

**SN54S64, SN54S65,  
SN74S64, SN74S65**  
**4-2-3-2 INPUT AND-OR-INVERT GATES**  
SDLS205 – DECEMBER 1983 – REVISED MARCH 1988

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

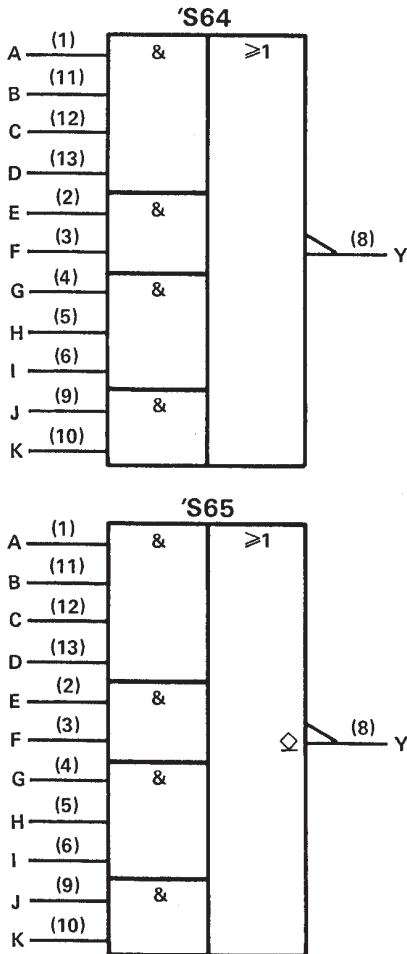
- Dependable Texas Instruments Quality and Reliability

**description**

These devices contain 4-2-3-2 input AND-OR-INVERT gates. They perform the Boolean function  $Y = \overline{ABCD + EF + GHI + JK}$ . The 'S64 has totem-pole outputs and the 'S65 has open-collector outputs.

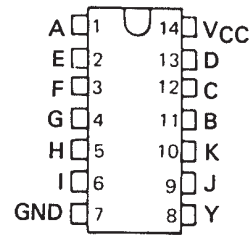
The SN54S64 and the SN54S65 are characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74S64 and the SN74S65 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

**logic symbols†**

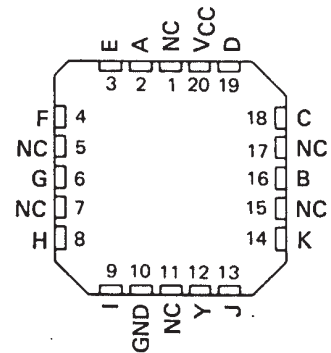


†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. Pin numbers shown are for D, J, N, and W packages.

SN54S64, SN54S65 . . . J OR W PACKAGE  
SN74S64, SN74S65 . . . D OR N PACKAGE  
(TOP VIEW)

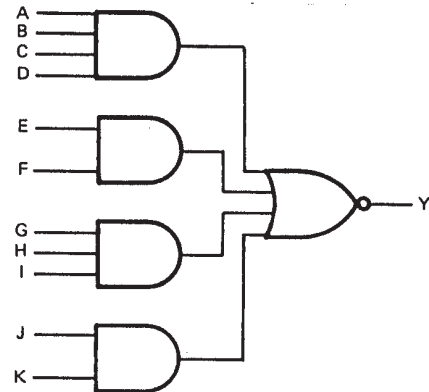


SN54S64, SN54S65 . . . FK PACKAGE  
(TOP VIEW)



NC - No internal connection

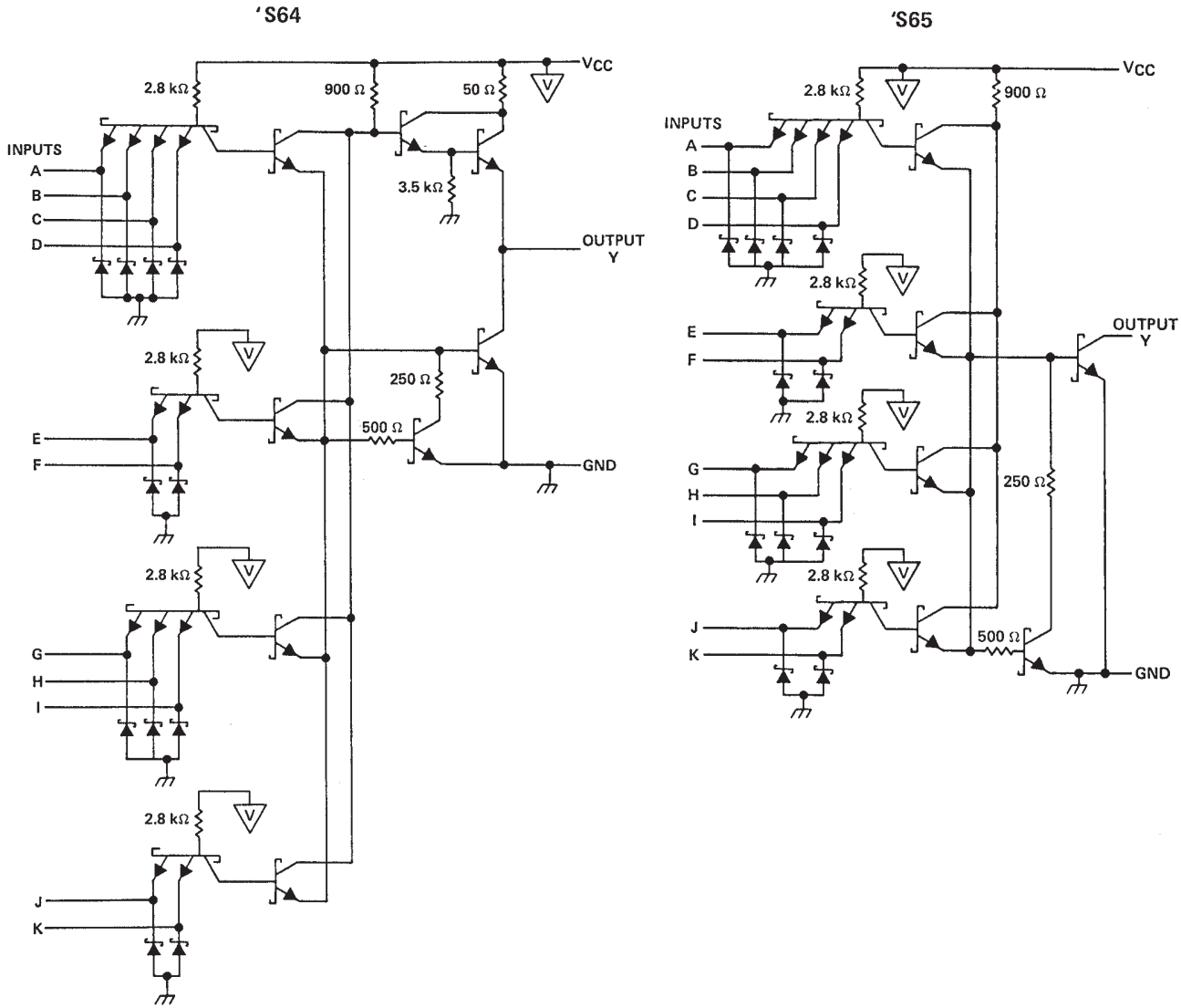
**logic diagram (each device) (positive logic)**



**SN54S64, SN54S65,  
SN74S64, SN74S65**  
**4-2-3-2 INPUT AND-OR-INVERT GATES**

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schematics (each gate)



Resistor values shown are nominal and in ohms.

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

Supply voltage, V <sub>CC</sub> (see Note 1)	7 V
Input voltage	5.5 V
Off-state output voltage, 'S65	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



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# SN54S64, SN54S65

## 4-2-3-2 INPUT AND-OR-INVERT GATES

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### recommended operating conditions

	SN54S64			SN74S64			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 †	SN54S64		SN74S64		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>CC</sub> H	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0		7	12.5		7	12.5	mA
I <sub>CC</sub> L	V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5 V		8.5	16		8.5	16	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>	Any	Y	R <sub>L</sub> = 280 Ω,	C <sub>L</sub> = 15 pF		3.5	5.5	ns
t <sub>PHL</sub>						3.5	5.5	ns
t <sub>PLH</sub>			R <sub>L</sub> = 280 Ω,	C <sub>L</sub> = 50 pF		5		ns
t <sub>PHL</sub>						5.5		ns

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



# SN54S65, SN54S65

## 4-2-3-2 INPUT AND-OR-INVERT GATES

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### recommended operating conditions

	SN54S65			SN74S65			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
V <sub>OH</sub> High-level output voltage			5.5			5.5	V
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†	SN54S65			SN74S65			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
I <sub>OH</sub>	V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.8 V, V <sub>OH</sub> = 5.5 V						0.25	mA
	V <sub>CC</sub> = MIN, V <sub>IL</sub> = 0.7 V, V <sub>OH</sub> = 5.5 V			0.25				
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		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> = 2.7 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>CCH</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0	6	11		6	11		mA
I <sub>CCL</sub>	V <sub>CC</sub> = MAX, V <sub>I</sub> = 4.5 V	8.5	16		8.5	16		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.

### 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>	Any	Y	R <sub>L</sub> = 280 Ω,	C <sub>L</sub> = 15 pF	2	5	7.5	ns
t <sub>PHL</sub>					2	5.5	8.5	ns
t <sub>PLH</sub>			R <sub>L</sub> = 280 Ω,	C <sub>L</sub> = 50 pF	8			ns
t <sub>PHL</sub>					6.5			ns

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



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## SN54S64, 4-2-3-2 Input AND-OR-invert Gates

DEVICE STATUS: **ACTIVE**

PARAMETER NAME	SN54S64
Voltage Nodes (V)	5
Vcc range (V)	4.5 to 5.5
Input Level	TTL
Output Level	TTL
No. of Gates	1

### FEATURES

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- 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

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These devices contain 4-2-3-2 input AND-OR-INVERT gates. They perform the Boolean function  $Y = ABCD + EF + GHI + JK$ . The 'S64 has totem-pole outputs and the 'S65 has open-collector outputs.

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### TECHNICAL DOCUMENTS

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**DATASHEET**[▲ Back to Top](#)Full datasheet in Acrobat PDF: [sdls205.pdf](#) (168 KB) (Updated: 03/01/1988)Full datasheet in Zipped PostScript: [sdls205.psz](#) (300 KB)**APPLICATION NOTES**[▲ Back to Top](#)View Application Reports for [Digital Logic](#)

- [Designing With Logic](#) (SDYA009C - Updated: 06/01/1997)
- [Input And Output Characteristics Of Digital Integrated Circuits](#) (SDYA010 - Updated: 10/01/1996)
- [Live Insertion](#) (SDYA012 - Updated: 10/01/1996)

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- [Documentation Rules \(SAP\) And Ordering Information](#) (SZZU001B, 4 KB - Updated: 05/06/1999)
- [Logic Selection Guide Second Half 2000](#) (SDYU001N, 5035 KB - Updated: 04/17/2000)
- [MicroStar Junior BGA Design Summary](#) (SCET004, 167 KB - Updated: 07/28/2000)
- [More Power In Less Space - Technical Article](#) (SCAU001A, 850 KB - Updated: 03/01/1996)

**PRICING/AVAILABILITY**[▲ Back to Top](#)

<u>ORDERABLE DEVICE</u>	<u>PACKAGE</u>	<u>PINS</u>	<u>TEMP (°C)</u>	<u>STATUS</u>	<u>BUDGETARY PRICE US\$/UNIT QTY=1000+</u>	<u>PACK QTY</u>	<u>DSCC NUMBER</u>	<u>PRICING/AVAILABILITY</u>
JM38510/07402BCA	<u>J</u>	14	-55 TO 125	ACTIVE	6.86	1		<a href="#">Check stock or order</a>
JM38510/07402BDA	<u>W</u>	14	-55 TO 125	ACTIVE	10.44	150		<a href="#">Check stock or order</a>
SN54S64J	<u>J</u>	14	-55 TO 125	ACTIVE	1.72	500		<a href="#">Check stock or order</a>
SNJ54S64FK	<u>FK</u>	20	-55 TO 125	ACTIVE	7.65	165		<a href="#">Check stock or order</a>
SNJ54S64J	<u>J</u>	14	-55 TO 125	ACTIVE	2.00	1		<a href="#">Check stock or order</a>
SNJ54S64W	<u>W</u>	14	-55 TO 125	ACTIVE	7.15	150		<a href="#">Check stock or order</a>

Table Data Updated on: 11/8/2000