MOTOROLA

TYPES SN54ALS21, SN74ALS21
DUAL 4-INPUT POSITIVE-AND GATES

000217

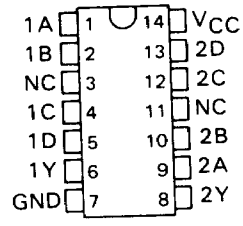
V55 1702/1238

description

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

The SN54ALS21 is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74ALS21 is characterized for operation from 0°C to 70°C.

(TOP VIEW)

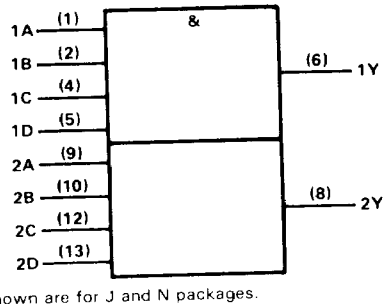


J Suffix—Case 632-07 (Ceramic)
N Suffix—Case 646-05 (Plastic)

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



Pin numbers shown are for J and N packages.

 DS9618

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: SN54ALS21 . . . . . −55 °C to 125 °C
SN74ALS21 . . . . . 0 °C to 70 °C
Storage temperature range . . . . . −65 °C to 150 °C

recommended operating conditions

		SN54ALS21			SN74ALS21			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			−0.4			−0.4	mA
I_{OL}	Low-level output current			4				mA
							8	
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		SN54ALS21			SN74ALS21			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,	I_{OH} = −0.4 mA	2.5	3.4		2.5			V
	V_{CC} = 4.75 V,	I_{OH} = −0.4 mA				2.7	3.4		
V_{OL}	V_{CC} = 4.5 V,	I_{OL} = 4 mA		0.25	0.4		0.25	0.4	V
	V_{CC} = 4.75 V,	I_{OL} = 8 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_{IL} = 0.4 V			−0.1			−0.1	mA
I_{OS}*	V_{CC} = 5.5 V,	V_O = GND	−25		−150	−25		−150	mA
I_{CCH}	V_{CC} = 5.5 V,	V_I = 4.5 V			1.2			1.2	mA
I_{CCL}	V_{CC} = 5.5 V,	V_I = 0 V			2.2			2.2	mA

‡All typical values are at V_{CC} = 5 V, T_A = 25 °C.
*The current produced by grounding the outputs is approximately twice that produced with 2.25 V on the outputs.

switching characteristics

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 15 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
			'ALS21	SN54ALS21		SN74ALS21		
			TYP	MIN	MAX	MIN	MAX	
t_{PLH}	Any	Y	12	6	24	6	24	ns
t_{PHL}	Any	Y	5	3	15	3	15	ns