SN54HC4514, SN74HC4514
4-LINE TO 16-LINE DECODERS/DEMULTIPLEXERS WITH ADDRESS LATCHES

D2684, DECEMBER 1982–REVISED JUNE 1989

- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

description

These devices present two output options of a 4-line to 16-line decoder with latched inputs. The 'HC4514 presents a high level at the selected output.

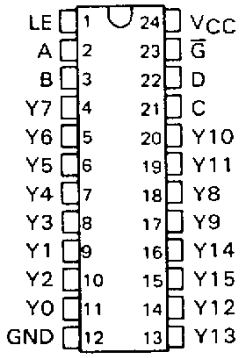
These devices consist of four storage latches with common latch enable (LE) and inhibit ($\overline{G}$) inputs. When a low signal is applied to the LE input, the input data is stored, decoded, and presented to the output. When $\overline{G}$ is high, all sixteen 'HC4514 outputs are at a low logic level.

The SN54HC4514 is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74HC4514 is characterized for operation from −40°C to 85°C.

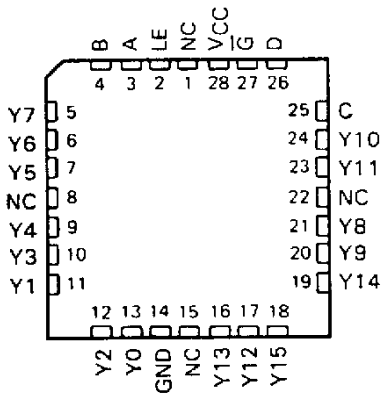
FUNCTION TABLE

INPUTS						OUTPUT SELECTED	OUTPUTS
LE	$\overline{G}$	D	C	B	A		
H	L	L	L	L	L	0	
H	L	L	L	L	H	1	
H	L	L	L	H	L	2	
H	L	L	L	H	H	3	
H	L	L	H	L	L	4	
H	L	L	H	L	H	5	Selected
H	L	L	H	H	L	6	Output = H
H	L	L	H	H	H	7	All others = L
H	L	H	L	L	L	8	
H	L	H	L	L	H	9	
H	L	H	L	H	L	10	
H	L	H	L	H	H	11	
H	L	H	H	L	L	12	
H	L	H	H	L	H	13	
H	L	H	H	H	L	14	
H	L	H	H	H	H	15	
X	H	X	X	X	X		All = L
L	L	X	X	X	X	All outputs remain in state existing before LE↑	

SN54HC4514 . . . JT PACKAGE
SN74HC4514 . . . DW OR NT PACKAGE
(TOP VIEW)

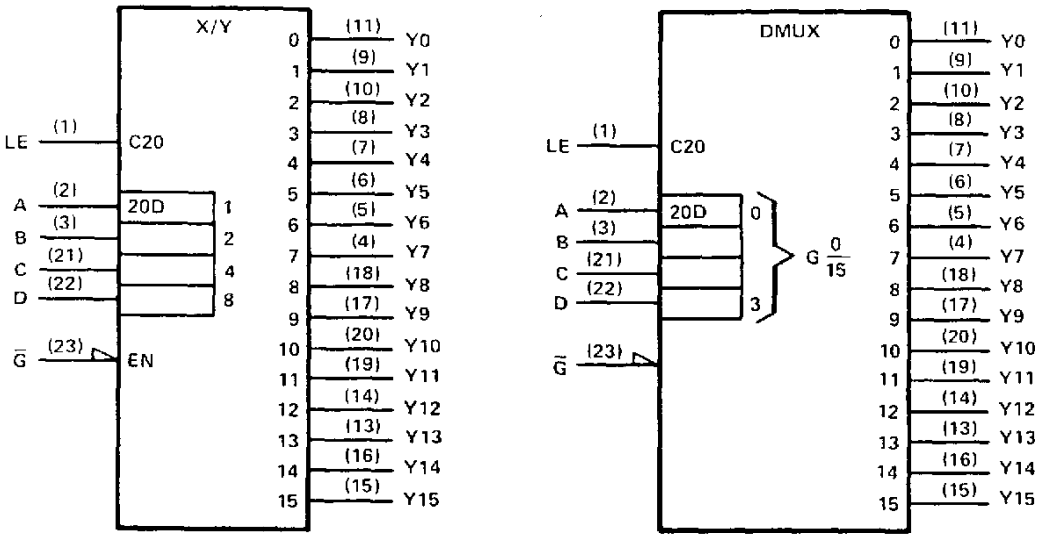


SN54HC4514 . . . FK PACKAGE
(TOP VIEW)



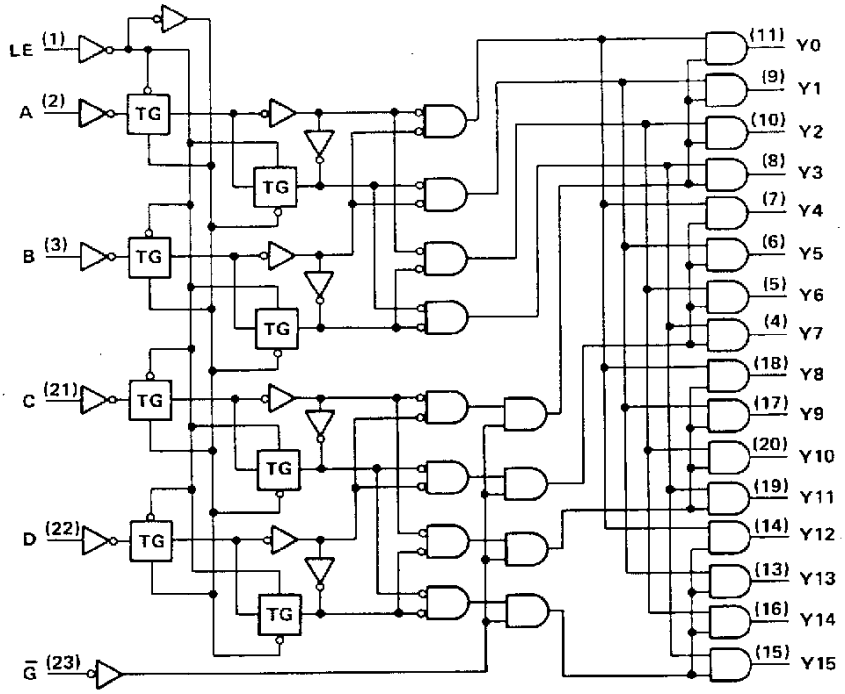
NC–No internal connection

logic symbols (alternatives)†



†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for DW, JT, and NT packages.

logic diagram (positive logic)



Pin numbers shown are for DW, JT, and NT packages.

absolute maximum ratings over operating free-air temperature range†

Supply voltage, V_{CC} . . . . . −0.5 V to 7 V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) . . . . . ±20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) . . . . . ±20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC}) . . . . . ±25 mA
Continuous current through V_{CC} or GND pins . . . . . ±50 mA
Lead temperature 1,6 mm (1/16 in) from case for 60 s: FK or JT package . . . . . 300°C
Lead temperature 1,6 mm (1/16 in) from case for 10 s: DW or NT package . . . . . 260°C
Storage temperature range . . . . . −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.

recommended operating conditions

			SN54HC4514			SN74HC4514			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 V	1.5			1.5			V
		V_{CC} = 4.5 V	3.15			3.15			
		V_{CC} = 6 V	4.2			4.2			
V_{IL}	Low-level input voltage	V_{CC} = 2 V	0		0.3	0		0.3	V
		V_{CC} = 4.5 V	0		0.9	0		0.9	
		V_{CC} = 6 V	0		1.2	0		1.2	
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) times	V_{CC} = 2 V	0		1000	0		1000	ns
		V_{CC} = 4.5 V	0		500	0		500	
		V_{CC} = 6 V	0		400	0		400	
T_A	Operating free-air temperature		−55		125	−40		85	°C

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

PARAMETER	TEST CONDITIONS	V_{CC}	T_A = 25°C			SN54HC4514		SN74HC4514		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		
	$V_I = V_{IH}$ or V_{IL}, I_{OH} = −4 mA	4.5 V	3.98	4.30		3.7		3.84		
	$V_I = V_{IH}$ or V_{IL}, I_{OH} = −5.2 mA	6 V	5.48	5.80		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	
	$V_I = V_{IH}$ or V_{IL}, I_{OL} = 4 mA	4.5 V		0.17	0.26		0.4		0.33	
	$V_I = V_{IH}$ or V_{IL}, 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 to 6 V		3	10		10		10	pF

PRODUCT PREVIEW

timing requirements over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		V_{CC}	T_A = 25°C		SN54HC4514		SN74HC4514		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration, LE high	2 V	80		119		100		ns
		4.5 V	16		24		20		
		6 V	14		20		17		
t_{su}	Setup time, A thru D before LE↓	2 V	100		149		125		ns
		4.5 V	20		30		25		
		6 V	17		2		21		
t_h	Hold time, A thru D before LE↓	2 V	5				5		ns
		4.5 V	5		5		5		
		6 V	5		5		5		

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	T_A = 25°C			SN54HC4514		SN74HC4514		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A thru D	Any	2 V		115	230		343		290	ns
			4.5 V		23	46		69		58	
			6 V		20	39				49	
t_{pd}	LE	Any	2 V		115	230		3		290	ns
			4.5 V		23	46		69		58	
			6 V		20	39		58		49	
t_{pd}	$\overline{G}$	Any	2 V		88	175		261		221	ns
			4.5 V		18	35		52		44	
			6 V		15	30		44		37	
t_t		Any	2 V		38	75		110		95	ns
			4.5 V		8	15		22		19	
			6 V		6	13		19		16	

C_{pd}	Power dissipation capacitance	No load, T_A = 25°C	60 pF typ

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

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