

## 74S64 Gate

Four-Two-Three-Two-Input AND-OR-Invert Gate  
Product Specification

Logic Products

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74S64	3.5ns	8mA

### ORDERING CODE

PACKAGES	COMMERCIAL RANGE $V_{CC} = 5V \pm 5\%$ ; $T_A = 0^\circ C$ to $+70^\circ C$
Plastic DIP	N74S64N
Plastic SO	N74S64D

#### 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
A-L	Inputs	1SuI
Y	Output	10SuI

#### NOTE:

A 74S unit load (SuI) is  $50\mu A$   $I_{IH}$  and  $-2.0mA$   $I_{IL}$ .

### FUNCTION TABLE

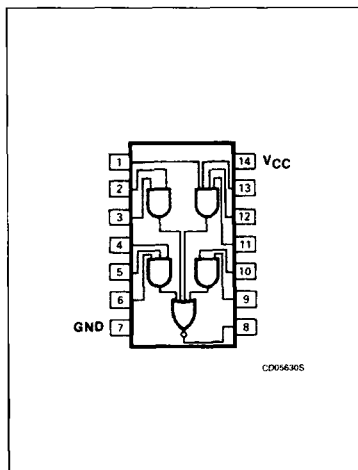
INPUTS											OUTPUT
A	B	C	D	E	F	G	H	J	K	L	Y
H	H	X	X	X	X	X	X	X	X	X	L
X	X	H	H	H	H	X	X	X	X	X	L
X	X	X	X	X	X	H	H	H	X	X	L
X	X	X	X	X	X	X	X	X	H	H	L
All other combinations											H

H = HIGH voltage level

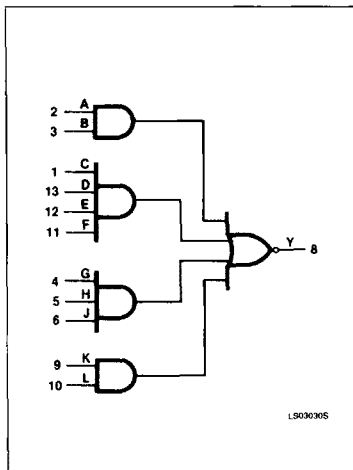
L = LOW voltage level

X = Don't care

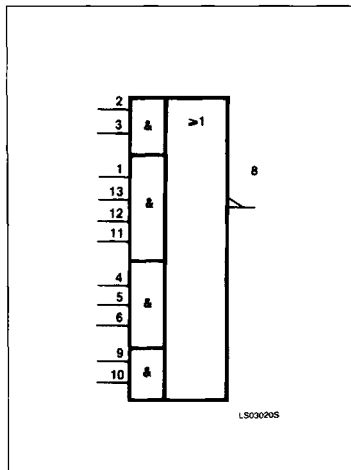
### PIN CONFIGURATION



### LOGIC SYMBOL



### LOGIC SYMBOL (IEEE/IEC)



# Gate

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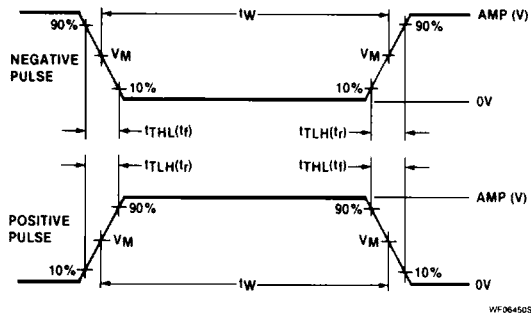
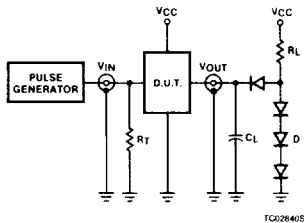
## ABSOLUTE MAXIMUM RATINGS (Over operating free-air temperature range unless otherwise noted.)

PARAMETER		74S	UNIT
V <sub>CC</sub>	Supply voltage	7.0	V
V <sub>IN</sub>	Input voltage	-0.5 to +5.5	V
I <sub>IN</sub>	Input current	-30 to +5	mA
V <sub>OUT</sub>	Voltage applied to output in HIGH output state	-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	74S			UNIT	
	Min	Nom	Max		
V <sub>CC</sub>	Supply voltage	4.75	5.0	5.25	V
V <sub>IH</sub>	HIGH-level input voltage	2.0			V
V <sub>IL</sub>	LOW-level input voltage			+0.8	V
I <sub>IK</sub>	Input clamp current			-18	mA
I <sub>OH</sub>	HIGH-level output current			-1000	μA
I <sub>OL</sub>	LOW-level output current			20	mA
T <sub>A</sub>	Operating free-air temperature	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>THL</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>THL</sub>
74	3.0V	1MHz	500ns	7ns	7ns
74LS	3.0V	1MHz	500ns	15ns	6ns
74S	3.0V	1MHz	500ns	2.5ns	2.5ns

## Gate

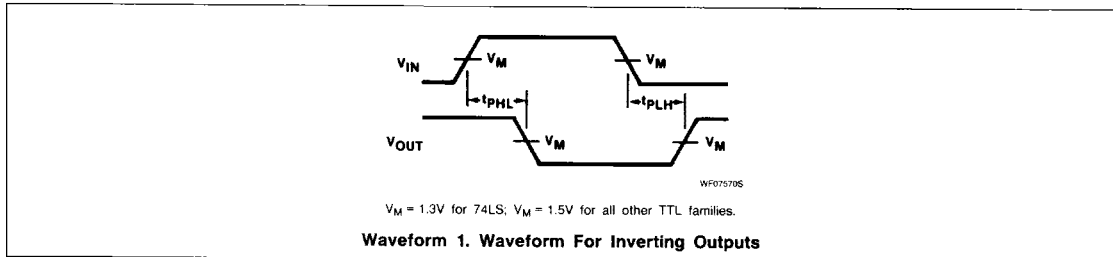
74S64

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

PARAMETER	TEST CONDITIONS <sup>1</sup>	74S64			UNIT
		Min	Typ <sup>2</sup>	Max	
$V_{OH}$ HIGH-level output voltage	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}, I_{OH} = \text{MAX}$	2.7	3.4		V
$V_{OL}$ LOW-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = \text{MIN}, I_{OL} = \text{MAX}$			0.5	V
$V_{IK}$ Input clamp voltage	$V_{CC} = \text{MIN}, I_I = I_K$			-1.2	V
$I_I$ Input current at maximum input voltage	$V_{CC} = \text{MAX}, V_I = 5.5\text{V}$			1.0	mA
$I_{IH}$ HIGH-level input current	$V_{CC} = \text{MAX}, V_I = 2.7\text{V}$			50	$\mu\text{A}$
$I_{IL}$ LOW-level input current	$V_{CC} = \text{MAX}, V_I = 0.5\text{V}$			-2	mA
$I_{OS}$ Short-circuit output current <sup>3</sup>	$V_{CC} = \text{MAX}$	-40		-100	mA
$I_{CC}$ Supply current (total)	$V_{CC} = \text{MAX}$	$I_{CCH}$ Outputs HIGH	7	12.5	mA
		$I_{CCL}$ Outputs LOW	8.5	16	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  $V_{CC} = 5\text{V}$ ,  $T_A = 25^\circ\text{C}$ .
- $I_{OS}$  is tested with  $V_{OUT} = +0.5\text{V}$  and  $V_{CC} = V_{CC} \text{ MAX} + 0.5\text{V}$ . Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.

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

PARAMETER	TEST CONDITIONS	74S		UNIT
		$C_L = 15\text{pF}, R_L = 280\Omega$		
		Min	Max	
$t_{PLH}$ $t_{PHL}$ Propagation delay	Waveform 1		5.5 5.5	ns