

## FEATURES

- Guaranteed maximum frequency >4GHz
- 3.3V and 5V power supply options
- Guaranteed propagation delay <460ps over temperature
- Wide operating temperature range: -40°C to +85°C
- Available in 8-pin MSOP and SOIC packages



**ECL Pro™**

## DESCRIPTION

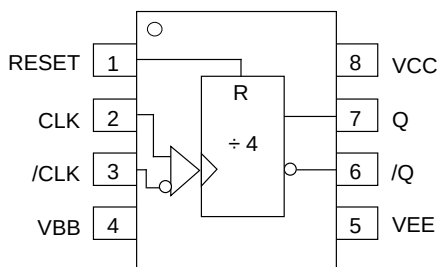
The SY10/100EP33V is an integrated ÷4 divider.

The  $V_{BB}$  pin, an internally generated voltage supply, is available to this device only. For single-ended input conditions, the unused differential input is connected to  $V_{BB}$  as a switching reference voltage.  $V_{BB}$  may also rebias AC-coupled inputs. When used, decouple  $V_{BB}$  and  $V_{CC}$  via a 0.01 $\mu$ F capacitor and limit current sourcing or sinking to 0.5mA. When not used,  $V_{BB}$  should be left open.

The reset pin is asynchronous and is asserted on the rising edge. Upon power-up, the internal flip-flops will attain a random state; the reset allows for the synchronous use of multiple EP33s in a system.

The 100K Series includes internal temperature compensation circuitry.

## PIN CONFIGURATION/BLOCK DIAGRAM



**TOP VIEW**  
(Available in MSOP or SOIC package)

## PIN NAMES

| Pin       | Function                                                                             |
|-----------|--------------------------------------------------------------------------------------|
| CLK, /CLK | ECL Clock Inputs with Internal 75k $\Omega$ Pull-Down Resistor, Default State is LOW |
| RESET     | ECL Asynchronous Reset                                                               |
| $V_{BB}$  | Reference Voltage Output                                                             |
| Q, /Q     | ECL Data Outputs                                                                     |

## TRUTH TABLE<sup>(1)</sup>

| CLK          | /CLK         | RESET | Q | /Q |
|--------------|--------------|-------|---|----|
| X            | X            | Z     | L | H  |
| $\downarrow$ | $\downarrow$ | L     | F | F  |

**Note 1.** F = Divide by 4 function

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

| Symbol             | Rating                                                                                                                                                                                         | Value                  | Unit   |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------|
| V <sub>CC</sub>    | Power Supply Voltage (V <sub>EE</sub> = 0)                                                                                                                                                     | +6.0 to 0              | V      |
| V <sub>EE</sub>    | Power Supply Voltage (V <sub>CC</sub> = 0)                                                                                                                                                     | −6.0 to 0              | V      |
| V <sub>IN</sub>    | Input Voltage (V <sub>CC</sub> = 0V, V <sub>IN</sub> not more negative than V <sub>EE</sub> )<br>Input Voltage (V <sub>EE</sub> = 0V, V <sub>IN</sub> not more positive than V <sub>CC</sub> ) | −6.0 to 0<br>+6.0 to 0 | V<br>V |
| I <sub>OUT</sub>   | Output Current<br>−Continuous<br>−Surge                                                                                                                                                        | 50<br>100              | mA     |
| T <sub>A</sub>     | Operating Temperature Range                                                                                                                                                                    | −40 to +85             | °C     |
| T <sub>store</sub> | Storage Temperature Range                                                                                                                                                                      | −65 to +150            | °C     |
| θ <sub>JA</sub>    | Thermal Resistance (Junction-to-Ambient)<br>SOIC-8<br>−Still Air<br>−500lfpm                                                                                                                   | 160                    | °C/W   |
|                    |                                                                                                                                                                                                | 109                    | °C/W   |
|                    | MSOP-8<br>−Still Air<br>−500lfpm                                                                                                                                                               | 206                    | °C/W   |
|                    |                                                                                                                                                                                                | 155                    | °C/W   |
| θ <sub>JC</sub>    | Thermal Resistance (Junction-to-Case)<br>SOIC-8<br>MSOP-8                                                                                                                                      | 39                     | °C/W   |
|                    |                                                                                                                                                                                                | 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.

**(10EP) LVPECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>**

V<sub>CC</sub> = +3.3V ±10%; V<sub>EE</sub> = 0V<sup>(2)</sup>

| Symbol             | Parameter                                                             | T <sub>A</sub> = −40°C |        |                 | T <sub>A</sub> = +25°C |        |                 | T <sub>A</sub> = +85°C |        |                 | Unit |
|--------------------|-----------------------------------------------------------------------|------------------------|--------|-----------------|------------------------|--------|-----------------|------------------------|--------|-----------------|------|
|                    |                                                                       | Min.                   | Typ.   | Max.            | Min.                   | Typ.   | Max.            | Min.                   | Typ.   | Max.            |      |
| I <sub>EE</sub>    | Power Supply Current                                                  | —                      | —      | 36              | —                      | 26     | 36              | —                      | —      | 36              | mA   |
| V <sub>OH</sub>    | Output HIGH Voltage <sup>(3)</sup>                                    | 2165                   | 2290   | 2415            | 2230                   | 2355   | 2480            | 2290                   | 2415   | 2540            | mV   |
| V <sub>OL</sub>    | Output LOW Voltage <sup>(3)</sup>                                     | 1365                   | 1490   | 1615            | 1430                   | 1555   | 1680            | 1490                   | 1615   | 1740            | mV   |
| V <sub>IH</sub>    | Input HIGH Voltage (Single-Ended)                                     | 2090                   | —      | 2415            | 2155                   | —      | 2480            | 2215                   | —      | 2540            | mV   |
| V <sub>IL</sub>    | Input LOW Voltage (Single-Ended)                                      | 1365                   | —      | 1690            | 1430                   | —      | 1755            | 1490                   | —      | 1815            | mV   |
| V <sub>BB</sub>    | Output Voltage                                                        | 1790                   | 1890   | 1990            | 1885                   | 1955   | 2055            | 1915                   | 2015   | 2115            | mV   |
| V <sub>IHCMR</sub> | Input HIGH Voltage <sup>(4)</sup><br>Common Mode Range (Differential) | 2.0                    | —      | V <sub>CC</sub> | 2.0                    | —      | V <sub>CC</sub> | 2.0                    | —      | V <sub>CC</sub> | V    |
| I <sub>IH</sub>    | Input HIGH Current                                                    | —                      | —      | 150             | —                      | —      | 150             | —                      | —      | 150             | μA   |
| I <sub>IL</sub>    | Input LOW Current<br>RESET, CLK /CLK                                  | 0.5<br>−150            | —<br>— | —<br>—          | 0.5<br>−150            | —<br>— | —<br>—          | 0.5<br>−150            | —<br>— | —<br>—          | 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<sub>CC</sub>.

**Note 3.** All loading with 50Ω to V<sub>CC</sub> −2.0V.

**Note 4.** The V<sub>IHCMR</sub> range is referenced to the most positive side of the differential input signal.

**(10EP) PECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = +5.0V \pm 10\%$ ;  $V_{EE} = 0V^{(2)}$ 

| 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                                               | —                   | —      | 36       | —                   | 26     | 36       | —                   | —      | 36       | mA      |
| $V_{OH}$    | Output HIGH Voltage <sup>(3)</sup>                                 | 3865                | 3990   | 4115     | 3930                | 4055   | 4180     | 3990                | 4115   | 4240     | mV      |
| $V_{OL}$    | Output LOW Voltage <sup>(3)</sup>                                  | 3065                | 3190   | 3315     | 3130                | 3255   | 3380     | 3190                | 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      |
| $V_{BB}$    | Output Voltage                                                     | 3490                | 3590   | 3690     | 3555                | 3655   | 3755     | 3615                | 3715   | 3815     | mV      |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(4)</sup> Common Mode Range (Differential) | 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 RESET, CLK Current /CLK                                  | 0.5<br>–150         | —<br>— | —<br>—   | 0.5<br>–150         | —<br>— | —<br>—   | 0.5<br>–150         | —<br>— | —<br>—   | $\mu A$ |

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**Note 2.** Input and output parameters vary 1:1 with  $V_{CC}$ .

**Note 3.** All loading with  $50\Omega$  to  $V_{CC} - 2.0V$ .

**Note 4.** The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal.

**(10EP) ECL/LVECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 0V$ ;  $V_{EE} = -3.3V$  to  $-5.0V \pm 10\%^{(2)}$ 

| 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                                               | —                   | —      | 36     | —                   | 26     | 36     | —                   | —      | 36     | mA      |
| $V_{OH}$    | Output HIGH Voltage <sup>(3)</sup>                                 | –1135               | –1010  | –885   | –1070               | –945   | –820   | –1010               | –885   | –760   | mV      |
| $V_{OL}$    | Output LOW Voltage <sup>(3)</sup>                                  | –1935               | –1810  | –1685  | –1870               | –1745  | –1620  | –1810               | –1685  | –1560  | mV      |
| $V_{IH}$    | Input HIGH Voltage (Single-Ended)                                  | –1210               | —      | –885   | –1145               | —      | –820   | –1085               | —      | –760   | mV      |
| $V_{IL}$    | Input LOW Voltage (Single-Ended)                                   | –1935               | —      | –1610  | –1870               | —      | –1545  | –1810               | —      | –1485  | mV      |
| $V_{BB}$    | Output Voltage                                                     | –1510               | –1410  | –1310  | –1445               | –1345  | –1245  | –1385               | –1285  | –1185  | mV      |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(4)</sup> Common Mode Range (Differential) | $V_{EE} + 2.0$      |        | 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 RESET, CLK Current /CLK                                  | 0.5<br>–150         | —<br>— | —<br>— | 0.5<br>–150         | —<br>— | —<br>— | 0.5<br>–150         | —<br>— | —<br>— | $\mu A$ |

**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  $V_{CC}$ .

**Note 3.** All loading with  $50\Omega$  to  $V_{CC} - 2.0V$ .

**Note 4.**  $V_{IHCMR}$  (Min) varies 1:1 with  $V_{EE}$ . The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal.

**(100EP) LVPECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = +3.3V \pm 10\%$ ;  $V_{EE} = 0V^{(2)}$ 

| 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                                                     | —                   | —      | 36       | —                   | 30     | 36       | —                   | —      | 40       | mA      |
| $V_{OH}$    | Output HIGH Voltage <sup>(3)</sup>                                       | 2155                | 2280   | 2405     | 2155                | 2280   | 2405     | 2155                | 2280   | 2405     | mV      |
| $V_{OL}$    | Output LOW Voltage <sup>(3)</sup>                                        | 1355                | 1480   | 1605     | 1355                | 1480   | 1605     | 1355                | 1480   | 1605     | mV      |
| $V_{IH}$    | Input HIGH Voltage<br>(Single-Ended)                                     | 2075                | —      | 2420     | 2075                | —      | 2420     | 2075                | —      | 2420     | mV      |
| $V_{IL}$    | Input LOW Voltage<br>(Single-Ended)                                      | 1355                | —      | 1675     | 1355                | —      | 1675     | 1355                | —      | 1675     | mV      |
| $V_{BB}$    | Output Voltage                                                           | 1775                | 1875   | 1975     | 1775                | 1875   | 1975     | 1775                | 1875   | 1975     | mV      |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(4)</sup><br>Common Mode Range<br>(Differential) | 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<br>RESET, CLK<br>/CLK                                  | 0.5<br>–150         | —<br>— | —<br>—   | 0.5<br>–150         | —<br>— | —<br>—   | 0.5<br>–150         | —<br>— | —<br>—   | $\mu A$ |

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**Note 2.** Input and output parameters vary 1:1 with  $V_{CC}$ .

**Note 3.** All loading with  $50\Omega$  to  $V_{CC} - 2.0V$ .

**Note 4.** The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal.

**(100EP) PECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = +5.0V \pm 10\%$ ;  $V_{EE} = 0V^{(2)}$ 

| 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                                                     | —                   | —      | 36       | —                   | 30     | 36       | —                   | —      | 40       | mA      |
| $V_{OH}$    | Output HIGH Voltage <sup>(3)</sup>                                       | 3855                | 3980   | 4105     | 3855                | 3980   | 4105     | 3855                | 3980   | 4105     | mV      |
| $V_{OL}$    | Output LOW Voltage <sup>(3)</sup>                                        | 3055                | 3180   | 3305     | 3055                | 3180   | 3305     | 3055                | 3180   | 3305     | mV      |
| $V_{IH}$    | Input HIGH Voltage<br>(Single-Ended)                                     | 3775                | —      | 4120     | 3775                | —      | 4120     | 3775                | —      | 4120     | mV      |
| $V_{IL}$    | Input LOW Voltage<br>(Single-Ended)                                      | 3055                | —      | 3375     | 3055                | —      | 3375     | 3055                | —      | 3375     | mV      |
| $V_{BB}$    | Output Voltage                                                           | 3475                | 3575   | 3675     | 3475                | 3575   | 3675     | 3475                | 3575   | 3675     | mV      |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(4)</sup><br>Common Mode Range<br>(Differential) | 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<br>RESET, CLK<br>/CLK                                  | 0.5<br>–150         | —<br>— | —<br>—   | 0.5<br>–150         | —<br>— | —<br>—   | 0.5<br>–150         | —<br>— | —<br>—   | $\mu A$ |

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**Note 2.** Input and output parameters vary 1:1 with  $V_{CC}$ .

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**Note 4.** The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal.

**(100EP) ECL/LVECL DC ELECTRICAL CHARACTERISTICS<sup>(1)</sup>** $V_{CC} = 0V$ ;  $V_{EE} = -3.3V$  to  $-5.0V \pm 10\%$ <sup>(2)</sup>

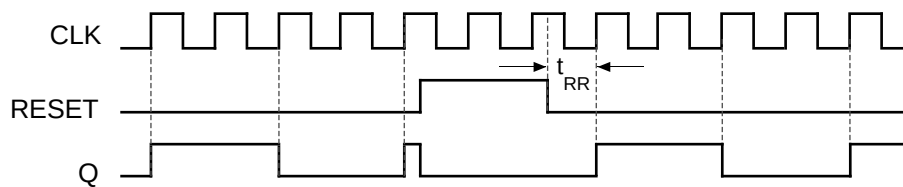
| Symbol      | Parameter                                                                | $T_A = -40^\circ C$ |        |        | $T_A = +25^\circ C$ |        |        | $T_A = +85^\circ C$ |        |        | Unit    |
|-------------|--------------------------------------------------------------------------|---------------------|--------|--------|---------------------|--------|--------|---------------------|--------|--------|---------|
|             |                                                                          | Min.                | Typ.   | Max.   | Min.                | Typ.   | Max.   | Min.                | Typ.   | Max.   |         |
| $I_{EE}$    | Power Supply Current                                                     | —                   | —      | 36     | —                   | 30     | 36     | —                   | —      | 40     | mA      |
| $V_{OH}$    | Output HIGH Voltage <sup>(3)</sup>                                       | -1145               | -1020  | -895   | -1145               | -1020  | -895   | -1145               | -1020  | -895   | mV      |
| $V_{OL}$    | Output LOW Voltage <sup>(3)</sup>                                        | -1945               | -1820  | -1695  | -1945               | -1820  | -1695  | -1945               | -1820  | -1695  | mV      |
| $V_{IH}$    | Input HIGH Voltage<br>(Single-Ended)                                     | -1225               | —      | -880   | -1225               | —      | -880   | -1225               | —      | -880   | mV      |
| $V_{IL}$    | Input LOW Voltage<br>(Single-Ended)                                      | -1945               | —      | -1625  | -1945               | —      | -1625  | -1945               | —      | -1625  | mV      |
| $V_{BB}$    | Output Voltage                                                           | -1525               | -1425  | -1325  | -1525               | -1425  | -1325  | -1525               | -1425  | -1325  | mV      |
| $V_{IHCMR}$ | Input HIGH Voltage <sup>(4)</sup><br>Common Mode Range<br>(Differential) | $V_{EE} + 2.0$      |        | 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<br>RESET, CLK<br>/CLK                                  | 0.5<br>-150         | —<br>— | —<br>— | 0.5<br>-150         | —<br>— | —<br>— | 0.5<br>-150         | —<br>— | —<br>— | $\mu A$ |

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**Note 2.** Input and output parameters vary 1:1 with  $V_{CC}$ .

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**Note 4.**  $V_{IHCMR}$  (Min) varies 1:1 with  $V_{EE}$ . The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal.

**TIMING DIAGRAM**

**AC ELECTRICAL CHARACTERISTICS<sup>(1, 2)</sup>**NECL:  $V_{CC} = 0V$ ,  $V_{EE} = -3.3V$  to  $-5.0V \pm 10\%$ ; PECL:  $V_{EE} = 0V$ ,  $V_{CC} = +3.3V$  to  $+5.0V \pm 10\%$ .

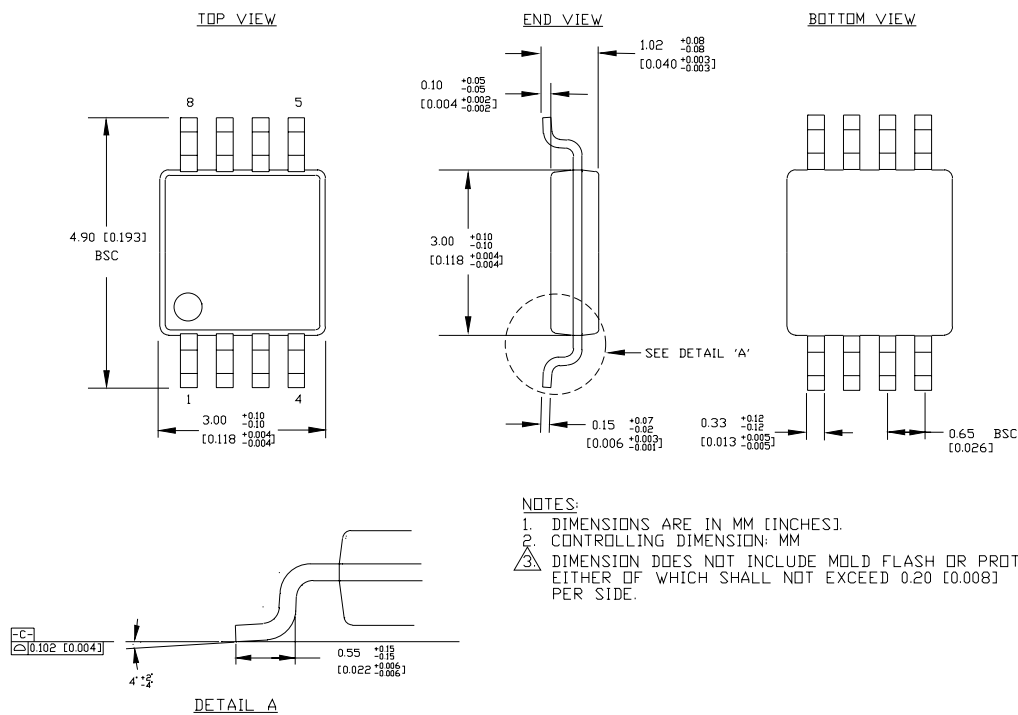
| Symbol                 | Parameter                                                                                 | $T_A = -40^\circ C$ |                   |                   | $T_A = +25^\circ C$ |                   |                   | $T_A = +85^\circ C$ |                   |                   | Unit    |
|------------------------|-------------------------------------------------------------------------------------------|---------------------|-------------------|-------------------|---------------------|-------------------|-------------------|---------------------|-------------------|-------------------|---------|
|                        |                                                                                           | Min.                | Typ.              | Max.              | Min.                | Typ.              | Max.              | Min.                | Typ.              | Max.              |         |
| $f_{MAX}$              | Maximum Frequency <sup>(3)</sup>                                                          | 4                   | —                 | —                 | 4                   | —                 | —                 | 4                   | —                 | —                 | GHz     |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay to Output<br>CLK → Q<br>(SY10EP33V) RESET → Q<br>(SY100EP33V) RESET → Q | 300<br>300<br>310   | 380<br>420<br>420 | 440<br>470<br>470 | 300<br>290<br>310   | 380<br>420<br>420 | 440<br>470<br>470 | 320<br>320<br>320   | 400<br>450<br>450 | 460<br>500<br>500 | ps      |
| $t_{RR}$               | Set/Reset Recovery                                                                        | 200                 | —                 | —                 | 200                 | 100               | —                 | 200                 | —                 | —                 | ps      |
| $t_{PW}$               | Minimum Pulse Width RESET                                                                 | 550                 | —                 | —                 | 550                 | 200               | —                 | 550                 | —                 | —                 | ps      |
| $t_{JITTER}$           | Cycle-to-Cycle RMS Jitter <sup>(3)</sup>                                                  | —                   | 0.2               | < 1               | —                   | 0.2               | < 1               | —                   | 0.2               | < 1               | ps(rms) |
| $V_{PP}$               | Input Voltage Swing<br>(Differential)                                                     | 150                 | 800               | 1200              | 150                 | 800               | 1200              | 150                 | 800               | 1200              | mV      |
| $t_r$<br>$t_f$         | Output Rise/Fall Times Q, /Q<br>(20% to 80%)                                              | 90                  | 170               | 200               | 100                 | 180               | 220               | 120                 | 200               | 240               | ps      |

**Note 1.** Measured using a 750mV source, 50% duty cycle clock source. All loading with  $50\Omega$  to  $V_{CC} - 2.0V$ .**Note 2.** Specifications for packaged product only.**Note 3.**  $f_{MAX}$  guaranteed for functionality only.  $V_{OL}$  and  $V_{OH}$  levels are guaranteed at DC only.**PRODUCT ORDERING CODE**

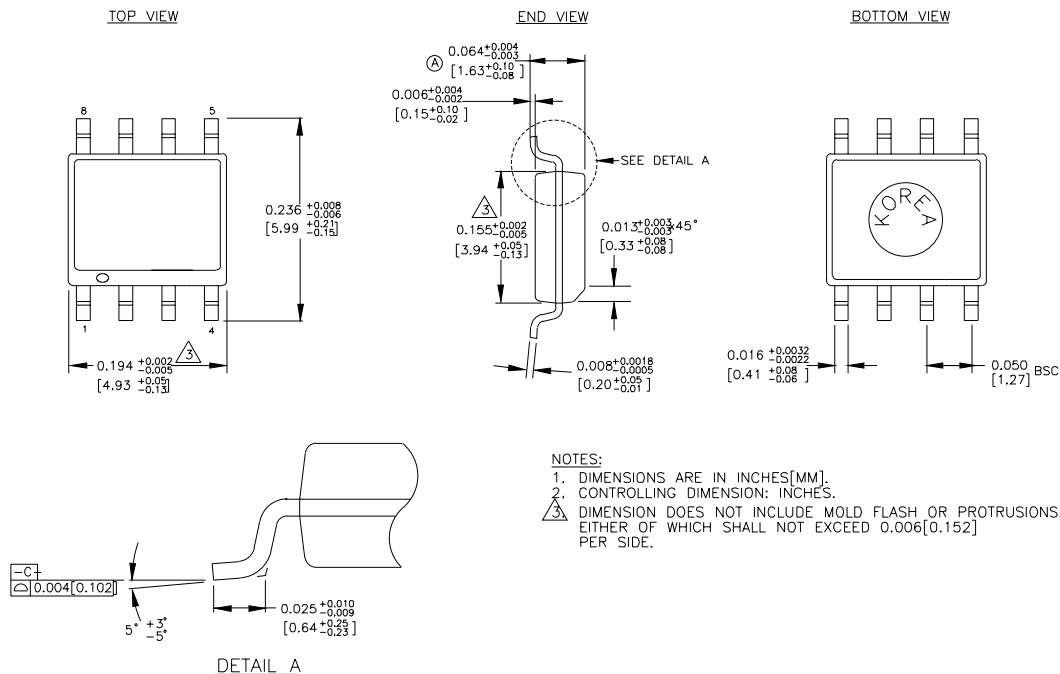
| Ordering Code                 | Package Type | Operating Range | Package Marking | Ordering Code                    | Package Type | Operating Range | Package Marking |
|-------------------------------|--------------|-----------------|-----------------|----------------------------------|--------------|-----------------|-----------------|
| SY10EP33VZC                   | Z8-1         | Commerical      | HEP33V          | SY10EP33VZI <sup>(2)</sup>       | Z8-1         | Industrial      | HEP33V          |
| SY10EP33VZCTR <sup>(1)</sup>  | Z8-1         | Commerical      | HEP33V          | SY10EP33VZITR <sup>(1, 2)</sup>  | Z8-1         | Industrial      | HEP33V          |
| SY100EP33VZC                  | Z8-1         | Commerical      | XEP33V          | SY100EP33VZI <sup>(2)</sup>      | Z8-1         | Industrial      | XEP33V          |
| SY100EP33VZCTR <sup>(1)</sup> | Z8-1         | Commerical      | XEP33V          | SY100EP33VZITR <sup>(1, 2)</sup> | Z8-1         | Industrial      | XEP33V          |
| SY10EP33VKC                   | K8-1         | Commerical      | HP33            | SY10EP33VKI <sup>(2)</sup>       | K8-1         | Industrial      | HP33            |
| SY10EP33VKCTR <sup>(1)</sup>  | K8-1         | Commerical      | HP33            | SY10EP33VKITR <sup>(1, 2)</sup>  | K8-1         | Industrial      | HP33            |
| SY100EP33VKC                  | K8-1         | Commerical      | XP33            | SY100EP33VKI <sup>(2)</sup>      | K8-1         | Industrial      | XP33            |
| SY100EP33VKCTR <sup>(1)</sup> | K8-1         | Commerical      | XP33            | SY100EP33VKITR <sup>(1, 2)</sup> | K8-1         | Industrial      | XP33            |

**Note 1.** Tape and Reel.**Note 2.** Recommended for new designs.

## 8 LEAD MSOP (K8-1)



Rev. 01

**8 LEAD SOIC .150" WIDE (Z8-1)**

Rev. 03

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