



ELECTRONICS, INC.
 44 FARRAND STREET
 BLOOMFIELD, NJ 07003
 (973) 748-5089
<http://www.nteinc.com>

NTE74LS47 Integrated Circuit TTL – BCD–to–Seven–Segment Decoder/Driver with Open Collector Outputs

Description:

The NTE74LS47 is a BCD–to–Seven–Segment Decoder/Driver in a 16–Lead plastic DIP type package that features active–low outputs designed for driving common–anode VLEDs or incandescent indicators directly. This device has full ripple–blinking input/output controls and a lamp test input. Display patterns for BCD input count above 9 are unique symbols to authenticate input conditions.

The NTE74LS47 incorporates automatic leading and/or trailing–edge zero–blinking control (\overline{RBI} and \overline{RBO}). Lamp test (\overline{LT}) may be performed at any time when the $\overline{BI/RBO}$ node is set at a high level. This device also contains an overriding blanking input (\overline{BI}) which can be used to control the lamp intensity by pulsing or to inhibit the outputs. Inputs and outputs are entirely compatible for use with TTL logic outputs.

Features:

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

Absolute Maximum Ratings: (Note 1)

| | |
|--|-----------------|
| Supply Voltage, V_{CC} | 7V |
| Input Voltage | 7V |
| Peak Output Current ($t_w \leq 1\text{ms}$, Duty Cycle $\leq 10\%$) | 200mA |
| Current Forced Into Any Output in the Off–State | 1mA |
| Operating Temperature Range, T_A | 0°C to +70°C |
| Storage Temperature Range, T_{stg} | –65°C to +150°C |

Note 1. Unless otherwise specified, all voltages are referenced to GND.

Recommended Operating Conditions:

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

Electrical Characteristics: (Note 2, Note 3)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit | |
|--|---------------------|--|----------------------------------|-----|------|---------------|----|
| High-Level Input Voltage | V_{IH} | | 2 | - | - | V | |
| Low-Level Input Voltage | V_{IL} | | - | - | 0.8 | V | |
| Input Clamp Voltage | V_{IK} | $V_{CC} = \text{MIN}, I_I = -18\text{mA}$ | - | - | -1.5 | V | |
| High Level Output Voltage BI/RBO | V_{OH} | $V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = \text{MAX}, I_{OH} = -50\mu\text{A}$ | 2.4 | 4.2 | - | V | |
| Low Level Output Voltage BI/RBO | V_{OL} | $V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = \text{MAX}$ | $I_{OL} = 1.6\text{mA}$ | - | 0.25 | 0.4 | V |
| | | | $I_{OL} = 3.2\text{mA}$ | - | 0.35 | 0.5 | V |
| Off-State Output Current a through g | $I_{O(\text{off})}$ | $V_{CC} = \text{MAX}, V_{IH} = 2\text{V}, V_{IL} = \text{MAX}, V_{O(\text{off})} = 15\text{V}$ | - | | 250 | μA | |
| On-State Output Voltage a through g | $V_{O(\text{on})}$ | $V_{CC} = \text{MIN}, V_{IH} = 2\text{V}, V_{IL} = \text{MAX}$ | $I_{O(\text{on})} = 12\text{mA}$ | - | 0.25 | 0.4 | V |
| | | | $I_{O(\text{on})} = 24\text{mA}$ | - | 0.35 | 0.5 | V |
| Input Current | I_I | $V_{CC} = \text{MAX}, V_I = 7\text{V}$ | - | - | 0.1 | mA | |
| High Level Input Current | I_{IH} | $V_{CC} = \text{MAX}, V_I = 2.7\text{V}$ | - | - | 20 | μA | |
| Low Level Input Current Any Input except BI/RBO | I_{IL} | $V_{CC} = \text{MAX}, V_I = 0.4\text{V}$ | | - | - | -0.4 | mA |
| BI/RBO | | | | - | - | -1.2 | mA |
| Short-Circuit Output Current BI/RBO | I_{OS} | $V_{CC} = \text{MAX}$ | -0.3 | - | -2 | mA | |
| Supply Current | I_{CC} | $V_{CC} = \text{MAX}, \text{Note 4}$ | - | 7 | 13 | mA | |

Note 2. For conditions shown as MIN or MAX, use the appropriate value specified under "Recommended Operation Conditions".

Note 3. All typical values are at $V_{CC} = 5\text{V}, T_A = +25^\circ\text{C}$.

Note 4. I_{CC} is measured with all outputs open and all inputs at 4.5V.

Switching Characteristics: ($V_{CC} = 5\text{V}, T_A = +25^\circ\text{C}$ unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|--|------------------|--------------------------------------|-----|-----|-----|------|
| Turn-Off Time from A Input | t_{off} | $R_L = 665\Omega, C_L = 15\text{pF}$ | - | - | 100 | ns |
| Turn-On Time from A Input | t_{on} | | - | - | 100 | ns |
| Turn-Off Time from $\overline{\text{RB}}\overline{\text{I}}$ Input | t_{off} | | - | - | 100 | ns |
| Turn-On Time from $\overline{\text{RB}}\overline{\text{I}}$ Input | t_{on} | | - | - | 100 | ns |

Function Table:

| Decimal or Function | Inputs | | | | | | BI/RBO (NOTE) | Outputs | | | | | | | Notes |
|---------------------|--------|-----|---|---|---|---|---------------|---------|-----|-----|-----|-----|-----|-----|-------|
| | 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 | OFF | 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 | OFF | 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

NOTE: $\overline{\text{BI}}/\overline{\text{RBO}}$ is wire-AND logic serving as blanking input ($\overline{\text{BI}}$) and/or ripple-blanking output ($\overline{\text{RBO}}$).

Note 1. The blanking input ($\overline{\text{BI}}$) must be open or held at a high logic level when output functions 0 through 15 are desired. The ripple-blanking input ($\overline{\text{RBI}}$) must be open or high if blanking of a decimal zero is not desired.

Note 2. When a low logic level is applied directly to the blanking input ($\overline{\text{BI}}$), all segment outputs are off regardless of the level of any other input.

Note 3. When ripple-blanking input ($\overline{\text{RBI}}$) 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 ($\overline{\text{RBO}}$) goes to a low level (response condition).

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

Pin Connection Diagram

