

SDAS202B – APRIL 1982 – REVISED DECEMBER 1994

- ## description

$$Y = \bar{A} + \bar{B} + \bar{C} + \bar{D} + \bar{E} + \bar{F} + \bar{G} + \bar{H} + \bar{I} + \bar{J} + \bar{K} + \bar{L} + \bar{M}$$
[illegible]

INPUTS A – M	OUTPUT Y
All inputs H	L
One or more inputs L	H

The diagram shows a 15-bit bus with inputs A through M. A 2-to-1 multiplexer is connected to the bus, selecting between input 7 (G) and input 10 (H) based on a select line 'S'. The output of the multiplexer is labeled '9' and 'Y'.

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SN54ALS133, SN74ALS133 13-INPUT POSITIVE-NAND GATES

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

Supply voltage, V_{CC}	7 V
Input voltage, V_I	7 V
Operating free-air temperature range, T_A : SN54ALS133	–55°C to 125°C
SN74ALS133	0°C to 70°C
Storage temperature range	–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.

recommended operating conditions

		SN54ALS133			SN74ALS133			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.8 [‡]			0.8	V
				0.7 [§]				
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	°C

[‡] Applies over temperature range –55°C to 70°C

[§] Applies over temperature range 70°C to 125°C

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

PARAMETER	TEST CONDITIONS		SN54ALS133			SN74ALS133			UNIT
			MIN	TYP [¶]	MAX	MIN	TYP [¶]	MAX	
V_{IK}	$V_{CC} = 4.5$ V, $I_I = -18$ mA				–1.2			–1.5	V
V_{OH}	$V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -0.4$ mA		$V_{CC}-2$			$V_{CC}-2$			V
V_{OL}	$V_{CC} = 4.5$ V, $I_{OL} = 4$ mA		0.25		0.5	0.25		0.4	V
	$I_{OL} = 8$ mA					0.35		0.5	
I_I	$V_{CC} = 5.5$ V, $V_I = 7$ V				0.1			0.1	mA
I_{IH}	$V_{CC} = 5.5$ V, $V_I = 2.7$ V				20			20	μA
I_{IL}	$V_{CC} = 5.5$ V, $V_I = 0.4$ V				–0.1			–0.1	mA
$I_{O}^{\#}$	$V_{CC} = 5.5$ V, $V_O = 2.25$ V		–20		–112	–30		–112	mA
I_{CCH}	$V_{CC} = 5.5$ V, $V_I = 0$		0.24		0.34	0.24		0.34	mA
I_{CCL}	$V_{CC} = 5.5$ V, $V_I = 4.5$ V		0.56		0.8	0.56		0.08	mA

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

[#] The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .



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switching characteristics (see Figure 1)

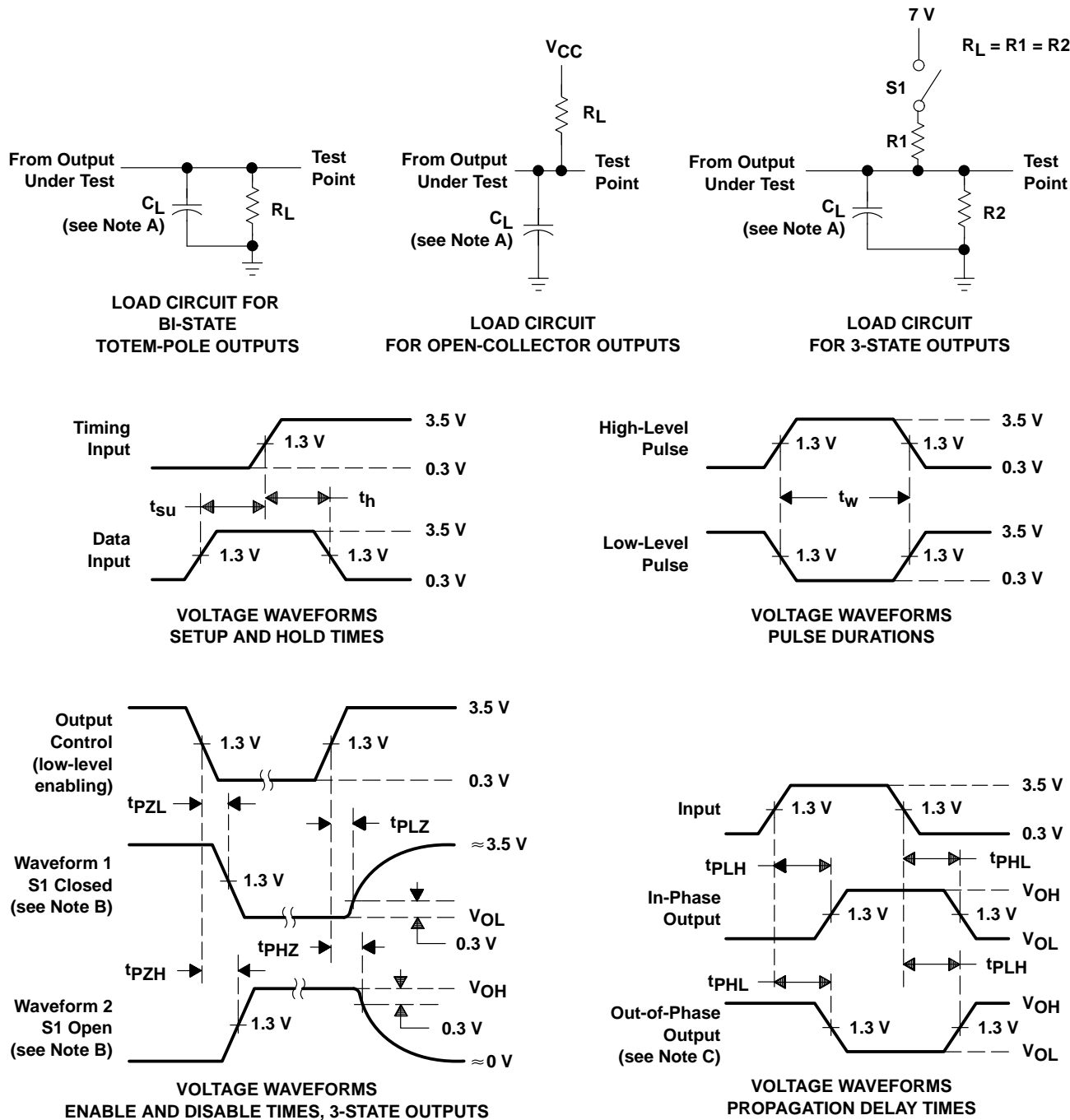
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX†				UNIT
			SN54ALS133		SN74ALS133		
			MIN	MAX	MIN	MAX	
t _{PLH}	Any	Y	1	16	3	11	ns
t _{PHL}			1	47	5	25	

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

SN54ALS133, SN74ALS133 13-INPUT POSITIVE-NAND GATES

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PARAMETER MEASUREMENT INFORMATION SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



- 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. When measuring propagation delay items of 3-state outputs, switch S1 is open.
 D. All input pulses have the following characteristics: $PRR \leq 1$ MHz, $t_r = t_f = 2$ ns, duty cycle = 50%.
 E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms

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