MOTOROLA

TYPES SN54ALS09, SN74ALS09
QUADRUPLE 2-INPUT POSITIVE-AND GATES WITH OPEN-COLLECTOR OUTPUTS

11/30

000211

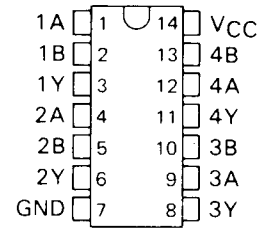
USS 7002/1276

description

These devices contain four independent 2-input AND gates. They perform the boolean functions $Y = A \cdot B$ or $Y = \overline{\overline{A} + \overline{B}}$ in positive logic. The open-collector outputs require pull-up resistors to perform correctly. They may be connected to other open-collector outputs to implement active-low wired-OR or active-high wired-AND functions. Open-collector devices are often used to generate higher V_{OH} levels.

The SN54ALS09 is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74ALS09 is characterized for operation from 0°C to 70°C.

(TOP VIEW)

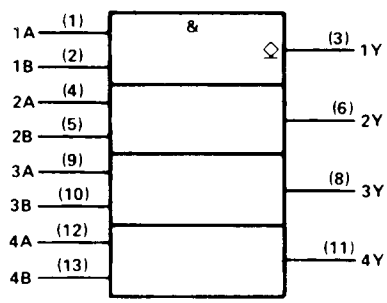


J Suffix—Case 632-07 (Ceramic)
N Suffix—Case 646-05 (Plastic)

FUNCTION TABLE (each gate)

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

logic symbol



Pin numbers shown are for J and N packages.

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 DS9612

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage . . . . . 7 V
Off-state output voltage . . . . . 7 V
Operating free-air temperature range: SN54ALS09 . . . . . −55 °C to 125 °C
SN74ALS09 . . . . . 0 °C to 70 °C
Storage temperature range . . . . . −65 °C to 150 °C

recommended operating conditions

		SN54ALS09			SN74ALS09			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
V_{OH}	High-level output voltage			5.5			5.5	V
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		SN54ALS09			SN74ALS09			UNIT
			MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	V_{CC} = 4.5 V,	I_I = −18 mA			−1.5			−1.5	V
I_{OH}	V_{CC} = 4.5 V,	V_{OH} = 5.5 V			0.1			0.1	mA
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_I = 0.4 V			−0.1			−0.1	mA
I_{CCH}	V_{CC} = 5.5 V,	V_I = 4.5 V			2.4			2.4	mA
I_{CCL}	V_{CC} = 5.5 V,	V_I = 0 V			4.4			4.4	mA

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

switching characteristics

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 15 pF, R_L = 2 kΩ, T_A = 25 °C	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R_L = 2 kΩ, T_A = MIN to MAX				UNIT
			'ALS09	SN54ALS09		SN74ALS09		
			TYP	MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Y	15	9	35	9	30	ns
t_{PHL}	A or B	Y	13	7	25	7	20	ns

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