

SN5408, SN54LS08, SN54S08, SN7408, SN74LS08, SN74S08 **QUADRUPL 2-INPUT POSITIVE-AND GATES**

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

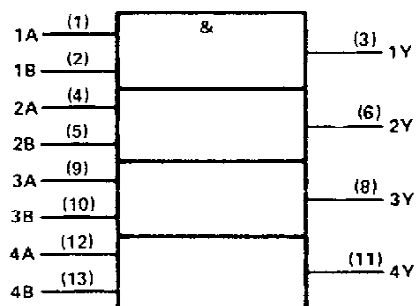
These devices contain four independent 2-input AND gates.

The SN5408, SN54LS08, and SN54S08 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN7408, SN74LS08 and SN74S08 are characterized for operation from 0° to 70°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.

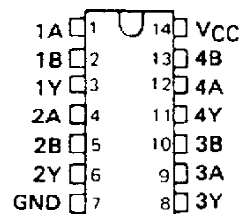
Pin numbers shown are for D, J, N, and W packages.

SN5408, SN54LS08, SN54S08 . . . J OR W PACKAGE

SN7408 . . . J OR N PACKAGE

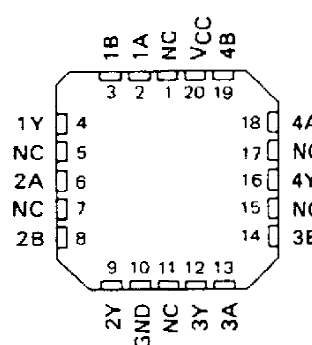
SN74LS08, SN74S08 . . . D, J OR N PACKAGE

(TOP VIEW)



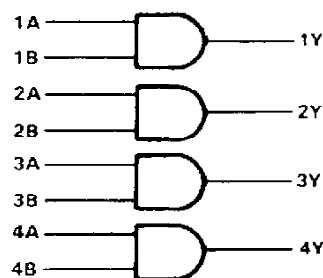
SN54LS08, SN54S08 . . . FK PACKAGE

(TOP VIEW)



NC—No internal connection

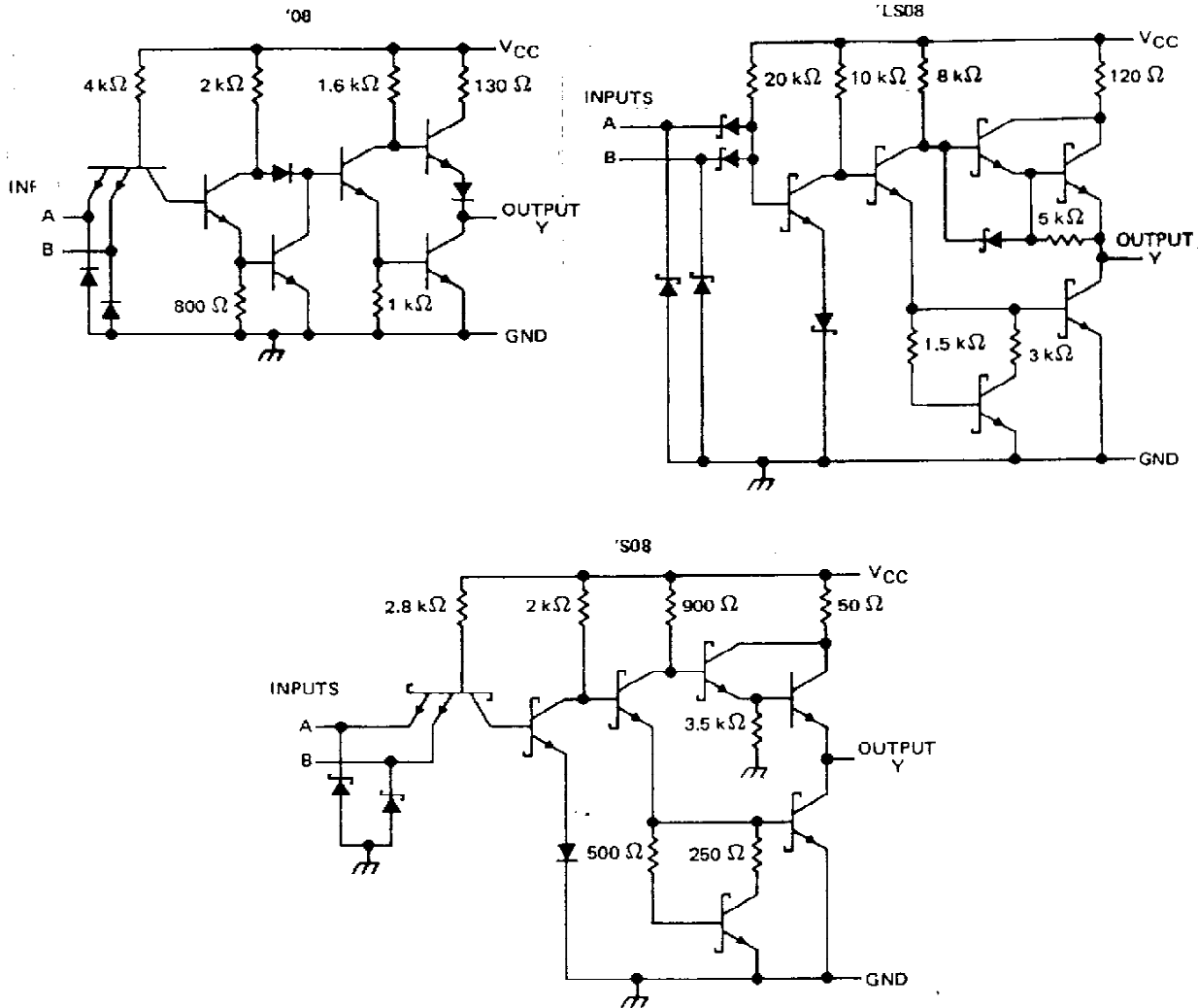
logic diagram (positive logic)



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

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

schematics (each gate)



Resistor values are nominal.

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

Supply voltage, V_{CC} (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.

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SN5408, SN7408
QUADRUPLE 2-INPUT POSITIVE-AND GATES

recommended operating conditions

	SN5408			SN7408			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			-0.8			-0.8	mA
I_{OL} Low-level output current			16			16	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 †	SN5408			SN7408			UNIT
		MIN	TYP ‡	MAX	MIN	TYP ‡	MAX	
V_{IK}	$V_{CC} = \text{MIN.}$, $I_I = -12 \text{ mA}$			-1.5			-1.5	V
V_{OH}	$V_{CC} = \text{MIN.}$, $V_{IH} = 2 \text{ V}$, $I_{OH} = -0.8 \text{ mA}$	2.4	3.4		2.4	3.4		V
V_{OL}	$V_{CC} = \text{MIN.}$, $V_{IL} = 0.8 \text{ V}$, $I_{OL} = 16 \text{ mA}$		0.2	0.4		0.2	0.4	V
I_I	$V_{CC} = \text{MAX.}$, $V_I = 5.5 \text{ V}$			1			1	mA
I_{IH}	$V_{CC} = \text{MAX.}$, $V_I = 2.4 \text{ V}$			40			40	µA
I_{IL}	$V_{CC} = \text{MAX.}$, $V_I = 0.4 \text{ V}$			-1.6			-1.6	mA
$I_{OS} §$	$V_{CC} = \text{MAX.}$	-20		-55	-18		-55	mA
I_{CCH}	$V_{CC} = \text{MAX.}$, $V_I = 4.5 \text{ V}$		11	21		11	21	mA
I_{CCL}	$V_{CC} = \text{MAX.}$, $V_I = 0 \text{ V}$		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 $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

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

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	$R_L = 400 \Omega$, $C_L = 15 \text{ pF}$		17.5	27	ns
t_{PHL}					12	19	ns

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

SN54LS08, SN74LS08 **QUADRUPLE 2-INPUT POSITIVE-AND GATES**

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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SN54S08, SN74S08 QUADRUPLE 2-INPUT POSITIVE-AND GATES

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} = MIN, I _I = -18 mA			-1.2			-1.2	V
V _{OH}	V _{CC} = MIN, V _{IH} = 2 V, I _{OH} = -1 mA	2.5	3.4		2.7	3.4		V
V _{OL}	V _{CC} = MIN, V _{IL} = 0.8 V, I _{OL} = 20 mA			0.5			0.5	V
I _I	V _{CC} = MAX, V _I = 5.5 V			1			1	mA
I _{IH}	V _{CC} = MAX, V _I = 2.7 V			50			50	µA
I _{IL}	V _{CC} = MAX, V _I = 0.5 V			-2			-2	mA
I _{OS} §	V _{CC} = MAX	-40		-100	-40		-100	mA
I _{CCH}	V _{CC} = MAX, V _I = 4.5 V		18	32		18	32	mA
I _{CCL}	V _{CC} = MAX, V _I = 0 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 V, T_A = 25°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 V, T_A = 25°C (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t _{PLH}	A or B	Y	R _L = 280 Ω, C _L = 15 pF		4.5	7	ns
t _{PHL}					5	7.5	ns
t _{PLH}			R _L = 280 Ω, C _L = 50 pF		6		ns
t _{PHL}					7.5		ns

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

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