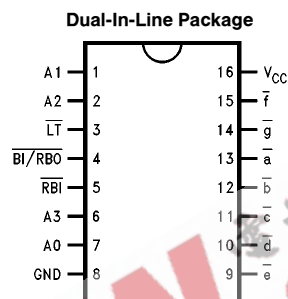


## DM54LS447/DM74LS447 BCD to 7-Segment Decoder/Driver with Open-Collector Outputs

### General Description

The 'LS447 is the same as the 'LS247 except that the Output OFF Voltage,  $V_{OH}$  is specified as 7.0V rather than 15V, with the same  $I_{OH}$  limit of 250  $\mu A$ . For all other information please refer to the 'LS247 data sheet.

### Connection Diagram



TL/F/10187-1

Order Number DM54LS447J, DM54LS447W, DM74LS447M or DM74LS447N  
See NS Package Number J16A, M16A, N16E or W16A

DM54LS447/DM74LS447 BCD to 7-Segment Decoder/Driver with Open-Collector Outputs

### Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

|                                      |                 |
|--------------------------------------|-----------------|
| Supply Voltage                       | 7V              |
| Input Voltage                        | 7V              |
| Operating Free Air Temperature Range |                 |
| DM54LS                               | −55°C to +125°C |
| DM74LS                               | 0°C to +70°C    |
| Storage Temperature Range            | −65°C to +150°C |

Note: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

### Recommended Operating Conditions

| Symbol          | Parameter                                                    | DM54LS447 |     |     | DM74LS447 |     |      | Units |
|-----------------|--------------------------------------------------------------|-----------|-----|-----|-----------|-----|------|-------|
|                 |                                                              | Min       | Nom | Max | Min       | Nom | Max  |       |
| V <sub>CC</sub> | Supply Voltage                                               | 4.5       | 5   | 5.5 | 4.75      | 5   | 5.25 | V     |
| V <sub>IH</sub> | High Level Input Voltage                                     | 2         |     |     | 2         |     |      | V     |
| V <sub>IL</sub> | Low Level Input Voltage                                      |           |     | 0.7 |           |     | 0.8  | V     |
| I <sub>OH</sub> | High Level Output Current ( $\overline{BI}/\overline{RBO}$ ) |           |     | −50 |           |     | −50  | μA    |
| I <sub>OL</sub> | Low Level Output Current                                     |           |     | 12  |           |     | 24   | mA    |
| T <sub>A</sub>  | Free Air Operating Temperature                               | −55       |     | 125 | 0         |     | 70   | °C    |

### Electrical Characteristics over recommended operating free air temperature range (unless otherwise noted)

| Symbol           | Parameter                         | Conditions                                                                                                | Min                                   | Typ<br>(Note 1) | Max  | Units |
|------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------|-----------------|------|-------|
| V <sub>I</sub>   | Input Clamp Voltage               | V <sub>CC</sub> = Min, I <sub>I</sub> = −18 mA                                                            |                                       |                 | −1.5 | V     |
| V <sub>OH</sub>  | High Level Output Voltage         | V <sub>CC</sub> = Min, I <sub>OH</sub> = Max,<br>V <sub>IL</sub> = Max ( $\overline{BI}/\overline{RBO}$ ) | DM54<br>2.4                           |                 |      | V     |
|                  |                                   |                                                                                                           | DM74<br>2.4                           | 3.4             |      |       |
| I <sub>OFF</sub> | High Level Output Current         | Segment Outputs, V <sub>O</sub> = 7.0V ( $\overline{a}-\overline{g}$ )                                    |                                       |                 | 250  | μA    |
| V <sub>OL</sub>  | Low Level Output Voltage          | V <sub>CC</sub> Min, I <sub>OL</sub> = Max,<br>V <sub>IH</sub> = Min                                      | DM54<br>0.4                           |                 | 0.4  | V     |
|                  |                                   | I <sub>OL</sub> = 12 mA, V <sub>CC</sub> = Min                                                            | DM74<br>0.25                          | 0.35            | 0.5  |       |
| I <sub>I</sub>   | Input Current @ Max Input Voltage | V <sub>CC</sub> = Max, V <sub>I</sub> = 7V<br>V <sub>I</sub> = 10V (DM54)                                 |                                       |                 | 0.1  | mA    |
| I <sub>IH</sub>  | High Level Input Current          | V <sub>CC</sub> = Max, V <sub>I</sub> = 2.7V                                                              |                                       |                 | 20   | μA    |
| I <sub>IL</sub>  | Low Level Input Current           | V <sub>CC</sub> = Max, V <sub>I</sub> = 0.4V                                                              | Others                                |                 | −0.4 | mA    |
|                  |                                   |                                                                                                           | $\overline{BI}/\overline{RBO}$ Inputs |                 | −1.2 | mA    |
| I <sub>OS</sub>  | Short Circuit Output Current      | V <sub>CC</sub> = Max<br>(Note 2)                                                                         | DM54<br>−0.3                          |                 | −2.0 | mA    |
|                  |                                   |                                                                                                           | DM74<br>−0.3                          |                 | −2.0 |       |
| I <sub>CC</sub>  | Supply Current                    | V <sub>CC</sub> = Max                                                                                     |                                       |                 | 13   | mA    |

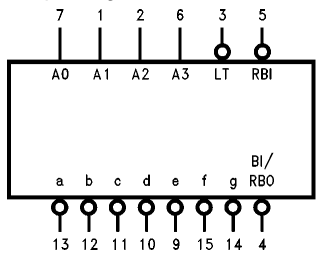
Note 1: All typicals are at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.

Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.

### Switching Characteristics at V<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C

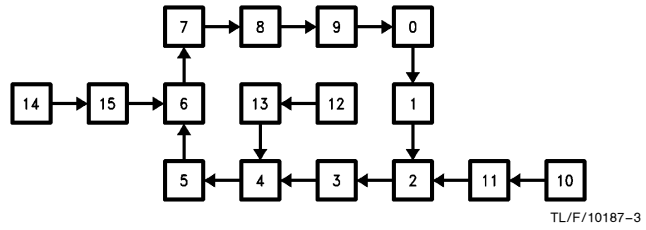
| Symbol                               | Parameter         | R <sub>L</sub> = 2 kΩ, C <sub>L</sub> = 15 pF |            | Units |
|--------------------------------------|-------------------|-----------------------------------------------|------------|-------|
|                                      |                   | Min                                           | Max        |       |
| t <sub>PLH</sub><br>t <sub>PHL</sub> | Propagation Delay |                                               | 100<br>100 | ns    |

## Logic Symbol



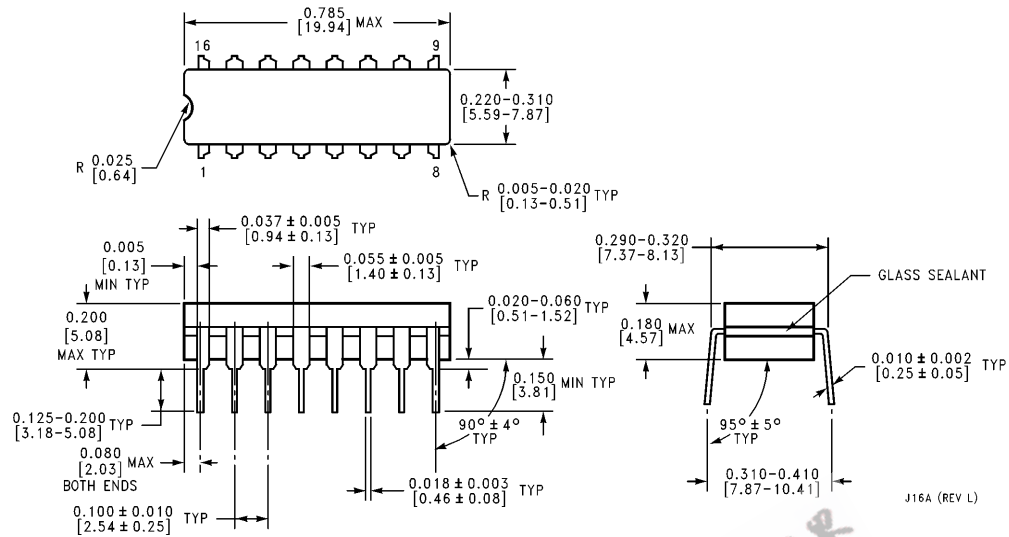
$V_{CC}$  = Pin 16  
GND = Pin 8

## State Diagram

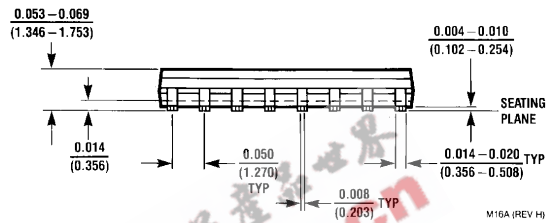
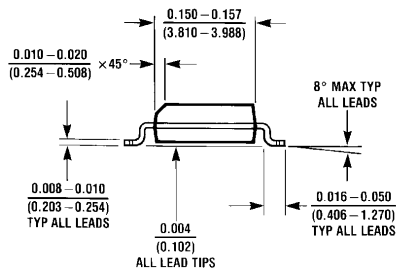
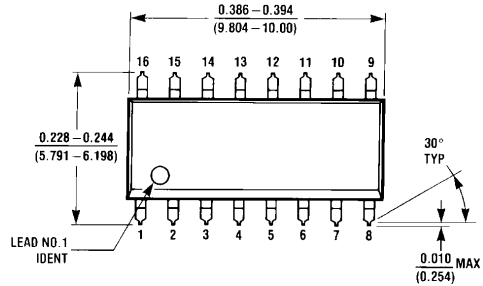


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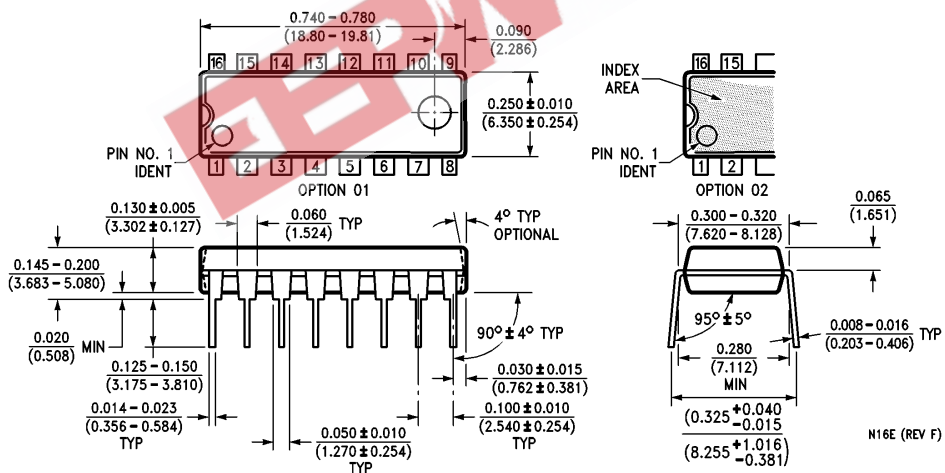
## Physical Dimensions inches (millimeters)



# Physical Dimensions inches (millimeters) (Continued)

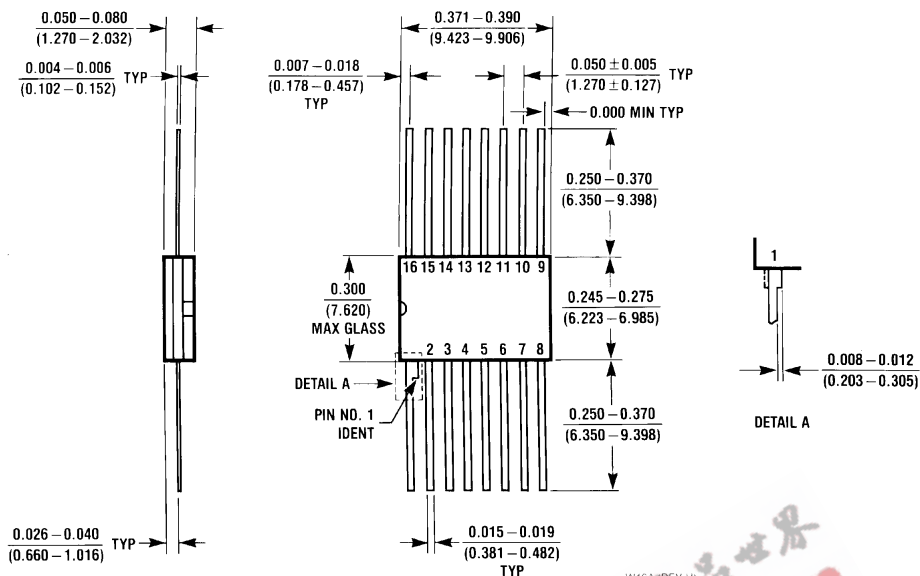


**16-Lead Small Outline Molded Package (M)**  
**Order Number DM74LS447M**  
**NS Package Number M16A**



**16-Lead Molded Dual-In-Line Package (N)**  
**Order Number DM74LS447N**  
**NS Package Number N16E**

## Physical Dimensions inches (millimeters) (Continued)



**16-Lead Ceramic Flat Package (W)**  
**Order Number DM54LS447W**  
**NS Package Number W16A**

### LIFE SUPPORT POLICY

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



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