

# MC10H165

## 8-Input Priority Encoder

### Description

The MC10H165 is an 8-Input Priority Encoder. This 10H part is a functional/pinout duplication of the standard MECL 10K™ family part, with 100% improvement in propagation delay, and no increases in power-supply current.

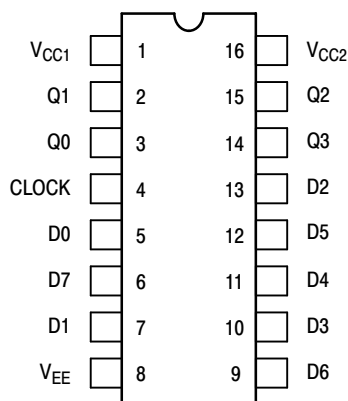
### Features

- Propagation Delay, Data-to-Output, 2.2 ns Typical
- Improved Noise Margin 150 mV (Over Operating Voltage and Temperature Range)
- Voltage Compensated
- MECL 10K Compatible
- Pb-Free Packages are Available\*

TRUTH TABLE

| DATA INPUTS |    |    |    |    |    |    |    | OUTPUTS |    |    |    |
|-------------|----|----|----|----|----|----|----|---------|----|----|----|
| D0          | D1 | D2 | D3 | D4 | D5 | D6 | D7 | Q3      | Q2 | Q1 | Q0 |
| H           | X  | X  | X  | X  | X  | X  | X  | H       | L  | L  | L  |
| L           | H  | X  | X  | X  | X  | X  | X  | H       | L  | L  | H  |
| L           | L  | H  | X  | X  | X  | X  | X  | H       | L  | H  | L  |
| L           | L  | L  | H  | X  | X  | X  | X  | H       | L  | H  | H  |
| L           | L  | L  | L  | H  | X  | X  | X  | H       | H  | L  | L  |
| L           | L  | L  | L  | L  | H  | X  | X  | H       | H  | L  | H  |
| L           | L  | L  | L  | L  | L  | H  | X  | H       | H  | H  | L  |
| L           | L  | L  | L  | L  | L  | L  | H  | H       | H  | H  | H  |
| L           | L  | L  | L  | L  | L  | L  | L  | L       | L  | L  | L  |

DIP  
PIN ASSIGNMENT



Pin assignment is for Dual-in-Line Package.  
For PLCC pin assignment, see the Pin Conversion Tables on page 18 of the ON Semiconductor MECL Data Book (DL122/D).

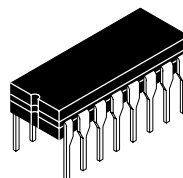
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



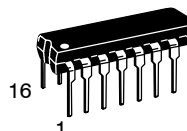
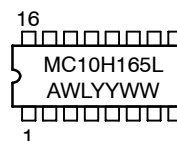
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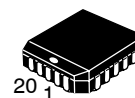
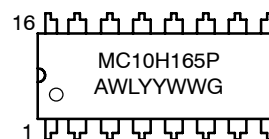
### MARKING DIAGRAMS\*



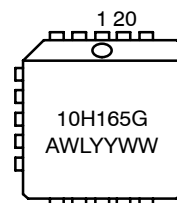
CDIP-16  
L SUFFIX  
CASE 620A



PDIP-16  
P SUFFIX  
CASE 648



PLCC-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.

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

# MC10H165

**Table 1. MAXIMUM RATINGS**

| Symbol    | Characteristic                                      | Rating                     | Unit |
|-----------|-----------------------------------------------------|----------------------------|------|
| $V_{EE}$  | Power Supply ( $V_{CC} = 0$ )                       | -8.0 to 0                  | Vdc  |
| $V_I$     | Input Voltage ( $V_{CC} = 0$ )                      | 0 to $V_{EE}$              | Vdc  |
| $I_{out}$ | Output Current<br>– Continuous<br>– Surge           | 50<br>100                  | mA   |
| $T_A$     | Operating Temperature Range                         | 0 to +75                   | °C   |
| $T_{stg}$ | Storage Temperature Range<br>– Plastic<br>– Ceramic | -55 to +150<br>-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.

**Table 2. ELECTRICAL CHARACTERISTICS** ( $V_{EE} = -5.2\text{ V} \pm 5\%$ ) (Note 1)

| Symbol    | Characteristic              | 0°    |       | 25°   |       | 75°   |        | Unit               |
|-----------|-----------------------------|-------|-------|-------|-------|-------|--------|--------------------|
|           |                             | Min   | Max   | Min   | Max   | Min   | Max    |                    |
| $I_E$     | Power Supply Current        | –     | 144   | –     | 131   | –     | 144    | mA                 |
| $I_{inH}$ | Input Current High<br>Pin 4 | –     | 510   | –     | 320   | –     | 320    | $\mu\text{A}_{dc}$ |
|           | Data Inputs                 | –     | 600   | –     | 370   | –     | 370    |                    |
| $I_{inL}$ | Input Current Low           | 0.5   | –     | 0.5   | –     | 0.3   | –      | $\mu\text{A}$      |
| $V_{OH}$  | High Output Voltage         | -1.02 | -0.84 | -0.98 | -0.81 | -0.92 | -0.735 | Vdc                |
| $V_{OL}$  | Low Output Voltage          | -1.95 | -1.63 | -1.95 | -1.63 | -1.95 | -1.60  | Vdc                |
| $V_{IH}$  | High Input Voltage          | -1.17 | -0.84 | -1.13 | -0.81 | -1.07 | -0.735 | Vdc                |
| $V_{IL}$  | Low Input Voltage           | -1.95 | -1.48 | -1.95 | -1.48 | -1.95 | -1.45  | Vdc                |

1. Each MECL 10H™ series circuit has been designed to meet the dc specifications shown in the test 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. Outputs are terminated through a 50  $\Omega$  resistor to -2.0 V.

**Table 3. AC PARAMETERS**

| Symbol     | Characteristic       | 0°  |     | 25° |     | 75° |     | Unit |
|------------|----------------------|-----|-----|-----|-----|-----|-----|------|
|            |                      | Min | Max | Min | Max | Min | Max |      |
| $t_{pd}$   | Propagation Delay    |     |     |     |     |     |     | ns   |
|            | Data Input → Output  | 0.7 | 3.4 | 0.7 | 3.4 | 0.7 | 3.4 |      |
|            | Clock Input → Output | 0.7 | 2.2 | 0.7 | 2.2 | 0.7 | 2.2 |      |
| $t_{set}$  | Set-up Time          | 3.0 | –   | 3.0 | –   | 3.0 | –   | ns   |
| $t_{hold}$ | Hold Time            | 0.5 | –   | 0.5 | –   | 0.5 | –   | ns   |
| $t_r$      | Rise Time            | 0.5 | 2.4 | 0.5 | 2.4 | 0.5 | 2.4 | ns   |
| $t_f$      | Fall Time            | 0.5 | 2.4 | 0.5 | 2.4 | 0.5 | 2.4 | ns   |

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 lfpm. 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.

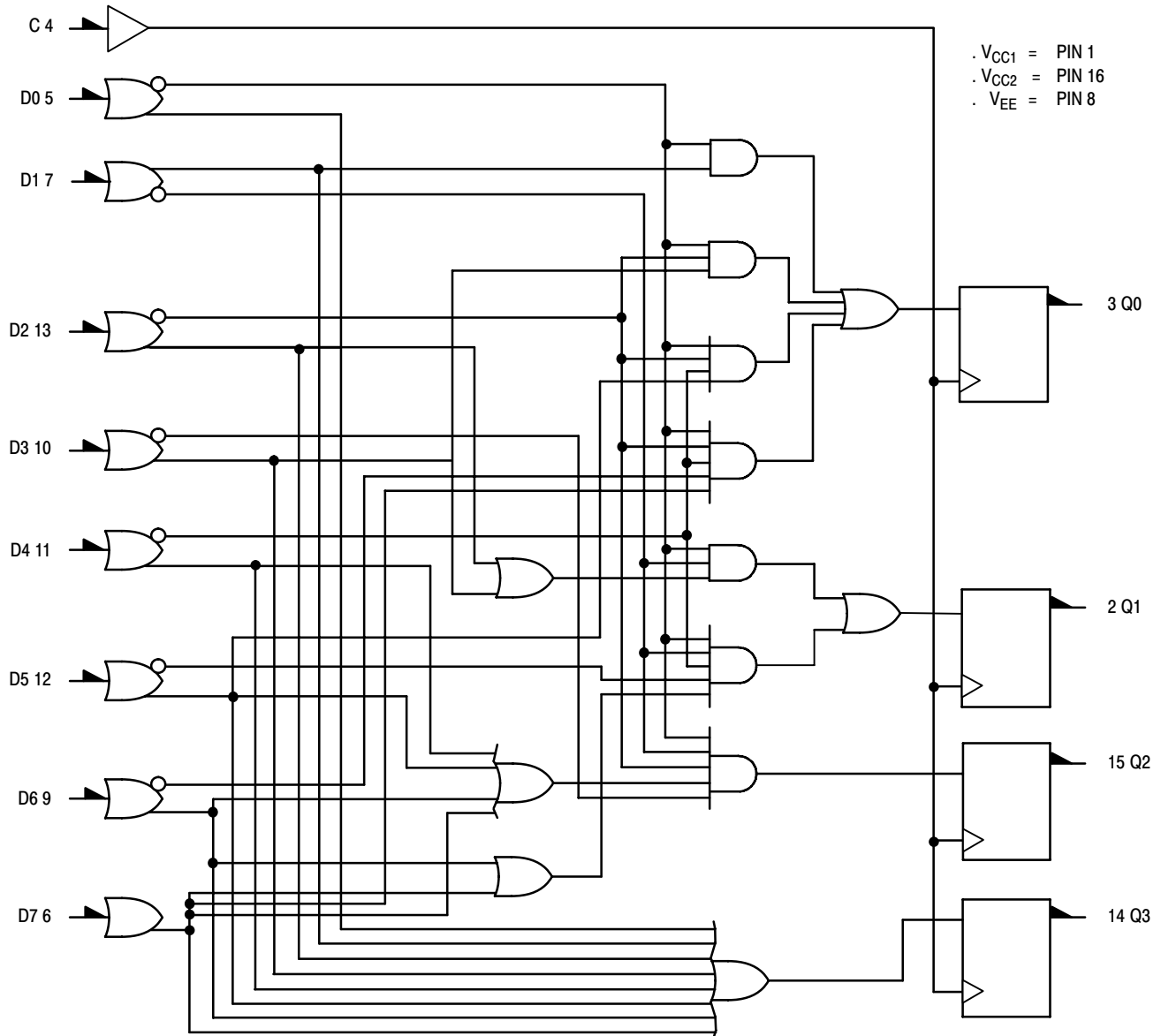
# MC10H165

## 8-INPUT PRIORITY ENCODER

The MC10H165 is a device designed to encode eight inputs to a binary coded output. The output code is that of the highest order input. Any input of lower priority is ignored. Each output incorporates a latch allowing synchronous operation. When the clock is low the outputs follow the inputs and latch when the clock goes high. This device is very useful for a variety of applications in checking system status in control processors, peripheral controllers, and testing systems.

The input is active when high, (e.g., the three binary outputs are low when input D0 is high). The Q3 output is high when any input is high. This allows direct extension into another priority encoder when more than eight inputs are necessary. The MC10H165 can also be used to develop binary codes from random logic inputs, for addressing ROMs, RAMs, or for multiplexing data.

### LOGIC DIAGRAM



Numbers at ends of terminals denote pin numbers for L and P packages.

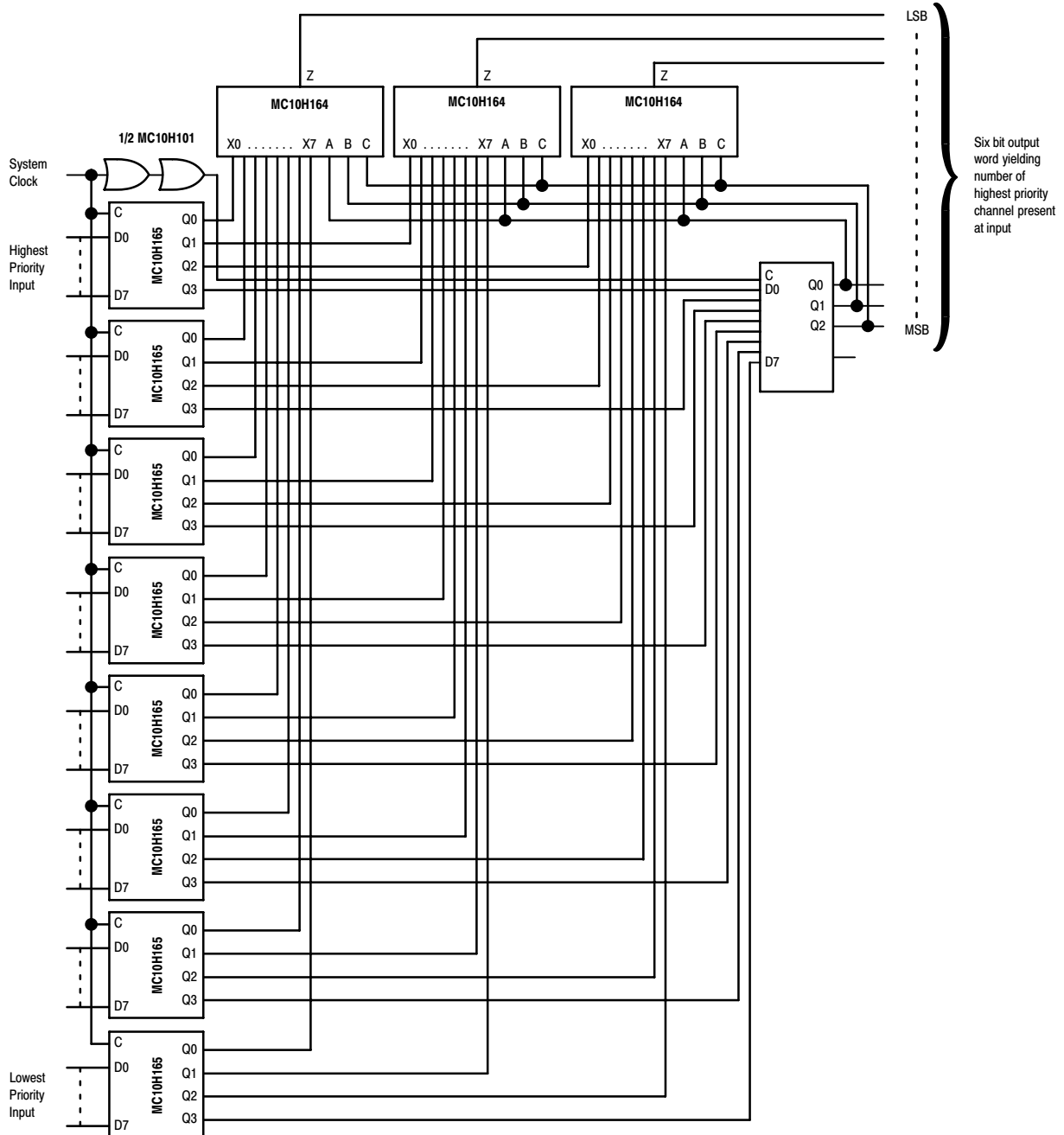
# MC10H165

## APPLICATION INFORMATION

A typical application of the MC10H165 is the decoding of system status on a priority basis. A 64-line priority encoder is shown in the figure below. System status lines are connected to this encoder such that, when a given condition exists, the respective input will be at a logic high level. This scheme will select the one of 64 different system conditions,

as represented at the encoder inputs, which has priority in determining the next system operation to be performed. The binary code showing the address of the highest priority input present will appear at the encoder outputs to control other system logic functions.

### 64-LINE PRIORITY ENCODER



## MC10H165

### ORDERING INFORMATION

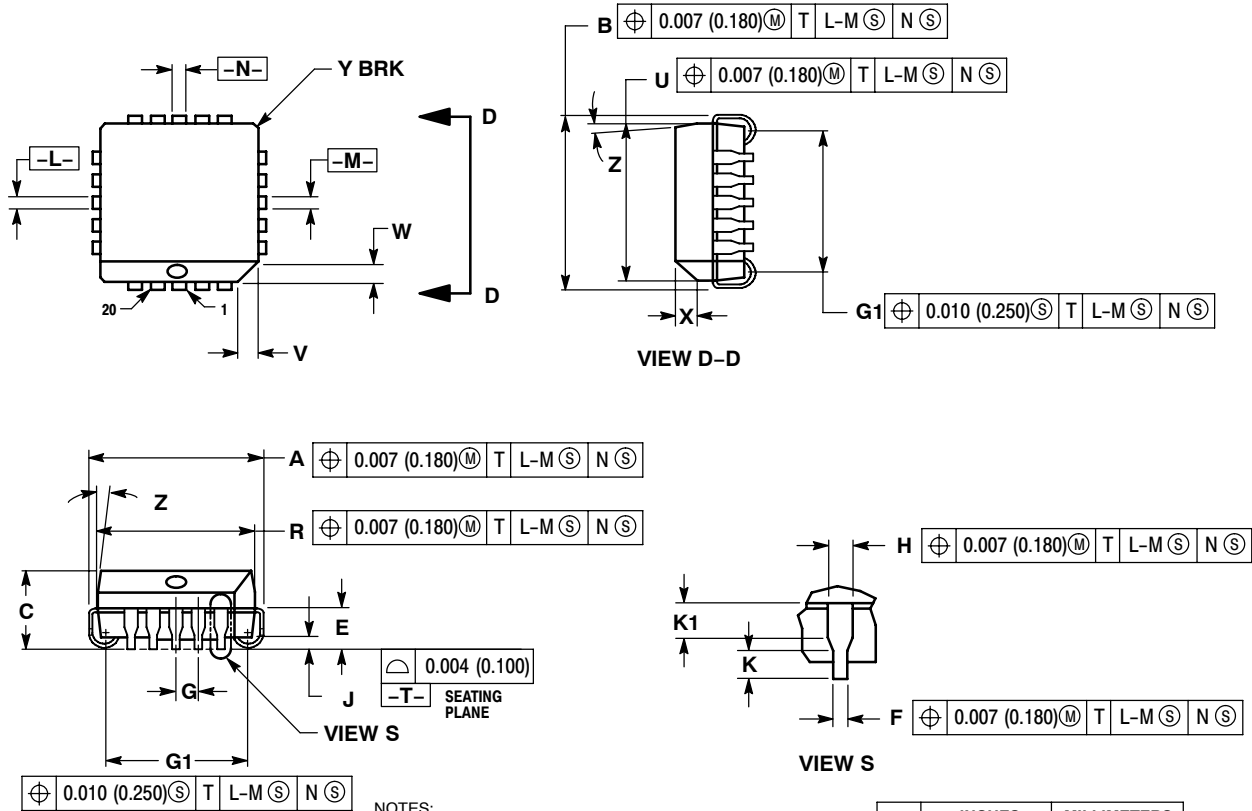
| Device        | Package              | Shipping <sup>†</sup> |
|---------------|----------------------|-----------------------|
| MC10H165FN    | PLLC-20              | 46 Units / Rail       |
| MC10H165FNG   | PLLC-20<br>(Pb-Free) | 46 Units / Rail       |
| MC10H165FNR2  | PLLC-20              | 500 / Tape & Reel     |
| MC10H165FNR2G | PLLC-20<br>(Pb-Free) | 500 / Tape & Reel     |
| MC10H165L     | CDIP-16              | 25 Unit / Rail        |
| MC10H165P     | PDIP-16              | 25 Unit / Rail        |
| MC10H165PG    | 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.

# MC10H165

## PACKAGE DIMENSIONS

20 LEAD PLLC  
CASE 775-02  
ISSUE E



### NOTES:

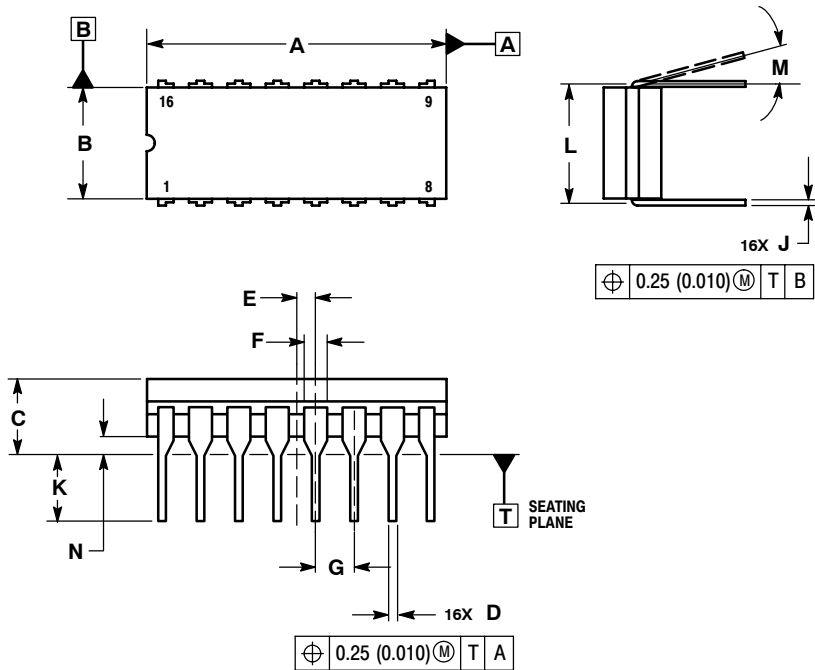
1. DIMENSIONS AND TOLERANCING PER ANSI Y14.5M, 1982.
2. DIMENSIONS IN INCHES.
3. DATUMS -L-, -M-, AND -N- DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
4. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM -T-, SEATING PLANE.
5. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
6. 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.
7. 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        | ---   |

# MC10H165

## PACKAGE DIMENSIONS

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



### NOTES:

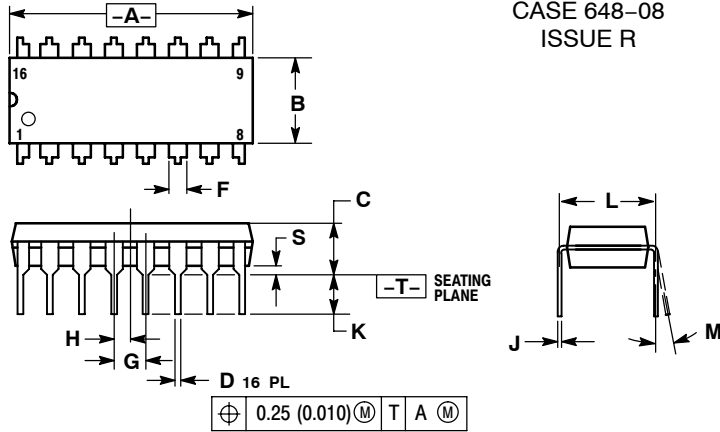
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
4. DIMENSION F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.
5. THIS DRAWING REPLACES OBSOLETE CASE OUTLINE 620-10.

| 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 |       | 1.27 BSC    |       |
| F   | 0.055     | 0.065 | 1.40        | 1.65  |
| G   | 0.100 BSC |       | 2.54 BSC    |       |
| H   | 0.008     | 0.015 | 0.21        | 0.38  |
| K   | 0.125     | 0.170 | 3.18        | 4.31  |
| L   | 0.300 BSC |       | 7.62 BSC    |       |
| M   | 0°        | 15°   | 0°          | 15°   |
| N   | 0.020     | 0.040 | 0.51        | 1.01  |

# MC10H165

## 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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