

# SN5453, SN7453 EXPANDABLE 4-WIDE AND-OR-INVERT GATES

DECEMBER 1983—REVISED MARCH 1988

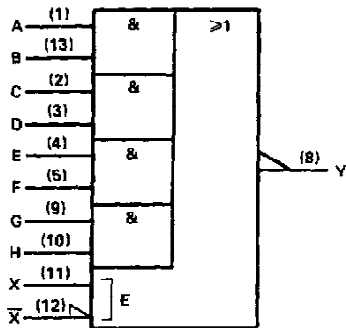
- Package Options Include Plastic and Ceramic DIPs and Ceramic Flat Packages
- Dependable Texas Instruments Quality and Reliability

### description

These devices are expandable 4-wide AND-OR-INVERT gates. They perform the Boolean function  $Y = \overline{AB + CD + EF + GH + X}$  with  $X = \text{output of SN5460/SN7460}$ .

The SN5453 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN7453 is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

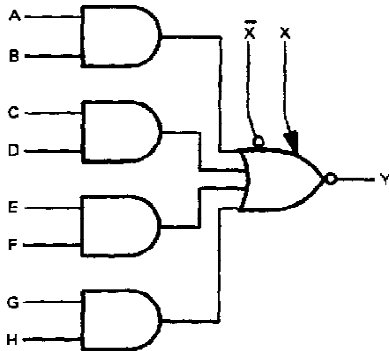
### logic symbol†



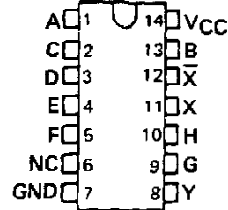
positive logic:  $Y = \overline{AB + CD + EF + GH + X}$   
 $X = \text{output of SN5460/SN7460}$

†This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.  
 Pin numbers shown are for J and N packages.

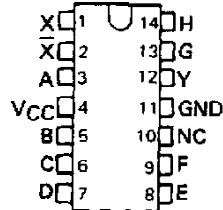
### logic diagram (positive logic)



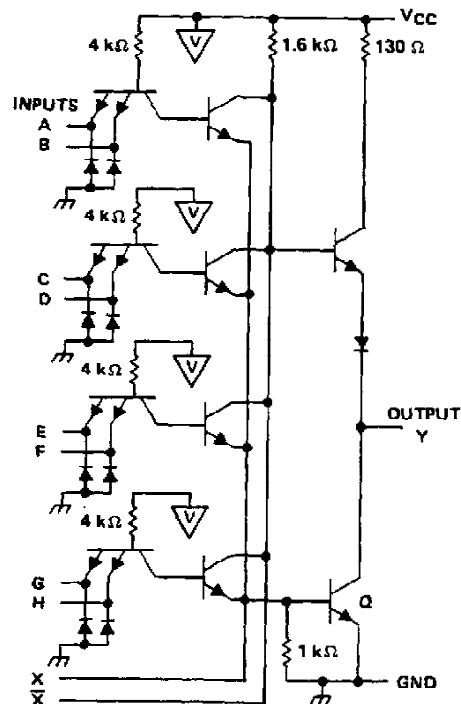
SN5453 . . . J PACKAGE  
 SN7453 . . . N PACKAGE  
 (TOP VIEW)



SN5453 . . . W PACKAGE  
 (TOP VIEW)



### schematic



Resistor values shown are nominal.  
 If expander is not used, leave X and X-bar open.

PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



# SN5453, SN7453 EXPANDABLE 4-WIDE AND-OR INVERT GATES

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

Supply voltage, $V_{CC}$ (see Note 1)	7 V
Input voltage	5.5 V
Operating free-air temperature range: SN5453	-55°C to 125°C
SN7453	0°C to 70°C
Storage temperature range	-65°C to 150°C

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

## recommended operating conditions

	SN5453			SN7453			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			-0.4			-0.4	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†	SN5453			SN7453			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
$V_{IK}$	$V_{CC} = \text{MIN.}$ , $I_I = -12 \text{ mA}$			-1.5			-1.5	V
$V_{OH}$	$V_{CC} = \text{MIN.}$ , $V_{IL} = 0.8 \text{ V.}$ , $I_{OH} = -0.4 \text{ mA}$	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
$I_{IH}$	$V_{CC} = \text{MAX.}$ , $V_{IH} = 2.4 \text{ V}$			40			40	µA
$I_{IL}$	$V_{CC} = \text{MAX.}$ , $V_{IL} = 0.4 \text{ V}$			-1.6			-1.6	mA
$I_{OS}§$	$V_{CC} = \text{MAX}$	-20		-55	-18		-55	mA
$I_{CCH}$	$V_{CC} = \text{MAX.}$ , $V_I = 0 \text{ V}$		4	8		4	8	mA
$I_{CCL}$	$V_{CC} = \text{MAX.}$ , See Note 2		5.1	9.5		5.1	9.5	mA
$I_{\bar{X}}¶$	$V_{\bar{X}\bar{X}} = 0.4 \text{ V.}$ , $I_{OL} = 16 \text{ mA}$			-2.9			-3.1	mA
$V_{BE(IQ)}¶$	$I_{\bar{X}} + I_{\bar{X}} = 0.41 \text{ mA}$ , $R_{\bar{X}\bar{X}} = 0$ , $I_{OL} = 16 \text{ mA}$			1.1				V
	$I_{\bar{X}} + I_{\bar{X}} = 0.62 \text{ mA}$ , $R_{\bar{X}\bar{X}} = 0$ , $I_{OL} = 16 \text{ mA}$						1	V
$V_{OH}¶$	$I_{\bar{X}} = 0.15 \text{ mA}$ , $I_{\bar{X}} = -0.15 \text{ mA}$ , $I_{OH} = -0.4 \text{ mA}$	2.4	3.4					V
	$I_{\bar{X}} = 0.27 \text{ mA}$ , $I_{\bar{X}} = -0.27 \text{ mA}$ , $I_{OH} = -0.4 \text{ mA}$				2.4	3.4		V
$V_{OL}¶$	$I_{\bar{X}} + I_{\bar{X}} = 0.3 \text{ mA}$ , $R_{\bar{X}\bar{X}} = 138 \Omega$ , $I_{OL} = 16 \text{ mA}$		0.2	0.4				V
	$I_{\bar{X}} + I_{\bar{X}} = 0.43 \text{ mA}$ , $R_{\bar{X}\bar{X}} = 130 \Omega$ , $I_{OL} = 16 \text{ mA}$				0.2	0.4		V

† 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.

¶ Using expander inputs,  $V_{CC} = \text{MIN}$ ,  $T_A = \text{MIN}$ , except typical values.

NOTE 2: All inputs of one AND gate 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
$t_{PLH}$	Any	Y	$R_L = 400 \Omega$ , $C_L = 15 \text{ pF}^\#$		13	22	ns
$t_{PHL}$					8	15	ns

# Expander pins open.

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

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