

**SN54F251A, SN74F251A**  
**1-OF-8 DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS**

TEXAS INSTR (LOGIC)

D2932, MARCH 1987—REVISED JULY 1989

- 3-State Versions of SN54F151A and SN74F151A
- 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
- 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 outputs. The 3-state outputs can interface with and drive data lines of bus-organized systems. When the strobe 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. Both the outputs are controlled by the strobe  $\bar{G}$ . The outputs are disabled when  $\bar{G}$  is high.

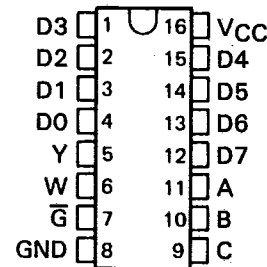
The SN54F251A is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74F251A is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

**FUNCTION TABLE**

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

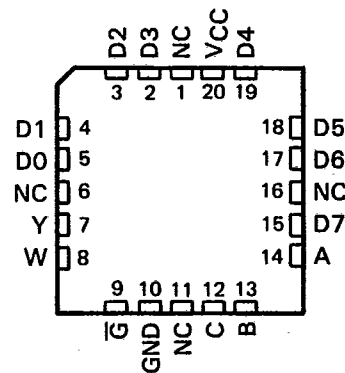
D0, D1 . . . D7 = the level of the respective D input

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



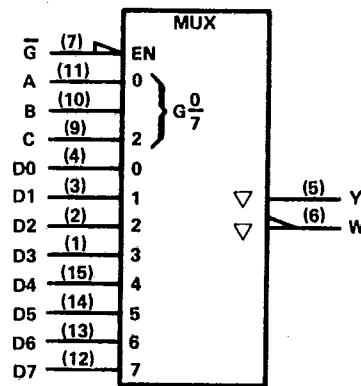
*T-66-21-S3*

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.

PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



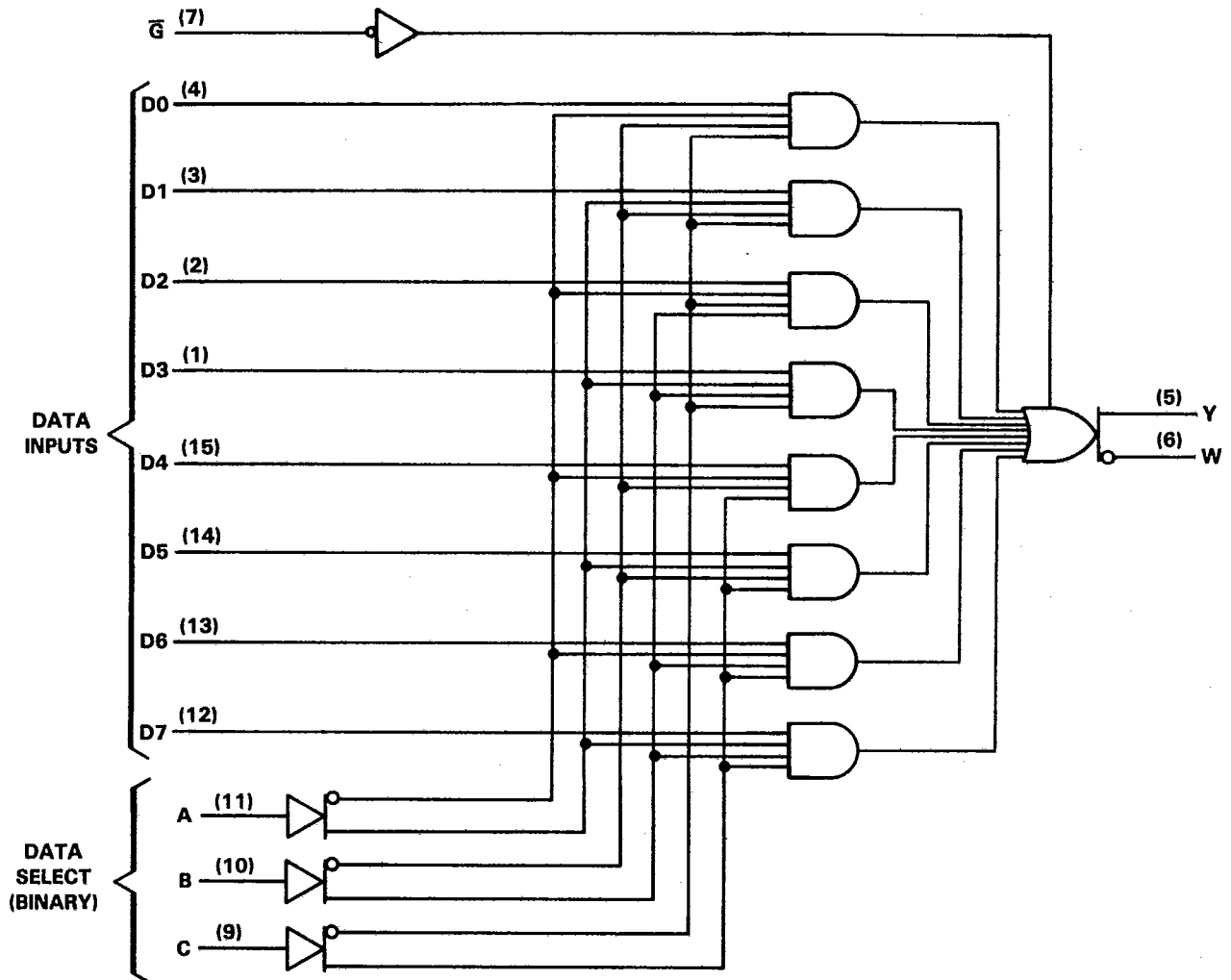
**SN54F251A, SN74F251A**  
**1-OF-8 DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS**

25E D ■ 8961723 0084425 0 ■

T-66-21-53

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logic diagram (positive logic)



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

## 1-OF-8 DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

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

Supply voltage, $V_{CC}$ .....	-0.5 V to 7 V
Input voltage <sup>†</sup> .....	-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

<sup>†</sup>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 <sup>‡</sup>	MAX	MIN		TYP <sup>‡</sup>
$V_{IK}$	$V_{CC} = 4.5 \text{ V}$ , $I_I = -18 \text{ mA}$			-1.2		-1.2	V
$V_{OH}$	$V_{CC} = 4.5 \text{ V}$	$I_{OH} = -1 \text{ mA}$	2.5	3.4	2.5	3.4	V
		$I_{OH} = -3 \text{ mA}$	2.4	3.3	2.4	3.3	
$V_{OL}$	$V_{CC} = 4.75 \text{ V}$	$I_{OH} = -1 \text{ mA to } -3 \text{ mA}$			2.7		V
		$V_{CC} = 4.5 \text{ V}$	$I_{OL} = 20 \text{ mA}$	0.30	0.5		
		$I_{OL} = 24 \text{ mA}$			0.35	0.5	
$I_{OZH}$	$V_{CC} = 5.5 \text{ V}$ , $V_O = 2.7 \text{ V}$			50		50	$\mu\text{A}$
$I_{OZL}$	$V_{CC} = 5.5 \text{ V}$ , $V_O = 0.5 \text{ V}$			-50		-50	$\mu\text{A}$
$I_I$	$V_{CC} = 5.5 \text{ V}$ , $V_I = 7 \text{ V}$			0.1		0.1	mA
$I_{IH}$	$V_{CC} = 5.5 \text{ V}$ , $V_I = 2.7 \text{ V}$			20		20	$\mu\text{A}$
$I_{IL}$	$V_{CC} = 5.5 \text{ V}$ , $V_I = 0.5 \text{ V}$			-0.6		-0.6	mA
$I_{OS}^{\S}$	$V_{CC} = 5.5 \text{ V}$ , $V_O = 0$	-60		-150	-60	-150	mA
$I_{CC}$	$V_{CC} = 5.5 \text{ V}$ , See Note 1	Condition A	15	22	15	22	mA
		Condition B	16	24	16	24	

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

<sup>\S</sup>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:

- Select input and data input at 4.5 V, output control grounded.
- All inputs at 4.5 V.

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switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 5 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = 500 Ω, R <sub>2</sub> = 500 Ω, T <sub>A</sub> = 25°C			V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 50 pF, R <sub>1</sub> = 500 Ω, R <sub>2</sub> = 500 Ω, T <sub>A</sub> = MIN to MAX†			UNIT	
			'F251A			SN54F251A		SN74F251A		
			MIN	TYP	MAX	MIN	MAX	MIN		MAX
t <sub>PLH</sub>	A, B, or C	W	3.5	5.4	9	3.5	11.5	3.5	9.5	ns
t <sub>PHL</sub>			3.2	4.4	7.5	3.1	8	3.1	7.5	
t <sub>PLH</sub>	A, B, or C	Y	4.5	6.2	10.5	3.5	14	4.2	12.5	ns
t <sub>PHL</sub>			4	6	8.5	3	10.5	4	9	
t <sub>PLH</sub>	Data (Any D)	W	2.8	3.7	6.5	2.1	8	2.4	7	ns
t <sub>PHL</sub>			1.3	1.9	4	1	6	1.1	5	
t <sub>PLH</sub>	Data (Any D)	Y	3	3.8	7	2.5	9	2.5	8	ns
t <sub>PHL</sub>			3.3	4.5	7	2.6	9	3	7.5	
t <sub>PZH</sub>	$\bar{G}$	W	2.5	3.6	6	2	7	2.5	7	ns
t <sub>PZL</sub>			2.5	3.8	6	2.5	7.5	2.5	6.5	
t <sub>PHZ</sub>	$\bar{G}$	W	1.9	2.5	5.5	1.4	6	1.5	6	ns
t <sub>PLZ</sub>			1.5	2.4	4.5	1.5	5	1.5	4.5	
t <sub>PZH</sub>	$\bar{G}$	Y	3.5	4.8	7	3	8.5	3	7.5	ns
t <sub>PZL</sub>			3.2	4	7.5	2.7	9	2.9	8	
t <sub>PHZ</sub>	$\bar{G}$	Y	1.9	2.5	5.5	1.7	5.5	1.8	5.5	ns
t <sub>PLZ</sub>			1.5	2.5	4.5	1.5	5.5	1.5	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 of the *F Logic (SN54/74F) Data Book, 1989*.

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