Quadruple Bus Buffer Gates With 3-State Outputs

Features

- High-Current 3-State Outputs Interface Directly With System Bus or Can Drive up to 15 LSTTL Loads.
- Packaging information: SOP-14 and TSSOP-14



SOP-14



TSSOP-14

Ordering Information

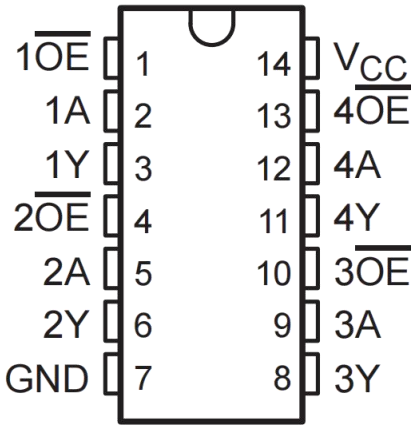
DEVICE	Package Type	MARKING	Packing	Packing Qty
74HC125DM/TR-HG	SOP-14	74HC125D	REEL	2500pcs/Reel
74HC125DMT/TR-HG	TSSOP-14	HC125D	REEL	2500pcs/Reel

Description

These quadruple bus buffer gates feature independent line drivers with 3-state outputs. Each output is disabled when the associated output-enable ($\overline{OE}$) input is high.

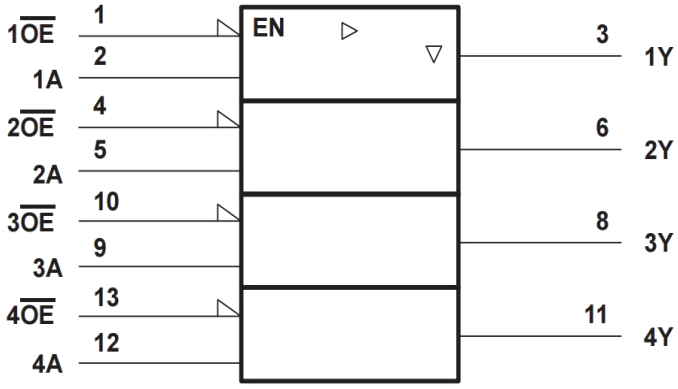
The 74HC125D is characterized for operation from -40°C to 85°C.

Pin Connection

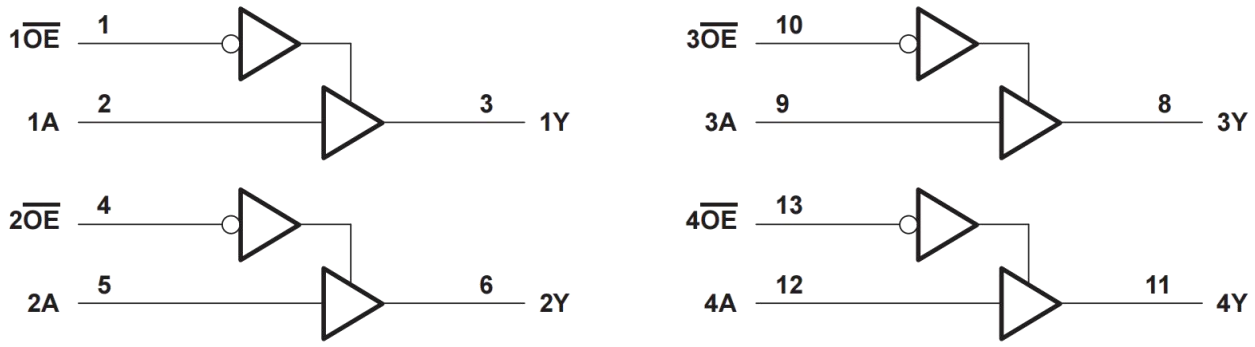


SOP-14/TSSOP-14

Logic Symbol



Logic Diagram (Positive Logic)



Function Table (each buffer)

INPUTS		OUTPUT
$\overline{OE}$	A	Y
L	H	H
L	L	L
H	X	Z

Absolute Maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Supply voltage range	-0.5 to 7	V
I_{IK}	Input clamp current (V_I < 0 or V_I > V_{CC})	±20	mA
I_{OK}	Output clamp current (V_O < 0 or V_O > V_{CC})	±20	mA
I_O	Continuous output current (V_O = 0 to V_{CC})	±35	mA
	Continuous current through V_{CC} or GND	±70	mA
θ_{JA}	Package thermal impedance	127	°C/W
T_{stg}	Storage temperature range	-65 to 150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds	260	°C

Note: Stress greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions outside those indicated in the operational sections of this specification are not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability

Recommended Operating Conditions

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	Supply voltage		2	5	6	V
V_{IH}	High-level input voltage	V_{CC} = 2 V	1.5			V
		V_{CC} = 4.5 V	3.15			
		V_{CC} = 6 V	4.2			
V_{IL}	Low-level input voltage	V_{CC} = 2 V	0		0.5	V
		V_{CC} = 4.5 V	0		1.35	
		V_{CC} = 6 V	0		1.8	
V_I	Input voltage		0		V_{CC}	V
V_O	Output voltage		0		V_{CC}	V
t_t	Input transition (rise and fall) time	V_{CC} = 2 V	0		1000	ns
		V_{CC} = 4.5 V	0		500	
		V_{CC} = 6 V	0		400	
T_A	Operating free-air temperature		–40		85	°C

Electrical Characteristics

Symbol	Parameter	Test Conditions		V_{CC}	TA = 25°C			T_A = -40~85°C		Unit
					Min	Typ	Max	Min	Max	
V_{OH}	High−Level Output Voltage	V_I = V_{IH} or V_{IL}	I_{OH} = –20 uA	2 V	1.9	1.998		1.9		V
				4.5 V	4.4	4.499		4.4		
				6 V	5.9	5.999		5.9		
			I_{OH} = –6 mA	4.5 V	3.98	4.3		3.84		
			I_{OH} = –7.8 mA	6 V	5.48	5.8		5.34		
V_{OL}	Low−Level Output Voltage	V_I = V_{IH} or V_{IL}	I_{OL} = 20 uA	2 V		0.002	0.1		0.1	V
				4.5 V		0.001	0.1		0.1	
				6 V		0.001	0.1		0.1	
			I_{OL} = 6 mA	4.5 V		0.17	0.26		0.33	
			I_{OL} = 7.8 mA	6 V		0.15	0.26		0.33	
I_I	Input Leakage Current	V_I = V_{CC} or 0		6 V		±0.1	±100		±1000	nA
I_{OZ}	Maximum Three−State Leakage Current	V_O = V_{CC} or 0		6 V		±0.01	±0.5		±5	uA
I_{CC}	Quiescent Supply Current	V_I = V_{CC} or 0, I_O = 0		6 V			8		80	uA
C_i	Input capacitance			2 V to 6 V		3	10		10	pF

Switching Characteristics

(C_L = 50 pF, unless otherwise noted) (see Figure 1)

Symbol	Parameter	V_{CC}	T_A = 25°C			T_A = -40~85°C		Unit
			Min	Typ	Max	Min	Max	
t_{pd}	Maximum Propagation Delay, Input A to Output Y	2 V		48	120		150	ns
		4.5 V		14	24		30	
		6 V		11	20		26	
t_{en}	Maximum Propagation Delay, Output $\overline{OE}$ to Y	2 V		53	120		150	ns
		4.5 V		14	24		30	
		6 V		11	20		26	
t_{dis}	Maximum Propagation Delay, Output $\overline{OE}$ to Y	2 V		30	120		150	ns
		4.5 V		15	24		30	
		6 V		14	20		26	
t_t	Maximum Output Transition Time, Any Output	2 V		28	60		75	ns
		4.5 V		8	12		15	
		6 V		6	10		13	

Switching Characteristics

(C_L = 150 pF, unless otherwise noted) (see Figure 1)

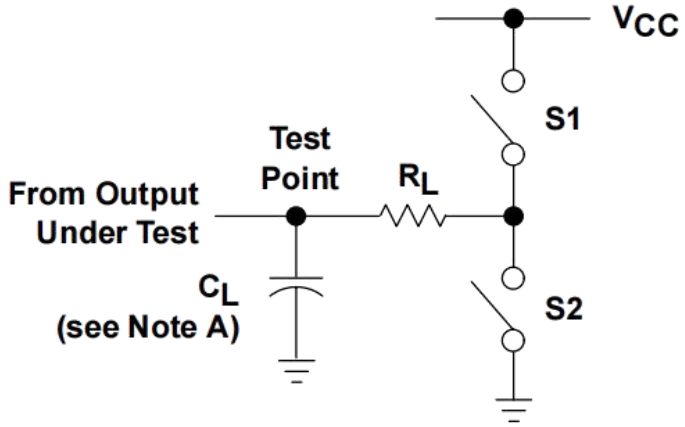
Symbol	Parameter	V_{CC}	T_A = 25°C			T_A = -40~85°C		Unit
			Min	Typ	Max	Min	Max	
t_{pd}	Maximum Propagation Delay, Input A to Output Y	2 V		67	150		190	ns
		4.5 V		19	30		38	
		6 V		15	25		32	
t_{en}	Maximum Propagation Delay, Output $\overline{OE}$ to Y	2 V		100	135		170	ns
		4.5 V		20	27		34	
		6 V		17	23		29	
t_t	Maximum Output Transition Time, Any Output	2 V		45	210		265	ns
		4.5 V		17	42		53	
		6 V		13	36		45	

Operating Characteristics

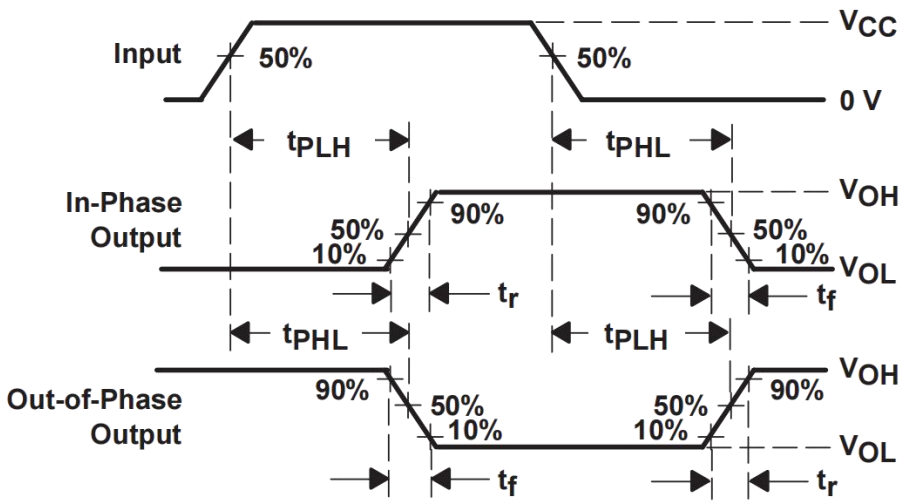
T_A = 25°C

Symbol	Parameter	Test Conditions	Typ	Unit
C_{pd}	Power dissipation capacitance per gate	No load	45	pF

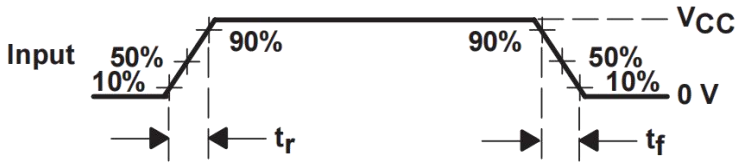
Parameter Measurement Information



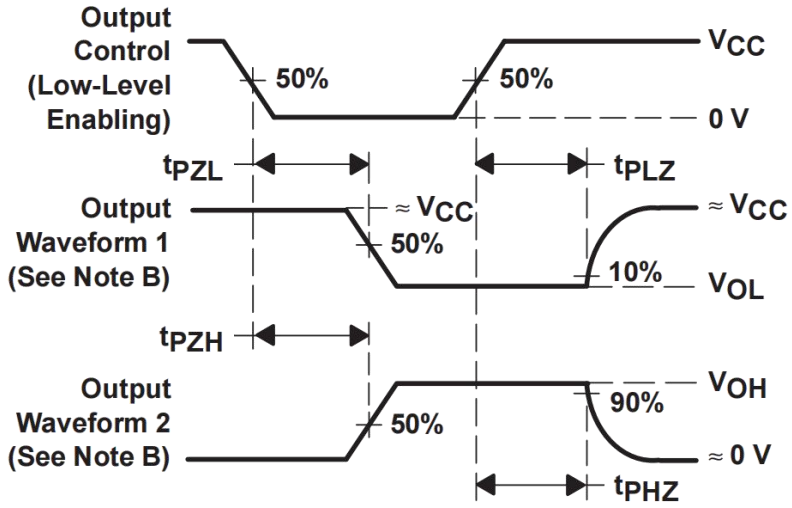
LOAD CIRCUIT



Voltage waveforms Propagation delay and output transition times



Voltage waveforminput rise and fall times



Voltage waveforms enable and disable times for 3-state outputs

PARAMETER		RL	CL	S1	S2
t_{en}	t_{PZH}	1 kΩ	50 pF or 150 pF	Open	Closed
	t_{PZL}			Closed	Open
t_{dis}	t_{PHZ}	1 kΩ	50 pF	Open	Closed
	t_{PLZ}			Closed	Open
t_{pd} or t_t		—	50 pF or 150 pF	Open	Open

NOTES:

A. C_L includes probe and test-fixture capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.

C. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, tr = 6 ns, t_f = 6 ns.

D. The outputs are measured one at a time with one input transition per measurement.

E. t_{PLZ} and t_{PHZ} are the same as tdis.

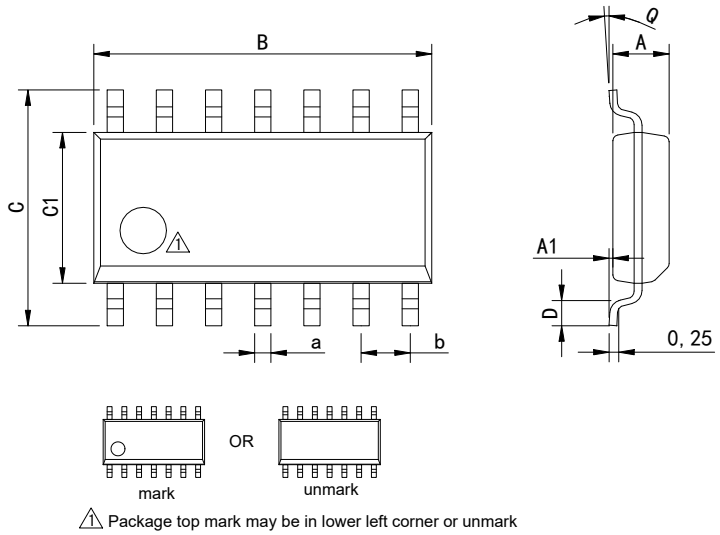
F. t_{PZL} and t_{PZH} are the same as ten.

G. t_{PLH} and t_{PHL} are the same as tpd.

Figure 1. Load Circuit and Voltage Waveforms

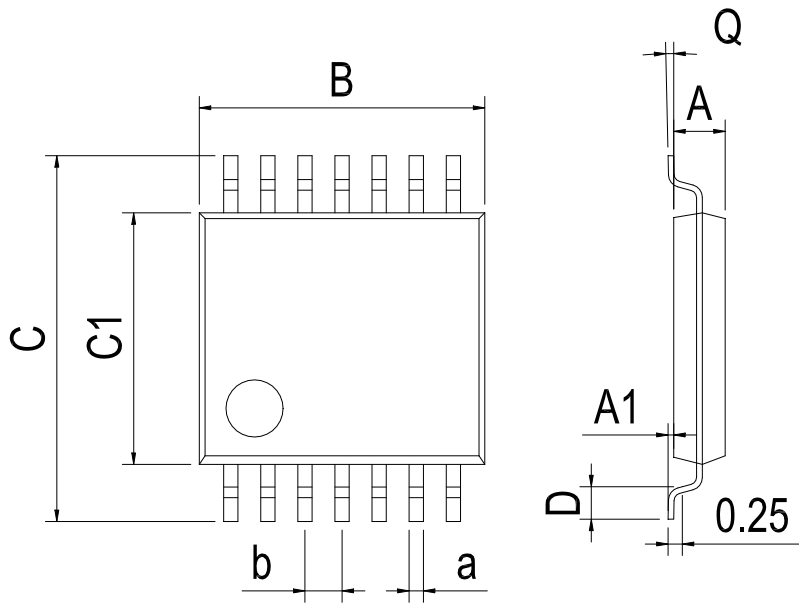
Physical Dimensions

SOP-14



Dimensions In Millimeters(SOP-14)									
Symbol:	**A**	**A1**	**B**	**C**	**C1**	**D**	**Q**	**a**	**b**
Min:	1.35	0.05	8.55	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	8.95	6.20	4.00	0.80	8°	0.45	

TSSOP-14



Dimensions In Millimeters(TSSOP-14)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	0.85	0.05	4.90	6.20	4.30	0.40	0°	0.20	0.65 BSC
Max:	0.95	0.20	5.10	6.60	4.50	0.80	8°	0.25	

Revision History

REVISION NUMBER	DATE	REVISION	PAGE
V1.0	2014-3	New	1-10
V1.1	2026-10	Document Reformatting	1-10

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