

# SN54ALS12A, SN74ALS12A TRIPLE 3-INPUT POSITIVE-NAND GATES WITH OPEN-COLLECTOR OUTPUTS

SDAS008A - 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

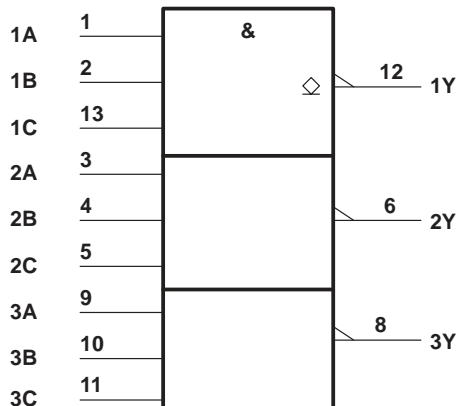
These devices contain three independent 3-input NAND gates with open-collector outputs. These gates perform the Boolean functions  $Y = \overline{A \cdot B \cdot C}$  or  $Y = \overline{A + B + C}$  in positive logic. The open-collector outputs require pullup resistors to perform correctly. They may 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 SN54ALS12A is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS12A is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

FUNCTION TABLE  
(each gate)

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

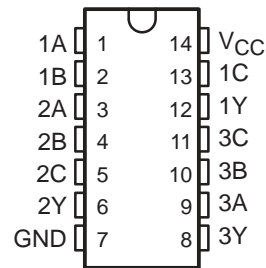
## logic symbol†



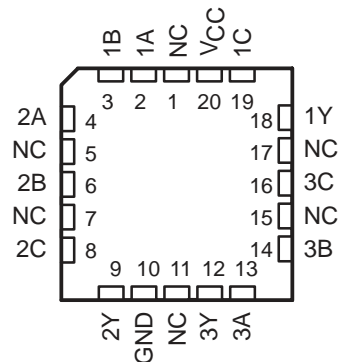
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

SN54ALS12A . . . J PACKAGE  
SN74ALS12A . . . D OR N PACKAGE  
(TOP VIEW)

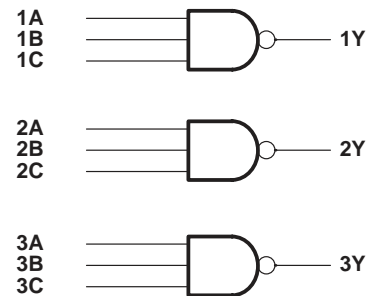


SN54ALS12A . . . FK PACKAGE  
(TOP VIEW)



NC—No internal connection

## logic diagram (positive logic)



# SN54ALS12A, SN74ALS12A

## TRIPLE 3-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: SN54ALS12A	-55°C to 125°C
SN74ALS12A	0°C to 70°C
Storage temperature range	-65°C to 150°C

#### recommended operating conditions

		SN54ALS12A			SN74ALS12A			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 voltage			5.5			5.5	V
$I_{OL}$	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	SN54ALS12A			SN74ALS12A			UNIT
		MIN	TYP†	MAX	MIN	TYP†	MAX	
$V_{IK}$	$V_{CC} = 4.5\text{ V}$ , $I_I = -18\text{ mA}$			-1.5			-1.5	V
$V_{OL}$	$V_{CC} = 4.5\text{ V}$ , $I_{OL} = 4\text{ mA}$		0.25	0.4		0.25	0.4	V
	$V_{CC} = 4.5\text{ V}$ , $I_{OL} = 8\text{ mA}$					0.35	0.5	
$I_{OH}$	$V_{CC} = 4.5\text{ V}$ , $V_{OH} = 5.5\text{ V}$			0.1			0.1	mA
$I_I$	$V_{CC} = 5.5\text{ V}$ , $V_I = 7\text{ V}$			0.1			0.1	mA
$I_{IH}$	$V_{CC} = 5.5\text{ V}$ , $V_I = 2.7\text{ V}$			20			20	μA
$I_{IL}$	$V_{CC} = 5.5\text{ V}$ , $V_I = 0.4\text{ V}$			-0.1			-0.1	mA
$I_{CCH}$	$V_{CC} = 5.5\text{ V}$ , $V_I = 0\text{ V}$		0.32	0.6		0.32	0.6	mA
$I_{CCL}$	$V_{CC} = 5.5\text{ V}$ , $V_I = 4.5\text{ V}$		1.2	2.2		1.2	2.2	mA

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

#### switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$ , $C_L = 50\text{ pF}$ , $R_L = 2\text{ k}\Omega$ , $T_A = \text{MIN to MAX}$				UNIT
			SN54ALS12A		SN74ALS12A		
			MIN	MAX	MIN	MAX	
$t_{PLH}$	Any	Y	23	59	23	54	ns
$t_{PHL}$	Any	Y	5	26	5	18	ns

NOTE 1: Load circuit and voltage waveforms are shown in Section 1 of ALS/AS Logic Data Book, 1986.



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