

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

description

These octal bus transceivers provide for asynchronous communication between data buses. The control-function implementation allows for maximum flexibility in timing. The 'ABT620 devices provide inverted data at the outputs.

These devices allow 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 (OEAB and OEBA) inputs.

The output-enable inputs can be used to disable the device so that the buses are effectively isolated. The dual-enable configuration gives the transceivers the capability of storing data by simultaneously enabling OEAB and \overline{OEBA} . When both OEAB and \overline{OEBA} are enabled and all other data sources to the two sets of bus lines are at high impedance, both sets of bus lines (16 total) remain at their last states. In this way, each output reinforces its input in this configuration.

To ensure the high-impedance state during power up or power down, \overline{OEBA} 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. $OEAB$ should be tied to GND through a pulldown resistor; the minimum value of the resistor is determined by the current-sourcing capability of the driver.

The SN54ABT620 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ABT620 is characterized for operation from -40°C to 85°C .



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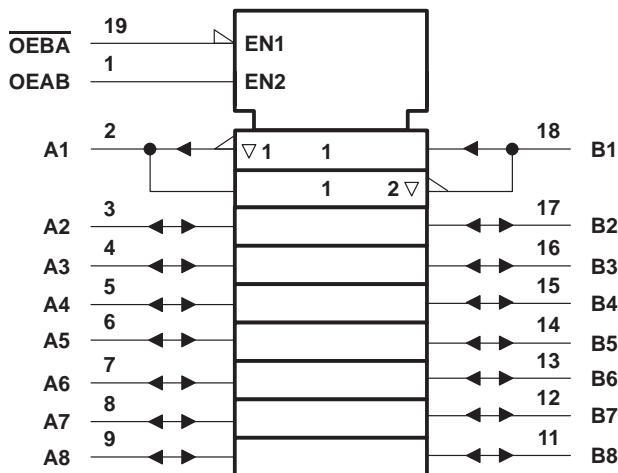
SN54ABT620, SN74ABT620 OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

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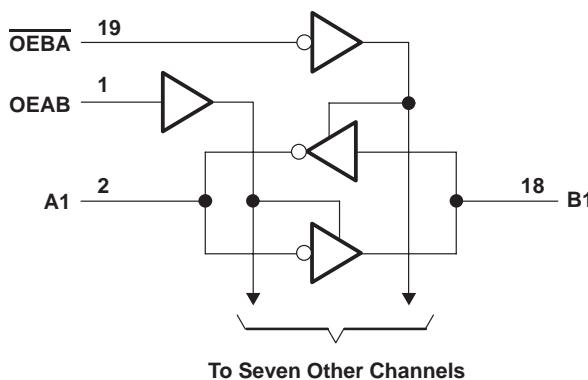
FUNCTION TABLE

INPUTS		OPERATION
OEBA	OEAB	
L	L	\overline{B} data to A bus
L	H	\overline{B} data to A bus, A data to B bus
H	L	Isolation
H	H	\overline{A} data to B bus

logic symbol†



logic diagram (positive logic)



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

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

‡ 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.

recommended operating conditions (see Note 3)

		SN54ABT620		SN74ABT620		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
Δt/Δv	Input transition rise or fall rate	Outputs enabled		5		ns/V
T _A	Operating free-air temperature	-55	125	-40	85	°C

NOTE 3: All unused pins (control or I/O) of the device must be held at V_{CC} 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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SCBS113D – FEBRUARY 1991 – REVISED APRIL 1998

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

PARAMETER	TEST CONDITIONS	TA = 25°C			SN54ABT620		SN74ABT620		UNIT
		MIN	TYPE†	MAX	MIN	MAX	MIN	MAX	
VIK	VCC = 4.5 V, I _I = -18 mA			-1.2		-1.2		-1.2	V
VOH	VCC = 4.5 V, I _{OH} = -3 mA	2.5			2.5		2.5		V
	VCC = 5 V, I _{OH} = -3 mA	3			3		3		
	VCC = 4.5 V	I _{OH} = -24 mA	2		2				
		I _{OH} = -32 mA	2*				2		
VOL	VCC = 4.5 V	I _{OL} = 48 mA		0.55		0.55			V
		I _{OL} = 64 mA		0.55*			0.55		
V _{hys}			100						mV
I _I	Control inputs A or B ports	VCC = 5.5 V, V _I = VCC or GND		±1	±1	±1			µA
				±100	±100	±100			
I _{OZH} ‡	VCC = 5.5 V, V _O = 2.7 V			50		50		50	µA
I _{OZL} ‡	VCC = 5.5 V, V _O = 0.5 V			-50		-50		-50	µA
I _{off}	VCC = 0, V _I or V _O ≤ 4.5 V			±100			±100		µA
I _{CEX}	VCC = 5.5 V, V _O = 5.5 V	Outputs high		50		50		50	µA
I _O §	VCC = 5.5 V, V _O = 2.5 V	-50 -100 -180		-50 -180		-50 -180			mA
I _{CC}	A or B ports	VCC = 5.5 V, I _O = 0, V _I = VCC or GND	Outputs high	5	250	250	250	250	µA
			Outputs low	24	30	30	30	30	mA
			Outputs disabled	0.5	250	250	250	250	µA
ΔI _{CC} ¶	Data inputs	VCC = 5.5 V, One input at 3.4 V, Other inputs at VCC or GND	Outputs enabled		1.5	1.5	1.5		mA
			Outputs disabled		0.05	0.05	0.05		
	Control inputs	VCC = 5.5 V, One input at 3.4 V, Other inputs at VCC or GND			1.5	1.5	1.5		
C _i	Control inputs	V _I = 2.5 V or 0.5 V		4					pF
C _{io}	A or B ports	V _O = 2.5 V or 0.5 V		7					pF

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

† All typical values are at VCC = 5 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 VCC 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, $C_L = 50 \text{ pF}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5 \text{ V}$, $T_A = 25^\circ\text{C}$		SN54ABT620	SN74ABT620	UNIT
			MIN	MAX	MIN	MAX	
t_{PLH}	A or B	B or A	1	4.1	1	1	4.8
t_{PHL}			1	4.3	1	1	4.8
t_{PZH}	OEBA	A	1.3	4.6	1.3	1.3	5.5
t_{PZL}			1	6.1	1	1	7.1
t_{PHZ}	OEBA	A	2	6.3	2	2	7
t_{PLZ}			1.4	5.4	1.4	1.4	5.8
t_{PZH}	OEAB	B	1.6	6.2	1.6	1.6	6.8
t_{PZL}			2	5.9	2	2	6.4
t_{PHZ}	OEAB	B	1.2	5.6	1.2	1.2	6.5
t_{PLZ}			1.1	4.7	1.1	1.1	5.6

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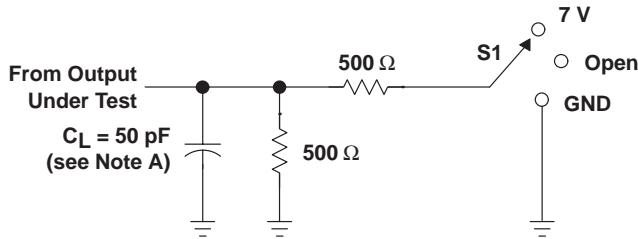


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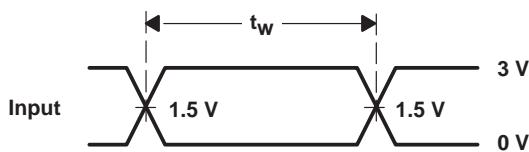
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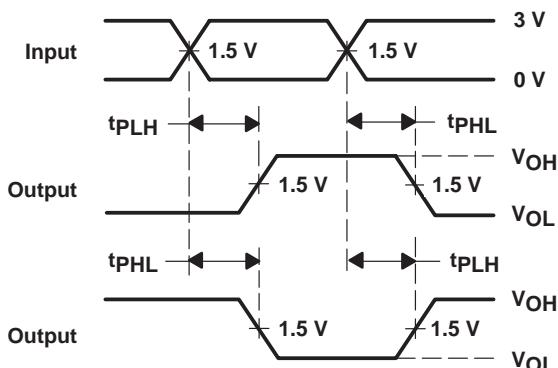
PARAMETER MEASUREMENT INFORMATION



LOAD CIRCUIT

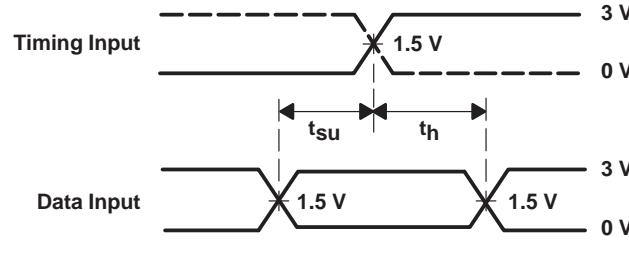


VOLTAGE WAVEFORMS
PULSE DURATION

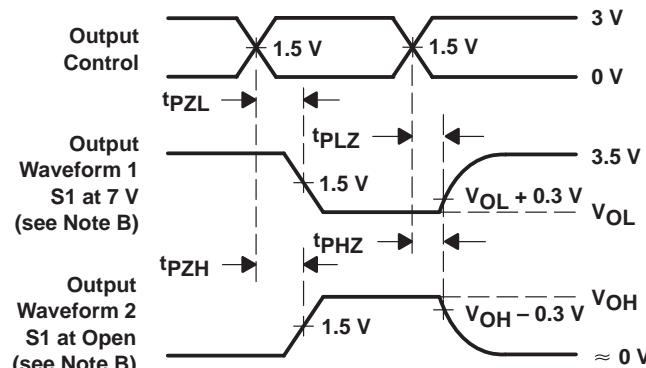


VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES
INVERTING AND NONINVERTING OUTPUTS

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



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES
LOW- AND HIGH-LEVEL ENABLING

NOTES:

- C_L includes probe and jig capacitance.
- 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.
- All input pulses are supplied by generators having the following characteristics: PRR \leq 10 MHz, $Z_O = 50 \Omega$, $t_r \leq 2.5$ ns, $t_f \leq 2.5$ ns.
- The outputs are measured one at a time with one transition per measurement.

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	MSL Peak Temp ⁽³⁾
SN74ABT620DBLE	OBsolete	SSOP	DB	20		TBD	Call TI	Call TI
SN74ABT620DBR	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT620DBRE4	ACTIVE	SSOP	DB	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT620DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT620DWE4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT620DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT620DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT620N	ACTIVE	PDIP	N	20	20	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74ABT620NSR	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74ABT620NSRE4	ACTIVE	SO	NS	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽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⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

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