

## **SN5400, SN54H00, SN54L00, SN54LS00, SN54S00 SN7400, SN74H00, SN74LS00, SN74S00**

### *Quadruple 2-Input Positive-NAND Gates*

The SN5400, SN54H00, SN54L00, SN54LS00, and SN54S00 are characterized for operation over the full military temperature range of -55°C to 125°C while the SN7400, SN74H00, SN74LS00, and SN74S00 are characterized for operation from 0°C to 70°C. These devices contain four independent 2-input NAND gates.

#### **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.*

# TYPES SN5400, SN54H00, SN54L00, SN54LS00, SN54S00, SN7400, SN74H00, SN74LS00, SN74S00 QUADRUPLE 2-INPUT POSITIVE-NAND GATES

REVISED DECEMBER 1983

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

## description

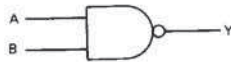
These devices contain four independent 2-input NAND gates.

The SN5400, SN54H00, SN54L00, and SN54LS00, and SN54S00 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN7400, SN74H00, SN74LS00, and SN74S00 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

FUNCTION TABLE (each gate)

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

## logic diagram (each gate)

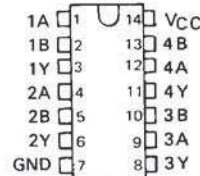


## positive logic

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

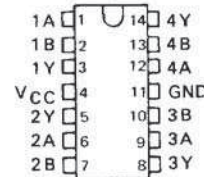
SN5400, SN54H00, SN54L00 ... J PACKAGE  
SN54LS00, SN54S00 ... J OR W PACKAGE  
SN7400, SN74H00 ... J OR N PACKAGE  
SN74LS00, SN74S00 ... D, J OR N PACKAGE

(TOP VIEW)



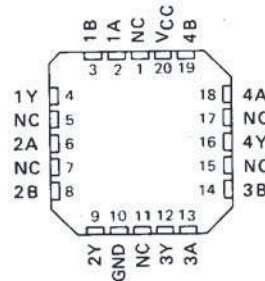
SN5400, SN54H00 ... W PACKAGE

(TOP VIEW)



SN54LS00, SN54S00 ... FK PACKAGE  
SN74LS00, SN74S00 ... FN PACKAGE

(TOP VIEW)



NC - No internal connection

3

TTL DEVICES

## PRODUCTION DATA

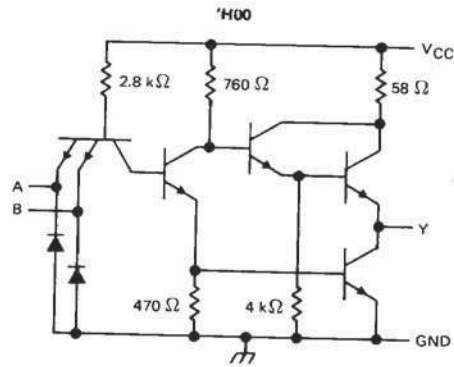
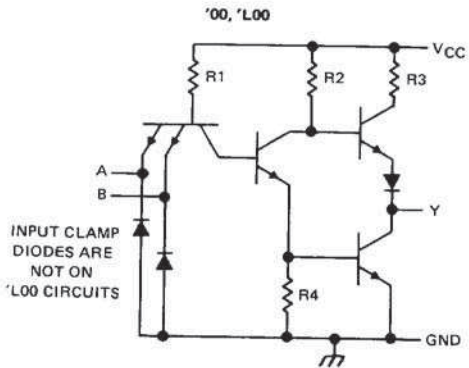
This document contains information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



POST OFFICE BOX 225012 • DALLAS, TEXAS 75265

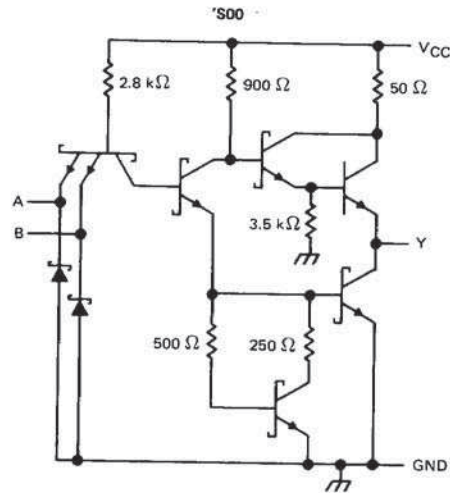
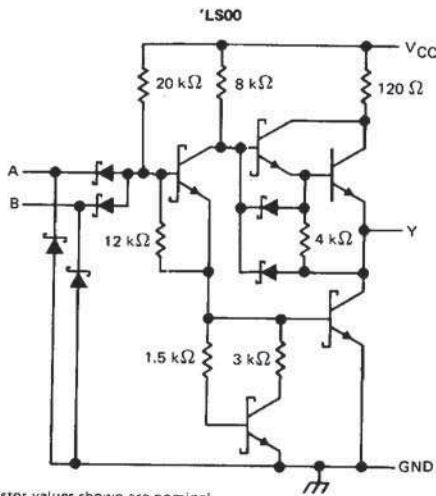
**TYPES SN5400, SN54H00, SN54L00, SN54LS00, SN54S00,  
SN7400, SN74H00, SN74LS00, SN74S00  
QUADRUPLE 2-INPUT POSITIVE-NAND GATES**

schematics (each gate)



CIRCUIT	R1	R2	R3	R4
'00	4 kΩ	1.6 kΩ	130 Ω	1 kΩ
'L00	40 kΩ	20 kΩ	500 Ω	12 kΩ

**3  
TTL DEVICES**



Resistor values shown are nominal.

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

Supply voltage, $V_{CC}$ (see Note 1) '00, 'H00, 'LS00, 'S00	7 V
'L00	8 V
Input voltage: '00, 'H00, 'L00, 'S00	5.5 V
'LS00	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.

**TYPES SN5400, SN7400**  
**QUADRUPLE 2-INPUT POSITIVE-NAND GATES**

**recommended operating conditions**

	SN5400			SN7400			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
I <sub>OH</sub> High-level output current	-0.4			-0.4			mA
I <sub>OL</sub> Low-level output current	16			16			mA
T <sub>A</sub> Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS †	SN5400		SN7400		UNIT		
		MIN	TYP ‡	MAX	MIN		TYP ‡	MAX
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -12 mA			-1.5		-1.5	V	
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V, I <sub>OH</sub> = -0.4 mA	2.4	3.4		2.4	3.4	V	
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 16 mA		0.2	0.4		0.2	0.4	V
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			40		40	µA	
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V			-1.6		-1.6	mA	
I <sub>OS</sub> §	V <sub>CC</sub> = MAX	-20		-55	-18	-55	mA	
I <sub>CCH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0 V		4	8		4	8	mA
I <sub>CCL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5 V		12	22		12	22	mA

† 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, T<sub>A</sub> = 25°C.

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

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see note 2)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t <sub>PLH</sub>	A or B	Y	R <sub>L</sub> = 400 Ω, C <sub>L</sub> = 15 pF		11	22	ns
t <sub>PHL</sub>					7	15	ns

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

**3**

**TTL DEVICES**

**TYPES SN54H00, SN74H00**  
**QUADRUPLE 2-INPUT POSITIVE-NAND GATES**

**recommended operating conditions**

	SN54H00			SN74H00			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
I <sub>OH</sub> High-level output current			-0.5			-0.5	mA
I <sub>OL</sub> Low-level output current			20			20	mA
T <sub>A</sub> 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 <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -8 mA			-1.5	V
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V, I <sub>OH</sub> = -0.5 mA	2.4	3.5		V
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 20 mA		0.2	0.4	V
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 5.5 V			1	mA
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.4 V			50	µA
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V			-2	mA
I <sub>OS</sub> §	V <sub>CC</sub> = MAX	-40		-100	mA
I <sub>CCH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0 V		10	16.8	mA
I <sub>CCL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5 V		26	40	mA

† 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, T<sub>A</sub> = 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.

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see note 2)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t <sub>PLH</sub>	A or B	Y	R <sub>L</sub> = 280 Ω, C <sub>L</sub> = 25 pF		5.9	10	ns
t <sub>PHL</sub>					6.2	10	ns

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

**3**

**TTL DEVICES**

**TYPE SN54L00**  
**QUADRUPLE 2-INPUT POSITIVE-NAND GATES**

**recommended operating conditions**

	SN54L00			UNIT
	MIN	NOM	MAX	
V <sub>CC</sub> Supply voltage	4.5	5	5.5	V
V <sub>IH</sub> High-level input voltage	2			V
V <sub>IL</sub> Low-level input voltage				0.7 V
I <sub>OH</sub> High-level output current				-0.1 mA
I <sub>OL</sub> Low-level output current				2 mA
T <sub>A</sub> Operating free-air temperature	-55	125		°C

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

PARAMETER	TEST CONDITIONS †	SN54L00		UNIT
		MIN	TYP ‡	
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.7 V, I <sub>OH</sub> = -0.1 mA	2.4	3.3	V
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 2 mA	0.15 0.3		V
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 5.5 V	0.1		mA
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.4 V	10		µA
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.3 V	-0.18		mA
I <sub>OS</sub> §	V <sub>CC</sub> = MAX	-3	-15	mA
I <sub>CCH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0 V	0.44 0.8		mA
I <sub>CCL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5 V	1.16 2.04		mA

† 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, T<sub>A</sub> = 25°C.

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

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see note 2)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t <sub>PLH</sub>	A or B	Y	R <sub>L</sub> = 4 kΩ, C <sub>L</sub> = 50 pF		35	60	ns
t <sub>PHL</sub>					31	60	ns

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

**3**

**TTL DEVICES**

**TYPES SN54LS00, SN74LS00**  
**QUADRUPLE 2-INPUT POSITIVE-NAND GATES**

**recommended operating conditions**

	SN54LS00			SN74LS00			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			0.7			0.8	V
I <sub>OH</sub> High-level output current			-0.4			-0.4	mA
I <sub>OL</sub> Low-level output current			4			8	mA
T <sub>A</sub> Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS †	SN54LS00			SN74LS00			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA			-1.5			-1.5	V
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, I <sub>OH</sub> = -0.4 mA	2.5	3.4		2.7	3.4		V
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 4 mA		0.25	0.4		0.25	0.4	V
	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 8 mA					0.35	0.5	
I <sub>I</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 7 V		0.1			0.1		mA
I <sub>IH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7 V		20			20		μA
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V			-0.4			-0.4	mA
I <sub>OS</sub> §	V <sub>CC</sub> = MAX	-20		-100	-20		-100	mA
I <sub>DCH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0 V		0.8	1.6		0.8	1.6	mA
I <sub>CCL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5 V		2.4	4.4		2.4	4.4	mA

† 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, T<sub>A</sub> = 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.

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see note 2)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t <sub>PLH</sub>	A or B	Y	R <sub>L</sub> = 2 kΩ, C <sub>L</sub> = 15 pF		9	15	ns
t <sub>PHL</sub>					10	15	

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

**TYPES SN54S00, SN74S00**  
**QUADRUPLE 2-INPUT POSITIVE-NAND GATES**

**recommended operating conditions**

	SN54S00			SN74S00			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
I <sub>OH</sub> High-level output current	-1			-1			mA
I <sub>OL</sub> Low-level output current	20			20			mA
T <sub>A</sub> Operating free-air temperature	-55 125			0 70			°C

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

PARAMETER	TEST CONDITIONS †	SN54S00			SN74S00			UNIT
		MIN	TYP ‡	MAX	MIN	TYP ‡	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA	-1.2			-1.2			V
V <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V, I <sub>OH</sub> = -1 mA	2.5	3.4		2.7	3.4	V	
V <sub>OL</sub>	V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, I <sub>OL</sub> = 20 mA	0.5			0.5			V
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> = 2.7 V	50			50			µA
I <sub>IL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.5 V	-2			-2			mA
I <sub>OS</sub> §	V <sub>CC</sub> = MAX	-40	-100		-40	-100	mA	
I <sub>CCH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0 V	10 16			10 16			mA
I <sub>CCL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5 V	20 36			20 36			mA

† 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, T<sub>A</sub> = 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.

**switching characteristics, V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C (see note 2)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t <sub>PLH</sub>	A or B	Y	R <sub>L</sub> = 280 Ω, C <sub>L</sub> = 15 pF	3	4.5		ns
t <sub>PHL</sub>				3	5		ns
t <sub>PLH</sub>			R <sub>L</sub> = 280 Ω, C <sub>L</sub> = 50 pF	4.5			ns
t <sub>PHL</sub>				5			ns

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

**3**  
**TTL DEVICES**