

MM54C08/MM74C08 Quad 2-Input AND Gate

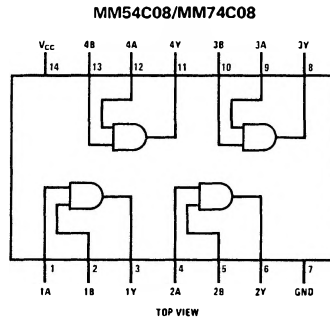
General Description

Employing 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.)

Connection Diagrams



Truth Tables

MM54C08/MM74C08

INPUTS		OUTPUT
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
MM54C08, MM54C86	-40°C to +85°C
MM74C08, MM74C86	-65°C to +150°C
Storage Temperature Range	-65°C to +150°C
Package Dissipation	500mW
Operating V_{CC} Range	3.0V to 15V
Absolute Maximum V_{CC}	18V
Lead Temperature (Soldering, 10 seconds)	300°C

DC Electrical Characteristics

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

Parameter	Conditions	Min.	Typ.	Max.	Units
CMOS to CMOS					
$V_{IN(1)}$	Logical "1" Input Voltage	$V_{CC} = 5.0V$ $V_{CC} = 10V$	3.5 8.0		V V
$V_{IN(0)}$	Logical "0" Input Voltage	$V_{CC} = 5.0V$ $V_{CC} = 10V$		1.5 2.0	V V
$V_{OUT(1)}$	Logical "1" Output Voltage	$V_{CC} = 5.0V, I_O = -10\mu A$ $V_{CC} = 10V, I_O = -10\mu A$	4.5 9.0		V V
$V_{OUT(0)}$	Logical "0" Output Voltage	$V_{CC} = 5.0V, I_O = +10\mu A$ $V_{CC} = 10V, I_O = +10\mu A$		0.5 1.0	V V
$I_{IN(1)}$	Logical "1" Input Current	$V_{CC} = 15V, V_{IN} = 15V$		0.005	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	μA
CMOS/LPTTL Interface					
$V_{IN(1)}$	Logical "1" Input Voltage	54C, $V_{CC} = 4.5V$ 74C, $V_{CC} = 4.75V$	$V_{CC} - 1.5$ $V_{CC} - 1.5$		V V
$V_{IN(0)}$	Logical "0" Input Voltage	54C, $V_{CC} = 4.5V$ 74C, $V_{CC} = 4.75V$		0.8 0.8	V V
$V_{OUT(1)}$	Logical "1" Output Voltage	54C, $V_{CC} = 4.5V, I_O = -360\mu A$ 74C, $V_{CC} = 4.75V, I_O = -360\mu A$	2.4 2.4		V V
$V_{OUT(0)}$	Logical "0" Output Voltage	54C, $V_{CC} = 4.5V, I_O = +360\mu A$ 74C, $V_{CC} = 4.75V, I_O = +360\mu A$		0.4 0.4	V V
Output Drive (See 54C/74C Family Characteristics Data Sheet) (short circuit current)					
I_{SOURCE}	Output Source Current (P-Channel)	$V_{CC} = 5.0V, V_{OUT} = 0V$ $T_A = 25^\circ C$	-1.75	-3.3	mA
I_{SOURCE}	Output Source Current (P-Channel)	$V_{CC} = 10V, V_{OUT} = 0V$ $T_A = 25^\circ C$	-8.0	15	mA
I_{SINK}	Output Sink Current (N-Channel)	$V_{CC} = 5.0V, V_{OUT} = V_{CC}$ $T_A = 25^\circ C$	1.75	3.6	mA
I_{SINK}	Output Sink Current (N-Channel)	$V_{CC} = 10V, V_{OUT} = V_{CC}$ $T_A = 25^\circ C$	8.0	16	mA

AC Electrical Characteristics

(MM54C08/MM74C08) $T_A = 25^\circ\text{C}$, $C_L = 50\text{ pF}$, unless otherwise specified.

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

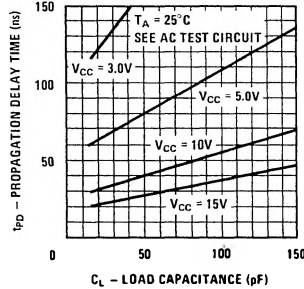
Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual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

Note 2: Capacitance is guaranteed by periodic testing.

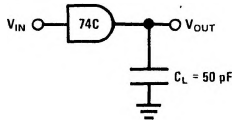
Note 3: C_{PD} determines the no load ac power consumption of any CMOS device. For complete explanation see 54C/74C Family Characteristics application note — AN-90.

Typical Performance Characteristics

Propagation Delay Time vs Load Capacitance
MM54C08/MM74C08



AC Test Circuits



NOTE: DELAYS MEASURED WITH INPUT t_r , $t_f = 20\text{ ns}$

Switching Time Waveforms

