

TOSHIBA CMOS Digital Integrated Circuit Silicon Monolithic

TC74VHCT367AF, TC74VHCT367AFN, TC74VHCT367AFT

Hex Bus Buffer

TC74VHCT367AF/AFN/AFT Non-Inverted,
3-State Outputs

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

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.

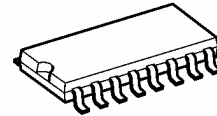
Input protection and output circuit ensure that 0 to 5.5 V can be applied to the input and output ^(Note) pins without regard to the supply voltage. These structure prevents device destruction due to mismatched supply and input/output voltages such as battery back up, hot board insertion, etc.

Note: Output in off-state

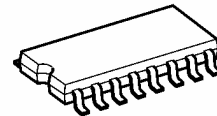
Features

- High speed: $t_{pd} = 4.7$ ns (typ.) at $V_{CC} = 5$ V
- Low power dissipation: $I_{CC} = 4$ μ A (max) at $T_a = 25^\circ$ C
- Compatible with TTL outputs: $V_{IL} = 0.8$ V (max)
 $V_{IH} = 2.0$ V (min)
- Power down protection is provided on all inputs and outputs.
- Balanced propagation delays: $t_{pLH} \approx t_{pHL}$
- Low noise: $V_{OLP} = 0.8$ V (max)
- Pin and function compatible with the 74ALS367.

TC74VHCT367AF

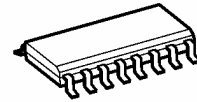


SOP16-P-300-1.27A



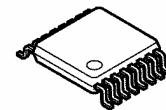
SOP16-P-300-1.27

TC74VHCT367AFN



SOL16-P-150-1.27

TC74VHCT367AFT

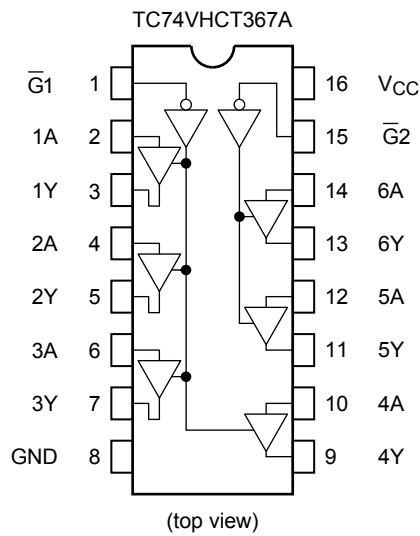


TSSOP16-P-0044-0.65A

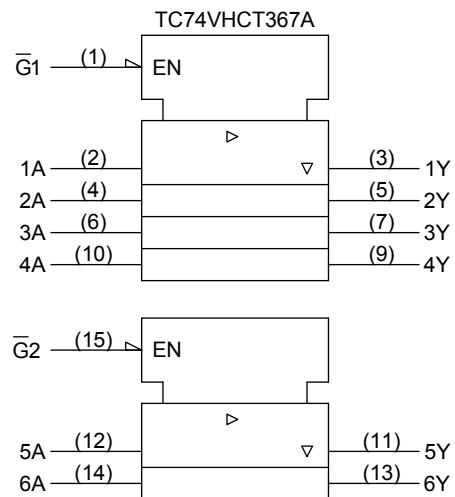
Weight

SOP16-P-300-1.27A	: 0.18 g (typ.)
SOP16-P-300-1.27	: 0.18 g (typ.)
SOL16-P-150-1.27	: 0.13 g (typ.)
TSSOP16-P-0044-0.65A	: 0.06 g (typ.)

Pin Assignment



IEC Logic Symbol



Truth Table

Inputs		Output
\bar{G}	A	Y
L	L	L
L	H	H
H	X	Z

X: Don't care

Z: High impedance

Absolute Maximum Ratings (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage range	V_{CC}	-0.5 to 7.0	V
DC input voltage	V_{IN}	-0.5 to 7.0	V
DC output voltage	V_{OUT}	-0.5 to 7.0 (Note 2)	V
		-0.5 to $V_{CC} + 0.5$ (Note 3)	
Input diode current	I_{IK}	-20	mA
Output diode current	I_{OK}	± 20 (Note 4)	mA
DC output current	I_{OUT}	± 25	mA
DC V_{CC} /ground current	I_{CC}	± 50	mA
Power dissipation	P_D	180	mW
Storage temperature	T_{stg}	-65 to 150	$^{\circ}C$

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

Note 2: Output in Off-State

Note 3: High or low state. I_{OUT} absolute maximum rating must be observed.

Note 4: $V_{OUT} < GND$, $V_{OUT} > V_{CC}$

Recommended Operating Conditions (Note 1)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	4.5 to 5.5	V
Input voltage	V_{IN}	0 to 5.5	V
Output voltage	V_{OUT}	0 to 5.5 (Note 2)	V
		0 to V_{CC} (Note 3)	
Operating temperature	T_{opr}	-40 to 85	°C
Input rise and fall time	dt/dV	0 to 20	ns/V

Note 1: The recommended operating conditions are required to ensure the normal operation of the device.
Unused inputs must be tied to either VCC or GND.

Note 2: Output in Off-State

Note 3: High or low state.

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition	Ta = 25°C			Ta = -40 to 85°C		Unit		
			VCC (V)	Min	Typ.	Max	Min		Max	
High-level input voltage	V_{IH}	—	4.5 to 5.5	2.0	—	—	2.0	—	V	
Low-level input voltage	V_{IL}	—	4.5 to 5.5	—	—	0.8	—	0.8	V	
High-level output voltage	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -50 \mu A$	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}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 50 \mu A$	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}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND	5.5	—	—	±0.25	—	±2.50	μA	
Input leakage current	I_{IN}	$V_{IN} = 5.5 \text{ V}$ or GND	0 to 5.5	—	—	±0.1	—	±1.0	μA	
Quiescent supply current	I_{CC}	$V_{IN} = V_{CC}$ or GND	5.5	—	—	4.0	—	40.0	μA	
	I_{CCT}	Per input: $V_{IN} = 3.4 \text{ V}$ Other input: V_{CC} 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 Characteristics (input: $t_r = t_f = 3$ ns)

Characteristics	Symbol	Test Condition		Ta = 25°C			Ta = -40 to 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	ns
	t _{pZH}			50	—	5.4	11.4	1.0	13.0	
3-state output disable time	t _{pLZ}	R _L = 1kΩ	5.0 ± 0.5	50	—	6.3	11.4	1.0	13.0	ns
	t _{pHZ}									
Output to output skew	t _{osLH}	(Note 1)	5.0 ± 0.5	50	—	—	1.0	—	1.0	ns
	t _{osHL}									
Input capacitance	C _{IN}	—		—	4	10	—	10	pF	
Output capacitance	C _{OUT}	—		—	6	—	—	—	pF	
Power dissipation capacitance	C _{PD}	—		(Note 2)	—	16	—	—	pF	

Note 1: Parameter guaranteed by design.

$$t_{osLH} = |t_{pLHm} - t_{pLHn}|, t_{osHL} = |t_{pHLm} - t_{pHLn}|$$

Note 2: 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:

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

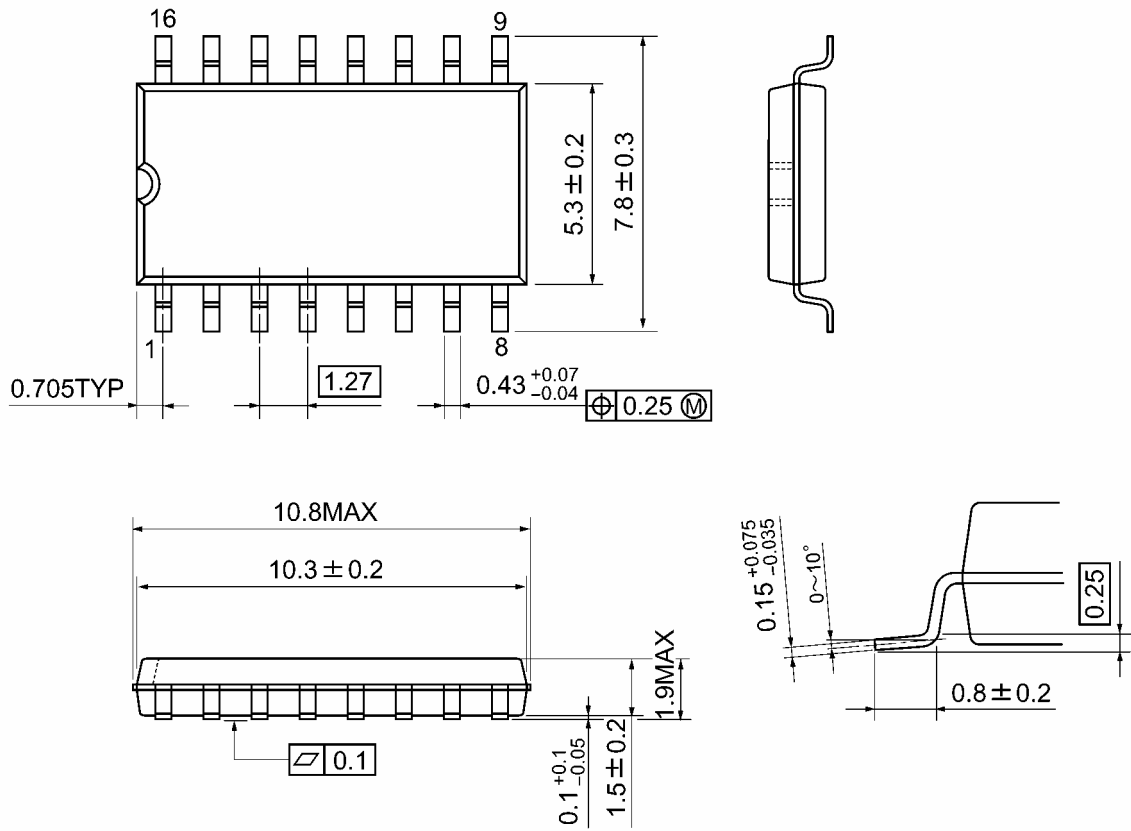
Noise Characteristics (input: $t_r = t_f = 3$ ns)

Characteristics	Symbol	Test Condition	Ta = 25°C			Unit
			V _{CC} (V)	Typ.	Max	
Quiet output maximum dynamic V _{OL}	V _{OLP}	C _L = 50 pF	5.0	0.6	0.8	V
Quiet output minimum dynamic V _{OL}	V _{OLV}	C _L = 50 pF	5.0	-0.6	-0.8	V
Minimum high level dynamic input voltage	V _{IHD}	C _L = 50 pF	5.0	—	2.0	V
Maximum low level dynamic input voltage	V _{ILD}	C _L = 50 pF	5.0	—	0.8	V

Package Dimensions

SOP16-P-300-1.27A

Unit: mm

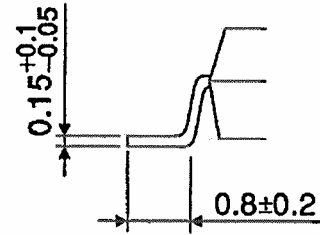
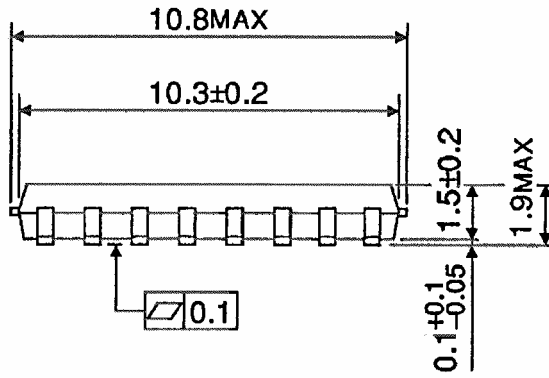
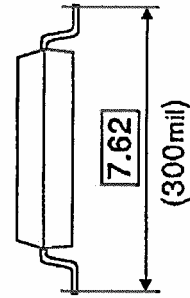
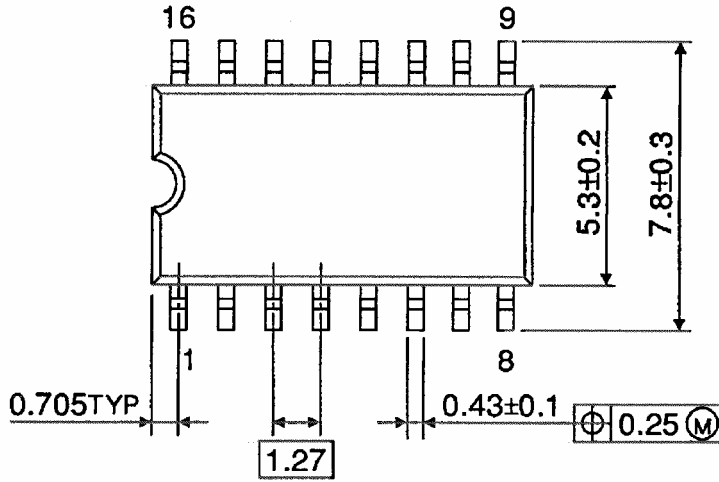


Weight: 0.18 g (typ.)

Package Dimensions

SOP16-P-300-1.27

Unit : mm

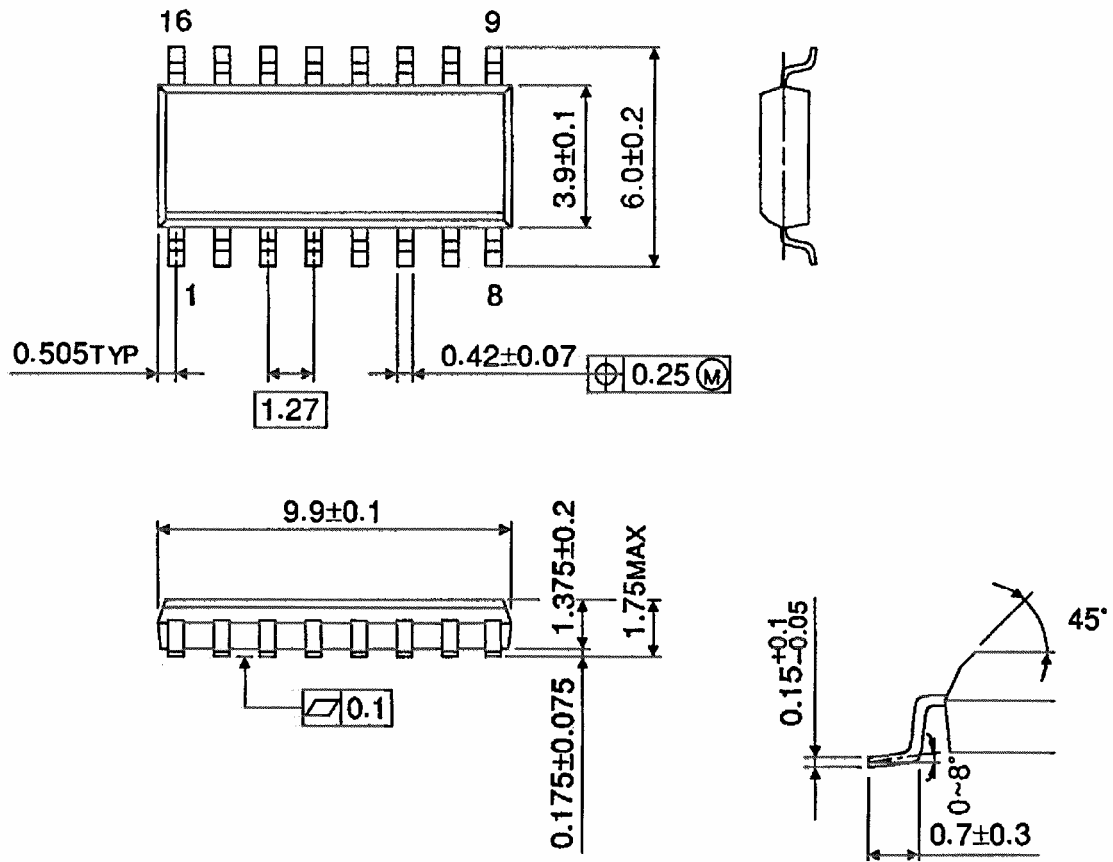


Weight: 0.18 g (typ.)

Package Dimensions (Note)

SOL16-P-150-1.27

Unit : mm



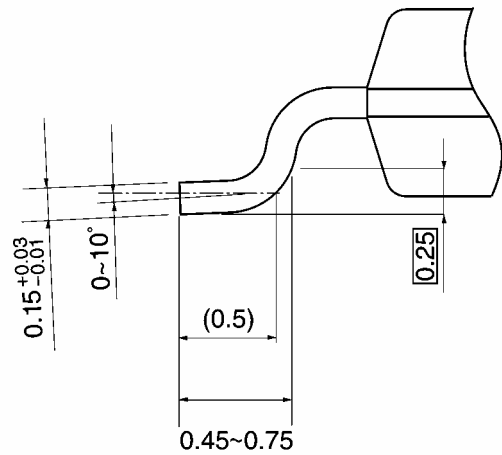
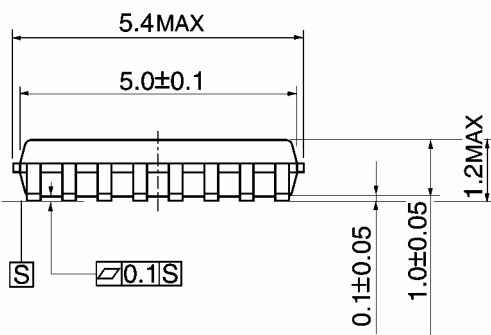
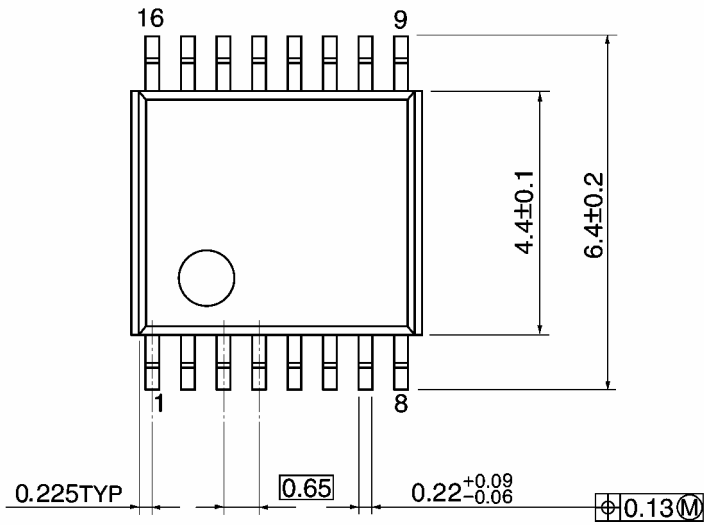
Note: This package is not available in Japan.

Weight: 0.13 g (typ.)

Package Dimensions

TSSOP16-P-0044-0.65A

Unit: mm



Weight: 0.06 g (typ.)

Note: Lead (Pb)-Free Packages**SOP16-P-300-1.27A SOL16-P-150-1.27 TSSOP16-P-0044-0.65A****RESTRICTIONS ON PRODUCT USE**

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