

74LCX06

Low Voltage Hex Inverter/Buffer with Open Drain Outputs

General Description

The LCX06 contains six inverters/buffers. The inputs tolerate voltages up to 7V allowing the interface of 5V systems to 3V systems.

The outputs of the LCX06 are open drain and can be connected to other open drain outputs to implement active LOW wire AND or active HIGH wire OR functions.

The 74LCX06 is fabricated with advanced CMOS technology to achieve high speed operation while maintaining CMOS low power dissipation.

Features

- 5V tolerant inputs
- 2.3V–3.6V V_{CC} specifications provided
- 3.7 ns t_{PD} max ($V_{CC} = 3.3V$), 10 μA I_{CC} max
- Power down high impedance inputs and outputs
- 24 mA output drive ($V_{CC} = 3.0V$)
- Implements patented noise/EMI reduction circuitry
- Latch-up performance exceeds 500 mA
- Functionally compatible with 74 series 05
- ESD performance:
 - Human body model > 2000V
 - Machine model > 200V

Ordering Code:

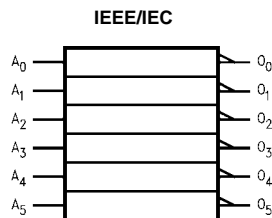
Order Number	Package Number	Package Description
74LCX06M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74LCX06MX_NL (Note 1)	M14A	Pb-Free 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74LCX06SJ	M14D	Pb-Free 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74LCX06MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
74LCX06MTCX_NL (Note 1)	MTC14	Pb-Free 14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

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

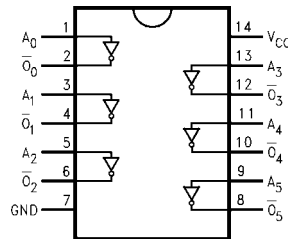
Pb-Free package per JEDEC J-STD-020B.

Note 1: "_NL" indicates Pb-Free package (per JEDEC J-STD-020B). Device available in Tape and Reel only.

Logic Symbol



Connection Diagram



Pin Descriptions

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

Absolute Maximum Ratings (Note 2)					
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 +7.0	Output in HIGH or LOW State (Note 3)	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 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 4)					
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	5.5	V	
I _{OL}	Output Current	V _{CC} = 3.0V - 3.6V		+24	mA
		V _{CC} = 2.7V - 3.0V		+12	
		V _{CC} = 2.3V - 2.7V		+8	
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 2: 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 3: I_O Absolute Maximum Rating must be observed.

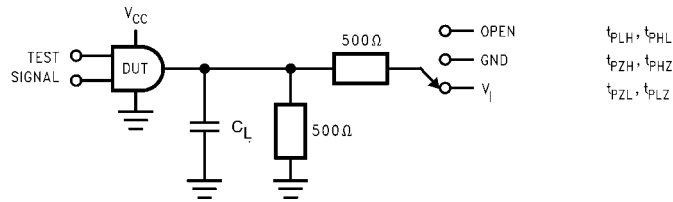
Note 4: Unused inputs must be held HIGH or LOW. They may not float.

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		2.3 - 2.7	1.7		V
			2.7 - 3.6	2.0		
V _{IL}	LOW Level Input Voltage		2.3 - 2.7		0.7	V
			2.7 - 3.6		0.8	
V _{OL}	LOW Level Output Voltage	I _{OL} = -100 μA	2.3 - 3.6		0.2	V
		I _{OL} = 8 mA	2.3		0.6	
		I _{OL} = 12 mA	2.7		0.4	
		I _{OL} = 16 mA	3.0		0.4	
		I _{OL} = 24 mA	3.0		0.55	
I _I	Input Leakage Current	0 ≤ V _I ≤ 5.5V	2.3 - 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	2.3 - 3.6		10	μA
		3.6V ≤ V _I ≤ 5.5V	2.3 - 3.6		±10	
ΔI _{CC}	Increase in I _{CC} per Input	V _{IH} = V _{CC} - 0.6V	2.3 - 3.6		500	μA
I _{OHZ}	Off State Current	V _O = 5.5	2 - 3.6		10	μA

AC Electrical Characteristics								
Symbol	Parameter	T _A = -40°C to +85°C, R _L = 500Ω						Units
		V _{CC} = 3.3V ± 0.3V		V _{CC} = 2.7V		V _{CC} = 2.5V ± 0.2V		
		C _L = 50 pF		C _L = 50 pF		C _L = 30 pF		
		Min	Max	Min	Max	Min	Max	
t _{PZL}	Propagation Delay Time	0.8	3.7	1.0	4.1	0.8	3.5	ns
t _{PLZ}		0.8	3.7	1.0	4.1	0.8	3.5	
Dynamic Switching Characteristics								
Symbol	Parameter	Conditions	V _{CC} (V)	T _A = 25°C	Units			
				Typical				
V _{OLP}	Quiet Output Dynamic Peak V _{OL}	C _L = 50 pF, V _{IH} = 3.3V, V _{IL} = 0V C _L = 30 pF, V _{IH} = 2.5V, V _{IL} = 0V	3.3 2.5	0.9 0.7	V			
V _{OLV}	Quiet Output Dynamic Valley V _{OL}	C _L = 50 pF, V _{IH} = 3.3V, V _{IL} = 0V C _L = 30 pF, V _{IH} = 2.5V, V _{IL} = 0V	3.3 2.5	-0.8 -0.6	V			
Capacitance								
Symbol	Parameter	Conditions	Typical	Units				
C _{IN}	Input Capacitance	V _{CC} = Open, V _I = 0V or V _{CC}	7	pF				
C _{OUT}	Output Capacitance	V _{CC} = 3.3V, V _I = 0V or V _{CC}	8	pF				
C _{PD}	Power Dissipation Capacitance	V _{CC} = 3.3V, V _I = 0V or V _{CC} , f = 10 MHz	25	pF				

AC Loading and Waveforms Generic for LCX Family



t_{PLH}, t_{PHL}
t_{PZH}, t_{PHZ}
t_{PZL}, t_{PLZ}

FIGURE 1. AC Test Circuit
(C_L includes probe and jig capacitance)

Test	Switch
t _{PLH} , t _{PHL}	OPEN
t _{PZL} , t _{PLZ}	6V at V _{CC} = 3.3 ± 0.3V V _{CC} × 2 at V _{CC} = 2.5 ± 0.2V
t _{PZH} , t _{PHZ}	GND

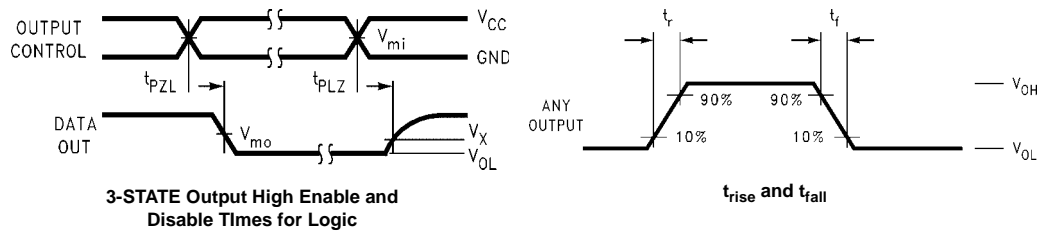
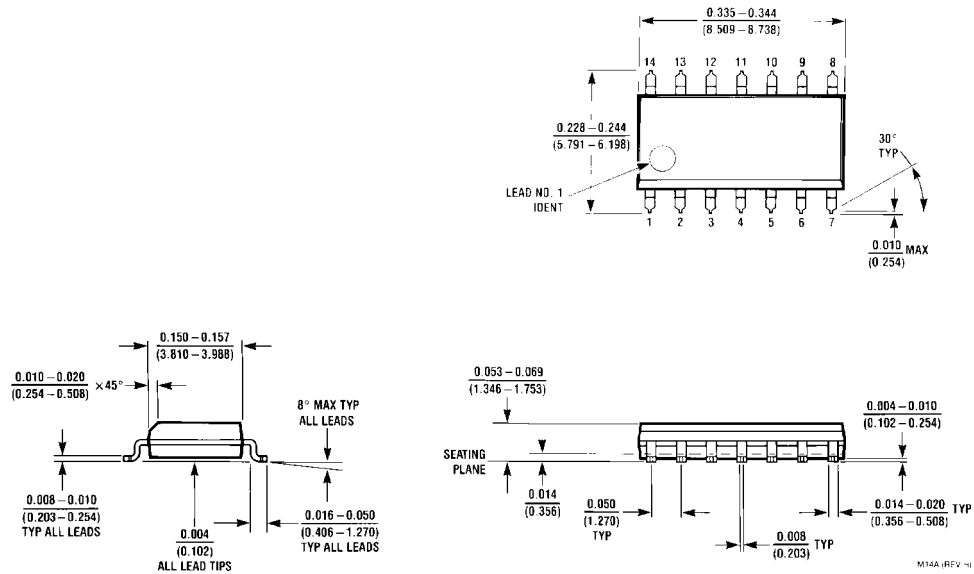


FIGURE 2. Waveforms
(Input Pulse Characteristics; f = 1MHz, t_r = t_f = 3ns)

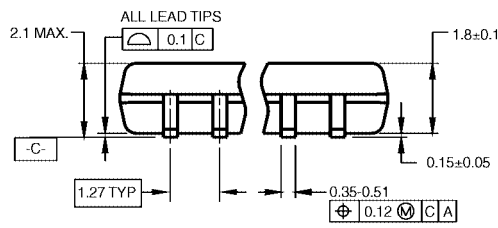
Symbol	V _{CC}		
	3.3V ± 0.3V	2.7V	2.5V ± 0.2V
V _{mi}	1.5V	1.5V	V _{CC} /2
V _{mo}	1.5V	1.5V	V _{CC} /2
V _x	V _{OL} + 0.3V	V _{OL} + 0.3V	V _{OL} + 0.15V
V _y	V _{OH} - 0.3V	V _{OH} - 0.3V	V _{OH} - 0.15V

Physical Dimensions inches (millimeters) unless otherwise noted



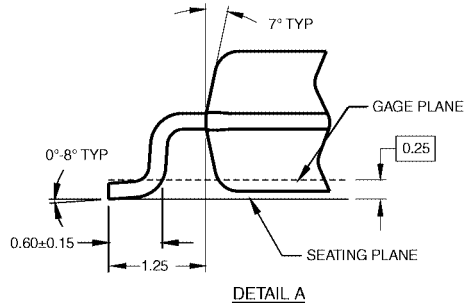
**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
Package Number M14A**

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



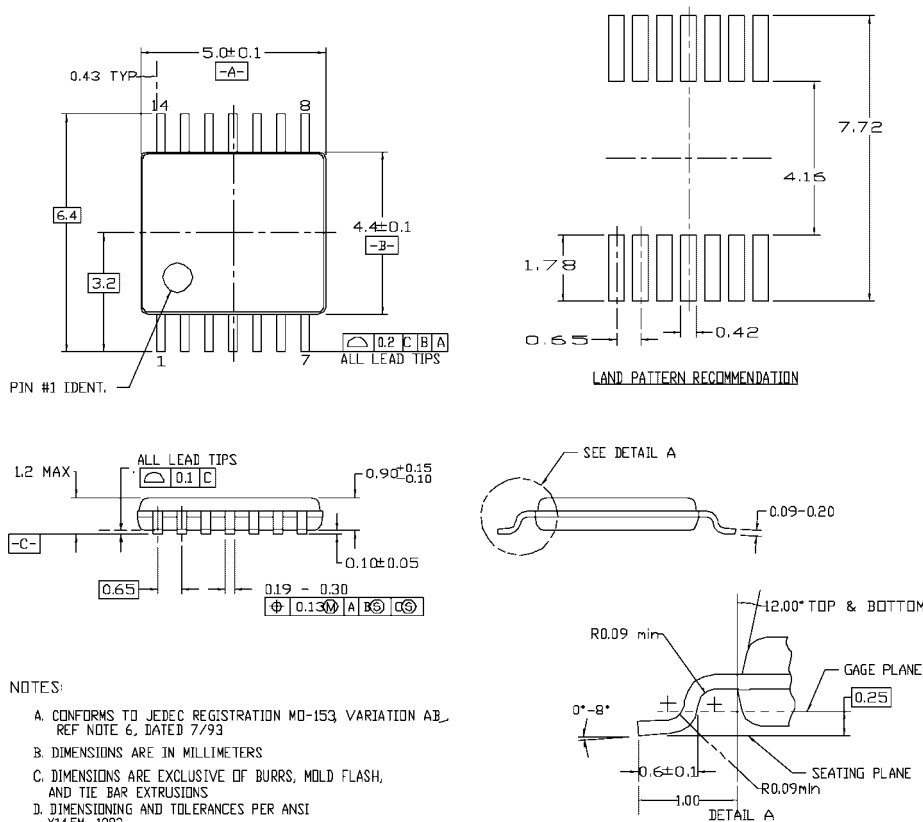
- NOTES:
 A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
 B. DIMENSIONS ARE IN MILLIMETERS.
 C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M14DRevB1



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:
- A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB, REF NOTE 6, DATED 7/93
 - B. DIMENSIONS ARE IN MILLIMETERS
 - C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS
 - D. 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

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