

# SN5423, SN5425, SN7423, SN7425 DUAL 4-INPUT NOR GATES WITH STROBE

SDLS082

DECEMBER 1983—REVISED MARCH 1988

- Package Options Include Plastic and Ceramic DIPs and Ceramic Flat Packages
- Dependable Texas Instruments Quality and Reliability

### description

These devices contain dual 4-input positive NOR gates with strobe. They perform the Boolean function;

$$Y = \overline{G(A+B+C+D)}$$

(with 1X and 1X̄ of '23 left open).

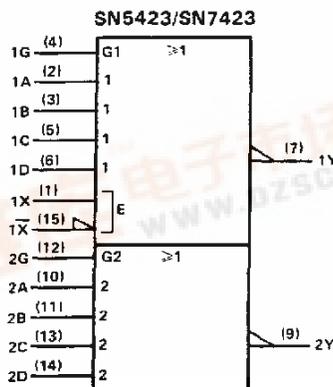
The SN5423 and the SN5425 are characterized for operation over the full military temperature range of -55°C to 125°C. The SN7423 and the SN7425 are characterized for operation from 0°C to 70°C.

### FUNCTION TABLE

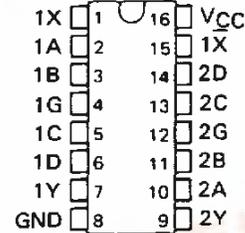
INPUTS					OUTPUT
A	B	C	D	G	Y
H	X	X	X	H	L
X	H	X	X	H	L
X	X	H	X	H	L
X	X	X	H	H	L
L	L	L	L	X	H
X	X	X	X	L	H

Expander inputs are open.  
H = high level, L = low level, X = irrelevant

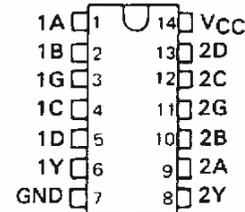
### logic symbols†



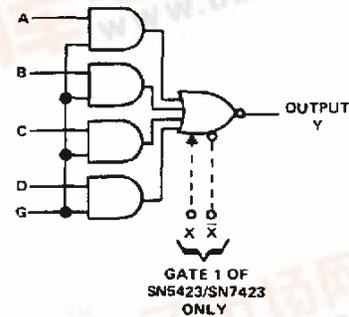
SN5423 . . . J OR W PACKAGE  
SN7423 . . . N PACKAGE  
(TOP VIEW)



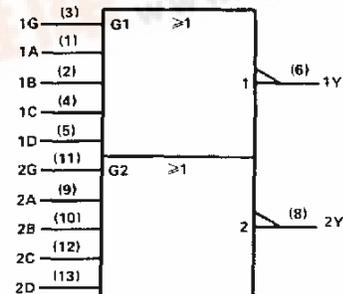
SN5425 . . . J OR W PACKAGE  
SN7425 . . . N PACKAGE  
(TOP VIEW)



### logic diagram



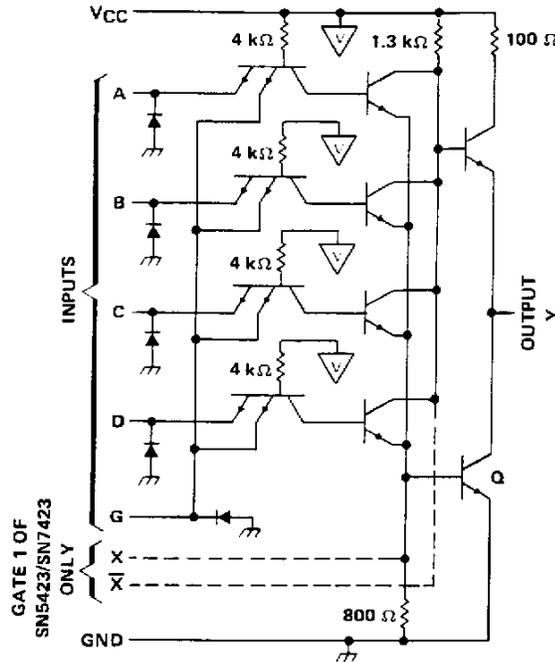
SN5425/SN7425



†These symbols are in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12. Pin numbers are for J, N, or W packages.

# SN5423, SN5425, SN7423, SNSN7425 DUAL 4-INPUT NOR GATES WITH STROBE

schematic (each gate)



- NOTES: A. Component values shown are nominal.  
 B. Both expander inputs are used simultaneously for expanding.  
 C. If expander is not used leave X and X open.  
 D. A total of four expander gates can be connected to the expander inputs.

 - VCC bus

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

Supply voltage $V_{CC}$ (see Note 1)	7 V
Input voltage (see Note 1)	5.5 V
Interemitter voltage (see Note 2)	5.5 V
Operating free-air temperature range: SN5423, SN5425 Circuits	-55°C to 125°C
SN7423, SN7425 Circuits	0°C to 70°C
Storage temperature range	-65°C to 150°C

- NOTES: 1. Voltage values, except interemitter voltage, are with respect to network ground terminal.  
 2. This is the voltage between two emitters of a multiple-emitter transistor.

## recommended operating conditions

		'23, '25			UNIT
		MIN	NOM	MAX	
$V_{CC}$ Supply voltage	54 Family	4.5	5	5.5	V
	74 Family	4.75	5	5.25	
$V_{IH}$ High-level input voltage		2			V
$V_{IL}$ Low-level input voltage		0.8			V
$I_{OH}$ High-level output current		-0.8			mA
$I_{OL}$ Low-level output current	54 Family	16			mA
	74 Family	16			
$T_A$ Operating free-air temperature range	54 Family	-55	125		°C
	74 Family	0	70		

The '23 is designed for use with up to four '60 expanders.

## SN5423, SN5425, SN7423, SN7425 DUAL 4-INPUT NOR GATES WITH STROBE

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

PARAMETER	TEST CONDITIONS†	MIN	TYP‡	MAX	UNIT
$V_I$	$V_{CC} = \text{MIN}$ , $I_I = -12 \text{ mA}$			-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		V
$V_{OL}$	$V_{CC} = \text{MIN}$ , $V_{IH} = 2 \text{ V}$ , $I_{OL} = 16 \text{ mA}$		0.2	0.4	V
$I_I$	$V_{CC} = \text{MAX}$ , $V_I = 5.5 \text{ V}$			1	mA
$I_{IH}$	data inputs	$V_{CC} = \text{MAX}$ , $V_I = 2.4 \text{ V}$		40	$\mu\text{A}$
	strobe inputs			160	
$I_{IL}$	data inputs	$V_{CC} = \text{MAX}$ , $V_I = 0.4 \text{ V}$		-1.6	mA
	strobe inputs			-6.4	
$I_{OS}\S$	$V_{CC} = \text{MAX}$	54 Family	-20	-55	mA
		74 Family	-18	-55	
$I_{CCH}$	$V_{CC} = \text{MAX}$ , All inputs at 0 V		8	16	mA
$I_{CCL}$	$V_{CC} = \text{MAX}$ , All inputs at 5 V		10	19	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable device type. Expander inputs X and  $\bar{X}$  are open.

‡ 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.

electrical characteristics (SN5423 circuits) using expander inputs,  $V_{CC} = 4.5 \text{ V}$ ,  $T_A = -55^\circ\text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
$I_{\bar{X}}$	Expander current $V_{X\bar{X}} = 0.4 \text{ V}$ , $I_{OL} = 16 \text{ mA}$			-3.5	mA
$V_{BE(Q)}$	Base-Emitter voltage of output transistor (Q) $I_{OL} = 16 \text{ mA}$ , $I_X + I_{\bar{X}} = 0.41 \text{ mA}$ , $R_{X\bar{X}} = 0$			1.1	V
$V_{OH}$	High-level output voltage $I_{OH} = -0.4 \text{ mA}$ , $I_X = 0.15 \text{ mA}$ , $I_{\bar{X}} = -0.15 \text{ mA}$	2.4	3.4		V
$V_{OL}$	Low-level output voltage $I_{OL} = 16 \text{ mA}$ , $I_X + I_{\bar{X}} = 0.3 \text{ mA}$ , $R_{X\bar{X}} = 114 \Omega$		0.2	0.4	V

electrical characteristics (SN7423 circuits) using expander inputs,  $V_{CC} = 4.75 \text{ V}$ ,  $T_A = 0^\circ\text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
$I_{\bar{X}}$	Expander current $V_{X\bar{X}} = 0.4 \text{ V}$ , $I_{OL} = 16 \text{ mA}$			-3.8	mA
$V_{BE(Q)}$	Base-Emitter voltage of output transistor (Q) $I_{OL} = 16 \text{ mA}$ , $I_X + I_{\bar{X}} = 0.62 \text{ mA}$ , $R_{X\bar{X}} = 0$			1	V
$V_{OH}$	High-level output voltage $I_{OH} = -0.4 \text{ mA}$ , $I_X = 0.27 \text{ mA}$ , $I_{\bar{X}} = -0.27 \text{ mA}$	2.4	3.4		V
$V_{OL}$	Low-level output voltage $I_{OL} = 16 \text{ mA}$ , $I_X + I_{\bar{X}} = 0.43 \text{ mA}$ , $R_{X\bar{X}} = 130 \Omega$		0.2	0.4	V

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

switching characteristics,  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^\circ\text{C}$ ,  $N = 10$ , (see note 3)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$	$R_L = 400 \Omega$ , $C_L = 15 \text{ pF}$		13	22	ns
$t_{PHL}$	$R_L = 400 \Omega$ , $C_L = 15 \text{ pF}$		8	15	ns

NOTE 3: Switching characteristics of the SN5423 and SN7424 are tested with the expander pins open.

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