Signetics

74S134
Gate

12-Input NAND Gate (3-State)
Product Specification

Logic Products

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT
74S134	5ns	10mA

FUNCTION TABLE

INPUTS		OUTPUT
$D_0 \ldots D_{11}$	$\overline{OE}$	$\overline{Y}$
H ... H	L	L
one input = L	L	H
X ... X	H	(Z)

H = HIGH voltage level
L = LOW voltage level
X = Don't care
(Z) = HIGH impedance "off" state

ORDERING CODE

PACKAGES	COMMERCIAL RANGE V_{CC} = 5V ±5%; T_A = 0°C to +70°C
Plastic DIP	N74S134N
Plastic SO	N74S134D

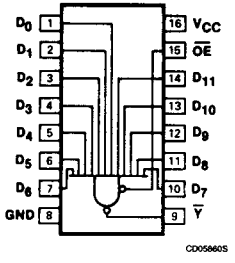
NOTE:
For information regarding devices processed to Military Specifications, see the Signetics Military Products Data Manual.

INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

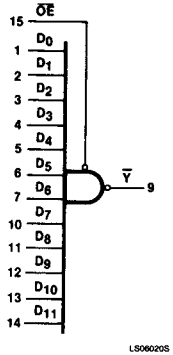
PINS	DESCRIPTION	74S
All	Inputs	1Sul
$\overline{Y}$	Output	10Sul

NOTE:
Where a 74S unit load (Sul) is understood to be 50μA I_{IH} and −2.0mA I_{IL}.

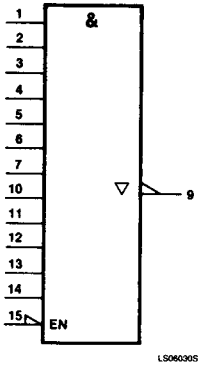
PIN CONFIGURATION



LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



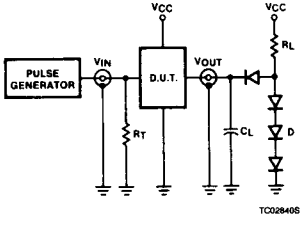
ABSOLUTE MAXIMUM RATINGS (Over operating free-air temperature range unless otherwise noted.)

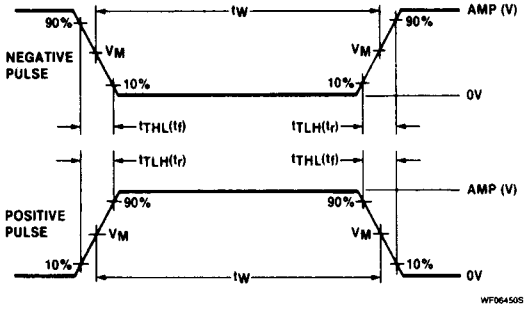
PARAMETER		74S	UNIT
V_{CC}	Supply voltage	7.0	V
V_{IN}	Input voltage	−0.5 to +5.5	V
I_{IN}	Input current	−30 to +5	mA
V_{OUT}	Voltage applied to output in HIGH output state	−0.5 to +V_{CC}	V
T_A	Operating free-air temperature range	0 to 70	°C

RECOMMENDED OPERATING CONDITIONS

PARAMETER		74S			UNIT
		Min	Nom	Max	
V_{CC}	Supply voltage	4.75	5.0	5.25	V
V_{IH}	HIGH-level input voltage	2.0			V
V_{IL}	LOW-level input voltage			+0.8	V
I_{IK}	Input clamp current			−18	mA
I_{OH}	HIGH-level output current			−6.5	μA
I_{OL}	LOW-level output current			20	mA
T_A	Operating free-air temperature	0		70	°C

TEST CIRCUITS AND WAVEFORMS





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

Test Circuit For 74 Totem-Pole Outputs

Input Pulse Definition

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.
D = Diodes are 1N916, 1N3064, or equivalent.
t_{TLH}, t_{THL} Values should be less than or equal to the table entries.

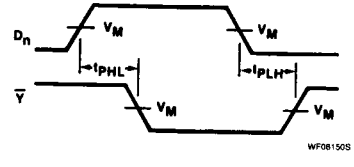
FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	Pulse Width	t_{TLH}	t_{THL}
74	3.0V	1MHz	500ns	7ns	7ns
74LS	3.0V	1MHz	500ns	15ns	6ns
74S	3.0V	1MHz	500ns	2.5ns	2.5ns

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

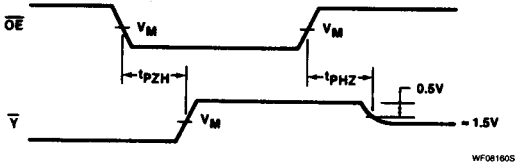
PARAMETER		TEST CONDITIONS[1]		74S134			UNIT
				Min	Typ[2]	Max	
V_{OH}	HIGH-level output voltage	V_{CC} = MIN, V_{IH} = MIN, V_{IL} = MAX	I_{OH} = −2mA	2.4	3.2		V
			I_{OH} = −6.5mA				
V_{OL}	LOW-level output voltage	V_{CC} = MIN, V_{IH} = MIN, V_{IL} = MAX, I_{OL} = MAX				0.5	V
V_{IK}	Input clamp voltage	V_{CC} = MIN, I_I = I_{IK}				−1.2	V
I_{OZH}	Off-state output current, HIGH-level voltage applied	V_{CC} = MAX, V_{IH} = MIN, V_{IL} = MAX, V_O = 2.4V				50	μA
I_{OZL}	Off-state output current, LOW-level voltage applied	V_{CC} = MAX, V_{IH} = MIN, V_{IL} = MAX, V_O = 0.5V				−50	μA
I_I	Input current at maximum input voltage	V_{CC} = MAX, V_I = 5.5V				1.0	mA
I_{IH}	HIGH-level input current	V_{CC} = MAX, V_I = 2.7V				50	μA
I_{IL}	LOW-level input current	V_{CC} = MAX, V_I = 0.5V				−2	mA
I_{OS}	Short-circuit output current[3]	V_{CC} = MAX		−40		−100	mA
I_{CC}	Supply current (total)	V_{CC} = MAX	I_{CCH} Outputs HIGH		7	13	mA
			I_{CCL} Outputs LOW		9	16	mA
			I_{CCZ} Outputs OFF		14	25	mA

NOTES:
1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
2. All typical values are at V_{CC} = 5V, T_A = 25°C.
3. I_{OS} is tested with V_{OUT} = +0.5V and V_{CC} = V_{CC} MAX + 0.5V. Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.

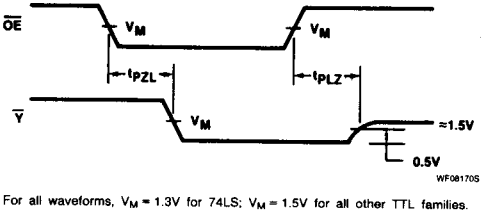
AC WAVEFORMS



Waveform 1. Waveform For Inverting Outputs



Waveform 2. 3-State Enable time To High Level And Disable Time From High Level



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

Waveform 3. 3-State Enable Time To Low Level And Disable Time From Low Level

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

PARAMETER		TEST CONDITIONS	74S		UNIT
			$C_L = 15pF$, $R_L = 280\Omega$		
			Min	Max	
t_{PLH}	Propagation delay	Waveform 1		6.0	ns
t_{PHL}	Propagation delay	Waveform 1		7.5	ns
t_{PZH}	Enable to HIGH	Waveform 2, $C_L = 50pF$		19.5	ns
t_{PZL}	Enable to LOW	Waveform 3, $C_L = 50pF$		21	ns
t_{PHZ}	Disable from HIGH	Waveform 2, $C_L = 5pF$		8.5	ns
t_{PLZ}	Disable from LOW	Waveform 3, $C_L = 5pF$		14	ns