SN54F51, SN74F51
DUAL 2-WIDE 2-INPUT, 2-WIDE 3-INPUT AND-OR-INVERT GATES

SDFS092 − JANUARY 1989 − REVISED OCTOBER 1993

- **Package Options Include Plastic Small-Outline Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs**

description

These devices contain 2-wide 2-input and 2-wide 3-input AND-OR-INVERT gates. They perform the following Boolean functions:

$$1Y = \overline{(1A \bullet 1B \bullet 1C) + (1D \bullet 1E \bullet 1F)}$$

$$2Y = \overline{(2A \bullet 2B) + (2C \bullet 2D)}$$

The SN54F51 is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74F51 is characterized for operation from 0°C to 70°C.

FUNCTION TABLES

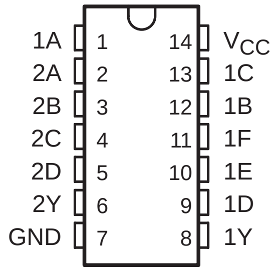
GATE 1

INPUTS						OUTPUT
1A	**1B**	**1C**	**1D**	**1E**	**1F**	**1Y**
H	H	H	X	X	X	L
X	X	X	H	H	H	L
All other combinations						H

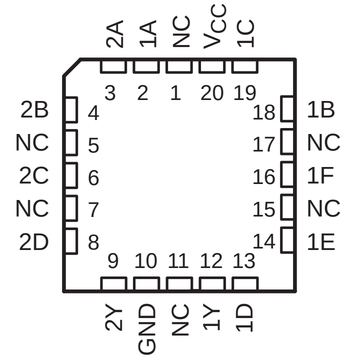
GATE 2

INPUTS				OUTPUT
2A	**2B**	**2C**	**2D**	**2Y**
H	H	X	X	L
X	X	H	H	L
All other combinations				H

SN54F51 . . . J PACKAGE
SN74F51 . . . D OR N PACKAGE
(TOP VIEW)

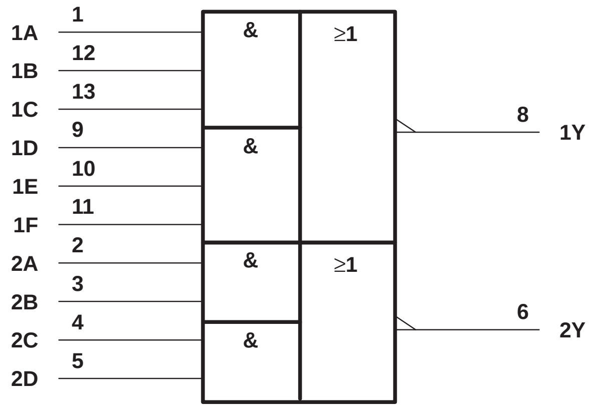


SN54F51 . . . FK PACKAGE
(TOP VIEW)



NC − No internal connection

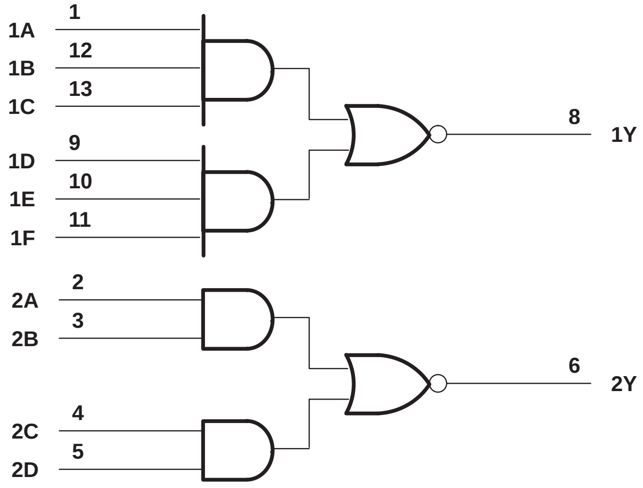
logic symbol[†]



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

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

logic diagram (positive logic)



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

Supply voltage range, V_{CC}	−0.5 V to 7 V
Input voltage range, V_I (see Note 1)	−1.2 V to 7 V
Input current range	−30 mA to 5 mA
Voltage range applied to any output in the high state	−0.5 V to V_{CC}
Current into any output in the low state	40 mA
Operating free-air temperature range: SN54F51	−55°C to 125°C
SN74F51	0°C to 70°C
Storage temperature range	−65°C to 150°C

[‡] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: The input voltage ratings may be exceeded provided the input current ratings are observed.

recommended operating conditions

		SN54F51			SN74F51			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			− 1			− 1	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		SN54F51			SN74F51			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,	I_{OH} = − 1 mA	2.5	3.4		2.5	3.4		V
	V_{CC} = 4.75 V,	I_{OH} = − 1 mA				2.7			
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			100			100	μA
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}‡	V_{CC} = 5.5 V,	V_O = 0	−60		−150	−60		−150	mA
I_{CCH}	V_{CC} = 5.5 V,	V_I = 0		1.8	3		1.8	3	mA
I_{CCL}	V_{CC} = 5.5 V,	V_I = 4.5 V		5.5	7.5		5.5	7.5	mA

† All typical values are at V_{CC} = 5 V, T_A = 25°C.

‡ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

switching characteristics (see Note 2)

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§				UNIT
			′F51			SN54F51		SN74F51		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	Any input	Y	2	3.5	5.5	1.5	7.5	1.5	6.5	ns
t_{PHL}			1	2.5	4	1	5	1	4.5	

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

NOTE 2: Load circuits and waveforms are shown in Section 1.

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