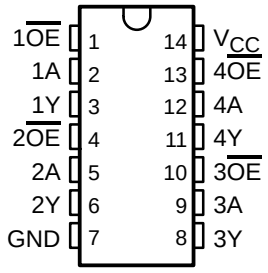
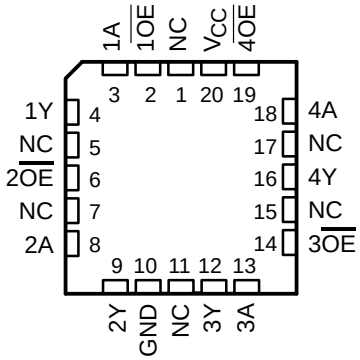
- **Inputs Are TTL-Voltage Compatible**
- ***EPIC***™ **(Enhanced-Performance Implanted CMOS) Process**
- **High Latch-Up Immunity Exceeds 250 mA Per JESD 17**
- **ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015**
- **Package Options Include Plastic Small-Outline (D), Shrink Small-Outline (DB), Thin Very Small-Outline (DGV), Thin Shrink Small-Outline (PW), and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs**

SN54AHCT125 . . . J OR W PACKAGE
SN74AHCT125 . . . D, DB, DGV, N, OR PW PACKAGE
(TOP VIEW)



SN54AHCT125 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description

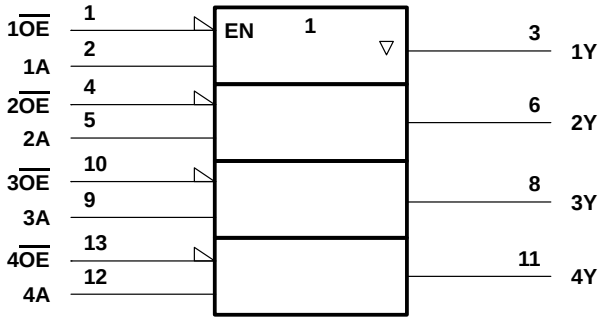
The ’AHCT125 are quadruple bus buffer gates featuring independent line drivers with 3-state outputs. Each output is disabled when the associated output-enable ($\overline{OE}$) input is high. When $\overline{OE}$ is low, the respective gate passes the data from the A input to its Y output.

The SN54AHCT125 is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74AHCT125 is characterized for operation from –40°C to 85°C.

FUNCTION TABLE
(each buffer)

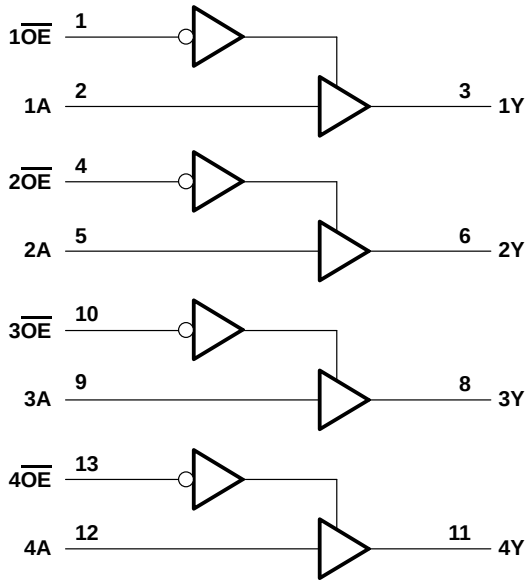
INPUTS		OUTPUT
$\overline{OE}$	A	Y
L	H	H
L	L	L
H	X	Z

logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for the D, DB, DGV, J, N, PW, and W packages.

logic diagram (positive logic)



Pin numbers shown are for the D, DB, DGV, J, N, PW, and W packages.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, V_{CC} . . . . . –0.5 V to 7 V
Input voltage range, V_I (see Note 1) . . . . . –0.5 V to 7 V
Output voltage range, V_O (see Note 1) . . . . . –0.5 V to V_{CC} + 0.5 V
Input clamp current, I_{IK} (V_I < 0) . . . . . –20 mA
Output clamp current, I_{OK} (V_O < 0 or V_O > V_{CC}) . . . . . ±20 mA
Continuous output current, I_O (V_O = 0 to V_{CC}) . . . . . ±25 mA
Continuous current through V_{CC} or GND . . . . . ±50 mA
Package thermal impedance, θ_{JA} (see Note 2): D package . . . . . 127°C/W
DB package . . . . . 158°C/W
DGV package . . . . . 182°C/W
N package . . . . . 78°C/W
PW package . . . . . 170°C/W
Storage temperature range, T_{stg} . . . . . –65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions (see Note 3)

		SN54AHCT125		SN74AHCT125		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	4.5	5.5	4.5	5.5	V
V_{IH}	High-level input voltage	2		2		V
V_{IL}	Low-level input voltage		0.8		0.8	V
V_I	Input voltage	0	5.5	0	5.5	V
V_O	Output voltage	0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current		–8		–8	mA
I_{OL}	Low-level output current		8		8	mA
$\Delta t/\Delta v$	Input transition rise or fall rate		20		20	ns/V
T_A	Operating free-air temperature	–55	125	–40	85	°C

NOTE 3: Unused inputs must be held high or low to prevent them from floating.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS	V_{CC}	T_A = 25°C			SN54AHCT125		SN74AHCT125		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}		I_{OH} = –50 μA	4.5 V	4.4	4.5		4.4		4.4		V
		I_{OH} = –8 mA		3.94			3.8		3.8		
V_{OL}		I_{OL} = 50 μA	4.5 V			0.1		0.1		0.1	V
		I_{OL} = 8 mA				0.36		0.44		0.44	
I_I	A or $\overline{OE}$ inputs	V_I = V_{CC} or GND	5.5 V			±0.1		±1		±1	μA
I_{OZ}		V_O = V_{CC} or GND	5.5 V			±0.25		±2.5		±2.5	μA
I_{CC}		V_I = V_{CC} or GND, I_O = 0	5.5 V			2		20		20	μA
ΔI_{CC}‡		One input at 3.4 V, Other inputs at V_{CC} or GND	5.5 V			1.35		1.5		1.5	mA
C_i		V_I = V_{CC} or GND	5 V		4	10				10	pF
C_o		V_O = V_{CC} or GND	5 V		15						pF

‡ This is the increase in supply current for each input at one of the specified TTL voltage levels rather than 0 V or V_{CC}.

switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	SN54AHCT125					UNIT
				T_A = 25°C			MIN	MAX	
				MIN	TYP	MAX			
t_{PLH}*	A	Y	C_L = 15 pF		3.8	5.5	1	6.5	ns
t_{PHL}*					3.8	5.5	1	6.5	
t_{PZH}*	$\overline{OE}$	Y	C_L = 15 pF		3.6	5.1	1	6	ns
t_{PZL}*					3.6	5.1	1	6	
t_{PHZ}*	$\overline{OE}$	Y	C_L = 15 pF		4.6	6.8	1	8	ns
t_{PLZ}*					4.6	6.8	1	8	
t_{PLH}	A	Y	C_L = 50 pF		5.3	7.5	1	8.5	ns
t_{PHL}					5.3	7.5	1	8.5	
t_{PZH}	$\overline{OE}$	Y	C_L = 50 pF		5.1	7.1	1	8	ns
t_{PZL}					5.1	7.1	1	8	
t_{PHZ}	$\overline{OE}$	Y	C_L = 50 pF		6.1	8.8	1	10	ns
t_{PLZ}					6.1	8.8	1	10	

* On products compliant to MIL-PRF-38535, this parameter is ensured but not production tested.

switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	SN74AHCT125					UNIT
				T_A = 25°C			MIN	MAX	
				MIN	TYP	MAX			
t_{PLH}	A	Y	C_L = 15 pF		3.8	5.5	1	6.5	ns
t_{PHL}					3.8	5.5	1	6.5	
t_{PZH}	$\overline{OE}$	Y	C_L = 15 pF		3.6	5.1	1	6	ns
t_{PZL}					3.6	5.1	1	6	
t_{PHZ}	$\overline{OE}$	Y	C_L = 15 pF		4.6	6.8	1	8	ns
t_{PLZ}					4.6	6.8	1	8	
t_{PLH}	A	Y	C_L = 50 pF		5.3	7.5	1	8.5	ns
t_{PHL}					5.3	7.5	1	8.5	
t_{PZH}	$\overline{OE}$	Y	C_L = 50 pF		5.1	7.1	1	8	ns
t_{PZL}					5.1	7.1	1	8	
t_{PHZ}	$\overline{OE}$	Y	C_L = 50 pF		6.1	8.8	1	10	ns
t_{PLZ}					6.1	8.8	1	10	

output-skew characteristics, C_L = 50 pF (see Note 4)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	SN74AHCT125				UNIT
				T_A = 25°C		MIN	MAX	
				MIN	MAX			
$t_{sk(o)}$	A	Y	5 V ± 0.5 V		1		1	ns

NOTE 4: Characteristics are determined during product characterization and ensured by design.

noise characteristics, V_{CC} = 5 V, C_L = 50 pF, T_A = 25°C (see Note 5)

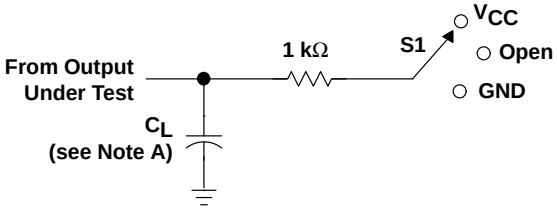
PARAMETER		SN74AHCT125		UNIT
		MIN	MAX	
$V_{OL(P)}$	Quiet output, maximum dynamic V_{OL}		0.8	V
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}		–0.8	V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}	4.4		V
$V_{IH(D)}$	High-level dynamic input voltage	2		V
$V_{IL(D)}$	Low-level dynamic input voltage		0.8	V

NOTE 5: Characteristics are determined during product characterization and ensured by design for surface-mount packages only.

operating characteristics, V_{CC} = 5 V, T_A = 25°C

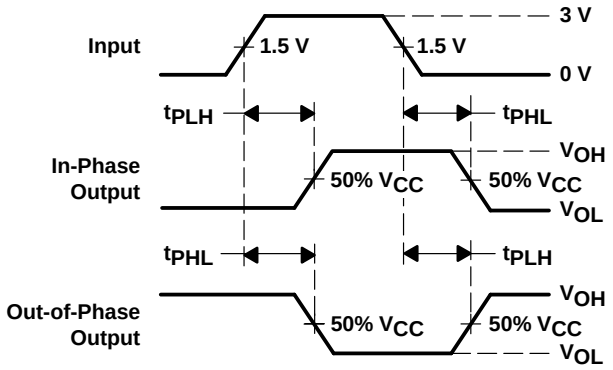
PARAMETER		TEST CONDITIONS		TYP	UNIT
C_{pd}	Power dissipation capacitance	No load,	f = 1 MHz	14	pF

PARAMETER MEASUREMENT INFORMATION

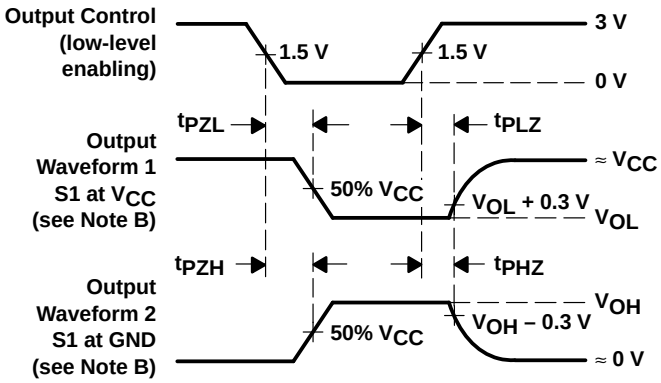


LOAD CIRCUIT

TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	V_{CC}
t_{PHZ}/t_{PZH}	GND



VOLTAGE WAVEFORMS
DELAY TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES

NOTES: A. C_L includes probe and jig 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. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, Z_O = 50 Ω, t_r = 3 ns, t_f = 3 ns.
D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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