

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

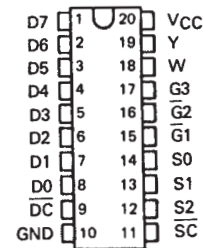
	DATA REGISTERS	OUTPUTS
'LS354	Transparent	3-State
'LS355	Transparent	Open-Collector
'LS356	Edge-Triggered	3-State

description

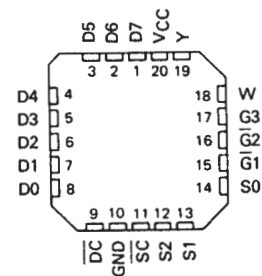
These monolithic data selectors/multiplexers contain full on-chip binary decoding to select one of eight data sources. The data-select address is stored in transparent latches that are enabled by a low level on pin 11, $\overline{SC}$. On the 'LS354 and 'LS355 a similar enable for data is obtained by 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 .

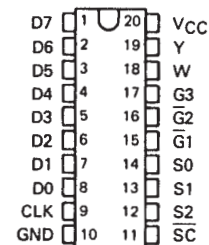
SN54LS354, SN54LS355 . . . J PACKAGE
SN74LS354, SN74LS355 . . . DW OR N PACKAGE
(TOP VIEW)



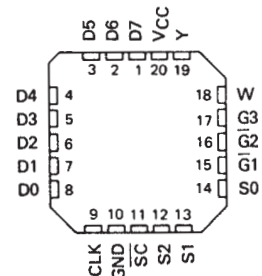
SN54LS354, SN54LS355 . . . FK PACKAGE
(TOP VIEW)



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

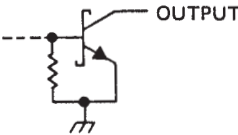
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FUNCTION TABLE

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

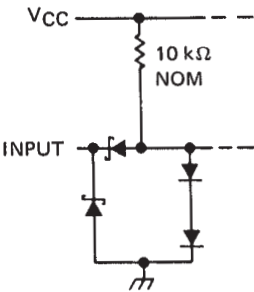
H = high level (steady state)
L = low level (steady state)
X = irrelevant (any input, including transitions)
Z = high-impedance state (off state)
↑ = transition from low to high level
D0 . . . D7 = the level of steady-state inputs at inputs D0 through D7, respectively, at the time of the low-to-high clock transition in the cae 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 $\overline{SC}$ low.

TYPICAL OF BOTH OUTPUTS ON 'LS355

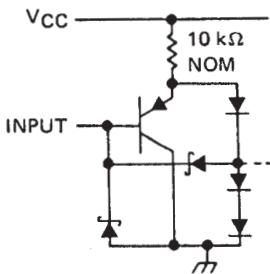


schematics of inputs and outputs

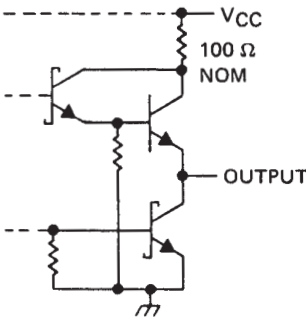
EQUIVALENT OF EACH DATA OR SELECT INPUT



EQUIVALENT OF ALL OTHER INPUTS



TYPICAL OF BOTH OUTPUTS ON 'LS354 AND 'LS356

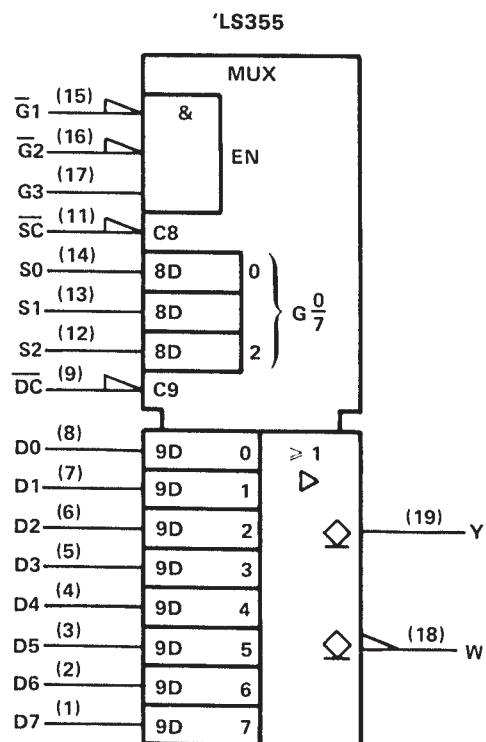
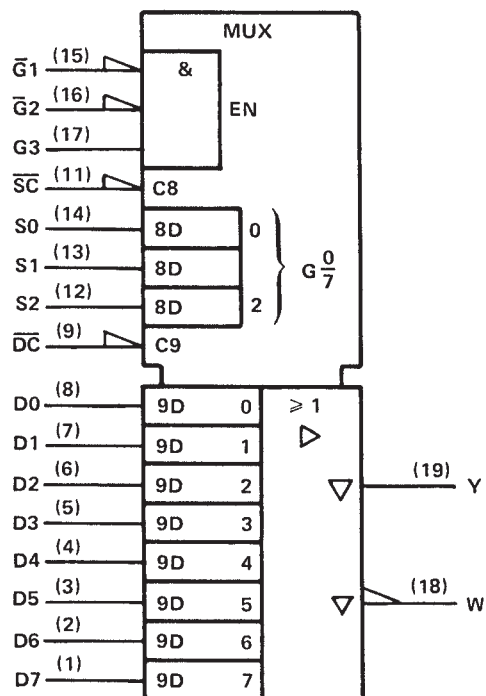


absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

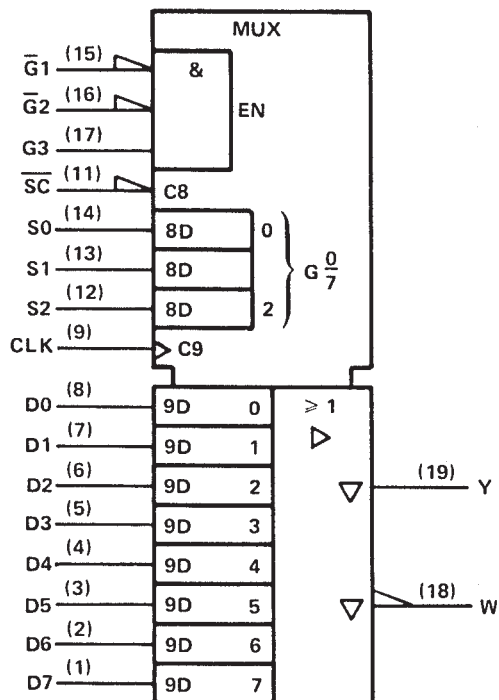
Supply voltage (see Note 1).	7 V
Input voltage.	7 V
Operating free-air temperature range: SN54LS'	− 55° C to 125° C
SN74LS'	0° C to 70° C
Storage temperature range	− 65° C to 150° C

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

'LS354



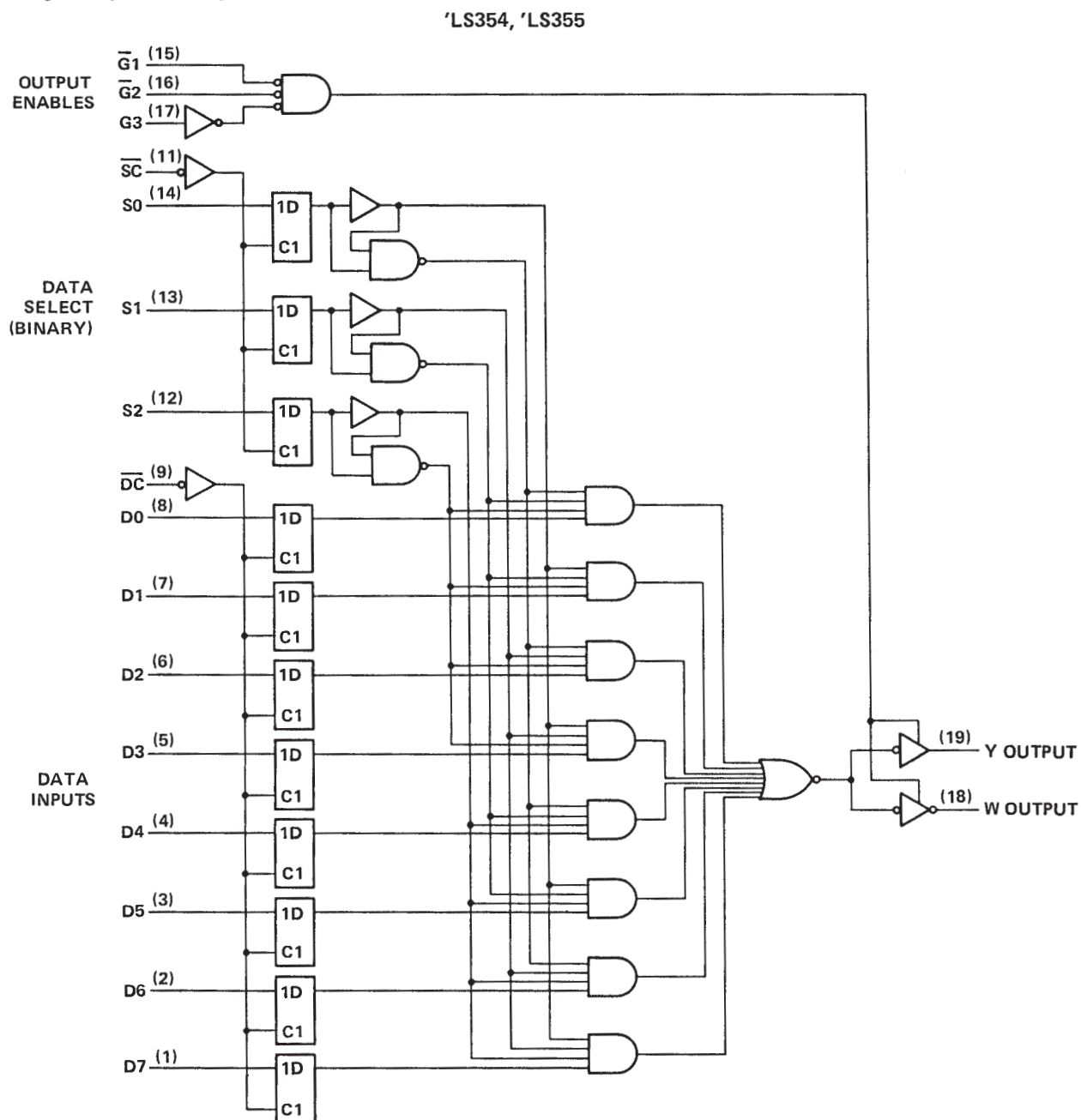
'LS356



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

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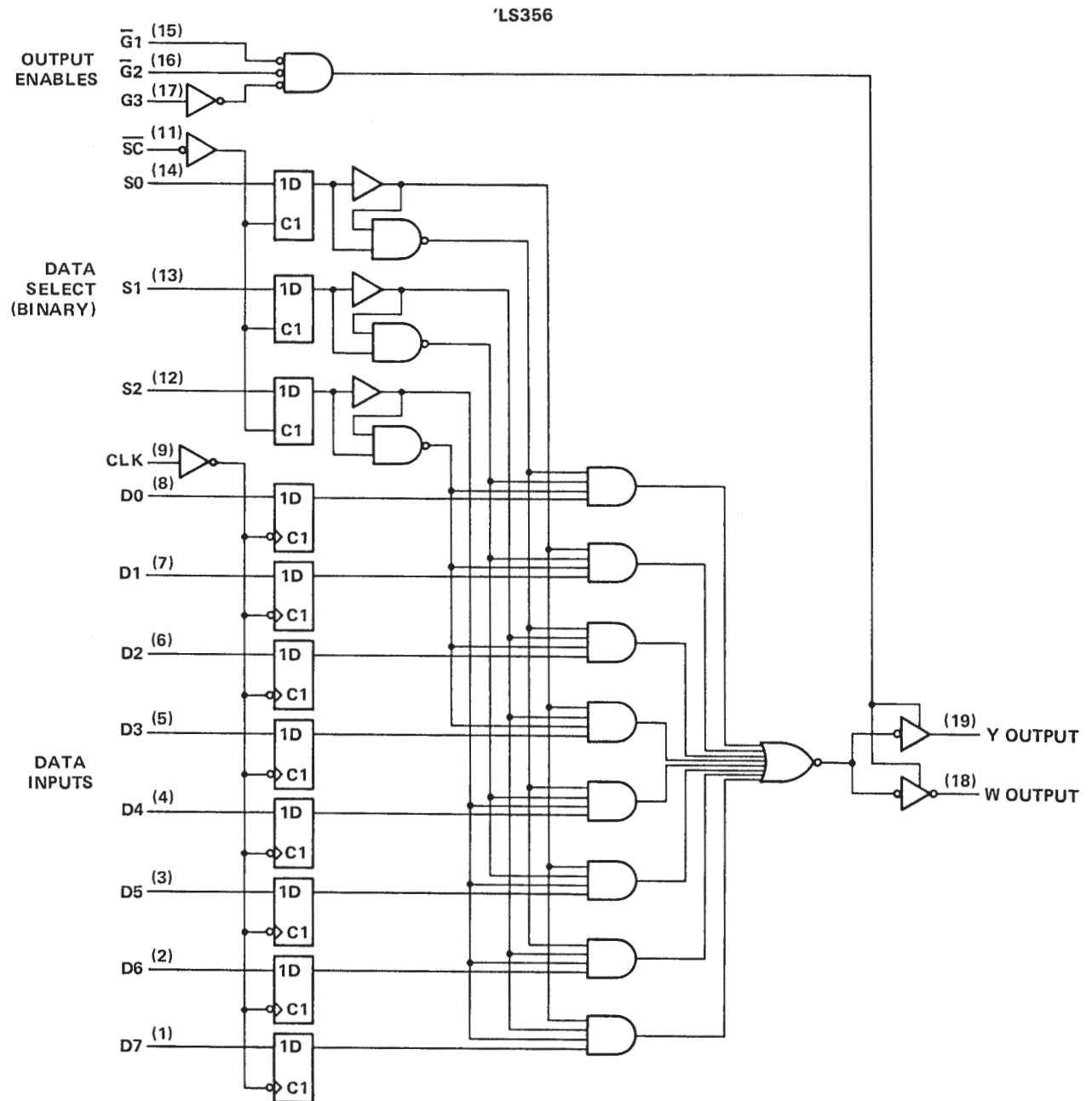
logic diagram (positive logic)



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

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 $\uparrow$ at pin 9)	'LS354	15		15			ns
		'LS356	15		15			
t_h	Hold times, high-or-low-level data (with respect to $\uparrow$ 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}		$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$			–1.5			–1.5		V
V_{OH}		$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = \text{MAX}, I_{OH} = \text{MAX}$		2.4			2.4			V
V_{OL}		$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = \text{MAX}$	$I_{OL} = 12 \text{ mA}$	0.25	0.4		0.25	0.4		V
			$I_{OL} = 24 \text{ mA}$				0.35	0.5		
I_{OZ}		$V_{CC} = \text{MAX}$	$V_O = 2.7 \text{ V}$		20			20		μA
			$V_O = 0.4 \text{ V}$		–20			–20		
I_I		$V_{CC} = \text{MAX}, V_I = 7 \text{ V}$			0.1			0.1		mA
I_{IH}		$V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$			20			20		μA
I_{IL}	$\overline{DC}$ or CLK, $\overline{G1}, \overline{G2}, \overline{G3}$	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$			–0.2			–0.2		mA
	All others				–0.4			–0.4		
$I_{OS}§$		$V_{CC} = \text{MAX}$		–30	–130		–30	–130		mA
I_{CC}		$V_{CC} = \text{MAX},$ 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 $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$.

§ 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		
tPLH	D0-D7	Y	CL = 45 pF, See Note 3	24	36					ns	
tPHL				23	35						
tPLH		W		18	27				ns		
tPHL				29	44						
tPLH	DC or CLK	Y		28	42		18	27		ns	
tPHL				26	39		33	50			
tPLH		W		22	33		24	36		ns	
tPHL				33	50		18	27			
tPLH	S0, S1 S2	Y		29	44		30	45		ns	
tPHL				24	45		28	48			
tPLH		W		28	42		36	54		ns	
tPHL				34	51		30	45			
tPLH	SC	Y		34	51		36	54		ns	
tPHL				31	47		40	60			
tPLH		W		27	41		32	48		ns	
tPHL				40	60		36	54			
tPZH	G1, G2	Y		14	27		14	25		ns	
tPZL				18	27		17	25			
tPHZ				15	25		16	24			ns
tPLZ				15	25		16	24			
tPZH		W		12	24		14	23		ns	
tPZL				16	24		16	23			
tPHZ				15	25		16	23			ns
tPLZ				15	25		16	23			
tPZH	G3	Y		15	29		15	27		ns	
tPZL				19	29		18	27			
tPHZ				15	25		16	25			ns
tPLZ				15	25		16	25			
tPZH		W		13	25		14	25		ns	
tPZL				17	25		16	25			
tPHZ				15	25		16	25			ns
tPLZ				15	25		16	25			

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

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

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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 $\uparrow$ at pin 9)	15			15			ns
t_h	Hold times, high-or low-level data (with respect to $\uparrow$ 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 _{OH} = 5.5 V V _{IL} = MAX		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	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		– 0.2		mA
	– 0.4			– 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 $V_{CC} = 5 \text{ V}, T_A = 25^\circ\text{C}$.

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

SN54LS354, SN54LS355, SN54LS356
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	'LS355			UNIT
				MIN	TYP	MAX	
tPLH	D0-D7	Y	CL = 45 pF, See Note 3		34	41	ns
tPHL					26	39	
tPLH		W			30	45	ns
tPHL					33	50	
tPLH	$\overline{DC}$ or CLK	Y			38	57	ns
tPHL					31	47	
tPLH		W			33	50	ns
tPHL					39	59	
tPLH	S0, S1, S2	Y			39	59	ns
tPHL					36	49	
tPLH		W			32	48	ns
tPHL					39	58	
tPLH	$\overline{SC}$	Y			45	68	ns
tPHL					42	63	
tPLH		W			44	66	ns
tPHL					45	68	
tPHL	$\overline{G}1, \overline{G}2$	Y			21	32	ns
tPHL					22	33	
tPLH		W			18	27	ns
tPHL					19	29	
tPLH	G3	Y			24	36	ns
tPHL					25	40	
tPLH		W			19	31	ns
tPHL					19	29	

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

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