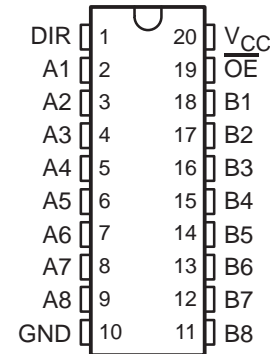


# SN74LVCZ245A OCTAL BUS TRANSCEIVER WITH 3-STATE OUTPUTS

SCES275B – JUNE 1999 – REVISED JANUARY 2000

- **EPIC™** (Enhanced-Performance Implanted CMOS) Submicron Process
- Typical  $V_{OLP}$  (Output Ground Bounce)  $<0.8$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- Typical  $V_{OHV}$  (Output  $V_{OH}$  Undershoot)  $>2$  V at  $V_{CC} = 3.3$  V,  $T_A = 25^\circ\text{C}$
- $I_{off}$  and Power-Up 3-State Support Hot Insertion
- Supports Mixed-Mode Signal Operation on All Ports (5-V Input/Output Voltage With 3.3-V  $V_{CC}$ )
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- Package Options Include Shrink Small-Outline (DB), Plastic Thin Very Small-Outline (DGV), Small-Outline (DW), and Thin Shrink Small-Outline (PW) Packages

DB, DGV, DW, OR PW PACKAGE  
(TOP VIEW)



## description

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

The SN74LVCZ245A 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 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.

Inputs can be driven from either 3.3-V or 5-V devices. This feature allows the use of these devices as translators in a mixed 3.3-V/5-V system environment.

When  $V_{CC}$  is between 0 and 1.5 V, the device is in the high-impedance state during power up or power down. However, to ensure the high-impedance state above 1.5 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.

This device is fully specified for hot-insertion applications using  $I_{off}$  and power-up 3-state. The  $I_{off}$  circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down. The power-up 3-state circuitry places the outputs in the high-impedance state during power up and power down, which prevents driver conflict.

The SN74LVCZ245A is characterized for operation from  $-40^\circ\text{C}$  to  $85^\circ\text{C}$ .

FUNCTION TABLE

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



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**TEXAS  
INSTRUMENTS**

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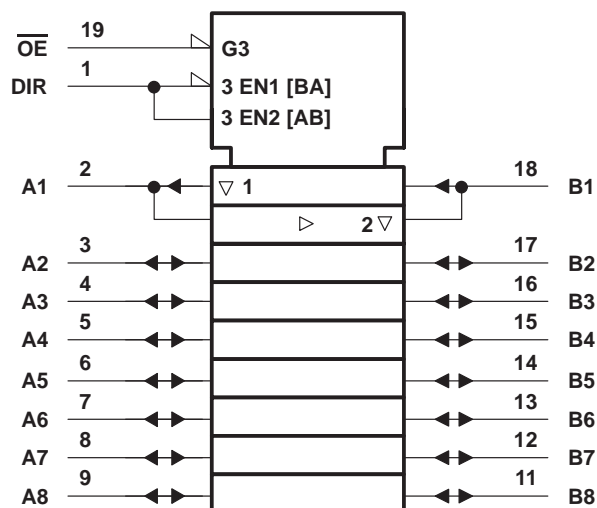
# SN74LVCZ245A

## OCTAL BUS TRANSCEIVER

### WITH 3-STATE OUTPUTS

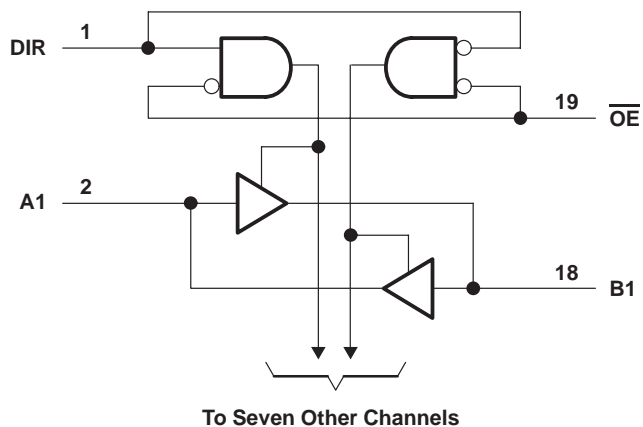
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#### logic symbol†



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

#### logic diagram (positive logic)



## 3

# SN74LVCZ245A

## OCTAL BUS TRANSCEIVER

### WITH 3-STATE OUTPUTS

SCES275B – JUNE 1999 – REVISED JANUARY 2000

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

PARAMETER		TEST CONDITIONS	V <sub>CC</sub>	MIN	TYP†	MAX	UNIT
V <sub>OH</sub>		I <sub>OH</sub> = –100 µA	2.7 V to 3.6 V	V <sub>CC</sub> –0.2			V
		I <sub>OH</sub> = –12 mA	2.7 V	2.2			
			3 V	2.4			
		I <sub>OH</sub> = –24 mA	3 V	2.2			
V <sub>OL</sub>		I <sub>OL</sub> = 100 µA	2.7 V to 3.6 V	0.2			V
		I <sub>OL</sub> = 12 mA	2.7 V	0.4			
		I <sub>OL</sub> = 24 mA	3 V	0.55			
I <sub>I</sub>	Control inputs	V <sub>I</sub> = 0 to 5.5 V	3.6 V			±5	µA
I <sub>off</sub>		V <sub>I</sub> or V <sub>O</sub> = 5.5 V	0			±5	µA
I <sub>OZ</sub> ‡		V <sub>O</sub> = 0 to 5.5 V	3.6 V			±5	µA
I <sub>OZPU</sub>		V <sub>O</sub> = 0.5 V to 2.5 V, $\overline{\text{OE}}$ = don't care	0 to 1.5 V			±5	µA
I <sub>OZPD</sub>		V <sub>O</sub> = 0.5 V to 2.5 V, $\overline{\text{OE}}$ = don't care	1.5 V to 0			±5	µA
I <sub>CC</sub>		V <sub>I</sub> = V <sub>CC</sub> or GND	3.6 V			100	µA
		3.6 V ≤ V <sub>I</sub> ≤ 5.5 V§				100	
ΔI <sub>CC</sub>		One input at V <sub>CC</sub> – 0.6 V, Other inputs at V <sub>CC</sub> or GND	2.7 V to 3.6 V			100	µA
C <sub>i</sub>	Control inputs	V <sub>I</sub> = V <sub>CC</sub> or GND	3.3 V			4	pF
C <sub>io</sub>	A or B ports	V <sub>O</sub> = V <sub>CC</sub> or GND	3.3 V			6	pF

† All typical values are at V<sub>CC</sub> = 3.3 V, T<sub>A</sub> = 25°C.

‡ For I/O ports, the parameter I<sub>OZ</sub> includes the input leakage current.

§ This applies in the disabled state only.

**switching characteristics over recommended operating free-air temperature range (unless otherwise noted) (see Figure 1)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 2.7 V		V <sub>CC</sub> = 3.3 V ± 0.3 V		UNIT
			MIN	MAX	MIN	MAX	
t <sub>pd</sub>	A or B	B or A		7.3	1.5	6.3	ns
t <sub>en</sub>	$\overline{\text{OE}}$	A or B		9.5	1.5	8.5	ns
t <sub>dis</sub>	$\overline{\text{OE}}$	A or B		8.5	1.7	7.5	ns

**operating characteristics, T<sub>A</sub> = 25°C**

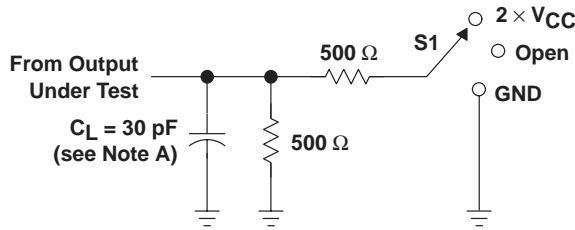
PARAMETER			TEST CONDITIONS	V <sub>CC</sub> = 3.3 V	UNIT
				TYP	
C <sub>pd</sub>	Power dissipation capacitance per transceiver	Outputs enabled	f = 10 MHz	42	pF
		Outputs disabled		3	



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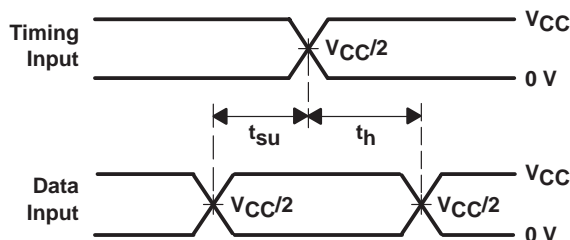
# PARAMETER MEASUREMENT INFORMATION

$V_{CC} = 2.7\text{ V AND } 3.3\text{ V} \pm 0.3\text{ V}$

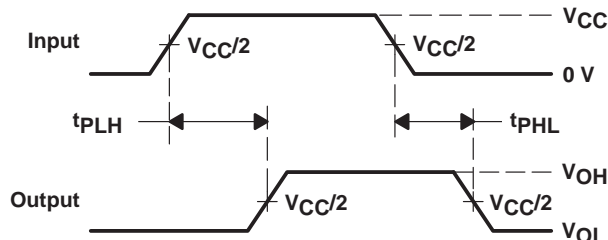


LOAD CIRCUIT

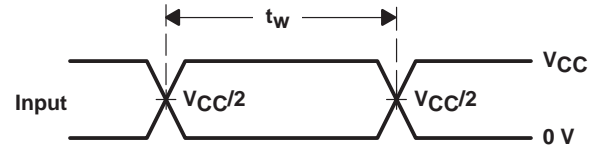
TEST	S1
$t_{pd}$	Open
$t_{PLZ}/t_{PZL}$	2 $\times V_{CC}$
$t_{PHZ}/t_{PZH}$	GND



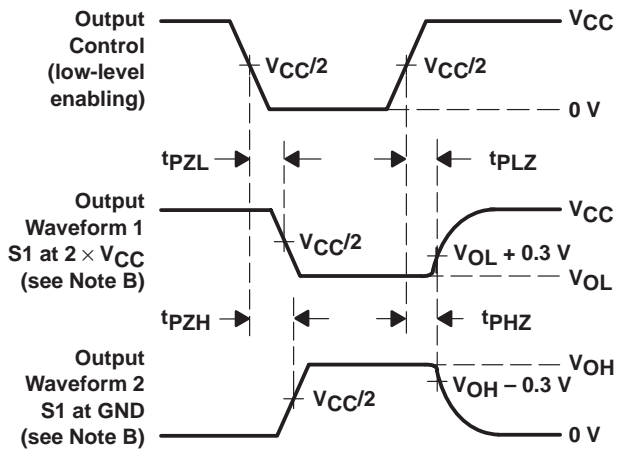
VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS  
PULSE DURATION



VOLTAGE WAVEFORMS  
ENABLE AND DISABLE TIMES

- 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:  $PRR \leq 10\text{ MHz}$ ,  $Z_O = 50\text{ }\Omega$ ,  $t_r \leq 2\text{ ns}$ ,  $t_f \leq 2\text{ ns}$ .
  - The outputs are measured one at a time with one transition per measurement.
  - $t_{PLZ}$  and  $t_{PHZ}$  are the same as  $t_{dis}$ .
  - $t_{PZL}$  and  $t_{PZH}$  are the same as  $t_{en}$ .
  - $t_{PLH}$  and  $t_{PHL}$  are the same as  $t_{pd}$ .

Figure 1. Load Circuit and Voltage Waveforms

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