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74HC125

QUADRUPLE 3-STATE BUFFERS OE LOW

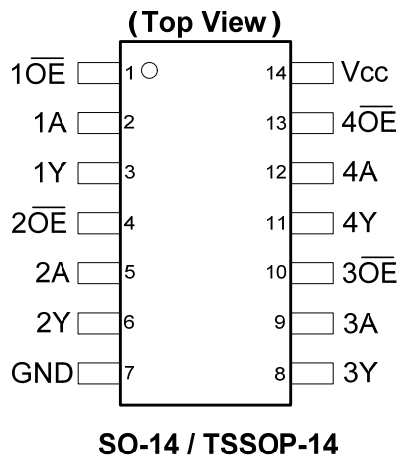
Description

The 74HC125 provides provides four independent buffer gates with 3-state outputs. Each buffer has a separate enable pin that if driven with a high logic level places the corresponding output in the high impedance state. The device is designed for operation with a power supply range of 2.0V to 6.0V.

Features

- Wide Supply Voltage Range from 2.0V to 6.0V
- Sinks or sources 4mA at V_{CC} = 4.5V
- CMOS low power consumption
- Schmitt Trigger Action at All Inputs
- ESD Protection Exceeds JESD 22
 - 200-V Machine Model (A115-A)
 - 2000-V Human Body Model (A114-A)
 - Exceeds 1000-V Charged Device Model (C101C)
- Range of Package Options SO-14 and TSSOP-14
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Pin Assignments



Applications

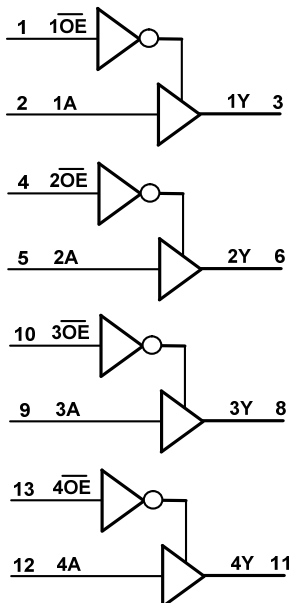
- General Purpose Logic
- Wide array of products such as:
 - PCs, Networking, Notebooks, Netbooks
 - Computer Peripherals, Hard Drives, CD/DVD ROM
 - TV, DVD, DVR, Set Top Box

Notes: 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
 2. See <http://www.diodes.com> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Pin Descriptions

Pin Number	Pin Name	Function
1	1 \overline{OE}	Data Enable Input (active low)
2	1A	Data Input
3	1Y	Data Output
4	2 \overline{OE}	Data Enable Input (active low)
5	2A	Data Input
6	2Y	Data Output
7	GND	Ground
8	3Y	Data Output
9	3A	Data Input
10	3 \overline{OE}	Data Enable Input (active low)
11	4Y	Data Output
12	4A	Data Input
13	4 \overline{OE}	Data Enable Input (active low)
14	V _{cc}	Supply Voltage

Logic Diagram



Function Table

Inputs		Output
\overline{OE}	A	Y
L	H	H
L	L	L
H	X	Z

Absolute Maximum Ratings (Note 4) (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Symbol	Description	Rating	Unit
ESD HBM	Human Body Model ESD Protection	2	KV
ESD CDM	Charged Device Model ESD Protection	1	KV
ESD MM	Machine Model ESD Protection	200	V
V_{CC}	Supply Voltage Range	-0.5 to +7.0	V
V_I	Input Voltage Range note 3)	-0.5 to +7.0	V
I_{IK}	Input Clamp Current $V_I < -0.5\text{V}$ or $V_I > V_{CC} + 0.5\text{V}$	± 20	mA
I_{OK}	Output Clamp Current $V_O < -0.5\text{V}$ or $V_O > V_{CC} + 0.5\text{V}$	± 20	mA
I_O	Continuous Output Current $-0.5\text{V} < V_O < V_{CC} + 0.5\text{V}$	+/- 25	mA
I_{CC}	Continuous Current Through V_{CC}	50	mA
I_{GND}	Continuous Current Through GND	-50	mA
T_J	Operating Junction Temperature	-40 to +150	$^\circ\text{C}$
T_{STG}	Storage Temperature	-65 to +150	$^\circ\text{C}$
P_{TOT}	Total Power Dissipation	500	mW

Notes: 4. Stresses beyond the absolute maximum may result in immediate failure or reduced reliability. These are stress values and device operation should be within recommend values.

5. Input Voltage cannot exceed V_{CC} to the extent the Maximum clamp current is exceeded.

Recommended Operating Conditions (Note 6) (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Symbol	Parameter	Conditions	Min	Max	Unit
V_{CC}	Supply Voltage		2.0	6.0	V
V_I	Input Voltage		0	V_{CC}	V
V_O	Output Voltage		0	V_{CC}	V
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate	$V_{CC} = 2.0\text{V}$		625	ns/V
		$V_{CC} = 4.5\text{V}$		140	
		$V_{CC} = 6.0\text{V}$		85	
T_A	Operating Free-Air Temperature		-40	+125	$^\circ\text{C}$

Note: 6. Unused inputs should be held at V_{CC} or Ground.

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Symbol	Parameter	Test Conditions	V _{CC}	T _A = -40°C to +85°C		T _A = -40°C to +125°C		Unit
				Min	Max	Min	Max	
V _{IH}	High-level Input Voltage		2.0V	1.5		1.5		V
			4.5V	3.15		3.15		
			6.0V	4.2		4.2		
V _{IL}	Low-level Input voltage		2.0V		0.5		0.5	V
			4.5V		1.35		1.35	
			6.0V		1.8		1.8	
V _{OH}	High-level Output Voltage	I _{OH} = -20μA	2.0V	1.9		1.9		V
		I _{OH} = -20μA	4.5V	4.4		4.4		
		I _{OH} = -20μA	6.0V	5.9		5.9		
		I _{OH} = -4.0mA	4.5V	3.84		3.7		
		I _{OH} = -5.2mA	6.0V	5.34		5.2		
V _{OL}	Low-level Output Voltage	I _{OL} = 20μA	2.0V		0.1		0.1	V
		I _{OL} = 20μA	4.5V		0.1		0.1	
		I _{OL} = 20μA	6.0V		0.1		0.1	
		I _{OL} = 4mA	4.5V		0.33		0.44	
		I _{OL} = 5.2mA	6.0V		0.33		0.44	
I _{oz}	Z State Leakage Current	V _O = 0 to 6.0V V _I = GND or 6.0V	6.0V		± 5.0		± 10	μA
I _I	Input Current	V _I = GND to 5.5V	6.0V		± 1		± 1	μA
I _{CC}	Supply Current	V _I = GND or V _{CC} , I _O = 0	6.0V		20		40	μA

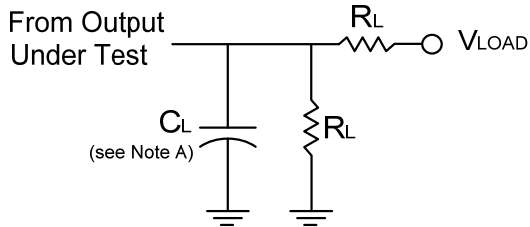
Switching Characteristics

Symbol	Parameter	Test Conditions	V _{CC}	T _A = +25°C			-40°C to +85°C	-40°C to +125°C	Unit
				Min	Typ.	Max	Max	Max	
t _{PD}	Propagation Delay A _N to Y _N	Figure 1 C _L = 50 pF	2.0V	—	30	100	125	150	ns
			4.5V	—	11	20	25	30	
			6.0V	—	9	17	21	26	
t _{EN}	Enable Time OE _N to Y _N	Figure 1 C _L = 50 pF	2.0V	—	41	125	155	190	ns
			4.5V	—	15	25	31	38	
			6.0V	—	12	21	26	32	
t _{DIS}	Disable Time OE to Y _N	Figure 1 C _L = 50 pF	2.0V	—	41	125	155	190	ns
			4.5V	—	15	25	31	38	
			6.0V	—	12	21	26	32	
t _t	Transition time	Figure 1 C _L = 50 pF	2.0V	—	14	60	75	90	ns
			4.5V	—	5	12	15	18	
			6.0V	—	4	10	13	15	

Operating Characteristics (@T_A = +25°C, unless otherwise specified.)

Parameter		Test Conditions	V _{CC} = 6V	Unit
			Typ	
C _{pd}	Power Dissipation Capacitance per Gate	f = 1MHz	22	pF
C _I	Input Capacitance	V _I = V _{CC} – or GND	4	pF

Parameter Measurement Information



TEST	Condition
t_{PLZ} (see Notes D and E)	Vload
t_{PZL} (see Notes D and F)	Vload

V_{CC}	Inputs		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_I	t_r/t_f					
2.0V to 6.0V	V_{CC}	$\leq 3ns$	$V_{CC}/2$	$2 \times V_{CC}$	15,50 pF	2 K Ω	10% of V_{CC}

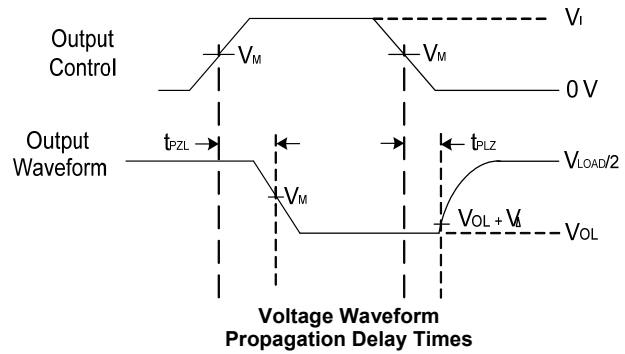
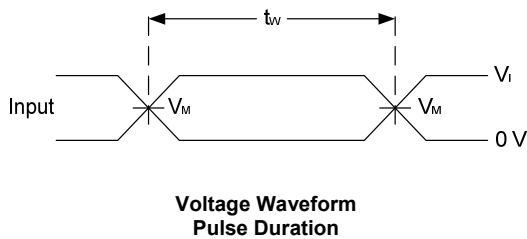
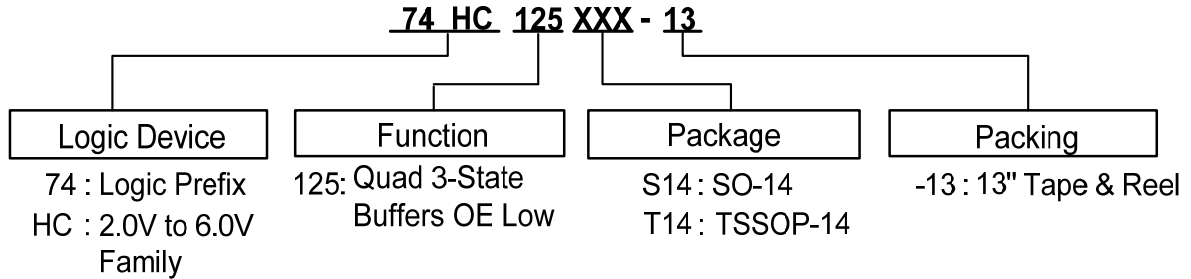


Figure 1 Load Circuit and Voltage Waveforms

- Notes:
- A. Includes test lead and test apparatus capacitance.
 - B. All pulses are supplied at pulse repetition rate ≤ 1 MHz.
 - C. The inputs are measured one at a time with one transition per measurement.
 - D. For the 3 state device t_{PLZ} and t_{PZL} are the same as t_{PD} .
 - E. t_{PZL} is measured at V_M .
 - D. t_{PLZ} is measured at $V_{OL} + V_{\Delta}$.

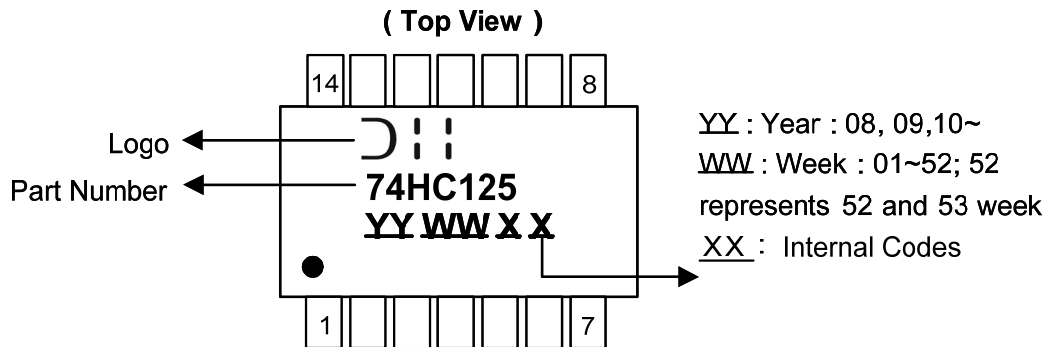
Ordering Information



Device	Package Code	Packaging	7" Tape and Reel	
			Quantity	Part Number Suffix
74HC125S14-13	S14	SO-14	2500/Tape & Reel	-13
74HC125T14-13	T14	TSSOP-14	2500/Tape & Reel	-13

Marking Information

(1) SO-14, TSSOP-14

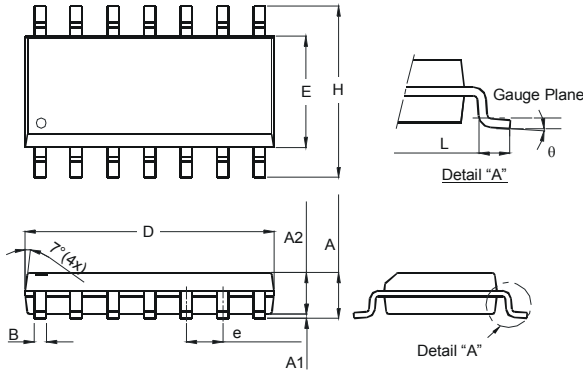


Part Number	Package
74HC125S14	SO-14
74HC125T14	TSSOP-14

Package Outline Dimensions (All dimensions in mm.)

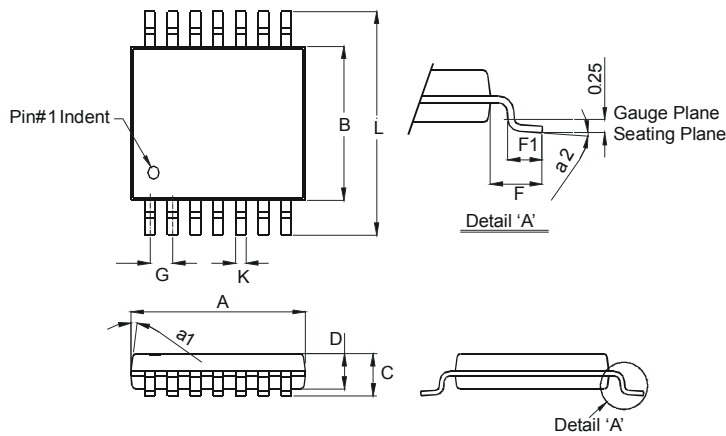
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.

Package Type: SO-14



SO-14		
Dim	Min	Max
A	1.47	1.73
A1	0.10	0.25
A2	1.45 Typ	
B	0.33	0.51
D	8.53	8.74
E	3.80	3.99
e	1.27 Typ	
H	5.80	6.20
L	0.38	1.27
θ	0°	8°
All Dimensions in mm		

Package Type: TSSOP-14

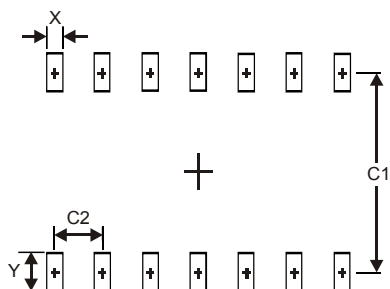


TSSOP-14		
Dim	Min	Max
a1	7° (4X)	
a2	0°	8°
A	4.9	5.10
B	4.30	4.50
C	—	1.2
D	0.8	1.05
F	1.00 Typ	
F1	0.45	0.75
G	0.65 Typ	
K	0.19	0.30
L	6.40 Typ	
All Dimensions in mm		

Suggested Pad Layout

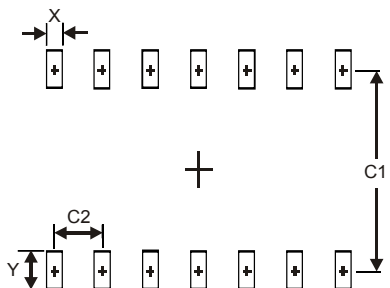
Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for latest version.

Package Type: SO-14



Dimensions	Value (in mm)
X	0.60
Y	1.50
C1	5.4
C2	1.27

Package Type: TSSOP-14



Dimensions	Value (in mm)
X	0.45
Y	1.45
C1	5.9
C2	0.65

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