

SN54ALS10A, SN54AS10, SN74ALS10A, SN74AS10 TRIPLE 3-INPUT POSITIVE-NAND GATES

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

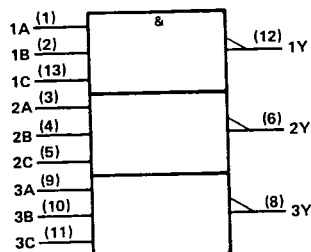
These devices contain three independent 3-input NAND gates. They perform the Boolean functions $Y = \overline{A \cdot B \cdot C}$ or $Y = \overline{A + B + C}$ in positive logic.

The SN54ALS10A and SN54AS10 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS10A and SN74AS10 are 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†

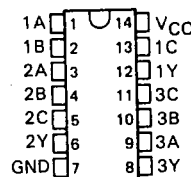


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, and N packages.

SN54ALS10A, SN54AS10 . . . J PACKAGE
SN74ALS10A, SN74AS10 . . . D OR N PACKAGE

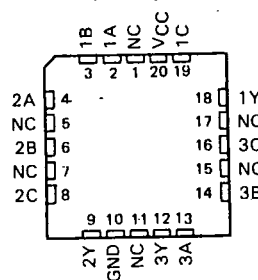
(TOP VIEW)

T-43-15



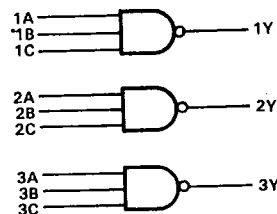
SN54ALS10A, SN54AS10 . . . FK PACKAGE

(TOP VIEW)



NC—No internal connection

logic diagram (positive logic)



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8961723 TEXAS INSTR (LOGIC)

81C 42632 D

SN54ALS10A, SN74ALS10A
TRIPLE 3-INPUT POSITIVE-NAND GATES

T-43-15

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: SN54ALS10A	-55 °C to 125 °C
SN74ALS10A	0 °C to 70 °C
Storage temperature range	-65 °C to 150 °C

recommended operating conditions

		SN54ALS10A			SN74ALS10A			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			-0.4			-0.4	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	SN54ALS10A			SN74ALS10A			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_{OH}	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}, I_{OH} = -0.4 \text{ mA}$	$V_{CC}-2$			$V_{CC}-2$			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_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_{O+}	$V_{CC} = 5.5 \text{ V}, V_O = 2.25 \text{ V}$	-30	-112		-30	-112		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 $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$.‡ 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} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX				UNIT
			SN54ALS10A		SN74ALS10A		
			MIN	MAX	MIN	MAX	
t _{PLH}	Any	Y	2	16	2	11	ns
t _{PHL}	Any	Y	2	12	2	10	ns

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

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SN54AS10, SN74AS10
TRIPLE 3-INPUT POSITIVE-NAND GATES

T-43-15

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: SN54AS10	-55°C to 125°C
SN74AS10	0°C to 70°C
Storage temperature range	-65°C to 150°C

recommended operating conditions

		SN54AS10			SN74AS10			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			0.8			0.8	V
I_{OH}	High-level output current			-2			-2	mA
I_{OL}	Low-level output current			20			20	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	SN54AS10			SN74AS10			UNIT
		MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}	$V_{CC} = 4.5$ V, $I_I = -18$ mA			-1.2			-1.2	V
V_{OH}	$V_{CC} = 4.5$ V to 5.5 V, $I_{OH} = -2$ mA	$V_{CC}-2$			$V_{CC}-2$			V
V_{OL}	$V_{CC} = 4.5$ V, $I_{OL} = 20$ mA	0.35		0.5	0.35		0.5	V
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			-0.5			-0.5	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		1.5	2.4		1.5	2.4	mA
I_{CCL}	$V_{CC} = 5.5$ V, $V_I = 4.5$ V		8.1	13		8.1	13	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)

Switching characteristics (see NOTE 1)							
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5\text{ V to }5.5\text{ V},$ $C_L = 50\text{ pF},$ $R_L = 500\ \Omega,$ $T_A = \text{MIN to MAX}$				UNIT
			SN54AS10		SN74AS10		
			MIN	MAX	MIN	MAX	
t_{PLH}	Any	Y	1	5	1	4.5	ns
t_{PHL}	Any	Y	1	5	1	4.5	ns

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



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2-29

2

ALS and AS Circuits