

TC74HC151AP, TC74HC151AF

8-Channel Multiplexer

The TC74HC151A is a high speed CMOS 8-CHANNEL MULTIPLEXER fabricated with silicon gate C²MOS 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).

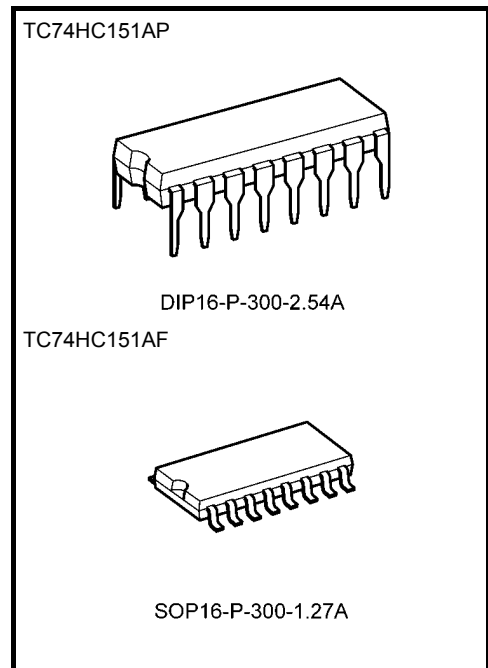
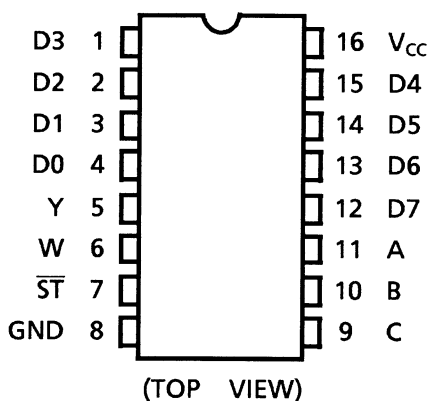
The strobe input provides two output conditions; a low level on the strobe input transfers the selected data to the outputs. A high level on the strobe input sets the Y output low and the W output high without regard to the data or select input conditions.

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

Features

- High speed: $t_{pd} = 15 \text{ ns}$ (typ.) at $V_{CC} = 5 \text{ V}$
- Low power dissipation: $I_{CC} = 4 \mu\text{A}$ (max) at $T_a = 25^\circ\text{C}$
- High noise immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (min)
- Output drive capability: 10 LSTTL loads
- Symmetrical output impedance: $|I_{OH}| = I_{OL} = 4 \text{ mA}$ (min)
- Balanced propagation delays: $t_{pLH} \approx t_{pHL}$
- Wide operating voltage range: $V_{CC} \text{ (opr)} = 2 \text{ to } 6 \text{ V}$
- Pin and function compatible with 74LS151

Pin Assignment

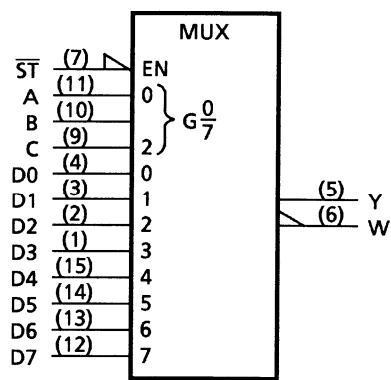


Weight

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

Start of commercial production
1986-11

IEC Logic Symbol

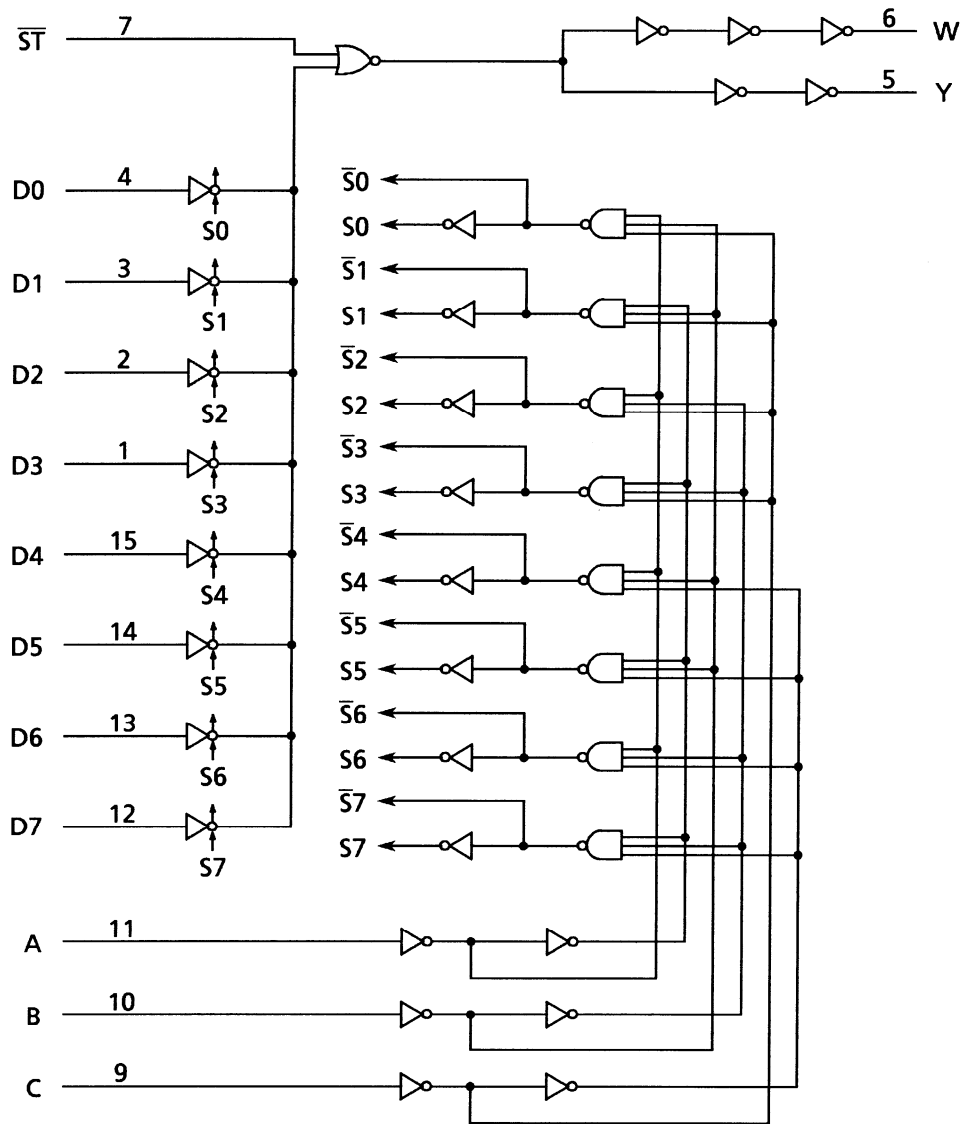


Truth Table

Inputs				Outputs	
Select			Strobe	Y	W
C	B	A	ST		
X	X	X	H	L	H
L	L	L	L	D0	D0
L	L	H	L	D1	D1
L	H	L	L	D2	D2
L	H	H	L	D3	D3
H	L	L	L	D4	D4
H	L	H	L	D5	D5
H	H	L	L	D6	D6
H	H	H	L	D7	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	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}	± 20	mA
Output diode current	I_{OK}	± 20	mA
DC output current	I_{OUT}	± 25	mA
DC V_{CC} /ground current	I_{CC}	± 50	mA
Power dissipation	P_D	500 (DIP) (Note 2)/180 (SOP)	mW
Storage temperature	T_{stg}	-65 to 150	$^{\circ}\text{C}$

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°C . From $T_a = 65$ to 85°C a derating factor of $-10 \text{ mW}/^{\circ}\text{C}$ shall be applied until 300 mW.

Operating Ranges (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2 to 6	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	t_r, t_f	0 to 1000 ($V_{CC} = 2.0$ V) 0 to 500 ($V_{CC} = 4.5$ V) 0 to 400 ($V_{CC} = 6.0$ V)	ns

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

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition		$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit
				V_{CC} (V)	Min	Typ.	Max	Min	Max
High-level input voltage	V_{IH}	—		2.0 4.5 6.0	1.50 3.15 4.20	— — —	— — —	1.50 3.15 4.20	V
Low-level input voltage	V_{IL}	—		2.0 4.5 6.0	— — —	— — —	0.50 1.35 1.80	— — —	V
High-level output voltage	V_{OH}	$V_{IN} = V_{IH} \text{ or } V_{IL}$	$I_{OH} = -20 \mu\text{A}$	2.0 4.5 6.0	1.9 4.4 5.9	2.0 4.5 6.0	— — —	1.9 4.4 5.9	V
			$I_{OH} = -4 \text{ mA}$	4.5 6.0	4.18 5.68	4.31 5.80	— —	4.13 5.63	
			$I_{OH} = -5.2 \text{ mA}$	6.0	5.68	5.80	—	5.63	
Low-level output voltage	V_{OL}	$V_{IN} = V_{IH} \text{ or } V_{IL}$	$I_{OL} = 20 \mu\text{A}$	2.0 4.5 6.0	— — —	0.0 0.0 0.0	0.1 0.1 0.1	— — —	V
			$I_{OL} = 4 \text{ mA}$	4.5 6.0	— —	0.17 0.18	0.26 0.26	— —	
			$I_{OL} = 5.2 \text{ mA}$	6.0	—	0.18	0.26	—	
Input leakage current	I_{IN}	$V_{IN} = V_{CC} \text{ or } \text{GND}$		6.0	—	—	± 0.1	—	μA
Quiescent supply current	I_{CC}	$V_{IN} = V_{CC} \text{ or } \text{GND}$		6.0	—	—	4.0	—	μA

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Output transition time	t_{TLH} t_{THL}	—	—	4	8	ns
Propagation delay time (D-Y)	t_{pLH} t_{pHL}	—	—	15	24	ns
Propagation delay time (D-W)	t_{pLH} t_{pHL}	—	—	15	24	ns
Propagation delay time ($\overline{ST}$ -Y)	t_{pLH} t_{pHL}	—	—	10	17	ns
Propagation delay time ($\overline{ST}$ -W)	t_{pLH} t_{pHL}	—	—	10	17	ns
Propagation delay time (A, B, C-Y)	t_{pLH} t_{pHL}	—	—	19	31	ns
Propagation delay time (A, B, C-W)	t_{pLH} t_{pHL}	—	—	19	31	ns

AC Characteristics (C_L = 50 pF, input: t_r = t_f = 6 ns)

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40 to 85°C		Unit
			V _{CC} (V)	Min	Typ.	Max	Min	Max
Output transition time	t _{TLH} t _{THL}	—	2.0	—	30	75	—	95
			4.5	—	8	15	—	19
			6.0	—	7	13	—	16
Propagation delay time (D-Y)	t _{pLH} t _{pHL}	—	2.0	—	65	140	—	175
			4.5	—	18	28	—	35
			6.0	—	15	24	—	30
Propagation delay time (D-W)	t _{pLH} t _{pHL}	—	2.0	—	65	140	—	175
			4.5	—	18	28	—	35
			6.0	—	15	24	—	30
Propagation delay time ($\overline{ST}$ -Y)	t _{pLH} t _{pHL}	—	2.0	—	36	100	—	125
			4.5	—	12	20	—	25
			6.0	—	10	17	—	21
Propagation delay time ($\overline{ST}$ -W)	t _{pLH} t _{pHL}	—	2.0	—	36	100	—	125
			4.5	—	12	20	—	25
			6.0	—	10	17	—	21
Propagation delay time (A, B, C-Y)	t _{pLH} t _{pHL}	—	2.0	—	80	180	—	225
			4.5	—	23	36	—	45
			6.0	—	19	31	—	38
Propagation delay time (A, B, C-W)	t _{pLH} t _{pHL}	—	2.0	—	80	180	—	225
			4.5	—	23	36	—	45
			6.0	—	19	31	—	38
Input capacitance	C _{IN}	—	—	—	5	10	—	10
Power dissipation capacitance	C _{PD} (Note)	—	—	—	69	—	—	—

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

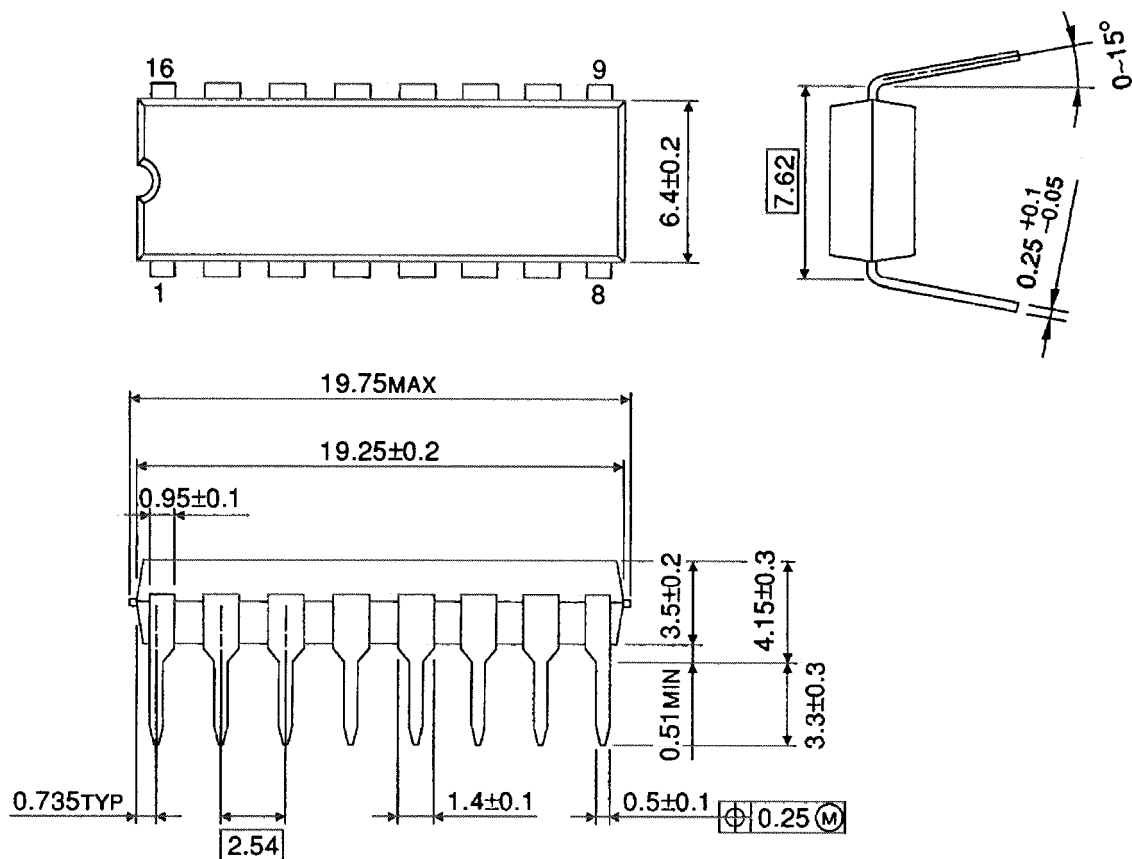
Average operating current can be obtained by the equation:

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

Package Dimensions

DIP16-P-300-2.54A

Unit : mm

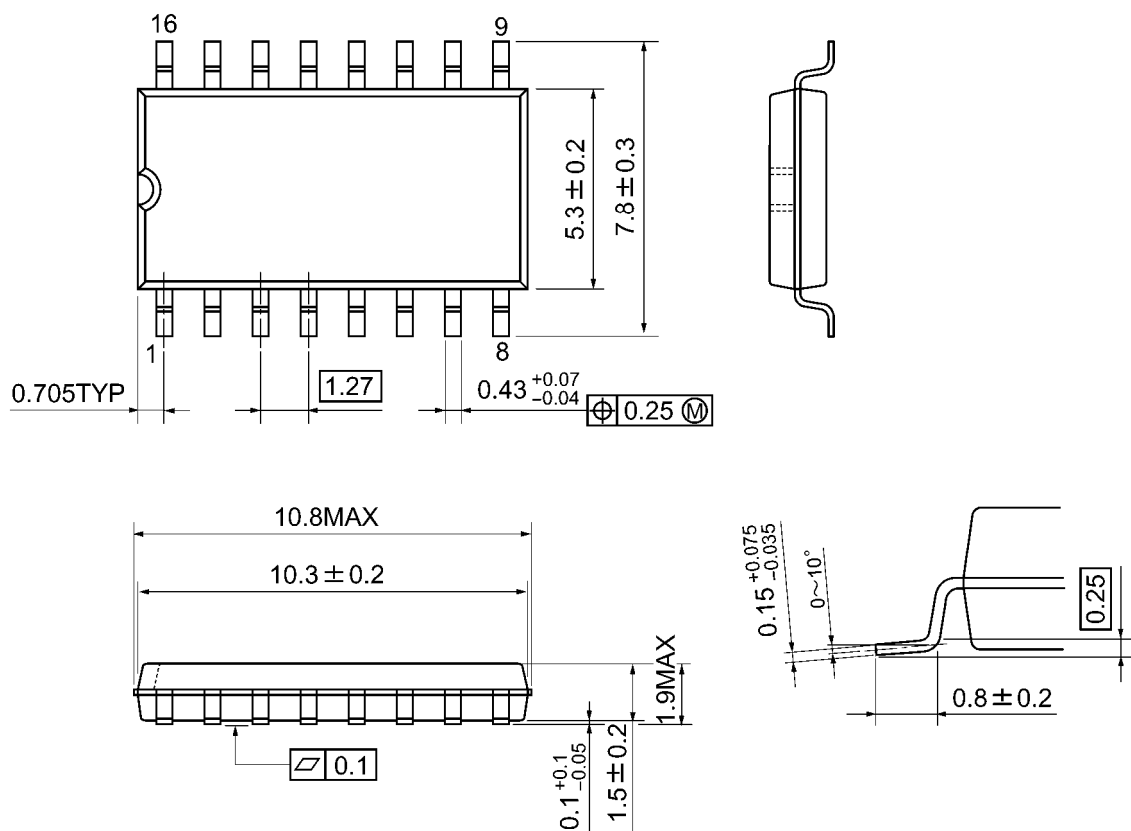


Weight: 1.00 g (typ.)

Package Dimensions

SOP16-P-300-1.27A

Unit: mm



Weight: 0.18 g (typ.)

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