

54F/74F132

Quad 2-Input NAND Schmitt Trigger

General Description

The 'F132 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 a greater noise margin than conventional NAND gates.

Each circuit contains a 2-input Schmitt trigger followed by level shifting circuitry and a standard FAST[®] output structure. The Schmitt trigger uses positive feedback to effectively speed-up slow input transitions, and provide different in-

put 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.

Features

- Guaranteed 4000V minimum ESD protection
- Standard Military Drawing (SMD)
— 5962-89487

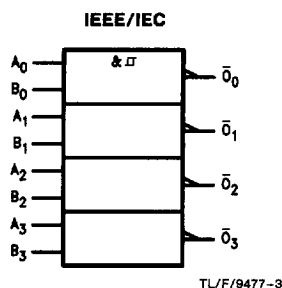
Ordering Code: See Section 11

Commercial	Military	Package Number	Package Description
74F132PC		N14A	14-Lead (0.300" Wide) Molded Dual-In-Line
	54F132DM (Note 2)	J14A	14-Lead Ceramic Dual-In-Line
74F132SC (Note 1)		M14A	14-Lead (0.150" Wide) Molded Small Outline, JEDEC
74F132SJ (Note 1)		M14D	14-Lead (0.300" Wide) Molded Small Outline, EIAJ
	54F132FM (Note 2)	W14B	14-Lead Cerpack
	54F132LM (Note 2)	E20A	20-Lead Ceramic Leadless Chip Carrier, Type C

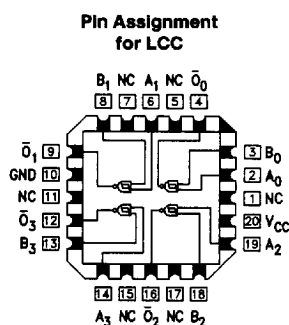
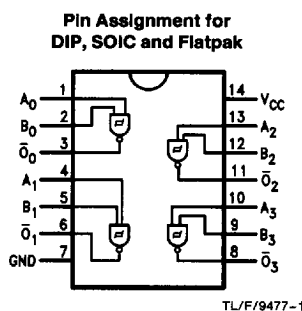
Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMOB, FMQB and LMQB.

Logic Symbol



Connection Diagrams



Unit Loading/Fan Out: See Section 2 for U.L. definitions

Pin Names	Description	54F/74F	
		U.L. HIGH/LOW	Input I_{IH}/I_{IL} Output I_{OH}/I_{OL}
A_n, B_n	Inputs	1.0/1.0	20 μ A/−0.6 mA
O_n	Outputs	50/33.3	−1 mA/20 mA

Function Table

Inputs		Outputs
A	B	$\bar{O}$
L	L	H
L	H	H
H	L	H
H	H	L

H = HIGH Voltage Level

L = LOW Voltage Level

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

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
Plastic	-55°C to +150°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}
 TRI-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

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.

Recommended Operating Conditions

Free Air Ambient Temperature

Military -55°C to +125°C
 Commercial 0°C to +70°C

Supply Voltage

Military +4.5V to +5.5V
 Commercial +4.5V to +5.5V

DC Electrical Characteristics

Symbol	Parameter	54F/74F			Units	V_{CC}	Conditions
		Min	Typ	Max			
V_{T+}	Positive-going Threshold	1.5		2.0	V	5.0	
V_{T-}	Negative-going Threshold	0.7		1.1	V	5.0	
ΔV_T	Hysteresis ($V_{T+} - V_{T-}$)	0.4			V	5.0	
V_{CD}	Input Clamp Diode Voltage			-1.2	V	Min	$I_{IN} = -18 \text{ mA}$
V_{OH}	Output HIGH Voltage	54F 10% V_{CC} 74F 10% V_{CC} 74F 5% V_{CC}	2.5 2.5 2.7		V	Min	$I_{OH} = -1 \text{ mA}$ $I_{OH} = -1 \text{ mA}$ $I_{OH} = -1 \text{ mA}$
V_{OL}	Output LOW Voltage	54F 10% V_{CC} 74F 10% V_{CC}		0.5 0.5	V	Min	$I_{OL} = 20 \text{ mA}$ $I_{OL} = 20 \text{ mA}$
I_{IH}	Input HIGH Current	54F 74F		20.0 5.0	μA	Max	$V_{IN} = 2.7V$
I_{BVI}	Input HIGH Current Breakdown Test	54F 74F		100 7.0	μA	Max	$V_{IN} = 7.0V$
I_{CEX}	Output HIGH Leakage Current	54F 74F		250 50	μA	Max	$V_{OUT} = V_{CC}$
V_{ID}	Input Leakage Test	74F	4.75		V	0.0	$I_{ID} = 1.9 \mu\text{A}$ All Other Pins Grounded
I_{OD}	Output Leakage Circuit Current	74F		3.75	μA	0.0	$V_{IOD} = 150 \text{ mV}$ 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		17.0		mA	Max	$V_O = \text{HIGH}$
I_{CCL}	Power Supply Current		18.0		mA	Max	$V_O = \text{LOW}$

AC Electrical Characteristics: See Section 2 for Waveforms and Load Configurations

Symbol	Parameter	74F			54F		74F		Units	Fig. No.
		$T_A = +25^{\circ}\text{C}$ $V_{CC} = +5.0\text{V}$ $C_L = 50\text{ pF}$			$T_A, V_{CC} = \text{MII}$ $C_L = 50\text{ pF}$		$T_A, V_{CC} = \text{Com}$ $C_L = 50\text{ pF}$			
		Min	Typ	Max	Min	Max	Min	Max		
t_{PLH}	Propagation Delay	4.0		10.5	2.0	13.0	3.5	12.0	ns	2-3
t_{PHL}	$A_n, B_n \text{ to } \overline{O}_n$	5.0		12.5	4.5	16.0	5.0	13.0		