

# MC10H350

## PECL\* to TTL Translator

(+5 Vdc Power Supply Only)

### Description

The MC10H350 is a member of the 10H family of high performance ECL logic. It consists of 4 translators with differential inputs and TTL outputs. The 3-state outputs can be disabled by applying a HIGH TTL logic level on the common OE input.

The MC10H350 is designed to be used primarily in systems incorporating both ECL and TTL logic operating off a common power supply. The separate  $V_{CC}$  power pins are not connected internally and thus isolate the noisy TTL  $V_{CC}$  runs from the relatively quiet ECL  $V_{CC}$  runs on the printed circuit board. The differential inputs allow the MC10H350 to be used as an inverting or noninverting translator, or a differential line receiver. The MC10H350 can also drive CMOS with the addition of a pullup resistor.

### Features

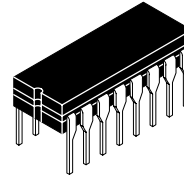
- Propagation Delay, 3.5 ns Typical
- MECL 10K™ Compatible
- Pb-Free Packages are Available\*



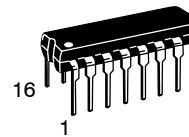
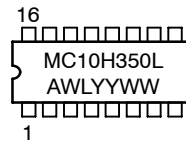
ON Semiconductor®

<http://onsemi.com>

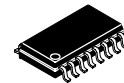
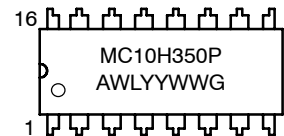
### MARKING DIAGRAMS\*



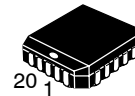
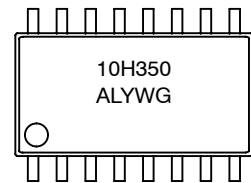
CDIP-16  
L SUFFIX  
CASE 620A



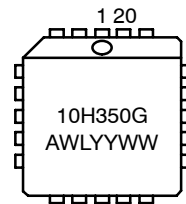
PDIP-16  
P SUFFIX  
CASE 648



SOEIAJ-16  
CASE 966



PLLC-20  
FN SUFFIX  
CASE 775



A = Assembly Location  
WL, L = Wafer Lot  
YY, Y = Year  
WW, W = Work Week  
G = Pb-Free Package

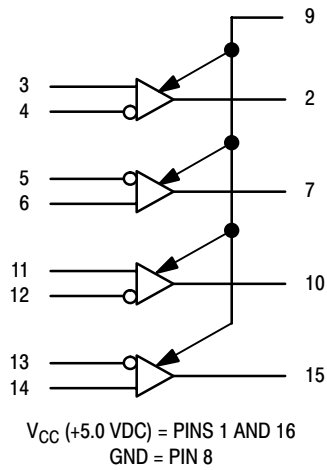
\*For additional marking information, refer to Application Note AND8002/D.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

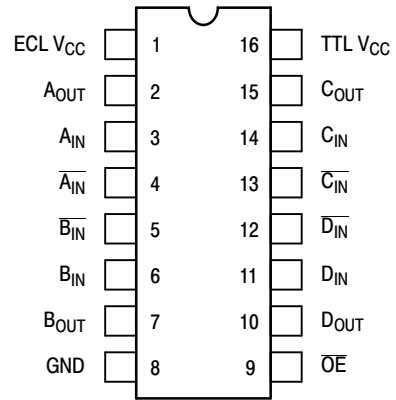
### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

# MC10H350



**Figure 1. Logic Diagram**



Pin assignment is for Dual-in-Line Package.

**Figure 2. Dip Pin Assignment**

**Table 1. MAXIMUM RATINGS**

| Symbol    | Characteristic                         | Rating      | Unit |
|-----------|--|-------------|------|
| $V_{CC}$  | Power Supply ( $V_{EE} = \text{GND}$ ) | 7.0         | Vdc  |
| $T_A$     | Operating Temperature Range            | 0 to +75    | °C   |
| $T_{stg}$ | Storage Temperature Range – Plastic    | -55 to +150 | °C   |
|           | – Ceramic                              | -55 to +165 | °C   |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

# MC10H350

**Table 2. ELECTRICAL CHARACTERISTICS** ( $V_{CC} = 5.0 \text{ V} \pm 5\%$ ) (Note 1)

| Symbol                | Characteristic   | $T_A = 0^\circ\text{C to } 75^\circ\text{C}$ |     | Unit     |               |
|-----------------------|--|--|-----|----------|---------------|
|                       |  | Min  | Max |          |               |
| $I_{CC}$              | Power Supply Current                                       | TTL  | –   | 20       | mA            |
|                       |  | ECL  | –   | 12       |               |
| $I_{IH}$<br>$I_{INH}$ | Input Current High   | Pin 9  | –   | 20       | $\mu\text{A}$ |
|                       |  | Others                                       | –   | 50       |               |
| $I_{IL}$<br>$I_{INL}$ | Input Current Low  | Pin 9  | –   | –0.6     | mA            |
|                       |  | Others                                       | –   | 50       |               |
| $V_{IH}$              | Input Voltage High   | Pin 9  | 2.0 | –        | Vdc           |
| $V_{IL}$              | Input Voltage Low  | Pin 9  | –   | 0.8      | Vdc           |
| $V_{DIFF}$            | Differential Input Voltage (Note 1)<br>Pins 3–6, 11–14 (1) |  | 350 | –        | mV            |
| $V_{CM}$              | Voltage Common Mode<br>Pins 3–6, 11–14                     |  | 2.8 | $V_{CC}$ | Vdc           |
| $V_{OH}$              | Output Voltage High<br>$I_{OH} = 3.0 \text{ mA}$           |  | 2.7 | –        | Vdc           |
| $V_{OL}$              | Output Voltage Low<br>$I_{OL} = 20 \text{ mA}$             |  | –   | 0.5      | Vdc           |
| $I_{OS}$              | Short Circuit Current<br>$V_{OUT} = 0 \text{ V}$           |  | –60 | –150     | mA            |
| $I_{OZH}$             | Output Disable Current High<br>$V_{OUT} = 2.7 \text{ V}$   |  | –   | 50       | $\mu\text{A}$ |
| $I_{OZL}$             | Output Disable Current Low<br>$V_{OUT} = 0.5 \text{ V}$    |  | –   | –50      | $\mu\text{A}$ |

\*Positive Emitter Coupled Logic

1. Common mode input voltage to pins 3–4, 5–6, 11–12, 13–14 must be between the values of 2.8 V and 5.0 V. This common mode input voltage range includes the differential input swing.
2. For single-ended use, apply 3.75 V ( $V_{BB}$ ) to either input depending on output polarity required. Signal level range to other input is 3.3 V to 4.2 V.
3. Any unused gates should have the inverting inputs tied to  $V_{CC}$  and the noninverting inputs tied to ground to prevent output glitching.

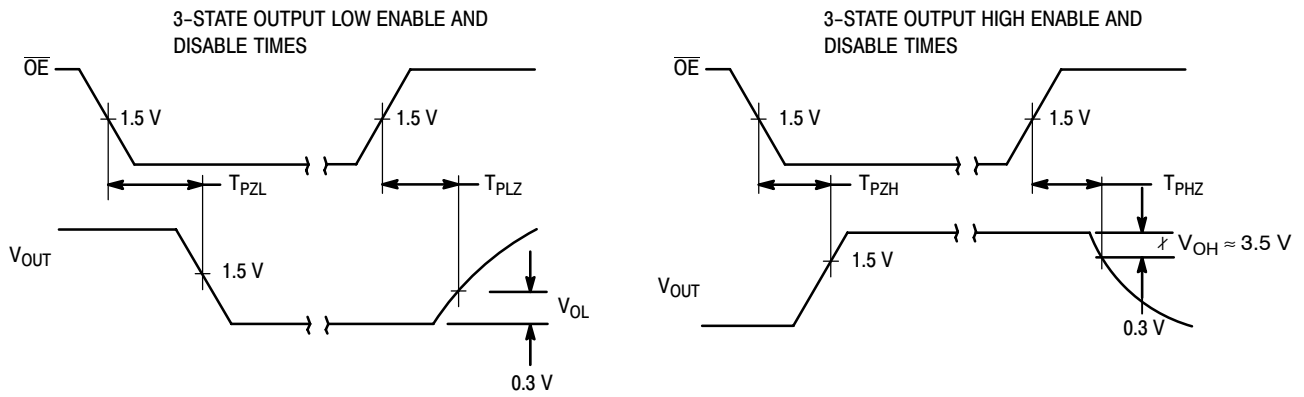
**Table 3. AC PARAMETERS** ( $C_L = 50 \text{ pF}$ ) ( $V_{CC} = 5.0 \pm 5\%$ ) ( $T_A = 0^\circ\text{C to } 75^\circ\text{C}$ )

| Symbol                   | Characteristic                        | $T_A = 0^\circ\text{C to } 75^\circ\text{C}$ |     | Unit |
|--------------------------|---------------------------------------|--|-----|------|
|                          |                                       | Min  | Max |      |
| $t_{pd}$                 | Propagation Delay Data (50% to 1.5 V) | 1.5  | 5.0 | ns   |
| $t_r$                    | Rise Time (Note 4)                    | 0.3  | 1.6 | ns   |
| $t_f$                    | Fall Time (Note 4)                    | 0.3  | 1.6 | ns   |
| $t_{pdLZ}$<br>$t_{pdHZ}$ | Output Disable Time                   | 2.0  | 6.0 | ns   |
|                          |                                       | 2.0  | 6.0 |      |
| $t_{pdZL}$<br>$t_{pdZH}$ | Output Enable Time                    | 2.0  | 8.0 | ns   |
|                          |                                       | 2.0  | 8.0 |      |

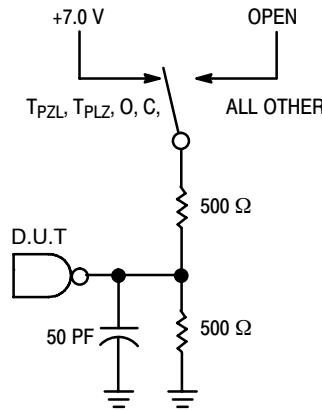
NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

4. 1.0 V to 2.0 V w/50 pF into 500  $\Omega$ .

# MC10H350



**Figure 3. 3-State Switching Waveforms**



\*INCLUDES JIG AND PROBE CAPACITANCE

Application Note: Pin.9 is an  $\overline{OE}$  and the MC10H350 is disabled when  $\overline{OE}$  is at  $V_{IH}$  or higher.

**Figure 4. Test Load**

## ORDERING INFORMATION

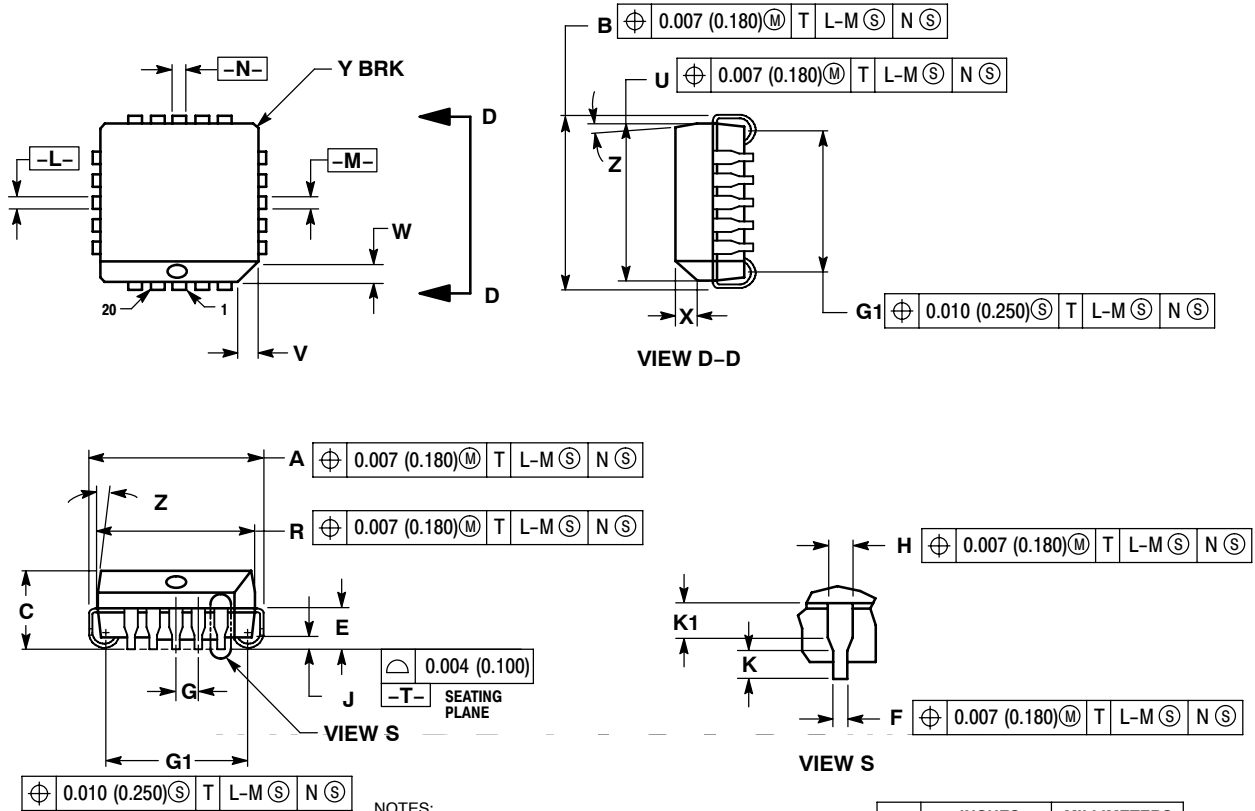
| Device        | Package                | Shipping <sup>†</sup> |
|---------------|------------------------|-----------------------|
| MC10H350FN    | PLLC-20                | 46 Units / Rail       |
| MC10H350FNG   | PLLC-20<br>(Pb-Free)   | 46 Units / Rail       |
| MC10H350FNR2  | PLLC-20                | 500 / Tape & Reel     |
| MC10H350FNR2G | PLLC-20<br>(Pb-Free)   | 500 / Tape & Reel     |
| MC10H350L     | CDIP-16                | 25 Unit / Rail        |
| MC10H350M     | SOEIAJ-16              | 50 Unit / Rail        |
| MC10H350MG    | SOEIAJ-16<br>(Pb-Free) | 50 Unit / Rail        |
| MC10H350MEL   | SOEIAJ-16              | 2000 / Tape & Reel    |
| MC10H350MELG  | SOEIAJ-16<br>(Pb-Free) | 2000 / Tape & Reel    |
| MC10H350P     | PDIP-16                | 25 Unit / Rail        |
| MC10H350PG    | PDIP-16<br>(Pb-Free)   | 25 Unit / Rail        |

<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.

# MC10H350

## PACKAGE DIMENSIONS

20 LEAD PLLC  
CASE 775-02  
ISSUE E



**NOTES:**

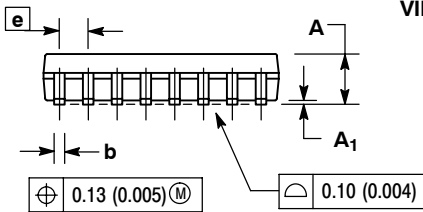
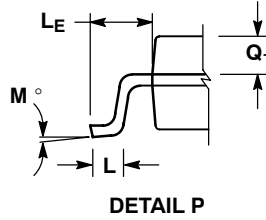
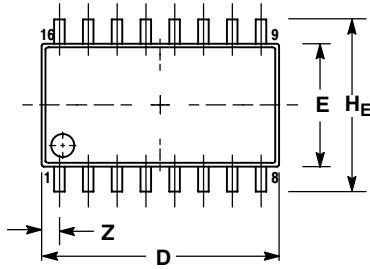
- DIMENSIONS AND TOLERANCING PER ANSI Y14.5M, 1982.
- DIMENSIONS IN INCHES.
- DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
- DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
- DIMENSIONS IN 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   | 0.385     | 0.395 | 9.78        | 10.03 |
| B   | 0.385     | 0.395 | 9.78        | 10.03 |
| 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   | 0.350     | 0.356 | 8.89        | 9.04  |
| U   | 0.350     | 0.356 | 8.89        | 9.04  |
| 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  | 0.310     | 0.330 | 7.88        | 8.38  |
| K1  | 0.040     | ----  | 1.02        | ----  |

# MC10H350

## PACKAGE DIMENSIONS

### SOEIAJ-16 CASE 966-01 ISSUE A

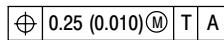
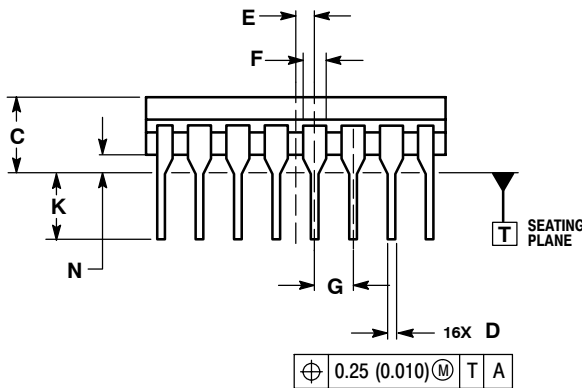
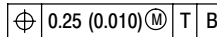
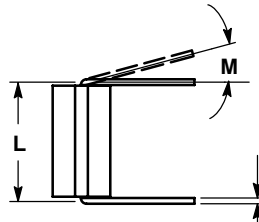
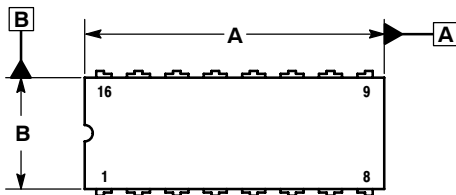


**NOTES:**

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER.
- DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
- TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
- THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.46 (0.018).

| DIM            | MILLIMETERS |       | INCHES |       |
|----------------|-------------|-------|--------|-------|
|                | MIN         | MAX   | MIN    | MAX   |
| A              | ---         | 2.05  | ---    | 0.081 |
| A <sub>1</sub> | 0.05        | 0.20  | 0.002  | 0.008 |
| b              | 0.35        | 0.50  | 0.014  | 0.020 |
| c              | 0.10        | 0.20  | 0.007  | 0.011 |
| D              | 9.90        | 10.50 | 0.390  | 0.413 |
| E              | 5.10        | 5.45  | 0.201  | 0.215 |
| e              | 1.27 BSC    |       |        |       |
| HE             | 7.40        | 8.20  | 0.291  | 0.323 |
| L              | 0.50        | 0.85  | 0.020  | 0.033 |
| LE             | 1.10        | 1.50  | 0.043  | 0.059 |
| M              | 0°          | 10°   | 0°     | 10°   |
| Q <sub>1</sub> | 0.70        | 0.90  | 0.028  | 0.035 |
| Z              | ---         | 0.78  | ---    | 0.031 |

### CDIP-16 L SUFFIX CERAMIC DIP PACKAGE CASE 620A-01 ISSUE O



**NOTES:**

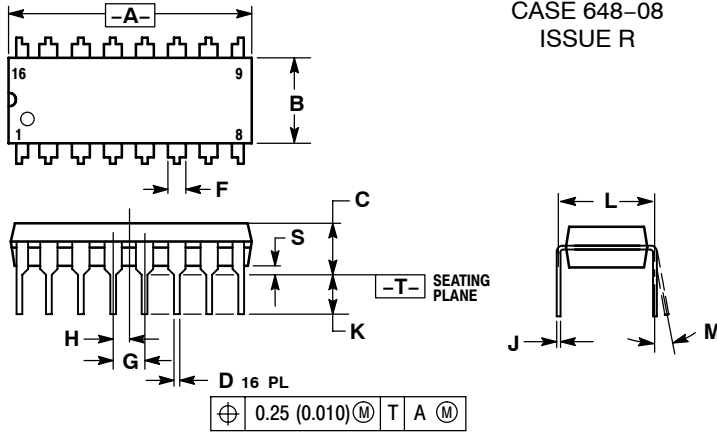
- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
- CONTROLLING DIMENSION: INCH.
- DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
- DIMENSION F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.
- THIS DRAWING REPLACES OBSOLETE CASE OUTLINE 620-10.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.750     | 0.785 | 19.05       | 19.93 |
| B   | 0.240     | 0.295 | 6.10        | 7.49  |
| C   | ---       | 0.200 | ---         | 5.08  |
| D   | 0.015     | 0.020 | 0.39        | 0.50  |
| E   | 0.050 BSC |       |             |       |
| F   | 0.055     | 0.065 | 1.40        | 1.65  |
| G   | 0.100 BSC |       |             |       |
| H   | 0.008     | 0.015 | 0.21        | 0.38  |
| K   | 0.125     | 0.170 | 3.18        | 4.31  |
| L   | 0.300 BSC |       |             |       |
| M   | 0°        | 15°   | 0°          | 15°   |
| N   | 0.020     | 0.040 | 0.51        | 1.01  |

# MC10H350

## PACKAGE DIMENSIONS

PDIP-16  
P SUFFIX  
PLASTIC DIP PACKAGE  
CASE 648-08  
ISSUE R



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 0.740     | 0.770 | 18.80       | 19.55 |
| B   | 0.250     | 0.270 | 6.35        | 6.85  |
| C   | 0.145     | 0.175 | 3.69        | 4.44  |
| D   | 0.015     | 0.021 | 0.39        | 0.53  |
| F   | 0.040     | 0.70  | 1.02        | 1.77  |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| H   | 0.050 BSC |       | 1.27 BSC    |       |
| J   | 0.008     | 0.015 | 0.21        | 0.38  |
| K   | 0.110     | 0.130 | 2.80        | 3.30  |
| L   | 0.295     | 0.305 | 7.50        | 7.74  |
| M   | 0°        | 10°   | 0°          | 10°   |
| S   | 0.020     | 0.040 | 0.51        | 1.01  |

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