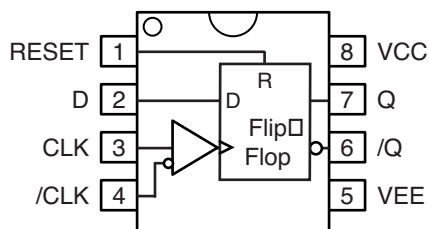
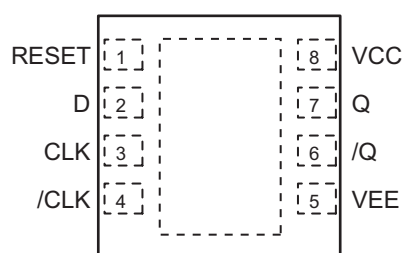


## PACKAGE/ORDERING INFORMATION



8-Pin SOIC and MSOP Packages



8-Pin (2mmx2mm) MLF®

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

| Part Number                     | Package Type | Operating Range | Package Marking                        | Lead Finish    |
|---------------------------------|--------------|-----------------|----------------------------------------|----------------|
| SY10EP51VKC                     | K8-1         | Commercial      | HP51                                   | Sn-Pb          |
| SY10EP51VKCTR <sup>(2)</sup>    | K8-1         | Commercial      | HP51                                   | Sn-Pb          |
| SY10EP51VZC                     | Z8-1         | Commercial      | HEP51V                                 | Sn-Pb          |
| SY10EP51VZCTR <sup>(2)</sup>    | Z8-1         | Commercial      | HEP51V                                 | Sn-Pb          |
| SY10EP51VKI                     | K8-1         | Industrial      | HP51                                   | Sn-Pb          |
| SY10EP51VKITR <sup>(2)</sup>    | K8-1         | Industrial      | HP51                                   | Sn-Pb          |
| SY10EP51VZI                     | Z8-1         | Industrial      | HEP51V                                 | Sn-Pb          |
| SY10EP51VZITR <sup>(2)</sup>    | Z8-1         | Industrial      | HEP51V                                 | Sn-Pb          |
| SY10EP51VKG <sup>(3)</sup>      | K8-1         | Industrial      | HP51 with Pb-Free bar-line indicator   | Pb-Free NiPdAu |
| SY10EP51VKGTR <sup>(2, 3)</sup> | K8-1         | Industrial      | HP51 with Pb-Free bar-line indicator   | Pb-Free NiPdAu |
| SY10EP51VMGTR <sup>(2, 3)</sup> | MLF-8        | Industrial      | H51 with Pb-Free bar-line indicator    | Pb-Free NiPdAu |
| SY10EP51VZG <sup>(3)</sup>      | Z8-1         | Industrial      | HEP51V with Pb-Free bar-line indicator | Pb-Free NiPdAu |
| SY10EP51VZGTR <sup>(2, 3)</sup> | Z8-1         | Industrial      | HEP51V 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                           |
| $T_{LEAD}$        | Lead Temperature (soldering, 20sec.)                                                                                                                                     | +260                                 | °C                           |
| $T_A$             | Operating Temperature Range                                                                                                                                              | -40 to +85                           | °C                           |
| $T_{store}$       | Storage Temperature Range                                                                                                                                                | -65 to +150                          | °C                           |
| $\theta_{JA}$     | Package Thermal Resistance (Junction-to-Ambient)<br>-Still-Air (SOIC)<br>-500lfpm (SOIC)<br>-Still-Air (MSOP)<br>-500lfpm (MSOP)<br>-Still-Air (MLF®)<br>-500lfpm (MLF®) | 160<br>109<br>206<br>155<br>93<br>87 | °C/W<br>°C/W<br>°C/W<br>°C/W |
| $\theta_{JC}$     | Package Thermal Resistance (Junction-to-Case)<br>(SOIC)<br>(MSOP)<br>(MLF®)                                                                                              | 39<br>39<br>60                       | °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.

**5V PECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>**

$V_{CC} = 5.0V$ ,  $V_{EE} = 0V^{(2)}$

| Symbol      | Parameter                                           | $T_A = -40^\circ C$ |      |          | $T_A = +25^\circ C$ |      |          | $T_A = +85^\circ C$ |      |          | Unit |
|-------------|-----------------------------------------------------|---------------------|------|----------|---------------------|------|----------|---------------------|------|----------|------|
|             |                                                     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     |      |
| $I_{EE}$    | Power Supply Current <sup>(3)</sup>                 | —                   | 35   | 40       | —                   | 35   | 40       | —                   | 35   | 40       | mA   |
| $V_{OH}$    | Output HIGH Voltage <sup>(4)</sup>                  | 3865                | 3990 | 4115     | 3930                | 4055 | 4180     | 3990                | 4115 | 4240     | mV   |
| $V_{OL}$    | Output LOW Voltage <sup>(4)</sup>                   | 3050                | 3190 | 3315     | 3050                | 3255 | 3380     | 3050                | 3315 | 3440     | mV   |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                   | 3790                | —    | 4115     | 3855                | —    | 4180     | 3915                | —    | 4240     | mV   |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                    | 3065                | —    | 3390     | 3130                | —    | 3455     | 3190                | —    | 3515     | mV   |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(5)</sup> Common Mode Range | 2.0                 | —    | $V_{CC}$ | 2.0                 | —    | $V_{CC}$ | 2.0                 | —    | $V_{CC}$ | V    |
| $I_{IH}$    | Input HIGH Current                                  | —                   | —    | 150      | —                   | —    | 150      | —                   | —    | 150      | μA   |
| $I_{IL}$    | Input LOW Current                                   | 0.5                 | —    | —        | 0.5                 | —    | —        | 0.5                 | —    | —        | μA   |

**Note 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.

**Note 2.** Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{CC}$  can vary +0.25V to +0.5V.

**Note 3.**  $V_{CC} = 0V$ ,  $V_{EE} = V_{EE}(\text{min.})$  to  $V_{EE}(\text{max.})$ , all other pins floating.

**Note 4.** All loading with 50Ω to  $V_{CC} - 2.0V$ .

**Note 5.**  $V_{IHCMR}(\text{min})$  varies 1:1 with  $V_{EE}$ ,  $V_{IHCMR}(\text{max})$  varies 1:1 with  $V_{CC}$ . The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal.

**3.3V LVPECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 3.3V$ ,  $V_{EE} = 0V^{(2)}$ 

| Symbol      | Parameter                                                      | $T_A = -40^\circ C$ |      |          | $T_A = +25^\circ C$ |      |          | $T_A = +85^\circ C$ |      |          | Unit    |
|-------------|----------------------------------------------------------------|---------------------|------|----------|---------------------|------|----------|---------------------|------|----------|---------|
|             |                                                                | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     | Min.                | Typ. | Max.     |         |
| $I_{EE}$    | Power Supply Current <sup>(3)</sup>                            | —                   | 35   | 40       | —                   | 35   | 40       | —                   | 35   | 40       | mA      |
| $V_{OH}$    | Output HIGH Voltage <sup>(4)</sup>                             | 2165                | 2290 | 2415     | 2230                | 2355 | 2480     | 2290                | 2415 | 2540     | mV      |
| $V_{OL}$    | Output LOW Voltage <sup>(4)</sup>                              | 1350                | 1490 | 1615     | 1350                | 1555 | 1680     | 1350                | 1615 | 1740     | mV      |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                              | 2090                | —    | 2415     | 2155                | —    | 2480     | 2215                | —    | 2540     | mV      |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                               | 1365                | —    | 1690     | 1430                | —    | 1755     | 1490                | —    | 1815     | mV      |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(5)</sup><br>Common Mode Range (Diff.) | 2.0                 | —    | $V_{CC}$ | 2.0                 | —    | $V_{CC}$ | 2.0                 | —    | $V_{CC}$ | V       |
| $I_{IH}$    | Input HIGH Current                                             | —                   | —    | 150      | —                   | —    | 150      | —                   | —    | 150      | $\mu A$ |
| $I_{IL}$    | Input LOW Current                                              | 0.5                 | —    | —        | 0.5                 | —    | —        | 0.5                 | —    | —        | $\mu A$ |

- Note 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.
- Note 2.** Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{CC}$  can vary  $-0.3V$  to  $+0.5V$ .
- Note 3.**  $V_{CC} = 0V$ ,  $V_{EE} = V_{EE}(\text{min.})$  to  $V_{EE}(\text{max.})$ , all other pins floating.
- Note 4.** All loading with  $50\Omega$  to  $V_{CC} - 2.0V$ .
- Note 5.**  $V_{IHCMR}(\text{min})$  varies 1:1 with  $V_{EE}$ ,  $V_{IHCMR}(\text{max})$  varies 1:1 with  $V_{CC}$ . The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal.

**NECL/LVECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 0V$ ,  $V_{EE} = -5.5V$  to  $-3.0V$ 

| Symbol      | Parameter                                              | $T_A = -40^\circ C$ |       |       | $T_A = +25^\circ C$ |       |       | $T_A = +85^\circ C$ |       |       | Unit    |
|-------------|--------------------------------------------------------|---------------------|-------|-------|---------------------|-------|-------|---------------------|-------|-------|---------|
|             |                                                        | Min.                | Typ.  | Max.  | Min.                | Typ.  | Max.  | Min.                | Typ.  | Max.  |         |
| $I_{EE}$    | Power Supply Current <sup>(2)</sup>                    | —                   | 35    | 40    | —                   | 35    | 40    | —                   | 35    | 40    | mA      |
| $V_{OH}$    | Output HIGH Voltage <sup>(3)</sup>                     | -1135               | -1010 | -0885 | -1070               | -0945 | -0820 | -1010               | -0885 | -0760 | mV      |
| $V_{OL}$    | Output LOW Voltage <sup>(3)</sup>                      | -1950               | -1810 | -1685 | -1950               | -1745 | -1620 | -1950               | -1685 | -1560 | mV      |
| $V_{IH}$    | Input HIGH Voltage                                     | -1210               | —     | -0885 | -1145               | —     | -0820 | -1085               | —     | -0760 | mV      |
| $V_{IL}$    | Input LOW Voltage                                      | -1935               | —     | -1610 | -1870               | —     | -1545 | -1810               | —     | -1485 | mV      |
| $V_{IHCMR}$ | Input HIGH Voltage<br>Common Mode Range <sup>(4)</sup> | $V_{EE}+2.0$        |       | 0.0   | $V_{EE}+2.0$        |       | 0.0   | $V_{EE}+2.0$        |       | 0.0   | V       |
| $I_{IH}$    | Input HIGH Current                                     | —                   | —     | 150   | —                   | —     | 150   | —                   | —     | 150   | $\mu A$ |
| $I_{IL}$    | Input LOW Current                                      | 0.5                 | —     | —     | 0.5                 | —     | —     | 0.5                 | —     | —     | $\mu A$ |

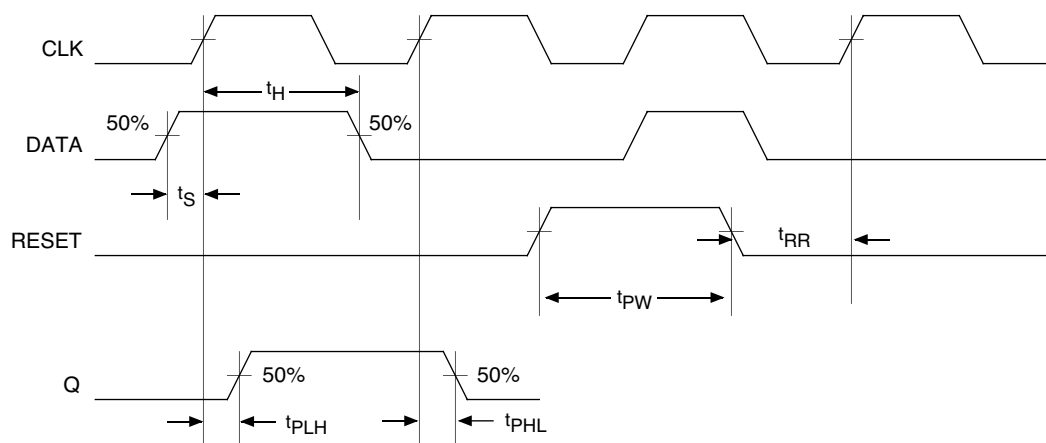
- Note 1.** 10EP circuits are designed to meet the DC specifications shown in the above table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and traverse airflow greater than 500lfpm is maintained.
- Note 2.**  $V_{CC} = 0V$ ,  $V_{EE}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

**AC ELECTRICAL CHARACTERISTICS**
 $V_{CC} = 0V$ ,  $V_{EE} = -3.0V$  to  $-5.5V$ ;  $V_{CC} = 3.0V$  to  $5.5V$ ,  $V_{EE} = 0V^{(1)}$ 

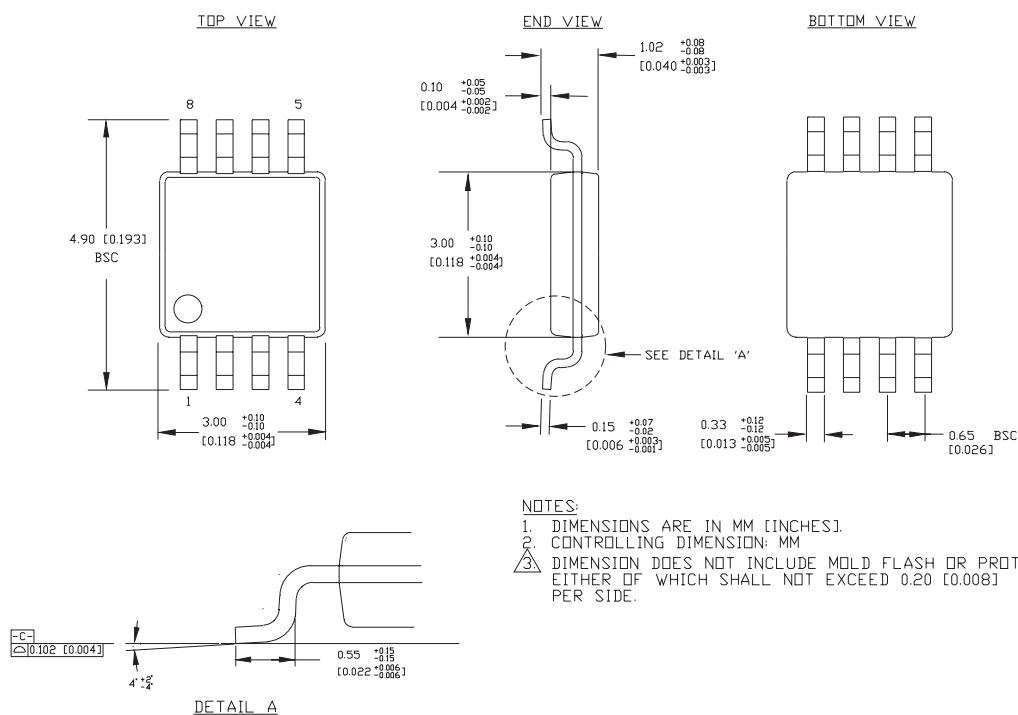
| Symbol                 | Parameter                                                                      | $T_A = -40^\circ C$ |            |            | $T_A = +25^\circ C$ |            |            | $T_A = +85^\circ C$ |            |            | Unit |
|------------------------|--------------------------------------------------------------------------------|---------------------|------------|------------|---------------------|------------|------------|---------------------|------------|------------|------|
|                        |                                                                                | Min.                | Typ.       | Max.       | Min.                | Typ.       | Max.       | Min.                | Typ.       | Max.       |      |
| $f_{MAX}$              | Maximum Toggle Frequency <sup>(2)</sup>                                        | 3                   | —          | —          | 3                   | —          | —          | 3                   | —          | —          | GHz  |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay to Output<br>Differential CLK, /CLK → Q, /Q<br>RESET → Q, /Q | 250<br>260          | 300<br>310 | 350<br>450 | 270<br>210          | 320<br>320 | 370<br>475 | 300<br>280          | 350<br>320 | 420<br>500 | ps   |
| $t_{RR}$               | Reset Recovery                                                                 | 150                 | —          | —          | 150                 | —          | —          | 150                 | —          | —          | ps   |
| $t_S$                  | Setup Time                                                                     | 100                 | —          | —          | 100                 | 80         | —          | 100                 | —          | —          | ps   |
| $t_H$                  | Hold Time                                                                      | 100                 | —          | —          | 100                 | 40         | —          | 100                 | —          | —          | ps   |
| $t_{PW}$               | Minimum Pulse Width RESET                                                      | 500                 | 440        | —          | 500                 | 440        | —          | 500                 | 440        | —          | ps   |
| $t_r$<br>$t_f$         | Output Rise/Fall Times Q, /Q<br>(20% to 80%)                                   | 70                  | 120        | 170        | 80                  | 130        | 180        | 100                 | 150        | 200        | ps   |

**Note 1.** Measured using 750mV source, 50% duty cycle clock source. All loading with  $50\Omega$  to  $V_{CC} - 2.0V$ .

**Note 2.**  $f_{MAX}$  guaranteed for functionality only.  $V_{OL}$  and  $V_{OH}$  levels are guaranteed at DC only.

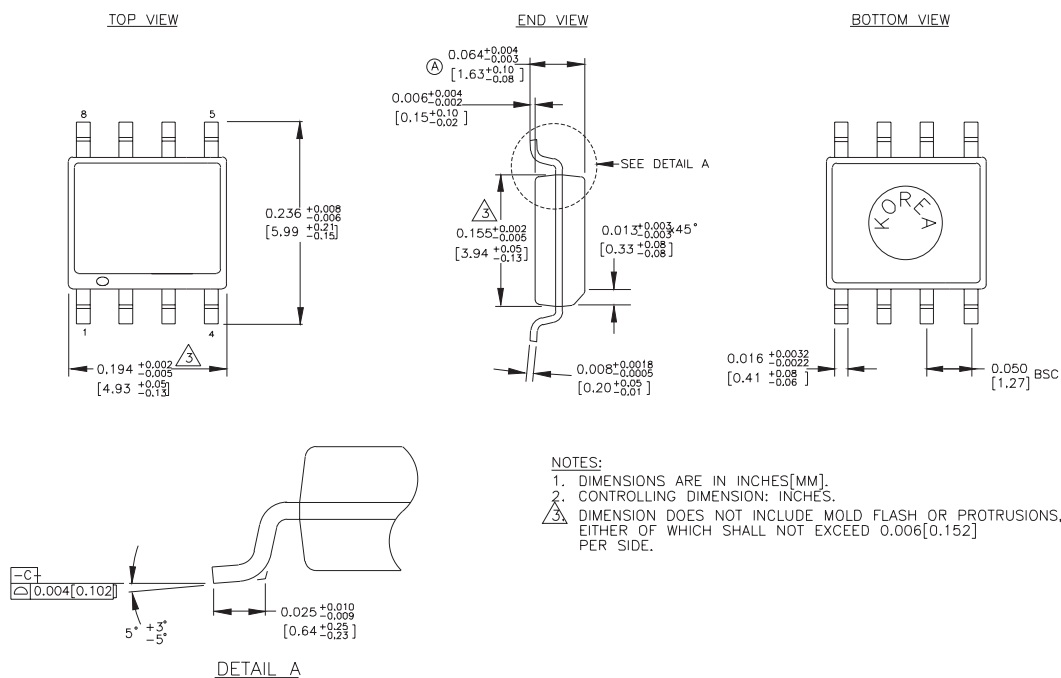
**TIMING DIAGRAMS**

## 8-PIN MSOP (K8-1)

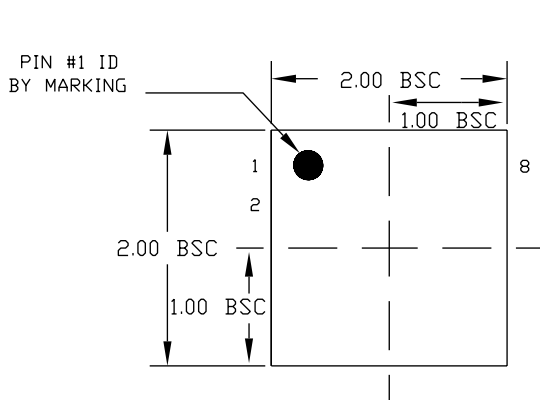
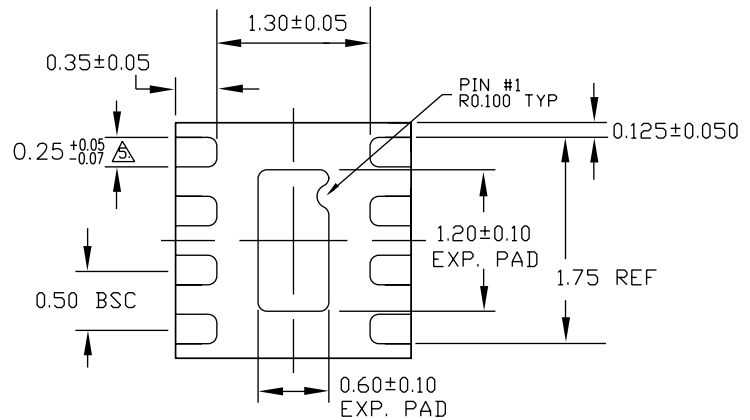
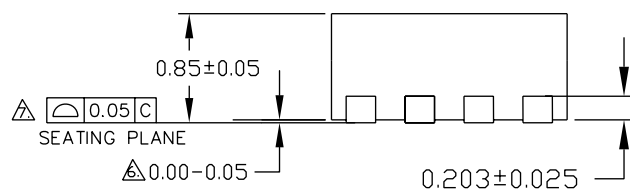


Rev. 01

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



Rev. 03

**8-PIN PLASTIC MLF® (MLF-8)**TOP VIEWBOTTOM VIEWSIDE VIEW**NOTE:**

1. ALL DIMENSIONS ARE IN MILLIMETERS.
  2. MAX. PACKAGE WARPAGE IS 0.05 mm.
  3. MAXIMUM ALLOWABLE BURRS IS 0.076 mm IN ALL DIRECTIONS.
  4. PIN #1 ID ON TOP WILL BE LASER/INK MARKED.
- △ DIMENSION APPLIES TO METALIZED TERMINAL AND IS MEASURED BETWEEN 0.20 AND 0.25 mm FROM TERMINAL TIP.
- △ APPLIED ONLY FOR TERMINALS.
- △ APPLIED FOR EXPOSED PAD AND TERMINALS.

**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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