

SN5422, SN54LS22, SN54S22 SN7422, SN74LS22, SN74S22

Dual 4-Input Positive-NAND Gates with Open-Collector Outputs

These devices contain two independent 4-input NAND gates. 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 higher V_{OH} levels.

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceeds the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-38535
 - Class Q Military
 - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
 - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

SN5422, SN54LS22, SN54S22, SN7422, SN74LS22, SN74S22

DUAL 4-INPUT POSITIVE-NAND GATES WITH OPEN-COLLECTOR OUTPUTS

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

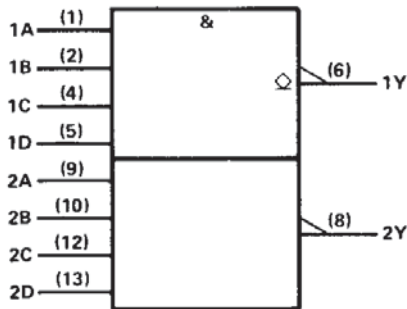
These devices contain two independent 4-input NAND gates. The open-collector outputs require pull-up resistors to perform correctly. They may be connected to other open-collector outputs to implement active-low wired-OR or active-high wired-AND functions. Open-collector devices are often used to generate higher V_{OH} levels.

The SN5422, SN54LS22 and SN54S22 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN7422, SN74LS22, and SN74S22 are characterized for operation from 0°C to 70°C .

FUNCTION TABLE (each gate)

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

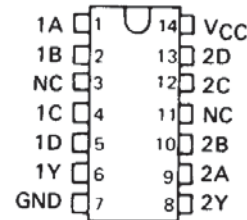
logic symbol†



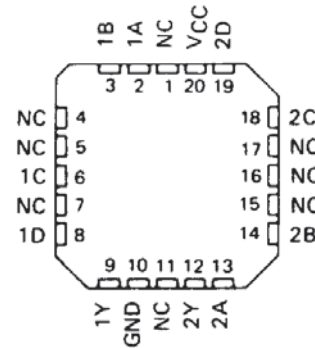
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

SN5422, SN54LS22, SN54S22 . . . J OR W PACKAGE
SN7422 . . . N PACKAGE
SN74LS22, SN74S22 . . . D OR N PACKAGE
(TOP VIEW)

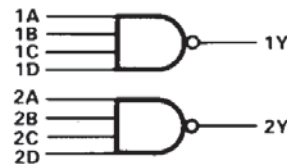


SN54LS22, SN54S22 . . . FK PACKAGE
(TOP VIEW)



NC No internal connection

logic diagram



positive logic

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

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TTL Devices

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.

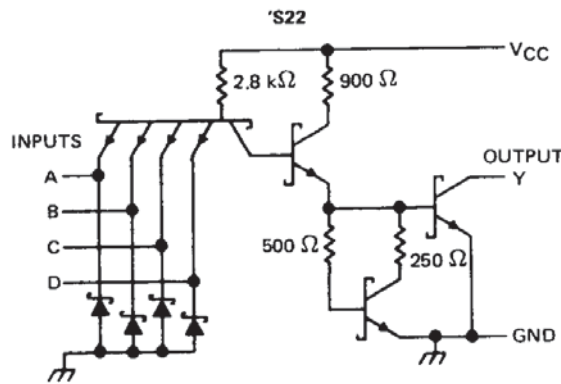
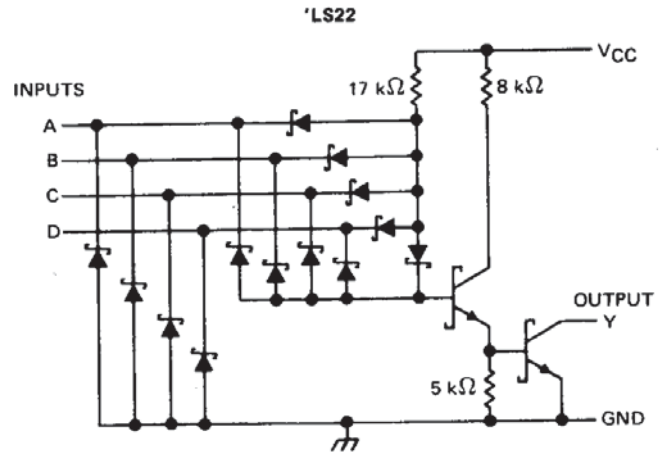
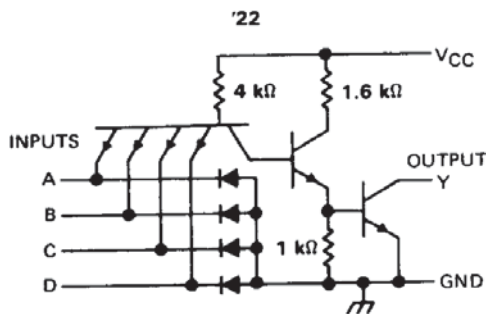
**TEXAS
INSTRUMENTS**

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2-105

**SN5422, SN54LS22, SN54S22,
SN7422, SN74LS22, SN74S22
DUAL 4-INPUT POSITIVE-NAND GATES WITH OPEN-COLLECTOR OUTPUTS**

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: '22, 'S22	5.5 V
'LS22	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.

SN5422, SN7422
DUAL 4-INPUT POSITIVE-NAND GATES WITH OPEN-COLLECTOR OUTPUTS

recommended operating conditions

	SN5422			SN7422			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	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†	SN5422			SN7422			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V _{IK}	V _{CC} = MIN, I _I = -12 mA	-1.5			-1.5			V
I _{OH}	V _{CC} = MIN, V _{IL} = 0.8 V, V _{OH} = 5.5 V				0.25			mA
	V _{CC} = MIN, V _{IL} = 0.7 V, V _{OH} = 5.5 V	0.25						
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 _{CCCH}	V _{CC} = MAX, V _I = 0	2	4		2	4	mA	
I _{CCCL}	V _{CC} = MAX, V _I = 4.5 V	6	11		6	11	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}	Any	Y	R _L = 4 k Ω, C _L = 15 pF		35	45	ns
t _{PHL}			R _L = 400 Ω, C _L = 15 pF		8	15	ns

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

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TTL Devices

SN54LS22, SN74LS22

DUAL 4-INPUT POSITIVE-NAND GATES WITH OPEN-COLLECTOR OUTPUTS

recommended operating conditions

	SN54LS22			SN74LS22			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†	SN54LS22			SN74LS22			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 _{IL} = MAX, 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 = 0		0.4	0.8		0.4	0.8	mA
I _{CCL}	V _{CC} = MAX, V _I = 4.5 V		1.2	2.2		1.2	2.2	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}	Any	Y	R _L = 2 kΩ, C _L = 15 pF		17	32	ns
t _{PHL}					15	28	ns

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

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SN54S22, SN74S22 DUAL 4-INPUT POSITIVE-NAND GATES WITH OPEN-COLLECTOR OUTPUTS

recommended operating conditions

	SN54S22			SN74S22			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†	SN54S22			SN74S22			UNIT	
		MIN	TYP‡	MAX	MIN	TYP‡	MAX		
V_{IK}	$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$	-1.2			-1.2			V	
I_{OH}	$V_{CC} = \text{MIN}, V_{IL} = 0.8 \text{ V}, V_{OH} = 5.5 \text{ V}$	0.25			0.25			mA	
	$V_{CC} = \text{MIN}, V_{IL} = 0.7 \text{ V}, V_{OH} = 5.5 \text{ V}$	0.25			0.25				
V_{OL}	$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, I_{OL} = 20 \text{ mA}$	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			μA	
I_{IL}	$V_{CC} = \text{MAX}, V_I = 0.5 \text{ V}$	-2			-2			mA	
I_{CCH}	$V_{CC} = \text{MAX}, V_I = 0$	3			3			6.6	mA
I_{CCL}	$V_{CC} = \text{MAX}, V_I = 4.5 \text{ V}$	10			10			18	mA

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

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

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}	Any	Y	$R_L = 280 \Omega, C_L = 15 \text{ pF}$	2	5	7.5	ns
t_{PHL}				2	4.5	7	ns
t_{PLH}			$R_L = 280 \Omega, C_L = 50 \text{ pF}$	7.5		ns	
t_{PHL}				7		ns	

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

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