TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC74HC257AP,TC74HC257AF,TC74HC257AFN

Quad 2-Channel Multiplexer (3-state)

The TC74HC257A is high speed CMOS MULTIPLEXER fabricated with silicon gate C^2MOS technology.

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

It is composed of four independent 2-channel multiplexers with common SELECT and $\overline{\text{OUTPUT ENABLE}}$ ($\overline{\text{OE}}$).

If $\overline{\text{OE}}$ is set low, the outputs are held in a high-impedance state. When SELECT is set low, "A" data inputs are enabled.

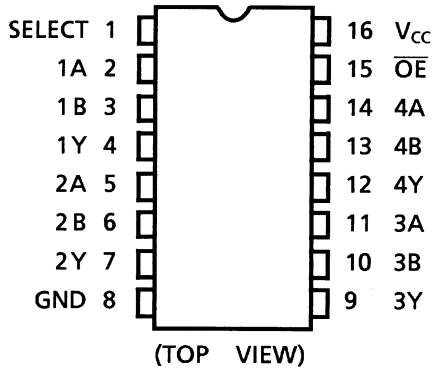
Conversely, when SELECT is high, "B" data inputs are enabled.

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

Features

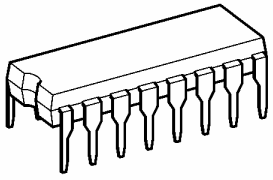
- High speed: t_{pd} = 10 ns (typ.) at V_{CC} = 5 V
- Low power dissipation: I_{CC} = 4 μA (max) at Ta = 25°C
- High noise immunity: $V_{NIH} = V_{NIL}$ = 28% V_{CC} (min)
- Output drive capability: 15 LSTTL loads
- Symmetrical output impedance: $|I_{OH}| = I_{OL}$ = 6 mA (min)
- Balanced propagation delays: $t_{pLH} \simeq t_{pHL}$
- Wide operating voltage range: V_{CC} (opr) = 2~6 V
- Pin and function compatible with 74LS257

Pin Assignment



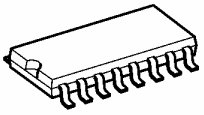
Note: xxxFN (JEDEC SOP) is not available in Japan.

TC74HC257AP

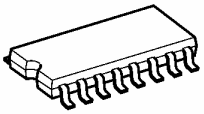


DIP16-P-300-2.54A

TC74HC257AF

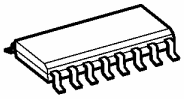


SOP16-P-300-1.27A



SOP16-P-300-1.27

TC74HC257AFN

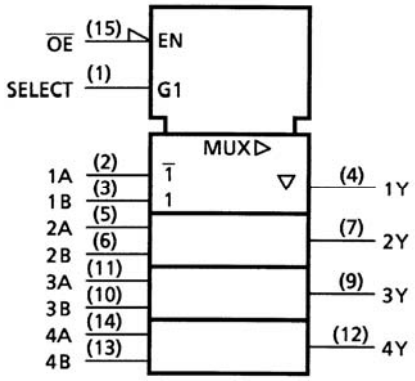


SOL16-P-150-1.27

Weight

DIP16-P-300-2.54A	: 1.00 g (typ.)
SOP16-P-300-1.27A	: 0.18 g (typ.)
SOP16-P-300-1.27	: 0.18 g (typ.)
SOL20-P-150-1.27	: 0.13 g (typ.)

IEC Logic Symbol



Truth Table

Inputs				Output
$\overline{OE}$	SELECT	A	B	Y
H	X	X	X	Z
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H

X: Don't care

Z: High impedance

Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	−0.5~7	V
DC input voltage	V_{IN}	−0.5~V_{CC} + 0.5	V
DC output voltage	V_{OUT}	−0.5~V_{CC} + 0.5	V
Input diode current	I_{IK}	±20	mA
Output diode current	I_{OK}	±20	mA
DC output current	I_{OUT}	±35	mA
DC V_{CC}/ground current	I_{CC}	±75	mA
Power dissipation	P_D	500 (DIP) (Note 2)/180 (SOP)	mW
Storage temperature	T_{stg}	−65~150	°C

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

Note 2: 500 mW in the range of Ta = −40~65°C. From Ta = 65 to 85°C a derating factor of −10 mW/°C shall be applied until 300 mW.

Recommended Operating Conditions (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2~6	V
Input voltage	V_{IN}	0~V_{CC}	V
Output voltage	V_{OUT}	0~V_{CC}	V
Operating temperature	T_{opr}	−40~85	°C
Input rise and fall time	t_r, t_f	0~1000 (V_{CC} = 2.0 V) 0~500 (V_{CC} = 4.5 V) 0~400 (V_{CC} = 6.0 V)	ns

Note: The recommended operating conditions are required 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		V_{CC} (V)	Ta = 25°C Min	Ta = 25°C Typ.	Ta = 25°C Max	Ta = −40~85°C Min	Ta = −40~85°C Max	Unit
High-level input voltage	V_{IH}	—		2.0	1.50	—	—	1.50	—	V
				4.5	3.15	—	—	3.15	—	
				6.0	4.20	—	—	4.20	—	
Low-level input voltage	V_{IL}	—		2.0	—	—	0.50	—	0.50	V
				4.5	—	—	1.35	—	1.35	
				6.0	—	—	1.80	—	1.80	
High-level output voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = −20 μA	2.0	1.9	2.0	—	1.9	—	V
				4.5	4.4	4.5	—	4.4	—	
				6.0	5.9	6.0	—	5.9	—	
			I_{OH} = −6 mA	4.5	4.18	4.31	—	4.13	—	
			I_{OH} = −7.8 mA	6.0	5.68	5.80	—	5.63	—	
Low-level output voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 20 μA	2.0	—	0.0	0.1	—	0.1	V
				4.5	—	0.0	0.1	—	0.1	
				6.0	—	0.0	0.1	—	0.1	
			I_{OL} = 6 mA	4.5	—	0.17	0.26	—	0.33	
			I_{OL} = 7.8 mA	6.0	—	0.18	0.26	—	0.33	
3-state off leak current	I_{OZ}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = V_{CC} or GND		6.0	—	—	±0.5	—	±5.0	μA
Input leakage current	I_{IN}	V_{IN} = V_{CC} or GND		6.0	—	—	±0.1	—	±1.0	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND		6.0	—	—	4.0	—	40.0	μA

AC Characteristics (input: $t_r = t_f = 6$ ns)

Characteristics	Symbol	Test Condition			Ta = 25°C			Ta = –40~85°C		Unit
			CL (pF)	V_{CC} (V)	Min	Typ.	Max	Min	Max	
Output transition time	t_{TLH} t_{THL}	—	50	2.0	—	20	60	—	75	ns
				4.5	—	6	12	—	15	
				6.0	—	5	10	—	13	
Propagation delay time (A, B-Y, $\overline{Y}$)	t_{pLH} t_{pHL}	—	50	2.0	—	45	100	—	125	ns
				4.5	—	13	20	—	25	
				6.0	—	11	17	—	21	
			150	2.0	—	62	140	—	175	
				4.5	—	18	28	—	35	
				6.0	—	15	24	—	30	
Propagation delay time (SELECT-Y, $\overline{Y}$)	t_{pLH} t_{pHL}	—	50	2.0	—	45	100	—	125	ns
				4.5	—	13	20	—	25	
				6.0	—	11	17	—	21	
			150	2.0	—	62	140	—	175	
				4.5	—	18	28	—	35	
				6.0	—	15	24	—	30	
3-state output enable time	t_{pZL} t_{pZH}	$R_L = 1k\Omega$	50	2.0	—	40	110	—	140	ns
				4.5	—	12	22	—	28	
				6.0	—	10	19	—	24	
			150	2.0	—	57	150	—	190	
				4.5	—	17	30	—	38	
				6.0	—	14	26	—	33	
3-state output disable time	t_{pLZ} t_{pHZ}	$R_L = 1k\Omega$	50	2.0	—	28	140	—	175	ns
				4.5	—	14	28	—	35	
				6.0	—	13	24	—	30	
Input capacitance	C_{IN}	—			—	5	10	—	10	pF
Output capacitance	C_{OUT}	—			—	10	—	—	—	pF
Power dissipation capacitance	C_{PD} (Note)	—			—	47	—	—	—	pF

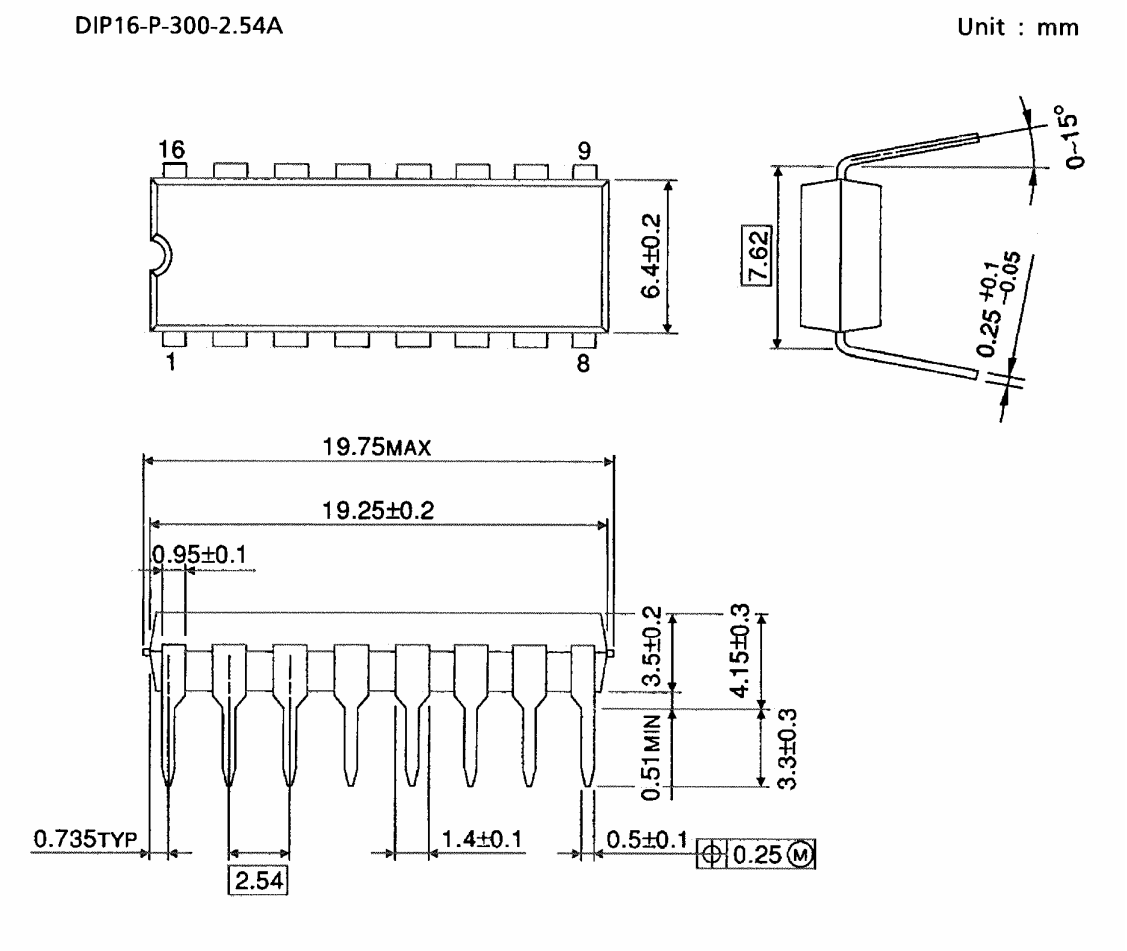
Note: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation:

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

Package Dimensions

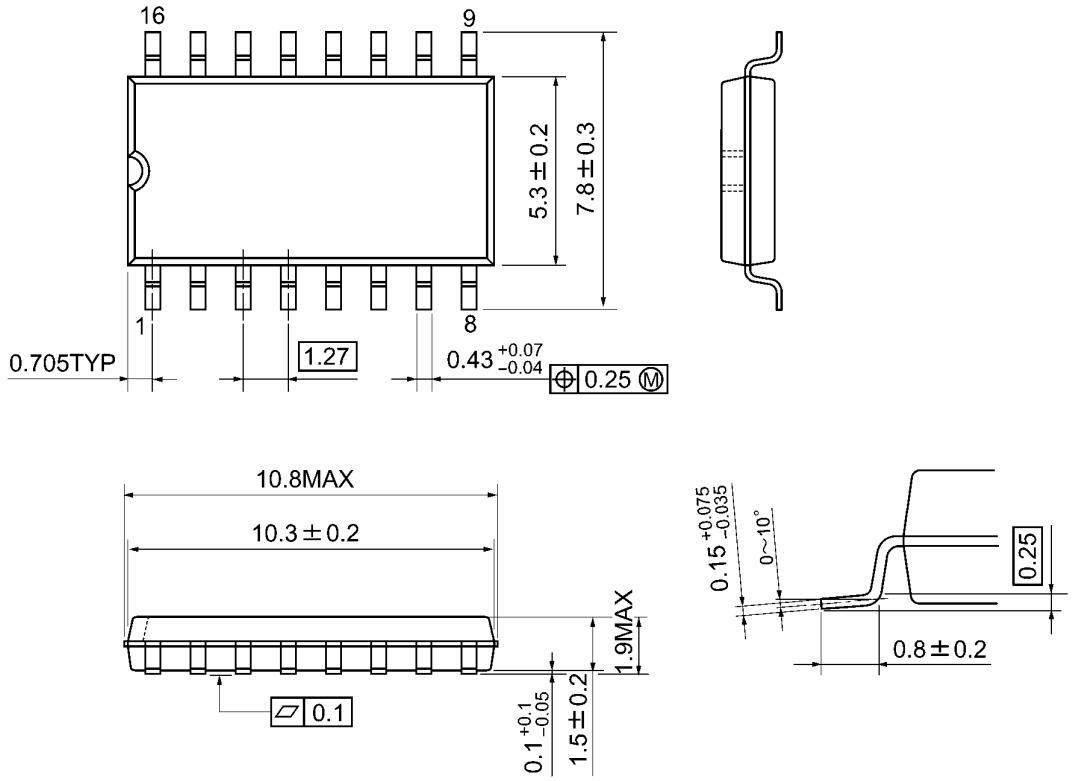
DIP16-P-300-2.54A Unit : mm



Weight: 1.00 g (typ.)

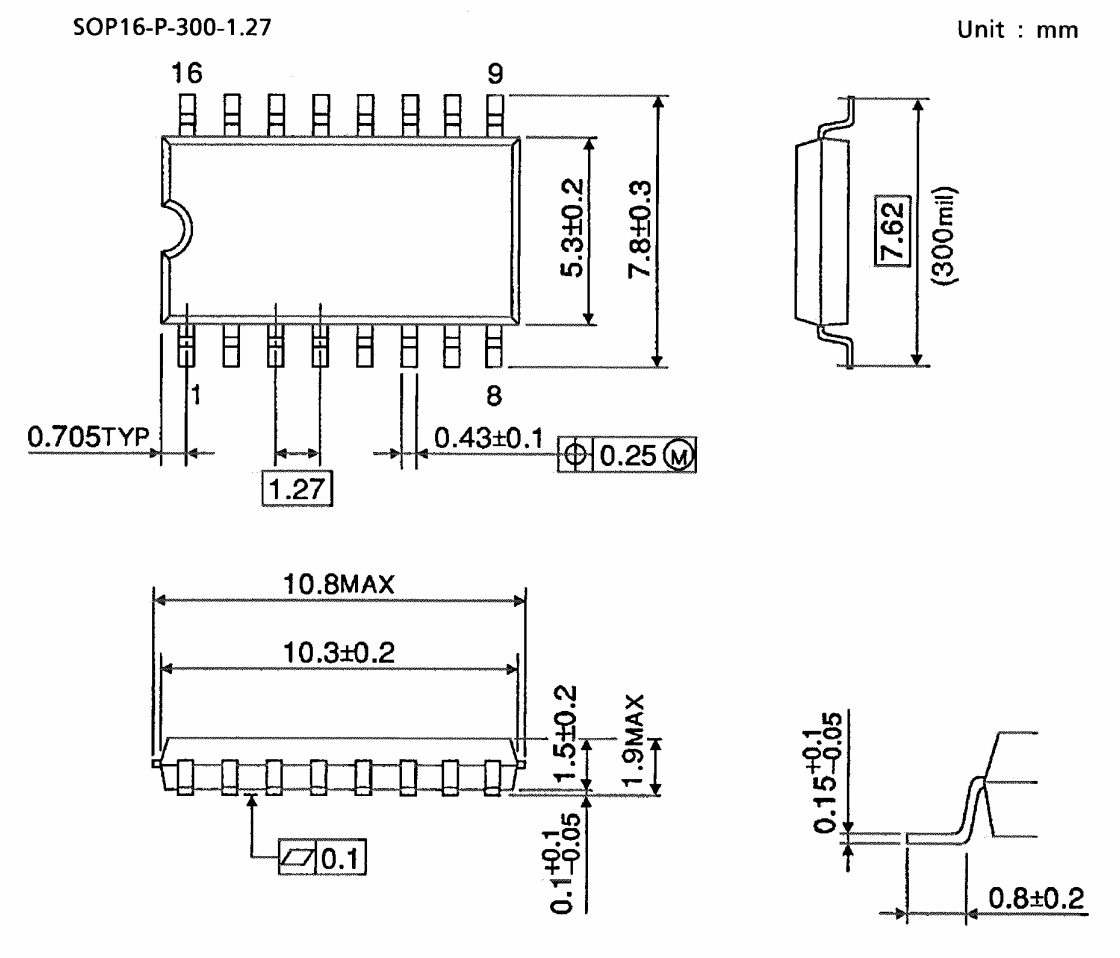
Package Dimensions

SOP16-P-300-1.27A Unit: mm



Weight: 0.18 g (typ.)

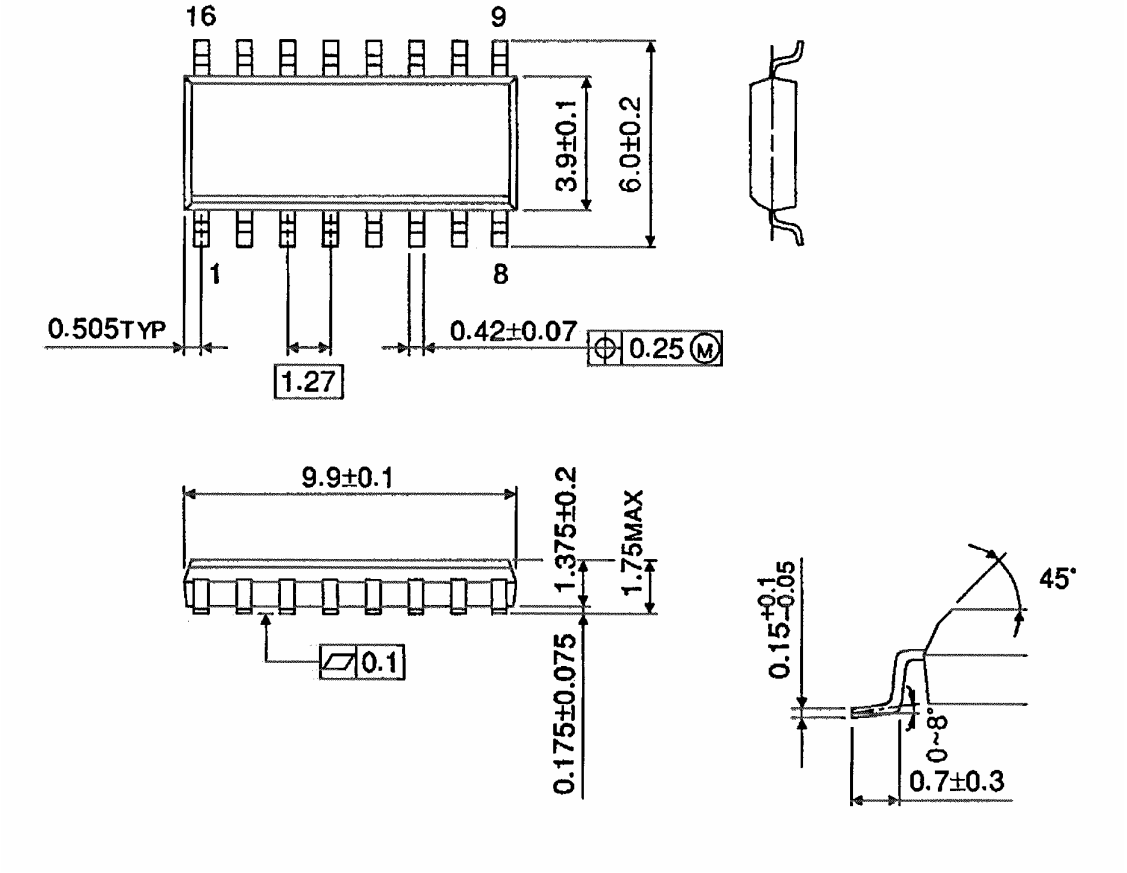
Package Dimensions



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.)

Note: Lead (Pb)-Free Packages

DIP16-P-300-2.54A SOP16-P-300-1.27A SOL16-P-150-1.27

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