

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

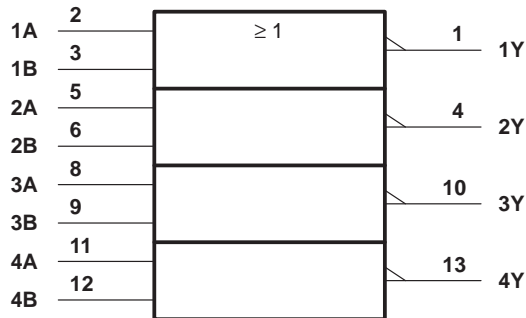
These devices contain four independent 2-input NOR gates. They perform the Boolean functions $Y = \overline{A \cdot B}$ or $Y = \overline{A} + \overline{B}$ in positive logic.

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)

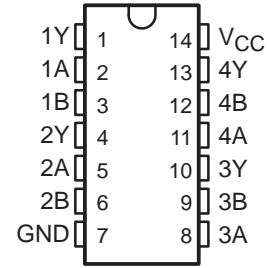
INPUTS		OUTPUT
A	B	Y
H	X	L
X	H	L
L	L	H

logic symbol†

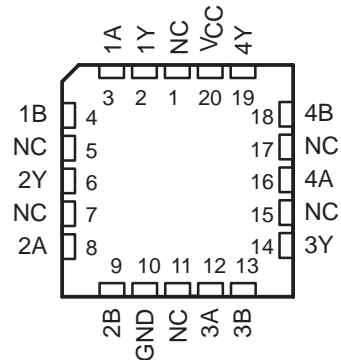


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for D, J, and N packages.

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

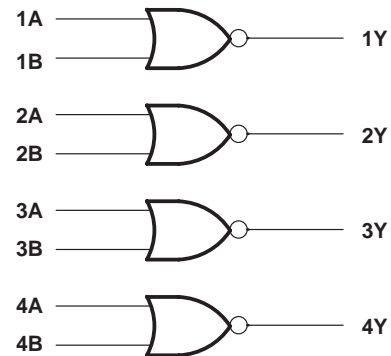


SN54ALS02, SN54AS02 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

logic diagram (positive logic)



SN54ALS02, SN74ALS02 QUAD 2-INPUT POSITIVE-NOR GATES

SDAS111 – D2661, APRIL 1982 – REVISED SEPTEMBER 1987

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 $V_{CC} = 5 V$, $T_A = 25^\circ C$.

¶ 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)	$V_{CC} = 5 V$, $C_L = pF$, $R_L = 500 \Omega$, $T_A = 25^\circ C$	$V_{CC} = 4.5 V$ to 5.5 V, $C_L = 50 pF$, $R_L = 500 \Omega$, $T_A = MIN$ 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.



SN54AS02, SN74AS02 QUAD 2-INPUT POSITIVE-NOR GATES

SDAS111 – D2661, APRIL 1982 – REVISED SEPTEMBER 1987

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.



IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.