

# SN54ALS22B, SN74ALS22B DUAL 4-INPUT POSITIVE-NAND GATES WITH OPEN-COLLECTOR OUTPUTS

SDAS005A – MARCH 1984 – REVISED MAY 1986

- 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

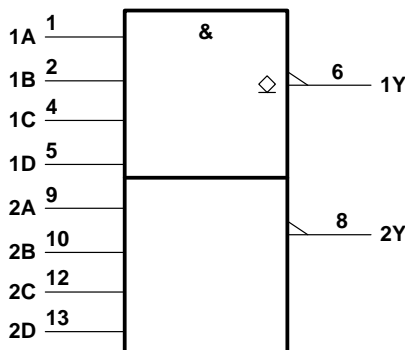
These devices contain two independent 4-input NAND gates. They perform the Boolean functions  $Y = \overline{A \cdot B \cdot C \cdot D}$  or  $Y = \overline{A+B+C+D}$  in positive logic. The open-collector outputs require pullup resistors to perform correctly. They may be connected to other open-collector outputs to implement active-low wired-OR or active-high wired-AND functions. Open-collector devices are often used to generate higher  $V_{OH}$  levels.

The SN54ALS22B is characterized for operation over the full military temperature range of 55°C to 125°C. The SN74ALS22B is characterized for operation from 0°C to 70°C.

FUNCTION TABLE  
(each gate)

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

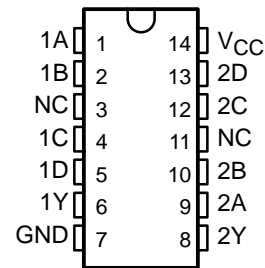
## logic symbol†



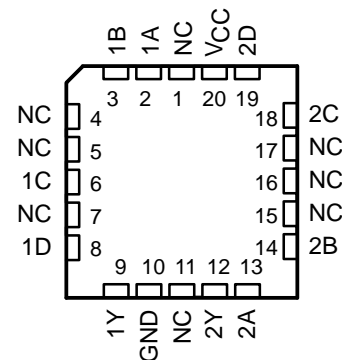
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

SN54ALS22B . . . J PACKAGE  
SN74ALS22B . . . D OR N PACKAGE  
(TOP VIEW)

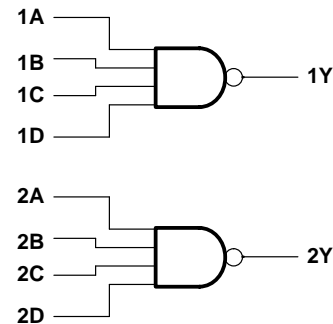


SN54ALS22B . . . FK PACKAGE  
(TOP VIEW)



NC—No internal connection

## logic diagram (positive logic)



# SN54ALS22B, SN74ALS22B

## DUAL 4-INPUT POSITIVE-NAND GATES

### WITH OPEN-COLLECTOR OUTPUTS WITH OPEN-COLLECTOR OUTPUTS

SDAS005A – MARCH 1984 – REVISED MAY 1986

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

Supply voltage, $V_{CC}$	7 V
Input voltage	7 V
Off-state output voltage	7 V
Operating free-air temperature range: SN54ALS22B	–55°C to 125°C
SN74ALS22B	0°C to 70°C
Storage temperature range	–65°C to 150°C

#### recommended operating conditions

		SN54ALS22B			SN74ALS22B			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			0.7			0.8	V
$I_{OH}$	High-level output current			5.5			5.5	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		SN54ALS22B			SN74ALS22B			UNIT
			MIN	TYP†	MAX	MIN	TYP†	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = 4.5 V,	I <sub>I</sub> = −18 mA			−1.5			−1.5	V
V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V,	I <sub>OL</sub> = 4 mA		0.25	0.4		0.25	0.4	V
	V <sub>CC</sub> = 4.5 V,	I <sub>OL</sub> = 8 mA					0.35	0.5	
I <sub>OH</sub>	V <sub>CC</sub> = 4.5 V,	V <sub>OH</sub> = 5.5 V			0.1			0.1	mA
I <sub>I</sub>	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 7 V			0.1			0.1	mA
I <sub>IH</sub>	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 2.7 V			20			20	μA
I <sub>IL</sub>	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 0.4 V			−0.1			−0.1	mA
I <sub>CCH</sub>	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 0 V		0.22	0.4		0.22	0.4	mA
I <sub>CCL</sub>	V <sub>CC</sub> = 5.5 V,	V <sub>I</sub> = 4.5 V		0.8	1.5		0.8	1.5	mA

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

#### switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 5 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 2 kΩ, T <sub>A</sub> = 25°C	V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 2 kΩ, T <sub>A</sub> = MIN to MAX				UNIT
			'ALS22B	SN54ALS22B		SN74ALS22B		
			TYP	MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	Any	Y	35	23	65	23	45	ns
t <sub>PHL</sub>	Any	Y	8	4	32	4	18	ns

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



## **IMPORTANT NOTICE**

Texas Instruments (TI) reserves the right to make changes to its products or to discontinue any semiconductor product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

TI warrants performance of its semiconductor products and related software 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, INTENDED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS.**

Inclusion of TI products in such applications is understood to be fully at the risk of the customer. Use of TI products in such applications requires the written approval of an appropriate TI officer. Questions concerning potential risk applications should be directed to TI through a local SC sales office.

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

TI assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services described herein. Nor does TI 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.