

# SN54BCT245, SN74BCT245 OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SCBS013F – SEPTEMBER 1988 – REVISED APRIL 1994

- State-of-the-Art BiCMOS Design Significantly Reduces  $I_{CCZ}$
- ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015
- 3-State Outputs Drive Bus Lines or Buffer Memory Address Registers
- Package Options Include Plastic Small-Outline (DW) and Shrink Small-Outline (DB) Packages, Ceramic Chip Carriers (FK) and Flatpacks (W), and Standard Plastic and Ceramic 300-mil DIPs (J, N)

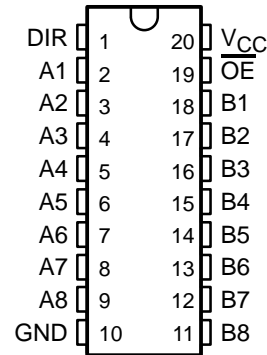
## description

These octal bus transceivers are designed for asynchronous communication between data buses. The devices transmit data from the A bus to the B bus or from the B bus to the A bus depending upon the level at the direction-control (DIR) input. The output-enable ( $\overline{OE}$ ) input can be used to disable the device so the buses are effectively isolated.

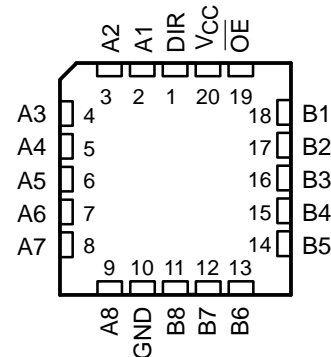
The SN74BCT245 is available in TI's shrink small-outline package (DB), which provides the same I/O pin count and functionality of standard small-outline packages in less than half the printed-circuit-board area.

The SN54BCT245 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74BCT245 is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN54BCT245 . . . J OR W PACKAGE  
SN74BCT245 . . . DB, DW, OR N PACKAGE  
(TOP VIEW)



SN54BCT245 . . . FK PACKAGE  
(TOP VIEW)



FUNCTION TABLE

INPUTS		OPERATION
$\overline{OE}$	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

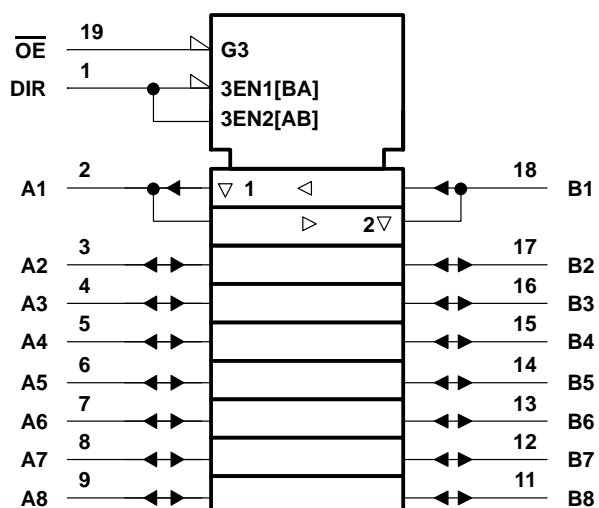
# SN54BCT245, SN74BCT245

## OCTAL BUS TRANSCEIVERS

### WITH 3-STATE OUTPUTS

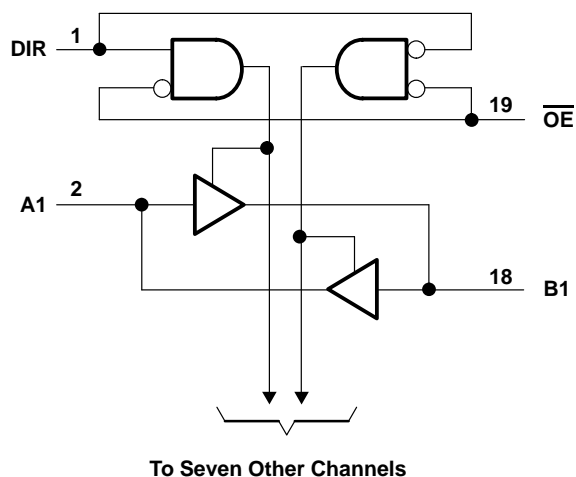
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#### logic symbol†



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

#### logic diagram (positive logic)



#### 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 7 V
Voltage range applied to any output in the high state, $V_O$	– 0.5 V to $V_{CC}$
Current into any output in the low state: SN54BCT245	96 mA
SN74BCT245	128 mA
Power dissipation (DB package only) (see Note 2)	650 mW
Operating free-air temperature range: SN54BCT245	– 55°C to 125°C
SN74BCT245	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.

- NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
2. Power dissipation is application dependent and is a function of supply voltage, operating temperature, the number of outputs switching simultaneously, and output duty cycle. Because the thermal resistance of the DB package is higher than that of the DW or N packages, the DB package may not be suitable for some applications.

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## recommended operating conditions

		SN54BCT245			SN74BCT245			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	A port		-3	mA
		B port		-12	B port		-15	
$I_{OL}$	Low-level output current	A port		20	A port		24	mA
		B port		48	B port		64	
$T_A$	Operating free-air temperature	-55		125	0		70	°C

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

PARAMETER		TEST CONDITIONS		SN54BCT245		SN74BCT245		UNIT
				MIN	TYP†	MAX	MIN	
$V_{IK}$		$V_{CC} = 4.5\text{ V}$ , $I_I = -18\text{ mA}$				-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			
			$I_{OH} = -15\text{ mA}$			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	
	B port	$V_{CC} = 4.5\text{ V}$	$I_{OL} = 48\text{ mA}$		0.38	0.55		
			$I_{OL} = 64\text{ mA}$				0.42	
$I_I$	A or B port	$V_{CC} = 5.5\text{ V}$ , $V_I = 5.5\text{ V}$			1		1	mA
	Control input				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	$\mu\text{A}$
	Control input				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
	Control input				-1.2		-1.2	
$I_{OS}^\S$	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	$V_{CC} = 5.5\text{ V}$		57	90	57	90	mA
$I_{CCH}$	A to B	$V_{CC} = 5.5\text{ V}$		36	57	36	57	mA
$I_{CCZ}$		$V_{CC} = 5.5\text{ V}$		10	15	10	15	mA
$C_i$	Control input	$V_{CC} = 5\text{ V}$ , $V_I = 2.5\text{ V or }0.5\text{ V}$		7		7		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 3)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 5 V, C <sub>L</sub> = 50 pF, R1 = 500 Ω, R2 = 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, R1 = 500 Ω, R2 = 500 Ω, T <sub>A</sub> = MIN to MAX†				UNIT
			‘BCT245			SN54BCT245		SN74BCT245		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A or B	B or A	1	4.4	6	1	7.2	1	7	ns
t <sub>PHL</sub>			1.5	4.8	6.6	1.5	7.6	1.5	7	
t <sub>PZH</sub>	$\overline{\text{OE}}$	A or B	1.5	8	9.4	1.5	11.2	1.5	10.9	ns
t <sub>PZL</sub>			1.5	8	10.2	1.5	11.8	1.5	11.6	
t <sub>PHZ</sub>	$\overline{\text{OE}}$	A or B	1.5	5.8	8.3	1.5	9.7	1.5	9.3	ns
t <sub>PLZ</sub>			1.5	5.1	7.8	1.5	9.6	1.5	9.1	

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

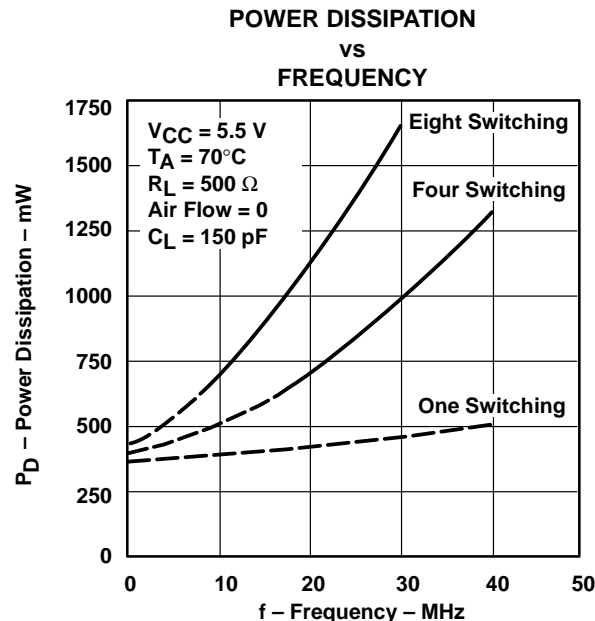
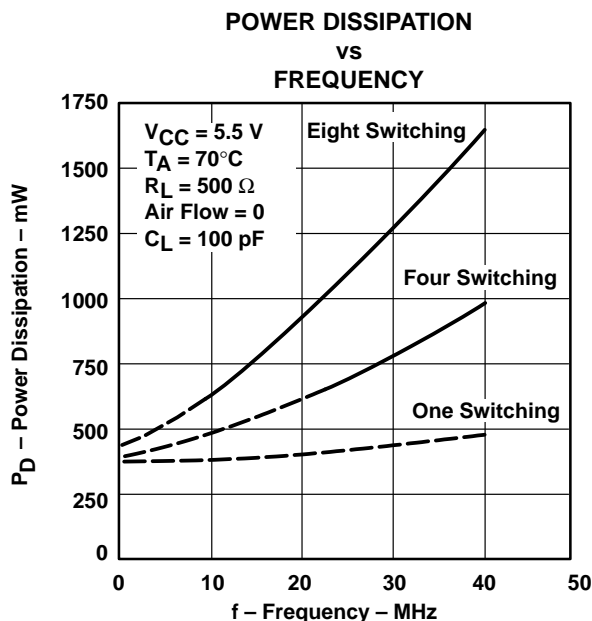
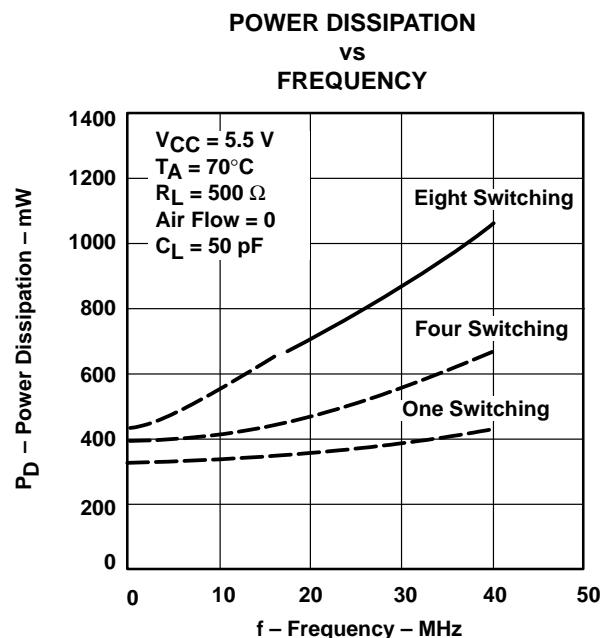
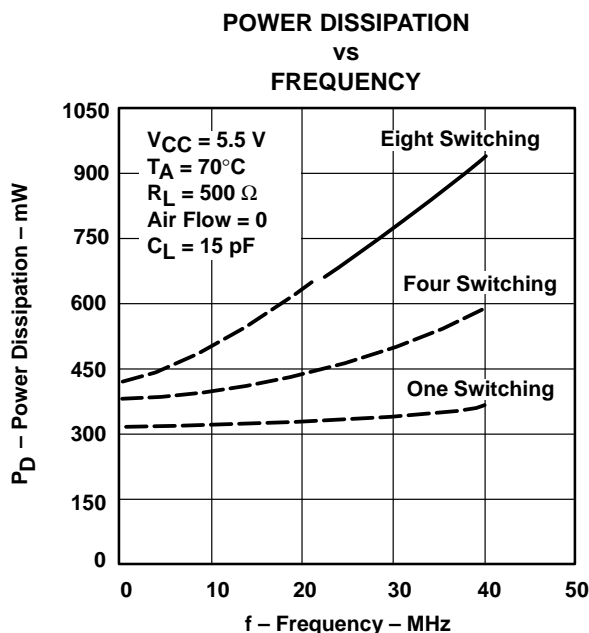
NOTE 3: Load circuits and voltage waveforms are shown in Section 1.

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## TYPICAL CHARACTERISTICS†

Figures 1 through 4 show the typical power dissipation for an SN74BCT245 over variations in outputs switching, output frequency, and capacitive load.



† The dashed lines are for the DB package only.



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