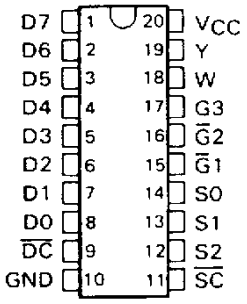
SN54HC354, SN74HC354
8-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS/ TRANSPARENT REGISTERS WITH 3-STATE OUTPUTS

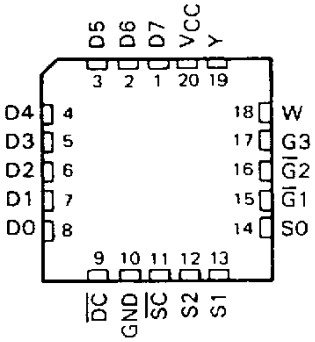
D2684, DECEMBER 1982—REVISED SEPTEMBER 1987

- Transparent Latches on Data Select Inputs
- Transparent Data Registers
- High-Current 3-State Outputs Can Drive Up to 15 LSTTL Loads
- Complementary Outputs
- Package Options: Plastic and Ceramic DIPs, Plastic Small-Outline Packages, and Ceramic Chip Carriers
- Dependable Texas Instruments Quality and Reliability

SN54HC354 . . . J PACKAGE
SN74HC354 . . . DW OR N PACKAGE
(TOP VIEW)



SN54HC354 . . . FK PACKAGE
(TOP VIEW)

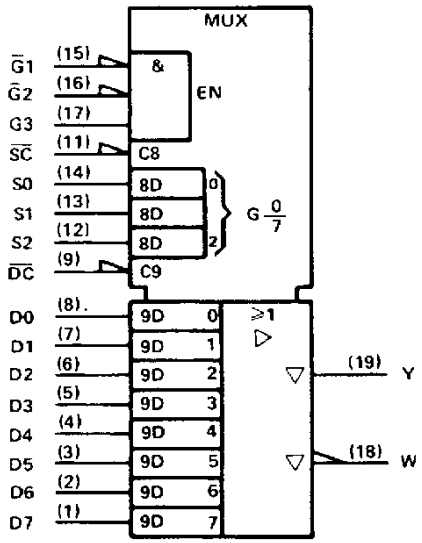


description

These monolithic data selectors/multiplexers contain full on-chip binary decoding to select one of eight data sources. The data-select is stored in transparent latches that are enabled by a low level on pin 11, $\overline{SC}$. A similar enable for data is obtained by a low level on pin 8, $\overline{DC}$.

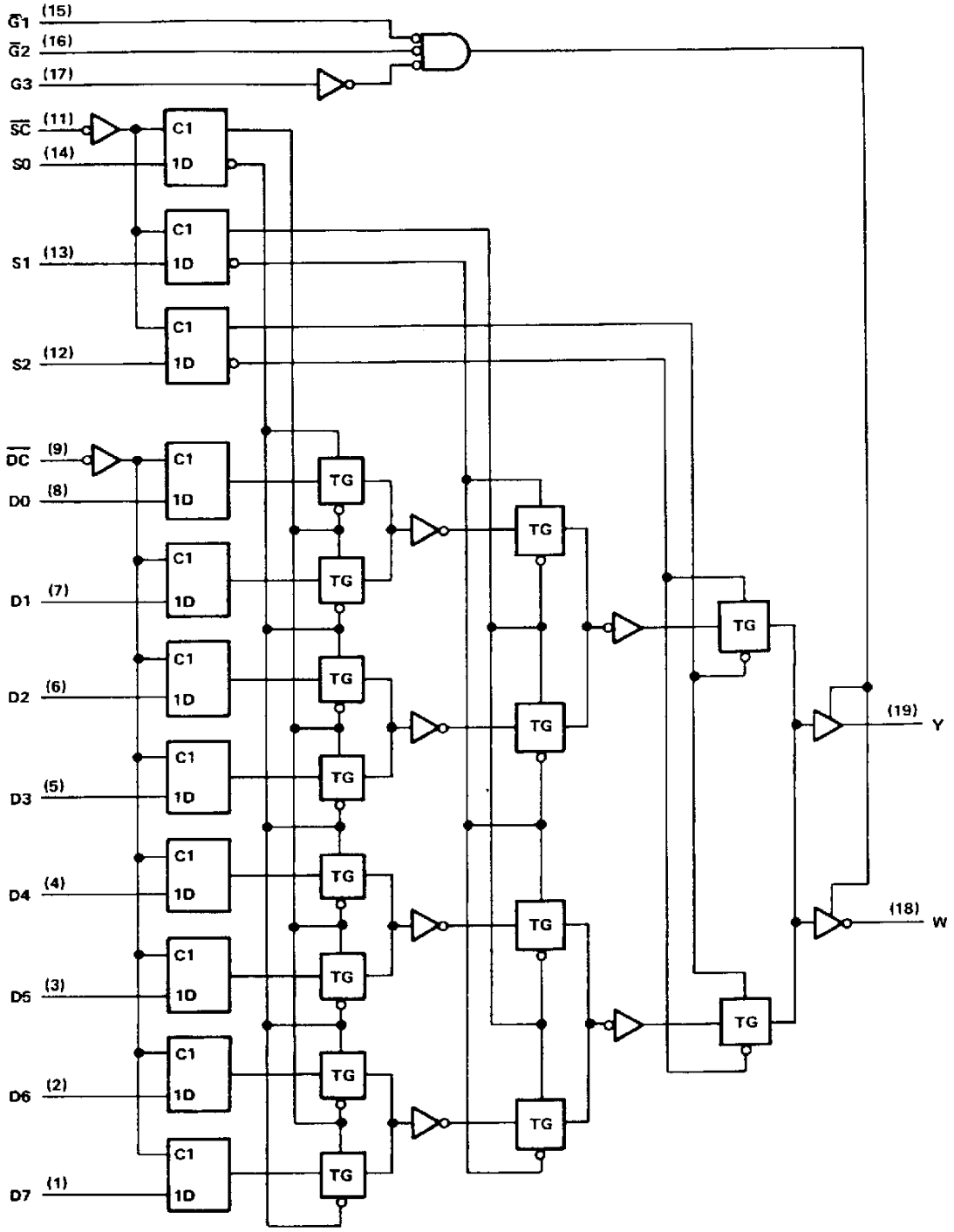
The SN54HC354 is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74HC354 is characterized for operation from −40°C to 85°C.

logic symbol†



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

logic diagram (positive logic)



FUNCTION TABLE

INPUTS							OUTPUTS	
SELECT†			DATA CONTROL	OUTPUT ENABLES				
S2	S1	S0	$\overline{DC}$	$\overline{G}1$	$\overline{G}2$	G3	W	Y
X	X	X	X	H	X	X	Z	Z
X	X	X	X	X	H	X	Z	Z
X	X	X	X	X	X	L	Z	Z
L	L	L	L	L	L	H	$\overline{D0}$	D0
L	L	L	H	L	L	H	$\overline{D0}_n$	$D0_n$
L	L	H	L	L	L	H	$\overline{D1}$	D1
L	L	H	H	L	L	H	$\overline{D1}_n$	$D1_n$
L	H	L	L	L	L	H	$\overline{D2}$	D2
L	H	L	H	L	L	H	$\overline{D2}_n$	$D2_n$
L	H	H	L	L	L	H	$\overline{D3}$	D3
L	H	H	H	L	L	H	$\overline{D3}_n$	$D3_n$
H	L	L	L	L	L	H	$\overline{D4}$	D4
H	L	L	H	L	L	H	$\overline{D4}_n$	$D4_n$
H	L	H	L	L	L	H	$\overline{D5}$	D5
H	L	H	H	L	L	H	$\overline{D5}_n$	$D5_n$
H	H	L	L	L	L	H	$\overline{D6}$	D6
H	H	L	H	L	L	H	$\overline{D6}_n$	$D6_n$
H	H	H	L	L	L	H	$\overline{D7}$	D7
H	H	H	H	L	L	H	$\overline{D7}_n$	$D7_n$

H = high level (steady state)
L = low level (steady state)
X = irrelevant (any input, including transitions)
Z = high-impedance state (off state)
↑ = transition from low to high level
D0 . . . D7 = the level of stead-state inputs at inputs D0 through D7, respectively
$D0_n$ . . . $D7_n$ = the level of steady state inputs at inputs D0 through D7, respectively, before the most recent low-to-high transition of data control
†This column shows the input address setup with $\overline{SC}$ low.

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}) . . . . . ±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}) . . . . . ±35 mA
Continuous current through V_{CC} or GND pins . . . . . ±70 mA
Lead temperature 1,6 mm (1/16 in) from case for 60 s: FK or J package . . . . . 300°C
Lead temperature 1,6 mm (1/16 in) from case for 10 s: DW or N 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 absoilute-maximum-rated conditions for extended periods may affect device reliability.

recommended operating conditions

			SN54HC354			SN74HC354			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			SN54HC354		SN74HC354		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} = −6 mA	4.5 V	3.98	4.30		3.7		3.84		
	V_I = V_{IH} or V_{IL}, I_{OH} = −7.8 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} = 6 mA	4.5 V		0.17	0.26		0.4		0.33	
	V_I = V_{IH} or V_{IL}, I_{OL} = 7.8 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_{OZ}	V_O = V_{CC} or 0	6 V		±0.01	±0.5		±10		±5	μA
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

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

		V_{CC}	T_A = 25°C		SN54HC354		SN74HC354		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_w Pulse duration	$\overline{SC}$ low	2 V	80		120		100		ns
		4.5 V	16		24		20		
		6 V	14		20		17		
	$\overline{DC}$ low	2 V	80		120		100		
		4.5 V	16		24		20		
		6 V	14		20		17		
t_{su} Setup time	Data before $\overline{DC}$↑	2 V	75		110		95		ns
		4.5 V	15		22		19		
		6 V	13		19		16		
	S0 thru S2 before $\overline{SC}$↑	2 V	75		110		95		
		4.5 V	15		22		19		
		6 V	13		19		16		
t_h Hold time	Data after $\overline{DC}$↑	2 V	5		5		5		ns
		4.5 V	5		5		5		
		6 V	5		5		5		
	S0 thru S2 after $\overline{SC}$↑	2 V	5		5		5		
		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			SN54HC354		SN74HC354		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	Any D	W or Y	2 V		90	235		352		295	ns
			4.5 V		29	47		71		59	
			6 V		25	40		60		50	
t_{pd}	$\overline{DC}$	W or Y	2 V		115	270		405		337	ns
			4.5 V		40	54		81		68	
			6 V		32	46		69		58	
t_{pd}	S0, S1, or S2	W or Y	2 V		120	285		427		355	ns
			4.5 V		42	57		86		71	
			6 V		34	48		72		60	
t_{pd}	$\overline{SC}$	W or Y	2 V		120	300		450		375	ns
			4.5 V		45	60		90		75	
			6 V		36	51		77		64	
t_{en}	$\overline{G1}$, $\overline{G2}$, or G3	W or Y	2 V		50	125		188		155	ns
			4.5 V		18	25		38		31	
			6 V		15	21		32		26	
t_{dis}	$\overline{G1}$, $\overline{G2}$, or G3	W or Y	2 V		68	165		248		205	ns
			4.5 V		24	33		50		41	
			6 V		20	28		43		35	
t_t		W or Y	2 V		28	60		90		75	ns
			4.5 V		8	12		18		15	
			6 V		6	10		15		13	

C_{pd}	Power dissipation capacitance	No load, T_A = 25°C	100 pF typ

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

switching characteristics over recommended operating free-air temperature range (unless otherwise noted), C_L = 150 pF (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	T_A = 25°C			SN54HC354		SN74HC354		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	Any D	W or Y	2 V		100	275		412		344	ns
			4.5 V		40	55		83		69	
			6 V		32	46		69		59	
t_{pd}	$\overline{DC}$	W or Y	2 V		125	310		465		387	ns
			4.5 V		46	62		93		78	
			6 V		38	52		78		66	
t_{pd}	S0, S1, or S2	W or Y	2 V		130	325		488		405	ns
			4.5 V		50	65		98		81	
			6 V		40	55		82		69	
t_{pd}	$\overline{SC}$	W or Y	2 V		110	340		510		425	ns
			4.5 V		52	68		102		85	
			6 V		42	58		87		72	
t_{en}	$\overline{G1}$, $\overline{G2}$, or G3	W or Y	2 V		60	165		248		205	ns
			4.5 V		25	33		50		41	
			6 V		21	28		42		35	
t_t		W or Y	2 V		37	210		315		265	ns
			4.5 V		12	42		63		53	
			6 V		10	36		53		45	

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

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