

SN54LS354, SN54LS355, SN54LS356 SN74LS354, SN74LS355, SN74LS356

8-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS/REGISTERS

SDLS164 – JULY 1979 – REVISED MARCH 1988

- Transparent Latches on Data Select Inputs
- Complementary Outputs
- Easily Expandable
- High-Density 20-Pin Package

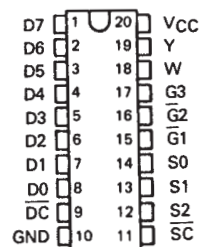
	DATA REGISTERS	OUTPUTS
'LS354	Transparent	3-State
'LS355	Transparent	Open-Collector
'LS356	Edge-Triggered	3-State

description

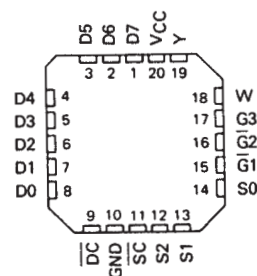
These monolithic data selectors/multiplexers contain full on-chip binary decoding to select one of eight data sources. The data-select address is stored in transparent latches that are enabled by a low level on pin 11, \overline{SC} . On the 'LS354 and 'LS355 a similar enable for data is obtained by a low level on pin 9, \overline{DC} . The edge-triggered data registers of the 'LS356 is clocked by a low-to-high transition on pin 9, CLK. Complementary outputs are available in either three-state versions ('LS354 and 'LS356) or open-collector version ('LS355).

The SN54LS354 through SN54LS356 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74LS354 through SN74LS356 are characterized for operation from 0°C to 70°C .

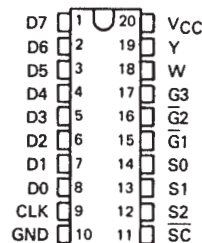
SN54LS354, SN54LS355 . . . J PACKAGE
SN74LS354, SN74LS355 . . . DW OR N PACKAGE
(TOP VIEW)



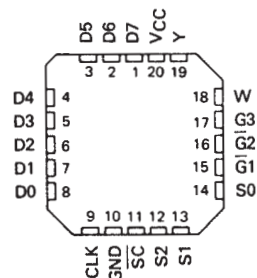
SN54LS354, SN54LS355 . . . FK PACKAGE
(TOP VIEW)



SN54LS356 . . . J OR W PACKAGE
SN74LS356 . . . DW OR N PACKAGE
(TOP VIEW)



SN54LS356 . . . FK PACKAGE
(TOP VIEW)



SN54LS354, SN54LS355, SN54LS356 SN74LS354, SN74LS355, SN74LS356 8-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS/REGISTERS

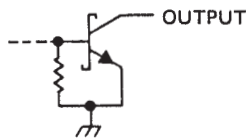
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FUNCTION TABLE

SELECT			INPUTS			OUTPUT ENABLES			OUTPUTS	
S2	S1	S0	DATA CONTROL ('LS354, 'LS355)	CLOCK ('LS356)	$\bar{G}1$	$\bar{G}2$	$G3$	W	Y	
X	X	X	X	X	H	X	X	Z	Z	
X	X	X	X	X	X	H	X	Z	Z	
X	X	X	X	X	X	X	L	Z	Z	
L	L	L	L	↑	L	L	H	$\bar{D}0$	D0	
L	L	L	H	H or L	L	L	H	$\bar{D}0_n$	D0 _n	
L	L	H	L	↑	L	L	H	$\bar{D}1$	D1	
L	L	H	H	H or L	L	L	H	$\bar{D}1_n$	D1 _n	
L	H	L	L	↑	L	L	H	$\bar{D}2$	D2	
L	H	L	H	H or L	L	L	H	$\bar{D}2_n$	D2 _n	
L	H	H	L	↑	L	L	H	$\bar{D}3$	D3	
L	H	H	H	H or L	L	L	H	$\bar{D}3_n$	D3 _n	
H	L	L	L	↑	L	L	H	D4	D4	
H	L	L	H	H or L	L	L	H	$\bar{D}4_n$	D4 _n	
H	L	H	L	↑	L	L	H	$\bar{D}5$	D5	
H	L	H	H	H or L	L	L	H	$\bar{D}5_n$	D5 _n	
H	H	L	L	↑	L	L	H	$\bar{D}6$	D6	
H	H	L	H	H or L	L	L	H	$\bar{D}6_n$	D6 _n	
H	H	H	L	↑	L	L	H	$\bar{D}7$	D7	
H	H	H	H	H or L	L	L	H	$\bar{D}7_n$	D7 _n	

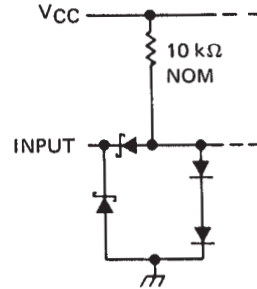
H = high level (steady state)
 L = low level (steady state)
 X = irrelevant (any input, including transitions)
 Z = high-impedance state (off state)
 ↑ = transition from low to high level
 D0 . . . D7 = the level of steady-state inputs at inputs D0 through D7, respectively, at the time of the low-to-high clock transition in the case of 'LS356.
 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 or clock
 This column shows the input address setup with $\bar{S}C$ low.

TYPICAL OF BOTH OUTPUTS ON 'LS355

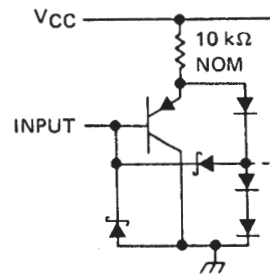


schematics of inputs and outputs

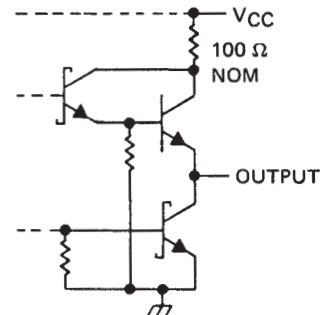
EQUIVALENT OF EACH DATA OR SELECT INPUT



EQUIVALENT OF ALL OTHER INPUTS



TYPICAL OF BOTH OUTPUTS ON 'LS354 AND 'LS356



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

- Supply voltage (see Note 1) 7 V
- Input voltage 7 V
- Operating free-air temperature range: SN54LS' - 55° C to 125° C
- SN74LS' 0° C to 70° C
- Storage temperature range - 65° C to 150° C

NOTE 1: Voltage values are with respect to network ground terminal.

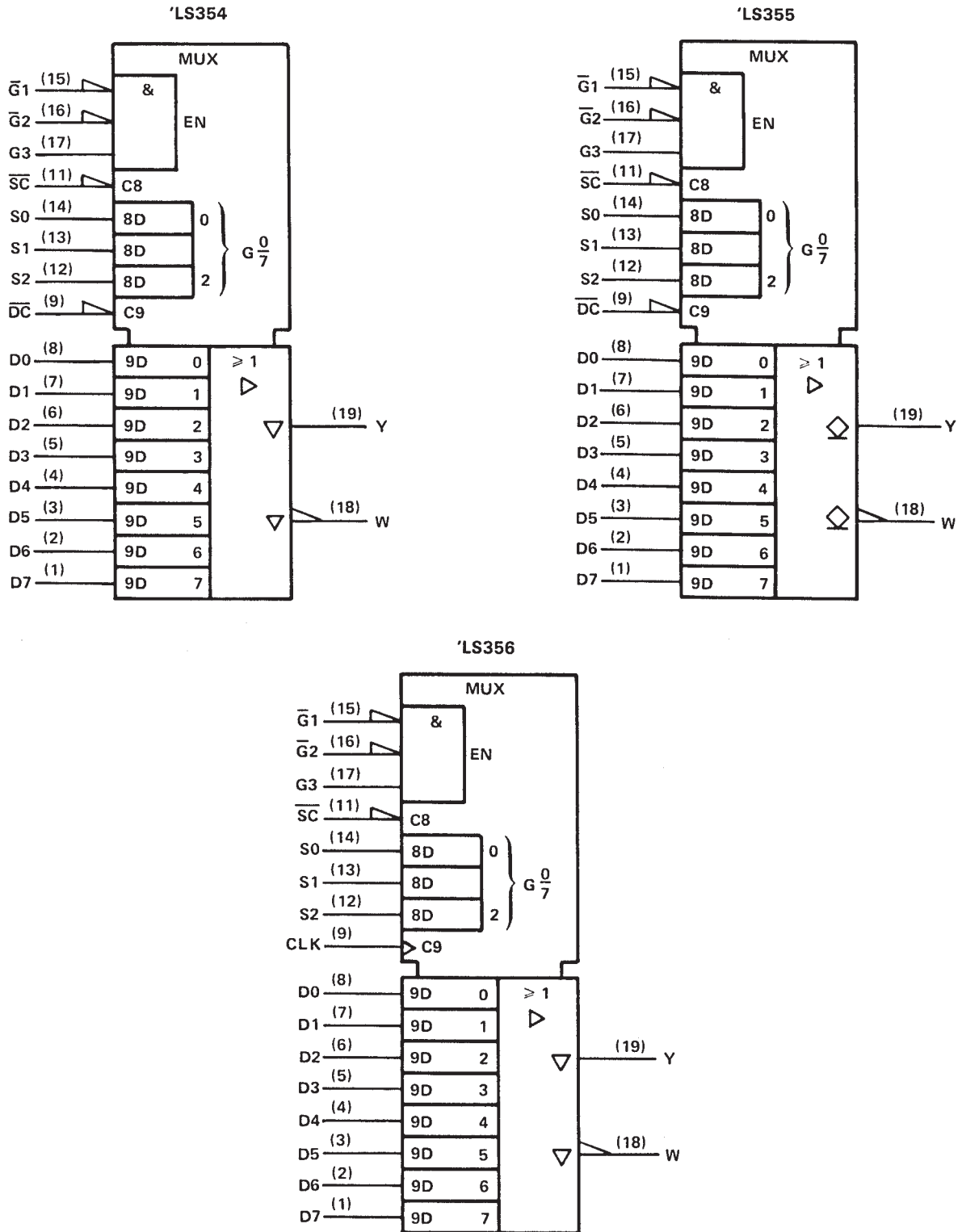


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 SN74LS354, SN74LS355, SN74LS356
 8-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS/REGISTERS

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logic symbols†



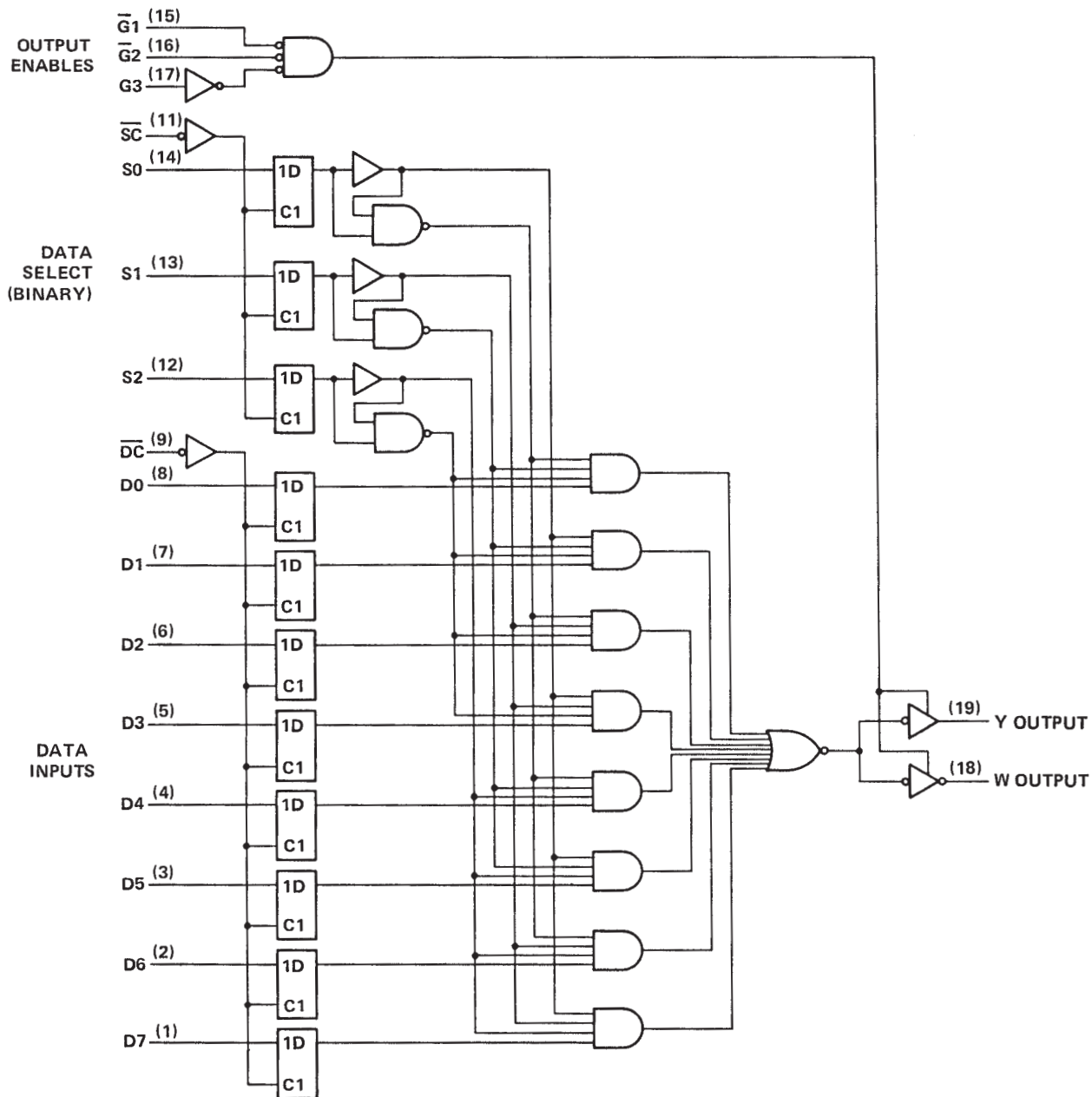
†This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12. Pin numbers shown are for DW, J, N, and W packages.

SN54LS354, SN54LS355, SN54LS356
 SN74LS354, SN74LS355, SN74LS356
 8-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS/REGISTERS

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logic diagram (positive logic)

'LS354, 'LS355



Pin numbers shown are for DW, J and N packages.

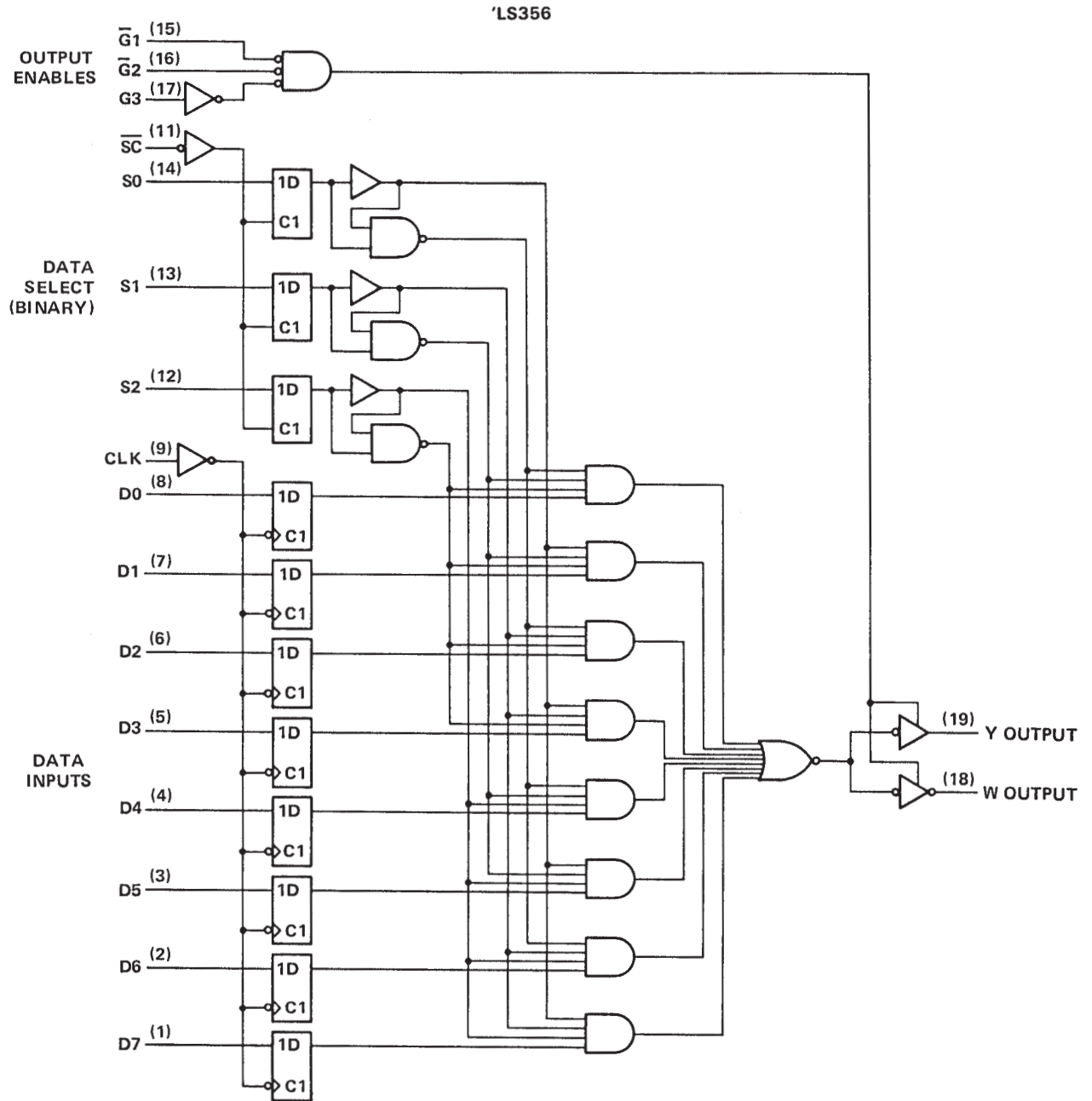


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SN54LS354, SN54LS355, SN54LS356
 SN74LS354, SN74LS355, SN74LS356
 8-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS/REGISTERS

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logic diagram (positive logic)



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



SN54LS354, SN54LS355, SN54LS356
SN74LS354, SN74LS355, SN74LS356
8-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS/REGISTERS

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recommended operating conditions

	SN54LS354 SN54LS356			SN74LS354 SN74LS356			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC} Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V _{IH} High-level input voltage	2			2			V
V _{IL} Low-level input voltage			0.7			0.8	V
I _{OH} High-level output current			-1			-2.6	mA
I _{OL} Low-level output current			12			24	mA
t _{su} Setup times, high-or-low-level data (with respect to ↑ at pin 9)	'LS354	15		15			ns
	'LS356	15		15			
t _h Hold times, high-or-low-level data (with respect to ↑ at pin 9)	'LS354	15		15			ns
	'LS356	0		0			
T _A Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS†	SN54LS354 SN54LS356		SN74LS354 SN74LS356		UNIT		
		MIN	TYP‡	MAX	MIN		TYP‡	MAX
V _{IK}	V _{CC} = MIN, I _I = -18 mA			-1.5		-1.5	V	
V _{OH}	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = MAX, I _{OH} = MAX,	2.4			2.4		V	
V _{OL}	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = MAX	I _{OL} = 12 mA	0.25	0.4	0.25	0.4	V	
		I _{OL} = 24 mA			0.35	0.5		
I _{OZ}	V _{CC} = MAX	V _O = 2.7 V		20		20	μA	
		V _O = 0.4 V		-20		-20		
I _I	V _{CC} = MAX, V _I = 7 V		0.1		0.1	mA		
I _{IH}	V _{CC} = MAX, V _I = 2.7 V		20		20	μA		
I _{IL}	DC or CLK, G1, G2, G3	V _{CC} = MAX, V _I = 0.4 V		-0.2		-0.2	mA	
	All others			-0.4		-0.4		
I _{OS} §	V _{CC} = MAX	-30		-130	-30		-130	mA
I _{CC}	V _{CC} = MAX, See Note 2		29	46		29	46	mA

† For conditions shown as MIN or MAX, use the appropriate values specified under recommended operating conditions.

‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.

§ Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second.

NOTE 2: I_{CC} is measured with the inputs grounded and the outputs open.



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SN74LS354, SN74LS355, SN74LS356
8-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS/REGISTERS

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switching characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$, $R_L = 667\ \Omega$

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	'LS354			'LS356			UNIT	
				MIN	TYP	MAX	MIN	TYP	MAX		
t _{PLH}	D0-D7	Y	C _L = 45 pF, See Note 3	24	36				ns		
t _{PHL}				23	35						
t _{PLH}		W		18	27			ns			
t _{PHL}				29	44						
t _{PLH}	\overline{DC} or CLK	Y		28	42	18	27	ns			
t _{PHL}				26	39	33	50				
t _{PLH}		W		22	33	24	36	ns			
t _{PHL}				33	50	18	27				
t _{PLH}	S0, S1 S2	Y		29	44	30	45	ns			
t _{PHL}				24	45	28	48				
t _{PLH}		W		28	42	36	54	ns			
t _{PHL}				34	51	30	45				
t _{PLH}	\overline{SC}	Y		34	51	36	54	ns			
t _{PHL}				31	47	40	60				
t _{PLH}		W		27	41	32	48	ns			
t _{PHL}				40	60	36	54				
t _{PZH}	$\overline{G1}, \overline{G2}$	Y	C _L = 5 pF, See Note 3	14	27	14	25	ns			
t _{PZL}				18	27	17	25				
t _{PHZ}				15	25	16	24				
t _{PLZ}				15	25	16	24				
t _{PZH}				12	24	14	23				
t _{PZL}		W	C _L = 45 pF, See Note 3	16	24	16	23	ns			
t _{PHZ}				15	25	16	23				
t _{PLZ}				15	25	16	23				
t _{PZH}				Y	C _L = 45 pF, See Note 3	15	29		15	27	ns
t _{PZL}						19	29		18	27	
t _{PHZ}	15	25	16			25					
t _{PLZ}	15	25	16			25					
t _{PZH}	W	C _L = 45 pF, See Note 3	13			25	14	25	ns		
t _{PZL}			17	25	16	25					
t _{PHZ}			15	25	16	25					
t _{PLZ}			15	25	16	25					
t _{PZH}			Y	C _L = 5 pF, See Note 3	15	25	16	25		ns	
t _{PHZ}	15	25			16	25					
t _{PLZ}	W	C _L = 5 pF, See Note 3	15	25	16	25	ns				
t _{PHZ}			15	25	16	25					

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.



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SN74LS354, SN74LS355, SN74LS356
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recommended operating conditions

		SN54LS355			SN74LS355			UNIT		
		MIN	NOM	MAX	MIN	NOM	MAX			
V _{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V		
V _{IH}	High-level input voltage	2			2			V		
V _{IL}	Low-level input voltage	0.7			0.8			V		
V _{OH}	High-level output voltage	5.5			5.5			V		
I _{OL}	Low-level output current	12			24			mA		
t _{su}	Setup times, high-or-low-level data, (with respect to ↑ at pin 9)	15			15			ns		
t _h	Hold times, high-or low-level data (with respect to ↑ at pin 9)	15			15			ns		
T _A	Operating free-air temperature	-55			125			0	70	°C

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

PARAMETER	TEST CONDITIONS†	SN54LS355		SN74LS355		UNIT
		MIN	TYP‡	MAX	MIN	
V _{IK}	V _{CC} = MIN, I _I = -18 mA	-1.5		-1.5		V
I _{OH}	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = MAX V _{OH} = 5.5 V	0.1		0.1		mA
V _{OL}	V _{CC} = MIN, V _{IH} = 2 V, V _{IL} = MAX	I _{OL} = 12 mA		0.25	0.4	V
		I _{OL} = 24 mA		0.35 0.5		
I _I	V _{CC} = MAX, V _I = 7 V	0.1		0.1		mA
I _{IH}	V _{CC} = MAX, V _I = 2.7 V	20		20		μA
I _{IL}	DC or CLK, G1, G2, G3	V _{CC} = MAX, V _I = 0.4 V		-0.2		mA
	All others			-0.4		
I _{CC}	V _{CC} = MAX, See Note 2	29	46	29	46	mA

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.

‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.

NOTE 2: I_{CC} is measured with the inputs grounded and the outputs open.



SN54LS354, SN54LS355, SN54LS356
SN74LS354, SN74LS355, SN74LS356
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switching characteristics, $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$, $R_L = 667\ \Omega$

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	'LS355			UNIT
				MIN	TYP	MAX	
t _{PLH}	D0-D7	Y	$C_L = 45\text{ pF}$, See Note 3	34	41	ns	
t _{PHL}				26	39		
t _{PLH}		W		30	45	ns	
t _{PHL}				33	50		
t _{PLH}	\overline{DC} or CLK	Y		38	57	ns	
t _{PHL}				31	47		
t _{PLH}		W		33	50	ns	
t _{PHL}				39	59		
t _{PLH}	S0, S1, S2	Y		39	59	ns	
t _{PHL}				36	49		
t _{PLH}		W		32	48	ns	
t _{PHL}				39	58		
t _{PLH}	\overline{SC}	Y		45	68	ns	
t _{PHL}				42	63		
t _{PLH}		W		44	66	ns	
t _{PHL}				45	68		
t _{PHL}	$\overline{G1}, \overline{G2}$	Y	21	32	ns		
t _{PHL}			22	33			
t _{PLH}		W	18	27	ns		
t _{PHL}			19	29			
t _{PLH}	G3	Y	24	36	ns		
t _{PHL}			25	40			
t _{PLH}		W	19	31	ns		
t _{PHL}			19	29			

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.



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