

The SN54125, SN54126, SN74125, SN74126, and SN54LS126A are obsolete and are no longer supplied.

# SN54125, SN54126, SN54LS125A, SN54LS126A, SN74125, SN74126, SN74LS125A, SN74LS126A QUADRUPLE BUS BUFFERS WITH 3-STATE OUTPUTS

SDLS044A - DECEMBER 1983 - REVISED MARCH 2002

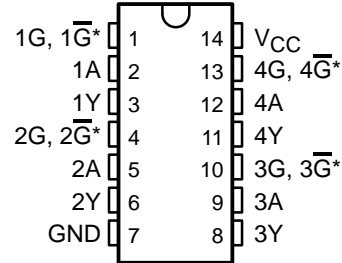
- Quad Bus Buffers
- 3-State Outputs
- Separate Control for Each Channel

## description

These bus buffers feature three-state outputs that, when enabled, have the low impedance characteristics of a TTL output with additional drive capability at high logic levels to permit driving heavily loaded bus lines without external pullup resistors. When disabled, both output transistors are turned off, presenting a high-impedance state to the bus so the output will act neither as a significant load nor as a driver. The '125 and 'LS125A devices' outputs are disabled when  $\bar{G}$  is high. The '126 and 'LS126A devices' outputs are disabled when G is low.

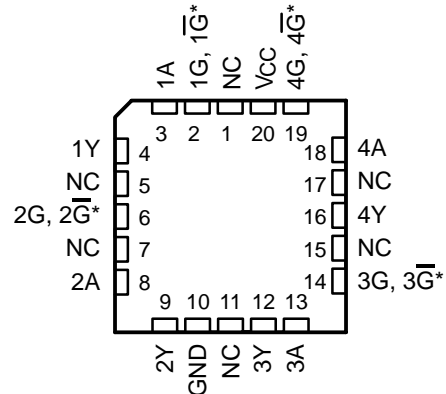
SN54125, SN54126, SN54LS125A, SN54LS126A . . . J OR W PACKAGE  
SN74125, SN74126 . . . N PACKAGE  
SN74LS125A, SN74LS126A . . . D, N, OR NS PACKAGE

(TOP VIEW)



$\bar{G}$  on '125 and 'LS125A devices;  
G on 126 and 'LS126A devices

SN54LS125A, SN54LS126A . . . FK PACKAGE  
(TOP VIEW)



$\bar{G}$  on '125 and 'LS125A devices;  
G on 126 and 'LS126A devices  
NC - No internal connection



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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  
INSTRUMENTS**

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On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

**SN54125, SN54126, SN54LS125A, SN54LS126A,  
SN74125, SN74126, SN74LS125A, SN74LS126A  
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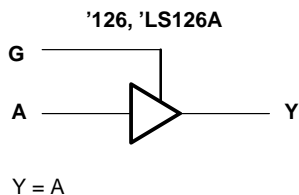
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**ORDERING INFORMATION**

T <sub>A</sub>	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	PDIP – N	Tube	SN74LS125AN	SN74LS125AN
		Tube	SN74LS126AN	SN74LS126AN
	SOIC – D	Tube	SN74LS125AD	LS125A
		Tape and reel	SN74LS125ADR	
		Tube	SN74LS126AD	LS126A
		Tape and reel	SN74LS126ADR	
SOP – NS	Tape and reel	SN74LS125ANSR	74LS125A	
	Tape and reel	SN74LS126ANSR	74LS126A	
–55°C to 125°C	CDIP – J	Tube	SN54LS125AJ	SN54LS125AJ
		Tube	SNJ54LS125AJ	SNJ54LS125AJ
	CFP – W	Tube	SNJ54LS125AW	SNJ54LS125AW
	LCCC – FK	Tube	SNJ54LS125AFK	SNJ54LS125AFK

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at [www.ti.com/sc/package](http://www.ti.com/sc/package).

**logic diagram (each gate)**



**SN54125, SN54126, SN54LS125A, SN54LS126A,  
SN74125, SN74126, SN74LS125A, SN74LS126A  
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schematics (each gate)



**absolute maximum ratings over operating free-air temperature (unless otherwise noted)†**  
(**'125 and '126**)

Supply voltage, $V_{CC}$ (see Note 1)	7 V
Input voltage, $V_I$	5.5 V
Package thermal impedance, $\theta_{JA}$ (see Note 2): N package	80°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.

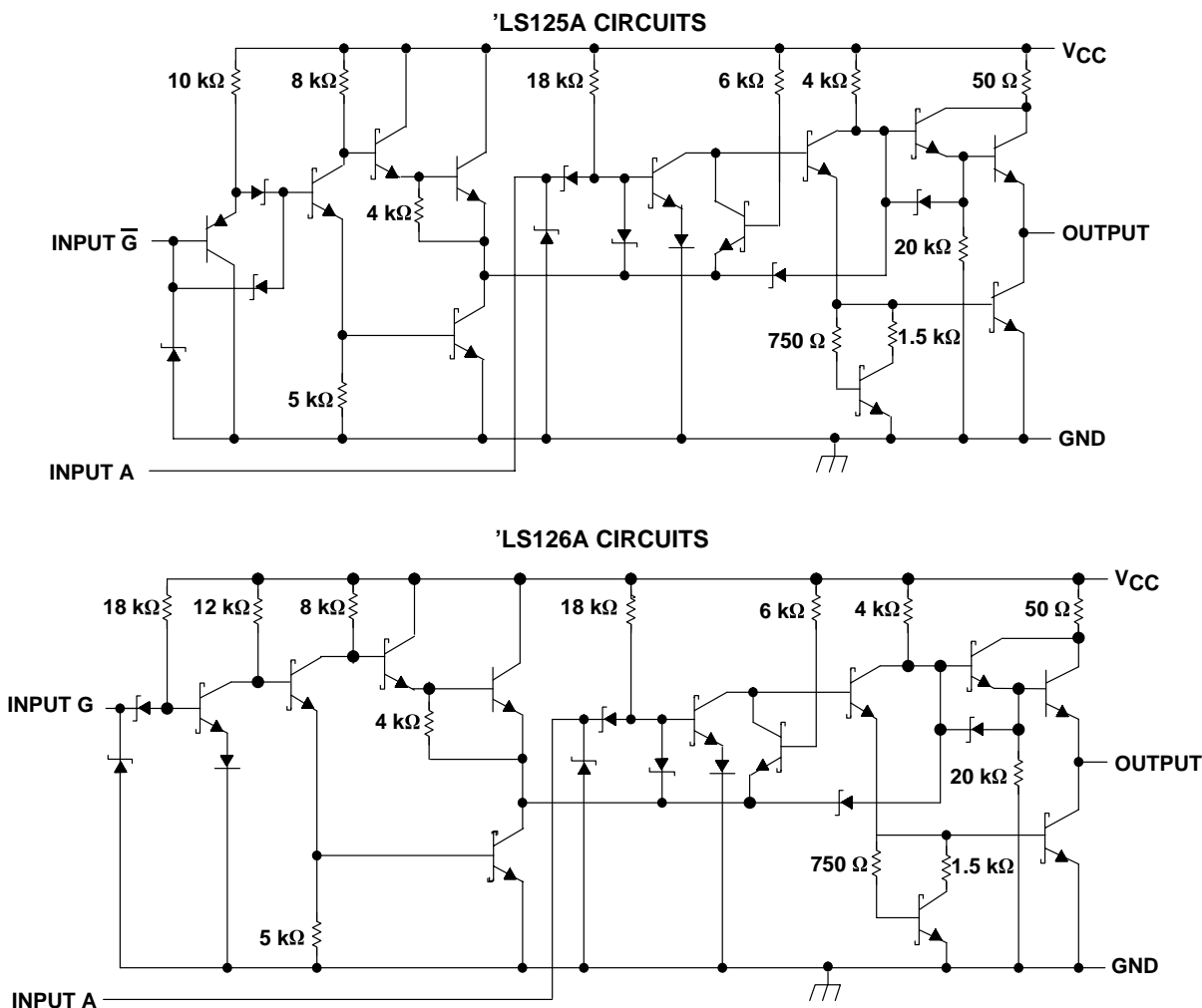
- NOTES: 1. Voltage values are with respect to network ground terminal.  
2. The package thermal impedance is calculated in accordance with JESD 51-7.

**SN54125, SN54126, SN54LS125A, SN54LS126A,  
SN74125, SN74126, SN74LS125A, SN74LS126A  
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**schematics (each gate)**



Resistor values shown are nominal.

**absolute maximum ratings over operating free-air temperature (unless otherwise noted)†**  
(‘LS125A and ‘LS126A)

Supply voltage, $V_{CC}$ (see Note 1)	7 V
Input voltage, $V_I$	7 V
Package thermal impedance, $\theta_{JA}$ (see Note 2):	
D package	86°C/W
N package	80°C/W
NS package	76°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. Voltage values are with respect to network ground terminal.  
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**SN54125, SN54126, SN54LS125A, SN54LS126A, SN74125, SN74126, SN74LS125A, SN74LS126A**  
**QUADRUPLE BUS BUFFERS WITH 3-STATE OUTPUTS**

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**recommended operating conditions**

		SN54125 SN54126			SN74125 SN74126			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub>	High-level input voltage	2			2			V
V <sub>IL</sub>	Low-level input voltage			0.8			0.8	V
I <sub>OH</sub>	High-level output current			-2			-5.2	mA
I <sub>OL</sub>	Low-level output current			16			16	mA
T <sub>A</sub>	Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†		SN54125 SN54126			SN74125 SN74126			UNIT	
			MIN	TYP‡	MAX	MIN	TYP‡	MAX		
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -12 mA				-1.5			-1.5	V	
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V	V <sub>IH</sub> = 2 V, I <sub>OH</sub> = -2 mA	2.4	3.3					V	
		V <sub>IH</sub> = 2 V, I <sub>OH</sub> = -5.2 mA				2.4	3.1			
V <sub>OL</sub>	V <sub>CC</sub> = MIN, I <sub>OL</sub> = 16 mA	V <sub>IH</sub> = 2 V, V <sub>IL</sub> = 0.8 V			0.4			0.4	V	
I <sub>OZ</sub>	V <sub>CC</sub> = MAX, V <sub>IL</sub> = 0.8 V	V <sub>IH</sub> = 2 V, V <sub>O</sub> = 2.4 V			40			40	μA	
		V <sub>IH</sub> = 2 V, V <sub>O</sub> = 0.4 V			-40			-40		
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 6.5 V				1			1	mA	
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.4 V				40			40	μA	
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V				-1.6			-1.6	mA	
I <sub>OS</sub> §	V <sub>CC</sub> = MAX				-30		-70	-28	-70	mA
I <sub>CC</sub>	V <sub>CC</sub> = MAX (see Note 3)	'125	32	54			32	54	mA	
		'126	36	62			36	62		

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

§ Not more than one output should be shorted at a time.

NOTE 3: Data inputs = 0 V; output control = 4.5 V for '125 and 0 V for '126.

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see Figure 1)**

PARAMETER	TEST CONDITIONS		SN54125 SN74125			SN54126 SN74126			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
t <sub>PLH</sub>	R <sub>L</sub> = 400 Ω, C <sub>L</sub> = 50 pF		8	13		8	13	ns	
t <sub>PHL</sub>			12	18		12	18		
t <sub>PZH</sub>	R <sub>L</sub> = 400 Ω, C <sub>L</sub> = 50 pF		11	17		11	18	ns	
t <sub>PZL</sub>			16	25		16	25		
t <sub>PHZ</sub>	R <sub>L</sub> = 400 Ω, C <sub>L</sub> = 5 pF		5	8		10	16	ns	
t <sub>PLZ</sub>			7	12		12	18		



**SN54125, SN54126, SN54LS125A, SN54LS126A,  
SN74125, SN74126, SN74LS125A, SN74LS126A  
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**recommended operating conditions**

		SN54LS125A SN54LS126A			SN74LS125A SN74LS126A			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub>	High-level input voltage	2			2			V
V <sub>IL</sub>	Low-level input voltage			0.7			0.8	V
I <sub>OH</sub>	High-level output current			-1			-2.6	mA
I <sub>OL</sub>	Low-level output current			12			24	mA
T <sub>A</sub>	Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†		SN54LS125A SN54LS126A			SN74LS125A SN74LS126A			UNIT			
			MIN	TYP‡	MAX	MIN	TYP‡	MAX				
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA		-1.5			-1.5			V			
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V	V <sub>IL</sub> = 0.7 V, I <sub>OH</sub> = -1 mA	2.4						V			
		V <sub>IL</sub> = 0.8 V, I <sub>OH</sub> = -2.6 mA				2.4						
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V	V <sub>IL</sub> = 0.7 V, I <sub>OL</sub> = 12 mA	0.25		0.4				V			
		V <sub>IL</sub> = 0.8 V, I <sub>OL</sub> = 12 mA			0.25		0.4					
		V <sub>IL</sub> = 0.8 V, I <sub>OL</sub> = 24 mA			0.35		0.5					
I <sub>OZ</sub>	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V,	V <sub>IL</sub> = 0.7 V	V <sub>O</sub> = 2.4 V		20			μA				
			V <sub>O</sub> = 0.4 V		-20							
		V <sub>IL</sub> = 0.8 V	V <sub>O</sub> = 2.4 V		20							
			V <sub>O</sub> = 0.4 V		-20							
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 7 V		0.1			0.1			mA			
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V		20			20			μA			
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V	'LS125A-G inputs		-0.2			-0.2			mA		
		'LS125A-A inputs; 'LS126A All inputs		-0.4			-0.4					
I <sub>OS</sub> §	V <sub>CC</sub> = MAX		-40		-225		-40		-225		mA	
I <sub>CC</sub>	V <sub>CC</sub> = MAX (see Note 4)	'LS125A		11		20		11		20		mA
		'LS126A		12		22		12		22		

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

§ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

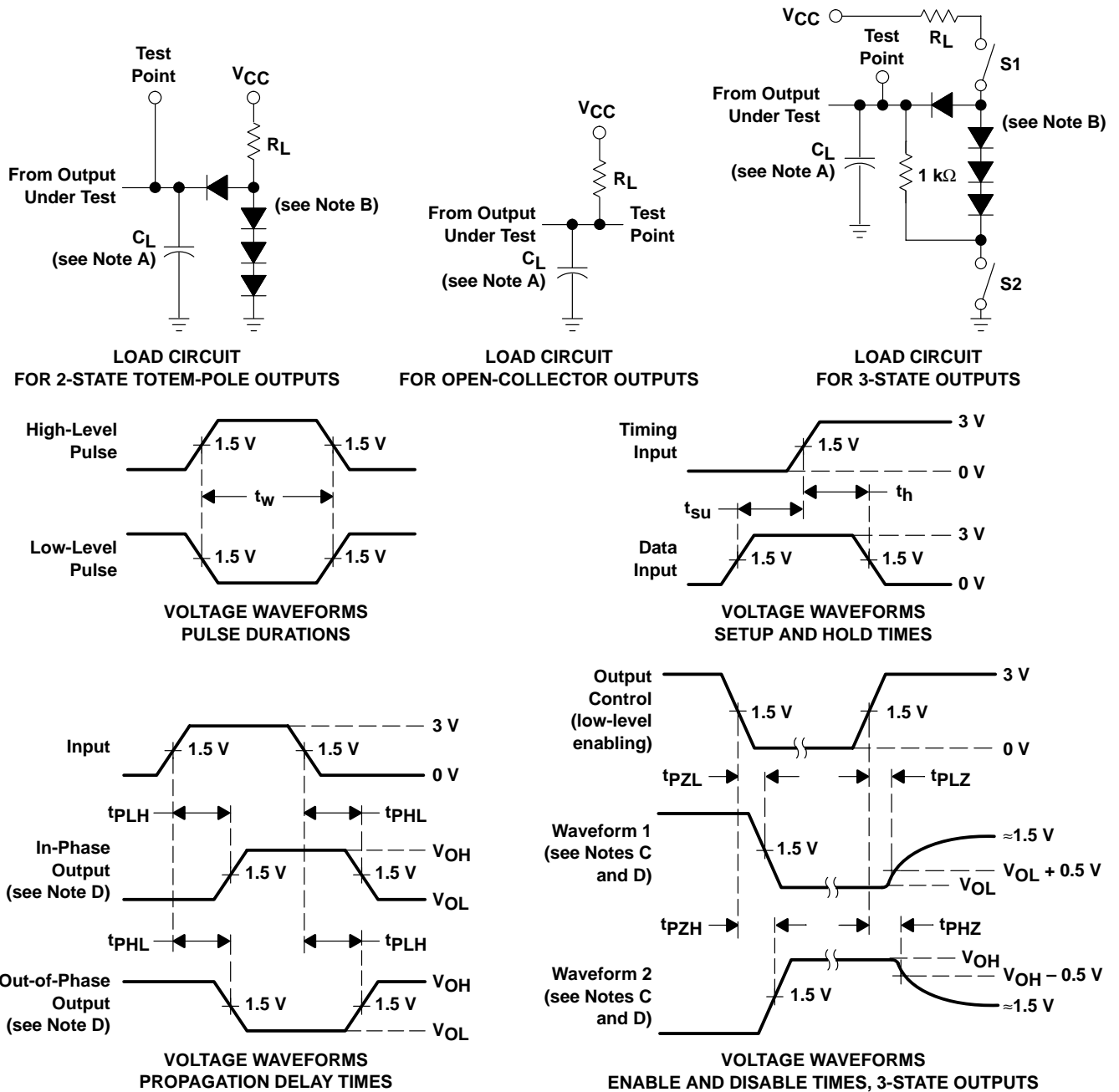
NOTE 4: Data inputs = 0 V; output control = 4.5 V for 'LS125A and 0 V for 'LS126A.

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see Figure 1)**

PARAMETER	TEST CONDITIONS		SN54LS125A SN74LS125A			SN54LS126A SN74LS126A			UNIT		
			MIN	TYP	MAX	MIN	TYP	MAX			
t <sub>PLH</sub>	R <sub>L</sub> = 667 Ω,	C <sub>L</sub> = 45 pF	9		15		9		15		ns
t <sub>PHL</sub>			7		18		8		18		
t <sub>PZH</sub>	R <sub>L</sub> = 667 Ω,	C <sub>L</sub> = 45 pF	12		20		16		25		ns
t <sub>PZL</sub>			15		25		21		35		
t <sub>PHZ</sub>	R <sub>L</sub> = 667 Ω,	C <sub>L</sub> = 5 pF			20				25		ns
t <sub>PLZ</sub>					20				25		



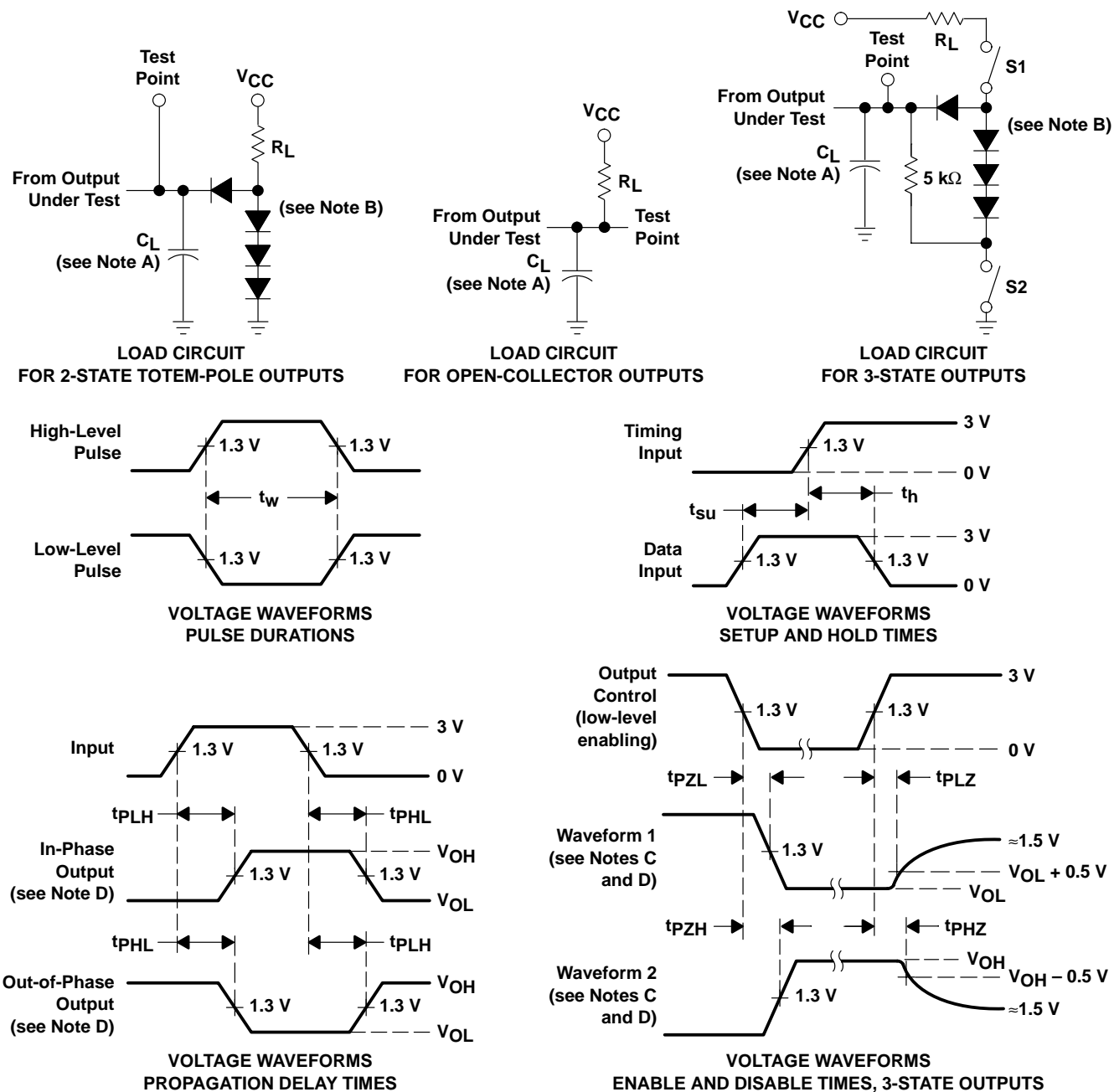
**PARAMETER MEASUREMENT INFORMATION**  
**SERIES 54/74 DEVICES**



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. All diodes are 1N3064 or equivalent.  
 C. 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.  
 D. S1 and S2 are closed for  $t_{PLH}$ ,  $t_{PHL}$ ,  $t_{PHZ}$ , and  $t_{PLZ}$ ; S1 is open and S2 is closed for  $t_{PZH}$ ; S1 is closed and S2 is open for  $t_{PZL}$ .  
 E. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1$  MHz,  $Z_O \approx 50 \Omega$ ;  $t_r$  and  $t_f \leq 7$  ns for Series 54/74 devices and  $t_r$  and  $t_f \leq 2.5$  ns for Series 54S/74S devices.  
 F. The outputs are measured one at a time with one input transition per measurement.

**Figure 1. Load Circuits and Voltage Waveforms**

PARAMETER MEASUREMENT INFORMATION  
 SERIES 54LS/74LS DEVICES



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. All diodes are 1N3064 or equivalent.  
 C. 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.  
 D. S1 and S2 are closed for  $t_{PLH}$ ,  $t_{PHL}$ ,  $t_{PHZ}$ , and  $t_{PLZ}$ ; S1 is open and S2 is closed for  $t_{PZH}$ ; S1 is closed and S2 is open for  $t_{PZL}$ .  
 E. Phase relationships between inputs and outputs have been chosen arbitrarily for these examples.  
 F. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1$  MHz,  $Z_O \approx 50 \Omega$ ,  $t_r \leq 1.5$  ns,  $t_f \leq 2.6$  ns.  
 G. The outputs are measured one at a time with one input transition per measurement.

Figure 2. Load Circuits and Voltage Waveforms



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