SN54AHCT132, SN74AHCT132 QUADRUPLE POSITIVE-NAND GATES WITH SCHMITT-TRIGGER INPUTS

SCLS366G - MAY 1997 - REVISED APRIL 2002

- Inputs Are TTL-Voltage Compatible
- Operation From Very Slow Input Transitions
- Temperature-Compensated Threshold Levels
- High Noise Immunity
- Same Pinouts as 'AHCT00
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)

description

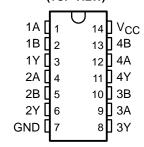
The 'AHCT132 devices are quadruple positive-NAND gates.

These devices perform the Boolean function $Y = \overline{A \cdot B}$ or $Y = \overline{A} + \overline{B}$ in positive logic.

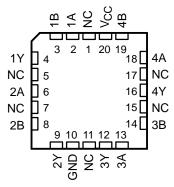
Each circuit functions as a NAND gate, but because of the Schmitt action, it has different input threshold levels for positive- and negative-going signals.

These circuits are temperature compensated and can be triggered from the slowest of input ramps and still give clean jitter-free output signals.

SN54AHCT132 . . . J OR W PACKAGE SN74AHCT132 . . . D, DB, DGV, N, NS, OR PW PACKAGE (TOP VIEW)



SN54AHCT132...FK PACKAGE (TOP VIEW)



NC - No internal connection

ORDERING INFORMATION

TA	PACKA	GEŤ	ORDERABLE PART NUMBER	TOP-SIDE MARKING
	PDIP – N	Tube	SN74AHCT132N	SN74AHCT132N
–40°C to 85°C	SOIC - D	Tube	SN74AHCT132D	AHCT132
	3010-15	Tape and reel	SN74AHCT132DR	AHOTISE
	SOP – NS	Tape and reel	SN74AHCT132NSR	AHCT132
	SSOP – DB	Tape and reel	SN74AHCT132DBR	HB132
	TSSOP – PW	Tape and reel	SN74AHCT132PWR	HB132
	TVSOP – DGV	Tape and reel	SN74AHCT132DGVR	HB132
	CDIP – J	Tube	SNJ54AHCT132J	SNJ54AHCT132J
–55°C to 125°C	CFP – W	Tube	SNJ54AHCT132W	SNJ54AHCT132W
	LCCC – FK	Tube	SNJ54AHCT132FK	SNJ54AHCT132FK

[†] Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



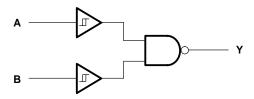
SN54AHCT132, SN74AHCT132 QUADRUPLE POSITIVE-NAND GATES

SCLS366G - MAY 1997 - REVISED APRIL 2002

FUNCTION TABLE (each gate)

INP	UTS	OUTPUT					
Α	В	Υ					
Н	Н	L					
L	X	Н					
Х	L	Н					

logic diagram, each gate (positive logic)



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage range, V _{CC}		
Output voltage range, VO (see Note 1)		-0.5 V to V _{CC} + 0.5 V
Input clamp current, I _{IK} (V _I < 0)		
Output clamp current, I _{OK} (V _O < 0 or V _O > V _{CO}	c)	±20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})		±25 mA
Continuous current through V _{CC} or GND		±50 mA
Package thermal impedance, θ _{JA} (see Note 2)	: D package	86°C/W
	DB package	96°C/W
	DGV package	127°C/W
	N package	80°C/W
	NS package	76°C/W
	PW package	113°C/W
Storage temperature range, T _{stq}		–65°C to 150°C

[†] Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
 - 2. The package thermal impedance is calculated in accordance with JESD 51-7.



SCLS366G - MAY 1997 - REVISED APRIL 2002

recommended operating conditions (see Note 3)

		SN54AH	ICT132	SN74AH	CT132	UNIT
		MIN	MAX	MIN	MAX	UNIT
Vcc	Supply voltage	4.5	5.5	4.5	5.5	V
VI	Input voltage	0	5.5	0	5.5	V
Vo	Output voltage	0	Vcc	0	VCC	V
ЮН	High-level output current	3	-8		-8	mA
loL	Low-level output current	Q _C	8		8	mA
TA	Operating free-air temperature	– 55	125	-40	85	°C

NOTE 3: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, Implications of Slow or Floating CMOS Inputs, literature number SCBA004.

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	V	T,	√ = 25°C	;	SN54AH	CT132	SN74AH	CT132	UNIT	
PARAMETER	TEST CONDITIONS	vcc	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT	
V _{T+}		4.5 V	0.9		1.9	0.9	1.9	0.9	1.9	V	
Positive-going input threshold voltage		5.5 V	1		2.1	1	2.1	1	2.1	V	
VT-		4.5 V	0.5		1.5	0.5	1.5	0.5	1.5	V	
Negative-going input threshold voltage		5.5 V	0.6		1.7	0.6	1.7	0.6	1.7	٧	
ΔV _T		4.5 V	0.3		1.4	0.3	1.4	0.3	1.4	V	
Hysteresis (V _{T+} - V _{T-})		5.5 V	0.3		1.5	0.3	1.5	0.3	1.5	V	
Vou	I _{OH} = -50 μA	4.5 V	4.4	4.5		4.4	,	4.4			
VOH	I _{OH} = –8 mA	4.5 V	3.94			3.8		3.8		7 °	
V	I _{OL} = 50 μA	4.5 V			0.1	08	0.1		0.1 V		
V _{OL}	I _{OL} = 8 mA	4.5 V			0.36	Q	0.5		0.44	V	
lı	V _I = 5.5 V or GND	0 V to 5.5 V			±0.1		±1*		±1	μΑ	
Icc	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			2		20		20	μΑ	
ΔI _{CC} †	One input at 3.4 V, Other inputs at V _{CC} or GND	5.5 V			1.35		1.5		1.5	mA	
C _i	V _I = V _{CC} or GND	5 V		2	10				10	pF	

 $^{^{*}}$ On products compliant to MIL-PRF-38535, this parameter is not production tested at $V_{CC} = 0 \text{ V}$.

[†] This is the increase in supply current for each input at one of the specified TTL voltage levels rather than 0 V or V_{CC}.

SN54AHCT132, SN74AHCT132 QUADRUPLE POSITIVE-NAND GATES WITH SCHMITT-TRIGGER INPUTS

SCLS366G - MAY 1997 - REVISED APRIL 2002

switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V \pm 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	то	LOAD CAPACITANCE	T _A = 25°C			SN54AHCT132		SN74AH	UNIT				
PARAMETER	(INPUT)	(OUTPUT)		MIN	TYP	MAX	MIN	MAX	MIN	MAX	ONII			
t _{PLH}	A or B	V	C _L = 15 pF		5.5*	8*	1*	9*	1	9	ns			
t _{PHL}	AOIB	ī			4.5*	6*	1*	7*	1	7	115			
tPLH	A or B	V	C _L = 50 pF		6.5	9	P10	10	1	10				
t _{PHL}	AUID	1		CL = 50 pF	CL = 50 pF	CL = 50 pF	CL = 50 pr		5.5	7	Q 1	8	1	8

^{*} On products compliant to MIL-PRF-38535, this parameter is not production tested.

noise characteristics, $V_{CC} = 5 \text{ V}$, $C_L = 50 \text{ pF}$, $T_A = 25^{\circ}\text{C}$ (see Note 4)

	PARAMETER	SN7	UNIT		
	PARAMETER	MIN	TYP	MAX	ONT
V _{OL(P)}	Quiet output, maximum dynamic V _{OL}		0.5	0.8	V
V _{OL(V)}	Quiet output, minimum dynamic VOL		-0.28	-0.8	V
V _{OH(V)}	Quiet output, minimum dynamic VOH		5		V
V _{IH(D)}	High-level dynamic input voltage	2			V
V _{IL(D)}	Low-level dynamic input voltage			0.8	V

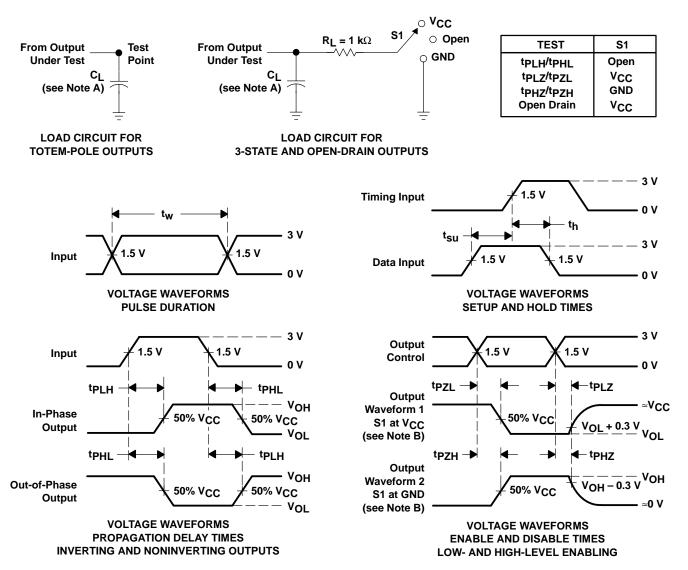
NOTE 4: Characteristics are for surface-mount packages only.

operating characteristics, $V_{CC} = 5 \text{ V}$, $T_A = 25^{\circ}\text{C}$

	PARAMETER	TEST CONDITIONS	TYP	UNIT
Ī	C _{pd} Power dissipation capacitance	No load, f = 1 MHz	15	pF

SCLS366G - MAY 1997 - REVISED APRIL 2002

PARAMETER MEASUREMENT INFORMATION



NOTES: A. C_L includes probe and jig capacitance.

- B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
- C. All input pulses are supplied by generators having the following characteristics: PRR \leq 1 MHz, $Z_Q = 50 \Omega$, $t_f \leq$ 3 ns, $t_f \leq$ 3 ns.
- D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms







10-Jun-2014

PACKAGING INFORMATION

Orderable Device	Status	Package Type	_	Pins	Package	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)	(6)	(3)		(4/5)	
SN74AHCT132D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT132	Samples
SN74AHCT132DBR	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB132	Samples
SN74AHCT132DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT132	Samples
SN74AHCT132DGVR	ACTIVE	TVSOP	DGV	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB132	Samples
SN74AHCT132DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT132	Samples
SN74AHCT132DRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT132	Samples
SN74AHCT132DRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT132	Samples
SN74AHCT132N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	-40 to 85	SN74AHCT132N	Samples
SN74AHCT132NSR	ACTIVE	so	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	AHCT132	Samples
SN74AHCT132PWR	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB132	Samples
SN74AHCT132PWRE4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB132	Samples
SN74AHCT132PWRG4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	HB132	Samples

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

TBD: The Pb-Free/Green conversion plan has not been defined.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.



PACKAGE OPTION ADDENDUM

10-Jun-2014

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes. **Pb-Free** (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

- (3) MSL, Peak Temp. The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.
- (4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.
- (5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.
- (6) Lead/Ball Finish Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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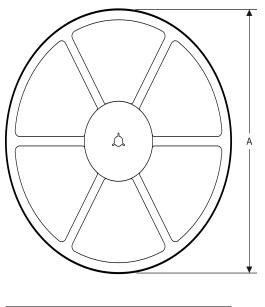
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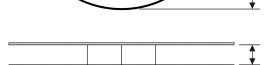
PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION

REEL DIMENSIONS





TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
В0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

TAPE AND REEL INFORMATION

*All dimensions are nominal

All diffiensions are nominal												
Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AHCT132DBR	SSOP	DB	14	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74AHCT132DGVR	TVSOP	DGV	14	2000	330.0	12.4	6.8	4.0	1.6	8.0	12.0	Q1
SN74AHCT132DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74AHCT132NSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74AHCT132PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

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*All dimensions are nominal

7 til dillionsions are nominal							
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHCT132DBR	SSOP	DB	14	2000	367.0	367.0	38.0
SN74AHCT132DGVR	TVSOP	DGV	14	2000	367.0	367.0	35.0
SN74AHCT132DR	SOIC	D	14	2500	367.0	367.0	38.0
SN74AHCT132NSR	SO	NS	14	2000	367.0	367.0	38.0
SN74AHCT132PWR	TSSOP	PW	14	2000	367.0	367.0	35.0

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