

SN54F40, SN74F40 DUAL 4-INPUT POSITIVE-NAND BUFFERS

D3208, JANUARY 1989

- 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

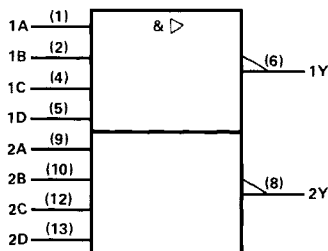
These devices contain two independent 4-input NAND buffer gates. They perform the Boolean functions $Y = A \cdot B \cdot C \cdot D$ or $Y = \overline{A + B + C + D}$ in positive logic.

The SN54F40 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74F40 is characterized for operation from 0°C to 70°C .

FUNCTION TABLE (each gate)

INPUTS				OUTPUT
A	B	C	D	Y
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

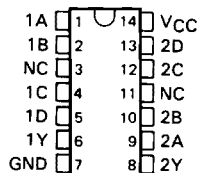
logic symbol†



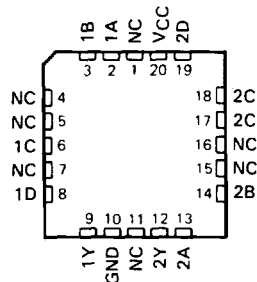
†This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

SN54F40 ... J PACKAGE
SN74F40 ... D OR N PACKAGE
(TOP VIEW)

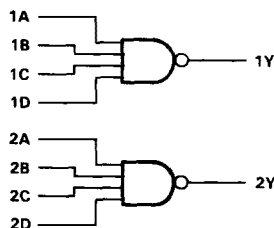


SN54F40 ... FK PACKAGE
(TOP VIEW)



NC—No internal connection

logic diagram (positive logic)



2

Data Sheets

SN54F40, SN74F40

DUAL 4-INPUT POSITIVE-NAND BUFFERS

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

Supply voltage, V_{CC}	-0.5 V to 7 V
Input voltage [†]	-0.5 V to 7 V
Input current	-30 mA to 5 mA
Voltage applied to any output in the high state	-0.5 V to V_{CC}
Current into any output in the low state	128 mA
Operating free-air temperature range: SN54F40	-55°C to 125°C
SN74F40	0°C to 70°C
Storage temperature range	-65°C to 150°C

[†]The input voltage ratings may be exceeded provided the input current ratings are observed.

recommended operating conditions

		SN54F40			SN74F40			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_{IK}	Input clamp current			-18			-18	mA
I_{OH}	High-level output current			-15			-15	mA
I_{OL}	Low-level output current			48			64	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	SN54F40			SN74F40			UNIT
		MIN	TYP [‡]	MAX	MIN	TYP [‡]	MAX	
V_{IK}	$V_{CC} = 4.5$ V, $I_I = -18$ mA	-0.73	-1.2			-1.2		V
V_{OH}	$V_{CC} = 4.5$ V, $I_{OH} = -1$ mA	2.5	3.4		2.5	3.4		V
	$V_{CC} = 4.5$ V, $I_{OH} = -15$ mA	2			2			
	$V_{CC} = 4.75$ V, $I_{OH} = -1$ mA				2.7			
V_{OL}	$V_{CC} = 4.5$ V, $I_{OL} = 48$ mA		0.35	0.5				V
	$I_{OL} = 64$ mA				0.4	0.55		
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, $V_I = 0.5$ V			-0.6			-0.6	mA
$I_{OS}^{\S}$	$V_{CC} = 5.5$ V, $V_O = 0$	-100		-225	-100		-225	mA
I_{CCH}	$V_{CC} = 5.5$ V, $V_I = 0$		1.75	4		1.75	4	mA
I_{CCL}	$V_{CC} = 5.5$ V, $V_I = 4.5$ V		11	17		11	17	mA

switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, C _L = 50 pF, R _L = 500 Ω, T _A = 25 °C			V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R _L = 500 Ω, T _A = MIN to MAX ¹			UNIT	
			'F40			SN54F40		SN74F40		
			MIN	TYP	MAX	MIN	MAX	MIN		MAX
t _{PLH}	A or B	Y	1.5	3.6	6	PRODUCT PREVIEW	1.5	7	ns	
t _{PHL}			1	2.6	5		1	5.5		

[‡]All typical values are at $V_{CC} = 5$ V, $T_A = 25$ °C.

^{\S}Not more than one output should be shorted at a time and the duration of the short circuit should not exceed one second.

^{\dagger}For conditions as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.

NOTE 1: Load circuits and waveforms are shown in Section 1.

2

Data Sheets