

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

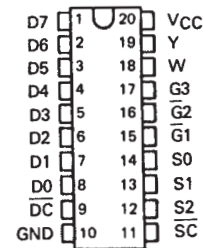
	DATA REGISTERS	OUTPUTS
'LS354	Transparent	3-State
'LS355	Transparent	Open-Collector
'LS356	Edge-Triggered	3-State

description

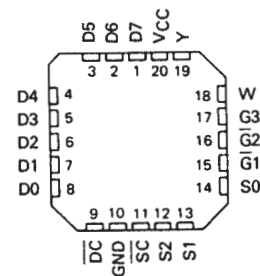
These monolithic data selectors/multiplexers contain full on-chip binary decoding to select one of eight data sources. The data-select address is stored in transparent latches that are enabled by a low level on pin 11, $\overline{SC}$. On the 'LS354 and 'LS355 a similar enable for data is obtained by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

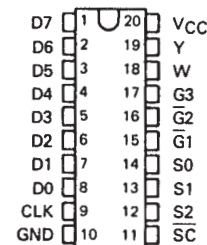
SN54LS354, SN54LS355 . . . J PACKAGE
SN74LS354, SN74LS355 . . . DW OR N PACKAGE
(TOP VIEW)



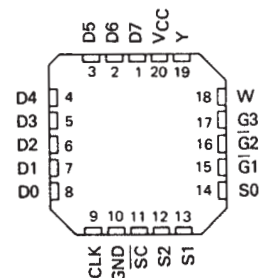
SN54LS354, SN54LS355 . . . FK PACKAGE
(TOP VIEW)



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



SN54LS356 . . . FK PACKAGE
(TOP VIEW)



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schematics of inputs and outputs

INPUTS							OUTPUTS		
SELECT			DATA CONTROL (LS354, 'LS355)	CLOCK (LS356)	OUTPUT ENABLES				
					G1	G2			G3
S2	S1	S0						W	Y
X	X	X	X	X	X	X	X	Z	Z
X	X	X	X	X	X	X	X	Z	Z
X	X	X	X	X	X	X	L	Z	Z
L	L	L	L	↑	L	L	H	D0	D0
L	L	L	H	H or L	L	L	H	D0n	D0n
L	L	H	L	↑	L	L	H	D1	D1
L	L	H	H	H or L	L	L	H	D1n	D1n
L	H	L	L	↑	L	L	H	D2	D2
L	H	L	H	H or L	L	L	H	D2n	D2n
L	H	H	L	↑	L	L	H	D3	D3
L	H	H	H	H or L	L	L	H	D3n	D3n
H	L	L	L	↑	L	L	H	D4	D4
H	L	L	H	H or L	L	L	H	D4n	D4n
H	L	H	L	↑	L	L	H	D5	D5
H	L	H	H	H or L	L	L	H	D5n	D5n
H	H	L	L	↑	L	L	H	D6	D6
H	H	L	H	H or L	L	L	H	D6n	D6n
H	H	H	L	↑	L	L	H	D7	D7
H	H	H	H	H or L	L	L	H	D7n	D7n

This column shows the input address setup with $\overline{SC}$ low.

EQUIVALENT OF ALL OTHER INPUTS

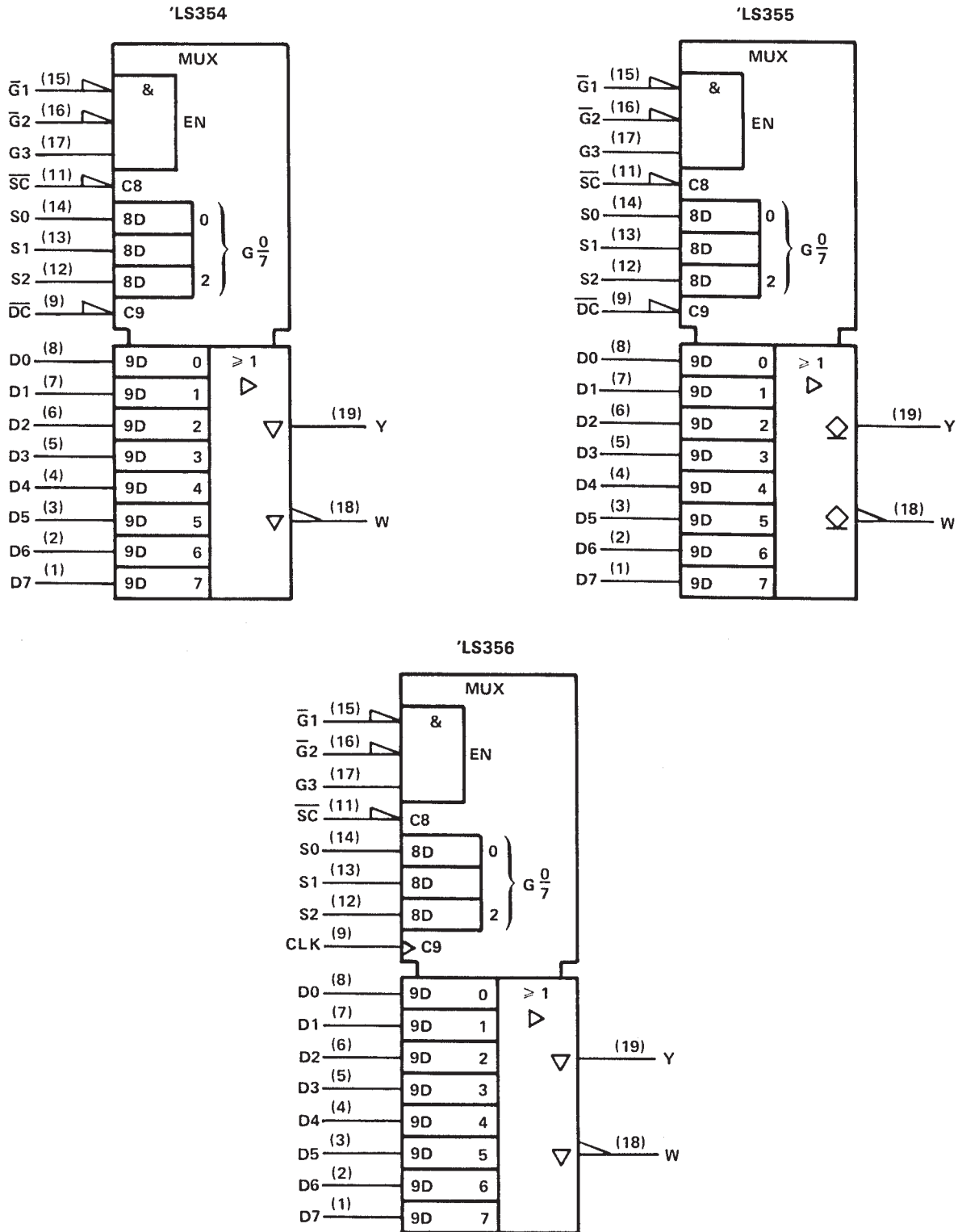
TYPICAL OF BOTH OUTPUTS ON 'LS354 AND 'LS356

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

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 SN74LS354, SN74LS355, SN74LS356
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logic symbols†

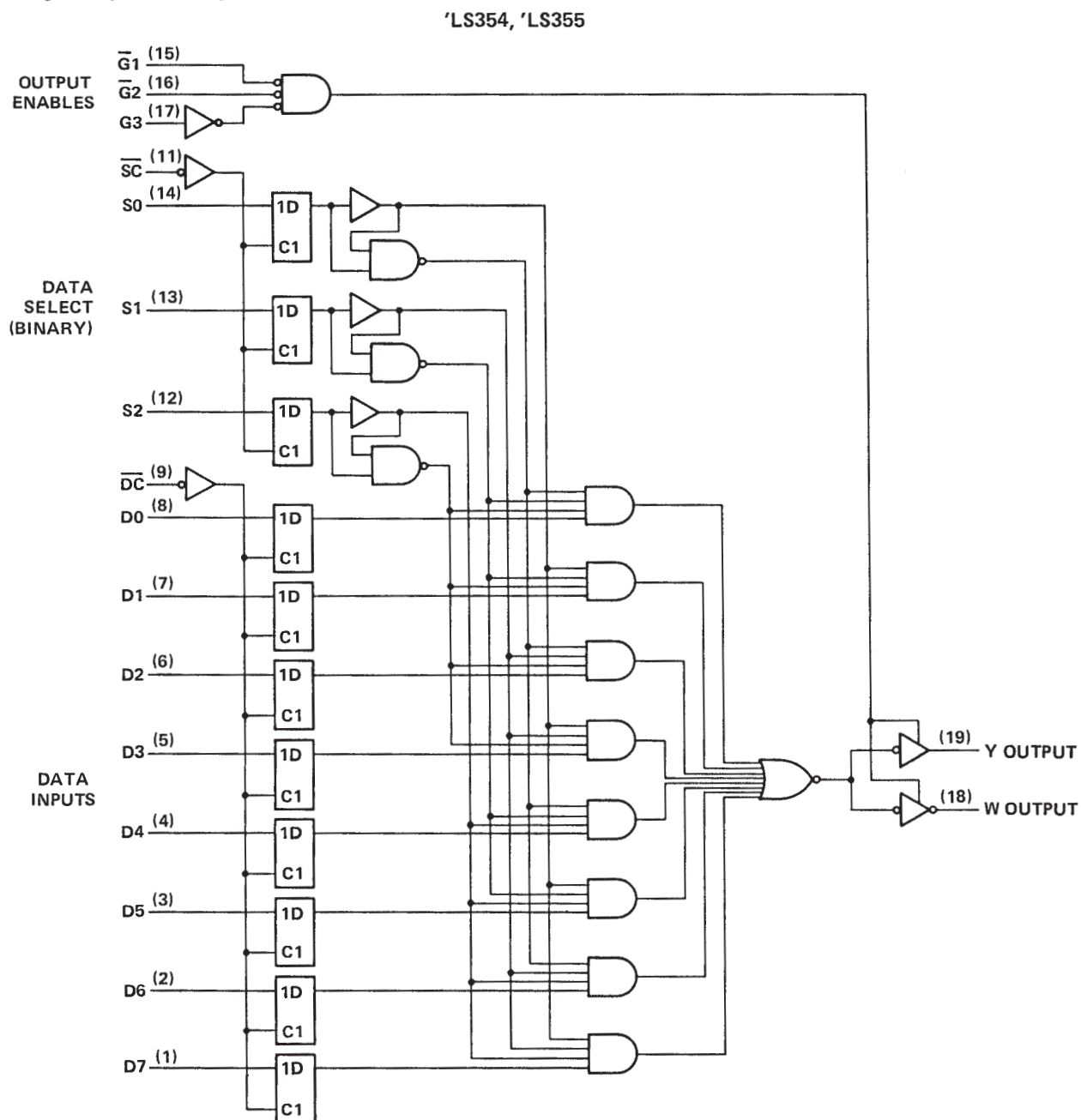


†This symbol is in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.
 Pin numbers shown are for DW, J, N, and W packages.

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

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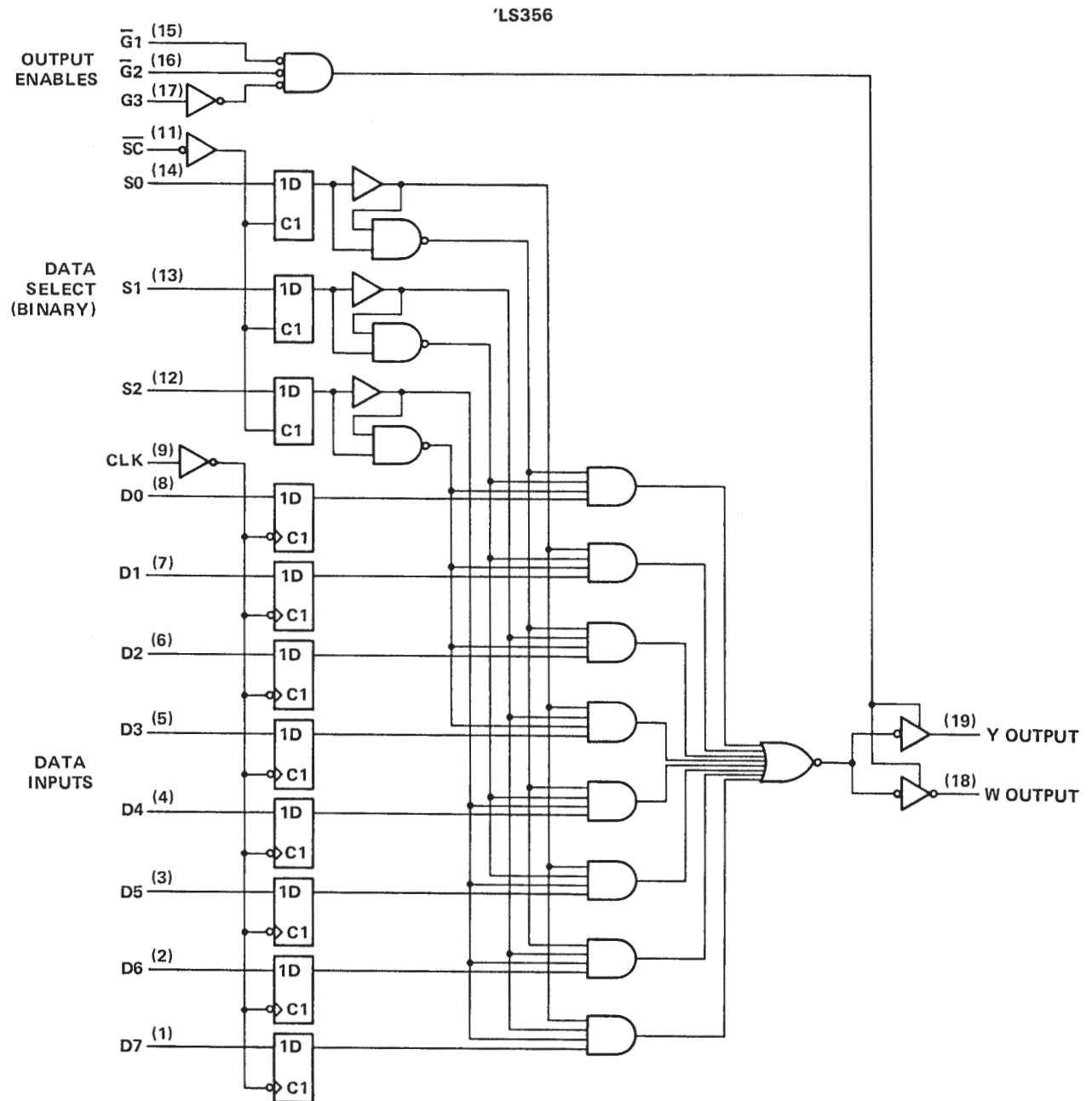
logic diagram (positive logic)



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
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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		
tPLZ				15	25		16	24		
tPZH		W		12	24		14	23	ns	
tPZL				16	24		16	23		
tPHZ				15	25		16	23		
tPLZ				15	25		16	23		
tPZH	G3	Y		15	29		15	27	ns	
tPZL				19	29		18	27		
tPHZ				15	25		16	25		
tPLZ				15	25		16	25		
tPZH		W		13	25		14	25	ns	
tPZL				17	25		16	25		
tPHZ				15	25		16	25		
tPLZ				15	25		16	25		

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

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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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