

SN54ALS40A, SN74ALS40A DUAL 4-INPUT POSITIVE-NAND BUFFERS

SDAS197 – D2661, APRIL 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

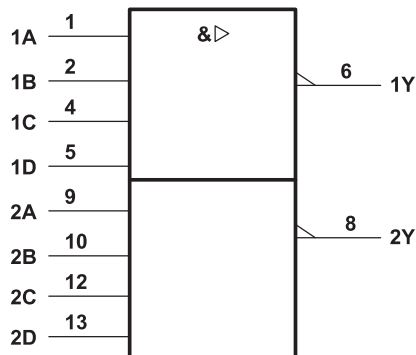
These devices contain two independent 4-input NAND buffer gates. They perform the Boolean functions $Y = A \cdot B \cdot C \cdot D$ or $Y = \overline{A} + \overline{B} + \overline{C} + \overline{D}$ in positive logic.

The SN54ALS40A is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ALS40A is characterized for operation from 0°C to 70°C .

FUNCTION TABLE
(each gate)

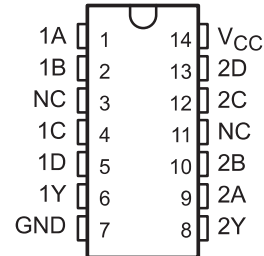
INPUTS				OUTPUT Y
A	B	C	D	
H	H	H	H	L
L	X	X	X	H
X	L	X	X	H
X	X	L	X	H
X	X	X	L	H

logic symbol†

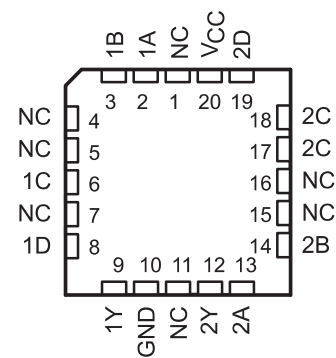


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, and N packages.

SN54ALS40A . . . J PACKAGE
SN74ALS40A . . . D OR N PACKAGE
(TOP VIEW)

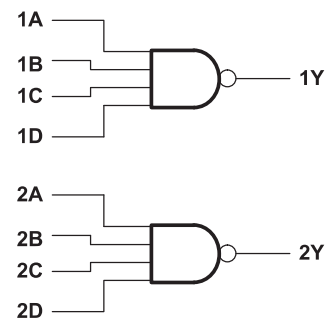


SN54ALS40A . . . FK PACKAGE
(TOP VIEW)



NC—No internal connection

logic diagram (positive logic)



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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: SN54ALS40A	–55°C to 125°C
SN74ALS40A	0°C to 70°C
Storage temperature range	–65°C to 150°C

recommended operating conditions

		SN54ALS40A			SN74ALS40A			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	SN54ALS40A			SN74ALS40A			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	2.3	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	–30		–112	mA
I_{CCH}	$V_{CC} = 5.5$ V, $V_I = 0$ V		0.43	0.8		0.43	0.8	mA
I_{CCL}	$V_{CC} = 5.5$ V, $V_I = 4.5$ V		2.4	3.9		2.4	3.9	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)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5\text{ V},$ $C_L = 50\text{ pF},$ $R_L = 500\ \Omega,$ $T_A = 25^{\circ}\text{C}$	$V_{CC} = 4.5\text{ V to }5.5\text{ V},$ $C_L = 50\text{ pF},$ $R_L = 500\ \Omega,$ $T_A = \text{MIN to MAX}$				UNIT
			'ALS40A	SN54ALS40A		SN74ALS40A		
			TYP	MIN	MAX	MIN	MAX	
tPLH	Any	Y	5	2	10	2	8	ns
tPHI			5	2	10	2	7	

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