

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°C to 125°C . The SN74F251A is characterized for operation from 0°C to 70°C .

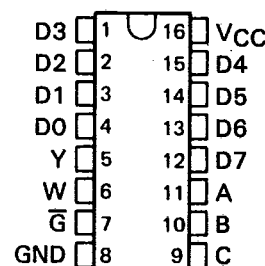
FUNCTION TABLE

INPUTS			STROBE $\bar{G}$	OUTPUTS	
SELECT				Y	W
C	B	A			
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

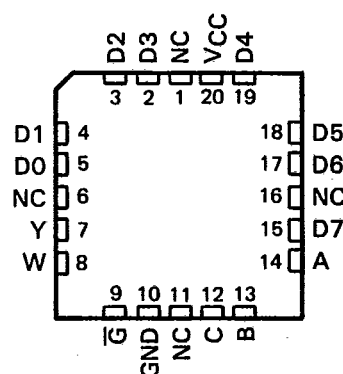
SN54F251A . . . J PACKAGE
SN74F251A . . . D OR N PACKAGE

(TOP VIEW)



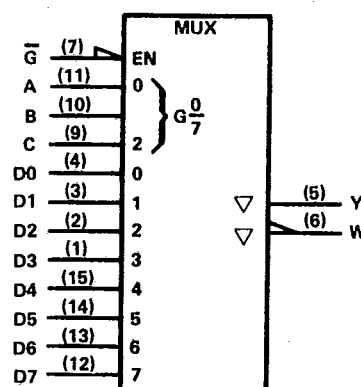
SN54F251A . . . FK PACKAGE

(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.

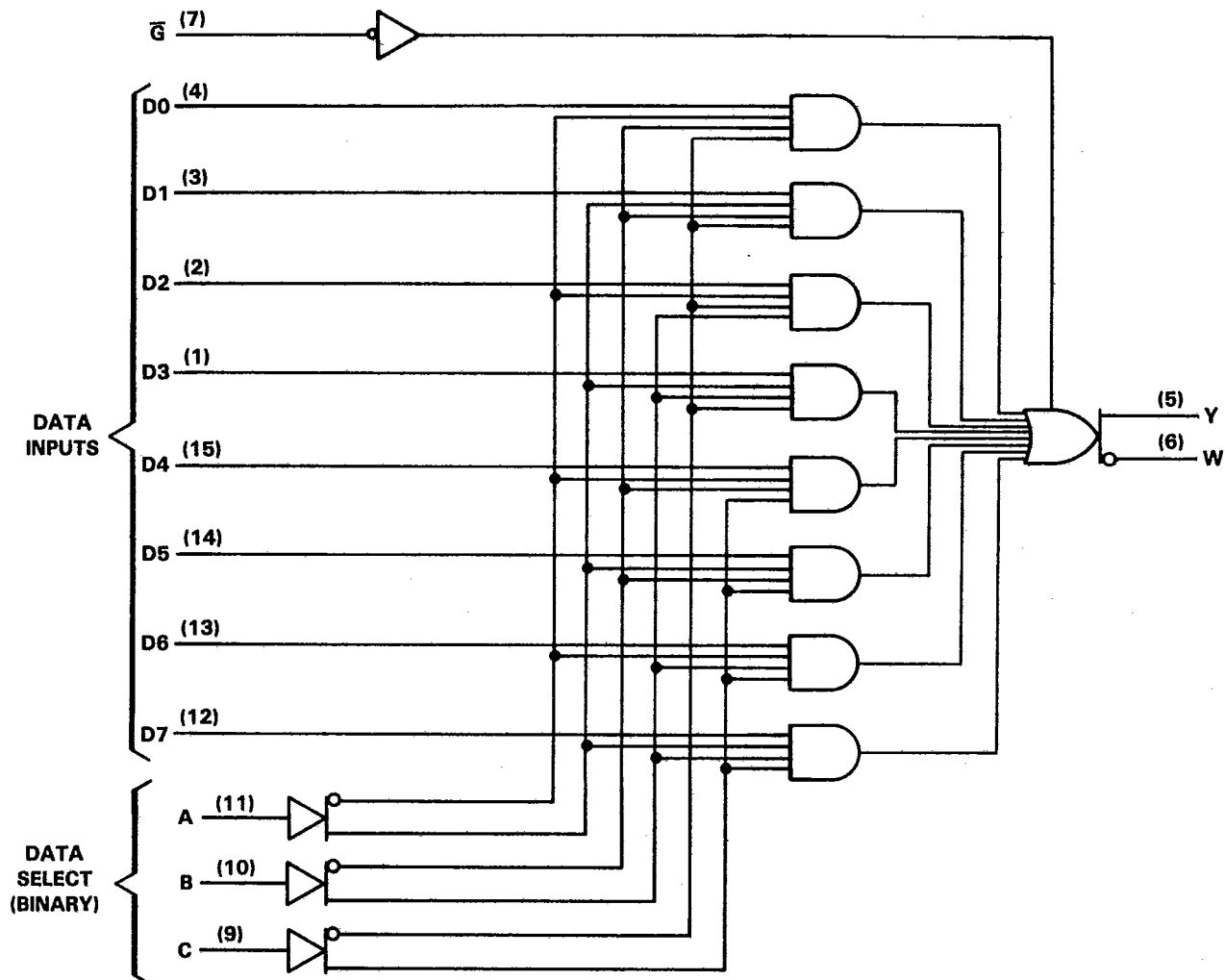
SN54F251A, SN74F251A
1-OF-8 DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

25E D ■ 8961723 0084425 0 ■

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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†	−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 $V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$.

§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.

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switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = 25°C			V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 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	3.5	5.4	9	3.5	11.5	3.5	9.5	ns
t _{PHL}			3.2	4.4	7.5	3.1	8	3.1	7.5	
t _{PLH}	A, B, or C	Y	4.5	6.2	10.5	3.5	14	4.2	12.5	ns
t _{PHL}			4	6	8.5	3	10.5	4	9	
t _{PLH}	Data (Any D)	W	2.8	3.7	6.5	2.1	8	2.4	7	ns
t _{PHL}			1.3	1.9	4	1	6	1.1	5	
t _{PLH}	Data (Any D)	Y	3	3.8	7	2.5	9	2.5	8	ns
t _{PHL}			3.3	4.5	7	2.6	9	3	7.5	
t _{PZH}	$\overline{G}$	W	2.5	3.6	6	2	7	2.5	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}			1.5	2.4	4.5	1.5	5	1.5	4.5	
t _{PZH}	$\overline{G}$	Y	3.5	4.8	7	3	8.5	3	7.5	ns
t _{PZL}			3.2	4	7.5	2.7	9	2.9	8	
t _{PHZ}	$\overline{G}$	Y	1.9	2.5	5.5	1.7	5.5	1.8	5.5	ns
t _{PLZ}			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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