

MM54HCT08/MM74HCT08 Quad 2-Input AND Gate

General Description

The MM54HCT08/MM74HCT08 are logic functions fabricated by using advanced silicon-gate CMOS technology which provides the inherent benefits of CMOS—low quiescent power and wide power supply range. These devices are input and output characteristic and pinout compatible with standard DM54LS/74LS logic families. All inputs are protected from static discharge damage by internal diodes to V_{CC} and ground.

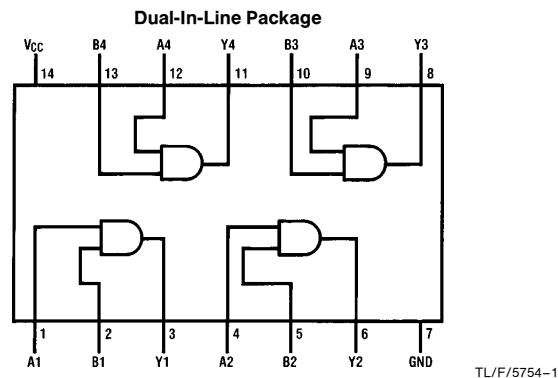
MM54HCT/MM74HCT devices are intended to interface between TTL and NMOS components and standard CMOS

devices. These parts are also plug-in replacements for LS-TTL devices and can be used to reduce power consumption in existing designs.

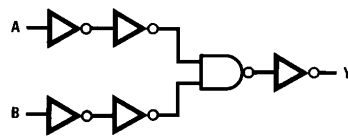
Features

- TTL, LS pin-out and threshold compatible
- Fast switching: t_{PLH} , t_{PHL} = 12 ns (typ)
- Low power: 10 μ W at DC
- High fan-out, 10 LS-TTL loads

Connection and Logic Diagrams



Order Number MM54HCT08 or MM74HCT08



Absolute Maximum Ratings (Notes 1 & 2)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{CC})	-0.5 to +7.0V
DC Input Voltage (V_{IN})	-1.5 to V_{CC} + 1.5V
DC Output Voltage (V_{OUT})	-0.5 to V_{CC} + 0.5V
Clamp Diode Current (I_{IK} , I_{OK})	±20 mA
DC Output Current, per pin (I_{OUT})	±25 mA
DC V_{CC} or GND Current, per pin (I_{CC})	±50 mA
Storage Temperature Range (T_{STG})	-65°C to +150°C
Power Dissipation (P_D) (Note 3)	600 mW
S.O. Package only	500 mW
Lead Temperature (T_L) (Soldering 10 seconds)	260°C

Operating Conditions

	Min	Max	Units
Supply Voltage (V_{CC})	4.5	5.5	V
DC Input or Output Voltage (V_{IN} , V_{OUT})	0	V_{CC}	V
Operating Temperature Range (T_A)			
MM74HCT	-40	+85	°C
MM54HCT	-55	+125	°C
Input Rise or Fall Times (t_r , t_f)		500	ns

DC Electrical Characteristics $V_{CC} = 5V \pm 10\%$ (unless otherwise specified)

Symbol	Parameter	Conditions	$T_A = 25^\circ\text{C}$		74HCT	54HCT	Units
			Typ	Guaranteed Limits		$T_A = -40 \text{ to } 85^\circ\text{C}$	
V_{IH}	Minimum High Level Input Voltage			2.0	2.0	2.0	V
V_{IL}	Maximum Low Level Input Voltage			0.8	0.8	0.8	V
V_{OH}	Minimum High Level Output Voltage	$V_{IN} = V_{IH}$ or V_{IL}	V_{CC}	$V_{CC} - 0.1$	$V_{CC} - 0.1$	$V_{CC} - 0.1$	V
		$ I_{OUT} = 20 \mu\text{A}$	4.2	3.98	3.84	3.7	V
		$ I_{OUT} = 4.0 \text{ mA}$, $V_{CC} = 4.5\text{V}$	5.2	4.98	4.84	4.7	V
V_{OL}	Maximum Low Level Voltage	$V_{IN} = V_{IH}$	0	0.1	0.1	0.1	V
		$ I_{OUT} = 20 \mu\text{A}$	0.2	0.26	0.33	0.4	V
		$ I_{OUT} = 4.0 \text{ mA}$, $V_{CC} = 4.5\text{V}$	0.2	0.26	0.33	0.4	V
I_{IN}	Maximum Input Current	$V_{IN} = V_{CC}$ or GND, V_{IH} or V_{IL}		±0.1	±1.0	±1.0	μA
I_{CC}	Maximum Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND		2.0	20	40	μA
		$I_{OUT} = 0 \mu\text{A}$					
		$V_{IN} = 2.4\text{V}$ or 0.5V (Note 4)		1.2	1.4	1.5	mA

Note 1: Absolute Maximum Ratings are those values beyond which damage to the device may occur.

Note 2: Unless otherwise specified all voltages are referenced to ground.

Note 3: Power Dissipation temperature derating — plastic "N" package — 12 mW/°C from 65°C to 85°C; ceramic "J" package 12 mW/°C from 100°C to 125°C.

Note 4: This is measured per input with all other inputs held at V_{CC} or ground.

AC Electrical Characteristics $V_{CC} = 5.0V$, $t_r = t_f = 6$ ns, $C_L = 15$ pF, $T_A = 25^\circ C$

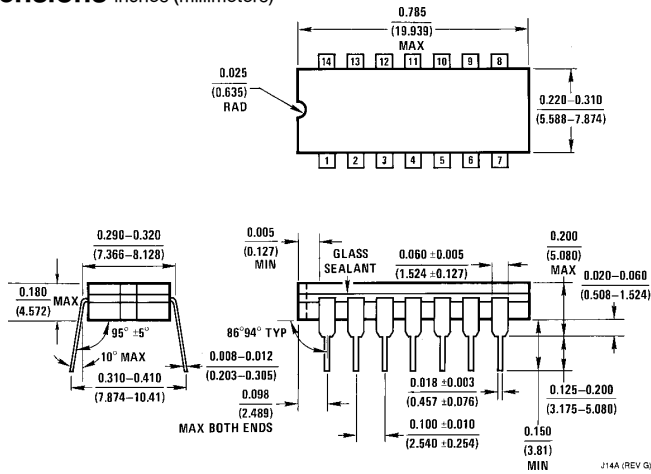
Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Units
t_{PLH} , t_{PHL}	Maximum Propagation Delay		9	15	ns

AC Electrical Characteristics $V_{CC} = 5.0V \pm 10\%$, $t_r = t_f = 6$ ns, $C_L = 50$ pF

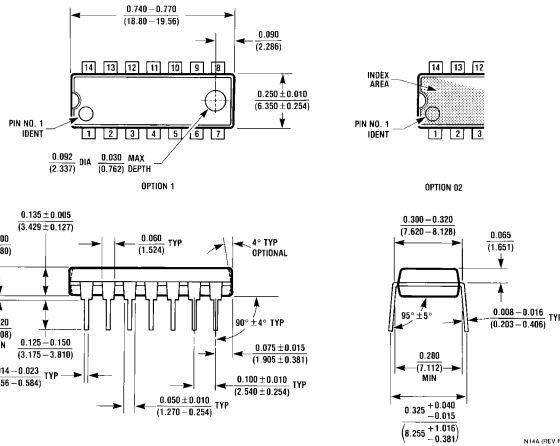
Symbol	Parameter	Conditions	$T_A = 25^\circ C$		74HCT	54HCT	Units
			Typ	Guaranteed Limits		$T_A = -40$ to $85^\circ C$	
t_{PLH} , t_{PHL}	Maximum Propagation Delay		11	18	23	27	ns
t_{THL} , t_{TLH}	Maximum Output Rise & Fall Time		7	15	19	22	ns
C_{PD}	Power Dissipation Capacitance	(Note 5)	38				pF
C_{IN}	Input Capacitance		5	10	10	10	pF

Note 5: C_{PD} determines the no load dynamic power consumption. $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$ and the no load dynamic current consumption. $I_S = C_{PD} V_{CC} f + I_{CC}$.

Physical Dimensions inches (millimeters)



Ceramic Dual-In-Line Package (J)
Order Number MM54HCT08J or MM74HCT08J
NS Package J14A



Molded Dual-In-Line Package (N)
Order Number MM74HCT08N
NS Package N14A

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