

# TYPES SN54H52, SN74H52 EXPANDABLE 4-WIDE AND-OR GATES

REVISED DECEMBER 1983

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

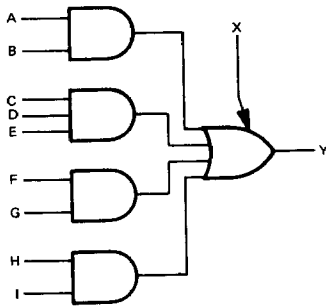
## description

These devices contain expandable 4-wide AND-OR gates. In the J and N packages they perform the Boolean function  $Y = AB + CDE + FG + HI + X$  and in the W package  $Y = AB + CD + EF + GHI + X$  with  $X =$  output of SN54H61/SN74H61.

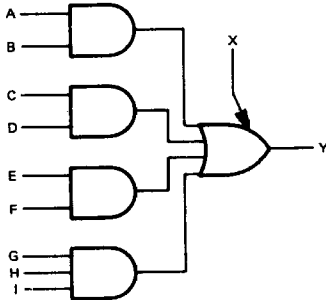
The SN54H52 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74H52 is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

## logic diagrams

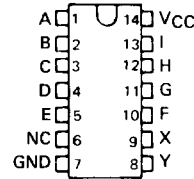
J OR N PACKAGE



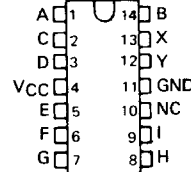
W PACKAGE



SN54H52 ... J PACKAGE  
SN74H52 ... J OR N PACKAGE  
(TOP VIEW)



SN54H52 ... W PACKAGE  
(TOP VIEW)



NC - No internal connection

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### PRODUCTION DATA

This document contains 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.

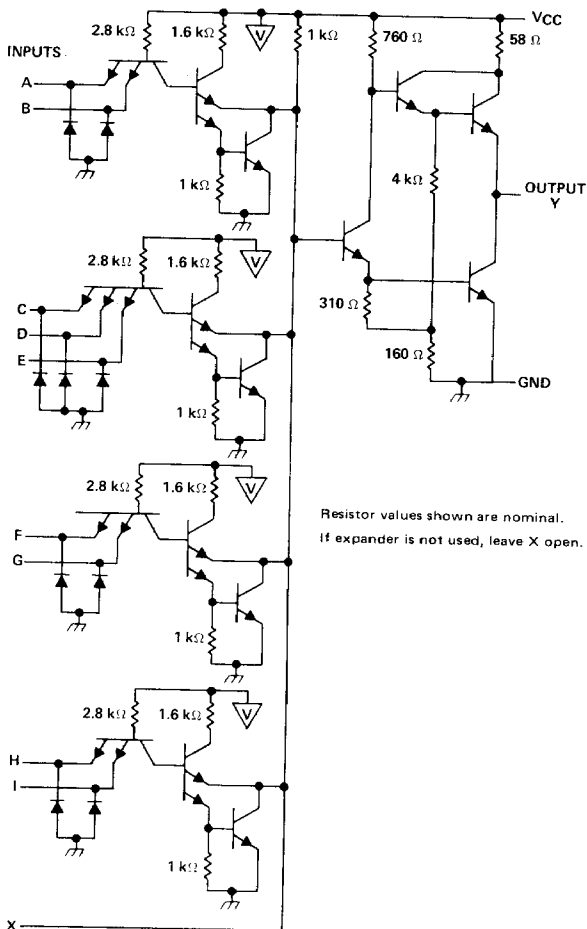
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# TYPES SN54H52, SN74H52 EXPANDABLE 4-WIDE AND-OR GATES

schematic



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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: SN54H52	-55°C to 125°C
SN74H52	0°C to 70°C
Storage temperature range	-65°C to 150°C

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

# TYPES SN54H52, SN74H52 EXPANDABLE 4-WIDE AND-OR GATES

## recommended operating conditions

		SN54H52			SN74H52			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	0.8			0.8			V		
I <sub>OH</sub>	High-level output current	-0.5			-0.5			mA		
I <sub>OL</sub>	Low-level output current	20			20			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†	SN54H52			SN74H52			UNIT	
		MIN	TYP‡	MAX	MIN	TYP‡	MAX		
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -8 mA	-1.5			-1.5			V	
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, I <sub>OH</sub> = -0.5 mA	2.4	3.4		2.4	3.4		V	
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V, I <sub>OL</sub> = 20 mA	0.2			0.2			V	
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 5.5 V	1			1			mA	
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2.4 V	50			50			µA	
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>IL</sub> = 0.4 V	-2			-2			mA	
I <sub>OS</sub> §	V <sub>CC</sub> = MAX	-40		-100	-40		-100	mA	
I <sub>CCH</sub>	V <sub>CC</sub> = MAX, See Note 2	20			20			31	mA
I <sub>CCL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0 V	15.2			15.2			24	mA
I <sub>X</sub> ▲	V <sub>X</sub> = 1 V, I <sub>OH</sub> = -0.5 mA	-2.7		-4.5	-2.9		-5.35	mA	
V <sub>OH</sub> ▲	V <sub>X</sub> = 1 V, I <sub>OH</sub> = -0.5 mA	2.4	3.4		2.4	3.4		V	
V <sub>OL</sub> ▲	I <sub>X</sub> = -0.3 mA, I <sub>OL</sub> = 20 mA, T <sub>A</sub> = MAX	0.2			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<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: All inputs of one AND gate at 4.5 V, all others at GND.

▲ Using expander inputs, V<sub>CC</sub> = MIN, T<sub>A</sub> = MIN (unless otherwise noted).

## 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>	Any	Y	R <sub>L</sub> = 280 Ω, Expander pins open	C <sub>L</sub> = 25 pF	10.6	15	ns
t <sub>PHL</sub>					9.2	15	ns
t <sub>PLH</sub>			R <sub>L</sub> = 280 Ω, Ground to X	C <sub>L</sub> = 25 pF, C = 15 pF	14.8		ns
t <sub>PHL</sub>					9.8		ns

NOTE 3: See General Information Section for load circuits and voltage waveforms.

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