

# SN54BCT29863B, SN74BCT29863B 9-BIT BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SCBS015D – NOVEMBER 1988 – REVISED NOVEMBER 1993

- BiCMOS Design Substantially Reduces  $I_{CCZ}$
- Functionally Equivalent to 'ALS29863 and AMD Am29863A
- Power-Up High-Impedance State
- 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 Standard Plastic and Ceramic 300-mil DIPs (JT, NT)

## description

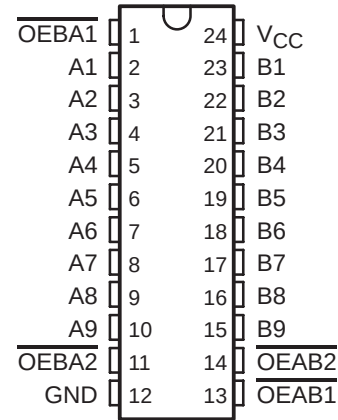
These 9-bit transceivers are designed for asynchronous communication between data buses. The control-function implementation allows for maximum flexibility in timing.

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

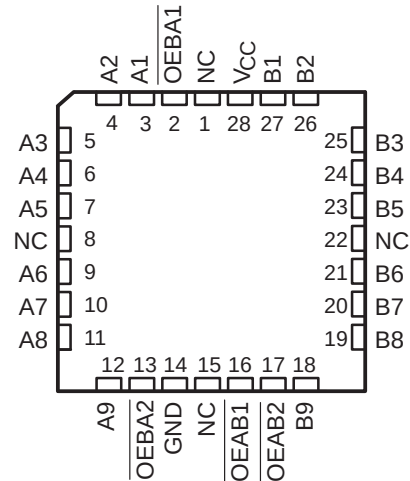
The outputs are in the high-impedance state during power-up and power-down conditions. The outputs remain in the high-impedance state while the device is powered down.

The SN54BCT29863B is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74BCT29863B is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN54BCT29863B . . . JT OR W PACKAGE  
SN74BCT29863B . . . DW OR NT PACKAGE  
(TOP VIEW)



SN54BCT29863B . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

FUNCTION TABLE

| INPUTS             |                    |                    |                    | OPERATION     |
|--------------------|--------------------|--------------------|--------------------|---------------|
| $\overline{OEAB1}$ | $\overline{OEAB2}$ | $\overline{OEBA1}$ | $\overline{OEBA2}$ |               |
| L                  | L                  | L                  | L                  | Latch A and B |
| L                  | L                  | H                  | X                  | A to B        |
| L                  | L                  | X                  | H                  |               |
| H                  | X                  | L                  | L                  | B to A        |
| X                  | H                  | L                  | L                  |               |
| H                  | X                  | H                  | X                  | Isolation     |
| H                  | X                  | X                  | H                  |               |
| X                  | H                  | X                  | H                  |               |
| X                  | H                  | H                  | X                  |               |

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.



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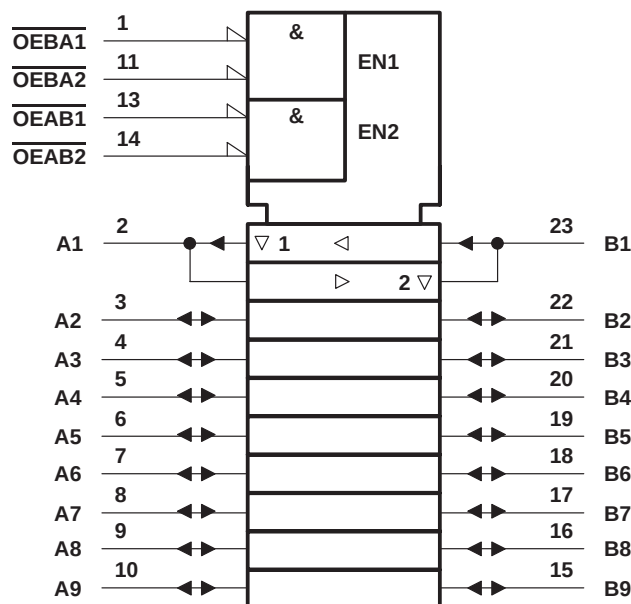
# SN54BCT29863B, SN74BCT29863B

## 9-BIT BUS TRANSCEIVERS

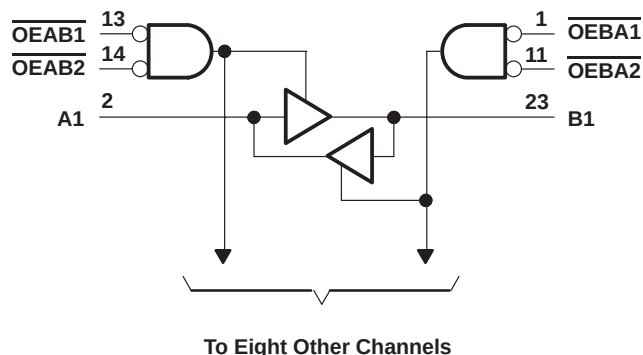
### WITH 3-STATE OUTPUTS

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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.

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 (I/O ports) (see Note 1)            | –0.5 V to 5.5 V    |
| Input voltage range (excluding I/O ports) (see Note 1)  | –0.5 V to 7 V      |
| Voltage range applied to any output in the high state   | –0.5 V to $V_{CC}$ |
| Input clamp current                                     | –30 mA             |
| Current into any output in the low state: SN54BCT29863B | 48 mA              |
| SN74BCT29863B                                           | 96 mA              |
| Operating free-air temperature range: SN54BCT29863B     | –55°C to 125°C     |
| SN74BCT29863B                                           | 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 negative input voltage ratings may be exceeded if the input current rating is observed.

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## 9-BIT BUS TRANSCEIVERS

### WITH 3-STATE OUTPUTS

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#### recommended operating conditions

|          |                                | SN54BCT29863B |     |     | SN74BCT29863B |     |     | 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      |               |     | -15 |               |     | -24 | mA   |
| $I_{OL}$ | Low-level output current       |               |     | 24  |               |     | 48  | 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                                                |                  | SN54BCT29863B |      |      | SN74BCT29863B |      |      | UNIT          |
|----------------------|----------------|----------------------------------------------------------------|------------------|---------------|------|------|---------------|------|------|---------------|
|                      |                |                                                                |                  | MIN           | TYP† | MAX  | MIN           | TYP† | MAX  |               |
| $V_{IK}$             |                | $V_{CC} = 4.5\text{ V}$ , $I_I = -18\text{ mA}$                |                  |               |      | -1.2 |               |      | -1.2 | V             |
| $V_{OH}$             |                | $V_{CC} = 4.5\text{ V}$ , $I_{OH} = -15\text{ mA}$             |                  | 2.4           | 3.3  |      | 2.4           | 3.3  |      | V             |
|                      |                | $V_{CC} = 4.5\text{ V}$ , $I_{OH} = -24\text{ mA}$             |                  |               |      |      | 2             | 3.1  |      |               |
|                      |                | $V_{CC} = 4.75\text{ V}$ , $I_{OH} = -3\text{ mA}$             |                  |               |      |      | 2.7           |      |      |               |
| $V_{OL}$             |                | $V_{CC} = 4.5\text{ V}$ , $I_{OL} = 24\text{ mA}$              |                  | 0.35          | 0.5  |      |               |      |      | V             |
|                      |                | $V_{CC} = 4.5\text{ V}$ , $I_{OL} = 48\text{ mA}$              |                  |               |      |      | 0.35          | 0.5  |      |               |
| $I_I$                |                | $V_{CC} = 5.5\text{ V}$ , $V_I = 5.5\text{ V}$                 |                  |               | 0.1  |      |               | 0.1  |      | mA            |
| $I_{IH}$             | Control inputs | $V_{CC} = 5.5\text{ V}$ , $V_I = 2.7\text{ V}$                 |                  |               | 20   |      |               | 20   |      | $\mu\text{A}$ |
|                      | A or B port‡   |                                                                |                  |               | 20   |      |               | 20   |      |               |
| $I_{IL}$             | Control inputs | $V_{CC} = 5.5\text{ V}$ , $V_I = 0.5\text{ V}$                 |                  |               | -0.2 |      |               | -0.2 |      | mA            |
|                      | A or B port‡   |                                                                |                  |               | -0.2 |      |               | -0.2 |      |               |
| $I_{IO(off)}^{\S}$   |                | $V_{CC} = 0$ , $V_O = 2.7\text{ V}$                            |                  |               | 0.1  |      |               | 0.1  |      | mA            |
| $I_{OS}^{\parallel}$ |                | $V_{CC} = 5.5\text{ V}$ , $V_O = 0$                            |                  | -75           |      | -250 | -75           |      | -250 | mA            |
| $I_{CC}$             |                | $V_{CC} = 5.5\text{ V}$                                        | Outputs high     | 18            | 30   |      | 18            | 30   |      | mA            |
|                      |                |                                                                | Outputs low      | 30            | 45   |      | 30            | 45   |      |               |
|                      |                |                                                                | Outputs disabled | 6.5           | 12   |      | 6.5           | 12   |      |               |
| $C_i$                |                | $V_{CC} = 5\text{ V}$ , $V_I = 2.5\text{ V}$ or $0.5\text{ V}$ |                  | 6             |      |      | 6             |      |      | pF            |
| $C_{io}$             |                | $V_{CC} = 5\text{ V}$ , $V_I = 2.5\text{ V}$ or $0.5\text{ V}$ |                  | 8             |      |      | 8             |      |      | pF            |

† 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.

§  $I_{IO(off)}$  = Power-off bus-leakage current

¶ Not more than one output should be shorted at a time and duration of the short circuit should not exceed one second.



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## 9-BIT BUS TRANSCEIVERS

### WITH 3-STATE OUTPUTS

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#### switching characteristics (see Note 2)

| PARAMETER        | FROM<br>(INPUT)                                      | TO<br>(OUTPUT) | V <sub>CC</sub> = 5 V,<br>C <sub>L</sub> = 50 pF,<br>R1 = 500 Ω,<br>R2 = 500 Ω,<br>T <sub>A</sub> = 25°C |     |      | V <sub>CC</sub> = 4.5 V to 5.5 V,<br>C <sub>L</sub> = 50 pF,<br>R1 = 500 Ω,<br>R2 = 500 Ω,<br>T <sub>A</sub> = MIN to MAX† |      |               |      | UNIT |
|------------------|------------------------------------------------------|----------------|----------------------------------------------------------------------------------------------------------|-----|------|----------------------------------------------------------------------------------------------------------------------------|------|---------------|------|------|
|                  |                                                      |                | 'BCT29863B                                                                                               |     |      | SN54BCT29863B                                                                                                              |      | SN74BCT29863B |      |      |
|                  |                                                      |                | MIN                                                                                                      | TYP | MAX  | MIN                                                                                                                        | MAX  | MIN           | MAX  |      |
| t <sub>PLH</sub> | A or B                                               | B or A         | 1                                                                                                        | 3   | 4.5  | 1                                                                                                                          | 5.4  | 1             | 5    | ns   |
| t <sub>PHL</sub> |                                                      |                | 2                                                                                                        | 4.8 | 6.8  | 2                                                                                                                          | 7.9  | 2             | 7.5  |      |
| t <sub>PZH</sub> | $\overline{\text{OEAB}}$ or $\overline{\text{OEBA}}$ | A or B         | 2                                                                                                        | 5.1 | 7    | 2                                                                                                                          | 9.2  | 2             | 8.4  | ns   |
| t <sub>PZL</sub> |                                                      |                | 4.5                                                                                                      | 8.4 | 10.8 | 4.5                                                                                                                        | 13.6 | 4.5           | 12.6 |      |
| t <sub>PHZ</sub> | $\overline{\text{OEAB}}$ or $\overline{\text{OEBA}}$ | A or B         | 2                                                                                                        | 5   | 7.2  | 2                                                                                                                          | 9.6  | 2             | 8.8  | ns   |
| t <sub>PLZ</sub> |                                                      |                | 1.7                                                                                                      | 4.7 | 6.7  | 1.7                                                                                                                        | 9.1  | 1.7           | 8.1  |      |

† 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.

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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
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