

# SN54BCT623, SN74BCT623 OCTAL BUS TRANSCEIVERS

D3057, SEPTEMBER 1988—REVISED NOVEMBER 1988

- State of the Art BICMOS Design Significantly Reduces ICCZ
- Functionally Equivalent to SN54F623 and SN74F623
- ESD Protection Exceeds 2000 V per MIL-STD-883C Method 3015
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

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BICMOS Circuits

## description

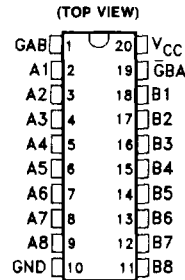
These octal bus transceivers are designed for asynchronous two-way communications between data buses. The control function implementation allows for maximum flexibility in timing.

These devices allow data transmission from the A bus to the B bus or from the B bus to the A bus depending upon the logic levels at the enable inputs ( $\overline{\text{GBA}}$  and  $\text{GAB}$ ).

The enable inputs can be used to disable the device so that the buses are effectively isolated. The dual-enable configuration gives the octal bus transceivers the capability to store data by simultaneous activation of  $\overline{\text{GBA}}$  and  $\text{GAB}$ . Each output reinforces its input in this transceiver configuration. When both enable inputs are activated and all other data sources to the two sets of bus lines are at high impedance, both sets of bus lines (16 in all) will remain at their last states.

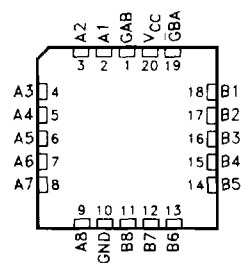
The SN54BCT623 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74BCT623 is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN54BCT623 ... J PACKAGE  
SN74BCT623 ... DW OR N PACKAGE



SN54BCT823 ... FK PACKAGE

(TOP VIEW)



FUNCTION TABLE

ENABLE INPUTS		OPERATION
$\overline{\text{GBA}}$	$\text{GAB}$	
L	L	B data to A bus
H	H	A data to B bus
H	L	Isolation
L	H	B data to A bus
L	H	A data to B bus

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**SN54BCT623, SN74BCT623  
OCTAL BUS TRANSCEIVERS**

**recommended operating conditions**

		SN54BCT623			SN74BCT623			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			V		
I <sub>IJK</sub>	Input clamp current				-18			mA		
I <sub>OH</sub>	High-level output current	Any A		-3			-3	mA		
		Any B		-12			-15			
I <sub>OL</sub>	Low-level output current	Any A		20			24	mA		
		Any B		48			64			
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)**

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**BICMOS Circuits**

PARAMETER		TEST CONDITIONS		SN54BCT623			SN74BCT623			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>	Any A	V <sub>CC</sub> = 4.5 V		I <sub>OH</sub> = -1 mA	2.5	3.4	2.5	3.4	V	
				I <sub>OH</sub> = -3 mA	2.4	3.3	2.4	3.3		
	Any B	V <sub>CC</sub> = 4.5 V		I <sub>OH</sub> = -3 mA	2.4	3.3	2.4	3.3		
				I <sub>OH</sub> = -12 mA	2	3.2				
V <sub>OL</sub>	Any A	V <sub>CC</sub> = 4.5 V		I <sub>OL</sub> = 20 mA	0.3	0.5			V	
				I <sub>OL</sub> = 24 mA			0.35	0.5		
	Any B	V <sub>CC</sub> = 4.5 V		I <sub>OL</sub> = 48 mA	0.38	0.55				
				I <sub>OL</sub> = 64 mA			0.42	0.55		
I <sub>I</sub>	A and B	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 5.5 V		1			1			mA
	GAB and GBA	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 5.5 V		0.1			0.1			
I <sub>IH</sub> ‡	A and B	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 2.7 V		70			70			µA
	GAB and GBA	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 2.7 V		20			20			
I <sub>IL</sub> ‡	A and B	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0.5 V		-0.65			-0.65			mA
	GAB and GBA	V <sub>CC</sub> = 5.5 V, V <sub>I</sub> = 0.5 V		-0.6			-0.6			
I <sub>OS</sub> §	Any A	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 0		-80	-150	-80	-150	mA		
	Any B	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 0		-100	-225	-100	-225			
I <sub>CCH</sub>		V <sub>CC</sub> = 5.5 V, See Note 2		33	53	33	53	mA		
I <sub>CCL</sub>		V <sub>CC</sub> = 5.5 V, See Note 2		58	92	58	92	mA		
I <sub>CCZ</sub>		V <sub>CC</sub> = 5.5 V		6	11	6	11	mA		
C <sub>in</sub>	GAB and GBA	V <sub>CC</sub> = 5 V, V <sub>I</sub> = 2.5 V or 0.5 V		5			5			pF
C <sub>io</sub>	A	V <sub>CC</sub> = 5 V, V <sub>I</sub> = 2.5 V or 0.5 V		9			9			pF
	B	V <sub>CC</sub> = 5 V, V <sub>I</sub> = 2.5 V or 0.5 V		12			12			pF

† All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.

‡ For I/O ports, the parameters I<sub>IH</sub> and I<sub>IL</sub> include the off-state output current.

§ 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<sub>CCH</sub> and I<sub>CCL</sub> are measured in the A-to-B mode.



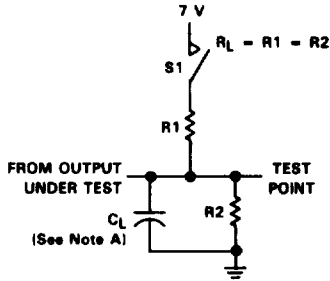
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switching characteristics (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	VCC = 5 V, CL = 50 pF, R1 = 500 Ω, R2 = 500 Ω, TA = 25°C			VCC = 4.5 V to 5.5 V, CL = 50 pF, R1 = 500 Ω, R2 = 500 Ω, TA = MIN to MAX†				UNIT
			'BCT623			SN54BCT623		SN74BCT623		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
tPLH	A	B	0.5	3.1	4.7	0.5	5.3	0.5	5.2	ns
tPHL			1.7	4.9	6.9	1.7	7.6	1.7	7.4	
tPLH	B	A	0.9	4.1	5.9	0.9	6.8	0.9	6.7	ns
tPHL			1.8	5.3	7.6	1.8	8.3	1.8	8	
tPZH	G̅BA	A	3.1	6.8	9.1	3.1	10.7	3.1	10.6	ns
tPZL			3.3	7.2	9.6	3.3	11.3	3.3	10.7	
tPHZ	G̅BA	A	1.9	6.1	8.3	1.9	10.6	1.9	9.8	ns
tPLZ			1.1	4.6	7	1.1	8.1	1.1	7.8	
tPZH	GAB	B	2	5	6.8	2	7.8	2	7.6	ns
tPZL			2.7	6.2	8	2.7	9.3	2.7	8.9	
tPHZ	GAB	B	1.1	4.6	6.5	1.1	8	1.1	7.7	ns
tPLZ			0.3	3.2	6.3	0.3	7.2	0.3	7.1	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

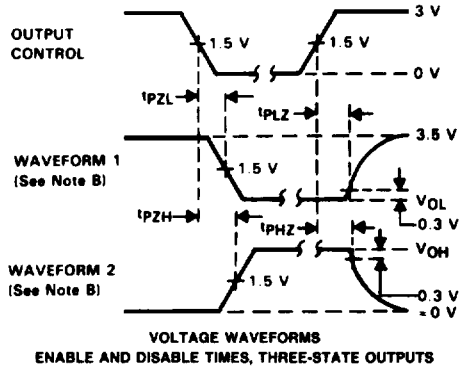
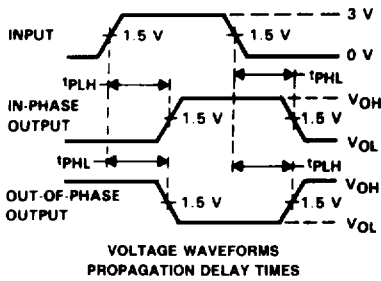
PARAMETER MEASUREMENT INFORMATION



SWITCH POSITION TABLE

TEST	S1
$t_{PLH}$	Open
$t_{PHL}$	Open
$t_{PZH}$	Open
$t_{PZL}$	Closed
$t_{PHZ}$	Open
$t_{PLZ}$	Closed

LOAD CIRCUIT



- NOTES: A.  $C_L$  includes probe and jig capacitance.  
 B. 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.  
 C. All input pulses are supplied by generators having the following characteristics:  $PRR \leq 10$  MHz,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5$  ns,  $t_f \leq 2.5$  ns.  
 D. The outputs are measured one at a time with one input transition per measurement.

FIGURE 1. SWITCHING CHARACTERISTICS