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FAIRCHILD SEMICONDUCTOR®

January 2008

74LCX06
Low Voltage Hex Inverter/Buffer with Open Drain Outputs

Features

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

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.

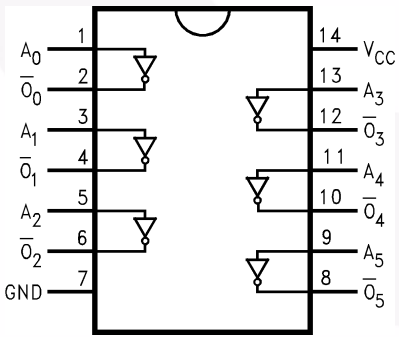
Ordering Information

Order Number	Package Number	Package Description
74LCX06M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74LCX06SJ	M14D	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

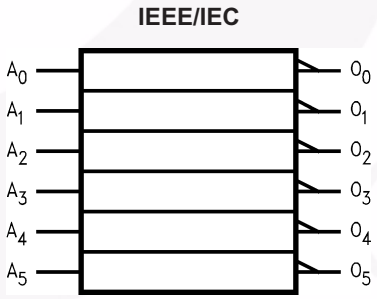
Device also available in Tape and Reel. Specify by appending suffix letter “X” to the ordering number.

All packages are lead free per JEDEC: J-STD-020B standard.

Connection Diagram



Logic Symbol



Pin Description

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

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Rating
V_{CC}	Supply Voltage	–0.5V to +7.0V
V_I	DC Input Voltage	–0.5V to +7.0V
V_O	DC Output Voltage, Output in HIGH or LOW State(1)	–0.5V to +7.0V
I_{IK}	DC Input Diode Current, V_I < GND	–50mA
I_{OK}	DC Output Diode Current	
	V_O < GND	–50mA
	V_O > V_{CC}	+50mA
I_O	DC Output Sink Current	+50mA
I_{CC}	DC Supply Current per Supply Pin	±100mA
I_{GND}	DC Ground Current per Ground Pin	±100mA
T_{STG}	Storage Temperature	–65°C to +150°C

Note:

1. I_O Absolute Maximum Rating must be observed.

Recommended Operating Conditions(2)

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to absolute maximum ratings.

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
$\Delta t / \Delta V$	Input Edge Rate, V_{IN} = 0.8V–2.0V, V_{CC} = 3.0V	0	10	ns/V

Note:

2. Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	Conditions	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	2.3–3.6	I_{OL} = 100μA		0.2	V
		2.3	I_{OL} = 8mA		0.6	
		2.7	I_{OL} = 12mA		0.4	
		3.0	I_{OL} = 16mA		0.4	
			I_{OL} = 24mA		0.55	
I_I	Input Leakage Current	2.3–3.6	$0 \le V_I \le 5.5V$		±5.0	μA
I_{OFF}	Power-Off Leakage Current	0	V_I or V_O = 5.5V		10	μA
I_{CC}	Quiescent Supply Current	2.3–3.6	$V_I = V_{CC}$ or GND		10	μA
			$3.6V \le V_I \le 5.5V$		±10	
ΔI_{CC}	Increase in I_{CC} per Input	2.3–3.6	$V_{IH} = V_{CC} – 0.6V$		500	μA
I_{OHZ}	Off State Current	2.0–3.6	V_O = 5.5V		10	μA

AC Electrical Characteristics

Symbol	Parameter	T_A = –40°C to +85°C, R_L = 500Ω						Units
		V_{CC} = 3.3V ± 0.3V, C_L = 50pF		V_{CC} = 2.7V, C_L = 50pF		V_{CC} = 2.5V ± 0.2V, C_L = 30pF		
		Min.	Max.	Min.	Max.	Min.	Max.	
t_{PZL}, t_{PLZ}	Propagation Delay Time	0.8	3.7	1.0	4.1	0.8	3.5	ns

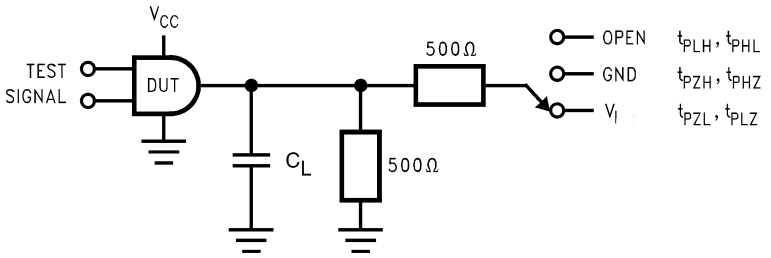
Dynamic Switching Characteristics

Symbol	Parameter	V_{CC} (V)	Conditions	T_A = 25°C	Unit
				Typical	
V_{OLP}	Quiet Output Dynamic Peak V_{OL}	3.3	C_L = 50pF, V_{IH} = 3.3V, V_{IL} = 0V	0.9	V
		2.5	C_L = 30pF, V_{IH} = 2.5V, V_{IL} = 0V	0.7	
V_{OLV}	Quiet Output Dynamic Valley V_{OL}	3.3	C_L = 50pF, V_{IH} = 3.3V, V_{IL} = 0V	–0.8	V
		2.5	C_L = 30pF, V_{IH} = 2.5V, V_{IL} = 0V	–0.6	

Capacitance

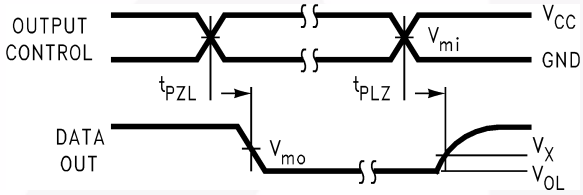
Symbol	Parameter	Conditions	Typical	Units
C_{IN}	Input Capacitance	V_{CC} = Open, V_I = 0V or V_{CC}	7	pF
C_{OUT}	Output Capacitance	V_{CC} = 3.3V, V_I = 0V or V_{CC}	8	pF
C_{PD}	Power Dissipation Capacitance	V_{CC} = 3.3V, V_I = 0V or V_{CC}, f = 10MHz	25	pF

AC Loading and Waveforms (Generic for LCX Family)

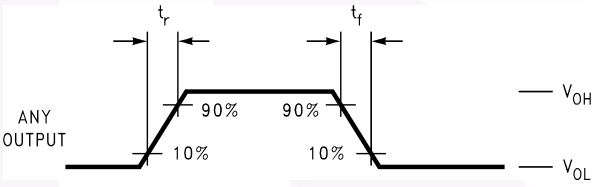


Test	Switch
t_{PLH}, t_{PHL}	Open
t_{PZL}, t_{PLZ}	6V at V_{CC} = 3.3 ± 0.3V V_{CC} x 2 at V_{CC} = 2.5 ± 0.2V
t_{PZH}, t_{PHZ}	GND

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



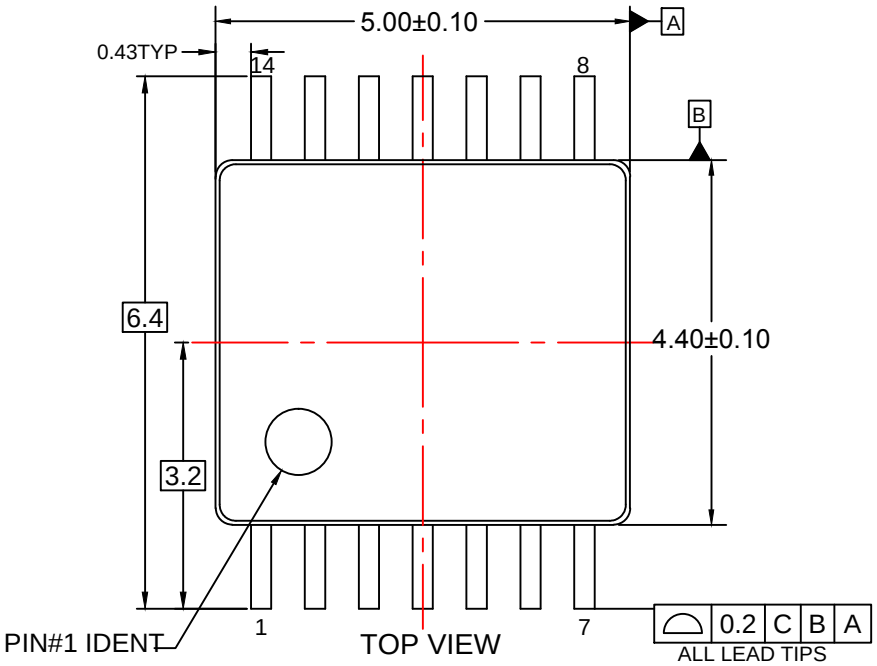
3-STATE Output Low Enable and Disable Times for Logic



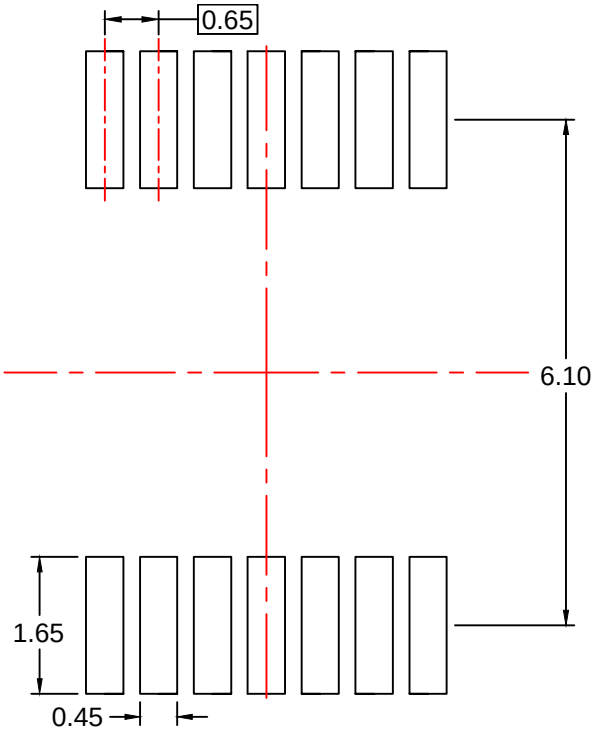
t_{rise} and t_{fall}

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

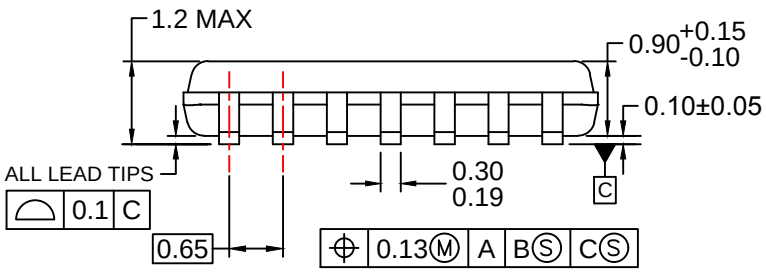
Figure 2. Waveforms (Input Characteristics; f = 1MHz, t_r = t_f = 3ns)



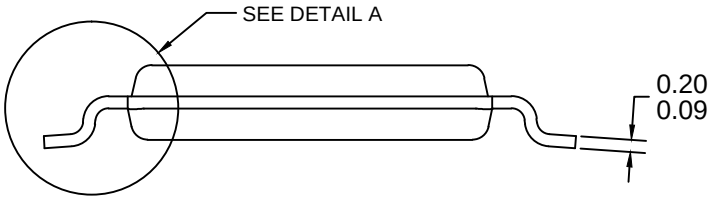
TOP VIEW

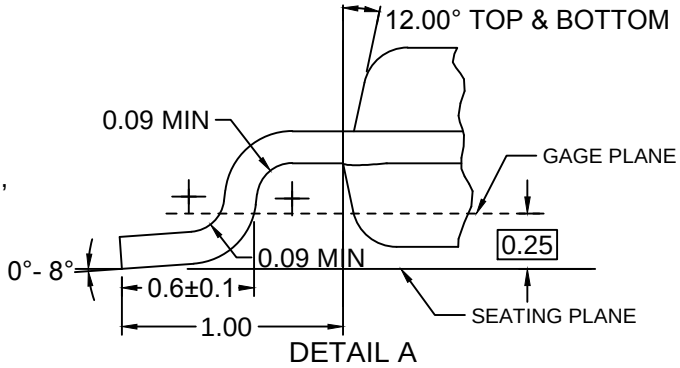


RECOMMENDED LAND PATTERN



FRONT VIEW





DETAIL A

NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AB, REF NOTE 6

B. DIMENSIONS ARE IN MILLIMETERS.

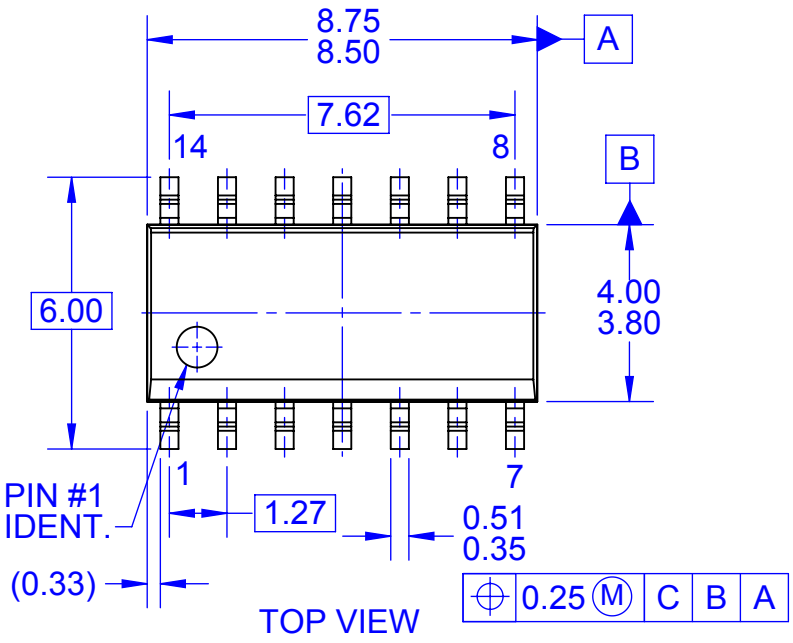
C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS

D. DIMENSIONING AND TOLERANCES PER ANSI Y14.5M, 2009.

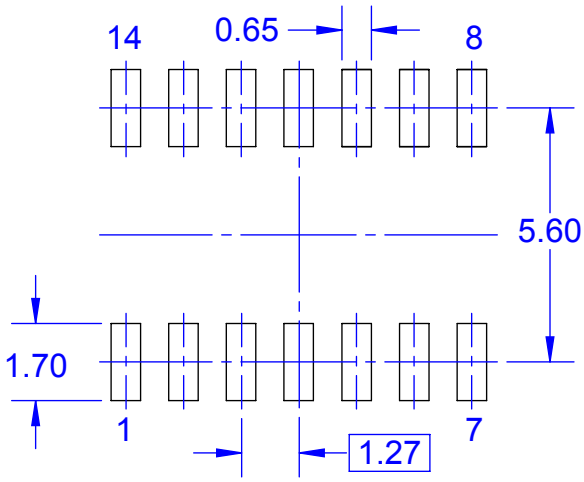
E. LANDPATTERN STANDARD: SOP65P640X110-14M.

F. DRAWING FILE NAME: MKT-MTC14rev7.

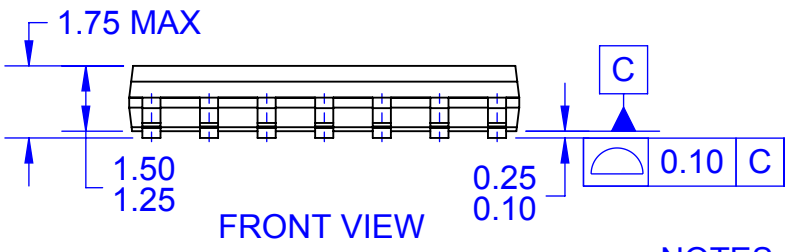
FAIRCHILD



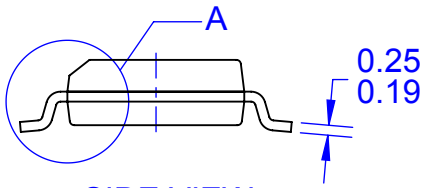
TOP VIEW



LAND PATTERN RECOMMENDATION



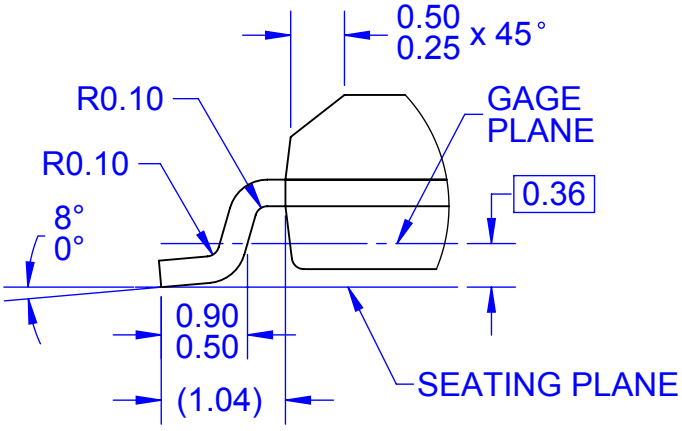
FRONT VIEW



SIDE VIEW

NOTES:

A. CONFORMS TO JEDEC MS-012, VARIATION AB, ISSUE C
B. ALL DIMENSIONS ARE IN MILLIMETERS
C. DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS
D. LAND PATTERN STANDARD: SOIC127P600X145-14M
E. CONFORMS TO ASME Y14.5M, 2009
D. DRAWING FILENAME: MKT-M14Arev14



DETAIL A
SCALE 16 : 1

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