

# 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

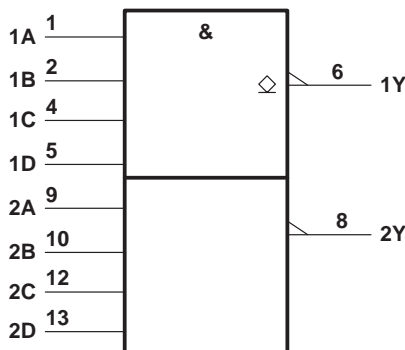
These devices contain two independent 4-input NAND gates. They perform the Boolean functions  $Y = \overline{A \cdot B \cdot C \cdot D}$  or  $Y = \overline{A + B + C + D}$  in positive logic. The open-collector outputs require pullup resistors to perform correctly. They may be connected to other open-collector 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

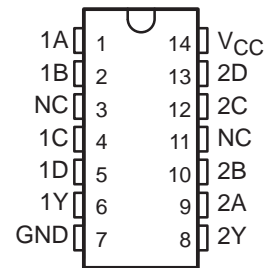
## logic symbol†



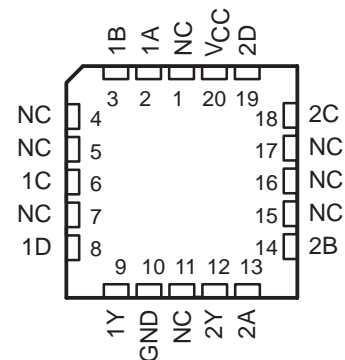
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

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

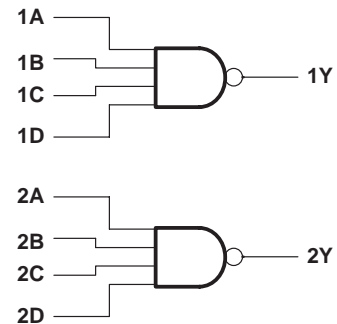


SN54ALS22B . . . FK PACKAGE  
(TOP VIEW)



NC—No internal connection

## logic diagram (positive logic)



**SN54ALS22B, SN74ALS22B**  
**DUAL 4-INPUT POSITIVE-NAND GATES**  
**WITH OPEN-COLLECTOR OUTPUTS**  
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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
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	
$V_{IK}$	$V_{CC} = 4.5$ V, $I_I = -18$ mA				–1.5			–1.5	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	
$I_{OH}$	$V_{CC} = 4.5$ V, $V_{OH} = 5.5$ V				0.1			0.1	mA
$I_I$	$V_{CC} = 5.5$ 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
$I_{CCH}$	$V_{CC} = 5.5$ V, $V_I = 0$ V		0.22		0.4	0.22		0.4	mA
$I_{CCL}$	$V_{CC} = 5.5$ V, $V_I = 4.5$ 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)	$V_{CC} = 5\text{ V},$ $C_L = 50\text{ pF},$ $R_L = 2\text{ k}\Omega,$ $T_A = 25^\circ\text{C}$	$V_{CC} = 4.5\text{ V to }5.5\text{ V},$ $C_L = 50\text{ pF},$ $R_L = 2\text{ k}\Omega,$ $T_A = \text{MIN to MAX}$				UNIT
			'ALS22B	SN54ALS22B		SN74ALS22B		
			TYP	MIN	MAX	MIN	MAX	
$t_{PLH}$	Any	Y	35	23	65	23	45	ns
$t_{PHL}$	Any	Y	8	4	32	4	18	ns

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

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