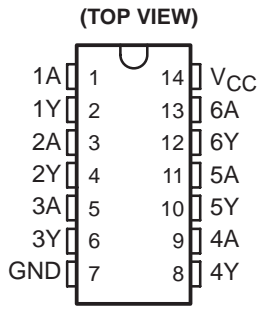
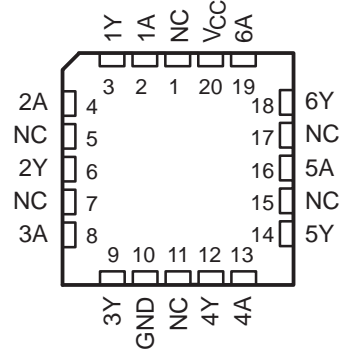


XL74LS04 SOP14/XD74LS04/DIP14 XD54LS04 DIP14

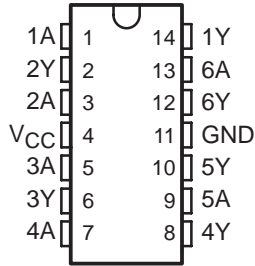


**XL74LS04
 XD74LS04
 XD54LS04**

**XD54LS04 . . . FK PACKAGE
 (TOP VIEW)**



**XD54LS04 . . . W PACKAGE
 (TOP VIEW)**



NC – No internal connection

ORDERING INFORMATION

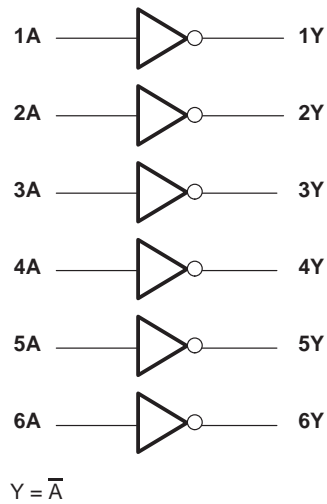
TA	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	PDIP – N	Tube	XD74LS04	XD74LS04
		Tube		
		Tube		
	SOIC – D	Tube	XL74LS04	7404
		Tape and reel		
		Tube		
		Tape and reel		
		Tube		
		Tape and reel		
	SOP – NS	Tape and reel	XL74LS04NS	SN7404
		Tape and reel		
		Tape and reel		
SSOP – DB	Tape and reel		74LS04	
–55°C to 125°C	CDIP – J	Tube		
		Tube		
		Tube		
		Tube		
		Tube		
		Tube		
	CFP – W	Tube		
		Tube		
		Tube		
		Tube		
	LCCC – FK	Tube		
		Tube		

XL74LS04 SOP14/XD74LS04/DIP14 XD54LS04 DIP14

FUNCTION TABLE
(each inverter)

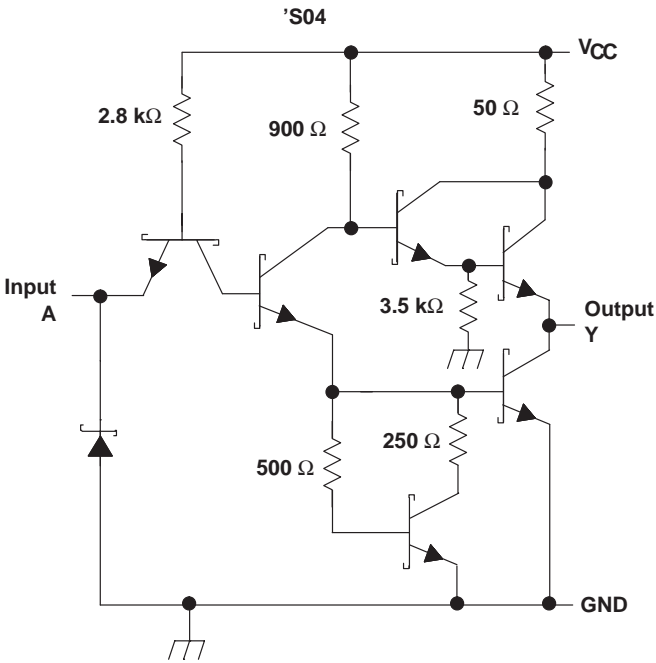
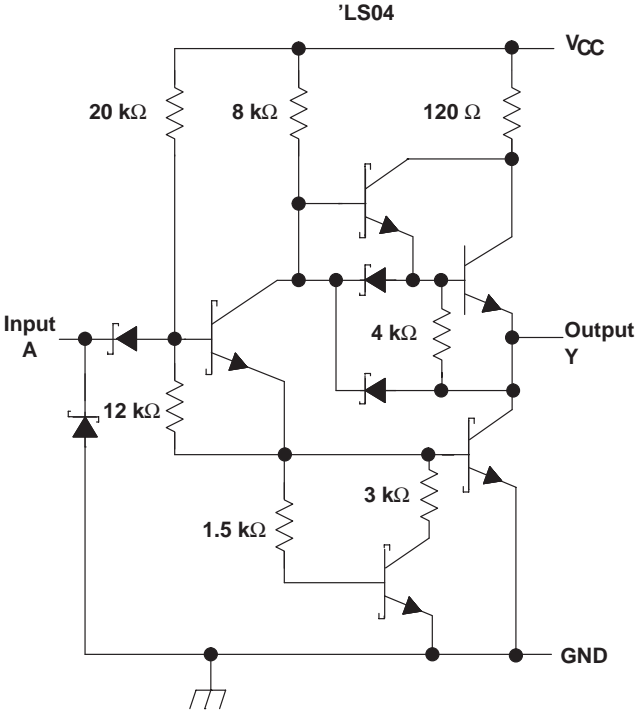
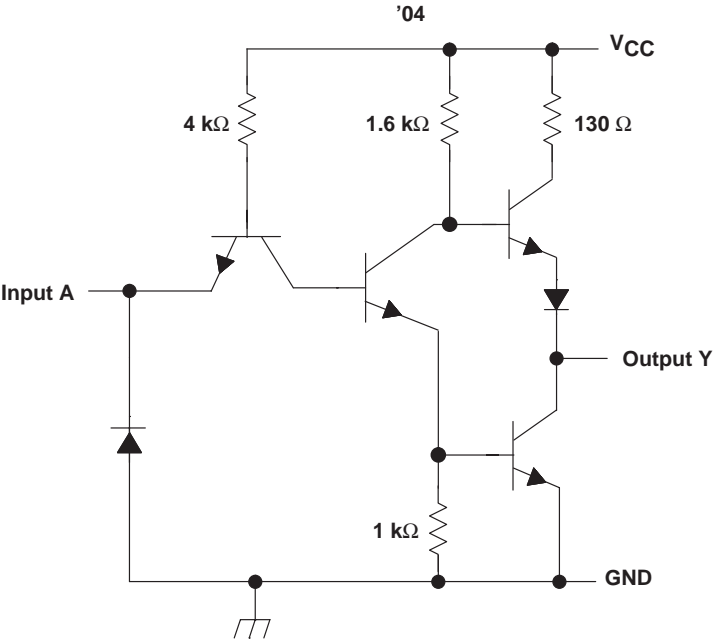
INPUT A	OUTPUT Y
H	L
L	H

logic diagram (positive logic)



XL74LS04 SOP14/XD74LS04/DIP14 XD54LS04 DIP14

schematics (each gate)



Resistor values shown are nominal.

XL74LS04 SOP14/XD74LS04/DIP14 XD54LS04 DIP14

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

Supply voltage, V_{CC} (see Note 1)	7 V
Input voltage, V_I : '04, 'S04	5.5 V
'LS04	7 V
Package thermal impedance, θ_{JA} (see Note 2): D package	86°C/W
DB package	96°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. This 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.

recommended operating conditions (see Note 3)

		XD54LS04			XL74LS04			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage	0.8			0.8			V
I_{OH}	High-level output current	-0.4			-0.4			mA
I_{OL}	Low-level output current	16			16			mA
T_A	Operating free-air temperature	-55			70			°C

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.
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‡	XD54LS04			XL74LS04			UNIT
		MIN	TYP§	MAX	MIN	TYP§	MAX	
V_{IK}	$V_{CC} = \text{MIN}$, $I_I = -12 \text{ mA}$	-1.5			-1.5			V
V_{OH}	$V_{CC} = \text{MIN}$, $V_{IL} = 0.8 \text{ V}$, $I_{OH} = -0.4 \text{ mA}$	2.4	3.4		2.4	3.4		V
V_{OL}	$V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $I_{OL} = 16 \text{ mA}$	0.2			0.4			V
I_I	$V_{CC} = \text{MAX}$, $V_I = 5.5 \text{ V}$	1			1			mA
I_{IH}	$V_{CC} = \text{MAX}$, $V_I = 2.4 \text{ V}$	40			40			µA
I_{IL}	$V_{CC} = \text{MAX}$, $V_I = 0.4 \text{ V}$	-1.6			-1.6			mA
$I_{OS}\parallel$	$V_{CC} = \text{MAX}$	-20		-55	-18		-55	mA
I_{CCH}	$V_{CC} = \text{MAX}$, $V_I = 0 \text{ V}$	6			12			mA
I_{CCL}	$V_{CC} = \text{MAX}$, $V_I = 4.5 \text{ V}$	18			33			mA

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

§ All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

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

XL74LS04 SOP14/XD74LS04/DIP14 XD54LS04 DIP14

switching characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$ (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	XD54LS04 XL74LS04			UNIT
				MIN	TYP	MAX	
t_{PLH}	A	Y	$R_L = 400\ \Omega$, $C_L = 15\text{ pF}$		12	22	ns
t_{PHL}				8	15		

recommended operating conditions (see Note 3)

		XD54LS04			XL74LS04			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.7			0.8	V
I_{OH}	High-level output current			-0.4			-0.4	mA
I_{OL}	Low-level output current			4			8	mA
T_A	Operating free-air temperature	-55		125	0		70	$^\circ\text{C}$

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.
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†	XD54LS04			XL74LS04			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	$V_{CC} = \text{MIN}$, $I_I = -18\text{ mA}$			-1.5			-1.5	V
V_{OH}	$V_{CC} = \text{MIN}$, $V_{IL} = \text{MAX}$, $I_{OH} = -0.4\text{ mA}$	2.5	3.4		2.7	3.4		V
V_{OL}	$V_{CC} = \text{MIN}$, $V_{IH} = 2\text{ V}$	$I_{OL} = 4\text{ mA}$					0.4	V
		$I_{OL} = 8\text{ mA}$				0.25	0.5	
I_I	$V_{CC} = \text{MAX}$, $V_I = 7\text{ V}$			0.1			0.1	mA
I_{IH}	$V_{CC} = \text{MAX}$, $V_I = 2.7\text{ V}$			20			20	μA
I_{IL}	$V_{CC} = \text{MAX}$, $V_I = 0.4\text{ V}$			-0.4			-0.4	mA
$I_{OS}§$	$V_{CC} = \text{MAX}$	-20		-100	-20		-100	mA
I_{CCH}	$V_{CC} = \text{MAX}$, $V_I = 0\text{ V}$		1.2	2.4		1.2	2.4	mA
I_{CCL}	$V_{CC} = \text{MAX}$, $V_I = 4.5\text{ V}$		3.6	6.6		3.6	6.6	mA

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

‡ All typical values are at $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$.

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

switching characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$ (see Figure 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	XD54LS04 XL74LS04			UNIT
				MIN	TYP	MAX	
t_{PLH}	A	Y	$R_L = 2\text{ k}\Omega$, $C_L = 15\text{ pF}$		9	15	ns
t_{PHL}				10	15		

XL74LS04 SOP14/XD74LS04/DIP14 XD54LS04 DIP14

recommended operating conditions (see Note 3)

		XD54LS04			XL74LS04			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.8			0.8	V
I_{OH}	High-level output current			-1			-1	mA
I_{OL}	Low-level output current			20			20	mA
T_A	Operating free-air temperature	-55		125	0		70	°C

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation.
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†	XD54LS04			XL74LS04			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	$V_{CC} = \text{MIN}$, $I_I = -18 \text{ mA}$			-1.2			-1.2	V
V_{OH}	$V_{CC} = \text{MIN}$, $V_{IL} = 0.8 \text{ V}$, $I_{OH} = -1 \text{ mA}$	2.5	3.4		2.7	3.4		V
V_{OL}	$V_{CC} = \text{MIN}$, $V_{IH} = 2 \text{ V}$, $I_{OL} = 20 \text{ mA}$			0.5			0.5	V
I_I	$V_{CC} = \text{MAX}$, $V_I = 5.5 \text{ V}$			1			1	mA
I_{IH}	$V_{CC} = \text{MAX}$, $V_I = 2.7 \text{ V}$			50			50	μA
I_{IL}	$V_{CC} = \text{MAX}$, $V_I = 0.5 \text{ V}$			-2			-2	mA
$I_{OS}§$	$V_{CC} = \text{MAX}$	-40		-100	-40		-100	mA
I_{CCH}	$V_{CC} = \text{MAX}$, $V_I = 0 \text{ V}$		15	24		15	24	mA
I_{CCL}	$V_{CC} = \text{MAX}$, $V_I = 4.5 \text{ V}$		30	54		30	54	mA

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

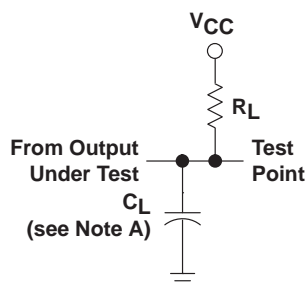
‡ All typical values are at $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

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

switching characteristics, $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$ (see Figure 1)

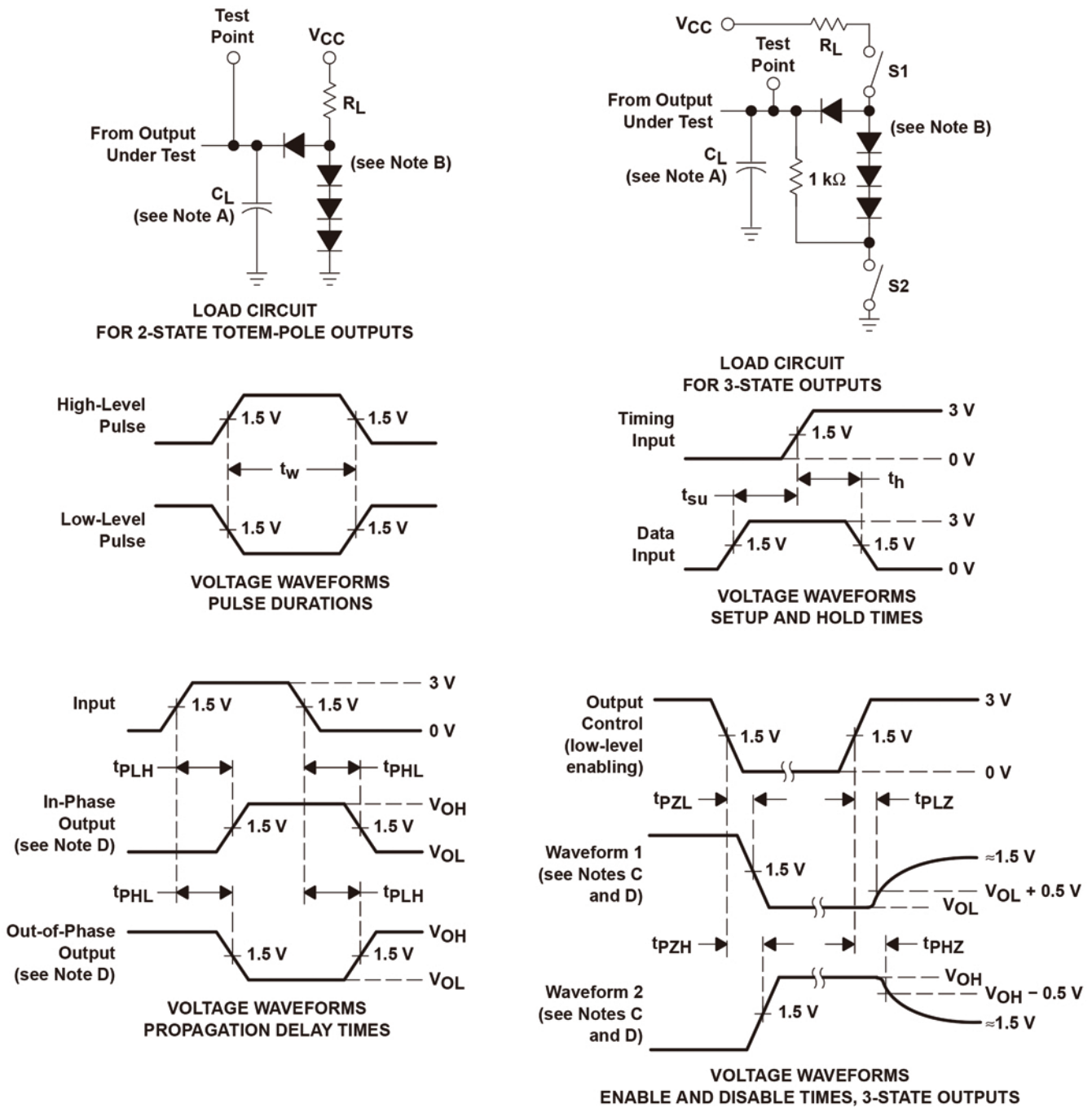
PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	XD54LS04 XL74LS04			UNIT
				MIN	TYP	MAX	
t_{PLH}	A	Y	$R_L = 280 \Omega$, $C_L = 15 \text{ pF}$	3 4.5			ns
t_{PHL}				3 5			
t_{PLH}	A	Y	$R_L = 280 \Omega$, $C_L = 50 \text{ pF}$	4.5			ns
t_{PHL}				5			

PARAMETER MEASUREMENT INFORMATION SERIES 54/74 AND 54S/74S DEVICES



LOAD CIRCUIT
FOR OPEN-COLLECTOR OUTPUTS

XL74LS04 SOP14/XD74LS04/DIP14 XD54LS04 DIP14

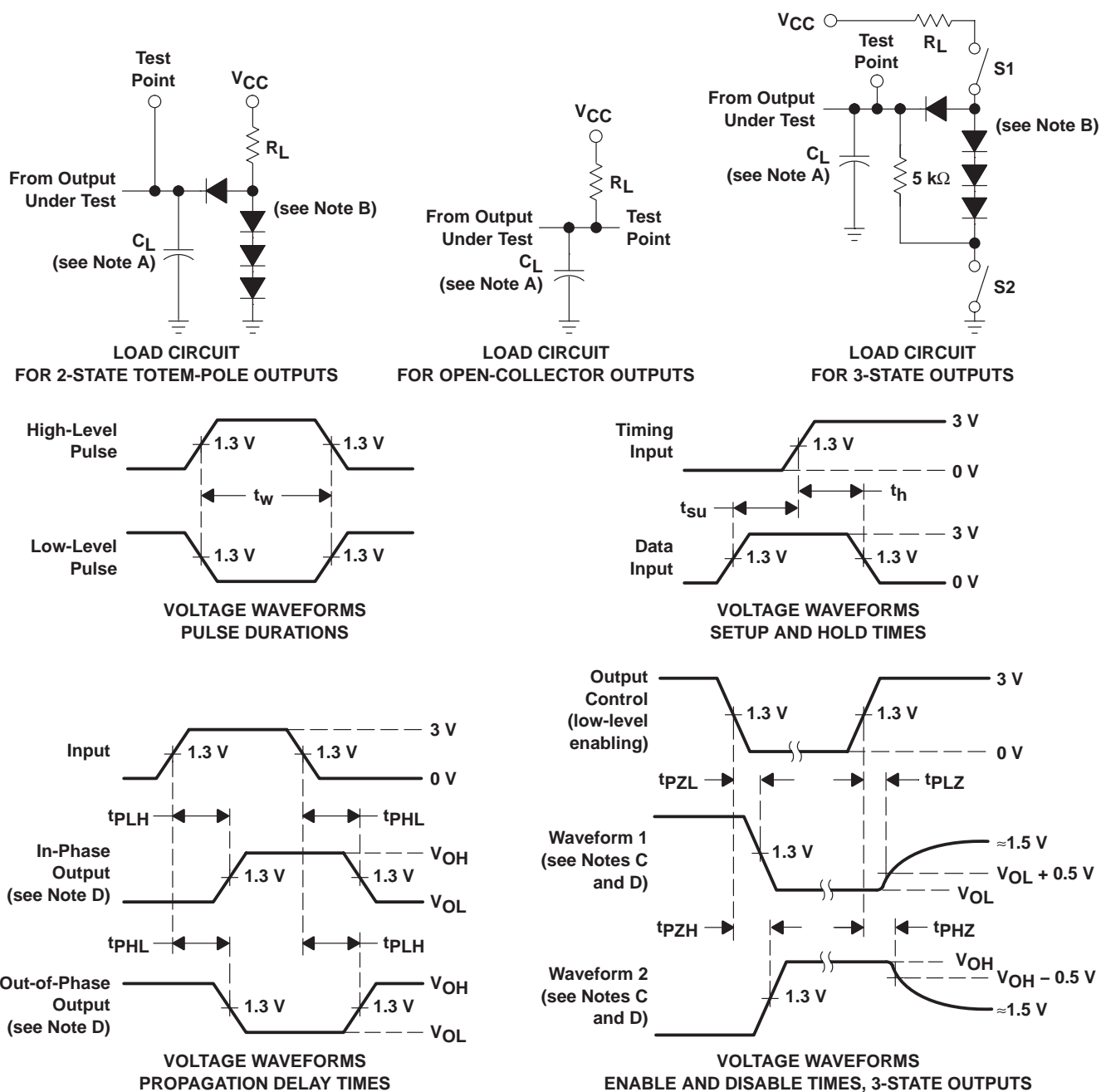


- NOTES:
- A. C_L includes probe and jig capacitance.
 - B. All diodes are 1N3064 or equivalent.
 - C. Waveform 1 is for an output with internal conditions such that the output is low, except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output 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

XL74LS04 SOP14/XD74LS04/DIP14 XD54LS04 DIP14

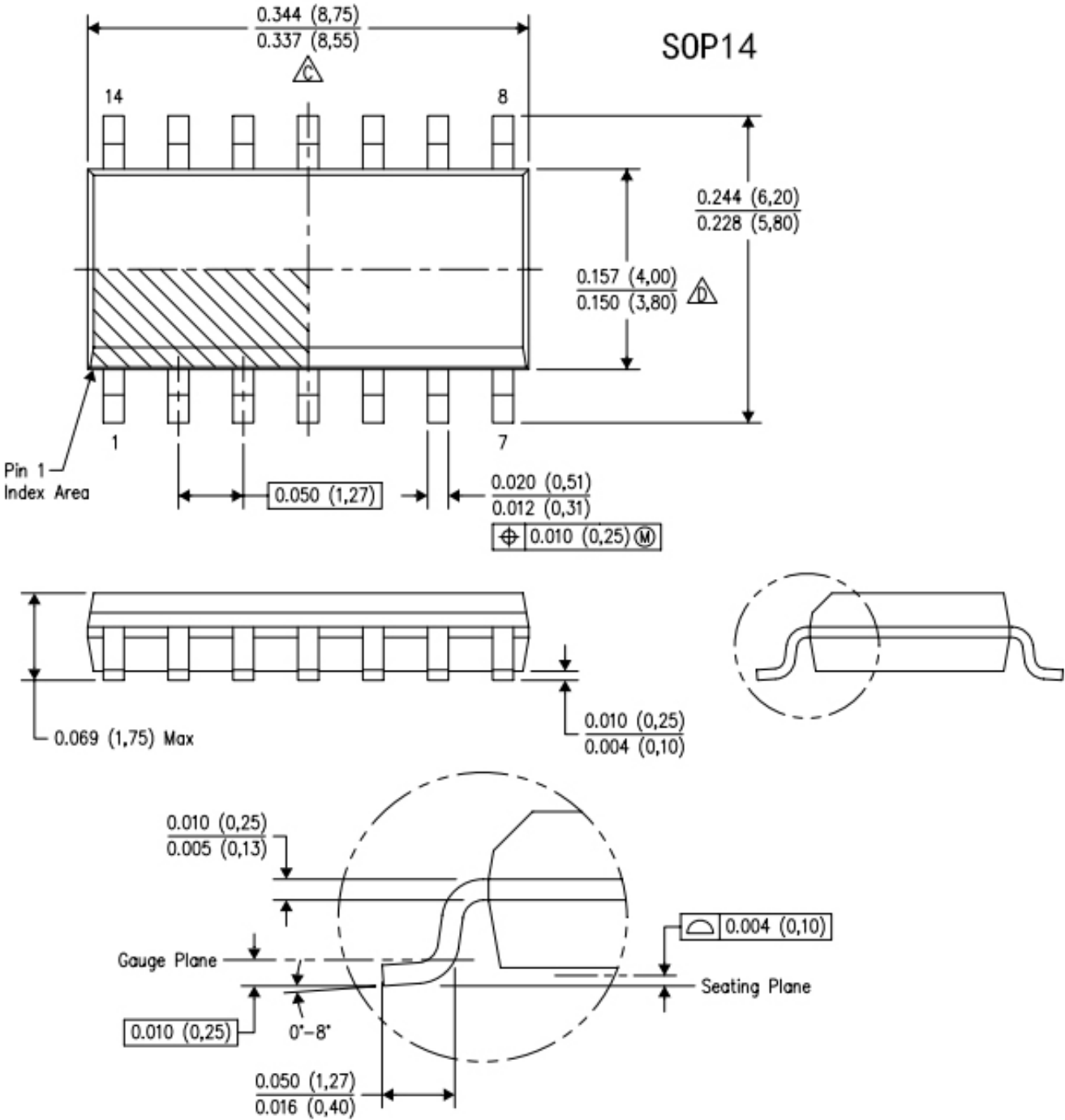
PARAMETER MEASUREMENT INFORMATION SERIES 54LS/74LS DEVICES



- 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.

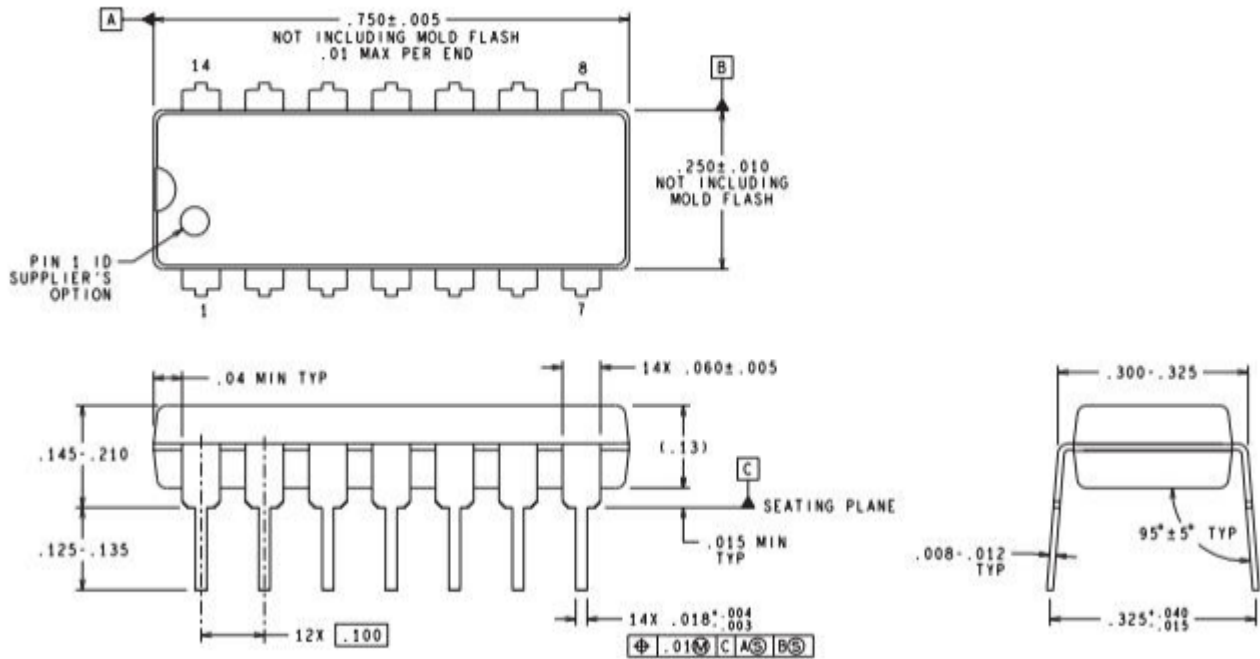
Figure 2. Load Circuits and Voltage Waveforms

XL74LS04 SOP14/XD74LS04/DIP14 XD54LS04 DIP14



XL74LS04 SOP14/XD74LS04/DIP14 XD54LS04 DIP14

DIP14



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