

# SN5408, SN54LS08, SN54S08 SN7408, SN74LS08, SN74S08 QUADRUPLE 2-INPUT POSITIVE-AND GATES

SDLS033 – DECEMBER 1983 – REVISED MARCH 1988

- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers and Flat Packages, and Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

## description

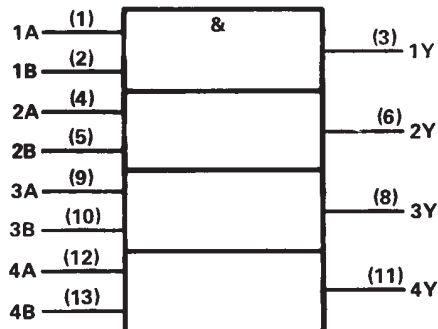
These devices contain four independent 2-input AND gates.

The SN5408, SN54LS08, and SN54S08 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN7408, SN74LS08 and SN74S08 are characterized for operation from  $0^{\circ}$  to  $70^{\circ}\text{C}$ .

FUNCTION TABLE (each gate)

INPUTS		OUTPUT
A	B	Y
H	H	H
L	X	L
X	L	L

## logic symbol†

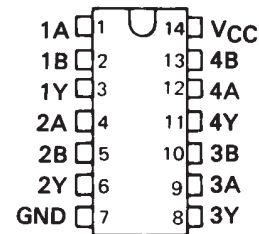


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

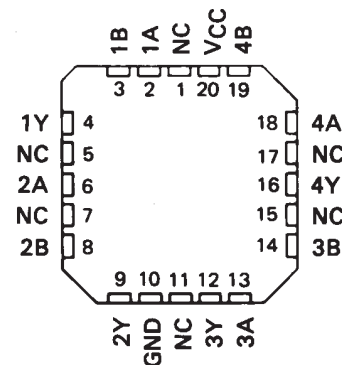
Pin numbers shown are for D, J, N, and W packages.

SN5408, SN54LS08, SN54S08 . . . J OR W PACKAGE  
SN7408 . . . J OR N PACKAGE  
SN74LS08, SN74S08 . . . D, J OR N PACKAGE

(TOP VIEW)

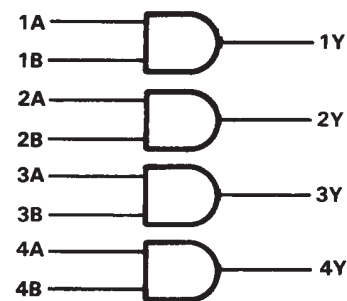


SN54LS08, SN54S08 . . . FK PACKAGE  
(TOP VIEW)



NC—No internal connection

## logic diagram (positive logic)

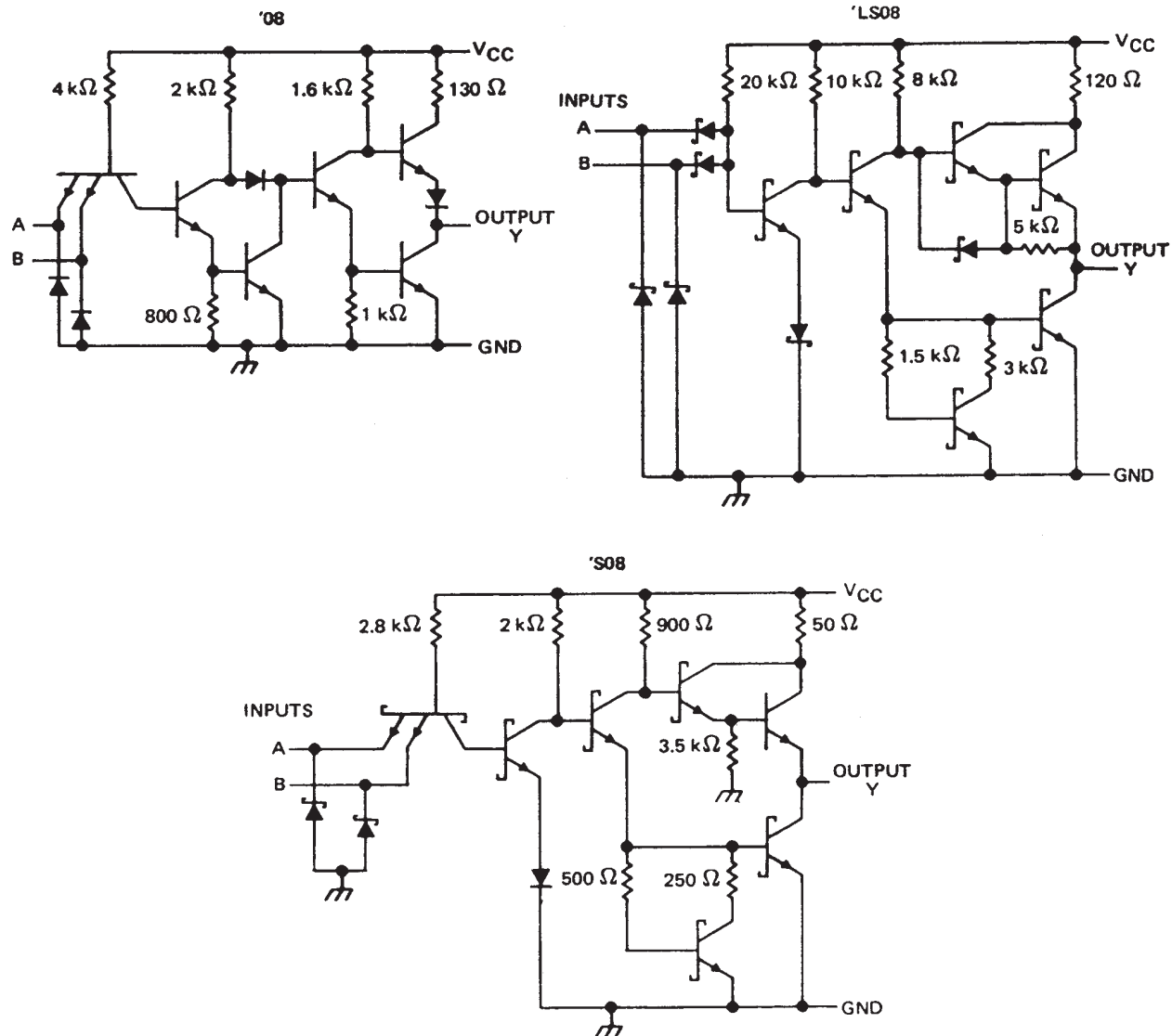


$$Y = A \cdot B \text{ or } Y = \overline{\overline{A} + \overline{B}}$$

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 SN7408, SN74LS08, SN74S08  
 QUADRUPLE 2-INPUT POSITIVE-AND GATES

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schematics (each gate)



Resistor values are nominal.

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

Supply voltage, V <sub>CC</sub> (see Note 1)	7 V
Input voltage: '08, 'S08	5.5 V
'LS08	7 V
Operating free-air temperature range: SN54'	−55°C to 125°C
SN74'	0°C to 70°C
Storage temperature range	−65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.

SN5408, SN54LS08, SN54S08  
SN7408, SN74LS08, SN74S08  
**QUADRUPLE 2-INPUT POSITIVE-AND GATES**  
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**recommended operating conditions**

	SN5408			SN7408			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub> Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub> High-level input voltage	2			2			V
V <sub>IL</sub> Low-level input voltage			0.8			0.8	V
I <sub>OH</sub> High-level output current			– 0.8			– 0.8	mA
I <sub>OL</sub> Low-level output current			16			16	mA
T <sub>A</sub> Operating free-air temperature	– 55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS †	SN5408			SN7408			UNIT
		MIN	TYP ‡	MAX	MIN	TYP ‡	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = – 12 mA			– 1.5			– 1.5	V
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, I <sub>OH</sub> = – 0.8 mA	2.4	3.4		2.4	3.4		V
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V, I <sub>OL</sub> = 16 mA		0.2	0.4		0.2	0.4	V
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 5.5 V			1			1	mA
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.4 V			40			40	µA
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V			– 1.6			– 1.6	mA
I <sub>OS</sub> §	V <sub>CC</sub> = MAX	– 20		– 55	– 18		– 55	mA
I <sub>CCH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5 V		11	21		11	21	mA
I <sub>CCL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0 V		20	33		20	33	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

§ Not more than one output should be shorted at a time.

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see note 2)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t <sub>PLH</sub>	A or B	Y	R <sub>L</sub> = 400 Ω, C <sub>L</sub> = 15 pF		17.5	27	ns
t <sub>PHL</sub>					12	19	ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

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SN7408, SN74LS08, SN74S08  
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recommended operating conditions

	SN54LS08			SN74LS08			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$ Supply voltage	4.5	5	5.5	4.75	5	5.25	V
$V_{IH}$ High-level input voltage	2			2			V
$V_{IL}$ Low-level input voltage			0.7			0.8	V
$I_{OH}$ High-level output current			– 0.4			– 0.4	mA
$I_{OL}$ Low-level output current			4			8	mA
$T_A$ Operating free-air temperature	– 55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS †	SN54LS08			SN74LS08			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
$V_{IK}$	$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$			– 1.5			– 1.5	V
$V_{OH}$	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, I_{OH} = -0.4 \text{ mA}$	2.5	3.4		2.7	3.4		V
$V_{OL}$	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}, I_{OL} = 4 \text{ mA}$	0.25	0.4		0.25	0.4		V
	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}, I_{OL} = 8 \text{ mA}$				0.35	0.5		
$I_I$	$V_{CC} = \text{MAX}, V_I = 7 \text{ V}$		0.1			0.1		mA
$I_{IH}$	$V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$		20			20		μA
$I_{IL}$	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$		– 0.4			– 0.4		mA
$I_{OS}§$	$V_{CC} = \text{MAX}$	– 20		– 100	– 20		– 100	mA
$I_{CCH}$	$V_{CC} = \text{MAX}, V_I = 4.5 \text{ V}$		2.4	4.8		2.4	4.8	mA
$I_{CCL}$	$V_{CC} = \text{MAX}, V_I = 0 \text{ V}$		4.4	8.8		4.4	8.8	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at  $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$

§ Not more than one output should be shorted at a time, and the duration of the short-circuit should not exceed one second.

switching characteristics,  $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$  (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$	A or B	Y	$R_L = 2 \text{ k}\Omega, C_L = 15 \text{ pF}$		8	15	ns
$t_{PHL}$					10	20	ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

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SN7408, SN74LS08, SN74S08  
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**recommended operating conditions**

	SN54S08			SN74S08			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$ Supply voltage	4.5	5	5.5	4.75	5	5.25	V
$V_{IH}$ High-level input voltage	2			2			V
$V_{IL}$ Low-level input voltage			0.8			0.8	V
$I_{OH}$ High-level output current			– 1			– 1	mA
$I_{OL}$ Low-level output current			20			20	mA
$T_A$ Operating free-air temperature	– 55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS †	SN54S08			SN74S08			UNIT
		MIN	TYP ‡	MAX	MIN	TYP ‡	MAX	
$V_{IK}$	$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$			–1.2			–1.2	V
$V_{OH}$	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, I_{OH} = -1 \text{ mA}$	2.5	3.4		2.7	3.4		V
$V_{OL}$	$V_{CC} = \text{MIN}, V_{IL} = 0.8 \text{ V}, I_{OL} = 20 \text{ mA}$			0.5			0.5	V
$I_I$	$V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$			1			1	mA
$I_{IH}$	$V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$			50			50	µA
$I_{IL}$	$V_{CC} = \text{MAX}, V_I = 0.5 \text{ V}$			–2			–2	mA
$I_{OS} §$	$V_{CC} = \text{MAX}$	–40		–100	–40		–100	mA
$I_{CCH}$	$V_{CC} = \text{MAX}, V_I = 4.5 \text{ V}$		18	32		18	32	mA
$I_{CCL}$	$V_{CC} = \text{MAX}, V_I = 0 \text{ V}$		32	57		32	57	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at  $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$ .

§ Not more than one output should be shorted at a time, and the duration of the short-circuit should not exceed one second.

**switching characteristics,  $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$  (see note 2)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$	A or B	Y	$R_L = 280 \Omega, C_L = 15 \text{ pF}$	4.5	7		ns
$t_{PHL}$				5	7.5		ns
$t_{PLH}$			$R_L = 280 \Omega, C_L = 50 \text{ pF}$	6			ns
$t_{PHL}$				7.5			ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

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