

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC74HC367AP, TC74HC367AF, TC74HC367AFN
TC74HC368AP, TC74HC368AF, TC74HC368AFN

HEX BUS BUFFER

TC74HC367AP/AF/AFN NON-INVERTED (3-STATE)
TC74HC368AP/AF/AFN INVERTED (3-STATE)

The TC74HC367A and TC74HC368A are high speed CMOS 3-STATE BUS BUFFERs fabricated with silicon gate C²MOS technology.

They achieve the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

They contain six buffers; four buffers are controlled by an enable input ($\overline{G1}$), and the other two buffers are controlled by another enable input ($\overline{G2}$). The outputs of each buffer group are enabled when $\overline{G1}$ and/or $\overline{G2}$ inputs are held low; if held high, these outputs are in a high impedance state.

The TC74HC367A is a non-inverting output type, while the TC74HC368A is an inverting output type.

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

FEATURES :

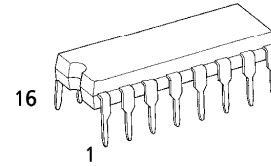
- High Speed..... $t_{pd} = 11\text{ns}(\text{typ.})$ at $V_{CC} = 5\text{V}$
- Low Power Dissipation..... $I_{CC} = 4\mu\text{A}(\text{Max.})$ at $T_a = 25^\circ\text{C}$
- High Noise Immunity..... $V_{NIH} = V_{NIL} = 28\% V_{CC} (\text{Min.})$
- Output Drive Capability..... 15 LSTTL Loads
- Symmetrical Output Impedance... $|I_{OH}| = I_{OL} = 6\text{mA}$
- Balanced Propagation Delays..... $t_{pLH} \approx t_{pHL}$
- Wide Operating Voltage Range.... $V_{CC} (\text{opr.}) = 2\text{V} \sim 6\text{V}$
- Pin and Function Compatible with 74LS367/368

TRUTH TABLE

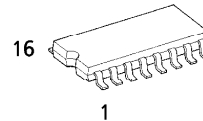
INPUTS		OUTPUTS	
$\overline{G}$	An	Y(367A)	$\overline{Y}$ (368A)
L	L	L	H
L	H	H	L
H	X	Z	Z

X : Don't Care, Z : High Impedance

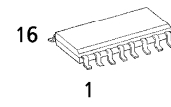
(Note) The JEDEC SOP (FN) is not available in Japan.



P (DIP16-P-300-2.54A)
Weight : 1.00g (Typ.)

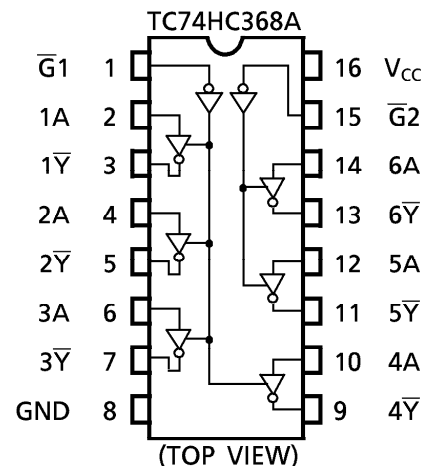
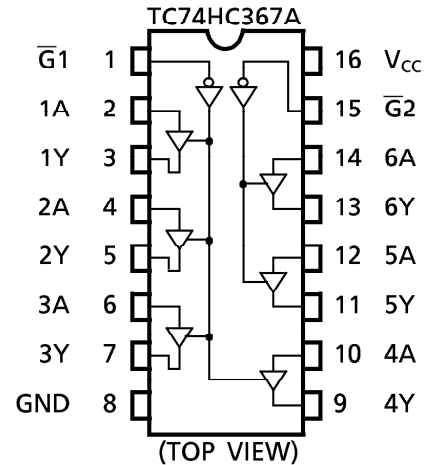


F (SOP16-P-300-1.27)
Weight : 0.18g (Typ.)



FN (SOL16-P-150-1.27)
Weight : 0.13g (Typ.)

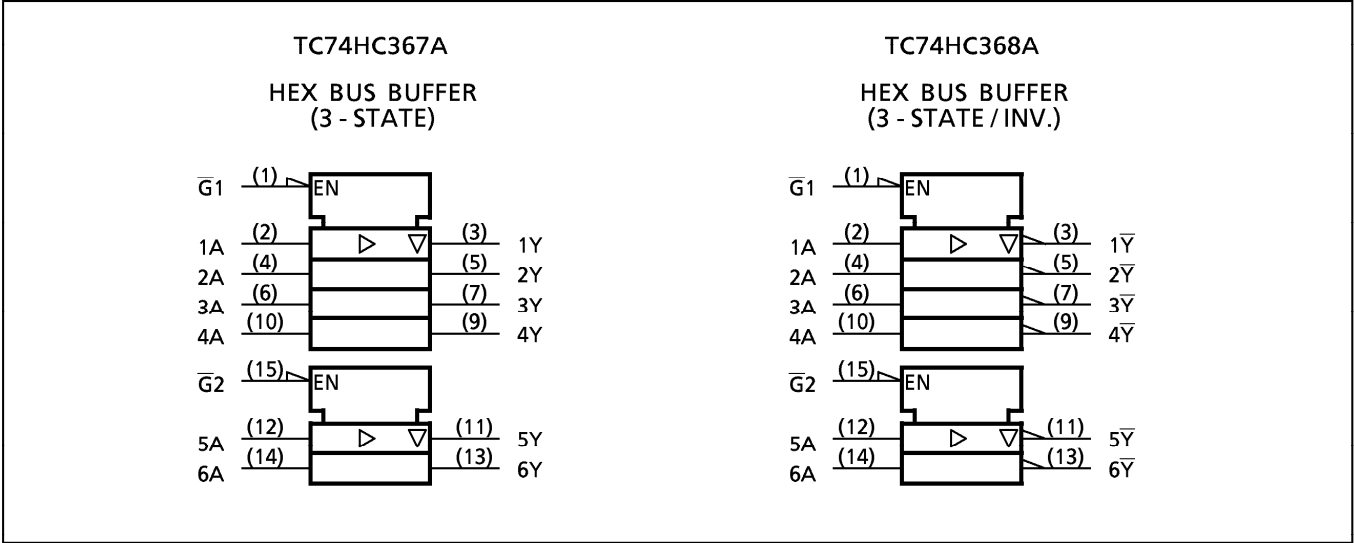
PIN ASSIGNMENT



961001EBA2

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IEC LOGIC SYMBOL



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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	$-0.5 \sim 7$	V
DC Input Voltage	V_{IN}	$-0.5 \sim V_{CC} + 0.5$	V
DC Output Voltage	V_{OUT}	$-0.5 \sim V_{CC} + 0.5$	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}	$-65 \sim 150$	°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°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}	$2 \sim 6$	V
Input Voltage	V_{IN}	$0 \sim V_{CC}$	V
Output Voltage	V_{OUT}	$0 \sim V_{CC}$	V
Operating Temperature	T_{opr}	$-40 \sim 85$	°C
Input Rise and Fall Time	t_r, t_f	$0 \sim 1000 (V_{CC} = 2.0\text{V})$ $0 \sim 500 (V_{CC} = 4.5\text{V})$ $0 \sim 400 (V_{CC} = 6.0\text{V})$	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 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	— — —	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
			$I_{OH} = -6\text{ mA}$	4.5	4.18	4.31	—	4.13	
			$I_{OH} = -7.8\text{ mA}$	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
			$I_{OL} = 6\text{ mA}$	4.5	—	0.17	—	0.33	
			$I_{OL} = 7.8\text{ mA}$	6.0	—	0.18	—	0.33	
3 - State Output Off - State Current	I_{OZ}	$V_{IN} = V_{IH} \text{ or } V_{IL}$ $V_{OUT} = V_{CC} \text{ or GND}$	6.0	—	—	± 0.5	—	± 5.0	μA
Input Leakage Current	I_{IN}	$V_{IN} = V_{CC} \text{ or GND}$	6.0	—	—	± 0.1	—	± 1.0	
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC} \text{ or GND}$	6.0	—	—	4.0	—	40.0	

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

PARAMETER	SYMBOL	TEST CONDITION			Ta = 25°C			Ta = -40~85°C		UNIT
			CL	V _{CC} (V)	MIN.	TYP.	MAX.	MIN.	MAX.	
Output Transition Time	t_{TLH} t_{THL}		50	2.0 4.5 6.0	— — —	25 7 6	60 12 10	— — —	75 15 13	ns
Propagation Delay Time	t_{pLH} t_{pHL}		50	2.0 4.5 6.0	— — —	36 12 10	95 19 16	— — —	120 24 20	
				2.0 4.5 6.0	— — —	40 16 14	130 26 22	— — —	165 33 28	
			150	2.0 4.5 6.0	— — —	40 16 14	130 26 22	— — —	165 33 28	
				2.0 4.5 6.0	— — —	40 16 14	130 26 22	— — —	165 33 28	
				2.0 4.5 6.0	— — —	40 16 14	130 26 22	— — —	165 33 28	
				2.0 4.5 6.0	— — —	40 16 14	130 26 22	— — —	165 33 28	
Output Enable Time	t_{pZL} t_{pZH}	$R_L = 1\text{k}\Omega$	50	2.0 4.5 6.0	— — —	36 12 10	120 24 20	— — —	150 30 26	
				2.0 4.5 6.0	— — —	40 16 14	160 32 27	— — —	200 40 34	
			150	2.0 4.5 6.0	— — —	40 16 14	160 32 27	— — —	200 40 34	
				2.0 4.5 6.0	— — —	40 16 14	160 32 27	— — —	200 40 34	
				2.0 4.5 6.0	— — —	40 16 14	160 32 27	— — —	200 40 34	
				2.0 4.5 6.0	— — —	40 16 14	160 32 27	— — —	200 40 34	
Output Disable Time	t_{pLZ} t_{pHZ}	$R_L = 1\text{k}\Omega$	50	2.0 4.5 6.0	— — —	35 15 13	120 24 20	— — —	150 30 26	
Input Capacitance	C_{IN}				—	5	10	—	10	pF
Output Capacitance	C_{OUT}				—	10	—	—	—	
Power Dissipation Capacitance	$C_{PD} (1)$	TC74HC367A			—	36	—	—	—	
		TC74HC368A			—	30	—	—	—	

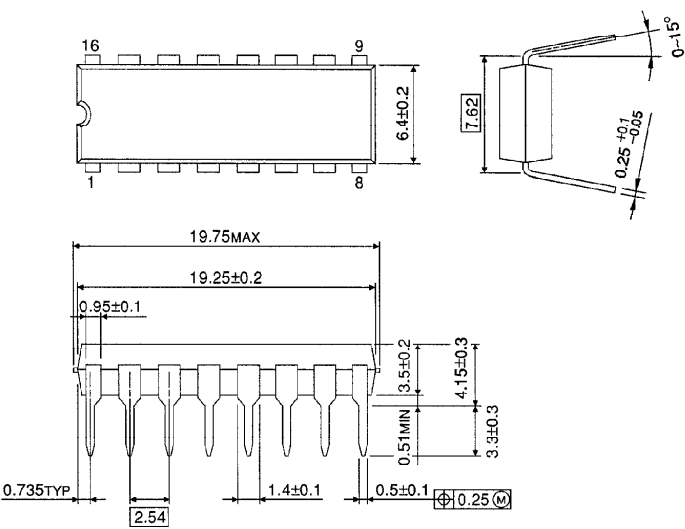
Note (1) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation :

$$I_{CC}(\text{opr}) = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 6 \text{ (per bit)}$$

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

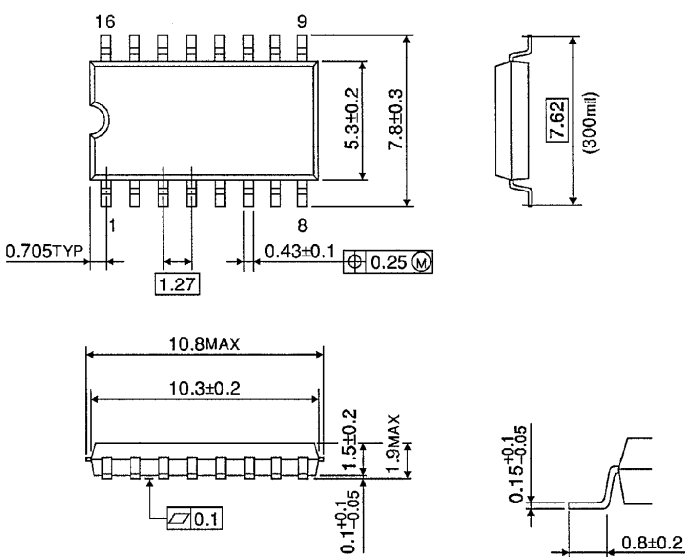
Unit in mm



Weight : 1.00g (Typ.)

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

Unit in mm

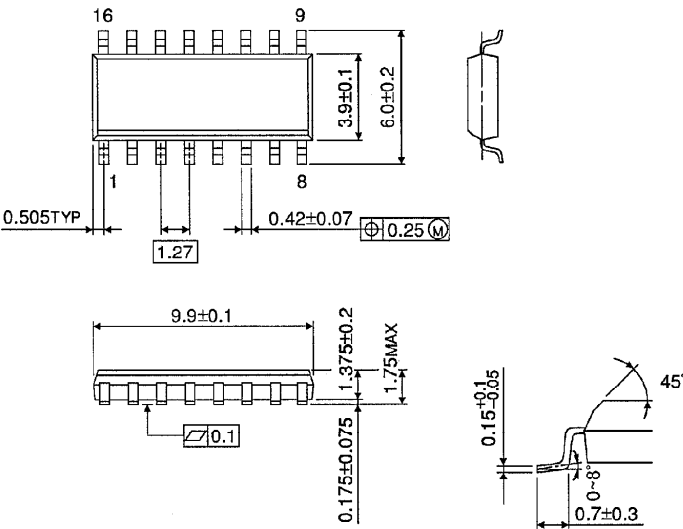


Weight : 0.18g (Typ.)

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.)