

## Electrical Characteristics

### Operating Conditions

When Stratix® III devices are implemented in a system, they are rated according to a set of defined parameters. To maintain the highest possible performance and reliability of Stratix III devices, system designers must consider the operating requirements discussed in this chapter. Stratix III devices are offered in both commercial and industrial grades. Commercial devices are offered in -2 (fastest), -3, -4 and -4L speed grades. Industrial devices are offered only in -3, -4, and -4L speed grades.



In this chapter, a prefix associated with the operating temperature range is attached to the speed grades; commercial with “C” prefix and industrial with “I” prefix. Commercial devices are therefore indicated as C2, C3, C4, and C4L per respective speed grades. Industrial devices are indicated as I3, I4, and I4L.

### Absolute Maximum Ratings

Absolute maximum ratings define the maximum operating conditions for Stratix III devices. The values are based on experiments conducted with the device and theoretical modeling of breakdown and damage mechanisms. The functional operation of the device is not implied at these conditions. Conditions beyond those listed in [Table 1-1](#) may cause permanent damage to the device. Additionally, device operation at the absolute maximum ratings for extended periods may have adverse effects on the device.

**Table 1-1.** Stratix III Device Absolute Maximum Ratings *(Note 1)* (Part 1 of 2)

Symbol	Parameter	Minimum	Maximum	Unit
$V_{CCL}$	Selectable core voltage power supply	-0.5	1.65	V
$V_{CC}$	I/O registers power supply	-0.5	1.65	V
$V_{CCD\_PLL}$	PLL digital power supply	-0.5	1.65	V
$V_{CCA\_PLL}$	PLL analog power supply	-0.5	3.75	V
$V_{CCPT}$	Programmable power technology power supply	-0.5	3.75	V
$V_{CCPGM}$	Configuration pins power supply	-0.5	3.9	V
$V_{CCPD}$	I/O pre-driver power supply	-0.5	3.9	V
$V_{CCIO}$	I/O power supply	-0.5	3.9	V
$V_{CC\_CLKIN}$	Differential clock input power supply (top and bottom I/O banks only)	-0.5	3.75	V
$V_{CCBAT}$	Battery back-up power supply for design security volatile key register	-0.5	3.75	V
$V_I$	DC Input voltage	-0.5	4.0	V

**Table 1-1.** Stratix III Device Absolute Maximum Ratings (Note 1) (Part 2 of 2)

Symbol	Parameter	Minimum	Maximum	Unit
$T_J$	Operating junction temperature	-55	125	°C
$I_{OUT}$	DC output current, per pin	-25	40	mA
$T_{STG}$	Storage temperature (No bias)	-65	150	°C

**Note to Table 1-1:**

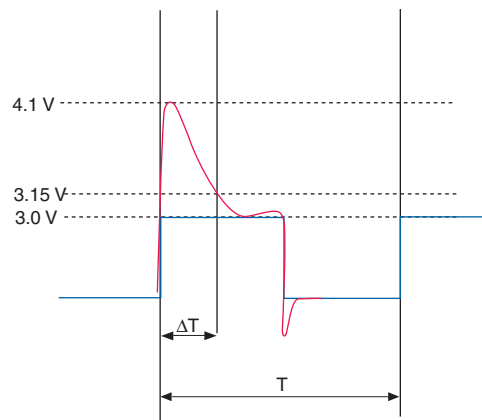
(1) Supply voltage specifications apply to voltage readings taken at the device pins, not the power supply.


**Maximum Allowed Overshoot/Undershoot Voltage**

During transitions, input signals may overshoot to the voltage shown in Table 1-2 and undershoot to -2.0 V for input currents less than 100 mA and periods shorter than 20 ns.

Table 1-2 lists the maximum allowed input overshoot voltage and the duration of the overshoot voltage as a percentage over the lifetime of the device. The maximum allowed overshoot duration is specified as percentage of high-time over the lifetime of the device.

A DC signal is equivalent to 100 % duty cycle. For example, a signal that overshoot to 4.2 V can only be at 4.2 V for 15.8 % over the lifetime of the device; for device lifetime of 10 years, this amounts to 15.8/10ths of a year. Figure 1-1 shows the way to determine the overshoot duration.

**Figure 1-1.** Overshoot Duration

 Figure 1-1 shows the methodology to determine the overshoot duration. In the example shown in Figure 1-1, the overshoot voltage is shown in red and is present at the Stratix III pin, up to 4.1 V. From Table 1-2, for an overshoot of up to 4.1 V, the percentage of high time for overshoot > 3.15 V can be as high as 46% over an 11.4-year period. The percentage of high time is calculated as  $(\Delta T/T) * 100$ . This 11.4-year period assumes the device is always turned on with 100% I/O toggle rate and 50% duty cycle signal. For lower I/O toggle rates and situations where the device is in an idle state, lifetimes are increased.

**Table 1-2.** Maximum Allowed Overshoot During Transitions

Symbol	Parameter	Condition	Overshoot duration as % of high time	Unit
Vi (AC)	AC Input Voltage (1)	4	100.000	%
		4.05	79.330	%
		4.1	46.270	%
		4.15	27.030	%
		4.2	15.800	%
		4.25	9.240	%
		4.3	5.410	%
		4.35	3.160	%
		4.4	1.850	%
		4.45	1.080	%
		4.5	0.630	%
		4.55	0.370	%
		4.6	0.220	%
		4.65	0.130	%
		4.7	0.074	%
		4.75	0.043	%
4.8	0.025	%		
4.85	0.015	%		

**Note to Table 1-2:**

(1) This input voltage is regardless of the  $V_{CCIO}$  supply which is used to power up the input buffer.

### Recommended Operating Conditions

This section lists the functional operation limits for AC and DC parameters for Stratix III devices. The steady-state voltage and current values expected from Stratix III devices are provided in Table 1-3. All supplies are required to monotonically reach their full-rail values within tRAMP. Maximum allowed ripple on power supplies is bounded by the minimum and maximum specifications listed in Table 1-3.

**Table 1-3.** Stratix III Device Recommended Operating Conditions (Part 1 of 2)

Symbol	Parameter	Conditions	Minimum	Typical	Maximum	Unit
$V_{CCL}$	Selectable core voltage power supply for internal logic and input buffers	—	1.05	1.1	1.15	V
	Selectable core voltage power supply for internal logic and input buffers	—	0.86	0.9	0.94	V
$V_{CC}$	I/O registers power supply	—	1.05	1.1	1.15	V
$V_{CCD\_PLL}$	PLL digital power supply	—	1.05	1.1	1.15	V
$V_{CCA\_PLL}$	PLL analog power supply	—	2.375	2.5	2.625	V
$V_{CCPT}$	Power supply for the programmable power technology	—	2.375	2.5	2.625	V

**Table 1-3.** Stratix III Device Recommended Operating Conditions (Part 2 of 2)

Symbol	Parameter	Conditions	Minimum	Typical	Maximum	Unit
$V_{CCPGM}$	Configuration pins power supply, 3.3 V	—	3.135	3.3	3.465	V
	Configuration pins power supply, 3.0 V	—	2.85	3	3.15	V
	Configuration pins power supply, 2.5 V	—	2.375	2.5	2.625	V
	Configuration pins power supply, 1.8 V	—	1.71	1.8	1.89	V
$V_{CCPD} (1)$	I/O pre-driver power supply, 3.3 V	—	3.135	3.3	3.465	V
	I/O pre-driver power supply, 3.0 V	—	2.85	3	3.15	V
	I/O pre-driver power supply, 2.5 V	—	2.375	2.5	2.625	V
$V_{CCIO}$	I/O power supply, 3.3 V	—	3.135	3.3	3.465	V
	I/O power supply, 3.0 V	—	2.85	3	3.15	V
	I/O power supply, 2.5 V	—	2.375	2.5	2.625	V
	I/O power supply, 1.8 V	—	1.71	1.8	1.89	V
	I/O power supply, 1.5 V	—	1.425	1.5	1.575	V
	I/O power supply, 1.2 V	—	1.14	1.2	1.26	V
$V_{CC\_CLKIN}$	Differential clock input power supply (top and bottom I/O banks only)	—	2.375	2.5	2.625	V
$V_{CCBAT}$	Battery back-up power supply for design security volatile key register	—	1.0	3.0	3.3	V
$V_I$	DC Input voltage	—	-0.3	—	3.6	V
$V_O$	Output voltage	—	0	—	VCCIO	V
$T_J$	Operating junction temperature	For commercial use	0	—	85	°C
		For industrial use(2)	-40	—	100	°C
$t_{RAMP}$	Power Supply Ramptime (For $V_{CCPT}$ )	Normal POR (PORSEL=0)	50 $\mu$ s	—	5 ms	—
		Fast POR (PORSEL=1)	50 $\mu$ s	—	5 ms	—
	Power Supply Ramptime (For all power supplies except $V_{CCPT}$ )	Normal POR (PORSEL=0)	50 $\mu$ s	—	100 ms	—
		Fast POR (PORSEL=1)	50 $\mu$ s	—	12 ms	—

**Notes to Table 1-3:**

- $V_{CCPD}$  is 2.5 V, 3.0 V, or 3.3 V. For a 3.3-V I/O standard,  $V_{CCPD}=3.3$  V. For a 3.0-V I/O standard,  $V_{CCPD} = 3.0$  V. For a 2.5 V or lower I/O standard,  $V_{CCPD} = 2.5$  V.
- For the EP3SL340, EP3SE260, and EP3SL200 devices in the I4L ordering code, the industrial junction temperature range is from 0° C to 100° C, regardless of supply voltage.

**DC Characteristics**

This section lists the input pin capacitances, on-chip termination tolerance, and hot-socketing specifications.

### Supply Current

Standby current is the current the device draws after the device is configured with no inputs/outputs toggling and no activity in the device. Since these currents vary largely with the resources used, use the Excel-based Early Power Estimator (EPE) to get supply current estimates for your design.

Table 1-4 lists supply current specifications for  $V_{CC\_CLKIN}$  and  $V_{CCPGM}$ . Use the EPE to get supply current estimates for remaining power supplies.

**Table 1-4.** Supply Current Specifications for  $V_{CC\_CLKIN}$  and  $V_{CCPGM}$

Symbol	Parameter	Min	Max	Unit
$I_{CLKIN}$	$V_{CC\_CLKIN}$ current specifications	0	250	mA
$I_{PGM}$	$V_{CCPGM}$ current specifications	0	250	mA

### I/O Pin Leakage Current

Table 1-5 defines Stratix III I/O Pin leakage current specifications.

**Table 1-5.** Stratix III I/O Pin Leakage Current (Note 1), (2)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_I$	Input Pin Leakage Current	$V_I = V_{CCIO\_MAX}$ to 0 V	-10	—	10	$\mu A$
$I_{OZ}$	Tri-stated I/O Pin Leakage Current	$V_O = V_{CCIO\_MAX}$ to 0 V	-10	—	10	$\mu A$

**Notes to Table 1-5:**

- (1) This value is specified for normal device operation. The value may vary during power-up. This applies for all  $V_{CCIO}$  settings (3.3, 3.0, 2.5, 1.8, 1.5, and 1.2 V).
- (2) 10- $\mu A$  I/O leakage current limit is applicable when the internal clamping diode is off. A higher current can be observed when the diode is on.

### Bus Hold Specifications

Table 1-7 shows the Stratix III device family bus hold specifications.

**Table 1-6.** Bus Hold Parameters

Parameter	Symbol	Conditions	$V_{CCIO}$										Unit
			1.2V		1.5V		1.8V		2.5V		3.0V/3.3V		
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
Low sustaining current	$I_{SUSL}$	$V_{IN} > V_{IL}$ (maximum)	22.5	—	25.0	—	30.0	—	50.0	—	70.0	—	$\mu A$
High sustaining current	$I_{SUSH}$	$V_{IN} < V_{IH}$ (minimum)	-22.5	—	-25.0	—	-30.0	—	-50.0	—	-70.0	—	$\mu A$
Low overdrive current	$I_{ODL}$	$0V < V_{IN} < V_{CCIO}$	—	120	—	160	—	200	—	300	—	500	$\mu A$
High overdrive current	$I_{ODH}$	$0V < V_{IN} < V_{CCIO}$	—	-120	—	-160	—	-200	—	-300	—	-500	$\mu A$
Bus-hold trip point	$V_{TRIP}$	—	0.45	0.95	0.50	1.00	0.68	1.07	0.70	1.70	0.80	2.00	V

**On-Chip Termination (OCT) Specifications**

If OCT calibration is enabled, calibration is automatically performed at power-up for I/Os connected to the calibration block. Table 1-7 lists the Stratix III OCT calibration block accuracy specifications.

**Table 1-7.** Stratix III On-Chip Termination Calibration Accuracy Specifications (Note 1), (2)

Symbol	Description	Conditions	Calibration Accuracy			Unit
			C2	C3, I3	C4, I4	
25-Ω R <sub>S</sub> 3.3/3.0/2.5/1.8/1.5/1.2	Internal series termination with calibration (25-Ω setting)	V <sub>CCIO</sub> = 3.3/3.0/2.5/1.8/1.5/1.2 V	±8	±8	±8	%
50-Ω R <sub>S</sub> 3.3/3.0/2.5/1.8/1.5/1.2	Internal series termination with calibration (50-Ω setting)	V <sub>CCIO</sub> = 3.3/3.0/2.5/1.8/1.5/1.2 V	±8	±8	±8	%
50-Ω R <sub>T</sub> 2.5/1.8/1.5/1.2	Internal parallel termination with calibration (50-Ω setting)	V <sub>CCIO</sub> = 2.5/1.8/1.5/1.2 V	±10	±10	±10	%

**Notes to Table 1-7:**

- (1) OCT calibration accuracy is valid at the time of calibration only.
- (2) The calibration accuracy stated in the table apply to both commercial and industrial grade.

The accuracy listed in Table 1-7 is valid at the time of calibration. If the voltage or temperature changes, the termination resistance value varies. Table 1-8 lists the resistance tolerance for Stratix III on chip termination.

**Table 1-8.** Stratix III On-Chip Termination Resistance Tolerance Specification for I/Os (Note 1) (Part 1 of 2)

Symbol	Description	Conditions	Resistance Tolerance			Unit
			C2	C3, I3	C4, I4	
R <sub>OCT_UNCAL</sub>	Internal series termination without calibration	—				
25-Ω RS 3.3/3.0/2.5	Internal series termination without calibration (25-Ω setting)	V <sub>CCIO</sub> = 3.3/3.0/2.5 V	±30	±40	±40	%
25-Ω RS 1.8/1.5	Internal series termination without calibration (25-Ω setting)	V <sub>CCIO</sub> = 1.8/1.5 V	±30	±50	±50	%
25-Ω RS 1.2	Internal series termination without calibration (25-Ω setting)	V <sub>CCIO</sub> = 1.2 V	±35	±60	±60	%
50-Ω RS 3.3/3.0/2.5	Internal series termination without calibration (50-Ω setting)	V <sub>CCIO</sub> = 3.3/3.0/2.5 V	±30	±40	±40	%
50-Ω RS 1.8/1.5	Internal series termination without calibration (50-Ω setting)	V <sub>CCIO</sub> = 1.8/1.5 V	±30	±50	±50	%

**Table 1-8.** Stratix III On-Chip Termination Resistance Tolerance Specification for I/Os (Note 1) (Part 2 of 2)

Symbol	Description	Conditions	Resistance Tolerance			Unit
			C2	C3, I3	C4, I4	
50-Ω RS 1.2	Internal series termination without calibration (50-Ω setting)	V <sub>CCIO</sub> = 1.2 V	±35	±60	±60	%
R <sub>OCT_CAL</sub>	Internal series termination with calibration	(2)				
R <sub>D</sub>	Internal differential termination for LVDS technology (1000-Ω setting)	V <sub>CCIO</sub> = 2.5 V	-15 to 35			%

**Notes to Table 1-8:**

- (1) The calibration accuracy stated in the table applies to both commercial and industrial grade.
- (2) For resistance tolerance after power-up calibration, refer to Equation 1-1 and Table 1-9.

Table 1-9 lists OCT variation with temperature and voltage after power-up calibration. Use Table 1-9 and Equation 1-1 to determine OCT variation without re-calibration.

**Equation 1-1.** OCT Variation Without Re-Calibration (Note 1)

$$R_{OCT} = R_{CAL} \left( 1 + \frac{dR}{dT} \times \Delta T + \frac{dR}{dV} \times \Delta V \right)$$

**Note to Equation 1-1:**

- (1) R<sub>CAL</sub> is calibrated on chip termination at power-up. ΔT and ΔV are variations in temperature and voltage w.r.t temperature and V<sub>CCIO</sub> values respectively, at power-up.

**Table 1-9.** On-Chip Termination Variation after Power-up Calibration (Note 1)

Symbol	Description	V <sub>CCIO</sub> (V)	Commercial Typical	Unit
dR/dV	OCT variation with voltage without re-calibration	3	0.029	%/mV
		2.5	0.036	%/mV
		1.8	0.033	%/mV
		1.5	0.033	%/mV
		1.2	0.033	%/mV
dR/dT	OCT variation with temperature without re-calibration	3	0.294	%/°C
		2.5	0.301	%/°C
		1.8	0.355	%/°C
		1.5	0.344	%/°C
		1.2	0.348	%/°C

**Note to Table 1-9:**

- (1) Valid for V<sub>CCIO</sub> range of +/- 5% and temperature range of 0° to 85° C.

**Pin Capacitance**

Table 1-10 shows the Stratix III device family pin capacitance.

**Table 1–10.** Stratix III Device Capacitance

Symbol	Parameter	Typical	Unit
$C_{IOTB}$	Input capacitance on top/bottom I/O pins	4	pF
$C_{IOLR}$	Input capacitance on left/right I/O pins	4	pF
$C_{CLKTB}$	Input capacitance on top/bottom non-dedicated clock input pins	4	pF
$C_{CLKLR}$	Input capacitance on left/right non-dedicated clock input pins	4	pF
$C_{OUTFB}$	Input capacitance on dual-purpose clock output/feedback pins	5	pF
$C_{CLK1}$ , $C_{CLK3}$ , $C_{CLK8}$ , and $C_{CLK10}$	Input capacitance for dedicated clock input pins	2	pF

### Hot-Socketing

Table 1–11 lists the hot-socketing specifications for Stratix III devices.

**Table 1–11.** Stratix III Hot-Socketing Specifications

Symbol	Parameter	Maximum
$I_{IOPIN}(DC)$	DC current per I/O pin	300 $\mu$ A
$I_{IOPIN}(AC)$	AC current per I/O pin	8 mA for $\leq 10$ ns

### Internal Weak Pull-Up Resistor

Table 1–12 lists the weak pull-up resistor values for Stratix III devices.

**Table 1–12.** Stratix III Internal Weak Pull-Up Resistor (Note 1), (3)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{PU}$	Value of I/O pin pull-up resistor before and during configuration, as well as user mode if the programmable pull-up resistor option is enabled	$V_{CCIO} = 3.3 \text{ V} \pm 5\%$ (2)	—	25	—	k $\Omega$
		$V_{CCIO} = 3.0 \text{ V} \pm 5\%$ (2)	—	25	—	k $\Omega$
		$V_{CCIO} = 2.5 \text{ V} \pm 5\%$ (2)	—	25	—	k $\Omega$
		$V_{CCIO} = 1.8 \text{ V} \pm 5\%$ (2)	—	25	—	k $\Omega$
		$V_{CCIO} = 1.5 \text{ V} \pm 5\%$ (2)	—	25	—	k $\Omega$
		$V_{CCIO} = 1.2 \text{ V} \pm 5\%$ (2)	—	25	—	k $\Omega$

**Notes to Table 1–12:**

- (1) All I/O pins have an option to enable weak pull-up except configuration, test, and JTAG pin.
- (2) Pin pull-up resistance values may be lower if an external source drives the pin higher than  $V_{CCIO}$ .
- (3) The internal weak pull-down feature is only available for JTAG TCK pin. The typical value for this internal weak pull-down resistor is around 25k  $\Omega$ .

### I/O Standard Specifications

The following tables list input voltage sensitivities ( $V_{IH}$  and  $V_{IL}$ ), output voltage ( $V_{OH}$  and  $V_{OL}$ ), and current drive characteristics ( $I_{OH}$  and  $I_{OL}$ ) for all I/O standards supported by Stratix III devices. Table 1–13 through Table 1–18 show the Stratix III device family I/O standard specifications. Refer to “Glossary” for explanation of terms used in the Table 1–14 through Table 1–18.  $V_{OL}$  and  $V_{OH}$  values are valid at the corresponding  $I_{OL}$  and  $I_{OH}$ , respectively.



**Table 1-13.** Single-Ended I/O Standards Specifications

I/O Standard	$V_{CCIO}$ (V)			$V_{IL}$ (V)		$V_{IH}$ (V)		$V_{OL}$ (V)	$V_{OH}$ (V)	IOL (mA)	IOH (mA)
	Min	Typ	Max	Min	Max	Min	Max	Max	Min		
3.3-V LVTTTL	3.135	3.3	3.465	-0.3	0.8	1.7	3.6	0.4	2.4	2	-2
3.0-V LVTTTL	2.85	3	3.15	-0.3	0.8	1.7	3.6	0.4	2.4	2	-2
3.3-V LVCMOS	3.135	3.3	3.465	-0.3	0.8	1.7	3.6	0.2	$V_{CCIO} - 0.2$	0.1	-0.1
3.0-V LVCMOS	2.85	3	3.15	-0.3	0.8	1.7	3.6	0.2	$V_{CCIO} - 0.2$	0.1	-0.1
2.5-V LVTTTL/ LVCMOS	2.375	2.5	2.625	-0.3	0.7	1.7	3.6	0.2	2.1	0.1	-0.1
		2.5	2.625	-0.3	0.7	1.7	3.6	0.4	2	1	-1
		2.5	2.625	-0.3	0.7	1.7	3.6	0.7	1.7	2	-2
1.8-V LVTTTL / LVCMOS	1.71	1.8	1.89	-0.3	$0.35 * V_{CCIO}$	$0.65 * V_{CCIO}$	$V_{CCIO} + 0.3$	0.45	$V_{CCIO} - 0.45$	2	-2
1.5-V LVTTTL/ LVCMOS	1.425	1.5	1.575	-0.3	$0.35 * V_{CCIO}$	$0.65 * V_{CCIO}$	$V_{CCIO} + 0.3$	$0.25 * V_{CCIO}$	$0.75 * V_{CCIO}$	2	-2
1.2-V LVTTTL / LVCMOS	1.14	1.2	1.26	-0.3	$0.35 * V_{CCIO}$	$0.65 * V_{CCIO}$	$V_{CCIO} + 0.3$	$0.25 * V_{CCIO}$	$0.75 * V_{CCIO}$	2	-2
3.0-V PCI	2.85	3	3.15	—	$0.3 * V_{CCIO}$	$0.5 * V_{CCIO}$	3.6	$0.1 * V_{CCIO}$	$0.9 * V_{CCIO}$	1.5	-0.5
3.0-V PCI-X	2.85	3	3.15	—	$0.35 * V_{CCIO}$	$0.5 * V_{CCIO}$	—	$0.1 * V_{CCIO}$	$0.9 * V_{CCIO}$	1.5	-0.5

Refer to the figure in “Single-Ended Voltage Referenced I/O Standard” in the “Glossary” for voltage referenced receiver input waveform and explanation of terms used in Table 1-14.

**Table 1-14.** Single-Ended SSTL and HSTL I/O Reference Voltage Specifications

I/O Standard	$V_{CCIO}$ (V)			$V_{REF}$ (V)			$V_{TT}$ (V)		
	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max
SSTL-2 CLASS I, II	2.375	2.5	2.625	$0.49 * V_{CCIO}$	$0.5 * V_{CCIO}$	$0.51 * V_{CCIO}$	$V_{REF} - 0.04$	$V_{REF}$	$V_{REF} + 0.04$
SSTL-18 CLASS I, II	1.71	1.8	1.89	0.833	0.9	0.969	$V_{REF} - 0.04$	$V_{REF}$	$V_{REF} + 0.04$
SSTL-15 CLASS I, II	1.425	1.5	1.575	$0.47 * V_{CCIO}$	$0.5 * V_{CCIO}$	$0.53 * V_{CCIO}$	$0.47 * V_{CCIO}$	$V_{REF}$	$0.53 * V_{CCIO}$
HSTL-18 CLASS I, II	1.71	1.8	1.89	0.85	0.9	0.95	—	$V_{CCIO}/2$	—
HSTL-15 CLASS I, II	1.425	1.5	1.575	0.68	0.75	0.9	—	$V_{CCIO}/2$	—
HSTL-12 CLASS I, II	1.14	1.2	1.26	$0.47 * V_{CCIO}$	$0.5 * V_{CCIO}$	$0.53 * V_{CCIO}$	—	$V_{CCIO}/2$	—

**Table 1-15.** Single-Ended SSTL and HSTL I/O Standards Signal Specifications (Note 1) (Part 1 of 2)

I/O Standard	$V_{IL(DC)}$ (V)		$V_{IH(DC)}$ (V)		$V_{IL(AC)}$ (V)	$V_{IH(AC)}$ (V)	$V_{OL}$ (V)	$V_{OH}$ (V)	IOL (mA)	IOH (mA)
	Min	Max	Min	Max	Max	Min	Max	Min		
SSTL-2 CLASS I	-0.3	$V_{REF} - 0.15$	$V_{REF} + 0.15$	$V_{CCIO} + 0.3$	$V_{REF} - 0.31$	$V_{REF} + 0.31$	$V_{TT} - 0.57$	$V_{TT} + 0.57$	8.1	-8.1
SSTL-2 CLASS II	-0.3	$V_{REF} - 0.15$	$V_{REF} + 0.15$	$V_{CCIO} + 0.3$	$V_{REF} - 0.31$	$V_{REF} + 0.31$	$V_{TT} - 0.76$	$V_{TT} + 0.76$	16.2	-16.2

**Table 1-15.** Single-Ended SSTL and HSTL I/O Standards Signal Specifications (*Note 1*) (Part 2 of 2)

I/O Standard	$V_{IL(DC)} (V)$		$V_{IH(DC)} (V)$		$V_{IL(AC)} (V)$	$V_{IH(AC)} (V)$	$V_{OL} (V)$	$V_{OH} (V)$	IOL (mA)	IOH (mA)
	Min	Max	Min	Max	Max	Min	Max	Min		
SSTL-18 CLASS I	-0.3	$V_{REF} - 0.125$	$V_{REF} + 0.125$	$V_{CCIO} + 0.3$	$V_{REF} - 0.25$	$V_{REF} + 0.25$	$V_{TT} - 0.475$	$V_{TT} + 0.475$	6.7	-6.7
SSTL-18 CLASS II	-0.3	$V_{REF} - 0.125$	$V_{REF} + 0.125$	$V_{CCIO} + 0.3$	$V_{REF} - 0.25$	$V_{REF} + 0.25$	0.28	$V_{CCIO} - 0.28$	13.4	-13.4
SSTL-15 CLASS I	-0.3	$V_{REF} - 0.1$	$V_{REF} + 0.1$	$V_{CCIO} + 0.3$	$V_{REF} - 0.175$	$V_{REF} + 0.175$	$0.2 * V_{CCIO}$	$0.8 * V_{CCIO}$	8	-8
SSTL-15 CLASS II	-0.3	$V_{REF} - 0.1$	$V_{REF} + 0.1$	$V_{CCIO} + 0.3$	$V_{REF} - 0.175$	$V_{REF} + 0.175$	$0.2 * V_{CCIO}$	$0.8 * V_{CCIO}$	16	-16
HSTL-18 CLASS I	-0.3	$V_{REF} - 0.1$	$V_{REF} + 0.1$	$V_{CCIO} + 0.3$	$V_{REF} - 0.2$	$V_{REF} + 0.2$	0.4	$V_{CCIO} - 0.4$	8	-8
HSTL-18 CLASS II	-0.3	$V_{REF} - 0.1$	$V_{REF} + 0.1$	$V_{CCIO} + 0.3$	$V_{REF} - 0.2$	$V_{REF} + 0.2$	0.4	$V_{CCIO} - 0.4$	16	-16
HSTL-15 CLASS I	-0.3	$V_{REF} - 0.1$	$V_{REF} + 0.1$	$V_{CCIO} + 0.3$	$V_{REF} - 0.2$	$V_{REF} + 0.2$	0.4	$V_{CCIO} - 0.4$	8	-8
HSTL-15 CLASS II	-0.3	$V_{REF} - 0.1$	$V_{REF} + 0.1$	$V_{CCIO} + 0.3$	$V_{REF} - 0.2$	$V_{REF} + 0.2$	0.4	$V_{CCIO} - 0.4$	16	-16
HSTL-12 CLASS I	-0.15	$V_{REF} - 0.08$	$V_{REF} + 0.08$	$V_{CCIO} + 0.15$	$V_{REF} - 0.15$	$V_{REF} + 0.15$	$0.25 * V_{CCIO}$	$0.75 * V_{CCIO}$	8	-8
HSTL-12 CLASS II	-0.15	$V_{REF} - 0.08$	$V_{REF} + 0.08$	$V_{CCIO} + 0.15$	$V_{REF} - 0.15$	$V_{REF} + 0.15$	$0.25 * V_{CCIO}$	$0.75 * V_{CCIO}$	16	-16

**Note to Table 1-15:**

- (1) Use current strength settings that are equal or larger than the  $I_{OL}/I_{OH}$  values listed to meet the  $V_{OL}/V_{OH}$  specifications for each line. OCT or lower current strengths may provide better signal integrity and lower power.

Refer to the figures for “Differential I/O Standards” in “Glossary” for receiver input and transmitter output waveforms, and for all differential I/O standards (LVDS, mini-LVDS, RSDS).  $V_{CC\_CLKIN}$  is the power supply for differential column clock input pins.  $V_{CCPD}$  is the power supply for row I/Os and all other column I/Os.

**Table 1-16.** Differential SSTL I/O Standard Specifications

I/O Standard	$V_{CCIO} (V)$			$V_{SWING(DC)} (V)$		$V_{X(AC)} (V)$			$V_{SWING(AC)} (V)$		$V_{OX(AC)} (V)$		
	Min	Typ	Max	Min	Max	Min	Typ	Max	Min	Max	Min	Typ	Max
SSTL-2 CLASS I, II	2.375	2.5	2.625	0.3	$V_{CCIO} + 0.6$	$V_{CCIO}/2 - 0.2$	—	$V_{CCIO}/2 + 0.2$	0.62	$V_{CCIO} + 0.6$	$V_{CCIO}/2 - 0.15$	—	$V_{CCIO}/2 + 0.15$
SSTL-18 CLASS I, II	1.71	1.8	1.89	0.25	$V_{CCIO} + 0.6$	$V_{CCIO}/2 - 0.175$	—	$V_{CCIO}/2 + 0.175$	0.5	$V_{CCIO} + 0.6$	$V_{CCIO}/2 - 0.125$	—	$V_{CCIO}/2 + 0.125$
SSTL-15 CLASS I, II	1.425	1.5	1.575	0.2	—	—	$V_{CCIO}/2$	—	0.35	—	—	$V_{CCIO}/2$	—

**Table 1-17.** Differential HSTL I/O Standards Specifications

I/O Standard	$V_{CCIO}$ (V)			$V_{DIF(DC)}$ (V)		$V_{X(AC)}$ (V)			$V_{CM(DC)}$ (V)			$V_{DIF(AC)}$ (V)	
	Min	Typ	Max	Min	Max	Min	Typ	Max	Min	Typ	Max	Min	Max
HSTL-18 CLASS I, II	1.71	1.8	1.89	0.2	—	0.78	—	1.12	0.78	—	1.12	0.4	—
HSTL-15 CLASS I, II	1.425	1.5	1.575	0.2	—	0.68	—	0.9	0.68	—	0.9	0.4	—
HSTL-12 CLASS I, II	1.14	1.2	1.26	0.16	$V_{CCIO}$ + 0.3	—	$0.5 * V_{CCIO}$	—	$0.4 * V_{CCIO}$	$0.5 * V_{CCIO}$	$0.6 * V_{CCIO}$	0.3	$V_{CCIO}$ + 0.48

**Table 1-18.** Differential I/O Standard Specifications

I/O Standard	$V_{CCIO}$ (V)			$V_{ID}$ (mV)(1)			$V_{ICM(DC)}$ (V)			$V_{OD}$ (V) (2)			$V_{OCM}$ (V) (2)		
	Min	Typ	Max	Min	Condition	Max	Min	Condition	Max	Min	Typ	Max	Min	Typ	Max
2.5 V LVDS (Row I/O)	2.375	2.5	2.625	100	$V_{CM} = 1.25$ V	—	0.05 (6)	$D_{max} \leq 700$ Mbps	1.8 (6)	0.247	—	0.6	1.125	1.25	1.375
	2.375	2.5	2.625	100	$V_{CM} = 1.25$ V	—	1.05 (6)	$D_{max} > 700$ Mbps	1.55 (6)	0.247	—	0.6	1.125	1.25	1.375
2.5 V LVDS (Column I/O)	2.375	2.5	2.625	100	$V_{CM} = 1.25$ V	—	0.05 (6)	$D_{max} \leq 700$ Mbps	1.8 (6)	0.247	—	0.6	1.0	1.25	1.5
	2.375	2.5	2.625	100	$V_{CM} = 1.25$ V	—	1.05 (6)	$D_{max} > 700$ Mbps	1.55 (6)	0.247	—	0.6	1.0	1.25	1.5
RSDS (Row I/O)	2.375	2.5	2.625	100	$V_{CM} = 1.25$ V	—	0.3	—	1.4	0.1	0.2	0.6	0.5	1.2	1.4
RSDS (Column I/O)	2.375	2.5	2.625	100	$V_{CM} = 1.25$ V	—	0.3	—	1.4	0.1	0.2	0.6	0.5	1.2	1.5
Mini-LVDS (Row I/O)	2.375	2.5	2.625	200	—	600	0.4	—	1.325	0.25	—	0.6	0.5	1.2	1.4
Mini-LVDS (Column I/O)	2.375	2.5	2.625	200	—	600	0.4	—	1.325	0.25	—	0.6	0.5	1.2	1.5
LVPECL (3)	2.375 (5)	2.5 (5)	2.625 (5)	300	—	—	0.6	$D_{max} \leq 700$ Mbps	1.8 (4)	—	—	—	—	—	—
	2.375 (5)	2.5 (5)	2.625 (5)	300	—	—	1.0	$D_{max} > 700$ Mbps	1.6 (4)	—	—	—	—	—	—

**Notes to Table 1-18:**


- (1) The minimum  $V_{ID}$  value is applicable over the entire common mode range,  $V_{CM}$ .
- (2) RL range:  $90 \leq RL \leq 110 \Omega$ .
- (3) Column and row I/O banks support LVPECL I/O standards for input operation only on dedicated clock input pins. Differential clock inputs in column I/O use  $V_{CC\_CLKIN}$  which should be powered by 2.5 V. Differential clock inputs in row I/O are powered by  $V_{CCPD}$ .
- (4) For data rate  $D_{max} > 700$  Mbps, the minimum input voltage is 0.85 V, the maximum input voltage is 1.75 V.  
For data rate  $D_{max} \leq 700$  Mbps, the minimum input voltage is 0.45 V, the maximum input voltage is 1.95 V.
- (5) Power supply for column I/O LVPECL differential clock input buffer is  $V_{CC\_CLKIN}$ .
- (6) For data rate:  $D_{max} > 700$  Mbps, the minimum input voltage is 1.0 V, the maximum input voltage is 1.6 V.  
For  $D_{max} \leq 700$  Mbps, the minimum input voltage is 0 V, the maximum input voltage is 1.85 V.

## Power Consumption

Altera offers two ways to estimate power for a design: the Excel-based Early Power Estimator and the Quartus® II **PowerPlay Power Analyzer** feature.

The interactive Excel-based Early Power Estimator is typically used prior to designing the FPGA in order to get a magnitude estimate of the device power. The Quartus II **PowerPlay Power Analyzer** provides better quality estimates based on the specifics of the design after the place-and-route is complete. The **PowerPlay Power Analyzer** can apply a combination of user-entered, simulation-derived and estimated signal activities which, combined with detailed circuit models, can yield very accurate power estimates.

See [Table 1-4](#) for supply current estimates for  $V_{CCPGM}$  and  $V_{CCCLKIN}$ . Use the EPE and PowerPlay Power Analyzer for current estimates of remaining power supplies.

 For more information about power estimation tools, refer to the *PowerPlay Early Power Estimator User Guide For Stratix III FPGAs* and the *PowerPlay Power Analysis* chapter in the *Quartus II Handbook*.

## Switching Characteristics

This section provides performance characteristics of Stratix III core and periphery blocks for commercial grade devices.

These characteristics can be designated as **Preliminary** and **Final** and each designation is defined below.

### Preliminary

Preliminary characteristics are created using simulation results, process data, and other known parameters.

### Final

Final numbers are based on actual silicon characterization and testing. These numbers reflect the actual performance of the device under worst-case silicon process, voltage, and junction temperature conditions. The upper-right hand corner of a table shows the designation as **Preliminary** or **Final**.

## Core Performance Specifications

These sections describe the Clock Tree, PLL, DSP, TriMatrix, and Configuration and JTAG Specifications.

### Clock Tree Specifications

[Table 1-19](#) lists the clock tree performance specifications for the logic array, DSP blocks, and TriMatrix Memory blocks for Stratix III devices.

**Table 1–19.** Stratix III Clock Tree Performance

Device	C2	C3, I3	C4, I4	C4L, I4L		Unit
	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
EP3SL50	600	500	450	450	375	MHz
EP3SL70	600	500	450	450	375	MHz
EP3SL110	600	500	450	450	375	MHz
EP3SL150	600	500	450	450	375	MHz
EP3SL200	600	500	450	450	375	MHz
EP3SE260	600	500	450	450	375	MHz
EP3SL340	600	500	450	450	375	MHz
EP3SE50	600	500	450	450	375	MHz
EP3SE80	600	500	450	450	375	MHz
EP3SE110	600	500	450	450	375	MHz

### PLL Specifications

Table 1–20 describes the Stratix III PLL specifications when operating in both the commercial junction temperature range (0 to 85° C) and the industrial junction temperature range (-40 to 100° C), except for EP3SL340, EP3SE260, and EP3SL200 devices in the I4L ordering code, where the industrial junction temperature range is from 0° C to 100° C, regardless of supply voltage. Refer to the figure in “PLL Specifications” in “Glossary” for PLL block diagram.

**Table 1–20.** Stratix III PLL Specifications (Part 1 of 2)

Symbol	Parameter	Min	Typ	Max	Unit
f <sub>IN</sub>	Input clock frequency	5	—	717 (1)	MHz
f <sub>INPFD</sub>	Input frequency to the PFD	5	—	325	MHz
f <sub>VCO</sub>	PLL VCO operating range (C2 Speed Grade)	600	—	1,600	MHz
	PLL VCO operating range (C3, I3 Speed Grade)	600	—	1,300	MHz
	PLL VCO operating range (C4, I4 Speed Grade)	600	—	1,300	MHz
t <sub>INDUTY</sub>	Input clock or external feedback clock input duty cycle	40	—	60	%
f <sub>OUT</sub>	Output frequency for internal global or regional clock	—	—	717 (2)	MHz
f <sub>OUT_EXT</sub>	Output frequency for external clock input	—	—	717 (2)	MHz
t <sub>OUTDUTY</sub>	Duty cycle for external clock output (when set to 50%)	45	50	55	%
t <sub>FCOMP</sub>	External feedback clock compensation time	—	—	10	ns
t <sub>CONFIGPLL</sub>	Time required to reconfigure scan chain	—	3.5	—	scanclk cycles
t <sub>CONFIGPHASE</sub>	Time required to reconfigure phase shift	—	1	—	scanclk cycles
f <sub>SCANCLK</sub>	scanclk frequency	—	—	100	MHz
t <sub>LOCK</sub>	Time required to lock from end of device configuration	—	—	1	ms
t <sub>DLOCK</sub>	Time required to lock dynamically (after switchover or reconfiguring any non-post-scale counters/delays)	—	—	1	ms

**Table 1-20.** Stratix III PLL Specifications (Part 2 of 2)

Symbol	Parameter	Min	Typ	Max	Unit
$f_{CLBW}$	PLL closed-loop low bandwidth	—	0.3	—	MHz
	PLL closed-loop medium bandwidth	—	1.5	—	MHz
	PLL closed-loop high bandwidth (5)	—	4	—	MHz
$t_{PLL\_PSERR}$	Accuracy of PLL phase shift	—	—	±50	ps
$t_{ARESET}$	Minimum pulse width on aretsignal	10	—	—	ns
$t_{INCCJ}$ (3)	Input clock cycle to cycle jitter ( $F_{REF} \geq 100$ MHz)	—	—	0.15	UI (p-p)
	Input clock cycle to cycle jitter ( $F_{REF} < 100$ MHz)	—	—	±750	ps(p-p)
$t_{OUTPJ\_DC}$ (4)	Period Jitter for dedicated clock output ( $F_{OUT} \geq 100$ MHz)	—	—	175	ps (p-p)
	Period Jitter for dedicated clock output ( $F_{OUT} < 100$ MHz)	—	—	17.5	mUI (p-p)
$t_{OUTCCJ\_DC}$ (4)	Cycle to Cycle Jitter for dedicated clock output ( $F_{OUT} \geq 100$ MHz)	—	—	175	ps (p-p)
	Cycle to Cycle Jitter for dedicated clock output ( $F_{OUT} < 100$ MHz)	—	—	17.5	mUI (p-p)
$t_{OUTPJ\_IO}$ (4)	Period Jitter for clock output on regular IO ( $F_{OUT} \geq 100$ MHz)	—	—	600	ps (p-p)
	Period Jitter for clock output on regular IO ( $F_{OUT} < 100$ MHz)	—	—	60	mUI (p-p)
$t_{OUTCCJ\_IO}$ (4)	Cycle to Cycle Jitter for clock output on regular IO ( $F_{OUT} \geq 100$ MHz)	—	—	600	ps (p-p)
	Cycle to Cycle Jitter for clock output on regular IO ( $F_{OUT} < 100$ MHz)	—	—	60	mUI (p-p)
$f_{DRIFT}$	Frequency drift after $\overline{PFDEN A}$ is disabled for duration of 100 $\mu$ s	—	—	±10	%

**Notes to Table 1-20:**

- (1) This specification is limited in Quartus II software by the I/O maximum frequency. The maximum I/O frequency is different for each I/O standard.
- (2) This specification is limited by the lower of the two: I/O  $f_{max}$  or  $f_{out}$  of the PLL.
- (3) A high input jitter will directly affect the PLL output jitter. To have low PLL output clock jitter, you need to provide a clean clock source, which is less than 200 ps.
- (4) Peak-to-peak jitter with a probability level of  $10^{-12}$  (14 sigma, 99.9999999974404 % confidence level). The output jitter specification applies to the intrinsic jitter of the PLL, when an input jitter of 30 ps is applied.
- (5) High bandwidth PLL settings are not supported in external feedback mode.

**DSP Block Specifications**

Table 1-21 describes the Stratix III DSP block performance specifications.

**Table 1-21.** Stratix III DSP Block Performance Specifications (Note 1) (Part 1 of 2)

Mode	Number of Multipliers	C2	C3	C4	C4L		I3	I4L	Unit
		$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	$V_{CCL} = 1.1V$	$V_{CCL} = 0.9V$	
9×9-bit multiplier (a, c, e, g) (2)	1	440	365	315	315	240	345	225	MHz
9×9-bit multiplier (b, d, f, h) (2)	1	500	410	375	375	270	385	250	MHz
12×12-bit multiplier(a, e) (3)	1	440	365	315	315	240	345	225	MHz
12×12-bit multiplier(b, d, f, h) (3)	1	500	410	375	375	270	385	250	MHz
18×18-bit multiplier	1	600	495	440	440	320	470	300	MHz
36×36-bit multiplier	1	440	365	315	315	220	345	205	MHz
Double mode	1	440	365	315	315	220	345	205	MHz

**Table 1-21.** Stratix III DSP Block Performance Specifications (*Note 1*) (Part 2 of 2)

Mode	Number of Multipliers	C2	C3	C4	C4L		I3	I4L	Unit
		V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
18×18-bit multiply adder	2	490	405	345	345	250	380	235	MHz
18×18-bit multiply adder	4	490	405	345	345	250	380	235	MHz
18×18-bit multiply adder with loop back	2	490	405	345	345	250	380	235	MHz
18×18-bit multiply adder with loop back (4)	2	390	320	300	240	180	300	135	MHz
18×18-bit multiply accumulator	4	475	390	330	330	240	370	225	MHz
18×18-bit multiply adder with chainout	4	475	390	330	330	240	370	225	MHz
Input Cascade Independent output of four 18×18 bit multiplier	4	550	455	415	415	270	430	250	MHz
36-bit shift (32 bit data)	1	475	390	330	330	250	370	235	MHz

**Notes to Table 1-21:**

- (1) Maximum is for fully pipelined block with **Round** and **Saturation** disabled.
- (2) The DSP block implements 8 independent 9b × 9b multiplies using a, b, c, d for top DSP half block and e, f, g, h for bottom DSP half block multipliers.
- (3) The DSP block implements 6 independent 12b × 12b multiplies using a, b, d for top DSP half block and e, f, h for bottom DSP half block multipliers.
- (4) Maximum for loopback input registers disabled, **Round** and **Saturation** disabled, pipeline and output registers enabled.

## TriMatrix Memory Block Specifications

Table 1-22 describes the Stratix III TriMatrix Memory Block specifications.

**Table 1-22.** Stratix III TriMatrix Memory Block Performance Specifications (Note 1) (Part 1 of 3) - Preliminary

Memory Block Type	Mode	ALUTs	TriMatrix Memory	C2	C3	C4	C4L		I3	I4L	Unit
				V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
MLAB	Single port 16 × 10	0	1	600	500	450	450	340	475	320	MHz
	Simple dual-port 16 × 20, single clock	0	1	600	500	450	450	340	475	320	MHz
	ROM 64 × 10	0	1	600	500	450	450	370	475	350	MHz
	ROM 32 × 20	0	1	600	500	450	450	340	475	320	MHz
M9K (2)	Single-port 8K × 1	0	1	550	465	390	390	245	440	230	MHz
	Single-port 4K × 2 or 2K × 4	0	1	575	485	405	405	255	460	230	MHz
	Single-port 1K × 9, 512 × 18, or 256 × 36	0	1	565	475	395	395	245	450	220	MHz
	Simple dual-port, 8K × 1, single clock	0	1	545	460	385	385	240	435	225	MHz
	Simple dual-port, 4K × 2 or 2K × 4, single clock	0	1	570	480	400	400	250	455	225	MHz
	Simple dual-port, 1K × 9, 512 × 18, or 256 × 36, single clock	0	1	565	475	395	395	245	450	220	MHz
	Simple dual-port, 8K × 1, 4K × 2 or 2K × 4, single clock with read-during-write option set to "Old Data"	0	1	375	312	265	265	205	295	185	MHz
	Simple dual-port, 1K × 9, 512 × 18, 256 × 36 single clock with read-during-write option set to "Old Data"	0	1	375	312	265	265	200	295	180	MHz
	True dual-port, 8K × 1 single clock	0	1	530	440	370	370	230	420	215	MHz
	True dual-port, 4K × 2 or 2K × 4 single clock	0	1	550	460	385	385	240	435	215	MHz
	True dual-port, 1K × 9 or 512 × 18 single clock	0	1	545	460	380	380	235	435	210	MHz
	True dual-port, 8K × 1, 4K × 2, or 2K × 4, single clock with read-during-write option set to "Old Data"	0	1	350	295	245	245	175	280	160	MHz
	True dual-port, 1K × 9 or 512 × 18, single clock with read-during-write option set to "Old Data"	0	1	340	285	240	240	165	270	150	MHz
	ROM 1P, 8K × 1, 4K × 2, or 2K × 4	0	1	580	485	405	405	260	460	235	MHz
	ROM 1P, 1K × 9, 512 × 18, or 256 × 36	0	1	575	485	405	405	255	460	230	MHz
	ROM 2P, 8K × 1, 4K × 2, or 2K × 4	0	1	580	485	405	405	265	460	240	MHz
	ROM 2P, 1K × 9, or 512 × 18	0	1	575	485	405	405	260	460	235	MHz
	Min Pulse Width (Clock High Time)	—	—	800	1000	1100	1100	1800	1000	1800	ps
	Min Pulse Width (Clock Low Time)	—	—	500	625	690	690	1100	625	1100	ps



**Table 1-22.** Stratix III TriMatrix Memory Block Performance Specifications (Note 1) (Part 2 of 3) - Preliminary

Memory Block Type	Mode	ALUTs	TriMatrix Memory	C2	C3	C4	C4L		I3	I4L	Unit
				V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
M144K (3), (4)	True dual-port 16K × 9 or 8K × 18, dual clock	0	1	350	300	245	245	180	280	170	MHz
	True dual-port 4K × 36 dual clock	0	1	520	430	365	365	250	405	235	MHz
	Simple dual-port 16K × 9 or 8K × 18, dual clock	0	1	350	300	245	245	180	280	170	MHz
	Simple dual-port 4K × 36 or 2K × 72, dual clock	0	1	565	470	395	395	225	440	210	MHz
	ROM 1Port	0	1	580	470	425	425	260	470	260	MHz
	ROM 2 Port	0	1	545	450	380	380	260	425	245	MHz
	Single-port 16K × 9 or 8K × 18	0	1	385	330	270	270	240	310	195	MHz
	Single-port 4K × 36	0	1	580	470	425	425	210	470	195	MHz
	True dual-port 16K × 9, 8K × 18, or 4K × 36, dual clock with read-during-write option set to "Old Data"	0	1	325	270	225	225	165	255	155	MHz
	Simple dual-port 16K × 9, 8K × 18, 4K × 36, or 2K × 72, dual clock with read-during-write option set to "Old Data"	0	1	350	292	250	250	200	275	190	MHz
	Simple dual-port 2K × 64 dual clock (with ECC)	0	1	255	210	180	180	130	195	120	MHz
	Min Pulse Width (Clock High Time)	—	—	800	1000	1100	1100	1800	1000	1800	ps
Min Pulse Width (Clock Low Time )	—	—	500	625	690	690	1100	625	1100	ps	
M144K (3), (5)	True dual-port 16K × 9 or 8K × 18, dual clock	0	1	425	360	300	300	210	340	195	MHz
	True dual-port 4K × 36 dual clock	0	1	520	430	365	365	250	405	235	MHz
	Simple dual-port 16K × 9 or 8K × 18, dual clock	0	1	425	360	300	300	210	340	195	MHz
	Simple dual-port 4K × 36 or 2K × 72, dual clock	0	1	565	470	395	395	225	440	210	MHz
	ROM 1Port	0	1	580	470	425	425	260	470	260	MHz
	ROM 2 Port	0	1	545	450	380	380	260	425	245	MHz
	Single-port 16K × 9 or 8K × 18	0	1	475	405	335	335	210	380	195	MHz
	Single-port 4K × 36	0	1	580	470	425	425	210	470	195	MHz
	True dual-port 16K × 9, 8K × 18, or 4K × 36, dual clock with read-during-write option set to "Old Data"	0	1	325	270	225	225	165	255	155	MHz
	Simple dual-port 16K × 9, 8K × 18, 4K × 36, or 2K × 72, dual clock with read-during-write option set to "Old Data"	0	1	350	292	250	250	200	275	190	MHz

**Table 1-22.** Stratix III TriMatrix Memory Block Performance Specifications (*Note 1*) (Part 3 of 3) - Preliminary

Memory Block Type	Mode	ALUTs	TriMatrix Memory	C2	C3	C4	C4L		I3	I4L	Unit
				V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
M144K (3), (5)	Simple dual-port 2K × 64 dual clock (with ECC)	0	1	255	210	180	180	130	195	120	MHz
	Min Pulse Width (Clock High Time)	—	—	800	1000	1100	1100	1800	1000	1800	ps
	Min Pulse Width (Clock Low Time)	—	—	500	625	690	690	1100	625	1100	ps

**Notes to Table 1-22:**

- (1) Use a memory block clock that comes through global clock routing from an on-chip PLL set to 50% output duty cycle to achieve the maximum memory block performance. Use Quartus II software to report timing for this and other memory block clocking schemes.
- (2) The F<sub>max</sub> shown for M9K degrades 2 % when you use Error Detection CRC feature on the device, except for C4L speed grade with V<sub>CCL</sub>=0.9 V. For C4L speed grade with V<sub>CCL</sub>=0.9V, there is no degradation in Fmax when Error Detection CRC feature is used.
- (3) The F<sub>max</sub> shown for M144K degrades 10 MHz when you use byte-enable support on M144K.
- (4) The Fmax is applicable when the **COMPTABILITY** option is turned ON.
- (5) The Fmax is applicable when the **COMPTABILITY** option is turned OFF. This option is turned ON by default in Quartus II software.

**Configuration and JTAG Specifications**

Table 1-23 lists the Stratix III Configuration Mode Specifications.

**Table 1-23.** Stratix III Configuration Mode Specifications

Programming Mode	DCLK F <sub>max</sub>	Unit
Passive Serial	100	MHz
Fast Passive Parallel (1)	100	MHz
Fast Active Serial	40	MHz
Remote Update only in Fast AS mode	10	MHz

**Note to Table 1-23:**

- (1) Data rate must be 4× slower than the clock when decompression and/or encryption are used.

Table 1-24 shows the JTAG timing parameters and values for Stratix III devices. Refer to figure for “HIGH-SPEED I/O Block” in “Glossary” for JTAG timing requirements.

**Table 1-24.** Stratix III JTAG Timing Parameters and Values

Symbol	Parameter	Min	Max	Unit
t <sub>JCP</sub>	TCK clock period	30	—	ns
t <sub>JCH</sub>	TCK clock high time	14	—	ns
t <sub>JCL</sub>	TCK clock low time	14	—	ns
t <sub>JPSU</sub> (TDI)	JTAG port setup time for TDI	1	—	ns
t <sub>JPSU</sub> (TMS)	JTAG port setup time for TMS	3	—	ns
t <sub>JPH</sub>	JTAG port hold time	5	—	ns
t <sub>JPCO</sub>	JTAG port clock to output	—	11	ns
t <sub>JPZX</sub>	JTAG port high impedance to valid output	—	14	ns
t <sub>JPXZ</sub>	JTAG port valid output to high impedance	—	14	ns

## Periphery Performance

This section describes the periphery performance, including high-speed I/O and external memory interface, and OCT calibration block specifications.

### High-Speed I/O Specifications

Refer to the “Glossary” for definitions of high-speed timing specifications.

Table 1-25 shows the high-speed I/O timing for Stratix III devices.

**Table 1-25.** Dedicated LVDS Specifications (Note 1), (2) (Part 1 of 2)

Symbol	Conditions	C2			C3, I3			C4, I4			C4L, I4L			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$f_{\text{HSCLK\_in}}$ (input clock frequency)	Clock boost factor $W = 1$ to 40 (3)	5	—	800	5	—	717	5	—	717	5	—	717	MHz
$f_{\text{HSCLK\_out}}$ (output clock frequency)	Clock boost factor $W = 1$ to 40 (3)	5	—	800	5	—	717	5	—	717	5	—	717	MHz
Transmitter														
$f_{\text{HSDR}}$ (data rate)	SERDES factor $J = 3$ to 10	150	—	1600	150	—	1250	150	—	1250	150	—	1250	Mbps
	SERDES factor $J = 2$ , Uses DDR Register	(4)	—	1250	(4)	—	1250	(4)	—	1250	(4)	—	1250	Mbps
	SERDES factor $J = 1$ , Uses SDR Register	(4)	—	800	(4)	—	717	(4)	—	717	(4)	—	717	Mbps
LVDS_E_3R - $f_{\text{HSDR}}$ (data rate)	SERDES factor $J = 4$ to 10	(4)	—	1100	(4)	—	1100	(4)	—	800	(4)	—	800	Mbps
LVDS_E_1R - $f_{\text{HSDR}}$ (data rate)	SERDES factor $J = 4$ to 10	(4)	—	311	(4)	—	200	(4)	—	200	(4)	—	200	Mbps
$t_{\text{x Jitter}}$	Total Jitter for Data Rate, 600 Mbps - 1.25 Gbps	—	—	160	—	—	160	—	—	160	—	—	160	ps
	Total Jitter for Data Rate, < 600 Mbps	—	—	0.1	—	—	0.1	—	—	0.1	—	—	0.1	UI
$t_{\text{DUTY}}$	$T_{\text{x}}$ output duty cycle for both True and Emulated Differential I/O	45	50	55	45	50	55	45	50	55	45	50	55	%
$t_{\text{RISE}} \& t_{\text{FALL}}$	True Differential I/O Standards	—	—	160	—	—	200	—	—	200	—	—	200	ps
$t_{\text{RISE}} \& t_{\text{FALL}}$	Emulated Differential I/O Standards with Three External Output Resistor Network	—	—	310	—	—	350	—	—	350	—	—	350	ps

**Table 1-25.** Dedicated LVDS Specifications (Note 1), (2) (Part 2 of 2)

Symbol	Conditions	C2			C3, I3			C4, I4			C4L, I4L			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$t_{RISE}$ & $t_{FALL}$	Emulated Differential I/O Standards with Three External Output Resistor Network	—	—	460	—	—	500	—	—	500	—	—	500	ps
TCCS	True Differential I/O Standards	—	—	100	—	—	100	—	—	100	—	—	100	ps
TCCS	Emulated Differential I/O Standards	—	—	250	—	—	250	—	—	250	—	—	250	ps
Receiver														
$f_{HSDRDPA}$ (data Rate)	SERDES factor J = 3 to 10	150	—	1600	150	—	1250	150	—	1250	150	—	1250	Mbps
DPA														
DPA run length	—	—	—	10000	—	—	10000	—	—	10000	—	—	10000	UI
Soft CDR mode														
Soft-CDR PPM tolerance	—	—	—	300	—	—	300	—	—	300	—	—	300	± PPM
Non DPA Mode														
Sampling Window	—	—	—	300	—	—	300	—	—	300	—	—	300	ps

**Notes to Table 1-25:**

- (1) When J = 3 to 10, the SERDES block is used.
- (2) When J = 1 or 2, the SERDES block is bypassed.
- (3) Clock Boost Factor ( $\Omega$ ) is the ratio between input data rate to the input clock rate.
- (4) The minimum specification is dependent on the clock source (PLL and clock pin, for example) and the clock routing resource (global, regional, or local) utilized. The I/O differential buffer and input register do not have a minimum toggle rate.

**Table 1-26.** DPA Lock Time Specifications for C2, C3, and C4 Speed Grades

Standard	Training Pattern	Transition Density	Min	Typ	Max	Unit
SPI-4	0000000001111111111	10%	(1)	—	—	Number of repetitions
Parallel Rapid I/O	00001111	25%	(1)	—	—	Number of repetitions
	10010000	50%	(1)	—	—	Number of repetitions
Miscellaneous	10101010	100%	(1)	—	—	Number of repetitions
	01010101	100%	(1)	—	—	Number of repetitions

**Notes to Table 1-26:**

- (1) Pending silicon characterization.

Figure 1-2. Stratix III LVDS Soft-CDR/DPA Sinusoidal Jitter Tolerance Spec

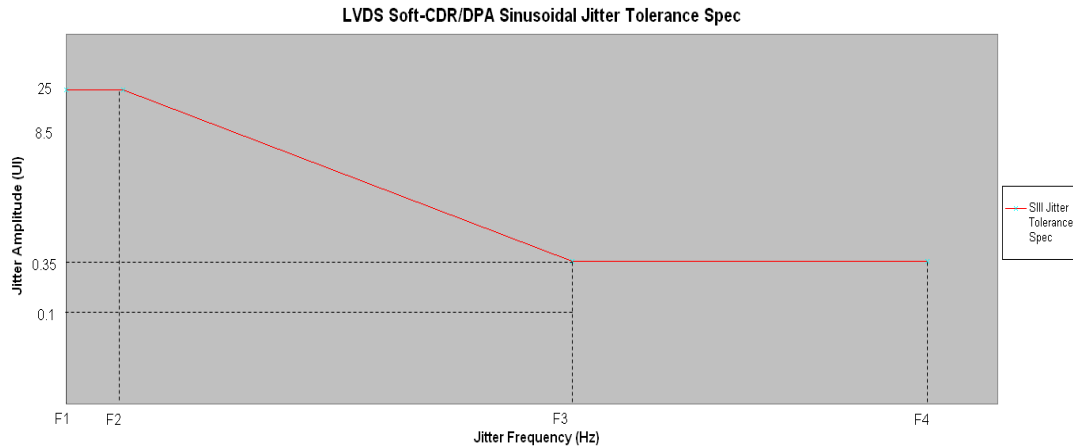


Table 1-27. Stratix III LVDS Soft-CDR/DPA Sinusoidal Jitter Mask Values

Jitter Frequency (Hz)		Jitter Amplitude	Unit
F1	10,000	25.000	UI
F2	17,565	25.000	UI
F3	1,493,000	0.350	UI
F4	50,000,000	0.350	UI

### External Memory Interface Specifications

Table 1-28 through Table 1-35 list the external memory interface specifications for the Stratix III device family.

Use Table 1-28 through Table 1-33 to perform memory interface timing analysis.

Table 1-28. Stratix III Maximum Clock Rate Support for External Memory Interfaces with Half-Rate Controller (Note 1), (2) (Part 1 of 2),

Memory Standards	C2			C3			C4			C4L						Unit
	V <sub>CCL</sub> = 1.1V			V <sub>CCL</sub> = 1.1V			V <sub>CCL</sub> = 1.1V			V <sub>CCL</sub> = 1.1V			V <sub>CCL</sub> = 0.9V			
	Column I/O/Banks (6)	Row I/O Banks (6)	Hybrid Mode (6)	Column I/O/Banks (6)	Row I/O Banks (6)	Hybrid Mode (6)	Column I/O/Banks (6)	Row I/O Banks (6)	Hybrid Mode (6)	Column I/O/Banks (6)	Row I/O Banks (6)	Hybrid Mode (6)	Column I/O/Banks (6)	Row I/O Banks (6)	Hybrid Mode (6)	
DDR3 SDRAM (3), (7)	533 (4)	533 (4)	533 (4)	400	400	400	333	333	333	333	333	333	—	—	—	MHz
DDR2 SDRAM (3)	400	400	400	333	333	333	333 (4)	333 (4)	333 (4)	333 (4)	333 (4)	333 (4)	200	200	200	MHz
DDR SDRAM (3)	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	MHz

**Table 1-28.** Stratix III Maximum Clock Rate Support for External Memory Interfaces with Half-Rate Controller (Note 1), (2) (Part 2 of 2) ,

Memory Standards	C2			C3			C4			C4L						Unit
	V <sub>CCL</sub> = 1.1V			V <sub>CCL</sub> = 1.1V			V <sub>CCL</sub> = 1.1V			V <sub>CCL</sub> = 1.1V			V <sub>CCL</sub> = 0.9V			
	Column I/O/Banks (6)	Row I/O Banks (6)	Hybrid Mode (6)	Column I/O/Banks (6)	Row I/O Banks (6)	Hybrid Mode (6)	Column I/O/Banks (6)	Row I/O Banks (6)	Hybrid Mode (6)	Column I/O/Banks (6)	Row I/O Banks (6)	Hybrid Mode (6)	Column I/O/Banks (6)	Row I/O Banks (6)	Hybrid Mode (6)	
QDRII+ SRAM (2.5 clock cycle latency only) (5), (8)	400	400	400	350	350	350	300	300	300	300	300	300	—	—	—	MHz
QDRII SRAM (1.5 or 1.8V) (5)	350	350	350	300	300	300	300	300	300	300	300	300	167	167	167	MHz
RLDRAM II (1.5 or 1.8V)	400	400	400	333	333	333	300	300	300	300	300	300	—	—	—	MHz

**Notes to Table 1-28:**

- (1) Numbers are preliminary until characterization is final. The supported operating frequencies listed here are memory interface maximums for the FPGA device family. Your design's actual achievable performance is based on design- and system-specific factors, as well as static timing analysis of the completed design.
- (2) The maximum clock rate support for external memory interfaces with half-rate controller stated in the table apply to both commercial and industrial grade.
- (3) This applies for interfaces with both modules and components.
- (4) Timing can not be closed at the target speed in Quartus II v8.0 but programming files can be generated. These designs can be used for prototyping and testing but you should not go to production until Altera releases IP able to achieve these speeds.
- (5) Please refer to the section "Supporting ×36 QDRII+/QDRII SRAM Interfaces in the F780 and F1152-Pin Packages" on page 8–20 in *Chapter 8 External Memory Interface in Stratix III Devices* for the implementation.
- (6) Column I/Os refer to Top and Bottom, I/Os. Rows I/Os refers to the Left and Right I/Os. Hybrid mode refers to DQ/DQS groups wrapping over Column I/Os and Row I/Os of the device.
- (7) DDR3 SDRAM interfaces operating at frequencies below 360-MHz are not supported in Quartus II 8.0 since the ALTMEMPHY sequencer lacks support for the 10-tap DLL mode required for these low frequencies. These designs can be used for FPGA resource planning and fitting studies, but should not go to production until Altera release IP that supports the 10-tap DLL mode.
- (8) The QDRII+ SRAM devices with 2.0 clock cycle latency are not supported due to hardware limitations.

**Table 1-29.** Stratix III Maximum Clock Rate Support for External Memory Interfaces with Full-Rate Controller (Note 1), (2), (3), (4)

Memory Standards	C2			C3			C4			C4L (3)						Unit
	V <sub>CCL</sub> = 1.1V			V <sub>CCL</sub> = 1.1V			V <sub>CCL</sub> = 1.1V			V <sub>CCL</sub> = 1.1V			V <sub>CCL</sub> = 0.9V			
	Column I/O Banks	Row I/O Banks	Hybrid Mode	Column I/O Banks	Row I/O Banks	Hybrid Mode	Column I/O Banks	Row I/O Banks	Hybrid Mode	Column I/O Banks	Row I/O Banks	Hybrid Mode	Column I/O Banks	Row I/O Banks	Hybrid Mode	
DDR2 SDRAM	267	267	267	233	233	233	200	200	200	200	200	200	167	167	167	MHz
DDR SDRAM	200	200	200	200	200	200	200	200	200	200	200	200	167	167	167	MHz

**Notes to Table 1-29:**

- (1) The supported operating frequencies listed here are memory interface maximums for the FPGA device family. Your design's actual achievable performance is based on design- and system-specific factors, as well as static timing analysis of the completed design. Numbers are preliminary until characterization is final.
- (2) This applies for interfaces with both modules and components.
- (3) The maximum clock rate support for external memory interfaces with full-rate controller stated in the table apply to both commercial and industrial grade.
- (4) The values apply to column I/Os, Rows I/Os and Hybrid mode interface. Column I/Os refers to Top and Bottom I/Os. Row I/Os refers to Left and Right I/Os. Hybrid mode refers to DQ/DQS groups wrapping over Column I/Os and Row I/Os of the device.

**External Memory I/O Timing Specifications**

Table 1-30 and Table 1-31 list Stratix III device timing uncertainties on the read and write data paths. Use these specifications to determine timing margins for source synchronous paths between the Stratix III FPGA and the external memory device. Refer to the figure for "SW (sampling window)" in "Glossary"

**Table 1-30.** Sampling Window (SW) - Read Side (Note 1),(2) (Part 1 of 2) - Preliminary

Memory Type	I/O Standard	Width	C2		C3, I3		C4, I4		C4L, I4L	
			SW (ps)		SW (ps)		SW (ps)		SW (ps)	
			Setup	Hold	Setup	Hold	Setup	Hold	Setup	Hold
DDR3	1.5 V SSTL	×4	250	250	300	300	374	374	374	374
DDR3	1.5 V SSTL	×8	250	250	300	300	374	374	374	374
DDR2 Differential	1.8 V SSTL	×4	181	306	234	326	257	326	257	326
DDR2 Differential	1.8 V SSTL	×8	181	306	234	326	257	326	257	326
DDR2 SEIO	1.8 V SSTL	×4	231	256	284	276	307	276	307	276
DDR2 SEIO	1.8 V SSTL	×8	231	256	284	276	307	276	307	276
DDR1 SEIO	2.5 V SSTL	×4	231	256	284	261	307	261	307	261
DDR1 SEIO	2.5 V SSTL	×8	231	256	284	261	307	261	307	261
QDRII/II+	1.5 V HSTL	×9	231	256	284	261	307	261	307	261
QDRII/II+	1.5 V HSTL	×18	261	286	314	291	337	291	337	291
QDRII/II+	1.5 V HSTL	×36	261	286	314	291	337	291	337	291
QDRII/II + Emulation	1.5 V HSTL	×36	261	328	314	337	307	350	337	350
QDRII	1.8 V HSTL	×9	231	256	284	261	337	261	307	261

**Table 1-30.** Sampling Window (SW) - Read Side (Note 1),(2) (Part 2 of 2) - Preliminary

Memory Type	I/O Standard	Width	C2		C3, I3		C4, I4		C4L, I4L	
			SW (ps)		SW (ps)		SW (ps)		SW (ps)	
			Setup	Hold	Setup	Hold	Setup	Hold	Setup	Hold
QDRII	1.8 V HSTL	×18	261	286	314	291	337	291	337	291
QDRII	1.8 V HSTL	×36	261	286	314	291	337	291	337	291
RLDRAM II	1.5 V HSTL	×9	181	306	234	326	257	326	257	326
RLDRAM II	1.5 V HSTL	×18	211	336	264	356	287	356	287	356
RLDRAM II	1.8 V HSTL	×9	181	306	234	326	257	326	257	326
RLDRAM II	1.8 V HSTL	×18	211	336	264	356	287	356	287	356

**Notes to Table 1-30:**

- (1) The values apply to Column I/Os, Row I/Os and Hybrid mode interface. Column I/Os refer to Top and Bottom I/Os. Hybrid mode refers to DQ/DQS groups wrapping over Column I/Os and Row I/Os of the device.
- (2) Please refer to the section “Supporting ×36 QDRII+/QDRII SRAM Interfaces in the F780 and F1152-Pin Packages” on page 8–20 in chapter 8 *External Memory Interface* in Stratix III Devices for the implementation.

**Table 1-31.** Transmitter Channel-to-Channel Skew (TCCS) - Write Side (Note 1), (2) (Part 1 of 2) - Preliminary

Memory Type	I/O Standard	Width	C2		C3, I3		C4, I4		C4L, I4L	
			TCCS (ps)		TCCS (ps)		TCCS (ps)		TCCS (ps)	
			Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
DDR3	1.5 V SSTL	×4	260	260	290	290	310	310	310	310
DDR3	1.5 V SSTL	×8	260	260	290	290	310	310	310	310
DDR2 Differential	1.8 V SSTL	×4	229	246	230	355	250	388	350	488
DDR2 Differential	1.8 V SSTL	×8	229	246	230	355	250	388	350	488
DDR2 SEIO	1.8 V SSTL	×4	316	168	318	239	346	260	446	360
DDR2 SEIO	1.8 V SSTL	×8	316	168	318	239	346	260	446	360
DDR1 SEIO	2.5 V SSTL	×4	313	157	315	222	343	242	443	342
DDR1 SEIO	2.5 V SSTL	×8	313	157	315	222	343	242	443	342
QDRII/II+	1.5 V HSTL	×9	260	248	262	358	285	391	385	491
QDRII/II+	1.5 V HSTL	×18	290	278	292	388	315	421	415	521
QDRII/II+	1.5 V HSTL	×36	290	278	292	388	315	421	415	521
QDROII/II + Emulation	1.5 V HSTL	×36	310	298	312	408	335	441	435	541
QDRII	1.8 V HSTL	×9	229	246	230	355	250	388	350	488
QDRII	1.8 V HSTL	×18	259	276	260	385	280	418	380	518
QDRII	1.8 V HSTL	×36	259	276	260	385	280	418	380	518



**Table 1-31.** Transmitter Channel-to-Channel Skew (TCCS) - Write Side (Note 1), (2) (Part 2 of 2) - Preliminary

Memory Type	I/O Standard	Width	C2		C3, I3		C4, I4		C4L, I4L	
			TCCS (ps)		TCCS (ps)		TCCS (ps)		TCCS (ps)	
			Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
RLDRAM II	1.5 V HSTL	×9	260	248	262	358	285	391	385	491
RLDRAM II	1.5 V HSTL	×18	290	278	292	388	315	421	415	521
RLDRAM II	1.8 V HSTL	×9	229	246	230	355	250	388	350	488
RLDRAM II	1.8 V HSTL	×18	259	276	260	385	280	418	280	418

**Notes to Table 1-31:**

- (1) The values apply to Column I/Os, Row I/Os and Hybrid mode interface. Column I/O refers to Top and Bottom I/Os. Hybrid mode refers to DQ/DQS groups wrapping over Column I/Os and Row I/Os of the device.
- (2) Please refer to the section “Supporting ×36 QDRII+/QDRII SRAM Interfaces in the F780 and F1152-Pin Packages” on page 8–20 in chapter 8 *External Memory Interface* in Stratix III Devices for the implementation.

**DLL and DQS Logic Block Specifications**

Table 1–32 describes the DLL frequency range specifications for Stratix III devices.

**Table 1–32.** Stratix III DLL Frequency Range Specifications (Note 1)

Frequency Mode	Frequency Range (MHz)				Resolution (Degrees)
	C2	C3	C4	C4L	
0	90 – 150	90 – 140	90 – 120	90 – 120	22.5
1	120 – 200	120 – 190	120 – 170	120 – 170	30
2	150 – 240	150 – 230	150 – 200	150 – 200	36
3	180 – 300	180 – 290	180 – 250	180 – 250	45
4	240 – 370	240 – 350	240 – 310	240 – 310	30
5	290 – 450	290 – 420	290 – 370	290 – 370	36
6	360 – 560	360 – 530	360 – 460	360 – 460	45

**Note to Table 1–32:**

(1) The DLL frequency range specifications stated in the table apply to both commercial and industrial grade.

Table 1–33 describes the average DQS phase offset delay per setting for Stratix III devices.

**Table 1–33.** Average DQS Phase Offset Delay per Setting (Note 1), (2), (3), (4)

Speed Grade	Min	Typ	Max	Unit
C2	7	10	13	ps
C3	7	11	15	ps
C4	7	11.5	16	ps
C4L	7	11.5	16	ps

**Notes to Table 1–33:**

- (1) The valid settings for phase offset are -64 to +63 for frequency modes 0 to 3 and -32 to +31 for frequency modes 4 to 6.
- (2) The typical value equals the average of the minimum and maximum values.
- (3) The delay settings are linear with a cumulative delay variation of  $\pm 20$ ps for all speed grades. For example, when using a C2 speed grade and applying  $10^\circ$  phase offset settings to a  $90^\circ$  phase shift at 400 MHz, the expected minimum cumulative delay is  $[625 \text{ ps} + (10 \times 7 \text{ ps}) - 20 \text{ ps}] = 675 \text{ ps}$ .
- (4) The average DQS phase offset delay per setting stated in the table apply to both commercial and industrial grade.

**OCT Calibration Block Specifications**

Table 1–34 shows the on-chip termination calibration block specifications for Stratix III devices.

**Table 1–34.** On-Chip Termination Calibration Block Specification

Symbol	Description	Min	Typical	Max	Unit
OCTUSRCLK	Clock required by OCT calibration blocks	—	—	20	MHz
$t_{\text{OCTCAL}}$	Number of OCTUSRCLK clock cycles required for OCT Rs and Rt calibration	—	1000	—	cycles
$t_{\text{OCTSHIFT}}$	Number of OCTUSRCLK clock cycles required for OCT code to shift out per OCT calibration block	—	28	—	cycles
$t_{\text{RS_RT}}$	Time required to dynamically switch from Rs to Rt	—	2.5	—	ns

## DCD Specifications

Table 1-35 lists the worst case duty cycle distortion for Stratix III devices. Detailed information on duty cycle distortion will be published after characterization.

**Table 1-35.** Duty Cycle Distortion on Stratix III I/O Pins (Note 1), (2)

Symbol	C2		C3		C4		Unit
	Min	Max	Min	Max	Min	Max	
Output Duty Cycle (2)	45	55	45	55	45	55	%

**Notes to Table 1-35:**

- (1) Preliminary DCD specification applies to clock outputs from PLLs, global clock tree, and IOE driving dedicated and general purpose I/O pins.
- (2) Detailed DCD specifications pending silicon characterization.

## I/O Timing

### Timing Model

The DirectDrive™ technology and MultiTrack™ interconnect ensure predictable performance, accurate simulation, and accurate timing analysis across all Stratix III device densities and speed grades. This section describes and specifies the performance of I/Os.

All specifications except the fast model are representative of worst-case supply voltage and junction temperature conditions. Fast model specifications are representative of best case process, supply voltage, and junction temperature conditions.

The timing numbers listed in the tables of this section are extracted from the Quartus II software version 8.1.

### Preliminary and Final Timing

Timing models can have either preliminary or final status. The Quartus II software issues an informational message during the design compilation if the timing models are preliminary. Table 1-36 shows the status of the Stratix III device timing models.

Preliminary status means that the timing models are subject to change in future Quartus II releases. Initially, timing numbers are created using simulation results, process data, and other known parameters. Parts of the timing models may be correlated to silicon measurements. Various tests are used to make the preliminary numbers as close to the actual timing parameters as possible.

Final timing models are based on simulation models that are characterized versus the actual device measurements under all allowable operating conditions. When the timing models are final, all or most of the Stratix III family devices have been completely characterized and no further changes to the timing model are expected.

**Table 1-36.** Stratix III Device Timing Model Status

Device	Preliminary	Final
EP3SL50	✓	—
EP3SL70	✓	—
EP3SL110	—	✓
EP3SL150	—	✓
EP3SL200	✓	—
EP3SL340	—	✓
EP3SE50	✓	—
EP3SE80	—	✓
EP3SE110	—	✓
EP3SE260	✓	—

## I/O Timing Measurement Methodology

Altera characterizes timing delays at the worst-case process, minimum voltage, and maximum temperature for input register setup time ( $t_{su}$ ) and hold time ( $t_h$ ). The Quartus II software uses the following equations to calculate  $t_{su}$  and  $t_h$  timing for Stratix III devices input signals.

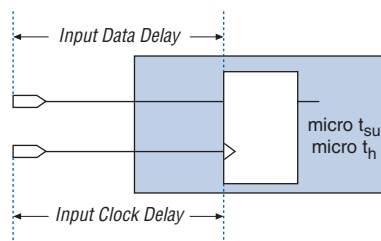
$t_{su} =$

- + data delay from input pin to input register
- + micro setup time of the input register
- clock delay from input pin to input register

$t_h =$

- data delay from input pin to input register
- + micro hold time of the input register
- + clock delay from input pin to input register

Figure 1-3 shows the setup and hold timing diagram for input registers.

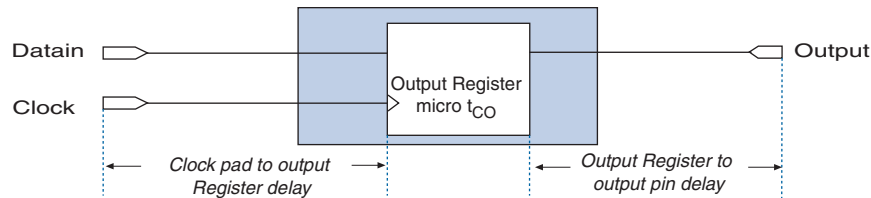
**Figure 1-3.** Input Register Setup and Hold Timing Diagram

For output timing, different I/O standards require different baseline loading techniques for reporting timing delays. Altera characterizes timing delays with the required termination for each I/O standard and with 0 pF (except for PCI and PCI-X, which use 10 pF) loading and the timing is specified up to the output pin of the FPGA device. The Quartus II software calculates the I/O timing for each I/O standard with a default baseline loading as specified by the I/O standards.

The following measurements are made during device characterization. Altera measures clock-to-output delays ( $t_{co}$ ) at worst-case process, minimum voltage, and maximum temperature (PVT) for default loading conditions shown in Table 1-37. The following equation describes clock pin to output pin timing for Stratix III devices.

The  $t_{co}$  from clock pin to I/O pin =  
 + delay from clock pad to I/O output register  
 + IOE output register clock-to-output delay  
 + delay from output register to output pin

**Figure 1-4.** Output Register Clock to Output Timing Diagram

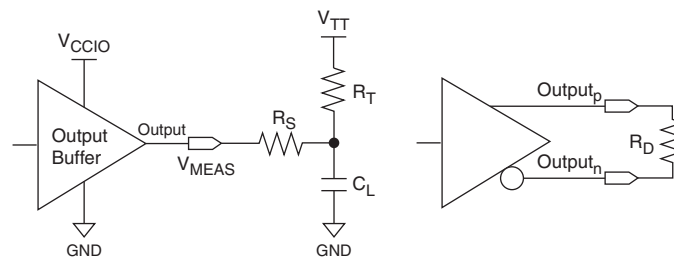


Simulation using IBIS models is required to determine the delays on the PCB traces in addition to the output pin delay timing reported by the Quartus II software and the timing model in the device handbook.

1. Simulate the output driver of choice into the generalized test setup, using values from Table 1-37.
2. Record the time to  $V_{MEAS}$  at the far end of the PCB trace.
3. Simulate the output driver of choice into the actual PCB trace and load, using the appropriate IBIS model or capacitance value to represent the load.
4. Record the time to  $V_{MEAS}$  at the far end of the PCB trace.
5. Compare the results of steps 2 and 4. The increase or decrease in delay should be added to or subtracted from the I/O Standard Output Adder delays to yield the actual worst-case propagation delay (clock-to-output) of the PCB trace.

The Quartus II software reports the timing with the conditions shown in Table 1-37 using the above equation. Figure 1-5 shows the model of the circuit that is represented by the output timing of the Quartus II software.

**Figure 1-5.** Output Delay Timing Reporting Setup Modeled by Quartus II Software for Single-Ended Outputs and Dedicated Differential Outputs (Note 1)

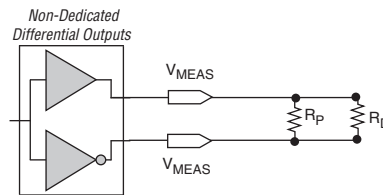


**Notes to Figure 1-5:**

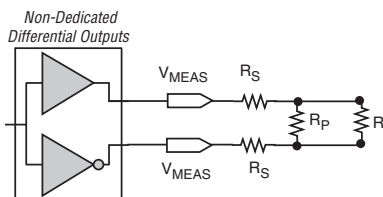
- (1) Output pin timing is reported at the output pin of the FPGA device. Additional delays for loading and board trace delay need to be accounted for with IBIS model simulations.

Figure 1-6 and Figure 1-7 show the model of the circuit that is represented by the output timing of the Quartus II software for differential outputs with single and multiple external resistors.

**Figure 1-6.** Output Delay Timing Reporting Setup Modeled by Quartus II Software for Differential Outputs with Single External Resistor



**Figure 1-7.** Output Delay Timing Reporting Setup modeled by Quartus II Software for Differential Outputs with Three External Resistor



**Table 1-37.** Output Timing Measurement Methodology for Output Pins (Part 1 of 3)

I/O Standard	Loading and Terminations									Measurement Point
	$R_S$	$R_D$	$R_T$	$R_P$	$V_{CCIO}$	$V_{CCPD}$	$V_{CC}$	$V_{TT}$	$C_L$ (pF)	$V_{MEAS}$ (v)
3.3-V LVTTTL	—	—	—	—	3.135	3.135	1.05	—	0	1.5675
3.3-V LVCMOS	—	—	—	—	3.135	3.135	1.05	—	0	1.5675
3.0-V LVTTTL	—	—	—	—	2.85	2.85	1.05	—	0	1.425
3.0-V LVCMOS	—	—	—	—	2.85	2.85	1.05	—	0	1.425
2.5-V	—	—	—	—	2.375	2.375	1.05	—	0	1.1875
1.8-V	—	—	—	—	1.71	2.375	1.05	—	0	0.855
1.5-V	—	—	—	—	1.425	2.375	1.05	—	0	0.7125
1.2-V	—	—	—	—	1.14	2.375	1.05	—	0	0.57
PCI	—	—	—	—	2.85	2.85	1.05	—	10	1.425
PCI-X	—	—	—	—	2.85	2.85	1.05	—	10	1.425
SSTL-2 CLASS I	25	—	50	—	2.325	2.325	1.02	1.25	0	1.1625
SSTL-2 CLASS II	25	—	25	—	2.325	2.325	1.02	1.25	0	1.1625
SSTL-18 CLASS I	25	—	50	—	1.66	2.325	1.02	0.90	0	0.83
SSTL-18 CLASS II	25	—	25	—	1.66	2.325	1.02	0.90	0	0.83
SSTL-15 CLASS I	25	—	50	—	1.375	2.325	1.02	0.75	0	0.6875
SSTL-15 CLASS II	25	—	25	—	1.375	2.325	1.02	0.75	0	0.6875
1.8-V HSTL CLASS I	—	—	50	—	1.66	2.325	1.02	0.90	0	0.83

**Table 1-37.** Output Timing Measurement Methodology for Output Pins (Part 2 of 3)

I/O Standard	Loading and Terminations									Measurement Point
	R <sub>s</sub>	R <sub>D</sub>	R <sub>T</sub>	R <sub>P</sub>	V <sub>CCIO</sub>	V <sub>CCPD</sub>	V <sub>CC</sub>	V <sub>TT</sub>	C <sub>L</sub> (pF)	V <sub>MEAS</sub> (V)
1.8-V HSTL CLASS II	—	—	25	—	1.66	2.325	1.02	0.90	0	0.83
1.5-V HSTL CLASS I	—	—	50	—	1.375	2.325	1.02	0.75	0	0.6875
1.5-V HSTL CLASS II	—	—	25	—	1.375	2.325	1.02	0.75	0	0.6875
1.2-V HSTL CLASS I	—	—	50	—	1.09	2.325	1.02	0.60	0	0.545
1.2-V HSTL CLASS II	—	—	25	—	1.09	2.325	1.02	0.60	0	0.545
Differential SSTL-2 CLASS I	25	—	50	—	2.325	2.325	1.02	1.25	0	1.1625
Differential SSTL-2 CLASS II	25	—	25	—	2.325	2.325	1.02	1.25	0	1.1625
Differential SSTL-18 CLASS I	25	—	50	—	1.66	2.325	1.02	0.90	0	0.83
Differential SSTL-18 CLASS II	25	—	25	—	1.66	2.325	1.02	0.90	0	0.83
1.8-V Differential HSTL CLASS I	—	—	50	—	1.66	2.325	1.02	0.90	0	0.83
1.8-V Differential HSTL CLASS II	—	—	25	—	1.66	2.325	1.02	0.90	0	0.83
1.5-V Differential HSTL CLASS I	—	—	50	—	1.375	2.325	1.02	0.75	0	0.6875
1.5-V Differential HSTL CLASS II	—	—	25	—	1.375	2.325	1.02	0.75	0	0.6875
1.2-V Differential HSTL CLASS I	—	—	50	—	1.09	2.325	1.02	0.60	0	0.545
1.2-V Differential HSTL CLASS II	—	—	25	—	1.09	2.325	1.02	0.60	0	0.545
LVDS	—	100	—	—	2.325	2.325	1.02	—	0	1.1625
MINI-LVDS	—	100	—	—	2.325	2.325	1.02	—	0	1.1625
RSDS	—	100	—	—	2.325	2.325	1.02	—	0	1.1625
LVDS_E_1R	—	100	—	120	2.325	2.325	1.02	—	0	1.1625
LVDS_E_3R	120	100	—	170	2.325	2.325	1.02	—	0	1.1625

**Table 1-37.** Output Timing Measurement Methodology for Output Pins (Part 3 of 3)

I/O Standard	Loading and Terminations									Measurement Point
	$R_s$	$R_D$	$R_T$	$R_P$	$V_{CCIO}$	$V_{CCPD}$	$V_{CC}$	$V_{TT}$	$C_L$ (pF)	$V_{MEAS}$ (V)
MINI-LVDS_E_1R	—	100	—	120	2.325	2.325	1.02	—	0	1.1625
MINI-LVDS_E_3R	120	100	—	170	2.325	2.325	1.02	—	0	1.1625
RSDS_E_1R	—	100	—	120	2.325	2.325	1.02	—	0	1.1625
RSDS_E_3R	120	100	—	170	2.325	2.325	1.02	—	0	1.1625

**Notes to Table 1-37:**

- (1) Hyper transport is not supported by Stratix III.
- (2) LVPECL outputs are not supported by Stratix III.
- (3) Quartus timing conditions can be changed using the Advanced I/O Timing feature.
- (4)  $V_{CC}$  is nominally 1.1 V less 50 mV (1.05 V).
- (5) Terminated I/O standards require an additional 30 mV IR drop on  $V_{CC}$  (1.02 V).
- (6) Terminated I/O standards required an additional 50 mV IR drop on  $V_{CCIO}$  and  $V_{CCPD}$ .

## I/O Default Capacitive Loading

See [Table 1-38](#) for default capacitive loading of different I/O standards.

**Table 1-38.** Default Loading of Different I/O Standards for Stratix III (Part 1 of 2)

I/O Standard	Capacitive Load	Unit
3.3-V LVTTTL	0	pF
3.3-V LVCMOS	0	pF
3.0-V LVTTTL	0	pF
3.0-V LVCMOS	0	pF
2.5-V LVTTTL/LVCMOS	0	pF
1.8-V LVTTTL/LVCMOS	0	pF
1.5-V LVTTTL/LVCMOS	0	pF
3.0-V PCI	10	pF
3.0-V PCI-X	10	pF
SSTL-2 CLASS I	0	pF
SSTL-2 CLASS II	0	pF
SSTL-18 CLASS I	0	pF
SSTL-18 CLASS II	0	pF
1.5-V HSTL CLASS I	0	pF
1.5-V HSTL CLASS II	0	pF
1.8-V HSTL CLASS I	0	pF
1.8-V HSTL CLASS II	0	pF
1.2-V HSTL	0	pF
Differential SSTL-2 CLASS I	0	pF
Differential SSTL-2 CLASS II	0	pF
Differential SSTL-18 CLASS I	0	pF



**Table 1-38.** Default Loading of Different I/O Standards for Stratix III (Part 2 of 2)

I/O Standard	Capacitive Load	Unit
Differential SSTL-18 CLASS II	0	pF
1.8-V Differential HSTL CLASS I	0	pF
1.8-V Differential HSTL CLASS II	0	pF
1.5-V Differential HSTL CLASS I	0	pF
1.5-V Differential HSTL CLASS II	0	pF
1.2-V Differential HSTL CLASS I	0	pF
1.2-V Differential HSTL CLASS II	0	pF
LVDS	0	pF

## Maximum Input and Output Clock Toggle Rate

Maximum clock toggle rate is defined as the maximum frequency achievable for a clock type signal at an I/O pin. The I/O pin can be a regular I/O pin or a dedicated clock I/O pin.

The maximum clock toggle rate is different from the maximum data bit rate. If the maximum clock toggle rate on a regular I/O pin is 300 MHz, the maximum data bit rate for double data rate (DDR) could be potentially as high as 600 Mbps on the same I/O pin.

Table 1-39 specifies the maximum input toggle rates for column I/O pins. Table 1-40 specifies the maximum output toggle rates at 0 pF load for column I/O pins at Quartus II default (fast) slew rate setting.

Table 1-41 specifies the maximum input toggle rates for row I/O pins. Table 1-42 specifies the maximum output toggle rates at 0 pF load for row I/O pins at Quartus II default (fast) slew rate setting.

Table 1-43 specifies the maximum input toggle rates for clock pins. Table 1-44 specifies the maximum output toggle rates at 0 pF load for clock pins at Quartus II default (fast) slew rate setting.

Table 1-45 and Table 1-47 specifies the derating factors for the output clock toggle rate for column I/O pins, row I/O pins and dedicated clock output pins respectively for a non 0 pF load at Quartus II default (fast) slew rate setting.

To calculate the output toggle rate for a non 0 pF load, use this formula:

The toggle rate for a non-0 pF load =  
 $1000 / (1000 / \text{toggle rate at } 0 \text{ pF load} + \text{derating factor} \times \text{load value in pF} / 1000)$

For example, the output toggle rate at 0 pF load for SSTL-18 Class II 16-mA I/O standard is 400 MHz on a C2 device column output pin. The derating factor is 150 ps/pF.

For a 10 pF load the toggle rate is calculated as:

**Equation 1-2.**

$$250(\text{MHz}) = \frac{1000}{\frac{1000}{400} + 150\left(\frac{10}{1000}\right)}$$

**Table 1-39.** Maximum Input Toggle Rate on Stratix III Devices for Column I/O Pins (Part 1 of 2)

I/O Standard	C2	C3, I3	C4, I4	C4L, I4L		Units
	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVTTTL	400	350	350	350	350	MHz
3.3-V LVCMOS	400	350	350	350	350	MHz
3.0-V LVTTTL	400	350	350	350	350	MHz
3.0-V LVCMOS	400	350	350	350	350	MHz
2.5 V	400	350	350	350	350	MHz
1.8 V	400	350	350	350	350	MHz
1.5 V	400	350	350	350	350	MHz
1.2 V	400	350	350	350	350	MHz
SSTL-2 CLASS I	600	550	550	550	550	MHz
SSTL-2 CLASS II	600	550	550	550	550	MHz
SSTL-18 CLASS I	600	550	550	550	550	MHz
SSTL-18 CLASS II	600	550	550	550	550	MHz
SSTL-15 CLASS I	600	550	550	550	550	MHz
SSTL-15 CLASS II	600	550	550	550	550	MHz
1.8-V HSTL CLASS I	600	550	550	550	550	MHz
1.8-V HSTL CLASS II	600	550	550	550	550	MHz
1.5-V HSTL CLASS I	600	550	550	550	550	MHz
1.5-V HSTL CLASS II	600	550	550	550	550	MHz
1.2-V HSTL CLASS I	600	550	550	550	550	MHz
1.2-V HSTL CLASS II	600	550	550	550	550	MHz
3.0-V PCI	400	350	350	350	350	MHz
3.0-V PCI-X	400	350	350	350	350	MHz
DIFFERENTIAL 1.2-V HSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.2-V HSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 1.5-V HSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.5-V HSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 1.8-V HSTL CLASS I	600	550	550	550	550	MHz

**Table 1-39.** Maximum Input Toggle Rate on Stratix III Devices for Column I/O Pins (Part 2 of 2)

I/O Standard	C2	C3, I3	C4, I4	C4L, I4L		Units
	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
DIFFERENTIAL 1.8-V HSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 1.5-V SSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.5-V SSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 1.8-V SSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.8-V SSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 2.5-V SSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 2.5-V SSTL CLASS II	600	550	550	550	550	MHz
LVDS	800	717	717	717	717	MHz
MINI-LVDS	500	450	450	450	450	MHz
RSDS	500	450	450	450	450	MHz
LVPECL	400	350	350	350	350	MHz

**Table 1-40.** Maximum Output Toggle Rate on Stratix III Devices for Column I/O Pins (Note 1) (Part 1 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
3.3-V LVTTTL	4 mA	150	140	130	130	130	MHz
	8 mA	250	230	220	220	220	MHz
	12 mA	350	310	290	290	290	MHz
	16 mA	400	370	350	350	350	MHz
3.3-V LVCMOS	4 mA	100	90	80	80	80	MHz
	8 mA	200	180	170	170	170	MHz
	12 mA	350	290	250	250	250	MHz
	16 mA	400	370	350	350	350	MHz
3.0-V LVTTTL	4 mA	150	130	120	120	120	MHz
	8 mA	250	230	220	220	220	MHz
	12 mA	350	310	280	280	280	MHz
	16 mA	400	360	330	330	330	MHz
3.0-V LVCMOS	4 mA	150	120	100	100	100	MHz
	8 mA	250	230	210	210	210	MHz
	12 mA	350	310	280	280	280	MHz
	16 mA	400	360	330	330	330	MHz

**Table 1-40.** Maximum Output Toggle Rate on Stratix III Devices for Column I/O Pins (*Note 1*) (Part 2 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
2.5 V	4 mA	150	120	100	100	100	MHz
	8 mA	250	220	200	200	200	MHz
	12 mA	350	270	210	210	210	MHz
	16 mA	400	360	330	330	330	MHz
1.8 V	2 mA	100	80	70	70	70	MHz
	4 mA	150	140	140	140	140	MHz
	6 mA	200	160	140	140	140	MHz
	8 mA	250	210	160	160	160	MHz
	10 mA	300	260	240	240	240	MHz
	12 mA	350	320	290	290	290	MHz
1.5 V	2 mA	100	70	60	60	60	MHz
	4 mA	150	110	90	90	90	MHz
	6 mA	200	150	130	130	130	MHz
	8 mA	250	180	140	140	140	MHz
	10 mA	300	260	240	240	240	MHz
	12 mA	350	340	310	310	310	MHz
1.2 V	2 mA	100	80	60	60	60	MHz
	4 mA	150	120	110	110	110	MHz
	6 mA	200	150	120	120	120	MHz
	8 mA	250	230	220	220	220	MHz
SSTL-2 CLASS I	8 mA	540	470	420	420	420	MHz
	10 mA	700	620	550	550	550	MHz
	12 mA	800	750	710	710	710	MHz
SSTL-2 CLASS II	16 mA	580	550	530	530	530	MHz
SSTL-18 CLASS I	4 mA	200	120	90	90	90	MHz
	6 mA	450	280	200	200	200	MHz
	8 mA	540	500	470	470	470	MHz
	10 mA	650	600	550	550	550	MHz
	12 mA	720	650	580	580	580	MHz
SSTL-18 CLASS II	8 mA	530	510	490	490	490	MHz
	16 mA	800	780	730	730	730	MHz
SSTL-15 CLASS I	4 mA	100	80	70	70	70	MHz
	6 mA	450	410	370	370	370	MHz
	8 mA	550	530	490	490	490	MHz
	10 mA	770	680	610	610	610	MHz
	12 mA	800	720	650	650	650	MHz
SSTL-15 CLASS II	8 mA	530	510	490	490	490	MHz
	16 mA	800	780	730	730	730	MHz

**Table 1-40.** Maximum Output Toggle Rate on Stratix III Devices for Column I/O Pins (Note 1) (Part 3 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
1.8-V HSTL CLASS I	4 mA	80	60	50	50	50	MHz
	6 mA	300	270	250	250	250	MHz
	8 mA	440	420	410	410	410	MHz
	10 mA	470	440	410	410	410	MHz
	12 mA	540	520	510	510	510	MHz
1.8-V HSTL CLASS II	16 mA	570	540	520	520	520	MHz
1.5-V HSTL CLASS I	4 mA	200	190	180	180	180	MHz
	6 mA	450	410	390	390	390	MHz
	8 mA	500	490	480	480	480	MHz
	10 mA	740	690	650	650	650	MHz
	12 mA	800	750	710	710	710	MHz
1.5-V HSTL CLASS II	16 mA	600	590	590	590	590	MHz
1.2-V HSTL CLASS I	4 mA	250	240	230	230	230	MHz
	6 mA	450	410	380	380	380	MHz
	8 mA	540	500	460	460	460	MHz
	10 mA	720	670	630	630	630	MHz
	12 mA	800	790	790	790	790	MHz
1.2-V HSTL CLASS II	16 mA	550	530	510	510	510	MHz
DIFFERENTIAL 1.2-V HSTL CLASS I	4 mA	250	240	230	230	230	MHz
	6 mA	450	410	380	380	380	MHz
	8 mA	540	500	460	460	460	MHz
	10 mA	720	670	630	630	630	MHz
	12 mA	800	790	790	790	790	MHz
DIFFERENTIAL 1.2-V HSTL CLASS II	16 mA	550	530	510	510	510	MHz
DIFFERENTIAL 1.5-V HSTL CLASS I	4 mA	200	190	180	180	180	MHz
	6 mA	450	410	390	390	390	MHz
	8 mA	500	490	480	480	480	MHz
	10 mA	740	690	650	650	650	MHz
	12 mA	800	750	710	710	710	MHz
DIFFERENTIAL 1.5-V HSTL CLASS II	16 mA	600	590	590	590	590	MHz
DIFFERENTIAL 1.8-V HSTL CLASS I	4 mA	80	60	50	50	50	MHz
	6 mA	300	270	250	250	250	MHz
	8 mA	440	420	410	410	410	MHz
	10 mA	470	440	410	410	410	MHz
	12 mA	540	520	510	510	510	MHz
DIFFERENTIAL 1.8-V HSTL CLASS II	16 mA	570	540	520	520	520	MHz

**Table 1-40.** Maximum Output Toggle Rate on Stratix III Devices for Column I/O Pins (*Note 1*) (Part 4 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
DIFFERENTIAL 1.5-V SSTL CLASS I	4 mA	100	80	70	70	70	MHz
	6 mA	450	410	370	370	370	MHz
	8 mA	550	530	490	490	490	MHz
	10 mA	770	680	610	610	610	MHz
	12 mA	800	720	650	650	650	MHz
DIFFERENTIAL 1.5-V SSTL CLASS II	8 mA	530	510	490	490	490	MHz
	16 mA	800	780	730	730	730	MHz
DIFFERENTIAL 1.8-V SSTL CLASS I	4 mA	200	120	90	90	90	MHz
	6 mA	450	280	200	200	200	MHz
	8 mA	540	500	470	470	470	MHz
	10 mA	650	600	550	550	550	MHz
	12 mA	720	650	580	580	580	MHz
DIFFERENTIAL 1.8-V SSTL CLASS II	8 mA	530	510	490	490	490	MHz
	16 mA	800	780	730	730	730	MHz
DIFFERENTIAL 2.5-V SSTL CLASS I	8 mA	540	470	420	420	420	MHz
	10 mA	700	620	550	550	550	MHz
	12 mA	800	750	710	710	710	MHz
DIFFERENTIAL 2.5-V SSTL CLASS II	16 mA	580	550	530	530	530	MHz
3.0-V PCI	—	400	380	360	360	360	MHz
3.0-V PCI-X	—	400	380	360	360	360	MHz
LVDS_E_1R	—	156	100	100	100	100	MHz
LVDS_E_3R	—	550	550	400	400	400	MHz
MINI-LVDS_E_1R	—	156	100	100	100	100	MHz
MINI-LVDS_E_3R	—	550	550	400	400	400	MHz
RSDS_E_1R	—	156	100	100	100	100	MHz
RSDS_E_3R	—	550	550	400	400	400	MHz
3.3-V LVTTTL	OCT 50 Ω	300	280	260	260	260	MHz
3.3-V LVCMOS	OCT 50 Ω	300	280	260	260	260	MHz
3.0-V LVTTTL	OCT 50 Ω	300	250	210	210	210	MHz
3.0-V LVCMOS	OCT 50 Ω	300	250	210	210	210	MHz
2.5 V	OCT 50 Ω	350	310	260	260	260	MHz
1.8 V	OCT 50 Ω	350	310	250	250	250	MHz
1.5 V	OCT 50 Ω	350	310	250	250	250	MHz
1.2 V	OCT 50 Ω	350	290	220	220	220	MHz
SSTL-2 CLASS I	OCT 50 Ω	800	770	720	720	720	MHz
SSTL-2 CLASS II	OCT 25 Ω	690	680	670	670	670	MHz
SSTL-18 CLASS I	OCT 50 Ω	830	820	810	810	810	MHz

**Table 1-40.** Maximum Output Toggle Rate on Stratix III Devices for Column I/O Pins (Note 1) (Part 5 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
SSTL-18 CLASS II	OCT 25 Ω	810	780	750	750	750	MHz
SSTL-15 CLASS I	OCT 50 Ω	930	910	890	890	890	MHz
SSTL-15 CLASS II	OCT 25 Ω	730	710	690	690	690	MHz
1.8-V HSTL CLASS I	OCT 50 Ω	800	780	760	760	760	MHz
1.8-V HSTL CLASS II	OCT 25 Ω	750	730	710	710	710	MHz
1.5-V HSTL CLASS I	OCT 50 Ω	800	780	760	760	760	MHz
1.5-V HSTL CLASS II	OCT 25 Ω	740	720	700	700	700	MHz
1.2-V HSTL CLASS I	OCT 50 Ω	850	810	770	770	770	MHz
1.2-V HSTL CLASS II	OCT 25 Ω	800	760	720	720	720	MHz
DIFFERENTIAL 1.2-V HSTL CLASS I	OCT 50 Ω	850	810	770	770	770	MHz
DIFFERENTIAL 1.2-V HSTL CLASS II	OCT 25 Ω	800	760	720	720	720	MHz
DIFFERENTIAL 1.5-V HSTL CLASS I	OCT 50 Ω	800	780	760	760	760	MHz
DIFFERENTIAL 1.5-V HSTL CLASS II	OCT 25 Ω	740	720	700	700	700	MHz
DIFFERENTIAL 1.8-V HSTL CLASS I	OCT 50 Ω	800	780	760	760	760	MHz
DIFFERENTIAL 1.8-V HSTL CLASS II	OCT 25 Ω	750	730	710	710	710	MHz
DIFFERENTIAL 1.5-V SSTL CLASS I	OCT 50 Ω	930	910	890	890	890	MHz
DIFFERENTIAL 1.5-V SSTL CLASS II	OCT 25 Ω	730	710	690	690	690	MHz
DIFFERENTIAL 1.8-V SSTL CLASS I	OCT 50 Ω	830	820	810	810	810	MHz
DIFFERENTIAL 1.8-V SSTL CLASS II	OCT 25 Ω	810	780	750	750	750	MHz
DIFFERENTIAL 2.5-V SSTL CLASS I	OCT 50 Ω	800	770	720	720	720	MHz
DIFFERENTIAL 2.5-V SSTL CLASS II	OCT 25 Ω	690	680	670	670	670	MHz

**Note to Table 1-40:**

(1) The maximum output toggle rates are specified at 0 pF load at Quartus II default (fast) slew rate setting.

Table 1-41 specifies the maximum input toggle rates for row I/O pins.

Table 1-42 specifies the maximum output toggle rates at 0 pF load for row I/O pins.

**Table 1-41.** Maximum Input Toggle Rate on Stratix III Devices for Row I/O Pins (Part 1 of 2) - Preliminary

I/O Standard	C2	C3, I3	C4, I4	C4L, I4L		Units
	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
3.3-V LVTTTL	400	350	350	350	350	MHz
3.3-V LVCMOS	400	350	350	350	350	MHz
3.0-V LVTTTL	400	350	350	350	350	MHz
3.0-V LVCMOS	400	350	350	350	350	MHz
2.5 V	400	350	350	350	350	MHz
1.8 V	400	350	350	350	350	MHz
1.5 V	400	350	350	350	350	MHz
1.2 V	400	350	350	350	350	MHz
SSTL-2 CLASS I	600	550	550	550	550	MHz
SSTL-2 CLASS II	600	550	550	550	550	MHz
SSTL-18 CLASS I	600	550	550	550	550	MHz
SSTL-18 CLASS II	600	550	550	550	550	MHz
SSTL-15 CLASS I	600	550	550	550	550	MHz
SSTL-15 CLASS II	600	550	550	550	550	MHz
1.8-V HSTL CLASS I	600	550	550	550	550	MHz
1.8-V HSTL CLASS II	600	550	550	550	550	MHz
1.5-V HSTL CLASS I	600	550	550	550	550	MHz
1.5-V HSTL CLASS II	600	550	550	550	550	MHz
1.2-V HSTL CLASS I	600	550	550	550	550	MHz
1.2-V HSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 1.2-V HSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.2-V HSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 1.5-V HSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.5-V HSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 1.8-V HSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.8-V HSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 1.5-V SSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.5-V SSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 1.8-V SSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.8-V SSTL CLASS II	600	550	550	550	550	MHz



**Table 1-41.** Maximum Input Toggle Rate on Stratix III Devices for Row I/O Pins (Part 2 of 2) - Preliminary

I/O Standard	C2	C3, I3	C4, I4	C4L, I4L		Units
	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
DIFFERENTIAL 2.5-V SSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 2.5-V SSTL CLASS II	600	550	550	550	550	MHz
3.0-V PCI	400	350	350	350	350	MHz
3.0-V PCI-X	400	350	350	350	350	MHz
LVDS	800	717	717	717	717	MHz
MINI-LVDS	500	450	450	450	450	MHz
RSDS	500	450	450	450	450	MHz
LVPECL	400	350	350	350	350	MHz

**Table 1-42.** Maximum Output Toggle Rate on Stratix III Devices for Row I/O Pins (Note 1) (Part 1 of 4)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
3.3-V LVTTTL	4 mA	150	140	130	130	130	MHz
	8 mA	250	230	220	220	220	MHz
	12 mA	350	310	290	290	290	MHz
3.3-V LVCMOS	4 mA	100	90	80	80	80	MHz
	8 mA	200	180	170	170	170	MHz
3.0-V LVTTTL	4 mA	150	130	120	120	120	MHz
	8 mA	250	230	220	220	220	MHz
	12 mA	350	310	280	280	280	MHz
3.0-V LVCMOS	4 mA	150	120	100	100	100	MHz
	8 mA	250	230	210	210	210	MHz
2.5 V	4 mA	150	120	100	100	100	MHz
	8 mA	250	220	200	200	200	MHz
	12 mA	350	270	210	210	210	MHz
1.8 V	2 mA	100	80	70	70	70	MHz
	4 mA	150	140	140	140	140	MHz
	6 mA	200	160	140	140	140	MHz
	8 mA	250	210	160	160	160	MHz
1.5 V	2 mA	100	70	60	60	60	MHz
	4 mA	150	110	90	90	90	MHz
	6 mA	200	150	130	130	130	MHz
	8 mA	250	180	140	140	140	MHz
1.2 V	2 mA	100	80	60	60	60	MHz
	4 mA	150	120	110	110	110	MHz

**Table 1-42.** Maximum Output Toggle Rate on Stratix III Devices for Row I/O Pins (*Note 1*) (Part 2 of 4)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
SSTL-2 CLASS I	8 mA	540	470	420	420	420	MHz
	12 mA	800	750	710	710	710	MHz
SSTL-2 CLASS II	16 mA	580	550	530	530	530	MHz
SSTL-18 CLASS I	4 mA	200	120	90	90	90	MHz
	6 mA	450	280	200	200	200	MHz
	8 mA	540	500	470	470	470	MHz
	10 mA	650	600	550	550	550	MHz
	12 mA	720	650	580	580	580	MHz
SSTL-18 CLASS II	8 mA	530	510	490	490	490	MHz
	16 mA	800	780	730	730	730	MHz
SSTL-15 CLASS I	4 mA	100	80	70	70	70	MHz
	6 mA	450	410	370	370	370	MHz
	8 mA	550	530	490	490	490	MHz
1.8-V HSTL CLASS I	4 mA	80	60	50	50	50	MHz
	6 mA	300	270	250	250	250	MHz
	8 mA	440	420	410	410	410	MHz
	10 mA	470	440	410	410	410	MHz
	12 mA	540	520	510	510	510	MHz
1.8-V HSTL CLASS II	16 mA	570	540	520	520	520	MHz
1.5-V HSTL CLASS I	4 mA	200	190	180	180	180	MHz
	6 mA	450	410	390	390	390	MHz
	8 mA	500	490	480	480	480	MHz
1.2-V HSTL CLASS I	4 mA	250	240	230	230	230	MHz
	6 mA	450	410	380	380	380	MHz
	8 mA	540	500	460	460	460	MHz
DIFFERENTIAL 1.2-V HSTL CLASS I	4 mA	250	240	230	230	230	MHz
	6 mA	450	410	380	380	380	MHz
	8 mA	540	500	460	460	460	MHz
DIFFERENTIAL 1.5-V HSTL CLASS I	4 mA	200	190	180	180	180	MHz
	6 mA	450	410	390	390	390	MHz
	8 mA	500	490	480	480	480	MHz
DIFFERENTIAL 1.8-V HSTL CLASS I	4 mA	80	60	50	50	50	MHz
	6 mA	300	270	250	250	250	MHz
	8 mA	440	420	410	410	410	MHz
	10 mA	470	440	410	410	410	MHz
	12 mA	540	520	510	510	510	MHz
DIFFERENTIAL 1.8-V HSTL CLASS II	16 mA	570	540	520	520	520	MHz

**Table 1-42.** Maximum Output Toggle Rate on Stratix III Devices for Row I/O Pins (*Note 1*) (Part 3 of 4)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
DIFFERENTIAL 1.5-V SSTL CLASS I	4 mA	100	80	70	70	70	MHz
	6 mA	450	410	370	370	370	MHz
	8 mA	550	530	490	490	490	MHz
DIFFERENTIAL 1.8-V SSTL CLASS I	4 mA	200	120	90	90	90	MHz
	6 mA	450	280	200	200	200	MHz
	8 mA	540	500	470	470	470	MHz
	10 mA	650	600	550	550	550	MHz
	12 mA	720	650	580	580	580	MHz
DIFFERENTIAL 1.8-V SSTL CLASS II	8 mA	530	510	490	490	490	MHz
	16 mA	800	780	730	730	730	MHz
DIFFERENTIAL 2.5-V SSTL CLASS I	8 mA	540	470	420	420	420	MHz
	12 mA	800	750	710	710	710	MHz
DIFFERENTIAL 2.5-V SSTL CLASS II	16 mA	580	550	530	530	530	MHz
3.0-V PCI	—	400	380	360	360	360	MHz
3.0-V PCI-X	—	400	380	360	360	360	MHz
LVDS	—	800	717	717	717	717	MHz
LVDS_E_1R	—	156	100	100	100	100	MHz
LVDS_E_3R	—	550	550	400	400	400	MHz
MINI-LVDS	—	500	450	450	450	450	MHz
MINI-LVDS_E_1R	—	156	100	100	100	100	MHz
MINI-LVDS_E_3R	—	550	550	400	400	400	MHz
RSDS	—	500	450	450	450	450	MHz
RSDS_E_1R	—	156	100	100	100	100	MHz
RSDS_E_3R	—	550	550	400	400	400	MHz
3.3-V LVTTTL	OCT 50 Ω	300	280	260	260	260	MHz
3.3-V LVCMOS	OCT 50 Ω	300	280	260	260	260	MHz
3.0-V LVTTTL	OCT 50 Ω	300	250	210	210	210	MHz
3.0-V LVCMOS	OCT 50 Ω	300	250	210	210	210	MHz
2.5 V	OCT 50 Ω	350	310	260	260	260	MHz
1.8 V	OCT 50 Ω	350	310	250	250	250	MHz
1.5 V	OCT 50 Ω	350	310	250	250	250	MHz
1.2 V	OCT 50 Ω	350	290	220	220	220	MHz
SSTL-2 CLASS I	OCT 50 Ω	800	770	720	720	720	MHz
SSTL-2 CLASS II	OCT 25 Ω	690	680	670	670	670	MHz
SSTL-18 CLASS I	OCT 50 Ω	830	820	810	810	810	MHz
SSTL-18 CLASS II	OCT 25 Ω	810	780	750	750	750	MHz
SSTL-15 CLASS I	OCT 50 Ω	930	910	890	890	890	MHz

**Table 1-42.** Maximum Output Toggle Rate on Stratix III Devices for Row I/O Pins (*Note 1*) (Part 4 of 4)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
1.8-V HSTL CLASS I	OCT 50 Ω	800	780	760	760	760	MHz
1.8-V HSTL CLASS II	OCT 25 Ω	750	730	710	710	710	MHz
1.5-V HSTL CLASS I	OCT 50 Ω	800	780	760	760	760	MHz
1.2-V HSTL CLASS I	OCT 50 Ω	850	810	770	770	770	MHz
DIFFERENTIAL 1.2-V HSTL CLASS I	OCT 50 Ω	850	810	770	770	770	MHz
DIFFERENTIAL 1.5-V HSTL CLASS I	OCT 50 Ω	800	780	760	760	760	MHz
DIFFERENTIAL 1.8-V HSTL CLASS I	OCT 50 Ω	800	780	760	760	760	MHz
DIFFERENTIAL 1.8-V HSTL CLASS II	OCT 25 Ω	750	730	710	710	710	MHz
DIFFERENTIAL 1.5-V SSTL CLASS I	OCT 50 Ω	930	910	890	890	890	MHz
DIFFERENTIAL 1.8-V SSTL CLASS I	OCT 50 Ω	830	820	810	810	810	MHz
DIFFERENTIAL 1.8-V SSTL CLASS II	OCT 25 Ω	810	780	750	750	750	MHz
DIFFERENTIAL 2.5-V SSTL CLASS I	OCT 50 Ω	800	770	720	720	720	MHz
DIFFERENTIAL 2.5-V SSTL CLASS II	OCT 25 Ω	690	680	670	670	670	MHz

**Note to Table 1-42:**

(1) The maximum output toggle rates are specified at 0 pF load at Quartus II default (fast) slew rate setting.

Table 1-43 specifies the maximum input toggle rates for clock pins.

Table 1-44 specifies the maximum output toggle rates at 0 pF load for clock pins.

**Table 1-43.** Maximum Input Toggle Rate on Stratix III Devices for Dedicated Clock Input Pins (Part 1 of 2)

I/O Standard	C2	C3, I3	C4, I4	C4L, I4L		Units
	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
3.3-V LVTTTL	400	350	350	350	350	MHz
3.3-V LVCMOS	400	350	350	350	350	MHz
3.0-V LVTTTL	400	350	350	350	350	MHz
3.0-V LVCMOS	400	350	350	350	350	MHz
2.5 V	400	350	350	350	350	MHz
1.8 V	400	350	350	350	350	MHz
1.5 V	400	350	350	350	350	MHz
1.2 V	400	350	350	350	350	MHz
SSTL-2 CLASS I	600	550	550	550	550	MHz
SSTL-2 CLASS II	600	550	550	550	550	MHz

**Table 1-43.** Maximum Input Toggle Rate on Stratix III Devices for Dedicated Clock Input Pins (Part 2 of 2)

I/O Standard	C2	C3, I3	C4, I4	C4L, I4L		Units
	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
SSTL-18 CLASS I	600	550	550	550	550	MHz
SSTL-18 CLASS II	600	550	550	550	550	MHz
SSTL-15 CLASS I	600	550	550	550	550	MHz
SSTL-15 CLASS II	600	550	550	550	550	MHz
1.8-V HSTL CLASS I	600	550	550	550	550	MHz
1.8-V HSTL CLASS II	600	550	550	550	550	MHz
1.5-V HSTL CLASS I	600	550	550	550	550	MHz
1.5-V HSTL CLASS II	600	550	550	550	550	MHz
1.2-V HSTL CLASS I	600	550	550	550	550	MHz
1.2-V HSTL CLASS II	600	550	550	550	550	MHz
3.0-V PCI	400	350	350	350	350	MHz
3.0-V PCI-X	400	350	350	350	350	MHz
DIFFERENTIAL LVPECL	400	350	350	350	350	MHz
DIFFERENTIAL 1.2-V HSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.2-V HSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 1.5-V HSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.5-V HSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 1.8-V HSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.8-V HSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 1.5-V SSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.5-V SSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 1.8-V SSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 1.8-V SSTL CLASS II	600	550	550	550	550	MHz
DIFFERENTIAL 2.5-V SSTL CLASS I	600	550	550	550	550	MHz
DIFFERENTIAL 2.5-V SSTL CLASS II	600	550	550	550	550	MHz
LVDS	800	717	717	717	717	MHz
MINI-LVDS	500	450	450	450	450	MHz
RSDS	500	450	450	450	450	MHz
LVPECL	400	350	350	350	350	MHz

**Table 1-44.** Maximum Output Toggle Rate on Stratix III Devices for Dedicated Clock Output Pins (Note 1) (Part 1 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVTTTL	4 mA	150	140	130	130	130	MHz
	8 mA	250	230	220	220	220	MHz
	12 mA	350	310	290	290	290	MHz
	16 mA	400	370	350	350	350	MHz
3.3-V LVCMOS	4 mA	100	90	80	80	80	MHz
	8 mA	200	180	170	170	170	MHz
	12 mA	350	290	250	250	250	MHz
	16 mA	400	370	350	350	350	MHz
3.0-V LVTTTL	4 mA	150	130	120	120	120	MHz
	8 mA	250	230	220	220	220	MHz
	12 mA	350	310	280	280	280	MHz
	16 mA	400	360	330	330	330	MHz
3.0-V LVCMOS	4 mA	150	120	100	100	100	MHz
	8 mA	250	230	210	210	210	MHz
	12 mA	350	310	280	280	280	MHz
	16 mA	400	360	330	330	330	MHz
2.5 V	4 mA	150	120	100	100	100	MHz
	8 mA	250	220	200	200	200	MHz
	12 mA	350	270	210	210	210	MHz
	16 mA	400	360	330	330	330	MHz
1.8 V	2 mA	100	80	70	70	70	MHz
	4 mA	150	140	140	140	140	MHz
	6 mA	200	160	140	140	140	MHz
	8 mA	250	210	160	160	160	MHz
	10 mA	300	260	240	240	240	MHz
	12 mA	350	320	290	290	290	MHz
1.5 V	2 mA	100	70	60	60	60	MHz
	4 mA	150	110	90	90	90	MHz
	6 mA	200	150	130	130	130	MHz
	8 mA	250	180	140	140	140	MHz
	10 mA	300	260	240	240	240	MHz
	12 mA	350	340	310	310	310	MHz
1.2 V	2 mA	100	80	60	60	60	MHz
	4 mA	150	120	110	110	110	MHz
	6 mA	200	150	120	120	120	MHz
	8 mA	250	230	220	220	220	MHz

**Table 1-44.** Maximum Output Toggle Rate on Stratix III Devices for Dedicated Clock Output Pins (Note 1) (Part 2 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
SSTL-2 CLASS I	8 mA	540	470	420	420	420	MHz
	10 mA	700	620	550	550	550	MHz
	12 mA	800	750	710	710	710	MHz
SSTL-2 CLASS II	16 mA	580	550	530	530	530	MHz
SSTL-18 CLASS I	4 mA	200	120	90	90	90	MHz
	6 mA	450	280	200	200	200	MHz
	8 mA	540	500	470	470	470	MHz
	10 mA	650	600	550	550	550	MHz
	12 mA	720	650	580	580	580	MHz
SSTL-18 CLASS II	8 mA	530	510	490	490	490	MHz
	16 mA	800	780	730	730	730	MHz
SSTL-15 CLASS I	4 mA	100	80	70	70	70	MHz
	6 mA	450	410	370	370	370	MHz
	8 mA	550	530	490	490	490	MHz
	10 mA	770	680	610	610	610	MHz
	12 mA	800	720	650	650	650	MHz
SSTL-15 CLASS II	8 mA	530	510	490	490	490	MHz
	16 mA	800	780	730	730	730	MHz
1.8-V HSTL CLASS I	4 mA	80	60	50	50	50	MHz
	6 mA	300	270	250	250	250	MHz
	8 mA	440	420	410	410	410	MHz
	10 mA	470	440	410	410	410	MHz
	12 mA	540	520	510	510	510	MHz
1.8-V HSTL CLASS II	16 mA	570	540	520	520	520	MHz
1.5-V HSTL CLASS I	4 mA	200	190	180	180	180	MHz
	6 mA	450	410	390	390	390	MHz
	8 mA	500	490	480	480	480	MHz
	10 mA	740	690	650	650	650	MHz
	12 mA	800	750	710	710	710	MHz
1.5-V HSTL CLASS II	16 mA	600	590	590	590	590	MHz
1.2-V HSTL CLASS I	4 mA	250	240	230	230	230	MHz
	6 mA	450	410	380	380	380	MHz
	8 mA	540	500	460	460	460	MHz
	10 mA	720	670	630	630	630	MHz
	12 mA	800	790	790	790	790	MHz
1.2-V HSTL CLASS II	16 mA	550	530	510	510	510	MHz

**Table 1-44.** Maximum Output Toggle Rate on Stratix III Devices for Dedicated Clock Output Pins (Note 1) (Part 3 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
DIFFERENTIAL 1.2-V HSTL CLASS I	4 mA	250	240	230	230	230	MHz
	6 mA	450	410	380	380	380	MHz
	8 mA	540	500	460	460	460	MHz
	10 mA	720	670	630	630	630	MHz
	12 mA	800	790	790	790	790	MHz
DIFFERENTIAL 1.2-V HSTL CLASS II	16 mA	550	530	510	510	510	MHz
DIFFERENTIAL 1.5-V HSTL CLASS I	4 mA	200	190	180	180	180	MHz
	6 mA	450	410	390	390	390	MHz
	8 mA	500	490	480	480	480	MHz
	10 mA	740	690	650	650	650	MHz
	12 mA	800	750	710	710	710	MHz
DIFFERENTIAL 1.5-V HSTL CLASS II	16 mA	600	590	590	590	590	MHz
DIFFERENTIAL 1.8-V HSTL CLASS I	4 mA	80	60	50	50	50	MHz
	6 mA	300	270	250	250	250	MHz
	8 mA	440	420	410	410	410	MHz
	10 mA	470	440	410	410	410	MHz
	12 mA	540	520	510	510	510	MHz
DIFFERENTIAL 1.8-V HSTL CLASS II	16 mA	570	540	520	520	520	MHz
DIFFERENTIAL 1.5-V SSTL CLASS I	4 mA	100	80	70	70	70	MHz
	6 mA	450	410	370	370	370	MHz
	8 mA	550	530	490	490	490	MHz
	10 mA	770	680	610	610	610	MHz
	12 mA	800	720	650	650	650	MHz
DIFFERENTIAL 1.5-V SSTL CLASS II	8 mA	530	510	490	490	490	MHz
	16 mA	800	780	730	730	730	MHz
DIFFERENTIAL 1.8-V SSTL CLASS I	4 mA	200	120	90	90	90	MHz
	6 mA	450	280	200	200	200	MHz
	8 mA	540	500	470	470	470	MHz
	10 mA	650	600	550	550	550	MHz
	12 mA	720	650	580	580	580	MHz
DIFFERENTIAL 1.8-V SSTL CLASS II	8 mA	530	510	490	490	490	MHz
	16 mA	800	780	730	730	730	MHz
DIFFERENTIAL 2.5-V SSTL CLASS I	8 mA	540	470	420	420	420	MHz
	10 mA	700	620	550	550	550	MHz
	12 mA	800	750	710	710	710	MHz



**Table 1-44.** Maximum Output Toggle Rate on Stratix III Devices for Dedicated Clock Output Pins (Note 1) (Part 4 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
DIFFERENTIAL 2.5-V SSTL CLASS II	16 mA	580	550	530	530	530	MHz
3.0-V PCI	—	400	380	360	360	360	MHz
3.0-V PCI-X	—	400	380	360	360	360	MHz
LVDS	—	800	717	717	717	717	MHz
LVDS_E_1R	—	156	100	100	100	100	MHz
LVDS_E_3R	—	550	550	400	400	400	MHz
MINI-LVDS	—	500	450	450	450	450	MHz
MINI-LVDS_E_1R	—	156	100	100	100	100	MHz
MINI-LVDS_E_3R	—	550	550	400	400	400	MHz
RSDS	—	500	450	450	450	450	MHz
RSDS_E_1R	—	156	100	100	100	100	MHz
RSDS_E_3R	—	550	550	400	400	400	MHz
3.3-V LVTTTL	OCT 50 Ω	300	280	260	260	260	MHz
3.3-V LVCMOS	OCT 50 Ω	300	280	260	260	260	MHz
3.0-V LVTTTL	OCT 50 Ω	300	250	210	210	210	MHz
3.0-V LVCMOS	OCT 50 Ω	300	250	210	210	210	MHz
2.5 V	OCT 50 Ω	350	310	260	260	260	MHz
1.8 V	OCT 50 Ω	350	310	250	250	250	MHz
1.5 V	OCT 50 Ω	350	310	250	250	250	MHz
1.2 V	OCT 50 Ω	350	290	220	220	220	MHz
SSTL-2 CLASS I	OCT 50 Ω	800	770	720	720	720	MHz
SSTL-2 CLASS II	OCT 25 Ω	690	680	670	670	670	MHz
SSTL-18 CLASS I	OCT 50 Ω	830	820	810	810	810	MHz
SSTL-18 CLASS II	OCT 25 Ω	810	780	750	750	750	MHz
SSTL-15 CLASS I	OCT 50 Ω	930	910	890	890	890	MHz
SSTL-15 CLASS II	OCT 25 Ω	730	710	690	690	690	MHz
1.8-V HSTL CLASS I	OCT 50 Ω	800	780	760	760	760	MHz
1.8-V HSTL CLASS II	OCT 25 Ω	750	730	710	710	710	MHz
1.5-V HSTL CLASS I	OCT 50 Ω	800	780	760	760	760	MHz
1.5-V HSTL CLASS II	OCT 25 Ω	740	720	700	700	700	MHz
1.2-V HSTL CLASS I	OCT 50 Ω	850	810	770	770	770	MHz
1.2-V HSTL CLASS II	OCT 25 Ω	800	760	720	720	720	MHz
DIFFERENTIAL 1.2-V HSTL CLASS I	OCT 50 Ω	850	810	770	770	770	MHz
DIFFERENTIAL 1.2-V HSTL CLASS II	OCT 25 Ω	800	760	720	720	720	MHz
DIFFERENTIAL 1.5-V HSTL CLASS I	OCT 50 Ω	800	780	760	760	760	MHz

**Table 1-44.** Maximum Output Toggle Rate on Stratix III Devices for Dedicated Clock Output Pins (*Note 1*) (Part 5 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
DIFFERENTIAL 1.5-V HSTL CLASS II	OCT 25 Ω	740	720	700	700	700	MHz
DIFFERENTIAL 1.8-V HSTL CLASS I	OCT 50 Ω	800	780	760	760	760	MHz
DIFFERENTIAL 1.8-V HSTL CLASS II	OCT 25 Ω	750	730	710	710	710	MHz
DIFFERENTIAL 1.5-V SSTL CLASS I	OCT 50 Ω	930	910	890	890	890	MHz
DIFFERENTIAL 1.5-V SSTL CLASS II	OCT 25 Ω	730	710	690	690	690	MHz
DIFFERENTIAL 1.8-V SSTL CLASS I	OCT 50 Ω	830	820	810	810	810	MHz
DIFFERENTIAL 1.8-V SSTL CLASS II	OCT 25 Ω	810	780	750	750	750	MHz
DIFFERENTIAL 2.5-V SSTL CLASS I	OCT 50 Ω	800	770	720	720	720	MHz
DIFFERENTIAL 2.5-V SSTL CLASS II	OCT 25 Ω	690	680	670	670	670	MHz

**Note to Table 1-44:**

(1) The maximum output toggle rates are specified at 0 pF load at Quartus II default slew rate setting.

Table 1-45 specifies the derating factors for the output clock toggle rate for column I/O pins. Table 1-46 specifies the derating factors for the output clock toggle rate for row I/O pins for a non-0 pF load.

**Table 1-45.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Column I/O Pins (*Note 1*) (Part 1 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Units
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
3.3-V LVTTTL	4 mA	545	561	578	578	578	ps/pF
	8 mA	358	366	373	373	373	ps/pF
	12 mA	235	237	253	253	253	ps/pF
	16 mA	220	221	257	257	257	ps/pF
3.3-V LVCMOS	4 mA	543	550	576	576	576	ps/pF
	8 mA	252	252	252	252	252	ps/pF
	12 mA	244	249	251	251	251	ps/pF
	16 mA	207	209	219	219	219	ps/pF
3.0-V LVTTTL	4 mA	510	539	573	573	573	ps/pF
	8 mA	255	257	261	261	261	ps/pF
	12 mA	254	254	256	256	256	ps/pF
	16 mA	231	241	252	252	252	ps/pF

**Table 1-45.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Column I/O Pins (Note 1) (Part 2 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Units
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
3.0-V LVCMOS	4 mA	395	408	409	409	409	ps/pF
	8 mA	235	241	250	250	250	ps/pF
	12 mA	111	113	113	113	113	ps/pF
	16 mA	110	111	112	112	112	ps/pF
2.5 V	4 mA	368	372	375	375	375	ps/pF
	8 mA	185	217	248	248	248	ps/pF
	12 mA	145	169	192	192	192	ps/pF
	16 mA	123	128	132	132	132	ps/pF
1.8 V	2 mA	878	870	1100	1100	1100	ps/pF
	4 mA	326	379	432	432	432	ps/pF
	6 mA	240	312	384	384	384	ps/pF
	8 mA	234	238	240	240	240	ps/pF
	10 mA	144	160	176	176	176	ps/pF
	12 mA	77	79	82	82	82	ps/pF
1.5 V	2 mA	685	814	943	943	943	ps/pF
	4 mA	226	290	355	355	355	ps/pF
	6 mA	218	225	270	270	270	ps/pF
	8 mA	194	265	415	415	415	ps/pF
	10 mA	66	67	69	69	69	ps/pF
	12 mA	66	66	67	67	67	ps/pF
1.2 V	2 mA	545	613	681	681	681	ps/pF
	4 mA	228	306	383	383	383	ps/pF
	6 mA	196	200	224	224	224	ps/pF
	8 mA	195	196	196	196	196	ps/pF
SSTL-2 CLASS I	8 mA	113	150	203	203	203	ps/pF
	10 mA	135	170	205	205	205	ps/pF
	12 mA	64	65	72	72	72	ps/pF
SSTL-2 CLASS II	16 mA	32	33	33	33	33	ps/pF
SSTL-18 CLASS I	4 mA	459	475	481	481	481	ps/pF
	6 mA	376	378	382	382	382	ps/pF
	8 mA	263	265	267	267	267	ps/pF
	10 mA	53	53	55	55	55	ps/pF
	12 mA	50	52	52	52	52	ps/pF
SSTL-18 CLASS II	8 mA	238	340	442	442	442	ps/pF
	16 mA	16	20	28	28	28	ps/pF

**Table 1-45.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Column I/O Pins (*Note 1*) (Part 3 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Units
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
SSTL-15 CLASS I	4 mA	437	438	442	442	442	ps/pF
	6 mA	317	326	329	329	329	ps/pF
	8 mA	117	171	226	226	226	ps/pF
	10 mA	69	72	73	73	73	ps/pF
	12 mA	68	70	71	71	71	ps/pF
SSTL-15 CLASS II	8 mA	238	340	442	442	442	ps/pF
	16 mA	16	20	28	28	28	ps/pF
1.8-V HSTL CLASS I	4 mA	146	157	196	196	196	ps/pF
	6 mA	102	104	105	105	105	ps/pF
	8 mA	72	76	79	79	79	ps/pF
	10 mA	35	38	39	39	39	ps/pF
	12 mA	28	30	30	30	30	ps/pF
1.8-V HSTL CLASS II	16 mA	90	91	92	92	92	ps/pF
1.5-V HSTL CLASS I	4 mA	262	289	292	292	292	ps/pF
	6 mA	139	142	146	146	146	ps/pF
	8 mA	82	95	110	110	110	ps/pF
	10 mA	79	92	104	104	104	ps/pF
	12 mA	40	41	41	41	41	ps/pF
1.5-V HSTL CLASS II	16 mA	79	81	82	82	82	ps/pF
1.2-V HSTL CLASS I	4 mA	344	344	385	385	385	ps/pF
	6 mA	143	151	159	159	159	ps/pF
	8 mA	106	111	157	157	157	ps/pF
	10 mA	78	84	98	98	98	ps/pF
	12 mA	67	88	108	108	108	ps/pF
1.2-V HSTL CLASS II	16 mA	76	80	86	86	86	ps/pF
DIFFERENTIAL 1.2-V HSTL CLASS I	4 mA	344	344	385	385	385	ps/pF
	6 mA	143	151	159	159	159	ps/pF
	8 mA	106	111	157	157	157	ps/pF
	10 mA	78	84	98	98	98	ps/pF
	12 mA	67	88	108	108	108	ps/pF
DIFFERENTIAL 1.2-V HSTL CLASS II	16 mA	76	80	86	86	86	ps/pF
DIFFERENTIAL 1.5-V HSTL CLASS I	4 mA	262	289	292	292	292	ps/pF
	6 mA	139	142	146	146	146	ps/pF
	8 mA	82	95	110	110	110	ps/pF
	10 mA	79	92	104	104	104	ps/pF
	12 mA	40	41	41	41	41	ps/pF
DIFFERENTIAL 1.5-V HSTL CLASS II	16 mA	79	81	82	82	82	ps/pF

**Table 1-45.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Column I/O Pins (*Note 1*) (Part 4 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Units
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
DIFFERENTIAL 1.8-V HSTL CLASS I	4 mA	146	157	196	196	196	ps/pF
	6 mA	102	104	105	105	105	ps/pF
	8 mA	72	76	79	79	79	ps/pF
	10 mA	35	38	39	39	39	ps/pF
	12 mA	28	30	30	30	30	ps/pF
DIFFERENTIAL 1.8-V HSTL CLASS II	16 mA	90	91	92	92	92	ps/pF
DIFFERENTIAL 1.5-V SSTL CLASS I	4 mA	437	438	442	442	442	ps/pF
	6 mA	317	326	329	329	329	ps/pF
	8 mA	117	171	226	226	226	ps/pF
	10 mA	69	72	73	73	73	ps/pF
	12 mA	68	70	71	71	71	ps/pF
DIFFERENTIAL 1.5-V SSTL CLASS II	8 mA	238	340	442	442	442	ps/pF
	16 mA	16	20	28	28	28	ps/pF
DIFFERENTIAL 1.8-V SSTL CLASS I	4 mA	459	475	481	481	481	ps/pF
	6 mA	376	378	382	382	382	ps/pF
	8 mA	263	265	267	267	267	ps/pF
	10 mA	53	53	55	55	55	ps/pF
	12 mA	50	52	52	52	52	ps/pF
DIFFERENTIAL 1.8-V SSTL CLASS II	8 mA	238	340	442	442	442	ps/pF
	16 mA	16	20	28	28	28	ps/pF
DIFFERENTIAL 2.5-V SSTL CLASS I	8 mA	113	150	203	203	203	ps/pF
	10 mA	135	170	205	205	205	ps/pF
	12 mA	64	65	72	72	72	ps/pF
DIFFERENTIAL 2.5-V SSTL CLASS II	16 mA	32	33	33	33	33	ps/pF
3.0-V PCI	—	108	110	113	113	113	ps/pF
3.0-V PCI-X	—	108	110	113	113	113	ps/pF
LVDS_E_1R	—	35	42	42	42	42	ps/pF
LVDS_E_3R	—	49	52	52	52	52	ps/pF
MINI-LVDS_E_1R	—	35	42	42	42	42	ps/pF
MINI-LVDS_E_3R	—	49	52	52	52	52	ps/pF
RSDS_E_1R	—	35	42	42	42	42	ps/pF
RSDS_E_3R	—	49	52	52	52	52	ps/pF
3.3-V LVTTTL	OCT 50 Ω	207	219	231	231	231	ps/pF
3.3-V LVCMOS	OCT 50 Ω	207	219	231	231	231	ps/pF
3.0-V LVTTTL	OCT 50 Ω	307	310	381	381	381	ps/pF
3.0-V LVCMOS	OCT 50 Ω	307	310	381	381	381	ps/pF
2.5 V	OCT 50 Ω	227	231	232	232	232	ps/pF

**Table 1-45.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Column I/O Pins (*Note 1*) (Part 5 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Units
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
1.8 V	OCT 50 Ω	240	241	245	245	245	ps/pF
1.5 V	OCT 50 Ω	256	269	282	282	282	ps/pF
1.2 V	OCT 50 Ω	248	250	293	293	293	ps/pF
SSTL-2 CLASS I	OCT 50 Ω	118	121	123	123	123	ps/pF
SSTL-2 CLASS II	OCT 25 Ω	117	120	122	122	122	ps/pF
SSTL-18 CLASS I	OCT 50 Ω	128	131	134	134	134	ps/pF
SSTL-18 CLASS II	OCT 25 Ω	125	135	138	138	138	ps/pF
SSTL-15 CLASS I	OCT 50 Ω	108	109	109	109	109	ps/pF
SSTL-15 CLASS II	OCT 25 Ω	88	88	88	88	88	ps/pF
1.8-V HSTL CLASS I	OCT 50 Ω	104	105	106	106	106	ps/pF
1.8-V HSTL CLASS II	OCT 25 Ω	80	94	95	95	95	ps/pF
1.5-V HSTL CLASS I	OCT 50 Ω	110	110	111	111	111	ps/pF
1.5-V HSTL CLASS II	OCT 25 Ω	104	112	121	121	121	ps/pF
1.2-V HSTL CLASS I	OCT 50 Ω	115	115	114	114	114	ps/pF
1.2-V HSTL CLASS II	OCT 25 Ω	108	110	112	112	112	ps/pF
DIFFERENTIAL 1.2-V HSTL CLASS I	OCT 50 Ω	115	115	114	114	114	ps/pF
DIFFERENTIAL 1.2-V HSTL CLASS II	OCT 25 Ω	108	110	112	112	112	ps/pF
DIFFERENTIAL 1.5-V HSTL CLASS I	OCT 50 Ω	110	110	111	111	111	ps/pF
DIFFERENTIAL 1.5-V HSTL CLASS II	OCT 25 Ω	104	112	121	121	121	ps/pF
DIFFERENTIAL 1.8-V HSTL CLASS I	OCT 50 Ω	104	105	106	106	106	ps/pF
DIFFERENTIAL 1.8-V HSTL CLASS II	OCT 25 Ω	80	94	95	95	95	ps/pF
DIFFERENTIAL 1.5-V SSTL CLASS I	OCT 50 Ω	108	109	109	109	109	ps/pF
DIFFERENTIAL 1.5-V SSTL CLASS II	OCT 25 Ω	88	88	88	88	88	ps/pF
DIFFERENTIAL 1.8-V SSTL CLASS I	OCT 50 Ω	128	131	134	134	134	ps/pF
DIFFERENTIAL 1.8-V SSTL CLASS II	OCT 25 Ω	125	135	138	138	138	ps/pF
DIFFERENTIAL 2.5-V SSTL CLASS I	OCT 50 Ω	118	121	123	123	123	ps/pF
DIFFERENTIAL 2.5-V SSTL CLASS II	OCT 25 Ω	117	120	122	122	122	ps/pF

**Note to Table 1-45:**

(1) The maximum output toggle rates are specified at 0 pF load at Quartus II default (fast) slew rate setting.

**Table 1-46.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Row I/O Pins (*Note 1*) (Part 1 of 4)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Units
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
3.3-V LVTTTL	4 mA	545	561	578	578	578	ps/pF
	8 mA	358	366	373	373	373	ps/pF
	12 mA	235	237	252	252	252	ps/pF
3.3-V LVCMOS	4 mA	542	548	574	574	574	ps/pF
	8 mA	251	251	251	251	251	ps/pF
3.0-V LVTTTL	4 mA	509	538	572	572	572	ps/pF
	8 mA	254	256	260	260	260	ps/pF
	12 mA	254	254	256	256	256	ps/pF
3.0-V LVCMOS	4 mA	395	408	409	409	409	ps/pF
	8 mA	235	241	250	250	250	ps/pF
2.5 V	4 mA	315	346	431	431	374	ps/pF
	8 mA	228	230	232	232	248	ps/pF
	12 mA	159	159	161	161	192	ps/pF
1.8 V	2 mA	811	870	1102	1102	1102	ps/pF
	4 mA	303	379	433	433	433	ps/pF
	6 mA	288	312	384	384	384	ps/pF
	8 mA	226	238	240	240	240	ps/pF
1.5 V	2 mA	707	814	944	944	944	ps/pF
	4 mA	398	288	354	354	354	ps/pF
	6 mA	288	224	269	269	269	ps/pF
	8 mA	245	265	416	416	416	ps/pF
1.2 V	2 mA	572	611	678	678	678	ps/pF
	4 mA	246	305	382	382	382	ps/pF
SSTL-2 CLASS I	8 mA	144	146	146	146	203	ps/pF
	12 mA	88	90	91	91	71	ps/pF
SSTL-2 CLASS II	16 mA	55	66	63	63	32	ps/pF
SSTL-18 CLASS I	4 mA	537	473	478	478	478	ps/pF
	6 mA	301	378	382	382	382	ps/pF
	8 mA	118	266	268	268	268	ps/pF
	10 mA	80	52	54	54	54	ps/pF
	12 mA	79	51	51	51	51	ps/pF
SSTL-18 CLASS II	8 mA	211	341	444	444	444	ps/pF
	16 mA	57	19	27	27	27	ps/pF
SSTL-15 CLASS I	4 mA	616	436	439	439	439	ps/pF
	6 mA	443	324	327	327	327	ps/pF
	8 mA	133	171	226	226	226	ps/pF

**Table 1-46.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Row I/O Pins (Note 1) (Part 2 of 4)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Units
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
1.8-V HSTL CLASS I	4 mA	176	156	196	196	196	ps/pF
	6 mA	158	103	104	104	104	ps/pF
	8 mA	29	76	79	79	79	ps/pF
	10 mA	28	38	39	39	39	ps/pF
	12 mA	37	29	29	29	29	ps/pF
1.8-V HSTL CLASS II	16 mA	48	91	92	92	92	ps/pF
1.5-V HSTL CLASS I	4 mA	116	290	293	293	293	ps/pF
	6 mA	63	142	146	146	146	ps/pF
	8 mA	28	95	110	110	110	ps/pF
1.2-V HSTL CLASS I	4 mA	108	346	387	387	387	ps/pF
	6 mA	68	151	159	159	159	ps/pF
	8 mA	105	110	156	156	156	ps/pF
DIFFERENTIAL 1.2-V HSTL CLASS I	4 mA	108	115	126	126	126	ps/pF
	6 mA	68	74	80	80	80	ps/pF
	8 mA	105	161	253	253	253	ps/pF
DIFFERENTIAL 1.5-V HSTL CLASS I	4 mA	116	118	121	121	121	ps/pF
	6 mA	63	68	72	72	72	ps/pF
	8 mA	28	43	65	65	65	ps/pF
DIFFERENTIAL 1.8-V HSTL CLASS I	4 mA	176	178	184	184	184	ps/pF
	6 mA	158	159	169	169	169	ps/pF
	8 mA	29	34	45	45	45	ps/pF
	10 mA	28	30	32	32	32	ps/pF
	12 mA	37	50	63	63	63	ps/pF
DIFFERENTIAL 1.8-V HSTL CLASS II	16 mA	48	49	50	50	50	ps/pF
DIFFERENTIAL 1.5-V SSTL CLASS I	4 mA	616	631	644	644	644	ps/pF
	6 mA	443	478	506	506	506	ps/pF
	8 mA	133	134	135	135	135	ps/pF
DIFFERENTIAL 1.8-V SSTL CLASS I	4 mA	537	614	703	703	703	ps/pF
	6 mA	301	308	309	309	309	ps/pF
	8 mA	118	129	139	139	139	ps/pF
	10 mA	80	82	82	82	82	ps/pF
	12 mA	79	79	79	79	79	ps/pF
DIFFERENTIAL 1.8-V SSTL CLASS II	8 mA	211	215	219	219	219	ps/pF
	16 mA	57	71	101	101	101	ps/pF
DIFFERENTIAL 2.5-V SSTL CLASS I	8 mA	144	146	146	146	146	ps/pF
	12 mA	88	90	91	91	91	ps/pF
DIFFERENTIAL 2.5-V SSTL CLASS II	16 mA	55	66	63	63	63	ps/pF



**Table 1-46.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Row I/O Pins (*Note 1*) (Part 3 of 4)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Units
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
3.0-V PCI	—	108	110	113	113	113	ps/pF
3.0-V PCI-X	—	108	110	113	113	113	ps/pF
LVDS	—	68	75	75	75	75	ps/pF
LVDS_E_1R	—	35	42	42	42	42	ps/pF
LVDS_E_3R	—	49	52	52	52	52	ps/pF
MINI-LVDS	—	68	75	75	75	75	ps/pF
MINI-LVDS_E_1R	—	35	42	42	42	42	ps/pF
MINI-LVDS_E_3R	—	49	52	52	52	52	ps/pF
RSDS	—	68	75	75	75	75	ps/pF
RSDS_E_1R	—	35	42	42	42	42	ps/pF
RSDS_E_3R	—	49	52	52	52	52	ps/pF
3.3-V LVTTTL	OCT 50 Ω	206	217	229	229	229	ps/pF
3.3-V LVCMOS	OCT 50 Ω	206	217	229	229	229	ps/pF
3.0-V LVTTTL	OCT 50 Ω	306	309	381	381	381	ps/pF
3.0-V LVCMOS	OCT 50 Ω	306	309	381	381	381	ps/pF
2.5 V	OCT 50 Ω	328	334	339	339	230	ps/pF
1.8 V	OCT 50 Ω	200	241	245	245	245	ps/pF
1.5 V	OCT 50 Ω	189	269	282	282	282	ps/pF
1.2 V	OCT 50 Ω	222	249	292	292	292	ps/pF
SSTL-2 CLASS I	OCT 50 Ω	130	133	135	135	122	ps/pF
SSTL-2 CLASS II	OCT 25 Ω	129	132	135	135	121	ps/pF
SSTL-18 CLASS I	OCT 50 Ω	141	130	133	133	133	ps/pF
SSTL-18 CLASS II	OCT 25 Ω	138	134	137	137	137	ps/pF
SSTL-15 CLASS I	OCT 50 Ω	118	108	108	108	108	ps/pF
1.8-V HSTL CLASS I	OCT 50 Ω	114	104	105	105	105	ps/pF
1.8-V HSTL CLASS II	OCT 25 Ω	88	93	94	94	94	ps/pF
1.5-V HSTL CLASS I	OCT 50 Ω	121	109	110	110	110	ps/pF
1.2-V HSTL CLASS I	OCT 50 Ω	126	114	113	113	113	ps/pF
DIFFERENTIAL 1.2-V HSTL CLASS I	OCT 50 Ω	126	126	126	126	126	ps/pF
DIFFERENTIAL 1.5-V HSTL CLASS I	OCT 50 Ω	121	122	122	122	122	ps/pF
DIFFERENTIAL 1.8-V HSTL CLASS I	OCT 50 Ω	114	115	116	116	116	ps/pF
DIFFERENTIAL 1.8-V HSTL CLASS II	OCT 25 Ω	88	104	105	105	105	ps/pF
DIFFERENTIAL 1.5-V SSTL CLASS I	OCT 50 Ω	118	119	120	120	120	ps/pF
DIFFERENTIAL 1.8-V SSTL CLASS I	OCT 50 Ω	141	144	147	147	147	ps/pF

**Table 1-46.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Row I/O Pins (*Note 1*) (Part 4 of 4)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Units
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
DIFFERENTIAL 1.8-V SSTL CLASS II	OCT 25 Ω	138	148	152	152	152	ps/pF
DIFFERENTIAL 2.5-V SSTL CLASS I	OCT 50 Ω	130	133	135	135	135	ps/pF
DIFFERENTIAL 2.5-V SSTL CLASS II	OCT 25 Ω	129	132	135	135	135	ps/pF

**Note to Table 1-46:**

(1) The maximum output toggle rates are specified at 0 pF load at Quartus II default (fast) slew rate setting.

**Table 1-47.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Dedicated Clock Output Pins (*Note 1*) (Part 1 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
3.3-V LVTTTL	4 mA	545	561	578	578	578	ps/pF
	8 mA	358	366	373	373	373	ps/pF
	12 mA	235	237	253	253	253	ps/pF
	16 mA	220	221	257	257	257	ps/pF
3.3-V LVCMOS	4 mA	543	550	576	576	576	ps/pF
	8 mA	252	252	252	252	252	ps/pF
	12 mA	244	249	251	251	251	ps/pF
	16 mA	207	209	219	219	219	ps/pF
3.0-V LVTTTL	4 mA	510	539	573	573	573	ps/pF
	8 mA	255	257	261	261	261	ps/pF
	12 mA	254	254	256	256	256	ps/pF
	16 mA	231	241	252	252	252	ps/pF
3.0-V LVCMOS	4 mA	395	408	409	409	409	ps/pF
	8 mA	235	241	250	250	250	ps/pF
	12 mA	111	113	113	113	113	ps/pF
	16 mA	110	111	112	112	112	ps/pF
2.5 V	4 mA	368	372	375	375	375	ps/pF
	8 mA	185	217	248	248	248	ps/pF
	12 mA	145	169	192	192	192	ps/pF
	16 mA	123	128	132	132	132	ps/pF
1.8 V	2 mA	878	870	1100	1100	1100	ps/pF
	4 mA	326	379	432	432	432	ps/pF
	6 mA	240	312	384	384	384	ps/pF
	8 mA	234	238	240	240	240	ps/pF
	10 mA	144	160	176	176	176	ps/pF
	12 mA	77	79	82	82	82	ps/pF

**Table 1-47.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Dedicated Clock Output Pins  
(Note 1) (Part 2 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
1.5 V	2 mA	685	814	943	943	943	ps/pF
	4 mA	226	290	355	355	355	ps/pF
	6 mA	218	225	270	270	270	ps/pF
	8 mA	194	265	415	415	415	ps/pF
	10 mA	66	67	69	69	69	ps/pF
	12 mA	66	66	67	67	67	ps/pF
1.2 V	2 mA	545	613	681	681	681	ps/pF
	4 mA	228	306	383	383	383	ps/pF
	6 mA	196	200	224	224	224	ps/pF
	8 mA	195	196	196	196	196	ps/pF
SSTL-2 CLASS I	8 mA	113	150	203	203	203	ps/pF
	10 mA	135	170	205	205	205	ps/pF
	12 mA	64	65	72	72	72	ps/pF
SSTL-2 CLASS II	16 mA	32	33	33	33	33	ps/pF
SSTL-18 CLASS I	4 mA	459	475	481	481	481	ps/pF
	6 mA	376	378	382	382	382	ps/pF
	8 mA	263	265	267	267	267	ps/pF
	10 mA	53	53	55	55	55	ps/pF
	12 mA	50	52	52	52	52	ps/pF
SSTL-18 CLASS II	8 mA	238	340	442	442	442	ps/pF
	16 mA	16	20	28	28	28	ps/pF
SSTL-15 CLASS I	4 mA	437	438	442	442	442	ps/pF
	6 mA	317	326	329	329	329	ps/pF
	8 mA	117	171	226	226	226	ps/pF
	10 mA	69	72	73	73	73	ps/pF
	12 mA	68	70	71	71	71	ps/pF
SSTL-15 CLASS II	8 mA	238	340	442	442	442	ps/pF
	16 mA	16	20	28	28	28	ps/pF
1.8-V HSTL CLASS I	4 mA	146	157	196	196	196	ps/pF
	6 mA	102	104	105	105	105	ps/pF
	8 mA	72	76	79	79	79	ps/pF
	10 mA	35	38	39	39	39	ps/pF
	12 mA	28	30	30	30	30	ps/pF
1.8-V HSTL CLASS II	16 mA	90	91	92	92	92	ps/pF

**Table 1-47.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Dedicated Clock Output Pins  
(Note 1) (Part 3 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
1.5-V HSTL CLASS I	4 mA	262	289	292	292	292	ps/pF
	6 mA	139	142	146	146	146	ps/pF
	8 mA	82	95	110	110	110	ps/pF
	10 mA	79	92	104	104	104	ps/pF
	12 mA	40	41	41	41	41	ps/pF
1.5-V HSTL CLASS II	16 mA	79	81	82	82	82	ps/pF
1.2-V HSTL CLASS I	4 mA	344	344	385	385	385	ps/pF
	6 mA	143	151	159	159	159	ps/pF
	8 mA	106	111	157	157	157	ps/pF
	10 mA	78	84	98	98	98	ps/pF
	12 mA	67	88	108	108	108	ps/pF
1.2-V HSTL CLASS II	16 mA	76	80	86	86	86	ps/pF
DIFFERENTIAL 1.2-V HSTL CLASS I	4 mA	344	344	385	385	385	ps/pF
	6 mA	143	151	159	159	159	ps/pF
	8 mA	106	111	157	157	157	ps/pF
	10 mA	78	84	98	98	98	ps/pF
	12 mA	67	88	108	108	108	ps/pF
DIFFERENTIAL 1.2-V HSTL CLASS II	16 mA	76	80	86	86	86	ps/pF
DIFFERENTIAL 1.5-V HSTL CLASS I	4 mA	262	289	292	292	292	ps/pF
	6 mA	139	142	146	146	146	ps/pF
	8 mA	82	95	110	110	110	ps/pF
	10 mA	79	92	104	104	104	ps/pF
	12 mA	40	41	41	41	41	ps/pF
DIFFERENTIAL 1.5-V HSTL CLASS II	16 mA	79	81	82	82	82	ps/pF
DIFFERENTIAL 1.8-V HSTL CLASS I	4 mA	146	157	196	196	196	ps/pF
	6 mA	102	104	105	105	105	ps/pF
	8 mA	72	76	79	79	79	ps/pF
	10 mA	35	38	39	39	39	ps/pF
	12 mA	28	30	30	30	30	ps/pF
DIFFERENTIAL 1.8-V HSTL CLASS II	16 mA	90	91	92	92	92	ps/pF
DIFFERENTIAL 1.5-V SSTL CLASS I	4 mA	437	438	442	442	442	ps/pF
	6 mA	317	326	329	329	329	ps/pF
	8 mA	117	171	226	226	226	ps/pF
	10 mA	69	72	73	73	73	ps/pF
	12 mA	68	70	71	71	71	ps/pF

**Table 1-47.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Dedicated Clock Output Pins  
(Note 1) (Part 4 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
DIFFERENTIAL 1.5-V SSTL CLASS II	8 mA	238	340	442	442	442	ps/pF
	16 mA	16	20	28	28	28	ps/pF
DIFFERENTIAL 1.8-V SSTL CLASS I	4 mA	459	475	481	481	481	ps/pF
	6 mA	376	378	382	382	382	ps/pF
	8 mA	263	265	267	267	267	ps/pF
	10 mA	53	53	55	55	55	ps/pF
	12 mA	50	52	52	52	52	ps/pF
DIFFERENTIAL 1.8-V SSTL CLASS II	8 mA	238	340	442	442	442	ps/pF
	16 mA	16	20	28	28	28	ps/pF
DIFFERENTIAL 2.5-V SSTL CLASS I	8 mA	113	150	203	203	203	ps/pF
	10 mA	135	170	205	205	205	ps/pF
	12 mA	64	65	72	72	72	ps/pF
DIFFERENTIAL 2.5-V SSTL CLASS II	16 mA	32	33	33	33	33	ps/pF
3.0-V PCI	—	108	110	113	113	113	ps/pF
3.0-V PCI-X	—	108	110	113	113	113	ps/pF
LVDS	—	68	75	75	75	75	ps/pF
LVDS_E_1R	—	35	42	42	42	42	ps/pF
LVDS_E_3R	—	49	52	52	52	52	ps/pF
MINI-LVDS	—	68	75	75	75	75	ps/pF
MINI-LVDS_E_1R	—	35	42	42	42	42	ps/pF
MINI-LVDS_E_3R	—	49	52	52	52	52	ps/pF
RSDS	—	68	75	75	75	75	ps/pF
RSDS_E_1R	—	35	42	42	42	42	ps/pF
RSDS_E_3R	—	49	52	52	52	52	ps/pF
3.3-V LVTTTL	OCT 50 Ω	207	219	231	231	231	ps/pF
3.3-V LVCMOS	OCT 50 Ω	207	219	231	231	231	ps/pF
3.0-V LVTTTL	OCT 50 Ω	307	310	381	381	381	ps/pF
3.0-V LVCMOS	OCT 50 Ω	307	310	381	381	381	ps/pF
2.5 V	OCT 50 Ω	227	231	232	232	232	ps/pF
1.8 V	OCT 50 Ω	240	241	245	245	245	ps/pF
1.5 V	OCT 50 Ω	256	269	282	282	282	ps/pF
1.2 V	OCT 50 Ω	248	250	293	293	293	ps/pF
SSTL-2 CLASS I	OCT 50 Ω	118	121	123	123	123	ps/pF
SSTL-2 CLASS II	OCT 25 Ω	117	120	122	122	122	ps/pF
SSTL-18 CLASS I	OCT 50 Ω	128	131	134	134	134	ps/pF
SSTL-18 CLASS II	OCT 25 Ω	125	135	138	138	138	ps/pF
SSTL-15 CLASS I	OCT 50 Ω	108	109	109	109	109	ps/pF

**Table 1-47.** Maximum Output Toggle Rate Derating Factors on Stratix III Devices for Dedicated Clock Output Pins  
(Note 1) (Part 5 of 5)

I/O Standard	Current Strength	C2	C3, I3	C4, I4	C4L, I4L		Unit
		V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
SSTL-15 CLASS II	OCT 25 Ω	88	88	88	88	88	ps/pF
1.8-V HSTL CLASS I	OCT 50 Ω	104	105	106	106	106	ps/pF
1.8-V HSTL CLASS II	OCT 25 Ω	80	94	95	95	95	ps/pF
1.5-V HSTL CLASS I	OCT 50 Ω	110	110	111	111	111	ps/pF
1.5-V HSTL CLASS II	OCT 25 Ω	104	112	121	121	121	ps/pF
1.2-V HSTL CLASS I	OCT 50 Ω	115	115	114	114	114	ps/pF
1.2-V HSTL CLASS II	OCT 25 Ω	108	110	112	112	112	ps/pF
DIFFERENTIAL 1.2-V HSTL CLASS I	OCT 50 Ω	115	115	114	114	114	ps/pF
DIFFERENTIAL 1.2-V HSTL CLASS II	OCT 25 Ω	108	110	112	112	112	ps/pF
DIFFERENTIAL 1.5-V HSTL CLASS I	OCT 50 Ω	110	110	111	111	111	ps/pF
DIFFERENTIAL 1.5-V HSTL CLASS II	OCT 25 Ω	104	112	121	121	121	ps/pF
DIFFERENTIAL 1.8-V HSTL CLASS I	OCT 50 Ω	104	105	106	106	106	ps/pF
DIFFERENTIAL 1.8-V HSTL CLASS II	OCT 25 Ω	80	94	95	95	95	ps/pF
DIFFERENTIAL 1.5-V SSTL CLASS I	OCT 50 Ω	108	109	109	109	109	ps/pF
DIFFERENTIAL 1.5-V SSTL CLASS II	OCT 25 Ω	88	88	88	88	88	ps/pF
DIFFERENTIAL 1.8-V SSTL CLASS I	OCT 50 Ω	128	131	134	134	134	ps/pF
DIFFERENTIAL 1.8-V SSTL CLASS II	OCT 25 Ω	125	135	138	138	138	ps/pF
DIFFERENTIAL 2.5-V SSTL CLASS I	OCT 50 Ω	118	121	123	123	123	ps/pF
DIFFERENTIAL 2.5-V SSTL CLASS II	OCT 25 Ω	117	120	122	122	122	ps/pF

**Note to Table 1-47 :**

(1) The maximum output toggle rates are specified at 0 pF load at Quartus II default (fast) slew rate setting.

## Programmable IOE Delay

Table 1-48 shows Stratix III IOE programmable delay settings. Refer to Figure 7-8 in the Stratix III Device I/O Features chapter for annotation of delays in the IOE.

**Table 1-48.** Stratix III IOE Programmable Delay

Parameter	Available Settings	C2 Speed Grade	
		Minimum Delay (ps)	Maximum Delay (ps)
D1	16	150	900
D2	8	330	700
D3	8	155	2581
D4	15	115	750
D5	16	123	897
D6	7	118	377

**Note to Table 1-48:**

- (1) The minimum delay chain represented in the table refers to the intrinsic delay (that is, the value for the Assignment Name is '0').
- (2) You can set this value in the Quartus II software by selecting D1, D2, D3, D4, D5, and D6 in the Assignment Name column.

## Programmable Output Buffer Delay

Table 1-49 lists the delay chain settings that control the rising and falling edge delays of the output buffer. Default delay is 0 ps.

**Table 1-49.** Programmable Output Buffer Delay (Note 1)

Symbol	Parameter	Typical	Unit
$D_{\text{OUTBUF}}$	Rising and/or Falling Edge delay	0 (default)	ps
		50	ps
		100	ps
		150	ps

**Note to Table 1-49:**

- (1) You can set the programmable output buffer delay in the Quartus II software by selecting the 'Output Buffer Delay Control' assignment to either positive, negative or both edges with the specific values as stated in the table above in ps for the 'Output Buffer Delay' assignment.

## User I/O Pin Timing

Table 1-50 through Table 1-149 show user I/O pin timing for Stratix III devices. I/O buffer  $t_{\text{su}}$ ,  $t_{\text{h}}$ , and  $t_{\text{co}}$  are reported for the cases when I/O clock is driven by a non-PLL global clock (GCLK) and a PLL driven global clock (GCLK-PLL). For  $t_{\text{su}}$ ,  $t_{\text{h}}$  and  $t_{\text{co}}$  using regional clock, add the value from the adder tables listed for each device to the GCLK/GCLK-PLL values for the device.

### EP3SL50 I/O Timing Parameters

Table 1-50 through Table 1-53 show the maximum I/O timing parameters for EP3SL50 devices for single-ended I/O standards.

Table 1-50 specifies EP3SL50 column pins input timing parameters for single-ended I/O standards.

**Table 1-50.** EP3SL50 Column Pins Input Timing Parameters (Part 1 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTL	GCLK	t <sub>su</sub>	-0.690	-0.689	-1.004	-1.103	-1.311	-1.266	-1.627	-1.103	-1.311	-1.266	-1.627	ns
		t <sub>h</sub>	0.816	0.814	1.182	1.304	1.531	1.475	1.830	1.304	1.531	1.475	1.830	ns
	GCLK PLL	t <sub>su</sub>	-0.975	-0.975	-1.405	-1.532	-1.773	-1.713	-2.026	-1.532	-1.773	-1.713	-2.026	ns
		t <sub>h</sub>	1.226	1.226	1.774	1.947	2.232	2.148	2.471	1.947	2.232	2.148	2.471	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-0.690	-0.689	-1.004	-1.103	-1.311	-1.266	-1.627	-1.103	-1.311	-1.266	-1.627	ns
		t <sub>h</sub>	0.816	0.814	1.182	1.304	1.531	1.475	1.830	1.304	1.531	1.475	1.830	ns
	GCLK PLL	t <sub>su</sub>	-0.975	-0.975	-1.405	-1.532	-1.773	-1.713	-2.026	-1.532	-1.773	-1.713	-2.026	ns
		t <sub>h</sub>	1.226	1.226	1.774	1.947	2.232	2.148	2.471	1.947	2.232	2.148	2.471	ns
3.0-V LVTTL	GCLK	t <sub>su</sub>	-0.701	-0.700	-1.003	-1.105	-1.310	-1.265	-1.626	-1.105	-1.310	-1.265	-1.626	ns
		t <sub>h</sub>	0.827	0.825	1.181	1.306	1.530	1.474	1.829	1.306	1.530	1.474	1.829	ns
	GCLK PLL	t <sub>su</sub>	-0.986	-0.986	-1.404	-1.534	-1.772	-1.712	-2.025	-1.534	-1.772	-1.712	-2.025	ns
		t <sub>h</sub>	1.237	1.237	1.773	1.949	2.231	2.147	2.470	1.949	2.231	2.147	2.470	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-0.701	-0.700	-1.003	-1.105	-1.310	-1.265	-1.626	-1.105	-1.310	-1.265	-1.626	ns
		t <sub>h</sub>	0.827	0.825	1.181	1.306	1.530	1.474	1.829	1.306	1.530	1.474	1.829	ns
	GCLK PLL	t <sub>su</sub>	-0.986	-0.986	-1.404	-1.534	-1.772	-1.712	-2.025	-1.534	-1.772	-1.712	-2.025	ns
		t <sub>h</sub>	1.237	1.237	1.773	1.949	2.231	2.147	2.470	1.949	2.231	2.147	2.470	ns
2.5 V	GCLK	t <sub>su</sub>	-0.696	-0.695	-1.012	-1.117	-1.329	-1.284	-1.645	-1.117	-1.329	-1.284	-1.645	ns
		t <sub>h</sub>	0.822	0.820	1.190	1.318	1.549	1.493	1.848	1.318	1.549	1.493	1.848	ns
	GCLK PLL	t <sub>su</sub>	-0.981	-0.981	-1.413	-1.546	-1.791	-1.731	-2.044	-1.546	-1.791	-1.731	-2.044	ns
		t <sub>h</sub>	1.232	1.232	1.782	1.961	2.250	2.166	2.489	1.961	2.250	2.166	2.489	ns
1.8 V	GCLK	t <sub>su</sub>	-0.716	-0.715	-1.052	-1.153	-1.327	-1.282	-1.643	-1.153	-1.327	-1.282	-1.643	ns
		t <sub>h</sub>	0.844	0.842	1.230	1.354	1.547	1.491	1.846	1.354	1.547	1.491	1.846	ns
	GCLK PLL	t <sub>su</sub>	-1.003	-1.003	-1.453	-1.582	-1.789	-1.729	-2.042	-1.582	-1.789	-1.729	-2.042	ns
		t <sub>h</sub>	1.256	1.256	1.822	1.997	2.248	2.164	2.487	1.997	2.248	2.164	2.487	ns
1.5 V	GCLK	t <sub>su</sub>	-0.706	-0.705	-1.029	-1.121	-1.257	-1.212	-1.573	-1.121	-1.257	-1.212	-1.573	ns
		t <sub>h</sub>	0.834	0.832	1.207	1.322	1.477	1.421	1.776	1.322	1.477	1.421	1.776	ns
	GCLK PLL	t <sub>su</sub>	-0.993	-0.993	-1.430	-1.550	-1.719	-1.659	-1.972	-1.550	-1.719	-1.659	-1.972	ns
		t <sub>h</sub>	1.246	1.246	1.799	1.965	2.178	2.094	2.417	1.965	2.178	2.094	2.417	ns
1.2 V	GCLK	t <sub>su</sub>	-0.654	-0.653	-0.952	-1.022	-1.101	-1.056	-1.417	-1.022	-1.101	-1.056	-1.417	ns
		t <sub>h</sub>	0.782	0.780	1.130	1.223	1.321	1.265	1.620	1.223	1.321	1.265	1.620	ns
	GCLK PLL	t <sub>su</sub>	-0.941	-0.941	-1.353	-1.451	-1.563	-1.503	-1.816	-1.451	-1.563	-1.503	-1.816	ns
		t <sub>h</sub>	1.194	1.194	1.722	1.866	2.022	1.938	2.261	1.866	2.022	1.938	2.261	ns
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-0.625	-0.624	-0.924	-1.006	-1.103	-1.058	-1.419	-1.006	-1.103	-1.058	-1.419	ns
		t <sub>h</sub>	0.753	0.751	1.102	1.207	1.323	1.267	1.622	1.207	1.323	1.267	1.622	ns
	GCLK PLL	t <sub>su</sub>	-0.912	-0.912	-1.325	-1.435	-1.565	-1.505	-1.818	-1.435	-1.565	-1.505	-1.818	ns
		t <sub>h</sub>	1.165	1.165	1.694	1.850	2.024	1.940	2.263	1.850	2.024	1.940	2.263	ns



**Table 1-50.** EP3SL50 Column Pins Input Timing Parameters (Part 2 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-0.625	-0.624	-0.924	-1.006	-1.103	-1.058	-1.419	-1.006	-1.103	-1.058	-1.419	ns
		t <sub>h</sub>	0.753	0.751	1.102	1.207	1.323	1.267	1.622	1.207	1.323	1.267	1.622	ns
	GCLK PLL	t <sub>su</sub>	-0.912	-0.912	-1.325	-1.435	-1.565	-1.505	-1.818	-1.435	-1.565	-1.505	-1.818	ns
		t <sub>h</sub>	1.165	1.165	1.694	1.850	2.024	1.940	2.263	1.850	2.024	1.940	2.263	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-0.619	-0.618	-0.912	-1.001	-1.103	-1.056	-1.417	-1.001	-1.103	-1.056	-1.417	ns
		t <sub>h</sub>	0.747	0.745	1.089	1.199	1.320	1.264	1.615	1.199	1.320	1.264	1.615	ns
	GCLK PLL	t <sub>su</sub>	-0.906	-0.906	-1.312	-1.427	-1.562	-1.500	-1.816	-1.427	-1.562	-1.500	-1.816	ns
		t <sub>h</sub>	1.159	1.159	1.681	1.839	2.018	1.934	2.256	1.839	2.018	1.934	2.256	ns
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-0.619	-0.618	-0.912	-1.001	-1.103	-1.056	-1.417	-1.001	-1.103	-1.056	-1.417	ns
		t <sub>h</sub>	0.747	0.745	1.089	1.199	1.320	1.264	1.615	1.199	1.320	1.264	1.615	ns
	GCLK PLL	t <sub>su</sub>	-0.906	-0.906	-1.312	-1.427	-1.562	-1.500	-1.816	-1.427	-1.562	-1.500	-1.816	ns
		t <sub>h</sub>	1.159	1.159	1.681	1.839	2.018	1.934	2.256	1.839	2.018	1.934	2.256	ns
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-0.608	-0.607	-0.903	-0.990	-1.084	-1.037	-1.398	-0.990	-1.084	-1.037	-1.398	ns
		t <sub>h</sub>	0.736	0.734	1.079	1.188	1.301	1.245	1.596	1.188	1.301	1.245	1.596	ns
	GCLK PLL	t <sub>su</sub>	-0.895	-0.895	-1.301	-1.416	-1.543	-1.481	-1.797	-1.416	-1.543	-1.481	-1.797	ns
		t <sub>h</sub>	1.148	1.148	1.669	1.828	1.999	1.915	2.237	1.828	1.999	1.915	2.237	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.608	-0.607	-0.903	-0.990	-1.084	-1.037	-1.398	-0.990	-1.084	-1.037	-1.398	ns
		t <sub>h</sub>	0.736	0.734	1.079	1.188	1.301	1.245	1.596	1.188	1.301	1.245	1.596	ns
	GCLK PLL	t <sub>su</sub>	-0.895	-0.895	-1.301	-1.416	-1.543	-1.481	-1.797	-1.416	-1.543	-1.481	-1.797	ns
		t <sub>h</sub>	1.148	1.148	1.669	1.828	1.999	1.915	2.237	1.828	1.999	1.915	2.237	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.619	-0.618	-0.912	-1.001	-1.103	-1.056	-1.417	-1.001	-1.103	-1.056	-1.417	ns
		t <sub>h</sub>	0.747	0.745	1.089	1.199	1.320	1.264	1.615	1.199	1.320	1.264	1.615	ns
	GCLK PLL	t <sub>su</sub>	-0.906	-0.906	-1.312	-1.427	-1.562	-1.500	-1.816	-1.427	-1.562	-1.500	-1.816	ns
		t <sub>h</sub>	1.159	1.159	1.681	1.839	2.018	1.934	2.256	1.839	2.018	1.934	2.256	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.619	-0.618	-0.912	-1.001	-1.103	-1.056	-1.417	-1.001	-1.103	-1.056	-1.417	ns
		t <sub>h</sub>	0.747	0.745	1.089	1.199	1.320	1.264	1.615	1.199	1.320	1.264	1.615	ns
	GCLK PLL	t <sub>su</sub>	-0.906	-0.906	-1.312	-1.427	-1.562	-1.500	-1.816	-1.427	-1.562	-1.500	-1.816	ns
		t <sub>h</sub>	1.159	1.159	1.681	1.839	2.018	1.934	2.256	1.839	2.018	1.934	2.256	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.608	-0.607	-0.903	-0.990	-1.084	-1.037	-1.398	-0.990	-1.084	-1.037	-1.398	ns
		t <sub>h</sub>	0.736	0.734	1.079	1.188	1.301	1.245	1.596	1.188	1.301	1.245	1.596	ns
	GCLK PLL	t <sub>su</sub>	-0.895	-0.895	-1.301	-1.416	-1.543	-1.481	-1.797	-1.416	-1.543	-1.481	-1.797	ns
		t <sub>h</sub>	1.148	1.148	1.669	1.828	1.999	1.915	2.237	1.828	1.999	1.915	2.237	ns
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.608	-0.607	-0.903	-0.990	-1.084	-1.037	-1.398	-0.990	-1.084	-1.037	-1.398	ns
		t <sub>h</sub>	0.736	0.734	1.079	1.188	1.301	1.245	1.596	1.188	1.301	1.245	1.596	ns
	GCLK PLL	t <sub>su</sub>	-0.895	-0.895	-1.301	-1.416	-1.543	-1.481	-1.797	-1.416	-1.543	-1.481	-1.797	ns
		t <sub>h</sub>	1.148	1.148	1.669	1.828	1.999	1.915	2.237	1.828	1.999	1.915	2.237	ns

**Table 1-50.** EP3SL50 Column Pins Input Timing Parameters (Part 3 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.596	-0.595	-0.893	-0.979	-1.068	-1.021	-1.382	-0.979	-1.068	-1.021	-1.382	ns
		t <sub>h</sub>	0.724	0.722	1.069	1.177	1.285	1.229	1.580	1.177	1.285	1.229	1.580	ns
	GCLK PLL	t <sub>su</sub>	-0.883	-0.883	-1.291	-1.405	-1.527	-1.465	-1.781	-1.405	-1.527	-1.465	-1.781	ns
		t <sub>h</sub>	1.136	1.136	1.659	1.817	1.983	1.899	2.221	1.817	1.983	1.899	2.221	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-0.596	-0.595	-0.893	-0.979	-1.068	-1.021	-1.382	-0.979	-1.068	-1.021	-1.382	ns
		t <sub>h</sub>	0.724	0.722	1.069	1.177	1.285	1.229	1.580	1.177	1.285	1.229	1.580	ns
	GCLK PLL	t <sub>su</sub>	-0.883	-0.883	-1.291	-1.405	-1.527	-1.465	-1.781	-1.405	-1.527	-1.465	-1.781	ns
		t <sub>h</sub>	1.136	1.136	1.659	1.817	1.983	1.899	2.221	1.817	1.983	1.899	2.221	ns
3.0-V PCI-X	GCLK	t <sub>su</sub>	-0.701	-0.700	-1.003	-1.105	-1.310	-1.265	-1.626	-1.105	-1.310	-1.265	-1.626	ns
		t <sub>h</sub>	0.827	0.825	1.181	1.306	1.530	1.474	1.829	1.306	1.530	1.474	1.829	ns
	GCLK PLL	t <sub>su</sub>	-0.986	-0.986	-1.404	-1.534	-1.772	-1.712	-2.025	-1.534	-1.772	-1.712	-2.025	ns
		t <sub>h</sub>	1.237	1.237	1.773	1.949	2.231	2.147	2.470	1.949	2.231	2.147	2.470	ns

Table 1-51 specifies EP3SL50 row pins input timing parameters for single-ended I/O standards.

**Table 1-51.** EP3SL50 Row Pins Input Timing Parameters (Part 1 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-0.641	-0.643	-0.912	-0.993	-1.176	-1.140	-1.484	-0.988	-1.272	-1.128	-1.517	ns
		t <sub>h</sub>	0.750	0.765	1.087	1.189	1.394	1.347	1.687	1.194	1.494	1.343	1.719	ns
	GCLK PLL	t <sub>su</sub>	1.003	0.949	1.534	1.892	2.007	1.891	1.683	1.905	2.031	1.916	1.735	ns
		t <sub>h</sub>	-0.765	-0.698	-1.158	-1.464	-1.528	-1.440	-1.231	-1.468	-1.541	-1.455	-1.282	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-0.641	-0.643	-0.912	-0.993	-1.176	-1.140	-1.484	-0.988	-1.272	-1.128	-1.517	ns
		t <sub>h</sub>	0.750	0.765	1.087	1.189	1.394	1.347	1.687	1.194	1.494	1.343	1.719	ns
	GCLK PLL	t <sub>su</sub>	1.003	0.949	1.534	1.892	2.007	1.891	1.683	1.905	2.031	1.916	1.735	ns
		t <sub>h</sub>	-0.765	-0.698	-1.158	-1.464	-1.528	-1.440	-1.231	-1.468	-1.541	-1.455	-1.282	ns
3.0-V LVTTTL	GCLK	t <sub>su</sub>	-0.647	-0.654	-0.909	-0.994	-1.179	-1.143	-1.487	-0.987	-1.277	-1.133	-1.522	ns
		t <sub>h</sub>	0.756	0.776	1.084	1.190	1.397	1.350	1.690	1.193	1.499	1.348	1.724	ns
	GCLK PLL	t <sub>su</sub>	0.997	0.938	1.537	1.891	2.004	1.888	1.680	1.906	2.026	1.911	1.730	ns
		t <sub>h</sub>	-0.759	-0.687	-1.161	-1.463	-1.525	-1.437	-1.228	-1.469	-1.536	-1.450	-1.277	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-0.647	-0.654	-0.909	-0.994	-1.179	-1.143	-1.487	-0.987	-1.277	-1.133	-1.522	ns
		t <sub>h</sub>	0.756	0.776	1.084	1.190	1.397	1.350	1.690	1.193	1.499	1.348	1.724	ns
	GCLK PLL	t <sub>su</sub>	0.997	0.938	1.537	1.891	2.004	1.888	1.680	1.906	2.026	1.911	1.730	ns
		t <sub>h</sub>	-0.759	-0.687	-1.161	-1.463	-1.525	-1.437	-1.228	-1.469	-1.536	-1.450	-1.277	ns

**Table 1-51.** EP3SL50 Row Pins Input Timing Parameters (Part 2 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
2.5 V	GCLK	t <sub>su</sub>	-0.635	-0.647	-0.918	-1.007	-1.194	-1.158	-1.502	-0.996	-1.287	-1.143	-1.532	ns
		t <sub>h</sub>	0.744	0.769	1.093	1.203	1.412	1.365	1.705	1.202	1.509	1.358	1.734	ns
	GCLK PLL	t <sub>su</sub>	1.009	0.945	1.528	1.878	1.989	1.873	1.665	1.897	2.016	1.901	1.720	ns
		t <sub>h</sub>	-0.771	-0.694	-1.152	-1.450	-1.510	-1.422	-1.213	-1.460	-1.526	-1.440	-1.267	ns
1.8 V	GCLK	t <sub>su</sub>	-0.725	-0.744	-1.051	-1.142	-1.304	-1.264	-1.504	-1.134	-1.291	-1.255	-1.538	ns
		t <sub>h</sub>	0.833	0.865	1.223	1.335	1.517	1.467	1.706	1.336	1.513	1.466	1.739	ns
	GCLK PLL	t <sub>su</sub>	0.969	0.915	1.488	1.832	1.978	1.863	1.784	1.851	2.006	1.886	1.835	ns
		t <sub>h</sub>	-0.728	-0.662	-1.112	-1.403	-1.500	-1.411	-1.327	-1.413	-1.516	-1.425	-1.378	ns
1.5 V	GCLK	t <sub>su</sub>	-0.715	-0.733	-1.027	-1.110	-1.236	-1.196	-1.436	-1.103	-1.226	-1.190	-1.473	ns
		t <sub>h</sub>	0.823	0.854	1.199	1.303	1.449	1.399	1.638	1.305	1.448	1.401	1.674	ns
	GCLK PLL	t <sub>su</sub>	0.979	0.926	1.512	1.864	2.046	1.931	1.852	1.882	2.071	1.951	1.900	ns
		t <sub>h</sub>	-0.738	-0.673	-1.136	-1.435	-1.568	-1.479	-1.395	-1.444	-1.581	-1.490	-1.443	ns
1.2 V	GCLK	t <sub>su</sub>	-0.655	-0.680	-0.948	-1.009	-1.077	-1.037	-1.277	-1.007	-1.071	-1.035	-1.318	ns
		t <sub>h</sub>	0.763	0.801	1.120	1.202	1.290	1.240	1.479	1.209	1.293	1.246	1.519	ns
	GCLK PLL	t <sub>su</sub>	1.039	0.979	1.591	1.965	2.205	2.090	2.011	1.978	2.226	2.106	2.055	ns
		t <sub>h</sub>	-0.798	-0.726	-1.215	-1.536	-1.727	-1.638	-1.554	-1.540	-1.736	-1.645	-1.598	ns
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-0.577	-0.588	-0.832	-0.898	-0.974	-0.938	-1.282	-0.884	-1.070	-0.926	-1.315	ns
		t <sub>h</sub>	0.687	0.711	1.007	1.094	1.192	1.145	1.485	1.090	1.292	1.141	1.517	ns
	GCLK PLL	t <sub>su</sub>	1.067	1.005	1.614	1.987	2.209	2.093	1.885	2.009	2.233	2.118	1.937	ns
		t <sub>h</sub>	-0.828	-0.752	-1.238	-1.559	-1.730	-1.642	-1.433	-1.572	-1.743	-1.657	-1.484	ns
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-0.577	-0.588	-0.832	-0.898	-0.974	-0.938	-1.282	-0.884	-1.070	-0.926	-1.315	ns
		t <sub>h</sub>	0.687	0.711	1.007	1.094	1.192	1.145	1.485	1.090	1.292	1.141	1.517	ns
	GCLK PLL	t <sub>su</sub>	1.067	1.005	1.614	1.987	2.209	2.093	1.885	2.009	2.233	2.118	1.937	ns
		t <sub>h</sub>	-0.828	-0.752	-1.238	-1.559	-1.730	-1.642	-1.433	-1.572	-1.743	-1.657	-1.484	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-0.629	-0.645	-0.910	-0.982	-1.072	-1.031	-1.273	-0.975	-1.064	-1.027	-1.311	ns
		t <sub>h</sub>	0.737	0.766	1.082	1.173	1.283	1.233	1.471	1.175	1.283	1.237	1.508	ns
	GCLK PLL	t <sub>su</sub>	1.065	1.014	1.629	1.990	2.207	2.093	2.013	2.007	2.230	2.112	2.060	ns
		t <sub>h</sub>	-0.824	-0.761	-1.253	-1.563	-1.732	-1.643	-1.560	-1.572	-1.743	-1.652	-1.607	ns
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-0.629	-0.645	-0.910	-0.982	-1.072	-1.031	-1.273	-0.975	-1.064	-1.027	-1.311	ns
		t <sub>h</sub>	0.737	0.766	1.082	1.173	1.283	1.233	1.471	1.175	1.283	1.237	1.508	ns
	GCLK PLL	t <sub>su</sub>	1.065	1.014	1.629	1.990	2.207	2.093	2.013	2.007	2.230	2.112	2.060	ns
		t <sub>h</sub>	-0.824	-0.761	-1.253	-1.563	-1.732	-1.643	-1.560	-1.572	-1.743	-1.652	-1.607	ns
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-0.615	-0.633	-0.895	-0.972	-1.054	-1.013	-1.255	-0.964	-1.047	-1.010	-1.294	ns
		t <sub>h</sub>	0.723	0.754	1.068	1.163	1.265	1.215	1.453	1.164	1.266	1.220	1.491	ns
	GCLK PLL	t <sub>su</sub>	1.079	1.026	1.640	2.000	2.225	2.111	2.031	2.018	2.247	2.129	2.077	ns
		t <sub>h</sub>	-0.838	-0.773	-1.265	-1.573	-1.750	-1.661	-1.578	-1.583	-1.760	-1.669	-1.624	ns

**Table 1-51.** EP3SL50 Row Pins Input Timing Parameters (Part 3 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.629	-0.645	-0.910	-0.982	-1.072	-1.031	-1.273	-0.975	-1.064	-1.027	-1.311	ns
		t <sub>h</sub>	0.737	0.766	1.082	1.173	1.283	1.233	1.471	1.175	1.283	1.237	1.508	ns
	GCLK PLL	t <sub>su</sub>	1.065	1.014	1.629	1.990	2.207	2.093	2.013	2.007	2.230	2.112	2.060	ns
		t <sub>h</sub>	-0.824	-0.761	-1.253	-1.563	-1.732	-1.643	-1.560	-1.572	-1.743	-1.652	-1.607	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.629	-0.645	-0.910	-0.982	-1.072	-1.031	-1.273	-0.975	-1.064	-1.027	-1.311	ns
		t <sub>h</sub>	0.737	0.766	1.082	1.173	1.283	1.233	1.471	1.175	1.283	1.237	1.508	ns
	GCLK PLL	t <sub>su</sub>	1.065	1.014	1.629	1.990	2.207	2.093	2.013	2.007	2.230	2.112	2.060	ns
		t <sub>h</sub>	-0.824	-0.761	-1.253	-1.563	-1.732	-1.643	-1.560	-1.572	-1.743	-1.652	-1.607	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.615	-0.633	-0.895	-0.972	-1.054	-1.013	-1.255	-0.964	-1.047	-1.010	-1.294	ns
		t <sub>h</sub>	0.723	0.754	1.068	1.163	1.265	1.215	1.453	1.164	1.266	1.220	1.491	ns
	GCLK PLL	t <sub>su</sub>	1.079	1.026	1.640	2.000	2.225	2.111	2.031	2.018	2.247	2.129	2.077	ns
		t <sub>h</sub>	-0.838	-0.773	-1.265	-1.573	-1.750	-1.661	-1.578	-1.583	-1.760	-1.669	-1.624	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.615	-0.633	-0.895	-0.972	-1.054	-1.013	-1.255	-0.964	-1.047	-1.010	-1.294	ns
		t <sub>h</sub>	0.723	0.754	1.068	1.163	1.265	1.215	1.453	1.164	1.266	1.220	1.491	ns
	GCLK PLL	t <sub>su</sub>	1.079	1.026	1.640	2.000	2.225	2.111	2.031	2.018	2.247	2.129	2.077	ns
		t <sub>h</sub>	-0.838	-0.773	-1.265	-1.573	-1.750	-1.661	-1.578	-1.583	-1.760	-1.669	-1.624	ns
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.606	-0.621	-0.886	-0.962	-1.038	-0.997	-1.239	-0.955	-1.031	-0.994	-1.278	ns
		t <sub>h</sub>	0.714	0.742	1.059	1.153	1.249	1.199	1.437	1.155	1.250	1.204	1.475	ns
	GCLK PLL	t <sub>su</sub>	1.088	1.038	1.649	2.010	2.241	2.127	2.047	2.027	2.263	2.145	2.093	ns
		t <sub>h</sub>	-0.847	-0.785	-1.274	-1.583	-1.766	-1.677	-1.594	-1.592	-1.776	-1.685	-1.640	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.606	-0.621	-0.886	-0.962	-1.038	-0.997	-1.239	-0.955	-1.031	-0.994	-1.278	ns
		t <sub>h</sub>	0.714	0.742	1.059	1.153	1.249	1.199	1.437	1.155	1.250	1.204	1.475	ns
	GCLK PLL	t <sub>su</sub>	1.088	1.038	1.649	2.010	2.241	2.127	2.047	2.027	2.263	2.145	2.093	ns
		t <sub>h</sub>	-0.847	-0.785	-1.274	-1.583	-1.766	-1.677	-1.594	-1.592	-1.776	-1.685	-1.640	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-0.647	-0.654	-0.909	-0.994	-1.179	-1.143	-1.487	-0.987	-1.277	-1.133	-1.522	ns
		t <sub>h</sub>	0.756	0.776	1.084	1.190	1.397	1.350	1.690	1.193	1.499	1.348	1.724	ns
	GCLK PLL	t <sub>su</sub>	0.997	0.938	1.537	1.891	2.004	1.888	1.680	1.906	2.026	1.911	1.730	ns
		t <sub>h</sub>	-0.759	-0.687	-1.161	-1.463	-1.525	-1.437	-1.228	-1.469	-1.536	-1.450	-1.277	ns
3.0-V PCI-X	GCLK	t <sub>su</sub>	-0.647	-0.654	-0.909	-0.994	-1.179	-1.143	-1.487	-0.987	-1.277	-1.133	-1.522	ns
		t <sub>h</sub>	0.756	0.776	1.084	1.190	1.397	1.350	1.690	1.193	1.499	1.348	1.724	ns
	GCLK PLL	t <sub>su</sub>	0.997	0.938	1.537	1.891	2.004	1.888	1.680	1.906	2.026	1.911	1.730	ns
		t <sub>h</sub>	-0.759	-0.687	-1.161	-1.463	-1.525	-1.437	-1.228	-1.469	-1.536	-1.450	-1.277	ns

Table 1-52 specifies EP3SL50 column pins output timing parameters for single-ended I/O standards.

**Table 1-52.** EP3SL50 Column Pins output Timing Parameters (Part 1 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
3.3-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.168	3.156	4.382	4.742	5.210	5.092	5.294	4.742	5.210	5.092	5.294	ns	
		GCLK PLL	t <sub>co</sub>	3.524	3.524	4.905	5.304	5.820	5.677	5.944	5.304	5.820	5.677	5.944	ns	
	8mA	GCLK	t <sub>co</sub>	3.101	3.089	4.273	4.631	5.097	4.979	5.181	4.631	5.097	4.979	5.181	ns	
		GCLK PLL	t <sub>co</sub>	3.457	3.457	4.796	5.193	5.707	5.564	5.831	5.193	5.707	5.564	5.831	ns	
	12mA	GCLK	t <sub>co</sub>	3.015	3.003	4.170	4.532	5.005	4.887	5.089	4.532	5.005	4.887	5.089	ns	
		GCLK PLL	t <sub>co</sub>	3.371	3.371	4.692	5.094	5.615	5.472	5.739	5.094	5.615	5.472	5.739	ns	
	16mA	GCLK	t <sub>co</sub>	3.008	2.996	4.153	4.504	4.964	4.846	5.048	4.504	4.964	4.846	5.048	ns	
		GCLK PLL	t <sub>co</sub>	3.364	3.364	4.675	5.066	5.574	5.431	5.698	5.066	5.574	5.431	5.698	ns	
	3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.174	3.162	4.387	4.747	5.217	5.099	5.301	4.747	5.217	5.099	5.301	ns
			GCLK PLL	t <sub>co</sub>	3.530	3.530	4.909	5.309	5.827	5.684	5.951	5.309	5.827	5.684	5.951	ns
		8mA	GCLK	t <sub>co</sub>	3.019	3.007	4.180	4.549	5.016	4.898	5.100	4.549	5.016	4.898	5.100	ns
			GCLK PLL	t <sub>co</sub>	3.375	3.375	4.702	5.111	5.626	5.483	5.750	5.111	5.626	5.483	5.750	ns
12mA		GCLK	t <sub>co</sub>	3.026	3.014	4.174	4.528	4.990	4.872	5.074	4.528	4.990	4.872	5.074	ns	
		GCLK PLL	t <sub>co</sub>	3.382	3.382	4.696	5.090	5.600	5.457	5.724	5.090	5.600	5.457	5.724	ns	
16mA		GCLK	t <sub>co</sub>	3.010	2.998	4.151	4.503	4.961	4.843	5.045	4.503	4.961	4.843	5.045	ns	
		GCLK PLL	t <sub>co</sub>	3.366	3.366	4.674	5.065	5.571	5.428	5.695	5.065	5.571	5.428	5.695	ns	
3.0-V LVTTTL		4mA	GCLK	t <sub>co</sub>	3.132	3.120	4.349	4.710	5.177	5.059	5.261	4.710	5.177	5.059	5.261	ns
			GCLK PLL	t <sub>co</sub>	3.488	3.488	4.872	5.272	5.787	5.644	5.911	5.272	5.787	5.644	5.911	ns
		8mA	GCLK	t <sub>co</sub>	3.021	3.009	4.219	4.576	5.040	4.923	5.122	4.576	5.040	4.923	5.122	ns
			GCLK PLL	t <sub>co</sub>	3.377	3.377	4.742	5.138	5.650	5.508	5.773	5.138	5.650	5.508	5.773	ns
	12mA	GCLK	t <sub>co</sub>	2.985	2.973	4.156	4.507	4.966	4.849	5.049	4.507	4.966	4.849	5.049	ns	
		GCLK PLL	t <sub>co</sub>	3.341	3.341	4.679	5.069	5.576	5.434	5.699	5.069	5.576	5.434	5.699	ns	
	16mA	GCLK	t <sub>co</sub>	2.967	2.955	4.127	4.479	4.937	4.819	5.021	4.479	4.937	4.819	5.021	ns	
		GCLK PLL	t <sub>co</sub>	3.323	3.323	4.650	5.041	5.547	5.404	5.671	5.041	5.547	5.404	5.671	ns	

**Table 1-52.** EP3SL50 Column Pins output Timing Parameters (Part 2 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.046	3.034	4.253	4.610	5.075	4.958	5.157	4.610	5.075	4.958	5.157	ns	
		GCLK PLL	t <sub>co</sub>	3.402	3.402	4.776	5.172	5.685	5.543	5.808	5.172	5.685	5.543	5.808	ns	
	8mA	GCLK	t <sub>co</sub>	2.967	2.955	4.130	4.481	4.940	4.823	5.022	4.481	4.940	4.823	5.022	ns	
		GCLK PLL	t <sub>co</sub>	3.323	3.323	4.652	5.043	5.550	5.408	5.673	5.043	5.550	5.408	5.673	ns	
	12mA	GCLK	t <sub>co</sub>	2.962	2.950	4.122	4.474	4.931	4.813	5.015	4.474	4.931	4.813	5.015	ns	
		GCLK PLL	t <sub>co</sub>	3.318	3.318	4.645	5.036	5.541	5.398	5.665	5.036	5.541	5.398	5.665	ns	
	16mA	GCLK	t <sub>co</sub>	2.953	2.941	4.108	4.459	4.916	4.798	5.000	4.459	4.916	4.798	5.000	ns	
		GCLK PLL	t <sub>co</sub>	3.309	3.309	4.631	5.021	5.526	5.383	5.650	5.021	5.526	5.383	5.650	ns	
	2.5 V	4mA	GCLK	t <sub>co</sub>	3.168	3.156	4.460	4.837	5.322	5.205	5.405	4.837	5.322	5.205	5.405	ns
			GCLK PLL	t <sub>co</sub>	3.524	3.524	4.983	5.399	5.932	5.790	6.055	5.399	5.932	5.790	6.055	ns
		8mA	GCLK	t <sub>co</sub>	3.068	3.056	4.341	4.711	5.190	5.073	5.272	4.711	5.190	5.073	5.272	ns
			GCLK PLL	t <sub>co</sub>	3.424	3.424	4.864	5.273	5.800	5.658	5.923	5.273	5.800	5.658	5.923	ns
12mA		GCLK	t <sub>co</sub>	3.024	3.012	4.254	4.620	5.094	4.976	5.178	4.620	5.094	4.976	5.178	ns	
		GCLK PLL	t <sub>co</sub>	3.380	3.380	4.777	5.182	5.704	5.561	5.828	5.182	5.704	5.561	5.828	ns	
16mA		GCLK	t <sub>co</sub>	2.986	2.974	4.215	4.578	5.051	4.933	5.135	4.578	5.051	4.933	5.135	ns	
		GCLK PLL	t <sub>co</sub>	3.342	3.342	4.738	5.140	5.661	5.518	5.785	5.140	5.661	5.518	5.785	ns	

**Table 1-52.** EP3SL50 Column Pins output Timing Parameters (Part 3 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
1.8 V	2mA	GCLK	t <sub>co</sub>	3.359	3.347	4.782	5.197	5.726	5.608	5.810	5.197	5.726	5.608	5.810	ns	
		GCLK PLL	t <sub>co</sub>	3.715	3.715	5.304	5.759	6.336	6.193	6.460	5.759	6.336	6.193	6.460	ns	
	4mA	GCLK	t <sub>co</sub>	3.178	3.166	4.503	4.888	5.379	5.262	5.461	4.888	5.379	5.262	5.461	ns	
		GCLK PLL	t <sub>co</sub>	3.534	3.534	5.025	5.450	5.989	5.847	6.112	5.450	5.989	5.847	6.112	ns	
	6mA	GCLK	t <sub>co</sub>	3.096	3.084	4.396	4.773	5.268	5.150	5.352	4.773	5.268	5.150	5.352	ns	
		GCLK PLL	t <sub>co</sub>	3.452	3.452	4.918	5.335	5.878	5.735	6.002	5.335	5.878	5.735	6.002	ns	
	8mA	GCLK	t <sub>co</sub>	3.076	3.064	4.337	4.719	5.202	5.084	5.286	4.719	5.202	5.084	5.286	ns	
		GCLK PLL	t <sub>co</sub>	3.432	3.432	4.860	5.281	5.812	5.669	5.936	5.281	5.812	5.669	5.936	ns	
	10mA	GCLK	t <sub>co</sub>	3.013	3.001	4.276	4.644	5.121	5.003	5.205	4.644	5.121	5.003	5.205	ns	
		GCLK PLL	t <sub>co</sub>	3.369	3.369	4.799	5.206	5.731	5.588	5.855	5.206	5.731	5.588	5.855	ns	
	12mA	GCLK	t <sub>co</sub>	2.995	2.983	4.256	4.623	5.098	4.980	5.182	4.623	5.098	4.980	5.182	ns	
		GCLK PLL	t <sub>co</sub>	3.351	3.351	4.778	5.185	5.708	5.565	5.832	5.185	5.708	5.565	5.832	ns	
	1.5 V	2mA	GCLK	t <sub>co</sub>	3.305	3.293	4.710	5.129	5.664	5.546	5.748	5.129	5.664	5.546	5.748	ns
			GCLK PLL	t <sub>co</sub>	3.661	3.661	5.233	5.691	6.274	6.131	6.398	5.691	6.274	6.131	6.398	ns
4mA		GCLK	t <sub>co</sub>	3.093	3.081	4.391	4.773	5.272	5.154	5.356	4.773	5.272	5.154	5.356	ns	
		GCLK PLL	t <sub>co</sub>	3.449	3.449	4.914	5.335	5.882	5.739	6.006	5.335	5.882	5.739	6.006	ns	
6mA		GCLK	t <sub>co</sub>	3.068	3.056	4.324	4.713	5.205	5.087	5.289	4.713	5.205	5.087	5.289	ns	
		GCLK PLL	t <sub>co</sub>	3.424	3.424	4.847	5.275	5.815	5.672	5.939	5.275	5.815	5.672	5.939	ns	
8mA		GCLK	t <sub>co</sub>	3.057	3.045	4.307	4.688	5.185	5.067	5.269	4.688	5.185	5.067	5.269	ns	
		GCLK PLL	t <sub>co</sub>	3.413	3.413	4.830	5.250	5.795	5.652	5.919	5.250	5.795	5.652	5.919	ns	
10mA		GCLK	t <sub>co</sub>	3.002	2.990	4.269	4.637	5.115	4.997	5.199	4.637	5.115	4.997	5.199	ns	
		GCLK PLL	t <sub>co</sub>	3.358	3.358	4.792	5.199	5.725	5.582	5.849	5.199	5.725	5.582	5.849	ns	
12mA		GCLK	t <sub>co</sub>	2.997	2.985	4.253	4.626	5.104	4.986	5.188	4.626	5.104	4.986	5.188	ns	
		GCLK PLL	t <sub>co</sub>	3.353	3.353	4.775	5.188	5.714	5.571	5.838	5.188	5.714	5.571	5.838	ns	

**Table 1-52.** EP3SL50 Column Pins output Timing Parameters (Part 4 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.2 V	2mA	GCLK	t <sub>co</sub>	3.221	3.209	4.636	5.065	5.608	5.490	5.692	5.065	5.608	5.490	5.692	ns
		GCLK PLL	t <sub>co</sub>	3.577	3.577	5.159	5.627	6.218	6.075	6.342	5.627	6.218	6.075	6.342	ns
	4mA	GCLK	t <sub>co</sub>	3.098	3.086	4.411	4.803	5.322	5.204	5.406	4.803	5.322	5.204	5.406	ns
		GCLK PLL	t <sub>co</sub>	3.454	3.454	4.933	5.365	5.932	5.789	6.056	5.365	5.932	5.789	6.056	ns
	6mA	GCLK	t <sub>co</sub>	3.060	3.048	4.318	4.714	5.209	5.091	5.293	4.714	5.209	5.091	5.293	ns
		GCLK PLL	t <sub>co</sub>	3.416	3.416	4.841	5.276	5.819	5.676	5.943	5.276	5.819	5.676	5.943	ns
	8mA	GCLK	t <sub>co</sub>	3.013	3.001	4.290	4.665	5.153	5.035	5.237	4.665	5.153	5.035	5.237	ns
		GCLK PLL	t <sub>co</sub>	3.369	3.369	4.813	5.227	5.763	5.620	5.887	5.227	5.763	5.620	5.887	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.013	3.001	4.247	4.612	5.084	4.966	5.168	4.612	5.084	4.966	5.168	ns
		GCLK PLL	t <sub>co</sub>	3.369	3.369	4.770	5.174	5.694	5.551	5.818	5.174	5.694	5.551	5.818	ns
	10mA	GCLK	t <sub>co</sub>	3.010	2.998	4.244	4.609	5.080	4.962	5.164	4.609	5.080	4.962	5.164	ns
		GCLK PLL	t <sub>co</sub>	3.366	3.366	4.767	5.171	5.690	5.547	5.814	5.171	5.690	5.547	5.814	ns
	12mA	GCLK	t <sub>co</sub>	3.008	2.996	4.244	4.610	5.081	4.963	5.165	4.610	5.081	4.963	5.165	ns
		GCLK PLL	t <sub>co</sub>	3.364	3.364	4.767	5.172	5.691	5.548	5.815	5.172	5.691	5.548	5.815	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	2.999	2.987	4.230	4.594	5.066	4.948	5.150	4.594	5.066	4.948	5.150	ns
		GCLK PLL	t <sub>co</sub>	3.355	3.355	4.752	5.156	5.676	5.533	5.800	5.156	5.676	5.533	5.800	ns
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.020	3.008	4.259	4.626	5.100	4.982	5.184	4.626	5.100	4.982	5.184	ns
		GCLK PLL	t <sub>co</sub>	3.376	3.376	4.782	5.188	5.710	5.567	5.834	5.188	5.710	5.567	5.834	ns
	6mA	GCLK	t <sub>co</sub>	3.016	3.004	4.257	4.624	5.098	4.980	5.182	4.624	5.098	4.980	5.182	ns
		GCLK PLL	t <sub>co</sub>	3.372	3.372	4.780	5.186	5.708	5.565	5.832	5.186	5.708	5.565	5.832	ns
	8mA	GCLK	t <sub>co</sub>	3.005	2.993	4.247	4.615	5.089	4.971	5.173	4.615	5.089	4.971	5.173	ns
		GCLK PLL	t <sub>co</sub>	3.361	3.361	4.770	5.177	5.699	5.556	5.823	5.177	5.699	5.556	5.823	ns
	10mA	GCLK	t <sub>co</sub>	2.994	2.982	4.235	4.602	5.076	4.958	5.160	4.602	5.076	4.958	5.160	ns
		GCLK PLL	t <sub>co</sub>	3.350	3.350	4.757	5.164	5.686	5.543	5.810	5.164	5.686	5.543	5.810	ns
	12mA	GCLK	t <sub>co</sub>	2.994	2.982	4.234	4.602	5.076	4.958	5.160	4.602	5.076	4.958	5.160	ns
		GCLK PLL	t <sub>co</sub>	3.350	3.350	4.757	5.164	5.686	5.543	5.810	5.164	5.686	5.543	5.810	ns



**Table 1-52.** EP3SL50 Column Pins output Timing Parameters (Part 5 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.000	2.988	4.233	4.599	5.071	4.953	5.155	4.599	5.071	4.953	5.155	ns
		GCLK PLL	t <sub>co</sub>	3.356	3.356	4.756	5.161	5.681	5.538	5.805	5.161	5.681	5.538	5.805	ns
	16mA	GCLK	t <sub>co</sub>	3.003	2.991	4.241	4.608	5.083	4.965	5.167	4.608	5.083	4.965	5.167	ns
		GCLK PLL	t <sub>co</sub>	3.359	3.359	4.764	5.170	5.693	5.550	5.817	5.170	5.693	5.550	5.817	ns
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.024	3.012	4.269	4.638	5.113	4.995	5.197	4.638	5.113	4.995	5.197	ns
		GCLK PLL	t <sub>co</sub>	3.380	3.380	4.791	5.200	5.723	5.580	5.847	5.200	5.723	5.580	5.847	ns
	6mA	GCLK	t <sub>co</sub>	3.010	2.998	4.258	4.628	5.104	4.986	5.188	4.628	5.104	4.986	5.188	ns
		GCLK PLL	t <sub>co</sub>	3.366	3.366	4.781	5.190	5.714	5.571	5.838	5.190	5.714	5.571	5.838	ns
	8mA	GCLK	t <sub>co</sub>	2.999	2.987	4.245	4.614	5.090	4.972	5.174	4.614	5.090	4.972	5.174	ns
		GCLK PLL	t <sub>co</sub>	3.355	3.355	4.767	5.176	5.700	5.557	5.824	5.176	5.700	5.557	5.824	ns
	10mA	GCLK	t <sub>co</sub>	2.998	2.986	4.248	4.617	5.094	4.976	5.178	4.617	5.094	4.976	5.178	ns
		GCLK PLL	t <sub>co</sub>	3.354	3.354	4.770	5.179	5.704	5.561	5.828	5.179	5.704	5.561	5.828	ns
	12mA	GCLK	t <sub>co</sub>	2.995	2.983	4.242	4.612	5.088	4.970	5.172	4.612	5.088	4.970	5.172	ns
		GCLK PLL	t <sub>co</sub>	3.351	3.351	4.765	5.174	5.698	5.555	5.822	5.174	5.698	5.555	5.822	ns
SSTL-15 CLASS II	8mA	GCLK	t <sub>co</sub>	2.997	2.985	4.231	4.598	5.071	4.953	5.155	4.598	5.071	4.953	5.155	ns
		GCLK PLL	t <sub>co</sub>	3.353	3.353	4.754	5.160	5.681	5.538	5.805	5.160	5.681	5.538	5.805	ns
	16mA	GCLK	t <sub>co</sub>	3.000	2.988	4.238	4.607	5.082	4.964	5.166	4.607	5.082	4.964	5.166	ns
		GCLK PLL	t <sub>co</sub>	3.356	3.356	4.761	5.169	5.692	5.549	5.816	5.169	5.692	5.549	5.816	ns

**Table 1-52.** EP3SL50 Column Pins output Timing Parameters (Part 6 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.007	2.995	4.233	4.598	5.069	4.951	5.153	4.598	5.069	4.951	5.153	ns
		GCLK PLL	t <sub>co</sub>	3.363	3.363	4.756	5.160	5.679	5.536	5.803	5.160	5.679	5.536	5.803	ns
	6mA	GCLK	t <sub>co</sub>	3.000	2.988	4.231	4.596	5.068	4.950	5.152	4.596	5.068	4.950	5.152	ns
		GCLK PLL	t <sub>co</sub>	3.356	3.356	4.754	5.158	5.678	5.535	5.802	5.158	5.678	5.535	5.802	ns
	8mA	GCLK	t <sub>co</sub>	2.992	2.980	4.224	4.589	5.061	4.943	5.145	4.589	5.061	4.943	5.145	ns
		GCLK PLL	t <sub>co</sub>	3.348	3.348	4.746	5.151	5.671	5.528	5.795	5.151	5.671	5.528	5.795	ns
	10mA	GCLK	t <sub>co</sub>	2.995	2.983	4.227	4.592	5.065	4.947	5.149	4.592	5.065	4.947	5.149	ns
		GCLK PLL	t <sub>co</sub>	3.351	3.351	4.749	5.154	5.675	5.532	5.799	5.154	5.675	5.532	5.799	ns
12mA	GCLK	t <sub>co</sub>	2.992	2.980	4.229	4.596	5.069	4.951	5.153	4.596	5.069	4.951	5.153	ns	
	GCLK PLL	t <sub>co</sub>	3.348	3.348	4.752	5.158	5.679	5.536	5.803	5.158	5.679	5.536	5.803	ns	
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.000	2.988	4.228	4.593	5.065	4.947	5.149	4.593	5.065	4.947	5.149	ns
		GCLK PLL	t <sub>co</sub>	3.356	3.356	4.751	5.155	5.675	5.532	5.799	5.155	5.675	5.532	5.799	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.012	3.000	4.242	4.608	5.080	4.962	5.164	4.608	5.080	4.962	5.164	ns
		GCLK PLL	t <sub>co</sub>	3.368	3.368	4.764	5.170	5.690	5.547	5.814	5.170	5.690	5.547	5.814	ns
	6mA	GCLK	t <sub>co</sub>	3.008	2.996	4.243	4.609	5.083	4.965	5.167	4.609	5.083	4.965	5.167	ns
		GCLK PLL	t <sub>co</sub>	3.364	3.364	4.765	5.171	5.693	5.550	5.817	5.171	5.693	5.550	5.817	ns
	8mA	GCLK	t <sub>co</sub>	3.004	2.992	4.238	4.605	5.078	4.960	5.162	4.605	5.078	4.960	5.162	ns
		GCLK PLL	t <sub>co</sub>	3.360	3.360	4.761	5.167	5.688	5.545	5.812	5.167	5.688	5.545	5.812	ns
	10mA	GCLK	t <sub>co</sub>	2.997	2.985	4.231	4.598	5.071	4.953	5.155	4.598	5.071	4.953	5.155	ns
		GCLK PLL	t <sub>co</sub>	3.353	3.353	4.754	5.160	5.681	5.538	5.805	5.160	5.681	5.538	5.805	ns
12mA	GCLK	t <sub>co</sub>	2.998	2.986	4.238	4.606	5.081	4.963	5.165	4.606	5.081	4.963	5.165	ns	
	GCLK PLL	t <sub>co</sub>	3.354	3.354	4.761	5.168	5.691	5.548	5.815	5.168	5.691	5.548	5.815	ns	
1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.996	2.984	4.219	4.584	5.055	4.937	5.139	4.584	5.055	4.937	5.139	ns
		GCLK PLL	t <sub>co</sub>	3.352	3.352	4.742	5.146	5.665	5.522	5.789	5.146	5.665	5.522	5.789	ns

**Table 1-52.** EP3SL50 Column Pins output Timing Parameters (Part 7 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.015	3.003	4.256	4.625	5.101	4.983	5.185	4.625	5.101	4.983	5.185	ns
		GCLK PLL	t <sub>co</sub>	3.371	3.371	4.778	5.187	5.711	5.568	5.835	5.187	5.711	5.568	5.835	ns
	6mA	GCLK	t <sub>co</sub>	3.007	2.995	4.247	4.616	5.092	4.974	5.176	4.616	5.092	4.974	5.176	ns
		GCLK PLL	t <sub>co</sub>	3.363	3.363	4.769	5.178	5.702	5.559	5.826	5.178	5.702	5.559	5.826	ns
	8mA	GCLK	t <sub>co</sub>	3.008	2.996	4.254	4.624	5.101	4.983	5.185	4.624	5.101	4.983	5.185	ns
		GCLK PLL	t <sub>co</sub>	3.364	3.364	4.777	5.186	5.711	5.568	5.835	5.186	5.711	5.568	5.835	ns
	10mA	GCLK	t <sub>co</sub>	2.997	2.985	4.241	4.611	5.087	4.969	5.171	4.611	5.087	4.969	5.171	ns
		GCLK PLL	t <sub>co</sub>	3.353	3.353	4.764	5.173	5.697	5.554	5.821	5.173	5.697	5.554	5.821	ns
12mA	GCLK	t <sub>co</sub>	2.997	2.985	4.241	4.611	5.088	4.970	5.172	4.611	5.088	4.970	5.172	ns	
	GCLK PLL	t <sub>co</sub>	3.353	3.353	4.764	5.173	5.698	5.555	5.822	5.173	5.698	5.555	5.822	ns	
1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.018	3.006	4.257	4.626	5.101	4.983	5.185	4.626	5.101	4.983	5.185	ns
		GCLK PLL	t <sub>co</sub>	3.374	3.374	4.780	5.188	5.711	5.568	5.835	5.188	5.711	5.568	5.835	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.121	3.109	4.302	4.660	5.126	5.008	5.210	4.660	5.126	5.008	5.210	ns
		GCLK PLL	t <sub>co</sub>	3.477	3.477	4.825	5.222	5.736	5.593	5.860	5.222	5.736	5.593	5.860	ns
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.121	3.109	4.302	4.660	5.126	5.008	5.210	4.660	5.126	5.008	5.210	ns
		GCLK PLL	t <sub>co</sub>	3.477	3.477	4.825	5.222	5.736	5.593	5.860	5.222	5.736	5.593	5.860	ns

Table 1-53 specifies EP3SL50 row pins output timing parameters for single-ended I/O standards.

**Table 1-53.** EP3SL50 Row Pins output Timing Parameters (Part 1 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.001	3.219	4.469	4.830	5.298	5.181	5.276	4.941	5.411	5.296	5.349	ns
		GCLK PLL	t <sub>co</sub>	1.486	1.699	2.111	2.177	2.377	2.394	2.348	2.279	2.471	2.497	2.338	ns
	8mA	GCLK	t <sub>co</sub>	2.908	3.114	4.339	4.692	5.153	5.036	5.162	4.800	5.262	5.147	5.234	ns
		GCLK PLL	t <sub>co</sub>	1.393	1.594	1.981	2.039	2.232	2.249	2.234	2.138	2.322	2.348	2.223	ns
	12mA	GCLK	t <sub>co</sub>	2.809	3.008	4.220	4.569	5.025	4.908	5.066	4.673	5.130	5.015	5.134	ns
		GCLK PLL	t <sub>co</sub>	1.294	1.488	1.862	1.916	2.104	2.121	2.138	2.011	2.190	2.216	2.123	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.011	3.223	4.477	4.835	5.302	5.185	5.285	4.947	5.415	5.300	5.361	ns
		GCLK PLL	t <sub>co</sub>	1.496	1.703	2.119	2.182	2.381	2.398	2.357	2.285	2.475	2.501	2.350	ns
	8mA	GCLK	t <sub>co</sub>	2.813	3.014	4.226	4.575	5.031	4.914	5.076	4.679	5.137	5.022	5.143	ns
		GCLK PLL	t <sub>co</sub>	1.298	1.494	1.868	1.922	2.110	2.127	2.148	2.017	2.197	2.223	2.132	ns
3.0-V LVTTTL	4mA	GCLK	t <sub>co</sub>	2.955	3.165	4.421	4.783	5.254	5.137	5.242	4.898	5.369	5.254	5.315	ns
		GCLK PLL	t <sub>co</sub>	1.440	1.645	2.063	2.130	2.333	2.350	2.314	2.236	2.429	2.455	2.304	ns
	8mA	GCLK	t <sub>co</sub>	2.830	3.038	4.268	4.624	5.090	4.973	5.097	4.736	5.205	5.089	5.169	ns
		GCLK PLL	t <sub>co</sub>	1.315	1.518	1.910	1.971	2.169	2.186	2.169	2.074	2.265	2.290	2.158	ns
	12mA	GCLK	t <sub>co</sub>	2.791	2.987	4.186	4.541	5.002	4.885	5.027	4.650	5.112	4.996	5.096	ns
		GCLK PLL	t <sub>co</sub>	1.276	1.467	1.828	1.888	2.081	2.098	2.099	1.988	2.172	2.197	2.085	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	2.869	3.084	4.315	4.676	5.144	5.027	5.133	4.790	5.258	5.142	5.205	ns
		GCLK PLL	t <sub>co</sub>	1.354	1.564	1.957	2.023	2.223	2.240	2.205	2.128	2.318	2.343	2.194	ns
	8mA	GCLK	t <sub>co</sub>	2.769	2.965	4.151	4.502	4.963	4.846	4.999	4.610	5.072	4.956	5.067	ns
		GCLK PLL	t <sub>co</sub>	1.254	1.445	1.793	1.849	2.042	2.059	2.071	1.948	2.132	2.157	2.056	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	2.981	3.201	4.553	4.937	5.426	5.309	5.387	5.058	5.548	5.432	5.467	ns
		GCLK PLL	t <sub>co</sub>	1.466	1.681	2.195	2.284	2.505	2.522	2.459	2.396	2.608	2.633	2.456	ns
	8mA	GCLK	t <sub>co</sub>	2.871	3.103	4.398	4.774	5.256	5.139	5.245	4.891	5.374	5.258	5.322	ns
		GCLK PLL	t <sub>co</sub>	1.356	1.583	2.040	2.121	2.335	2.352	2.317	2.229	2.434	2.459	2.311	ns
	12mA	GCLK	t <sub>co</sub>	2.825	3.026	4.287	4.655	5.130	5.013	5.154	4.768	5.244	5.128	5.228	ns
		GCLK PLL	t <sub>co</sub>	1.310	1.506	1.929	2.002	2.209	2.226	2.226	2.106	2.304	2.329	2.217	ns

**Table 1-53.** EP3SL50 Row Pins output Timing Parameters (Part 2 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.8 V	2mA	GCLK	t <sub>co</sub>	3.199	3.433	4.924	5.352	5.888	5.771	5.949	5.479	6.019	5.903	6.043	ns
		GCLK PLL	t <sub>co</sub>	1.699	1.901	2.555	2.713	2.980	2.997	3.012	2.833	3.095	3.118	3.021	ns
	4mA	GCLK	t <sub>co</sub>	2.974	3.231	4.597	4.983	5.483	5.366	5.544	5.114	5.613	5.496	5.636	ns
		GCLK PLL	t <sub>co</sub>	1.474	1.699	2.228	2.344	2.575	2.592	2.607	2.468	2.689	2.711	2.614	ns
	6mA	GCLK	t <sub>co</sub>	2.909	3.129	4.444	4.833	5.324	5.207	5.385	4.946	5.440	5.324	5.464	ns
		GCLK PLL	t <sub>co</sub>	1.409	1.597	2.075	2.194	2.416	2.433	2.448	2.300	2.516	2.539	2.442	ns
	8mA	GCLK	t <sub>co</sub>	2.849	3.055	4.367	4.739	5.227	5.110	5.288	4.851	5.346	5.230	5.370	ns
		GCLK PLL	t <sub>co</sub>	1.349	1.534	1.998	2.100	2.319	2.336	2.351	2.205	2.422	2.445	2.348	ns
1.5 V	2mA	GCLK	t <sub>co</sub>	3.110	3.351	4.834	5.265	5.816	5.699	5.877	5.386	5.943	5.827	5.967	ns
		GCLK PLL	t <sub>co</sub>	1.610	1.819	2.465	2.626	2.908	2.925	2.940	2.740	3.019	3.042	2.945	ns
	4mA	GCLK	t <sub>co</sub>	2.868	3.093	4.429	4.828	5.325	5.208	5.386	4.940	5.439	5.323	5.463	ns
		GCLK PLL	t <sub>co</sub>	1.368	1.561	2.060	2.189	2.417	2.434	2.449	2.294	2.515	2.538	2.441	ns
	6mA	GCLK	t <sub>co</sub>	2.841	3.046	4.356	4.732	5.219	5.102	5.280	4.842	5.334	5.218	5.358	ns
		GCLK PLL	t <sub>co</sub>	1.341	1.525	1.987	2.093	2.311	2.328	2.343	2.196	2.410	2.433	2.336	ns
	8mA	GCLK	t <sub>co</sub>	2.832	3.037	4.334	4.714	5.200	5.083	5.261	4.824	5.312	5.196	5.336	ns
		GCLK PLL	t <sub>co</sub>	1.332	1.514	1.965	2.075	2.292	2.309	2.324	2.178	2.388	2.411	2.314	ns
1.2 V	2mA	GCLK	t <sub>co</sub>	3.053	3.276	4.744	5.179	5.741	5.624	5.802	5.298	5.859	5.743	5.883	ns
		GCLK PLL	t <sub>co</sub>	1.553	1.744	2.375	2.540	2.833	2.850	2.865	2.652	2.935	2.958	2.861	ns
	4mA	GCLK	t <sub>co</sub>	2.873	3.087	4.451	4.856	5.366	5.249	5.427	4.965	5.481	5.365	5.505	ns
		GCLK PLL	t <sub>co</sub>	1.373	1.555	2.082	2.217	2.458	2.475	2.490	2.319	2.557	2.580	2.483	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	2.810	3.012	4.265	4.627	5.098	4.981	5.144	4.735	5.206	5.091	5.214	ns
		GCLK PLL	t <sub>co</sub>	1.295	1.492	1.907	1.974	2.177	2.194	2.216	2.073	2.266	2.292	2.203	ns
	12mA	GCLK	t <sub>co</sub>	2.798	3.000	4.257	4.619	5.090	4.973	5.142	4.727	5.199	5.084	5.213	ns
		GCLK PLL	t <sub>co</sub>	1.283	1.480	1.899	1.966	2.169	2.186	2.214	2.065	2.262	2.285	2.202	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	2.782	2.982	4.232	4.594	5.063	4.946	5.125	4.701	5.172	5.057	5.195	ns
		GCLK PLL	t <sub>co</sub>	1.267	1.462	1.874	1.941	2.142	2.159	2.197	2.039	2.244	2.258	2.184	ns

**Table 1-53.** EP3SL50 Row Pins output Timing Parameters (Part 3 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	2.810	3.011	4.262	4.627	5.101	4.984	5.162	4.732	5.209	5.093	5.233	ns
		GCLK PLL	t <sub>co</sub>	1.310	1.479	1.893	1.988	2.193	2.210	2.225	2.086	2.285	2.308	2.211	ns
	6mA	GCLK	t <sub>co</sub>	2.795	2.997	4.259	4.625	5.099	4.982	5.160	4.730	5.207	5.091	5.231	ns
		GCLK PLL	t <sub>co</sub>	1.295	1.473	1.891	1.986	2.191	2.208	2.223	2.084	2.283	2.306	2.209	ns
	8mA	GCLK	t <sub>co</sub>	2.784	2.985	4.242	4.608	5.082	4.965	5.144	4.713	5.195	5.075	5.216	ns
		GCLK PLL	t <sub>co</sub>	1.284	1.462	1.881	1.969	2.174	2.191	2.206	2.067	2.267	2.290	2.193	ns
	10mA	GCLK	t <sub>co</sub>	2.760	2.962	4.226	4.592	5.067	4.950	5.131	4.698	5.183	5.060	5.204	ns
		GCLK PLL	t <sub>co</sub>	1.260	1.451	1.868	1.953	2.159	2.176	2.191	2.052	2.255	2.275	2.178	ns
	12mA	GCLK	t <sub>co</sub>	2.760	2.961	4.225	4.591	5.066	4.949	5.131	4.697	5.183	5.059	5.204	ns
		GCLK PLL	t <sub>co</sub>	1.260	1.450	1.868	1.952	2.158	2.175	2.191	2.051	2.255	2.274	2.178	ns
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	2.770	2.970	4.223	4.587	5.060	4.943	5.126	4.692	5.177	5.052	5.198	ns
		GCLK PLL	t <sub>co</sub>	1.270	1.457	1.867	1.948	2.152	2.169	2.186	2.046	2.249	2.267	2.172	ns
	16mA	GCLK	t <sub>co</sub>	2.767	2.965	4.222	4.588	5.062	4.945	5.136	4.694	5.188	5.056	5.209	ns
		GCLK PLL	t <sub>co</sub>	1.264	1.460	1.873	1.949	2.154	2.171	2.196	2.048	2.260	2.271	2.183	ns
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	2.806	3.007	4.273	4.641	5.118	5.001	5.179	4.745	5.225	5.109	5.249	ns
		GCLK PLL	t <sub>co</sub>	1.306	1.481	1.904	2.002	2.210	2.227	2.242	2.099	2.301	2.324	2.227	ns
	6mA	GCLK	t <sub>co</sub>	2.783	2.985	4.255	4.624	5.101	4.984	5.162	4.729	5.209	5.093	5.233	ns
		GCLK PLL	t <sub>co</sub>	1.283	1.467	1.891	1.985	2.193	2.210	2.225	2.083	2.285	2.308	2.211	ns
	8mA	GCLK	t <sub>co</sub>	2.766	2.968	4.238	4.606	5.083	4.966	5.145	4.711	5.196	5.076	5.217	ns
		GCLK PLL	t <sub>co</sub>	1.266	1.455	1.878	1.967	2.175	2.192	2.207	2.065	2.268	2.291	2.194	ns

**Table 1-53.** EP3SL50 Row Pins output Timing Parameters (Part 4 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.785	2.983	4.229	4.592	5.063	4.946	5.124	4.696	5.174	5.055	5.195	ns
		GCLK PLL	t <sub>co</sub>	1.285	1.463	1.866	1.953	2.155	2.172	2.187	2.050	2.247	2.270	2.173	ns
	6mA	GCLK	t <sub>co</sub>	2.773	2.971	4.220	4.584	5.055	4.938	5.123	4.688	5.174	5.048	5.195	ns
		GCLK PLL	t <sub>co</sub>	1.273	1.457	1.864	1.945	2.147	2.164	2.183	2.042	2.246	2.263	2.169	ns
	8mA	GCLK	t <sub>co</sub>	2.760	2.959	4.211	4.575	5.047	4.930	5.116	4.680	5.167	5.040	5.188	ns
		GCLK PLL	t <sub>co</sub>	1.260	1.449	1.857	1.936	2.139	2.156	2.176	2.034	2.239	2.255	2.162	ns
	10mA	GCLK	t <sub>co</sub>	2.762	2.961	4.214	4.578	5.050	4.933	5.120	4.683	5.170	5.043	5.191	ns
		GCLK PLL	t <sub>co</sub>	1.262	1.451	1.860	1.939	2.142	2.159	2.180	2.037	2.242	2.258	2.165	ns
	12mA	GCLK	t <sub>co</sub>	2.756	2.956	4.212	4.577	5.050	4.933	5.123	4.683	5.175	5.044	5.196	ns
		GCLK PLL	t <sub>co</sub>	1.255	1.448	1.862	1.938	2.142	2.159	2.183	2.037	2.247	2.259	2.170	ns
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.764	2.960	4.207	4.569	5.041	4.924	5.119	4.674	5.169	5.033	5.190	ns
		GCLK PLL	t <sub>co</sub>	1.261	1.456	1.860	1.930	2.133	2.150	2.179	2.028	2.241	2.248	2.164	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.792	2.990	4.240	4.605	5.078	4.961	5.139	4.708	5.185	5.069	5.209	ns
		GCLK PLL	t <sub>co</sub>	1.292	1.469	1.875	1.966	2.170	2.187	2.202	2.062	2.261	2.284	2.187	ns
	6mA	GCLK	t <sub>co</sub>	2.780	2.980	4.236	4.601	5.074	4.957	5.137	4.705	5.188	5.066	5.209	ns
		GCLK PLL	t <sub>co</sub>	1.280	1.464	1.876	1.962	2.166	2.183	2.198	2.059	2.260	2.281	2.184	ns
	8mA	GCLK	t <sub>co</sub>	2.776	2.975	4.230	4.595	5.068	4.951	5.132	4.699	5.182	5.060	5.203	ns
		GCLK PLL	t <sub>co</sub>	1.276	1.460	1.871	1.956	2.160	2.177	2.192	2.053	2.254	2.275	2.178	ns
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.791	2.989	4.251	4.619	5.096	4.979	5.157	4.722	5.204	5.086	5.226	ns
		GCLK PLL	t <sub>co</sub>	1.291	1.471	1.888	1.980	2.188	2.205	2.220	2.076	2.278	2.301	2.204	ns
	6mA	GCLK	t <sub>co</sub>	2.779	2.977	4.240	4.607	5.084	4.967	5.145	4.711	5.195	5.075	5.216	ns
		GCLK PLL	t <sub>co</sub>	1.279	1.463	1.879	1.968	2.176	2.193	2.208	2.065	2.267	2.290	2.193	ns
	8mA	GCLK	t <sub>co</sub>	2.775	2.975	4.244	4.612	5.090	4.973	5.154	4.717	5.205	5.082	5.226	ns
		GCLK PLL	t <sub>co</sub>	1.275	1.463	1.886	1.973	2.182	2.199	2.214	2.071	2.277	2.297	2.200	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	2.895	3.095	4.290	4.645	5.107	4.990	5.184	4.753	5.233	5.103	5.256	ns
		GCLK PLL	t <sub>co</sub>	1.380	1.577	1.934	1.992	2.186	2.203	2.256	2.091	2.305	2.304	2.245	ns
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	2.895	3.095	4.290	4.645	5.107	4.990	5.184	4.753	5.233	5.103	5.256	ns
		GCLK PLL	t <sub>co</sub>	1.380	1.577	1.934	1.992	2.186	2.203	2.256	2.091	2.305	2.304	2.245	ns

Table 1-54 through Table 1-57 show the maximum I/O timing parameters for EP3SL50 devices for differential I/O standards.

Table 1-54 specifies EP3SL50 column pins input timing parameters for differential I/O standards.

**Table 1-54.** EP3SL50 Column Pins Input Timing Parameters (Part 1 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS	GCLK	t <sub>su</sub>	-0.751	-0.749	-0.792	-0.756	-0.885	-0.844	-1.119	-0.710	-1.093	-0.793	-1.152	ns
		t <sub>h</sub>	0.870	0.884	1.000	0.994	1.148	1.097	1.368	0.957	1.377	1.058	1.400	ns
	GCLK PLL	t <sub>su</sub>	0.896	0.924	1.795	2.133	2.302	2.193	2.080	2.187	2.491	2.254	2.133	ns
		t <sub>h</sub>	-0.648	-0.660	-1.383	-1.664	-1.779	-1.696	-1.583	-1.709	-1.937	-1.745	-1.635	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-0.751	-0.749	-0.792	-0.756	-0.885	-0.844	-1.119	-0.710	-1.093	-0.793	-1.152	ns
		t <sub>h</sub>	0.870	0.884	1.000	0.994	1.148	1.097	1.368	0.957	1.377	1.058	1.400	ns
	GCLK PLL	t <sub>su</sub>	0.896	0.924	1.795	2.133	2.302	2.193	2.080	2.187	2.491	2.254	2.133	ns
		t <sub>h</sub>	-0.648	-0.660	-1.383	-1.664	-1.779	-1.696	-1.583	-1.709	-1.937	-1.745	-1.635	ns
RSDS	GCLK	t <sub>su</sub>	-0.751	-0.749	-0.792	-0.756	-0.885	-0.844	-1.119	-0.710	-1.093	-0.793	-1.152	ns
		t <sub>h</sub>	0.870	0.884	1.000	0.994	1.148	1.097	1.368	0.957	1.377	1.058	1.400	ns
	GCLK PLL	t <sub>su</sub>	0.896	0.924	1.795	2.133	2.302	2.193	2.080	2.187	2.491	2.254	2.133	ns
		t <sub>h</sub>	-0.648	-0.660	-1.383	-1.664	-1.779	-1.696	-1.583	-1.709	-1.937	-1.745	-1.635	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.567	-0.572	-0.869	-0.955	-1.044	-0.998	-1.268	-0.945	-1.033	-0.991	-1.306	ns
		t <sub>h</sub>	0.679	0.699	1.045	1.153	1.261	1.205	1.472	1.150	1.258	1.208	1.509	ns
	GCLK PLL	t <sub>su</sub>	1.080	1.101	1.718	1.934	2.143	2.039	1.931	1.952	2.163	2.056	1.979	ns
		t <sub>h</sub>	-0.839	-0.845	-1.338	-1.505	-1.666	-1.588	-1.479	-1.516	-1.677	-1.595	-1.526	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.567	-0.572	-0.869	-0.955	-1.044	-0.998	-1.268	-0.945	-1.033	-0.991	-1.306	ns
		t <sub>h</sub>	0.679	0.699	1.045	1.153	1.261	1.205	1.472	1.150	1.258	1.208	1.509	ns
	GCLK PLL	t <sub>su</sub>	1.080	1.101	1.718	1.934	2.143	2.039	1.931	1.952	2.163	2.056	1.979	ns
		t <sub>h</sub>	-0.839	-0.845	-1.338	-1.505	-1.666	-1.588	-1.479	-1.516	-1.677	-1.595	-1.526	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.575	-0.584	-0.879	-0.966	-1.060	-1.014	-1.284	-0.956	-1.048	-1.006	-1.321	ns
		t <sub>h</sub>	0.687	0.711	1.055	1.164	1.277	1.221	1.488	1.161	1.273	1.223	1.524	ns
	GCLK PLL	t <sub>su</sub>	1.072	1.089	1.708	1.923	2.127	2.023	1.915	1.941	2.148	2.041	1.964	ns
		t <sub>h</sub>	-0.831	-0.833	-1.328	-1.494	-1.650	-1.572	-1.463	-1.505	-1.662	-1.580	-1.511	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.575	-0.584	-0.879	-0.966	-1.060	-1.014	-1.284	-0.956	-1.048	-1.006	-1.321	ns
		t <sub>h</sub>	0.687	0.711	1.055	1.164	1.277	1.221	1.488	1.161	1.273	1.223	1.524	ns
	GCLK PLL	t <sub>su</sub>	1.072	1.089	1.708	1.923	2.127	2.023	1.915	1.941	2.148	2.041	1.964	ns
		t <sub>h</sub>	-0.831	-0.833	-1.328	-1.494	-1.650	-1.572	-1.463	-1.505	-1.662	-1.580	-1.511	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.587	-0.595	-0.888	-0.977	-1.079	-1.033	-1.303	-0.967	-1.066	-1.024	-1.339	ns
		t <sub>h</sub>	0.699	0.722	1.065	1.175	1.296	1.240	1.507	1.172	1.291	1.241	1.542	ns
	GCLK PLL	t <sub>su</sub>	1.060	1.078	1.699	1.912	2.108	2.004	1.896	1.930	2.130	2.023	1.946	ns
		t <sub>h</sub>	-0.819	-0.822	-1.318	-1.483	-1.631	-1.553	-1.444	-1.494	-1.644	-1.562	-1.493	ns



**Table 1-54.** EP3SL50 Column Pins Input Timing Parameters (Part 2 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.587	-0.595	-0.888	-0.977	-1.079	-1.033	-1.303	-0.967	-1.066	-1.024	-1.339	ns
		t <sub>h</sub>	0.699	0.722	1.065	1.175	1.296	1.240	1.507	1.172	1.291	1.241	1.542	ns
	GCLK PLL	t <sub>su</sub>	1.060	1.078	1.699	1.912	2.108	2.004	1.896	1.930	2.130	2.023	1.946	ns
		t <sub>h</sub>	-0.819	-0.822	-1.318	-1.483	-1.631	-1.553	-1.444	-1.494	-1.644	-1.562	-1.493	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.575	-0.584	-0.879	-0.966	-1.060	-1.014	-1.284	-0.956	-1.048	-1.006	-1.321	ns
		t <sub>h</sub>	0.687	0.711	1.055	1.164	1.277	1.221	1.488	1.161	1.273	1.223	1.524	ns
	GCLK PLL	t <sub>su</sub>	1.072	1.089	1.708	1.923	2.127	2.023	1.915	1.941	2.148	2.041	1.964	ns
		t <sub>h</sub>	-0.831	-0.833	-1.328	-1.494	-1.650	-1.572	-1.463	-1.505	-1.662	-1.580	-1.511	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.575	-0.584	-0.879	-0.966	-1.060	-1.014	-1.284	-0.956	-1.048	-1.006	-1.321	ns
		t <sub>h</sub>	0.687	0.711	1.055	1.164	1.277	1.221	1.488	1.161	1.273	1.223	1.524	ns
	GCLK PLL	t <sub>su</sub>	1.072	1.089	1.708	1.923	2.127	2.023	1.915	1.941	2.148	2.041	1.964	ns
		t <sub>h</sub>	-0.831	-0.833	-1.328	-1.494	-1.650	-1.572	-1.463	-1.505	-1.662	-1.580	-1.511	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.587	-0.595	-0.888	-0.977	-1.079	-1.033	-1.303	-0.967	-1.066	-1.024	-1.339	ns
		t <sub>h</sub>	0.699	0.722	1.065	1.175	1.296	1.240	1.507	1.172	1.291	1.241	1.542	ns
	GCLK PLL	t <sub>su</sub>	1.060	1.078	1.699	1.912	2.108	2.004	1.896	1.930	2.130	2.023	1.946	ns
		t <sub>h</sub>	-0.819	-0.822	-1.318	-1.483	-1.631	-1.553	-1.444	-1.494	-1.644	-1.562	-1.493	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.587	-0.595	-0.888	-0.977	-1.079	-1.033	-1.303	-0.967	-1.066	-1.024	-1.339	ns
		t <sub>h</sub>	0.699	0.722	1.065	1.175	1.296	1.240	1.507	1.172	1.291	1.241	1.542	ns
	GCLK PLL	t <sub>su</sub>	1.060	1.078	1.699	1.912	2.108	2.004	1.896	1.930	2.130	2.023	1.946	ns
		t <sub>h</sub>	-0.819	-0.822	-1.318	-1.483	-1.631	-1.553	-1.444	-1.494	-1.644	-1.562	-1.493	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.594	-0.601	-0.900	-0.982	-1.079	-1.035	-1.302	-0.971	-1.061	-1.022	-1.335	ns
		t <sub>h</sub>	0.706	0.728	1.078	1.183	1.299	1.243	1.511	1.179	1.291	1.240	1.543	ns
	GCLK PLL	t <sub>su</sub>	1.053	1.072	1.687	1.907	2.108	2.002	1.897	1.926	2.135	2.025	1.950	ns
		t <sub>h</sub>	-0.812	-0.816	-1.305	-1.475	-1.628	-1.550	-1.440	-1.487	-1.644	-1.563	-1.492	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.594	-0.601	-0.900	-0.982	-1.079	-1.035	-1.302	-0.971	-1.061	-1.022	-1.335	ns
		t <sub>h</sub>	0.706	0.728	1.078	1.183	1.299	1.243	1.511	1.179	1.291	1.240	1.543	ns
	GCLK PLL	t <sub>su</sub>	1.053	1.072	1.687	1.907	2.108	2.002	1.897	1.926	2.135	2.025	1.950	ns
		t <sub>h</sub>	-0.812	-0.816	-1.305	-1.475	-1.628	-1.550	-1.440	-1.487	-1.644	-1.563	-1.492	ns

Table 1-55 specifies EP3SL50 row pins input timing parameters for differential I/O standards.

**Table 1-55.** EP3SL50 Row Pins Input Timing Parameters (Part 1 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS	GCLK	t <sub>su</sub>	-0.735	-0.735	-0.703	-0.634	-0.739	-0.705	-0.955	-0.580	-0.681	-0.649	-0.989	ns
		t <sub>h</sub>	0.852	0.867	0.911	0.873	1.003	0.959	1.206	0.832	0.955	0.915	1.239	ns
	GCLK PLL	t <sub>su</sub>	0.871	0.899	1.843	2.215	2.410	2.291	2.206	2.274	2.479	2.357	2.255	ns
		t <sub>h</sub>	-0.624	-0.638	-1.432	-1.744	-1.885	-1.792	-1.706	-1.789	-1.941	-1.846	-1.752	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-0.735	-0.735	-0.703	-0.634	-0.739	-0.705	-0.955	-0.580	-0.681	-0.649	-0.989	ns
		t <sub>h</sub>	0.852	0.867	0.911	0.873	1.003	0.959	1.206	0.832	0.955	0.915	1.239	ns
	GCLK PLL	t <sub>su</sub>	0.871	0.899	1.843	2.215	2.410	2.291	2.206	2.274	2.479	2.357	2.255	ns
		t <sub>h</sub>	-0.624	-0.638	-1.432	-1.744	-1.885	-1.792	-1.706	-1.789	-1.941	-1.846	-1.752	ns
RSDS	GCLK	t <sub>su</sub>	-0.735	-0.735	-0.703	-0.634	-0.739	-0.705	-0.955	-0.580	-0.681	-0.649	-0.989	ns
		t <sub>h</sub>	0.852	0.867	0.911	0.873	1.003	0.959	1.206	0.832	0.955	0.915	1.239	ns
	GCLK PLL	t <sub>su</sub>	0.871	0.899	1.843	2.215	2.410	2.291	2.206	2.274	2.479	2.357	2.255	ns
		t <sub>h</sub>	-0.624	-0.638	-1.432	-1.744	-1.885	-1.792	-1.706	-1.789	-1.941	-1.846	-1.752	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.550	-0.560	-0.800	-0.868	-0.936	-0.899	-1.144	-0.857	-0.924	-0.891	-1.183	ns
		t <sub>h</sub>	0.660	0.683	0.976	1.062	1.150	1.104	1.346	1.060	1.147	1.105	1.384	ns
	GCLK PLL	t <sub>su</sub>	1.066	1.084	1.756	1.991	2.221	2.107	2.027	2.007	2.242	2.125	2.071	ns
		t <sub>h</sub>	-0.826	-0.832	-1.377	-1.565	-1.745	-1.657	-1.576	-1.571	-1.756	-1.666	-1.617	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.550	-0.560	-0.800	-0.868	-0.936	-0.899	-1.144	-0.857	-0.924	-0.891	-1.183	ns
		t <sub>h</sub>	0.660	0.683	0.976	1.062	1.150	1.104	1.346	1.060	1.147	1.105	1.384	ns
	GCLK PLL	t <sub>su</sub>	1.066	1.084	1.756	1.991	2.221	2.107	2.027	2.007	2.242	2.125	2.071	ns
		t <sub>h</sub>	-0.826	-0.832	-1.377	-1.565	-1.745	-1.657	-1.576	-1.571	-1.756	-1.666	-1.617	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.559	-0.572	-0.809	-0.878	-0.952	-0.915	-1.160	-0.866	-0.940	-0.907	-1.199	ns
		t <sub>h</sub>	0.669	0.695	0.985	1.072	1.166	1.120	1.362	1.069	1.163	1.121	1.400	ns
	GCLK PLL	t <sub>su</sub>	1.057	1.072	1.747	1.981	2.205	2.091	2.011	1.998	2.226	2.109	2.055	ns
		t <sub>h</sub>	-0.817	-0.820	-1.368	-1.555	-1.729	-1.641	-1.560	-1.562	-1.740	-1.650	-1.601	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.559	-0.572	-0.809	-0.878	-0.952	-0.915	-1.160	-0.866	-0.940	-0.907	-1.199	ns
		t <sub>h</sub>	0.669	0.695	0.985	1.072	1.166	1.120	1.362	1.069	1.163	1.121	1.400	ns
	GCLK PLL	t <sub>su</sub>	1.057	1.072	1.747	1.981	2.205	2.091	2.011	1.998	2.226	2.109	2.055	ns
		t <sub>h</sub>	-0.817	-0.820	-1.368	-1.555	-1.729	-1.641	-1.560	-1.562	-1.740	-1.650	-1.601	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.573	-0.584	-0.822	-0.888	-0.970	-0.933	-1.178	-0.877	-0.957	-0.924	-1.216	ns
		t <sub>h</sub>	0.683	0.707	0.997	1.082	1.184	1.138	1.380	1.080	1.180	1.138	1.417	ns
	GCLK PLL	t <sub>su</sub>	1.043	1.060	1.734	1.971	2.187	2.073	1.993	1.987	2.209	2.092	2.038	ns
		t <sub>h</sub>	-0.803	-0.808	-1.356	-1.545	-1.711	-1.623	-1.542	-1.551	-1.723	-1.633	-1.584	ns

**Table 1-55.** EP3SL50 Row Pins Input Timing Parameters (Part 2 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.573	-0.584	-0.822	-0.888	-0.970	-0.933	-1.178	-0.877	-0.957	-0.924	-1.216	ns
		t <sub>h</sub>	0.683	0.707	0.997	1.082	1.184	1.138	1.380	1.080	1.180	1.138	1.417	ns
	GCLK PLL	t <sub>su</sub>	1.043	1.060	1.734	1.971	2.187	2.073	1.993	1.987	2.209	2.092	2.038	ns
		t <sub>h</sub>	-0.803	-0.808	-1.356	-1.545	-1.711	-1.623	-1.542	-1.551	-1.723	-1.633	-1.584	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.559	-0.572	-0.809	-0.878	-0.952	-0.915	-1.160	-0.866	-0.940	-0.907	-1.199	ns
		t <sub>h</sub>	0.669	0.695	0.985	1.072	1.166	1.120	1.362	1.069	1.163	1.121	1.400	ns
	GCLK PLL	t <sub>su</sub>	1.057	1.072	1.747	1.981	2.205	2.091	2.011	1.998	2.226	2.109	2.055	ns
		t <sub>h</sub>	-0.817	-0.820	-1.368	-1.555	-1.729	-1.641	-1.560	-1.562	-1.740	-1.650	-1.601	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.559	-0.572	-0.809	-0.878	-0.952	-0.915	-1.160	-0.866	-0.940	-0.907	-1.199	ns
		t <sub>h</sub>	0.669	0.695	0.985	1.072	1.166	1.120	1.362	1.069	1.163	1.121	1.400	ns
	GCLK PLL	t <sub>su</sub>	1.057	1.072	1.747	1.981	2.205	2.091	2.011	1.998	2.226	2.109	2.055	ns
		t <sub>h</sub>	-0.817	-0.820	-1.368	-1.555	-1.729	-1.641	-1.560	-1.562	-1.740	-1.650	-1.601	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.573	-0.584	-0.822	-0.888	-0.970	-0.933	-1.178	-0.877	-0.957	-0.924	-1.216	ns
		t <sub>h</sub>	0.683	0.707	0.997	1.082	1.184	1.138	1.380	1.080	1.180	1.138	1.417	ns
	GCLK PLL	t <sub>su</sub>	1.043	1.060	1.734	1.971	2.187	2.073	1.993	1.987	2.209	2.092	2.038	ns
		t <sub>h</sub>	-0.803	-0.808	-1.356	-1.545	-1.711	-1.623	-1.542	-1.551	-1.723	-1.633	-1.584	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.573	-0.584	-0.822	-0.888	-0.970	-0.933	-1.178	-0.877	-0.957	-0.924	-1.216	ns
		t <sub>h</sub>	0.683	0.707	0.997	1.082	1.184	1.138	1.380	1.080	1.180	1.138	1.417	ns
	GCLK PLL	t <sub>su</sub>	1.043	1.060	1.734	1.971	2.187	2.073	1.993	1.987	2.209	2.092	2.038	ns
		t <sub>h</sub>	-0.803	-0.808	-1.356	-1.545	-1.711	-1.623	-1.542	-1.551	-1.723	-1.633	-1.584	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.572	-0.583	-0.827	-0.894	-0.971	-0.935	-1.179	-0.878	-0.953	-0.922	-1.213	ns
		t <sub>h</sub>	0.682	0.706	1.002	1.090	1.188	1.142	1.385	1.084	1.179	1.137	1.418	ns
	GCLK PLL	t <sub>su</sub>	1.034	1.051	1.719	1.955	2.176	2.061	1.982	1.976	2.203	2.084	2.031	ns
		t <sub>h</sub>	-0.794	-0.799	-1.341	-1.527	-1.697	-1.609	-1.527	-1.537	-1.714	-1.624	-1.573	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.572	-0.583	-0.827	-0.894	-0.971	-0.935	-1.179	-0.878	-0.953	-0.922	-1.213	ns
		t <sub>h</sub>	0.682	0.706	1.002	1.090	1.188	1.142	1.385	1.084	1.179	1.137	1.418	ns
	GCLK PLL	t <sub>su</sub>	1.034	1.051	1.719	1.955	2.176	2.061	1.982	1.976	2.203	2.084	2.031	ns
		t <sub>h</sub>	-0.794	-0.799	-1.341	-1.527	-1.697	-1.609	-1.527	-1.537	-1.714	-1.624	-1.573	ns

Table 1-56 specifies EP3SL50 Column Pins Output Timing parameters for differential I/O standards.

**Table 1-56.** EP3SL50 Column Pins output Timing Parameters (Part 1 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
LVDS_E_1R	—	GCLK	t <sub>co</sub>	2.878	3.078	4.338	4.711	5.195	5.069	5.265	4.823	5.306	5.181	5.331	ns	
			t <sub>co</sub>	1.347	1.521	1.941	2.039	2.254	2.262	2.301	2.142	2.358	2.366	2.284	ns	
LVDS_E_3R	—	GCLK	t <sub>co</sub>	2.874	3.081	4.385	4.766	5.257	5.131	5.327	4.882	5.372	5.247	5.397	ns	
			t <sub>co</sub>	1.343	1.524	1.988	2.094	2.316	2.324	2.363	2.201	2.424	2.432	2.350	ns	
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	2.878	3.078	4.338	4.711	5.195	5.069	5.265	4.823	5.306	5.181	5.331	ns	
			t <sub>co</sub>	1.347	1.521	1.941	2.039	2.254	2.262	2.301	2.142	2.358	2.366	2.284	ns	
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	2.874	3.081	4.385	4.766	5.257	5.131	5.327	4.882	5.372	5.247	5.397	ns	
			t <sub>co</sub>	1.343	1.524	1.988	2.094	2.316	2.324	2.363	2.201	2.424	2.432	2.350	ns	
RSDS_E_1R	—	GCLK	t <sub>co</sub>	2.878	3.078	4.338	4.711	5.195	5.069	5.265	4.823	5.306	5.181	5.331	ns	
			t <sub>co</sub>	1.347	1.521	1.941	2.039	2.254	2.262	2.301	2.142	2.358	2.366	2.284	ns	
RSDS_E_3R	—	GCLK	t <sub>co</sub>	2.874	3.081	4.385	4.766	5.257	5.131	5.327	4.882	5.372	5.247	5.397	ns	
			t <sub>co</sub>	1.343	1.524	1.988	2.094	2.316	2.324	2.363	2.201	2.424	2.432	2.350	ns	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.905	3.111	4.409	4.789	5.279	5.153	5.349	4.903	5.392	5.267	5.417	ns	
			t <sub>co</sub>	1.374	1.554	2.012	2.117	2.338	2.346	2.385	2.222	2.444	2.452	2.370	ns	
	6mA	GCLK	t <sub>co</sub>	2.895	3.101	4.399	4.778	5.269	5.143	5.339	4.892	5.382	5.257	5.407	ns	
			t <sub>co</sub>	1.364	1.544	2.002	2.106	2.328	2.336	2.375	2.211	2.434	2.442	2.360	ns	
	8mA	GCLK	t <sub>co</sub>	2.895	3.101	4.402	4.782	5.273	5.147	5.343	4.897	5.387	5.262	5.412	ns	
			t <sub>co</sub>	1.364	1.544	2.005	2.110	2.332	2.340	2.379	2.216	2.439	2.447	2.365	ns	
	10mA	GCLK	t <sub>co</sub>	2.888	3.095	4.395	4.776	5.267	5.141	5.337	4.890	5.381	5.256	5.406	ns	
			t <sub>co</sub>	1.357	1.538	1.998	2.104	2.326	2.334	2.373	2.209	2.433	2.441	2.359	ns	
	12mA	GCLK	t <sub>co</sub>	2.887	3.093	4.392	4.773	5.264	5.138	5.334	4.887	5.377	5.252	5.402	ns	
			t <sub>co</sub>	1.356	1.536	1.995	2.101	2.323	2.331	2.370	2.206	2.429	2.437	2.355	ns	
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.909	3.115	4.413	4.793	5.283	5.157	5.353	4.907	5.397	5.272	5.422	ns
				t <sub>co</sub>	1.378	1.558	2.016	2.121	2.342	2.350	2.389	2.226	2.449	2.457	2.375	ns

**Table 1-56.** EP3SL50 Column Pins output Timing Parameters (Part 2 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.899	3.104	4.392	4.770	5.258	5.132	5.328	4.883	5.370	5.245	5.395	ns
		GCLK PLL	t <sub>co</sub>	1.368	1.547	1.995	2.098	2.317	2.325	2.364	2.202	2.422	2.430	2.348	ns
	6mA	GCLK	t <sub>co</sub>	2.894	3.100	4.392	4.770	5.259	5.133	5.329	4.884	5.372	5.247	5.397	ns
		GCLK PLL	t <sub>co</sub>	1.363	1.543	1.995	2.098	2.318	2.326	2.365	2.203	2.424	2.432	2.350	ns
	8mA	GCLK	t <sub>co</sub>	2.892	3.098	4.391	4.769	5.257	5.131	5.327	4.883	5.371	5.246	5.396	ns
		GCLK PLL	t <sub>co</sub>	1.361	1.541	1.994	2.097	2.316	2.324	2.363	2.202	2.423	2.431	2.349	ns
	10mA	GCLK	t <sub>co</sub>	2.884	3.089	4.381	4.759	5.248	5.122	5.318	4.873	5.361	5.236	5.386	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.532	1.984	2.087	2.307	2.315	2.354	2.192	2.413	2.421	2.339	ns
	12mA	GCLK	t <sub>co</sub>	2.885	3.091	4.387	4.766	5.256	5.130	5.326	4.881	5.370	5.245	5.395	ns
		GCLK PLL	t <sub>co</sub>	1.354	1.534	1.990	2.094	2.315	2.323	2.362	2.200	2.422	2.430	2.348	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.884	3.088	4.370	4.747	5.234	5.108	5.304	4.860	5.346	5.221	5.371	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.531	1.973	2.075	2.293	2.301	2.340	2.179	2.398	2.406	2.324	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.896	3.101	4.388	4.765	5.252	5.126	5.322	4.879	5.365	5.240	5.390	ns
		GCLK PLL	t <sub>co</sub>	1.365	1.544	1.991	2.093	2.311	2.319	2.358	2.198	2.417	2.425	2.343	ns
	6mA	GCLK	t <sub>co</sub>	2.892	3.098	4.389	4.767	5.256	5.130	5.326	4.881	5.369	5.244	5.394	ns
		GCLK PLL	t <sub>co</sub>	1.361	1.541	1.992	2.095	2.315	2.323	2.362	2.200	2.421	2.429	2.347	ns
	8mA	GCLK	t <sub>co</sub>	2.882	3.087	4.378	4.756	5.244	5.118	5.314	4.870	5.357	5.232	5.382	ns
		GCLK PLL	t <sub>co</sub>	1.351	1.530	1.981	2.084	2.303	2.311	2.350	2.189	2.409	2.417	2.335	ns
	10mA	GCLK	t <sub>co</sub>	2.880	3.085	4.376	4.753	5.242	5.116	5.312	4.868	5.355	5.230	5.380	ns
		GCLK PLL	t <sub>co</sub>	1.349	1.528	1.979	2.081	2.301	2.309	2.348	2.187	2.407	2.415	2.333	ns
	12mA	GCLK	t <sub>co</sub>	2.880	3.086	4.379	4.758	5.247	5.121	5.317	4.872	5.361	5.236	5.386	ns
		GCLK PLL	t <sub>co</sub>	1.349	1.529	1.982	2.086	2.306	2.314	2.353	2.191	2.413	2.421	2.339	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.884	3.089	4.376	4.753	5.241	5.115	5.311	4.867	5.354	5.229	5.379	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.532	1.979	2.081	2.300	2.308	2.347	2.186	2.406	2.414	2.332	ns

**Table 1-56.** EP3SL50 Column Pins output Timing Parameters (Part 3 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.910	3.118	4.421	4.801	5.291	5.165	5.361	4.915	5.404	5.279	5.429	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.561	2.024	2.129	2.350	2.358	2.397	2.234	2.456	2.464	2.382	ns
	6mA	GCLK	t <sub>co</sub>	2.896	3.104	4.409	4.790	5.281	5.155	5.351	4.905	5.395	5.270	5.420	ns
		GCLK PLL	t <sub>co</sub>	1.365	1.547	2.012	2.118	2.340	2.348	2.387	2.224	2.447	2.455	2.373	ns
	8mA	GCLK	t <sub>co</sub>	2.884	3.091	4.392	4.772	5.263	5.137	5.333	4.887	5.377	5.252	5.402	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.534	1.995	2.100	2.322	2.330	2.369	2.206	2.429	2.437	2.355	ns
	10mA	GCLK	t <sub>co</sub>	2.884	3.091	4.395	4.776	5.267	5.141	5.337	4.891	5.382	5.257	5.407	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.534	1.998	2.104	2.326	2.334	2.373	2.210	2.434	2.442	2.360	ns
	12mA	GCLK	t <sub>co</sub>	2.880	3.087	4.388	4.768	5.260	5.134	5.330	4.884	5.374	5.249	5.399	ns
		GCLK PLL	t <sub>co</sub>	1.349	1.530	1.991	2.096	2.319	2.327	2.366	2.203	2.426	2.434	2.352	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	2.884	3.089	4.381	4.759	5.248	5.122	5.318	4.873	5.361	5.236	5.386	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.532	1.984	2.087	2.307	2.315	2.354	2.192	2.413	2.421	2.339	ns
	16mA	GCLK	t <sub>co</sub>	2.885	3.091	4.389	4.769	5.259	5.133	5.329	4.883	5.373	5.248	5.398	ns
		GCLK PLL	t <sub>co</sub>	1.354	1.534	1.992	2.097	2.318	2.326	2.365	2.202	2.425	2.433	2.351	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.913	3.121	4.420	4.799	5.289	5.163	5.359	4.914	5.402	5.277	5.427	ns
		GCLK PLL	t <sub>co</sub>	1.382	1.564	2.023	2.127	2.348	2.356	2.395	2.233	2.454	2.462	2.380	ns
	6mA	GCLK	t <sub>co</sub>	2.902	3.109	4.408	4.787	5.277	5.151	5.347	4.902	5.390	5.265	5.415	ns
		GCLK PLL	t <sub>co</sub>	1.371	1.552	2.011	2.115	2.336	2.344	2.383	2.221	2.442	2.450	2.368	ns
	8mA	GCLK	t <sub>co</sub>	2.897	3.105	4.408	4.788	5.278	5.152	5.348	4.903	5.392	5.267	5.417	ns
		GCLK PLL	t <sub>co</sub>	1.366	1.548	2.011	2.116	2.337	2.345	2.384	2.222	2.444	2.452	2.370	ns
	10mA	GCLK	t <sub>co</sub>	2.883	3.090	4.390	4.769	5.259	5.133	5.329	4.884	5.374	5.249	5.399	ns
		GCLK PLL	t <sub>co</sub>	1.352	1.533	1.993	2.097	2.318	2.326	2.365	2.203	2.426	2.434	2.352	ns
	12mA	GCLK	t <sub>co</sub>	2.881	3.088	4.388	4.767	5.257	5.131	5.327	4.882	5.371	5.246	5.396	ns
		GCLK PLL	t <sub>co</sub>	1.350	1.531	1.991	2.095	2.316	2.324	2.363	2.201	2.423	2.431	2.349	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	2.885	3.090	4.380	4.757	5.245	5.119	5.315	4.871	5.358	5.233	5.383	ns
		GCLK PLL	t <sub>co</sub>	1.354	1.533	1.983	2.085	2.304	2.312	2.351	2.190	2.410	2.418	2.336	ns
	16mA	GCLK	t <sub>co</sub>	2.885	3.091	4.388	4.767	5.257	5.131	5.327	4.882	5.371	5.246	5.396	ns
		GCLK PLL	t <sub>co</sub>	1.354	1.534	1.991	2.095	2.316	2.324	2.363	2.201	2.423	2.431	2.349	ns

**Table 1-56.** EP3SL50 Column Pins output Timing Parameters (Part 4 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.901	3.108	4.404	4.782	5.271	5.145	5.341	4.897	5.384	5.259	5.409	ns
			GCLK PLL	t <sub>co</sub>	1.370	1.551	2.007	2.110	2.330	2.338	2.377	2.216	2.436	2.444	2.362
	10mA	GCLK	t <sub>co</sub>	2.901	3.108	4.404	4.782	5.271	5.145	5.341	4.897	5.384	5.259	5.409	ns
			GCLK PLL	t <sub>co</sub>	1.370	1.551	2.007	2.110	2.330	2.338	2.377	2.216	2.436	2.444	2.362
	12mA	GCLK	t <sub>co</sub>	2.891	3.098	4.394	4.772	5.261	5.135	5.331	4.887	5.375	5.250	5.400	ns
			GCLK PLL	t <sub>co</sub>	1.360	1.541	1.997	2.100	2.320	2.328	2.367	2.206	2.427	2.435	2.353
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.884	3.090	4.380	4.757	5.245	5.119	5.315	4.871	5.358	5.233	5.383	ns
			GCLK PLL	t <sub>co</sub>	1.353	1.533	1.983	2.085	2.304	2.312	2.351	2.190	2.410	2.418	2.336

Table 1-57 specifies EP3SL50 row pins output timing parameters for differential I/O standards.

**Table 1-57.** EP3SL50 Row Pins output Timing Parameters (Part 1 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
LVDS	—	GCLK	t <sub>co</sub>	2.455	2.608	3.645	3.971	4.409	4.291	4.470	4.059	4.496	4.382	4.518	ns
			GCLK PLL	t <sub>co</sub>	0.987	1.109	1.309	1.367	1.532	1.550	1.569	1.445	1.614	1.631	1.536
LVDS_E_1R	—	GCLK	t <sub>co</sub>	2.857	3.062	4.326	4.697	5.182	5.056	5.227	4.810	5.294	5.171	5.291	ns
			GCLK PLL	t <sub>co</sub>	1.379	1.553	1.980	2.083	2.295	2.305	2.316	2.186	2.402	2.410	2.299
LVDS_E_3R	—	GCLK	t <sub>co</sub>	2.839	3.052	4.364	4.743	5.236	5.110	5.281	4.861	5.355	5.232	5.352	ns
			GCLK PLL	t <sub>co</sub>	1.361	1.543	2.018	2.129	2.349	2.359	2.370	2.237	2.463	2.471	2.360
MINI-LVDS	—	GCLK	t <sub>co</sub>	2.455	2.608	3.645	3.971	4.409	4.291	4.470	4.059	4.496	4.382	4.518	ns
			GCLK PLL	t <sub>co</sub>	0.987	1.109	1.309	1.367	1.532	1.550	1.569	1.445	1.614	1.631	1.536
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	2.857	3.062	4.326	4.697	5.182	5.056	5.227	4.810	5.294	5.171	5.291	ns
			GCLK PLL	t <sub>co</sub>	1.379	1.553	1.980	2.083	2.295	2.305	2.316	2.186	2.402	2.410	2.299
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	2.839	3.052	4.364	4.743	5.236	5.110	5.281	4.861	5.355	5.232	5.352	ns
			GCLK PLL	t <sub>co</sub>	1.361	1.543	2.018	2.129	2.349	2.359	2.370	2.237	2.463	2.471	2.360
RSDS	—	GCLK	t <sub>co</sub>	2.455	2.608	3.645	3.971	4.409	4.291	4.470	4.059	4.496	4.382	4.518	ns
			GCLK PLL	t <sub>co</sub>	0.987	1.109	1.309	1.367	1.532	1.550	1.569	1.445	1.614	1.631	1.536

**Table 1-57.** EP3SL50 Row Pins output Timing Parameters (Part 2 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RSDS_E_1R	—	GCLK	t <sub>co</sub>	2.857	3.062	4.326	4.697	5.182	5.056	5.227	4.810	5.294	5.171	5.291	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.553	1.980	2.083	2.295	2.305	2.316	2.186	2.402	2.410	2.299	ns
RSDS_E_3R	—	GCLK	t <sub>co</sub>	2.839	3.052	4.364	4.743	5.236	5.110	5.281	4.861	5.355	5.232	5.352	ns
		GCLK PLL	t <sub>co</sub>	1.361	1.543	2.018	2.129	2.349	2.359	2.370	2.237	2.463	2.471	2.360	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.893	3.105	4.410	4.787	5.279	5.153	5.324	4.904	5.394	5.271	5.391	ns
		GCLK PLL	t <sub>co</sub>	1.395	1.576	2.044	2.153	2.372	2.382	2.393	2.260	2.482	2.490	2.379	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	6mA	GCLK	t <sub>co</sub>	2.879	3.091	4.397	4.774	5.266	5.140	5.311	4.890	5.381	5.258	5.378	ns
		GCLK PLL	t <sub>co</sub>	1.381	1.562	2.031	2.140	2.359	2.369	2.380	2.246	2.469	2.477	2.366	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.875	3.087	4.395	4.774	5.267	5.141	5.312	4.890	5.383	5.260	5.380	ns
		GCLK PLL	t <sub>co</sub>	1.377	1.558	2.029	2.140	2.360	2.370	2.381	2.246	2.471	2.479	2.368	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.891	3.102	4.396	4.771	5.261	5.135	5.306	4.887	5.376	5.253	5.373	ns
		GCLK PLL	t <sub>co</sub>	1.393	1.573	2.030	2.137	2.354	2.364	2.375	2.243	2.464	2.472	2.361	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	6mA	GCLK	t <sub>co</sub>	2.880	3.092	4.392	4.767	5.258	5.132	5.303	4.884	5.373	5.250	5.370	ns
		GCLK PLL	t <sub>co</sub>	1.382	1.563	2.026	2.133	2.351	2.361	2.372	2.240	2.461	2.469	2.358	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.877	3.089	4.390	4.765	5.256	5.130	5.301	4.882	5.372	5.249	5.369	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.560	2.024	2.131	2.349	2.359	2.370	2.238	2.460	2.468	2.357	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.888	3.099	4.391	4.766	5.255	5.129	5.300	4.882	5.370	5.247	5.367	ns
		GCLK PLL	t <sub>co</sub>	1.390	1.570	2.025	2.132	2.348	2.358	2.369	2.238	2.458	2.466	2.355	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	6mA	GCLK	t <sub>co</sub>	2.878	3.090	4.389	4.764	5.254	5.128	5.299	4.881	5.370	5.247	5.367	ns
		GCLK PLL	t <sub>co</sub>	1.380	1.561	2.023	2.130	2.347	2.357	2.368	2.237	2.458	2.466	2.355	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.864	3.076	4.374	4.749	5.240	5.114	5.285	4.866	5.355	5.232	5.352	ns
		GCLK PLL	t <sub>co</sub>	1.366	1.547	2.008	2.115	2.333	2.343	2.354	2.222	2.443	2.451	2.340	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	10mA	GCLK	t <sub>co</sub>	2.861	3.072	4.370	4.745	5.236	5.110	5.281	4.862	5.351	5.228	5.348	ns
		GCLK PLL	t <sub>co</sub>	1.363	1.543	2.004	2.111	2.329	2.339	2.350	2.218	2.439	2.447	2.336	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	12mA	GCLK	t <sub>co</sub>	2.858	3.070	4.371	4.748	5.239	5.113	5.284	4.865	5.355	5.232	5.352	ns
		GCLK PLL	t <sub>co</sub>	1.360	1.541	2.005	2.114	2.332	2.342	2.353	2.221	2.443	2.451	2.340	ns



**Table 1-57.** EP3SL50 Row Pins output Timing Parameters (Part 3 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.859	3.070	4.361	4.736	5.226	5.100	5.271	4.852	5.341	5.218	5.338	ns
		GCLK PLL	t <sub>co</sub>	1.361	1.541	1.995	2.102	2.319	2.329	2.340	2.208	2.429	2.437	2.326	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.908	3.123	4.432	4.809	5.302	5.176	5.347	4.926	5.417	5.294	5.414	ns
		GCLK PLL	t <sub>co</sub>	1.410	1.594	2.066	2.175	2.395	2.405	2.416	2.282	2.505	2.513	2.402	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	6mA	GCLK	t <sub>co</sub>	2.884	3.099	4.414	4.792	5.285	5.159	5.330	4.909	5.402	5.279	5.399	ns
		GCLK PLL	t <sub>co</sub>	1.386	1.570	2.048	2.158	2.378	2.388	2.399	2.265	2.490	2.498	2.387	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.867	3.080	4.392	4.770	5.263	5.137	5.308	4.887	5.380	5.257	5.377	ns
		GCLK PLL	t <sub>co</sub>	1.369	1.551	2.026	2.136	2.356	2.366	2.377	2.243	2.468	2.476	2.365	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.912	3.126	4.432	4.809	5.301	5.175	5.346	4.926	5.417	5.294	5.414	ns
		GCLK PLL	t <sub>co</sub>	1.414	1.597	2.066	2.175	2.394	2.404	2.415	2.282	2.505	2.513	2.402	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	6mA	GCLK	t <sub>co</sub>	2.897	3.111	4.418	4.794	5.286	5.160	5.331	4.911	5.402	5.279	5.399	ns
		GCLK PLL	t <sub>co</sub>	1.399	1.582	2.052	2.160	2.379	2.389	2.400	2.267	2.490	2.498	2.387	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.886	3.100	4.413	4.791	5.283	5.157	5.328	4.908	5.400	5.277	5.397	ns
		GCLK PLL	t <sub>co</sub>	1.388	1.571	2.047	2.157	2.376	2.386	2.397	2.264	2.488	2.496	2.385	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	10mA	GCLK	t <sub>co</sub>	2.866	3.080	4.390	4.767	5.260	5.134	5.305	4.885	5.376	5.253	5.373	ns
		GCLK PLL	t <sub>co</sub>	1.368	1.551	2.024	2.133	2.353	2.363	2.374	2.241	2.464	2.472	2.361	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	12mA	GCLK	t <sub>co</sub>	2.863	3.076	4.386	4.764	5.256	5.130	5.301	4.881	5.373	5.250	5.370	ns
		GCLK PLL	t <sub>co</sub>	1.365	1.547	2.020	2.130	2.349	2.359	2.370	2.237	2.461	2.469	2.358	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	2.868	3.080	4.377	4.752	5.242	5.116	5.287	4.868	5.357	5.234	5.354	ns
		GCLK PLL	t <sub>co</sub>	1.370	1.551	2.011	2.118	2.335	2.345	2.356	2.224	2.445	2.453	2.342	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.861	3.073	4.376	4.753	5.245	5.119	5.290	4.871	5.362	5.239	5.359	ns
		GCLK PLL	t <sub>co</sub>	1.363	1.544	2.010	2.119	2.338	2.348	2.359	2.227	2.450	2.458	2.347	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.889	3.102	4.404	4.780	5.271	5.145	5.316	4.897	5.387	5.264	5.384	ns
		GCLK PLL	t <sub>co</sub>	1.411	1.593	2.058	2.166	2.384	2.394	2.405	2.273	2.495	2.503	2.392	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	12mA	GCLK	t <sub>co</sub>	2.871	3.085	4.389	4.765	5.256	5.130	5.301	4.882	5.372	5.249	5.369	ns
		GCLK PLL	t <sub>co</sub>	1.393	1.576	2.043	2.151	2.369	2.379	2.390	2.258	2.480	2.488	2.377	ns

**Table 1-57.** EP3SL50 Row Pins output Timing Parameters (Part 4 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 2.5-V SSTL CLASS II	16m A	GCLK	t <sub>co</sub>	2.857	3.069	4.366	4.741	5.231	5.105	5.276	4.858	5.347	5.224	5.344	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.560	2.020	2.127	2.344	2.354	2.365	2.234	2.455	2.463	2.352	ns

Table 1-58 and Table 1-59 show EP3SL50 regional clock (RCLK) adder values that should be added to GCLK values. These adder values are used to determine I/O timing when I/O pin is driven using regional clock. This applies for all I/O standards supported by Stratix III.

Table 1-58 specifies EP3SL50 Column Pin delay adders when using the regional clock.

**Table 1-58.** EP3SL50 Column Pin Delay Adders for Regional Clock - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RCLK input adder	-0.058	-0.069	-0.098	-0.116	-0.131	-0.126	0.02	-0.124	-0.127	-0.123	-0.006	ns
RCLK PLL input adder	2.008	2.082	3.178	3.535	3.893	3.713	4.103	3.481	3.908	3.725	4.104	ns
RCLK output adder	-0.197	0.013	0.022	0.031	0.044	0.037	-0.003	0.149	0.159	0.154	0.068	ns
RCLK PLL output adder	-0.133	-0.446	-0.947	-0.921	-0.059	-0.895	0.866	0.222	0.018	0.544	0.346	ns

Table 1-59 specifies EP3SL50 Row Pin delay adders when using the regional clock.

**Table 1-59.** EP3SL50 Row Pin Delay Adders for Regional Clock- Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RCLK input adder	-0.072	-0.081	-0.108	-0.125	-0.142	-0.135	-0.097	-0.137	-0.154	-0.147	-0.094	ns
RCLK PLL input adder	0.107	0.101	0.181	0.203	0.232	0.217	0.387	0.191	0.221	0.205	0.384	ns
RCLK output adder	0.09	0.1	0.137	0.157	0.181	0.17	0.131	0.172	0.197	0.183	0.13	ns
RCLK PLL output adder	-0.086	-0.084	-0.142	-0.173	-0.197	-0.185	-0.343	-0.157	-0.17	-0.168	-0.338	ns

### EP3SL70 I/O Timing Parameters

Table 1-60 through Table 1-63 show the maximum I/O timing parameters for EP3SL70 devices for single-ended I/O standards.

Table 1-60 specifies EP3SL70 column pins input timing parameters for single-ended I/O standards.

**Table 1-60.** EP3SL70 Column Pins Input Timing Parameters (Part 1 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTL	GCLK	t <sub>su</sub>	-0.812	-0.811	-1.154	-1.261	-1.312	-1.266	-1.645	-1.261	-1.312	-1.266	-1.645	ns
		t <sub>h</sub>	0.934	0.934	1.327	1.457	1.533	1.475	1.850	1.457	1.533	1.475	1.850	ns
	GCLK PLL	t <sub>su</sub>	-0.965	-0.965	-1.395	-1.522	-1.763	-1.703	-2.094	-1.522	-1.763	-1.703	-2.094	ns
		t <sub>h</sub>	1.216	1.216	1.764	1.937	2.222	2.138	2.540	1.937	2.222	2.138	2.540	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-0.812	-0.811	-1.154	-1.261	-1.312	-1.266	-1.645	-1.261	-1.312	-1.266	-1.645	ns
		t <sub>h</sub>	0.934	0.934	1.327	1.457	1.533	1.475	1.850	1.457	1.533	1.475	1.850	ns
	GCLK PLL	t <sub>su</sub>	-0.965	-0.965	-1.395	-1.522	-1.763	-1.703	-2.094	-1.522	-1.763	-1.703	-2.094	ns
		t <sub>h</sub>	1.216	1.216	1.764	1.937	2.222	2.138	2.540	1.937	2.222	2.138	2.540	ns
3.0-V LVTTL	GCLK	t <sub>su</sub>	-0.823	-0.822	-1.153	-1.263	-1.311	-1.265	-1.644	-1.263	-1.311	-1.265	-1.644	ns
		t <sub>h</sub>	0.945	0.945	1.326	1.459	1.532	1.474	1.849	1.459	1.532	1.474	1.849	ns
	GCLK PLL	t <sub>su</sub>	-0.976	-0.976	-1.394	-1.524	-1.762	-1.702	-2.093	-1.524	-1.762	-1.702	-2.093	ns
		t <sub>h</sub>	1.227	1.227	1.763	1.939	2.221	2.137	2.539	1.939	2.221	2.137	2.539	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-0.823	-0.822	-1.153	-1.263	-1.311	-1.265	-1.644	-1.263	-1.311	-1.265	-1.644	ns
		t <sub>h</sub>	0.945	0.945	1.326	1.459	1.532	1.474	1.849	1.459	1.532	1.474	1.849	ns
	GCLK PLL	t <sub>su</sub>	-0.976	-0.976	-1.394	-1.524	-1.762	-1.702	-2.093	-1.524	-1.762	-1.702	-2.093	ns
		t <sub>h</sub>	1.227	1.227	1.763	1.939	2.221	2.137	2.539	1.939	2.221	2.137	2.539	ns
2.5 V	GCLK	t <sub>su</sub>	-0.818	-0.817	-1.162	-1.275	-1.330	-1.284	-1.663	-1.275	-1.330	-1.284	-1.663	ns
		t <sub>h</sub>	0.940	0.940	1.335	1.471	1.551	1.493	1.868	1.471	1.551	1.493	1.868	ns
	GCLK PLL	t <sub>su</sub>	-0.971	-0.971	-1.403	-1.536	-1.781	-1.721	-2.112	-1.536	-1.781	-1.721	-2.112	ns
		t <sub>h</sub>	1.222	1.222	1.772	1.951	2.240	2.156	2.558	1.951	2.240	2.156	2.558	ns
1.8 V	GCLK	t <sub>su</sub>	-0.840	-0.839	-1.202	-1.311	-1.328	-1.282	-1.661	-1.311	-1.328	-1.282	-1.661	ns
		t <sub>h</sub>	0.964	0.964	1.375	1.507	1.549	1.491	1.866	1.507	1.549	1.491	1.866	ns
	GCLK PLL	t <sub>su</sub>	-0.993	-0.993	-1.443	-1.572	-1.779	-1.719	-2.110	-1.572	-1.779	-1.719	-2.110	ns
		t <sub>h</sub>	1.246	1.246	1.812	1.987	2.238	2.154	2.556	1.987	2.238	2.154	2.556	ns
1.5 V	GCLK	t <sub>su</sub>	-0.830	-0.829	-1.179	-1.279	-1.258	-1.212	-1.591	-1.279	-1.258	-1.212	-1.591	ns
		t <sub>h</sub>	0.954	0.954	1.352	1.475	1.479	1.421	1.796	1.475	1.479	1.421	1.796	ns
	GCLK PLL	t <sub>su</sub>	-0.983	-0.983	-1.420	-1.540	-1.709	-1.649	-2.040	-1.540	-1.709	-1.649	-2.040	ns
		t <sub>h</sub>	1.236	1.236	1.789	1.955	2.168	2.084	2.486	1.955	2.168	2.084	2.486	ns
1.2 V	GCLK	t <sub>su</sub>	-0.778	-0.777	-1.102	-1.180	-1.102	-1.056	-1.435	-1.180	-1.102	-1.056	-1.435	ns
		t <sub>h</sub>	0.902	0.902	1.275	1.376	1.323	1.265	1.640	1.376	1.323	1.265	1.640	ns
	GCLK PLL	t <sub>su</sub>	-0.931	-0.931	-1.343	-1.441	-1.553	-1.493	-1.884	-1.441	-1.553	-1.493	-1.884	ns
		t <sub>h</sub>	1.184	1.184	1.712	1.856	2.012	1.928	2.330	1.856	2.012	1.928	2.330	ns
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-0.749	-0.748	-1.074	-1.164	-1.104	-1.058	-1.437	-1.164	-1.104	-1.058	-1.437	ns
		t <sub>h</sub>	0.873	0.873	1.247	1.360	1.325	1.267	1.642	1.360	1.325	1.267	1.642	ns
	GCLK PLL	t <sub>su</sub>	-0.902	-0.902	-1.315	-1.425	-1.555	-1.495	-1.886	-1.425	-1.555	-1.495	-1.886	ns
		t <sub>h</sub>	1.155	1.155	1.684	1.840	2.014	1.930	2.332	1.840	2.014	1.930	2.332	ns

**Table 1-60.** EP3SL70 Column Pins Input Timing Parameters (Part 2 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
SSTL-2 CLASS II	GCLK	$t_{su}$	-0.749	-0.748	-1.074	-1.164	-1.104	-1.058	-1.437	-1.164	-1.104	-1.058	-1.437	ns
		$t_h$	0.873	0.873	1.247	1.360	1.325	1.267	1.642	1.360	1.325	1.267	1.642	ns
	GCLK PLL	$t_{su}$	-0.902	-0.902	-1.315	-1.425	-1.555	-1.495	-1.886	-1.425	-1.555	-1.495	-1.886	ns
		$t_h$	1.155	1.155	1.684	1.840	2.014	1.930	2.332	1.840	2.014	1.930	2.332	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-0.743	-0.742	-1.061	-1.156	-1.104	-1.056	-1.435	-1.156	-1.104	-1.056	-1.435	ns
		$t_h$	0.867	0.867	1.234	1.349	1.322	1.264	1.635	1.349	1.322	1.264	1.635	ns
	GCLK PLL	$t_{su}$	-0.896	-0.896	-1.302	-1.417	-1.552	-1.490	-1.884	-1.417	-1.552	-1.490	-1.884	ns
		$t_h$	1.149	1.149	1.671	1.829	2.008	1.924	2.325	1.829	2.008	1.924	2.325	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.743	-0.742	-1.061	-1.156	-1.104	-1.056	-1.435	-1.156	-1.104	-1.056	-1.435	ns
		$t_h$	0.867	0.867	1.234	1.349	1.322	1.264	1.635	1.349	1.322	1.264	1.635	ns
	GCLK PLL	$t_{su}$	-0.896	-0.896	-1.302	-1.417	-1.552	-1.490	-1.884	-1.417	-1.552	-1.490	-1.884	ns
		$t_h$	1.149	1.149	1.671	1.829	2.008	1.924	2.325	1.829	2.008	1.924	2.325	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-0.732	-0.731	-1.050	-1.145	-1.085	-1.037	-1.416	-1.145	-1.085	-1.037	-1.416	ns
		$t_h$	0.856	0.856	1.222	1.338	1.303	1.245	1.616	1.338	1.303	1.245	1.616	ns
	GCLK PLL	$t_{su}$	-0.885	-0.885	-1.291	-1.406	-1.533	-1.471	-1.865	-1.406	-1.533	-1.471	-1.865	ns
		$t_h$	1.138	1.138	1.659	1.818	1.989	1.905	2.306	1.818	1.989	1.905	2.306	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.732	-0.731	-1.050	-1.145	-1.085	-1.037	-1.416	-1.145	-1.085	-1.037	-1.416	ns
		$t_h$	0.856	0.856	1.222	1.338	1.303	1.245	1.616	1.338	1.303	1.245	1.616	ns
	GCLK PLL	$t_{su}$	-0.885	-0.885	-1.291	-1.406	-1.533	-1.471	-1.865	-1.406	-1.533	-1.471	-1.865	ns
		$t_h$	1.138	1.138	1.659	1.818	1.989	1.905	2.306	1.818	1.989	1.905	2.306	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.743	-0.742	-1.061	-1.156	-1.104	-1.056	-1.435	-1.156	-1.104	-1.056	-1.435	ns
		$t_h$	0.867	0.867	1.234	1.349	1.322	1.264	1.635	1.349	1.322	1.264	1.635	ns
	GCLK PLL	$t_{su}$	-0.896	-0.896	-1.302	-1.417	-1.552	-1.490	-1.884	-1.417	-1.552	-1.490	-1.884	ns
		$t_h$	1.149	1.149	1.671	1.829	2.008	1.924	2.325	1.829	2.008	1.924	2.325	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.743	-0.742	-1.061	-1.156	-1.104	-1.056	-1.435	-1.156	-1.104	-1.056	-1.435	ns
		$t_h$	0.867	0.867	1.234	1.349	1.322	1.264	1.635	1.349	1.322	1.264	1.635	ns
	GCLK PLL	$t_{su}$	-0.896	-0.896	-1.302	-1.417	-1.552	-1.490	-1.884	-1.417	-1.552	-1.490	-1.884	ns
		$t_h$	1.149	1.149	1.671	1.829	2.008	1.924	2.325	1.829	2.008	1.924	2.325	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.732	-0.731	-1.050	-1.145	-1.085	-1.037	-1.416	-1.145	-1.085	-1.037	-1.416	ns
		$t_h$	0.856	0.856	1.222	1.338	1.303	1.245	1.616	1.338	1.303	1.245	1.616	ns
	GCLK PLL	$t_{su}$	-0.885	-0.885	-1.291	-1.406	-1.533	-1.471	-1.865	-1.406	-1.533	-1.471	-1.865	ns
		$t_h$	1.138	1.138	1.659	1.818	1.989	1.905	2.306	1.818	1.989	1.905	2.306	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.732	-0.731	-1.050	-1.145	-1.085	-1.037	-1.416	-1.145	-1.085	-1.037	-1.416	ns
		$t_h$	0.856	0.856	1.222	1.338	1.303	1.245	1.616	1.338	1.303	1.245	1.616	ns
	GCLK PLL	$t_{su}$	-0.885	-0.885	-1.291	-1.406	-1.533	-1.471	-1.865	-1.406	-1.533	-1.471	-1.865	ns
		$t_h$	1.138	1.138	1.659	1.818	1.989	1.905	2.306	1.818	1.989	1.905	2.306	ns

**Table 1-60.** EP3SL70 Column Pins Input Timing Parameters (Part 3 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.720	-0.719	-1.040	-1.134	-1.069	-1.021	-1.400	-1.134	-1.069	-1.021	-1.400	ns
		t <sub>h</sub>	0.844	0.844	1.212	1.327	1.287	1.229	1.600	1.327	1.287	1.229	1.600	ns
	GCLK PLL	t <sub>su</sub>	-0.873	-0.873	-1.281	-1.395	-1.517	-1.455	-1.849	-1.395	-1.517	-1.455	-1.849	ns
		t <sub>h</sub>	1.126	1.126	1.649	1.807	1.973	1.889	2.290	1.807	1.973	1.889	2.290	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-0.720	-0.719	-1.040	-1.134	-1.069	-1.021	-1.400	-1.134	-1.069	-1.021	-1.400	ns
		t <sub>h</sub>	0.844	0.844	1.212	1.327	1.287	1.229	1.600	1.327	1.287	1.229	1.600	ns
	GCLK PLL	t <sub>su</sub>	-0.873	-0.873	-1.281	-1.395	-1.517	-1.455	-1.849	-1.395	-1.517	-1.455	-1.849	ns
		t <sub>h</sub>	1.126	1.126	1.649	1.807	1.973	1.889	2.290	1.807	1.973	1.889	2.290	ns
3.0-V PCI-X	GCLK	t <sub>su</sub>	-0.823	-0.822	-1.153	-1.263	-1.311	-1.265	-1.644	-1.263	-1.311	-1.265	-1.644	ns
		t <sub>h</sub>	0.945	0.945	1.326	1.459	1.532	1.474	1.849	1.459	1.532	1.474	1.849	ns
	GCLK PLL	t <sub>su</sub>	-0.976	-0.976	-1.394	-1.524	-1.762	-1.702	-2.093	-1.524	-1.762	-1.702	-2.093	ns
		t <sub>h</sub>	1.227	1.227	1.763	1.939	2.221	2.137	2.539	1.939	2.221	2.137	2.539	ns

Table 1-61 specifies EP3SL70 row pins input timing parameters for single-ended I/O standards.

**Table 1-61.** EP3SL70 Row Pins Input Timing Parameters (Part 1 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-0.697	-0.705	-1.002	-1.090	-1.313	-1.243	-1.374	-1.091	-1.301	-1.234	-1.549	ns
		t <sub>h</sub>	0.804	0.824	1.174	1.283	1.527	1.446	1.580	1.293	1.523	1.445	1.751	ns
	GCLK PLL	t <sub>su</sub>	0.901	0.952	1.566	1.745	1.884	1.740	1.795	1.755	1.910	1.760	1.714	ns
		t <sub>h</sub>	-0.663	-0.702	-1.190	-1.320	-1.410	-1.293	-1.339	-1.322	-1.426	-1.302	-1.261	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-0.697	-0.705	-1.002	-1.090	-1.313	-1.243	-1.374	-1.091	-1.301	-1.234	-1.549	ns
		t <sub>h</sub>	0.804	0.824	1.174	1.283	1.527	1.446	1.580	1.293	1.523	1.445	1.751	ns
	GCLK PLL	t <sub>su</sub>	0.901	0.952	1.566	1.745	1.884	1.740	1.795	1.755	1.910	1.760	1.714	ns
		t <sub>h</sub>	-0.663	-0.702	-1.190	-1.320	-1.410	-1.293	-1.339	-1.322	-1.426	-1.302	-1.261	ns
3.0-V LVTTTL	GCLK	t <sub>su</sub>	-0.703	-0.716	-0.999	-1.091	-1.316	-1.246	-1.377	-1.090	-1.306	-1.239	-1.554	ns
		t <sub>h</sub>	0.810	0.835	1.171	1.284	1.530	1.449	1.583	1.292	1.528	1.450	1.756	ns
	GCLK PLL	t <sub>su</sub>	0.895	0.941	1.569	1.744	1.881	1.737	1.792	1.756	1.905	1.755	1.709	ns
		t <sub>h</sub>	-0.657	-0.691	-1.193	-1.319	-1.407	-1.290	-1.336	-1.323	-1.421	-1.297	-1.256	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-0.703	-0.716	-0.999	-1.091	-1.316	-1.246	-1.377	-1.090	-1.306	-1.239	-1.554	ns
		t <sub>h</sub>	0.810	0.835	1.171	1.284	1.530	1.449	1.583	1.292	1.528	1.450	1.756	ns
	GCLK PLL	t <sub>su</sub>	0.895	0.941	1.569	1.744	1.881	1.737	1.792	1.756	1.905	1.755	1.709	ns
		t <sub>h</sub>	-0.657	-0.691	-1.193	-1.319	-1.407	-1.290	-1.336	-1.323	-1.421	-1.297	-1.256	ns

**Table 1-61.** EP3SL70 Row Pins Input Timing Parameters (Part 2 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
2.5 V	GCLK	t <sub>su</sub>	-0.691	-0.709	-1.008	-1.104	-1.331	-1.261	-1.392	-1.099	-1.316	-1.249	-1.564	ns
		t <sub>h</sub>	0.798	0.828	1.180	1.297	1.545	1.464	1.598	1.301	1.538	1.460	1.766	ns
	GCLK PLL	t <sub>su</sub>	0.907	0.948	1.560	1.731	1.866	1.722	1.777	1.747	1.895	1.745	1.699	ns
		t <sub>h</sub>	-0.669	-0.698	-1.184	-1.306	-1.392	-1.275	-1.321	-1.314	-1.411	-1.287	-1.246	ns
1.8 V	GCLK	t <sub>su</sub>	-0.741	-0.761	-1.068	-1.157	-1.319	-1.279	-1.519	-1.152	-1.306	-1.270	-1.552	ns
		t <sub>h</sub>	0.849	0.881	1.240	1.350	1.532	1.482	1.721	1.354	1.528	1.481	1.754	ns
	GCLK PLL	t <sub>su</sub>	1.011	1.031	1.630	1.841	1.978	1.869	1.788	1.861	2.005	1.891	1.842	ns
		t <sub>h</sub>	-0.771	-0.775	-1.249	-1.411	-1.500	-1.418	-1.331	-1.423	-1.515	-1.431	-1.383	ns
1.5 V	GCLK	t <sub>su</sub>	-0.731	-0.750	-1.044	-1.125	-1.251	-1.211	-1.451	-1.121	-1.241	-1.205	-1.487	ns
		t <sub>h</sub>	0.839	0.870	1.216	1.318	1.464	1.414	1.653	1.323	1.463	1.416	1.689	ns
	GCLK PLL	t <sub>su</sub>	1.021	1.042	1.654	1.873	2.046	1.937	1.856	1.892	2.070	1.956	1.907	ns
		t <sub>h</sub>	-0.781	-0.786	-1.273	-1.443	-1.568	-1.486	-1.399	-1.454	-1.580	-1.496	-1.448	ns
1.2 V	GCLK	t <sub>su</sub>	-0.671	-0.697	-0.965	-1.024	-1.092	-1.052	-1.292	-1.025	-1.086	-1.050	-1.332	ns
		t <sub>h</sub>	0.779	0.817	1.137	1.217	1.305	1.255	1.494	1.227	1.308	1.261	1.534	ns
	GCLK PLL	t <sub>su</sub>	1.081	1.095	1.733	1.974	2.205	2.096	2.015	1.988	2.225	2.111	2.062	ns
		t <sub>h</sub>	-0.841	-0.839	-1.352	-1.544	-1.727	-1.645	-1.558	-1.550	-1.735	-1.651	-1.603	ns
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-0.634	-0.651	-0.922	-0.995	-1.111	-1.041	-1.172	-0.987	-1.099	-1.032	-1.347	ns
		t <sub>h</sub>	0.742	0.771	1.094	1.188	1.325	1.244	1.378	1.189	1.321	1.243	1.549	ns
	GCLK PLL	t <sub>su</sub>	0.964	1.006	1.646	1.840	2.086	1.942	1.997	1.859	2.112	1.962	1.916	ns
		t <sub>h</sub>	-0.725	-0.755	-1.270	-1.415	-1.612	-1.495	-1.541	-1.426	-1.628	-1.504	-1.463	ns
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-0.634	-0.651	-0.922	-0.995	-1.111	-1.041	-1.172	-0.987	-1.099	-1.032	-1.347	ns
		t <sub>h</sub>	0.742	0.771	1.094	1.188	1.325	1.244	1.378	1.189	1.321	1.243	1.549	ns
	GCLK PLL	t <sub>su</sub>	0.964	1.006	1.646	1.840	2.086	1.942	1.997	1.859	2.112	1.962	1.916	ns
		t <sub>h</sub>	-0.725	-0.755	-1.270	-1.415	-1.612	-1.495	-1.541	-1.426	-1.628	-1.504	-1.463	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-0.645	-0.662	-0.927	-0.997	-1.087	-1.046	-1.288	-0.993	-1.079	-1.042	-1.325	ns
		t <sub>h</sub>	0.753	0.782	1.099	1.188	1.298	1.248	1.486	1.193	1.298	1.252	1.523	ns
	GCLK PLL	t <sub>su</sub>	1.107	1.130	1.770	1.994	2.203	2.095	2.012	2.013	2.224	2.112	2.062	ns
		t <sub>h</sub>	-0.867	-0.874	-1.390	-1.567	-1.728	-1.646	-1.560	-1.578	-1.739	-1.654	-1.608	ns
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-0.645	-0.662	-0.927	-0.997	-1.087	-1.046	-1.288	-0.993	-1.079	-1.042	-1.325	ns
		t <sub>h</sub>	0.753	0.782	1.099	1.188	1.298	1.248	1.486	1.193	1.298	1.252	1.523	ns
	GCLK PLL	t <sub>su</sub>	1.107	1.130	1.770	1.994	2.203	2.095	2.012	2.013	2.224	2.112	2.062	ns
		t <sub>h</sub>	-0.867	-0.874	-1.390	-1.567	-1.728	-1.646	-1.560	-1.578	-1.739	-1.654	-1.608	ns
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-0.631	-0.650	-0.912	-0.987	-1.069	-1.028	-1.270	-0.982	-1.062	-1.025	-1.308	ns
		t <sub>h</sub>	0.739	0.770	1.085	1.178	1.280	1.230	1.468	1.182	1.281	1.235	1.506	ns
	GCLK PLL	t <sub>su</sub>	1.121	1.142	1.779	2.004	2.221	2.113	2.030	2.024	2.241	2.129	2.079	ns
		t <sub>h</sub>	-0.881	-0.886	-1.400	-1.577	-1.746	-1.664	-1.578	-1.589	-1.756	-1.671	-1.625	ns

**Table 1-61.** EP3SL70 Row Pins Input Timing Parameters (Part 3 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.645	-0.662	-0.927	-0.997	-1.087	-1.046	-1.288	-0.993	-1.079	-1.042	-1.325	ns
		t <sub>h</sub>	0.753	0.782	1.099	1.188	1.298	1.248	1.486	1.193	1.298	1.252	1.523	ns
	GCLK PLL	t <sub>su</sub>	1.107	1.130	1.770	1.994	2.203	2.095	2.012	2.013	2.224	2.112	2.062	ns
		t <sub>h</sub>	-0.867	-0.874	-1.390	-1.567	-1.728	-1.646	-1.560	-1.578	-1.739	-1.654	-1.608	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.645	-0.662	-0.927	-0.997	-1.087	-1.046	-1.288	-0.993	-1.079	-1.042	-1.325	ns
		t <sub>h</sub>	0.753	0.782	1.099	1.188	1.298	1.248	1.486	1.193	1.298	1.252	1.523	ns
	GCLK PLL	t <sub>su</sub>	1.107	1.130	1.770	1.994	2.203	2.095	2.012	2.013	2.224	2.112	2.062	ns
		t <sub>h</sub>	-0.867	-0.874	-1.390	-1.567	-1.728	-1.646	-1.560	-1.578	-1.739	-1.654	-1.608	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.631	-0.650	-0.912	-0.987	-1.069	-1.028	-1.270	-0.982	-1.062	-1.025	-1.308	ns
		t <sub>h</sub>	0.739	0.770	1.085	1.178	1.280	1.230	1.468	1.182	1.281	1.235	1.506	ns
	GCLK PLL	t <sub>su</sub>	1.121	1.142	1.779	2.004	2.221	2.113	2.030	2.024	2.241	2.129	2.079	ns
		t <sub>h</sub>	-0.881	-0.886	-1.400	-1.577	-1.746	-1.664	-1.578	-1.589	-1.756	-1.671	-1.625	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.631	-0.650	-0.912	-0.987	-1.069	-1.028	-1.270	-0.982	-1.062	-1.025	-1.308	ns
		t <sub>h</sub>	0.739	0.770	1.085	1.178	1.280	1.230	1.468	1.182	1.281	1.235	1.506	ns
	GCLK PLL	t <sub>su</sub>	1.121	1.142	1.779	2.004	2.221	2.113	2.030	2.024	2.241	2.129	2.079	ns
		t <sub>h</sub>	-0.881	-0.886	-1.400	-1.577	-1.746	-1.664	-1.578	-1.589	-1.756	-1.671	-1.625	ns
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.622	-0.638	-0.903	-0.977	-1.053	-1.012	-1.254	-0.973	-1.046	-1.009	-1.292	ns
		t <sub>h</sub>	0.730	0.758	1.076	1.168	1.264	1.214	1.452	1.173	1.265	1.219	1.490	ns
	GCLK PLL	t <sub>su</sub>	1.130	1.154	1.788	2.014	2.237	2.129	2.046	2.033	2.257	2.145	2.095	ns
		t <sub>h</sub>	-0.890	-0.898	-1.409	-1.587	-1.762	-1.680	-1.594	-1.598	-1.772	-1.687	-1.641	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.622	-0.638	-0.903	-0.977	-1.053	-1.012	-1.254	-0.973	-1.046	-1.009	-1.292	ns
		t <sub>h</sub>	0.730	0.758	1.076	1.168	1.264	1.214	1.452	1.173	1.265	1.219	1.490	ns
	GCLK PLL	t <sub>su</sub>	1.130	1.154	1.788	2.014	2.237	2.129	2.046	2.033	2.257	2.145	2.095	ns
		t <sub>h</sub>	-0.890	-0.898	-1.409	-1.587	-1.762	-1.680	-1.594	-1.598	-1.772	-1.687	-1.641	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-0.703	-0.716	-0.999	-1.091	-1.316	-1.246	-1.377	-1.090	-1.306	-1.239	-1.554	ns
		t <sub>h</sub>	0.810	0.835	1.171	1.284	1.530	1.449	1.583	1.292	1.528	1.450	1.756	ns
	GCLK PLL	t <sub>su</sub>	0.895	0.941	1.569	1.744	1.881	1.737	1.792	1.756	1.905	1.755	1.709	ns
		t <sub>h</sub>	-0.657	-0.691	-1.193	-1.319	-1.407	-1.290	-1.336	-1.323	-1.421	-1.297	-1.256	ns
3.0-V PCI-X	GCLK	t <sub>su</sub>	-0.703	-0.716	-0.999	-1.091	-1.316	-1.246	-1.377	-1.090	-1.306	-1.239	-1.554	ns
		t <sub>h</sub>	0.810	0.835	1.171	1.284	1.530	1.449	1.583	1.292	1.528	1.450	1.756	ns
	GCLK PLL	t <sub>su</sub>	0.895	0.941	1.569	1.744	1.881	1.737	1.792	1.756	1.905	1.755	1.709	ns
		t <sub>h</sub>	-0.657	-0.691	-1.193	-1.319	-1.407	-1.290	-1.336	-1.323	-1.421	-1.297	-1.256	ns

Table 1-62 specifies EP3SL70 Column Pins Output Timing parameters for single-ended I/O standards.

**Table 1-62.** EP3SL70 Column Pins output Timing Parameters (Part 1 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.187	3.187	4.411	4.765	5.226	5.105	5.313	4.765	5.226	5.105	5.313	ns
		GCLK PLL	t <sub>co</sub>	3.514	3.514	4.895	5.293	5.823	5.680	5.963	5.293	5.823	5.680	5.963	ns
	8mA	GCLK	t <sub>co</sub>	3.120	3.120	4.302	4.654	5.113	4.992	5.200	4.654	5.113	4.992	5.200	ns
		GCLK PLL	t <sub>co</sub>	3.447	3.447	4.786	5.182	5.710	5.567	5.850	5.182	5.710	5.567	5.850	ns
	12mA	GCLK	t <sub>co</sub>	3.034	3.034	4.198	4.556	5.021	4.900	5.108	4.556	5.021	4.900	5.108	ns
		GCLK PLL	t <sub>co</sub>	3.361	3.361	4.682	5.083	5.618	5.475	5.760	5.083	5.618	5.475	5.760	ns
	16mA	GCLK	t <sub>co</sub>	3.028	3.028	4.182	4.528	4.980	4.859	5.067	4.528	4.980	4.859	5.067	ns
		GCLK PLL	t <sub>co</sub>	3.354	3.354	4.665	5.055	5.577	5.434	5.718	5.055	5.577	5.434	5.718	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.193	3.193	4.415	4.770	5.233	5.112	5.320	4.770	5.233	5.112	5.320	ns
		GCLK PLL	t <sub>co</sub>	3.520	3.520	4.899	5.298	5.830	5.687	5.971	5.298	5.830	5.687	5.971	ns
	8mA	GCLK	t <sub>co</sub>	3.038	3.038	4.209	4.573	5.032	4.911	5.119	4.573	5.032	4.911	5.119	ns
		GCLK PLL	t <sub>co</sub>	3.365	3.365	4.692	5.100	5.629	5.486	5.770	5.100	5.629	5.486	5.770	ns
	12mA	GCLK	t <sub>co</sub>	3.045	3.045	4.203	4.552	5.006	4.885	5.093	4.552	5.006	4.885	5.093	ns
		GCLK PLL	t <sub>co</sub>	3.372	3.372	4.686	5.079	5.603	5.460	5.746	5.079	5.603	5.460	5.746	ns
	16mA	GCLK	t <sub>co</sub>	3.029	3.029	4.180	4.527	4.977	4.856	5.064	4.527	4.977	4.856	5.064	ns
		GCLK PLL	t <sub>co</sub>	3.356	3.356	4.664	5.054	5.574	5.431	5.717	5.054	5.574	5.431	5.717	ns
3.0-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.150	3.150	4.378	4.733	5.193	5.072	5.280	4.733	5.193	5.072	5.280	ns
		GCLK PLL	t <sub>co</sub>	3.478	3.478	4.862	5.261	5.790	5.647	5.954	5.261	5.790	5.647	5.954	ns
	8mA	GCLK	t <sub>co</sub>	3.043	3.043	4.250	4.602	5.056	4.936	5.142	4.602	5.056	4.936	5.142	ns
		GCLK PLL	t <sub>co</sub>	3.367	3.367	4.732	5.127	5.652	5.510	5.837	5.127	5.652	5.510	5.837	ns
	12mA	GCLK	t <sub>co</sub>	3.005	3.005	4.184	4.530	4.982	4.862	5.068	4.530	4.982	4.862	5.068	ns
		GCLK PLL	t <sub>co</sub>	3.331	3.331	4.669	5.058	5.578	5.436	5.773	5.058	5.578	5.436	5.773	ns
	16mA	GCLK	t <sub>co</sub>	2.986	2.986	4.156	4.503	4.953	4.832	5.040	4.503	4.953	4.832	5.040	ns
		GCLK PLL	t <sub>co</sub>	3.313	3.313	4.640	5.030	5.550	5.407	5.750	5.030	5.550	5.407	5.750	ns



**Table 1-62.** EP3SL70 Column Pins output Timing Parameters (Part 2 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.067	3.067	4.284	4.635	5.091	4.971	5.177	4.635	5.091	4.971	5.177	ns
		GCLK PLL	t <sub>co</sub>	3.392	3.392	4.766	5.161	5.687	5.545	5.873	5.161	5.687	5.545	5.873	ns
	8mA	GCLK	t <sub>co</sub>	2.988	2.988	4.160	4.505	4.956	4.836	5.042	4.505	4.956	4.836	5.042	ns
		GCLK PLL	t <sub>co</sub>	3.313	3.313	4.642	5.032	5.552	5.410	5.763	5.032	5.552	5.410	5.763	ns
	12mA	GCLK	t <sub>co</sub>	2.981	2.981	4.152	4.498	4.947	4.826	5.034	4.498	4.947	4.826	5.034	ns
		GCLK PLL	t <sub>co</sub>	3.308	3.308	4.635	5.025	5.544	5.401	5.732	5.025	5.544	5.401	5.732	ns
	16mA	GCLK	t <sub>co</sub>	2.972	2.972	4.137	4.482	4.932	4.811	5.019	4.482	4.932	4.811	5.019	ns
		GCLK PLL	t <sub>co</sub>	3.299	3.299	4.621	5.010	5.529	5.386	5.737	5.010	5.529	5.386	5.737	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.187	3.187	4.490	4.860	5.338	5.218	5.424	4.860	5.338	5.218	5.424	ns
		GCLK PLL	t <sub>co</sub>	3.514	3.514	4.973	5.388	5.934	5.792	6.081	5.388	5.934	5.792	6.081	ns
	8mA	GCLK	t <sub>co</sub>	3.090	3.090	4.371	4.735	5.206	5.086	5.292	4.735	5.206	5.086	5.292	ns
		GCLK PLL	t <sub>co</sub>	3.414	3.414	4.854	5.262	5.802	5.660	5.957	5.262	5.802	5.660	5.957	ns
	12mA	GCLK	t <sub>co</sub>	3.045	3.045	4.284	4.644	5.110	4.989	5.197	4.644	5.110	4.989	5.197	ns
		GCLK PLL	t <sub>co</sub>	3.370	3.370	4.767	5.171	5.707	5.564	5.879	5.171	5.707	5.564	5.879	ns
	16mA	GCLK	t <sub>co</sub>	3.006	3.006	4.245	4.602	5.067	4.946	5.154	4.602	5.067	4.946	5.154	ns
		GCLK PLL	t <sub>co</sub>	3.332	3.332	4.728	5.129	5.664	5.521	5.822	5.129	5.664	5.521	5.822	ns

**Table 1-62.** EP3SL70 Column Pins output Timing Parameters (Part 3 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.8 V	2mA	GCLK	t <sub>co</sub>	3.378	3.378	4.810	5.219	5.742	5.621	5.829	5.219	5.742	5.621	5.829	ns
		GCLK PLL	t <sub>co</sub>	3.705	3.705	5.294	5.748	6.339	6.196	6.478	5.748	6.339	6.196	6.478	ns
	4mA	GCLK	t <sub>co</sub>	3.200	3.200	4.533	4.912	5.395	5.275	5.481	4.912	5.395	5.275	5.481	ns
		GCLK PLL	t <sub>co</sub>	3.524	3.524	5.015	5.439	5.991	5.849	6.147	5.439	5.991	5.849	6.147	ns
	6mA	GCLK	t <sub>co</sub>	3.115	3.115	4.424	4.796	5.284	5.163	5.371	4.796	5.284	5.163	5.371	ns
		GCLK PLL	t <sub>co</sub>	3.442	3.442	4.908	5.324	5.881	5.738	6.035	5.324	5.881	5.738	6.035	ns
	8mA	GCLK	t <sub>co</sub>	3.095	3.095	4.366	4.742	5.218	5.097	5.305	4.742	5.218	5.097	5.305	ns
		GCLK PLL	t <sub>co</sub>	3.422	3.422	4.850	5.270	5.815	5.672	5.958	5.270	5.815	5.672	5.958	ns
	10mA	GCLK	t <sub>co</sub>	3.032	3.032	4.306	4.668	5.137	5.016	5.224	4.668	5.137	5.016	5.224	ns
		GCLK PLL	t <sub>co</sub>	3.359	3.359	4.789	5.195	5.734	5.591	5.889	5.195	5.734	5.591	5.889	ns
	12mA	GCLK	t <sub>co</sub>	3.015	3.015	4.285	4.647	5.114	4.993	5.201	4.647	5.114	4.993	5.201	ns
		GCLK PLL	t <sub>co</sub>	3.341	3.341	4.768	5.174	5.711	5.568	5.856	5.174	5.711	5.568	5.856	ns
1.5 V	2mA	GCLK	t <sub>co</sub>	3.324	3.324	4.739	5.152	5.680	5.559	5.767	5.152	5.680	5.559	5.767	ns
		GCLK PLL	t <sub>co</sub>	3.651	3.651	5.223	5.680	6.277	6.134	6.423	5.680	6.277	6.134	6.423	ns
	4mA	GCLK	t <sub>co</sub>	3.112	3.112	4.420	4.795	5.288	5.167	5.375	4.795	5.288	5.167	5.375	ns
		GCLK PLL	t <sub>co</sub>	3.439	3.439	4.904	5.324	5.885	5.742	6.037	5.324	5.885	5.742	6.037	ns
	6mA	GCLK	t <sub>co</sub>	3.088	3.088	4.353	4.737	5.221	5.100	5.308	4.737	5.221	5.100	5.308	ns
		GCLK PLL	t <sub>co</sub>	3.414	3.414	4.837	5.264	5.818	5.675	5.960	5.264	5.818	5.675	5.960	ns
	8mA	GCLK	t <sub>co</sub>	3.076	3.076	4.337	4.712	5.201	5.080	5.288	4.712	5.201	5.080	5.288	ns
		GCLK PLL	t <sub>co</sub>	3.403	3.403	4.820	5.239	5.798	5.655	5.943	5.239	5.798	5.655	5.943	ns
	10mA	GCLK	t <sub>co</sub>	3.021	3.021	4.298	4.661	5.131	5.010	5.218	4.661	5.131	5.010	5.218	ns
		GCLK PLL	t <sub>co</sub>	3.348	3.348	4.782	5.188	5.728	5.585	5.880	5.188	5.728	5.585	5.880	ns
	12mA	GCLK	t <sub>co</sub>	3.015	3.015	4.281	4.648	5.120	4.999	5.207	4.648	5.120	4.999	5.207	ns
		GCLK PLL	t <sub>co</sub>	3.343	3.343	4.765	5.177	5.717	5.574	5.859	5.177	5.717	5.574	5.859	ns

**Table 1-62.** EP3SL70 Column Pins output Timing Parameters (Part 4 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.2 V	2mA	GCLK	t <sub>co</sub>	3.240	3.240	4.665	5.087	5.624	5.503	5.711	5.087	5.624	5.503	5.711	ns
		GCLK PLL	t <sub>co</sub>	3.567	3.567	5.149	5.616	6.221	6.078	6.363	5.616	6.221	6.078	6.363	ns
	4mA	GCLK	t <sub>co</sub>	3.118	3.118	4.440	4.827	5.338	5.217	5.425	4.827	5.338	5.217	5.425	ns
		GCLK PLL	t <sub>co</sub>	3.444	3.444	4.923	5.354	5.935	5.792	6.078	5.354	5.935	5.792	6.078	ns
	6mA	GCLK	t <sub>co</sub>	3.080	3.080	4.347	4.737	5.225	5.104	5.312	4.737	5.225	5.104	5.312	ns
		GCLK PLL	t <sub>co</sub>	3.406	3.406	4.831	5.265	5.822	5.679	5.964	5.265	5.822	5.679	5.964	ns
	8mA	GCLK	t <sub>co</sub>	3.031	3.031	4.318	4.687	5.169	5.048	5.256	4.687	5.169	5.048	5.256	ns
		GCLK PLL	t <sub>co</sub>	3.359	3.359	4.803	5.216	5.766	5.623	5.917	5.216	5.766	5.623	5.917	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.032	3.032	4.275	4.634	5.100	4.979	5.187	4.634	5.100	4.979	5.187	ns
		GCLK PLL	t <sub>co</sub>	3.359	3.359	4.760	5.163	5.697	5.554	5.874	5.163	5.697	5.554	5.874	ns
	10mA	GCLK	t <sub>co</sub>	3.029	3.029	4.272	4.630	5.096	4.975	5.183	4.630	5.096	4.975	5.183	ns
		GCLK PLL	t <sub>co</sub>	3.356	3.356	4.757	5.160	5.693	5.550	5.869	5.160	5.693	5.550	5.869	ns
	12mA	GCLK	t <sub>co</sub>	3.028	3.028	4.272	4.631	5.097	4.976	5.184	4.631	5.097	4.976	5.184	ns
		GCLK PLL	t <sub>co</sub>	3.354	3.354	4.757	5.161	5.694	5.551	5.870	5.161	5.694	5.551	5.870	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.019	3.019	4.259	4.617	5.082	4.961	5.169	4.617	5.082	4.961	5.169	ns
		GCLK PLL	t <sub>co</sub>	3.345	3.345	4.742	5.145	5.679	5.536	5.854	5.145	5.679	5.536	5.854	ns
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.039	3.039	4.287	4.648	5.116	4.995	5.203	4.648	5.116	4.995	5.203	ns
		GCLK PLL	t <sub>co</sub>	3.366	3.366	4.772	5.177	5.713	5.570	5.893	5.177	5.713	5.570	5.893	ns
	6mA	GCLK	t <sub>co</sub>	3.035	3.035	4.285	4.646	5.114	4.993	5.201	4.646	5.114	4.993	5.201	ns
		GCLK PLL	t <sub>co</sub>	3.362	3.362	4.770	5.175	5.711	5.568	5.891	5.175	5.711	5.568	5.891	ns
	8mA	GCLK	t <sub>co</sub>	3.025	3.025	4.276	4.637	5.105	4.984	5.192	4.637	5.105	4.984	5.192	ns
		GCLK PLL	t <sub>co</sub>	3.351	3.351	4.760	5.166	5.702	5.559	5.889	5.166	5.702	5.559	5.889	ns
	10mA	GCLK	t <sub>co</sub>	3.013	3.013	4.263	4.624	5.092	4.971	5.179	4.624	5.092	4.971	5.179	ns
		GCLK PLL	t <sub>co</sub>	3.340	3.340	4.747	5.153	5.689	5.546	5.864	5.153	5.689	5.546	5.864	ns
	12mA	GCLK	t <sub>co</sub>	3.013	3.013	4.263	4.624	5.092	4.971	5.179	4.624	5.092	4.971	5.179	ns
		GCLK PLL	t <sub>co</sub>	3.340	3.340	4.747	5.153	5.689	5.546	5.863	5.153	5.689	5.546	5.863	ns

**Table 1-62.** EP3SL70 Column Pins output Timing Parameters (Part 5 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.020	3.020	4.262	4.621	5.087	4.966	5.174	4.621	5.087	4.966	5.174	ns	
		GCLK PLL	t <sub>co</sub>	3.346	3.346	4.746	5.150	5.684	5.541	5.866	5.150	5.684	5.541	5.866	ns	
	16mA	GCLK	t <sub>co</sub>	3.022	3.022	4.269	4.630	5.099	4.978	5.186	4.630	5.099	4.978	5.186	ns	
		GCLK PLL	t <sub>co</sub>	3.349	3.349	4.754	5.159	5.696	5.553	5.889	5.159	5.696	5.553	5.889	ns	
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.042	3.042	4.297	4.659	5.129	5.008	5.216	4.659	5.129	5.008	5.216	ns	
		GCLK PLL	t <sub>co</sub>	3.370	3.370	4.781	5.189	5.726	5.583	5.908	5.189	5.726	5.583	5.908	ns	
	6mA	GCLK	t <sub>co</sub>	3.030	3.030	4.287	4.650	5.120	4.999	5.207	4.650	5.120	4.999	5.207	ns	
		GCLK PLL	t <sub>co</sub>	3.356	3.356	4.771	5.179	5.717	5.574	5.894	5.179	5.717	5.574	5.894	ns	
	8mA	GCLK	t <sub>co</sub>	3.018	3.018	4.273	4.636	5.106	4.985	5.193	4.636	5.106	4.985	5.193	ns	
		GCLK PLL	t <sub>co</sub>	3.345	3.345	4.757	5.165	5.703	5.560	5.879	5.165	5.703	5.560	5.879	ns	
	10mA	GCLK	t <sub>co</sub>	3.017	3.017	4.275	4.639	5.110	4.989	5.197	4.639	5.110	4.989	5.197	ns	
		GCLK PLL	t <sub>co</sub>	3.344	3.344	4.760	5.168	5.707	5.564	5.876	5.168	5.707	5.564	5.876	ns	
	12mA	GCLK	t <sub>co</sub>	3.014	3.014	4.270	4.633	5.104	4.983	5.191	4.633	5.104	4.983	5.191	ns	
		GCLK PLL	t <sub>co</sub>	3.341	3.341	4.755	5.163	5.701	5.558	5.870	5.163	5.701	5.558	5.870	ns	
	SSTL-15 CLASS II	8mA	GCLK	t <sub>co</sub>	3.016	3.016	4.260	4.620	5.087	4.966	5.174	4.620	5.087	4.966	5.174	ns
			GCLK PLL	t <sub>co</sub>	3.343	3.343	4.744	5.149	5.684	5.541	5.867	5.149	5.684	5.541	5.867	ns
16mA		GCLK	t <sub>co</sub>	3.019	3.019	4.267	4.628	5.098	4.977	5.185	4.628	5.098	4.977	5.185	ns	
		GCLK PLL	t <sub>co</sub>	3.346	3.346	4.751	5.158	5.695	5.552	5.891	5.158	5.695	5.552	5.891	ns	

**Table 1-62.** EP3SL70 Column Pins output Timing Parameters (Part 6 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.026	3.026	4.261	4.619	5.085	4.964	5.172	4.619	5.085	4.964	5.172	ns
		GCLK PLL	t <sub>co</sub>	3.353	3.353	4.746	5.149	5.682	5.539	5.868	5.149	5.682	5.539	5.868	ns
	6mA	GCLK	t <sub>co</sub>	3.020	3.020	4.260	4.619	5.084	4.963	5.171	4.619	5.084	4.963	5.171	ns
		GCLK PLL	t <sub>co</sub>	3.346	3.346	4.744	5.147	5.681	5.538	5.873	5.147	5.681	5.538	5.873	ns
	8mA	GCLK	t <sub>co</sub>	3.012	3.012	4.252	4.611	5.077	4.956	5.164	4.611	5.077	4.956	5.164	ns
		GCLK PLL	t <sub>co</sub>	3.338	3.338	4.736	5.140	5.674	5.531	5.855	5.140	5.674	5.531	5.855	ns
	10mA	GCLK	t <sub>co</sub>	3.014	3.014	4.255	4.614	5.081	4.960	5.168	4.614	5.081	4.960	5.168	ns
		GCLK PLL	t <sub>co</sub>	3.341	3.341	4.739	5.143	5.678	5.535	5.858	5.143	5.678	5.535	5.858	ns
	12mA	GCLK	t <sub>co</sub>	3.011	3.011	4.257	4.617	5.085	4.964	5.172	4.617	5.085	4.964	5.172	ns
		GCLK PLL	t <sub>co</sub>	3.338	3.338	4.742	5.147	5.682	5.539	5.865	5.147	5.682	5.539	5.865	ns
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.019	3.019	4.256	4.615	5.081	4.960	5.168	4.615	5.081	4.960	5.168	ns
		GCLK PLL	t <sub>co</sub>	3.346	3.346	4.741	5.144	5.678	5.535	5.869	5.144	5.678	5.535	5.869	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.031	3.031	4.269	4.629	5.096	4.975	5.183	4.629	5.096	4.975	5.183	ns
		GCLK PLL	t <sub>co</sub>	3.358	3.358	4.754	5.159	5.693	5.550	5.881	5.159	5.693	5.550	5.881	ns
	6mA	GCLK	t <sub>co</sub>	3.027	3.027	4.272	4.632	5.099	4.978	5.186	4.632	5.099	4.978	5.186	ns
		GCLK PLL	t <sub>co</sub>	3.354	3.354	4.755	5.160	5.696	5.553	5.878	5.160	5.696	5.553	5.878	ns
	8mA	GCLK	t <sub>co</sub>	3.023	3.023	4.267	4.627	5.094	4.973	5.181	4.627	5.094	4.973	5.181	ns
		GCLK PLL	t <sub>co</sub>	3.350	3.350	4.751	5.156	5.691	5.548	5.873	5.156	5.691	5.548	5.873	ns
	10mA	GCLK	t <sub>co</sub>	3.016	3.016	4.260	4.620	5.087	4.966	5.174	4.620	5.087	4.966	5.174	ns
		GCLK PLL	t <sub>co</sub>	3.343	3.343	4.744	5.149	5.684	5.541	5.867	5.149	5.684	5.541	5.867	ns
	12mA	GCLK	t <sub>co</sub>	3.016	3.016	4.266	4.627	5.097	4.976	5.184	4.627	5.097	4.976	5.184	ns
		GCLK PLL	t <sub>co</sub>	3.344	3.344	4.751	5.157	5.694	5.551	5.870	5.157	5.694	5.551	5.870	ns
1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.014	3.014	4.247	4.605	5.071	4.950	5.158	4.605	5.071	4.950	5.158	ns
		GCLK PLL	t <sub>co</sub>	3.342	3.342	4.732	5.135	5.668	5.525	5.855	5.135	5.668	5.525	5.855	ns

**Table 1-62.** EP3SL70 Column Pins output Timing Parameters (Part 7 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.035	3.035	4.284	4.647	5.117	4.996	5.204	4.647	5.117	4.996	5.204	ns
		GCLK PLL	$t_{co}$	3.361	3.361	4.768	5.176	5.714	5.571	5.900	5.176	5.714	5.571	5.900	ns
	6mA	GCLK	$t_{co}$	3.026	3.026	4.275	4.638	5.108	4.987	5.195	4.638	5.108	4.987	5.195	ns
		GCLK PLL	$t_{co}$	3.353	3.353	4.759	5.167	5.705	5.562	5.888	5.167	5.705	5.562	5.888	ns
	8mA	GCLK	$t_{co}$	3.026	3.026	4.282	4.646	5.117	4.996	5.204	4.646	5.117	4.996	5.204	ns
		GCLK PLL	$t_{co}$	3.354	3.354	4.767	5.175	5.714	5.571	5.891	5.175	5.714	5.571	5.891	ns
	10mA	GCLK	$t_{co}$	3.016	3.016	4.269	4.632	5.103	4.982	5.190	4.632	5.103	4.982	5.190	ns
		GCLK PLL	$t_{co}$	3.343	3.343	4.754	5.162	5.700	5.557	5.885	5.162	5.700	5.557	5.885	ns
	12mA	GCLK	$t_{co}$	3.016	3.016	4.270	4.633	5.104	4.983	5.191	4.633	5.104	4.983	5.191	ns
		GCLK PLL	$t_{co}$	3.343	3.343	4.754	5.162	5.701	5.558	5.877	5.162	5.701	5.558	5.877	ns
1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.037	3.037	4.286	4.648	5.117	4.996	5.204	4.648	5.117	4.996	5.204	ns
		GCLK PLL	$t_{co}$	3.364	3.364	4.770	5.177	5.714	5.571	5.914	5.177	5.714	5.571	5.914	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.140	3.140	4.331	4.684	5.142	5.021	5.229	4.684	5.142	5.021	5.229	ns
		GCLK PLL	$t_{co}$	3.467	3.467	4.815	5.211	5.739	5.596	5.945	5.211	5.739	5.596	5.945	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.140	3.140	4.331	4.684	5.142	5.021	5.229	4.684	5.142	5.021	5.229	ns
		GCLK PLL	$t_{co}$	3.467	3.467	4.815	5.211	5.739	5.596	5.945	5.211	5.739	5.596	5.945	ns

Table 1-63 specifies EP3SL70 Row Pins Output Timing parameters for single-ended I/O standards.

**Table 1-63.** EP3SL70 Row Pins output Timing Parameters (Part 1 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVTTTL	4mA	GCLK	t <sub>co</sub>	2.952	3.162	4.390	4.745	5.224	5.098	5.331	4.857	5.335	5.208	5.420	ns
		GCLK PLL	t <sub>co</sub>	1.470	1.661	2.073	2.161	2.394	2.376	2.430	2.263	2.475	2.483	2.390	ns
	8mA	GCLK	t <sub>co</sub>	2.886	3.091	4.280	4.634	5.110	4.984	5.186	4.744	5.220	5.093	5.271	ns
		GCLK PLL	t <sub>co</sub>	1.398	1.564	1.943	2.023	2.249	2.231	2.285	2.122	2.326	2.334	2.241	ns
	12mA	GCLK	t <sub>co</sub>	2.807	3.002	4.174	4.534	5.014	4.888	5.062	4.645	5.120	4.993	5.139	ns
		GCLK PLL	t <sub>co</sub>	1.319	1.475	1.824	1.911	2.121	2.127	2.157	2.010	2.194	2.226	2.134	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	2.954	3.169	4.394	4.751	5.233	5.107	5.335	4.865	5.347	5.220	5.424	ns
		GCLK PLL	t <sub>co</sub>	1.480	1.665	2.081	2.166	2.398	2.380	2.434	2.269	2.479	2.487	2.394	ns
	8mA	GCLK	t <sub>co</sub>	2.811	3.006	4.185	4.549	5.024	4.898	5.072	4.657	5.129	5.002	5.146	ns
		GCLK PLL	t <sub>co</sub>	1.323	1.479	1.830	1.926	2.127	2.137	2.163	2.022	2.201	2.235	2.143	ns
3.0-V LVTTTL	4mA	GCLK	t <sub>co</sub>	2.913	3.123	4.357	4.714	5.190	5.064	5.287	4.825	5.301	5.174	5.378	ns
		GCLK PLL	t <sub>co</sub>	1.425	1.607	2.025	2.114	2.350	2.332	2.386	2.220	2.433	2.441	2.348	ns
	8mA	GCLK	t <sub>co</sub>	2.812	3.011	4.220	4.572	5.045	4.919	5.123	4.683	5.156	5.028	5.213	ns
		GCLK PLL	t <sub>co</sub>	1.324	1.484	1.872	1.955	2.186	2.168	2.222	2.058	2.269	2.276	2.183	ns
	12mA	GCLK	t <sub>co</sub>	2.775	2.973	4.160	4.507	4.975	4.849	5.035	4.615	5.082	4.955	5.120	ns
		GCLK PLL	t <sub>co</sub>	1.287	1.446	1.796	1.884	2.098	2.088	2.134	1.980	2.176	2.188	2.096	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	2.834	3.035	4.255	4.607	5.081	4.955	5.177	4.716	5.192	5.064	5.266	ns
		GCLK PLL	t <sub>co</sub>	1.346	1.526	1.919	2.007	2.240	2.222	2.276	2.112	2.322	2.329	2.236	ns
	8mA	GCLK	t <sub>co</sub>	2.762	2.957	4.132	4.478	4.947	4.821	4.996	4.585	5.054	4.926	5.080	ns
		GCLK PLL	t <sub>co</sub>	1.274	1.430	1.768	1.855	2.059	2.060	2.095	1.950	2.136	2.159	2.067	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	2.939	3.160	4.465	4.840	5.335	5.209	5.459	4.957	5.453	5.326	5.556	ns
		GCLK PLL	t <sub>co</sub>	1.451	1.643	2.157	2.268	2.522	2.504	2.558	2.380	2.612	2.619	2.526	ns
	8mA	GCLK	t <sub>co</sub>	2.854	3.057	4.341	4.705	5.193	5.067	5.289	4.820	5.309	5.181	5.382	ns
		GCLK PLL	t <sub>co</sub>	1.366	1.545	2.002	2.105	2.352	2.334	2.388	2.213	2.438	2.445	2.352	ns
	12mA	GCLK	t <sub>co</sub>	2.797	3.013	4.257	4.619	5.102	4.976	5.163	4.731	5.214	5.087	5.252	ns
		GCLK PLL	t <sub>co</sub>	1.309	1.486	1.893	1.996	2.226	2.215	2.262	2.096	2.308	2.320	2.228	ns

**Table 1-63.** EP3SL70 Row Pins output Timing Parameters (Part 2 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.8 V	2mA	GCLK	$t_{co}$	3.205	3.439	4.931	5.357	5.893	5.776	5.954	5.487	6.024	5.908	6.048	ns
		GCLK PLL	$t_{co}$	1.683	1.890	2.543	2.697	2.964	2.979	3.002	2.817	3.088	3.104	3.011	ns
	4mA	GCLK	$t_{co}$	2.980	3.237	4.604	4.988	5.488	5.371	5.549	5.122	5.618	5.501	5.641	ns
		GCLK PLL	$t_{co}$	1.468	1.688	2.216	2.328	2.559	2.574	2.597	2.452	2.682	2.697	2.604	ns
	6mA	GCLK	$t_{co}$	2.915	3.135	4.451	4.838	5.329	5.212	5.390	4.954	5.445	5.329	5.469	ns
		GCLK PLL	$t_{co}$	1.393	1.586	2.063	2.178	2.400	2.415	2.438	2.284	2.509	2.525	2.432	ns
	8mA	GCLK	$t_{co}$	2.859	3.064	4.374	4.744	5.232	5.115	5.293	4.859	5.351	5.235	5.375	ns
		GCLK PLL	$t_{co}$	1.375	1.555	1.996	2.101	2.312	2.329	2.350	2.202	2.415	2.434	2.340	ns
1.5 V	2mA	GCLK	$t_{co}$	3.116	3.357	4.841	5.270	5.821	5.704	5.882	5.394	5.948	5.832	5.972	ns
		GCLK PLL	$t_{co}$	1.594	1.808	2.453	2.610	2.892	2.907	2.930	2.724	3.012	3.028	2.935	ns
	4mA	GCLK	$t_{co}$	2.875	3.099	4.436	4.833	5.330	5.213	5.391	4.948	5.444	5.328	5.468	ns
		GCLK PLL	$t_{co}$	1.391	1.572	2.049	2.173	2.401	2.416	2.439	2.278	2.508	2.524	2.431	ns
	6mA	GCLK	$t_{co}$	2.848	3.055	4.363	4.737	5.224	5.107	5.285	4.850	5.339	5.223	5.363	ns
		GCLK PLL	$t_{co}$	1.364	1.546	1.981	2.093	2.312	2.329	2.350	2.195	2.414	2.434	2.340	ns
	8mA	GCLK	$t_{co}$	2.838	3.044	4.341	4.719	5.205	5.088	5.266	4.832	5.317	5.201	5.341	ns
		GCLK PLL	$t_{co}$	1.345	1.535	1.964	2.068	2.293	2.310	2.331	2.171	2.395	2.415	2.321	ns
1.2 V	2mA	GCLK	$t_{co}$	3.059	3.282	4.751	5.184	5.746	5.629	5.807	5.306	5.864	5.748	5.888	ns
		GCLK PLL	$t_{co}$	1.537	1.733	2.363	2.524	2.817	2.832	2.855	2.636	2.928	2.944	2.851	ns
	4mA	GCLK	$t_{co}$	2.880	3.093	4.458	4.861	5.371	5.254	5.432	4.973	5.486	5.370	5.510	ns
		GCLK PLL	$t_{co}$	1.396	1.576	2.070	2.201	2.442	2.457	2.480	2.303	2.550	2.566	2.473	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	2.801	3.001	4.250	4.610	5.092	4.966	5.140	4.718	5.200	5.073	5.215	ns
		GCLK PLL	$t_{co}$	1.313	1.474	1.886	1.987	2.194	2.205	2.230	2.083	2.270	2.306	2.214	ns
	12mA	GCLK	$t_{co}$	2.796	2.997	4.247	4.608	5.090	4.964	5.138	4.717	5.199	5.072	5.211	ns
		GCLK PLL	$t_{co}$	1.308	1.470	1.883	1.985	2.186	2.203	2.222	2.082	2.263	2.305	2.213	ns
SSTL-2 CLASS II	16mA	GCLK	$t_{co}$	2.787	2.986	4.232	4.592	5.073	4.947	5.121	4.700	5.181	5.054	5.193	ns
		GCLK PLL	$t_{co}$	1.299	1.459	1.868	1.969	2.159	2.186	2.195	2.065	2.236	2.287	2.195	ns



**Table 1-63.** EP3SL70 Row Pins output Timing Parameters (Part 3 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	2.816	3.017	4.269	4.632	5.106	4.989	5.167	4.740	5.214	5.098	5.238	ns
		GCLK PLL	$t_{co}$	1.324	1.499	1.915	2.005	2.207	2.224	2.245	2.101	2.305	2.325	2.231	ns
	6mA	GCLK	$t_{co}$	2.803	3.003	4.266	4.630	5.104	4.987	5.165	4.738	5.212	5.096	5.236	ns
		GCLK PLL	$t_{co}$	1.319	1.494	1.913	2.004	2.206	2.223	2.244	2.099	2.303	2.323	2.229	ns
	8mA	GCLK	$t_{co}$	2.792	2.992	4.249	4.613	5.087	4.970	5.148	4.721	5.196	5.080	5.220	ns
		GCLK PLL	$t_{co}$	1.308	1.483	1.903	1.994	2.196	2.213	2.234	2.090	2.294	2.314	2.220	ns
	10mA	GCLK	$t_{co}$	2.781	2.981	4.235	4.598	5.074	4.957	5.133	4.707	5.183	5.065	5.205	ns
		GCLK PLL	$t_{co}$	1.297	1.472	1.890	1.981	2.183	2.200	2.221	2.078	2.282	2.302	2.208	ns
	12mA	GCLK	$t_{co}$	2.781	2.980	4.235	4.598	5.074	4.957	5.132	4.706	5.183	5.064	5.204	ns
		GCLK PLL	$t_{co}$	1.297	1.471	1.890	1.981	2.183	2.200	2.221	2.077	2.282	2.302	2.208	ns
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	2.789	2.987	4.234	4.595	5.069	4.952	5.126	4.702	5.177	5.058	5.198	ns
		GCLK PLL	$t_{co}$	1.305	1.478	1.889	1.978	2.178	2.195	2.216	2.073	2.276	2.296	2.202	ns
	16mA	GCLK	$t_{co}$	2.790	2.990	4.240	4.603	5.079	4.962	5.136	4.711	5.188	5.069	5.209	ns
		GCLK PLL	$t_{co}$	1.306	1.481	1.895	1.986	2.188	2.205	2.226	2.082	2.287	2.307	2.213	ns
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	2.812	3.013	4.280	4.646	5.123	5.006	5.184	4.753	5.230	5.114	5.254	ns
		GCLK PLL	$t_{co}$	1.327	1.502	1.924	2.016	2.220	2.237	2.258	2.111	2.317	2.337	2.243	ns
	6mA	GCLK	$t_{co}$	2.797	2.997	4.262	4.629	5.106	4.989	5.167	4.737	5.214	5.098	5.238	ns
		GCLK PLL	$t_{co}$	1.313	1.488	1.913	2.006	2.210	2.227	2.248	2.102	2.308	2.328	2.234	ns
	8mA	GCLK	$t_{co}$	2.786	2.985	4.245	4.611	5.088	4.971	5.149	4.719	5.197	5.081	5.221	ns
		GCLK PLL	$t_{co}$	1.302	1.476	1.900	1.993	2.197	2.214	2.235	2.089	2.295	2.315	2.221	ns

**Table 1-63.** EP3SL70 Row Pins output Timing Parameters (Part 4 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	2.796	2.993	4.236	4.597	5.068	4.951	5.129	4.704	5.176	5.060	5.200	ns
		GCLK PLL	$t_{co}$	1.312	1.484	1.888	1.976	2.176	2.193	2.214	2.072	2.273	2.293	2.199	ns
	6mA	GCLK	$t_{co}$	2.789	2.987	4.231	4.592	5.066	4.949	5.123	4.700	5.174	5.055	5.195	ns
		GCLK PLL	$t_{co}$	1.305	1.478	1.886	1.975	2.175	2.192	2.213	2.071	2.273	2.293	2.199	ns
	8mA	GCLK	$t_{co}$	2.780	2.979	4.224	4.585	5.059	4.942	5.116	4.693	5.167	5.048	5.188	ns
		GCLK PLL	$t_{co}$	1.296	1.470	1.879	1.968	2.168	2.185	2.206	2.064	2.266	2.286	2.192	ns
	10mA	GCLK	$t_{co}$	2.783	2.981	4.227	4.588	5.063	4.946	5.120	4.696	5.170	5.051	5.191	ns
		GCLK PLL	$t_{co}$	1.299	1.472	1.882	1.971	2.172	2.189	2.210	2.067	2.269	2.289	2.195	ns
12mA	GCLK	$t_{co}$	2.779	2.978	4.229	4.591	5.066	4.949	5.123	4.699	5.175	5.056	5.196	ns	
	GCLK PLL	$t_{co}$	1.295	1.469	1.884	1.974	2.175	2.192	2.213	2.070	2.274	2.294	2.200	ns	
1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	2.787	2.986	4.227	4.588	5.062	4.945	5.119	4.695	5.169	5.050	5.190	ns
		GCLK PLL	$t_{co}$	1.303	1.477	1.882	1.971	2.171	2.188	2.209	2.066	2.268	2.288	2.194	ns
1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	2.802	2.999	4.247	4.610	5.083	4.966	5.144	4.716	5.190	5.074	5.214	ns
		GCLK PLL	$t_{co}$	1.318	1.490	1.897	1.986	2.187	2.204	2.225	2.081	2.284	2.304	2.210	ns
	6mA	GCLK	$t_{co}$	2.796	2.994	4.243	4.606	5.080	4.963	5.140	4.713	5.188	5.071	5.211	ns
		GCLK PLL	$t_{co}$	1.312	1.485	1.898	1.988	2.189	2.206	2.227	2.083	2.287	2.307	2.213	ns
	8mA	GCLK	$t_{co}$	2.792	2.990	4.238	4.600	5.075	4.958	5.134	4.707	5.182	5.065	5.205	ns
		GCLK PLL	$t_{co}$	1.308	1.481	1.893	1.983	2.184	2.201	2.222	2.078	2.281	2.301	2.207	ns
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	2.804	3.001	4.258	4.624	5.101	4.984	5.162	4.730	5.207	5.091	5.231	ns
		GCLK PLL	$t_{co}$	1.320	1.492	1.910	2.002	2.206	2.223	2.244	2.097	2.303	2.323	2.229	ns
	6mA	GCLK	$t_{co}$	2.795	2.993	4.247	4.612	5.089	4.972	5.150	4.719	5.196	5.080	5.220	ns
		GCLK PLL	$t_{co}$	1.311	1.484	1.901	1.993	2.197	2.214	2.235	2.088	2.294	2.314	2.220	ns
	8mA	GCLK	$t_{co}$	2.794	2.993	4.253	4.618	5.097	4.980	5.156	4.726	5.205	5.087	5.227	ns
		GCLK PLL	$t_{co}$	1.310	1.484	1.908	2.001	2.206	2.223	2.244	2.097	2.304	2.324	2.230	ns
3.0-V PCI	—	GCLK	$t_{co}$	2.907	3.107	4.302	4.656	5.132	5.006	5.180	4.766	5.242	5.115	5.254	ns
		GCLK PLL	$t_{co}$	1.419	1.580	1.938	2.033	2.203	2.245	2.239	2.131	2.282	2.348	2.256	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	2.907	3.107	4.302	4.656	5.132	5.006	5.180	4.766	5.242	5.115	5.254	ns
		GCLK PLL	$t_{co}$	1.419	1.580	1.938	2.033	2.203	2.245	2.239	2.131	2.282	2.348	2.256	ns

Table 1-64 through Table 1-69 show the maximum I/O timing parameters for EP3SL70 devices for differential I/O standards.

Table 1-64 specifies EP3SL70 column pins input timing parameters for differential I/O standards.

**Table 1-64.** EP3SL70 Column Pins Input Timing Parameters (Part 1 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS	GCLK	t <sub>su</sub>	-0.751	-0.749	-0.792	-0.756	-0.885	-0.844	-1.119	-0.710	-1.093	-0.793	-1.152	ns
		t <sub>h</sub>	0.870	0.884	1.000	0.994	1.148	1.097	1.368	0.957	1.377	1.058	1.400	ns
	GCLK PLL	t <sub>su</sub>	0.896	0.924	1.795	2.133	2.302	2.193	2.080	2.187	2.491	2.254	2.133	ns
		t <sub>h</sub>	-0.648	-0.660	-1.383	-1.664	-1.779	-1.696	-1.583	-1.709	-1.937	-1.745	-1.635	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-0.751	-0.749	-0.792	-0.756	-0.885	-0.844	-1.119	-0.710	-1.093	-0.793	-1.152	ns
		t <sub>h</sub>	0.870	0.884	1.000	0.994	1.148	1.097	1.368	0.957	1.377	1.058	1.400	ns
	GCLK PLL	t <sub>su</sub>	0.896	0.924	1.795	2.133	2.302	2.193	2.080	2.187	2.491	2.254	2.133	ns
		t <sub>h</sub>	-0.648	-0.660	-1.383	-1.664	-1.779	-1.696	-1.583	-1.709	-1.937	-1.745	-1.635	ns
RSDS	GCLK	t <sub>su</sub>	-0.751	-0.749	-0.792	-0.756	-0.885	-0.844	-1.119	-0.710	-1.093	-0.793	-1.152	ns
		t <sub>h</sub>	0.870	0.884	1.000	0.994	1.148	1.097	1.368	0.957	1.377	1.058	1.400	ns
	GCLK PLL	t <sub>su</sub>	0.896	0.924	1.795	2.133	2.302	2.193	2.080	2.187	2.491	2.254	2.133	ns
		t <sub>h</sub>	-0.648	-0.660	-1.383	-1.664	-1.779	-1.696	-1.583	-1.709	-1.937	-1.745	-1.635	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.567	-0.572	-0.869	-0.955	-1.044	-0.998	-1.268	-0.945	-1.033	-0.991	-1.306	ns
		t <sub>h</sub>	0.679	0.699	1.045	1.153	1.261	1.205	1.472	1.150	1.258	1.208	1.509	ns
	GCLK PLL	t <sub>su</sub>	1.080	1.101	1.718	1.934	2.143	2.039	1.931	1.952	2.163	2.056	1.979	ns
		t <sub>h</sub>	-0.839	-0.845	-1.338	-1.505	-1.666	-1.588	-1.479	-1.516	-1.677	-1.595	-1.526	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.567	-0.572	-0.869	-0.955	-1.044	-0.998	-1.268	-0.945	-1.033	-0.991	-1.306	ns
		t <sub>h</sub>	0.679	0.699	1.045	1.153	1.261	1.205	1.472	1.150	1.258	1.208	1.509	ns
	GCLK PLL	t <sub>su</sub>	1.080	1.101	1.718	1.934	2.143	2.039	1.931	1.952	2.163	2.056	1.979	ns
		t <sub>h</sub>	-0.839	-0.845	-1.338	-1.505	-1.666	-1.588	-1.479	-1.516	-1.677	-1.595	-1.526	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.575	-0.584	-0.879	-0.966	-1.060	-1.014	-1.284	-0.956	-1.048	-1.006	-1.321	ns
		t <sub>h</sub>	0.687	0.711	1.055	1.164	1.277	1.221	1.488	1.161	1.273	1.223	1.524	ns
	GCLK PLL	t <sub>su</sub>	1.072	1.089	1.708	1.923	2.127	2.023	1.915	1.941	2.148	2.041	1.964	ns
		t <sub>h</sub>	-0.831	-0.833	-1.328	-1.494	-1.650	-1.572	-1.463	-1.505	-1.662	-1.580	-1.511	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.575	-0.584	-0.879	-0.966	-1.060	-1.014	-1.284	-0.956	-1.048	-1.006	-1.321	ns
		t <sub>h</sub>	0.687	0.711	1.055	1.164	1.277	1.221	1.488	1.161	1.273	1.223	1.524	ns
	GCLK PLL	t <sub>su</sub>	1.072	1.089	1.708	1.923	2.127	2.023	1.915	1.941	2.148	2.041	1.964	ns
		t <sub>h</sub>	-0.831	-0.833	-1.328	-1.494	-1.650	-1.572	-1.463	-1.505	-1.662	-1.580	-1.511	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.587	-0.595	-0.888	-0.977	-1.079	-1.033	-1.303	-0.967	-1.066	-1.024	-1.339	ns
		t <sub>h</sub>	0.699	0.722	1.065	1.175	1.296	1.240	1.507	1.172	1.291	1.241	1.542	ns
	GCLK PLL	t <sub>su</sub>	1.060	1.078	1.699	1.912	2.108	2.004	1.896	1.930	2.130	2.023	1.946	ns
		t <sub>h</sub>	-0.819	-0.822	-1.318	-1.483	-1.631	-1.553	-1.444	-1.494	-1.644	-1.562	-1.493	ns

**Table 1-64.** EP3SL70 Column Pins Input Timing Parameters (Part 2 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.587	-0.595	-0.888	-0.977	-1.079	-1.033	-1.303	-0.967	-1.066	-1.024	-1.339	ns
		$t_h$	0.699	0.722	1.065	1.175	1.296	1.240	1.507	1.172	1.291	1.241	1.542	ns
	GCLK PLL	$t_{su}$	1.060	1.078	1.699	1.912	2.108	2.004	1.896	1.930	2.130	2.023	1.946	ns
		$t_h$	-0.819	-0.822	-1.318	-1.483	-1.631	-1.553	-1.444	-1.494	-1.644	-1.562	-1.493	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.575	-0.584	-0.879	-0.966	-1.060	-1.014	-1.284	-0.956	-1.048	-1.006	-1.321	ns
		$t_h$	0.687	0.711	1.055	1.164	1.277	1.221	1.488	1.161	1.273	1.223	1.524	ns
	GCLK PLL	$t_{su}$	1.072	1.089	1.708	1.923	2.127	2.023	1.915	1.941	2.148	2.041	1.964	ns
		$t_h$	-0.831	-0.833	-1.328	-1.494	-1.650	-1.572	-1.463	-1.505	-1.662	-1.580	-1.511	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.575	-0.584	-0.879	-0.966	-1.060	-1.014	-1.284	-0.956	-1.048	-1.006	-1.321	ns
		$t_h$	0.687	0.711	1.055	1.164	1.277	1.221	1.488	1.161	1.273	1.223	1.524	ns
	GCLK PLL	$t_{su}$	1.072	1.089	1.708	1.923	2.127	2.023	1.915	1.941	2.148	2.041	1.964	ns
		$t_h$	-0.831	-0.833	-1.328	-1.494	-1.650	-1.572	-1.463	-1.505	-1.662	-1.580	-1.511	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.587	-0.595	-0.888	-0.977	-1.079	-1.033	-1.303	-0.967	-1.066	-1.024	-1.339	ns
		$t_h$	0.699	0.722	1.065	1.175	1.296	1.240	1.507	1.172	1.291	1.241	1.542	ns
	GCLK PLL	$t_{su}$	1.060	1.078	1.699	1.912	2.108	2.004	1.896	1.930	2.130	2.023	1.946	ns
		$t_h$	-0.819	-0.822	-1.318	-1.483	-1.631	-1.553	-1.444	-1.494	-1.644	-1.562	-1.493	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.587	-0.595	-0.888	-0.977	-1.079	-1.033	-1.303	-0.967	-1.066	-1.024	-1.339	ns
		$t_h$	0.699	0.722	1.065	1.175	1.296	1.240	1.507	1.172	1.291	1.241	1.542	ns
	GCLK PLL	$t_{su}$	1.060	1.078	1.699	1.912	2.108	2.004	1.896	1.930	2.130	2.023	1.946	ns
		$t_h$	-0.819	-0.822	-1.318	-1.483	-1.631	-1.553	-1.444	-1.494	-1.644	-1.562	-1.493	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.594	-0.601	-0.900	-0.982	-1.079	-1.035	-1.302	-0.971	-1.061	-1.022	-1.335	ns
		$t_h$	0.706	0.728	1.078	1.183	1.299	1.243	1.511	1.179	1.291	1.240	1.543	ns
	GCLK PLL	$t_{su}$	1.053	1.072	1.687	1.907	2.108	2.002	1.897	1.926	2.135	2.025	1.950	ns
		$t_h$	-0.812	-0.816	-1.305	-1.475	-1.628	-1.550	-1.440	-1.487	-1.644	-1.563	-1.492	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.594	-0.601	-0.900	-0.982	-1.079	-1.035	-1.302	-0.971	-1.061	-1.022	-1.335	ns
		$t_h$	0.706	0.728	1.078	1.183	1.299	1.243	1.511	1.179	1.291	1.240	1.543	ns
	GCLK PLL	$t_{su}$	1.053	1.072	1.687	1.907	2.108	2.002	1.897	1.926	2.135	2.025	1.950	ns
		$t_h$	-0.812	-0.816	-1.305	-1.475	-1.628	-1.550	-1.440	-1.487	-1.644	-1.563	-1.492	ns

Table 1-65 specifies EP3SL70 row pins input timing parameters for differential I/O standards.

**Table 1-65.** EP3SL70 Row Pins Input Timing Parameters (Part 1 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS	GCLK	t <sub>SU</sub>	-0.735	-0.735	-0.703	-0.634	-0.739	-0.705	-0.955	-0.580	-0.681	-0.649	-0.989	ns
		t <sub>h</sub>	0.852	0.867	0.911	0.873	1.003	0.959	1.206	0.832	0.955	0.915	1.239	ns
	GCLK PLL	t <sub>SU</sub>	0.871	0.899	1.843	2.215	2.410	2.291	2.206	2.274	2.479	2.357	2.255	ns
		t <sub>h</sub>	-0.624	-0.638	-1.432	-1.744	-1.885	-1.792	-1.706	-1.789	-1.941	-1.846	-1.752	ns
MINI-LVDS	GCLK	t <sub>SU</sub>	-0.735	-0.735	-0.703	-0.634	-0.739	-0.705	-0.955	-0.580	-0.681	-0.649	-0.989	ns
		t <sub>h</sub>	0.852	0.867	0.911	0.873	1.003	0.959	1.206	0.832	0.955	0.915	1.239	ns
	GCLK PLL	t <sub>SU</sub>	0.871	0.899	1.843	2.215	2.410	2.291	2.206	2.274	2.479	2.357	2.255	ns
		t <sub>h</sub>	-0.624	-0.638	-1.432	-1.744	-1.885	-1.792	-1.706	-1.789	-1.941	-1.846	-1.752	ns
RSDS	GCLK	t <sub>SU</sub>	-0.735	-0.735	-0.703	-0.634	-0.739	-0.705	-0.955	-0.580	-0.681	-0.649	-0.989	ns
		t <sub>h</sub>	0.852	0.867	0.911	0.873	1.003	0.959	1.206	0.832	0.955	0.915	1.239	ns
	GCLK PLL	t <sub>SU</sub>	0.871	0.899	1.843	2.215	2.410	2.291	2.206	2.274	2.479	2.357	2.255	ns
		t <sub>h</sub>	-0.624	-0.638	-1.432	-1.744	-1.885	-1.792	-1.706	-1.789	-1.941	-1.846	-1.752	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>SU</sub>	-0.550	-0.560	-0.800	-0.868	-0.936	-0.899	-1.144	-0.857	-0.924	-0.891	-1.183	ns
		t <sub>h</sub>	0.660	0.683	0.976	1.062	1.150	1.104	1.346	1.060	1.147	1.105	1.384	ns
	GCLK PLL	t <sub>SU</sub>	1.066	1.084	1.756	1.991	2.221	2.107	2.027	2.007	2.242	2.125	2.071	ns
		t <sub>h</sub>	-0.826	-0.832	-1.377	-1.565	-1.745	-1.657	-1.576	-1.571	-1.756	-1.666	-1.617	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	t <sub>SU</sub>	-0.550	-0.560	-0.800	-0.868	-0.936	-0.899	-1.144	-0.857	-0.924	-0.891	-1.183	ns
		t <sub>h</sub>	0.660	0.683	0.976	1.062	1.150	1.104	1.346	1.060	1.147	1.105	1.384	ns
	GCLK PLL	t <sub>SU</sub>	1.066	1.084	1.756	1.991	2.221	2.107	2.027	2.007	2.242	2.125	2.071	ns
		t <sub>h</sub>	-0.826	-0.832	-1.377	-1.565	-1.745	-1.657	-1.576	-1.571	-1.756	-1.666	-1.617	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>SU</sub>	-0.559	-0.572	-0.809	-0.878	-0.952	-0.915	-1.160	-0.866	-0.940	-0.907	-1.199	ns
		t <sub>h</sub>	0.669	0.695	0.985	1.072	1.166	1.120	1.362	1.069	1.163	1.121	1.400	ns
	GCLK PLL	t <sub>SU</sub>	1.057	1.072	1.747	1.981	2.205	2.091	2.011	1.998	2.226	2.109	2.055	ns
		t <sub>h</sub>	-0.817	-0.820	-1.368	-1.555	-1.729	-1.641	-1.560	-1.562	-1.740	-1.650	-1.601	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	t <sub>SU</sub>	-0.559	-0.572	-0.809	-0.878	-0.952	-0.915	-1.160	-0.866	-0.940	-0.907	-1.199	ns
		t <sub>h</sub>	0.669	0.695	0.985	1.072	1.166	1.120	1.362	1.069	1.163	1.121	1.400	ns
	GCLK PLL	t <sub>SU</sub>	1.057	1.072	1.747	1.981	2.205	2.091	2.011	1.998	2.226	2.109	2.055	ns
		t <sub>h</sub>	-0.817	-0.820	-1.368	-1.555	-1.729	-1.641	-1.560	-1.562	-1.740	-1.650	-1.601	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>SU</sub>	-0.573	-0.584	-0.822	-0.888	-0.970	-0.933	-1.178	-0.877	-0.957	-0.924	-1.216	ns
		t <sub>h</sub>	0.683	0.707	0.997	1.082	1.184	1.138	1.380	1.080	1.180	1.138	1.417	ns
	GCLK PLL	t <sub>SU</sub>	1.043	1.060	1.734	1.971	2.187	2.073	1.993	1.987	2.209	2.092	2.038	ns
		t <sub>h</sub>	-0.803	-0.808	-1.356	-1.545	-1.711	-1.623	-1.542	-1.551	-1.723	-1.633	-1.584	ns

**Table 1-65.** EP3SL70 Row Pins Input Timing Parameters (Part 2 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.573	-0.584	-0.822	-0.888	-0.970	-0.933	-1.178	-0.877	-0.957	-0.924	-1.216	ns
		$t_h$	0.683	0.707	0.997	1.082	1.184	1.138	1.380	1.080	1.180	1.138	1.417	ns
	GCLK PLL	$t_{su}$	1.043	1.060	1.734	1.971	2.187	2.073	1.993	1.987	2.209	2.092	2.038	ns
		$t_h$	-0.803	-0.808	-1.356	-1.545	-1.711	-1.623	-1.542	-1.551	-1.723	-1.633	-1.584	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.559	-0.572	-0.809	-0.878	-0.952	-0.915	-1.160	-0.866	-0.940	-0.907	-1.199	ns
		$t_h$	0.669	0.695	0.985	1.072	1.166	1.120	1.362	1.069	1.163	1.121	1.400	ns
	GCLK PLL	$t_{su}$	1.057	1.072	1.747	1.981	2.205	2.091	2.011	1.998	2.226	2.109	2.055	ns
		$t_h$	-0.817	-0.820	-1.368	-1.555	-1.729	-1.641	-1.560	-1.562	-1.740	-1.650	-1.601	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.559	-0.572	-0.809	-0.878	-0.952	-0.915	-1.160	-0.866	-0.940	-0.907	-1.199	ns
		$t_h$	0.669	0.695	0.985	1.072	1.166	1.120	1.362	1.069	1.163	1.121	1.400	ns
	GCLK PLL	$t_{su}$	1.057	1.072	1.747	1.981	2.205	2.091	2.011	1.998	2.226	2.109	2.055	ns
		$t_h$	-0.817	-0.820	-1.368	-1.555	-1.729	-1.641	-1.560	-1.562	-1.740	-1.650	-1.601	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.573	-0.584	-0.822	-0.888	-0.970	-0.933	-1.178	-0.877	-0.957	-0.924	-1.216	ns
		$t_h$	0.683	0.707	0.997	1.082	1.184	1.138	1.380	1.080	1.180	1.138	1.417	ns
	GCLK PLL	$t_{su}$	1.043	1.060	1.734	1.971	2.187	2.073	1.993	1.987	2.209	2.092	2.038	ns
		$t_h$	-0.803	-0.808	-1.356	-1.545	-1.711	-1.623	-1.542	-1.551	-1.723	-1.633	-1.584	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.573	-0.584	-0.822	-0.888	-0.970	-0.933	-1.178	-0.877	-0.957	-0.924	-1.216	ns
		$t_h$	0.683	0.707	0.997	1.082	1.184	1.138	1.380	1.080	1.180	1.138	1.417	ns
	GCLK PLL	$t_{su}$	1.043	1.060	1.734	1.971	2.187	2.073	1.993	1.987	2.209	2.092	2.038	ns
		$t_h$	-0.803	-0.808	-1.356	-1.545	-1.711	-1.623	-1.542	-1.551	-1.723	-1.633	-1.584	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.572	-0.583	-0.827	-0.894	-0.971	-0.935	-1.179	-0.878	-0.953	-0.922	-1.213	ns
		$t_h$	0.682	0.706	1.002	1.090	1.188	1.142	1.385	1.084	1.179	1.137	1.418	ns
	GCLK PLL	$t_{su}$	1.034	1.051	1.719	1.955	2.176	2.061	1.982	1.976	2.203	2.084	2.031	ns
		$t_h$	-0.794	-0.799	-1.341	-1.527	-1.697	-1.609	-1.527	-1.537	-1.714	-1.624	-1.573	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.572	-0.583	-0.827	-0.894	-0.971	-0.935	-1.179	-0.878	-0.953	-0.922	-1.213	ns
		$t_h$	0.682	0.706	1.002	1.090	1.188	1.142	1.385	1.084	1.179	1.137	1.418	ns
	GCLK PLL	$t_{su}$	1.034	1.051	1.719	1.955	2.176	2.061	1.982	1.976	2.203	2.084	2.031	ns
		$t_h$	-0.794	-0.799	-1.341	-1.527	-1.697	-1.609	-1.527	-1.537	-1.714	-1.624	-1.573	ns

Table 1-66 specifies EP3SL70 Column Pins Output Timing parameters for differential I/O standards.

**Table 1-66.** EP3SL70 Column Pins output Timing Parameters (Part 1 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
LVDS_E_1R	—	GCLK	t <sub>co</sub>	2.878	3.078	4.338	4.711	5.195	5.069	5.265	4.823	5.306	5.181	5.331	ns	
		GCLK PLL	t <sub>co</sub>	1.347	1.521	1.941	2.039	2.254	2.262	2.301	2.142	2.358	2.366	2.284	ns	
LVDS_E_3R	—	GCLK	t <sub>co</sub>	2.874	3.081	4.385	4.766	5.257	5.131	5.327	4.882	5.372	5.247	5.397	ns	
		GCLK PLL	t <sub>co</sub>	1.343	1.524	1.988	2.094	2.316	2.324	2.363	2.201	2.424	2.432	2.350	ns	
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	2.878	3.078	4.338	4.711	5.195	5.069	5.265	4.823	5.306	5.181	5.331	ns	
		GCLK PLL	t <sub>co</sub>	1.347	1.521	1.941	2.039	2.254	2.262	2.301	2.142	2.358	2.366	2.284	ns	
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	2.874	3.081	4.385	4.766	5.257	5.131	5.327	4.882	5.372	5.247	5.397	ns	
		GCLK PLL	t <sub>co</sub>	1.343	1.524	1.988	2.094	2.316	2.324	2.363	2.201	2.424	2.432	2.350	ns	
RSDS_E_1R	—	GCLK	t <sub>co</sub>	2.878	3.078	4.338	4.711	5.195	5.069	5.265	4.823	5.306	5.181	5.331	ns	
		GCLK PLL	t <sub>co</sub>	1.347	1.521	1.941	2.039	2.254	2.262	2.301	2.142	2.358	2.366	2.284	ns	
RSDS_E_3R	—	GCLK	t <sub>co</sub>	2.874	3.081	4.385	4.766	5.257	5.131	5.327	4.882	5.372	5.247	5.397	ns	
		GCLK PLL	t <sub>co</sub>	1.343	1.524	1.988	2.094	2.316	2.324	2.363	2.201	2.424	2.432	2.350	ns	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.905	3.111	4.409	4.789	5.279	5.153	5.349	4.903	5.392	5.267	5.417	ns	
		GCLK PLL	t <sub>co</sub>	1.374	1.554	2.012	2.117	2.338	2.346	2.385	2.222	2.444	2.452	2.370	ns	
	6mA	GCLK	t <sub>co</sub>	2.895	3.101	4.399	4.778	5.269	5.143	5.339	4.892	5.382	5.257	5.407	ns	
		GCLK PLL	t <sub>co</sub>	1.364	1.544	2.002	2.106	2.328	2.336	2.375	2.211	2.434	2.442	2.360	ns	
	8mA	GCLK	t <sub>co</sub>	2.895	3.101	4.402	4.782	5.273	5.147	5.343	4.897	5.387	5.262	5.412	ns	
		GCLK PLL	t <sub>co</sub>	1.364	1.544	2.005	2.110	2.332	2.340	2.379	2.216	2.439	2.447	2.365	ns	
	10mA	GCLK	t <sub>co</sub>	2.888	3.095	4.395	4.776	5.267	5.141	5.337	4.890	5.381	5.256	5.406	ns	
		GCLK PLL	t <sub>co</sub>	1.357	1.538	1.998	2.104	2.326	2.334	2.373	2.209	2.433	2.441	2.359	ns	
	12mA	GCLK	t <sub>co</sub>	2.887	3.093	4.392	4.773	5.264	5.138	5.334	4.887	5.377	5.252	5.402	ns	
		GCLK PLL	t <sub>co</sub>	1.356	1.536	1.995	2.101	2.323	2.331	2.370	2.206	2.429	2.437	2.355	ns	
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.909	3.115	4.413	4.793	5.283	5.157	5.353	4.907	5.397	5.272	5.422	ns
			GCLK PLL	t <sub>co</sub>	1.378	1.558	2.016	2.121	2.342	2.350	2.389	2.226	2.449	2.457	2.375	ns

**Table 1-66.** EP3SL70 Column Pins output Timing Parameters (Part 2 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.899	3.104	4.392	4.770	5.258	5.132	5.328	4.883	5.370	5.245	5.395	ns
		GCLK PLL	t <sub>co</sub>	1.368	1.547	1.995	2.098	2.317	2.325	2.364	2.202	2.422	2.430	2.348	ns
	6mA	GCLK	t <sub>co</sub>	2.894	3.100	4.392	4.770	5.259	5.133	5.329	4.884	5.372	5.247	5.397	ns
		GCLK PLL	t <sub>co</sub>	1.363	1.543	1.995	2.098	2.318	2.326	2.365	2.203	2.424	2.432	2.350	ns
	8mA	GCLK	t <sub>co</sub>	2.892	3.098	4.391	4.769	5.257	5.131	5.327	4.883	5.371	5.246	5.396	ns
		GCLK PLL	t <sub>co</sub>	1.361	1.541	1.994	2.097	2.316	2.324	2.363	2.202	2.423	2.431	2.349	ns
	10mA	GCLK	t <sub>co</sub>	2.884	3.089	4.381	4.759	5.248	5.122	5.318	4.873	5.361	5.236	5.386	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.532	1.984	2.087	2.307	2.315	2.354	2.192	2.413	2.421	2.339	ns
	12mA	GCLK	t <sub>co</sub>	2.885	3.091	4.387	4.766	5.256	5.130	5.326	4.881	5.370	5.245	5.395	ns
		GCLK PLL	t <sub>co</sub>	1.354	1.534	1.990	2.094	2.315	2.323	2.362	2.200	2.422	2.430	2.348	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.884	3.088	4.370	4.747	5.234	5.108	5.304	4.860	5.346	5.221	5.371	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.531	1.973	2.075	2.293	2.301	2.340	2.179	2.398	2.406	2.324	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.896	3.101	4.388	4.765	5.252	5.126	5.322	4.879	5.365	5.240	5.390	ns
		GCLK PLL	t <sub>co</sub>	1.365	1.544	1.991	2.093	2.311	2.319	2.358	2.198	2.417	2.425	2.343	ns
	6mA	GCLK	t <sub>co</sub>	2.892	3.098	4.389	4.767	5.256	5.130	5.326	4.881	5.369	5.244	5.394	ns
		GCLK PLL	t <sub>co</sub>	1.361	1.541	1.992	2.095	2.315	2.323	2.362	2.200	2.421	2.429	2.347	ns
	8mA	GCLK	t <sub>co</sub>	2.882	3.087	4.378	4.756	5.244	5.118	5.314	4.870	5.357	5.232	5.382	ns
		GCLK PLL	t <sub>co</sub>	1.351	1.530	1.981	2.084	2.303	2.311	2.350	2.189	2.409	2.417	2.335	ns
	10mA	GCLK	t <sub>co</sub>	2.880	3.085	4.376	4.753	5.242	5.116	5.312	4.868	5.355	5.230	5.380	ns
		GCLK PLL	t <sub>co</sub>	1.349	1.528	1.979	2.081	2.301	2.309	2.348	2.187	2.407	2.415	2.333	ns
	12mA	GCLK	t <sub>co</sub>	2.880	3.086	4.379	4.758	5.247	5.121	5.317	4.872	5.361	5.236	5.386	ns
		GCLK PLL	t <sub>co</sub>	1.349	1.529	1.982	2.086	2.306	2.314	2.353	2.191	2.413	2.421	2.339	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.884	3.089	4.376	4.753	5.241	5.115	5.311	4.867	5.354	5.229	5.379	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.532	1.979	2.081	2.300	2.308	2.347	2.186	2.406	2.414	2.332	ns



**Table 1-66.** EP3SL70 Column Pins output Timing Parameters (Part 3 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.910	3.118	4.421	4.801	5.291	5.165	5.361	4.915	5.404	5.279	5.429	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.561	2.024	2.129	2.350	2.358	2.397	2.234	2.456	2.464	2.382	ns
	6mA	GCLK	t <sub>co</sub>	2.896	3.104	4.409	4.790	5.281	5.155	5.351	4.905	5.395	5.270	5.420	ns
		GCLK PLL	t <sub>co</sub>	1.365	1.547	2.012	2.118	2.340	2.348	2.387	2.224	2.447	2.455	2.373	ns
	8mA	GCLK	t <sub>co</sub>	2.884	3.091	4.392	4.772	5.263	5.137	5.333	4.887	5.377	5.252	5.402	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.534	1.995	2.100	2.322	2.330	2.369	2.206	2.429	2.437	2.355	ns
	10mA	GCLK	t <sub>co</sub>	2.884	3.091	4.395	4.776	5.267	5.141	5.337	4.891	5.382	5.257	5.407	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.534	1.998	2.104	2.326	2.334	2.373	2.210	2.434	2.442	2.360	ns
	12mA	GCLK	t <sub>co</sub>	2.880	3.087	4.388	4.768	5.260	5.134	5.330	4.884	5.374	5.249	5.399	ns
		GCLK PLL	t <sub>co</sub>	1.349	1.530	1.991	2.096	2.319	2.327	2.366	2.203	2.426	2.434	2.352	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	2.884	3.089	4.381	4.759	5.248	5.122	5.318	4.873	5.361	5.236	5.386	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.532	1.984	2.087	2.307	2.315	2.354	2.192	2.413	2.421	2.339	ns
	16mA	GCLK	t <sub>co</sub>	2.885	3.091	4.389	4.769	5.259	5.133	5.329	4.883	5.373	5.248	5.398	ns
		GCLK PLL	t <sub>co</sub>	1.354	1.534	1.992	2.097	2.318	2.326	2.365	2.202	2.425	2.433	2.351	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.913	3.121	4.420	4.799	5.289	5.163	5.359	4.914	5.402	5.277	5.427	ns
		GCLK PLL	t <sub>co</sub>	1.382	1.564	2.023	2.127	2.348	2.356	2.395	2.233	2.454	2.462	2.380	ns
	6mA	GCLK	t <sub>co</sub>	2.902	3.109	4.408	4.787	5.277	5.151	5.347	4.902	5.390	5.265	5.415	ns
		GCLK PLL	t <sub>co</sub>	1.371	1.552	2.011	2.115	2.336	2.344	2.383	2.221	2.442	2.450	2.368	ns
	8mA	GCLK	t <sub>co</sub>	2.897	3.105	4.408	4.788	5.278	5.152	5.348	4.903	5.392	5.267	5.417	ns
		GCLK PLL	t <sub>co</sub>	1.366	1.548	2.011	2.116	2.337	2.345	2.384	2.222	2.444	2.452	2.370	ns
	10mA	GCLK	t <sub>co</sub>	2.883	3.090	4.390	4.769	5.259	5.133	5.329	4.884	5.374	5.249	5.399	ns
		GCLK PLL	t <sub>co</sub>	1.352	1.533	1.993	2.097	2.318	2.326	2.365	2.203	2.426	2.434	2.352	ns
	12mA	GCLK	t <sub>co</sub>	2.881	3.088	4.388	4.767	5.257	5.131	5.327	4.882	5.371	5.246	5.396	ns
		GCLK PLL	t <sub>co</sub>	1.350	1.531	1.991	2.095	2.316	2.324	2.363	2.201	2.423	2.431	2.349	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	2.885	3.090	4.380	4.757	5.245	5.119	5.315	4.871	5.358	5.233	5.383	ns
		GCLK PLL	t <sub>co</sub>	1.354	1.533	1.983	2.085	2.304	2.312	2.351	2.190	2.410	2.418	2.336	ns
	16mA	GCLK	t <sub>co</sub>	2.885	3.091	4.388	4.767	5.257	5.131	5.327	4.882	5.371	5.246	5.396	ns
		GCLK PLL	t <sub>co</sub>	1.354	1.534	1.991	2.095	2.316	2.324	2.363	2.201	2.423	2.431	2.349	ns

**Table 1-66.** EP3SL70 Column Pins output Timing Parameters (Part 4 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	2.901	3.108	4.404	4.782	5.271	5.145	5.341	4.897	5.384	5.259	5.409	ns
		GCLK PLL	$t_{co}$	1.370	1.551	2.007	2.110	2.330	2.338	2.377	2.216	2.436	2.444	2.362	ns
	10mA	GCLK	$t_{co}$	2.901	3.108	4.404	4.782	5.271	5.145	5.341	4.897	5.384	5.259	5.409	ns
		GCLK PLL	$t_{co}$	1.370	1.551	2.007	2.110	2.330	2.338	2.377	2.216	2.436	2.444	2.362	ns
	12mA	GCLK	$t_{co}$	2.891	3.098	4.394	4.772	5.261	5.135	5.331	4.887	5.375	5.250	5.400	ns
		GCLK PLL	$t_{co}$	1.360	1.541	1.997	2.100	2.320	2.328	2.367	2.206	2.427	2.435	2.353	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	2.884	3.090	4.380	4.757	5.245	5.119	5.315	4.871	5.358	5.233	5.383	ns
		GCLK PLL	$t_{co}$	1.353	1.533	1.983	2.085	2.304	2.312	2.351	2.190	2.410	2.418	2.336	ns

Table 1-67 specifies EP3SL70 Row Pins Output Timing parameters for differential I/O standards.

**Table 1-67.** EP3SL70 Row Pins output Timing Parameters (Part 1 of 3) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
LVDS	—	GCLK	t <sub>co</sub>	2.455	2.608	3.645	3.971	4.409	4.291	4.470	4.059	4.496	4.382	4.518	ns
		GCLK PLL	t <sub>co</sub>	0.987	1.109	1.309	1.367	1.532	1.550	1.569	1.445	1.614	1.631	1.536	ns
LVDS_E_1R	—	GCLK	t <sub>co</sub>	2.857	3.062	4.326	4.697	5.182	5.056	5.227	4.810	5.294	5.171	5.291	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.553	1.980	2.083	2.295	2.305	2.316	2.186	2.402	2.410	2.299	ns
LVDS_E_3R	—	GCLK	t <sub>co</sub>	2.839	3.052	4.364	4.743	5.236	5.110	5.281	4.861	5.355	5.232	5.352	ns
		GCLK PLL	t <sub>co</sub>	1.361	1.543	2.018	2.129	2.349	2.359	2.370	2.237	2.463	2.471	2.360	ns
MINI-LVDS	—	GCLK	t <sub>co</sub>	2.455	2.608	3.645	3.971	4.409	4.291	4.470	4.059	4.496	4.382	4.518	ns
		GCLK PLL	t <sub>co</sub>	0.987	1.109	1.309	1.367	1.532	1.550	1.569	1.445	1.614	1.631	1.536	ns
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	2.857	3.062	4.326	4.697	5.182	5.056	5.227	4.810	5.294	5.171	5.291	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.553	1.980	2.083	2.295	2.305	2.316	2.186	2.402	2.410	2.299	ns
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	2.839	3.052	4.364	4.743	5.236	5.110	5.281	4.861	5.355	5.232	5.352	ns
		GCLK PLL	t <sub>co</sub>	1.361	1.543	2.018	2.129	2.349	2.359	2.370	2.237	2.463	2.471	2.360	ns
RSDS	—	GCLK	t <sub>co</sub>	2.455	2.608	3.645	3.971	4.409	4.291	4.470	4.059	4.496	4.382	4.518	ns
		GCLK PLL	t <sub>co</sub>	0.987	1.109	1.309	1.367	1.532	1.550	1.569	1.445	1.614	1.631	1.536	ns
RSDS_E_1R	—	GCLK	t <sub>co</sub>	2.857	3.062	4.326	4.697	5.182	5.056	5.227	4.810	5.294	5.171	5.291	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.553	1.980	2.083	2.295	2.305	2.316	2.186	2.402	2.410	2.299	ns
RSDS_E_3R	—	GCLK	t <sub>co</sub>	2.839	3.052	4.364	4.743	5.236	5.110	5.281	4.861	5.355	5.232	5.352	ns
		GCLK PLL	t <sub>co</sub>	1.361	1.543	2.018	2.129	2.349	2.359	2.370	2.237	2.463	2.471	2.360	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.893	3.105	4.410	4.787	5.279	5.153	5.324	4.904	5.394	5.271	5.391	ns
		GCLK PLL	t <sub>co</sub>	1.395	1.576	2.044	2.153	2.372	2.382	2.393	2.260	2.482	2.490	2.379	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	6mA	GCLK	t <sub>co</sub>	2.879	3.091	4.397	4.774	5.266	5.140	5.311	4.890	5.381	5.258	5.378	ns
		GCLK PLL	t <sub>co</sub>	1.381	1.562	2.031	2.140	2.359	2.369	2.380	2.246	2.469	2.477	2.366	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.875	3.087	4.395	4.774	5.267	5.141	5.312	4.890	5.383	5.260	5.380	ns
		GCLK PLL	t <sub>co</sub>	1.377	1.558	2.029	2.140	2.360	2.370	2.381	2.246	2.471	2.479	2.368	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.891	3.102	4.396	4.771	5.261	5.135	5.306	4.887	5.376	5.253	5.373	ns
		GCLK PLL	t <sub>co</sub>	1.393	1.573	2.030	2.137	2.354	2.364	2.375	2.243	2.464	2.472	2.361	ns

**Table 1-67.** EP3SL70 Row Pins output Timing Parameters (Part 2 of 3) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.5-V HSTL CLASS I	6mA	GCLK	t <sub>co</sub>	2.880	3.092	4.392	4.767	5.258	5.132	5.303	4.884	5.373	5.250	5.370	ns
		GCLK PLL	t <sub>co</sub>	1.382	1.563	2.026	2.133	2.351	2.361	2.372	2.240	2.461	2.469	2.358	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.877	3.089	4.390	4.765	5.256	5.130	5.301	4.882	5.372	5.249	5.369	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.560	2.024	2.131	2.349	2.359	2.370	2.238	2.460	2.468	2.357	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.888	3.099	4.391	4.766	5.255	5.129	5.300	4.882	5.370	5.247	5.367	ns
		GCLK PLL	t <sub>co</sub>	1.390	1.570	2.025	2.132	2.348	2.358	2.369	2.238	2.458	2.466	2.355	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	6mA	GCLK	t <sub>co</sub>	2.878	3.090	4.389	4.764	5.254	5.128	5.299	4.881	5.370	5.247	5.367	ns
		GCLK PLL	t <sub>co</sub>	1.380	1.561	2.023	2.130	2.347	2.357	2.368	2.237	2.458	2.466	2.355	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.864	3.076	4.374	4.749	5.240	5.114	5.285	4.866	5.355	5.232	5.352	ns
		GCLK PLL	t <sub>co</sub>	1.366	1.547	2.008	2.115	2.333	2.343	2.354	2.222	2.443	2.451	2.340	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	10mA	GCLK	t <sub>co</sub>	2.861	3.072	4.370	4.745	5.236	5.110	5.281	4.862	5.351	5.228	5.348	ns
		GCLK PLL	t <sub>co</sub>	1.363	1.543	2.004	2.111	2.329	2.339	2.350	2.218	2.439	2.447	2.336	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	12mA	GCLK	t <sub>co</sub>	2.858	3.070	4.371	4.748	5.239	5.113	5.284	4.865	5.355	5.232	5.352	ns
		GCLK PLL	t <sub>co</sub>	1.360	1.541	2.005	2.114	2.332	2.342	2.353	2.221	2.443	2.451	2.340	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.859	3.070	4.361	4.736	5.226	5.100	5.271	4.852	5.341	5.218	5.338	ns
		GCLK PLL	t <sub>co</sub>	1.361	1.541	1.995	2.102	2.319	2.329	2.340	2.208	2.429	2.437	2.326	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.908	3.123	4.432	4.809	5.302	5.176	5.347	4.926	5.417	5.294	5.414	ns
		GCLK PLL	t <sub>co</sub>	1.410	1.594	2.066	2.175	2.395	2.405	2.416	2.282	2.505	2.513	2.402	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	6mA	GCLK	t <sub>co</sub>	2.884	3.099	4.414	4.792	5.285	5.159	5.330	4.909	5.402	5.279	5.399	ns
		GCLK PLL	t <sub>co</sub>	1.386	1.570	2.048	2.158	2.378	2.388	2.399	2.265	2.490	2.498	2.387	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.867	3.080	4.392	4.770	5.263	5.137	5.308	4.887	5.380	5.257	5.377	ns
		GCLK PLL	t <sub>co</sub>	1.369	1.551	2.026	2.136	2.356	2.366	2.377	2.243	2.468	2.476	2.365	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.912	3.126	4.432	4.809	5.301	5.175	5.346	4.926	5.417	5.294	5.414	ns
		GCLK PLL	t <sub>co</sub>	1.414	1.597	2.066	2.175	2.394	2.404	2.415	2.282	2.505	2.513	2.402	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	6mA	GCLK	t <sub>co</sub>	2.897	3.111	4.418	4.794	5.286	5.160	5.331	4.911	5.402	5.279	5.399	ns
		GCLK PLL	t <sub>co</sub>	1.399	1.582	2.052	2.160	2.379	2.389	2.400	2.267	2.490	2.498	2.387	ns

**Table 1-67.** EP3SL70 Row Pins output Timing Parameters (Part 3 of 3) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
DIFFERENTIAL 1.8-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.886	3.100	4.413	4.791	5.283	5.157	5.328	4.908	5.400	5.277	5.397	ns
		GCLK PLL	t <sub>co</sub>	1.388	1.571	2.047	2.157	2.376	2.386	2.397	2.264	2.488	2.496	2.385	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	10m A	GCLK	t <sub>co</sub>	2.866	3.080	4.390	4.767	5.260	5.134	5.305	4.885	5.376	5.253	5.373	ns
		GCLK PLL	t <sub>co</sub>	1.368	1.551	2.024	2.133	2.353	2.363	2.374	2.241	2.464	2.472	2.361	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	12m A	GCLK	t <sub>co</sub>	2.863	3.076	4.386	4.764	5.256	5.130	5.301	4.881	5.373	5.250	5.370	ns
		GCLK PLL	t <sub>co</sub>	1.365	1.547	2.020	2.130	2.349	2.359	2.370	2.237	2.461	2.469	2.358	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	2.868	3.080	4.377	4.752	5.242	5.116	5.287	4.868	5.357	5.234	5.354	ns
		GCLK PLL	t <sub>co</sub>	1.370	1.551	2.011	2.118	2.335	2.345	2.356	2.224	2.445	2.453	2.342	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	16m A	GCLK	t <sub>co</sub>	2.861	3.073	4.376	4.753	5.245	5.119	5.290	4.871	5.362	5.239	5.359	ns
		GCLK PLL	t <sub>co</sub>	1.363	1.544	2.010	2.119	2.338	2.348	2.359	2.227	2.450	2.458	2.347	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.889	3.102	4.404	4.780	5.271	5.145	5.316	4.897	5.387	5.264	5.384	ns
		GCLK PLL	t <sub>co</sub>	1.411	1.593	2.058	2.166	2.384	2.394	2.405	2.273	2.495	2.503	2.392	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	12m A	GCLK	t <sub>co</sub>	2.871	3.085	4.389	4.765	5.256	5.130	5.301	4.882	5.372	5.249	5.369	ns
		GCLK PLL	t <sub>co</sub>	1.393	1.576	2.043	2.151	2.369	2.379	2.390	2.258	2.480	2.488	2.377	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16m A	GCLK	t <sub>co</sub>	2.857	3.069	4.366	4.741	5.231	5.105	5.276	4.858	5.347	5.224	5.344	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.560	2.020	2.127	2.344	2.354	2.365	2.234	2.455	2.463	2.352	ns

Table 1-68 and Table 1-69 show EP3SL70 regional clock (RCLK) adder values that should be added to GCLK values. These adder values are used to determine I/O timing when I/O pin is driven using regional clock. This applies for all I/O standards supported by Stratix III devices.

Table 1-68 specifies EP3SL70 Column Pin delay adders when using the regional clock.

**Table 1-68.** EP3SL70 Column Pin Delay Adders for Regional Clock - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
RCLK input adder	0.02	0.009	0.006	0.001	-0.013	-0.012	0.04	-0.008	-0.001	-0.002	0.016	ns
RCLK PLL input adder	2.063	2.082	3.178	3.535	3.893	3.713	4.103	3.535	3.908	3.725	4.16	ns
RCLK output adder	-0.186	0.01	0.022	0.031	0.053	0.048	0.001	0.15	0.168	0.164	0.069	ns
RCLK PLL output adder	-0.327	0.153	-0.307	-0.266	-0.105	-0.234	0.259	-0.102	-0.032	0.008	0.302	ns

Table 1-69 specifies EP3SL70 Row Pin delay adders when using the regional clock.

**Table 1-69.** EP3SL70 Row Pin Delay Adders for Regional Clock- Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
RCLK input adder	-0.073	-0.081	-0.108	-0.126	-0.143	-0.136	-0.098	-0.138	-0.155	-0.147	-0.094	ns
RCLK PLL input adder	0.111	0.105	0.177	0.203	0.231	0.216	0.384	0.192	0.217	0.205	0.384	ns
RCLK output adder	0.092	0.101	0.137	0.159	0.181	0.17	0.132	0.173	0.197	0.184	0.13	ns
RCLK PLL output adder	-0.091	-0.084	-0.145	-0.166	-0.186	-0.175	-0.34	-0.149	-0.169	-0.164	-0.338	ns

### EP3SL110 I/O Timing Parameters

Table 1-70 through Table 1-74 show the maximum I/O timing parameters for EP3SL110 devices for single-ended I/O standards.

Table 1-70 specifies EP3SL110 column pins input timing parameters for single-ended I/O standards.

**Table 1-70.** EP3SL110 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.3-V LVTTTL	GCLK	$t_{su}$	-0.917	-0.917	-1.333	-1.452	-1.682	-1.627	-1.980	-1.452	-1.682	-1.627	-1.980	ns
		$t_h$	1.053	1.053	1.524	1.667	1.918	1.850	2.205	1.667	1.918	1.850	2.205	ns
	GCLK PLL	$t_{su}$	-1.234	-1.176	-1.704	-1.940	-2.210	-2.135	-2.470	-1.940	-2.210	-2.135	-2.470	ns
		$t_h$	1.512	1.460	2.116	2.394	2.710	2.610	2.971	2.394	2.710	2.610	2.971	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-0.917	-0.917	-1.333	-1.452	-1.682	-1.627	-1.980	-1.452	-1.682	-1.627	-1.980	ns
		$t_h$	1.053	1.053	1.524	1.667	1.918	1.850	2.205	1.667	1.918	1.850	2.205	ns
	GCLK PLL	$t_{su}$	-1.234	-1.176	-1.704	-1.940	-2.210	-2.135	-2.470	-1.940	-2.210	-2.135	-2.470	ns
		$t_h$	1.512	1.460	2.116	2.394	2.710	2.610	2.971	2.394	2.710	2.610	2.971	ns
3.0-V LVTTTL	GCLK	$t_{su}$	-0.928	-0.928	-1.332	-1.454	-1.681	-1.626	-1.979	-1.454	-1.681	-1.626	-1.979	ns
		$t_h$	1.064	1.064	1.523	1.669	1.917	1.849	2.204	1.669	1.917	1.849	2.204	ns
	GCLK PLL	$t_{su}$	-1.245	-1.187	-1.703	-1.942	-2.209	-2.134	-2.469	-1.942	-2.209	-2.134	-2.469	ns
		$t_h$	1.523	1.471	2.115	2.396	2.709	2.609	2.970	2.396	2.709	2.609	2.970	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-0.928	-0.928	-1.332	-1.454	-1.681	-1.626	-1.979	-1.454	-1.681	-1.626	-1.979	ns
		$t_h$	1.064	1.064	1.523	1.669	1.917	1.849	2.204	1.669	1.917	1.849	2.204	ns
	GCLK PLL	$t_{su}$	-1.245	-1.187	-1.703	-1.942	-2.209	-2.134	-2.469	-1.942	-2.209	-2.134	-2.469	ns
		$t_h$	1.523	1.471	2.115	2.396	2.709	2.609	2.970	2.396	2.709	2.609	2.970	ns
2.5 V	GCLK	$t_{su}$	-0.923	-0.923	-1.341	-1.466	-1.700	-1.645	-1.998	-1.466	-1.700	-1.645	-1.998	ns
		$t_h$	1.059	1.059	1.532	1.681	1.936	1.868	2.223	1.681	1.936	1.868	2.223	ns
	GCLK PLL	$t_{su}$	-1.240	-1.182	-1.712	-1.954	-2.228	-2.153	-2.488	-1.954	-2.228	-2.153	-2.488	ns
		$t_h$	1.518	1.466	2.124	2.408	2.728	2.628	2.989	2.408	2.728	2.628	2.989	ns

**Table 1-70.** EP3SL110 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.8 V	GCLK	t <sub>su</sub>	-0.943	-0.943	-1.381	-1.502	-1.698	-1.643	-1.996	-1.502	-1.698	-1.643	-1.996	ns
		t <sub>h</sub>	1.081	1.081	1.572	1.717	1.934	1.866	2.221	1.717	1.934	1.866	2.221	ns
	GCLK PLL	t <sub>su</sub>	-1.262	-1.202	-1.752	-1.990	-2.226	-2.151	-2.486	-1.990	-2.226	-2.151	-2.486	ns
		t <sub>h</sub>	1.542	1.488	2.164	2.444	2.726	2.626	2.987	2.444	2.726	2.626	2.987	ns
1.5 V	GCLK	t <sub>su</sub>	-0.933	-0.933	-1.358	-1.470	-1.628	-1.573	-1.926	-1.470	-1.628	-1.573	-1.926	ns
		t <sub>h</sub>	1.071	1.071	1.549	1.685	1.864	1.796	2.151	1.685	1.864	1.796	2.151	ns
	GCLK PLL	t <sub>su</sub>	-1.252	-1.192	-1.729	-1.958	-2.156	-2.081	-2.416	-1.958	-2.156	-2.081	-2.416	ns
		t <sub>h</sub>	1.532	1.478	2.141	2.412	2.656	2.556	2.917	2.412	2.656	2.556	2.917	ns
1.2 V	GCLK	t <sub>su</sub>	-0.881	-0.881	-1.281	-1.371	-1.472	-1.417	-1.770	-1.371	-1.472	-1.417	-1.770	ns
		t <sub>h</sub>	1.019	1.019	1.472	1.586	1.708	1.640	1.995	1.586	1.708	1.640	1.995	ns
	GCLK PLL	t <sub>su</sub>	-1.200	-1.140	-1.652	-1.859	-2.000	-1.925	-2.260	-1.859	-2.000	-1.925	-2.260	ns
		t <sub>h</sub>	1.480	1.426	2.064	2.313	2.500	2.400	2.761	2.313	2.500	2.400	2.761	ns
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-0.852	-0.852	-1.253	-1.355	-1.474	-1.419	-1.772	-1.355	-1.474	-1.419	-1.772	ns
		t <sub>h</sub>	0.990	0.990	1.444	1.570	1.710	1.642	1.997	1.570	1.710	1.642	1.997	ns
	GCLK PLL	t <sub>su</sub>	-1.171	-1.111	-1.624	-1.843	-2.002	-1.927	-2.262	-1.843	-2.002	-1.927	-2.262	ns
		t <sub>h</sub>	1.451	1.397	2.036	2.297	2.502	2.402	2.763	2.297	2.502	2.402	2.763	ns
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-0.852	-0.852	-1.253	-1.355	-1.474	-1.419	-1.772	-1.355	-1.474	-1.419	-1.772	ns
		t <sub>h</sub>	0.990	0.990	1.444	1.570	1.710	1.642	1.997	1.570	1.710	1.642	1.997	ns
	GCLK PLL	t <sub>su</sub>	-1.171	-1.111	-1.624	-1.843	-2.002	-1.927	-2.262	-1.843	-2.002	-1.927	-2.262	ns
		t <sub>h</sub>	1.451	1.397	2.036	2.297	2.502	2.402	2.763	2.297	2.502	2.402	2.763	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-0.846	-0.846	-1.241	-1.350	-1.474	-1.417	-1.773	-1.350	-1.474	-1.417	-1.773	ns
		t <sub>h</sub>	0.984	0.984	1.431	1.562	1.707	1.639	1.993	1.562	1.707	1.639	1.993	ns
	GCLK PLL	t <sub>su</sub>	-1.165	-1.105	-1.612	-1.835	-1.999	-1.922	-2.263	-1.835	-1.999	-1.922	-2.263	ns
		t <sub>h</sub>	1.445	1.391	2.023	2.286	2.496	2.396	2.759	2.286	2.496	2.396	2.759	ns
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-0.846	-0.846	-1.241	-1.350	-1.474	-1.417	-1.773	-1.350	-1.474	-1.417	-1.773	ns
		t <sub>h</sub>	0.984	0.984	1.431	1.562	1.707	1.639	1.993	1.562	1.707	1.639	1.993	ns
	GCLK PLL	t <sub>su</sub>	-1.165	-1.105	-1.612	-1.835	-1.999	-1.922	-2.263	-1.835	-1.999	-1.922	-2.263	ns
		t <sub>h</sub>	1.445	1.391	2.023	2.286	2.496	2.396	2.759	2.286	2.496	2.396	2.759	ns
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-0.835	-0.835	-1.232	-1.339	-1.455	-1.398	-1.754	-1.339	-1.455	-1.398	-1.754	ns
		t <sub>h</sub>	0.973	0.973	1.421	1.551	1.688	1.620	1.974	1.551	1.688	1.620	1.974	ns
	GCLK PLL	t <sub>su</sub>	-1.154	-1.094	-1.603	-1.824	-1.980	-1.903	-2.244	-1.824	-1.980	-1.903	-2.244	ns
		t <sub>h</sub>	1.434	1.380	2.013	2.275	2.477	2.377	2.740	2.275	2.477	2.377	2.740	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.835	-0.835	-1.232	-1.339	-1.455	-1.398	-1.754	-1.339	-1.455	-1.398	-1.754	ns
		t <sub>h</sub>	0.973	0.973	1.421	1.551	1.688	1.620	1.974	1.551	1.688	1.620	1.974	ns
	GCLK PLL	t <sub>su</sub>	-1.154	-1.094	-1.603	-1.824	-1.980	-1.903	-2.244	-1.824	-1.980	-1.903	-2.244	ns
		t <sub>h</sub>	1.434	1.380	2.013	2.275	2.477	2.377	2.740	2.275	2.477	2.377	2.740	ns

**Table 1-70.** EP3SL110 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.846	-0.846	-1.241	-1.350	-1.474	-1.417	-1.773	-1.350	-1.474	-1.417	-1.773	ns
		$t_h$	0.984	0.984	1.431	1.562	1.707	1.639	1.993	1.562	1.707	1.639	1.993	ns
	GCLK PLL	$t_{su}$	-1.165	-1.105	-1.612	-1.835	-1.999	-1.922	-2.263	-1.835	-1.999	-1.922	-2.263	ns
		$t_h$	1.445	1.391	2.023	2.286	2.496	2.396	2.759	2.286	2.496	2.396	2.759	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.846	-0.846	-1.241	-1.350	-1.474	-1.417	-1.773	-1.350	-1.474	-1.417	-1.773	ns
		$t_h$	0.984	0.984	1.431	1.562	1.707	1.639	1.993	1.562	1.707	1.639	1.993	ns
	GCLK PLL	$t_{su}$	-1.165	-1.105	-1.612	-1.835	-1.999	-1.922	-2.263	-1.835	-1.999	-1.922	-2.263	ns
		$t_h$	1.445	1.391	2.023	2.286	2.496	2.396	2.759	2.286	2.496	2.396	2.759	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.835	-0.835	-1.232	-1.339	-1.455	-1.398	-1.754	-1.339	-1.455	-1.398	-1.754	ns
		$t_h$	0.973	0.973	1.421	1.551	1.688	1.620	1.974	1.551	1.688	1.620	1.974	ns
	GCLK PLL	$t_{su}$	-1.154	-1.094	-1.603	-1.824	-1.980	-1.903	-2.244	-1.824	-1.980	-1.903	-2.244	ns
		$t_h$	1.434	1.380	2.013	2.275	2.477	2.377	2.740	2.275	2.477	2.377	2.740	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.835	-0.835	-1.232	-1.339	-1.455	-1.398	-1.754	-1.339	-1.455	-1.398	-1.754	ns
		$t_h$	0.973	0.973	1.421	1.551	1.688	1.620	1.974	1.551	1.688	1.620	1.974	ns
	GCLK PLL	$t_{su}$	-1.154	-1.094	-1.603	-1.824	-1.980	-1.903	-2.244	-1.824	-1.980	-1.903	-2.244	ns
		$t_h$	1.434	1.380	2.013	2.275	2.477	2.377	2.740	2.275	2.477	2.377	2.740	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.823	-0.823	-1.222	-1.328	-1.439	-1.382	-1.738	-1.328	-1.439	-1.382	-1.738	ns
		$t_h$	0.961	0.961	1.411	1.540	1.672	1.604	1.958	1.540	1.672	1.604	1.958	ns
	GCLK PLL	$t_{su}$	-1.142	-1.082	-1.593	-1.813	-1.964	-1.887	-2.228	-1.813	-1.964	-1.887	-2.228	ns
		$t_h$	1.422	1.368	2.003	2.264	2.461	2.361	2.724	2.264	2.461	2.361	2.724	ns
3.0-V PCI	GCLK	$t_{su}$	-0.823	-0.823	-1.222	-1.328	-1.439	-1.382	-1.738	-1.328	-1.439	-1.382	-1.738	ns
		$t_h$	0.961	0.961	1.411	1.540	1.672	1.604	1.958	1.540	1.672	1.604	1.958	ns
	GCLK PLL	$t_{su}$	-1.142	-1.082	-1.593	-1.813	-1.964	-1.887	-2.228	-1.813	-1.964	-1.887	-2.228	ns
		$t_h$	1.422	1.368	2.003	2.264	2.461	2.361	2.724	2.264	2.461	2.361	2.724	ns
3.0-V PCI-X	GCLK	$t_{su}$	-0.928	-0.928	-1.332	-1.454	-1.681	-1.626	-1.979	-1.454	-1.681	-1.626	-1.979	ns
		$t_h$	1.064	1.064	1.523	1.669	1.917	1.849	2.204	1.669	1.917	1.849	2.204	ns
	GCLK PLL	$t_{su}$	-1.245	-1.187	-1.703	-1.942	-2.209	-2.134	-2.469	-1.942	-2.209	-2.134	-2.469	ns
		$t_h$	1.523	1.471	2.115	2.396	2.709	2.609	2.970	2.396	2.709	2.609	2.970	ns



Table 1-71 specifies EP3SL110 row pins input timing parameters for single-ended I/O standards.

**Table 1-71.** EP3SL110 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTL	GCLK	t <sub>su</sub>	-0.910	-0.883	-1.252	-1.441	-1.559	-1.604	-1.843	-1.465	-1.551	-1.605	-1.881	ns
		t <sub>h</sub>	1.025	1.015	1.440	1.648	1.792	1.822	2.066	1.682	1.794	1.831	2.104	ns
	GCLK PLL	t <sub>su</sub>	0.992	1.013	1.646	1.862	1.976	1.860	1.804	1.870	1.998	1.880	1.856	ns
		t <sub>h</sub>	-0.741	-0.746	-1.246	-1.412	-1.475	-1.388	-1.322	-1.411	-1.486	-1.398	-1.371	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-0.910	-0.883	-1.252	-1.441	-1.559	-1.604	-1.843	-1.465	-1.551	-1.605	-1.881	ns
		t <sub>h</sub>	1.025	1.015	1.440	1.648	1.792	1.822	2.066	1.682	1.794	1.831	2.104	ns
	GCLK PLL	t <sub>su</sub>	0.992	1.013	1.646	1.862	1.976	1.860	1.804	1.870	1.998	1.880	1.856	ns
		t <sub>h</sub>	-0.741	-0.746	-1.246	-1.412	-1.475	-1.388	-1.322	-1.411	-1.486	-1.398	-1.371	ns
3.0-V LVTTL	GCLK	t <sub>su</sub>	-0.916	-0.894	-1.249	-1.442	-1.562	-1.607	-1.846	-1.464	-1.556	-1.610	-1.886	ns
		t <sub>h</sub>	1.031	1.026	1.437	1.649	1.795	1.825	2.069	1.681	1.799	1.836	2.109	ns
	GCLK PLL	t <sub>su</sub>	0.986	1.002	1.649	1.861	1.973	1.857	1.801	1.871	1.993	1.875	1.851	ns
		t <sub>h</sub>	-0.735	-0.735	-1.249	-1.411	-1.472	-1.385	-1.319	-1.412	-1.481	-1.393	-1.366	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-0.916	-0.894	-1.249	-1.442	-1.562	-1.607	-1.846	-1.464	-1.556	-1.610	-1.886	ns
		t <sub>h</sub>	1.031	1.026	1.437	1.649	1.795	1.825	2.069	1.681	1.799	1.836	2.109	ns
	GCLK PLL	t <sub>su</sub>	0.986	1.002	1.649	1.861	1.973	1.857	1.801	1.871	1.993	1.875	1.851	ns
		t <sub>h</sub>	-0.735	-0.735	-1.249	-1.411	-1.472	-1.385	-1.319	-1.412	-1.481	-1.393	-1.366	ns
2.5 V	GCLK	t <sub>su</sub>	-0.904	-0.887	-1.258	-1.455	-1.577	-1.622	-1.861	-1.473	-1.566	-1.620	-1.896	ns
		t <sub>h</sub>	1.019	1.019	1.446	1.662	1.810	1.840	2.084	1.690	1.809	1.846	2.119	ns
	GCLK PLL	t <sub>su</sub>	0.998	1.009	1.640	1.848	1.958	1.842	1.786	1.862	1.983	1.865	1.841	ns
		t <sub>h</sub>	-0.747	-0.742	-1.240	-1.398	-1.457	-1.370	-1.304	-1.403	-1.471	-1.383	-1.356	ns
1.8 V	GCLK	t <sub>su</sub>	-0.873	-0.918	-1.298	-1.402	-1.575	-1.530	-1.859	-1.402	-1.567	-1.526	-1.897	ns
		t <sub>h</sub>	0.990	1.051	1.486	1.612	1.808	1.751	2.082	1.622	1.810	1.756	2.120	ns
	GCLK PLL	t <sub>su</sub>	0.968	0.977	1.600	1.815	1.960	1.844	1.788	1.829	1.982	1.864	1.840	ns
		t <sub>h</sub>	-0.716	-0.709	-1.200	-1.365	-1.459	-1.372	-1.306	-1.370	-1.470	-1.382	-1.355	ns
1.5 V	GCLK	t <sub>su</sub>	-0.863	-0.907	-1.274	-1.370	-1.507	-1.462	-1.791	-1.371	-1.502	-1.461	-1.832	ns
		t <sub>h</sub>	0.980	1.040	1.462	1.580	1.740	1.683	2.014	1.591	1.745	1.691	2.055	ns
	GCLK PLL	t <sub>su</sub>	0.978	0.988	1.624	1.847	2.028	1.912	1.856	1.860	2.047	1.929	1.905	ns
		t <sub>h</sub>	-0.726	-0.720	-1.224	-1.397	-1.527	-1.440	-1.374	-1.401	-1.535	-1.447	-1.420	ns
1.2 V	GCLK	t <sub>su</sub>	-0.803	-0.854	-1.195	-1.269	-1.348	-1.303	-1.632	-1.275	-1.347	-1.306	-1.677	ns
		t <sub>h</sub>	0.920	0.987	1.383	1.479	1.581	1.524	1.855	1.495	1.590	1.536	1.900	ns
	GCLK PLL	t <sub>su</sub>	1.038	1.041	1.703	1.948	2.187	2.071	2.015	1.956	2.202	2.084	2.060	ns
		t <sub>h</sub>	-0.786	-0.773	-1.303	-1.498	-1.686	-1.599	-1.533	-1.497	-1.690	-1.602	-1.575	ns

**Table 1-71.** EP3SL110 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-0.847	-0.828	-1.172	-1.346	-1.357	-1.402	-1.641	-1.361	-1.349	-1.403	-1.679	ns
		t <sub>h</sub>	0.963	0.961	1.360	1.553	1.590	1.620	1.864	1.578	1.592	1.629	1.902	ns
	GCLK PLL	t <sub>su</sub>	1.055	1.067	1.726	1.957	2.178	2.062	2.006	1.974	2.200	2.082	2.058	ns
		t <sub>h</sub>	-0.803	-0.799	-1.326	-1.507	-1.677	-1.590	-1.524	-1.515	-1.688	-1.600	-1.573	ns
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-0.847	-0.828	-1.172	-1.346	-1.357	-1.402	-1.641	-1.361	-1.349	-1.403	-1.679	ns
		t <sub>h</sub>	0.963	0.961	1.360	1.553	1.590	1.620	1.864	1.578	1.592	1.629	1.902	ns
	GCLK PLL	t <sub>su</sub>	1.055	1.067	1.726	1.957	2.178	2.062	2.006	1.974	2.200	2.082	2.058	ns
		t <sub>h</sub>	-0.803	-0.799	-1.326	-1.507	-1.677	-1.590	-1.524	-1.515	-1.688	-1.600	-1.573	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-0.777	-0.819	-1.157	-1.244	-1.346	-1.300	-1.630	-1.246	-1.343	-1.300	-1.672	ns
		t <sub>h</sub>	0.894	0.952	1.345	1.452	1.576	1.519	1.849	1.463	1.583	1.529	1.891	ns
	GCLK PLL	t <sub>su</sub>	1.064	1.076	1.741	1.975	2.192	2.077	2.019	1.988	2.209	2.092	2.067	ns
		t <sub>h</sub>	-0.812	-0.808	-1.341	-1.527	-1.693	-1.606	-1.541	-1.531	-1.700	-1.611	-1.586	ns
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-0.777	-0.819	-1.157	-1.244	-1.346	-1.300	-1.630	-1.246	-1.343	-1.300	-1.672	ns
		t <sub>h</sub>	0.894	0.952	1.345	1.452	1.576	1.519	1.849	1.463	1.583	1.529	1.891	ns
	GCLK PLL	t <sub>su</sub>	1.064	1.076	1.741	1.975	2.192	2.077	2.019	1.988	2.209	2.092	2.067	ns
		t <sub>h</sub>	-0.812	-0.808	-1.341	-1.527	-1.693	-1.606	-1.541	-1.531	-1.700	-1.611	-1.586	ns
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-0.763	-0.807	-1.144	-1.234	-1.328	-1.282	-1.612	-1.235	-1.326	-1.283	-1.655	ns
		t <sub>h</sub>	0.880	0.940	1.333	1.442	1.558	1.501	1.831	1.452	1.566	1.512	1.874	ns
	GCLK PLL	t <sub>su</sub>	1.078	1.088	1.756	1.985	2.210	2.095	2.037	1.999	2.226	2.109	2.084	ns
		t <sub>h</sub>	-0.826	-0.820	-1.355	-1.537	-1.711	-1.624	-1.559	-1.542	-1.717	-1.628	-1.603	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.777	-0.819	-1.157	-1.244	-1.346	-1.300	-1.630	-1.246	-1.343	-1.300	-1.672	ns
		t <sub>h</sub>	0.894	0.952	1.345	1.452	1.576	1.519	1.849	1.463	1.583	1.529	1.891	ns
	GCLK PLL	t <sub>su</sub>	1.064	1.076	1.741	1.975	2.192	2.077	2.019	1.988	2.209	2.092	2.067	ns
		t <sub>h</sub>	-0.812	-0.808	-1.341	-1.527	-1.693	-1.606	-1.541	-1.531	-1.700	-1.611	-1.586	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.777	-0.819	-1.157	-1.244	-1.346	-1.300	-1.630	-1.246	-1.343	-1.300	-1.672	ns
		t <sub>h</sub>	0.894	0.952	1.345	1.452	1.576	1.519	1.849	1.463	1.583	1.529	1.891	ns
	GCLK PLL	t <sub>su</sub>	1.064	1.076	1.741	1.975	2.192	2.077	2.019	1.988	2.209	2.092	2.067	ns
		t <sub>h</sub>	-0.812	-0.808	-1.341	-1.527	-1.693	-1.606	-1.541	-1.531	-1.700	-1.611	-1.586	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.763	-0.807	-1.144	-1.234	-1.328	-1.282	-1.612	-1.235	-1.326	-1.283	-1.655	ns
		t <sub>h</sub>	0.880	0.940	1.333	1.442	1.558	1.501	1.831	1.452	1.566	1.512	1.874	ns
	GCLK PLL	t <sub>su</sub>	1.078	1.088	1.756	1.985	2.210	2.095	2.037	1.999	2.226	2.109	2.084	ns
		t <sub>h</sub>	-0.826	-0.820	-1.355	-1.537	-1.711	-1.624	-1.559	-1.542	-1.717	-1.628	-1.603	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.763	-0.807	-1.144	-1.234	-1.328	-1.282	-1.612	-1.235	-1.326	-1.283	-1.655	ns
		t <sub>h</sub>	0.880	0.940	1.333	1.442	1.558	1.501	1.831	1.452	1.566	1.512	1.874	ns
	GCLK PLL	t <sub>su</sub>	1.078	1.088	1.756	1.985	2.210	2.095	2.037	1.999	2.226	2.109	2.084	ns
		t <sub>h</sub>	-0.826	-0.820	-1.355	-1.537	-1.711	-1.624	-1.559	-1.542	-1.717	-1.628	-1.603	ns

**Table 1-71.** EP3SL110 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.754	-0.795	-1.135	-1.224	-1.312	-1.266	-1.596	-1.226	-1.310	-1.267	-1.639	ns
		t <sub>h</sub>	0.871	0.928	1.324	1.432	1.542	1.485	1.815	1.443	1.550	1.496	1.858	ns
	GCLK PLL	t <sub>su</sub>	1.087	1.100	1.765	1.995	2.226	2.111	2.053	2.008	2.242	2.125	2.100	ns
		t <sub>h</sub>	-0.835	-0.832	-1.364	-1.547	-1.727	-1.640	-1.575	-1.551	-1.733	-1.644	-1.619	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.754	-0.795	-1.135	-1.224	-1.312	-1.266	-1.596	-1.226	-1.310	-1.267	-1.639	ns
		t <sub>h</sub>	0.871	0.928	1.324	1.432	1.542	1.485	1.815	1.443	1.550	1.496	1.858	ns
	GCLK PLL	t <sub>su</sub>	1.087	1.100	1.765	1.995	2.226	2.111	2.053	2.008	2.242	2.125	2.100	ns
		t <sub>h</sub>	-0.835	-0.832	-1.364	-1.547	-1.727	-1.640	-1.575	-1.551	-1.733	-1.644	-1.619	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-0.916	-0.894	-1.249	-1.442	-1.562	-1.607	-1.846	-1.464	-1.556	-1.610	-1.886	ns
		t <sub>h</sub>	1.031	1.026	1.437	1.649	1.795	1.825	2.069	1.681	1.799	1.836	2.109	ns
	GCLK PLL	t <sub>su</sub>	0.986	1.002	1.649	1.861	1.973	1.857	1.801	1.871	1.993	1.875	1.851	ns
		t <sub>h</sub>	-0.735	-0.735	-1.249	-1.411	-1.472	-1.385	-1.319	-1.412	-1.481	-1.393	-1.366	ns
3.0-V PCI-X	GCLK	t <sub>su</sub>	-0.916	-0.894	-1.249	-1.442	-1.562	-1.607	-1.846	-1.464	-1.556	-1.610	-1.886	ns
		t <sub>h</sub>	1.031	1.026	1.437	1.649	1.795	1.825	2.069	1.681	1.799	1.836	2.109	ns
	GCLK PLL	t <sub>su</sub>	0.986	1.002	1.649	1.861	1.973	1.857	1.801	1.871	1.993	1.875	1.851	ns
		t <sub>h</sub>	-0.735	-0.735	-1.249	-1.411	-1.472	-1.385	-1.319	-1.412	-1.481	-1.393	-1.366	ns

Table 1-72 specifies EP3SL110 Column Pins Output Timing parameters for single-ended I/O standards.

**Table 1-72.** EP3SL110 Column Pins output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.439	3.439	4.768	5.145	5.638	5.507	5.801	5.145	5.638	5.507	5.801	ns
		GCLK PLL	t <sub>co</sub>	3.829	3.829	5.344	5.778	6.326	6.168	6.550	5.778	6.326	6.168	6.550	ns
	8mA	GCLK	t <sub>co</sub>	3.372	3.372	4.659	5.034	5.525	5.394	5.688	5.034	5.525	5.394	5.688	ns
		GCLK PLL	t <sub>co</sub>	3.762	3.762	5.235	5.667	6.213	6.055	6.437	5.667	6.213	6.055	6.437	ns
	12mA	GCLK	t <sub>co</sub>	3.286	3.286	4.556	4.936	5.433	5.302	5.596	4.936	5.433	5.302	5.596	ns
		GCLK PLL	t <sub>co</sub>	3.676	3.676	5.131	5.568	6.121	5.963	6.345	5.568	6.121	5.963	6.345	ns
	16mA	GCLK	t <sub>co</sub>	3.279	3.279	4.539	4.908	5.392	5.261	5.555	4.908	5.392	5.261	5.555	ns
		GCLK PLL	t <sub>co</sub>	3.669	3.669	5.114	5.540	6.080	5.922	6.304	5.540	6.080	5.922	6.304	ns

**Table 1-72.** EP3SL110 Column Pins output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.445	3.445	4.773	5.150	5.645	5.514	5.808	5.150	5.645	5.514	5.808	ns
		GCLK PLL	t <sub>co</sub>	3.835	3.835	5.348	5.783	6.333	6.175	6.557	5.783	6.333	6.175	6.557	ns
	8mA	GCLK	t <sub>co</sub>	3.290	3.290	4.566	4.953	5.444	5.313	5.607	4.953	5.444	5.313	5.607	ns
		GCLK PLL	t <sub>co</sub>	3.680	3.680	5.141	5.585	6.132	5.974	6.356	5.585	6.132	5.974	6.356	ns
	12mA	GCLK	t <sub>co</sub>	3.297	3.297	4.560	4.932	5.418	5.287	5.581	4.932	5.418	5.287	5.581	ns
		GCLK PLL	t <sub>co</sub>	3.687	3.687	5.135	5.564	6.106	5.948	6.330	5.564	6.106	5.948	6.330	ns
	16mA	GCLK	t <sub>co</sub>	3.281	3.281	4.537	4.906	5.389	5.258	5.552	4.906	5.389	5.258	5.552	ns
		GCLK PLL	t <sub>co</sub>	3.671	3.671	5.113	5.539	6.077	5.919	6.301	5.539	6.077	5.919	6.301	ns
3.0-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.403	3.403	4.735	5.114	5.605	5.474	5.768	5.114	5.605	5.474	5.768	ns
		GCLK PLL	t <sub>co</sub>	3.793	3.793	5.311	5.746	6.293	6.135	6.517	5.746	6.293	6.135	6.517	ns
	8mA	GCLK	t <sub>co</sub>	3.292	3.292	4.605	4.980	5.467	5.337	5.629	4.980	5.467	5.337	5.629	ns
		GCLK PLL	t <sub>co</sub>	3.682	3.682	5.181	5.612	6.156	5.999	6.379	5.612	6.156	5.999	6.379	ns
	12mA	GCLK	t <sub>co</sub>	3.256	3.256	4.542	4.911	5.393	5.263	5.556	4.911	5.393	5.263	5.556	ns
		GCLK PLL	t <sub>co</sub>	3.646	3.646	5.118	5.543	6.082	5.925	6.305	5.543	6.082	5.925	6.305	ns
	16mA	GCLK	t <sub>co</sub>	3.238	3.238	4.513	4.883	5.365	5.234	5.528	4.883	5.365	5.234	5.528	ns
		GCLK PLL	t <sub>co</sub>	3.628	3.628	5.089	5.515	6.053	5.895	6.277	5.515	6.053	5.895	6.277	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.317	3.317	4.639	5.013	5.502	5.372	5.664	5.013	5.502	5.372	5.664	ns
		GCLK PLL	t <sub>co</sub>	3.707	3.707	5.215	5.646	6.191	6.034	6.414	5.646	6.191	6.034	6.414	ns
	8mA	GCLK	t <sub>co</sub>	3.238	3.238	4.516	4.884	5.367	5.237	5.529	4.884	5.367	5.237	5.529	ns
		GCLK PLL	t <sub>co</sub>	3.628	3.628	5.091	5.517	6.056	5.899	6.279	5.517	6.056	5.899	6.279	ns
	12mA	GCLK	t <sub>co</sub>	3.233	3.233	4.508	4.877	5.359	5.228	5.522	4.877	5.359	5.228	5.522	ns
		GCLK PLL	t <sub>co</sub>	3.623	3.623	5.084	5.510	6.047	5.889	6.271	5.510	6.047	5.889	6.271	ns
	16mA	GCLK	t <sub>co</sub>	3.224	3.224	4.494	4.862	5.344	5.213	5.507	4.862	5.344	5.213	5.507	ns
		GCLK PLL	t <sub>co</sub>	3.614	3.614	5.070	5.495	6.032	5.874	6.256	5.495	6.032	5.874	6.256	ns

**Table 1-72.** EP3SL110 Column Pins output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
2.5 V	4mA	GCLK	t <sub>co</sub>	3.439	3.439	4.846	5.240	5.749	5.619	5.912	5.240	5.749	5.619	5.912	ns
		GCLK PLL	t <sub>co</sub>	3.829	3.829	5.422	5.873	6.438	6.281	6.661	5.873	6.438	6.281	6.661	ns
	8mA	GCLK	t <sub>co</sub>	3.339	3.339	4.727	5.114	5.617	5.487	5.779	5.114	5.617	5.487	5.779	ns
		GCLK PLL	t <sub>co</sub>	3.729	3.729	5.303	5.747	6.306	6.149	6.529	5.747	6.306	6.149	6.529	ns
	12mA	GCLK	t <sub>co</sub>	3.295	3.295	4.640	5.024	5.522	5.391	5.685	5.024	5.522	5.391	5.685	ns
		GCLK PLL	t <sub>co</sub>	3.685	3.685	5.216	5.656	6.210	6.052	6.434	5.656	6.210	6.052	6.434	ns
	16mA	GCLK	t <sub>co</sub>	3.257	3.257	4.601	4.981	5.479	5.348	5.642	4.981	5.479	5.348	5.642	ns
		GCLK PLL	t <sub>co</sub>	3.647	3.647	5.177	5.614	6.167	6.009	6.391	5.614	6.167	6.009	6.391	ns
1.8 V	2mA	GCLK	t <sub>co</sub>	3.630	3.630	5.168	5.600	6.154	6.023	6.317	5.600	6.154	6.023	6.317	ns
		GCLK PLL	t <sub>co</sub>	4.020	4.020	5.743	6.233	6.842	6.684	7.066	6.233	6.842	6.684	7.066	ns
	4mA	GCLK	t <sub>co</sub>	3.449	3.449	4.889	5.291	5.806	5.676	5.968	5.291	5.806	5.676	5.968	ns
		GCLK PLL	t <sub>co</sub>	3.839	3.839	5.464	5.924	6.495	6.338	6.718	5.924	6.495	6.338	6.718	ns
	6mA	GCLK	t <sub>co</sub>	3.367	3.367	4.782	5.176	5.696	5.565	5.859	5.176	5.696	5.565	5.859	ns
		GCLK PLL	t <sub>co</sub>	3.757	3.757	5.357	5.809	6.384	6.226	6.608	5.809	6.384	6.226	6.608	ns
	8mA	GCLK	t <sub>co</sub>	3.347	3.347	4.723	5.123	5.630	5.499	5.793	5.123	5.630	5.499	5.793	ns
		GCLK PLL	t <sub>co</sub>	3.737	3.737	5.299	5.755	6.318	6.160	6.542	5.755	6.318	6.160	6.542	ns
	10mA	GCLK	t <sub>co</sub>	3.284	3.284	4.662	5.048	5.549	5.418	5.712	5.048	5.549	5.418	5.712	ns
		GCLK PLL	t <sub>co</sub>	3.674	3.674	5.238	5.680	6.237	6.079	6.461	5.680	6.237	6.079	6.461	ns
	12mA	GCLK	t <sub>co</sub>	3.266	3.266	4.642	5.026	5.526	5.395	5.689	5.026	5.526	5.395	5.689	ns
		GCLK PLL	t <sub>co</sub>	3.656	3.656	5.217	5.659	6.214	6.056	6.438	5.659	6.214	6.056	6.438	ns

**Table 1-72.** EP3SL110 Column Pins output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.5 V	2mA	GCLK	$t_{co}$	3.576	3.576	5.096	5.533	6.092	5.961	6.255	5.533	6.092	5.961	6.255	ns
		GCLK PLL	$t_{co}$	3.966	3.966	5.672	6.165	6.780	6.622	7.004	6.165	6.780	6.622	7.004	ns
	4mA	GCLK	$t_{co}$	3.364	3.364	4.777	5.176	5.700	5.569	5.863	5.176	5.700	5.569	5.863	ns
		GCLK PLL	$t_{co}$	3.754	3.754	5.353	5.809	6.388	6.230	6.612	5.809	6.388	6.230	6.612	ns
	6mA	GCLK	$t_{co}$	3.339	3.339	4.710	5.116	5.633	5.502	5.796	5.116	5.633	5.502	5.796	ns
		GCLK PLL	$t_{co}$	3.729	3.729	5.286	5.749	6.321	6.163	6.545	5.749	6.321	6.163	6.545	ns
	8mA	GCLK	$t_{co}$	3.328	3.328	4.693	5.091	5.613	5.482	5.776	5.091	5.613	5.482	5.776	ns
		GCLK PLL	$t_{co}$	3.718	3.718	5.269	5.724	6.301	6.143	6.525	5.724	6.301	6.143	6.525	ns
	10mA	GCLK	$t_{co}$	3.273	3.273	4.655	5.041	5.543	5.412	5.706	5.041	5.543	5.412	5.706	ns
		GCLK PLL	$t_{co}$	3.663	3.663	5.231	5.673	6.231	6.073	6.455	5.673	6.231	6.073	6.455	ns
	12mA	GCLK	$t_{co}$	3.268	3.268	4.639	5.029	5.532	5.401	5.695	5.029	5.532	5.401	5.695	ns
		GCLK PLL	$t_{co}$	3.658	3.658	5.214	5.662	6.220	6.062	6.444	5.662	6.220	6.062	6.444	ns
1.2 V	2mA	GCLK	$t_{co}$	3.492	3.492	5.022	5.468	6.036	5.905	6.199	5.468	6.036	5.905	6.199	ns
		GCLK PLL	$t_{co}$	3.882	3.882	5.598	6.101	6.724	6.566	6.948	6.101	6.724	6.566	6.948	ns
	4mA	GCLK	$t_{co}$	3.369	3.369	4.797	5.207	5.750	5.619	5.913	5.207	5.750	5.619	5.913	ns
		GCLK PLL	$t_{co}$	3.759	3.759	5.372	5.839	6.438	6.280	6.662	5.839	6.438	6.280	6.662	ns
	6mA	GCLK	$t_{co}$	3.331	3.331	4.704	5.117	5.637	5.506	5.800	5.117	5.637	5.506	5.800	ns
		GCLK PLL	$t_{co}$	3.721	3.721	5.280	5.750	6.325	6.167	6.549	5.750	6.325	6.167	6.549	ns
	8mA	GCLK	$t_{co}$	3.284	3.284	4.676	5.068	5.581	5.450	5.744	5.068	5.581	5.450	5.744	ns
		GCLK PLL	$t_{co}$	3.674	3.674	5.252	5.701	6.269	6.111	6.493	5.701	6.269	6.111	6.493	ns
SSTL-2 CLASS I	8mA	GCLK	$t_{co}$	3.284	3.284	4.633	5.016	5.512	5.381	5.675	5.016	5.512	5.381	5.675	ns
		GCLK PLL	$t_{co}$	3.674	3.674	5.209	5.648	6.200	6.042	6.424	5.648	6.200	6.042	6.424	ns
	10mA	GCLK	$t_{co}$	3.281	3.281	4.630	5.012	5.508	5.377	5.671	5.012	5.508	5.377	5.671	ns
		GCLK PLL	$t_{co}$	3.671	3.671	5.206	5.645	6.196	6.038	6.420	5.645	6.196	6.038	6.420	ns
	12mA	GCLK	$t_{co}$	3.279	3.279	4.630	5.013	5.509	5.378	5.672	5.013	5.509	5.378	5.672	ns
		GCLK PLL	$t_{co}$	3.669	3.669	5.206	5.646	6.197	6.039	6.421	5.646	6.197	6.039	6.421	ns

**Table 1-72.** EP3SL110 Column Pins output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.270	3.270	4.616	4.998	5.494	5.363	5.657	4.998	5.494	5.363	5.657	ns
		GCLK PLL	t <sub>co</sub>	3.660	3.660	5.191	5.630	6.182	6.024	6.406	5.630	6.182	6.024	6.406	ns
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.291	3.291	4.645	5.030	5.528	5.397	5.691	5.030	5.528	5.397	5.691	ns
		GCLK PLL	t <sub>co</sub>	3.681	3.681	5.221	5.662	6.216	6.058	6.440	5.662	6.216	6.058	6.440	ns
	6mA	GCLK	t <sub>co</sub>	3.287	3.287	4.643	5.028	5.526	5.395	5.689	5.028	5.526	5.395	5.689	ns
		GCLK PLL	t <sub>co</sub>	3.677	3.677	5.219	5.660	6.214	6.056	6.438	5.660	6.214	6.056	6.438	ns
	8mA	GCLK	t <sub>co</sub>	3.276	3.276	4.633	5.018	5.517	5.386	5.680	5.018	5.517	5.386	5.680	ns
		GCLK PLL	t <sub>co</sub>	3.666	3.666	5.209	5.651	6.205	6.047	6.429	5.651	6.205	6.047	6.429	ns
	10mA	GCLK	t <sub>co</sub>	3.265	3.265	4.621	5.005	5.504	5.373	5.667	5.005	5.504	5.373	5.667	ns
		GCLK PLL	t <sub>co</sub>	3.655	3.655	5.196	5.638	6.192	6.034	6.416	5.638	6.192	6.034	6.416	ns
	12mA	GCLK	t <sub>co</sub>	3.265	3.265	4.620	5.005	5.504	5.373	5.667	5.005	5.504	5.373	5.667	ns
		GCLK PLL	t <sub>co</sub>	3.655	3.655	5.196	5.638	6.192	6.034	6.416	5.638	6.192	6.034	6.416	ns
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.271	3.271	4.619	5.002	5.499	5.368	5.662	5.002	5.499	5.368	5.662	ns
		GCLK PLL	t <sub>co</sub>	3.661	3.661	5.195	5.635	6.187	6.029	6.411	5.635	6.187	6.029	6.411	ns
	16mA	GCLK	t <sub>co</sub>	3.274	3.274	4.627	5.012	5.511	5.380	5.674	5.012	5.511	5.380	5.674	ns
		GCLK PLL	t <sub>co</sub>	3.664	3.664	5.203	5.644	6.199	6.041	6.423	5.644	6.199	6.041	6.423	ns
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.295	3.295	4.655	5.041	5.541	5.410	5.704	5.041	5.541	5.410	5.704	ns
		GCLK PLL	t <sub>co</sub>	3.685	3.685	5.230	5.674	6.229	6.071	6.453	5.674	6.229	6.071	6.453	ns
	6mA	GCLK	t <sub>co</sub>	3.281	3.281	4.644	5.031	5.532	5.401	5.695	5.031	5.532	5.401	5.695	ns
		GCLK PLL	t <sub>co</sub>	3.671	3.671	5.220	5.664	6.220	6.062	6.444	5.664	6.220	6.062	6.444	ns
	8mA	GCLK	t <sub>co</sub>	3.270	3.270	4.631	5.017	5.518	5.387	5.681	5.017	5.518	5.387	5.681	ns
		GCLK PLL	t <sub>co</sub>	3.660	3.660	5.206	5.650	6.206	6.048	6.430	5.650	6.206	6.048	6.430	ns
	10mA	GCLK	t <sub>co</sub>	3.269	3.269	4.634	5.021	5.522	5.391	5.685	5.021	5.522	5.391	5.685	ns
		GCLK PLL	t <sub>co</sub>	3.659	3.659	5.209	5.653	6.210	6.052	6.434	5.653	6.210	6.052	6.434	ns
12mA	GCLK	t <sub>co</sub>	3.266	3.266	4.628	5.015	5.516	5.385	5.679	5.015	5.516	5.385	5.679	ns	
	GCLK PLL	t <sub>co</sub>	3.656	3.656	5.204	5.648	6.204	6.046	6.428	5.648	6.204	6.046	6.428	ns	

**Table 1-72.** EP3SL110 Column Pins output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
SSTL-15 CLASS II	8mA	GCLK	t <sub>co</sub>	3.268	3.268	4.617	5.001	5.499	5.368	5.662	5.001	5.499	5.368	5.662	ns	
		GCLK PLL	t <sub>co</sub>	3.658	3.658	5.193	5.634	6.187	6.029	6.411	5.634	6.187	6.029	6.411	ns	
	16mA	GCLK	t <sub>co</sub>	3.271	3.271	4.624	5.010	5.510	5.379	5.673	5.010	5.510	5.379	5.673	ns	
		GCLK PLL	t <sub>co</sub>	3.661	3.661	5.200	5.643	6.198	6.040	6.422	5.643	6.198	6.040	6.422	ns	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.278	3.278	4.619	5.001	5.497	5.366	5.660	5.001	5.497	5.366	5.660	ns	
		GCLK PLL	t <sub>co</sub>	3.668	3.668	5.195	5.634	6.185	6.027	6.409	5.634	6.185	6.027	6.409	ns	
	6mA	GCLK	t <sub>co</sub>	3.271	3.271	4.617	5.000	5.496	5.365	5.659	5.000	5.496	5.365	5.659	ns	
		GCLK PLL	t <sub>co</sub>	3.661	3.661	5.193	5.632	6.184	6.026	6.408	5.632	6.184	6.026	6.408	ns	
	8mA	GCLK	t <sub>co</sub>	3.263	3.263	4.610	4.992	5.489	5.358	5.652	4.992	5.489	5.358	5.652	ns	
		GCLK PLL	t <sub>co</sub>	3.653	3.653	5.185	5.625	6.177	6.019	6.401	5.625	6.177	6.019	6.401	ns	
	10mA	GCLK	t <sub>co</sub>	3.266	3.266	4.613	4.996	5.493	5.362	5.656	4.996	5.493	5.362	5.656	ns	
		GCLK PLL	t <sub>co</sub>	3.656	3.656	5.188	5.628	6.181	6.023	6.405	5.628	6.181	6.023	6.405	ns	
	12mA	GCLK	t <sub>co</sub>	3.263	3.263	4.615	4.999	5.497	5.366	5.660	4.999	5.497	5.366	5.660	ns	
		GCLK PLL	t <sub>co</sub>	3.653	3.653	5.191	5.632	6.185	6.027	6.409	5.632	6.185	6.027	6.409	ns	
	1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.271	3.271	4.614	4.997	5.493	5.362	5.656	4.997	5.493	5.362	5.656	ns
			GCLK PLL	t <sub>co</sub>	3.661	3.661	5.190	5.629	6.181	6.023	6.405	5.629	6.181	6.023	6.405	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.283	3.283	4.628	5.011	5.508	5.377	5.671	5.011	5.508	5.377	5.671	ns	
		GCLK PLL	t <sub>co</sub>	3.673	3.673	5.203	5.644	6.196	6.038	6.420	5.644	6.196	6.038	6.420	ns	
	6mA	GCLK	t <sub>co</sub>	3.279	3.279	4.629	5.013	5.511	5.380	5.674	5.013	5.511	5.380	5.674	ns	
		GCLK PLL	t <sub>co</sub>	3.669	3.669	5.204	5.645	6.199	6.041	6.423	5.645	6.199	6.041	6.423	ns	
	8mA	GCLK	t <sub>co</sub>	3.275	3.275	4.624	5.008	5.506	5.375	5.669	5.008	5.506	5.375	5.669	ns	
		GCLK PLL	t <sub>co</sub>	3.665	3.665	5.200	5.641	6.194	6.036	6.418	5.641	6.194	6.036	6.418	ns	
	10mA	GCLK	t <sub>co</sub>	3.268	3.268	4.617	5.001	5.499	5.368	5.662	5.001	5.499	5.368	5.662	ns	
		GCLK PLL	t <sub>co</sub>	3.658	3.658	5.193	5.634	6.187	6.029	6.411	5.634	6.187	6.029	6.411	ns	
	12mA	GCLK	t <sub>co</sub>	3.269	3.269	4.624	5.009	5.509	5.378	5.672	5.009	5.509	5.378	5.672	ns	
		GCLK PLL	t <sub>co</sub>	3.659	3.659	5.200	5.642	6.197	6.039	6.421	5.642	6.197	6.039	6.421	ns	



**Table 1-72.** EP3SL110 Column Pins output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.267	3.267	4.605	4.987	5.483	5.352	5.646	4.987	5.483	5.352	5.646	ns
		GCLK PLL	t <sub>co</sub>	3.657	3.657	5.181	5.620	6.171	6.013	6.395	5.620	6.171	6.013	6.395	ns
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.286	3.286	4.642	5.028	5.529	5.398	5.692	5.028	5.529	5.398	5.692	ns
		GCLK PLL	t <sub>co</sub>	3.676	3.676	5.217	5.661	6.217	6.059	6.441	5.661	6.217	6.059	6.441	ns
	6mA	GCLK	t <sub>co</sub>	3.278	3.278	4.633	5.019	5.520	5.389	5.683	5.019	5.520	5.389	5.683	ns
		GCLK PLL	t <sub>co</sub>	3.668	3.668	5.208	5.652	6.208	6.050	6.432	5.652	6.208	6.050	6.432	ns
	8mA	GCLK	t <sub>co</sub>	3.279	3.279	4.640	5.028	5.529	5.398	5.692	5.028	5.529	5.398	5.692	ns
		GCLK PLL	t <sub>co</sub>	3.669	3.669	5.216	5.660	6.217	6.059	6.441	5.660	6.217	6.059	6.441	ns
	10mA	GCLK	t <sub>co</sub>	3.268	3.268	4.627	5.014	5.515	5.384	5.678	5.014	5.515	5.384	5.678	ns
		GCLK PLL	t <sub>co</sub>	3.658	3.658	5.203	5.647	6.203	6.045	6.427	5.647	6.203	6.045	6.427	ns
	12mA	GCLK	t <sub>co</sub>	3.268	3.268	4.627	5.014	5.516	5.385	5.679	5.014	5.516	5.385	5.679	ns
		GCLK PLL	t <sub>co</sub>	3.658	3.658	5.203	5.647	6.204	6.046	6.428	5.647	6.204	6.046	6.428	ns
1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.289	3.289	4.643	5.029	5.529	5.398	5.692	5.029	5.529	5.398	5.692	ns
		GCLK PLL	t <sub>co</sub>	3.679	3.679	5.219	5.662	6.217	6.059	6.441	5.662	6.217	6.059	6.441	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.392	3.392	4.688	5.063	5.554	5.423	5.717	5.063	5.554	5.423	5.717	ns
		GCLK PLL	t <sub>co</sub>	3.782	3.782	5.264	5.696	6.242	6.084	6.466	5.696	6.242	6.084	6.466	ns
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.392	3.392	4.688	5.063	5.554	5.423	5.717	5.063	5.554	5.423	5.717	ns
		GCLK PLL	t <sub>co</sub>	3.782	3.782	5.264	5.696	6.242	6.084	6.466	5.696	6.242	6.084	6.466	ns

Table 1-73 specifies EP3SL110 Row Pins Output Timing parameters for single-ended I/O standards.

**Table 1-73.** EP3SL110 Row Pins output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.3-V LVTTTL	4mA	GCLK	$t_{co}$	3.182	3.481	4.833	5.216	5.678	5.579	5.814	5.256	5.802	5.703	5.896	ns
		GCLK PLL	$t_{co}$	1.457	1.650	2.051	2.136	2.329	2.349	2.337	2.239	2.435	2.454	2.331	ns
	8mA	GCLK	$t_{co}$	3.116	3.376	4.703	5.078	5.533	5.434	5.669	5.143	5.653	5.554	5.747	ns
		GCLK PLL	$t_{co}$	1.364	1.545	1.921	1.998	2.184	2.204	2.192	2.098	2.286	2.305	2.182	ns
	12mA	GCLK	$t_{co}$	3.037	3.270	4.584	4.955	5.405	5.306	5.541	5.044	5.521	5.422	5.615	ns
		GCLK PLL	$t_{co}$	1.265	1.439	1.802	1.875	2.056	2.076	2.064	1.971	2.154	2.173	2.050	ns
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.184	3.485	4.841	5.221	5.682	5.583	5.818	5.264	5.806	5.707	5.900	ns
		GCLK PLL	$t_{co}$	1.467	1.654	2.059	2.141	2.333	2.353	2.341	2.245	2.439	2.458	2.335	ns
	8mA	GCLK	$t_{co}$	3.041	3.276	4.590	4.961	5.411	5.312	5.548	5.056	5.528	5.429	5.622	ns
		GCLK PLL	$t_{co}$	1.269	1.445	1.808	1.881	2.062	2.082	2.070	1.977	2.161	2.180	2.057	ns
3.0-V LVTTTL	4mA	GCLK	$t_{co}$	3.143	3.427	4.785	5.169	5.634	5.535	5.770	5.224	5.760	5.661	5.854	ns
		GCLK PLL	$t_{co}$	1.411	1.596	2.003	2.089	2.285	2.305	2.293	2.196	2.393	2.412	2.289	ns
	8mA	GCLK	$t_{co}$	3.042	3.300	4.632	5.010	5.470	5.371	5.606	5.082	5.596	5.496	5.689	ns
		GCLK PLL	$t_{co}$	1.286	1.469	1.850	1.930	2.121	2.141	2.129	2.034	2.229	2.247	2.124	ns
	12mA	GCLK	$t_{co}$	3.005	3.249	4.550	4.927	5.382	5.283	5.518	5.014	5.503	5.403	5.596	ns
		GCLK PLL	$t_{co}$	1.247	1.418	1.768	1.847	2.033	2.053	2.041	1.948	2.136	2.154	2.031	ns
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.064	3.346	4.679	5.062	5.524	5.425	5.660	5.115	5.649	5.549	5.742	ns
		GCLK PLL	$t_{co}$	1.325	1.515	1.897	1.982	2.175	2.195	2.183	2.088	2.282	2.300	2.177	ns
	8mA	GCLK	$t_{co}$	2.992	3.227	4.515	4.888	5.343	5.244	5.479	4.984	5.463	5.363	5.556	ns
		GCLK PLL	$t_{co}$	1.225	1.396	1.733	1.808	1.994	2.014	2.002	1.908	2.096	2.114	1.991	ns
2.5 V	4mA	GCLK	$t_{co}$	3.169	3.463	4.917	5.323	5.806	5.707	5.942	5.356	5.939	5.839	6.032	ns
		GCLK PLL	$t_{co}$	1.437	1.632	2.135	2.243	2.457	2.477	2.465	2.356	2.572	2.590	2.467	ns
	8mA	GCLK	$t_{co}$	3.084	3.365	4.762	5.160	5.636	5.537	5.772	5.219	5.765	5.665	5.858	ns
		GCLK PLL	$t_{co}$	1.327	1.534	1.980	2.080	2.287	2.307	2.295	2.189	2.398	2.416	2.293	ns
	12mA	GCLK	$t_{co}$	3.027	3.288	4.651	5.041	5.510	5.411	5.646	5.130	5.635	5.535	5.728	ns
		GCLK PLL	$t_{co}$	1.281	1.457	1.869	1.961	2.161	2.181	2.169	2.066	2.268	2.286	2.163	ns

**Table 1-73.** EP3SL110 Row Pins output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.8 V	2mA	GCLK	t <sub>co</sub>	3.438	3.706	5.298	5.747	6.303	6.177	6.439	5.888	6.445	6.318	6.538	ns
		GCLK PLL	t <sub>co</sub>	1.670	1.879	2.521	2.672	2.932	2.952	2.937	2.793	3.056	3.075	2.949	ns
	4mA	GCLK	t <sub>co</sub>	3.213	3.504	4.971	5.378	5.898	5.772	6.034	5.523	6.039	5.911	6.131	ns
		GCLK PLL	t <sub>co</sub>	1.445	1.677	2.194	2.303	2.527	2.547	2.532	2.428	2.650	2.668	2.542	ns
	6mA	GCLK	t <sub>co</sub>	3.148	3.402	4.818	5.228	5.739	5.613	5.875	5.355	5.866	5.739	5.959	ns
		GCLK PLL	t <sub>co</sub>	1.380	1.575	2.041	2.153	2.368	2.388	2.373	2.260	2.477	2.496	2.370	ns
	8mA	GCLK	t <sub>co</sub>	3.088	3.328	4.741	5.134	5.642	5.516	5.778	5.260	5.772	5.645	5.865	ns
		GCLK PLL	t <sub>co</sub>	1.320	1.501	1.964	2.059	2.271	2.291	2.276	2.165	2.383	2.402	2.276	ns
1.5 V	2mA	GCLK	t <sub>co</sub>	3.349	3.624	5.208	5.660	6.231	6.105	6.367	5.795	6.369	6.242	6.462	ns
		GCLK PLL	t <sub>co</sub>	1.581	1.797	2.431	2.585	2.860	2.880	2.865	2.700	2.980	2.999	2.873	ns
	4mA	GCLK	t <sub>co</sub>	3.107	3.366	4.803	5.223	5.740	5.614	5.876	5.349	5.865	5.738	5.958	ns
		GCLK PLL	t <sub>co</sub>	1.339	1.539	2.026	2.148	2.369	2.389	2.374	2.254	2.476	2.495	2.369	ns
	6mA	GCLK	t <sub>co</sub>	3.080	3.319	4.730	5.127	5.634	5.508	5.770	5.251	5.760	5.633	5.853	ns
		GCLK PLL	t <sub>co</sub>	1.312	1.492	1.953	2.052	2.263	2.283	2.268	2.156	2.371	2.390	2.264	ns
	8mA	GCLK	t <sub>co</sub>	3.071	3.310	4.708	5.109	5.615	5.489	5.751	5.233	5.738	5.611	5.831	ns
		GCLK PLL	t <sub>co</sub>	1.303	1.483	1.931	2.034	2.244	2.264	2.249	2.138	2.349	2.368	2.242	ns
1.2 V	2mA	GCLK	t <sub>co</sub>	3.292	3.549	5.118	5.574	6.156	6.030	6.292	5.707	6.285	6.158	6.378	ns
		GCLK PLL	t <sub>co</sub>	1.524	1.722	2.341	2.499	2.785	2.805	2.790	2.612	2.896	2.915	2.789	ns
	4mA	GCLK	t <sub>co</sub>	3.112	3.360	4.825	5.251	5.781	5.655	5.917	5.374	5.907	5.780	6.000	ns
		GCLK PLL	t <sub>co</sub>	1.344	1.533	2.048	2.176	2.410	2.430	2.415	2.279	2.518	2.537	2.411	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.031	3.274	4.629	5.013	5.478	5.379	5.616	5.117	5.597	5.498	5.692	ns
		GCLK PLL	t <sub>co</sub>	1.266	1.443	1.847	1.933	2.129	2.149	2.137	2.033	2.230	2.249	2.126	ns
	12mA	GCLK	t <sub>co</sub>	3.026	3.262	4.621	5.005	5.476	5.371	5.614	5.116	5.596	5.491	5.691	ns
		GCLK PLL	t <sub>co</sub>	1.254	1.431	1.839	1.925	2.121	2.141	2.129	2.025	2.223	2.242	2.119	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.017	3.244	4.596	4.980	5.459	5.344	5.597	5.099	5.578	5.464	5.673	ns
		GCLK PLL	t <sub>co</sub>	1.238	1.413	1.814	1.900	2.094	2.114	2.102	1.999	2.196	2.215	2.092	ns

**Table 1-73.** EP3SL110 Row Pins output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.049	3.284	4.636	5.022	5.516	5.390	5.652	5.141	5.635	5.508	5.728	ns	
		GCLK PLL	t <sub>co</sub>	1.281	1.457	1.859	1.947	2.145	2.165	2.150	2.046	2.246	2.265	2.139	ns	
	6mA	GCLK	t <sub>co</sub>	3.034	3.270	4.633	5.020	5.514	5.388	5.650	5.139	5.633	5.506	5.726	ns	
		GCLK PLL	t <sub>co</sub>	1.266	1.443	1.856	1.945	2.143	2.163	2.148	2.044	2.244	2.263	2.137	ns	
	8mA	GCLK	t <sub>co</sub>	3.023	3.258	4.616	5.003	5.497	5.371	5.633	5.122	5.617	5.490	5.710	ns	
		GCLK PLL	t <sub>co</sub>	1.255	1.431	1.839	1.928	2.126	2.146	2.131	2.027	2.228	2.247	2.121	ns	
	10mA	GCLK	t <sub>co</sub>	2.999	3.235	4.600	4.987	5.482	5.356	5.618	5.107	5.602	5.475	5.695	ns	
		GCLK PLL	t <sub>co</sub>	1.231	1.408	1.823	1.912	2.111	2.131	2.116	2.012	2.213	2.232	2.106	ns	
	12mA	GCLK	t <sub>co</sub>	2.999	3.234	4.599	4.986	5.481	5.355	5.617	5.106	5.601	5.474	5.694	ns	
		GCLK PLL	t <sub>co</sub>	1.231	1.407	1.822	1.911	2.110	2.130	2.116	2.011	2.212	2.231	2.106	ns	
	SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.009	3.243	4.597	4.982	5.475	5.349	5.611	5.101	5.594	5.467	5.687	ns
			GCLK PLL	t <sub>co</sub>	1.241	1.416	1.820	1.907	2.104	2.124	2.111	2.006	2.205	2.224	2.100	ns
16mA		GCLK	t <sub>co</sub>	3.004	3.238	4.596	4.983	5.477	5.351	5.613	5.103	5.598	5.471	5.691	ns	
		GCLK PLL	t <sub>co</sub>	1.235	1.411	1.819	1.908	2.106	2.126	2.121	2.008	2.209	2.228	2.111	ns	
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.045	3.280	4.647	5.036	5.533	5.407	5.669	5.154	5.651	5.524	5.744	ns	
		GCLK PLL	t <sub>co</sub>	1.277	1.453	1.870	1.961	2.162	2.182	2.167	2.059	2.262	2.281	2.155	ns	
	6mA	GCLK	t <sub>co</sub>	3.022	3.258	4.629	5.019	5.516	5.390	5.652	5.138	5.635	5.508	5.728	ns	
		GCLK PLL	t <sub>co</sub>	1.254	1.431	1.852	1.944	2.145	2.165	2.150	2.043	2.246	2.265	2.139	ns	
	8mA	GCLK	t <sub>co</sub>	3.005	3.241	4.612	5.001	5.498	5.372	5.634	5.120	5.618	5.491	5.711	ns	
		GCLK PLL	t <sub>co</sub>	1.237	1.414	1.835	1.926	2.127	2.147	2.132	2.025	2.229	2.248	2.122	ns	

**Table 1-73.** EP3SL110 Row Pins output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.024	3.256	4.603	4.987	5.478	5.352	5.614	5.105	5.597	5.470	5.690	ns
		GCLK PLL	t <sub>co</sub>	1.256	1.429	1.826	1.912	2.107	2.127	2.112	2.010	2.208	2.227	2.101	ns
	6mA	GCLK	t <sub>co</sub>	3.012	3.244	4.594	4.979	5.470	5.344	5.606	5.097	5.590	5.463	5.683	ns
		GCLK PLL	t <sub>co</sub>	1.244	1.417	1.817	1.904	2.099	2.119	2.108	2.002	2.201	2.220	2.097	ns
	8mA	GCLK	t <sub>co</sub>	2.999	3.232	4.585	4.970	5.462	5.336	5.598	5.089	5.582	5.455	5.675	ns
		GCLK PLL	t <sub>co</sub>	1.231	1.405	1.808	1.895	2.091	2.111	2.101	1.994	2.193	2.212	2.090	ns
	10mA	GCLK	t <sub>co</sub>	3.001	3.234	4.588	4.973	5.465	5.339	5.601	5.092	5.585	5.458	5.678	ns
		GCLK PLL	t <sub>co</sub>	1.233	1.407	1.811	1.898	2.094	2.114	2.105	1.997	2.196	2.215	2.093	ns
	12mA	GCLK	t <sub>co</sub>	2.994	3.229	4.586	4.972	5.465	5.339	5.601	5.092	5.586	5.459	5.679	ns
		GCLK PLL	t <sub>co</sub>	1.226	1.402	1.809	1.897	2.094	2.114	2.108	1.997	2.197	2.216	2.098	ns
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.001	3.234	4.581	4.964	5.457	5.330	5.595	5.083	5.575	5.448	5.670	ns
		GCLK PLL	t <sub>co</sub>	1.232	1.406	1.804	1.889	2.085	2.105	2.104	1.988	2.186	2.205	2.092	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.031	3.263	4.614	5.000	5.493	5.367	5.629	5.117	5.611	5.484	5.704	ns
		GCLK PLL	t <sub>co</sub>	1.263	1.436	1.837	1.925	2.122	2.142	2.127	2.022	2.222	2.241	2.115	ns
	6mA	GCLK	t <sub>co</sub>	3.019	3.253	4.610	4.996	5.489	5.363	5.625	5.114	5.608	5.481	5.701	ns
		GCLK PLL	t <sub>co</sub>	1.251	1.426	1.833	1.921	2.118	2.138	2.123	2.019	2.219	2.238	2.112	ns
	8mA	GCLK	t <sub>co</sub>	3.015	3.248	4.604	4.990	5.483	5.357	5.619	5.108	5.602	5.475	5.695	ns
		GCLK PLL	t <sub>co</sub>	1.247	1.421	1.827	1.915	2.112	2.132	2.117	2.013	2.213	2.232	2.106	ns
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.030	3.262	4.625	5.014	5.511	5.385	5.647	5.131	5.628	5.501	5.721	ns
		GCLK PLL	t <sub>co</sub>	1.262	1.435	1.848	1.939	2.140	2.160	2.145	2.036	2.239	2.258	2.132	ns
	6mA	GCLK	t <sub>co</sub>	3.018	3.250	4.614	5.002	5.499	5.373	5.635	5.120	5.617	5.490	5.710	ns
		GCLK PLL	t <sub>co</sub>	1.250	1.423	1.837	1.927	2.128	2.148	2.133	2.025	2.228	2.247	2.121	ns
	8mA	GCLK	t <sub>co</sub>	3.014	3.248	4.618	5.007	5.505	5.379	5.641	5.126	5.624	5.497	5.717	ns
		GCLK PLL	t <sub>co</sub>	1.246	1.421	1.841	1.932	2.134	2.154	2.139	2.031	2.235	2.254	2.128	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.137	3.357	4.654	5.031	5.518	5.390	5.656	5.165	5.639	5.511	5.734	ns
		GCLK PLL	t <sub>co</sub>	1.351	1.526	1.872	1.951	2.138	2.158	2.146	2.051	2.242	2.261	2.138	ns
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.137	3.357	4.654	5.031	5.518	5.390	5.656	5.165	5.639	5.511	5.734	ns
		GCLK PLL	t <sub>co</sub>	1.351	1.526	1.872	1.951	2.138	2.158	2.146	2.051	2.242	2.261	2.138	ns

Table 1-74 through Table 1-79 show the maximum I/O timing parameters for EP3SL110 devices for differential I/O standards.

Table 1-74 specifies EP3SL110 column pins input timing parameters for differential I/O standards.

**Table 1-74.** EP3SL110 Column Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	
LVDS	GCLK	t <sub>su</sub>	-0.978	-1.006	-1.151	-1.135	-1.286	-1.233	-1.594	-1.098	-1.339	-1.193	-1.632	ns
		t <sub>h</sub>	1.104	1.152	1.371	1.387	1.564	1.502	1.860	1.361	1.634	1.471	1.898	ns
	GCLK PLL	t <sub>su</sub>	0.967	1.001	1.885	2.230	2.404	2.293	2.197	2.284	2.556	2.353	2.249	ns
		t <sub>h</sub>	-0.707	-0.719	-1.450	-1.735	-1.855	-1.769	-1.669	-1.780	-1.984	-1.818	-1.718	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-0.978	-1.006	-1.151	-1.135	-1.286	-1.233	-1.594	-1.098	-1.339	-1.193	-1.632	ns
		t <sub>h</sub>	1.104	1.152	1.371	1.387	1.564	1.502	1.860	1.361	1.634	1.471	1.898	ns
	GCLK PLL	t <sub>su</sub>	0.967	1.001	1.885	2.230	2.404	2.293	2.197	2.284	2.556	2.353	2.249	ns
		t <sub>h</sub>	-0.707	-0.719	-1.450	-1.735	-1.855	-1.769	-1.669	-1.780	-1.984	-1.818	-1.718	ns
RSDS	GCLK	t <sub>su</sub>	-0.978	-1.006	-1.151	-1.135	-1.286	-1.233	-1.594	-1.098	-1.339	-1.193	-1.632	ns
		t <sub>h</sub>	1.104	1.152	1.371	1.387	1.564	1.502	1.860	1.361	1.634	1.471	1.898	ns
	GCLK PLL	t <sub>su</sub>	0.967	1.001	1.885	2.230	2.404	2.293	2.197	2.284	2.556	2.353	2.249	ns
		t <sub>h</sub>	-0.707	-0.719	-1.450	-1.735	-1.855	-1.769	-1.669	-1.780	-1.984	-1.818	-1.718	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.794	-0.829	-1.228	-1.334	-1.445	-1.387	-1.743	-1.333	-1.443	-1.391	-1.786	ns
		t <sub>h</sub>	0.913	0.967	1.416	1.546	1.677	1.610	1.964	1.554	1.684	1.621	2.007	ns
	GCLK PLL	t <sub>su</sub>	1.151	1.178	1.808	2.031	2.245	2.139	2.048	2.049	2.266	2.155	2.095	ns
		t <sub>h</sub>	-0.898	-0.904	-1.405	-1.576	-1.742	-1.661	-1.565	-1.587	-1.753	-1.668	-1.609	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.794	-0.829	-1.228	-1.334	-1.445	-1.387	-1.743	-1.333	-1.443	-1.391	-1.786	ns
		t <sub>h</sub>	0.913	0.967	1.416	1.546	1.677	1.610	1.964	1.554	1.684	1.621	2.007	ns
	GCLK PLL	t <sub>su</sub>	1.151	1.178	1.808	2.031	2.245	2.139	2.048	2.049	2.266	2.155	2.095	ns
		t <sub>h</sub>	-0.898	-0.904	-1.405	-1.576	-1.742	-1.661	-1.565	-1.587	-1.753	-1.668	-1.609	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		t <sub>h</sub>	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	t <sub>su</sub>	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		t <sub>h</sub>	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		t <sub>h</sub>	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	t <sub>su</sub>	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		t <sub>h</sub>	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		t <sub>h</sub>	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	t <sub>su</sub>	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		t <sub>h</sub>	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns

**Table 1-74.** EP3SL110 Column Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	t <sub>SU</sub>	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		t <sub>H</sub>	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	t <sub>SU</sub>	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		t <sub>H</sub>	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	t <sub>SU</sub>	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		t <sub>H</sub>	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	t <sub>SU</sub>	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		t <sub>H</sub>	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	t <sub>SU</sub>	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		t <sub>H</sub>	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	t <sub>SU</sub>	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		t <sub>H</sub>	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	t <sub>SU</sub>	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		t <sub>H</sub>	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	t <sub>SU</sub>	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		t <sub>H</sub>	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	t <sub>SU</sub>	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		t <sub>H</sub>	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	t <sub>SU</sub>	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		t <sub>H</sub>	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	t <sub>SU</sub>	-0.821	-0.858	-1.259	-1.361	-1.480	-1.424	-1.777	-1.359	-1.471	-1.422	-1.815	ns
		t <sub>H</sub>	0.940	0.996	1.449	1.576	1.715	1.648	2.003	1.583	1.717	1.653	2.041	ns
	GCLK PLL	t <sub>SU</sub>	1.124	1.149	1.777	2.004	2.210	2.102	2.014	2.023	2.238	2.124	2.066	ns
		t <sub>H</sub>	-0.871	-0.875	-1.372	-1.546	-1.704	-1.623	-1.526	-1.558	-1.720	-1.636	-1.575	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	t <sub>SU</sub>	-0.821	-0.858	-1.259	-1.361	-1.480	-1.424	-1.777	-1.359	-1.471	-1.422	-1.815	ns
		t <sub>H</sub>	0.940	0.996	1.449	1.576	1.715	1.648	2.003	1.583	1.717	1.653	2.041	ns
	GCLK PLL	t <sub>SU</sub>	1.124	1.149	1.777	2.004	2.210	2.102	2.014	2.023	2.238	2.124	2.066	ns
		t <sub>H</sub>	-0.871	-0.875	-1.372	-1.546	-1.704	-1.623	-1.526	-1.558	-1.720	-1.636	-1.575	ns

Table 1-75 specifies EP3SL110 parameters for differential I/O standards.

**Table 1-75.** EP3SL110 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS	GCLK	t <sub>SU</sub>	-0.919	-0.950	-1.021	-0.981	-1.115	-1.070	-1.404	-0.940	-1.066	-1.023	-1.442	ns
		t <sub>H</sub>	1.043	1.092	1.245	1.237	1.395	1.339	1.672	1.207	1.358	1.303	1.711	ns
	GCLK PLL	t <sub>SU</sub>	0.959	0.987	1.949	2.324	2.527	2.403	2.334	2.384	2.597	2.470	2.387	ns
		t <sub>H</sub>	-0.698	-0.708	-1.513	-1.828	-1.977	-1.881	-1.804	-1.875	-2.032	-1.933	-1.853	ns

**Table 1-75.** EP3SL110 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
MINI-LVDS	GCLK	$t_{su}$	-0.919	-0.950	-1.021	-0.981	-1.115	-1.070	-1.404	-0.940	-1.066	-1.023	-1.442	ns
		$t_h$	1.043	1.092	1.245	1.237	1.395	1.339	1.672	1.207	1.358	1.303	1.711	ns
	GCLK PLL	$t_{su}$	0.959	0.987	1.949	2.324	2.527	2.403	2.334	2.384	2.597	2.470	2.387	ns
		$t_h$	-0.698	-0.708	-1.513	-1.828	-1.977	-1.881	-1.804	-1.875	-2.032	-1.933	-1.853	ns
RSDS	GCLK	$t_{su}$	-0.919	-0.950	-1.021	-0.981	-1.115	-1.070	-1.404	-0.940	-1.066	-1.023	-1.442	ns
		$t_h$	1.043	1.092	1.245	1.237	1.395	1.339	1.672	1.207	1.358	1.303	1.711	ns
	GCLK PLL	$t_{su}$	0.959	0.987	1.949	2.324	2.527	2.403	2.334	2.384	2.597	2.470	2.387	ns
		$t_h$	-0.698	-0.708	-1.513	-1.828	-1.977	-1.881	-1.804	-1.875	-2.032	-1.933	-1.853	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.724	-0.765	-1.113	-1.210	-1.304	-1.254	-1.583	-1.211	-1.303	-1.255	-1.626	ns
		$t_h$	0.841	0.898	1.302	1.420	1.535	1.474	1.802	1.429	1.543	1.483	1.846	ns
	GCLK PLL	$t_{su}$	1.154	1.172	1.862	2.100	2.338	2.219	2.155	2.117	2.360	2.238	2.203	ns
		$t_h$	-0.900	-0.902	-1.458	-1.649	-1.837	-1.746	-1.674	-1.657	-1.847	-1.753	-1.718	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.724	-0.765	-1.113	-1.210	-1.304	-1.254	-1.583	-1.211	-1.303	-1.255	-1.626	ns
		$t_h$	0.841	0.898	1.302	1.420	1.535	1.474	1.802	1.429	1.543	1.483	1.846	ns
	GCLK PLL	$t_{su}$	1.154	1.172	1.862	2.100	2.338	2.219	2.155	2.117	2.360	2.238	2.203	ns
		$t_h$	-0.900	-0.902	-1.458	-1.649	-1.837	-1.746	-1.674	-1.657	-1.847	-1.753	-1.718	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		$t_h$	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	$t_{su}$	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		$t_h$	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		$t_h$	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	$t_{su}$	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		$t_h$	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		$t_h$	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	$t_{su}$	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		$t_h$	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		$t_h$	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	$t_{su}$	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		$t_h$	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		$t_h$	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	$t_{su}$	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		$t_h$	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns



**Table 1-75.** EP3SL110 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		t <sub>h</sub>	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	t <sub>su</sub>	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		t <sub>h</sub>	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		t <sub>h</sub>	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	t <sub>su</sub>	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		t <sub>h</sub>	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		t <sub>h</sub>	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	t <sub>su</sub>	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		t <sub>h</sub>	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.756	-0.798	-1.145	-1.241	-1.345	-1.296	-1.623	-1.238	-1.337	-1.291	-1.661	ns
		t <sub>h</sub>	0.873	0.931	1.336	1.454	1.579	1.518	1.847	1.459	1.582	1.521	1.886	ns
	GCLK PLL	t <sub>su</sub>	1.122	1.139	1.825	2.064	2.293	2.173	2.110	2.086	2.321	2.197	2.163	ns
		t <sub>h</sub>	-0.868	-0.869	-1.422	-1.611	-1.789	-1.698	-1.625	-1.623	-1.805	-1.711	-1.674	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.756	-0.798	-1.145	-1.241	-1.345	-1.296	-1.623	-1.238	-1.337	-1.291	-1.661	ns
		t <sub>h</sub>	0.873	0.931	1.336	1.454	1.579	1.518	1.847	1.459	1.582	1.521	1.886	ns
	GCLK PLL	t <sub>su</sub>	1.122	1.139	1.825	2.064	2.293	2.173	2.110	2.086	2.321	2.197	2.163	ns
		t <sub>h</sub>	-0.868	-0.869	-1.422	-1.611	-1.789	-1.698	-1.625	-1.623	-1.805	-1.711	-1.674	ns

Table 1-76 specifies EP3SL110 Column Pins Output Timing parameters for differential I/O standards.

**Table 1-76.** EP3SL110 Column Pins output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.100	3.330	4.687	5.079	5.586	5.447	5.731	5.200	5.706	5.570	5.803	ns
			t <sub>co</sub>	1.308	1.480	1.885	1.978	2.188	2.199	2.226	2.081	2.293	2.303	2.211	ns
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.096	3.333	4.734	5.134	5.648	5.509	5.793	5.259	5.772	5.636	5.869	ns
			t <sub>co</sub>	1.304	1.483	1.932	2.033	2.250	2.261	2.288	2.140	2.359	2.369	2.277	ns
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.100	3.330	4.687	5.079	5.586	5.447	5.731	5.200	5.706	5.570	5.803	ns
			t <sub>co</sub>	1.308	1.480	1.885	1.978	2.188	2.199	2.226	2.081	2.293	2.303	2.211	ns
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.096	3.333	4.734	5.134	5.648	5.509	5.793	5.259	5.772	5.636	5.869	ns
			t <sub>co</sub>	1.304	1.483	1.932	2.033	2.250	2.261	2.288	2.140	2.359	2.369	2.277	ns

**Table 1-76.** EP3SL110 Column Pins output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.100	3.330	4.687	5.079	5.586	5.447	5.731	5.200	5.706	5.570	5.803	ns	
		GCLK PLL	t <sub>co</sub>	1.308	1.480	1.885	1.978	2.188	2.199	2.226	2.081	2.293	2.303	2.211	ns	
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.096	3.333	4.734	5.134	5.648	5.509	5.793	5.259	5.772	5.636	5.869	ns	
		GCLK PLL	t <sub>co</sub>	1.304	1.483	1.932	2.033	2.250	2.261	2.288	2.140	2.359	2.369	2.277	ns	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.127	3.363	4.758	5.157	5.670	5.531	5.815	5.280	5.792	5.656	5.889	ns	
		GCLK PLL	t <sub>co</sub>	1.335	1.513	1.956	2.056	2.272	2.283	2.310	2.161	2.379	2.389	2.297	ns	
	6mA	GCLK	t <sub>co</sub>	3.117	3.353	4.748	5.146	5.660	5.521	5.805	5.269	5.782	5.646	5.879	ns	
		GCLK PLL	t <sub>co</sub>	1.325	1.503	1.946	2.045	2.262	2.273	2.300	2.150	2.369	2.379	2.287	ns	
	8mA	GCLK	t <sub>co</sub>	3.117	3.353	4.751	5.150	5.664	5.525	5.809	5.274	5.787	5.651	5.884	ns	
		GCLK PLL	t <sub>co</sub>	1.325	1.503	1.949	2.049	2.266	2.277	2.304	2.155	2.374	2.384	2.292	ns	
	10mA	GCLK	t <sub>co</sub>	3.110	3.347	4.744	5.144	5.658	5.519	5.803	5.267	5.781	5.645	5.878	ns	
		GCLK PLL	t <sub>co</sub>	1.318	1.497	1.942	2.043	2.260	2.271	2.298	2.148	2.368	2.378	2.286	ns	
	12mA	GCLK	t <sub>co</sub>	3.109	3.345	4.741	5.141	5.655	5.516	5.800	5.264	5.777	5.641	5.874	ns	
		GCLK PLL	t <sub>co</sub>	1.317	1.495	1.939	2.040	2.257	2.268	2.295	2.145	2.364	2.374	2.282	ns	
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.131	3.367	4.762	5.161	5.674	5.535	5.819	5.284	5.797	5.661	5.894	ns
			GCLK PLL	t <sub>co</sub>	1.339	1.517	1.960	2.060	2.276	2.287	2.314	2.165	2.384	2.394	2.302	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.121	3.356	4.741	5.138	5.649	5.510	5.794	5.260	5.770	5.634	5.867	ns	
		GCLK PLL	t <sub>co</sub>	1.329	1.506	1.939	2.037	2.251	2.262	2.289	2.141	2.357	2.367	2.275	ns	
	6mA	GCLK	t <sub>co</sub>	3.116	3.352	4.741	5.138	5.650	5.511	5.795	5.261	5.772	5.636	5.869	ns	
		GCLK PLL	t <sub>co</sub>	1.324	1.502	1.939	2.037	2.252	2.263	2.290	2.142	2.359	2.369	2.277	ns	
	8mA	GCLK	t <sub>co</sub>	3.114	3.350	4.740	5.137	5.648	5.509	5.793	5.260	5.771	5.635	5.868	ns	
		GCLK PLL	t <sub>co</sub>	1.322	1.500	1.938	2.036	2.250	2.261	2.288	2.141	2.358	2.368	2.276	ns	
	10mA	GCLK	t <sub>co</sub>	3.106	3.341	4.730	5.127	5.639	5.500	5.784	5.250	5.761	5.625	5.858	ns	
		GCLK PLL	t <sub>co</sub>	1.314	1.491	1.928	2.026	2.241	2.252	2.279	2.131	2.348	2.358	2.266	ns	
	12mA	GCLK	t <sub>co</sub>	3.107	3.343	4.736	5.134	5.647	5.508	5.792	5.258	5.770	5.634	5.867	ns	
		GCLK PLL	t <sub>co</sub>	1.315	1.493	1.934	2.033	2.249	2.260	2.287	2.139	2.357	2.367	2.275	ns	
	DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.106	3.340	4.719	5.115	5.625	5.486	5.770	5.237	5.746	5.610	5.843	ns
			GCLK PLL	t <sub>co</sub>	1.314	1.490	1.917	2.014	2.227	2.238	2.265	2.118	2.333	2.343	2.251	ns

**Table 1-76.** EP3SL110 Column Pins output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.118	3.353	4.737	5.133	5.643	5.504	5.788	5.256	5.765	5.629	5.862	ns	
		GCLK PLL	t <sub>co</sub>	1.326	1.503	1.935	2.032	2.245	2.256	2.283	2.137	2.352	2.362	2.270	ns	
	6mA	GCLK	t <sub>co</sub>	3.114	3.350	4.738	5.135	5.647	5.508	5.792	5.258	5.769	5.633	5.866	ns	
		GCLK PLL	t <sub>co</sub>	1.322	1.500	1.936	2.034	2.249	2.260	2.287	2.139	2.356	2.366	2.274	ns	
	8mA	GCLK	t <sub>co</sub>	3.104	3.339	4.727	5.124	5.635	5.496	5.780	5.247	5.757	5.621	5.854	ns	
		GCLK PLL	t <sub>co</sub>	1.312	1.489	1.925	2.023	2.237	2.248	2.275	2.128	2.344	2.354	2.262	ns	
	10mA	GCLK	t <sub>co</sub>	3.102	3.337	4.725	5.121	5.633	5.494	5.778	5.245	5.755	5.619	5.852	ns	
		GCLK PLL	t <sub>co</sub>	1.310	1.487	1.923	2.020	2.235	2.246	2.273	2.126	2.342	2.352	2.260	ns	
	12mA	GCLK	t <sub>co</sub>	3.102	3.338	4.728	5.126	5.638	5.499	5.783	5.249	5.761	5.625	5.858	ns	
		GCLK PLL	t <sub>co</sub>	1.310	1.488	1.926	2.025	2.240	2.251	2.278	2.130	2.348	2.358	2.266	ns	
	DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.106	3.341	4.725	5.121	5.632	5.493	5.777	5.244	5.754	5.618	5.851	ns
			GCLK PLL	t <sub>co</sub>	1.314	1.491	1.923	2.020	2.234	2.245	2.272	2.125	2.341	2.351	2.259	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.132	3.370	4.770	5.169	5.682	5.543	5.827	5.292	5.804	5.668	5.901	ns	
		GCLK PLL	t <sub>co</sub>	1.340	1.520	1.968	2.068	2.284	2.295	2.322	2.173	2.391	2.401	2.309	ns	
	6mA	GCLK	t <sub>co</sub>	3.118	3.356	4.758	5.158	5.672	5.533	5.817	5.282	5.795	5.659	5.892	ns	
		GCLK PLL	t <sub>co</sub>	1.326	1.506	1.956	2.057	2.274	2.285	2.312	2.163	2.382	2.392	2.300	ns	
	8mA	GCLK	t <sub>co</sub>	3.106	3.343	4.741	5.140	5.654	5.515	5.799	5.264	5.777	5.641	5.874	ns	
		GCLK PLL	t <sub>co</sub>	1.314	1.493	1.939	2.039	2.256	2.267	2.294	2.145	2.364	2.374	2.282	ns	
	10mA	GCLK	t <sub>co</sub>	3.106	3.343	4.744	5.144	5.658	5.519	5.803	5.268	5.782	5.646	5.879	ns	
		GCLK PLL	t <sub>co</sub>	1.314	1.493	1.942	2.043	2.260	2.271	2.298	2.149	2.369	2.379	2.287	ns	
	12mA	GCLK	t <sub>co</sub>	3.102	3.339	4.737	5.136	5.651	5.512	5.796	5.261	5.774	5.638	5.871	ns	
		GCLK PLL	t <sub>co</sub>	1.310	1.489	1.935	2.035	2.253	2.264	2.291	2.142	2.361	2.371	2.279	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.106	3.341	4.730	5.127	5.639	5.500	5.784	5.250	5.761	5.625	5.858	ns
			GCLK PLL	t <sub>co</sub>	1.314	1.491	1.928	2.026	2.241	2.252	2.279	2.131	2.348	2.358	2.266	ns
16mA		GCLK	t <sub>co</sub>	3.107	3.343	4.738	5.137	5.650	5.511	5.795	5.260	5.773	5.637	5.870	ns	
		GCLK PLL	t <sub>co</sub>	1.315	1.493	1.936	2.036	2.252	2.263	2.290	2.141	2.360	2.370	2.278	ns	

**Table 1-76.** EP3SL110 Column Pins output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.135	3.373	4.769	5.167	5.680	5.541	5.825	5.291	5.802	5.666	5.899	ns	
		GCLK PLL	$t_{co}$	1.343	1.523	1.967	2.066	2.282	2.293	2.320	2.172	2.389	2.399	2.307	ns	
	6mA	GCLK	$t_{co}$	3.124	3.361	4.757	5.155	5.668	5.529	5.813	5.279	5.790	5.654	5.887	ns	
		GCLK PLL	$t_{co}$	1.332	1.511	1.955	2.054	2.270	2.281	2.308	2.160	2.377	2.387	2.295	ns	
	8mA	GCLK	$t_{co}$	3.119	3.357	4.757	5.156	5.669	5.530	5.814	5.280	5.792	5.656	5.889	ns	
		GCLK PLL	$t_{co}$	1.327	1.507	1.955	2.055	2.271	2.282	2.309	2.161	2.379	2.389	2.297	ns	
	10mA	GCLK	$t_{co}$	3.105	3.342	4.739	5.137	5.650	5.511	5.795	5.261	5.774	5.638	5.871	ns	
		GCLK PLL	$t_{co}$	1.313	1.492	1.937	2.036	2.252	2.263	2.290	2.142	2.361	2.371	2.279	ns	
	12mA	GCLK	$t_{co}$	3.103	3.340	4.737	5.135	5.648	5.509	5.793	5.259	5.771	5.635	5.868	ns	
		GCLK PLL	$t_{co}$	1.311	1.490	1.935	2.034	2.250	2.261	2.288	2.140	2.358	2.368	2.276	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	$t_{co}$	3.107	3.342	4.729	5.125	5.636	5.497	5.781	5.248	5.758	5.622	5.855	ns
			GCLK PLL	$t_{co}$	1.315	1.492	1.927	2.024	2.238	2.249	2.276	2.129	2.345	2.355	2.263	ns
16mA		GCLK	$t_{co}$	3.107	3.343	4.737	5.135	5.648	5.509	5.793	5.259	5.771	5.635	5.868	ns	
		GCLK PLL	$t_{co}$	1.315	1.493	1.935	2.034	2.250	2.261	2.288	2.140	2.358	2.368	2.276	ns	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.123	3.360	4.753	5.150	5.662	5.523	5.807	5.274	5.784	5.648	5.881	ns	
		GCLK PLL	$t_{co}$	1.331	1.510	1.951	2.049	2.264	2.275	2.302	2.155	2.371	2.381	2.289	ns	
	10mA	GCLK	$t_{co}$	3.123	3.360	4.753	5.150	5.662	5.523	5.807	5.274	5.784	5.648	5.881	ns	
		GCLK PLL	$t_{co}$	1.331	1.510	1.951	2.049	2.264	2.275	2.302	2.155	2.371	2.381	2.289	ns	
	12mA	GCLK	$t_{co}$	3.113	3.350	4.743	5.140	5.652	5.513	5.797	5.264	5.775	5.639	5.872	ns	
		GCLK PLL	$t_{co}$	1.321	1.500	1.941	2.039	2.254	2.265	2.292	2.145	2.362	2.372	2.280	ns	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.106	3.342	4.729	5.125	5.636	5.497	5.781	5.248	5.758	5.622	5.855	ns	
		GCLK PLL	$t_{co}$	1.314	1.492	1.927	2.024	2.238	2.249	2.276	2.129	2.345	2.355	2.263	ns	

Table 1-77 specifies EP3SL110 Row Pins Output Timing parameters for differential I/O standards.

**Table 1-77.** EP3SL110 Row Pins output Timing Parameters (Part 1 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS	—	GCLK	t <sub>co</sub>	2.711	2.894	4.033	4.387	4.843	4.717	4.978	4.486	4.943	4.816	5.035	ns
			GCLK PLL	t <sub>co</sub>	0.934	1.059	1.248	1.300	1.459	1.480	1.491	1.379	1.542	1.561	1.459
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.106	3.342	4.709	5.107	5.611	5.475	5.730	5.229	5.736	5.599	5.802	ns
			GCLK PLL	t <sub>co</sub>	1.326	1.503	1.919	2.016	2.222	2.235	2.238	2.120	2.330	2.340	2.222
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.088	3.332	4.747	5.153	5.665	5.529	5.784	5.280	5.797	5.660	5.863	ns
			GCLK PLL	t <sub>co</sub>	1.308	1.493	1.957	2.062	2.276	2.289	2.292	2.171	2.391	2.401	2.283
MINI-LVDS	—	GCLK	t <sub>co</sub>	2.711	2.894	4.033	4.387	4.843	4.717	4.978	4.486	4.943	4.816	5.035	ns
			GCLK PLL	t <sub>co</sub>	0.934	1.059	1.248	1.300	1.459	1.480	1.491	1.379	1.542	1.561	1.459
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.106	3.342	4.709	5.107	5.611	5.475	5.730	5.229	5.736	5.599	5.802	ns
			GCLK PLL	t <sub>co</sub>	1.326	1.503	1.919	2.016	2.222	2.235	2.238	2.120	2.330	2.340	2.222
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.088	3.332	4.747	5.153	5.665	5.529	5.784	5.280	5.797	5.660	5.863	ns
			GCLK PLL	t <sub>co</sub>	1.308	1.493	1.957	2.062	2.276	2.289	2.292	2.171	2.391	2.401	2.283
RSDS	—	GCLK	t <sub>co</sub>	2.711	2.894	4.033	4.387	4.843	4.717	4.978	4.486	4.943	4.816	5.035	ns
			GCLK PLL	t <sub>co</sub>	0.934	1.059	1.248	1.300	1.459	1.480	1.491	1.379	1.542	1.561	1.459
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.106	3.342	4.709	5.107	5.611	5.475	5.730	5.229	5.736	5.599	5.802	ns
			GCLK PLL	t <sub>co</sub>	1.326	1.503	1.919	2.016	2.222	2.235	2.238	2.120	2.330	2.340	2.222
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.088	3.332	4.747	5.153	5.665	5.529	5.784	5.280	5.797	5.660	5.863	ns
			GCLK PLL	t <sub>co</sub>	1.308	1.493	1.957	2.062	2.276	2.289	2.292	2.171	2.391	2.401	2.283
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.132	3.375	4.783	5.187	5.698	5.562	5.817	5.313	5.826	5.689	5.892	ns
			GCLK PLL	t <sub>co</sub>	1.352	1.536	1.993	2.096	2.309	2.322	2.325	2.204	2.420	2.430	2.312
DIFFERENTIAL 1.2-V HSTL CLASS I	6mA	GCLK	t <sub>co</sub>	3.118	3.361	4.770	5.174	5.685	5.549	5.804	5.299	5.813	5.676	5.879	ns
			GCLK PLL	t <sub>co</sub>	1.338	1.522	1.980	2.083	2.296	2.309	2.312	2.190	2.407	2.417	2.299
DIFFERENTIAL 1.2-V HSTL CLASS I	8mA	GCLK	t <sub>co</sub>	3.114	3.357	4.768	5.174	5.686	5.550	5.805	5.299	5.815	5.678	5.881	ns
			GCLK PLL	t <sub>co</sub>	1.334	1.518	1.978	2.083	2.297	2.310	2.313	2.190	2.409	2.419	2.301
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.130	3.372	4.769	5.171	5.680	5.544	5.799	5.296	5.808	5.671	5.874	ns
			GCLK PLL	t <sub>co</sub>	1.350	1.533	1.979	2.080	2.291	2.304	2.307	2.187	2.402	2.412	2.294

**Table 1-77.** EP3SL110 Row Pins output Timing Parameters (Part 2 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.5-V HSTL CLASS I	6mA	GCLK	t <sub>co</sub>	3.119	3.362	4.765	5.167	5.677	5.541	5.796	5.293	5.805	5.668	5.871	ns
		GCLK PLL	t <sub>co</sub>	1.339	1.523	1.975	2.076	2.288	2.301	2.304	2.184	2.399	2.409	2.291	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	8mA	GCLK	t <sub>co</sub>	3.116	3.359	4.763	5.165	5.675	5.539	5.794	5.291	5.804	5.667	5.870	ns
		GCLK PLL	t <sub>co</sub>	1.336	1.520	1.973	2.074	2.286	2.299	2.302	2.182	2.398	2.408	2.290	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.127	3.369	4.764	5.166	5.674	5.538	5.793	5.291	5.802	5.665	5.868	ns
		GCLK PLL	t <sub>co</sub>	1.347	1.530	1.974	2.075	2.285	2.298	2.301	2.182	2.396	2.406	2.288	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	6mA	GCLK	t <sub>co</sub>	3.117	3.360	4.762	5.164	5.673	5.537	5.792	5.290	5.802	5.665	5.868	ns
		GCLK PLL	t <sub>co</sub>	1.337	1.521	1.972	2.073	2.284	2.297	2.300	2.181	2.396	2.406	2.288	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	8mA	GCLK	t <sub>co</sub>	3.103	3.346	4.747	5.149	5.659	5.523	5.778	5.275	5.787	5.650	5.853	ns
		GCLK PLL	t <sub>co</sub>	1.323	1.507	1.957	2.058	2.270	2.283	2.286	2.166	2.381	2.391	2.273	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	10mA	GCLK	t <sub>co</sub>	3.100	3.342	4.743	5.145	5.655	5.519	5.774	5.271	5.783	5.646	5.849	ns
		GCLK PLL	t <sub>co</sub>	1.320	1.503	1.953	2.054	2.266	2.279	2.282	2.162	2.377	2.387	2.269	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	12mA	GCLK	t <sub>co</sub>	3.097	3.340	4.744	5.148	5.658	5.522	5.777	5.274	5.787	5.650	5.853	ns
		GCLK PLL	t <sub>co</sub>	1.317	1.501	1.954	2.057	2.269	2.282	2.285	2.165	2.381	2.391	2.273	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.098	3.340	4.734	5.136	5.645	5.509	5.764	5.261	5.773	5.636	5.839	ns
		GCLK PLL	t <sub>co</sub>	1.318	1.501	1.944	2.045	2.256	2.269	2.272	2.152	2.367	2.377	2.259	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.147	3.393	4.805	5.209	5.721	5.585	5.840	5.335	5.849	5.712	5.915	ns
		GCLK PLL	t <sub>co</sub>	1.367	1.554	2.015	2.118	2.332	2.345	2.348	2.226	2.443	2.453	2.335	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	6mA	GCLK	t <sub>co</sub>	3.123	3.369	4.787	5.192	5.704	5.568	5.823	5.318	5.834	5.697	5.900	ns
		GCLK PLL	t <sub>co</sub>	1.343	1.530	1.997	2.101	2.315	2.328	2.331	2.209	2.428	2.438	2.320	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	3.106	3.350	4.765	5.170	5.682	5.546	5.801	5.296	5.812	5.675	5.878	ns
		GCLK PLL	t <sub>co</sub>	1.326	1.511	1.975	2.079	2.293	2.306	2.309	2.187	2.406	2.416	2.298	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.151	3.396	4.805	5.209	5.720	5.584	5.839	5.335	5.849	5.712	5.915	ns
		GCLK PLL	t <sub>co</sub>	1.371	1.557	2.015	2.118	2.331	2.344	2.347	2.226	2.443	2.453	2.335	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	6mA	GCLK	t <sub>co</sub>	3.136	3.381	4.791	5.194	5.705	5.569	5.824	5.320	5.834	5.697	5.900	ns
		GCLK PLL	t <sub>co</sub>	1.356	1.542	2.001	2.103	2.316	2.329	2.332	2.211	2.428	2.438	2.320	ns

**Table 1-77.** EP3SL110 Row Pins output Timing Parameters (Part 3 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.8-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	3.125	3.370	4.786	5.191	5.702	5.566	5.821	5.317	5.832	5.695	5.898	ns
		GCLK PLL	t <sub>co</sub>	1.345	1.531	1.996	2.100	2.313	2.326	2.329	2.208	2.426	2.436	2.318	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	10mA	GCLK	t <sub>co</sub>	3.105	3.350	4.763	5.167	5.679	5.543	5.798	5.294	5.808	5.671	5.874	ns
		GCLK PLL	t <sub>co</sub>	1.325	1.511	1.973	2.076	2.290	2.303	2.306	2.185	2.402	2.412	2.294	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	12mA	GCLK	t <sub>co</sub>	3.102	3.346	4.759	5.164	5.675	5.539	5.794	5.290	5.805	5.668	5.871	ns
		GCLK PLL	t <sub>co</sub>	1.322	1.507	1.969	2.073	2.286	2.299	2.302	2.181	2.399	2.409	2.291	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.107	3.350	4.750	5.152	5.661	5.525	5.780	5.277	5.789	5.652	5.855	ns
		GCLK PLL	t <sub>co</sub>	1.327	1.511	1.960	2.061	2.272	2.285	2.288	2.168	2.383	2.393	2.275	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.100	3.343	4.749	5.153	5.664	5.528	5.783	5.280	5.794	5.657	5.860	ns
		GCLK PLL	t <sub>co</sub>	1.320	1.504	1.959	2.062	2.275	2.288	2.291	2.171	2.388	2.398	2.280	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	3.138	3.382	4.787	5.190	5.700	5.564	5.819	5.316	5.829	5.692	5.895	ns
		GCLK PLL	t <sub>co</sub>	1.358	1.543	1.997	2.099	2.311	2.324	2.327	2.207	2.423	2.433	2.315	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	12mA	GCLK	t <sub>co</sub>	3.120	3.365	4.772	5.175	5.685	5.549	5.804	5.301	5.814	5.677	5.880	ns
		GCLK PLL	t <sub>co</sub>	1.340	1.526	1.982	2.084	2.296	2.309	2.312	2.192	2.408	2.418	2.300	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.106	3.349	4.749	5.151	5.660	5.524	5.779	5.277	5.789	5.652	5.855	ns
		GCLK PLL	t <sub>co</sub>	1.326	1.510	1.959	2.060	2.271	2.284	2.287	2.168	2.383	2.393	2.275	ns

Table 1-78 and Table 1-79 show EP3SL110 regional clock (RCLK) adder values that should be added to GCLK values. These adder values are used to determine I/O timing when I/O pin is driven using regional clock. This applies for all I/O standards supported by Stratix III devices.

Table 1-78 specifies EP3SL110 Column Pin delay adders when using the regional clock.

**Table 1-78.** EP3SL110 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RCLK input adder	0.186	0.171	0.245	0.255	0.268	0.261	0.393	0.248	0.277	0.267	0.364	ns
RCLK PLL input adder	2.391	2.371	3.577	4.036	4.418	4.225	4.574	4.044	4.442	4.246	4.635	ns
RCLK output adder	-0.374	-0.162	-0.226	-0.233	-0.244	-0.239	-0.367	-0.111	-0.123	-0.116	-0.296	ns
RCLK PLL output adder	-2.001	-1.786	-2.669	-2.844	-2.996	-2.879	-2.722	-2.699	-3.067	-2.798	-2.773	ns

Table 1-79 specifies EP3SL110 Row Pin delay adders when using the regional clock.

**Table 1-79.** EP3SL110 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
RCLK input adder	0.086	0.109	0.158	0.16	0.161	0.159	0.281	0.137	0.153	0.153	0.285	ns
RCLK PLL input adder	0.075	0.075	0.117	0.123	0.129	0.125	0.222	0.113	0.118	0.114	0.226	ns
RCLK output adder	-0.072	-0.097	-0.137	-0.135	-0.116	-0.134	-0.24	-0.11	-0.104	-0.124	-0.244	ns
RCLK PLL output adder	-0.063	-0.065	-0.097	-0.1	-0.104	-0.101	-0.198	-0.088	-0.09	-0.088	-0.201	ns

### EP3SL150 I/O Timing Parameters

Table 1-80 through Table 1-83 show the maximum I/O timing parameters for EP3SL150 devices for single-ended I/O standards.

Table 1-80 specifies EP3SL150 column pins input timing parameters for single-ended I/O standards.

**Table 1-80.** EP3SL150 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.3-V LVTTTL	GCLK	$t_{su}$	-0.986	-0.964	-1.402	-1.558	-1.797	-1.778	-2.106	-1.558	-1.797	-1.778	-2.106	ns
		$t_h$	1.119	1.093	1.584	1.767	2.027	1.996	2.327	1.767	2.027	1.996	2.327	ns
	GCLK PLL	$t_{su}$	-1.278	-1.221	-1.771	-1.984	-2.197	-2.123	-2.542	-1.984	-2.197	-2.123	-2.542	ns
		$t_h$	1.556	1.499	2.175	2.439	2.697	2.598	3.034	2.439	2.697	2.598	3.034	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-0.986	-0.964	-1.402	-1.558	-1.797	-1.778	-2.106	-1.558	-1.797	-1.778	-2.106	ns
		$t_h$	1.119	1.093	1.584	1.767	2.027	1.996	2.327	1.767	2.027	1.996	2.327	ns
	GCLK PLL	$t_{su}$	-1.278	-1.221	-1.771	-1.984	-2.197	-2.123	-2.542	-1.984	-2.197	-2.123	-2.542	ns
		$t_h$	1.556	1.499	2.175	2.439	2.697	2.598	3.034	2.439	2.697	2.598	3.034	ns
3.0-V LVTTTL	GCLK	$t_{su}$	-0.997	-0.975	-1.401	-1.560	-1.796	-1.777	-2.105	-1.560	-1.796	-1.777	-2.105	ns
		$t_h$	1.130	1.104	1.583	1.769	2.026	1.995	2.326	1.769	2.026	1.995	2.326	ns
	GCLK PLL	$t_{su}$	-1.289	-1.232	-1.770	-1.986	-2.196	-2.122	-2.541	-1.986	-2.196	-2.122	-2.541	ns
		$t_h$	1.567	1.510	2.174	2.441	2.696	2.597	3.033	2.441	2.696	2.597	3.033	ns
3.0-V LVCMOS	GCLK	$t_{su}$	-0.997	-0.975	-1.401	-1.560	-1.796	-1.777	-2.105	-1.560	-1.796	-1.777	-2.105	ns
		$t_h$	1.130	1.104	1.583	1.769	2.026	1.995	2.326	1.769	2.026	1.995	2.326	ns
	GCLK PLL	$t_{su}$	-1.289	-1.232	-1.770	-1.986	-2.196	-2.122	-2.541	-1.986	-2.196	-2.122	-2.541	ns
		$t_h$	1.567	1.510	2.174	2.441	2.696	2.597	3.033	2.441	2.696	2.597	3.033	ns
2.5 V	GCLK	$t_{su}$	-0.992	-0.970	-1.410	-1.572	-1.815	-1.796	-2.124	-1.572	-1.815	-1.796	-2.124	ns
		$t_h$	1.125	1.099	1.592	1.781	2.045	2.014	2.345	1.781	2.045	2.014	2.345	ns
	GCLK PLL	$t_{su}$	-1.284	-1.227	-1.779	-1.998	-2.215	-2.141	-2.560	-1.998	-2.215	-2.141	-2.560	ns
		$t_h$	1.562	1.505	2.183	2.453	2.715	2.616	3.052	2.453	2.715	2.616	3.052	ns



**Table 1-80.** EP3SL150 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.8 V	GCLK	t <sub>SU</sub>	-1.014	-0.992	-1.450	-1.608	-1.813	-1.794	-2.122	-1.608	-1.813	-1.794	-2.122	ns
		t <sub>H</sub>	1.149	1.123	1.632	1.817	2.043	2.012	2.343	1.817	2.043	2.012	2.343	ns
	GCLK PLL	t <sub>SU</sub>	-1.306	-1.249	-1.819	-2.034	-2.213	-2.139	-2.558	-2.034	-2.213	-2.139	-2.558	ns
		t <sub>H</sub>	1.586	1.529	2.223	2.489	2.713	2.614	3.050	2.489	2.713	2.614	3.050	ns
1.5 V	GCLK	t <sub>SU</sub>	-1.004	-0.982	-1.427	-1.576	-1.743	-1.724	-2.052	-1.576	-1.743	-1.724	-2.052	ns
		t <sub>H</sub>	1.139	1.113	1.609	1.785	1.973	1.942	2.273	1.785	1.973	1.942	2.273	ns
	GCLK PLL	t <sub>SU</sub>	-1.296	-1.239	-1.796	-2.002	-2.143	-2.069	-2.488	-2.002	-2.143	-2.069	-2.488	ns
		t <sub>H</sub>	1.576	1.519	2.200	2.457	2.643	2.544	2.980	2.457	2.643	2.544	2.980	ns
1.2 V	GCLK	t <sub>SU</sub>	-0.952	-0.930	-1.350	-1.477	-1.587	-1.568	-1.896	-1.477	-1.587	-1.568	-1.896	ns
		t <sub>H</sub>	1.087	1.061	1.532	1.686	1.817	1.786	2.117	1.686	1.817	1.786	2.117	ns
	GCLK PLL	t <sub>SU</sub>	-1.244	-1.187	-1.719	-1.903	-1.987	-1.913	-2.332	-1.903	-1.987	-1.913	-2.332	ns
		t <sub>H</sub>	1.524	1.467	2.123	2.358	2.487	2.388	2.824	2.358	2.487	2.388	2.824	ns
SSTL-2 CLASS I	GCLK	t <sub>SU</sub>	-0.923	-0.901	-1.322	-1.461	-1.589	-1.570	-1.898	-1.461	-1.589	-1.570	-1.898	ns
		t <sub>H</sub>	1.058	1.032	1.504	1.670	1.819	1.788	2.119	1.670	1.819	1.788	2.119	ns
	GCLK PLL	t <sub>SU</sub>	-1.215	-1.158	-1.691	-1.887	-1.989	-1.915	-2.334	-1.887	-1.989	-1.915	-2.334	ns
		t <sub>H</sub>	1.495	1.438	2.095	2.342	2.489	2.390	2.826	2.342	2.489	2.390	2.826	ns
SSTL-2 CLASS II	GCLK	t <sub>SU</sub>	-0.923	-0.901	-1.322	-1.461	-1.589	-1.570	-1.898	-1.461	-1.589	-1.570	-1.898	ns
		t <sub>H</sub>	1.058	1.032	1.504	1.670	1.819	1.788	2.119	1.670	1.819	1.788	2.119	ns
	GCLK PLL	t <sub>SU</sub>	-1.215	-1.158	-1.691	-1.887	-1.989	-1.915	-2.334	-1.887	-1.989	-1.915	-2.334	ns
		t <sub>H</sub>	1.495	1.438	2.095	2.342	2.489	2.390	2.826	2.342	2.489	2.390	2.826	ns
SSTL-18 CLASS I	GCLK	t <sub>SU</sub>	-0.917	-0.895	-1.309	-1.453	-1.586	-1.565	-1.896	-1.453	-1.586	-1.565	-1.896	ns
		t <sub>H</sub>	1.052	1.026	1.491	1.659	1.813	1.782	2.112	1.659	1.813	1.782	2.112	ns
	GCLK PLL	t <sub>SU</sub>	-1.209	-1.152	-1.678	-1.879	-1.986	-1.910	-2.332	-1.879	-1.986	-1.910	-2.332	ns
		t <sub>H</sub>	1.489	1.432	2.082	2.331	2.483	2.384	2.819	2.331	2.483	2.384	2.819	ns
SSTL-18 CLASS II	GCLK	t <sub>SU</sub>	-0.917	-0.895	-1.309	-1.453	-1.586	-1.565	-1.896	-1.453	-1.586	-1.565	-1.896	ns
		t <sub>H</sub>	1.052	1.026	1.491	1.659	1.813	1.782	2.112	1.659	1.813	1.782	2.112	ns
	GCLK PLL	t <sub>SU</sub>	-1.209	-1.152	-1.678	-1.879	-1.986	-1.910	-2.332	-1.879	-1.986	-1.910	-2.332	ns
		t <sub>H</sub>	1.489	1.432	2.082	2.331	2.483	2.384	2.819	2.331	2.483	2.384	2.819	ns
SSTL-15 CLASS I	GCLK	t <sub>SU</sub>	-0.906	-0.884	-1.298	-1.442	-1.567	-1.546	-1.877	-1.442	-1.567	-1.546	-1.877	ns
		t <sub>H</sub>	1.041	1.015	1.479	1.648	1.794	1.763	2.093	1.648	1.794	1.763	2.093	ns
	GCLK PLL	t <sub>SU</sub>	-1.198	-1.141	-1.667	-1.868	-1.967	-1.891	-2.313	-1.868	-1.967	-1.891	-2.313	ns
		t <sub>H</sub>	1.478	1.421	2.070	2.320	2.464	2.365	2.800	2.320	2.464	2.365	2.800	ns
1.8-V HSTL CLASS I	GCLK	t <sub>SU</sub>	-0.906	-0.884	-1.298	-1.442	-1.567	-1.546	-1.877	-1.442	-1.567	-1.546	-1.877	ns
		t <sub>H</sub>	1.041	1.015	1.479	1.648	1.794	1.763	2.093	1.648	1.794	1.763	2.093	ns
	GCLK PLL	t <sub>SU</sub>	-1.198	-1.141	-1.667	-1.868	-1.967	-1.891	-2.313	-1.868	-1.967	-1.891	-2.313	ns
		t <sub>H</sub>	1.478	1.421	2.070	2.320	2.464	2.365	2.800	2.320	2.464	2.365	2.800	ns

**Table 1-80.** EP3SL150 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.917	-0.895	-1.309	-1.453	-1.586	-1.565	-1.896	-1.453	-1.586	-1.565	-1.896	ns
		$t_h$	1.052	1.026	1.491	1.659	1.813	1.782	2.112	1.659	1.813	1.782	2.112	ns
	GCLK PLL	$t_{su}$	-1.209	-1.152	-1.678	-1.879	-1.986	-1.910	-2.332	-1.879	-1.986	-1.910	-2.332	ns
		$t_h$	1.489	1.432	2.082	2.331	2.483	2.384	2.819	2.331	2.483	2.384	2.819	ns
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.917	-0.895	-1.309	-1.453	-1.586	-1.565	-1.896	-1.453	-1.586	-1.565	-1.896	ns
		$t_h$	1.052	1.026	1.491	1.659	1.813	1.782	2.112	1.659	1.813	1.782	2.112	ns
	GCLK PLL	$t_{su}$	-1.209	-1.152	-1.678	-1.879	-1.986	-1.910	-2.332	-1.879	-1.986	-1.910	-2.332	ns
		$t_h$	1.489	1.432	2.082	2.331	2.483	2.384	2.819	2.331	2.483	2.384	2.819	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.906	-0.884	-1.298	-1.442	-1.567	-1.546	-1.877	-1.442	-1.567	-1.546	-1.877	ns
		$t_h$	1.041	1.015	1.479	1.648	1.794	1.763	2.093	1.648	1.794	1.763	2.093	ns
	GCLK PLL	$t_{su}$	-1.198	-1.141	-1.667	-1.868	-1.967	-1.891	-2.313	-1.868	-1.967	-1.891	-2.313	ns
		$t_h$	1.478	1.421	2.070	2.320	2.464	2.365	2.800	2.320	2.464	2.365	2.800	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.906	-0.884	-1.298	-1.442	-1.567	-1.546	-1.877	-1.442	-1.567	-1.546	-1.877	ns
		$t_h$	1.041	1.015	1.479	1.648	1.794	1.763	2.093	1.648	1.794	1.763	2.093	ns
	GCLK PLL	$t_{su}$	-1.198	-1.141	-1.667	-1.868	-1.967	-1.891	-2.313	-1.868	-1.967	-1.891	-2.313	ns
		$t_h$	1.478	1.421	2.070	2.320	2.464	2.365	2.800	2.320	2.464	2.365	2.800	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.894	-0.872	-1.288	-1.431	-1.551	-1.530	-1.861	-1.431	-1.551	-1.530	-1.861	ns
		$t_h$	1.029	1.003	1.469	1.637	1.778	1.747	2.077	1.637	1.778	1.747	2.077	ns
	GCLK PLL	$t_{su}$	-1.186	-1.129	-1.657	-1.857	-1.951	-1.875	-2.297	-1.857	-1.951	-1.875	-2.297	ns
		$t_h$	1.466	1.409	2.060	2.309	2.448	2.349	2.784	2.309	2.448	2.349	2.784	ns
3.0-V PCI	GCLK	$t_{su}$	-0.894	-0.872	-1.288	-1.431	-1.551	-1.530	-1.861	-1.431	-1.551	-1.530	-1.861	ns
		$t_h$	1.029	1.003	1.469	1.637	1.778	1.747	2.077	1.637	1.778	1.747	2.077	ns
	GCLK PLL	$t_{su}$	-1.186	-1.129	-1.657	-1.857	-1.951	-1.875	-2.297	-1.857	-1.951	-1.875	-2.297	ns
		$t_h$	1.466	1.409	2.060	2.309	2.448	2.349	2.784	2.309	2.448	2.349	2.784	ns
3.0-V PCI-X	GCLK	$t_{su}$	-0.997	-0.975	-1.401	-1.560	-1.796	-1.777	-2.105	-1.560	-1.796	-1.777	-2.105	ns
		$t_h$	1.130	1.104	1.583	1.769	2.026	1.995	2.326	1.769	2.026	1.995	2.326	ns
	GCLK PLL	$t_{su}$	-1.289	-1.232	-1.770	-1.986	-2.196	-2.122	-2.541	-1.986	-2.196	-2.122	-2.541	ns
		$t_h$	1.567	1.510	2.174	2.441	2.696	2.597	3.033	2.441	2.696	2.597	3.033	ns

Table 1-81 specifies EP3SL150 row pins input timing parameters for single-ended I/O standards.

**Table 1-81.** EP3SL150 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-0.925	-0.964	-1.360	-1.470	-1.682	-1.633	-1.954	-1.480	-1.679	-1.634	-1.993	ns
		t <sub>h</sub>	1.040	1.094	1.544	1.677	1.910	1.851	2.173	1.698	1.917	1.860	2.212	ns
	GCLK PLL	t <sub>su</sub>	0.988	1.009	1.642	1.858	1.971	1.855	1.796	1.865	1.993	1.875	1.848	ns
		t <sub>h</sub>	-0.737	-0.741	-1.241	-1.407	-1.471	-1.383	-1.314	-1.407	-1.482	-1.393	-1.363	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-0.925	-0.964	-1.360	-1.470	-1.682	-1.633	-1.954	-1.480	-1.679	-1.634	-1.993	ns
		t <sub>h</sub>	1.040	1.094	1.544	1.677	1.910	1.851	2.173	1.698	1.917	1.860	2.212	ns
	GCLK PLL	t <sub>su</sub>	0.988	1.009	1.642	1.858	1.971	1.855	1.796	1.865	1.993	1.875	1.848	ns
		t <sub>h</sub>	-0.737	-0.741	-1.241	-1.407	-1.471	-1.383	-1.314	-1.407	-1.482	-1.393	-1.363	ns
3.0-V LVTTTL	GCLK	t <sub>su</sub>	-0.931	-0.975	-1.357	-1.471	-1.685	-1.636	-1.957	-1.479	-1.684	-1.639	-1.998	ns
		t <sub>h</sub>	1.046	1.105	1.541	1.678	1.913	1.854	2.176	1.697	1.922	1.865	2.217	ns
	GCLK PLL	t <sub>su</sub>	0.982	0.998	1.645	1.857	1.968	1.852	1.793	1.866	1.988	1.870	1.843	ns
		t <sub>h</sub>	-0.731	-0.730	-1.244	-1.406	-1.468	-1.380	-1.311	-1.408	-1.477	-1.388	-1.358	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-0.931	-0.975	-1.357	-1.471	-1.685	-1.636	-1.957	-1.479	-1.684	-1.639	-1.998	ns
		t <sub>h</sub>	1.046	1.105	1.541	1.678	1.913	1.854	2.176	1.697	1.922	1.865	2.217	ns
	GCLK PLL	t <sub>su</sub>	0.982	0.998	1.645	1.857	1.968	1.852	1.793	1.866	1.988	1.870	1.843	ns
		t <sub>h</sub>	-0.731	-0.730	-1.244	-1.406	-1.468	-1.380	-1.311	-1.408	-1.477	-1.388	-1.358	ns
2.5 V	GCLK	t <sub>su</sub>	-0.919	-0.968	-1.366	-1.484	-1.700	-1.651	-1.972	-1.488	-1.694	-1.649	-2.008	ns
		t <sub>h</sub>	1.034	1.098	1.550	1.691	1.928	1.869	2.191	1.706	1.932	1.875	2.227	ns
	GCLK PLL	t <sub>su</sub>	0.994	1.005	1.636	1.844	1.953	1.837	1.778	1.857	1.978	1.860	1.833	ns
		t <sub>h</sub>	-0.743	-0.737	-1.235	-1.393	-1.453	-1.365	-1.296	-1.399	-1.467	-1.378	-1.348	ns
1.8 V	GCLK	t <sub>su</sub>	-0.949	-1.000	-1.406	-1.530	-1.590	-1.662	-1.875	-1.521	-1.582	-1.663	-1.913	ns
		t <sub>h</sub>	1.065	1.131	1.590	1.738	1.824	1.880	2.098	1.739	1.826	1.889	2.137	ns
	GCLK PLL	t <sub>su</sub>	0.964	0.966	1.589	1.806	1.955	1.835	1.780	1.824	1.977	1.854	1.832	ns
		t <sub>h</sub>	-0.712	-0.698	-1.190	-1.356	-1.455	-1.362	-1.298	-1.366	-1.466	-1.372	-1.347	ns
1.5 V	GCLK	t <sub>su</sub>	-0.939	-0.989	-1.382	-1.498	-1.522	-1.594	-1.807	-1.490	-1.517	-1.598	-1.848	ns
		t <sub>h</sub>	1.055	1.120	1.566	1.706	1.756	1.812	2.030	1.708	1.761	1.824	2.072	ns
	GCLK PLL	t <sub>su</sub>	0.974	0.977	1.613	1.838	2.023	1.903	1.848	1.855	2.042	1.919	1.897	ns
		t <sub>h</sub>	-0.722	-0.709	-1.214	-1.388	-1.523	-1.430	-1.366	-1.397	-1.531	-1.437	-1.412	ns
1.2 V	GCLK	t <sub>su</sub>	-0.879	-0.936	-1.303	-1.397	-1.363	-1.435	-1.648	-1.394	-1.362	-1.443	-1.693	ns
		t <sub>h</sub>	0.995	1.067	1.487	1.605	1.597	1.653	1.871	1.612	1.606	1.669	1.917	ns
	GCLK PLL	t <sub>su</sub>	1.034	1.030	1.692	1.939	2.182	2.062	2.007	1.951	2.197	2.074	2.052	ns
		t <sub>h</sub>	-0.782	-0.762	-1.293	-1.489	-1.682	-1.589	-1.525	-1.493	-1.686	-1.592	-1.567	ns

**Table 1-81.** EP3SL150 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-0.862	-0.910	-1.280	-1.375	-1.480	-1.431	-1.752	-1.376	-1.477	-1.432	-1.791	ns
		t <sub>h</sub>	0.978	1.041	1.464	1.582	1.708	1.649	1.971	1.594	1.715	1.658	2.010	ns
	GCLK PLL	t <sub>su</sub>	1.051	1.063	1.722	1.953	2.173	2.057	1.998	1.969	2.195	2.077	2.050	ns
		t <sub>h</sub>	-0.799	-0.794	-1.321	-1.502	-1.673	-1.585	-1.516	-1.511	-1.684	-1.595	-1.565	ns
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-0.862	-0.910	-1.280	-1.375	-1.480	-1.431	-1.752	-1.376	-1.477	-1.432	-1.791	ns
		t <sub>h</sub>	0.978	1.041	1.464	1.582	1.708	1.649	1.971	1.594	1.715	1.658	2.010	ns
	GCLK PLL	t <sub>su</sub>	1.051	1.063	1.722	1.953	2.173	2.057	1.998	1.969	2.195	2.077	2.050	ns
		t <sub>h</sub>	-0.799	-0.794	-1.321	-1.502	-1.673	-1.585	-1.516	-1.511	-1.684	-1.595	-1.565	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-0.853	-0.901	-1.265	-1.370	-1.361	-1.429	-1.646	-1.362	-1.358	-1.435	-1.688	ns
		t <sub>h</sub>	0.969	1.032	1.449	1.576	1.592	1.646	1.865	1.578	1.599	1.660	1.908	ns
	GCLK PLL	t <sub>su</sub>	1.060	1.065	1.730	1.966	2.187	2.068	2.011	1.983	2.204	2.082	2.059	ns
		t <sub>h</sub>	-0.808	-0.797	-1.331	-1.518	-1.689	-1.596	-1.533	-1.527	-1.696	-1.601	-1.578	ns
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-0.853	-0.901	-1.265	-1.370	-1.361	-1.429	-1.646	-1.362	-1.358	-1.435	-1.688	ns
		t <sub>h</sub>	0.969	1.032	1.449	1.576	1.592	1.646	1.865	1.578	1.599	1.660	1.908	ns
	GCLK PLL	t <sub>su</sub>	1.060	1.065	1.730	1.966	2.187	2.068	2.011	1.983	2.204	2.082	2.059	ns
		t <sub>h</sub>	-0.808	-0.797	-1.331	-1.518	-1.689	-1.596	-1.533	-1.527	-1.696	-1.601	-1.578	ns
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-0.839	-0.889	-1.250	-1.360	-1.343	-1.411	-1.628	-1.351	-1.341	-1.418	-1.671	ns
		t <sub>h</sub>	0.955	1.020	1.435	1.566	1.574	1.628	1.847	1.567	1.582	1.643	1.891	ns
	GCLK PLL	t <sub>su</sub>	1.074	1.077	1.745	1.976	2.205	2.086	2.029	1.994	2.221	2.099	2.076	ns
		t <sub>h</sub>	-0.822	-0.809	-1.345	-1.528	-1.707	-1.614	-1.551	-1.538	-1.713	-1.618	-1.595	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.853	-0.901	-1.265	-1.370	-1.361	-1.429	-1.646	-1.362	-1.358	-1.435	-1.688	ns
		t <sub>h</sub>	0.969	1.032	1.449	1.576	1.592	1.646	1.865	1.578	1.599	1.660	1.908	ns
	GCLK PLL	t <sub>su</sub>	1.060	1.065	1.730	1.966	2.187	2.068	2.011	1.983	2.204	2.082	2.059	ns
		t <sub>h</sub>	-0.808	-0.797	-1.331	-1.518	-1.689	-1.596	-1.533	-1.527	-1.696	-1.601	-1.578	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.853	-0.901	-1.265	-1.370	-1.361	-1.429	-1.646	-1.362	-1.358	-1.435	-1.688	ns
		t <sub>h</sub>	0.969	1.032	1.449	1.576	1.592	1.646	1.865	1.578	1.599	1.660	1.908	ns
	GCLK PLL	t <sub>su</sub>	1.060	1.065	1.730	1.966	2.187	2.068	2.011	1.983	2.204	2.082	2.059	ns
		t <sub>h</sub>	-0.808	-0.797	-1.331	-1.518	-1.689	-1.596	-1.533	-1.527	-1.696	-1.601	-1.578	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.839	-0.889	-1.250	-1.360	-1.343	-1.411	-1.628	-1.351	-1.341	-1.418	-1.671	ns
		t <sub>h</sub>	0.955	1.020	1.435	1.566	1.574	1.628	1.847	1.567	1.582	1.643	1.891	ns
	GCLK PLL	t <sub>su</sub>	1.074	1.077	1.745	1.976	2.205	2.086	2.029	1.994	2.221	2.099	2.076	ns
		t <sub>h</sub>	-0.822	-0.809	-1.345	-1.528	-1.707	-1.614	-1.551	-1.538	-1.713	-1.618	-1.595	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.839	-0.889	-1.250	-1.360	-1.343	-1.411	-1.628	-1.351	-1.341	-1.418	-1.671	ns
		t <sub>h</sub>	0.955	1.020	1.435	1.566	1.574	1.628	1.847	1.567	1.582	1.643	1.891	ns
	GCLK PLL	t <sub>su</sub>	1.074	1.077	1.745	1.976	2.205	2.086	2.029	1.994	2.221	2.099	2.076	ns
		t <sub>h</sub>	-0.822	-0.809	-1.345	-1.528	-1.707	-1.614	-1.551	-1.538	-1.713	-1.618	-1.595	ns

**Table 1-81.** EP3SL150 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.830	-0.877	-1.241	-1.350	-1.327	-1.395	-1.612	-1.342	-1.325	-1.402	-1.655	ns
		t <sub>h</sub>	0.946	1.008	1.426	1.556	1.558	1.612	1.831	1.558	1.566	1.627	1.875	ns
	GCLK PLL	t <sub>su</sub>	1.083	1.089	1.754	1.986	2.221	2.102	2.045	2.003	2.237	2.115	2.092	ns
		t <sub>h</sub>	-0.831	-0.821	-1.354	-1.538	-1.723	-1.630	-1.567	-1.547	-1.729	-1.634	-1.611	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.830	-0.877	-1.241	-1.350	-1.327	-1.395	-1.612	-1.342	-1.325	-1.402	-1.655	ns
		t <sub>h</sub>	0.946	1.008	1.426	1.556	1.558	1.612	1.831	1.558	1.566	1.627	1.875	ns
	GCLK PLL	t <sub>su</sub>	1.083	1.089	1.754	1.986	2.221	2.102	2.045	2.003	2.237	2.115	2.092	ns
		t <sub>h</sub>	-0.831	-0.821	-1.354	-1.538	-1.723	-1.630	-1.567	-1.547	-1.729	-1.634	-1.611	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-0.931	-0.975	-1.357	-1.471	-1.685	-1.636	-1.957	-1.479	-1.684	-1.639	-1.998	ns
		t <sub>h</sub>	1.046	1.105	1.541	1.678	1.913	1.854	2.176	1.697	1.922	1.865	2.217	ns
	GCLK PLL	t <sub>su</sub>	0.982	0.998	1.645	1.857	1.968	1.852	1.793	1.866	1.988	1.870	1.843	ns
		t <sub>h</sub>	-0.731	-0.730	-1.244	-1.406	-1.468	-1.380	-1.311	-1.408	-1.477	-1.388	-1.358	ns
3.0-V PCI-X	GCLK	t <sub>su</sub>	-0.931	-0.975	-1.357	-1.471	-1.685	-1.636	-1.957	-1.479	-1.684	-1.639	-1.998	ns
		t <sub>h</sub>	1.046	1.105	1.541	1.678	1.913	1.854	2.176	1.697	1.922	1.865	2.217	ns
	GCLK PLL	t <sub>su</sub>	0.982	0.998	1.645	1.857	1.968	1.852	1.793	1.866	1.988	1.870	1.843	ns
		t <sub>h</sub>	-0.731	-0.730	-1.244	-1.406	-1.468	-1.380	-1.311	-1.408	-1.477	-1.388	-1.358	ns

Table 1-82 specifies EP3SL150 Column Pins Output Timing parameters for single-ended I/O standards.

**Table 1-82.** EP3SL150 Column Pins output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.422	3.439	4.768	5.127	5.625	5.473	5.808	5.127	5.625	5.473	5.808	ns
		GCLK PLL	t <sub>co</sub>	3.898	3.841	5.355	5.880	6.341	6.161	6.543	5.880	6.341	6.161	6.543	ns
	8mA	GCLK	t <sub>co</sub>	3.355	3.372	4.659	5.016	5.512	5.360	5.695	5.016	5.512	5.360	5.695	ns
		GCLK PLL	t <sub>co</sub>	3.781	3.774	5.246	5.718	6.228	6.048	6.430	5.718	6.228	6.048	6.430	ns
	12mA	GCLK	t <sub>co</sub>	3.269	3.286	4.555	4.918	5.420	5.268	5.603	4.918	5.420	5.268	5.603	ns
		GCLK PLL	t <sub>co</sub>	3.692	3.688	5.142	5.583	6.136	5.956	6.338	5.583	6.136	5.956	6.338	ns
	16mA	GCLK	t <sub>co</sub>	3.262	3.279	4.538	4.890	5.379	5.227	5.562	4.890	5.379	5.227	5.562	ns
		GCLK PLL	t <sub>co</sub>	3.685	3.681	5.125	5.555	6.095	5.915	6.297	5.555	6.095	5.915	6.297	ns

**Table 1-82.** EP3SL150 Column Pins output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.428	3.445	4.772	5.132	5.632	5.480	5.815	5.132	5.632	5.480	5.815	ns
		GCLK PLL	t <sub>co</sub>	3.901	3.847	5.359	5.892	6.348	6.168	6.550	5.892	6.348	6.168	6.550	ns
	8mA	GCLK	t <sub>co</sub>	3.273	3.290	4.565	4.935	5.431	5.279	5.614	4.935	5.431	5.279	5.614	ns
		GCLK PLL	t <sub>co</sub>	3.701	3.692	5.152	5.600	6.147	5.967	6.349	5.600	6.147	5.967	6.349	ns
	12mA	GCLK	t <sub>co</sub>	3.280	3.297	4.559	4.914	5.405	5.253	5.588	4.914	5.405	5.253	5.588	ns
		GCLK PLL	t <sub>co</sub>	3.703	3.699	5.146	5.579	6.121	5.941	6.323	5.579	6.121	5.941	6.323	ns
	16mA	GCLK	t <sub>co</sub>	3.264	3.281	4.537	4.888	5.376	5.224	5.559	4.888	5.376	5.224	5.559	ns
		GCLK PLL	t <sub>co</sub>	3.687	3.683	5.124	5.553	6.092	5.912	6.294	5.553	6.092	5.912	6.294	ns
3.0-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.386	3.403	4.735	5.096	5.592	5.440	5.775	5.096	5.592	5.440	5.775	ns
		GCLK PLL	t <sub>co</sub>	3.843	3.805	5.322	5.831	6.308	6.128	6.510	5.831	6.308	6.128	6.510	ns
	8mA	GCLK	t <sub>co</sub>	3.275	3.292	4.605	4.962	5.455	5.303	5.637	4.962	5.455	5.303	5.637	ns
		GCLK PLL	t <sub>co</sub>	3.713	3.694	5.192	5.659	6.170	5.991	6.371	5.659	6.170	5.991	6.371	ns
	12mA	GCLK	t <sub>co</sub>	3.239	3.256	4.542	4.893	5.381	5.229	5.563	4.893	5.381	5.229	5.563	ns
		GCLK PLL	t <sub>co</sub>	3.662	3.658	5.129	5.560	6.096	5.917	6.298	5.560	6.096	5.917	6.298	ns
	16mA	GCLK	t <sub>co</sub>	3.221	3.238	4.513	4.865	5.352	5.200	5.535	4.865	5.352	5.200	5.535	ns
		GCLK PLL	t <sub>co</sub>	3.644	3.640	5.100	5.530	6.070	5.888	6.270	5.530	6.070	5.888	6.270	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.300	3.317	4.639	4.995	5.490	5.338	5.672	4.995	5.490	5.338	5.672	ns
		GCLK PLL	t <sub>co</sub>	3.751	3.719	5.226	5.712	6.205	6.026	6.406	5.712	6.205	6.026	6.406	ns
	8mA	GCLK	t <sub>co</sub>	3.221	3.238	4.515	4.866	5.355	5.203	5.537	4.866	5.355	5.203	5.537	ns
		GCLK PLL	t <sub>co</sub>	3.644	3.640	5.102	5.531	6.083	5.891	6.271	5.531	6.083	5.891	6.271	ns
	12mA	GCLK	t <sub>co</sub>	3.216	3.233	4.508	4.859	5.346	5.194	5.529	4.859	5.346	5.194	5.529	ns
		GCLK PLL	t <sub>co</sub>	3.639	3.635	5.095	5.524	6.062	5.882	6.264	5.524	6.062	5.882	6.264	ns
	16mA	GCLK	t <sub>co</sub>	3.207	3.224	4.494	4.844	5.331	5.179	5.514	4.844	5.331	5.179	5.514	ns
		GCLK PLL	t <sub>co</sub>	3.630	3.626	5.081	5.509	6.057	5.867	6.249	5.509	6.057	5.867	6.249	ns

**Table 1-82.** EP3SL150 Column Pins output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	
2.5 V	4mA	GCLK	t <sub>co</sub>	3.422	3.439	4.846	5.222	5.737	5.585	5.919	5.222	5.737	5.585	5.919	ns
		GCLK PLL	t <sub>co</sub>	3.898	3.841	5.433	5.991	6.452	6.273	6.654	5.991	6.452	6.273	6.654	ns
	8mA	GCLK	t <sub>co</sub>	3.322	3.339	4.727	5.096	5.605	5.453	5.787	5.096	5.605	5.453	5.787	ns
		GCLK PLL	t <sub>co</sub>	3.773	3.741	5.314	5.807	6.320	6.141	6.521	5.807	6.320	6.141	6.521	ns
	12mA	GCLK	t <sub>co</sub>	3.278	3.295	4.640	5.006	5.509	5.357	5.692	5.006	5.509	5.357	5.692	ns
		GCLK PLL	t <sub>co</sub>	3.701	3.697	5.227	5.671	6.225	6.045	6.427	5.671	6.225	6.045	6.427	ns
	16mA	GCLK	t <sub>co</sub>	3.240	3.257	4.601	4.963	5.466	5.314	5.649	4.963	5.466	5.314	5.649	ns
		GCLK PLL	t <sub>co</sub>	3.663	3.659	5.188	5.628	6.182	6.002	6.384	5.628	6.182	6.002	6.384	ns
1.8 V	2mA	GCLK	t <sub>co</sub>	3.613	3.630	5.167	5.582	6.141	5.989	6.324	5.582	6.141	5.989	6.324	ns
		GCLK PLL	t <sub>co</sub>	4.161	4.032	5.754	6.474	6.857	6.677	7.059	6.474	6.857	6.677	7.059	ns
	4mA	GCLK	t <sub>co</sub>	3.432	3.449	4.888	5.273	5.794	5.642	5.976	5.273	5.794	5.642	5.976	ns
		GCLK PLL	t <sub>co</sub>	3.920	3.851	5.475	6.068	6.509	6.330	6.710	6.068	6.509	6.330	6.710	ns
	6mA	GCLK	t <sub>co</sub>	3.350	3.367	4.781	5.158	5.683	5.531	5.866	5.158	5.683	5.531	5.866	ns
		GCLK PLL	t <sub>co</sub>	3.802	3.769	5.368	5.878	6.399	6.219	6.601	5.878	6.399	6.219	6.601	ns
	8mA	GCLK	t <sub>co</sub>	3.330	3.347	4.723	5.105	5.617	5.465	5.800	5.105	5.617	5.465	5.800	ns
		GCLK PLL	t <sub>co</sub>	3.753	3.749	5.310	5.780	6.333	6.153	6.535	5.780	6.333	6.153	6.535	ns
	10mA	GCLK	t <sub>co</sub>	3.267	3.284	4.662	5.030	5.536	5.384	5.719	5.030	5.536	5.384	5.719	ns
		GCLK PLL	t <sub>co</sub>	3.690	3.686	5.249	5.695	6.252	6.072	6.454	5.695	6.252	6.072	6.454	ns
	12mA	GCLK	t <sub>co</sub>	3.249	3.266	4.641	5.008	5.513	5.361	5.696	5.008	5.513	5.361	5.696	ns
		GCLK PLL	t <sub>co</sub>	3.672	3.668	5.228	5.673	6.229	6.049	6.431	5.673	6.229	6.049	6.431	ns

**Table 1-82.** EP3SL150 Column Pins output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
1.5 V	2mA	GCLK	t <sub>co</sub>	3.559	3.576	5.096	5.515	6.079	5.927	6.262	5.515	6.079	5.927	6.262	ns
		GCLK PLL	t <sub>co</sub>	4.069	3.978	5.683	6.384	6.795	6.615	6.997	6.384	6.795	6.615	6.997	ns
	4mA	GCLK	t <sub>co</sub>	3.347	3.364	4.777	5.158	5.687	5.535	5.870	5.158	5.687	5.535	5.870	ns
		GCLK PLL	t <sub>co</sub>	3.786	3.766	5.364	5.871	6.403	6.223	6.605	5.871	6.403	6.223	6.605	ns
	6mA	GCLK	t <sub>co</sub>	3.322	3.339	4.710	5.098	5.620	5.468	5.803	5.098	5.620	5.468	5.803	ns
		GCLK PLL	t <sub>co</sub>	3.745	3.741	5.297	5.763	6.336	6.156	6.538	5.763	6.336	6.156	6.538	ns
	8mA	GCLK	t <sub>co</sub>	3.311	3.328	4.693	5.073	5.600	5.448	5.783	5.073	5.600	5.448	5.783	ns
		GCLK PLL	t <sub>co</sub>	3.734	3.730	5.280	5.742	6.316	6.136	6.518	5.742	6.316	6.136	6.518	ns
	10mA	GCLK	t <sub>co</sub>	3.256	3.273	4.655	5.023	5.530	5.378	5.713	5.023	5.530	5.378	5.713	ns
		GCLK PLL	t <sub>co</sub>	3.679	3.675	5.242	5.688	6.246	6.066	6.448	5.688	6.246	6.066	6.448	ns
	12mA	GCLK	t <sub>co</sub>	3.251	3.268	4.638	5.011	5.519	5.367	5.702	5.011	5.519	5.367	5.702	ns
		GCLK PLL	t <sub>co</sub>	3.674	3.670	5.225	5.676	6.235	6.055	6.437	5.676	6.235	6.055	6.437	ns
1.2 V	2mA	GCLK	t <sub>co</sub>	3.475	3.492	5.022	5.450	6.023	5.871	6.206	5.450	6.023	5.871	6.206	ns
		GCLK PLL	t <sub>co</sub>	3.959	3.894	5.609	6.283	6.739	6.559	6.941	6.283	6.739	6.559	6.941	ns
	4mA	GCLK	t <sub>co</sub>	3.352	3.369	4.796	5.189	5.737	5.585	5.920	5.189	5.737	5.585	5.920	ns
		GCLK PLL	t <sub>co</sub>	3.786	3.771	5.383	5.902	6.453	6.273	6.655	5.902	6.453	6.273	6.655	ns
	6mA	GCLK	t <sub>co</sub>	3.314	3.331	4.704	5.099	5.624	5.472	5.807	5.099	5.624	5.472	5.807	ns
		GCLK PLL	t <sub>co</sub>	3.737	3.733	5.291	5.764	6.340	6.160	6.542	5.764	6.340	6.160	6.542	ns
	8mA	GCLK	t <sub>co</sub>	3.267	3.284	4.676	5.050	5.568	5.416	5.751	5.050	5.568	5.416	5.751	ns
		GCLK PLL	t <sub>co</sub>	3.690	3.686	5.263	5.715	6.284	6.104	6.486	5.715	6.284	6.104	6.486	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.267	3.284	4.633	4.998	5.499	5.347	5.682	4.998	5.499	5.347	5.682	ns
		GCLK PLL	t <sub>co</sub>	3.690	3.686	5.220	5.663	6.215	6.035	6.417	5.663	6.215	6.035	6.417	ns
	10mA	GCLK	t <sub>co</sub>	3.264	3.281	4.630	4.994	5.495	5.343	5.678	4.994	5.495	5.343	5.678	ns
		GCLK PLL	t <sub>co</sub>	3.687	3.683	5.217	5.659	6.211	6.031	6.413	5.659	6.211	6.031	6.413	ns
	12mA	GCLK	t <sub>co</sub>	3.262	3.279	4.630	4.995	5.496	5.344	5.679	4.995	5.496	5.344	5.679	ns
		GCLK PLL	t <sub>co</sub>	3.685	3.681	5.217	5.660	6.212	6.032	6.414	5.660	6.212	6.032	6.414	ns



**Table 1-82.** EP3SL150 Column Pins output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.253	3.270	4.615	4.980	5.481	5.329	5.664	4.980	5.481	5.329	5.664	ns	
		GCLK PLL	t <sub>co</sub>	3.676	3.672	5.202	5.645	6.197	6.017	6.399	5.645	6.197	6.017	6.399	ns	
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.274	3.291	4.645	5.012	5.515	5.363	5.698	5.012	5.515	5.363	5.698	ns	
		GCLK PLL	t <sub>co</sub>	3.697	3.693	5.232	5.677	6.231	6.051	6.433	5.677	6.231	6.051	6.433	ns	
	6mA	GCLK	t <sub>co</sub>	3.270	3.287	4.643	5.010	5.513	5.361	5.696	5.010	5.513	5.361	5.696	ns	
		GCLK PLL	t <sub>co</sub>	3.693	3.689	5.230	5.675	6.229	6.049	6.431	5.675	6.229	6.049	6.431	ns	
	8mA	GCLK	t <sub>co</sub>	3.259	3.276	4.633	5.000	5.504	5.352	5.687	5.000	5.504	5.352	5.687	ns	
		GCLK PLL	t <sub>co</sub>	3.682	3.678	5.220	5.665	6.220	6.040	6.422	5.665	6.220	6.040	6.422	ns	
	10mA	GCLK	t <sub>co</sub>	3.248	3.265	4.620	4.987	5.491	5.339	5.674	4.987	5.491	5.339	5.674	ns	
		GCLK PLL	t <sub>co</sub>	3.671	3.667	5.207	5.652	6.207	6.027	6.409	5.652	6.207	6.027	6.409	ns	
	12mA	GCLK	t <sub>co</sub>	3.248	3.265	4.620	4.987	5.491	5.339	5.674	4.987	5.491	5.339	5.674	ns	
		GCLK PLL	t <sub>co</sub>	3.671	3.667	5.207	5.652	6.207	6.027	6.409	5.652	6.207	6.027	6.409	ns	
	SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.254	3.271	4.619	4.984	5.486	5.334	5.669	4.984	5.486	5.334	5.669	ns
			GCLK PLL	t <sub>co</sub>	3.677	3.673	5.206	5.649	6.202	6.022	6.404	5.649	6.202	6.022	6.404	ns
16mA		GCLK	t <sub>co</sub>	3.257	3.274	4.627	4.994	5.498	5.346	5.681	4.994	5.498	5.346	5.681	ns	
		GCLK PLL	t <sub>co</sub>	3.680	3.676	5.214	5.659	6.214	6.034	6.416	5.659	6.214	6.034	6.416	ns	
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.278	3.295	4.654	5.023	5.528	5.376	5.711	5.023	5.528	5.376	5.711	ns	
		GCLK PLL	t <sub>co</sub>	3.701	3.697	5.241	5.688	6.244	6.064	6.446	5.688	6.244	6.064	6.446	ns	
	6mA	GCLK	t <sub>co</sub>	3.264	3.281	4.644	5.013	5.519	5.367	5.702	5.013	5.519	5.367	5.702	ns	
		GCLK PLL	t <sub>co</sub>	3.687	3.683	5.231	5.678	6.235	6.055	6.437	5.678	6.235	6.055	6.437	ns	
	8mA	GCLK	t <sub>co</sub>	3.253	3.270	4.630	4.999	5.505	5.353	5.688	4.999	5.505	5.353	5.688	ns	
		GCLK PLL	t <sub>co</sub>	3.676	3.672	5.217	5.664	6.221	6.041	6.423	5.664	6.221	6.041	6.423	ns	
	10mA	GCLK	t <sub>co</sub>	3.252	3.269	4.633	5.003	5.509	5.357	5.692	5.003	5.509	5.357	5.692	ns	
		GCLK PLL	t <sub>co</sub>	3.675	3.671	5.220	5.668	6.225	6.045	6.427	5.668	6.225	6.045	6.427	ns	
	12mA	GCLK	t <sub>co</sub>	3.249	3.266	4.628	4.997	5.503	5.351	5.686	4.997	5.503	5.351	5.686	ns	
		GCLK PLL	t <sub>co</sub>	3.672	3.668	5.215	5.662	6.219	6.039	6.421	5.662	6.219	6.039	6.421	ns	

**Table 1-82.** EP3SL150 Column Pins output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
SSTL-15 CLASS II	8mA	GCLK	t <sub>co</sub>	3.251	3.268	4.617	4.983	5.486	5.334	5.669	4.983	5.486	5.334	5.669	ns	
		GCLK PLL	t <sub>co</sub>	3.674	3.670	5.204	5.648	6.202	6.022	6.404	5.648	6.202	6.022	6.404	ns	
	16mA	GCLK	t <sub>co</sub>	3.254	3.271	4.624	4.992	5.497	5.345	5.680	4.992	5.497	5.345	5.680	ns	
		GCLK PLL	t <sub>co</sub>	3.677	3.673	5.211	5.657	6.213	6.033	6.415	5.657	6.213	6.033	6.415	ns	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.261	3.278	4.619	4.983	5.484	5.332	5.667	4.983	5.484	5.332	5.667	ns	
		GCLK PLL	t <sub>co</sub>	3.684	3.680	5.206	5.648	6.200	6.020	6.402	5.648	6.200	6.020	6.402	ns	
	6mA	GCLK	t <sub>co</sub>	3.254	3.271	4.617	4.982	5.483	5.331	5.666	4.982	5.483	5.331	5.666	ns	
		GCLK PLL	t <sub>co</sub>	3.677	3.673	5.204	5.647	6.199	6.019	6.401	5.647	6.199	6.019	6.401	ns	
	8mA	GCLK	t <sub>co</sub>	3.246	3.263	4.609	4.974	5.476	5.324	5.659	4.974	5.476	5.324	5.659	ns	
		GCLK PLL	t <sub>co</sub>	3.669	3.665	5.196	5.639	6.192	6.012	6.394	5.639	6.192	6.012	6.394	ns	
	10mA	GCLK	t <sub>co</sub>	3.249	3.266	4.612	4.978	5.480	5.328	5.663	4.978	5.480	5.328	5.663	ns	
		GCLK PLL	t <sub>co</sub>	3.672	3.668	5.199	5.643	6.196	6.016	6.398	5.643	6.196	6.016	6.398	ns	
	12mA	GCLK	t <sub>co</sub>	3.246	3.263	4.615	4.981	5.484	5.332	5.667	4.981	5.484	5.332	5.667	ns	
		GCLK PLL	t <sub>co</sub>	3.669	3.665	5.202	5.646	6.200	6.020	6.402	5.646	6.200	6.020	6.402	ns	
	1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.254	3.271	4.614	4.979	5.480	5.328	5.663	4.979	5.480	5.328	5.663	ns
			GCLK PLL	t <sub>co</sub>	3.677	3.673	5.201	5.644	6.196	6.016	6.398	5.644	6.196	6.016	6.398	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.266	3.283	4.627	4.993	5.495	5.343	5.678	4.993	5.495	5.343	5.678	ns	
		GCLK PLL	t <sub>co</sub>	3.689	3.685	5.214	5.658	6.211	6.031	6.413	5.658	6.211	6.031	6.413	ns	
	6mA	GCLK	t <sub>co</sub>	3.262	3.279	4.628	4.995	5.498	5.346	5.681	4.995	5.498	5.346	5.681	ns	
		GCLK PLL	t <sub>co</sub>	3.685	3.681	5.215	5.660	6.214	6.034	6.416	5.660	6.214	6.034	6.416	ns	
	8mA	GCLK	t <sub>co</sub>	3.258	3.275	4.624	4.990	5.493	5.341	5.676	4.990	5.493	5.341	5.676	ns	
		GCLK PLL	t <sub>co</sub>	3.681	3.677	5.211	5.655	6.209	6.029	6.411	5.655	6.209	6.029	6.411	ns	
	10mA	GCLK	t <sub>co</sub>	3.251	3.268	4.617	4.983	5.486	5.334	5.669	4.983	5.486	5.334	5.669	ns	
		GCLK PLL	t <sub>co</sub>	3.674	3.670	5.204	5.648	6.202	6.022	6.404	5.648	6.202	6.022	6.404	ns	
	12mA	GCLK	t <sub>co</sub>	3.252	3.269	4.624	4.991	5.496	5.344	5.679	4.991	5.496	5.344	5.679	ns	
		GCLK PLL	t <sub>co</sub>	3.675	3.671	5.211	5.656	6.212	6.032	6.414	5.656	6.212	6.032	6.414	ns	

**Table 1-82.** EP3SL150 Column Pins output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	
1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.250	3.267	4.605	4.969	5.470	5.318	5.653	4.969	5.470	5.318	5.653	ns
		GCLK PLL	t <sub>co</sub>	3.673	3.669	5.192	5.634	6.186	6.006	6.388	5.634	6.186	6.006	6.388	ns
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.269	3.286	4.641	5.010	5.516	5.364	5.699	5.010	5.516	5.364	5.699	ns
		GCLK PLL	t <sub>co</sub>	3.692	3.688	5.228	5.675	6.232	6.052	6.434	5.675	6.232	6.052	6.434	ns
	6mA	GCLK	t <sub>co</sub>	3.261	3.278	4.632	5.001	5.507	5.355	5.690	5.001	5.507	5.355	5.690	ns
		GCLK PLL	t <sub>co</sub>	3.684	3.680	5.219	5.666	6.223	6.043	6.425	5.666	6.223	6.043	6.425	ns
	8mA	GCLK	t <sub>co</sub>	3.262	3.279	4.640	5.010	5.516	5.364	5.699	5.010	5.516	5.364	5.699	ns
		GCLK PLL	t <sub>co</sub>	3.685	3.681	5.227	5.675	6.232	6.052	6.434	5.675	6.232	6.052	6.434	ns
	10mA	GCLK	t <sub>co</sub>	3.251	3.268	4.627	4.996	5.502	5.350	5.685	4.996	5.502	5.350	5.685	ns
		GCLK PLL	t <sub>co</sub>	3.674	3.670	5.214	5.661	6.218	6.038	6.420	5.661	6.218	6.038	6.420	ns
	12mA	GCLK	t <sub>co</sub>	3.251	3.268	4.627	4.996	5.503	5.351	5.686	4.996	5.503	5.351	5.686	ns
		GCLK PLL	t <sub>co</sub>	3.674	3.670	5.214	5.661	6.219	6.039	6.421	5.661	6.219	6.039	6.421	ns
1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.272	3.289	4.643	5.011	5.516	5.364	5.699	5.011	5.516	5.364	5.699	ns
		GCLK PLL	t <sub>co</sub>	3.695	3.691	5.230	5.676	6.233	6.052	6.434	5.676	6.233	6.052	6.434	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.375	3.392	4.688	5.045	5.541	5.389	5.724	5.045	5.541	5.389	5.724	ns
		GCLK PLL	t <sub>co</sub>	3.798	3.794	5.275	5.710	6.264	6.077	6.459	5.710	6.264	6.077	6.459	ns
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.375	3.392	4.688	5.045	5.541	5.389	5.724	5.045	5.541	5.389	5.724	ns
		GCLK PLL	t <sub>co</sub>	3.798	3.794	5.275	5.710	6.264	6.077	6.459	5.710	6.264	6.077	6.459	ns

Table 1-83 specifies EP3SL150 Row Pins Output Timing parameters for single-ended I/O standards.

**Table 1-83.** EP3SL150 Row Pins output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.3-V LVTTTL	4mA	GCLK	$t_{co}$	3.214	3.466	4.819	5.204	5.693	5.566	5.831	5.325	5.817	5.689	5.913	ns
		GCLK PLL	$t_{co}$	1.420	1.606	1.985	2.065	2.256	2.277	2.285	2.167	2.360	2.380	2.277	ns
	8mA	GCLK	$t_{co}$	3.121	3.361	4.689	5.066	5.548	5.421	5.686	5.184	5.668	5.540	5.764	ns
		GCLK PLL	$t_{co}$	1.354	1.535	1.875	1.954	2.142	2.163	2.171	2.054	2.245	2.265	2.162	ns
	12mA	GCLK	$t_{co}$	3.042	3.271	4.570	4.943	5.420	5.293	5.558	5.057	5.536	5.408	5.632	ns
		GCLK PLL	$t_{co}$	1.275	1.446	1.769	1.854	2.046	2.067	2.075	1.955	2.145	2.165	2.062	ns
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.224	3.470	4.827	5.209	5.697	5.570	5.835	5.331	5.821	5.693	5.917	ns
		GCLK PLL	$t_{co}$	1.422	1.613	1.989	2.071	2.265	2.286	2.294	2.175	2.372	2.392	2.289	ns
	8mA	GCLK	$t_{co}$	3.046	3.275	4.576	4.949	5.427	5.301	5.564	5.063	5.543	5.417	5.639	ns
		GCLK PLL	$t_{co}$	1.279	1.450	1.780	1.869	2.056	2.077	2.085	1.967	2.154	2.174	2.071	ns
3.0-V LVTTTL	4mA	GCLK	$t_{co}$	3.168	3.412	4.771	5.157	5.649	5.522	5.787	5.282	5.775	5.647	5.871	ns
		GCLK PLL	$t_{co}$	1.381	1.567	1.952	2.034	2.222	2.243	2.251	2.135	2.326	2.346	2.243	ns
	8mA	GCLK	$t_{co}$	3.047	3.285	4.618	4.998	5.485	5.358	5.623	5.120	5.611	5.482	5.706	ns
		GCLK PLL	$t_{co}$	1.280	1.455	1.815	1.892	2.077	2.098	2.106	1.993	2.181	2.200	2.097	ns
	12mA	GCLK	$t_{co}$	3.010	3.242	4.536	4.915	5.397	5.270	5.535	5.034	5.518	5.389	5.613	ns
		GCLK PLL	$t_{co}$	1.243	1.417	1.755	1.827	2.007	2.028	2.036	1.925	2.107	2.127	2.024	ns
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.082	3.331	4.665	5.050	5.539	5.412	5.677	5.174	5.664	5.535	5.759	ns
		GCLK PLL	$t_{co}$	1.302	1.479	1.850	1.927	2.113	2.134	2.142	2.026	2.217	2.236	2.133	ns
	8mA	GCLK	$t_{co}$	2.997	3.226	4.502	4.876	5.358	5.231	5.496	4.994	5.478	5.349	5.573	ns
		GCLK PLL	$t_{co}$	1.230	1.401	1.727	1.798	1.979	2.000	2.008	1.895	2.079	2.098	1.995	ns
2.5 V	4mA	GCLK	$t_{co}$	3.194	3.448	4.903	5.311	5.821	5.694	5.959	5.442	5.954	5.825	6.049	ns
		GCLK PLL	$t_{co}$	1.407	1.604	2.060	2.160	2.367	2.388	2.396	2.267	2.478	2.498	2.395	ns
	8mA	GCLK	$t_{co}$	3.089	3.350	4.748	5.148	5.651	5.524	5.789	5.275	5.780	5.651	5.875	ns
		GCLK PLL	$t_{co}$	1.322	1.501	1.936	2.025	2.225	2.246	2.254	2.130	2.334	2.353	2.250	ns
	12mA	GCLK	$t_{co}$	3.038	3.282	4.637	5.029	5.525	5.398	5.663	5.152	5.650	5.521	5.745	ns
		GCLK PLL	$t_{co}$	1.265	1.457	1.852	1.939	2.134	2.155	2.163	2.041	2.239	2.259	2.156	ns

**Table 1-83.** EP3SL150 Row Pins output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =0.9V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =1.1V	V <sub>CC1</sub> =0.9V	
1.8 V	2mA	GCLK	t <sub>co</sub>	3.431	3.699	5.291	5.740	6.296	6.169	6.434	5.882	6.438	6.310	6.534	ns
		GCLK PLL	t <sub>co</sub>	1.655	1.850	2.491	2.527	2.770	2.796	2.799	2.776	2.888	2.913	2.805	ns
	4mA	GCLK	t <sub>co</sub>	3.206	3.497	4.964	5.371	5.891	5.764	6.029	5.517	6.032	5.903	6.127	ns
		GCLK PLL	t <sub>co</sub>	1.430	1.648	2.164	2.201	2.410	2.436	2.439	2.411	2.527	2.551	2.443	ns
	6mA	GCLK	t <sub>co</sub>	3.141	3.395	4.811	5.221	5.732	5.605	5.870	5.349	5.859	5.731	5.955	ns
		GCLK PLL	t <sub>co</sub>	1.365	1.546	2.011	2.096	2.310	2.336	2.339	2.243	2.421	2.446	2.338	ns
	8mA	GCLK	t <sub>co</sub>	3.081	3.321	4.734	5.127	5.635	5.508	5.773	5.254	5.765	5.637	5.861	ns
		GCLK PLL	t <sub>co</sub>	1.327	1.508	1.937	2.043	2.244	2.270	2.273	2.148	2.349	2.374	2.266	ns
1.5 V	2mA	GCLK	t <sub>co</sub>	3.342	3.617	5.201	5.653	6.224	6.097	6.362	5.789	6.362	6.234	6.458	ns
		GCLK PLL	t <sub>co</sub>	1.566	1.768	2.401	2.454	2.707	2.733	2.736	2.683	2.823	2.848	2.740	ns
	4mA	GCLK	t <sub>co</sub>	3.100	3.359	4.796	5.216	5.733	5.606	5.871	5.343	5.858	5.730	5.954	ns
		GCLK PLL	t <sub>co</sub>	1.343	1.525	1.996	2.096	2.313	2.339	2.342	2.237	2.422	2.447	2.339	ns
	6mA	GCLK	t <sub>co</sub>	3.073	3.312	4.723	5.120	5.627	5.502	5.765	5.245	5.753	5.625	5.849	ns
		GCLK PLL	t <sub>co</sub>	1.316	1.499	1.923	2.035	2.244	2.270	2.273	2.139	2.349	2.374	2.266	ns
	8mA	GCLK	t <sub>co</sub>	3.064	3.303	4.701	5.102	5.608	5.483	5.746	5.227	5.731	5.606	5.827	ns
		GCLK PLL	t <sub>co</sub>	1.297	1.488	1.905	2.010	2.225	2.251	2.254	2.121	2.330	2.355	2.247	ns
1.2 V	2mA	GCLK	t <sub>co</sub>	3.285	3.542	5.111	5.567	6.149	6.022	6.287	5.701	6.278	6.150	6.374	ns
		GCLK PLL	t <sub>co</sub>	1.509	1.693	2.311	2.386	2.646	2.672	2.675	2.595	2.754	2.779	2.671	ns
	4mA	GCLK	t <sub>co</sub>	3.105	3.353	4.818	5.244	5.774	5.647	5.912	5.368	5.900	5.772	5.996	ns
		GCLK PLL	t <sub>co</sub>	1.348	1.529	2.018	2.124	2.361	2.387	2.390	2.262	2.466	2.491	2.383	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.036	3.270	4.620	5.004	5.495	5.369	5.631	5.123	5.614	5.488	5.708	ns
		GCLK PLL	t <sub>co</sub>	1.269	1.445	1.845	1.930	2.124	2.145	2.153	2.028	2.225	2.245	2.142	ns
	12mA	GCLK	t <sub>co</sub>	3.031	3.266	4.617	5.002	5.493	5.367	5.628	5.122	5.613	5.487	5.706	ns
		GCLK PLL	t <sub>co</sub>	1.264	1.441	1.842	1.928	2.122	2.143	2.151	2.027	2.224	2.244	2.141	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.022	3.255	4.602	4.986	5.476	5.350	5.611	5.105	5.595	5.469	5.688	ns
		GCLK PLL	t <sub>co</sub>	1.255	1.430	1.827	1.912	2.105	2.126	2.134	2.010	2.206	2.226	2.123	ns

**Table 1-83.** EP3SL150 Row Pins output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
SSTL-18 CLASS I	4mA	GCLK	$t_{co}$	3.042	3.277	4.629	5.031	5.512	5.397	5.647	5.135	5.631	5.516	5.724	ns
		GCLK PLL	$t_{co}$	1.276	1.452	1.856	1.947	2.139	2.165	2.168	2.041	2.240	2.265	2.157	ns
	6mA	GCLK	$t_{co}$	3.027	3.263	4.626	5.030	5.511	5.396	5.646	5.133	5.629	5.514	5.722	ns
		GCLK PLL	$t_{co}$	1.271	1.447	1.854	1.946	2.138	2.164	2.167	2.039	2.238	2.263	2.155	ns
	8mA	GCLK	$t_{co}$	3.016	3.251	4.609	5.020	5.501	5.386	5.636	5.116	5.620	5.505	5.713	ns
		GCLK PLL	$t_{co}$	1.260	1.436	1.844	1.936	2.128	2.154	2.157	2.030	2.229	2.254	2.146	ns
	10mA	GCLK	$t_{co}$	2.992	3.228	4.593	5.007	5.488	5.373	5.623	5.101	5.608	5.493	5.701	ns
		GCLK PLL	$t_{co}$	1.249	1.425	1.831	1.923	2.115	2.141	2.144	2.018	2.217	2.242	2.134	ns
	12mA	GCLK	$t_{co}$	2.992	3.227	4.592	5.007	5.488	5.373	5.623	5.100	5.608	5.493	5.701	ns
		GCLK PLL	$t_{co}$	1.249	1.424	1.831	1.923	2.115	2.141	2.144	2.017	2.217	2.242	2.134	ns
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.002	3.236	4.590	5.004	5.483	5.368	5.618	5.095	5.602	5.487	5.695	ns
		GCLK PLL	$t_{co}$	1.257	1.431	1.830	1.920	2.110	2.136	2.139	2.013	2.211	2.236	2.128	ns
	16mA	GCLK	$t_{co}$	2.996	3.231	4.589	5.012	5.493	5.378	5.628	5.097	5.613	5.498	5.706	ns
		GCLK PLL	$t_{co}$	1.258	1.434	1.836	1.928	2.120	2.146	2.149	2.022	2.222	2.247	2.139	ns
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.038	3.273	4.640	5.042	5.526	5.410	5.664	5.148	5.644	5.528	5.740	ns
		GCLK PLL	$t_{co}$	1.279	1.455	1.865	1.958	2.152	2.178	2.181	2.051	2.252	2.277	2.169	ns
	6mA	GCLK	$t_{co}$	3.015	3.251	4.622	5.032	5.515	5.400	5.650	5.132	5.634	5.519	5.727	ns
		GCLK PLL	$t_{co}$	1.265	1.441	1.854	1.948	2.142	2.168	2.171	2.042	2.243	2.268	2.160	ns
	8mA	GCLK	$t_{co}$	2.998	3.234	4.605	5.019	5.502	5.387	5.637	5.114	5.621	5.506	5.714	ns
		GCLK PLL	$t_{co}$	1.254	1.429	1.841	1.935	2.129	2.155	2.158	2.029	2.230	2.255	2.147	ns

**Table 1-83.** EP3SL150 Row Pins output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.017	3.249	4.596	5.002	5.481	5.366	5.616	5.099	5.599	5.484	5.692	ns
		GCLK PLL	t <sub>co</sub>	1.264	1.437	1.829	1.918	2.108	2.134	2.137	2.012	2.208	2.233	2.125	ns
	6mA	GCLK	t <sub>co</sub>	3.005	3.237	4.587	5.001	5.480	5.365	5.615	5.091	5.599	5.484	5.692	ns
		GCLK PLL	t <sub>co</sub>	1.257	1.431	1.827	1.917	2.107	2.133	2.136	2.011	2.208	2.233	2.125	ns
	8mA	GCLK	t <sub>co</sub>	2.992	3.225	4.578	4.994	5.473	5.358	5.608	5.083	5.592	5.477	5.685	ns
		GCLK PLL	t <sub>co</sub>	1.248	1.423	1.820	1.910	2.100	2.126	2.129	2.004	2.201	2.226	2.118	ns
	10mA	GCLK	t <sub>co</sub>	2.994	3.227	4.581	4.997	5.477	5.362	5.612	5.086	5.595	5.480	5.688	ns
		GCLK PLL	t <sub>co</sub>	1.251	1.425	1.823	1.913	2.104	2.130	2.133	2.007	2.204	2.229	2.121	ns
	12mA	GCLK	t <sub>co</sub>	2.987	3.222	4.579	5.000	5.480	5.365	5.615	5.086	5.600	5.485	5.693	ns
GCLK PLL		t <sub>co</sub>	1.247	1.422	1.825	1.916	2.107	2.133	2.136	2.010	2.209	2.234	2.126	ns	
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.993	3.226	4.574	4.997	5.476	5.361	5.611	5.077	5.594	5.479	5.687	ns
		GCLK PLL	t <sub>co</sub>	1.255	1.430	1.823	1.913	2.103	2.129	2.132	2.006	2.203	2.228	2.120	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.024	3.256	4.607	5.012	5.492	5.377	5.627	5.111	5.610	5.495	5.703	ns
		GCLK PLL	t <sub>co</sub>	1.270	1.443	1.838	1.928	2.119	2.145	2.148	2.021	2.219	2.244	2.136	ns
	6mA	GCLK	t <sub>co</sub>	3.012	3.246	4.603	5.014	5.494	5.379	5.629	5.108	5.613	5.498	5.706	ns
		GCLK PLL	t <sub>co</sub>	1.264	1.438	1.839	1.930	2.121	2.147	2.150	2.023	2.222	2.247	2.139	ns
	8mA	GCLK	t <sub>co</sub>	3.008	3.241	4.597	5.009	5.489	5.374	5.624	5.102	5.607	5.492	5.700	ns
		GCLK PLL	t <sub>co</sub>	1.260	1.434	1.834	1.925	2.116	2.142	2.145	2.018	2.216	2.241	2.133	ns
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.023	3.255	4.618	5.028	5.511	5.396	5.646	5.125	5.629	5.514	5.722	ns
		GCLK PLL	t <sub>co</sub>	1.272	1.445	1.851	1.944	2.138	2.164	2.167	2.037	2.238	2.263	2.155	ns
	6mA	GCLK	t <sub>co</sub>	3.011	3.243	4.607	5.019	5.502	5.387	5.637	5.114	5.620	5.505	5.713	ns
		GCLK PLL	t <sub>co</sub>	1.263	1.437	1.842	1.935	2.129	2.155	2.158	2.028	2.229	2.254	2.146	ns
	8mA	GCLK	t <sub>co</sub>	3.007	3.241	4.611	5.027	5.511	5.396	5.646	5.120	5.630	5.515	5.723	ns
		GCLK PLL	t <sub>co</sub>	1.262	1.437	1.849	1.943	2.138	2.164	2.167	2.037	2.239	2.264	2.156	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.142	3.376	4.672	5.050	5.535	5.409	5.670	5.171	5.656	5.530	5.749	ns
		GCLK PLL	t <sub>co</sub>	1.375	1.551	1.897	1.976	2.164	2.185	2.193	2.076	2.267	2.287	2.184	ns
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.142	3.376	4.672	5.050	5.535	5.409	5.670	5.171	5.656	5.530	5.749	ns
		GCLK PLL	t <sub>co</sub>	1.375	1.551	1.897	1.976	2.164	2.185	2.193	2.076	2.267	2.287	2.184	ns

Table 1-84 through Table 1-84 show the maximum I/O timing parameters for EP3SL150 devices for differential I/O standards.

Table 1-84 specifies EP3SL150 column pins input timing parameters for differential I/O standards.

**Table 1-84.** EP3SL150 Column Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS	GCLK	t <sub>su</sub>	-0.978	-1.006	-1.151	-1.135	-1.286	-1.233	-1.594	-1.098	-1.339	-1.193	-1.632	ns
		t <sub>h</sub>	1.104	1.152	1.371	1.387	1.564	1.502	1.860	1.361	1.634	1.471	1.898	ns
	GCLK PLL	t <sub>su</sub>	0.967	1.001	1.885	2.230	2.404	2.293	2.197	2.284	2.556	2.353	2.249	ns
		t <sub>h</sub>	-0.707	-0.719	-1.450	-1.735	-1.855	-1.769	-1.669	-1.780	-1.984	-1.818	-1.718	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-0.978	-1.006	-1.151	-1.135	-1.286	-1.233	-1.594	-1.098	-1.339	-1.193	-1.632	ns
		t <sub>h</sub>	1.104	1.152	1.371	1.387	1.564	1.502	1.860	1.361	1.634	1.471	1.898	ns
	GCLK PLL	t <sub>su</sub>	0.967	1.001	1.885	2.230	2.404	2.293	2.197	2.284	2.556	2.353	2.249	ns
		t <sub>h</sub>	-0.707	-0.719	-1.450	-1.735	-1.855	-1.769	-1.669	-1.780	-1.984	-1.818	-1.718	ns
RSDS	GCLK	t <sub>su</sub>	-0.978	-1.006	-1.151	-1.135	-1.286	-1.233	-1.594	-1.098	-1.339	-1.193	-1.632	ns
		t <sub>h</sub>	1.104	1.152	1.371	1.387	1.564	1.502	1.860	1.361	1.634	1.471	1.898	ns
	GCLK PLL	t <sub>su</sub>	0.967	1.001	1.885	2.230	2.404	2.293	2.197	2.284	2.556	2.353	2.249	ns
		t <sub>h</sub>	-0.707	-0.719	-1.450	-1.735	-1.855	-1.769	-1.669	-1.780	-1.984	-1.818	-1.718	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.794	-0.829	-1.228	-1.334	-1.445	-1.387	-1.743	-1.333	-1.443	-1.391	-1.786	ns
		t <sub>h</sub>	0.913	0.967	1.416	1.546	1.677	1.610	1.964	1.554	1.684	1.621	2.007	ns
	GCLK PLL	t <sub>su</sub>	1.151	1.178	1.808	2.031	2.245	2.139	2.048	2.049	2.266	2.155	2.095	ns
		t <sub>h</sub>	-0.898	-0.904	-1.405	-1.576	-1.742	-1.661	-1.565	-1.587	-1.753	-1.668	-1.609	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.794	-0.829	-1.228	-1.334	-1.445	-1.387	-1.743	-1.333	-1.443	-1.391	-1.786	ns
		t <sub>h</sub>	0.913	0.967	1.416	1.546	1.677	1.610	1.964	1.554	1.684	1.621	2.007	ns
	GCLK PLL	t <sub>su</sub>	1.151	1.178	1.808	2.031	2.245	2.139	2.048	2.049	2.266	2.155	2.095	ns
		t <sub>h</sub>	-0.898	-0.904	-1.405	-1.576	-1.742	-1.661	-1.565	-1.587	-1.753	-1.668	-1.609	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		t <sub>h</sub>	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	t <sub>su</sub>	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		t <sub>h</sub>	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		t <sub>h</sub>	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	t <sub>su</sub>	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		t <sub>h</sub>	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		t <sub>h</sub>	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	t <sub>su</sub>	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		t <sub>h</sub>	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns



**Table 1-84.** EP3SL150 Column Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{SU}$	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		$t_H$	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	$t_{SU}$	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		$t_H$	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{SU}$	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		$t_H$	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	$t_{SU}$	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		$t_H$	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{SU}$	-0.802	-0.841	-1.238	-1.345	-1.461	-1.403	-1.759	-1.344	-1.458	-1.406	-1.801	ns
		$t_H$	0.921	0.979	1.426	1.557	1.693	1.626	1.980	1.565	1.699	1.636	2.022	ns
	GCLK PLL	$t_{SU}$	1.143	1.166	1.798	2.020	2.229	2.123	2.032	2.038	2.251	2.140	2.080	ns
		$t_H$	-0.890	-0.892	-1.395	-1.565	-1.726	-1.645	-1.549	-1.576	-1.738	-1.653	-1.594	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{SU}$	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		$t_H$	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	$t_{SU}$	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		$t_H$	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{SU}$	-0.814	-0.852	-1.247	-1.356	-1.480	-1.422	-1.778	-1.355	-1.476	-1.424	-1.819	ns
		$t_H$	0.933	0.990	1.436	1.568	1.712	1.645	1.999	1.576	1.717	1.654	2.040	ns
	GCLK PLL	$t_{SU}$	1.131	1.155	1.789	2.009	2.210	2.104	2.013	2.027	2.233	2.122	2.062	ns
		$t_H$	-0.878	-0.881	-1.385	-1.554	-1.707	-1.626	-1.530	-1.565	-1.720	-1.635	-1.576	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{SU}$	-0.821	-0.858	-1.259	-1.361	-1.480	-1.424	-1.777	-1.359	-1.471	-1.422	-1.815	ns
		$t_H$	0.940	0.996	1.449	1.576	1.715	1.648	2.003	1.583	1.717	1.653	2.041	ns
	GCLK PLL	$t_{SU}$	1.124	1.149	1.777	2.004	2.210	2.102	2.014	2.023	2.238	2.124	2.066	ns
		$t_H$	-0.871	-0.875	-1.372	-1.546	-1.704	-1.623	-1.526	-1.558	-1.720	-1.636	-1.575	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{SU}$	-0.821	-0.858	-1.259	-1.361	-1.480	-1.424	-1.777	-1.359	-1.471	-1.422	-1.815	ns
		$t_H$	0.940	0.996	1.449	1.576	1.715	1.648	2.003	1.583	1.717	1.653	2.041	ns
	GCLK PLL	$t_{SU}$	1.124	1.149	1.777	2.004	2.210	2.102	2.014	2.023	2.238	2.124	2.066	ns
		$t_H$	-0.871	-0.875	-1.372	-1.546	-1.704	-1.623	-1.526	-1.558	-1.720	-1.636	-1.575	ns

Table 1-85 specifies EP3SL150 row pins input timing parameters for differential I/O standards.

**Table 1-85.** EP3SL150 Row Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
LVDS	GCLK	$t_{SU}$	-0.919	-0.950	-1.021	-0.981	-1.115	-1.070	-1.404	-0.940	-1.066	-1.023	-1.442	ns
		$t_h$	1.043	1.092	1.245	1.237	1.395	1.339	1.672	1.207	1.358	1.303	1.711	ns
	GCLK PLL	$t_{SU}$	0.959	0.987	1.949	2.324	2.527	2.403	2.334	2.384	2.597	2.470	2.387	ns
		$t_h$	-0.698	-0.708	-1.513	-1.828	-1.977	-1.881	-1.804	-1.875	-2.032	-1.933	-1.853	ns
MINI-LVDS	GCLK	$t_{SU}$	-0.919	-0.950	-1.021	-0.981	-1.115	-1.070	-1.404	-0.940	-1.066	-1.023	-1.442	ns
		$t_h$	1.043	1.092	1.245	1.237	1.395	1.339	1.672	1.207	1.358	1.303	1.711	ns
	GCLK PLL	$t_{SU}$	0.959	0.987	1.949	2.324	2.527	2.403	2.334	2.384	2.597	2.470	2.387	ns
		$t_h$	-0.698	-0.708	-1.513	-1.828	-1.977	-1.881	-1.804	-1.875	-2.032	-1.933	-1.853	ns
RSDS	GCLK	$t_{SU}$	-0.919	-0.950	-1.021	-0.981	-1.115	-1.070	-1.404	-0.940	-1.066	-1.023	-1.442	ns
		$t_h$	1.043	1.092	1.245	1.237	1.395	1.339	1.672	1.207	1.358	1.303	1.711	ns
	GCLK PLL	$t_{SU}$	0.959	0.987	1.949	2.324	2.527	2.403	2.334	2.384	2.597	2.470	2.387	ns
		$t_h$	-0.698	-0.708	-1.513	-1.828	-1.977	-1.881	-1.804	-1.875	-2.032	-1.933	-1.853	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{SU}$	-0.724	-0.765	-1.113	-1.210	-1.304	-1.254	-1.583	-1.211	-1.303	-1.255	-1.626	ns
		$t_h$	0.841	0.898	1.302	1.420	1.535	1.474	1.802	1.429	1.543	1.483	1.846	ns
	GCLK PLL	$t_{SU}$	1.154	1.172	1.862	2.100	2.338	2.219	2.155	2.117	2.360	2.238	2.203	ns
		$t_h$	-0.900	-0.902	-1.458	-1.649	-1.837	-1.746	-1.674	-1.657	-1.847	-1.753	-1.718	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{SU}$	-0.724	-0.765	-1.113	-1.210	-1.304	-1.254	-1.583	-1.211	-1.303	-1.255	-1.626	ns
		$t_h$	0.841	0.898	1.302	1.420	1.535	1.474	1.802	1.429	1.543	1.483	1.846	ns
	GCLK PLL	$t_{SU}$	1.154	1.172	1.862	2.100	2.338	2.219	2.155	2.117	2.360	2.238	2.203	ns
		$t_h$	-0.900	-0.902	-1.458	-1.649	-1.837	-1.746	-1.674	-1.657	-1.847	-1.753	-1.718	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{SU}$	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		$t_h$	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	$t_{SU}$	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		$t_h$	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{SU}$	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		$t_h$	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	$t_{SU}$	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		$t_h$	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{SU}$	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		$t_h$	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	$t_{SU}$	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		$t_h$	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns

**Table 1-85.** EP3SL150 Row Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		t <sub>h</sub>	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	t <sub>su</sub>	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		t <sub>h</sub>	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		t <sub>h</sub>	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	t <sub>su</sub>	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		t <sub>h</sub>	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.733	-0.777	-1.122	-1.220	-1.320	-1.270	-1.599	-1.220	-1.319	-1.271	-1.642	ns
		t <sub>h</sub>	0.850	0.910	1.311	1.430	1.551	1.490	1.818	1.438	1.559	1.499	1.862	ns
	GCLK PLL	t <sub>su</sub>	1.145	1.160	1.853	2.090	2.322	2.203	2.139	2.108	2.344	2.222	2.187	ns
		t <sub>h</sub>	-0.891	-0.890	-1.449	-1.639	-1.821	-1.730	-1.658	-1.648	-1.831	-1.737	-1.702	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		t <sub>h</sub>	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	t <sub>su</sub>	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		t <sub>h</sub>	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.747	-0.789	-1.131	-1.230	-1.338	-1.288	-1.617	-1.231	-1.336	-1.288	-1.659	ns
		t <sub>h</sub>	0.864	0.922	1.321	1.440	1.569	1.508	1.836	1.449	1.576	1.516	1.879	ns
	GCLK PLL	t <sub>su</sub>	1.131	1.148	1.840	2.080	2.304	2.185	2.121	2.097	2.327	2.205	2.170	ns
		t <sub>h</sub>	-0.877	-0.878	-1.437	-1.629	-1.803	-1.712	-1.640	-1.637	-1.814	-1.720	-1.685	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.756	-0.798	-1.145	-1.241	-1.345	-1.296	-1.623	-1.238	-1.337	-1.291	-1.661	ns
		t <sub>h</sub>	0.873	0.931	1.336	1.454	1.579	1.518	1.847	1.459	1.582	1.521	1.886	ns
	GCLK PLL	t <sub>su</sub>	1.122	1.139	1.825	2.064	2.293	2.173	2.110	2.086	2.321	2.197	2.163	ns
		t <sub>h</sub>	-0.868	-0.869	-1.422	-1.611	-1.789	-1.698	-1.625	-1.623	-1.805	-1.711	-1.674	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.756	-0.798	-1.145	-1.241	-1.345	-1.296	-1.623	-1.238	-1.337	-1.291	-1.661	ns
		t <sub>h</sub>	0.873	0.931	1.336	1.454	1.579	1.518	1.847	1.459	1.582	1.521	1.886	ns
	GCLK PLL	t <sub>su</sub>	1.122	1.139	1.825	2.064	2.293	2.173	2.110	2.086	2.321	2.197	2.163	ns
		t <sub>h</sub>	-0.868	-0.869	-1.422	-1.611	-1.789	-1.698	-1.625	-1.623	-1.805	-1.711	-1.674	ns

Table 1-86 specifies EP3SL150 Column Pins Output Timing parameters for differential I/O standards.

**Table 1-86.** EP3SL150 Column Pins output Timing Parameters (Part 1 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.100	3.330	4.687	5.079	5.586	5.447	5.731	5.200	5.706	5.570	5.803	ns
			GCLK PLL	t <sub>co</sub>	1.308	1.480	1.885	1.978	2.188	2.199	2.226	2.081	2.293	2.303	2.211

**Table 1-86.** EP3SL150 Column Pins output Timing Parameters (Part 2 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
LVDS_E_3R	—	GCLK	$t_{co}$	3.096	3.333	4.734	5.134	5.648	5.509	5.793	5.259	5.772	5.636	5.869	ns
		GCLK PLL	$t_{co}$	1.304	1.483	1.932	2.033	2.250	2.261	2.288	2.140	2.359	2.369	2.277	ns
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.100	3.330	4.687	5.079	5.586	5.447	5.731	5.200	5.706	5.570	5.803	ns
		GCLK PLL	$t_{co}$	1.308	1.480	1.885	1.978	2.188	2.199	2.226	2.081	2.293	2.303	2.211	ns
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.096	3.333	4.734	5.134	5.648	5.509	5.793	5.259	5.772	5.636	5.869	ns
		GCLK PLL	$t_{co}$	1.304	1.483	1.932	2.033	2.250	2.261	2.288	2.140	2.359	2.369	2.277	ns
RSDS_E_1R	—	GCLK	$t_{co}$	3.100	3.330	4.687	5.079	5.586	5.447	5.731	5.200	5.706	5.570	5.803	ns
		GCLK PLL	$t_{co}$	1.308	1.480	1.885	1.978	2.188	2.199	2.226	2.081	2.293	2.303	2.211	ns
RSDS_E_3R	—	GCLK	$t_{co}$	3.096	3.333	4.734	5.134	5.648	5.509	5.793	5.259	5.772	5.636	5.869	ns
		GCLK PLL	$t_{co}$	1.304	1.483	1.932	2.033	2.250	2.261	2.288	2.140	2.359	2.369	2.277	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.127	3.363	4.758	5.157	5.670	5.531	5.815	5.280	5.792	5.656	5.889	ns
		GCLK PLL	$t_{co}$	1.335	1.513	1.956	2.056	2.272	2.283	2.310	2.161	2.379	2.389	2.297	ns
	6mA	GCLK	$t_{co}$	3.117	3.353	4.748	5.146	5.660	5.521	5.805	5.269	5.782	5.646	5.879	ns
		GCLK PLL	$t_{co}$	1.325	1.503	1.946	2.045	2.262	2.273	2.300	2.150	2.369	2.379	2.287	ns
	8mA	GCLK	$t_{co}$	3.117	3.353	4.751	5.150	5.664	5.525	5.809	5.274	5.787	5.651	5.884	ns
		GCLK PLL	$t_{co}$	1.325	1.503	1.949	2.049	2.266	2.277	2.304	2.155	2.374	2.384	2.292	ns
	10mA	GCLK	$t_{co}$	3.110	3.347	4.744	5.144	5.658	5.519	5.803	5.267	5.781	5.645	5.878	ns
		GCLK PLL	$t_{co}$	1.318	1.497	1.942	2.043	2.260	2.271	2.298	2.148	2.368	2.378	2.286	ns
	12mA	GCLK	$t_{co}$	3.109	3.345	4.741	5.141	5.655	5.516	5.800	5.264	5.777	5.641	5.874	ns
		GCLK PLL	$t_{co}$	1.317	1.495	1.939	2.040	2.257	2.268	2.295	2.145	2.364	2.374	2.282	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.131	3.367	4.762	5.161	5.674	5.535	5.819	5.284	5.797	5.661	5.894	ns
		GCLK PLL	$t_{co}$	1.339	1.517	1.960	2.060	2.276	2.287	2.314	2.165	2.384	2.394	2.302	ns

**Table 1-86.** EP3SL150 Column Pins output Timing Parameters (Part 3 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.121	3.356	4.741	5.138	5.649	5.510	5.794	5.260	5.770	5.634	5.867	ns
		GCLK PLL	t <sub>co</sub>	1.329	1.506	1.939	2.037	2.251	2.262	2.289	2.141	2.357	2.367	2.275	ns
	6mA	GCLK	t <sub>co</sub>	3.116	3.352	4.741	5.138	5.650	5.511	5.795	5.261	5.772	5.636	5.869	ns
		GCLK PLL	t <sub>co</sub>	1.324	1.502	1.939	2.037	2.252	2.263	2.290	2.142	2.359	2.369	2.277	ns
	8mA	GCLK	t <sub>co</sub>	3.114	3.350	4.740	5.137	5.648	5.509	5.793	5.260	5.771	5.635	5.868	ns
		GCLK PLL	t <sub>co</sub>	1.322	1.500	1.938	2.036	2.250	2.261	2.288	2.141	2.358	2.368	2.276	ns
	10mA	GCLK	t <sub>co</sub>	3.106	3.341	4.730	5.127	5.639	5.500	5.784	5.250	5.761	5.625	5.858	ns
		GCLK PLL	t <sub>co</sub>	1.314	1.491	1.928	2.026	2.241	2.252	2.279	2.131	2.348	2.358	2.266	ns
	12mA	GCLK	t <sub>co</sub>	3.107	3.343	4.736	5.134	5.647	5.508	5.792	5.258	5.770	5.634	5.867	ns
		GCLK PLL	t <sub>co</sub>	1.315	1.493	1.934	2.033	2.249	2.260	2.287	2.139	2.357	2.367	2.275	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.106	3.340	4.719	5.115	5.625	5.486	5.770	5.237	5.746	5.610	5.843	ns
		GCLK PLL	t <sub>co</sub>	1.314	1.490	1.917	2.014	2.227	2.238	2.265	2.118	2.333	2.343	2.251	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.118	3.353	4.737	5.133	5.643	5.504	5.788	5.256	5.765	5.629	5.862	ns
		GCLK PLL	t <sub>co</sub>	1.326	1.503	1.935	2.032	2.245	2.256	2.283	2.137	2.352	2.362	2.270	ns
	6mA	GCLK	t <sub>co</sub>	3.114	3.350	4.738	5.135	5.647	5.508	5.792	5.258	5.769	5.633	5.866	ns
		GCLK PLL	t <sub>co</sub>	1.322	1.500	1.936	2.034	2.249	2.260	2.287	2.139	2.356	2.366	2.274	ns
	8mA	GCLK	t <sub>co</sub>	3.104	3.339	4.727	5.124	5.635	5.496	5.780	5.247	5.757	5.621	5.854	ns
		GCLK PLL	t <sub>co</sub>	1.312	1.489	1.925	2.023	2.237	2.248	2.275	2.128	2.344	2.354	2.262	ns
	10mA	GCLK	t <sub>co</sub>	3.102	3.337	4.725	5.121	5.633	5.494	5.778	5.245	5.755	5.619	5.852	ns
		GCLK PLL	t <sub>co</sub>	1.310	1.487	1.923	2.020	2.235	2.246	2.273	2.126	2.342	2.352	2.260	ns
	12mA	GCLK	t <sub>co</sub>	3.102	3.338	4.728	5.126	5.638	5.499	5.783	5.249	5.761	5.625	5.858	ns
		GCLK PLL	t <sub>co</sub>	1.310	1.488	1.926	2.025	2.240	2.251	2.278	2.130	2.348	2.358	2.266	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.106	3.341	4.725	5.121	5.632	5.493	5.777	5.244	5.754	5.618	5.851	ns
		GCLK PLL	t <sub>co</sub>	1.314	1.491	1.923	2.020	2.234	2.245	2.272	2.125	2.341	2.351	2.259	ns

**Table 1-86.** EP3SL150 Column Pins output Timing Parameters (Part 4 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.132	3.370	4.770	5.169	5.682	5.543	5.827	5.292	5.804	5.668	5.901	ns	
		GCLK PLL	t <sub>co</sub>	1.340	1.520	1.968	2.068	2.284	2.295	2.322	2.173	2.391	2.401	2.309	ns	
	6mA	GCLK	t <sub>co</sub>	3.118	3.356	4.758	5.158	5.672	5.533	5.817	5.282	5.795	5.659	5.892	ns	
		GCLK PLL	t <sub>co</sub>	1.326	1.506	1.956	2.057	2.274	2.285	2.312	2.163	2.382	2.392	2.300	ns	
	8mA	GCLK	t <sub>co</sub>	3.106	3.343	4.741	5.140	5.654	5.515	5.799	5.264	5.777	5.641	5.874	ns	
		GCLK PLL	t <sub>co</sub>	1.314	1.493	1.939	2.039	2.256	2.267	2.294	2.145	2.364	2.374	2.282	ns	
	10mA	GCLK	t <sub>co</sub>	3.106	3.343	4.744	5.144	5.658	5.519	5.803	5.268	5.782	5.646	5.879	ns	
		GCLK PLL	t <sub>co</sub>	1.314	1.493	1.942	2.043	2.260	2.271	2.298	2.149	2.369	2.379	2.287	ns	
	12mA	GCLK	t <sub>co</sub>	3.102	3.339	4.737	5.136	5.651	5.512	5.796	5.261	5.774	5.638	5.871	ns	
		GCLK PLL	t <sub>co</sub>	1.310	1.489	1.935	2.035	2.253	2.264	2.291	2.142	2.361	2.371	2.279	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.106	3.341	4.730	5.127	5.639	5.500	5.784	5.250	5.761	5.625	5.858	ns
			GCLK PLL	t <sub>co</sub>	1.314	1.491	1.928	2.026	2.241	2.252	2.279	2.131	2.348	2.358	2.266	ns
16mA		GCLK	t <sub>co</sub>	3.107	3.343	4.738	5.137	5.650	5.511	5.795	5.260	5.773	5.637	5.870	ns	
		GCLK PLL	t <sub>co</sub>	1.315	1.493	1.936	2.036	2.252	2.263	2.290	2.141	2.360	2.370	2.278	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.135	3.373	4.769	5.167	5.680	5.541	5.825	5.291	5.802	5.666	5.899	ns	
		GCLK PLL	t <sub>co</sub>	1.343	1.523	1.967	2.066	2.282	2.293	2.320	2.172	2.389	2.399	2.307	ns	
	6mA	GCLK	t <sub>co</sub>	3.124	3.361	4.757	5.155	5.668	5.529	5.813	5.279	5.790	5.654	5.887	ns	
		GCLK PLL	t <sub>co</sub>	1.332	1.511	1.955	2.054	2.270	2.281	2.308	2.160	2.377	2.387	2.295	ns	
	8mA	GCLK	t <sub>co</sub>	3.119	3.357	4.757	5.156	5.669	5.530	5.814	5.280	5.792	5.656	5.889	ns	
		GCLK PLL	t <sub>co</sub>	1.327	1.507	1.955	2.055	2.271	2.282	2.309	2.161	2.379	2.389	2.297	ns	
	10mA	GCLK	t <sub>co</sub>	3.105	3.342	4.739	5.137	5.650	5.511	5.795	5.261	5.774	5.638	5.871	ns	
		GCLK PLL	t <sub>co</sub>	1.313	1.492	1.937	2.036	2.252	2.263	2.290	2.142	2.361	2.371	2.279	ns	
	12mA	GCLK	t <sub>co</sub>	3.103	3.340	4.737	5.135	5.648	5.509	5.793	5.259	5.771	5.635	5.868	ns	
		GCLK PLL	t <sub>co</sub>	1.311	1.490	1.935	2.034	2.250	2.261	2.288	2.140	2.358	2.368	2.276	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.107	3.342	4.729	5.125	5.636	5.497	5.781	5.248	5.758	5.622	5.855	ns
			GCLK PLL	t <sub>co</sub>	1.315	1.492	1.927	2.024	2.238	2.249	2.276	2.129	2.345	2.355	2.263	ns
16mA		GCLK	t <sub>co</sub>	3.107	3.343	4.737	5.135	5.648	5.509	5.793	5.259	5.771	5.635	5.868	ns	
		GCLK PLL	t <sub>co</sub>	1.315	1.493	1.935	2.034	2.250	2.261	2.288	2.140	2.358	2.368	2.276	ns	

**Table 1-86.** EP3SL150 Column Pins output Timing Parameters (Part 5 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	3.123	3.360	4.753	5.150	5.662	5.523	5.807	5.274	5.784	5.648	5.881	ns
		GCLK PLL	t <sub>co</sub>	1.331	1.510	1.951	2.049	2.264	2.275	2.302	2.155	2.371	2.381	2.289	ns
	10mA	GCLK	t <sub>co</sub>	3.123	3.360	4.753	5.150	5.662	5.523	5.807	5.274	5.784	5.648	5.881	ns
		GCLK PLL	t <sub>co</sub>	1.331	1.510	1.951	2.049	2.264	2.275	2.302	2.155	2.371	2.381	2.289	ns
	12mA	GCLK	t <sub>co</sub>	3.113	3.350	4.743	5.140	5.652	5.513	5.797	5.264	5.775	5.639	5.872	ns
		GCLK PLL	t <sub>co</sub>	1.321	1.500	1.941	2.039	2.254	2.265	2.292	2.145	2.362	2.372	2.280	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.106	3.342	4.729	5.125	5.636	5.497	5.781	5.248	5.758	5.622	5.855	ns
		GCLK PLL	t <sub>co</sub>	1.314	1.492	1.927	2.024	2.238	2.249	2.276	2.129	2.345	2.355	2.263	ns

Table 1-87 specifies EP3SL150 Row Pins Output Timing parameters for differential I/O standards.

**Table 1-87.** EP3SL150 Row Pins output Timing Parameters (Part 1 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
LVDS	—	GCLK	$t_{co}$	2.711	2.894	4.033	4.387	4.843	4.717	4.978	4.486	4.943	4.816	5.035	ns
			GCLK PLL	$t_{co}$	0.934	1.059	1.248	1.300	1.459	1.480	1.491	1.379	1.542	1.561	1.459
LVDS_E_1R	—	GCLK	$t_{co}$	3.106	3.342	4.709	5.107	5.611	5.475	5.730	5.229	5.736	5.599	5.802	ns
			GCLK PLL	$t_{co}$	1.326	1.503	1.919	2.016	2.222	2.235	2.238	2.120	2.330	2.340	2.222
LVDS_E_3R	—	GCLK	$t_{co}$	3.088	3.332	4.747	5.153	5.665	5.529	5.784	5.280	5.797	5.660	5.863	ns
			GCLK PLL	$t_{co}$	1.308	1.493	1.957	2.062	2.276	2.289	2.292	2.171	2.391	2.401	2.283
MINI-LVDS	—	GCLK	$t_{co}$	2.711	2.894	4.033	4.387	4.843	4.717	4.978	4.486	4.943	4.816	5.035	ns
			GCLK PLL	$t_{co}$	0.934	1.059	1.248	1.300	1.459	1.480	1.491	1.379	1.542	1.561	1.459
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.106	3.342	4.709	5.107	5.611	5.475	5.730	5.229	5.736	5.599	5.802	ns
			GCLK PLL	$t_{co}$	1.326	1.503	1.919	2.016	2.222	2.235	2.238	2.120	2.330	2.340	2.222
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.088	3.332	4.747	5.153	5.665	5.529	5.784	5.280	5.797	5.660	5.863	ns
			GCLK PLL	$t_{co}$	1.308	1.493	1.957	2.062	2.276	2.289	2.292	2.171	2.391	2.401	2.283
RSDS	—	GCLK	$t_{co}$	2.711	2.894	4.033	4.387	4.843	4.717	4.978	4.486	4.943	4.816	5.035	ns
			GCLK PLL	$t_{co}$	0.934	1.059	1.248	1.300	1.459	1.480	1.491	1.379	1.542	1.561	1.459
RSDS_E_1R	—	GCLK	$t_{co}$	3.106	3.342	4.709	5.107	5.611	5.475	5.730	5.229	5.736	5.599	5.802	ns
			GCLK PLL	$t_{co}$	1.326	1.503	1.919	2.016	2.222	2.235	2.238	2.120	2.330	2.340	2.222
RSDS_E_3R	—	GCLK	$t_{co}$	3.088	3.332	4.747	5.153	5.665	5.529	5.784	5.280	5.797	5.660	5.863	ns
			GCLK PLL	$t_{co}$	1.308	1.493	1.957	2.062	2.276	2.289	2.292	2.171	2.391	2.401	2.283
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.132	3.375	4.783	5.187	5.698	5.562	5.817	5.313	5.826	5.689	5.892	ns
			GCLK PLL	$t_{co}$	1.352	1.536	1.993	2.096	2.309	2.322	2.325	2.204	2.420	2.430	2.312
	6mA	GCLK	$t_{co}$	3.118	3.361	4.770	5.174	5.685	5.549	5.804	5.299	5.813	5.676	5.879	ns
			GCLK PLL	$t_{co}$	1.338	1.522	1.980	2.083	2.296	2.309	2.312	2.190	2.407	2.417	2.299
	8mA	GCLK	$t_{co}$	3.114	3.357	4.768	5.174	5.686	5.550	5.805	5.299	5.815	5.678	5.881	ns
			GCLK PLL	$t_{co}$	1.334	1.518	1.978	2.083	2.297	2.310	2.313	2.190	2.409	2.419	2.301



**Table 1-87.** EP3SL150 Row Pins output Timing Parameters (Part 2 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$		
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.130	3.372	4.769	5.171	5.680	5.544	5.799	5.296	5.808	5.671	5.874	ns	
		GCLK PLL	$t_{co}$	1.350	1.533	1.979	2.080	2.291	2.304	2.307	2.187	2.402	2.412	2.294	ns	
	6mA	GCLK	$t_{co}$	3.119	3.362	4.765	5.167	5.677	5.541	5.796	5.293	5.805	5.668	5.871	ns	
		GCLK PLL	$t_{co}$	1.339	1.523	1.975	2.076	2.288	2.301	2.304	2.184	2.399	2.409	2.291	ns	
	8mA	GCLK	$t_{co}$	3.116	3.359	4.763	5.165	5.675	5.539	5.794	5.291	5.804	5.667	5.870	ns	
		GCLK PLL	$t_{co}$	1.336	1.520	1.973	2.074	2.286	2.299	2.302	2.182	2.398	2.408	2.290	ns	
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.127	3.369	4.764	5.166	5.674	5.538	5.793	5.291	5.802	5.665	5.868	ns	
		GCLK PLL	$t_{co}$	1.347	1.530	1.974	2.075	2.285	2.298	2.301	2.182	2.396	2.406	2.288	ns	
	6mA	GCLK	$t_{co}$	3.117	3.360	4.762	5.164	5.673	5.537	5.792	5.290	5.802	5.665	5.868	ns	
		GCLK PLL	$t_{co}$	1.337	1.521	1.972	2.073	2.284	2.297	2.300	2.181	2.396	2.406	2.288	ns	
	8mA	GCLK	$t_{co}$	3.103	3.346	4.747	5.149	5.659	5.523	5.778	5.275	5.787	5.650	5.853	ns	
		GCLK PLL	$t_{co}$	1.323	1.507	1.957	2.058	2.270	2.283	2.286	2.166	2.381	2.391	2.273	ns	
	10mA	GCLK	$t_{co}$	3.100	3.342	4.743	5.145	5.655	5.519	5.774	5.271	5.783	5.646	5.849	ns	
		GCLK PLL	$t_{co}$	1.320	1.503	1.953	2.054	2.266	2.279	2.282	2.162	2.377	2.387	2.269	ns	
	12mA	GCLK	$t_{co}$	3.097	3.340	4.744	5.148	5.658	5.522	5.777	5.274	5.787	5.650	5.853	ns	
		GCLK PLL	$t_{co}$	1.317	1.501	1.954	2.057	2.269	2.282	2.285	2.165	2.381	2.391	2.273	ns	
	16mA	GCLK	$t_{co}$	3.098	3.340	4.734	5.136	5.645	5.509	5.764	5.261	5.773	5.636	5.839	ns	
		GCLK PLL	$t_{co}$	1.318	1.501	1.944	2.045	2.256	2.269	2.272	2.152	2.367	2.377	2.259	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.147	3.393	4.805	5.209	5.721	5.585	5.840	5.335	5.849	5.712	5.915	ns
			GCLK PLL	$t_{co}$	1.367	1.554	2.015	2.118	2.332	2.345	2.348	2.226	2.443	2.453	2.335	ns
6mA		GCLK	$t_{co}$	3.123	3.369	4.787	5.192	5.704	5.568	5.823	5.318	5.834	5.697	5.900	ns	
		GCLK PLL	$t_{co}$	1.343	1.530	1.997	2.101	2.315	2.328	2.331	2.209	2.428	2.438	2.320	ns	
8mA		GCLK	$t_{co}$	3.106	3.350	4.765	5.170	5.682	5.546	5.801	5.296	5.812	5.675	5.878	ns	
		GCLK PLL	$t_{co}$	1.326	1.511	1.975	2.079	2.293	2.306	2.309	2.187	2.406	2.416	2.298	ns	

**Table 1-87.** EP3SL150 Row Pins output Timing Parameters (Part 3 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$		
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	$t_{co}$	3.151	3.396	4.805	5.209	5.720	5.584	5.839	5.335	5.849	5.712	5.915	ns	
		GCLK PLL	$t_{co}$	1.371	1.557	2.015	2.118	2.331	2.344	2.347	2.226	2.443	2.453	2.335	ns	
	6mA	GCLK	$t_{co}$	3.136	3.381	4.791	5.194	5.705	5.569	5.824	5.320	5.834	5.697	5.900	ns	
		GCLK PLL	$t_{co}$	1.356	1.542	2.001	2.103	2.316	2.329	2.332	2.211	2.428	2.438	2.320	ns	
	8mA	GCLK	$t_{co}$	3.125	3.370	4.786	5.191	5.702	5.566	5.821	5.317	5.832	5.695	5.898	ns	
		GCLK PLL	$t_{co}$	1.345	1.531	1.996	2.100	2.313	2.326	2.329	2.208	2.426	2.436	2.318	ns	
	10mA	GCLK	$t_{co}$	3.105	3.350	4.763	5.167	5.679	5.543	5.798	5.294	5.808	5.671	5.874	ns	
		GCLK PLL	$t_{co}$	1.325	1.511	1.973	2.076	2.290	2.303	2.306	2.185	2.402	2.412	2.294	ns	
	12mA	GCLK	$t_{co}$	3.102	3.346	4.759	5.164	5.675	5.539	5.794	5.290	5.805	5.668	5.871	ns	
		GCLK PLL	$t_{co}$	1.322	1.507	1.969	2.073	2.286	2.299	2.302	2.181	2.399	2.409	2.291	ns	
	8mA	GCLK	$t_{co}$	3.107	3.350	4.750	5.152	5.661	5.525	5.780	5.277	5.789	5.652	5.855	ns	
		GCLK PLL	$t_{co}$	1.327	1.511	1.960	2.061	2.272	2.285	2.288	2.168	2.383	2.393	2.275	ns	
	16mA	GCLK	$t_{co}$	3.100	3.343	4.749	5.153	5.664	5.528	5.783	5.280	5.794	5.657	5.860	ns	
		GCLK PLL	$t_{co}$	1.320	1.504	1.959	2.062	2.275	2.288	2.291	2.171	2.388	2.398	2.280	ns	
	DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.138	3.382	4.787	5.190	5.700	5.564	5.819	5.316	5.829	5.692	5.895	ns
			GCLK PLL	$t_{co}$	1.358	1.543	1.997	2.099	2.311	2.324	2.327	2.207	2.423	2.433	2.315	ns
12mA		GCLK	$t_{co}$	3.120	3.365	4.772	5.175	5.685	5.549	5.804	5.301	5.814	5.677	5.880	ns	
		GCLK PLL	$t_{co}$	1.340	1.526	1.982	2.084	2.296	2.309	2.312	2.192	2.408	2.418	2.300	ns	
16mA		GCLK	$t_{co}$	3.106	3.349	4.749	5.151	5.660	5.524	5.779	5.277	5.789	5.652	5.855	ns	
		GCLK PLL	$t_{co}$	1.326	1.510	1.959	2.060	2.271	2.284	2.287	2.168	2.383	2.393	2.275	ns	

Table 1-88 and Table 1-89 show EP3SL150 regional clock (RCLK) adder values that should be added to GCLK values. These adder values are used to determine I/O timing when I/O pin is driven using regional clock. This applies for all I/O standards supported by Stratix III devices.

Table 1-88 specifies EP3SL150 Column Pin delay adders when using the regional clock.

**Table 1-88.** EP3SL150 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RCLK input adder	0.198	0.152	0.22	0.258	0.27	0.262	0.393	0.244	0.271	0.261	0.495	ns
RCLK PLL input adder	2.453	2.426	3.654	4.098	4.422	4.224	4.664	4.106	4.447	4.101	4.707	ns
RCLK output adder	-0.374	-0.152	-0.216	-0.232	-0.248	-0.227	-0.367	-0.11	-0.127	-0.106	-0.303	ns
RCLK PLL output adder	-2.017	-1.798	-2.68	-2.859	-3.011	-2.872	-2.715	-2.714	-3.082	-2.791	-2.766	ns

Table 1-89 specifies EP3SL150 Row Pin delay adders when using the regional clock.

**Table 1-89.** EP3SL150 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RCLK input adder	0.107	0.115	0.164	0.165	0.167	0.165	0.285	0.158	0.159	0.158	0.29	ns
RCLK PLL input adder	0.074	0.075	0.116	0.123	0.129	0.126	0.218	0.114	0.118	0.114	0.223	ns
RCLK output adder	-0.093	-0.103	-0.137	-0.136	-0.133	-0.134	-0.257	-0.125	-0.121	-0.122	-0.261	ns
RCLK PLL output adder	-0.063	-0.065	-0.097	-0.102	-0.103	-0.102	-0.198	-0.088	-0.089	-0.088	-0.202	ns

### EP3SL200 I/O Timing Parameters

Table 1-90 through Table 1-93 show the maximum I/O timing parameters for EP3SL200 devices for single-ended I/O standards.

Table 1-90 specifies EP3SL200 column pins input timing parameters for single-ended I/O standards.

**Table 1-90.** EP3SL200 Column Pins Input Timing Parameters (Part 1 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-1.137	-1.173	-1.810	-1.775	-2.002	-1.934	-2.482	-1.775	-2.002	-1.934	-2.482	ns
		t <sub>h</sub>	1.285	1.319	2.032	2.008	2.259	2.177	2.724	2.008	2.259	2.177	2.724	ns
	GCLK PLL	t <sub>su</sub>	-1.465	-1.465	-2.238	-2.271	-2.558	-2.477	-2.997	-2.271	-2.558	-2.477	-2.997	ns
		t <sub>h</sub>	1.778	1.778	2.727	2.776	3.113	3.000	3.543	2.776	3.113	3.000	3.543	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-1.137	-1.173	-1.810	-1.775	-2.002	-1.934	-2.482	-1.775	-2.002	-1.934	-2.482	ns
		t <sub>h</sub>	1.285	1.319	2.032	2.008	2.259	2.177	2.724	2.008	2.259	2.177	2.724	ns
	GCLK PLL	t <sub>su</sub>	-1.465	-1.465	-2.238	-2.271	-2.558	-2.477	-2.997	-2.271	-2.558	-2.477	-2.997	ns
		t <sub>h</sub>	1.778	1.778	2.727	2.776	3.113	3.000	3.543	2.776	3.113	3.000	3.543	ns
3.0-V LVTTTL	GCLK	t <sub>su</sub>	-1.148	-1.184	-1.809	-1.777	-2.001	-1.933	-2.481	-1.777	-2.001	-1.933	-2.481	ns
		t <sub>h</sub>	1.296	1.330	2.031	2.010	2.258	2.176	2.723	2.010	2.258	2.176	2.723	ns
	GCLK PLL	t <sub>su</sub>	-1.476	-1.476	-2.237	-2.273	-2.557	-2.476	-2.996	-2.273	-2.557	-2.476	-2.996	ns
		t <sub>h</sub>	1.789	1.789	2.726	2.778	3.112	2.999	3.542	2.778	3.112	2.999	3.542	ns

**Table 1-90.** EP3SL200 Column Pins Input Timing Parameters (Part 2 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.0-V LVCMOS	GCLK	$t_{su}$	-1.148	-1.184	-1.809	-1.777	-2.001	-1.933	-2.481	-1.777	-2.001	-1.933	-2.481	ns
		$t_h$	1.296	1.330	2.031	2.010	2.258	2.176	2.723	2.010	2.258	2.176	2.723	ns
	GCLK PLL	$t_{su}$	-1.476	-1.476	-2.237	-2.273	-2.557	-2.476	-2.996	-2.273	-2.557	-2.476	-2.996	ns
		$t_h$	1.789	1.789	2.726	2.778	3.112	2.999	3.542	2.778	3.112	2.999	3.542	ns
2.5 V	GCLK	$t_{su}$	-1.143	-1.179	-1.818	-1.789	-2.020	-1.952	-2.500	-1.789	-2.020	-1.952	-2.500	ns
		$t_h$	1.291	1.325	2.040	2.022	2.277	2.195	2.742	2.022	2.277	2.195	2.742	ns
	GCLK PLL	$t_{su}$	-1.471	-1.471	-2.246	-2.285	-2.576	-2.495	-3.015	-2.285	-2.576	-2.495	-3.015	ns
		$t_h$	1.784	1.784	2.735	2.790	3.131	3.018	3.561	2.790	3.131	3.018	3.561	ns
1.8 V	GCLK	$t_{su}$	-1.163	-1.201	-1.858	-1.825	-2.018	-1.950	-2.498	-1.825	-2.018	-1.950	-2.498	ns
		$t_h$	1.313	1.349	2.080	2.058	2.275	2.193	2.740	2.058	2.275	2.193	2.740	ns
	GCLK PLL	$t_{su}$	-1.493	-1.493	-2.286	-2.321	-2.574	-2.493	-3.013	-2.321	-2.574	-2.493	-3.013	ns
		$t_h$	1.808	1.808	2.775	2.826	3.129	3.016	3.559	2.826	3.129	3.016	3.559	ns
1.5 V	GCLK	$t_{su}$	-1.153	-1.191	-1.835	-1.793	-1.948	-1.880	-2.428	-1.793	-1.948	-1.880	-2.428	ns
		$t_h$	1.303	1.339	2.057	2.026	2.205	2.123	2.670	2.026	2.205	2.123	2.670	ns
	GCLK PLL	$t_{su}$	-1.483	-1.483	-2.263	-2.289	-2.504	-2.423	-2.943	-2.289	-2.504	-2.423	-2.943	ns
		$t_h$	1.798	1.798	2.752	2.794	3.059	2.946	3.489	2.794	3.059	2.946	3.489	ns
1.2 V	GCLK	$t_{su}$	-1.101	-1.139	-1.758	-1.694	-1.792	-1.724	-2.272	-1.694	-1.792	-1.724	-2.272	ns
		$t_h$	1.251	1.287	1.980	1.927	2.049	1.967	2.514	1.927	2.049	1.967	2.514	ns
	GCLK PLL	$t_{su}$	-1.431	-1.431	-2.186	-2.190	-2.348	-2.267	-2.787	-2.190	-2.348	-2.267	-2.787	ns
		$t_h$	1.746	1.746	2.675	2.695	2.903	2.790	3.333	2.695	2.903	2.790	3.333	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-1.072	-1.110	-1.730	-1.678	-1.794	-1.726	-2.274	-1.678	-1.794	-1.726	-2.274	ns
		$t_h$	1.222	1.258	1.952	1.911	2.051	1.969	2.516	1.911	2.051	1.969	2.516	ns
	GCLK PLL	$t_{su}$	-1.402	-1.402	-2.158	-2.174	-2.350	-2.269	-2.789	-2.174	-2.350	-2.269	-2.789	ns
		$t_h$	1.717	1.717	2.647	2.679	2.905	2.792	3.335	2.679	2.905	2.792	3.335	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-1.072	-1.110	-1.730	-1.678	-1.794	-1.726	-2.274	-1.678	-1.794	-1.726	-2.274	ns
		$t_h$	1.222	1.258	1.952	1.911	2.051	1.969	2.516	1.911	2.051	1.969	2.516	ns
	GCLK PLL	$t_{su}$	-1.402	-1.402	-2.158	-2.174	-2.350	-2.269	-2.789	-2.174	-2.350	-2.269	-2.789	ns
		$t_h$	1.717	1.717	2.647	2.679	2.905	2.792	3.335	2.679	2.905	2.792	3.335	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-1.066	-1.104	-1.717	-1.673	-1.794	-1.724	-2.272	-1.673	-1.794	-1.724	-2.272	ns
		$t_h$	1.216	1.252	1.939	1.903	2.048	1.966	2.509	1.903	2.048	1.966	2.509	ns
	GCLK PLL	$t_{su}$	-1.396	-1.396	-2.145	-2.166	-2.347	-2.264	-2.787	-2.166	-2.347	-2.264	-2.787	ns
		$t_h$	1.711	1.711	2.634	2.668	2.899	2.786	3.328	2.668	2.899	2.786	3.328	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-1.066	-1.104	-1.717	-1.673	-1.794	-1.724	-2.272	-1.673	-1.794	-1.724	-2.272	ns
		$t_h$	1.216	1.252	1.939	1.903	2.048	1.966	2.509	1.903	2.048	1.966	2.509	ns
	GCLK PLL	$t_{su}$	-1.396	-1.396	-2.145	-2.166	-2.347	-2.264	-2.787	-2.166	-2.347	-2.264	-2.787	ns
		$t_h$	1.711	1.711	2.634	2.668	2.899	2.786	3.328	2.668	2.899	2.786	3.328	ns

**Table 1-90.** EP3SL200 Column Pins Input Timing Parameters (Part 3 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-15 CLASS I	GCLK	t <sub>SU</sub>	-1.055	-1.093	-1.706	-1.662	-1.775	-1.705	-2.253	-1.662	-1.775	-1.705	-2.253	ns
		t <sub>H</sub>	1.205	1.241	1.927	1.892	2.029	1.947	2.490	1.892	2.029	1.947	2.490	ns
	GCLK PLL	t <sub>SU</sub>	-1.385	-1.385	-2.134	-2.155	-2.328	-2.245	-2.768	-2.155	-2.328	-2.245	-2.768	ns
		t <sub>H</sub>	1.700	1.700	2.622	2.657	2.880	2.767	3.309	2.657	2.880	2.767	3.309	ns
1.8-V HSTL CLASS I	GCLK	t <sub>SU</sub>	-1.055	-1.093	-1.706	-1.662	-1.775	-1.705	-2.253	-1.662	-1.775	-1.705	-2.253	ns
		t <sub>H</sub>	1.205	1.241	1.927	1.892	2.029	1.947	2.490	1.892	2.029	1.947	2.490	ns
	GCLK PLL	t <sub>SU</sub>	-1.385	-1.385	-2.134	-2.155	-2.328	-2.245	-2.768	-2.155	-2.328	-2.245	-2.768	ns
		t <sub>H</sub>	1.700	1.700	2.622	2.657	2.880	2.767	3.309	2.657	2.880	2.767	3.309	ns
1.8-V HSTL CLASS II	GCLK	t <sub>SU</sub>	-1.066	-1.104	-1.717	-1.673	-1.794	-1.724	-2.272	-1.673	-1.794	-1.724	-2.272	ns
		t <sub>H</sub>	1.216	1.252	1.939	1.903	2.048	1.966	2.509	1.903	2.048	1.966	2.509	ns
	GCLK PLL	t <sub>SU</sub>	-1.396	-1.396	-2.145	-2.166	-2.347	-2.264	-2.787	-2.166	-2.347	-2.264	-2.787	ns
		t <sub>H</sub>	1.711	1.711	2.634	2.668	2.899	2.786	3.328	2.668	2.899	2.786	3.328	ns
1.5-V HSTL CLASS I	GCLK	t <sub>SU</sub>	-1.066	-1.104	-1.717	-1.673	-1.794	-1.724	-2.272	-1.673	-1.794	-1.724	-2.272	ns
		t <sub>H</sub>	1.216	1.252	1.939	1.903	2.048	1.966	2.509	1.903	2.048	1.966	2.509	ns
	GCLK PLL	t <sub>SU</sub>	-1.396	-1.396	-2.145	-2.166	-2.347	-2.264	-2.787	-2.166	-2.347	-2.264	-2.787	ns
		t <sub>H</sub>	1.711	1.711	2.634	2.668	2.899	2.786	3.328	2.668	2.899	2.786	3.328	ns
1.5-V HSTL CLASS II	GCLK	t <sub>SU</sub>	-1.055	-1.093	-1.706	-1.662	-1.775	-1.705	-2.253	-1.662	-1.775	-1.705	-2.253	ns
		t <sub>H</sub>	1.205	1.241	1.927	1.892	2.029	1.947	2.490	1.892	2.029	1.947	2.490	ns
	GCLK PLL	t <sub>SU</sub>	-1.385	-1.385	-2.134	-2.155	-2.328	-2.245	-2.768	-2.155	-2.328	-2.245	-2.768	ns
		t <sub>H</sub>	1.700	1.700	2.622	2.657	2.880	2.767	3.309	2.657	2.880	2.767	3.309	ns
1.2-V HSTL CLASS I	GCLK	t <sub>SU</sub>	-1.055	-1.093	-1.706	-1.662	-1.775	-1.705	-2.253	-1.662	-1.775	-1.705	-2.253	ns
		t <sub>H</sub>	1.205	1.241	1.927	1.892	2.029	1.947	2.490	1.892	2.029	1.947	2.490	ns
	GCLK PLL	t <sub>SU</sub>	-1.385	-1.385	-2.134	-2.155	-2.328	-2.245	-2.768	-2.155	-2.328	-2.245	-2.768	ns
		t <sub>H</sub>	1.700	1.700	2.622	2.657	2.880	2.767	3.309	2.657	2.880	2.767	3.309	ns
1.2-V HSTL CLASS II	GCLK	t <sub>SU</sub>	-1.043	-1.081	-1.696	-1.651	-1.759	-1.689	-2.237	-1.651	-1.759	-1.689	-2.237	ns
		t <sub>H</sub>	1.193	1.229	1.917	1.881	2.013	1.931	2.474	1.881	2.013	1.931	2.474	ns
	GCLK PLL	t <sub>SU</sub>	-1.373	-1.373	-2.124	-2.144	-2.312	-2.229	-2.752	-2.144	-2.312	-2.229	-2.752	ns
		t <sub>H</sub>	1.688	1.688	2.612	2.646	2.864	2.751	3.293	2.646	2.864	2.751	3.293	ns
3.0-V PCI	GCLK	t <sub>SU</sub>	-1.043	-1.081	-1.696	-1.651	-1.759	-1.689	-2.237	-1.651	-1.759	-1.689	-2.237	ns
		t <sub>H</sub>	1.193	1.229	1.917	1.881	2.013	1.931	2.474	1.881	2.013	1.931	2.474	ns
	GCLK PLL	t <sub>SU</sub>	-1.373	-1.373	-2.124	-2.144	-2.312	-2.229	-2.752	-2.144	-2.312	-2.229	-2.752	ns
		t <sub>H</sub>	1.688	1.688	2.612	2.646	2.864	2.751	3.293	2.646	2.864	2.751	3.293	ns
3.0-V PCI-X	GCLK	t <sub>SU</sub>	-1.148	-1.184	-1.809	-1.777	-2.001	-1.933	-2.481	-1.777	-2.001	-1.933	-2.481	ns
		t <sub>H</sub>	1.296	1.330	2.031	2.010	2.258	2.176	2.723	2.010	2.258	2.176	2.723	ns
	GCLK PLL	t <sub>SU</sub>	-1.476	-1.476	-2.237	-2.273	-2.557	-2.476	-2.996	-2.273	-2.557	-2.476	-2.996	ns
		t <sub>H</sub>	1.789	1.789	2.726	2.778	3.112	2.999	3.542	2.778	3.112	2.999	3.542	ns

Table 1-91 specifies EP3SL200 row pins input timing parameters for single-ended I/O standards.

**Table 1-91.** EP3SL200 Row Pins Input Timing Parameters (Part 1 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-1.128	-1.100	-1.648	-1.793	-2.040	-1.969	-2.400	-1.810	-2.030	-1.923	-2.437	ns
		t <sub>h</sub>	1.256	1.246	1.872	2.022	2.291	2.207	2.641	2.048	2.290	2.171	2.679	ns
	GCLK PLL	t <sub>su</sub>	0.939	0.939	1.649	1.760	1.828	1.731	1.650	1.770	1.848	1.773	1.702	ns
		t <sub>h</sub>	-0.672	-0.654	-1.192	-1.284	-1.301	-1.233	-1.140	-1.284	-1.308	-1.265	-1.190	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-1.128	-1.100	-1.648	-1.793	-2.040	-1.969	-2.400	-1.810	-2.030	-1.923	-2.437	ns
		t <sub>h</sub>	1.256	1.246	1.872	2.022	2.291	2.207	2.641	2.048	2.290	2.171	2.679	ns
	GCLK PLL	t <sub>su</sub>	0.939	0.939	1.649	1.760	1.828	1.731	1.650	1.770	1.848	1.773	1.702	ns
		t <sub>h</sub>	-0.672	-0.654	-1.192	-1.284	-1.301	-1.233	-1.140	-1.284	-1.308	-1.265	-1.190	ns
3.0-V LVTTTL	GCLK	t <sub>su</sub>	-1.134	-1.111	-1.645	-1.794	-2.043	-1.972	-2.403	-1.809	-2.035	-1.928	-2.442	ns
		t <sub>h</sub>	1.262	1.257	1.869	2.023	2.294	2.210	2.644	2.047	2.295	2.176	2.684	ns
	GCLK PLL	t <sub>su</sub>	0.933	0.928	1.652	1.759	1.825	1.728	1.647	1.771	1.843	1.768	1.697	ns
		t <sub>h</sub>	-0.666	-0.643	-1.195	-1.283	-1.298	-1.230	-1.137	-1.285	-1.303	-1.260	-1.185	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-1.134	-1.111	-1.645	-1.794	-2.043	-1.972	-2.403	-1.809	-2.035	-1.928	-2.442	ns
		t <sub>h</sub>	1.262	1.257	1.869	2.023	2.294	2.210	2.644	2.047	2.295	2.176	2.684	ns
	GCLK PLL	t <sub>su</sub>	0.933	0.928	1.652	1.759	1.825	1.728	1.647	1.771	1.843	1.768	1.697	ns
		t <sub>h</sub>	-0.666	-0.643	-1.195	-1.283	-1.298	-1.230	-1.137	-1.285	-1.303	-1.260	-1.185	ns
2.5 V	GCLK	t <sub>su</sub>	-1.122	-1.104	-1.654	-1.807	-2.058	-1.987	-2.418	-1.818	-2.045	-1.938	-2.452	ns
		t <sub>h</sub>	1.250	1.250	1.878	2.036	2.309	2.225	2.659	2.056	2.305	2.186	2.694	ns
	GCLK PLL	t <sub>su</sub>	0.945	0.935	1.643	1.746	1.810	1.713	1.632	1.762	1.833	1.758	1.687	ns
		t <sub>h</sub>	-0.678	-0.650	-1.186	-1.270	-1.283	-1.215	-1.122	-1.276	-1.293	-1.250	-1.175	ns
1.8 V	GCLK	t <sub>su</sub>	-1.152	-1.206	-1.800	-1.840	-2.045	-1.985	-2.405	-1.851	-2.046	-1.939	-2.443	ns
		t <sub>h</sub>	1.281	1.351	2.021	2.069	2.295	2.223	2.647	2.089	2.306	2.187	2.685	ns
	GCLK PLL	t <sub>su</sub>	0.942	0.903	1.603	1.782	1.812	1.715	1.634	1.800	1.832	1.832	1.686	ns
		t <sub>h</sub>	-0.671	-0.617	-1.146	-1.303	-1.285	-1.217	-1.124	-1.309	-1.292	-1.320	-1.174	ns
1.5 V	GCLK	t <sub>su</sub>	-1.142	-1.195	-1.776	-1.808	-1.977	-1.917	-2.337	-1.820	-1.981	-1.874	-2.378	ns
		t <sub>h</sub>	1.271	1.340	1.997	2.037	2.227	2.155	2.579	2.058	2.241	2.122	2.620	ns
	GCLK PLL	t <sub>su</sub>	0.952	0.914	1.627	1.814	1.880	1.783	1.702	1.831	1.897	1.897	1.751	ns
		t <sub>h</sub>	-0.681	-0.628	-1.170	-1.335	-1.353	-1.285	-1.192	-1.340	-1.357	-1.385	-1.239	ns
1.2 V	GCLK	t <sub>su</sub>	-1.082	-1.142	-1.697	-1.707	-1.818	-1.758	-2.178	-1.724	-1.826	-1.719	-2.223	ns
		t <sub>h</sub>	1.211	1.287	1.918	1.936	2.068	1.996	2.420	1.962	2.086	1.967	2.465	ns
	GCLK PLL	t <sub>su</sub>	1.012	0.967	1.706	1.915	2.039	1.942	1.861	1.927	2.052	2.052	1.906	ns
		t <sub>h</sub>	-0.741	-0.681	-1.249	-1.436	-1.512	-1.444	-1.351	-1.436	-1.512	-1.540	-1.394	ns

**Table 1-91.** EP3SL200 Row Pins Input Timing Parameters (Part 2 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-1.065	-1.045	-1.568	-1.698	-1.838	-1.767	-2.198	-1.706	-1.828	-1.721	-2.235	ns
		t <sub>h</sub>	1.194	1.192	1.792	1.927	2.089	2.005	2.439	1.944	2.088	1.969	2.477	ns
	GCLK PLL	t <sub>su</sub>	1.002	0.993	1.729	1.855	2.030	1.933	1.852	1.874	2.050	1.975	1.904	ns
		t <sub>h</sub>	-0.734	-0.707	-1.272	-1.379	-1.503	-1.435	-1.342	-1.388	-1.510	-1.467	-1.392	ns
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-1.065	-1.045	-1.568	-1.698	-1.838	-1.767	-2.198	-1.706	-1.828	-1.721	-2.235	ns
		t <sub>h</sub>	1.194	1.192	1.792	1.927	2.089	2.005	2.439	1.944	2.088	1.969	2.477	ns
	GCLK PLL	t <sub>su</sub>	1.002	0.993	1.729	1.855	2.030	1.933	1.852	1.874	2.050	1.975	1.904	ns
		t <sub>h</sub>	-0.734	-0.707	-1.272	-1.379	-1.503	-1.435	-1.342	-1.388	-1.510	-1.467	-1.392	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-1.056	-1.107	-1.659	-1.680	-1.813	-1.752	-2.174	-1.692	-1.819	-1.711	-2.216	ns
		t <sub>h</sub>	1.185	1.252	1.880	1.907	2.061	1.989	2.412	1.928	2.076	1.958	2.454	ns
	GCLK PLL	t <sub>su</sub>	1.038	1.002	1.744	1.940	2.044	1.948	1.865	1.956	2.059	2.058	1.913	ns
		t <sub>h</sub>	-0.767	-0.716	-1.287	-1.463	-1.519	-1.451	-1.359	-1.468	-1.522	-1.547	-1.405	ns
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-1.056	-1.107	-1.659	-1.680	-1.813	-1.752	-2.174	-1.692	-1.819	-1.711	-2.216	ns
		t <sub>h</sub>	1.185	1.252	1.880	1.907	2.061	1.989	2.412	1.928	2.076	1.958	2.454	ns
	GCLK PLL	t <sub>su</sub>	1.038	1.002	1.744	1.940	2.044	1.948	1.865	1.956	2.059	2.058	1.913	ns
		t <sub>h</sub>	-0.767	-0.716	-1.287	-1.463	-1.519	-1.451	-1.359	-1.468	-1.522	-1.547	-1.405	ns
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-1.042	-1.095	-1.644	-1.670	-1.795	-1.734	-2.156	-1.681	-1.802	-1.694	-2.199	ns
		t <sub>h</sub>	1.171	1.240	1.866	1.897	2.043	1.971	2.394	1.917	2.059	1.941	2.437	ns
	GCLK PLL	t <sub>su</sub>	1.052	1.014	1.759	1.950	2.062	1.966	1.883	1.967	2.076	2.075	1.930	ns
		t <sub>h</sub>	-0.781	-0.728	-1.301	-1.473	-1.537	-1.469	-1.377	-1.479	-1.539	-1.564	-1.422	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.056	-1.107	-1.659	-1.680	-1.813	-1.752	-2.174	-1.692	-1.819	-1.711	-2.216	ns
		t <sub>h</sub>	1.185	1.252	1.880	1.907	2.061	1.989	2.412	1.928	2.076	1.958	2.454	ns
	GCLK PLL	t <sub>su</sub>	1.038	1.002	1.744	1.940	2.044	1.948	1.865	1.956	2.059	2.058	1.913	ns
		t <sub>h</sub>	-0.767	-0.716	-1.287	-1.463	-1.519	-1.451	-1.359	-1.468	-1.522	-1.547	-1.405	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-1.056	-1.107	-1.659	-1.680	-1.813	-1.752	-2.174	-1.692	-1.819	-1.711	-2.216	ns
		t <sub>h</sub>	1.185	1.252	1.880	1.907	2.061	1.989	2.412	1.928	2.076	1.958	2.454	ns
	GCLK PLL	t <sub>su</sub>	1.038	1.002	1.744	1.940	2.044	1.948	1.865	1.956	2.059	2.058	1.913	ns
		t <sub>h</sub>	-0.767	-0.716	-1.287	-1.463	-1.519	-1.451	-1.359	-1.468	-1.522	-1.547	-1.405	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.042	-1.095	-1.644	-1.670	-1.795	-1.734	-2.156	-1.681	-1.802	-1.694	-2.199	ns
		t <sub>h</sub>	1.171	1.240	1.866	1.897	2.043	1.971	2.394	1.917	2.059	1.941	2.437	ns
	GCLK PLL	t <sub>su</sub>	1.052	1.014	1.759	1.950	2.062	1.966	1.883	1.967	2.076	2.075	1.930	ns
		t <sub>h</sub>	-0.781	-0.728	-1.301	-1.473	-1.537	-1.469	-1.377	-1.479	-1.539	-1.564	-1.422	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-1.042	-1.095	-1.644	-1.670	-1.795	-1.734	-2.156	-1.681	-1.802	-1.694	-2.199	ns
		t <sub>h</sub>	1.171	1.240	1.866	1.897	2.043	1.971	2.394	1.917	2.059	1.941	2.437	ns
	GCLK PLL	t <sub>su</sub>	1.052	1.014	1.759	1.950	2.062	1.966	1.883	1.967	2.076	2.075	1.930	ns
		t <sub>h</sub>	-0.781	-0.728	-1.301	-1.473	-1.537	-1.469	-1.377	-1.479	-1.539	-1.564	-1.422	ns

**Table 1-91.** EP3SL200 Row Pins Input Timing Parameters (Part 3 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.033	-1.083	-1.635	-1.660	-1.779	-1.718	-2.140	-1.672	-1.786	-1.678	-2.183	ns
		t <sub>h</sub>	1.162	1.228	1.857	1.887	2.027	1.955	2.378	1.908	2.043	1.925	2.421	ns
	GCLK PLL	t <sub>su</sub>	1.061	1.026	1.768	1.960	2.078	1.982	1.899	1.976	2.092	2.091	1.946	ns
		t <sub>h</sub>	-0.790	-0.740	-1.310	-1.483	-1.553	-1.485	-1.393	-1.488	-1.555	-1.580	-1.438	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-1.033	-1.083	-1.635	-1.660	-1.779	-1.718	-2.140	-1.672	-1.786	-1.678	-2.183	ns
		t <sub>h</sub>	1.162	1.228	1.857	1.887	2.027	1.955	2.378	1.908	2.043	1.925	2.421	ns
	GCLK PLL	t <sub>su</sub>	1.061	1.026	1.768	1.960	2.078	1.982	1.899	1.976	2.092	2.091	1.946	ns
		t <sub>h</sub>	-0.790	-0.740	-1.310	-1.483	-1.553	-1.485	-1.393	-1.488	-1.555	-1.580	-1.438	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-1.134	-1.111	-1.645	-1.794	-2.043	-1.972	-2.403	-1.809	-2.035	-1.928	-2.442	ns
		t <sub>h</sub>	1.262	1.257	1.869	2.023	2.294	2.210	2.644	2.047	2.295	2.176	2.684	ns
	GCLK PLL	t <sub>su</sub>	0.933	0.928	1.652	1.759	1.825	1.728	1.647	1.771	1.843	1.768	1.697	ns
		t <sub>h</sub>	-0.666	-0.643	-1.195	-1.283	-1.298	-1.230	-1.137	-1.285	-1.303	-1.260	-1.185	ns
3.0-V PCI-X	GCLK	t <sub>su</sub>	-1.134	-1.111	-1.645	-1.794	-2.043	-1.972	-2.403	-1.809	-2.035	-1.928	-2.442	ns
		t <sub>h</sub>	1.262	1.257	1.869	2.023	2.294	2.210	2.644	2.047	2.295	2.176	2.684	ns
	GCLK PLL	t <sub>su</sub>	0.933	0.928	1.652	1.759	1.825	1.728	1.647	1.771	1.843	1.768	1.697	ns
		t <sub>h</sub>	-0.666	-0.643	-1.195	-1.283	-1.298	-1.230	-1.137	-1.285	-1.303	-1.260	-1.185	ns

Table 1-92 specifies EP3SL200 Column Pins Output Timing parameters for single-ended I/O standards.

**Table 1-92.** EP3SL200 Column Pins output Timing Parameters (Part 1 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.677	3.677	5.302	5.492	5.997	5.854	6.259	5.492	5.997	5.854	6.259	ns
		GCLK PLL	t <sub>co</sub>	4.076	4.076	5.937	6.132	6.701	6.529	7.016	6.132	6.701	6.529	7.016	ns
	8mA	GCLK	t <sub>co</sub>	3.610	3.610	5.193	5.381	5.884	5.741	6.146	5.381	5.884	5.741	6.146	ns
		GCLK PLL	t <sub>co</sub>	4.009	4.009	5.828	6.021	6.588	6.416	6.903	6.021	6.588	6.416	6.903	ns
	12mA	GCLK	t <sub>co</sub>	3.524	3.524	5.089	5.282	5.792	5.649	6.054	5.282	5.792	5.649	6.054	ns
		GCLK PLL	t <sub>co</sub>	3.923	3.923	5.724	5.922	6.496	6.324	6.811	5.922	6.496	6.324	6.811	ns
	16mA	GCLK	t <sub>co</sub>	3.517	3.517	5.072	5.254	5.751	5.608	6.013	5.254	5.751	5.608	6.013	ns
		GCLK PLL	t <sub>co</sub>	3.916	3.916	5.707	5.894	6.455	6.283	6.770	5.894	6.455	6.283	6.770	ns



**Table 1-92.** EP3SL200 Column Pins output Timing Parameters (Part 2 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.683	3.683	5.306	5.497	6.004	5.861	6.266	5.497	6.004	5.861	6.266	ns
		GCLK PLL	t <sub>co</sub>	4.082	4.082	5.941	6.137	6.708	6.536	7.023	6.137	6.708	6.536	7.023	ns
	8mA	GCLK	t <sub>co</sub>	3.528	3.528	5.099	5.299	5.803	5.660	6.065	5.299	5.803	5.660	6.065	ns
		GCLK PLL	t <sub>co</sub>	3.927	3.927	5.734	5.939	6.507	6.335	6.822	5.939	6.507	6.335	6.822	ns
	12mA	GCLK	t <sub>co</sub>	3.535	3.535	5.093	5.278	5.777	5.634	6.039	5.278	5.777	5.634	6.039	ns
		GCLK PLL	t <sub>co</sub>	3.934	3.934	5.728	5.918	6.481	6.309	6.796	5.918	6.481	6.309	6.796	ns
	16mA	GCLK	t <sub>co</sub>	3.519	3.519	5.071	5.253	5.748	5.605	6.010	5.253	5.748	5.605	6.010	ns
		GCLK PLL	t <sub>co</sub>	3.918	3.918	5.706	5.893	6.452	6.280	6.767	5.893	6.452	6.280	6.767	ns
3.0-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.641	3.641	5.269	5.460	5.964	5.821	6.226	5.460	5.964	5.821	6.226	ns
		GCLK PLL	t <sub>co</sub>	4.040	4.040	5.904	6.100	6.668	6.496	6.983	6.100	6.668	6.496	6.983	ns
	8mA	GCLK	t <sub>co</sub>	3.530	3.530	5.139	5.326	5.826	5.684	6.088	5.326	5.826	5.684	6.088	ns
		GCLK PLL	t <sub>co</sub>	3.929	3.929	5.774	5.966	6.531	6.360	6.845	5.966	6.531	6.360	6.845	ns
	12mA	GCLK	t <sub>co</sub>	3.494	3.494	5.076	5.257	5.752	5.610	6.014	5.257	5.752	5.610	6.014	ns
		GCLK PLL	t <sub>co</sub>	3.893	3.893	5.711	5.897	6.457	6.286	6.771	5.897	6.457	6.286	6.771	ns
	16mA	GCLK	t <sub>co</sub>	3.476	3.476	5.047	5.229	5.724	5.581	5.986	5.229	5.724	5.581	5.986	ns
		GCLK PLL	t <sub>co</sub>	3.875	3.875	5.682	5.869	6.428	6.256	6.743	5.869	6.428	6.256	6.743	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.555	3.555	5.173	5.360	5.861	5.719	6.123	5.360	5.861	5.719	6.123	ns
		GCLK PLL	t <sub>co</sub>	3.954	3.954	5.808	6.000	6.566	6.395	6.880	6.000	6.566	6.395	6.880	ns
	8mA	GCLK	t <sub>co</sub>	3.476	3.476	5.049	5.231	5.726	5.584	5.988	5.231	5.726	5.584	5.988	ns
		GCLK PLL	t <sub>co</sub>	3.875	3.875	5.684	5.871	6.431	6.260	6.745	5.871	6.431	6.260	6.745	ns
	12mA	GCLK	t <sub>co</sub>	3.471	3.471	5.042	5.224	5.718	5.575	5.980	5.224	5.718	5.575	5.980	ns
		GCLK PLL	t <sub>co</sub>	3.870	3.870	5.677	5.864	6.422	6.250	6.737	5.864	6.422	6.250	6.737	ns
	16mA	GCLK	t <sub>co</sub>	3.462	3.462	5.028	5.209	5.703	5.560	5.965	5.209	5.703	5.560	5.965	ns
		GCLK PLL	t <sub>co</sub>	3.861	3.861	5.663	5.849	6.407	6.235	6.722	5.849	6.407	6.235	6.722	ns

**Table 1-92.** EP3SL200 Column Pins output Timing Parameters (Part 3 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
2.5 V	4mA	GCLK	t <sub>co</sub>	3.677	3.677	5.380	5.587	6.108	5.966	6.370	5.587	6.108	5.966	6.370	ns
		GCLK PLL	t <sub>co</sub>	4.076	4.076	6.015	6.227	6.813	6.642	7.127	6.227	6.813	6.642	7.127	ns
	8mA	GCLK	t <sub>co</sub>	3.577	3.577	5.261	5.461	5.976	5.834	6.238	5.461	5.976	5.834	6.238	ns
		GCLK PLL	t <sub>co</sub>	3.976	3.976	5.896	6.101	6.681	6.510	6.995	6.101	6.681	6.510	6.995	ns
	12mA	GCLK	t <sub>co</sub>	3.533	3.533	5.174	5.370	5.881	5.738	6.143	5.370	5.881	5.738	6.143	ns
		GCLK PLL	t <sub>co</sub>	3.932	3.932	5.809	6.010	6.585	6.413	6.900	6.010	6.585	6.413	6.900	ns
	16mA	GCLK	t <sub>co</sub>	3.495	3.495	5.135	5.328	5.838	5.695	6.100	5.328	5.838	5.695	6.100	ns
		GCLK PLL	t <sub>co</sub>	3.894	3.894	5.770	5.968	6.542	6.370	6.857	5.968	6.542	6.370	6.857	ns
1.8 V	2mA	GCLK	t <sub>co</sub>	3.868	3.868	5.701	5.947	6.513	6.370	6.775	5.947	6.513	6.370	6.775	ns
		GCLK PLL	t <sub>co</sub>	4.267	4.267	6.336	6.587	7.217	7.045	7.532	6.587	7.217	7.045	7.532	ns
	4mA	GCLK	t <sub>co</sub>	3.687	3.687	5.422	5.638	6.165	6.023	6.427	5.638	6.165	6.023	6.427	ns
		GCLK PLL	t <sub>co</sub>	4.086	4.086	6.057	6.278	6.870	6.699	7.184	6.278	6.870	6.699	7.184	ns
	6mA	GCLK	t <sub>co</sub>	3.605	3.605	5.315	5.523	6.055	5.912	6.317	5.523	6.055	5.912	6.317	ns
		GCLK PLL	t <sub>co</sub>	4.004	4.004	5.950	6.163	6.759	6.587	7.074	6.163	6.759	6.587	7.074	ns
	8mA	GCLK	t <sub>co</sub>	3.585	3.585	5.257	5.469	5.989	5.846	6.251	5.469	5.989	5.846	6.251	ns
		GCLK PLL	t <sub>co</sub>	3.984	3.984	5.892	6.109	6.693	6.521	7.008	6.109	6.693	6.521	7.008	ns
	10mA	GCLK	t <sub>co</sub>	3.522	3.522	5.196	5.394	5.908	5.765	6.170	5.394	5.908	5.765	6.170	ns
		GCLK PLL	t <sub>co</sub>	3.921	3.921	5.831	6.034	6.612	6.440	6.927	6.034	6.612	6.440	6.927	ns
	12mA	GCLK	t <sub>co</sub>	3.504	3.504	5.175	5.373	5.885	5.742	6.147	5.373	5.885	5.742	6.147	ns
		GCLK PLL	t <sub>co</sub>	3.903	3.903	5.810	6.013	6.589	6.417	6.904	6.013	6.589	6.417	6.904	ns

**Table 1-92.** EP3SL200 Column Pins output Timing Parameters (Part 4 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.5 V	2mA	GCLK	t <sub>co</sub>	3.814	3.814	5.630	5.879	6.451	6.308	6.713	5.879	6.451	6.308	6.713	ns
		GCLK PLL	t <sub>co</sub>	4.213	4.213	6.265	6.519	7.155	6.983	7.470	6.519	7.155	6.983	7.470	ns
	4mA	GCLK	t <sub>co</sub>	3.602	3.602	5.311	5.523	6.059	5.916	6.321	5.523	6.059	5.916	6.321	ns
		GCLK PLL	t <sub>co</sub>	4.001	4.001	5.946	6.163	6.763	6.591	7.078	6.163	6.763	6.591	7.078	ns
	6mA	GCLK	t <sub>co</sub>	3.577	3.577	5.244	5.463	5.992	5.849	6.254	5.463	5.992	5.849	6.254	ns
		GCLK PLL	t <sub>co</sub>	3.976	3.976	5.879	6.103	6.696	6.524	7.011	6.103	6.696	6.524	7.011	ns
	8mA	GCLK	t <sub>co</sub>	3.566	3.566	5.227	5.438	5.972	5.829	6.234	5.438	5.972	5.829	6.234	ns
		GCLK PLL	t <sub>co</sub>	3.965	3.965	5.862	6.078	6.676	6.504	6.991	6.078	6.676	6.504	6.991	ns
	10mA	GCLK	t <sub>co</sub>	3.511	3.511	5.189	5.387	5.902	5.759	6.164	5.387	5.902	5.759	6.164	ns
		GCLK PLL	t <sub>co</sub>	3.910	3.910	5.824	6.027	6.606	6.434	6.921	6.027	6.606	6.434	6.921	ns
	12mA	GCLK	t <sub>co</sub>	3.506	3.506	5.172	5.376	5.891	5.748	6.153	5.376	5.891	5.748	6.153	ns
		GCLK PLL	t <sub>co</sub>	3.905	3.905	5.807	6.016	6.595	6.423	6.910	6.016	6.595	6.423	6.910	ns
1.2 V	2mA	GCLK	t <sub>co</sub>	3.730	3.730	5.556	5.815	6.395	6.252	6.657	5.815	6.395	6.252	6.657	ns
		GCLK PLL	t <sub>co</sub>	4.129	4.129	6.191	6.455	7.099	6.927	7.414	6.455	7.099	6.927	7.414	ns
	4mA	GCLK	t <sub>co</sub>	3.607	3.607	5.330	5.553	6.109	5.966	6.371	5.553	6.109	5.966	6.371	ns
		GCLK PLL	t <sub>co</sub>	4.006	4.006	5.965	6.193	6.813	6.641	7.128	6.193	6.813	6.641	7.128	ns
	6mA	GCLK	t <sub>co</sub>	3.569	3.569	5.238	5.464	5.996	5.853	6.258	5.464	5.996	5.853	6.258	ns
		GCLK PLL	t <sub>co</sub>	3.968	3.968	5.873	6.104	6.700	6.528	7.015	6.104	6.700	6.528	7.015	ns
8mA	GCLK	t <sub>co</sub>	3.522	3.522	5.210	5.415	5.940	5.797	6.202	5.415	5.940	5.797	6.202	ns	
	GCLK PLL	t <sub>co</sub>	3.921	3.921	5.845	6.055	6.644	6.472	6.959	6.055	6.644	6.472	6.959	ns	
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.522	3.522	5.167	5.362	5.871	5.728	6.133	5.362	5.871	5.728	6.133	ns
		GCLK PLL	t <sub>co</sub>	3.921	3.921	5.802	6.002	6.575	6.403	6.890	6.002	6.575	6.403	6.890	ns
	10mA	GCLK	t <sub>co</sub>	3.519	3.519	5.164	5.359	5.867	5.724	6.129	5.359	5.867	5.724	6.129	ns
		GCLK PLL	t <sub>co</sub>	3.918	3.918	5.799	5.999	6.571	6.399	6.886	5.999	6.571	6.399	6.886	ns
	12mA	GCLK	t <sub>co</sub>	3.517	3.517	5.164	5.360	5.868	5.725	6.130	5.360	5.868	5.725	6.130	ns
		GCLK PLL	t <sub>co</sub>	3.916	3.916	5.799	6.000	6.572	6.400	6.887	6.000	6.572	6.400	6.887	ns

**Table 1-92.** EP3SL200 Column Pins output Timing Parameters (Part 5 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.508	3.508	5.149	5.344	5.853	5.710	6.115	5.344	5.853	5.710	6.115	ns
		GCLK PLL	t <sub>co</sub>	3.907	3.907	5.784	5.984	6.557	6.385	6.872	5.984	6.557	6.385	6.872	ns
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.529	3.529	5.179	5.376	5.887	5.744	6.149	5.376	5.887	5.744	6.149	ns
		GCLK PLL	t <sub>co</sub>	3.928	3.928	5.814	6.016	6.591	6.419	6.906	6.016	6.591	6.419	6.906	ns
	6mA	GCLK	t <sub>co</sub>	3.525	3.525	5.177	5.374	5.885	5.742	6.147	5.374	5.885	5.742	6.147	ns
		GCLK PLL	t <sub>co</sub>	3.924	3.924	5.812	6.014	6.589	6.417	6.904	6.014	6.589	6.417	6.904	ns
	8mA	GCLK	t <sub>co</sub>	3.514	3.514	5.167	5.365	5.876	5.733	6.138	5.365	5.876	5.733	6.138	ns
		GCLK PLL	t <sub>co</sub>	3.913	3.913	5.802	6.005	6.580	6.408	6.895	6.005	6.580	6.408	6.895	ns
	10mA	GCLK	t <sub>co</sub>	3.503	3.503	5.154	5.352	5.863	5.720	6.125	5.352	5.863	5.720	6.125	ns
		GCLK PLL	t <sub>co</sub>	3.902	3.902	5.789	5.992	6.567	6.395	6.882	5.992	6.567	6.395	6.882	ns
	12mA	GCLK	t <sub>co</sub>	3.503	3.503	5.154	5.352	5.863	5.720	6.125	5.352	5.863	5.720	6.125	ns
		GCLK PLL	t <sub>co</sub>	3.902	3.902	5.789	5.992	6.567	6.395	6.882	5.992	6.567	6.395	6.882	ns
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.509	3.509	5.153	5.349	5.858	5.715	6.120	5.349	5.858	5.715	6.120	ns
		GCLK PLL	t <sub>co</sub>	3.908	3.908	5.788	5.989	6.562	6.390	6.877	5.989	6.562	6.390	6.877	ns
	16mA	GCLK	t <sub>co</sub>	3.512	3.512	5.161	5.358	5.870	5.727	6.132	5.358	5.870	5.727	6.132	ns
		GCLK PLL	t <sub>co</sub>	3.911	3.911	5.796	5.998	6.574	6.402	6.889	5.998	6.574	6.402	6.889	ns
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.533	3.533	5.188	5.388	5.900	5.757	6.162	5.388	5.900	5.757	6.162	ns
		GCLK PLL	t <sub>co</sub>	3.932	3.932	5.823	6.028	6.604	6.432	6.919	6.028	6.604	6.432	6.919	ns
	6mA	GCLK	t <sub>co</sub>	3.519	3.519	5.178	5.378	5.891	5.748	6.153	5.378	5.891	5.748	6.153	ns
		GCLK PLL	t <sub>co</sub>	3.918	3.918	5.813	6.018	6.595	6.423	6.910	6.018	6.595	6.423	6.910	ns
	8mA	GCLK	t <sub>co</sub>	3.508	3.508	5.164	5.364	5.877	5.734	6.139	5.364	5.877	5.734	6.139	ns
		GCLK PLL	t <sub>co</sub>	3.907	3.907	5.799	6.004	6.581	6.409	6.896	6.004	6.581	6.409	6.896	ns
	10mA	GCLK	t <sub>co</sub>	3.507	3.507	5.167	5.367	5.881	5.738	6.143	5.367	5.881	5.738	6.143	ns
		GCLK PLL	t <sub>co</sub>	3.906	3.906	5.802	6.007	6.585	6.413	6.900	6.007	6.585	6.413	6.900	ns
	12mA	GCLK	t <sub>co</sub>	3.504	3.504	5.162	5.362	5.875	5.732	6.137	5.362	5.875	5.732	6.137	ns
		GCLK PLL	t <sub>co</sub>	3.903	3.903	5.797	6.002	6.579	6.407	6.894	6.002	6.579	6.407	6.894	ns

**Table 1-92.** EP3SL200 Column Pins output Timing Parameters (Part 6 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
SSTL-15 CLASS II	8mA	GCLK	t <sub>co</sub>	3.506	3.506	5.151	5.348	5.858	5.715	6.120	5.348	5.858	5.715	6.120	ns	
		GCLK PLL	t <sub>co</sub>	3.905	3.905	5.786	5.988	6.562	6.390	6.877	5.988	6.562	6.390	6.877	ns	
	16mA	GCLK	t <sub>co</sub>	3.509	3.509	5.158	5.357	5.869	5.726	6.131	5.357	5.869	5.726	6.131	ns	
		GCLK PLL	t <sub>co</sub>	3.908	3.908	5.793	5.997	6.573	6.401	6.888	5.997	6.573	6.401	6.888	ns	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.516	3.516	5.153	5.348	5.856	5.713	6.118	5.348	5.856	5.713	6.118	ns	
		GCLK PLL	t <sub>co</sub>	3.915	3.915	5.788	5.988	6.560	6.388	6.875	5.988	6.560	6.388	6.875	ns	
	6mA	GCLK	t <sub>co</sub>	3.509	3.509	5.151	5.346	5.855	5.712	6.117	5.346	5.855	5.712	6.117	ns	
		GCLK PLL	t <sub>co</sub>	3.908	3.908	5.786	5.986	6.559	6.387	6.874	5.986	6.559	6.387	6.874	ns	
	8mA	GCLK	t <sub>co</sub>	3.501	3.501	5.143	5.339	5.848	5.705	6.110	5.339	5.848	5.705	6.110	ns	
		GCLK PLL	t <sub>co</sub>	3.900	3.900	5.778	5.979	6.552	6.380	6.867	5.979	6.552	6.380	6.867	ns	
	10mA	GCLK	t <sub>co</sub>	3.504	3.504	5.146	5.342	5.852	5.709	6.114	5.342	5.852	5.709	6.114	ns	
		GCLK PLL	t <sub>co</sub>	3.903	3.903	5.781	5.982	6.556	6.384	6.871	5.982	6.556	6.384	6.871	ns	
	12mA	GCLK	t <sub>co</sub>	3.501	3.501	5.149	5.346	5.856	5.713	6.118	5.346	5.856	5.713	6.118	ns	
		GCLK PLL	t <sub>co</sub>	3.900	3.900	5.784	5.986	6.560	6.388	6.875	5.986	6.560	6.388	6.875	ns	
	1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.509	3.509	5.148	5.343	5.852	5.709	6.114	5.343	5.852	5.709	6.114	ns
			GCLK PLL	t <sub>co</sub>	3.908	3.908	5.783	5.983	6.556	6.384	6.871	5.983	6.556	6.384	6.871	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.521	3.521	5.161	5.358	5.867	5.724	6.129	5.358	5.867	5.724	6.129	ns	
		GCLK PLL	t <sub>co</sub>	3.920	3.920	5.796	5.998	6.571	6.399	6.886	5.998	6.571	6.399	6.886	ns	
	6mA	GCLK	t <sub>co</sub>	3.517	3.517	5.162	5.359	5.870	5.727	6.132	5.359	5.870	5.727	6.132	ns	
		GCLK PLL	t <sub>co</sub>	3.916	3.916	5.797	5.999	6.574	6.402	6.889	5.999	6.574	6.402	6.889	ns	
	8mA	GCLK	t <sub>co</sub>	3.513	3.513	5.158	5.355	5.865	5.722	6.127	5.355	5.865	5.722	6.127	ns	
		GCLK PLL	t <sub>co</sub>	3.912	3.912	5.793	5.995	6.569	6.397	6.884	5.995	6.569	6.397	6.884	ns	
	10mA	GCLK	t <sub>co</sub>	3.506	3.506	5.151	5.348	5.858	5.715	6.120	5.348	5.858	5.715	6.120	ns	
		GCLK PLL	t <sub>co</sub>	3.905	3.905	5.786	5.988	6.562	6.390	6.877	5.988	6.562	6.390	6.877	ns	
	12mA	GCLK	t <sub>co</sub>	3.507	3.507	5.158	5.356	5.868	5.725	6.130	5.356	5.868	5.725	6.130	ns	
		GCLK PLL	t <sub>co</sub>	3.906	3.906	5.793	5.996	6.572	6.400	6.887	5.996	6.572	6.400	6.887	ns	

**Table 1-92.** EP3SL200 Column Pins output Timing Parameters (Part 7 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.505	3.505	5.139	5.334	5.842	5.699	6.104	5.334	5.842	5.699	6.104	ns
		GCLK PLL	t <sub>co</sub>	3.904	3.904	5.774	5.974	6.546	6.374	6.861	5.974	6.546	6.374	6.861	ns
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.524	3.524	5.175	5.375	5.888	5.745	6.150	5.375	5.888	5.745	6.150	ns
		GCLK PLL	t <sub>co</sub>	3.923	3.923	5.810	6.015	6.592	6.420	6.907	6.015	6.592	6.420	6.907	ns
	6mA	GCLK	t <sub>co</sub>	3.516	3.516	5.166	5.366	5.879	5.736	6.141	5.366	5.879	5.736	6.141	ns
		GCLK PLL	t <sub>co</sub>	3.915	3.915	5.801	6.006	6.583	6.411	6.898	6.006	6.583	6.411	6.898	ns
	8mA	GCLK	t <sub>co</sub>	3.517	3.517	5.174	5.374	5.888	5.745	6.150	5.374	5.888	5.745	6.150	ns
		GCLK PLL	t <sub>co</sub>	3.916	3.916	5.809	6.014	6.592	6.420	6.907	6.014	6.592	6.420	6.907	ns
	10mA	GCLK	t <sub>co</sub>	3.506	3.506	5.161	5.361	5.874	5.731	6.136	5.361	5.874	5.731	6.136	ns
		GCLK PLL	t <sub>co</sub>	3.905	3.905	5.796	6.001	6.578	6.406	6.893	6.001	6.578	6.406	6.893	ns
	12mA	GCLK	t <sub>co</sub>	3.506	3.506	5.161	5.361	5.875	5.732	6.137	5.361	5.875	5.732	6.137	ns
		GCLK PLL	t <sub>co</sub>	3.905	3.905	5.796	6.001	6.579	6.407	6.894	6.001	6.579	6.407	6.894	ns
1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.527	3.527	5.177	5.376	5.888	5.745	6.150	5.376	5.888	5.745	6.150	ns
		GCLK PLL	t <sub>co</sub>	3.926	3.926	5.812	6.016	6.592	6.420	6.907	6.016	6.592	6.420	6.907	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.630	3.630	5.222	5.410	5.913	5.770	6.175	5.410	5.913	5.770	6.175	ns
		GCLK PLL	t <sub>co</sub>	4.029	4.029	5.857	6.050	6.617	6.445	6.932	6.050	6.617	6.445	6.932	ns
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.630	3.630	5.222	5.410	5.913	5.770	6.175	5.410	5.913	5.770	6.175	ns
		GCLK PLL	t <sub>co</sub>	4.029	4.029	5.857	6.050	6.617	6.445	6.932	6.050	6.617	6.445	6.932	ns

Table 1-93 specifies EP3SL200 Row Pins Output Timing parameters for single-ended I/O standards.

**Table 1-93.** EP3SL200 Row Pins output Timing Parameters (Part 1 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.451	3.720	5.364	5.562	6.063	5.939	6.287	5.692	6.191	6.069	6.368	ns
		GCLK PLL	t <sub>co</sub>	1.540	1.732	2.180	2.278	2.513	2.487	2.543	2.382	2.623	2.595	2.537	ns
	8mA	GCLK	t <sub>co</sub>	3.358	3.615	5.234	5.424	5.918	5.794	6.142	5.551	6.042	5.920	6.219	ns
		GCLK PLL	t <sub>co</sub>	1.447	1.627	2.050	2.140	2.368	2.342	2.398	2.241	2.474	2.446	2.388	ns
	12mA	GCLK	t <sub>co</sub>	3.259	3.509	5.115	5.301	5.798	5.666	6.020	5.424	5.914	5.788	6.094	ns
		GCLK PLL	t <sub>co</sub>	1.348	1.533	1.931	2.017	2.240	2.217	2.270	2.114	2.342	2.314	2.256	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.461	3.724	5.372	5.567	6.067	5.943	6.291	5.698	6.195	6.073	6.372	ns
		GCLK PLL	t <sub>co</sub>	1.550	1.736	2.188	2.283	2.517	2.491	2.547	2.388	2.627	2.599	2.541	ns
	8mA	GCLK	t <sub>co</sub>	3.263	3.515	5.121	5.307	5.808	5.672	6.030	5.430	5.923	5.795	6.103	ns
		GCLK PLL	t <sub>co</sub>	1.352	1.537	1.937	2.023	2.246	2.227	2.276	2.120	2.349	2.321	2.263	ns
3.0-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.405	3.666	5.316	5.515	6.019	5.895	6.243	5.649	6.149	6.027	6.326	ns
		GCLK PLL	t <sub>co</sub>	1.494	1.678	2.132	2.231	2.469	2.443	2.499	2.339	2.581	2.553	2.495	ns
	8mA	GCLK	t <sub>co</sub>	3.280	3.539	5.164	5.356	5.855	5.731	6.079	5.487	5.985	5.862	6.161	ns
		GCLK PLL	t <sub>co</sub>	1.369	1.551	1.980	2.072	2.305	2.279	2.335	2.177	2.417	2.388	2.330	ns
	12mA	GCLK	t <sub>co</sub>	3.241	3.488	5.082	5.273	5.767	5.643	5.991	5.401	5.892	5.769	6.068	ns
		GCLK PLL	t <sub>co</sub>	1.330	1.504	1.898	1.989	2.217	2.191	2.247	2.091	2.324	2.295	2.237	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.319	3.585	5.211	5.408	5.909	5.785	6.133	5.541	6.038	5.915	6.214	ns
		GCLK PLL	t <sub>co</sub>	1.408	1.597	2.027	2.124	2.359	2.333	2.389	2.231	2.470	2.441	2.383	ns
	8mA	GCLK	t <sub>co</sub>	3.219	3.466	5.047	5.234	5.731	5.604	5.953	5.361	5.852	5.729	6.028	ns
		GCLK PLL	t <sub>co</sub>	1.308	1.488	1.863	1.950	2.178	2.152	2.208	2.051	2.284	2.255	2.197	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.431	3.702	5.449	5.669	6.191	6.067	6.415	5.809	6.328	6.205	6.504	ns
		GCLK PLL	t <sub>co</sub>	1.520	1.714	2.265	2.385	2.641	2.615	2.671	2.499	2.760	2.731	2.673	ns
	8mA	GCLK	t <sub>co</sub>	3.321	3.604	5.294	5.506	6.021	5.897	6.245	5.642	6.154	6.031	6.330	ns
		GCLK PLL	t <sub>co</sub>	1.410	1.616	2.110	2.222	2.471	2.445	2.501	2.332	2.586	2.557	2.499	ns
	12mA	GCLK	t <sub>co</sub>	3.275	3.527	5.183	5.387	5.895	5.771	6.119	5.519	6.024	5.901	6.200	ns
		GCLK PLL	t <sub>co</sub>	1.364	1.544	1.999	2.103	2.345	2.319	2.375	2.209	2.456	2.427	2.369	ns

**Table 1-93.** EP3SL200 Row Pins output Timing Parameters (Part 2 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.8 V	2mA	GCLK	t <sub>co</sub>	3.647	3.920	5.808	6.086	6.666	6.527	6.890	6.232	6.812	6.684	6.989	ns
		GCLK PLL	t <sub>co</sub>	1.769	1.884	2.520	2.827	3.116	2.941	2.996	2.951	3.244	3.217	2.983	ns
	4mA	GCLK	t <sub>co</sub>	3.422	3.718	5.482	5.717	6.261	6.122	6.485	5.867	6.406	6.277	6.582	ns
		GCLK PLL	t <sub>co</sub>	1.544	1.698	2.230	2.458	2.711	2.581	2.636	2.586	2.838	2.810	2.621	ns
	6mA	GCLK	t <sub>co</sub>	3.357	3.616	5.328	5.567	6.102	5.963	6.326	5.699	6.233	6.105	6.410	ns
		GCLK PLL	t <sub>co</sub>	1.479	1.616	2.130	2.308	2.552	2.481	2.536	2.418	2.665	2.638	2.516	ns
	8mA	GCLK	t <sub>co</sub>	3.315	3.542	5.251	5.473	6.005	5.866	6.229	5.604	6.139	6.011	6.316	ns
		GCLK PLL	t <sub>co</sub>	1.419	1.596	2.073	2.214	2.455	2.415	2.470	2.323	2.571	2.544	2.444	ns
1.5 V	2mA	GCLK	t <sub>co</sub>	3.558	3.838	5.718	5.999	6.594	6.455	6.818	6.139	6.736	6.608	6.913	ns
		GCLK PLL	t <sub>co</sub>	1.680	1.827	2.448	2.740	3.044	2.878	2.933	2.858	3.168	3.141	2.918	ns
	4mA	GCLK	t <sub>co</sub>	3.331	3.580	5.313	5.562	6.103	5.964	6.327	5.693	6.232	6.104	6.409	ns
		GCLK PLL	t <sub>co</sub>	1.438	1.613	2.126	2.303	2.553	2.484	2.539	2.412	2.664	2.637	2.517	ns
	6mA	GCLK	t <sub>co</sub>	3.304	3.533	5.240	5.466	5.997	5.862	6.221	5.595	6.127	5.999	6.304	ns
		GCLK PLL	t <sub>co</sub>	1.411	1.587	2.058	2.207	2.447	2.415	2.470	2.314	2.559	2.532	2.444	ns
	8mA	GCLK	t <sub>co</sub>	3.285	3.524	5.218	5.448	5.978	5.843	6.202	5.577	6.105	5.977	6.282	ns
		GCLK PLL	t <sub>co</sub>	1.402	1.576	2.041	2.189	2.428	2.396	2.451	2.296	2.537	2.510	2.425	ns
1.2 V	2mA	GCLK	t <sub>co</sub>	3.501	3.763	5.628	5.913	6.519	6.380	6.743	6.051	6.652	6.524	6.829	ns
		GCLK PLL	t <sub>co</sub>	1.623	1.740	2.369	2.654	2.969	2.817	2.872	2.770	3.084	3.057	2.849	ns
	4mA	GCLK	t <sub>co</sub>	3.336	3.574	5.335	5.590	6.144	6.005	6.368	5.718	6.274	6.146	6.451	ns
		GCLK PLL	t <sub>co</sub>	1.443	1.617	2.143	2.331	2.594	2.532	2.587	2.437	2.706	2.679	2.561	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.260	3.513	5.160	5.359	5.876	5.739	6.098	5.486	5.994	5.864	6.174	ns
		GCLK PLL	t <sub>co</sub>	1.349	1.532	1.979	2.075	2.313	2.295	2.343	2.176	2.418	2.390	2.332	ns
	12mA	GCLK	t <sub>co</sub>	3.248	3.501	5.152	5.351	5.874	5.731	6.096	5.478	5.993	5.857	6.173	ns
		GCLK PLL	t <sub>co</sub>	1.337	1.528	1.976	2.067	2.305	2.293	2.335	2.168	2.411	2.383	2.325	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.232	3.483	5.127	5.326	5.857	5.704	6.079	5.452	5.975	5.830	6.155	ns
		GCLK PLL	t <sub>co</sub>	1.321	1.517	1.961	2.042	2.278	2.276	2.308	2.142	2.384	2.356	2.298	ns



**Table 1-93.** EP3SL200 Row Pins output Timing Parameters (Part 3 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.264	3.498	5.146	5.361	5.879	5.757	6.103	5.490	6.002	5.880	6.179	ns	
		GCLK PLL	t <sub>co</sub>	1.380	1.540	1.992	2.102	2.329	2.310	2.365	2.204	2.434	2.407	2.335	ns	
	6mA	GCLK	t <sub>co</sub>	3.259	3.484	5.143	5.359	5.877	5.756	6.101	5.488	6.000	5.878	6.177	ns	
		GCLK PLL	t <sub>co</sub>	1.365	1.535	1.990	2.100	2.327	2.309	2.364	2.202	2.432	2.405	2.333	ns	
	8mA	GCLK	t <sub>co</sub>	3.248	3.472	5.126	5.342	5.860	5.746	6.084	5.479	5.984	5.869	6.161	ns	
		GCLK PLL	t <sub>co</sub>	1.354	1.524	1.980	2.083	2.310	2.299	2.354	2.185	2.416	2.389	2.324	ns	
	10mA	GCLK	t <sub>co</sub>	3.237	3.449	5.110	5.326	5.845	5.733	6.069	5.467	5.969	5.857	6.146	ns	
		GCLK PLL	t <sub>co</sub>	1.330	1.513	1.967	2.067	2.295	2.286	2.341	2.170	2.401	2.374	2.312	ns	
	12mA	GCLK	t <sub>co</sub>	3.237	3.448	5.109	5.325	5.844	5.733	6.068	5.466	5.968	5.857	6.145	ns	
		GCLK PLL	t <sub>co</sub>	1.330	1.512	1.967	2.066	2.294	2.286	2.341	2.169	2.400	2.373	2.312	ns	
	SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.245	3.457	5.107	5.321	5.838	5.728	6.062	5.462	5.961	5.851	6.138	ns
			GCLK PLL	t <sub>co</sub>	1.340	1.519	1.966	2.062	2.288	2.281	2.336	2.164	2.393	2.366	2.306	ns
16mA		GCLK	t <sub>co</sub>	3.246	3.452	5.106	5.322	5.840	5.738	6.064	5.471	5.965	5.862	6.142	ns	
		GCLK PLL	t <sub>co</sub>	1.334	1.522	1.972	2.063	2.293	2.291	2.346	2.166	2.397	2.370	2.317	ns	
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.267	3.494	5.157	5.375	5.896	5.770	6.120	5.500	6.018	5.892	6.195	ns	
		GCLK PLL	t <sub>co</sub>	1.376	1.543	2.001	2.116	2.346	2.323	2.378	2.217	2.450	2.423	2.347	ns	
	6mA	GCLK	t <sub>co</sub>	3.253	3.472	5.139	5.358	5.879	5.760	6.103	5.491	6.002	5.883	6.179	ns	
		GCLK PLL	t <sub>co</sub>	1.353	1.529	1.990	2.099	2.329	2.313	2.368	2.201	2.434	2.407	2.338	ns	
	8mA	GCLK	t <sub>co</sub>	3.242	3.455	5.122	5.340	5.861	5.747	6.085	5.478	5.985	5.870	6.162	ns	
		GCLK PLL	t <sub>co</sub>	1.336	1.517	1.977	2.081	2.311	2.300	2.355	2.183	2.417	2.390	2.325	ns	

**Table 1-93.** EP3SL200 Row Pins output Timing Parameters (Part 4 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.252	3.470	5.113	5.326	5.841	5.726	6.065	5.461	5.964	5.848	6.141	ns
		GCLK PLL	t <sub>co</sub>	1.355	1.525	1.965	2.067	2.291	2.279	2.334	2.168	2.396	2.369	2.303	ns
	6mA	GCLK	t <sub>co</sub>	3.245	3.458	5.104	5.318	5.833	5.725	6.057	5.460	5.957	5.848	6.134	ns
		GCLK PLL	t <sub>co</sub>	1.343	1.519	1.963	2.059	2.283	2.278	2.333	2.160	2.389	2.362	2.303	ns
	8mA	GCLK	t <sub>co</sub>	3.236	3.446	5.095	5.309	5.825	5.718	6.049	5.453	5.949	5.841	6.126	ns
		GCLK PLL	t <sub>co</sub>	1.330	1.511	1.956	2.050	2.275	2.271	2.326	2.152	2.381	2.354	2.296	ns
	10mA	GCLK	t <sub>co</sub>	3.239	3.448	5.098	5.312	5.828	5.722	6.052	5.456	5.952	5.844	6.129	ns
		GCLK PLL	t <sub>co</sub>	1.332	1.513	1.959	2.053	2.278	2.275	2.330	2.155	2.384	2.357	2.299	ns
	12mA	GCLK	t <sub>co</sub>	3.235	3.443	5.096	5.311	5.828	5.725	6.052	5.459	5.953	5.849	6.130	ns
		GCLK PLL	t <sub>co</sub>	1.325	1.510	1.961	2.052	2.280	2.278	2.333	2.155	2.385	2.358	2.304	ns
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.243	3.447	5.091	5.303	5.819	5.721	6.043	5.455	5.942	5.843	6.119	ns
		GCLK PLL	t <sub>co</sub>	1.331	1.518	1.959	2.044	2.276	2.274	2.329	2.146	2.378	2.347	2.298	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.258	3.477	5.124	5.339	5.856	5.737	6.080	5.470	5.978	5.859	6.155	ns
		GCLK PLL	t <sub>co</sub>	1.362	1.531	1.974	2.080	2.306	2.290	2.345	2.180	2.410	2.383	2.314	ns
	6mA	GCLK	t <sub>co</sub>	3.252	3.467	5.120	5.335	5.852	5.739	6.076	5.472	5.975	5.862	6.152	ns
		GCLK PLL	t <sub>co</sub>	1.350	1.526	1.975	2.076	2.302	2.292	2.347	2.177	2.407	2.380	2.317	ns
	8mA	GCLK	t <sub>co</sub>	3.248	3.462	5.114	5.329	5.846	5.734	6.070	5.467	5.969	5.856	6.146	ns
		GCLK PLL	t <sub>co</sub>	1.346	1.522	1.970	2.070	2.296	2.287	2.342	2.171	2.401	2.374	2.311	ns
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.260	3.476	5.135	5.353	5.874	5.756	6.098	5.486	5.995	5.878	6.172	ns
		GCLK PLL	t <sub>co</sub>	1.361	1.533	1.987	2.094	2.324	2.309	2.364	2.194	2.427	2.400	2.333	ns
	6mA	GCLK	t <sub>co</sub>	3.251	3.464	5.124	5.341	5.862	5.747	6.086	5.477	5.984	5.869	6.161	ns
		GCLK PLL	t <sub>co</sub>	1.349	1.525	1.978	2.082	2.312	2.300	2.355	2.183	2.416	2.389	2.324	ns
	8mA	GCLK	t <sub>co</sub>	3.250	3.462	5.128	5.346	5.868	5.756	6.092	5.486	5.991	5.879	6.168	ns
		GCLK PLL	t <sub>co</sub>	1.345	1.525	1.985	2.087	2.318	2.309	2.364	2.189	2.423	2.396	2.334	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.345	3.596	5.185	5.377	5.916	5.748	6.138	5.504	6.036	5.876	6.216	ns
		GCLK PLL	t <sub>co</sub>	1.434	1.638	2.031	2.093	2.322	2.335	2.357	2.194	2.430	2.402	2.347	ns
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.345	3.596	5.185	5.377	5.916	5.748	6.138	5.504	6.036	5.876	6.216	ns
		GCLK PLL	t <sub>co</sub>	1.434	1.638	2.031	2.093	2.322	2.335	2.357	2.194	2.430	2.402	2.347	ns

Table 1-94 through Table 1-97 show the maximum I/O timing parameters for EP3SL200 devices for differential I/O standards.

Table 1-94 specifies EP3SL200 column pins input timing parameters for differential I/O standards.

**Table 1-94.** EP3SL200 Column Pins Input Timing Parameters (Part 1 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
LVDS	GCLK	$t_{su}$	-1.207	-1.253	-1.548	-1.485	-1.658	-1.594	-2.054	-1.455	-1.881	-1.560	-2.092	ns
		$t_h$	1.345	1.411	1.807	1.755	1.956	1.880	2.339	1.736	2.200	1.858	2.378	ns
	GCLK PLL	$t_{su}$	0.856	0.886	1.886	2.066	2.230	2.125	2.003	2.122	2.420	2.183	2.060	ns
		$t_h$	-0.579	-0.587	-1.391	-1.550	-1.656	-1.580	-1.450	-1.593	-1.814	-1.626	-1.503	ns
MINI-LVDS	GCLK	$t_{su}$	-1.207	-1.253	-1.548	-1.485	-1.658	-1.594	-2.054	-1.455	-1.881	-1.560	-2.092	ns
		$t_h$	1.345	1.411	1.807	1.755	1.956	1.880	2.339	1.736	2.200	1.858	2.378	ns
	GCLK PLL	$t_{su}$	0.856	0.886	1.886	2.066	2.230	2.125	2.003	2.122	2.420	2.183	2.060	ns
		$t_h$	-0.579	-0.587	-1.391	-1.550	-1.656	-1.580	-1.450	-1.593	-1.814	-1.626	-1.503	ns
RSDS	GCLK	$t_{su}$	-1.207	-1.253	-1.548	-1.485	-1.658	-1.594	-2.054	-1.455	-1.881	-1.560	-2.092	ns
		$t_h$	1.345	1.411	1.807	1.755	1.956	1.880	2.339	1.736	2.200	1.858	2.378	ns
	GCLK PLL	$t_{su}$	0.856	0.886	1.886	2.066	2.230	2.125	2.003	2.122	2.420	2.183	2.060	ns
		$t_h$	-0.579	-0.587	-1.391	-1.550	-1.656	-1.580	-1.450	-1.593	-1.814	-1.626	-1.503	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-1.023	-1.076	-1.661	-1.684	-1.817	-1.748	-2.203	-1.690	-1.821	-1.758	-2.246	ns
		$t_h$	1.154	1.226	1.887	1.914	2.069	1.988	2.443	1.929	2.081	2.008	2.487	ns
	GCLK PLL	$t_{su}$	1.040	1.063	1.773	1.867	2.071	1.971	1.854	1.887	2.091	1.985	1.906	ns
		$t_h$	-0.770	-0.772	-1.311	-1.391	-1.543	-1.472	-1.346	-1.400	-1.553	-1.476	-1.394	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-1.023	-1.076	-1.661	-1.684	-1.817	-1.748	-2.203	-1.690	-1.821	-1.758	-2.246	ns
		$t_h$	1.154	1.226	1.887	1.914	2.069	1.988	2.443	1.929	2.081	2.008	2.487	ns
	GCLK PLL	$t_{su}$	1.040	1.063	1.773	1.867	2.071	1.971	1.854	1.887	2.091	1.985	1.906	ns
		$t_h$	-0.770	-0.772	-1.311	-1.391	-1.543	-1.472	-1.346	-1.400	-1.553	-1.476	-1.394	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-1.031	-1.088	-1.671	-1.695	-1.833	-1.764	-2.219	-1.701	-1.836	-1.773	-2.261	ns
		$t_h$	1.162	1.238	1.897	1.925	2.085	2.004	2.459	1.940	2.096	2.023	2.502	ns
	GCLK PLL	$t_{su}$	1.032	1.051	1.763	1.856	2.055	1.955	1.838	1.876	2.076	1.970	1.891	ns
		$t_h$	-0.762	-0.760	-1.301	-1.380	-1.527	-1.456	-1.330	-1.389	-1.538	-1.461	-1.379	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-1.031	-1.088	-1.671	-1.695	-1.833	-1.764	-2.219	-1.701	-1.836	-1.773	-2.261	ns
		$t_h$	1.162	1.238	1.897	1.925	2.085	2.004	2.459	1.940	2.096	2.023	2.502	ns
	GCLK PLL	$t_{su}$	1.032	1.051	1.763	1.856	2.055	1.955	1.838	1.876	2.076	1.970	1.891	ns
		$t_h$	-0.762	-0.760	-1.301	-1.380	-1.527	-1.456	-1.330	-1.389	-1.538	-1.461	-1.379	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-1.043	-1.099	-1.680	-1.706	-1.852	-1.783	-2.238	-1.712	-1.854	-1.791	-2.279	ns
		$t_h$	1.174	1.249	1.906	1.936	2.104	2.023	2.478	1.951	2.114	2.041	2.520	ns
	GCLK PLL	$t_{su}$	1.020	1.040	1.754	1.845	2.036	1.936	1.819	1.865	2.058	1.952	1.873	ns
		$t_h$	-0.750	-0.749	-1.292	-1.369	-1.508	-1.437	-1.311	-1.378	-1.520	-1.443	-1.361	ns

**Table 1-94.** EP3SL200 Column Pins Input Timing Parameters (Part 2 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.043	-1.099	-1.680	-1.706	-1.852	-1.783	-2.238	-1.712	-1.854	-1.791	-2.279	ns
		$t_h$	1.174	1.249	1.906	1.936	2.104	2.023	2.478	1.951	2.114	2.041	2.520	ns
	GCLK PLL	$t_{su}$	1.020	1.040	1.754	1.845	2.036	1.936	1.819	1.865	2.058	1.952	1.873	ns
		$t_h$	-0.750	-0.749	-1.292	-1.369	-1.508	-1.437	-1.311	-1.378	-1.520	-1.443	-1.361	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.031	-1.088	-1.671	-1.695	-1.833	-1.764	-2.219	-1.701	-1.836	-1.773	-2.261	ns
		$t_h$	1.162	1.238	1.897	1.925	2.085	2.004	2.459	1.940	2.096	2.023	2.502	ns
	GCLK PLL	$t_{su}$	1.032	1.051	1.763	1.856	2.055	1.955	1.838	1.876	2.076	1.970	1.891	ns
		$t_h$	-0.762	-0.760	-1.301	-1.380	-1.527	-1.456	-1.330	-1.389	-1.538	-1.461	-1.379	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.031	-1.088	-1.671	-1.695	-1.833	-1.764	-2.219	-1.701	-1.836	-1.773	-2.261	ns
		$t_h$	1.162	1.238	1.897	1.925	2.085	2.004	2.459	1.940	2.096	2.023	2.502	ns
	GCLK PLL	$t_{su}$	1.032	1.051	1.763	1.856	2.055	1.955	1.838	1.876	2.076	1.970	1.891	ns
		$t_h$	-0.762	-0.760	-1.301	-1.380	-1.527	-1.456	-1.330	-1.389	-1.538	-1.461	-1.379	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-1.043	-1.099	-1.680	-1.706	-1.852	-1.783	-2.238	-1.712	-1.854	-1.791	-2.279	ns
		$t_h$	1.174	1.249	1.906	1.936	2.104	2.023	2.478	1.951	2.114	2.041	2.520	ns
	GCLK PLL	$t_{su}$	1.020	1.040	1.754	1.845	2.036	1.936	1.819	1.865	2.058	1.952	1.873	ns
		$t_h$	-0.750	-0.749	-1.292	-1.369	-1.508	-1.437	-1.311	-1.378	-1.520	-1.443	-1.361	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-1.043	-1.099	-1.680	-1.706	-1.852	-1.783	-2.238	-1.712	-1.854	-1.791	-2.279	ns
		$t_h$	1.174	1.249	1.906	1.936	2.104	2.023	2.478	1.951	2.114	2.041	2.520	ns
	GCLK PLL	$t_{su}$	1.020	1.040	1.754	1.845	2.036	1.936	1.819	1.865	2.058	1.952	1.873	ns
		$t_h$	-0.750	-0.749	-1.292	-1.369	-1.508	-1.437	-1.311	-1.378	-1.520	-1.443	-1.361	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.050	-1.105	-1.692	-1.711	-1.852	-1.785	-2.237	-1.716	-1.849	-1.789	-2.275	ns
		$t_h$	1.181	1.255	1.919	1.944	2.107	2.026	2.482	1.958	2.114	2.040	2.521	ns
	GCLK PLL	$t_{su}$	1.013	1.034	1.742	1.840	2.036	1.934	1.820	1.861	2.063	1.954	1.877	ns
		$t_h$	-0.743	-0.743	-1.279	-1.361	-1.505	-1.434	-1.307	-1.371	-1.520	-1.444	-1.360	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.050	-1.105	-1.692	-1.711	-1.852	-1.785	-2.237	-1.716	-1.849	-1.789	-2.275	ns
		$t_h$	1.181	1.255	1.919	1.944	2.107	2.026	2.482	1.958	2.114	2.040	2.521	ns
	GCLK PLL	$t_{su}$	1.013	1.034	1.742	1.840	2.036	1.934	1.820	1.861	2.063	1.954	1.877	ns
		$t_h$	-0.743	-0.743	-1.279	-1.361	-1.505	-1.434	-1.307	-1.371	-1.520	-1.444	-1.360	ns

Table 1-95 specifies EP3SL200 row pins input timing parameters for differential I/O standards.

**Table 1-95.** EP3SL200 Row Pins Input Timing Parameters (Part 1 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS	GCLK	t <sub>SU</sub>	-1.149	-1.197	-1.416	-1.330	-1.491	-1.432	-1.861	-1.296	-1.448	-1.390	-1.903	ns
		t <sub>H</sub>	1.287	1.353	1.678	1.607	1.791	1.721	2.152	1.586	1.761	1.693	2.195	ns
	GCLK PLL	t <sub>SU</sub>	0.859	0.886	1.969	2.177	2.369	2.252	2.160	2.237	2.436	2.316	2.213	ns
		t <sub>H</sub>	-0.581	-0.589	-1.474	-1.655	-1.792	-1.704	-1.601	-1.699	-1.843	-1.753	-1.650	ns
MINI-LVDS	GCLK	t <sub>SU</sub>	-1.149	-1.197	-1.416	-1.330	-1.491	-1.432	-1.861	-1.296	-1.448	-1.390	-1.903	ns
		t <sub>H</sub>	1.287	1.353	1.678	1.607	1.791	1.721	2.152	1.586	1.761	1.693	2.195	ns
	GCLK PLL	t <sub>SU</sub>	0.859	0.886	1.969	2.177	2.369	2.252	2.160	2.237	2.436	2.316	2.213	ns
		t <sub>H</sub>	-0.581	-0.589	-1.474	-1.655	-1.792	-1.704	-1.601	-1.699	-1.843	-1.753	-1.650	ns
RSDS	GCLK	t <sub>SU</sub>	-1.149	-1.197	-1.416	-1.330	-1.491	-1.432	-1.861	-1.296	-1.448	-1.390	-1.903	ns
		t <sub>H</sub>	1.287	1.353	1.678	1.607	1.791	1.721	2.152	1.586	1.761	1.693	2.195	ns
	GCLK PLL	t <sub>SU</sub>	0.859	0.886	1.969	2.177	2.369	2.252	2.160	2.237	2.436	2.316	2.213	ns
		t <sub>H</sub>	-0.581	-0.589	-1.474	-1.655	-1.792	-1.704	-1.601	-1.699	-1.843	-1.753	-1.650	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>SU</sub>	-0.954	-1.012	-1.546	-1.559	-1.680	-1.616	-2.040	-1.567	-1.685	-1.622	-2.087	ns
		t <sub>H</sub>	1.085	1.159	1.772	1.790	1.931	1.856	2.282	1.808	1.946	1.873	2.330	ns
	GCLK PLL	t <sub>SU</sub>	1.054	1.071	1.844	1.953	2.180	2.068	1.981	1.970	2.199	2.084	2.029	ns
		t <sub>H</sub>	-0.783	-0.783	-1.383	-1.476	-1.652	-1.569	-1.471	-1.481	-1.658	-1.573	-1.515	ns
	GCLK	t <sub>SU</sub>	-0.954	-1.012	-1.546	-1.559	-1.680	-1.616	-2.040	-1.567	-1.685	-1.622	-2.087	ns
		t <sub>H</sub>	1.085	1.159	1.772	1.790	1.931	1.856	2.282	1.808	1.946	1.873	2.330	ns
	GCLK PLL	t <sub>SU</sub>	1.054	1.071	1.844	1.953	2.180	2.068	1.981	1.970	2.199	2.084	2.029	ns
		t <sub>H</sub>	-0.783	-0.783	-1.383	-1.476	-1.652	-1.569	-1.471	-1.481	-1.658	-1.573	-1.515	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>SU</sub>	-0.963	-1.024	-1.555	-1.569	-1.696	-1.632	-2.056	-1.576	-1.701	-1.638	-2.103	ns
		t <sub>H</sub>	1.094	1.171	1.781	1.800	1.947	1.872	2.298	1.817	1.962	1.889	2.346	ns
	GCLK PLL	t <sub>SU</sub>	1.045	1.059	1.835	1.943	2.164	2.052	1.965	1.961	2.183	2.068	2.013	ns
		t <sub>H</sub>	-0.774	-0.771	-1.374	-1.466	-1.636	-1.553	-1.455	-1.472	-1.642	-1.557	-1.499	ns
	GCLK	t <sub>SU</sub>	-0.963	-1.024	-1.555	-1.569	-1.696	-1.632	-2.056	-1.576	-1.701	-1.638	-2.103	ns
		t <sub>H</sub>	1.094	1.171	1.781	1.800	1.947	1.872	2.298	1.817	1.962	1.889	2.346	ns
	GCLK PLL	t <sub>SU</sub>	1.045	1.059	1.835	1.943	2.164	2.052	1.965	1.961	2.183	2.068	2.013	ns
		t <sub>H</sub>	-0.774	-0.771	-1.374	-1.466	-1.636	-1.553	-1.455	-1.472	-1.642	-1.557	-1.499	ns

**Table 1-95.** EP3SL200 Row Pins Input Timing Parameters (Part 2 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.977	-1.036	-1.564	-1.579	-1.714	-1.650	-2.074	-1.587	-1.718	-1.655	-2.120	ns
		$t_h$	1.108	1.183	1.790	1.810	1.965	1.890	2.316	1.828	1.979	1.906	2.363	ns
	GCLK PLL	$t_{su}$	1.031	1.047	1.822	1.933	2.146	2.034	1.947	1.950	2.166	2.051	1.996	ns
		$t_h$	-0.760	-0.759	-1.362	-1.456	-1.618	-1.535	-1.437	-1.461	-1.625	-1.540	-1.482	ns
	GCLK	$t_{su}$	-0.977	-1.036	-1.564	-1.579	-1.714	-1.650	-2.074	-1.587	-1.718	-1.655	-2.120	ns
		$t_h$	1.108	1.183	1.790	1.810	1.965	1.890	2.316	1.828	1.979	1.906	2.363	ns
GCLK PLL	$t_{su}$	1.031	1.047	1.822	1.933	2.146	2.034	1.947	1.950	2.166	2.051	1.996	ns	
	$t_h$	-0.760	-0.759	-1.362	-1.456	-1.618	-1.535	-1.437	-1.461	-1.625	-1.540	-1.482	ns	
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.963	-1.024	-1.555	-1.569	-1.696	-1.632	-2.056	-1.576	-1.701	-1.638	-2.103	ns
		$t_h$	1.094	1.171	1.781	1.800	1.947	1.872	2.298	1.817	1.962	1.889	2.346	ns
	GCLK PLL	$t_{su}$	1.045	1.059	1.835	1.943	2.164	2.052	1.965	1.961	2.183	2.068	2.013	ns
		$t_h$	-0.774	-0.771	-1.374	-1.466	-1.636	-1.553	-1.455	-1.472	-1.642	-1.557	-1.499	ns
	GCLK	$t_{su}$	-0.963	-1.024	-1.555	-1.569	-1.696	-1.632	-2.056	-1.576	-1.701	-1.638	-2.103	ns
		$t_h$	1.094	1.171	1.781	1.800	1.947	1.872	2.298	1.817	1.962	1.889	2.346	ns
GCLK PLL	$t_{su}$	1.045	1.059	1.835	1.943	2.164	2.052	1.965	1.961	2.183	2.068	2.013	ns	
	$t_h$	-0.774	-0.771	-1.374	-1.466	-1.636	-1.553	-1.455	-1.472	-1.642	-1.557	-1.499	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.977	-1.036	-1.564	-1.579	-1.714	-1.650	-2.074	-1.587	-1.718	-1.655	-2.120	ns
		$t_h$	1.108	1.183	1.790	1.810	1.965	1.890	2.316	1.828	1.979	1.906	2.363	ns
	GCLK PLL	$t_{su}$	1.031	1.047	1.822	1.933	2.146	2.034	1.947	1.950	2.166	2.051	1.996	ns
		$t_h$	-0.760	-0.759	-1.362	-1.456	-1.618	-1.535	-1.437	-1.461	-1.625	-1.540	-1.482	ns
	GCLK	$t_{su}$	-0.977	-1.036	-1.564	-1.579	-1.714	-1.650	-2.074	-1.587	-1.718	-1.655	-2.120	ns
		$t_h$	1.108	1.183	1.790	1.810	1.965	1.890	2.316	1.828	1.979	1.906	2.363	ns
GCLK PLL	$t_{su}$	1.031	1.047	1.822	1.933	2.146	2.034	1.947	1.950	2.166	2.051	1.996	ns	
	$t_h$	-0.760	-0.759	-1.362	-1.456	-1.618	-1.535	-1.437	-1.461	-1.625	-1.540	-1.482	ns	
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.986	-1.045	-1.578	-1.590	-1.721	-1.658	-2.080	-1.594	-1.719	-1.658	-2.122	ns
		$t_h$	1.117	1.192	1.805	1.824	1.975	1.900	2.327	1.838	1.985	1.911	2.370	ns
	GCLK PLL	$t_{su}$	1.022	1.038	1.807	1.917	2.135	2.022	1.936	1.939	2.160	2.043	1.989	ns
		$t_h$	-0.751	-0.750	-1.347	-1.438	-1.604	-1.521	-1.422	-1.447	-1.616	-1.531	-1.471	ns
	GCLK	$t_{su}$	-0.986	-1.045	-1.578	-1.590	-1.721	-1.658	-2.080	-1.594	-1.719	-1.658	-2.122	ns
		$t_h$	1.117	1.192	1.805	1.824	1.975	1.900	2.327	1.838	1.985	1.911	2.370	ns
GCLK PLL	$t_{su}$	1.022	1.038	1.807	1.917	2.135	2.022	1.936	1.939	2.160	2.043	1.989	ns	
	$t_h$	-0.751	-0.750	-1.347	-1.438	-1.604	-1.521	-1.422	-1.447	-1.616	-1.531	-1.471	ns	

Table 1-96 specifies EP3SL200 Column Pins Output Timing parameters for differential I/O standards.

**Table 1-96.** EP3SL200 Column Pins output Timing Parameters (Part 1 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.328	3.582	5.252	5.447	5.978	5.828	6.213	5.576	6.105	5.957	6.287	ns	
		GCLK PLL	t <sub>co</sub>	1.421	1.603	2.073	2.162	2.385	2.387	2.443	2.267	2.491	2.493	2.425	ns	
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.324	3.585	5.299	5.502	6.040	5.890	6.275	5.635	6.171	6.023	6.353	ns	
		GCLK PLL	t <sub>co</sub>	1.417	1.606	2.120	2.217	2.447	2.449	2.505	2.326	2.557	2.559	2.491	ns	
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.328	3.582	5.252	5.447	5.978	5.828	6.213	5.576	6.105	5.957	6.287	ns	
		GCLK PLL	t <sub>co</sub>	1.421	1.603	2.073	2.162	2.385	2.387	2.443	2.267	2.491	2.493	2.425	ns	
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.324	3.585	5.299	5.502	6.040	5.890	6.275	5.635	6.171	6.023	6.353	ns	
		GCLK PLL	t <sub>co</sub>	1.417	1.606	2.120	2.217	2.447	2.449	2.505	2.326	2.557	2.559	2.491	ns	
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.328	3.582	5.252	5.447	5.978	5.828	6.213	5.576	6.105	5.957	6.287	ns	
		GCLK PLL	t <sub>co</sub>	1.421	1.603	2.073	2.162	2.385	2.387	2.443	2.267	2.491	2.493	2.425	ns	
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.324	3.585	5.299	5.502	6.040	5.890	6.275	5.635	6.171	6.023	6.353	ns	
		GCLK PLL	t <sub>co</sub>	1.417	1.606	2.120	2.217	2.447	2.449	2.505	2.326	2.557	2.559	2.491	ns	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.355	3.615	5.323	5.525	6.062	5.912	6.297	5.656	6.191	6.043	6.373	ns	
		GCLK PLL	t <sub>co</sub>	1.448	1.636	2.144	2.240	2.469	2.471	2.527	2.347	2.577	2.579	2.511	ns	
	6mA	GCLK	t <sub>co</sub>	3.345	3.605	5.313	5.514	6.052	5.902	6.287	5.645	6.181	6.033	6.363	ns	
		GCLK PLL	t <sub>co</sub>	1.438	1.626	2.134	2.229	2.459	2.461	2.517	2.336	2.567	2.569	2.501	ns	
	8mA	GCLK	t <sub>co</sub>	3.345	3.605	5.316	5.518	6.056	5.906	6.291	5.650	6.186	6.038	6.368	ns	
		GCLK PLL	t <sub>co</sub>	1.438	1.626	2.137	2.233	2.463	2.465	2.521	2.341	2.572	2.574	2.506	ns	
	10mA	GCLK	t <sub>co</sub>	3.338	3.599	5.309	5.512	6.050	5.900	6.285	5.643	6.180	6.032	6.362	ns	
		GCLK PLL	t <sub>co</sub>	1.431	1.620	2.130	2.227	2.457	2.459	2.515	2.334	2.566	2.568	2.500	ns	
	12mA	GCLK	t <sub>co</sub>	3.337	3.597	5.306	5.509	6.047	5.897	6.282	5.640	6.176	6.028	6.358	ns	
		GCLK PLL	t <sub>co</sub>	1.430	1.618	2.127	2.224	2.454	2.456	2.512	2.331	2.562	2.564	2.496	ns	
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.359	3.619	5.327	5.529	6.066	5.916	6.301	5.660	6.196	6.048	6.378	ns
			GCLK PLL	t <sub>co</sub>	1.452	1.640	2.148	2.244	2.473	2.475	2.531	2.351	2.582	2.584	2.516	ns

**Table 1-96.** EP3SL200 Column Pins output Timing Parameters (Part 2 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.349	3.608	5.306	5.506	6.041	5.891	6.276	5.636	6.169	6.021	6.351	ns
		GCLK PLL	t <sub>co</sub>	1.442	1.629	2.127	2.221	2.448	2.450	2.506	2.327	2.555	2.557	2.489	ns
	6mA	GCLK	t <sub>co</sub>	3.344	3.604	5.306	5.506	6.042	5.892	6.277	5.637	6.171	6.023	6.353	ns
		GCLK PLL	t <sub>co</sub>	1.437	1.625	2.127	2.221	2.449	2.451	2.507	2.328	2.557	2.559	2.491	ns
	8mA	GCLK	t <sub>co</sub>	3.342	3.602	5.305	5.505	6.040	5.890	6.275	5.636	6.170	6.022	6.352	ns
		GCLK PLL	t <sub>co</sub>	1.435	1.623	2.126	2.220	2.447	2.449	2.505	2.327	2.556	2.558	2.490	ns
	10mA	GCLK	t <sub>co</sub>	3.334	3.593	5.295	5.495	6.031	5.881	6.266	5.626	6.160	6.012	6.342	ns
		GCLK PLL	t <sub>co</sub>	1.427	1.614	2.116	2.210	2.438	2.440	2.496	2.317	2.546	2.548	2.480	ns
12mA	GCLK	t <sub>co</sub>	3.335	3.595	5.301	5.502	6.039	5.889	6.274	5.634	6.169	6.021	6.351	ns	
	GCLK PLL	t <sub>co</sub>	1.428	1.616	2.122	2.217	2.446	2.448	2.504	2.325	2.555	2.557	2.489	ns	
DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.334	3.592	5.284	5.483	6.017	5.867	6.252	5.613	6.145	5.997	6.327	ns
		GCLK PLL	t <sub>co</sub>	1.427	1.613	2.105	2.198	2.424	2.426	2.482	2.304	2.531	2.533	2.465	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.346	3.605	5.302	5.501	6.035	5.885	6.270	5.632	6.164	6.016	6.346	ns
		GCLK PLL	t <sub>co</sub>	1.439	1.626	2.123	2.216	2.442	2.444	2.500	2.323	2.550	2.552	2.484	ns
	6mA	GCLK	t <sub>co</sub>	3.342	3.602	5.303	5.503	6.039	5.889	6.274	5.634	6.168	6.020	6.350	ns
		GCLK PLL	t <sub>co</sub>	1.435	1.623	2.124	2.218	2.446	2.448	2.504	2.325	2.554	2.556	2.488	ns
	8mA	GCLK	t <sub>co</sub>	3.332	3.591	5.292	5.492	6.027	5.877	6.262	5.623	6.156	6.008	6.338	ns
		GCLK PLL	t <sub>co</sub>	1.425	1.612	2.113	2.207	2.434	2.436	2.492	2.314	2.542	2.544	2.476	ns
	10mA	GCLK	t <sub>co</sub>	3.330	3.589	5.290	5.489	6.025	5.875	6.260	5.621	6.154	6.006	6.336	ns
		GCLK PLL	t <sub>co</sub>	1.423	1.610	2.111	2.204	2.432	2.434	2.490	2.312	2.540	2.542	2.474	ns
12mA	GCLK	t <sub>co</sub>	3.330	3.590	5.293	5.494	6.030	5.880	6.265	5.625	6.160	6.012	6.342	ns	
	GCLK PLL	t <sub>co</sub>	1.423	1.611	2.114	2.209	2.437	2.439	2.495	2.316	2.546	2.548	2.480	ns	
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.334	3.593	5.290	5.489	6.024	5.874	6.259	5.620	6.153	6.005	6.335	ns
		GCLK PLL	t <sub>co</sub>	1.427	1.614	2.111	2.204	2.431	2.433	2.489	2.311	2.539	2.541	2.473	ns



**Table 1-96.** EP3SL200 Column Pins output Timing Parameters (Part 3 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V		
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.360	3.622	5.335	5.537	6.074	5.924	6.309	5.668	6.203	6.055	6.385	ns	
		GCLK PLL	t <sub>co</sub>	1.453	1.643	2.156	2.252	2.481	2.483	2.539	2.359	2.589	2.591	2.523	ns	
	6mA	GCLK	t <sub>co</sub>	3.346	3.608	5.323	5.526	6.064	5.914	6.299	5.658	6.194	6.046	6.376	ns	
		GCLK PLL	t <sub>co</sub>	1.439	1.629	2.144	2.241	2.471	2.473	2.529	2.349	2.580	2.582	2.514	ns	
	8mA	GCLK	t <sub>co</sub>	3.334	3.595	5.306	5.508	6.046	5.896	6.281	5.640	6.176	6.028	6.358	ns	
		GCLK PLL	t <sub>co</sub>	1.427	1.616	2.127	2.223	2.453	2.455	2.511	2.331	2.562	2.564	2.496	ns	
	10m A	GCLK	t <sub>co</sub>	3.334	3.595	5.309	5.512	6.050	5.900	6.285	5.644	6.181	6.033	6.363	ns	
		GCLK PLL	t <sub>co</sub>	1.427	1.616	2.130	2.227	2.457	2.459	2.515	2.335	2.567	2.569	2.501	ns	
	12m A	GCLK	t <sub>co</sub>	3.330	3.591	5.302	5.504	6.043	5.893	6.278	5.637	6.173	6.025	6.355	ns	
		GCLK PLL	t <sub>co</sub>	1.423	1.612	2.123	2.219	2.450	2.452	2.508	2.328	2.559	2.561	2.493	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.334	3.593	5.295	5.495	6.031	5.881	6.266	5.626	6.160	6.012	6.342	ns
			GCLK PLL	t <sub>co</sub>	1.427	1.614	2.116	2.210	2.438	2.440	2.496	2.317	2.546	2.548	2.480	ns
16m A		GCLK	t <sub>co</sub>	3.335	3.595	5.303	5.505	6.042	5.892	6.277	5.636	6.172	6.024	6.354	ns	
		GCLK PLL	t <sub>co</sub>	1.428	1.616	2.124	2.220	2.449	2.451	2.507	2.327	2.558	2.560	2.492	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.363	3.625	5.334	5.535	6.072	5.922	6.307	5.667	6.201	6.053	6.383	ns	
		GCLK PLL	t <sub>co</sub>	1.456	1.646	2.155	2.250	2.479	2.481	2.537	2.358	2.587	2.589	2.521	ns	
	6mA	GCLK	t <sub>co</sub>	3.352	3.613	5.322	5.523	6.060	5.910	6.295	5.655	6.189	6.041	6.371	ns	
		GCLK PLL	t <sub>co</sub>	1.445	1.634	2.143	2.238	2.467	2.469	2.525	2.346	2.575	2.577	2.509	ns	
	8mA	GCLK	t <sub>co</sub>	3.347	3.609	5.322	5.524	6.061	5.911	6.296	5.656	6.191	6.043	6.373	ns	
		GCLK PLL	t <sub>co</sub>	1.440	1.630	2.143	2.239	2.468	2.470	2.526	2.347	2.577	2.579	2.511	ns	
	10m A	GCLK	t <sub>co</sub>	3.333	3.594	5.304	5.505	6.042	5.892	6.277	5.637	6.173	6.025	6.355	ns	
		GCLK PLL	t <sub>co</sub>	1.426	1.615	2.125	2.220	2.449	2.451	2.507	2.328	2.559	2.561	2.493	ns	
	12m A	GCLK	t <sub>co</sub>	3.331	3.592	5.302	5.503	6.040	5.890	6.275	5.635	6.170	6.022	6.352	ns	
		GCLK PLL	t <sub>co</sub>	1.424	1.613	2.123	2.218	2.447	2.449	2.505	2.326	2.556	2.558	2.490	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.335	3.594	5.294	5.493	6.028	5.878	6.263	5.624	6.157	6.009	6.339	ns
			GCLK PLL	t <sub>co</sub>	1.428	1.615	2.115	2.208	2.435	2.437	2.493	2.315	2.543	2.545	2.477	ns
16m A		GCLK	t <sub>co</sub>	3.335	3.595	5.302	5.503	6.040	5.890	6.275	5.635	6.170	6.022	6.352	ns	
		GCLK PLL	t <sub>co</sub>	1.428	1.616	2.123	2.218	2.447	2.449	2.505	2.326	2.556	2.558	2.490	ns	

**Table 1-96.** EP3SL200 Column Pins output Timing Parameters (Part 4 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.351	3.612	5.318	5.518	6.054	5.904	6.289	5.650	6.183	6.035	6.365	ns
		GCLK PLL	$t_{co}$	1.444	1.633	2.139	2.233	2.461	2.463	2.519	2.341	2.569	2.571	2.503	ns
	10mA	GCLK	$t_{co}$	3.351	3.612	5.318	5.518	6.054	5.904	6.289	5.650	6.183	6.035	6.365	ns
		GCLK PLL	$t_{co}$	1.444	1.633	2.139	2.233	2.461	2.463	2.519	2.341	2.569	2.571	2.503	ns
	12mA	GCLK	$t_{co}$	3.341	3.602	5.308	5.508	6.044	5.894	6.279	5.640	6.174	6.026	6.356	ns
		GCLK PLL	$t_{co}$	1.434	1.623	2.129	2.223	2.451	2.453	2.509	2.331	2.560	2.562	2.494	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.334	3.594	5.294	5.493	6.028	5.878	6.263	5.624	6.157	6.009	6.339	ns
		GCLK PLL	$t_{co}$	1.427	1.615	2.115	2.208	2.435	2.437	2.493	2.315	2.543	2.545	2.477	ns

Table 1-97 specifies EP3SL200 Row Pins Output Timing parameters for differential I/O standards.

**Table 1-97.** EP3SL200 Row Pins output Timing Parameters (Part 1 of 3) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
LVDS	—	GCLK	t <sub>co</sub>	2.940	3.142	4.581	4.743	5.225	5.084	5.443	4.847	5.330	5.188	5.504	ns
		GCLK PLL	t <sub>co</sub>	1.047	1.174	1.411	1.472	1.641	1.656	1.690	1.552	1.726	1.739	1.653	ns
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.332	3.586	5.263	5.459	5.988	5.839	6.190	5.588	6.118	5.967	6.267	ns
		GCLK PLL	t <sub>co</sub>	1.449	1.628	2.103	2.198	2.414	2.421	2.447	2.303	2.524	2.528	2.426	ns
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.314	3.576	5.301	5.505	6.042	5.893	6.244	5.639	6.179	6.028	6.328	ns
		GCLK PLL	t <sub>co</sub>	1.431	1.618	2.141	2.244	2.468	2.475	2.501	2.354	2.585	2.589	2.487	ns
MINI-LVDS	—	GCLK	t <sub>co</sub>	2.940	3.142	4.581	4.743	5.225	5.084	5.443	4.847	5.330	5.188	5.504	ns
		GCLK PLL	t <sub>co</sub>	1.047	1.174	1.411	1.472	1.641	1.656	1.690	1.552	1.726	1.739	1.653	ns
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.332	3.586	5.263	5.459	5.988	5.839	6.190	5.588	6.118	5.967	6.267	ns
		GCLK PLL	t <sub>co</sub>	1.449	1.628	2.103	2.198	2.414	2.421	2.447	2.303	2.524	2.528	2.426	ns
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.314	3.576	5.301	5.505	6.042	5.893	6.244	5.639	6.179	6.028	6.328	ns
		GCLK PLL	t <sub>co</sub>	1.431	1.618	2.141	2.244	2.468	2.475	2.501	2.354	2.585	2.589	2.487	ns
RSDS	—	GCLK	t <sub>co</sub>	2.940	3.142	4.581	4.743	5.225	5.084	5.443	4.847	5.330	5.188	5.504	ns
		GCLK PLL	t <sub>co</sub>	1.047	1.174	1.411	1.472	1.641	1.656	1.690	1.552	1.726	1.739	1.653	ns
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.332	3.586	5.263	5.459	5.988	5.839	6.190	5.588	6.118	5.967	6.267	ns
		GCLK PLL	t <sub>co</sub>	1.449	1.628	2.103	2.198	2.414	2.421	2.447	2.303	2.524	2.528	2.426	ns
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.314	3.576	5.301	5.505	6.042	5.893	6.244	5.639	6.179	6.028	6.328	ns
		GCLK PLL	t <sub>co</sub>	1.431	1.618	2.141	2.244	2.468	2.475	2.501	2.354	2.585	2.589	2.487	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.358	3.619	5.337	5.539	6.075	5.926	6.277	5.672	6.208	6.057	6.357	ns
		GCLK PLL	t <sub>co</sub>	1.485	1.671	2.187	2.288	2.511	2.518	2.544	2.397	2.624	2.628	2.526	ns
	6mA	GCLK	t <sub>co</sub>	3.344	3.605	5.324	5.526	6.062	5.913	6.264	5.658	6.195	6.044	6.344	ns
		GCLK PLL	t <sub>co</sub>	1.471	1.657	2.174	2.275	2.498	2.505	2.531	2.383	2.611	2.615	2.513	ns
	8mA	GCLK	t <sub>co</sub>	3.340	3.601	5.322	5.526	6.063	5.914	6.265	5.658	6.197	6.046	6.346	ns
		GCLK PLL	t <sub>co</sub>	1.467	1.653	2.172	2.275	2.499	2.506	2.532	2.383	2.613	2.617	2.515	ns

**Table 1-97.** EP3SL200 Row Pins output Timing Parameters (Part 2 of 3) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.356	3.616	5.323	5.523	6.057	5.908	6.259	5.655	6.190	6.039	6.339	ns
		GCLK PLL	t <sub>co</sub>	1.483	1.668	2.173	2.272	2.493	2.500	2.526	2.380	2.606	2.610	2.508	ns
	6mA	GCLK	t <sub>co</sub>	3.345	3.606	5.319	5.519	6.054	5.905	6.256	5.652	6.187	6.036	6.336	ns
		GCLK PLL	t <sub>co</sub>	1.472	1.658	2.169	2.268	2.490	2.497	2.523	2.377	2.603	2.607	2.505	ns
	8mA	GCLK	t <sub>co</sub>	3.342	3.603	5.317	5.517	6.052	5.903	6.254	5.650	6.186	6.035	6.335	ns
		GCLK PLL	t <sub>co</sub>	1.469	1.655	2.167	2.266	2.488	2.495	2.521	2.375	2.602	2.606	2.504	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.353	3.613	5.318	5.518	6.051	5.902	6.253	5.650	6.184	6.033	6.333	ns
		GCLK PLL	t <sub>co</sub>	1.480	1.665	2.168	2.267	2.487	2.494	2.520	2.375	2.600	2.604	2.502	ns
	6mA	GCLK	t <sub>co</sub>	3.343	3.604	5.316	5.516	6.050	5.901	6.252	5.649	6.184	6.033	6.333	ns
		GCLK PLL	t <sub>co</sub>	1.470	1.656	2.166	2.265	2.486	2.493	2.519	2.374	2.600	2.604	2.502	ns
	8mA	GCLK	t <sub>co</sub>	3.329	3.590	5.301	5.501	6.036	5.887	6.238	5.634	6.169	6.018	6.318	ns
		GCLK PLL	t <sub>co</sub>	1.456	1.642	2.151	2.250	2.472	2.479	2.505	2.359	2.585	2.589	2.487	ns
	10mA	GCLK	t <sub>co</sub>	3.326	3.586	5.297	5.497	6.032	5.883	6.234	5.630	6.165	6.014	6.314	ns
		GCLK PLL	t <sub>co</sub>	1.453	1.638	2.147	2.246	2.468	2.475	2.501	2.355	2.581	2.585	2.483	ns
	12mA	GCLK	t <sub>co</sub>	3.323	3.584	5.298	5.500	6.035	5.886	6.237	5.633	6.169	6.018	6.318	ns
		GCLK PLL	t <sub>co</sub>	1.450	1.636	2.148	2.249	2.471	2.478	2.504	2.358	2.585	2.589	2.487	ns
	16mA	GCLK	t <sub>co</sub>	3.324	3.584	5.288	5.488	6.022	5.873	6.224	5.620	6.155	6.004	6.304	ns
		GCLK PLL	t <sub>co</sub>	1.451	1.636	2.138	2.237	2.458	2.465	2.491	2.345	2.571	2.575	2.473	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.373	3.637	5.359	5.561	6.098	5.949	6.300	5.694	6.231	6.080	6.380	ns
		GCLK PLL	t <sub>co</sub>	1.500	1.689	2.209	2.310	2.534	2.541	2.567	2.419	2.647	2.651	2.549	ns
	6mA	GCLK	t <sub>co</sub>	3.349	3.613	5.341	5.544	6.081	5.932	6.283	5.677	6.216	6.065	6.365	ns
		GCLK PLL	t <sub>co</sub>	1.476	1.665	2.191	2.293	2.517	2.524	2.550	2.402	2.632	2.636	2.534	ns
	8mA	GCLK	t <sub>co</sub>	3.332	3.594	5.319	5.522	6.059	5.910	6.261	5.655	6.194	6.043	6.343	ns
		GCLK PLL	t <sub>co</sub>	1.459	1.646	2.169	2.271	2.495	2.502	2.528	2.380	2.610	2.614	2.512	ns

**Table 1-97.** EP3SL200 Row Pins output Timing Parameters (Part 3 of 3) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.377	3.640	5.359	5.561	6.097	5.948	6.299	5.694	6.231	6.080	6.380	ns	
		GCLK PLL	t <sub>co</sub>	1.504	1.692	2.209	2.310	2.533	2.540	2.566	2.419	2.647	2.651	2.549	ns	
	6mA	GCLK	t <sub>co</sub>	3.362	3.625	5.345	5.546	6.082	5.933	6.284	5.679	6.216	6.065	6.365	ns	
		GCLK PLL	t <sub>co</sub>	1.489	1.677	2.195	2.295	2.518	2.525	2.551	2.404	2.632	2.636	2.534	ns	
	8mA	GCLK	t <sub>co</sub>	3.351	3.614	5.340	5.543	6.079	5.930	6.281	5.676	6.214	6.063	6.363	ns	
		GCLK PLL	t <sub>co</sub>	1.478	1.666	2.190	2.292	2.515	2.522	2.548	2.401	2.630	2.634	2.532	ns	
	10mA	GCLK	t <sub>co</sub>	3.331	3.594	5.317	5.519	6.056	5.907	6.258	5.653	6.190	6.039	6.339	ns	
		GCLK PLL	t <sub>co</sub>	1.458	1.646	2.167	2.268	2.492	2.499	2.525	2.378	2.606	2.610	2.508	ns	
	12mA	GCLK	t <sub>co</sub>	3.328	3.590	5.313	5.516	6.052	5.903	6.254	5.649	6.187	6.036	6.336	ns	
		GCLK PLL	t <sub>co</sub>	1.455	1.642	2.163	2.265	2.488	2.495	2.521	2.374	2.603	2.607	2.505	ns	
	8mA	GCLK	t <sub>co</sub>	3.333	3.594	5.304	5.504	6.038	5.889	6.240	5.636	6.171	6.020	6.320	ns	
		GCLK PLL	t <sub>co</sub>	1.460	1.646	2.154	2.253	2.474	2.481	2.507	2.361	2.587	2.591	2.489	ns	
	16mA	GCLK	t <sub>co</sub>	3.326	3.587	5.303	5.505	6.041	5.892	6.243	5.639	6.176	6.025	6.325	ns	
		GCLK PLL	t <sub>co</sub>	1.453	1.639	2.153	2.254	2.477	2.484	2.510	2.364	2.592	2.596	2.494	ns	
	DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	3.364	3.626	5.341	5.542	6.077	5.928	6.279	5.675	6.211	6.060	6.360	ns
			GCLK PLL	t <sub>co</sub>	1.481	1.668	2.181	2.281	2.503	2.510	2.536	2.390	2.617	2.621	2.519	ns
12mA		GCLK	t <sub>co</sub>	3.346	3.609	5.326	5.527	6.062	5.913	6.264	5.660	6.196	6.045	6.345	ns	
		GCLK PLL	t <sub>co</sub>	1.463	1.651	2.166	2.266	2.488	2.495	2.521	2.375	2.602	2.606	2.504	ns	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.332	3.593	5.303	5.503	6.037	5.888	6.239	5.636	6.171	6.020	6.320	ns	
		GCLK PLL	t <sub>co</sub>	1.449	1.635	2.143	2.242	2.463	2.470	2.496	2.351	2.577	2.581	2.479	ns	

Table 1-98 and Table 1-99 show EP3SL200 regional clock (RCLK) adder values that should be added to GCLK values. These adder values are used to determine I/O timing when I/O pin is driven using regional clock. This applies for all I/O standards supported by Stratix III devices.

Table 1-98 specifies EP3SL200 Column Pin delay adders when using the regional clock.

**Table 1-98.** EP3SL200 Column Pin Delay Adders for Regional Clock - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RCLK input adder	0.126	0.111	0.182	0.102	0.08	0.081	0.407	0.09	0.075	0.072	0.376	ns
RCLK PLL input adder	2.546	2.57	4.13	4.258	4.658	4.459	5.061	4.26	4.675	4.472	5.12	ns
RCLK output adder	-0.406	-0.19	-0.251	-0.226	-0.218	-0.217	-0.306	-0.095	-0.091	-0.088	-0.233	ns
RCLK PLL output adder	-2.24	-2.013	-3.141	-3.179	-3.283	-3.262	-3.266	-3.058	-3.343	-3.077	-3.289	ns

Table 1-99 specifies EP3SL200 Row Pin delay adders when using the regional clock.

**Table 1-99.** EP3SL200 Row Pin Delay Adders for Regional Clock- Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RCLK input adder	0.09	0.068	0.108	0.127	0.121	0.123	0.216	0.119	0.112	0.092	0.219	ns
RCLK PLL input adder	0.134	0.131	0.232	0.243	0.271	0.256	0.434	0.232	0.261	0.245	0.436	ns
RCLK output adder	-0.045	-0.054	-0.083	-0.069	-0.092	-0.064	-0.188	-0.058	-0.078	-0.053	-0.192	ns
RCLK PLL output adder	-0.125	-0.118	-0.206	-0.22	-0.238	-0.225	-0.403	-0.21	-0.226	-0.212	-0.401	ns

### EP3SL340 I/O Timing Parameters

Table 1-100 through Table 1-103 show the maximum I/O timing parameters for EP3SL340 devices for single-ended I/O standards.

Table 1-100 specifies EP3SL340 column pins input timing parameters for single-ended I/O standards.

**Table 1-100.** EP3SL340 Column Pins Input Timing Parameters (Part 1 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-1.345	-1.335	-2.017	-2.061	-2.330	-2.245	-2.542	-2.061	-2.330	-2.245	-2.542	ns
		t <sub>h</sub>	1.486	1.476	2.232	2.284	2.574	2.476	2.783	2.284	2.574	2.476	2.783	ns
	GCLK PLL	t <sub>su</sub>	-1.691	-1.691	-2.554	-2.585	-2.890	-2.799	-3.373	-2.585	-2.890	-2.799	-3.373	ns
		t <sub>h</sub>	1.996	1.996	3.031	3.081	3.434	3.313	3.912	3.081	3.434	3.313	3.912	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-1.345	-1.335	-2.017	-2.061	-2.330	-2.245	-2.542	-2.061	-2.330	-2.245	-2.542	ns
		t <sub>h</sub>	1.486	1.476	2.232	2.284	2.574	2.476	2.783	2.284	2.574	2.476	2.783	ns
	GCLK PLL	t <sub>su</sub>	-1.691	-1.691	-2.554	-2.585	-2.890	-2.799	-3.373	-2.585	-2.890	-2.799	-3.373	ns
		t <sub>h</sub>	1.996	1.996	3.031	3.081	3.434	3.313	3.912	3.081	3.434	3.313	3.912	ns

**Table 1-100.** EP3SL340 Column Pins Input Timing Parameters (Part 2 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.0-V LVTTL	GCLK	t <sub>su</sub>	-1.356	-1.346	-2.016	-2.063	-2.329	-2.244	-2.541	-2.063	-2.329	-2.244	-2.541	ns
		t <sub>h</sub>	1.497	1.487	2.231	2.286	2.573	2.475	2.782	2.286	2.573	2.475	2.782	ns
	GCLK PLL	t <sub>su</sub>	-1.702	-1.702	-2.553	-2.587	-2.889	-2.798	-3.372	-2.587	-2.889	-2.798	-3.372	ns
		t <sub>h</sub>	2.007	2.007	3.030	3.083	3.433	3.312	3.911	3.083	3.433	3.312	3.911	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-1.356	-1.346	-2.016	-2.063	-2.329	-2.244	-2.541	-2.063	-2.329	-2.244	-2.541	ns
		t <sub>h</sub>	1.497	1.487	2.231	2.286	2.573	2.475	2.782	2.286	2.573	2.475	2.782	ns
	GCLK PLL	t <sub>su</sub>	-1.702	-1.702	-2.553	-2.587	-2.889	-2.798	-3.372	-2.587	-2.889	-2.798	-3.372	ns
		t <sub>h</sub>	2.007	2.007	3.030	3.083	3.433	3.312	3.911	3.083	3.433	3.312	3.911	ns
2.5 V	GCLK	t <sub>su</sub>	-1.351	-1.341	-2.025	-2.075	-2.348	-2.263	-2.560	-2.075	-2.348	-2.263	-2.560	ns
		t <sub>h</sub>	1.492	1.482	2.240	2.298	2.592	2.494	2.801	2.298	2.592	2.494	2.801	ns
	GCLK PLL	t <sub>su</sub>	-1.697	-1.697	-2.562	-2.599	-2.908	-2.817	-3.391	-2.599	-2.908	-2.817	-3.391	ns
		t <sub>h</sub>	2.002	2.002	3.039	3.095	3.452	3.331	3.930	3.095	3.452	3.331	3.930	ns
1.8 V	GCLK	t <sub>su</sub>	-1.373	-1.363	-2.065	-2.111	-2.346	-2.261	-2.558	-2.111	-2.346	-2.261	-2.558	ns
		t <sub>h</sub>	1.516	1.506	2.280	2.334	2.590	2.492	2.799	2.334	2.590	2.492	2.799	ns
	GCLK PLL	t <sub>su</sub>	-1.719	-1.719	-2.602	-2.635	-2.906	-2.815	-3.389	-2.635	-2.906	-2.815	-3.389	ns
		t <sub>h</sub>	2.026	2.026	3.079	3.131	3.450	3.329	3.928	3.131	3.450	3.329	3.928	ns
1.5 V	GCLK	t <sub>su</sub>	-1.363	-1.353	-2.042	-2.079	-2.276	-2.191	-2.488	-2.079	-2.276	-2.191	-2.488	ns
		t <sub>h</sub>	1.506	1.496	2.257	2.302	2.520	2.422	2.729	2.302	2.520	2.422	2.729	ns
	GCLK PLL	t <sub>su</sub>	-1.709	-1.709	-2.579	-2.603	-2.836	-2.745	-3.319	-2.603	-2.836	-2.745	-3.319	ns
		t <sub>h</sub>	2.016	2.016	3.056	3.099	3.380	3.259	3.858	3.099	3.380	3.259	3.858	ns
1.2 V	GCLK	t <sub>su</sub>	-1.311	-1.301	-1.965	-1.980	-2.120	-2.035	-2.332	-1.980	-2.120	-2.035	-2.332	ns
		t <sub>h</sub>	1.454	1.444	2.180	2.203	2.364	2.266	2.573	2.203	2.364	2.266	2.573	ns
	GCLK PLL	t <sub>su</sub>	-1.657	-1.657	-2.502	-2.504	-2.680	-2.589	-3.163	-2.504	-2.680	-2.589	-3.163	ns
		t <sub>h</sub>	1.964	1.964	2.979	3.000	3.224	3.103	3.702	3.000	3.224	3.103	3.702	ns
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-1.282	-1.272	-1.937	-1.964	-2.122	-2.037	-2.334	-1.964	-2.122	-2.037	-2.334	ns
		t <sub>h</sub>	1.425	1.415	2.152	2.187	2.366	2.268	2.575	2.187	2.366	2.268	2.575	ns
	GCLK PLL	t <sub>su</sub>	-1.628	-1.628	-2.474	-2.488	-2.682	-2.591	-3.165	-2.488	-2.682	-2.591	-3.165	ns
		t <sub>h</sub>	1.935	1.935	2.951	2.984	3.226	3.105	3.704	2.984	3.226	3.105	3.704	ns
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-1.282	-1.272	-1.937	-1.964	-2.122	-2.037	-2.334	-1.964	-2.122	-2.037	-2.334	ns
		t <sub>h</sub>	1.425	1.415	2.152	2.187	2.366	2.268	2.575	2.187	2.366	2.268	2.575	ns
	GCLK PLL	t <sub>su</sub>	-1.628	-1.628	-2.474	-2.488	-2.682	-2.591	-3.165	-2.488	-2.682	-2.591	-3.165	ns
		t <sub>h</sub>	1.935	1.935	2.951	2.984	3.226	3.105	3.704	2.984	3.226	3.105	3.704	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-1.276	-1.266	-1.924	-1.956	-2.119	-2.032	-2.335	-1.956	-2.119	-2.032	-2.335	ns
		t <sub>h</sub>	1.419	1.409	2.139	2.176	2.360	2.262	2.571	2.176	2.360	2.262	2.571	ns
	GCLK PLL	t <sub>su</sub>	-1.622	-1.622	-2.461	-2.480	-2.679	-2.586	-3.163	-2.480	-2.679	-2.586	-3.163	ns
		t <sub>h</sub>	1.929	1.929	2.938	2.973	3.220	3.099	3.697	2.973	3.220	3.099	3.697	ns

**Table 1-100.** EP3SL340 Column Pins Input Timing Parameters (Part 3 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-1.276	-1.266	-1.924	-1.956	-2.119	-2.032	-2.335	-1.956	-2.119	-2.032	-2.335	ns
		t <sub>h</sub>	1.419	1.409	2.139	2.176	2.360	2.262	2.571	2.176	2.360	2.262	2.571	ns
	GCLK PLL	t <sub>su</sub>	-1.622	-1.622	-2.461	-2.480	-2.679	-2.586	-3.163	-2.480	-2.679	-2.586	-3.163	ns
		t <sub>h</sub>	1.929	1.929	2.938	2.973	3.220	3.099	3.697	2.973	3.220	3.099	3.697	ns
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-1.265	-1.255	-1.913	-1.945	-2.100	-2.013	-2.316	-1.945	-2.100	-2.013	-2.316	ns
		t <sub>h</sub>	1.408	1.398	2.127	2.165	2.341	2.243	2.552	2.165	2.341	2.243	2.552	ns
	GCLK PLL	t <sub>su</sub>	-1.611	-1.611	-2.450	-2.469	-2.660	-2.567	-3.144	-2.469	-2.660	-2.567	-3.144	ns
		t <sub>h</sub>	1.918	1.918	2.926	2.962	3.201	3.080	3.678	2.962	3.201	3.080	3.678	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.265	-1.255	-1.913	-1.945	-2.100	-2.013	-2.316	-1.945	-2.100	-2.013	-2.316	ns
		t <sub>h</sub>	1.408	1.398	2.127	2.165	2.341	2.243	2.552	2.165	2.341	2.243	2.552	ns
	GCLK PLL	t <sub>su</sub>	-1.611	-1.611	-2.450	-2.469	-2.660	-2.567	-3.144	-2.469	-2.660	-2.567	-3.144	ns
		t <sub>h</sub>	1.918	1.918	2.926	2.962	3.201	3.080	3.678	2.962	3.201	3.080	3.678	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-1.276	-1.266	-1.924	-1.956	-2.119	-2.032	-2.335	-1.956	-2.119	-2.032	-2.335	ns
		t <sub>h</sub>	1.419	1.409	2.139	2.176	2.360	2.262	2.571	2.176	2.360	2.262	2.571	ns
	GCLK PLL	t <sub>su</sub>	-1.622	-1.622	-2.461	-2.480	-2.679	-2.586	-3.163	-2.480	-2.679	-2.586	-3.163	ns
		t <sub>h</sub>	1.929	1.929	2.938	2.973	3.220	3.099	3.697	2.973	3.220	3.099	3.697	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.276	-1.266	-1.924	-1.956	-2.119	-2.032	-2.335	-1.956	-2.119	-2.032	-2.335	ns
		t <sub>h</sub>	1.419	1.409	2.139	2.176	2.360	2.262	2.571	2.176	2.360	2.262	2.571	ns
	GCLK PLL	t <sub>su</sub>	-1.622	-1.622	-2.461	-2.480	-2.679	-2.586	-3.163	-2.480	-2.679	-2.586	-3.163	ns
		t <sub>h</sub>	1.929	1.929	2.938	2.973	3.220	3.099	3.697	2.973	3.220	3.099	3.697	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-1.265	-1.255	-1.913	-1.945	-2.100	-2.013	-2.316	-1.945	-2.100	-2.013	-2.316	ns
		t <sub>h</sub>	1.408	1.398	2.127	2.165	2.341	2.243	2.552	2.165	2.341	2.243	2.552	ns
	GCLK PLL	t <sub>su</sub>	-1.611	-1.611	-2.450	-2.469	-2.660	-2.567	-3.144	-2.469	-2.660	-2.567	-3.144	ns
		t <sub>h</sub>	1.918	1.918	2.926	2.962	3.201	3.080	3.678	2.962	3.201	3.080	3.678	ns
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.265	-1.255	-1.913	-1.945	-2.100	-2.013	-2.316	-1.945	-2.100	-2.013	-2.316	ns
		t <sub>h</sub>	1.408	1.398	2.127	2.165	2.341	2.243	2.552	2.165	2.341	2.243	2.552	ns
	GCLK PLL	t <sub>su</sub>	-1.611	-1.611	-2.450	-2.469	-2.660	-2.567	-3.144	-2.469	-2.660	-2.567	-3.144	ns
		t <sub>h</sub>	1.918	1.918	2.926	2.962	3.201	3.080	3.678	2.962	3.201	3.080	3.678	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-1.253	-1.243	-1.903	-1.934	-2.084	-1.997	-2.300	-1.934	-2.084	-1.997	-2.300	ns
		t <sub>h</sub>	1.396	1.386	2.117	2.154	2.325	2.227	2.536	2.154	2.325	2.227	2.536	ns
	GCLK PLL	t <sub>su</sub>	-1.599	-1.599	-2.440	-2.458	-2.644	-2.551	-3.128	-2.458	-2.644	-2.551	-3.128	ns
		t <sub>h</sub>	1.906	1.906	2.916	2.951	3.185	3.064	3.662	2.951	3.185	3.064	3.662	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-1.253	-1.243	-1.903	-1.934	-2.084	-1.997	-2.300	-1.934	-2.084	-1.997	-2.300	ns
		t <sub>h</sub>	1.396	1.386	2.117	2.154	2.325	2.227	2.536	2.154	2.325	2.227	2.536	ns
	GCLK PLL	t <sub>su</sub>	-1.599	-1.599	-2.440	-2.458	-2.644	-2.551	-3.128	-2.458	-2.644	-2.551	-3.128	ns
		t <sub>h</sub>	1.906	1.906	2.916	2.951	3.185	3.064	3.662	2.951	3.185	3.064	3.662	ns



**Table 1-100.** EP3SL340 Column Pins Input Timing Parameters (Part 4 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.0-V PCI-X	GCLK	t <sub>su</sub>	-1.356	-1.346	-2.016	-2.063	-2.329	-2.244	-2.541	-2.063	-2.329	-2.244	-2.541	ns
		t <sub>h</sub>	1.497	1.487	2.231	2.286	2.573	2.475	2.782	2.286	2.573	2.475	2.782	ns
	GCLK PLL	t <sub>su</sub>	-1.702	-1.702	-2.553	-2.587	-2.889	-2.798	-3.372	-2.587	-2.889	-2.798	-3.372	ns
		t <sub>h</sub>	2.007	2.007	3.030	3.083	3.433	3.312	3.911	3.083	3.433	3.312	3.911	ns

Table 1-101 specifies EP3SL340 row pins input timing parameters for single-ended I/O standards.

**Table 1-101.** EP3SL340 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-1.239	-1.296	-1.925	-1.956	-2.199	-2.135	-2.587	-1.973	-2.204	-2.142	-2.522	ns
		t <sub>h</sub>	1.362	1.435	2.137	2.177	2.442	2.366	2.822	2.205	2.456	2.382	2.763	ns
	GCLK PLL	t <sub>su</sub>	0.879	0.945	1.670	1.687	1.786	1.680	1.689	1.689	1.807	1.695	1.746	ns
		t <sub>h</sub>	-0.615	-0.660	-1.216	-1.217	-1.263	-1.188	-1.178	-1.208	-1.273	-1.193	-1.231	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-1.239	-1.296	-1.925	-1.956	-2.199	-2.135	-2.587	-1.973	-2.204	-2.142	-2.522	ns
		t <sub>h</sub>	1.362	1.435	2.137	2.177	2.442	2.366	2.822	2.205	2.456	2.382	2.763	ns
	GCLK PLL	t <sub>su</sub>	0.879	0.945	1.670	1.687	1.786	1.680	1.689	1.689	1.807	1.695	1.746	ns
		t <sub>h</sub>	-0.615	-0.660	-1.216	-1.217	-1.263	-1.188	-1.178	-1.208	-1.273	-1.193	-1.231	ns
3.0-V LVTTTL	GCLK	t <sub>su</sub>	-1.245	-1.307	-1.922	-1.957	-2.202	-2.138	-2.590	-1.972	-2.209	-2.147	-2.527	ns
		t <sub>h</sub>	1.368	1.446	2.134	2.178	2.445	2.369	2.825	2.204	2.461	2.387	2.768	ns
	GCLK PLL	t <sub>su</sub>	0.873	0.934	1.673	1.686	1.783	1.677	1.686	1.690	1.802	1.690	1.741	ns
		t <sub>h</sub>	-0.609	-0.649	-1.219	-1.216	-1.260	-1.185	-1.175	-1.209	-1.268	-1.188	-1.226	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-1.245	-1.307	-1.922	-1.957	-2.202	-2.138	-2.590	-1.972	-2.209	-2.147	-2.527	ns
		t <sub>h</sub>	1.368	1.446	2.134	2.178	2.445	2.369	2.825	2.204	2.461	2.387	2.768	ns
	GCLK PLL	t <sub>su</sub>	0.873	0.934	1.673	1.686	1.783	1.677	1.686	1.690	1.802	1.690	1.741	ns
		t <sub>h</sub>	-0.609	-0.649	-1.219	-1.216	-1.260	-1.185	-1.175	-1.209	-1.268	-1.188	-1.226	ns
2.5 V	GCLK	t <sub>su</sub>	-1.233	-1.300	-1.931	-1.970	-2.217	-2.153	-2.605	-1.981	-2.219	-2.157	-2.537	ns
		t <sub>h</sub>	1.356	1.439	2.143	2.191	2.460	2.384	2.840	2.213	2.471	2.397	2.778	ns
	GCLK PLL	t <sub>su</sub>	0.885	0.941	1.664	1.673	1.768	1.662	1.671	1.681	1.792	1.680	1.731	ns
		t <sub>h</sub>	-0.621	-0.656	-1.210	-1.203	-1.245	-1.170	-1.160	-1.200	-1.258	-1.178	-1.216	ns
1.8 V	GCLK	t <sub>su</sub>	-1.251	-1.343	-1.980	-1.995	-2.204	-2.138	-2.582	-2.003	-2.208	-2.153	-2.621	ns
		t <sub>h</sub>	1.377	1.482	2.193	2.216	2.447	2.369	2.817	2.234	2.461	2.393	2.859	ns
	GCLK PLL	t <sub>su</sub>	0.827	0.910	1.624	1.634	1.857	1.742	1.565	1.620	1.886	1.762	1.619	ns
		t <sub>h</sub>	-0.562	-0.624	-1.170	-1.164	-1.330	-1.246	-1.060	-1.140	-1.347	-1.255	-1.107	ns

**Table 1-101.** EP3SL340 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.5 V	GCLK	$t_{su}$	-1.241	-1.332	-1.956	-1.963	-2.136	-2.070	-2.514	-1.972	-2.143	-2.088	-2.556	ns
		$t_h$	1.367	1.471	2.169	2.184	2.379	2.301	2.749	2.203	2.396	2.328	2.794	ns
	GCLK PLL	$t_{su}$	0.837	0.921	1.648	1.666	1.925	1.810	1.633	1.651	1.951	1.827	1.684	ns
		$t_h$	-0.572	-0.635	-1.194	-1.196	-1.398	-1.314	-1.128	-1.171	-1.412	-1.320	-1.172	ns
1.2 V	GCLK	$t_{su}$	-1.181	-1.279	-1.877	-1.862	-1.977	-1.911	-2.355	-1.876	-1.988	-1.933	-2.401	ns
		$t_h$	1.307	1.418	2.090	2.083	2.220	2.142	2.590	2.107	2.241	2.173	2.639	ns
	GCLK PLL	$t_{su}$	0.897	0.974	1.727	1.767	2.084	1.969	1.792	1.747	2.106	1.982	1.839	ns
		$t_h$	-0.632	-0.688	-1.273	-1.297	-1.557	-1.473	-1.287	-1.267	-1.567	-1.475	-1.327	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-1.176	-1.242	-1.845	-1.861	-1.997	-1.933	-2.385	-1.869	-2.002	-1.940	-2.320	ns
		$t_h$	1.300	1.382	2.057	2.082	2.240	2.164	2.620	2.101	2.254	2.180	2.561	ns
	GCLK PLL	$t_{su}$	0.942	1.000	1.750	1.782	1.988	1.882	1.891	1.793	2.009	1.897	1.948	ns
		$t_h$	-0.677	-0.714	-1.296	-1.312	-1.465	-1.390	-1.380	-1.312	-1.475	-1.395	-1.433	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-1.176	-1.242	-1.845	-1.861	-1.997	-1.933	-2.385	-1.869	-2.002	-1.940	-2.320	ns
		$t_h$	1.300	1.382	2.057	2.082	2.240	2.164	2.620	2.101	2.254	2.180	2.561	ns
	GCLK PLL	$t_{su}$	0.942	1.000	1.750	1.782	1.988	1.882	1.891	1.793	2.009	1.897	1.948	ns
		$t_h$	-0.677	-0.714	-1.296	-1.312	-1.465	-1.390	-1.380	-1.312	-1.475	-1.395	-1.433	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-1.155	-1.244	-1.839	-1.835	-1.972	-1.905	-2.351	-1.844	-1.981	-1.925	-2.394	ns
		$t_h$	1.281	1.383	2.052	2.054	2.213	2.135	2.582	2.073	2.231	2.164	2.628	ns
	GCLK PLL	$t_{su}$	0.923	1.009	1.765	1.794	2.086	1.972	1.796	1.779	2.110	1.988	1.846	ns
		$t_h$	-0.658	-0.723	-1.311	-1.326	-1.562	-1.478	-1.295	-1.301	-1.574	-1.482	-1.338	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-1.155	-1.244	-1.839	-1.835	-1.972	-1.905	-2.351	-1.844	-1.981	-1.925	-2.394	ns
		$t_h$	1.281	1.383	2.052	2.054	2.213	2.135	2.582	2.073	2.231	2.164	2.628	ns
	GCLK PLL	$t_{su}$	0.923	1.009	1.765	1.794	2.086	1.972	1.796	1.779	2.110	1.988	1.846	ns
		$t_h$	-0.658	-0.723	-1.311	-1.326	-1.562	-1.478	-1.295	-1.301	-1.574	-1.482	-1.338	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-1.141	-1.232	-1.824	-1.825	-1.954	-1.887	-2.333	-1.833	-1.964	-1.908	-2.377	ns
		$t_h$	1.267	1.371	2.038	2.044	2.195	2.117	2.564	2.062	2.214	2.147	2.611	ns
	GCLK PLL	$t_{su}$	0.937	1.021	1.778	1.804	2.104	1.990	1.814	1.790	2.127	2.005	1.863	ns
		$t_h$	-0.672	-0.735	-1.323	-1.336	-1.580	-1.496	-1.313	-1.312	-1.591	-1.499	-1.355	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-1.155	-1.244	-1.839	-1.835	-1.972	-1.905	-2.351	-1.844	-1.981	-1.925	-2.394	ns
		$t_h$	1.281	1.383	2.052	2.054	2.213	2.135	2.582	2.073	2.231	2.164	2.628	ns
	GCLK PLL	$t_{su}$	0.923	1.009	1.765	1.794	2.086	1.972	1.796	1.779	2.110	1.988	1.846	ns
		$t_h$	-0.658	-0.723	-1.311	-1.326	-1.562	-1.478	-1.295	-1.301	-1.574	-1.482	-1.338	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.155	-1.244	-1.839	-1.835	-1.972	-1.905	-2.351	-1.844	-1.981	-1.925	-2.394	ns
		$t_h$	1.281	1.383	2.052	2.054	2.213	2.135	2.582	2.073	2.231	2.164	2.628	ns
	GCLK PLL	$t_{su}$	0.923	1.009	1.765	1.794	2.086	1.972	1.796	1.779	2.110	1.988	1.846	ns
		$t_h$	-0.658	-0.723	-1.311	-1.326	-1.562	-1.478	-1.295	-1.301	-1.574	-1.482	-1.338	ns

**Table 1-101.** EP3SL340 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.5-V HSTL CLASS I	GCLK	$t_{su}$	-1.141	-1.232	-1.824	-1.825	-1.954	-1.887	-2.333	-1.833	-1.964	-1.908	-2.377	ns
		$t_h$	1.267	1.371	2.038	2.044	2.195	2.117	2.564	2.062	2.214	2.147	2.611	ns
	GCLK PLL	$t_{su}$	0.937	1.021	1.778	1.804	2.104	1.990	1.814	1.790	2.127	2.005	1.863	ns
		$t_h$	-0.672	-0.735	-1.323	-1.336	-1.580	-1.496	-1.313	-1.312	-1.591	-1.499	-1.355	ns
1.5-V HSTL CLASS II	GCLK	$t_{su}$	-1.141	-1.232	-1.824	-1.825	-1.954	-1.887	-2.333	-1.833	-1.964	-1.908	-2.377	ns
		$t_h$	1.267	1.371	2.038	2.044	2.195	2.117	2.564	2.062	2.214	2.147	2.611	ns
	GCLK PLL	$t_{su}$	0.937	1.021	1.778	1.804	2.104	1.990	1.814	1.790	2.127	2.005	1.863	ns
		$t_h$	-0.672	-0.735	-1.323	-1.336	-1.580	-1.496	-1.313	-1.312	-1.591	-1.499	-1.355	ns
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-1.132	-1.220	-1.815	-1.815	-1.938	-1.871	-2.317	-1.824	-1.948	-1.892	-2.361	ns
		$t_h$	1.258	1.359	2.029	2.034	2.179	2.101	2.548	2.053	2.198	2.131	2.595	ns
	GCLK PLL	$t_{su}$	0.946	1.033	1.787	1.814	2.120	2.006	1.830	1.799	2.143	2.021	1.879	ns
		$t_h$	-0.681	-0.747	-1.332	-1.346	-1.596	-1.512	-1.329	-1.321	-1.607	-1.515	-1.371	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-1.132	-1.220	-1.815	-1.815	-1.938	-1.871	-2.317	-1.824	-1.948	-1.892	-2.361	ns
		$t_h$	1.258	1.359	2.029	2.034	2.179	2.101	2.548	2.053	2.198	2.131	2.595	ns
	GCLK PLL	$t_{su}$	0.946	1.033	1.787	1.814	2.120	2.006	1.830	1.799	2.143	2.021	1.879	ns
		$t_h$	-0.681	-0.747	-1.332	-1.346	-1.596	-1.512	-1.329	-1.321	-1.607	-1.515	-1.371	ns
3.0-V PCI	GCLK	$t_{su}$	-1.245	-1.307	-1.922	-1.957	-2.202	-2.138	-2.590	-1.972	-2.209	-2.147	-2.527	ns
		$t_h$	1.368	1.446	2.134	2.178	2.445	2.369	2.825	2.204	2.461	2.387	2.768	ns
	GCLK PLL	$t_{su}$	0.873	0.934	1.673	1.686	1.783	1.677	1.686	1.690	1.802	1.690	1.741	ns
		$t_h$	-0.609	-0.649	-1.219	-1.216	-1.260	-1.185	-1.175	-1.209	-1.268	-1.188	-1.226	ns
3.0-V PCI-X	GCLK	$t_{su}$	-1.245	-1.307	-1.922	-1.957	-2.202	-2.138	-2.590	-1.972	-2.209	-2.147	-2.527	ns
		$t_h$	1.368	1.446	2.134	2.178	2.445	2.369	2.825	2.204	2.461	2.387	2.768	ns
	GCLK PLL	$t_{su}$	0.873	0.934	1.673	1.686	1.783	1.677	1.686	1.690	1.802	1.690	1.741	ns
		$t_h$	-0.609	-0.649	-1.219	-1.216	-1.260	-1.185	-1.175	-1.209	-1.268	-1.188	-1.226	ns

Table 1-102 specifies EP3SL340 Column Pins Output Timing parameters for single-ended I/O standards.

**Table 1-102.** EP3SL340 Column Pins output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.3-V LVTTL	4mA	GCLK	$t_{co}$	3.705	3.705	5.372	5.559	6.083	5.935	6.364	5.559	6.083	5.935	6.364	ns
		GCLK PLL	$t_{co}$	4.269	4.269	6.214	6.409	6.992	6.812	7.355	6.409	6.992	6.812	7.355	ns
	8mA	GCLK	$t_{co}$	3.638	3.638	5.263	5.448	5.970	5.822	6.251	5.448	5.970	5.822	6.251	ns
		GCLK PLL	$t_{co}$	4.202	4.202	6.105	6.298	6.879	6.699	7.242	6.298	6.879	6.699	7.242	ns
	12mA	GCLK	$t_{co}$	3.552	3.552	5.160	5.350	5.878	5.730	6.159	5.350	5.878	5.730	6.159	ns
		GCLK PLL	$t_{co}$	4.116	4.116	6.001	6.200	6.789	6.609	7.152	6.200	6.789	6.609	7.152	ns
	16mA	GCLK	$t_{co}$	3.545	3.545	5.143	5.322	5.837	5.689	6.118	5.322	5.837	5.689	6.118	ns
		GCLK PLL	$t_{co}$	4.110	4.110	5.985	6.172	6.747	6.567	7.110	6.172	6.747	6.567	7.110	ns
3.3-V LVCMOS	4mA	GCLK	$t_{co}$	3.711	3.711	5.377	5.564	6.090	5.942	6.371	5.564	6.090	5.942	6.371	ns
		GCLK PLL	$t_{co}$	4.275	4.275	6.218	6.414	7.000	6.820	7.363	6.414	7.000	6.820	7.363	ns
	8mA	GCLK	$t_{co}$	3.556	3.556	5.170	5.367	5.889	5.741	6.170	5.367	5.889	5.741	6.170	ns
		GCLK PLL	$t_{co}$	4.120	4.120	6.012	6.217	6.799	6.619	7.162	6.217	6.799	6.619	7.162	ns
	12mA	GCLK	$t_{co}$	3.563	3.563	5.164	5.346	5.863	5.715	6.144	5.346	5.863	5.715	6.144	ns
		GCLK PLL	$t_{co}$	4.127	4.127	6.006	6.196	6.775	6.595	7.138	6.196	6.775	6.595	7.138	ns
	16mA	GCLK	$t_{co}$	3.547	3.547	5.141	5.320	5.834	5.686	6.115	5.320	5.834	5.686	6.115	ns
		GCLK PLL	$t_{co}$	4.111	4.111	5.983	6.171	6.746	6.566	7.109	6.171	6.746	6.566	7.109	ns
3.0-V LVTTL	4mA	GCLK	$t_{co}$	3.669	3.669	5.339	5.528	6.050	5.902	6.331	5.528	6.050	5.902	6.331	ns
		GCLK PLL	$t_{co}$	4.232	4.232	6.181	6.377	6.983	6.803	7.346	6.377	6.983	6.803	7.346	ns
	8mA	GCLK	$t_{co}$	3.558	3.558	5.209	5.394	5.912	5.765	6.193	5.394	5.912	5.765	6.193	ns
		GCLK PLL	$t_{co}$	4.125	4.125	6.053	6.246	6.867	6.688	7.229	6.246	6.867	6.688	7.229	ns
	12mA	GCLK	$t_{co}$	3.522	3.522	5.146	5.325	5.838	5.691	6.119	5.325	5.838	5.691	6.119	ns
		GCLK PLL	$t_{co}$	4.087	4.087	5.987	6.174	6.803	6.624	7.165	6.174	6.803	6.624	7.165	ns
	16mA	GCLK	$t_{co}$	3.504	3.504	5.117	5.297	5.810	5.662	6.091	5.297	5.810	5.662	6.091	ns
		GCLK PLL	$t_{co}$	4.068	4.068	5.959	6.147	6.780	6.601	7.142	6.147	6.780	6.601	7.142	ns

**Table 1-102.** EP3SL340 Column Pins output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.0-V LVCMOS	4mA	GCLK	$t_{co}$	3.583	3.583	5.243	5.427	5.947	5.800	6.228	5.427	5.947	5.800	6.228	ns
		GCLK PLL	$t_{co}$	4.149	4.149	6.087	6.279	6.903	6.724	7.265	6.279	6.903	6.724	7.265	ns
	8mA	GCLK	$t_{co}$	3.504	3.504	5.120	5.298	5.812	5.665	6.093	5.298	5.812	5.665	6.093	ns
		GCLK PLL	$t_{co}$	4.070	4.070	5.963	6.149	6.793	6.614	7.155	6.149	6.793	6.614	7.155	ns
	12mA	GCLK	$t_{co}$	3.499	3.499	5.112	5.291	5.804	5.656	6.085	5.291	5.804	5.656	6.085	ns
		GCLK PLL	$t_{co}$	4.063	4.063	5.955	6.142	6.761	6.581	7.124	6.142	6.761	6.581	7.124	ns
	16mA	GCLK	$t_{co}$	3.490	3.490	5.098	5.276	5.789	5.641	6.070	5.276	5.789	5.641	6.070	ns
		GCLK PLL	$t_{co}$	4.054	4.054	5.940	6.126	6.767	6.588	7.129	6.126	6.767	6.588	7.129	ns
2.5 V	4mA	GCLK	$t_{co}$	3.705	3.705	5.450	5.654	6.194	6.047	6.475	5.654	6.194	6.047	6.475	ns
		GCLK PLL	$t_{co}$	4.269	4.269	6.293	6.504	7.111	6.932	7.473	6.504	7.111	6.932	7.473	ns
	8mA	GCLK	$t_{co}$	3.605	3.605	5.331	5.528	6.062	5.915	6.343	5.528	6.062	5.915	6.343	ns
		GCLK PLL	$t_{co}$	4.172	4.172	6.174	6.379	6.987	6.808	7.349	6.379	6.987	6.808	7.349	ns
	12mA	GCLK	$t_{co}$	3.561	3.561	5.244	5.438	5.967	5.819	6.248	5.438	5.967	5.819	6.248	ns
		GCLK PLL	$t_{co}$	4.127	4.127	6.087	6.288	6.909	6.730	7.271	6.288	6.909	6.730	7.271	ns
	16mA	GCLK	$t_{co}$	3.523	3.523	5.205	5.395	5.924	5.776	6.205	5.395	5.924	5.776	6.205	ns
		GCLK PLL	$t_{co}$	4.088	4.088	6.048	6.246	6.852	6.673	7.214	6.246	6.852	6.673	7.214	ns

**Table 1-102.** EP3SL340 Column Pins output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.8 V	2mA	GCLK	$t_{co}$	3.896	3.896	5.772	6.014	6.599	6.451	6.880	6.014	6.599	6.451	6.880	ns
		GCLK PLL	$t_{co}$	4.460	4.460	6.613	6.863	7.507	7.327	7.870	6.863	7.507	7.327	7.870	ns
	4mA	GCLK	$t_{co}$	3.715	3.715	5.493	5.705	6.251	6.104	6.532	5.705	6.251	6.104	6.532	ns
		GCLK PLL	$t_{co}$	4.282	4.282	6.336	6.556	7.177	6.998	7.539	6.556	7.177	6.998	7.539	ns
	6mA	GCLK	$t_{co}$	3.633	3.633	5.386	5.590	6.141	5.993	6.422	5.590	6.141	5.993	6.422	ns
		GCLK PLL	$t_{co}$	4.197	4.197	6.227	6.440	7.064	6.884	7.427	6.440	7.064	6.884	7.427	ns
	8mA	GCLK	$t_{co}$	3.613	3.613	5.327	5.537	6.075	5.927	6.356	5.537	6.075	5.927	6.356	ns
		GCLK PLL	$t_{co}$	4.177	4.177	6.169	6.386	6.987	6.807	7.350	6.386	6.987	6.807	7.350	ns
	10mA	GCLK	$t_{co}$	3.550	3.550	5.266	5.462	5.994	5.846	6.275	5.462	5.994	5.846	6.275	ns
		GCLK PLL	$t_{co}$	4.114	4.114	6.109	6.312	6.918	6.738	7.281	6.312	6.918	6.738	7.281	ns
	12mA	GCLK	$t_{co}$	3.532	3.532	5.246	5.440	5.971	5.823	6.252	5.440	5.971	5.823	6.252	ns
		GCLK PLL	$t_{co}$	4.097	4.097	6.088	6.291	6.885	6.705	7.248	6.291	6.885	6.705	7.248	ns
1.5 V	2mA	GCLK	$t_{co}$	3.842	3.842	5.700	5.947	6.537	6.389	6.818	5.947	6.537	6.389	6.818	ns
		GCLK PLL	$t_{co}$	4.406	4.406	6.542	6.796	7.452	7.272	7.815	6.796	7.452	7.272	7.815	ns
	4mA	GCLK	$t_{co}$	3.630	3.630	5.381	5.590	6.145	5.997	6.426	5.590	6.145	5.997	6.426	ns
		GCLK PLL	$t_{co}$	4.194	4.194	6.223	6.439	7.066	6.886	7.429	6.439	7.066	6.886	7.429	ns
	6mA	GCLK	$t_{co}$	3.605	3.605	5.314	5.530	6.078	5.930	6.359	5.530	6.078	5.930	6.359	ns
		GCLK PLL	$t_{co}$	4.170	4.170	6.156	6.381	6.989	6.809	7.352	6.381	6.989	6.809	7.352	ns
	8mA	GCLK	$t_{co}$	3.594	3.594	5.297	5.505	6.058	5.910	6.339	5.505	6.058	5.910	6.339	ns
		GCLK PLL	$t_{co}$	4.158	4.158	6.140	6.356	6.972	6.792	7.335	6.356	6.972	6.792	7.335	ns
	10mA	GCLK	$t_{co}$	3.539	3.539	5.259	5.455	5.988	5.840	6.269	5.455	5.988	5.840	6.269	ns
		GCLK PLL	$t_{co}$	4.103	4.103	6.101	6.305	6.909	6.729	7.272	6.305	6.909	6.729	7.272	ns
	12mA	GCLK	$t_{co}$	3.534	3.534	5.243	5.443	5.977	5.829	6.258	5.443	5.977	5.829	6.258	ns
		GCLK PLL	$t_{co}$	4.097	4.097	6.084	6.292	6.888	6.708	7.251	6.292	6.888	6.708	7.251	ns

**Table 1-102.** EP3SL340 Column Pins output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.2 V	2mA	GCLK	t <sub>co</sub>	3.758	3.758	5.626	5.882	6.481	6.333	6.762	5.882	6.481	6.333	6.762	ns
		GCLK PLL	t <sub>co</sub>	4.322	4.322	6.468	6.731	7.392	7.212	7.755	6.731	7.392	7.212	7.755	ns
	4mA	GCLK	t <sub>co</sub>	3.635	3.635	5.401	5.621	6.195	6.047	6.476	5.621	6.195	6.047	6.476	ns
		GCLK PLL	t <sub>co</sub>	4.200	4.200	6.243	6.471	7.107	6.927	7.470	6.471	7.107	6.927	7.470	ns
	6mA	GCLK	t <sub>co</sub>	3.597	3.597	5.308	5.531	6.082	5.934	6.363	5.531	6.082	5.934	6.363	ns
		GCLK PLL	t <sub>co</sub>	4.162	4.162	6.150	6.381	6.993	6.813	7.356	6.381	6.993	6.813	7.356	ns
	8mA	GCLK	t <sub>co</sub>	3.550	3.550	5.280	5.482	6.026	5.878	6.307	5.482	6.026	5.878	6.307	ns
		GCLK PLL	t <sub>co</sub>	4.113	4.113	6.121	6.331	6.946	6.766	7.309	6.331	6.946	6.766	7.309	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.550	3.550	5.237	5.430	5.957	5.809	6.238	5.430	5.957	5.809	6.238	ns
		GCLK PLL	t <sub>co</sub>	4.114	4.114	6.078	6.278	6.903	6.723	7.266	6.278	6.903	6.723	7.266	ns
	10mA	GCLK	t <sub>co</sub>	3.547	3.547	5.234	5.426	5.953	5.805	6.234	5.426	5.953	5.805	6.234	ns
		GCLK PLL	t <sub>co</sub>	4.111	4.111	6.075	6.274	6.899	6.720	7.261	6.274	6.899	6.720	7.261	ns
	12mA	GCLK	t <sub>co</sub>	3.545	3.545	5.234	5.427	5.954	5.806	6.235	5.427	5.954	5.806	6.235	ns
		GCLK PLL	t <sub>co</sub>	4.110	4.110	6.075	6.275	6.899	6.719	7.262	6.275	6.899	6.719	7.262	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.536	3.536	5.220	5.412	5.939	5.791	6.220	5.412	5.939	5.791	6.220	ns
		GCLK PLL	t <sub>co</sub>	4.101	4.101	6.062	6.261	6.883	6.703	7.246	6.261	6.883	6.703	7.246	ns
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.557	3.557	5.249	5.444	5.973	5.825	6.254	5.444	5.973	5.825	6.254	ns
		GCLK PLL	t <sub>co</sub>	4.121	4.121	6.090	6.292	6.923	6.744	7.285	6.292	6.923	6.744	7.285	ns
	6mA	GCLK	t <sub>co</sub>	3.553	3.553	5.247	5.442	5.971	5.823	6.252	5.442	5.971	5.823	6.252	ns
		GCLK PLL	t <sub>co</sub>	4.117	4.117	6.088	6.290	6.920	6.740	7.283	6.290	6.920	6.740	7.283	ns
	8mA	GCLK	t <sub>co</sub>	3.542	3.542	5.237	5.432	5.962	5.814	6.243	5.432	5.962	5.814	6.243	ns
		GCLK PLL	t <sub>co</sub>	4.107	4.107	6.079	6.281	6.919	6.740	7.281	6.281	6.919	6.740	7.281	ns
	10mA	GCLK	t <sub>co</sub>	3.531	3.531	5.225	5.419	5.949	5.801	6.230	5.419	5.949	5.801	6.230	ns
		GCLK PLL	t <sub>co</sub>	4.095	4.095	6.066	6.268	6.894	6.715	7.256	6.268	6.894	6.715	7.256	ns
	12mA	GCLK	t <sub>co</sub>	3.531	3.531	5.224	5.419	5.949	5.801	6.230	5.419	5.949	5.801	6.230	ns
		GCLK PLL	t <sub>co</sub>	4.095	4.095	6.066	6.268	6.892	6.712	7.255	6.268	6.892	6.712	7.255	ns

**Table 1-102.** EP3SL340 Column Pins output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$		
SSTL-18 CLASS II	8mA	GCLK	$t_{co}$	3.537	3.537	5.223	5.416	5.944	5.796	6.225	5.416	5.944	5.796	6.225	ns	
		GCLK PLL	$t_{co}$	4.102	4.102	6.065	6.265	6.895	6.715	7.258	6.265	6.895	6.715	7.258	ns	
	16mA	GCLK	$t_{co}$	3.540	3.540	5.231	5.426	5.956	5.808	6.237	5.426	5.956	5.808	6.237	ns	
		GCLK PLL	$t_{co}$	4.104	4.104	6.072	6.274	6.918	6.738	7.281	6.274	6.918	6.738	7.281	ns	
SSTL-15 CLASS I	4mA	GCLK	$t_{co}$	3.561	3.561	5.259	5.455	5.986	5.838	6.267	5.455	5.986	5.838	6.267	ns	
		GCLK PLL	$t_{co}$	4.124	4.124	6.100	6.303	6.937	6.757	7.300	6.303	6.937	6.757	7.300	ns	
	6mA	GCLK	$t_{co}$	3.547	3.547	5.248	5.445	5.977	5.829	6.258	5.445	5.977	5.829	6.258	ns	
		GCLK PLL	$t_{co}$	4.112	4.112	6.090	6.294	6.923	6.743	7.286	6.294	6.923	6.743	7.286	ns	
	8mA	GCLK	$t_{co}$	3.536	3.536	5.235	5.431	5.963	5.815	6.244	5.431	5.963	5.815	6.244	ns	
		GCLK PLL	$t_{co}$	4.100	4.100	6.076	6.280	6.908	6.728	7.271	6.280	6.908	6.728	7.271	ns	
	10mA	GCLK	$t_{co}$	3.535	3.535	5.238	5.435	5.967	5.819	6.248	5.435	5.967	5.819	6.248	ns	
		GCLK PLL	$t_{co}$	4.099	4.099	6.078	6.283	6.905	6.726	7.268	6.283	6.905	6.726	7.268	ns	
	12mA	GCLK	$t_{co}$	3.532	3.532	5.232	5.429	5.961	5.813	6.242	5.429	5.961	5.813	6.242	ns	
		GCLK PLL	$t_{co}$	4.096	4.096	6.073	6.277	6.899	6.719	7.262	6.277	6.899	6.719	7.262	ns	
	SSTL-15 CLASS II	8mA	GCLK	$t_{co}$	3.534	3.534	5.221	5.415	5.944	5.796	6.225	5.415	5.944	5.796	6.225	ns
			GCLK PLL	$t_{co}$	4.098	4.098	6.063	6.264	6.896	6.716	7.259	6.264	6.896	6.716	7.259	ns
16mA		GCLK	$t_{co}$	3.537	3.537	5.228	5.424	5.955	5.807	6.236	5.424	5.955	5.807	6.236	ns	
		GCLK PLL	$t_{co}$	4.101	4.101	6.070	6.272	6.920	6.740	7.283	6.272	6.920	6.740	7.283	ns	



**Table 1-102.** EP3SL340 Column Pins output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.544	3.544	5.223	5.415	5.942	5.794	6.223	5.415	5.942	5.794	6.223	ns
		GCLK PLL	t <sub>co</sub>	4.108	4.108	6.064	6.263	6.897	6.717	7.260	6.263	6.897	6.717	7.260	ns
	6mA	GCLK	t <sub>co</sub>	3.537	3.537	5.221	5.414	5.941	5.793	6.222	5.414	5.941	5.793	6.222	ns
		GCLK PLL	t <sub>co</sub>	4.102	4.102	6.063	6.263	6.903	6.724	7.265	6.263	6.903	6.724	7.265	ns
	8mA	GCLK	t <sub>co</sub>	3.529	3.529	5.214	5.406	5.934	5.786	6.215	5.406	5.934	5.786	6.215	ns
		GCLK PLL	t <sub>co</sub>	4.094	4.094	6.055	6.255	6.885	6.706	7.247	6.255	6.885	6.706	7.247	ns
	10mA	GCLK	t <sub>co</sub>	3.532	3.532	5.217	5.410	5.938	5.790	6.219	5.410	5.938	5.790	6.219	ns
		GCLK PLL	t <sub>co</sub>	4.096	4.096	6.058	6.258	6.887	6.707	7.250	6.258	6.887	6.707	7.250	ns
	12mA	GCLK	t <sub>co</sub>	3.529	3.529	5.219	5.413	5.942	5.794	6.223	5.413	5.942	5.794	6.223	ns
		GCLK PLL	t <sub>co</sub>	4.093	4.093	6.060	6.261	6.895	6.716	7.257	6.261	6.895	6.716	7.257	ns
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.537	3.537	5.218	5.411	5.938	5.790	6.219	5.411	5.938	5.790	6.219	ns
		GCLK PLL	t <sub>co</sub>	4.101	4.101	6.059	6.259	6.898	6.718	7.261	6.259	6.898	6.718	7.261	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.549	3.549	5.232	5.425	5.953	5.805	6.234	5.425	5.953	5.805	6.234	ns
		GCLK PLL	t <sub>co</sub>	4.113	4.113	6.072	6.273	6.910	6.730	7.273	6.273	6.910	6.730	7.273	ns
	6mA	GCLK	t <sub>co</sub>	3.545	3.545	5.233	5.427	5.956	5.808	6.237	5.427	5.956	5.808	6.237	ns
		GCLK PLL	t <sub>co</sub>	4.109	4.109	6.075	6.276	6.907	6.727	7.270	6.276	6.907	6.727	7.270	ns
	8mA	GCLK	t <sub>co</sub>	3.541	3.541	5.228	5.422	5.951	5.803	6.232	5.422	5.951	5.803	6.232	ns
		GCLK PLL	t <sub>co</sub>	4.105	4.105	6.070	6.271	6.902	6.722	7.265	6.271	6.902	6.722	7.265	ns
	10mA	GCLK	t <sub>co</sub>	3.534	3.534	5.221	5.415	5.944	5.796	6.225	5.415	5.944	5.796	6.225	ns
		GCLK PLL	t <sub>co</sub>	4.098	4.098	6.063	6.264	6.896	6.716	7.259	6.264	6.896	6.716	7.259	ns
	12mA	GCLK	t <sub>co</sub>	3.535	3.535	5.228	5.423	5.954	5.806	6.235	5.423	5.954	5.806	6.235	ns
		GCLK PLL	t <sub>co</sub>	4.098	4.098	6.069	6.271	6.900	6.721	7.262	6.271	6.900	6.721	7.262	ns
1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.533	3.533	5.209	5.401	5.928	5.780	6.209	5.401	5.928	5.780	6.209	ns
		GCLK PLL	t <sub>co</sub>	4.096	4.096	6.050	6.249	6.884	6.704	7.247	6.249	6.884	6.704	7.247	ns

**Table 1-102.** EP3SL340 Column Pins output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.552	3.552	5.246	5.442	5.974	5.826	6.255	5.442	5.974	5.826	6.255	ns
		GCLK PLL	$t_{co}$	4.117	4.117	6.087	6.291	6.929	6.749	7.292	6.291	6.929	6.749	7.292	ns
	6mA	GCLK	$t_{co}$	3.544	3.544	5.237	5.433	5.965	5.817	6.246	5.433	5.965	5.817	6.246	ns
		GCLK PLL	$t_{co}$	4.108	4.108	6.078	6.282	6.917	6.737	7.280	6.282	6.917	6.737	7.280	ns
	8mA	GCLK	$t_{co}$	3.545	3.545	5.244	5.442	5.974	5.826	6.255	5.442	5.974	5.826	6.255	ns
		GCLK PLL	$t_{co}$	4.108	4.108	6.085	6.290	6.920	6.740	7.283	6.290	6.920	6.740	7.283	ns
	10mA	GCLK	$t_{co}$	3.534	3.534	5.231	5.428	5.960	5.812	6.241	5.428	5.960	5.812	6.241	ns
		GCLK PLL	$t_{co}$	4.098	4.098	6.072	6.276	6.915	6.736	7.277	6.276	6.915	6.736	7.277	ns
	12mA	GCLK	$t_{co}$	3.534	3.534	5.231	5.428	5.961	5.813	6.242	5.428	5.961	5.813	6.242	ns
		GCLK PLL	$t_{co}$	4.098	4.098	6.073	6.277	6.906	6.727	7.269	6.277	6.906	6.727	7.269	ns
1.2-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.555	3.555	5.247	5.443	5.974	5.826	6.255	5.443	5.974	5.826	6.255	ns
		GCLK PLL	$t_{co}$	4.119	4.119	6.089	6.292	6.943	6.763	7.306	6.292	6.943	6.763	7.306	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.658	3.658	5.292	5.477	5.999	5.851	6.280	5.477	5.999	5.851	6.280	ns
		GCLK PLL	$t_{co}$	4.222	4.222	6.134	6.328	6.974	6.794	7.337	6.328	6.974	6.794	7.337	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.658	3.658	5.292	5.477	5.999	5.851	6.280	5.477	5.999	5.851	6.280	ns
		GCLK PLL	$t_{co}$	4.222	4.222	6.134	6.328	6.974	6.794	7.337	6.328	6.974	6.794	7.337	ns

Table 1-103 specifies EP3SL340 Row Pins Output Timing parameters for single-ended I/O standards.

**Table 1-103.** EP3SL340 Row Pins output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	
3.3-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.479	3.781	5.469	5.657	6.238	6.095	6.481	5.741	6.370	6.120	6.565	ns
		GCLK PLL	t <sub>co</sub>	1.562	1.782	2.243	2.285	2.559	2.570	2.578	2.386	2.666	2.671	2.594	ns
	8mA	GCLK	t <sub>co</sub>	3.413	3.681	5.339	5.519	6.093	5.950	6.336	5.628	6.221	6.005	6.416	ns
		GCLK PLL	t <sub>co</sub>	1.496	1.677	2.113	2.174	2.414	2.425	2.433	2.273	2.517	2.522	2.445	ns
	12mA	GCLK	t <sub>co</sub>	3.334	3.592	5.220	5.398	5.965	5.822	6.208	5.529	6.089	5.905	6.284	ns
		GCLK PLL	t <sub>co</sub>	1.417	1.575	1.994	2.074	2.286	2.297	2.305	2.174	2.385	2.390	2.313	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.481	3.785	5.477	5.662	6.242	6.099	6.485	5.749	6.374	6.132	6.569	ns
		GCLK PLL	t <sub>co</sub>	1.564	1.786	2.251	2.291	2.563	2.574	2.582	2.394	2.670	2.675	2.598	ns
	8mA	GCLK	t <sub>co</sub>	3.338	3.596	5.226	5.413	5.971	5.828	6.214	5.541	6.096	5.914	6.291	ns
		GCLK PLL	t <sub>co</sub>	1.421	1.579	2.000	2.089	2.292	2.303	2.311	2.186	2.392	2.397	2.320	ns
3.0-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.440	3.727	5.421	5.610	6.194	6.051	6.437	5.709	6.328	6.086	6.523	ns
		GCLK PLL	t <sub>co</sub>	1.523	1.728	2.195	2.254	2.515	2.526	2.534	2.354	2.624	2.629	2.552	ns
	8mA	GCLK	t <sub>co</sub>	3.339	3.601	5.269	5.451	6.030	5.887	6.273	5.567	6.164	5.940	6.358	ns
		GCLK PLL	t <sub>co</sub>	1.422	1.601	2.043	2.112	2.351	2.362	2.370	2.212	2.460	2.464	2.387	ns
	12mA	GCLK	t <sub>co</sub>	3.302	3.563	5.188	5.371	5.942	5.799	6.185	5.499	6.071	5.867	6.265	ns
		GCLK PLL	t <sub>co</sub>	1.385	1.550	1.961	2.047	2.263	2.274	2.282	2.144	2.367	2.371	2.294	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.361	3.646	5.316	5.503	6.084	5.941	6.327	5.600	6.217	5.976	6.411	ns
		GCLK PLL	t <sub>co</sub>	1.444	1.647	2.090	2.147	2.405	2.416	2.424	2.245	2.513	2.517	2.440	ns
	8mA	GCLK	t <sub>co</sub>	3.289	3.547	5.161	5.342	5.903	5.760	6.146	5.469	6.031	5.838	6.225	ns
		GCLK PLL	t <sub>co</sub>	1.372	1.530	1.926	2.018	2.224	2.235	2.243	2.114	2.327	2.331	2.254	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.466	3.763	5.554	5.764	6.366	6.223	6.609	5.841	6.507	6.238	6.701	ns
		GCLK PLL	t <sub>co</sub>	1.549	1.764	2.328	2.380	2.687	2.698	2.706	2.486	2.803	2.807	2.730	ns
	8mA	GCLK	t <sub>co</sub>	3.381	3.665	5.399	5.601	6.196	6.053	6.439	5.704	6.333	6.093	6.527	ns
		GCLK PLL	t <sub>co</sub>	1.464	1.666	2.173	2.245	2.517	2.528	2.536	2.349	2.629	2.633	2.556	ns
	12mA	GCLK	t <sub>co</sub>	3.324	3.603	5.288	5.483	6.070	5.927	6.313	5.615	6.203	5.999	6.397	ns
		GCLK PLL	t <sub>co</sub>	1.407	1.589	2.062	2.159	2.391	2.402	2.410	2.260	2.499	2.503	2.426	ns

**Table 1-103.** EP3SL340 Row Pins output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	
1.8 V	2mA	GCLK	t <sub>co</sub>	3.692	3.942	5.817	6.193	6.841	6.698	7.084	6.248	6.991	6.682	7.186	ns
		GCLK PLL	t <sub>co</sub>	1.785	1.925	2.574	2.860	3.162	3.173	3.192	2.985	3.287	3.292	3.203	ns
	4mA	GCLK	t <sub>co</sub>	3.519	3.756	5.527	5.824	6.436	6.293	6.679	5.922	6.585	6.320	6.779	ns
		GCLK PLL	t <sub>co</sub>	1.562	1.739	2.284	2.491	2.757	2.768	2.787	2.620	2.881	2.885	2.796	ns
	6mA	GCLK	t <sub>co</sub>	3.444	3.674	5.427	5.674	6.277	6.134	6.520	5.808	6.412	6.215	6.607	ns
		GCLK PLL	t <sub>co</sub>	1.495	1.657	2.184	2.341	2.598	2.609	2.628	2.452	2.708	2.713	2.624	ns
	8mA	GCLK	t <sub>co</sub>	3.426	3.654	5.370	5.595	6.180	6.037	6.423	5.752	6.318	6.143	6.513	ns
		GCLK PLL	t <sub>co</sub>	1.469	1.637	2.127	2.259	2.501	2.512	2.531	2.361	2.614	2.619	2.530	ns
1.5 V	2mA	GCLK	t <sub>co</sub>	3.634	3.885	5.745	6.106	6.769	6.626	7.012	6.169	6.915	6.617	7.110	ns
		GCLK PLL	t <sub>co</sub>	1.696	1.868	2.502	2.773	3.090	3.101	3.120	2.892	3.211	3.216	3.127	ns
	4mA	GCLK	t <sub>co</sub>	3.442	3.671	5.423	5.669	6.278	6.135	6.521	5.805	6.411	6.216	6.606	ns
		GCLK PLL	t <sub>co</sub>	1.485	1.654	2.180	2.336	2.599	2.610	2.629	2.446	2.707	2.712	2.623	ns
	6mA	GCLK	t <sub>co</sub>	3.415	3.645	5.355	5.587	6.172	6.029	6.415	5.745	6.306	6.143	6.501	ns
		GCLK PLL	t <sub>co</sub>	1.458	1.628	2.112	2.251	2.493	2.504	2.523	2.354	2.602	2.607	2.518	ns
	8mA	GCLK	t <sub>co</sub>	3.396	3.634	5.338	5.562	6.153	6.010	6.396	5.721	6.284	6.124	6.479	ns
		GCLK PLL	t <sub>co</sub>	1.439	1.617	2.095	2.226	2.474	2.485	2.504	2.330	2.580	2.585	2.496	ns
1.2 V	2mA	GCLK	t <sub>co</sub>	3.564	3.798	5.666	6.020	6.694	6.551	6.937	6.100	6.831	6.548	7.026	ns
		GCLK PLL	t <sub>co</sub>	1.639	1.781	2.423	2.687	3.015	3.026	3.045	2.804	3.127	3.132	3.043	ns
	4mA	GCLK	t <sub>co</sub>	3.447	3.675	5.440	5.697	6.319	6.176	6.562	5.834	6.453	6.260	6.648	ns
		GCLK PLL	t <sub>co</sub>	1.490	1.658	2.197	2.364	2.640	2.651	2.670	2.471	2.749	2.754	2.665	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.328	3.591	5.278	5.474	6.038	5.895	6.281	5.602	6.165	5.985	6.360	ns
		GCLK PLL	t <sub>co</sub>	1.411	1.575	2.039	2.150	2.359	2.370	2.378	2.247	2.461	2.466	2.389	ns
	12mA	GCLK	t <sub>co</sub>	3.323	3.587	5.275	5.472	6.030	5.887	6.273	5.601	6.158	5.984	6.353	ns
		GCLK PLL	t <sub>co</sub>	1.406	1.570	2.032	2.148	2.351	2.362	2.370	2.246	2.454	2.459	2.382	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.314	3.576	5.260	5.456	6.003	5.860	6.246	5.584	6.131	5.966	6.326	ns
		GCLK PLL	t <sub>co</sub>	1.397	1.559	2.017	2.132	2.324	2.335	2.343	2.229	2.427	2.432	2.355	ns

**Table 1-103.** EP3SL340 Row Pins output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.375	3.598	5.289	5.499	6.054	5.911	6.297	5.651	6.181	6.034	6.376	ns
		GCLK PLL	t <sub>co</sub>	1.418	1.581	2.046	2.163	2.375	2.386	2.405	2.260	2.477	2.482	2.393	ns
	6mA	GCLK	t <sub>co</sub>	3.370	3.593	5.287	5.498	6.052	5.909	6.295	5.649	6.179	6.032	6.374	ns
		GCLK PLL	t <sub>co</sub>	1.413	1.576	2.044	2.162	2.373	2.384	2.403	2.258	2.475	2.480	2.391	ns
	8mA	GCLK	t <sub>co</sub>	3.359	3.582	5.277	5.488	6.035	5.895	6.278	5.640	6.163	6.023	6.358	ns
		GCLK PLL	t <sub>co</sub>	1.402	1.565	2.034	2.152	2.356	2.367	2.386	2.249	2.459	2.464	2.375	ns
	10mA	GCLK	t <sub>co</sub>	3.348	3.571	5.264	5.475	6.020	5.882	6.263	5.628	6.148	6.011	6.343	ns
		GCLK PLL	t <sub>co</sub>	1.391	1.554	2.021	2.139	2.341	2.352	2.371	2.237	2.444	2.449	2.360	ns
	12mA	GCLK	t <sub>co</sub>	3.348	3.570	5.264	5.475	6.019	5.882	6.262	5.627	6.147	6.011	6.342	ns
		GCLK PLL	t <sub>co</sub>	1.391	1.553	2.021	2.139	2.340	2.351	2.370	2.236	2.443	2.448	2.359	ns
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.356	3.577	5.263	5.472	6.013	5.877	6.256	5.623	6.140	6.005	6.335	ns
		GCLK PLL	t <sub>co</sub>	1.399	1.560	2.020	2.136	2.334	2.345	2.364	2.232	2.436	2.441	2.352	ns
	16mA	GCLK	t <sub>co</sub>	3.357	3.580	5.269	5.480	6.015	5.887	6.258	5.632	6.144	6.016	6.339	ns
		GCLK PLL	t <sub>co</sub>	1.400	1.563	2.026	2.144	2.336	2.347	2.366	2.241	2.440	2.445	2.356	ns
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.378	3.601	5.298	5.510	6.071	5.928	6.314	5.661	6.197	6.046	6.392	ns
		GCLK PLL	t <sub>co</sub>	1.421	1.584	2.055	2.174	2.392	2.403	2.422	2.270	2.493	2.498	2.409	ns
	6mA	GCLK	t <sub>co</sub>	3.364	3.587	5.287	5.500	6.054	5.911	6.297	5.652	6.181	6.037	6.376	ns
		GCLK PLL	t <sub>co</sub>	1.407	1.570	2.044	2.164	2.375	2.386	2.405	2.261	2.477	2.482	2.393	ns
	8mA	GCLK	t <sub>co</sub>	3.353	3.575	5.274	5.487	6.036	5.896	6.279	5.639	6.164	6.024	6.359	ns
		GCLK PLL	t <sub>co</sub>	1.396	1.558	2.031	2.151	2.357	2.368	2.387	2.248	2.460	2.465	2.376	ns

**Table 1-103.** EP3SL340 Row Pins output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =1.1V	V <sub>ccl</sub> =0.9V	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.363	3.583	5.262	5.470	6.016	5.875	6.259	5.622	6.143	6.002	6.338	ns
		GCLK PLL	t <sub>co</sub>	1.406	1.566	2.019	2.134	2.337	2.348	2.367	2.231	2.439	2.444	2.355	ns
	6mA	GCLK	t <sub>co</sub>	3.356	3.577	5.260	5.469	6.008	5.874	6.251	5.621	6.136	6.002	6.331	ns
		GCLK PLL	t <sub>co</sub>	1.399	1.560	2.017	2.133	2.329	2.340	2.359	2.230	2.432	2.437	2.348	ns
	8mA	GCLK	t <sub>co</sub>	3.347	3.569	5.253	5.462	6.000	5.867	6.243	5.614	6.128	5.995	6.323	ns
		GCLK PLL	t <sub>co</sub>	1.390	1.552	2.010	2.126	2.321	2.332	2.351	2.223	2.424	2.429	2.340	ns
	10mA	GCLK	t <sub>co</sub>	3.350	3.571	5.256	5.465	6.003	5.871	6.246	5.617	6.131	5.998	6.326	ns
		GCLK PLL	t <sub>co</sub>	1.393	1.554	2.013	2.129	2.324	2.335	2.354	2.226	2.427	2.432	2.343	ns
	12mA	GCLK	t <sub>co</sub>	3.346	3.568	5.258	5.468	6.003	5.874	6.246	5.620	6.132	6.003	6.327	ns
GCLK PLL		t <sub>co</sub>	1.389	1.551	2.015	2.132	2.324	2.335	2.354	2.229	2.428	2.433	2.344	ns	
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.354	3.576	5.256	5.465	5.994	5.870	6.237	5.616	6.121	5.997	6.316	ns
		GCLK PLL	t <sub>co</sub>	1.397	1.559	2.013	2.129	2.315	2.326	2.345	2.225	2.417	2.422	2.333	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.369	3.589	5.271	5.480	6.031	5.888	6.274	5.631	6.157	6.013	6.352	ns
		GCLK PLL	t <sub>co</sub>	1.412	1.572	2.028	2.144	2.352	2.363	2.382	2.240	2.453	2.458	2.369	ns
	6mA	GCLK	t <sub>co</sub>	3.363	3.584	5.272	5.482	6.027	5.888	6.270	5.633	6.154	6.016	6.349	ns
		GCLK PLL	t <sub>co</sub>	1.406	1.567	2.029	2.146	2.348	2.359	2.378	2.242	2.450	2.455	2.366	ns
	8mA	GCLK	t <sub>co</sub>	3.359	3.580	5.267	5.477	6.021	5.883	6.264	5.628	6.148	6.010	6.343	ns
		GCLK PLL	t <sub>co</sub>	1.402	1.563	2.024	2.141	2.342	2.353	2.372	2.237	2.444	2.449	2.360	ns
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.371	3.591	5.284	5.496	6.049	5.906	6.292	5.647	6.174	6.032	6.369	ns
		GCLK PLL	t <sub>co</sub>	1.414	1.574	2.041	2.160	2.370	2.381	2.400	2.256	2.470	2.475	2.386	ns
	6mA	GCLK	t <sub>co</sub>	3.362	3.583	5.275	5.487	6.037	5.896	6.280	5.638	6.163	6.023	6.358	ns
		GCLK PLL	t <sub>co</sub>	1.405	1.566	2.032	2.151	2.358	2.369	2.388	2.247	2.459	2.464	2.375	ns
	8mA	GCLK	t <sub>co</sub>	3.361	3.583	5.282	5.495	6.043	5.905	6.286	5.647	6.170	6.033	6.365	ns
		GCLK PLL	t <sub>co</sub>	1.404	1.566	2.039	2.159	2.364	2.375	2.394	2.256	2.466	2.471	2.382	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.434	3.697	5.330	5.520	6.047	5.904	6.299	5.650	6.177	6.027	6.372	ns
		GCLK PLL	t <sub>co</sub>	1.517	1.680	2.087	2.196	2.378	2.386	2.387	2.295	2.482	2.493	2.401	ns
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.434	3.697	5.330	5.520	6.047	5.904	6.299	5.650	6.177	6.027	6.372	ns
		GCLK PLL	t <sub>co</sub>	1.517	1.680	2.087	2.196	2.378	2.386	2.387	2.295	2.482	2.493	2.401	ns

Table 1-104 through Table 1-107 show the maximum I/O timing parameters for EP3SL340 devices for differential I/O standards.

Table 1-104 specifies EP3SL340 column pins input timing parameters for differential I/O standards.

**Table 1-104.** EP3SL340 Column Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS	GCLK	t <sub>SU</sub>	-1.278	-1.335	-1.674	-1.607	-1.788	-1.721	-2.204	-1.580	-2.013	-1.689	-2.242	ns
		t <sub>H</sub>	1.414	1.489	1.926	1.873	2.080	2.002	2.485	1.857	2.327	1.981	2.527	ns
	GCLK PLL	t <sub>SU</sub>	0.857	0.885	1.872	2.050	2.211	2.107	1.975	2.104	2.409	2.165	2.031	ns
		t <sub>H</sub>	-0.582	-0.589	-1.382	-1.537	-1.640	-1.565	-1.423	-1.579	-1.804	-1.612	-1.474	ns
MINI-LVDS	GCLK	t <sub>SU</sub>	-1.278	-1.335	-1.674	-1.607	-1.788	-1.721	-2.204	-1.580	-2.013	-1.689	-2.242	ns
		t <sub>H</sub>	1.414	1.489	1.926	1.873	2.080	2.002	2.485	1.857	2.327	1.981	2.527	ns
	GCLK PLL	t <sub>SU</sub>	0.857	0.885	1.872	2.050	2.211	2.107	1.975	2.104	2.409	2.165	2.031	ns
		t <sub>H</sub>	-0.582	-0.589	-1.382	-1.537	-1.640	-1.565	-1.423	-1.579	-1.804	-1.612	-1.474	ns
RSDS	GCLK	t <sub>SU</sub>	-1.278	-1.335	-1.674	-1.607	-1.788	-1.721	-2.204	-1.580	-2.013	-1.689	-2.242	ns
		t <sub>H</sub>	1.414	1.489	1.926	1.873	2.080	2.002	2.485	1.857	2.327	1.981	2.527	ns
	GCLK PLL	t <sub>SU</sub>	0.857	0.885	1.872	2.050	2.211	2.107	1.975	2.104	2.409	2.165	2.031	ns
		t <sub>H</sub>	-0.582	-0.589	-1.382	-1.537	-1.640	-1.565	-1.423	-1.579	-1.804	-1.612	-1.474	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>SU</sub>	-1.094	-1.158	-1.787	-1.806	-1.947	-1.875	-2.353	-1.815	-1.953	-1.887	-2.396	ns
		t <sub>H</sub>	1.223	1.304	2.006	2.032	2.193	2.110	2.589	2.050	2.208	2.131	2.636	ns
	GCLK PLL	t <sub>SU</sub>	1.041	1.062	1.759	1.851	2.052	1.953	1.826	1.869	2.073	1.967	1.877	ns
		t <sub>H</sub>	-0.773	-0.774	-1.302	-1.378	-1.527	-1.457	-1.319	-1.386	-1.537	-1.462	-1.365	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	t <sub>SU</sub>	-1.094	-1.158	-1.787	-1.806	-1.947	-1.875	-2.353	-1.815	-1.953	-1.887	-2.396	ns
		t <sub>H</sub>	1.223	1.304	2.006	2.032	2.193	2.110	2.589	2.050	2.208	2.131	2.636	ns
	GCLK PLL	t <sub>SU</sub>	1.041	1.062	1.759	1.851	2.052	1.953	1.826	1.869	2.073	1.967	1.877	ns
		t <sub>H</sub>	-0.773	-0.774	-1.302	-1.378	-1.527	-1.457	-1.319	-1.386	-1.537	-1.462	-1.365	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>SU</sub>	-1.102	-1.170	-1.797	-1.817	-1.963	-1.891	-2.369	-1.826	-1.968	-1.902	-2.411	ns
		t <sub>H</sub>	1.231	1.316	2.016	2.043	2.209	2.126	2.605	2.061	2.223	2.146	2.651	ns
	GCLK PLL	t <sub>SU</sub>	1.033	1.050	1.749	1.840	2.036	1.937	1.810	1.858	2.058	1.952	1.862	ns
		t <sub>H</sub>	-0.765	-0.762	-1.292	-1.367	-1.511	-1.441	-1.303	-1.375	-1.522	-1.447	-1.350	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	t <sub>SU</sub>	-1.102	-1.170	-1.797	-1.817	-1.963	-1.891	-2.369	-1.826	-1.968	-1.902	-2.411	ns
		t <sub>H</sub>	1.231	1.316	2.016	2.043	2.209	2.126	2.605	2.061	2.223	2.146	2.651	ns
	GCLK PLL	t <sub>SU</sub>	1.033	1.050	1.749	1.840	2.036	1.937	1.810	1.858	2.058	1.952	1.862	ns
		t <sub>H</sub>	-0.765	-0.762	-1.292	-1.367	-1.511	-1.441	-1.303	-1.375	-1.522	-1.447	-1.350	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>SU</sub>	-1.114	-1.181	-1.806	-1.828	-1.982	-1.910	-2.388	-1.837	-1.986	-1.920	-2.429	ns
		t <sub>H</sub>	1.243	1.327	2.025	2.054	2.228	2.145	2.624	2.072	2.241	2.164	2.669	ns
	GCLK PLL	t <sub>SU</sub>	1.021	1.039	1.740	1.829	2.017	1.918	1.791	1.847	2.040	1.934	1.844	ns
		t <sub>H</sub>	-0.753	-0.751	-1.283	-1.356	-1.492	-1.422	-1.284	-1.364	-1.504	-1.429	-1.332	ns

**Table 1-104.** EP3SL340 Column Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.114	-1.181	-1.806	-1.828	-1.982	-1.910	-2.388	-1.837	-1.986	-1.920	-2.429	ns
		$t_h$	1.243	1.327	2.025	2.054	2.228	2.145	2.624	2.072	2.241	2.164	2.669	ns
	GCLK PLL	$t_{su}$	1.021	1.039	1.740	1.829	2.017	1.918	1.791	1.847	2.040	1.934	1.844	ns
		$t_h$	-0.753	-0.751	-1.283	-1.356	-1.492	-1.422	-1.284	-1.364	-1.504	-1.429	-1.332	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.102	-1.170	-1.797	-1.817	-1.963	-1.891	-2.369	-1.826	-1.968	-1.902	-2.411	ns
		$t_h$	1.231	1.316	2.016	2.043	2.209	2.126	2.605	2.061	2.223	2.146	2.651	ns
	GCLK PLL	$t_{su}$	1.033	1.050	1.749	1.840	2.036	1.937	1.810	1.858	2.058	1.952	1.862	ns
		$t_h$	-0.765	-0.762	-1.292	-1.367	-1.511	-1.441	-1.303	-1.375	-1.522	-1.447	-1.350	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.102	-1.170	-1.797	-1.817	-1.963	-1.891	-2.369	-1.826	-1.968	-1.902	-2.411	ns
		$t_h$	1.231	1.316	2.016	2.043	2.209	2.126	2.605	2.061	2.223	2.146	2.651	ns
	GCLK PLL	$t_{su}$	1.033	1.050	1.749	1.840	2.036	1.937	1.810	1.858	2.058	1.952	1.862	ns
		$t_h$	-0.765	-0.762	-1.292	-1.367	-1.511	-1.441	-1.303	-1.375	-1.522	-1.447	-1.350	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-1.114	-1.181	-1.806	-1.828	-1.982	-1.910	-2.388	-1.837	-1.986	-1.920	-2.429	ns
		$t_h$	1.243	1.327	2.025	2.054	2.228	2.145	2.624	2.072	2.241	2.164	2.669	ns
	GCLK PLL	$t_{su}$	1.021	1.039	1.740	1.829	2.017	1.918	1.791	1.847	2.040	1.934	1.844	ns
		$t_h$	-0.753	-0.751	-1.283	-1.356	-1.492	-1.422	-1.284	-1.364	-1.504	-1.429	-1.332	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-1.114	-1.181	-1.806	-1.828	-1.982	-1.910	-2.388	-1.837	-1.986	-1.920	-2.429	ns
		$t_h$	1.243	1.327	2.025	2.054	2.228	2.145	2.624	2.072	2.241	2.164	2.669	ns
	GCLK PLL	$t_{su}$	1.021	1.039	1.740	1.829	2.017	1.918	1.791	1.847	2.040	1.934	1.844	ns
		$t_h$	-0.753	-0.751	-1.283	-1.356	-1.492	-1.422	-1.284	-1.364	-1.504	-1.429	-1.332	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.121	-1.187	-1.818	-1.833	-1.982	-1.912	-2.387	-1.841	-1.981	-1.918	-2.425	ns
		$t_h$	1.250	1.333	2.038	2.062	2.231	2.148	2.628	2.079	2.241	2.163	2.670	ns
	GCLK PLL	$t_{su}$	1.014	1.033	1.728	1.824	2.017	1.916	1.792	1.843	2.045	1.936	1.848	ns
		$t_h$	-0.746	-0.745	-1.270	-1.348	-1.489	-1.419	-1.280	-1.357	-1.504	-1.430	-1.331	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.121	-1.187	-1.818	-1.833	-1.982	-1.912	-2.387	-1.841	-1.981	-1.918	-2.425	ns
		$t_h$	1.250	1.333	2.038	2.062	2.231	2.148	2.628	2.079	2.241	2.163	2.670	ns
	GCLK PLL	$t_{su}$	1.014	1.033	1.728	1.824	2.017	1.916	1.792	1.843	2.045	1.936	1.848	ns
		$t_h$	-0.746	-0.745	-1.270	-1.348	-1.489	-1.419	-1.280	-1.357	-1.504	-1.430	-1.331	ns



Table 1-105 specifies EP3SL340 row pins input timing parameters for differential I/O standards.

**Table 1-105.** EP3SL340 Row Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS	GCLK	t <sub>su</sub>	-1.246	-1.308	-1.577	-1.488	-1.656	-1.595	-2.046	-1.456	-1.615	-1.558	-2.087	ns
		t <sub>h</sub>	1.380	1.458	1.832	1.758	1.950	1.878	2.332	1.738	1.920	1.853	2.374	ns
	GCLK PLL	t <sub>su</sub>	0.822	0.846	1.911	2.121	2.309	2.193	2.091	2.181	2.377	2.260	2.149	ns
		t <sub>h</sub>	-0.548	-0.552	-1.422	-1.604	-1.736	-1.650	-1.536	-1.651	-1.790	-1.702	-1.588	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-1.246	-1.308	-1.577	-1.488	-1.656	-1.595	-2.046	-1.456	-1.615	-1.558	-2.087	ns
		t <sub>h</sub>	1.380	1.458	1.832	1.758	1.950	1.878	2.332	1.738	1.920	1.853	2.374	ns
	GCLK PLL	t <sub>su</sub>	0.822	0.846	1.911	2.121	2.309	2.193	2.091	2.181	2.377	2.260	2.149	ns
		t <sub>h</sub>	-0.548	-0.552	-1.422	-1.604	-1.736	-1.650	-1.536	-1.651	-1.790	-1.702	-1.588	ns
RSDS	GCLK	t <sub>su</sub>	-1.246	-1.308	-1.577	-1.488	-1.656	-1.595	-2.046	-1.456	-1.615	-1.558	-2.087	ns
		t <sub>h</sub>	1.380	1.458	1.832	1.758	1.950	1.878	2.332	1.738	1.920	1.853	2.374	ns
	GCLK PLL	t <sub>su</sub>	0.822	0.846	1.911	2.121	2.309	2.193	2.091	2.181	2.377	2.260	2.149	ns
		t <sub>h</sub>	-0.548	-0.552	-1.422	-1.604	-1.736	-1.650	-1.536	-1.651	-1.790	-1.702	-1.588	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.051	-1.123	-1.707	-1.717	-1.845	-1.779	-2.225	-1.727	-1.852	-1.790	-2.271	ns
		t <sub>h</sub>	1.178	1.264	1.926	1.941	2.090	2.013	2.462	1.960	2.105	2.033	2.509	ns
	GCLK PLL	t <sub>su</sub>	1.007	1.021	1.776	1.887	2.110	1.999	1.902	1.904	2.130	2.018	1.955	ns
		t <sub>h</sub>	-0.740	-0.736	-1.321	-1.415	-1.586	-1.505	-1.396	-1.423	-1.595	-1.512	-1.443	ns
	GCLK	t <sub>su</sub>	-1.051	-1.123	-1.707	-1.717	-1.845	-1.779	-2.225	-1.727	-1.852	-1.790	-2.271	ns
		t <sub>h</sub>	1.178	1.264	1.926	1.941	2.090	2.013	2.462	1.960	2.105	2.033	2.509	ns
	GCLK PLL	t <sub>su</sub>	1.007	1.021	1.776	1.887	2.110	1.999	1.902	1.904	2.130	2.018	1.955	ns
		t <sub>h</sub>	-0.740	-0.736	-1.321	-1.415	-1.586	-1.505	-1.396	-1.423	-1.595	-1.512	-1.443	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.060	-1.135	-1.716	-1.727	-1.861	-1.795	-2.241	-1.736	-1.868	-1.806	-2.287	ns
		t <sub>h</sub>	1.187	1.276	1.935	1.951	2.106	2.029	2.478	1.969	2.121	2.049	2.525	ns
	GCLK PLL	t <sub>su</sub>	0.998	1.009	1.767	1.877	2.094	1.983	1.886	1.895	2.114	2.002	1.939	ns
		t <sub>h</sub>	-0.731	-0.724	-1.312	-1.405	-1.570	-1.489	-1.380	-1.414	-1.579	-1.496	-1.427	ns
	GCLK	t <sub>su</sub>	-1.060	-1.135	-1.716	-1.727	-1.861	-1.795	-2.241	-1.736	-1.868	-1.806	-2.287	ns
		t <sub>h</sub>	1.187	1.276	1.935	1.951	2.106	2.029	2.478	1.969	2.121	2.049	2.525	ns
	GCLK PLL	t <sub>su</sub>	0.998	1.009	1.767	1.877	2.094	1.983	1.886	1.895	2.114	2.002	1.939	ns
		t <sub>h</sub>	-0.731	-0.724	-1.312	-1.405	-1.570	-1.489	-1.380	-1.414	-1.579	-1.496	-1.427	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.074	-1.147	-1.725	-1.737	-1.879	-1.813	-2.259	-1.747	-1.885	-1.823	-2.304	ns
		t <sub>h</sub>	1.201	1.288	1.944	1.961	2.124	2.047	2.496	1.980	2.138	2.066	2.542	ns
	GCLK PLL	t <sub>su</sub>	0.984	0.997	1.754	1.867	2.076	1.965	1.868	1.884	2.097	1.985	1.922	ns
		t <sub>h</sub>	-0.717	-0.712	-1.300	-1.395	-1.552	-1.471	-1.362	-1.403	-1.562	-1.479	-1.410	ns

**Table 1-105.** EP3SL340 Row Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.074	-1.147	-1.725	-1.737	-1.879	-1.813	-2.259	-1.747	-1.885	-1.823	-2.304	ns
		$t_h$	1.201	1.288	1.944	1.961	2.124	2.047	2.496	1.980	2.138	2.066	2.542	ns
	GCLK PLL	$t_{su}$	0.984	0.997	1.754	1.867	2.076	1.965	1.868	1.884	2.097	1.985	1.922	ns
		$t_h$	-0.717	-0.712	-1.300	-1.395	-1.552	-1.471	-1.362	-1.403	-1.562	-1.479	-1.410	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.060	-1.135	-1.716	-1.727	-1.861	-1.795	-2.241	-1.736	-1.868	-1.806	-2.287	ns
		$t_h$	1.187	1.276	1.935	1.951	2.106	2.029	2.478	1.969	2.121	2.049	2.525	ns
	GCLK PLL	$t_{su}$	0.998	1.009	1.767	1.877	2.094	1.983	1.886	1.895	2.114	2.002	1.939	ns
		$t_h$	-0.731	-0.724	-1.312	-1.405	-1.570	-1.489	-1.380	-1.414	-1.579	-1.496	-1.427	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.060	-1.135	-1.716	-1.727	-1.861	-1.795	-2.241	-1.736	-1.868	-1.806	-2.287	ns
		$t_h$	1.187	1.276	1.935	1.951	2.106	2.029	2.478	1.969	2.121	2.049	2.525	ns
	GCLK PLL	$t_{su}$	0.998	1.009	1.767	1.877	2.094	1.983	1.886	1.895	2.114	2.002	1.939	ns
		$t_h$	-0.731	-0.724	-1.312	-1.405	-1.570	-1.489	-1.380	-1.414	-1.579	-1.496	-1.427	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-1.074	-1.147	-1.725	-1.737	-1.879	-1.813	-2.259	-1.747	-1.885	-1.823	-2.304	ns
		$t_h$	1.201	1.288	1.944	1.961	2.124	2.047	2.496	1.980	2.138	2.066	2.542	ns
	GCLK PLL	$t_{su}$	0.984	0.997	1.754	1.867	2.076	1.965	1.868	1.884	2.097	1.985	1.922	ns
		$t_h$	-0.717	-0.712	-1.300	-1.395	-1.552	-1.471	-1.362	-1.403	-1.562	-1.479	-1.410	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-1.074	-1.147	-1.725	-1.737	-1.879	-1.813	-2.259	-1.747	-1.885	-1.823	-2.304	ns
		$t_h$	1.201	1.288	1.944	1.961	2.124	2.047	2.496	1.980	2.138	2.066	2.542	ns
	GCLK PLL	$t_{su}$	0.984	0.997	1.754	1.867	2.076	1.965	1.868	1.884	2.097	1.985	1.922	ns
		$t_h$	-0.717	-0.712	-1.300	-1.395	-1.552	-1.471	-1.362	-1.403	-1.562	-1.479	-1.410	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.083	-1.156	-1.739	-1.748	-1.886	-1.821	-2.265	-1.754	-1.886	-1.826	-2.306	ns
		$t_h$	1.210	1.297	1.959	1.975	2.134	2.057	2.507	1.990	2.144	2.071	2.549	ns
	GCLK PLL	$t_{su}$	0.985	0.998	1.749	1.861	2.075	1.963	1.867	1.883	2.101	1.987	1.925	ns
		$t_h$	-0.718	-0.713	-1.295	-1.387	-1.548	-1.467	-1.357	-1.399	-1.563	-1.480	-1.409	ns
	GCLK	$t_{su}$	-1.083	-1.156	-1.739	-1.748	-1.886	-1.821	-2.265	-1.754	-1.886	-1.826	-2.306	ns
		$t_h$	1.210	1.297	1.959	1.975	2.134	2.057	2.507	1.990	2.144	2.071	2.549	ns
	GCLK PLL	$t_{su}$	0.985	0.998	1.749	1.861	2.075	1.963	1.867	1.883	2.101	1.987	1.925	ns
		$t_h$	-0.718	-0.713	-1.295	-1.387	-1.548	-1.467	-1.357	-1.399	-1.563	-1.480	-1.409	ns

Table 1-106 specifies EP3SL340 Column Pins Output Timing parameters for differential I/O standards.

**Table 1-106.** EP3SL340 Column Pins output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.438	3.700	5.415	5.607	6.143	5.991	6.399	5.739	6.274	6.122	6.475	ns	
			GCLK PLL	t <sub>co</sub>	1.427	1.606	2.089	2.181	2.406	2.407	2.475	2.287	2.511	2.514	2.459	ns
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.434	3.703	5.462	5.662	6.205	6.053	6.461	5.798	6.340	6.188	6.541	ns	
			GCLK PLL	t <sub>co</sub>	1.423	1.609	2.136	2.236	2.468	2.469	2.537	2.346	2.577	2.580	2.525	ns
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.438	3.700	5.415	5.607	6.143	5.991	6.399	5.739	6.274	6.122	6.475	ns	
			GCLK PLL	t <sub>co</sub>	1.427	1.606	2.089	2.181	2.406	2.407	2.475	2.287	2.511	2.514	2.459	ns
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.434	3.703	5.462	5.662	6.205	6.053	6.461	5.798	6.340	6.188	6.541	ns	
			GCLK PLL	t <sub>co</sub>	1.423	1.609	2.136	2.236	2.468	2.469	2.537	2.346	2.577	2.580	2.525	ns
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.438	3.700	5.415	5.607	6.143	5.991	6.399	5.739	6.274	6.122	6.475	ns	
			GCLK PLL	t <sub>co</sub>	1.427	1.606	2.089	2.181	2.406	2.407	2.475	2.287	2.511	2.514	2.459	ns
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.434	3.703	5.462	5.662	6.205	6.053	6.461	5.798	6.340	6.188	6.541	ns	
			GCLK PLL	t <sub>co</sub>	1.423	1.609	2.136	2.236	2.468	2.469	2.537	2.346	2.577	2.580	2.525	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.465	3.733	5.486	5.685	6.227	6.075	6.483	5.819	6.360	6.208	6.561	ns	
			GCLK PLL	t <sub>co</sub>	1.454	1.639	2.160	2.259	2.490	2.491	2.559	2.367	2.597	2.600	2.545	ns
	6mA	GCLK	t <sub>co</sub>	3.455	3.723	5.476	5.674	6.217	6.065	6.473	5.808	6.350	6.198	6.551	ns	
			GCLK PLL	t <sub>co</sub>	1.444	1.629	2.150	2.248	2.480	2.481	2.549	2.356	2.587	2.590	2.535	ns
	8mA	GCLK	t <sub>co</sub>	3.455	3.723	5.479	5.678	6.221	6.069	6.477	5.813	6.355	6.203	6.556	ns	
			GCLK PLL	t <sub>co</sub>	1.444	1.629	2.153	2.252	2.484	2.485	2.553	2.361	2.592	2.595	2.540	ns
	10mA	GCLK	t <sub>co</sub>	3.448	3.717	5.472	5.672	6.215	6.063	6.471	5.806	6.349	6.197	6.550	ns	
			GCLK PLL	t <sub>co</sub>	1.437	1.623	2.146	2.246	2.478	2.479	2.547	2.354	2.586	2.589	2.534	ns
	12mA	GCLK	t <sub>co</sub>	3.447	3.715	5.469	5.669	6.212	6.060	6.468	5.803	6.345	6.193	6.546	ns	
			GCLK PLL	t <sub>co</sub>	1.436	1.621	2.143	2.243	2.475	2.476	2.544	2.351	2.582	2.585	2.530	ns
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.469	3.737	5.490	5.689	6.231	6.079	6.487	5.823	6.365	6.213	6.566	ns
				GCLK PLL	t <sub>co</sub>	1.458	1.643	2.164	2.263	2.494	2.495	2.563	2.371	2.602	2.605	2.550

**Table 1-106.** EP3SL340 Column Pins output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.459	3.726	5.469	5.666	6.206	6.054	6.462	5.799	6.338	6.186	6.539	ns	
		GCLK PLL	t <sub>co</sub>	1.448	1.632	2.143	2.240	2.469	2.470	2.538	2.347	2.575	2.578	2.523	ns	
	6mA	GCLK	t <sub>co</sub>	3.454	3.722	5.469	5.666	6.207	6.055	6.463	5.800	6.340	6.188	6.541	ns	
		GCLK PLL	t <sub>co</sub>	1.443	1.628	2.143	2.240	2.470	2.471	2.539	2.348	2.577	2.580	2.525	ns	
	8mA	GCLK	t <sub>co</sub>	3.452	3.720	5.468	5.665	6.205	6.053	6.461	5.799	6.339	6.187	6.540	ns	
		GCLK PLL	t <sub>co</sub>	1.441	1.626	2.142	2.239	2.468	2.469	2.537	2.347	2.576	2.579	2.524	ns	
	10mA	GCLK	t <sub>co</sub>	3.444	3.711	5.458	5.655	6.196	6.044	6.452	5.789	6.329	6.177	6.530	ns	
		GCLK PLL	t <sub>co</sub>	1.433	1.617	2.132	2.229	2.459	2.460	2.528	2.337	2.566	2.569	2.514	ns	
	12mA	GCLK	t <sub>co</sub>	3.445	3.713	5.464	5.662	6.204	6.052	6.460	5.797	6.338	6.186	6.539	ns	
		GCLK PLL	t <sub>co</sub>	1.434	1.619	2.138	2.236	2.467	2.468	2.536	2.345	2.575	2.578	2.523	ns	
	DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.444	3.710	5.447	5.643	6.182	6.030	6.438	5.776	6.314	6.162	6.515	ns
			GCLK PLL	t <sub>co</sub>	1.433	1.616	2.121	2.217	2.445	2.446	2.514	2.324	2.551	2.554	2.499	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.456	3.723	5.465	5.661	6.200	6.048	6.456	5.795	6.333	6.181	6.534	ns	
		GCLK PLL	t <sub>co</sub>	1.445	1.629	2.139	2.235	2.463	2.464	2.532	2.343	2.570	2.573	2.518	ns	
	6mA	GCLK	t <sub>co</sub>	3.452	3.720	5.466	5.663	6.204	6.052	6.460	5.797	6.337	6.185	6.538	ns	
		GCLK PLL	t <sub>co</sub>	1.441	1.626	2.140	2.237	2.467	2.468	2.536	2.345	2.574	2.577	2.522	ns	
	8mA	GCLK	t <sub>co</sub>	3.442	3.709	5.455	5.652	6.192	6.040	6.448	5.786	6.325	6.173	6.526	ns	
		GCLK PLL	t <sub>co</sub>	1.431	1.615	2.129	2.226	2.455	2.456	2.524	2.334	2.562	2.565	2.510	ns	
	10mA	GCLK	t <sub>co</sub>	3.440	3.707	5.453	5.649	6.190	6.038	6.446	5.784	6.323	6.171	6.524	ns	
		GCLK PLL	t <sub>co</sub>	1.429	1.613	2.127	2.223	2.453	2.454	2.522	2.332	2.560	2.563	2.508	ns	
	12mA	GCLK	t <sub>co</sub>	3.440	3.708	5.456	5.654	6.195	6.043	6.451	5.788	6.329	6.177	6.530	ns	
		GCLK PLL	t <sub>co</sub>	1.429	1.614	2.130	2.228	2.458	2.459	2.527	2.336	2.566	2.569	2.514	ns	
	DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.444	3.711	5.453	5.649	6.189	6.037	6.445	5.783	6.322	6.170	6.523	ns
			GCLK PLL	t <sub>co</sub>	1.433	1.617	2.127	2.223	2.452	2.453	2.521	2.331	2.559	2.562	2.507	ns

**Table 1-106.** EP3SL340 Column Pins output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V		
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.470	3.740	5.498	5.697	6.239	6.087	6.495	5.831	6.372	6.220	6.573	ns	
		GCLK PLL	t <sub>co</sub>	1.459	1.646	2.172	2.271	2.502	2.503	2.571	2.379	2.609	2.612	2.557	ns	
	6mA	GCLK	t <sub>co</sub>	3.456	3.726	5.486	5.686	6.229	6.077	6.485	5.821	6.363	6.211	6.564	ns	
		GCLK PLL	t <sub>co</sub>	1.445	1.632	2.160	2.260	2.492	2.493	2.561	2.369	2.600	2.603	2.548	ns	
	8mA	GCLK	t <sub>co</sub>	3.444	3.713	5.469	5.668	6.211	6.059	6.467	5.803	6.345	6.193	6.546	ns	
		GCLK PLL	t <sub>co</sub>	1.433	1.619	2.143	2.242	2.474	2.475	2.543	2.351	2.582	2.585	2.530	ns	
	10mA	GCLK	t <sub>co</sub>	3.444	3.713	5.472	5.672	6.215	6.063	6.471	5.807	6.350	6.198	6.551	ns	
		GCLK PLL	t <sub>co</sub>	1.433	1.619	2.146	2.246	2.478	2.479	2.547	2.355	2.587	2.590	2.535	ns	
	12mA	GCLK	t <sub>co</sub>	3.440	3.709	5.465	5.664	6.208	6.056	6.464	5.800	6.342	6.190	6.543	ns	
		GCLK PLL	t <sub>co</sub>	1.429	1.615	2.139	2.238	2.471	2.472	2.540	2.348	2.579	2.582	2.527	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.444	3.711	5.458	5.655	6.196	6.044	6.452	5.789	6.329	6.177	6.530	ns
			GCLK PLL	t <sub>co</sub>	1.433	1.617	2.132	2.229	2.459	2.460	2.528	2.337	2.566	2.569	2.514	ns
16mA		GCLK	t <sub>co</sub>	3.445	3.713	5.466	5.665	6.207	6.055	6.463	5.799	6.341	6.189	6.542	ns	
		GCLK PLL	t <sub>co</sub>	1.434	1.619	2.140	2.239	2.470	2.471	2.539	2.347	2.578	2.581	2.526	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.473	3.743	5.497	5.695	6.237	6.085	6.493	5.830	6.370	6.218	6.571	ns	
		GCLK PLL	t <sub>co</sub>	1.462	1.649	2.171	2.269	2.500	2.501	2.569	2.378	2.607	2.610	2.555	ns	
	6mA	GCLK	t <sub>co</sub>	3.462	3.731	5.485	5.683	6.225	6.073	6.481	5.818	6.358	6.206	6.559	ns	
		GCLK PLL	t <sub>co</sub>	1.451	1.637	2.159	2.257	2.488	2.489	2.557	2.366	2.595	2.598	2.543	ns	
	8mA	GCLK	t <sub>co</sub>	3.457	3.727	5.485	5.684	6.226	6.074	6.482	5.819	6.360	6.208	6.561	ns	
		GCLK PLL	t <sub>co</sub>	1.446	1.633	2.159	2.258	2.489	2.490	2.558	2.367	2.597	2.600	2.545	ns	
	10mA	GCLK	t <sub>co</sub>	3.443	3.712	5.467	5.665	6.207	6.055	6.463	5.800	6.342	6.190	6.543	ns	
		GCLK PLL	t <sub>co</sub>	1.432	1.618	2.141	2.239	2.470	2.471	2.539	2.348	2.579	2.582	2.527	ns	
	12mA	GCLK	t <sub>co</sub>	3.441	3.710	5.465	5.663	6.205	6.053	6.461	5.798	6.339	6.187	6.540	ns	
		GCLK PLL	t <sub>co</sub>	1.430	1.616	2.139	2.237	2.468	2.469	2.537	2.346	2.576	2.579	2.524	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.445	3.712	5.457	5.653	6.193	6.041	6.449	5.787	6.326	6.174	6.527	ns
			GCLK PLL	t <sub>co</sub>	1.434	1.618	2.131	2.227	2.456	2.457	2.525	2.335	2.563	2.566	2.511	ns
16mA		GCLK	t <sub>co</sub>	3.445	3.713	5.465	5.663	6.205	6.053	6.461	5.798	6.339	6.187	6.540	ns	
		GCLK PLL	t <sub>co</sub>	1.434	1.619	2.139	2.237	2.468	2.469	2.537	2.346	2.576	2.579	2.524	ns	

**Table 1-106.** EP3SL340 Column Pins output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.461	3.730	5.481	5.678	6.219	6.067	6.475	5.813	6.352	6.200	6.553	ns
		GCLK PLL	$t_{co}$	1.450	1.636	2.155	2.252	2.482	2.483	2.551	2.361	2.589	2.592	2.537	ns
	10mA	GCLK	$t_{co}$	3.461	3.730	5.481	5.678	6.219	6.067	6.475	5.813	6.352	6.200	6.553	ns
		GCLK PLL	$t_{co}$	1.450	1.636	2.155	2.252	2.482	2.483	2.551	2.361	2.589	2.592	2.537	ns
	12mA	GCLK	$t_{co}$	3.451	3.720	5.471	5.668	6.209	6.057	6.465	5.803	6.343	6.191	6.544	ns
		GCLK PLL	$t_{co}$	1.440	1.626	2.145	2.242	2.472	2.473	2.541	2.351	2.580	2.583	2.528	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.444	3.712	5.457	5.653	6.193	6.041	6.449	5.787	6.326	6.174	6.527	ns
		GCLK PLL	$t_{co}$	1.433	1.618	2.131	2.227	2.456	2.457	2.525	2.335	2.563	2.566	2.511	ns

Table 1-107 specifies EP3SL340 Row Pins Output Timing parameters for differential I/O standards.

**Table 1-107.** EP3SL340 Row Pins output Timing Parameters (Part 1 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
LVDS	—	GCLK	t <sub>co</sub>	3.022	3.234	4.714	4.872	5.362	5.217	5.602	4.981	5.467	5.326	5.662	ns
			GCLK PLL	t <sub>co</sub>	1.063	1.193	1.445	1.501	1.678	1.690	1.735	1.583	1.761	1.772	1.704
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.414	3.678	5.396	5.588	6.125	5.972	6.349	5.722	6.255	6.105	6.425	ns
			GCLK PLL	t <sub>co</sub>	1.455	1.637	2.127	2.217	2.441	2.445	2.482	2.324	2.549	2.551	2.467
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.396	3.668	5.434	5.634	6.179	6.026	6.403	5.773	6.316	6.166	6.486	ns
			GCLK PLL	t <sub>co</sub>	1.437	1.627	2.165	2.263	2.495	2.499	2.536	2.375	2.610	2.612	2.528
MINI-LVDS	—	GCLK	t <sub>co</sub>	3.022	3.234	4.714	4.872	5.362	5.217	5.602	4.981	5.467	5.326	5.662	ns
			GCLK PLL	t <sub>co</sub>	1.063	1.193	1.445	1.501	1.678	1.690	1.735	1.583	1.761	1.772	1.704
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.414	3.678	5.396	5.588	6.125	5.972	6.349	5.722	6.255	6.105	6.425	ns
			GCLK PLL	t <sub>co</sub>	1.455	1.637	2.127	2.217	2.441	2.445	2.482	2.324	2.549	2.551	2.467
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.396	3.668	5.434	5.634	6.179	6.026	6.403	5.773	6.316	6.166	6.486	ns
			GCLK PLL	t <sub>co</sub>	1.437	1.627	2.165	2.263	2.495	2.499	2.536	2.375	2.610	2.612	2.528
RSDS	—	GCLK	t <sub>co</sub>	3.022	3.234	4.714	4.872	5.362	5.217	5.602	4.981	5.467	5.326	5.662	ns
			GCLK PLL	t <sub>co</sub>	1.063	1.193	1.445	1.501	1.678	1.690	1.735	1.583	1.761	1.772	1.704
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.414	3.678	5.396	5.588	6.125	5.972	6.349	5.722	6.255	6.105	6.425	ns
			GCLK PLL	t <sub>co</sub>	1.455	1.637	2.127	2.217	2.441	2.445	2.482	2.324	2.549	2.551	2.467
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.396	3.668	5.434	5.634	6.179	6.026	6.403	5.773	6.316	6.166	6.486	ns
			GCLK PLL	t <sub>co</sub>	1.437	1.627	2.165	2.263	2.495	2.499	2.536	2.375	2.610	2.612	2.528
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.440	3.711	5.470	5.668	6.212	6.059	6.436	5.806	6.345	6.195	6.515	ns
			GCLK PLL	t <sub>co</sub>	1.491	1.680	2.211	2.307	2.538	2.542	2.579	2.418	2.649	2.651	2.567
	6mA	GCLK	t <sub>co</sub>	3.426	3.697	5.457	5.655	6.199	6.046	6.423	5.792	6.332	6.182	6.502	ns
			GCLK PLL	t <sub>co</sub>	1.477	1.666	2.198	2.294	2.525	2.529	2.566	2.404	2.636	2.638	2.554
	8mA	GCLK	t <sub>co</sub>	3.422	3.693	5.455	5.655	6.200	6.047	6.424	5.792	6.334	6.184	6.504	ns
			GCLK PLL	t <sub>co</sub>	1.473	1.662	2.196	2.294	2.526	2.530	2.567	2.404	2.638	2.640	2.556

**Table 1-107.** EP3SL340 Row Pins output Timing Parameters (Part 2 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.438	3.708	5.456	5.652	6.194	6.041	6.418	5.789	6.327	6.177	6.497	ns
		GCLK PLL	t <sub>co</sub>	1.489	1.677	2.197	2.291	2.520	2.524	2.561	2.401	2.631	2.633	2.549	ns
	6mA	GCLK	t <sub>co</sub>	3.427	3.698	5.452	5.648	6.191	6.038	6.415	5.786	6.324	6.174	6.494	ns
		GCLK PLL	t <sub>co</sub>	1.478	1.667	2.193	2.287	2.517	2.521	2.558	2.398	2.628	2.630	2.546	ns
	8mA	GCLK	t <sub>co</sub>	3.424	3.695	5.450	5.646	6.189	6.036	6.413	5.784	6.323	6.173	6.493	ns
		GCLK PLL	t <sub>co</sub>	1.475	1.664	2.191	2.285	2.515	2.519	2.556	2.396	2.627	2.629	2.545	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.435	3.705	5.451	5.647	6.188	6.035	6.412	5.784	6.321	6.171	6.491	ns
		GCLK PLL	t <sub>co</sub>	1.486	1.674	2.192	2.286	2.514	2.518	2.555	2.396	2.625	2.627	2.543	ns
	6mA	GCLK	t <sub>co</sub>	3.425	3.696	5.449	5.645	6.187	6.034	6.411	5.783	6.321	6.171	6.491	ns
		GCLK PLL	t <sub>co</sub>	1.476	1.665	2.190	2.284	2.513	2.517	2.554	2.395	2.625	2.627	2.543	ns
	8mA	GCLK	t <sub>co</sub>	3.411	3.682	5.434	5.630	6.173	6.020	6.397	5.768	6.306	6.156	6.476	ns
		GCLK PLL	t <sub>co</sub>	1.462	1.651	2.175	2.269	2.499	2.503	2.540	2.380	2.610	2.612	2.528	ns
	10mA	GCLK	t <sub>co</sub>	3.408	3.678	5.430	5.626	6.169	6.016	6.393	5.764	6.302	6.152	6.472	ns
		GCLK PLL	t <sub>co</sub>	1.459	1.647	2.171	2.265	2.495	2.499	2.536	2.376	2.606	2.608	2.524	ns
	12mA	GCLK	t <sub>co</sub>	3.405	3.676	5.431	5.629	6.172	6.019	6.396	5.767	6.306	6.156	6.476	ns
		GCLK PLL	t <sub>co</sub>	1.456	1.645	2.172	2.268	2.498	2.502	2.539	2.379	2.610	2.612	2.528	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.406	3.676	5.421	5.617	6.159	6.006	6.383	5.754	6.292	6.142	6.462	ns
		GCLK PLL	t <sub>co</sub>	1.457	1.645	2.162	2.256	2.485	2.489	2.526	2.366	2.596	2.598	2.514	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.455	3.729	5.492	5.690	6.235	6.082	6.459	5.828	6.368	6.218	6.538	ns
		GCLK PLL	t <sub>co</sub>	1.506	1.698	2.233	2.329	2.561	2.565	2.602	2.440	2.672	2.674	2.590	ns
	6mA	GCLK	t <sub>co</sub>	3.431	3.705	5.474	5.673	6.218	6.065	6.442	5.811	6.353	6.203	6.523	ns
		GCLK PLL	t <sub>co</sub>	1.482	1.674	2.215	2.312	2.544	2.548	2.585	2.423	2.657	2.659	2.575	ns
	8mA	GCLK	t <sub>co</sub>	3.414	3.686	5.452	5.651	6.196	6.043	6.420	5.789	6.331	6.181	6.501	ns
		GCLK PLL	t <sub>co</sub>	1.465	1.655	2.193	2.290	2.522	2.526	2.563	2.401	2.635	2.637	2.553	ns



**Table 1-107.** EP3SL340 Row Pins output Timing Parameters (Part 3 of 3)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.459	3.732	5.492	5.690	6.234	6.081	6.458	5.828	6.368	6.218	6.538	ns
		GCLK PLL	t <sub>co</sub>	1.510	1.701	2.233	2.329	2.560	2.564	2.601	2.440	2.672	2.674	2.590	ns
	6mA	GCLK	t <sub>co</sub>	3.444	3.717	5.478	5.675	6.219	6.066	6.443	5.813	6.353	6.203	6.523	ns
		GCLK PLL	t <sub>co</sub>	1.495	1.686	2.219	2.314	2.545	2.549	2.586	2.425	2.657	2.659	2.575	ns
	8mA	GCLK	t <sub>co</sub>	3.433	3.706	5.473	5.672	6.216	6.063	6.440	5.810	6.351	6.201	6.521	ns
		GCLK PLL	t <sub>co</sub>	1.484	1.675	2.214	2.311	2.542	2.546	2.583	2.422	2.655	2.657	2.573	ns
	10mA	GCLK	t <sub>co</sub>	3.413	3.686	5.450	5.648	6.193	6.040	6.417	5.787	6.327	6.177	6.497	ns
		GCLK PLL	t <sub>co</sub>	1.464	1.655	2.191	2.287	2.519	2.523	2.560	2.399	2.631	2.633	2.549	ns
	12mA	GCLK	t <sub>co</sub>	3.410	3.682	5.446	5.645	6.189	6.036	6.413	5.783	6.324	6.174	6.494	ns
		GCLK PLL	t <sub>co</sub>	1.461	1.651	2.187	2.284	2.515	2.519	2.556	2.395	2.628	2.630	2.546	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.415	3.686	5.437	5.633	6.175	6.022	6.399	5.770	6.308	6.158	6.478	ns
		GCLK PLL	t <sub>co</sub>	1.466	1.655	2.178	2.272	2.501	2.505	2.542	2.382	2.612	2.614	2.530	ns
	16mA	GCLK	t <sub>co</sub>	3.408	3.679	5.436	5.634	6.178	6.025	6.402	5.773	6.313	6.163	6.483	ns
		GCLK PLL	t <sub>co</sub>	1.459	1.648	2.177	2.273	2.504	2.508	2.545	2.385	2.617	2.619	2.535	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	3.446	3.718	5.474	5.671	6.214	6.061	6.438	5.809	6.348	6.198	6.518	ns
		GCLK PLL	t <sub>co</sub>	1.487	1.677	2.205	2.300	2.530	2.534	2.571	2.411	2.642	2.644	2.560	ns
	12mA	GCLK	t <sub>co</sub>	3.428	3.701	5.459	5.656	6.199	6.046	6.423	5.794	6.333	6.183	6.503	ns
		GCLK PLL	t <sub>co</sub>	1.469	1.660	2.190	2.285	2.515	2.519	2.556	2.396	2.627	2.629	2.545	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.414	3.685	5.436	5.632	6.174	6.021	6.398	5.770	6.308	6.158	6.478	ns
		GCLK PLL	t <sub>co</sub>	1.455	1.644	2.167	2.261	2.490	2.494	2.531	2.372	2.602	2.604	2.520	ns

Table 1-108 and Table 1-109 show EP3SL340 regional (RCLK) clock adder values that should be added to GCLK values. These adder values are used to determine I/O timing when I/O pin is driven using regional clock. This applies for all I/O standards supported by Stratix III devices.

Table 1-108 specifies EP3SL340 Column Pin delay adders when using the regional clock.

**Table 1-108.** EP3SL340 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RCLK input adder	0.318	0.171	0.255	0.247	0.257	0.244	0.369	0.37	0.253	0.232	0.336	ns
RCLK PLL input adder	2.716	2.739	4.379	4.508	4.926	4.717	5.376	4.508	4.94	4.89	5.434	ns
RCLK output adder	-0.341	-0.107	-0.18	-0.169	-0.171	-0.167	-0.362	-0.03	-0.043	-0.034	-0.287	ns
RCLK PLL output adder	-2.36	-2.128	-3.344	-3.384	-3.571	-3.487	-3.545	-3.246	-3.636	-3.357	-3.544	ns

Table 1-109 specifies EP3SL340 Row Pin delay adders when using the regional clock.

**Table 1-109.** EP3SL340 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RCLK input adder	0.075	0.079	0.133	0.124	0.125	0.124	0.307	0.117	0.116	0.117	0.31	ns
RCLK PLL input adder	0.157	0.151	0.262	0.274	0.306	0.288	0.464	0.268	0.291	0.278	0.46	ns
RCLK output adder	-0.052	-0.066	-0.107	-0.098	-0.127	-0.129	-0.282	-0.082	-0.118	-0.085	-0.285	ns
RCLK PLL output adder	-0.157	-0.139	-0.232	-0.248	-0.272	-0.259	-0.422	-0.252	-0.256	-0.244	-0.444	ns

### EP3SE50 I/O Timing Parameters

Table 1-110 through Table 1-113 show the maximum I/O timing parameters for EP3SE50 devices for single-ended I/O standards.

Table 1-110 specifies EP3SE50 column pins input timing parameters for single-ended I/O standards.

**Table 1-110.** EP3SE50 Column Pins Input Timing Parameters (Part 1 of 4) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-0.743	-0.742	-1.063	-1.165	-1.374	-1.329	-1.605	-1.165	-1.374	-1.329	-1.605	ns
		t <sub>h</sub>	0.870	0.869	1.241	1.366	1.595	1.538	1.815	1.366	1.595	1.538	1.815	ns
	GCLK PLL	t <sub>su</sub>	-1.037	-1.037	-1.466	-1.593	-1.830	-1.772	-2.038	-1.593	-1.830	-1.772	-2.038	ns
		t <sub>h</sub>	1.290	1.290	1.836	2.009	2.292	2.207	2.484	2.009	2.292	2.207	2.484	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-0.743	-0.742	-1.063	-1.165	-1.374	-1.329	-1.605	-1.165	-1.374	-1.329	-1.605	ns
		t <sub>h</sub>	0.870	0.869	1.241	1.366	1.595	1.538	1.815	1.366	1.595	1.538	1.815	ns
	GCLK PLL	t <sub>su</sub>	-1.037	-1.037	-1.466	-1.593	-1.830	-1.772	-2.038	-1.593	-1.830	-1.772	-2.038	ns
		t <sub>h</sub>	1.290	1.290	1.836	2.009	2.292	2.207	2.484	2.009	2.292	2.207	2.484	ns

**Table 1-110.** EP3SE50 Column Pins Input Timing Parameters (Part 2 of 4) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.0-V LVTTTL	GCLK	t <sub>SU</sub>	-0.754	-0.753	-1.062	-1.167	-1.373	-1.328	-1.604	-1.167	-1.373	-1.328	-1.604	ns
		t <sub>H</sub>	0.881	0.880	1.240	1.368	1.594	1.537	1.814	1.368	1.594	1.537	1.814	ns
	GCLK PLL	t <sub>SU</sub>	-1.048	-1.048	-1.465	-1.595	-1.829	-1.771	-2.037	-1.595	-1.829	-1.771	-2.037	ns
		t <sub>H</sub>	1.301	1.301	1.835	2.011	2.291	2.206	2.483	2.011	2.291	2.206	2.483	ns
3.0-V LVCMOS	GCLK	t <sub>SU</sub>	-0.754	-0.753	-1.062	-1.167	-1.373	-1.328	-1.604	-1.167	-1.373	-1.328	-1.604	ns
		t <sub>H</sub>	0.881	0.880	1.240	1.368	1.594	1.537	1.814	1.368	1.594	1.537	1.814	ns
	GCLK PLL	t <sub>SU</sub>	-1.048	-1.048	-1.465	-1.595	-1.829	-1.771	-2.037	-1.595	-1.829	-1.771	-2.037	ns
		t <sub>H</sub>	1.301	1.301	1.835	2.011	2.291	2.206	2.483	2.011	2.291	2.206	2.483	ns
2.5 V	GCLK	t <sub>SU</sub>	-0.749	-0.748	-1.071	-1.179	-1.392	-1.347	-1.623	-1.179	-1.392	-1.347	-1.623	ns
		t <sub>H</sub>	0.876	0.875	1.249	1.380	1.613	1.556	1.833	1.380	1.613	1.556	1.833	ns
	GCLK PLL	t <sub>SU</sub>	-1.043	-1.043	-1.474	-1.607	-1.848	-1.790	-2.056	-1.607	-1.848	-1.790	-2.056	ns
		t <sub>H</sub>	1.296	1.296	1.844	2.023	2.310	2.225	2.502	2.023	2.310	2.225	2.502	ns
1.8 V	GCLK	t <sub>SU</sub>	-0.769	-0.768	-1.111	-1.215	-1.390	-1.345	-1.621	-1.215	-1.390	-1.345	-1.621	ns
		t <sub>H</sub>	0.898	0.897	1.289	1.416	1.611	1.554	1.831	1.416	1.611	1.554	1.831	ns
	GCLK PLL	t <sub>SU</sub>	-1.065	-1.065	-1.514	-1.643	-1.846	-1.788	-2.054	-1.643	-1.846	-1.788	-2.054	ns
		t <sub>H</sub>	1.320	1.320	1.884	2.059	2.308	2.223	2.500	2.059	2.308	2.223	2.500	ns
1.5 V	GCLK	t <sub>SU</sub>	-0.759	-0.758	-1.088	-1.183	-1.320	-1.275	-1.551	-1.183	-1.320	-1.275	-1.551	ns
		t <sub>H</sub>	0.888	0.887	1.266	1.384	1.541	1.484	1.761	1.384	1.541	1.484	1.761	ns
	GCLK PLL	t <sub>SU</sub>	-1.055	-1.055	-1.491	-1.611	-1.776	-1.718	-1.984	-1.611	-1.776	-1.718	-1.984	ns
		t <sub>H</sub>	1.310	1.310	1.861	2.027	2.238	2.153	2.430	2.027	2.238	2.153	2.430	ns
1.2 V	GCLK	t <sub>SU</sub>	-0.707	-0.706	-1.011	-1.084	-1.164	-1.119	-1.395	-1.084	-1.164	-1.119	-1.395	ns
		t <sub>H</sub>	0.836	0.835	1.189	1.285	1.385	1.328	1.605	1.285	1.385	1.328	1.605	ns
	GCLK PLL	t <sub>SU</sub>	-1.003	-1.003	-1.414	-1.512	-1.620	-1.562	-1.828	-1.512	-1.620	-1.562	-1.828	ns
		t <sub>H</sub>	1.258	1.258	1.784	1.928	2.082	1.997	2.274	1.928	2.082	1.997	2.274	ns
SSTL-2 CLASS I	GCLK	t <sub>SU</sub>	-0.678	-0.677	-0.983	-1.068	-1.166	-1.121	-1.397	-1.068	-1.166	-1.121	-1.397	ns
		t <sub>H</sub>	0.807	0.806	1.161	1.269	1.387	1.330	1.607	1.269	1.387	1.330	1.607	ns
	GCLK PLL	t <sub>SU</sub>	-0.974	-0.974	-1.386	-1.496	-1.622	-1.564	-1.830	-1.496	-1.622	-1.564	-1.830	ns
		t <sub>H</sub>	1.229	1.229	1.756	1.912	2.084	1.999	2.276	1.912	2.084	1.999	2.276	ns
SSTL-2 CLASS II	GCLK	t <sub>SU</sub>	-0.678	-0.677	-0.983	-1.068	-1.166	-1.121	-1.397	-1.068	-1.166	-1.121	-1.397	ns
		t <sub>H</sub>	0.807	0.806	1.161	1.269	1.387	1.330	1.607	1.269	1.387	1.330	1.607	ns
	GCLK PLL	t <sub>SU</sub>	-0.974	-0.974	-1.386	-1.496	-1.622	-1.564	-1.830	-1.496	-1.622	-1.564	-1.830	ns
		t <sub>H</sub>	1.229	1.229	1.756	1.912	2.084	1.999	2.276	1.912	2.084	1.999	2.276	ns
SSTL-18 CLASS I	GCLK	t <sub>SU</sub>	-0.672	-0.671	-0.971	-1.063	-1.166	-1.119	-1.398	-1.063	-1.166	-1.119	-1.398	ns
		t <sub>H</sub>	0.801	0.800	1.148	1.261	1.384	1.327	1.603	1.261	1.384	1.327	1.603	ns
	GCLK PLL	t <sub>SU</sub>	-0.968	-0.968	-1.373	-1.488	-1.619	-1.559	-1.828	-1.488	-1.619	-1.559	-1.828	ns
		t <sub>H</sub>	1.223	1.223	1.743	1.901	2.078	1.993	2.269	1.901	2.078	1.993	2.269	ns

**Table 1-110.** EP3SE50 Column Pins Input Timing Parameters (Part 3 of 4) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-0.672	-0.671	-0.971	-1.063	-1.166	-1.119	-1.398	-1.063	-1.166	-1.119	-1.398	ns
		t <sub>h</sub>	0.801	0.800	1.148	1.261	1.384	1.327	1.603	1.261	1.384	1.327	1.603	ns
	GCLK PLL	t <sub>su</sub>	-0.968	-0.968	-1.373	-1.488	-1.619	-1.559	-1.828	-1.488	-1.619	-1.559	-1.828	ns
		t <sub>h</sub>	1.223	1.223	1.743	1.901	2.078	1.993	2.269	1.901	2.078	1.993	2.269	ns
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-0.661	-0.660	-0.962	-1.052	-1.147	-1.100	-1.379	-1.052	-1.147	-1.100	-1.379	ns
		t <sub>h</sub>	0.790	0.789	1.138	1.250	1.365	1.308	1.584	1.250	1.365	1.308	1.584	ns
	GCLK PLL	t <sub>su</sub>	-0.957	-0.957	-1.362	-1.477	-1.600	-1.540	-1.809	-1.477	-1.600	-1.540	-1.809	ns
		t <sub>h</sub>	1.212	1.212	1.731	1.890	2.059	1.974	2.250	1.890	2.059	1.974	2.250	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.661	-0.660	-0.962	-1.052	-1.147	-1.100	-1.379	-1.052	-1.147	-1.100	-1.379	ns
		t <sub>h</sub>	0.790	0.789	1.138	1.250	1.365	1.308	1.584	1.250	1.365	1.308	1.584	ns
	GCLK PLL	t <sub>su</sub>	-0.957	-0.957	-1.362	-1.477	-1.600	-1.540	-1.809	-1.477	-1.600	-1.540	-1.809	ns
		t <sub>h</sub>	1.212	1.212	1.731	1.890	2.059	1.974	2.250	1.890	2.059	1.974	2.250	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.672	-0.671	-0.971	-1.063	-1.166	-1.119	-1.398	-1.063	-1.166	-1.119	-1.398	ns
		t <sub>h</sub>	0.801	0.800	1.148	1.261	1.384	1.327	1.603	1.261	1.384	1.327	1.603	ns
	GCLK PLL	t <sub>su</sub>	-0.968	-0.968	-1.373	-1.488	-1.619	-1.559	-1.828	-1.488	-1.619	-1.559	-1.828	ns
		t <sub>h</sub>	1.223	1.223	1.743	1.901	2.078	1.993	2.269	1.901	2.078	1.993	2.269	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.672	-0.671	-0.971	-1.063	-1.166	-1.119	-1.398	-1.063	-1.166	-1.119	-1.398	ns
		t <sub>h</sub>	0.801	0.800	1.148	1.261	1.384	1.327	1.603	1.261	1.384	1.327	1.603	ns
	GCLK PLL	t <sub>su</sub>	-0.968	-0.968	-1.373	-1.488	-1.619	-1.559	-1.828	-1.488	-1.619	-1.559	-1.828	ns
		t <sub>h</sub>	1.223	1.223	1.743	1.901	2.078	1.993	2.269	1.901	2.078	1.993	2.269	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.661	-0.660	-0.962	-1.052	-1.147	-1.100	-1.379	-1.052	-1.147	-1.100	-1.379	ns
		t <sub>h</sub>	0.790	0.789	1.138	1.250	1.365	1.308	1.584	1.250	1.365	1.308	1.584	ns
	GCLK PLL	t <sub>su</sub>	-0.957	-0.957	-1.362	-1.477	-1.600	-1.540	-1.809	-1.477	-1.600	-1.540	-1.809	ns
		t <sub>h</sub>	1.212	1.212	1.731	1.890	2.059	1.974	2.250	1.890	2.059	1.974	2.250	ns
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.661	-0.660	-0.962	-1.052	-1.147	-1.100	-1.379	-1.052	-1.147	-1.100	-1.379	ns
		t <sub>h</sub>	0.790	0.789	1.138	1.250	1.365	1.308	1.584	1.250	1.365	1.308	1.584	ns
	GCLK PLL	t <sub>su</sub>	-0.957	-0.957	-1.362	-1.477	-1.600	-1.540	-1.809	-1.477	-1.600	-1.540	-1.809	ns
		t <sub>h</sub>	1.212	1.212	1.731	1.890	2.059	1.974	2.250	1.890	2.059	1.974	2.250	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.649	-0.648	-0.952	-1.041	-1.131	-1.084	-1.363	-1.041	-1.131	-1.084	-1.363	ns
		t <sub>h</sub>	0.778	0.777	1.128	1.239	1.349	1.292	1.568	1.239	1.349	1.292	1.568	ns
	GCLK PLL	t <sub>su</sub>	-0.945	-0.945	-1.352	-1.466	-1.584	-1.524	-1.793	-1.466	-1.584	-1.524	-1.793	ns
		t <sub>h</sub>	1.200	1.200	1.721	1.879	2.043	1.958	2.234	1.879	2.043	1.958	2.234	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-0.649	-0.648	-0.952	-1.041	-1.131	-1.084	-1.363	-1.041	-1.131	-1.084	-1.363	ns
		t <sub>h</sub>	0.778	0.777	1.128	1.239	1.349	1.292	1.568	1.239	1.349	1.292	1.568	ns
	GCLK PLL	t <sub>su</sub>	-0.945	-0.945	-1.352	-1.466	-1.584	-1.524	-1.793	-1.466	-1.584	-1.524	-1.793	ns
		t <sub>h</sub>	1.200	1.200	1.721	1.879	2.043	1.958	2.234	1.879	2.043	1.958	2.234	ns

**Table 1-110.** EP3SE50 Column Pins Input Timing Parameters (Part 4 of 4) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.0-V   PCI-X	GCLK	t <sub>su</sub>	-0.754	-0.753	-1.062	-1.167	-1.373	-1.328	-1.604	-1.167	-1.373	-1.328	-1.604	ns
		t <sub>h</sub>	0.881	0.880	1.240	1.368	1.594	1.537	1.814	1.368	1.594	1.537	1.814	ns
	GCLK PLL	t <sub>su</sub>	-1.048	-1.048	-1.465	-1.595	-1.829	-1.771	-2.037	-1.595	-1.829	-1.771	-2.037	ns
		t <sub>h</sub>	1.301	1.301	1.835	2.011	2.291	2.206	2.483	2.011	2.291	2.206	2.483	ns

Table 1-111 specifies EP3SE50 row pins input timing parameters for single-ended I/O standards.

**Table 1-111.** EP3SE50 Row Pins Input Timing Parameters (Part 1 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-0.639	-0.644	-0.919	-1.001	-1.184	-1.150	-1.514	-0.998	-1.167	-1.137	-1.546	ns
		t <sub>h</sub>	0.749	0.767	1.093	1.197	1.401	1.356	1.716	1.204	1.395	1.352	1.749	ns
	GCLK PLL	t <sub>su</sub>	0.914	0.934	1.548	1.758	1.867	1.754	1.676	1.766	1.887	1.773	1.729	ns
		t <sub>h</sub>	-0.676	-0.684	-1.170	-1.334	-1.390	-1.306	-1.224	-1.332	-1.402	-1.317	-1.275	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-0.639	-0.644	-0.919	-1.001	-1.184	-1.150	-1.514	-0.998	-1.167	-1.137	-1.546	ns
		t <sub>h</sub>	0.749	0.767	1.093	1.197	1.401	1.356	1.716	1.204	1.395	1.352	1.749	ns
	GCLK PLL	t <sub>su</sub>	0.914	0.934	1.548	1.758	1.867	1.754	1.676	1.766	1.887	1.773	1.729	ns
		t <sub>h</sub>	-0.676	-0.684	-1.170	-1.334	-1.390	-1.306	-1.224	-1.332	-1.402	-1.317	-1.275	ns
3.0-V LVTTTL	GCLK	t <sub>su</sub>	-0.645	-0.655	-0.916	-1.002	-1.187	-1.153	-1.517	-0.997	-1.172	-1.142	-1.551	ns
		t <sub>h</sub>	0.755	0.778	1.090	1.198	1.404	1.359	1.719	1.203	1.400	1.357	1.754	ns
	GCLK PLL	t <sub>su</sub>	0.908	0.923	1.551	1.757	1.864	1.751	1.673	1.767	1.882	1.768	1.724	ns
		t <sub>h</sub>	-0.670	-0.673	-1.173	-1.333	-1.387	-1.303	-1.221	-1.333	-1.397	-1.312	-1.270	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-0.645	-0.655	-0.916	-1.002	-1.187	-1.153	-1.517	-0.997	-1.172	-1.142	-1.551	ns
		t <sub>h</sub>	0.755	0.778	1.090	1.198	1.404	1.359	1.719	1.203	1.400	1.357	1.754	ns
	GCLK PLL	t <sub>su</sub>	0.908	0.923	1.551	1.757	1.864	1.751	1.673	1.767	1.882	1.768	1.724	ns
		t <sub>h</sub>	-0.670	-0.673	-1.173	-1.333	-1.387	-1.303	-1.221	-1.333	-1.397	-1.312	-1.270	ns
2.5 V	GCLK	t <sub>su</sub>	-0.633	-0.648	-0.925	-1.015	-1.202	-1.168	-1.532	-1.006	-1.182	-1.152	-1.561	ns
		t <sub>h</sub>	0.743	0.771	1.099	1.211	1.419	1.374	1.734	1.212	1.410	1.367	1.764	ns
	GCLK PLL	t <sub>su</sub>	0.920	0.930	1.542	1.744	1.849	1.736	1.658	1.758	1.872	1.758	1.714	ns
		t <sub>h</sub>	-0.682	-0.680	-1.164	-1.320	-1.372	-1.288	-1.206	-1.324	-1.387	-1.302	-1.260	ns
1.8 V	GCLK	t <sub>su</sub>	-0.672	-0.689	-0.975	-1.058	-1.210	-1.176	-1.424	-1.049	-1.193	-1.163	-1.455	ns
		t <sub>h</sub>	0.783	0.813	1.149	1.254	1.427	1.382	1.630	1.255	1.421	1.378	1.663	ns
	GCLK PLL	t <sub>su</sub>	0.890	0.898	1.502	1.711	1.851	1.738	1.660	1.725	1.871	1.757	1.713	ns
		t <sub>h</sub>	-0.651	-0.647	-1.124	-1.287	-1.374	-1.290	-1.208	-1.291	-1.386	-1.301	-1.259	ns

**Table 1-111.** EP3SE50 Row Pins Input Timing Parameters (Part 2 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.5 V	GCLK	$t_{su}$	-0.662	-0.678	-0.951	-1.026	-1.142	-1.108	-1.356	-1.018	-1.128	-1.098	-1.390	ns
		$t_h$	0.773	0.802	1.125	1.222	1.359	1.314	1.562	1.224	1.356	1.313	1.598	ns
	GCLK PLL	$t_{su}$	0.900	0.909	1.526	1.743	1.919	1.806	1.728	1.756	1.936	1.822	1.778	ns
		$t_h$	-0.661	-0.658	-1.148	-1.319	-1.442	-1.358	-1.276	-1.322	-1.451	-1.366	-1.324	ns
1.2 V	GCLK	$t_{su}$	-0.602	-0.625	-0.872	-0.925	-0.983	-0.949	-1.197	-0.922	-0.973	-0.943	-1.235	ns
		$t_h$	0.713	0.749	1.046	1.121	1.200	1.155	1.403	1.128	1.201	1.158	1.443	ns
	GCLK PLL	$t_{su}$	0.960	0.962	1.605	1.844	2.078	1.965	1.887	1.852	2.091	1.977	1.933	ns
		$t_h$	-0.721	-0.711	-1.227	-1.420	-1.601	-1.517	-1.435	-1.418	-1.606	-1.521	-1.479	ns
SSTL-2 CLASS I	GCLK	$t_{su}$	-0.575	-0.589	-0.839	-0.906	-0.982	-0.948	-1.312	-0.894	-0.965	-0.935	-1.344	ns
		$t_h$	0.686	0.713	1.013	1.102	1.199	1.154	1.514	1.100	1.193	1.150	1.547	ns
	GCLK PLL	$t_{su}$	0.977	0.988	1.628	1.853	2.069	1.956	1.878	1.870	2.089	1.975	1.931	ns
		$t_h$	-0.738	-0.737	-1.250	-1.429	-1.592	-1.508	-1.426	-1.436	-1.604	-1.519	-1.477	ns
SSTL-2 CLASS II	GCLK	$t_{su}$	-0.575	-0.589	-0.839	-0.906	-0.982	-0.948	-1.312	-0.894	-0.965	-0.935	-1.344	ns
		$t_h$	0.686	0.713	1.013	1.102	1.199	1.154	1.514	1.100	1.193	1.150	1.547	ns
	GCLK PLL	$t_{su}$	0.977	0.988	1.628	1.853	2.069	1.956	1.878	1.870	2.089	1.975	1.931	ns
		$t_h$	-0.738	-0.737	-1.250	-1.429	-1.592	-1.508	-1.426	-1.436	-1.604	-1.519	-1.477	ns
SSTL-18 CLASS I	GCLK	$t_{su}$	-0.576	-0.590	-0.834	-0.900	-0.981	-0.946	-1.195	-0.893	-0.969	-0.937	-1.230	ns
		$t_h$	0.687	0.714	1.008	1.094	1.195	1.150	1.397	1.096	1.194	1.151	1.434	ns
	GCLK PLL	$t_{su}$	0.986	0.997	1.643	1.871	2.083	1.971	1.891	1.884	2.098	1.985	1.940	ns
		$t_h$	-0.747	-0.746	-1.265	-1.449	-1.608	-1.524	-1.443	-1.452	-1.616	-1.530	-1.490	ns
SSTL-18 CLASS II	GCLK	$t_{su}$	-0.576	-0.590	-0.834	-0.900	-0.981	-0.946	-1.195	-0.893	-0.969	-0.937	-1.230	ns
		$t_h$	0.687	0.714	1.008	1.094	1.195	1.150	1.397	1.096	1.194	1.151	1.434	ns
	GCLK PLL	$t_{su}$	0.986	0.997	1.643	1.871	2.083	1.971	1.891	1.884	2.098	1.985	1.940	ns
		$t_h$	-0.747	-0.746	-1.265	-1.449	-1.608	-1.524	-1.443	-1.452	-1.616	-1.530	-1.490	ns
SSTL-15 CLASS I	GCLK	$t_{su}$	-0.562	-0.578	-0.821	-0.890	-0.963	-0.928	-1.177	-0.882	-0.952	-0.920	-1.213	ns
		$t_h$	0.673	0.702	0.996	1.084	1.177	1.132	1.379	1.085	1.177	1.134	1.417	ns
	GCLK PLL	$t_{su}$	1.000	1.009	1.658	1.881	2.101	1.989	1.909	1.895	2.115	2.002	1.957	ns
		$t_h$	-0.761	-0.758	-1.279	-1.459	-1.626	-1.542	-1.461	-1.463	-1.633	-1.547	-1.507	ns
1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.576	-0.590	-0.834	-0.900	-0.981	-0.946	-1.195	-0.893	-0.969	-0.937	-1.230	ns
		$t_h$	0.687	0.714	1.008	1.094	1.195	1.150	1.397	1.096	1.194	1.151	1.434	ns
	GCLK PLL	$t_{su}$	0.986	0.997	1.643	1.871	2.083	1.971	1.891	1.884	2.098	1.985	1.940	ns
		$t_h$	-0.747	-0.746	-1.265	-1.449	-1.608	-1.524	-1.443	-1.452	-1.616	-1.530	-1.490	ns
1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.576	-0.590	-0.834	-0.900	-0.981	-0.946	-1.195	-0.893	-0.969	-0.937	-1.230	ns
		$t_h$	0.687	0.714	1.008	1.094	1.195	1.150	1.397	1.096	1.194	1.151	1.434	ns
	GCLK PLL	$t_{su}$	0.986	0.997	1.643	1.871	2.083	1.971	1.891	1.884	2.098	1.985	1.940	ns
		$t_h$	-0.747	-0.746	-1.265	-1.449	-1.608	-1.524	-1.443	-1.452	-1.616	-1.530	-1.490	ns

**Table 1-111.** EP3SE50 Row Pins Input Timing Parameters (Part 3 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.562	-0.578	-0.821	-0.890	-0.963	-0.928	-1.177	-0.882	-0.952	-0.920	-1.213	ns
		t <sub>h</sub>	0.673	0.702	0.996	1.084	1.177	1.132	1.379	1.085	1.177	1.134	1.417	ns
	GCLK PLL	t <sub>su</sub>	1.000	1.009	1.658	1.881	2.101	1.989	1.909	1.895	2.115	2.002	1.957	ns
		t <sub>h</sub>	-0.761	-0.758	-1.279	-1.459	-1.626	-1.542	-1.461	-1.463	-1.633	-1.547	-1.507	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.562	-0.578	-0.821	-0.890	-0.963	-0.928	-1.177	-0.882	-0.952	-0.920	-1.213	ns
		t <sub>h</sub>	0.673	0.702	0.996	1.084	1.177	1.132	1.379	1.085	1.177	1.134	1.417	ns
	GCLK PLL	t <sub>su</sub>	1.000	1.009	1.658	1.881	2.101	1.989	1.909	1.895	2.115	2.002	1.957	ns
		t <sub>h</sub>	-0.761	-0.758	-1.279	-1.459	-1.626	-1.542	-1.461	-1.463	-1.633	-1.547	-1.507	ns
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.553	-0.566	-0.812	-0.880	-0.947	-0.912	-1.161	-0.873	-0.936	-0.904	-1.197	ns
		t <sub>h</sub>	0.664	0.690	0.987	1.074	1.161	1.116	1.363	1.076	1.161	1.118	1.401	ns
	GCLK PLL	t <sub>su</sub>	1.009	1.021	1.667	1.891	2.117	2.005	1.925	1.904	2.131	2.018	1.973	ns
		t <sub>h</sub>	-0.770	-0.770	-1.288	-1.469	-1.642	-1.558	-1.477	-1.472	-1.649	-1.563	-1.523	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.553	-0.566	-0.812	-0.880	-0.947	-0.912	-1.161	-0.873	-0.936	-0.904	-1.197	ns
		t <sub>h</sub>	0.664	0.690	0.987	1.074	1.161	1.116	1.363	1.076	1.161	1.118	1.401	ns
	GCLK PLL	t <sub>su</sub>	1.009	1.021	1.667	1.891	2.117	2.005	1.925	1.904	2.131	2.018	1.973	ns
		t <sub>h</sub>	-0.770	-0.770	-1.288	-1.469	-1.642	-1.558	-1.477	-1.472	-1.649	-1.563	-1.523	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-0.645	-0.655	-0.916	-1.002	-1.187	-1.153	-1.517	-0.997	-1.172	-1.142	-1.551	ns
		t <sub>h</sub>	0.755	0.778	1.090	1.198	1.404	1.359	1.719	1.203	1.400	1.357	1.754	ns
	GCLK PLL	t <sub>su</sub>	0.908	0.923	1.551	1.757	1.864	1.751	1.673	1.767	1.882	1.768	1.724	ns
		t <sub>h</sub>	-0.670	-0.673	-1.173	-1.333	-1.387	-1.303	-1.221	-1.333	-1.397	-1.312	-1.270	ns
3.0-V PCI-X	GCLK	t <sub>su</sub>	-0.645	-0.655	-0.916	-1.002	-1.187	-1.153	-1.517	-0.997	-1.172	-1.142	-1.551	ns
		t <sub>h</sub>	0.755	0.778	1.090	1.198	1.404	1.359	1.719	1.203	1.400	1.357	1.754	ns
	GCLK PLL	t <sub>su</sub>	0.908	0.923	1.551	1.757	1.864	1.751	1.673	1.767	1.882	1.768	1.724	ns
		t <sub>h</sub>	-0.670	-0.673	-1.173	-1.333	-1.387	-1.303	-1.221	-1.333	-1.397	-1.312	-1.270	ns

Table 1-112 specifies EP3SE50 Column Pins Output Timing parameters for single-ended I/O standards.

**Table 1-112.** EP3SE50 Column Pins output Timing Parameters (Part 1 of 6) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.293	3.293	4.559	4.925	5.402	5.282	5.365	4.925	5.402	5.282	5.365	ns
		GCLK PLL	t <sub>co</sub>	3.550	3.524	4.903	5.329	5.819	5.674	5.973	5.329	5.819	5.674	5.973	ns
	8mA	GCLK	t <sub>co</sub>	3.176	3.176	4.405	4.763	5.232	5.112	5.252	4.763	5.232	5.112	5.252	ns
		GCLK PLL	t <sub>co</sub>	3.483	3.457	4.794	5.218	5.706	5.561	5.860	5.218	5.706	5.561	5.860	ns
	12mA	GCLK	t <sub>co</sub>	3.081	3.081	4.268	4.620	5.080	4.960	5.162	4.620	5.080	4.960	5.162	ns
		GCLK PLL	t <sub>co</sub>	3.397	3.371	4.691	5.120	5.614	5.469	5.768	5.120	5.614	5.469	5.768	ns
	16mA	GCLK	t <sub>co</sub>	3.041	3.051	4.243	4.596	5.055	4.935	5.120	4.596	5.055	4.935	5.120	ns
		GCLK PLL	t <sub>co</sub>	3.390	3.364	4.674	5.092	5.573	5.428	5.727	5.092	5.573	5.428	5.727	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.296	3.296	4.563	4.937	5.416	5.296	5.373	4.937	5.416	5.296	5.373	ns
		GCLK PLL	t <sub>co</sub>	3.556	3.530	4.908	5.334	5.826	5.681	5.980	5.334	5.826	5.681	5.980	ns
	8mA	GCLK	t <sub>co</sub>	3.096	3.096	4.273	4.625	5.086	4.966	5.172	4.625	5.086	4.966	5.172	ns
		GCLK PLL	t <sub>co</sub>	3.401	3.375	4.701	5.137	5.625	5.480	5.779	5.137	5.625	5.480	5.779	ns
	12mA	GCLK	t <sub>co</sub>	3.059	3.069	4.236	4.594	5.055	4.935	5.148	4.594	5.055	4.935	5.148	ns
		GCLK PLL	t <sub>co</sub>	3.408	3.382	4.695	5.116	5.599	5.454	5.753	5.116	5.599	5.454	5.753	ns
	16mA	GCLK	t <sub>co</sub>	3.043	3.053	4.212	4.553	5.025	4.904	5.119	4.553	5.025	4.904	5.119	ns
		GCLK PLL	t <sub>co</sub>	3.392	3.366	4.672	5.090	5.570	5.425	5.724	5.090	5.570	5.425	5.724	ns
3.0-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.238	3.238	4.508	4.876	5.367	5.247	5.356	4.876	5.367	5.247	5.356	ns
		GCLK PLL	t <sub>co</sub>	3.514	3.488	4.870	5.298	5.786	5.641	5.940	5.298	5.786	5.641	5.940	ns
	8mA	GCLK	t <sub>co</sub>	3.108	3.108	4.339	4.704	5.205	5.086	5.239	4.704	5.205	5.086	5.239	ns
		GCLK PLL	t <sub>co</sub>	3.403	3.377	4.740	5.164	5.648	5.504	5.801	5.164	5.648	5.504	5.801	ns
	12mA	GCLK	t <sub>co</sub>	3.033	3.033	4.250	4.605	5.103	4.984	5.175	4.605	5.103	4.984	5.175	ns
		GCLK PLL	t <sub>co</sub>	3.367	3.341	4.677	5.095	5.574	5.430	5.728	5.095	5.574	5.430	5.728	ns
	16mA	GCLK	t <sub>co</sub>	3.000	3.010	4.188	4.536	5.053	4.934	5.152	4.536	5.053	4.934	5.152	ns
		GCLK PLL	t <sub>co</sub>	3.349	3.323	4.648	5.067	5.546	5.401	5.700	5.067	5.546	5.401	5.700	ns



**Table 1-112.** EP3SE50 Column Pins output Timing Parameters (Part 2 of 6) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.146	3.146	4.397	4.757	5.259	5.140	5.275	4.757	5.259	5.140	5.275	ns	
		GCLK PLL	t <sub>co</sub>	3.428	3.402	4.774	5.197	5.683	5.539	5.836	5.197	5.683	5.539	5.836	ns	
	8mA	GCLK	t <sub>co</sub>	3.009	3.010	4.202	4.558	5.077	4.958	5.165	4.558	5.077	4.958	5.165	ns	
		GCLK PLL	t <sub>co</sub>	3.349	3.323	4.651	5.068	5.548	5.404	5.701	5.068	5.548	5.404	5.701	ns	
	12mA	GCLK	t <sub>co</sub>	2.995	3.005	4.183	4.524	5.009	4.889	5.134	4.524	5.009	4.889	5.134	ns	
		GCLK PLL	t <sub>co</sub>	3.344	3.318	4.643	5.061	5.540	5.395	5.694	5.061	5.540	5.395	5.694	ns	
	16mA	GCLK	t <sub>co</sub>	2.986	2.996	4.169	4.509	5.007	4.888	5.139	4.509	5.007	4.888	5.139	ns	
		GCLK PLL	t <sub>co</sub>	3.335	3.309	4.629	5.046	5.525	5.380	5.679	5.046	5.525	5.380	5.679	ns	
	2.5 V	4mA	GCLK	t <sub>co</sub>	3.293	3.293	4.651	5.036	5.541	5.422	5.483	5.036	5.541	5.422	5.483	ns
			GCLK PLL	t <sub>co</sub>	3.550	3.524	4.981	5.424	5.930	5.786	6.084	5.424	5.930	5.786	6.084	ns
		8mA	GCLK	t <sub>co</sub>	3.168	3.168	4.478	4.852	5.344	5.225	5.359	4.852	5.344	5.225	5.359	ns
			GCLK PLL	t <sub>co</sub>	3.450	3.424	4.862	5.298	5.798	5.654	5.951	5.298	5.798	5.654	5.951	ns
12mA		GCLK	t <sub>co</sub>	3.068	3.068	4.349	4.716	5.204	5.085	5.281	4.716	5.204	5.085	5.281	ns	
		GCLK PLL	t <sub>co</sub>	3.406	3.380	4.775	5.208	5.703	5.558	5.857	5.208	5.703	5.558	5.857	ns	
16mA		GCLK	t <sub>co</sub>	3.041	3.041	4.280	4.649	5.154	5.035	5.224	4.649	5.154	5.035	5.224	ns	
		GCLK PLL	t <sub>co</sub>	3.368	3.342	4.736	5.165	5.660	5.515	5.814	5.165	5.660	5.515	5.814	ns	
1.8 V		2mA	GCLK	t <sub>co</sub>	3.556	3.556	5.088	5.519	6.078	5.958	5.880	5.519	6.078	5.958	5.880	ns
			GCLK PLL	t <sub>co</sub>	3.741	3.715	5.303	5.784	6.335	6.190	6.489	5.784	6.335	6.190	6.489	ns
		4mA	GCLK	t <sub>co</sub>	3.315	3.315	4.728	5.113	5.617	5.498	5.549	5.113	5.617	5.498	5.549	ns
			GCLK PLL	t <sub>co</sub>	3.560	3.534	5.024	5.475	5.987	5.843	6.140	5.475	5.987	5.843	6.140	ns
	6mA	GCLK	t <sub>co</sub>	3.197	3.197	4.538	4.923	5.443	5.323	5.437	4.923	5.443	5.323	5.437	ns	
		GCLK PLL	t <sub>co</sub>	3.478	3.452	4.917	5.360	5.877	5.732	6.031	5.360	5.877	5.732	6.031	ns	
	8mA	GCLK	t <sub>co</sub>	3.143	3.143	4.438	4.825	5.331	5.211	5.360	4.825	5.331	5.211	5.360	ns	
		GCLK PLL	t <sub>co</sub>	3.458	3.432	4.858	5.307	5.811	5.666	5.965	5.307	5.811	5.666	5.965	ns	
	10mA	GCLK	t <sub>co</sub>	3.075	3.075	4.342	4.727	5.217	5.097	5.291	4.727	5.217	5.097	5.291	ns	
		GCLK PLL	t <sub>co</sub>	3.395	3.369	4.797	5.232	5.730	5.585	5.884	5.232	5.730	5.585	5.884	ns	
	12mA	GCLK	t <sub>co</sub>	3.051	3.051	4.317	4.680	5.179	5.059	5.258	4.680	5.179	5.059	5.258	ns	
		GCLK PLL	t <sub>co</sub>	3.377	3.351	4.777	5.210	5.707	5.562	5.861	5.210	5.707	5.562	5.861	ns	

**Table 1-112.** EP3SE50 Column Pins output Timing Parameters (Part 3 of 6) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
1.5 V	2mA	GCLK	t <sub>co</sub>	3.464	3.464	4.981	5.429	5.995	5.875	5.825	5.429	5.995	5.875	5.825	ns	
		GCLK PLL	t <sub>co</sub>	3.687	3.661	5.231	5.717	6.273	6.128	6.427	5.717	6.273	6.128	6.427	ns	
	4mA	GCLK	t <sub>co</sub>	3.181	3.181	4.527	4.916	5.439	5.319	5.439	4.916	5.439	5.319	5.439	ns	
		GCLK PLL	t <sub>co</sub>	3.475	3.449	4.912	5.360	5.881	5.736	6.035	5.360	5.881	5.736	6.035	ns	
	6mA	GCLK	t <sub>co</sub>	3.103	3.111	4.427	4.808	5.322	5.202	5.362	4.808	5.322	5.202	5.362	ns	
		GCLK PLL	t <sub>co</sub>	3.450	3.424	4.845	5.300	5.814	5.669	5.968	5.300	5.814	5.669	5.968	ns	
	8mA	GCLK	t <sub>co</sub>	3.093	3.100	4.409	4.787	5.290	5.170	5.345	4.787	5.290	5.170	5.345	ns	
		GCLK PLL	t <sub>co</sub>	3.439	3.413	4.828	5.275	5.794	5.649	5.948	5.275	5.794	5.649	5.948	ns	
	10mA	GCLK	t <sub>co</sub>	3.063	3.063	4.330	4.709	5.208	5.088	5.282	4.709	5.208	5.088	5.282	ns	
		GCLK PLL	t <sub>co</sub>	3.384	3.358	4.790	5.225	5.724	5.579	5.878	5.225	5.724	5.579	5.878	ns	
	12mA	GCLK	t <sub>co</sub>	3.030	3.040	4.314	4.676	5.168	5.047	5.261	4.676	5.168	5.047	5.261	ns	
		GCLK PLL	t <sub>co</sub>	3.379	3.353	4.774	5.213	5.713	5.568	5.867	5.213	5.713	5.568	5.867	ns	
1.2 V	2mA	GCLK	t <sub>co</sub>	3.354	3.354	4.868	5.328	5.915	5.795	5.765	5.328	5.915	5.795	5.765	ns	
		GCLK PLL	t <sub>co</sub>	3.603	3.577	5.157	5.652	6.217	6.072	6.371	5.652	6.217	6.072	6.371	ns	
	4mA	GCLK	t <sub>co</sub>	3.181	3.181	4.546	4.947	5.486	5.366	5.480	4.947	5.486	5.366	5.480	ns	
		GCLK PLL	t <sub>co</sub>	3.480	3.454	4.932	5.391	5.931	5.786	6.085	5.391	5.931	5.786	6.085	ns	
	6mA	GCLK	t <sub>co</sub>	3.094	3.103	4.419	4.806	5.331	5.211	5.366	4.806	5.331	5.211	5.366	ns	
		GCLK PLL	t <sub>co</sub>	3.442	3.416	4.839	5.301	5.818	5.673	5.972	5.301	5.818	5.673	5.972	ns	
	8mA	GCLK	t <sub>co</sub>	3.070	3.070	4.351	4.746	5.240	5.120	5.319	4.746	5.240	5.120	5.319	ns	
		GCLK PLL	t <sub>co</sub>	3.395	3.369	4.811	5.252	5.762	5.617	5.916	5.252	5.762	5.617	5.916	ns	
	SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.058	3.058	4.312	4.677	5.188	5.068	5.276	4.677	5.188	5.068	5.276	ns
			GCLK PLL	t <sub>co</sub>	3.395	3.369	4.768	5.200	5.693	5.548	5.847	5.200	5.693	5.548	5.847	ns
		10mA	GCLK	t <sub>co</sub>	3.055	3.055	4.305	4.670	5.193	5.074	5.271	4.670	5.193	5.074	5.271	ns
			GCLK PLL	t <sub>co</sub>	3.392	3.366	4.765	5.196	5.689	5.544	5.843	5.196	5.689	5.544	5.843	ns
12mA		GCLK	t <sub>co</sub>	3.043	3.051	4.305	4.666	5.174	5.054	5.272	4.666	5.174	5.054	5.272	ns	
		GCLK PLL	t <sub>co</sub>	3.390	3.364	4.765	5.197	5.690	5.545	5.844	5.197	5.690	5.545	5.844	ns	
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.032	3.042	4.291	4.644	5.140	5.020	5.256	4.644	5.140	5.020	5.256	ns	
		GCLK PLL	t <sub>co</sub>	3.381	3.355	4.751	5.182	5.675	5.530	5.829	5.182	5.675	5.530	5.829	ns	

**Table 1-112.** EP3SE50 Column Pins output Timing Parameters (Part 4 of 6) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.074	3.074	4.324	4.692	5.215	5.096	5.295	4.692	5.215	5.096	5.295	ns
		GCLK PLL	t <sub>co</sub>	3.402	3.376	4.780	5.214	5.709	5.564	5.863	5.214	5.709	5.564	5.863	ns
	6mA	GCLK	t <sub>co</sub>	3.057	3.059	4.321	4.689	5.205	5.085	5.293	4.689	5.205	5.085	5.293	ns
		GCLK PLL	t <sub>co</sub>	3.398	3.372	4.778	5.212	5.707	5.562	5.861	5.212	5.707	5.562	5.861	ns
	8mA	GCLK	t <sub>co</sub>	3.045	3.048	4.308	4.669	5.197	5.078	5.291	4.669	5.197	5.078	5.291	ns
		GCLK PLL	t <sub>co</sub>	3.387	3.361	4.768	5.202	5.698	5.553	5.852	5.202	5.698	5.553	5.852	ns
	10mA	GCLK	t <sub>co</sub>	3.027	3.037	4.296	4.652	5.159	5.039	5.266	4.652	5.159	5.039	5.266	ns
		GCLK PLL	t <sub>co</sub>	3.376	3.350	4.756	5.189	5.685	5.540	5.839	5.189	5.685	5.540	5.839	ns
	12mA	GCLK	t <sub>co</sub>	3.027	3.037	4.295	4.652	5.159	5.039	5.265	4.652	5.159	5.039	5.265	ns
		GCLK PLL	t <sub>co</sub>	3.376	3.350	4.755	5.189	5.685	5.540	5.839	5.189	5.685	5.540	5.839	ns
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.033	3.043	4.294	4.649	5.159	5.039	5.268	4.649	5.159	5.039	5.268	ns
		GCLK PLL	t <sub>co</sub>	3.382	3.356	4.754	5.186	5.680	5.535	5.834	5.186	5.680	5.535	5.834	ns
	16mA	GCLK	t <sub>co</sub>	3.036	3.046	4.302	4.658	5.164	5.044	5.291	4.658	5.164	5.044	5.291	ns
		GCLK PLL	t <sub>co</sub>	3.385	3.359	4.762	5.196	5.692	5.547	5.846	5.196	5.692	5.547	5.846	ns
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.068	3.068	4.338	4.709	5.230	5.110	5.310	4.709	5.230	5.110	5.310	ns
		GCLK PLL	t <sub>co</sub>	3.406	3.380	4.790	5.225	5.722	5.577	5.876	5.225	5.722	5.577	5.876	ns
	6mA	GCLK	t <sub>co</sub>	3.043	3.053	4.319	4.688	5.204	5.084	5.296	4.688	5.204	5.084	5.296	ns
		GCLK PLL	t <sub>co</sub>	3.392	3.366	4.779	5.215	5.713	5.568	5.867	5.215	5.713	5.568	5.867	ns
	8mA	GCLK	t <sub>co</sub>	3.032	3.042	4.306	4.667	5.180	5.060	5.281	4.667	5.180	5.060	5.281	ns
		GCLK PLL	t <sub>co</sub>	3.381	3.355	4.766	5.201	5.699	5.554	5.853	5.201	5.699	5.554	5.853	ns
	10mA	GCLK	t <sub>co</sub>	3.031	3.041	4.309	4.667	5.169	5.049	5.278	4.667	5.169	5.049	5.278	ns
		GCLK PLL	t <sub>co</sub>	3.380	3.354	4.769	5.205	5.703	5.558	5.857	5.205	5.703	5.558	5.857	ns
	12mA	GCLK	t <sub>co</sub>	3.028	3.038	4.303	4.662	5.159	5.039	5.272	4.662	5.159	5.039	5.272	ns
		GCLK PLL	t <sub>co</sub>	3.377	3.351	4.763	5.199	5.697	5.552	5.851	5.199	5.697	5.552	5.851	ns
SSTL-15 CLASS II	8mA	GCLK	t <sub>co</sub>	3.030	3.040	4.292	4.648	5.159	5.039	5.269	4.648	5.159	5.039	5.269	ns
		GCLK PLL	t <sub>co</sub>	3.379	3.353	4.752	5.185	5.680	5.535	5.834	5.185	5.680	5.535	5.834	ns
	16mA	GCLK	t <sub>co</sub>	3.033	3.043	4.299	4.657	5.165	5.045	5.293	4.657	5.165	5.045	5.293	ns
		GCLK PLL	t <sub>co</sub>	3.382	3.356	4.759	5.194	5.691	5.546	5.845	5.194	5.691	5.546	5.845	ns

**Table 1-112.** EP3SE50 Column Pins output Timing Parameters (Part 5 of 6) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.042	3.050	4.294	4.654	5.173	5.053	5.270	4.654	5.173	5.053	5.270	ns
		GCLK PLL	t <sub>co</sub>	3.389	3.363	4.754	5.185	5.678	5.533	5.832	5.185	5.678	5.533	5.832	ns
	6mA	GCLK	t <sub>co</sub>	3.033	3.043	4.292	4.646	5.169	5.050	5.275	4.646	5.169	5.050	5.275	ns
		GCLK PLL	t <sub>co</sub>	3.382	3.356	4.752	5.184	5.677	5.532	5.831	5.184	5.677	5.532	5.831	ns
	8mA	GCLK	t <sub>co</sub>	3.025	3.035	4.285	4.639	5.142	5.023	5.257	4.639	5.142	5.023	5.257	ns
		GCLK PLL	t <sub>co</sub>	3.374	3.348	4.745	5.176	5.670	5.525	5.824	5.176	5.670	5.525	5.824	ns
	10mA	GCLK	t <sub>co</sub>	3.028	3.038	4.288	4.642	5.145	5.025	5.260	4.642	5.145	5.025	5.260	ns
		GCLK PLL	t <sub>co</sub>	3.377	3.351	4.748	5.180	5.674	5.529	5.828	5.180	5.674	5.529	5.828	ns
	12mA	GCLK	t <sub>co</sub>	3.025	3.035	4.290	4.646	5.144	5.025	5.267	4.646	5.144	5.025	5.267	ns
		GCLK PLL	t <sub>co</sub>	3.374	3.348	4.750	5.183	5.678	5.533	5.832	5.183	5.678	5.533	5.832	ns
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.033	3.043	4.289	4.643	5.141	5.021	5.271	4.643	5.141	5.021	5.271	ns
		GCLK PLL	t <sub>co</sub>	3.382	3.356	4.749	5.181	5.674	5.529	5.828	5.181	5.674	5.529	5.828	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.048	3.055	4.303	4.667	5.189	5.069	5.283	4.667	5.189	5.069	5.283	ns
		GCLK PLL	t <sub>co</sub>	3.394	3.368	4.763	5.195	5.689	5.544	5.843	5.195	5.689	5.544	5.843	ns
	6mA	GCLK	t <sub>co</sub>	3.041	3.051	4.304	4.662	5.178	5.058	5.280	4.662	5.178	5.058	5.280	ns
		GCLK PLL	t <sub>co</sub>	3.390	3.364	4.764	5.197	5.692	5.547	5.846	5.197	5.692	5.547	5.846	ns
	8mA	GCLK	t <sub>co</sub>	3.037	3.047	4.299	4.655	5.172	5.052	5.275	4.655	5.172	5.052	5.275	ns
		GCLK PLL	t <sub>co</sub>	3.386	3.360	4.759	5.192	5.687	5.542	5.841	5.192	5.687	5.542	5.841	ns
	10mA	GCLK	t <sub>co</sub>	3.030	3.040	4.292	4.648	5.159	5.039	5.269	4.648	5.159	5.039	5.269	ns
		GCLK PLL	t <sub>co</sub>	3.379	3.353	4.752	5.185	5.680	5.535	5.834	5.185	5.680	5.535	5.834	ns
	12mA	GCLK	t <sub>co</sub>	3.031	3.041	4.299	4.656	5.155	5.035	5.272	4.656	5.155	5.035	5.272	ns
		GCLK PLL	t <sub>co</sub>	3.380	3.354	4.759	5.193	5.690	5.545	5.844	5.193	5.690	5.545	5.844	ns
1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.029	3.039	4.280	4.634	5.134	5.014	5.257	4.634	5.134	5.014	5.257	ns
		GCLK PLL	t <sub>co</sub>	3.378	3.352	4.740	5.171	5.664	5.519	5.818	5.171	5.664	5.519	5.818	ns

**Table 1-112.** EP3SE50 Column Pins output Timing Parameters (Part 6 of 6) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.048	3.058	4.317	4.683	5.208	5.088	5.302	4.683	5.208	5.088	5.302	ns
		GCLK PLL	t <sub>co</sub>	3.397	3.371	4.777	5.212	5.710	5.565	5.864	5.212	5.710	5.565	5.864	ns
	6mA	GCLK	t <sub>co</sub>	3.040	3.050	4.308	4.668	5.191	5.071	5.290	4.668	5.191	5.071	5.290	ns
		GCLK PLL	t <sub>co</sub>	3.389	3.363	4.768	5.203	5.701	5.556	5.855	5.203	5.701	5.556	5.855	ns
	8mA	GCLK	t <sub>co</sub>	3.041	3.051	4.315	4.674	5.187	5.067	5.293	4.674	5.187	5.067	5.293	ns
		GCLK PLL	t <sub>co</sub>	3.390	3.364	4.775	5.212	5.710	5.565	5.864	5.212	5.710	5.565	5.864	ns
	10mA	GCLK	t <sub>co</sub>	3.030	3.040	4.302	4.661	5.164	5.044	5.287	4.661	5.164	5.044	5.287	ns
		GCLK PLL	t <sub>co</sub>	3.379	3.353	4.762	5.198	5.696	5.551	5.850	5.198	5.696	5.551	5.850	ns
12mA	GCLK	t <sub>co</sub>	3.030	3.040	4.302	4.661	5.165	5.045	5.279	4.661	5.165	5.045	5.279	ns	
	GCLK PLL	t <sub>co</sub>	3.379	3.353	4.762	5.198	5.697	5.552	5.851	5.198	5.697	5.552	5.851	ns	
1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.061	3.061	4.318	4.685	5.243	5.123	5.316	4.685	5.243	5.123	5.316	ns
		GCLK PLL	t <sub>co</sub>	3.400	3.374	4.778	5.213	5.710	5.565	5.864	5.213	5.710	5.565	5.864	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.154	3.164	4.363	4.710	5.218	5.098	5.347	4.710	5.218	5.098	5.347	ns
		GCLK PLL	t <sub>co</sub>	3.503	3.477	4.823	5.247	5.735	5.590	5.889	5.247	5.735	5.590	5.889	ns
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.154	3.164	4.363	4.710	5.218	5.098	5.347	4.710	5.218	5.098	5.347	ns
		GCLK PLL	t <sub>co</sub>	3.503	3.477	4.823	5.247	5.735	5.590	5.889	5.247	5.735	5.590	5.889	ns

Table 1-113 specifies EP3SE50 Row Pins Output Timing parameters for single-ended I/O standards.

**Table 1-113.** EP3SE50 Row Pins output Timing Parameters (Part 1 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVTTL	4mA	GCLK	t <sub>co</sub>	2.980	3.201	4.455	4.818	5.286	5.170	5.337	4.931	5.402	5.285	5.412	ns
		GCLK PLL	t <sub>co</sub>	1.451	1.634	2.028	2.110	2.309	2.325	2.345	2.213	2.412	2.428	2.336	ns
	8mA	GCLK	t <sub>co</sub>	2.887	3.096	4.325	4.680	5.141	5.025	5.192	4.790	5.253	5.136	5.263	ns
		GCLK PLL	t <sub>co</sub>	1.385	1.563	1.918	1.999	2.195	2.211	2.231	2.100	2.297	2.313	2.221	ns
	12mA	GCLK	t <sub>co</sub>	2.788	2.990	4.206	4.557	5.013	4.897	5.085	4.663	5.121	5.004	5.154	ns
		GCLK PLL	t <sub>co</sub>	1.306	1.474	1.812	1.899	2.099	2.115	2.135	2.001	2.197	2.213	2.121	ns

**Table 1-113.** EP3SE50 Row Pins output Timing Parameters (Part 2 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	2.990	3.205	4.463	4.823	5.290	5.174	5.341	4.937	5.406	5.289	5.416	ns
		GCLK PLL	t <sub>co</sub>	1.453	1.641	2.032	2.116	2.318	2.334	2.354	2.221	2.424	2.440	2.348	ns
	8mA	GCLK	t <sub>co</sub>	2.792	2.996	4.212	4.563	5.019	4.903	5.095	4.669	5.128	5.011	5.163	ns
		GCLK PLL	t <sub>co</sub>	1.310	1.478	1.823	1.914	2.109	2.125	2.145	2.013	2.206	2.222	2.130	ns
3.0-V LVTTL	4mA	GCLK	t <sub>co</sub>	2.934	3.147	4.407	4.771	5.242	5.126	5.293	4.888	5.360	5.243	5.370	ns
		GCLK PLL	t <sub>co</sub>	1.412	1.595	1.995	2.079	2.275	2.291	2.311	2.181	2.378	2.394	2.302	ns
	8mA	GCLK	t <sub>co</sub>	2.809	3.020	4.254	4.612	5.078	4.962	5.129	4.726	5.196	5.078	5.205	ns
		GCLK PLL	t <sub>co</sub>	1.311	1.483	1.858	1.937	2.130	2.146	2.166	2.039	2.233	2.248	2.156	ns
	12mA	GCLK	t <sub>co</sub>	2.770	2.969	4.172	4.529	4.990	4.874	5.046	4.640	5.103	4.985	5.116	ns
		GCLK PLL	t <sub>co</sub>	1.274	1.445	1.798	1.872	2.060	2.076	2.096	1.971	2.159	2.175	2.083	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	2.848	3.066	4.301	4.664	5.132	5.016	5.183	4.780	5.249	5.131	5.258	ns
		GCLK PLL	t <sub>co</sub>	1.333	1.507	1.893	1.972	2.166	2.182	2.202	2.072	2.269	2.284	2.192	ns
	8mA	GCLK	t <sub>co</sub>	2.748	2.947	4.137	4.490	4.951	4.835	5.018	4.600	5.063	4.945	5.087	ns
		GCLK PLL	t <sub>co</sub>	1.261	1.429	1.770	1.843	2.032	2.048	2.068	1.941	2.131	2.146	2.054	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	2.960	3.183	4.539	4.925	5.414	5.298	5.465	5.048	5.539	5.421	5.548	ns
		GCLK PLL	t <sub>co</sub>	1.438	1.632	2.103	2.205	2.420	2.436	2.456	2.313	2.530	2.546	2.454	ns
	8mA	GCLK	t <sub>co</sub>	2.850	3.085	4.384	4.762	5.244	5.128	5.295	4.881	5.365	5.247	5.374	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.529	1.979	2.070	2.278	2.294	2.314	2.176	2.386	2.401	2.309	ns
	12mA	GCLK	t <sub>co</sub>	2.804	3.008	4.273	4.643	5.118	5.002	5.173	4.758	5.235	5.117	5.248	ns
		GCLK PLL	t <sub>co</sub>	1.296	1.485	1.895	1.984	2.187	2.203	2.223	2.087	2.291	2.307	2.215	ns
1.8 V	2mA	GCLK	t <sub>co</sub>	3.203	3.440	4.935	5.364	5.899	5.783	5.940	5.495	6.007	5.916	6.033	ns
		GCLK PLL	t <sub>co</sub>	1.628	1.827	2.430	2.571	2.827	2.843	3.035	2.688	3.120	2.960	3.046	ns
	4mA	GCLK	t <sub>co</sub>	2.978	3.238	4.608	4.995	5.494	5.378	5.535	5.130	5.601	5.509	5.626	ns
		GCLK PLL	t <sub>co</sub>	1.455	1.641	2.139	2.245	2.467	2.483	2.630	2.362	2.714	2.598	2.639	ns
	6mA	GCLK	t <sub>co</sub>	2.913	3.136	4.455	4.845	5.335	5.219	5.376	4.962	5.428	5.337	5.454	ns
		GCLK PLL	t <sub>co</sub>	1.380	1.559	2.040	2.140	2.367	2.383	2.471	2.248	2.541	2.493	2.467	ns
	8mA	GCLK	t <sub>co</sub>	2.853	3.062	4.378	4.751	5.238	5.122	5.304	4.867	5.352	5.243	5.379	ns
		GCLK PLL	t <sub>co</sub>	1.362	1.539	1.983	2.087	2.301	2.317	2.374	2.192	2.447	2.421	2.373	ns

**Table 1-113.** EP3SE50 Row Pins output Timing Parameters (Part 3 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.5 V	2mA	GCLK	t <sub>co</sub>	3.114	3.358	4.845	5.277	5.827	5.711	5.868	5.402	5.931	5.840	5.957	ns
		GCLK PLL	t <sub>co</sub>	1.570	1.770	2.358	2.498	2.764	2.780	2.963	2.609	3.044	2.895	2.970	ns
	4mA	GCLK	t <sub>co</sub>	2.872	3.100	4.440	4.840	5.336	5.220	5.377	4.956	5.427	5.336	5.453	ns
		GCLK PLL	t <sub>co</sub>	1.378	1.556	2.036	2.140	2.370	2.386	2.472	2.245	2.540	2.494	2.466	ns
	6mA	GCLK	t <sub>co</sub>	2.845	3.053	4.367	4.744	5.230	5.114	5.304	4.858	5.352	5.231	5.379	ns
		GCLK PLL	t <sub>co</sub>	1.351	1.530	1.968	2.079	2.301	2.317	2.366	2.185	2.435	2.421	2.361	ns
	8mA	GCLK	t <sub>co</sub>	2.836	3.044	4.345	4.726	5.211	5.095	5.285	4.840	5.333	5.209	5.360	ns
		GCLK PLL	t <sub>co</sub>	1.332	1.519	1.951	2.054	2.282	2.298	2.347	2.161	2.413	2.402	2.339	ns
1.2 V	2mA	GCLK	t <sub>co</sub>	3.057	3.283	4.755	5.191	5.752	5.636	5.793	5.314	5.847	5.756	5.873	ns
		GCLK PLL	t <sub>co</sub>	1.500	1.683	2.279	2.430	2.703	2.719	2.888	2.540	2.960	2.826	2.886	ns
	4mA	GCLK	t <sub>co</sub>	2.877	3.094	4.462	4.868	5.377	5.261	5.421	4.981	5.469	5.378	5.496	ns
		GCLK PLL	t <sub>co</sub>	1.383	1.560	2.053	2.168	2.418	2.434	2.513	2.274	2.582	2.538	2.508	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	2.789	2.994	4.251	4.615	5.086	4.970	5.163	4.725	5.197	5.080	5.234	ns
		GCLK PLL	t <sub>co</sub>	1.300	1.473	1.888	1.975	2.177	2.193	2.213	2.074	2.277	2.293	2.201	ns
	12mA	GCLK	t <sub>co</sub>	2.777	2.982	4.243	4.607	5.078	4.962	5.161	4.717	5.190	5.073	5.233	ns
		GCLK PLL	t <sub>co</sub>	1.295	1.469	1.885	1.973	2.175	2.191	2.211	2.073	2.276	2.292	2.200	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	2.761	2.964	4.218	4.582	5.051	4.935	5.144	4.691	5.163	5.046	5.215	ns
		GCLK PLL	t <sub>co</sub>	1.286	1.458	1.870	1.957	2.158	2.174	2.194	2.056	2.258	2.274	2.182	ns
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	2.814	3.018	4.273	4.639	5.112	4.996	5.199	4.748	5.243	5.106	5.270	ns
		GCLK PLL	t <sub>co</sub>	1.311	1.483	1.902	1.991	2.196	2.212	2.248	2.091	2.310	2.312	2.236	ns
	6mA	GCLK	t <sub>co</sub>	2.799	3.004	4.270	4.637	5.110	4.994	5.198	4.746	5.241	5.104	5.268	ns
		GCLK PLL	t <sub>co</sub>	1.306	1.478	1.900	1.990	2.195	2.211	2.246	2.089	2.308	2.310	2.234	ns
	8mA	GCLK	t <sub>co</sub>	2.788	2.992	4.253	4.620	5.093	4.977	5.188	4.729	5.232	5.088	5.259	ns
		GCLK PLL	t <sub>co</sub>	1.295	1.467	1.890	1.980	2.185	2.201	2.229	2.080	2.292	2.301	2.218	ns
	10mA	GCLK	t <sub>co</sub>	2.764	2.969	4.237	4.604	5.078	4.962	5.175	4.714	5.220	5.073	5.247	ns
		GCLK PLL	t <sub>co</sub>	1.284	1.456	1.877	1.967	2.172	2.188	2.214	2.068	2.277	2.289	2.203	ns
12mA	GCLK	t <sub>co</sub>	2.764	2.968	4.236	4.603	5.077	4.961	5.175	4.713	5.220	5.072	5.247	ns	
	GCLK PLL	t <sub>co</sub>	1.284	1.455	1.877	1.967	2.172	2.188	2.213	2.067	2.276	2.289	2.202	ns	

**Table 1-113.** EP3SE50 Row Pins output Timing Parameters (Part 4 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	2.774	2.977	4.234	4.599	5.071	4.955	5.170	4.708	5.214	5.065	5.241	ns
		GCLK PLL	t <sub>co</sub>	1.292	1.462	1.876	1.964	2.167	2.183	2.207	2.063	2.269	2.283	2.195	ns
	16mA	GCLK	t <sub>co</sub>	2.768	2.972	4.233	4.600	5.073	4.957	5.180	4.710	5.225	5.069	5.252	ns
		GCLK PLL	t <sub>co</sub>	1.293	1.465	1.882	1.972	2.177	2.193	2.209	2.072	2.273	2.294	2.199	ns
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	2.810	3.014	4.284	4.653	5.129	5.013	5.212	4.761	5.255	5.122	5.282	ns
		GCLK PLL	t <sub>co</sub>	1.314	1.486	1.911	2.002	2.209	2.225	2.265	2.101	2.326	2.324	2.252	ns
	6mA	GCLK	t <sub>co</sub>	2.787	2.992	4.266	4.636	5.112	4.996	5.202	4.745	5.246	5.106	5.273	ns
		GCLK PLL	t <sub>co</sub>	1.300	1.472	1.900	1.992	2.199	2.215	2.248	2.092	2.310	2.315	2.236	ns
	8mA	GCLK	t <sub>co</sub>	2.770	2.975	4.249	4.618	5.094	4.978	5.189	4.727	5.233	5.089	5.260	ns
		GCLK PLL	t <sub>co</sub>	1.289	1.460	1.887	1.979	2.186	2.202	2.230	2.079	2.293	2.302	2.219	ns
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.789	2.990	4.240	4.604	5.074	4.958	5.168	4.712	5.211	5.068	5.238	ns
		GCLK PLL	t <sub>co</sub>	1.299	1.468	1.875	1.962	2.165	2.181	2.210	2.062	2.272	2.280	2.198	ns
	6mA	GCLK	t <sub>co</sub>	2.777	2.978	4.231	4.596	5.066	4.950	5.167	4.704	5.211	5.061	5.238	ns
		GCLK PLL	t <sub>co</sub>	1.292	1.462	1.873	1.961	2.164	2.180	2.202	2.061	2.265	2.280	2.191	ns
	8mA	GCLK	t <sub>co</sub>	2.764	2.966	4.222	4.587	5.058	4.942	5.160	4.696	5.204	5.053	5.231	ns
		GCLK PLL	t <sub>co</sub>	1.283	1.454	1.866	1.954	2.157	2.173	2.194	2.054	2.257	2.273	2.183	ns
	10mA	GCLK	t <sub>co</sub>	2.766	2.968	4.225	4.590	5.061	4.945	5.164	4.699	5.207	5.056	5.234	ns
		GCLK PLL	t <sub>co</sub>	1.286	1.456	1.869	1.957	2.161	2.177	2.197	2.057	2.260	2.276	2.186	ns
12mA	GCLK	t <sub>co</sub>	2.759	2.963	4.223	4.589	5.061	4.945	5.167	4.699	5.212	5.057	5.239	ns	
	GCLK PLL	t <sub>co</sub>	1.282	1.453	1.871	1.960	2.164	2.180	2.197	2.060	2.261	2.281	2.187	ns	
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.765	2.967	4.218	4.581	5.052	4.936	5.163	4.690	5.206	5.046	5.233	ns
		GCLK PLL	t <sub>co</sub>	1.290	1.461	1.869	1.957	2.160	2.176	2.188	2.056	2.250	2.275	2.176	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.796	2.997	4.251	4.617	5.089	4.973	5.179	4.724	5.222	5.082	5.249	ns
		GCLK PLL	t <sub>co</sub>	1.305	1.474	1.884	1.972	2.176	2.192	2.225	2.071	2.286	2.291	2.212	ns
	6mA	GCLK	t <sub>co</sub>	2.784	2.987	4.247	4.613	5.085	4.969	5.181	4.721	5.225	5.079	5.252	ns
		GCLK PLL	t <sub>co</sub>	1.299	1.469	1.885	1.974	2.178	2.194	2.221	2.073	2.283	2.294	2.209	ns
	8mA	GCLK	t <sub>co</sub>	2.780	2.982	4.241	4.607	5.079	4.963	5.176	4.715	5.219	5.073	5.246	ns
		GCLK PLL	t <sub>co</sub>	1.295	1.465	1.880	1.969	2.173	2.189	2.215	2.068	2.277	2.288	2.203	ns



**Table 1-113.** EP3SE50 Row Pins output Timing Parameters (Part 5 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.795	2.996	4.262	4.631	5.107	4.991	5.198	4.738	5.241	5.099	5.268	ns
			t <sub>co</sub>	1.307	1.476	1.897	1.988	2.195	2.211	2.243	2.087	2.303	2.310	2.229	ns
	6mA	GCLK	t <sub>co</sub>	2.783	2.984	4.251	4.619	5.095	4.979	5.189	4.727	5.232	5.088	5.259	ns
			t <sub>co</sub>	1.298	1.468	1.888	1.979	2.186	2.202	2.231	2.078	2.292	2.301	2.218	ns
	8mA	GCLK	t <sub>co</sub>	2.779	2.982	4.255	4.624	5.101	4.985	5.198	4.733	5.242	5.095	5.269	ns
			t <sub>co</sub>	1.297	1.468	1.895	1.987	2.195	2.211	2.237	2.087	2.299	2.311	2.225	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	2.874	3.077	4.276	4.633	5.095	4.979	5.203	4.743	5.209	5.092	5.276	ns
			t <sub>co</sub>	1.406	1.579	1.940	2.021	2.217	2.233	2.253	2.122	2.319	2.335	2.243	ns
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	2.874	3.077	4.276	4.633	5.095	4.979	5.203	4.743	5.209	5.092	5.276	ns
			t <sub>co</sub>	1.406	1.579	1.940	2.021	2.217	2.233	2.253	2.122	2.319	2.335	2.243	ns

Table 1-124 through Table 1-117 show the maximum I/O timing parameters for EP3SE50 devices for differential I/O standards.

Table 1-114 specifies EP3SE50 column pins input timing parameters for differential I/O standards.

**Table 1-114.** EP3SE50 Column Pins Input Timing Parameters (Part 1 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
LVDS	GCLK	t <sub>su</sub>	-0.784	-0.783	-0.834	-0.802	-0.932	-0.891	-1.176	-0.757	-1.141	-0.841	-1.207	ns
		t <sub>h</sub>	0.904	0.919	1.042	1.041	1.197	1.144	1.426	1.005	1.428	1.105	1.458	ns
	GCLK PLL	t <sub>su</sub>	0.872	0.903	1.770	2.105	2.274	2.167	2.049	2.160	2.465	2.225	2.103	ns
		t <sub>h</sub>	-0.622	-0.637	-1.355	-1.635	-1.748	-1.668	-1.550	-1.681	-1.909	-1.716	-1.600	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-0.784	-0.783	-0.834	-0.802	-0.932	-0.891	-1.176	-0.757	-1.141	-0.841	-1.207	ns
		t <sub>h</sub>	0.904	0.919	1.042	1.041	1.197	1.144	1.426	1.005	1.428	1.105	1.458	ns
	GCLK PLL	t <sub>su</sub>	0.872	0.903	1.770	2.105	2.274	2.167	2.049	2.160	2.465	2.225	2.103	ns
		t <sub>h</sub>	-0.622	-0.637	-1.355	-1.635	-1.748	-1.668	-1.550	-1.681	-1.909	-1.716	-1.600	ns
RSDS	GCLK	t <sub>su</sub>	-0.784	-0.783	-0.834	-0.802	-0.932	-0.891	-1.176	-0.757	-1.141	-0.841	-1.207	ns
		t <sub>h</sub>	0.904	0.919	1.042	1.041	1.197	1.144	1.426	1.005	1.428	1.105	1.458	ns
	GCLK PLL	t <sub>su</sub>	0.872	0.903	1.770	2.105	2.274	2.167	2.049	2.160	2.465	2.225	2.103	ns
		t <sub>h</sub>	-0.622	-0.637	-1.355	-1.635	-1.748	-1.668	-1.550	-1.681	-1.909	-1.716	-1.600	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.600	-0.606	-0.911	-1.001	-1.091	-1.045	-1.325	-0.992	-1.081	-1.039	-1.361	ns
		t <sub>h</sub>	0.713	0.734	1.087	1.200	1.310	1.252	1.530	1.198	1.309	1.255	1.567	ns
	GCLK PLL	t <sub>su</sub>	1.056	1.080	1.693	1.906	2.115	2.013	1.900	1.925	2.136	2.027	1.949	ns
		t <sub>h</sub>	-0.813	-0.822	-1.310	-1.476	-1.635	-1.560	-1.446	-1.488	-1.648	-1.566	-1.491	ns

**Table 1-114.** EP3SE50 Column Pins Input Timing Parameters (Part 2 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.600	-0.606	-0.911	-1.001	-1.091	-1.045	-1.325	-0.992	-1.081	-1.039	-1.361	ns
		$t_h$	0.713	0.734	1.087	1.200	1.310	1.252	1.530	1.198	1.309	1.255	1.567	ns
	GCLK PLL	$t_{su}$	1.056	1.080	1.693	1.906	2.115	2.013	1.900	1.925	2.136	2.027	1.949	ns
		$t_h$	-0.813	-0.822	-1.310	-1.476	-1.635	-1.560	-1.446	-1.488	-1.648	-1.566	-1.491	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.608	-0.618	-0.921	-1.012	-1.107	-1.061	-1.341	-1.003	-1.096	-1.054	-1.376	ns
		$t_h$	0.721	0.746	1.097	1.211	1.326	1.268	1.546	1.209	1.324	1.270	1.582	ns
	GCLK PLL	$t_{su}$	1.048	1.068	1.683	1.895	2.099	1.997	1.884	1.914	2.121	2.012	1.934	ns
		$t_h$	-0.805	-0.810	-1.300	-1.465	-1.619	-1.544	-1.430	-1.477	-1.633	-1.551	-1.476	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.608	-0.618	-0.921	-1.012	-1.107	-1.061	-1.341	-1.003	-1.096	-1.054	-1.376	ns
		$t_h$	0.721	0.746	1.097	1.211	1.326	1.268	1.546	1.209	1.324	1.270	1.582	ns
	GCLK PLL	$t_{su}$	1.048	1.068	1.683	1.895	2.099	1.997	1.884	1.914	2.121	2.012	1.934	ns
		$t_h$	-0.805	-0.810	-1.300	-1.465	-1.619	-1.544	-1.430	-1.477	-1.633	-1.551	-1.476	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.620	-0.629	-0.930	-1.023	-1.126	-1.080	-1.360	-1.014	-1.114	-1.072	-1.394	ns
		$t_h$	0.733	0.757	1.107	1.222	1.345	1.287	1.565	1.220	1.342	1.288	1.600	ns
	GCLK PLL	$t_{su}$	1.036	1.057	1.674	1.884	2.080	1.978	1.865	1.903	2.103	1.994	1.916	ns
		$t_h$	-0.793	-0.799	-1.290	-1.454	-1.600	-1.525	-1.411	-1.466	-1.615	-1.533	-1.458	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.620	-0.629	-0.930	-1.023	-1.126	-1.080	-1.360	-1.014	-1.114	-1.072	-1.394	ns
		$t_h$	0.733	0.757	1.107	1.222	1.345	1.287	1.565	1.220	1.342	1.288	1.600	ns
	GCLK PLL	$t_{su}$	1.036	1.057	1.674	1.884	2.080	1.978	1.865	1.903	2.103	1.994	1.916	ns
		$t_h$	-0.793	-0.799	-1.290	-1.454	-1.600	-1.525	-1.411	-1.466	-1.615	-1.533	-1.458	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.608	-0.618	-0.921	-1.012	-1.107	-1.061	-1.341	-1.003	-1.096	-1.054	-1.376	ns
		$t_h$	0.721	0.746	1.097	1.211	1.326	1.268	1.546	1.209	1.324	1.270	1.582	ns
	GCLK PLL	$t_{su}$	1.048	1.068	1.683	1.895	2.099	1.997	1.884	1.914	2.121	2.012	1.934	ns
		$t_h$	-0.805	-0.810	-1.300	-1.465	-1.619	-1.544	-1.430	-1.477	-1.633	-1.551	-1.476	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.608	-0.618	-0.921	-1.012	-1.107	-1.061	-1.341	-1.003	-1.096	-1.054	-1.376	ns
		$t_h$	0.721	0.746	1.097	1.211	1.326	1.268	1.546	1.209	1.324	1.270	1.582	ns
	GCLK PLL	$t_{su}$	1.048	1.068	1.683	1.895	2.099	1.997	1.884	1.914	2.121	2.012	1.934	ns
		$t_h$	-0.805	-0.810	-1.300	-1.465	-1.619	-1.544	-1.430	-1.477	-1.633	-1.551	-1.476	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.620	-0.629	-0.930	-1.023	-1.126	-1.080	-1.360	-1.014	-1.114	-1.072	-1.394	ns
		$t_h$	0.733	0.757	1.107	1.222	1.345	1.287	1.565	1.220	1.342	1.288	1.600	ns
	GCLK PLL	$t_{su}$	1.036	1.057	1.674	1.884	2.080	1.978	1.865	1.903	2.103	1.994	1.916	ns
		$t_h$	-0.793	-0.799	-1.290	-1.454	-1.600	-1.525	-1.411	-1.466	-1.615	-1.533	-1.458	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.620	-0.629	-0.930	-1.023	-1.126	-1.080	-1.360	-1.014	-1.114	-1.072	-1.394	ns
		$t_h$	0.733	0.757	1.107	1.222	1.345	1.287	1.565	1.220	1.342	1.288	1.600	ns
	GCLK PLL	$t_{su}$	1.036	1.057	1.674	1.884	2.080	1.978	1.865	1.903	2.103	1.994	1.916	ns
		$t_h$	-0.793	-0.799	-1.290	-1.454	-1.600	-1.525	-1.411	-1.466	-1.615	-1.533	-1.458	ns

**Table 1-114.** EP3SE50 Column Pins Input Timing Parameters (Part 3 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.627	-0.635	-0.942	-1.028	-1.126	-1.082	-1.359	-1.018	-1.109	-1.070	-1.390	ns
		t <sub>h</sub>	0.740	0.763	1.120	1.230	1.348	1.290	1.569	1.227	1.342	1.287	1.601	ns
	GCLK PLL	t <sub>su</sub>	1.029	1.051	1.662	1.879	2.080	1.976	1.866	1.899	2.108	1.996	1.920	ns
		t <sub>h</sub>	-0.786	-0.793	-1.277	-1.446	-1.597	-1.522	-1.407	-1.459	-1.615	-1.534	-1.457	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.627	-0.635	-0.942	-1.028	-1.126	-1.082	-1.359	-1.018	-1.109	-1.070	-1.390	ns
		t <sub>h</sub>	0.740	0.763	1.120	1.230	1.348	1.290	1.569	1.227	1.342	1.287	1.601	ns
	GCLK PLL	t <sub>su</sub>	1.029	1.051	1.662	1.879	2.080	1.976	1.866	1.899	2.108	1.996	1.920	ns
		t <sub>h</sub>	-0.786	-0.793	-1.277	-1.446	-1.597	-1.522	-1.407	-1.459	-1.615	-1.534	-1.457	ns

Table 1-115 specifies EP3SE50 row pins input timing parameters for differential I/O standards.

**Table 1-115.** EP3SE50 Row Pins Input Timing Parameters (Part 1 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
LVDS	GCLK	$t_{su}$	-0.742	-0.744	-0.719	-0.649	-0.752	-0.722	-0.976	-0.599	-0.693	-0.666	-1.008	ns
		$t_h$	0.859	0.876	0.925	0.887	1.015	0.974	1.227	0.851	0.969	0.931	1.260	ns
	GCLK PLL	$t_{su}$	0.875	0.902	1.845	2.214	2.412	2.292	2.204	2.274	2.480	2.358	2.257	ns
		$t_h$	-0.626	-0.640	-1.431	-1.744	-1.885	-1.793	-1.703	-1.790	-1.941	-1.847	-1.753	ns
MINI-LVDS	GCLK	$t_{su}$	-0.742	-0.744	-0.719	-0.649	-0.752	-0.722	-0.976	-0.599	-0.693	-0.666	-1.008	ns
		$t_h$	0.859	0.876	0.925	0.887	1.015	0.974	1.227	0.851	0.969	0.931	1.260	ns
	GCLK PLL	$t_{su}$	0.875	0.902	1.845	2.214	2.412	2.292	2.204	2.274	2.480	2.358	2.257	ns
		$t_h$	-0.626	-0.640	-1.431	-1.744	-1.885	-1.793	-1.703	-1.790	-1.941	-1.847	-1.753	ns
RSDS	GCLK	$t_{su}$	-0.742	-0.744	-0.719	-0.649	-0.752	-0.722	-0.976	-0.599	-0.693	-0.666	-1.008	ns
		$t_h$	0.859	0.876	0.925	0.887	1.015	0.974	1.227	0.851	0.969	0.931	1.260	ns
	GCLK PLL	$t_{su}$	0.875	0.902	1.845	2.214	2.412	2.292	2.204	2.274	2.480	2.358	2.257	ns
		$t_h$	-0.626	-0.640	-1.431	-1.744	-1.885	-1.793	-1.703	-1.790	-1.941	-1.847	-1.753	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.557	-0.569	-0.816	-0.883	-0.951	-0.916	-1.165	-0.876	-0.940	-0.908	-1.202	ns
		$t_h$	0.667	0.692	0.990	1.076	1.165	1.119	1.367	1.079	1.164	1.121	1.405	ns
	GCLK PLL	$t_{su}$	1.070	1.087	1.758	1.990	2.223	2.108	2.025	2.007	2.243	2.126	2.073	ns
		$t_h$	-0.828	-0.834	-1.376	-1.565	-1.745	-1.658	-1.573	-1.572	-1.756	-1.667	-1.618	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.557	-0.569	-0.816	-0.883	-0.951	-0.916	-1.165	-0.876	-0.940	-0.908	-1.202	ns
		$t_h$	0.667	0.692	0.990	1.076	1.165	1.119	1.367	1.079	1.164	1.121	1.405	ns
	GCLK PLL	$t_{su}$	1.070	1.087	1.758	1.990	2.223	2.108	2.025	2.007	2.243	2.126	2.073	ns
		$t_h$	-0.828	-0.834	-1.376	-1.565	-1.745	-1.658	-1.573	-1.572	-1.756	-1.667	-1.618	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.566	-0.581	-0.825	-0.893	-0.967	-0.932	-1.181	-0.885	-0.956	-0.924	-1.218	ns
		$t_h$	0.676	0.704	0.999	1.086	1.181	1.135	1.383	1.088	1.180	1.137	1.421	ns
	GCLK PLL	$t_{su}$	1.061	1.075	1.749	1.980	2.207	2.092	2.009	1.998	2.227	2.110	2.057	ns
		$t_h$	-0.819	-0.822	-1.367	-1.555	-1.729	-1.642	-1.557	-1.563	-1.740	-1.651	-1.602	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.566	-0.581	-0.825	-0.893	-0.967	-0.932	-1.181	-0.885	-0.956	-0.924	-1.218	ns
		$t_h$	0.676	0.704	0.999	1.086	1.181	1.135	1.383	1.088	1.180	1.137	1.421	ns
	GCLK PLL	$t_{su}$	1.061	1.075	1.749	1.980	2.207	2.092	2.009	1.998	2.227	2.110	2.057	ns
		$t_h$	-0.819	-0.822	-1.367	-1.555	-1.729	-1.642	-1.557	-1.563	-1.740	-1.651	-1.602	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.580	-0.593	-0.838	-0.903	-0.985	-0.950	-1.199	-0.896	-0.973	-0.941	-1.235	ns
		$t_h$	0.690	0.716	1.011	1.096	1.199	1.153	1.401	1.099	1.197	1.154	1.438	ns
	GCLK PLL	$t_{su}$	1.047	1.063	1.736	1.970	2.189	2.074	1.991	1.987	2.210	2.093	2.040	ns
		$t_h$	-0.805	-0.810	-1.355	-1.545	-1.711	-1.624	-1.539	-1.552	-1.723	-1.634	-1.585	ns

**Table 1-115.** EP3SE50 Row Pins Input Timing Parameters (Part 2 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.580	-0.593	-0.838	-0.903	-0.985	-0.950	-1.199	-0.896	-0.973	-0.941	-1.235	ns
		t <sub>h</sub>	0.690	0.716	1.011	1.096	1.199	1.153	1.401	1.099	1.197	1.154	1.438	ns
	GCLK PLL	t <sub>su</sub>	1.047	1.063	1.736	1.970	2.189	2.074	1.991	1.987	2.210	2.093	2.040	ns
		t <sub>h</sub>	-0.805	-0.810	-1.355	-1.545	-1.711	-1.624	-1.539	-1.552	-1.723	-1.634	-1.585	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.566	-0.581	-0.825	-0.893	-0.967	-0.932	-1.181	-0.885	-0.956	-0.924	-1.218	ns
		t <sub>h</sub>	0.676	0.704	0.999	1.086	1.181	1.135	1.383	1.088	1.180	1.137	1.421	ns
	GCLK PLL	t <sub>su</sub>	1.061	1.075	1.749	1.980	2.207	2.092	2.009	1.998	2.227	2.110	2.057	ns
		t <sub>h</sub>	-0.819	-0.822	-1.367	-1.555	-1.729	-1.642	-1.557	-1.563	-1.740	-1.651	-1.602	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.566	-0.581	-0.825	-0.893	-0.967	-0.932	-1.181	-0.885	-0.956	-0.924	-1.218	ns
		t <sub>h</sub>	0.676	0.704	0.999	1.086	1.181	1.135	1.383	1.088	1.180	1.137	1.421	ns
	GCLK PLL	t <sub>su</sub>	1.061	1.075	1.749	1.980	2.207	2.092	2.009	1.998	2.227	2.110	2.057	ns
		t <sub>h</sub>	-0.819	-0.822	-1.367	-1.555	-1.729	-1.642	-1.557	-1.563	-1.740	-1.651	-1.602	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.580	-0.593	-0.838	-0.903	-0.985	-0.950	-1.199	-0.896	-0.973	-0.941	-1.235	ns
		t <sub>h</sub>	0.690	0.716	1.011	1.096	1.199	1.153	1.401	1.099	1.197	1.154	1.438	ns
	GCLK PLL	t <sub>su</sub>	1.047	1.063	1.736	1.970	2.189	2.074	1.991	1.987	2.210	2.093	2.040	ns
		t <sub>h</sub>	-0.805	-0.810	-1.355	-1.545	-1.711	-1.624	-1.539	-1.552	-1.723	-1.634	-1.585	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.580	-0.593	-0.838	-0.903	-0.985	-0.950	-1.199	-0.896	-0.973	-0.941	-1.235	ns
		t <sub>h</sub>	0.690	0.716	1.011	1.096	1.199	1.153	1.401	1.099	1.197	1.154	1.438	ns
	GCLK PLL	t <sub>su</sub>	1.047	1.063	1.736	1.970	2.189	2.074	1.991	1.987	2.210	2.093	2.040	ns
		t <sub>h</sub>	-0.805	-0.810	-1.355	-1.545	-1.711	-1.624	-1.539	-1.552	-1.723	-1.634	-1.585	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.579	-0.592	-0.843	-0.909	-0.986	-0.952	-1.200	-0.897	-0.969	-0.939	-1.232	ns
		t <sub>h</sub>	0.689	0.715	1.016	1.104	1.203	1.157	1.406	1.103	1.196	1.153	1.439	ns
	GCLK PLL	t <sub>su</sub>	1.038	1.054	1.721	1.954	2.178	2.062	1.980	1.976	2.204	2.085	2.033	ns
		t <sub>h</sub>	-0.796	-0.801	-1.340	-1.527	-1.697	-1.610	-1.524	-1.538	-1.714	-1.625	-1.574	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.579	-0.592	-0.843	-0.909	-0.986	-0.952	-1.200	-0.897	-0.969	-0.939	-1.232	ns
		t <sub>h</sub>	0.689	0.715	1.016	1.104	1.203	1.157	1.406	1.103	1.196	1.153	1.439	ns
	GCLK PLL	t <sub>su</sub>	1.038	1.054	1.721	1.954	2.178	2.062	1.980	1.976	2.204	2.085	2.033	ns
		t <sub>h</sub>	-0.796	-0.801	-1.340	-1.527	-1.697	-1.610	-1.524	-1.538	-1.714	-1.625	-1.574	ns

Table 1-116 specifies EP3SE50 Column Pins Output Timing parameters for differential I/O standards.

**Table 1-116.** EP3SE50 Column Pins Output Timing Parameters (Part 1 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS_E_1R	—	GCLK	t <sub>co</sub>	2.907	3.109	4.373	4.749	5.235	5.107	5.314	4.862	5.348	5.221	5.380	ns
		GCLK PLL	t <sub>co</sub>	1.373	1.544	1.969	2.068	2.285	2.290	2.334	2.170	2.387	2.395	2.319	ns
LVDS_E_3R	—	GCLK	t <sub>co</sub>	2.903	3.112	4.420	4.804	5.297	5.169	5.376	4.921	5.414	5.287	5.446	ns
		GCLK PLL	t <sub>co</sub>	1.369	1.547	2.016	2.123	2.347	2.352	2.396	2.229	2.453	2.461	2.385	ns
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	2.907	3.109	4.373	4.749	5.235	5.107	5.314	4.862	5.348	5.221	5.380	ns
		GCLK PLL	t <sub>co</sub>	1.373	1.544	1.969	2.068	2.285	2.290	2.334	2.170	2.387	2.395	2.319	ns
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	2.903	3.112	4.420	4.804	5.297	5.169	5.376	4.921	5.414	5.287	5.446	ns
		GCLK PLL	t <sub>co</sub>	1.369	1.547	2.016	2.123	2.347	2.352	2.396	2.229	2.453	2.461	2.385	ns
RSDS_E_1R	—	GCLK	t <sub>co</sub>	2.907	3.109	4.373	4.749	5.235	5.107	5.314	4.862	5.348	5.221	5.380	ns
		GCLK PLL	t <sub>co</sub>	1.373	1.544	1.969	2.068	2.285	2.290	2.334	2.170	2.387	2.395	2.319	ns
RSDS_E_3R	—	GCLK	t <sub>co</sub>	2.903	3.112	4.420	4.804	5.297	5.169	5.376	4.921	5.414	5.287	5.446	ns
		GCLK PLL	t <sub>co</sub>	1.369	1.547	2.016	2.123	2.347	2.352	2.396	2.229	2.453	2.461	2.385	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.934	3.142	4.444	4.827	5.319	5.191	5.398	4.942	5.434	5.307	5.466	ns
		GCLK PLL	t <sub>co</sub>	1.400	1.577	2.040	2.146	2.369	2.374	2.418	2.250	2.473	2.481	2.405	ns
	6mA	GCLK	t <sub>co</sub>	2.924	3.132	4.434	4.816	5.309	5.181	5.388	4.931	5.424	5.297	5.456	ns
		GCLK PLL	t <sub>co</sub>	1.390	1.567	2.030	2.135	2.359	2.364	2.408	2.239	2.463	2.471	2.395	ns
	8mA	GCLK	t <sub>co</sub>	2.924	3.132	4.437	4.820	5.313	5.185	5.392	4.936	5.429	5.302	5.461	ns
		GCLK PLL	t <sub>co</sub>	1.390	1.567	2.033	2.139	2.363	2.368	2.412	2.244	2.468	2.476	2.400	ns
	10mA	GCLK	t <sub>co</sub>	2.917	3.126	4.430	4.814	5.307	5.179	5.386	4.929	5.423	5.296	5.455	ns
		GCLK PLL	t <sub>co</sub>	1.383	1.561	2.026	2.133	2.357	2.362	2.406	2.237	2.462	2.470	2.394	ns
	12mA	GCLK	t <sub>co</sub>	2.916	3.124	4.427	4.811	5.304	5.176	5.383	4.926	5.419	5.292	5.451	ns
		GCLK PLL	t <sub>co</sub>	1.382	1.559	2.023	2.130	2.354	2.359	2.403	2.234	2.458	2.466	2.390	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.938	3.146	4.448	4.831	5.323	5.195	5.402	4.946	5.439	5.312	5.471	ns
		GCLK PLL	t <sub>co</sub>	1.404	1.581	2.044	2.150	2.373	2.378	2.422	2.254	2.478	2.486	2.410	ns

**Table 1-116.** EP3SE50 Column Pins Output Timing Parameters (Part 2 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.928	3.135	4.427	4.808	5.298	5.170	5.377	4.922	5.412	5.285	5.444	ns
		GCLK PLL	t <sub>co</sub>	1.394	1.570	2.023	2.127	2.348	2.353	2.397	2.230	2.451	2.459	2.383	ns
	6mA	GCLK	t <sub>co</sub>	2.923	3.131	4.427	4.808	5.299	5.171	5.378	4.923	5.414	5.287	5.446	ns
		GCLK PLL	t <sub>co</sub>	1.389	1.566	2.023	2.127	2.349	2.354	2.398	2.231	2.453	2.461	2.385	ns
	8mA	GCLK	t <sub>co</sub>	2.921	3.129	4.426	4.807	5.297	5.169	5.376	4.922	5.413	5.286	5.445	ns
		GCLK PLL	t <sub>co</sub>	1.387	1.564	2.022	2.126	2.347	2.352	2.396	2.230	2.452	2.460	2.384	ns
	10mA	GCLK	t <sub>co</sub>	2.913	3.120	4.416	4.797	5.288	5.160	5.367	4.912	5.403	5.276	5.435	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.555	2.012	2.116	2.338	2.343	2.387	2.220	2.442	2.450	2.374	ns
12mA	GCLK	t <sub>co</sub>	2.914	3.122	4.422	4.804	5.296	5.168	5.375	4.920	5.412	5.285	5.444	ns	
	GCLK PLL	t <sub>co</sub>	1.380	1.557	2.018	2.123	2.346	2.351	2.395	2.228	2.451	2.459	2.383	ns	
DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.913	3.119	4.405	4.785	5.274	5.146	5.353	4.899	5.388	5.261	5.420	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.554	2.001	2.104	2.324	2.329	2.373	2.207	2.427	2.435	2.359	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.925	3.132	4.423	4.803	5.292	5.164	5.371	4.918	5.407	5.280	5.439	ns
		GCLK PLL	t <sub>co</sub>	1.391	1.567	2.019	2.122	2.342	2.347	2.391	2.226	2.446	2.454	2.378	ns
	6mA	GCLK	t <sub>co</sub>	2.921	3.129	4.424	4.805	5.296	5.168	5.375	4.920	5.411	5.284	5.443	ns
		GCLK PLL	t <sub>co</sub>	1.387	1.564	2.020	2.124	2.346	2.351	2.395	2.228	2.450	2.458	2.382	ns
	8mA	GCLK	t <sub>co</sub>	2.911	3.118	4.413	4.794	5.284	5.156	5.363	4.909	5.399	5.272	5.431	ns
		GCLK PLL	t <sub>co</sub>	1.377	1.553	2.009	2.113	2.334	2.339	2.383	2.217	2.438	2.446	2.370	ns
	10mA	GCLK	t <sub>co</sub>	2.909	3.116	4.411	4.791	5.282	5.154	5.361	4.907	5.397	5.270	5.429	ns
		GCLK PLL	t <sub>co</sub>	1.375	1.551	2.007	2.110	2.332	2.337	2.381	2.215	2.436	2.444	2.368	ns
12mA	GCLK	t <sub>co</sub>	2.909	3.117	4.414	4.796	5.287	5.159	5.366	4.911	5.403	5.276	5.435	ns	
	GCLK PLL	t <sub>co</sub>	1.375	1.552	2.010	2.115	2.337	2.342	2.386	2.219	2.442	2.450	2.374	ns	
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.913	3.120	4.411	4.791	5.281	5.153	5.360	4.906	5.396	5.269	5.428	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.555	2.007	2.110	2.331	2.336	2.380	2.214	2.435	2.443	2.367	ns

**Table 1-116.** EP3SE50 Column Pins Output Timing Parameters (Part 3 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.939	3.149	4.456	4.839	5.331	5.203	5.410	4.954	5.446	5.319	5.478	ns	
		GCLK PLL	t <sub>co</sub>	1.405	1.584	2.052	2.158	2.381	2.386	2.430	2.262	2.485	2.493	2.417	ns	
	6mA	GCLK	t <sub>co</sub>	2.925	3.135	4.444	4.828	5.321	5.193	5.400	4.944	5.437	5.310	5.469	ns	
		GCLK PLL	t <sub>co</sub>	1.391	1.570	2.040	2.147	2.371	2.376	2.420	2.252	2.476	2.484	2.408	ns	
	8mA	GCLK	t <sub>co</sub>	2.913	3.122	4.427	4.810	5.303	5.175	5.382	4.926	5.419	5.292	5.451	ns	
		GCLK PLL	t <sub>co</sub>	1.379	1.557	2.023	2.129	2.353	2.358	2.402	2.234	2.458	2.466	2.390	ns	
	10mA	GCLK	t <sub>co</sub>	2.913	3.122	4.430	4.814	5.307	5.179	5.386	4.930	5.424	5.297	5.456	ns	
		GCLK PLL	t <sub>co</sub>	1.379	1.557	2.026	2.133	2.357	2.362	2.406	2.238	2.463	2.471	2.395	ns	
	12mA	GCLK	t <sub>co</sub>	2.909	3.118	4.423	4.806	5.300	5.172	5.379	4.923	5.416	5.289	5.448	ns	
		GCLK PLL	t <sub>co</sub>	1.375	1.553	2.019	2.125	2.350	2.355	2.399	2.231	2.455	2.463	2.387	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	2.913	3.120	4.416	4.797	5.288	5.160	5.367	4.912	5.403	5.276	5.435	ns
			GCLK PLL	t <sub>co</sub>	1.379	1.555	2.012	2.116	2.338	2.343	2.387	2.220	2.442	2.450	2.374	ns
16mA		GCLK	t <sub>co</sub>	2.914	3.122	4.424	4.807	5.299	5.171	5.378	4.922	5.415	5.288	5.447	ns	
		GCLK PLL	t <sub>co</sub>	1.380	1.557	2.020	2.126	2.349	2.354	2.398	2.230	2.454	2.462	2.386	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.942	3.152	4.455	4.837	5.329	5.201	5.408	4.953	5.444	5.317	5.476	ns	
		GCLK PLL	t <sub>co</sub>	1.408	1.587	2.051	2.156	2.379	2.384	2.428	2.261	2.483	2.491	2.415	ns	
	6mA	GCLK	t <sub>co</sub>	2.931	3.140	4.443	4.825	5.317	5.189	5.396	4.941	5.432	5.305	5.464	ns	
		GCLK PLL	t <sub>co</sub>	1.397	1.575	2.039	2.144	2.367	2.372	2.416	2.249	2.471	2.479	2.403	ns	
	8mA	GCLK	t <sub>co</sub>	2.926	3.136	4.443	4.826	5.318	5.190	5.397	4.942	5.434	5.307	5.466	ns	
		GCLK PLL	t <sub>co</sub>	1.392	1.571	2.039	2.145	2.368	2.373	2.417	2.250	2.473	2.481	2.405	ns	
	10mA	GCLK	t <sub>co</sub>	2.912	3.121	4.425	4.807	5.299	5.171	5.378	4.923	5.416	5.289	5.448	ns	
		GCLK PLL	t <sub>co</sub>	1.378	1.556	2.021	2.126	2.349	2.354	2.398	2.231	2.455	2.463	2.387	ns	
	12mA	GCLK	t <sub>co</sub>	2.910	3.119	4.423	4.805	5.297	5.169	5.376	4.921	5.413	5.286	5.445	ns	
		GCLK PLL	t <sub>co</sub>	1.376	1.554	2.019	2.124	2.347	2.352	2.396	2.229	2.452	2.460	2.384	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	2.914	3.121	4.415	4.795	5.285	5.157	5.364	4.910	5.400	5.273	5.432	ns
			GCLK PLL	t <sub>co</sub>	1.380	1.556	2.011	2.114	2.335	2.340	2.384	2.218	2.439	2.447	2.371	ns
16mA		GCLK	t <sub>co</sub>	2.914	3.122	4.423	4.805	5.297	5.169	5.376	4.921	5.413	5.286	5.445	ns	
		GCLK PLL	t <sub>co</sub>	1.380	1.557	2.019	2.124	2.347	2.352	2.396	2.229	2.452	2.460	2.384	ns	



**Table 1-116.** EP3SE50 Column Pins Output Timing Parameters (Part 4 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.930	3.139	4.439	4.820	5.311	5.183	5.390	4.936	5.426	5.299	5.458	ns
		GCLK PLL	t <sub>co</sub>	1.396	1.574	2.035	2.139	2.361	2.366	2.410	2.244	2.465	2.473	2.397	ns
	10mA	GCLK	t <sub>co</sub>	2.930	3.139	4.439	4.820	5.311	5.183	5.390	4.936	5.426	5.299	5.458	ns
		GCLK PLL	t <sub>co</sub>	1.396	1.574	2.035	2.139	2.361	2.366	2.410	2.244	2.465	2.473	2.397	ns
	12mA	GCLK	t <sub>co</sub>	2.920	3.129	4.429	4.810	5.301	5.173	5.380	4.926	5.417	5.290	5.449	ns
		GCLK PLL	t <sub>co</sub>	1.386	1.564	2.025	2.129	2.351	2.356	2.400	2.234	2.456	2.464	2.388	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.913	3.121	4.415	4.795	5.285	5.157	5.364	4.910	5.400	5.273	5.432	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.556	2.011	2.114	2.335	2.340	2.384	2.218	2.439	2.447	2.371	ns

Table 1-117 specifies EP3SE50 Row Pins Output Timing parameters for differential I/O standards.

**Table 1-117.** EP3SE50 Row Pins output Timing Parameters (Part 1 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
LVDS	—	GCLK	t <sub>co</sub>	2.462	2.615	3.656	3.986	4.422	4.305	4.488	4.075	4.513	4.396	4.539	ns
		GCLK PLL	t <sub>co</sub>	0.983	1.105	1.308	1.363	1.530	1.547	1.568	1.443	1.611	1.628	1.536	ns
LVDS_E_1R	—	GCLK	t <sub>co</sub>	2.864	3.069	4.337	4.712	5.195	5.070	5.245	4.826	5.311	5.185	5.312	ns
		GCLK PLL	t <sub>co</sub>	1.375	1.549	1.979	2.079	2.293	2.302	2.315	2.184	2.399	2.407	2.299	ns
LVDS_E_3R	—	GCLK	t <sub>co</sub>	2.846	3.059	4.375	4.758	5.249	5.124	5.299	4.877	5.372	5.246	5.373	ns
		GCLK PLL	t <sub>co</sub>	1.357	1.539	2.017	2.125	2.347	2.356	2.369	2.235	2.460	2.468	2.360	ns
MINI-LVDS	—	GCLK	t <sub>co</sub>	2.462	2.615	3.656	3.986	4.422	4.305	4.488	4.075	4.513	4.396	4.539	ns
		GCLK PLL	t <sub>co</sub>	0.983	1.105	1.308	1.363	1.530	1.547	1.568	1.443	1.611	1.628	1.536	ns
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	2.864	3.069	4.337	4.712	5.195	5.070	5.245	4.826	5.311	5.185	5.312	ns
		GCLK PLL	t <sub>co</sub>	1.375	1.549	1.979	2.079	2.293	2.302	2.315	2.184	2.399	2.407	2.299	ns
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	2.846	3.059	4.375	4.758	5.249	5.124	5.299	4.877	5.372	5.246	5.373	ns
		GCLK PLL	t <sub>co</sub>	1.357	1.539	2.017	2.125	2.347	2.356	2.369	2.235	2.460	2.468	2.360	ns
RSDS	—	GCLK	t <sub>co</sub>	2.462	2.615	3.656	3.986	4.422	4.305	4.488	4.075	4.513	4.396	4.539	ns
		GCLK PLL	t <sub>co</sub>	0.983	1.105	1.308	1.363	1.530	1.547	1.568	1.443	1.611	1.628	1.536	ns

**Table 1-117.** EP3SE50 Row Pins output Timing Parameters (Part 2 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	
RSDS_E_1R	—	GCLK	t <sub>co</sub>	2.864	3.069	4.337	4.712	5.195	5.070	5.245	4.826	5.311	5.185	5.312	ns
			t <sub>co</sub>	1.375	1.549	1.979	2.079	2.293	2.302	2.315	2.184	2.399	2.407	2.299	ns
RSDS_E_3R	—	GCLK	t <sub>co</sub>	2.846	3.059	4.375	4.758	5.249	5.124	5.299	4.877	5.372	5.246	5.373	ns
			t <sub>co</sub>	1.357	1.539	2.017	2.125	2.347	2.356	2.369	2.235	2.460	2.468	2.360	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.900	3.112	4.421	4.802	5.292	5.167	5.342	4.920	5.411	5.285	5.412	ns
			t <sub>co</sub>	1.401	1.582	2.053	2.159	2.380	2.389	2.402	2.268	2.489	2.497	2.389	ns
	6mA	GCLK	t <sub>co</sub>	2.886	3.098	4.408	4.789	5.279	5.154	5.329	4.906	5.398	5.272	5.399	ns
			t <sub>co</sub>	1.387	1.568	2.040	2.146	2.367	2.376	2.389	2.254	2.476	2.484	2.376	ns
	8mA	GCLK	t <sub>co</sub>	2.882	3.094	4.406	4.789	5.280	5.155	5.330	4.906	5.400	5.274	5.401	ns
			t <sub>co</sub>	1.383	1.564	2.038	2.146	2.368	2.377	2.390	2.254	2.478	2.486	2.378	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.898	3.109	4.407	4.786	5.274	5.149	5.324	4.903	5.393	5.267	5.394	ns
			t <sub>co</sub>	1.399	1.579	2.039	2.143	2.362	2.371	2.384	2.251	2.471	2.479	2.371	ns
	6mA	GCLK	t <sub>co</sub>	2.887	3.099	4.403	4.782	5.271	5.146	5.321	4.900	5.390	5.264	5.391	ns
			t <sub>co</sub>	1.388	1.569	2.035	2.139	2.359	2.368	2.381	2.248	2.468	2.476	2.368	ns
	8mA	GCLK	t <sub>co</sub>	2.884	3.096	4.401	4.780	5.269	5.144	5.319	4.898	5.389	5.263	5.390	ns
			t <sub>co</sub>	1.385	1.566	2.033	2.137	2.357	2.366	2.379	2.246	2.467	2.475	2.367	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.895	3.106	4.402	4.781	5.268	5.143	5.318	4.898	5.387	5.261	5.388	ns
			t <sub>co</sub>	1.396	1.576	2.034	2.138	2.356	2.365	2.378	2.246	2.465	2.473	2.365	ns
	6mA	GCLK	t <sub>co</sub>	2.885	3.097	4.400	4.779	5.267	5.142	5.317	4.897	5.387	5.261	5.388	ns
			t <sub>co</sub>	1.386	1.567	2.032	2.136	2.355	2.364	2.377	2.245	2.465	2.473	2.365	ns
	8mA	GCLK	t <sub>co</sub>	2.871	3.083	4.385	4.764	5.253	5.128	5.303	4.882	5.372	5.246	5.373	ns
			t <sub>co</sub>	1.372	1.553	2.017	2.121	2.341	2.350	2.363	2.230	2.450	2.458	2.350	ns
	10mA	GCLK	t <sub>co</sub>	2.868	3.079	4.381	4.760	5.249	5.124	5.299	4.878	5.368	5.242	5.369	ns
			t <sub>co</sub>	1.369	1.549	2.013	2.117	2.337	2.346	2.359	2.226	2.446	2.454	2.346	ns
12mA	GCLK	t <sub>co</sub>	2.865	3.077	4.382	4.763	5.252	5.127	5.302	4.881	5.372	5.246	5.373	ns	
		t <sub>co</sub>	1.366	1.547	2.014	2.120	2.340	2.349	2.362	2.229	2.450	2.458	2.350	ns	

**Table 1-117.** EP3SE50 Row Pins output Timing Parameters (Part 3 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	2.866	3.077	4.372	4.751	5.239	5.114	5.289	4.868	5.358	5.232	5.359	ns	
		GCLK PLL	t <sub>co</sub>	1.367	1.547	2.004	2.108	2.327	2.336	2.349	2.216	2.436	2.444	2.336	ns	
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.915	3.130	4.443	4.824	5.315	5.190	5.365	4.942	5.434	5.308	5.435	ns	
		GCLK PLL	t <sub>co</sub>	1.416	1.600	2.075	2.181	2.403	2.412	2.425	2.290	2.512	2.520	2.412	ns	
	6mA	GCLK	t <sub>co</sub>	2.891	3.106	4.425	4.807	5.298	5.173	5.348	4.925	5.419	5.293	5.420	ns	
		GCLK PLL	t <sub>co</sub>	1.392	1.576	2.057	2.164	2.386	2.395	2.408	2.273	2.497	2.505	2.397	ns	
	8mA	GCLK	t <sub>co</sub>	2.874	3.087	4.403	4.785	5.276	5.151	5.326	4.903	5.397	5.271	5.398	ns	
		GCLK PLL	t <sub>co</sub>	1.375	1.557	2.035	2.142	2.364	2.373	2.386	2.251	2.475	2.483	2.375	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	2.919	3.133	4.443	4.824	5.314	5.189	5.364	4.942	5.434	5.308	5.435	ns	
		GCLK PLL	t <sub>co</sub>	1.420	1.603	2.075	2.181	2.402	2.411	2.424	2.290	2.512	2.520	2.412	ns	
	6mA	GCLK	t <sub>co</sub>	2.904	3.118	4.429	4.809	5.299	5.174	5.349	4.927	5.419	5.293	5.420	ns	
		GCLK PLL	t <sub>co</sub>	1.405	1.588	2.061	2.166	2.387	2.396	2.409	2.275	2.497	2.505	2.397	ns	
	8mA	GCLK	t <sub>co</sub>	2.893	3.107	4.424	4.806	5.296	5.171	5.346	4.924	5.417	5.291	5.418	ns	
		GCLK PLL	t <sub>co</sub>	1.394	1.577	2.056	2.163	2.384	2.393	2.406	2.272	2.495	2.503	2.395	ns	
	10mA	GCLK	t <sub>co</sub>	2.873	3.087	4.401	4.782	5.273	5.148	5.323	4.901	5.393	5.267	5.394	ns	
		GCLK PLL	t <sub>co</sub>	1.374	1.557	2.033	2.139	2.361	2.370	2.383	2.249	2.471	2.479	2.371	ns	
	12mA	GCLK	t <sub>co</sub>	2.870	3.083	4.397	4.779	5.269	5.144	5.319	4.897	5.390	5.264	5.391	ns	
		GCLK PLL	t <sub>co</sub>	1.371	1.553	2.029	2.136	2.357	2.366	2.379	2.245	2.468	2.476	2.368	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	2.875	3.087	4.388	4.767	5.255	5.130	5.305	4.884	5.374	5.248	5.375	ns
			GCLK PLL	t <sub>co</sub>	1.376	1.557	2.020	2.124	2.343	2.352	2.365	2.232	2.452	2.460	2.352	ns
16mA		GCLK	t <sub>co</sub>	2.868	3.080	4.387	4.768	5.258	5.133	5.308	4.887	5.379	5.253	5.380	ns	
		GCLK PLL	t <sub>co</sub>	1.369	1.550	2.019	2.125	2.346	2.355	2.368	2.235	2.457	2.465	2.357	ns	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	2.896	3.109	4.415	4.795	5.284	5.159	5.334	4.913	5.404	5.278	5.405	ns	
		GCLK PLL	t <sub>co</sub>	1.407	1.589	2.057	2.162	2.382	2.391	2.404	2.271	2.492	2.500	2.392	ns	
	12mA	GCLK	t <sub>co</sub>	2.878	3.092	4.400	4.780	5.269	5.144	5.319	4.898	5.389	5.263	5.390	ns	
		GCLK PLL	t <sub>co</sub>	1.389	1.572	2.042	2.147	2.367	2.376	2.389	2.256	2.477	2.485	2.377	ns	

**Table 1–117.** EP3SE50 Row Pins output Timing Parameters (Part 4 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	2.864	3.076	4.377	4.756	5.244	5.119	5.294	4.874	5.364	5.238	5.365	ns
		GCLK PLL	$t_{co}$	1.375	1.556	2.019	2.123	2.342	2.351	2.364	2.232	2.452	2.460	2.352	ns

Table 1–118 and Table 1–119 show EP3SE50 regional clock (RCLK) adder values that should be added to GCLK values. These adder values are used to determine I/O timing when I/O pin is driven using regional clock. This applies for all I/O standards supported by Stratix III devices.

Table 1–118 specifies EP3SE50 Column Pin delay adders when using the regional clock in Stratix III devices.

**Table 1–118.** EP3SE50 Column Pin Delay Adders for Regional Clock - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
RCLK input adder	0.015	0.012	0.011	0.006	-0.004	0.001	0.05	0.002	0.008	0.007	0.024	ns
RCLK PLL input adder	2.069	2.092	3.193	3.551	3.907	3.729	4.124	3.55	3.92	3.738	4.182	ns
RCLK output adder	-0.218	0.006	0.018	0.027	0.041	0.033	-0.013	0.139	0.154	0.152	0.052	ns
RCLK PLL output adder	-0.279	0.165	-0.299	-0.285	-0.326	-0.236	0.124	-0.042	-0.266	0.06	0.018	ns

Table 1–119 specifies EP3SE50 Row Pin delay adders when using the regional clock in Stratix III devices.

**Table 1–119.** EP3SE50 Row Pin Delay Adders for Regional Clock - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
RCLK input adder	-0.07	-0.078	-0.103	-0.119	-0.139	-0.13	-0.088	-0.131	-0.152	-0.142	-0.085	ns
RCLK PLL input adder	0.138	0.135	0.214	0.245	0.273	0.258	0.448	0.232	0.259	0.245	0.448	ns
RCLK output adder	0.087	0.095	0.133	0.153	0.177	0.166	0.123	0.167	0.191	0.18	0.12	ns
RCLK PLL output adder	-0.109	-0.103	-0.172	-0.196	-0.222	-0.208	-0.382	-0.181	-0.205	-0.192	-0.384	ns

### EP3SE80 I/O Timing Parameters

Table 1-120 through Table 1-123 show the maximum I/O timing parameters for EP3SE80 devices for single-ended I/O standards.

Table 1-120 specifies EP3SE80 column pins input timing parameters for single-ended I/O standards.

**Table 1-120.** EP3SE80 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-1.054	-1.054	-1.505	-1.636	-1.872	-1.819	-2.173	-1.636	-1.872	-1.819	-2.173	ns
		t <sub>h</sub>	1.195	1.195	1.704	1.861	2.117	2.050	2.409	1.861	2.117	2.050	2.409	ns
	GCLK PLL	t <sub>su</sub>	-1.307	-1.307	-1.870	-2.028	-2.321	-2.214	-2.661	-2.028	-2.321	-2.214	-2.661	ns
		t <sub>h</sub>	1.605	1.605	2.302	2.513	2.858	2.721	3.186	2.513	2.858	2.721	3.186	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-1.054	-1.054	-1.505	-1.636	-1.872	-1.819	-2.173	-1.636	-1.872	-1.819	-2.173	ns
		t <sub>h</sub>	1.195	1.195	1.704	1.861	2.117	2.050	2.409	1.861	2.117	2.050	2.409	ns
	GCLK PLL	t <sub>su</sub>	-1.307	-1.307	-1.870	-2.028	-2.321	-2.214	-2.661	-2.028	-2.321	-2.214	-2.661	ns
		t <sub>h</sub>	1.605	1.605	2.302	2.513	2.858	2.721	3.186	2.513	2.858	2.721	3.186	ns
3.0-V LVTTTL	GCLK	t <sub>su</sub>	-1.065	-1.065	-1.504	-1.638	-1.871	-1.818	-2.172	-1.638	-1.871	-1.818	-2.172	ns
		t <sub>h</sub>	1.206	1.206	1.703	1.863	2.116	2.049	2.408	1.863	2.116	2.049	2.408	ns
	GCLK PLL	t <sub>su</sub>	-1.318	-1.318	-1.869	-2.030	-2.320	-2.213	-2.660	-2.030	-2.320	-2.213	-2.660	ns
		t <sub>h</sub>	1.616	1.616	2.301	2.515	2.857	2.720	3.185	2.515	2.857	2.720	3.185	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-1.065	-1.065	-1.504	-1.638	-1.871	-1.818	-2.172	-1.638	-1.871	-1.818	-2.172	ns
		t <sub>h</sub>	1.206	1.206	1.703	1.863	2.116	2.049	2.408	1.863	2.116	2.049	2.408	ns
	GCLK PLL	t <sub>su</sub>	-1.318	-1.318	-1.869	-2.030	-2.320	-2.213	-2.660	-2.030	-2.320	-2.213	-2.660	ns
		t <sub>h</sub>	1.616	1.616	2.301	2.515	2.857	2.720	3.185	2.515	2.857	2.720	3.185	ns
2.5 V	GCLK	t <sub>su</sub>	-1.060	-1.060	-1.513	-1.650	-1.890	-1.837	-2.191	-1.650	-1.890	-1.837	-2.191	ns
		t <sub>h</sub>	1.201	1.201	1.712	1.875	2.135	2.068	2.427	1.875	2.135	2.068	2.427	ns
	GCLK PLL	t <sub>su</sub>	-1.313	-1.313	-1.878	-2.042	-2.339	-2.232	-2.679	-2.042	-2.339	-2.232	-2.679	ns
		t <sub>h</sub>	1.611	1.611	2.310	2.527	2.876	2.739	3.204	2.527	2.876	2.739	3.204	ns
1.8 V	GCLK	t <sub>su</sub>	-1.082	-1.082	-1.553	-1.686	-1.888	-1.835	-2.189	-1.686	-1.888	-1.835	-2.189	ns
		t <sub>h</sub>	1.225	1.225	1.752	1.911	2.133	2.066	2.425	1.911	2.133	2.066	2.425	ns
	GCLK PLL	t <sub>su</sub>	-1.335	-1.335	-1.918	-2.078	-2.337	-2.230	-2.677	-2.078	-2.337	-2.230	-2.677	ns
		t <sub>h</sub>	1.635	1.635	2.350	2.563	2.874	2.737	3.202	2.563	2.874	2.737	3.202	ns
1.5 V	GCLK	t <sub>su</sub>	-1.072	-1.072	-1.530	-1.654	-1.818	-1.765	-2.119	-1.654	-1.818	-1.765	-2.119	ns
		t <sub>h</sub>	1.215	1.215	1.729	1.879	2.063	1.996	2.355	1.879	2.063	1.996	2.355	ns
	GCLK PLL	t <sub>su</sub>	-1.325	-1.325	-1.895	-2.046	-2.267	-2.160	-2.607	-2.046	-2.267	-2.160	-2.607	ns
		t <sub>h</sub>	1.625	1.625	2.327	2.531	2.804	2.667	3.132	2.531	2.804	2.667	3.132	ns
1.2 V	GCLK	t <sub>su</sub>	-1.020	-1.020	-1.453	-1.555	-1.662	-1.609	-1.963	-1.555	-1.662	-1.609	-1.963	ns
		t <sub>h</sub>	1.163	1.163	1.652	1.780	1.907	1.840	2.199	1.780	1.907	1.840	2.199	ns
	GCLK PLL	t <sub>su</sub>	-1.273	-1.273	-1.818	-1.947	-2.111	-2.004	-2.451	-1.947	-2.111	-2.004	-2.451	ns
		t <sub>h</sub>	1.573	1.573	2.250	2.432	2.648	2.511	2.976	2.432	2.648	2.511	2.976	ns

**Table 1–120.** EP3SE80 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-0.991	-0.991	-1.425	-1.539	-1.664	-1.611	-1.965	-1.539	-1.664	-1.611	-1.965	ns
		t <sub>h</sub>	1.134	1.134	1.624	1.764	1.909	1.842	2.201	1.764	1.909	1.842	2.201	ns
	GCLK PLL	t <sub>su</sub>	-1.244	-1.244	-1.790	-1.931	-2.113	-2.006	-2.453	-1.931	-2.113	-2.006	-2.453	ns
		t <sub>h</sub>	1.544	1.544	2.222	2.416	2.650	2.513	2.978	2.416	2.650	2.513	2.978	ns
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-0.991	-0.991	-1.425	-1.539	-1.664	-1.611	-1.965	-1.539	-1.664	-1.611	-1.965	ns
		t <sub>h</sub>	1.134	1.134	1.624	1.764	1.909	1.842	2.201	1.764	1.909	1.842	2.201	ns
	GCLK PLL	t <sub>su</sub>	-1.244	-1.244	-1.790	-1.931	-2.113	-2.006	-2.453	-1.931	-2.113	-2.006	-2.453	ns
		t <sub>h</sub>	1.544	1.544	2.222	2.416	2.650	2.513	2.978	2.416	2.650	2.513	2.978	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-0.985	-0.985	-1.412	-1.531	-1.661	-1.606	-1.963	-1.531	-1.661	-1.606	-1.963	ns
		t <sub>h</sub>	1.128	1.128	1.611	1.753	1.903	1.836	2.194	1.753	1.903	1.836	2.194	ns
	GCLK PLL	t <sub>su</sub>	-1.238	-1.238	-1.777	-1.923	-2.110	-2.001	-2.451	-1.923	-2.110	-2.001	-2.451	ns
		t <sub>h</sub>	1.538	1.538	2.209	2.405	2.644	2.507	2.971	2.405	2.644	2.507	2.971	ns
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-0.985	-0.985	-1.412	-1.531	-1.661	-1.606	-1.963	-1.531	-1.661	-1.606	-1.963	ns
		t <sub>h</sub>	1.128	1.128	1.611	1.753	1.903	1.836	2.194	1.753	1.903	1.836	2.194	ns
	GCLK PLL	t <sub>su</sub>	-1.238	-1.238	-1.777	-1.923	-2.110	-2.001	-2.451	-1.923	-2.110	-2.001	-2.451	ns
		t <sub>h</sub>	1.538	1.538	2.209	2.405	2.644	2.507	2.971	2.405	2.644	2.507	2.971	ns
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-0.974	-0.974	-1.401	-1.520	-1.642	-1.587	-1.944	-1.520	-1.642	-1.587	-1.944	ns
		t <sub>h</sub>	1.117	1.117	1.599	1.742	1.884	1.817	2.175	1.742	1.884	1.817	2.175	ns
	GCLK PLL	t <sub>su</sub>	-1.227	-1.227	-1.766	-1.912	-2.091	-1.982	-2.432	-1.912	-2.091	-1.982	-2.432	ns
		t <sub>h</sub>	1.527	1.527	2.197	2.394	2.625	2.488	2.952	2.394	2.625	2.488	2.952	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.974	-0.974	-1.401	-1.520	-1.642	-1.587	-1.944	-1.520	-1.642	-1.587	-1.944	ns
		t <sub>h</sub>	1.117	1.117	1.599	1.742	1.884	1.817	2.175	1.742	1.884	1.817	2.175	ns
	GCLK PLL	t <sub>su</sub>	-1.227	-1.227	-1.766	-1.912	-2.091	-1.982	-2.432	-1.912	-2.091	-1.982	-2.432	ns
		t <sub>h</sub>	1.527	1.527	2.197	2.394	2.625	2.488	2.952	2.394	2.625	2.488	2.952	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.985	-0.985	-1.412	-1.531	-1.661	-1.606	-1.963	-1.531	-1.661	-1.606	-1.963	ns
		t <sub>h</sub>	1.128	1.128	1.611	1.753	1.903	1.836	2.194	1.753	1.903	1.836	2.194	ns
	GCLK PLL	t <sub>su</sub>	-1.238	-1.238	-1.777	-1.923	-2.110	-2.001	-2.451	-1.923	-2.110	-2.001	-2.451	ns
		t <sub>h</sub>	1.538	1.538	2.209	2.405	2.644	2.507	2.971	2.405	2.644	2.507	2.971	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.985	-0.985	-1.412	-1.531	-1.661	-1.606	-1.963	-1.531	-1.661	-1.606	-1.963	ns
		t <sub>h</sub>	1.128	1.128	1.611	1.753	1.903	1.836	2.194	1.753	1.903	1.836	2.194	ns
	GCLK PLL	t <sub>su</sub>	-1.238	-1.238	-1.777	-1.923	-2.110	-2.001	-2.451	-1.923	-2.110	-2.001	-2.451	ns
		t <sub>h</sub>	1.538	1.538	2.209	2.405	2.644	2.507	2.971	2.405	2.644	2.507	2.971	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.974	-0.974	-1.401	-1.520	-1.642	-1.587	-1.944	-1.520	-1.642	-1.587	-1.944	ns
		t <sub>h</sub>	1.117	1.117	1.599	1.742	1.884	1.817	2.175	1.742	1.884	1.817	2.175	ns
	GCLK PLL	t <sub>su</sub>	-1.227	-1.227	-1.766	-1.912	-2.091	-1.982	-2.432	-1.912	-2.091	-1.982	-2.432	ns
		t <sub>h</sub>	1.527	1.527	2.197	2.394	2.625	2.488	2.952	2.394	2.625	2.488	2.952	ns

**Table 1-120.** EP3SE80 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.974	-0.974	-1.401	-1.520	-1.642	-1.587	-1.944	-1.520	-1.642	-1.587	-1.944	ns
		t <sub>h</sub>	1.117	1.117	1.599	1.742	1.884	1.817	2.175	1.742	1.884	1.817	2.175	ns
	GCLK PLL	t <sub>su</sub>	-1.227	-1.227	-1.766	-1.912	-2.091	-1.982	-2.432	-1.912	-2.091	-1.982	-2.432	ns
		t <sub>h</sub>	1.527	1.527	2.197	2.394	2.625	2.488	2.952	2.394	2.625	2.488	2.952	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.962	-0.962	-1.391	-1.509	-1.626	-1.571	-1.928	-1.509	-1.626	-1.571	-1.928	ns
		t <sub>h</sub>	1.105	1.105	1.589	1.731	1.868	1.801	2.159	1.731	1.868	1.801	2.159	ns
	GCLK PLL	t <sub>su</sub>	-1.215	-1.215	-1.756	-1.901	-2.075	-1.966	-2.416	-1.901	-2.075	-1.966	-2.416	ns
		t <sub>h</sub>	1.515	1.515	2.187	2.383	2.609	2.472	2.936	2.383	2.609	2.472	2.936	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-0.962	-0.962	-1.391	-1.509	-1.626	-1.571	-1.928	-1.509	-1.626	-1.571	-1.928	ns
		t <sub>h</sub>	1.105	1.105	1.589	1.731	1.868	1.801	2.159	1.731	1.868	1.801	2.159	ns
	GCLK PLL	t <sub>su</sub>	-1.215	-1.215	-1.756	-1.901	-2.075	-1.966	-2.416	-1.901	-2.075	-1.966	-2.416	ns
		t <sub>h</sub>	1.515	1.515	2.187	2.383	2.609	2.472	2.936	2.383	2.609	2.472	2.936	ns
3.0-V PCI-X	GCLK	t <sub>su</sub>	-1.065	-1.065	-1.504	-1.638	-1.871	-1.818	-2.172	-1.638	-1.871	-1.818	-2.172	ns
		t <sub>h</sub>	1.206	1.206	1.703	1.863	2.116	2.049	2.408	1.863	2.116	2.049	2.408	ns
	GCLK PLL	t <sub>su</sub>	-1.318	-1.318	-1.869	-2.030	-2.320	-2.213	-2.660	-2.030	-2.320	-2.213	-2.660	ns
		t <sub>h</sub>	1.616	1.616	2.301	2.515	2.857	2.720	3.185	2.515	2.857	2.720	3.185	ns

Table 1-121 specifies EP3SE80 row pins input timing parameters for single-ended I/O standards.

**Table 1-121.** EP3SE80 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-0.922	-0.964	-1.369	-1.481	-1.595	-1.647	-1.890	-1.492	-1.697	-1.649	-1.929	ns
		t <sub>h</sub>	1.045	1.103	1.566	1.703	1.842	1.878	2.128	1.725	1.950	1.890	2.168	ns
	GCLK PLL	t <sub>su</sub>	1.087	1.110	1.770	2.000	1.985	2.004	1.799	2.012	2.003	2.024	1.850	ns
		t <sub>h</sub>	-0.825	-0.830	-1.353	-1.532	-1.470	-1.513	-1.300	-1.533	-1.477	-1.523	-1.349	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-0.922	-0.964	-1.369	-1.481	-1.595	-1.647	-1.890	-1.492	-1.697	-1.649	-1.929	ns
		t <sub>h</sub>	1.045	1.103	1.566	1.703	1.842	1.878	2.128	1.725	1.950	1.890	2.168	ns
	GCLK PLL	t <sub>su</sub>	1.087	1.110	1.770	2.000	1.985	2.004	1.799	2.012	2.003	2.024	1.850	ns
		t <sub>h</sub>	-0.825	-0.830	-1.353	-1.532	-1.470	-1.513	-1.300	-1.533	-1.477	-1.523	-1.349	ns
3.0-V LVTTTL	GCLK	t <sub>su</sub>	-0.928	-0.975	-1.366	-1.482	-1.598	-1.650	-1.893	-1.491	-1.702	-1.654	-1.934	ns
		t <sub>h</sub>	1.051	1.114	1.563	1.704	1.845	1.881	2.131	1.724	1.955	1.895	2.173	ns
	GCLK PLL	t <sub>su</sub>	1.081	1.099	1.773	1.999	1.982	2.001	1.796	2.013	1.998	2.019	1.845	ns
		t <sub>h</sub>	-0.819	-0.819	-1.356	-1.531	-1.467	-1.510	-1.297	-1.534	-1.472	-1.518	-1.344	ns

**Table 1–121.** EP3SE80 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-0.928	-0.975	-1.366	-1.482	-1.598	-1.650	-1.893	-1.491	-1.702	-1.654	-1.934	ns
		t <sub>h</sub>	1.051	1.114	1.563	1.704	1.845	1.881	2.131	1.724	1.955	1.895	2.173	ns
	GCLK PLL	t <sub>su</sub>	1.081	1.099	1.773	1.999	1.982	2.001	1.796	2.013	1.998	2.019	1.845	ns
		t <sub>h</sub>	-0.819	-0.819	-1.356	-1.531	-1.467	-1.510	-1.297	-1.534	-1.472	-1.518	-1.344	ns
2.5 V	GCLK	t <sub>su</sub>	-0.916	-0.968	-1.375	-1.495	-1.613	-1.665	-1.908	-1.500	-1.712	-1.664	-1.944	ns
		t <sub>h</sub>	1.039	1.107	1.572	1.717	1.860	1.896	2.146	1.733	1.965	1.905	2.183	ns
	GCLK PLL	t <sub>su</sub>	1.093	1.106	1.764	1.986	1.967	1.986	1.781	2.004	1.988	2.009	1.835	ns
		t <sub>h</sub>	-0.831	-0.826	-1.347	-1.518	-1.452	-1.495	-1.282	-1.525	-1.462	-1.508	-1.334	ns
1.8 V	GCLK	t <sub>su</sub>	-0.973	-1.027	-1.441	-1.555	-1.741	-1.689	-1.906	-1.560	-1.739	-1.691	-1.945	ns
		t <sub>h</sub>	1.097	1.167	1.638	1.777	1.984	1.920	2.144	1.792	1.992	1.931	2.184	ns
	GCLK PLL	t <sub>su</sub>	0.974	0.984	1.606	1.824	1.969	1.854	1.783	1.837	1.987	1.870	1.834	ns
		t <sub>h</sub>	-0.714	-0.705	-1.192	-1.359	-1.454	-1.366	-1.284	-1.362	-1.461	-1.373	-1.333	ns
1.5 V	GCLK	t <sub>su</sub>	-0.963	-1.016	-1.417	-1.523	-1.673	-1.621	-1.838	-1.529	-1.674	-1.626	-1.880	ns
		t <sub>h</sub>	1.087	1.156	1.614	1.745	1.916	1.852	2.076	1.761	1.927	1.866	2.119	ns
	GCLK PLL	t <sub>su</sub>	0.984	0.995	1.630	1.856	2.037	1.922	1.851	1.868	2.052	1.935	1.899	ns
		t <sub>h</sub>	-0.724	-0.716	-1.216	-1.391	-1.522	-1.434	-1.352	-1.393	-1.526	-1.438	-1.398	ns
1.2 V	GCLK	t <sub>su</sub>	-0.903	-0.963	-1.338	-1.422	-1.514	-1.462	-1.679	-1.433	-1.519	-1.471	-1.725	ns
		t <sub>h</sub>	1.027	1.103	1.535	1.644	1.757	1.693	1.917	1.665	1.772	1.711	1.964	ns
	GCLK PLL	t <sub>su</sub>	1.044	1.048	1.709	1.957	2.196	2.081	2.010	1.964	2.207	2.090	2.054	ns
		t <sub>h</sub>	-0.784	-0.769	-1.295	-1.492	-1.681	-1.593	-1.511	-1.489	-1.681	-1.593	-1.553	ns
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-0.859	-0.910	-1.289	-1.386	-1.393	-1.445	-1.688	-1.388	-1.495	-1.447	-1.727	ns
		t <sub>h</sub>	0.983	1.050	1.486	1.608	1.640	1.676	1.926	1.621	1.748	1.688	1.966	ns
	GCLK PLL	t <sub>su</sub>	1.151	1.165	1.850	2.095	2.187	2.206	2.001	2.116	2.205	2.226	2.052	ns
		t <sub>h</sub>	-0.888	-0.884	-1.433	-1.627	-1.672	-1.715	-1.502	-1.637	-1.679	-1.725	-1.551	ns
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-0.859	-0.910	-1.289	-1.386	-1.393	-1.445	-1.688	-1.388	-1.495	-1.447	-1.727	ns
		t <sub>h</sub>	0.983	1.050	1.486	1.608	1.640	1.676	1.926	1.621	1.748	1.688	1.966	ns
	GCLK PLL	t <sub>su</sub>	1.151	1.165	1.850	2.095	2.187	2.206	2.001	2.116	2.205	2.226	2.052	ns
		t <sub>h</sub>	-0.888	-0.884	-1.433	-1.627	-1.672	-1.715	-1.502	-1.637	-1.679	-1.725	-1.551	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-0.877	-0.928	-1.300	-1.395	-1.509	-1.456	-1.677	-1.401	-1.512	-1.463	-1.720	ns
		t <sub>h</sub>	1.001	1.068	1.497	1.615	1.750	1.686	1.911	1.631	1.762	1.702	1.955	ns
	GCLK PLL	t <sub>su</sub>	1.070	1.083	1.747	1.984	2.201	2.087	2.014	1.996	2.214	2.098	2.061	ns
		t <sub>h</sub>	-0.810	-0.804	-1.333	-1.521	-1.688	-1.600	-1.519	-1.523	-1.691	-1.602	-1.564	ns
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-0.877	-0.928	-1.300	-1.395	-1.509	-1.456	-1.677	-1.401	-1.512	-1.463	-1.720	ns
		t <sub>h</sub>	1.001	1.068	1.497	1.615	1.750	1.686	1.911	1.631	1.762	1.702	1.955	ns
	GCLK PLL	t <sub>su</sub>	1.070	1.083	1.747	1.984	2.201	2.087	2.014	1.996	2.214	2.098	2.061	ns
		t <sub>h</sub>	-0.810	-0.804	-1.333	-1.521	-1.688	-1.600	-1.519	-1.523	-1.691	-1.602	-1.564	ns



**Table 1-121.** EP3SE80 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-0.863	-0.916	-1.285	-1.385	-1.491	-1.438	-1.659	-1.390	-1.495	-1.446	-1.703	ns
		t <sub>h</sub>	0.987	1.056	1.483	1.605	1.732	1.668	1.893	1.620	1.745	1.685	1.938	ns
	GCLK PLL	t <sub>su</sub>	1.084	1.095	1.762	1.994	2.219	2.105	2.032	2.007	2.231	2.115	2.078	ns
		t <sub>h</sub>	-0.824	-0.816	-1.347	-1.531	-1.706	-1.618	-1.537	-1.534	-1.708	-1.619	-1.581	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.877	-0.928	-1.300	-1.395	-1.509	-1.456	-1.677	-1.401	-1.512	-1.463	-1.720	ns
		t <sub>h</sub>	1.001	1.068	1.497	1.615	1.750	1.686	1.911	1.631	1.762	1.702	1.955	ns
	GCLK PLL	t <sub>su</sub>	1.070	1.083	1.747	1.984	2.201	2.087	2.014	1.996	2.214	2.098	2.061	ns
		t <sub>h</sub>	-0.810	-0.804	-1.333	-1.521	-1.688	-1.600	-1.519	-1.523	-1.691	-1.602	-1.564	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.877	-0.928	-1.300	-1.395	-1.509	-1.456	-1.677	-1.401	-1.512	-1.463	-1.720	ns
		t <sub>h</sub>	1.001	1.068	1.497	1.615	1.750	1.686	1.911	1.631	1.762	1.702	1.955	ns
	GCLK PLL	t <sub>su</sub>	1.070	1.083	1.747	1.984	2.201	2.087	2.014	1.996	2.214	2.098	2.061	ns
		t <sub>h</sub>	-0.810	-0.804	-1.333	-1.521	-1.688	-1.600	-1.519	-1.523	-1.691	-1.602	-1.564	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.863	-0.916	-1.285	-1.385	-1.491	-1.438	-1.659	-1.390	-1.495	-1.446	-1.703	ns
		t <sub>h</sub>	0.987	1.056	1.483	1.605	1.732	1.668	1.893	1.620	1.745	1.685	1.938	ns
	GCLK PLL	t <sub>su</sub>	1.084	1.095	1.762	1.994	2.219	2.105	2.032	2.007	2.231	2.115	2.078	ns
		t <sub>h</sub>	-0.824	-0.816	-1.347	-1.531	-1.706	-1.618	-1.537	-1.534	-1.708	-1.619	-1.581	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.863	-0.916	-1.285	-1.385	-1.491	-1.438	-1.659	-1.390	-1.495	-1.446	-1.703	ns
		t <sub>h</sub>	0.987	1.056	1.483	1.605	1.732	1.668	1.893	1.620	1.745	1.685	1.938	ns
	GCLK PLL	t <sub>su</sub>	1.084	1.095	1.762	1.994	2.219	2.105	2.032	2.007	2.231	2.115	2.078	ns
		t <sub>h</sub>	-0.824	-0.816	-1.347	-1.531	-1.706	-1.618	-1.537	-1.534	-1.708	-1.619	-1.581	ns
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.854	-0.904	-1.276	-1.375	-1.475	-1.422	-1.643	-1.381	-1.479	-1.430	-1.687	ns
		t <sub>h</sub>	0.978	1.044	1.474	1.595	1.716	1.652	1.877	1.611	1.729	1.669	1.922	ns
	GCLK PLL	t <sub>su</sub>	1.093	1.107	1.771	2.004	2.235	2.121	2.048	2.016	2.247	2.131	2.094	ns
		t <sub>h</sub>	-0.833	-0.828	-1.356	-1.541	-1.722	-1.634	-1.553	-1.543	-1.724	-1.635	-1.597	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.854	-0.904	-1.276	-1.375	-1.475	-1.422	-1.643	-1.381	-1.479	-1.430	-1.687	ns
		t <sub>h</sub>	0.978	1.044	1.474	1.595	1.716	1.652	1.877	1.611	1.729	1.669	1.922	ns
	GCLK PLL	t <sub>su</sub>	1.093	1.107	1.771	2.004	2.235	2.121	2.048	2.016	2.247	2.131	2.094	ns
		t <sub>h</sub>	-0.833	-0.828	-1.356	-1.541	-1.722	-1.634	-1.553	-1.543	-1.724	-1.635	-1.597	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-0.928	-0.975	-1.366	-1.482	-1.598	-1.650	-1.893	-1.491	-1.702	-1.654	-1.934	ns
		t <sub>h</sub>	1.051	1.114	1.563	1.704	1.845	1.881	2.131	1.724	1.955	1.895	2.173	ns
	GCLK PLL	t <sub>su</sub>	1.081	1.099	1.773	1.999	1.982	2.001	1.796	2.013	1.998	2.019	1.845	ns
		t <sub>h</sub>	-0.819	-0.819	-1.356	-1.531	-1.467	-1.510	-1.297	-1.534	-1.472	-1.518	-1.344	ns
3.0-V PCI-X	GCLK	t <sub>su</sub>	-0.928	-0.975	-1.366	-1.482	-1.598	-1.650	-1.893	-1.491	-1.702	-1.654	-1.934	ns
		t <sub>h</sub>	1.051	1.114	1.563	1.704	1.845	1.881	2.131	1.724	1.955	1.895	2.173	ns
	GCLK PLL	t <sub>su</sub>	1.081	1.099	1.773	1.999	1.982	2.001	1.796	2.013	1.998	2.019	1.845	ns
		t <sub>h</sub>	-0.819	-0.819	-1.356	-1.531	-1.467	-1.510	-1.297	-1.534	-1.472	-1.518	-1.344	ns

Table 1-122 specifies EP3SE80 Column Pins Output Timing parameters for single-ended I/O standards.

**Table 1-122.** EP3SE80 Column Pins output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	
3.3-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.559	3.559	4.935	5.323	5.638	5.693	5.865	5.323	5.638	5.693	5.865	ns
		GCLK PLL	t <sub>co</sub>	3.859	3.865	5.394	5.826	6.396	6.210	6.631	5.826	6.396	6.210	6.631	ns
	8mA	GCLK	t <sub>co</sub>	3.442	3.442	4.781	5.161	5.525	5.523	5.752	5.161	5.525	5.523	5.752	ns
		GCLK PLL	t <sub>co</sub>	3.792	3.798	5.285	5.715	6.283	6.097	6.518	5.715	6.283	6.097	6.518	ns
	12mA	GCLK	t <sub>co</sub>	3.347	3.347	4.644	5.018	5.433	5.371	5.660	5.018	5.433	5.371	5.660	ns
		GCLK PLL	t <sub>co</sub>	3.706	3.712	5.181	5.616	6.191	6.005	6.426	5.616	6.191	6.005	6.426	ns
	16mA	GCLK	t <sub>co</sub>	3.302	3.302	4.619	4.994	5.392	5.346	5.619	4.994	5.392	5.346	5.619	ns
		GCLK PLL	t <sub>co</sub>	3.699	3.705	5.164	5.588	6.150	5.964	6.385	5.588	6.150	5.964	6.385	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.562	3.562	4.939	5.335	5.645	5.707	5.872	5.335	5.645	5.707	5.872	ns
		GCLK PLL	t <sub>co</sub>	3.865	3.871	5.398	5.831	6.403	6.217	6.638	5.831	6.403	6.217	6.638	ns
	8mA	GCLK	t <sub>co</sub>	3.362	3.362	4.649	5.023	5.444	5.377	5.671	5.023	5.444	5.377	5.671	ns
		GCLK PLL	t <sub>co</sub>	3.710	3.716	5.191	5.633	6.202	6.016	6.437	5.633	6.202	6.016	6.437	ns
	12mA	GCLK	t <sub>co</sub>	3.305	3.305	4.612	4.992	5.418	5.346	5.645	4.992	5.418	5.346	5.645	ns
		GCLK PLL	t <sub>co</sub>	3.717	3.723	5.185	5.612	6.176	5.990	6.411	5.612	6.176	5.990	6.411	ns
	16mA	GCLK	t <sub>co</sub>	3.285	3.285	4.558	4.934	5.389	5.289	5.616	4.934	5.389	5.289	5.616	ns
		GCLK PLL	t <sub>co</sub>	3.701	3.707	5.163	5.587	6.147	5.961	6.382	5.587	6.147	5.961	6.382	ns
3.0-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.504	3.504	4.884	5.274	5.605	5.658	5.832	5.274	5.605	5.658	5.832	ns
		GCLK PLL	t <sub>co</sub>	3.823	3.829	5.361	5.794	6.363	6.177	6.598	5.794	6.363	6.177	6.598	ns
	8mA	GCLK	t <sub>co</sub>	3.374	3.374	4.715	5.102	5.468	5.497	5.693	5.102	5.468	5.497	5.693	ns
		GCLK PLL	t <sub>co</sub>	3.712	3.718	5.231	5.660	6.225	6.041	6.459	5.660	6.225	6.041	6.459	ns
	12mA	GCLK	t <sub>co</sub>	3.299	3.299	4.626	5.003	5.394	5.395	5.620	5.003	5.394	5.395	5.620	ns
		GCLK PLL	t <sub>co</sub>	3.676	3.682	5.168	5.591	6.151	5.967	6.386	5.591	6.151	5.967	6.386	ns
	16mA	GCLK	t <sub>co</sub>	3.262	3.262	4.561	4.934	5.365	5.345	5.592	4.934	5.365	5.345	5.592	ns
		GCLK PLL	t <sub>co</sub>	3.658	3.664	5.139	5.563	6.123	5.937	6.358	5.563	6.123	5.937	6.358	ns

**Table 1-122.** EP3SE80 Column Pins output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 0.9V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 0.9V	
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.412	3.412	4.773	5.155	5.503	5.551	5.728	5.155	5.503	5.551	5.728	ns
		GCLK PLL	t <sub>co</sub>	3.737	3.743	5.265	5.694	6.260	6.076	6.494	5.694	6.260	6.076	6.494	ns
	8mA	GCLK	t <sub>co</sub>	3.275	3.275	4.578	4.956	5.368	5.369	5.593	4.956	5.368	5.369	5.593	ns
		GCLK PLL	t <sub>co</sub>	3.658	3.664	5.141	5.565	6.125	5.941	6.359	5.565	6.125	5.941	6.359	ns
	12mA	GCLK	t <sub>co</sub>	3.245	3.245	4.532	4.904	5.359	5.300	5.586	4.904	5.359	5.300	5.586	ns
		GCLK PLL	t <sub>co</sub>	3.653	3.659	5.134	5.558	6.117	5.931	6.352	5.558	6.117	5.931	6.352	ns
	16mA	GCLK	t <sub>co</sub>	3.223	3.224	4.510	4.883	5.344	5.299	5.571	4.883	5.344	5.299	5.571	ns
		GCLK PLL	t <sub>co</sub>	3.644	3.650	5.120	5.543	6.102	5.916	6.337	5.543	6.102	5.916	6.337	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.559	3.559	5.027	5.434	5.750	5.833	5.976	5.434	5.750	5.833	5.976	ns
		GCLK PLL	t <sub>co</sub>	3.859	3.865	5.472	5.921	6.507	6.323	6.742	5.921	6.507	6.323	6.742	ns
	8mA	GCLK	t <sub>co</sub>	3.434	3.434	4.854	5.250	5.618	5.636	5.843	5.250	5.618	5.636	5.843	ns
		GCLK PLL	t <sub>co</sub>	3.759	3.765	5.353	5.795	6.375	6.191	6.609	5.795	6.375	6.191	6.609	ns
	12mA	GCLK	t <sub>co</sub>	3.334	3.334	4.725	5.114	5.522	5.496	5.749	5.114	5.522	5.496	5.749	ns
		GCLK PLL	t <sub>co</sub>	3.715	3.721	5.266	5.704	6.280	6.094	6.515	5.704	6.280	6.094	6.515	ns
	16mA	GCLK	t <sub>co</sub>	3.307	3.307	4.656	5.047	5.479	5.446	5.706	5.047	5.479	5.446	5.706	ns
		GCLK PLL	t <sub>co</sub>	3.677	3.683	5.227	5.662	6.237	6.051	6.472	5.662	6.237	6.051	6.472	ns

**Table 1-122.** EP3SE80 Column Pins output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 0.9V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 0.9V	
1.8 V	2mA	GCLK	t <sub>co</sub>	3.822	3.822	5.464	5.917	6.154	6.369	6.381	5.917	6.154	6.369	6.381	ns
		GCLK PLL	t <sub>co</sub>	4.050	4.056	5.793	6.281	6.912	6.726	7.147	6.281	6.912	6.726	7.147	ns
	4mA	GCLK	t <sub>co</sub>	3.581	3.581	5.104	5.511	5.807	5.909	6.032	5.511	5.807	5.909	6.032	ns
		GCLK PLL	t <sub>co</sub>	3.869	3.875	5.514	5.972	6.564	6.380	6.798	5.972	6.564	6.380	6.798	ns
	6mA	GCLK	t <sub>co</sub>	3.463	3.463	4.914	5.321	5.696	5.734	5.923	5.321	5.696	5.734	5.923	ns
		GCLK PLL	t <sub>co</sub>	3.787	3.793	5.407	5.857	6.454	6.268	6.689	5.857	6.454	6.268	6.689	ns
	8mA	GCLK	t <sub>co</sub>	3.409	3.409	4.814	5.223	5.630	5.622	5.857	5.223	5.630	5.622	5.857	ns
		GCLK PLL	t <sub>co</sub>	3.767	3.773	5.349	5.803	6.388	6.202	6.623	5.803	6.388	6.202	6.623	ns
	10mA	GCLK	t <sub>co</sub>	3.341	3.341	4.718	5.125	5.549	5.508	5.776	5.125	5.549	5.508	5.776	ns
		GCLK PLL	t <sub>co</sub>	3.704	3.710	5.288	5.728	6.307	6.121	6.542	5.728	6.307	6.121	6.542	ns
	12mA	GCLK	t <sub>co</sub>	3.317	3.317	4.685	5.078	5.526	5.470	5.753	5.078	5.526	5.470	5.753	ns
		GCLK PLL	t <sub>co</sub>	3.686	3.692	5.267	5.707	6.284	6.098	6.519	5.707	6.284	6.098	6.519	ns
1.5 V	2mA	GCLK	t <sub>co</sub>	3.730	3.730	5.357	5.827	6.092	6.286	6.319	5.827	6.092	6.286	6.319	ns
		GCLK PLL	t <sub>co</sub>	3.996	4.002	5.722	6.213	6.850	6.664	7.085	6.213	6.850	6.664	7.085	ns
	4mA	GCLK	t <sub>co</sub>	3.447	3.447	4.903	5.314	5.700	5.730	5.927	5.314	5.700	5.730	5.927	ns
		GCLK PLL	t <sub>co</sub>	3.784	3.790	5.403	5.857	6.458	6.272	6.693	5.857	6.458	6.272	6.693	ns
	6mA	GCLK	t <sub>co</sub>	3.369	3.369	4.803	5.206	5.633	5.613	5.860	5.206	5.633	5.613	5.860	ns
		GCLK PLL	t <sub>co</sub>	3.759	3.765	5.336	5.797	6.391	6.205	6.626	5.797	6.391	6.205	6.626	ns
	8mA	GCLK	t <sub>co</sub>	3.359	3.359	4.785	5.185	5.613	5.581	5.840	5.185	5.613	5.581	5.840	ns
		GCLK PLL	t <sub>co</sub>	3.748	3.754	5.319	5.772	6.371	6.185	6.606	5.772	6.371	6.185	6.606	ns
	10mA	GCLK	t <sub>co</sub>	3.329	3.329	4.701	5.107	5.543	5.499	5.770	5.107	5.543	5.499	5.770	ns
		GCLK PLL	t <sub>co</sub>	3.693	3.699	5.281	5.721	6.301	6.115	6.536	5.721	6.301	6.115	6.536	ns
	12mA	GCLK	t <sub>co</sub>	3.280	3.280	4.679	5.072	5.532	5.457	5.759	5.072	5.532	5.457	5.759	ns
		GCLK PLL	t <sub>co</sub>	3.688	3.694	5.264	5.710	6.290	6.104	6.525	5.710	6.290	6.104	6.525	ns

**Table 1-122.** EP3SE80 Column Pins output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 0.9V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 0.9V	
1.2 V	2mA	GCLK	t <sub>co</sub>	3.620	3.620	5.244	5.726	6.036	6.206	6.263	5.726	6.036	6.206	6.263	ns
		GCLK PLL	t <sub>co</sub>	3.912	3.918	5.648	6.149	6.794	6.608	7.029	6.149	6.794	6.608	7.029	ns
	4mA	GCLK	t <sub>co</sub>	3.447	3.447	4.922	5.345	5.750	5.777	5.977	5.345	5.750	5.777	5.977	ns
		GCLK PLL	t <sub>co</sub>	3.789	3.795	5.422	5.887	6.508	6.322	6.743	5.887	6.508	6.322	6.743	ns
	6mA	GCLK	t <sub>co</sub>	3.360	3.360	4.795	5.204	5.637	5.622	5.864	5.204	5.637	5.622	5.864	ns
		GCLK PLL	t <sub>co</sub>	3.751	3.757	5.330	5.798	6.395	6.209	6.630	5.798	6.395	6.209	6.630	ns
	8mA	GCLK	t <sub>co</sub>	3.336	3.336	4.726	5.144	5.581	5.531	5.808	5.144	5.581	5.531	5.808	ns
		GCLK PLL	t <sub>co</sub>	3.704	3.710	5.302	5.749	6.339	6.153	6.574	5.749	6.339	6.153	6.574	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.324	3.324	4.688	5.075	5.512	5.479	5.739	5.075	5.512	5.479	5.739	ns
		GCLK PLL	t <sub>co</sub>	3.704	3.710	5.259	5.696	6.270	6.084	6.505	5.696	6.270	6.084	6.505	ns
	10mA	GCLK	t <sub>co</sub>	3.321	3.321	4.681	5.068	5.508	5.485	5.735	5.068	5.508	5.485	5.735	ns
		GCLK PLL	t <sub>co</sub>	3.701	3.707	5.256	5.693	6.266	6.080	6.501	5.693	6.266	6.080	6.501	ns
	12mA	GCLK	t <sub>co</sub>	3.309	3.309	4.677	5.064	5.509	5.465	5.736	5.064	5.509	5.465	5.736	ns
		GCLK PLL	t <sub>co</sub>	3.699	3.705	5.256	5.694	6.267	6.081	6.502	5.694	6.267	6.081	6.502	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.286	3.286	4.647	5.033	5.494	5.431	5.721	5.033	5.494	5.431	5.721	ns
		GCLK PLL	t <sub>co</sub>	3.690	3.696	5.241	5.678	6.252	6.066	6.487	5.678	6.252	6.066	6.487	ns
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.340	3.340	4.700	5.090	5.528	5.507	5.755	5.090	5.528	5.507	5.755	ns
		GCLK PLL	t <sub>co</sub>	3.711	3.717	5.271	5.710	6.286	6.100	6.521	5.710	6.286	6.100	6.521	ns
	6mA	GCLK	t <sub>co</sub>	3.323	3.323	4.697	5.087	5.526	5.496	5.753	5.087	5.526	5.496	5.753	ns
		GCLK PLL	t <sub>co</sub>	3.707	3.713	5.269	5.708	6.284	6.098	6.519	5.708	6.284	6.098	6.519	ns
	8mA	GCLK	t <sub>co</sub>	3.311	3.311	4.677	5.067	5.517	5.489	5.744	5.067	5.517	5.489	5.744	ns
		GCLK PLL	t <sub>co</sub>	3.696	3.702	5.259	5.699	6.275	6.089	6.510	5.699	6.275	6.089	6.510	ns
	10mA	GCLK	t <sub>co</sub>	3.282	3.282	4.659	5.049	5.504	5.450	5.731	5.049	5.504	5.450	5.731	ns
		GCLK PLL	t <sub>co</sub>	3.685	3.691	5.246	5.686	6.262	6.076	6.497	5.686	6.262	6.076	6.497	ns
	12mA	GCLK	t <sub>co</sub>	3.281	3.281	4.659	5.049	5.504	5.450	5.731	5.049	5.504	5.450	5.731	ns
		GCLK PLL	t <sub>co</sub>	3.685	3.691	5.246	5.686	6.262	6.076	6.497	5.686	6.262	6.076	6.497	ns

**Table 1-122.** EP3SE80 Column Pins output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 0.9V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 1.1V	V <sub>CC1</sub> = 0.9V		
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.290	3.290	4.656	5.044	5.499	5.450	5.726	5.044	5.499	5.450	5.726	ns	
		GCLK PLL	t <sub>co</sub>	3.691	3.697	5.245	5.683	6.257	6.071	6.492	5.683	6.257	6.071	6.492	ns	
	16mA	GCLK	t <sub>co</sub>	3.279	3.279	4.649	5.039	5.511	5.455	5.738	5.039	5.511	5.455	5.738	ns	
		GCLK PLL	t <sub>co</sub>	3.694	3.700	5.253	5.692	6.269	6.083	6.504	5.692	6.269	6.083	6.504	ns	
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.334	3.334	4.714	5.107	5.541	5.521	5.768	5.107	5.541	5.521	5.768	ns	
		GCLK PLL	t <sub>co</sub>	3.715	3.721	5.280	5.722	6.299	6.113	6.534	5.722	6.299	6.113	6.534	ns	
	6mA	GCLK	t <sub>co</sub>	3.309	3.309	4.693	5.086	5.532	5.495	5.759	5.086	5.532	5.495	5.759	ns	
		GCLK PLL	t <sub>co</sub>	3.701	3.707	5.270	5.712	6.290	6.104	6.525	5.712	6.290	6.104	6.525	ns	
	8mA	GCLK	t <sub>co</sub>	3.289	3.289	4.672	5.065	5.518	5.471	5.745	5.065	5.518	5.471	5.745	ns	
		GCLK PLL	t <sub>co</sub>	3.690	3.696	5.256	5.698	6.276	6.090	6.511	5.698	6.276	6.090	6.511	ns	
	10mA	GCLK	t <sub>co</sub>	3.280	3.280	4.666	5.059	5.522	5.460	5.749	5.059	5.522	5.460	5.749	ns	
		GCLK PLL	t <sub>co</sub>	3.689	3.695	5.259	5.701	6.280	6.094	6.515	5.701	6.280	6.094	6.515	ns	
	12mA	GCLK	t <sub>co</sub>	3.275	3.275	4.659	5.051	5.516	5.450	5.743	5.051	5.516	5.450	5.743	ns	
		GCLK PLL	t <sub>co</sub>	3.686	3.692	5.254	5.696	6.274	6.088	6.509	5.696	6.274	6.088	6.509	ns	
	SSTL-15 CLASS II	8mA	GCLK	t <sub>co</sub>	3.284	3.284	4.652	5.042	5.499	5.450	5.726	5.042	5.499	5.450	5.726	ns
			GCLK PLL	t <sub>co</sub>	3.688	3.694	5.243	5.682	6.257	6.071	6.492	5.682	6.257	6.071	6.492	ns
16mA		GCLK	t <sub>co</sub>	3.274	3.274	4.646	5.036	5.510	5.456	5.737	5.036	5.510	5.456	5.737	ns	
		GCLK PLL	t <sub>co</sub>	3.691	3.697	5.250	5.691	6.268	6.082	6.503	5.691	6.268	6.082	6.503	ns	

**Table 1-122.** EP3SE80 Column Pins output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.308	3.308	4.665	5.052	5.497	5.464	5.724	5.052	5.497	5.464	5.724	ns
		GCLK PLL	t <sub>co</sub>	3.698	3.704	5.245	5.682	6.255	6.069	6.490	5.682	6.255	6.069	6.490	ns
	6mA	GCLK	t <sub>co</sub>	3.294	3.294	4.652	5.040	5.496	5.461	5.723	5.040	5.496	5.461	5.723	ns
		GCLK PLL	t <sub>co</sub>	3.691	3.697	5.243	5.680	6.254	6.068	6.489	5.680	6.254	6.068	6.489	ns
	8mA	GCLK	t <sub>co</sub>	3.278	3.278	4.642	5.029	5.489	5.434	5.716	5.029	5.489	5.434	5.716	ns
		GCLK PLL	t <sub>co</sub>	3.683	3.689	5.235	5.673	6.247	6.061	6.482	5.673	6.247	6.061	6.482	ns
	10mA	GCLK	t <sub>co</sub>	3.279	3.279	4.644	5.032	5.493	5.436	5.720	5.032	5.493	5.436	5.720	ns
		GCLK PLL	t <sub>co</sub>	3.686	3.692	5.238	5.676	6.251	6.065	6.486	5.676	6.251	6.065	6.486	ns
	12mA	GCLK	t <sub>co</sub>	3.271	3.271	4.640	5.028	5.497	5.436	5.724	5.028	5.497	5.436	5.724	ns
		GCLK PLL	t <sub>co</sub>	3.683	3.689	5.241	5.680	6.255	6.069	6.490	5.680	6.255	6.069	6.490	ns
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.274	3.274	4.631	5.018	5.493	5.432	5.720	5.018	5.493	5.432	5.720	ns
		GCLK PLL	t <sub>co</sub>	3.691	3.697	5.240	5.677	6.251	6.065	6.486	5.677	6.251	6.065	6.486	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.314	3.314	4.676	5.065	5.508	5.480	5.735	5.065	5.508	5.480	5.735	ns
		GCLK PLL	t <sub>co</sub>	3.703	3.709	5.253	5.692	6.266	6.080	6.501	5.692	6.266	6.080	6.501	ns
	6mA	GCLK	t <sub>co</sub>	3.302	3.302	4.670	5.060	5.511	5.469	5.738	5.060	5.511	5.469	5.738	ns
		GCLK PLL	t <sub>co</sub>	3.699	3.705	5.254	5.693	6.269	6.083	6.504	5.693	6.269	6.083	6.504	ns
	8mA	GCLK	t <sub>co</sub>	3.296	3.296	4.664	5.053	5.506	5.463	5.733	5.053	5.506	5.463	5.733	ns
		GCLK PLL	t <sub>co</sub>	3.695	3.701	5.250	5.689	6.264	6.078	6.499	5.689	6.264	6.078	6.499	ns
	10mA	GCLK	t <sub>co</sub>	3.284	3.284	4.652	5.042	5.499	5.450	5.726	5.042	5.499	5.450	5.726	ns
		GCLK PLL	t <sub>co</sub>	3.688	3.694	5.243	5.682	6.257	6.071	6.492	5.682	6.257	6.071	6.492	ns
	12mA	GCLK	t <sub>co</sub>	3.279	3.279	4.653	5.043	5.509	5.446	5.736	5.043	5.509	5.446	5.736	ns
		GCLK PLL	t <sub>co</sub>	3.689	3.695	5.250	5.690	6.267	6.081	6.502	5.690	6.267	6.081	6.502	ns
1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.275	3.275	4.629	5.015	5.483	5.425	5.710	5.015	5.483	5.425	5.710	ns
		GCLK PLL	t <sub>co</sub>	3.687	3.693	5.231	5.668	6.241	6.055	6.476	5.668	6.241	6.055	6.476	ns

**Table 1–122.** EP3SE80 Column Pins output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{CO}$	3.312	3.312	4.688	5.081	5.529	5.499	5.756	5.081	5.529	5.499	5.756	ns
		GCLK PLL	$t_{CO}$	3.706	3.712	5.267	5.709	6.287	6.101	6.522	5.709	6.287	6.101	6.522	ns
	6mA	GCLK	$t_{CO}$	3.298	3.298	4.674	5.066	5.520	5.482	5.747	5.066	5.520	5.482	5.747	ns
		GCLK PLL	$t_{CO}$	3.698	3.704	5.258	5.700	6.278	6.092	6.513	5.700	6.278	6.092	6.513	ns
	8mA	GCLK	$t_{CO}$	3.292	3.292	4.675	5.068	5.529	5.478	5.756	5.068	5.529	5.478	5.756	ns
		GCLK PLL	$t_{CO}$	3.699	3.705	5.266	5.708	6.287	6.101	6.522	5.708	6.287	6.101	6.522	ns
	10mA	GCLK	$t_{CO}$	3.277	3.277	4.657	5.049	5.515	5.455	5.742	5.049	5.515	5.455	5.742	ns
		GCLK PLL	$t_{CO}$	3.688	3.694	5.253	5.695	6.273	6.087	6.508	5.695	6.273	6.087	6.508	ns
	12mA	GCLK	$t_{CO}$	3.277	3.277	4.657	5.049	5.516	5.456	5.743	5.049	5.516	5.456	5.743	ns
		GCLK PLL	$t_{CO}$	3.688	3.694	5.253	5.695	6.274	6.088	6.509	5.695	6.274	6.088	6.509	ns
1.2-V HSTL CLASS II	16mA	GCLK	$t_{CO}$	3.327	3.327	4.692	5.083	5.529	5.534	5.756	5.083	5.529	5.534	5.756	ns
		GCLK PLL	$t_{CO}$	3.709	3.715	5.269	5.710	6.287	6.101	6.522	5.710	6.287	6.101	6.522	ns
3.0-V PCI	—	GCLK	$t_{CO}$	3.395	3.395	4.701	5.080	5.554	5.509	5.781	5.080	5.554	5.509	5.781	ns
		GCLK PLL	$t_{CO}$	3.812	3.818	5.314	5.744	6.312	6.126	6.547	5.744	6.312	6.126	6.547	ns
3.0-V PCI-X	—	GCLK	$t_{CO}$	3.395	3.395	4.701	5.080	5.554	5.509	5.781	5.080	5.554	5.509	5.781	ns
		GCLK PLL	$t_{CO}$	3.812	3.818	5.314	5.744	6.312	6.126	6.547	5.744	6.312	6.126	6.547	ns

Table 1–123 specifies EP3SE80 Row Pins Output Timing parameters for single-ended I/O standards.

**Table 1–123.** EP3SE80 Row Pins output Timing Parameters (Part 1 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
3.3-V LVTTL	4mA	GCLK	$t_{CO}$	3.238	3.493	4.856	5.245	5.757	5.609	5.907	5.368	5.891	5.735	5.990	ns
		GCLK PLL	$t_{CO}$	1.439	1.634	2.039	2.121	2.343	2.334	2.309	2.226	2.430	2.441	2.301	ns
	8mA	GCLK	$t_{CO}$	3.156	3.399	4.726	5.107	5.612	5.464	5.762	5.227	5.742	5.586	5.841	ns
		GCLK PLL	$t_{CO}$	1.346	1.529	1.909	1.983	2.198	2.189	2.195	2.085	2.281	2.292	2.186	ns
	12mA	GCLK	$t_{CO}$	3.077	3.310	4.607	4.984	5.484	5.348	5.634	5.107	5.610	5.468	5.709	ns
		GCLK PLL	$t_{CO}$	1.247	1.423	1.790	1.860	2.070	2.061	2.099	1.958	2.149	2.160	2.086	ns



**Table 1-123.** EP3SE80 Row Pins output Timing Parameters (Part 2 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.248	3.497	4.864	5.250	5.761	5.613	5.911	5.374	5.895	5.739	5.994	ns
		GCLK PLL	t <sub>co</sub>	1.449	1.638	2.047	2.126	2.347	2.338	2.318	2.232	2.434	2.445	2.313	ns
	8mA	GCLK	t <sub>co</sub>	3.081	3.314	4.613	4.999	5.490	5.358	5.640	5.119	5.617	5.477	5.716	ns
		GCLK PLL	t <sub>co</sub>	1.251	1.429	1.796	1.866	2.076	2.067	2.109	1.964	2.156	2.167	2.095	ns
3.0-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.192	3.439	4.808	5.198	5.713	5.565	5.863	5.325	5.849	5.693	5.948	ns
		GCLK PLL	t <sub>co</sub>	1.393	1.580	1.991	2.074	2.299	2.290	2.275	2.183	2.388	2.399	2.267	ns
	8mA	GCLK	t <sub>co</sub>	3.082	3.319	4.655	5.039	5.549	5.401	5.699	5.163	5.685	5.528	5.783	ns
		GCLK PLL	t <sub>co</sub>	1.268	1.453	1.838	1.915	2.135	2.126	2.130	2.021	2.224	2.234	2.121	ns
	12mA	GCLK	t <sub>co</sub>	3.045	3.281	4.582	4.957	5.461	5.313	5.611	5.077	5.592	5.435	5.690	ns
		GCLK PLL	t <sub>co</sub>	1.229	1.402	1.756	1.832	2.047	2.038	2.060	1.935	2.131	2.141	2.048	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.106	3.358	4.702	5.091	5.603	5.455	5.753	5.217	5.738	5.581	5.836	ns
		GCLK PLL	t <sub>co</sub>	1.307	1.499	1.885	1.967	2.189	2.180	2.166	2.075	2.277	2.287	2.157	ns
	8mA	GCLK	t <sub>co</sub>	3.032	3.265	4.554	4.928	5.422	5.281	5.572	5.047	5.552	5.401	5.650	ns
		GCLK PLL	t <sub>co</sub>	1.207	1.380	1.721	1.793	2.008	1.999	2.032	1.895	2.091	2.101	2.019	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.218	3.475	4.940	5.352	5.885	5.737	6.035	5.485	6.028	5.871	6.126	ns
		GCLK PLL	t <sub>co</sub>	1.419	1.616	2.123	2.228	2.471	2.462	2.420	2.343	2.567	2.577	2.419	ns
	8mA	GCLK	t <sub>co</sub>	3.124	3.377	4.785	5.189	5.715	5.567	5.865	5.318	5.854	5.697	5.952	ns
		GCLK PLL	t <sub>co</sub>	1.309	1.518	1.968	2.065	2.301	2.292	2.278	2.176	2.393	2.403	2.274	ns
	12mA	GCLK	t <sub>co</sub>	3.067	3.321	4.679	5.070	5.589	5.441	5.739	5.195	5.724	5.567	5.822	ns
		GCLK PLL	t <sub>co</sub>	1.263	1.441	1.857	1.946	2.175	2.166	2.187	2.053	2.263	2.273	2.180	ns
1.8 V	2mA	GCLK	t <sub>co</sub>	3.451	3.722	5.326	5.781	6.360	6.212	6.510	5.922	6.504	6.356	6.611	ns
		GCLK PLL	t <sub>co</sub>	1.652	1.862	2.507	2.657	2.761	2.937	2.944	2.780	2.883	3.062	2.957	ns
	4mA	GCLK	t <sub>co</sub>	3.229	3.520	4.999	5.412	5.955	5.807	6.105	5.557	6.098	5.949	6.204	ns
		GCLK PLL	t <sub>co</sub>	1.427	1.660	2.180	2.288	2.401	2.532	2.539	2.415	2.522	2.655	2.550	ns
	6mA	GCLK	t <sub>co</sub>	3.161	3.418	4.846	5.262	5.796	5.648	5.946	5.389	5.925	5.777	6.032	ns
		GCLK PLL	t <sub>co</sub>	1.362	1.558	2.027	2.138	2.301	2.373	2.380	2.247	2.416	2.483	2.378	ns
	8mA	GCLK	t <sub>co</sub>	3.136	3.379	4.770	5.176	5.699	5.552	5.849	5.300	5.831	5.683	5.938	ns
		GCLK PLL	t <sub>co</sub>	1.315	1.497	1.950	2.044	2.235	2.276	2.297	2.152	2.344	2.389	2.290	ns

**Table 1-123.** EP3SE80 Row Pins output Timing Parameters (Part 3 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.5 V	2mA	GCLK	t <sub>co</sub>	3.362	3.640	5.236	5.694	6.288	6.140	6.438	5.829	6.428	6.280	6.535	ns
		GCLK PLL	t <sub>co</sub>	1.563	1.780	2.417	2.570	2.698	2.865	2.872	2.687	2.818	2.986	2.881	ns
	4mA	GCLK	t <sub>co</sub>	3.152	3.396	4.831	5.257	5.797	5.649	5.947	5.383	5.924	5.776	6.031	ns
		GCLK PLL	t <sub>co</sub>	1.331	1.522	2.012	2.133	2.304	2.374	2.381	2.241	2.417	2.482	2.377	ns
	6mA	GCLK	t <sub>co</sub>	3.125	3.370	4.758	5.168	5.691	5.552	5.841	5.293	5.819	5.677	5.926	ns
		GCLK PLL	t <sub>co</sub>	1.304	1.488	1.939	2.037	2.235	2.268	2.297	2.143	2.344	2.377	2.290	ns
	8mA	GCLK	t <sub>co</sub>	3.106	3.359	4.738	5.143	5.672	5.533	5.822	5.269	5.797	5.658	5.904	ns
		GCLK PLL	t <sub>co</sub>	1.285	1.477	1.917	2.019	2.216	2.249	2.278	2.125	2.325	2.355	2.271	ns
1.2 V	2mA	GCLK	t <sub>co</sub>	3.305	3.565	5.146	5.608	6.213	6.065	6.363	5.741	6.344	6.196	6.451	ns
		GCLK PLL	t <sub>co</sub>	1.506	1.705	2.327	2.484	2.637	2.790	2.797	2.599	2.749	2.902	2.797	ns
	4mA	GCLK	t <sub>co</sub>	3.157	3.400	4.853	5.285	5.838	5.690	5.988	5.408	5.966	5.818	6.073	ns
		GCLK PLL	t <sub>co</sub>	1.336	1.518	2.034	2.161	2.352	2.415	2.422	2.266	2.461	2.524	2.419	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.071	3.309	4.672	5.060	5.557	5.426	5.707	5.180	5.686	5.548	5.785	ns
		GCLK PLL	t <sub>co</sub>	1.248	1.427	1.835	1.918	2.143	2.134	2.177	2.020	2.225	2.236	2.166	ns
	12mA	GCLK	t <sub>co</sub>	3.066	3.305	4.669	5.058	5.549	5.424	5.699	5.179	5.679	5.547	5.778	ns
		GCLK PLL	t <sub>co</sub>	1.236	1.415	1.827	1.910	2.135	2.126	2.175	2.012	2.218	2.229	2.165	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.057	3.294	4.654	5.042	5.522	5.407	5.672	5.162	5.652	5.529	5.751	ns
		GCLK PLL	t <sub>co</sub>	1.220	1.397	1.802	1.885	2.108	2.099	2.158	1.986	2.191	2.202	2.147	ns
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.085	3.323	4.689	5.080	5.578	5.447	5.724	5.199	5.698	5.568	5.802	ns
		GCLK PLL	t <sub>co</sub>	1.264	1.441	1.849	1.934	2.130	2.151	2.192	2.035	2.235	2.254	2.181	ns
	6mA	GCLK	t <sub>co</sub>	3.080	3.318	4.687	5.079	5.577	5.446	5.723	5.197	5.696	5.566	5.800	ns
		GCLK PLL	t <sub>co</sub>	1.259	1.436	1.847	1.933	2.129	2.150	2.191	2.033	2.233	2.252	2.179	ns
	8mA	GCLK	t <sub>co</sub>	3.069	3.307	4.677	5.069	5.567	5.436	5.713	5.188	5.687	5.557	5.791	ns
		GCLK PLL	t <sub>co</sub>	1.248	1.425	1.837	1.923	2.119	2.140	2.181	2.024	2.224	2.243	2.170	ns
	10mA	GCLK	t <sub>co</sub>	3.058	3.296	4.664	5.056	5.554	5.423	5.700	5.176	5.675	5.545	5.779	ns
		GCLK PLL	t <sub>co</sub>	1.237	1.414	1.824	1.910	2.106	2.127	2.168	2.012	2.212	2.231	2.158	ns
	12mA	GCLK	t <sub>co</sub>	3.058	3.295	4.664	5.056	5.554	5.423	5.700	5.175	5.675	5.545	5.779	ns
		GCLK PLL	t <sub>co</sub>	1.237	1.413	1.824	1.910	2.106	2.127	2.168	2.011	2.212	2.231	2.158	ns

**Table 1-123.** EP3SE80 Row Pins output Timing Parameters (Part 4 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.066	3.302	4.663	5.053	5.549	5.418	5.695	5.171	5.669	5.539	5.773	ns
		GCLK PLL	t <sub>co</sub>	1.245	1.420	1.823	1.907	2.101	2.122	2.163	2.007	2.206	2.225	2.152	ns
	16mA	GCLK	t <sub>co</sub>	3.067	3.305	4.669	5.061	5.559	5.428	5.705	5.180	5.680	5.550	5.784	ns
		GCLK PLL	t <sub>co</sub>	1.246	1.423	1.829	1.915	2.111	2.132	2.173	2.016	2.217	2.236	2.163	ns
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.088	3.326	4.698	5.091	5.591	5.460	5.740	5.209	5.710	5.580	5.817	ns
		GCLK PLL	t <sub>co</sub>	1.267	1.444	1.858	1.946	2.143	2.167	2.205	2.046	2.247	2.268	2.193	ns
	6mA	GCLK	t <sub>co</sub>	3.074	3.312	4.687	5.081	5.581	5.450	5.727	5.200	5.701	5.571	5.805	ns
		GCLK PLL	t <sub>co</sub>	1.253	1.430	1.847	1.935	2.133	2.154	2.195	2.036	2.238	2.257	2.184	ns
	8mA	GCLK	t <sub>co</sub>	3.063	3.300	4.674	5.068	5.568	5.437	5.714	5.187	5.688	5.558	5.792	ns
		GCLK PLL	t <sub>co</sub>	1.242	1.418	1.834	1.922	2.120	2.141	2.182	2.023	2.225	2.244	2.171	ns
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.073	3.308	4.662	5.051	5.547	5.416	5.693	5.170	5.666	5.536	5.770	ns
		GCLK PLL	t <sub>co</sub>	1.252	1.426	1.822	1.905	2.099	2.120	2.161	2.006	2.203	2.222	2.149	ns
	6mA	GCLK	t <sub>co</sub>	3.066	3.302	4.660	5.050	5.546	5.415	5.692	5.169	5.666	5.536	5.770	ns
		GCLK PLL	t <sub>co</sub>	1.245	1.420	1.820	1.904	2.098	2.119	2.160	2.005	2.203	2.222	2.149	ns
	8mA	GCLK	t <sub>co</sub>	3.057	3.294	4.653	5.043	5.539	5.408	5.685	5.162	5.659	5.529	5.763	ns
		GCLK PLL	t <sub>co</sub>	1.236	1.412	1.813	1.897	2.091	2.112	2.153	1.998	2.196	2.215	2.142	ns
	10mA	GCLK	t <sub>co</sub>	3.060	3.296	4.656	5.046	5.543	5.412	5.689	5.165	5.662	5.532	5.766	ns
		GCLK PLL	t <sub>co</sub>	1.239	1.414	1.816	1.900	2.095	2.116	2.157	2.001	2.199	2.218	2.145	ns
12mA	GCLK	t <sub>co</sub>	3.056	3.293	4.658	5.049	5.546	5.415	5.692	5.168	5.667	5.537	5.771	ns	
	GCLK PLL	t <sub>co</sub>	1.235	1.411	1.818	1.903	2.098	2.119	2.160	2.004	2.204	2.223	2.150	ns	
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.064	3.301	4.656	5.046	5.542	5.411	5.688	5.164	5.661	5.531	5.765	ns
		GCLK PLL	t <sub>co</sub>	1.243	1.419	1.816	1.900	2.094	2.115	2.156	2.000	2.198	2.217	2.144	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.079	3.314	4.671	5.061	5.558	5.427	5.704	5.179	5.677	5.547	5.781	ns
		GCLK PLL	t <sub>co</sub>	1.258	1.432	1.831	1.915	2.110	2.131	2.172	2.015	2.214	2.233	2.160	ns
	6mA	GCLK	t <sub>co</sub>	3.073	3.309	4.672	5.063	5.560	5.429	5.706	5.181	5.680	5.550	5.784	ns
		GCLK PLL	t <sub>co</sub>	1.252	1.427	1.832	1.917	2.112	2.133	2.174	2.017	2.217	2.236	2.163	ns
	8mA	GCLK	t <sub>co</sub>	3.069	3.305	4.667	5.058	5.555	5.424	5.701	5.176	5.674	5.544	5.778	ns
		GCLK PLL	t <sub>co</sub>	1.248	1.423	1.827	1.912	2.107	2.128	2.169	2.012	2.211	2.230	2.157	ns

**Table 1-123.** EP3SE80 Row Pins output Timing Parameters (Part 5 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
1.2-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.081	3.316	4.684	5.077	5.577	5.446	5.723	5.195	5.696	5.566	5.800	ns
		GCLK PLL	$t_{co}$	1.260	1.434	1.844	1.931	2.129	2.150	2.191	2.031	2.233	2.252	2.179	ns
	6mA	GCLK	$t_{co}$	3.072	3.308	4.675	5.068	5.568	5.437	5.714	5.186	5.687	5.557	5.791	ns
		GCLK PLL	$t_{co}$	1.251	1.426	1.835	1.922	2.120	2.141	2.182	2.022	2.224	2.243	2.170	ns
	8mA	GCLK	$t_{co}$	3.071	3.308	4.682	5.076	5.577	5.446	5.723	5.195	5.697	5.567	5.801	ns
		GCLK PLL	$t_{co}$	1.250	1.426	1.842	1.930	2.129	2.150	2.191	2.031	2.234	2.253	2.180	ns
3.0-V PCI	—	GCLK	$t_{co}$	3.177	3.415	4.724	5.106	5.581	5.466	5.731	5.228	5.698	5.590	5.810	ns
		GCLK PLL	$t_{co}$	1.333	1.510	1.860	1.936	2.152	2.143	2.217	2.038	2.252	2.248	2.208	ns
3.0-V PCI-X	—	GCLK	$t_{co}$	3.177	3.415	4.724	5.106	5.581	5.466	5.731	5.228	5.698	5.590	5.810	ns
		GCLK PLL	$t_{co}$	1.333	1.510	1.860	1.936	2.152	2.143	2.217	2.038	2.252	2.248	2.208	ns

Table 1-124 through Table 1-127 show the maximum I/O timing parameters for EP3SE80 devices for differential I/O standards.

Table 1-124 specifies EP3SE80 column pins input timing parameters for differential I/O standards.

**Table 1-124.** EP3SE80 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=1.1V$	$V_{CCL}=0.9V$	
LVDS	GCLK	$t_{su}$	-0.997	-1.029	-1.181	-1.169	-1.324	-1.269	-1.645	-1.133	-1.542	-1.230	-1.683	ns
		$t_h$	1.133	1.184	1.415	1.436	1.618	1.551	1.927	1.411	1.858	1.524	1.966	ns
	GCLK PLL	$t_{su}$	0.960	0.994	1.879	2.224	2.401	2.288	2.194	2.277	2.567	2.345	2.245	ns
		$t_h$	-0.691	-0.701	-1.428	-1.714	-1.834	-1.749	-1.648	-1.756	-1.968	-1.795	-1.697	ns
MINI-LVDS	GCLK	$t_{su}$	-0.997	-1.029	-1.181	-1.169	-1.324	-1.269	-1.645	-1.133	-1.542	-1.230	-1.683	ns
		$t_h$	1.133	1.184	1.415	1.436	1.618	1.551	1.927	1.411	1.858	1.524	1.966	ns
	GCLK PLL	$t_{su}$	0.960	0.994	1.879	2.224	2.401	2.288	2.194	2.277	2.567	2.345	2.245	ns
		$t_h$	-0.691	-0.701	-1.428	-1.714	-1.834	-1.749	-1.648	-1.756	-1.968	-1.795	-1.697	ns
RSDS	GCLK	$t_{su}$	-0.997	-1.029	-1.181	-1.169	-1.324	-1.269	-1.645	-1.133	-1.542	-1.230	-1.683	ns
		$t_h$	1.133	1.184	1.415	1.436	1.618	1.551	1.927	1.411	1.858	1.524	1.966	ns
	GCLK PLL	$t_{su}$	0.960	0.994	1.879	2.224	2.401	2.288	2.194	2.277	2.567	2.345	2.245	ns
		$t_h$	-0.691	-0.701	-1.428	-1.714	-1.834	-1.749	-1.648	-1.756	-1.968	-1.795	-1.697	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{su}$	-0.813	-0.852	-1.258	-1.368	-1.483	-1.423	-1.794	-1.368	-1.482	-1.428	-1.837	ns
		$t_h$	0.942	0.999	1.460	1.595	1.731	1.659	2.031	1.604	1.739	1.674	2.075	ns
	GCLK PLL	$t_{su}$	1.144	1.171	1.802	2.025	2.242	2.134	2.045	2.042	2.260	2.147	2.091	ns
		$t_h$	-0.882	-0.886	-1.383	-1.555	-1.721	-1.641	-1.544	-1.563	-1.729	-1.645	-1.588	ns

**Table 1-124.** EP3SE80 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-0.813	-0.852	-1.258	-1.368	-1.483	-1.423	-1.794	-1.368	-1.482	-1.428	-1.837	ns
		$t_h$	0.942	0.999	1.460	1.595	1.731	1.659	2.031	1.604	1.739	1.674	2.075	ns
	GCLK PLL	$t_{su}$	1.144	1.171	1.802	2.025	2.242	2.134	2.045	2.042	2.260	2.147	2.091	ns
		$t_h$	-0.882	-0.886	-1.383	-1.555	-1.721	-1.641	-1.544	-1.563	-1.729	-1.645	-1.588	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		$t_h$	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	$t_{su}$	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		$t_h$	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		$t_h$	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	$t_{su}$	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		$t_h$	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		$t_h$	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	$t_{su}$	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		$t_h$	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		$t_h$	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	$t_{su}$	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		$t_h$	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		$t_h$	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	$t_{su}$	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		$t_h$	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		$t_h$	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	$t_{su}$	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		$t_h$	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		$t_h$	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	$t_{su}$	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		$t_h$	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		$t_h$	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	$t_{su}$	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		$t_h$	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns

**Table 1-124.** EP3SE80 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.840	-0.881	-1.289	-1.395	-1.518	-1.460	-1.828	-1.394	-1.510	-1.459	-1.866	ns
		$t_h$	0.969	1.028	1.493	1.625	1.769	1.697	2.070	1.633	1.772	1.706	2.109	ns
	GCLK PLL	$t_{su}$	1.117	1.142	1.771	1.998	2.207	2.097	2.011	2.016	2.232	2.116	2.062	ns
		$t_h$	-0.855	-0.857	-1.350	-1.525	-1.683	-1.603	-1.505	-1.534	-1.696	-1.613	-1.554	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.840	-0.881	-1.289	-1.395	-1.518	-1.460	-1.828	-1.394	-1.510	-1.459	-1.866	ns
		$t_h$	0.969	1.028	1.493	1.625	1.769	1.697	2.070	1.633	1.772	1.706	2.109	ns
	GCLK PLL	$t_{su}$	1.117	1.142	1.771	1.998	2.207	2.097	2.011	2.016	2.232	2.116	2.062	ns
		$t_h$	-0.855	-0.857	-1.350	-1.525	-1.683	-1.603	-1.505	-1.534	-1.696	-1.613	-1.554	ns

Table 1-125 specifies EP3SE80 row pins input timing parameters for differential I/O standards.

**Table 1-125.** EP3SE80 Row Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS	GCLK	t <sub>su</sub>	-0.944	-0.979	-1.054	-1.015	-1.154	-1.107	-1.454	-0.975	-1.107	-1.061	-1.493	ns
		t <sub>h</sub>	1.077	1.130	1.288	1.285	1.447	1.389	1.737	1.257	1.412	1.355	1.777	ns
	GCLK PLL	t <sub>su</sub>	0.961	0.989	1.951	2.328	2.533	2.408	2.342	2.387	2.599	2.472	2.394	ns
		t <sub>h</sub>	-0.691	-0.700	-1.502	-1.818	-1.968	-1.871	-1.796	-1.862	-2.019	-1.921	-1.844	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-0.944	-0.979	-1.054	-1.015	-1.154	-1.107	-1.454	-0.975	-1.107	-1.061	-1.493	ns
		t <sub>h</sub>	1.077	1.130	1.288	1.285	1.447	1.389	1.737	1.257	1.412	1.355	1.777	ns
	GCLK PLL	t <sub>su</sub>	0.961	0.989	1.951	2.328	2.533	2.408	2.342	2.387	2.599	2.472	2.394	ns
		t <sub>h</sub>	-0.691	-0.700	-1.502	-1.818	-1.968	-1.871	-1.796	-1.862	-2.019	-1.921	-1.844	ns
RSDS	GCLK	t <sub>su</sub>	-0.944	-0.979	-1.054	-1.015	-1.154	-1.107	-1.454	-0.975	-1.107	-1.061	-1.493	ns
		t <sub>h</sub>	1.077	1.130	1.288	1.285	1.447	1.389	1.737	1.257	1.412	1.355	1.777	ns
	GCLK PLL	t <sub>su</sub>	0.961	0.989	1.951	2.328	2.533	2.408	2.342	2.387	2.599	2.472	2.394	ns
		t <sub>h</sub>	-0.691	-0.700	-1.502	-1.818	-1.968	-1.871	-1.796	-1.862	-2.019	-1.921	-1.844	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.749	-0.794	-1.145	-1.244	-1.343	-1.291	-1.633	-1.246	-1.344	-1.293	-1.677	ns
		t <sub>h</sub>	0.875	0.936	1.345	1.468	1.587	1.524	1.867	1.479	1.597	1.535	1.912	ns
	GCLK PLL	t <sub>su</sub>	1.156	1.174	1.864	2.104	2.344	2.224	2.163	2.120	2.362	2.240	2.210	ns
		t <sub>h</sub>	-0.893	-0.894	-1.447	-1.639	-1.828	-1.736	-1.666	-1.644	-1.834	-1.741	-1.709	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.749	-0.794	-1.145	-1.244	-1.343	-1.291	-1.633	-1.246	-1.344	-1.293	-1.677	ns
		t <sub>h</sub>	0.875	0.936	1.345	1.468	1.587	1.524	1.867	1.479	1.597	1.535	1.912	ns
	GCLK PLL	t <sub>su</sub>	1.156	1.174	1.864	2.104	2.344	2.224	2.163	2.120	2.362	2.240	2.210	ns
		t <sub>h</sub>	-0.893	-0.894	-1.447	-1.639	-1.828	-1.736	-1.666	-1.644	-1.834	-1.741	-1.709	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		t <sub>h</sub>	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	t <sub>su</sub>	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		t <sub>h</sub>	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		t <sub>h</sub>	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	t <sub>su</sub>	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		t <sub>h</sub>	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		t <sub>h</sub>	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	t <sub>su</sub>	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		t <sub>h</sub>	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns

**Table 1-125.** EP3SE80 Row Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		$t_h$	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	$t_{su}$	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		$t_h$	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		$t_h$	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	$t_{su}$	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		$t_h$	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.781	-0.827	-1.178	-1.275	-1.384	-1.333	-1.673	-1.273	-1.378	-1.329	-1.712	ns
		$t_h$	0.907	0.969	1.379	1.502	1.631	1.568	1.912	1.509	1.636	1.573	1.952	ns
	GCLK PLL	$t_{su}$	1.124	1.141	1.827	2.068	2.299	2.178	2.118	2.089	2.323	2.199	2.170	ns
		$t_h$	-0.861	-0.861	-1.411	-1.601	-1.780	-1.688	-1.617	-1.610	-1.792	-1.699	-1.665	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.781	-0.827	-1.178	-1.275	-1.384	-1.333	-1.673	-1.273	-1.378	-1.329	-1.712	ns
		$t_h$	0.907	0.969	1.379	1.502	1.631	1.568	1.912	1.509	1.636	1.573	1.952	ns
	GCLK PLL	$t_{su}$	1.124	1.141	1.827	2.068	2.299	2.178	2.118	2.089	2.323	2.199	2.170	ns
		$t_h$	-0.861	-0.861	-1.411	-1.601	-1.780	-1.688	-1.617	-1.610	-1.792	-1.699	-1.665	ns



Table 1-126 specifies EP3SE80 Column Pins Output Timing parameters for differential I/O standards.

**Table 1-126.** EP3SE80 Column Pins output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.152	3.387	4.757	5.155	5.666	5.526	5.826	5.278	5.789	5.650	5.899	ns	
		GCLK PLL	t <sub>co</sub>	1.328	1.502	1.913	2.006	2.214	2.225	2.251	2.110	2.321	2.331	2.237	ns	
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.148	3.390	4.804	5.210	5.728	5.588	5.888	5.337	5.855	5.716	5.965	ns	
		GCLK PLL	t <sub>co</sub>	1.324	1.505	1.960	2.061	2.276	2.287	2.313	2.169	2.387	2.397	2.303	ns	
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.152	3.387	4.757	5.155	5.666	5.526	5.826	5.278	5.789	5.650	5.899	ns	
		GCLK PLL	t <sub>co</sub>	1.328	1.502	1.913	2.006	2.214	2.225	2.251	2.110	2.321	2.331	2.237	ns	
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.148	3.390	4.804	5.210	5.728	5.588	5.888	5.337	5.855	5.716	5.965	ns	
		GCLK PLL	t <sub>co</sub>	1.324	1.505	1.960	2.061	2.276	2.287	2.313	2.169	2.387	2.397	2.303	ns	
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.152	3.387	4.757	5.155	5.666	5.526	5.826	5.278	5.789	5.650	5.899	ns	
		GCLK PLL	t <sub>co</sub>	1.328	1.502	1.913	2.006	2.214	2.225	2.251	2.110	2.321	2.331	2.237	ns	
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.148	3.390	4.804	5.210	5.728	5.588	5.888	5.337	5.855	5.716	5.965	ns	
		GCLK PLL	t <sub>co</sub>	1.324	1.505	1.960	2.061	2.276	2.287	2.313	2.169	2.387	2.397	2.303	ns	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.179	3.420	4.828	5.233	5.750	5.610	5.910	5.358	5.875	5.736	5.985	ns	
		GCLK PLL	t <sub>co</sub>	1.355	1.535	1.984	2.084	2.298	2.309	2.335	2.190	2.407	2.417	2.323	ns	
	6mA	GCLK	t <sub>co</sub>	3.169	3.410	4.818	5.222	5.740	5.600	5.900	5.347	5.865	5.726	5.975	ns	
		GCLK PLL	t <sub>co</sub>	1.345	1.525	1.974	2.073	2.288	2.299	2.325	2.179	2.397	2.407	2.313	ns	
	8mA	GCLK	t <sub>co</sub>	3.169	3.410	4.821	5.226	5.744	5.604	5.904	5.352	5.870	5.731	5.980	ns	
		GCLK PLL	t <sub>co</sub>	1.345	1.525	1.977	2.077	2.292	2.303	2.329	2.184	2.402	2.412	2.318	ns	
	10mA	GCLK	t <sub>co</sub>	3.162	3.404	4.814	5.220	5.738	5.598	5.898	5.345	5.864	5.725	5.974	ns	
		GCLK PLL	t <sub>co</sub>	1.338	1.519	1.970	2.071	2.286	2.297	2.323	2.177	2.396	2.406	2.312	ns	
	12mA	GCLK	t <sub>co</sub>	3.161	3.402	4.811	5.217	5.735	5.595	5.895	5.342	5.860	5.721	5.970	ns	
		GCLK PLL	t <sub>co</sub>	1.337	1.517	1.967	2.068	2.283	2.294	2.320	2.174	2.392	2.402	2.308	ns	
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.183	3.424	4.832	5.237	5.754	5.614	5.914	5.362	5.880	5.741	5.990	ns
			GCLK PLL	t <sub>co</sub>	1.359	1.539	1.988	2.088	2.302	2.313	2.339	2.194	2.412	2.422	2.328	ns

**Table 1-126.** EP3SE80 Column Pins output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.173	3.413	4.811	5.214	5.729	5.589	5.889	5.338	5.853	5.714	5.963	ns
		GCLK PLL	$t_{co}$	1.349	1.528	1.967	2.065	2.277	2.288	2.314	2.170	2.385	2.395	2.301	ns
	6mA	GCLK	$t_{co}$	3.168	3.409	4.811	5.214	5.730	5.590	5.890	5.339	5.855	5.716	5.965	ns
		GCLK PLL	$t_{co}$	1.344	1.524	1.967	2.065	2.278	2.289	2.315	2.171	2.387	2.397	2.303	ns
	8mA	GCLK	$t_{co}$	3.166	3.407	4.810	5.213	5.728	5.588	5.888	5.338	5.854	5.715	5.964	ns
		GCLK PLL	$t_{co}$	1.342	1.522	1.966	2.064	2.276	2.287	2.313	2.170	2.386	2.396	2.302	ns
	10mA	GCLK	$t_{co}$	3.158	3.398	4.800	5.203	5.719	5.579	5.879	5.328	5.844	5.705	5.954	ns
		GCLK PLL	$t_{co}$	1.334	1.513	1.956	2.054	2.267	2.278	2.304	2.160	2.376	2.386	2.292	ns
12mA	GCLK	$t_{co}$	3.159	3.400	4.806	5.210	5.727	5.587	5.887	5.336	5.853	5.714	5.963	ns	
	GCLK PLL	$t_{co}$	1.335	1.515	1.962	2.061	2.275	2.286	2.312	2.168	2.385	2.395	2.301	ns	
DIFFERENTIAL 1.5-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.158	3.397	4.789	5.191	5.705	5.565	5.865	5.315	5.829	5.690	5.939	ns
		GCLK PLL	$t_{co}$	1.334	1.512	1.945	2.042	2.253	2.264	2.290	2.147	2.361	2.371	2.277	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	$t_{co}$	3.170	3.410	4.807	5.209	5.723	5.583	5.883	5.334	5.848	5.709	5.958	ns
		GCLK PLL	$t_{co}$	1.346	1.525	1.963	2.060	2.271	2.282	2.308	2.166	2.380	2.390	2.296	ns
	6mA	GCLK	$t_{co}$	3.166	3.407	4.808	5.211	5.727	5.587	5.887	5.336	5.852	5.713	5.962	ns
		GCLK PLL	$t_{co}$	1.342	1.522	1.964	2.062	2.275	2.286	2.312	2.168	2.384	2.394	2.300	ns
	8mA	GCLK	$t_{co}$	3.156	3.396	4.797	5.200	5.715	5.575	5.875	5.325	5.840	5.701	5.950	ns
		GCLK PLL	$t_{co}$	1.332	1.511	1.953	2.051	2.263	2.274	2.300	2.157	2.372	2.382	2.288	ns
	10mA	GCLK	$t_{co}$	3.154	3.394	4.795	5.197	5.713	5.573	5.873	5.323	5.838	5.699	5.948	ns
		GCLK PLL	$t_{co}$	1.330	1.509	1.951	2.048	2.261	2.272	2.298	2.155	2.370	2.380	2.286	ns
12mA	GCLK	$t_{co}$	3.154	3.395	4.798	5.202	5.718	5.578	5.878	5.327	5.844	5.705	5.954	ns	
	GCLK PLL	$t_{co}$	1.330	1.510	1.954	2.053	2.266	2.277	2.303	2.159	2.376	2.386	2.292	ns	
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	$t_{co}$	3.158	3.398	4.795	5.197	5.712	5.572	5.872	5.322	5.837	5.698	5.947	ns
		GCLK PLL	$t_{co}$	1.334	1.513	1.951	2.048	2.260	2.271	2.297	2.154	2.369	2.379	2.285	ns

**Table 1–126.** EP3SE80 Column Pins output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.184	3.427	4.840	5.245	5.762	5.622	5.922	5.370	5.887	5.748	5.997	ns	
		GCLK PLL	t <sub>co</sub>	1.360	1.542	1.996	2.096	2.310	2.321	2.347	2.202	2.419	2.429	2.335	ns	
	6mA	GCLK	t <sub>co</sub>	3.170	3.413	4.828	5.234	5.752	5.612	5.912	5.360	5.878	5.739	5.988	ns	
		GCLK PLL	t <sub>co</sub>	1.346	1.528	1.984	2.085	2.300	2.311	2.337	2.192	2.410	2.420	2.326	ns	
	8mA	GCLK	t <sub>co</sub>	3.158	3.400	4.811	5.216	5.734	5.594	5.894	5.342	5.860	5.721	5.970	ns	
		GCLK PLL	t <sub>co</sub>	1.334	1.515	1.967	2.067	2.282	2.293	2.319	2.174	2.392	2.402	2.308	ns	
	10mA	GCLK	t <sub>co</sub>	3.158	3.400	4.814	5.220	5.738	5.598	5.898	5.346	5.865	5.726	5.975	ns	
		GCLK PLL	t <sub>co</sub>	1.334	1.515	1.970	2.071	2.286	2.297	2.323	2.178	2.397	2.407	2.313	ns	
	12mA	GCLK	t <sub>co</sub>	3.154	3.396	4.807	5.212	5.731	5.591	5.891	5.339	5.857	5.718	5.967	ns	
		GCLK PLL	t <sub>co</sub>	1.330	1.511	1.963	2.063	2.279	2.290	2.316	2.171	2.389	2.399	2.305	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.158	3.398	4.800	5.203	5.719	5.579	5.879	5.328	5.844	5.705	5.954	ns
			GCLK PLL	t <sub>co</sub>	1.334	1.513	1.956	2.054	2.267	2.278	2.304	2.160	2.376	2.386	2.292	ns
16mA		GCLK	t <sub>co</sub>	3.159	3.400	4.808	5.213	5.730	5.590	5.890	5.338	5.856	5.717	5.966	ns	
		GCLK PLL	t <sub>co</sub>	1.335	1.515	1.964	2.064	2.278	2.289	2.315	2.170	2.388	2.398	2.304	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.187	3.430	4.839	5.243	5.760	5.620	5.920	5.369	5.885	5.746	5.995	ns	
		GCLK PLL	t <sub>co</sub>	1.363	1.545	1.995	2.094	2.308	2.319	2.345	2.201	2.417	2.427	2.333	ns	
	6mA	GCLK	t <sub>co</sub>	3.176	3.418	4.827	5.231	5.748	5.608	5.908	5.357	5.873	5.734	5.983	ns	
		GCLK PLL	t <sub>co</sub>	1.352	1.533	1.983	2.082	2.296	2.307	2.333	2.189	2.405	2.415	2.321	ns	
	8mA	GCLK	t <sub>co</sub>	3.171	3.414	4.827	5.232	5.749	5.609	5.909	5.358	5.875	5.736	5.985	ns	
		GCLK PLL	t <sub>co</sub>	1.347	1.529	1.983	2.083	2.297	2.308	2.334	2.190	2.407	2.417	2.323	ns	
	10mA	GCLK	t <sub>co</sub>	3.157	3.399	4.809	5.213	5.730	5.590	5.890	5.339	5.857	5.718	5.967	ns	
		GCLK PLL	t <sub>co</sub>	1.333	1.514	1.965	2.064	2.278	2.289	2.315	2.171	2.389	2.399	2.305	ns	
	12mA	GCLK	t <sub>co</sub>	3.155	3.397	4.807	5.211	5.728	5.588	5.888	5.337	5.854	5.715	5.964	ns	
		GCLK PLL	t <sub>co</sub>	1.331	1.512	1.963	2.062	2.276	2.287	2.313	2.169	2.386	2.396	2.302	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.159	3.399	4.799	5.201	5.716	5.576	5.876	5.326	5.841	5.702	5.951	ns
			GCLK PLL	t <sub>co</sub>	1.335	1.514	1.955	2.052	2.264	2.275	2.301	2.158	2.373	2.383	2.289	ns
16mA		GCLK	t <sub>co</sub>	3.159	3.400	4.807	5.211	5.728	5.588	5.888	5.337	5.854	5.715	5.964	ns	
		GCLK PLL	t <sub>co</sub>	1.335	1.515	1.963	2.062	2.276	2.287	2.313	2.169	2.386	2.396	2.302	ns	

**Table 1–126.** EP3SE80 Column Pins output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.175	3.417	4.823	5.226	5.742	5.602	5.902	5.352	5.867	5.728	5.977	ns
		GCLK PLL	$t_{co}$	1.351	1.532	1.979	2.077	2.290	2.301	2.327	2.184	2.399	2.409	2.315	ns
	10mA	GCLK	$t_{co}$	3.175	3.417	4.823	5.226	5.742	5.602	5.902	5.352	5.867	5.728	5.977	ns
		GCLK PLL	$t_{co}$	1.351	1.532	1.979	2.077	2.290	2.301	2.327	2.184	2.399	2.409	2.315	ns
	12mA	GCLK	$t_{co}$	3.165	3.407	4.813	5.216	5.732	5.592	5.892	5.342	5.858	5.719	5.968	ns
		GCLK PLL	$t_{co}$	1.341	1.522	1.969	2.067	2.280	2.291	2.317	2.174	2.390	2.400	2.306	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.158	3.399	4.799	5.201	5.716	5.576	5.876	5.326	5.841	5.702	5.951	ns
		GCLK PLL	$t_{co}$	1.334	1.514	1.955	2.052	2.264	2.275	2.301	2.158	2.373	2.383	2.289	ns

Table 1–127 specifies EP3SE80 Row Pins Output Timing parameters for differential I/O standards.

**Table 1–127.** EP3SE80 Row Pins output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
LVDS	—	GCLK	$t_{co}$	2.744	2.932	4.083	4.440	4.901	4.771	5.049	4.540	5.002	4.873	5.107	ns
		GCLK PLL	$t_{co}$	0.931	1.057	1.249	1.300	1.458	1.480	1.486	1.382	1.545	1.563	1.456	ns
LVDS_E_1R	—	GCLK	$t_{co}$	3.136	3.376	4.754	5.156	5.664	5.526	5.797	5.281	5.790	5.652	5.871	ns
		GCLK PLL	$t_{co}$	1.333	1.511	1.930	2.026	2.231	2.245	2.243	2.133	2.343	2.352	2.229	ns
LVDS_E_3R	—	GCLK	$t_{co}$	3.118	3.366	4.792	5.202	5.718	5.580	5.851	5.332	5.851	5.713	5.932	ns
		GCLK PLL	$t_{co}$	1.315	1.501	1.968	2.072	2.285	2.299	2.297	2.184	2.404	2.413	2.290	ns
MINI-LVDS	—	GCLK	$t_{co}$	2.744	2.932	4.083	4.440	4.901	4.771	5.049	4.540	5.002	4.873	5.107	ns
		GCLK PLL	$t_{co}$	0.931	1.057	1.249	1.300	1.458	1.480	1.486	1.382	1.545	1.563	1.456	ns
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.136	3.376	4.754	5.156	5.664	5.526	5.797	5.281	5.790	5.652	5.871	ns
		GCLK PLL	$t_{co}$	1.333	1.511	1.930	2.026	2.231	2.245	2.243	2.133	2.343	2.352	2.229	ns
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.118	3.366	4.792	5.202	5.718	5.580	5.851	5.332	5.851	5.713	5.932	ns
		GCLK PLL	$t_{co}$	1.315	1.501	1.968	2.072	2.285	2.299	2.297	2.184	2.404	2.413	2.290	ns
RSDS	—	GCLK	$t_{co}$	2.744	2.932	4.083	4.440	4.901	4.771	5.049	4.540	5.002	4.873	5.107	ns
		GCLK PLL	$t_{co}$	0.931	1.057	1.249	1.300	1.458	1.480	1.486	1.382	1.545	1.563	1.456	ns

**Table 1-127.** EP3SE80 Row Pins output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.136	3.376	4.754	5.156	5.664	5.526	5.797	5.281	5.790	5.652	5.871	ns
		GCLK PLL	t <sub>co</sub>	1.333	1.511	1.930	2.026	2.231	2.245	2.243	2.133	2.343	2.352	2.229	ns
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.118	3.366	4.792	5.202	5.718	5.580	5.851	5.332	5.851	5.713	5.932	ns
		GCLK PLL	t <sub>co</sub>	1.315	1.501	1.968	2.072	2.285	2.299	2.297	2.184	2.404	2.413	2.290	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.162	3.409	4.828	5.236	5.751	5.613	5.884	5.365	5.880	5.742	5.961	ns
		GCLK PLL	t <sub>co</sub>	1.359	1.544	2.004	2.106	2.318	2.332	2.330	2.217	2.433	2.442	2.319	ns
	6mA	GCLK	t <sub>co</sub>	3.148	3.395	4.815	5.223	5.738	5.600	5.871	5.351	5.867	5.729	5.948	ns
		GCLK PLL	t <sub>co</sub>	1.345	1.530	1.991	2.093	2.305	2.319	2.317	2.203	2.420	2.429	2.306	ns
	8mA	GCLK	t <sub>co</sub>	3.144	3.391	4.813	5.223	5.739	5.601	5.872	5.351	5.869	5.731	5.950	ns
		GCLK PLL	t <sub>co</sub>	1.341	1.526	1.989	2.093	2.306	2.320	2.318	2.203	2.422	2.431	2.308	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.160	3.406	4.814	5.220	5.733	5.595	5.866	5.348	5.862	5.724	5.943	ns
		GCLK PLL	t <sub>co</sub>	1.357	1.541	1.990	2.090	2.300	2.314	2.312	2.200	2.415	2.424	2.301	ns
	6mA	GCLK	t <sub>co</sub>	3.149	3.396	4.810	5.216	5.730	5.592	5.863	5.345	5.859	5.721	5.940	ns
		GCLK PLL	t <sub>co</sub>	1.346	1.531	1.986	2.086	2.297	2.311	2.309	2.197	2.412	2.421	2.298	ns
	8mA	GCLK	t <sub>co</sub>	3.146	3.393	4.808	5.214	5.728	5.590	5.861	5.343	5.858	5.720	5.939	ns
		GCLK PLL	t <sub>co</sub>	1.343	1.528	1.984	2.084	2.295	2.309	2.307	2.195	2.411	2.420	2.297	ns

**Table 1-127.** EP3SE80 Row Pins output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.157	3.403	4.809	5.215	5.727	5.589	5.860	5.343	5.856	5.718	5.937	ns
		GCLK PLL	t <sub>co</sub>	1.354	1.538	1.985	2.085	2.294	2.308	2.306	2.195	2.409	2.418	2.295	ns
	6mA	GCLK	t <sub>co</sub>	3.147	3.394	4.807	5.213	5.726	5.588	5.859	5.342	5.856	5.718	5.937	ns
		GCLK PLL	t <sub>co</sub>	1.344	1.529	1.983	2.083	2.293	2.307	2.305	2.194	2.409	2.418	2.295	ns
	8mA	GCLK	t <sub>co</sub>	3.133	3.380	4.792	5.198	5.712	5.574	5.845	5.327	5.841	5.703	5.922	ns
		GCLK PLL	t <sub>co</sub>	1.330	1.515	1.968	2.068	2.279	2.293	2.291	2.179	2.394	2.403	2.280	ns
	10mA	GCLK	t <sub>co</sub>	3.130	3.376	4.788	5.194	5.708	5.570	5.841	5.323	5.837	5.699	5.918	ns
		GCLK PLL	t <sub>co</sub>	1.327	1.511	1.964	2.064	2.275	2.289	2.287	2.175	2.390	2.399	2.276	ns
	12mA	GCLK	t <sub>co</sub>	3.127	3.374	4.789	5.197	5.711	5.573	5.844	5.326	5.841	5.703	5.922	ns
		GCLK PLL	t <sub>co</sub>	1.324	1.509	1.965	2.067	2.278	2.292	2.290	2.178	2.394	2.403	2.280	ns
	16mA	GCLK	t <sub>co</sub>	3.128	3.374	4.779	5.185	5.698	5.560	5.831	5.313	5.827	5.689	5.908	ns
		GCLK PLL	t <sub>co</sub>	1.325	1.509	1.955	2.055	2.265	2.279	2.277	2.165	2.380	2.389	2.266	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.177	3.427	4.850	5.258	5.774	5.636	5.907	5.387	5.903	5.765	5.984	ns
		GCLK PLL	t <sub>co</sub>	1.374	1.562	2.026	2.128	2.341	2.355	2.353	2.239	2.456	2.465	2.342	ns
	6mA	GCLK	t <sub>co</sub>	3.153	3.403	4.832	5.241	5.757	5.619	5.890	5.370	5.888	5.750	5.969	ns
		GCLK PLL	t <sub>co</sub>	1.350	1.538	2.008	2.111	2.324	2.338	2.336	2.222	2.441	2.450	2.327	ns
	8mA	GCLK	t <sub>co</sub>	3.136	3.384	4.810	5.219	5.735	5.597	5.868	5.348	5.866	5.728	5.947	ns
		GCLK PLL	t <sub>co</sub>	1.333	1.519	1.986	2.089	2.302	2.316	2.314	2.200	2.419	2.428	2.305	ns

**Table 1-127.** EP3SE80 Row Pins output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.181	3.430	4.850	5.258	5.773	5.635	5.906	5.387	5.903	5.765	5.984	ns	
		GCLK PLL	t <sub>co</sub>	1.378	1.565	2.026	2.128	2.340	2.354	2.352	2.239	2.456	2.465	2.342	ns	
	6mA	GCLK	t <sub>co</sub>	3.166	3.415	4.836	5.243	5.758	5.620	5.891	5.372	5.888	5.750	5.969	ns	
		GCLK PLL	t <sub>co</sub>	1.363	1.550	2.012	2.113	2.325	2.339	2.337	2.224	2.441	2.450	2.327	ns	
	8mA	GCLK	t <sub>co</sub>	3.155	3.404	4.831	5.240	5.755	5.617	5.888	5.369	5.886	5.748	5.967	ns	
		GCLK PLL	t <sub>co</sub>	1.352	1.539	2.007	2.110	2.322	2.336	2.334	2.221	2.439	2.448	2.325	ns	
	10mA	GCLK	t <sub>co</sub>	3.135	3.384	4.808	5.216	5.732	5.594	5.865	5.346	5.862	5.724	5.943	ns	
		GCLK PLL	t <sub>co</sub>	1.332	1.519	1.984	2.086	2.299	2.313	2.311	2.198	2.415	2.424	2.301	ns	
	12mA	GCLK	t <sub>co</sub>	3.132	3.380	4.804	5.213	5.728	5.590	5.861	5.342	5.859	5.721	5.940	ns	
		GCLK PLL	t <sub>co</sub>	1.329	1.515	1.980	2.083	2.295	2.309	2.307	2.194	2.412	2.421	2.298	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.137	3.384	4.795	5.201	5.714	5.576	5.847	5.329	5.843	5.705	5.924	ns
			GCLK PLL	t <sub>co</sub>	1.334	1.519	1.971	2.071	2.281	2.295	2.293	2.181	2.396	2.405	2.282	ns
16mA		GCLK	t <sub>co</sub>	3.130	3.377	4.794	5.202	5.717	5.579	5.850	5.332	5.848	5.710	5.929	ns	
		GCLK PLL	t <sub>co</sub>	1.327	1.512	1.970	2.072	2.284	2.298	2.296	2.184	2.401	2.410	2.287	ns	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	3.168	3.416	4.832	5.239	5.753	5.615	5.886	5.368	5.883	5.745	5.964	ns	
		GCLK PLL	t <sub>co</sub>	1.365	1.551	2.008	2.109	2.320	2.334	2.332	2.220	2.436	2.445	2.322	ns	
	12mA	GCLK	t <sub>co</sub>	3.150	3.399	4.817	5.224	5.738	5.600	5.871	5.353	5.868	5.730	5.949	ns	
		GCLK PLL	t <sub>co</sub>	1.347	1.534	1.993	2.094	2.305	2.319	2.317	2.205	2.421	2.430	2.307	ns	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.136	3.383	4.794	5.200	5.713	5.575	5.846	5.329	5.843	5.705	5.924	ns	
		GCLK PLL	t <sub>co</sub>	1.333	1.518	1.970	2.070	2.280	2.294	2.292	2.181	2.396	2.405	2.282	ns	

Table 1-128 and Table 1-129 show EP3SE80 regional clock (RCLK) adder values that should be added to GCLK values. These adder values are used to determine I/O timing when I/O pin is driven using regional clock. This applies for all I/O standards supported by Stratix III devices.

Table 1-128 specifies EP3SE80 Column Pin delay adders when using the regional clock.

**Table 1-128.** EP3SE80 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RCLK input adder	0.251	0.187	0.308	0.239	0.389	0.103	0.176	0.199	0.102	0.099	0.172	ns
RCLK PLL input adder	1.895	1.982	2.923	3.16	3.601	4.28	4.913	3.261	4.491	4.295	4.833	ns
RCLK output adder	-0.069	0.253	0.551	0.865	0.693	-0.059	-0.119	1.06	0.135	0.066	-0.046	ns
RCLK PLL output adder	-1.545	-1.367	-1.715	-1.587	-1.976	-3.145	-3.116	-1.541	-3.343	-3.027	-3.123	ns

Table 1-129 specifies EP3SE80 Row Pin delay adders when using the regional clock.

**Table 1-129.** EP3SE80 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RCLK input adder	0.014	0.014	0.018	0.005	-0.022	0.0	0.052	-0.004	-0.014	-0.008	0.056	ns
RCLK PLL input adder	0.116	0.122	0.192	0.206	0.231	0.217	0.367	0.198	0.223	0.21	0.371	ns
RCLK output adder	0.004	0.003	0.029	0.042	0.056	0.039	-0.021	0.047	0.061	0.049	-0.025	ns
RCLK PLL output adder	-0.089	-0.089	-0.145	-0.161	-0.197	-0.169	-0.332	-0.151	-0.186	-0.157	-0.333	ns

### EP3SE110 I/O Timing Parameters

Table 1-130 through Table 1-133 show the maximum I/O timing parameters for EP3SE110 for single-ended I/O standards.

Table 1-130 specifies EP3SE110 column pins input timing parameters for single-ended I/O standards.

**Table 1-130.** EP3SE110 Column Pins Input Timing Parameters (Part 1 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-1.030	-1.006	-1.454	-1.613	-1.847	-1.786	-2.148	-1.613	-1.847	-1.786	-2.148	ns
		t <sub>h</sub>	1.172	1.144	1.648	1.838	2.093	2.017	2.385	1.838	2.093	2.017	2.385	ns
	GCLK PLL	t <sub>su</sub>	-1.297	-1.267	-1.831	-2.023	-2.261	-2.187	-2.655	-2.023	-2.261	-2.187	-2.655	ns
		t <sub>h</sub>	1.600	1.565	2.262	2.514	2.793	2.689	3.180	2.514	2.793	2.689	3.180	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-1.030	-1.006	-1.454	-1.613	-1.847	-1.786	-2.148	-1.613	-1.847	-1.786	-2.148	ns
		t <sub>h</sub>	1.172	1.144	1.648	1.838	2.093	2.017	2.385	1.838	2.093	2.017	2.385	ns
	GCLK PLL	t <sub>su</sub>	-1.297	-1.267	-1.831	-2.023	-2.261	-2.187	-2.655	-2.023	-2.261	-2.187	-2.655	ns
		t <sub>h</sub>	1.600	1.565	2.262	2.514	2.793	2.689	3.180	2.514	2.793	2.689	3.180	ns



**Table 1-130.** EP3SE110 Column Pins Input Timing Parameters (Part 2 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.0-V LVTTTL	GCLK	t <sub>su</sub>	-1.041	-1.017	-1.453	-1.615	-1.846	-1.785	-2.147	-1.615	-1.846	-1.785	-2.147	ns
		t <sub>h</sub>	1.183	1.155	1.647	1.840	2.092	2.016	2.384	1.840	2.092	2.016	2.384	ns
	GCLK PLL	t <sub>su</sub>	-1.308	-1.278	-1.830	-2.025	-2.260	-2.186	-2.654	-2.025	-2.260	-2.186	-2.654	ns
		t <sub>h</sub>	1.611	1.576	2.261	2.516	2.792	2.688	3.179	2.516	2.792	2.688	3.179	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-1.041	-1.017	-1.453	-1.615	-1.846	-1.785	-2.147	-1.615	-1.846	-1.785	-2.147	ns
		t <sub>h</sub>	1.183	1.155	1.647	1.840	2.092	2.016	2.384	1.840	2.092	2.016	2.384	ns
	GCLK PLL	t <sub>su</sub>	-1.308	-1.278	-1.830	-2.025	-2.260	-2.186	-2.654	-2.025	-2.260	-2.186	-2.654	ns
		t <sub>h</sub>	1.611	1.576	2.261	2.516	2.792	2.688	3.179	2.516	2.792	2.688	3.179	ns
2.5 V	GCLK	t <sub>su</sub>	-1.036	-1.012	-1.462	-1.627	-1.865	-1.804	-2.166	-1.627	-1.865	-1.804	-2.166	ns
		t <sub>h</sub>	1.178	1.150	1.656	1.852	2.111	2.035	2.403	1.852	2.111	2.035	2.403	ns
	GCLK PLL	t <sub>su</sub>	-1.303	-1.273	-1.839	-2.037	-2.279	-2.205	-2.673	-2.037	-2.279	-2.205	-2.673	ns
		t <sub>h</sub>	1.606	1.571	2.270	2.528	2.811	2.707	3.198	2.528	2.811	2.707	3.198	ns
1.8 V	GCLK	t <sub>su</sub>	-1.058	-1.034	-1.502	-1.663	-1.863	-1.802	-2.164	-1.663	-1.863	-1.802	-2.164	ns
		t <sub>h</sub>	1.202	1.174	1.696	1.888	2.109	2.033	2.401	1.888	2.109	2.033	2.401	ns
	GCLK PLL	t <sub>su</sub>	-1.325	-1.295	-1.879	-2.073	-2.277	-2.203	-2.671	-2.073	-2.277	-2.203	-2.671	ns
		t <sub>h</sub>	1.630	1.595	2.310	2.564	2.809	2.705	3.196	2.564	2.809	2.705	3.196	ns
1.5 V	GCLK	t <sub>su</sub>	-1.048	-1.024	-1.479	-1.631	-1.793	-1.732	-2.094	-1.631	-1.793	-1.732	-2.094	ns
		t <sub>h</sub>	1.192	1.164	1.673	1.856	2.039	1.963	2.331	1.856	2.039	1.963	2.331	ns
	GCLK PLL	t <sub>su</sub>	-1.315	-1.285	-1.856	-2.041	-2.207	-2.133	-2.601	-2.041	-2.207	-2.133	-2.601	ns
		t <sub>h</sub>	1.620	1.585	2.287	2.532	2.739	2.635	3.126	2.532	2.739	2.635	3.126	ns
1.2 V	GCLK	t <sub>su</sub>	-0.996	-0.972	-1.402	-1.532	-1.637	-1.576	-1.938	-1.532	-1.637	-1.576	-1.938	ns
		t <sub>h</sub>	1.140	1.112	1.596	1.757	1.883	1.807	2.175	1.757	1.883	1.807	2.175	ns
	GCLK PLL	t <sub>su</sub>	-1.263	-1.233	-1.779	-1.942	-2.051	-1.977	-2.445	-1.942	-2.051	-1.977	-2.445	ns
		t <sub>h</sub>	1.568	1.533	2.210	2.433	2.583	2.479	2.970	2.433	2.583	2.479	2.970	ns
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-0.967	-0.943	-1.374	-1.516	-1.639	-1.578	-1.940	-1.516	-1.639	-1.578	-1.940	ns
		t <sub>h</sub>	1.111	1.083	1.568	1.741	1.885	1.809	2.177	1.741	1.885	1.809	2.177	ns
	GCLK PLL	t <sub>su</sub>	-1.234	-1.204	-1.751	-1.926	-2.053	-1.979	-2.447	-1.926	-2.053	-1.979	-2.447	ns
		t <sub>h</sub>	1.539	1.504	2.182	2.417	2.585	2.481	2.972	2.417	2.585	2.481	2.972	ns
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-0.967	-0.943	-1.374	-1.516	-1.639	-1.578	-1.940	-1.516	-1.639	-1.578	-1.940	ns
		t <sub>h</sub>	1.111	1.083	1.568	1.741	1.885	1.809	2.177	1.741	1.885	1.809	2.177	ns
	GCLK PLL	t <sub>su</sub>	-1.234	-1.204	-1.751	-1.926	-2.053	-1.979	-2.447	-1.926	-2.053	-1.979	-2.447	ns
		t <sub>h</sub>	1.539	1.504	2.182	2.417	2.585	2.481	2.972	2.417	2.585	2.481	2.972	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-0.961	-0.937	-1.361	-1.508	-1.636	-1.573	-1.938	-1.508	-1.636	-1.573	-1.938	ns
		t <sub>h</sub>	1.105	1.077	1.555	1.730	1.879	1.803	2.170	1.730	1.879	1.803	2.170	ns
	GCLK PLL	t <sub>su</sub>	-1.228	-1.198	-1.738	-1.918	-2.050	-1.974	-2.445	-1.918	-2.050	-1.974	-2.445	ns
		t <sub>h</sub>	1.533	1.498	2.169	2.406	2.579	2.475	2.965	2.406	2.579	2.475	2.965	ns

**Table 1-130.** EP3SE110 Column Pins Input Timing Parameters (Part 3 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-0.961	-0.937	-1.361	-1.508	-1.636	-1.573	-1.938	-1.508	-1.636	-1.573	-1.938	ns
		t <sub>h</sub>	1.105	1.077	1.555	1.730	1.879	1.803	2.170	1.730	1.879	1.803	2.170	ns
	GCLK PLL	t <sub>su</sub>	-1.228	-1.198	-1.738	-1.918	-2.050	-1.974	-2.445	-1.918	-2.050	-1.974	-2.445	ns
		t <sub>h</sub>	1.533	1.498	2.169	2.406	2.579	2.475	2.965	2.406	2.579	2.475	2.965	ns
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-0.950	-0.926	-1.350	-1.497	-1.617	-1.554	-1.919	-1.497	-1.617	-1.554	-1.919	ns
		t <sub>h</sub>	1.094	1.066	1.543	1.719	1.860	1.784	2.151	1.719	1.860	1.784	2.151	ns
	GCLK PLL	t <sub>su</sub>	-1.217	-1.187	-1.727	-1.907	-2.031	-1.955	-2.426	-1.907	-2.031	-1.955	-2.426	ns
		t <sub>h</sub>	1.522	1.487	2.157	2.395	2.560	2.456	2.946	2.395	2.560	2.456	2.946	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.950	-0.926	-1.350	-1.497	-1.617	-1.554	-1.919	-1.497	-1.617	-1.554	-1.919	ns
		t <sub>h</sub>	1.094	1.066	1.543	1.719	1.860	1.784	2.151	1.719	1.860	1.784	2.151	ns
	GCLK PLL	t <sub>su</sub>	-1.217	-1.187	-1.727	-1.907	-2.031	-1.955	-2.426	-1.907	-2.031	-1.955	-2.426	ns
		t <sub>h</sub>	1.522	1.487	2.157	2.395	2.560	2.456	2.946	2.395	2.560	2.456	2.946	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.961	-0.937	-1.361	-1.508	-1.636	-1.573	-1.938	-1.508	-1.636	-1.573	-1.938	ns
		t <sub>h</sub>	1.105	1.077	1.555	1.730	1.879	1.803	2.170	1.730	1.879	1.803	2.170	ns
	GCLK PLL	t <sub>su</sub>	-1.228	-1.198	-1.738	-1.918	-2.050	-1.974	-2.445	-1.918	-2.050	-1.974	-2.445	ns
		t <sub>h</sub>	1.533	1.498	2.169	2.406	2.579	2.475	2.965	2.406	2.579	2.475	2.965	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.961	-0.937	-1.361	-1.508	-1.636	-1.573	-1.938	-1.508	-1.636	-1.573	-1.938	ns
		t <sub>h</sub>	1.105	1.077	1.555	1.730	1.879	1.803	2.170	1.730	1.879	1.803	2.170	ns
	GCLK PLL	t <sub>su</sub>	-1.228	-1.198	-1.738	-1.918	-2.050	-1.974	-2.445	-1.918	-2.050	-1.974	-2.445	ns
		t <sub>h</sub>	1.533	1.498	2.169	2.406	2.579	2.475	2.965	2.406	2.579	2.475	2.965	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.950	-0.926	-1.350	-1.497	-1.617	-1.554	-1.919	-1.497	-1.617	-1.554	-1.919	ns
		t <sub>h</sub>	1.094	1.066	1.543	1.719	1.860	1.784	2.151	1.719	1.860	1.784	2.151	ns
	GCLK PLL	t <sub>su</sub>	-1.217	-1.187	-1.727	-1.907	-2.031	-1.955	-2.426	-1.907	-2.031	-1.955	-2.426	ns
		t <sub>h</sub>	1.522	1.487	2.157	2.395	2.560	2.456	2.946	2.395	2.560	2.456	2.946	ns
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.950	-0.926	-1.350	-1.497	-1.617	-1.554	-1.919	-1.497	-1.617	-1.554	-1.919	ns
		t <sub>h</sub>	1.094	1.066	1.543	1.719	1.860	1.784	2.151	1.719	1.860	1.784	2.151	ns
	GCLK PLL	t <sub>su</sub>	-1.217	-1.187	-1.727	-1.907	-2.031	-1.955	-2.426	-1.907	-2.031	-1.955	-2.426	ns
		t <sub>h</sub>	1.522	1.487	2.157	2.395	2.560	2.456	2.946	2.395	2.560	2.456	2.946	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.938	-0.914	-1.340	-1.486	-1.601	-1.538	-1.903	-1.486	-1.601	-1.538	-1.903	ns
		t <sub>h</sub>	1.082	1.054	1.533	1.708	1.844	1.768	2.135	1.708	1.844	1.768	2.135	ns
	GCLK PLL	t <sub>su</sub>	-1.205	-1.175	-1.717	-1.896	-2.015	-1.939	-2.410	-1.896	-2.015	-1.939	-2.410	ns
		t <sub>h</sub>	1.510	1.475	2.147	2.384	2.544	2.440	2.930	2.384	2.544	2.440	2.930	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-0.938	-0.914	-1.340	-1.486	-1.601	-1.538	-1.903	-1.486	-1.601	-1.538	-1.903	ns
		t <sub>h</sub>	1.082	1.054	1.533	1.708	1.844	1.768	2.135	1.708	1.844	1.768	2.135	ns
	GCLK PLL	t <sub>su</sub>	-1.205	-1.175	-1.717	-1.896	-2.015	-1.939	-2.410	-1.896	-2.015	-1.939	-2.410	ns
		t <sub>h</sub>	1.510	1.475	2.147	2.384	2.544	2.440	2.930	2.384	2.544	2.440	2.930	ns

**Table 1-130.** EP3SE110 Column Pins Input Timing Parameters (Part 4 of 4)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.0-V PCI-X	GCLK	t <sub>su</sub>	-1.041	-1.017	-1.453	-1.615	-1.846	-1.785	-2.147	-1.615	-1.846	-1.785	-2.147	ns
		t <sub>h</sub>	1.183	1.155	1.647	1.840	2.092	2.016	2.384	1.840	2.092	2.016	2.384	ns
	GCLK PLL	t <sub>su</sub>	-1.308	-1.278	-1.830	-2.025	-2.260	-2.186	-2.654	-2.025	-2.260	-2.186	-2.654	ns
		t <sub>h</sub>	1.611	1.576	2.261	2.516	2.792	2.688	3.179	2.516	2.792	2.688	3.179	ns

Table 1-131 specifies EP3SE110 row pins input timing parameters for single-ended I/O standards.

**Table 1-131.** EP3SE110 Row Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVTTL	GCLK	t <sub>su</sub>	-0.917	-0.960	-1.364	-1.476	-1.736	-1.642	-2.026	-1.488	-1.737	-1.683	-2.064	ns
		t <sub>h</sub>	1.041	1.099	1.561	1.698	1.978	1.873	2.261	1.720	1.989	1.922	2.300	ns
	GCLK PLL	t <sub>su</sub>	1.022	1.000	1.632	1.851	1.964	1.893	1.808	1.901	1.982	1.864	1.859	ns
		t <sub>h</sub>	-0.762	-0.722	-1.218	-1.386	-1.449	-1.406	-1.309	-1.426	-1.456	-1.368	-1.357	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-0.917	-0.960	-1.364	-1.476	-1.736	-1.642	-2.026	-1.488	-1.737	-1.683	-2.064	ns
		t <sub>h</sub>	1.041	1.099	1.561	1.698	1.978	1.873	2.261	1.720	1.989	1.922	2.300	ns
	GCLK PLL	t <sub>su</sub>	1.022	1.000	1.632	1.851	1.964	1.893	1.808	1.901	1.982	1.864	1.859	ns
		t <sub>h</sub>	-0.762	-0.722	-1.218	-1.386	-1.449	-1.406	-1.309	-1.426	-1.456	-1.368	-1.357	ns
3.0-V LVTTL	GCLK	t <sub>su</sub>	-0.923	-0.971	-1.361	-1.477	-1.739	-1.645	-2.029	-1.487	-1.742	-1.688	-2.069	ns
		t <sub>h</sub>	1.047	1.110	1.558	1.699	1.981	1.876	2.264	1.719	1.994	1.927	2.305	ns
	GCLK PLL	t <sub>su</sub>	1.016	0.989	1.635	1.850	1.961	1.890	1.805	1.902	1.977	1.859	1.854	ns
		t <sub>h</sub>	-0.756	-0.711	-1.221	-1.385	-1.446	-1.403	-1.306	-1.427	-1.451	-1.363	-1.352	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-0.923	-0.971	-1.361	-1.477	-1.739	-1.645	-2.029	-1.487	-1.742	-1.688	-2.069	ns
		t <sub>h</sub>	1.047	1.110	1.558	1.699	1.981	1.876	2.264	1.719	1.994	1.927	2.305	ns
	GCLK PLL	t <sub>su</sub>	1.016	0.989	1.635	1.850	1.961	1.890	1.805	1.902	1.977	1.859	1.854	ns
		t <sub>h</sub>	-0.756	-0.711	-1.221	-1.385	-1.446	-1.403	-1.306	-1.427	-1.451	-1.363	-1.352	ns
2.5 V	GCLK	t <sub>su</sub>	-0.911	-0.964	-1.370	-1.490	-1.754	-1.660	-2.044	-1.496	-1.752	-1.698	-2.079	ns
		t <sub>h</sub>	1.035	1.103	1.567	1.712	1.996	1.891	2.279	1.728	2.004	1.937	2.315	ns
	GCLK PLL	t <sub>su</sub>	1.028	0.996	1.626	1.837	1.946	1.875	1.790	1.893	1.967	1.849	1.844	ns
		t <sub>h</sub>	-0.768	-0.718	-1.212	-1.372	-1.431	-1.388	-1.291	-1.418	-1.441	-1.353	-1.342	ns
1.8 V	GCLK	t <sub>su</sub>	-0.987	-1.042	-1.456	-1.570	-1.756	-1.705	-2.042	-1.576	-1.754	-1.707	-2.080	ns
		t <sub>h</sub>	1.112	1.182	1.653	1.793	1.999	1.936	2.277	1.808	2.007	1.948	2.316	ns
	GCLK PLL	t <sub>su</sub>	1.040	1.054	1.703	1.929	1.948	1.963	1.900	1.946	1.966	1.848	1.952	ns
		t <sub>h</sub>	-0.777	-0.773	-1.286	-1.461	-1.433	-1.472	-1.399	-1.468	-1.440	-1.352	-1.447	ns

**Table 1-131.** EP3SE110 Row Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.5 V	GCLK	t <sub>su</sub>	-0.977	-1.031	-1.432	-1.538	-1.688	-1.637	-1.974	-1.545	-1.689	-1.642	-2.015	ns
		t <sub>h</sub>	1.102	1.171	1.629	1.761	1.931	1.868	2.209	1.777	1.942	1.883	2.251	ns
	GCLK PLL	t <sub>su</sub>	1.050	1.065	1.727	1.961	2.016	2.031	1.968	1.977	2.031	1.913	2.017	ns
		t <sub>h</sub>	-0.787	-0.784	-1.310	-1.493	-1.501	-1.540	-1.467	-1.499	-1.505	-1.417	-1.512	ns
1.2 V	GCLK	t <sub>su</sub>	-0.917	-0.978	-1.353	-1.437	-1.529	-1.478	-1.815	-1.449	-1.534	-1.487	-1.860	ns
		t <sub>h</sub>	1.042	1.118	1.550	1.660	1.772	1.709	2.050	1.681	1.787	1.728	2.096	ns
	GCLK PLL	t <sub>su</sub>	1.110	1.118	1.806	2.062	2.175	2.190	2.127	2.073	2.186	2.068	2.172	ns
		t <sub>h</sub>	-0.847	-0.837	-1.389	-1.594	-1.660	-1.699	-1.626	-1.595	-1.660	-1.572	-1.667	ns
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-0.854	-0.906	-1.284	-1.381	-1.534	-1.440	-1.824	-1.384	-1.535	-1.481	-1.862	ns
		t <sub>h</sub>	0.979	1.046	1.481	1.603	1.776	1.671	2.059	1.616	1.787	1.720	2.098	ns
	GCLK PLL	t <sub>su</sub>	1.085	1.054	1.712	1.946	2.166	2.095	2.010	2.005	2.184	2.066	2.061	ns
		t <sub>h</sub>	-0.824	-0.775	-1.298	-1.481	-1.651	-1.608	-1.511	-1.530	-1.658	-1.570	-1.559	ns
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-0.854	-0.906	-1.284	-1.381	-1.534	-1.440	-1.824	-1.384	-1.535	-1.481	-1.862	ns
		t <sub>h</sub>	0.979	1.046	1.481	1.603	1.776	1.671	2.059	1.616	1.787	1.720	2.098	ns
	GCLK PLL	t <sub>su</sub>	1.085	1.054	1.712	1.946	2.166	2.095	2.010	2.005	2.184	2.066	2.061	ns
		t <sub>h</sub>	-0.824	-0.775	-1.298	-1.481	-1.651	-1.608	-1.511	-1.530	-1.658	-1.570	-1.559	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-0.891	-0.943	-1.315	-1.410	-1.524	-1.472	-1.811	-1.417	-1.530	-1.479	-1.853	ns
		t <sub>h</sub>	1.016	1.083	1.512	1.631	1.765	1.702	2.042	1.647	1.778	1.719	2.085	ns
	GCLK PLL	t <sub>su</sub>	1.136	1.153	1.844	2.087	2.180	2.193	2.129	2.102	2.193	2.076	2.177	ns
		t <sub>h</sub>	-0.873	-0.872	-1.427	-1.621	-1.667	-1.704	-1.632	-1.627	-1.670	-1.581	-1.676	ns
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-0.891	-0.943	-1.315	-1.410	-1.524	-1.472	-1.811	-1.417	-1.530	-1.479	-1.853	ns
		t <sub>h</sub>	1.016	1.083	1.512	1.631	1.765	1.702	2.042	1.647	1.778	1.719	2.085	ns
	GCLK PLL	t <sub>su</sub>	1.136	1.153	1.844	2.087	2.180	2.193	2.129	2.102	2.193	2.076	2.177	ns
		t <sub>h</sub>	-0.873	-0.872	-1.427	-1.621	-1.667	-1.704	-1.632	-1.627	-1.670	-1.581	-1.676	ns
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-0.877	-0.931	-1.300	-1.400	-1.506	-1.454	-1.793	-1.406	-1.513	-1.462	-1.836	ns
		t <sub>h</sub>	1.002	1.071	1.498	1.621	1.747	1.684	2.024	1.636	1.761	1.702	2.068	ns
	GCLK PLL	t <sub>su</sub>	1.150	1.165	1.857	2.097	2.198	2.211	2.147	2.113	2.210	2.093	2.194	ns
		t <sub>h</sub>	-0.887	-0.884	-1.439	-1.631	-1.685	-1.722	-1.650	-1.638	-1.687	-1.598	-1.693	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.891	-0.943	-1.315	-1.410	-1.524	-1.472	-1.811	-1.417	-1.530	-1.479	-1.853	ns
		t <sub>h</sub>	1.016	1.083	1.512	1.631	1.765	1.702	2.042	1.647	1.778	1.719	2.085	ns
	GCLK PLL	t <sub>su</sub>	1.136	1.153	1.844	2.087	2.180	2.193	2.129	2.102	2.193	2.076	2.177	ns
		t <sub>h</sub>	-0.873	-0.872	-1.427	-1.621	-1.667	-1.704	-1.632	-1.627	-1.670	-1.581	-1.676	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.891	-0.943	-1.315	-1.410	-1.524	-1.472	-1.811	-1.417	-1.530	-1.479	-1.853	ns
		t <sub>h</sub>	1.016	1.083	1.512	1.631	1.765	1.702	2.042	1.647	1.778	1.719	2.085	ns
	GCLK PLL	t <sub>su</sub>	1.136	1.153	1.844	2.087	2.180	2.193	2.129	2.102	2.193	2.076	2.177	ns
		t <sub>h</sub>	-0.873	-0.872	-1.427	-1.621	-1.667	-1.704	-1.632	-1.627	-1.670	-1.581	-1.676	ns

**Table 1-131.** EP3SE110 Row Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.877	-0.931	-1.300	-1.400	-1.506	-1.454	-1.793	-1.406	-1.513	-1.462	-1.836	ns
		t <sub>h</sub>	1.002	1.071	1.498	1.621	1.747	1.684	2.024	1.636	1.761	1.702	2.068	ns
	GCLK PLL	t <sub>su</sub>	1.150	1.165	1.857	2.097	2.198	2.211	2.147	2.113	2.210	2.093	2.194	ns
		t <sub>h</sub>	-0.887	-0.884	-1.439	-1.631	-1.685	-1.722	-1.650	-1.638	-1.687	-1.598	-1.693	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.877	-0.931	-1.300	-1.400	-1.506	-1.454	-1.793	-1.406	-1.513	-1.462	-1.836	ns
		t <sub>h</sub>	1.002	1.071	1.498	1.621	1.747	1.684	2.024	1.636	1.761	1.702	2.068	ns
	GCLK PLL	t <sub>su</sub>	1.150	1.165	1.857	2.097	2.198	2.211	2.147	2.113	2.210	2.093	2.194	ns
		t <sub>h</sub>	-0.887	-0.884	-1.439	-1.631	-1.685	-1.722	-1.650	-1.638	-1.687	-1.598	-1.693	ns
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.868	-0.919	-1.291	-1.390	-1.490	-1.438	-1.777	-1.397	-1.497	-1.446	-1.820	ns
		t <sub>h</sub>	0.993	1.059	1.489	1.611	1.731	1.668	2.008	1.627	1.745	1.686	2.052	ns
	GCLK PLL	t <sub>su</sub>	1.159	1.177	1.866	2.107	2.214	2.227	2.163	2.122	2.226	2.109	2.210	ns
		t <sub>h</sub>	-0.896	-0.896	-1.448	-1.641	-1.701	-1.738	-1.666	-1.647	-1.703	-1.614	-1.709	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.868	-0.919	-1.291	-1.390	-1.490	-1.438	-1.777	-1.397	-1.497	-1.446	-1.820	ns
		t <sub>h</sub>	0.993	1.059	1.489	1.611	1.731	1.668	2.008	1.627	1.745	1.686	2.052	ns
	GCLK PLL	t <sub>su</sub>	1.159	1.177	1.866	2.107	2.214	2.227	2.163	2.122	2.226	2.109	2.210	ns
		t <sub>h</sub>	-0.896	-0.896	-1.448	-1.641	-1.701	-1.738	-1.666	-1.647	-1.703	-1.614	-1.709	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-0.923	-0.971	-1.361	-1.477	-1.739	-1.645	-2.029	-1.487	-1.742	-1.688	-2.069	ns
		t <sub>h</sub>	1.047	1.110	1.558	1.699	1.981	1.876	2.264	1.719	1.994	1.927	2.305	ns
	GCLK PLL	t <sub>su</sub>	1.016	0.989	1.635	1.850	1.961	1.890	1.805	1.902	1.977	1.859	1.854	ns
		t <sub>h</sub>	-0.756	-0.711	-1.221	-1.385	-1.446	-1.403	-1.306	-1.427	-1.451	-1.363	-1.352	ns
3.0-V PCI-X	GCLK	t <sub>su</sub>	-0.923	-0.971	-1.361	-1.477	-1.739	-1.645	-2.029	-1.487	-1.742	-1.688	-2.069	ns
		t <sub>h</sub>	1.047	1.110	1.558	1.699	1.981	1.876	2.264	1.719	1.994	1.927	2.305	ns
	GCLK PLL	t <sub>su</sub>	1.016	0.989	1.635	1.850	1.961	1.890	1.805	1.902	1.977	1.859	1.854	ns
		t <sub>h</sub>	-0.756	-0.711	-1.221	-1.385	-1.446	-1.403	-1.306	-1.427	-1.451	-1.363	-1.352	ns

Table 1-132 specifies EP3SE110 Column Pins Output Timing parameters for single-ended I/O standards.

**Table 1-132.** EP3SE110 Column Pins output Timing Parameters (Part 1 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		UnitS
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.489	3.489	4.830	5.213	5.686	5.551	5.863	5.213	5.686	5.551	5.863	ns
		GCLK PLL	t <sub>co</sub>	3.868	3.881	5.415	5.837	6.442	6.278	6.680	5.837	6.442	6.278	6.680	ns
	8mA	GCLK	t <sub>co</sub>	3.422	3.422	4.721	5.102	5.573	5.438	5.750	5.102	5.573	5.438	5.750	ns
		GCLK PLL	t <sub>co</sub>	3.801	3.814	5.306	5.726	6.329	6.165	6.567	5.726	6.329	6.165	6.567	ns
	12mA	GCLK	t <sub>co</sub>	3.336	3.336	4.617	5.003	5.481	5.346	5.658	5.003	5.481	5.346	5.658	ns
		GCLK PLL	t <sub>co</sub>	3.715	3.728	5.203	5.628	6.237	6.073	6.475	5.628	6.237	6.073	6.475	ns
	16mA	GCLK	t <sub>co</sub>	3.329	3.329	4.600	4.975	5.440	5.305	5.617	4.975	5.440	5.305	5.617	ns
		GCLK PLL	t <sub>co</sub>	3.709	3.721	5.186	5.600	6.196	6.032	6.434	5.600	6.196	6.032	6.434	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.495	3.495	4.834	5.218	5.693	5.558	5.870	5.218	5.693	5.558	5.870	ns
		GCLK PLL	t <sub>co</sub>	3.874	3.887	5.420	5.842	6.449	6.285	6.687	5.842	6.449	6.285	6.687	ns
	8mA	GCLK	t <sub>co</sub>	3.340	3.340	4.627	5.020	5.492	5.357	5.669	5.020	5.492	5.357	5.669	ns
		GCLK PLL	t <sub>co</sub>	3.719	3.732	5.213	5.645	6.248	6.084	6.486	5.645	6.248	6.084	6.486	ns
	12mA	GCLK	t <sub>co</sub>	3.347	3.347	4.621	4.999	5.466	5.331	5.643	4.999	5.466	5.331	5.643	ns
		GCLK PLL	t <sub>co</sub>	3.726	3.739	5.207	5.624	6.222	6.058	6.460	5.624	6.222	6.058	6.460	ns
	16mA	GCLK	t <sub>co</sub>	3.331	3.331	4.599	4.974	5.437	5.302	5.614	4.974	5.437	5.302	5.614	ns
		GCLK PLL	t <sub>co</sub>	3.710	3.723	5.184	5.599	6.193	6.029	6.431	5.599	6.193	6.029	6.431	ns
3.0-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.453	3.453	4.797	5.181	5.653	5.518	5.830	5.181	5.653	5.518	5.830	ns
		GCLK PLL	t <sub>co</sub>	3.831	3.845	5.382	5.805	6.409	6.245	6.647	5.805	6.409	6.245	6.647	ns
	8mA	GCLK	t <sub>co</sub>	3.342	3.342	4.667	5.047	5.515	5.381	5.691	5.047	5.515	5.381	5.691	ns
		GCLK PLL	t <sub>co</sub>	3.724	3.734	5.252	5.674	6.272	6.109	6.509	5.674	6.272	6.109	6.509	ns
	12mA	GCLK	t <sub>co</sub>	3.306	3.306	4.604	4.978	5.441	5.307	5.618	4.978	5.441	5.307	5.618	ns
		GCLK PLL	t <sub>co</sub>	3.686	3.698	5.189	5.602	6.198	6.035	6.435	5.602	6.198	6.035	6.435	ns
	16mA	GCLK	t <sub>co</sub>	3.288	3.288	4.575	4.950	5.413	5.278	5.590	4.950	5.413	5.278	5.590	ns
		GCLK PLL	t <sub>co</sub>	3.667	3.680	5.160	5.575	6.169	6.005	6.407	5.575	6.169	6.005	6.407	ns

**Table 1-132.** EP3SE110 Column Pins output Timing Parameters (Part 2 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		UnitS
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.367	3.367	4.701	5.081	5.550	5.416	5.726	5.081	5.550	5.416	5.726	ns
		GCLK PLL	t <sub>co</sub>	3.748	3.759	5.286	5.707	6.307	6.144	6.544	5.707	6.307	6.144	6.544	ns
	8mA	GCLK	t <sub>co</sub>	3.288	3.288	4.577	4.952	5.415	5.281	5.591	4.952	5.415	5.281	5.591	ns
		GCLK PLL	t <sub>co</sub>	3.669	3.680	5.163	5.577	6.172	6.009	6.413	5.577	6.172	6.009	6.413	ns
	12mA	GCLK	t <sub>co</sub>	3.283	3.283	4.570	4.945	5.407	5.272	5.584	4.945	5.407	5.272	5.584	ns
		GCLK PLL	t <sub>co</sub>	3.662	3.675	5.155	5.570	6.163	5.999	6.401	5.570	6.163	5.999	6.401	ns
	16mA	GCLK	t <sub>co</sub>	3.274	3.274	4.556	4.930	5.392	5.257	5.569	4.930	5.392	5.257	5.569	ns
		GCLK PLL	t <sub>co</sub>	3.653	3.666	5.141	5.554	6.148	5.984	6.387	5.554	6.148	5.984	6.387	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.489	3.489	4.908	5.308	5.797	5.663	5.974	5.308	5.797	5.663	5.974	ns
		GCLK PLL	t <sub>co</sub>	3.868	3.881	5.493	5.932	6.554	6.391	6.791	5.932	6.554	6.391	6.791	ns
	8mA	GCLK	t <sub>co</sub>	3.389	3.389	4.789	5.182	5.665	5.531	5.841	5.182	5.665	5.531	5.841	ns
		GCLK PLL	t <sub>co</sub>	3.771	3.781	5.374	5.807	6.422	6.259	6.659	5.807	6.422	6.259	6.659	ns
	12mA	GCLK	t <sub>co</sub>	3.345	3.345	4.702	5.091	5.570	5.435	5.747	5.091	5.570	5.435	5.747	ns
		GCLK PLL	t <sub>co</sub>	3.726	3.737	5.287	5.716	6.326	6.162	6.564	5.716	6.326	6.162	6.564	ns
	16mA	GCLK	t <sub>co</sub>	3.307	3.307	4.663	5.049	5.527	5.392	5.704	5.049	5.527	5.392	5.704	ns
		GCLK PLL	t <sub>co</sub>	3.687	3.699	5.248	5.674	6.283	6.119	6.521	5.674	6.283	6.119	6.521	ns

**Table 1-132.** EP3SE110 Column Pins output Timing Parameters (Part 3 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		UnitS
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.8 V	2mA	GCLK	t <sub>co</sub>	3.680	3.680	5.229	5.668	6.202	6.067	6.379	5.668	6.202	6.067	6.379	ns
		GCLK PLL	t <sub>co</sub>	4.059	4.072	5.815	6.291	6.958	6.794	7.196	6.291	6.958	6.794	7.196	ns
	4mA	GCLK	t <sub>co</sub>	3.499	3.499	4.950	5.359	5.854	5.720	6.030	5.359	5.854	5.720	6.030	ns
		GCLK PLL	t <sub>co</sub>	3.881	3.891	5.536	5.984	6.611	6.448	6.848	5.984	6.611	6.448	6.848	ns
	6mA	GCLK	t <sub>co</sub>	3.417	3.417	4.843	5.244	5.744	5.609	5.921	5.244	5.744	5.609	5.921	ns
		GCLK PLL	t <sub>co</sub>	3.796	3.809	5.429	5.868	6.500	6.336	6.738	5.868	6.500	6.336	6.738	ns
	8mA	GCLK	t <sub>co</sub>	3.397	3.397	4.785	5.190	5.678	5.543	5.855	5.190	5.678	5.543	5.855	ns
		GCLK PLL	t <sub>co</sub>	3.776	3.789	5.370	5.814	6.434	6.270	6.672	5.814	6.434	6.270	6.672	ns
	10mA	GCLK	t <sub>co</sub>	3.334	3.334	4.724	5.115	5.597	5.462	5.774	5.115	5.597	5.462	5.774	ns
		GCLK PLL	t <sub>co</sub>	3.713	3.726	5.309	5.740	6.353	6.189	6.591	5.740	6.353	6.189	6.591	ns
	12mA	GCLK	t <sub>co</sub>	3.316	3.316	4.703	5.094	5.574	5.439	5.751	5.094	5.574	5.439	5.751	ns
		GCLK PLL	t <sub>co</sub>	3.696	3.708	5.289	5.719	6.330	6.166	6.568	5.719	6.330	6.166	6.568	ns
1.5 V	2mA	GCLK	t <sub>co</sub>	3.626	3.626	5.158	5.600	6.140	6.005	6.317	5.600	6.140	6.005	6.317	ns
		GCLK PLL	t <sub>co</sub>	4.005	4.018	5.743	6.224	6.896	6.732	7.134	6.224	6.896	6.732	7.134	ns
	4mA	GCLK	t <sub>co</sub>	3.414	3.414	4.839	5.244	5.748	5.613	5.925	5.244	5.748	5.613	5.925	ns
		GCLK PLL	t <sub>co</sub>	3.793	3.806	5.424	5.867	6.504	6.340	6.742	5.867	6.504	6.340	6.742	ns
	6mA	GCLK	t <sub>co</sub>	3.389	3.389	4.772	5.184	5.681	5.546	5.858	5.184	5.681	5.546	5.858	ns
		GCLK PLL	t <sub>co</sub>	3.769	3.781	5.357	5.809	6.437	6.273	6.675	5.809	6.437	6.273	6.675	ns
	8mA	GCLK	t <sub>co</sub>	3.378	3.378	4.755	5.159	5.661	5.526	5.838	5.159	5.661	5.526	5.838	ns
		GCLK PLL	t <sub>co</sub>	3.757	3.770	5.340	5.784	6.417	6.253	6.655	5.784	6.417	6.253	6.655	ns
	10mA	GCLK	t <sub>co</sub>	3.323	3.323	4.717	5.108	5.591	5.456	5.768	5.108	5.591	5.456	5.768	ns
		GCLK PLL	t <sub>co</sub>	3.702	3.715	5.302	5.733	6.347	6.183	6.585	5.733	6.347	6.183	6.585	ns
	12mA	GCLK	t <sub>co</sub>	3.318	3.318	4.700	5.097	5.580	5.445	5.757	5.097	5.580	5.445	5.757	ns
		GCLK PLL	t <sub>co</sub>	3.696	3.710	5.286	5.720	6.336	6.172	6.574	5.720	6.336	6.172	6.574	ns



**Table 1-132.** EP3SE110 Column Pins output Timing Parameters (Part 4 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		UnitS
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.2 V	2mA	GCLK	t <sub>co</sub>	3.542	3.542	5.084	5.536	6.084	5.949	6.261	5.536	6.084	5.949	6.261	ns
		GCLK PLL	t <sub>co</sub>	3.921	3.934	5.669	6.159	6.840	6.676	7.078	6.159	6.840	6.676	7.078	ns
	4mA	GCLK	t <sub>co</sub>	3.419	3.419	4.858	5.274	5.798	5.663	5.975	5.274	5.798	5.663	5.975	ns
		GCLK PLL	t <sub>co</sub>	3.799	3.811	5.444	5.899	6.554	6.390	6.792	5.899	6.554	6.390	6.792	ns
	6mA	GCLK	t <sub>co</sub>	3.381	3.381	4.766	5.185	5.685	5.550	5.862	5.185	5.685	5.550	5.862	ns
		GCLK PLL	t <sub>co</sub>	3.761	3.773	5.351	5.809	6.441	6.277	6.679	5.809	6.441	6.277	6.679	ns
	8mA	GCLK	t <sub>co</sub>	3.334	3.334	4.738	5.136	5.629	5.494	5.806	5.136	5.629	5.494	5.806	ns
		GCLK PLL	t <sub>co</sub>	3.712	3.726	5.323	5.759	6.385	6.221	6.623	5.759	6.385	6.221	6.623	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.334	3.334	4.695	5.083	5.560	5.425	5.737	5.083	5.560	5.425	5.737	ns
		GCLK PLL	t <sub>co</sub>	3.713	3.726	5.280	5.706	6.316	6.152	6.554	5.706	6.316	6.152	6.554	ns
	10mA	GCLK	t <sub>co</sub>	3.331	3.331	4.692	5.080	5.556	5.421	5.733	5.080	5.556	5.421	5.733	ns
		GCLK PLL	t <sub>co</sub>	3.710	3.723	5.277	5.702	6.312	6.148	6.550	5.702	6.312	6.148	6.550	ns
	12mA	GCLK	t <sub>co</sub>	3.329	3.329	4.692	5.081	5.557	5.422	5.734	5.081	5.557	5.422	5.734	ns
		GCLK PLL	t <sub>co</sub>	3.709	3.721	5.277	5.703	6.313	6.149	6.551	5.703	6.313	6.149	6.551	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.320	3.320	4.677	5.065	5.542	5.407	5.719	5.065	5.542	5.407	5.719	ns
		GCLK PLL	t <sub>co</sub>	3.700	3.712	5.263	5.689	6.298	6.134	6.536	5.689	6.298	6.134	6.536	ns
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.341	3.341	4.707	5.097	5.576	5.441	5.753	5.097	5.576	5.441	5.753	ns
		GCLK PLL	t <sub>co</sub>	3.720	3.733	5.292	5.720	6.332	6.168	6.570	5.720	6.332	6.168	6.570	ns
	6mA	GCLK	t <sub>co</sub>	3.337	3.337	4.705	5.095	5.574	5.439	5.751	5.095	5.574	5.439	5.751	ns
		GCLK PLL	t <sub>co</sub>	3.716	3.729	5.290	5.718	6.330	6.166	6.568	5.718	6.330	6.166	6.568	ns
	8mA	GCLK	t <sub>co</sub>	3.326	3.326	4.695	5.086	5.565	5.430	5.742	5.086	5.565	5.430	5.742	ns
		GCLK PLL	t <sub>co</sub>	3.706	3.718	5.280	5.709	6.321	6.157	6.559	5.709	6.321	6.157	6.559	ns
	10mA	GCLK	t <sub>co</sub>	3.315	3.315	4.682	5.073	5.552	5.417	5.729	5.073	5.552	5.417	5.729	ns
		GCLK PLL	t <sub>co</sub>	3.694	3.707	5.268	5.696	6.308	6.144	6.546	5.696	6.308	6.144	6.546	ns
	12mA	GCLK	t <sub>co</sub>	3.315	3.315	4.682	5.073	5.552	5.417	5.729	5.073	5.552	5.417	5.729	ns
		GCLK PLL	t <sub>co</sub>	3.694	3.707	5.267	5.696	6.308	6.144	6.546	5.696	6.308	6.144	6.546	ns

**Table 1-132.** EP3SE110 Column Pins output Timing Parameters (Part 5 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		UnitS
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.321	3.321	4.681	5.070	5.547	5.412	5.724	5.070	5.547	5.412	5.724	ns
		GCLK PLL	t <sub>co</sub>	3.701	3.713	5.266	5.693	6.303	6.139	6.541	5.693	6.303	6.139	6.541	ns
	16mA	GCLK	t <sub>co</sub>	3.324	3.324	4.689	5.079	5.559	5.424	5.736	5.079	5.559	5.424	5.736	ns
		GCLK PLL	t <sub>co</sub>	3.703	3.716	5.274	5.702	6.315	6.151	6.553	5.702	6.315	6.151	6.553	ns
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.345	3.345	4.716	5.109	5.589	5.454	5.766	5.109	5.589	5.454	5.766	ns
		GCLK PLL	t <sub>co</sub>	3.723	3.737	5.302	5.731	6.345	6.181	6.583	5.731	6.345	6.181	6.583	ns
	6mA	GCLK	t <sub>co</sub>	3.331	3.331	4.706	5.099	5.580	5.445	5.757	5.099	5.580	5.445	5.757	ns
		GCLK PLL	t <sub>co</sub>	3.711	3.723	5.291	5.722	6.336	6.172	6.574	5.722	6.336	6.172	6.574	ns
	8mA	GCLK	t <sub>co</sub>	3.320	3.320	4.692	5.085	5.566	5.431	5.743	5.085	5.566	5.431	5.743	ns
		GCLK PLL	t <sub>co</sub>	3.699	3.712	5.278	5.708	6.322	6.158	6.560	5.708	6.322	6.158	6.560	ns
	10mA	GCLK	t <sub>co</sub>	3.319	3.319	4.695	5.088	5.570	5.435	5.747	5.088	5.570	5.435	5.747	ns
		GCLK PLL	t <sub>co</sub>	3.698	3.711	5.281	5.711	6.326	6.162	6.564	5.711	6.326	6.162	6.564	ns
	12mA	GCLK	t <sub>co</sub>	3.316	3.316	4.690	5.083	5.564	5.429	5.741	5.083	5.564	5.429	5.741	ns
		GCLK PLL	t <sub>co</sub>	3.695	3.708	5.275	5.705	6.320	6.156	6.558	5.705	6.320	6.156	6.558	ns
SSTL-15 CLASS II	8mA	GCLK	t <sub>co</sub>	3.318	3.318	4.679	5.069	5.547	5.412	5.724	5.069	5.547	5.412	5.724	ns
		GCLK PLL	t <sub>co</sub>	3.697	3.710	5.264	5.692	6.303	6.139	6.541	5.692	6.303	6.139	6.541	ns
	16mA	GCLK	t <sub>co</sub>	3.321	3.321	4.686	5.078	5.558	5.423	5.735	5.078	5.558	5.423	5.735	ns
		GCLK PLL	t <sub>co</sub>	3.700	3.713	5.271	5.700	6.314	6.150	6.552	5.700	6.314	6.150	6.552	ns

**Table 1-132.** EP3SE110 Column Pins output Timing Parameters (Part 6 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		UnitS
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.328	3.328	4.681	5.069	5.545	5.410	5.722	5.069	5.545	5.410	5.722	ns
		GCLK PLL	t <sub>co</sub>	3.707	3.720	5.266	5.691	6.301	6.137	6.539	5.691	6.301	6.137	6.539	ns
	6mA	GCLK	t <sub>co</sub>	3.321	3.321	4.679	5.067	5.544	5.409	5.721	5.067	5.544	5.409	5.721	ns
		GCLK PLL	t <sub>co</sub>	3.701	3.713	5.264	5.691	6.300	6.136	6.538	5.691	6.300	6.136	6.538	ns
	8mA	GCLK	t <sub>co</sub>	3.313	3.313	4.671	5.060	5.537	5.402	5.714	5.060	5.537	5.402	5.714	ns
		GCLK PLL	t <sub>co</sub>	3.693	3.705	5.257	5.683	6.293	6.129	6.531	5.683	6.293	6.129	6.531	ns
	10mA	GCLK	t <sub>co</sub>	3.316	3.316	4.674	5.063	5.541	5.406	5.718	5.063	5.541	5.406	5.718	ns
		GCLK PLL	t <sub>co</sub>	3.695	3.708	5.260	5.686	6.297	6.133	6.535	5.686	6.297	6.133	6.535	ns
	12mA	GCLK	t <sub>co</sub>	3.313	3.313	4.677	5.067	5.545	5.410	5.722	5.067	5.545	5.410	5.722	ns
		GCLK PLL	t <sub>co</sub>	3.692	3.705	5.262	5.689	6.301	6.137	6.539	5.689	6.301	6.137	6.539	ns
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.321	3.321	4.676	5.064	5.541	5.406	5.718	5.064	5.541	5.406	5.718	ns
		GCLK PLL	t <sub>co</sub>	3.700	3.713	5.261	5.687	6.297	6.133	6.535	5.687	6.297	6.133	6.535	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.333	3.333	4.689	5.079	5.556	5.421	5.733	5.079	5.556	5.421	5.733	ns
		GCLK PLL	t <sub>co</sub>	3.712	3.725	5.275	5.701	6.312	6.148	6.550	5.701	6.312	6.148	6.550	ns
	6mA	GCLK	t <sub>co</sub>	3.329	3.329	4.690	5.080	5.559	5.424	5.736	5.080	5.559	5.424	5.736	ns
		GCLK PLL	t <sub>co</sub>	3.708	3.721	5.276	5.704	6.315	6.151	6.553	5.704	6.315	6.151	6.553	ns
	8mA	GCLK	t <sub>co</sub>	3.325	3.325	4.686	5.076	5.554	5.419	5.731	5.076	5.554	5.419	5.731	ns
		GCLK PLL	t <sub>co</sub>	3.704	3.717	5.271	5.699	6.310	6.146	6.548	5.699	6.310	6.146	6.548	ns
	10mA	GCLK	t <sub>co</sub>	3.318	3.318	4.679	5.069	5.547	5.412	5.724	5.069	5.547	5.412	5.724	ns
		GCLK PLL	t <sub>co</sub>	3.697	3.710	5.264	5.692	6.303	6.139	6.541	5.692	6.303	6.139	6.541	ns
	12mA	GCLK	t <sub>co</sub>	3.319	3.319	4.686	5.077	5.557	5.422	5.734	5.077	5.557	5.422	5.734	ns
		GCLK PLL	t <sub>co</sub>	3.697	3.711	5.271	5.699	6.313	6.149	6.551	5.699	6.313	6.149	6.551	ns
1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.317	3.317	4.667	5.055	5.531	5.396	5.708	5.055	5.531	5.396	5.708	ns
		GCLK PLL	t <sub>co</sub>	3.695	3.709	5.252	5.677	6.287	6.123	6.525	5.677	6.287	6.123	6.525	ns

**Table 1–132.** EP3SE110 Column Pins output Timing Parameters (Part 7 of 7)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.336	3.336	4.703	5.096	5.577	5.442	5.754	5.096	5.577	5.442	5.754	ns
		GCLK PLL	t <sub>co</sub>	3.716	3.728	5.289	5.719	6.333	6.169	6.571	5.719	6.333	6.169	6.571	ns
	6mA	GCLK	t <sub>co</sub>	3.328	3.328	4.694	5.087	5.568	5.433	5.745	5.087	5.568	5.433	5.745	ns
		GCLK PLL	t <sub>co</sub>	3.707	3.720	5.280	5.710	6.324	6.160	6.562	5.710	6.324	6.160	6.562	ns
	8mA	GCLK	t <sub>co</sub>	3.329	3.329	4.702	5.095	5.577	5.442	5.754	5.095	5.577	5.442	5.754	ns
		GCLK PLL	t <sub>co</sub>	3.707	3.721	5.287	5.718	6.333	6.169	6.571	5.718	6.333	6.169	6.571	ns
	10mA	GCLK	t <sub>co</sub>	3.318	3.318	4.689	5.082	5.563	5.428	5.740	5.082	5.563	5.428	5.740	ns
		GCLK PLL	t <sub>co</sub>	3.697	3.710	5.274	5.704	6.319	6.155	6.557	5.704	6.319	6.155	6.557	ns
	12mA	GCLK	t <sub>co</sub>	3.318	3.318	4.689	5.082	5.564	5.429	5.741	5.082	5.564	5.429	5.741	ns
		GCLK PLL	t <sub>co</sub>	3.697	3.710	5.274	5.705	6.320	6.156	6.558	5.705	6.320	6.156	6.558	ns
1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.339	3.339	4.705	5.097	5.577	5.442	5.754	5.097	5.577	5.442	5.754	ns
		GCLK PLL	t <sub>co</sub>	3.718	3.731	5.290	5.720	6.333	6.169	6.571	5.720	6.333	6.169	6.571	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.442	3.442	4.750	5.131	5.602	5.467	5.779	5.131	5.602	5.467	5.779	ns
		GCLK PLL	t <sub>co</sub>	3.821	3.834	5.335	5.756	6.358	6.194	6.596	5.756	6.358	6.194	6.596	ns
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.442	3.442	4.750	5.131	5.602	5.467	5.779	5.131	5.602	5.467	5.779	ns
		GCLK PLL	t <sub>co</sub>	3.821	3.834	5.335	5.756	6.358	6.194	6.596	5.756	6.358	6.194	6.596	ns

Table 1–133 specifies EP3SE110 Row Pins Output Timing parameters for single-ended I/O standards.

**Table 1–133.** EP3SE110 Row Pins output Timing Parameters (Part 1 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.208	3.456	4.797	5.180	5.703	5.543	5.850	5.304	5.827	5.696	5.930	ns
		GCLK PLL	t <sub>co</sub>	1.452	1.625	2.008	2.086	2.326	2.346	2.347	2.239	2.435	2.455	2.342	ns
	8mA	GCLK	t <sub>co</sub>	3.142	3.385	4.687	5.069	5.589	5.429	5.736	5.191	5.712	5.581	5.815	ns
		GCLK PLL	t <sub>co</sub>	1.359	1.554	1.898	1.975	2.181	2.201	2.202	2.098	2.286	2.306	2.193	ns
	12mA	GCLK	t <sub>co</sub>	3.063	3.296	4.581	4.969	5.493	5.333	5.640	5.092	5.612	5.481	5.715	ns
		GCLK PLL	t <sub>co</sub>	1.260	1.465	1.792	1.875	2.053	2.073	2.074	1.971	2.154	2.174	2.061	ns

**Table 1-133.** EP3SE110 Row Pins output Timing Parameters (Part 2 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.210	3.463	4.801	5.186	5.712	5.552	5.859	5.312	5.839	5.708	5.942	ns
		GCLK PLL	t <sub>co</sub>	1.462	1.632	2.012	2.092	2.330	2.350	2.351	2.245	2.439	2.459	2.346	ns
	8mA	GCLK	t <sub>co</sub>	3.067	3.300	4.592	4.984	5.503	5.343	5.650	5.104	5.621	5.490	5.724	ns
		GCLK PLL	t <sub>co</sub>	1.264	1.469	1.803	1.890	2.059	2.079	2.080	1.977	2.161	2.181	2.068	ns
3.0-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.169	3.417	4.764	5.149	5.669	5.509	5.816	5.272	5.793	5.662	5.896	ns
		GCLK PLL	t <sub>co</sub>	1.406	1.586	1.975	2.055	2.282	2.302	2.303	2.196	2.393	2.413	2.300	ns
	8mA	GCLK	t <sub>co</sub>	3.068	3.305	4.627	5.007	5.524	5.364	5.671	5.130	5.648	5.516	5.750	ns
		GCLK PLL	t <sub>co</sub>	1.281	1.474	1.838	1.913	2.118	2.138	2.139	2.034	2.229	2.248	2.135	ns
	12mA	GCLK	t <sub>co</sub>	3.031	3.267	4.567	4.942	5.454	5.294	5.601	5.062	5.574	5.443	5.677	ns
		GCLK PLL	t <sub>co</sub>	1.242	1.436	1.778	1.848	2.030	2.050	2.051	1.948	2.136	2.155	2.042	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.090	3.329	4.662	5.042	5.560	5.400	5.707	5.163	5.684	5.552	5.786	ns
		GCLK PLL	t <sub>co</sub>	1.320	1.498	1.873	1.948	2.172	2.192	2.193	2.088	2.282	2.301	2.188	ns
	8mA	GCLK	t <sub>co</sub>	3.018	3.251	4.539	4.913	5.426	5.266	5.573	5.032	5.546	5.414	5.648	ns
		GCLK PLL	t <sub>co</sub>	1.220	1.420	1.750	1.819	1.991	2.011	2.012	1.908	2.096	2.115	2.002	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.195	3.454	4.872	5.275	5.814	5.654	5.961	5.404	5.945	5.814	6.048	ns
		GCLK PLL	t <sub>co</sub>	1.432	1.623	2.083	2.181	2.454	2.474	2.475	2.356	2.572	2.591	2.478	ns
	8mA	GCLK	t <sub>co</sub>	3.110	3.351	4.748	5.140	5.672	5.512	5.819	5.267	5.801	5.669	5.903	ns
		GCLK PLL	t <sub>co</sub>	1.322	1.520	1.959	2.046	2.284	2.304	2.305	2.189	2.398	2.417	2.304	ns
	12mA	GCLK	t <sub>co</sub>	3.053	3.307	4.664	5.054	5.581	5.421	5.728	5.178	5.706	5.575	5.809	ns
		GCLK PLL	t <sub>co</sub>	1.276	1.476	1.875	1.960	2.158	2.178	2.179	2.066	2.268	2.287	2.174	ns
1.8 V	2mA	GCLK	t <sub>co</sub>	3.458	3.730	5.334	5.790	6.350	6.220	6.500	5.931	6.493	6.365	6.600	ns
		GCLK PLL	t <sub>co</sub>	1.663	1.874	2.520	2.669	2.929	2.949	2.954	2.792	3.056	3.075	2.967	ns
	4mA	GCLK	t <sub>co</sub>	3.233	3.528	5.007	5.421	5.945	5.815	6.095	5.566	6.087	5.958	6.193	ns
		GCLK PLL	t <sub>co</sub>	1.438	1.672	2.193	2.300	2.524	2.544	2.549	2.427	2.650	2.668	2.560	ns
	6mA	GCLK	t <sub>co</sub>	3.168	3.426	4.854	5.271	5.786	5.656	5.936	5.398	5.914	5.786	6.021	ns
		GCLK PLL	t <sub>co</sub>	1.373	1.570	2.040	2.150	2.365	2.385	2.390	2.259	2.477	2.496	2.388	ns
	8mA	GCLK	t <sub>co</sub>	3.108	3.352	4.777	5.177	5.691	5.559	5.839	5.303	5.820	5.692	5.927	ns
		GCLK PLL	t <sub>co</sub>	1.313	1.496	1.963	2.056	2.268	2.288	2.293	2.164	2.383	2.402	2.294	ns

**Table 1-133.** EP3SE110 Row Pins output Timing Parameters (Part 3 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.5 V	2mA	GCLK	t <sub>co</sub>	3.369	3.648	5.244	5.703	6.278	6.148	6.428	5.838	6.417	6.289	6.524	ns
		GCLK PLL	t <sub>co</sub>	1.574	1.792	2.430	2.582	2.857	2.877	2.882	2.699	2.980	2.999	2.891	ns
	4mA	GCLK	t <sub>co</sub>	3.127	3.390	4.839	5.266	5.787	5.657	5.937	5.392	5.913	5.785	6.020	ns
		GCLK PLL	t <sub>co</sub>	1.332	1.534	2.025	2.145	2.366	2.386	2.391	2.253	2.476	2.495	2.387	ns
	6mA	GCLK	t <sub>co</sub>	3.100	3.343	4.766	5.170	5.691	5.551	5.834	5.294	5.816	5.685	5.916	ns
		GCLK PLL	t <sub>co</sub>	1.305	1.487	1.952	2.049	2.260	2.280	2.285	2.155	2.371	2.390	2.282	ns
8mA	GCLK	t <sub>co</sub>	3.091	3.334	4.744	5.152	5.672	5.532	5.815	5.276	5.797	5.666	5.897	ns	
	GCLK PLL	t <sub>co</sub>	1.296	1.478	1.930	2.031	2.241	2.261	2.266	2.137	2.349	2.368	2.260	ns	
1.2 V	2mA	GCLK	t <sub>co</sub>	3.312	3.573	5.154	5.617	6.203	6.073	6.353	5.750	6.333	6.205	6.440	ns
		GCLK PLL	t <sub>co</sub>	1.517	1.717	2.340	2.496	2.782	2.802	2.807	2.611	2.896	2.915	2.807	ns
	4mA	GCLK	t <sub>co</sub>	3.132	3.384	4.861	5.294	5.828	5.698	5.978	5.417	5.955	5.827	6.062	ns
		GCLK PLL	t <sub>co</sub>	1.337	1.528	2.047	2.173	2.407	2.427	2.432	2.278	2.518	2.537	2.429	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.057	3.295	4.657	5.045	5.571	5.411	5.718	5.165	5.692	5.561	5.795	ns
		GCLK PLL	t <sub>co</sub>	1.261	1.464	1.868	1.951	2.126	2.146	2.147	2.033	2.230	2.250	2.137	ns
	12mA	GCLK	t <sub>co</sub>	3.052	3.291	4.654	5.043	5.569	5.409	5.716	5.164	5.691	5.560	5.794	ns
		GCLK PLL	t <sub>co</sub>	1.249	1.460	1.865	1.949	2.118	2.138	2.139	2.025	2.223	2.243	2.130	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.043	3.280	4.639	5.027	5.552	5.392	5.699	5.147	5.673	5.542	5.776	ns
		GCLK PLL	t <sub>co</sub>	1.234	1.449	1.850	1.933	2.097	2.111	2.112	1.999	2.202	2.221	2.103	ns
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.069	3.308	4.672	5.065	5.586	5.433	5.729	5.184	5.707	5.576	5.807	ns
		GCLK PLL	t <sub>co</sub>	1.274	1.452	1.858	1.944	2.142	2.162	2.167	2.045	2.246	2.265	2.157	ns
	6mA	GCLK	t <sub>co</sub>	3.054	3.294	4.669	5.063	5.585	5.431	5.728	5.182	5.705	5.574	5.805	ns
		GCLK PLL	t <sub>co</sub>	1.259	1.438	1.855	1.942	2.140	2.160	2.165	2.043	2.244	2.263	2.155	ns
	8mA	GCLK	t <sub>co</sub>	3.043	3.282	4.652	5.046	5.575	5.414	5.718	5.165	5.696	5.565	5.796	ns
		GCLK PLL	t <sub>co</sub>	1.248	1.426	1.838	1.925	2.123	2.143	2.148	2.026	2.228	2.247	2.139	ns
	10mA	GCLK	t <sub>co</sub>	3.030	3.267	4.636	5.030	5.562	5.399	5.705	5.150	5.684	5.553	5.784	ns
		GCLK PLL	t <sub>co</sub>	1.228	1.404	1.822	1.909	2.108	2.128	2.133	2.011	2.213	2.232	2.124	ns
12mA	GCLK	t <sub>co</sub>	3.030	3.266	4.635	5.029	5.562	5.398	5.705	5.149	5.684	5.553	5.784	ns	
	GCLK PLL	t <sub>co</sub>	1.228	1.403	1.821	1.908	2.107	2.127	2.132	2.010	2.213	2.232	2.123	ns	

**Table 1-133.** EP3SE110 Row Pins output Timing Parameters (Part 4 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.038	3.273	4.633	5.025	5.557	5.392	5.700	5.144	5.678	5.547	5.778	ns
		GCLK PLL	t <sub>co</sub>	1.236	1.411	1.819	1.904	2.102	2.121	2.126	2.005	2.207	2.226	2.116	ns
	16mA	GCLK	t <sub>co</sub>	3.039	3.276	4.639	5.031	5.567	5.400	5.710	5.150	5.689	5.558	5.789	ns
		GCLK PLL	t <sub>co</sub>	1.237	1.413	1.818	1.905	2.112	2.123	2.128	2.007	2.218	2.237	2.120	ns
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.065	3.304	4.683	5.079	5.599	5.450	5.742	5.197	5.719	5.588	5.819	ns
		GCLK PLL	t <sub>co</sub>	1.270	1.448	1.869	1.958	2.159	2.179	2.184	2.058	2.262	2.281	2.173	ns
	6mA	GCLK	t <sub>co</sub>	3.046	3.283	4.665	5.062	5.589	5.433	5.732	5.181	5.710	5.579	5.810	ns
		GCLK PLL	t <sub>co</sub>	1.247	1.426	1.851	1.941	2.142	2.162	2.167	2.042	2.246	2.265	2.157	ns
	8mA	GCLK	t <sub>co</sub>	3.035	3.271	4.648	5.044	5.576	5.415	5.719	5.163	5.697	5.566	5.797	ns
		GCLK PLL	t <sub>co</sub>	1.233	1.409	1.834	1.923	2.124	2.144	2.149	2.024	2.229	2.248	2.140	ns
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.045	3.280	4.639	5.030	5.555	5.395	5.698	5.148	5.675	5.544	5.775	ns
		GCLK PLL	t <sub>co</sub>	1.249	1.424	1.825	1.909	2.104	2.124	2.129	2.009	2.208	2.227	2.119	ns
	6mA	GCLK	t <sub>co</sub>	3.038	3.273	4.630	5.022	5.554	5.387	5.697	5.140	5.675	5.544	5.775	ns
		GCLK PLL	t <sub>co</sub>	1.237	1.412	1.816	1.901	2.099	2.116	2.121	2.001	2.204	2.223	2.112	ns
	8mA	GCLK	t <sub>co</sub>	3.029	3.265	4.623	5.013	5.547	5.380	5.690	5.132	5.668	5.537	5.768	ns
		GCLK PLL	t <sub>co</sub>	1.227	1.402	1.807	1.892	2.092	2.108	2.113	1.993	2.197	2.216	2.104	ns
	10mA	GCLK	t <sub>co</sub>	3.032	3.267	4.626	5.016	5.551	5.384	5.694	5.135	5.671	5.540	5.771	ns
		GCLK PLL	t <sub>co</sub>	1.230	1.404	1.810	1.895	2.096	2.111	2.116	1.996	2.200	2.219	2.107	ns
12mA	GCLK	t <sub>co</sub>	3.028	3.264	4.628	5.019	5.554	5.387	5.697	5.138	5.676	5.545	5.776	ns	
	GCLK PLL	t <sub>co</sub>	1.226	1.401	1.808	1.894	2.099	2.111	2.116	1.996	2.205	2.224	2.108	ns	
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.036	3.272	4.626	5.016	5.550	5.383	5.693	5.134	5.670	5.539	5.770	ns
		GCLK PLL	t <sub>co</sub>	1.234	1.409	1.805	1.890	2.095	2.106	2.107	1.991	2.199	2.218	2.097	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.051	3.287	4.650	5.043	5.566	5.410	5.709	5.160	5.686	5.555	5.786	ns
		GCLK PLL	t <sub>co</sub>	1.256	1.431	1.836	1.922	2.119	2.139	2.144	2.021	2.222	2.241	2.133	ns
	6mA	GCLK	t <sub>co</sub>	3.045	3.280	4.646	5.039	5.568	5.406	5.711	5.157	5.689	5.558	5.789	ns
		GCLK PLL	t <sub>co</sub>	1.244	1.421	1.832	1.918	2.115	2.135	2.140	2.018	2.219	2.238	2.130	ns
	8mA	GCLK	t <sub>co</sub>	3.041	3.276	4.640	5.033	5.563	5.400	5.706	5.151	5.683	5.552	5.783	ns
		GCLK PLL	t <sub>co</sub>	1.240	1.416	1.826	1.912	2.109	2.129	2.134	2.012	2.213	2.232	2.124	ns

**Table 1-133.** EP3SE110 Row Pins output Timing Parameters (Part 5 of 5)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.053	3.287	4.661	5.057	5.585	5.428	5.728	5.174	5.705	5.574	5.805	ns
			GCLK PLL	t <sub>co</sub>	1.255	1.430	1.847	1.936	2.137	2.157	2.162	2.035	2.239	2.258	2.150
	6mA	GCLK	t <sub>co</sub>	3.044	3.279	4.650	5.045	5.576	5.416	5.719	5.163	5.696	5.565	5.796	ns
			GCLK PLL	t <sub>co</sub>	1.243	1.418	1.836	1.924	2.125	2.145	2.150	2.024	2.228	2.247	2.139
	8mA	GCLK	t <sub>co</sub>	3.043	3.279	4.654	5.050	5.585	5.422	5.728	5.169	5.706	5.575	5.806	ns
			GCLK PLL	t <sub>co</sub>	1.241	1.416	1.840	1.929	2.131	2.151	2.156	2.030	2.235	2.254	2.146
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.163	3.401	4.709	5.091	5.611	5.451	5.758	5.213	5.734	5.603	5.837	ns
			GCLK PLL	t <sub>co</sub>	1.354	1.570	1.920	1.997	2.156	2.167	2.156	2.061	2.263	2.282	2.149
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.163	3.401	4.709	5.091	5.611	5.451	5.758	5.213	5.734	5.603	5.837	ns
			GCLK PLL	t <sub>co</sub>	1.354	1.570	1.920	1.997	2.156	2.167	2.156	2.061	2.263	2.282	2.149

Table 1-134 through Table 1-137 show the maximum I/O timing parameters for EP3SE110 devices for differential I/O standards.

Table 1-134 specifies EP3SE110 column pins input timing parameters for differential I/O standards.

**Table 1-134.** EP3SE110 Column Pins Input Timing Parameters (Part 1 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS	GCLK	t <sub>su</sub>	-0.997	-1.029	-1.181	-1.169	-1.324	-1.269	-1.645	-1.133	-1.542	-1.230	-1.683	ns
		t <sub>h</sub>	1.133	1.184	1.415	1.436	1.618	1.551	1.927	1.411	1.858	1.524	1.966	ns
	GCLK PLL	t <sub>su</sub>	0.960	0.994	1.879	2.224	2.401	2.288	2.194	2.277	2.567	2.345	2.245	ns
		t <sub>h</sub>	-0.691	-0.701	-1.428	-1.714	-1.834	-1.749	-1.648	-1.756	-1.968	-1.795	-1.697	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-0.997	-1.029	-1.181	-1.169	-1.324	-1.269	-1.645	-1.133	-1.542	-1.230	-1.683	ns
		t <sub>h</sub>	1.133	1.184	1.415	1.436	1.618	1.551	1.927	1.411	1.858	1.524	1.966	ns
	GCLK PLL	t <sub>su</sub>	0.960	0.994	1.879	2.224	2.401	2.288	2.194	2.277	2.567	2.345	2.245	ns
		t <sub>h</sub>	-0.691	-0.701	-1.428	-1.714	-1.834	-1.749	-1.648	-1.756	-1.968	-1.795	-1.697	ns
RSDS	GCLK	t <sub>su</sub>	-0.997	-1.029	-1.181	-1.169	-1.324	-1.269	-1.645	-1.133	-1.542	-1.230	-1.683	ns
		t <sub>h</sub>	1.133	1.184	1.415	1.436	1.618	1.551	1.927	1.411	1.858	1.524	1.966	ns
	GCLK PLL	t <sub>su</sub>	0.960	0.994	1.879	2.224	2.401	2.288	2.194	2.277	2.567	2.345	2.245	ns
		t <sub>h</sub>	-0.691	-0.701	-1.428	-1.714	-1.834	-1.749	-1.648	-1.756	-1.968	-1.795	-1.697	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.813	-0.852	-1.258	-1.368	-1.483	-1.423	-1.794	-1.368	-1.482	-1.428	-1.837	ns
		t <sub>h</sub>	0.942	0.999	1.460	1.595	1.731	1.659	2.031	1.604	1.739	1.674	2.075	ns
	GCLK PLL	t <sub>su</sub>	1.144	1.171	1.802	2.025	2.242	2.134	2.045	2.042	2.260	2.147	2.091	ns
		t <sub>h</sub>	-0.882	-0.886	-1.383	-1.555	-1.721	-1.641	-1.544	-1.563	-1.729	-1.645	-1.588	ns



**Table 1-134.** EP3SE110 Column Pins Input Timing Parameters (Part 2 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.813	-0.852	-1.258	-1.368	-1.483	-1.423	-1.794	-1.368	-1.482	-1.428	-1.837	ns
		t <sub>h</sub>	0.942	0.999	1.460	1.595	1.731	1.659	2.031	1.604	1.739	1.674	2.075	ns
	GCLK PLL	t <sub>su</sub>	1.144	1.171	1.802	2.025	2.242	2.134	2.045	2.042	2.260	2.147	2.091	ns
		t <sub>h</sub>	-0.882	-0.886	-1.383	-1.555	-1.721	-1.641	-1.544	-1.563	-1.729	-1.645	-1.588	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		t <sub>h</sub>	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	t <sub>su</sub>	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		t <sub>h</sub>	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		t <sub>h</sub>	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	t <sub>su</sub>	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		t <sub>h</sub>	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		t <sub>h</sub>	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	t <sub>su</sub>	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		t <sub>h</sub>	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		t <sub>h</sub>	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	t <sub>su</sub>	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		t <sub>h</sub>	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		t <sub>h</sub>	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	t <sub>su</sub>	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		t <sub>h</sub>	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.821	-0.864	-1.268	-1.379	-1.499	-1.439	-1.810	-1.379	-1.497	-1.443	-1.852	ns
		t <sub>h</sub>	0.950	1.011	1.470	1.606	1.747	1.675	2.047	1.615	1.754	1.689	2.090	ns
	GCLK PLL	t <sub>su</sub>	1.136	1.159	1.792	2.014	2.226	2.118	2.029	2.031	2.245	2.132	2.076	ns
		t <sub>h</sub>	-0.874	-0.874	-1.373	-1.544	-1.705	-1.625	-1.528	-1.552	-1.714	-1.630	-1.573	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		t <sub>h</sub>	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	t <sub>su</sub>	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		t <sub>h</sub>	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.833	-0.875	-1.277	-1.390	-1.518	-1.458	-1.829	-1.390	-1.515	-1.461	-1.870	ns
		t <sub>h</sub>	0.962	1.022	1.480	1.617	1.766	1.694	2.066	1.626	1.772	1.707	2.108	ns
	GCLK PLL	t <sub>su</sub>	1.124	1.148	1.783	2.003	2.207	2.099	2.010	2.020	2.227	2.114	2.058	ns
		t <sub>h</sub>	-0.862	-0.863	-1.363	-1.533	-1.686	-1.606	-1.509	-1.541	-1.696	-1.612	-1.555	ns

**Table 1-134.** EP3SE110 Column Pins Input Timing Parameters (Part 3 of 3)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.840	-0.881	-1.289	-1.395	-1.518	-1.460	-1.828	-1.394	-1.510	-1.459	-1.866	ns
		$t_h$	0.969	1.028	1.493	1.625	1.769	1.697	2.070	1.633	1.772	1.706	2.109	ns
	GCLK PLL	$t_{su}$	1.117	1.142	1.771	1.998	2.207	2.097	2.011	2.016	2.232	2.116	2.062	ns
		$t_h$	-0.855	-0.857	-1.350	-1.525	-1.683	-1.603	-1.505	-1.534	-1.696	-1.613	-1.554	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.840	-0.881	-1.289	-1.395	-1.518	-1.460	-1.828	-1.394	-1.510	-1.459	-1.866	ns
		$t_h$	0.969	1.028	1.493	1.625	1.769	1.697	2.070	1.633	1.772	1.706	2.109	ns
	GCLK PLL	$t_{su}$	1.117	1.142	1.771	1.998	2.207	2.097	2.011	2.016	2.232	2.116	2.062	ns
		$t_h$	-0.855	-0.857	-1.350	-1.525	-1.683	-1.603	-1.505	-1.534	-1.696	-1.613	-1.554	ns

Table 1-135 specifies EP3SE110 row pins input timing parameters for differential I/O standards

Table 1-135. EP3SE110 Row Pins Input Timing Parameters (Part 1 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
LVDS	GCLK	t <sub>su</sub>	-0.944	-0.979	-1.054	-1.015	-1.154	-1.107	-1.454	-0.975	-1.107	-1.061	-1.493	ns
		t <sub>h</sub>	1.077	1.130	1.288	1.285	1.447	1.389	1.737	1.257	1.412	1.355	1.777	ns
	GCLK PLL	t <sub>su</sub>	0.961	0.989	1.951	2.328	2.533	2.408	2.342	2.387	2.599	2.472	2.394	ns
		t <sub>h</sub>	-0.691	-0.700	-1.502	-1.818	-1.968	-1.871	-1.796	-1.862	-2.019	-1.921	-1.844	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-0.944	-0.979	-1.054	-1.015	-1.154	-1.107	-1.454	-0.975	-1.107	-1.061	-1.493	ns
		t <sub>h</sub>	1.077	1.130	1.288	1.285	1.447	1.389	1.737	1.257	1.412	1.355	1.777	ns
	GCLK PLL	t <sub>su</sub>	0.961	0.989	1.951	2.328	2.533	2.408	2.342	2.387	2.599	2.472	2.394	ns
		t <sub>h</sub>	-0.691	-0.700	-1.502	-1.818	-1.968	-1.871	-1.796	-1.862	-2.019	-1.921	-1.844	ns
RSDS	GCLK	t <sub>su</sub>	-0.944	-0.979	-1.054	-1.015	-1.154	-1.107	-1.454	-0.975	-1.107	-1.061	-1.493	ns
		t <sub>h</sub>	1.077	1.130	1.288	1.285	1.447	1.389	1.737	1.257	1.412	1.355	1.777	ns
	GCLK PLL	t <sub>su</sub>	0.961	0.989	1.951	2.328	2.533	2.408	2.342	2.387	2.599	2.472	2.394	ns
		t <sub>h</sub>	-0.691	-0.700	-1.502	-1.818	-1.968	-1.871	-1.796	-1.862	-2.019	-1.921	-1.844	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.749	-0.794	-1.145	-1.244	-1.343	-1.291	-1.633	-1.246	-1.344	-1.293	-1.677	ns
		t <sub>h</sub>	0.875	0.936	1.345	1.468	1.587	1.524	1.867	1.479	1.597	1.535	1.912	ns
	GCLK PLL	t <sub>su</sub>	1.156	1.174	1.864	2.104	2.344	2.224	2.163	2.120	2.362	2.240	2.210	ns
		t <sub>h</sub>	-0.893	-0.894	-1.447	-1.639	-1.828	-1.736	-1.666	-1.644	-1.834	-1.741	-1.709	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.749	-0.794	-1.145	-1.244	-1.343	-1.291	-1.633	-1.246	-1.344	-1.293	-1.677	ns
		t <sub>h</sub>	0.875	0.936	1.345	1.468	1.587	1.524	1.867	1.479	1.597	1.535	1.912	ns
	GCLK PLL	t <sub>su</sub>	1.156	1.174	1.864	2.104	2.344	2.224	2.163	2.120	2.362	2.240	2.210	ns
		t <sub>h</sub>	-0.893	-0.894	-1.447	-1.639	-1.828	-1.736	-1.666	-1.644	-1.834	-1.741	-1.709	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		t <sub>h</sub>	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	t <sub>su</sub>	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		t <sub>h</sub>	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		t <sub>h</sub>	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	t <sub>su</sub>	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		t <sub>h</sub>	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		t <sub>h</sub>	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	t <sub>su</sub>	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		t <sub>h</sub>	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns

**Table 1-135.** EP3SE110 Row Pins Input Timing Parameters (Part 2 of 2)

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		$t_h$	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	$t_{su}$	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		$t_h$	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.758	-0.806	-1.154	-1.254	-1.359	-1.307	-1.649	-1.255	-1.360	-1.309	-1.693	ns
		$t_h$	0.884	0.948	1.354	1.478	1.603	1.540	1.883	1.488	1.613	1.551	1.928	ns
	GCLK PLL	$t_{su}$	1.147	1.162	1.855	2.094	2.328	2.208	2.147	2.111	2.346	2.224	2.194	ns
		$t_h$	-0.884	-0.882	-1.438	-1.629	-1.812	-1.720	-1.650	-1.635	-1.818	-1.725	-1.693	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-0.772	-0.818	-1.163	-1.264	-1.377	-1.325	-1.667	-1.266	-1.377	-1.326	-1.710	ns
		$t_h$	0.898	0.960	1.364	1.488	1.621	1.558	1.901	1.499	1.630	1.568	1.945	ns
	GCLK PLL	$t_{su}$	1.133	1.150	1.842	2.084	2.310	2.190	2.129	2.100	2.329	2.207	2.177	ns
		$t_h$	-0.870	-0.870	-1.426	-1.619	-1.794	-1.702	-1.632	-1.624	-1.801	-1.708	-1.676	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	$t_{su}$	-0.781	-0.827	-1.178	-1.275	-1.384	-1.333	-1.673	-1.273	-1.378	-1.329	-1.712	ns
		$t_h$	0.907	0.969	1.379	1.502	1.631	1.568	1.912	1.509	1.636	1.573	1.952	ns
	GCLK PLL	$t_{su}$	1.124	1.141	1.827	2.068	2.299	2.178	2.118	2.089	2.323	2.199	2.170	ns
		$t_h$	-0.861	-0.861	-1.411	-1.601	-1.780	-1.688	-1.617	-1.610	-1.792	-1.699	-1.665	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	$t_{su}$	-0.781	-0.827	-1.178	-1.275	-1.384	-1.333	-1.673	-1.273	-1.378	-1.329	-1.712	ns
		$t_h$	0.907	0.969	1.379	1.502	1.631	1.568	1.912	1.509	1.636	1.573	1.952	ns
	GCLK PLL	$t_{su}$	1.124	1.141	1.827	2.068	2.299	2.178	2.118	2.089	2.323	2.199	2.170	ns
		$t_h$	-0.861	-0.861	-1.411	-1.601	-1.780	-1.688	-1.617	-1.610	-1.792	-1.699	-1.665	ns

Table 1-136 specifies EP3SE110 Column Pins Output Timing parameters for differential I/O standards.

**Table 1-136.** EP3SE110 Column Pins output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 1.1V	V <sub>ccl</sub> = 0.9V	
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.152	3.387	4.757	5.155	5.666	5.526	5.826	5.278	5.789	5.650	5.899	ns
		GCLK PLL	t <sub>co</sub>	1.328	1.502	1.913	2.006	2.214	2.225	2.251	2.110	2.321	2.331	2.237	ns
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.148	3.390	4.804	5.210	5.728	5.588	5.888	5.337	5.855	5.716	5.965	ns
		GCLK PLL	t <sub>co</sub>	1.324	1.505	1.960	2.061	2.276	2.287	2.313	2.169	2.387	2.397	2.303	ns
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.152	3.387	4.757	5.155	5.666	5.526	5.826	5.278	5.789	5.650	5.899	ns
		GCLK PLL	t <sub>co</sub>	1.328	1.502	1.913	2.006	2.214	2.225	2.251	2.110	2.321	2.331	2.237	ns
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.148	3.390	4.804	5.210	5.728	5.588	5.888	5.337	5.855	5.716	5.965	ns
		GCLK PLL	t <sub>co</sub>	1.324	1.505	1.960	2.061	2.276	2.287	2.313	2.169	2.387	2.397	2.303	ns
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.152	3.387	4.757	5.155	5.666	5.526	5.826	5.278	5.789	5.650	5.899	ns
		GCLK PLL	t <sub>co</sub>	1.328	1.502	1.913	2.006	2.214	2.225	2.251	2.110	2.321	2.331	2.237	ns
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.148	3.390	4.804	5.210	5.728	5.588	5.888	5.337	5.855	5.716	5.965	ns
		GCLK PLL	t <sub>co</sub>	1.324	1.505	1.960	2.061	2.276	2.287	2.313	2.169	2.387	2.397	2.303	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.179	3.420	4.828	5.233	5.750	5.610	5.910	5.358	5.875	5.736	5.985	ns
		GCLK PLL	t <sub>co</sub>	1.355	1.535	1.984	2.084	2.298	2.309	2.335	2.190	2.407	2.417	2.323	ns
	6mA	GCLK	t <sub>co</sub>	3.169	3.410	4.818	5.222	5.740	5.600	5.900	5.347	5.865	5.726	5.975	ns
		GCLK PLL	t <sub>co</sub>	1.345	1.525	1.974	2.073	2.288	2.299	2.325	2.179	2.397	2.407	2.313	ns
	8mA	GCLK	t <sub>co</sub>	3.169	3.410	4.821	5.226	5.744	5.604	5.904	5.352	5.870	5.731	5.980	ns
		GCLK PLL	t <sub>co</sub>	1.345	1.525	1.977	2.077	2.292	2.303	2.329	2.184	2.402	2.412	2.318	ns
	10mA	GCLK	t <sub>co</sub>	3.162	3.404	4.814	5.220	5.738	5.598	5.898	5.345	5.864	5.725	5.974	ns
		GCLK PLL	t <sub>co</sub>	1.338	1.519	1.970	2.071	2.286	2.297	2.323	2.177	2.396	2.406	2.312	ns
	12mA	GCLK	t <sub>co</sub>	3.161	3.402	4.811	5.217	5.735	5.595	5.895	5.342	5.860	5.721	5.970	ns
		GCLK PLL	t <sub>co</sub>	1.337	1.517	1.967	2.068	2.283	2.294	2.320	2.174	2.392	2.402	2.308	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.183	3.424	4.832	5.237	5.754	5.614	5.914	5.362	5.880	5.741	5.990	ns
		GCLK PLL	t <sub>co</sub>	1.359	1.539	1.988	2.088	2.302	2.313	2.339	2.194	2.412	2.422	2.328	ns

**Table 1-136.** EP3SE110 Column Pins output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.173	3.413	4.811	5.214	5.729	5.589	5.889	5.338	5.853	5.714	5.963	ns	
		GCLK PLL	t <sub>co</sub>	1.349	1.528	1.967	2.065	2.277	2.288	2.314	2.170	2.385	2.395	2.301	ns	
	6mA	GCLK	t <sub>co</sub>	3.168	3.409	4.811	5.214	5.730	5.590	5.890	5.339	5.855	5.716	5.965	ns	
		GCLK PLL	t <sub>co</sub>	1.344	1.524	1.967	2.065	2.278	2.289	2.315	2.171	2.387	2.397	2.303	ns	
	8mA	GCLK	t <sub>co</sub>	3.166	3.407	4.810	5.213	5.728	5.588	5.888	5.338	5.854	5.715	5.964	ns	
		GCLK PLL	t <sub>co</sub>	1.342	1.522	1.966	2.064	2.276	2.287	2.313	2.170	2.386	2.396	2.302	ns	
	10m A	GCLK	t <sub>co</sub>	3.158	3.398	4.800	5.203	5.719	5.579	5.879	5.328	5.844	5.705	5.954	ns	
		GCLK PLL	t <sub>co</sub>	1.334	1.513	1.956	2.054	2.267	2.278	2.304	2.160	2.376	2.386	2.292	ns	
	12m A	GCLK	t <sub>co</sub>	3.159	3.400	4.806	5.210	5.727	5.587	5.887	5.336	5.853	5.714	5.963	ns	
		GCLK PLL	t <sub>co</sub>	1.335	1.515	1.962	2.061	2.275	2.286	2.312	2.168	2.385	2.395	2.301	ns	
	DIFFERENTIAL 1.5-V HSTL CLASS II	16m A	GCLK	t <sub>co</sub>	3.158	3.397	4.789	5.191	5.705	5.565	5.865	5.315	5.829	5.690	5.939	ns
			GCLK PLL	t <sub>co</sub>	1.334	1.512	1.945	2.042	2.253	2.264	2.290	2.147	2.361	2.371	2.277	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.170	3.410	4.807	5.209	5.723	5.583	5.883	5.334	5.848	5.709	5.958	ns	
		GCLK PLL	t <sub>co</sub>	1.346	1.525	1.963	2.060	2.271	2.282	2.308	2.166	2.380	2.390	2.296	ns	
	6mA	GCLK	t <sub>co</sub>	3.166	3.407	4.808	5.211	5.727	5.587	5.887	5.336	5.852	5.713	5.962	ns	
		GCLK PLL	t <sub>co</sub>	1.342	1.522	1.964	2.062	2.275	2.286	2.312	2.168	2.384	2.394	2.300	ns	
	8mA	GCLK	t <sub>co</sub>	3.156	3.396	4.797	5.200	5.715	5.575	5.875	5.325	5.840	5.701	5.950	ns	
		GCLK PLL	t <sub>co</sub>	1.332	1.511	1.953	2.051	2.263	2.274	2.300	2.157	2.372	2.382	2.288	ns	
	10m A	GCLK	t <sub>co</sub>	3.154	3.394	4.795	5.197	5.713	5.573	5.873	5.323	5.838	5.699	5.948	ns	
		GCLK PLL	t <sub>co</sub>	1.330	1.509	1.951	2.048	2.261	2.272	2.298	2.155	2.370	2.380	2.286	ns	
	12m A	GCLK	t <sub>co</sub>	3.154	3.395	4.798	5.202	5.718	5.578	5.878	5.327	5.844	5.705	5.954	ns	
		GCLK PLL	t <sub>co</sub>	1.330	1.510	1.954	2.053	2.266	2.277	2.303	2.159	2.376	2.386	2.292	ns	
	DIFFERENTIAL 1.8-V HSTL CLASS II	16m A	GCLK	t <sub>co</sub>	3.158	3.398	4.795	5.197	5.712	5.572	5.872	5.322	5.837	5.698	5.947	ns
			GCLK PLL	t <sub>co</sub>	1.334	1.513	1.951	2.048	2.260	2.271	2.297	2.154	2.369	2.379	2.285	ns

**Table 1-136.** EP3SE110 Column Pins output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V		
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.184	3.427	4.840	5.245	5.762	5.622	5.922	5.370	5.887	5.748	5.997	ns	
		GCLK PLL	t <sub>co</sub>	1.360	1.542	1.996	2.096	2.310	2.321	2.347	2.202	2.419	2.429	2.335	ns	
	6mA	GCLK	t <sub>co</sub>	3.170	3.413	4.828	5.234	5.752	5.612	5.912	5.360	5.878	5.739	5.988	ns	
		GCLK PLL	t <sub>co</sub>	1.346	1.528	1.984	2.085	2.300	2.311	2.337	2.192	2.410	2.420	2.326	ns	
	8mA	GCLK	t <sub>co</sub>	3.158	3.400	4.811	5.216	5.734	5.594	5.894	5.342	5.860	5.721	5.970	ns	
		GCLK PLL	t <sub>co</sub>	1.334	1.515	1.967	2.067	2.282	2.293	2.319	2.174	2.392	2.402	2.308	ns	
	10mA	GCLK	t <sub>co</sub>	3.158	3.400	4.814	5.220	5.738	5.598	5.898	5.346	5.865	5.726	5.975	ns	
		GCLK PLL	t <sub>co</sub>	1.334	1.515	1.970	2.071	2.286	2.297	2.323	2.178	2.397	2.407	2.313	ns	
	12mA	GCLK	t <sub>co</sub>	3.154	3.396	4.807	5.212	5.731	5.591	5.891	5.339	5.857	5.718	5.967	ns	
		GCLK PLL	t <sub>co</sub>	1.330	1.511	1.963	2.063	2.279	2.290	2.316	2.171	2.389	2.399	2.305	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.158	3.398	4.800	5.203	5.719	5.579	5.879	5.328	5.844	5.705	5.954	ns
			GCLK PLL	t <sub>co</sub>	1.334	1.513	1.956	2.054	2.267	2.278	2.304	2.160	2.376	2.386	2.292	ns
16mA		GCLK	t <sub>co</sub>	3.159	3.400	4.808	5.213	5.730	5.590	5.890	5.338	5.856	5.717	5.966	ns	
		GCLK PLL	t <sub>co</sub>	1.335	1.515	1.964	2.064	2.278	2.289	2.315	2.170	2.388	2.398	2.304	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.187	3.430	4.839	5.243	5.760	5.620	5.920	5.369	5.885	5.746	5.995	ns	
		GCLK PLL	t <sub>co</sub>	1.363	1.545	1.995	2.094	2.308	2.319	2.345	2.201	2.417	2.427	2.333	ns	
	6mA	GCLK	t <sub>co</sub>	3.176	3.418	4.827	5.231	5.748	5.608	5.908	5.357	5.873	5.734	5.983	ns	
		GCLK PLL	t <sub>co</sub>	1.352	1.533	1.983	2.082	2.296	2.307	2.333	2.189	2.405	2.415	2.321	ns	
	8mA	GCLK	t <sub>co</sub>	3.171	3.414	4.827	5.232	5.749	5.609	5.909	5.358	5.875	5.736	5.985	ns	
		GCLK PLL	t <sub>co</sub>	1.347	1.529	1.983	2.083	2.297	2.308	2.334	2.190	2.407	2.417	2.323	ns	
	10mA	GCLK	t <sub>co</sub>	3.157	3.399	4.809	5.213	5.730	5.590	5.890	5.339	5.857	5.718	5.967	ns	
		GCLK PLL	t <sub>co</sub>	1.333	1.514	1.965	2.064	2.278	2.289	2.315	2.171	2.389	2.399	2.305	ns	
	12mA	GCLK	t <sub>co</sub>	3.155	3.397	4.807	5.211	5.728	5.588	5.888	5.337	5.854	5.715	5.964	ns	
		GCLK PLL	t <sub>co</sub>	1.331	1.512	1.963	2.062	2.276	2.287	2.313	2.169	2.386	2.396	2.302	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.159	3.399	4.799	5.201	5.716	5.576	5.876	5.326	5.841	5.702	5.951	ns
			GCLK PLL	t <sub>co</sub>	1.335	1.514	1.955	2.052	2.264	2.275	2.301	2.158	2.373	2.383	2.289	ns
16mA		GCLK	t <sub>co</sub>	3.159	3.400	4.807	5.211	5.728	5.588	5.888	5.337	5.854	5.715	5.964	ns	
		GCLK PLL	t <sub>co</sub>	1.335	1.515	1.963	2.062	2.276	2.287	2.313	2.169	2.386	2.396	2.302	ns	

**Table 1–136.** EP3SE110 Column Pins output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.175	3.417	4.823	5.226	5.742	5.602	5.902	5.352	5.867	5.728	5.977	ns
		GCLK PLL	$t_{co}$	1.351	1.532	1.979	2.077	2.290	2.301	2.327	2.184	2.399	2.409	2.315	ns
	10mA	GCLK	$t_{co}$	3.175	3.417	4.823	5.226	5.742	5.602	5.902	5.352	5.867	5.728	5.977	ns
		GCLK PLL	$t_{co}$	1.351	1.532	1.979	2.077	2.290	2.301	2.327	2.184	2.399	2.409	2.315	ns
	12mA	GCLK	$t_{co}$	3.165	3.407	4.813	5.216	5.732	5.592	5.892	5.342	5.858	5.719	5.968	ns
		GCLK PLL	$t_{co}$	1.341	1.522	1.969	2.067	2.280	2.291	2.317	2.174	2.390	2.400	2.306	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.158	3.399	4.799	5.201	5.716	5.576	5.876	5.326	5.841	5.702	5.951	ns
		GCLK PLL	$t_{co}$	1.334	1.514	1.955	2.052	2.264	2.275	2.301	2.158	2.373	2.383	2.289	ns

Table 1–137 specifies EP3SE110 Row Pins Output Timing parameters for differential I/O standards.

**Table 1–137.** EP3SE110 Row Pins output Timing Parameters (Part 1 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
LVDS	—	GCLK	$t_{co}$	2.744	2.932	4.083	4.440	4.901	4.771	5.049	4.540	5.002	4.873	5.107	ns
		GCLK PLL	$t_{co}$	0.931	1.057	1.249	1.300	1.458	1.480	1.486	1.382	1.545	1.563	1.456	ns
LVDS_E_1R	—	GCLK	$t_{co}$	3.136	3.376	4.754	5.156	5.664	5.526	5.797	5.281	5.790	5.652	5.871	ns
		GCLK PLL	$t_{co}$	1.333	1.511	1.930	2.026	2.231	2.245	2.243	2.133	2.343	2.352	2.229	ns
LVDS_E_3R	—	GCLK	$t_{co}$	3.118	3.366	4.792	5.202	5.718	5.580	5.851	5.332	5.851	5.713	5.932	ns
		GCLK PLL	$t_{co}$	1.315	1.501	1.968	2.072	2.285	2.299	2.297	2.184	2.404	2.413	2.290	ns
MINI-LVDS	—	GCLK	$t_{co}$	2.744	2.932	4.083	4.440	4.901	4.771	5.049	4.540	5.002	4.873	5.107	ns
		GCLK PLL	$t_{co}$	0.931	1.057	1.249	1.300	1.458	1.480	1.486	1.382	1.545	1.563	1.456	ns
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.136	3.376	4.754	5.156	5.664	5.526	5.797	5.281	5.790	5.652	5.871	ns
		GCLK PLL	$t_{co}$	1.333	1.511	1.930	2.026	2.231	2.245	2.243	2.133	2.343	2.352	2.229	ns
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.118	3.366	4.792	5.202	5.718	5.580	5.851	5.332	5.851	5.713	5.932	ns
		GCLK PLL	$t_{co}$	1.315	1.501	1.968	2.072	2.285	2.299	2.297	2.184	2.404	2.413	2.290	ns
RSDS	—	GCLK	$t_{co}$	2.744	2.932	4.083	4.440	4.901	4.771	5.049	4.540	5.002	4.873	5.107	ns
		GCLK PLL	$t_{co}$	0.931	1.057	1.249	1.300	1.458	1.480	1.486	1.382	1.545	1.563	1.456	ns



**Table 1-137.** EP3SE110 Row Pins output Timing Parameters (Part 2 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.136	3.376	4.754	5.156	5.664	5.526	5.797	5.281	5.790	5.652	5.871	ns
		GCLK PLL	t <sub>co</sub>	1.333	1.511	1.930	2.026	2.231	2.245	2.243	2.133	2.343	2.352	2.229	ns
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.118	3.366	4.792	5.202	5.718	5.580	5.851	5.332	5.851	5.713	5.932	ns
		GCLK PLL	t <sub>co</sub>	1.315	1.501	1.968	2.072	2.285	2.299	2.297	2.184	2.404	2.413	2.290	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.162	3.409	4.828	5.236	5.751	5.613	5.884	5.365	5.880	5.742	5.961	ns
		GCLK PLL	t <sub>co</sub>	1.359	1.544	2.004	2.106	2.318	2.332	2.330	2.217	2.433	2.442	2.319	ns
	6mA	GCLK	t <sub>co</sub>	3.148	3.395	4.815	5.223	5.738	5.600	5.871	5.351	5.867	5.729	5.948	ns
		GCLK PLL	t <sub>co</sub>	1.345	1.530	1.991	2.093	2.305	2.319	2.317	2.203	2.420	2.429	2.306	ns
	8mA	GCLK	t <sub>co</sub>	3.144	3.391	4.813	5.223	5.739	5.601	5.872	5.351	5.869	5.731	5.950	ns
		GCLK PLL	t <sub>co</sub>	1.341	1.526	1.989	2.093	2.306	2.320	2.318	2.203	2.422	2.431	2.308	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.160	3.406	4.814	5.220	5.733	5.595	5.866	5.348	5.862	5.724	5.943	ns
		GCLK PLL	t <sub>co</sub>	1.357	1.541	1.990	2.090	2.300	2.314	2.312	2.200	2.415	2.424	2.301	ns
	6mA	GCLK	t <sub>co</sub>	3.149	3.396	4.810	5.216	5.730	5.592	5.863	5.345	5.859	5.721	5.940	ns
		GCLK PLL	t <sub>co</sub>	1.346	1.531	1.986	2.086	2.297	2.311	2.309	2.197	2.412	2.421	2.298	ns
	8mA	GCLK	t <sub>co</sub>	3.146	3.393	4.808	5.214	5.728	5.590	5.861	5.343	5.858	5.720	5.939	ns
		GCLK PLL	t <sub>co</sub>	1.343	1.528	1.984	2.084	2.295	2.309	2.307	2.195	2.411	2.420	2.297	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.157	3.403	4.809	5.215	5.727	5.589	5.860	5.343	5.856	5.718	5.937	ns
		GCLK PLL	t <sub>co</sub>	1.354	1.538	1.985	2.085	2.294	2.308	2.306	2.195	2.409	2.418	2.295	ns
	6mA	GCLK	t <sub>co</sub>	3.147	3.394	4.807	5.213	5.726	5.588	5.859	5.342	5.856	5.718	5.937	ns
		GCLK PLL	t <sub>co</sub>	1.344	1.529	1.983	2.083	2.293	2.307	2.305	2.194	2.409	2.418	2.295	ns
	8mA	GCLK	t <sub>co</sub>	3.133	3.380	4.792	5.198	5.712	5.574	5.845	5.327	5.841	5.703	5.922	ns
		GCLK PLL	t <sub>co</sub>	1.330	1.515	1.968	2.068	2.279	2.293	2.291	2.179	2.394	2.403	2.280	ns
	10mA	GCLK	t <sub>co</sub>	3.130	3.376	4.788	5.194	5.708	5.570	5.841	5.323	5.837	5.699	5.918	ns
		GCLK PLL	t <sub>co</sub>	1.327	1.511	1.964	2.064	2.275	2.289	2.287	2.175	2.390	2.399	2.276	ns
12mA	GCLK	t <sub>co</sub>	3.127	3.374	4.789	5.197	5.711	5.573	5.844	5.326	5.841	5.703	5.922	ns	
	GCLK PLL	t <sub>co</sub>	1.324	1.509	1.965	2.067	2.278	2.292	2.290	2.178	2.394	2.403	2.280	ns	

**Table 1-137.** EP3SE110 Row Pins output Timing Parameters (Part 3 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.128	3.374	4.779	5.185	5.698	5.560	5.831	5.313	5.827	5.689	5.908	ns	
		GCLK PLL	t <sub>co</sub>	1.325	1.509	1.955	2.055	2.265	2.279	2.277	2.165	2.380	2.389	2.266	ns	
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.177	3.427	4.850	5.258	5.774	5.636	5.907	5.387	5.903	5.765	5.984	ns	
		GCLK PLL	t <sub>co</sub>	1.374	1.562	2.026	2.128	2.341	2.355	2.353	2.239	2.456	2.465	2.342	ns	
	6mA	GCLK	t <sub>co</sub>	3.153	3.403	4.832	5.241	5.757	5.619	5.890	5.370	5.888	5.750	5.969	ns	
		GCLK PLL	t <sub>co</sub>	1.350	1.538	2.008	2.111	2.324	2.338	2.336	2.222	2.441	2.450	2.327	ns	
	8mA	GCLK	t <sub>co</sub>	3.136	3.384	4.810	5.219	5.735	5.597	5.868	5.348	5.866	5.728	5.947	ns	
		GCLK PLL	t <sub>co</sub>	1.333	1.519	1.986	2.089	2.302	2.316	2.314	2.200	2.419	2.428	2.305	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.181	3.430	4.850	5.258	5.773	5.635	5.906	5.387	5.903	5.765	5.984	ns	
		GCLK PLL	t <sub>co</sub>	1.378	1.565	2.026	2.128	2.340	2.354	2.352	2.239	2.456	2.465	2.342	ns	
	6mA	GCLK	t <sub>co</sub>	3.166	3.415	4.836	5.243	5.758	5.620	5.891	5.372	5.888	5.750	5.969	ns	
		GCLK PLL	t <sub>co</sub>	1.363	1.550	2.012	2.113	2.325	2.339	2.337	2.224	2.441	2.450	2.327	ns	
	8mA	GCLK	t <sub>co</sub>	3.155	3.404	4.831	5.240	5.755	5.617	5.888	5.369	5.886	5.748	5.967	ns	
		GCLK PLL	t <sub>co</sub>	1.352	1.539	2.007	2.110	2.322	2.336	2.334	2.221	2.439	2.448	2.325	ns	
	10mA	GCLK	t <sub>co</sub>	3.135	3.384	4.808	5.216	5.732	5.594	5.865	5.346	5.862	5.724	5.943	ns	
		GCLK PLL	t <sub>co</sub>	1.332	1.519	1.984	2.086	2.299	2.313	2.311	2.198	2.415	2.424	2.301	ns	
	12mA	GCLK	t <sub>co</sub>	3.132	3.380	4.804	5.213	5.728	5.590	5.861	5.342	5.859	5.721	5.940	ns	
		GCLK PLL	t <sub>co</sub>	1.329	1.515	1.980	2.083	2.295	2.309	2.307	2.194	2.412	2.421	2.298	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.137	3.384	4.795	5.201	5.714	5.576	5.847	5.329	5.843	5.705	5.924	ns
			GCLK PLL	t <sub>co</sub>	1.334	1.519	1.971	2.071	2.281	2.295	2.293	2.181	2.396	2.405	2.282	ns
16mA		GCLK	t <sub>co</sub>	3.130	3.377	4.794	5.202	5.717	5.579	5.850	5.332	5.848	5.710	5.929	ns	
		GCLK PLL	t <sub>co</sub>	1.327	1.512	1.970	2.072	2.284	2.298	2.296	2.184	2.401	2.410	2.287	ns	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	3.168	3.416	4.832	5.239	5.753	5.615	5.886	5.368	5.883	5.745	5.964	ns	
		GCLK PLL	t <sub>co</sub>	1.365	1.551	2.008	2.109	2.320	2.334	2.332	2.220	2.436	2.445	2.322	ns	
	12mA	GCLK	t <sub>co</sub>	3.150	3.399	4.817	5.224	5.738	5.600	5.871	5.353	5.868	5.730	5.949	ns	
		GCLK PLL	t <sub>co</sub>	1.347	1.534	1.993	2.094	2.305	2.319	2.317	2.205	2.421	2.430	2.307	ns	

**Table 1-137.** EP3SE110 Row Pins output Timing Parameters (Part 4 of 4)

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.136	3.383	4.794	5.200	5.713	5.575	5.846	5.329	5.843	5.705	5.924	ns
		GCLK PLL	t <sub>co</sub>	1.333	1.518	1.970	2.070	2.280	2.294	2.292	2.181	2.396	2.405	2.282	ns

Table 1-138 and Table 1-139 show EP3SE110 regional clock (RCLK) adder values that should be added to GCLK values. These adder values are used to determine I/O timing when I/O pin is driven using regional clock. This applies for all I/O standards supported by Stratix III devices.

Table 1-138 specifies EP3SE110 Column Pin delay adders when using the regional clock.

**Table 1-138.** EP3SE110 Column Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
RCLK input adder	0.111	0.14	0.19	0.103	0.105	0.103	0.177	0.085	0.101	0.098	0.146	ns
RCLK PLL input adder	2.506	2.513	3.782	4.081	4.579	4.381	4.923	4.222	4.603	4.401	4.984	ns
RCLK output adder	-0.281	-0.062	-0.079	-0.074	-0.074	-0.072	-0.128	0.056	0.051	0.054	-0.055	ns
RCLK PLL output adder	-2.121	-1.833	-2.75	-2.908	-3.127	-3.057	-3.165	-2.959	-3.157	-2.903	-3.172	ns

Table 1-139 specifies EP3SE110 Row Pin delay adders when using the regional clock.

**Table 1-139.** EP3SE110 Row Pin Delay Adders for Regional Clock

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
RCLK input adder	-0.003	-0.002	0.001	-0.012	-0.01	-0.017	0.078	-0.02	-0.02	-0.016	0.08	ns
RCLK PLL input adder	0.116	0.122	0.192	0.212	0.227	0.217	0.375	0.198	0.219	0.209	0.379	ns
RCLK output adder	0.02	0.019	0.027	0.041	0.044	0.048	-0.038	0.051	0.057	0.051	-0.04	ns
RCLK PLL output adder	-0.103	-0.105	-0.162	-0.179	-0.194	-0.185	-0.322	-0.167	-0.183	-0.175	-0.324	ns

### EP3SE260 I/O Timing Parameters

Table 1-140 through Table 1-144 show the maximum I/O timing parameters for EP3SE260 devices for single-ended I/O standards.

Table 1-140 specifies EP3SE260 column pins input timing parameters for single-ended I/O standards.

**Table 1-140.** EP3SE260 Column Pins Input Timing Parameters (Part 1 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTTL	GCLK	t <sub>su</sub>	-1.242	-1.186	-1.822	-1.915	-2.184	-2.050	-2.482	-1.915	-2.184	-2.050	-2.482	ns
		t <sub>h</sub>	1.388	1.332	2.045	2.146	2.437	2.285	2.724	2.146	2.437	2.285	2.724	ns
	GCLK PLL	t <sub>su</sub>	-1.417	-1.465	-2.238	-2.189	-2.558	-2.477	-3.038	-2.189	-2.558	-2.477	-3.038	ns
		t <sub>h</sub>	1.732	1.778	2.727	2.697	3.113	3.000	3.584	2.697	3.113	3.000	3.584	ns
3.3-V LVCMOS	GCLK	t <sub>su</sub>	-1.242	-1.186	-1.822	-1.915	-2.184	-2.050	-2.482	-1.915	-2.184	-2.050	-2.482	ns
		t <sub>h</sub>	1.388	1.332	2.045	2.146	2.437	2.285	2.724	2.146	2.437	2.285	2.724	ns
	GCLK PLL	t <sub>su</sub>	-1.417	-1.465	-2.238	-2.189	-2.558	-2.477	-3.038	-2.189	-2.558	-2.477	-3.038	ns
		t <sub>h</sub>	1.732	1.778	2.727	2.697	3.113	3.000	3.584	2.697	3.113	3.000	3.584	ns
3.0-V LVTTTL	GCLK	t <sub>su</sub>	-1.253	-1.197	-1.821	-1.917	-2.183	-2.049	-2.481	-1.917	-2.183	-2.049	-2.481	ns
		t <sub>h</sub>	1.399	1.343	2.044	2.148	2.436	2.284	2.723	2.148	2.436	2.284	2.723	ns
	GCLK PLL	t <sub>su</sub>	-1.428	-1.476	-2.237	-2.191	-2.557	-2.476	-3.037	-2.191	-2.557	-2.476	-3.037	ns
		t <sub>h</sub>	1.743	1.789	2.726	2.699	3.112	2.999	3.583	2.699	3.112	2.999	3.583	ns
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-1.253	-1.197	-1.821	-1.917	-2.183	-2.049	-2.481	-1.917	-2.183	-2.049	-2.481	ns
		t <sub>h</sub>	1.399	1.343	2.044	2.148	2.436	2.284	2.723	2.148	2.436	2.284	2.723	ns
	GCLK PLL	t <sub>su</sub>	-1.428	-1.476	-2.237	-2.191	-2.557	-2.476	-3.037	-2.191	-2.557	-2.476	-3.037	ns
		t <sub>h</sub>	1.743	1.789	2.726	2.699	3.112	2.999	3.583	2.699	3.112	2.999	3.583	ns
2.5 V	GCLK	t <sub>su</sub>	-1.248	-1.192	-1.830	-1.929	-2.202	-2.068	-2.500	-1.929	-2.202	-2.068	-2.500	ns
		t <sub>h</sub>	1.394	1.338	2.053	2.160	2.455	2.303	2.742	2.160	2.455	2.303	2.742	ns
	GCLK PLL	t <sub>su</sub>	-1.423	-1.471	-2.246	-2.203	-2.576	-2.495	-3.056	-2.203	-2.576	-2.495	-3.056	ns
		t <sub>h</sub>	1.738	1.784	2.735	2.711	3.131	3.018	3.602	2.711	3.131	3.018	3.602	ns
1.8 V	GCLK	t <sub>su</sub>	-1.270	-1.214	-1.870	-1.965	-2.200	-2.066	-2.498	-1.965	-2.200	-2.066	-2.498	ns
		t <sub>h</sub>	1.418	1.362	2.093	2.196	2.453	2.301	2.740	2.196	2.453	2.301	2.740	ns
	GCLK PLL	t <sub>su</sub>	-1.443	-1.493	-2.286	-2.239	-2.574	-2.493	-3.054	-2.239	-2.574	-2.493	-3.054	ns
		t <sub>h</sub>	1.760	1.808	2.775	2.747	3.129	3.016	3.600	2.747	3.129	3.016	3.600	ns
1.5 V	GCLK	t <sub>su</sub>	-1.260	-1.204	-1.847	-1.933	-2.130	-1.996	-2.428	-1.933	-2.130	-1.996	-2.428	ns
		t <sub>h</sub>	1.408	1.352	2.070	2.164	2.383	2.231	2.670	2.164	2.383	2.231	2.670	ns
	GCLK PLL	t <sub>su</sub>	-1.433	-1.483	-2.263	-2.207	-2.504	-2.423	-2.984	-2.207	-2.504	-2.423	-2.984	ns
		t <sub>h</sub>	1.750	1.798	2.752	2.715	3.059	2.946	3.530	2.715	3.059	2.946	3.530	ns
1.2 V	GCLK	t <sub>su</sub>	-1.208	-1.152	-1.770	-1.834	-1.974	-1.840	-2.272	-1.834	-1.974	-1.840	-2.272	ns
		t <sub>h</sub>	1.356	1.300	1.993	2.065	2.227	2.075	2.514	2.065	2.227	2.075	2.514	ns
	GCLK PLL	t <sub>su</sub>	-1.381	-1.431	-2.186	-2.108	-2.348	-2.267	-2.828	-2.108	-2.348	-2.267	-2.828	ns
		t <sub>h</sub>	1.698	1.746	2.675	2.616	2.903	2.790	3.374	2.616	2.903	2.790	3.374	ns

**Table 1-140.** EP3SE260 Column Pins Input Timing Parameters (Part 2 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-1.179	-1.123	-1.742	-1.818	-1.976	-1.842	-2.274	-1.818	-1.976	-1.842	-2.274	ns
		t <sub>h</sub>	1.327	1.271	1.965	2.049	2.229	2.077	2.516	2.049	2.229	2.077	2.516	ns
	GCLK PLL	t <sub>su</sub>	-1.352	-1.402	-2.158	-2.092	-2.350	-2.269	-2.830	-2.092	-2.350	-2.269	-2.830	ns
		t <sub>h</sub>	1.669	1.717	2.647	2.600	2.905	2.792	3.376	2.600	2.905	2.792	3.376	ns
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-1.179	-1.123	-1.742	-1.818	-1.976	-1.842	-2.274	-1.818	-1.976	-1.842	-2.274	ns
		t <sub>h</sub>	1.327	1.271	1.965	2.049	2.229	2.077	2.516	2.049	2.229	2.077	2.516	ns
	GCLK PLL	t <sub>su</sub>	-1.352	-1.402	-2.158	-2.092	-2.350	-2.269	-2.830	-2.092	-2.350	-2.269	-2.830	ns
		t <sub>h</sub>	1.669	1.717	2.647	2.600	2.905	2.792	3.376	2.600	2.905	2.792	3.376	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-1.173	-1.117	-1.729	-1.810	-1.973	-1.837	-2.272	-1.810	-1.973	-1.837	-2.272	ns
		t <sub>h</sub>	1.321	1.265	1.952	2.038	2.223	2.071	2.509	2.038	2.223	2.071	2.509	ns
	GCLK PLL	t <sub>su</sub>	-1.346	-1.396	-2.145	-2.087	-2.347	-2.264	-2.828	-2.087	-2.347	-2.264	-2.828	ns
		t <sub>h</sub>	1.663	1.711	2.634	2.592	2.899	2.786	3.369	2.592	2.899	2.786	3.369	ns
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-1.173	-1.117	-1.729	-1.810	-1.973	-1.837	-2.272	-1.810	-1.973	-1.837	-2.272	ns
		t <sub>h</sub>	1.321	1.265	1.952	2.038	2.223	2.071	2.509	2.038	2.223	2.071	2.509	ns
	GCLK PLL	t <sub>su</sub>	-1.346	-1.396	-2.145	-2.087	-2.347	-2.264	-2.828	-2.087	-2.347	-2.264	-2.828	ns
		t <sub>h</sub>	1.663	1.711	2.634	2.592	2.899	2.786	3.369	2.592	2.899	2.786	3.369	ns
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-1.162	-1.106	-1.718	-1.799	-1.954	-1.818	-2.253	-1.799	-1.954	-1.818	-2.253	ns
		t <sub>h</sub>	1.310	1.254	1.940	2.027	2.204	2.052	2.490	2.027	2.204	2.052	2.490	ns
	GCLK PLL	t <sub>su</sub>	-1.335	-1.385	-2.134	-2.076	-2.328	-2.245	-2.809	-2.076	-2.328	-2.245	-2.809	ns
		t <sub>h</sub>	1.652	1.700	2.622	2.581	2.880	2.767	3.350	2.581	2.880	2.767	3.350	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.162	-1.106	-1.718	-1.799	-1.954	-1.818	-2.253	-1.799	-1.954	-1.818	-2.253	ns
		t <sub>h</sub>	1.310	1.254	1.940	2.027	2.204	2.052	2.490	2.027	2.204	2.052	2.490	ns
	GCLK PLL	t <sub>su</sub>	-1.335	-1.385	-2.134	-2.076	-2.328	-2.245	-2.809	-2.076	-2.328	-2.245	-2.809	ns
		t <sub>h</sub>	1.652	1.700	2.622	2.581	2.880	2.767	3.350	2.581	2.880	2.767	3.350	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-1.173	-1.117	-1.729	-1.810	-1.973	-1.837	-2.272	-1.810	-1.973	-1.837	-2.272	ns
		t <sub>h</sub>	1.321	1.265	1.952	2.038	2.223	2.071	2.509	2.038	2.223	2.071	2.509	ns
	GCLK PLL	t <sub>su</sub>	-1.346	-1.396	-2.145	-2.087	-2.347	-2.264	-2.828	-2.087	-2.347	-2.264	-2.828	ns
		t <sub>h</sub>	1.663	1.711	2.634	2.592	2.899	2.786	3.369	2.592	2.899	2.786	3.369	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.173	-1.117	-1.729	-1.810	-1.973	-1.837	-2.272	-1.810	-1.973	-1.837	-2.272	ns
		t <sub>h</sub>	1.321	1.265	1.952	2.038	2.223	2.071	2.509	2.038	2.223	2.071	2.509	ns
	GCLK PLL	t <sub>su</sub>	-1.346	-1.396	-2.145	-2.087	-2.347	-2.264	-2.828	-2.087	-2.347	-2.264	-2.828	ns
		t <sub>h</sub>	1.663	1.711	2.634	2.592	2.899	2.786	3.369	2.592	2.899	2.786	3.369	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-1.162	-1.106	-1.718	-1.799	-1.954	-1.818	-2.253	-1.799	-1.954	-1.818	-2.253	ns
		t <sub>h</sub>	1.310	1.254	1.940	2.027	2.204	2.052	2.490	2.027	2.204	2.052	2.490	ns
	GCLK PLL	t <sub>su</sub>	-1.335	-1.385	-2.134	-2.076	-2.328	-2.245	-2.809	-2.076	-2.328	-2.245	-2.809	ns
		t <sub>h</sub>	1.652	1.700	2.622	2.581	2.880	2.767	3.350	2.581	2.880	2.767	3.350	ns

**Table 1-140.** EP3SE260 Column Pins Input Timing Parameters (Part 3 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
1.2-V HSTL CLASS I	GCLK	$t_{su}$	-1.162	-1.106	-1.718	-1.799	-1.954	-1.818	-2.253	-1.799	-1.954	-1.818	-2.253	ns
		$t_h$	1.310	1.254	1.940	2.027	2.204	2.052	2.490	2.027	2.204	2.052	2.490	ns
	GCLK PLL	$t_{su}$	-1.335	-1.385	-2.134	-2.076	-2.328	-2.245	-2.809	-2.076	-2.328	-2.245	-2.809	ns
		$t_h$	1.652	1.700	2.622	2.581	2.880	2.767	3.350	2.581	2.880	2.767	3.350	ns
1.2-V HSTL CLASS II	GCLK	$t_{su}$	-1.150	-1.094	-1.708	-1.788	-1.938	-1.802	-2.237	-1.788	-1.938	-1.802	-2.237	ns
		$t_h$	1.298	1.242	1.930	2.016	2.188	2.036	2.474	2.016	2.188	2.036	2.474	ns
	GCLK PLL	$t_{su}$	-1.323	-1.373	-2.124	-2.065	-2.312	-2.229	-2.793	-2.065	-2.312	-2.229	-2.793	ns
		$t_h$	1.640	1.688	2.612	2.570	2.864	2.751	3.334	2.570	2.864	2.751	3.334	ns
3.0-V PCI	GCLK	$t_{su}$	-1.150	-1.094	-1.708	-1.788	-1.938	-1.802	-2.237	-1.788	-1.938	-1.802	-2.237	ns
		$t_h$	1.298	1.242	1.930	2.016	2.188	2.036	2.474	2.016	2.188	2.036	2.474	ns
	GCLK PLL	$t_{su}$	-1.323	-1.373	-2.124	-2.065	-2.312	-2.229	-2.793	-2.065	-2.312	-2.229	-2.793	ns
		$t_h$	1.640	1.688	2.612	2.570	2.864	2.751	3.334	2.570	2.864	2.751	3.334	ns
3.0-V PCI-X	GCLK	$t_{su}$	-1.253	-1.197	-1.821	-1.917	-2.183	-2.049	-2.481	-1.917	-2.183	-2.049	-2.481	ns
		$t_h$	1.399	1.343	2.044	2.148	2.436	2.284	2.723	2.148	2.436	2.284	2.723	ns
	GCLK PLL	$t_{su}$	-1.428	-1.476	-2.237	-2.191	-2.557	-2.476	-3.037	-2.191	-2.557	-2.476	-3.037	ns
		$t_h$	1.743	1.789	2.726	2.699	3.112	2.999	3.583	2.699	3.112	2.999	3.583	ns

Table 1-141 specifies EP3SE260 row pins input timing parameters for single-ended I/O standards.

**Table 1-141.** EP3SE260 Row Pins Input Timing Parameters (Part 1 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
3.3-V LVTTTL	GCLK	$t_{su}$	-1.094	-1.147	-1.730	-1.802	-1.984	-1.933	-2.282	-1.773	-1.921	-1.938	-2.380	ns
		$t_h$	1.222	1.290	1.950	2.031	2.234	2.170	2.529	2.010	2.187	2.186	2.621	ns
	GCLK PLL	$t_{su}$	0.958	0.983	1.727	1.822	1.839	1.723	1.642	1.835	1.846	1.744	1.700	ns
		$t_h$	-0.688	-0.696	-1.267	-1.343	-1.312	-1.226	-1.133	-1.343	-1.307	-1.236	-1.187	ns
3.3-V LVCMOS	GCLK	$t_{su}$	-1.094	-1.147	-1.730	-1.802	-1.984	-1.933	-2.282	-1.773	-1.921	-1.938	-2.380	ns
		$t_h$	1.222	1.290	1.950	2.031	2.234	2.170	2.529	2.010	2.187	2.186	2.621	ns
	GCLK PLL	$t_{su}$	0.958	0.983	1.727	1.822	1.839	1.723	1.642	1.835	1.846	1.744	1.700	ns
		$t_h$	-0.688	-0.696	-1.267	-1.343	-1.312	-1.226	-1.133	-1.343	-1.307	-1.236	-1.187	ns
3.0-V LVTTTL	GCLK	$t_{su}$	-1.100	-1.158	-1.727	-1.803	-1.987	-1.936	-2.285	-1.772	-1.926	-1.943	-2.385	ns
		$t_h$	1.228	1.301	1.947	2.032	2.237	2.173	2.532	2.009	2.192	2.191	2.626	ns
	GCLK PLL	$t_{su}$	0.952	0.972	1.730	1.821	1.836	1.720	1.639	1.836	1.841	1.739	1.695	ns
		$t_h$	-0.682	-0.685	-1.270	-1.342	-1.309	-1.223	-1.130	-1.344	-1.302	-1.231	-1.182	ns

**Table 1-141.** EP3SE260 Row Pins Input Timing Parameters (Part 2 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.0-V LVCMOS	GCLK	t <sub>su</sub>	-1.100	-1.158	-1.727	-1.803	-1.987	-1.936	-2.285	-1.772	-1.926	-1.943	-2.385	ns
		t <sub>h</sub>	1.228	1.301	1.947	2.032	2.237	2.173	2.532	2.009	2.192	2.191	2.626	ns
	GCLK PLL	t <sub>su</sub>	0.952	0.972	1.730	1.821	1.836	1.720	1.639	1.836	1.841	1.739	1.695	ns
		t <sub>h</sub>	-0.682	-0.685	-1.270	-1.342	-1.309	-1.223	-1.130	-1.344	-1.302	-1.231	-1.182	ns
2.5 V	GCLK	t <sub>su</sub>	-1.088	-1.151	-1.736	-1.816	-2.002	-1.951	-2.300	-1.781	-1.936	-1.953	-2.395	ns
		t <sub>h</sub>	1.216	1.294	1.956	2.045	2.252	2.188	2.547	2.018	2.202	2.201	2.636	ns
	GCLK PLL	t <sub>su</sub>	0.964	0.979	1.721	1.808	1.821	1.705	1.624	1.827	1.831	1.729	1.685	ns
		t <sub>h</sub>	-0.694	-0.692	-1.261	-1.329	-1.294	-1.208	-1.115	-1.335	-1.292	-1.221	-1.172	ns
1.8 V	GCLK	t <sub>su</sub>	-1.134	-1.203	-1.797	-1.803	-2.075	-2.011	-2.386	-1.834	-1.937	-1.954	-2.340	ns
		t <sub>h</sub>	1.263	1.348	2.018	2.031	2.326	2.248	2.627	2.072	2.203	2.202	2.588	ns
	GCLK PLL	t <sub>su</sub>	0.935	0.873	1.575	1.775	1.930	1.804	1.605	1.794	1.833	1.724	1.679	ns
		t <sub>h</sub>	-0.664	-0.587	-1.117	-1.296	-1.399	-1.303	-1.096	-1.302	-1.294	-1.216	-1.166	ns
1.5 V	GCLK	t <sub>su</sub>	-1.124	-1.192	-1.773	-1.771	-2.007	-1.943	-2.318	-1.803	-1.872	-1.889	-2.275	ns
		t <sub>h</sub>	1.253	1.337	1.994	1.999	2.258	2.180	2.559	2.041	2.138	2.137	2.523	ns
	GCLK PLL	t <sub>su</sub>	0.945	0.884	1.599	1.807	1.998	1.872	1.673	1.825	1.898	1.789	1.744	ns
		t <sub>h</sub>	-0.674	-0.598	-1.141	-1.328	-1.467	-1.371	-1.164	-1.333	-1.359	-1.281	-1.231	ns
1.2 V	GCLK	t <sub>su</sub>	-1.064	-1.139	-1.694	-1.670	-1.848	-1.784	-2.159	-1.707	-1.717	-1.734	-2.120	ns
		t <sub>h</sub>	1.193	1.284	1.915	1.898	2.099	2.021	2.400	1.945	1.983	1.982	2.368	ns
	GCLK PLL	t <sub>su</sub>	1.005	0.937	1.678	1.908	2.157	2.031	1.832	1.921	2.053	1.944	1.899	ns
		t <sub>h</sub>	-0.734	-0.651	-1.220	-1.429	-1.626	-1.530	-1.323	-1.429	-1.514	-1.436	-1.386	ns
SSTL-2 CLASS I	GCLK	t <sub>su</sub>	-1.031	-1.093	-1.650	-1.707	-1.782	-1.731	-2.080	-1.669	-1.719	-1.736	-2.178	ns
		t <sub>h</sub>	1.160	1.237	1.870	1.936	2.032	1.968	2.327	1.906	1.985	1.984	2.419	ns
	GCLK PLL	t <sub>su</sub>	1.022	1.038	1.807	1.917	2.041	1.925	1.844	1.939	2.048	1.946	1.902	ns
		t <sub>h</sub>	-0.751	-0.750	-1.347	-1.438	-1.514	-1.428	-1.335	-1.447	-1.509	-1.438	-1.389	ns
SSTL-2 CLASS II	GCLK	t <sub>su</sub>	-1.031	-1.093	-1.650	-1.707	-1.782	-1.731	-2.080	-1.669	-1.719	-1.736	-2.178	ns
		t <sub>h</sub>	1.160	1.237	1.870	1.936	2.032	1.968	2.327	1.906	1.985	1.984	2.419	ns
	GCLK PLL	t <sub>su</sub>	1.022	1.038	1.807	1.917	2.041	1.925	1.844	1.939	2.048	1.946	1.902	ns
		t <sub>h</sub>	-0.751	-0.750	-1.347	-1.438	-1.514	-1.428	-1.335	-1.447	-1.509	-1.438	-1.389	ns
SSTL-18 CLASS I	GCLK	t <sub>su</sub>	-1.038	-1.104	-1.656	-1.643	-1.847	-1.782	-2.155	-1.675	-1.718	-1.726	-2.120	ns
		t <sub>h</sub>	1.167	1.249	1.877	1.869	2.095	2.017	2.392	1.911	1.979	1.973	2.363	ns
	GCLK PLL	t <sub>su</sub>	1.031	0.972	1.716	1.933	2.159	2.034	1.836	1.950	2.060	1.952	1.906	ns
		t <sub>h</sub>	-0.760	-0.686	-1.258	-1.456	-1.631	-1.535	-1.331	-1.461	-1.524	-1.445	-1.397	ns
SSTL-18 CLASS II	GCLK	t <sub>su</sub>	-1.038	-1.104	-1.656	-1.643	-1.847	-1.782	-2.155	-1.675	-1.718	-1.726	-2.120	ns
		t <sub>h</sub>	1.167	1.249	1.877	1.869	2.095	2.017	2.392	1.911	1.979	1.973	2.363	ns
	GCLK PLL	t <sub>su</sub>	1.031	0.972	1.716	1.933	2.159	2.034	1.836	1.950	2.060	1.952	1.906	ns
		t <sub>h</sub>	-0.760	-0.686	-1.258	-1.456	-1.631	-1.535	-1.331	-1.461	-1.524	-1.445	-1.397	ns

**Table 1-141.** EP3SE260 Row Pins Input Timing Parameters (Part 3 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-15 CLASS I	GCLK	t <sub>su</sub>	-1.024	-1.092	-1.641	-1.633	-1.829	-1.764	-2.137	-1.664	-1.701	-1.709	-2.103	ns
		t <sub>h</sub>	1.153	1.237	1.863	1.859	2.077	1.999	2.374	1.900	1.962	1.956	2.346	ns
	GCLK PLL	t <sub>su</sub>	1.045	0.984	1.731	1.943	2.177	2.052	1.854	1.961	2.077	1.969	1.923	ns
		t <sub>h</sub>	-0.774	-0.698	-1.272	-1.466	-1.649	-1.553	-1.349	-1.472	-1.541	-1.462	-1.414	ns
1.8-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.038	-1.104	-1.656	-1.643	-1.847	-1.782	-2.155	-1.675	-1.718	-1.726	-2.120	ns
		t <sub>h</sub>	1.167	1.249	1.877	1.869	2.095	2.017	2.392	1.911	1.979	1.973	2.363	ns
	GCLK PLL	t <sub>su</sub>	1.031	0.972	1.716	1.933	2.159	2.034	1.836	1.950	2.060	1.952	1.906	ns
		t <sub>h</sub>	-0.760	-0.686	-1.258	-1.456	-1.631	-1.535	-1.331	-1.461	-1.524	-1.445	-1.397	ns
1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-1.038	-1.104	-1.656	-1.643	-1.847	-1.782	-2.155	-1.675	-1.718	-1.726	-2.120	ns
		t <sub>h</sub>	1.167	1.249	1.877	1.869	2.095	2.017	2.392	1.911	1.979	1.973	2.363	ns
	GCLK PLL	t <sub>su</sub>	1.031	0.972	1.716	1.933	2.159	2.034	1.836	1.950	2.060	1.952	1.906	ns
		t <sub>h</sub>	-0.760	-0.686	-1.258	-1.456	-1.631	-1.535	-1.331	-1.461	-1.524	-1.445	-1.397	ns
1.5-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.024	-1.092	-1.641	-1.633	-1.829	-1.764	-2.137	-1.664	-1.701	-1.709	-2.103	ns
		t <sub>h</sub>	1.153	1.237	1.863	1.859	2.077	1.999	2.374	1.900	1.962	1.956	2.346	ns
	GCLK PLL	t <sub>su</sub>	1.045	0.984	1.731	1.943	2.177	2.052	1.854	1.961	2.077	1.969	1.923	ns
		t <sub>h</sub>	-0.774	-0.698	-1.272	-1.466	-1.649	-1.553	-1.349	-1.472	-1.541	-1.462	-1.414	ns
1.5-V HSTL CLASS II	GCLK	t <sub>su</sub>	-1.024	-1.092	-1.641	-1.633	-1.829	-1.764	-2.137	-1.664	-1.701	-1.709	-2.103	ns
		t <sub>h</sub>	1.153	1.237	1.863	1.859	2.077	1.999	2.374	1.900	1.962	1.956	2.346	ns
	GCLK PLL	t <sub>su</sub>	1.045	0.984	1.731	1.943	2.177	2.052	1.854	1.961	2.077	1.969	1.923	ns
		t <sub>h</sub>	-0.774	-0.698	-1.272	-1.466	-1.649	-1.553	-1.349	-1.472	-1.541	-1.462	-1.414	ns
1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.015	-1.080	-1.632	-1.623	-1.813	-1.748	-2.121	-1.655	-1.685	-1.693	-2.087	ns
		t <sub>h</sub>	1.144	1.225	1.854	1.849	2.061	1.983	2.358	1.891	1.946	1.940	2.330	ns
	GCLK PLL	t <sub>su</sub>	1.054	0.996	1.740	1.953	2.193	2.068	1.870	1.970	2.093	1.985	1.939	ns
		t <sub>h</sub>	-0.783	-0.710	-1.281	-1.476	-1.665	-1.569	-1.365	-1.481	-1.557	-1.478	-1.430	ns
1.2-V HSTL CLASS II	GCLK	t <sub>su</sub>	-1.015	-1.080	-1.632	-1.623	-1.813	-1.748	-2.121	-1.655	-1.685	-1.693	-2.087	ns
		t <sub>h</sub>	1.144	1.225	1.854	1.849	2.061	1.983	2.358	1.891	1.946	1.940	2.330	ns
	GCLK PLL	t <sub>su</sub>	1.054	0.996	1.740	1.953	2.193	2.068	1.870	1.970	2.093	1.985	1.939	ns
		t <sub>h</sub>	-0.783	-0.710	-1.281	-1.476	-1.665	-1.569	-1.365	-1.481	-1.557	-1.478	-1.430	ns
3.0-V PCI	GCLK	t <sub>su</sub>	-1.100	-1.158	-1.727	-1.803	-1.987	-1.936	-2.285	-1.772	-1.926	-1.943	-2.385	ns
		t <sub>h</sub>	1.228	1.301	1.947	2.032	2.237	2.173	2.532	2.009	2.192	2.191	2.626	ns
	GCLK PLL	t <sub>su</sub>	0.952	0.972	1.730	1.821	1.836	1.720	1.639	1.836	1.841	1.739	1.695	ns
		t <sub>h</sub>	-0.682	-0.685	-1.270	-1.342	-1.309	-1.223	-1.130	-1.344	-1.302	-1.231	-1.182	ns
3.0-V PCI-X	GCLK	t <sub>su</sub>	-1.100	-1.158	-1.727	-1.803	-1.987	-1.936	-2.285	-1.772	-1.926	-1.943	-2.385	ns
		t <sub>h</sub>	1.228	1.301	1.947	2.032	2.237	2.173	2.532	2.009	2.192	2.191	2.626	ns
	GCLK PLL	t <sub>su</sub>	0.952	0.972	1.730	1.821	1.836	1.720	1.639	1.836	1.841	1.739	1.695	ns
		t <sub>h</sub>	-0.682	-0.685	-1.270	-1.342	-1.309	-1.223	-1.130	-1.344	-1.302	-1.231	-1.182	ns



Table 1-142 specifies EP3SE260 Column Pins Output Timing parameters for single-ended I/O standards.

**Table 1-142.** EP3SE260 Column Pins output Timing Parameters (Part 1 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.644	3.677	5.302	5.460	6.139	5.837	6.259	5.460	6.139	5.837	6.259	ns
		GCLK PLL	t <sub>co</sub>	4.087	4.076	5.937	6.144	6.701	6.529	7.188	6.144	6.701	6.529	7.188	ns
	8mA	GCLK	t <sub>co</sub>	3.577	3.610	5.193	5.349	5.969	5.724	6.146	5.349	5.969	5.724	6.146	ns
		GCLK PLL	t <sub>co</sub>	4.020	4.009	5.828	6.033	6.588	6.416	7.018	6.033	6.588	6.416	7.018	ns
	12mA	GCLK	t <sub>co</sub>	3.491	3.524	5.089	5.250	5.817	5.632	6.054	5.250	5.817	5.632	6.054	ns
		GCLK PLL	t <sub>co</sub>	3.934	3.923	5.724	5.934	6.496	6.324	6.866	5.934	6.496	6.324	6.866	ns
	16mA	GCLK	t <sub>co</sub>	3.484	3.517	5.072	5.222	5.792	5.591	6.013	5.222	5.792	5.591	6.013	ns
		GCLK PLL	t <sub>co</sub>	3.927	3.916	5.707	5.906	6.455	6.283	6.841	5.906	6.455	6.283	6.841	ns
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.650	3.683	5.306	5.465	6.153	5.844	6.266	5.465	6.153	5.844	6.266	ns
		GCLK PLL	t <sub>co</sub>	4.093	4.082	5.941	6.149	6.708	6.536	7.202	6.149	6.708	6.536	7.202	ns
	8mA	GCLK	t <sub>co</sub>	3.495	3.528	5.099	5.267	5.823	5.643	6.065	5.267	5.823	5.643	6.065	ns
		GCLK PLL	t <sub>co</sub>	3.938	3.927	5.734	5.951	6.507	6.335	6.872	5.951	6.507	6.335	6.872	ns
	12mA	GCLK	t <sub>co</sub>	3.502	3.535	5.093	5.246	5.792	5.617	6.039	5.246	5.792	5.617	6.039	ns
		GCLK PLL	t <sub>co</sub>	3.945	3.934	5.728	5.930	6.481	6.309	6.841	5.930	6.481	6.309	6.841	ns
	16mA	GCLK	t <sub>co</sub>	3.486	3.519	5.071	5.221	5.735	5.588	6.010	5.221	5.735	5.588	6.010	ns
		GCLK PLL	t <sub>co</sub>	3.929	3.918	5.706	5.905	6.452	6.280	6.784	5.905	6.452	6.280	6.784	ns
3.0-V LVTTL	4mA	GCLK	t <sub>co</sub>	3.608	3.641	5.269	5.428	6.104	5.804	6.226	5.428	6.104	5.804	6.226	ns
		GCLK PLL	t <sub>co</sub>	4.051	4.040	5.904	6.112	6.668	6.496	7.153	6.112	6.668	6.496	7.153	ns
	8mA	GCLK	t <sub>co</sub>	3.497	3.530	5.139	5.294	5.942	5.668	6.088	5.294	5.942	5.668	6.088	ns
		GCLK PLL	t <sub>co</sub>	3.940	3.929	5.774	5.978	6.531	6.360	6.990	5.978	6.531	6.360	6.990	ns
	12mA	GCLK	t <sub>co</sub>	3.461	3.494	5.076	5.225	5.840	5.594	6.014	5.225	5.840	5.594	6.014	ns
		GCLK PLL	t <sub>co</sub>	3.904	3.893	5.711	5.909	6.457	6.286	6.888	5.909	6.457	6.286	6.888	ns
	16mA	GCLK	t <sub>co</sub>	3.443	3.476	5.047	5.197	5.790	5.564	5.986	5.197	5.790	5.564	5.986	ns
		GCLK PLL	t <sub>co</sub>	3.886	3.875	5.682	5.881	6.428	6.256	6.838	5.881	6.428	6.256	6.838	ns

**Table 1-142.** EP3SE260 Column Pins output Timing Parameters (Part 2 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.522	3.555	5.173	5.328	5.996	5.703	6.123	5.328	5.996	5.703	6.123	ns
		GCLK PLL	t <sub>co</sub>	3.965	3.954	5.808	6.012	6.566	6.395	7.044	6.012	6.566	6.395	7.044	ns
	8mA	GCLK	t <sub>co</sub>	3.443	3.476	5.049	5.199	5.814	5.568	5.988	5.199	5.814	5.568	5.988	ns
		GCLK PLL	t <sub>co</sub>	3.886	3.875	5.684	5.883	6.431	6.260	6.862	5.883	6.431	6.260	6.862	ns
	12mA	GCLK	t <sub>co</sub>	3.438	3.471	5.042	5.192	5.746	5.558	5.980	5.192	5.746	5.558	5.980	ns
		GCLK PLL	t <sub>co</sub>	3.881	3.870	5.677	5.876	6.422	6.250	6.795	5.876	6.422	6.250	6.795	ns
	16mA	GCLK	t <sub>co</sub>	3.429	3.462	5.028	5.177	5.744	5.543	5.965	5.177	5.744	5.543	5.965	ns
		GCLK PLL	t <sub>co</sub>	3.872	3.861	5.663	5.861	6.407	6.235	6.792	5.861	6.407	6.235	6.792	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.644	3.677	5.380	5.555	6.278	5.950	6.370	5.555	6.278	5.950	6.370	ns
		GCLK PLL	t <sub>co</sub>	4.087	4.076	6.015	6.239	6.813	6.642	7.326	6.239	6.813	6.642	7.326	ns
	8mA	GCLK	t <sub>co</sub>	3.544	3.577	5.261	5.429	6.081	5.818	6.238	5.429	6.081	5.818	6.238	ns
		GCLK PLL	t <sub>co</sub>	3.987	3.976	5.896	6.113	6.681	6.510	7.129	6.113	6.681	6.510	7.129	ns
	12mA	GCLK	t <sub>co</sub>	3.500	3.533	5.174	5.338	5.941	5.721	6.143	5.338	5.941	5.721	6.143	ns
		GCLK PLL	t <sub>co</sub>	3.943	3.932	5.809	6.022	6.585	6.413	6.989	6.022	6.585	6.413	6.989	ns
	16mA	GCLK	t <sub>co</sub>	3.462	3.495	5.135	5.296	5.891	5.678	6.100	5.296	5.891	5.678	6.100	ns
		GCLK PLL	t <sub>co</sub>	3.905	3.894	5.770	5.980	6.542	6.370	6.939	5.980	6.542	6.370	6.939	ns

**Table 1-142.** EP3SE260 Column Pins output Timing Parameters (Part 3 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.8 V	2mA	GCLK	t <sub>co</sub>	3.835	3.868	5.701	5.915	6.815	6.353	6.775	5.915	6.815	6.353	6.775	ns
		GCLK PLL	t <sub>co</sub>	4.278	4.267	6.336	6.599	7.217	7.045	7.864	6.599	7.217	7.045	7.864	ns
	4mA	GCLK	t <sub>co</sub>	3.654	3.687	5.422	5.606	6.354	6.007	6.427	5.606	6.354	6.007	6.427	ns
		GCLK PLL	t <sub>co</sub>	4.097	4.086	6.057	6.290	6.870	6.699	7.402	6.290	6.870	6.699	7.402	ns
	6mA	GCLK	t <sub>co</sub>	3.572	3.605	5.315	5.491	6.180	5.895	6.317	5.491	6.180	5.895	6.317	ns
		GCLK PLL	t <sub>co</sub>	4.015	4.004	5.950	6.175	6.759	6.587	7.229	6.175	6.759	6.587	7.229	ns
	8mA	GCLK	t <sub>co</sub>	3.552	3.585	5.257	5.437	6.068	5.829	6.251	5.437	6.068	5.829	6.251	ns
		GCLK PLL	t <sub>co</sub>	3.995	3.984	5.892	6.121	6.693	6.521	7.117	6.121	6.693	6.521	7.117	ns
	10mA	GCLK	t <sub>co</sub>	3.489	3.522	5.196	5.362	5.954	5.748	6.170	5.362	5.954	5.748	6.170	ns
		GCLK PLL	t <sub>co</sub>	3.932	3.921	5.831	6.046	6.612	6.440	7.003	6.046	6.612	6.440	7.003	ns
	12mA	GCLK	t <sub>co</sub>	3.471	3.504	5.175	5.341	5.916	5.725	6.147	5.341	5.916	5.725	6.147	ns
		GCLK PLL	t <sub>co</sub>	3.914	3.903	5.810	6.025	6.589	6.417	6.965	6.025	6.589	6.417	6.965	ns
1.5 V	2mA	GCLK	t <sub>co</sub>	3.781	3.814	5.630	5.847	6.732	6.291	6.713	5.847	6.732	6.291	6.713	ns
		GCLK PLL	t <sub>co</sub>	4.224	4.213	6.265	6.531	7.155	6.983	7.781	6.531	7.155	6.983	7.781	ns
	4mA	GCLK	t <sub>co</sub>	3.569	3.602	5.311	5.491	6.176	5.899	6.321	5.491	6.176	5.899	6.321	ns
		GCLK PLL	t <sub>co</sub>	4.012	4.001	5.946	6.175	6.763	6.591	7.225	6.175	6.763	6.591	7.225	ns
	6mA	GCLK	t <sub>co</sub>	3.544	3.577	5.244	5.431	6.059	5.832	6.254	5.431	6.059	5.832	6.254	ns
		GCLK PLL	t <sub>co</sub>	3.987	3.976	5.879	6.115	6.696	6.524	7.108	6.115	6.696	6.524	7.108	ns
	8mA	GCLK	t <sub>co</sub>	3.533	3.566	5.227	5.406	6.027	5.812	6.234	5.406	6.027	5.812	6.234	ns
		GCLK PLL	t <sub>co</sub>	3.976	3.965	5.862	6.090	6.676	6.504	7.076	6.090	6.676	6.504	7.076	ns
	10mA	GCLK	t <sub>co</sub>	3.478	3.511	5.189	5.355	5.945	5.742	6.164	5.355	5.945	5.742	6.164	ns
		GCLK PLL	t <sub>co</sub>	3.921	3.910	5.824	6.039	6.606	6.434	6.994	6.039	6.606	6.434	6.994	ns
	12mA	GCLK	t <sub>co</sub>	3.473	3.506	5.172	5.344	5.903	5.731	6.153	5.344	5.903	5.731	6.153	ns
		GCLK PLL	t <sub>co</sub>	3.916	3.905	5.807	6.028	6.595	6.423	6.952	6.028	6.595	6.423	6.952	ns

**Table 1-142.** EP3SE260 Column Pins output Timing Parameters (Part 4 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.2 V	2mA	GCLK	t <sub>co</sub>	3.697	3.730	5.556	5.783	6.652	6.235	6.657	5.783	6.652	6.235	6.657	ns
		GCLK PLL	t <sub>co</sub>	4.140	4.129	6.191	6.467	7.099	6.927	7.701	6.467	7.099	6.927	7.701	ns
	4mA	GCLK	t <sub>co</sub>	3.574	3.607	5.330	5.521	6.223	5.949	6.371	5.521	6.223	5.949	6.371	ns
		GCLK PLL	t <sub>co</sub>	4.017	4.006	5.965	6.205	6.813	6.641	7.272	6.205	6.813	6.641	7.272	ns
	6mA	GCLK	t <sub>co</sub>	3.536	3.569	5.238	5.432	6.068	5.836	6.258	5.432	6.068	5.836	6.258	ns
		GCLK PLL	t <sub>co</sub>	3.979	3.968	5.873	6.116	6.700	6.528	7.117	6.116	6.700	6.528	7.117	ns
	8mA	GCLK	t <sub>co</sub>	3.489	3.522	5.210	5.383	5.977	5.780	6.202	5.383	5.977	5.780	6.202	ns
		GCLK PLL	t <sub>co</sub>	3.932	3.921	5.845	6.067	6.644	6.472	7.026	6.067	6.644	6.472	7.026	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.489	3.522	5.167	5.330	5.925	5.711	6.133	5.330	5.925	5.711	6.133	ns
		GCLK PLL	t <sub>co</sub>	3.932	3.921	5.802	6.014	6.575	6.403	6.974	6.014	6.575	6.403	6.974	ns
	10mA	GCLK	t <sub>co</sub>	3.486	3.519	5.164	5.327	5.930	5.707	6.129	5.327	5.930	5.707	6.129	ns
		GCLK PLL	t <sub>co</sub>	3.929	3.918	5.799	6.011	6.571	6.399	6.978	6.011	6.571	6.399	6.978	ns
	12mA	GCLK	t <sub>co</sub>	3.484	3.517	5.164	5.328	5.911	5.708	6.130	5.328	5.911	5.708	6.130	ns
		GCLK PLL	t <sub>co</sub>	3.927	3.916	5.799	6.012	6.572	6.400	6.960	6.012	6.572	6.400	6.960	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.475	3.508	5.149	5.312	5.877	5.693	6.115	5.312	5.877	5.693	6.115	ns
		GCLK PLL	t <sub>co</sub>	3.918	3.907	5.784	5.996	6.557	6.385	6.926	5.996	6.557	6.385	6.926	ns
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.496	3.529	5.179	5.344	5.952	5.727	6.149	5.344	5.952	5.727	6.149	ns
		GCLK PLL	t <sub>co</sub>	3.939	3.928	5.814	6.028	6.591	6.419	7.000	6.028	6.591	6.419	7.000	ns
	6mA	GCLK	t <sub>co</sub>	3.492	3.525	5.177	5.342	5.942	5.725	6.147	5.342	5.942	5.725	6.147	ns
		GCLK PLL	t <sub>co</sub>	3.935	3.924	5.812	6.026	6.589	6.417	6.991	6.026	6.589	6.417	6.991	ns
	8mA	GCLK	t <sub>co</sub>	3.481	3.514	5.167	5.333	5.934	5.716	6.138	5.333	5.934	5.716	6.138	ns
		GCLK PLL	t <sub>co</sub>	3.924	3.913	5.802	6.017	6.580	6.408	6.982	6.017	6.580	6.408	6.982	ns
	10mA	GCLK	t <sub>co</sub>	3.470	3.503	5.154	5.320	5.896	5.703	6.125	5.320	5.896	5.703	6.125	ns
		GCLK PLL	t <sub>co</sub>	3.913	3.902	5.789	6.004	6.567	6.395	6.945	6.004	6.567	6.395	6.945	ns
	12mA	GCLK	t <sub>co</sub>	3.470	3.503	5.154	5.320	5.896	5.703	6.125	5.320	5.896	5.703	6.125	ns
		GCLK PLL	t <sub>co</sub>	3.913	3.902	5.789	6.004	6.567	6.395	6.945	6.004	6.567	6.395	6.945	ns

**Table 1-142.** EP3SE260 Column Pins output Timing Parameters (Part 5 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.476	3.509	5.153	5.317	5.896	5.698	6.120	5.317	5.896	5.698	6.120	ns	
		GCLK PLL	t <sub>co</sub>	3.919	3.908	5.788	6.001	6.562	6.390	6.945	6.001	6.562	6.390	6.945	ns	
	16mA	GCLK	t <sub>co</sub>	3.479	3.512	5.161	5.326	5.901	5.710	6.132	5.326	5.901	5.710	6.132	ns	
		GCLK PLL	t <sub>co</sub>	3.922	3.911	5.796	6.010	6.574	6.402	6.950	6.010	6.574	6.402	6.950	ns	
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.500	3.533	5.188	5.356	5.967	5.740	6.162	5.356	5.967	5.740	6.162	ns	
		GCLK PLL	t <sub>co</sub>	3.943	3.932	5.823	6.040	6.604	6.432	7.016	6.040	6.604	6.432	7.016	ns	
	6mA	GCLK	t <sub>co</sub>	3.486	3.519	5.178	5.346	5.941	5.731	6.153	5.346	5.941	5.731	6.153	ns	
		GCLK PLL	t <sub>co</sub>	3.929	3.918	5.813	6.030	6.595	6.423	6.990	6.030	6.595	6.423	6.990	ns	
	8mA	GCLK	t <sub>co</sub>	3.475	3.508	5.164	5.332	5.917	5.717	6.139	5.332	5.917	5.717	6.139	ns	
		GCLK PLL	t <sub>co</sub>	3.918	3.907	5.799	6.016	6.581	6.409	6.966	6.016	6.581	6.409	6.966	ns	
	10mA	GCLK	t <sub>co</sub>	3.474	3.507	5.167	5.335	5.906	5.721	6.143	5.335	5.906	5.721	6.143	ns	
		GCLK PLL	t <sub>co</sub>	3.917	3.906	5.802	6.019	6.585	6.413	6.955	6.019	6.585	6.413	6.955	ns	
	12mA	GCLK	t <sub>co</sub>	3.471	3.504	5.162	5.330	5.896	5.715	6.137	5.330	5.896	5.715	6.137	ns	
		GCLK PLL	t <sub>co</sub>	3.914	3.903	5.797	6.014	6.579	6.407	6.945	6.014	6.579	6.407	6.945	ns	
	SSTL-15 CLASS II	8mA	GCLK	t <sub>co</sub>	3.473	3.506	5.151	5.316	5.896	5.698	6.120	5.316	5.896	5.698	6.120	ns
			GCLK PLL	t <sub>co</sub>	3.916	3.905	5.786	6.000	6.562	6.390	6.945	6.000	6.562	6.390	6.945	ns
16mA		GCLK	t <sub>co</sub>	3.476	3.509	5.158	5.325	5.902	5.709	6.131	5.325	5.902	5.709	6.131	ns	
		GCLK PLL	t <sub>co</sub>	3.919	3.908	5.793	6.009	6.573	6.401	6.951	6.009	6.573	6.401	6.951	ns	

**Table 1-142.** EP3SE260 Column Pins output Timing Parameters (Part 6 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.483	3.516	5.153	5.316	5.910	5.696	6.118	5.316	5.910	5.696	6.118	ns
		GCLK PLL	t <sub>co</sub>	3.926	3.915	5.788	6.000	6.560	6.388	6.959	6.000	6.560	6.388	6.959	ns
	6mA	GCLK	t <sub>co</sub>	3.476	3.509	5.151	5.314	5.906	5.695	6.117	5.314	5.906	5.695	6.117	ns
		GCLK PLL	t <sub>co</sub>	3.919	3.908	5.786	5.998	6.559	6.387	6.954	5.998	6.559	6.387	6.954	ns
	8mA	GCLK	t <sub>co</sub>	3.468	3.501	5.143	5.307	5.879	5.688	6.110	5.307	5.879	5.688	6.110	ns
		GCLK PLL	t <sub>co</sub>	3.911	3.900	5.778	5.991	6.552	6.380	6.928	5.991	6.552	6.380	6.928	ns
	10mA	GCLK	t <sub>co</sub>	3.471	3.504	5.146	5.310	5.882	5.692	6.114	5.310	5.882	5.692	6.114	ns
		GCLK PLL	t <sub>co</sub>	3.914	3.903	5.781	5.994	6.556	6.384	6.931	5.994	6.556	6.384	6.931	ns
	12mA	GCLK	t <sub>co</sub>	3.468	3.501	5.149	5.314	5.881	5.696	6.118	5.314	5.881	5.696	6.118	ns
		GCLK PLL	t <sub>co</sub>	3.911	3.900	5.784	5.998	6.560	6.388	6.929	5.998	6.560	6.388	6.929	ns
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.476	3.509	5.148	5.311	5.878	5.692	6.114	5.311	5.878	5.692	6.114	ns
		GCLK PLL	t <sub>co</sub>	3.919	3.908	5.783	5.995	6.556	6.384	6.927	5.995	6.556	6.384	6.927	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.488	3.521	5.161	5.326	5.926	5.707	6.129	5.326	5.926	5.707	6.129	ns
		GCLK PLL	t <sub>co</sub>	3.931	3.920	5.796	6.010	6.571	6.399	6.975	6.010	6.571	6.399	6.975	ns
	6mA	GCLK	t <sub>co</sub>	3.484	3.517	5.162	5.327	5.915	5.710	6.132	5.327	5.915	5.710	6.132	ns
		GCLK PLL	t <sub>co</sub>	3.927	3.916	5.797	6.011	6.574	6.402	6.964	6.011	6.574	6.402	6.964	ns
	8mA	GCLK	t <sub>co</sub>	3.480	3.513	5.158	5.323	5.909	5.705	6.127	5.323	5.909	5.705	6.127	ns
		GCLK PLL	t <sub>co</sub>	3.923	3.912	5.793	6.007	6.569	6.397	6.958	6.007	6.569	6.397	6.958	ns
	10mA	GCLK	t <sub>co</sub>	3.473	3.506	5.151	5.316	5.896	5.698	6.120	5.316	5.896	5.698	6.120	ns
		GCLK PLL	t <sub>co</sub>	3.916	3.905	5.786	6.000	6.562	6.390	6.945	6.000	6.562	6.390	6.945	ns
	12mA	GCLK	t <sub>co</sub>	3.474	3.507	5.158	5.324	5.892	5.708	6.130	5.324	5.892	5.708	6.130	ns
		GCLK PLL	t <sub>co</sub>	3.917	3.906	5.793	6.008	6.572	6.400	6.941	6.008	6.572	6.400	6.941	ns
1.5-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.472	3.505	5.139	5.302	5.871	5.682	6.104	5.302	5.871	5.682	6.104	ns
		GCLK PLL	t <sub>co</sub>	3.915	3.904	5.774	5.986	6.546	6.374	6.920	5.986	6.546	6.374	6.920	ns

**Table 1-142.** EP3SE260 Column Pins output Timing Parameters (Part 7 of 7) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.491	3.524	5.175	5.343	5.945	5.728	6.150	5.343	5.945	5.728	6.150	ns
		GCLK PLL	t <sub>co</sub>	3.934	3.923	5.810	6.027	6.592	6.420	6.994	6.027	6.592	6.420	6.994	ns
	6mA	GCLK	t <sub>co</sub>	3.483	3.516	5.166	5.334	5.928	5.719	6.141	5.334	5.928	5.719	6.141	ns
		GCLK PLL	t <sub>co</sub>	3.926	3.915	5.801	6.018	6.583	6.411	6.977	6.018	6.583	6.411	6.977	ns
	8mA	GCLK	t <sub>co</sub>	3.484	3.517	5.174	5.342	5.924	5.728	6.150	5.342	5.924	5.728	6.150	ns
		GCLK PLL	t <sub>co</sub>	3.927	3.916	5.809	6.026	6.592	6.420	6.973	6.026	6.592	6.420	6.973	ns
	10mA	GCLK	t <sub>co</sub>	3.473	3.506	5.161	5.329	5.901	5.714	6.136	5.329	5.901	5.714	6.136	ns
		GCLK PLL	t <sub>co</sub>	3.916	3.905	5.796	6.013	6.578	6.406	6.950	6.013	6.578	6.406	6.950	ns
	12mA	GCLK	t <sub>co</sub>	3.473	3.506	5.161	5.329	5.902	5.715	6.137	5.329	5.902	5.715	6.137	ns
		GCLK PLL	t <sub>co</sub>	3.916	3.905	5.796	6.013	6.579	6.407	6.951	6.013	6.579	6.407	6.951	ns
1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.494	3.527	5.177	5.344	5.980	5.728	6.150	5.344	5.980	5.728	6.150	ns
		GCLK PLL	t <sub>co</sub>	3.937	3.926	5.812	6.028	6.592	6.420	7.029	6.028	6.592	6.420	7.029	ns
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.597	3.630	5.222	5.378	5.955	5.753	6.175	5.378	5.955	5.753	6.175	ns
		GCLK PLL	t <sub>co</sub>	4.040	4.029	5.857	6.062	6.617	6.445	7.004	6.062	6.617	6.445	7.004	ns
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.597	3.630	5.222	5.378	5.955	5.753	6.175	5.378	5.955	5.753	6.175	ns
		GCLK PLL	t <sub>co</sub>	4.040	4.029	5.857	6.062	6.617	6.445	7.004	6.062	6.617	6.445	7.004	ns

Table 1-143 specifies EP3SE260 Row Pins Output Timing parameters for single-ended I/O standards.

**Table 1-143.** EP3SE260 Row Pins output Timing Parameters (Part 1 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
3.3-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.420	3.732	5.381	5.559	6.094	5.854	6.315	5.660	6.225	5.980	6.401	ns
		GCLK PLL	t <sub>co</sub>	1.573	1.768	2.215	2.308	2.461	2.525	2.523	2.414	2.594	2.634	2.537	ns
	8mA	GCLK	t <sub>co</sub>	3.327	3.627	5.251	5.421	5.949	5.740	6.170	5.519	6.076	5.865	6.252	ns
		GCLK PLL	t <sub>co</sub>	1.480	1.663	2.085	2.170	2.316	2.380	2.378	2.273	2.445	2.485	2.388	ns
	12mA	GCLK	t <sub>co</sub>	3.230	3.521	5.132	5.298	5.821	5.644	6.042	5.392	5.944	5.765	6.120	ns
		GCLK PLL	t <sub>co</sub>	1.381	1.557	1.966	2.047	2.215	2.252	2.254	2.146	2.313	2.353	2.256	ns

**Table 1-143.** EP3SE260 Row Pins output Timing Parameters (Part 2 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
3.3-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.430	3.736	5.389	5.564	6.098	5.863	6.319	5.666	6.229	5.992	6.405	ns
		GCLK PLL	t <sub>co</sub>	1.583	1.772	2.223	2.313	2.465	2.529	2.527	2.420	2.598	2.638	2.541	ns
	8mA	GCLK	t <sub>co</sub>	3.234	3.527	5.138	5.304	5.827	5.654	6.048	5.398	5.951	5.774	6.127	ns
		GCLK PLL	t <sub>co</sub>	1.385	1.563	1.972	2.053	2.225	2.258	2.264	2.152	2.320	2.360	2.263	ns
3.0-V LVTTTL	4mA	GCLK	t <sub>co</sub>	3.374	3.678	5.333	5.512	6.050	5.820	6.271	5.617	6.183	5.946	6.359	ns
		GCLK PLL	t <sub>co</sub>	1.527	1.714	2.167	2.261	2.417	2.481	2.479	2.371	2.552	2.592	2.495	ns
	8mA	GCLK	t <sub>co</sub>	3.249	3.551	5.181	5.353	5.886	5.675	6.107	5.455	6.019	5.800	6.194	ns
		GCLK PLL	t <sub>co</sub>	1.402	1.587	2.015	2.102	2.253	2.317	2.315	2.209	2.388	2.427	2.330	ns
	12mA	GCLK	t <sub>co</sub>	3.210	3.500	5.099	5.270	5.798	5.605	6.019	5.369	5.926	5.727	6.101	ns
		GCLK PLL	t <sub>co</sub>	1.363	1.536	1.933	2.019	2.176	2.229	2.227	2.123	2.295	2.334	2.237	ns
3.0-V LVCMOS	4mA	GCLK	t <sub>co</sub>	3.288	3.597	5.228	5.405	5.940	5.711	6.161	5.509	6.072	5.836	6.247	ns
		GCLK PLL	t <sub>co</sub>	1.441	1.633	2.062	2.154	2.307	2.371	2.369	2.263	2.441	2.480	2.383	ns
	8mA	GCLK	t <sub>co</sub>	3.188	3.478	5.064	5.231	5.759	5.577	5.980	5.329	5.886	5.698	6.061	ns
		GCLK PLL	t <sub>co</sub>	1.341	1.514	1.898	1.980	2.148	2.190	2.188	2.083	2.255	2.294	2.197	ns
2.5 V	4mA	GCLK	t <sub>co</sub>	3.400	3.714	5.466	5.666	6.222	5.965	6.443	5.777	6.362	6.098	6.537	ns
		GCLK PLL	t <sub>co</sub>	1.553	1.750	2.300	2.415	2.589	2.653	2.651	2.531	2.731	2.770	2.673	ns
	8mA	GCLK	t <sub>co</sub>	3.290	3.616	5.311	5.503	6.052	5.823	6.273	5.610	6.188	5.953	6.363	ns
		GCLK PLL	t <sub>co</sub>	1.443	1.652	2.145	2.252	2.419	2.483	2.481	2.364	2.557	2.596	2.499	ns
	12mA	GCLK	t <sub>co</sub>	3.244	3.539	5.200	5.384	5.926	5.732	6.147	5.487	6.058	5.859	6.233	ns
		GCLK PLL	t <sub>co</sub>	1.397	1.575	2.034	2.133	2.303	2.357	2.355	2.241	2.427	2.466	2.369	ns
1.8 V	2mA	GCLK	t <sub>co</sub>	3.649	3.936	5.824	5.921	6.697	6.388	6.918	6.235	6.846	6.494	7.022	ns
		GCLK PLL	t <sub>co</sub>	1.786	1.997	2.685	2.844	3.100	3.128	3.144	2.968	3.191	3.255	3.133	ns
	4mA	GCLK	t <sub>co</sub>	3.424	3.734	5.498	5.595	6.292	6.028	6.513	5.870	6.440	6.132	6.615	ns
		GCLK PLL	t <sub>co</sub>	1.561	1.795	2.359	2.475	2.695	2.723	2.739	2.603	2.785	2.848	2.726	ns
	6mA	GCLK	t <sub>co</sub>	3.359	3.632	5.344	5.490	6.133	5.928	6.354	5.702	6.267	6.027	6.443	ns
		GCLK PLL	t <sub>co</sub>	1.496	1.693	2.205	2.325	2.536	2.564	2.580	2.435	2.612	2.676	2.554	ns
	8mA	GCLK	t <sub>co</sub>	3.299	3.558	5.267	5.437	6.036	5.862	6.257	5.607	6.173	5.955	6.349	ns
		GCLK PLL	t <sub>co</sub>	1.436	1.619	2.128	2.231	2.439	2.467	2.483	2.340	2.531	2.582	2.460	ns



**Table 1-143.** EP3SE260 Row Pins output Timing Parameters (Part 3 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.5 V	2mA	GCLK	t <sub>co</sub>	3.560	3.854	5.734	5.848	6.625	6.325	6.846	6.142	6.770	6.429	6.946	ns
		GCLK PLL	t <sub>co</sub>	1.697	1.915	2.595	2.757	3.028	3.056	3.072	2.875	3.115	3.179	3.057	ns
	4mA	GCLK	t <sub>co</sub>	3.318	3.596	5.329	5.490	6.134	5.931	6.355	5.696	6.266	6.028	6.442	ns
		GCLK PLL	t <sub>co</sub>	1.455	1.657	2.190	2.320	2.537	2.565	2.581	2.429	2.611	2.675	2.553	ns
	6mA	GCLK	t <sub>co</sub>	3.291	3.549	5.256	5.429	6.028	5.862	6.249	5.598	6.161	5.955	6.337	ns
		GCLK PLL	t <sub>co</sub>	1.428	1.610	2.117	2.224	2.431	2.459	2.475	2.331	2.531	2.570	2.457	ns
	8mA	GCLK	t <sub>co</sub>	3.282	3.540	5.234	5.404	6.009	5.843	6.230	5.580	6.139	5.936	6.315	ns
		GCLK PLL	t <sub>co</sub>	1.419	1.601	2.095	2.206	2.412	2.440	2.456	2.313	2.512	2.548	2.438	ns
1.2 V	2mA	GCLK	t <sub>co</sub>	3.503	3.779	5.644	5.780	6.550	6.264	6.771	6.054	6.686	6.360	6.862	ns
		GCLK PLL	t <sub>co</sub>	1.640	1.840	2.505	2.671	2.953	2.981	2.997	2.787	3.031	3.095	2.973	ns
	4mA	GCLK	t <sub>co</sub>	3.323	3.590	5.351	5.518	6.175	5.979	6.396	5.721	6.308	6.072	6.484	ns
		GCLK PLL	t <sub>co</sub>	1.460	1.651	2.212	2.348	2.578	2.606	2.622	2.454	2.653	2.717	2.595	ns
SSTL-2 CLASS I	8mA	GCLK	t <sub>co</sub>	3.229	3.525	5.177	5.356	5.894	5.722	6.115	5.454	6.020	5.845	6.196	ns
		GCLK PLL	t <sub>co</sub>	1.382	1.561	2.011	2.105	2.293	2.325	2.332	2.208	2.389	2.429	2.332	ns
	12mA	GCLK	t <sub>co</sub>	3.219	3.513	5.169	5.348	5.886	5.720	6.107	5.446	6.013	5.844	6.189	ns
		GCLK PLL	t <sub>co</sub>	1.370	1.549	2.003	2.097	2.291	2.317	2.330	2.200	2.382	2.422	2.325	ns
SSTL-2 CLASS II	16mA	GCLK	t <sub>co</sub>	3.210	3.495	5.144	5.323	5.859	5.703	6.080	5.426	5.986	5.826	6.162	ns
		GCLK PLL	t <sub>co</sub>	1.354	1.531	1.978	2.072	2.274	2.290	2.313	2.174	2.355	2.395	2.298	ns
SSTL-18 CLASS I	4mA	GCLK	t <sub>co</sub>	3.260	3.514	5.162	5.341	5.910	5.757	6.131	5.488	6.036	5.846	6.212	ns
		GCLK PLL	t <sub>co</sub>	1.397	1.575	2.023	2.119	2.313	2.341	2.357	2.221	2.422	2.445	2.348	ns
	6mA	GCLK	t <sub>co</sub>	3.245	3.500	5.159	5.340	5.908	5.756	6.129	5.486	6.034	5.844	6.210	ns
		GCLK PLL	t <sub>co</sub>	1.382	1.561	2.020	2.117	2.311	2.339	2.355	2.219	2.420	2.443	2.346	ns
	8mA	GCLK	t <sub>co</sub>	3.234	3.488	5.142	5.330	5.891	5.746	6.112	5.469	6.018	5.835	6.194	ns
		GCLK PLL	t <sub>co</sub>	1.371	1.549	2.003	2.100	2.294	2.322	2.338	2.202	2.411	2.427	2.337	ns
	10mA	GCLK	t <sub>co</sub>	3.210	3.465	5.126	5.317	5.876	5.733	6.097	5.454	6.003	5.823	6.179	ns
		GCLK PLL	t <sub>co</sub>	1.347	1.532	1.987	2.084	2.279	2.307	2.323	2.187	2.399	2.412	2.325	ns
	12mA	GCLK	t <sub>co</sub>	3.210	3.464	5.125	5.317	5.875	5.733	6.096	5.453	6.002	5.823	6.178	ns
		GCLK PLL	t <sub>co</sub>	1.347	1.531	1.986	2.083	2.278	2.306	2.322	2.186	2.399	2.411	2.325	ns

**Table 1-143.** EP3SE260 Row Pins output Timing Parameters (Part 4 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
SSTL-18 CLASS II	8mA	GCLK	t <sub>co</sub>	3.220	3.473	5.123	5.314	5.869	5.728	6.090	5.448	5.995	5.817	6.171	ns
		GCLK PLL	t <sub>co</sub>	1.357	1.538	1.984	2.079	2.272	2.300	2.316	2.181	2.393	2.404	2.319	ns
	16mA	GCLK	t <sub>co</sub>	3.214	3.468	5.122	5.322	5.879	5.738	6.092	5.450	5.999	5.828	6.175	ns
		GCLK PLL	t <sub>co</sub>	1.351	1.541	1.989	2.080	2.274	2.302	2.318	2.183	2.404	2.413	2.330	ns
SSTL-15 CLASS I	4mA	GCLK	t <sub>co</sub>	3.256	3.510	5.173	5.352	5.927	5.770	6.148	5.501	6.052	5.858	6.228	ns
		GCLK PLL	t <sub>co</sub>	1.393	1.571	2.034	2.133	2.330	2.358	2.374	2.234	2.434	2.461	2.360	ns
	6mA	GCLK	t <sub>co</sub>	3.233	3.488	5.155	5.342	5.910	5.760	6.131	5.485	6.036	5.849	6.212	ns
		GCLK PLL	t <sub>co</sub>	1.370	1.549	2.016	2.116	2.313	2.341	2.357	2.218	2.425	2.445	2.351	ns
	8mA	GCLK	t <sub>co</sub>	3.216	3.471	5.138	5.329	5.892	5.747	6.113	5.467	6.019	5.836	6.195	ns
		GCLK PLL	t <sub>co</sub>	1.353	1.536	1.999	2.098	2.295	2.323	2.339	2.200	2.412	2.428	2.338	ns
1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.235	3.486	5.129	5.312	5.872	5.726	6.093	5.452	5.998	5.814	6.174	ns
		GCLK PLL	t <sub>co</sub>	1.372	1.547	1.990	2.084	2.275	2.303	2.319	2.185	2.390	2.407	2.316	ns
	6mA	GCLK	t <sub>co</sub>	3.223	3.474	5.120	5.311	5.866	5.725	6.085	5.444	5.991	5.814	6.167	ns
		GCLK PLL	t <sub>co</sub>	1.360	1.538	1.981	2.076	2.267	2.295	2.311	2.177	2.390	2.400	2.316	ns
	8mA	GCLK	t <sub>co</sub>	3.210	3.462	5.111	5.304	5.859	5.718	6.077	5.436	5.983	5.807	6.159	ns
		GCLK PLL	t <sub>co</sub>	1.347	1.530	1.973	2.067	2.259	2.287	2.303	2.169	2.383	2.392	2.309	ns
	10mA	GCLK	t <sub>co</sub>	3.212	3.464	5.114	5.307	5.863	5.722	6.080	5.439	5.986	5.810	6.162	ns
		GCLK PLL	t <sub>co</sub>	1.349	1.532	1.976	2.070	2.262	2.290	2.306	2.172	2.386	2.395	2.312	ns
12mA	GCLK	t <sub>co</sub>	3.205	3.459	5.112	5.310	5.866	5.725	6.080	5.439	5.987	5.815	6.163	ns	
	GCLK PLL	t <sub>co</sub>	1.342	1.529	1.978	2.069	2.262	2.290	2.306	2.172	2.391	2.400	2.317	ns	
1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.211	3.463	5.107	5.307	5.862	5.721	6.071	5.430	5.976	5.809	6.152	ns
		GCLK PLL	t <sub>co</sub>	1.348	1.537	1.976	2.061	2.253	2.281	2.297	2.163	2.385	2.394	2.311	ns
1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.242	3.493	5.140	5.322	5.887	5.737	6.108	5.464	6.012	5.825	6.188	ns
		GCLK PLL	t <sub>co</sub>	1.379	1.554	2.001	2.097	2.290	2.318	2.334	2.197	2.401	2.421	2.327	ns
	6mA	GCLK	t <sub>co</sub>	3.230	3.483	5.136	5.324	5.883	5.739	6.104	5.461	6.009	5.828	6.185	ns
		GCLK PLL	t <sub>co</sub>	1.367	1.545	1.997	2.093	2.286	2.314	2.330	2.194	2.404	2.418	2.330	ns
	8mA	GCLK	t <sub>co</sub>	3.226	3.478	5.130	5.319	5.877	5.734	6.098	5.455	6.003	5.822	6.179	ns
		GCLK PLL	t <sub>co</sub>	1.363	1.541	1.991	2.087	2.280	2.308	2.324	2.188	2.398	2.412	2.324	ns

**Table 1-143.** EP3SE260 Row Pins output Timing Parameters (Part 5 of 5) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.241	3.492	5.151	5.338	5.905	5.756	6.126	5.478	6.029	5.844	6.205	ns
			GCLK PLL	t <sub>co</sub>	1.378	1.553	2.012	2.111	2.308	2.336	2.352	2.211	2.420	2.438	2.346
	6mA	GCLK	t <sub>co</sub>	3.229	3.480	5.140	5.329	5.893	5.747	6.114	5.467	6.018	5.835	6.194	ns
			GCLK PLL	t <sub>co</sub>	1.366	1.544	2.001	2.099	2.296	2.324	2.340	2.200	2.411	2.427	2.337
	8mA	GCLK	t <sub>co</sub>	3.225	3.478	5.144	5.337	5.899	5.756	6.120	5.473	6.025	5.845	6.201	ns
			GCLK PLL	t <sub>co</sub>	1.362	1.544	2.005	2.104	2.302	2.330	2.346	2.206	2.421	2.434	2.347
3.0-V PCI	—	GCLK	t <sub>co</sub>	3.330	3.608	5.202	5.374	5.903	5.762	6.124	5.492	6.032	5.887	6.208	ns
			GCLK PLL	t <sub>co</sub>	1.468	1.644	2.036	2.123	2.333	2.334	2.372	2.230	2.401	2.441	2.344
3.0-V PCI-X	—	GCLK	t <sub>co</sub>	3.330	3.608	5.202	5.374	5.903	5.762	6.124	5.492	6.032	5.887	6.208	ns
			GCLK PLL	t <sub>co</sub>	1.468	1.644	2.036	2.123	2.333	2.334	2.372	2.230	2.401	2.441	2.344

Table 1-144 through Table 1-147 show the maximum I/O timing parameters for EP3SE260 devices for differential I/O standards.

Table 1-144 specifies EP3SE260 column pins input timing parameters for differential I/O standards.

**Table 1-144.** EP3SE260 Column Pins Input Timing Parameters (Part 1 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =1.1V	V <sub>CCL</sub> =0.9V	
LVDS	GCLK	t <sub>su</sub>	-1.207	-1.253	-1.548	-1.485	-1.658	-1.594	-2.054	-1.455	-1.881	-1.560	-2.092	ns
		t <sub>h</sub>	1.345	1.411	1.807	1.755	1.956	1.880	2.339	1.736	2.200	1.858	2.378	ns
	GCLK PLL	t <sub>su</sub>	0.856	0.886	1.886	2.066	2.230	2.125	2.003	2.122	2.420	2.183	2.060	ns
		t <sub>h</sub>	-0.579	-0.587	-1.391	-1.550	-1.656	-1.580	-1.450	-1.593	-1.814	-1.626	-1.503	ns
MINI-LVDS	GCLK	t <sub>su</sub>	-1.207	-1.253	-1.548	-1.485	-1.658	-1.594	-2.054	-1.455	-1.881	-1.560	-2.092	ns
		t <sub>h</sub>	1.345	1.411	1.807	1.755	1.956	1.880	2.339	1.736	2.200	1.858	2.378	ns
	GCLK PLL	t <sub>su</sub>	0.856	0.886	1.886	2.066	2.230	2.125	2.003	2.122	2.420	2.183	2.060	ns
		t <sub>h</sub>	-0.579	-0.587	-1.391	-1.550	-1.656	-1.580	-1.450	-1.593	-1.814	-1.626	-1.503	ns
RSDS	GCLK	t <sub>su</sub>	-1.207	-1.253	-1.548	-1.485	-1.658	-1.594	-2.054	-1.455	-1.881	-1.560	-2.092	ns
		t <sub>h</sub>	1.345	1.411	1.807	1.755	1.956	1.880	2.339	1.736	2.200	1.858	2.378	ns
	GCLK PLL	t <sub>su</sub>	0.856	0.886	1.886	2.066	2.230	2.125	2.003	2.122	2.420	2.183	2.060	ns
		t <sub>h</sub>	-0.579	-0.587	-1.391	-1.550	-1.656	-1.580	-1.450	-1.593	-1.814	-1.626	-1.503	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	t <sub>su</sub>	-1.023	-1.076	-1.661	-1.684	-1.817	-1.748	-2.203	-1.690	-1.821	-1.758	-2.246	ns
		t <sub>h</sub>	1.154	1.226	1.887	1.914	2.069	1.988	2.443	1.929	2.081	2.008	2.487	ns
	GCLK PLL	t <sub>su</sub>	1.040	1.063	1.773	1.867	2.071	1.971	1.854	1.887	2.091	1.985	1.906	ns
		t <sub>h</sub>	-0.770	-0.772	-1.311	-1.391	-1.543	-1.472	-1.346	-1.400	-1.553	-1.476	-1.394	ns

**Table 1-144.** EP3SE260 Column Pins Input Timing Parameters (Part 2 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{su}$	-1.023	-1.076	-1.661	-1.684	-1.817	-1.748	-2.203	-1.690	-1.821	-1.758	-2.246	ns
		$t_h$	1.154	1.226	1.887	1.914	2.069	1.988	2.443	1.929	2.081	2.008	2.487	ns
	GCLK PLL	$t_{su}$	1.040	1.063	1.773	1.867	2.071	1.971	1.854	1.887	2.091	1.985	1.906	ns
		$t_h$	-0.770	-0.772	-1.311	-1.391	-1.543	-1.472	-1.346	-1.400	-1.553	-1.476	-1.394	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{su}$	-1.031	-1.088	-1.671	-1.695	-1.833	-1.764	-2.219	-1.701	-1.836	-1.773	-2.261	ns
		$t_h$	1.162	1.238	1.897	1.925	2.085	2.004	2.459	1.940	2.096	2.023	2.502	ns
	GCLK PLL	$t_{su}$	1.032	1.051	1.763	1.856	2.055	1.955	1.838	1.876	2.076	1.970	1.891	ns
		$t_h$	-0.762	-0.760	-1.301	-1.380	-1.527	-1.456	-1.330	-1.389	-1.538	-1.461	-1.379	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{su}$	-1.031	-1.088	-1.671	-1.695	-1.833	-1.764	-2.219	-1.701	-1.836	-1.773	-2.261	ns
		$t_h$	1.162	1.238	1.897	1.925	2.085	2.004	2.459	1.940	2.096	2.023	2.502	ns
	GCLK PLL	$t_{su}$	1.032	1.051	1.763	1.856	2.055	1.955	1.838	1.876	2.076	1.970	1.891	ns
		$t_h$	-0.762	-0.760	-1.301	-1.380	-1.527	-1.456	-1.330	-1.389	-1.538	-1.461	-1.379	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{su}$	-1.043	-1.099	-1.680	-1.706	-1.852	-1.783	-2.238	-1.712	-1.854	-1.791	-2.279	ns
		$t_h$	1.174	1.249	1.906	1.936	2.104	2.023	2.478	1.951	2.114	2.041	2.520	ns
	GCLK PLL	$t_{su}$	1.020	1.040	1.754	1.845	2.036	1.936	1.819	1.865	2.058	1.952	1.873	ns
		$t_h$	-0.750	-0.749	-1.292	-1.369	-1.508	-1.437	-1.311	-1.378	-1.520	-1.443	-1.361	ns
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	$t_{su}$	-1.043	-1.099	-1.680	-1.706	-1.852	-1.783	-2.238	-1.712	-1.854	-1.791	-2.279	ns
		$t_h$	1.174	1.249	1.906	1.936	2.104	2.023	2.478	1.951	2.114	2.041	2.520	ns
	GCLK PLL	$t_{su}$	1.020	1.040	1.754	1.845	2.036	1.936	1.819	1.865	2.058	1.952	1.873	ns
		$t_h$	-0.750	-0.749	-1.292	-1.369	-1.508	-1.437	-1.311	-1.378	-1.520	-1.443	-1.361	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	$t_{su}$	-1.031	-1.088	-1.671	-1.695	-1.833	-1.764	-2.219	-1.701	-1.836	-1.773	-2.261	ns
		$t_h$	1.162	1.238	1.897	1.925	2.085	2.004	2.459	1.940	2.096	2.023	2.502	ns
	GCLK PLL	$t_{su}$	1.032	1.051	1.763	1.856	2.055	1.955	1.838	1.876	2.076	1.970	1.891	ns
		$t_h$	-0.762	-0.760	-1.301	-1.380	-1.527	-1.456	-1.330	-1.389	-1.538	-1.461	-1.379	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	$t_{su}$	-1.031	-1.088	-1.671	-1.695	-1.833	-1.764	-2.219	-1.701	-1.836	-1.773	-2.261	ns
		$t_h$	1.162	1.238	1.897	1.925	2.085	2.004	2.459	1.940	2.096	2.023	2.502	ns
	GCLK PLL	$t_{su}$	1.032	1.051	1.763	1.856	2.055	1.955	1.838	1.876	2.076	1.970	1.891	ns
		$t_h$	-0.762	-0.760	-1.301	-1.380	-1.527	-1.456	-1.330	-1.389	-1.538	-1.461	-1.379	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	$t_{su}$	-1.043	-1.099	-1.680	-1.706	-1.852	-1.783	-2.238	-1.712	-1.854	-1.791	-2.279	ns
		$t_h$	1.174	1.249	1.906	1.936	2.104	2.023	2.478	1.951	2.114	2.041	2.520	ns
	GCLK PLL	$t_{su}$	1.020	1.040	1.754	1.845	2.036	1.936	1.819	1.865	2.058	1.952	1.873	ns
		$t_h$	-0.750	-0.749	-1.292	-1.369	-1.508	-1.437	-1.311	-1.378	-1.520	-1.443	-1.361	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	$t_{su}$	-1.043	-1.099	-1.680	-1.706	-1.852	-1.783	-2.238	-1.712	-1.854	-1.791	-2.279	ns
		$t_h$	1.174	1.249	1.906	1.936	2.104	2.023	2.478	1.951	2.114	2.041	2.520	ns
	GCLK PLL	$t_{su}$	1.020	1.040	1.754	1.845	2.036	1.936	1.819	1.865	2.058	1.952	1.873	ns
		$t_h$	-0.750	-0.749	-1.292	-1.369	-1.508	-1.437	-1.311	-1.378	-1.520	-1.443	-1.361	ns

**Table 1-144.** EP3SE260 Column Pins Input Timing Parameters (Part 3 of 3) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-1.050	-1.105	-1.692	-1.711	-1.852	-1.785	-2.237	-1.716	-1.849	-1.789	-2.275	ns
		t <sub>h</sub>	1.181	1.255	1.919	1.944	2.107	2.026	2.482	1.958	2.114	2.040	2.521	ns
	GCLK PLL	t <sub>su</sub>	1.013	1.034	1.742	1.840	2.036	1.934	1.820	1.861	2.063	1.954	1.877	ns
		t <sub>h</sub>	-0.743	-0.743	-1.279	-1.361	-1.505	-1.434	-1.307	-1.371	-1.520	-1.444	-1.360	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-1.050	-1.105	-1.692	-1.711	-1.852	-1.785	-2.237	-1.716	-1.849	-1.789	-2.275	ns
		t <sub>h</sub>	1.181	1.255	1.919	1.944	2.107	2.026	2.482	1.958	2.114	2.040	2.521	ns
	GCLK PLL	t <sub>su</sub>	1.013	1.034	1.742	1.840	2.036	1.934	1.820	1.861	2.063	1.954	1.877	ns
		t <sub>h</sub>	-0.743	-0.743	-1.279	-1.361	-1.505	-1.434	-1.307	-1.371	-1.520	-1.444	-1.360	ns

Table 1-145 specifies EP3SE260 row pins input timing parameters for differential I/O standards.

**Table 1-145.** EP3SE260 Row Pins Input Timing Parameters (Part 1 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
LVDS	GCLK	$t_{SU}$	-1.149	-1.197	-1.416	-1.330	-1.491	-1.432	-1.861	-1.296	-1.448	-1.390	-1.903	ns
		$t_h$	1.287	1.353	1.678	1.607	1.791	1.721	2.152	1.586	1.761	1.693	2.195	ns
	GCLK PLL	$t_{SU}$	0.859	0.886	1.969	2.177	2.369	2.252	2.160	2.237	2.436	2.316	2.213	ns
		$t_h$	-0.581	-0.589	-1.474	-1.655	-1.792	-1.704	-1.601	-1.699	-1.843	-1.753	-1.650	ns
MINI-LVDS	GCLK	$t_{SU}$	-1.149	-1.197	-1.416	-1.330	-1.491	-1.432	-1.861	-1.296	-1.448	-1.390	-1.903	ns
		$t_h$	1.287	1.353	1.678	1.607	1.791	1.721	2.152	1.586	1.761	1.693	2.195	ns
	GCLK PLL	$t_{SU}$	0.859	0.886	1.969	2.177	2.369	2.252	2.160	2.237	2.436	2.316	2.213	ns
		$t_h$	-0.581	-0.589	-1.474	-1.655	-1.792	-1.704	-1.601	-1.699	-1.843	-1.753	-1.650	ns
RSDS	GCLK	$t_{SU}$	-1.149	-1.197	-1.416	-1.330	-1.491	-1.432	-1.861	-1.296	-1.448	-1.390	-1.903	ns
		$t_h$	1.287	1.353	1.678	1.607	1.791	1.721	2.152	1.586	1.761	1.693	2.195	ns
	GCLK PLL	$t_{SU}$	0.859	0.886	1.969	2.177	2.369	2.252	2.160	2.237	2.436	2.316	2.213	ns
		$t_h$	-0.581	-0.589	-1.474	-1.655	-1.792	-1.704	-1.601	-1.699	-1.843	-1.753	-1.650	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	GCLK	$t_{SU}$	-0.954	-1.012	-1.546	-1.559	-1.680	-1.616	-2.040	-1.567	-1.685	-1.622	-2.087	ns
		$t_h$	1.085	1.159	1.772	1.790	1.931	1.856	2.282	1.808	1.946	1.873	2.330	ns
	GCLK PLL	$t_{SU}$	1.054	1.071	1.844	1.953	2.180	2.068	1.981	1.970	2.199	2.084	2.029	ns
		$t_h$	-0.783	-0.783	-1.383	-1.476	-1.652	-1.569	-1.471	-1.481	-1.658	-1.573	-1.515	ns
DIFFERENTIAL 1.2-V HSTL CLASS II	GCLK	$t_{SU}$	-0.954	-1.012	-1.546	-1.559	-1.680	-1.616	-2.040	-1.567	-1.685	-1.622	-2.087	ns
		$t_h$	1.085	1.159	1.772	1.790	1.931	1.856	2.282	1.808	1.946	1.873	2.330	ns
	GCLK PLL	$t_{SU}$	1.054	1.071	1.844	1.953	2.180	2.068	1.981	1.970	2.199	2.084	2.029	ns
		$t_h$	-0.783	-0.783	-1.383	-1.476	-1.652	-1.569	-1.471	-1.481	-1.658	-1.573	-1.515	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	GCLK	$t_{SU}$	-0.963	-1.024	-1.555	-1.569	-1.696	-1.632	-2.056	-1.576	-1.701	-1.638	-2.103	ns
		$t_h$	1.094	1.171	1.781	1.800	1.947	1.872	2.298	1.817	1.962	1.889	2.346	ns
	GCLK PLL	$t_{SU}$	1.045	1.059	1.835	1.943	2.164	2.052	1.965	1.961	2.183	2.068	2.013	ns
		$t_h$	-0.774	-0.771	-1.374	-1.466	-1.636	-1.553	-1.455	-1.472	-1.642	-1.557	-1.499	ns
DIFFERENTIAL 1.5-V HSTL CLASS II	GCLK	$t_{SU}$	-0.963	-1.024	-1.555	-1.569	-1.696	-1.632	-2.056	-1.576	-1.701	-1.638	-2.103	ns
		$t_h$	1.094	1.171	1.781	1.800	1.947	1.872	2.298	1.817	1.962	1.889	2.346	ns
	GCLK PLL	$t_{SU}$	1.045	1.059	1.835	1.943	2.164	2.052	1.965	1.961	2.183	2.068	2.013	ns
		$t_h$	-0.774	-0.771	-1.374	-1.466	-1.636	-1.553	-1.455	-1.472	-1.642	-1.557	-1.499	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	GCLK	$t_{SU}$	-0.977	-1.036	-1.564	-1.579	-1.714	-1.650	-2.074	-1.587	-1.718	-1.655	-2.120	ns
		$t_h$	1.108	1.183	1.790	1.810	1.965	1.890	2.316	1.828	1.979	1.906	2.363	ns
	GCLK PLL	$t_{SU}$	1.031	1.047	1.822	1.933	2.146	2.034	1.947	1.950	2.166	2.051	1.996	ns
		$t_h$	-0.760	-0.759	-1.362	-1.456	-1.618	-1.535	-1.437	-1.461	-1.625	-1.540	-1.482	ns

**Table 1-145.** EP3SE260 Row Pins Input Timing Parameters (Part 2 of 2) - Preliminary

I/O Standard	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
			Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.8-V HSTL CLASS II	GCLK	t <sub>su</sub>	-0.977	-1.036	-1.564	-1.579	-1.714	-1.650	-2.074	-1.587	-1.718	-1.655	-2.120	ns
		t <sub>h</sub>	1.108	1.183	1.790	1.810	1.965	1.890	2.316	1.828	1.979	1.906	2.363	ns
	GCLK PLL	t <sub>su</sub>	1.031	1.047	1.822	1.933	2.146	2.034	1.947	1.950	2.166	2.051	1.996	ns
		t <sub>h</sub>	-0.760	-0.759	-1.362	-1.456	-1.618	-1.535	-1.437	-1.461	-1.625	-1.540	-1.482	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.963	-1.024	-1.555	-1.569	-1.696	-1.632	-2.056	-1.576	-1.701	-1.638	-2.103	ns
		t <sub>h</sub>	1.094	1.171	1.781	1.800	1.947	1.872	2.298	1.817	1.962	1.889	2.346	ns
	GCLK PLL	t <sub>su</sub>	1.045	1.059	1.835	1.943	2.164	2.052	1.965	1.961	2.183	2.068	2.013	ns
		t <sub>h</sub>	-0.774	-0.771	-1.374	-1.466	-1.636	-1.553	-1.455	-1.472	-1.642	-1.557	-1.499	ns
DIFFERENTIAL 1.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.963	-1.024	-1.555	-1.569	-1.696	-1.632	-2.056	-1.576	-1.701	-1.638	-2.103	ns
		t <sub>h</sub>	1.094	1.171	1.781	1.800	1.947	1.872	2.298	1.817	1.962	1.889	2.346	ns
	GCLK PLL	t <sub>su</sub>	1.045	1.059	1.835	1.943	2.164	2.052	1.965	1.961	2.183	2.068	2.013	ns
		t <sub>h</sub>	-0.774	-0.771	-1.374	-1.466	-1.636	-1.553	-1.455	-1.472	-1.642	-1.557	-1.499	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.977	-1.036	-1.564	-1.579	-1.714	-1.650	-2.074	-1.587	-1.718	-1.655	-2.120	ns
		t <sub>h</sub>	1.108	1.183	1.790	1.810	1.965	1.890	2.316	1.828	1.979	1.906	2.363	ns
	GCLK PLL	t <sub>su</sub>	1.031	1.047	1.822	1.933	2.146	2.034	1.947	1.950	2.166	2.051	1.996	ns
		t <sub>h</sub>	-0.760	-0.759	-1.362	-1.456	-1.618	-1.535	-1.437	-1.461	-1.625	-1.540	-1.482	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.977	-1.036	-1.564	-1.579	-1.714	-1.650	-2.074	-1.587	-1.718	-1.655	-2.120	ns
		t <sub>h</sub>	1.108	1.183	1.790	1.810	1.965	1.890	2.316	1.828	1.979	1.906	2.363	ns
	GCLK PLL	t <sub>su</sub>	1.031	1.047	1.822	1.933	2.146	2.034	1.947	1.950	2.166	2.051	1.996	ns
		t <sub>h</sub>	-0.760	-0.759	-1.362	-1.456	-1.618	-1.535	-1.437	-1.461	-1.625	-1.540	-1.482	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	GCLK	t <sub>su</sub>	-0.986	-1.045	-1.578	-1.590	-1.721	-1.658	-2.080	-1.594	-1.719	-1.658	-2.122	ns
		t <sub>h</sub>	1.117	1.192	1.805	1.824	1.975	1.900	2.327	1.838	1.985	1.911	2.370	ns
	GCLK PLL	t <sub>su</sub>	1.022	1.038	1.807	1.917	2.135	2.022	1.936	1.939	2.160	2.043	1.989	ns
		t <sub>h</sub>	-0.751	-0.750	-1.347	-1.438	-1.604	-1.521	-1.422	-1.447	-1.616	-1.531	-1.471	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	GCLK	t <sub>su</sub>	-0.986	-1.045	-1.578	-1.590	-1.721	-1.658	-2.080	-1.594	-1.719	-1.658	-2.122	ns
		t <sub>h</sub>	1.117	1.192	1.805	1.824	1.975	1.900	2.327	1.838	1.985	1.911	2.370	ns
	GCLK PLL	t <sub>su</sub>	1.022	1.038	1.807	1.917	2.135	2.022	1.936	1.939	2.160	2.043	1.989	ns
		t <sub>h</sub>	-0.751	-0.750	-1.347	-1.438	-1.604	-1.521	-1.422	-1.447	-1.616	-1.531	-1.471	ns

Table 1-146 specifies EP3SE260 Column Pins Output Timing parameters for differential I/O standards.

**Table 1-146.** EP3SE260 Column Pins output Timing Parameters (Part 1 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.328	3.582	5.252	5.447	5.978	5.828	6.213	5.576	6.105	5.957	6.287	ns	
		GCLK PLL	t <sub>co</sub>	1.421	1.603	2.073	2.162	2.385	2.387	2.443	2.267	2.491	2.493	2.425	ns	
LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.324	3.585	5.299	5.502	6.040	5.890	6.275	5.635	6.171	6.023	6.353	ns	
		GCLK PLL	t <sub>co</sub>	1.417	1.606	2.120	2.217	2.447	2.449	2.505	2.326	2.557	2.559	2.491	ns	
MINI-LVDS_E_1R	—	GCLK	t <sub>co</sub>	3.328	3.582	5.252	5.447	5.978	5.828	6.213	5.576	6.105	5.957	6.287	ns	
		GCLK PLL	t <sub>co</sub>	1.421	1.603	2.073	2.162	2.385	2.387	2.443	2.267	2.491	2.493	2.425	ns	
MINI-LVDS_E_3R	—	GCLK	t <sub>co</sub>	3.324	3.585	5.299	5.502	6.040	5.890	6.275	5.635	6.171	6.023	6.353	ns	
		GCLK PLL	t <sub>co</sub>	1.417	1.606	2.120	2.217	2.447	2.449	2.505	2.326	2.557	2.559	2.491	ns	
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.328	3.582	5.252	5.447	5.978	5.828	6.213	5.576	6.105	5.957	6.287	ns	
		GCLK PLL	t <sub>co</sub>	1.421	1.603	2.073	2.162	2.385	2.387	2.443	2.267	2.491	2.493	2.425	ns	
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.324	3.585	5.299	5.502	6.040	5.890	6.275	5.635	6.171	6.023	6.353	ns	
		GCLK PLL	t <sub>co</sub>	1.417	1.606	2.120	2.217	2.447	2.449	2.505	2.326	2.557	2.559	2.491	ns	
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.355	3.615	5.323	5.525	6.062	5.912	6.297	5.656	6.191	6.043	6.373	ns	
		GCLK PLL	t <sub>co</sub>	1.448	1.636	2.144	2.240	2.469	2.471	2.527	2.347	2.577	2.579	2.511	ns	
	6mA	GCLK	t <sub>co</sub>	3.345	3.605	5.313	5.514	6.052	5.902	6.287	5.645	6.181	6.033	6.363	ns	
		GCLK PLL	t <sub>co</sub>	1.438	1.626	2.134	2.229	2.459	2.461	2.517	2.336	2.567	2.569	2.501	ns	
	8mA	GCLK	t <sub>co</sub>	3.345	3.605	5.316	5.518	6.056	5.906	6.291	5.650	6.186	6.038	6.368	ns	
		GCLK PLL	t <sub>co</sub>	1.438	1.626	2.137	2.233	2.463	2.465	2.521	2.341	2.572	2.574	2.506	ns	
	10mA	GCLK	t <sub>co</sub>	3.338	3.599	5.309	5.512	6.050	5.900	6.285	5.643	6.180	6.032	6.362	ns	
		GCLK PLL	t <sub>co</sub>	1.431	1.620	2.130	2.227	2.457	2.459	2.515	2.334	2.566	2.568	2.500	ns	
	12mA	GCLK	t <sub>co</sub>	3.337	3.597	5.306	5.509	6.047	5.897	6.282	5.640	6.176	6.028	6.358	ns	
		GCLK PLL	t <sub>co</sub>	1.430	1.618	2.127	2.224	2.454	2.456	2.512	2.331	2.562	2.564	2.496	ns	
	DIFFERENTIAL 1.2-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.359	3.619	5.327	5.529	6.066	5.916	6.301	5.660	6.196	6.048	6.378	ns
			GCLK PLL	t <sub>co</sub>	1.452	1.640	2.148	2.244	2.473	2.475	2.531	2.351	2.582	2.584	2.516	ns



**Table 1-146.** EP3SE260 Column Pins output Timing Parameters (Part 2 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.349	3.608	5.306	5.506	6.041	5.891	6.276	5.636	6.169	6.021	6.351	ns	
		GCLK PLL	t <sub>co</sub>	1.442	1.629	2.127	2.221	2.448	2.450	2.506	2.327	2.555	2.557	2.489	ns	
	6mA	GCLK	t <sub>co</sub>	3.344	3.604	5.306	5.506	6.042	5.892	6.277	5.637	6.171	6.023	6.353	ns	
		GCLK PLL	t <sub>co</sub>	1.437	1.625	2.127	2.221	2.449	2.451	2.507	2.328	2.557	2.559	2.491	ns	
	8mA	GCLK	t <sub>co</sub>	3.342	3.602	5.305	5.505	6.040	5.890	6.275	5.636	6.170	6.022	6.352	ns	
		GCLK PLL	t <sub>co</sub>	1.435	1.623	2.126	2.220	2.447	2.449	2.505	2.327	2.556	2.558	2.490	ns	
	10m A	GCLK	t <sub>co</sub>	3.334	3.593	5.295	5.495	6.031	5.881	6.266	5.626	6.160	6.012	6.342	ns	
		GCLK PLL	t <sub>co</sub>	1.427	1.614	2.116	2.210	2.438	2.440	2.496	2.317	2.546	2.548	2.480	ns	
	12m A	GCLK	t <sub>co</sub>	3.335	3.595	5.301	5.502	6.039	5.889	6.274	5.634	6.169	6.021	6.351	ns	
		GCLK PLL	t <sub>co</sub>	1.428	1.616	2.122	2.217	2.446	2.448	2.504	2.325	2.555	2.557	2.489	ns	
	DIFFERENTIAL 1.5-V HSTL CLASS II	16m A	GCLK	t <sub>co</sub>	3.334	3.592	5.284	5.483	6.017	5.867	6.252	5.613	6.145	5.997	6.327	ns
			GCLK PLL	t <sub>co</sub>	1.427	1.613	2.105	2.198	2.424	2.426	2.482	2.304	2.531	2.533	2.465	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.346	3.605	5.302	5.501	6.035	5.885	6.270	5.632	6.164	6.016	6.346	ns	
		GCLK PLL	t <sub>co</sub>	1.439	1.626	2.123	2.216	2.442	2.444	2.500	2.323	2.550	2.552	2.484	ns	
	6mA	GCLK	t <sub>co</sub>	3.342	3.602	5.303	5.503	6.039	5.889	6.274	5.634	6.168	6.020	6.350	ns	
		GCLK PLL	t <sub>co</sub>	1.435	1.623	2.124	2.218	2.446	2.448	2.504	2.325	2.554	2.556	2.488	ns	
	8mA	GCLK	t <sub>co</sub>	3.332	3.591	5.292	5.492	6.027	5.877	6.262	5.623	6.156	6.008	6.338	ns	
		GCLK PLL	t <sub>co</sub>	1.425	1.612	2.113	2.207	2.434	2.436	2.492	2.314	2.542	2.544	2.476	ns	
	10m A	GCLK	t <sub>co</sub>	3.330	3.589	5.290	5.489	6.025	5.875	6.260	5.621	6.154	6.006	6.336	ns	
		GCLK PLL	t <sub>co</sub>	1.423	1.610	2.111	2.204	2.432	2.434	2.490	2.312	2.540	2.542	2.474	ns	
	12m A	GCLK	t <sub>co</sub>	3.330	3.590	5.293	5.494	6.030	5.880	6.265	5.625	6.160	6.012	6.342	ns	
		GCLK PLL	t <sub>co</sub>	1.423	1.611	2.114	2.209	2.437	2.439	2.495	2.316	2.546	2.548	2.480	ns	
	DIFFERENTIAL 1.8-V HSTL CLASS II	16m A	GCLK	t <sub>co</sub>	3.334	3.593	5.290	5.489	6.024	5.874	6.259	5.620	6.153	6.005	6.335	ns
			GCLK PLL	t <sub>co</sub>	1.427	1.614	2.111	2.204	2.431	2.433	2.489	2.311	2.539	2.541	2.473	ns

**Table 1-146.** EP3SE260 Column Pins output Timing Parameters (Part 3 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units	
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V		
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.360	3.622	5.335	5.537	6.074	5.924	6.309	5.668	6.203	6.055	6.385	ns	
		GCLK PLL	t <sub>co</sub>	1.453	1.643	2.156	2.252	2.481	2.483	2.539	2.359	2.589	2.591	2.523	ns	
	6mA	GCLK	t <sub>co</sub>	3.346	3.608	5.323	5.526	6.064	5.914	6.299	5.658	6.194	6.046	6.376	ns	
		GCLK PLL	t <sub>co</sub>	1.439	1.629	2.144	2.241	2.471	2.473	2.529	2.349	2.580	2.582	2.514	ns	
	8mA	GCLK	t <sub>co</sub>	3.334	3.595	5.306	5.508	6.046	5.896	6.281	5.640	6.176	6.028	6.358	ns	
		GCLK PLL	t <sub>co</sub>	1.427	1.616	2.127	2.223	2.453	2.455	2.511	2.331	2.562	2.564	2.496	ns	
	10m A	GCLK	t <sub>co</sub>	3.334	3.595	5.309	5.512	6.050	5.900	6.285	5.644	6.181	6.033	6.363	ns	
		GCLK PLL	t <sub>co</sub>	1.427	1.616	2.130	2.227	2.457	2.459	2.515	2.335	2.567	2.569	2.501	ns	
	12m A	GCLK	t <sub>co</sub>	3.330	3.591	5.302	5.504	6.043	5.893	6.278	5.637	6.173	6.025	6.355	ns	
		GCLK PLL	t <sub>co</sub>	1.423	1.612	2.123	2.219	2.450	2.452	2.508	2.328	2.559	2.561	2.493	ns	
	DIFFERENTIAL 1.5-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.334	3.593	5.295	5.495	6.031	5.881	6.266	5.626	6.160	6.012	6.342	ns
			GCLK PLL	t <sub>co</sub>	1.427	1.614	2.116	2.210	2.438	2.440	2.496	2.317	2.546	2.548	2.480	ns
16m A		GCLK	t <sub>co</sub>	3.335	3.595	5.303	5.505	6.042	5.892	6.277	5.636	6.172	6.024	6.354	ns	
		GCLK PLL	t <sub>co</sub>	1.428	1.616	2.124	2.220	2.449	2.451	2.507	2.327	2.558	2.560	2.492	ns	
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.363	3.625	5.334	5.535	6.072	5.922	6.307	5.667	6.201	6.053	6.383	ns	
		GCLK PLL	t <sub>co</sub>	1.456	1.646	2.155	2.250	2.479	2.481	2.537	2.358	2.587	2.589	2.521	ns	
	6mA	GCLK	t <sub>co</sub>	3.352	3.613	5.322	5.523	6.060	5.910	6.295	5.655	6.189	6.041	6.371	ns	
		GCLK PLL	t <sub>co</sub>	1.445	1.634	2.143	2.238	2.467	2.469	2.525	2.346	2.575	2.577	2.509	ns	
	8mA	GCLK	t <sub>co</sub>	3.347	3.609	5.322	5.524	6.061	5.911	6.296	5.656	6.191	6.043	6.373	ns	
		GCLK PLL	t <sub>co</sub>	1.440	1.630	2.143	2.239	2.468	2.470	2.526	2.347	2.577	2.579	2.511	ns	
	10m A	GCLK	t <sub>co</sub>	3.333	3.594	5.304	5.505	6.042	5.892	6.277	5.637	6.173	6.025	6.355	ns	
		GCLK PLL	t <sub>co</sub>	1.426	1.615	2.125	2.220	2.449	2.451	2.507	2.328	2.559	2.561	2.493	ns	
	12m A	GCLK	t <sub>co</sub>	3.331	3.592	5.302	5.503	6.040	5.890	6.275	5.635	6.170	6.022	6.352	ns	
		GCLK PLL	t <sub>co</sub>	1.424	1.613	2.123	2.218	2.447	2.449	2.505	2.326	2.556	2.558	2.490	ns	
	DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.335	3.594	5.294	5.493	6.028	5.878	6.263	5.624	6.157	6.009	6.339	ns
			GCLK PLL	t <sub>co</sub>	1.428	1.615	2.115	2.208	2.435	2.437	2.493	2.315	2.543	2.545	2.477	ns
16m A		GCLK	t <sub>co</sub>	3.335	3.595	5.302	5.503	6.040	5.890	6.275	5.635	6.170	6.022	6.352	ns	
		GCLK PLL	t <sub>co</sub>	1.428	1.616	2.123	2.218	2.447	2.449	2.505	2.326	2.556	2.558	2.490	ns	

**Table 1-146.** EP3SE260 Column Pins output Timing Parameters (Part 4 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	$t_{co}$	3.351	3.612	5.318	5.518	6.054	5.904	6.289	5.650	6.183	6.035	6.365	ns
		GCLK PLL	$t_{co}$	1.444	1.633	2.139	2.233	2.461	2.463	2.519	2.341	2.569	2.571	2.503	ns
	10mA	GCLK	$t_{co}$	3.351	3.612	5.318	5.518	6.054	5.904	6.289	5.650	6.183	6.035	6.365	ns
		GCLK PLL	$t_{co}$	1.444	1.633	2.139	2.233	2.461	2.463	2.519	2.341	2.569	2.571	2.503	ns
	12mA	GCLK	$t_{co}$	3.341	3.602	5.308	5.508	6.044	5.894	6.279	5.640	6.174	6.026	6.356	ns
		GCLK PLL	$t_{co}$	1.434	1.623	2.129	2.223	2.451	2.453	2.509	2.331	2.560	2.562	2.494	ns
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.334	3.594	5.294	5.493	6.028	5.878	6.263	5.624	6.157	6.009	6.339	ns
		GCLK PLL	$t_{co}$	1.427	1.615	2.115	2.208	2.435	2.437	2.493	2.315	2.543	2.545	2.477	ns

Table 1-147 specifies EP3SE260 Row Pins Output Timing parameters for differential I/O standards.

**Table 1-147.** EP3SE260 Row Pins output Timing Parameters (Part 1 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
LVDS	—	GCLK	$t_{co}$	2.940	3.142	4.581	4.743	5.225	5.084	5.443	4.847	5.330	5.188	5.504	ns
		GCLK PLL	$t_{co}$	1.047	1.174	1.411	1.472	1.641	1.656	1.690	1.552	1.726	1.739	1.653	ns
LVDS_E_1R	—	GCLK	$t_{co}$	3.332	3.586	5.263	5.459	5.988	5.839	6.190	5.588	6.118	5.967	6.267	ns
		GCLK PLL	$t_{co}$	1.449	1.628	2.103	2.198	2.414	2.421	2.447	2.303	2.524	2.528	2.426	ns
LVDS_E_3R	—	GCLK	$t_{co}$	3.314	3.576	5.301	5.505	6.042	5.893	6.244	5.639	6.179	6.028	6.328	ns
		GCLK PLL	$t_{co}$	1.431	1.618	2.141	2.244	2.468	2.475	2.501	2.354	2.585	2.589	2.487	ns
MINI-LVDS	—	GCLK	$t_{co}$	2.940	3.142	4.581	4.743	5.225	5.084	5.443	4.847	5.330	5.188	5.504	ns
		GCLK PLL	$t_{co}$	1.047	1.174	1.411	1.472	1.641	1.656	1.690	1.552	1.726	1.739	1.653	ns
MINI-LVDS_E_1R	—	GCLK	$t_{co}$	3.332	3.586	5.263	5.459	5.988	5.839	6.190	5.588	6.118	5.967	6.267	ns
		GCLK PLL	$t_{co}$	1.449	1.628	2.103	2.198	2.414	2.421	2.447	2.303	2.524	2.528	2.426	ns
MINI-LVDS_E_3R	—	GCLK	$t_{co}$	3.314	3.576	5.301	5.505	6.042	5.893	6.244	5.639	6.179	6.028	6.328	ns
		GCLK PLL	$t_{co}$	1.431	1.618	2.141	2.244	2.468	2.475	2.501	2.354	2.585	2.589	2.487	ns
RSDS	—	GCLK	$t_{co}$	2.940	3.142	4.581	4.743	5.225	5.084	5.443	4.847	5.330	5.188	5.504	ns
		GCLK PLL	$t_{co}$	1.047	1.174	1.411	1.472	1.641	1.656	1.690	1.552	1.726	1.739	1.653	ns

**Table 1-147.** EP3SE260 Row Pins output Timing Parameters (Part 2 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
RSDS_E_1R	—	GCLK	t <sub>co</sub>	3.332	3.586	5.263	5.459	5.988	5.839	6.190	5.588	6.118	5.967	6.267	ns
		GCLK PLL	t <sub>co</sub>	1.449	1.628	2.103	2.198	2.414	2.421	2.447	2.303	2.524	2.528	2.426	ns
RSDS_E_3R	—	GCLK	t <sub>co</sub>	3.314	3.576	5.301	5.505	6.042	5.893	6.244	5.639	6.179	6.028	6.328	ns
		GCLK PLL	t <sub>co</sub>	1.431	1.618	2.141	2.244	2.468	2.475	2.501	2.354	2.585	2.589	2.487	ns
DIFFERENTIAL 1.2-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.358	3.619	5.337	5.539	6.075	5.926	6.277	5.672	6.208	6.057	6.357	ns
		GCLK PLL	t <sub>co</sub>	1.485	1.671	2.187	2.288	2.511	2.518	2.544	2.397	2.624	2.628	2.526	ns
	6mA	GCLK	t <sub>co</sub>	3.344	3.605	5.324	5.526	6.062	5.913	6.264	5.658	6.195	6.044	6.344	ns
		GCLK PLL	t <sub>co</sub>	1.471	1.657	2.174	2.275	2.498	2.505	2.531	2.383	2.611	2.615	2.513	ns
	8mA	GCLK	t <sub>co</sub>	3.340	3.601	5.322	5.526	6.063	5.914	6.265	5.658	6.197	6.046	6.346	ns
		GCLK PLL	t <sub>co</sub>	1.467	1.653	2.172	2.275	2.499	2.506	2.532	2.383	2.613	2.617	2.515	ns
DIFFERENTIAL 1.5-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.356	3.616	5.323	5.523	6.057	5.908	6.259	5.655	6.190	6.039	6.339	ns
		GCLK PLL	t <sub>co</sub>	1.483	1.668	2.173	2.272	2.493	2.500	2.526	2.380	2.606	2.610	2.508	ns
	6mA	GCLK	t <sub>co</sub>	3.345	3.606	5.319	5.519	6.054	5.905	6.256	5.652	6.187	6.036	6.336	ns
		GCLK PLL	t <sub>co</sub>	1.472	1.658	2.169	2.268	2.490	2.497	2.523	2.377	2.603	2.607	2.505	ns
	8mA	GCLK	t <sub>co</sub>	3.342	3.603	5.317	5.517	6.052	5.903	6.254	5.650	6.186	6.035	6.335	ns
		GCLK PLL	t <sub>co</sub>	1.469	1.655	2.167	2.266	2.488	2.495	2.521	2.375	2.602	2.606	2.504	ns
DIFFERENTIAL 1.8-V HSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.353	3.613	5.318	5.518	6.051	5.902	6.253	5.650	6.184	6.033	6.333	ns
		GCLK PLL	t <sub>co</sub>	1.480	1.665	2.168	2.267	2.487	2.494	2.520	2.375	2.600	2.604	2.502	ns
	6mA	GCLK	t <sub>co</sub>	3.343	3.604	5.316	5.516	6.050	5.901	6.252	5.649	6.184	6.033	6.333	ns
		GCLK PLL	t <sub>co</sub>	1.470	1.656	2.166	2.265	2.486	2.493	2.519	2.374	2.600	2.604	2.502	ns
	8mA	GCLK	t <sub>co</sub>	3.329	3.590	5.301	5.501	6.036	5.887	6.238	5.634	6.169	6.018	6.318	ns
		GCLK PLL	t <sub>co</sub>	1.456	1.642	2.151	2.250	2.472	2.479	2.505	2.359	2.585	2.589	2.487	ns
	10mA	GCLK	t <sub>co</sub>	3.326	3.586	5.297	5.497	6.032	5.883	6.234	5.630	6.165	6.014	6.314	ns
		GCLK PLL	t <sub>co</sub>	1.453	1.638	2.147	2.246	2.468	2.475	2.501	2.355	2.581	2.585	2.483	ns
	12mA	GCLK	t <sub>co</sub>	3.323	3.584	5.298	5.500	6.035	5.886	6.237	5.633	6.169	6.018	6.318	ns
		GCLK PLL	t <sub>co</sub>	1.450	1.636	2.148	2.249	2.471	2.478	2.504	2.358	2.585	2.589	2.487	ns

**Table 1-147.** EP3SE260 Row Pins output Timing Parameters (Part 3 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
DIFFERENTIAL 1.8-V HSTL CLASS II	16mA	GCLK	t <sub>co</sub>	3.324	3.584	5.288	5.488	6.022	5.873	6.224	5.620	6.155	6.004	6.304	ns
		GCLK PLL	t <sub>co</sub>	1.451	1.636	2.138	2.237	2.458	2.465	2.491	2.345	2.571	2.575	2.473	ns
DIFFERENTIAL 1.5-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.373	3.637	5.359	5.561	6.098	5.949	6.300	5.694	6.231	6.080	6.380	ns
		GCLK PLL	t <sub>co</sub>	1.500	1.689	2.209	2.310	2.534	2.541	2.567	2.419	2.647	2.651	2.549	ns
	6mA	GCLK	t <sub>co</sub>	3.349	3.613	5.341	5.544	6.081	5.932	6.283	5.677	6.216	6.065	6.365	ns
		GCLK PLL	t <sub>co</sub>	1.476	1.665	2.191	2.293	2.517	2.524	2.550	2.402	2.632	2.636	2.534	ns
	8mA	GCLK	t <sub>co</sub>	3.332	3.594	5.319	5.522	6.059	5.910	6.261	5.655	6.194	6.043	6.343	ns
		GCLK PLL	t <sub>co</sub>	1.459	1.646	2.169	2.271	2.495	2.502	2.528	2.380	2.610	2.614	2.512	ns
DIFFERENTIAL 1.8-V SSTL CLASS I	4mA	GCLK	t <sub>co</sub>	3.377	3.640	5.359	5.561	6.097	5.948	6.299	5.694	6.231	6.080	6.380	ns
		GCLK PLL	t <sub>co</sub>	1.504	1.692	2.209	2.310	2.533	2.540	2.566	2.419	2.647	2.651	2.549	ns
	6mA	GCLK	t <sub>co</sub>	3.362	3.625	5.345	5.546	6.082	5.933	6.284	5.679	6.216	6.065	6.365	ns
		GCLK PLL	t <sub>co</sub>	1.489	1.677	2.195	2.295	2.518	2.525	2.551	2.404	2.632	2.636	2.534	ns
	8mA	GCLK	t <sub>co</sub>	3.351	3.614	5.340	5.543	6.079	5.930	6.281	5.676	6.214	6.063	6.363	ns
		GCLK PLL	t <sub>co</sub>	1.478	1.666	2.190	2.292	2.515	2.522	2.548	2.401	2.630	2.634	2.532	ns
	10mA	GCLK	t <sub>co</sub>	3.331	3.594	5.317	5.519	6.056	5.907	6.258	5.653	6.190	6.039	6.339	ns
		GCLK PLL	t <sub>co</sub>	1.458	1.646	2.167	2.268	2.492	2.499	2.525	2.378	2.606	2.610	2.508	ns
	12mA	GCLK	t <sub>co</sub>	3.328	3.590	5.313	5.516	6.052	5.903	6.254	5.649	6.187	6.036	6.336	ns
		GCLK PLL	t <sub>co</sub>	1.455	1.642	2.163	2.265	2.488	2.495	2.521	2.374	2.603	2.607	2.505	ns
DIFFERENTIAL 1.8-V SSTL CLASS II	8mA	GCLK	t <sub>co</sub>	3.333	3.594	5.304	5.504	6.038	5.889	6.240	5.636	6.171	6.020	6.320	ns
		GCLK PLL	t <sub>co</sub>	1.460	1.646	2.154	2.253	2.474	2.481	2.507	2.361	2.587	2.591	2.489	ns
	16mA	GCLK	t <sub>co</sub>	3.326	3.587	5.303	5.505	6.041	5.892	6.243	5.639	6.176	6.025	6.325	ns
		GCLK PLL	t <sub>co</sub>	1.453	1.639	2.153	2.254	2.477	2.484	2.510	2.364	2.592	2.596	2.494	ns
DIFFERENTIAL 2.5-V SSTL CLASS I	8mA	GCLK	t <sub>co</sub>	3.364	3.626	5.341	5.542	6.077	5.928	6.279	5.675	6.211	6.060	6.360	ns
		GCLK PLL	t <sub>co</sub>	1.481	1.668	2.181	2.281	2.503	2.510	2.536	2.390	2.617	2.621	2.519	ns
	12mA	GCLK	t <sub>co</sub>	3.346	3.609	5.326	5.527	6.062	5.913	6.264	5.660	6.196	6.045	6.345	ns
		GCLK PLL	t <sub>co</sub>	1.463	1.651	2.166	2.266	2.488	2.495	2.521	2.375	2.602	2.606	2.504	ns

**Table 1-147.** EP3SE260 Row Pins output Timing Parameters (Part 4 of 4) - Preliminary

I/O Standard	Current Strength	Clock	Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
				Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	
DIFFERENTIAL 2.5-V SSTL CLASS II	16mA	GCLK	$t_{co}$	3.332	3.593	5.303	5.503	6.037	5.888	6.239	5.636	6.171	6.020	6.320	ns
		GCLK PLL	$t_{co}$	1.449	1.635	2.143	2.242	2.463	2.470	2.496	2.351	2.577	2.581	2.479	ns

Table 1-148 and Table 1-149 show EP3SE260 regional clock (RCLK) adder values that should be added to GCLK values. These adder values are used to determine I/O timing when I/O pin is driven using regional clock. This applies for all I/O standards supported by Stratix III devices.

Table 1-148 specifies EP3SE260 Column Pin delay adders when using the regional clock.

**Table 1-148.** EP3SE260 Column Pin Delay Adders for Regional Clock - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
RCLK input adder	0.188	0.093	0.162	0.21	0.22	0.312	0.299	0.189	0.372	0.31	0.214	ns
RCLK PLL input adder	2.498	2.632	4.226	4.303	4.658	4.562	5.2	4.178	4.69	4.581	5.293	ns
RCLK output adder	-0.348	-0.159	-0.22	-0.201	-0.193	-0.183	-0.311	-0.038	-0.068	-0.052	-0.233	ns
RCLK PLL output adder	-2.251	-2.013	-3.141	-3.191	-3.283	-3.262	-3.312	-3.07	-3.343	-3.132	-3.331	ns

Table 1-149 specifies EP3SE260 Row Pin delay adders when using the regional clock in Stratix III devices.

**Table 1-149.** EP3SE260 Row Pin Delay Adders for Regional Clock- Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=1.1V$	$V_{CC1}=0.9V$	
RCLK input adder	0.06	0.067	0.109	0.125	0.09	0.092	0.216	0.087	0.112	0.083	0.188	ns
RCLK PLL input adder	0.136	0.134	0.232	0.243	0.287	0.263	0.437	0.233	0.258	0.253	0.433	ns
RCLK output adder	-0.043	-0.083	-0.116	-0.099	-0.091	-0.072	-0.189	-0.058	-0.079	-0.061	-0.192	ns
RCLK PLL output adder	-0.122	-0.12	-0.205	-0.215	-0.254	-0.226	-0.409	-0.205	-0.223	-0.215	-0.401	ns

## Dedicated Clock Pin Timing

Table 1-150 to Table 1-210 show clock pin timing for Stratix III devices when the clock is driven by global clock, regional clock, periphery clock and a PLL.

Table 1-150 describes Stratix III clock timing parameters.

**Table 1-150.** Stratix III Clock Timing Parameters

Symbol	Parameter
$t_{CIN}$	Delay from clock pad to I/O input register
$t_{COUT}$	Delay from clock pad to I/O output register

**Table 1-150.** Stratix III Clock Timing Parameters

Symbol	Parameter
$t_{PLL\text{CIN}}$	Delay from PLL <code>inclk</code> pad to I/O input register
$t_{PLL\text{COUT}}$	Delay from PLL <code>inclk</code> pad to I/O output register

### EP3SL50 Clock Timing Parameters

Table 1-151 and Table 1-152 show the global clock timing parameters for EP3SL50 devices.

**Table 1-151.** EP3SL50 Column Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=0.9\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=0.9\text{V}$	
$t_{\text{CIN}}$	1.736	1.752	2.459	2.691	3.036	2.957	3.435	2.691	3.036	2.957	3.435	ns
$t_{\text{COUT}}$	1.736	1.752	2.459	2.691	3.036	2.957	3.435	2.691	3.036	2.957	3.435	ns
$t_{\text{PLL}\text{CIN}}$	-0.018	-0.009	-0.237	-0.312	-0.281	-0.211	-0.013	-0.312	-0.281	-0.211	-0.013	ns
$t_{\text{PLL}\text{COUT}}$	-0.018	-0.009	-0.237	-0.312	-0.281	-0.211	-0.013	-0.312	-0.281	-0.211	-0.013	ns

**Table 1-152.** EP3SL50 Row Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=0.9\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=0.9\text{V}$	
$t_{\text{CIN}}$	1.735	1.839	2.522	2.758	3.096	2.995	3.223	2.814	3.152	3.053	3.263	ns
$t_{\text{COUT}}$	1.653	1.748	2.380	2.595	2.915	2.824	3.064	2.644	2.963	2.874	3.104	ns
$t_{\text{PLL}\text{CIN}}$	0.048	0.115	-0.144	-0.214	-0.181	-0.132	-0.188	-0.173	-0.137	-0.085	-0.230	ns
$t_{\text{PLL}\text{COUT}}$	-0.034	0.024	-0.286	-0.377	-0.362	-0.303	-0.347	-0.343	-0.326	-0.264	-0.389	ns

Table 1-153 and Table 1-154 show the regional clock timing parameters for EP3SL50 devices.

**Table 1-153.** EP3SL50 Column Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=0.9\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=1.1\text{V}$	$V_{\text{CCL}}=0.9\text{V}$	
$t_{\text{CIN}}$	1.601	1.613	2.259	2.477	2.809	2.731	3.141	2.477	2.809	2.731	3.141	ns
$t_{\text{COUT}}$	1.601	1.613	2.259	2.477	2.809	2.731	3.141	2.477	2.809	2.731	3.141	ns
$t_{\text{PLL}\text{CIN}}$	-0.019	-0.009	-0.240	-0.315	-0.286	-0.214	-0.019	-0.315	-0.286	-0.214	-0.019	ns
$t_{\text{PLL}\text{COUT}}$	-0.019	-0.009	-0.240	-0.315	-0.286	-0.214	-0.019	-0.315	-0.286	-0.214	-0.019	ns

**Table 1-154.** EP3SL50 Row Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.634	1.727	2.355	2.564	2.897	2.802	2.964	2.621	2.948	2.856	3.003	ns
t <sub>COU</sub>	1.552	1.636	2.213	2.401	2.716	2.631	2.805	2.451	2.759	2.677	2.844	ns
t <sub>PLLCIN</sub>	0.014	0.084	-0.178	-0.255	-0.221	-0.167	-0.225	-0.208	-0.173	-0.120	-0.272	ns
t <sub>PLLCOU</sub>	-0.068	-0.007	-0.320	-0.418	-0.402	-0.338	-0.384	-0.378	-0.362	-0.299	-0.431	ns

Table 1-155 and Table 1-156 show the periphery clock timing parameters for EP3SL50 devices.

**Table 1-155.** EP3SL50 Column Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.456	1.467	2.140	2.406	2.784	2.671	3.219	2.406	2.784	2.671	3.219	ns
t <sub>COU</sub>	1.456	1.467	2.140	2.406	2.784	2.671	3.221	2.406	2.784	2.671	3.221	ns
t <sub>PLLCIN</sub>	-0.081	-0.066	-0.305	-0.383	-0.355	-0.280	-0.104	-0.383	-0.355	-0.280	-0.104	ns
t <sub>PLLCOU</sub>	-0.081	-0.066	-0.305	-0.383	-0.355	-0.280	-0.104	-0.383	-0.355	-0.280	-0.104	ns

**Table 1-156.** EP3SL50 Row Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.479	1.556	2.223	2.488	2.862	2.743	3.031	2.536	2.905	2.788	3.060	ns
t <sub>COU</sub>	1.397	1.465	2.078	2.325	2.681	2.572	2.872	2.366	2.716	2.609	2.901	ns
t <sub>PLLCIN</sub>	-0.014	0.042	-0.222	-0.302	-0.278	-0.221	-0.295	-0.256	-0.228	-0.175	-0.260	ns
t <sub>PLLCOU</sub>	-0.096	-0.049	-0.364	-0.465	-0.459	-0.392	-0.454	-0.426	-0.417	-0.354	-0.419	ns

### EP3SL70 Clock Timing Parameters

Table 1-157 and Table 1-158 show the global clock timing specifications for EP3SL70 devices.

**Table 1-157.** EP3SL70 Column Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.752	1.736	2.441	2.706	3.040	2.931	3.426	2.706	3.040	2.931	3.426	ns
t <sub>COU</sub>	1.752	1.736	2.441	2.706	3.040	2.931	3.426	2.706	3.040	2.931	3.426	ns
t <sub>PLLCIN</sub>	-0.009	-0.018	-0.248	-0.302	-0.278	-0.233	-0.024	-0.302	-0.278	-0.233	-0.024	ns
t <sub>PLLCOU</sub>	-0.009	-0.018	-0.248	-0.302	-0.278	-0.233	-0.024	-0.302	-0.278	-0.233	-0.024	ns



**Table 1-158.** EP3SL70 Row Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.735	1.839	2.522	2.758	3.090	2.989	3.227	2.814	3.152	3.055	3.260	ns
t <sub>COUT</sub>	1.653	1.748	2.380	2.595	2.909	2.818	3.068	2.644	2.963	2.876	3.101	ns
t <sub>PLLCIN</sub>	0.048	0.119	-0.139	-0.217	-0.188	-0.140	-0.185	-0.173	-0.134	-0.089	-0.230	ns
t <sub>PLLCOUT</sub>	-0.034	0.028	-0.281	-0.380	-0.369	-0.311	-0.344	-0.343	-0.323	-0.268	-0.389	ns

Table 1-159 and Table 1-160 show the regional clock timing parameters for EP3SL70 devices.

**Table 1-159.** EP3SL70 Column Pin Regional Clock Timing Specification - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.613	1.609	2.254	2.491	2.816	2.715	3.136	2.491	2.816	2.715	3.136	ns
t <sub>COUT</sub>	1.613	1.609	2.254	2.491	2.816	2.715	3.136	2.491	2.816	2.715	3.136	ns
t <sub>PLLCIN</sub>	-0.009	-0.019	-0.252	-0.306	-0.282	-0.236	-0.031	-0.306	-0.282	-0.236	-0.031	ns
t <sub>PLLCOUT</sub>	-0.009	-0.019	-0.252	-0.306	-0.282	-0.236	-0.031	-0.306	-0.282	-0.236	-0.031	ns

**Table 1-160.** EP3SL70 Row Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.634	1.726	2.353	2.564	2.885	2.790	2.968	2.621	2.948	2.853	3.000	ns
t <sub>COUT</sub>	1.552	1.635	2.211	2.401	2.704	2.619	2.809	2.451	2.759	2.674	2.841	ns
t <sub>PLLCIN</sub>	0.014	0.084	-0.178	-0.255	-0.226	-0.175	-0.229	-0.208	-0.173	-0.126	-0.275	ns
t <sub>PLLCOUT</sub>	-0.068	-0.007	-0.320	-0.418	-0.407	-0.346	-0.388	-0.378	-0.362	-0.305	-0.434	ns

Table 1-161 and Table 1-162 show the periphery clock timing parameters for EP3SL70 devices.

**Table 1-161.** EP3SL70 Column Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.467	1.464	2.143	2.413	2.792	2.665	3.215	2.413	2.792	2.665	3.215	ns
t <sub>COUT</sub>	1.467	1.464	2.143	2.413	2.792	2.665	3.215	2.413	2.792	2.665	3.215	ns
t <sub>PLLCIN</sub>	-0.066	-0.081	-0.322	-0.367	-0.350	-0.306	-0.113	-0.367	-0.350	-0.306	-0.113	ns
t <sub>PLLCOUT</sub>	-0.066	-0.081	-0.322	-0.367	-0.350	-0.306	-0.113	-0.367	-0.350	-0.306	-0.113	ns

**Table 1-162.** EP3SL70 Row Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.482	1.556	2.223	2.491	2.851	2.732	3.031	2.539	2.905	2.785	3.056	ns
t <sub>COU</sub>	1.400	1.465	2.078	2.328	2.670	2.561	2.872	2.369	2.716	2.606	2.897	ns
t <sub>PLLCIN</sub>	-0.018	0.039	-0.225	-0.302	-0.285	-0.233	-0.292	-0.259	-0.231	-0.180	-0.254	ns
t <sub>PLLCOU</sub>	-0.100	-0.052	-0.367	-0.465	-0.466	-0.404	-0.451	-0.429	-0.420	-0.359	-0.413	ns

### EP3SL110 Clock Timing Parameters

Table 1-163 and Table 1-164 show the global clock timing parameters for EP3SL110 devices.

**Table 1-163.** EP3SL110 Column Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.909	1.907	2.674	2.936	3.285	3.182	3.700	2.936	3.285	3.182	3.700	ns
t <sub>COU</sub>	1.909	1.907	2.674	2.936	3.285	3.182	3.700	2.936	3.285	3.182	3.700	ns
t <sub>PLLCIN</sub>	-0.048	-0.050	-0.274	-0.330	-0.290	-0.251	-0.032	-0.330	-0.290	-0.251	-0.032	ns
t <sub>PLLCOU</sub>	-0.048	-0.050	-0.274	-0.330	-0.290	-0.251	-0.032	-0.330	-0.290	-0.251	-0.032	ns

**Table 1-164.** EP3SL110 Row Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Unit
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.882	2.014	2.754	2.975	3.344	3.221	3.511	3.062	3.413	3.287	3.551	ns
t <sub>COU</sub>	1.800	1.923	2.612	2.812	3.163	3.050	3.352	2.892	3.224	3.108	3.392	ns
t <sub>PLLCIN</sub>	-0.002	0.059	-0.202	-0.271	-0.231	-0.184	-0.212	-0.219	-0.184	-0.138	-0.260	ns
t <sub>PLLCOU</sub>	-0.084	-0.032	-0.347	-0.434	-0.412	-0.355	-0.371	-0.389	-0.373	-0.317	-0.419	ns

Table 1-165 and Table 1-166 show the regional clock timing parameters for EP3SL110 devices.

**Table 1-165.** EP3SL110 Column Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.689	1.687	2.360	2.600	2.924	2.836	3.241	2.600	2.924	2.836	3.241	ns
t <sub>COU</sub>	1.689	1.687	2.360	2.600	2.924	2.836	3.241	2.600	2.924	2.836	3.241	ns
t <sub>PLLCIN</sub>	-0.036	-0.038	-0.262	-0.317	-0.278	-0.239	-0.020	-0.317	-0.278	-0.239	-0.020	ns
t <sub>PLLCOU</sub>	-0.036	-0.038	-0.262	-0.317	-0.278	-0.239	-0.020	-0.317	-0.278	-0.239	-0.020	ns

**Table 1-166.** EP3SL110 Row Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.684	1.792	2.440	2.644	2.985	2.879	3.044	2.720	3.044	2.938	3.083	ns
t <sub>COU</sub>	1.602	1.701	2.298	2.481	2.804	2.708	2.885	2.550	2.855	2.759	2.924	ns
t <sub>PLLCIN</sub>	0.008	0.071	-0.189	-0.276	-0.218	-0.188	-0.214	-0.209	-0.174	-0.141	-0.263	ns
t <sub>PLLCOU</sub>	-0.074	-0.020	-0.334	-0.439	-0.399	-0.359	-0.373	-0.379	-0.363	-0.320	-0.422	ns

Table 1-167 and Table 1-168 show the periphery clock timing parameters for EP3SL110 devices.

**Table 1-167.** EP3SL110 Column Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.541	1.538	2.257	2.539	2.931	2.810	3.345	2.539	2.931	2.810	3.345	ns
t <sub>COU</sub>	1.541	1.538	2.257	2.539	2.931	2.810	3.345	2.539	2.931	2.810	3.345	ns
t <sub>PLLCIN</sub>	-0.029	-0.031	-0.253	-0.310	-0.276	-0.222	-0.020	-0.310	-0.276	-0.222	-0.020	ns
t <sub>PLLCOU</sub>	-0.029	-0.031	-0.253	-0.310	-0.276	-0.222	-0.020	-0.310	-0.276	-0.222	-0.020	ns

**Table 1-168.** EP3SL110 Row Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.430	1.503	2.156	2.416	2.783	2.665	2.926	2.465	2.828	2.711	2.951	ns
t <sub>COU</sub>	1.348	1.412	2.011	2.253	2.602	2.494	2.767	2.295	2.639	2.532	2.792	ns
t <sub>PLLCIN</sub>	0.015	0.072	-0.188	-0.267	-0.219	-0.180	-0.214	-0.206	-0.170	-0.133	-0.263	ns
t <sub>PLLCOU</sub>	-0.067	-0.019	-0.333	-0.430	-0.400	-0.351	-0.373	-0.376	-0.359	-0.312	-0.422	ns

### EP3SL150 Clock Timing Parameters

Table 1-169 and Table 1-170 show the global clock timing parameters for EP3SL150 devices.

**Table 1-169.** EP3SL150 Column Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Unit
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.898	1.926	2.692	2.920	3.294	3.170	3.719	2.920	3.294	3.170	3.719	ns
t <sub>COU</sub>	1.898	1.926	2.692	2.920	3.294	3.170	3.719	2.920	3.294	3.170	3.719	ns
t <sub>PLLCIN</sub>	-0.054	-0.028	-0.252	-0.342	-0.296	-0.239	-0.018	-0.342	-0.296	-0.239	-0.018	ns
t <sub>PLLCOU</sub>	-0.054	-0.028	-0.252	-0.342	-0.296	-0.239	-0.018	-0.342	-0.296	-0.239	-0.018	ns

**Table 1-170.** EP3SL150 Row Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.868	2.010	2.750	2.982	3.347	3.224	3.506	3.048	3.400	3.293	3.549	ns
t <sub>COUT</sub>	1.786	1.919	2.608	2.819	3.166	3.053	3.347	2.878	3.211	3.114	3.390	ns
t <sub>PLLCIN</sub>	0.007	0.059	-0.202	-0.255	-0.231	-0.184	-0.214	-0.210	-0.173	-0.122	-0.249	ns
t <sub>PLLCOUT</sub>	-0.075	-0.032	-0.347	-0.418	-0.412	-0.355	-0.373	-0.380	-0.362	-0.301	-0.408	ns

Table 1-171 and Table 1-172 show the regional clock timing parameters for EP3SL150 devices.

**Table 1-171.** EP3SL150 Column Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.683	1.701	2.375	2.595	2.936	2.833	3.255	2.595	2.936	2.833	3.255	ns
t <sub>COUT</sub>	1.683	1.701	2.375	2.595	2.936	2.833	3.255	2.595	2.936	2.833	3.255	ns
t <sub>PLLCIN</sub>	-0.043	-0.016	-0.240	-0.329	-0.284	-0.227	-0.005	-0.329	-0.284	-0.227	-0.005	ns
t <sub>PLLCOUT</sub>	-0.043	-0.016	-0.240	-0.329	-0.284	-0.227	-0.005	-0.329	-0.284	-0.227	-0.005	ns

**Table 1-172.** EP3SL150 Row Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.683	1.793	2.441	2.659	2.987	2.875	3.042	2.719	3.047	2.951	3.096	ns
t <sub>COUT</sub>	1.601	1.702	2.299	2.496	2.806	2.704	2.883	2.549	2.858	2.772	2.937	ns
t <sub>PLLCIN</sub>	-0.007	0.068	-0.192	-0.269	-0.221	-0.188	-0.211	-0.226	-0.186	-0.135	-0.260	ns
t <sub>PLLCOUT</sub>	-0.089	-0.023	-0.337	-0.432	-0.402	-0.359	-0.370	-0.396	-0.375	-0.314	-0.419	ns

Table 1-173 and Table 1-174 show the periphery clock timing parameters for EP3SL150 devices.

**Table 1-173.** EP3SL150 Column Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.537	1.550	2.268	2.535	2.929	2.812	3.354	2.535	2.929	2.812	3.354	ns
t <sub>COUT</sub>	1.537	1.550	2.268	2.535	2.929	2.812	3.354	2.535	2.929	2.812	3.354	ns
t <sub>PLLCIN</sub>	-0.040	-0.012	-0.235	-0.326	-0.267	-0.234	0.002	-0.326	-0.267	-0.234	0.002	ns
t <sub>PLLCOUT</sub>	-0.040	-0.012	-0.235	-0.326	-0.267	-0.234	0.002	-0.326	-0.267	-0.234	0.002	ns

**Table 1-174.** EP3SL150 Row Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.438	1.505	2.159	2.429	2.783	2.657	2.934	2.475	2.838	2.725	2.972	ns
t <sub>COU</sub>	1.356	1.414	2.014	2.266	2.602	2.486	2.775	2.305	2.649	2.546	2.813	ns
t <sub>PLLCIN</sub>	0.002	0.076	-0.183	-0.266	-0.217	-0.185	-0.206	-0.220	-0.182	-0.132	-0.260	ns
t <sub>PLLCOU</sub>	-0.080	-0.015	-0.328	-0.429	-0.398	-0.356	-0.365	-0.390	-0.371	-0.311	-0.419	ns

### EP3SL200 Clock Timing Parameters

Table 1-175 and Table 1-176 show the global clock timing parameters for EP3SL200 devices.

**Table 1-175.** EP3SL200 Column Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Unit
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	2.260	2.237	3.307	3.439	3.811	3.709	4.342	3.439	3.811	3.709	4.342	ns
t <sub>COU</sub>	2.260	2.237	3.307	3.439	3.811	3.709	4.342	3.439	3.811	3.709	4.342	ns
t <sub>PLLCIN</sub>	0.055	0.035	-0.200	-0.194	-0.169	-0.097	0.079	-0.194	-0.169	-0.097	0.079	ns
t <sub>PLLCOU</sub>	0.055	0.035	-0.200	-0.194	-0.169	-0.097	0.079	-0.194	-0.169	-0.097	0.079	ns

**Table 1-176.** EP3SL200 Row Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	2.205	2.335	3.414	3.522	3.881	3.771	4.166	3.598	3.963	3.847	4.200	ns
t <sub>COU</sub>	2.123	2.244	3.262	3.362	3.700	3.600	4.007	3.430	3.774	3.668	4.041	ns
t <sub>PLLCIN</sub>	0.100	0.164	-0.095	-0.115	-0.089	-0.029	-0.074	-0.068	-0.031	0.019	-0.121	ns
t <sub>PLLCOU</sub>	0.018	0.073	-0.247	-0.278	-0.270	-0.200	-0.233	-0.238	-0.220	-0.160	-0.280	ns

Table 1-177 and Table 1-178 show the regional clock timing parameters for EP3SL200.

**Table 1-177.** EP3SL200 Column Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.953	1.930	2.846	2.978	3.322	3.235	3.744	2.978	3.322	3.235	3.744	ns
t <sub>COU</sub>	1.953	1.930	2.846	2.978	3.322	3.235	3.744	2.978	3.322	3.235	3.744	ns
t <sub>PLLCIN</sub>	0.081	0.061	-0.175	-0.168	-0.143	-0.071	0.104	-0.168	-0.143	-0.071	0.104	ns
t <sub>PLLCOU</sub>	0.081	0.061	-0.175	-0.168	-0.143	-0.071	0.104	-0.168	-0.143	-0.071	0.104	ns

**Table 1-178.** EP3SL200 Row Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.934	2.039	2.973	3.071	3.400	3.303	3.574	3.136	3.461	3.369	3.612	ns
t <sub>COUT</sub>	1.852	1.948	2.821	2.911	3.219	3.132	3.415	2.968	3.272	3.190	3.453	ns
t <sub>PLLCIN</sub>	0.125	0.158	-0.103	-0.091	-0.063	-0.004	-0.067	-0.045	-0.015	0.045	-0.131	ns
t <sub>PLLCOUT</sub>	0.043	0.067	-0.255	-0.254	-0.244	-0.175	-0.226	-0.215	-0.204	-0.134	-0.290	ns

Table 1-179 and Table 1-180 show the periphery clock timing parameters for EP3SL200 devices.

**Table 1-179.** EP3SL200 Column Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.709	1.708	2.614	2.765	3.176	3.044	3.656	2.765	3.176	3.044	3.656	ns
t <sub>COUT</sub>	1.709	1.708	2.614	2.765	3.176	3.044	3.656	2.765	3.176	3.044	3.656	ns
t <sub>PLLCIN</sub>	0.060	0.037	-0.197	-0.190	-0.164	-0.095	0.087	-0.190	-0.164	-0.095	0.087	ns
t <sub>PLLCOUT</sub>	0.060	0.037	-0.197	-0.190	-0.164	-0.095	0.087	-0.190	-0.164	-0.095	0.087	ns

**Table 1-180.** EP3SL200 Row Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.497	1.564	2.360	2.520	2.876	2.774	3.060	2.562	2.928	2.820	3.086	ns
t <sub>COUT</sub>	1.415	1.473	2.205	2.357	2.695	2.603	2.901	2.392	2.739	2.641	2.927	ns
t <sub>PLLCIN</sub>	0.100	0.134	-0.126	-0.116	-0.091	-0.029	-0.091	-0.071	-0.036	0.020	-0.151	ns
t <sub>PLLCOUT</sub>	0.018	0.043	-0.278	-0.279	-0.272	-0.200	-0.250	-0.241	-0.225	-0.159	-0.310	ns

### EP3SL340 Clock Timing Parameters

Table 1-181 and Table 1-182 show the global clock timing parameters for EP3S340 devices.

**Table 1-181.** EP3SL340 Column Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	2.357	2.331	3.440	3.566	3.938	3.807	4.482	3.566	3.938	3.807	4.482	ns
t <sub>COUT</sub>	2.357	2.331	3.440	3.566	3.938	3.807	4.482	3.566	3.938	3.807	4.482	ns
t <sub>PLLCIN</sub>	0.091	0.058	-0.165	-0.152	-0.140	-0.096	0.111	-0.152	-0.140	-0.096	0.111	ns
t <sub>PLLCOUT</sub>	0.091	0.058	-0.165	-0.152	-0.140	-0.096	0.111	-0.152	-0.140	-0.096	0.111	ns

**Table 1-182.** EP3SL340 Row Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	2.293	2.479	3.608	3.630	4.020	3.880	4.324	3.746	4.099	3.977	4.369	ns
t <sub>COUT</sub>	2.211	2.388	3.456	3.470	3.839	3.709	4.165	3.578	3.910	3.798	4.210	ns
t <sub>PLLCIN</sub>	0.121	0.210	-0.034	-0.098	-0.045	-0.001	-0.042	-0.031	0.005	0.051	-0.083	ns
t <sub>PLLCOUT</sub>	0.039	0.119	-0.186	-0.261	-0.226	-0.172	-0.201	-0.201	-0.184	-0.128	-0.242	ns

Table 1-183 and Table 1-184 show the regional clock timing parameters for EP3S340 devices.

**Table 1-183.** EP3SL340 Column Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	2.031	2.013	2.958	3.073	3.435	3.308	3.803	3.073	3.435	3.308	3.803	ns
t <sub>COUT</sub>	2.031	2.013	2.958	3.073	3.435	3.308	3.803	3.073	3.435	3.308	3.803	ns
t <sub>PLLCIN</sub>	0.127	0.094	-0.128	-0.116	-0.104	-0.061	0.148	-0.116	-0.104	-0.061	0.148	ns
t <sub>PLLCOUT</sub>	0.127	0.094	-0.128	-0.116	-0.104	-0.061	0.148	-0.116	-0.104	-0.061	0.148	ns

**Table 1-184.** EP3SL340 Row Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.998	2.161	3.129	3.149	3.501	3.376	3.648	3.242	3.570	3.463	3.707	ns
t <sub>COUT</sub>	1.916	2.070	2.977	2.989	3.320	3.205	3.492	3.074	3.381	3.284	3.551	ns
t <sub>PLLCIN</sub>	0.157	0.248	0.006	-0.069	-0.009	0.017	-0.011	0.003	0.039	0.093	-0.057	ns
t <sub>PLLCOUT</sub>	0.075	0.157	-0.146	-0.232	-0.190	-0.154	-0.170	-0.167	-0.150	-0.086	-0.216	ns

Table 1-185 and Table 1-186 show the periphery clock timing parameters for EP3SL340 devices.

**Table 1-185.** EP3SL340 Column Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.778	1.760	2.687	2.847	3.240	3.099	3.718	2.847	3.240	3.099	3.718	ns
t <sub>COUT</sub>	1.778	1.760	2.687	2.847	3.240	3.099	3.718	2.847	3.240	3.099	3.718	ns
t <sub>PLLCIN</sub>	0.086	0.061	-0.164	-0.161	-0.140	-0.097	0.101	-0.161	-0.140	-0.097	0.101	ns
t <sub>PLLCOUT</sub>	0.086	0.061	-0.164	-0.161	-0.140	-0.097	0.101	-0.161	-0.140	-0.097	0.101	ns

**Table 1-186.** EP3SL340 Row Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.524	1.616	2.435	2.567	2.958	2.823	3.141	2.605	3.002	2.861	3.165	ns
t <sub>COU</sub>	1.442	1.525	2.280	2.404	2.777	2.652	2.982	2.435	2.813	2.682	3.006	ns
t <sub>PLLCIN</sub>	0.116	0.211	-0.039	-0.116	-0.055	-0.030	-0.051	-0.040	-0.006	0.050	-0.098	ns
t <sub>PLLCOU</sub>	0.034	0.120	-0.191	-0.279	-0.236	-0.201	-0.210	-0.210	-0.195	-0.129	-0.257	ns

### EP3SE50 Clock Timing Parameters

Table 1-187 and Table 1-188 show the global clock timing parameters for EP3SE50 devices.

**Table 1-187.** EP3SE50 Column Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.786	1.795	2.507	2.750	3.103	2.995	3.496	2.750	3.103	2.995	3.496	ns
t <sub>COU</sub>	1.786	1.795	2.507	2.750	3.103	2.995	3.496	2.750	3.103	2.995	3.496	ns
t <sub>PLLCIN</sub>	0.001	0.045	-0.125	-0.289	-0.233	-0.178	0.022	-0.289	-0.233	-0.178	0.022	ns
t <sub>PLLCOU</sub>	0.001	0.032	-0.195	-0.289	-0.246	-0.178	0.022	-0.289	-0.246	-0.178	0.022	ns

**Table 1-188.** EP3SE50 Row Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.741	1.842	2.528	2.773	3.109	3.008	3.250	2.831	3.169	3.067	3.287	ns
t <sub>COU</sub>	1.659	1.751	2.386	2.610	2.928	2.837	3.091	2.661	2.980	2.888	3.128	ns
t <sub>PLLCIN</sub>	0.047	0.108	-0.154	-0.216	-0.183	-0.131	-0.183	-0.168	-0.135	-0.084	-0.228	ns
t <sub>PLLCOU</sub>	-0.035	0.017	-0.296	-0.379	-0.364	-0.302	-0.342	-0.338	-0.324	-0.263	-0.387	ns

Table 1-189 and Table 1-190 show the regional clock timing parameters for EP3SE50 devices.

**Table 1-189.** EP3SE50 Column Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.646	1.652	2.303	2.533	2.872	2.759	3.187	2.533	2.872	2.759	3.187	ns
t <sub>COU</sub>	1.646	1.652	2.303	2.533	2.872	2.759	3.187	2.533	2.872	2.759	3.187	ns
t <sub>PLLCIN</sub>	0.014	0.043	-0.184	-0.273	-0.221	-0.164	0.038	-0.273	-0.221	-0.164	0.038	ns
t <sub>PLLCOU</sub>	0.014	0.043	-0.184	-0.273	-0.230	-0.164	0.038	-0.273	-0.230	-0.164	0.038	ns



**Table 1-190.** EP3SE50 Row Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.640	1.724	2.352	2.578	2.905	2.810	2.980	2.636	2.960	2.864	3.014	ns
t <sub>COU</sub>	1.558	1.633	2.210	2.415	2.724	2.639	2.821	2.466	2.771	2.685	2.855	ns
t <sub>PLLCIN</sub>	0.025	0.084	-0.176	-0.235	-0.205	-0.152	-0.206	-0.185	-0.156	-0.105	-0.253	ns
t <sub>PLLCOU</sub>	-0.057	-0.007	-0.318	-0.398	-0.386	-0.323	-0.365	-0.355	-0.345	-0.284	-0.412	ns

Table 1-191 and Table 1-192 show the periphery clock timing parameters for EP3SE50 devices.

**Table 1-191.** EP3SE50 Column Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.484	1.489	2.167	2.435	2.819	2.677	3.241	2.435	2.819	2.677	3.241	ns
t <sub>COU</sub>	1.484	1.489	2.167	2.435	2.819	2.677	3.241	2.435	2.819	2.677	3.241	ns
t <sub>PLLCIN</sub>	-0.046	-0.038	-0.276	-0.345	-0.310	-0.264	-0.073	-0.345	-0.310	-0.264	-0.073	ns
t <sub>PLLCOU</sub>	-0.046	-0.038	-0.276	-0.345	-0.310	-0.264	-0.073	-0.345	-0.310	-0.264	-0.073	ns

**Table 1-192.** EP3SE50 Row Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.470	1.535	2.201	2.478	2.843	2.726	3.016	2.524	2.891	2.771	3.039	ns
t <sub>COU</sub>	1.388	1.444	2.056	2.315	2.662	2.555	2.857	2.354	2.702	2.592	2.880	ns
t <sub>PLLCIN</sub>	-0.018	0.027	-0.241	-0.307	-0.285	-0.233	-0.299	-0.260	-0.238	-0.187	-0.344	ns
t <sub>PLLCOU</sub>	-0.100	-0.064	-0.383	-0.470	-0.466	-0.404	-0.458	-0.430	-0.427	-0.366	-0.503	ns

### EP3SE80 Clock Timing Parameters

Table 1-193 and Table 1-194 show the global clock timing parameters for EP3SE80 devices.

**Table 1-193.** EP3SE80 Column Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	2.037	2.059	2.879	3.127	3.524	3.430	3.989	3.127	3.524	3.430	3.989	ns
t <sub>COU</sub>	2.037	2.059	2.879	3.127	3.524	3.430	3.989	3.127	3.524	3.430	3.989	ns
t <sub>PLLCIN</sub>	-0.024	-0.007	-0.235	-0.315	-0.292	-0.199	-0.042	-0.315	-0.292	-0.199	-0.042	ns
t <sub>PLLCOU</sub>	-0.024	-0.007	-0.235	-0.315	-0.292	-0.199	-0.042	-0.315	-0.292	-0.199	-0.042	ns

**Table 1-194.** EP3SE80 Row Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.994	2.143	2.942	3.188	3.552	3.446	3.769	3.258	3.633	3.515	3.813	ns
t <sub>COUT</sub>	1.912	2.052	2.800	3.025	3.371	3.275	3.610	3.089	3.444	3.336	3.654	ns
t <sub>PLLCIN</sub>	0.020	0.086	-0.177	-0.249	-0.221	-0.171	-0.221	-0.199	-0.173	-0.121	-0.266	ns
t <sub>PLLCOUT</sub>	-0.062	-0.005	-0.319	-0.412	-0.402	-0.342	-0.380	-0.369	-0.362	-0.300	-0.425	ns

Table 1-195 and Table 1-196 show the regional clock timing parameters for EP3SE80 devices.

**Table 1-195.** EP3SE80 Column Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.828	1.849	2.578	2.811	3.171	3.087	3.547	2.811	3.171	3.087	3.547	ns
t <sub>COUT</sub>	1.828	1.849	2.578	2.811	3.171	3.087	3.547	2.811	3.171	3.087	3.547	ns
t <sub>PLLCIN</sub>	-0.013	0.004	-0.224	-0.303	-0.280	-0.187	-0.030	-0.303	-0.280	-0.187	-0.030	ns
t <sub>PLLCOUT</sub>	-0.013	0.004	-0.224	-0.303	-0.280	-0.187	-0.030	-0.303	-0.280	-0.187	-0.030	ns

**Table 1-196.** EP3SE80 Row Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.812	1.928	2.638	2.874	3.205	3.107	3.332	2.938	3.277	3.169	3.373	ns
t <sub>COUT</sub>	1.730	1.837	2.496	2.711	3.024	2.936	3.173	2.768	3.088	2.990	3.214	ns
t <sub>PLLCIN</sub>	0.010	0.087	-0.176	-0.259	-0.231	-0.167	-0.229	-0.210	-0.169	-0.118	-0.275	ns
t <sub>PLLCOUT</sub>	-0.072	-0.004	-0.318	-0.422	-0.412	-0.338	-0.388	-0.380	-0.358	-0.297	-0.434	ns

Table 1-197 and Table 1-198 show the periphery clock timing parameters for EP3SE80 devices.

**Table 1-197.** EP3SE80 Column Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.564	1.585	2.309	2.566	2.962	2.838	3.377	2.566	2.962	2.838	3.377	ns
t <sub>COUT</sub>	1.564	1.584	2.308	2.566	2.962	2.844	3.377	2.566	2.962	2.844	3.377	ns
t <sub>PLLCIN</sub>	-0.028	-0.006	-0.234	-0.327	-0.270	-0.193	-0.018	-0.327	-0.270	-0.193	-0.018	ns
t <sub>PLLCOUT</sub>	-0.028	-0.006	-0.234	-0.327	-0.270	-0.193	-0.018	-0.327	-0.270	-0.193	-0.018	ns

**Table 1-198.** EP3SE80 Row Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.441	1.503	2.156	2.429	2.776	2.665	2.934	2.477	2.828	2.711	2.959	ns
t <sub>COU</sub>	1.359	1.412	2.011	2.266	2.595	2.494	2.775	2.307	2.639	2.532	2.800	ns
t <sub>PLLCIN</sub>	0.004	0.077	-0.186	-0.268	-0.243	-0.177	-0.238	-0.219	-0.177	-0.128	-0.287	ns
t <sub>PLLCOU</sub>	-0.078	-0.014	-0.328	-0.431	-0.424	-0.348	-0.397	-0.389	-0.366	-0.307	-0.446	ns

### EP3SE110 Clock Timing Parameters

Table 1-199 and Table 1-200 show the global clock timing parameters for EP3SE110 devices.

**Table 1-199.** EP3SE110 Column Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	2.046	2.046	2.868	3.144	3.524	3.429	3.989	3.144	3.524	3.429	3.989	ns
t <sub>COU</sub>	2.046	2.046	2.868	3.144	3.524	3.429	3.989	3.144	3.524	3.429	3.989	ns
t <sub>PLLCIN</sub>	-0.020	-0.034	-0.265	-0.311	-0.267	-0.198	-0.034	-0.311	-0.267	-0.198	-0.034	ns
t <sub>PLLCOU</sub>	-0.020	-0.034	-0.265	-0.311	-0.267	-0.198	-0.034	-0.311	-0.267	-0.198	-0.034	ns

**Table 1-200.** EP3SE110 Row Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.985	2.130	2.928	3.183	3.546	3.437	3.772	3.250	3.615	3.507	3.815	ns
t <sub>COU</sub>	1.903	2.039	2.786	3.020	3.365	3.266	3.613	3.082	3.426	3.328	3.656	ns
t <sub>PLLCIN</sub>	0.012	0.084	-0.180	-0.253	-0.223	-0.173	-0.223	-0.207	-0.173	-0.123	-0.267	ns
t <sub>PLLCOU</sub>	-0.070	-0.007	-0.322	-0.416	-0.404	-0.344	-0.382	-0.377	-0.362	-0.302	-0.426	ns

Table 1-201 and Table 1-202 show the regional clock timing parameters for EP3SE110 devices.

**Table 1-201.** EP3SE110 Column Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.828	1.849	2.578	2.811	3.155	3.082	3.560	2.811	3.155	3.082	3.560	ns
t <sub>COU</sub>	1.828	1.849	2.578	2.811	3.155	3.082	3.560	2.811	3.155	3.082	3.560	ns
t <sub>PLLCIN</sub>	-0.008	-0.022	-0.254	-0.299	-0.255	-0.186	-0.021	-0.299	-0.255	-0.186	-0.021	ns
t <sub>PLLCOU</sub>	-0.008	-0.022	-0.254	-0.299	-0.255	-0.186	-0.021	-0.299	-0.255	-0.186	-0.021	ns

**Table 1-202.** EP3SE110 Row Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.798	1.924	2.631	2.860	3.204	3.101	3.332	2.920	3.268	3.163	3.373	ns
t <sub>COU</sub>	1.716	1.833	2.489	2.697	3.023	2.930	3.173	2.750	3.079	2.984	3.214	ns
t <sub>PLLCIN</sub>	0.001	0.076	-0.188	-0.262	-0.231	-0.184	-0.229	-0.218	-0.180	-0.134	-0.277	ns
t <sub>PLLCOU</sub>	-0.081	-0.015	-0.330	-0.425	-0.412	-0.355	-0.388	-0.388	-0.369	-0.313	-0.436	ns

Table 1-203 and Table 1-204 show the periphery clock timing parameters for EP3SE110 devices.

**Table 1-203.** EP3SE110 Column Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.564	1.585	2.309	2.566	2.951	2.843	3.398	2.566	2.951	2.843	3.398	ns
t <sub>COU</sub>	1.564	1.584	2.308	2.566	2.951	2.843	3.398	2.566	2.951	2.843	3.398	ns
t <sub>PLLCIN</sub>	-0.019	-0.019	-0.245	-0.310	-0.267	-0.194	-0.018	-0.310	-0.267	-0.194	-0.018	ns
t <sub>PLLCOU</sub>	-0.019	-0.019	-0.245	-0.310	-0.267	-0.194	-0.018	-0.310	-0.267	-0.194	-0.018	ns

**Table 1-204.** EP3SE110 Row Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.423	1.502	2.156	2.411	2.781	2.659	2.934	2.455	2.826	2.704	2.949	ns
t <sub>COU</sub>	1.341	1.411	2.011	2.248	2.600	2.488	2.775	2.285	2.637	2.525	2.790	ns
t <sub>PLLCIN</sub>	0.001	0.069	-0.195	-0.271	-0.241	-0.188	-0.238	-0.222	-0.190	-0.139	-0.288	ns
t <sub>PLLCOU</sub>	-0.081	-0.022	-0.337	-0.434	-0.422	-0.359	-0.397	-0.392	-0.379	-0.318	-0.447	ns

### EP3SE260 Clock Timing Parameters

Table 1-205 and Table 1-206 show the global clock timing parameters for EP3SE260 devices.

**Table 1-205.** EP3SE260 Column Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	2.264	2.260	3.332	3.442	3.814	3.686	4.335	3.442	3.814	3.686	4.335	ns
t <sub>COU</sub>	2.264	2.260	3.332	3.442	3.814	3.686	4.335	3.442	3.814	3.686	4.335	ns
t <sub>PLLCIN</sub>	0.061	0.055	-0.175	-0.189	-0.164	-0.112	0.077	-0.189	-0.164	-0.112	0.077	ns
t <sub>PLLCOU</sub>	0.061	0.055	-0.175	-0.189	-0.164	-0.112	0.077	-0.189	-0.164	-0.112	0.077	ns

**Table 1-206.** EP3SE260 Row Pin Global Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	2.196	2.360	3.441	3.512	3.866	3.760	4.179	3.590	3.960	3.834	4.224	ns
t <sub>COUT</sub>	2.114	2.269	3.289	3.352	3.685	3.589	4.020	3.422	3.771	3.655	4.065	ns
t <sub>PLLCIN</sub>	0.082	0.155	-0.106	-0.134	-0.099	-0.046	-0.086	-0.087	-0.043	0.003	-0.133	ns
t <sub>PLLCOUT</sub>	0.000	0.064	-0.258	-0.297	-0.280	-0.217	-0.245	-0.257	-0.232	-0.176	-0.292	ns

Table 1-207 and Table 1-208 show the regional clock timing parameters for EP3SE260 devices.

**Table 1-207.** EP3SE260 Column Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.956	1.953	2.871	2.981	3.329	3.205	3.742	2.981	3.329	3.205	3.742	ns
t <sub>COUT</sub>	1.956	1.953	2.871	2.981	3.329	3.205	3.742	2.981	3.329	3.205	3.742	ns
t <sub>PLLCIN</sub>	0.086	0.081	-0.149	-0.163	-0.138	-0.087	0.103	-0.163	-0.138	-0.087	0.103	ns
t <sub>PLLCOUT</sub>	0.086	0.081	-0.149	-0.163	-0.138	-0.087	0.103	-0.163	-0.138	-0.087	0.103	ns

**Table 1-208.** EP3SE260 Row Pin Regional Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.916	2.046	2.980	3.051	3.379	3.288	3.578	3.120	3.463	3.349	3.619	ns
t <sub>COUT</sub>	1.834	1.955	2.828	2.891	3.198	3.117	3.419	2.952	3.274	3.170	3.460	ns
t <sub>PLLCIN</sub>	0.114	0.186	-0.071	-0.109	-0.080	-0.015	-0.056	-0.054	-0.020	0.028	-0.100	ns
t <sub>PLLCOUT</sub>	0.032	0.095	-0.223	-0.272	-0.261	-0.186	-0.215	-0.224	-0.209	-0.151	-0.259	ns

Table 1-209 and Table 1-210 show the periphery clock timing parameters for EP3SE260 devices

**Table 1-209.** EP3SE260 Column Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 1.1V	V <sub>CCL</sub> = 0.9V	
t <sub>CIN</sub>	1.734	1.716	2.624	2.793	3.180	3.040	3.675	2.793	3.180	3.040	3.675	ns
t <sub>COUT</sub>	1.734	1.716	2.624	2.793	3.180	3.040	3.675	2.793	3.180	3.040	3.675	ns
t <sub>PLLCIN</sub>	0.064	0.060	-0.171	-0.187	-0.161	-0.118	0.077	-0.187	-0.161	-0.118	0.077	ns
t <sub>PLLCOUT</sub>	0.064	0.060	-0.171	-0.187	-0.161	-0.118	0.077	-0.187	-0.161	-0.118	0.077	ns

**Table 1-210.** EP3SE260 Row Pin Periphery Clock Timing Specifications - Preliminary

Parameter	Fast Model		C2	C3	C4	C4L		I3	I4	I4L		Units
	Industrial	Commercial	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 1.1V$	$V_{CC1} = 0.9V$	
$t_{CIN}$	1.496	1.571	2.364	2.504	2.878	2.752	3.059	2.552	2.928	2.804	3.083	ns
$t_{COUT}$	1.414	1.480	2.209	2.341	2.697	2.581	2.900	2.382	2.739	2.625	2.924	ns
$t_{PLLIN}$	0.085	0.156	-0.102	-0.134	-0.100	-0.040	-0.083	-0.086	-0.042	0.001	-0.126	ns
$t_{PLLCOUT}$	0.003	0.065	-0.254	-0.297	-0.281	-0.211	-0.242	-0.256	-0.231	-0.178	-0.285	ns

## Glossary

The following table shows the glossary for this chapter.

**Table 1.**

Glossary Table (Part 1 of 4)		
Letter	Subject	Definitions
A	—	—
B	—	—
C	—	—
D	Differential I/O Standards	<p><b>Receiver Input Waveforms</b></p> <p><b>Transmitter Output Waveforms</b></p>

Table 1.

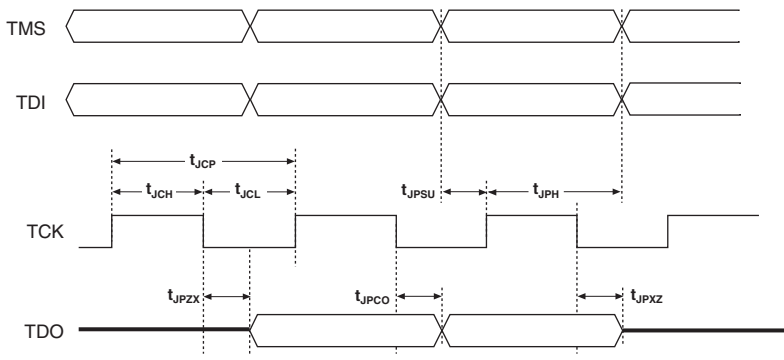
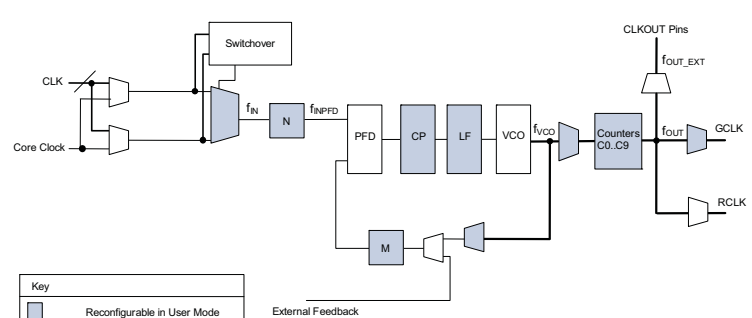
Glossary Table (Part 2 of 4)		
Letter	Subject	Definitions
E	—	—
F	$f_{HSCLK}$	HIGH-SPEED I/O Block: High-speed receiver/transmitter input and output clock frequency.
	$f_{HSDR}$	HIGH-SPEED I/O Block: Maximum/minimum LVDS data transfer rate ( $f_{HSDR} = 1/TUI$ ), non-DPA.
	$f_{HSDRDPA}$	HIGH-SPEED I/O Block: Maximum/minimum LVDS data transfer rate ( $f_{HSDRDPA} = 1/TUI$ ), DPA.
G	—	—
H	—	—
I	—	—
J	J	HIGH-SPEED I/O Block: Deserialization factor (width of parallel data bus).
	JTAG Timing Specifications	JTAG Timing Specifications are in the following figure: 
K	—	—
L	—	—
M	—	—
N	—	—
O	—	—
P	PLL Specifications	The block diagram shown in the following figure highlights the PLL Specification parameters: Diagram of PLL Specifications (1) 
		<b>Note:</b> (1) CoreClock can only be fed by dedicated clock input pins or PLL outputs.
Q	—	—

Table 1.

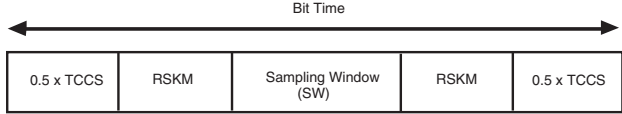
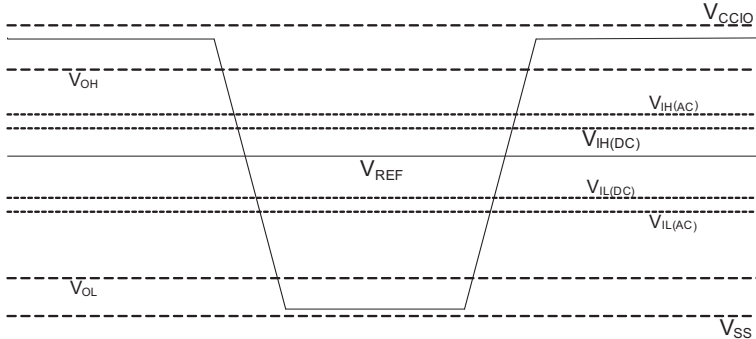
Glossary Table (Part 3 of 4)		
Letter	Subject	Definitions
R	$R_L$	Receiver differential input discrete resistor (external to Stratix III device).
S	SW (sampling window)	<p>The period of time during which the data must be valid in order to capture it correctly. The setup and hold times determine the ideal strobe position within the sampling window (the following figure):</p> <p>Timing Diagram</p> 
	Single-ended Voltage Referenced I/O Standard	<p>The JEDEC standard for SSTI and HSTL I/O standards defines both the AC and DC input signal values. The AC values indicate the voltage levels at which the receiver must meet its timing specifications. The DC values indicate the voltage levels at which the final logic state of the receiver is unambiguously defined. Once the receiver input has crossed the AC value, the receiver will change to the new logic state.</p> <p>The new logic state will be maintained as long as the input stays beyond the DC threshold. This approach is intended to provide predictable receiver timing in the presence of input waveform ringing (The following figure):</p> <p>Single-Ended Voltage Referenced I/O Standard</p> 
T	$t_C$	High-speed receiver/transmitter input and output clock period.
	TCCS (channel-to-channel-skew)	The timing difference between the fastest and the slowest output edges, including $t_{co}$ variation and clock skew, across channels driven by the same PLL. The clock is included in the TCCS measurement (refer to the <i>Timing Diagram</i> figure under <b>S</b> in this table)
	$t_{DUTY}$	HIGH-SPEED I/O Block: Duty cycle on high-speed transmitter output clock. Timing Unit Interval (TUI) The timing budget allowed for skew, propagation delays, and data sampling window. (TUI = $1/(\text{Receiver Input Clock Frequency Multiplication Factor}) = t_C/w$ )
	$t_{FALL}$	Signal High-to-low transition time (80-20%)
	$t_{INCCJ}$	Cycle-to-cycle jitter tolerance on PLL clock input
	$t_{OUTPJ\_IO}$	Period jitter on general purpose I/O driven by a PLL
	$t_{OUTPJ\_DC}$	Period jitter on dedicated clock output driven by a PLL
	$t_{RISE}$	Signal Low-to-high transition time (20-80%)
U	—	—



Table 1.

<b>Glossary Table (Part 4 of 4)</b>		
<b>Letter</b>	<b>Subject</b>	<b>Definitions</b>
<b>V</b>	$V_{CM(DC)}$	DC Common Mode Input Voltage.
	$V_{ICM}$	Input Common Mode Voltage: The common mode of the differential signal at the receiver.
	$V_{ID}$	Input differential Voltage Swing: The difference in voltage between the positive and complementary conductors of a differential transmission at the receiver.
	$V_{DIF(AC)}$	AC differential Input Voltage: Minimum AC input differential voltage required for switching.
	$V_{DIF(DC)}$	DC differential Input Voltage: Minimum DC input differential voltage required for switching.
	$V_{IH}$	Voltage Input High: The minimum positive voltage applied to the input that will be accepted by the device as a logic high.
	$V_{IH(AC)}$	High-level AC input voltage
	$V_{IH(DC)}$	High-level DC input voltage
	$V_{IL}$	Voltage Input Low: The maximum positive voltage applied to the input that will be accepted by the device as a logic low.
	$V_{IL(AC)}$	Low-level AC input voltage
	$V_{IL(DC)}$	Low-level DC input voltage
		$V_{OCM}$
	$V_{OD}$	Output differential Voltage Swing: The difference in voltage between the positive and complementary conductors of a differential transmission at the transmitter.
<b>w</b>	<b>W</b>	HIGH-SPEED I/O BLOCK: Clock Boost Factor
<b>x</b>	—	—
<b>y</b>	—	—
<b>z</b>	—	—

## Referenced Documents

This chapter references the following documents:

- [PowerPlay Early Power Estimator User Guide For Stratix III FPGAs](#)
- [PowerPlay Power Analysis](#)
- [External Memory Interface in Stratix III Devices](#)

## Chapter Revision History

Table 1-211 shows the revision history for this document.

**Table 1-211.** Chapter Revision History (Part 1 of 2)

Date and Revision	Changes Made	Summary of Changes
October 2008, version 1.8	<ul style="list-style-type: none"> <li>■ Updated “Operating Conditions”.</li> <li>■ Added “Bus Hold Specifications”.</li> <li>■ Updated Table 1-3, Table 1-6, Table 1-7, Table 1-11, and Table 1-14.</li> <li>■ Updated Table 1-17 to Table 1-25.</li> <li>■ Updated Table 1-39 to Table 1-47.</li> <li>■ Updated Table 1-50 to Table 1-210.</li> <li>■ Added (Note 3) to Table 1-11.</li> <li>■ Added (Note 1) to Table 1-14.</li> <li>■ Added (Note 6) to Table 1-17.</li> <li>■ Added (Note 1) to Table 1-47.</li> <li>■ Added Table 1-26.</li> <li>■ Added Figure 1-2.</li> </ul>	—
July 2008, version 1.7	<ul style="list-style-type: none"> <li>■ Updated “Operating Conditions” introduction section.</li> <li>■ Updated Table 1-3, Table 1-7, Table 1-8, Table 1-19, Table 1-21, Table 1-22, Table 1-25, Table 1-26, Table 1-28, Table 1-29, Table 1-30, Table 1-31, Table 1-32, Table 1-33, Table 1-35, and Table 1-48.</li> <li>■ Updated “PLL Specifications” introduction section.</li> <li>■ Updated “I/O Timing Measurement Methodology” section.</li> <li>■ Updated Figure 1-5, Figure 1-6, and Figure 1-7.</li> </ul>	—
May 2008, version 1.6	<ul style="list-style-type: none"> <li>■ Updated all tables for timing section.</li> <li>■ Added “Internal Weak Pull-Up Resistor” section.</li> <li>■ Removed “Stratix III Temperature Sensing Diode Specifications” section.</li> <li>■ Added Figure 1-6 and Figure 1-7.</li> <li>■ Added derating factors Table 1-45 and Table 1-46.</li> </ul>	Text, Table, and Figure updates.
November 2007, version 1.5	<ul style="list-style-type: none"> <li>■ Updated Table 1-90 to Table 1-109.</li> <li>■ Updated Table 1-140 to Table 1-149.</li> <li>■ Updated Table 1-175 to Table 1-180.</li> <li>■ Updated Table 1-181 to Table 1-186.</li> <li>■ Updated Table 1-205 to Table 1-210.</li> </ul>	—
October 2007, version 1.4	<ul style="list-style-type: none"> <li>■ Updated I/O Timing</li> <li>■ Added new device packages for EP3SL50, EP3SL110, EP3SE80.</li> </ul>	—
May 2007, version 1.3	<ul style="list-style-type: none"> <li>■ Added new contact information table to the About this Handbook section.</li> </ul>	—
May 2007, version 1.2	<ul style="list-style-type: none"> <li>■ Updated Table 1-44 through Table 1-205.</li> </ul>	—

**Table 1-211.** Chapter Revision History (Part 2 of 2)

<b>Date and Revision</b>	<b>Changes Made</b>	<b>Summary of Changes</b>
March 2007, version 1.1	■ Added I/O Timing section	—
November 2006, version 1.0	■ Initial Release	—