FAIRCHILD SEMICONDUCTOR™

October 1987
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MM74C08
Quad 2-Input AND Gate

General Description

The MM74C08 employs complementary MOS (CMOS) transistors to achieve wide power supply operating range, low power consumption and high noise margin, these gates provide basic functions used in the implementation of digital integrated circuit systems. The N- and P-channel enhancement mode transistors provide a symmetrical circuit with output swing essentially equal to the supply voltage. No DC power other than that caused by leakage current is consumed during static condition. All inputs are protected from damage due to static discharge by diode clamps to V_{CC} and GND.

Features

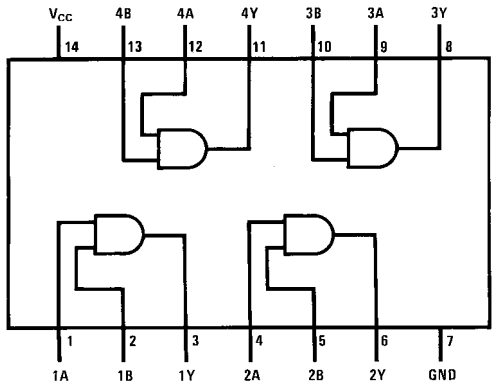
- Wide supply voltage range: 3.0V to 15V
- Guaranteed noise margin: 1.0V
- High noise immunity: 0.45 V_{CC} (typ.)
- Low power TTL compatibility:
  Fan out of 2 driving 74L
- Low power consumption: 10 nW/package (typ.)

Ordering Code:

Order Number	Package Number	Package Description
MM74C08M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
MM74CD8N	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Devices also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.

Connection Diagram



Top View

Truth Table

Inputs		Outputs
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

H = HIGH Level
L = LOW Level

Absolute Maximum Ratings (Note 1)

Voltage at Any Pin	−0.3V to V_{CC} + 0.3V
Operating Temperature Range	−55°C to +125°C
Storage Temperature Range	−65°C to +150°C
Power Dissipation (P_D)	
Dual-In-Line	700 mW
Small Outline	500 mW
Operating V_{CC} Range	3.0V to 15V
Absolute Maximum V_{CC}	18V
Lead Temperature	
(Soldering, 10 seconds)	260°C

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The Electrical Characteristics table provides conditions for actual device operation.

DC Electrical Characteristics

Min/Max limits apply across the guaranteed temperature range, unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
CMOS TO CMOS						
$V_{IN(1)}$	Logical "1" Input Voltage	V_{CC} = 5.0V	3.5			V
		V_{CC} = 10V	8.0			
$V_{IN(0)}$	Logical "0" Input Voltage	V_{CC} = 5.0V			1.5	V
		V_{CC} = 10V			2.0	
$V_{OUT(1)}$	Logical "1" Output Voltage	V_{CC} = 5.0V, I_O = −10 µA	4.5			V
		V_{CC} = 10V, I_O = −10 µA	9.0			
$V_{OUT(0)}$	Logical "0" Output Voltage	V_{CC} = 5.0V, I_O = 10 µA			0.5	V
		V_{CC} = 10V, I_O = 10 µA			1.0	
$I_{IN(1)}$	Logical "1" Input Current	V_{CC} = 15V, V_{IN} = 15V		0.005	1.0	µA
$I_{IN(0)}$	Logical "0" Input Current	V_{CC} = 15V, V_{IN} = 0V	−1.0	−0.005		µA
I_{CC}	Supply Current	V_{CC} = 15V		0.01	15	µA
CMOS/LPTTL INTERFACE						
$V_{IN(1)}$	Logical "1" Input Voltage	74C, V_{CC} = 4.75V	V_{CC} − 1.5			V
$V_{IN(0)}$	Logical "0" Input Voltage	74C, V_{CC} = 4.75V			0.8	V
$V_{OUT(1)}$	Logical "1" Output Voltage	74C, V_{CC} = 4.75V, I_O = −360 µA	2.4			V
$V_{OUT(0)}$	Logical "0" Output Voltage	74C, V_{CC} = 4.75V, I_O = 360 µA			0.4	V
OUTPUT DRIVE (see Family Characteristics Data Sheet) T_A = 25°C (short circuit current)						
I_{SOURCE}	Output Source Current (P-Channel)	V_{CC} = 5.0V, V_{OUT} = 0V	−1.75	−3.3		mA
I_{SOURCE}	Output Source Current (P-Channel)	V_{CC} = 10V, V_{OUT} = 0V	−8.0	15		mA
I_{SINK}	Output Sink Current (N-Channel)	V_{CC} = 5.0V, V_{OUT} = V_{CC}	1.75	3.6		mA
I_{SINK}	Output Sink Current (N-Channel)	V_{CC} = 10V, V_{OUT} = V_{CC}	8.0	16		mA

AC Electrical Characteristics (Note 2)

(MM74C08) $T_A = 25°C$, $C_L = 50$ pF, unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{pd0}, t_{pd1}	Propagation Delay Time to Logical "1" or "0"	$V_{CC} = 5.0V$		80	140	ns
		$V_{CC} = 10V$		40	70	
C_{IN}	Input Capacitance	(Note 3)		5.0		pF
C_{PD}	Power Dissipation Capacitance	(Note 4) Per Gate		14		pF

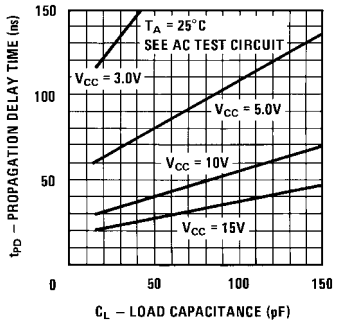
Note 2: AC Parameters are guaranteed by DC correlated testing.

Note 3: Capacitance is guaranteed by periodic testing.

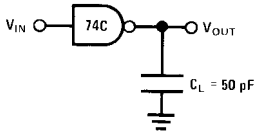
Note 4: C_{PD} determines the no load AC power consumption of any CMOS device. For complete explanation see Family Characteristics Application Note—AN-90.

Typical Performance Characteristics

Propagation Delay Time vs Load Capacitance MMM74C08

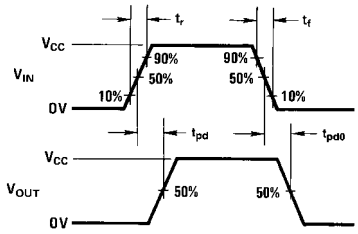


AC Test Circuit

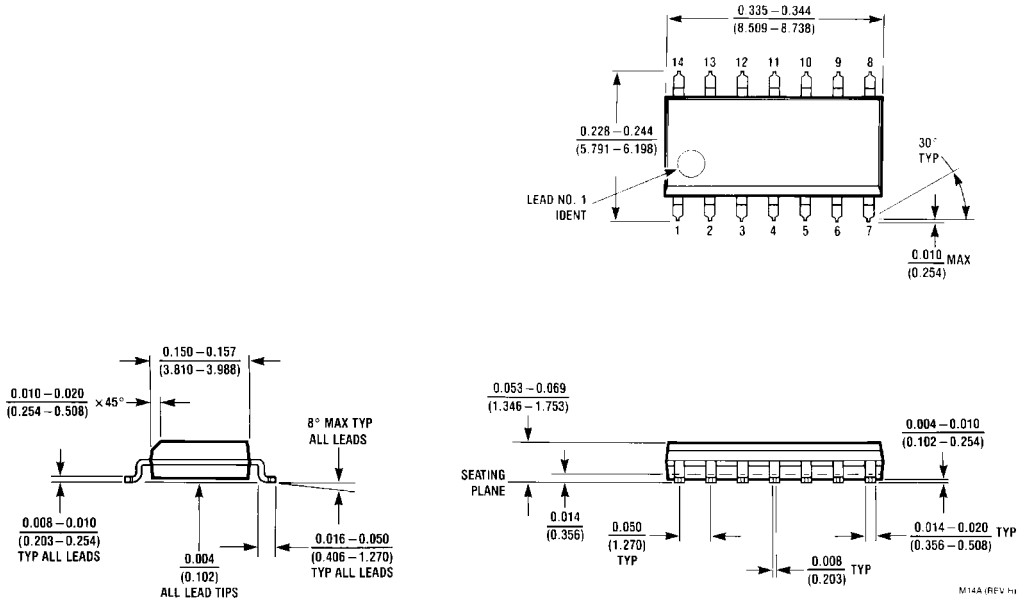


Note: Delays measured with input t_r, $t_f = 20$ ns

Switching Time Waveforms

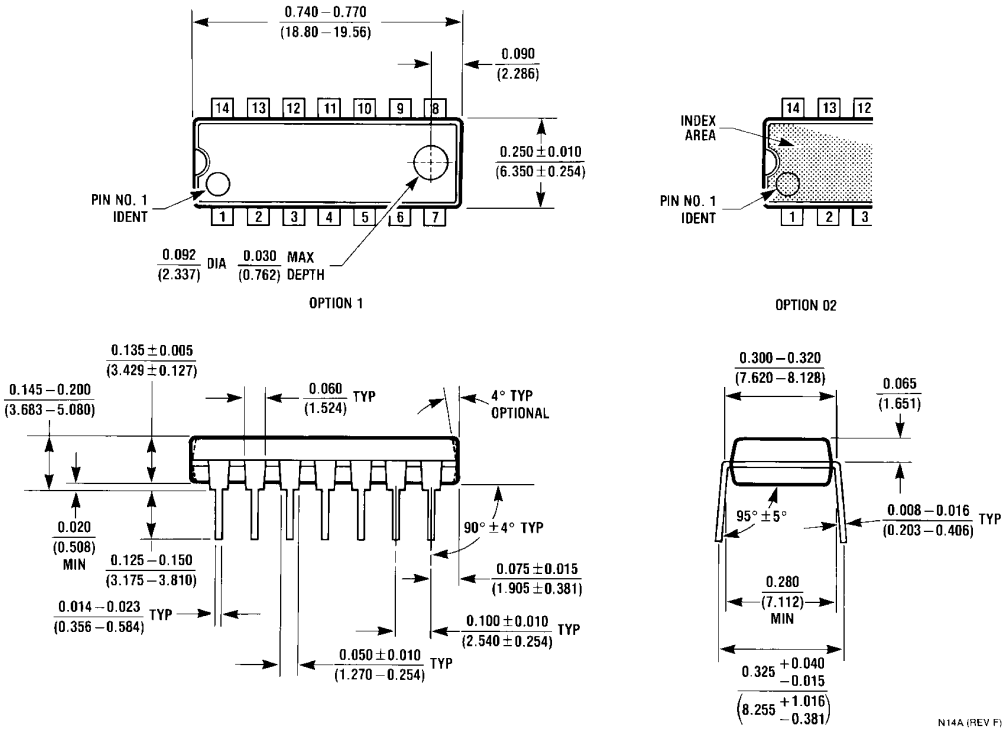


Physical Dimensions inches (millimeters) unless otherwise noted



14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
Package Number M14A

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
Package Number N14A