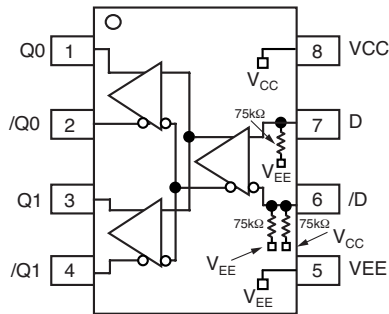


## PACKAGE/ORDERING INFORMATION



8-pin MSOP and SOIC Packages

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

| Part Number                      | Package Type | Operating Range | Package Marking                        | Lead Finish    |
|----------------------------------|--------------|-----------------|----------------------------------------|----------------|
| SY10EP11UKC                      | K8-1         | Commercial      | HP11                                   | Sn-Pb          |
| SY10EP11UKCTR <sup>(2)</sup>     | K8-1         | Commercial      | HP11                                   | Sn-Pb          |
| SY100EP11UKC                     | K8-1         | Commercial      | XP11                                   | Sn-Pb          |
| SY100EP11UKCTR <sup>(2)</sup>    | K8-1         | Commercial      | XP11                                   | Sn-Pb          |
| SY10EP11UZC                      | Z8-1         | Commercial      | HEP11U                                 | Sn-Pb          |
| SY10EP11UZCTR <sup>(2)</sup>     | Z8-1         | Commercial      | HEP11U                                 | Sn-Pb          |
| SY100EP11UZC                     | Z8-1         | Commercial      | XEP11U                                 | Sn-Pb          |
| SY100EP11UZCTR <sup>(2)</sup>    | Z8-1         | Commercial      | XEP11U                                 | Sn-Pb          |
| SY10EP11UKI                      | K8-1         | Industrial      | HP11                                   | Sn-Pb          |
| SY10EP11UKITR <sup>(2)</sup>     | K8-1         | Industrial      | HP11                                   | Sn-Pb          |
| SY100EP11UKI                     | K8-1         | Industrial      | XP11                                   | Sn-Pb          |
| SY100EP11UKITR <sup>(2)</sup>    | K8-1         | Industrial      | XP11                                   | Sn-Pb          |
| SY10EP11UZI                      | Z8-1         | Industrial      | HEP11U                                 | Sn-Pb          |
| SY10EP11UZITR <sup>(2)</sup>     | Z8-1         | Industrial      | HEP11U                                 | Sn-Pb          |
| SY100EP11UZI                     | Z8-1         | Industrial      | XEP11U                                 | Sn-Pb          |
| SY100EP11UZITR <sup>(2)</sup>    | Z8-1         | Industrial      | XEP11U                                 | Sn-Pb          |
| SY10EP11UKG <sup>(3)</sup>       | K8-1         | Industrial      | HP11 with Pb-Free bar-line indicator   | Pb-Free NiPdAu |
| SY10EP11UKGTR <sup>(2, 3)</sup>  | K8-1         | Industrial      | HP11 with Pb-Free bar-line indicator   | Pb-Free NiPdAu |
| SY100EP11UKG <sup>(3)</sup>      | K8-1         | Industrial      | XP11 with Pb-Free bar-line indicator   | Pb-Free NiPdAu |
| SY100EP11UKGTR <sup>(2, 3)</sup> | K8-1         | Industrial      | XP11 with Pb-Free bar-line indicator   | Pb-Free NiPdAu |
| SY10EP11UZG <sup>(3)</sup>       | Z8-1         | Industrial      | HEP11U with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY10EP11UZGTR <sup>(2, 3)</sup>  | Z8-1         | Industrial      | HEP11U with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY100EP11UZG <sup>(3)</sup>      | Z8-1         | Industrial      | XEP11U with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY100EP11UZGTR <sup>(2, 3)</sup> | Z8-1         | Industrial      | XEP11U 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            | Rating                                                                                                                                                   | Value                    | Unit         |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------|
| $V_{CC} - V_{EE}$ | Power Supply Voltage                                                                                                                                     | 6V                       | 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           |
| $T_A$             | Operating Temperature Range                                                                                                                              | -40 to +85               | °C           |
| $T_{LEAD}$        | Lead Temperature (soldering, 20sec.)                                                                                                                     | 260                      | °C           |
| $T_{store}$       | Storage Temperature Range                                                                                                                                | -65 to +150              | °C           |
| $\theta_{JA}$     | Package Thermal Resistance (Junction-to-Ambient)<br>-Still-Air (SOIC)<br>-500lfpm (SOIC)<br>-Still-Air (MSOP)<br>-500lfpm (MSOP)                         | 160<br>109<br>206<br>155 | °C/W<br>°C/W |
| $\theta_{JC}$     | Package Thermal Resistance (Junction-to-Case)<br>(SOIC)<br>(MSOP)                                                                                        | 39<br>39                 | °C/W         |

**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>**

| Symbol   | Parameter                                                      | $T_A = -40^\circ\text{C}$   |                          |                             | $T_A = +25^\circ\text{C}$   |                          |                             | $T_A = +85^\circ\text{C}$   |                          |                             | Unit     | Condition                              |
|----------|----------------------------------------------------------------|-----------------------------|--------------------------|-----------------------------|-----------------------------|--------------------------|-----------------------------|-----------------------------|--------------------------|-----------------------------|----------|----------------------------------------|
|          |                                                                | Min.                        | Typ.                     | Max.                        | Min.                        | Typ.                     | Max.                        | Min.                        | Typ.                     | Max.                        |          |                                        |
| $V_{CC}$ | Power Supply Voltage<br>(PECL)<br>(LVPECL)<br>(ECL)<br>(LVECL) | 4.5<br>2.37<br>-5.5<br>-3.8 | 5.0<br>—<br>-5.0<br>-3.3 | 5.5<br>3.8<br>-4.5<br>-2.37 | 4.5<br>2.37<br>-5.5<br>-3.8 | 5.0<br>—<br>-5.0<br>-3.3 | 5.5<br>3.8<br>-4.5<br>-2.37 | 4.5<br>2.37<br>-5.5<br>-3.8 | 5.0<br>—<br>-5.0<br>-3.3 | 5.5<br>3.8<br>-4.5<br>-2.37 | V        |                                        |
| $I_{EE}$ | Power Supply Current<br>SY10EP11U<br>SY100EP11U                | —<br>—                      | —<br>—                   | 37<br>44                    | —<br>—                      | 25<br>30                 | 39<br>44                    | —<br>—                      | —<br>—                   | 40<br>44                    | mA<br>mA |                                        |
| $I_{IH}$ | Input HIGH Current                                             | —                           | —                        | 150                         | —                           | —                        | 150                         | —                           | —                        | 150                         | μA       | $V_{IN} = V_{IH}$                      |
| $I_{IL}$ | Input LOW Current<br>D<br>/D                                   | 0.5<br>-150                 | —<br>—                   | —<br>—                      | 0.5<br>-150                 | —<br>—                   | —<br>—                      | 0.5<br>-150                 | —<br>—                   | —<br>—                      | μA<br>μA | $V_{IN} = V_{IL}$<br>$V_{IN} = V_{IL}$ |
| $C_{IN}$ | Input Capacitance (MSOP)<br>(SOIC)                             | —<br>—                      | —<br>—                   | —<br>—                      | —<br>—                      | 1.0<br>1.35              | —<br>—                      | —<br>—                      | —<br>—                   | —<br>—                      | pF<br>pF |                                        |

**Note:**

1. 10/100KEP 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.

**(10KEP) LVPECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 2.5V \pm 5\%$ ,  $V_{EE} = 0V$ .

| Symbol      | Parameter                                              | $T_A = -40^\circ C$ |      |          | $T_A = +25^\circ C$ |      |          | $T_A = +85^\circ C$ |      |          | Unit | Condition                 |
|-------------|--------------------------------------------------------|---------------------|------|----------|---------------------|------|----------|---------------------|------|----------|------|---------------------------|
|             |                                                        | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     |      |                           |
| $V_{OL}$    | Output LOW Voltage                                     | 565                 | 690  | 815      | 630                 | 755  | 880      | 690                 | 815  | 940      | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{OH}$    | Output HIGH Voltage                                    | 1365                | 1490 | 1615     | 1430                | 1555 | 1680     | 1490                | 1615 | 1740     | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(2)</sup><br>Common Mode Range | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | V    |                           |

**(10KEP) LVPECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 3.3V \pm 10\%$ ,  $V_{EE} = 0V$ .

| Symbol      | Parameter                                              | $T_A = -40^\circ C$ |      |          | $T_A = +25^\circ C$ |      |          | $T_A = +85^\circ C$ |      |          | Unit | Condition                 |
|-------------|--------------------------------------------------------|---------------------|------|----------|---------------------|------|----------|---------------------|------|----------|------|---------------------------|
|             |                                                        | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     |      |                           |
| $V_{IL}$    | Input LOW Voltage<br>(Single-Ended)                    | 1365                | —    | 1690     | 1430                | —    | 1755     | 1490                | —    | 1815     | mV   |                           |
| $V_{IH}$    | Input HIGH Voltage<br>(Single-Ended)                   | 2090                | —    | 2415     | 2155                | —    | 2480     | 2215                | —    | 2540     | mV   |                           |
| $V_{OL}$    | Output LOW Voltage                                     | 1365                | 1490 | 1615     | 1430                | 1555 | 1680     | 1490                | 1615 | 1740     | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{OH}$    | Output HIGH Voltage                                    | 2165                | 2290 | 2415     | 2230                | 2355 | 2480     | 2290                | 2415 | 2540     | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(2)</sup><br>Common Mode Range | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | V    |                           |

**(10KEP) PECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 5.0V \pm 10\%$ ,  $V_{EE} = 0V$ .

| Symbol      | Parameter                                              | $T_A = -40^\circ C$ |      |          | $T_A = +25^\circ C$ |      |          | $T_A = +85^\circ C$ |      |          | Unit | Condition                 |
|-------------|--------------------------------------------------------|---------------------|------|----------|---------------------|------|----------|---------------------|------|----------|------|---------------------------|
|             |                                                        | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     |      |                           |
| $V_{IL}$    | Input LOW Voltage<br>(Single-Ended)                    | 3065                | —    | 3390     | 3130                | —    | 3455     | 3190                | —    | 3515     | mV   |                           |
| $V_{IH}$    | Input HIGH Voltage<br>(Single-Ended)                   | 3790                | —    | 4115     | 3855                | —    | 4180     | 3915                | —    | 4240     | mV   |                           |
| $V_{OL}$    | Output LOW Voltage                                     | 3065                | 3190 | 3315     | 3130                | 3255 | 3380     | 3190                | 3315 | 3440     | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{OH}$    | Output HIGH Voltage                                    | 3865                | 3990 | 4115     | 3930                | 4055 | 4180     | 3990                | 4115 | 4240     | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(2)</sup><br>Common Mode Range | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | V    |                           |

**No tes:**

- 10KEP 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. Input and output parameters are at  $V_{CC} = 2.5V$ . They vary 1:1 with  $V_{CC}$ .
- The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal. See "Input Waveform" section. Single-ended input CLK pin operation is limited to  $V_{CC} \geq 3.0V$  in PECL mode.

**(10KEP) ECL/LVECL DC ELECTRICAL CHARACTERISTICS<sup>(3)</sup>** $V_{CC} = 0V$ ,  $V_{EE} = -5.5V$  to  $-2.375V$ .

| Symbol      | Parameter                                           | $T_A = -40^\circ C$ |       |       | $T_A = +25^\circ C$ |       |       | $T_A = +85^\circ C$ |       |       | Unit | Condition                 |
|-------------|-----------------------------------------------------|---------------------|-------|-------|---------------------|-------|-------|---------------------|-------|-------|------|---------------------------|
|             |                                                     | Min.                | Typ.  | Max.  | Min.                | Typ.  | Max.  | Min.                | Typ.  | Max.  |      |                           |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                    | -1935               | —     | -1610 | -1870               | —     | -1545 | -1810               | —     | -1485 | mV   |                           |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                   | -1210               | —     | -885  | -1145               | —     | -820  | -1085               | —     | -760  | mV   |                           |
| $V_{OL}$    | Output LOW Voltage                                  | -1935               | -1810 | -1685 | -1870               | -1745 | -1620 | -1810               | -1685 | -1560 | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{OH}$    | Output HIGH Voltage                                 | -1135               | -1010 | -885  | -1070               | -945  | -820  | -1010               | -885  | -760  | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(4)</sup> Common Mode Range | $V_{EE} + 1.2$      |       | 0.0   | $V_{EE} + 1.2$      |       | 0.0   | $V_{EE} + 1.2$      |       | 0.0   | V    |                           |

**(100KEP) LVPECL DC ELECTRICAL CHARACTERISTICS<sup>(3)</sup>** $V_{CC} = 2.5V \pm 5\%$ .

| Symbol      | Parameter                                           | $T_A = -40^\circ C$ |      |          | $T_A = +25^\circ C$ |      |          | $T_A = +85^\circ C$ |      |          | Unit | Condition                 |
|-------------|-----------------------------------------------------|---------------------|------|----------|---------------------|------|----------|---------------------|------|----------|------|---------------------------|
|             |                                                     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     |      |                           |
| $V_{OL}$    | Output LOW Voltage                                  | 555                 | 680  | 805      | 555                 | 680  | 805      | 555                 | 680  | 805      | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{OH}$    | Output HIGH Voltage                                 | 1355                | 1480 | 1605     | 1355                | 1480 | 1605     | 1355                | 1480 | 1605     | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(4)</sup> Common Mode Range | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | V    |                           |

**(100KEP) LVPECL DC ELECTRICAL CHARACTERISTICS<sup>(3)</sup>** $V_{CC} = 3.3V \pm 10\%$ ,  $V_{EE} = 0V$ .

| Symbol      | Parameter                                           | $T_A = -40^\circ C$ |      |          | $T_A = +25^\circ C$ |      |          | $T_A = +85^\circ C$ |      |          | Unit | Condition                 |
|-------------|-----------------------------------------------------|---------------------|------|----------|---------------------|------|----------|---------------------|------|----------|------|---------------------------|
|             |                                                     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     |      |                           |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                    | 1355                | —    | 1675     | 1355                | —    | 1675     | 1355                | —    | 1675     | mV   |                           |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                   | 2075                | —    | 2420     | 2075                | —    | 2420     | 2075                | —    | 2420     | mV   |                           |
| $V_{OL}$    | Output LOW Voltage                                  | 1355                | 1480 | 1605     | 1355                | 1480 | 1605     | 1355                | 1480 | 1605     | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{OH}$    | Output HIGH Voltage                                 | 2155                | 2280 | 2405     | 2155                | 2280 | 2405     | 2155                | 2280 | 2405     | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(4)</sup> Common Mode Range | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | 1.2                 | —    | $V_{CC}$ | V    |                           |

**Notes:**

- 10KEP 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.
- The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal. See "Input Waveform" section. Single-ended input CLK pin operation is limited to  $V_{EE} \leq -3.0V$  in ECL/LVECL mode.

**(100KEP) PECL DC ELECTRICAL CHARACTERISTICS<sup>(5)</sup>** $V_{CC} = 5.0V \pm 10\%$ ,  $V_{EE} = 0V$ .

| Symbol      | Parameter                                           | $T_A = -40^\circ C$ |      |          | $T_A = +25^\circ C$ |      |          | $T_A = +85^\circ C$ |      |          | Unit | Condition                 |
|-------------|-----------------------------------------------------|---------------------|------|----------|---------------------|------|----------|---------------------|------|----------|------|---------------------------|
|             |                                                     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     |      |                           |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                    | 3055                | —    | 3375     | 3055                | —    | 3375     | 3055                | —    | 3375     | mV   |                           |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                   | 3775                | —    | 4120     | 3775                | —    | 4120     | 3775                | —    | 4120     | mV   |                           |
| $V_{OL}$    | Output LOW Voltage                                  | 3055                | 3180 | 3305     | 3055                | 3180 | 3305     | 3055                | 3180 | 3305     | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{OH}$    | Output HIGH Voltage                                 | 3855                | 3980 | 4105     | 3855                | 3980 | 4105     | 3855                | 3980 | 4105     | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(6)</sup> Common Mode Range | 2.0                 | —    | $V_{CC}$ | 2.0                 | —    | $V_{CC}$ | 2.0                 | —    | $V_{CC}$ | V    |                           |

**Notes:**

5. 100KEP 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. Input and output parameters are at  $V_{CC} = 5.0V$ . They vary 1:1 with  $V_{CC}$ .
6. The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal. See "Input Waveform" section. Single-ended input CLK pin operation is limited to  $V_{CC} \geq 3.0V$  in PECL mode.

**(100KEP) ECL/LVECL DC ELECTRICAL CHARACTERISTICS<sup>(7)</sup>** $V_{CC} = 0V$ ,  $V_{EE} = -5.5V$  to  $-2.375V$ .

| Symbol      | Parameter                                           | $T_A = -40^\circ C$ |       |       | $T_A = +25^\circ C$ |       |       | $T_A = +85^\circ C$ |       |       | Unit | Condition                 |
|-------------|-----------------------------------------------------|---------------------|-------|-------|---------------------|-------|-------|---------------------|-------|-------|------|---------------------------|
|             |                                                     | Min.                | Typ.  | Max.  | Min.                | Typ.  | Max.  | Min.                | Typ.  | Max.  |      |                           |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                    | -1945               | —     | -1625 | -1945               | —     | -1625 | -1945               | —     | -1625 | mV   |                           |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                   | -1225               | —     | -880  | -1225               | —     | -880  | -1225               | —     | -880  | mV   |                           |
| $V_{OL}$    | Output LOW Voltage                                  | -1945               | -1820 | -1695 | -1945               | -1820 | -1695 | -1945               | -1820 | -1695 | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{OH}$    | Output HIGH Voltage                                 | -1145               | -1020 | -895  | -1145               | -1020 | -895  | -1145               | -1020 | -895  | mV   | $50\Omega$ to $V_{CC}-2V$ |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(8)</sup> Common Mode Range | $V_{EE} + 1.2$      |       | 0.0   | $V_{EE} + 1.2$      |       | 0.0   | $V_{EE} + 1.2$      |       | 0.0   | V    |                           |

**Notes:**

7. 100KEP 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.
8. The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal. See "Input Waveform" section. Single-ended input CLK pin operation is limited to  $V_{EE} \leq -3.0V$  in ECL/LVECL mode.

**AC ELECTRICAL CHARACTERISTICS**

$V_{CC} = 0V$ ;  $V_{EE} = -5.5V$  to  $-2.375V$  or  $V_{CC} = 2.375V$  to  $5.5V$ ,  $V_{EE} = 0V$ .

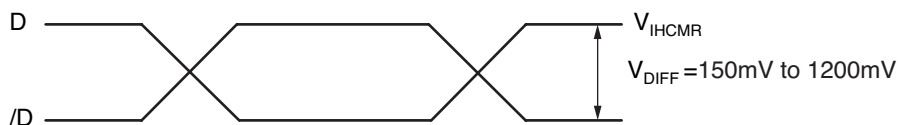
| Symbol                 | Parameter                                                    | $T_A = -40^\circ C$ |            |            | $T_A = +25^\circ C$ |            |            | $T_A = +85^\circ C$ |            |            | Unit              | Condition                            |
|------------------------|--------------------------------------------------------------|---------------------|------------|------------|---------------------|------------|------------|---------------------|------------|------------|-------------------|--------------------------------------|
|                        |                                                              | Min.                | Typ.       | Max.       | Min.                | Typ.       | Max.       | Min.                | Typ.       | Max.       |                   |                                      |
| $f_{MAX}$              | Max. Toggle Frequency <sup>(9)</sup>                         | 3                   | —          | —          | 3                   | —          | —          | 3                   | —          | —          | GHz               |                                      |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay (Differential)<br>D to Q, /Q<br>D to Q, /Q | 140<br>170          | 200<br>230 | 250<br>300 | 160<br>180          | 220<br>240 | 270<br>310 | 180<br>210          | 240<br>270 | 300<br>360 | ps<br>ps          | $V_{CC} = 3.3/5V$<br>$V_{CC} = 2.5V$ |
| $t_{SKEW}$             | Within-Device Skew <sup>(10)</sup> Q, /Q                     | —                   | 5          | 20         | —                   | 5          | 20         | —                   | 5          | 20         | ps                |                                      |
|                        | Part-to-Part Skew <sup>(10)</sup>                            | —<br>—              | —<br>—     | 130<br>110 | —<br>—              | —<br>—     | 130<br>110 | —<br>—              | —<br>—     | 150<br>120 | ps<br>ps          | $V_{CC} = 3.3/5V$<br>$V_{CC} = 2.5V$ |
| $t_{JITTER}$           | Cycle-to-Cycle Jitter (RMS)                                  | —                   | 0.2        | < 1        | —                   | 0.2        | < 1        | —                   | 0.2        | < 1        | ps <sub>RMS</sub> |                                      |
| $V_{DIFF}$             | Input Swing <sup>(11)</sup>                                  | 150                 | 800        | 1200       | 150                 | 800        | 1200       | 150                 | 800        | 1200       | mV                |                                      |
| $t_r, t_f$             | Output Rise/Fall Time<br>(20% to 80%)                        | 70                  | 110        | 170        | 80                  | 120        | 180        | 100                 | 140        | 200        | ps                |                                      |

**Notes:**

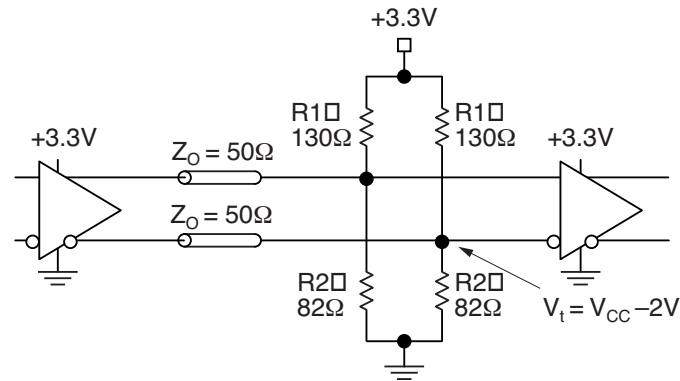
9. Measured with 750mV input signal, 50% duty cycle. All loading with a 50Ω to  $V_{CC} - 2.0V$ .

10. Skew is measured between outputs under identical transitions. Duty cycle skew is defined only for differential operation when the delays are measured from the cross point of the inputs to the cross point of the outputs.

11. See "Input Waveform."

**INPUT WAVEFORM**

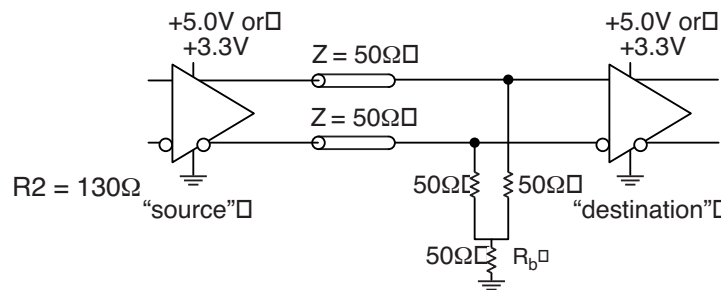
## TERMINATION RECOMMENDATIONS



**Figure 1. Parallel Termination–Thevenin Equivalent**

**Notes:**

1. For +2.5V systems:  $R_1 = 250\Omega$ ,  $R_2 = 62.5\Omega$ .
2. For +5.0V systems:  $R_1 = 82\Omega$ .

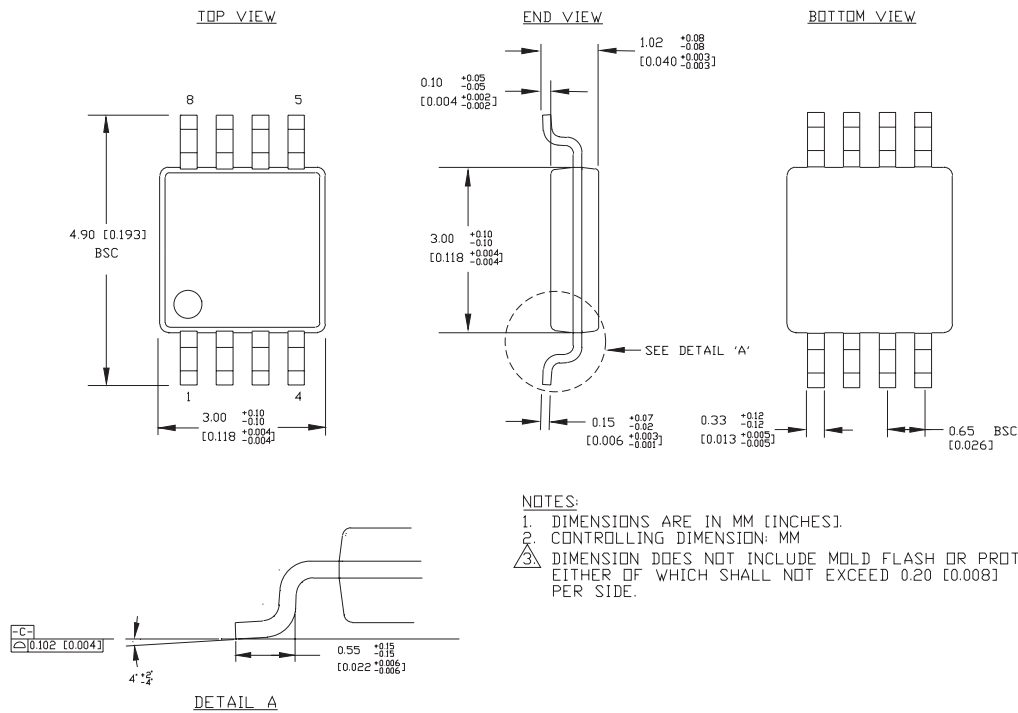


**Figure 2. Three-Resistor ‘Y-Termination’**

**Notes:**

1. Power-saving alternative to Thevenin termination.
2. Place termination resistors as close to destination inputs as possible.
3.  $R_b$  resistor sets the DC bias voltage equal to  $V_t$ . For +3.3V systems  $R_b = 46\Omega$  to  $50\Omega$ . For +5V systems,  $R_b = 110\Omega$ .

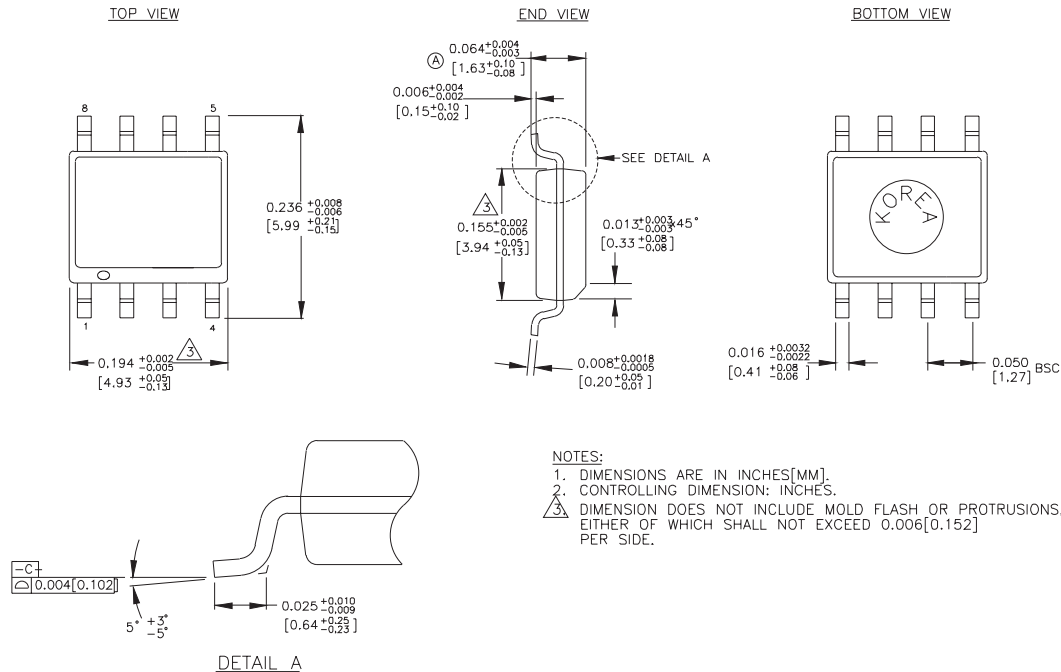
## 8-PIN MSOP (K8-1)



Rev. 01



## 8-PIN SOIC (Z8-1)



Rev. 03

**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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