

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

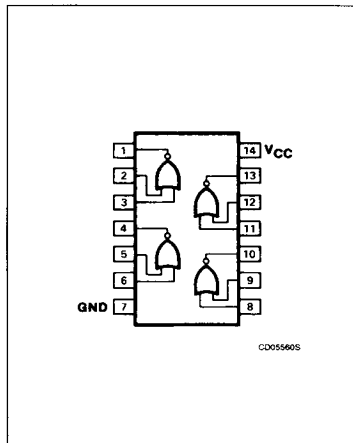
INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

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

NOTE:

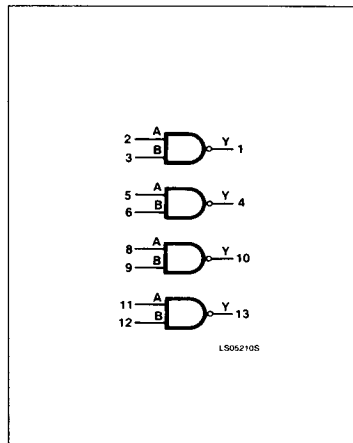
Where a 74 unit load (uI) is understood to be $40\mu A$ I_{IH} and $-1.6mA$ I_{IL} , a 74LS unit load (LSuI) is $20\mu A$ I_{IH} and $-0.4mA$ I_{IL} .

PIN CONFIGURATION



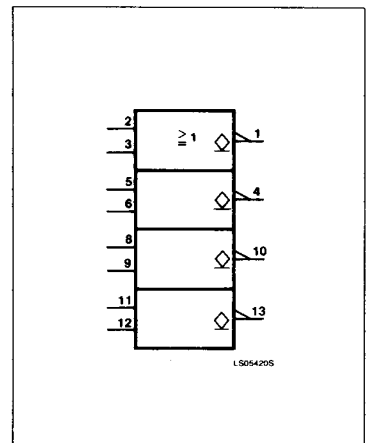
December 4, 1985

LOGIC SYMBOL



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LOGIC SYMBOL (IEEE/IEC)



853-0556 81501

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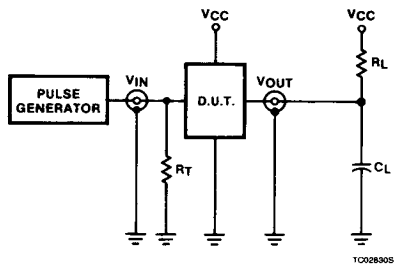
ABSOLUTE MAXIMUM RATINGS (Over operating free-air temperature range unless otherwise noted.)

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}	4.75	5.0	5.25	4.75	5.0	5.25	V
V _{IH}	2.0			2.0			V
V _{IL}			+0.8			+0.8	V
I _{IK}			-12			-18	mA
V _{OH}			5.5			5.5	V
I _{OL}			48			24	mA
T _A	0		70	0		70	°C

TEST CIRCUITS AND WAVEFORMS



**Test Circuit For 74
Open Collector Outputs**

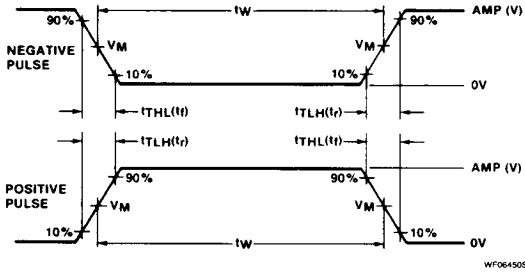
DEFINITIONS

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

Buffers

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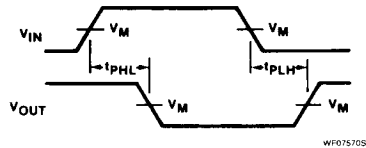
DC ELECTRICAL CHARACTERISTICS (Over recommended operating free-air temperature range unless otherwise noted.)

PARAMETER	TEST CONDITIONS ¹	7433			74LS33			UNIT
		Min	Typ ²	Max	Min	Typ ²	Max	
I_{OH} HIGH-level output current	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}, V_{OH} = 5.5\text{V}$			250			250	μA
V_{OL} LOW-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = \text{MIN}$	$I_{OL} = \text{MAX}$		0.2	0.4	0.35	0.5	V
		$I_{OL} = 12\text{mA} (74\text{LS})$				0.25	0.4	V
V_{IK} Input clamp voltage	$V_{CC} = \text{MIN}, I_I = I_{IK}$			-1.5			-1.5	V
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}$	$V_I = 5.5\text{V}$			1.0			mA
		$V_I = 7.0\text{V}$					0.1	mA
I_{IH} HIGH-level input current	$V_{CC} = \text{MAX}$	$V_I = 2.4\text{V}$			40			μA
		$V_I = 2.7\text{V}$					20	μA
I_{IL} LOW-level input current	$V_{CC} = \text{MAX}, V_I = 0.4\text{V}$			-1.6			-0.4	mA
I_{CC} Supply current (total)	$V_{CC} = \text{MAX}$	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 $V_{CC} = 5\text{V}, T_A = 25^\circ\text{C}$.

AC WAVEFORM



$V_M = 1.3\text{V}$ for 74LS; $V_M = 1.5\text{V}$ for all other TTL families.

Waveform 1. Waveform For Inverting Outputs

AC ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}, V_{CC} = 5.0\text{V}$

PARAMETER	TEST CONDITIONS	74		74LS		UNIT
		$R_L = 133\Omega$		$C_L = 45\text{pF}, R_L = 667\Omega$		
		Min	Max	Min	Max	
t_{PLH} t_{PHL} Propagation delay	$C_L = 50\text{pF}$ for 7433 Waveform 1		15 18		32 28	ns
t_{PLH} t_{PHL} Propagation delay	$C_L = 150\text{pF}$ for 7433 Waveform 1		22 24			ns