

# SN54AHC245, SN74AHC245 OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SCLS230G – OCTOBER 1995 – REVISED JANUARY 2000

- **EPIC™ (Enhanced-Performance Implanted CMOS) Process**
- **Operating Range 2-V to 5.5-V  $V_{CC}$**
- **Latch-Up Performance Exceeds 250 mA Per JESD 17**
- **Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), Thin Very Small-Outline (DGV), Thin Shrink Small-Outline (PW), and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) DIPs**

## description

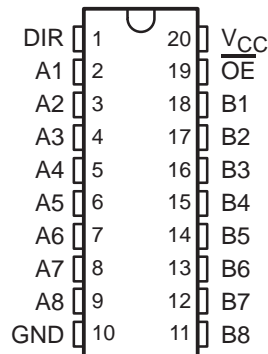
The 'AHC245 octal bus transceivers are designed for asynchronous two-way communication between data buses. The control-function implementation minimizes external timing requirements.

These devices 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.

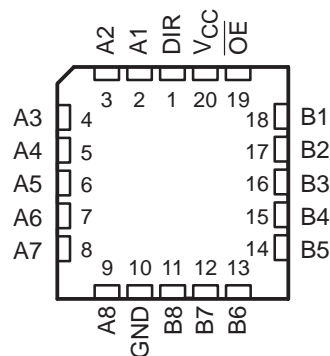
To ensure the high-impedance state during power up or power down,  $\overline{OE}$  should be tied to  $V_{CC}$  through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

The SN54AHC245 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74AHC245 is characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ .

SN54AHC245 . . . J OR W PACKAGE  
SN74AHC245 . . . DB, DGV, DW, N, OR PW PACKAGE  
(TOP VIEW)



SN54AHC245 . . . FK PACKAGE  
(TOP VIEW)



FUNCTION TABLE  
(each transceiver)

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**

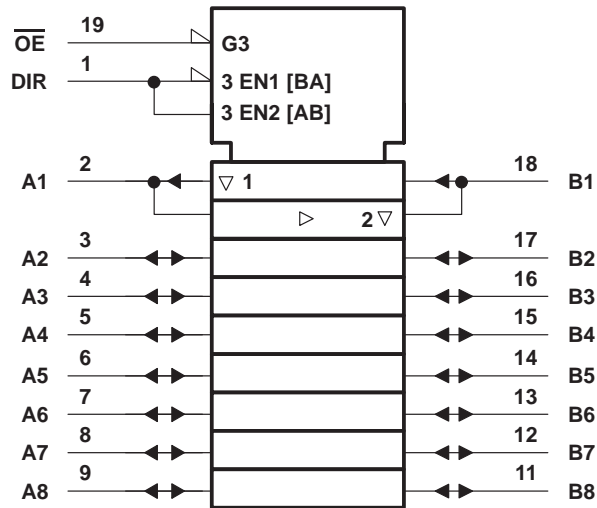
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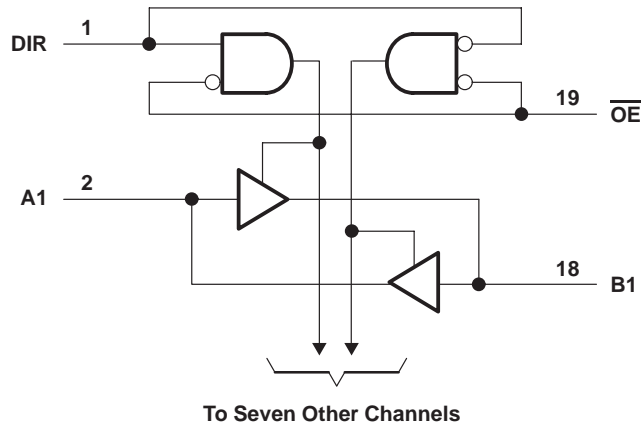
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## logic symbol†



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

## logic diagram (positive logic)





# SN54AHC245, SN74AHC245 OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

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

PARAMETER	TEST CONDITIONS	V <sub>CC</sub>	T <sub>A</sub> = 25°C			SN54AHC245		SN74AHC245		UNIT
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V <sub>OH</sub>	I <sub>OH</sub> = -50 μA	2 V	1.9	2		1.9		1.9	V	
		3 V	2.9	3		2.9		2.9		
		4.5 V	4.4	4.5		4.4		4.4		
	I <sub>OH</sub> = -4 mA	3 V	2.58			2.48		2.48		
	I <sub>OH</sub> = -8 mA	4.5 V	3.94			3.8		3.8		
V <sub>OL</sub>	I <sub>OL</sub> = 50 μA	2 V			0.1		0.1	0.1	V	
		3 V			0.1		0.1	0.1		
		4.5 V			0.1		0.1	0.1		
	I <sub>OL</sub> = 4 mA	3 V			0.36		0.5	0.44		
	I <sub>OL</sub> = 8 mA	4.5 V			0.36		0.5	0.44		
I <sub>I</sub>	A or B inputs	V <sub>I</sub> = V <sub>CC</sub> or GND	5.5 V			±0.1		±1	±1	μA
	$\overline{\text{OE}}$ or DIR		0 V to 5.5 V			±0.1		±1*	±1	
I <sub>OZ</sub> †		V <sub>O</sub> = V <sub>CC</sub> or GND, V <sub>I</sub> ( $\overline{\text{OE}}$ ) = V <sub>IL</sub> or V <sub>IH</sub>	5.5 V			±0.25		±2.5	±2.5	μA
I <sub>CC</sub>		V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0	5.5 V			4		40	40	μA
C <sub>i</sub>	$\overline{\text{OE}}$ or DIR	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V			2.5	10		10	pF
C <sub>io</sub>	A or B inputs	V <sub>I</sub> = V <sub>CC</sub> or GND	5 V			4				pF

\* On products compliant to MIL-PRF-38535, this parameter is not production tested at V<sub>CC</sub> = 0 V.

† The parameter I<sub>OZ</sub> includes the input leakage current.

switching characteristics over recommended operating free-air temperature range,  
V<sub>CC</sub> = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	T <sub>A</sub> = 25°C			SN54AHC245		SN74AHC245		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A or B	B or A	C <sub>L</sub> = 15 pF		5.8**	8.4**	1**	10**	1	10	ns
t <sub>PHL</sub>					5.8**	8.4**	1**	10**	1	10	
t <sub>PZH</sub>	$\overline{\text{OE}}$	A or B	C <sub>L</sub> = 15 pF		8.5**	13.2**	1**	15.5**	1	15.5	ns
t <sub>PZL</sub>					8.5**	13.2**	1**	15.5**	1	15.5	
t <sub>PHZ</sub>	$\overline{\text{OE}}$	A or B	C <sub>L</sub> = 15 pF		8.9**	12.5**	1**	15.5**	1	15.5	ns
t <sub>PLZ</sub>					8.9**	12.5**	1**	15.5**	1	15.5	
t <sub>PLH</sub>	A or B	B or A	C <sub>L</sub> = 50 pF		8.3	11.9	1	13.5	1	13.5	ns
t <sub>PHL</sub>					8.3	11.9	1	13.5	1	13.5	
t <sub>PZH</sub>	$\overline{\text{OE}}$	A or B	C <sub>L</sub> = 50 pF		11	16.7	1	19	1	19	ns
t <sub>PZL</sub>					11	16.7	1	19	1	19	
t <sub>PHZ</sub>	$\overline{\text{OE}}$	A or B	C <sub>L</sub> = 50 pF		11.5	15.8	1	18	1	18	ns
t <sub>PLZ</sub>					11.5	15.8	1	18	1	18	
t <sub>sk(o)</sub>			C <sub>L</sub> = 50 pF			1.5***			1.5	ns	

\*\* On products compliant to MIL-PRF-38535, this parameter is not production tested.

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



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switching characteristics over recommended operating free-air temperature range,  
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$  (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ\text{C}$			SN54AHC245		SN74AHC245		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$t_{PLH}$	A or B	B or A	$C_L = 15\text{ pF}$	4*	5.5*	1*	6.5*	1	6.5	ns	
$t_{PHL}$				4*	5.5*	1*	6.5*	1	6.5		
$t_{PZH}$	$\overline{OE}$	A or B	$C_L = 15\text{ pF}$	5.8*	8.5*	1*	10*	1	10	ns	
$t_{PZL}$				5.8*	8.5*	1*	10*	1	10		
$t_{PHZ}$	$\overline{OE}$	A or B	$C_L = 15\text{ pF}$	5.6*	7.8*	1*	9.2*	1	9.2	ns	
$t_{PLZ}$				5.6*	7.8*	1*	9.2*	1	9.2		
$t_{PLH}$	A or B	B or A	$C_L = 50\text{ pF}$	5.5	7.5	1	8.5	1	8.5	ns	
$t_{PHL}$				5.5	7.5	1	8.5	1	8.5		
$t_{PZH}$	$\overline{OE}$	A or B	$C_L = 50\text{ pF}$	7.3	10.6	1	12	1	12	ns	
$t_{PZL}$				7.3	10.6	1	12	1	12		
$t_{PHZ}$	$\overline{OE}$	A or B	$C_L = 50\text{ pF}$	7	9.7	1	11	1	11	ns	
$t_{PLZ}$				7	9.7	1	11	1	11		
$t_{sk(o)}$			$C_L = 50\text{ pF}$			1**			1	ns	

\* On products compliant to MIL-PRF-38535, this parameter is not production tested.

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

noise characteristics,  $V_{CC} = 5\text{ V}$ ,  $C_L = 50\text{ pF}$ ,  $T_A = 25^\circ\text{C}$  (see Note 4)

PARAMETER		SN74AHC245			UNIT
		MIN	TYP	MAX	
$V_{OL(P)}$	Quiet output, maximum dynamic $V_{OL}$		0.9		V
$V_{OL(V)}$	Quiet output, minimum dynamic $V_{OL}$		-0.9		V
$V_{OH(V)}$	Quiet output, minimum dynamic $V_{OH}$		4.3		V
$V_{IH(D)}$	High-level dynamic input voltage		3.5		V
$V_{IL(D)}$	Low-level dynamic input voltage			1.5	V

NOTE 4: Characteristics are for surface-mount packages only.

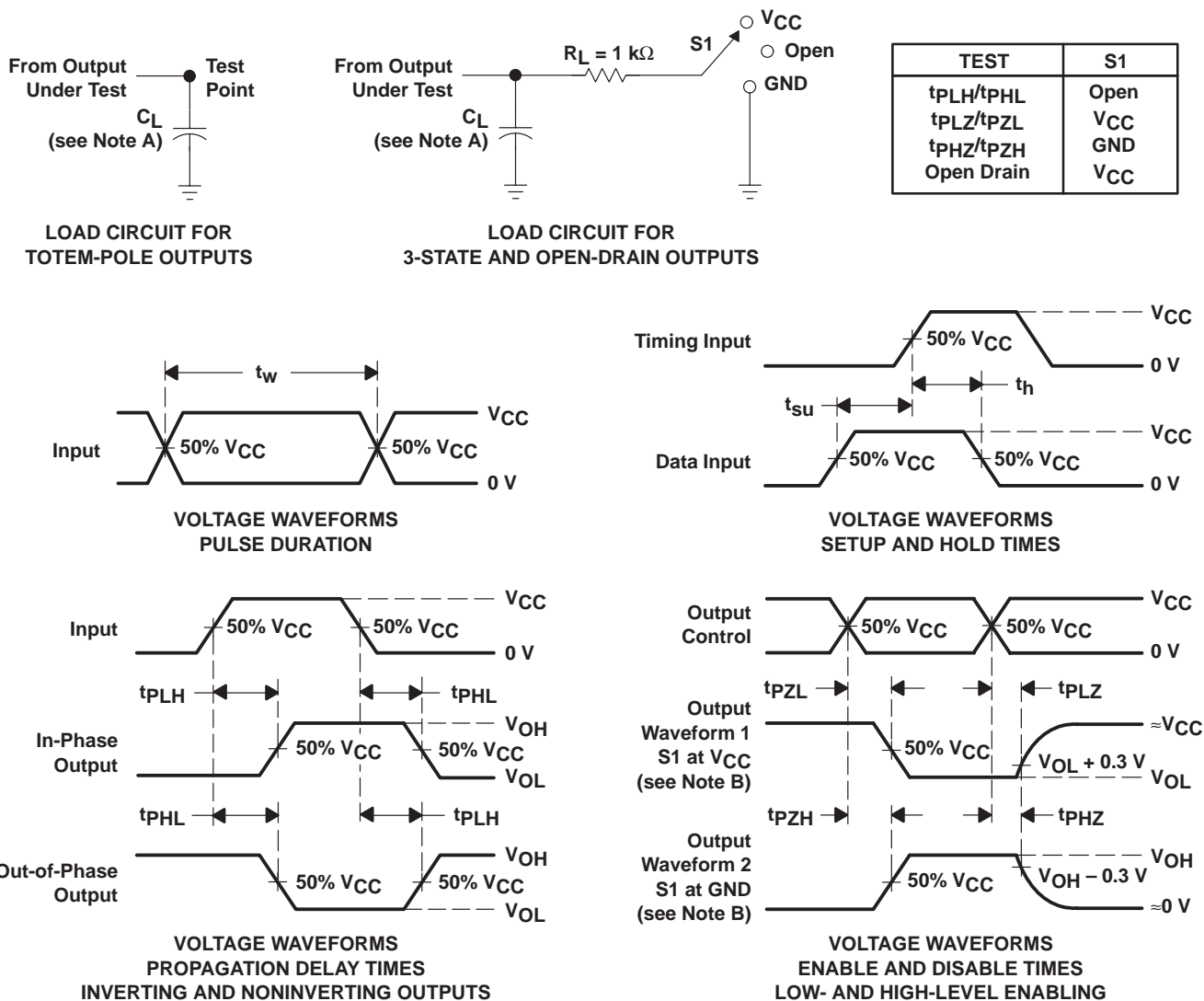
operating characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	TYP	UNIT
$C_{pd}$	Power dissipation capacitance	No load, $f = 1\text{ MHz}$	14	pF

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## PARAMETER MEASUREMENT INFORMATION



- 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:  $PRR \leq 1\text{ MHz}$ ,  $Z_O = 50\ \Omega$ ,  $t_r \leq 3\text{ ns}$ ,  $t_f \leq 3\text{ ns}$ .  
 D. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

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