

7433, LS33 Buffers

Quad Two-Input NOR Buffer (Open Collector)
Product Specification

Logic Products

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
7433	11ns	23mA
74LS33	19ns	4mA

ORDERING CODE

PACKAGES	COMMERCIAL RANGE $V_{CC} = 5V \pm 5\%$; $T_A = 0^\circ C$ to $+70^\circ C$
Plastic DIP	N7433N, N74LS33N

NOTE:

For information regarding devices processed to Military Specifications, see the Signetics Military Products Data Manual.

FUNCTION TABLE

INPUTS		OUTPUT
A	B	Y
L	L	H
L	H	L
H	L	L
H	H	L

H = HIGH voltage level
L = LOW voltage level

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

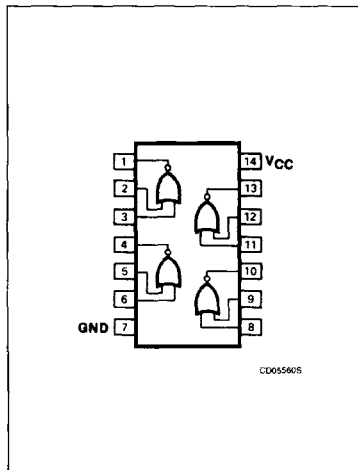
PINS	DESCRIPTION	74	74LS
A, B	Inputs	1uI	1LSuI
Y	Output	30uI	10LSuI

NOTE:

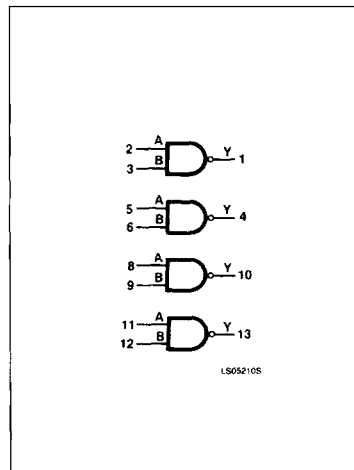
Where a 74 unit load (uI) is understood to be $40\mu A I_{IH}$ and $-1.6mA I_{IL}$, a 74LS unit load (LSuI) is $20\mu A I_{IH}$ and $-0.4mA I_{IL}$.

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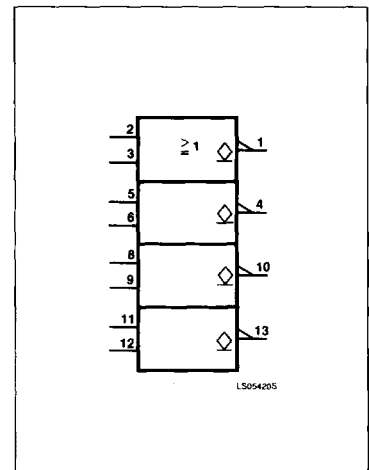
PIN CONFIGURATION



LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



Buffers

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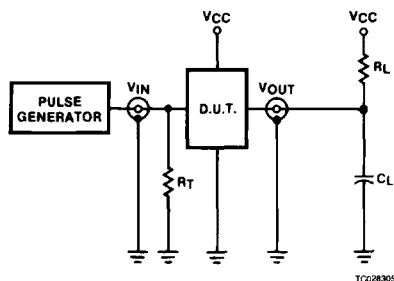
ABSOLUTE MAXIMUM RATINGS (Over operating free-air temperature range unless otherwise noted.)

PARAMETER		74	74LS	UNIT
V _{CC}	Supply voltage	7.0	7.0	V
V _{IN}	Input voltage	-0.5 to +5.5	-0.5 to +7.0	V
I _{IN}	Input current	-30 to +5	-30 to +1	mA
V _{OUT}	Voltage applied to output in HIGH output state	-0.5 to +V _{CC}	-0.5 to +V _{CC}	V
T _A	Operating free-air temperature range	0 to 70		°C

RECOMMENDED OPERATING CONDITIONS

PARAMETER	74			74LS			UNIT	
	Min	Nom	Max	Min	Nom	Max		
V _{CC}	Supply voltage	4.75	5.0	5.25	4.75	5.0	5.25	V
V _{IH}	HIGH-level input voltage	2.0			2.0			V
V _{IL}	LOW-level input voltage			+0.8			+0.8	V
I _{IK}	Input clamp current			-12			-18	mA
V _{OH}	HIGH-level output voltage			5.5			5.5	V
I _{OL}	LOW-level output current			48			24	mA
T _A	Operating free-air temperature	0		70	0		70	°C

TEST CIRCUITS AND WAVEFORMS



Test Circuit For 74
Open Collector Outputs

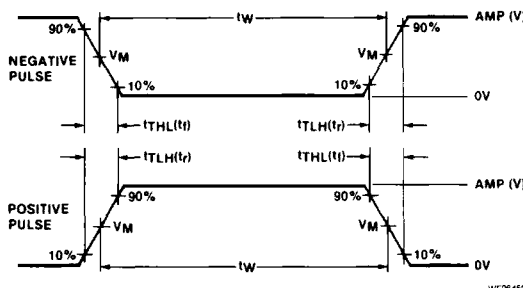
DEFINITIONS

R_L = Load resistor to V_{CC}; see AC CHARACTERISTICS for value.

C_L = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

R_T = Termination resistance should be equal to Z_{OUT} of Pulse Generators.

t_{TLH}, t_{THL} Values should be less than or equal to the table entries.



V_M = 1.3V for 74LS; V_M = 1.5V for all other TTL families.

Input Pulse Definition

FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	Pulse Width	t _{TLH}	t _{THL}
74	3.0V	1MHz	500ns	7ns	7ns
74LS	3.0V	1MHz	500ns	15ns	6ns
74S	3.0V	1MHz	500ns	2.5ns	2.5ns

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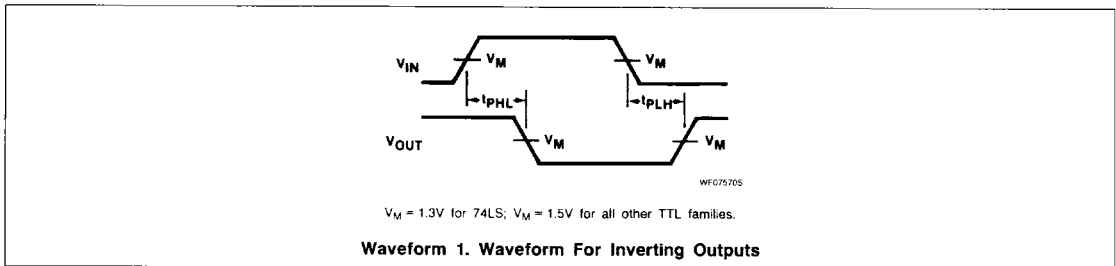
DC ELECTRICAL CHARACTERISTICS (Over recommended operating free-air temperature range unless otherwise noted.)

PARAMETER	TEST CONDITIONS ¹	7433			74LS33			UNIT
		Min	Typ ²	Max	Min	Typ ²	Max	
I _{OH}	HIGH-level output current V _{CC} = MIN, V _{IL} = MAX, V _{OH} = 5.5V			250			250	μA
V _{OL}	LOW-level output voltage V _{CC} = MIN, V _{IH} = MIN	I _{OL} = MAX		0.2	0.4	0.35	0.5	V
		I _{OL} = 12mA (74LS)				0.25	0.4	V
V _{IK}	Input clamp voltage V _{CC} = MIN, I _I = I _{IK}			-1.5			-1.5	V
I _I	Input current at maximum input voltage V _{CC} = MAX	V _I = 5.5V			1.0			mA
		V _I = 7.0V					0.1	mA
I _{IH}	HIGH-level input current V _{CC} = MAX	V _I = 2.4V			40			μA
		V _I = 2.7V					20	μA
I _{IL}	LOW-level input current V _{CC} = MAX, V _I = 0.4V			-1.6			-0.4	mA
I _{CC}	Supply current (total) V _{CC} = MAX	I _{CCH} Outputs HIGH		12	21	1.8	3.6	mA
		I _{CCL} Outputs LOW		33	57	6.9	13.8	mA

NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at V_{CC} = 5V, T_A = 25°C.

AC WAVEFORM



AC ELECTRICAL CHARACTERISTICS T_A = 25°C, V_{CC} = 5.0V

PARAMETER	TEST CONDITIONS	74		74LS		UNIT
		R _L = 133Ω		C _L = 45pF, R _L = 667Ω		
		Min	Max	Min	Max	
t _{PLH} t _{PHL}	C _L = 50pF for 7433 Waveform 1		15		32	ns
			18		28	
t _{PLH} t _{PHL}	C _L = 150pF for 7433 Waveform 1		22			ns
			24			