

SINGLE SCHMITT-TRIGGER INVERTER GATE

Check for Samples: SN74AHCT1G14

FEATURES

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

NC [1 5] V_{CC} GND [3 4] Y

NC - No internal connection

See mechanical drawings for dimensions.

DESCRIPTION

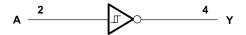
description/ordering information The SN74AHCT1G14 contains a single inverter gate. The device performs the Boolean function $Y = \overline{A}$.

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.

FUNCTION TABLE

INPUTS	OUTPUT
Α	Y
Н	L
L	Н

LOGIC DIAGRAM (POSITIVE LOGIC)





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ABSOLUTE MAXIMUM RATINGS

over operating free-air temperature range (unless otherwise noted)(1)

·		VALUE	UNIT
Supply voltage range, V _{CC}		–0.5 to 7	V
Input voltage range, V _I ⁽²⁾	–0.5 to 7	V	
Output voltage range, V _O ⁽²⁾		−0.5 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 $V_O >$	±20	mA	
Continuous output current, I_O ($V_O = 0$ to V_O	'cc)	±25	mA
Continuous current through V _{CC} or GND		±50	mA
Dealers the median of (3)	DBV package	206	9C/M
Package thermal impedance, θ _{JA} ⁽³⁾	DCK package	252	°C/W
Storage temperature range, T _{stq}		-65 to 150	°C

⁽¹⁾ 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.

RECOMMENDED OPERATING CONDITIONS(1)

		MIN	MAX	UNIT
V_{CC}	Supply voltage	4.5	5.5	V
V_{I}	Input voltage	0	5.5	V
Vo	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	125	°C

⁽¹⁾ 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.

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⁽²⁾ The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

⁽³⁾ The package thermal impedance is calculated in accordance with JESD 51-7.



ELECTRICAL CHARACTERISTICS

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

. 5	, ,		$T_A = 25$ °C $T_A = -40$ °C to				Recomm	ended			
PARAMETER	TEST CONDITIONS	V _{cc}				T _A = -40°C	to 85°C	T _A = -40 125°	UNIT		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX		
V _{T+}		4.5 V	0.9		2	0.9		0.9	2.0		
Positive-going input threshold voltage		5.5 V	1.1		2	1.1		1.1	2.0	V	
V _{T-}		4.5 V	0.5		1.6	0.5		0.5	1.6		
Negative-going input threshold votlage		5.5 V	0.6		1.5	0.6		0.6	1.5	V	
ΔV _T		4.5 V	0.4		1.4	0.4		0.4	1.4		
Hysteresis (V _{T+} – V _{T-})		5.5 V	0.5		1.6	0.4		0.5	1.6	V	
V	I _{OH} = -50 mA	4.5.\/	4.4	4.5		4.4		4.4		٧	
V _{OH}	$I_{OH} = -8 \text{ mA}$	4.5 V	3.94			3.88		3.7		V	
V	I _{OL} = 50 mA	4.5 V			0.1		0.1		0.1	V	
V _{OL}	$I_{OL} = 8 \text{ mA}$	4.5 V			0.36		0.44		0.55	V	
l _l	V _I = 5.5 V or GND	0 V to 5.5 V			±0.1		±1		±1	μΑ	
Icc	$V_I = V_{CC}$ or $I_O = 0$	5.5 V			1		10		10	μΑ	
C_{i}	$V_I = V_{CC}$ or GND	5 V		2	10		10		10	pF	

SWITCHING CHARACTERISTICS

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

						T 4	000 40	Recomi	mended			
PARAMETER	FROM (INPUT)	TO (OUTPUT)	OUTPUT CAPACITANCE	T _A = 25°C		T _A = -4 85°	°C	T _A = -4	UNIT			
				TYP	MAX	MIN	MAX	MIN	MAX			
t _{PLH}	۸	V	0 45 - 5	C 15 pF	Y	4	7	1	8	1	9	ns
t _{PHL}	Α	1	ř	r		4	7	1	8	1	9	
t _{PLH}	^	V	C _L = 50 pF	5.5	8	1	9	1	10	no		
t _{PHL}	A	r		$C_L = 50 \text{ pF}$	5.5	8	1	9	1	10	ns	

OPERATING CHARACTERISTICS

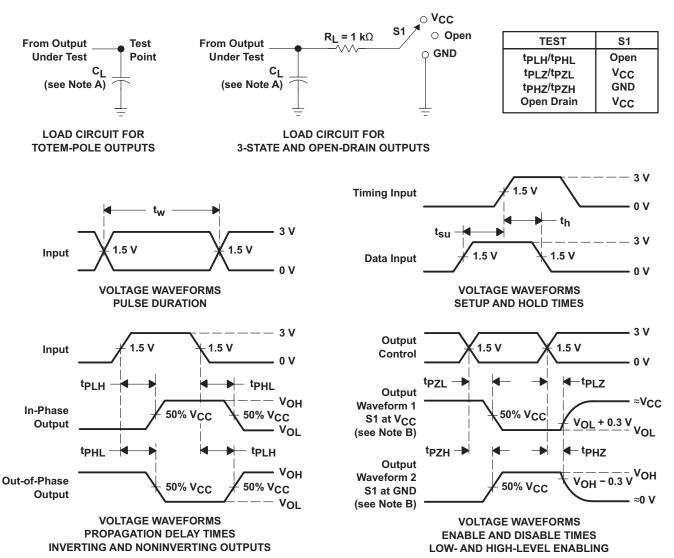
 $V_{CC} = 5 \text{ V}, T_A = 25^{\circ}\text{C}$

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

Product Folder Links: SN74AHCT1G14



PARAMETER MEASUREMENT INFORMATION



- 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, $Z_O = 50 \Omega$, $t_f \leq$ 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

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REVISION HISTORY

CI	hanges from Revision O (January 2003) to Revision P	Page
•	Changed document format from Quicksilver to DocZone.	
•	Extended operating temperature range to 125°C	

Product Folder Links: SN74AHCT1G14





29-May-2013

PACKAGING INFORMATION

Orderable Device	Status	Package Type	U	Pins	_	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)		(3)		(4/5)	
74AHCT1G14DBVRE4	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(B142 ~ B143 ~ B14G ~ B14J ~ B14L ~ B14S)	Samples
74AHCT1G14DBVRG4	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(B142 ~ B143 ~ B14G ~ B14J ~ B14L ~ B14S)	Samples
74AHCT1G14DBVTE4	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(B143 ~ B14G ~ B14L ~ B14S)	Samples
74AHCT1G14DBVTG4	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(B143 ~ B14G ~ B14L ~ B14S)	Samples
74AHCT1G14DCKRE4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(BF3 ~ BFG ~ BFJ ~ BFL ~ BFS)	Samples
74AHCT1G14DCKTE4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(BF3 ~ BFG ~ BFL ~ BFS)	Samples
74AHCT1G14DCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(BF3 ~ BFG ~ BFL ~ BFS)	Samples
SN74AHCT1G14DBVR	ACTIVE	SOT-23	DBV	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(B142 ~ B143 ~ B14G ~ B14J ~ B14L ~ B14S)	Samples
SN74AHCT1G14DBVT	ACTIVE	SOT-23	DBV	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(B143 ~ B14G ~ B14L ~ B14S)	Samples
SN74AHCT1G14DCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(BF3 ~ BFG ~ BFJ ~ BFL ~ BFS)	Samples
SN74AHCT1G14DCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(BF3 ~ BFG ~ BFJ ~ BFL ~ BFS)	Samples
SN74AHCT1G14DCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	(BF3 ~ BFG ~ BFL ~ BFS)	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.



PACKAGE OPTION ADDENDUM

29-May-2013

(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.

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)

- (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.

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PACKAGE MATERIALS INFORMATION

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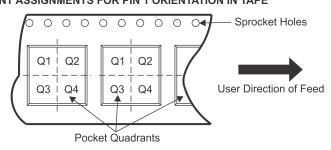
TAPE AND REEL INFORMATION



TAPE DIMENSIONS KO P1 BO W Cavity AO

A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

D. d.	D I	D I	D:	000	D 1	D	4.0	Б0	1/0	D4	14/	Dis. 4
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
SN74AHCT1G14DBVR	SOT-23	DBV	5	3000	178.0	9.2	3.3	3.2	1.55	4.0	8.0	Q3
SN74AHCT1G14DBVR	SOT-23	DBV	5	3000	180.0	8.4	3.23	3.17	1.37	4.0	8.0	Q3
SN74AHCT1G14DBVR	SOT-23	DBV	5	3000	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
SN74AHCT1G14DBVR	SOT-23	DBV	5	3000	180.0	9.2	3.17	3.23	1.37	4.0	8.0	Q3
SN74AHCT1G14DBVT	SOT-23	DBV	5	250	178.0	9.0	3.23	3.17	1.37	4.0	8.0	Q3
SN74AHCT1G14DBVT	SOT-23	DBV	5	250	178.0	9.2	3.3	3.2	1.55	4.0	8.0	Q3
SN74AHCT1G14DCKR	SC70	DCK	5	3000	178.0	9.2	2.4	2.4	1.22	4.0	8.0	Q3
SN74AHCT1G14DCKR	SC70	DCK	5	3000	180.0	9.2	2.3	2.55	1.2	4.0	8.0	Q3
SN74AHCT1G14DCKR	SC70	DCK	5	3000	178.0	9.0	2.4	2.5	1.2	4.0	8.0	Q3
SN74AHCT1G14DCKT	SC70	DCK	5	250	180.0	9.2	2.3	2.55	1.2	4.0	8.0	Q3
SN74AHCT1G14DCKT	SC70	DCK	5	250	178.0	9.0	2.4	2.5	1.2	4.0	8.0	Q3
SN74AHCT1G14DCKT	SC70	DCK	5	250	178.0	9.2	2.4	2.4	1.22	4.0	8.0	Q3

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*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHCT1G14DBVR	SOT-23	DBV	5	3000	180.0	180.0	18.0
SN74AHCT1G14DBVR	SOT-23	DBV	5	3000	202.0	201.0	28.0
SN74AHCT1G14DBVR	SOT-23	DBV	5	3000	180.0	180.0	18.0
SN74AHCT1G14DBVR	SOT-23	DBV	5	3000	205.0	200.0	33.0
SN74AHCT1G14DBVT	SOT-23	DBV	5	250	180.0	180.0	18.0
SN74AHCT1G14DBVT	SOT-23	DBV	5	250	180.0	180.0	18.0
SN74AHCT1G14DCKR	SC70	DCK	5	3000	180.0	180.0	18.0
SN74AHCT1G14DCKR	SC70	DCK	5	3000	205.0	200.0	33.0
SN74AHCT1G14DCKR	SC70	DCK	5	3000	180.0	180.0	18.0
SN74AHCT1G14DCKT	SC70	DCK	5	250	205.0	200.0	33.0
SN74AHCT1G14DCKT	SC70	DCK	5	250	180.0	180.0	18.0
SN74AHCT1G14DCKT	SC70	DCK	5	250	180.0	180.0	18.0

DBV (R-PDSO-G5)

PLASTIC SMALL-OUTLINE PACKAGE



NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
- D. Falls within JEDEC MO-178 Variation AA.



DBV (R-PDSO-G5)

PLASTIC SMALL OUTLINE



NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
- D. Publication IPC-7351 is recommended for alternate designs.
- E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.



DCK (R-PDSO-G5)

PLASTIC SMALL-OUTLINE PACKAGE



NOTES: A. All linear dimensions are in millimeters.

- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
- D. Falls within JEDEC MO-203 variation AA.



DCK (R-PDSO-G5)

PLASTIC SMALL OUTLINE



NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
- D. Publication IPC-7351 is recommended for alternate designs.
- E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC-7525 for other stencil recommendations.



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