

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC74HCT157AP, TC74HCT157AF

Quad 2-Channel Multiplexer

The TC74HCT157A is a high speed CMOS 2-CHANNEL MULTIPLEXERS fabricated with silicon gate C²MOS technology.

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

This device may be used as a level converter for interfacing TTL or NMOS to High Speed CMOS. The inputs are compatible with TTL, NMOS and CMOS output voltage levels.

When **STROBE** is held high, selection of data is inhibited and all the outputs become low.

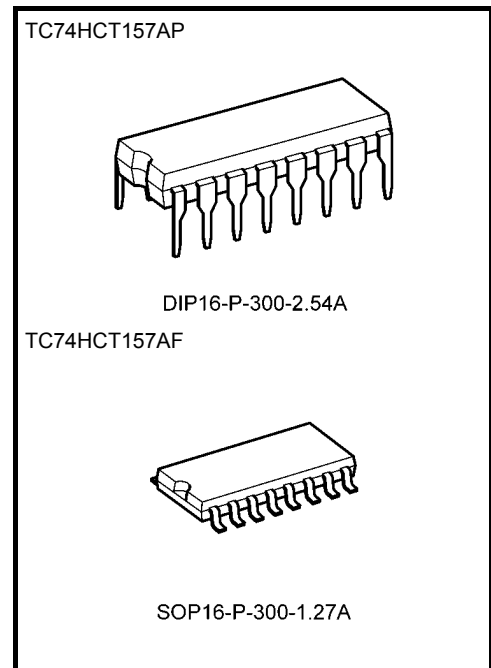
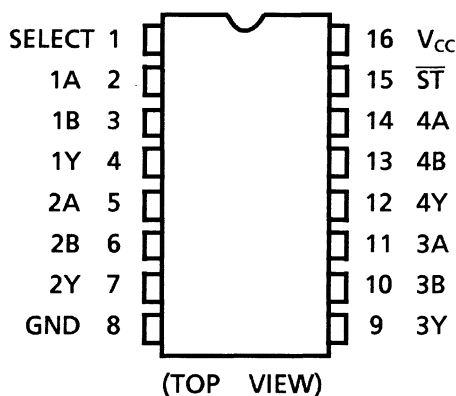
The **SELECT** decoding determines whether the A or B inputs get transferred to their corresponding Y outputs.

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

Features

- High speed: $t_{pd} = 21 \text{ ns}$ (typ.) at $V_{CC} = 5 \text{ V}$
- Low power dissipation: $I_{CC} = 4 \mu\text{A}$ (max) at $T_a = 25^\circ\text{C}$
- Compatible with TTL outputs: $V_{IH} = 2.0 \text{ V}$ (min)
 $V_{IL} = 0.8 \text{ V}$ (max)
- Wide interfacing ability: LSTTL, NMOS, CMOS
- Output drive capability: 10 LSTTL loads
- Symmetrical output impedance: $|I_{OH}| = I_{OL} = 4 \text{ mA}$ (min)
- Balanced propagation delays: $t_{pLH} \approx t_{pHL}$
- Pin and function compatible with 74LS157

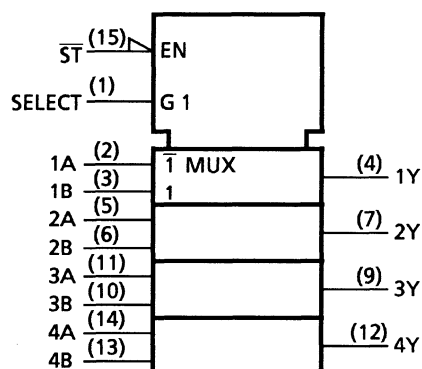
Pin Assignment



Weight

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

IEC Logic Symbol



Truth Table

Inputs				Output
$\overline{ST}$	SELECT	A	B	
H	X	X	X	L
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H

X: Don't care

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	°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 mW/°C shall be applied until 300 mW.

Operating Ranges (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	4.5 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	t_r, t_f	0 to 500	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			Ta = 25°C			Ta = -40 to 85°C		Unit	
				V _{CC} (V)	Min	Typ.	Max	Min	Max		
High-level input voltage	V _{IH}	—			4.5 to 5.5	2.0	—	—	2.0	—	V
Low-level input voltage	V _{IL}	—			4.5 to 5.5	—	—	0.8	—	0.8	V
High-level output voltage	V _{OH}	V _{IN} = V _{IH} or V _{IL}	I _{OH} = -20 μA	4.5	4.4	4.5	—	4.4	—	V	
			I _{OH} = -4 mA	4.5	4.18	4.31	—	4.13	—		
Low-level output voltage	V _{OL}	V _{IN} = V _{IH} or V _{IL}	I _{OL} = 20 μA	4.5	—	0.0	0.1	—	0.1	V	
			I _{OL} = 4 mA	4.5	—	0.17	0.26	—	0.33		
Input leakage current	I _{IN}	V _{IN} = V _{CC} or GND			5.5	—	—	±0.1	—	±1.0	μA
Quiescent supply current	I _{CC}	V _{IN} = V _{CC} or GND			5.5	—	—	4.0	—	40.0	μA
	I _C	Per input: V _{IN} = 0.5 V or 2.4 V Other input: V _{CC} or GND			5.5	—	—	2.0	—	2.9	mA

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 (A, B-Y)	t_{pLH} t_{pHL}	—	—	19	30	ns
Propagation delay time ($\overline{\text{STROBE}}$ -Y)	t_{pLH} t_{pHL}	—	—	19	30	ns
Propagation delay time (SELECT-Y)	t_{pLH} t_{pHL}	—	—	21	32	ns

AC Characteristics ($C_L = 50 \text{ pF}$, input: $t_r = t_f = 6 \text{ ns}$)

Characteristics	Symbol	Test Condition	V_{CC} (V)	$T_a = 25^\circ\text{C}$			$T_a = -40 \text{ to } 85^\circ\text{C}$		Unit
				Min	Typ.	Max	Min	Max	
Output transition time	t_{TLH}	—	4.5	—	8	15	—	19	ns
	t_{THL}		5.5	—	7	14	—	18	
Propagation delay time (A, B-Y)	t_{pLH}	—	4.5	—	23	35	—	44	ns
	t_{pHL}		5.5	—	20	32	—	40	
Propagation delay time ($\overline{\text{STROBE}}$ -Y)	t_{pLH}	—	4.5	—	23	35	—	44	ns
	t_{pHL}		5.5	—	20	32	—	40	
Propagation delay time (SELECT-Y)	t_{pLH}	—	4.5	—	25	37	—	46	ns
	t_{pHL}		5.5	—	21	34	—	42	
Input capacitance	C_{IN}	—	—	—	5	10	—	10	pF
Power dissipation capacitance	C_{PD} (Note)	—	—	—	59	—	—	—	pF

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

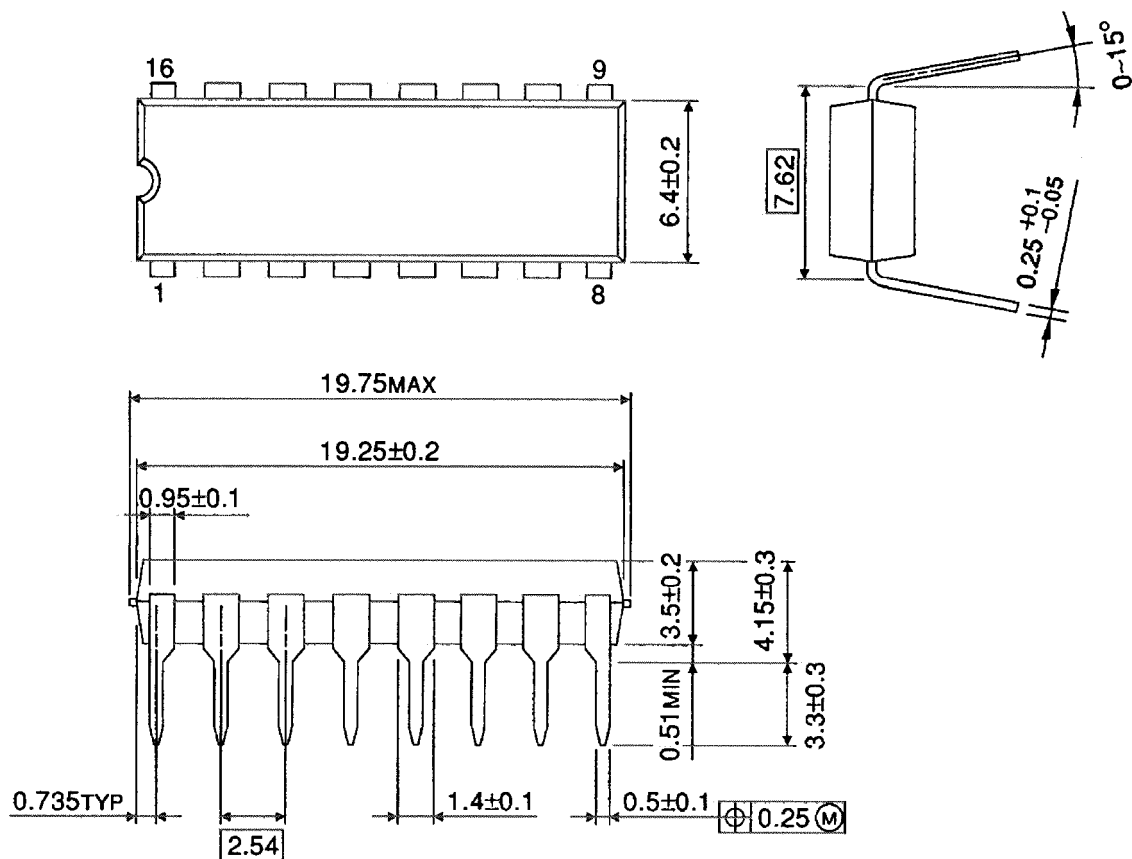
Average operating current can be obtained by the equation:

$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/4 \text{ (per bit)}$$

Package Dimensions

DIP16-P-300-2.54A

Unit : mm

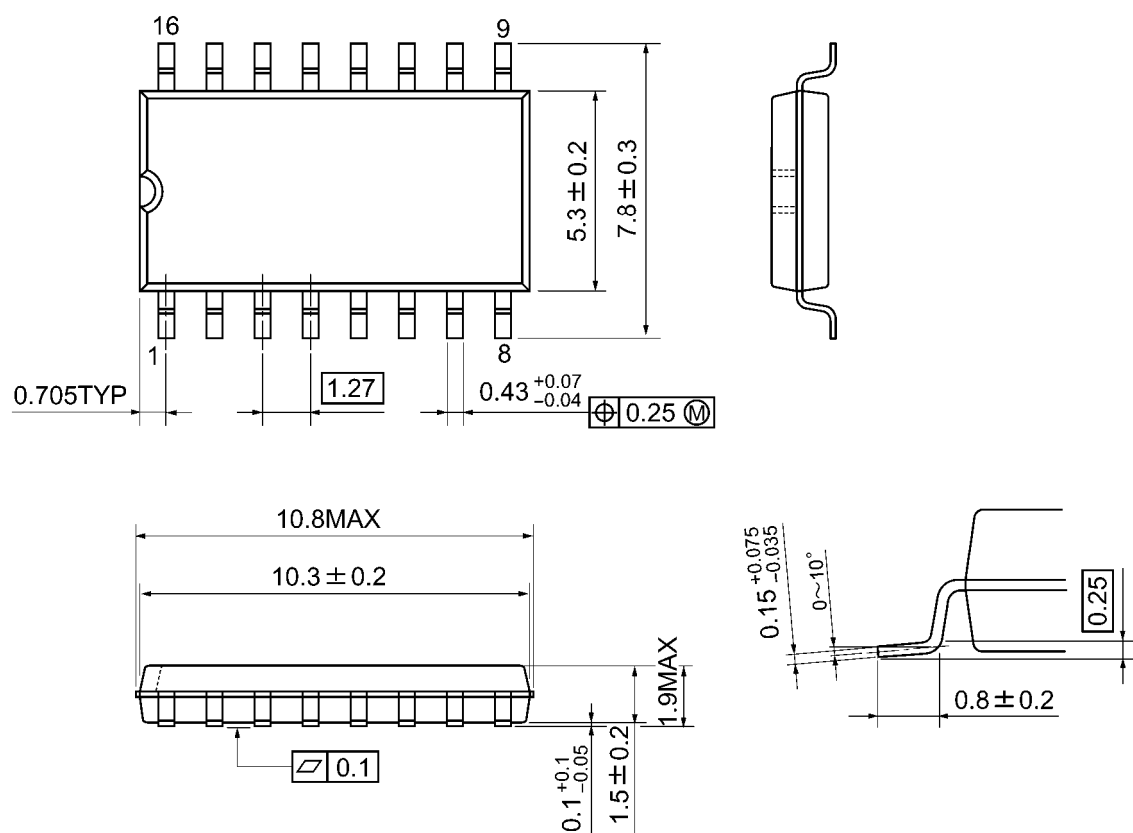


Weight: 1.00 g (typ.)

Package Dimensions

SOP16-P-300-1.27A

Unit: mm



Weight: 0.18 g (typ.)

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