

# TYPES SN5460, SN54H60, SN7460, SN74H60 DUAL 4-INPUT EXPANDERS

REVISED DECEMBER 1983

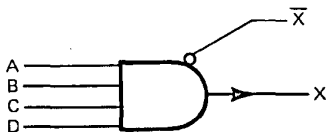
- Package Options Include Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

## description

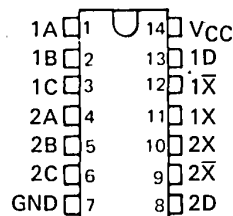
These devices contain two independent 4-input expanders. The '60 perform the Boolean function  $X = ABCD$  when connected to X and  $\bar{X}$  inputs of SN5423/SN7423, SN5450/SN7450, or SN5453/SN7453. The 'H60 performs the same function when connected to X and  $\bar{X}$  inputs of SN54H50/SN74H50, SN54H53/SN74H53, or SN54H55/SN74H55.

The SN5460 and SN54H60 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN7460 and SN74H60 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

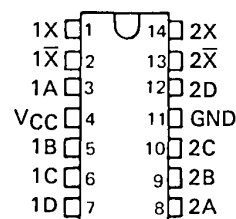
## logic diagram (each gate)



SN5460, SN54H60 ... J PACKAGE  
SN7460, SN74H60 ... J OR N PACKAGE  
(TOP VIEW)



SN5460, SN54H60 ... W PACKAGE  
(TOP VIEW)



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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.

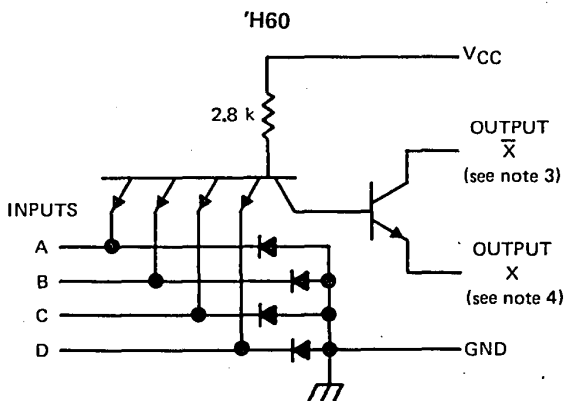
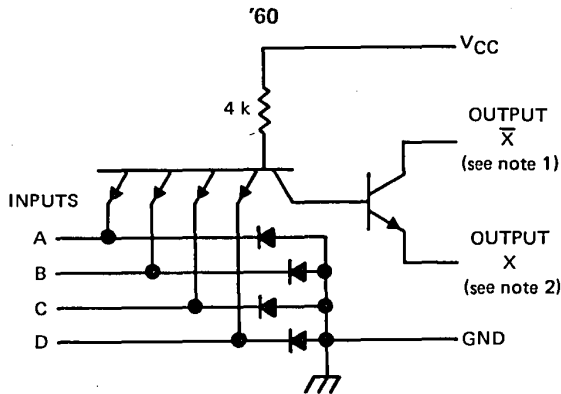
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**TYPES SN5460, SN54H60,  
SN7460, SN74H60  
DUAL 4-INPUT EXPANDERS**

schematics (each gate)



NOTES: 1. Connect to  $\bar{X}$  input of '23, '50, or '53 circuit.  
 2. Connect to X input of '23, '50, or '53 circuit.  
 3. Connect to  $\bar{X}$  input of 'H50, 'H53, or 'H55 circuit.  
 4. Connect to X input of 'H50, 'H53, or 'H55 circuit.  
 Resistor values shown are nominal.

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

Supply voltage, V <sub>CC</sub> (see Note 5)	7 V
Input voltage	5.5 V
Operating free-air temperature range: SN54'	-55°C to 125°C
SN74'	0°C to 70°C
Storage temperature range	-65°C to 150°C

NOTE 5: Voltage values are with respect to network ground terminal.

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# TYPES SN5460, SN7460 DUAL 4-INPUT EXPANDERS

## recommended operating conditions

	SN5460			SN7460			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
T <sub>A</sub> Operating free-air temperature	-55		125	0		70	°C

The '23, '50, and '53 are designed for use with up to four '60 expanders.

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

PARAMETER	TEST CONDITIONS†	SN5460		SN7460		UNIT	
		MIN	TYP‡	MAX	MIN		TYP‡
V <sub>XX(on)</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>X</sub> = 1.1 V, I <sub>X</sub> = 3.5 mA, T <sub>A</sub> = -55°C			0.4		V	
	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>X</sub> = 1 V, I <sub>X</sub> = 3.8 mA, T <sub>A</sub> = 0°C				0.4		
I <sub>X(on)</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>X</sub> = 1.1 V, I <sub>X</sub> = 0, T <sub>A</sub> = -55°C	-0.3				mA	
	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>X</sub> = 1 V, I <sub>X</sub> = 0, T <sub>A</sub> = 0°C			-0.43			
I <sub>X(off)</sub>	V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V, V <sub>X</sub> = 4.5 V, R <sub>X</sub> = 1.2 kΩ, T <sub>A</sub> = -55°C			0.15		mA	
	V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V, V <sub>X</sub> = 4.5 V, R <sub>X</sub> = 1.2 kΩ, T <sub>A</sub> = 0°C				0.27		
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>I</sub> = 2.4 V			40	40	μA	
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V			-1.6	-1.6	mA	
I <sub>CC(on)</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5 V, V <sub>X</sub> = 0.85 V, I <sub>X</sub> = 0		1.2	2.5	1.2	2.5	mA
I <sub>CC(off)</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0, V <sub>X</sub> = 0.85 V, I <sub>X</sub> = 0		2	4	2	4	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> = 5V, T<sub>A</sub> = 25°C.

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# TYPES SN54H60, SN74H60 DUAL 4-INPUT EXPANDERS

## recommended operating conditions

	SN54H60			SN74H60			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
T <sub>A</sub> Operating free-air temperature	-55			125			°C

The 'H50, 'H53, and 'H55 are designed for use with up to four 'H60 expanders.

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

PARAMETER	TEST CONDITIONS†	SN54H60		SN74H60		UNIT	
		MIN	TYP‡	MAX	MIN		TYP‡
V <sub>X(on)</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>X</sub> = 1.1 V, I <sub>X</sub> = 5.85 mA, T <sub>A</sub> = -55°C			0.4		V	
	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>X</sub> = 1 V, I <sub>X</sub> = 6.3 mA, T <sub>A</sub> = 0°C				0.4		
	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>X</sub> = 1 V, I <sub>X</sub> = 7.85 mA, T <sub>A</sub> = 125°C			0.4			
	V <sub>CC</sub> = MAX, V <sub>IH</sub> = 2 V, V <sub>X</sub> = 1 V, I <sub>X</sub> = 7.4 mA, T <sub>A</sub> = 70°C				0.4		
I <sub>X(on)</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>X</sub> = 1.1 V, I <sub>X</sub> = 0, T <sub>A</sub> = -55°C	-0.47				mA	
	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>X</sub> = 1 V, I <sub>X</sub> = 0, T <sub>A</sub> = 0°C				-0.6		
I <sub>X(off)</sub>	V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V, V <sub>X</sub> = 4.5 V, R <sub>X</sub> = 575 Ω, T <sub>A</sub> = -55°C			0.32		mA	
	V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V, V <sub>X</sub> = 4.5 V, R <sub>X</sub> = 575 Ω, T <sub>A</sub> = 0°C				0.57		
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>I</sub> = 2.4 V		50		50	mA	
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V		-2		-2	mA	
I <sub>CC(on)</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5 V, V <sub>X</sub> = 0.85 V, I <sub>X</sub> = 0		1.9	3.5	1.9	3.5	mA
I <sub>CC(off)</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0, V <sub>X</sub> = 0.85 V, I <sub>X</sub> = 0		3	4.5	3	4.5	mA
C <sub>X</sub>	V <sub>CC</sub> , inputs, and X open, f = 1 MHz		5.4		5.4	pF	

† 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 (except C<sub>X</sub>), T<sub>A</sub> = 25°C.

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