

- **8-Line to 1-Line Multiplexers Can Perform as:**

**Boolean Function Generators  
 Parallel-to-Serial Converters  
 Data Source Selectors**

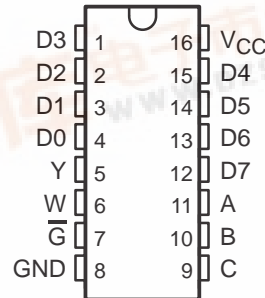
- **Input Clamping Diodes Simplify System Design**
- **Package Options Include Plastic Small-Outline (D) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs**

**description**

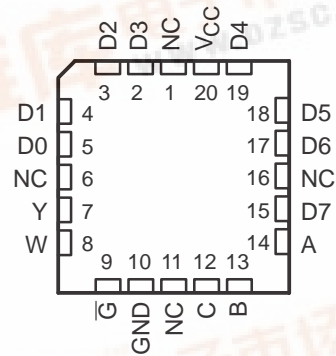
These data selectors/multiplexers provide full binary decoding to select one-of-eight data sources. The strobe ( $\bar{G}$ ) input must be at a low logic level to enable the inputs. A high level at the strobe terminal forces the W output high and the Y output low.

The SN54ALS151 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS151 and SN74AS151 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

**SN54ALS151 ... J PACKAGE  
 SN74ALS151, SN74AS151 ... D OR N PACKAGE  
 (TOP VIEW)**



**SN54ALS151 ... FK PACKAGE  
 (TOP VIEW)**



NC – No internal connection

**FUNCTION TABLE**

INPUTS				OUTPUTS	
SELECT			STROBE $\bar{G}$	Y	W
C	B	A			
X	X	X	H	L	H
L	L	L	L	D0	D0
L	L	H	L	D1	$\overline{D1}$
L	H	L	L	D2	$\overline{D2}$
L	H	H	L	D3	$\overline{D3}$
H	L	L	L	D4	$\overline{D4}$
H	L	H	L	D5	$\overline{D5}$
H	H	L	L	D6	$\overline{D6}$
H	H	H	L	D7	$\overline{D7}$

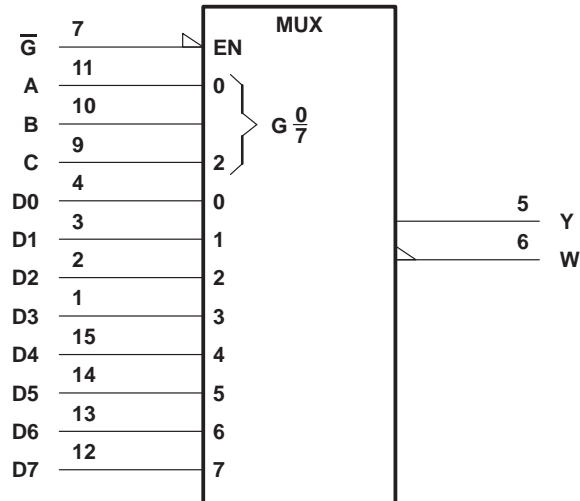
H = high level, L = low level, X = irrelevant  
 D0, D1, ... D7 = the level of the respective D input



# SN54ALS151, SN74ALS151, SN74AS151 1-OF-8 DATA SELECTORS/MULTIPLEXERS

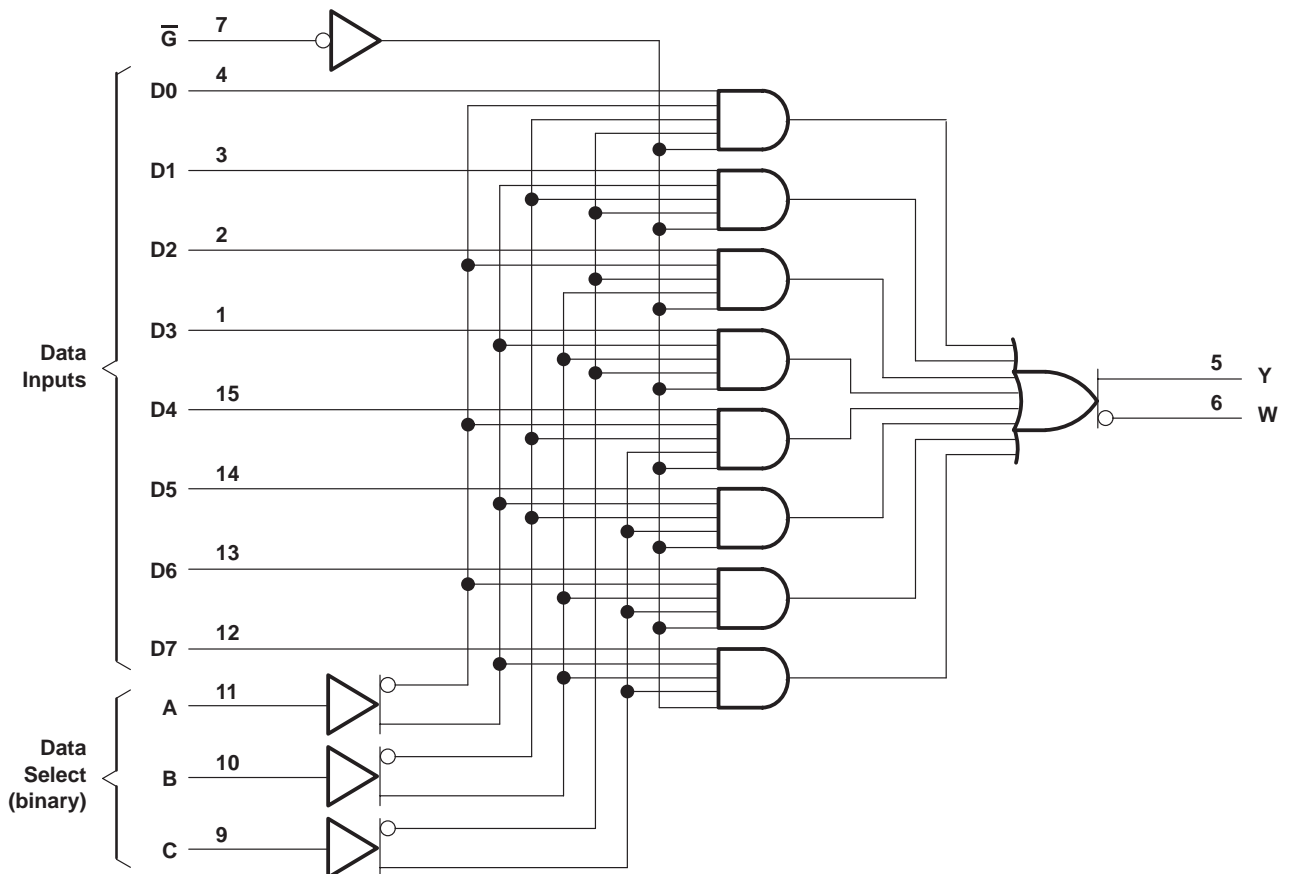
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## logic symbol†



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

## logic diagram (positive logic)



Pin numbers shown are for the D, J, and N packages.

# SN54ALS151, SN74ALS151, SN74AS151 1-OF-8 DATA SELECTORS/MULTIPLEXERS

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

Supply voltage, $V_{CC}$ .....	7 V
Input voltage, $V_I$ .....	7 V
Operating free-air temperature range, $T_A$ : SN54ALS151 .....	–55°C to 125°C
SN74ALS151 .....	0°C to 70°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

		SN54ALS151			SN74ALS151			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$	Supply voltage	4.5	5	5.5	4.5	5	5.5	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
$T_A$	Operating free-air temperature	–55		125	0		70	°C

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

PARAMETER	TEST CONDITIONS	SN54ALS151			SN74ALS151			UNIT
		MIN	TYP‡	MAX	MIN	TYP‡	MAX	
$V_{IK}$	$V_{CC} = 4.5\text{ V}$ , $I_I = -18\text{ mA}$			–1.5			–1.5	V
$V_{OH}$	$V_{CC} = 4.5\text{ V to } 5.5\text{ V}$ , $I_{OH} = -0.4\text{ mA}$	$V_{CC} - 2$			$V_{CC} - 2$			V
	$V_{CC} = 4.5\text{ V}$		2.4	3.3				
						2.4	3.2	
$V_{OL}$	$V_{CC} = 4.5\text{ V}$		0.25	0.4		0.25	0.4	V
						0.35	0.5	
$I_I$	$V_{CC} = 5.5\text{ V}$ , $V_I = 7\text{ V}$			0.1			0.1	mA
$I_{IH}$	$V_{CC} = 5.5\text{ V}$ , $V_I = 2.7\text{ V}$			20			20	μA
$I_{IL}$	$V_{CC} = 5.5\text{ V}$ , $V_I = 0.4\text{ V}$			–0.1			–0.1	mA
$I_{O}^{\S}$	$V_{CC} = 5.5\text{ V}$ , $V_O = 2.25\text{ V}$	–20		–112	–30		–112	mA
$I_{CC}$	$V_{CC} = 5.5\text{ V}$ , Inputs at 4.5 V		7.5	12		7.5	12	mA

‡ All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

§ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

# SN54ALS151, SN74ALS151, SN74AS151 1-OF-8 DATA SELECTORS/MULTIPLEXERS

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## switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 50 pF, R <sub>L</sub> = 500 Ω, T <sub>A</sub> = MIN to MAX†				UNIT
			SN54ALS151		SN74ALS151		
			MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A, B, or C	Y	4	21	4	18	ns
t <sub>PHL</sub>			7	35	8	24	
t <sub>PLH</sub>	A, B, or C	W	5	36	7	24	ns
t <sub>PHL</sub>			7	26	7	23	
t <sub>PLH</sub>	Any D	Y	3	14	3	10	ns
t <sub>PHL</sub>			5	21	5	15	
t <sub>PLH</sub>	Any D	W	3	23	3	15	ns
t <sub>PHL</sub>			4	20	4	15	
t <sub>PLH</sub>	$\bar{G}$	Y	4	21	4	18	ns
t <sub>PHL</sub>			4	25	4	19	
t <sub>PLH</sub>	$\bar{G}$	W	5	27	5	19	ns
t <sub>PHL</sub>			5	26	5	23	

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

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

Supply voltage, V <sub>CC</sub>	7 V
Input voltage, V <sub>I</sub>	7 V
Operating free-air temperature range, T <sub>A</sub> : SN74AS151	0°C to 70°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

		SN74AS151			UNIT
		MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5	5.5	V
V <sub>IH</sub>	High-level input voltage	2			V
V <sub>IL</sub>	Low-level input voltage			0.8	V
I <sub>OH</sub>	High-level output current			-15	mA
I <sub>OL</sub>	Low-level output current			48	mA
T <sub>A</sub>	Operating free-air temperature	0		70	°C

# SN54ALS151, SN74ALS151, SN74AS151 1-OF-8 DATA SELECTORS/MULTIPLEXERS

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

PARAMETER	TEST CONDITIONS	SN74AS151			UNIT
		MIN	TYP†	MAX	
$V_{IK}$	$V_{CC} = 4.5\text{ V}$ , $I_I = -18\text{ mA}$			-1.2	V
$V_{OH}$	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$ , $I_{OH} = -2\text{ mA}$	$V_{CC} - 2$			V
	$V_{CC} = 4.5\text{ V}$ , $I_{OH} = -15\text{ mA}$	2.4	3.2		
$V_{OL}$	$V_{CC} = 4.5\text{ V}$ , $I_{OL} = 48\text{ mA}$	0.35	0.5		V
$I_I$	A, B, or C	$V_{CC} = 5.5\text{ V}$ , $V_I = 7\text{ V}$			mA
	All others				
$I_{IH}$	A, B, or C	$V_{CC} = 5.5\text{ V}$ , $V_I = 2.7\text{ V}$			$\mu\text{A}$
	All others				
$I_{IL}$	A, B, or C	$V_{CC} = 5.5\text{ V}$ , $V_I = 0.4\text{ V}$			mA
	All others				
$I_{O}^\ddagger$	$V_{CC} = 5.5\text{ V}$ , $V_O = 2.25\text{ V}$	-30		-112	mA
$I_{CC}$	$V_{CC} = 5.5\text{ V}$	18.6	30		mA

† All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

‡ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

## switching characteristics (see Figure 1)

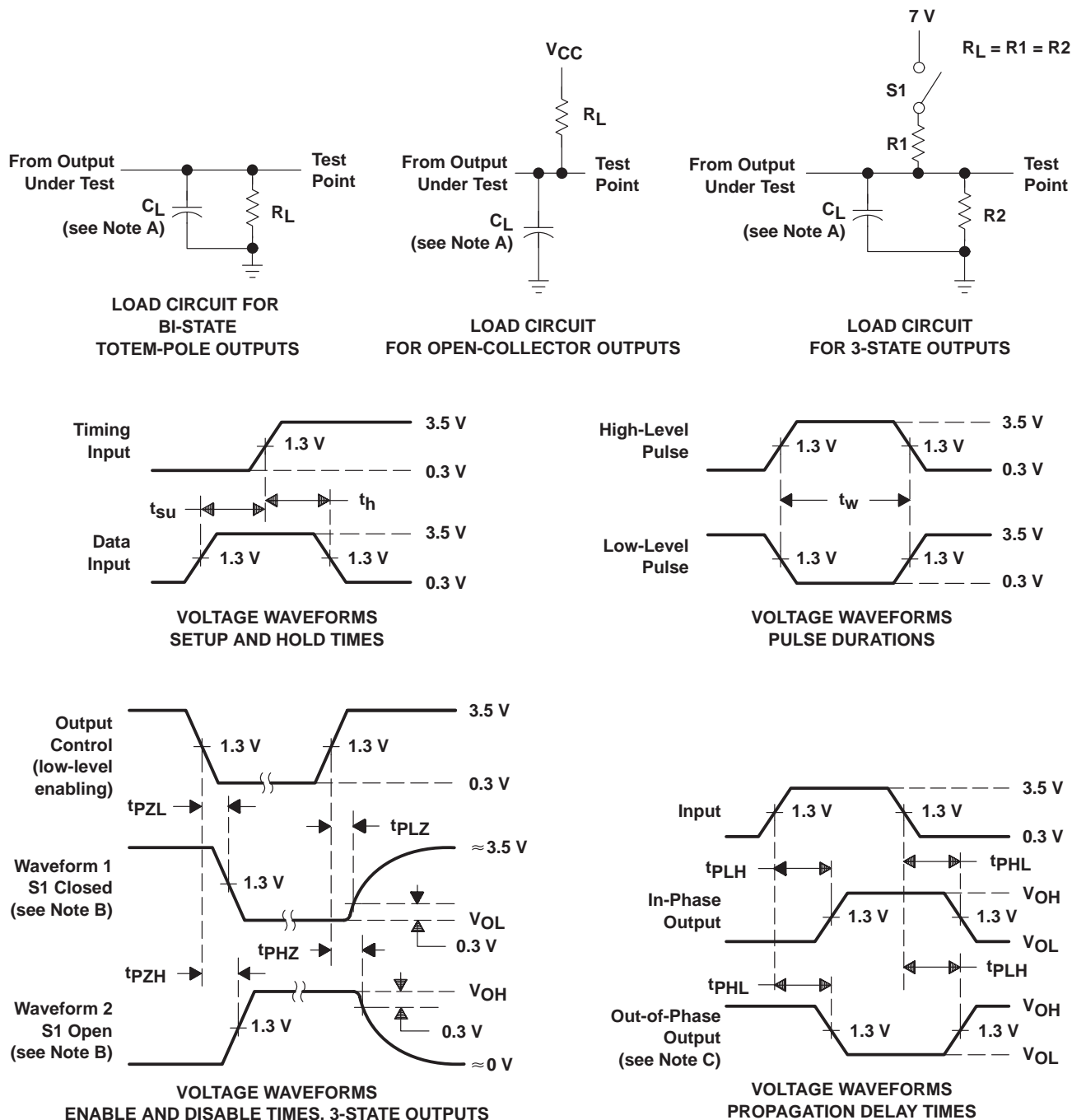
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 4.5\text{ V to }5.5\text{ V}$ , $C_L = 50\text{ pF}$ , $R_L = 500\ \Omega$ , $T_A = \text{MIN to MAX}^\S$		UNIT
			SN74AS151		
			MIN	MAX	
$t_{PLH}$	A, B, or C	Y	4.5	14.5	ns
$t_{PHL}$			4.5	15	
$t_{PLH}$	A, B, or C	W	4	12	ns
$t_{PHL}$			4	12	
$t_{PLH}$	Any D	Y	3	10.5	ns
$t_{PHL}$			3	11	
$t_{PLH}$	Any D	W	2	6.5	ns
$t_{PHL}$			1	4.5	
$t_{PLH}$	$\bar{G}$	Y	4.5	14	ns
$t_{PHL}$			3	11	
$t_{PLH}$	$\bar{G}$	W	1.5	6	ns
$t_{PHL}$			3	10	

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

# SN54ALS151, SN74ALS151, SN74AS151 1-OF-8 DATA SELECTORS/MULTIPLEXERS

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## PARAMETER MEASUREMENT INFORMATION SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.  
 C. When measuring propagation delay items of 3-state outputs, switch S1 is open.  
 D. All input pulses have the following characteristics:  $PRR \leq 1$  MHz,  $t_r = t_f = 2$  ns, duty cycle = 50%.  
 E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms