

SN74LVC245 OCTAL BUS TRANSCEIVER WITH 3-STATE OUTPUTS

SCAS218C – JANUARY 1993 – REVISED JULY 1994

- **EPIC™** (Enhanced-Performance Implanted CMOS) Submicron Process
- Typical V_{OLP} (Output Ground Bounce) $< 0.8\text{ V}$ at $V_{CC} = 3.3\text{ V}$, $T_A = 25^\circ\text{C}$
- Typical V_{OHV} (Output V_{OH} Undershoot) $> 2\text{ V}$ at $V_{CC} = 3.3\text{ V}$, $T_A = 25^\circ\text{C}$
- Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), and Thin Shrink Small-Outline (PW) Packages

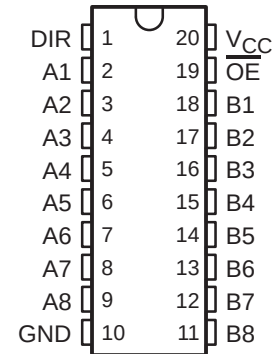
description

This octal bus transceiver is designed for 2.7-V to 3.6-V V_{CC} operation.

The SN74LVC245 is designed for asynchronous communication between data buses. The device transmits data 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 the buses are effectively isolated.

The SN74LVC245 is characterized for operation from -40°C to 85°C .

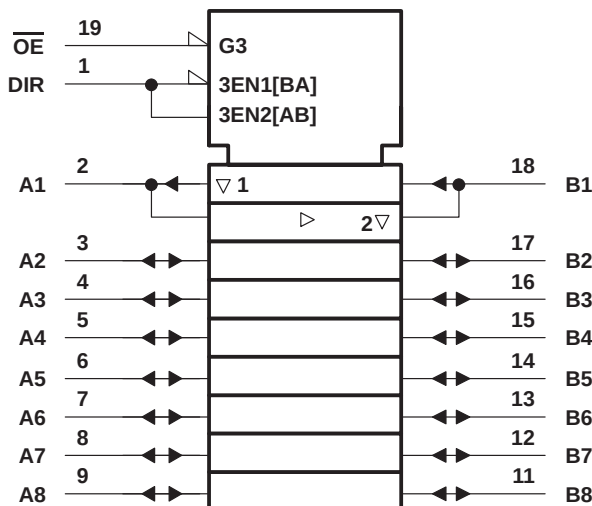
DB, DW, OR PW PACKAGE
(TOP VIEW)



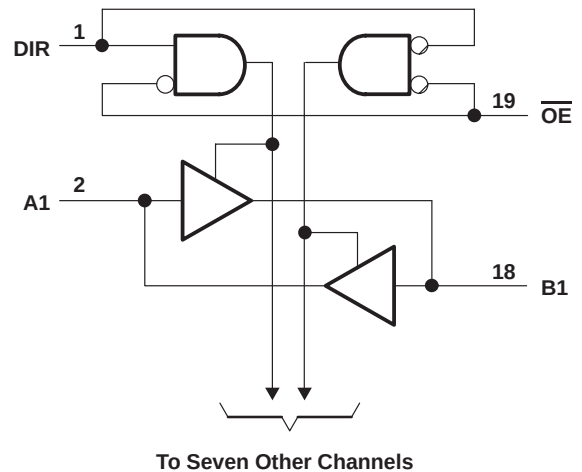
FUNCTION TABLE

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

logic symbol†



logic diagram (positive logic)



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

EPIC is a trademark of Texas Instruments Incorporated.

PRODUCTION DATA information is 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 © 1994, Texas Instruments Incorporated

SN74LVC245

OCTAL BUS TRANSCEIVER

WITH 3-STATE OUTPUTS

SCAS218C – JANUARY 1993 – REVISED JULY 1994

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

Supply voltage range, V_{CC}	–0.5 V to 4.6 V
Input voltage range, V_I : except I/O ports	–0.5 V to 4.6 V
I/O ports (see Note 1)	–0.5 V to $V_{CC} + 0.5$ V
Output voltage range, V_O (see Note 1)	–0.5 V to $V_{CC} + 0.5$ V
Input clamp current, I_{IK} ($V_I < 0$)	–50 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$)	±50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	±50 mA
Continuous current through V_{CC} or GND	±100 mA
Maximum power dissipation at $T_A = 55^\circ\text{C}$ (in still air) (see Note 2): DB package	0.6 W
DW package	1.6 W
PW package	0.7 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.

NOTES: 1. This value is limited to 4.6 V maximum.

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# SCBD002B.

recommended operating conditions (see Note 3)

			MIN	MAX	UNIT
V _{CC}	Supply voltage		2.7	3.6	V
V _{IH}	High-level input voltage	V _{CC} = 2.7 V to 3.6 V	2		V
V _{IL}	Low-level input voltage	V _{CC} = 2.7 V to 3.6 V		0.8	V
V _I	Input voltage		0	V _{CC}	V
V _O	Output voltage		0	V _{CC}	V
I _{OH}	High-level output current	V _{CC} = 2.7 V		−12	mA
		V _{CC} = 3 V		−24	
I _{OL}	Low-level output current	V _{CC} = 2.7 V		12	mA
		V _{CC} = 3 V		24	
Δt/Δv	Input transition rise or fall rate		0	10	ns/V
T _A	Operating free-air temperature		−40	85	°C

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



SN74LVC245
OCTAL BUS TRANSCEIVER
WITH 3-STATE OUTPUTS

SCAS218C – JANUARY 1993 – REVISED JULY 1994

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

PARAMETER		TEST CONDITIONS	V _{CC} [†]	T _A = −40°C to 85°C			UNIT
				MIN	TYP	MAX	
V _{OH}		I _{OH} = −100 μA	MIN to MAX	V _{CC} −0.2			V
		I _{OH} = −12 mA	2.7 V	2.2			
			3 V	2.4			
		I _{OH} = −24 mA	3 V	2			
V _{OL}		I _{OL} = 100 μA	MIN to MAX	0.2			V
		I _{OL} = 12 mA	2.7 V	0.4			
		I _{OL} = 24 mA	3 V	0.55			
I _I		V _I = V _{CC} or GND	3.6 V	±5			μA
I _{OZ} [‡]		V _O = V _{CC} or GND	3.6 V	±10			μA
I _{CC}		V _I = V _{CC} or GND, I _O = 0	3.6 V	20			μA
ΔI _{CC}		V _{CC} = 3 V to 3.6 V, One input at V _{CC} − 0.6 V, Other inputs at V _{CC} or GND		500			μA
C _i	Control inputs	V _I = V _{CC} or GND	3.3 V	5.5			pF
C _{io}	A or B ports	V _O = V _{CC} or GND	3.3 V	6.7			pF

† For conditions shown as MIN or MAX, use the appropriate values under recommended operating conditions.

‡ For I/O ports, the parameter I_{OZ} includes the input leakage current.

switching characteristics over recommended operating free-air temperature range, $C_L = 50\ \text{pF}$ (unless otherwise noted) (see Figure 1)

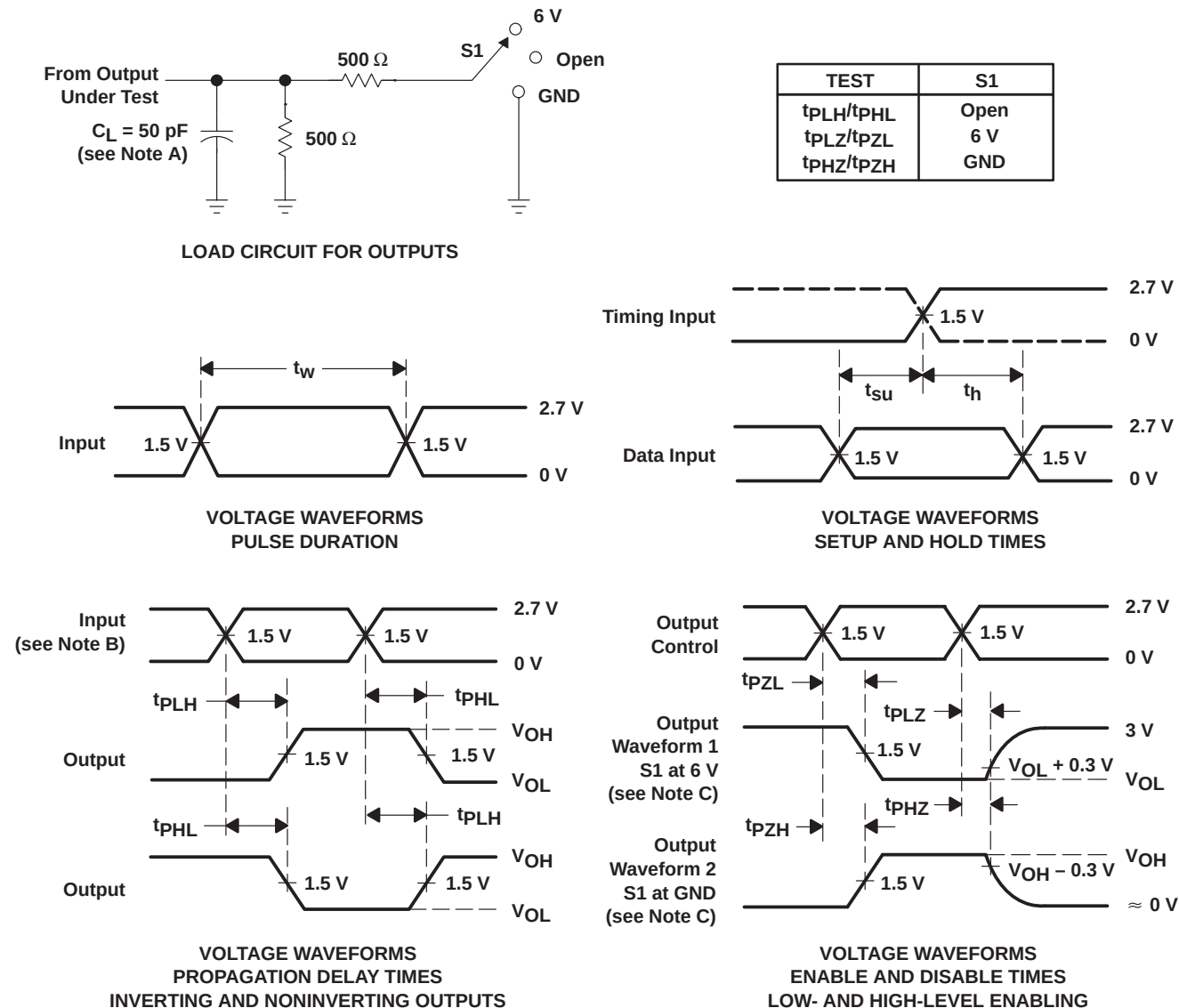
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 3.3\ \text{V} \pm 0.3\ \text{V}$			$V_{CC} = 2.7\ \text{V}$		UNIT
			MIN	TYP §	MAX	MIN	MAX	
t_{pd}	A or B	B or A	1.5	4	7	8		ns
t_{en}	$\overline{OE}$	A or B	1.5	4.5	9	10		ns
t_{dis}	$\overline{OE}$	A or B	1.5	5.5	8	9		ns

§ All typical values are $V_{CC} = 3.3\ \text{V}$, $T_A = 25^{\circ}\text{C}$.

operating characteristics, $V_{CC} = 3.3\ \text{V}$, $T_A = 25^{\circ}\text{C}$

PARAMETER		TEST CONDITIONS		TYP	UNIT
C_{pd}	Power dissipation capacitance per transceiver	Outputs enabled	$C_L = 50\ \text{pF}$, $f = 10\ \text{MHz}$	25	pF
		Outputs disabled		2	

PARAMETER MEASUREMENT INFORMATION



- NOTES: A. C_L includes probe and jig capacitance.
- B. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10 \text{ MHz}$, $Z_O = 50 \Omega$, $t_r \leq 2.5 \text{ ns}$, $t_f \leq 2.5 \text{ ns}$.
- C. 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.
- 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.