

## MM74HC259

### 8-Bit Addressable Latch/3-to-8 Line Decoder

#### General Description

The MM74HC259 device utilizes advanced silicon-gate CMOS technology to implement an 8-bit addressable latch, designed for general purpose storage applications in digital systems.

The MM74HC259 has a single data input (D), 8 latch outputs (Q1–Q8), 3 address inputs (A, B, and C), a common enable input ( $\bar{G}$ ), and a common CLEAR input. To operate this device as an addressable latch, data is held on the D input, and the address of the latch into which the data is to be entered is held on the A, B, and C inputs. When ENABLE is taken LOW the data flows through to the addressed output. The data is stored when ENABLE transitions from LOW-to-HIGH. All unaddressed latches will remain unaffected. With enable in the HIGH state the device is deselected, and all latches remain in their previous state, unaffected by changes on the data or address

inputs. To eliminate the possibility of entering erroneous data into the latches, the enable should be held HIGH (inactive) while the address lines are changing.

If enable is held HIGH and CLEAR is taken LOW all eight latches are cleared to a LOW state. If enable is LOW all latches except the addressed latch will be cleared. The addressed latch will instead follow the D input, effectively implementing a 3-to-8 line decoder.

All inputs are protected from damage due to static discharge by diodes to  $V_{CC}$  and ground.

#### Features

- Typical propagation delay: 18 ns
- Wide supply range: 2–6V
- Low input current: 1  $\mu$ A maximum
- Low quiescent current: 80  $\mu$ A maximum (74HC Series)

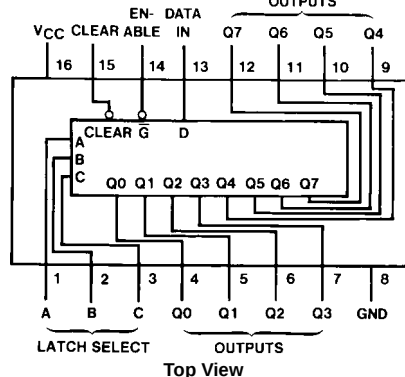
#### Ordering Code:

| Order Number | Package Number | Package Description                                                          |
|--------------|----------------|------------------------------------------------------------------------------|
| MM74HC259M   | M16A           | 16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow |
| MM74HC259SJ  | M16D           | 16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide                |
| MM74HC259MTC | MTC16          | 16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide  |
| MM74HC259N   | N16E           | 16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide       |

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

#### Connection Diagram

Pin Assignments for DIP, SOIC, SOP and TSSOP



#### Latch Selection Table

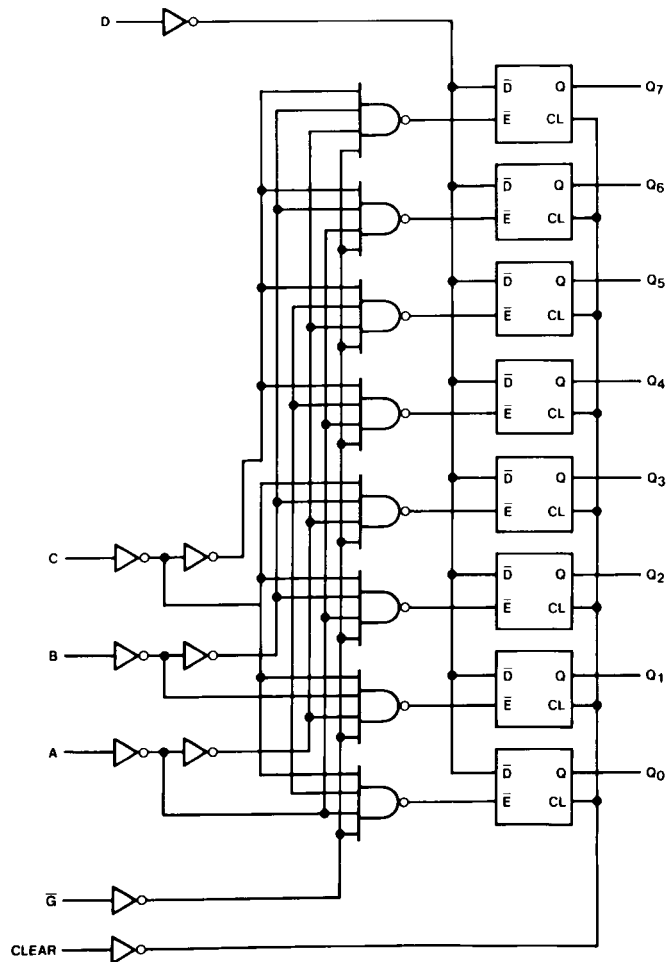
| Select Inputs |   |   | Latch     |
|---------------|---|---|-----------|
| C             | B | A | Addressed |
| L             | L | L | 0         |
| L             | L | H | 1         |
| L             | H | L | 2         |
| L             | H | H | 3         |
| H             | L | L | 4         |
| H             | L | H | 5         |
| H             | H | L | 6         |
| H             | H | H | 7         |

H = HIGH level, L = LOW level  
D = the level at the data input  
Q<sub>i</sub> the level of Q<sub>i</sub> (i = 0, 1...7, as appropriate) before the indicated steady-state input conditions were established.

## Truth Table

| Inputs |                | Outputs of<br>Addressed<br>Latch | Each<br>Other<br>Output | Function          |
|--------|----------------|----------------------------------|-------------------------|-------------------|
| Clear  | $\overline{G}$ |                                  |                         |                   |
| H      | L              | D                                | $Q_{10}$                | Addressable Latch |
| H      | H              | $Q_{10}$                         | $Q_{10}$                | Memory            |
| L      | L              | D                                | L                       | 8-Line Decoder    |
| L      | H              | L                                | L                       | Clear             |

## Logic Diagram



**Absolute Maximum Ratings**(Note 1)

(Note 2)

|                                                  |                       |
|--------------------------------------------------|-----------------------|
| Supply Voltage ( $V_{CC}$ )                      | -0.5 to +7.0V         |
| DC Input Voltage ( $V_{IN}$ )                    | -1.5 to $V_{CC}+1.5V$ |
| DC Output Voltage ( $V_{OUT}$ )                  | -0.5 to $V_{CC}+0.5V$ |
| Clamp Diode Current ( $I_{IK}, I_{OK}$ )         | $\pm 20$ mA           |
| DC Output Current, per pin ( $I_{OUT}$ )         | $\pm 25$ mA           |
| DC $V_{CC}$ or GND Current, per pin ( $I_{CC}$ ) | $\pm 50$ mA           |
| Storage Temperature Range ( $T_{STG}$ )          | -65°C to +150°C       |
| Power Dissipation ( $P_D$ )                      |                       |
| (Note 3)                                         | 600 mW                |
| S.O. Package only                                | 500 mW                |
| Lead Temperature ( $T_L$ )                       |                       |
| (Soldering 10 seconds)                           | 260°C                 |

**Recommended Operating Conditions**

|                                                         | Min | Max      | Units |
|---------------------------------------------------------|-----|----------|-------|
| Supply Voltage ( $V_{CC}$ )                             | 2   | 6        | V     |
| DC Input or Output Voltage ( $V_{IN}, V_{OUT}$ )        | 0   | $V_{CC}$ | V     |
| Operating Temperature Range ( $T_A$ )                   | -40 | +85      | °C    |
| Input Rise or Fall Times ( $t_r, t_f$ ) $V_{CC} = 2.0V$ |     | 1000     | ns    |
| $V_{CC} = 4.5V$                                         |     | 500      | ns    |
| $V_{CC} = 6.0V$                                         |     | 400      | ns    |

**Note 1:** Absolute Maximum Ratings are those values beyond which damage to the device may occur.**Note 2:** Unless otherwise specified all voltages are referenced to ground.**Note 3:** Power Dissipation temperature derating — plastic "N" package: — 12 mW/°C from 65°C to 85°C**DC Electrical Characteristics** (Note 4)

| Symbol          | Parameter                         | Conditions                                                                                                           | V <sub>CC</sub> | T <sub>A</sub> = 25°C |                   | T <sub>A</sub> = –40 to 85°C | T <sub>A</sub> = –55 to 125°C | Units |
|-----------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------|-----------------|-----------------------|-------------------|------------------------------|-------------------------------|-------|
|                 |                                   |                                                                                                                      |                 | Typ                   | Guaranteed Limits |                              |                               |       |
| V <sub>IH</sub> | Minimum HIGH Level Input Voltage  |                                                                                                                      | 2.0V            |                       | 1.5               | 1.5                          | 1.5                           | V     |
|                 |                                   |                                                                                                                      | 4.5V            |                       | 3.15              | 3.15                         | 3.15                          | V     |
|                 |                                   |                                                                                                                      | 6.0V            |                       | 4.2               | 4.2                          | 4.2                           | V     |
| V <sub>IL</sub> | Maximum LOW Level Input Voltage   |                                                                                                                      | 2.0V            |                       | 0.5               | 0.5                          | 0.5                           | V     |
|                 |                                   |                                                                                                                      | 4.5V            |                       | 1.35              | 1.35                         | 1.35                          | V     |
|                 |                                   |                                                                                                                      | 6.0V            |                       | 1.8               | 1.8                          | 1.8                           | V     |
| V <sub>OH</sub> | Minimum HIGH Level Output Voltage | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br> I <sub>OUT</sub>   ≤ 20 μA                                  | 2.0V            | 2.0                   | 1.9               | 1.9                          | 1.9                           | V     |
|                 |                                   |                                                                                                                      | 4.5V            | 4.5                   | 4.4               | 4.4                          | 4.4                           | V     |
|                 |                                   |                                                                                                                      | 6.0V            | 6.0                   | 5.9               | 5.9                          | 5.9                           | V     |
|                 |                                   | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br> I <sub>OUT</sub>   ≤ 4.0 mA<br> I <sub>OUT</sub>   ≤ 5.2 mA | 4.5V            | 4.2                   | 3.98              | 3.84                         | 3.7                           | V     |
|                 |                                   |                                                                                                                      | 6.0V            | 5.7                   | 5.48              | 5.34                         | 5.2                           | V     |
|                 |                                   |                                                                                                                      |                 |                       |                   |                              |                               |       |
| V <sub>OL</sub> | Maximum LOW Level Output Voltage  | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br> I <sub>OUT</sub>   ≤ 20 μA                                  | 2.0V            | 0                     | 0.1               | 0.1                          | 0.1                           | V     |
|                 |                                   |                                                                                                                      | 4.5V            | 0                     | 0.1               | 0.1                          | 0.1                           | V     |
|                 |                                   |                                                                                                                      | 6.0V            | 0                     | 0.1               | 0.1                          | 0.1                           | V     |
|                 |                                   | V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub><br> I <sub>OUT</sub>   ≤ 4.0 mA<br> I <sub>OUT</sub>   ≤ 5.2 mA | 4.5V            | 0.2                   | 0.26              | 0.33                         | 0.4                           | V     |
|                 |                                   |                                                                                                                      | 6.0V            | 0.2                   | 0.26              | 0.33                         | 0.4                           | V     |
|                 |                                   |                                                                                                                      |                 |                       |                   |                              |                               |       |
| I <sub>IN</sub> | Maximum Input Current             | V <sub>IN</sub> = V <sub>CC</sub> or GND                                                                             | 6.0V            |                       | ±0.1              | ±1.0                         | ±1.0                          | μA    |
| I <sub>CC</sub> | Maximum Quiescent Supply Current  | V <sub>IN</sub> = V <sub>CC</sub> or GND<br>I <sub>OUT</sub> = 0 μA                                                  | 6.0V            |                       | 8.0               | 80                           | 160                           | μA    |

**Note 4:** For a power supply of 5V  $\pm 10\%$  the worst case output voltages ( $V_{OH}$ , and  $V_{OL}$ ) occur for HC at 4.5V. Thus the 4.5V values should be used when designing with this supply. Worst case  $V_{IH}$  and  $V_{IL}$  occur at  $V_{CC}=5.5V$  and 4.5V respectively. (The  $V_{IH}$  value at 5.5V is 3.85V.) The worst case leakage current ( $I_{IN}$ ,  $I_{CC}$ , and  $I_{OZ}$ ) occur for CMOS at the higher voltage and so the 6.0V values should be used.

## AC Electrical Characteristics

( $V_{CC} = 5.0V$ ,  $T_A = 25^\circ C$ ,  $t_r = t_f = 6$  ns,  $C_L = 15$  pF unless otherwise specified.)

| Symbol             | Parameter                                      | Conditions | Typ | Guaranteed Limit | Units |
|--------------------|------------------------------------------------|------------|-----|------------------|-------|
| $t_{PHL}, t_{PLH}$ | Maximum Propagation Delay<br>Data to Output    |            | 18  | 32               | ns    |
| $t_{PHL}, t_{PLH}$ | Maximum Propagation Delay<br>Select to Output  |            | 20  | 38               | ns    |
| $t_{PHL}, t_{PLH}$ | Maximum Propagation Delay<br>Enable to Output  |            | 20  | 35               | ns    |
| $t_{PHL}$          | Maximum Propagation Delay<br>Clear to Output   |            | 17  | 27               | ns    |
| $t_W$              | Minimum Enable Pulse Width                     |            | 10  | 16               | ns    |
| $t_W$              | Minimum Clear Pulse Width                      |            | 10  | 16               | ns    |
| $t_r, t_f$         | Maximum Input Rise and Fall Time               |            |     | 500              | ns    |
| $t_s$              | Minimum Setup Time Select or<br>Data to Enable |            | 15  | 20               | ns    |
| $t_H$              | Minimum Hold Time Data or<br>Address to Enable |            | -2  | 0                | ns    |

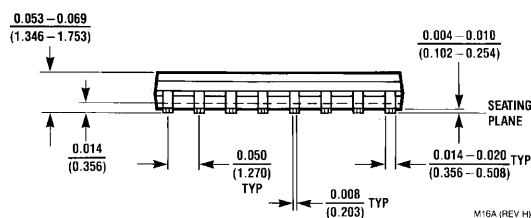
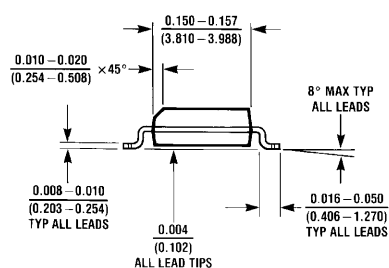
## AC Electrical Characteristics

$t_r = t_f = 6$  ns,  $C_L = 50$  pF,  $V_{CC} = 2.0V - 6.0V$

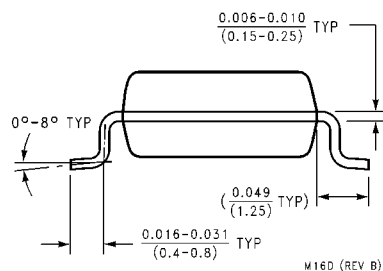
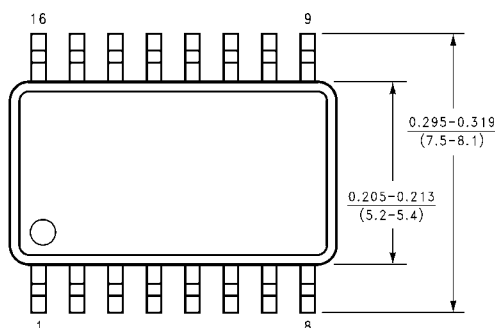
| Symbol                              | Parameter                                       | Conditions    | V <sub>CC</sub> | T <sub>A</sub> = 25°C |                   | T <sub>A</sub> = −40 to 85°C | T <sub>A</sub> = −55 to 125°C | Units |
|-------------------------------------|-------------------------------------------------|---------------|-----------------|-----------------------|-------------------|------------------------------|-------------------------------|-------|
|                                     |                                                 |               |                 | Typ                   | Guaranteed Limits |                              |                               |       |
| t <sub>PHL</sub> , t <sub>PLH</sub> | Maximum Propagation Delay<br>Data to Output     |               | 2.0V            | 60                    | 180               | 225                          | 250                           | ns    |
|                                     |                                                 |               | 4.5V            | 19                    | 37                | 46                           | 52                            | ns    |
|                                     |                                                 |               | 6.0V            | 17                    | 32                | 40                           | 45                            | ns    |
| t <sub>PHL</sub> , t <sub>PLH</sub> | Maximum Propagation Delay<br>Select to Output   |               | 2.0V            | 72                    | 220               | 275                          | 310                           | ns    |
|                                     |                                                 |               | 4.5V            | 21                    | 43                | 54                           | 60                            | ns    |
|                                     |                                                 |               | 6.0V            | 18                    | 37                | 46                           | 52                            | ns    |
| t <sub>PHL</sub> , t <sub>PLH</sub> | Maximum Propagation Delay<br>Enable to Output   |               | 2.0V            | 65                    | 200               | 250                          | 280                           | ns    |
|                                     |                                                 |               | 4.5V            | 27                    | 40                | 50                           | 58                            | ns    |
|                                     |                                                 |               | 6.0V            | 23                    | 35                | 44                           | 50                            | ns    |
| t <sub>PHL</sub>                    | Maximum Propagation Delay<br>Clear to Output    |               | 2.0V            | 50                    | 150               | 190                          | 210                           | ns    |
|                                     |                                                 |               | 4.5V            | 18                    | 31                | 39                           | 44                            | ns    |
|                                     |                                                 |               | 6.0V            | 16                    | 26                | 32                           | 37                            | ns    |
| t <sub>W</sub>                      | Minimum Pulse Width<br>Clear or Enable          |               | 2.0V            |                       | 80                | 100                          | 120                           | ns    |
|                                     |                                                 |               | 4.5V            |                       | 16                | 20                           | 24                            | ns    |
|                                     |                                                 |               | 6.0V            |                       | 14                | 18                           | 20                            | ns    |
| t <sub>S</sub>                      | Minimum Setup Time Address<br>or Data to Enable |               | 2.0V            |                       | 100               | 125                          | 150                           | ns    |
|                                     |                                                 |               | 4.5V            |                       | 20                | 25                           | 28                            | ns    |
|                                     |                                                 |               | 6.0V            |                       | 15                | 19                           | 25                            | ns    |
| t <sub>H</sub>                      | Minimum Hold Time Address<br>or Data to Enable  |               | 2.0V            | −10                   | 0                 | 0                            | 0                             | ns    |
|                                     |                                                 |               | 4.5V            | −2                    | 0                 | 0                            | 0                             | ns    |
|                                     |                                                 |               | 6.0V            | −2                    | 0                 | 0                            | 0                             | ns    |
| t <sub>TLH</sub> , t <sub>THL</sub> | Maximum Output Rise<br>and Fall Time            |               | 2.0V            | 30                    | 75                | 95                           | 110                           | ns    |
|                                     |                                                 |               | 4.5V            | 8                     | 15                | 19                           | 22                            | ns    |
|                                     |                                                 |               | 6.0V            | 7                     | 13                | 16                           | 19                            | ns    |
| C <sub>IN</sub>                     | Input Capacitance                               |               |                 | 5                     | 10                | 10                           | 10                            | pF    |
| C <sub>PD</sub>                     | Power Dissipation<br>Capacitance (Note 5)       | (per package) |                 | 80                    |                   |                              |                               | pF    |

**Note 5:**  $C_{PD}$  determines the no load dynamic power consumption,  $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$ , and the no load dynamic current consumption,  $I_S = C_{PD} S V_{CC} f + I_{CC}$ .

**Physical Dimensions** inches (millimeters) unless otherwise noted

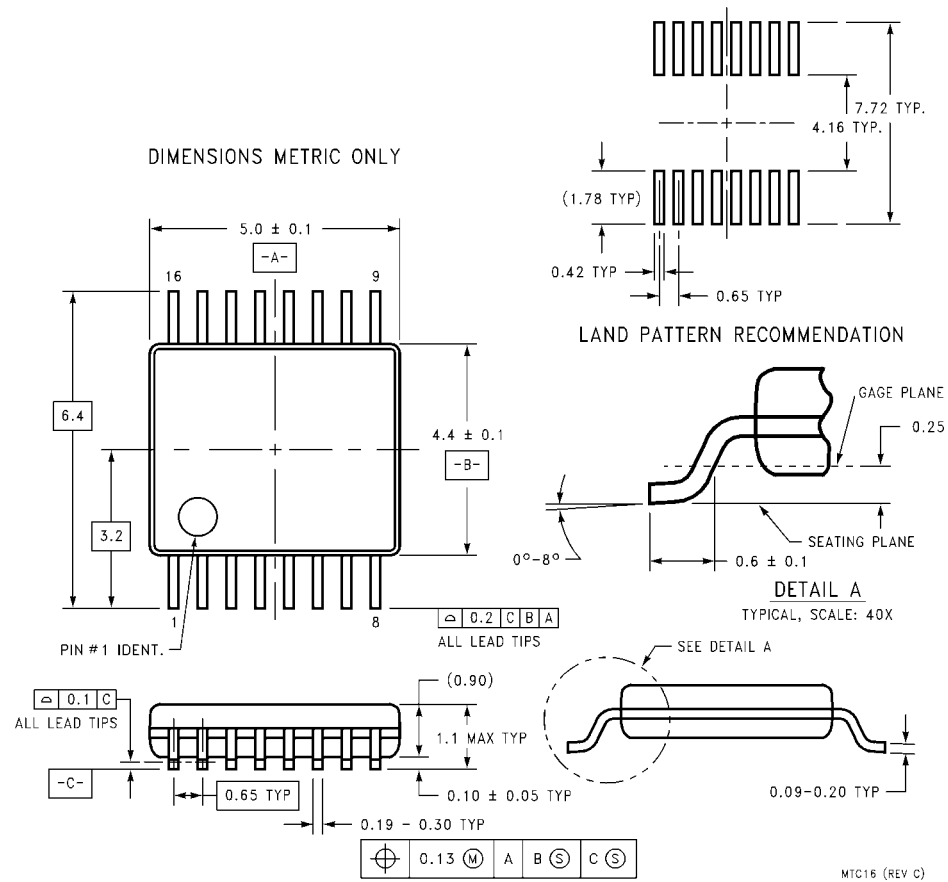


**16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow  
Package Number M16A**

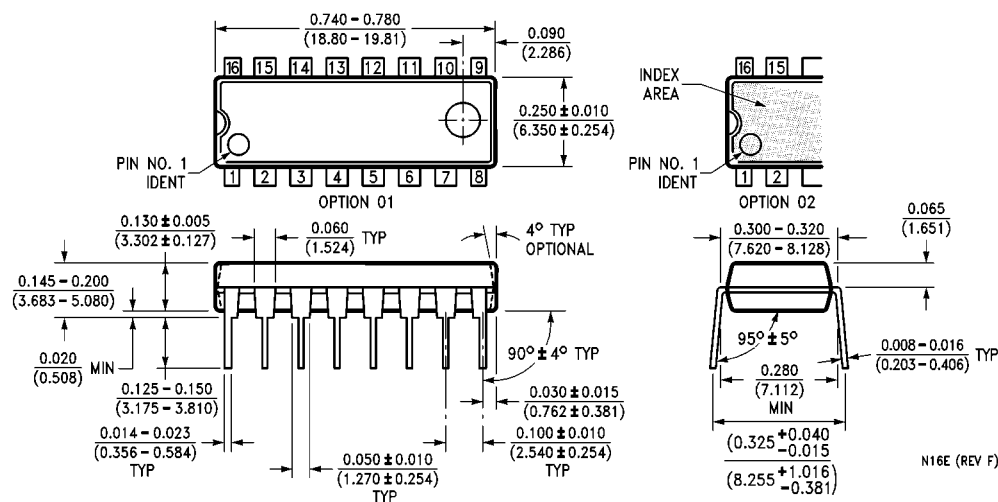


**16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide  
Package Number M16D**

# Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



# Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide Package Number N16E

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