MC74LCX06

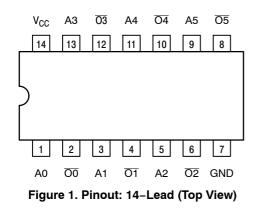
Low-Voltage CMOS Hex Inverter with Open Drain Outputs

With 5 V – Tolerant Inputs

The MC74LCX06 is a high performance hex inverter operating from a 2.3 V to 3.6 V supply. High impedance TTL compatible inputs significantly reduce current loading to input drivers. These LCX devices have open drain outputs which provide the ability to set output levels, or do active–HIGH AND or active–LOW OR functions. A V_I specification of 5.5 V allows MC74LCX06 inputs to be safely driven from 5.0 V devices.

Features

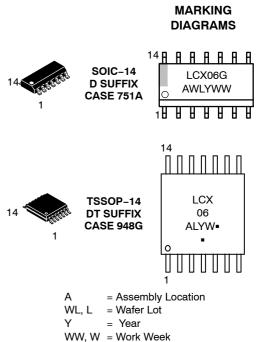
- Designed for 2.3 V to 3.6 V V_{CC} Operation
- 5.0 V Tolerant Inputs/Outputs
- LVTTL Compatible
- LVCMOS Compatible
- 24 mA Output Sink Capability
- Near Zero Static Supply Current (10 µA) Substantially Reduces System Power Requirements
- Latchup Performance Exceeds 500 mA
- Wired-OR, Wired-AND
- Output Level Can Be Set Externally Without Affecting Speed of Device
- Functionally Compatible with LCX05
- ESD Performance: Human Body Model >1500 V; Machine Model >200 V
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant





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G or = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

MC74LCX06

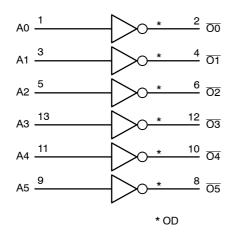


Figure 2. Logic Diagram

Table 1. PIN NAMES

Pins	Function
An	Data Inputs
On	Outputs

Table 2. TRUTH TABLE

An	Ōn
L	Z
H	L

MAXIMUM RATINGS

Symbol	Parameter	Value	Condition	Unit
V _{CC}	DC Supply Voltage	-0.5 to +7.0		V
VI	DC Input Voltage	$-0.5 \le V_{ } \le +7.0$		V
Vo	DC Output Voltage	$-0.5 \le V_{O} \le +7.0$	Output in HIGH or LOW State (Note 1)	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}	mA
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 Range	-65 to +150		°C
MSL	Moisture Sensitivity		Level 1	

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. I_O absolute maximum rating must be observed.

ORDERING INFORMATION

Device	Package	Shipping [†]
MC74LCX06DG	SOIC-14 (Pb-Free)	55 Units / Rail
MC74LCX06DR2G	SOIC-14 (Pb-Free)	2500 / Tape & Reel
MC74LCX06DTG	TSSOP-14 (Pb-Free)	96 Units / Rail
MC74LCX06DTR2G	TSSOP-14 (Pb-Free)	2500 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

RECOMMENDED OPERATING CONDITIONS

Symbol	Par	Min	Тур	Max	Unit	
V _{CC}	Supply Voltage	Operating Data Retention Only	2.0 1.5	2.5, 3.3 2.5, 3.3	3.6 3.6	V
VI	Input Voltage		0		5.5	V
Vo	Output Voltage	(HIGH or LOW State)	0		V _{CC}	V
I _{OL}	LOW Level Output Current Sink	$V_{CC} = 3.0 \text{ V} - 3.6 \text{ V}$ $V_{CC} = 2.7 \text{ V} - 3.0 \text{ V}$ $V_{CC} = 2.3 \text{ V} - 2.7 \text{ V}$			+24 +12 +8	mA
T _A	Operating Free-Air Temperature		-40		+85	°C
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate, V	_N from 0.8 V to 2.0 V, V _{CC} = 3.0 V	0		10	ns/V

DC ELECTRICAL CHARACTERISTICS (T_A = -40° C to $+85^{\circ}$ C)

Symbol	Characteristic	Condition	Min	Max	Unit
V _{IH}	HIGH Level Input Voltage (Note 2)	$2.3 \text{ V} \le \text{V}_{\text{CC}} \le 2.7 \text{ V}$	1.7		V
		$2.7 \text{ V} \le \text{V}_{\text{CC}} \le 3.6 \text{ V}$	2.0		
V _{IL}	LOW Level Input Voltage (Note 2)	$2.3 \text{ V} \le \text{V}_{\text{CC}} \le 2.7 \text{ V}$		0.7	V
		$2.7 \text{ V} \le \text{V}_{\text{CC}} \le 3.6 \text{ V}$		0.8	
V _{OL}	LOW Level Output Voltage	$2.3 \text{ V} \le \text{V}_{\text{CC}} \le 3.6 \text{ V}; \text{ I}_{\text{OL}} = 100 \mu\text{A}$		0.2	V
		$V_{CC} = 2.3 \text{ V}; \text{ I}_{OL} = 8 \text{ mA}$		0.3	
		V _{CC} = 2.7 V; I _{OL} = 12 mA		0.4	
		V _{CC} = 3.0 V; I _{OL} = 16 mA		0.4	
		V _{CC} = 3.0 V; I _{OL} = 24 mA		0.55	
I _{OZ}	3-State Output Current	$\label{eq:V_CC} \begin{array}{l} V_{CC} = 3.6 \ \text{V}, \ \text{V}_{\text{IN}} = \text{V}_{\text{IH}} \ \text{or} \ \text{V}_{\text{IL}}, \\ \text{V}_{\text{OUT}} = 0 \ \text{to} \ 5.5 \ \text{V} \end{array}$		±5	μΑ
I _{OFF}	Power Off Leakage Current	V_{CC} = 0, V_{IN} = 5.5 V or V_{OUT} = 5.5 V		10	μA
I _{IN}	Input Leakage Current	V_{CC} = 3.6 V, V_{IN} = 5.5 V or GND		±5	μA
I _{CC}	Quiescent Supply Current	V_{CC} = 3.6 V, V_{IN} = 5.5 V or GND		10	μA
ΔI_{CC}	Increase in I _{CC} per Input	$2.3 \text{ V} \le \text{V}_{CC} \le 3.6 \text{ V}$ One Input at $\text{V}_{IH} = \text{V}_{CC} - 0.6 \text{ V}$		500	μΑ

2. These values of V_I are used to test DC electrical characteristics only.

AC ELECTRICAL CHARACTERISTICS (T_A = -40° C to $+85^{\circ}$ C)

		$\begin{array}{c} V_{CC} = 3.3 \ V \pm 0.3 \ V \\ C_L = 50 \ pF \end{array}$				V_{CC} = 2.5 V ± 0.2 V C _L = 30 pF		
Symbol	Parameter	Min	Мах	Min	Max	Min	Max	Unit
t _{PLZ} t _{PZL}	Propagation Delay Input to Output	0.8 0.8	3.7 3.7	1.0 1.0	4.1 4.1	0.8 0.8	3.5 3.5	ns ns

DYNAMIC SWITCHING CHARACTERISTICS (T_A = +25°C)

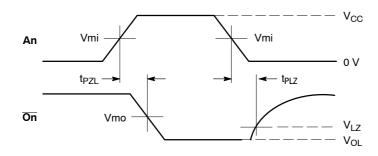
Symbol	Characteristic	Condition	Min	Тур	Max	Unit
V _{OLP}	Dynamic LOW Peak Voltage (Note 3)			0.9 0.7		V
V _{OLV}	Dynamic LOW Valley Voltage (Note 3)	$ \begin{array}{l} V_{CC} = 3.3 \text{ V}, \ C_L = 50 \text{ pF}, \ V_{IH} = 3.3 \text{ V}, \ V_{IL} = 0 \text{ V} \\ V_{CC} = 2.5 \text{ V}, \ C_L = 30 \text{ pF}, \ V_{IH} = 2.5 \text{ V}, \ V_{IL} = 0 \text{ V} \end{array} $		-0.8 -0.6		V

 Number of outputs defined as "n". Measured with "n-1" outputs switching from HIGH-to-LOW or LOW-to-HIGH. The remaining output is measured in the LOW state.

MC74LCX06

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C _{IN}	Input Capacitance	V_{CC} = 3.3 V, V_{I} = 0 V or V_{CC}	7	pF
C _{OUT}	Output Capacitance	V_{CC} = 3.3 V, V_{I} = 0 V or V_{CC}	8	pF
C _{PD}	Power Dissipation Capacitance	10 MHz, V_{CC} = 3.3 V, V_{I} = 0 V or V_{CC}	25	pF



PROPAGATION DELAYS

 t_R = t_F = 2.5 ns, 10% to 90%; f = 1 MHz; t_W = 500 ns

Table 3. AC WAVEFORMS

	V _{CC}					
Symbol	$3.3 \ V \pm 0.3 \ V \qquad 2.7 \ V \qquad 2.5 \ V \pm 0.2 \ V$					
V _{mi}	1.5 V	1.5 V	V _{CC} / 2			
V _{mo}	1.5 V	1.5 V	V _{CC} / 2			
V_{LZ}	V _{OL} + 0.3 V	V _{OL} + 0.3 V	V _{OL} + 0.15 V			

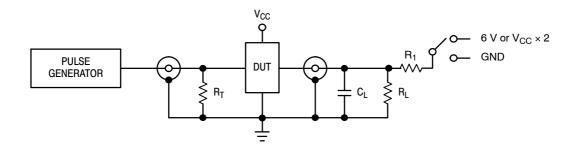
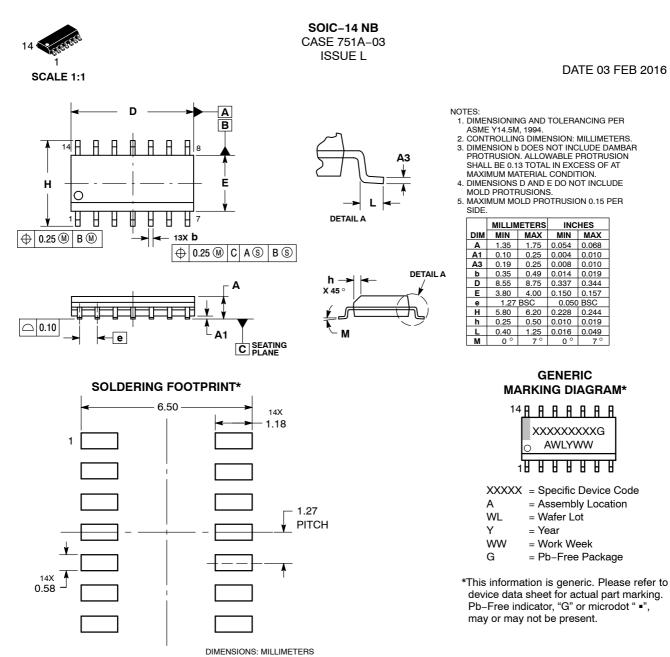


Table 4. TEST CIRCUIT

TEST	SWITCH
t _{PZL} , t _{PLZ}	6 V
Open Collector/Drain $t_{\mbox{PLH}}$ and $t_{\mbox{PHL}}$	6 V
t _{PZH} , t _{PHZ}	GND

 $\begin{array}{l} C_L = 50 \ \text{pF} \ \text{at} \ V_{CC} = \ 3.3 \ \pm \ 0.3 \ \text{V} \ \text{or equivalent} \ (\text{includes jig and} \\ \text{probe capacitance)} \\ C_L = \ 30 \ \text{pF} \ \text{at} \ V_{CC} = \ 2.5 \ \pm \ 0.2 \ \text{V} \ \text{or equivalent} \ (\text{includes jig and} \\ \text{probe capacitance)} \\ R_L = \ R_1 = 500 \ \Omega \ \text{or equivalent} \\ R_T = \ Z_{OUT} \ \text{of pulse generator} \ (\text{typically 50 } \Omega) \end{array}$





*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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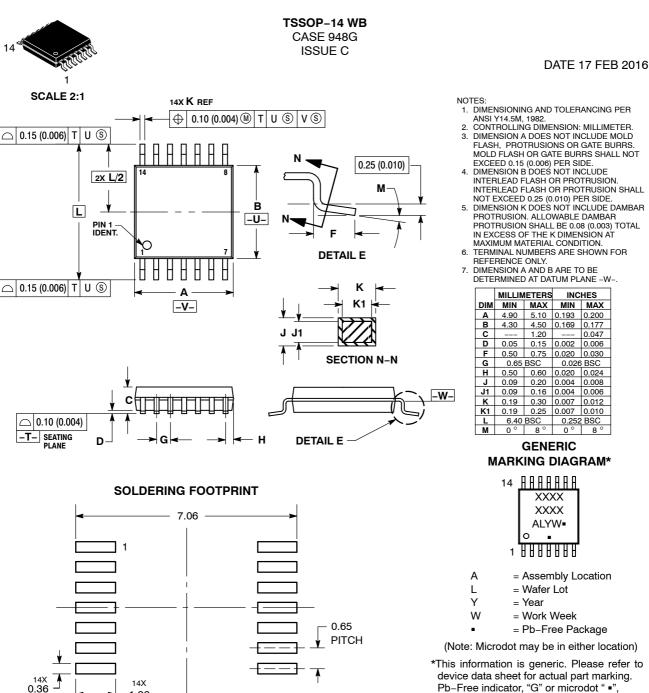
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STYLE 1: PIN 1. COMMON CATHODE 2. ANODE/CATHODE 3. ANODE/CATHODE 4. NO CONNECTION 5. ANODE/CATHODE 6. NO CONNECTION 7. ANODE/CATHODE 8. ANODE/CATHODE 9. ANODE/CATHODE 10. NO CONNECTION 11. ANODE/CATHODE 12. ANODE/CATHODE 13. NO CONNECTION 14. COMMON ANODE	STYLE 2: CANCELLED	STYLE 3: PIN 1. NO CONNECTION 2. ANODE 3. ANODE 4. NO CONNECTION 5. ANODE 6. NO CONNECTION 7. ANODE 9. ANODE 10. NO CONNECTION 11. ANODE 12. ANODE 13. NO CONNECTION 14. COMMON CATHODE	STYLE 4: PIN 1. NO CONNECTION 2. CATHODE 3. CATHODE 4. NO CONNECTION 5. CATHODE 6. NO CONNECTION 7. CATHODE 8. CATHODE 9. CATHODE 10. NO CONNECTION 11. CATHODE 12. CATHODE 13. NO CONNECTION 14. COMMON ANODE
STYLE 5: PIN 1. COMMON CATHODE 2. ANODE/CATHODE 3. ANODE/CATHODE 4. ANODE/CATHODE 5. ANODE/CATHODE 6. NO CONNECTION 7. COMMON ANODE 8. COMMON CATHODE 9. ANODE/CATHODE 10. ANODE/CATHODE 11. ANODE/CATHODE 12. ANODE/CATHODE 13. NO CONNECTION 14. COMMON ANODE	STYLE 6: PIN 1. CATHODE 2. CATHODE 3. CATHODE 4. CATHODE 5. CATHODE 6. CATHODE 7. CATHODE 8. ANODE 10. ANODE 10. ANODE 11. ANODE 13. ANODE 14. ANODE	STYLE 7: PIN 1. ANODE/CATHODE 2. COMMON ANODE 3. COMMON CATHODE 4. ANODE/CATHODE 5. ANODE/CATHODE 6. ANODE/CATHODE 7. ANODE/CATHODE 9. ANODE/CATHODE 10. ANODE/CATHODE 11. COMMON CATHODE 12. COMMON CATHODE 13. ANODE/CATHODE 14. ANODE/CATHODE	STYLE 8: PIN 1. COMMON CATHODE 2. ANODE/CATHODE 3. ANODE/CATHODE 4. NO CONNECTION 5. ANODE/CATHODE 6. ANODE/CATHODE 7. COMMON ANODE 8. COMMON ANODE 9. ANODE/CATHODE 10. ANODE/CATHODE 11. NO CONNECTION 12. ANODE/CATHODE 13. ANODE/CATHODE 14. COMMON CATHODE

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