

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

MARCH 1984—REVISED MAY 1988

- 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

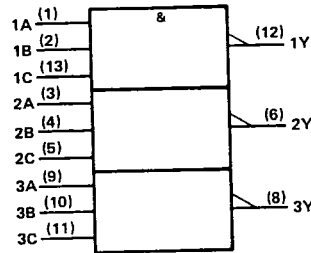
These devices contain three independent 3-input NAND gates. They perform the Boolean functions $Y = \overline{A \cdot B \cdot C}$ or $Y = \overline{A + B + C}$ in positive logic.

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†

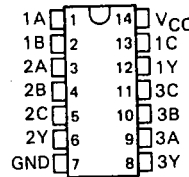


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for D, J, and N packages.

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

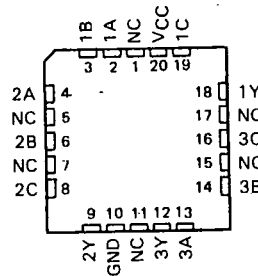
(TOP VIEW)

T-43-15



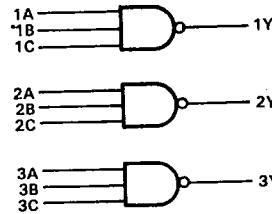
SN54ALS10A, SN54AS10 . . . FK PACKAGE

(TOP VIEW)



NC—No internal connection

logic diagram (positive logic)



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SN54ALS10A, SN74ALS10A
TRIPLE 3-INPUT POSITIVE-NAND GATES

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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: 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}	$V_{CC} = 4.5 V, I_I = -18 mA$			-1.5			-1.5	V
V_{OH}	$V_{CC} = 4.5 V \text{ to } 5.5 V, I_{OH} = -0.4 mA$	$V_{CC}-2$			$V_{CC}-2$			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_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}	$V_{CC} = 5.5 V, V_I = 0 V$		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 $V_{CC} = 5 V, T_A = 25 °C$.
 ‡ 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)	$V_{CC} = 4.5 V \text{ to } 5.5 V,$ $C_L = 50 pF,$ $R_L = 500 \Omega,$ $T_A = \text{MIN to MAX}$				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.

2 ALS and AS Circuits

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SN54AS10, SN74AS10
TRIPLE 3-INPUT POSITIVE-NAND GATES

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absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

Supply voltage, VCC	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	
VCC	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			V
I _{OH}	High-level output current				-2			mA
I _{OL}	Low-level output current				20			mA
T _A	Operating free-air temperature	-55			125			°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‡}	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 °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
			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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ALS and AS Circuits

