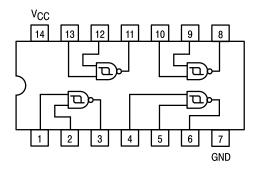


# QUAD 2-INPUT SCHMITT TRIGGER NAND GATE

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, jitterfree output signals. Additionally, they have greater noise margin than conventional NAND Gates.

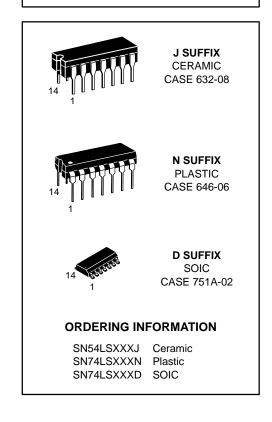
Each circuit contains a 2-input Schmitt trigger followed by a Darlington level shifter and a phase splitter driving a TTL totem pole output. The Schmitt trigger uses positive feedback to effectively speed-up slow input transitions, and provide different input threshold voltages for positive and negative-going 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



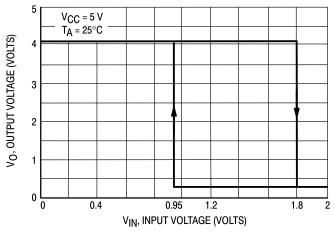


Figure 1. VIN versus VOUT Transfer Function

# SN54/74LS132

### **GUARANTEED OPERATING RANGES**

Symbol	Parameter		Min	Тур	Max	Unit
VCC	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
TA	Operating Ambient Temperature Range	54 74	-55 0	25 25	125 70	°C
lOH	Output Current — High	54, 74			-0.4	mA
loL	Output Current — Low	54 74			4.0 8.0	mA

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

		Limits						
Symbol	Parameter		Min	Тур	Max	Unit	Test Conditions	
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		0.6		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	
VIK	Input Clamp Diode Voltage			-0.65	-1.5	V	$V_{CC} = MIN, I_{IN} = -18 \text{ mA}$	
	Outract HIOLIVella na	54	2.5	3.4		,,	$V_{CC} = MIN$ , $I_{OH} = -400 \mu A$ , $V_{IN} = V_{IL}$	
VOH	Output HIGH Voltage	74	2.7	3.4		V		
.,	Output LOW Voltage	54, 74		0.25	0.4	V	$V_{CC}$ = MIN, $I_{OL}$ = 4.0 mA, $V_{IN}$ = 2.0 V	
VOL		74		0.35	0.5	V	$V_{CC}$ = MIN, $I_{OL}$ = 8.0 mA, $V_{IN}$ = 2.0 V	
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> _	
	Input HIGH Current				20	μΑ	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 2.7 V	
lН					0.1	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 7.0 V	
I <sub>IL</sub>	Input LOW Current				-0.4	mA	$V_{CC} = MAX$ , $V_{IN} = 0.4 V$	
los	Output Short Circuit Current (Note 1)		-20		-100	mA	V <sub>CC</sub> = MAX, V <sub>OUT</sub> = 0 V	
Icc	Power Supply Current Total, Output HIGH			5.9	11	mA	V <sub>CC</sub> = MAX, V <sub>IN</sub> = 0 V	
	Total, Output LOW			8.2	14	mA	$V_{CC} = MAX, V_{IN} = 4.5 V$	

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

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

		Limits				
Symbol	Parameter	Min	Тур	Max	Unit	Test Conditions
tPLH	Turn-Off Delay, Input to Output			22	ns	V <sub>CC</sub> = 5.0 V
tPHL	Turn-On Delay, Input to Output			22	ns	C <sub>L</sub> = 15 pF

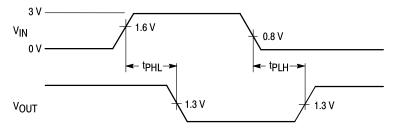


Figure 2. AC Waveforms

# SN54/74LS132

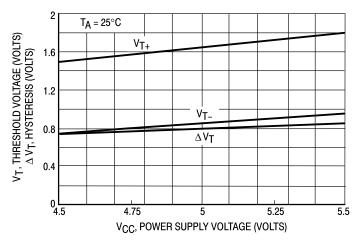


Figure 3. Threshold Voltage and Hysteresis versus Power Supply Voltage

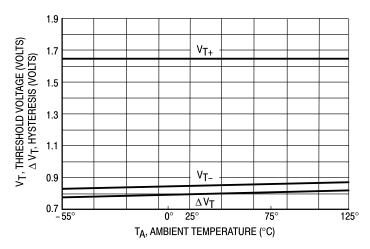
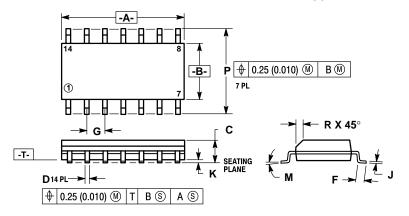
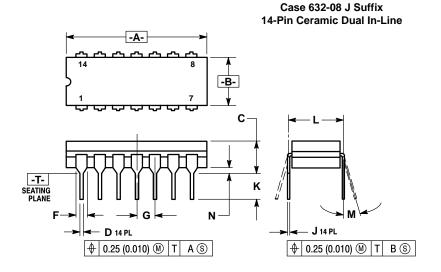


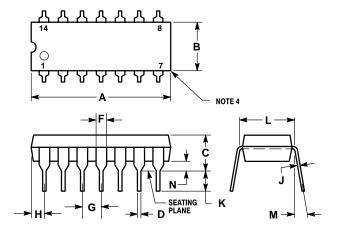
Figure 4. Threshold Voltage and Hysteresis versus Temperature

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





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



#### NOTES:

- DIMENSIONS "A" AND "B" ARE DATUMS AND
  "T" IS A DATUM SURFACE.

  "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.
  6. 751A-01 IS OBSOLETE, NEW STANDARD 751A-02.

	MILLIM	ETERS	INCHES		
DIM	MIN	MAX	MIN	MAX	
Α	8.55	8.75	0.337	0.344	
В	3.80 4.00		0.150	0.157	
С	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°	0° 7°		7°	
Р	5.80 6.20		0.229	0.244	
R	0.25 0.50		0.010	0.019	

#### NOTES:

- IOLES:
  1. DIMENSIONING AND TOLERANCING PER ANSI
  Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEAD WHEN
  FORMED PARALLEL.
  4. DIM F MAY NARROW TO 0.76 (0.030) WHERE

- THE LEAD ENTERS THE CERAMIC BODY.
  5. 632-01 THRU -07 OBSOLETE, NEW STANDARD

	MILLIM	ETERS	INCHES		
DIM	MIN	MAX	MIN	MAX	
Α	19.05	19.94	0.750	0.785	
В	6.23	7.11	0.245	0.280	
С	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	

- NOTES:

  1. LEADS WITHIN 0.13 mm (0.005) RADIUS OF TRUE POSITION AT SEATING PLANE AT MAXIMUM MATERIAL CONDITION.

  2. DIMENSION "L" TO CENTER OF LEADS WHEN FORMED PARALLEL.

  3. DIMENSION "B" DOES NOT INCLUDE MOLD ELACH.
- FLASH
- ROUNDED CORNERS OPTIONAL. 646-05 OBSOLETE, NEW STANDARD 646-06.

	MILLIM	ETERS	INCHES		
DIM	MIN	MAX	MIN	MAX	
Α	18.16	19.56	0.715	0.770	
В	6.10	6.60	0.240	0.260	
С	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		
Н	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	

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

#### **Literature Distribution Centers:**

USA: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036.

EUROPE: Motorola Ltd.; European Literature Centre; 88 Tanners Drive, Blakelands, Milton Keynes, MK14 5BP, England.

JAPAN: Nippon Motorola Ltd.; 4-32-1, Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan.

ASIA PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Center, No. 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.

