

74LCX07

Low Voltage Hex Buffer with Open Drain Outputs

General Description

The LCX07 contains six buffers. The inputs tolerate voltages up to 7V allowing the interface of 5V systems to 3V systems.

The outputs of the LCX07 are open drain and can be connected to other open drain outputs to implement active HIGH wire AND or active LOW wire OR functions.

The 74LCX07 is fabricated with advanced CMOS technology to achieve high speed operation while maintaining CMOS low power dissipation.

Features

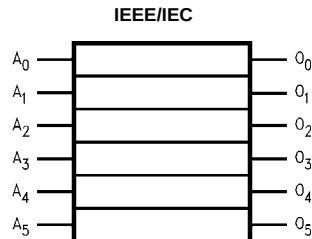
- 5V tolerant inputs
- 2.3V–5.5V V_{CC} specifications provided
- 2.9 ns t_{PD} max ($V_{CC} = 3.3V$), 10 μA I_{CC} max
- Power down high impedance inputs and outputs
- ± 24 mA output drive ($V_{CC} = 3.0V$)
- Implements patented noise/EMI reduction circuitry
- Latch-up performance exceeds 500 mA
- ESD performance:
 - Human body model > 2000V
 - Machine model > 200V

Ordering Code:

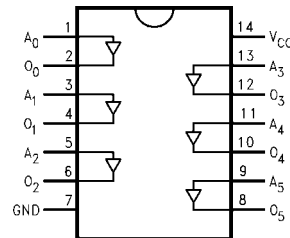
Order Number	Package Number	Package Description
74LCX07M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow
74LCX07SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74LCX07MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

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

Logic Symbol



Connection Diagram



Pin Descriptions

Pin Names	Description
A_n	Inputs
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	$V_I < \text{GND}$	mA
I_{OK}	DC Output Diode Current	-50 +50	$V_O < \text{GND}$ $V_O > V_{CC}$	mA
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 Data Retention	2.0 1.5	5.5 5.5	V
V _I	Input Voltage	0	5.5	V
V _O	Output Voltage HIGH or LOW State	0	V _{CC}	V
I _{OL}	Output Current V _{CC} = 4.5 – 5.5V V _{CC} = 3.0V – 3.6V V _{CC} = 2.7V – 3.0V V _{CC} = 2.3V – 2.7V		+32 +24 +12 +8	mA
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)	$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		Units
				Min	Max	
V_{IH}	HIGH Level Input Voltage		2.3 - 2.7 2.7 - 3.6 4.5 - 5.5	1.7 2.0 $0.7 \times V_{CC}$		V
V_{IL}	LOW Level Input Voltage		2.3 - 2.7 2.7 - 3.6 4.5 - 5.5		0.7 0.8 $0.3 \times V_{CC}$	V
V_{OL}	LOW Level Output Voltage	$I_{OL} = -100 \mu A$ $I_{OL} = 8 \text{ mA}$ $I_{OL} = 12 \text{ mA}$ $I_{OL} = 16 \text{ mA}$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 32 \text{ mA}$	2.3 - 5.5 2.3 2.7 3.0 3.0 4.5		0.2 0.6 0.4 0.4 0.55 0.55	V
I_I	Input Leakage Current	$0 \leq V_I \leq 5.5V$	2.3 - 5.5		± 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 $3.6V \leq V_I \leq 5.5V$	2.3 - 5.5 2.3 - 5.5		10 ± 10	μA
ΔI_{CC}	Increase in I_{CC} per Input	$V_{IH} = V_{CC} - 0.6V$	2.3 - 3.6 4.5 - 5.5		500 1	μA mA

AC Electrical Characteristics

Symbol	Parameter	T _A = -40°C to +85°C, R _L = 500Ω								Units
		V _{CC} = 5.0V ± 0.5V		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 = 50 pF		C _L = 30 pF		
		Min	Max	Min	Max	Min	Max	Min	Max	
t _{PZL}	Propagation Delay Time	0.5	3.0	0.8	3.7	1.0	4.4	0.8	3.8	ns
t _{PLZ}		0.5	3.0	0.8	3.7	1.0	4.4	0.8	3.8	

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_{QSHL}) or LOW-to-HIGH (t_{QSLH}).

Dynamic Switching Characteristics

Symbol	Parameter	Conditions	V_{CC} (V)	$T_A = 25^{\circ}\text{C}$	Units
				Typical	
V_{OLP}	Quiet Output Dynamic Peak V_{OL}	$C_L = 50\text{ pF}, V_{IH} = 3.3\text{V}, V_{IL} = 0\text{V}$ $C_L = 30\text{ pF}, V_{IH} = 2.5\text{V}, V_{IL} = 0\text{V}$	3.3 2.5	0.9 0.7	V
V_{OLV}	Quiet Output Dynamic Valley V_{OL}	$C_L = 50\text{ pF}, V_{IH} = 3.3\text{V}, V_{IL} = 0\text{V}$ $C_L = 30\text{ pF}, V_{IH} = 2.5\text{V}, V_{IL} = 0\text{V}$	3.3 2.5	-0.8 -0.6	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	$V_{CC} = 3.3\text{V}, V_O = 0\text{V or } V_{CC}$	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

AC Loading and Waveforms

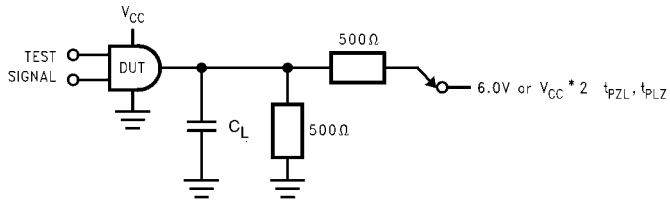


FIGURE 1. AC Test Circuit
(C_L includes probe and jig capacitance)

Test	Switch
t_{PZL}, t_{PLZ}	$V_{CC} \times 2$ at $V_{CC} = 5.0 \pm 0.5V$
	6V at $V_{CC} = 3.3 \pm 0.3V$
	$V_{CC} \times 2$ at $V_{CC} = 2.5 \pm 0.2V$

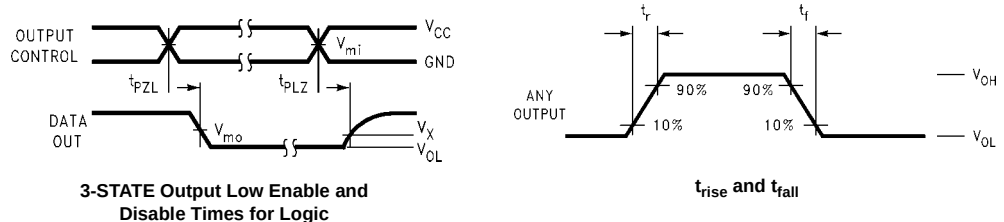
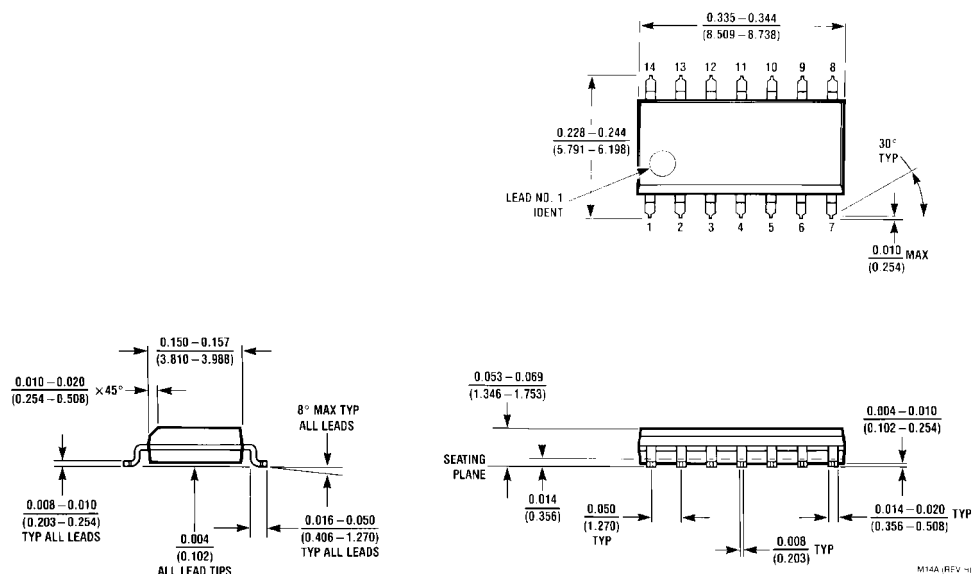


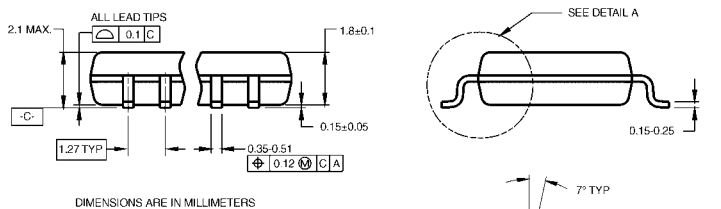
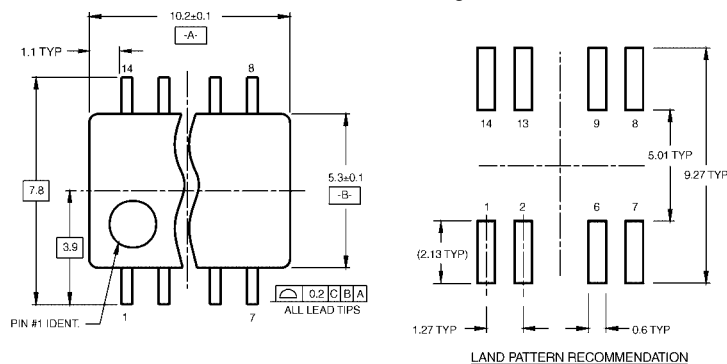
FIGURE 2. Waveforms
(Input Pulse Characteristics; $f = 1MHz$, $t_r = t_f = 3ns$)

Symbol	V_{CC}			
	$5.0V \pm 0.5V$	$3.3V \pm 0.3V$	2.7V	$2.5V \pm 0.2V$
V_{mi}	$V_{CC}/2$	1.5V	1.5V	$V_{CC}/2$
V_{mo}	$V_{CC}/2$	1.5V	1.5V	$V_{CC}/2$
V_x	$V_{OL} + 0.3V$	$V_{OL} + 0.3V$	$V_{OL} + 0.3V$	$V_{OL} + 0.15V$
V_y	$V_{OH} - 0.3V$	$V_{OH} - 0.3V$	$V_{OH} - 0.3V$	$V_{OH} - 0.15V$

Physical Dimensions inches (millimeters) unless otherwise noted

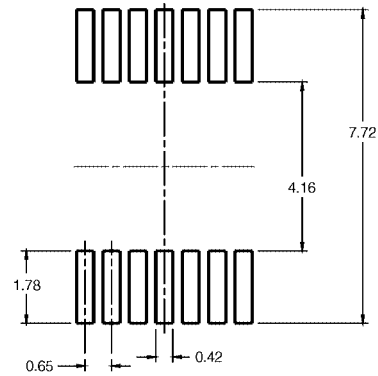
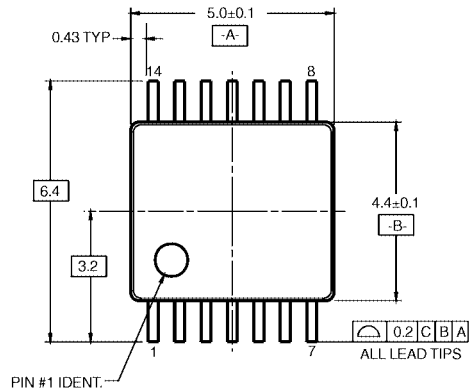


**14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150" Narrow
Package Number M14A**

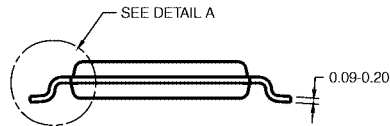
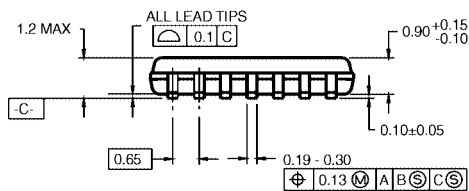


**14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M14D**

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



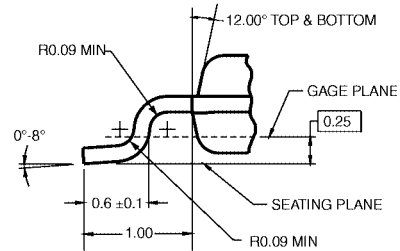
LAND PATTERN RECOMMENDATION



NOTES:

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

MTC14RevC3



DETAIL A

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

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