

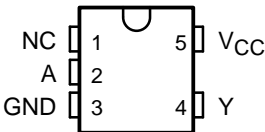
# SN74AHC1G14

## SINGLE SCHMITT-TRIGGER INVERTER GATE

SCLS321A – MARCH 1996 – REVISED MAY 1996

- Operating Range: 2-V to 5.5-V  $V_{CC}$
- EPIC™ (Enhanced-Performance Implanted CMOS) Process
- Packaged in Plastic Small-Outline Transistor Package

DBV PACKAGE  
(TOP VIEW)



NC – No internal connection

### description

The SN74AHC1G14 contains one inverter gate. The device performs the Boolean function  $Y = \bar{A}$ .

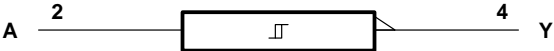
The device functions as an independent inverter gate, but because of the Schmitt action, gates may have different input threshold levels for positive- ( $V_{T+}$ ) and negative-going ( $V_{T-}$ ) signals.

The SN74AHC1G14 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

FUNCTION TABLE

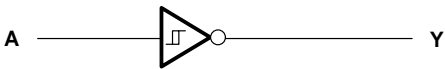
INPUTS	OUTPUT
A	Y
H	L
L	H

### logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

### logic diagram (positive logic)



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

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, $I_{IK}$ ( $V_I < 0$ or $V_I > V_{CC}$ )	– 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
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air)(see Note 2)	0.2 W
Storage temperature range, $T_{stg}$	–65°C to 150°C

<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 maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 25 millimeters.

### recommended operating conditions (see Note 3)

			MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage		2	5.5	V
V <sub>I</sub>	Input voltage		0	5.5	V
V <sub>O</sub>	Output voltage		0	V <sub>CC</sub>	V
I <sub>OH</sub>	High-level output current	V <sub>CC</sub> = 2 V	− 50		μA
		V <sub>CC</sub> = 3.3 V ± 0.3 V	− 4		mA
		V <sub>CC</sub> = 5 V ± 0.5 V	− 8		
I <sub>OL</sub>	Low-level output current	V <sub>CC</sub> = 2 V	50		μA
		V <sub>CC</sub> = 3.3 V ± 0.3 V	4		mA
		V <sub>CC</sub> = 5 V ± 0.5 V	8		
T <sub>A</sub>	Operating free-air temperature		− 40	85	°C

NOTE 3: Unused inputs must be held high or low to prevent them from floating.

# SN74AHC1G14

## SINGLE SCHMITT-TRIGGER INVERTER GATE

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

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			MIN	MAX	UNIT
			MIN	TYP	MAX			
V <sub>T+</sub> Positive-going input threshold voltage		3 V	2.2			2.2		V
		4.5 V	3.15			3.15		
		5.5 V	3.85			3.85		
V <sub>T–</sub> Negative-going input threshold voltage		3 V	0.9			0.9		V
		4.5 V	1.35			1.35		
		5.5 V	1.65			1.65		
ΔV <sub>T</sub> Hysteresis (V <sub>T+</sub> – V <sub>T–</sub> )		3 V	0.3			0.3	1.2	V
		4.5 V	0.4			0.4	1.4	
		5.5 V	0.5			0.5	1.6	
V <sub>OH</sub>	I <sub>OH</sub> = – 50 μA	2 V	1.9	2		1.9		V
		3 V	2.9	3		2.9		
		4.5 V	4.4	4.5		4.4		
	I <sub>OH</sub> = – 4 mA	3 V	2.58			2.48		
	I <sub>OH</sub> = – 8 mA	4.5 V	3.94			3.8		
V <sub>OL</sub>	I <sub>OL</sub> = 50 μA	2 V	0.1			0.1		V
		3 V	0.1			0.1		
		4.5 V	0.1			0.1		
	I <sub>OL</sub> = 4 mA	3 V	0.36			0.44		
	I <sub>OL</sub> = 8 mA	4.5 V	0.36			0.44		
I <sub>I</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	5.5 V	± 0.1			± 1		μA
I <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0	5.5 V	2			20		μA
C <sub>i</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V	2 10			10		pF

switching characteristics over recommended operating free-air temperature range, V<sub>CC</sub> = 3.3 V  $\pm$  0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T <sub>A</sub> = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
t <sub>PLH</sub>	A	Y	C <sub>L</sub> = 15 pF	8.3 12.8			1	15	ns
t <sub>PHL</sub>				8.3 12.8			1	15	
t <sub>PLH</sub>	A	Y	C <sub>L</sub> = 50 pF	10.8 16.3			1	18.5	ns
t <sub>PHL</sub>				10.8 16.3			1	18.5	

switching characteristics over recommended operating free-air temperature range, V<sub>CC</sub> = 5 V  $\pm$  0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T <sub>A</sub> = 25°C			MIN	MAX	UNIT
				MIN	TYP	MAX			
t <sub>PLH</sub>	A	Y	C <sub>L</sub> = 15 pF	5.5 8.6			1	10	ns
t <sub>PHL</sub>				5.5 8.6			1	10	
t <sub>PLH</sub>	A	Y	C <sub>L</sub> = 50 pF	7 10.6			1	12	ns
t <sub>PHL</sub>				7 10.6			1	12	



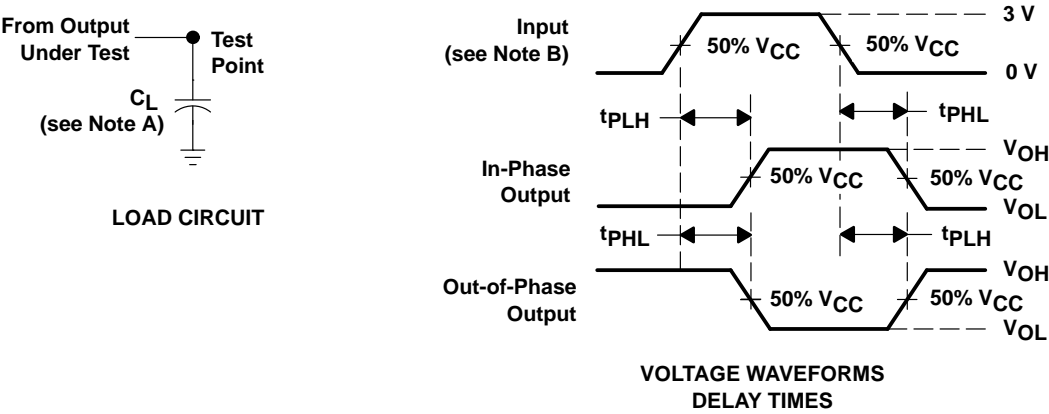
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operating characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	TYP	UNIT
$C_{pd}$	Power dissipation capacitance	No load, $f = 1\text{ MHz}$	9	pF

PARAMETER MEASUREMENT INFORMATION



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
B. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 1\text{ MHz}$ ,  $Z_O = 50\ \Omega$ ,  $t_r = 3\text{ ns}$ ,  $t_f = 3\text{ ns}$ .  
C. The output is measured with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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