

7486, LS86, S86 Gates

Quad Two-Input Exclusive-OR Gate
Product Specification

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
7486	14ns	30mA
74LS86	10ns	6.1mA
74S86	7ns	50mA

ORDERING CODE

PACKAGES	COMMERCIAL RANGE $V_{CC} = 5V \pm 5\%$; $T_A = 0^\circ C$ to $+70^\circ C$
Plastic DIP	N7486N, N74LS86N, N74S86N
Plastic SO	N74LS86D, N74S86D

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	L
L	H	H
H	L	H
H	H	L

H = HIGH voltage level
L = LOW voltage level

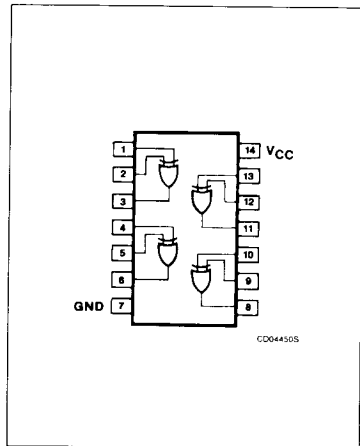
INPUT AND OUTPUT LOADING AND FAN-OUT TABLE

PINS	DESCRIPTION	74	74S	74LS
A, B	Inputs	1uI	1Sul	1LSul
Y	Output	10uI	10Sul	10LSul

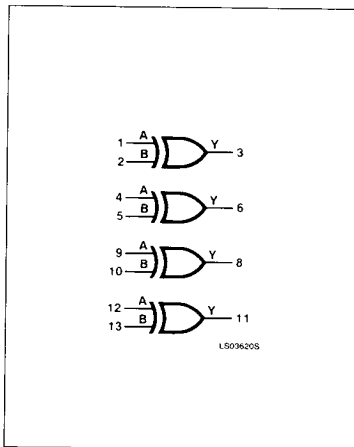
NOTE:

Where a 74 unit load (uI) is understood to be $40\mu A$ I_{IH} and $-1.6mA$ I_{IL} , a 74S unit load (Sul) is $50\mu A$ I_{IH} and $-2.0mA$ I_{IL} , and a 74LS unit load (LSul) is $20\mu A$ I_{IH} and $-0.4mA$ I_{IL} .

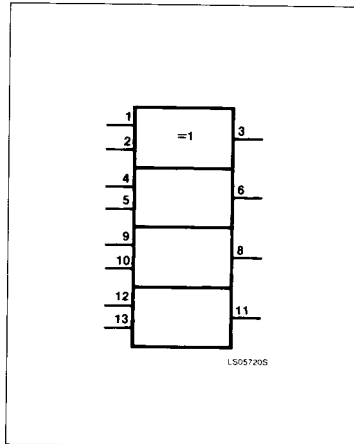
PIN CONFIGURATION



LOGIC SYMBOL



LOGIC SYMBOL (IEEE/IEC)



Gates

7486, LS86, S86

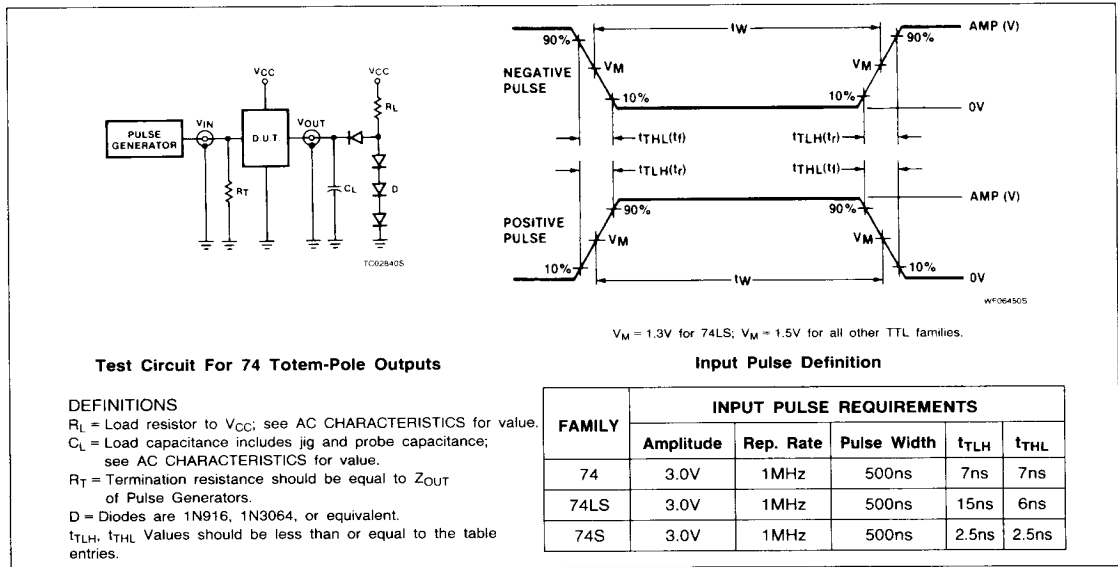
ABSOLUTE MAXIMUM RATINGS (Over operating free-air temperature range unless otherwise noted.)

PARAMETER	74	74LS	74S	UNIT
V _{CC} Supply voltage	7.0	7.0	7.0	V
V _{IN} Input voltage	−0.5 to +5.5	−0.5 to +7.0	−0.5 to +5.5	V
I _{IN} Input current	−30 to +5	−30 to +1	−30 to +5	mA
V _{OUT} Voltage applied to output in HIGH output state	−0.5 to +V _{CC}	−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			74S			UNIT
	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	
V _{CC} Supply voltage	4.75	5.0	5.25	4.75	5.0	5.25	4.75	5.0	5.25	V
V _{IH} HIGH-level input voltage	2.0			2.0			2.0			V
V _{IL} LOW-level input voltage			+ 0.8			+ 0.8			+ 0.8	V
I _{IK} Input clamp current			− 12			− 18			− 18	mA
I _{OH} HIGH-level output current			− 800			− 400			− 1000	μA
I _{OL} LOW-level output current			16			8			20	mA
T _A Operating free-air temperature	0		70	0		70	0		70	°C

TEST CIRCUITS AND WAVEFORMS



Gates

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

PARAMETER	TEST CONDITIONS ¹	7486			74LS86			74S86			UNIT
		Min	Typ ²	Max	Min	Typ ²	Max	Min	Typ ²	Max	
V_{OH} HIGH-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = \text{MIN}, V_{IL} = \text{MAX}, I_{OH} = \text{MAX}$	2.4	3.4		2.7	3.4		2.7	3.4		V
V_{OL} LOW-level output voltage	$V_{CC} = \text{MIN}, V_{IH} = \text{MIN}, V_{IL} = \text{MAX}$	$I_{OL} = \text{MAX}$				0.35	0.5			0.5	V
		$I_{OL} = 4\text{mA (74LS)}$				0.25	0.4				V
V_{IK} Input clamp voltage	$V_{CC} = \text{MIN}, I_I = I_{IK}$			-1.5			-1.5			-1.2	V
I_I Input current at maximum input voltage	$V_{CC} = \text{MAX}$	$V_I = 5.5\text{V}$								1.0	mA
		$V_I = 7.0\text{V}$					0.2				mA
I_{IH} HIGH-level input current	$V_{CC} = \text{MAX}$	$V_I = 2.4\text{V}$			40						μA
		$V_I = 2.7\text{V}$					40			50	μA
I_{IL} LOW-level input current	$V_{CC} = \text{MAX}$	$V_I = 0.4\text{V}$			-1.6		-0.8				mA
		$V_I = 0.5\text{V}$								-2.0	mA
I_{OS} Short-circuit output current ³	$V_{CC} = \text{MAX}$	-18		-55	-15		-100	-40		-100	mA
I_{CC} Supply current ⁴ (total)	$V_{CC} = \text{MAX}$		30	50		6.1	10		50	75	mA

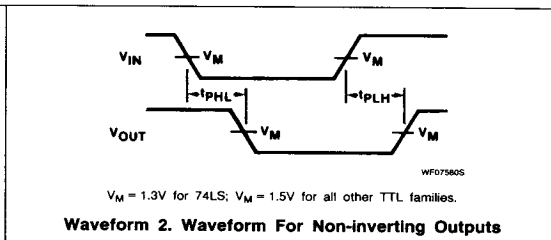
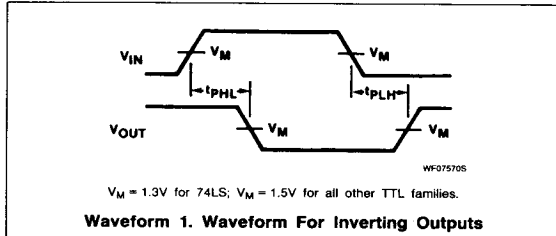
NOTES:

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 $V_{CC} = 5\text{V}$, $T_A = 25^\circ\text{C}$.

3. 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.

4. I_{CC} is measured with inputs grounded and outputs open.

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

PARAMETER		TEST CONDITIONS	74		74LS		74S		UNIT
			$C_L = 15\text{pF}, R_L = 400\Omega$		$C_L = 15\text{pF}, R_L = 2\text{k}\Omega$		$C_L = 15\text{pF}, R_L = 280\Omega$		
			Min	Max	Min	Max	Min	Max	
t_{PLH}	Propagation delay A or B to output	Other input LOW Waveform 2		23		23		10.5 10	ns
t_{PHL}	Propagation delay A or B to output	Other input HIGH Waveform 1		30 22		30 22		10.5 10	ns