

TC74VHCT367AF, TC74VHCT367AFN, TC74VHCT367AFT**HEX BUS BUFFER****TC74VHCT367 AF/AFN/AFT NON-INVERTED, 3-STATE OUTPUTS**

The TC74VHCT367A is advanced high speed CMOS HEX BUS BUFFERS fabricated with silicon gate C²MOS technology.

They achieve the high speed operation similar to equivalent Bipolar Schottky TTL 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.

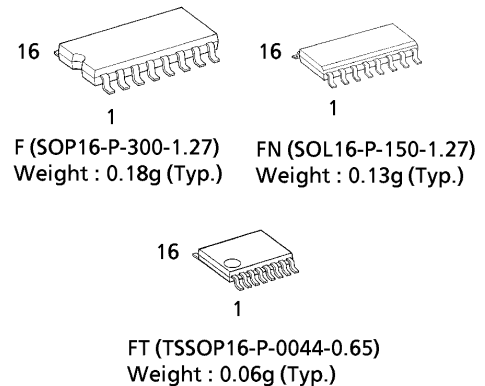
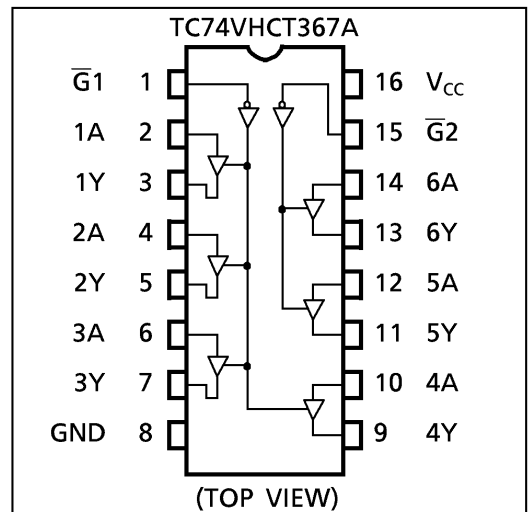
The TC74VHCT367A is a non-inverting output type.

Input protection and output circuit ensure that 0 to 5.5V can be applied to the input and output*1 pins without regard to the supply voltage. These structure prevents device destruction due to mismatched supply and input/output voltages such as battery back up, hot board insertion, etc.

*1: output in off-state

FEATURES:

- High Speed..... $t_{pd} = 4.7\text{ns}$ (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 ... $V_{IL} = 0.8\text{V}$ (Max.)
 $V_{IH} = 2.0\text{V}$ (Min.)
- Power Down Protection is provided on all inputs and outputs
- Balanced Propagation Delays..... $t_{pLH} \approx t_{pHL}$
- Low Noise $V_{OLP} = 0.8\text{V}$ (Max.)
- Pin and Function Compatible with the 74ALS367.

**PIN ASSIGNMENT**

000707EBA1

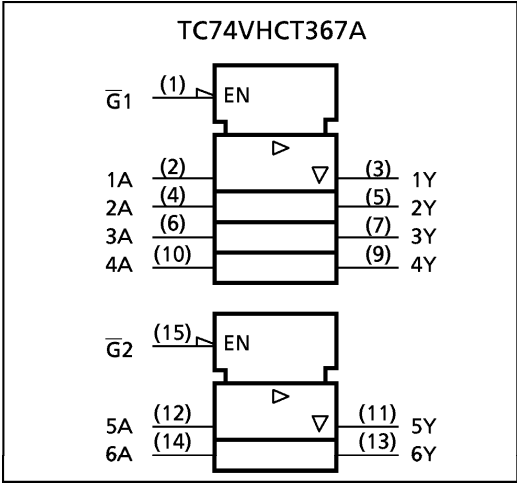
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.
- The information contained herein is subject to change without notice.

TRUTH TABLE

INPUTS		OUTPUTS
$\overline{G}$	A	Y
L	L	L
L	H	H
H	X	Z

X : Don't Care
Z : High Impedance

IEC LOGIC SYMBOL



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage Range	V_{CC}	$-0.5 \sim 7.0$	V
DC Input Voltage	V_{IN}	$-0.5 \sim 7.0$	V
DC Output Voltage	V_{OUT}	$-0.5 \sim 7.0$ (Note 1)	V
		$-0.5 \sim V_{CC} + 0.5$ (Note 2)	
Input Diode Current	I_{IK}	-20	mA
Output Diode Current	I_{OK}	± 20 (Note 3)	mA
DC Output Current	I_{OUT}	± 25	mA
DC Vcc/Ground Current	I_{CC}	± 50	mA
Power Dissipation	P_D	180	mW
Storage Temperature	T_{stg}	$-65 \sim 150$	$^{\circ}C$

- (Note 1) $V_{CC} = 0V$
(Note 2) High or Low State. I_{OUT} absolute maximum rating must be observed.
(Note 3) $V_{OUT} < GND$, $V_{OUT} > V_{CC}$

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V_{CC}	4.5~5.5	V
Input Voltage	V_{IN}	0~5.5	V
Output Voltage	V_{OUT}	0~5.5 (Note 4)	V
		0~ V_{CC} (Note 5)	
Operating Temperature	T_{opr}	$-40 \sim 85$	$^{\circ}C$
Input Rise and Fall Time	dt / dV	0~20	ns / V

- (Note 4) $V_{CC} = 0V$
(Note 5) High or Low State

DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITON		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}			4.5~5.5	2.0	—	—	2.0	—	V
Low - Level Input Voltage	V_{IL}			4.5~5.5	—	—	0.8	—	0.8	V
High - Level Output Voltage	V_{OH}	$V_{IN} = V_{IH} \text{ or } V_{IL}$	$I_{OH} = -50\mu\text{A}$	4.5	4.40	4.50	—	4.40	—	V
			$I_{OH} = -8\text{mA}$	4.5	3.94	—	—	3.80	—	
Low - Level Output Voltage	V_{OL}	$V_{IN} = V_{IH} \text{ or } V_{IL}$	$I_{OL} = 50\mu\text{A}$	4.5	—	0.0	0.10	—	0.10	V
			$I_{OL} = 8\text{mA}$	4.5	—	—	0.36	—	0.44	
3 - State Output Off - State Current	I_{OZ}	$V_{IN} = V_{IH} \text{ or } V_{IL}$ $V_{OUT} = V_{CC} \text{ or GND}$		5.5	—	—	± 0.25	—	± 2.50	μA
Input Leakage Current	I_{IN}	$V_{IN} = 5.5\text{V or GND}$		0~5.5	—	—	± 0.1	—	± 1.0	
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC} \text{ or GND}$		5.5	—	—	4.0	—	40.0	
	I_{CCT}	PER INPUT : $V_{IN} = 3.4\text{V}$ OTHER INPUT : $V_{CC} \text{ or GND}$		5.5	—	—	1.35	—	1.50	mA
Output Leakage Current	I_{OPD}	$V_{OUT} = 5.5\text{V}$		0	—	—	+0.5	—	+5.0	μA

AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3\text{ns}$)

PARAMETER	SYMBOL	TEST CONDITION			Ta = 25°C			Ta = − 40~85°C		UNIT
			V _{CC} (V)	C _L (pF)	MIN.	TYP.	MAX.	MIN.	MAX.	
Propagation Delay Time	t _{pLH}		5.0 ± 0.5	15	—	4.7	7.4	1.0	8.5	ns
	t _{pHL}			50	—	5.2	8.4	1.0	9.5	
3-State Output Enable Time	t _{pZL}	R _L = 1kΩ	5.0 ± 0.5	15	—	4.9	10.4	1.0	12.0	
	t _{pZH}			50	—	5.4	11.4	1.0	13.0	
3-State Output Disable Time	t _{pLZ} t _{pHZ}	R _L = 1kΩ	5.0 ± 0.5	50	—	6.3	11.4	1.0	13.0	
Output to Output Skew	t _{osLH} t _{osHL}	(Note 6)	5.0 ± 0.5	50	—	—	1.0	—	1.0	
Input Capacitance	C _{IN}				—	4	10	—	10	pF
Output Capacitance	C _{OUT}				—	6	—	—	—	
Power Dissipation Capacitance	C _{PD}	(Note 7)			—	16	—	—	—	

(Note 6) Parameter guaranteed by design. $t_{osLH} = |t_{pLH\ m} - t_{pLH\ n}|$, $t_{osHL} = |t_{pHL\ m} - t_{pHL\ n}|$

(Note 7) 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 :

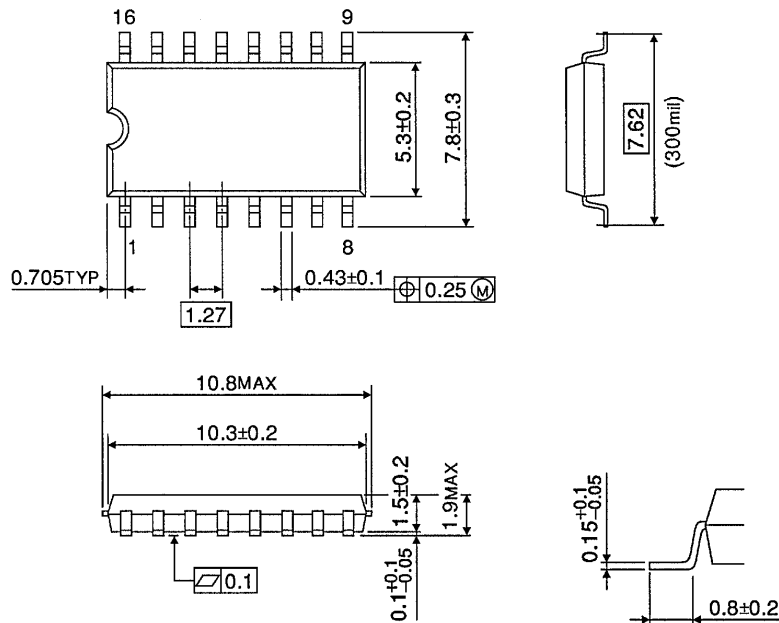
$$I_{CC(\text{opr.})} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC} / 6 \text{ (per bit)}$$

NOISE CHARACTERISTICS (Input $t_r = t_f = 3\text{ns}$)

PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C		UNIT
			V _{CC} (V)	TYP.	MAX.	
Quiet Output	V _{OLP}	C _L = 50pF	5.0	0.6	0.8	V
Maximum Dynamic V _{OL}						
Quiet Output	V _{OLV}	C _L = 50pF	5.0	-0.6	-0.8	V
Minimum Dynamic V _{OL}						
Minimum High Level Dynamic Input Voltage	V _{IHD}	C _L = 50pF	5.0	—	2.0	V
Maximum Low Level Dynamic Input Voltage	V _{ILD}	C _L = 50pF	5.0	—	0.8	V

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

Unit in mm

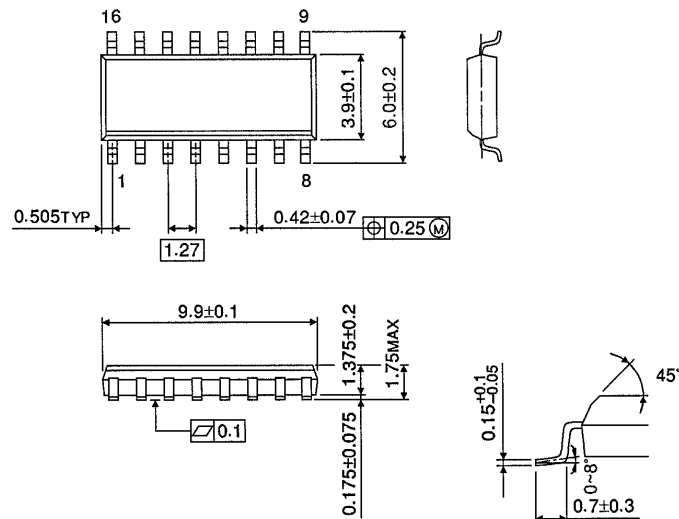


Weight : 0.18g (Typ.)

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.)

TSSOP 16PIN PACKAGE DIMENSIONS (TSSOP16-P-0044-0.65)

Unit in mm

