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74LVX14

Low Voltage Hex Inverter with Schmitt Trigger Input

Features

- Input voltage level translation from 5V to 3V
- Ideal for low power/low noise 3.3V applications
- Guaranteed simultaneous switching noise level and dynamic threshold performance

General Description

The LVX14 contains six inverter gates each with a Schmitt trigger input. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. In addition, they have a greater noise margin than conventional inverters.

The LVX14 has hysteresis between the positive-going and negative-going input thresholds (typically 1.0V) which is determined internally by transistor ratios and is essentially insensitive to temperature and supply voltage variations.

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

Ordering Information

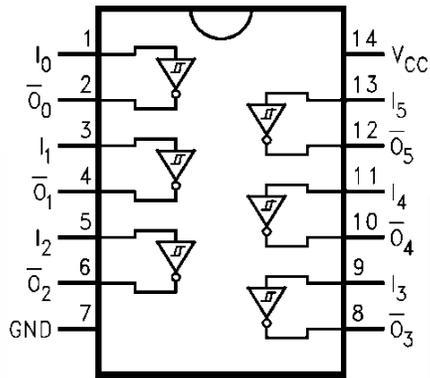
Order Number	Package Number	Package Description
74LVX14M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74LVX14SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74LVX14MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

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

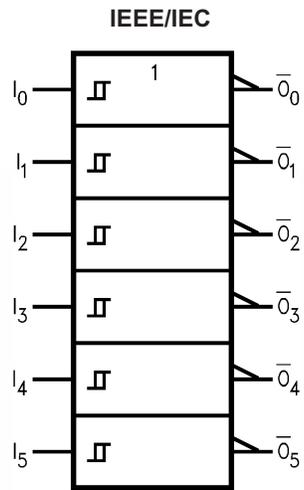
 All packages are lead free per JEDEC: J-STD-020B standard.



Connection Diagram



Logic Symbol



Pin Description

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

Truth Table

Input	Output
A	\bar{O}
L	H
H	L

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

Recommended Operating Conditions⁽¹⁾

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	Rating
V_{CC}	Supply Voltage	2.0V to 3.6V
V_I	Input Voltage	0V to 5.5V
V_O	Output Voltage	0V to V_{CC}
T_A	Operating Temperature	-40°C to +85°C

Note:

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

DC Electrical Characteristics

Symbol	Parameter	V _{CC}	Conditions	T _A = +25°C			T _A = -40°C to +85°C		Units
				Min.	Typ.	Max.	Min.	Max.	
V _{t+}	Positive Threshold	3.0				2.2		2.2	V
V _{t-}	Negative Threshold	3.0		0.9			0.9		V
V _H	Hysteresis	3.0		0.3		1.2	0.3	1.2	V
V _{OH}	HIGH Level Output Voltage	2.0	V _{IN} = V _{IL} or V _{IH} , I _{OH} = -50μA	1.9	2.0		1.9		V
		3.0	V _{IN} = V _{IL} or V _{IH} , I _{OH} = -50μA	2.9	3.0		2.9		
			V _{IN} = V _{IL} or V _{IH} , I _{OH} = -4mA	2.58			2.48		
V _{OL}	LOW Level Output Voltage	2.0	V _{IN} = V _{IL} or V _{IH} , I _{OL} = 50μA		0.0	0.1		0.1	V
		3.0	V _{IN} = V _{IL} or V _{IH} , I _{OL} = 50μA		0.0	0.1		0.1	
			V _{IN} = V _{IL} or V _{IH} , I _{OL} = 4mA			0.36		0.44	
I _{IN}	Input Leakage Current	3.6	V _{IN} = 5.5V or GND			±0.1		±1.0	μA
I _{CC}	Quiescent Supply Current	3.6	V _{IN} = V _{CC} or GND			2.0		20	μA

Noise Characteristics⁽²⁾

Symbol	Parameter	V _{CC} (V)	C _L (pF)	T _A = 25°C		Units
				Typ.	Limit	
V _{OLP}	Quiet Output Maximum Dynamic V _{OL}	3.3	50	0.3	0.5	V
V _{OLV}	Quiet Output Minimum Dynamic V _{OL}	3.3	50	-0.3	-0.5	V
V _{IHD}	Minimum HIGH Level Dynamic Input Voltage	3.3	50		2.0	V
V _{ILD}	Maximum LOW Level Dynamic Input Voltage	3.3	50		0.8	V

Note:2. Input t_r = t_f = 3ns

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V)	C _L (pF)	T _A = +25°C			T _A = -40°C to +85°C		Units
				Min.	Typ.	Max.	Min.	Max.	
t _{PLH} , t _{PHL}	Propagation Delay Time	2.7	15		8.7	16.3	1.0	19.5	ns
			50		11.2	19.8	1.0	23.0	
		3.3 ± 0.3	15		6.8	10.6	1.0	12.5	
			50		9.3	14.1	1.0	16.0	
t _{OSLH} , t _{OSHL}	Output to Output Skew ⁽³⁾	2.7	50			1.5		1.5	ns
		3.3				1.5		1.5	

Note:

3. Parameter guaranteed by design $t_{OSLH} = |t_{PLHm} - t_{PLHn}|$, $t_{OSHL} = |t_{PHLm} - t_{PHLn}|$

Capacitance

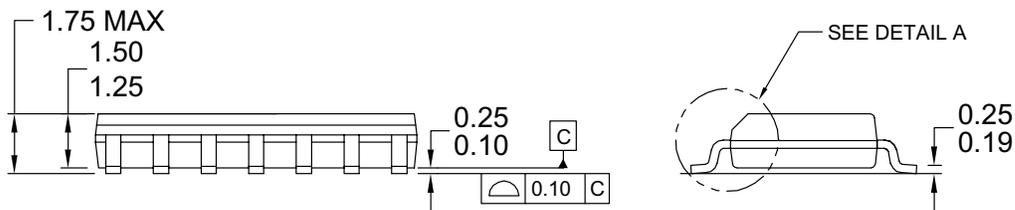
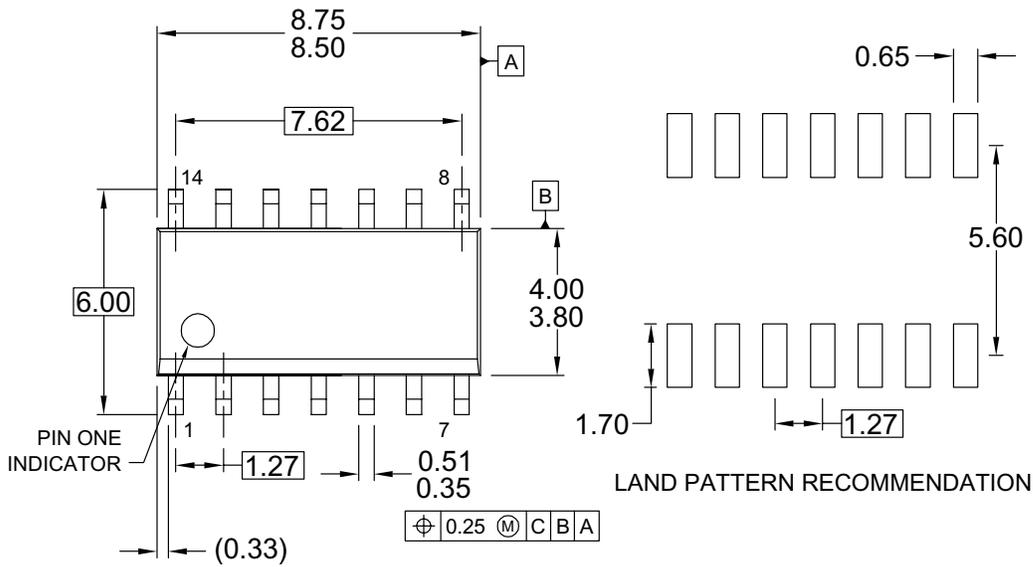
Symbol	Parameter	T _A = +25°C			T _A = -40°C to +85°C		Units
		Min.	Typ.	Max.	Min.	Max.	
C _{IN}	Input Capacitance		4	10		10	pF
C _{PD}	Power Dissipation Capacitance ⁽⁴⁾		21				pF

Note:

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

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

Physical Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE 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) LANDPATTERN STANDARD: SOIC127P600X145-14M
- E) DRAWING CONFORMS TO ASME Y14.5M-1994
- F) DRAWING FILE NAME: M14AREV13

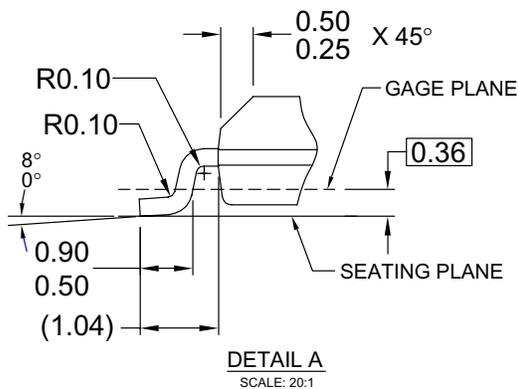


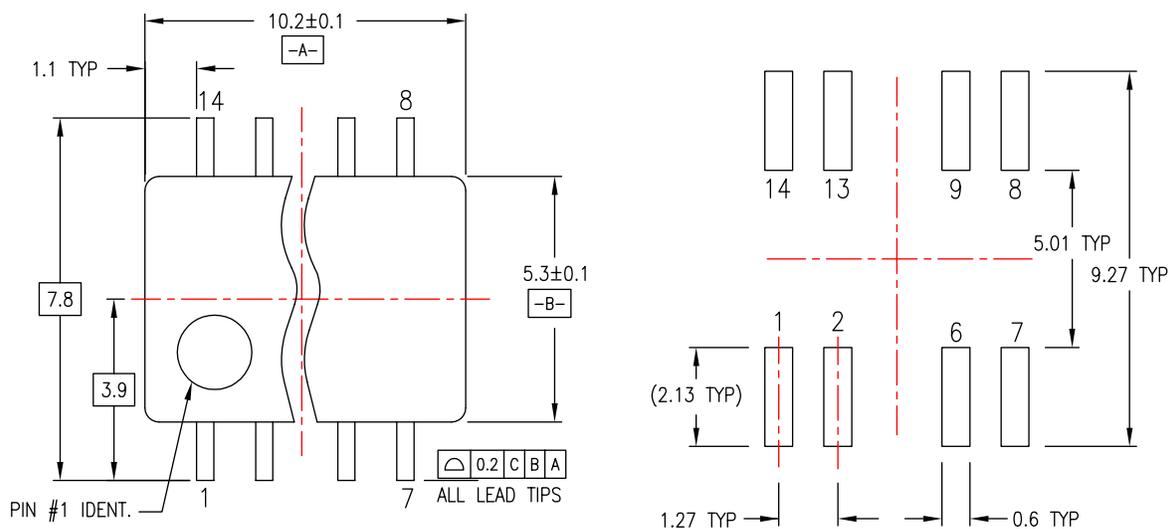
Figure 1. 14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow

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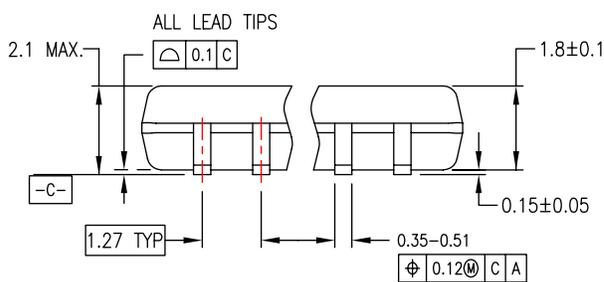
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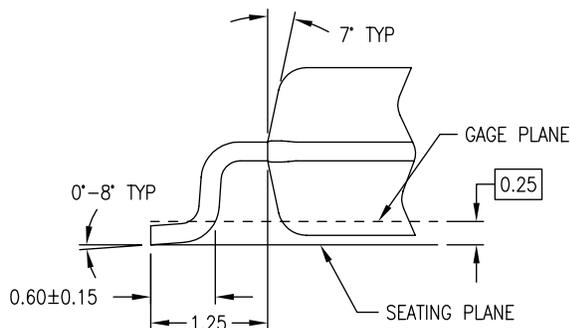
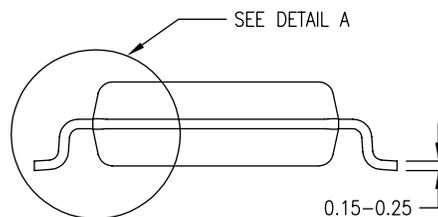
LAND PATTERN RECOMMENDATION



DIMENSIONS ARE IN MILLIMETERS

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.



DETAIL A

M14DREVC

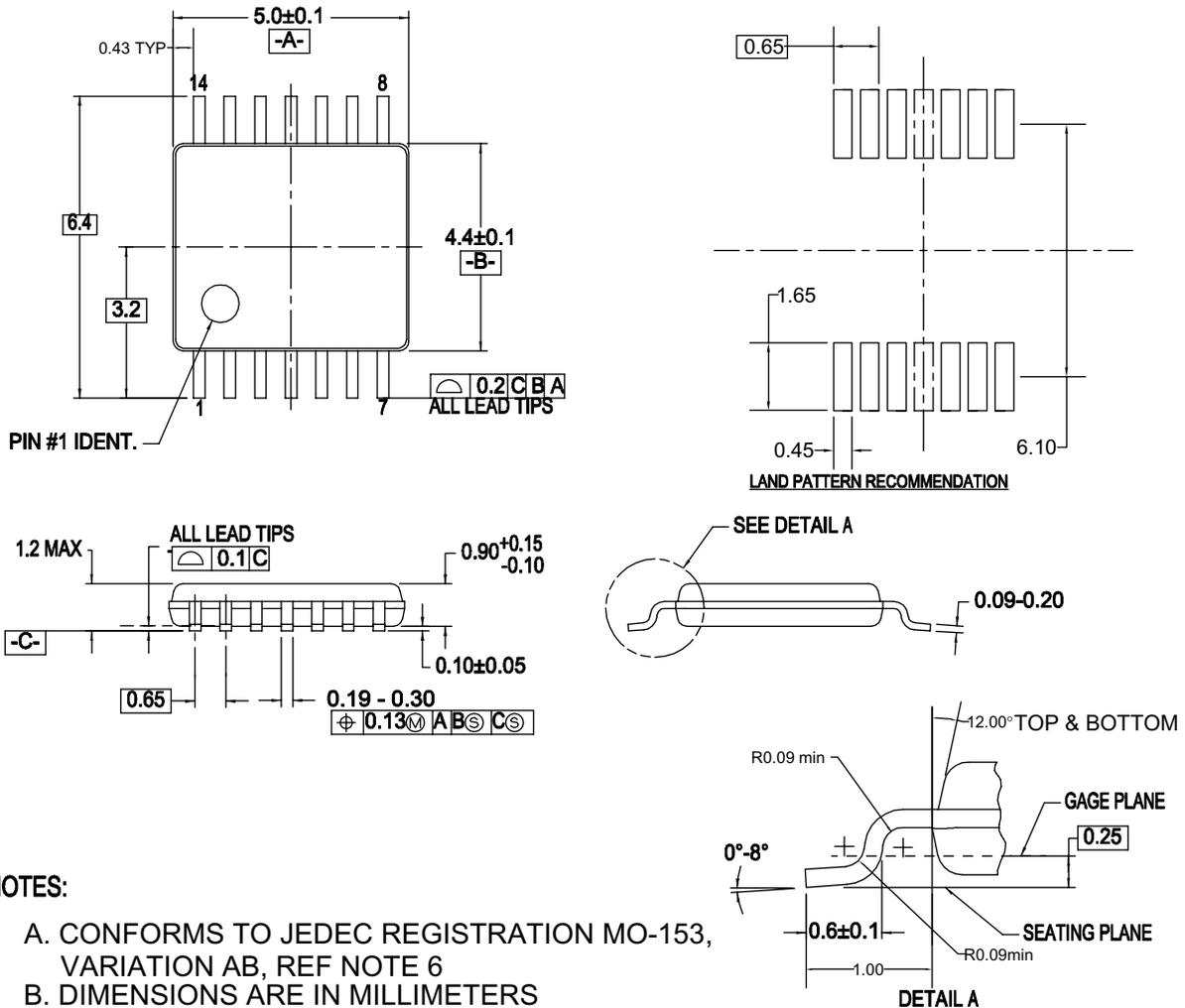
Figure 2. 14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide

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Physical Dimensions (Continued)



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, 1982
- E. LANDPATTERN STANDARD: SOP65P640X110-14M
- F. DRAWING FILE NAME: MTC14REV6

Figure 3. 14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

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