



# 3.3V TRIPLE LVPECL-to-ECL OR LVPECL-to-LVECL TRANSLATOR

SY100EL91L

## FEATURES

- 3.3V power supply
- 620ps propagation delay
- Fully differential design
- Supports low voltage operation
- Available in 20-pin SOIC package

## DESCRIPTION

The SY100EL91L is a triple LVPECL-to-ECL or LVPECL-to-LVECL translator.

A  $V_{BB}$  output is provided for interfacing with single ended PECL signals at the input. If a single ended input is to be used, the  $V_{BB}$  output should be connected to the  $\bar{D}$  input. The active signal would then drive the D input. When used, the  $V_{BB}$  output should be bypassed to ground via a  $0.01\mu\text{F}$  capacitor. The  $V_{BB}$  output is designed to act as the switching reference for the EL91L 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 EL91L 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  $0.01\mu\text{F}$  capacitors.

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

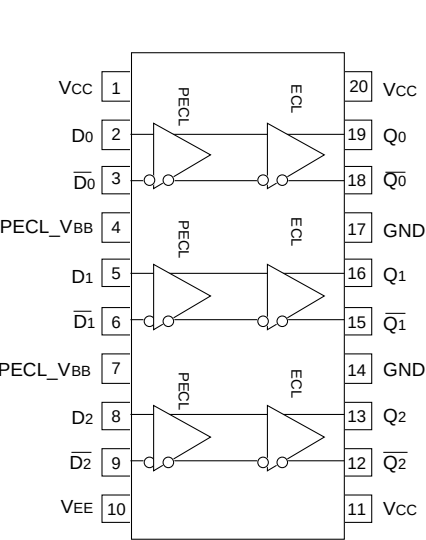
## FUNCTION TABLE

| Function        | Vcc  | VEE   |
|-----------------|------|-------|
| LVPECL-to-ECL   | 3.3V | -5.0V |
| LVPECL-to-LVECL | 3.3V | -3.3V |

## PIN NAMES

| Pin      | Function                      |
|----------|-------------------------------|
| Dn       | PECL Inputs                   |
| Qn       | ECL Outputs                   |
| PECL_VBB | PECL Reference Voltage Output |

PACKAGE/ORDERING INFORMATION



20-Pin Wide SOIC (Z20-1)

Ordering Information<sup>(1)</sup>

| Part Number                      | Package Type | Operating Range | Package Marking                              | Lead Finish    |
|----------------------------------|--------------|-----------------|----------------------------------------------|----------------|
| SY100EL91LZC                     | Z20-1        | Commercial      | SY100EL91LZC                                 | Sn-Pb          |
| SY100EL91LZCTR <sup>(2)</sup>    | Z20-1        | Commercial      | SY100EL91LZC                                 | Sn-Pb          |
| SY100EL91LZI                     | Z20-1        | Industrial      | SY100EL91LZI                                 | Sn-Pb          |
| SY100EL91LZITR <sup>(2)</sup>    | Z20-1        | Industrial      | SY100EL91LZI                                 | Sn-Pb          |
| SY100EL91LZG <sup>(3)</sup>      | Z20-1        | Industrial      | SY100EL91LZG with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY100EL91LZGTR <sup>(2, 3)</sup> | Z20-1        | Industrial      | SY100EL91LZG with Pb-Free bar-line indicator | Pb-Free NiPdAu |

- Notes:**
- 1. Contact factory for die availability. Dice are guaranteed at T<sub>A</sub> = 25°C, DC Electricals only.
  - 2. Tape and Reel.
  - 3. Pb-Free package is recommended for new designs.

**3.3V LVPECL INPUT DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>**

| Symbol          | Parameter                         | T <sub>A</sub> = -40°C |      |       | T <sub>A</sub> = 0°C |      |       | T <sub>A</sub> = +25°C |       |       | T <sub>A</sub> = +85°C |      |       | Unit |
|-----------------|-----------------------------------|------------------------|------|-------|----------------------|------|-------|------------------------|-------|-------|------------------------|------|-------|------|
|                 |                                   | Min.                   | Typ. | Max.  | Min.                 | Typ. | Max.  | Min.                   | Typ.  | Max.  | Min.                   | Typ. | Max.  |      |
| V <sub>CC</sub> | Power Supply Voltage              | 3.0                    | —    | 3.8   | 3.0                  | —    | 3.8   | 3.0                    | 3.3   | 3.8   | 3.0                    | —    | 3.8   | V    |
| V <sub>IH</sub> | Input HIGH Voltage <sup>(2)</sup> | 2.135                  | —    | 2.420 | 2.135                | —    | 2.420 | 2.135                  | 2.350 | 2.420 | 2.135                  | —    | 2.420 | V    |
| V <sub>IL</sub> | Input LOW Voltage <sup>(2)</sup>  | 1.490                  | —    | 1.825 | 1.490                | —    | 1.825 | 1.490                  | —     | 1.825 | 1.490                  | —    | 1.825 | V    |
| I <sub>IH</sub> | Input HIGH Current                | —                      | —    | 150   | —                    | —    | 150   | —                      | —     | 150   | —                      | —    | 150   | μA   |
| I <sub>IL</sub> | Input LOW Current $\frac{Dn}{Dn}$ | 0.5                    | —    | —     | 0.5                  | —    | —     | 0.5                    | —     | —     | 0.5                    | —    | —     | μA   |
|                 |                                   | -600                   | —    | —     | -600                 | —    | —     | -600                   | —     | —     | -600                   | —    | —     |      |
| V <sub>BB</sub> | Output Reference <sup>(2)</sup>   | 1.920                  | —    | 2.040 | 1.920                | —    | 2.040 | 1.920                  | —     | 2.040 | 1.920                  | —    | 2.040 | V    |
| I <sub>CC</sub> | Power Supply Current              | —                      | —    | 10    | —                    | —    | 10    | —                      | 6.0   | 10    | —                      | —    | 10    | mA   |

**Notes:**

1. Parametric values specified at: 3 volt Power Supply Range 100EL91L Series -3.0V to -3.8V.
2. These levels are for V<sub>CC</sub> = 3.3V. Level specifications will vary 1:1 with V<sub>CC</sub>.

**ECL/LVECL OUTPUT DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>**

| Symbol          | Parameter                                | T <sub>A</sub> = -40°C |      |       | T <sub>A</sub> = 0°C |      |       | T <sub>A</sub> = +25°C |       |       | T <sub>A</sub> = +85°C |      |       | Unit |
|-----------------|------------------------------------------|------------------------|------|-------|----------------------|------|-------|------------------------|-------|-------|------------------------|------|-------|------|
|                 |                                          | Min.                   | Typ. | Max.  | Min.                 | Typ. | Max.  | Min.                   | Typ.  | Max.  | Min.                   | Typ. | Max.  |      |
| V <sub>EE</sub> | Power Supply Voltage $\frac{ECL}{LVECL}$ | -4.2                   | —    | -5.5  | -4.2                 | —    | -5.5  | -4.2                   | —     | -5.5  | -4.2                   | —    | -5.5  | V    |
|                 |                                          | -3.0                   | —    | -3.8  | -3.0                 | —    | -3.8  | -3.0                   | —     | -3.8  | -3.0                   | —    | -3.8  |      |
| V <sub>OH</sub> | Output HIGH Voltage                      | -1085                  | —    | -880  | -1025                | —    | -880  | -1025                  | -955  | -880  | -1025                  | —    | -880  | mV   |
| V <sub>OL</sub> | Output LOW Voltage                       | -1830                  | —    | -1555 | -1810                | —    | -1620 | -1810                  | -1705 | -1620 | -1810                  | —    | -1620 | mV   |
| I <sub>EE</sub> | Power Supply Current                     | —                      | —    | 28    | —                    | —    | 28    | —                      | 22    | 28    | —                      | —    | 30    | mA   |

**Note:**

1. Parametric values specified at: 3 volt Power Supply Range 100EL91L Series -3.0V to -3.8V.

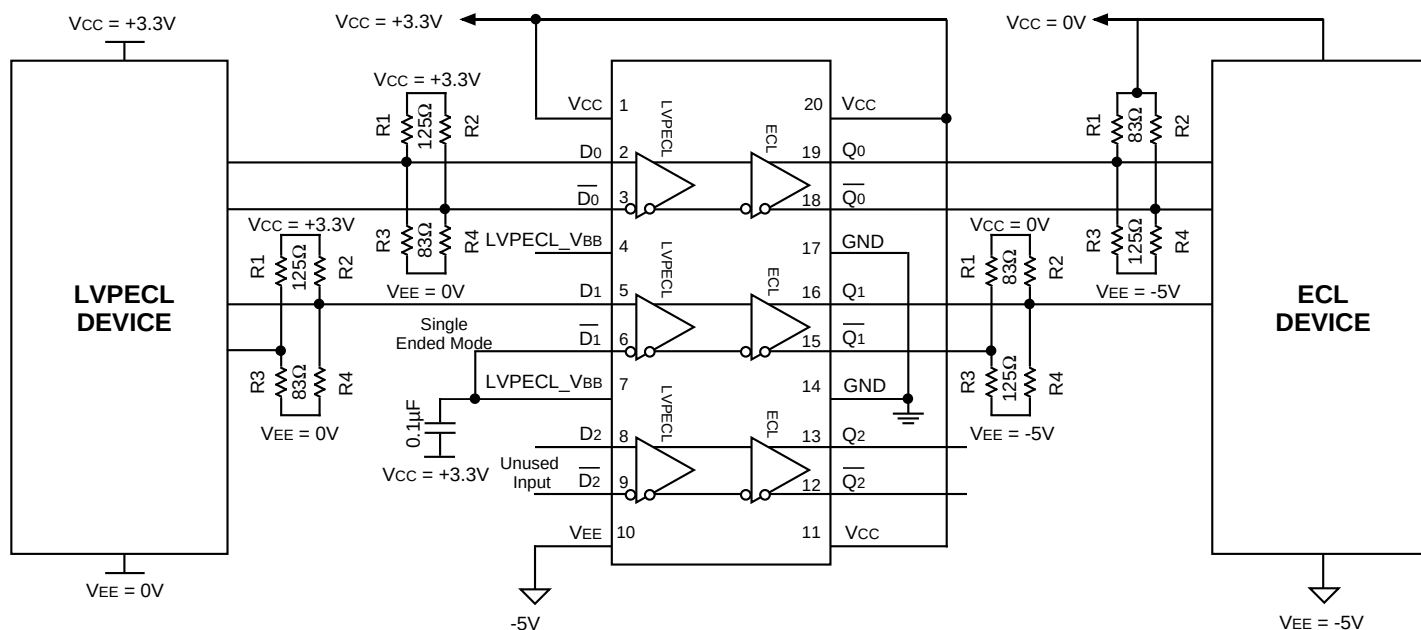
**AC ELECTRICAL CHARACTERISTICS<sup>(4)</sup>**LVPECL:  $V_{CC} = +3.0V$  to  $+3.8V$ , ECL:  $V_{EE} = -4.2V$  to  $-5.5V$ , LVECL:  $V_{EE} = -3.0V$  to  $-3.8V$ 

| Symbol                           | Parameter                                | T <sub>A</sub> = −40°C |            |            | T <sub>A</sub> = 0°C |            |            | T <sub>A</sub> = +25°C |            |            | T <sub>A</sub> = +85°C |            |            | Unit                 |    |
|----------------------------------|------------------------------------------|------------------------|------------|------------|----------------------|------------|------------|------------------------|------------|------------|------------------------|------------|------------|----------------------|----|
|                                  |                                          | Min.                   | Typ.       | Max.       | Min.                 | Typ.       | Max.       | Min.                   | Typ.       | Max.       | Min.                   | Typ.       | Max.       |                      |    |
| t <sub>PD</sub>                  | Propagation Delay<br>D to Q              | Diff.<br>S.E.          | 490<br>440 | 590<br>590 | 690<br>740           | 510<br>460 | 610<br>610 | 710<br>760             | 520<br>470 | 620<br>620 | 720<br>770             | 560<br>510 | 660<br>660 | 760<br>810           | ps |
| t <sub>skew</sub>                | Within-Device Skew <sup>(1)</sup>        |                        |            |            |                      |            |            |                        |            |            |                        |            |            |                      | ps |
|                                  | Output-to-Output                         |                        | —          | 40         | 100                  | —          | 40         | 100                    | —          | 40         | 100                    | —          | 40         | 100                  |    |
|                                  | Part-to-Part (Diff.)                     |                        | —          | —          | 200                  | —          | —          | 200                    | —          | —          | 200                    | —          | —          | 200                  |    |
|                                  | Duty Cycle (Diff.)                       |                        | —          | 25         | —                    | —          | 25         | —                      | —          | 25         | —                      | —          | 25         | —                    |    |
| V <sub>PP</sub>                  | Minimum Input Swing <sup>(2)</sup>       |                        | 150        | —          | —                    | 150        | —          | —                      | 150        | —          | —                      | 150        | —          | —                    | mV |
| V <sub>CMR</sub>                 | Common Mode Range <sup>(3)</sup>         |                        |            |            |                      |            |            |                        |            |            |                        |            |            |                      | V  |
|                                  | V <sub>PP</sub> < 500mV                  |                        | 1.3        | —          | V <sub>CC</sub> −0.2 | 1.2        | —          | V <sub>CC</sub> −0.2   | 1.2        | —          | V <sub>CC</sub> −0.2   | 1.2        | —          | V <sub>CC</sub> −0.2 |    |
|                                  | V <sub>PP</sub> > 500mV                  |                        | 1.5        | —          | V <sub>CC</sub> −0.2 | 1.4        | —          | V <sub>CC</sub> −0.2   | 1.4        | —          | V <sub>CC</sub> −0.2   | 1.4        | —          | V <sub>CC</sub> −0.2 |    |
| t <sub>r</sub><br>t <sub>f</sub> | Output Rise/Fall Times Q<br>(20% to 80%) |                        | 320        | 400        | 580                  | 320        | 400        | 580                    | 320        | 400        | 580                    | 320        | 400        | 580                  | ps |

**Notes:**

- Skew is measured between outputs under identical transitions.
- Minimum input swing for which AC parameters are guaranteed. The device has a DC gain of ~40.
- 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.
- Parametric values specified at: 3 volt Power Supply Range 100EL91L Series -3.0V to -3.8V.

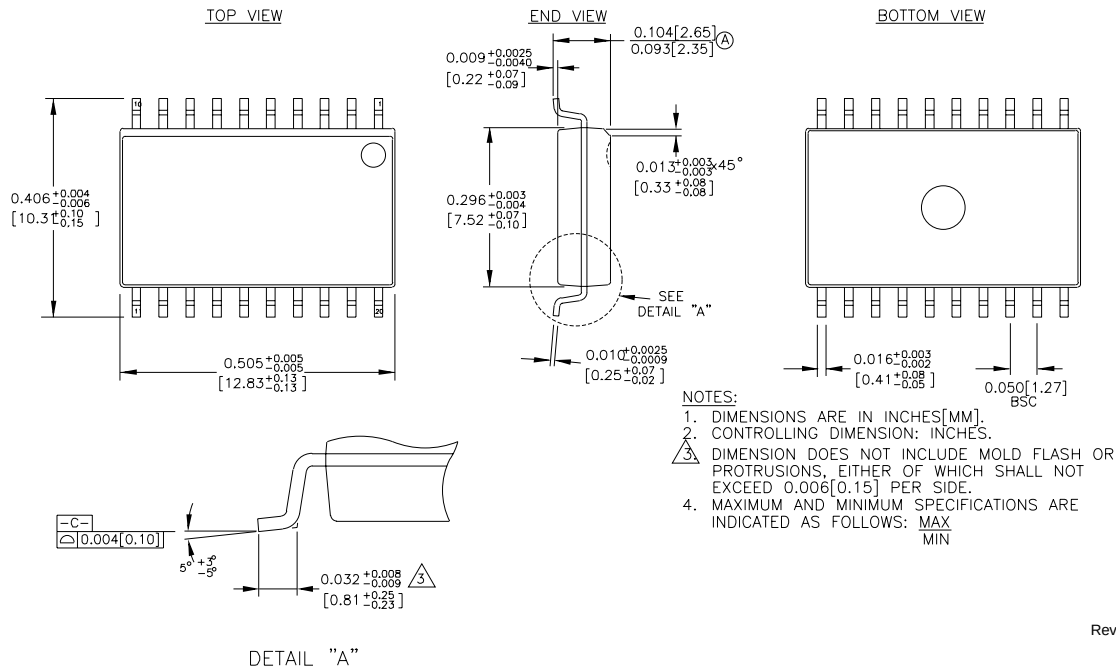
### 3.3V Configuration



### 5.0V Configuration

1. The schematic above demonstrates three different ways that all or any inputs of SY100EL91L can be used. The three modes of operation are: Differential LVPECL, Single-Ended LVPECL, and/or Open.
2. If D2 and  $\overline{D2}$  are used in differential mode, then the same scheme of D0 and  $\overline{D0}$  applies. If used in single-ended mode, then use the same scheme of D1 and  $\overline{D1}$ .

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



Rev. 03

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