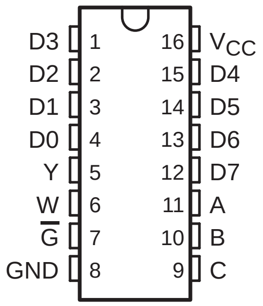
SN54F251B, SN74F251B
1-OF-8 DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

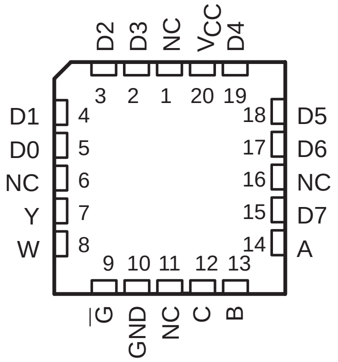
SDFS066A − MARCH 1987 − REVISED OCTOBER 1993

- **3-State Versions of SN54F151B and SN74F151B**
- **3-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**

SN54F251B . . . J PACKAGE
SN74F251B . . . D OR N PACKAGE
(TOP VIEW)



SN54F251B . . . FK 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 outputs. The 3-state outputs can interface with and drive data lines of bus-organized systems. When the strobe ($\overline{G}$) input is high, both outputs are in a high-impedance state in which both the upper and lower transistors of each totem-pole output are off, and the output neither drives nor loads the bus significantly.

The SN54F251B is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74F251B is characterized for operation from 0°C to 70°C.

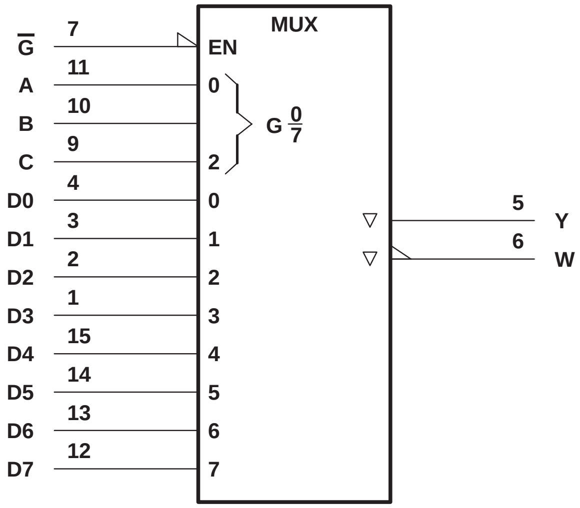
FUNCTION TABLE

INPUTS				OUTPUTS	
SELECT			STROBE $\overline{G}$		
C	B	A		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.

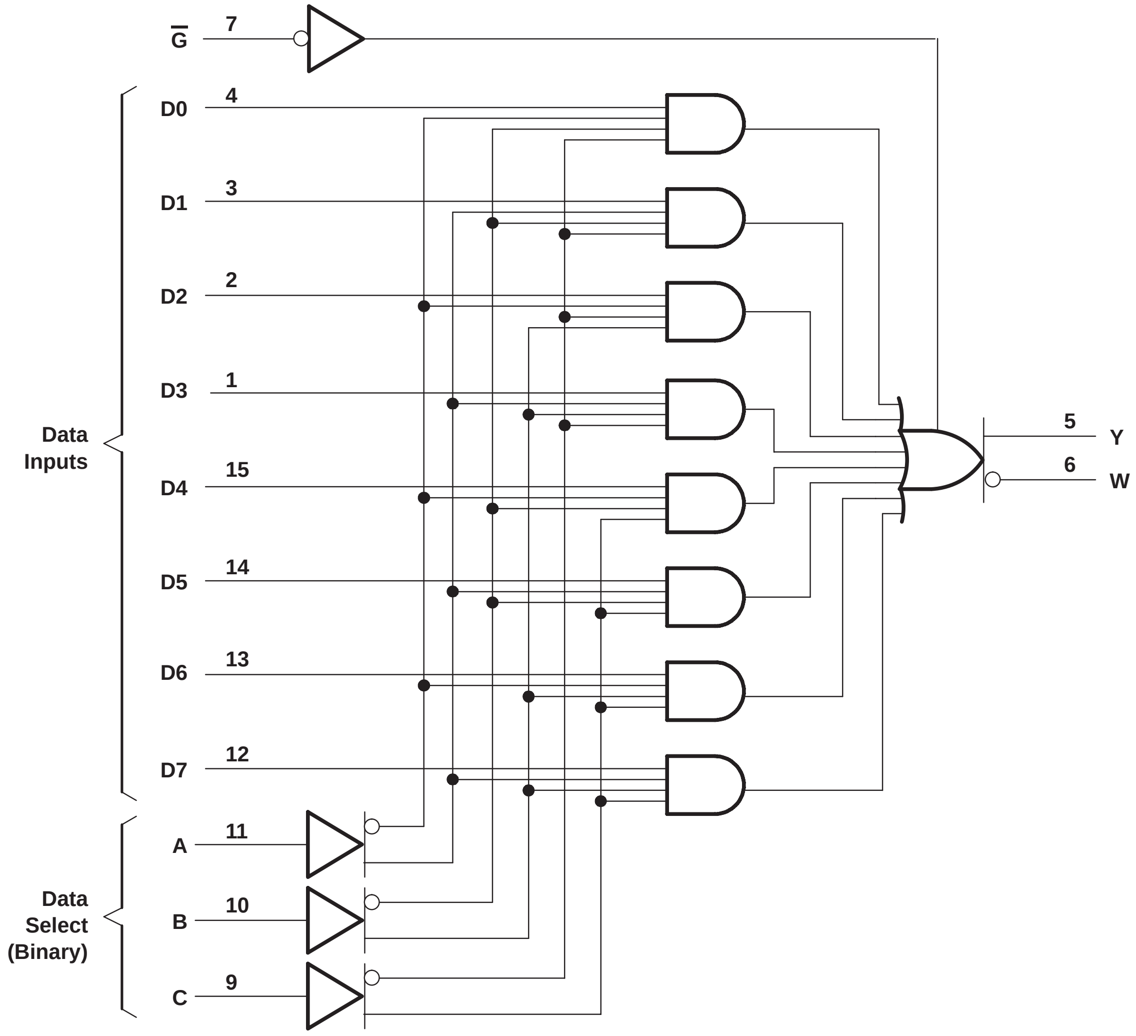
TEXAS INSTRUMENTS

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.

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

Supply voltage range, V_{CC}		−0.5 V to 7 V
Input voltage range (see Note 1)		−1.2 V to 7 V
Input current range		−30 mA to 5 mA
Voltage range applied to any output in the disabled or power-off state		−0.5 V to 5.5 V
Voltage range applied to any output in the high state		−0.5 V to V_{CC}
Current into any output in the low state:	SN54F251B	40 mA
	SN74F251B	48 mA
Operating free-air temperature range:	SN54F251B	−55°C to 125°C
	SN74F251B	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.

NOTE 1: The input voltage ratings may be exceeded provided the input current ratings are observed.

recommended operating conditions

		SN54F251B			SN74F251B			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		SN54F251B			SN74F251B			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		0.3	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 2	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 2: 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 3)

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
			′F251B			SN54F251B		SN74F251B		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A, B, or C	W	3.5	5.4	9	3.5	11.5	3.5	9.5	ns
t_{PHL}			2.5	4.4	7.5	2.5	8	2.5	7.5	
t_{PLH}	A, B, or C	Y	4.5	6.2	10.5	3.5	14	4	12.5	ns
t_{PHL}			4	6	8.5	3	10.9	3.5	9	
t_{PLH}	Any D	W	2.5	3.7	6.5	1.8	8	2	7	ns
t_{PHL}			1	1.9	4	1	6	1	5	
t_{PLH}	Any D	Y	3	3.8	7	2.3	9	2.3	8	ns
t_{PHL}			3	4.5	7	2.3	9	2.5	8	
t_{PZH}	$\overline{G}$	W	2.5	3.6	6	2	7	2	7	ns
t_{PZL}			2.5	3.8	6	2.5	7.5	2.5	6.5	
t_{PHZ}	$\overline{G}$	W	1.9	2.5	5.5	1.4	6	1.5	6	ns
t_{PLZ}			1	2.4	4.5	1	5	1	4.5	
t_{PZH}	$\overline{G}$	Y	3.4	4.8	7	2.7	8.5	2.9	8.5	ns
t_{PZL}			2.9	4	7.5	2.6	9	2.6	8	
t_{PHZ}	$\overline{G}$	Y	1.9	2.5	5.5	1.7	5.5	1.8	5.5	ns
t_{PLZ}			1	2.3	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 3: Load circuits and waveforms are shown in Section 1.

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