

# SN54ALS1020A, SN74ALS1020A DUAL 4-INPUT POSITIVE-NAND BUFFERS

SDAS 242 – D2661, APRIL 1982 – REVISED MAY 1986

- Buffer Version of 'ALS20B
- 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

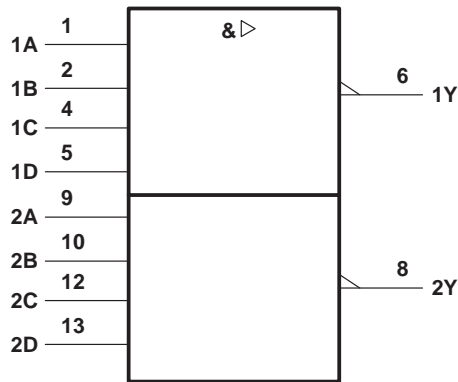
These devices contain two independent 4-input NAND buffers. They perform the Boolean functions  $Y = \overline{A \cdot B \cdot C \cdot D}$  or  $Y = \overline{A+B+C+D}$  positive logic.

The SN54ALS1020A is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS1020A is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

FUNCTION TABLE  
(each gate)

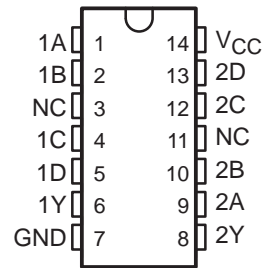
INPUTS				OUTPUT Y
A	B	C	D	
H	H	H	H	L
L	X	X	X	H
X	L	X	X	H
X	X	L	X	H
X	X	X	L	H

## logic symbol†

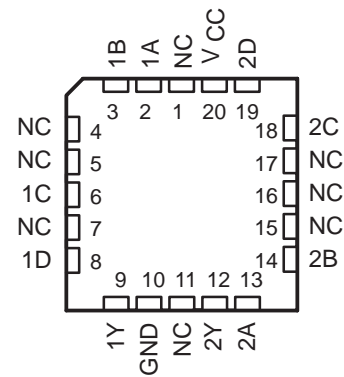


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.  
Pin numbers shown are for D, J, and N packages.

SN54ALS1020A . . . J PACKAGE  
SN74ALS1020A . . . D OR N PACKAGE  
(TOP VIEW)

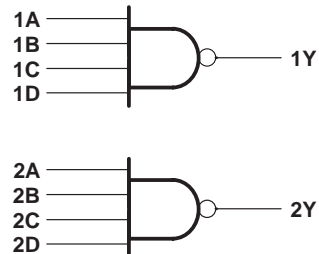


SN54ALS1020A . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

## logic diagram (positive logic)



# SN54ALS1020A, SN74ALS1020A DUAL 4-INPUT POSITIVE-NAND 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:	
SN54ALS1020A	–55°C to 125°C
SN74ALS1020A	0°C to 70°C
Storage temperature range	–65°C to 150°C

## recommended operating conditions

		SN54ALS1020A			SN74ALS1020A			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			–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	SN54ALS1020A			SN74ALS1020A			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		2.4	3.3		
	$V_{CC} = 4.5$ V, $I_{OH} = -2.6$ mA							
$V_{OL}$	$V_{CC} = 4.5$ 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, $V_I = 0$		0.5	0.8		0.5	0.8	mA
$I_{CCL}$	$V_{CC} = 5.5$ V, $V_I = 4.5$ V		2.4	3.9		2.4	3.9	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
			'ALS1020A		SN54ALS1020A		SN74ALS1020A		
			TYP		MIN	MAX	MIN	MAX	
$t_{PLH}$	Any	Y	5		2	10	2	8	ns
$t_{PHL}$			5		2	10	2	7	

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

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