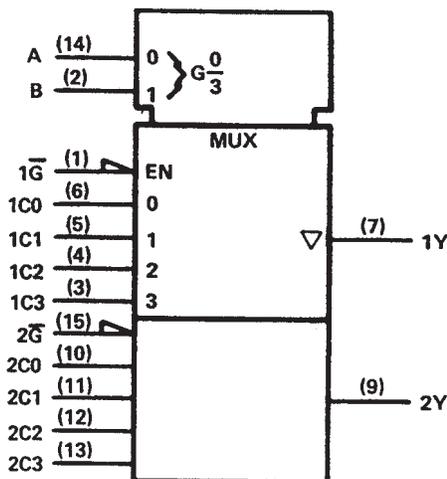# SN54LS253, SN54S253, SN74LS253, SN74S253
DUAL 4-LINE TO 1-LINE DATA SELECTORS/MULTIPLEXERS
WITH 3-STATE OUTPUTS
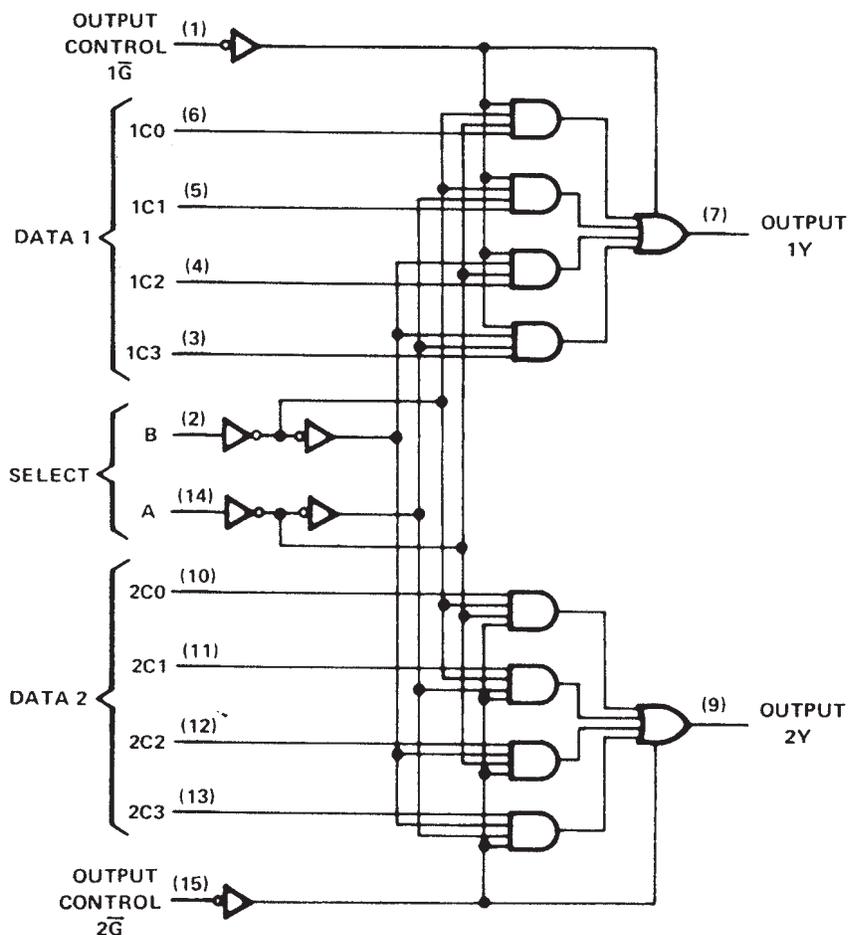
- Three-State Version of SN54/74LS153, SN54/74S153

- Schottky-Diode-Clamped Transistors

- Permits Multiplexing from N Lines to 1 Line

- Performs Parallel-to-Serial Conversion

- Fully Compatible with Most TTL Circuits

- Low Power Dissipation
  - 'LS253 . . . 35 mW Typical
  - 'S253 . . . 225 mW Typical

SN54LS253, SN54S253 . . . J OR W PACKAGE
SN74LS253, SN74S253 . . . D OR N PACKAGE
(TOP VIEW)

```
        ___
 1G [1  U  16] VCC
  B [2     15] 2G
1C3 [3     14] A
1C2 [4     13] 2C3
1C1 [5     12] 2C2
1C0 [6     11] 2C1
 1Y [7     10] 2C0
GND [8      9] 2Y
```

SN54LS253, SN54S253 . . . FK PACKAGE
(TOP VIEW)

```
           B  1G  NC  VCC  2G
           3   2   1  20  19
     1C3 [4              18] A
     1C2 [5              17] 2C3
      NC [6              16] NC
     1C1 [7              15] 2C2
     1C0 [8              14] 2C1
           9  10 11 12 13
          1Y GND NC  2Y  2C0
```

NC-No internal connection

description

Each of these Schottky-clamped data selectors/multiplexers contains inverters and drivers to supply fully complementary, on-chip, 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.

FUNCTION TABLE

SELECT INPUTS		DATA INPUTS				OUTPUT CONTROL	OUTPUT
B	A	C0	C1	C2	C3	$\overline{G}$	Y
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

Address inputs A and B are common to both sections.

H = high level, L = low level, X = irrelevant, Z = high impedance (off)

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

Supply voltage, V_{CC} (see Note 1) . . . . 7 V
Input voltage: 'LS253 . . . . 7 V
              'S253 . . . . 5.5 V
Off-state output voltage . . . . 5.5 V
Operating free-air temperature range: SN54LS253, SN54S253 . . . . − 55°C to 125°C
                                 SN74LS253, SN74S253 . . . . 0°C to 70°C
Storage temperature range . . . . − 65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.

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TEXAS INSTRUMENTS

logic symbol†

†This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagram (positive logic)

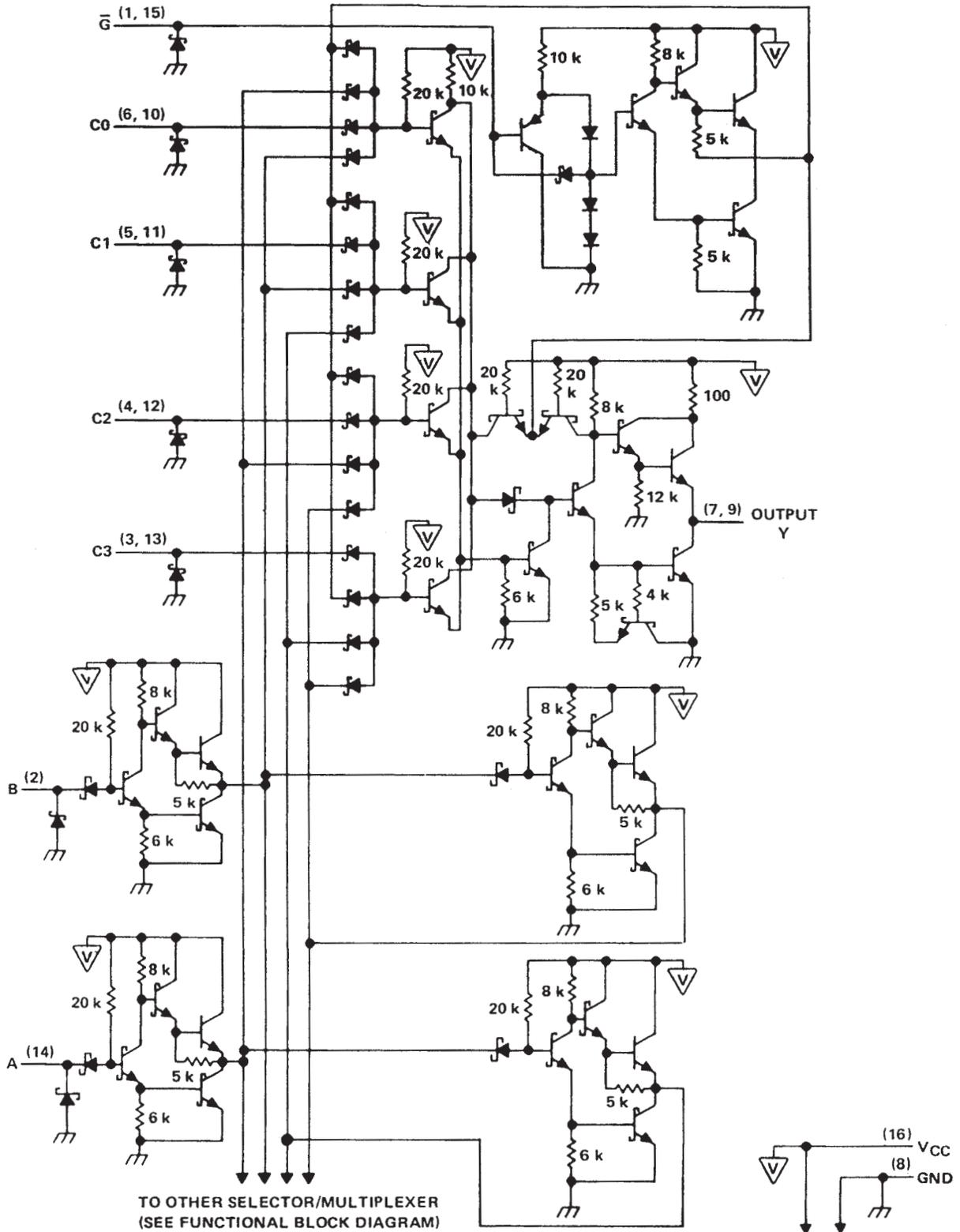Pin numbers shown are for D, J, N, and W packages.

schematic (each selector/multiplexer, and the common select section)

TO OTHER SELECTOR/MULTIPLEXER
(SEE FUNCTIONAL BLOCK DIAGRAM)

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

recommended operating conditions

		\multicolumn{3}{SN54LS253}			\multicolumn{3}{SN74LS253}			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.7			0.8	V
I_{OH}	High-level output current			−1			−2.6	mA
I_{OL}	Low-level output current			4			8	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[†]				SN54LS253			SN74LS253			UNIT
					MIN	TYP[‡]	MAX	MIN	TYP[‡]	MAX	
V_{IK}	V_{CC} = MIN,	I_I = −18 mA					−1.5			−1.5	V
V_{OH}	V_{CC} = MIN,	V_{IH} = 2 V,	V_{IL} = MAX,	I_{OH} = MAX	2.4	3.4		2.4	3.1		V
V_{OL}	V_{CC} = MIN,	V_{IH} = 2 V,	V_{IL} = MAX	I_{OL} = 4 mA		0.25	0.4		0.25	0.4	V
				I_{OL} = 8 mA					0.25	0.5	
I_{OZ}	V_{CC} = MAX,	V_{IH} = 2 V		V_O = 2.7 V			20			20	μA
				V_O = 0.4 V			−20			−20	
I_I	V_{CC} = MAX,	V_I = 7 V					0.1			0.1	mA
I_{IH}	V_{CC} = MAX,	V_I = 2.7 V					20			20	μA
I_{IL}	V_{CC} = MAX,	V_I = 0.4 V		$\overline{G}$			−0.2			−0.2	mA
				All other			−0.4			−0.4	
I_{OS}[§]	V_{CC} = MAX				−30		−130	−30		−130	mA
I_{CC}	V_{CC} = MAX,	See Note 2		Condition A		7	12		7	12	mA
				Condition B		8.5	14		8.5	14	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.
§ Not more than one output should be shorted at a time, and duration for the short-circuit should exceed one second.
NOTE 2: I_{CC} is measured with the outputs open under the following conditions:
    A. All inputs grounded.
    B. Output control at 4.5 V, all inputs grounded.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	Data	Y				17	25	ns
t_{PHL}						13	20	
t_{PLH}	Select	Y	C_L = 15 pF,	R_L = 2 kΩ,		30	45	ns
t_{PHL}			See Note 3			21	32	
t_{PZH}	Output Control	Y				15	28	ns
t_{PZL}						15	23	
t_{PHZ}	Output Control	Y	C_L = 5 pF,	R_L = 2 kΩ,		27	41	ns
t_{PLZ}			See Note 3			18	27	

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

recommended operating conditions

		SN54S253 MIN	NOM	MAX	SN74S253 MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
V_{IH}	High-level input voltage	2			2			V
V_{IL}	Low-level input voltage			0.8			0.8	V
I_{OH}	High-level output current			−2			−6.5	mA
I_{OL}	Low-level output current			20			20	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†				MIN	TYP‡	MAX	UNIT
V_{IK}	V_{CC} = MIN,	I_I = −18 mA					−1.2	V
V_{OH}	V_{CC} = MIN,	V_{IH} = 2 V,	V_{IL} = 0.8 V,	I_{OH} = MAX	Series 54S	2.5	3.4		V
					Series 74S	2.7	3.4		
V_{OL}	V_{CC} = MIN,	V_{IH} = 2 V,	V_{IL} = 0.8 V,	I_{OL} = 20 mA				0.5	V
I_{OZ}	V_{CC} = MAX,	V_{IH} = 2 V			V_O = 2.4 V			50	μA
					V_O = 0.5 V			−50	
I_I	V_{CC} = MAX,	V_I = 5.5 V						1	mA
I_{IH}	V_{CC} = MAX,	V_I = 2.7 V						50	μA
I_{IL}	V_{CC} = MAX,	V_I = 0.5 V			$\overline{G}$ = 0.8 V			−2	mA
					$\overline{G}$ = 2 V			−0.25	
I_{OS}§	V_{CC} = MAX					−40		−100	mA
I_{CC}	V_{CC} = MAX,	See Note 2			Condition A		45	70	mA
					Condition B		65	85	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.
  Not more than one output should be shorted at a time and duration of short-circuit should not exceed one second.
NOTE 2: I_{CC} is measured with the outputs open under the following conditions:
     A. All inputs grounded.
     B. Output control at 4.5 V, all inputs grounded.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	Data	Y				6	9	ns
t_{PHL}						6	9	
t_{PLH}	Select	Y	R_L = 280 Ω,	C_L = 15 pF		11.5	18	ns
t_{PHL}			See Note 3			12	18	
t_{PZH}	Output Control	Y				11	16.5	ns
t_{PZL}						12	18	
t_{PHZ}	Output Control	Y	R_L = 280 Ω,	C_L = 5 pF		6.5	9.5	ns
t_{PLZ}			See Note 3			10	15	

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

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