

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

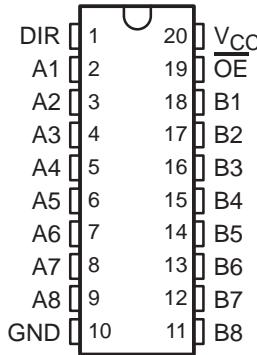
description

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

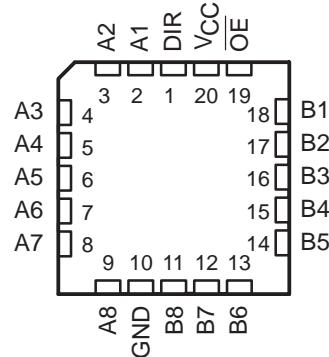
The devices allow data transmission from the A bus to the B bus or from the B bus to the A bus, depending on the logic level at the direction-control (DIR) input. The output-enable (\overline{OE}) input can be used to disable the device so that the buses are effectively isolated.

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
OE	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation



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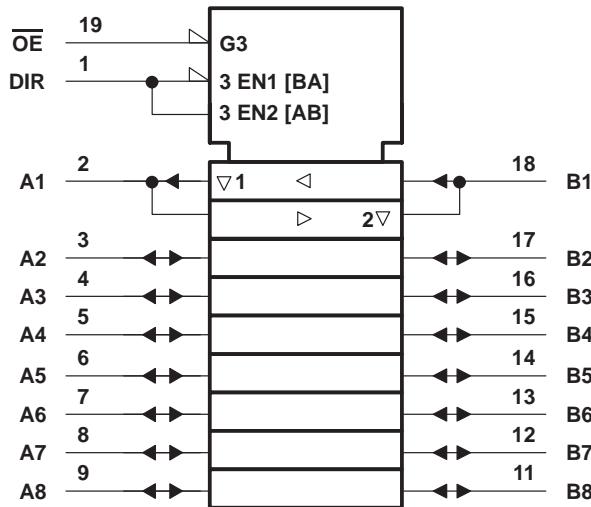
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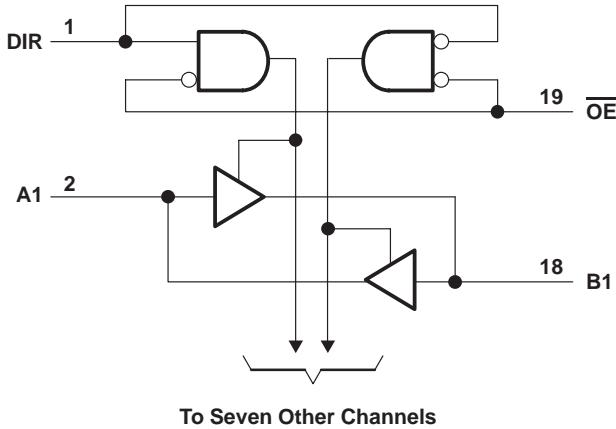
SCLS131B – DECEMBER 1982 – REVISED MAY 1997

logic symbol†



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

logic diagram (positive logic)



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 JESD 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		1.5				V
		V _{CC} = 4.5 V	3.15		3.15				
		V _{CC} = 6 V	4.2		4.2				
V _{IL}	Low-level input voltage	V _{CC} = 2 V	0	0.5	0	0	0.5	0.5	V
		V _{CC} = 4.5 V	0	1.35	0	0	1.35	1.35	
		V _{CC} = 6 V	0	1.8	0	0	1.8	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 _f	Input transition (rise and fall) time	V _{CC} = 2 V	0	1000		0	1000		ns
		V _{CC} = 4.5 V	0	500		0	500		
		V _{CC} = 6 V	0	400		0	400		
T _A	Operating free-air temperature		-55	125		-40	85		°C

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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	
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	
		I _{OH} = -7.8 mA	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	
		I _{OL} = 7.8 mA	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	
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	

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				

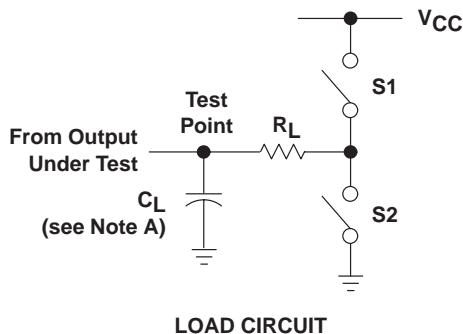
operating characteristics, $T_A = 25^\circ\text{C}$

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

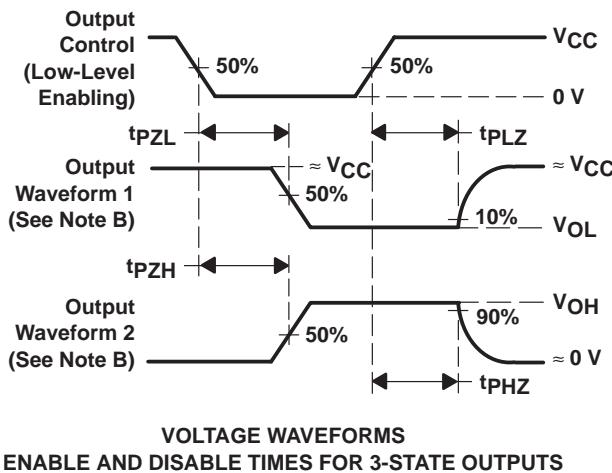
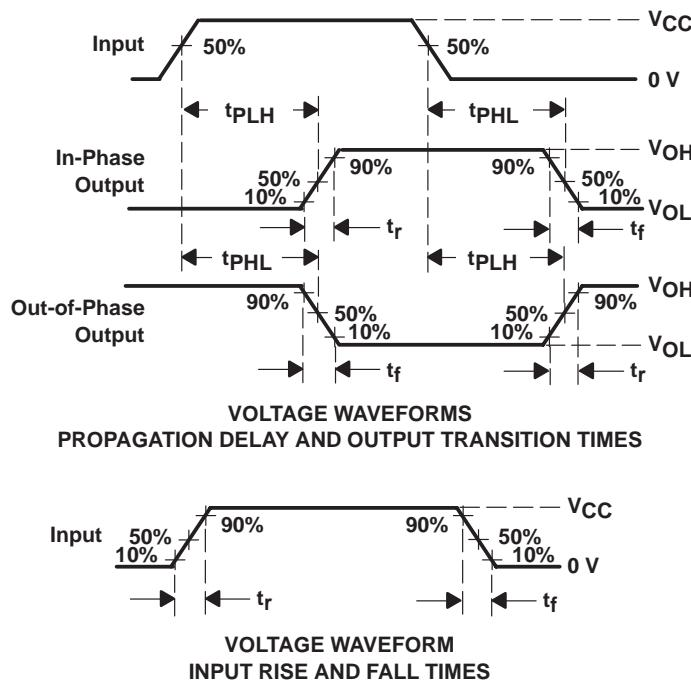
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SCLS131B – DECEMBER 1982 – REVISED MAY 1997

PARAMETER MEASUREMENT INFORMATION



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



NOTES:

- C_L includes probe and test-fixture 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.
- 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.
- The outputs are measured one at a time with one input 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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