

# MC10E150, MC100E150

## 5V ECL 6-Bit D Latch

The MC10E/100E150 contains six D-type latches with differential outputs. When both Latch Enables (LEN1, LEN2) are LOW, the latch is transparent and input data transitions propagate through to the output. A logic HIGH on either LEN1 or LEN2 (or both) latches the data. The Master Reset (MR) overrides all other controls to set the Q outputs low.

The 100 Series contains temperature compensation.

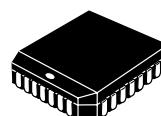
- 800 ps Max. Propagation Delay
- PECL Mode Operating Range:  $V_{CC} = 4.2\text{ V}$  to  $5.7\text{ V}$  with  $V_{EE} = 0\text{ V}$
- NECL Mode Operating Range:  $V_{CC} = 0\text{ V}$  with  $V_{EE} = -4.2\text{ V}$  to  $-5.7\text{ V}$
- Internal Input  $50\text{ K}\Omega$  Pull-down Resistors
- ESD Protection:  
Human Body Model;  $> 1\text{ KV}$ ,  
Machine Body Model;  $> 75\text{ V}$
- 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 @  $0.125\text{ in}$ ,  
Oxygen Index: 28 to 34
- Transistor Count = 173 devices



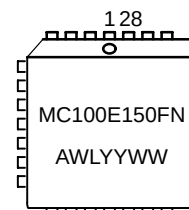
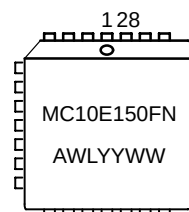
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### MARKING DIAGRAMS



PLCC-28  
FN SUFFIX  
CASE 776



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

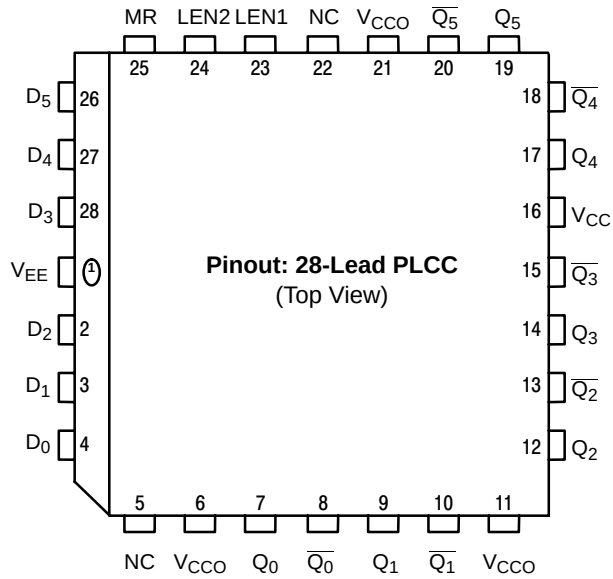
### ORDERING INFORMATION

| Device        | Package | Shipping <sup>†</sup> |
|---------------|---------|-----------------------|
| MC10E150FN    | PLCC-28 | 37 Units/Rail         |
| MC10E150FNR2  | PLCC-28 | 500 / Tape & Reel     |
| MC100E150FN   | PLCC-28 | 37 Units/Rail         |
| MC100E150FNR2 | PLCC-28 | 500 / Tape & 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.

# MC10E150, MC100E150

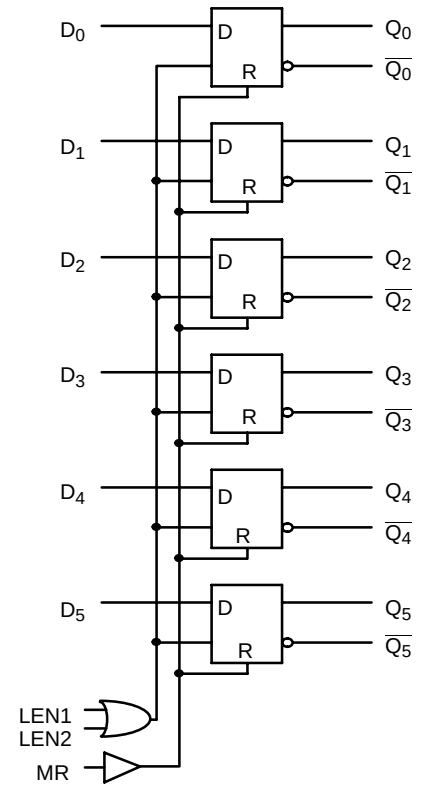
## LOGIC DIAGRAM AND PINOUT ASSIGNMENT



\* All  $V_{CC}$  and  $V_{CCO}$  pins are tied together on the die.

Warning: All  $V_{CC}$ ,  $V_{CCO}$ , and  $V_{EE}$  pins must be externally connected to Power Supply to guarantee proper operation.

## LOGIC DIAGRAM



## PIN DESCRIPTION

| PIN                                          | FUNCTION                 |
|----------------------------------------------|--------------------------|
| $D_0 - D_5$                                  | ECL Data Inputs          |
| LEN1, LEN2                                   | ECL Latch Enables        |
| MR                                           | ECL Master Reset         |
| $Q_0 - Q_5, \overline{Q_0} - \overline{Q_5}$ | ECL Differential Outputs |
| $V_{CC}, V_{CCO}$                            | Positive Supply          |
| $V_{EE}$                                     | Negative Supply          |
| NC                                           | No Connect               |

# MC10E150, MC100E150

## 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>EE</sub>  | NECL Mode Power Supply                             | V <sub>CC</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         |
| V <sub>EE</sub>  | PECL Operating Range<br>NECL Operating Range       |                                                |                                                                      | 4.2 to 5.7<br>-5.7 to -4.2 | V<br>V       |
| 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               |      | 52   | 62         |      | 52   | 62         |      | 52   | 62         | 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>D<br>LEN, MR |      |      | 200<br>150 |      |      | 200<br>150 |      |      | 200<br>150 | 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.

## 10E SERIES NECL DC CHARACTERISTICS V<sub>CCx</sub> = 0.0 V; V<sub>EE</sub> = -5.0 V (Note 4)

| 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               |       | 52    | 62         |       | 52    | 62         |       | 52    | 62         | 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>D<br>LEN, MR |       |       | 200<br>150 |       |       | 200<br>150 |       |       | 200<br>150 | 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.

# MC10E150, MC100E150

## 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               |      | 52   | 62         |      | 52   | 62         |      | 60   | 72         | 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<br>D<br>LEN, MR |      |      | 200<br>150 |      |      | 200<br>150 |      |      | 200<br>150 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $I_{IL}$ | 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 lfm 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               |       | 52    | 62         |       | 52    | 62         |       | 60    | 72         | 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<br>D<br>LEN, MR |       |       | 200<br>150 |       |       | 200<br>150 |       |       | 200<br>150 | $\mu\text{A}$<br>$\mu\text{A}$ |
| $I_{IL}$ | 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 lfm 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  $V_{CC} - 2\text{ volts}$ .

# MC10E150, MC100E150

**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)

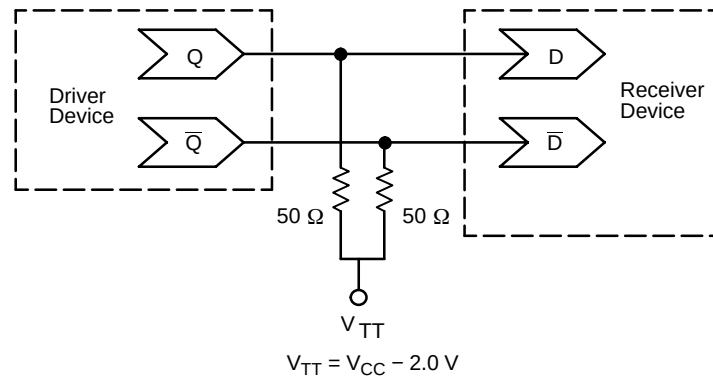
| Symbol                 | Characteristic                                | 0°C               |                   |                   | 25°C              |                   |                   | 85°C              |                   |                   | Unit |
|------------------------|-----------------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|------|
|                        |                                               | Min               | Typ               | Max               | Min               | Typ               | Max               | Min               | Typ               | Max               |      |
| $f_{MAX}$              | Maximum Toggle Frequency                      | 900               | 1100              |                   | 900               | 1100              |                   | 900               | 1100              |                   | MHz  |
| $t_{PLH}$<br>$t_{PHL}$ | Propagation Delay to Output<br>D<br>LEN<br>MR | 250<br>375<br>450 | 375<br>500<br>625 | 550<br>700<br>750 | 250<br>375<br>450 | 375<br>500<br>625 | 550<br>700<br>750 | 250<br>375<br>450 | 375<br>500<br>625 | 550<br>700<br>750 | ps   |
| $t_s$                  | Setup Time<br>D                               | 200               | 50                |                   | 200               | 50                |                   | 200               | 50                |                   | ps   |
| $t_h$                  | Hold Time<br>D                                | 200               | - 50              |                   | 200               | - 50              |                   | 200               | - 50              |                   | ps   |
| $t_{RR}$               | Reset Recovery Time                           | 750               | 650               |                   | 750               | 650               |                   | 750               | 650               |                   | ps   |
| $t_{PW}$               | Minimum Pulse Width<br>MR                     | 400               |                   |                   | 400               |                   |                   | 400               |                   |                   | ps   |
| $t_{SKEW}$             | Within-Device Skew (Note 11)                  |                   | 50                |                   |                   | 50                |                   |                   | 50                |                   | ps   |
| $t_{JITTER}$           | Random Clock Jitter (RMS)                     |                   | < 1               |                   |                   | < 1               |                   |                   | < 1               |                   | ps   |
| $t_r$<br>$t_f$         | Rise/Fall Times<br>(20 - 80%)                 | 300               | 450               | 650               | 300               | 450               | 650               | 300               | 450               | 650               | ps   |

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.

11. Within-device skew is defined as identical transitions on similar paths through a device.

## MC10E150, MC100E150



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

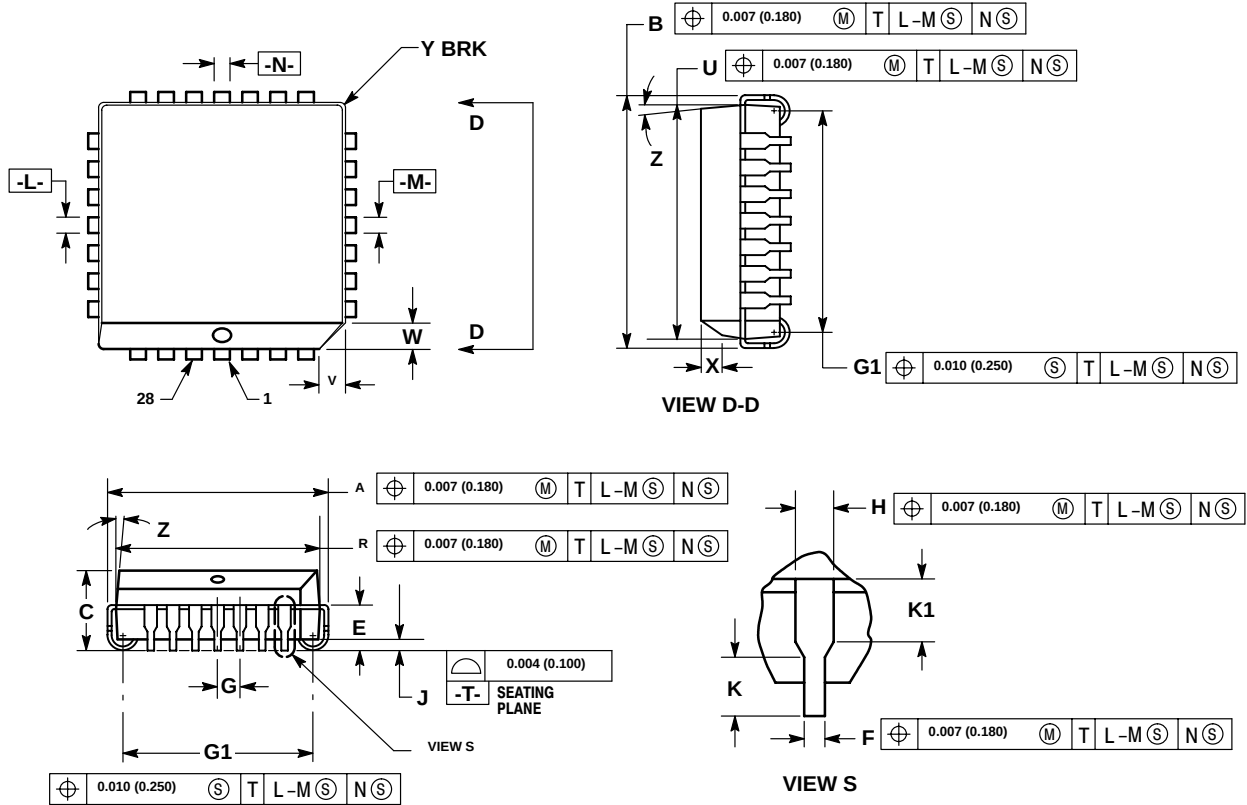
### Resource Reference of Application Notes

|                |                                                                |
|----------------|----------------------------------------------------------------|
| <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                             |

# MC10E150, MC100E150

## PACKAGE DIMENSIONS

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



### NOTES:

- DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- DIM G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
- DIM R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
- DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

| 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        | —     |

# MC10E150, MC100E150

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