

SN54ABT861, SN74ABT861 10-BIT TRANSCEIVERS WITH 3-STATE OUTPUTS

SCBS199A – FEBRUARY 1991 – REVISED OCTOBER 1995

- State-of-the-Art *EPIC-II B*™ BiCMOS Design Significantly Reduces Power Dissipation
- ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17
- High-Drive Outputs (–32-mA I_{OH} , 64-mA I_{OL})
- Package Options Include Plastic Small-Outline (DW) and Shrink Small-Outline (DB) Packages, Ceramic Chip Carriers (FK), and Plastic (NT) and Ceramic (JT) DIPs

description

The 'ABT861 are 10-bit transceivers designed for asynchronous communication between data buses. The control function implementation allows for maximum flexibility in timing.

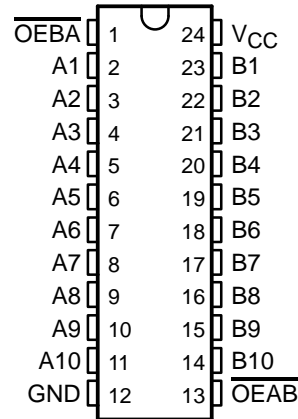
These devices allow data transmission from the A bus to the B bus or from the B bus to the A bus, depending upon the logic levels at the output-enable (\overline{OEAB} and \overline{OEBA}) inputs.

To ensure the high-impedance state during power up or power down, \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.

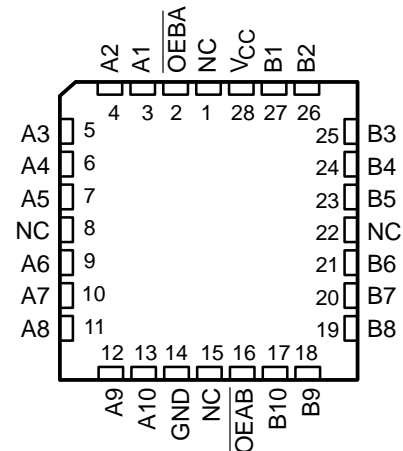
The SN74ABT861 is available in TI's shrink small-outline package (DB), which provides the same I/O pin count and functionality of standard small-outline packages in less than half the printed-circuit-board area.

The SN54ABT861 is characterized for operation over the full military temperature range of –55°C to 125°C. The SN74ABT861 is characterized for operation from –40°C to 85°C.

SN54ABT861 . . . JT PACKAGE
SN74ABT861 . . . DB, DW, OR NT PACKAGE
(TOP VIEW)



SN54ABT861 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection



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**TEXAS
INSTRUMENTS**

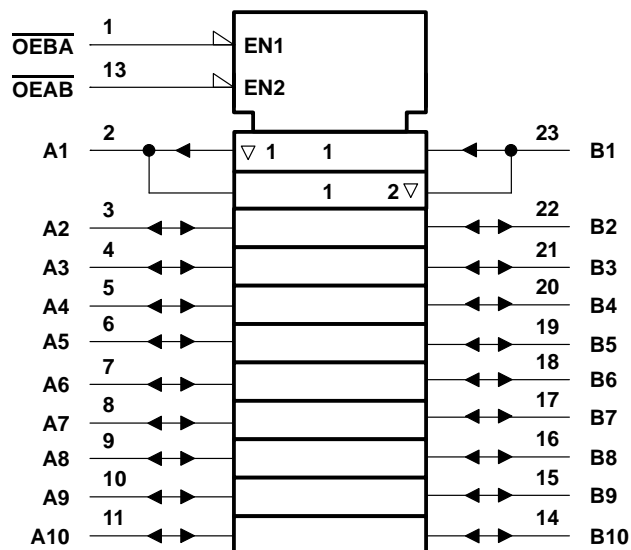
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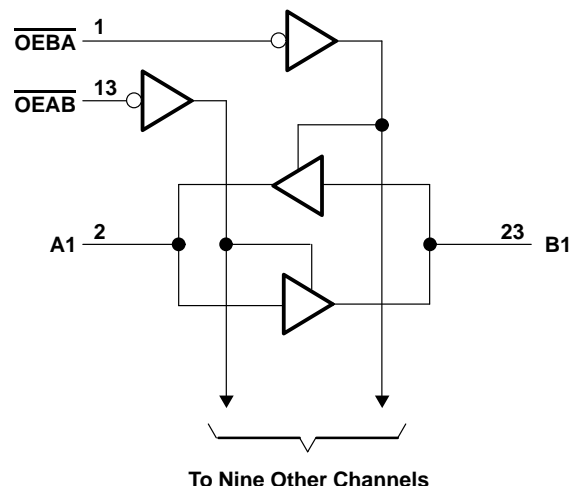
FUNCTION TABLE

INPUTS		OPERATION
OEAB	OEBA	
L	H	A data to B bus
H	L	B data to A bus
H	H	Isolation
L	L	Latch A and B (A = B)

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 DB, DW, JT, and NT 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 state or power-off state, V_O	–0.5 V to 5.5 V
Current into any output in the low state, I_O : SN54ABT861	96 mA
SN74ABT861	128 mA
Input clamp current, I_{IK} ($V_I < 0$)	–18 mA
Output clamp current, I_{OK} ($V_O < 0$)	–50 mA
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2): DB package	0.7 W
DW package	1 W
NT package	1.3 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 maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils. For more information, refer to the *Package Thermal Considerations* application note in the 1994 *ABT Advanced BiCMOS Technology Data Book*, literature number SCBD002B.

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recommended operating conditions (see Note 3)

		SN54ABT861		SN74ABT861		UNIT
		MIN	MAX	MIN	MAX	
V_{CC}	Supply voltage	4.5	5.5	4.5	5.5	V
V_{IH}	High-level input voltage	2		2		V
V_{IL}	Low-level input voltage		0.8		0.8	V
V_I	Input voltage	0	V_{CC}	0	V_{CC}	V
I_{OH}	High-level output current		-24		-32	mA
I_{OL}	Low-level output current		48		64	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	Outputs enabled		5	5	ns/V
T_A	Operating free-air temperature	-55	125	-40	85	°C

NOTE 3: Unused inputs must be held high or low to prevent them from floating.

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

PARAMETER	TEST CONDITIONS		TA = 25°C			SN54ABT861		SN74ABT861		UNIT	
			MIN	TYP†	MAX	MIN	MAX	MIN	MAX		
V _{IK}	V _{CC} = 4.5 V, I _I = −18 mA		−1.2			−1.2		−1.2		V	
V _{OH}	V _{CC} = 4.5 V, I _{OH} = −3 mA		2.5			2.5		2.5		V	
	V _{CC} = 5 V, I _{OH} = −3 mA		3			3		3			
	V _{CC} = 4.5 V, I _{OH} = −24 mA		2			2					
	V _{CC} = 4.5 V, I _{OH} = −32 mA		2*					2			
V _{OL}	V _{CC} = 4.5 V, I _{OL} = 48 mA		0.55			0.55				V	
	V _{CC} = 4.5 V, I _{OL} = 64 mA		0.55*					0.55			
I _I	V _{CC} = 5.5 V, V _I = V _{CC} or GND		Control inputs		±1		±1		±1		μA
			A or B ports		±100		±100		±100		
I _{OZPU}	V _{CC} = 0 to 2.1 V, V _O = 0.5 V to 2.7 V, \overline{OE} = X		±50			±50		±50		μA	
I _{OZPD}	V _{CC} = 2.1 V to 0, V _O = 0.5 V to 2.7 V, \overline{OE} = X		±50			±50		±50		μA	
I _{OZH} [‡]	V _{CC} = 5.5 V, V _O = 2.7 V		50			50		50		μA	
I _{OZL} [‡]	V _{CC} = 5.5 V, V _O = 0.5 V		−50			−50		−50		μA	
I _{off}	V _{CC} = 0, V _I or V _O ≤ 4.5 V		±100					±100		μA	
I _{CEX}	V _{CC} = 5.5 V, V _O = 5.5 V		Outputs high		50		50		50		μA
I _O [§]	V _{CC} = 5.5 V, V _O = 2.5 V		−50	−100	−225 [#]	−50	−225 [#]	−50	−225 [#]	mA	
I _{CC}	V _{CC} = 5.5 V, I _O = 0, V _I = V _{CC} or GND	A or B ports	Outputs high		1 250		250		250		μA
			Outputs low		24 38		38		38		mA
			Outputs disabled		0.5 250		250		250		μA
ΔI _{CC} [¶]	V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND	Data inputs	Outputs enabled		1.5		1.5		1.5		mA
			Outputs disabled		1.5 [#]		1.5 [#]		1.5 [#]		
		Control inputs				1.5		1.5		1.5	
C _i	V _I = 2.5 V or 0.5 V		Control inputs		4.5						pF
C _{io}	V _O = 2.5 V or 0.5 V		A or B ports		10.5						pF

* On products compliant to MIL-STD-883, Class B, this parameter does not apply.

† All typical values are at $V_{CC} = 5\text{ V}$.

‡ The parameters I_{OZH} and I_{OZL} 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_{CC} or GND.

This limit may vary among suppliers.

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10-BIT TRANSCEIVERS

WITH 3-STATE OUTPUTS

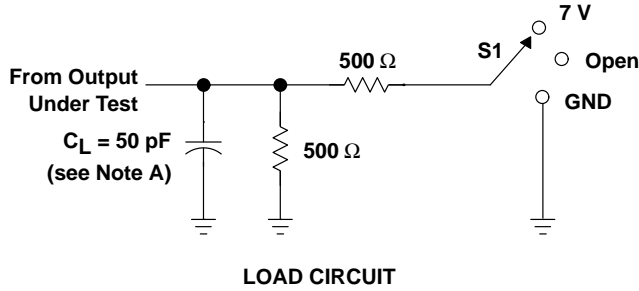
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switching characteristics over recommended ranges of supply voltage and operating free-air temperature, $C_L = 50$ pF (unless otherwise noted) (see Figure 1)

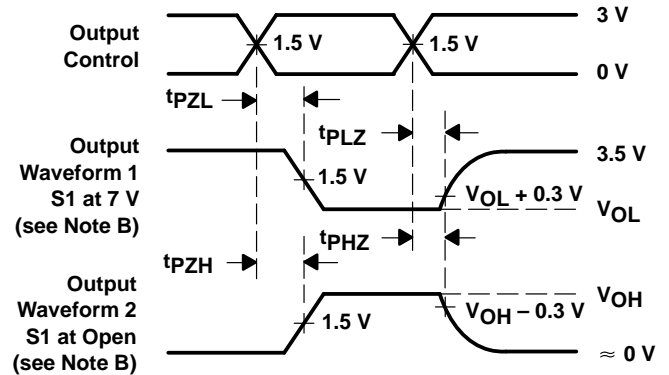
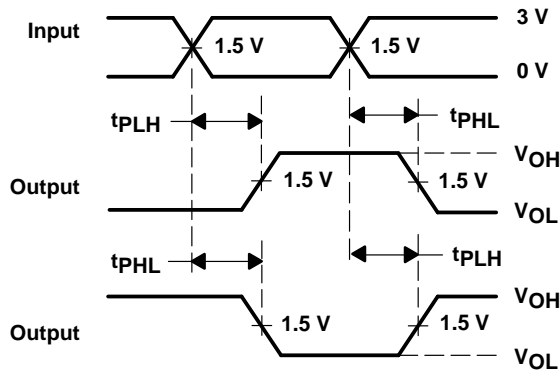
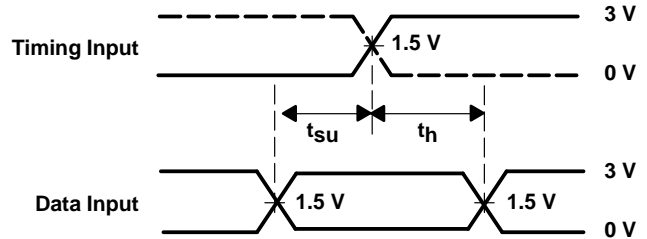
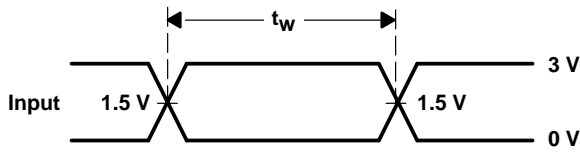
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$			SN54ABT861		SN74ABT861		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A or B	B or A	1	3.4	4.9	1	5.3	1	5.2	ns
t_{PHL}			1	3.2	4.4	1	5	1	4.9†	
t_{PZH}	\overline{OEAB} or \overline{OEBA}	B or A	1	3.5	5	1	6	1	5.9	ns
t_{PZL}			1	4.6	6	1	7	1	6.9	
t_{PHZ}	\overline{OEAB} or \overline{OEBA}	B or A	2.1	5.3	6.5	2.1	7.6	2.1	7.5	ns
t_{PLZ}			1.5	5.3	6.6	1.5	7.2	1.5	7.1	

† This limit may vary among suppliers.

PARAMETER MEASUREMENT INFORMATION



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



- NOTES: A. C_L includes probe and jig capacitance.
- B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
- C. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r \leq 2.5 \text{ ns}$, $t_f \leq 2.5 \text{ ns}$.
- D. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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