

MC74HC132A

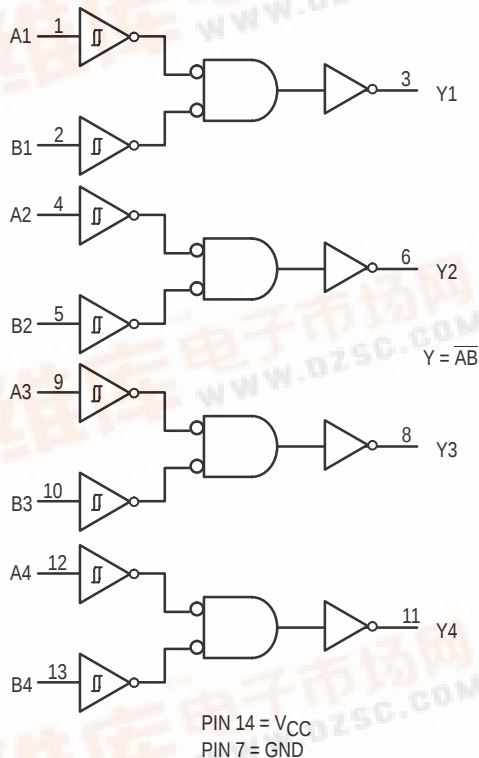
Quad 2-Input NAND Gate with Schmitt-Trigger Inputs High-Performance Silicon-Gate CMOS

The MC74HC132A is identical in pinout to the LS132. The device inputs are compatible with standard CMOS outputs; with pullup resistors, they are compatible with LSTTL outputs.

The HC132A can be used to enhance noise immunity or to square up slowly changing waveforms.

- Output Drive Capability: 10 LSTTL Loads
- Outputs Directly Interface to CMOS, NMOS, and TTL
- Operating Voltage Range: 2.0 to 6.0 V
- Low Input Current: 1.0 μ A
- High Noise Immunity Characteristic of CMOS Devices
- In Compliance with the Requirements Defined by JEDEC Standard No. 7A
- Chip Complexity: 72 FETs or 18 Equivalent Gates

LOGIC DIAGRAM



FUNCTION TABLE

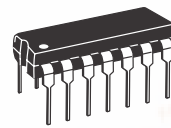
Inputs		Output
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L



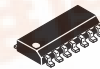
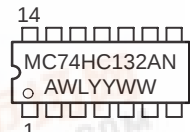
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MARKING DIAGRAMS



PDIP-14
N SUFFIX
CASE 646



SOIC-14
D SUFFIX
CASE 751A



A = Assembly Location
WL or L = Wafer Lot
YY or Y = Year
WW or W = Work Week

PIN ASSIGNMENT

A1	1	14	V _{CC}
B1	2	13	B4
Y1	3	12	A4
A2	4	11	Y4
B2	5	10	B3
Y2	6	9	A3
GND	7	8	Y3

ORDERING INFORMATION

Device	Package	Shipping
MC74HC132AN	PDIP-14	2000 / Box
MC74HC132AD	SOIC-14	55 / Rail
MC74HC132ADR2	SOIC-14	2500 / Reel



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MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	– 0.5 to + 7.0	V
V_{in}	DC Input Voltage (Referenced to GND)	– 1.5 to $V_{CC} + 1.5$	V
V_{out}	DC Output Voltage (Referenced to GND)	– 0.5 to $V_{CC} + 0.5$	V
I_{in}	DC Input Current, per Pin	± 20	mA
I_{out}	DC Output Current, per Pin	± 25	mA
I_{CC}	DC Supply Current, V_{CC} and GND Pins	± 50	mA
P_D	Power Dissipation in Still Air, Plastic DIP† SOIC Package†	750 500	mW
T_{stg}	Storage Temperature	– 65 to + 150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds (Plastic DIP or SOIC Package)	260	°C

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high-impedance circuit. For proper operation, V_{in} and V_{out} should be constrained to the range $GND \leq (V_{in} \text{ or } V_{out}) \leq V_{CC}$. Unused inputs must always be tied to an appropriate logic voltage level (e.g., either GND or V_{CC}). Unused outputs must be left open.

*Maximum Ratings are those values beyond which damage to the device may occur.

Functional operation should be restricted to the Recommended Operating Conditions.

†Derating — Plastic DIP: – 10 mW/°C from 65° to 125°C

SOIC Package: – 7 mW/°C from 65° to 125°C

For high frequency or heavy load considerations, see Chapter 2 of the Motorola High-Speed CMOS Data Book (DL129/D).

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	DC Supply Voltage (Referenced to GND)	2.0	6.0	V
V_{in}, V_{out}	DC Input Voltage, Output Voltage (Referenced to GND)	0	V_{CC}	V
T_A	Operating Temperature, All Package Types	– 55	+ 125	°C
t_r, t_f	Input Rise and Fall Time (Figure 1)	—	no limit*	ns

*When $V_{in} \sim 0.5 V_{CC}$, $I_{CC} \gg$ quiescent current.

DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

Symbol	Parameter	Test Conditions	V_{CC} V	Guaranteed Limit			Unit
				25°C	– 40°C to + 85°C	– 55°C to + 125°C	
$V_{T+} \text{ max}$	Maximum Positive-Going Input Threshold Voltage (Figure 3)	$V_{out} = 0.1 \text{ V}$ $ I_{out} \leq 20 \mu\text{A}$	2.0 4.5 6.0	1.5 3.15 4.2	1.5 3.15 4.2	1.5 3.15 4.2	V
$V_{T+} \text{ min}$	Minimum Positive-Going Input Threshold Voltage (Figure 3)	$V_{out} = 0.1 \text{ V}$ $ I_{out} \leq 20 \mu\text{A}$	2.0 4.5 6.0	1.0 2.3 3.0	0.95 2.25 2.95	0.95 2.25 2.95	V
$V_{T-} \text{ max}$	Maximum Negative-Going Input Threshold Voltage (Figure 3)	$V_{out} = V_{CC} - 0.1 \text{ V}$ $ I_{out} \leq 20 \mu\text{A}$	2.0 4.5 6.0	0.9 2.0 2.6	0.95 2.05 2.65	0.95 2.05 2.65	V
$V_{T-} \text{ min}$	Minimum Negative-Going Input Threshold Voltage (Figure 3)	$V_{out} = V_{CC} - 0.1 \text{ V}$ $ I_{out} \leq 20 \mu\text{A}$	2.0 4.5 6.0	0.3 0.9 1.2	0.3 0.9 1.2	0.3 0.9 1.2	V
V_{Hmax} Note 2	Maximum Hysteresis Voltage (Figure 3)	$V_{out} = 0.1 \text{ V}$ or $V_{CC} - 0.1 \text{ V}$ $ I_{out} \leq 20 \mu\text{A}$	2.0 4.5 6.0	1.2 2.25 3.0	1.2 2.25 3.0	1.2 2.25 3.0	V
V_{Hmin} Note 2	Minimum Hysteresis Voltage (Figure 3)	$V_{out} = 0.1 \text{ V}$ or $V_{CC} - 0.1 \text{ V}$ $ I_{out} \leq 20 \mu\text{A}$	2.0 4.5 6.0	0.2 0.4 0.5	0.2 0.4 0.5	0.2 0.4 0.5	V

NOTE: 1. $V_{Hmin} > (V_{T+} \text{ min}) - (V_{T-} \text{ max})$; $V_{Hmax} = (V_{T+} \text{ max}) + (V_{T-} \text{ min})$.

NOTE: Information on typical parametric values can be found in Chapter 2 of the Motorola High-Speed CMOS Data Book (DL129/D).

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DC ELECTRICAL CHARACTERISTICS (Voltages Referenced to GND)

Symbol	Parameter	Test Conditions	V _{CC} V	Guaranteed Limit			Unit
				- 55 to 25°C	≤ 85°C	≤ 125°C	
V _{OH}	Minimum High-Level Output Voltage	V _{in} ≤ V _{T-} min or V _{T+} max I _{out} ≤ 20 μA	2.0 4.5 6.0	1.9 4.4 5.9	1.9 4.4 5.9	1.9 4.4 5.9	V
		V _{in} ≤ -V _{T-} min or V _{T+} max I _{out} ≤ 4.0 mA I _{out} ≤ 5.2 mA	4.5 6.0	3.98 5.48	3.84 5.34	3.7 5.2	
V _{OL}	Maximum Low-Level Output Voltage	V _{in} ≥ V _{T+} max I _{out} ≤ 20 μA	2.0 4.5 6.0	0.1 0.1 0.1	0.1 0.1 0.1	0.1 0.1 0.1	V
		V _{in} ≥ V _{T+} max I _{out} ≤ 4.0 mA I _{out} ≤ 5.2 mA	4.5 6.0	0.26 0.26	0.33 0.33	0.4 0.4	
I _{in}	Maximum Input Leakage Current	V _{in} = V _{CC} or GND	6.0	± 0.1	± 1.0	± 1.0	μA
I _{CC}	Maximum Quiescent Supply Current (per Package)	V _{in} = V _{CC} or GND I _{out} = 0 μA	6.0	1.0	10	40	μA

AC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, Input t_r = t_f = 6.0 ns)

Symbol	Parameter	V _{CC} V	Guaranteed Limit			Unit
			- 55 to 25°C	≤ 85°C	≤ 125°C	
t _{PLH} , t _{PHL}	Maximum Propagation Delay, Input A or B to Output Y (Figures 1 and 2)	2.0 4.5 6.0	125 25 21	155 31 26	190 38 32	ns
t _{TLH} , t _{THL}	Maximum Output Transition Time, Any Output (Figures 1 and 2)	2.0 4.5 6.0	75 15 13	95 19 16	110 22 19	
C _{in}	Maximum Input Capacitance	—	10	10	10	pF

NOTE: For propagation delays with loads other than 50 pF, and information on typical parametric values, see Chapter 2 of the Motorola High-Speed CMOS Data Book (DL129/D).

C _{PD}	Power Dissipation Capacitance (Per Gate)*	Typical @ 25°C, V _{CC} = 5.0 V	pF
		24	

* Used to determine the no-load dynamic power consumption: P_D = C_{PD} V_{CC}²f + I_{CC} V_{CC}. For load considerations, see Chapter 2 of the Motorola High-Speed CMOS Data Book (DL129/D).

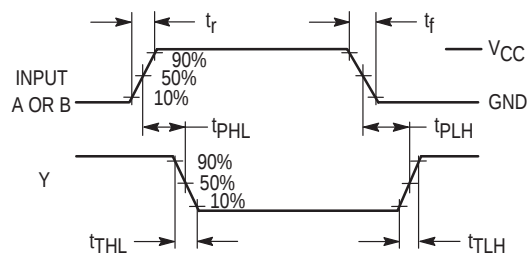
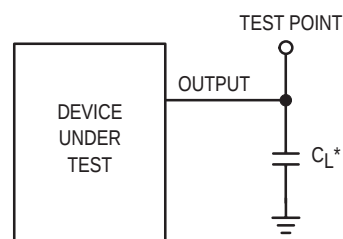


Figure 1. Switching Waveforms



*Includes all probe and jig capacitance

Figure 2. Test Circuit

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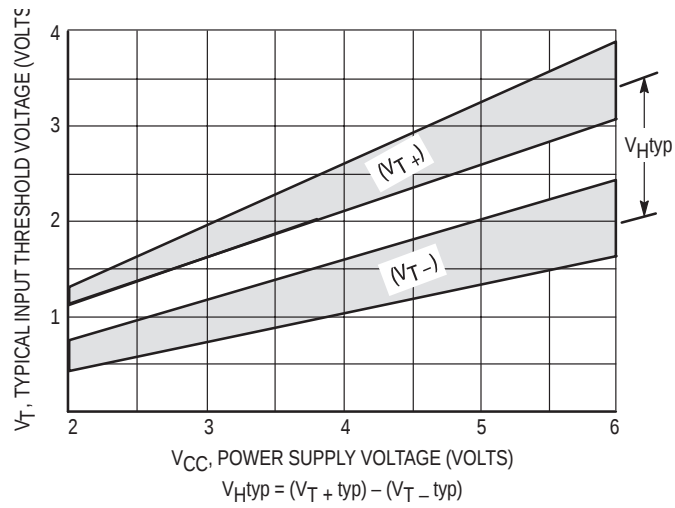


Figure 3. Typical Input Threshold, V_{T+} , V_{T-} Versus Power Supply Voltage

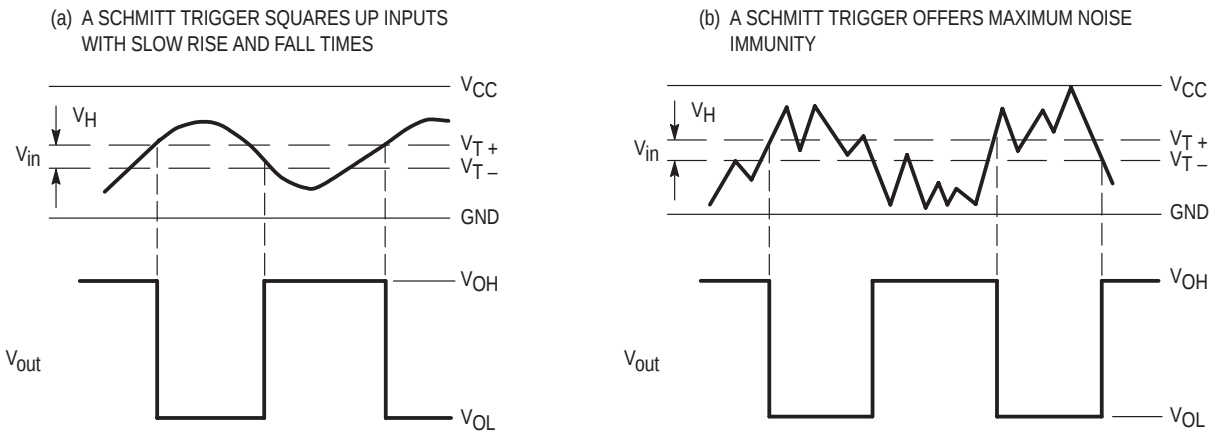
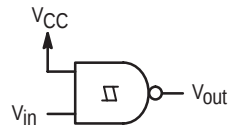
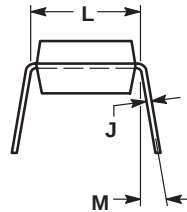
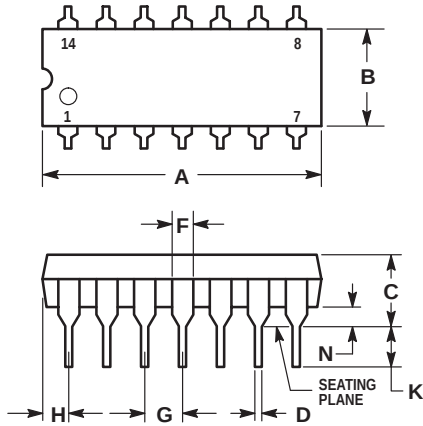


Figure 4. Typical Schmitt-Trigger Applications

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PACKAGE DIMENSIONS

PDIP-14
N SUFFIX
CASE 646-06
ISSUE L

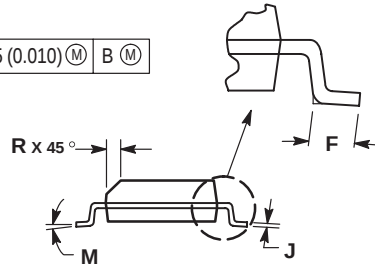
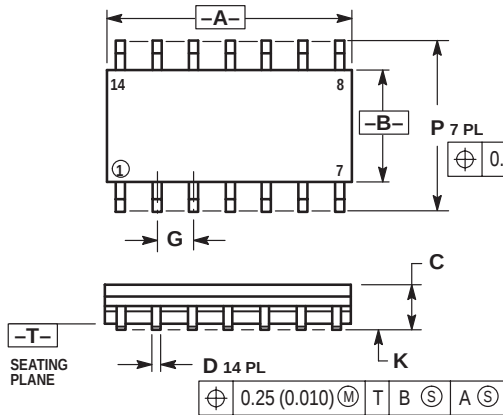


NOTES:

1. LEADS WITHIN 0.13 (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 FLASH.
4. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.715	0.770	18.16	19.56
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	0.300 BSC		7.62 BSC	
M	0°	10°	0°	10°
N	0.015	0.039	0.39	1.01

SOIC-14
D SUFFIX
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°	7°	0°	7°
P	5.80	6.20	0.228	0.244
R	0.25	0.50	0.010	0.019

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Notes

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