## FEATURES

- **3.3V and 5V power supply options**
- **500ps propagation delay**
- **Fully differential design**
- **Supports both standard and low voltage operation**
- **Available in 20-pin SOIC package**

## DESCRIPTION

The SY100EL90V is a triple ECL/LVECL-to-PECL/LVPECL translator. The device can translate over all combinations of supply voltages: -5V ECL to 5V PECL, -5V ECL to 3.3V LVPECL, -3.3V LVECL to 5V PECL or -3.3V LVECL to 3.3V LVPECL.

A $V_{BB}$ output is provided for interfacing with single ended ECL signals at the input. If a single ended input is to be used, the $V_{BB}$ output should be connected to the $\overline{D}$ input. The active signal would then drive the D input. When used, the $V_{BB}$ output should be bypassed to via a 0.01µF capacitor. The $V_{BB}$ output is designed to act as the switching reference for the EL90V under single ended input switching conditions. As a result this pin can only source/sink up to 0.5mA of current.

To accomplish the level translation the EL90V requires three power rails. The $V_{CC}$ supply should be connected to the positive supply, and the $V_{EE}$ pin should be connected to the negative power supply. The GND pins as expected are connected to the system ground plane. Both $V_{EE}$ and $V_{CC}$ should be bypassed to ground via 0.01µF capacitors.

Under open input conditions, the $\overline{D}$ input will be biased at $V_{CC}/2$ and the D input will be pulled to $V_{EE}$. This condition will force the Q output to a LOW, ensuring stability.

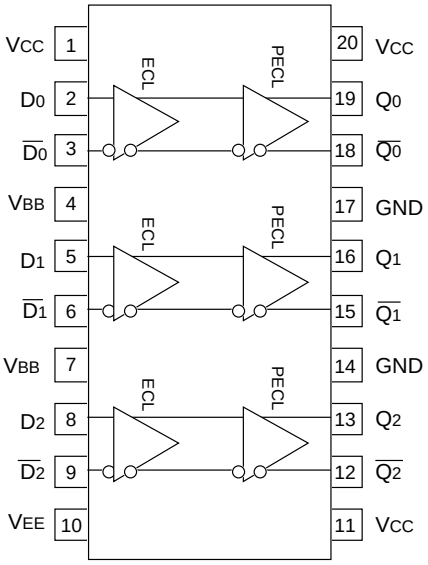
## FUNCTION TABLE

| Function | $V_{CC}$ | GND | $V_{EE}$ |
|---|---|---|---|
| –5V ECL to 5V PECL | 5V | 0V | –5V |
| –5V ECL to 3.3V LVPECL | 3.3V | 0V | –5V |
| –3.3V LVECL to 5V PECL | 5V | 0V | –3.3V |
| –3.3V LVECL to 3.3V LVPECL | 3.3V | 0V | –3.3V |

## PIN NAMES

| Pin | Function |
|---|---|
| Dn | ECL/LVECL Inputs |
| $Q_n$ | PECL/LVPECL Outputs |
| $V_{BB}$ | ECL/LVECL Reference Voltage Output |

## PACKAGE/ORDERING INFORMATION




**20-Pin Wide SOIC (Z20-1)**

## Ordering Information[1]

| Part Number | Package Type | Operating Range | Package Marking | Lead Finish |
|---|---|---|---|---|
| SY100EL90VZC | Z20-1 | Commercial | SY100EL90VZC | Sn-Pb |
| SY100EL90VZCTR[2] | Z20-1 | Commercial | SY100EL90VZC | Sn-Pb |
| SY100EL90VZI | Z20-1 | Industrial | SY100EL90VZI | Sn-Pb |
| SY100EL90VZITR[2] | Z20-1 | Industrial | SY100EL90VZI | Sn-Pb |
| SY100EL90VZG[3] | Z20-1 | Industiral | SY100EL90VZG with Pb-Free bar-line indicator | NiPdAu Pb-Free |
| SY100EL90VZGTR[2, 3] | Z20-1 | Industrial | SY100EL90VZG 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.

## ECL/LVECL INPUT DC ELECTRICAL CHARACTERISTICS

ECL: $V_{EE}$ = –4.2V to –5.5V; LVECL: $V_{EE}$ = –3.0V to –3.8V

| 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. | |
| $V_{IH}$ | Input HIGH Voltage | –1165 | — | –880 | –1165 | — | –880 | –1165 | — | –880 | –1165 | — | –880 | mV |
| $V_{IL}$ | Input LOW Voltage | –1810 | — | –1475 | –1810 | — | –1475 | –1810 | — | –1475 | –1810 | — | –1475 | mV |
| $I_{EE}$ | Power Supply Current | — | — | 8 | — | — | 8 | — | — | 8 | — | — | 8 | mA |
| $I_{IH}$ | Input HIGH Current | — | — | 150 | — | — | 150 | — | — | 150 | — | — | 150 | µA |
| $I_{IL}$ | Input LOW Current Dn | 0.5 | — | — | 0.5 | — | — | 0.5 | — | — | 0.5 | — | — | µA |
| | $\overline{Dn}$ | –600 | — | — | –600 | — | — | –600 | — | — | –600 | — | — | |
| $V_{BB}$ | Output Reference | –1.38 | — | –1.26 | –1.38 | — | –1.26 | –1.38 | — | –1.26 | –1.38 | — | –1.26 | V |
| $V_{PP}$ | Minimum Peak-to-Peak Input | 150 | — | — | 150 | — | — | 150 | — | — | 150 | — | — | mV |

## LVPECL OUTPUT DC ELECTRICAL CHARACTERISTICS

$V_{CC}$ = +3.0V to +3.8V

| 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. | |
| $V_{OH}$ | 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 |
| $I_{CC}$ | Power Supply Current | — | — | 24 | — | — | 24 | — | 20 | 24 | — | — | 26 | mA |

**Note:**

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

## PECL OUTPUT DC ELECTRICAL CHARACTERISTICS

$V_{CC}$ = +4.2V 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. | |
| $V_{OH}$ | Output HIGH Voltage[1] | 3.915 | — | 4.120 | 3.975 | — | 4.120 | 3.975 | 4.050 | 4.120 | 3.975 | — | 4.120 | V |
| $V_{OL}$ | Output LOW Voltage[1] | 3.170 | — | 3.445 | 3.190 | — | 3.380 | 3.190 | 3.300 | 3.380 | 3.190 | — | 3.380 | V |
| $I_{CC}$ | Power Supply Current | — | — | 24 | — | — | 24 | — | 20 | 24 | — | — | 26 | mA |

**Note:**

1. These values are for $V_{CC}$ = 5V. Level specifications will vary 1:1 with $V_{CC}$.

## AC ELECTRICAL CHARACTERISTICS

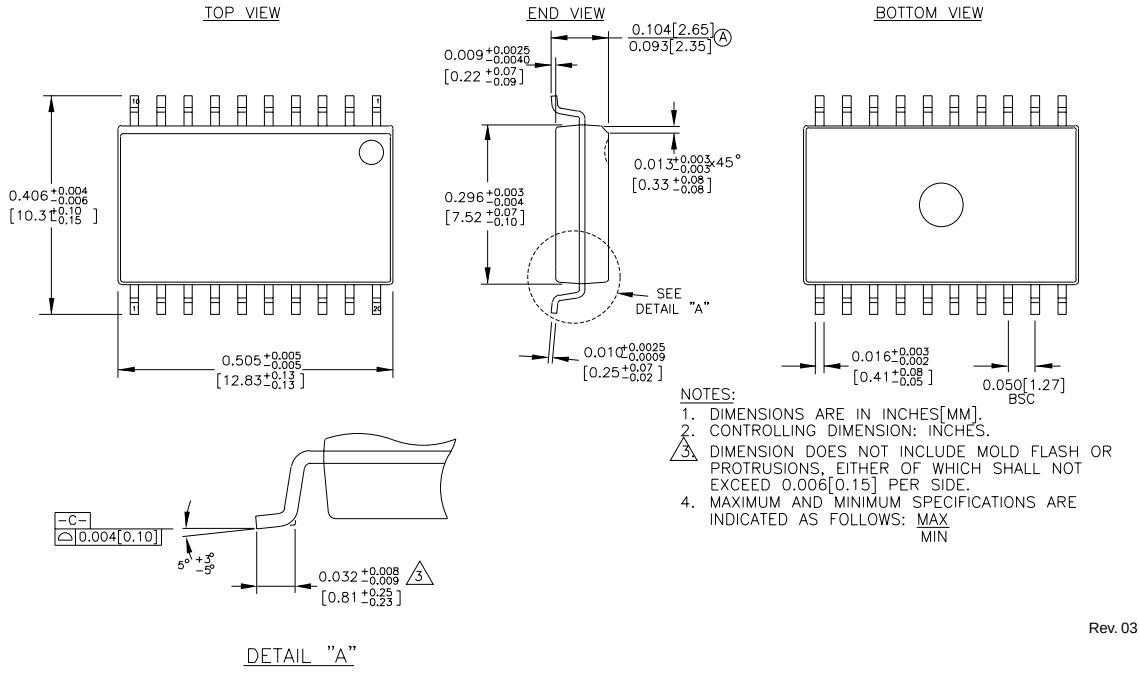
ECL: $V_{EE}$ = –4.2V to –5.5V; LVECL: $V_{EE}$ = –3.0V to –3.8V; PECL: $V_{CC}$ = +4.2V to +5.5V; LVPECL: $V_{CC}$ = +3.0V to +3.8V

| | | $T_A$ = –40°C | | | $T_A$ = 0°C | | | $T_A$ = +25°C | | | $T_A$ = +85°C | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Symbol** | **Parameter** | **Min.** | **Typ.** | **Max.** | **Min.** | **Typ.** | **Max.** | **Min.** | **Typ.** | **Max.** | **Min.** | **Typ.** | **Max.** | **Unit** |
| $t_{PD}$ | Propagation Delay Diff. | 390 | — | 590 | 410 | — | 610 | 420 | — | 620 | 460 | — | 660 | ps |
| | D to Q S.E. | 340 | — | 640 | 360 | — | 660 | 370 | — | 670 | 410 | — | 710 | |
| $t_{skew}$ | Within-Device Skew(1) | | | | | | | | | | | | | |
| | Output-to-Output | — | 20 | 100 | — | 20 | 100 | — | 20 | 100 | — | 20 | 100 | ps |
| | Part-to-Part (Diff.) | — | — | 200 | — | — | 200 | — | — | 200 | — | — | 200 | |
| | Duty Cycle (Diff.) | — | 25 | — | — | 25 | — | — | 25 | — | — | 25 | — | |
| $V_{PP}$ | Minimum Input Swing(2) | 150 | — | — | 150 | — | — | 150 | — | — | 150 | — | — | mV |
| $V_{CMR}$ | Common Mode Range(3) | — | — | –0.4 | — | — | –0.4 | — | — | –0.4 | — | — | –0.4 | V |
| $t_r$ | Output Rise/Fall Times Q | 230 | — | 500 | 230 | — | 500 | 230 | — | 500 | 230 | — | 500 | ps |
| $t_f$ | (20% to 80%) | | | | | | | | | | | | | |

**Notes:**

1. Skew is measured between outputs under identical transitions.
2. Minimum input swing for which AC parameters are guaranteed. The device will function reliably with differential inputs down to 100mV.
3. 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. $V_{CMR}$ min. depends on $V_{EE}$, $V_{PP}$ and temperature at $V_{PP}$ <500mV and –40°C, $V_{CMR}$ is $V_{EE}$+1.3V; and for 0–85°C, $V_{CMR}$ is $V_{EE}$+1.2V. At $V_{PP} \geq$ 500mV and –40°C, $V_{CMR}$ is $V_{EE}$+1.5V; and for 0–85°C, $V_{CMR}$ is $V_{EE}$+1.4V.

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

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