



SN74LS247

BCD-to-Seven-Segment Decoders/Drivers

The SN74LS247 is a BCD-to-Seven-Segment Decoder/Drivers.

The LS247 composes the  and  with the tails. The LS247 has active-low outputs for direct drive of indicators.

The LS247 features a lamp test input and have full ripple-blanking input/output controls. An automatic leading and/or trailing-edge zero-blanking control (RBI and RBO) is incorporated and an overriding blanking input (BI) is contained which may be used to control the lamp intensity by pulsing or to inhibit the output's lamp test may be performed at any time when the BI/RBO node is at high level. Segment identification and resultant displays are shown below. Display pattern for BCD input counts above 9 are unique symbols to authenticate input conditions.

- Open-Collector Outputs Drive Indicators Directly
- Lamp-Test Provision
- Leading/Trailing Zero Suppression

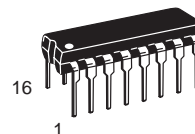
GUARANTEED OPERATING RANGES

| Symbol | Parameter | Min | Typ | Max | Unit |
|--------------|-------------------------------------|------|-----|------|---------|
| V_{CC} | Supply Voltage | 4.75 | 5.0 | 5.25 | V |
| T_A | Operating Ambient Temperature Range | 0 | 25 | 70 | °C |
| I_{OH} | Output Current – High BI/RBO | | | -50 | μ A |
| I_{OL} | Output Current – Low BI/RBO | | | 3.2 | mA |
| $V_{O(off)}$ | Off-State Output Voltage a – g | | | 15 | V |
| $I_{O(on)}$ | On-State Output Current a – g | | | 24 | mA |

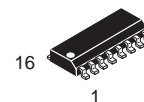


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LOW POWER SCHOTTKY



PLASTIC
N SUFFIX
CASE 648



SOIC
D SUFFIX
CASE 751B

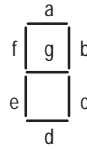
ORDERING INFORMATION

| Device | Package | Shipping |
|------------|------------|------------------|
| SN74LS247N | 16 Pin DIP | 2000 Units/Box |
| SN74LS247D | 16 Pin | 2500/Tape & Reel |

SN74LS247

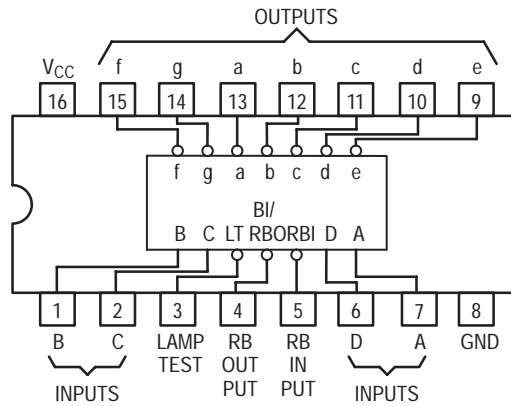


NUMERICAL DESIGNATIONS AND RESULTANT DISPLAYS



SEGMENT IDENTIFICATION

SN74LS247
(TOP VIEW)



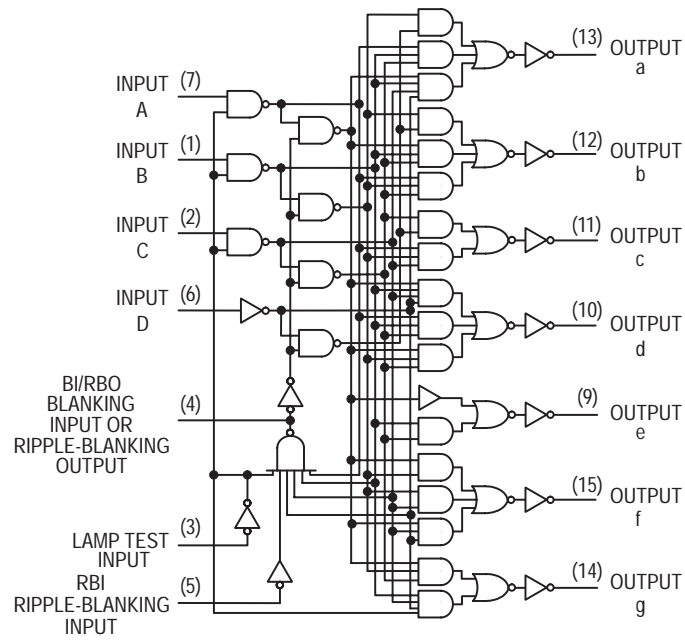
CIRCUIT FEATURES LAMP INTENSITY MODULATION CAPABILITY

| TYPE | DRIVER OUTPUTS | | | | TYPICAL POWER DISSIPATION |
|-----------|----------------|----------------------|--------------|-------------|---------------------------|
| | ACTIVE LEVEL | OUTPUT CONFIGURATION | SINK CURRENT | MAX VOLTAGE | |
| SN74LS247 | low | open-collector | 24 mA | 15 V | 35 mW |

SN74LS247

LOGIC DIAGRAM

LS247



SN74LS247

LS247 FUNCTION TABLE

| DECIMAL OR FUNCTION | INPUTS | | | | | | BI/RBO [†] | OUTPUTS | | | | | | | NOTE |
|---------------------------|--------|-----|---|---|---|---|---------------------|---------|-----|-----|-----|-----|-----|-----|------|
| | LT | RBI | D | C | B | A | | a | b | c | d | e | f | g | |
| 0 | H | H | L | L | L | L | H | ON | ON | ON | ON | ON | ON | OFF | 1 |
| 1 | H | X | L | L | L | H | H | OFF | ON | ON | OFF | OFF | OFF | OFF | |
| 2 | H | X | L | L | H | L | H | ON | ON | OFF | ON | ON | OFF | ON | |
| 3 | H | X | L | L | H | H | H | ON | ON | ON | ON | OFF | OFF | ON | |
| 4 | H | X | L | H | L | L | H | OFF | ON | ON | OFF | OFF | ON | ON | |
| 5 | H | X | L | H | L | H | H | ON | OFF | ON | ON | OFF | ON | ON | |
| 6 | H | X | L | H | H | L | H | ON | OFF | ON | ON | ON | ON | ON | |
| 7 | H | X | L | H | H | H | H | ON | ON | ON | OFF | OFF | OFF | OFF | |
| 8 | H | X | H | L | L | L | H | ON | ON | ON | ON | ON | ON | ON | |
| 9 | H | X | H | L | L | H | H | ON | ON | ON | ON | OFF | ON | ON | |
| 10 | H | X | H | L | H | L | H | OFF | OFF | OFF | ON | ON | OFF | ON | |
| 11 | H | X | H | L | H | H | H | OFF | OFF | ON | ON | OFF | OFF | ON | |
| 12 | H | X | H | H | L | L | H | OFF | ON | OFF | OFF | OFF | ON | ON | |
| 13 | H | X | H | H | L | H | H | ON | OFF | OFF | ON | OFF | ON | ON | |
| 14 | H | X | H | H | H | L | H | OFF | OFF | OFF | ON | ON | ON | ON | |
| 15 | H | X | H | H | H | H | H | OFF | OFF | OFF | OFF | OFF | OFF | OFF | |
| BI | X | X | X | X | X | X | L | OFF | OFF | OFF | OFF | OFF | OFF | OFF | 2 |
| RBI | H | L | L | L | L | L | L | OFF | OFF | OFF | OFF | OFF | OFF | OFF | 3 |
| LT | L | X | X | X | X | X | H | ON | ON | ON | ON | ON | ON | ON | 4 |

H = HIGH Level, L = LOW Level, X = Irrelevant

NOTES: 1. The blanking input (BI) must be open or held at a high logic level when output functions 0 through 15 are desired. The ripple-blanking input (RBI) must be open or high if blanking of a decimal zero is not desired.

2. When a low logic level is applied directly to the blanking input (BI), all segment outputs are off regardless of the level of any other input.

3. When ripple-blanking input (RBI) and inputs A, B, C, and D are at a low level with the lamp test input high, all segment outputs go off and the ripple-blanking output (RBO) goes to a low level (response condition).

4. When the blanking input/ripple blanking output (BI/RBO) is open or held high and a low is applied to the lamp-test input, all segment outputs are on.

[†] BI/RBO is wire-AND logic serving as blanking input (BI) and/or ripple-blanking output (RBO).

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DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

| Symbol | Parameter | Limits | | | Unit | Test Conditions |
|---------------------|---|--------|-------|------|------|---|
| | | Min | Typ | Max | | |
| V _{IH} | Input HIGH Voltage | 2.0 | | | V | Guaranteed Input HIGH Voltage for All Inputs |
| V _{IL} | Input LOW Voltage | | | 0.8 | V | Guaranteed Input LOW Voltage for All Inputs |
| V _{IK} | Input Clamp Diode Voltage | | -0.65 | -1.5 | V | V _{CC} = MIN, I _{IN} = -18 mA |
| V _{OH} | Output HIGH Voltage BI/RBO | 2.4 | 4.2 | | V | V _{CC} = MIN, I _{OH} = MAX, V _{IN} = V _{IH} or V _{IL} per Truth Table |
| V _{OL} | Output LOW Voltage BI/RBO | | 0.25 | 0.4 | V | I _{OL} = 1.6 mA V _{CC} = V _{CC} MIN, V _{IN} = V _{IL} or V _{IH} per Truth Table |
| | | | 0.35 | 0.5 | V | |
| I _{O(off)} | Off-State Output Current a-g | | | 250 | μA | V _{CC} = MAX, V _{IH} = 2.0 V, V _{O(off)} = 15 V, V _{IL} = MAX |
| V _{O(on)} | On-State Output Voltage a-g | | 0.25 | 0.4 | V | I _{O(on)} = 12 mA V _{CC} = MIN, V _{IH} = 2.0 V, V _{IL} per Truth Table |
| | | | 0.35 | 0.5 | V | |
| I _{IH} | Input HIGH Current | | | 20 | μA | V _{CC} = MAX, V _{IN} = 2.7 V |
| | | | | 0.1 | mA | V _{CC} = MAX, V _{IN} = 7.0 V |
| I _{IL} | Input LOW Current Any Input, except BI/RBO BI/RBO | | | -0.4 | mA | V _{CC} = MAX, V _{IN} = 0.4 V |
| | | | | -1.2 | | |
| I _{OS} | Short Circuit Current BI/RBO (Note 1) | -0.3 | | -2.0 | mA | V _{CC} = MAX |
| I _{CC} | Power Supply Current | | 7.0 | 13 | mA | V _{CC} = MAX |

Note 1: Not more than one output should be shorted at a time, nor for more than 1 second.

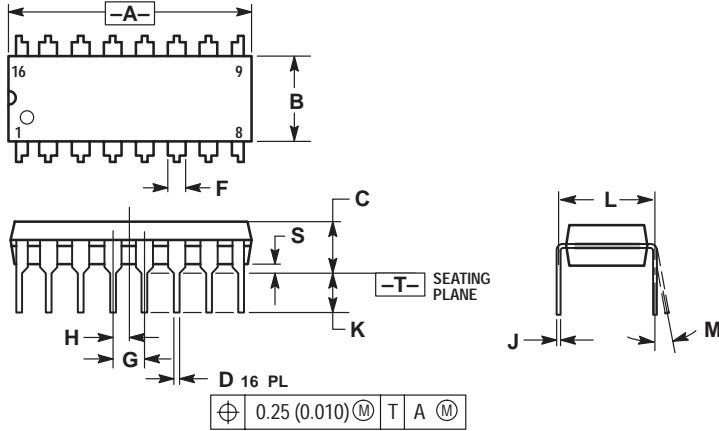
AC CHARACTERISTICS (V_{CC} = 5.0 V, T_A = 25°C)

| Symbol | Parameter | Limits | | | Unit | Test Conditions |
|--------------------------------------|---|--------|-----|------------|------|---|
| | | Min | Typ | Max | | |
| t _{PLH} t _{PHL} | Turn-Off Time from A Input Turn-On Time from A Input | | | 100 100 | ns | C _L = 15 pF, R _L = 665 Ω |
| t _{PHL} t _{PLH} | Turn-Off Time from RBI Input Turn-On Time from RBI Input | | | 100 100 | | |

SN74LS247

PACKAGE DIMENSIONS

N SUFFIX
PLASTIC PACKAGE
CASE 648-08
ISSUE R



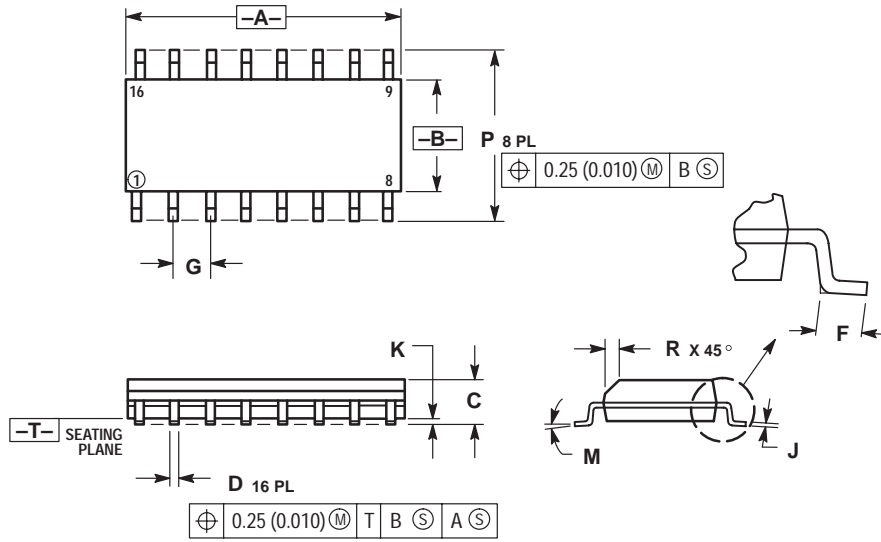
NOTES:

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 |

SN74LS247


D SUFFIX PLASTIC SOIC PACKAGE CASE 751B-05 ISSUE J



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|-------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 9.80 | 10.00 | 0.386 | 0.393 |
| B | 3.80 | 4.00 | 0.150 | 0.157 |
| C | 1.35 | 1.75 | 0.054 | 0.068 |
| D | 0.35 | 0.49 | 0.014 | 0.019 |
| F | 0.40 | 1.25 | 0.016 | 0.049 |
| G | 1.27 BSC | | 0.050 BSC | |
| J | 0.19 | 0.25 | 0.008 | 0.009 |
| K | 0.10 | 0.25 | 0.004 | 0.009 |
| M | 0° 7° | | 0° 7° | |
| P | 5.80 | 6.20 | 0.229 | 0.244 |
| R | 0.25 | 0.50 | 0.010 | 0.019 |

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