- **Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers and Flat Packages, and Plastic and Ceramic DIPs**

- **Dependable Texas Instruments Quality and Reliability**

description

These devices contain three independent 3-input AND gates with open-collector outputs. The open-collector outputs require pull-up resistors to perform correctly. They may be connected to other open-collector outputs to implement active-low wired-OR or active-high wired-AND functions. Open-collector devices are often used to generate high V_{OH} levels.

The SN54LS15 and SN54S15 are characterized for operation over the full military temperature range of −55°C to 125°C. The SN74LS15 and SN74S15 are characterized for operation from 0°C to 70°C.

FUNCTION TABLE (each gate)

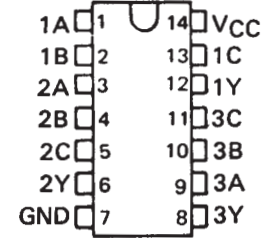| INPUTS			OUTPUT
A	B	C	Y
H	H	H	H
L	X	X	L
X	L	X	L
X	X	L	L

logic symbol†
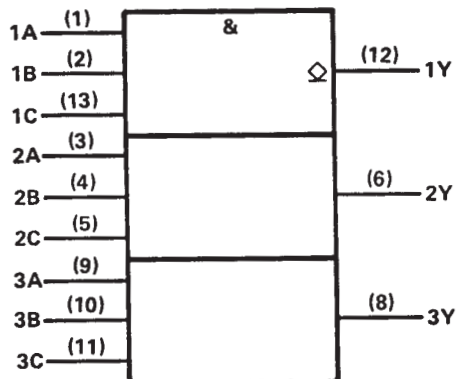
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for D, J, N, and W packages.
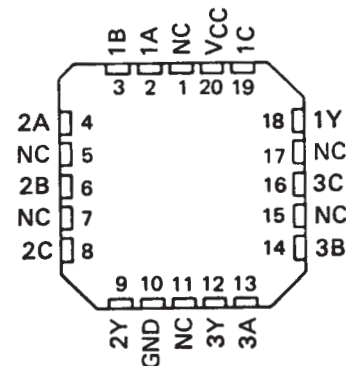
SN54LS15, SN54S15 . . . J OR W PACKAGE
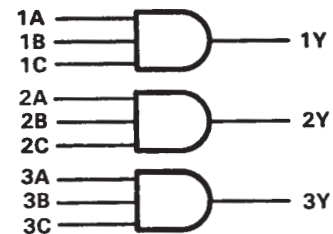**SN74LS15, SN74S15 . . . D OR N PACKAGE**
(TOP VIEW)

SN54LS15, SN54S15 . . . FK PACKAGE
(TOP VIEW)

NC—No internal connection

logic diagram (positive logic)
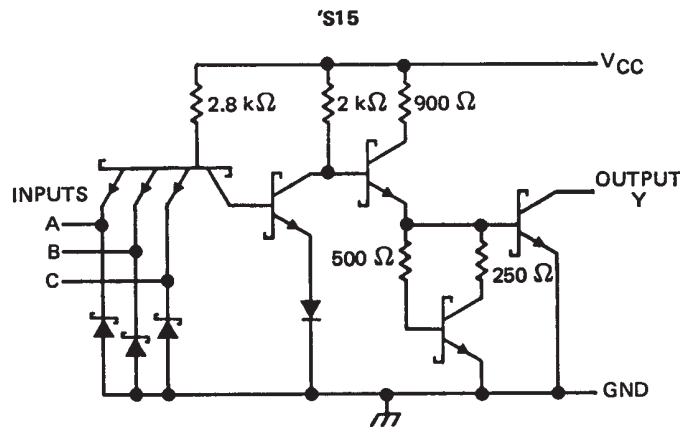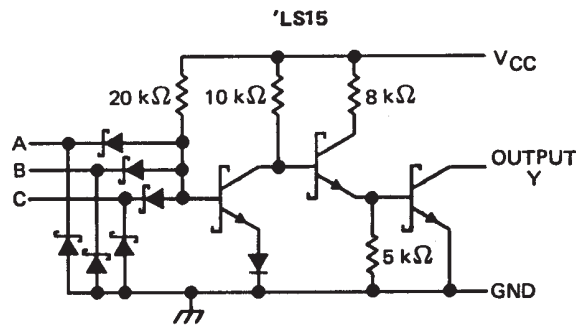

$$Y = A \cdot B \cdot C \text{ or}$$

$$Y = \overline{\overline{A} + \overline{B} + \overline{C}}$$

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TEXAS INSTRUMENTS

schematics (each gate)

'LS15

'S15

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: 'S15 .... 5.5 V
                   'LS15 .... 7 V
Off-state output voltage .... 7 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 1: Voltage values are with respect to network ground terminal.

recommended operating conditions

		SN54LS15			SN74LS15			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
V_{OH}	High-level output voltage			5.5			5.5	V
I_{OL}	Low-level output current			4			8	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†			SN54LS15			SN74LS15			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}	V_{CC} = MIN,	I_I = −18 mA				−1.5			−1.5	V
I_{OH}	V_{CC} = MIN,	V_{IH} = 2 V,	V_{OH} = 5.5 V			0.1			0.1	mA
V_{OL}	V_{CC} = MIN,	V_{IH} = 2 V,	I_{OL} = 4 mA		0.25	0.4		0.25	0.4	V
	V_{CC} = MIN,	V_{IH} = 2 V,	I_{OL} = 8 mA					0.35	0.5	
I_I	V_{CC} = MAX,	V_I = 7 V				0.1			0.1	mA
I_{IH}	V_{CC} = MAX,	V_I = 2.7 V				20			20	µA
I_{IL}	V_{CC} = MAX,	V_I = 0.4 V				−0.4			−0.4	mA
I_{CCH}	V_{CC} = MAX,	V_I = 4.5 V			1.8	3.6		1.8	3.6	mA
I_{CCL}	V_{CC} = MAX,	V_I = 0 V			3.3	6.6		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 V, T_A = 25°C.

switching characteristics, V_{CC} = 5 V, T_A = 25°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 kΩ,	C_L = 15 pF		20	35	ns
t_{PHL}						17	35	ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

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recommended operating conditions

		SN54S15			SN74S15			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
V_{OH}	High-level output voltage			5.5			5.5	V
I_{OL}	Low-level output current			20			20	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†			MIN	TYP‡	MAX	UNIT
V_{IK}	V_{CC} = MIN,	I_I = − 18 mA				− 1.2	V
I_{OH}	V_{CC} = MIN,	V_{IH} = 2 V,	V_{OH} = 5.5 V			0.25	mA
V_{OL}	V_{CC} = MIN,	V_{IH} = 2 V,	I_{OL} = 20 mA			0.5	V
I_I	V_{CC} = MAX,	V_I = 5.5 V				1	mA
I_{IH}	V_{CC} = MAX,	V_I = 2.7 V				50	µA
I_{IL}	V_{CC} = MAX,	V_I = 0.5 V				− 2	mA
I_{CCH}	V_{CC} = MAX,	V_I = 4.5 V			10.5	19.5	mA
I_{CCL}	V_{CC} = MAX,	V_I = 0 V			24	42	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 V, T_A = 25°C.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}			R_L = 280 Ω,	C_L = 15 pF		5.5	8.5	ns
t_{PHL}	A, B, or C	Y				6	9	ns
t_{PLH}			R_L = 280 Ω,	C_L = 50 pF		8.5		ns
t_{PHL}						8		ns

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

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