MOTOROLA

MC54F/74F132

Advance Information

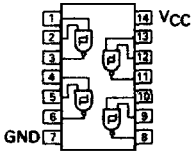
QUAD 2-INPUT NAND SCHMITT TRIGGER

FAST™ SCHOTTKY TTL

The MC54/74F132 contains four 2-input NAND gates 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 greater noise margin than conventional NAND gates.

Each circuit contains a 2-input 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 threshold (typically 800 mV) is determined by resistor ratios and is essentially insensitive to temperature and supply voltage variations.

PIN CONFIGURATION



J Suffix — Case 632-08 (Ceramic)
N Suffix — Case 646-06 (Plastic)
D Suffix — Case 751A-02 (SOIC)

GUARANTEED OPERATING RANGES

SYMBOL	PARAMETER		MIN	TYP	MAX	UNIT
V_{CC}	Supply Voltage	54,74	4.5	5.0	5.5	V
T_A	Operating Ambient Temperature Range	54 74	−55 0	25 25	125 70	°C
I_{OH}	Output Current — High	54,74			−1.0	mA
I_{OL}	Output Current — Low	54,74			20	mA

FUNCTION TABLE

INPUTS		OUTPUT
A	B	$\overline{Y}$
L	L	H
L	H	H
H	L	H
H	H	L

H = HIGH Voltage level L = LOW voltage level

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

SYMBOL	PARAMETER		LIMITS MIN	LIMITS TYP	LIMITS MAX	UNITS	TEST CONDITIONS	
V_{T+}	Positive-Going Threshold Voltage		1.5		2.0	V	V_{CC} = 5.0 V	
V_{T-}	Negative-Going Threshold Voltage		0.7		1.1	V	V_{CC} = 5.0 V	
$V_{T+}-V_{T-}$	Hysteresis		0.4	0.8		V	V_{CC} = 5.0 V	
V_{IH}	Input HIGH Voltage		2.0			V	Guaranteed Input HIGH Voltage	
V_{IL}	Input LOW Voltage				0.8	V	Guaranteed Input LOW Voltage	
V_{IK}	Input Clamp Diode Voltage				−1.2	V	V_{CC} = MIN, I_{IN} = −18 mA	
V_{OH}	Output HIGH Voltage	54,74	2.5			V	I_{OH} = −1.0 mA	V_{CC} = 4.5
		74	2.7			V	I_{OH} = −1.0 mA	V_{CC} = 4.75
V_{OL}	Output LOW Voltage				0.5	V	I_{OL} = 20 mA	V_{CC} = MIN
I_{T+}	Input Current at Positive-Going Threshold			0		μA	V_{CC} = 5.0 V, V_{IN} = V_{T+}	
I_{T-}	Input Current at Negative-Going Threshold			−350		μA	V_{CC} = 5.0 V, V_{IN} = V_{T-}	
I_{IH}	Input HIGH Current				20	μA	V_{CC} = MAX, V_{IN} = 2.7 V	
					0.1	mA	V_{CC} = MAX, V_{IN} = 7.0 V	
I_{IL}	Input LOW Current				−0.6	mA	V_{CC} = MAX, V_{IN} = 0.5 V	
I_{OS}	Output Short Circuit Current (Note 2)		−60		−150	mA	V_{CC} = MAX, V_{OUT} = 0 V	
I_{CC}	Total, Supply Current	I_{CCH}		8.5	12	mA	V_{IN} = GND	V_{CC} = MAX
		I_{CCL}		13	19.5		V_{IN} = 4.5 V	

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.

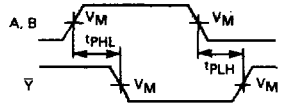
This document contains information on a new product. Specifications and information herein are subject to change without notice.

AC ELECTRICAL CHARACTERISTICS

PARAMETER		TEST CONDITIONS	54/74F $T_A = +25°C$ $V_{CC} = +5.0\ V$ $C_L = 50\ pF$			54F $T_A = -55°C$ to $+125°C$ $V_{CC} = 5.0\ V \pm 10\%$ $C_L = 50\ pF$		74F $T_A = 0°C$ to $+70°C$ $V_{CC} = +5.0\ V \pm 10\%$ $C_L = 50\ pF$		UNIT
			Min	Typ	Max	Min	Max	Min	Max	
t_{PLH}	Propagation delay	Waveform 1	3.5	5.5	7.0	3.5	9.0	3.5	8.0	ns
t_{PHL}	A, B to $\overline{Y}$		3.0	5.0	6.5	3.0	8.0	3.0	7.0	

NOTE: Subtract 0.2 ns from minimum values for SO package.

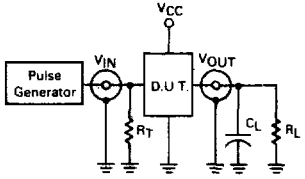
AC WAVEFORM



Note: For all waveforms, $V_M = 1.5\ V$.

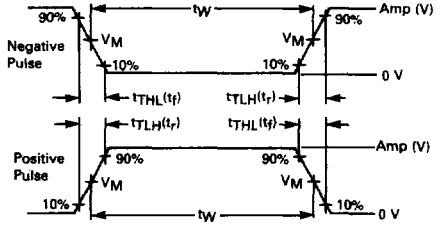
Waveform 1. For Inverting Outputs

TEST CIRCUIT AND WAVEFORMS



Test Circuit For Totem-Pole Outputs

DEFINITIONS
R_L = Load resistor; see AC CHARACTERISTICS for value.
C_L = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.
R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.



$V_M = 1.5\ V$

Input Pulse Definition

FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	Pulse Width	t_{TLH}	t_{THL}
74F	3.0 V	1.0 MHz	500 ns	2.5 ns	2.5 ns