

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC  
**TC74VHC125F, TC74VHC125FN, TC74VHC125FT**  
**TC74VHC126F, TC74VHC126FN, TC74VHC126FT**

**TC74VHC125F / FN / FT QUAD BUS BUFFER**  
**TC74VHC126F / FN / FT QUAD BUS BUFFER**

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

The TC74VHC125/126 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 Schottky TTL while maintaining the CMOS low power dissipation.

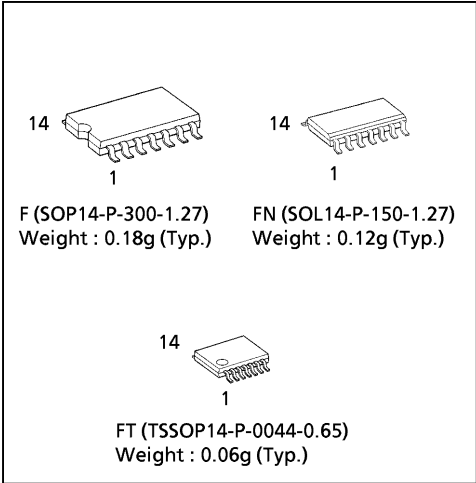
The TC74VHC125 requires the 3-state control input  $\bar{G}$  to be set high to place the output into the high impedance state, whereas the TC74VHC126 requires the control input G to be set low to place the output into high impedance.

An input protection circuit ensures that 0 to 5.5V can be applied to the input pins without regard to the supply voltage. This device can be used to interface 5V to 3V systems and two supply systems such as battery back up.

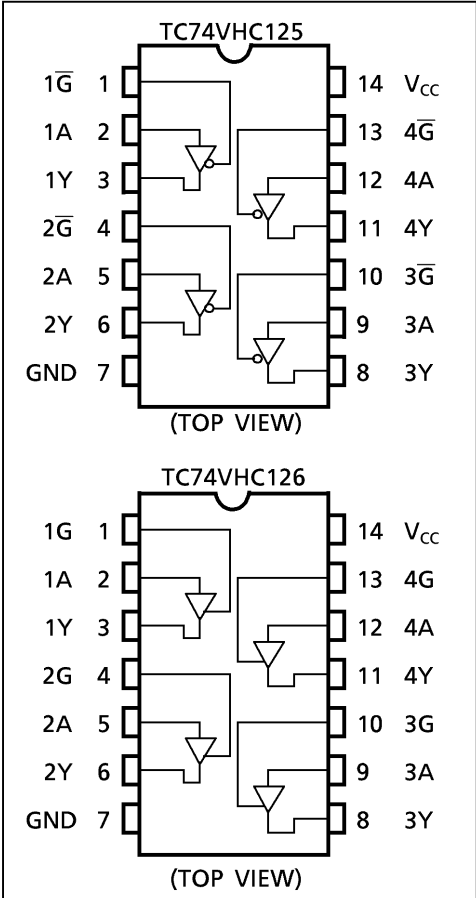
This circuit prevents device destruction due to mismatched supply and input voltages.

**FEATURES :**

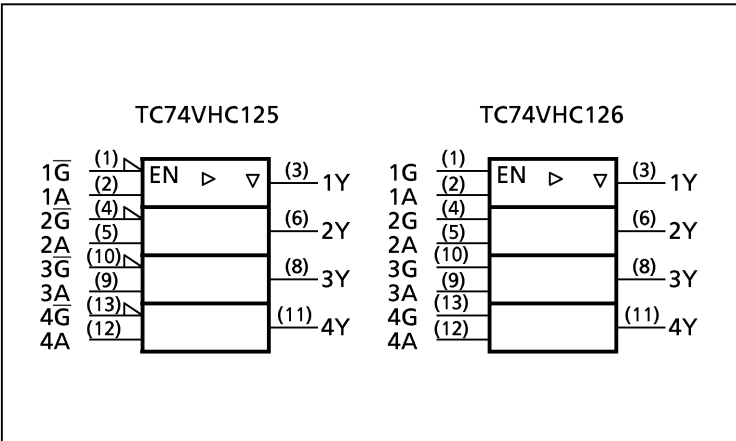
- High Speed..... $t_{pd} = 3.8ns(typ.)$  at  $V_{CC} = 5V$
- Low Power Dissipation..... $I_{CC} = 4\mu A(Max.)$  at  $T_a = 25^{\circ}C$
- High Noise Immunity..... $V_{NIH} = V_{NIL} = 28\% V_{CC} (Min.)$
- Power Down Protection is provided on all inputs.
- Balanced Propagation Delays..... $t_{pLH} \approx t_{pHL}$
- Wide Operating Voltage Range..... $V_{CC} (opr.) = 2V \sim 5.5V$
- Low Noise..... $V_{OLP} = 0.8V (Max.)$
- Pin and Function Compatible with 74ALS125/126



**PIN ASSIGNMENT**



**IEC LOGIC SYMBOL**



980910EBA2

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**TRUTH TABLE**

<p><b>TC74VHC125</b></p> <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">INPUTS</th> <th>OUTPUTS</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>\bar{G}</math></td> <td style="text-align: center;">A</td> <td style="text-align: center;">Y</td> </tr> <tr> <td style="text-align: center;">H</td> <td style="text-align: center;">X</td> <td style="text-align: center;">Z</td> </tr> <tr> <td style="text-align: center;">L</td> <td style="text-align: center;">L</td> <td style="text-align: center;">L</td> </tr> <tr> <td style="text-align: center;">L</td> <td style="text-align: center;">H</td> <td style="text-align: center;">H</td> </tr> </tbody> </table> <p style="text-align: center; margin-top: 5px;">X: Don't Care Z: High Impedance</p>	INPUTS		OUTPUTS	$\bar{G}$	A	Y	H	X	Z	L	L	L	L	H	H	<p><b>TC74VHC126</b></p> <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2">INPUTS</th> <th>OUTPUTS</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">G</td> <td style="text-align: center;">A</td> <td style="text-align: center;">Y</td> </tr> <tr> <td style="text-align: center;">L</td> <td style="text-align: center;">X</td> <td style="text-align: center;">Z</td> </tr> <tr> <td style="text-align: center;">H</td> <td style="text-align: center;">L</td> <td style="text-align: center;">L</td> </tr> <tr> <td style="text-align: center;">H</td> <td style="text-align: center;">H</td> <td style="text-align: center;">H</td> </tr> </tbody> </table> <p style="text-align: center; margin-top: 5px;">X: Don't Care Z: High Impedance</p>	INPUTS		OUTPUTS	G	A	Y	L	X	Z	H	L	L	H	H	H
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**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~ $V_{CC} + 0.5$	V
Input Diode Current	$I_{IK}$	-20	mA
Output Diode Current	$I_{OK}$	±20	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	$T_{stg}$	-65~150	°C

**RECOMMENDED OPERATING CONDITIONS**

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	$V_{CC}$	2.0~5.5	V
Input Voltage	$V_{IN}$	0~5.5	V
Output Voltage	$V_{OUT}$	0~ $V_{CC}$	V
Operating Temperature	$T_{opr}$	-40~85	°C
Input Rise and Fall Time	dt/dv	0~100 ( $V_{CC} = 3.3 \pm 0.3V$ ) 0~20 ( $V_{CC} = 5 \pm 0.5V$ )	ns/V

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**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 3.0~ 5.5	1.50 V <sub>CC</sub> × 0.7	— —	— —	1.50 V <sub>CC</sub> × 0.7	— —	V
Low - Level Input Voltage	V <sub>IL</sub>			2.0 3.0~ 5.5	— —	— —	0.50 V <sub>CC</sub> × 0.3	— —	0.50 V <sub>CC</sub> × 0.3	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> = -50μA	2.0 3.0 4.5	1.9 2.9 4.4	2.0 3.0 4.5	— — —	1.9 2.9 4.4	— — —	V
			I <sub>OH</sub> = -4mA I <sub>OH</sub> = -8mA	3.0 4.5	2.58 3.94	— —	— —	2.48 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> = 50μA	2.0 3.0 4.5	— — —	0.0 0.0 0.0	0.1 0.1 0.1	— — —	0.1 0.1 0.1	V
			I <sub>OL</sub> = 4mA I <sub>OL</sub> = 8mA	3.0 4.5	— —	— —	0.36 0.36	— —	0.44 0.44	
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	μA
Input Leakage Current	I <sub>IN</sub>	V <sub>IN</sub> = 5.5V or GND		0~5.5	—	—	± 0.1	—	± 1.0	
Quiescent Supply Current	I <sub>CC</sub>	V <sub>IN</sub> = V <sub>CC</sub> or GND		5.5	—	—	4.0	—	40.0	

**AC ELECTRICAL CHARACTERISTICS ( Input  $t_r = t_f = 3ns$  )**

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>	3.3 ± 0.3	15	—	5.6	8.0	1.0	9.5	ns
			50	—	8.1	11.5	1.0	13.0	
	t <sub>pHL</sub>	5.0 ± 0.5	15	—	3.8	5.5	1.0	6.5	
			50	—	5.3	7.5	1.0	8.5	
Output Enable time	t <sub>pZL</sub>	3.3 ± 0.3	15	—	5.4	8.0	1.0	9.5	
			50	—	7.9	11.5	1.0	13.0	
	t <sub>pZH</sub>	5.0 ± 0.5	15	—	3.6	5.1	1.0	6.0	
			50	—	5.1	7.1	1.0	8.0	
Output Disable time	t <sub>pLZ</sub>	3.3 ± 0.3	50	—	9.5	13.2	1.0	15.0	
			t <sub>pHZ</sub>	5.0 ± 0.5	50	—	6.1	8.8	1.0
Output to Output Skew	t <sub>osLH</sub>	(Note 1)	3.3 ± 0.3	50	—	—	1.5	—	1.5
			t <sub>osHL</sub>	5.0 ± 0.5	50	—	—	1.0	—
Input Capacitance	C <sub>IN</sub>			—	4	10	—	10	pF
Output Capacitance	C <sub>OUT</sub>			—	6	—	—	—	
Power Dissipation Capacitance (Note 2)	C <sub>PD</sub>	TC74VHC125		—	14	—	—	—	
		TC74VHC126		—	15	—	—	—	

Note (1) Parameter guaranteed by design.  $t_{osLH} = |t_{pLHm} - t_{pLHn}|$ ,  $t_{osHL} = |t_{pHLm} - t_{pHLn}|$

Note (2) C<sub>PD</sub> is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

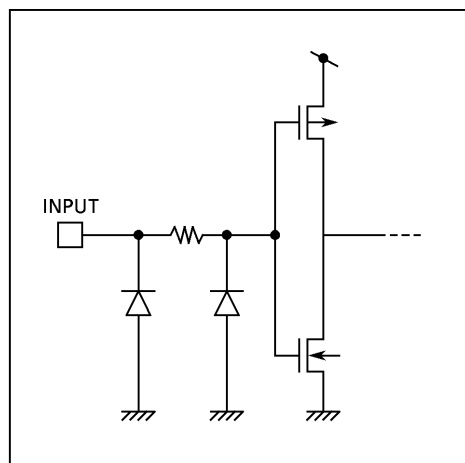
Average operating current can be obtained by the equation :

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

**NOISE CHARACTERISTICS (Input  $t_r = t_f = 3ns$ )**

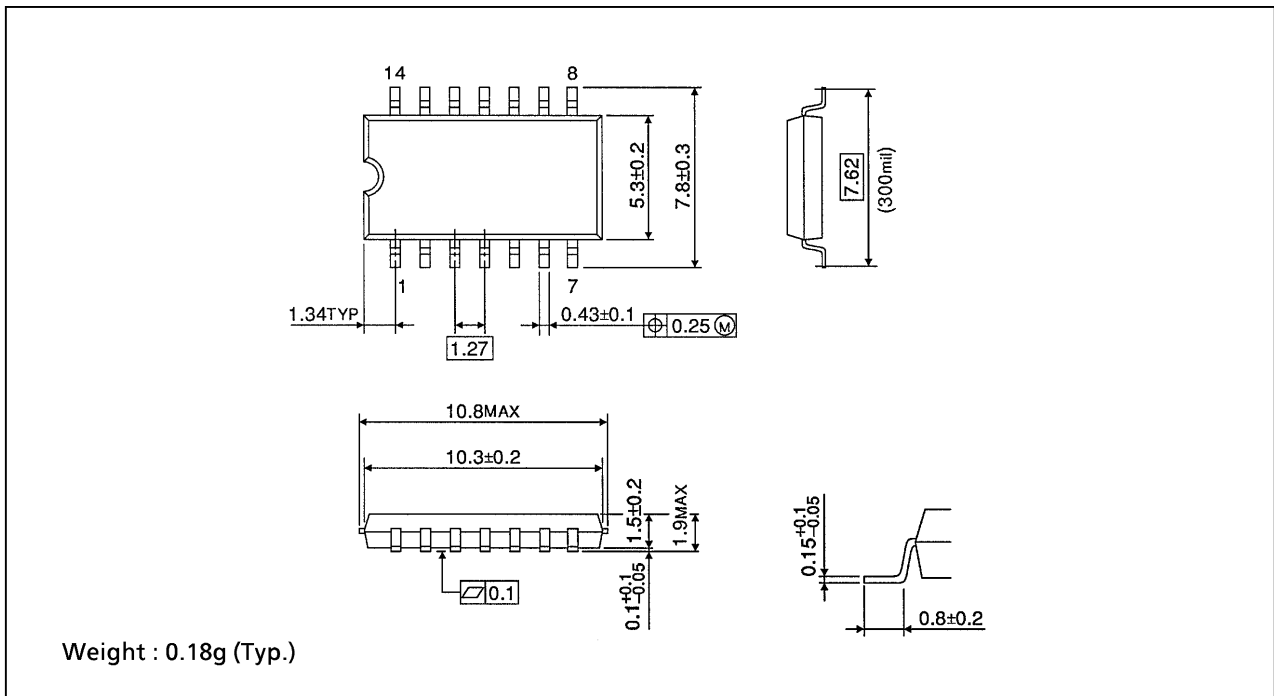
PARAMETER	SYMBOL	TEST CONDITION	Ta = 25°C		UNIT	
			V <sub>CC</sub> (V)	TYP.		LIMIT
Quiet Output Maximum Dynamic V <sub>OL</sub>	V <sub>OLP</sub>	C <sub>L</sub> = 50pF	5.0	0.3	0.8	V
Quiet Output Minimum Dynamic V <sub>OL</sub>	V <sub>OLV</sub>	C <sub>L</sub> = 50pF	5.0	-0.3	-0.8	V
Minimum High Level Dynamic Input Voltage	V <sub>IHD</sub>	C <sub>L</sub> = 50pF	5.0	-	3.5	V
Maximum Low Level Dynamic Input Voltage	V <sub>ILD</sub>	C <sub>L</sub> = 50pF	5.0	-	1.5	V

**INPUT EQUIVALENT CIRCUIT**



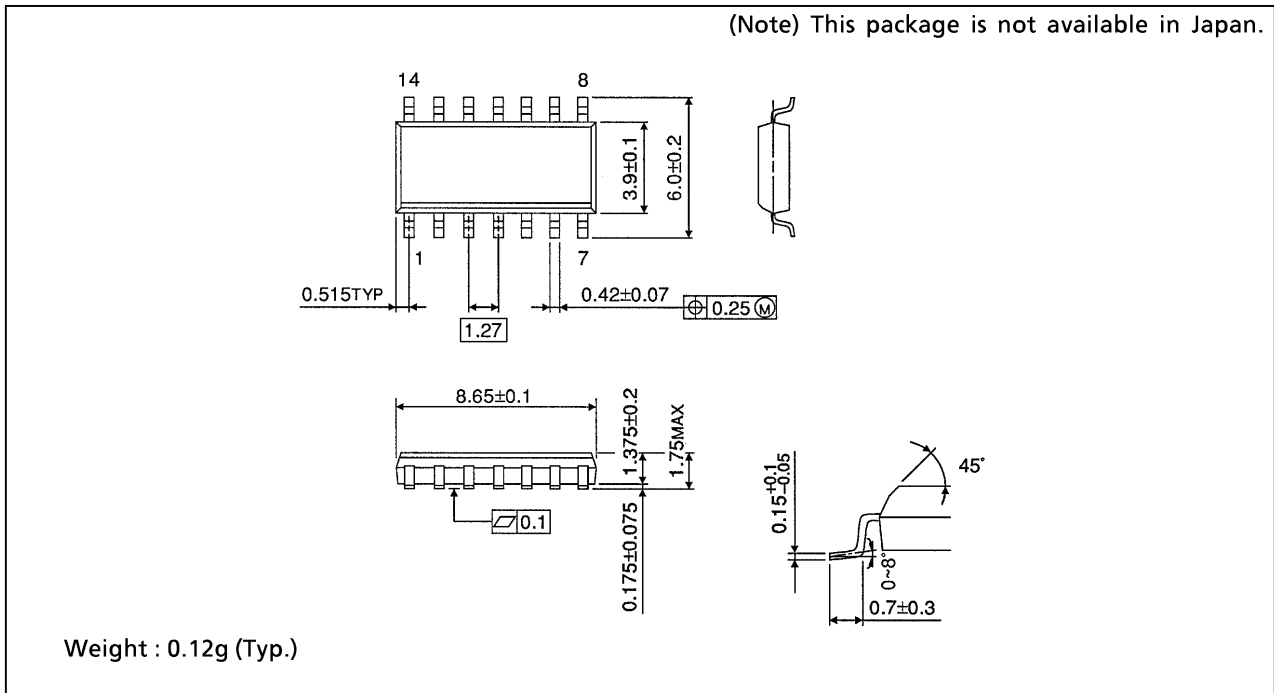
**SOP 14PIN (200mil BODY) PACKAGE DIMENSIONS (SOP14-P-300-1.27)**

Unit in mm



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

Unit in mm



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

Unit in mm

