TOSHIBA CMOS Digital Integrated Circuit   Silicon Monolithic

TC74HC125AP,TC74HC125AF,TC74HC125AFN
TC74HC126AP,TC74HC126AF

TC74HC125AP/AF/AFN   Quad Bus Buffer

TC74HC126AP/AF   Quad Bus Buffer

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

The TC74HC125A/126A are high speed CMOS QUAD BUS BUFFERs fabricated with silicon gate C^{2}MOS technology.

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

The TC74HC125A requires the 3-state control input $\overline{G}$ to be set high to place the output into the high impedance state, whereas the TC74HC126A requires the control input to be set low to place the output into high impedance.

All inputs are equipped with protection circuits against static discharge or transient excess voltage.

Features

- High speed: t_{pd} = 10 ns (typ.) at V_{CC} = 5 V
- Low power dissipation: I_{CC} = 4 μA (max) at Ta = 25°C
- High noise immunity: V_{NIH} = V_{NIL} = 28% V_{CC} (min)
- Output drive capability: 15 LSTTL loads
- Symmetrical output impedance: $|I_{OH}|$ = I_{OL} = 6 mA (min)
- Balanced propagation delays: $t_{pLH} \simeq t_{pHL}$
- Wide operating voltage range: V_{CC} (opr) = 2 to 6 V
- Pin and function compatible with 74LS125/126

TC74HC125AP, TC74HC126AP
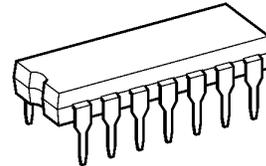
DIP14-P-300-2.54

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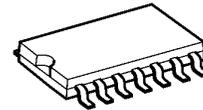
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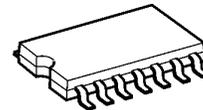
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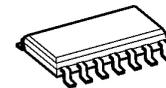
SOL14-P-150-1.27

Weight
DIP14-P-300-2.54   : 0.96 g (typ.)
SOP14-P-300-1.27A   : 0.18 g (typ.)
SOP14-P-300-1.27   : 0.18 g (typ.)
SOL14-P-150-1.27   : 0.12 g (typ.)

Pin Assignment

TC74HC125A

1$\overline{\text{G}}$	1	
1A	2	
2Y	3	
2$\overline{\text{G}}$	4	
2A	5	
2Y	6	
GND	7	

14	V$_{CC}$	
13	4$\overline{\text{G}}$	
12	4A	
11	4Y	
10	3$\overline{\text{G}}$	
9	3A	
8	3Y	

(TOP VIEW)

TC74HC126A

1G	1	
1A	2	
2Y	3	
2G	4	
2A	5	
2Y	6	
GND	7	

14	V$_{CC}$	
13	4G	
12	4A	
11	4Y	
10	3G	
9	3A	
8	3Y	

(TOP VIEW)
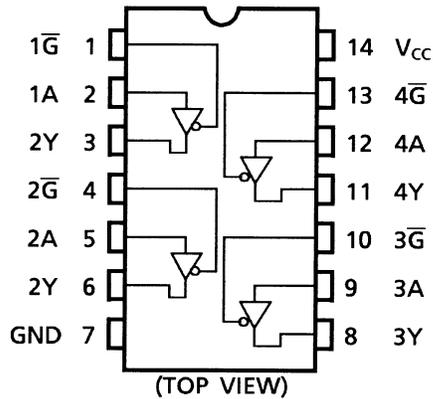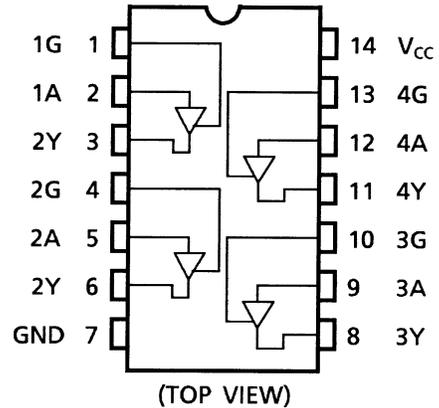
IEC Logic Symbol

TC74HC125A

1$\overline{\text{G}}$ (1)
1A (2)
2$\overline{\text{G}}$ (4)
2A (5)
3$\overline{\text{G}}$ (10)
3A (9)
4$\overline{\text{G}}$ (13)
4A (12)

EN ▷ ▽

(3) 1Y
(6) 2Y
(8) 3Y
(11) 4Y

TC74HC126A

1G (1)
1A (2)
2G (4)
2A (5)
3G (10)
3A (9)
4G (13)
4A (12)

EN ▷ ▽

(3) 1Y
(6) 2Y
(8) 3Y
(11) 4Y
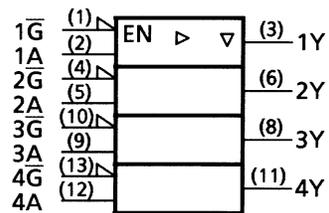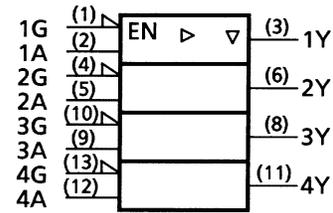
Truth Table

TC74HC125A

Inputs		Output
$\overline{\text{G}}$	A	Y
H	X	Z
L	L	L
L	H	H

X: Don't care

Z: High impedance

TC74HC126A

Inputs		Output
G	A	Y
L	X	Z
H	L	L
H	H	H

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	V
DC input voltage	V_{IN}	−0.5 to V_{CC} + 0.5	V
DC output voltage	V_{OUT}	−0.5 to V_{CC} + 0.5	V
Input diode current	I_{IK}	±20	mA
Output diode current	I_{OK}	±20	mA
DC output current	I_{OUT}	±35	mA
DC V_{CC}/ground current	I_{CC}	±75	mA
Power dissipation	P_D	500 (DIP) (Note 2)/180 (SOP)	mW
Storage temperature	T_{stg}	−65 to 150	°C

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

Note 2: 500 mW in the range of Ta = −40 to 65°C. From Ta = 65 to 85°C a derating factor of −10 mW/°C shall be applied until 300 mW.

Recommended Operating Conditions (Note)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{CC}	2 to 6	V
Input voltage	V_{IN}	0 to V_{CC}	V
Output voltage	V_{OUT}	0 to V_{CC}	V
Operating temperature	T_{opr}	−40 to 85	°C
Input rise and fall time	t_r, t_f	0 to 1000 (V_{CC} = 2.0 V) 0 to 500 (V_{CC} = 4.5 V) 0 to 400 (V_{CC} = 6.0 V)	ns

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

Electrical Characteristics

DC Characteristics

Characteristics	Symbol	Test Condition		V_{CC} (V)	Ta = 25°C			Ta = −40 to 85°C		Unit
					Min	Typ.	Max	Min	Max	
High-level input voltage	V_{IH}	—		2.0	1.50	—	—	1.50	—	V
				4.5	3.15	—	—	3.15	—	
				6.0	4.20	—	—	4.20	—	
Low-level input voltage	V_{IL}	—		2.0	—	—	0.50	—	0.50	V
				4.5	—	—	1.35	—	1.35	
				6.0	—	—	1.80	—	1.80	
High-level output voltage	V_{OH}	V_{IN} = V_{IH} or V_{IL}	I_{OH} = −20 μA	2.0	1.9	2.0	—	1.9	—	V
				4.5	4.4	4.5	—	4.4	—	
				6.0	5.9	6.0	—	5.9	—	
			I_{OH} = −6 mA	4.5	4.18	4.31	—	4.13	—	
			I_{OH} = −7.8 mA	6.0	5.68	5.80	—	5.63	—	
Low-level output voltage	V_{OL}	V_{IN} = V_{IH} or V_{IL}	I_{OL} = 20 μA	2.0	—	0.0	0.1	—	0.1	V
				4.5	—	0.0	0.1	—	0.1	
				6.0	—	0.0	0.1	—	0.1	
			I_{OL} = 6 mA	4.5	—	0.17	0.26	—	0.33	
			I_{OL} = 7.8 mA	6.0	—	0.18	0.26	—	0.33	
3-state output off-state current	I_{OZ}	V_{IN} = V_{IH} or V_{IL} V_{OUT} = V_{CC} or GND		6.0	—	—	±0.5	—	±5.0	μA
Input leakage current	I_{IN}	V_{IN} = V_{CC} or GND		6.0	—	—	±0.1	—	±1.0	μA
Quiescent supply current	I_{CC}	V_{IN} = V_{CC} or GND		6.0	—	—	4.0	—	40.0	μA

AC Characteristics (input: $t_r = t_f = 6$ ns)

Characteristics	Symbol	Test Condition			Ta = 25°C			Ta = −40 to 85°C		Unit
			CL (pF)	V_CC (V)	Min	Typ.	Max	Min	Max	
Output transition time	t_{TLH} t_{THL}	—	50	2.0	—	20	60	—	75	ns
				4.5	—	6	12	—	15	
				6.0	—	5	10	—	13	
Propagation delay time	t_{pLH} t_{pHL}	—	50	2.0	—	30	90	—	115	ns
				4.5	—	11	18	—	23	
				6.0	—	10	15	—	20	
			150	2.0	—	42	130	—	165	
				4.5	—	14	26	—	33	
				6.0	—	12	22	—	28	
Output enable time	t_{pZL} t_{pZH}	$R_L = 1$ kΩ	50	2.0	—	30	90	—	115	ns
				4.5	—	11	18	—	23	
				6.0	—	10	15	—	20	
			150	2.0	—	42	130	—	165	
				4.5	—	14	26	—	33	
				6.0	—	12	22	—	28	
Output disable time	t_{pLZ} t_{pHZ}	$R_L = 1$ kΩ	50	2.0	—	24	100	—	125	ns
				4.5	—	12	20	—	25	
				6.0	—	10	17	—	21	
Input capacitance	C_{IN}	—			—	5	10	—	10	pF
Output capacitance	C_{OUT}	—			—	10	—	—	—	pF
Power dissipation capacitance	C_{PD} (Note)	—			—	41	—	—	—	pF

Note:　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:

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

Package Dimensions

DIP14-P-300-2.54   Unit : mm
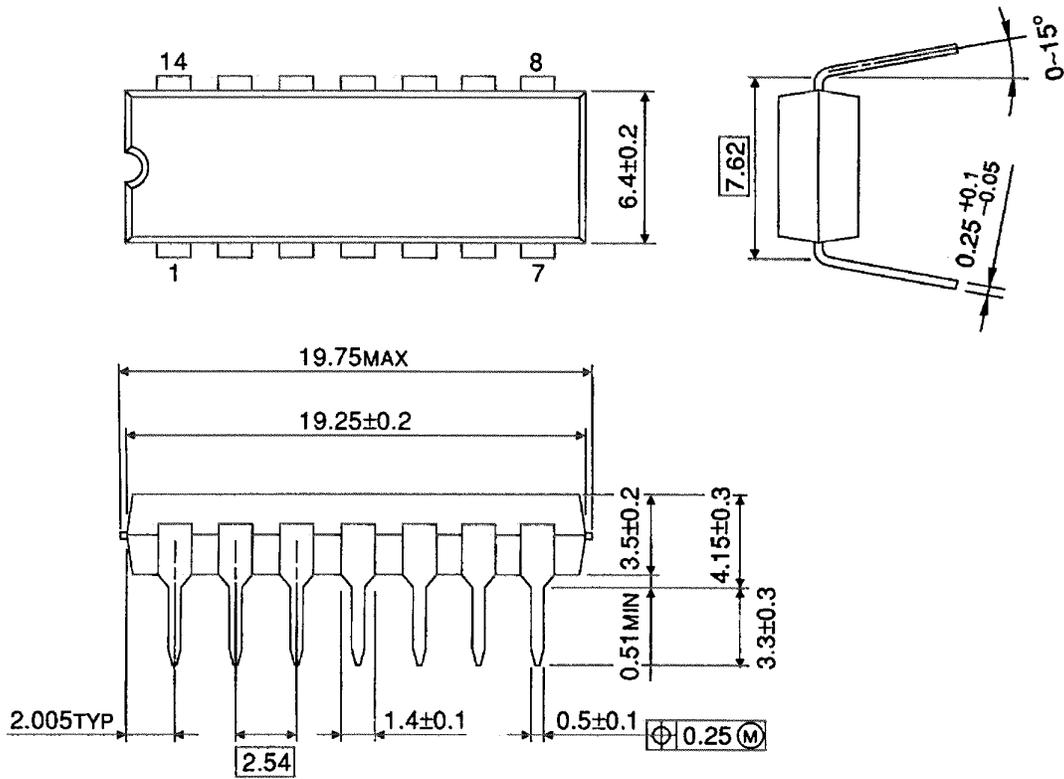
Weight: 0.96 g (typ.)

Package Dimensions

SOP14-P-300-1.27A   Unit: mm

Weight: 0.18 g (typ.)
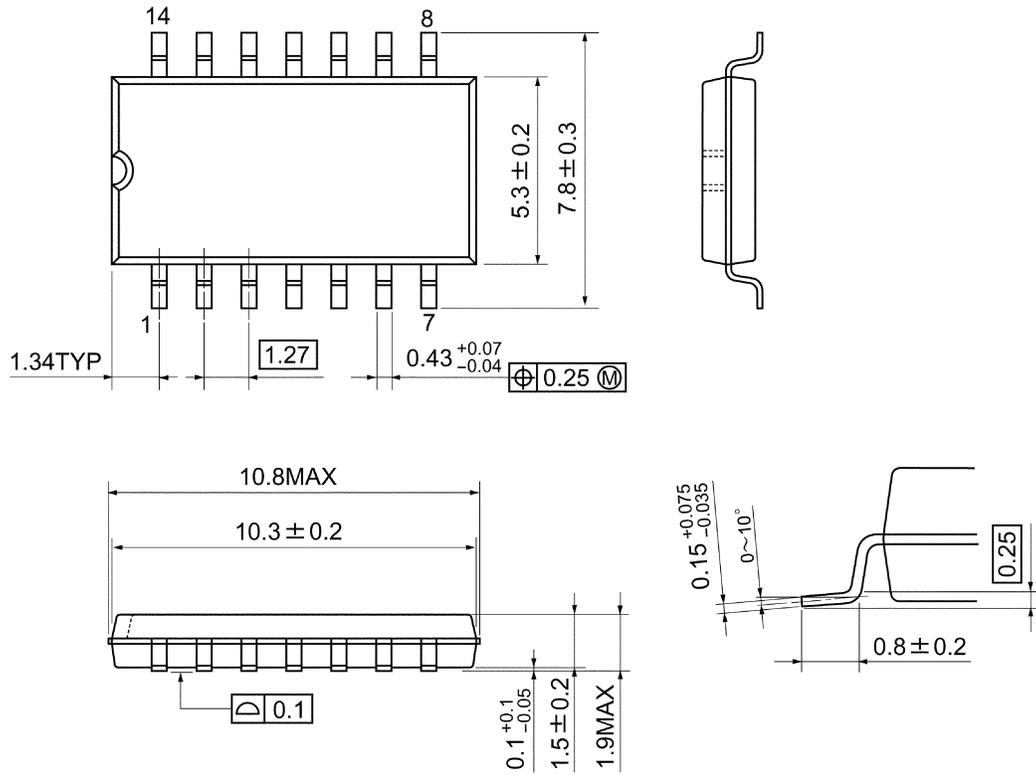
Package Dimensions

SOP14-P-300-1.27　　　　　　　　　　　　　　　　　　　　　　Unit : mm
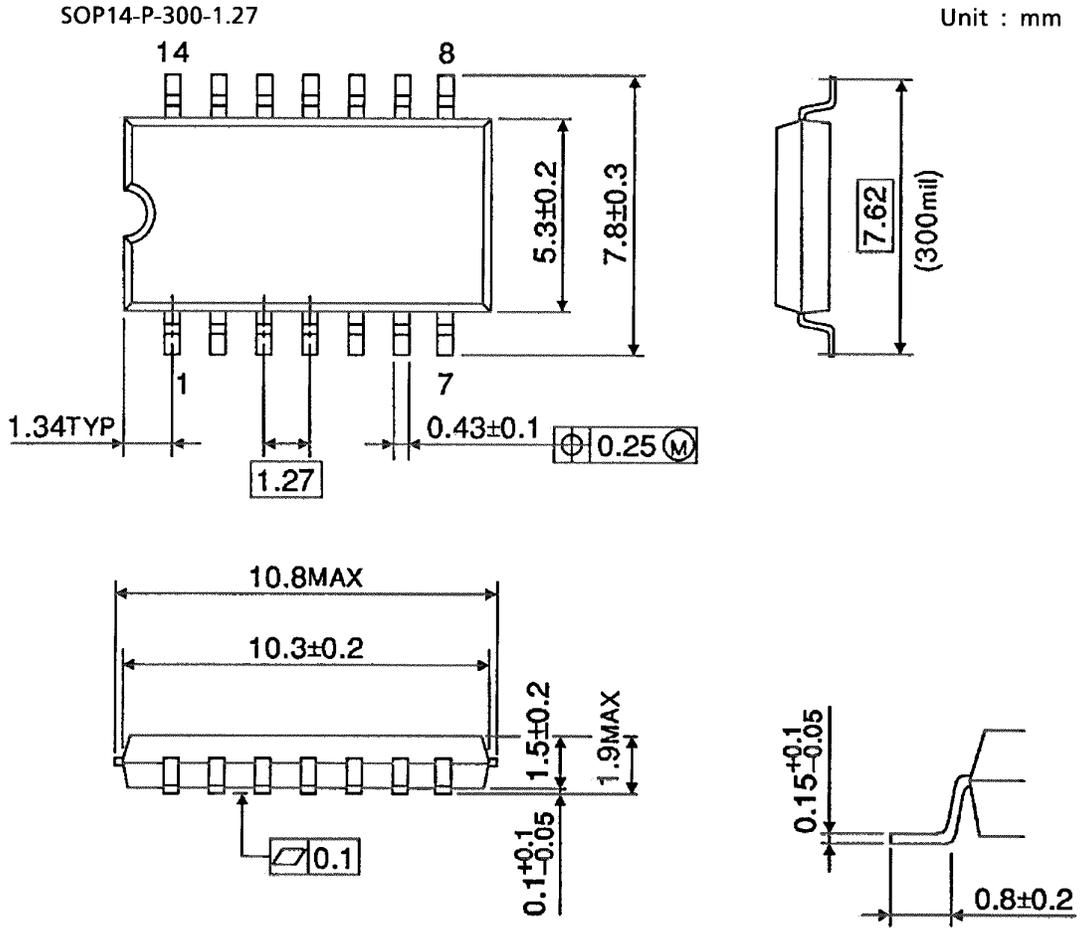
Weight: 0.18 g (typ.)

Package Dimensions (Note)

SOL14-P-150-1.27   Unit : mm

14   8

3.9±0.1   6.0±0.2

1   7

0.515TYP   0.42±0.07   ⊕ 0.25 Ⓜ

1.27

8.65±0.1   1.375±0.2   1.75MAX

0.1   0.175±0.075

0.15 +0.1 −0.05   45°

0~8°

0.7±0.3
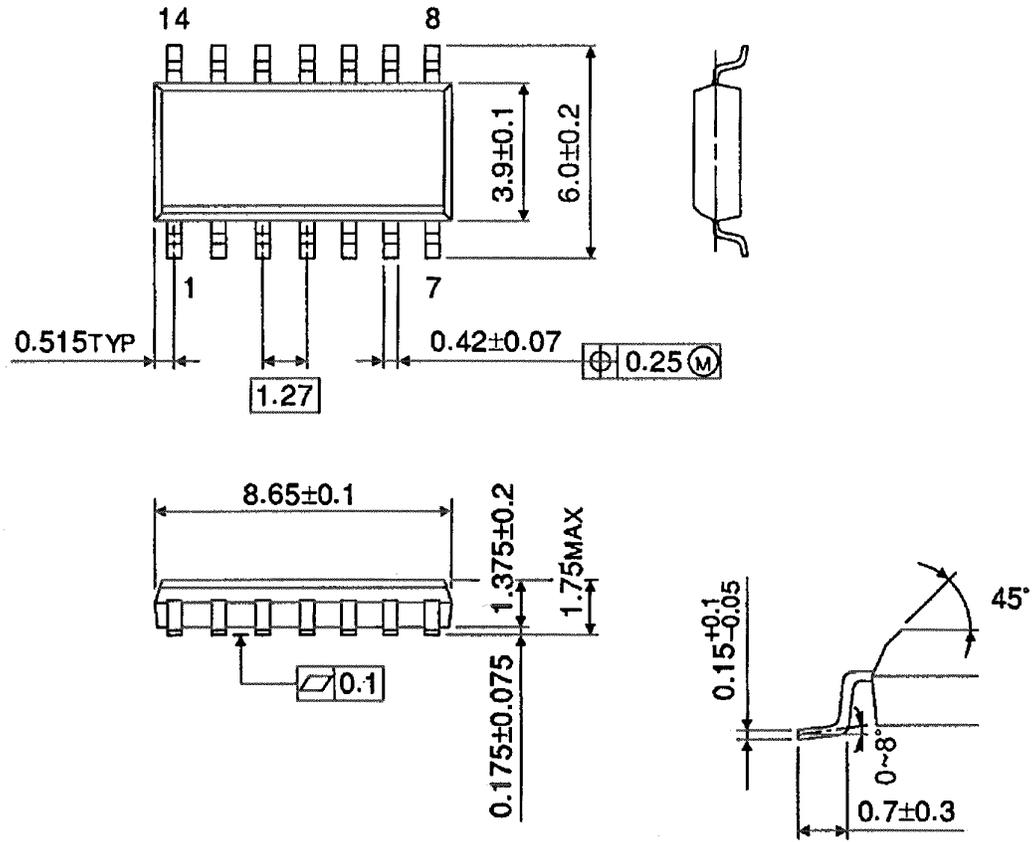
Note: This package is not available in Japan.

Weight: 0.12 g (typ.)

Note: Lead (Pb)-Free Packages

DIP14-P-300-2.54   SOP14-P-300-1.27A   SOL14-P-150-1.27

RESTRICTIONS ON PRODUCT USE