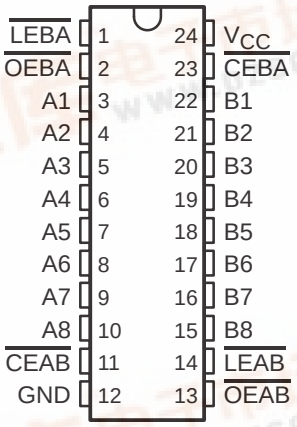
OCTAL REGISTERED TRANSCEIVERS WITH 3-STATE OUTPUTS

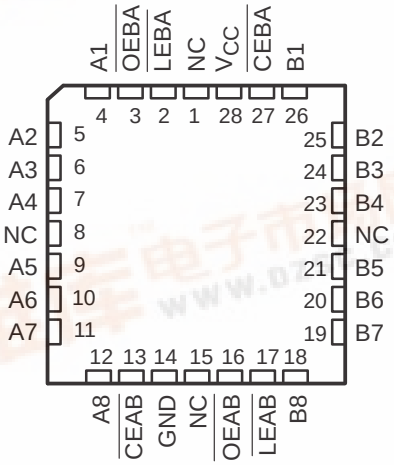
SCBS026C – NOVEMBER 1988 – REVISED APRIL 1994

- **State-of-the-Art BiCMOS Design Significantly Reduces I_{CCZ}**
- **3-State True Outputs**
- **Back-to-Back Registers for Storage**
- **ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015**
- **Package Options Include Plastic Small-Outline Packages (DW), Ceramic Chip Carriers (FK) and Flatpacks (W), and Plastic and Ceramic 300-mil DIPs (JT, NT)**

SN54BCT543 . . . JT OR W PACKAGE
SN74BCT543 . . . DW OR NT PACKAGE
(TOP VIEW)



SN54BCT543 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

description

The ′BCT543 octal transceiver contains two sets of D-type latches for temporary storage of data flowing in either direction. Separate latch-enable ($\overline{\text{LEAB}}$ or $\overline{\text{LEBA}}$) and output-enable ($\overline{\text{OEAB}}$ or $\overline{\text{OEBA}}$) inputs are provided for each register to permit independent control in either direction of data flow.

The A-to-B enable ($\overline{\text{CEAB}}$) input must be low in order to enter data from A or to output data from B. If $\overline{\text{CEAB}}$ is low and $\overline{\text{LEAB}}$ is low, the A-to-B latches are transparent; a subsequent low-to-high transition of $\overline{\text{LEAB}}$ puts the A latches in the storage mode. With $\overline{\text{CEAB}}$ and $\overline{\text{OEAB}}$ both low, the 3-state B outputs are active and reflect the data present at the output of the A latches. Data flow from B to A is similar but requires using the $\overline{\text{CEBA}}$, $\overline{\text{LEBA}}$, and $\overline{\text{OEBA}}$ inputs.

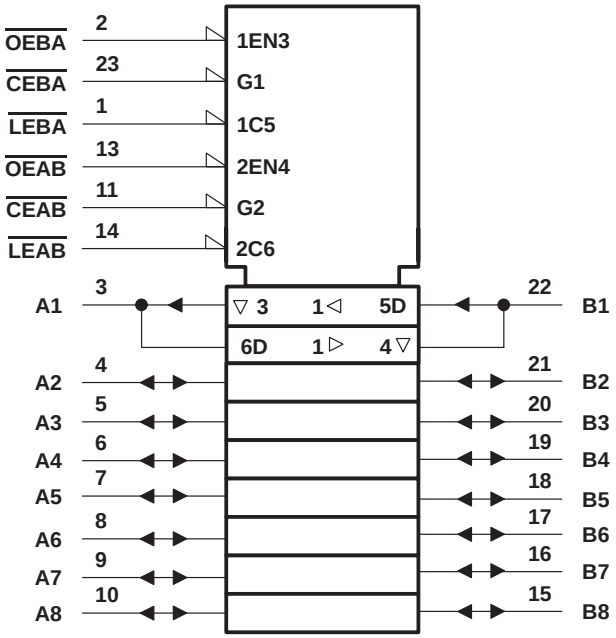
The SN54BCT543 is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74BCT543 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE†

INPUTS				OUTPUT
$\overline{\text{CEAB}}$	$\overline{\text{LEAB}}$	$\overline{\text{OEAB}}$	A	B
H	X	X	X	Z
X	X	H	X	Z
L	H	L	X	B_0‡
L	L	L	L	L
L	L	L	H	H

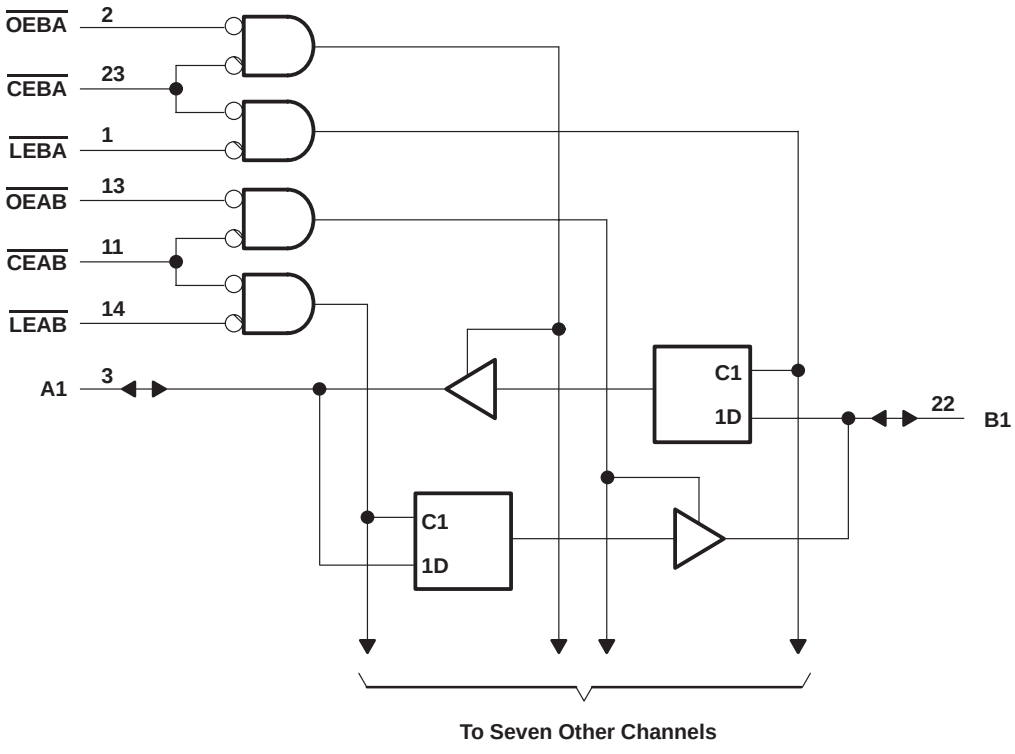
† A-to-B data flow is shown; B-to-A flow control is the same except that it uses $\overline{\text{CEBA}}$, $\overline{\text{LEBA}}$, and $\overline{\text{OEBA}}$.
‡ Output level before the indicated steady-state input conditions were established.

logic symbol†



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

logic diagram (positive logic)



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: 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}
Input clamp current, I_{IK} . . . . . –30 mA
Current into any output in the low state: SN54BCT543 . . . . . 96 mA
SN74BCT543 . . . . . 128 mA
Operating free-air temperature range: SN54BCT543 . . . . . – 55°C to 125°C
SN74BCT543 . . . . . 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

		SN54BCT543			SN74BCT543			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			–12			–15	mA
I_{OL}	Low-level output current			48			64	mA
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		SN54BCT543			SN74BCT543			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}		V_{CC} = 4.5 V	I_{OH} = –3 mA	2.4	3.3		2.4	3.3		V
			I_{OH} = –12 mA	2	3.2					
			I_{OH} = –15 mA				2	3.1		
V_{OL}		V_{CC} = 4.5 V	I_{OL} = 48 mA		0.38	0.55				V
			I_{OL} = 64 mA					0.42	0.55	
I_I		V_{CC} = 5.5 V,	V_I = 5.5 V			0.4			0.4	mA
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			–0.65			–0.65	mA
	Control input					–0.6			–0.6	
I_{OS}§		V_{CC} = 5.5 V,	V_O = 0	–100		–225	–100		–225	mA
I_{CCL}	A or B port	V_{CC} = 5.5 V			45	71		45	71	mA
I_{CCH}	A or B port	V_{CC} = 5.5 V			5	8		5	8	mA
I_{CCZ}	A or B port	V_{CC} = 5.5 V			9	15		9	15	mA
C_i	Control input	V_{CC} = 5 V,	V_I = 2.5 V or 0.5 V		6			6		pF
C_{io}	A or B port	V_{CC} = 5 V,	V_O = 2.5 V or 0.5 V		16			16		pF

† 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.

timing requirements over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted)

			V_{CC} = 5 V, T_A = 25°C		SN54BCT543		SN74BCT543		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration, $\overline{LEAB}$ or $\overline{LEBA}$ low		7		8		7		ns
t_{su}	Setup time, data before $\overline{LEAB}$ or $\overline{LEBA}$↑	High or low	4.5		5.5		4.5		ns
t_h	Hold time, data after $\overline{LEAB}$ or $\overline{LEBA}$↑	High or low	1.5		1.5		1.5		ns

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
			′BCT543			SN54BCT543		SN74BCT543		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A or B	B or A	2	5.7	7.5	2	9.9	2	8.8	ns
t_{PHL}			2	6.3	8.2	2	9.7	2	9.6	
t_{PLH}	$\overline{LE}$	A or B	2	8.2	10.3	2	13.9	2	12.9	ns
t_{PHL}			2	8.5	10.6	2	13.2	2	12.7	
t_{PZH}	$\overline{OE}$	A or B	1	6.8	8.6	1	11.4	1	10.7	ns
t_{PZL}			1	8.7	10.8	1	12.8	1	12.3	
t_{PHZ}	$\overline{OE}$	A or B	1	5.5	7.2	1	8.8	1	8.1	ns
t_{PLZ}			1	4.7	6.4	1	8.1	1	7.2	
t_{PZH}	$\overline{CE}$	A or B	1	7.6	9.8	1	12.8	1	12	ns
t_{PZL}			1	9.5	11.6	1	13.8	1	13.5	
t_{PHZ}	$\overline{CE}$	A or B	1	5.8	7.5	1	9.3	1	8.5	ns
t_{PLZ}			1	4.8	6.7	1	8.4	1	7.6	

† 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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