

### 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

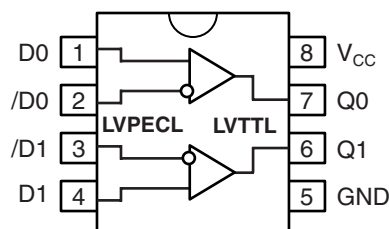
The SY100EPT23L is a dual differential LVPECL-to-LVTTL translator. Because LVPECL (Low Voltage Positive ECL) levels are used, only +3.3V and ground are required. The tiny 8-pin MSOP and dual-gate design of the EPT23L makes it ideal for applications which require the translation of a clock and data signal.

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 NAMES

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

## PACKAGE/ORDERING INFORMATION



**8-pin SOIC (Z8-1)**  
**8-pin MSOP (K8-1)**

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

| Part Number                       | Package Type | Operating Range | Package Marking                        | Lead Finish    |
|-----------------------------------|--------------|-----------------|----------------------------------------|----------------|
| SY100EPT23LZC                     | Z8-1         | Commercial      | XEP23L                                 | Sn-Pb          |
| SY100EPT23LZCTR <sup>(2)</sup>    | Z8-1         | Commercial      | XEP23L                                 | Sn-Pb          |
| SY100EPT23LKC                     | K8-1         | Commercial      | XP23                                   | Sn-Pb          |
| SY100EPT23LKCTR <sup>(2)</sup>    | K8-1         | Commercial      | XP23                                   | Sn-Pb          |
| SY100EPT23LZI                     | Z8-1         | Industrial      | XEP23L                                 | Sn-Pb          |
| SY100EPT23LZITR <sup>(2)</sup>    | Z8-1         | Industrial      | XEP23L                                 | Sn-Pb          |
| SY100EPT23LKI                     | K8-1         | Industrial      | XP23                                   | Sn-Pb          |
| SY100EPT23LKITR <sup>(2)</sup>    | K8-1         | Industrial      | XP23                                   | Sn-Pb          |
| SY100EPT23LZG <sup>(3)</sup>      | Z8-1         | Industrial      | XEP23L with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY100EPT23LZGTR <sup>(2, 3)</sup> | Z8-1         | Industrial      | XEP23L with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY100EPT23LKG <sup>(3)</sup>      | K8-1         | Industrial      | XP23 with Pb-Free bar-line indicator   | Pb-Free NiPdAu |
| SY100EPT23LKGTR <sup>(2, 3)</sup> | K8-1         | Industrial      | XP23 with Pb-Free bar-line indicator   | Pb-Free NiPdAu |

## Notes:

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

**ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>**

| Symbol             | Parameter                               | Value                           | Unit         |
|--------------------|-----------------------------------------|---------------------------------|--------------|
| V <sub>CC</sub>    | Power Supply Voltage                    | −0.5 to +3.8                    | V            |
| V <sub>IN</sub>    | PECL Input Voltage                      | 0V to V <sub>CC</sub> + 0.5     | V            |
| V <sub>OUT</sub>   | Voltage Applied to Output at HIGH State | −0.5 to V <sub>CC</sub>         | V            |
| I <sub>OUT</sub>   | Current Applied to Output at LOW State  | Twice the Rated I <sub>OL</sub> | mA           |
| T <sub>Lead</sub>  | Lead Temperature (soldering, 20 sec.)   | +260                            | °C           |
| T <sub>store</sub> | Storage Temperature                     | −65 to +150                     | °C           |
| T <sub>A</sub>     | Operating Temperature                   | −40 to +85                      | °C           |
| θ <sub>JA</sub>    | (Still-air) SOIC<br>(Still-air) MSOP    | 160<br>200                      | °C/W<br>°C/W |
| θ <sub>JC</sub>    | SOIC<br>MSOP                            | 39<br>39                        | °C/W<br>°C/W |

**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<sub>CC</sub> = 3.3V, GND = 0V.

| 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. |      |                          |
| V <sub>OH</sub> | Output HIGH Voltage <sup>(2)</sup> | 2.3                    | —    | 2.3                  | —    | 2.3                    | —    | 2.3                    | —    | V    | I <sub>OH</sub> = −3.0mA |
| V <sub>OL</sub> | Output LOW Voltage                 | —                      | 0.5  | —                    | 0.5  | —                      | 0.5  | —                      | 0.5  | V    | I <sub>OL</sub> = 24mA   |
| I <sub>OS</sub> | Output Short Circuit Current       | −80                    | −240 | −80                  | −240 | −80                    | −240 | −80                    | −240 | mA   | V <sub>OUT</sub> = 0V    |

**LVPECL DC ELECTRICAL CHARACTERISTICS**V<sub>CC</sub> = 3.3V, GND = 0V.

| 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. |      |
| I <sub>CC</sub>  | Power Supply Current                      | —                      | —    | 30   | —                    | —    | 30   | —                      | —    | 30   | —                      | —    | 30   | mA   |
| I <sub>IH</sub>  | Input HIGH Current                        | —                      | —    | 150  | —                    | —    | 150  | —                      | —    | 150  | —                      | —    | 150  | μA   |
| I <sub>IL</sub>  | Input LOW Current                         | 0.5                    | —    | —    | 0.5                  | —    | —    | 0.5                    | —    | —    | 0.5                    | —    | —    | μA   |
| V <sub>CMR</sub> | Common Mode Range                         | 1.5                    | —    | 3.3  | 1.5                  | —    | 3.3  | 1.5                    | —    | 3.3  | 1.5                    | —    | 3.3  | V    |
| V <sub>PP</sub>  | Minimum Peak-to-Peak Input <sup>(1)</sup> | 200                    | —    | —    | 200                  | —    | —    | 200                    | —    | —    | 200                    | —    | —    | mV   |
| V <sub>IH</sub>  | Input HIGH Voltage <sup>(2)</sup>         | 2070                   | —    | 2420 | 2130                 | —    | 2460 | 2135                   | —    | 2490 | 2130                   | —    | 2565 | mV   |
| V <sub>IL</sub>  | Input LOW Voltage <sup>(2)</sup>          | 1350                   | —    | 1825 | 1350                 | —    | 1825 | 1350                   | —    | 1825 | 1350                   | —    | 1825 | mV   |

**Notes:**

1. 200mV input guarantees full logic at output.
2. These values are for V<sub>CC</sub> = 3.3V. Level Specifications will vary 1:1 with V<sub>CC</sub>.

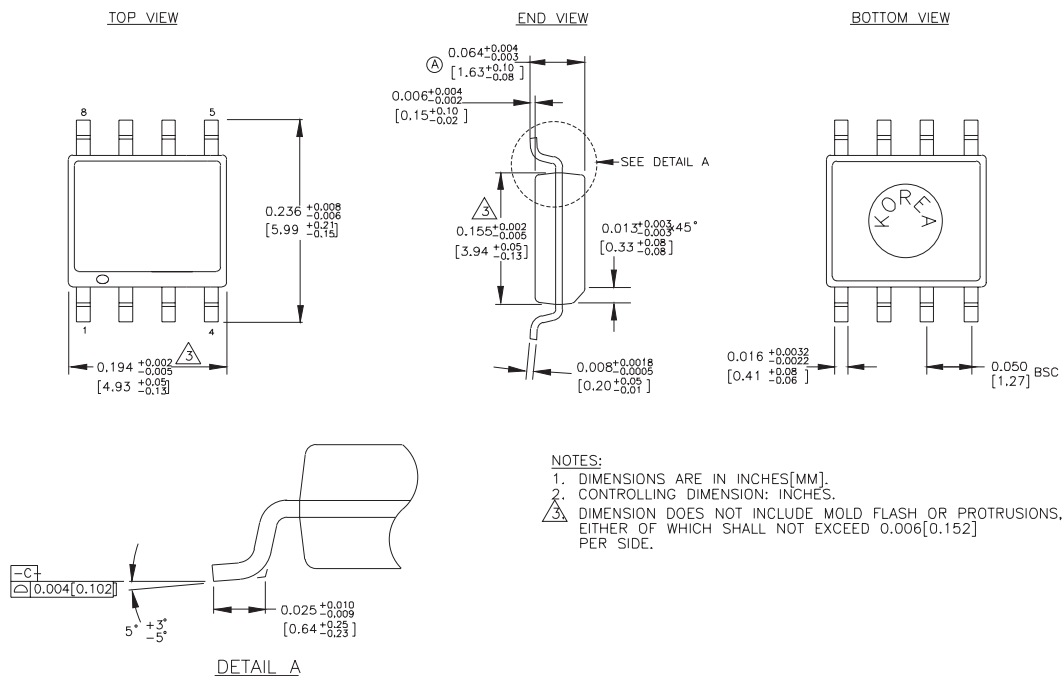
**AC ELECTRICAL CHARACTERISTICS** $V_{CC} = 3.0V$  to  $3.6V$ ,  $GND = 0V$ .

| Symbol         | Parameter                                | $T_A = -40^{\circ}C$ |      | $T_A = 0^{\circ}C$ |      | $T_A = +25^{\circ}C$ |      | $T_A = +85^{\circ}C$ |      | Unit | Condition    |
|----------------|------------------------------------------|----------------------|------|--------------------|------|----------------------|------|----------------------|------|------|--------------|
|                |                                          | Min.                 | Max. | Min.               | Max. | Min.                 | Max. | Min.                 | Max. |      |              |
| $t_{PD}$       | Propagation Delay                        | 1.5                  | 2.5  | 1.5                | 2.5  | 1.5                  | 2.5  | 1.5                  | 2.5  | ns   | $C_L = 20pF$ |
| $t_{skpp}$     | Part-to-Part Skew <sup>(1,4)</sup>       | —                    | 0.5  | —                  | 0.5  | —                    | 0.5  | —                    | 0.5  | ns   | $C_L = 20pF$ |
| $t_{skew++}$   | Within-Device Skew <sup>(2,4)</sup>      | —                    | 0.3  | —                  | 0.3  | —                    | 0.3  | —                    | 0.3  | ns   | $C_L = 20pF$ |
| $t_{skew--}$   | Within-Device Skew <sup>(3,4)</sup>      | —                    | 0.3  | —                  | 0.3  | —                    | 0.3  | —                    | 0.3  | ns   | $C_L = 20pF$ |
| $t_r$<br>$t_f$ | 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   | $C_L = 20pF$ |
| $f_{MAX}$      | Maximum Input Frequency <sup>(5,6)</sup> | 275                  | —    | 275                | —    | 275                  | —    | 275                  | —    | MHz  | $C_L = 20pF$ |

Notes:

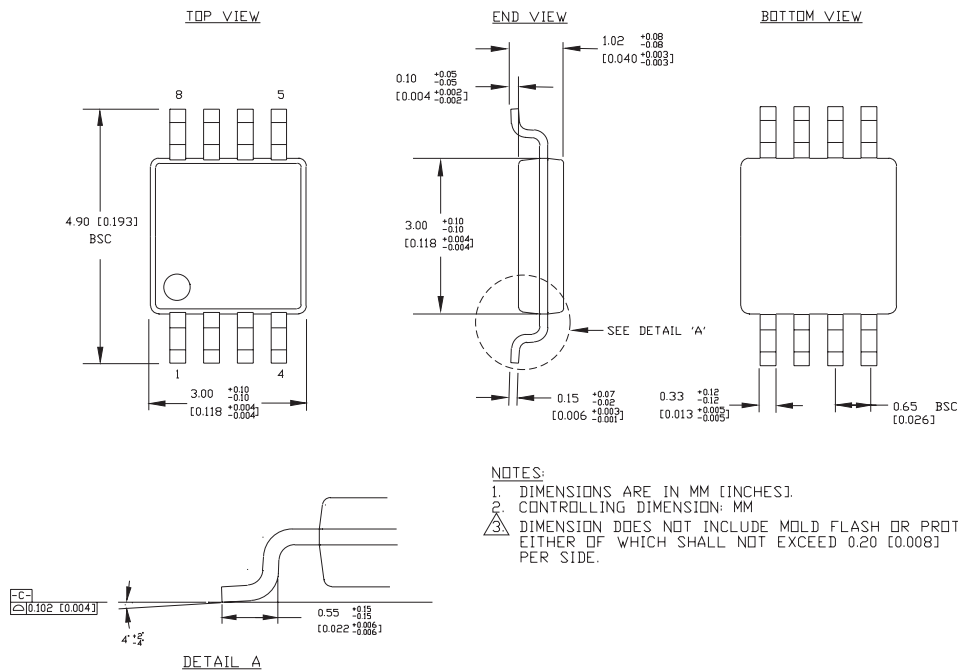
1. Device-to-Device Skew considering HIGH-to-HIGH transitions at common  $V_{CC}$  level.
2. Within-Device Skew considering HIGH-to-HIGH transitions at common  $V_{CC}$  level.
3. Within-Device Skew considering LOW-to-LOW transitions at common  $V_{CC}$  level.
4. All skew parameters are guaranteed but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

## 8-PIN PLASTIC SOIC (Z8-1)



Rev. 03

## 8-PIN MSOP (K8-1)



Rev. 01

**MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA**TEL + 1 (408) 944-0800 FAX + 1 (408) 474-1000 WEB <http://www.micrel.com>

The information furnished by Micrel in this datasheet is believed to be accurate and reliable. However, no responsibility is assumed by Micrel for its use. Micrel reserves the right to change circuitry and specifications at any time without notification to the customer.

Micrel Products are not designed or authorized for use as components in life support appliances, devices or systems where malfunction of a product can reasonably be expected to result in personal injury. Life support devices or systems are devices or systems that (a) are intended for surgical implant into the body or (b) support or sustain life, and whose failure to perform can be reasonably expected to result in a significant injury to the user. A Purchaser's use or sale of Micrel Products for use in life support appliances, devices or systems is at Purchaser's own risk and Purchaser agrees to fully indemnify Micrel for any damages resulting from such use or sale.

© 2005 Micrel, Incorporated.