

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

SDFS064A – D2032, MARCH 1987 – REVISED OCTOBER 1993

- 3-State Versions of SN54F153 and SN74F153
- Permits Multiplexing From N Lines to One Line
- Performs Parallel-to-Serial Conversion
- Package Options Include Plastic Small-Outline Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs

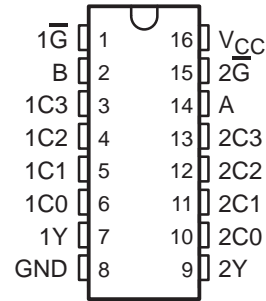
## description

These data selectors/multiplexers contain 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 4-line sections.

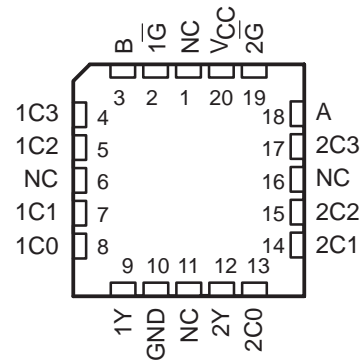
The 3-state outputs can interface with and drive data lines of bus-organized systems. With all but one of the common outputs disabled (at a high-impedance state), the low impedance of the single enabled output will drive the bus line to a high or low logic level. Each output has its own strobe ( $\overline{G}$ ) inputs. 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  $70^{\circ}\text{C}$ .

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



SN54F253 . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

FUNCTION TABLE

INPUTS						STROBE $\overline{G}$	OUTPUT Y
SELECT		DATA					
B	A	C0	C1	C2	C3		
X	X	X	X	X	X	H	Z
L	L	L	X	X	X	L	L
L	L	H	X	X	X	L	H
L	H	X	L	X	X	L	L
L	H	X	H	X	X	L	H
H	L	X	X	L	X	L	L
H	L	X	X	H	X	L	H
H	H	X	X	X	L	L	L
H	H	X	X	X	H	L	H

Select inputs A and B are common to both sections.

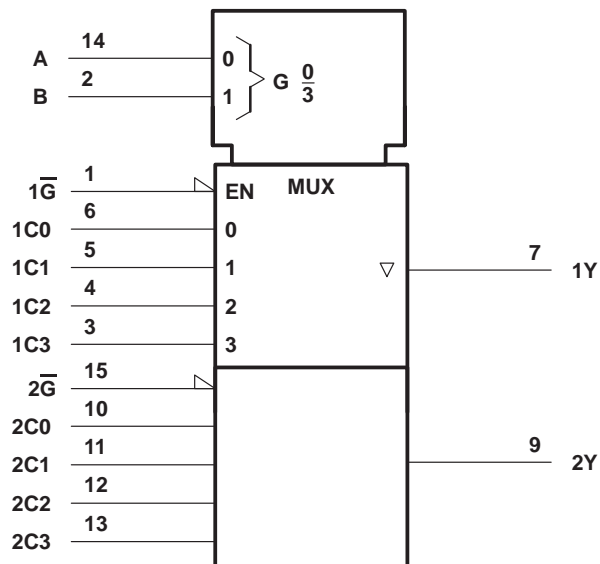
# SN54F253, SN74F253

## DUAL 1-OF-4 DATA SELECTORS/MULTIPLEXERS

### WITH 3-STATE OUTPUTS

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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.

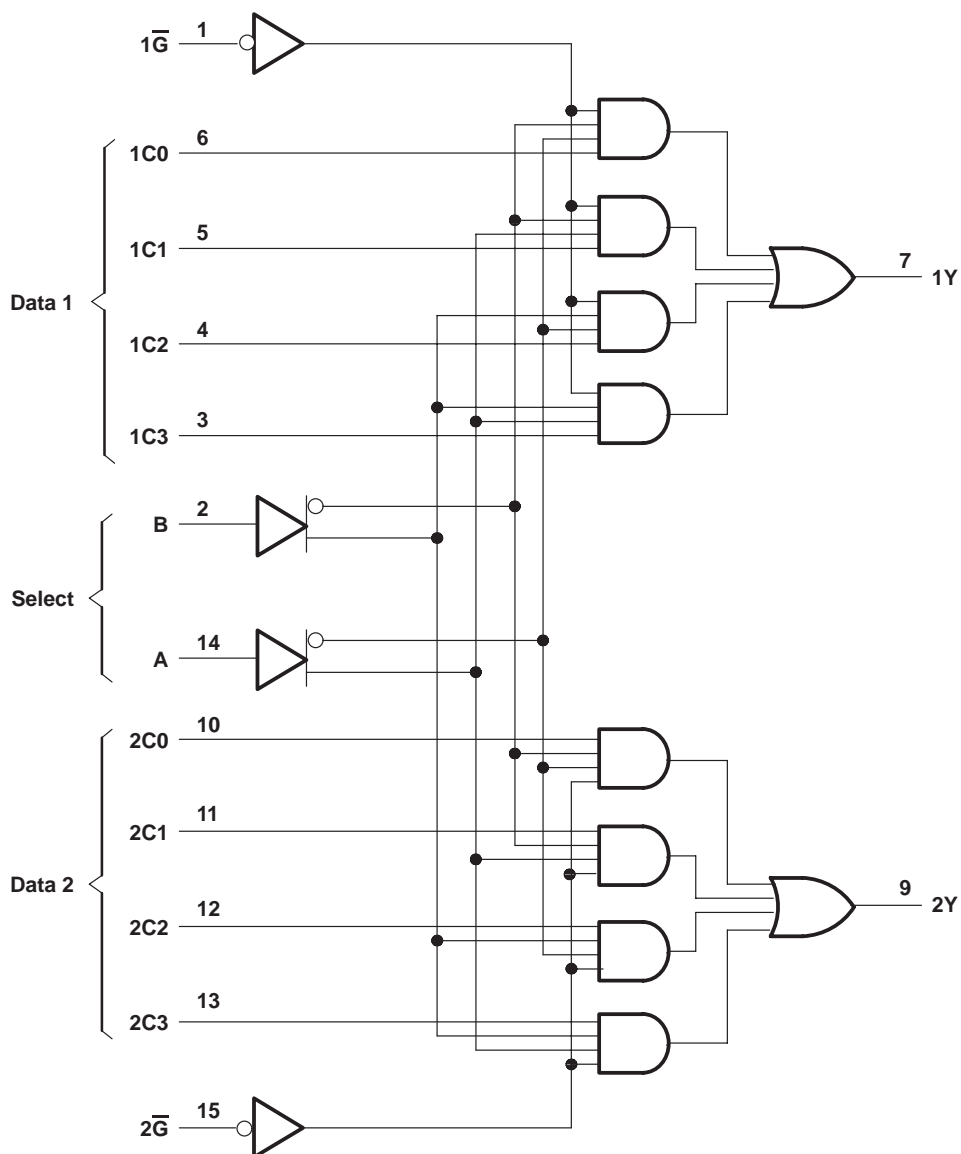
# SN54F253, SN74F253

## DUAL 1-OF-4 DATA SELECTORS/MULTIPLEXERS

### WITH 3-STATE OUTPUTS

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logic diagram (positive logic)



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

# SN54F253, SN74F253

## DUAL 1-OF-4 DATA SELECTORS/MULTIPLEXERS

### WITH 3-STATE OUTPUTS

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#### absolute maximum ratings over operating free-air temperature range (unless otherwise noted)<sup>†</sup>

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: 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> 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

		SN54F253			SN74F253			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



# SN54F253, SN74F253

## DUAL 1-OF-4 DATA SELECTORS/MULTIPLEXERS

### WITH 3-STATE OUTPUTS

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

PARAMETER	TEST CONDITIONS		SN54F253			SN74F253			UNIT
			MIN	TYP†	MAX	MIN	TYP†	MAX	
$V_{IK}$	$V_{CC} = 4.5\text{ V}$ , $I_I = -18\text{ mA}$				-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		
	$V_{CC} = 4.75\text{ V}$ ,	$I_{OH} = -1\text{ mA to } -3\text{ mA}$				2.7			
$V_{OL}$	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 20\text{ mA}$		0.3	0.5				V
		$I_{OL} = 24\text{ mA}$				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
$I_{OS}^\ddagger$	$V_{CC} = 5.5\text{ V}$ ,	$V_O = 0$	-60		-150	-60		-150	mA
$I_{CCH}$	$V_{CC} = 5.5\text{ V}$ , See Note 2	Condition A		11.5	16		11.5	16	mA
$I_{CCL}$		Condition B		16	23		16	23	
$I_{CCZ}$		Condition C		16	23		16	23	

† 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 2:  $I_{CC}$  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 1 $\overline{G}$  and 2 $\overline{G}$  at 4.5 V, other inputs grounded

### switching characteristics (see Note 3)

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>	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>	G̅	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>	G̅	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 3: Load circuit and waveforms are shown in Section 1.



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