

**SN5402, SN54LS02, SN54S02,
SN7402, SN74LS02, SN74S02
QUADRUPLE 2-INPUT POSITIVE-NOR GATES**

DECEMBER 1983—REVISED MARCH 1988

- 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

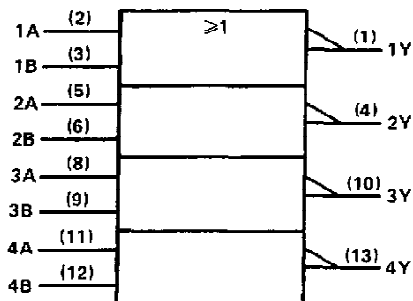
These devices contain four independent 2-input-NOR gates.

The SN5402, SN54LS02, and SN54S02 are characterized for operation over the full military temperature range of -55°C to 125°C. The SN7402, SN74LS02, and SN74S02 are characterized for operation from 0°C to 70°C.

FUNCTION TABLE (each gate)

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

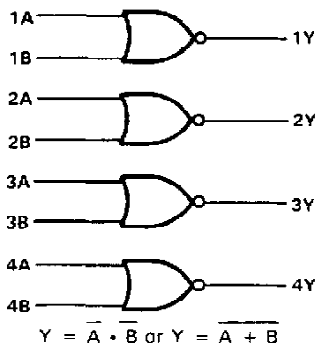
logic symbol†



†This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.

Pin numbers shown are for D, J, and N packages.

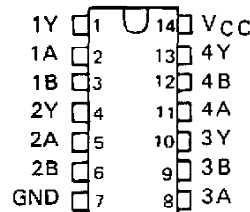
logic diagram (positive logic)



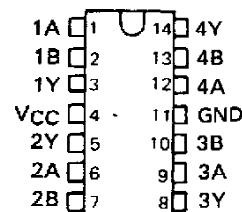
PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

- SN5402 . . . J PACKAGE
- SN54LS02, SN54S02 . . . J OR W PACKAGE
- SN7402 . . . N PACKAGE
- SN74LS02, SN74S02 . . . D OR N PACKAGE

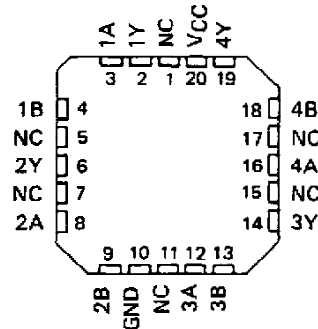
(TOP VIEW)



SN5402 . . . W PACKAGE
(TOP VIEW)



SN54LS02, SN54S02 . . . FK PACKAGE
(TOP VIEW)



NC - No internal connection



SN5402, SN7402 QUADRUPLE 2-INPUT POSITIVE-NOR GATES

recommended operating conditions

	SN5402			SN7402			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			-0.4			-0.4	mA
I _{OL} Low-level output current			16			16	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 †	SN5402			SN7402			UNIT
		MIN	TYP ‡	MAX	MIN	TYP ‡	MAX	
V _{IK}	V _{CC} = MIN, I _I = -12 mA			-1.5			-1.5	V
V _{OH}	V _{CC} = MIN, V _{IL} = 0.8 V, I _{OH} = -0.4 mA	2.4	3.4		2.4	3.4		V
V _{OL}	V _{CC} = MIN, V _{IH} = 2 V, I _{OL} = 16 mA		0.2	0.4		0.2	0.4	V
I _I	V _{CC} = MAX, V _I = 5.5 V			1			1	mA
I _{IH}	V _{CC} = MAX, V _I = 2.4 V			40			40	μA
I _{IL}	V _{CC} = MAX, V _I = 0.4 V			-1.6			-1.6	mA
I _{OS} §	V _{CC} = MAX	-20		-55	-18		-55	mA
I _{CCH}	V _{CC} = MAX, V _I = 0 V		8	16		8	16	mA
I _{CCL}	V _{CC} = MAX, See Note 2		14	27		14	27	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.

§ Not more than one output should be shorted at a time.

NOTE 2: One input at 4.5 V, all others at GND.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t _{PLH}	A or B	Y	R _L = 400 Ω, C _L = 15 pF		12	22	ns
t _{PHL}					8	15	ns

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.


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SN54LS02, SN74LS02 QUADRUPLE 2-INPUT POSITIVE-NOR GATES

recommended operating conditions

	SN54LS02			SN74LS02			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	°C

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

PARAMETER	TEST CONDITIONS †	SN54LS02		SN74LS02		UNIT		
		MIN	TYP ‡	MAX	MIN		TYP ‡	MAX
V _{IK}	V _{CC} = MIN, I _I = -18 mA			-1.5		-1.5	V	
V _{OH}	V _{CC} = MIN, V _{IL} = MAX, I _{OH} = -0.4 mA	2.5	3.4		2.7	3.4	V	
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 _{OS} §	V _{CC} = MAX	-20		-100	-20	-100	mA	
I _{CCH}	V _{CC} = MAX, V _I = 0 V		1.6	3.2		1.6	3.2	mA
I _{CCL}	V _{CC} = MAX, See Note 2		2.8	5.4		2.8	5.4	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 V, T_A = 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: One input at 4.5 V, all others at GND.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t _{PLH}	A or B	Y	R _L = 2 kΩ, C _L = 15 pF		10	15	ns
t _{PHL}					10	15	ns

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

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SN54S02, SN74S02 QUADRUPLE 2-INPUT POSITIVE-NOR GATES

recommended operating conditions

	SN54S02			SN74S02			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	°C

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

PARAMETER	TEST CONDITIONS †	SN54S02			SN74S02			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V _{IK}	V _{CC} = MIN, I _I = -18 mA			-1.2			-1.2	V
V _{OH}	V _{CC} = MIN, V _{IL} = 0.8 V, I _{OH} = -1 mA	2.5	3.4		2.7	3.4		V
V _{OL}	V _{CC} = MIN, V _{IH} = 2 V, I _{OL} = 20 mA			0.5			0.5	V
I _I	V _{CC} = MAX, V _I = 5.5 V			1			1	mA
I _{IH}	V _{CC} = MAX, V _I = 2.7 V			50			50	μA
I _{IL}	V _{CC} = MAX, V _I = 0.5 V			-2			-2	mA
I _{OS} §	V _{CC} = MAX	-40		-100	-40		-100	mA
I _{CCH}	V _{CC} = MAX, V _I = 0 V		17	29		17	29	mA
I _{CCL}	V _{CC} = MAX, See Note 2		26	45		26	45	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.

§ 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: One input at 4.5 V, all others at GND.

switching characteristics, V_{CC} = 5 V, T_A = 25°C (see note 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t _{PLH}	A or B	Y	R _L = 280 Ω, C _L = 15 pF	3.5	5.5		ns
t _{PHL}				3.5	5.5		ns
t _{PLH}			R _L = 280 Ω, C _L = 50 pF	5			ns
t _{PHL}				5			ns

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.


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PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
JM38510/00401BCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/00401BDA	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/00401BDA	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/07301BCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/07301BCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/07301BDA	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/07301BDA	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30301B2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30301B2A	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30301BCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30301BCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30301BDA	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30301BDA	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30301SCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30301SCA	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30301SDA	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
JM38510/30301SDA	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
SN5402J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SN5402J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SN54LS02J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SN54LS02J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SN54S02J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SN54S02J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SN7402N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN7402N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN7402N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN7402N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN74LS02D	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS02D	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS02DE4	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS02DE4	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS02DR	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS02DR	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS02DRE4	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS02DRE4	ACTIVE	SOIC	D	14	2500	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN74LS02J	OBSOLETE	CDIP	J	14		TBD	Call TI	Call TI
SN74LS02J	OBSOLETE	CDIP	J	14		TBD	Call TI	Call TI
SN74LS02N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS02N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74LS02N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN74LS02N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN74LS02NSR	ACTIVE	SO	NS	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS02NSR	ACTIVE	SO	NS	14	2000	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74LS02NSRG4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS02NSRG4	ACTIVE	SO	NS	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74S02D	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74S02D	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74S02DE4	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74S02DE4	ACTIVE	SOIC	D	14	50	Pb-Free (RoHS)	CU NIPDAU	Level-2-260C-1 YEAR/ Level-1-235C-UNLIM
SN74S02DR	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI
SN74S02DR	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI
SN74S02N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74S02N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74S02N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN74S02N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN74S02NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SN74S02NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	Level-NC-NC-NC
SNJ5402J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SNJ5402J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SNJ5402W	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
SNJ5402W	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS02FK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS02FK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS02J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS02J	ACTIVE	CDIP	J	14	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS02W	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
SNJ54LS02W	ACTIVE	CFP	W	14	1	TBD	Call TI	Level-NC-NC-NC
SNJ54S02FK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC
SNJ54S02FK	ACTIVE	LCCC	FK	20	1	TBD	Call TI	Level-NC-NC-NC