

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

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 ( $\bar{G}$ ). The outputs are disabled when  $\bar{G}$  is high.

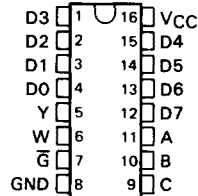
The SN54F251A is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74F251A is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

FUNCTION TABLE

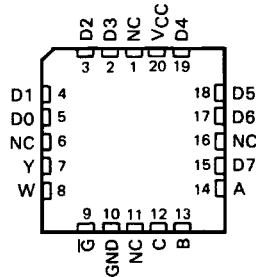
INPUTS				OUTPUTS	
SELECT			STROBE	Y	W
C	B	A	$\bar{G}$		
X	X	X	H	Z	Z
L	L	L	L	D0	$\bar{D0}$
L	L	H	L	D1	$\bar{D1}$
L	H	L	L	D2	$\bar{D2}$
L	H	H	L	D3	$\bar{D3}$
H	L	L	L	D4	$\bar{D4}$
H	L	H	L	D5	$\bar{D5}$
H	H	L	L	D6	$\bar{D6}$
H	H	H	L	D7	$\bar{D7}$

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

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

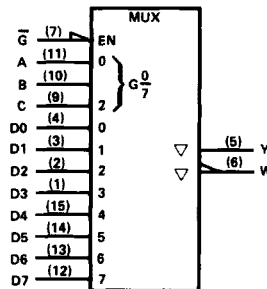


SN54F251A . . . FK PACKAGE  
(TOP VIEW)



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.

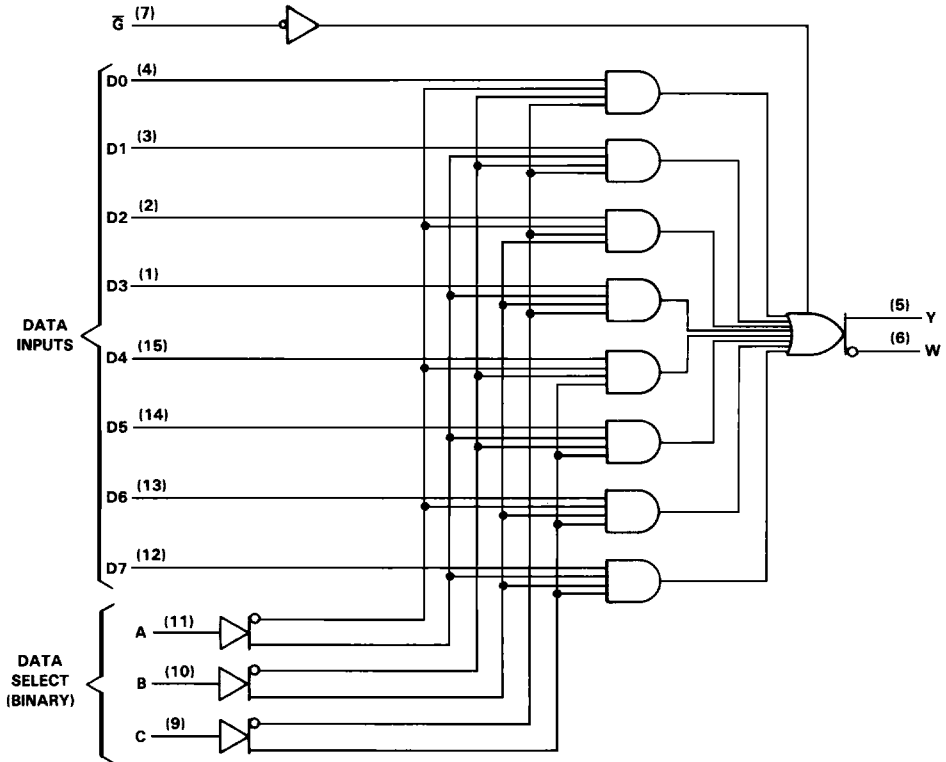
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logic diagram (positive logic)



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

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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
$I_{QH}$ 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>	MAX	
$V_{IK}$	$V_{CC} = 4.5$ V, $I_I = -18$ mA			-1.2			-1.2	V
$V_{OH}$	$V_{CC} = 4.5$ V	$I_{QH} = -1$ mA	2.5	3.4	2.5	3.4		V
		$I_{QH} = -3$ mA	2.4	3.3	2.4	3.3		
$V_{OL}$	$V_{CC} = 4.75$ V	$I_{OH} = -1$ mA to -3 mA			2.7			V
		$V_{CC} = 4.5$ V	$I_{OL} = 20$ mA	0.30	0.5			
		$I_{OL} = 24$ 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			-60			-60	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			-0.8			-0.8	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	18	24	18	24		

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

<sup>§</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:

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

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

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	2.7	5.4	9	2.7	11.5	2.7	9.5	ns
t <sub>PHL</sub>			2.4	4.6	7.5	2.4	8	2.4	7.5	
t <sub>PLH</sub>	A, B, or C	Y	3.7	7.1	10.5	2.7	14	3.7	12.5	ns
t <sub>PHL</sub>			3.2	5.6	8.5	2.2	10.5	3.2	9	
t <sub>PLH</sub>	Data (Any D)	W	2.2	4.6	6.5	1.7	8	2.2	7	ns
t <sub>PHL</sub>			1	2.1	4	1	6	1	5	
t <sub>PLH</sub>	Data (Any D)	Y	2.7	4.6	7	1.7	9	1.7	8	ns
t <sub>PHL</sub>			2.7	5.1	7	2.7	9	2.7	7.5	
t <sub>PZH</sub>	⊘	W	1.7	3.9	6	1.3	7	1.7	7	ns
t <sub>PZL</sub>			1.7	3.9	6	1.7	7.5	1.7	6.5	
t <sub>PHZ</sub>	⊘	W	1.7	3.6	5.5	1.7	6	1.7	6	ns
t <sub>PLZ</sub>			1	2.6	4.5	1	5	2.9	4.5	
t <sub>PZH</sub>	⊘	Y	2.7	4.4	7	2.3	8.5	2.3	7.5	ns
t <sub>PZL</sub>			2.7	5.1	7.5	2.7	9	2.7	8	
t <sub>PHZ</sub>	⊘	Y	1.3	3.4	5.5	1.3	5.5	1.3	5.5	ns
t <sub>PLZ</sub>			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.

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