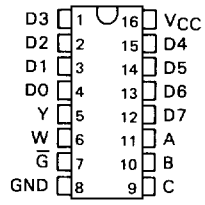
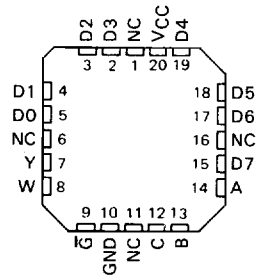
D2661, APRIL 1982—REVISED DECEMBER 1983

- **Three-State Versions of 'ALS151 and 'AS151**
- **Three-State Outputs Interface Directly with System Bus**
- **Performs Parallel-to-Serial Conversion**
- **Complementary Outputs Provide True and Inverted Data**
- **Fully Compatible with Most TTL Circuits**
- **Package Options Include Both Plastic and Ceramic Chip Carriers in Addition to Plastic and Ceramic DIPs**
- **Dependable Texas Instruments Quality and Reliability**

SN54ALS251, SN54AS251 . . . J PACKAGE
SN74ALS251, SN74AS251 . . . N PACKAGE
(TOP VIEW)



SN54ALS251, SN54AS251 . . . FH PACKAGE
SN74ALS251, SN74AS251 . . . FN PACKAGE
(TOP VIEW)



NC — No internal connection.

description

These data selectors/multiplexers contain full binary decoding to select one-of-eight data sources and feature strobe-controlled complementary three-state outputs.

The three-state outputs can interface with and drive data lines of bus-organized systems. With all but one of the common outputs disabled (at a high-impedance state), the low-impedance of the single enabled output will drive the bus line to a high or low logic level. Both outputs are controlled by the strobe ($\overline{G}$). The outputs are disabled when $\overline{G}$ is high.

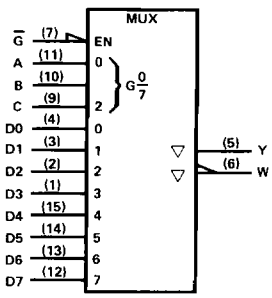
The SN54ALS251 and SN54AS251 are characterized for operation over the full military temperature range of −55 °C to 125 °C. The SN74ALS251 and SN74AS251 are characterized for operation from 0 °C to 70 °C.

FUNCTION TABLE

INPUTS				OUTPUTS	
SELECT			STROBE		
C	B	A	$\overline{G}$	Y	W
X	X	X	H	Z	Z
L	L	L	L	D0	$\overline{D0}$
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	$\overline{D7}$

D0, D1 . . . D7 = the level of the respective D input

logic symbol



Pin numbers shown are for J and N packages.

2 ALS AND AS CIRCUITS

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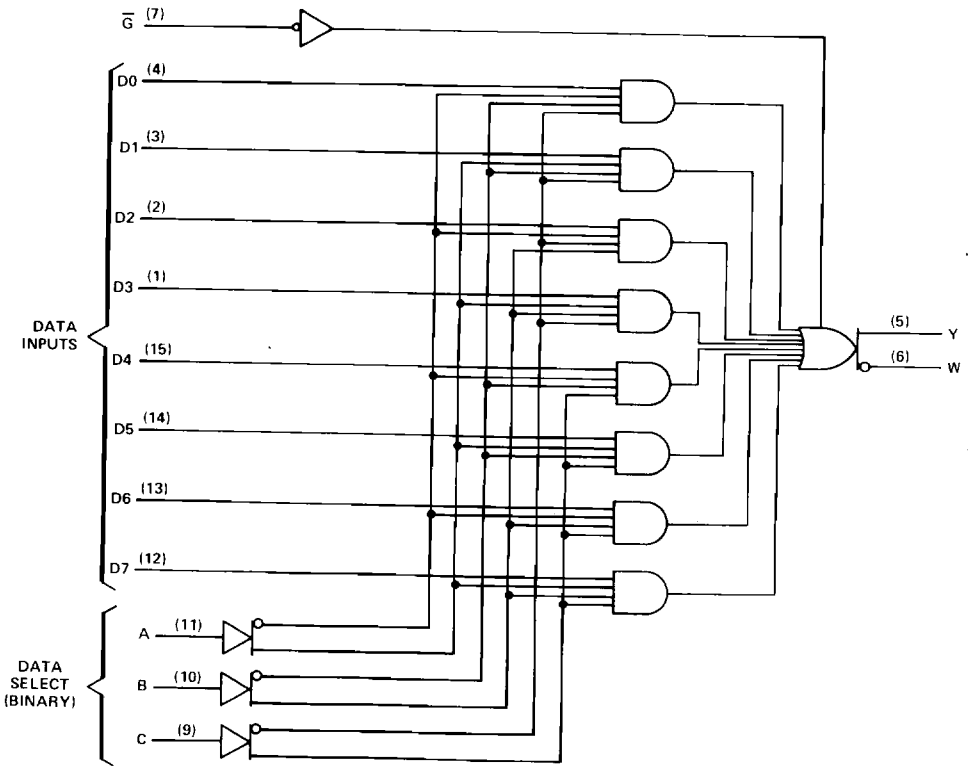
logic diagram (positive logic)



Pin numbers shown are for J and N packages.

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage . . . . . 7 V
Voltage applied to a disabled 3-state output . . . . . 5.5 V
Operating free-air temperature range: SN54ALS251, SN54AS251 . . . . . −55 °C to 125 °C
SN74ALS251, SN74AS251 . . . . . 0 °C to 70 °C
Storage temperature range . . . . . −65 °C to 150 °C

recommended operating conditions

		SN54ALS251			SN74ALS251			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			0.8			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		SN54ALS251			SN74ALS251			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = −18 mA			−1.5			−1.5	V
V_{OH}		V_{CC} = 4.5 V to 5.5 V,	I_{OH} = −0.4 mA	V_{CC}−2			V_{CC}−2			V
		V_{CC} = 4.5 V,	I_{OH} = −1 mA	2.4	3.3					
		V_{CC} = 4.5 V,	I_{OH} = −2.6 mA				2.4	3.2		
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 12 mA		0.25	0.4		0.25	0.4	V
		V_{CC} = 4.5 V,	I_{OL} = 24 mA					0.35	0.5	
I_{OZH}		V_{CC} = 5.5 V,	V_O = 2.7 V			20			20	μA
I_{OZL}		V_{CC} = 5.5 V,	V_I = 0.4 V			−20			−20	μA
I_I		V_{CC} = 5.5 V,	V_I = 7 V			0.1			0.1	mA
I_{IH}		V_{CC} = 5.5 V,	V_I = 2.7 V			20			20	μA
I_{IL}		V_{CC} = 5.5 V,	V_I = 0.4 V			−0.1			−0.1	mA
I_O‡		V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	−30		−112	mA
I_{CC}	Enabled	V_{CC} = 5.5 V,	Inputs at Gnd.		7	10		7	10	mA
	Disabled	V_{CC} = 5.5 V,	Inputs at 4.5 V		9.4	14		9.4	14	

†All typical values are at V_{CC} = 5 V, T_A = 25°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 Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX				UNIT
			SN54ALS251		SN74ALS251		
			MIN	MAX	MIN	MAX	
t_{PLH}	A, B or C	Y	5	21	5	18	ns
t_{PHL}			8	28	8	24	
t_{PLH}	A, B or C	W	8	28	8	24	ns
t_{PHL}			7	26	7	23	
t_{PLH}	Any D	Y	2	12	2	10	ns
t_{PHL}			3	18	3	15	
t_{PLH}	Any D	W	3	18	3	15	ns
t_{PHL}			3	18	3	15	
t_{PZH}	$\overline{G}$	Y	3	18	3	15	ns
t_{PZL}			3	18	3	15	
t_{PZH}	$\overline{G}$	W	3	18	3	15	ns
t_{PZL}			3	18	3	15	
t_{PHZ}	$\overline{G}$	Y	2	12	2	10	ns
t_{PLZ}			1	12	1	10	
t_{PHZ}	$\overline{G}$	W	2	12	2	10	ns
t_{PLZ}			1	12	1	10	

NOTE 1: For load circuit and voltage waveforms, see page 1-12.

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recommended operating conditions

		SN54AS251			SN74AS251			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			0.8			0.8	V
I_{OH}	High-level output current			−12			−15	mA
I_{OL}	Low-level output current			32			48	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		SN54AS251			SN74AS251			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = −18 mA			−1.2			−1.2	V
V_{OH}		V_{CC} = 4.5 V to 5.5 V,	I_{OH} = −2 mA	V_{CC}−2			V_{CC}−2			V
		V_{CC} = 4.5 V,	I_{OH} = −12 mA	2.4	3.2					
		V_{CC} = 4.5 V,	I_{OH} = −15 mA				2.4	3.3		
V_{OL}		V_{CC} = 4.5 V,	I_{OL} = 32 mA		0.25	0.5				V
		V_{CC} = 4.5 V,	I_{OL} = 48 mA					0.35	0.5	
I_{OZH}		V_{CC} = 5.5 V,	V_O = 2.7 V			50			50	μA
I_{OZL}		V_{CC} = 5.5 V,	V_I = 0.4 V			−50			−50	μA
I_I	A, B, C	V_{CC} = 5.5 V,	V_I = 7 V			0.2			0.2	mA
	All other					0.1			0.1	
I_{IH}	A, B, C	V_{CC} = 5.5 V,	V_I = 2.7 V			40			40	μA
	All other					20			20	
I_{IL}	A, B, C	V_{CC} = 5.5 V,	V_I = 0.4 V		−0.6			−0.6		mA
	All other				−0.3			−0.3		
I_O‡		V_{CC} = 5.5 V,	V_O = 2.25 V	−30		−112	−30		−112	mA
I_{CC}		V_{CC} = 5.5 V,			28			28		mA

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

PRODUCT PREVIEW

switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX						UNIT
			SN54AS251			SN74AS251			
			MIN	TYP†	MAX	MIN	TYP†	MAX	
t_{PLH}	A, B,or C	Y		5			5		ns
t_{PHL}				5			5		
t_{PLH}	A, B, or C	W		4.5			4.5		ns
t_{PHL}				4.5			4.5		
t_{PLH}	Any D	Y		3			3		ns
t_{PHL}				4			4		
t_{PLH}	Any D	W		3			3		ns
t_{PHL}				2.5			2.5		
t_{PZH}	$\overline{G}$	Y		5			5		ns
t_{PZL}				6			6		
t_{PZH}	$\overline{G}$	W		5			5		ns
t_{PZL}				6			6		
t_{PHZ}	$\overline{G}$	Y		3			3		ns
t_{PLZ}				4			4		
t_{PHZ}	$\overline{G}$	W		3			3		ns
t_{PLZ}				4			4		

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

NOTE 1: For load circuit and voltage waveforms, see page 1-12.

Additional information on these products can be obtained from the factory as it becomes available.