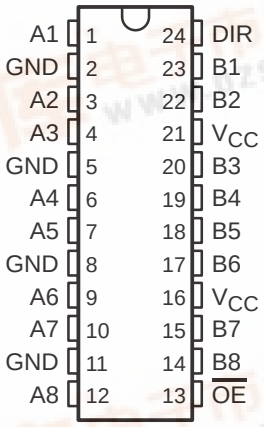
25-Ω OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

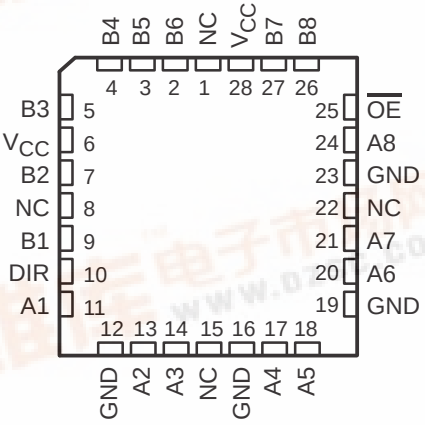
SCBS053B – MAY 1990 – REVISED APRIL 1994

- **State-of-the-Art BiCMOS Design Significantly Reduces I_{CCZ}**
- **ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)**
- **Designed to Facilitate Incident-Wave Switching for Line Impedances of 25 Ω or Greater**
- **Distributed V_{CC} and GND Pins Minimize Noise Generated by the Simultaneous Switching of Outputs**
- **Package Options Include Plastic Small-Outline (DW) Packages, Ceramic Chip Carriers (FK) and Flatpacks (W), and Standard Plastic and Ceramic 300-mil DIPs (JT, NT)**

SN54BCT25245 . . . JT OR W PACKAGE
SN74BCT25245 . . . DW OR NT PACKAGE
(TOP VIEW)



SN54BCT25245 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description

The ′BCT25245 is a 25-Ω octal bus transceiver designed for asynchronous communication between data buses. It improves both the performance and density of 3-state memory address drivers, clock drivers, and bus-oriented transceivers.

The 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 level at the direction-control (DIR) input. The output-enable ($\overline{OE}$) input can disable the device so that both buses are effectively isolated.

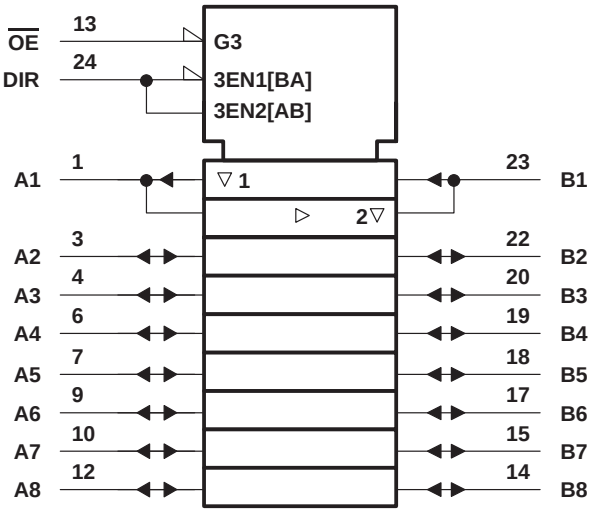
These transceivers are capable of sinking 188-mA I_{OL}, which facilitates switching 25-Ω transmission lines on the incident wave. The distributed V_{CC} and GND pins minimize switching noise for more reliable system operation.

The SN54BCT25245 is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74BCT25245 is characterized for operation from 0°C to 70°C.

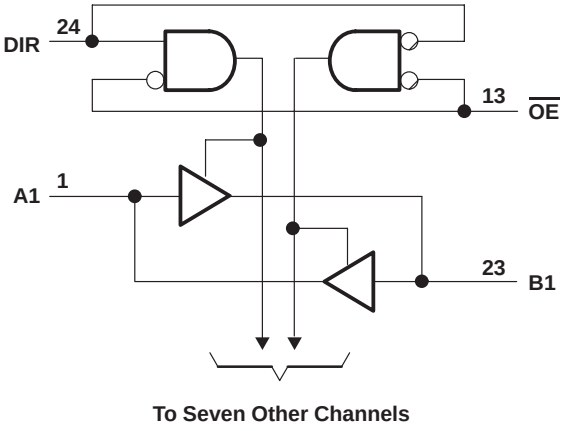
FUNCTION TABLE

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

logic symbol†



logic diagram (positive logic)



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
Pin numbers shown are for the DW, JT, NT, and W 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): Control inputs . . . . . –0.5 V to 7 V
I/O ports . . . . . –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 (B port) . . . . . –0.5 V to V_{CC}
Input clamp current, I_{IK} . . . . . –30 mA
Current into any output in the low state, I_O: SN54BCT25245 (A port) . . . . . 250 mA
SN54BCT25245 (B port) . . . . . 40 mA
SN74BCT25245 (A port) . . . . . 376 mA
SN74BCT25245 (B port) . . . . . 48 mA
Operating free-air temperature range: SN54BCT25245 . . . . . –55°C to 125°C
SN74BCT25245 . . . . . 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 negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.

recommended operating conditions

			SN54BCT25245			SN74BCT25245			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			–53			–80	mA
		B port			–3			–3	
I_{OL}	Low-level output current	A port			125			188	mA
		B port			20			24	
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		SN54BCT25245			SN74BCT25245			UNIT
				MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = –18 mA			–1.2			–1.2	V
V_{OH}	A port	V_{CC} = 4.5 V	I_{OH} = –53 mA	2						V
			I_{OH} = – 80 mA				2			
		V_{CC} = 4.75 V,	I_{OH} = –3 mA				2.7			
	B port	V_{CC} = 4.5 V,	I_{OH} = –3 mA	2.4	3.3		2.4	3.3		
V_{OL}	A port	V_{CC} = 4.5 V	I_{OL} = 94 mA		0.38	0.55		0.42	0.55	V
			I_{OL} = 125 mA			0.8				
			I_{OL} = 188 mA						0.7	
	B port	V_{CC} = 4.5 V	I_{OL} = 20 mA		0.3	0.5				
			I_{OL} = 24 mA					0.35	0.5	
I_I	A or B port	V_{CC} = 5.5 V,	V_I = 5.5 V			0.25			0.25	mA
	Control input					0.1			0.1	
I_{IH}‡	A or B port	V_{CC} = 5.5 V,	V_I = 2.7 V			70			70	µA
	Control input					20			20	
I_{IL}‡	A or B port	V_{CC} = 5.5 V,	V_I = 0.5 V			–0.6			–0.6	mA
	Control input					–0.6			–0.6	
I_{OS}§	B port only¶	V_{CC} = 5.5 V,	V_O = 0	–60		–150	–60		–150	mA
I_{CCH}	A to B	V_{CC} = 5.5 V			36	46		36	46	mA
	B to A				63	80		63	80	
I_{CCL}	A to B	V_{CC} = 5.5 V			48	60		48	60	mA
	B to A				95	125		95	125	
I_{CCZ}		V_{CC} = 5.5 V			12	16		12	16	mA
C_i	Control input	V_{CC} = 5 V,	V_I = 2.5 V or 0.5 V		8			8		pF
C_{io}	A port	V_{CC} = 5 V,	V_O = 2.5 V or 0.5 V		18			18		pF
	B port				8			8		

† All typical values are at V_{CC} = 5 V, T_A = 25°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.
¶ Testing for this parameter on the A port is not recommended.

switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = 25°C			V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX†				UNIT
			′BCT25245			SN54BCT25245		SN74BCT25245		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A	B	1.2	3.3	5.1	1.2	5.8	1.2	5.7	ns
t_{PHL}			1.9	4.3	6.7	1.9	7.6	1.9	7.2	
t_{PLH}	B	A	1.2	3.3	4.8	1.2	5.7	1.2	5.5	ns
t_{PHL}			2.1	4	5.6	2.1	6.4	2.1	6.2	
t_{PZH}	$\overline{OE}$	A	3.7	6.3	8.4	3.7	10.1	3.7	9.6	ns
t_{PZL}			4.5	7.4	9.2	4.5	11.1	4.5	10.3	
t_{PHZ}	$\overline{OE}$	A	1.8	3.7	5.5	1.8	6.4	1.8	6.2	ns
t_{PLZ}			3.3	5.1	7.2	3.3	9.6	3.3	8.3	
t_{PZH}	$\overline{OE}$	B	3.4	5.7	7.9	3.4	9.2	3.4	8.9	ns
t_{PZL}			4.3	6.6	8.7	4.3	10.1	4.3	9.7	
t_{PHZ}	$\overline{OE}$	B	2.7	4.5	6.3	2.7	7.2	2.7	6.9	ns
t_{PLZ}			1.7	4.5	6.8	1.7	8.3	1.7	7.5	

† 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.

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