

SN54ABTR2245, SN74ABTR2245 OCTAL TRANSCEIVERS AND LINE/MEMORY DRIVERS WITH 3-STATE OUTPUTS

SCBS680A – MARCH 1997 – REVISED MAY 1997

- Outputs Have Equivalent 25- Ω Series Resistors, So No External Resistors Are Required
- State-of-the-Art EPIC-IIB™ BiCMOS Design Significantly Reduces Power Dissipation
- High-Impedance State During Power Up and Power Down
- Latch-Up Performance Exceeds 500 mA Per JEDEC Standard JESD-17
- ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015; Exceeds 200 V Using Machine Model (C = 200 pF, R = 0)
- Typical V_{OLP} (Output Ground Bounce) < 1 V at $V_{CC} = 5$ V, $T_A = 25^\circ\text{C}$
- Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), Thin Shrink Small-Outline (PW), and Thin Very Small-Outline (DGV) Packages, Ceramic Chip Carriers (FK), and Plastic (N) and Ceramic (J) DIPs

description

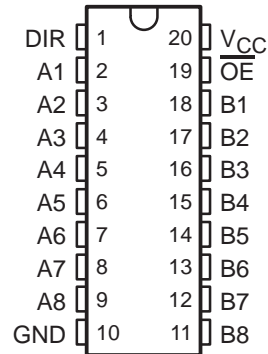
These octal transceivers and line drivers are designed for asynchronous communication between data buses. The devices transmit data from the A bus to the B bus or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable (\overline{OE}) input can be used to disable the device so the buses are effectively isolated.

Both the A-port and B-port outputs, which are designed to sink up to 12 mA, include equivalent 25- Ω series resistors to reduce overshoot and undershoot.

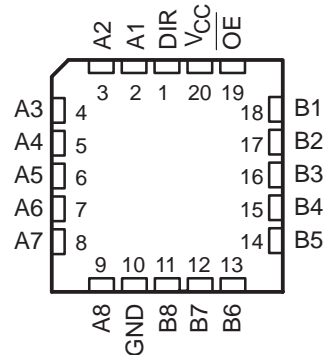
When V_{CC} is between 0 and 2.1 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 2.1 V, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking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

The SN54ABTR2245 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74ABTR2245 is characterized for operation from -40°C to 85°C .

SN54ABTR2245 . . . J PACKAGE
SN74ABTR2245 . . . DB, DGV, DW, N, OR PW PACKAGE
(TOP VIEW)



SN54ABTR2245 . . . FK PACKAGE
(TOP VIEW)



FUNCTION TABLE

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



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.

EPIC-IIB is a trademark 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**

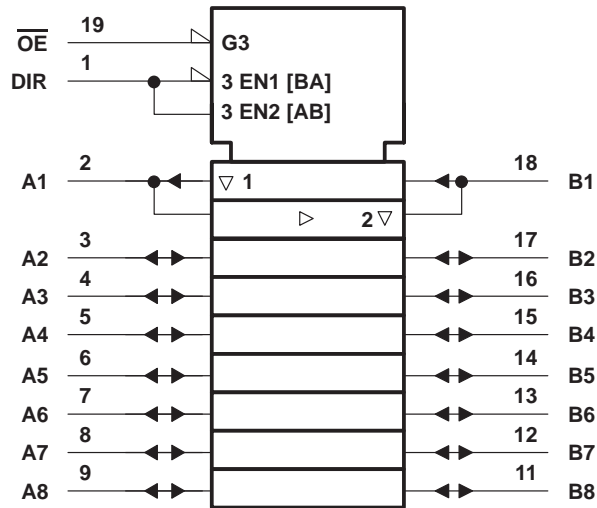
POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1997, Texas Instruments Incorporated

SN54ABTR2245, SN74ABTR2245 OCTAL TRANSCEIVERS AND LINE/MEMORY DRIVERS WITH 3-STATE OUTPUTS

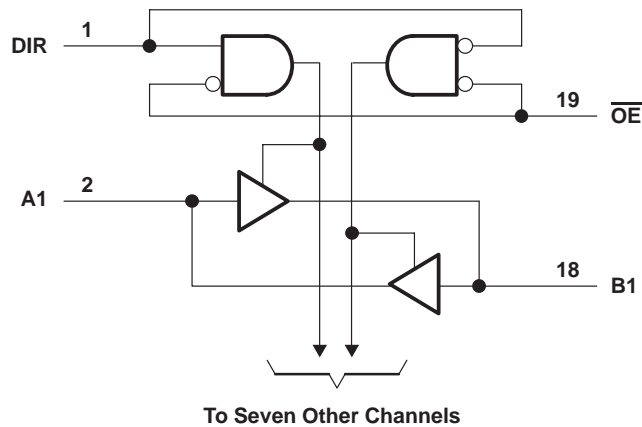
SCBS680A – MARCH 1997 – REVISED MAY 1997

logic symbol†



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

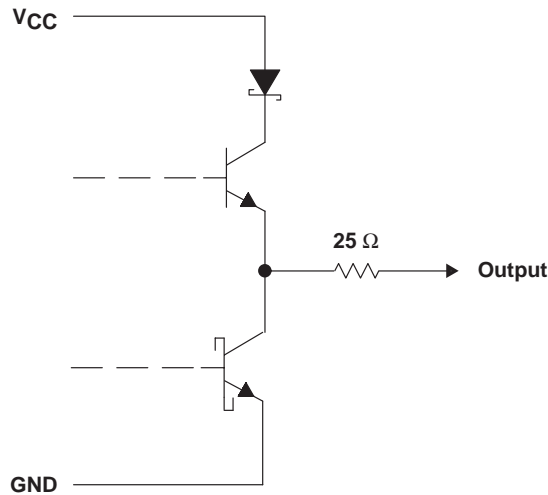
logic diagram (positive logic)



SN54ABTR2245, SN74ABTR2245
OCTAL TRANSCEIVERS AND LINE/MEMORY DRIVERS
WITH 3-STATE OUTPUTS

SCBS680A – MARCH 1997 – REVISED MAY 1997

output schematic



All resistor values shown are nominal.

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	30 mA
Input clamp current, I_{IK} ($V_I < 0$)	-18 mA
Output clamp current, I_{OK} ($V_O < 0$)	-50 mA
Package thermal impedance, θ_{JA} (see Note 2):	
DB package	115°C/W
DGV package	146°C/W
DW package	97°C/W
N package	67°C/W
PW package	128°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 EIA/JEDEC Std JESD51, except for through-hole packages, which use a trace length of zero.

SN54ABTR2245, SN74ABTR2245 OCTAL TRANSCEIVERS AND LINE/MEMORY DRIVERS WITH 3-STATE OUTPUTS

SCBS680A – MARCH 1997 – REVISED MAY 1997

recommended operating conditions (see Note 3)

		SN54ABTR2245		SN74ABTR2245		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		-12		-12	mA
I _{OL}	Low-level output current		12		12	mA
Δt/Δv	Input transition rise or fall rate	Outputs enabled		5	5	ns/V
Δt/ΔV _{CC}	Power-up ramp rate	200		200		μs/V
T _A	Operating free-air temperature	-55	125	-40	85	°C

NOTE 3: Unused pins (input or I/O) must be held high or low to prevent them from floating.

SN54ABTR2245, SN74ABTR2245 OCTAL TRANSCEIVERS AND LINE/MEMORY DRIVERS WITH 3-STATE OUTPUTS

SCBS680A – MARCH 1997 – REVISED MAY 1997

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

PARAMETER	TEST CONDITIONS	T _A = 25°C			SN54ABTR2245		SN74ABTR2245		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} = -1 mA			3.35		3.3		3.35	V
	V _{CC} = 5 V, I _{OH} = -1 mA			3.85		3.8		3.85	
	V _{CC} = 4.5 V, I _{OH} = -3 mA					3		3.1	
V _{OL}	V _{CC} = 4.5 V, I _{OL} = 8 mA					0.8		0.65	V
						0.8		0.8	
V _{hys}				100					mV
I _I	Control inputs V _{CC} = 0 to 5.5 V, V _I = V _{CC} or GND			±1		±1		±1	μA
	A or B ports V _{CC} = 2.1 V to 5.5 V, V _I = V _{CC} or GND			±20		±20		±20	
I _{OZH} ‡	V _{CC} = 2.1 V to 5.5 V, V _O = 2.7 V, OE ≥ 2 V			10		10		10	μA
I _{OZL} ‡	V _{CC} = 2.1 V to 5.5 V, V _O = 0.5 V, OE ≥ 2 V			-10		-10		-10	μA
I _{OZPU} §	V _{CC} = 0 to 2.1 V, V _O = 0.5 V to 2.7 V, OE = X			±50		±50		±50	μA
I _{OZPD} §	V _{CC} = 2.1 V to 0, V _O = 0.5 V to 2.7 V, OE = X			±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			-25		-25		-100	mA
I _{CC}	A or B ports V _{CC} = 5.5 V, I _O = 0, V _I = V _{CC} or GND	Outputs high		1	250		250	250	μA
		Outputs low		24	32		32	32	mA
		Outputs disabled		0.5	250		250	250	μA
ΔI _{CC} #	Data inputs V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND	Outputs enabled		1.5		1.5		1.5	mA
		Outputs disabled		0.05		0.05		0.05	
	Control inputs V _{CC} = 5.5 V, One input at 3.4 V, Other inputs at V _{CC} or GND			1.5		1.5		1.5	
C _i	V _I = 2.5 V or 0.5 V			3					pF
C _{io}	V _O = 2.5 V or 0.5 V			6					pF

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

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

‡ The parameters I_{OZH} and I_{OZL} include the input leakage current.

§ This parameter is characterized but not production tested.

¶ 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.

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

SN54ABTR2245, SN74ABTR2245
OCTAL TRANSCEIVERS AND LINE/MEMORY DRIVERS
WITH 3-STATE OUTPUTS

SCBS680A – MARCH 1997 – REVISED MAY 1997

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			SN54ABTR2245		SN74ABTR2245		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A or B	B or A	1	2.5	3.4	1	4	1	3.8	ns
t_{PHL}			1	3.2	4.2	1	4.6	1	4.5	
t_{PZH}	\overline{OE}	A or B	1.5	3.6	4.9	1.5	6.3	1.5	6.1	ns
t_{PZL}			1.5	3.9	5.3	1.5	6.6	1.5	6.3	
t_{PHZ}	\overline{OE}	A or B	1.5	3.6	4.7	1.5	5.5	1.5	5.3	ns
t_{PLZ}			1.5	3.3	4.4	1.5	4.9	1.5	4.8	

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.

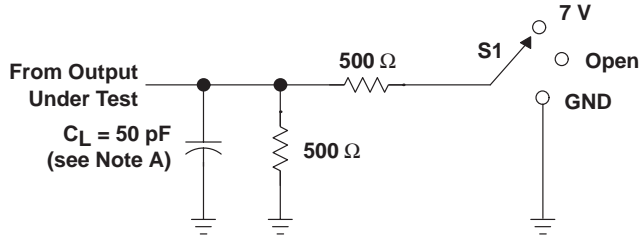


POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN54ABTR2245, SN74ABTR2245 OCTAL TRANSCEIVERS AND LINE/MEMORY DRIVERS WITH 3-STATE OUTPUTS

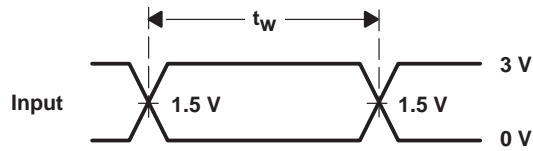
SCBS680A – MARCH 1997 – REVISED MAY 1997

PARAMETER MEASUREMENT INFORMATION

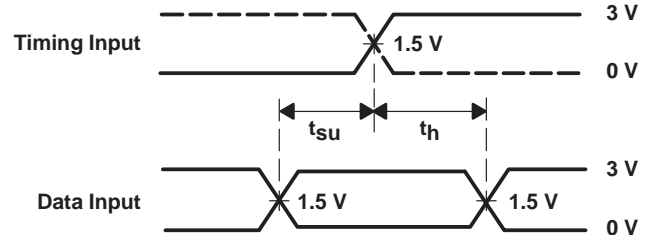


TEST	S1
t_{PLH}/t_{PHL}	Open
t_{PLZ}/t_{PZL}	7 V
t_{PHZ}/t_{PZH}	Open

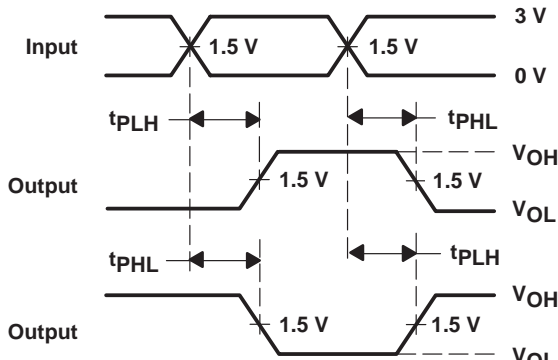
LOAD CIRCUIT



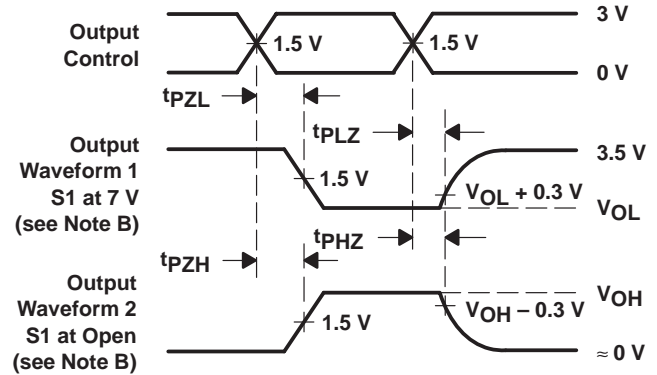
VOLTAGE WAVEFORMS PULSE DURATION



VOLTAGE WAVEFORMS SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS PROPAGATION DELAY TIMES INVERTING AND NONINVERTING OUTPUTS



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

- 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

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
SN74ABTR2245DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1
SN74ABTR2245PWR	TSSOP	PW	20	2000	330.0	16.4	6.95	7.1	1.6	8.0	16.0	Q1

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74ABTR2245DWR	SOIC	DW	20	2000	367.0	367.0	45.0
SN74ABTR2245PWR	TSSOP	PW	20	2000	367.0	367.0	38.0

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

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 relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Applications Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community

e2e.ti.com