

# SN54F253, SN74F253 DUAL 1-OF-4 DATA SELECTORS/MULTIPLEXERS WITH 3-STATE OUTPUTS

D2932, MARCH 1987—REVISED JANUARY 1989

- Three-State Versions of SN54F153 and SN74F153
- Permits Multiplexing from N Lines to 1 Line
- Performs Parallel-to-Serial Conversion
- 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

Each of these data selectors/multiplexers contains inverters and drivers to supply full binary decoding data selection to the AND-OR gates. Separate output control inputs are provided for each of the two four-line sections.

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. Each output has its own strobe ( $\bar{G}$ ). The output is disabled when its strobe is high.

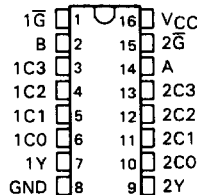
The SN54F253 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74F253 is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

FUNCTION TABLE

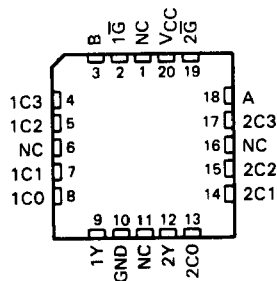
SELECT INPUTS	DATA INPUTS				STROBE	OUTPUT
	B	A	C0	C1		
X	X	X	X	X	X	Z
L	L	L	X	X	X	L
L	L	H	X	X	X	L
L	H	X	L	X	X	L
L	H	X	H	X	X	L
H	L	X	X	L	X	L
H	L	X	X	H	X	L
H	H	X	X	X	L	L
H	H	X	X	X	H	L

Address inputs A and B are common to both sections.

SN54F253 . . . J PACKAGE  
SN74F253 . . . D OR N PACKAGE  
(TOP VIEW)

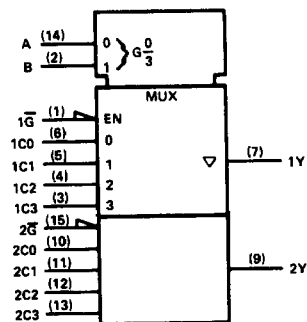


SN54F253 . . . FK PACKAGE  
(TOP VIEW)



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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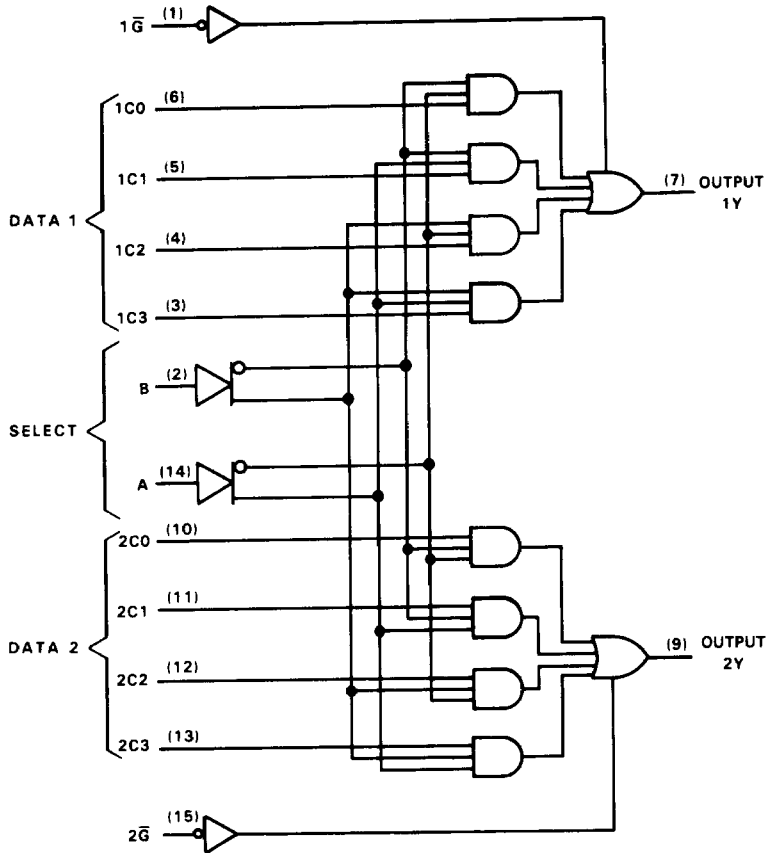
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**SN54F253, SN74F253**  
**DUAL 1-OF-4 DATA SELECTORS/MULTIPLEXERS**  
**WITH 3-STATE OUTPUTS**

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 <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: SN54F253 .....	40 mA
SN74F253 .....	48 mA
Operating free-air temperature range: SN54F253 .....	-55°C to 125°C
SN74F253 .....	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.

**SN54F253, SN74F253**  
**DUAL 1-OF-4 DATA SELECTORS/MULTIPLEXERS**  
**WITH 3-STATE OUTPUTS**

**recommended operating conditions**

	SN54F253			SN74F253			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub> Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V <sub>IH</sub> High-level input voltage	2			2			V
V <sub>IL</sub> Low-level input voltage			0.8			0.8	V
I <sub>IK</sub> Input clamp current			-18			-18	mA
I <sub>OH</sub> High-level output current			-3			-3	mA
I <sub>OL</sub> Low-level output current			20			24	mA
T <sub>A</sub> Operating free-air temperature	-55		125	0		70	°C

**electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)**

PARAMETER	TEST CONDITIONS		SN54F253			SN74F253			UNIT
			MIN	TYP†	MAX	MIN	TYP†	MAX	
V <sub>IK</sub>	V <sub>CC</sub> = 4.5 V, I <sub>I</sub> = -18 mA				-1.2			-1.2	V
V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V		I <sub>OH</sub> = -1 mA	2.5	3.4	I <sub>OH</sub> = -1 mA	2.5	3.4	V
			I <sub>OH</sub> = -3 mA	2.4	3.3	I <sub>OH</sub> = -3 mA	2.4	3.3	
	Any output	V <sub>CC</sub> = 4.75 V	I <sub>OH</sub> = -1 mA to -3 mA				2.7		
V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V		I <sub>OL</sub> = 20 mA	0.30	0.5				V
			I <sub>OL</sub> = 24 mA			0.35	0.5		
I <sub>OZH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.7 V				50			50	μA
I <sub>OZL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 0.5 V				-50			-50	μA
I <sub>I</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 7 V				0.1			0.1	mA
I <sub>IH</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 2.7 V				20			20	μA
I <sub>IL</sub>	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0.5 V				-0.6			-0.6	mA
I <sub>OS</sub> ‡	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 0				-60		-60	-150	mA
I <sub>CCH</sub>	V <sub>CC</sub> = 5.5 V,		Condition A	11.5	16	Condition A	11.5	16	mA
I <sub>CCL</sub>			Condition B	16	23	Condition B	16	23	
I <sub>CCZ</sub>	See Note 1		Condition C	16	23	Condition C	16	23	

† All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 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<sub>CC</sub> is measured with the outputs open under the following conditions:

- A. Inputs A, B, 1C3, and 2C3 at 4.5 V, other inputs grounded
- B. All inputs grounded
- C. Inputs 1G and 2G at 4.5 V, other inputs grounded.

**2**  
Data Sheets

**SN54F253, SN74F253**  
**DUAL 1-OF-4 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	
			F253			SN54F253		SN74F253		
			MIN	TYP	MAX	MIN	MAX	MIN		MAX
t <sub>PLH</sub>	A or B	Any Y	3.7	8.1	11.5	2.7	15	3.7	13	ns
t <sub>PHL</sub>			2.2	6.1	9	1.7	11	2.2	10	
t <sub>PLH</sub>	Data (Any C)	Any Y	2.2	5.1	7	1.7	9	2.2	8	ns
t <sub>PHL</sub>			1.7	4.1	6	1.7	8	1.7	7	
t <sub>PZH</sub>	G	Any Y	2.2	5.6	8	1.7	10	2.2	9	ns
t <sub>PZL</sub>			2.2	5.6	8	1.7	10	2.2	9	
t <sub>PHZ</sub>	G	Any Y	1.2	3.3	5	1.2	6.5	1.2	6	ns
t <sub>PLZ</sub>			1.2	4	6	1.2	8	1.2	7	

† 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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Data Sheets