

MM54HCT03/MM74HCT03 Quad 2-Input NAND Gate (Open Drain)

General Description

The MM54HCT03/MM74HCT03 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.

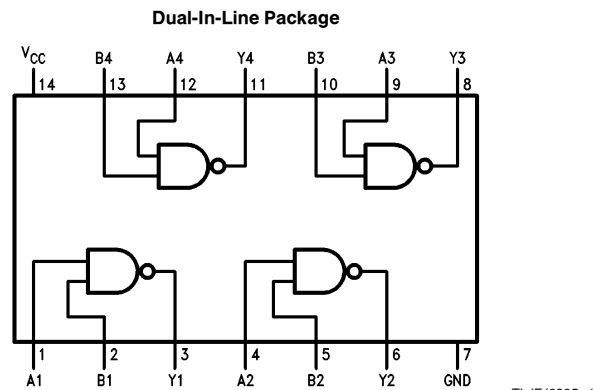
MM54HCT/MM74HCT devices are intended to interface between TTL and NMOS components and standard CMOS

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

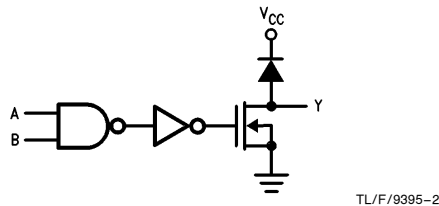
Features

- 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 MM54HCT03 or MM74HCT03



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})	−0.5V to +7.0V
DC Input Voltage (V_{IN})	−1.5V to V_{CC} + 1.5V
DC Output Voltage (V_{OUT})	−0.5V 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°C		74HCT	54HCT	Units
					T _A = −40°C to +85°C	T _A = −55°C to +125°C	
			Typ	Guaranteed Limits			
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 _{OL}	Maximum Low Level Voltage	V _{IN} = V _{IH}					
		I _{OUT} = 20 μA	0	0.1	0.1	0.1	V
		I _{OUT} = 4.0 mA, V _{CC} = 4.5V	0.2	0.26	0.33	0.4	V
		I _{OUT} = 4.8 mA, V _{CC} = 5.5V	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 _{LKG}	Minimum High Level Output Leakage Current	V _{IN} = V _{IH} or V _{IL} , V _{OUT} = V _{CC}		0.5	5.0	10	μA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND I _{OUT} = 0 μA		2.0	20	40	μA
		V _{IN} = 2.4V 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.

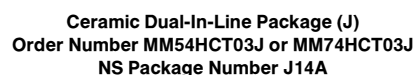
Note 3: Power Dissipation temperature derating — plastic "N" package: −12 mW/°C from 65°C to 85°C; ceramic "J" package: −12 mW/°C from 100°C to 125°C.

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

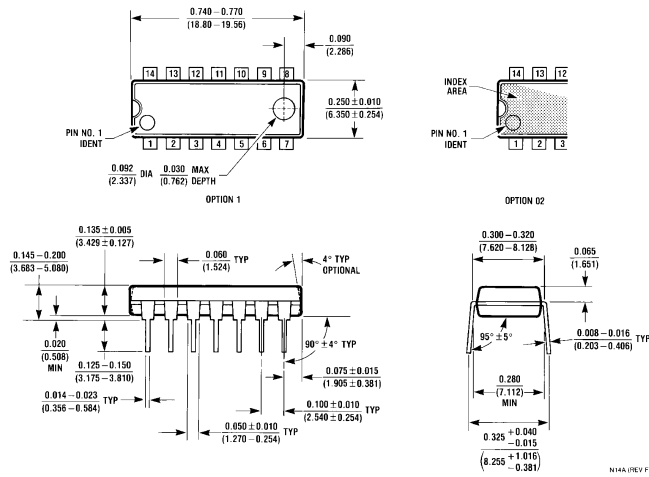
Symbol	Parameter	Conditions	Typ	Units
t_{pZL}	Maximum Propagation Delay	$R_L = 1\text{ k}\Omega$	7	ns
t_{pLZ}	Maximum Propagation Delay	$R_L = 1\text{ k}\Omega$	10	ns

Symbol	Parameter	Conditions	T _A €25°		74HCT	54HCT	Units
			Typ	T _A = -40°C to +85°C			
t _{PZL}	Maximum Propagation Delay	R _L = 1 kΩ	10	20	25	30	ns
t _{PLZ}	Maximum Propagation Delay	R _L = 1 kΩ	12	20	25	30	ns
t _{THL}	Maximum Output Fall Time		10	15	19	22	ns
C _{PD}	Power Dissipation Capacitance (Note 5)	(per gate) R _L = ∞		14			pF
C _{IN}	Maximum Input Capacitance			5	10	10	pF

Physical Dimensions inches (millimeters)



Physical Dimensions inches (millimeters) (Continued)



Molded Dual-In-Line Package (N)
Order Number MM74HCT03N
NS Package Number N14A

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