

SN54F21, SN74F21 DUAL 4-INPUT POSITIVE-AND GATES

D2932, MARCH 1987—REVISED 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

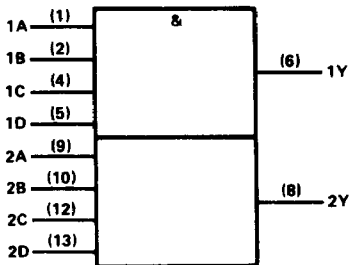
These devices contain two independent 4-input AND gates. They perform the Boolean functions $Y = A \cdot B \cdot C \cdot D$ or $Y = \overline{A + B + C + D}$ in positive logic.

The SN54F21 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74F21 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	H
L	X	X	X	L
X	L	X	X	L
X	X	L	X	L
X	X	X	L	L

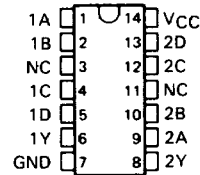
logic symbol†



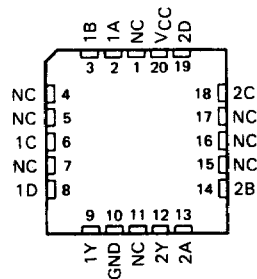
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

SN54F21 . . . J PACKAGE
SN74F21 . . . D OR N PACKAGE
(TOP VIEW)

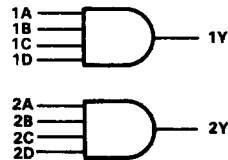


SN54F21 . . . FK PACKAGE
(TOP VIEW)



NC—No internal connection

logic diagram (positive logic)



SN54F21, SN74F21

DUAL 4-INPUT POSITIVE-AND GATES

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

Supply voltage, V_{CC}	-0.5 V to 7 V
Input voltage†	-1.2 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	40 mA
Operating free-air temperature range: SN54F21	-55°C to 125°C
SN74F21	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

	SN54F21			SN74F21			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

2 Data Sheets

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS	SN54F21			SN74F21			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		0.30	0.5		0.30	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, $V_I = 0.5$ V			-0.6			-0.6	mA
I_{OS}^{\S}	$V_{CC} = 5.5$ V, $V_O = 0$	-60		-150	-60		-150	mA
I_{CCH}	$V_{CC} = 5.5$ V, $V_I = 4.5$ V		2.8	4.3		2.8	4.3	mA
I_{CCL}	$V_{CC} = 5.5$ V, $V_I = 0$		4.7	7.3		4.7	7.3	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, $T_A = \text{MIN to MAX}^{\ddagger}$			UNIT	
			'F21			SN54F21		SN74F21		
			MIN	TYP	MAX	MIN	MAX	MIN		MAX
t_{PLH}	A or B	Y	1	3.2	4.7	1	5.6	1	5.3	ns
t_{PHL}	A or B	Y	1.5	3.4	5.1	1.5	5.9	1.5	5.5	ns

[‡]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.

[†]For conditions shown as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.

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