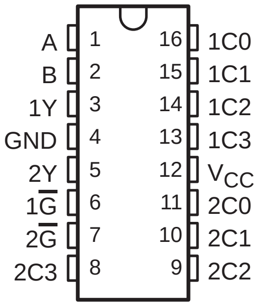
54AC11253, 74AC11253
DUAL 1-OF-4 DATA SELECTORS/MULTIPLEXERS
WITH 3-STATE OUTPUTS

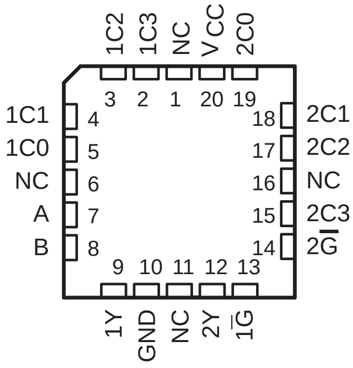
SCAS041A – MAY 1988 – REVISED APRIL 1993

- **Permits Multiplexing From N Lines to One Line**
- **Performs Parallel-to-Serial Conversion**
- **Flow-Through Architecture Optimizes PCB Layout**
- **Center-Pin V_{CC} and GND Configurations Minimize High-Speed Switching Noise**
- ***EPIC*™ (Enhanced-Performance Implanted CMOS) 1-µm Process**
- **Package Options Include Plastic Small-Outline Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs**

54AC11253 . . . J PACKAGE
74AC11253 . . . D OR N PACKAGE
(TOP VIEW)



54AC11253 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

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 ($\overline{G}$). The output is disabled when its strobe is high.

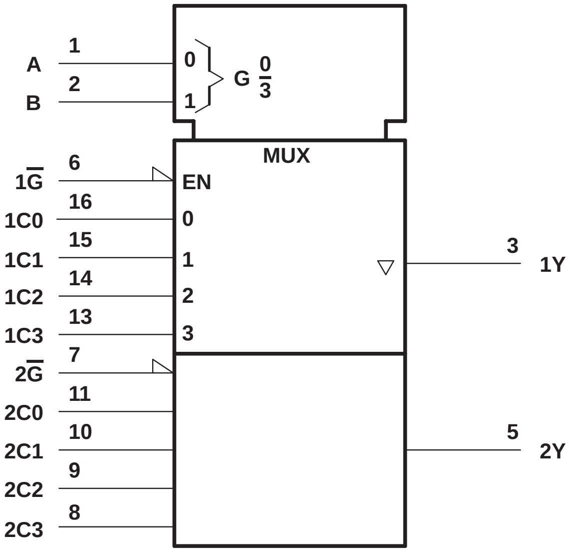
The 54AC11253 is characterized for operation over the full military temperature range of – 55°C to 125°C. The 74AC11253 is characterized for operation from – 40°C to 85°C.

FUNCTION TABLE

SELECT INPUTS		DATA INPUTS				OUTPUT CONTROL $\overline{G}$	OUTPUT Y
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

Address inputs A and B are common to both sections.

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.

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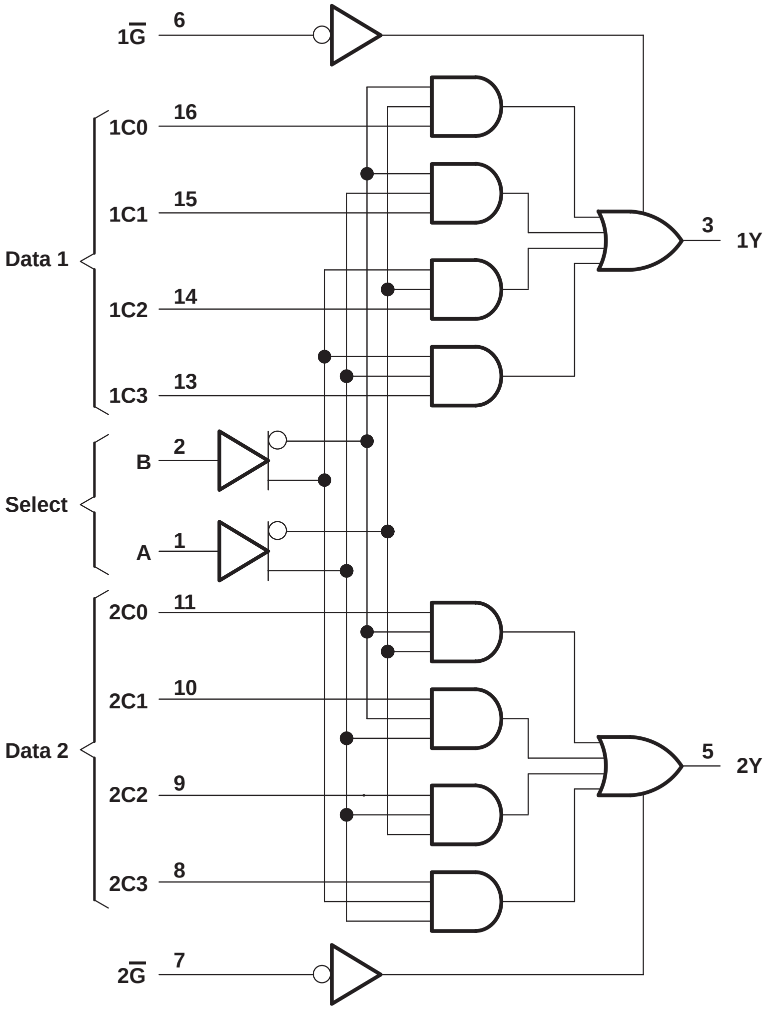
TEXAS INSTRUMENTS

logic diagram (positive logic)



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

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

Supply voltage range, V_{CC}	–0.5 V to 7 V
Input voltage range, V_I (see Note 1)	–0.5 V to V_{CC} + 0.5 V
Output voltage range, V_O (see Note 1)	–0.5 V to V_{CC} + 0.5 V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)	±20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$)	±50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	±50 mA
Continuous current through V_{CC} or GND	±100 mA
Storage temperature range	–65°C to 150°C

† 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 and output voltage ratings may be exceeded provided the input and output current ratings are observed.

recommended operating conditions

			54AC11253			74AC11253			UNIT
			MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage		3	5	5.5	3	5	5.5	V
V_{IH}	High-level input voltage	V_{CC} = 3 V	2.1			2.1			V
		V_{CC} = 4.5 V	3.15			3.15			
		V_{CC} = 5.5 V	3.85			3.85			
V_{IL}	Low-level input voltage	V_{CC} = 3 V			0.9			0.9	V
		V_{CC} = 4.5 V			1.35			1.35	
		V_{CC} = 5.5 V			1.65			1.65	
V_I	Input voltage		0		V_{CC}	0		V_{CC}	V
V_O	Output voltage		0		V_{CC}	0		V_{CC}	V
I_{OH}	High-level output current	V_{CC} = 3 V			–4			–4	mA
		V_{CC} = 4.5 V			–24			–24	
		V_{CC} = 5.5 V			–24			–24	
I_{OL}	Low-level output current	V_{CC} = 3 V			12			12	mA
		V_{CC} = 4.5 V			24			24	
		V_{CC} = 5.5 V			24			24	
$\Delta t/\Delta v$	Input transition rise or fall rate		0		10	0		10	ns/V
T_A	Operating free-air temperature		–55		125	–40		85	°C

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

PARAMETER	TEST CONDITIONS	V_{CC}	T_A = 25°C			54AC11253		74AC11253		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V_{OH}	I_{OH} = – 50 μA	3 V	2.9			2.9		2.9		V
		4.5 V	4.4			4.4		4.4		
		5.5 V	5.4			5.4		5.4		
	I_{OH} = – 4 mA	3 V	2.58			2.4		2.48		
	I_{OH} = – 24 mA	4.5 V	3.94			3.7		3.8		
		5.5 V	4.94			4.7		4.8		
	I_{OH} = – 50 mA†	5.5 V				3.85				
	I_{OH} = – 75 mA†	5.5 V						3.85		
V_{OL}	I_{OL} = 50 μA	3 V			0.1		0.1		0.1	V
		4.5 V			0.1		0.1		0.1	
		5.5 V			0.1		0.1		0.1	
	I_{OL} = 12 mA	3 V			0.36		0.5		0.44	
	I_{OL} = 24 mA	4.5 V			0.36		0.5		0.44	
		5.5 V			0.36		0.5		0.44	
	I_{OL} = 50 mA†	5.5 V					1.65			
	I_{OL} = 75 mA†	5.5 V							1.65	
I_{OZ}	$V_O = V_{CC}$ or GND	5.5 V			± 0.5		± 10		± 5	μA
I_I	$V_I = V_{CC}$ or GND	5.5 V			± 0.1		± 1		± 1	μA
I_{CC}	$V_I = V_{CC}$ or GND, I_O = 0	5.5 V			8		160		80	μA
C_i	$V_I = V_{CC}$ or GND	5 V		3.5						pF
C_o	$V_O = V_{CC}$ or GND	5 V		8						pF

† Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

switching characteristics over recommended operating free-air temperature range, V_{CC} = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = 25°C			54AC11253		74AC11253		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Y	1.5	7.1	9.7	1.5	11.7	1.5	11	ns
t_{PHL}			1.5	7.5	10.1	1.5	12.1	1.5	11.4	
t_{PLH}	Data (Any C)	Y	1.5	6.8	8.3	1.5	9.9	1.5	9.3	ns
t_{PHL}			1.5	7	8.8	1.5	10.3	1.5	9.6	
t_{PZH}	$\overline{G}$	Y	1.5	4.8	6.2	1.5	7.2	1.5	6.8	ns
t_{PZL}			1.5	5.8	7.4	1.5	8.7	1.5	8.2	
t_{PHZ}	$\overline{G}$	Y	1.5	5	6.3	1.5	7	1.5	6.7	ns
t_{PLZ}			1.5	5.2	6.5	1.5	7.2	1.5	6.9	

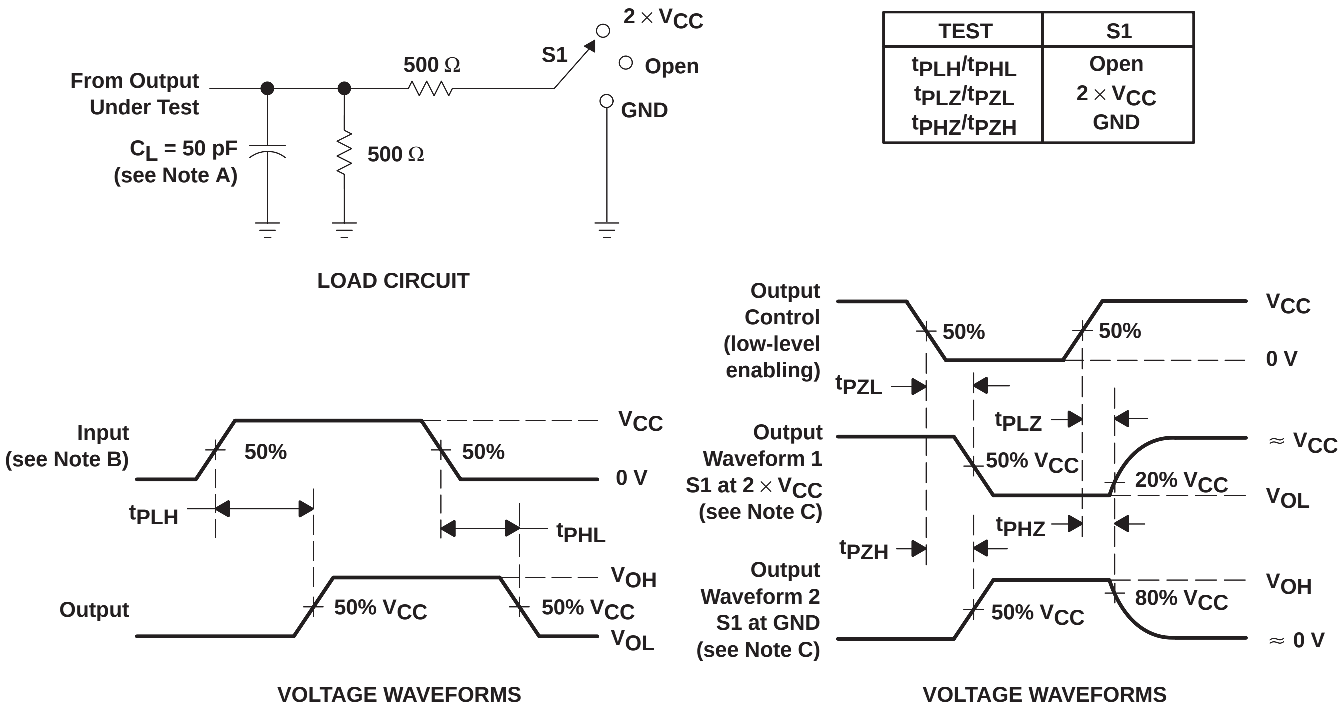
switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V ± 0.5 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	T_A = 25°C			54AC11253		74AC11253		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A or B	Y	1.5	4.9	7	1.5	8.3	1.5	7.9	ns
t_{PHL}			1.5	5.2	7.3	1.5	8.7	1.5	8.2	
t_{PLH}	Data (Any C)	Y	1.5	4.5	5.9	1.5	7.1	1.5	6.6	ns
t_{PHL}			1.5	4.8	6.3	1.5	7.3	1.5	6.9	
t_{PZH}	$\overline{G}$	Y	1.5	3.4	4.6	1.5	6.4	1.5	5.1	ns
t_{PZL}			1.5	4	5.3	1.5	6.1	1.5	5.8	
t_{PHZ}	$\overline{G}$	Y	1.5	4.7	6	1.5	6.6	1.5	6.3	ns
t_{PLZ}			1.5	4.6	5.9	1.5	6.4	1.5	6.2	

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

PARAMETER			TEST CONDITIONS	TYP	UNIT
C_{pd}	Power dissipation capacitance per multiplexer	Outputs enabled	C_L = 50 pF, f = 1 MHz	31	pF
		Outputs disabled		11	

PARAMETER MEASUREMENT INFORMATION



TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	2 × V_{CC}
t_{PHZ}/t_{PZH}	GND

LOAD CIRCUIT

VOLTAGE WAVEFORMS

VOLTAGE WAVEFORMS

NOTES:
A. C_L includes probe and jig capacitance.
B. All input pulses are supplied by generators having the following characteristics: PRR ≤ 10 MHz, Z_O = 50 Ω, t_r = 3 ns, t_f = 3 ns.
C. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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