



**TRIPLE LVPECL-TO-PECL
OR PECL-TO-LVPECL TRANSLATOR**

SY100EL92

FEATURES

- 5V and 3.3V power supplies required
- Also, supports LVPECL-to-PECL translation
- 500ps propagation delays
- Fully differential design
- Differential line receiver capability
- Application note
- Available in 20-pin SOIC package

DESCRIPTION

The SY100EL92 is a triple LVPECL-to-PECL or PECL-to-LVPECL translator. The device receives standard PECL signals and translates them to differential LVPECL output signals (or vice versa). SY100EL92 can also be used as a differential line receiver for PECL-to-PECL or LVPECL-to-LVPECL signals. However, please note that for the latter we will need two different power supplies. Please refer to Function Table for more details.

VBB outputs are provided for interfacing single ended input signals. If a single ended input is to be used, the VBB output should be connected to the \bar{D} input and the active signal will drive the D input. When used, the VBB should be bypassed to VCC via a 0.01 μ F capacitor. The VBB is designed to act as a switching reference for the SY100EL92 under single ended input conditions. As a result, the pin can only source/sink 0.5mA of current.

To accomplish the PECL-to-LVPECL level translation, the SY100EL92 requires three power rails. The VCC and VCC_VBB supply is to be connected to the standard PECL supply, the 3.3V supply is to be connected to the VCCO supply, and GND is connected to the system ground plane. Both the VCC and VCCO should be bypassed to ground with a 0.01 μ F capacitor.

To accomplish the LVPECL-to-PECL level translation, the SY100EL92 requires three power rails as well. The 5.0V supply is connected to the VCC and VCCO pins, 3.3V supply is connected to the VCC_VBB pin and GND is connected to the system ground plane. VCC_VBB is used to provide a proper VBB output level if a single ended input is used. For differential LVPECL input VCC_VBB can be either 3.3V or 5V.

Under open input conditions, the \bar{D} input will be biased at a VCC/2 voltage level and the D input will be pulled to GND. This condition will force the "Q" output low, ensuring stability.

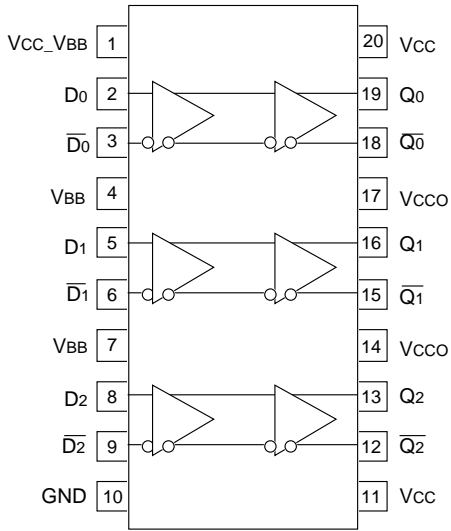
FUNCTION TABLE

| Function | Vcc | Vcco | Vcc_VBB |
|------------------|------|------|---------|
| PECL-to-LVPECL | 5.0V | 3.3V | 5.0V |
| LVPECL-to-PECL | 5.0V | 5.0V | 3.3V |
| PECL-to-PECL | 5.0V | 5.0V | 5.0V |
| LVPECL-to-LVPECL | 5.0V | 3.3V | 3.3V |

PIN NAMES

| Pin | Function |
|---------|--|
| Dn | PECL / LVPECL Inputs |
| Qn | PECL / LVPECL Outputs |
| VBB | PECL / LVPECL Reference Voltage Output |
| VCCO | Vcc for Output |
| VCC_VBB | Vcc for VBB Output |
| GND | Common Ground Rail |
| VCC | Vcc for Internal Circuitry |

PACKAGE/ORDERING INFORMATION



20-Pin Wide SOIC (Z20-1)

Ordering Information⁽¹⁾

| Part Number | Package Type | Operating Range | Package Marking | Lead Finish |
|---------------------------------|--------------|-----------------|---|----------------|
| SY100EL92ZC | Z20-1 | Commercial | SY100EL92ZC | Sn-Pb |
| SY100EL92ZCTR ⁽²⁾ | Z20-1 | Commercial | SY100EL92ZC | Sn-Pb |
| SY100EL92ZI | Z20-1 | Industrial | SY100EL92ZI | Sn-Pb |
| SY100EL92ZITR ⁽²⁾ | Z20-1 | Industrial | SY100EL92ZI | Sn-Pb |
| SY100EL92ZG ⁽³⁾ | Z20-1 | Industrial | SY100EL92ZG with Pb-Free bar-line indicator | NiPdAu Pb-Free |
| SY100EL92ZGTR ^(2, 3) | Z20-1 | Industrial | SY100EL92ZG with Pb-Free bar-line indicator | NiPdAu Pb-Free |

Notes:

1. Contact factory for die availability. Dice are guaranteed at T_A = 25°C, DC Electricals only.
2. Tape and Reel.
3. Pb-Free package is recommended for new designs.

PECL INPUT DC ELECTRICAL CHARACTERISTICS

VCC_VBB = VCC = +4.5V to +5.5V; VCCO = +3.0V to +3.8V

| Symbol | Parameter | TA = -40°C | | | TA = 0°C | | | TA = +25°C | | | TA = +85°C | | | Unit |
|-----------------|-----------------------------------|-------------|--------|--------|-------------|--------|--------|-------------|--------|--------|-------------|--------|--------|------|
| | | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| VCC | Power Supply Voltage | 4.5 | — | 5.5 | 4.5 | — | 5.5 | 4.5 | — | 5.5 | 4.5 | — | 5.5 | V |
| VIH | Input HIGH Voltage ⁽¹⁾ | 3.835 | — | 4.120 | 3.835 | — | 4.120 | 3.835 | — | 4.120 | 3.835 | — | 4.120 | V |
| VIL | Input LOW Voltage ⁽¹⁾ | 3.190 | — | 3.515 | 3.190 | — | 3.525 | 3.190 | — | 3.525 | 3.190 | — | 3.525 | V |
| VPP | Minimum Peak-to-Peak Input | 150 | — | — | 150 | — | — | 150 | — | — | 150 | — | — | mV |
| I _{IH} | Input HIGH Current | — | — | 150 | — | — | 150 | — | — | 150 | — | — | 150 | μA |
| I _{IL} | Input LOW Current | 0.5 -600 | — — | — — | 0.5 -600 | — — | — — | 0.5 -600 | — — | — — | 0.5 -600 | — — | — — | μA |
| V _{BB} | Output Reference ⁽¹⁾ | 3.620 | — | 3.740 | 3.620 | — | 3.740 | 3.620 | — | 3.740 | 3.620 | — | 3.740 | V |
| I _{CC} | Power Supply Current | — | — | 12 | — | — | 12 | — | 8.0 | 12 | — | — | 12 | mA |

Note:

1. These levels are for VCC_VBB = 5.0V. Level specifications will vary 1:1 with VCC_VBB.

LVPECL OUTPUT DC ELECTRICAL CHARACTERISTICS

VCC_VBB = VCC = +4.5V to +5.5V; VCCO = +3.0V to +3.8V

| Symbol | Parameter | TA = -40°C | | | TA = 0°C | | | TA = +25°C | | | TA = +85°C | | | Unit |
|------------------|------------------------------------|------------|------|-------|----------|------|-------|------------|-------|-------|------------|------|-------|------|
| | | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| V _{CCO} | Power Supply Voltage | 3.0 | — | 3.8 | 3.0 | — | 3.8 | 3.0 | 3.3 | 3.8 | 3.0 | — | 3.8 | V |
| V _{OH} | Output HIGH Voltage ⁽¹⁾ | 2.215 | — | 2.420 | 2.275 | — | 2.420 | 2.275 | 2.350 | 2.420 | 2.275 | — | 2.420 | V |
| V _{OL} | Output LOW Voltage ⁽¹⁾ | 1.470 | — | 1.745 | 1.490 | — | 1.680 | 1.490 | 1.600 | 1.680 | 1.490 | — | 1.680 | V |
| I _{CCO} | Power Supply Current | — | — | 20 | — | — | 20 | — | 15 | 20 | — | — | 21 | mA |

Note:

1. These levels are for V_{CCO} = 3.3V. Level specifications will vary 1:1 with V_{CCO}.

LVPECL INPUT DC ELECTRICAL CHARACTERISTICS

VCC_VBB = +3.0V to +3.8V⁽¹⁾; VCC = VCCO = +4.5V to +5.5V

| Symbol | Parameter | TA = -40°C | | | TA = 0°C | | | TA = +25°C | | | TA = +85°C | | | Unit |
|-----------------|-----------------------------------|-------------|--------|--------|-------------|--------|--------|-------------|--------|--------|-------------|--------|--------|------|
| | | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| VCC | Power Supply Voltage | 4.5 | — | 5.5 | 4.5 | — | 5.5 | 4.5 | — | 5.5 | 4.5 | — | 5.5 | V |
| VIH | Input HIGH Voltage ⁽²⁾ | 2.135 | — | 2.420 | 2.135 | — | 2.420 | 2.135 | — | 2.420 | 2.135 | — | 2.420 | V |
| VIL | Input LOW Voltage ⁽²⁾ | 1.490 | — | 1.825 | 1.490 | — | 1.825 | 1.490 | — | 1.825 | 1.490 | — | 1.825 | V |
| VPP | Minimum Peak-to-Peak Input | 150 | — | — | 150 | — | — | 150 | — | — | 150 | — | — | mV |
| I _{IH} | Input HIGH Current | — | — | 150 | — | — | 150 | — | — | 150 | — | — | 150 | μA |
| I _{IL} | Input LOW Current | 0.5 -600 | — — | — — | 0.5 -600 | — — | — — | 0.5 -600 | — — | — — | 0.5 -600 | — — | — — | μA |
| V _{BB} | Output Reference ⁽²⁾ | 1.92 | — | 2.04 | 1.92 | — | 2.04 | 1.92 | — | 2.04 | 1.92 | — | 2.04 | V |
| I _{CC} | Power Supply Current | — | — | 12 | — | — | 12 | — | 8.0 | 12 | — | — | 12 | mA |

Notes:

- VCC_VBB = 3.3V is only required for single-ended LVPECL input. For differential LVPECL input, VCC_VBB can be either 3.3V or 5V.
- These levels are for VCC_VBB = 3.3V. Level specifications will vary 1:1 with VCC_VBB.

PECL OUTPUT DC ELECTRICAL CHARACTERISTICS

V_{CC_VBB} = +3.0V to +3.8V; V_{CC} = V_{CCO} = +4.5V to +5.5V

| Symbol | Parameter | T _A = -40°C | | | T _A = 0°C | | | T _A = +25°C | | | T _A = +85°C | | | Unit |
|------------------|------------------------------------|------------------------|------|-------|----------------------|------|-------|------------------------|------|-------|------------------------|------|-------|------|
| | | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| V _{CCO} | Power Supply Voltage | 4.5 | — | 5.5 | 4.5 | — | 5.5 | 4.5 | — | 5.5 | 4.5 | — | 5.5 | V |
| V _{OH} | Output HIGH Voltage ⁽¹⁾ | 3.915 | — | 4.120 | 3.975 | — | 4.120 | 3.975 | — | 4.120 | 3.975 | — | 4.120 | V |
| V _{OL} | Output LOW Voltage ⁽¹⁾ | 3.170 | — | 3.445 | 3.190 | — | 3.380 | 3.190 | — | 3.380 | 3.190 | — | 3.380 | V |
| I _{CCO} | Power Supply Current | — | — | 20 | — | — | 20 | — | 15 | 20 | — | — | 21 | mA |

Note:

1. These levels are for V_{CCO} = 5.0V. Level specifications will vary 1:1 with V_{CCO}.

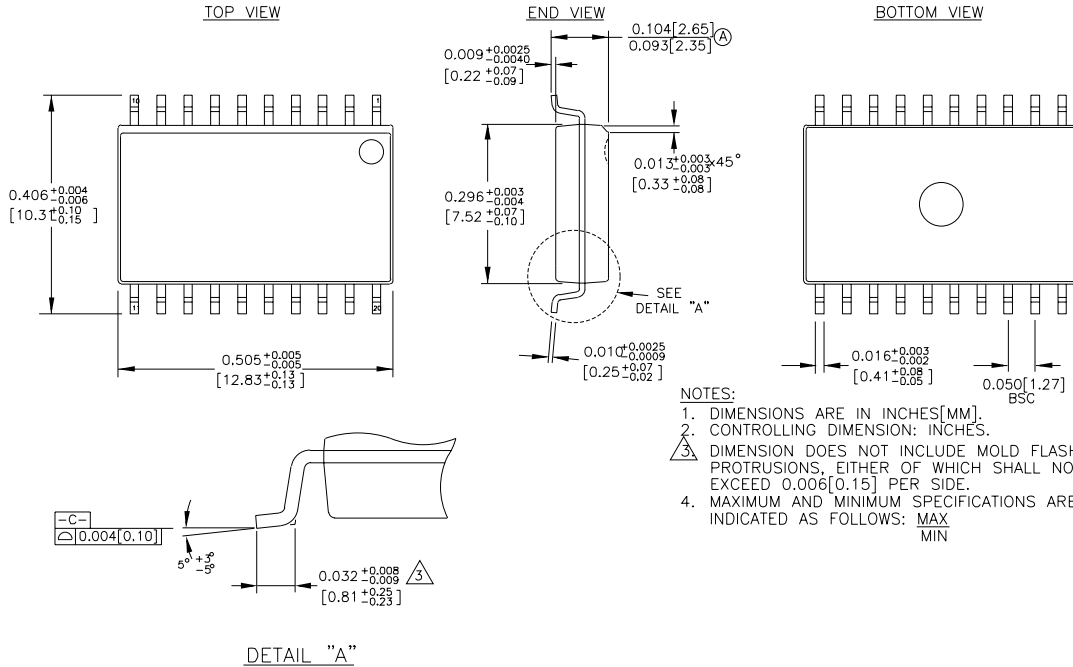
AC ELECTRICAL CHARACTERISTICS⁽¹⁾

| Symbol | Parameter | T _A = -40°C | | | T _A = 0°C | | | T _A = +25°C | | | T _A = +85°C | | | Unit |
|----------------------------------|---|------------------------|----------------|--|----------------------|----------------|--|------------------------|----------------|--|------------------------|----------------|--|------|
| | | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | |
| t _{PD} | Propagation Delay D to Q Diff. S.E. | 430 410 | 520 540 | 630 710 | 430 410 | 520 540 | 630 710 | 430 410 | 520 540 | 630 710 | 430 410 | 520 540 | 630 710 | ps |
| t _{skew} | Within-Device Skew Output-to-Output ⁽²⁾ Part-to-Part (Diff.) ⁽²⁾ Duty Cycle (Diff.) ⁽³⁾ | — — — | 20 20 25 | 100 200 — | — — — | 20 20 25 | 100 200 — | — — — | 20 20 25 | 100 200 — | — — — | 20 20 25 | 100 200 — | ps |
| V _{PP} | Minimum Input Swing ⁽⁴⁾ | 150 | — | — | 150 | — | — | 150 | — | — | 150 | — | — | mV |
| V _{CMR} | Common Mode Range ⁽⁵⁾ V _{PP} < 500mV V _{PP} ≥ 500mV | 1.3 1.5 | — — | V _{CC} -0.2 V _{CC} -0.2 | 1.2 1.4 | — — | V _{CC} -0.2 V _{CC} -0.2 | 1.2 1.4 | — — | V _{CC} -0.2 V _{CC} -0.2 | 1.2 1.4 | — — | V _{CC} -0.2 V _{CC} -0.2 | V |
| t _r t _f | Output Rise/Fall Times Q (20% to 80%) | 320 | — | 580 | 320 | — | 580 | 320 | — | 580 | 320 | — | 580 | ps |

Notes:

1. Power supply requirements applies as indicated in the DC electrical characteristics tables.
2. Skew is measured between outputs under identical transitions.
3. Duty cycle skew is the difference between a TPLH and TPHL propagation delay through a device Common Mode Range.
4. Minimum input swing for which AC parameters are guaranteed. The device has a DC gain of ~40.
5. The CMR range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between V_{PP} min. and 1V.

20-PIN SOIC .300" WIDE (Z20-1)



Rev. 03

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