



# 3.3V DUAL DIFFERENTIAL LVPECL-to-LVTTL TRANSLATOR

ECL Pro™  
SY100EPT23L

## FEATURES

- 3.3V power supply
- 1.9ns typical propagation delay
- Maximum frequency > 275MHz
- Differential LVPECL inputs
- 24mA LVTTL outputs
- Flow-through pinouts
- Internal input resistors: pulldown on D, pulldown and pullup on /D
- Q output will default LOW with inputs open or at Ground
- Available in 8-pin MSOP and SOIC packages



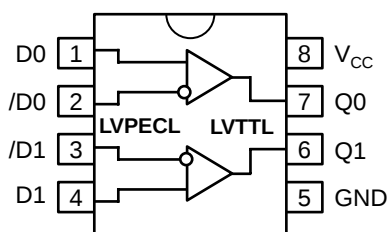
ECL Pro™

## DESCRIPTION

The SY100EPT23L is a dual differential LVPECL-to-LVTTL translator. Because LVPECL (Low Voltage Positive ECL) levels are used, only +3.3V and ground are required. The tiny 8-pin MSOP and dual-gate design of the EPT23L makes it ideal for applications which require the translation of a clock and data signal.

The EPT23L is available in only the ECL 100K standard. Since there are no LVPECL outputs or an external  $V_{BB}$  reference, the EPT23L does not require both ECL standard versions. The inputs can accept 10K voltage levels and any standard differential LVPECL input referenced from a  $V_{CC}$  of +3.3V

## PIN CONFIGURATION/BLOCK DIAGRAM



(Available in 8-pin SOIC and 8-pin MSOP)

## PIN NAMES

| Pin              | Function                   |
|------------------|----------------------------|
| Q0, Q1           | LVTTL Outputs              |
| D0, /D0, D1, /D1 | Differential LVPECL Inputs |
| $V_{CC}$         | Positive Supply            |
| GND              | Ground                     |

**ABSOLUTE MAXIMUM RATINGS**(Note 1)

| Symbol      | Parameter                               | Value                    | Unit |
|-------------|-----------------------------------------|--------------------------|------|
| $V_{CC}$    | Power Supply Voltage                    | -0.5 to +3.8             | V    |
| $V_{IN}$    | PECL Input Voltage                      | 0V to $V_{CC}+0.5$       | V    |
| $V_{OUT}$   | Voltage Applied to Output at HIGH State | -0.5 to $V_{CC}$         | V    |
| $I_{OUT}$   | Current Applied to Output at LOW State  | Twice the Rated $I_{OL}$ | mA   |
| $T_{store}$ | Storage Temperature                     | -65 to +150              | °C   |
| $T_A$       | Operating Temperature                   | -40 to +85               | °C   |

**TRUTH TABLE**

| D    | /D   | Q |
|------|------|---|
| L    | H    | L |
| H    | L    | H |
| Open | Open | L |

**NOTE:**

1. Permanent device damage may occur if ABSOLUTE MAXIMUM RATINGS are exceeded. This is a stress rating only and functional operation is not implied at conditions other than those detailed in the operational sections of this data sheet. Exposure to ABSOLUTE MAXIMUM RATING conditions for extended periods may affect device reliability.

**LVTTTL DC ELECTRICAL CHARACTERISTICS**

$$V_{CC} = +3.3V \pm 10\%$$

| Symbol   | Parameter                    | $T_A = -40^\circ\text{C}$ |      | $T_A = 0^\circ\text{C}$ |      | $T_A = +25^\circ\text{C}$ |      | $T_A = +85^\circ\text{C}$ |      | Unit | Condition                |
|----------|------------------------------|---------------------------|------|-------------------------|------|---------------------------|------|---------------------------|------|------|--------------------------|
|          |                              | Min.                      | Max. | Min.                    | Max. | Min.                      | Max. | Min.                      | Max. |      |                          |
| $V_{OH}$ | Output HIGH Voltage          | 2.0                       | —    | 2.0                     | —    | 2.0                       | —    | 2.0                       | —    | V    | $I_{OH} = -3.0\text{mA}$ |
| $V_{OL}$ | Output LOW Voltage           | —                         | 0.5  | —                       | 0.5  | —                         | 0.5  | —                         | 0.5  | V    | $I_{OL} = 24\text{mA}$   |
| $I_{CC}$ | Power Supply Current         | —                         | 30   | —                       | 30   | —                         | 30   | —                         | 30   | mA   |                          |
| $I_{OS}$ | Output Short Circuit Current | -80                       | -240 | -80                     | -240 | -80                       | -240 | -80                       | -240 | mA   | $V_{OUT} = 0V$           |

**LVPECL DC ELECTRICAL CHARACTERISTICS**

$$V_{CC} = +3.3V \pm 10\%$$

| Symbol    | Parameter                                      | $T_A = -40^\circ\text{C}$ |      |          | $T_A = 0^\circ\text{C}$ |      |          | $T_A = +25^\circ\text{C}$ |      |          | $T_A = +85^\circ\text{C}$ |      |          | Unit          |
|-----------|------------------------------------------------|---------------------------|------|----------|-------------------------|------|----------|---------------------------|------|----------|---------------------------|------|----------|---------------|
|           |                                                | Min.                      | Typ. | Max.     | Min.                    | Typ. | Max.     | Min.                      | Typ. | Max.     | Min.                      | Typ. | Max.     |               |
| $I_{IH}$  | Input HIGH Current                             | —                         | —    | 150      | —                       | —    | 150      | —                         | —    | 150      | —                         | —    | 150      | $\mu\text{A}$ |
| $I_{IL}$  | Input LOW Current                              | 0.5                       | —    | —        | 0.5                     | —    | —        | 0.5                       | —    | —        | 0.5                       | —    | —        | $\mu\text{A}$ |
| $V_{CMR}$ | Common Mode Range                              | 1.5                       | —    | $V_{CC}$ | 1.5                     | —    | $V_{CC}$ | 1.5                       | —    | $V_{CC}$ | 1.5                       | —    | $V_{CC}$ | V             |
| $V_{PP}$  | Minimum Peak-to-Peak Input <sup>(Note 1)</sup> | 200                       | —    | —        | 200                     | —    | —        | 200                       | —    | —        | 200                       | —    | —        | mV            |
| $V_{IH}$  | Input HIGH Voltage <sup>(Note 2)</sup>         | 2070                      | —    | 2420     | 2130                    | —    | 2460     | 2135                      | —    | 2490     | 2130                      | —    | 2565     | mV            |
| $V_{IL}$  | Input LOW Voltage <sup>(Note 2)</sup>          | 1350                      | —    | 1825     | 1350                    | —    | 1825     | 1350                      | —    | 1825     | 1350                      | —    | 1825     | mV            |

**Note 1.** 200mV input guarantees full logic at output.

**Note 2.** These values are for  $V_{CC} = 3.3V$ . Level Specifications will vary 1:1 with  $V_{CC}$ .

## AC ELECTRICAL CHARACTERISTICS

 $V_{CC} = +3.3V \pm 5\%$ 

| 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 | Condition             |
|--------------------------------------|-----------------------------------------------|------------------------|------|----------------------|------|------------------------|------|------------------------|------|------|-----------------------|
|                                      |                                               | Min.                   | Max. | Min.                 | Max. | Min.                   | Max. | Min.                   | Max. |      |                       |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay                             | 1.5                    | 2.5  | 1.5                  | 2.5  | 1.5                    | 2.5  | 1.5                    | 2.5  | ns   | C <sub>L</sub> = 20pF |
| t <sub>skpp</sub>                    | Part-to-Part Skew <sup>(Note 1,4)</sup>       | —                      | 0.5  | —                    | 0.5  | —                      | 0.5  | —                      | 0.5  | ns   | C <sub>L</sub> = 20pF |
| t <sub>skew++</sub>                  | Within-Device Skew <sup>(Note 2,4)</sup>      | —                      | 0.3  | —                    | 0.3  | —                      | 0.3  | —                      | 0.3  | ns   | C <sub>L</sub> = 20pF |
| t <sub>skew--</sub>                  | Within-Device Skew <sup>(Note 3,4)</sup>      | —                      | 0.3  | —                    | 0.3  | —                      | 0.3  | —                      | 0.3  | ns   | C <sub>L</sub> = 20pF |
| t <sub>r</sub><br>t <sub>f</sub>     | Output Rise/Fall Time<br>1.0V to 2.0V         | 0.5                    | 1.0  | 0.5                  | 1.0  | 0.5                    | 1.0  | 0.5                    | 1.0  | ns   | C <sub>L</sub> = 20pF |
| f <sub>MAX</sub>                     | Maximum Input Frequency <sup>(Note 5,6)</sup> | 275                    | —    | 275                  | —    | 275                    | —    | 275                    | —    | MHz  | C <sub>L</sub> = 20pF |

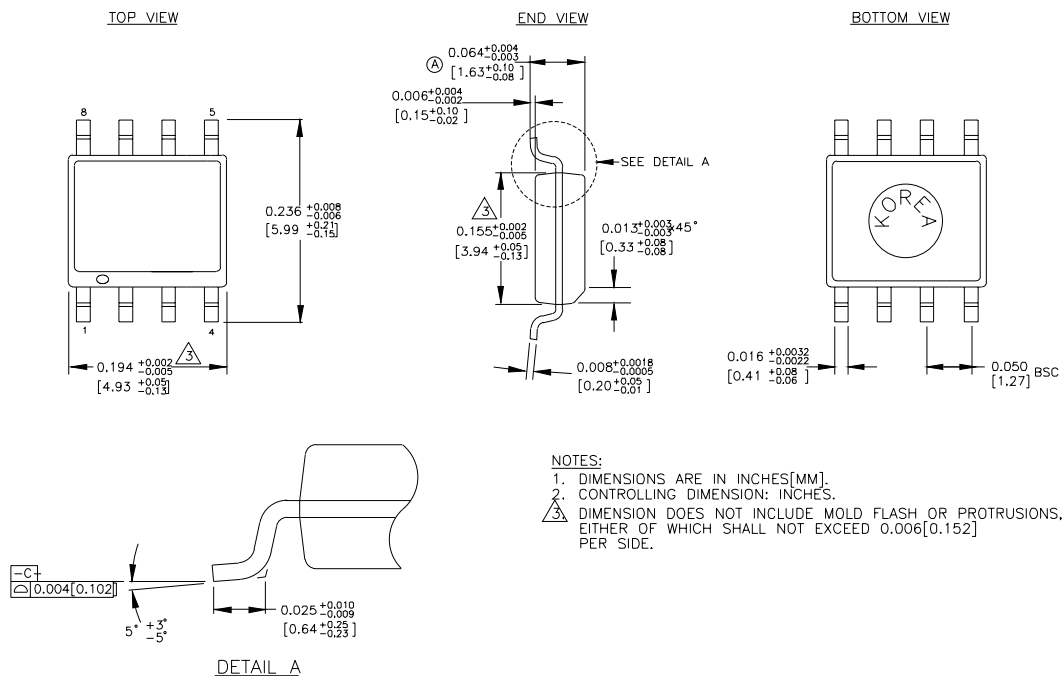
**Note 1.** Device-to-Device Skew considering HIGH-to-HIGH transitions at common V<sub>CC</sub> level.**Note 2.** Within-Device Skew considering HIGH-to-HIGH transitions at common V<sub>CC</sub> level.**Note 3.** Within-Device Skew considering LOW-to-LOW transitions at common V<sub>CC</sub> level.**Note 4.** All skew parameters are guaranteed but not tested.**Note 5.** Frequency at which guaranteed for functionality. V<sub>OH</sub> and V<sub>OL</sub> levels are guaranteed at DC only.**Note 6.** The f<sub>MAX</sub> value is specified as the minimum guaranteed maximum frequency. Actual operational maximum frequency may be greater.

## PRODUCT ORDERING CODE

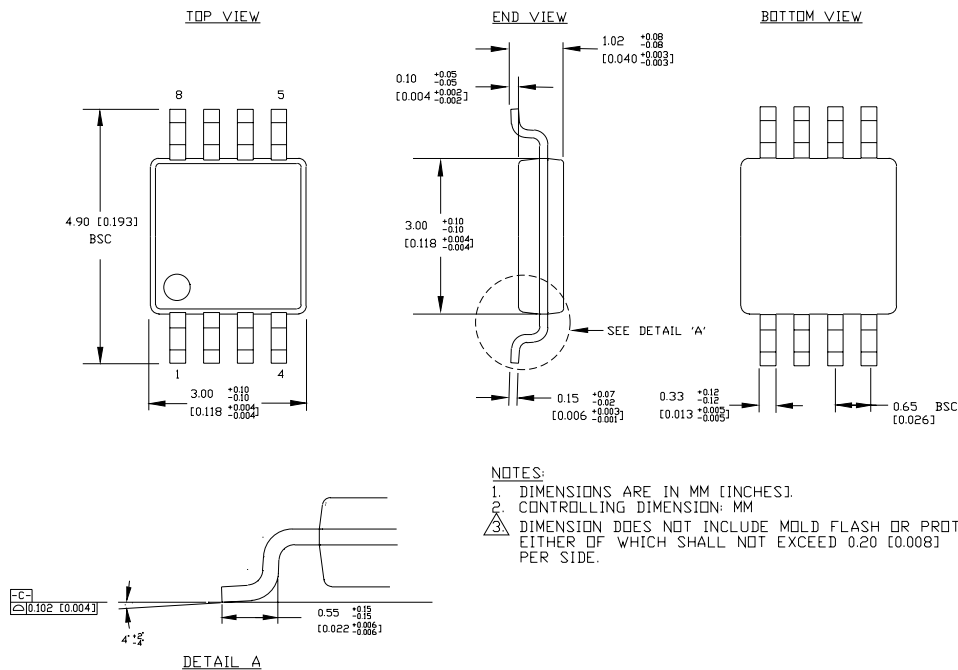
| Ordering Code                       | Package Type | Operating Range | Package Marking | Ordering Code                         | Package Type | Operating Range | Package Marking |
|-------------------------------------|--------------|-----------------|-----------------|---------------------------------------|--------------|-----------------|-----------------|
| SY100EPT23LZC                       | Z8-1         | Commercial      | XEP23L          | SY100EPT23LZI <sup>(Note 2)</sup>     | Z8-1         | Industrial      | XEP23L          |
| SY100EPT23LZCTR <sup>(Note 1)</sup> | Z8-1         | Commercial      | XEP23L          | SY100EPT23LZITR <sup>(Note 1,2)</sup> | Z8-1         | Industrial      | XEP23L          |
| SY100EPT23LKCC                      | K8-1         | Commercial      | XP23            | SY100EPT23LKI <sup>(Note 2)</sup>     | K8-1         | Industrial      | XP23            |
| SY100EPT23LKCTR <sup>(Note 1)</sup> | K8-1         | Commercial      | XP23            | SY100EPT23LKITR <sup>(Note 1,2)</sup> | K8-1         | Industrial      | XP23            |

**Note 1.** Tape and Reel.**Note 2.** Recommended for new designs.

## 8 LEAD PLASTIC SOIC (Z8-1)



Rev. 03

**8 LEAD MSOP (K8-1)**

Rev. 01

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