

March 1988 Revised July 1999

## 74F14

## **Hex Inverter Schmitt Trigger**

## **General Description**

The 74F14 contains six logic inverters which accept standard TTL input signals and provide standard TTL output levels. 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.

Each circuit contains a Schmitt trigger followed by a Darlington level shifter and a phase splitter driving a TTL

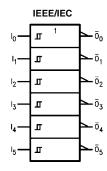
totem-pole output. The Schmitt trigger uses positive feed back to effectively speed-up slow input transition, and provide different input threshold voltages for positive and negative-going transitions. This hysteresis between the positive-going and negative-going input thresholds (typically 800 mV) is determined internally by resistor ratios and is essentially insensitive to temperature and supply voltage variations.

## **Ordering Code:**

Order Number	Package Number	Package Description
74F14SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow
74F14SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74F14PC	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

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

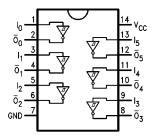
## **Logic Symbol**



## Unit Loading/Fan Out

Din Names	Decerintian	U.L.	Input I <sub>IH</sub> /I <sub>IL</sub>		
Pin Names	Description	HIGH/LOW	Output I <sub>OH</sub> /I <sub>OL</sub>		
In	Input	1.0/1.0	20 μA/-0.6 mA		
$\overline{O}_n$	Output	50/33.3	-1 mA/20 mA		

## **Connection Diagram**



#### **Function Table**

Input	Output
Α	ō
L	Н
Н	L

H = HIGH Voltage Level L = LOW Voltage Level

## **Absolute Maximum Ratings**(Note 1)

Storage Temperature  $-65^{\circ}\text{C} \text{ to } +150^{\circ}\text{C}$ 

-30 mA to +5.0 mA

 $\begin{array}{ll} \mbox{Ambient Temperature under Bias} & -55\mbox{°C to } +125\mbox{°C} \\ \mbox{Junction Temperature under Bias} & -55\mbox{°C to } +175\mbox{°C} \\ \end{array}$ 

 $V_{CC}$  Pin Potential to Ground Pin -0.5V to +7.0V Input Voltage (Note 2) -0.5V to +7.0V

Voltage Applied to Output in HIGH State (with  $V_{CC} = 0V$ )

Input Current (Note 2)

 $\begin{array}{ll} \mbox{Standard Output} & -0.5\mbox{V to V}_{\mbox{CC}} \\ \mbox{3-STATE Output} & -0.5\mbox{V to } +5.5\mbox{V} \end{array}$ 

Current Applied to Output

in LOW State (Max) twice the rated  $I_{OL}$  (mA) ESD Last Passing Voltage (Min) 4000V

# Recommended Operating Conditions

Free Air Ambient Temperature  $0^{\circ}$ C to  $+70^{\circ}$ C Supply Voltage +4.5V to +5.5V

**Note 1:** Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

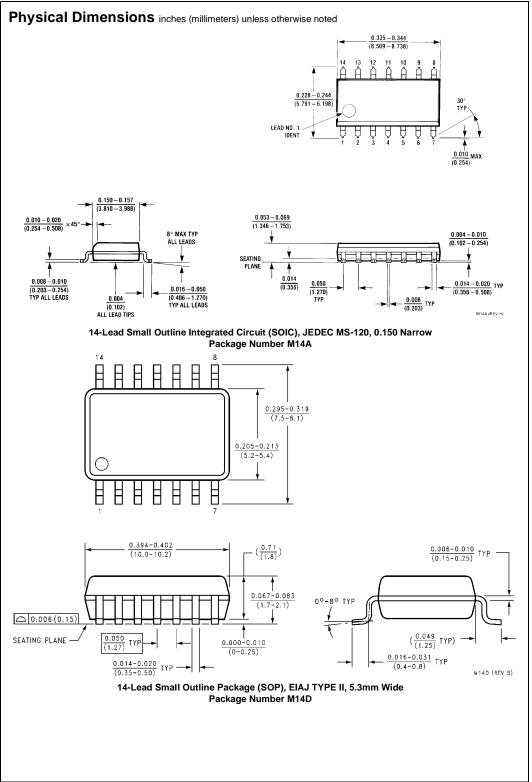
Note 2: Either voltage limit or current limit is sufficient to protect inputs.

#### **DC Electrical Characteristics**

Symbol	Parameter	Min	Тур	Max	Units	V <sub>CC</sub>	Conditions	
$V_{T+}$	Positive-Going Threshold	1.5	1.7	2.0	V	5.0V		
$V_{T-}$	Negative-Going Threshold	0.7	0.9	1.1	V	5.0V		
$\Delta V_{T}$	Hysteresis (V <sub>T+</sub> -V <sub>T-</sub> )	0.4	0.8		V	5.0V		
V <sub>CD</sub>	Input Clamp Diode Voltage			-1.2	V	Min	I <sub>IN</sub> = -18 mA	
V <sub>OH</sub>	Output HIGH 10% V <sub>CC</sub>	2.5			V	Min	I <sub>OH</sub> = -1 mA	
	Voltage 5% V <sub>CC</sub>	2.7			V	IVIIII	$I_{OH} = -1 \text{ mA}$	
V <sub>OL</sub>	Output LOW 10% V <sub>CC</sub>			0.5	V	Min	I <sub>OL</sub> = 20 mA	
	Voltage			0.5	•	IVIIII	IOL - 20 IIIA	
I <sub>IH</sub>	Input HIGH			5.0	μА	Max	V <sub>IN</sub> = 2.7V	
	Current			3.0	μΛ	IVIAX		
I <sub>BVI</sub>	Input HIGH Current			7.0	μА	Max	V <sub>IN</sub> = 7.0V	
	Breakdown Test			7.0	μΛ	IVIGA		
I <sub>CEX</sub>	Output HIGH			50	μА	Max	V <sub>OUT</sub> = V <sub>CC</sub>	
	Leakage Current			00	μι	IVIGA		
V <sub>ID</sub>	Input Leakage	4.75			V	Max	$I_{ID} = 1.9 \mu A$	
	Test	4.75					All Other Pins Grounded	
I <sub>OD</sub>	Output Leakage		3.7	3.75 μΑ	0.0	V <sub>IOD</sub> = 150 mV		
	Circuit Current				μΛ	0.0	All Other Pins Grounded	
I <sub>IL</sub>	Input LOW Current			-0.6	mA	Max	V <sub>IN</sub> = 0.5V	
I <sub>OS</sub>	Output Short-Circuit Current	-60		-150	mA	Max	$V_{OUT} = 0V$	
I <sub>CCH</sub>	Power Supply Current			25	mA	Max	$V_0 = HIGH$	
I <sub>CCL</sub>	Power Supply Current			25	mA	Max	$V_O = LOW$	

### **AC Electrical Characteristics**

Symbol	Parameter	$T_A = +25^{\circ}C$ $V_{CC} = +5.0V$ $C_L = 50 \text{ pF}$		$T_{A} = -55^{\circ}C \text{ to } +125^{\circ}C$ $V_{CC} = +5.0V$ $C_{L} = 50 \text{ pF}$		$T_A = 0$ °C to +70°C $V_{CC} = +5.0V$ $C_L = 50 \text{ pF}$		Units
		Min	Max	Min	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay	4.0	10.5	4.0	13.0	4.0	11.5	ns
t <sub>PHL</sub>	$I_n \rightarrow \overline{O}_n$	3.5	8.5	3.5	10.0	3.5	9.0	



#### Physical Dimensions inches (millimeters) unless otherwise noted (Continued) 0.740 - 0.770 (18.80 - 19.56)0.090 (2.286) 14 13 12 11 10 9 8 14 13 12 INDEX AREA 0.250 ± 0.010 (6.350 ± 0.254) PIN NO. 1 PIN NO. 1 IDENT 1 2 3 4 5 6 7 1 2 3 $\frac{0.092}{(2.337)}$ DIA $\frac{0.030}{(0.762)}$ MAX OPTION 1 OPTION 02 $\frac{0.135 \pm 0.005}{(3.429 \pm 0.127)}$ 0.300 - 0.320 $\frac{0.620 - 8.128}{(7.620 - 8.128)}$ 0.060 0.145 - 0.2004° TYP Optional (1.651) (3.683 - 5.080) $\frac{0.008 - 0.016}{(0.203 - 0.406)}$ TYP 0.020 (0.508) 0.125 - 0.150 $0.075 \pm 0.015$ $\overline{(3.175 - 3.810)}$ $(1.905 \pm 0.381)$ (7.112) MIN 0.014 - 0.0230.100 ± 0.010 (2.540 ± 0.254) (0.356 - 0.584) $\frac{0.050 \pm 0.010}{(1.270 - 0.254)}$ TYP 0.325 <sup>+0.040</sup> -0.015

14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide Package Number N14A

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8.255 + 1.016

N144 (REV.F)

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