

### FEATURES

- Faster version of the SY10EL16V
- Guaranteed AC performance over temperature and supply voltage:
  - DC to 3GHz clock throughput
  - <180ps tr/ft time
- Internal 75k $\Omega$  input pulldown resistor
- Improved output waveform characteristics
- 10K ECL compatible I/O
- Available in small 8-pin (3mm) MSOP and SOIC packages



ECL Pro™

### DESCRIPTION

The SY10EP16V is a high-speed differential receiver. The device is functionally equivalent to the EL16V devices, with higher performance capabilities. With output transition times significantly faster than the EL16V, the SY10EP16V is ideally suited for interfacing with high-frequency sources.

The SY10EP16V provides a  $V_{BB}$  output for either single-ended use or as a DC bias for AC coupling to the device. The  $V_{BB}$  pin should be used only as a bias for the SY10EP16V as its current sink/source capability is limited. Whenever used, the  $V_{BB}$  pin should be bypassed to the most positive supply voltage ( $V_{CC}$  for LVPECL applications) via a 0.01 $\mu$ F capacitor.

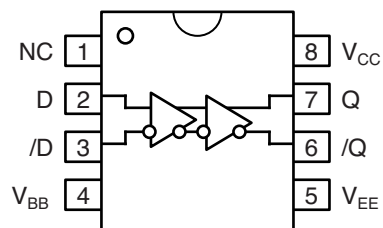
Under open input conditions (pulled to  $V_{EE}$ ), internal input clamps will force the Q output LOW.

All support documentation can be found on Micrel's web site at [www.micrel.com](http://www.micrel.com).

### PIN NAMES

| Pin      | Function                 |
|----------|--------------------------|
| D, /D    | ECL Data Inputs          |
| Q, /Q    | ECL Data Outputs         |
| $V_{BB}$ | Reference Voltage Output |
| $V_{CC}$ | Positive Power Supply    |
| $V_{EE}$ | Negative Power Supply    |

## PACKAGE/ORDERING INFORMATION



Available in 8-Pin SOIC and  
MSOP Packages

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

| Part Number                     | Package Type | Operating Range | Package Marking                          | Lead Finish       |
|---------------------------------|--------------|-----------------|------------------------------------------|-------------------|
| SY10EP16VZC                     | Z8-1         | Commercial      | HEP16                                    | Sn-Pb             |
| SY10EP16VZCTR <sup>(2)</sup>    | Z8-1         | Commercial      | HEP16                                    | Sn-Pb             |
| SY10EP16VKC                     | K8-1         | Commercial      | HP16                                     | Sn-Pb             |
| SY10EP16VKCTR <sup>(2)</sup>    | K8-1         | Commercial      | HP16                                     | Sn-Pb             |
| SY10EP16VZI                     | Z8-1         | Industrial      | HEP16                                    | Sn-Pb             |
| SY10EP16VZITR <sup>(2)</sup>    | Z8-1         | Industrial      | HEP16                                    | Sn-Pb             |
| SY10EP16VKI                     | K8-1         | Industrial      | HP16                                     | Sn-Pb             |
| SY10EP16VKITR <sup>(2, 3)</sup> | K8-1         | Industrial      | HP16                                     | Sn-Pb             |
| SY10EP16VZG <sup>(3)</sup>      | Z8-1         | Industrial      | HEP16 with<br>Pb-Free bar-line indicator | Pb-Free<br>NiPdAu |
| SY10EP16VZGTR <sup>(2, 3)</sup> | Z8-1         | Industrial      | HEP16 with<br>Pb-Free bar-line indicator | Pb-Free<br>NiPdAu |
| SY10EP16VKG <sup>(3)</sup>      | K8-1         | Industrial      | HP16 with<br>Pb-Free bar-line indicator  | Pb-Free<br>NiPdAu |
| SY10EP16VKGTR <sup>(2, 3)</sup> | K8-1         | Industrial      | HP16 with<br>Pb-Free bar-line indicator  | Pb-Free<br>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      | Rating                                                                                                                                                   | Value                  | Unit       |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------|
| $V_{EE}$    | Power Supply Voltage ( $V_{CC} = 0$ )                                                                                                                    | -6.0 to 0              | Vdc        |
| $V_{CC}$    | Power Supply Voltage ( $V_{EE} = 0$ )                                                                                                                    | +6.0 to 0              | Vdc        |
| $V_{IN}$    | Input Voltage ( $V_{CC} = 0V$ , $V_{IN}$ not more negative than $V_{EE}$ )<br>Input Voltage ( $V_{EE} = 0V$ , $V_{IN}$ not more negative than $V_{CC}$ ) | -6.0 to 0<br>+6.0 to 0 | Vdc<br>Vdc |
| $I_{OUT}$   | Output Current<br>-Continuous<br>-Surge                                                                                                                  | 50<br>100              | mA         |
| $I_{BB}$    | $V_{BB}$ Sink/Source Current <sup>(2)</sup>                                                                                                              | ±0.5                   | mA         |
| $T_{LEAD}$  | Lead Temperature (soldering, 20sec.)                                                                                                                     | +260                   | °C         |
| $T_A$       | Operating Temperature Range                                                                                                                              | -40 to +85             | °C         |
| $T_{store}$ | Storage Temperature Range                                                                                                                                | -65 to +150            | °C         |

**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)</sup>**

$V_{CC} = 0V$ ;  $V_{EE} = -5.5V$  to  $-3.0V$ ;  $V_{CC} = 3.0V$  to  $5.5V$ ,  $V_{EE} = 0V$ <sup>(5)</sup>

| Symbol      | Parameter                                           | $T_A = -40^{\circ}C$ |                 | $T_A = +25^{\circ}C$ |      |                 | $T_A = +85^{\circ}C$ |                 | Unit |
|-------------|-----------------------------------------------------|----------------------|-----------------|----------------------|------|-----------------|----------------------|-----------------|------|
|             |                                                     | Min.                 | Max.            | Min.                 | Typ. | Max.            | Min.                 | Max.            |      |
| $I_{EE}$    | Power Supply Current <sup>(2)</sup>                 | —                    | 42              | —                    | —    | 42              | —                    | 42              | mA   |
| $V_{OH}$    | Output HIGH Voltage <sup>(3)</sup>                  | $V_{CC} - 1080$      | $V_{CC} - 0890$ | $V_{CC} - 0980$      | —    | $V_{CC} - 0810$ | $V_{CC} - 0910$      | $V_{CC} - 0720$ | mV   |
| $V_{OL}$    | Output LOW Voltage <sup>(3)</sup>                   | $V_{CC} - 1950$      | $V_{CC} - 1650$ | $V_{CC} - 1950$      | —    | $V_{CC} - 1630$ | $V_{CC} - 1950$      | $V_{CC} - 1595$ | mV   |
| $V_{IH}$    | Input HIGH Voltage                                  | $V_{CC} - 1230$      | $V_{CC} - 0890$ | $V_{CC} - 1130$      | —    | $V_{CC} - 0810$ | $V_{CC} - 1060$      | $V_{CC} - 0720$ | mV   |
| $V_{IL}$    | Input LOW Voltage                                   | $V_{CC} - 1950$      | $V_{CC} - 1500$ | $V_{CC} - 1950$      | —    | $V_{CC} - 1480$ | $V_{CC} - 1950$      | $V_{CC} - 1445$ | mV   |
| $V_{BB}$    | Output Reference Voltage                            | $V_{CC} - 1430$      | $V_{CC} - 1300$ | $V_{CC} - 1350$      | —    | $V_{CC} - 1250$ | $V_{CC} - 1310$      | $V_{CC} - 1190$ | mV   |
| $V_{IHCMR}$ | Input HIGH Voltage Common Mode Range <sup>(4)</sup> | $V_{EE} + 2.0$       | $V_{CC} - 0.4$  | $V_{EE} + 2.0$       | —    | $V_{CC} - 0.4$  | $V_{EE} + 2.0$       | $V_{CC} - 0.4$  | V    |
| $I_{IH}$    | Input HIGH Current                                  | —                    | 150             | —                    | —    | 150             | —                    | 150             | μA   |
| $I_{IL}$    | Input LOW Current                                   | 0.5                  | —               | 0.5                  | —    | —               | 0.5                  | —               | μA   |

**Notes:**

1. 10EP circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and traverse airflow greater than 500lfpm is maintained.
2.  $V_{CC} = 0V$ ,  $V_{EE} = V_{EE}(\text{min.})$  to  $V_{EE}(\text{max.})$ , all other pins floating.
3. All loading with  $50\Omega$  to  $V_{CC} - 2.0V$ .
4.  $V_{IHCMR}(\text{min.})$  varies 1:1 with  $V_{EE}$ , Max. varies 1:1 with  $V_{CC}$ .
5. Input and output parameters vary 1:1 with  $V_{CC}$ .

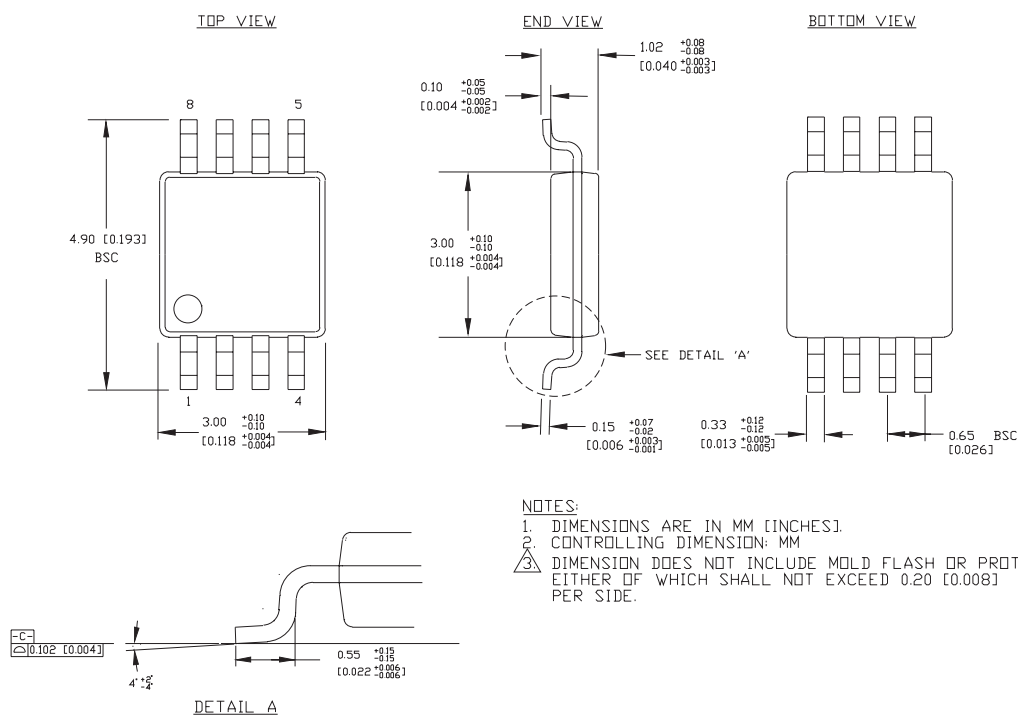
**AC ELECTRICAL CHARACTERISTICS**
 $V_{CC} = 0V$ ;  $V_{EE} = -5.5V$  to  $-3.0V$ ;  $V_{CC} = 3.0V$  to  $5.5V$ ,  $V_{EE} = 0V$ 

| Symbol                 | Parameter                                                                        | $T_A = -40^\circ C$ |      | $T_A = +25^\circ C$ |      |      | $T_A = +85^\circ C$ |      | Unit |
|------------------------|----------------------------------------------------------------------------------|---------------------|------|---------------------|------|------|---------------------|------|------|
|                        |                                                                                  | Min.                | Max. | Min.                | Typ. | Max. | Min.                | Max. |      |
| $f_{MAX}$              | Maximum Toggle Frequency <sup>(1)</sup>                                          | —                   | —    | —                   | 3    | —    | —                   | —    | GHz  |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay to<br>Output Differential <sup>(2)</sup> $D \rightarrow Q, /Q$ | 100                 | 300  | 150                 | 200  | 250  | 200                 | 300  | ps   |
| $t_{SKEW}$             | Device Skew                                                                      | —                   | —    | —                   | 5.0  | 20   | —                   | 20   | ps   |
| $t_r$<br>$t_f$         | Output Rise/Fall Times<br>(20% to 80%) $Q$                                       | 60                  | 180  | 60                  | 110  | 180  | 70                  | 180  | ps   |

**Notes:**

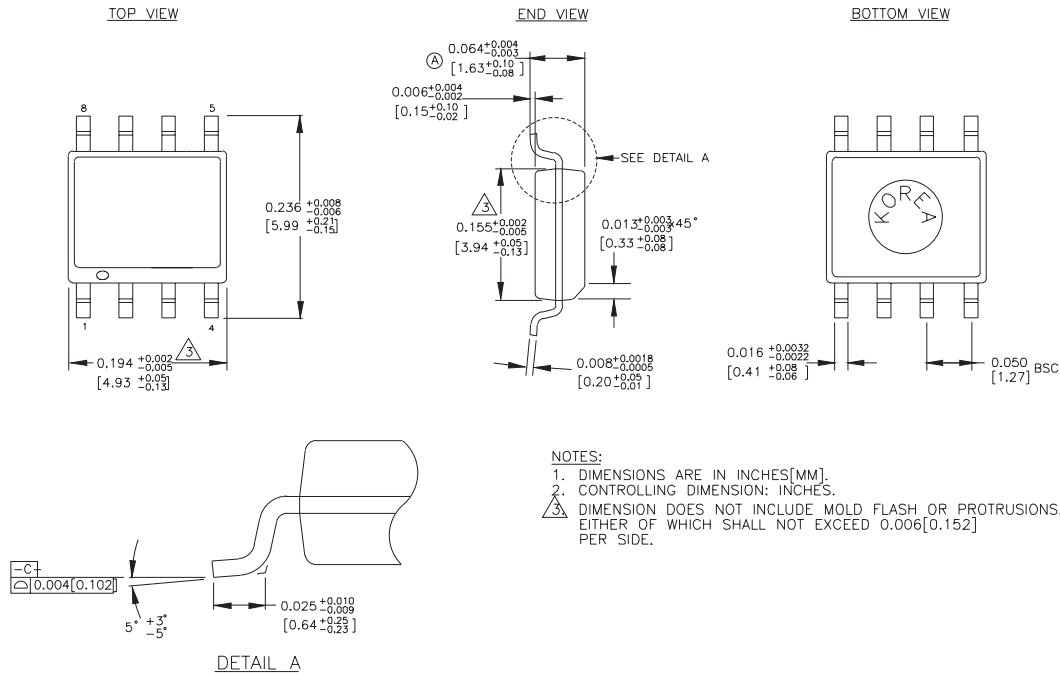
- $f_{MAX}$  guaranteed for functionality only.  $V_{OL}$  and  $V_{OH}$  levels are guaranteed at DC only.
- $V_{IN} = 800mV$ .

## 8-PIN MSOP (K8-1)



Rev. 01

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



Rev. 03

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