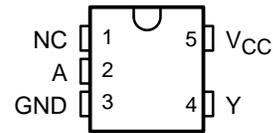


# SN74AHCT1G14 SINGLE SCHMITT-TRIGGER INVERTER GATE

SCLS3220 – MARCH 1996 – REVISED JANUARY 2003

- Operating Range of 4.5 V to 5.5 V
- Max  $t_{pd}$  of 8 ns at 5 V
- Low Power Consumption, 10- $\mu$ A Max  $I_{CC}$
- $\pm 8$ -mA Output Drive at 5 V
- Inputs Are TTL-Voltage Compatible
- Latch-Up Performance Exceeds 250 mA Per JESD 17

DBV OR DCK PACKAGE  
(TOP VIEW)



NC – No internal connection

## description/ordering information

The SN74AHCT1G14 contains a single inverter gate. The device performs the Boolean function  $Y = \bar{A}$ .

The device functions as an independent inverter gate, but because of the Schmitt action, gates may have different input threshold levels for positive- ( $V_{T+}$ ) and negative-going ( $V_{T-}$ ) signals.

## ORDERING INFORMATION

$T_A$	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING‡
-40°C to 85°C	SOT (SOT-23) – DBV	Reel of 3000	SN74AHCT1G14DBVR	B14_
		Reel of 250	SN74AHCT1G14DBVT	
	SOT (SC-70) – DCK	Reel of 3000	SN74AHCT1G14DCKR	BF_
		Reel of 250	SN74AHCT1G14DCKT	

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

‡ The actual top-side marking has one additional character that designates the assembly/test site.

## FUNCTION TABLE

INPUT A	OUTPUT Y
H	L
L	H

## logic diagram (positive logic)



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.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS  
INSTRUMENTS**

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# SN74AHCT1G14

## SINGLE SCHMITT-TRIGGER INVERTER GATE

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

Supply voltage range, $V_{CC}$	–0.5 V to 7 V
Input voltage range, $V_I$ (see Note 1)	–0.5 V to 7 V
Output voltage range, $V_O$ (see Note 1)	–0.5 V to $V_{CC} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ )	–20 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ )	±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, $\theta_{JA}$ (see Note 2): DBV package	206°C/W
DCK package	252°C/W
Storage temperature range, $T_{stg}$	–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.

### recommended operating conditions (see Note 3)

	MIN	MAX	UNIT
$V_{CC}$ Supply voltage	4.5	5.5	V
$V_I$ Input voltage	0	5.5	V
$V_O$ Output voltage	0	$V_{CC}$	V
$I_{OH}$ High-level output current		–8	mA
$I_{OL}$ Low-level output current		8	mA
$T_A$ Operating free-air temperature	–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	$V_{CC}$	$T_A = 25^\circ\text{C}$			MIN	MAX	UNIT
			MIN	TYP	MAX			
$V_{T+}$ Positive-going input threshold voltage		4.5 V	0.9		2	0.9	2	V
		5.5 V	1.1		2	1.1	2	
$V_{T-}$ Negative-going input threshold voltage		4.5 V	0.5		1.6	0.5	1.6	V
		5.5 V	0.6		1.5	0.6	1.5	
$\Delta V_T$ Hysteresis ( $V_{T+} - V_{T-}$ )		4.5 V	0.4		1.4	0.4	1.4	V
		5.5 V	0.5		1.6	0.4	1.6	
$V_{OH}$	$I_{OH} = -50 \mu\text{A}$	4.5 V	4.4	4.5		4.4		V
	$I_{OH} = -8 \text{ mA}$		3.94			3.8		
$V_{OL}$	$I_{OL} = 50 \mu\text{A}$	4.5 V			0.1		0.1	V
	$I_{OL} = 8 \text{ mA}$				0.36		0.44	
$I_I$	$V_I = 5.5 \text{ V or GND}$	0 V to 5.5 V			±0.1		±1	μA
$I_{CC}$	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			1		10	μA
$C_i$	$V_I = V_{CC}$ or GND	5 V		2	10		10	pF



# SN74AHCT1G14 SINGLE SCHMITT-TRIGGER INVERTER GATE

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ\text{C}$			MIN	MAX	UNIT
				MIN	TYP	MAX			
$t_{PLH}$	A	Y	$C_L = 15\text{ pF}$	4	7	7	1	8	ns
$t_{PHL}$				4	7	7	1	8	
$t_{PLH}$	A	Y	$C_L = 50\text{ pF}$	5.5	8	8	1	9	ns
$t_{PHL}$				5.5	8	8	1	9	

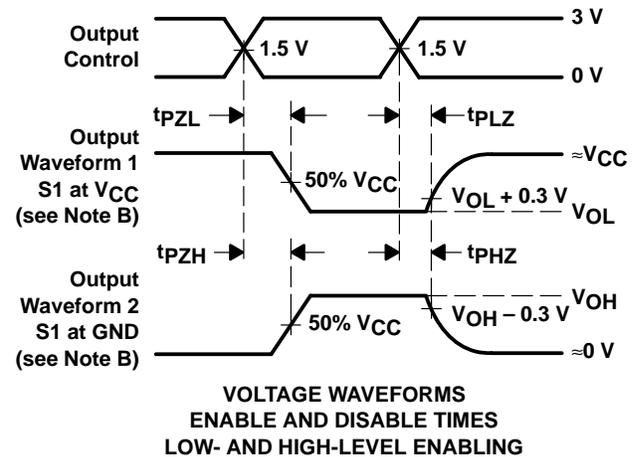
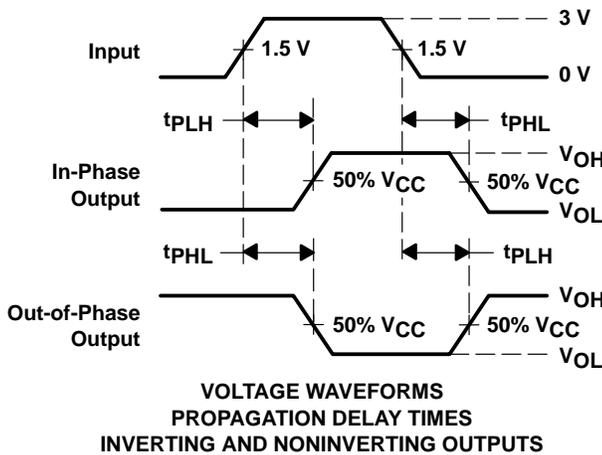
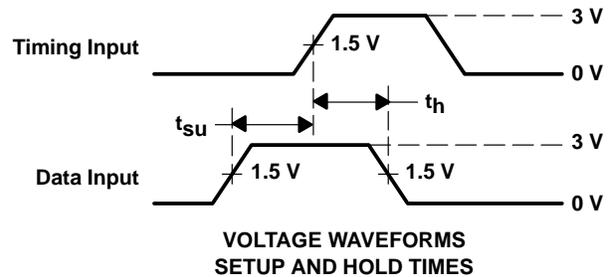
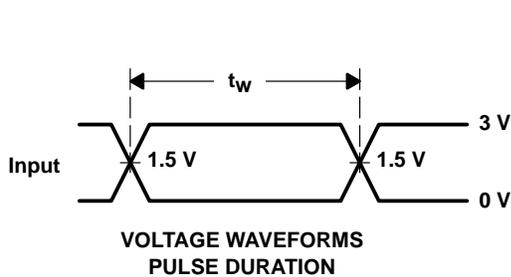
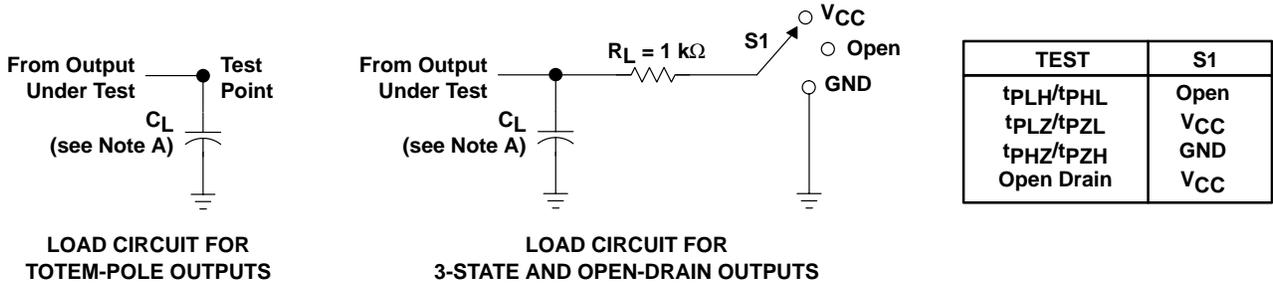
operating characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
$C_{pd}$ Power dissipation capacitance	No load, $f = 1\text{ MHz}$	12	pF

# SN74AHCT1G14 SINGLE SCHMITT-TRIGGER INVERTER GATE

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## PARAMETER MEASUREMENT INFORMATION



- NOTES:
- $C_L$  includes probe and jig capacitance.
  - 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.
  - All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1\text{ MHz}$ ,  $Z_O = 50\ \Omega$ ,  $t_r \leq 3\text{ ns}$ ,  $t_f \leq 3\text{ ns}$ .
  - The outputs are measured one at a time with one input transition per measurement.
  - All parameters and waveforms are not applicable to all devices.

Figure 1. Load Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
74AHCT1G14DBVRE4	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AHCT1G14DBVRG4	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AHCT1G14DBVTE4	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AHCT1G14DBVTG4	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AHCT1G14DCKRE4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AHCT1G14DCKTE4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AHCT1G14DCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHCT1G14DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHCT1G14DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHCT1G14DCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHCT1G14DCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74AHCT1G14DCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

<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.

**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.

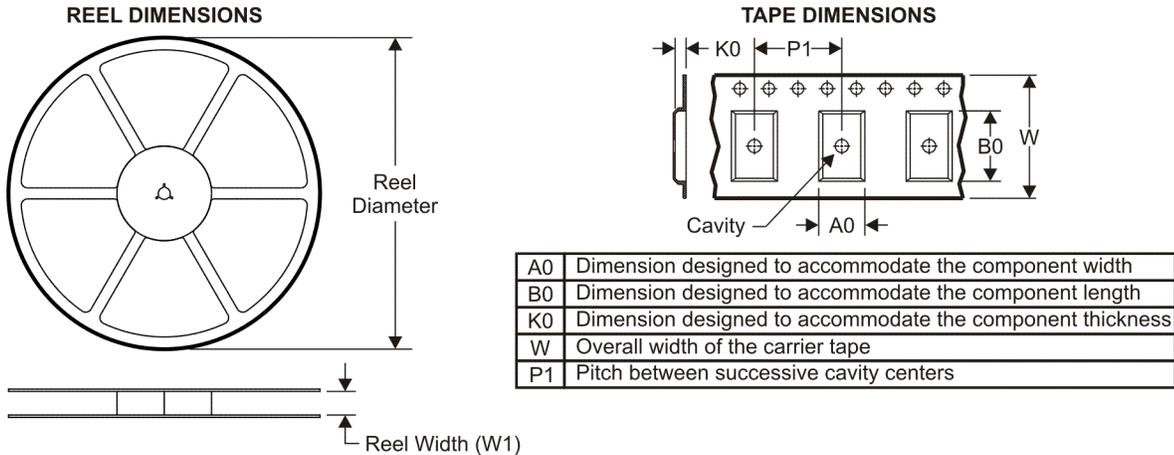
**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

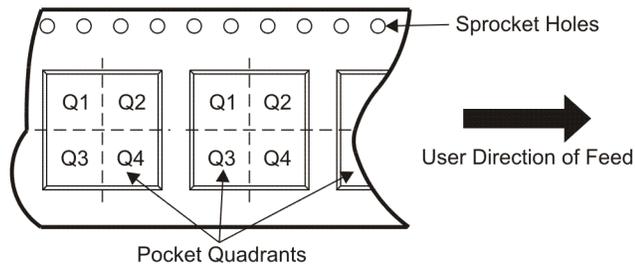
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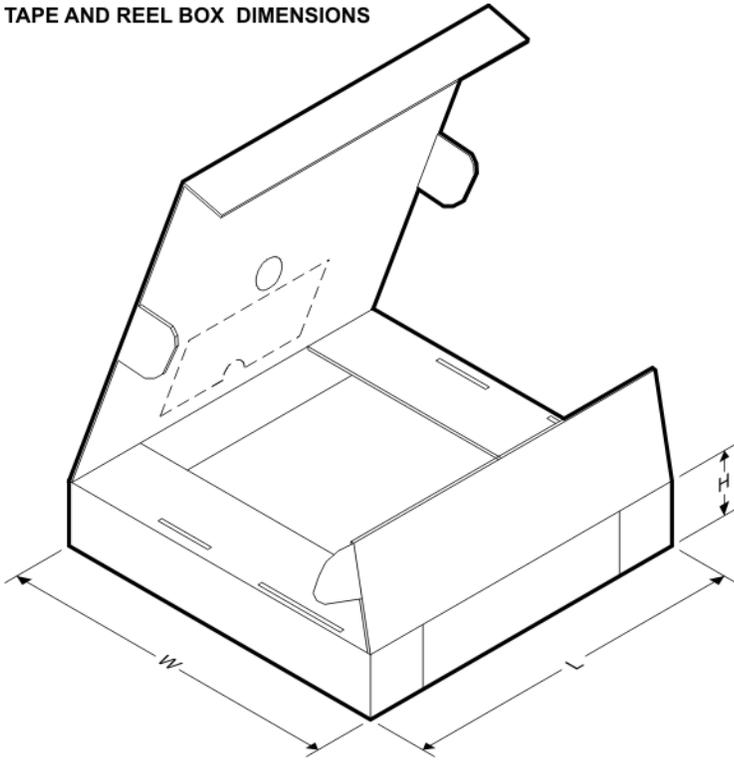
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74AHCT1G14DBVR	SOT-23	DBV	5	3000	180.0	9.2	3.23	3.17	1.37	4.0	8.0	Q3
SN74AHCT1G14DBVT	SOT-23	DBV	5	250	180.0	9.2	3.23	3.17	1.37	4.0	8.0	Q3
SN74AHCT1G14DCKR	SC70	DCK	5	3000	180.0	9.2	2.24	2.34	1.22	4.0	8.0	Q3
SN74AHCT1G14DCKT	SC70	DCK	5	250	180.0	9.2	2.24	2.34	1.22	4.0	8.0	Q3

**TAPE AND REEL BOX DIMENSIONS**



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHCT1G14DBVR	SOT-23	DBV	5	3000	205.0	200.0	33.0
SN74AHCT1G14DBVT	SOT-23	DBV	5	250	201.0	192.0	26.0
SN74AHCT1G14DCKR	SC70	DCK	5	3000	205.0	200.0	33.0
SN74AHCT1G14DCKT	SC70	DCK	5	250	201.0	192.0	26.0





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