- *EPIC*™ (Enhanced-Performance Implanted CMOS) 2-μ Process
- Typical V_{OLP} (Output Ground Bounce) < 0.8 V at V_{CC}, T_A = 25°C
- Typical V_{OHV} (Output V_{OH} Undershoot) > 2 V at V_{CC}, T_A = 25°C
- ESD Protection Exceeds 2000 V per MIL-STD-883C, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)
- Latch-Up Performance Exceeds 250 mA Per JEDEC Standard JESD-17
- Package Options Include Plastic Small-Outline (D), Shrink Small-Outline (DB), Thin Shrink Small-Outline (PW), Ceramic Flat (W) Packages, Chip Carriers (FK), and (J) 300-mil DIPs

description

These quadruple bus buffer gates are designed for 2.7-V to 5.5-V V_{CC} operation.

The 'LV125 feature independent line drivers with 3-state outputs. Each output is disabled when the associated output-enable ($\overline{OE}$) input is high.

The SN54LV125 is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74LV125 is characterized for operation from –40°C to 85°C.

SN54LV125 . . . J OR W PACKAGE
SN74LV125 . . . D, DB, OR PW PACKAGE
(TOP VIEW)

1$\overline{OE}$	1	14	V_{CC}
1A	2	13	4$\overline{OE}$
1Y	3	12	4A
2$\overline{OE}$	4	11	4Y
2A	5	10	3$\overline{OE}$
2Y	6	9	3A
GND	7	8	3Y
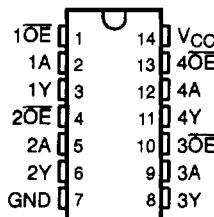
SN54LV125 . . . FK PACKAGE
(TOP VIEW)

Top pins: 1A, 1$\overline{OE}$, NC, V_{CC}, 4$\overline{OE}$ (3 2 1 20 19)

1Y	4	18	4A
NC	5	17	NC
2$\overline{OE}$	6	16	4Y
NC	7	15	NC
2A	8	14	3$\overline{OE}$

Bottom pins: 2Y, GND, NC, 3Y, 3A (9 10 11 12 13)
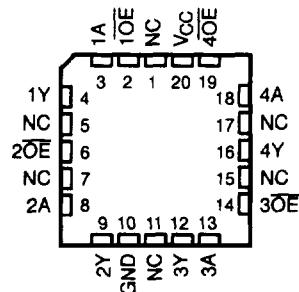
NC – No internal connection

FUNCTION TABLE
(each buffer)

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

TEXAS INSTRUMENTS

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SN54LV125, SN74LV125
QUADRUPLE BUS BUFFER GATES
WITH 3-STATE OUTPUTS

SCES003B – NOVEMBER 1994 – REVISED APRIL 1996

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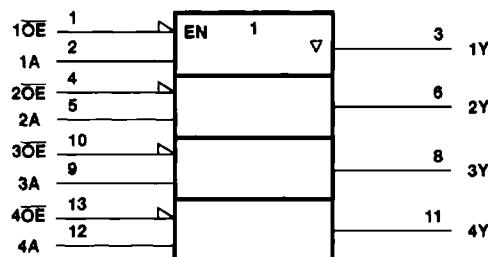
† This symbol is in accordance with ANSI/IEEE Std 91-1984
and IEC Publication 617-12.
Pin numbers shown are for D, DB, J, PW, and W packages.

logic diagram (positive logic)
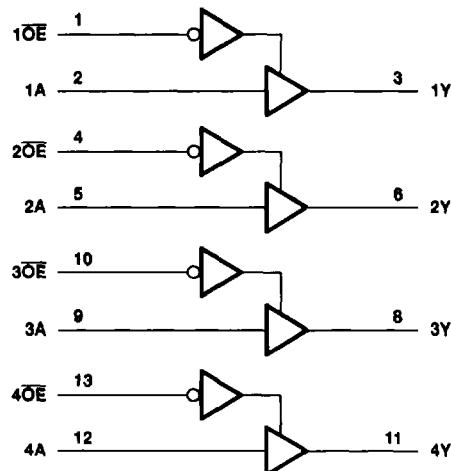
absolute maximum ratings over operating free-air temperature range (unless otherwise noted)‡

Supply voltage range, V_{CC} .... −0.5 V to 7 V
Input voltage range, V_I (see Note 1) .... −0.5 V to V_{CC} + 0.5 V
Output voltage range, V_O (see Notes 1 and 2) .... −0.5 V to V_{CC} + 0.5 V
Input clamp current, I_{IK} (V_I < 0 or V_I > V_{CC}) .... ±20 mA
Output clamp current, I_{OK} (V_O < 0 or V_O > V_{CC}) .... ±50 mA
Continuous output current, I_O (V_O ≈ 0 to V_{CC}) .... ±35 mA
Continuous current through V_{CC} or GND .... ±70 mA
Maximum power dissipation at T_A = 55°C (in still air) (see Note 3): D package .... 1.25 W
DB or PW package .... 0.5 W
Operating free-air temperature range, T_A .... −40°C to 85°C
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. This value is limited to 7 V maximum.
3. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils.

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recommended operating conditions (see Note 4)

			SN54LV125 MIN	SN54LV125 MAX	SN74LV125 MIN	SN74LV125 MAX	UNIT
V_{CC}	Supply voltage		2.7	5.5	2.7	5.5	V
V_{IH}	High-level input voltage	V_{CC} = 2.7 V to 3.6 V	2		2		V
		V_{CC} = 4.5 V to 5.5 V	3.15		3.15		
V_{IL}	Low-level input voltage	V_{CC} = 2.7 V to 3.6 V		0.8		0.8	V
		V_{CC} = 4.5 V to 5.5 V		1.65		1.65	
V_I	Input voltage		0	V_{CC}	0	V_{CC}	V
V_O	Output voltage		0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 2.7 V to 3.6 V		−8		−8	mA
		V_{CC} = 4.5 V to 5.5 V		−16		−16	
I_{OL}	Low-level output current	V_{CC} = 2.7 V to 3.6 V		8		8	mA
		V_{CC} = 4.5 V to 5.5 V		16		16	
$\Delta t/\Delta V$	Input transition rise or fall rate		0	100	0	100	ns/V
T_A	Operating free-air temperature		−55	125	−40	85	°C

NOTE 4: 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}[†]	SN54LV125 MIN	SN54LV125 TYP[†]	SN54LV125 MAX	SN74LV125 MIN	SN74LV125 TYP[†]	SN74LV125 MAX	UNIT
V_{OH}	I_{OH} = −100 µA	MIN to MAX[‡]	V_{CC}−0.2			V_{CC}−0.2			V
	I_{OH} = −8 mA	3 V	2.4			2.4			
	I_{OH} = −16 mA	4.5 V	3.6			3.6			
V_{OL}	I_{OL} = 100 µA	MIN to MAX[‡]			0.2			0.2	V
	I_{OL} = 8 mA	3 V			0.4			0.4	
	I_{OL} = 16mA	4.5 V			0.55			0.55	
I_I	V_I = V_{CC} or GND	3.6 V			±1			±1	µA
		5.5 V			±1			±1	
I_{OZ}	V_O = V_{CC} or GND	3.6 V			±5			±5	µA
		5.5 V			±5			±5	
I_{CC}	V_I = V_{CC} or GND, I_O = 0	3.6 V			20			20	µA
		5.5 V			20			20	
ΔI_{CC}	One input at V_{CC} − 0.6 V, Other inputs at V_{CC} or GND	3 V to 3.6 V			500			500	µA
C_i	V_I = V_{CC} or GND	3.3 V		3.5			3.5		pF
		5 V		3.5			3.5		
C_o	V_O = V_{CC} or GND	3.3 V		8			8		pF
		5 V		8			8		

† All typical values are at V_{CC} = 3.3 V, T_A = 25°C.
‡ For conditions shown as MIN or MAX, use the appropriate values under recommended operating conditions.

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switching characteristics over recommended operating free-air temperature range, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN54LV125								UNIT
			V_{CC} = 5.5 V ± 0.5 V			V_{CC} = 3.3 V ± 0.3 V			V_{CC} = 2.7 V		
			MIN	TYP†	MAX	MIN	TYP†	MAX	MIN	MAX	
t_{pd}	A	Y		7			9			23	ns
t_{en}	$\overline{OE}$	Y		5	19		7	25		31	ns
t_{dis}	$\overline{OE}$	Y		7			9			28	ns

† All typical values are at V_{CC} = 3.3 V, T_A = 25°C.

switching characteristics over recommended operating free-air temperature range, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	SN74LV125								UNIT
			V_{CC} = 5.5 V ± 0.5 V			V_{CC} = 3.3 V ± 0.3 V			V_{CC} = 2.7 V		
			MIN	TYP†	MAX	MIN	TYP†	MAX	MIN	MAX	
t_{pd}	A	Y		7	18		9	19		23	ns
t_{en}	$\overline{OE}$	Y		5	19		7	25		31	ns
t_{dis}	$\overline{OE}$	Y		7	17		9	23		28	ns

† All typical values are at V_{CC} = 3.3 V, T_A = 25°C.

operating characteristics, T_A = 25°C

PARAMETER		TEST CONDITIONS	V_{CC}	TYP	UNIT
C_{pd} Power dissipation capacitance	Outputs enabled	C_L = 50 pF, f = 10 MHz	3.3 V	45	pF
	Outputs disabled			5	
	Outputs enabled		5 V	48	pF
	Outputs disabled			5	

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PARAMETER MEASUREMENT INFORMATION
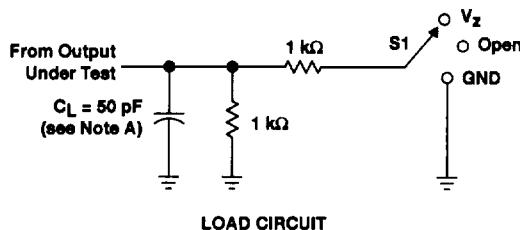
TEST	S1
tPLH/tPHL	Open
tPLZ/tPZL	V_Z
tPHZ/tPZH	GND

WAVEFORM CONDITION	$V_{CC} = 4.5$ V to 5.5 V	$V_{CC} = 2.7$ V to 3.6 V
V_m	$0.5 \times V_{CC}$	1.5 V
V_I	V_{CC}	2.7 V
V_Z	$2 \times V_{CC}$	6 V

LOAD CIRCUIT

From Output Under Test — 1 kΩ — S1 — V_Z / Open / GND
$C_L = 50$ pF (see Note A), 1 kΩ

VOLTAGE WAVEFORMS
PULSE DURATION

VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES

VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS

VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING
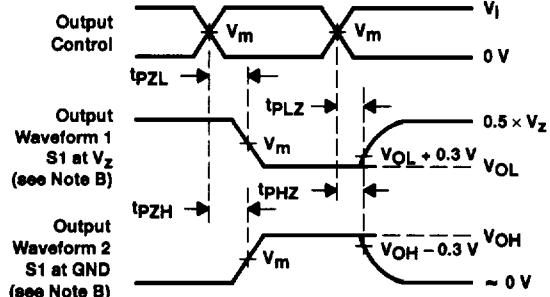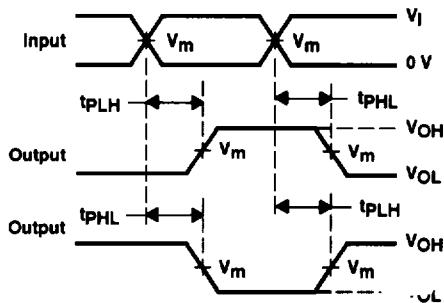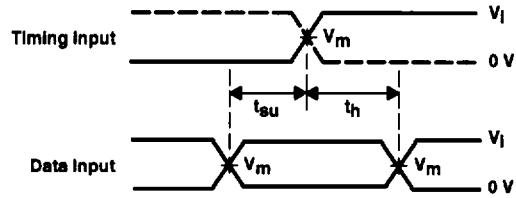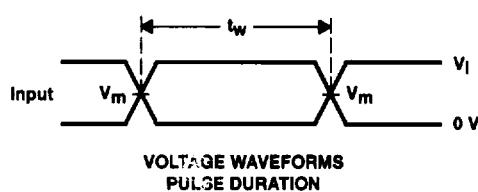
NOTES: A. C_L includes probe and jig capacitance.
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.
 Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
 C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, $Z_O = 50$ Ω, $t_r ≤ 2.5$ ns, $t_f ≤ 2.5$ ns.
 D. The outputs are measured one at a time with one transition per measurement.
 E. tPLZ and tPHZ are the same as t_{dis}.
 F. tPZL and tPZH are the same as t_{en}.
 G. tPLH and tPHL are the same as t_{pd}.

Figure 1. Load Circuit and Voltage Waveforms