

# SN54ALS28A, SN74ALS28A QUADRUPLE 2-INPUT POSITIVE-NOR BUFFERS

SDAS193 – D2661, APRIL 1982 – 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

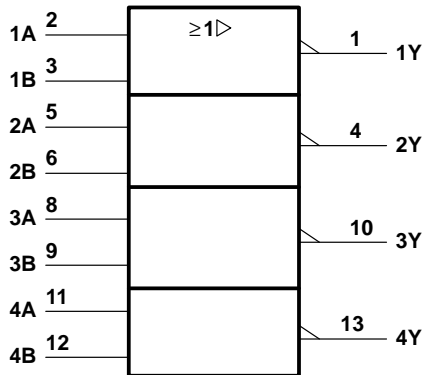
These devices contain four independent 2-input NOR buffer gates. They perform the Boolean functions  $Y = \overline{A+B}$  or  $Y = \overline{A \cdot B}$  in positive logic.

The SN54ALS28A is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS28A is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

FUNCTION TABLE  
(each gate)

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

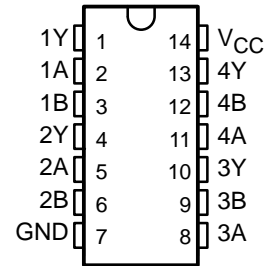
## logic symbol†



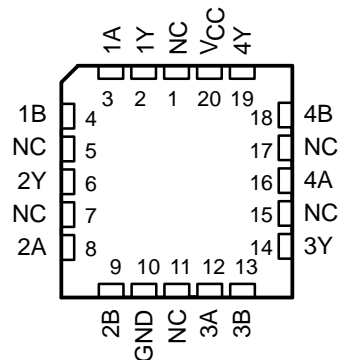
† This symbol is in accordance with ANSI/IEEE Std –1984 and IEC Publication 617-12.

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

SN54ALS28A . . . J PACKAGE  
SN74ALS28A . . . D OR N PACKAGE  
(TOP VIEW)

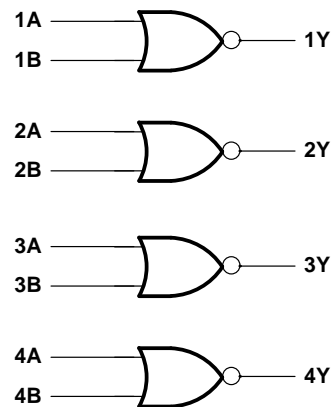


SN54ALS28A . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

## logic diagram (positive logic)



# SN54ALS28A, SN74ALS28A QUADRUPLE 2-INPUT POSITIVE-NOR BUFFERS

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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: SN54ALS28A	–55°C to 125°C
SN74ALS28A	0°C to 70°C
Storage temperature range	–65°C to 150°C

## recommended operating conditions

		SN54ALS28A			SN74ALS28A			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
$V_{OH}$	High-level output current			–1			–2.6	mA
$I_{OL}$	Low-level output current			12			24	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	SN54ALS28A			SN74ALS28A			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	$V_{CC} - 2$			$V_{CC} - 2$			V
	$V_{CC} = 4.5$ V, $I_{OH} = -1$ mA	2.4	3.3					
	$V_{CC} = 4.5$ V, $I_{OH} = -2.6$ mA				2.4	3.3		
$V_{OL}$	$V_{CC} = 4.5$ V, $I_{OL} = 12$ mA	0.25	0.4		0.25	0.4		V
	$V_{CC} = 4.5$ V, $I_{OL} = 24$ 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
$I_{O\ddagger}$	$V_{CC} = 5.5$ V, $V_O = 2.25$ V	–30		–112	–30		–112	mA
$I_{CCH}$	$V_{CC} = 5.5$ V, $V_I = 0$ V		1.7	2.8		1.7	2.8	mA
$I_{CCL}$	$V_{CC} = 5.5$ V, $V_I = 4.5$ V		5.6	9		5.6	9	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, $C_L = 50$ 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	
			'ALS28A	SN54ALS28A	SN74ALS28A		
			TYP	MIN	MAX	MIN	MAX
$t_{PLH}$	A or B	Y	4	1	16	2	8
$t_{PHL}$	A or B	Y	4	1	10	2	7

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



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