

TYPES SN54H11, SN54LS11, SN54S11,  
SN74H11, SN74LS11, SN74S11  
TRIPLE 3-INPUT POSITIVE-AND GATES  
REVISED APRIL 1985

- Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs
- Dependable Texas Instruments Quality and Reliability

**description**

These devices contain three independent 3-input AND gates.

The SN54H11, SN54LS11, SN54S11 are characterized for operation over the full military temperature range of -55°C to 125°C. The SN74H11, SN74LS11, and SN74S11, are characterized for operation from 0°C to 70°C.

**FUNCTION TABLE (each gate)**

INPUTS			OUTPUT
A	B	C	Y
H	H	H	H
L	X	X	L
X	L	X	L
X	X	L	L

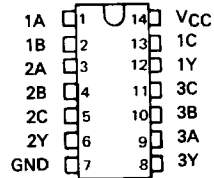
**logic diagram (each gate)**



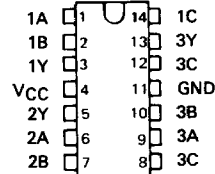
**positive logic**

$$Y = A \cdot B \cdot C \text{ or } Y = \overline{\overline{A} + \overline{B} + \overline{C}}$$

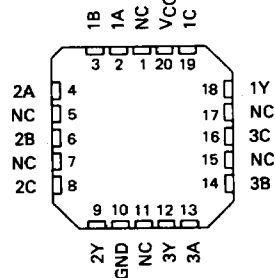
SN54H11 ... J PACKAGE  
SN54LS11, SN54S11 ... J OR W PACKAGE  
SN74H11 ... J OR N PACKAGE  
SN74LS11, SN74S11 ... D, J OR N PACKAGE  
(TOP VIEW)



SN54H11 ... W PACKAGE  
(TOP VIEW)



SN54LS11, SN54S11 ... FK PACKAGE  
SN74LS11, SN74S11 ... FN PACKAGE  
(TOP VIEW)



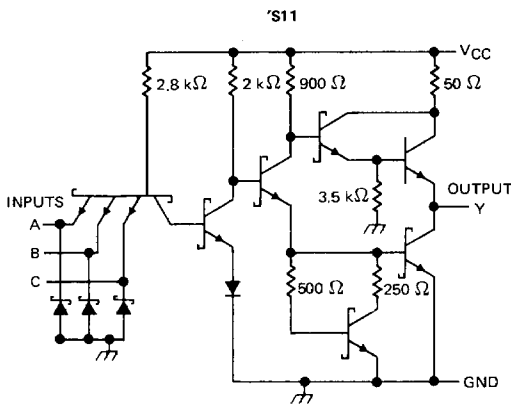
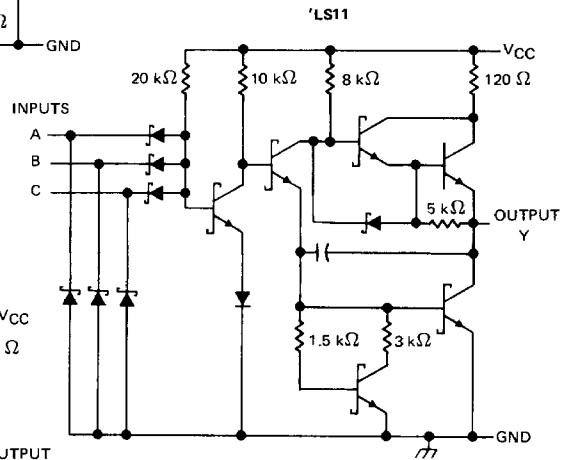
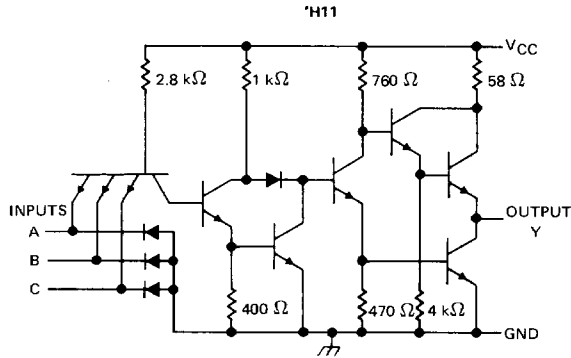
NC - No internal connection

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TTL DEVICES

**TYPES SN54H11, SN54LS11, SN54S11  
SN74H11, SN74LS11, SN74S11  
TRIPLE 3-INPUT POSITIVE-AND GATES**

schematics (each gate)



Resistor values shown are nominal.

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

Supply voltage, $V_{CC}$ (see Note 1)	7 V
Input voltage: 'H11, 'S11	5.5 V
'LS11	7 V
Operating free-air temperature: SN54'	-55°C to 125°C
SN74'	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 SN54H11, SN74H11 TRIPLE 3-INPUT POSITIVE-AND GATES

## recommended operating conditions

	SN54H11			SN74H11			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	-0.5			-0.5			mA
$I_{OL}$ Low-level output current	20			20			mA
$T_A$ Operating free-air temperature	-55			125			°C

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

PARAMETER	TEST CONDITIONS †	SN54H11		SN74H11		UNIT
		MIN	TYP ‡	MAX	MIN	
$V_{IK}$	$V_{CC} = \text{MIN}, I_I = -8 \text{ mA}$	-1.5		-1.5		V
$V_{OH}$	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, I_{OH} = -0.5 \text{ mA}$	2.4	3.4	2.4	3.4	V
$V_{OL}$	$V_{CC} = \text{MIN}, V_{IL} = 0.8 \text{ V}, I_{OL} = 20 \text{ mA}$	0.2	0.4	0.2	0.4	V
$I_I$	$V_{CC} = \text{MAX}, V_I = 5.5 \text{ V}$	1		1		mA
$I_{IH}$	$V_{CC} = \text{MAX}, V_I = 2.4 \text{ V}$	50		50		µA
$I_{IL}$	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$	-2		-2		mA
$I_{OS} §$	$V_{CC} = \text{MAX}$	-40	-100	-40	-100	mA
$I_{CCH}$	$V_{CC} = \text{MAX}, V_I = 4.5 \text{ V}$	18	30	18	30	mA
$I_{CCL}$	$V_{CC} = \text{MAX}, V_I = 0 \text{ V}$	30	48	30	48	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at  $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$ .

§ Not more than one output should be shorted at a time, and the duration of the output short circuit should not exceed one second.

## switching characteristics, $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$ (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$	A, B or C	Y	$R_L = 280 \Omega, C_L = 25 \text{ pF}$		7.6	12	ns
$t_{PHL}$					8.8	12	ns

NOTE 2: See General Information Section for load circuits and voltage waveforms.

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# TYPES SN54LS11, SN74LS11

## TRIPLE 3-INPUT POSITIVE-AND GATES

### recommended operating conditions

	SN54LS11			SN74LS11			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			0.7			0.8	V
$I_{OH}$ High-level output current			-0.4			-0.4	mA
$I_{OL}$ Low-level output current			4			8	mA
$T_A$ Operating free-air temperature	-55		125	0		70	$^{\circ}$ C

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

PARAMETER	TEST CONDITIONS †	SN54LS11		SN74LS11		UNIT
		MIN	TYP ‡	MAX	MIN	
$V_{IK}$	$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$		-1.5		-1.5	V
$V_{OH}$	$V_{CC} = \text{MIN}, V_{IH} = 2 V, I_{OH} = -0.4 \text{ mA}$	2.5	3.4	2.7	3.4	V
$V_{OL}$	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}, I_{OL} = 4 \text{ mA}$	0.25	0.4	0.25	0.4	V
	$V_{CC} = \text{MIN}, V_{IL} = \text{MAX}, I_{OL} = 8 \text{ mA}$			0.35	0.5	
$I_I$	$V_{CC} = \text{MAX}, V_I = 7 \text{ V}$		0.1		0.1	mA
$I_{IH}$	$V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$		20		20	$\mu$ A
$I_{IL}$	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$		-0.4		-0.4	mA
$I_{OS} §$	$V_{CC} = \text{MAX}$	-20		-100		mA
$I_{CCH}$	$V_{CC} = \text{MAX}, V_I = 4.5 \text{ V}$		1.8	3.6		mA
$I_{CCL}$	$V_{CC} = \text{MAX}, V_I = 0 \text{ V}$		3.3	6.6		mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at  $V_{CC} = 5 \text{ V}, T_A = 25^{\circ}\text{C}$ .

§ Not more than one output should be shorted at a time, and the duration of the short-circuit should not exceed one second.

### switching characteristics, $V_{CC} = 5 \text{ V}, T_A = 25^{\circ}\text{C}$ (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$	A, B or C	Y	$R_L = 2 \text{ k}\Omega, C_L = 15 \text{ pF}$		8	15	ns
$t_{PHL}$					10	20	

NOTE 2: See General Information Section for load circuits and voltage waveforms.

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# TYPES SN54S11, SN74S11 TRIPLE 3-INPUT POSITIVE-AND GATES

## recommended operating conditions

	SN54S11			SN74S11			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			-1			-1	mA
$I_{OL}$ Low-level output current			20			20	mA
$T_A$ Operating free-air temperature	-55		125	0		70	$^{\circ}$ C

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

PARAMETER	TEST CONDITIONS †	SN54S11			SN74S11			UNIT
		MIN	TYP ‡	MAX	MIN	TYP ‡	MAX	
$V_{IK}$	$V_{CC} = \text{MIN}$ , $I_I = -18 \text{ mA}$			-1.2			-1.2	V
$V_{OH}$	$V_{CC} = \text{MIN}$ , $V_{IH} = 2 \text{ V}$ , $I_{OH} = -1 \text{ mA}$	2.5	3.4		2.7	3.4		V
$V_{OL}$	$V_{CC} = \text{MIN}$ , $V_{IL} = 0.8 \text{ V}$ , $I_{OL} = 20 \text{ mA}$			0.5			0.5	V
$I_I$	$V_{CC} = \text{MAX}$ , $V_I = 5.5 \text{ V}$			1			1	mA
$I_{IH}$	$V_{CC} = \text{MAX}$ , $V_I = 2.7 \text{ V}$			50			50	$\mu$ A
$I_{IL}$	$V_{CC} = \text{MAX}$ , $V_I = 0.5 \text{ V}$			-2			-2	mA
$I_{OS} §$	$V_{CC} = \text{MAX}$	-40		-100	-40		-100	mA
$I_{CCH}$	$V_{CC} = \text{MAX}$ , $V_I = 4.5 \text{ V}$			13.5			13.5	mA
$I_{CCL}$	$V_{CC} = \text{MAX}$ , $V_I = 0 \text{ V}$			24			24	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

‡ All typical values are at  $V_{CC} = 5 \text{ V}$ ,  $T_A = 25^{\circ}\text{C}$ .

§ Not more than one output should be shorted at a time, and the duration of the short-circuit should not exceed one second.

## switching characteristics, $V_{CC} = 5 \text{ V}$ , $T_A = 25^{\circ}\text{C}$ (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
$t_{PLH}$	A, B or C	Y	$R_L = 280 \Omega$ , $C_L = 15 \text{ pF}$		4.5	7	ns	
$t_{PHL}$					5	7.5	ns	
$t_{PLH}$			$R_L = 280 \Omega$ , $C_L = 50 \text{ pF}$			6		ns
$t_{PHL}$						7.5		ns

NOTE 2: See General Information Section for load circuits and voltage waveforms.

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