

MM74HCT00

Quad 2 Input NAND Gate

General Description

The MM74HCT00 is a NAND gates fabricated using advanced silicon-gate CMOS technology which provides the inherent benefits of CMOS—low quiescent power and wide power supply range. This device is input and output characteristic and pin-out compatible with standard 74LS logic families. All inputs are protected from static discharge damage by internal diodes to V_{CC} and ground.

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

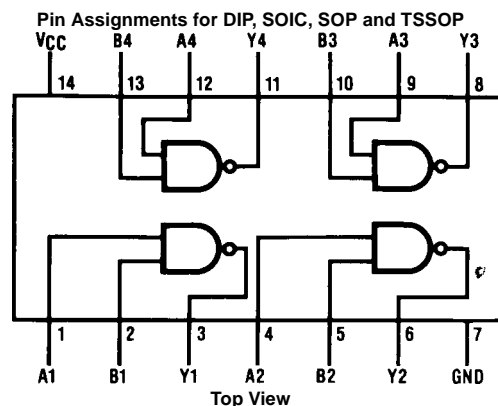
- TTL, LS pin-out and threshold compatible
- Fast switching: t_{PLH} , t_{PHL} =14 ns (typ)
- Low power: 10 μ W at DC
- High fan out, 10 LS-TTL loads

Ordering Code:

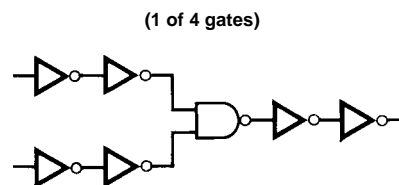
Order Number	Package Number	Package Description
MM74HCT00M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
MM74HCT00MX_NL	M14A	Pb-Free 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
MM74HCT00SJ	M14D	Pb-Free 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
MM74HCT00MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
MM74HCT00MTCX_NL	MTC14	Pb-Free 14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
MM74HCT00N	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
MM74HCT00N_NL	N14A	Pb-Free 14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.
Pb-Free package per JEDEC J-STD-020B.

Connection Diagram



Logic Diagram



Absolute Maximum Ratings(Note 1)

(Note 2)

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

Recommended 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)	-40	+85	°C
Input Rise or Fall Times (t_r, t_f)		500	ns

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

Symbol	Parameter	Conditions	T _A = 25°C		T _A = -40 to 85°C	T _A = -55 to 125°C	Units
			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 _{OH}	Minimum HIGH Level Output Voltage	V _{IN} = V _{IH} or V _{IL}					
		I _{OUT} = 20 μA	V _{CC}	V _{CC} -0.1	V _{CC} -0.1	V _{CC} -0.1	V
		I _{OUT} = 4.0 mA, V _{CC} = 4.5V	4.2	3.98	3.84	3.7	V
		I _{OUT} = 4.8 mA, V _{CC} = 5.5V	5.2	4.98	4.84	4.7	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}		±0.05	±0.5	±1.0	μA
I _{CC}	Maximum Quiescent Supply Current	V _{IN} = V _{CC} or GND, I _{OUT} = 0 μA		1.0	10	40	μA
		V _{IN} = 2.4V or 0.5V (Note 4)	0.18	0.3	0.4	0.5	mA

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

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

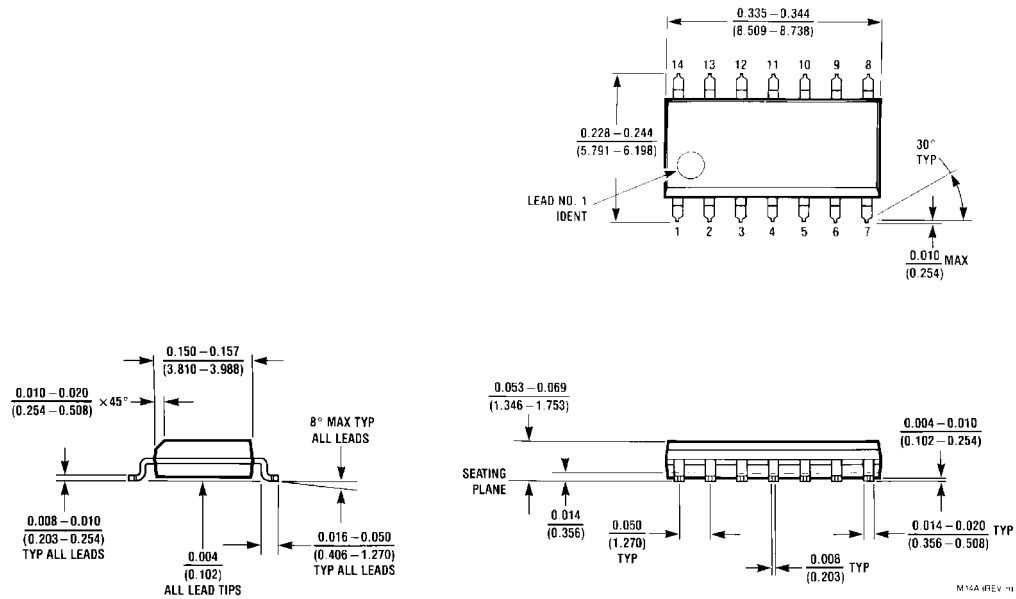
Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Units
t_{PLH} , t_{PHL}	Maximum Propagation Delay		14	18	ns

AC Electrical Characteristics
 $V_{CC} = 5.0V \pm 10\%$, $t_r = t_f = 6\text{ ns}$, $C_L = 50\text{ pF}$ (unless otherwise noted)

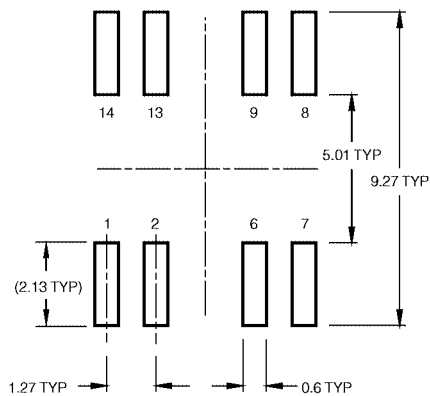
Symbol	Parameter	Conditions	$T_A = 25^\circ\text{C}$		$T_A = -40\text{ to }85^\circ\text{C}$	$T_A = -55\text{ to }125^\circ\text{C}$	Units
			Typ	Guaranteed Limits			
t_{PLH} , t_{PHL}	Maximum Propagation Delay		18	23	29	35	ns
t_{THL} , t_{TLH}	Maximum Output Rise & Fall Time		8	15	19	22	ns
C_{PD}	Power Dissipation Capacitance	(Note 5)	30				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, $I_S = C_{PD} V_{CC} f + I_{CC}$.

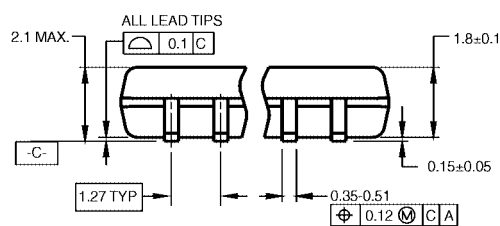
Physical Dimensions inches (millimeters) unless otherwise noted



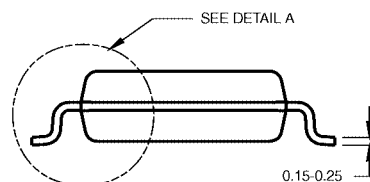
**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
Package Number M14A**



LAND PATTERN RECOMMENDATION



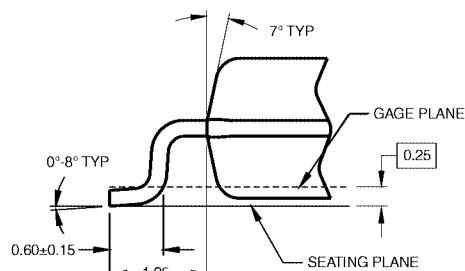
DIMENSIONS ARE IN MILLIMETERS



NOTES:

- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION,
ESTABLISHED IN DECEMBER, 1998.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD
FLASH, AND TIE BAR EXTRUSIONS.

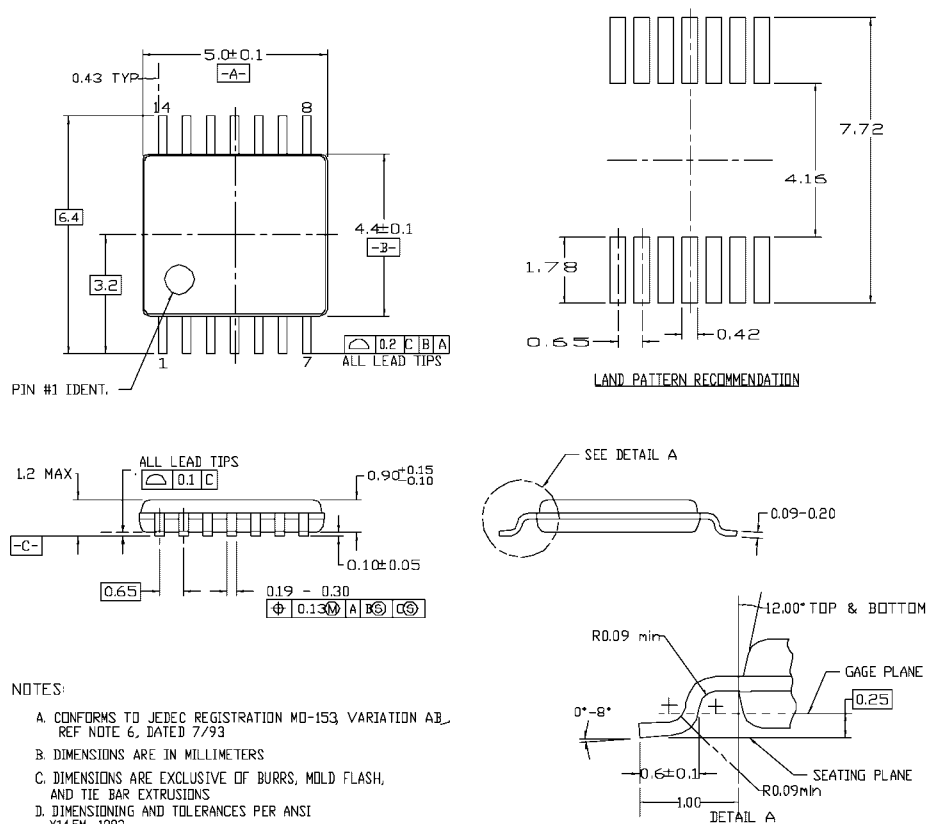
M14DRevB1



DETAIL A

**Pb-Free 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M14D**

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



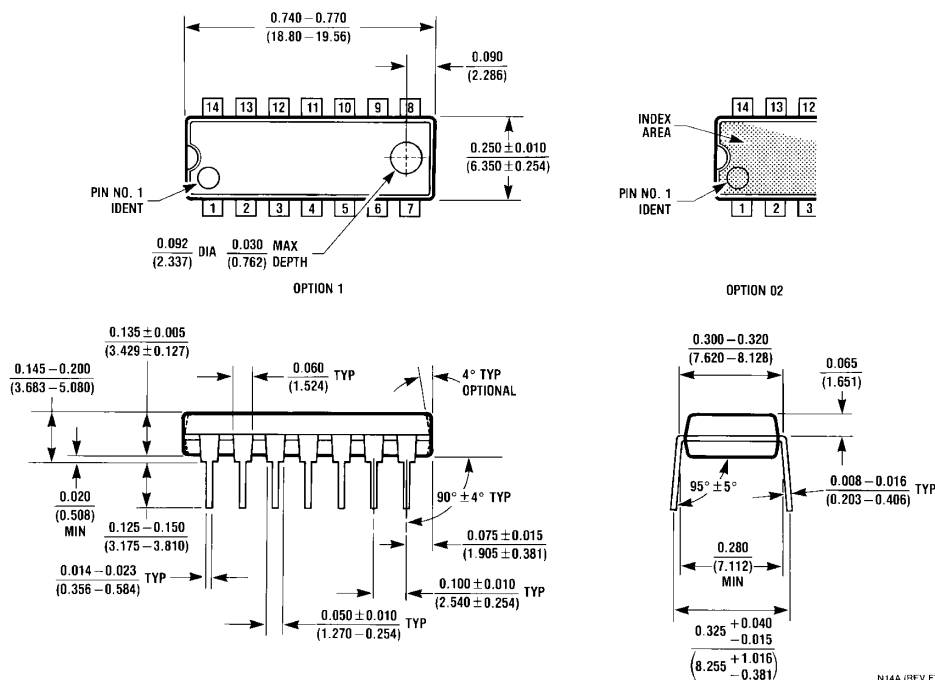
NOTES:

- CONFORMS TO JEDEC REGISTRATION MO-153 VARIATION AB, REF NOTE 6, DATED 7/93
- DIMENSIONS ARE IN MILLIMETERS
- DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS
- DIMENSIONING AND TOLERANCES PER ANSI Y14.5M, 1982

MTC14revD

**14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
Package Number MTC14**

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



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