

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)**

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

The TC74HC367A and TC74HC368A are high speed CMOS 3-STATE BUS BUFFERS fabricated with silicon gate C<sup>2</sup>MOS 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 ( $\bar{G}1$ ), and the other two buffers are controlled by another enable input ( $\bar{G}2$ ). The outputs of each buffer group are enabled when  $\bar{G}1$  and/or  $\bar{G}2$  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.

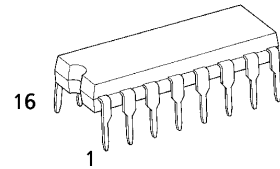
**FEATURES :**

- 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

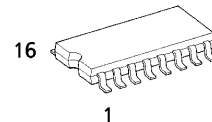
**TRUTH TABLE**

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

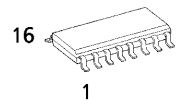
X : Don't Care, Z : High Impedance



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

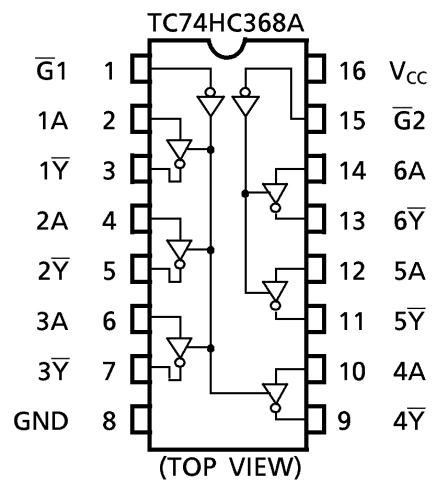
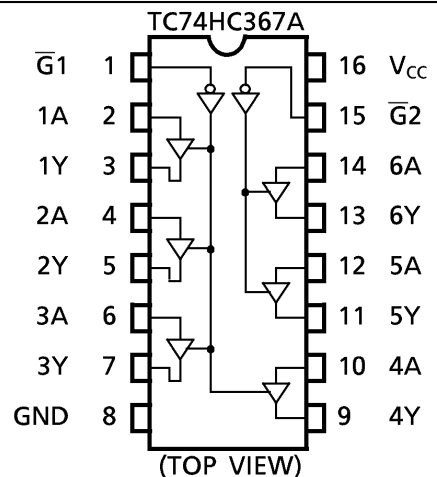


F (SOP16-P-300-1.27)  
Weight : 0.18g (Typ.)

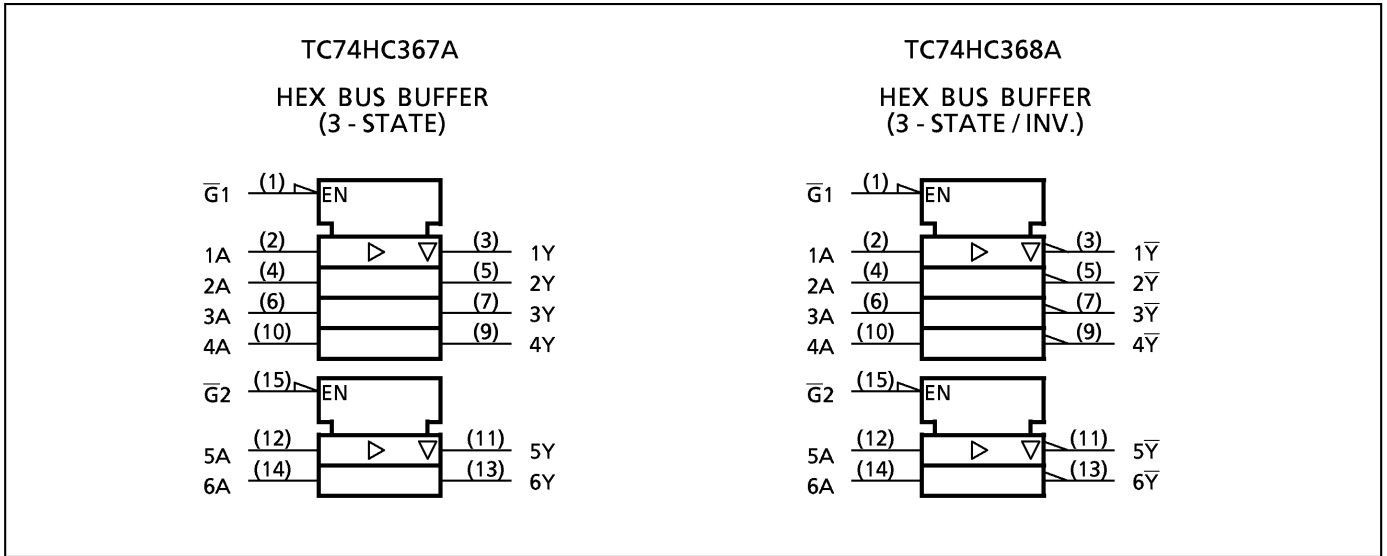


FN (SOL16-P-150-1.27)  
Weight : 0.13g (Typ.)

**PIN ASSIGNMENT**



**IEC LOGIC SYMBOL**



**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V <sub>CC</sub>	-0.5~7	V
DC Input Voltage	V <sub>IN</sub>	-0.5~V <sub>CC</sub> +0.5	V
DC Output Voltage	V <sub>OUT</sub>	-0.5~V <sub>CC</sub> +0.5	V
Input Diode Current	I <sub>IK</sub>	± 20	mA
Output Diode Current	I <sub>OK</sub>	± 20	mA
DC Output Current	I <sub>OUT</sub>	± 35	mA
DC V <sub>CC</sub> /Ground Current	I <sub>CC</sub>	± 75	mA
Power Dissipation	P <sub>D</sub>	500 (DIP)* / 180 (SOP)	mW
Storage Temperature	T <sub>stg</sub>	-65~150	°C

\*500mW in the range of Ta = -40°C~65°C. From Ta = 65°C to 85°C a derating factor of -10mW/°C shall be applied until 300mW.

**RECOMMENDED OPERATING CONDITIONS**

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V <sub>CC</sub>	2~6	V
Input Voltage	V <sub>IN</sub>	0~V <sub>CC</sub>	V
Output Voltage	V <sub>OUT</sub>	0~V <sub>CC</sub>	V
Operating Temperature	T <sub>opr</sub>	-40~85	°C
Input Rise and Fall Time	t <sub>r</sub> , t <sub>f</sub>	0~ 1000 (V <sub>CC</sub> = 2.0V) 0~ 500 (V <sub>CC</sub> = 4.5V) 0~ 400 (V <sub>CC</sub> = 6.0V)	ns

**DC ELECTRICAL CHARACTERISTICS**

PARAMETER	SYMBOL	TEST CONDITION	V <sub>CC</sub> (V)	Ta = 25°C			Ta = -40~85°C		UNIT		
				MIN.	TYP.	MAX.	MIN.	MAX.			
High - Level Input Voltage	V <sub>IH</sub>		2.0 4.5 6.0	1.50 3.15 4.20	— — —	— — —	1.50 3.15 4.20	— — —	V		
Low - Level Input Voltage	V <sub>IL</sub>		2.0 4.5 6.0	— — —	— — —	0.50 1.35 1.80	— — —	0.50 1.35 1.80	V		
High - Level Output Voltage	V <sub>OH</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>		I <sub>OH</sub> = -20μA	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 <sub>OH</sub> = -6 mA I <sub>OH</sub> = -7.8mA	4.5 6.0	4.18 5.68	4.31 5.80	— —	4.13 5.63	— —	
Low - Level Output Voltage	V <sub>OL</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub>		I <sub>OL</sub> = 20μA	2.0 4.5 6.0	— — —	0.0 0.0 0.0	0.1 0.1 0.1	— — —	0.1 0.1 0.1	V
				I <sub>OL</sub> = 6 mA I <sub>OL</sub> = 7.8mA	4.5 6.0	— —	0.17 0.18	0.26 0.26	— —	0.33 0.33	
3 - State Output Off - State Current	I <sub>OZ</sub>	V <sub>IN</sub> = V <sub>IH</sub> or V <sub>IL</sub> V <sub>OUT</sub> = V <sub>CC</sub> or GND	6.0	—	—	± 0.5	—	± 5.0	μA		
Input Leakage Current	I <sub>IN</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND	6.0	—	—	± 0.1	—	± 1.0	μA		
Quiescent Supply Current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND	6.0	—	—	4.0	—	40.0	μA		

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 <sub>CC</sub> (V)	MIN.	TYP.	MAX.		MIN.	MAX.
Output Transition Time	$t_{TLH}$ $t_{THL}$		50	2.0	—	25	60	—	75	ns
				4.5	—	7	12	—	15	
				6.0	—	6	10	—	13	
Propagation Delay Time	$t_{pLH}$ $t_{pHL}$		50	2.0	—	36	95	—	120	
				4.5	—	12	19	—	24	
				6.0	—	10	16	—	20	
			150	2.0	—	40	130	—	165	
				4.5	—	16	26	—	33	
				6.0	—	14	22	—	28	
Output Enable Time	$t_{pZL}$ $t_{pZH}$	$R_L = 1\text{k}\Omega$	50	2.0	—	36	120	—	150	
				4.5	—	12	24	—	30	
				6.0	—	10	20	—	26	
			150	2.0	—	40	160	—	200	
				4.5	—	16	32	—	40	
				6.0	—	14	27	—	34	
Output Disable Time	$t_{pLZ}$ $t_{pHZ}$	$R_L = 1\text{k}\Omega$	50	2.0	—	35	120	—	150	
				4.5	—	15	24	—	30	
				6.0	—	13	20	—	26	
Input Capacitance	$C_{IN}$				—	5	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 PACKAGE DIMENSIONS (DIP16-P-300-2.54A)**

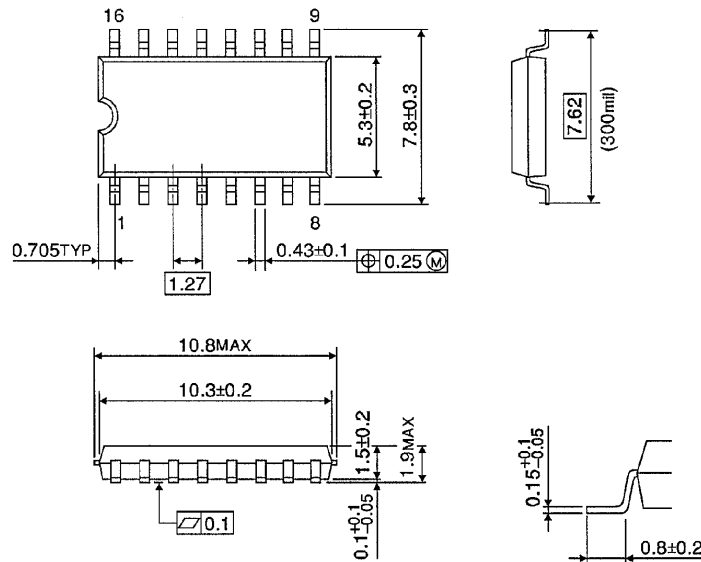
Unit in mm



Weight : 1.00g (Typ.)

**SOP 16PIN (200mil BODY) PACKAGE DIMENSIONS (SOP16-P-300-1.27)**

Unit in mm



Weight : 0.18g (Typ.)

**SOP 16PIN (150mil BODY) PACKAGE DIMENSIONS (SOL16-P-150 -1.27)**

Unit in mm

(Note) This package is not available in Japan.



Weight : 0.13g (Typ.)

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