

# SN5427, SN54LS27, SN7427, SN74LS27 TRIPLE 3-INPUT POSITIVE-NOR GATES

SDLS089

DECEMBER 1983—REVISED MARCH 1988

- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers and Flat Packages, and Plastic and Ceramic DIPs

- Dependable Texas Instruments Quality and Reliability

## description

These devices contain three independent 3-input NOR gates.

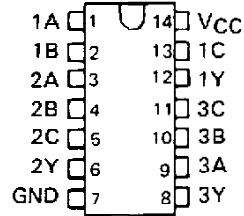
The SN5427 and SN54LS27 are characterized for operation over the full military temperature range of -55°C to 125°C. The SN7427 and SN74LS27 are characterized for operation from 0°C to 70°C.

SN5427, SN54LS27 . . . J OR W PACKAGE

SN7427 . . . N PACKAGE

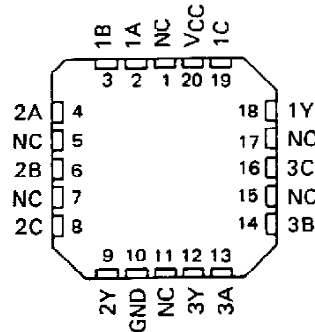
SN74LS27 . . . D OR N PACKAGE

(TOP VIEW)



SN54LS27 . . . FK PACKAGE

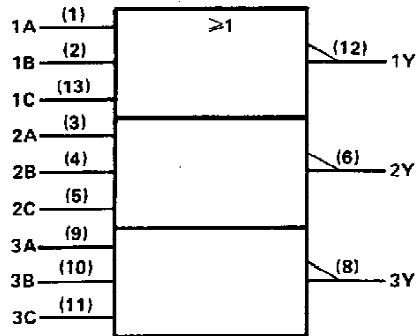
(TOP VIEW)



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

## logic symbol†

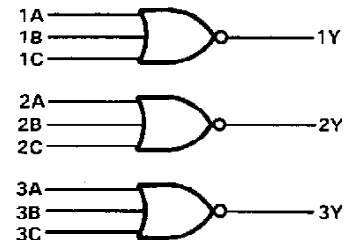


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

NC - No internal connection

## logic diagram



## positive logic

$$Y = A + B + C \text{ or } Y = \overline{A} \cdot \overline{B} \cdot \overline{C}$$

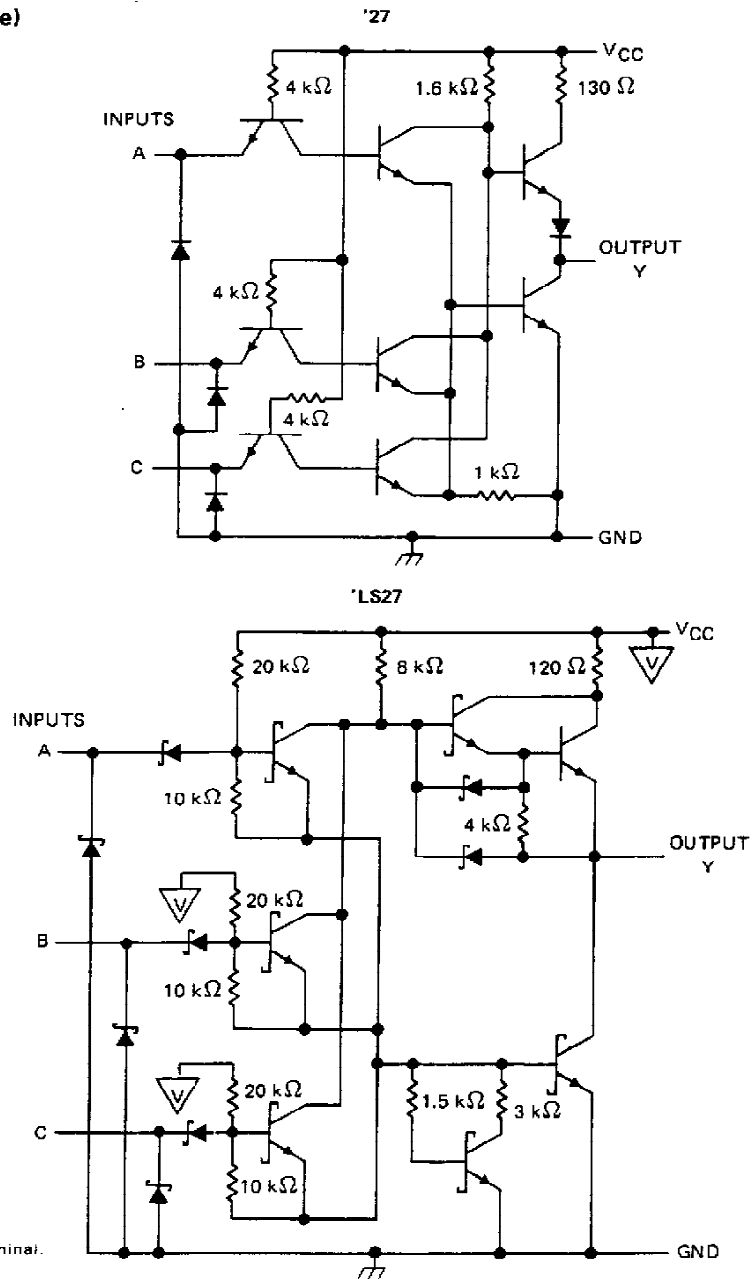
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# SN5427, SN54LS27, SN7427, SN74LS27 TRIPLE 3-INPUT POSITIVE-NOR GATES

schematics (each gate)



Resistor values shown are nominal.

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

Supply voltage, $V_{CC}$ (see Note 1)	7 V
Input voltage: '27	5.5 V
'LS27	7 V
Operating free-air temperature: SN54'	-55°C to 125°C
SN74'	0°C to 70°C
Storage temperature range	-65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.



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# SN5427, SN7427 TRIPLE 3-INPUT POSITIVE-NOR GATES

## recommended operating conditions

	SN5427			SN7427			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$ Supply voltage	4.5	5	5.5	4.75	5	5.25	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			-0.8			-0.8	mA
$I_{OL}$ Low-level output current			16			16	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 †	SN5427			SN7427			UNIT
		MIN	TYP ‡	MAX	MIN	TYP ‡	MAX	
$V_{IK}$	$V_{CC} = \text{MIN}$ , $I_I = -12 \text{ mA}$			-1.5			-1.5	V
$V_{OH}$	$V_{CC} = \text{MIN}$ , $V_{IL} = 0.8 \text{ V}$ , $I_{OH} = -0.8 \text{ mA}$	2.4	3.4		2.4	3.4		V
$V_{OL}$	$V_{CC} = \text{MIN}$ , $V_{IH} = 2 \text{ V}$ , $I_{OL} = 16 \text{ mA}$		0.2	0.4		0.2	0.4	V
$I_I$	$V_{CC} = \text{MAX}$ , $V_I = 5.5 \text{ V}$			1			1	mA
$I_{IH}$	$V_{CC} = \text{MAX}$ , $V_I = 2.4 \text{ V}$			40			40	μA
$I_{IL}$	$V_{CC} = \text{MAX}$ , $V_I = 0.4 \text{ V}$			-1.6			-1.6	mA
$I_{OS} §$	$V_{CC} = \text{MAX}$	-20		-55	-18		-55	mA
$I_{CCH}$	$V_{CC} = \text{MAX}$ , $V_I = 0 \text{ V}$		10	16		10	16	mA
$I_{CCL}$	$V_{CC} = \text{MAX}$ , See Note 2		16	26		16	26	mA

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

‡ All typical values are at  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

§ Not more than one output should be shorted at a time.

NOTE 2: One input at 4.5 V, all others at GND.

## switching characteristics, $V_{CC} = 5 \text{ V}$ , $T_A = 25^\circ\text{C}$ (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$	A, B or C	Y	$R_L = 400 \Omega$ , $C_L = 15 \text{ pF}$		10	15	ns
$t_{PHL}$					7	11	ns

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.



# SN54LS27, SN74LS27

## TRIPLE 3-INPUT POSITIVE-NOR GATES

### recommended operating conditions

	SN54LS27			SN74LS27			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub> Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub> High-level input voltage	2			2			V
V <sub>IL</sub> Low-level input voltage			0.7			0.8	V
I <sub>OH</sub> High-level output current			-0.4			-0.4	mA
I <sub>OL</sub> Low-level output current			4			8	mA
T <sub>A</sub> Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS †	SN54LS27			SN74LS27			UNIT
		MIN	TYP ‡	MAX	MIN	TYP ‡	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA			-1.5			-1.5	V
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, I <sub>OH</sub> = -0.4 mA	2.5	3.4		2.7	3.4		V
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 4 mA		0.25	0.4		0.25	0.4	V
	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 8 mA					0.35	0.5	
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 7 V			0.1			0.1	mA
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V			20			20	μA
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V			-0.4			-0.4	mA
I <sub>OS</sub> §	V <sub>CC</sub> = MAX	-20		-100	-20		-100	mA
I <sub>CCH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0 V		2	4		2	4	mA
I <sub>CCL</sub>	V <sub>CC</sub> = MAX, See Note 2		3.4	6.8		3.4	6.8	mA

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

‡ All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 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.

NOTE 2: One input at 4.5 V, all others at GND.

### switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t <sub>PLH</sub>	A, B or C	Y	R <sub>L</sub> = 2 kΩ,	C <sub>L</sub> = 15 pF		10	15	ns
t <sub>PHL</sub>						10	15	

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

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**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
JM38510/00404BCA	OBSOLETE	CDIP	J	14		TBD	Call TI	Call TI
JM38510/30302B2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30302B2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30302BCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30302BCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30302BDA	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30302BDA	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
SN5427J	OBSOLETE	CDIP	J	14		TBD	Call TI	Call TI
SN5427J	OBSOLETE	CDIP	J	14		TBD	Call TI	Call TI
SN54LS27J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SN54LS27J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SN7427N	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN7427N	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN74LS27D	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS27D	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS27DE4	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS27DE4	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS27DR	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS27DR	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS27DRE4	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS27DRE4	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS27N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS27N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS27N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN74LS27N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN74LS27NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS27NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS27NSR	ACTIVE	SO	NS	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS27NSR	ACTIVE	SO	NS	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS27NSRE4	ACTIVE	SO	NS	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS27NSRE4	ACTIVE	SO	NS	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
SNJ5427J	OBSOLETE	CDIP	J	14		TBD	Call TI	Call TI
SNJ5427J	OBSOLETE	CDIP	J	14		TBD	Call TI	Call TI
SNJ5427W	OBSOLETE	CFP	W	14		TBD	Call TI	Call TI
SNJ5427W	OBSOLETE	CFP	W	14		TBD	Call TI	Call TI
SNJ54LS27FK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS27FK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS27J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS27J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS27W	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS27W	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

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<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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