

SN54ABT162245, SN74ABT162245 16-BIT BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

MARCH 1993

- A-Port Outputs Have Equivalent 25- Ω Series Resistors, So No External Resistors Are Required
- Members of the Texas Instruments *Widebus*™ Family
- State-of-the-Art *EPIC-II*B™ BiCMOS Design Significantly Reduces Power Dissipation
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17
- Typical V_{OLP} (Output Ground Bounce) < 1 V at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$
- Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise
- Flow-Through Architecture Optimizes PCB Layout
- Packaged in Plastic 300-mil Shrink Small-Outline and Thin Shrink Small-Outline Packages and 380-mil Fine-Pitch Ceramic Flat Packages Using 25-mil Center-to-Center Spacings

description

The 'ABT162245 is a 16-bit (dual-octal) noninverting 3-state transceiver designed for synchronous two-way communication between data buses. The control function implementation minimizes external timing requirements.

This device can be used as two 8-bit transceivers or one 16-bit transceiver. It allows data transmission from the A bus to the B bus or from the B bus to the A bus depending upon the logic level at the direction-control (DIR) input. The output-enable ($\overline{OE}$) input can be used to disable the device so that the buses are effectively isolated.

The A-port outputs, which are designed to source or sink up to 12 mA, include 25- Ω series resistors to reduce overshoot and undershoot.

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 SN74ABT162245 is available in TI's shrink small-outline package (DL), which provides twice the I/O pin count and functionality of standard small-outline packages in the same printed-circuit-board area.

The SN54ABT162245 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ABT162245 is characterized for operation from -40°C to 85°C .

FUNCTION TABLE
(each 8-bit section)

INPUTS		OPERATION
$\overline{OE}$	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

SN54ABT162245 ... WD PACKAGE
SN74ABT162245 ... DGG OR DL PACKAGE
(TOP VIEW)

1DIR	1	48	$1\overline{OE}$
1B1	2	47	1A1
1B2	3	46	1A2
GND	4	45	GND
1B3	5	44	1A3
1B4	6	43	1A4
V_{CC}	7	42	V_{CC}
1B5	8	41	1A5
1B6	9	40	1A6
GND	10	39	GND
1B7	11	38	1A7
1B8	12	37	1A8
2B1	13	36	2A1
2B2	14	35	2A2
GND	15	34	GND
2B3	16	33	2A3
2B4	17	32	2A4
V_{CC}	18	31	V_{CC}
2B5	19	30	2A5
2B6	20	29	2A6
GND	21	28	GND
2B7	22	27	2A7
2B8	23	26	2A8
2DIR	24	25	$2\overline{OE}$

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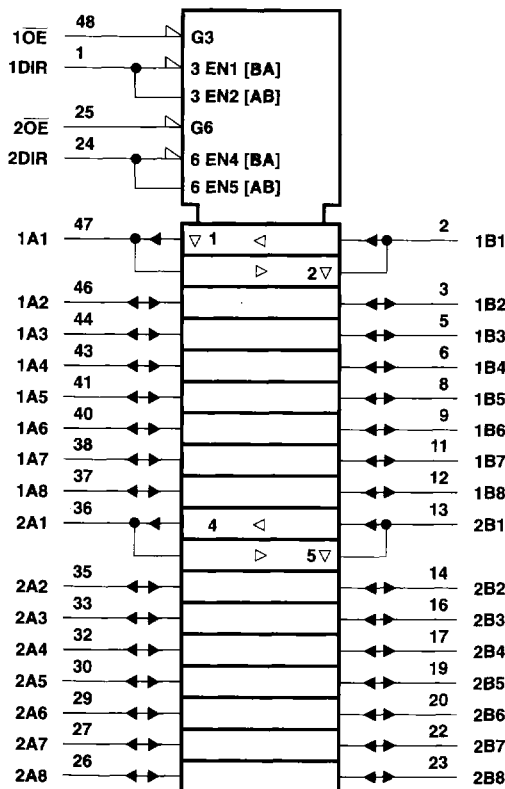
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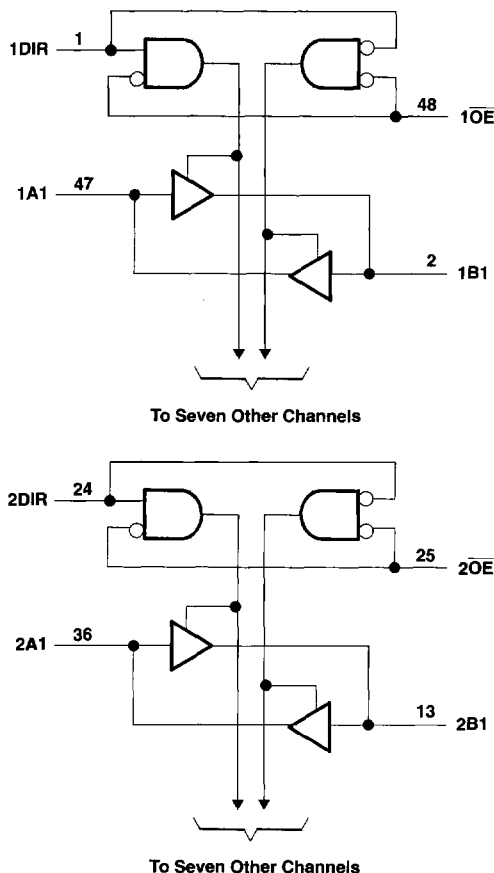
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logic symbol†



logic diagram (positive logic)



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† 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)‡

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 : SN54ABT162245 (B port)	96 mA
SN74ABT162245 (B port)	128 mA
A port	30 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): DGG package	0.8 W
DL package	0.85 W
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 negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.



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recommended operating conditions (see Note 2)

			SN54ABT162245		SN74ABT162245		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	B port	−24		−32		mA
		A port	−12		−12		
I _{OL}	Low-level output current	B port	48		64		mA
		A port	12		12		
Δt/Δv	Input transition rise or fall rate		Outputs enabled		10		ns/V
T _A	Operating free-air temperature		−55	125	−40	85	°C

NOTE 2: Unused or floating pins (input or I/O) must be held high or low.

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

PARAMETER	TEST CONDITIONS		T _A = 25°C			SN54ABT162245		SN74ABT162245		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	B port		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 _{CC} = 4.5 V, I _{OH} = -12 mA	A port		2.6‡				2.6		
V _{OL}	V _{CC} = 4.5 V	I _{OL} = 8 mA	A port	0.4	0.8		0.8		0.65	V
		I _{OL} = 12 mA							0.8	
		I _{OL} = 48 mA	B port		0.55		0.55			
		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 _{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	-180	-50	-180	-50	-180	mA
I _{CC}	V _{CC} = 5.5 V, I _O = 0, V _I = V _{CC} or GND	A or B ports	Outputs high		2		2		2	mA
			Outputs low		32		32		32	
			Outputs disabled		2		2		2	
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		1.5		1	mA
			Outputs disabled		0.05		1		0.05	
		Control inputs			1.5		1.5		1.5	
C _I	V _I = 2.5 V or 0.5 V			7						pF
C _{IO}	V _O = 2.5 V or 0.5 V			7						pF

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

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

 § 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.

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