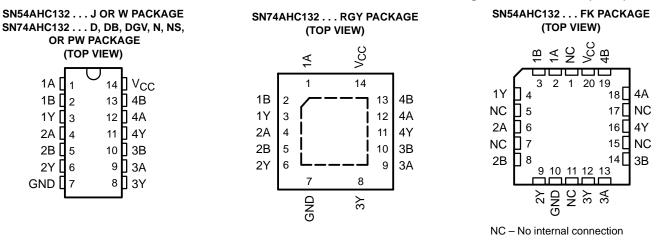
#### SN54AHC132, SN74AHC132 QUADRUPLE POSITIVE-NAND GATES WITH SCHMITT-TRIGGER INPUTS SCLS365G – MAY 1997 – REVISED SEPTEMBER 2002

- Operating Range 2-V to 5.5-V V<sub>CC</sub>
- Operation From Very Slow Input Transitions
- Temperature-Compensated Threshold Levels
- High Noise Immunity

- Same Pinouts as 'AHC00
- 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/ordering information

The 'AHC132 devices are quadruple positive-NAND gates designed for 2-V to 5.5-V V<sub>CC</sub> operation. These devices perform the Boolean function  $Y = \overline{A \bullet B}$  or  $Y = \overline{A} + \overline{B}$  in positive logic.

		OR	DERING INFO	RMATION	
	TA	PACKA	GE <sup>†</sup>	ORDERABLE PART NUMBER	TOP-SIDE MARKING
		QFN – RGY	Tape and reel	SN74AHC132RGYR	HA132
		PDIP – N	Tube	SN74AHC132N	SN74AHC132N
		SOIC – D	Tube	SN74AHC132D	AHC132
	–40°C to 85°C	3010 - 0	Tape and reel	SN74AHC132DR	Anorsz
	-40 C 10 85 C	SOP – NS	Tape and reel	SN74AHC132NSR	AHC132
		SSOP – DB	Tape and reel	SN74AHC132DBR	HA132
		TSSOP – PW	Tape and reel	SN74AHC132PWR	HA132
		TVSOP – DGV	Tape and reel	SN74AHC132DGVR	HA132
		CDIP – J	Tube	SNJ54AHC132J	SNJ54AHC132J
	–55°C to 125°C	CFP – W	Tube	SNJ54AHC132W	SNJ54AHC132W
		LCCC – FK	Tube	SNJ54AHC132FK	SNJ54AHC132FK

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



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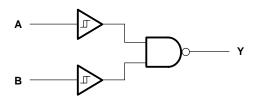
#### description/ordering information (continued)

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.

FUNCTION TABLE (each gate)												
INPUTS OUTPUT												
A	В	Y										
н	Н	L										
L	Х	Н										
Х	L	Н										

logic diagram, each gate (positive logic)



#### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

<sup>†</sup> 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.

3. The package thermal impedance is calculated in accordance with JESD 51-5.



SCLS365G - MAY 1997 - REVISED SEPTEMBER 2002

#### recommended operating conditions (see Note 4)

			SN54A	HC132	SN74A	HC132	UNIT
			MIN	MAX	MIN	MAX	UNIT
VCC	Supply voltage		2	5.5	2	5.5	V
VI	Input voltage		0	5.5	0	5.5	V
Vo	Output voltage		0	Vcc	0	VCC	V
		$V_{CC} = 2 V$		-50		-50	μA
ЮН	High-level output current	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$	4	<b>χ</b> –4		-4	mA
		$V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$	C)	-8		-8	ША
		$V_{CC} = 2 V$	la c	50		50	μΑ
IOL	Low-level output current	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$	5	4		4	mA
		$V_{CC}$ = 5 V ± 0.5 V		8		8	ША
ТĄ	Operating free-air temperature		-55	125	-40	85	°C

NOTE 4: All unused inputs of the device must be held at V<sub>CC</sub> 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)

DADAMETED	TEST CONDITIONS	N	Т	Δ = 25°C	;	SN54A	HC132	SN74A	HC132	UNIT
PARAMETER	TEST CONDITIONS	Vcc	MIN	TYP	MAX	MIN	MAX	MIN	MAX	UNIT
V <sub>T+</sub>		3 V	1.2		2.2	1.2	2.2	1.2	2.2	
Positive-going		4.5 V	1.75		3.15	1.75	3.15	1.75	3.15	V
input threshold voltage		5.5 V	2.15		3.85	2.15	3.85	2.15	3.85	
V <sub>T</sub>		3 V	0.9		1.9	0.9	1.9	0.9	1.9	
Negative-going		4.5 V	1.35		2.75	1.35	2.75	1.35	2.75	V
input threshold voltage		5.5 V	1.65		3.35	1.65	3.35	1.65	3.35	
		3 V	0.3		1.2	0.3	1.2	0.3	1.2	
$\Delta V_T$ Hysteresis (V <sub>T+</sub> – V <sub>T-</sub> )		4.5 V	0.4		1.4	0.4	1.4	0.4	1.4	V
		5.5 V	0.5		1.6	0.5	1.6	0.5	1.6	
		2 V	1.9	2		1.9	351	1.9		
	I <sub>OH</sub> = -50 μA	3 V	2.9	3		2.9	2	2.9		
V <sub>OH</sub>		4.5 V	4.4	4.5		4.4	4	4.4		V
	$I_{OH} = -4 \text{ mA}$	3 V	2.58			2.48		2.48		
	I <sub>OH</sub> = –8 mA	4.5 V	3.94			3.8		3.8		
		2 V			0.1		0.1		0.1	
	I <sub>OL</sub> = 50 μA	3 V			0.1		0.1		0.1	
VOL		4.5 V			0.1		0.1		0.1	V
	I <sub>OL</sub> = 4 mA	mA 3 V 0.36 0				0.5		0.44		
	I <sub>OL</sub> = 8 mA	4.5 V			0.36		0.5		0.44	
lı	$V_{I} = 5.5 V \text{ or GND}$	0 V to 5.5 V			±0.1		±1*		±1	μΑ
ICC	$V_I = V_{CC} \text{ or } GND,  I_O = 0$	5.5 V			2		20		20	μΑ
Ci	$V_I = V_{CC}$ or GND	5 V		1.9	10				10	pF

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



SCLS365G - MAY 1997 - REVISED SEPTEMBER 2002

# switching characteristics over recommended operating free-air temperature range, $V_{CC}$ = 3.3 V $\pm$ 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	TO (OUTPUT)	LOAD CAPACITANCE	T <sub>A</sub> = 25°C			SN54AHC132		SN74AHC132		UNIT
FARAIWIETER	(INPUT)			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
<sup>t</sup> PLH	A or B	v	C <sub>L</sub> = 15 pF		5.6*	11.9*	1*	14*	1	14	ns
<sup>t</sup> PHL	A or B				5.6*	11.9*	1*	14*	1	14	
<sup>t</sup> PLH	A or P	Y	CL = 50 pF		7.6	15.4	~1<	17.5	1	17.5	ns
<sup>t</sup> PHL	A or B				7.6	15.4	<b>Q</b> 1	17.5	1	17.5	

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

# 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	TO (OUTPUT)	LOAD CAPACITANCE	T <sub>A</sub> = 25°C			SN54AHC132		SN74AHC132		UNIT
PARAMETER	(INPUT)			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
<sup>t</sup> PLH	A or B	v	C <sub>L</sub> = 15 pF		3.9*	7.7*	1*	9*	1	9	ns
<sup>t</sup> PHL	AUB	T I			3.9*	7.7*	1*	9*	1	9	
<sup>t</sup> PLH	A or P	Y	CL = 50 pF		5.3	9.7	्रम्	11	1	11	ns
<sup>t</sup> PHL	A or B				5.3	9.7	<b>Q</b> 1	11	1	11	

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

## noise characteristics, $V_{CC}$ = 5 V, $C_L$ = 50 pF, $T_A$ = 25°C (see Note 5)

	PARAMETER	SN7	32	UNIT	
	FARAMETER	MIN	TYP	MAX	UNIT
V <sub>OL(P)</sub>	Quiet output, maximum dynamic V <sub>OL</sub>		0.45	0.8	V
V <sub>OL(V)</sub>	Quiet output, minimum dynamic V <sub>OL</sub>		-0.35	-0.8	V
VOH(V)	Quiet output, minimum dynamic V <sub>OH</sub>		4.8		V
VIH(D)	High-level dynamic input voltage	3.5			V
V <sub>IL(D)</sub>	Low-level dynamic input voltage			1.5	V

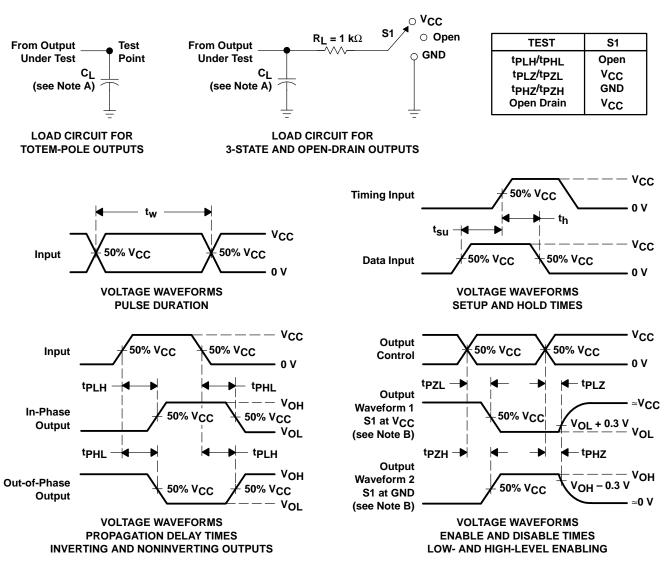
NOTE 5: Characteristics are for surface-mount packages only.

## operating characteristics, V<sub>CC</sub> = 5 V, $T_A$ = 25°C

PARAMETER	TEST C	ONDITIONS	TYP	UNIT
C <sub>pd</sub> Power dissipation capacitance	No load,	f = 1 MHz	11	pF



SCLS365G - MAY 1997 - REVISED SEPTEMBER 2002



### PARAMETER MEASUREMENT INFORMATION

NOTES: A. C<sub>1</sub> 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<sub>O</sub> = 50  $\Omega$ , t<sub>f</sub>  $\leq$  3 ns, t<sub>f</sub>  $\leq$  3 ns.
- D. The outputs are measured one at a time with one input transition per measurement.
- E. All parameters and waveforms are not applicable to all devices.

#### Figure 1. Load Circuit and Voltage Waveforms



4-Jun-2007

#### **PACKAGING INFORMATION**

TEXAS INSTRUMENTS www.ti.com

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Packag Qty	e Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
SN74AHC132D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132DBR	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132DBRE4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132DBRG4	ACTIVE	SSOP	DB	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132DE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132DGVR	ACTIVE	TVSOP	DGV	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132DGVRE4	ACTIVE	TVSOP	DGV	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132DGVRG4	ACTIVE	TVSOP	DGV	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132DRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132DRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132N	ACTIVE	PDIP	Ν	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74AHC132NE4	ACTIVE	PDIP	Ν	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74AHC132NSR	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132NSRE4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132NSRG4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132PW	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132PWE4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132PWG4	ACTIVE	TSSOP	PW	14	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132PWR	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132PWRE4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132PWRG4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHC132RGYR	ACTIVE	QFN	RGY	14	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR
SN74AHC132RGYRG4	ACTIVE	QFN	RGY	14	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR

<sup>(1)</sup> 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.

<sup>(2)</sup> 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.

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

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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)

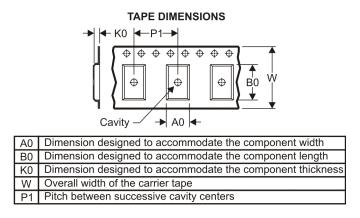
<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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### TAPE AND REEL INFORMATION





## QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

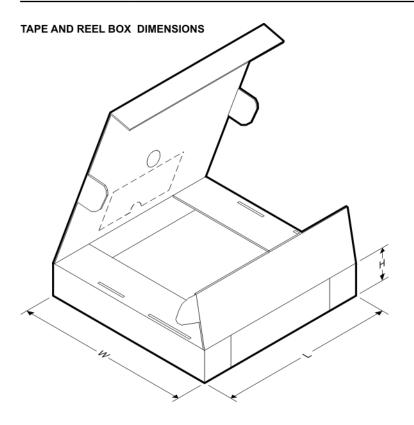


*All dimensions are nominal												
Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AHC132DBR	SSOP	DB	14	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74AHC132DGVR	TVSOP	DGV	14	2000	330.0	12.4	6.8	4.0	1.6	8.0	12.0	Q1
SN74AHC132DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74AHC132NSR	SO	NS	14	2000	330.0	16.4	8.2	10.5	2.5	12.0	16.0	Q1
SN74AHC132PWR	TSSOP	PW	14	2000	330.0	12.4	7.0	5.6	1.6	8.0	12.0	Q1
SN74AHC132RGYR	QFN	RGY	14	1000	180.0	12.4	3.85	3.85	1.35	8.0	12.0	Q1



## PACKAGE MATERIALS INFORMATION

19-Mar-2008



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHC132DBR	SSOP	DB	14	2000	346.0	346.0	33.0
SN74AHC132DGVR	TVSOP	DGV	14	2000	346.0	346.0	29.0
SN74AHC132DR	SOIC	D	14	2500	346.0	346.0	33.0
SN74AHC132NSR	SO	NS	14	2000	346.0	346.0	33.0
SN74AHC132PWR	TSSOP	PW	14	2000	346.0	346.0	29.0
SN74AHC132RGYR	QFN	RGY	14	1000	190.5	212.7	31.8

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