

# TC74HC151AP, TC74HC151AF, TC74HC151AFN

## 8 - CHANNEL MULTIPLEXER

The TC74HC151A is a high speed CMOS 8 - CHANNEL MULTIPLEXER fabricated with silicon gate C<sup>2</sup>MOS technology.

It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

One of eight data input signals (D0 - D7) is selected by decoding of the three - bit address input (A, B, C). The selected data appears on two outputs : non - inverting (Y) and inverting (W).

The strobe input provides two output conditions ; a low level on the strobe input transfers the selected data to the outputs. A high level on the strobe input sets the Y output low and the W output high without regard to the data or select input conditions.

All inputs are equipped with protection circuits against static discharge or transient excess voltage.

### FEATURES :

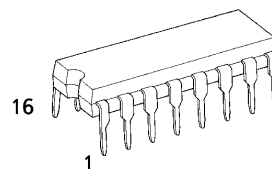
- High Speed..... $t_{pd} = 15\text{ns}(\text{typ.})$  at  $V_{CC} = 5\text{V}$
- Low Power Dissipation..... $I_{CC} = 4\mu\text{A}(\text{Max.})$  at  $T_a = 25^\circ\text{C}$
- High Noise Immunity..... $V_{NIH} = V_{NIL} = 28\% V_{CC} (\text{Min.})$
- Output Drive Capability..... 10 LSTTL Loads
- Symmetrical Output Impedance...  $|I_{OH}| = I_{OL} = 4\text{mA}(\text{Min.})$
- Balanced Propagation Delays.....  $t_{PLH} \approx t_{PHL}$
- Wide Operating Voltage Range...  $V_{CC} (\text{opr.}) = 2\text{V} \sim 6\text{V}$
- Pin and Function Compatible with 74LS151

### TRUTH TABLE

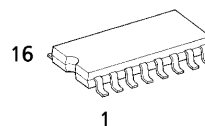
| INPUTS |   |   |                 | OUTPUTS |                 |
|--------|---|---|-----------------|---------|-----------------|
| SELECT |   |   | STROBE          | Y       | W               |
| C      | B | A | $\overline{ST}$ |         |                 |
| X      | X | X | H               | L       | H               |
| L      | L | L | L               | D0      | $\overline{D0}$ |
| L      | L | H | L               | D1      | $\overline{D1}$ |
| L      | H | L | L               | D2      | $\overline{D2}$ |
| L      | H | H | L               | D3      | $\overline{D3}$ |
| H      | L | L | L               | D4      | $\overline{D4}$ |
| H      | L | H | L               | D5      | $\overline{D5}$ |
| H      | H | L | L               | D6      | $\overline{D6}$ |
| H      | H | H | L               | D7      | $\overline{D7}$ |

X : Don't Care

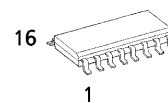
(Note) The JEDEC SOP (FN) is not available in Japan.



P (DIP16-P-300-2.54A)  
Weight : 1.00g (Typ.)

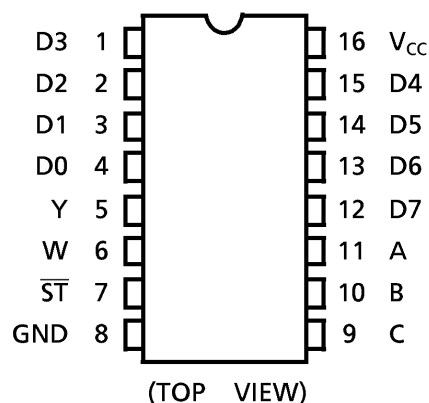


F (SOP16-P-300-1.27)  
Weight : 0.18g (Typ.)

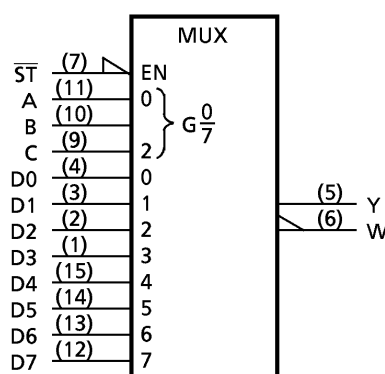


FN (SOL16-P-150-1.27)  
Weight : 0.13g (Typ.)

### PIN ASSIGNMENT



### IEC LOGIC SYMBOL



The diagram illustrates the internal logic of a 74163 4-bit binary counter. It features a 3-bit parallel data input (A, B, C) and a 7-segment display (S0-S7) connected to the counter outputs (D0-D7). The counter is enabled by the  $\overline{ST}$  input (pin 7). The display shows the hexadecimal value 07. The counter has two additional outputs, W (pin 6) and Y (pin 5), which are connected to a 3-bit parallel data input.

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER                    | SYMBOL    | VALUE                    | UNIT               |
|------------------------------|-----------|--------------------------|--------------------|
| Supply Voltage Range         | $V_{CC}$  | $-0.5 \sim 7$            | V                  |
| DC Input Voltage             | $V_{IN}$  | $-0.5 \sim V_{CC} + 0.5$ | V                  |
| DC Output Voltage            | $V_{OUT}$ | $-0.5 \sim V_{CC} + 0.5$ | V                  |
| Input Diode Current          | $I_{IK}$  | $\pm 20$                 | mA                 |
| Output Diode Current         | $I_{OK}$  | $\pm 20$                 | mA                 |
| DC Output Current            | $I_{OUT}$ | $\pm 25$                 | mA                 |
| DC $V_{CC}$ / Ground Current | $I_{CC}$  | $\pm 50$                 | mA                 |
| Power Dissipation            | $P_D$     | 500 (DIP)* / 180 (SOP)   | mW                 |
| Storage Temperature          | $T_{stg}$ | $-65 \sim 150$           | $^{\circ}\text{C}$ |

\*500mW in the range of  $T_a = -40^{\circ}\text{C} \sim 65^{\circ}\text{C}$ . From  $T_a = 65^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  a derating factor of  $-10\text{mW}/^{\circ}\text{C}$  shall be applied until 300mW.

## RECOMMENDED OPERATING CONDITIONS

| PARAMETER                | SYMBOL     | VALUE                                                                                                              | UNIT               |
|--------------------------|------------|--------------------------------------------------------------------------------------------------------------------|--------------------|
| Supply Voltage           | $V_{CC}$   | $2 \sim 6$                                                                                                         | V                  |
| Input Voltage            | $V_{IN}$   | $0 \sim V_{CC}$                                                                                                    | V                  |
| Output Voltage           | $V_{OUT}$  | $0 \sim V_{CC}$                                                                                                    | V                  |
| Operating Temperature    | $T_{opr}$  | $-40 \sim 85$                                                                                                      | $^{\circ}\text{C}$ |
| Input Rise and Fall Time | $t_r, t_f$ | $0 \sim 1000 (V_{CC} = 2.0\text{V})$<br>$0 \sim 500 (V_{CC} = 4.5\text{V})$<br>$0 \sim 400 (V_{CC} = 6.0\text{V})$ | ns                 |

## DC ELECTRICAL CHARACTERISTICS

| PARAMETER                   | SYMBOL   | TEST CONDITION                           | $V_{CC}$<br>(V)   | $T_a = 25^{\circ}\text{C}$ |             |                      | $T_a = -40 \sim 85^{\circ}\text{C}$ |                      | UNIT          |
|-----------------------------|----------|------------------------------------------|-------------------|----------------------------|-------------|----------------------|-------------------------------------|----------------------|---------------|
|                             |          |                                          |                   | MIN.                       | TYP.        | MAX.                 | MIN.                                | MAX.                 |               |
| High - Level Input Voltage  | $V_{IH}$ |                                          | 2.0<br>4.5<br>6.0 | 1.50<br>3.15<br>4.20       | —<br>—<br>— | —<br>—<br>—          | 1.50<br>3.15<br>4.20                | —<br>—<br>—          | V             |
| Low - Level Input Voltage   | $V_{IL}$ |                                          | 2.0<br>4.5<br>6.0 | —<br>—<br>—                | —<br>—<br>— | 0.50<br>1.35<br>1.80 | —<br>—<br>—                         | 0.50<br>1.35<br>1.80 | V             |
| High - Level Output Voltage | $V_{OH}$ | $V_{IN} = V_{IH} \text{ or } V_{IL}$     |                   |                            |             |                      |                                     |                      | V             |
|                             |          |                                          |                   |                            |             |                      |                                     |                      |               |
|                             |          |                                          |                   |                            |             |                      |                                     |                      |               |
|                             |          |                                          |                   |                            |             |                      |                                     |                      |               |
| Low - Level Output Voltage  | $V_{OL}$ | $V_{IN} = V_{IH} \text{ or } V_{IL}$     |                   |                            |             |                      |                                     |                      | V             |
|                             |          |                                          |                   |                            |             |                      |                                     |                      |               |
|                             |          |                                          |                   |                            |             |                      |                                     |                      |               |
|                             |          |                                          |                   |                            |             |                      |                                     |                      |               |
| Input Leakage Current       | $I_{IN}$ | $V_{IN} = V_{CC} \text{ or } \text{GND}$ | 6.0               | —                          | —           | $\pm 0.1$            | —                                   | $\pm 1.0$            | $\mu\text{A}$ |
| Quiescent Supply Current    | $I_{CC}$ | $V_{IN} = V_{CC} \text{ or } \text{GND}$ | 6.0               | —                          | —           | 4.0                  | —                                   | 40.0                 |               |

AC ELECTRICAL CHARACTERISTICS (  $C_L = 15\text{pF}$ ,  $V_{CC} = 5\text{V}$ ,  $T_a = 25^\circ\text{C}$ , Input  $t_r = t_f = 6\text{ns}$  )

| PARAMETER                                       | SYMBOL                 | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|-------------------------------------------------|------------------------|----------------|------|------|------|------|
| Output Transition Time                          | $t_{TLH}$<br>$t_{THL}$ |                | —    | 4    | 8    | ns   |
| Propagation Delay Time<br>(D—Y)                 | $t_{PLH}$<br>$t_{PHL}$ |                | —    | 15   | 24   |      |
| Propagation Delay Time<br>(D—W)                 | $t_{PLH}$<br>$t_{PHL}$ |                | —    | 15   | 24   |      |
| Propagation Delay Time<br>( $\overline{ST}$ —Y) | $t_{PLH}$<br>$t_{PHL}$ |                | —    | 10   | 17   |      |
| Propagation Delay Time<br>( $\overline{ST}$ —W) | $t_{PLH}$<br>$t_{PHL}$ |                | —    | 10   | 17   |      |
| Propagation Delay Time<br>(A, B, C—Y)           | $t_{PLH}$<br>$t_{PHL}$ |                | —    | 19   | 31   |      |
| Propagation Delay Time<br>(A, B, C—W)           | $t_{PLH}$<br>$t_{PHL}$ |                | —    | 19   | 31   |      |

AC ELECTRICAL CHARACTERISTICS (  $C_L = 50\text{pF}$ , Input  $t_r = t_f = 6\text{ns}$  )

| PARAMETER                                       | SYMBOL                               | TEST CONDITION | Ta = 25°C           |      |      |      | Ta = -40~85°C |      | UNIT |
|-------------------------------------------------|--------------------------------------|----------------|---------------------|------|------|------|---------------|------|------|
|                                                 |                                      |                | V <sub>CC</sub> (V) | MIN. | TYP. | MAX. | MIN.          | MAX. |      |
| Output Transition Time                          | t <sub>TLH</sub><br>t <sub>THL</sub> |                | 2.0                 | —    | 30   | 75   | —             | 95   | ns   |
|                                                 |                                      |                | 4.5                 | —    | 8    | 15   | —             | 19   |      |
|                                                 |                                      |                | 6.0                 | —    | 7    | 13   | —             | 16   |      |
| Propagation Delay Time<br>(D—Y)                 | t <sub>pLH</sub><br>t <sub>pHL</sub> |                | 2.0                 | —    | 65   | 140  | —             | 175  |      |
|                                                 |                                      |                | 4.5                 | —    | 18   | 28   | —             | 35   |      |
|                                                 |                                      |                | 6.0                 | —    | 15   | 24   | —             | 30   |      |
| Propagation Delay Time<br>(D—W)                 | t <sub>pLH</sub><br>t <sub>pHL</sub> |                | 2.0                 | —    | 65   | 140  | —             | 175  |      |
|                                                 |                                      |                | 4.5                 | —    | 18   | 28   | —             | 35   |      |
|                                                 |                                      |                | 6.0                 | —    | 15   | 24   | —             | 30   |      |
| Propagation Delay Time<br>( $\overline{ST}$ —Y) | t <sub>pLH</sub><br>t <sub>pHL</sub> |                | 2.0                 | —    | 36   | 100  | —             | 125  |      |
|                                                 |                                      |                | 4.5                 | —    | 12   | 20   | —             | 25   |      |
|                                                 |                                      |                | 6.0                 | —    | 10   | 17   | —             | 21   |      |
| Propagation Delay Time<br>( $\overline{ST}$ —W) | t <sub>pLH</sub><br>t <sub>pHL</sub> |                | 2.0                 | —    | 36   | 100  | —             | 125  |      |
|                                                 |                                      |                | 4.5                 | —    | 12   | 20   | —             | 25   |      |
|                                                 |                                      |                | 6.0                 | —    | 10   | 17   | —             | 21   |      |
| Propagation Delay Time<br>(A, B, C—Y)           | t <sub>pLH</sub><br>t <sub>pHL</sub> |                | 2.0                 | —    | 80   | 180  | —             | 225  |      |
|                                                 |                                      |                | 4.5                 | —    | 23   | 36   | —             | 45   |      |
|                                                 |                                      |                | 6.0                 | —    | 19   | 31   | —             | 38   |      |
| Propagation Delay Time<br>(A, B, C—W)           | t <sub>pLH</sub><br>t <sub>pHL</sub> |                | 2.0                 | —    | 80   | 180  | —             | 225  |      |
|                                                 |                                      |                | 4.5                 | —    | 23   | 36   | —             | 45   |      |
|                                                 |                                      |                | 6.0                 | —    | 19   | 31   | —             | 38   |      |
| Input Capacitance                               | C <sub>IN</sub>                      |                |                     | —    | 5    | 10   | —             | 10   | pF   |
| Power Dissipation Capacitance                   | C <sub>PD</sub> (1)                  |                |                     | —    | 69   | —    | —             | —    |      |

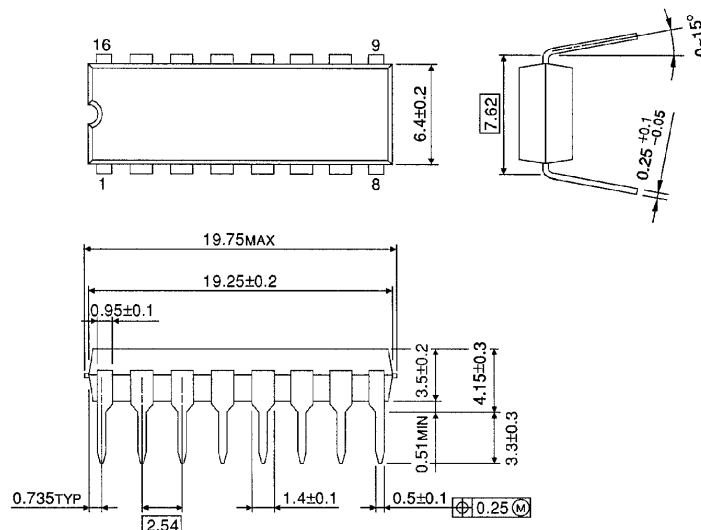
Note (1)  $C_{PD}$  is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$$

## DIP 16PIN PACKAGE DIMENSIONS (DIP16-P-300-2.54A )

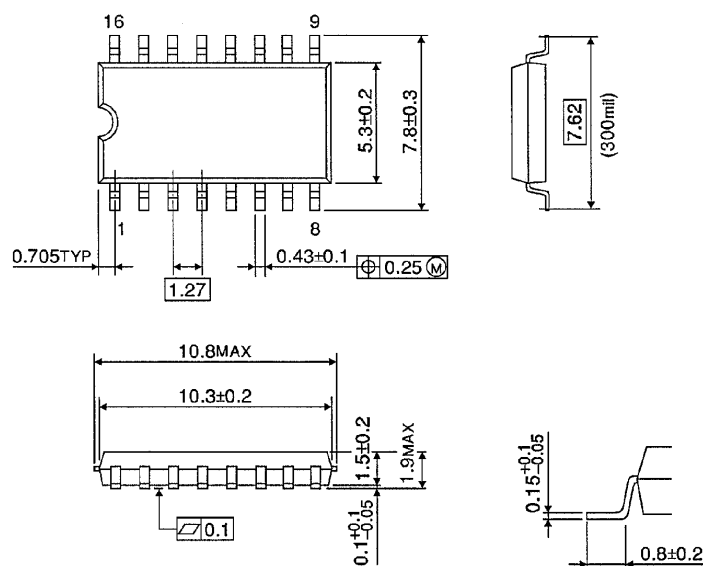
Unit in mm



Weight : 1.00g (Typ.)

## SOP 16PIN ( 200mil BODY ) PACKAGE DIMENSIONS ( SOP16-P-300-1.27 )

Unit in mm

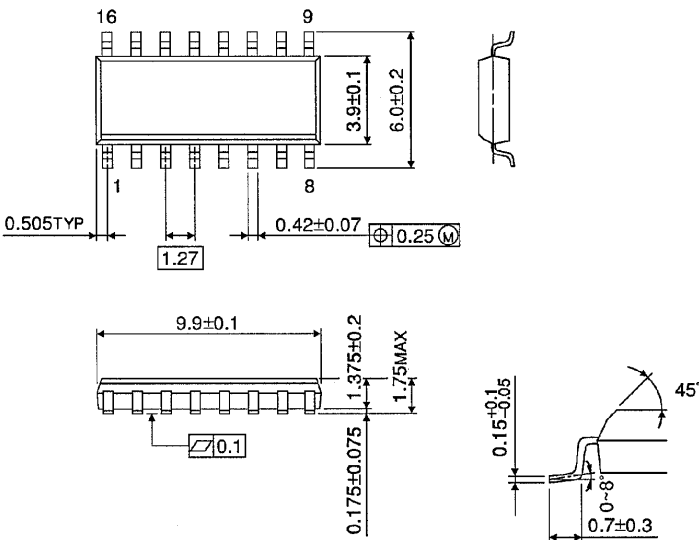


Weight : 0.18g (Typ.)

SOP 16PIN ( 150mil BODY ) PACKAGE DIMENSIONS ( SOL16-P-150 -1.27)

Unit in mm

(Note) This package is not available in Japan.



Weight : 0.13g (Typ.)

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