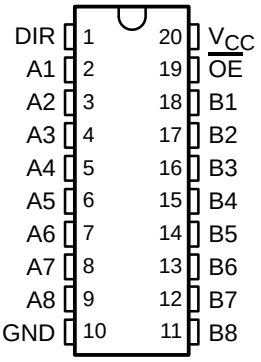
- **3-State Outputs Drive Bus Lines Directly**
- **PNP Inputs Reduce dc Loading on Bus Lines**
- **Hysteresis at Bus Inputs Improves Noise Margins**
- **Typical Propagation Delay Times Port to Port, 8 ns**

TYPE	I_{OL} (SINK CURRENT)	I_{OH} (SOURCE CURRENT)
SN54LS245	12 mA	–12 mA
SN74LS245	24 mA	–15 mA

SN54LS245 . . . J OR W PACKAGE
SN74LS245 . . . DB, DW, N, OR NS PACKAGE
(TOP VIEW)

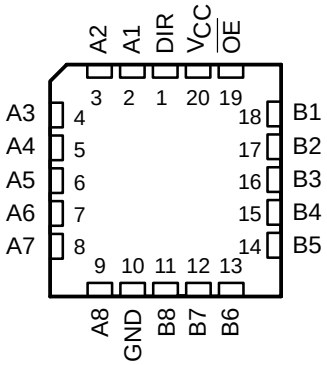


description

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 disable the device so that the buses are effectively isolated.

SN54LS245 . . . FK PACKAGE
(TOP VIEW)



ORDERING INFORMATION

T_A	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	PDIP – N	Tube	SN74LS245N	SN74LS245N
	SOIC – DW	Tube	SN74LS245DW	LS245
		Tape and reel	SN74LS245DWR	
	SOP – NS	Tape and reel	SN74LS245NSR	74LS245
	SSOP – DB	Tape and reel	SN74LS245DBR	LS245
–55°C to 125°C	CDIP – J	Tube	SN54LS245J	SN54LS245J
		Tube	SNJ54LS245J	SNJ54LS245J
	CFP – W	Tube	SNJ54LS245W	SNJ54LS245W
	LCCC – FK	Tube	SN54LS245FK	SN54LS245FK

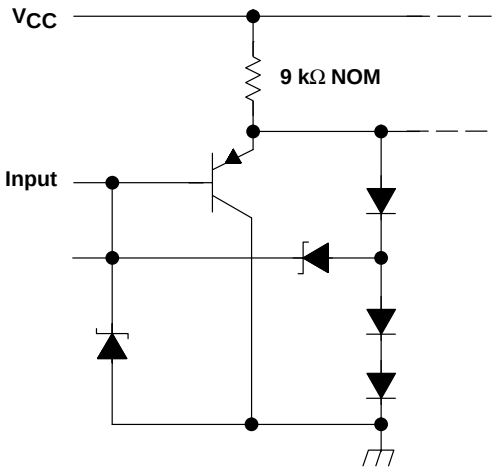
† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE

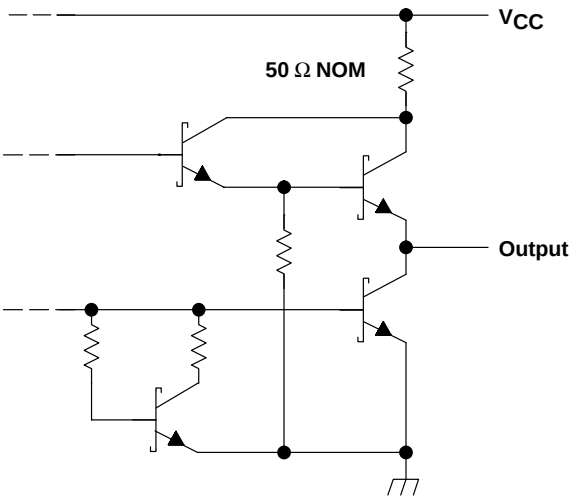
INPUTS		OPERATION
$\overline{OE}$	DIR	
L	L	B data to A bus
L	H	A data to B bus
H	X	Isolation

schematics of inputs and outputs

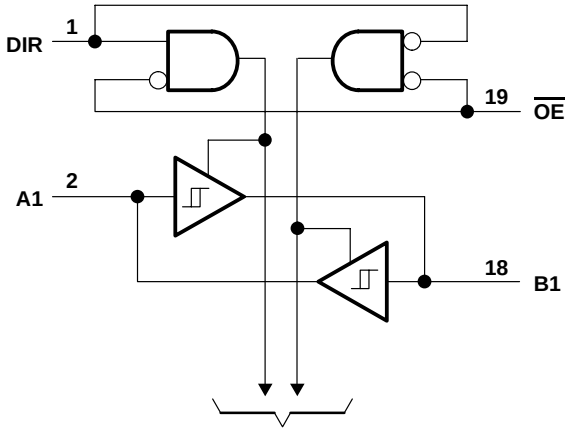
EQUIVALENT OF EACH INPUT



TYPICAL OF ALL OUTPUTS



logic diagram (positive logic)



To Seven Other Channels

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

Supply voltage, V_{CC} . . . . . 7 V
Input voltage, V_I (see Note 1) . . . . . 7 V
Package thermal impedance, θ_{JA} (see Note 2): DB package . . . . . 70°C/W
DW package . . . . . 58°C/W
N package . . . . . 69°C/W
NS package . . . . . 60°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. All voltage values are with respect to GND.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions

		SN54LS245			SN74LS245			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V_{CC}	Supply voltage	4.5	5	5.5	4.75	5	5.25	V
I_{OH}	High-level output current			–12			–15	mA
I_{OL}	Low-level output current			12			24	mA
T_A	Operating free-air temperature	–55		125	0		70	°C

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

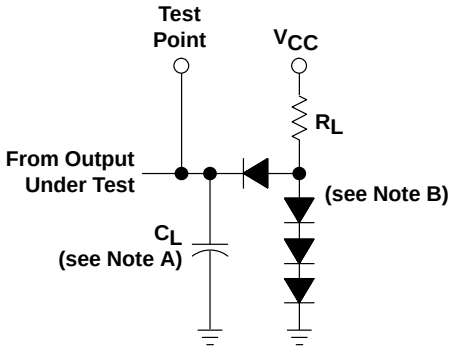
PARAMETER			TEST CONDITIONS†		SN54LS245			SN74LS245			UNIT
					MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IH}	High-level input voltage				2			2			V
V_{IL}	Low-level input voltage						0.7			0.8	V
V_{IK}	Input clamp voltage		V_{CC} = MIN,	I_I = –18 mA			–1.5			–1.5	V
	Hysteresis ($V_{T+} – V_{T–}$)	A or B	V_{CC} = MIN		0.2	0.4		0.2	0.4		V
V_{OH}	High-level output voltage		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = $V_{IL(max)}$	I_{OH} = –3 mA	2.4	3.4		2.4	3.4		V
				I_{OH} = MAX	2			2			
V_{OL}	Low-level output voltage		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = $V_{IL(max)}$	I_{OL} = 12 mA			0.4			0.4	V
				I_{OL} = 24 mA						0.5	
I_{OZH}	Off-state output current, high-level voltage applied		V_{CC} = MAX, $\overline{OE}$ at 2 V	V_O = 2.7 V			20			20	µA
I_{OZL}	Off-state output current, low-level voltage applied		V_{CC} = MAX, $\overline{OE}$ at 2 V	V_O = 0.4 V			–200			–200	µA
I_I	Input current at maximum input voltage	A or B	V_{CC} = MAX	V_I = 5.5 V			0.1			0.1	mA
		DIR or $\overline{OE}$		V_I = 7 V			0.1			0.1	
I_{IH}	High-level input current		V_{CC} = MAX,	V_{IH} = 2.7 V			20			20	µA
I_{IL}	Low-level input current		V_{CC} = MAX,	V_{IL} = 0.4 V			–0.2			–0.2	mA
I_{OS}	Short-circuit output current§		V_{CC} = MAX		–40		–225	40		–225	mA
I_{CC}	Supply current	Total, outputs high	V_{CC} = MAX	Outputs open		48	70		48	70	mA
		Total, outputs low				62	90		62	90	
		Outputs at high Z				64	95		64	95	

† For conditions shown as MIN or MAX, use the appropriate values specified under recommended operating conditions.
‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.
§ Not more than one output should be shorted at a time, and duration of the short circuit should not exceed one second.

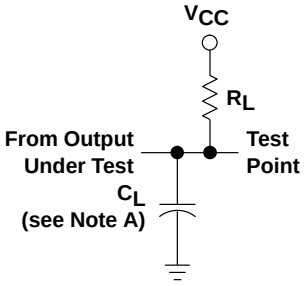
switching characteristics, V_{CC} = 5 V, T_A = 25°C (see Figure 1)

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low- to high-level output	C_L = 45 pF,	R_L = 667 Ω		8	12	ns
t_{PHL}	Propagation delay time, high- to low-level output				8	12	
t_{PZL}	Output enable time to low level	C_L = 45 pF,	R_L = 667 Ω		27	40	ns
t_{PZH}	Output enable time to high level				25	40	
t_{PLZ}	Output disable time from low level	C_L = 5 pF,	R_L = 667 Ω		15	25	ns
t_{PHZ}	Output disable time from high level				15	28	

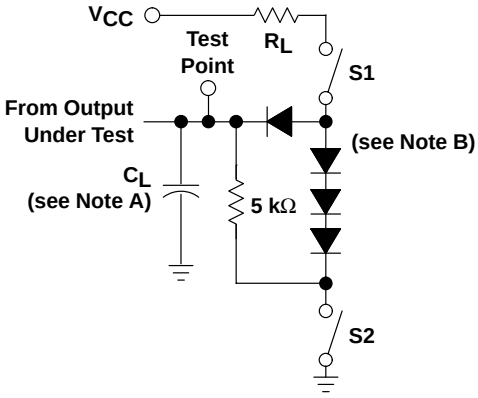
PARAMETER MEASUREMENT INFORMATION
SERIES 54LS/74LS DEVICES



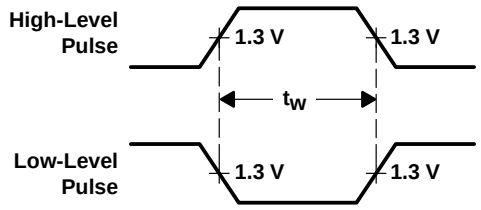
LOAD CIRCUIT
FOR 2-STATE TOTEM-POLE OUTPUTS



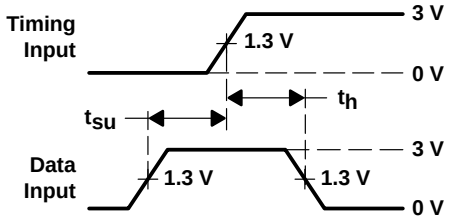
LOAD CIRCUIT
FOR OPEN-COLLECTOR OUTPUTS



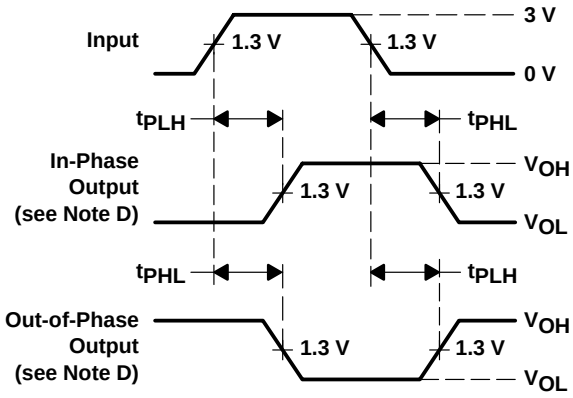
LOAD CIRCUIT
FOR 3-STATE OUTPUTS



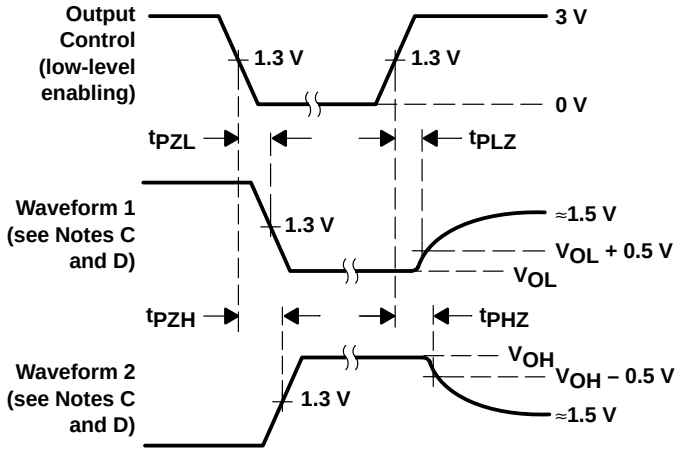
VOLTAGE WAVEFORMS
PULSE DURATIONS



VOLTAGE WAVEFORMS
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS
ENABLE AND DISABLE TIMES, 3-STATE OUTPUTS

NOTES: A. C_L includes probe and jig capacitance.
B. All diodes are 1N3064 or equivalent.
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. S1 and S2 are closed for t_{PLH}, t_{PHL}, t_{PHZ}, and t_{PLZ}; S1 is open and S2 is closed for t_{PZH}; S1 is closed and S2 is open for t_{PZL}.
E. Phase relationships between inputs and outputs have been chosen arbitrarily for these examples.
F. All input pulses are supplied by generators having the following characteristics: PRR ≤ 1 MHz, $Z_O \approx 50\ \Omega$, $t_r \le 1.5$ ns, $t_f \le 2.6$ ns.
G. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms