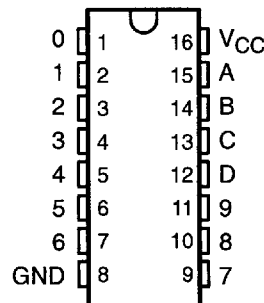


SN54HC42, SN74HC42 4-LINE TO 10-LINE DECODERS (1-of-10)

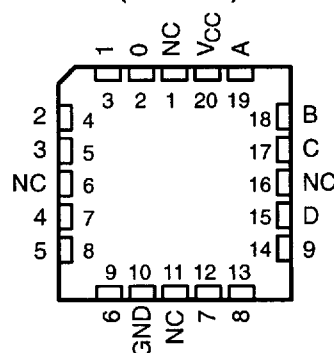
SCLS091A – DECEMBER 1982 – REVISED JANUARY 1996

- Full Decoding of Input Logic
- All Outputs Are High for Invalid BCD Conditions
- Also for Applications as 3-Line to 8-Line Decoders
- Package Options Include Plastic Small-Outline (D) and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

SN54HC42 ... J OR W PACKAGE
SN74HC42 ... D OR N PACKAGE
(TOP VIEW)



SN54HC42 ... FK PACKAGE
(TOP VIEW)



NC – No internal connection

description

These monolithic decimal decoders consist of eight inverters and ten 4-input NAND gates. The inverters are connected in pairs to make BCD input data available for decoding by the NAND gates. Full decoding of valid input logic ensures that all inputs remain off for all invalid input conditions.

The SN54HC42 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74HC42 is characterized for operation from -40°C to 85°C .

FUNCTION TABLE

NO.	INPUTS				OUTPUTS									
	D	C	B	A	0	1	2	3	4	5	6	7	8	9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
Invalid	H	L	H	L	H	H	H	H	H	H	H	H	H	H
	H	L	H	H	H	H	H	H	H	H	H	H	H	H
	H	H	L	L	H	H	H	H	H	H	H	H	H	H
	H	H	L	H	H	H	H	H	H	H	H	H	H	H
	H	H	H	L	H	H	H	H	H	H	H	H	H	H



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

PRODUCTION DATA information is 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**

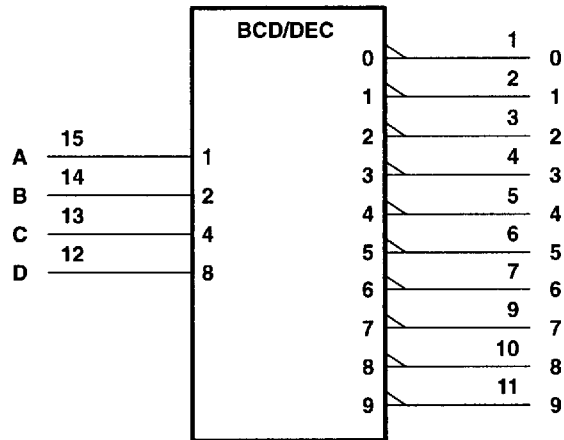
POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1996, Texas Instruments Incorporated

SN54HC42, SN74HC42 4-LINE TO 10-LINE DECODERS (1-of-10)

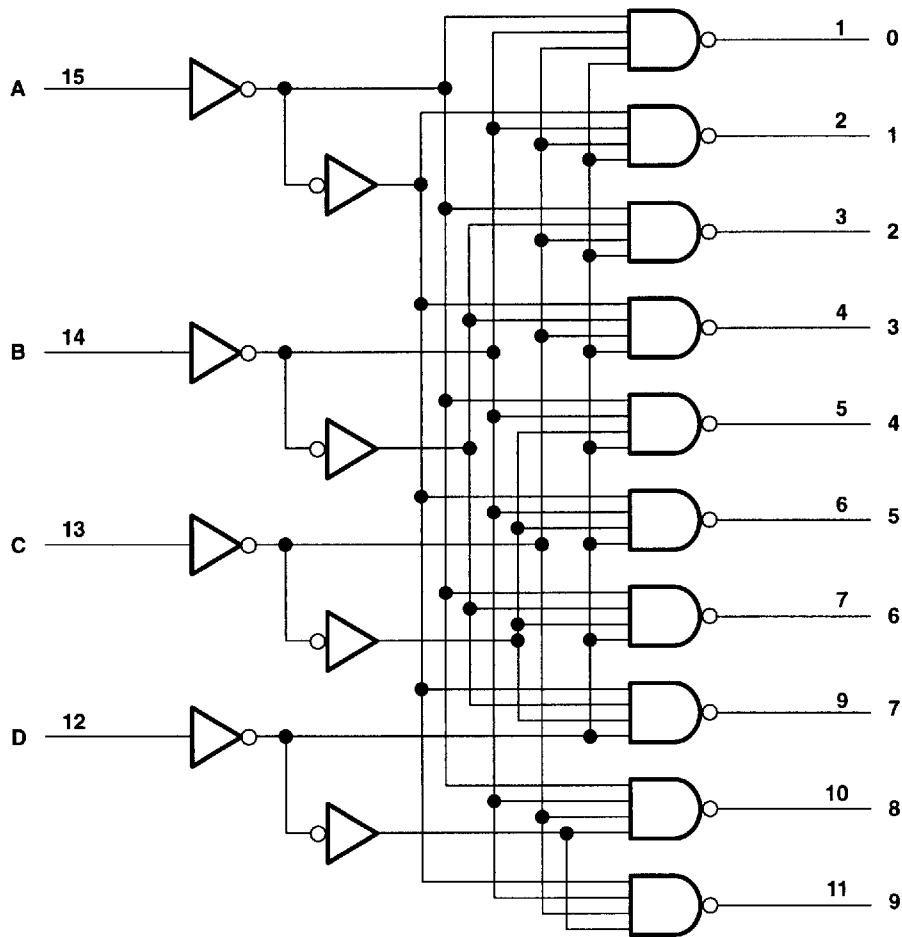
SCLS091A – DECEMBER 1982 – REVISED JANUARY 1996

logic symbol†



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

logic diagram (positive logic)



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



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN54HC42, SN74HC42 4-LINE TO 10-LINE DECODERS (1-of-10)

SCLS091A – DECEMBER 1982 – REVISED JANUARY 1996

absolute maximum ratings over operating free-air temperature range†

Supply voltage range, V_{CC}	-0.5 V to 7 V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (see Note 1)	± 20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) (see Note 1)	± 20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	± 25 mA
Continuous current through V_{CC} or GND	± 50 mA
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2): D package	1.3 W
N package	1.1 W
Storage temperature range, T_{stg}	-65°C to 150°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
 2. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils, except for the N package, which has a trace length of zero.

recommended operating conditions

		SN54HC42			SN74HC42			UNIT	
		MIN	NOM	MAX	MIN	NOM	MAX		
V_{CC}	Supply voltage	2	5	6	2	5	6	V	
V_{IH}	High-level input voltage	$V_{CC} = 2\text{ V}$		1.5	$V_{CC} = 2\text{ V}$		1.5	V	
		$V_{CC} = 4.5\text{ V}$		3.15	$V_{CC} = 4.5\text{ V}$		3.15		
		$V_{CC} = 6\text{ V}$		4.2	$V_{CC} = 6\text{ V}$		4.2		
V_{IL}	Low-level input voltage	$V_{CC} = 2\text{ V}$		0	0.5	$V_{CC} = 2\text{ V}$		0	V
		$V_{CC} = 4.5\text{ V}$		0	1.35	$V_{CC} = 4.5\text{ V}$		0	
		$V_{CC} = 6\text{ V}$		0	1.8	$V_{CC} = 6\text{ V}$		0	
V_I	Input voltage	0	V_{CC}		0	V_{CC}		V	
V_O	Output voltage	0	V_{CC}		0	V_{CC}		V	
t_t	Input transition (rise and fall) time	$V_{CC} = 2\text{ V}$		0	1000	$V_{CC} = 2\text{ V}$		0	ns
		$V_{CC} = 4.5\text{ V}$		0	500	$V_{CC} = 4.5\text{ V}$		0	
		$V_{CC} = 6\text{ V}$		0	400	$V_{CC} = 6\text{ V}$		0	
T_A	Operating free-air temperature	-55		125		-40		85	$^\circ\text{C}$



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN54HC42, SN74HC42 4-LINE TO 10-LINE DECODERS (1-of-10)

SCLS091A – DECEMBER 1982 – REVISED JANUARY 1996

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

PARAMETER	TEST CONDITIONS		V _{CC}	T _A = 25°C			SN54HC42		SN74HC42		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{OH}	V _I = V _{IH} or V _{IL}	I _{OH} = -20 μA	2 V	1.9	1.998		1.9		1.9	V	
			4.5 V	4.4	4.499		4.4		4.4		
			6 V	5.9	5.999		5.9		5.9		
		I _{OH} = -4 mA	4.5 V	3.98	4.3		3.7		3.84		
		I _{OH} = -5.2 mA	6 V	5.48	5.8		5.2		5.34		
V _{OL}	V _I = V _{IH} or V _{IL}	I _{OL} = 20 μA	2 V		0.002	0.1		0.1		0.1	V
			4.5 V		0.001	0.1		0.1		0.1	
			6 V		0.001	0.1		0.1		0.1	
		I _{OL} = 4 mA	4.5 V		0.17	0.26		0.4		0.33	
		I _{OL} = 5.2 mA	6 V		0.15	0.26		0.4		0.33	
I _I	V _I = V _{CC} or 0		6 V		±0.1	±100		±1000		±1000	nA
I _{CC}	V _I = V _{CC} or 0, I _O = 0		6 V			8		160		80	μA
C _i			2 V to 6 V		3	10		10		10	pF

switching characteristics over recommended operating free-air temperature range, C_L = 50 pF (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC}	T _A = 25°C			SN54HC42		SN74HC42		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{pd}	A, B, C, or D	0-9	2 V		65	150		225		190	ns
			4.5 V		18	30		45		38	
			6 V		14	26		38		32	
t _t		Any	2 V		28	75		110		95	ns
			4.5 V		8	15		22		19	
			6 V		7	13		19		16	

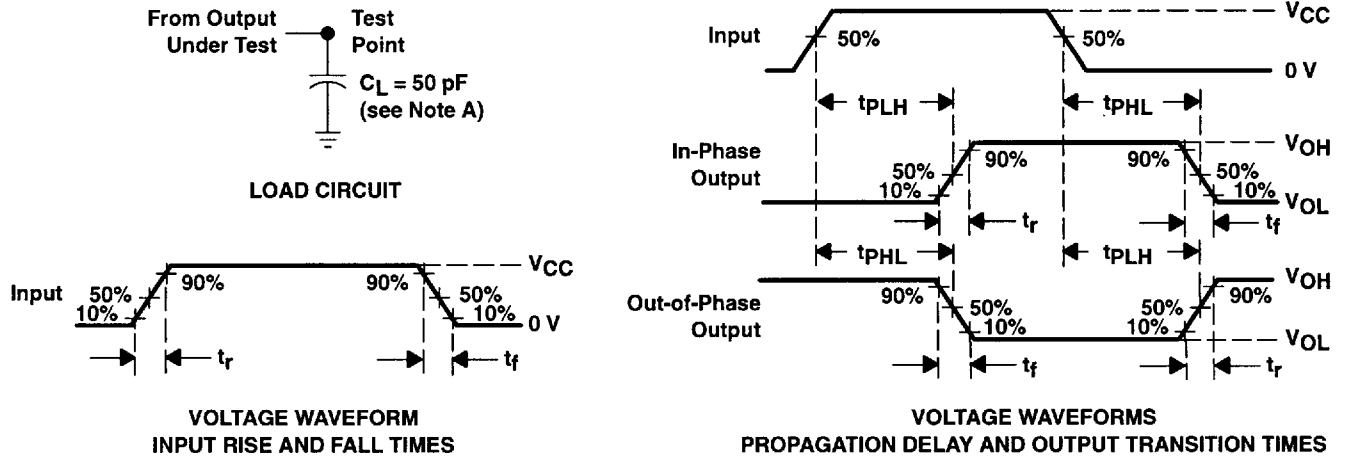
operating characteristics, T_A = 25°C

PARAMETER	TEST CONDITIONS	TYP	UNIT
C _{pdc} Power dissipation capacitance	No load	39	pF



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

PARAMETER MEASUREMENT INFORMATION



- NOTES: A. C_L includes probe and test-fixture capacitance.
 B. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r = 6 \text{ ns}$, $t_f = 6 \text{ ns}$.
 C. The outputs are measured one at a time with one input transition per measurement.
 D. t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms