

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

**TC74VHCT125AF, TC74VHCT125AFN, TC74VHCT125AFT**  
**TC74VHCT126AF, TC74VHCT126AFN, TC74VHCT126AFT**

**TC74VHCT125AF / AFN / AFT QUAD BUS BUFFER**  
**TC74VHCT126AF / AFN / AFT QUAD BUS BUFFER**

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

The TC74VHCT125A / 126A are high speed CMOS QUAD BUS BUFFERS fabricated with silicon gate C<sup>2</sup>MOS technology.

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

The TC74VHCT125A requires the 3-state control input  $\bar{G}$  to be set high to place the output into the high impedance state, whereas the TC74VHCT126A requires the control input G to be set low to place the output into high impedance.

The input voltage are compatible with TTL output voltage. This device may be used as a level converter for interfacing 3.3 V to 5 V system.

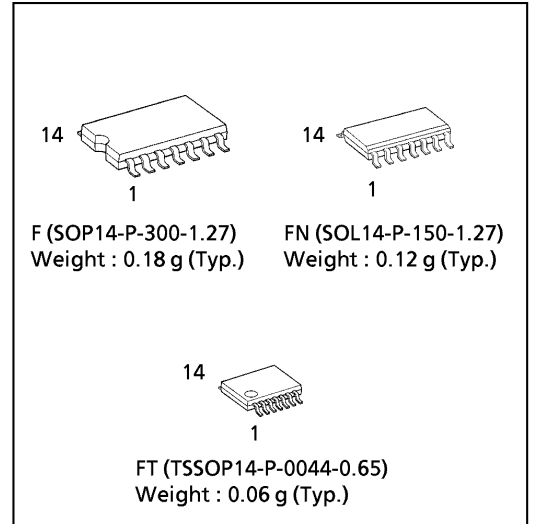
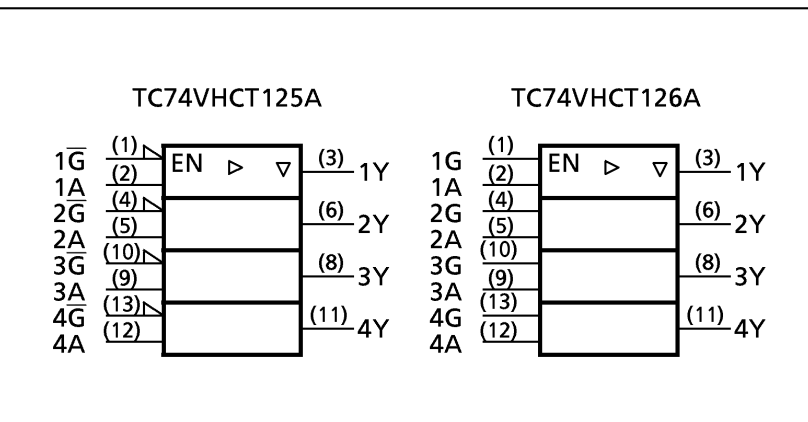
Input protection and output circuit ensure that 0 to 5.5 V can be applied to the input and output\*1 pins without regard to the supply voltage. These structure prevents device destruction due to mismatched supply and input/output voltages such as battery back up, hot board insertion, etc.

\*1: V<sub>cc</sub> = 0 V

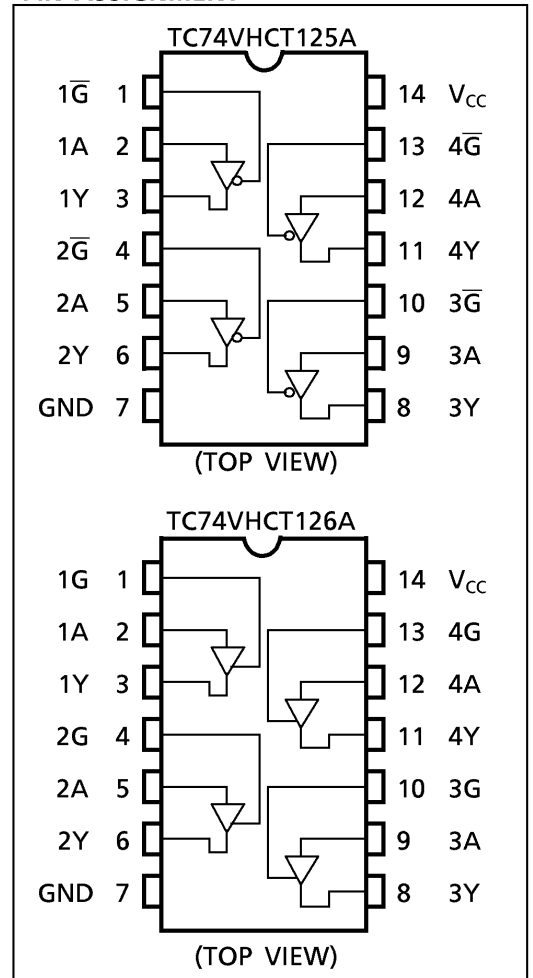
**FEATURES:**

- High Speed.....t<sub>pd</sub> = 3.8 ns (typ.) at V<sub>CC</sub> = 5 V
- Low Power Dissipation.....I<sub>CC</sub> = 4 μA (Max.) at T<sub>a</sub> = 25°C
- Compatible with TTL outputs....V<sub>IL</sub> = 0.8 V (Max.)  
V<sub>IH</sub> = 2.0 V (Min.)
- Power Down Protection is provided on all inputs and outputs.
- Balanced Propagation Delays.....t<sub>pLH</sub> ≈ t<sub>pHL</sub>
- Low Noise .....V<sub>OLP</sub> = 0.8 V (Max.)
- Pin and Function Compatible with the 74 series (74AC / HC / F / ALS / LS etc.) 125 / 126 type.

**IEC LOGIC SYMBOL**



**PIN ASSIGNMENT**



## TRUTH TABLE

TC74VHCT125A			TC74VHCT126A		
INPUTS		OUTPUTS	INPUTS		OUTPUTS
$\bar{G}$	A	Y	G	A	Y
H	X	Z	L	X	Z
L	L	L	H	L	L
L	H	H	H	H	H

X: Don't Care  
Z: High Impedance

X: Don't Care  
Z: High Impedance

## ABSOLUTE MAXIMUM RATINGS

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

(Note 1) : Output in Off-State

(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	$T_{opr}$	-40~85	$^{\circ}C$
Input Rise and Fall Time	dt/dV	0~20	ns/V

(Note 4) : Output in Off-State

(Note 5) : High or Low State

## DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITON	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>		4.5~5.5	2.0	—	—	2.0	—	V	
Low - Level Input Voltage	V <sub>IL</sub>		4.5~5.5	—	—	0.8	—	0.8	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> = -50 μA	4.5	4.40	4.50	—	4.40	—	V
			I <sub>OH</sub> = -8 mA	4.5	3.94	—	—	3.80	—	
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> = 50 μA	4.5	—	0.0	0.1	—	0.1	V
			I <sub>OL</sub> = 8 mA	4.5	—	—	0.36	—	0.44	
Input Leakage Current	I <sub>IN</sub>	V <sub>IN</sub> = 5.5 V or GND	0~5.5	—	—	±0.1	—	±1.0	μA	
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	5.5	—	—	±0.25	—	±2.50		
Quiescent Supply Current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND	5.5	—	—	4.0	—	40.0		
	I <sub>CCT</sub>	PER INPUT : V <sub>IN</sub> = 3.4 V OTHER INPUT : V <sub>CC</sub> or GND	5.5	—	—	1.35	—	1.50	mA	
Output Leakage Current	I <sub>OPD</sub>	V <sub>OUT</sub> = 5.5 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 <sub>CC</sub> (V)	CL (pF)	MIN.	TYP.	MAX.	MIN.	MAX.	
Propagation Delay Time	t <sub>pLH</sub>		5.0 ± 0.5	15	—	3.8	5.5	1.0	6.5	ns
	t <sub>pHL</sub>			50	—	5.3	7.5	1.0	8.5	
Output Enable Time	t <sub>pZL</sub>	RL = 1 kΩ	5.0 ± 0.5	15	—	3.6	5.1	1.0	6.0	
	t <sub>pZH</sub>				50	—	5.1	7.1	1.0	
Output Disable Time	t <sub>pLZ</sub>	RL = 1 kΩ	5.0 ± 0.5	50	—	6.1	8.8	1.0	10.0	
	t <sub>pHZ</sub>									
Output to Output Skew	t <sub>osLH</sub> t <sub>osHL</sub>	(Note 6)	5.0 ± 0.5	50	—	—	1.0	—	1.0	
Input Capacitance	C <sub>IN</sub>				—	4	10	—	10	pF
Output Capacitance	C <sub>OUT</sub>				—	6	—	—	—	
Power Dissipation Capacitance (Note 7)	C <sub>PD</sub>	TC74VHCT125A			—	14	—	—	—	
		TC74VHCT126A			—	15	—	—	—	

(Note 6) : Parameter guaranteed by design.  $t_{osLH} = |t_{pLHm} - t_{pLHn}|$ ,  $t_{osHL} = |t_{pHLm} - t_{pHLn}|$

(Note 7) : 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 :

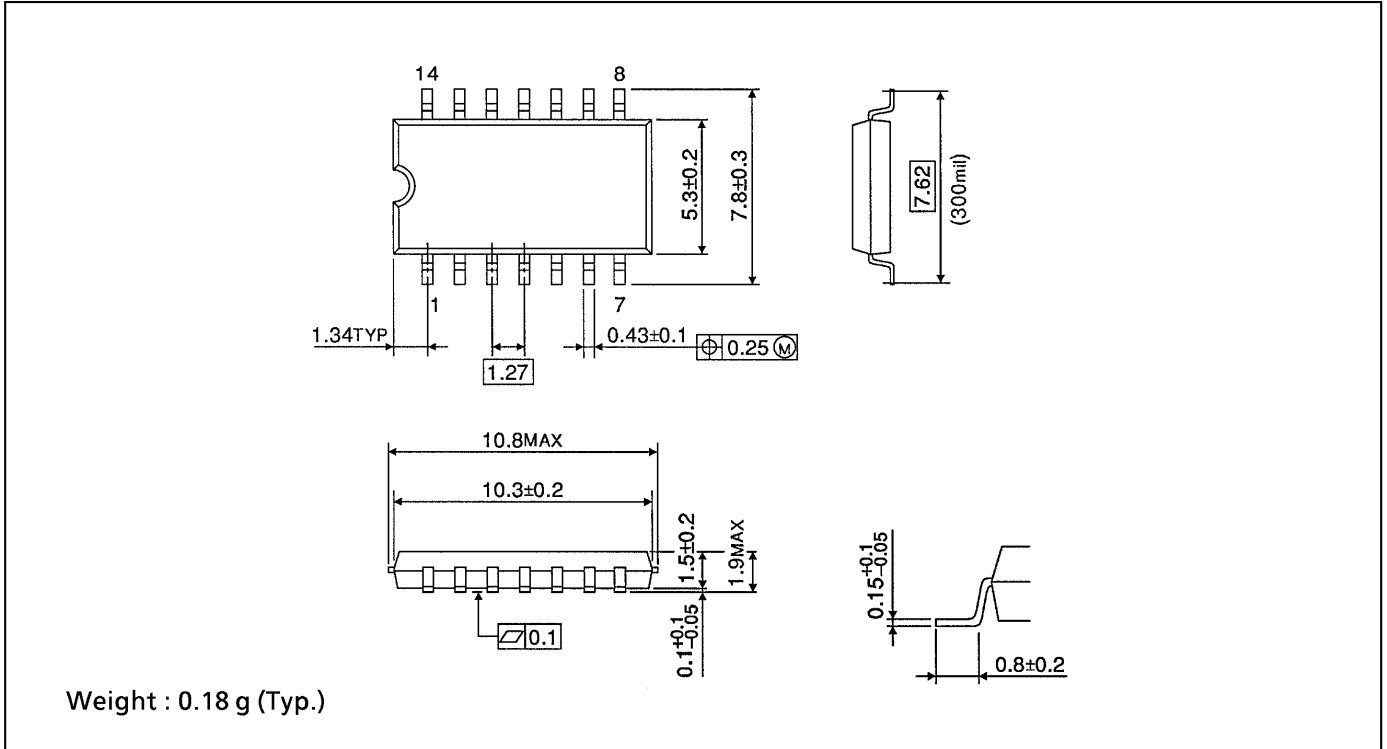
$$I_{CC(opr.)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/4 \text{ (per Gate)}$$

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

PARAMETER	SYMBOL	TEST CONDITION		Ta = 25°C		UNIT
			V <sub>CC</sub> (V)	TYP.	LIMIT	
Quiet Output Maximum Dynamic V <sub>OL</sub>	V <sub>OLP</sub>	C <sub>L</sub> = 50 pF	5.0	0.5	0.8	V
Quiet Output Minimum Dynamic V <sub>OL</sub>	V <sub>OLV</sub>	C <sub>L</sub> = 50 pF	5.0	-0.5	-0.8	V
Minimum High Level Dynamic Input Voltage	V <sub>IHD</sub>	C <sub>L</sub> = 50 pF	5.0	—	2.0	V
Maximum Low Level Dynamic Input Voltage	V <sub>ILD</sub>	C <sub>L</sub> = 50 pF	5.0	—	0.8	V

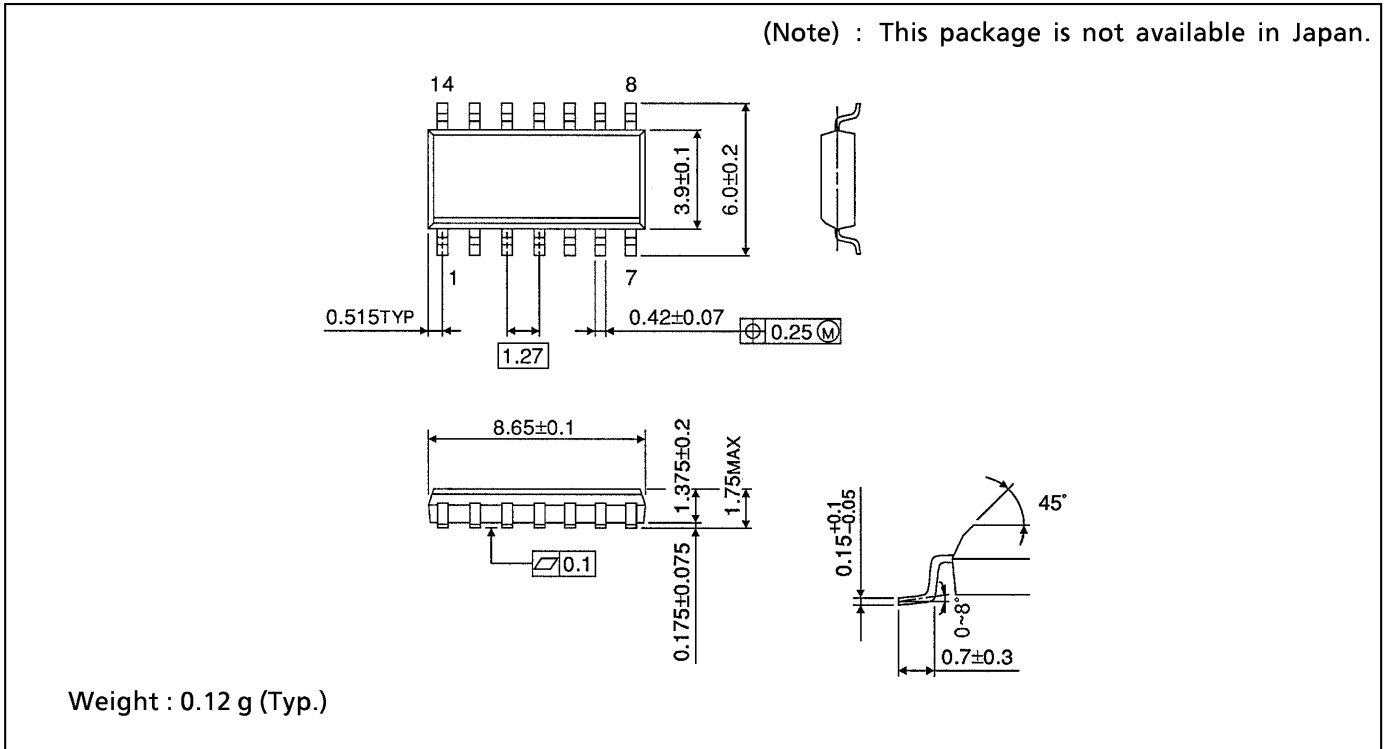
**SOP 14 PIN (200 mil BODY) PACKAGE DIMENSIONS (SOP14-P-300-1.27)**

Unit in mm



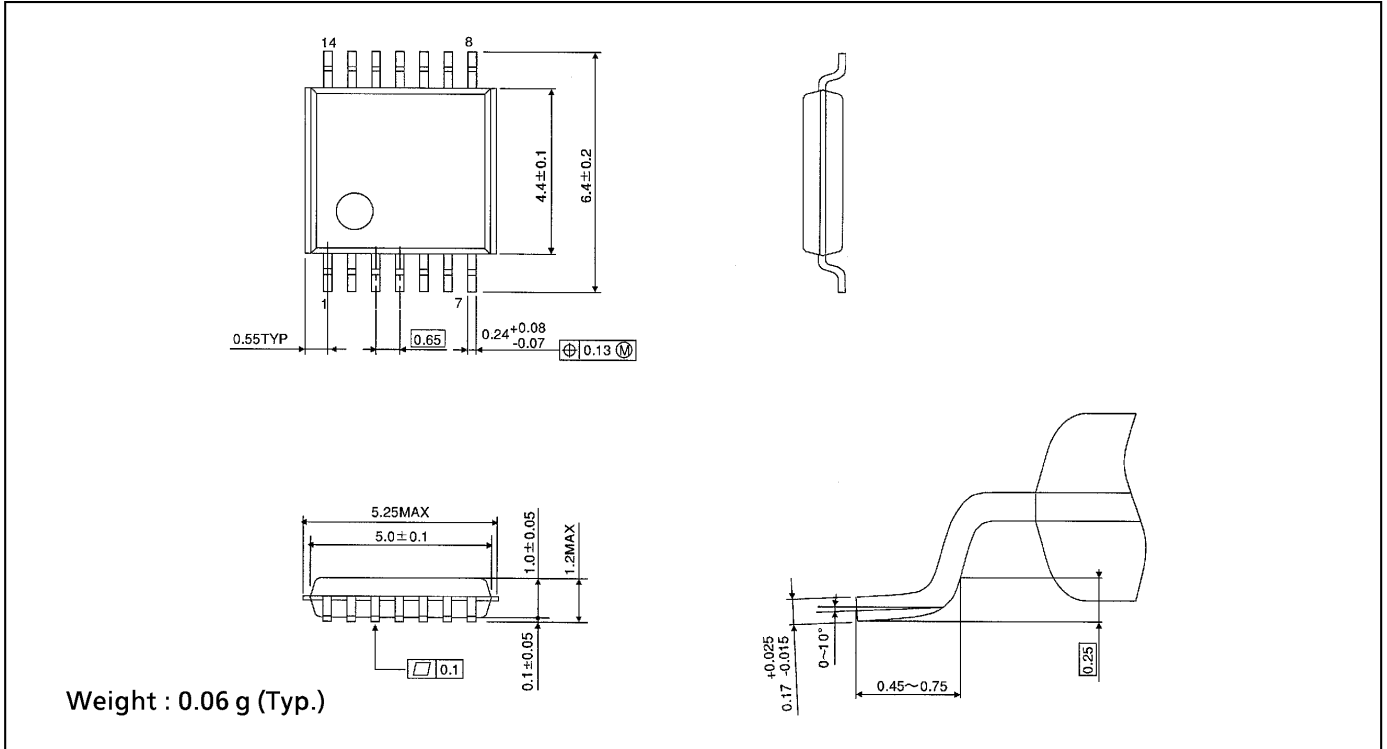
**SOP 14 PIN (150 mil BODY) PACKAGE DIMENSIONS (SOP14-P-150-1.27)**

Unit in mm



**TSSOP 14 PIN PACKAGE DIMENSIONS (TSSOP14-P-0044-0.65)**

Unit in mm



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