FAIRCHILD SEMICONDUCTOR™

March 1988
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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.

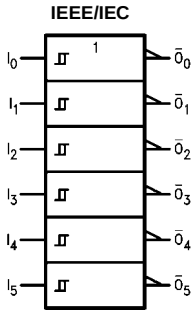
Each circuit contains a Schmitt trigger followed by a Darlington level shifter and a phase splitter driving a TTL totem-pole output. The Schmitt trigger uses positive feed back to effectively speed-up slow input transition, and provide different input threshold voltages for positive and negative-going 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:

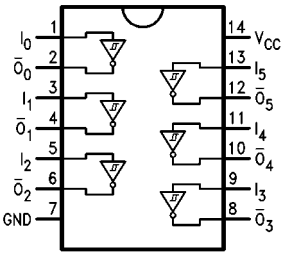
Order Number	Package Number	Package Description
74F14SC	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-120, 0.150 Narrow
74F14SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74F14PC	N14A	14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

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

Logic Symbol



Connection Diagram



Unit Loading/Fan Out

Pin Names	Description	U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
I_n	Input	1.0/1.0	20 μA/–0.6 mA
$\overline{O}_n$	Output	50/33.3	–1 mA/20 mA

Function Table

Input	Output
A	$\overline{O}$
L	H
H	L

H = HIGH Voltage Level
L = LOW Voltage Level

Absolute Maximum Ratings(Note 1)

Storage Temperature	−65°C to +150°C
Ambient Temperature under Bias	−55°C to +125°C
Junction Temperature under Bias	−55°C to +175°C
V_{CC} Pin Potential to Ground Pin	−0.5V to +7.0V
Input Voltage (Note 2)	−0.5V to +7.0V
Input Current (Note 2)	−30 mA to +5.0 mA
Voltage Applied to Output	
in HIGH State (with V_{CC} = 0V)	
Standard Output	−0.5V to V_{CC}
3-STATE Output	−0.5V to +5.5V
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°C to +70°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.

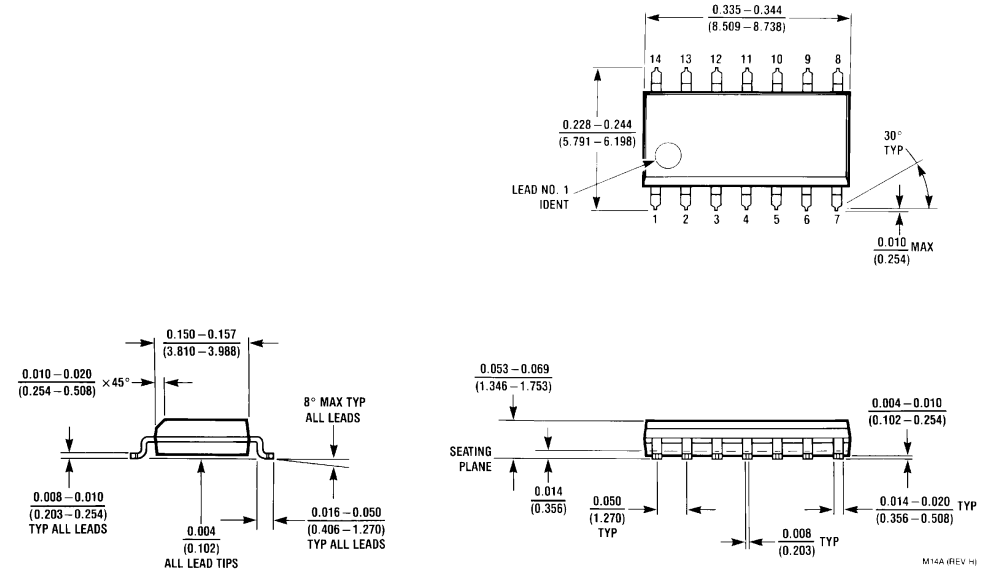
DC Electrical Characteristics

Symbol	Parameter	Min	Typ	Max	Units	V_{CC}	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	
ΔV_T	Hysteresis (V_{T+}–V_{T-})	0.4	0.8		V	5.0V	
V_{CD}	Input Clamp Diode Voltage			−1.2	V	Min	I_{IN} = −18 mA
V_{OH}	Output HIGH 10% V_{CC}	2.5			V	Min	I_{OH} = −1 mA
	Voltage 5% V_{CC}	2.7					I_{OH} = −1 mA
V_{OL}	Output LOW 10% V_{CC} Voltage			0.5	V	Min	I_{OL} = 20 mA
I_{IH}	Input HIGH Current			5.0	µA	Max	V_{IN} = 2.7V
I_{BVI}	Input HIGH Current Breakdown Test			7.0	µA	Max	V_{IN} = 7.0V
I_{CEX}	Output HIGH Leakage Current			50	µA	Max	V_{OUT} = V_{CC}
V_{ID}	Input Leakage Test	4.75			V	Max	I_{ID} = 1.9 µA All Other Pins Grounded
I_{OD}	Output Leakage Circuit Current			3.75	µA	0.0	V_{IOD} = 150 mV All Other Pins Grounded
I_{IL}	Input LOW Current			−0.6	mA	Max	V_{IN} = 0.5V
I_{OS}	Output Short-Circuit Current	−60		−150	mA	Max	V_{OUT} = 0V
I_{CCH}	Power Supply Current			25	mA	Max	V_O = HIGH
I_{CCL}	Power Supply Current			25	mA	Max	V_O = LOW

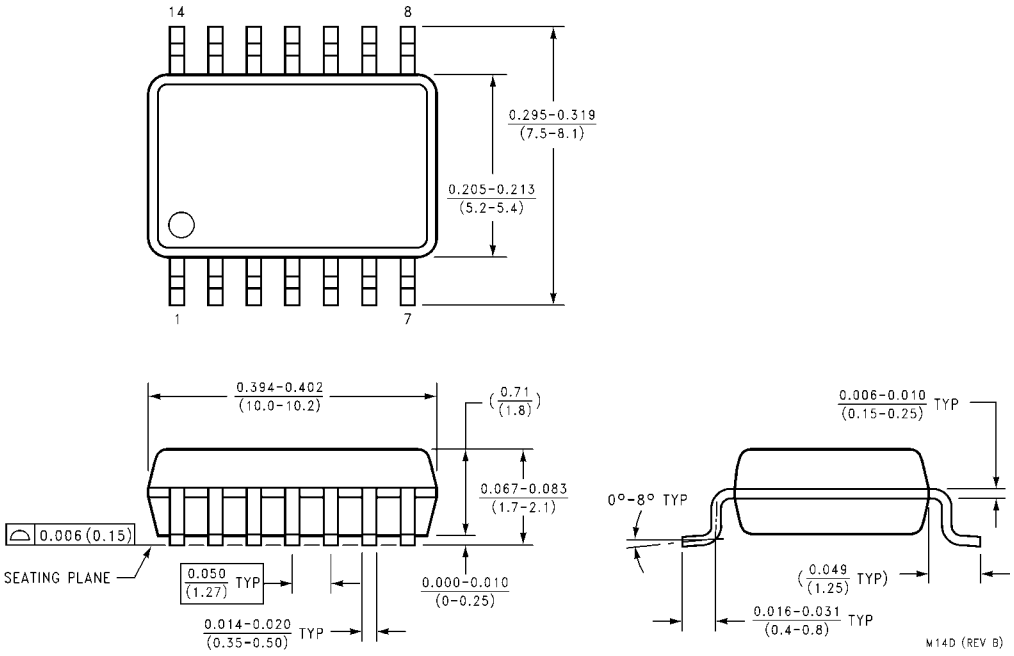
AC Electrical Characteristics

Symbol	Parameter	T_A = +25°C, V_{CC} = +5.0V, C_L = 50 pF		T_A = −55°C to +125°C, V_{CC} = +5.0V, C_L = 50 pF		T_A = 0°C to +70°C, V_{CC} = +5.0V, C_L = 50 pF		Units
		Min	Max	Min	Max	Min	Max	
t_{PLH}	Propagation Delay	4.0	10.5	4.0	13.0	4.0	11.5	ns
t_{PHL}	$I_n \rightarrow \overline{O}_n$	3.5	8.5	3.5	10.0	3.5	9.0	

Physical Dimensions inches (millimeters) unless otherwise noted

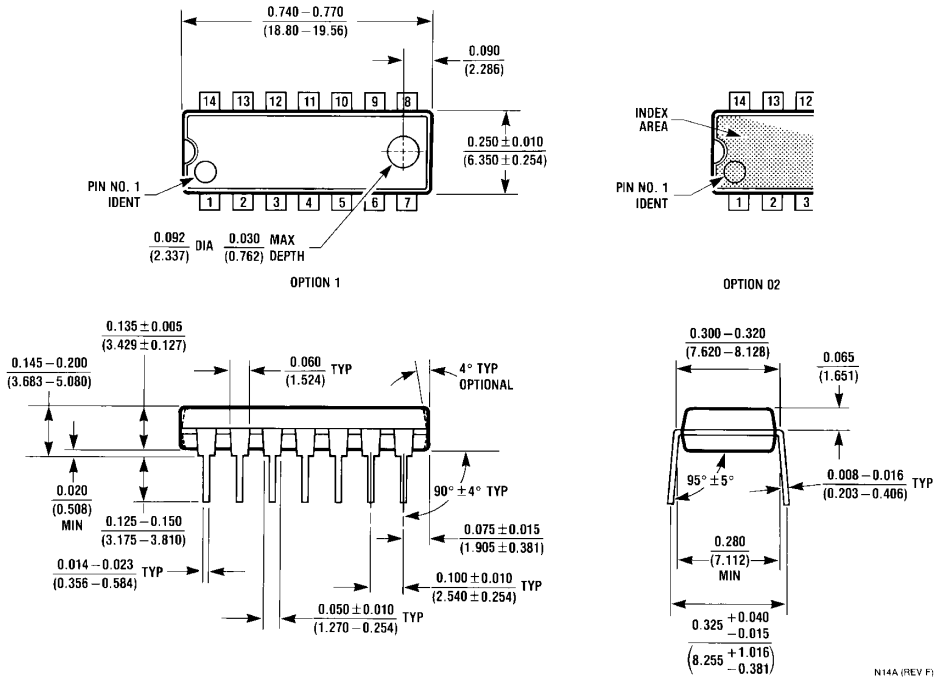


14-Lead Small Outline Integrated Circuit (SOC), JEDEC MS-120, 0.150 Narrow
Package Number M14A



14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
Package Number M14D

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



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