

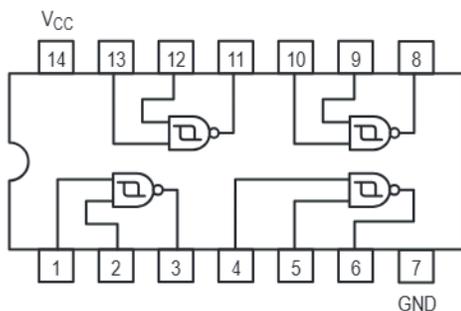
# SN74LS132

## Quad 2-Input Schmitt Trigger NAND Gate

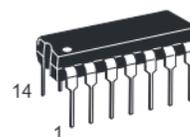
The SN74LS132 contains four 2-Input NAND Gates which accept standard TTL input signals and provide standard TTL output levels. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. Additionally, they have greater noise margin than conventional 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)**



**LOW  
POWER  
SCHOTTKY**



**PLASTIC  
N SUFFIX  
CASE 646**



**SOIC  
D SUFFIX  
CASE 751A**

### GUARANTEED OPERATING RANGES

Symbol	Parameter	Min	Typ	Max	Unit
$V_{CC}$	Supply Voltage	4.75	5.0	5.25	V
$T_A$	Operating Ambient Temperature Range	0	25	70	$^{\circ}\text{C}$
$I_{OH}$	Output Current – High			-0.4	mA
$I_{OL}$	Output Current – Low			8.0	mA

### ORDERING INFORMATION

Device	Package	Shipping
SN74LS132N	14 Pin DIP	2000 Units/Box
SN74LS132D	14 Pin	2500/Tape & Reel

# SN74LS132

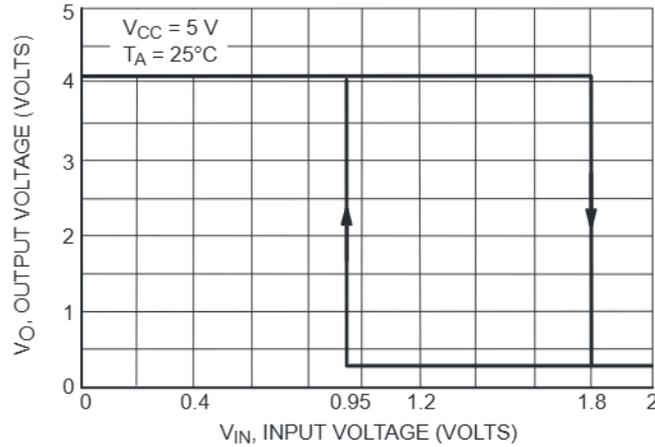


Figure 1.  $V_{IN}$  versus  $V_{OUT}$  Transfer Function

## 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	2.7	3.4		V	$V_{CC} = \text{MIN}$ , $I_{OH} = -400$ $\mu$ A, $V_{IN} = V_{IL}$
$V_{OL}$	Output LOW Voltage		0.25	0.4	V	$V_{CC} = \text{MIN}$ , $I_{OL} = 4.0$ mA, $V_{IN} = 2.0$ V
			0.35	0.5	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 <sup>(1)</sup>	-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	

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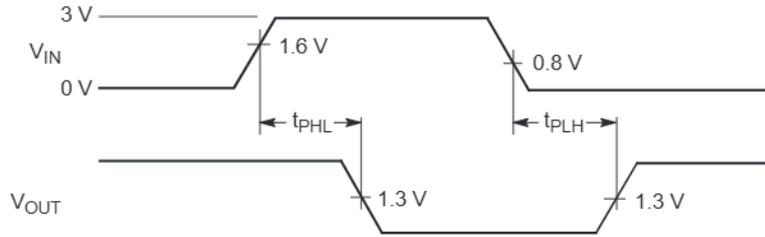


Figure 2. AC Waveforms

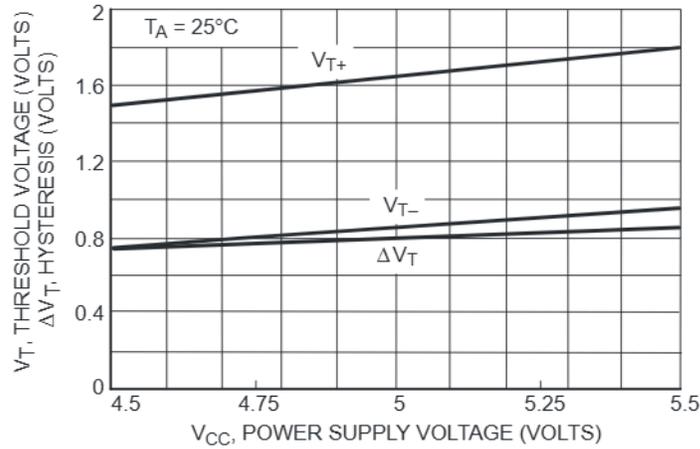


Figure 3. Threshold Voltage and Hysteresis versus Power Supply Voltage

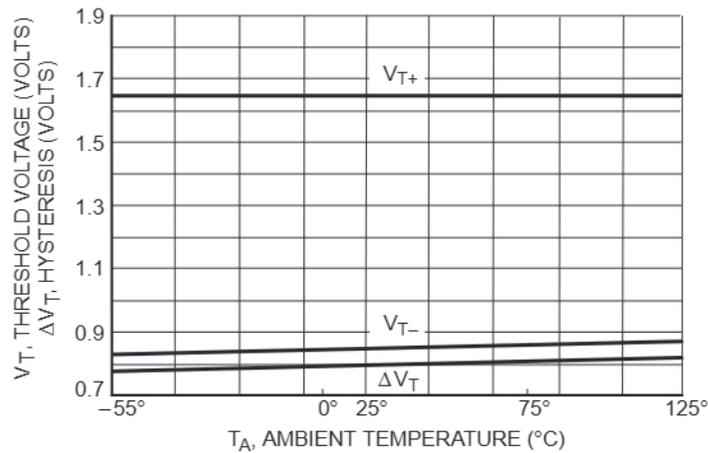
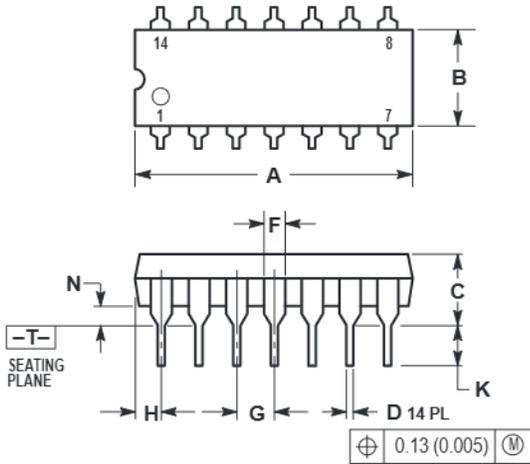


Figure 4. Threshold Voltage and Hysteresis versus Temperature

# SN74LS132

## PACKAGE DIMENSIONS

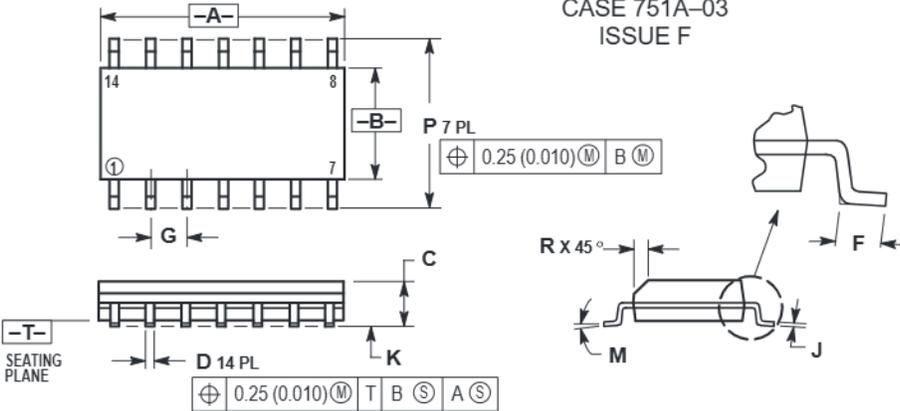
### N SUFFIX PLASTIC PACKAGE CASE 646-06 ISSUE M



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
  5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.715	0.770	18.16	18.80
B	0.240	0.260	6.10	6.60
C	0.145	0.185	3.69	4.69
D	0.015	0.021	0.38	0.53
F	0.040	0.070	1.02	1.78
G	0.100 BSC		2.54 BSC	
H	0.052	0.095	1.32	2.41
J	0.008	0.015	0.20	0.38
K	0.115	0.135	2.92	3.43
L	0.290	0.310	7.37	7.87
M	10°		10°	
N	0.015	0.039	0.38	1.01

### D SUFFIX PLASTIC SOIC PACKAGE CASE 751A-03 ISSUE F



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
  5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

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° to 7°		0° to 7°	
P	5.80	6.20	0.228	0.244
R	0.25	0.50	0.010	0.019

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