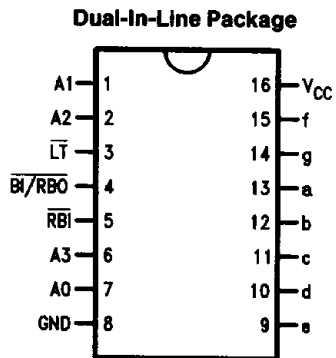


54LS248/DM74LS248 BCD to 7-Segment Decoder (with 2 kΩ Pull-Up Resistors)

General Description

The 'LS248 has active HIGH outputs with internal 2 kΩ pull-up resistors. It has the same electrical characteristics and pin connections as the 'LS48. The only difference is that the 'LS248 will light the top bar (segment a) for numeral 6 and the bottom bar (segment d) for numeral 9. For detailed description and specifications please refer to the 'LS48 data sheet.

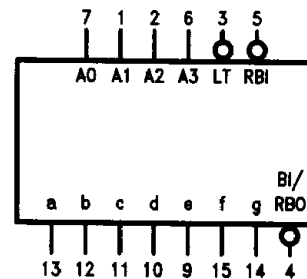
Connection Diagram



TL/F/10181-1

**Order Number 54LS248DMQB, 54LS248FMQB,
DM74LS248M or DM74LS248N
See NS Package Number J16A, M16A, N16E or W16A**

Logic Symbol



V_{CC} = Pin 16
GND = Pin 8

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| Pin Names | Description |
|---------------------|---|
| A0-A3 | BCD Inputs |
| \overline{RBI} | Ripple Blanking Input (Active LOW) |
| \overline{LT} | Lamp Test Input (Active LOW) |
| $\overline{BI/RBO}$ | Blanking Input (Active LOW) or Ripple Blanking Output (Active LOW) |
| a-g | Segment Outputs (Active HIGH) |

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 | |
| 54LS | -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 | 54LS248 | | | DM74LS248 | | | Units |
|-----------------|--------------------------------|---------|-----|------|-----------|-----|------|-------|
| | | Min | Nom | Max | Min | Nom | Max | |
| V _{CC} | Supply Voltage | 4.5 | 5 | 5.5 | 4.75 | 5 | 5.25 | V |
| V _{IH} | High Level Input Voltage | 2 | | | 2 | | | V |
| V _{IL} | Low Level Input Voltage | | | 0.7 | | | 0.8 | V |
| I _{OH} | High Level Output Current | | | -0.1 | | | -0.1 | mA |
| I _{OL} | Low Level Output Current | | | 2 | | | 6 | mA |
| T _A | 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 (Note 1) | Max | Units |
|------------------|-----------------------------------|---|------|--------------|------|-------|
| V _I | Input Clamp Voltage | V _{CC} = Min, I _I = -18 mA | | | -1.5 | V |
| V _{OH} | High Level Output Voltage | V _{CC} = Min, I _{OH} = Max, V _{IL} = Max | 54LS | 2.4 | | V |
| | | | DM74 | 2.4 | | |
| V _{OL} | Low Level Output Voltage | V _{CC} = Min, I _{OL} = Max, V _{IH} = Min | 54LS | | 0.4 | V |
| | | | DM74 | | 0.5 | |
| | | I _{OL} = 3.2 mA, V _{CC} = Min | DM74 | | 0.4 | |
| I _I | Input Current @ Max Input Voltage | V _{CC} = Max, V _I = 10V | | | 0.1 | mA |
| I _{IH} | High Level Input Current | V _{CC} = Max, V _I = 2.7V | | | 20 | μA |
| I _{IL} | Low Level Input Current | V _{CC} = Max, V _I = 0.4V | | | -0.4 | mA |
| I _{OS} | Short Circuit Output Current | V _{CC} = Max (Note 2) | 54LS | -0.3 | -2.0 | mA |
| | | | DM74 | -0.3 | -2.0 | |
| I _{CC} | Supply Current | V _{CC} = Max | | | 38 | mA |
| I _{OFF} | Output High Current | Segment Inputs, V _O = 0.85V | -1.3 | | | μA |

Note 1: All typicals are at V_{CC} = 5V, T_A = 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 $V_{CC} = +5.0V$, $T_A = +25^{\circ}C$ (See Section 1 for waveforms and load configurations)

| Symbol | Parameter | $R_L = 2\text{ k}\Omega$, $C_L = 15\text{ pF}$ | | Units |
|-----------|--|---|-----|-------|
| | | Min | Max | |
| t_{PLH} | Propagation Delay Time Low to High Level Output | | 100 | ns |
| t_{PHL} | Propagation Delay Time High to Low Level Output | | 100 | ns |