

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

DECEMBER 1983—REVISED MARCH 1988

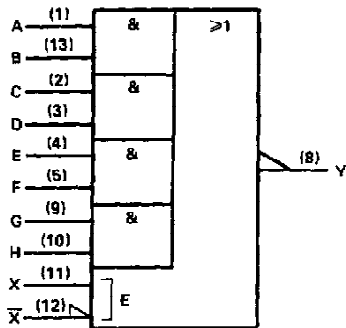
- Package Options Include Plastic and Ceramic DIPs and Ceramic Flat Packages
- Dependable Texas Instruments Quality and Reliability

description

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

The SN5453 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN7453 is characterized for operation from 0°C to 70°C .

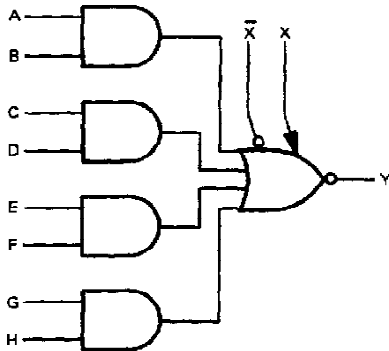
logic symbol†



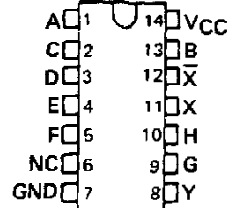
positive logic: $Y = \overline{AB + CD + EF + GH + X}$
 $X =$ output of SN5460/SN7460

†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.

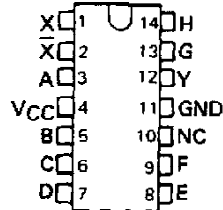
logic diagram (positive logic)



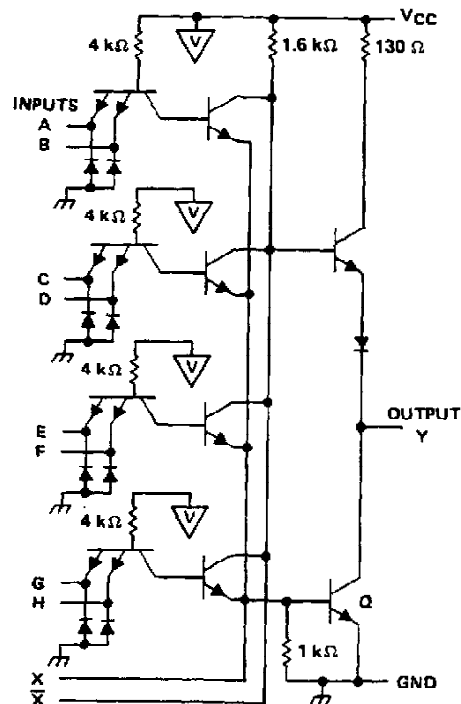
SN5453 . . . J PACKAGE
 SN7453 . . . N PACKAGE
 (TOP VIEW)



SN5453 . . . W PACKAGE
 (TOP VIEW)



schematic



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

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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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