

SN54ALS02, SN54AS02, SN74ALS02, SN74AS02 QUAD 2-INPUT POSITIVE-NOR GATES

SDAS111 – D2661, APRIL 1982 – REVISED SEPTEMBER 1987

- Package Options include Plastic Small Outline Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

description

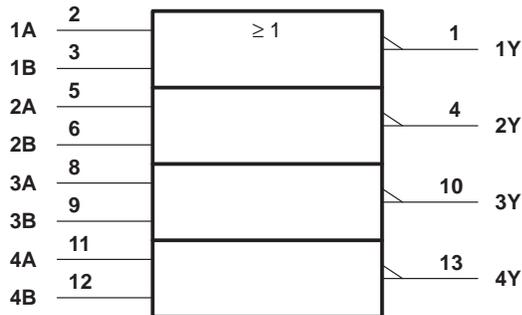
These devices contain four independent 2-input NOR gates. They perform the Boolean functions $Y = \overline{A \cdot B}$ or $Y = \overline{A} + \overline{B}$ in positive logic.

The SN54ALS02 and SN54AS02 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS02 and SN74AS02 are characterized for operation from 0°C to 70°C .

FUNCTION TABLE
(each gate)

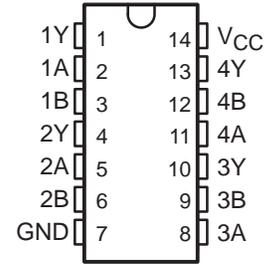
INPUTS		OUTPUT
A	B	Y
H	X	L
X	H	L
L	L	H

logic symbol†

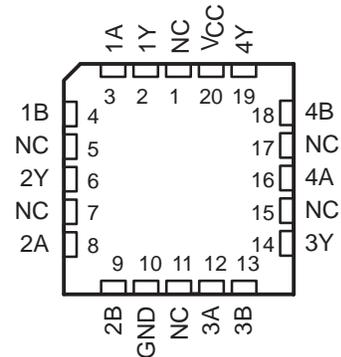


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, and N packages.

SN54ALS02, SN54AS02 . . . J PACKAGE
SN74ALS02, SN74AS02 . . . D OR N PACKAGE
(TOP VIEW)

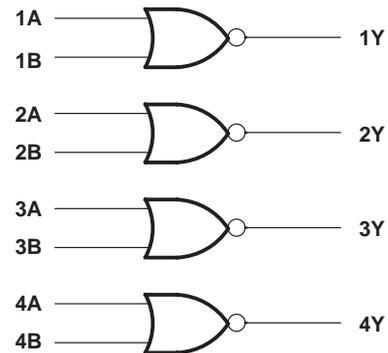


SN54ALS02, SN54AS02 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

logic diagram (positive logic)



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

Supply voltage, V_{CC}	7 V
Input voltage	7 V
Operating free-air temperature range:	
SN54ALS02	–55°C to 125°C
SN74ALS02	0°C to 70°C
Storage temperature range	–65°C to 150°C

recommended operating conditions

		SN54ALS02			SN74ALS02			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage						0.8	V
				0.8†				
				0.7‡				
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

† Tested at –55°C to 70°C.

‡ Tested at 70°C to 125°C, per MIL-STD-833, method 5005, sub-group 1, 2, and 3. Static test is performed at 25°C, 125°C, and –55°C.

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

PARAMETER	TEST CONDITIONS	SN54ALS02			SN74ALS02			UNIT
		MIN	TYP§	MAX	MIN	TYP§	MAX	
V_{IK}	$V_{CC} = 4.5$ V, $I_I = -18$ mA			–1.5			–1.5	V
V_{OH}	$V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -0.4$ mA			$V_{CC}-2$				V
V_{OL}	$V_{CC} = 4.5$ V, $I_{OL} = 4$ mA		0.25	0.4		0.25	0.4	V
	$V_{CC} = 4.5$ V, $I_{OL} = 8$ mA					0.35	0.5	
I_I	$V_{CC} = 5.5$ V, $V_I = 7$ V			0.1			0.1	mA
I_{IH}	$V_{CC} = 5.5$ V, $V_I = 2.7$ V			20			20	μA
I_{IL}	$V_{CC} = 5.5$ V, $V_I = 0.4$ V			–0.1			–0.1	mA
I_{O}^{\parallel}	$V_{CC} = 5.5$ V, $V_O = 2.25$ V	–30		–112	–30		–112	mA
I_{CCH}	$V_{CC} = 5.5$ V, $V_I = 0$ V		0.86	2.2		0.86	2.2	mA
I_{CCL}	$V_{CC} = 5.5$ V, $V_I = 4.5$ V		2.16	4		2.16	4	mA

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

¶ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5$ V, $C_L = \text{pF}$, $R_L = 500 \Omega$, $T_A = 25^\circ\text{C}$	$V_{CC} = 4.5$ V to 5.5 V, $C_L = 50$ pF, $R_L = 500 \Omega$, $T_A = \text{MIN to MAX}^\#$				UNIT
				'ALS02		SN54ALS02		
				TYP	MIN	MAX	MIN	
t_{PLH}	A or B	Y	7	1	16	3	12	ns
t_{PHL}	A or B	Y	5	1	7.5	3	7.58	ns

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

NOTE 1: Load circuit and Voltage waveforms are shown in Section 1 of the *ALS/AS Logic Data Book*, 1986.



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

Supply voltage, V_{CC}	7 V
Input voltage	7 V
Operating free-air temperature range: SN54AS02	–55°C to 125°C
SN74AS02	0°C to 70°C
Storage temperature range	–65°C to 150°C

recommended operating conditions

		SN54AS02			SN74AS02			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	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			–2			–2	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	SN54AS02			SN74AS02			UNIT
		MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}	$V_{CC} = 4.5\text{ V}$, $I_I = -18\text{ mA}$			–1.2			–1.2	V
V_{OH}	$V_{CC} = 4.5\text{ V to } 5.5\text{ V}$, $I_{OH} = -2\text{ mA}$	$V_{CC}-2$			$V_{CC}-2$			V
V_{OL}	$V_{CC} = 4.5\text{ V}$, $I_{OL} = 20\text{ mA}$		0.35	0.5		0.35	0.5	V
I_I	$V_{CC} = 5.5\text{ V}$, $V_I = 7\text{ V}$			0.1			0.1	mA
I_{IH}	$V_{CC} = 5.5\text{ V}$, $V_I = 2.7\text{ V}$			20			20	μA
I_{IL}	$V_{CC} = 5.5\text{ V}$, $V_I = 0.4\text{ V}$			–0.5			–0.5	mA
$I_{O\ddagger}$	$V_{CC} = 5.5\text{ V}$, $V_O = 2.25\text{ V}$	–30		–112	–30		–112	mA
I_{CCH}	$V_{CC} = 5.5\text{ V}$, $V_I = 0\text{ V}$		3.7	5.9		3.7	5.9	mA
I_{CCL}	$V_{CC} = 5.5\text{ V}$, $V_I = 4.5\text{ V}$		12.5	20.1		12.5	20.1	mA

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

‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current, I_{OS} .

switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5\text{ V to } 5.5\text{ V}$, $C_L = 50\text{ pF}$, $R_L = 500\ \Omega$, $T_A = \text{MIN to MAX}\S$				UNIT
			SN54ALS02		SN74ALS02		
			MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Y	1	5	1	4.5	ns
t_{PHL}	A or B	Y	1	5	1	4.5	ns

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

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of the *ALS/AS Logic Data Book*, 1986.



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