FAIRCHILD SEMICONDUCTOR™

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74F779
8-Bit Bidirectional Binary Counter with 3-STATE Outputs

General Description

The 74F779 is a fully synchronous 8-stage up/down counter with multiplexed 3-STATE I/O ports for bus-oriented applications. All control functions (hold, count up, count down, synchronous load) are controlled by two mode pins (S_0, S_1). The device also features carry lookahead for easy cascading. All state changes are initiated by the rising edge of the clock.

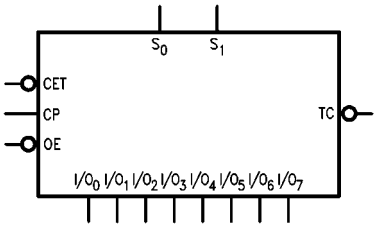
Features

- Multiplexed 3-STATE I/O ports
- Built-in lookahead carry capability
- Count frequency 100 MHz typ
- Supply current 80 mA typ
- Available in SOIC (300 mil only)

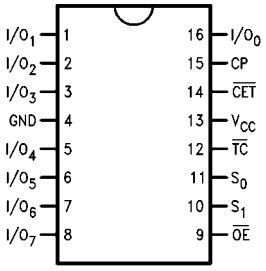
Ordering Code:

Order Number	Package Number	Package Description
74F779SC	M16B	16-Lead Small Outline Intergrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
74F779PC	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Logic Symbol



Connection Diagram



Unit Loading/Fan Out

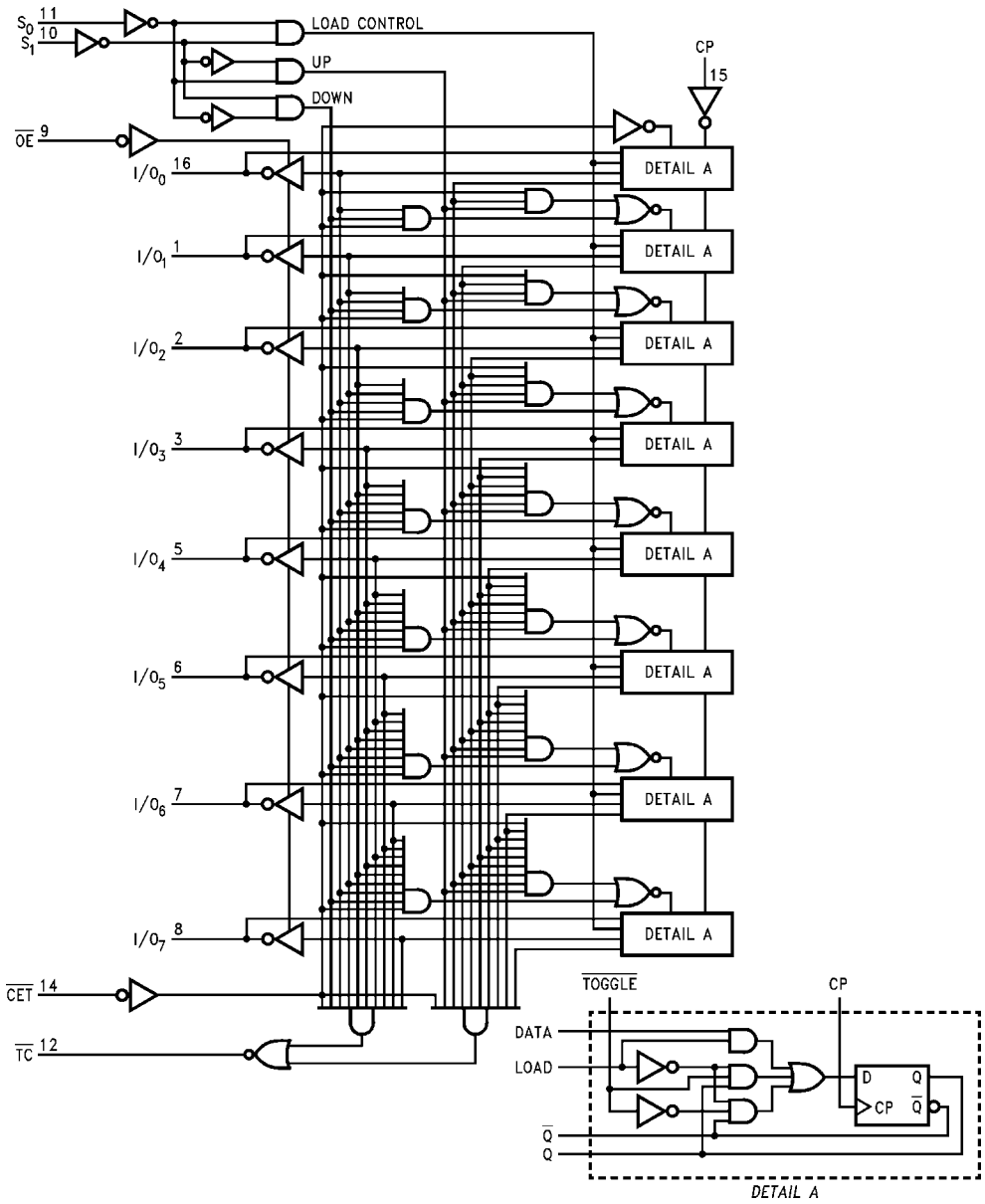
Pin Names	Description	U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
I/O_0–I/O_7	Data Inputs	0.25/0.33	5 μA/–0.2 mA
	Data Outputs	75/15 (12.5)	–3 mA/24 mA (20 mA)
S_0, S_1	Select Inputs	0.25/0.33	5 μA/–0.2 mA
$\overline{OE}$	Output Enable Input (Active LOW)	0.25/0.33	5 μA/–0.2 mA
$\overline{CET}$	Count Enable Trickle Input (Active LOW)	0.25/0.33	5 μA/–0.2 mA
CP	Clock Pulse Input (Active Rising Edge)	0.25/0.33	5 μA/–0.2 mA
$\overline{TC}$	Terminal Count Output (Active LOW)	25/12.5	–1 mA/20 mA

Function Table

S_1	S_0	$\overline{CET}$	$\overline{OE}$	CP	Function
X	X	X	H	X	I/O_0 to I/O_7 in High Z
X	X	X	L	X	Flip-Flop Outputs Appear on I/O Lines
L	L	X	H	⌐	Parallel Load All Flip-Flops
(Not LL)		H	X	⌐	Hold ($\overline{TC}$ Held HIGH)
H	L	L	X	⌐	Count Up
L	H	L	X	⌐	Count Down

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial
⌐ = LOW-to-HIGH Clock Transition
(Not LL) means S_0 and S_1 should never both be LOW level at the same time.

Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Absolute Maximum Ratings(Note 1)

Storage Temperature	−65°C to +150°C
Ambient Temperature under Bias	−55°C to +125°C
Junction Temperature under Bias	−55°C to +150°C
V_{CC} Pin Potential to Ground Pin	−0.5V to +7.0V
Input Voltage (Note 2)	−0.5V to +7.0V
Input Current ((Note 2)	−30 mA to +5.0 mA
Voltage Applied to Output	
in HIGH State (with V_{CC} = 0V)	
Standard Output	−0.5V to V_{CC}
3-STATE Output	−0.5V to +5.5V
Current Applied to Output	
in LOW State (Max)	twice the rated I_{OL} (mA)
ESD Last Passing Voltage (Min)	4000V

Recommended Operating Conditions

Free Air Ambient Temperature	0°C to +70°C
Supply Voltage	+4.5V to +5.5V

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

DC Electrical Characteristics

Symbol	Parameter		Min	Typ	Max	Units	V_{CC}	Conditions
V_{IH}	Input HIGH Voltage		2.0			V		Recognized as a HIGH Signal
V_{IL}	Input LOW Voltage				0.8	V		Recognized as a LOW Signal
V_{CD}	Input Clamp Diode Voltage				−1.2	V	Min	I_{IN} = −18 mA
V_{OH}	Output HIGH Voltage	10% V_{CC}	2.4			V	Min	I_{OH} = −3 mA
		5% V_{CC}	2.7					
V_{OL}	Output LOW Voltage	10% V_{CC}			0.5	V	Min	I_{OL} = 20 mA
		5% V_{CC}			0.5			I_{OL} = 20 mA
I_{IH}	Input HIGH Current				5.0	µA	Max	V_{IN} = 2.7V (Non-I/O Pins)
I_{BVI}	Input HIGH Current Breakdown Test				7.0	µA	Max	V_{IN} = 7.0V (Non-I/O Pins)
I_{BVIT}	Input HIGH Current Breakdown (I/O)				0.5	mA	Max	V_{IN} = 5.5V (I/O_n)
I_{CEX}	Output HIGH Leakage Current				50	µA	Max	V_{OUT} = V_{CC}
V_{ID}	Input Leakage Test		4.75			V	0.0	I_{ID} = 1.9 µA All other pins grounded
I_{OD}	Output Leakage Circuit Current				3.75	µA	0.0	V_{IOD} = 150 mV All other pins grounded
I_{ZZ}	Bus Drainage Test				500	µA	0.0	V_{OUT} = 5.25V
I_{IL}	Input LOW Current				−0.2	mA	Max	V_{IN} = 0.5V (Non I/O Pins)
$I_{IH} + I_{OZH}$	Output Leakage Current				70	µA	Max	V_{OUT} = 2.7V (I/O_n)
$I_{IL} + I_{OZL}$	Output Leakage Current				−200	µA	Max	V_{OUT} = 0.5V (I/O_n)
I_{OS}	Output Short-Circuit Current		−60		−150	mA	Max	V_{OUT} = 0V
I_{CCH}	Power Supply Current				90	mA	Max	V_O = HIGH
I_{CCL}	Power Supply Current				105	mA	Max	V_O = LOW
I_{CCZ}	Power Supply Current				110	mA	Max	V_O = HIGH Z

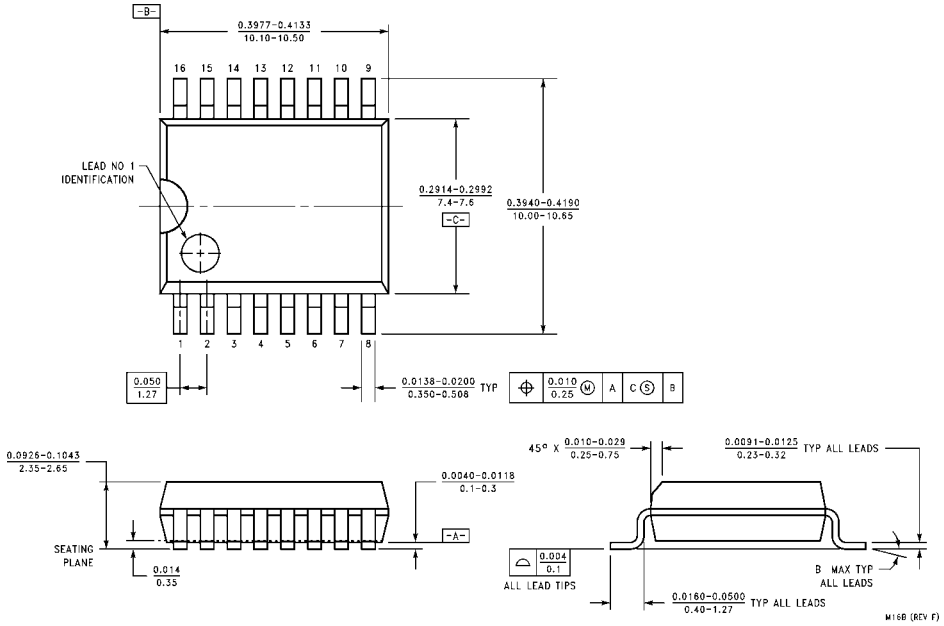
AC Electrical Characteristics

Symbol	Parameter	$T_A = +25°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF			$T_A = 0°C$ to $+70°C$, $V_{CC} = +5.0V$, $C_L = 50$ pF		Units
		Min	Typ	Max	Min	Max	
f_{MAX}	Maximum Clock Frequency	100	105		90		
t_{PLH}	Propagation Delay	3.0	5.0	8.0	3.0	8.5	ns
t_{PHL}	CP to I/O_n	5.0	7.5	11.0	5.0	11.0	
t_{PLH}	Propagation Delay	5.0	7.5	9.0	5.0	10.0	ns
t_{PHL}	CP to $\overline{TC}$	5.0	9.3	10.5	5.0	11.5	
t_{PLH}	Propagation Delay	2.5	3.8	5.5	2.5	6.0	ns
t_{PHL}	$\overline{CET}$ to $\overline{TC}$	4.5	6.1	8.0	4.5	8.5	
t_{PLH}	Propagation Delay	3.5	6.5	12.0	3.5	13.0	ns
t_{PHL}	SN to $\overline{TC}$	3.5	7.5	12.0	3.5	13.0	
t_{PZH}	Output Enable Time	3.0	5.0	7.0	3.0	8.0	ns
t_{PZL}	$\overline{OE}$ to I/O_n	5.0	8.0	10.0	5.0	10.5	
t_{PHZ}	Output Disable Time	1.0	4.0	6.5	1.0	7.0	ns
t_{PLZ}	$\overline{OE}$ to I/O_n	1.0	3.7	6.5	1.0	7.0	

AC Operating Requirements

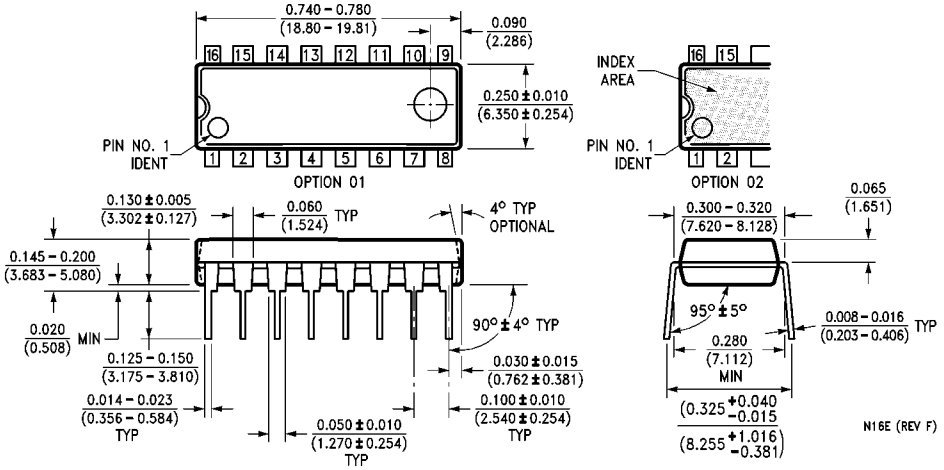
Symbol	Parameter	$T_A = +25°C$, $V_{CC} = +5.0V$		$T_A = 0°C$ to $+70°C$, $V_{CC} = +5.0V$		Units
		Min	Max	Min	Max	
$t_S(H)$	Setup Time	5.0		5.0		ns
$t_S(L)$	I/O_n to CP	5.0		5.0		
$t_H(H)$	Hold Time	0.0		0.0		ns
$t_H(L)$	I/O_n to CP	0.0		0.0		
$t_S(H)$	Setup Time	9.5		10.0		ns
$t_S(L)$	S_n to CP	9.5		10.0		
$t_H(H)$	Hold Time	0.0		0.0		ns
$t_H(L)$	S_n to CP	0.0		0.0		
$t_S(H)$	Setup Time	7.0		7.0		ns
$t_S(L)$	$\overline{CET}$ to CP	7.0		7.0		
$t_H(H)$	Hold Time	0.0		0.0		ns
$t_H(L)$	$\overline{CET}$ to CP	0.0		0.0		
$t_W(H)$	Clock Pulse Width	4.0		4.0		ns
$t_W(L)$	HIGH or LOW	4.0		4.0		

Physical Dimensions inches (millimeters) unless otherwise noted



16-Lead Small Outline Intergrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
Package Number M16B

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
Package Number N16E