

# TYPES SN54ALS27, SN54AS27, SN74ALS27, SN74AS27 TRIPLE 3-INPUT POSITIVE-NOR GATES

D2661, APRIL 1982 - REVISED DECEMBER 1983

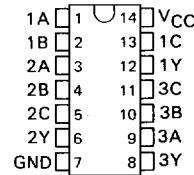
- Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

## description

These devices contain three independent 3-input NOR gates. They perform the Boolean functions  $Y = \overline{A+B+C}$  or  $Y = \overline{A} \cdot \overline{B} \cdot \overline{C}$  in positive logic.

The SN54ALS27 and SN54AS27 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS27 and SN74AS27 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

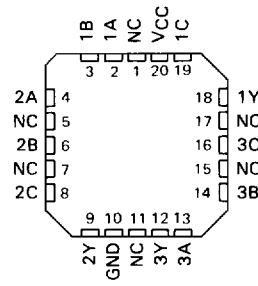
## SN54ALS27, SN54AS27 . . . J PACKAGE SN74ALS27, SN74AS27 . . . N PACKAGE (TOP VIEW)



FUNCTION TABLE (each gate)

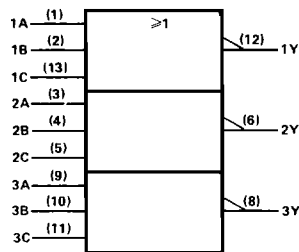
INPUTS			OUTPUT
A	B	C	Y
H	X	X	L
X	H	X	L
X	X	H	L
L	L	L	H

## SN54ALS27, SN54AS27 . . . FH PACKAGE SN74ALS27, SN74AS27 . . . FN PACKAGE (TOP VIEW)



NC - No internal connection

## logic symbol



Pin numbers shown are for J and N packages.

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ALS AND AS CIRCUITS

# TYPES SN54ALS27, SN74ALS27

## TRIPLE 3-INPUT POSITIVE-NOR GATES

### 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: SN54ALS27	-55 °C to 125 °C
SN74ALS27	0 °C to 70 °C
Storage temperature range	-65 °C to 150 °C

### recommended operating conditions

		SN54ALS27			SN74ALS27			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			8			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	SN54ALS27			SN74ALS27			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 to 5.5 V, $I_{OH} = -0.4$ mA	$V_{CC}-2$			$V_{CC}-2$			V
$V_{OL}$	$V_{CC} = 4.5$ V, $I_{OL} = 4$ mA	0.25 0.4			0.25 0.4			V
	$V_{CC} = 4.5$ 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
$I_{O\ddagger}$	$V_{CC} = 5.5$ V, $V_O = 2.25$ V	-30 -112			-30 -112			mA
$I_{CCH}$	$V_{CC} = 5.5$ V, $V_I = 0$ V	0.97 1.8			0.97 1.8			mA
$I_{CCL}$	$V_{CC} = 5.5$ V, $V_I = 4.5$ V	2 4			2 4			mA

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

‡The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

### switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5$ V to 5.5 V, $C_L = 50$ pF, $R_L = 500$ Ω, $T_A = \text{MIN to MAX}$				UNIT
			SN54ALS27		SN74ALS27		
			MIN	MAX	MIN	MAX	
$t_{PLH}$	Any	Y	4	22	4	15	ns
$t_{PHL}$	Any	Y	3	10	3	9	ns

NOTE 1: For load circuit and voltage waveforms, see page 1-12.

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**TYPES SN54AS27, SN74AS27  
TRIPLE 3-INPUT POSITIVE-NOR GATES**

**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: SN54AS27 .....	-55 °C to 125 °C
SN74AS27 .....	0 °C to 70 °C
Storage temperature range .....	-65 °C to 150 °C

**recommended operating conditions**

		SN54AS27			SN74AS27			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	-2			-2			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	SN54AS27			SN74AS27			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 to 5.5 V, $I_{OH} = -2$ mA	$V_{CC}-2$			$V_{CC}-2$			V
$V_{OL}$	$V_{CC} = 4.5$ V, $I_{OL} = 20$ mA	0.35			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, $V_I = 0.4$ V	-0.5			-0.5			mA
$I_{O\ddagger}$	$V_{CC} = 5.5$ V, $V_O = 2.25$ V	-30			-112			mA
$I_{CCH}$	$V_{CC} = 5.5$ V, $V_I = 0$ V	4			6.4			mA
$I_{CCL}$	$V_{CC} = 5.5$ V, $V_I = 4.5$ V	10.6			17.1			mA

† All typical values are at  $V_{CC} = 5$  V,  $T_A = 25$  °C.  
‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

**switching characteristics (see Note 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5$ V to 5.5 V, $C_L = 50$ pF, $R_L = 500$ Ω, $T_A = \text{MIN to MAX}$				UNIT
			SN54AS27		SN74AS27		
			MIN	MAX	MIN	MAX	
$t_{PLH}$	Any	Y	1	6.5	1	5.5	ns
$t_{PHL}$	Any	Y	1	5	1	4.5	ns

NOTE 1: For load circuit and voltage waveforms, see page 1-12.

**ALS AND AS CIRCUITS 2**