MC74AC132, MC74ACT132

Quad 2-Input NAND Schmitt Trigger

High–Performance Silicon–Gate CMOS

The MC74AC/74ACT132 contains four 2–input NAND gates which are capable of transforming slowly changing input signals into sharply defined, jitter–free output signals. In addition, they have greater noise margin than conventional NAND gates.

Each circuit contains a 2–input Schmitt trigger. 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 threshold is determined by resistor ratios and is essentially insensitive to temperature and supply voltage variations.

Features

- Schmitt Trigger Inputs
- Outputs Source/Sink 24 mA
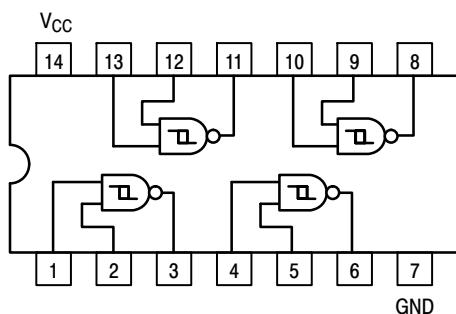- ′ACT132 Has TTL Compatible Inputs
- These are Pb–Free Devices

Figure 1. Pinout; 14–Lead Packages Conductors
(Top View)

FUNCTION TABLE

Inputs		Output
A	B	$\overline{Y}$
L	L	H
L	H	H
H	L	H
H	H	L
H = HIGH Voltage Level	L = LOW Voltage Level	

MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{CC}	DC Supply Voltage		-0.5 to $+7.0$	V
V_I	DC Input Voltage		$-0.5 \leq V_I \leq V_{CC} +0.5$	V
V_O	DC Output Voltage	(Note 1)	$-0.5 \leq V_O \leq V_{CC} +0.5$	V
I_{IK}	DC Input Diode Current		± 20	mA
I_{OK}	DC Output Diode Current		± 50	mA
I_O	DC Output Sink/Source Current		± 50	mA
I_{CC}	DC Supply Current per Output Pin		± 50	mA
I_{GND}	DC Ground Current per Output Pin		± 50	mA
T_{STG}	Storage Temperature Range		-65 to $+150$	°C
T_L	Lead temperature, 1 mm from Case for 10 Seconds		260	°C
T_J	Junction temperature under Bias		$+150$	°C
θ_{JA}	Thermal Resistance (Note 2)		125	°C/W
P_D	Power Dissipation in Still Air at 85°C		125	mW
MSL	Moisture Sensitivity		Level 1	
F_R	Flammability Rating	Oxygen Index: 30% – 35%	UL 94 V–0 @ 0.125 in	
V_{ESD}	ESD Withstand Voltage	Human Body Model (Note 3) Machine Model (Note 4) Charged Device Model (Note 5)	> 2000 > 200 > 1000	V
$I_{Latch-Up}$	Latch–Up Performance Above V_{CC} and Below GND at 85°C (Note 6)		± 100	mA

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.
1. I_O absolute maximum rating must be observed.
2. The package thermal impedance is calculated in accordance with JESD51–7.
3. Tested to EIA/JESD22–A114–A.
4. Tested to EIA/JESD22–A115–A.
5. Tested to JESD22–C101–A.
6. Tested to EIA/JESD78.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter		Min	Typ	Max	Unit
V_{CC}	Supply Voltage	'AC	2.0	5.0	6.0	V
		'ACT	4.5	5.0	5.5	
V_{in}, V_{out}	DC Input Voltage, Output Voltage (Ref. to GND)		0	–	V_{CC}	V
t_r, t_f	Input Rise and Fall Time (Note 1) 'AC Devices except Schmitt Inputs	V_{CC} @ 3.0 V	–	150	–	ns/V
		V_{CC} @ 4.5 V	–	40	–	
		V_{CC} @ 5.5 V	–	25	–	
t_r, t_f	Input Rise and Fall Time (Note 2) 'ACT Devices except Schmitt Inputs	V_{CC} @ 4.5 V	–	10	–	ns/V
		V_{CC} @ 5.5 V	–	8.0	–	
T_J	Junction Temperature (PDIP)		–	–	140	°C
T_A	Operating Ambient Temperature Range		–40	25	85	°C
I_{OH}	Output Current – High		–	–	–24	mA
I_{OL}	Output Current – Low		–	–	24	mA

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.
1. V_{in} from 30% to 70% V_{CC}; see individual Data Sheets for devices that differ from the typical input rise and fall times.
2. V_{in} from 0.8 V to 2.0 V; see individual Data Sheets for devices that differ from the typical input rise and fall times.

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DC CHARACTERISTICS

Symbol	Parameter	V$_{CC}$ (V)	74AC T$_A$ = +25°C	74AC T$_A$ = −40°C to +85°C	Unit	Conditions
			Typ	Guaranteed Limits		
V$_{OH}$	Minimum High Level Output Voltage	3.0 4.5 5.5	2.99 4.49 5.49	2.9 2.9 4.4 4.4 5.4 5.4	V	I$_{OUT}$ = −50 μA
		3.0 4.5 5.5	− − −	2.56 2.46 3.86 3.76 4.86 4.76	V	*V$_{IN}$ = V$_{IL}$ or V$_{IH}$ −12 mA I$_{OH}$ −24 mA −24 mA
V$_{OL}$	Maximum Low Level Output Voltage	3.0 4.5 5.5	0.002 0.001 0.001	0.1 0.1 0.1 0.1 0.1 0.1	V	I$_{OUT}$ = 50 μA
		3.0 4.5 5.5	− − −	0.36 0.44 0.36 0.44 0.36 0.44	V	*V$_{IN}$ = V$_{IL}$ or V$_{IH}$ 12 mA I$_{OL}$ 24 mA 24 mA
I$_{IN}$	Maximum Input Leakage Current	5.5	−	±0.1 ±1.0	μA	V$_I$ = V$_{CC}$, GND
I$_{OLD}$	†Minimum Dynamic Output Current	5.5	−	− 75	mA	V$_{OLD}$ = 1.65 V Max
I$_{OHD}$		5.5	−	− −75	mA	V$_{OHD}$ = 3.85 V Min
I$_{CC}$	Maximum Quiescent Supply Current	5.5	−	4.0 40	μA	V$_{IN}$ = V$_{CC}$ or GND

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
*All outputs loaded; thresholds on input associated with output under test.
†Maximum test duration 2.0 ms, one output loaded at a time.

NOTE: I$_{IN}$ and I$_{CC}$ @ 3.0 V are guaranteed to be less than or equal to the respective limit @ 5.5 V V$_{CC}$.

AC CHARACTERISTICS

Symbol	Parameter	V$_{CC}$* (V)	74AC T$_A$ = +25°C C$_L$ = 50 pF			74AC T$_A$ = −40°C to +85°C C$_L$ = 50 pF		Unit	Fig. No.
			Min	Typ	Max	Min	Max		
t$_{PLH}$	Propagation Delay	3.3 5.0	2.0 2.0	− −	13.0 9.0	1.5 1.5	14.0 10.0	ns	3–5
t$_{PHL}$	Propagation Delay	3.3 5.0	2.0 2.0	− −	13.5 9.0	1.5 1.5	15.0 10.0	ns	3–5

*Voltage Range 3.3 V is 3.3 V ±0.3 V.
  Voltage Range 5.0 V is 5.0 V ±0.5 V.

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DC CHARACTERISTICS

Symbol	Parameter	V_{CC} (V)	74ACT $T_A = +25°C$		74ACT $T_A = -40°C$ to $+85°C$	Unit	Conditions
			Typ	Guaranteed Limits	Guaranteed Limits		
V_{OH}	Minimum High Level Output Voltage	4.5 5.5	4.49 5.49	4.4 5.4	4.4 5.4	V	$I_{OUT} = -50\ \mu A$
		4.5 5.5	– –	3.86 4.86	3.76 4.76	V	*$V_{IN} = V_{IL}$ or V_{IH} I_{OH} -24 mA -24 mA
V_{OL}	Maximum Low Level Output Voltage	4.5 5.5	0.001 0.001	0.1 0.1	0.1 0.1	V	$I_{OUT} = 50\ \mu A$
		4.5 5.5	– –	0.36 0.36	0.44 0.44	V	*$V_{IN} = V_{IL}$ or V_{IH} I_{OL} 24 mA 24 mA
I_{IN}	Maximum Input Leakage Current	5.5	–	±0.1	±1.0	μA	$V_I = V_{CC}$, GND
ΔI_{CCT}	Additional Max. I_{CC}/Input	5.5	0.6	–	1.5	mA	$V_I = V_{CC} - 2.1$ V
I_{OLD}	†Minimum Dynamic Output Current	5.5	–	–	75	mA	$V_{OLD} = 1.65$ V Max
I_{OHD}		5.5	–	–	–75	mA	$V_{OHD} = 3.85$ V Min
I_{CC}	Maximum Quiescent Supply Current	5.5	–	4.0	40	μA	$V_{IN} = V_{CC}$ or GND

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
*All outputs loaded; thresholds on input associated with output under test.
†Maximum test duration 2.0 ms, one output loaded at a time.

AC CHARACTERISTICS

Symbol	Parameter	V_{CC}* (V)	74ACT $T_A = +25°C$ $C_L = 50$ pF			74ACT $T_A = -40°C$ to $+85°C$ $C_L = 50$ pF		Unit	Fig. No.
			Min	Typ	Max	Min	Max		
t_{PLH}	Propagation Delay	5.0	3.0	–	11.5	2.5	13.0	ns	3–6
t_{PHL}	Propagation Delay	5.0	3.0	–	11.0	2.5	12.5	ns	3–5

*Voltage Range 5.0 V is 5.0 V ±0.5 V.

INPUT CHARACTERISTICS (unless otherwise specified)

Symbol	Parameter	V_{CC} (V)	74AC	74ACT	Unit	Test Conditions
$V_{t\,+}$	Maximum Positive Threshold	3.0 4.5 5.5	2.2 3.2 3.9	2.0	V	T_A = Worst Case
$V_{t\,-}$	Minimum Negative Threshold	3.0 4.5 5.5	0.5 0.9 1.1	0.8	V	T_A = Worst Case
$V_{h(max)}$	Maximum Hysteresis	3.0 4.5 5.5	1.2 1.4 1.6	1.2	V	T_A = Worst Case
$V_{h(min)}$	Minimum Hysteresis	3.0 4.5 5.5	0.3 0.4 0.5	0.4	V	T_A = Worst Case

CAPACITANCE

Symbol	Parameter	Value Typ	Unit	Test Conditions
C_{IN}	Input Capacitance	4.5	pF	V_{CC} = 5.0 V
C_{PD}	Power Dissipation Capacitance	30	pF	V_{CC} = 5.0 V

ORDERING INFORMATION

Device	Package	Shipping[†]
MC74AC132DG	SOIC−14 (Pb−Free)	55 Units/Rail
MC74AC132DR2G	SOIC−14 (Pb−Free)	2500/Tape & Reel
MC74ACT132DG	SOIC−14 (Pb−Free)	55 Units/Rail
MC74ACT132DR2G	SOIC−14 (Pb−Free)	2500/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.
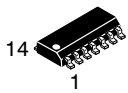
SOIC−14 NB
CASE 751A−03
ISSUE L

DATE 03 FEB 2016

14

1

SCALE 1:1
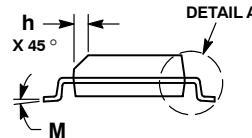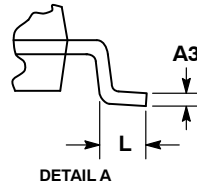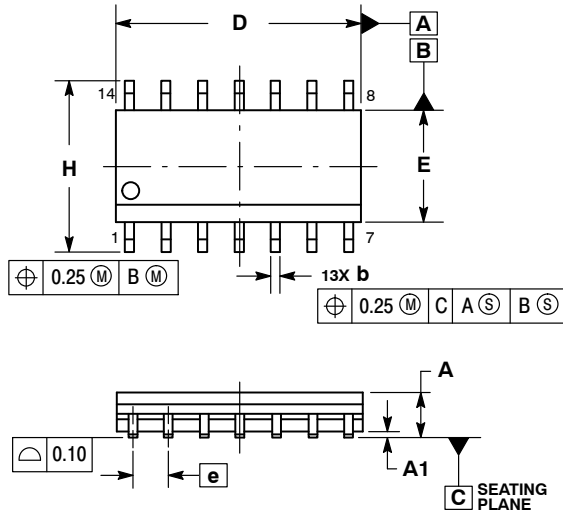
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.

DETAIL A

A3

L

DETAIL A

h

X 45°

M

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.054	0.068
A1	0.10	0.25	0.004	0.010
A3	0.19	0.25	0.008	0.010
b	0.35	0.49	0.014	0.019
D	8.55	8.75	0.337	0.344
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.019
L	0.40	1.25	0.016	0.049
M	0°	7°	0°	7°

D

A
B

14   8

H   **E**

1   7

⊕ 0.25 Ⓜ B Ⓜ

13X **b**

⊕ 0.25 Ⓜ C A Ⓢ B Ⓢ

A

◇ 0.10

e

A1

C SEATING PLANE

SOLDERING FOOTPRINT*

6.50

14X
1.18

1

1.27
PITCH

14X
0.58
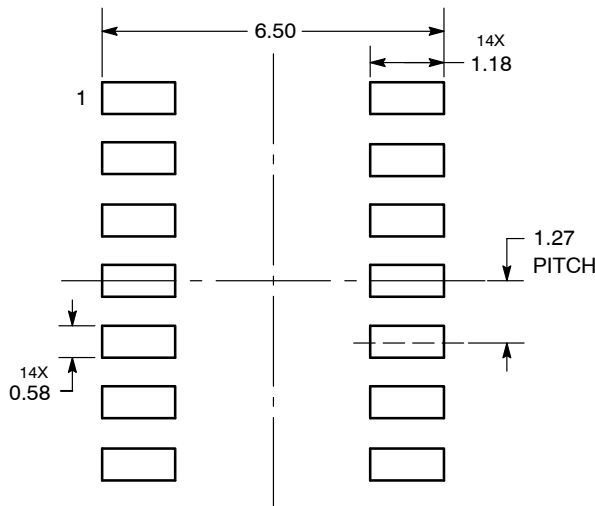
DIMENSIONS: MILLIMETERS

GENERIC MARKING DIAGRAM*

14

XXXXXXXXXG
AWLYWW

1
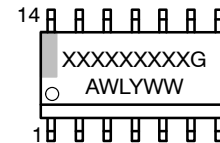
XXXXX = Specific Device Code
A = Assembly Location
WL = Wafer Lot
Y = Year
WW = Work Week
G = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLES ON PAGE 2

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STYLE 1:
PIN 1. COMMON CATHODE
2. ANODE/CATHODE
3. ANODE/CATHODE
4. NO CONNECTION
5. ANODE/CATHODE
6. NO CONNECTION
7. ANODE/CATHODE
8. ANODE/CATHODE
9. ANODE/CATHODE
10. NO CONNECTION
11. ANODE/CATHODE
12. ANODE/CATHODE
13. NO CONNECTION
14. COMMON ANODE

STYLE 2:
CANCELLED

STYLE 3:
PIN 1. NO CONNECTION
2. ANODE
3. ANODE
4. NO CONNECTION
5. ANODE
6. NO CONNECTION
7. ANODE
8. ANODE
9. ANODE
10. NO CONNECTION
11. ANODE
12. ANODE
13. NO CONNECTION
14. COMMON CATHODE

STYLE 4:
PIN 1. NO CONNECTION
2. CATHODE
3. CATHODE
4. NO CONNECTION
5. CATHODE
6. NO CONNECTION
7. CATHODE
8. CATHODE
9. CATHODE
10. NO CONNECTION
11. CATHODE
12. CATHODE
13. NO CONNECTION
14. COMMON ANODE

STYLE 5:
PIN 1. COMMON CATHODE
2. ANODE/CATHODE
3. ANODE/CATHODE
4. ANODE/CATHODE
5. ANODE/CATHODE
6. NO CONNECTION
7. COMMON ANODE
8. COMMON CATHODE
9. ANODE/CATHODE
10. ANODE/CATHODE
11. ANODE/CATHODE
12. ANODE/CATHODE
13. NO CONNECTION
14. COMMON ANODE

STYLE 6:
PIN 1. CATHODE
2. CATHODE
3. CATHODE
4. CATHODE
5. CATHODE
6. CATHODE
7. CATHODE
8. ANODE
9. ANODE
10. ANODE
11. ANODE
12. ANODE
13. ANODE
14. ANODE

STYLE 7:
PIN 1. ANODE/CATHODE
2. COMMON ANODE
3. COMMON CATHODE
4. ANODE/CATHODE
5. ANODE/CATHODE
6. ANODE/CATHODE
7. ANODE/CATHODE
8. ANODE/CATHODE
9. ANODE/CATHODE
10. ANODE/CATHODE
11. COMMON CATHODE
12. COMMON ANODE
13. ANODE/CATHODE
14. ANODE/CATHODE

STYLE 8:
PIN 1. COMMON CATHODE
2. ANODE/CATHODE
3. ANODE/CATHODE
4. NO CONNECTION
5. ANODE/CATHODE
6. ANODE/CATHODE
7. COMMON ANODE
8. COMMON ANODE
9. ANODE/CATHODE
10. ANODE/CATHODE
11. NO CONNECTION
12. ANODE/CATHODE
13. ANODE/CATHODE
14. COMMON CATHODE

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ADDITIONAL INFORMATION

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