



## 5V/3.3V DIFFERENTIAL RECEIVER

**SY10EL16V**  
**SY100EL16V**

### FEATURES

- 3.3V and 5V power supply options
- 250ps propagation delay
- High bandwidth output transitions
- Internal 75K $\Omega$  input pull-down resistors
- Replaces SY10/100EL16
- Improved output waveform characteristics
- Available in 8-pin (3x3mm) MSOP and SOIC package

### DESCRIPTION

The SY10/100EL16V are differential receivers. The devices are functionally equivalent to the E116 devices, with higher performance capabilities. With output transition times significantly faster than the E116, the EL16V is ideally suited for interfacing with high-frequency sources.

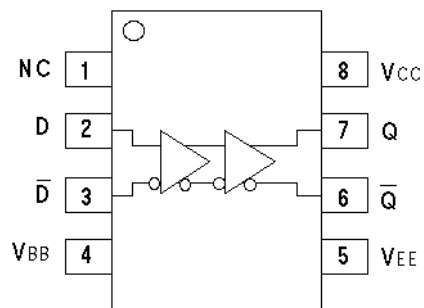
The EL16V provides a VBB output for either single-ended use or as a DC bias for AC coupling to the device. The VBB pin should be used only as a bias for the EL16V as its current sink/source capability is limited. Whenever used, the VBB pin should be bypassed to ground via a 0.01 $\mu$ F capacitor.

Under open input conditions (pulled to VEE), internal input clamps will force the Q output LOW.

### PIN NAMES

| Pin | Function                 |
|-----|--------------------------|
| D   | Data Inputs              |
| Q   | Data Outputs             |
| VBB | Reference Voltage Output |

## PACKAGE/ORDERING INFORMATION



8-Pin MSOP (K8-1)

8-Pin SOIC (Z8-1)

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

| Part Number                      | Package Type | Operating Range | Package Marking                        | Lead Finish    |
|----------------------------------|--------------|-----------------|----------------------------------------|----------------|
| SY10EL16VKC                      | K8-1         | Commercial      | HEL16V                                 | Sn-Pb          |
| SY10EL16VKCTR <sup>(2)</sup>     | K8-1         | Commercial      | HEL16V                                 | Sn-Pb          |
| SY100EL16VKC                     | K8-1         | Commercial      | XEL16V                                 | Sn-Pb          |
| SY100EL16VKCTR <sup>(2)</sup>    | K8-1         | Commercial      | XEL16V                                 | Sn-Pb          |
| SY10EL16VZC                      | Z8-1         | Commercial      | HEL16V                                 | Sn-Pb          |
| SY10EL16VZCTR <sup>(2)</sup>     | Z8-1         | Commercial      | XEL16V                                 | Sn-Pb          |
| SY100EL16VZC                     | Z8-1         | Commercial      | HEL16V                                 | Sn-Pb          |
| SY100EL16VZCTR <sup>(2)</sup>    | Z8-1         | Commercial      | XEL16V                                 | Sn-Pb          |
| SY10EL16VKI                      | K8-1         | Industrial      | HEL16V                                 | Sn-Pb          |
| SY10EL16VKITR <sup>(2)</sup>     | K8-1         | Industrial      | HEL16V                                 | Sn-Pb          |
| SY100EL16VKI                     | K8-1         | Industrial      | XEL16V                                 | Sn-Pb          |
| SY100EL16VKITR <sup>(2)</sup>    | K8-1         | Industrial      | XEL16V                                 | Sn-Pb          |
| SY10EL16VZI                      | Z8-1         | Industrial      | HEL16V                                 | Sn-Pb          |
| SY10EL16VZITR <sup>(2)</sup>     | Z8-1         | Industrial      | XEL16V                                 | Sn-Pb          |
| SY100EL16VZI                     | Z8-1         | Industrial      | HEL16V                                 | Sn-Pb          |
| SY100EL16VZITR <sup>(2)</sup>    | Z8-1         | Industrial      | XEL16V                                 | Sn-Pb          |
| SY10EL16VKG <sup>(3)</sup>       | K8-1         | Industrial      | H16V with Pb-Free bar-line indicator   | Pb-Free NiPdAu |
| SY10EL16VKGTR <sup>(2, 3)</sup>  | K8-1         | Industrial      | H16V with Pb-Free bar-line indicator   | Pb-Free NiPdAu |
| SY100EL16VKG <sup>(3)</sup>      | K8-1         | Industrial      | X16V with Pb-Free bar-line indicator   | Pb-Free NiPdAu |
| SY100EL16VKGTR <sup>(2, 3)</sup> | K8-1         | Industrial      | X16V with Pb-Free bar-line indicator   | Pb-Free NiPdAu |
| SY10EL16VZG <sup>(3)</sup>       | Z8-1         | Industrial      | HEL16V with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY10EL16VZGTR <sup>(2, 3)</sup>  | Z8-1         | Industrial      | HEL16V with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY100EL16VZG <sup>(2)</sup>      | Z8-1         | Industrial      | XEL16V with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY100EL16VZGTR <sup>(2, 3)</sup> | Z8-1         | Industrial      | XEL16V 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.

## PRODUCT/PROCESS INFORMATION

Process: Bipolar

ESD Rating: Per Mil Std. 883 Human Body Model, &gt;2.0kV (all pins).

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

| Symbol        | Rating                                                                                                                                                   | Value                  | Unit         |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------|
| $V_{CC}$      | Power Supply Voltage ( $V_{EE} = 0$ )                                                                                                                    | +6.0 to 0              | V            |
| $V_{EE}$      | Power Supply Voltage ( $V_{CC} = 0$ )                                                                                                                    | -6.0 to 0              | V            |
| $V_{IN}$      | Input Voltage ( $V_{CC} = 0V$ , $V_{IN}$ not more negative than $V_{EE}$ )<br>Input Voltage ( $V_{EE} = 0V$ , $V_{IN}$ not more positive than $V_{CC}$ ) | -6.0 to 0<br>+6.0 to 0 | V<br>V       |
| $I_{OUT}$     | Output Current<br>-Continuous<br>-Surge                                                                                                                  | 50<br>100              | mA           |
| $T_{LEAD}$    | Lead Temperature Range (soldering, 20sec.)                                                                                                               | +260                   | °C           |
| $T_A$         | Operating Temperature Range                                                                                                                              | -40 to +85             | °C           |
| $T_{store}$   | Storage Temperature Range                                                                                                                                | -65 to +150            | °C           |
| $\theta_{JA}$ | Thermal Resistance (Junction-to-Ambient)<br>-Still Air<br>-500lfpm                                                                                       | 160<br>109             | °C/W<br>°C/W |
| $\theta_{JC}$ | Thermal Resistance (Junction-to-Case)                                                                                                                    | 39                     | °C/W         |
| ESD           | Mil Std. 883 Human Body Model, All Pins                                                                                                                  | >2.0k                  | V            |

**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.

**DC ELECTRICAL CHARACTERISTICS<sup>(1, 2)</sup>**

$V_{EE} = V_{EE} \text{ (Min.) to } V_{EE} \text{ (Max.)}; V_{CC} = \text{GND}$

| 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.  |      |
| $I_{EE}$ | Power Supply Current     |                           |      |       |                         |      |       |                           |      |       |                           |      |       | mA   |
|          | 10EL                     | —                         | 18   | 22    | 9                       | 18   | 22    | 9                         | 18   | 22    | 9                         | 18   | 22    |      |
|          | 100EL                    | —                         | 18   | 22    | 9                       | 18   | 22    | 9                         | 18   | 22    | 9                         | 21   | 26    |      |
| $V_{BB}$ | Output Reference Voltage |                           |      |       |                         |      |       |                           |      |       |                           |      |       | V    |
|          | 10EL                     | -1.43                     | —    | -1.30 | -1.38                   | —    | -1.27 | -1.35                     | —    | -1.25 | -1.31                     | —    | -1.19 |      |
|          | 100EL                    | -1.38                     | —    | -1.26 | -1.38                   | —    | -1.26 | -1.38                     | —    | -1.26 | -1.38                     | —    | -1.26 |      |
| $I_{IH}$ | Input HIGH Current       | —                         | —    | 150   | —                       | —    | 150   | —                         | —    | 150   | —                         | —    | 150   | μA   |

**Note 1.** Parametric values specified at: 10/100EL16V Series: -3.0V to -5.5V.

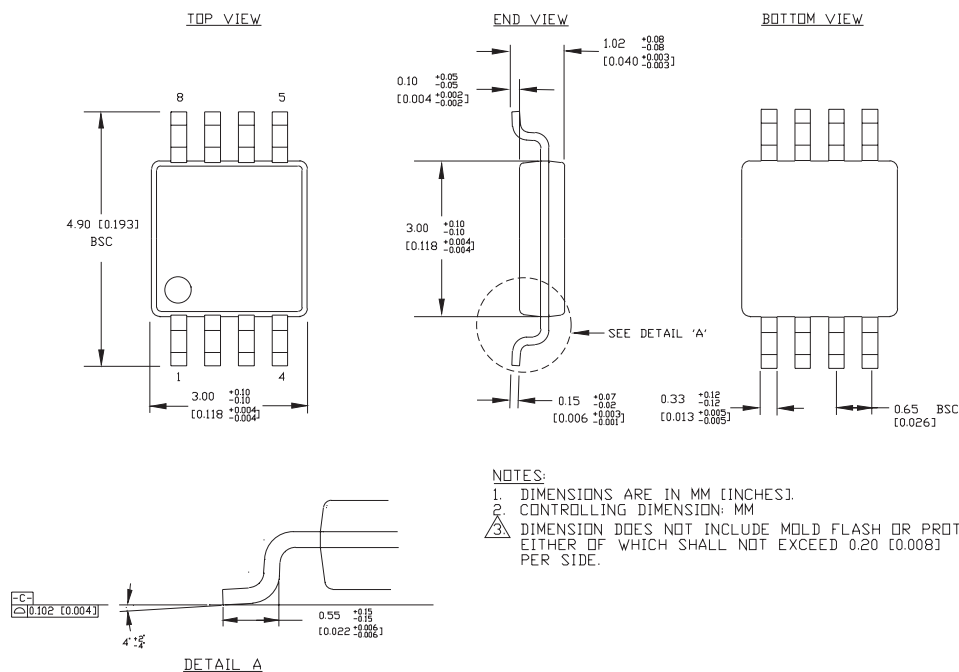
**Note 2.** specification for packaged product only.

**AC ELECTRICAL CHARACTERISTICS<sup>(1, 5)</sup>**V<sub>EE</sub> = V<sub>EE</sub> (Min.) to V<sub>EE</sub> (Max.); V<sub>CC</sub> = GND

| 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 to Output              |                        |      |      |                      |      |      |                        |      |      |                        |      |      | ps   |
|                                  | D (Diff)                                 | 125                    | 250  | 375  | 175                  | 250  | 325  | 175                    | 250  | 325  | 205                    | 280  | 355  |      |
|                                  | D (SE)                                   | 75                     | 250  | 425  | 125                  | 250  | 375  | 125                    | 250  | 375  | 155                    | 280  | 405  |      |
| t <sub>skew</sub>                | Duty Cycle Skew <sup>(2)</sup> (Diff)    | —                      | 5    | —    | —                    | 5    | 20   | —                      | 5    | 20   | —                      | 5    | 20   | ps   |
| V <sub>PP</sub>                  | Minimum Input Swing <sup>(3)</sup>       | 150                    | —    | —    | 150                  | —    | —    | 150                    | —    | —    | 150                    | —    | —    | mV   |
| V <sub>CMR</sub>                 | Common Mode Range <sup>(4)</sup>         | -1.3                   | —    | -0.4 | -1.4                 | —    | -0.4 | -1.4                   | —    | -0.4 | -1.4                   | —    | -0.4 | V    |
| t <sub>r</sub><br>t <sub>f</sub> | Output Rise/Fall Times Q<br>(20% to 80%) | 100                    | 225  | 350  | 100                  | 225  | 350  | 100                    | 225  | 350  | 100                    | 225  | 350  | ps   |

**Note 1.** Parametric values specified at: 10/100EL16V Series: -3.0V to -5.5V.**Note 2.** Duty cycle skew is the difference between a t<sub>PLH</sub> and t<sub>PHL</sub> propagation delay through a device.**Note 3.** Minimum input swing for which AC parameters are guaranteed. The device has a DC gain of ≈40.**Note 4.** 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<sub>PP</sub> min. and 1V. The lower end of the CMR range varies 1:1 with V<sub>EE</sub>. The numbers in the spec table assume a nominal V<sub>EE</sub> = -3.3V. Note for PECL operation, the V<sub>CMR</sub> (min) will be fixed at 3.3V - I<sub>V<sub>CMR</sub></sub> (min)I.**Note 5.** Specification for packaged product only.

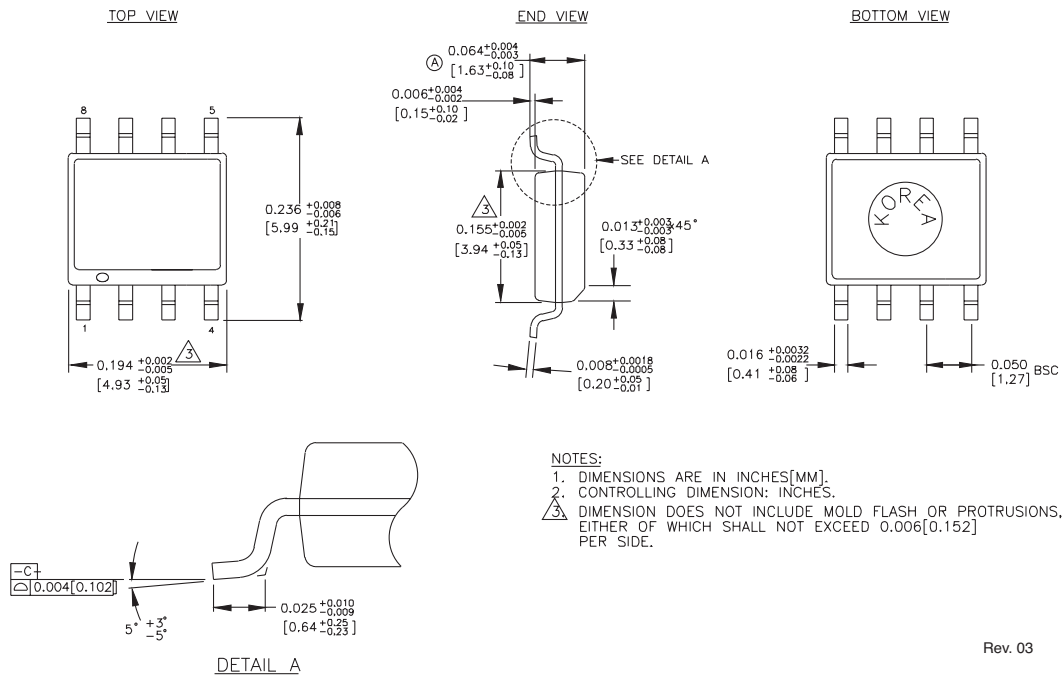
## 8-PIN MSOP (K8-1)



Rev. 01

**Package Notes:****Note 1.** Package meets Level 1 moisture sensitivity.

## 8-PIN SOIC(Z8-1)



Rev. 03

**Package Notes:****Note 1.** Package meets Level 1 moisture sensitivity.**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>

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