

74LVX04 Low Voltage Hex Inverter

General Description

The LVX04 contains six inverters. The inputs tolerate voltages up to 7V allowing the interface of 5V systems to 3V systems.

Features

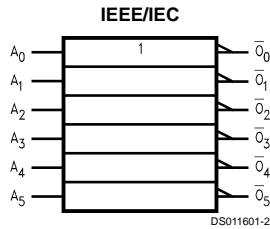
- Input voltage level translation from 5V to 3V
- Ideal for low power/low noise 3.3V applications
- Available in SOIC JEDEC, SOIC EIAJ and TSSOP packages
- Guaranteed simultaneous switching noise level and dynamic threshold performance

Ordering Code

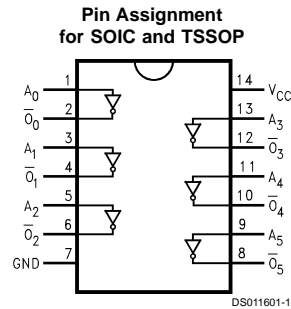
Order Number	Package Number	Package Description
74LVX04M	M14A	14-Lead (0.150" Wide) Small Outline Package SOIC JEDEC
74LVX04SJ	M14D	14-Lead Small Outline Package SOIC EIAJ
74LVX04MTC	MTC14	14-Lead Thin Shrink Outline Package SOIC EIAJ

Device also available in Tape and Reel. Specify by appending 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)

Supply Voltage (V_{CC})	-0.5V to +7.0V
DC Input Diode Current (I_{IK})	
$V_I = -0.5V$	-20 mA
DC Input Voltage (V_I)	-0.5V to 7V
DC Output Diode Current (I_{OK})	
$V_O = -0.5V$	-20 mA
$V_O = V_{CC} + 0.5V$	+20 mA
DC Output Voltage (V_O)	-0.5V to $V_{CC} + 0.5V$
DC Output Source or Sink Current (I_O)	±25 mA
DC V_{CC} or Ground Current (I_{CC} or I_{GND})	±50 mA
Storage Temperature (T_{STG})	-65°C to +150°C
Power Dissipation	180 mW

Recommended Operating Conditions (Note 2)

Supply Voltage (V_{CC})	2.0V to 3.6V
Input Voltage (V_I)	0V to 5.5V
Output Voltage (V_O)	0V to V_{CC}
Operating Temperature (T_A)	-40°C to +85°C
Input Rise and Fall Time ($\Delta t/\Delta V$)	0 ns/V to 100 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: Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol	Parameter	V_{CC}	$T_A = +25^\circ C$			$T_A =$ -40°C to +85°C		Units	Conditions	
			Min	Typ	Max	Min	Max			
			V_{IH}	High Level Input Voltage	2.0 3.0 3.6	1.5 2.0 2.4				
V_{IL}	Low Level Input Voltage	2.0 3.0 3.6			0.5 0.8 0.8		0.5 0.8 0.8	V		
V_{OH}	High Level Output Voltage	2.0 3.0 3.0	1.9 2.9 2.58	2.0 3.0		1.9 2.9 2.48		V	$V_{IN} = V_{IL}$ or V_{IH} $I_{OH} = -50 \mu A$ $I_{OH} = -50 \mu A$ $I_{OH} = -4 mA$	
V_{OL}	Low Level Output Voltage	2.0 3.0 3.0		0.0 0.0	0.1 0.1 0.36		0.1 0.1 0.44	V	$V_{IN} = V_{IL}$ or V_{IH} $I_{OL} = 50 \mu A$ $I_{OL} = 50 \mu A$ $I_{OL} = 4 mA$	
I_{IN}	Input Leakage Current	3.6			±0.1		±1.0	μA	$V_{IN} = 5.5V$ or GND	
I_{CC}	Quiescent Supply Current	3.6			2.0		20.0	μA	$V_{IN} = V_{CC}$ or GND	

Noise Characteristics (Note 3)

Symbol	Parameter	V_{CC} (V)	$T_A = 25^\circ C$		Units	C_L (pF)
			Typ	Limit		
V_{OLP}	Quiet Output Maximum Dynamic V_{OL}	3.3	0.3	0.5	V	50
V_{OLV}	Quiet Output Minimum Dynamic V_{OL}	3.3	-0.3	-0.5	V	50
V_{IHD}	Minimum High Level Dynamic Input Voltage	3.3		2.0	V	50
V_{ILD}	Maximum Low Level Dynamic Input Voltage	3.3		0.8	V	50

Note 3: Input $t_r = t_f = 3ns$

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V)	T _A = +25°C			T _A = -40°C to +85°C		Units	C _L (pF)
			Min	Typ	Max	Min	Max		
t _{PLH}	Propagation Delay Time	2.7		5.4	10.1	1.0	12.5	ns	15
t _{PHL}				7.9	13.6	1.0	16.0		50
		3.3 ±0.3		4.1	6.2	1.0	7.5	15	
				6.6	9.7	1.0	11.0	50	
t _{OSLH} t _{OSHL}	Output to Output Skew (Note 4)	2.7			1.5		1.5	ns	50

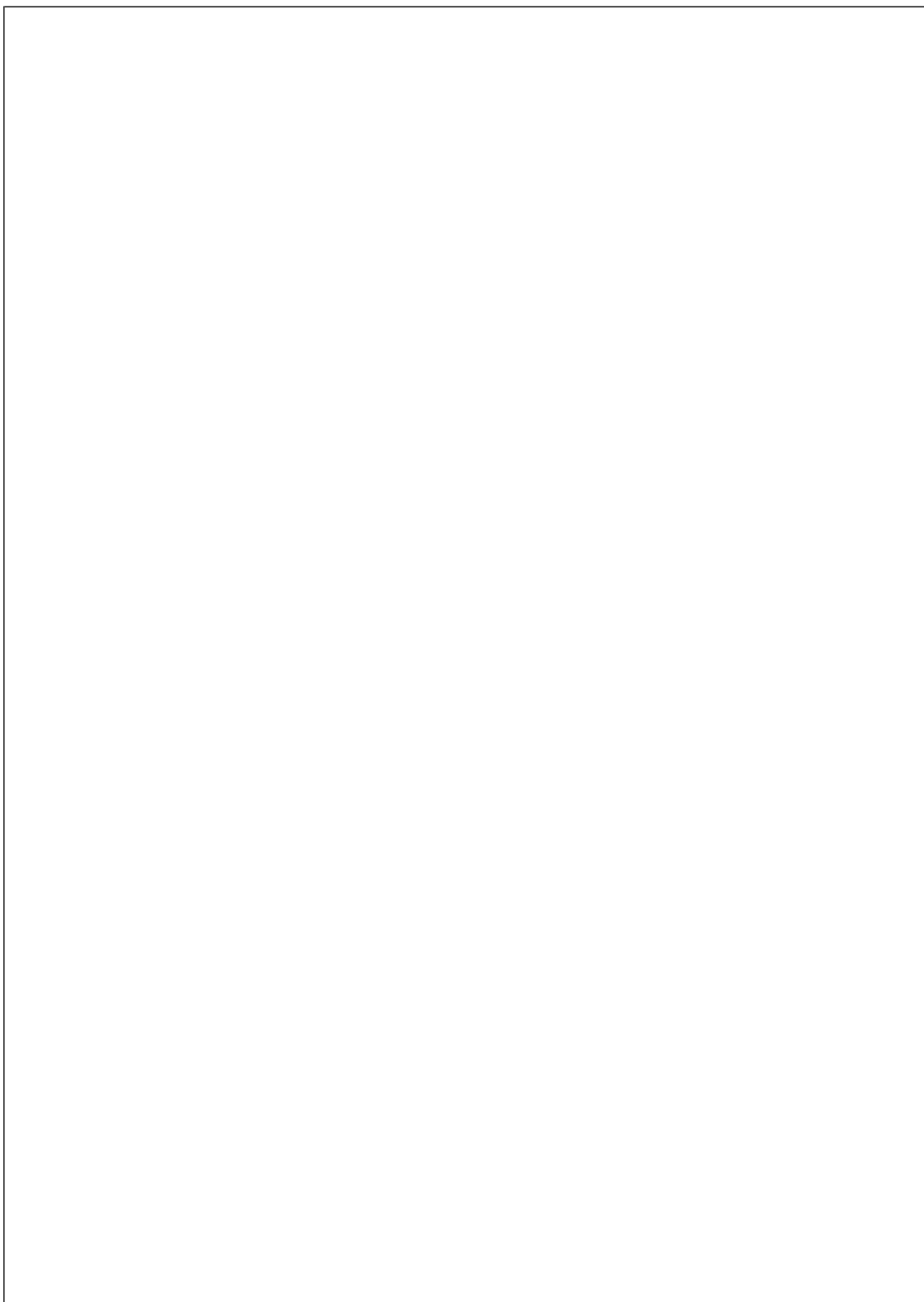
Note 4: Parameter guaranteed by design. t_{OSLH} = |t_{PLHm} - t_{PLHn}|, t_{OSHL} = |t_{PHLm} - t_{PHLn}|.

Capacitance

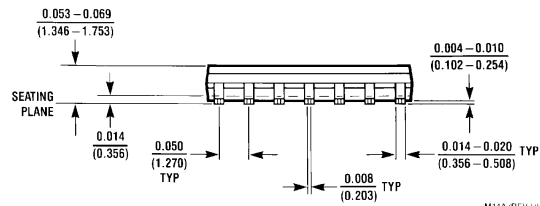
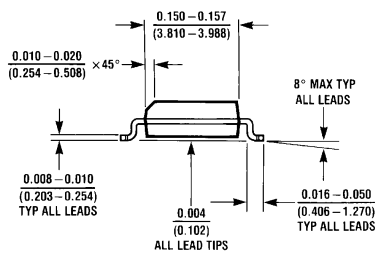
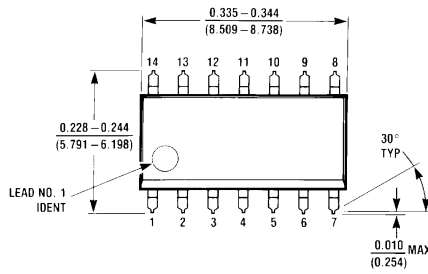
Symbol	Parameter	T _A = +25°C			T _A = -40°C to +85°C		Units
		Min	Typ	Ma	Min	Max	
C _{IN}	Input Capacitance		4	10		10	pF
C _{PD}	Power Dissipation Capacitance (Note 5)		18				pF

Note 5: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

$$\text{Average operating current can be obtained by the equation: } I_{CC(\text{opr.})} = \frac{C_{PD} \times V_{CC} \times f_{IN} + I_{CC}}{6 \text{ (per Gate)}}$$

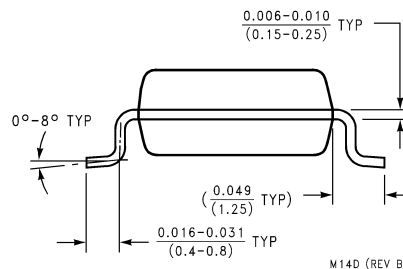
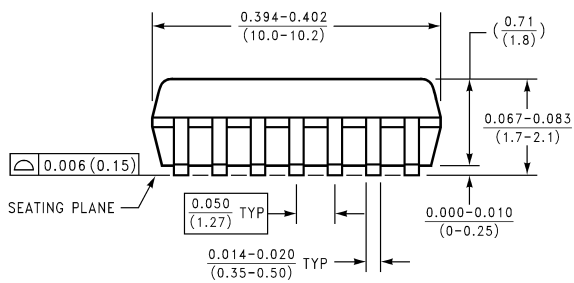
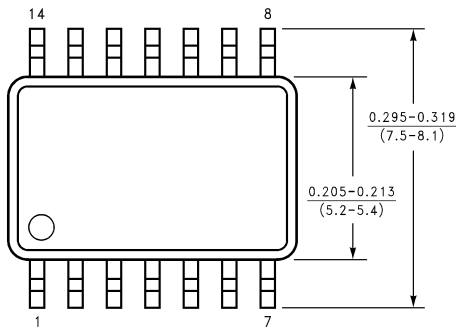


Physical Dimensions inches (millimeters) unless otherwise noted



M14A (REV H)

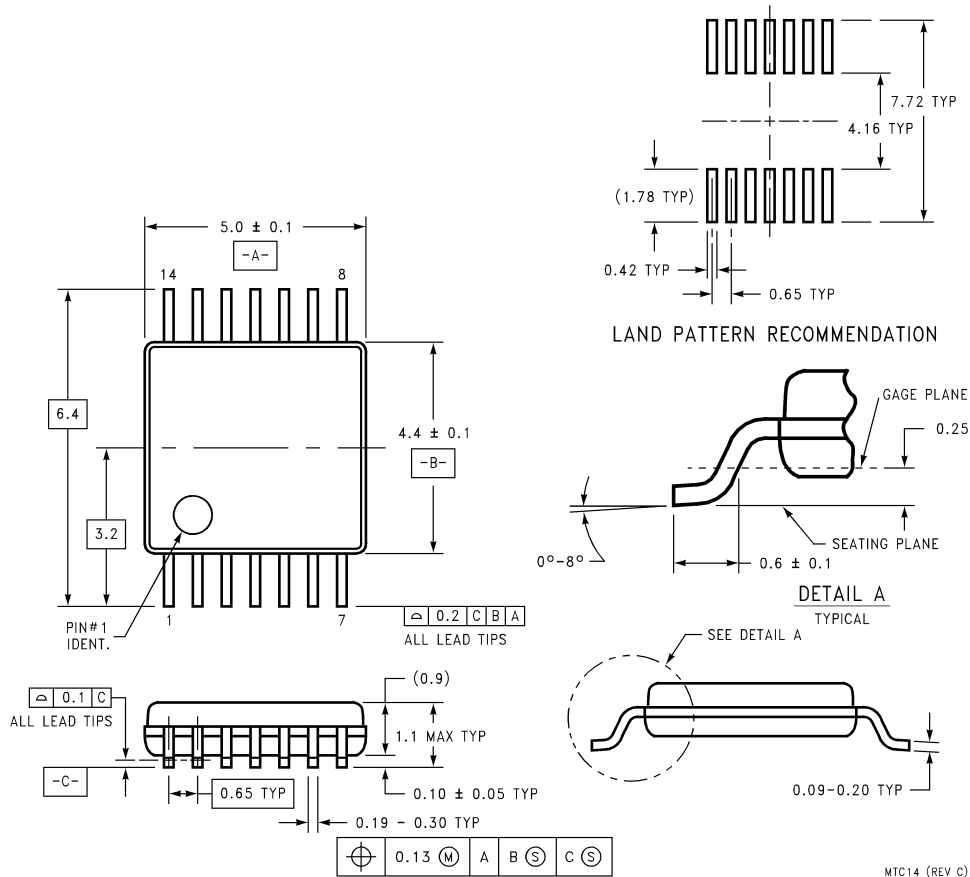
**14-Lead (0.150" Wide) Small Outline Package SOIC JEDEC
Package Number M14A**



M14D (REV B)

**14-Lead Small Outline Package SOIC EIAJ
Package Number M14D**

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



14-Lead Thin Shrink Small Outline Package, SOIC EIAJ
Package Number MTC14

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

Fairchild Semiconductor Corporation Americas
 Customer Response Center
 Tel: 1-888-522-5372

Fairchild Semiconductor Europe
 Fax: +49 (0) 1 80-530 85 86
 Email: europe.support@nsc.com
 Deutsch Tel: +49 (0) 8 141-35-0
 English Tel: +44 (0) 1 793-85-68-56
 Italy Tel: +39 (0) 2 57 5631

Fairchild Semiconductor Hong Kong Ltd.
 13th Floor, Straight Block,
 Ocean Centre, 5 Canton Rd.
 Tsimshatsui, Kowloon
 Hong Kong
 Tel: +862 2737-7200
 Fax: +852 2314-0061

National Semiconductor Japan Ltd.
 Tel: 81-3-5620-6175
 Fax: 81-3-5620-6179

www.fairchildsemi.com