#### SN74AHC1G08 SINGLE 2-INPUT POSITIVE-AND GATE

SCLS314I - MARCH 1996 - REVISED JANUARY 2002

- Operating Range 2-V to 5.5-V V<sub>CC</sub>
- 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)

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#### description

The SN74AHC1G08 is a single 2-input positive-AND gate. The device performs the Boolean function  $Y = A \bullet B$  or  $Y = \overline{A} + \overline{B}$  in positive logic.

#### **ORDERING INFORMATION**

TA	PACKAGI	<u>:</u> †	ORDERABLE PART NUMBER	TOP-SIDE MARKING <sup>‡</sup>
40°C to 95°C	SOT (SOT-23) – DBV	Tape and reel	SN74AHC1G08DBVR	A08_
-40°C to 85°C	SOT (SC-70) - DCK	Tape and reel	SN74AHC1G08DCKR	AE_

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

#### **FUNCTION TABLE**

	INP	UTS	OUTPUT
	Α	В	Υ
Γ	Н	Н	Н
ı	L	X	L
ı	Χ	L	L

#### logic diagram (positive logic)





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<sup>&</sup>lt;sup>‡</sup> The actual top-side marking has one additional character that designates the assembly/test site.

SCLS314I - MARCH 1996 - REVISED JANUARY 2002

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

Supply voltage range, V <sub>CC</sub>	–0.5 V to 7 V
Input voltage range, V <sub>I</sub> (see Note 1)	0.5 V to 7 V
Output voltage range, V <sub>O</sub> (see Note 1)	0.5 V to V <sub>CC</sub> + 0.5 V
Input clamp current, I <sub>IK</sub> (V <sub>I</sub> < 0)	–20 mA
Output clamp current, I <sub>OK</sub> (V <sub>O</sub> < 0 or V <sub>O</sub> > V <sub>CC</sub> )	±20 mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ )	±25 mA
Continuous current through V <sub>CC</sub> 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 <sub>stq</sub>	–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 package thermal impedance is calculated in accordance with JESD 51-7.

#### recommended operating conditions (see Note 3)

			MIN	MAX	UNIT
Vcc	Supply voltage		2	5.5	V
	V <sub>CC</sub> = 2 V		1.5		
$V_{\text{IH}}$	High-level input voltage	V <sub>CC</sub> = 3 V	2.1		V
		V <sub>CC</sub> = 5.5 V	3.85		
		V <sub>CC</sub> = 2 V		0.5	
$V_{IL}$	Low-level input voltage V <sub>CC</sub> = 3 V	V <sub>CC</sub> = 3 V		0.9	V
		V <sub>CC</sub> = 5.5 V		1.65	
VI	Input voltage		0	5.5	V
٧o	Output voltage		0	VCC	V
	L Low-level input voltage  Input voltage O Output voltage  High-level output current  Low-level output current  Input transition rise or fall rate	V <sub>CC</sub> = 2 V		-50	μΑ
loh		$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$	-4		mA
		$V_{CC} = 5 V \pm 0.5 V$		-8	IIIA
		V <sub>CC</sub> = 2 V		50	μΑ
IOL	Low-level output current $V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$			4	mA
		$V_{CC} = 5 V \pm 0.5 V$		8	IIIA
A+/A>r	Input transition rise or fall rate	$V_{CC} = 3.3 \text{ V} \pm 0.3 \text{ V}$		100	20/1/
Δt/Δv	input transition rise of fall rate $V_{CC} = 5 \text{ V} \pm 0.5 \text{ V}$			20	ns/V
TA	Operating free-air temperature		-40	85	°C

NOTE 3: 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.



SCLS314I - MARCH 1996 - REVISED JANUARY 2002

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

PARAMETER	TEST CONDITIONS	Vac	T <sub>A</sub> = 25°C			MIN	MAV	UNIT	
PARAMETER	TEST CONDITIONS	VCC	MIN	TYP	MAX	IVIIIV	MAX	UNIT	
<sup>V</sup> ОН		2 V	1.9	2		1.9			
	I <sub>OH</sub> = -50 μA	3 V	2.9	3		2.9			
		4.5 V	4.4	4.5		4.4		V	
	$I_{OH} = -4 \text{ mA}$	3 V	2.58			2.48			
	I <sub>OH</sub> = -8 mA	4.5 V	3.94			3.8		]	
	I <sub>OL</sub> = 50 μA	2 V			0.1		0.1		
		3 V			0.1		0.1		
V <sub>OL</sub>		4.5 V			0.1		0.1	V	
	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	]	
lį	V <sub>I</sub> = 5.5 V or GND	0 V to 5.5 V			±0.1		±1	μΑ	
lcc	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			1		10	μΑ	
Ci	$V_I = V_{CC}$ or GND	5 V		4	10		10	pF	

## 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	то	OUTPUT	T,	չ = 25°C	;	MIN	MAX	UNIT		
	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	IVIIIV	IVIAA	UNIT		
<sup>t</sup> PLH	A or B		C <sub>I</sub> = 15 pF		6.2	8.8	1	10.5	ne		
<sup>t</sup> PHL	AUIB	ī	CL = 13 pr		6.2	8.8	1	10.5	ns		
<sup>t</sup> PLH	A or D	V	C: - 50 pF		8.7	12.3	1	14	no		
<sup>t</sup> PHL	A or B	Y	Y	ĭ	C <sub>L</sub> = 50 pF		8.7	12.3	1	14	ns

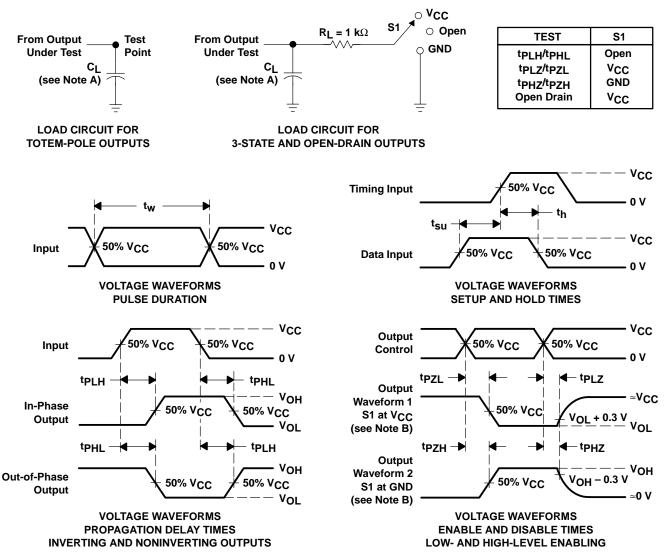
## switching characteristics over recommended operating free-air temperature range, $V_{CC}$ = 5 V $\pm$ 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM	то	OUTPUT	T,	<b>Վ = 25°C</b>	;	MIN	MAX	UNIT
PARAMETER	(INPUT)	(OUTPUT)	CAPACITANCE	MIN	TYP	MAX	IVIIIN	WAX	UNII
<sup>t</sup> PLH	A or D	Y C <sub>L</sub> = 15 pF	C: _ 15 pE		4.3	5.9	1	7	20
tpHL	A or B		CL = 15 μr		4.3	5.9	1	7	ns
tPLH	A D	V	C: - 50 pF		5.8	7.9	1	9	no
t <sub>PHL</sub>	A or B	Y	C <sub>L</sub> = 50 pF		5.8	7.9	1	9	ns

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

	PARAMETER		ONDITIONS	TYP	UNIT
C <sub>pd</sub>	Power dissipation capacitance	No load,	f = 1 MHz	18	pF

#### PARAMETER MEASUREMENT INFORMATION



NOTES: A. C<sub>L</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,  $Z_O = 50 \Omega$ ,  $t_f \leq 3$  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



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