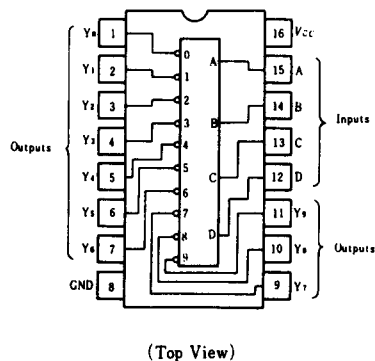


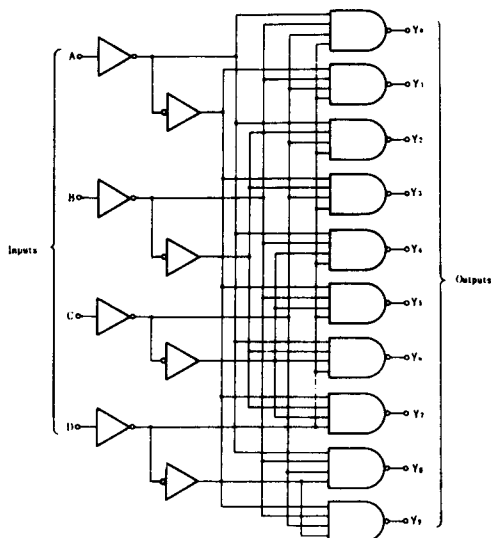
# HD74LS145 • BCD-to-Decimal Decoders/Drivers (with 15V outputs)

This BCD-to-decimal decoder/driver consists of eight inverters and ten four-input NAND gates. The inverters are connected in pairs to make BCD input data available for decoding by the NAND gates. Full decoding of valid BCD input logic ensures that all outputs remain off for all invalid binary input conditions. This decoder features high-performance, n-p-n output transistors designed for use as indicator/relay drivers or as open-collector logic-circuit drivers.

## PIN ARRANGEMENT



## BLOCK DIAGRAM



## FUNCTION TABLE

| No.     | Inputs |   |   |   | Outputs |   |   |   |   |   |   |   |   |   |
|---------|--------|---|---|---|---------|---|---|---|---|---|---|---|---|---|
|         | D      | C | B | A | 0       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0       | L      | L | L | L | L       | H | H | H | H | H | H | H | H | H |
| 1       | L      | L | L | H | H       | L | H | H | H | H | H | H | H | H |
| 2       | L      | L | H | L | H       | H | L | H | H | H | H | H | H | H |
| 3       | L      | L | H | H | H       | H | H | L | H | H | H | H | H | H |
| 4       | L      | H | L | L | H       | H | H | H | L | H | H | H | H | H |
| 5       | L      | H | L | H | H       | H | H | H | H | L | H | H | H | H |
| 6       | L      | H | H | L | H       | H | H | H | H | H | L | H | H | H |
| 7       | L      | H | H | H | H       | H | H | H | H | H | H | L | H | H |
| 8       | H      | L | L | L | H       | H | H | H | H | H | H | H | L | H |
| 9       | H      | L | L | H | H       | H | H | H | H | H | H | H | H | L |
| INVALID | H      | L | H | L | H       | H | H | H | H | H | H | H | H | H |
|         | H      | L | H | H | H       | H | H | H | H | H | H | H | H | H |
|         | H      | H | L | L | H       | H | H | H | H | H | H | H | H | H |
|         | H      | H | L | H | H       | H | H | H | H | H | H | H | H | H |
|         | H      | H | H | L | H       | H | H | H | H | H | H | H | H | H |

## RECOMMENDED OPERATING CONDITIONS

| Item                     | Symbol       | min | typ | max | Unit |
|--------------------------|--------------|-----|-----|-----|------|
| Off-state output voltage | $V_{O(off)}$ | —   | —   | 15  | V    |
| Low level output current | $I_{OL}$     | —   | —   | 80  | mA   |

## 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             |
| Off-state output current | $I_{O(off)}$ | $V_{CC}=4.75\text{V}$ , $V_{IH}=2\text{V}$ , $V_{IL}=0.8\text{V}$ , $V_{O(off)}=15\text{V}$ | —                    | —    | 250  | $\mu\text{A}$ |
| On-state output voltage  | $V_{O(on)}$  | $V_{CC}=4.75\text{V}$ , $V_{IL}=2\text{V}$ ,<br>$V_{IL}=0.8\text{V}$                        | $I_{OL}=12\text{mA}$ | —    | 0.4  | V             |
|                          |              |                                                                                             | $I_{OL}=24\text{mA}$ | —    | 0.5  |               |
|                          |              |                                                                                             | $I_{OL}=80\text{mA}$ | —    | 3.0  |               |
| Input current            | $I_{IH}$     | $V_{CC}=5.25\text{V}$ , $V_i=2.7\text{V}$                                                   | —                    | —    | 20   | $\mu\text{A}$ |
|                          | $I_{IL}$     | $V_{CC}=5.25\text{V}$ , $V_i=0.4\text{V}$                                                   | —                    | —    | -0.4 | mA            |
|                          | $I_I$        | $V_{CC}=5.25\text{V}$ , $V_i=7\text{V}$                                                     | —                    | —    | 0.1  | mA            |
| Supply current **        | $I_{CC}$     | $V_{CC}=5.25\text{V}$                                                                       | —                    | 7    | 13   | mA            |
| Input clamp voltage      | $V_{IK}$     | $V_{CC}=4.75\text{V}$ , $I_{IN}=-18\text{mA}$                                               | —                    | —    | -1.5 | V             |

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

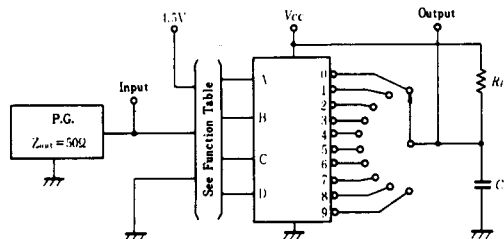
\*\*  $I_{CC}$  is measured with all outputs open and all inputs grounded.

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

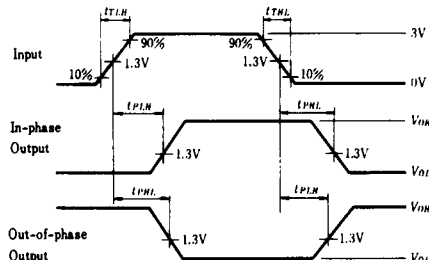
| Item                   | Symbol    | Test Conditions                     | min | typ | max | Unit |
|------------------------|-----------|-------------------------------------|-----|-----|-----|------|
| Propagation delay time | $t_{PLH}$ | $C_L=45\text{pF}$ , $R_L=665\Omega$ | —   | —   | 50  | ns   |
|                        | $t_{PHL}$ |                                     | —   | —   | 50  |      |

## TESTING METHOD

### 1) Test Circuit



### Waveform



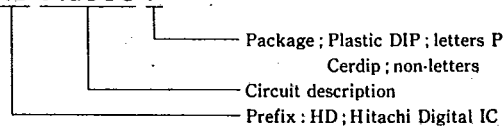
Notes 1. Input pulse;  $t_{TLH} \leq 15\text{ns}$ ,  $t_{THL} \leq 6\text{ns}$ ,  $PRR=1\text{MHz}$ , duty cycle=50%

# PACKAGING INFORMATION

T-90-20

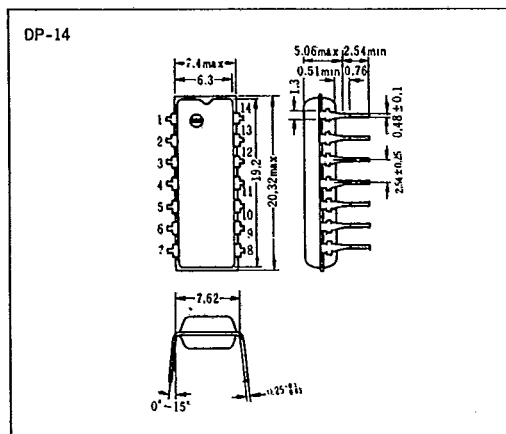
Factory orders for circuits described in this databook should include a three-part type number as explained in the following example.

## HD 74LS00 P

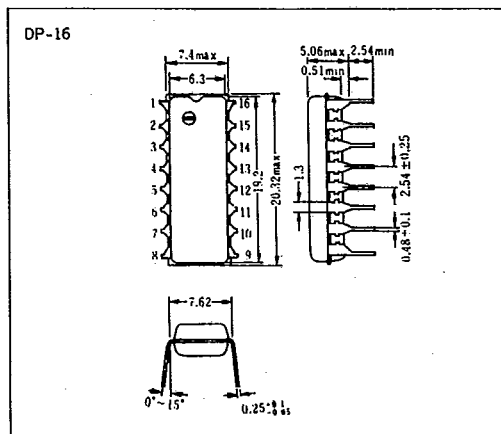


### ■ Plastic DIP

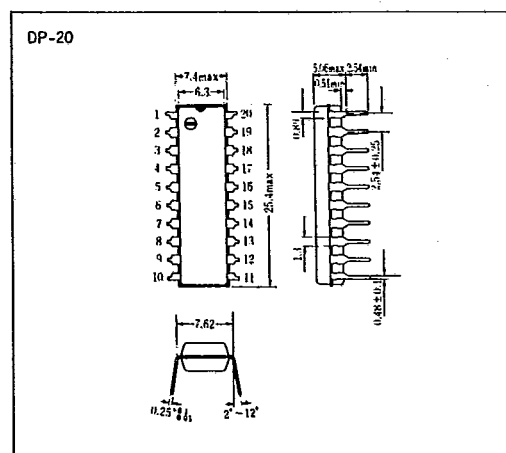
#### ● 14 Pin



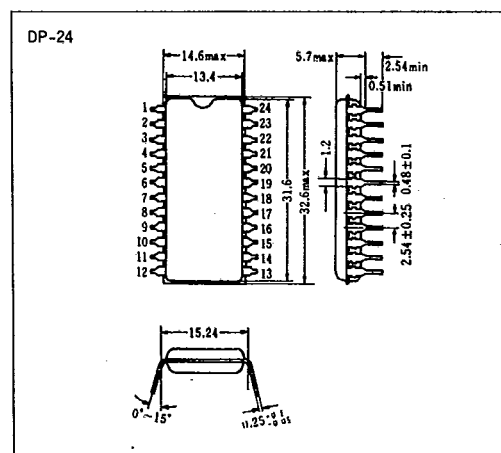
#### ● 16 Pin



#### ● 20 Pin



#### ● 24 Pin



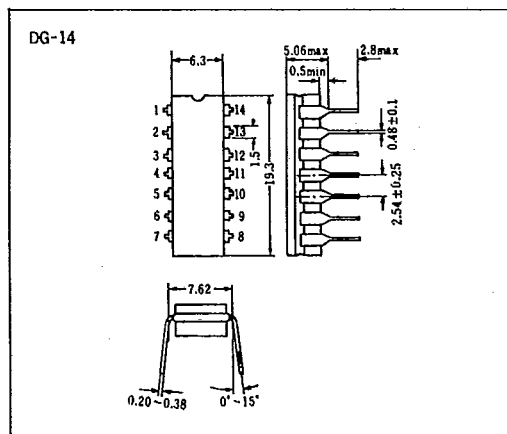
Hitachi America Ltd. • 2210 O'Toole Ave. • San Jose, CA 95131 • (408) 435-8300

T-90-20

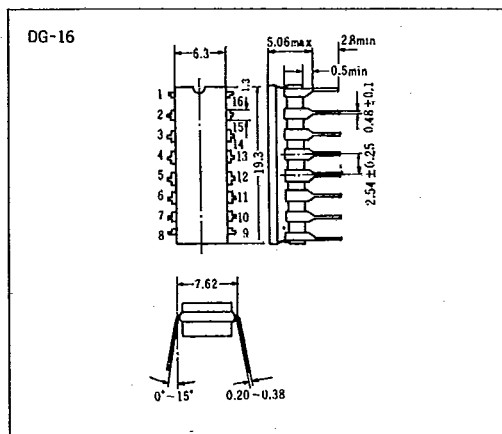
# PACKAGING INFORMATION

## ■Cerdip

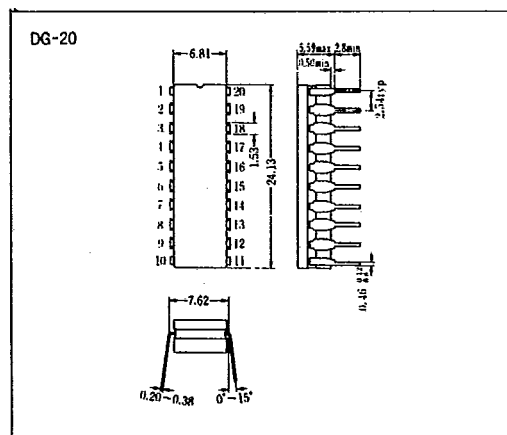
### ●14 Pin



### ●16 Pin



### ●20 Pin



### ●24 Pin

