D2932, MARCH 1987—REVISED JANUARY 1989

- **Three-State Versions of SN54F151A and SN74F151A**
- **Three-State Outputs Interface Directly with System Bus**
- **Performs Parallel-to-Serial Conversion**
- **Complementary Outputs Provide True and Inverted Data**
- **Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers and Standard Plastic and Ceramic 300-mil DIPs**
- **Dependable Texas Instruments Quality and Reliability**

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.

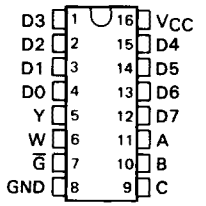
The SN54F251A is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74F251A is characterized for operation from 0°C to 70°C.

FUNCTION TABLE

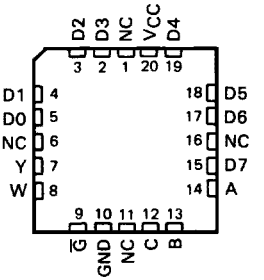
INPUTS				OUTPUTS	
SELECT			STROBE		
C	B	A	$\overline{G}$	Y	W
X	X	X	H	Z	Z
L	L	L	L	D0	$\overline{D0}$
L	L	H	L	D1	$\overline{D1}$
L	H	L	L	D2	$\overline{D2}$
L	H	H	L	D3	$\overline{D3}$
H	L	L	L	D4	$\overline{D4}$
H	L	H	L	D5	$\overline{D5}$
H	H	L	L	D6	$\overline{D6}$
H	H	H	L	D7	$\overline{D7}$

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

SN54F251A . . . J PACKAGE
SN74F251A . . . D OR N PACKAGE
(TOP VIEW)

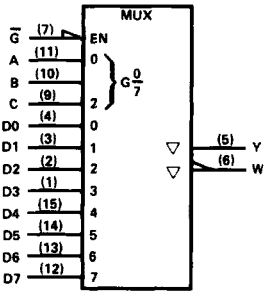


SN54F251A . . . FK PACKAGE
(TOP VIEW)



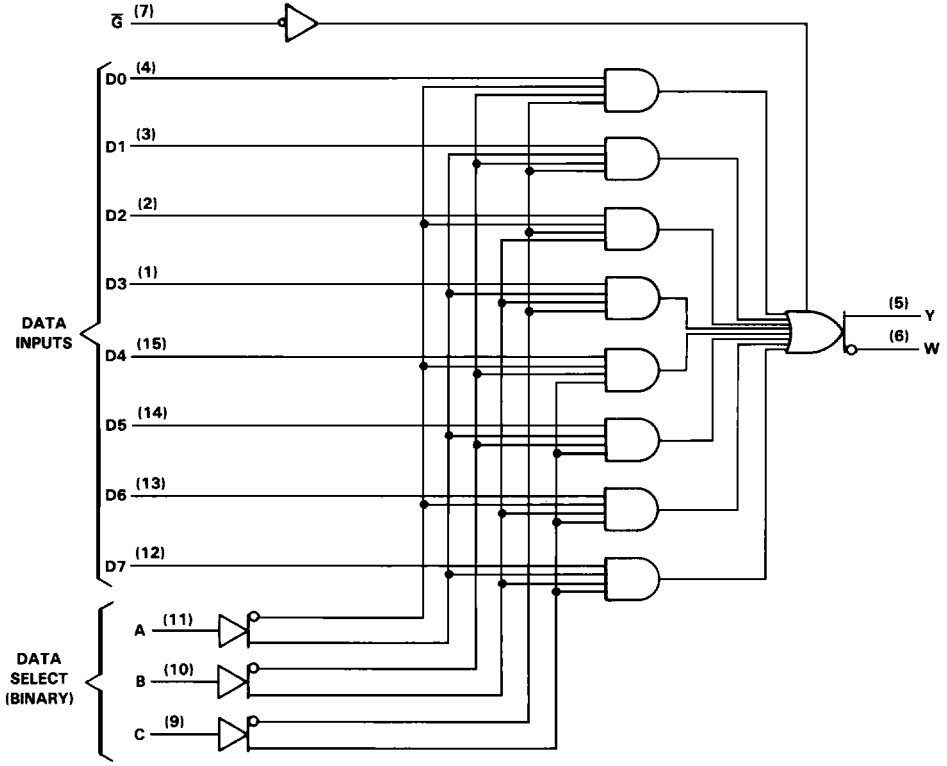
NC—No internal connection

logic symbol†



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

logic diagram (positive logic)



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

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

Supply voltage, V_{CC} . . . . . −0.5 V to 7 V
Input voltage† . . . . . −1.2 V to 7 V
Input current . . . . . −30 mA to 5 mA
Voltage applied to any output in the disabled or power-off state . . . . . −0.5 V to 5.5 V
Voltage applied to any output in the high state . . . . . −0.5 V to V_{CC}
Current into any output in the low state: SN54F251A . . . . . 40 mA
SN74F251A . . . . . 48 mA
Operating free-air temperature range: SN54F251A . . . . . −55°C to 125°C
SN74F251A . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C

†The input voltage ratings may be exceeded provided the input current ratings are observed.

recommended operating conditions

		SN54F251A			SN74F251A			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_{IK}	Input clamp current			−18			−18	mA
I_{OH}	High-level output current			−3			−3	mA
I_{OL}	Low-level output current			20			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		SN54F251A			SN74F251A			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	I_{OH} = −1 mA	2.5	3.4		2.5	3.4		V
		I_{OH} = −3 mA	2.4	3.3		2.4	3.3		
	V_{CC} = 4.75 V	I_{OH} = −1 mA to −3 mA				2.7			
V_{OL}	V_{CC} = 4.5 V	I_{OL} = 20 mA		0.30	0.5				V
		I_{OL} = 24 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_O = 0.5 V			−50			−50	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 = 0.5 V			−0.6			−0.6	mA
I_{OS}§	V_{CC} = 5.5 V,	V_O = 0	−60		−150	−60		−150	mA
I_{CC}	V_{CC} = 5.5 V, See Note 1	Condition A		15	22		15	22	mA
		Condition B		16	24		16	24	

‡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 the duration of the short circuit should not exceed one second.
NOTE 1: I_{CC} is measured with the outputs open under the following conditions:
A. Select input and data input at 4.5 V, output control grounded.
B. All inputs at 4.5 V.

switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = 25°C			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
			'F251A			SN54F251A		SN74F251A		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A, B, or C	W	2.7	5.4	9	2.7	11.5	2.7	9.5	ns
t_{PHL}			2.4	4.6	7.5	2.4	8	2.4	7.5	
t_{PLH}	A, B, or C	Y	3.7	7.1	10.5	2.7	14	3.7	12.5	ns
t_{PHL}			3.2	5.6	8.5	2.2	10.5	3.2	9	
t_{PLH}	Data (Any D)	W	2.2	4.6	6.5	1.7	8	2.2	7	ns
t_{PHL}			1	2.1	4	1	6	1	5	
t_{PLH}	Data (Any D)	Y	2.7	4.6	7	1.7	9	1.7	8	ns
t_{PHL}			2.7	5.1	7	2.7	9	2.7	7.5	
t_{PZH}	$\overline{G}$	W	1.7	3.9	6	1.3	7	1.7	7	ns
t_{PZL}			1.7	3.9	6	1.7	7.5	1.7	6.5	
t_{PHZ}	$\overline{G}$	W	1.7	3.6	5.5	1.7	6	1.7	6	ns
t_{PLZ}			1	2.6	4.5	1	5	2.9	4.5	
t_{PZH}	$\overline{G}$	Y	2.7	4.4	7	2.3	8.5	2.3	7.5	ns
t_{PZL}			2.7	5.1	7.5	2.7	9	2.7	8	
t_{PHZ}	$\overline{G}$	Y	1.3	3.4	5.5	1.3	5.5	1.3	5.5	ns
t_{PLZ}			2	2.6	4.5	1	5.5	1	4.5	

†For conditions shown as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.
NOTE 2: Load circuits and waveforms are shown in Section 1.