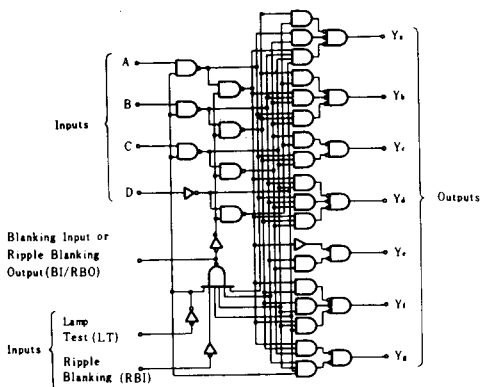


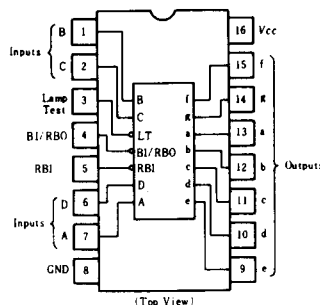
# HD74LS48 • BCD-to-Seven-Segment Decoder/Driver (Internal Pull-up outputs)

The HD74LS48 features active high outputs for driving lamp buffers. This circuit has full ripple blanking input/output controls and a lamp test input. Display patterns for BCD input counts above 9 are unique symbols to authenticate input conditions. This circuit incorporates automatic leading and/or trailing-edge zero-blanking control (RBI and RBO). Lamp test (LT) of these types may be performed at any time when the BI/RBO node is at a high level. It contains an overriding blanking input (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 or DTL logic outputs.

## ■ BLOCK DIAGRAM



## ■ PIN ARRANGEMENT



## ■ RECOMMENDED OPERATING CONDITIONS

| Item                      | Symbol   | min | typ | max  | Unit    |
|---------------------------|----------|-----|-----|------|---------|
| High level output current | $I_{OH}$ |     |     |      |         |
|                           | a ~ g    | —   | —   | —100 | $\mu A$ |
| Low level output current  | $I_{OL}$ |     |     |      |         |
|                           | a ~ g    | —   | —   | 6    | $m A$   |
|                           | BI/RBO   | —   | —   | 3.2  | $m A$   |

## ■ FUNCTION TABLE

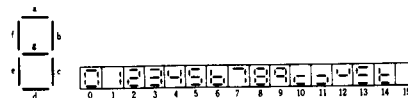
| Decimal or Function | LT | RBI | Inputs |   |   |   | BI/RBO | Outputs |   |   |   |   |   |   | Note |
|---------------------|----|-----|--------|---|---|---|--------|---------|---|---|---|---|---|---|------|
|                     |    |     | D      | C | B | A |        | a       | b | c | d | e | f | g |      |
| 0                   | H  | H   | L      | L | L | L | H      | H       | H | H | H | H | H | L | 1    |
| 1                   | H  | X   | L      | L | L | H | H      | L       | H | H | L | L | L | L |      |
| 2                   | H  | X   | L      | L | H | L | H      | H       | H | L | H | H | L | H |      |
| 3                   | H  | X   | L      | L | H | H | H      | H       | H | H | H | L | L | H |      |
| 4                   | H  | X   | L      | H | L | L | H      | L       | H | H | L | L | H | H |      |
| 5                   | H  | X   | L      | H | L | H | H      | H       | L | H | H | L | H | H |      |
| 6                   | H  | X   | L      | H | H | L | H      | L       | L | H | H | H | H | H |      |
| 7                   | H  | X   | L      | H | H | H | H      | H       | H | H | L | L | L | L |      |
| 8                   | H  | X   | H      | L | L | L | H      | H       | H | H | H | H | H | H |      |
| 9                   | H  | X   | H      | L | L | H | H      | H       | H | H | L | L | H | H |      |
| 10                  | H  | X   | H      | L | H | L | H      | L       | L | L | H | H | L | H |      |
| 11                  | H  | X   | H      | L | H | H | H      | L       | L | L | H | L | L | H |      |
| 12                  | H  | X   | H      | H | L | L | H      | L       | H | L | L | L | H | H |      |
| 13                  | H  | X   | H      | H | L | H | H      | H       | L | L | H | L | H | H |      |
| 14                  | H  | X   | H      | H | H | L | H      | L       | L | L | H | H | H | H |      |
| 15                  | H  | X   | H      | H | H | H | H      | L       | L | L | L | L | L | L |      |
| BI                  | X  | X   | X      | X | X | X | L      | L       | L | L | L | L | L | L | 2    |
| RBI                 | H  | L   | L      | L | L | L | L      | L       | L | L | L | L | L | L | 3    |
| LT                  | L  | X   | X      | X | X | X | H      | H       | H | H | H | H | H | H | 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.
  2. When a low logic level is applied directly to the blanking input (BI), all segment outputs are low 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 low and the ripple-blanking output (RBO) goes to a low level (response condition).

goes to a low level (response condition).

4. When a 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 high.



# HD74LS48

## ■ELECTRICAL CHARACTERISTICS ( $T_a = -20 \sim +75^\circ\text{C}$ )

| Item                         | Symbol          | Test Conditions                                                                  | min                                                     | typ* | max  | Unit          |
|------------------------------|-----------------|----------------------------------------------------------------------------------|---------------------------------------------------------|------|------|---------------|
| Input voltage                | $V_{IH}$        |                                                                                  | 2.0                                                     | —    | —    | V             |
|                              | $V_{IL}$        |                                                                                  | —                                                       | —    | 0.8  | V             |
| Output voltage               | a — B<br>BI/RBO | $V_{OH}$ $V_{CC} = 4.75\text{V}$ , $V_{IH} = 2\text{V}$ , $V_{IL} = 0.8\text{V}$ | $I_{OH} = -100\mu\text{A}$<br>$I_{OH} = -50\mu\text{A}$ | 2.4  | —    | V             |
|                              | a — g           | $V_{OL}$ $V_{CC} = 4.75\text{V}$ , $V_{IH} = 2\text{V}$ , $V_{IL} = 0.8\text{V}$ | $I_{OL} = 2\text{mA}$                                   | —    | 0.4  | V             |
|                              |                 |                                                                                  | $I_{OL} = 6\text{mA}$                                   | —    | 0.5  |               |
|                              |                 |                                                                                  | $I_{OL} = 1.6\text{mA}$                                 | —    | 0.4  |               |
|                              | BI/RBO          |                                                                                  | $I_{OL} = 3.2\text{mA}$                                 | —    | 0.5  |               |
| Output current **            | a — g           | $I_O$ $V_{CC} = 4.75\text{V}$ , $V_O = 0.85\text{V}$                             | -1.3                                                    | —    | —    | mA            |
| Input current                | except BI/RBO   | $I_{IH}$ $V_{CC} = 5.25\text{V}$ , $V_I = 2.7\text{V}$                           | —                                                       | —    | 20   | $\mu\text{A}$ |
|                              | BI/RBO          | $I_{IL}$ $V_{CC} = 5.25\text{V}$ , $V_I = 0.4\text{V}$                           | —                                                       | —    | -0.4 | mA            |
|                              | BI/RBO          | $I_{IL}$ $V_{CC} = 5.25\text{V}$ , $V_I = 0.4\text{V}$                           | —                                                       | —    | -1.2 | mA            |
|                              | except BI/RBO   | $I_I$ $V_{CC} = 5.25\text{V}$ , $V_I = 7\text{V}$                                | —                                                       | —    | 0.1  | mA            |
| Short-circuit output current | BI/RBO          | $I_{OS}$ $V_{CC} = 5.25\text{V}$                                                 | -0.3                                                    | —    | -2   | mA            |
| Supply current ***           |                 | $I_{CC}$ $V_{CC} = 5.25\text{V}$                                                 | —                                                       | 25   | 38   | mA            |
| Input clamp voltage          |                 | $V_{IK}$ $V_{CC} = 4.75\text{V}$ , $I_{IN} = -18\text{mA}$                       | —                                                       | —    | -1.5 | V             |

\*  $V_{CC} = 5\text{V}$ ,  $T_a = 25^\circ\text{C}$

\*\* Input condition as for  $V_{OH}$

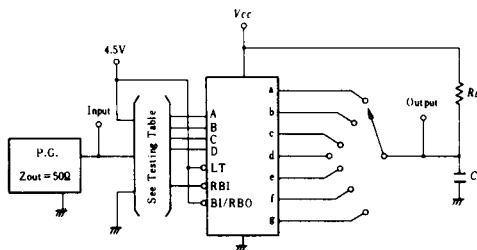
\*\*\*  $I_{CC}$  is measured with all outputs open and all inputs at 4.5V.

## ■SWITCHING CHARACTERISTICS ( $V_{CC} = 5\text{V}$ , $T_a = 25^\circ\text{C}$ )

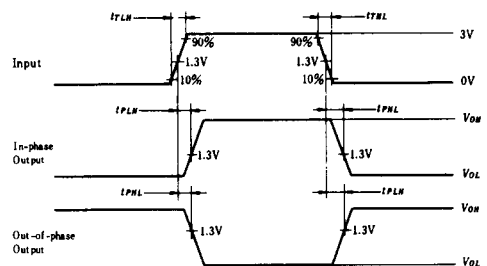
| Item                   | Symbol    | Input | Test Conditions                               | min | typ | max | Unit |
|------------------------|-----------|-------|-----------------------------------------------|-----|-----|-----|------|
| Propagation delay time | $t_{PHL}$ | A     | $C_L = 15\text{pF}$ , $R_L = 4\text{k}\Omega$ | —   | —   | 100 | ns   |
|                        | $t_{PLH}$ | A     | $C_L = 15\text{pF}$ , $R_L = 4\text{k}\Omega$ | —   | —   | 100 | ns   |
|                        | $t_{PHL}$ | RBI   | $C_L = 15\text{pF}$ , $R_L = 6\text{k}\Omega$ | —   | —   | 100 | ns   |
|                        | $t_{PLH}$ | RBI   | $C_L = 15\text{pF}$ , $R_L = 6\text{k}\Omega$ | —   | —   | 100 | ns   |

## ■TESTING METHOD

### 1) Test Circuit



### Waveform



### 2) Testing Table

| Item                   | Inputs |     |      |      |     | Outputs |     |     |     |     |     |     |
|------------------------|--------|-----|------|------|-----|---------|-----|-----|-----|-----|-----|-----|
|                        | RBI    | D   | C    | B    | A   | a       | b   | c   | d   | e   | f   | g   |
| $t_{PLH}$<br>$t_{PHL}$ | 4.5V   | GND | GND  | GND  | IN  | OUT     | —   | —   | OUT | OUT | OUT | —   |
|                        | 4.5V   | GND | GND  | 4.5V | IN  | —       | —   | OUT | —   | OUT | —   | —   |
|                        | 4.5V   | GND | 4.5V | 4.5V | IN  | OUT     | OUT | —   | OUT | OUT | OUT | OUT |
|                        | IN     | GND | GND  | GND  | GND | OUT     | OUT | OUT | OUT | OUT | OUT | —   |

# PACKAGING INFORMATION

T-90-20

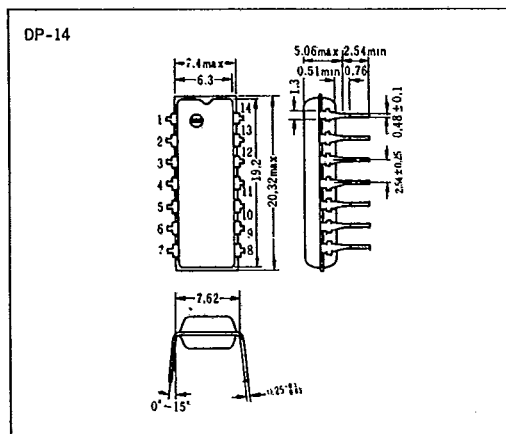
Factory orders for circuits described in this databook should include a three-part type number as explained in the following example.

## HD 74LS00 P

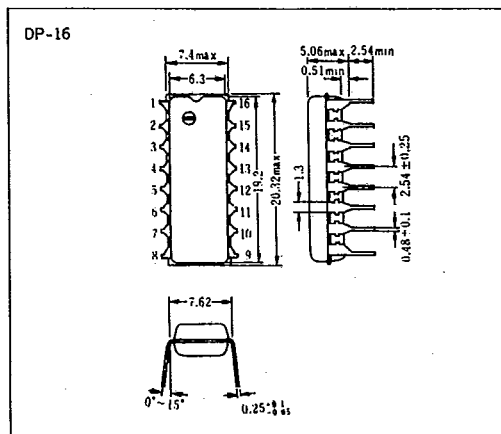
Package ; Plastic DIP ; letters P  
Cerdip ; non-letters  
Circuit description  
Prefix : HD ; Hitachi Digital IC

### ■ Plastic DIP

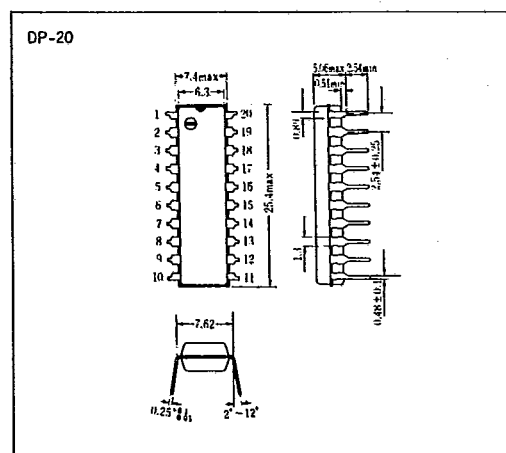
#### ● 14 Pin



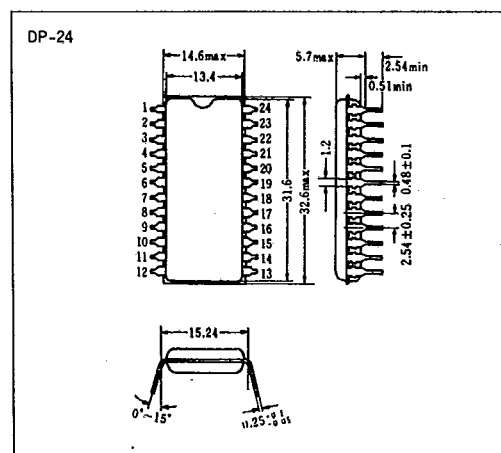
#### ● 16 Pin



#### ● 20 Pin



#### ● 24 Pin



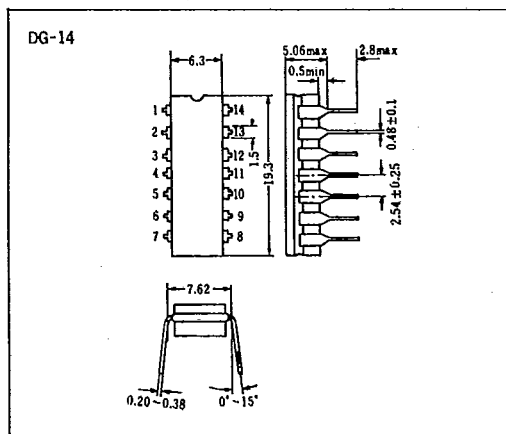
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T-90-20

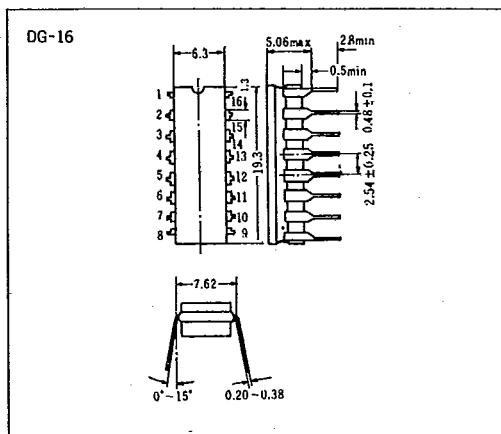
# PACKAGING INFORMATION

## ■Cerdip

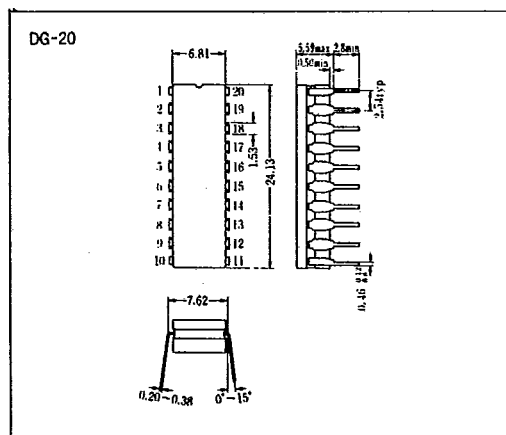
### ●14 Pin



### ●16 Pin



### ●20 Pin



### ●24 Pin

