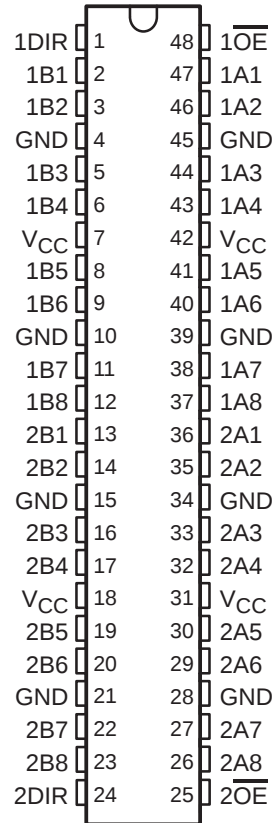


SN54ABTH162245, SN74ABTH162245 16-BIT BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SCBS712A – FEBRUARY 1998 – REVISED APRIL 1999

- Members of the Texas Instruments **Widebus™** Family
- A-Port Outputs Have Equivalent 25-Ω Series Resistors, So No External Resistors Are Required
- State-of-the-Art **EPIC-II B™** BiCMOS Design Significantly Reduces Power Dissipation
- Typical V_{OLP} (Output Ground Bounce) < 1 V at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$
- Distributed V_{CC} and GND Pin Configuration Minimizes High-Speed Switching Noise
- Flow-Through Architecture Optimizes PCB Layout
- Bus Hold on Data Inputs Eliminates the Need for External Pullup/Pulldown Resistors
- 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 Thin Shrink Small-Outline (DGG), Thin Very Small-Outline (DGV), and Shrink Small-Outline (DL) Packages and 380-mil Fine-Pitch Ceramic Flat (WD) Package Using 25-mil Center-to-Center Spacings

SN54ABTH162245 . . . WD PACKAGE
SN74ABTH162245 . . . DGG, DGV, OR DL PACKAGE
(TOP VIEW)



description

The 'ABTH162245 devices are 16-bit noninverting 3-state transceivers designed for synchronous two-way communication between data buses. The control-function implementation minimizes external timing requirements.

These devices can be used as two 8-bit transceivers or one 16-bit transceiver. They allow data transmission from the A bus to the B bus or from the B bus to the A bus, depending on 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 equivalent 25-Ω series resistors to reduce overshoot and undershoot.

Active bus-hold circuitry is provided to hold unused or floating data inputs at a valid logic level.

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 SN54ABTH162245 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ABTH162245 is characterized for operation from -40°C to 85°C .



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

Widebus and EPIC-II B are trademarks of Texas Instruments Incorporated.

UNLESS OTHERWISE NOTED this document contains PRODUCTION DATA information 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.

**TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1999, Texas Instruments Incorporated

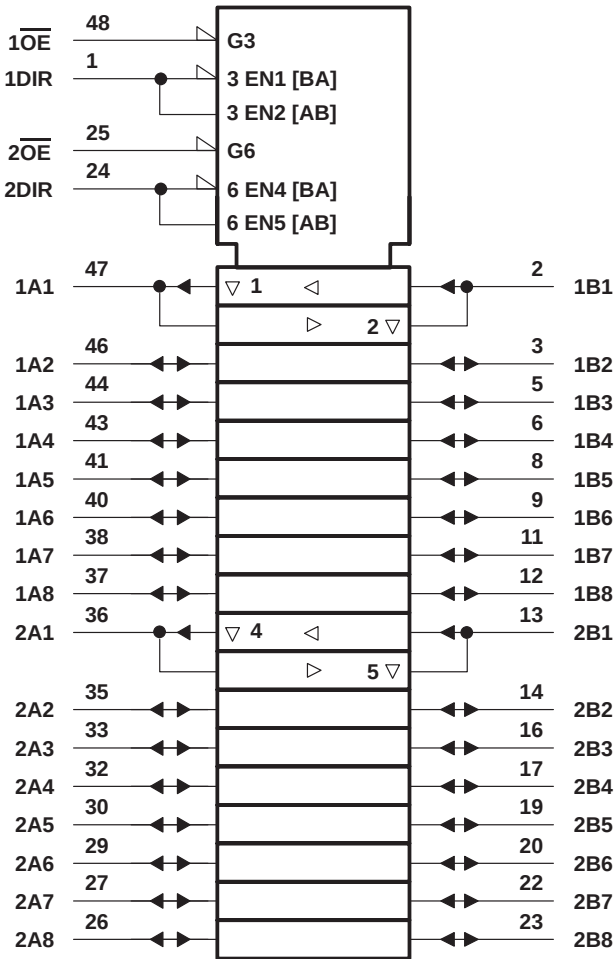
SN54ABTH162245, SN74ABTH162245
16-BIT BUS TRANSCEIVERS
WITH 3-STATE OUTPUTS

SCBS712A – FEBRUARY 1998 – REVISED APRIL 1999

FUNCTION TABLE
(each 8-bit section)

INPUTS		OPERATION
OE	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

logic symbol†



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

SCBS712A – FEBRUARY 1998 – REVISED APRIL 1999

3

SN54ABTH162245, SN74ABTH162245

16-BIT BUS TRANSCEIVERS

WITH 3-STATE OUTPUTS

SCBS712A – FEBRUARY 1998 – REVISED APRIL 1999

recommended operating conditions (see Note 3)

			SN54ABTH162245		SN74ABTH162245		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	
$\Delta t/\Delta v$	Input transition rise or fall rate	Outputs enabled		10		10	ns/V
T_A	Operating free-air temperature		–55	125	–40	85	°C

NOTE 3: All unused control inputs 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.

SN54ABTH162245, SN74ABTH162245
16-BIT BUS TRANSCEIVERS
WITH 3-STATE OUTPUTS

SCBS712A – FEBRUARY 1998 – REVISED APRIL 1999

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

PARAMETER		TEST CONDITIONS		SN54ABTH162245			SN74ABTH162245			UNIT		
				MIN	TYP†	MAX	MIN	TYP†	MAX			
V _{IK}		V _{CC} = 4.5 V, I _I = −18 mA		−1.2			−1.2			V		
V _{OH}	A port	V _{CC} = 5 V, I _{OH} = −1 mA		2.5			2.5			V		
		V _{CC} = 4.5 V	I _{OH} = −1 mA	3			3					
			I _{OH} = −3 mA	3			3.1					
			I _{OH} = −12 mA				2.6					
	B port	V _{CC} = 5 V, I _{OH} = −3 mA		3			3					
		V _{CC} = 4.5 V	I _{OH} = −3 mA	2.5			2.5					
			I _{OH} = −24 mA	2								
			I _{OH} = −32 mA				2					
V _{OL}	A port	V _{CC} = 4.5 V	I _{OL} = 12 mA	0.8			0.8			V		
	B port		I _{OL} = 48 mA	0.45			0.45					
			I _{OL} = 64 mA				0.55					
V _{hys}				100			100			mV		
I _I	Control inputs	V _{CC} = 5.5 V, V _I = V _{CC} or GND		±1			±1			μA		
	A or B ports										±20	
I _I (hold)		V _{CC} = 4.5 V	V _I = 0.8 V	100			100			μA		
			V _I = 2 V	−100			−100					
I _{off}		V _{CC} = 0, V _I or V _O = 0 to 4.5 V					±100			μA		
I _O ‡	A port	V _{CC} = 5.5 V, V _O = 2.5 V		−25 −90			−25 −100			mA		
	B port			−50 −180			−50 −180					
I _{CEX}		V _{CC} = 5.5 V, V _O = 5.5 V	Outputs high		50			50			μA	
I _{CC}	A or B ports	V _{CC} = 5.5 V, I _O = 0, V _I = V _{CC} or GND		Outputs high		2			2			mA
				Outputs low		32			32			
				Outputs disabled		2			2			
ΔI _{CC} §	Data inputs	V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND		2			2			mA		
	Control inputs	V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND		1.5			1.5					
C _i		V _I = 2.5 V or 0.5 V		3			3			pF		
C _{io}		V _O = 2.5 V or 0.5 V		6			6			pF		

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

[‡] 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.

SN54ABTH162245, SN74ABTH162245

16-BIT BUS TRANSCEIVERS

WITH 3-STATE OUTPUTS

SCBS712A – FEBRUARY 1998 – REVISED APRIL 1999

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

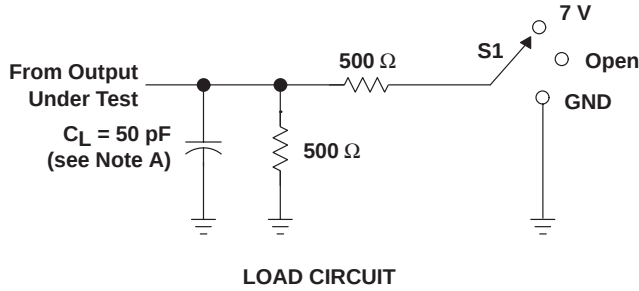
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$			SN54ABTH162245		SN74ABTH162245		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A	B	1	2.2	3.4	1	4.1	1	3.9	ns
t_{PHL}			1	2.3	3.7	1	4.4	1	4.2	
t_{PLH}	B	A	1	2.7	4.1	1	4.9	1	4.6	ns
t_{PHL}			1.5	3.1	4.6	1.5	5.2	1.5	5.1	
t_{PZH}	$\overline{OE}$	B	1	3.6	5.2	1	6.4	1	6.3	ns
t_{PZL}			1	3.7	5.4	1	6.5	1	6.4	
t_{PHZ}	$\overline{OE}$	B	2	4.4	5.8	2	6.4	2	6.3	ns
t_{PLZ}			1.5	3.3	4.7	1.5	5.6	1.5	5.2	
t_{PZH}	$\overline{OE}$	A	1.5	4.1	6	1.5	7.2	1.5	7.1	ns
t_{PZL}			1.5	4.3	6.1	1.5	7.3	1.5	7	
t_{PHZ}	$\overline{OE}$	A	2	4.5	6.1	2	6.8	2	6.6	ns
t_{PLZ}			1.5	3.7	5.1	1.5	6.1	1.5	5.7	

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.

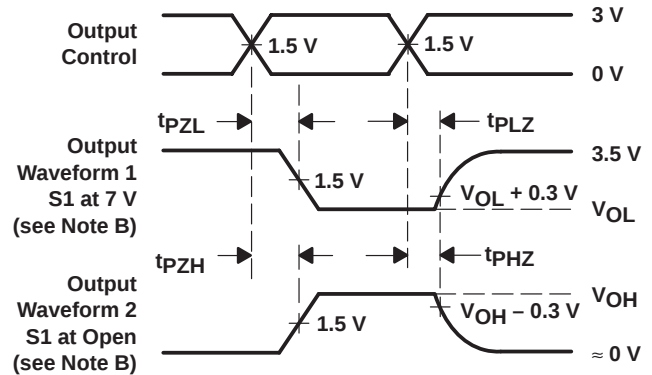
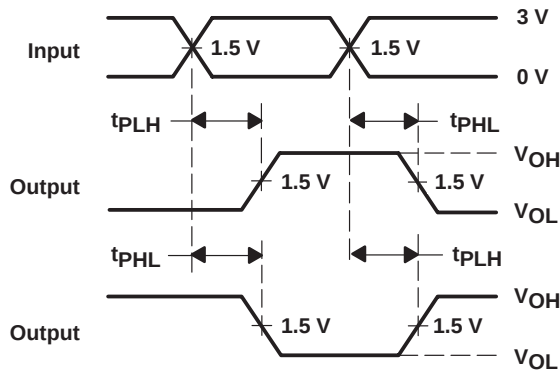
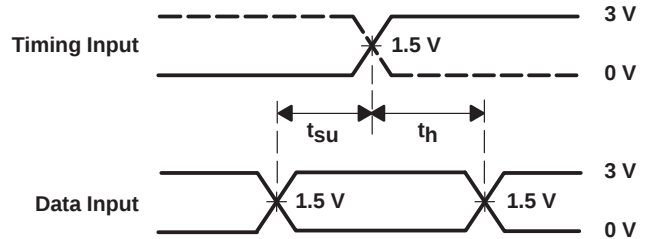
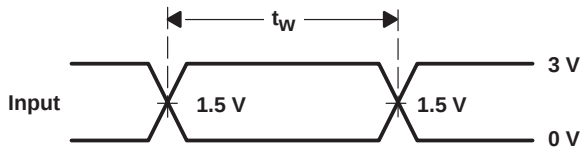


POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

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

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.