

SN54ALS1000A, SN74ALS1000A, SN54AS1000A, SN74AS1000A QUADRUPLE 2-INPUT POSITIVE-NAND BUFFERS/DRIVERS

D2661, APRIL 1984 — REVISED MAY 1986

- 'ALS1000A is a Buffer Version of 'ALS00B
- 'AS1000A is a Driver Version of 'AS00
- 'AS1000A Offers High Capacitive-Driver Capability
- 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

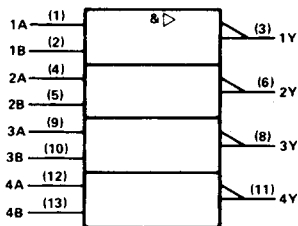
These devices contain four independent 2-input NAND buffers/drivers. They perform the Boolean functions $Y = \overline{A \cdot B}$ or $Y = \overline{A + B}$ in positive logic.

The SN54ALS1000A and SN54AS1000A are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS1000A and SN74AS1000A are characterized for operation from 0°C to 70°C .

FUNCTION TABLE (each gate)

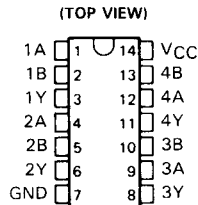
INPUTS		OUTPUT
A	B	Y
H	H	L
L	X	H
X	L	H

logic symbol†

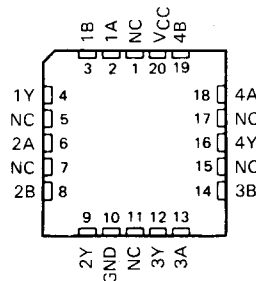


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, and N packages.

SN54ALS1000A, SN54AS1000A . . . J PACKAGE
SN74ALS1000A, SN74AS1000A . . . D OR N PACKAGE

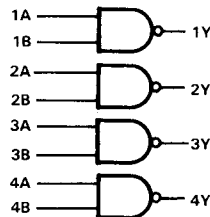


SN54ALS1000A, SN54AS1000A . . . FK PACKAGE
(TOP VIEW)



NC—No internal connection

logic diagram (positive logic)



PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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INSTRUMENTS

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SN54ALS1000A, SN74ALS1000A QUADRUPLE 2-INPUT POSITIVE-NAND BUFFERS

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: SN54ALS1000A	-55°C to 125°C
SN74ALS1000A	0°C to 70°C
Storage temperature range	-65°C to 150°C

recommended operating conditions

	SN54ALS1000A			SN74ALS1000A			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	SN54ALS1000A		SN74ALS1000A		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					
	$V_{CC} = 4.5 V$, $I_{OH} = -2.6 mA$			2.4	3.2			
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		mA
I_{CCH}	$V_{CC} = 5.5 V$, $V_I = 0 V$		0.86	1.6		0.86	1.6	mA
I_{CCL}	$V_{CC} = 5.5 V$, $V_I = 4.5 V$		4.8	7.8		4.8	7.8	mA

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

‡ 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)	$V_{CC} = 5 V$, $C_L = 50 pF$, $R_L = 500 \Omega$, $T_A = 25^\circ C$	$V_{CC} = 4.5 V$ to $5.5 V$, $C_L = 50 pF$, $R_L = 500 \Omega$, $T_A = MIN$ to MAX				UNIT
				ALS1000A		SN74ALS1000A		
				TYP	MIN	MAX	MIN	
t_{PLH}	A or B	Y	4	2	10	2	8	ns
t_{PHL}	A or B	Y	5	2	10	2	7	ns

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

SN54AS1000A, SN74AS1000A QUADRUPLE 2-INPUT POSITIVE-NAND DRIVERS

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: SN54AS1000A	-55°C to 125°C
SN74AS1000A	0°C to 70°C
Storage temperature range	-65°C to 150°C

recommended operating conditions

	SN54AS1000A			SN74AS1000A			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	-40			-48			mA		
I_{OL} Low-level output current	40			48			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	SN54AS1000A		SN74AS1000A		UNIT
		MIN	TYP†	MAX	MIN	
V_{IK}	$V_{CC} = 4.5 \text{ V}$, $I_I = -18 \text{ mA}$	-1.2		-1.2		V
V_{OH}	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$, $I_{OH} = -2 \text{ mA}$	$V_{CC} - 2$		$V_{CC} - 2$		V
	$V_{CC} = 4.5 \text{ V}$, $I_{OH} = -3 \text{ mA}$	2.4	3.2	2.4	3.2	
	$V_{CC} = 4.5 \text{ V}$, $I_{OH} = -40 \text{ mA}$	2		2		
	$V_{CC} = 4.5 \text{ V}$, $I_{OL} = -48 \text{ mA}$	2		2		
V_{OL}	$V_{CC} = 4.5 \text{ V}$, $I_{OL} = 40 \text{ mA}$	0.25	0.5			V
	$V_{CC} = 4.5 \text{ V}$, $I_{OL} = 48 \text{ mA}$			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}	$V_{CC} = 5.5 \text{ V}$, $V_I = 0.4 \text{ V}$	-0.5		-0.5		mA
I_O^\ddagger	$V_{CC} = 5.5 \text{ V}$, $V_O = 2.25 \text{ V}$	-50	-200	-50	-200	mA
I_{CCH}	$V_{CC} = 5.5 \text{ V}$, $V_I = 0 \text{ V}$	2.2	3.5	2.2	3.5	mA
I_{CCL}	$V_{CC} = 5.5 \text{ V}$, $V_I = 4.5 \text{ V}$	12	19	12	19	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)	$V_{CC} = 4.5 \text{ V to } 5.5 \text{ V}$, $C_L = 50 \text{ pF}$, $R_L = 500 \Omega$, $T_A = \text{MIN to MAX}$				UNIT
			SN54AS1000A		SN74AS1000A		
			MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Y	1	5	1	4	ns
t_{PHL}	A or B	Y	1	5	1	4	ns

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