

# SN54ABT863, SN74ABT863 9-BIT BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SCBS201E – FEBRUARY 1991 – REVISED JULY 1998

- State-of-the-Art *EPIC-IIB™* BiCMOS Design Significantly Reduces Power Dissipation
- Typical  $V_{OLP}$  (Output Ground Bounce) < 1 V at  $V_{CC} = 5$  V,  $T_A = 25^\circ\text{C}$
- High-Impedance State During Power Up and Power Down
- High-Drive Outputs ( $-32\text{-mA } I_{OH}$ ,  $64\text{-mA } I_{OL}$ )
- Latch-Up Performance Exceeds 500 mA Per JESD 17
- ESD Protection Exceeds 2000 V Per MIL-STD-883, Method 3015; Exceeds 200 V Using Machine Model ( $C = 200$  pF,  $R = 0$ )
- Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB) Packages, and Thin Shrink Small-Outline (PW), Ceramic Chip Carriers (FK), Plastic (NT), and Ceramic (JT) DIPs

## description

The 'ABT863 devices are 9-bit transceivers designed for asynchronous communication between data buses. The control-function implementation allows for maximum flexibility in timing.

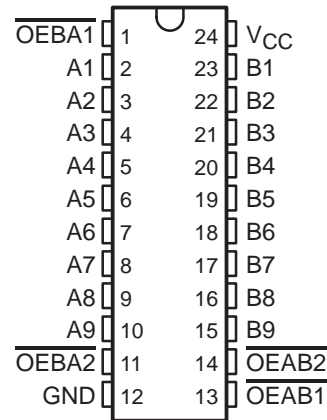
These devices allow noninverted data transmission from the A bus to the B bus or from the B bus to the A bus, depending on the logic levels at the output-enable ( $\overline{OEAB}$  and  $\overline{OEBA}$ ) inputs.

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

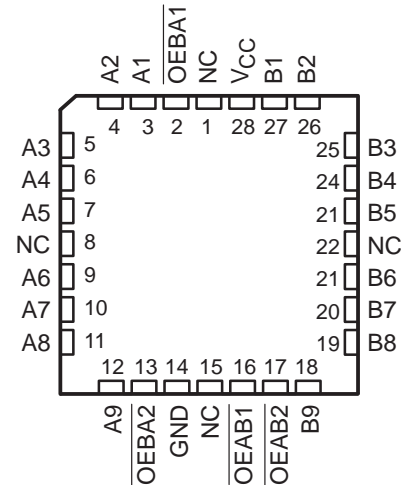
When  $V_{CC}$  is between 0 and 2.1 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 2.1 V,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

The SN54ABT863 is characterized for operation over the full military temperature range of  $-55^\circ\text{C}$  to  $125^\circ\text{C}$ . The SN74ABT863 is characterized for operation from  $-40^\circ\text{C}$  to  $85^\circ\text{C}$ .

SN54ABT863 . . . JT PACKAGE  
SN74ABT863 . . . DB, DW, NT, OR PW PACKAGE  
(TOP VIEW)



SN54ABT863 . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection



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**TEXAS  
INSTRUMENTS**

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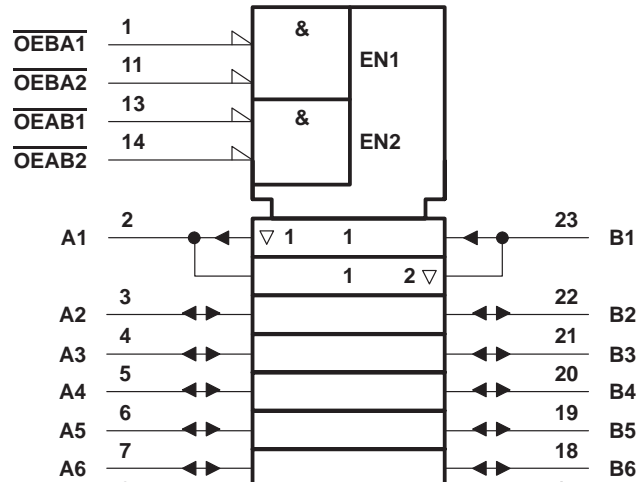
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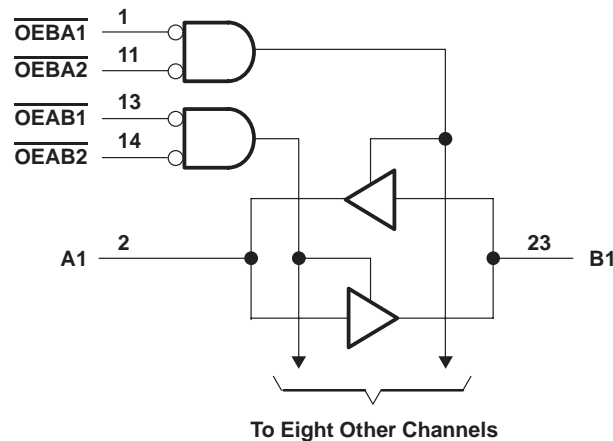
**FUNCTION TABLE**

INPUTS				OPERATION
OEAB1	OEAB2	OEBA1	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	

**logic symbol†**



logic diagram (positive logic)



Pin numbers shown are for the DB, DW, JT, NT, and PW 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, $V_I$ (except I/O ports) (see Note 1) .....	-0.5 V to 7 V
Voltage range applied to any output in the high or power-off state, $V_O$ .....	-0.5 V to 5.5 V
Current into any output in the low state, $I_O$ : SN54ABT863 .....	96 mA
SN74ABT863 .....	128 mA
Input clamp current, $I_{IK}$ ( $V_I < 0$ ) .....	-18 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ ) .....	-50 mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): DB package .....	104°C/W
DW package .....	81°C/W
NT package .....	67°C/W
PW package .....	120°C/W
Storage temperature range, $T_{Stg}$ .....	-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 negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.  
2. The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

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**recommended operating conditions (see Note 3)**

		SN54ABT863		SN74ABT863		UNIT
		MIN	MAX	MIN	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5.5	4.5	5.5	V
V <sub>IH</sub>	High-level input voltage	2		2		V
V <sub>IL</sub>	Low-level input voltage		0.8		0.8	V
V <sub>I</sub>	Input voltage	0	V <sub>CC</sub>	0	V <sub>CC</sub>	V
I <sub>OH</sub>	High-level output current		-24		-32	mA
I <sub>OL</sub>	Low-level output current		48		64	mA
Δt/Δv	Input transition rise or fall rate	Outputs enabled			5	ns/V
Δt/ΔV <sub>CC</sub>	Power-up ramp rate	200		200		μs/V
T <sub>A</sub>	Operating free-air temperature	-55	125	-40	85	°C

NOTE 3: All unused inputs of the device must be held at V<sub>CC</sub> or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

PARAMETER	TEST CONDITIONS	T <sub>A</sub> = 25°C			SN54ABT863		SN74ABT863		UNIT	
		MIN	TYP†	MAX	MIN	MAX	MIN	MAX		
V <sub>IK</sub>	V <sub>CC</sub> = 4.5 V, I <sub>I</sub> = -18 mA			-1.2		-1.2		-1.2	V	
V <sub>OH</sub>	V <sub>CC</sub> = 4.5 V, I <sub>OH</sub> = -3 mA			2.5		2.5		2.5	V	
	V <sub>CC</sub> = 5 V, I <sub>OH</sub> = -3 mA			3		3		3		
	V <sub>CC</sub> = 4.5 V, I <sub>OH</sub> = -24 mA			2		2				
V <sub>OL</sub>	V <sub>CC</sub> = 4.5 V, I <sub>OL</sub> = 48 mA					0.55			V	
						0.55*		0.55		
V <sub>hys</sub>				100					mV	
I <sub>I</sub>	Control inputs	V <sub>CC</sub> = 0 to 5.5 V, V <sub>I</sub> = V <sub>CC</sub> or GND				±1		±1	±1	µA
	A or B ports	V <sub>CC</sub> = 2.1 V to 5.5 V, V <sub>I</sub> = V <sub>CC</sub> or GND				±20		±20	±20	
I <sub>OZPU</sub>	V <sub>CC</sub> = 0 to 2.1 V, V <sub>O</sub> = 0.5 V to 2.7 V, OE = * don't care			±50		±50**		±50	µA	
I <sub>OZPD</sub>	V <sub>CC</sub> = 2.1 V to 0, V <sub>O</sub> = 0.5 V to 2.7 V, OE = * don't care			±50		±50**		±50	µA	
I <sub>OZH</sub> ‡	V <sub>CC</sub> = 2.1 V to 5.5 V, V <sub>O</sub> = 2.7 V, OE ≥ 2 V			10		10		10	µA	
I <sub>OZL</sub> ‡	V <sub>CC</sub> = 2.1 V to 5.5 V, V <sub>O</sub> = 0.5 V, OE ≥ 2 V			-10		-10		-10	µA	
I <sub>off</sub>	V <sub>CC</sub> = 0, V <sub>I</sub> or V <sub>O</sub> ≤ 4.5 V			±100*				±100	µA	
I <sub>CEX</sub>	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 5.5 V	Outputs high				50		50	µA	
I <sub>O</sub> §	V <sub>CC</sub> = 5.5 V, V <sub>O</sub> = 2.5 V			-50	-100	-225		-50	-225	mA
I <sub>CC</sub>	A or B ports	V <sub>CC</sub> = 5.5 V, I <sub>O</sub> = 0, V <sub>I</sub> = V <sub>CC</sub> or GND	Outputs high		1	250		250	250	µA
			Outputs low		24	30		38	38	mA
			Outputs disabled		0.5	250		250	250	µA
ΔI <sub>CC</sub> ¶	Data inputs	V <sub>CC</sub> = 5.5 V, One input at 3.4 V, Other inputs at V <sub>CC</sub> or GND	Outputs enabled			1.5		1.5	1.5	mA
			Outputs disabled			0.05		0.05	0.05	
	Control inputs	V <sub>CC</sub> = 5.5 V, One input at 3.4 V, Other inputs at V <sub>CC</sub> or GND				1.5		1.5	1.5	
C <sub>i</sub>	Control inputs	V <sub>I</sub> = 2.5 V or 0.5 V			4				pF	
C <sub>io</sub>	A or B ports	V <sub>O</sub> = 2.5 V or 0.5 V			7				pF	

\* On products compliant to MIL-PRF-38535, this parameter does not apply.

\*\* On products compliant to MIL-PRF-38535, this parameter is not production tested.

† All typical values are at V<sub>CC</sub> = 5 V.

‡ The parameters I<sub>OZH</sub> and I<sub>OZL</sub> include the input leakage current.

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

¶ This is the increase in supply current for each input that is at the specified TTL voltage level rather than V<sub>CC</sub> or GND.

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.



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switching characteristics over recommended ranges of supply voltage and operating free-air temperature,  $C_L = 50$  pF (unless otherwise noted) (see Figure 1)

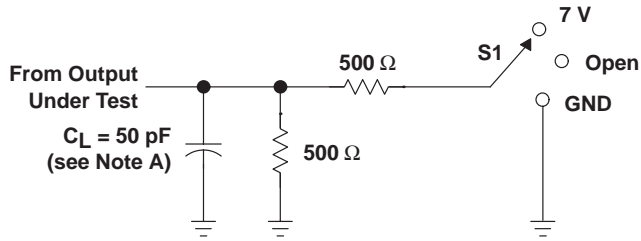
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5$ V, $T_A = 25^\circ$ C			SN54ABT863		SN74ABT863		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{PLH}$	A or B	B or A	1	2.6	4.1	1	7	1	5.7	ns
$t_{PHL}$			1	2.3	3.3	1	3.9	1	3.9	
$t_{PZH}$	$\overline{OEAB}$ or $\overline{OEBA}$	B or A	1	3.2	4.3	1	5.4	1	5.5	ns
$t_{PZL}$			1	3.3	4.4	1	5.5	1	5.4	
$t_{PHZ}$	$\overline{OEAB}$ or $\overline{OEBA}$	B or A	2.5	4.8	6	2.5	6.8	2.5	6.7	ns
$t_{PLZ}$			1.5	4.4	5.9	1.5	7.8	1.5	6.9	

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PARAMETER MEASUREMENT INFORMATION



TEST	S1
$t_{PLH}/t_{PHL}$	Open
$t_{PLZ}/t_{PZL}$	7 V
$t_{PHZ}/t_{PZH}$	Open

LOAD CIRCUIT

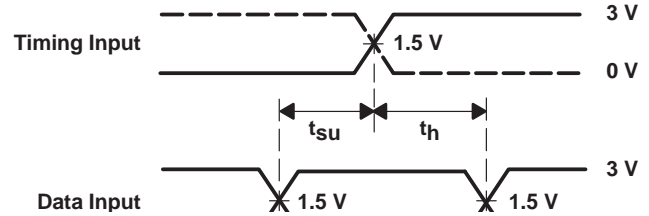
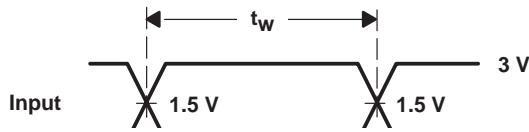


Figure 1. Load Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
SN74ABT863DW	ACTIVE	SOIC	DW	24	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT863	<a href="#">Samples</a>
SN74ABT863DWR	ACTIVE	SOIC	DW	24	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	ABT863	<a href="#">Samples</a>

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBsolete:** TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

**RoHS Exempt:** TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

**Green:** TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

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## TAPE AND REEL INFORMATION



### QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74ABT863DWR	SOIC	DW	24	2000	330.0	24.4	10.75	15.7	2.7	12.0	24.0	Q1

**TAPE AND REEL BOX DIMENSIONS**



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ABT863DWR	SOIC	DW	24	2000	350.0	350.0	43.0

DW (R-PDSO-G24)

PLASTIC SMALL OUTLINE



- NOTES:
- All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
  - This drawing is subject to change without notice.
  - Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
  - Falls within JEDEC MS-013 variation AD.

DW (R-PDSO-G24)

PLASTIC SMALL OUTLINE



4209202-5/F 08/13

- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Refer to IPC7351 for alternate board design.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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