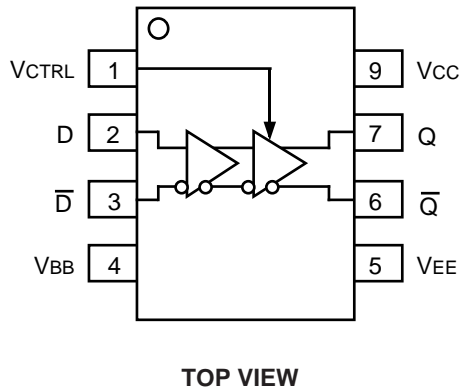


### FEATURES

- 5V power supply options
- High bandwidth output transitions
- Internal 75KΩ pull-down resistors on inputs
- Functionally equivalent to SY10/100EL16V with variable output swing
- Improved output waveform characteristics
- ESD protection of 2000V
- Available in 8-pin (3mm) TSSOP

### PIN CONFIGURATION/BLOCK DIAGRAM



### DESCRIPTION

The SY100EL16S is a differential receiver with variable output swing. This device is functionally equivalent to the EL16V, with an additional input that control the output amplitude.

The operating range of the EL16S control input is from VBB (max. swing) to VCC (min. swing). Control of the output swing can be obtained by a variable resistor between the VBB pin and VCC with the wiper driving VCTRL.

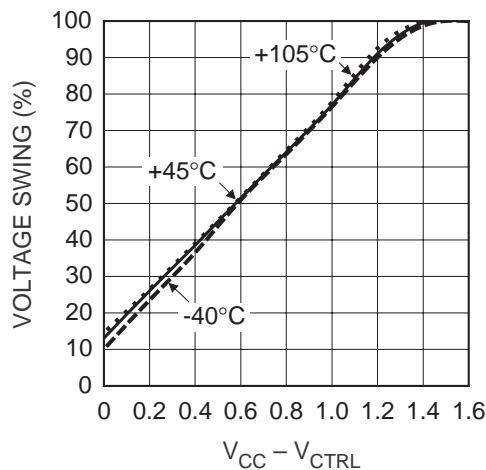
The EL16S provides a VBB output for either single-ended use or as a DC bias for AC coupling to the device. The VBB pin should be used only as a bias for the EL16S as its current sink/source capability is limited. Whenever used, the VBB pin should be bypassed to VCC via a 0.01μF capacitor.

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

### PIN NAMES

| Pin          | Function                 |
|--------------|--------------------------|
| D, $\bar{D}$ | Data Inputs              |
| Q, $\bar{Q}$ | Data Outputs             |
| VBB          | Reference Voltage Output |
| VCTRL        | Output Swing Control     |

### TYPICAL VOLTAGE OUTPUT SWING



**Figure 1. Typical Voltage Output Swing**  
VCC = 5V

## DC ELECTRICAL CHARACTERISTICS<sup>(1)</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 <sub>EE</sub> | Power Supply Current                | —                         | —    | 22    | —                       | —    | 22    | 9                         | 18   | 22    | 9                         | 21   | 26    | mA   |
| V <sub>BB</sub> | Output Reference Voltage            | -1.38                     | —    | -1.26 | -1.38                   | —    | -1.26 | -1.38                     | —    | -1.26 | -1.38                     | —    | -1.26 | V    |
| I <sub>IH</sub> | Input HIGH Current                  | —                         | —    | 150   | —                       | —    | 150   | —                         | —    | 150   | —                         | —    | 150   | μA   |
|                 | —D, $\bar{D}$<br>—V <sub>CTRL</sub> | —                         | —    | 40    | —                       | —    | 40    | —                         | —    | 40    | —                         | —    | 40    |      |

### NOTE:

- Parametric values specified at: 100EL16S Series:  $-4.5\text{V}$  to  $-5.5\text{V}$ .

## AC ELECTRICAL CHARACTERISTICS<sup>(1)</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.  |      |
| t <sub>PLH</sub>                 | Propagation Delay to Output D (Diff)                                     | 175                       | —    | 325   | 175                     | —    | 325   | 175                       | —     | 325   | 205                       | —    | 355   | ps   |
| t <sub>PHL</sub>                 | Delay to Output D (SE)   | 125                       | 250  | 425   | 125                     | 250  | 375   | 125                       | 250   | 375   | 125                       | 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    |
| V <sub>OL</sub>                  | Output LOW Voltage <sup>(5)</sup><br>V <sub>CTRL</sub> = V <sub>BB</sub> | -1890                     | —    | -1620 | -1870                   | —    | -1680 | -1870                     | -1775 | -1680 | -1870                     | —    | -1680 | mV   |
| V <sub>OL</sub>                  | Output LOW Voltage <sup>(5)</sup><br>V <sub>CTRL</sub> = V <sub>CC</sub> | -1180                     | —    | -975  | -1135                   | —    | -990  | -1135                     | -1065 | -990  | -1135                     | —    | -990  | mV   |
| V <sub>OH</sub>                  | Output HIGH Voltage <sup>(6)</sup>                                       | -1085                     | —    | -880  | -1025                   | —    | -880  | -1025                     | -955  | -880  | -1025                     | —    | -880  | mV   |
| t <sub>r</sub><br>t <sub>f</sub> | Output Rise/Fall Times Q<br>(20% to 80%)                                 | —                         | —    | 350   | —                       | —    | 350   | —                         | —     | 350   | —                         | —    | 350   | ps   |

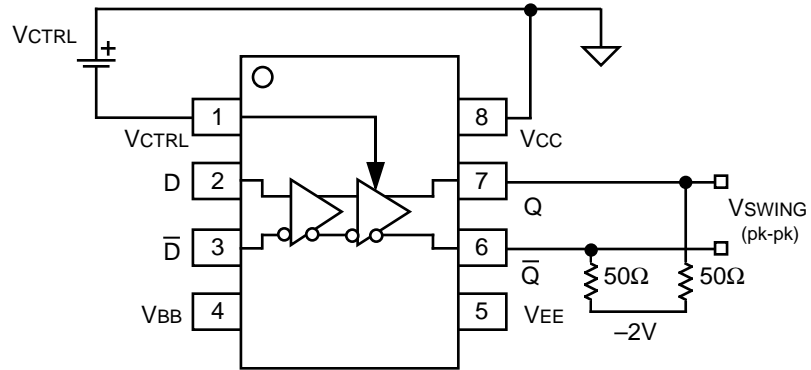
### NOTES:

- Parametric values specified at: 100EL16S Series:  $-4.5\text{V}$  to  $-5.5\text{V}$ .
- Duty cycle skew is the difference between a t<sub>PLH</sub> and t<sub>PHL</sub> propagation delay through a device.
- Minimum input swing for which AC parameters are guaranteed. The device has a DC gain of  $\approx 40$  when output has a full swing.
- 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> =  $-3.3\text{V}$ . Note for PECL operation, the V<sub>CMR</sub> (min) will be fixed at  $3.3\text{V} - |V_{\text{CMR}} (\text{min})|$ .
- If V<sub>CTRL</sub> is Open Circuit, use the V<sub>OH</sub> (max. & min.) and V<sub>OL</sub> (V<sub>CTRL</sub> = V<sub>BB</sub>: max only) limits.
- $V_{CC} \geq V_{\text{CTRL}} \geq V_{EE}$

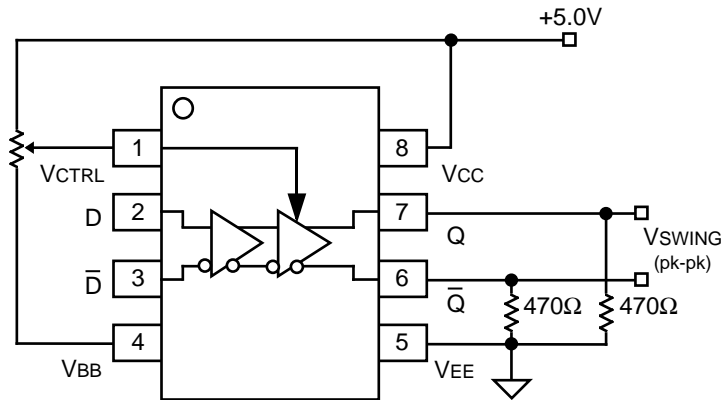
## PRODUCT ORDERING CODE

| Ordering Code | Package Type | Operating Range | V <sub>EE</sub> Range (V) |
|---------------|--------------|-----------------|---------------------------|
| SY100EL16SKC  | K8-1         | Commercial      | $-4.5$ to $-5.5$          |
| SY100EL16SZC  | Z8-1         | Commercial      | $-4.5$ to $-5.5$          |

**APPLICATION IMPLEMENTATION**

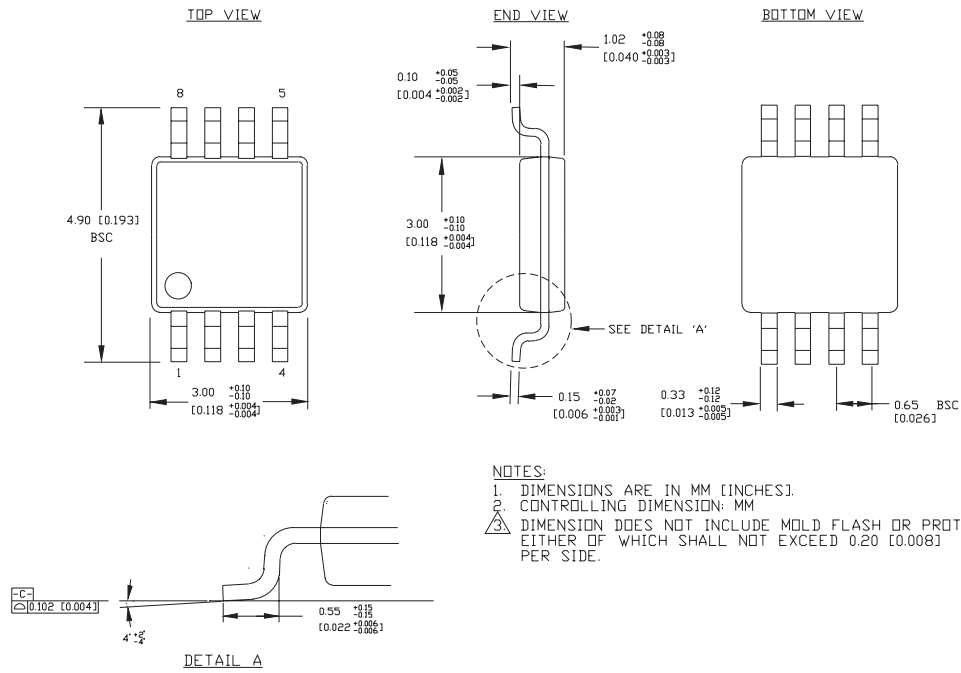


**Figure 2. Voltage Source Implementation**



**Figure 3. Alternative Implementation**

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



NOTES:  
1. DIMENSIONS ARE IN MM [INCHES].  
2. CONTROLLING DIMENSION: MM  
⚠ DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.20 [0.008] PER SIDE.

**8 LEAD PLASTIC SOIC (Z8-1)**

