

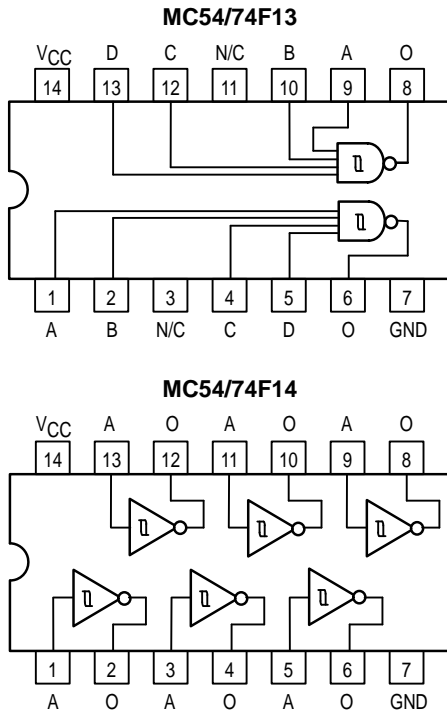


# SCHMITT TRIGGERS DUAL 4-INPUT NAND/HEX INVERTERS

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.

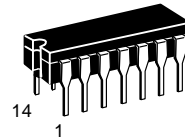
## LOGIC AND CONNECTION DIAGRAMS



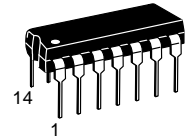
**MC54/74F13**  
**MC54/74F14**

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

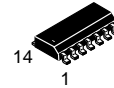
**FAST™ SCHOTTKY TTL**



**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:**

1. For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type.
2. 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	

## MC54/74F13 • MC54/74F14

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