

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

**TC74HC257AP, TC74HC257AF, TC74HC257AFN**

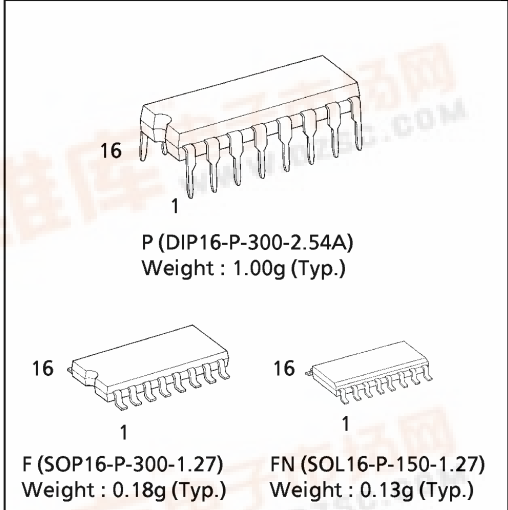
**QUAD 2 - CHANNEL MULTIPLEXER (3 - STATE)**

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

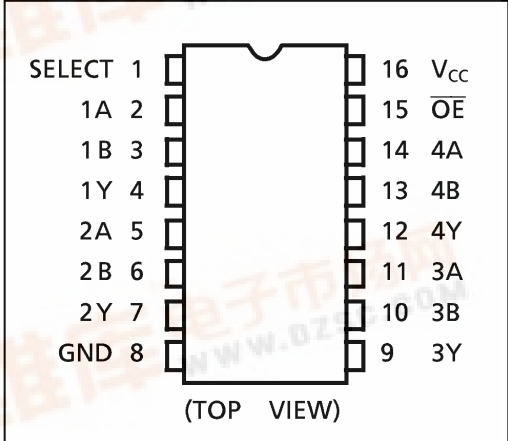
The TC74HC257A is high speed CMOS MULTIPLEXER fabricated with silicon gate C<sup>2</sup>MOS technology. It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation. It is composed of four independent 2 - channel multiplexers with common SELECT and OUTPUTENABLE ( $\overline{OE}$ ). If  $\overline{OE}$  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.....  $t_{pd} = 10ns$ (typ.) at  $V_{CC} = 5V$
- Low Power Dissipation.....  $I_{CC} = 4\mu A$ (Max.) at  $T_a = 25^\circ C$
- High Noise Immunity.....  $V_{NIH} = V_{NIL} = 28\% V_{CC}$  (Min.)
- Output Drive Capability..... 15 LSTTL Loads
- Symmetrical Output Impedance...  $|I_{OH}| = I_{OL} = 6mA$ (Min.)
- Balanced Propagation Delays.....  $t_{pLH} \approx t_{pHL}$
- Wide Operating Voltage Range...  $V_{CC}$  (opr.) = 2V~6V
- Pin and Function Compatible with 74LS257



**PIN ASSIGNMENT**

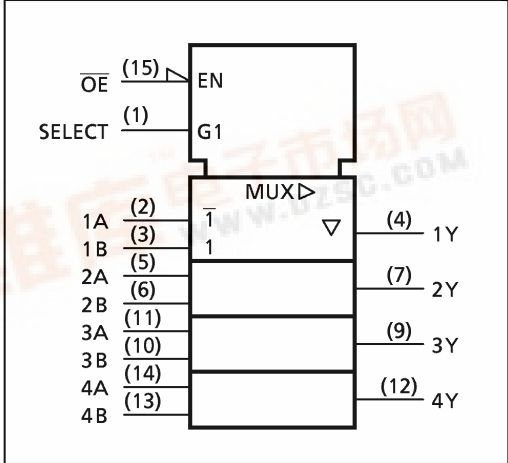


**TRUTH TABLE**

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

**IEC LOGIC SYMBOL**



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## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	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)* / 180 (SOP)	mW
Storage Temperature	$T_{stg}$	-65~150	°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	$V_{CC}$	2~6	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 ( $V_{CC} = 2.0\text{V}$ ) 0~500 ( $V_{CC} = 4.5\text{V}$ ) 0~400 ( $V_{CC} = 6.0\text{V}$ )	ns

## DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	$V_{CC}$ (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	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 $V_{IL}$	$I_{OH} = -20\mu\text{A}$	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	—	
				4.5	4.18	4.31	—	4.13	—	
Low - Level Output Voltage	$V_{OL}$	$V_{IN} = V_{IH}$ or $V_{IL}$	$I_{OL} = 20\mu\text{A}$	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	
				4.5	—	0.17	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	$\mu\text{A}$	
			Input Leakage Current	$I_{IN}$	$V_{IN} = V_{CC}$ or GND	6.0	—	—		±0.1
Quiescent Supply Current	$I_{CC}$	$V_{IN} = V_{CC}$ or GND	6.0	—	—	4.0	—	40.0		

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

PARAMETER	SYMBOL	TEST CONDITION	CL (pF)	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40~85°C		UNIT
					MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	t <sub>TLH</sub>		50	2.0	—	20	60	—	75	ns
	t <sub>THL</sub>			4.5	—	6	12	—	15	
Propagation Delay Time (A, B—Y, $\bar{Y}$ )	t <sub>pLH</sub>		50	2.0	—	45	100	—	125	
				4.5	—	13	20	—	25	
	t <sub>pHL</sub>		6.0	—	11	17	—	21		
			150	2.0	—	62	140	—	175	
Propagation Delay Time (SELECT—Y, $\bar{Y}$ )	t <sub>pLH</sub>		50	2.0	—	45	100	—	125	
				4.5	—	13	20	—	25	
	t <sub>pHL</sub>		6.0	—	11	17	—	21		
			150	2.0	—	62	140	—	175	
3—State Output Enable Time	t <sub>pZL</sub>	R <sub>L</sub> = 1kΩ	50	2.0	—	40	110	—	140	
				4.5	—	12	22	—	28	
	t <sub>pZH</sub>		6.0	—	10	19	—	24		
			150	2.0	—	57	150	—	190	
3—State Output Enable Time	t <sub>pLZ</sub>	R <sub>L</sub> = 1kΩ	50	2.0	—	28	140	—	175	
				4.5	—	14	28	—	35	
	t <sub>pHZ</sub>		6.0	—	13	24	—	30		
			150	2.0	—	28	140	—	175	
Input Capacitance	C <sub>IN</sub>				—	5	10	—	pF	
Output Capacitance	C <sub>OUT</sub>				—	10	—	—		
Power Dissipation Capacitance	C <sub>PD(1)</sub>				—	47	—	—		

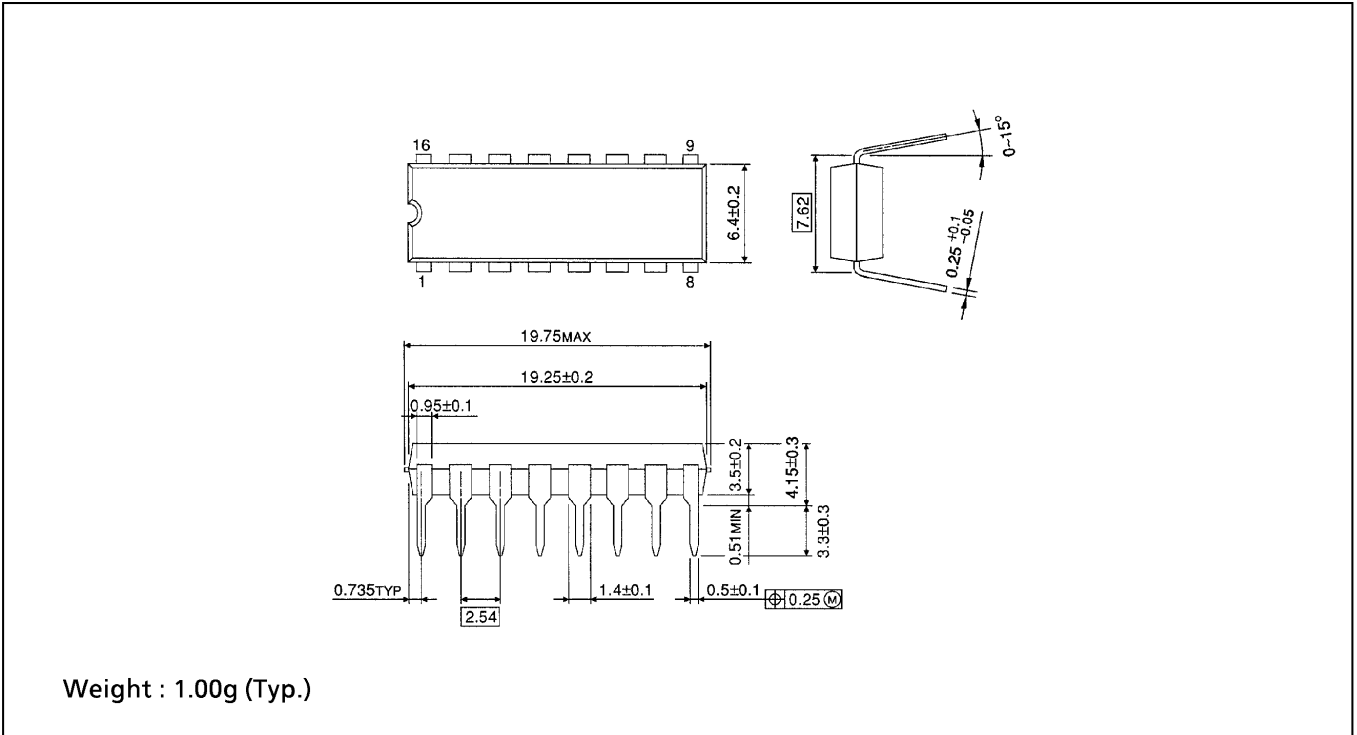
Note (1) C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

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

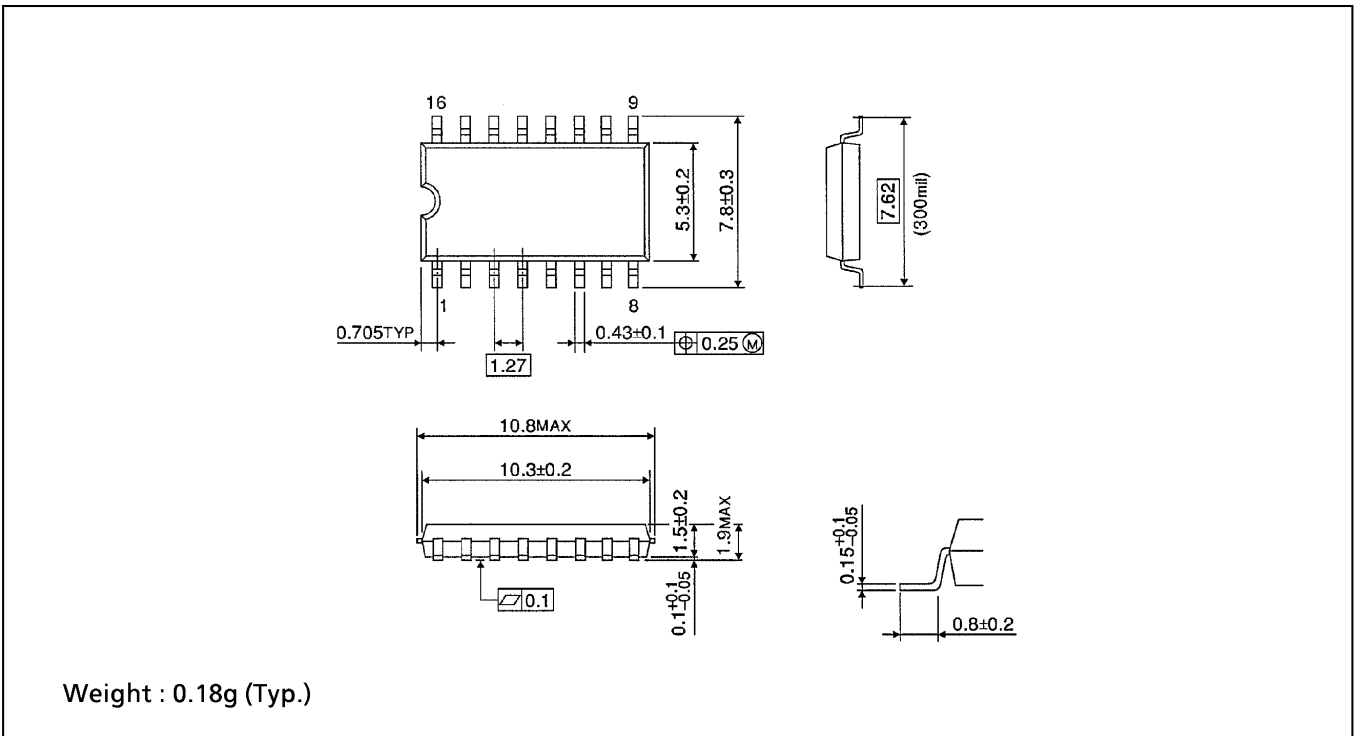
**DIP 16PIN OUTLINE DRAWING (DIP16-P-300-2.54A)**

Unit in mm



**SOP 16PIN (200mil BODY) OUTLINE DRAWING (SOP16-P-300-1.27)**

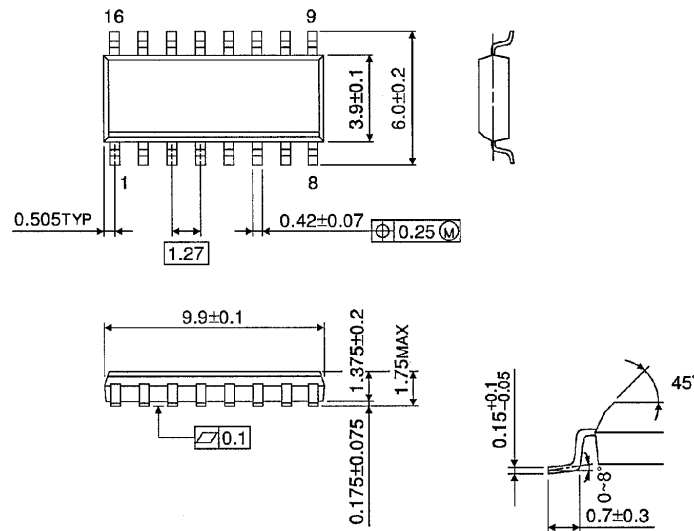
Unit in mm



**SOP 16PIN (150mil BODY) OUTLINE DRAWING (SOL16-P-150 -1.27)**

Unit in mm

(Note) This package is not available in Japan.



Weight : 0.13g (Typ.)