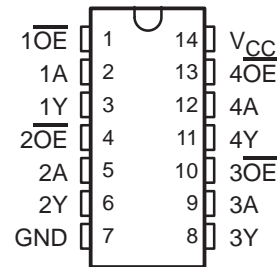


SN74LVC125A-Q1 QUADRUPLE BUS BUFFER GATE WITH 3-STATE OUTPUTS

SCAS762A – FEBRUARY 2004 – REVISED MAY 2004

- Qualification in Accordance With AEC-Q100†
- Qualified for Automotive Applications
- Customer-Specific Configuration Control Can Be Supported Along With Major-Change Approval
- Operates From 1.65 V to 3.6 V
- Specified From -40°C to 125°C
- Inputs Accept Voltages to 5.5 V
- Max t_{pd} of 4.8 ns at 3.3 V
- Typical V_{OLP} (Output Ground Bounce) $<0.8\text{ V}$ at $V_{CC} = 3.3\text{ V}$, $T_A = 25^{\circ}\text{C}$
- Typical V_{OHV} (Output V_{OH} Undershoot) $>2\text{ V}$ at $V_{CC} = 3.3\text{ V}$, $T_A = 25^{\circ}\text{C}$
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)

D OR PW PACKAGE
(TOP VIEW)



† Contact factory for details. Q100 qualification data available on request.

description/ordering information

This quadruple bus buffer gate is designed for 1.65-V to 3.6-V V_{CC} operation.

The SN74LVC125A features independent line drivers with 3-state outputs. Each output is disabled when the associated output-enable (\overline{OE}) input is high.

To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

Inputs can be driven from either 3.3-V or 5-V devices. This feature allows the use of this device as a translator in a mixed 3.3-V/5-V system environment.

ORDERING INFORMATION

T_A	PACKAGE‡		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 125°C	SOIC – D	Reel of 2500	SN74LVC125AQDRQ1	LC125AQ
	TSSOP – PW	Reel of 2000	SN74LVC125AQPWRQ1	LC125AQ

‡ Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE
(each buffer)

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



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS
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WITH 3-STATE OUTPUTS

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recommended operating conditions (see Note 6)

		$T_A = 25^\circ\text{C}$		$-40 \text{ TO } 125^\circ\text{C}$		UNIT
		MIN	MAX	MIN	MAX	
V_{CC} Supply voltage	Operating	1.65	3.6	1.65	3.6	V
	Data retention only	1.5		1.5		
V_{IH} High-level input voltage	$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	$0.65 \times V_{CC}$		$0.65 \times V_{CC}$		V
	$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	1.7		1.7		
	$V_{CC} = 2.7 \text{ V to } 3.6 \text{ V}$	2		2		
V_{IL} Low-level input voltage	$V_{CC} = 1.65 \text{ V to } 1.95 \text{ V}$	$0.35 \times V_{CC}$		$0.35 \times V_{CC}$		V
	$V_{CC} = 2.3 \text{ V to } 2.7 \text{ V}$	0.7		0.7		
	$V_{CC} = 2.7 \text{ V to } 3.6 \text{ V}$	0.8		0.8		
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	$V_{CC} = 1.65 \text{ V}$		-4		-4	mA
	$V_{CC} = 2.3 \text{ V}$		-8		-8	
	$V_{CC} = 2.7 \text{ V}$		-12		-12	
	$V_{CC} = 3 \text{ V}$		-24		-24	
I_{OL} Low-level output current	$V_{CC} = 1.65 \text{ V}$		4		4	mA
	$V_{CC} = 2.3 \text{ V}$		8		8	
	$V_{CC} = 2.7 \text{ V}$		12		12	
	$V_{CC} = 3 \text{ V}$		24		24	
$\Delta t/\Delta v$ Input transition rise or fall rate			8		8	ns/V

NOTE 6: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

PARAMETER	TEST CONDITIONS	V_{CC}	$T_A = 25^\circ\text{C}$			$-40 \text{ TO } 125^\circ\text{C}$		UNIT
			MIN	TYP	MAX	MIN	MAX	
V_{OH}	$I_{OH} = -100 \mu\text{A}$	1.65 V to 3.6 V	$V_{CC}-0.2$			$V_{CC}-0.2$		V
	$I_{OH} = -4 \text{ mA}$	1.65 V	1.29			1.1		
	$I_{OH} = -8 \text{ mA}$	2.3 V	1.9			1.75		
	$I_{OH} = -12 \text{ mA}$	2.7 V	2.2			2.1		
		3 V	2.4			2.35		
	$I_{OH} = -24 \text{ mA}$	3 V	2.3			2.1		
V_{OL}	$I_{OL} = 100 \mu\text{A}$	1.65 V to 3.6 V				0.1	0.2	V
	$I_{OL} = 4 \text{ mA}$	1.65 V				0.24	0.45	
	$I_{OL} = 8 \text{ mA}$	2.3 V				0.3	0.7	
	$I_{OL} = 12 \text{ mA}$	2.7 V				0.4	0.5	
	$I_{OL} = 24 \text{ mA}$	3 V				0.55	0.7	
I_I	$V_I = 5.5 \text{ V or GND}$	3.6 V				± 1	± 10	μA
I_{OZ}	$V_O = V_{CC} \text{ or GND}$	3.6 V				± 1	± 10	μA
I_{CC}	$V_I = V_{CC} \text{ or GND, } I_O = 0$	3.6 V				1	20	μA
ΔI_{CC}	One input at $V_{CC} - 0.6 \text{ V}$, Other inputs at $V_{CC} \text{ or GND}$	2.7 V to 3.6 V				500	500	μA
C_i	$V_I = V_{CC} \text{ or GND}$	3.3 V				5		pF



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switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)

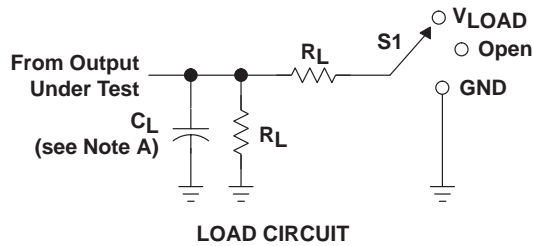
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC}	T _A = 25°C			-40 TO 125°C		UNIT
				MIN	TYP	MAX	MIN	MAX	
t _{pd}	A	Y	2.7 V	1	3	5.3	1	7	ns
			3.3 V ± 0.3 V	1	2.5	4.6	1	6	
t _{en}	\overline{OE}	Y	2.7 V	1	3.3	6.4	1	8.5	ns
			3.3 V ± 0.3 V	1	2.4	5.2	1	7	
t _{dis}	\overline{OE}	Y	2.7 V	1	2.5	4.8	1	6.5	ns
			3.3 V ± 0.3 V	1	2.4	4.4	1	6	
t _{sk(o)}			3.3 V ± 0.3 V					1.5	ns

operating characteristics, T_A = 25°C

PARAMETER	TEST CONDITIONS	V _{CC}	TYP	UNIT
C _{pd} Power dissipation capacitance per gate	f = 10 MHz	3.3 V	15	pF

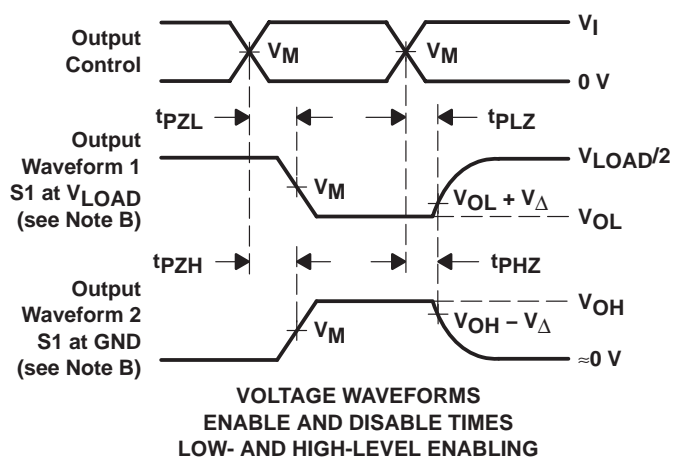
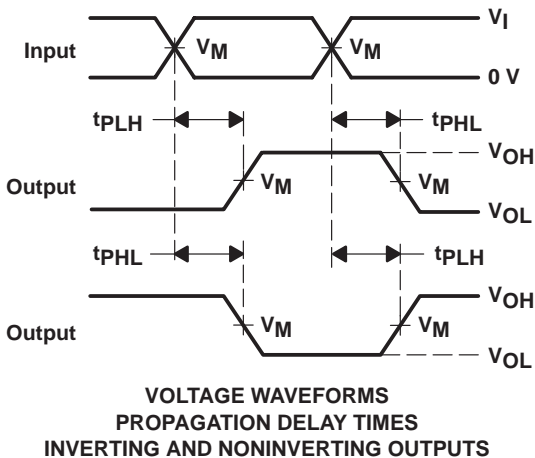
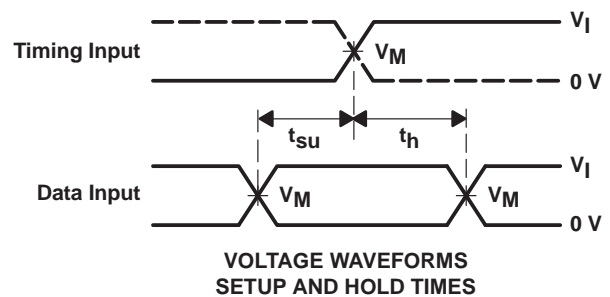
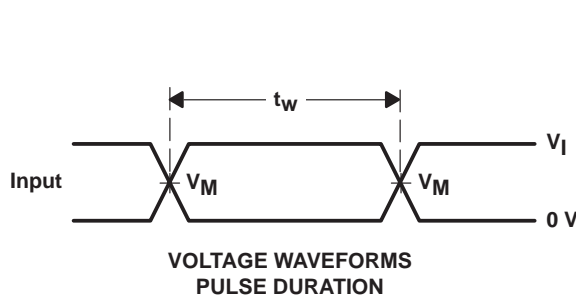


PARAMETER MEASUREMENT INFORMATION



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

V_{CC}	INPUT		V_M	V_{LOAD}	C_L	R_L	V_{Δ}
	V_I	t_r/t_f					
2.7 V	2.7 V	≤ 2.5 ns	1.5 V	6 V	50 pF	500 Ω	0.3 V
$3.3 \text{ V} \pm 0.3 \text{ V}$	2.7 V	≤ 2.5 ns	1.5 V	6 V	50 pF	500 Ω	0.3 V

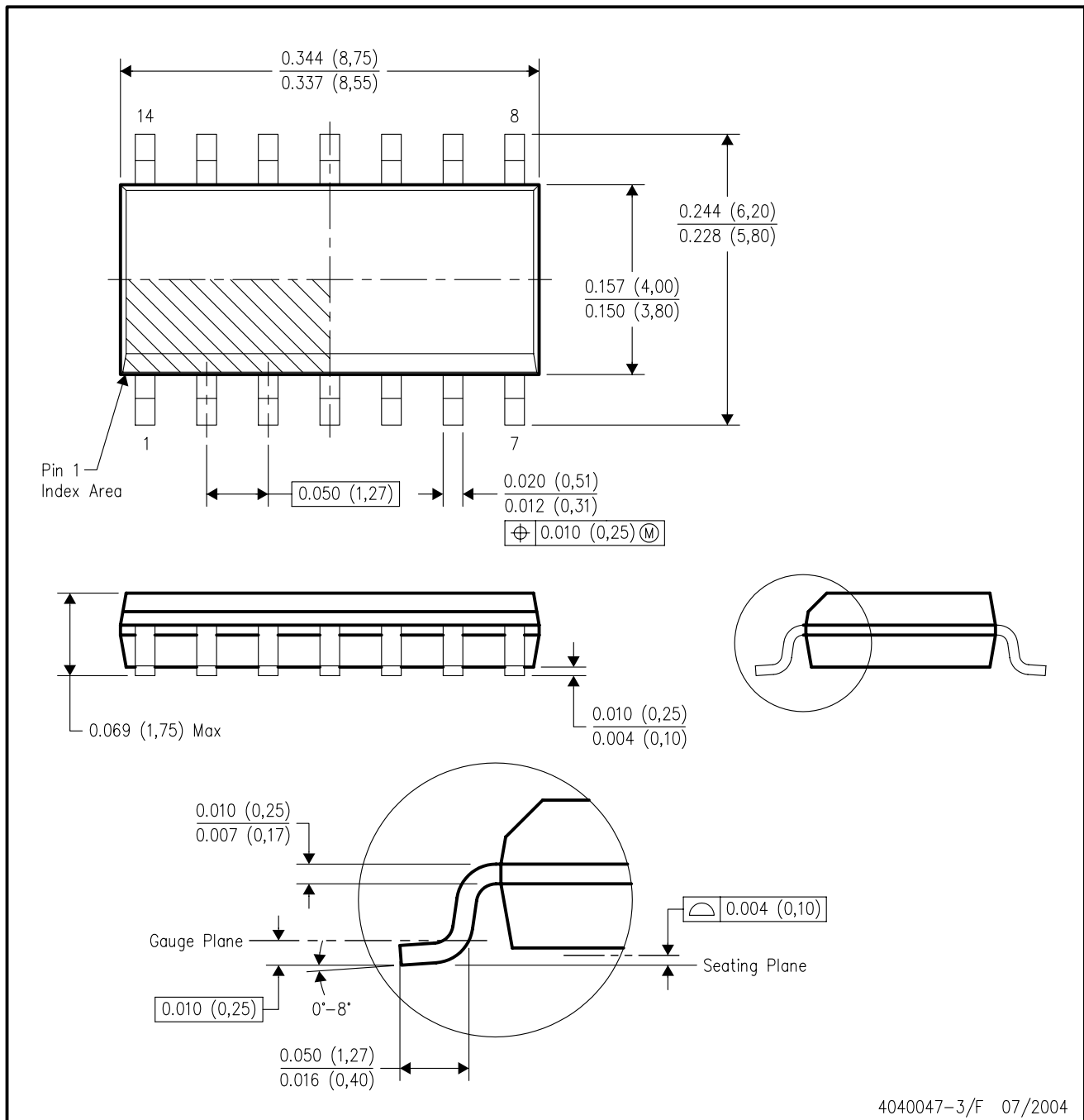


- NOTES: A. C_L includes probe and jig capacitance.
 B. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high, except when disabled by the output control.
 C. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, $Z_O = 50 \Omega$.
 D. The outputs are measured one at a time, with one transition per measurement.
 E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 F. t_{PZL} and t_{PZH} are the same as t_{en} .
 G. t_{PLH} and t_{PHL} are the same as t_{pd} .
 H. All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

D (R-PDSO-G14)

PLASTIC SMALL-OUTLINE PACKAGE

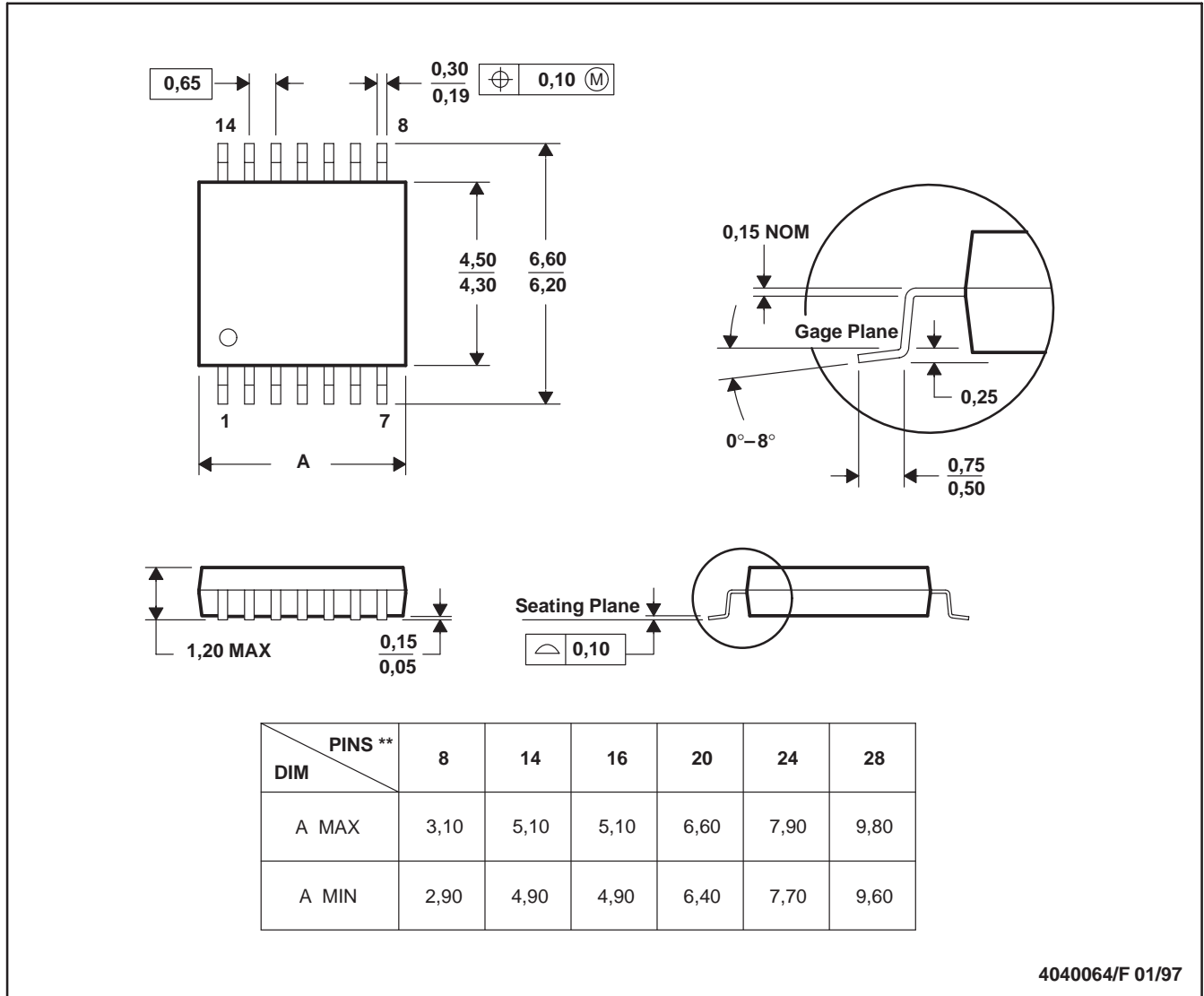


- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
 - D. Falls within JEDEC MS-012 variation AB.

PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



4040064/F 01/97

- NOTES: A. All linear dimensions are in millimeters.
 B. This drawing is subject to change without notice.
 C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-153

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