

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

REVISED DECEMBER 1983

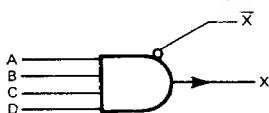
- Package Options Include Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

### description

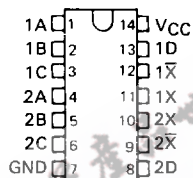
These devices contain two independent 4-input expanders. The '60 perform the Boolean function  $X = ABCD$  when connected to X and  $\bar{X}$  inputs of SN5423/SN7423, SN5450/SN7450, or SN5453/SN7453. The 'H60 performs the same function when connected to X and  $\bar{X}$  inputs of SN54H50/SN74H50, SN54H53/SN74H53, 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  $70^{\circ}\text{C}$ .

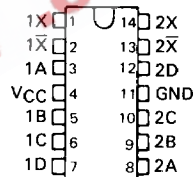
### logic diagram (each gate)



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



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

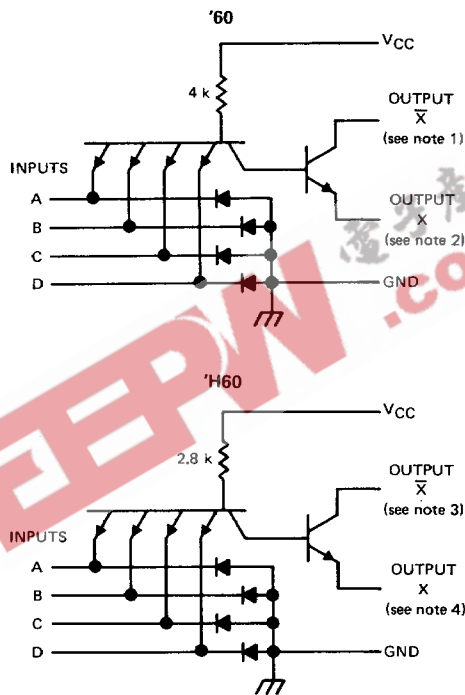


3

TTL DEVICES

**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, $V_{CC}$ (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.

TYPES SN5460, SN7460  
DUAL 4-INPUT EXPANDERS

recommended operating conditions

	SN5460			SN7460			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
$T_A$ Operating free-air temperature	- 55			125			°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	
$V_{\bar{X}}(on)$	$V_{CC} = \text{MIN.}$ $I_{\bar{X}} = 3.5 \text{ mA}$	$V_{IH} = 2 \text{ V,}$ $T_A = -55^\circ\text{C}$	$V_X = 1.1 \text{ V,}$	0.4				V
	$V_{CC} = \text{MIN.}$ $I_{\bar{X}} = 3.8 \text{ mA}$	$V_{IH} = 2 \text{ V,}$ $T_A = 0^\circ\text{C}$	$V_X = 1 \text{ V,}$			0.4		
$I_X(on)$	$V_{CC} = \text{MIN.}$ $I_{\bar{X}} = 0,$	$V_{IH} = 2 \text{ V,}$ $T_A = -55^\circ\text{C}$	$V_X = 1.1 \text{ V,}$	- 0.3				mA
	$V_{CC} = \text{MIN.}$ $I_{\bar{X}} = 0,$	$V_{IH} = 2 \text{ V,}$ $T_A = 0^\circ\text{C}$	$V_X = 1 \text{ V,}$			- 0.43		
$I_{\bar{X}}(off)$	$V_{CC} = \text{MIN.}$ $R_X = 1.2 \text{ k}\Omega,$	$V_{IL} = 0.8 \text{ V,}$ $T_A = -55^\circ\text{C}$	$V_{\bar{X}} = 4.5 \text{ V,}$	0.15				mA
	$V_{CC} = \text{MIN.}$ $R_X = 1.2 \text{ k}\Omega,$	$V_{IL} = 0.8 \text{ V,}$ $T_A = 0^\circ\text{C}$	$V_{\bar{X}} = 4.5 \text{ V,}$			0.27		
$I_I$	$V_{CC} = \text{MAX,}$ $V_I = 5.5 \text{ V}$		1		1		mA	
$I_{IH}$	$V_{CC} = \text{MAX,}$ $V_I = 2.4 \text{ V}$		40		40		$\mu\text{A}$	
$I_{IL}$	$V_{CC} = \text{MAX,}$ $V_I = 0.4 \text{ V}$		- 1.6		- 1.6		mA	
$I_{CC}(on)$	$V_{CC} = \text{MAX,}$ $V_X = 0.85 \text{ V,}$ $I_{\bar{X}} = 0$		1.2 2.5		1.2 2.5		mA	
$I_{CC}(off)$	$V_{CC} = \text{MAX,}$ $V_X = 0.85 \text{ V,}$ $I_{\bar{X}} = 0$		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  $V_{CC} = 5 \text{ V, } T_A = 25^\circ\text{C}.$

3

TTL DEVICES

**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			70			°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‡	MAX	
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> = 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.