

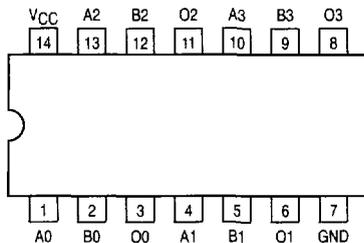
Low-Voltage CMOS Quad 2-Input XOR Gate With 5V-Tolerant Inputs

The MC74LCX86 is a high performance, quad 2-input XOR gate operating from a 2.7 to 3.6V supply. High impedance TTL compatible inputs significantly reduce current loading to input drivers while TTL compatible outputs offer improved switching noise performance. A V_I specification of 5.5V allows MC74LCX86 inputs to be safely driven from 5V devices.

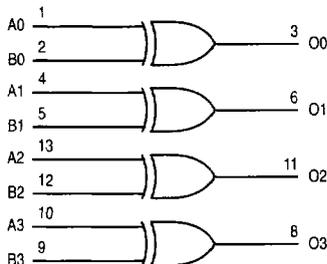
Current drive capability is 24mA at the outputs.

- Designed for 2.7 to 3.6V V_{CC} Operation
- 5V Tolerant Inputs — Interface Capability With 5V TTL Logic
- LVTTTL Compatible
- LVCMOS Compatible
- 24mA Balanced Output Sink and Source Capability
- Near Zero Static Supply Current (10 μ A) Substantially Reduces System Power Requirements
- Latchup Performance Exceeds 500mA
- ESD Performance: Human Body Model >2000V; Machine Model >200V

Pinout: 14-Lead (Top View)



LOGIC DIAGRAM



MC74LCX86

LCX

**LOW-VOLTAGE CMOS
QUAD 2-INPUT XOR GATE**



D SUFFIX
PLASTIC SOIC
CASE 751A-03



M SUFFIX
PLASTIC SOIC EIAJ
CASE 965-01



SD SUFFIX
PLASTIC SSOP
CASE 940A-03



DT SUFFIX
PLASTIC TSSOP
CASE 948G-01

PIN NAMES

Pins	Function
An, Bn	Data Inputs
On	Outputs

FUNCTION TABLE

Inputs		Outputs
An	Bn	On
L	L	L
L	H	H
H	L	H
H	H	L



ABSOLUTE MAXIMUM RATINGS*

Symbol	Parameter	Value	Condition	Unit
V _{CC}	DC Supply Voltage	-0.5 to +7.0		V
V _I	DC Input Voltage	-0.5 ≤ V _I ≤ +7.0		V
V _O	DC Output Voltage	-0.5 ≤ V _O ≤ V _{CC} + 0.5	Note 1.	V
I _{IK}	DC Input Diode Current	-50	V _I < GND	mA
I _{OK}	DC Output Diode Current	-50	V _O < GND	mA
		+50	V _O > V _{CC}	mA
I _O	DC Output Source/Sink Current	±50		mA
I _{CC}	DC Supply Current Per Supply Pin	±100		mA
I _{GND}	DC Ground Current Per Ground Pin	±100		mA
T _{STG}	Storage Temperature Range	-65 to +150		°C

* Absolute maximum continuous ratings are those values beyond which damage to the device may occur. Exposure to these conditions or conditions beyond those indicated may adversely affect device reliability. Functional operation under absolute-maximum-rated conditions is not implied.

1. Output in HIGH or LOW State. I_O absolute maximum rating must be observed.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Typ	Max	Unit
V _{CC}	Supply Voltage	Operating	2.0	3.3	3.6
		Data Retention Only	1.5	3.3	3.6
V _I	Input Voltage	0		5.5	V
V _O	Output Voltage (HIGH or LOW State)	0		V _{CC}	V
I _{OH}	HIGH Level Output Current, V _{CC} = 3.0V – 3.6V			-24	mA
I _{OL}	LOW Level Output Current, V _{CC} = 3.0V – 3.6V			24	mA
I _{OH}	HIGH Level Output Current, V _{CC} = 2.7V – 3.0V			-12	mA
I _{OL}	LOW Level Output Current, V _{CC} = 2.7V – 3.0V			12	mA
T _A	Operating Free-Air Temperature	-40		+85	°C
Δt/ΔV	Input Transition Rise or Fall Rate, V _{IN} from 0.8V to 2.0V, V _{CC} = 3.0V	0		10	ns/V

DC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic	Condition	T _A = -40°C to +85°C		Unit
			Min	Max	
V _{IH}	HIGH Level Input Voltage (Note 2.)	2.7V ≤ V _{CC} ≤ 3.6V	2.0		V
V _{IL}	LOW Level Input Voltage (Note 2.)	2.7V ≤ V _{CC} ≤ 3.6V		0.8	V
V _{OH}	HIGH Level Output Voltage	2.7V ≤ V _{CC} ≤ 3.6V; I _{OH} = -100μA	V _{CC} - 0.2		V
		V _{CC} = 2.7V; I _{OH} = -12mA	2.2		
		V _{CC} = 3.0V; I _{OH} = -18mA	2.4		
		V _{CC} = 3.0V; I _{OH} = -24mA	2.2		
V _{OL}	LOW Level Output Voltage	2.7V ≤ V _{CC} ≤ 3.6V; I _{OL} = 100μA		0.2	V
		V _{CC} = 2.7V; I _{OL} = 12mA		0.4	
		V _{CC} = 3.0V; I _{OL} = 16mA		0.4	
		V _{CC} = 3.0V; I _{OL} = 24mA		0.55	

2. These values of V_I are used to test DC electrical characteristics only.

MC74LCX86

DC ELECTRICAL CHARACTERISTICS (continued)

Symbol	Characteristic	Condition	$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		Unit
			Min	Max	
I_I	Input Leakage Current	$2.7\text{V} \leq V_{CC} \leq 3.6\text{V}; 0\text{V} \leq V_I \leq 5.5\text{V}$		± 5.0	μA
I_{CC}	Quiescent Supply Current	$2.7\text{V} \leq V_{CC} \leq 3.6\text{V}; V_I = \text{GND or } V_{CC}$		10	μA
		$2.7\text{V} \leq V_{CC} \leq 3.6\text{V}; 3.6\text{V} \leq V_I \leq 5.5\text{V}$		± 10	μA
ΔI_{CC}	Increase in I_{CC} per Input	$2.7\text{V} \leq V_{CC} \leq 3.6\text{V}; V_{IH} = V_{CC} - 0.6\text{V}$		500	μA

AC CHARACTERISTICS ($t_R = t_F = 2.5\text{ns}; C_L = 50\text{pF}; R_L = 500\Omega$)

Symbol	Parameter	Waveform	Limits			Unit
			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$			
			$V_{CC} = 3.0\text{V to } 3.6\text{V}$		$V_{CC} = 2.7\text{V}$	
			Min	Max	Max	
t_{PLH} t_{PHL}	Propagation Delay Input to Output	1,2	1.5 1.5	6.5 6.5	7.0 7.0	ns
t_{OSHL} t_{OSLH}	Output-to-Output Skew (Note 3.)			1.0 1.0		ns

3. Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH-to-LOW (t_{OSHL}) or LOW-to-HIGH (t_{OSLH}); parameter guaranteed by design.

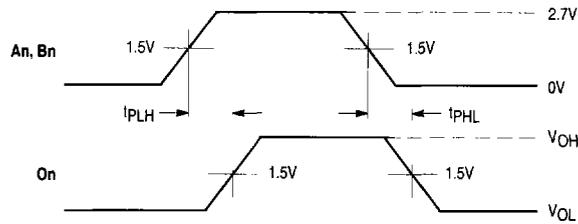
DYNAMIC SWITCHING CHARACTERISTICS

Symbol	Characteristic	Condition	$T_A = +25^\circ\text{C}$			Unit
			Min	Typ	Max	
V_{OLP}	Dynamic LOW Peak Voltage (Note 4.)	$V_{CC} = 3.3\text{V}, C_L = 50\text{pF}, V_{IH} = 3.3\text{V}, V_{IL} = 0\text{V}$		0.8		V
V_{OLV}	Dynamic LOW Valley Voltage (Note 4.)	$V_{CC} = 3.3\text{V}, C_L = 50\text{pF}, V_{IH} = 3.3\text{V}, V_{IL} = 0\text{V}$		0.8		V

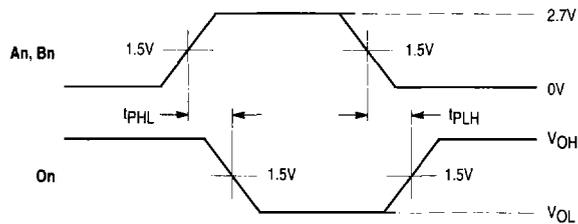
4. Number of outputs defined as "n". Measured with "n-1" outputs switching from HIGH-to-LOW or LOW-to-HIGH. The remaining output is measured in the LOW state.

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C_{IN}	Input Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V or } V_{CC}$	7	pF
C_{OUT}	Output Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V or } V_{CC}$	8	pF
C_{PD}	Power Dissipation Capacitance	10MHz, $V_{CC} = 3.3\text{V}, V_I = 0\text{V or } V_{CC}$	25	pF

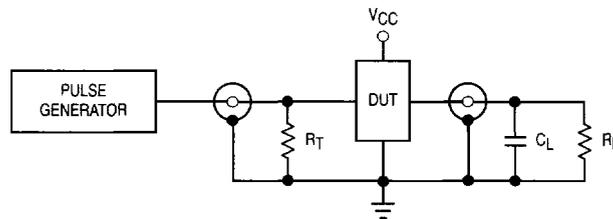


WAVEFORM 1 – NON-INVERTING PROPAGATION DELAYS
 $t_{PL} = t_{PF} = 2.5\text{ns}$, 10% to 90%; $f = 1\text{MHz}$; $t_{W} = 500\text{ns}$



WAVEFORM 2 – INVERTING PROPAGATION DELAYS
 $t_{PL} = t_{PF} = 2.5\text{ns}$, 10% to 90%; $f = 1\text{MHz}$; $t_{W} = 500\text{ns}$

Figure 1. AC Waveforms



$C_L = 50\text{pF}$ or equivalent (Includes jig and probe capacitance)
 $R_L = R_1 = 500\Omega$ or equivalent
 $R_T = Z_{OUT}$ of pulse generator (typically 50Ω)

Figure 2. Test Circuit