

74LCX00

Low Voltage Quad 2-Input NAND Gate with 5V Tolerant Inputs

General Description

The LCX00 contains four 2-input NAND gates. The inputs tolerate voltages up to 7V allowing the interface of 5V systems to 3V systems.

The 74LCX00 is fabricated with advanced CMOS technology to achieve high speed operation while maintaining CMOS low power dissipation.

Features

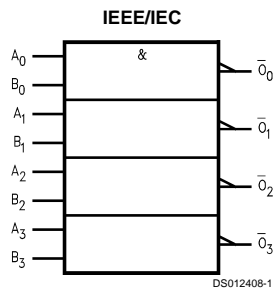
- 5V tolerant inputs
- 5.2 ns t_{PD} max, 10 μ A I_{CCQ} max
- Power down high impedance inputs and outputs
- Supports live insertion/withdrawal
- 2.0V–3.6V V_{CC} supply operation
- \pm 24 mA output drive
- Implements patented noise/EMI reduction circuitry
- Functionally compatible with 74 series 00
- Latch-up performance exceeds 500 mA
- ESD performance:
 - Human body model > 2000V
 - Machine model > 200V

Ordering Code:

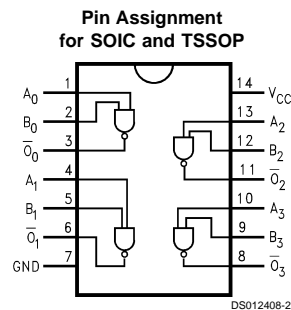
Order Number	Package Number	Package Description
74LCX00M	M14A	14-Lead Small Outline Package, SOIC, JEDEC
74LCX00SJ	M14D	14-Lead Small Outline Package, SOIC, EIAJ
74LCX00MTC	MTC14	14-Lead Thin Shrink Small Outline Package, TSSOP

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

Logic Symbol



Connection Diagram



Pin Descriptions

Pin Names	Description
A_n, B_n	Inputs
\bar{O}_n	Outputs

Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Value	Conditions	Units
V _{CC}	Supply Voltage	-0.5 to +7.0		V
V _I	DC Input Voltage	-0.5 to +7.0		V
V _O	DC Output Voltage	-0.5 to V _{CC} + 0.5	Output in High or Low State (Note 2)	V
I _{IK}	DC Input Diode Current	-50	V _I < GND	mA
I _{OK}	DC Output Diode Current	-50	V _O < GND	mA
		+50	V _O > V _{CC}	
I _O	DC Output Source/Sink Current	±50		mA
I _{CC}	DC Supply Current per Supply Pin	±100		mA
I _{GND}	DC Ground Current per Ground Pin	±100		mA
T _{STG}	Storage Temperature	-65 to +150		°C

Recommended Operating Conditions (Note 3)

Symbol	Parameter	Min	Max	Units	
V _{CC}	Supply Voltage	Operating	2.0	3.6	V
		Data Retention	1.5	3.6	
V _I	Input Voltage	0	5.5	V	
V _O	Output Voltage	0	V _{CC}	V	
I _{OH} /I _{OL}	Output Current	V _{CC} = 3.0V – 3.6V		±24	mA
		V _{CC} = 2.7V		±12	
T _A	Free-Air Operating Temperature	-40	85	°C	
Δt/ΔV	Input Edge Rate, V _{IN} = 0.8V–2.0V, V _{CC} = 3.0V	0	10	ns/V	

Note 1: The Absolute Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the Absolute Maximum Ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Note 2: I_O Absolute Maximum Rating must be observed.

Note 3: Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = -40°C to +85°C		Units
				Min	Max	
V _{IH}	HIGH Level Input Voltage		2.7–3.6	2.0		V
V _{IL}	LOW Level Input Voltage		2.7–3.6		0.8	V
V _{OH}	HIGH Level Output Voltage	I _{OH} = -100 μA	2.7–3.6	V _{CC} - 0.2		V
		I _{OH} = -12 mA	2.7	2.2		V
		I _{OH} = -18 mA	3.0	2.4		V
		I _{OH} = -24 mA	3.0	2.2		V
V _{OL}	LOW Level Output Voltage	I _{OL} = 100 μA	2.7–3.6		0.2	V
		I _{OL} = 12 mA	2.7		0.4	V
		I _{OL} = 16 mA	3.0		0.4	V
		I _{OL} = 24 mA	3.0		0.55	V
I _I	Input Leakage Current	0 ≤ V _I ≤ 5.5V	2.7–3.6		±5.0	μA
I _{OFF}	Power-Off Leakage Current	V _I or V _O = 5.5V	0		10	μA
I _{CC}	Quiescent Supply Current	V _I = V _{CC} or GND	2.7–3.6		10	μA
		3.6V ≤ V _I ≤ 5.5V	2.7–3.6		±10	μA
ΔI _{CC}	Increase in I _{CC} per Input	V _{IH} = V _{CC} - 0.6V	2.7–3.6		500	μA

AC Electrical Characteristics

Symbol	Parameter	$T_A = -40^{\circ}\text{C to }+85^{\circ}\text{C}, C_L = 50\text{pF}, R_L = 500\Omega$				Units
		$V_{CC} = 3.3\text{V} \pm 0.3\text{V}$		$V_{CC} = 2.7\text{V}$		
		Min	Max	Min	Max	
t_{PHL}	Propagation Delay	1.5	5.2	1.5	6.0	ns
t_{PLH}		1.5	5.2	1.5	6.0	
t_{OSHL}	Output to Output Skew (Note 4)		1.0			ns
t_{OSLH}			1.0			

Note 4: Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH to LOW (t_{OSHL}) or LOW to HIGH (t_{OSLH}).

Dynamic Switching Characteristics

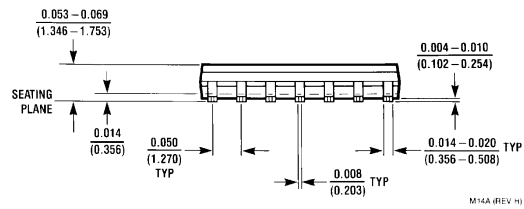
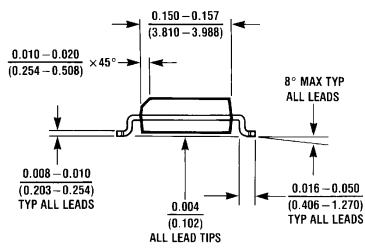
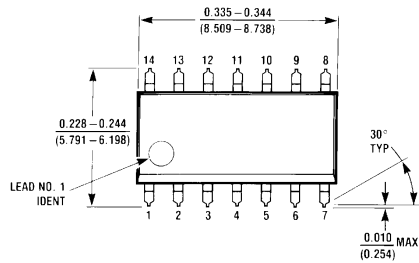
Symbol	Parameter	Conditions	V_{CC} (V)	$T_A = 25^{\circ}\text{C}$	Unit
				Typical	
V_{OLP}	Quiet Output Dynamic Peak V_{OL}	$C_L = 50\text{ pF}, V_{IH} = 3.3\text{V}, V_{IL} = 0\text{V}$	3.3	0.8	V
V_{OLV}	Quiet Output Dynamic Valley V_{OL}	$C_L = 50\text{ pF}, V_{IH} = 3.3\text{V}, V_{IL} = 0\text{V}$	3.3	-0.8	V

Capacitance

Symbol	Parameter	Conditions	Typical	Units
C_{IN}	Input Capacitance	$V_{CC} = \text{Open}, V_I = 0\text{V or }V_{CC}$	7	pF
C_{OUT}	Output Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V or }V_{CC}$	8	pF
C_{PD}	Power Dissipation Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V or }V_{CC}, f = 10\text{ MHz}$	25	pF

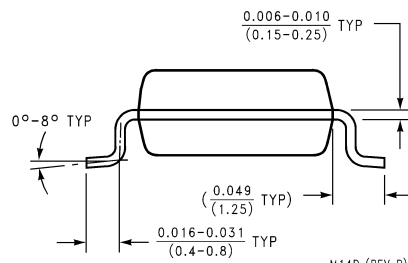
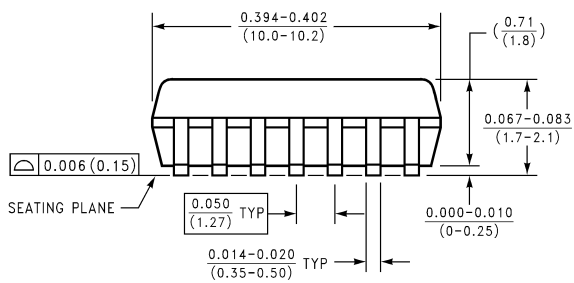
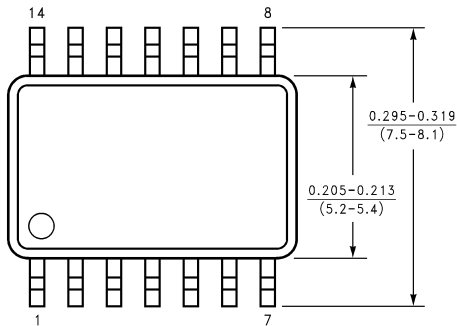


Physical Dimensions inches (millimeters) unless otherwise noted



M14A (REV H)

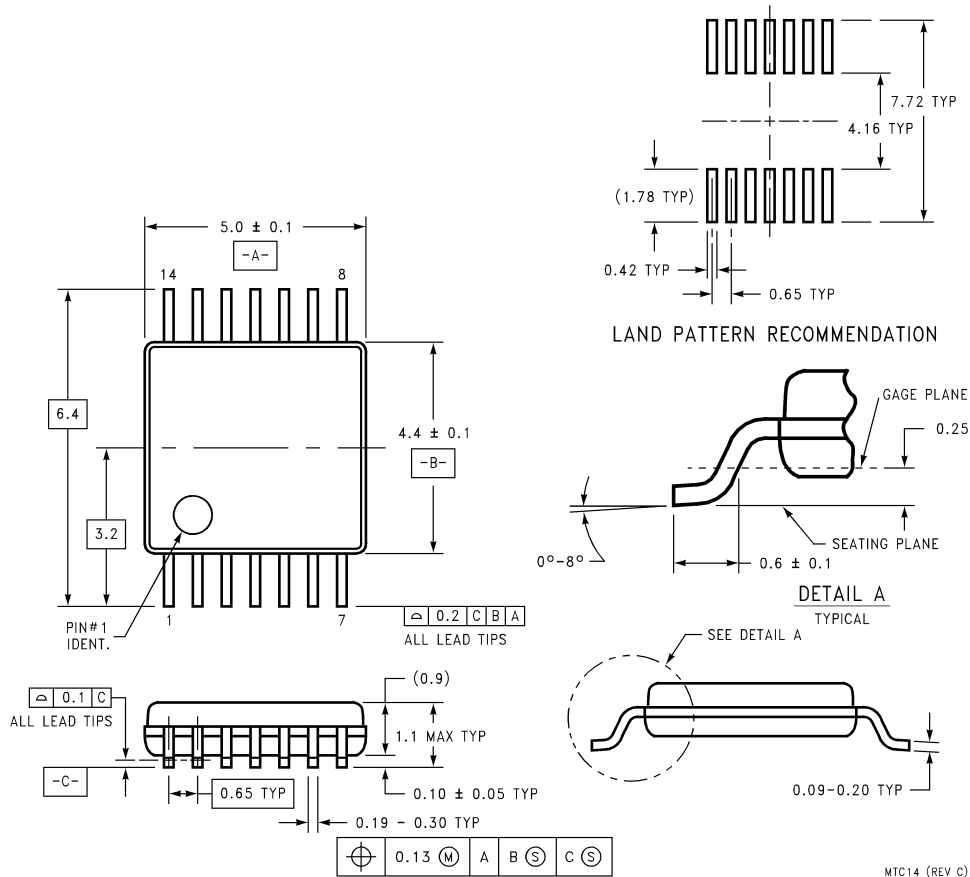
**14-Lead Small Outline Package JEDEC (M)
Package Number M14A**



M14D (REV B)

**14-Lead Small Outline Package EIAJ (SJ)
Package Number M14D**

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



14-Lead Thin Shrink Small Outline Package, JEDEC Package Number MTC14

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