

# MC10E160, MC100E160

## 5V ECL 12-Bit Parity Generator/Checker

The MC10E/100E160 is a 12-bit parity generator/checker. The Q output is HIGH when an odd number of inputs are HIGH. A HIGH on the Enable input ( $\overline{EN}$ ) forces the Q output LOW.

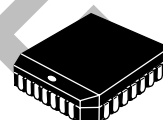
The 100 Series contains temperature compensation.

- Provides Odd-HIGH Parity of 12 Inputs
- Shiftable Output Register with Hold
- 900 ps Max. D to  $Q/\overline{Q}$  Output
- Enable
- Asynchronous Register Reset
- Dual Clocks
- PECL Mode Operating Range:  $V_{CC} = 4.2\text{ V}$  to  $5.7\text{ V}$  with  $V_{EE} = 0\text{ V}$
- NECL Mode Operating Range:  $V_{CC} = 0\text{ V}$  with  $V_{EE} = -4.2\text{ V}$  to  $-5.7\text{ V}$
- Internal Input to  $50\text{ K}\Omega$  Pulldown Resistors
- ESD Protection: Human Body Model;  $> 1\text{ KV}$ , Machine Model;  $> 7\text{ V}$
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity Level 1  
For Additional Information, see Application Note AND8003/D
- Flammability Rating: UL 94 V-0 @ 0.125 in, Oxygen Index: 28 to 34
- Transistor Count = 312 devices



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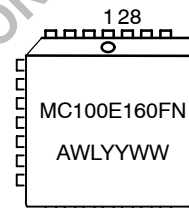
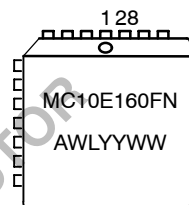
<http://onsemi.com>



**PLCC-28  
FN SUFFIX  
CASE 776**

A = Assembly Location  
WL = Wafer Lot  
YY = Year  
WW = Work Week

### MARKING DIAGRAMS



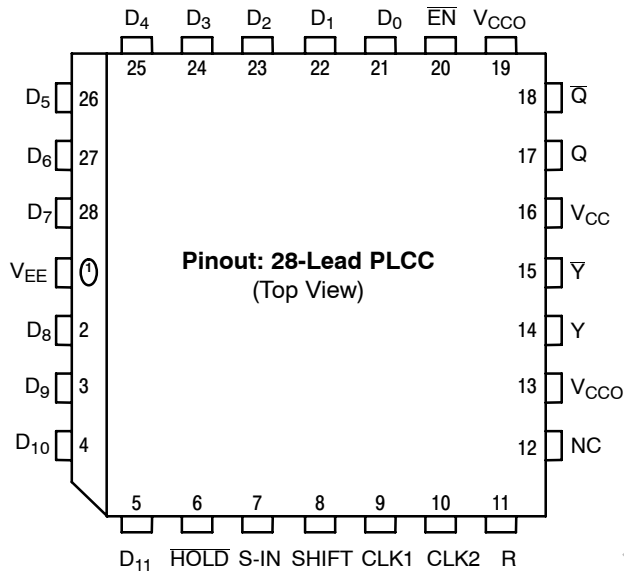
### ORDERING INFORMATION

| Device        | Package | Shipping <sup>†</sup> |
|---------------|---------|-----------------------|
| MC10E160FN    | PLCC-28 | 37 Units/Rail         |
| MC10E160FNR2  | PLCC-28 | 500 Units/Reel        |
| MC100E160FN   | PLCC-28 | 37 Units/Rail         |
| MC100E160FNR2 | PLCC-28 | 500 Units/Reel        |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MC10E160, MC100E160

## LOGIC DIAGRAM AND PINOUT ASSIGNMENT



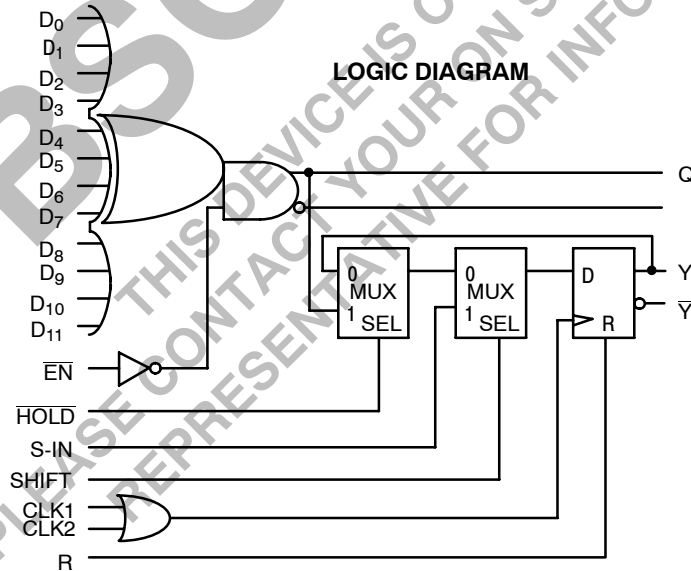
## PIN DESCRIPTION

| PIN                                | FUNCTION               |
|------------------------------------|------------------------|
| D <sub>0</sub> – D <sub>11</sub>   | ECL Data Inputs        |
| S-IN                               | ECL Serial Data Input  |
| EN                                 | ECL Enable, active LOW |
| HOLD                               | ECL Hold, active LOW   |
| SHIFT                              | ECL Shift, active HIGH |
| CLK1, CLK2                         | ECL Clock Inputs       |
| R                                  | ECL Reset Inputs       |
| Q, Q̄                              | ECL Direct Output      |
| Y, Ȳ                              | ECL Register Output    |
| V <sub>CC</sub> , V <sub>CCO</sub> | Positive Supply        |
| V <sub>EE</sub>                    | Negative Supply        |
| NC                                 | No Connect             |

\* All V<sub>CC</sub> and V<sub>CCO</sub> pins are tied together on the die.

Warning: All V<sub>CC</sub>, V<sub>CCO</sub>, and V<sub>EE</sub> pins must be externally connected to Power Supply to guarantee proper operation.

## LOGIC DIAGRAM



# MC10E160, MC100E160

## MAXIMUM RATINGS (Note 1)

| Symbol           | Parameter                                          | Condition 1                                    | Condition 2                                                          | Rating       | Unit         |
|------------------|----------------------------------------------------|------------------------------------------------|----------------------------------------------------------------------|--------------|--------------|
| V <sub>CC</sub>  | PECL Mode Power Supply                             | V <sub>EE</sub> = 0 V                          |                                                                      | 8            | V            |
| V <sub>I</sub>   | PECL Mode Input Voltage<br>NECL Mode Input Voltage | V <sub>EE</sub> = 0 V<br>V <sub>CC</sub> = 0 V | V <sub>I</sub> ≤ V <sub>CC</sub><br>V <sub>I</sub> ≥ V <sub>EE</sub> | 6<br>-6      | V<br>V       |
| I <sub>out</sub> | Output Current                                     | Continuous<br>Surge                            |                                                                      | 50<br>100    | mA<br>mA     |
| T <sub>A</sub>   | Operating Temperature Range                        |                                                |                                                                      | 0 to +85     | °C           |
| T <sub>stg</sub> | Storage Temperature Range                          |                                                |                                                                      | -65 to +150  | °C           |
| θ <sub>JA</sub>  | Thermal Resistance (Junction-to-Ambient)           | 0 LFPM<br>500 LFPM                             | 28 PLCC<br>28 PLCC                                                   | 63.5<br>43.5 | °C/W<br>°C/W |
| θ <sub>JC</sub>  | Thermal Resistance (Junction-to-Case)              | Standard Board                                 | 28 PLCC                                                              | 22 to 26     | °C/W         |
| T <sub>sol</sub> | Wave Solder                                        | <2 to 3 sec @ 248°C                            |                                                                      | 265          | °C           |

1. Maximum Ratings are those values beyond which device damage may occur.

## 10E SERIES PECL DC CHARACTERISTICS V<sub>CCx</sub> = 5.0 V; V<sub>EE</sub> = 0.0 V (Note 2)

| Symbol          | Characteristic                                            | 0°C  |      |                   | 25°C |      |                   | 85°C |      |                   | Unit           |
|-----------------|-----------------------------------------------------------|------|------|-------------------|------|------|-------------------|------|------|-------------------|----------------|
|                 |                                                           | Min  | Typ  | Max               | Min  | Typ  | Max               | Min  | Typ  | Max               |                |
| I <sub>EE</sub> | Power Supply Current                                      |      | 82   | 98                |      | 82   | 98                |      | 82   | 98                | mA             |
| V <sub>OH</sub> | Output HIGH Voltage (Note 3)                              | 3980 | 4070 | 4160              | 4020 | 4105 | 4190              | 4090 | 4185 | 4280              | mV             |
| V <sub>OL</sub> | Output LOW Voltage (Note 3)                               | 3050 | 3210 | 3370              | 3050 | 3210 | 3370              | 3050 | 3227 | 3405              | mV             |
| V <sub>IH</sub> | Input HIGH Voltage                                        | 3830 | 3995 | 4160              | 3870 | 4030 | 4190              | 3940 | 4110 | 4280              | mV             |
| V <sub>IL</sub> | Input LOW Voltage                                         | 3050 | 3285 | 3520              | 3050 | 3285 | 3520              | 3050 | 3302 | 3555              | mV             |
| I <sub>IH</sub> | Input HIGH Current<br>CLK1, CLK2<br>R<br>All Other Inputs |      |      | 200<br>300<br>150 |      |      | 200<br>300<br>150 |      |      | 200<br>300<br>150 | μA<br>μA<br>μA |
| I <sub>IL</sub> | Input LOW Current                                         | 0.5  | 0.3  |                   | 0.5  | 0.25 |                   | 0.3  | 0.2  |                   | μA             |

NOTE: Devices 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 transverse air flow greater than 500 LFPM is maintained.

2. Input and output parameters vary 1:1 with V<sub>CC</sub>. V<sub>EE</sub> can vary -0.46 V / +0.06 V.

3. Outputs are terminated through a 50 ohm resistor to V<sub>CC</sub> - 2 volts.

## 100E SERIES NECL DC CHARACTERISTICS V<sub>CCx</sub> = 0.0 V; V<sub>EE</sub> = -5.0 V (Note 8)

| Symbol          | Characteristic                                            | 0°C   |       |                   | 25°C  |       |                   | 85°C  |       |                   | Unit           |
|-----------------|-----------------------------------------------------------|-------|-------|-------------------|-------|-------|-------------------|-------|-------|-------------------|----------------|
|                 |                                                           | Min   | Typ   | Max               | Min   | Typ   | Max               | Min   | Typ   | Max               |                |
| I <sub>EE</sub> | Power Supply Current                                      |       | 82    | 98                |       | 82    | 98                |       | 82    | 98                | mA             |
| V <sub>OH</sub> | Output HIGH Voltage (Note 5)                              | -1020 | -930  | -840              | -980  | -895  | -810              | -910  | -815  | -720              | mV             |
| V <sub>OL</sub> | Output LOW Voltage (Note 5)                               | -1950 | -1790 | -1630             | -1950 | -1790 | -1630             | -1950 | -1773 | -1595             | mV             |
| V <sub>IH</sub> | Input HIGH Voltage                                        | -1170 | -1005 | -840              | -1130 | -970  | -810              | -1060 | -890  | -720              | mV             |
| V <sub>IL</sub> | Input LOW Voltage                                         | -1950 | -1715 | -1480             | -1950 | -1715 | -1480             | -1950 | -1698 | -1445             | mV             |
| I <sub>IH</sub> | Input HIGH Current<br>CLK1, CLK2<br>R<br>All Other Inputs |       |       | 200<br>300<br>150 |       |       | 200<br>300<br>150 |       |       | 200<br>300<br>150 | μA<br>μA<br>μA |
| I <sub>IL</sub> | Input LOW Current                                         | 0.5   | 0.3   |                   | 0.5   | 0.065 |                   | 0.3   | 0.2   |                   | μA             |

NOTE: Devices 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 transverse air flow greater than 500 LFPM is maintained.

4. Input and output parameters vary 1:1 with V<sub>CC</sub>. V<sub>EE</sub> can vary -0.46 V / +0.06 V.

5. Outputs are terminated through a 50 ohm resistor to V<sub>CC</sub> - 2 volts.

# MC10E160, MC100E160

## 100E SERIES PECL DC CHARACTERISTICS $V_{CCx} = 5.0\text{ V}$ ; $V_{EE} = 0.0\text{ V}$ (Note 6)

| Symbol   | Characteristic               | 0°C  |      |      | 25°C |      |      | 85°C |      |      | Unit          |
|----------|------------------------------|------|------|------|------|------|------|------|------|------|---------------|
|          |                              | Min  | Typ  | Max  | Min  | Typ  | Max  | Min  | Typ  | Max  |               |
| $I_{EE}$ | Power Supply Current         |      | 82   | 98   |      | 82   | 98   |      | 94   | 113  | mA            |
| $V_{OH}$ | Output HIGH Voltage (Note 7) | 3975 | 4050 | 4120 | 3975 | 4050 | 4120 | 3975 | 4050 | 4120 | mV            |
| $V_{OL}$ | Output LOW Voltage (Note 7)  | 3190 | 3295 | 3380 | 3190 | 3255 | 3380 | 3190 | 3260 | 3380 | mV            |
| $V_{IH}$ | Input HIGH Voltage           | 3835 | 3975 | 4120 | 3835 | 3975 | 4120 | 3835 | 3975 | 4120 | mV            |
| $V_{IL}$ | Input LOW Voltage            | 3190 | 3355 | 3525 | 3190 | 3355 | 3525 | 3190 | 3355 | 3525 | mV            |
| $I_{IH}$ | Input HIGH Current           |      |      |      |      |      |      |      |      |      |               |
|          | CLK1, CLK2                   |      |      | 200  |      |      | 200  |      |      | 200  | $\mu\text{A}$ |
|          | R                            |      |      | 300  |      |      | 300  |      |      | 300  | $\mu\text{A}$ |
|          | All Other Inputs             |      |      | 150  |      |      | 150  |      |      | 150  | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current            | 0.5  | 0.3  |      | 0.5  | 0.25 |      | 0.5  | 0.2  |      | $\mu\text{A}$ |

NOTE: Devices 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 transverse air flow greater than 500 LFPM is maintained.

6. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary  $-0.46\text{ V} / +0.8\text{ V}$ .

7. Outputs are terminated through a 50 ohm resistor to  $V_{CC} - 2\text{ volts}$ .

## 100E SERIES NECL DC CHARACTERISTICS $V_{CCx} = 0.0\text{ V}$ ; $V_{EE} = -5.0\text{ V}$ (Note 8)

| Symbol   | Characteristic               | 0°C   |       |       | 25°C  |       |       | 85°C  |       |       | Unit          |
|----------|------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------------|
|          |                              | Min   | Typ   | Max   | Min   | Typ   | Max   | Min   | Typ   | Max   |               |
| $I_{EE}$ | Power Supply Current         |       | 82    | 98    |       | 82    | 98    |       | 94    | 113   | mA            |
| $V_{OH}$ | Output HIGH Voltage (Note 9) | -1025 | -950  | -880  | -1025 | -950  | -880  | -1025 | -950  | -880  | mV            |
| $V_{OL}$ | Output LOW Voltage (Note 9)  | -1810 | -1705 | -1620 | -1810 | -1745 | -1620 | -1810 | -1740 | -1620 | mV            |
| $V_{IH}$ | Input HIGH Voltage           | -1165 | -1025 | -880  | -1165 | -1025 | -880  | -1165 | -1025 | -880  | mV            |
| $V_{IL}$ | Input LOW Voltage            | -1810 | -1645 | -1475 | -1810 | -1645 | -1475 | -1810 | -1645 | -1475 | mV            |
| $I_{IH}$ | Input HIGH Current           |       |       |       |       |       |       |       |       |       |               |
|          | CLK1, CLK2                   |       |       | 200   |       |       | 200   |       |       | 200   | $\mu\text{A}$ |
|          | R                            |       |       | 300   |       |       | 300   |       |       | 300   | $\mu\text{A}$ |
|          | All Other Inputs             |       |       | 150   |       |       | 150   |       |       | 150   | $\mu\text{A}$ |
| $I_{IL}$ | Input LOW Current            | 0.5   | 0.3   |       | 0.5   | 0.25  |       | 0.5   | 0.2   |       | $\mu\text{A}$ |

NOTE: Devices 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 transverse air flow greater than 500 LFPM is maintained.

8. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary  $-0.46\text{ V} / +0.8\text{ V}$ .

9. Outputs are terminated through a 50 ohm resistor to  $V_{CC} - 2\text{ volts}$ .

# MC10E160, MC100E160

**AC CHARACTERISTICS**  $V_{CCx} = 5.0 \text{ V}$ ;  $V_{EE} = 0.0 \text{ V}$  or  $V_{CCx} = 0.0 \text{ V}$ ;  $V_{EE} = -5.0 \text{ V}$  (Note 10)

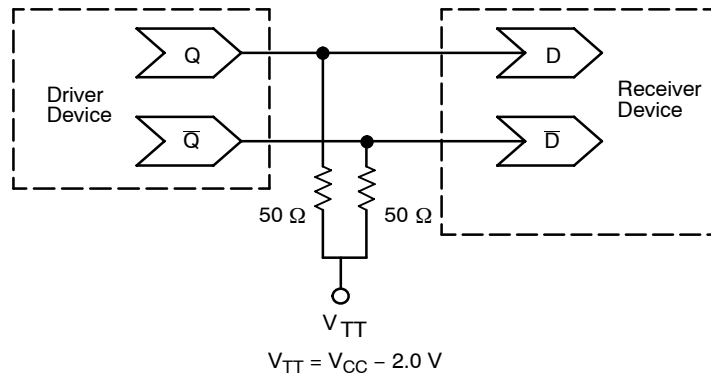
| Symbol       | Characteristic                                                                      | 0°C   |       |     | 25°C  |       |     | 85°C  |       |     | Unit |
|--------------|-------------------------------------------------------------------------------------|-------|-------|-----|-------|-------|-----|-------|-------|-----|------|
|              |                                                                                     | Min   | Typ   | Max | Min   | Typ   | Max | Min   | Typ   | Max |      |
| $f_{MAX}$    | Maximum Toggle Frequency                                                            | 700   | 1100  |     | 700   | 1100  |     | 700   | 1100  |     | MHz  |
| $t_{PLH}$    | Propagation Delay to Output<br>D to Q<br>$\overline{EN}$ to Q<br>CLK to Y<br>R to Y | 400   | 650   | 950 | 400   | 650   | 950 | 400   | 650   | 950 | ps   |
| $t_{PHL}$    |                                                                                     | 300   | 550   | 750 | 300   | 550   | 750 | 300   | 550   | 750 |      |
|              |                                                                                     | 275   | 500   | 700 | 275   | 500   | 700 | 275   | 500   | 700 |      |
|              |                                                                                     | 275   | 500   | 725 | 275   | 500   | 725 | 275   | 500   | 725 |      |
| $t_s$        | Setup Time<br>D<br>$\overline{HOLD}$<br>S-IN<br>SHIFT                               | 1200  | 900   |     | 1200  | 900   |     | 1200  | 900   |     | ps   |
|              |                                                                                     | 600   | 300   |     | 600   | 300   |     | 600   | 300   |     |      |
|              |                                                                                     | 350   | 150   |     | 350   | 150   |     | 350   | 150   |     |      |
|              |                                                                                     | 500   | 250   |     | 500   | 250   |     | 500   | 250   |     |      |
| $t_h$        | Hold Time<br>D<br>$\overline{HOLD}$<br>S-IN<br>SHIFT                                | - 400 | - 900 |     | - 400 | - 900 |     | - 400 | - 900 |     | ps   |
|              |                                                                                     | 100   | - 300 |     | 100   | - 300 |     | 100   | - 300 |     |      |
|              |                                                                                     | 300   | -150  |     | 300   | -150  |     | 300   | -150  |     |      |
|              |                                                                                     | 200   | - 250 |     | 200   | - 250 |     | 200   | - 250 |     |      |
| $t_{JITTER}$ | Random Clock Jitter (RMS)                                                           |       | < 1   |     |       | < 1   |     |       | < 1   |     | ps   |
| $t_r$        | Rise/Fall Time<br>(20 - 80%)                                                        | 300   | 450   | 650 | 300   | 450   | 650 | 300   | 450   | 650 | ps   |
| $t_f$        |                                                                                     |       |       |     |       |       |     |       |       |     |      |

NOTE: Devices are designed to meet the AC 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 transverse air flow greater than 500 LFPM is maintained.

10, 10 Series:  $V_{EE}$  can vary -0.46 V / +0.06 V.

100 Series:  $V_{EE}$  can vary -0.46 V / +0.8 V.

## MC10E160, MC100E160



**Figure 1. Typical Termination for Output Driver and Device Evaluation**  
(See Application Note AND8020 – Termination of ECL Logic Devices.)

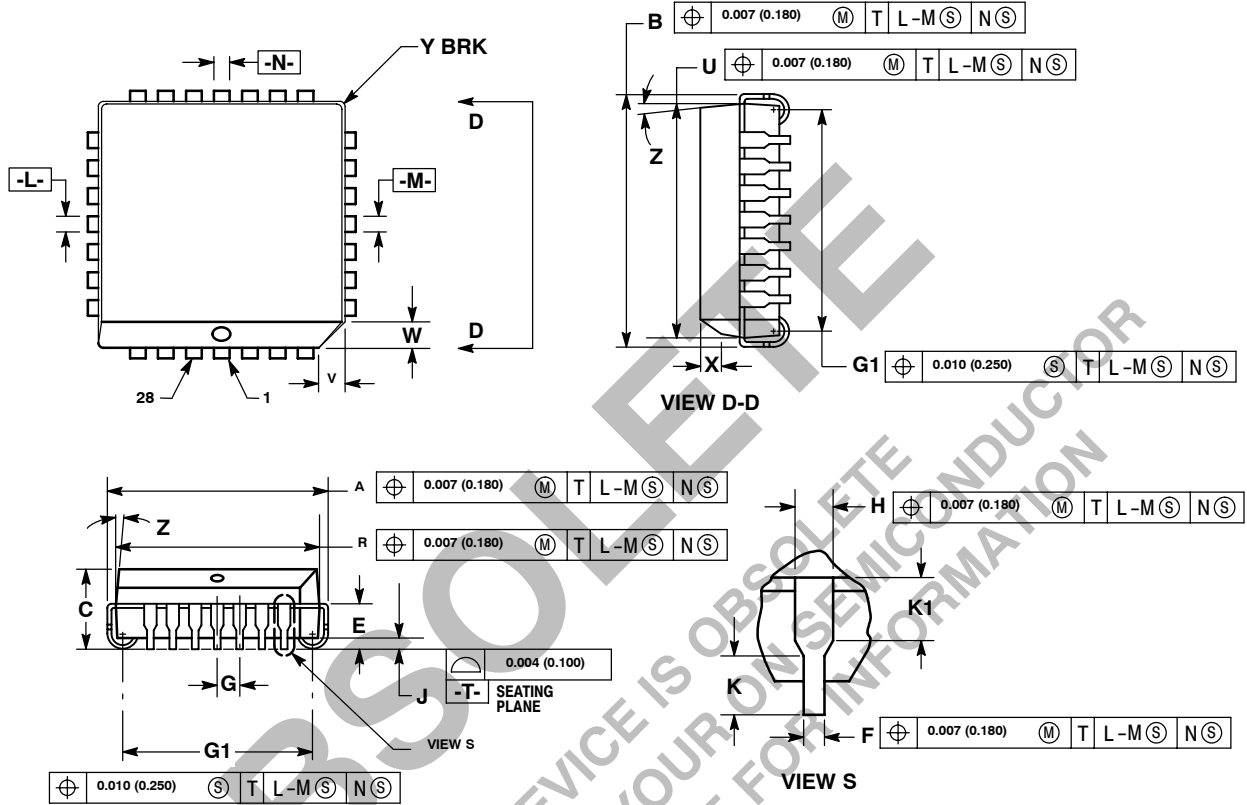
### Resource Reference of Application Notes

- |                |                                                               |
|----------------|---------------------------------------------------------------|
| <b>AN1404</b>  | – ECLinPS Circuit Performance at Non-Standard $V_{IH}$ Levels |
| <b>AN1405</b>  | – ECL Clock Distribution Techniques                           |
| <b>AN1406</b>  | – Designing with PECL (ECL at +5.0 V)                         |
| <b>AN1503</b>  | – ECLinPS I/O SPICE Modeling Kit                              |
| <b>AN1504</b>  | – Metastability and the ECLinPS Family                        |
| <b>AN1568</b>  | – Interfacing Between LVDS and ECL                            |
| <b>AN1596</b>  | – ECLinPS Lite Translator ELT Family SPICE I/O Model Kit      |
| <b>AN1650</b>  | – Using Wire-OR Ties in ECLinPS Designs                       |
| <b>AN1672</b>  | – The ECL Translator Guide                                    |
| <b>AND8001</b> | – Odd Number Counters Design                                  |
| <b>AND8002</b> | – Marking and Date Codes                                      |
| <b>AND8020</b> | – Termination of ECL Logic Devices                            |

# MC10E160, MC100E160

## PACKAGE DIMENSIONS

PLCC-28  
FN SUFFIX  
PLASTIC PLCC PACKAGE  
CASE 776-02  
ISSUE E



| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.485     | 0.495 | 12.32       | 12.57 |
| B   | 0.485     | 0.495 | 12.32       | 12.57 |
| C   | 0.165     | 0.180 | 4.20        | 4.57  |
| E   | 0.090     | 0.110 | 2.29        | 2.79  |
| F   | 0.013     | 0.019 | 0.33        | 0.48  |
| G   | 0.050 BSC |       | 1.27 BSC    |       |
| H   | 0.026     | 0.032 | 0.66        | 0.81  |
| J   | 0.020     | —     | 0.51        | —     |
| K   | 0.025     | —     | 0.64        | —     |
| R   | 0.450     | 0.456 | 11.43       | 11.58 |
| U   | 0.450     | 0.456 | 11.43       | 11.58 |
| V   | 0.042     | 0.048 | 1.07        | 1.21  |
| W   | 0.042     | 0.048 | 1.07        | 1.21  |
| X   | 0.042     | 0.056 | 1.07        | 1.42  |
| Y   | —         | 0.020 | —           | 0.50  |
| Z   | 2°        | 10°   | 2°          | 10°   |
| G1  | 0.410     | 0.430 | 10.42       | 10.92 |
| K1  | 0.040     | —     | 1.02        | —     |

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