

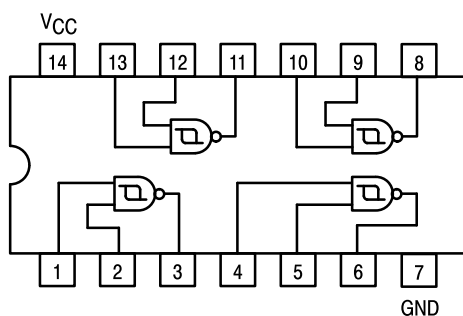


# QUAD 2-INPUT SCHMITT TRIGGER NAND GATE

The SN54/74LS132 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. Additionally, they have greater noise margin than conventional NAND Gates.

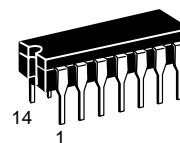
Each circuit contains a 2-input Schmitt trigger followed by a Darlington level shifter and a phase splitter driving a TTL totem pole output. The Schmitt trigger uses positive feedback to effectively speed-up slow input transitions, and provide different input threshold voltages for positive and negative-going transitions. This hysteresis between the positive-going and negative-going input thresholds (typically 800 mV) is determined internally by resistor ratios and is essentially insensitive to temperature and supply voltage variations. As long as one input remains at a more positive voltage than  $V_{T+}$  (MAX), the gate will respond to the transitions of the other input as shown in Figure 1.

## LOGIC AND CONNECTION DIAGRAM DIP (TOP VIEW)

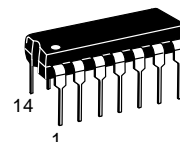


**SN54/74LS132**

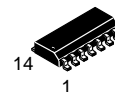
**QUAD 2-INPUT  
SCHMITT TRIGGER NAND GATE**  
**LOW POWER SCHOTTKY**



**J SUFFIX**  
CERAMIC  
CASE 632-08



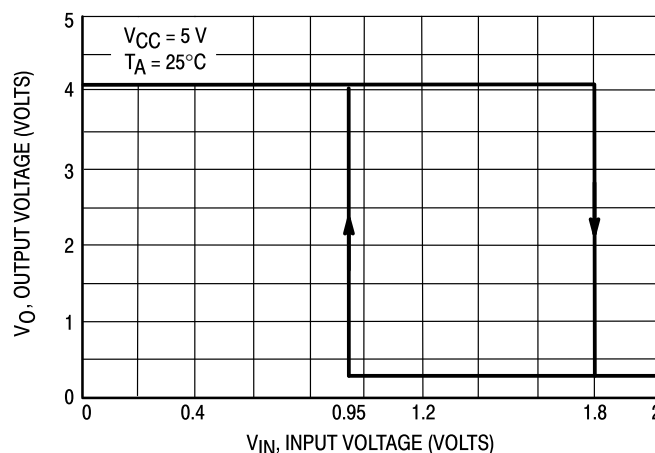
**N SUFFIX**  
PLASTIC  
CASE 646-06



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

## ORDERING INFORMATION

SN54LSXXXJ	Ceramic
SN74LSXXXN	Plastic
SN74LSXXXD	SOIC



**Figure 1.  $V_{IN}$  versus  $V_{OUT}$  Transfer Function**

# SN54/74LS132

## GUARANTEED OPERATING RANGES

Symbol	Parameter		Min	Typ	Max	Unit
$V_{CC}$	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
$T_A$	Operating Ambient Temperature Range	54 74	-55 0	25 25	125 70	°C
$I_{OH}$	Output Current — High	54, 74			-0.4	mA
$I_{OL}$	Output Current — Low	54 74			4.0 8.0	mA

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

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
$V_{T+}$	Positive-Going Threshold Voltage	1.5		2.0	V	$V_{CC} = 5.0$ V
$V_{T-}$	Negative-Going Threshold Voltage	0.6		1.1	V	$V_{CC} = 5.0$ V
$V_{T+} - V_{T-}$	Hysteresis	0.4	0.8		V	$V_{CC} = 5.0$ V
$V_{IK}$	Input Clamp Diode Voltage		-0.65	-1.5	V	$V_{CC} = \text{MIN}$ , $I_{IN} = -18$ mA
$V_{OH}$	Output HIGH Voltage	54	2.5	3.4	V	$V_{CC} = \text{MIN}$ , $I_{OH} = -400$ $\mu$ A, $V_{IN} = V_{IL}$
		74	2.7	3.4		
$V_{OL}$	Output LOW Voltage	54, 74		0.25	V	$V_{CC} = \text{MIN}$ , $I_{OL} = 4.0$ mA, $V_{IN} = 2.0$ V
		74		0.35	V	$V_{CC} = \text{MIN}$ , $I_{OL} = 8.0$ mA, $V_{IN} = 2.0$ V
$I_{T+}$	Input Current at Positive-Going Threshold		-0.14		mA	$V_{CC} = 5.0$ V, $V_{IN} = V_{T+}$
$I_{T-}$	Input Current at Negative-Going Threshold		-0.18		mA	$V_{CC} = 5.0$ V, $V_{IN} = V_{T-}$
$I_{IH}$	Input HIGH Current			20	$\mu$ A	$V_{CC} = \text{MAX}$ , $V_{IN} = 2.7$ V
				0.1	mA	$V_{CC} = \text{MAX}$ , $V_{IN} = 7.0$ V
$I_{IL}$	Input LOW Current			-0.4	mA	$V_{CC} = \text{MAX}$ , $V_{IN} = 0.4$ V
$I_{OS}$	Output Short Circuit Current (Note 1)	-20		-100	mA	$V_{CC} = \text{MAX}$ , $V_{OUT} = 0$ V
$I_{CC}$	Power Supply Current Total, Output HIGH		5.9	11	mA	$V_{CC} = \text{MAX}$ , $V_{IN} = 0$ V
	Total, Output LOW		8.2	14	mA	$V_{CC} = \text{MAX}$ , $V_{IN} = 4.5$ V

Note 1: Not more than one output should be shorted at a time, nor for more than 1 second.

## AC CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Limits			Unit	Test Conditions
		Min	Typ	Max		
$t_{PLH}$	Turn-Off Delay, Input to Output			22	ns	$V_{CC} = 5.0$ V $C_L = 15$ pF
$t_{PHL}$	Turn-On Delay, Input to Output			22	ns	

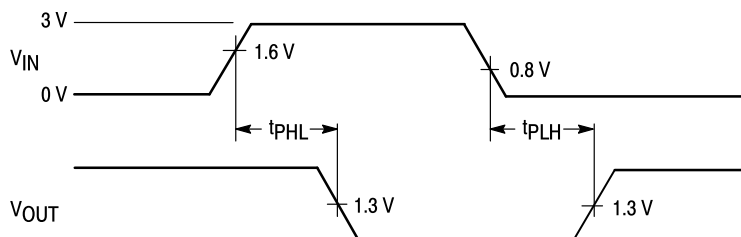
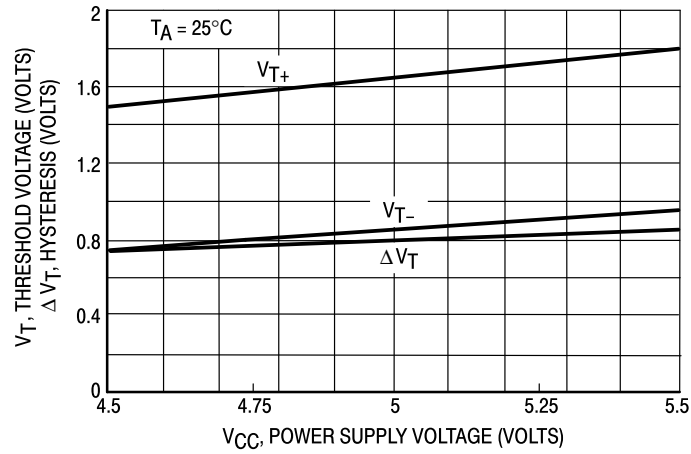
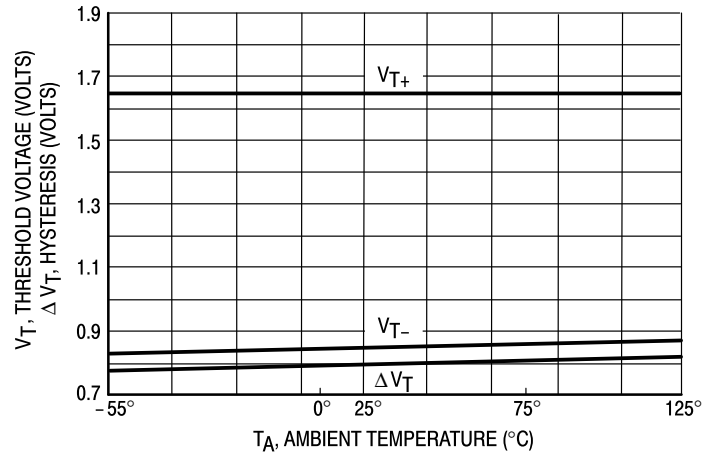


Figure 2. AC Waveforms

# SN54/74LS132

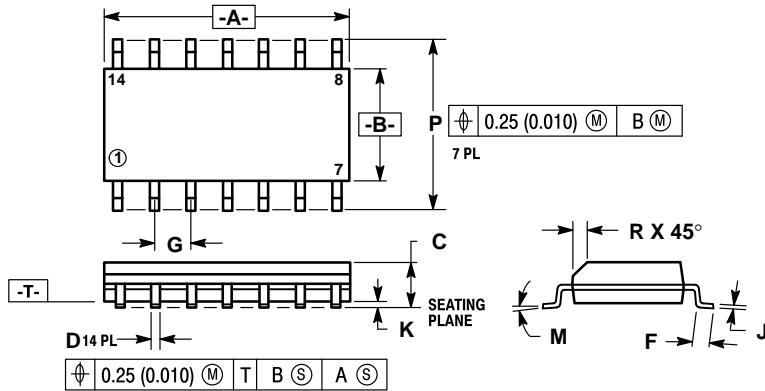


**Figure 3. Threshold Voltage and Hysteresis versus Power Supply Voltage**



**Figure 4. Threshold Voltage and Hysteresis versus Temperature**

**Case 751A-02 D Suffix**  
**14-Pin Plastic**  
**SO-14**

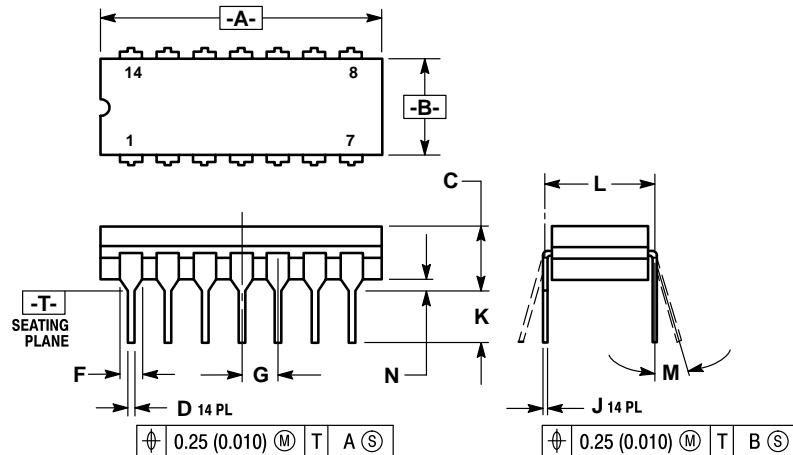


**NOTES:**

- DIMENSIONS "A" AND "B" ARE DATUMS AND "T" IS A DATUM SURFACE.
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER.
- DIMENSION A AND B DO NOT INCLUDE MOLD PROTRUSION.
- MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
- 751A-01 IS OBSOLETE, NEW STANDARD 751A-02.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.55	8.75	0.337	0.344
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

**Case 632-08 J Suffix**  
**14-Pin Ceramic Dual In-Line**

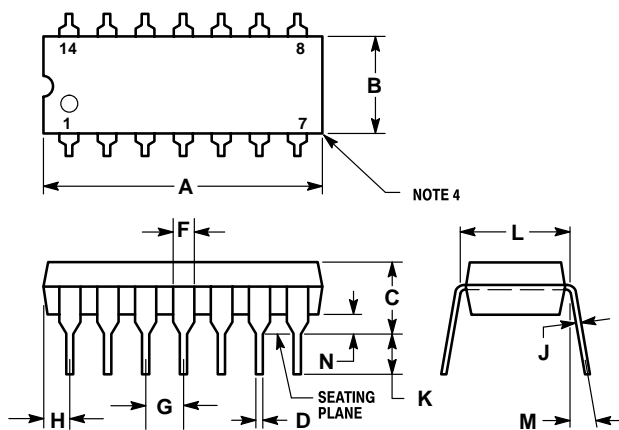


**NOTES:**

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
- DIM F MAY NARROW TO 0.76 (0.030) WHERE THE LEAD ENTERS THE CERAMIC BODY.
- 632-01 THRU -07 OBSOLETE, NEW STANDARD 632-08.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	19.05	19.94	0.750	0.785
B	6.23	7.11	0.245	0.280
C	3.94	5.08	0.155	0.200
D	0.39	0.50	0.015	0.020
F	1.40	1.65	0.055	0.065
G	2.54 BSC		0.100 BSC	
J	0.21	0.38	0.008	0.015
K	3.18	4.31	0.125	0.170
L	7.62 BSC		0.300 BSC	
M	0°	15°	0°	15°
N	0.51	1.01	0.020	0.040


**Case 646-06 N Suffix**  
**14-Pin Plastic**



**NOTES:**

- LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.
- DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.
- DIMENSION "B" DOES NOT INCLUDE MOLD FLASH.
- ROUNDED CORNERS OPTIONAL.
- 646-05 OBSOLETE, NEW STANDARD 646-06.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	18.16	19.56	0.715	0.770
B	6.10	6.60	0.240	0.260
C	3.69	4.69	0.145	0.185
D	0.38	0.53	0.015	0.021
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	1.32	2.41	0.052	0.095
J	0.20	0.38	0.008	0.015
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	0°	10°	0°	10°
N	0.39	1.01	0.015	0.039

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