

## TC74AC151P, TC74AC151F, TC74AC151FN

### 8-Channel Multiplexer

The TC74AC151 is an advanced high speed CMOS 8-CHANNEL MULTIPLEXER fabricated with silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology.

It achieves the high speed operation similar to equivalent Bipolar Schottky TTL 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).

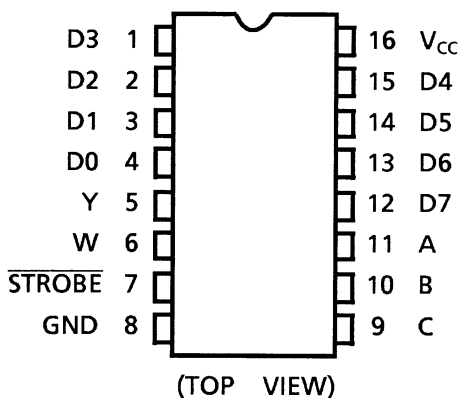
The STROBE input provides two output conditions; a low level on the STROBE input transfers the selected data to the outputs. A high level on the STROBE input sets the Y output low and the W output high without regard to the data or select input conditions.

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

### Features

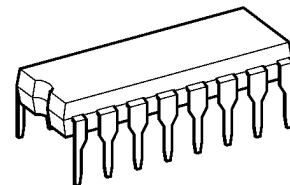
- High speed:  $t_{pd} = 5.3 \text{ ns (typ.)}$  at  $V_{CC} = 5 \text{ V}$
- Low power dissipation:  $I_{CC} = 8 \mu\text{A (max)}$  at  $T_a = 25^\circ\text{C}$
- High noise immunity:  $V_{NIH} = V_{NIL} = 28\% V_{CC} \text{ (min)}$
- Symmetrical output impedance:  $|I_{OH}| = I_{OL} = 24 \text{ mA (min)}$   
Capability of driving  $50 \Omega$  transmission lines.
- Balanced propagation delays:  $t_{pLH} \approx t_{pHL}$
- Wide operating voltage range:  $V_{CC} \text{ (opr)} = 2 \text{ to } 5.5 \text{ V}$
- Pin and function compatible with 74F151

### Pin Assignment



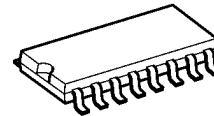
Note: xxxFN (JEDEC SOP) is not available in Japan.

TC74AC151P



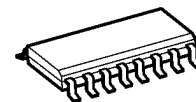
DIP16-P-300-2.54A

TC74AC151F



SOP16-P-300-1.27A

TC74AC151FN

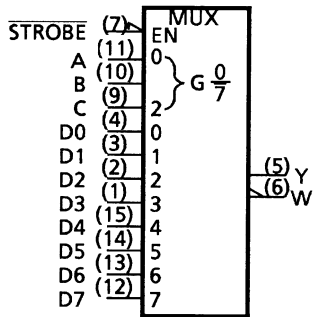


SOL16-P-150-1.27

### Weight

DIP16-P-300-2.54A	: 1.00 g (typ.)
SOP16-P-300-1.27A	: 0.18 g (typ.)
SOL16-P-150-1.27	: 0.13 g (typ.)

IEC Logic Symbol

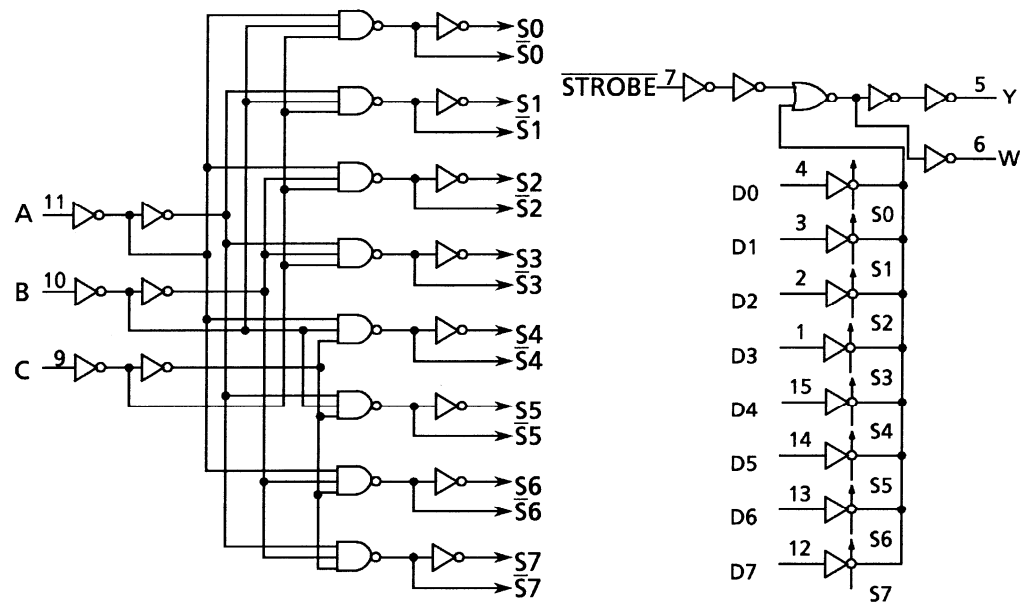


Truth Table

Inputs				Outputs	
Select			$\overline{\text{STROBE}}$	Y	W
C	B	A			
X	X	X	H	L	H
L	L	L	L	D0	$\overline{\text{D0}}$
L	L	H	L	D1	$\overline{\text{D1}}$
L	H	L	L	D2	$\overline{\text{D2}}$
L	H	H	L	D3	$\overline{\text{D3}}$
H	L	L	L	D4	$\overline{\text{D4}}$
H	L	H	L	D5	$\overline{\text{D5}}$
H	H	L	L	D6	$\overline{\text{D6}}$
H	H	H	L	D7	$\overline{\text{D7}}$

X: Don't care

System Diagram



## Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage range	$V_{CC}$	-0.5 to 7.0	V
DC input voltage	$V_{IN}$	-0.5 to $V_{CC} + 0.5$	V
DC output voltage	$V_{OUT}$	-0.5 to $V_{CC} + 0.5$	V
Input diode current	$I_{IK}$	$\pm 20$	mA
Output diode current	$I_{OK}$	$\pm 50$	mA
DC output current	$I_{OUT}$	$\pm 50$	mA
DC $V_{CC}$ /ground current	$I_{CC}$	$\pm 100$	mA
Power dissipation	$P_D$	500 (DIP) (Note 2)/180 (SOP)	mW
Storage temperature	$T_{stg}$	-65 to 150	°C

Note 1: Exceeding any of the absolute maximum ratings, even briefly, lead to deterioration in IC performance or even destruction.

Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc.).

Note 2: 500 mW in the range of  $T_a = -40$  to  $65^\circ\text{C}$ . From  $T_a = 65$  to  $85^\circ\text{C}$  a derating factor of  $-10\text{ mW}/^\circ\text{C}$  should be applied up to 300 mW.

## Operating Ranges (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	2.0 to 5.5	V
Input voltage	$V_{IN}$	0 to $V_{CC}$	V
Output voltage	$V_{OUT}$	0 to $V_{CC}$	V
Operating temperature	$T_{opr}$	-40 to 85	°C
Input rise and fall time	$dt/dV$	0 to 100 ( $V_{CC} = 3.3 \pm 0.3\text{ V}$ ) 0 to 20 ( $V_{CC} = 5 \pm 0.5\text{ V}$ )	ns/V

Note: The operating ranges must be maintained to ensure the normal operation of the device. Unused inputs must be tied to either VCC or GND.

**Electrical Characteristics**
**DC Characteristics**

Characteristics	Symbol	Test Condition		Ta = 25°C			Ta = -40 to 85°C		Unit
				V <sub>CC</sub> (V)	Min	Typ.	Max	Min	Max
High-level input voltage	V <sub>IH</sub>	—		2.0 3.0 5.5	1.50 2.10 3.85	— — —	— — —	1.50 2.10 3.85	V
Low-level input voltage	V <sub>IL</sub>	—		2.0 3.0 5.5	— — —	— — —	0.50 0.90 1.65	— — —	V
High-level output voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OH</sub> = -50 µA	2.0 3.0 4.5	1.9 2.9 4.4	2.0 3.0 4.5	— — —	1.9 2.9 4.4	V
			I <sub>OH</sub> = -4 mA	3.0	2.58	—	—	2.48	
			I <sub>OH</sub> = -24 mA	4.5	3.94	—	—	3.80	
			I <sub>OH</sub> = -75 mA (Note)	5.5	—	—	—	3.85	
Low-level output voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>OL</sub> = 50 µA	2.0 3.0 4.5	— — —	0.0 0.0 0.0	0.1 0.1 0.1	— — —	V
			I <sub>OL</sub> = 12 mA	3.0	—	—	0.36	—	
			I <sub>OL</sub> = 24 mA	4.5	—	—	0.36	—	
			I <sub>OL</sub> = 75 mA (Note)	5.5	—	—	—	—	
Input leakage current	I <sub>IN</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND		5.5	—	—	±0.1	—	µA
Quiescent supply current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND		5.5	—	—	8.0	—	µA

Note: This spec indicates the capability of driving 50 Ω transmission lines.

One output should be tested at a time for a 10 ms maximum duration.

**AC Characteristics ( $C_L = 50 \text{ pF}$ ,  $R_L = 500 \Omega$ , input:  $t_r = t_f = 3 \text{ ns}$ )**

Characteristics	Symbol	Test Condition	V <sub>CC</sub> (V)	Ta = 25°C			Ta = −40 to 85°C		Unit
				Min	Typ.	Max	Min	Max	
Propagation delay time (D-Y, W)	t <sub>pLH</sub>	—	3.3 ± 0.3	—	10.7	19.3	1.0	22.0	ns
	t <sub>pHL</sub>		5.0 ± 0.5	—	6.6	10.5	1.0	12.0	
Propagation delay time (A, B, C-Y, W)	t <sub>pLH</sub>	—	3.3 ± 0.3	—	13.3	23.7	1.0	27.0	ns
	t <sub>pHL</sub>		5.0 ± 0.5	—	8.2	13.0	1.0	14.8	
Propagation delay time ( $\overline{\text{ST}}$ -Y, W)	t <sub>pLH</sub>	—	3.3 ± 0.3	—	8.6	15.3	1.0	18.0	ns
	t <sub>pHL</sub>		5.0 ± 0.5	—	5.6	9.6	1.0	11.0	
Input capacitance	C <sub>IN</sub>	—		—	5	10	—	10	pF
Power dissipation capacitance	C <sub>PD</sub> (Note)	—		—	68	—	—	—	pF

Note: C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

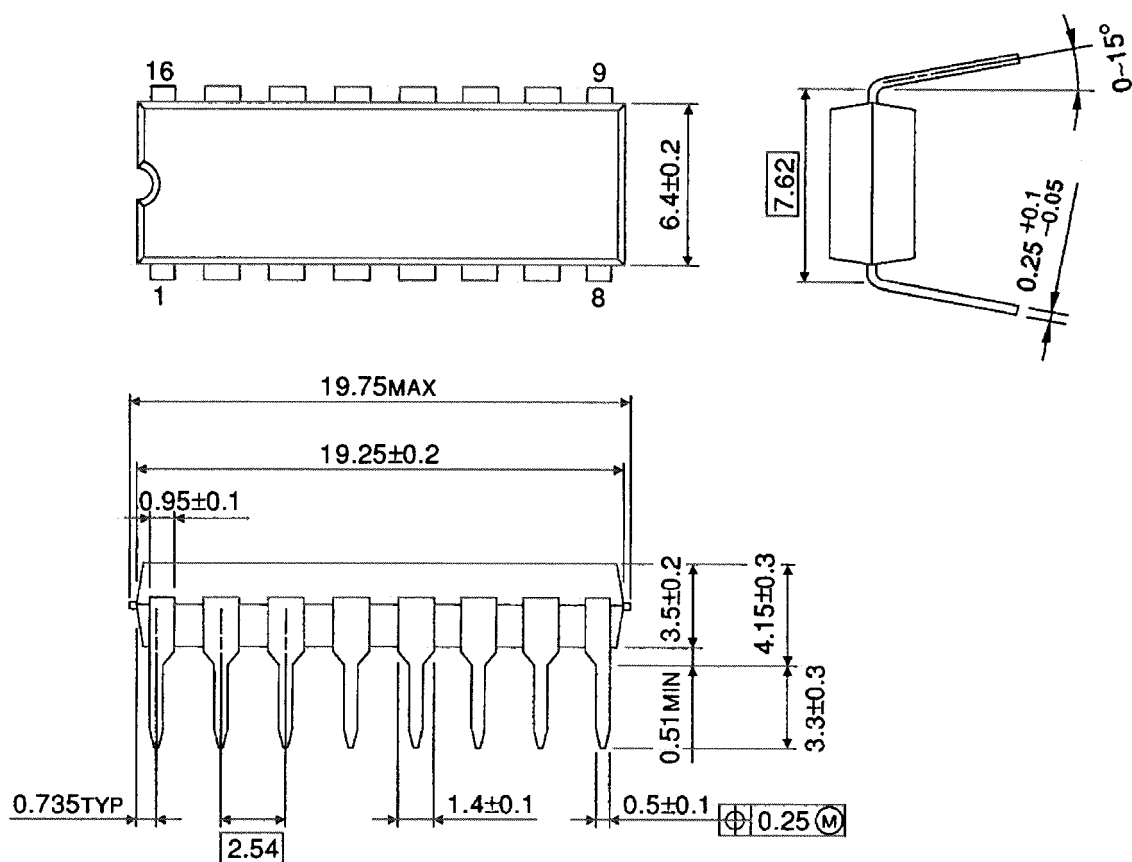
Average operating current can be obtained by the equation:

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

## Package Dimensions

DIP16-P-300-2.54A

Unit : mm

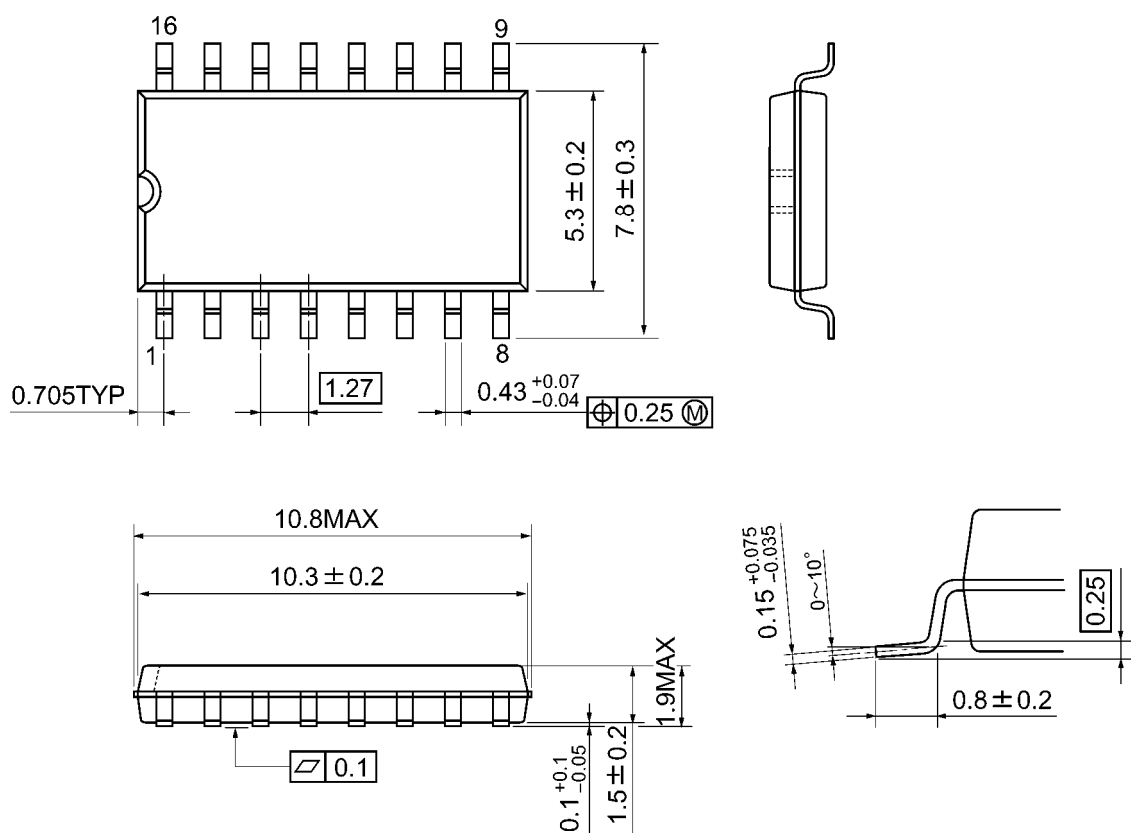


Weight: 1.00 g (typ.)

## Package Dimensions

SOP16-P-300-1.27A

Unit: mm

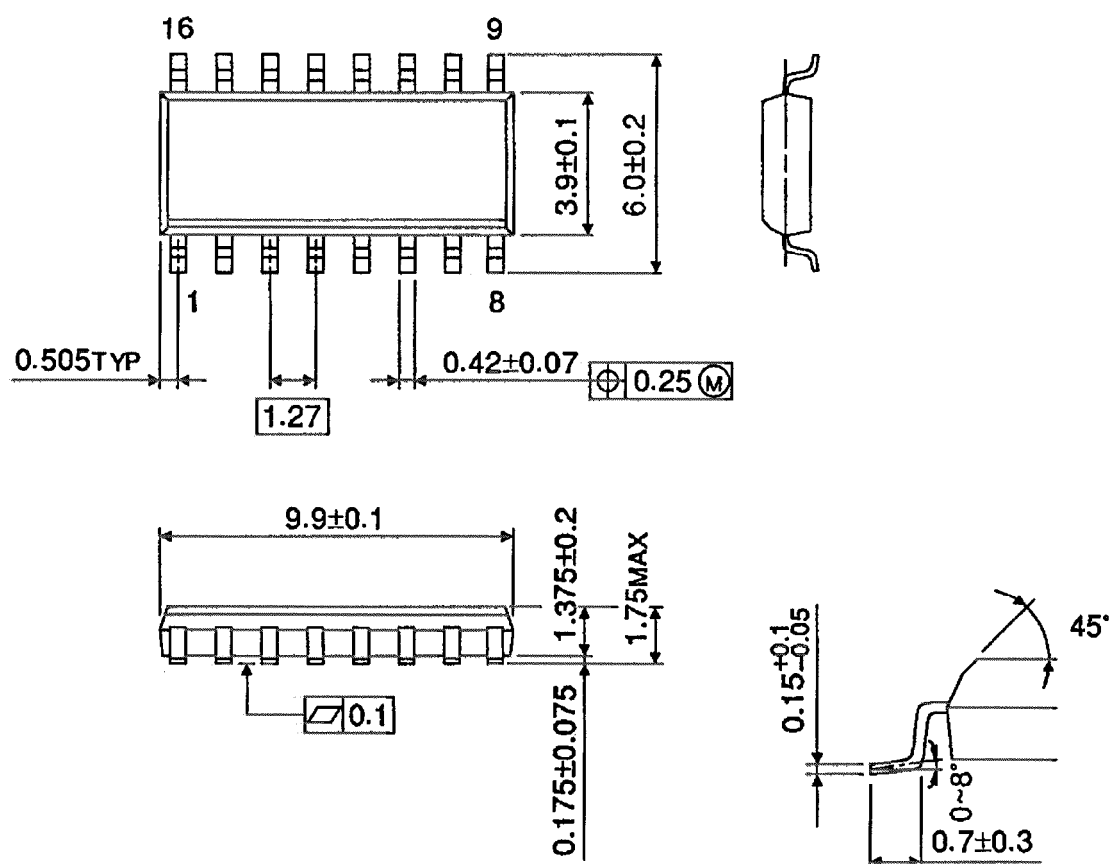


Weight: 0.18 g (typ.)

## Package Dimensions (Note)

SOL16-P-150-1.27

Unit : mm



Note: This package is not available in Japan.

Weight: 0.13 g (typ.)



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