

# SN54BCT623, SN74BCT623 OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SCBS020A – SEPTEMBER 1988 – REVISED NOVEMBER 1993

- State-of-the-Art BICMOS Design Significantly Reduces  $I_{CCZ}$
- ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015
- Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK) and Flatpacks (W), and Plastic and Ceramic 300-mil DIPs (J, N)

## description

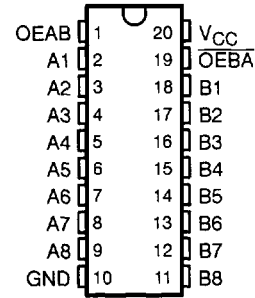
The 'BCT623 bus transceiver is designed for asynchronous communication between data buses. The control function implementation allows for maximum flexibility in timing. The 'BCT623 provides true data at its outputs.

This device allows 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 output-enable (OEAB and  $\overline{OEBA}$ ) inputs.

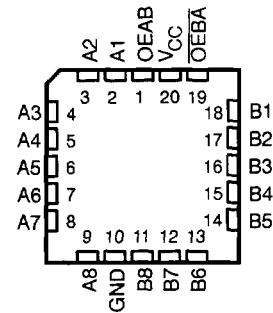
The output-enable inputs can be used to disable the device so that the buses are effectively isolated. The dual-enable configuration gives the transceivers the capability of storing data by simultaneously enabling OEAB and  $\overline{OEBA}$ . Each output reinforces its input in this configuration. When both OEAB and  $\overline{OEBA}$  are enabled 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 OR W PACKAGE  
SN74BCT623 . . . DW OR N PACKAGE  
(TOP VIEW)



SN54BCT623 . . . FK PACKAGE  
(TOP VIEW)



FUNCTION TABLE

INPUTS		OPERATION
$\overline{OEBA}$	OEAB	
L	L	B data to A bus
L	H	B data to A bus, A data to B bus
H	L	isolation
H	H	A data to B bus

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

 **TEXAS  
INSTRUMENTS**

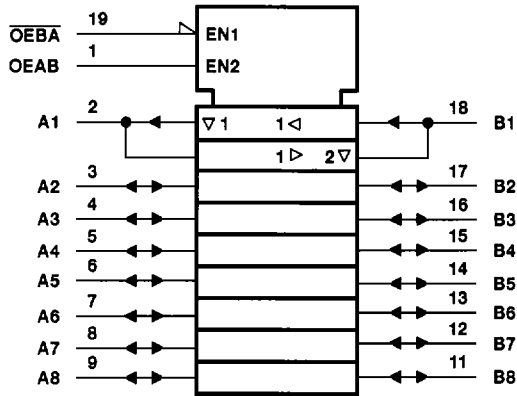
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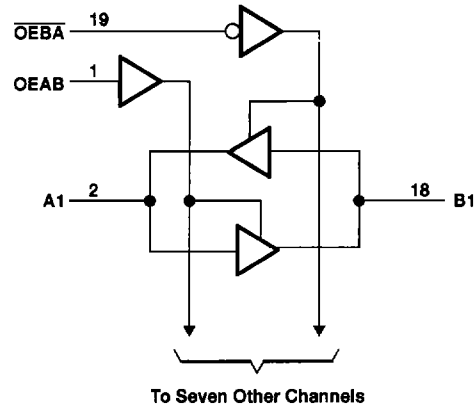
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## logic symbol†



## logic diagram (positive logic)



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

## 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: Control inputs (see Note 1) .....	-0.5 V to 7 V
I/O ports (see Note 1) .....	-0.5 V to 5.5 V
Voltage range applied to any output in the disabled or power-off state, $V_O$ .....	-0.5 V to 5.5 V
Voltage range applied to any output in the high state, $V_O$ .....	-0.5 V to $V_{CC}$
Input clamp current, $I_{IK}$ .....	-30 mA
Current into any output in the low state: SN54BCT623 .....	96 mA
SN74BCT623 .....	128 mA
Operating free-air temperature range: SN54BCT623 .....	-55°C to 125°C
SN74BCT623 .....	0°C to 70°C
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 if the input and output current ratings are observed.

## recommended operating conditions

		SN54BCT623			SN74BCT623			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	A port		-3	-3		mA	
		B port		-12	-15			
$I_{OL}$	Low-level output current	A port		20	24		mA	
		B port		48	64			
$T_A$	Operating free-air temperature	-55	125		0	70		°C



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

PARAMETER	TEST CONDITIONS	SN54BCT623		SN74BCT623		UNIT		
		MIN	TYP†	MAX	MIN		TYP†	MAX
$V_{IK}$	$V_{CC} = 4.5\text{ V}$ , $I_I = -18\text{ mA}$			-1.2		V		
$V_{OH}$	A port	$V_{CC} = 4.5\text{ V}$	$I_{OH} = -1\text{ mA}$	2.5	3.4	2.5	3.4	V
			$I_{OH} = -3\text{ mA}$	2.4	3.3	2.4	3.3	
	B port	$V_{CC} = 4.5\text{ V}$	$I_{OH} = -3\text{ mA}$	2.4	3.3	2.4	3.3	
			$I_{OH} = -12\text{ mA}$	2	3.2			
					2	3.1		
$V_{OL}$	A port	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 20\text{ mA}$	0.3	0.5			V
			$I_{OL} = 24\text{ mA}$			0.35	0.5	
	B port	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 48\text{ mA}$	0.38	0.55			
			$I_{OL} = 64\text{ mA}$			0.42	0.55	
$I_I$	A or B port OEAB or OEBA	$V_{CC} = 5.5\text{ V}$ , $V_I = 5.5\text{ V}$		1		1	mA	
				0.1		0.1		
$I_{IH}^\ddagger$	A or B port	$V_{CC} = 5.5\text{ V}$ , $V_I = 2.7\text{ V}$		70		70	$\mu\text{A}$	
	OEAB or OEBA			20		20		
$I_{IL}^\ddagger$	A or B port	$V_{CC} = 5.5\text{ V}$ , $V_I = 0.5\text{ V}$		-0.65		-0.65	mA	
	OEAB or OEBA			-0.6		-0.6		
$I_{OS}^\S$	A port	$V_{CC} = 5.5\text{ V}$ , $V_O = 0$		-60	-150	-60	-150	mA
	B port			-100	-225	-100	-225	
$I_{CCL}$	A to B	$V_{CC} = 5.5\text{ V}$		58	92	58	92	mA
$I_{CCH}$	A to B	$V_{CC} = 5.5\text{ V}$		33	53	33	53	mA
$I_{CCZ}$		$V_{CC} = 5.5\text{ V}$		6	11	6	11	mA
$C_i$	OEAB or OEBA	$V_{CC} = 5\text{ V}$ , $V_I = 2.5\text{ V}$ or $0.5\text{ V}$		5		5		pF
$C_{io}$	A to B	$V_{CC} = 5\text{ V}$ , $V_O = 2.5\text{ V}$ or $0.5\text{ V}$		9		9		pF
	B to A			12		12		

† All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

‡ For I/O ports, the parameters  $I_{IH}$  and  $I_{IL}$  include the off-state output current.

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



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**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
			BCT623			SN54BCT623		SN74BCT623		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A	B	0.5	3.1	4.7	0.5	5.3	0.5	5.2	ns
t <sub>PHL</sub>			1.7	4.9	6.9	1.7	7.6	1.7	7.4	
t <sub>PLH</sub>	B	A	0.9	4.1	5.9	0.9	6.8	0.9	6.7	ns
t <sub>PHL</sub>			1.8	5.3	7.6	1.8	8.3	1.8	8	
t <sub>PZH</sub>	OEBA	A	3.1	6.8	9.1	3.1	10.7	3.1	10.6	ns
t <sub>PZL</sub>			3.3	7.2	9.6	3.3	11.3	3.3	10.7	
t <sub>PHZ</sub>	OEBA	A	1.9	6.1	8.3	1.9	10.6	1.9	9.8	ns
t <sub>PLZ</sub>			1.1	4.6	7	1.1	8.1	1.1	7.8	
t <sub>PZH</sub>	OEAB	B	2	5	6.8	2	7.8	2	7.6	ns
t <sub>PZL</sub>			2.7	6.2	8	2.7	9.3	2.7	8.9	
t <sub>PHZ</sub>	OEAB	B	1.1	4.6	6.5	1.1	8	1.1	7.7	ns
t <sub>PLZ</sub>			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.

NOTE 2: Load circuits and voltage waveforms are shown in Section 1.

