



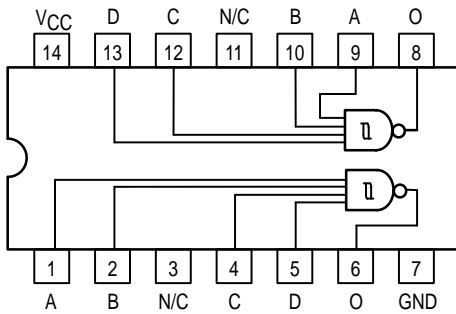
# SCHMITT TRIGGERS DUAL 4-INPUT NAND/HEX INVERTERS

The MC54/74F13 and MC54/74F14 contain logic gates/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. Additionally, they have greater noise margin than conventional inverters.

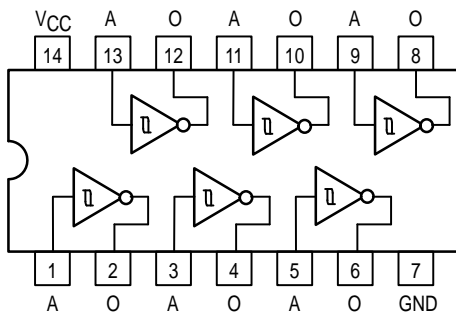
Each circuit contains a Schmitt trigger followed by a Darlington level shifter and a phase splitter driving a TTL totem pole output. The Schmitt trigger uses positive feedback to effectively speed up slow input transitions and provide different input threshold voltages for positive and negative-going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

## LOGIC AND CONNECTION DIAGRAMS

**MC54/74F13**



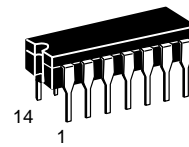
**MC54/74F14**



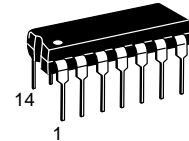
**MC54/74F13**  
**MC54/74F14**

**SCHMITT TRIGGERS**  
**DUAL 4-INPUT**  
**NAND/HEX INVERTERS**

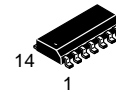
**FAST™ SCHOTTKY TTL**



**J SUFFIX**  
CERAMIC  
CASE 632-08



**N SUFFIX**  
PLASTIC  
CASE 646-06



**D SUFFIX**  
SOIC  
CASE 751A-02

## ORDERING INFORMATION

MC54FXXJ Ceramic  
MC74FXXN Plastic  
MC74FXXD SOIC

## GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
V <sub>CC</sub>	Supply Voltage	54, 74	4.5	5.0	5.5	V
T <sub>A</sub>	Operating Ambient Temperature Range	54	-55	25	125	°C
		74	0	25	70	
I <sub>OH</sub>	Output Current — High	54, 74			-1.0	mA
I <sub>OL</sub>	Output Current — Low	54, 74			20	mA

# MC54/74F13 • MC54/74F14

## DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

Symbol	Parameter		Limits			Unit	Test Conditions	
			Min	Typ	Max			
V <sub>T+</sub>	Positive-Going Threshold Voltage		1.5		2.0	V	V <sub>CC</sub> = 5.0 V	
V <sub>T-</sub>	Negative-Going Threshold Voltage		0.7		1.1	V	V <sub>CC</sub> = 5.0 V	
V <sub>T+</sub> -V <sub>T-</sub>	Hysteresis		0.4	0.8		V	V <sub>CC</sub> = 5.0 V	
V <sub>IH</sub>	Input HIGH Voltage		2.0			V	Guaranteed Input HIGH Voltage	
V <sub>IL</sub>	Input LOW Voltage				0.8	V	Guaranteed Input LOW Voltage	
V <sub>IK</sub>	Input Clamp Diode Voltage				-1.2	V	V <sub>CC</sub> = MIN, I <sub>IN</sub> = -18 mA	
V <sub>OH</sub>	Output HIGH Voltage	54, 74	2.5			V	I <sub>OH</sub> = -1.0 mA	V <sub>CC</sub> = 4.5
		74	2.7			V	I <sub>OH</sub> = -1.0 mA	V <sub>CC</sub> = 4.75
V <sub>OL</sub>	Output LOW Voltage				0.5	V	I <sub>OL</sub> = 20 mA	V <sub>CC</sub> = MIN
I <sub>T+</sub>	Input Current at Positive-Going Threshold			-0.14		mA	V <sub>CC</sub> = 5.0 V, V <sub>IN</sub> = V <sub>T+</sub>	
I <sub>T-</sub>	Input Current at Negative-Going Threshold			-0.18		mA	V <sub>CC</sub> = 5.0 V, V <sub>IN</sub> = V <sub>T-</sub>	
I <sub>IH</sub>	Input HIGH Current				20	μA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V	
					0.1	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V	
I <sub>IL</sub>	Input LOW Current				-0.6	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0.5 V	
I <sub>OS</sub>	Output Short Circuit Current (Note 2)		-60		-150	mA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 0 V	
I <sub>CCH</sub>	Power Supply Current Total, Output HIGH	F13		4.5	8.5	mA	V <sub>CC</sub> = MAX	
		F14		13	22			
I <sub>CCL</sub>	Power Supply Current Total, Output LOW	F13		7.0	10			
		F14		23	32			

**NOTES:**

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.
- Not more than one output should be shorted at a time, nor for more than 1 second.

## AC CHARACTERISTICS (C<sub>L</sub> = 50 pF)

Symbol	Parameter		54/74F		54F		74F		Unit
			T <sub>A</sub> = +25°C		T <sub>A</sub> = -55°C to +125°C		T <sub>A</sub> = 0°C to 70°C		
			V <sub>CC</sub> = +5.0 V		V <sub>CC</sub> = 5.0 V ± 10%		V <sub>CC</sub> = 5.0 V ± 10%		
			Min	Max	Min	Max	Min	Max	
t <sub>PLH</sub>	Propagation Delay	F13	3.5	7.0	3.5	9.0	3.5	8.0	ns
t <sub>PHL</sub>			3.0	8.0	3.0	9.5	3.0	8.5	
t <sub>PLH</sub>	Propagation Delay	F14	3.5	7.0	3.5	9.0	3.5	8.0	ns
t <sub>PHL</sub>			3.0	6.5	3.0	8.0	3.0	7.0	

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**FUNCTION TABLE MC54/74F13**

Inputs				Output
A	B	C	D	O
L	X	X	X	H
X	L	X	X	H
X	X	L	X	H
X	X	X	L	H
H	H	H	H	L

H = HIGH Voltage Level

L = LOW Voltage Level

X = Don't Care

**FUNCTION TABLE MC54/74F14**

Input	Output
A	O
L	H
H	L