

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

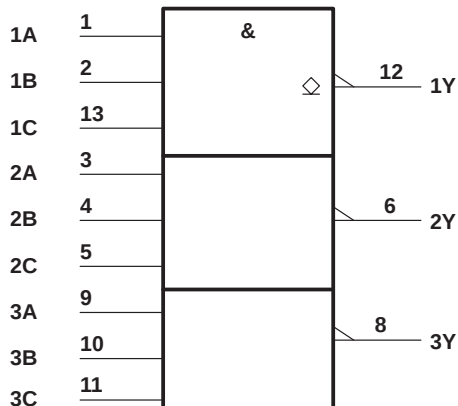
These devices contain three independent 3-input NAND gates with open-collector outputs. These gates perform the Boolean functions $Y = \overline{A \cdot B \cdot C}$ or $Y = \overline{A + B + C}$ in positive logic. The open-collector outputs require pullup resistors to perform correctly. They may be connected 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°C to 125°C . The SN74ALS12A is characterized for operation from 0°C to 70°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

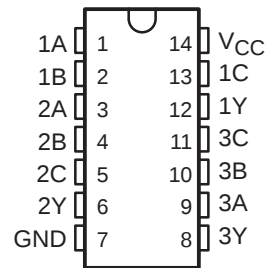
logic symbol†



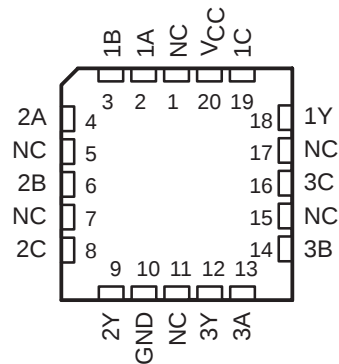
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

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

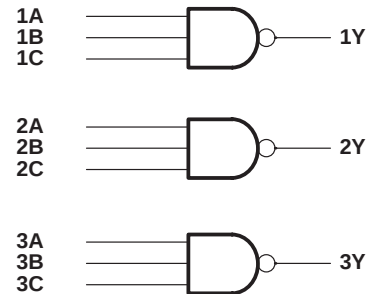


SN54ALS12A . . . FK PACKAGE
(TOP VIEW)



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}	$V_{CC} = 4.5$ 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		0.32	0.6		0.32	0.6	mA
I_{CCL}	$V_{CC} = 5.5$ V, $V_I = 4.5$ V		1.2	2.2		1.2	2.2	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} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 2 k Ω, T _A = 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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