

## 7427, LS27 Gates

Triple Three-Input NOR Gate  
Product Specification

Logic Products

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
7427	9ns	13mA
74LS27	10ns	2.7mA

### ORDERING CODE

PACKAGES	COMMERCIAL RANGE $V_{CC} = 5V \pm 5\%$ ; $T_A = 0^\circ C$ to $+70^\circ C$
Plastic DIP	N7427N, N74LS27N
Plastic SO	N74LS27D

#### NOTE:

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

### FUNCTION TABLE

INPUTS			OUTPUT
A	B	C	Y
L	L	L	H
X	X	H	L
X	H	X	L
H	X	X	L

H = HIGH voltage level  
L = LOW voltage level  
X = Don't care

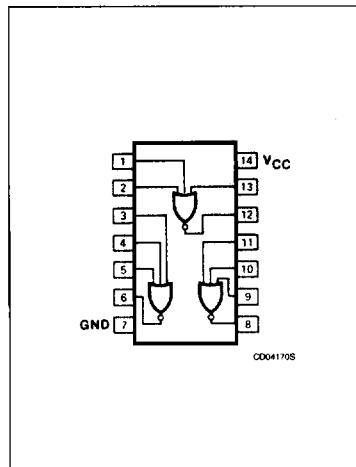
### INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	74	74LS
A - C	Inputs	1ul	1LSul
Y	Output	10ul	10LSul

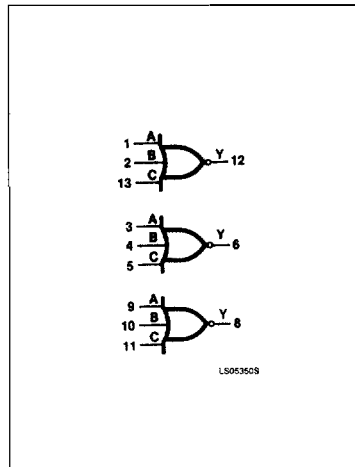
#### NOTE:

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

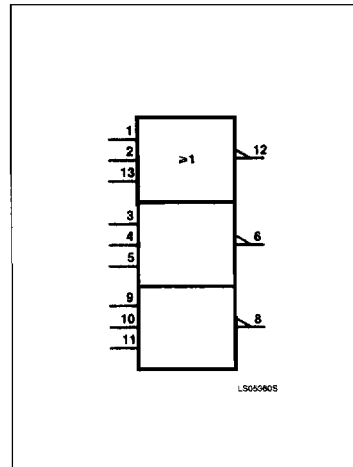
### PIN CONFIGURATION



### LOGIC SYMBOL



### LOGIC SYMBOL (IEEE/IEC)



# Gates

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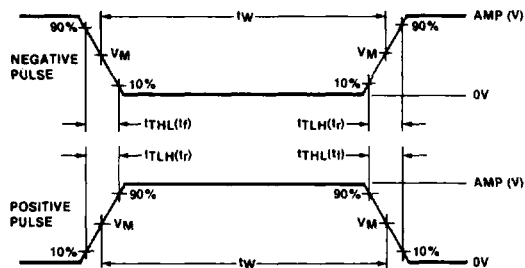
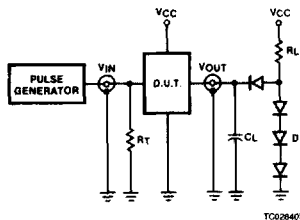
### ABSOLUTE MAXIMUM RATINGS (Over operating free-air temperature range unless otherwise noted.)

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

### RECOMMENDED OPERATING CONDITIONS

PARAMETER	74			74LS			UNIT
	Min	Nom	Max	Min	Nom	Max	
V <sub>CC</sub> Supply voltage	4.75	5.0	5.25	4.75	5.0	5.25	V
V <sub>IH</sub> HIGH-level input voltage	2.0			2.0			V
V <sub>IL</sub> LOW-level input voltage			+0.8			+0.8	V
I <sub>IK</sub> Input clamp current			-12			-18	mA
I <sub>OH</sub> HIGH-level output current			-800			-400	μA
I <sub>OL</sub> LOW-level output current			16			8	mA
T <sub>A</sub> Operating free-air temperature	0		70	0		70	°C

### TEST CIRCUITS AND WAVEFORMS



V<sub>M</sub> = 1.3V for 74LS; V<sub>M</sub> = 1.5V for all other TTL families.

#### Test Circuit For 74 Totem-Pole Outputs

#### DEFINITIONS

R<sub>L</sub> = Load resistor to V<sub>CC</sub>; see AC CHARACTERISTICS for value.

C<sub>L</sub> = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

R<sub>T</sub> = Termination resistance should be equal to Z<sub>OUT</sub> of Pulse Generators.

D = Diodes are 1N916, 1N3064, or equivalent.

t<sub>TLH</sub>, t<sub>rHL</sub> Values should be less than or equal to the table entries.

#### Input Pulse Definition

FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	Pulse Width	t <sub>TLH</sub>	t <sub>rHL</sub>
74	3.0V	1MHz	500ns	7ns	7ns
74LS	3.0V	1MHz	500ns	15ns	6ns
74S	3.0V	1MHz	500ns	2.5ns	2.5ns

Gates

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

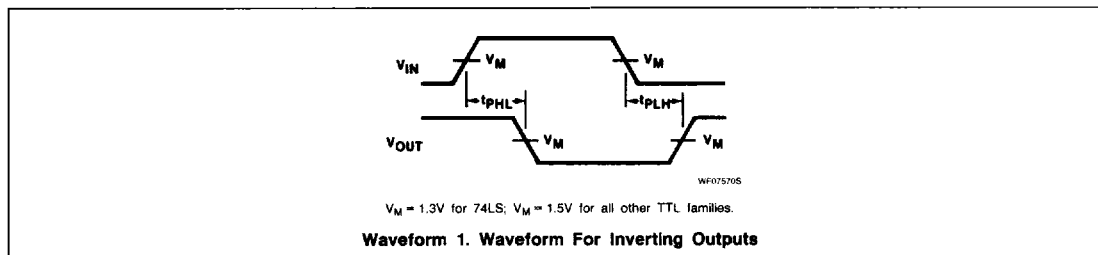
PARAMETER	TEST CONDITIONS <sup>1</sup>	7427			74LS27			UNIT	
		Min	Typ <sup>2</sup>	Max	Min	Typ <sup>2</sup>	Max		
V <sub>OH</sub> HIGH-level output voltage	V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, I <sub>OH</sub> = MAX	2.4	3.4		2.7	3.4		V	
V <sub>OL</sub> LOW-level output voltage	V <sub>CC</sub> = MIN, V <sub>IH</sub> = MIN	I <sub>OL</sub> = MAX				0.35	0.5	V	
		I <sub>OL</sub> = 4mA (74LS)				0.25	0.4	V	
V <sub>IK</sub> Input clamp voltage	V <sub>CC</sub> = MIN, I <sub>I</sub> = I <sub>IK</sub>			-1.5		-1.5	V		
I <sub>I</sub> Input current at maximum input voltage	V <sub>CC</sub> = MAX	V <sub>I</sub> = 5.5V						mA	
		V <sub>I</sub> = 7.0V					0.1	mA	
I <sub>IH</sub> HIGH-level input current	V <sub>CC</sub> = MAX	V <sub>I</sub> = 2.4V						μA	
		V <sub>I</sub> = 2.7V					20	μA	
I <sub>IL</sub> LOW-level input current	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4V			-1.6		-0.4	mA		
I <sub>OS</sub> Short-circuit output current <sup>3</sup>	V <sub>CC</sub> = MAX	-18		-55	-20	-100	mA		
I <sub>CC</sub> Supply current (total)	V <sub>CC</sub> = MAX	I <sub>CC</sub> H Outputs HIGH			10	16	2.0	4	mA
		I <sub>CC</sub> L Outputs LOW			16	26	3.4	6.8	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<sub>CC</sub> = 5V, T<sub>A</sub> = 25°C.
- I<sub>OS</sub> is tested with V<sub>OUT</sub> = +0.5V and V<sub>CC</sub> = V<sub>CC</sub> 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.

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**AC WAVEFORM**



**AC ELECTRICAL CHARACTERISTICS** T<sub>A</sub> = 25°C, V<sub>CC</sub> = 5.0V

PARAMETER	TEST CONDITIONS	74		74LS		UNIT
		C <sub>L</sub> = 15pF, R <sub>L</sub> = 400Ω		C <sub>L</sub> = 15pF, R <sub>L</sub> = 2kΩ		
		Min	Max	Min	Max	
t <sub>PLH</sub> t <sub>PHL</sub> Propagation delay	Waveform 1		15 11		15 15	ns