

SN54HC245, SN74HC245 OCTAL BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SCLS131B – DECEMBER 1982 – REVISED MAY 1997

- High-Current 3-State Outputs Drive Bus Lines Directly or up to 15 LSTTL Loads
- Package Options Include Plastic Small-Outline (DW), Shrink Small-Outline (DB), Thin Shrink Small-Outline (PW), and Ceramic Flat (W) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

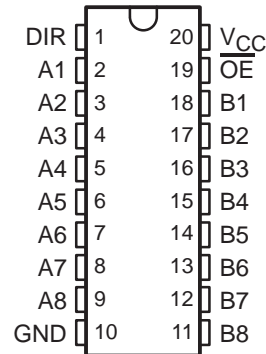
description

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

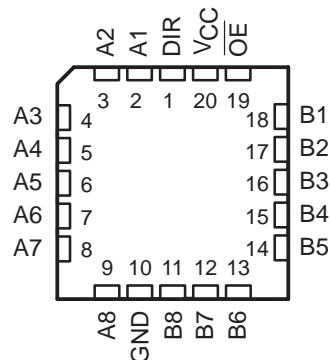
The devices allow data transmission from the A bus to the B bus or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable (\overline{OE}) input can be used to disable the device so that the buses are effectively isolated.

The SN54HC245 is characterized for operation over the full military temperature range of -55°C to 125°C . The SN74HC245 is characterized for operation from -40°C to 85°C .

SN54HC245 . . . J OR W PACKAGE
SN74HC245 . . . DB, DW, N, OR PW PACKAGE
(TOP VIEW)



SN54HC245 . . . 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



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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**

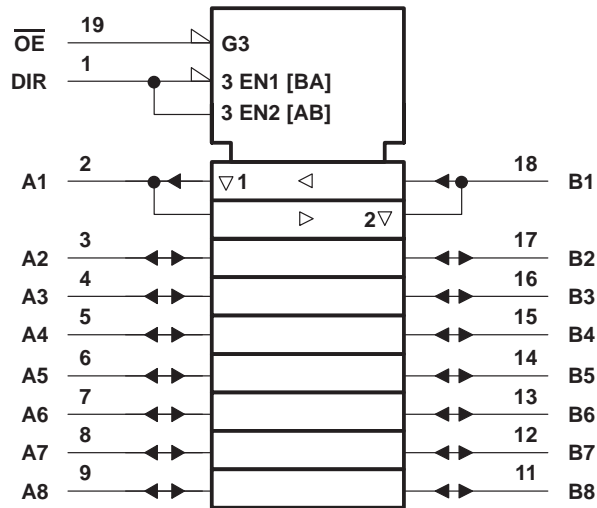
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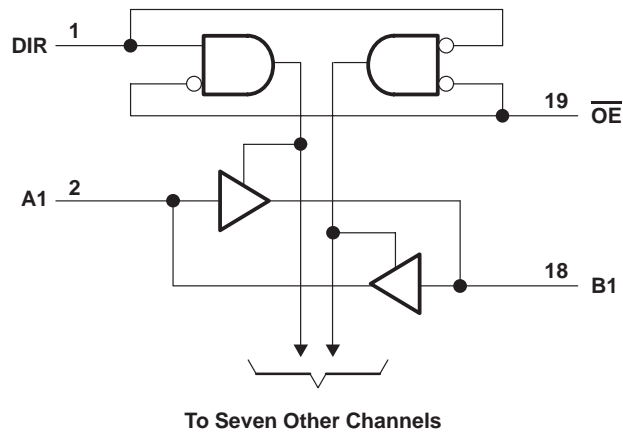
SCLS131B – DECEMBER 1982 – REVISED MAY 1997

logic symbol†



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

logic diagram (positive logic)



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SCLS131B – DECEMBER 1982 – REVISED MAY 1997

absolute maximum ratings over operating free-air temperature range†

Supply voltage range, V_{CC}	–0.5 V to 7 V
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$) (see Note 1)	±20 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) (see Note 1)	±20 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	±35 mA
Continuous current through V_{CC} or GND	±70 mA
Package thermal impedance, θ_{JA} (see Note 2): DB package	115°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 voltage ratings may be exceeded if the input and output current ratings are observed.
 2. The package thermal impedance is calculated in accordance with JEDEC 51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions

		SN54HC245			SN74HC245			UNIT	
		MIN	NOM	MAX	MIN	NOM	MAX		
V_{CC}	Supply voltage	2	5	6	2	5	6	V	
V_{IH}	High-level input voltage	$V_{CC} = 2$ V		1.5	$V_{CC} = 2$ V		1.5	V	
		$V_{CC} = 4.5$ V		3.15	$V_{CC} = 4.5$ V		3.15		
		$V_{CC} = 6$ V		4.2	$V_{CC} = 6$ V		4.2		
V_{IL}	Low-level input voltage	$V_{CC} = 2$ V		0	0.5	$V_{CC} = 2$ V		V	
		$V_{CC} = 4.5$ V		0	1.35	$V_{CC} = 4.5$ V			1.35
		$V_{CC} = 6$ V		0	1.8	$V_{CC} = 6$ V			1.8
V_I	Input voltage	0	V_{CC}		0	V_{CC}		V	
V_O	Output voltage	0	V_{CC}		0	V_{CC}		V	
t_t	Input transition (rise and fall) time	$V_{CC} = 2$ V		0	1000	$V_{CC} = 2$ V		ns	
		$V_{CC} = 4.5$ V		0	500	$V_{CC} = 4.5$ V			500
		$V_{CC} = 6$ V		0	400	$V_{CC} = 6$ V			400
T_A	Operating free-air temperature	–55	125		–40	85		°C	



SN54HC245, SN74HC245
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WITH 3-STATE OUTPUTS

SCLS131B – DECEMBER 1982 – REVISED MAY 1997

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

PARAMETER		TEST CONDITIONS	V _{CC}	T _A = 25°C			SN54HC245		SN74HC245		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V _{OH}		V _I = V _{IH} or V _{IL}	I _{OH} = -20 μA	2 V	1.9	1.998	1.9	1.9	V		
				4.5 V	4.4	4.499	4.4	4.4			
				6 V	5.9	5.999	5.9	5.9			
			I _{OH} = -6 mA	4.5 V	3.98	4.3	3.7	3.84			
				6 V	5.48	5.8	5.2	5.34			
V _{OL}		V _I = V _{IH} or V _{IL}	I _{OL} = 20 μA	2 V	0.002	0.1	0.1	0.1	V		
				4.5 V	0.001	0.1	0.1	0.1			
				6 V	0.001	0.1	0.1	0.1			
			I _{OL} = 6 mA	4.5 V	0.17	0.26	0.4	0.33			
				6 V	0.15	0.26	0.4	0.33			
I _I	DIR or \overline{OE}	V _I = V _{CC} or 0	6 V	±0.1	±100	±1000	±1000	nA			
I _{OZ}	A or B	V _O = V _{CC} or 0	6 V	±0.01	±0.5	±10	±5	μA			
I _{CC}		V _I = V _{CC} or 0, I _O = 0	6 V		8	160	80	μA			
C _i	DIR or \overline{OE}		2 V to 6 V		3	10	10	10	pF		

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

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC}	T _A = 25°C			SN54HC245		SN74HC245		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{pd}	A or B	B or A	2 V		40	105	160	130	ns		
			4.5 V		15	21	32	26			
			6 V		12	18	27	22			
t _{en}	\overline{OE}	A or B	2 V		125	230	340	290	ns		
			4.5 V		23	46	68	58			
			6 V		20	39	58	49			
t _{dis}	\overline{OE}	A or B	2 V		74	200	300	250	ns		
			4.5 V		25	40	60	50			
			6 V		21	34	51	43			
t _t		A or B	2 V		20	60	90	75	ns		
			4.5 V		8	12	18	15			
			6 V		6	10	15	13			



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SCLS131B – DECEMBER 1982 – REVISED MAY 1997

switching characteristics over recommended operating free-air temperature range, $C_L = 150 \text{ pF}$
(unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC}	$T_A = 25^\circ\text{C}$			SN54HC245		SN74HC245		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	A or B	B or A	2 V		54	135		200		170	ns
			4.5 V		18	27		40		34	
			6 V		15	23		34		29	
t_{en}	\overline{OE}	A or B	2 V		150	270		405		335	ns
			4.5 V		31	54		81		67	
			6 V		25	46		69		56	
t_t		A or B	2 V		45	210		315		265	ns
			4.5 V		17	42		63		53	
			6 V		13	36		53		45	

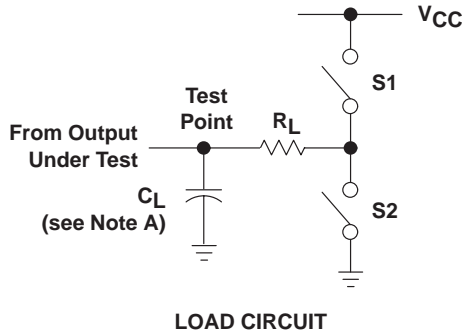
operating characteristics, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
C_{pd} Power dissipation capacitance per transceiver	No load	40	pF

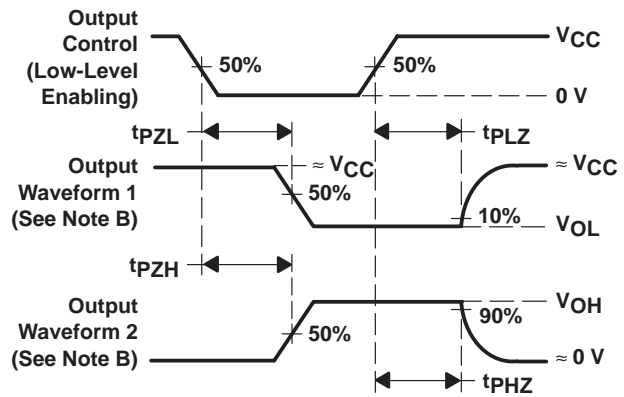
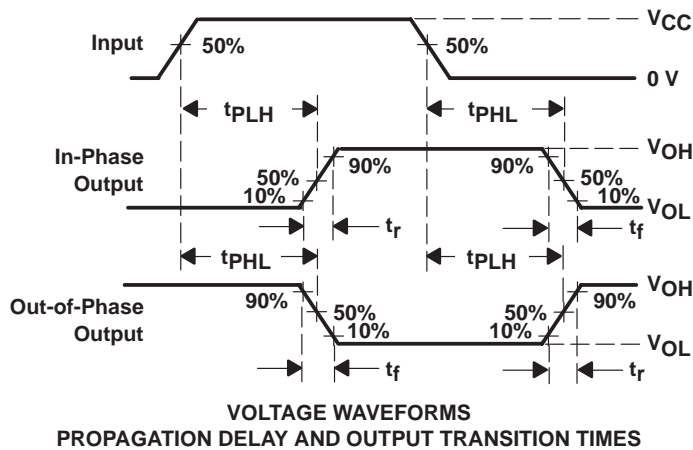
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OCTAL BUS TRANSCEIVERS
WITH 3-STATE OUTPUTS

SCLS131B – DECEMBER 1982 – REVISED MAY 1997

PARAMETER MEASUREMENT INFORMATION



PARAMETER	R_L	C_L	S1	S2
t_{en}	1 k Ω	50 pF or 150 pF	Open	Closed
			Closed	Open
t_{dis}	1 k Ω	50 pF	Open	Closed
			Closed	Open
t_{pd} or t_t	—	50 pF or 150 pF	Open	Open



VOLTAGE WAVEFORM INPUT RISE AND FALL TIMES

VOLTAGE WAVEFORMS ENABLE AND DISABLE TIMES FOR 3-STATE OUTPUTS

- NOTES:
- A. C_L includes probe and test-fixture 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. Phase relationships between waveforms were chosen arbitrarily. All input pulses are supplied by generators having the following characteristics: $PRR \leq 1$ MHz, $Z_O = 50 \Omega$, $t_r = 6$ ns, $t_f = 6$ ns.
 - D. The outputs are measured one at a time with one input transition per measurement.
 - E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - F. t_{PZL} and t_{PZH} are the same as t_{en} .
 - G. t_{PLH} and t_{PHL} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms

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