

# SN54ALS243A, SN74ALS243A QUADRUPLE BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SDAS069B – DECEMBER 1982 – REVISED DECEMBER 1994

- Two-Way Asynchronous Communication Between Data Buses
- pnp Inputs Reduce dc Loading
- Package Options Include Plastic Small-Outline (D) Packages, Ceramic Chip Carriers (FK), and Standard Plastic (N) and Ceramic (J) 300-mil DIPs

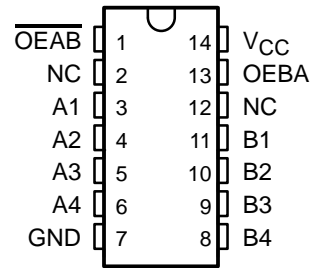
## description

These quadruple bus transceivers are designed for asynchronous two-way communication between data buses. The control-function implementation allows for maximum flexibility in timing. These devices allow data transmission from the A bus to the B bus or from the B bus to the A bus depending upon the logic levels at the output-enable (OEBA and OEAB) inputs. The output-enable inputs can be used to disable the device so that the buses are effectively isolated.

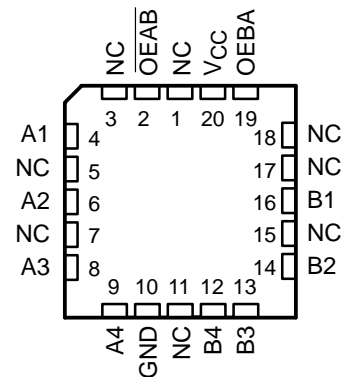
The dual-enable configuration gives the quadruple bus transceivers the capability to store data by simultaneously enabling OEBA and OEAB. Each output reinforces its input in this transceiver configuration. When both control inputs are enabled and all other data sources to the two sets of bus lines are at high impedance, both sets of bus lines (eight in all) retain their states. The 4-bit codes appearing on the two sets of buses are identical.

The SN54ALS243A is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74ALS243A is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN54ALS243A . . . J PACKAGE  
SN74ALS243A . . . D OR N PACKAGE  
(TOP VIEW)



SN54ALS243A . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

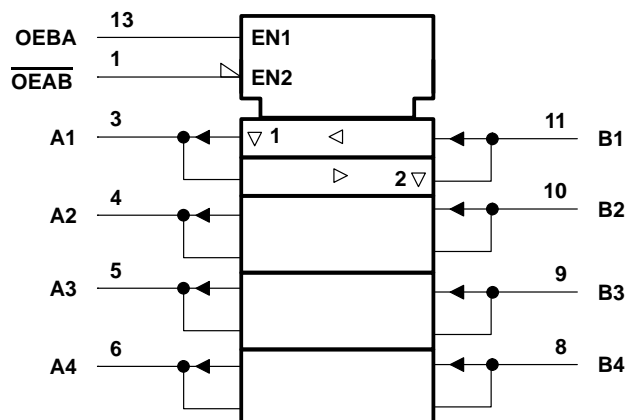
FUNCTION TABLE

INPUTS		FUNCTION
OEAB	OEBA	
L	L	A to B
H	H	B to A
H	L	Isolation
L	H	Latch A and B (A = B)

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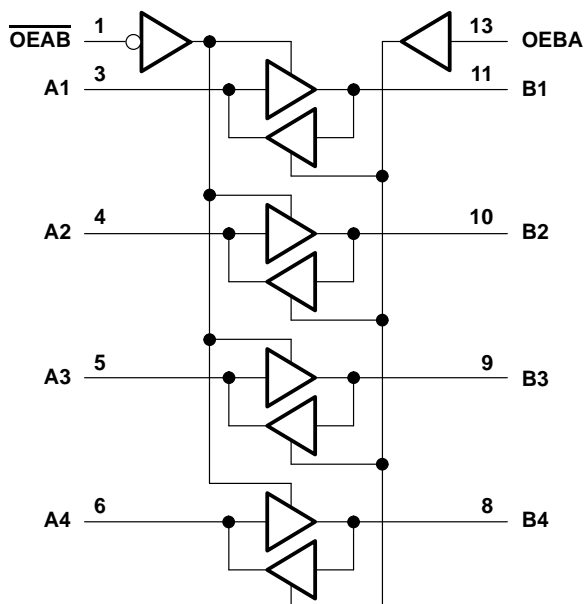
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## logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.  
Pin numbers shown are for the D, J, and N packages.

## logic diagram (positive logic)



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

Supply voltage, $V_{CC}$	7 V
Input voltage, $V_I$ : All inputs	7 V
I/O ports	5.5 V
Operating free-air temperature range, $T_A$ : SN54ALS243A	–55°C to 125°C
SN74ALS243A	0°C to 70°C
Storage temperature range	–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.

## recommended operating conditions

		SN54ALS243A			SN74ALS243A			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$	Supply voltage	4.5	5	5.5	4.5	5	5.5	V
$V_{IH}$	High-level input voltage	2			2			V
$V_{IL}$	Low-level input voltage			0.7			0.8	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

# SN54ALS243A, SN74ALS243A QUADRUPLE 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	SN54ALS243A			SN74ALS243A			UNIT
			MIN	TYP†	MAX	MIN	TYP†	MAX	
$V_{IK}$		$V_{CC} = 4.5\text{ V}$ , $I_I = -18\text{ mA}$			-1.2			-1.2	V
$V_{OH}$		$V_{CC} = 4.5\text{ V to } 5.5\text{ V}$ , $I_{OH} = -0.4\text{ mA}$	$V_{CC} - 2$			$V_{CC} - 2$			V
		$V_{CC} = 4.5\text{ V}$ , $I_{OH} = -3\text{ mA}$	2.4	3.2		2.4	3.2		
		$I_{OH} = -12\text{ mA}$	2						
		$I_{OH} = -15\text{ mA}$				2			
$V_{OL}$		$V_{CC} = 4.5\text{ V}$ , $I_{OL} = 12\text{ mA}$	0.25	0.4		0.25	0.4		V
		$I_{OL} = 24\text{ mA}$				0.35	0.5		
$I_I$	Control inputs	$V_{CC} = 5.5\text{ V}$ , $V_I = 7\text{ V}$			0.1			0.1	mA
	A or B ports				0.1			0.1	
$I_{IH}$	Control inputs	$V_{CC} = 5.5\text{ V}$ , $V_I = 2.7\text{ V}$			20			20	$\mu\text{A}$
	A or B ports‡				20			20	
$I_{IL}$	Control inputs	$V_{CC} = 5.5\text{ V}$ , $V_I = 2.7\text{ V}$			-0.1			-0.1	mA
	A or B ports‡				-0.1			-0.1	
$I_{OS}$		$V_{CC} = 5.5\text{ V}$ , $V_O = 2.25\text{ V}$	-20		-112	-30		-112	mA
$I_{CC}$		$V_{CC} = 5.5\text{ V}$ , Outputs high	15	30		15	25		mA
		Outputs low	20	35		20	30		
		Outputs disabled	21	37		21	32		

† All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

‡ For I/O ports, the parameters  $I_{IH}$  and  $I_{IL}$  include the off-state output current.

§ The output conditions have been chosen to produce a current that closely approximates one half of the true short-circuit output current,  $I_{OS}$ .

## switching characteristics (see Figure 1)

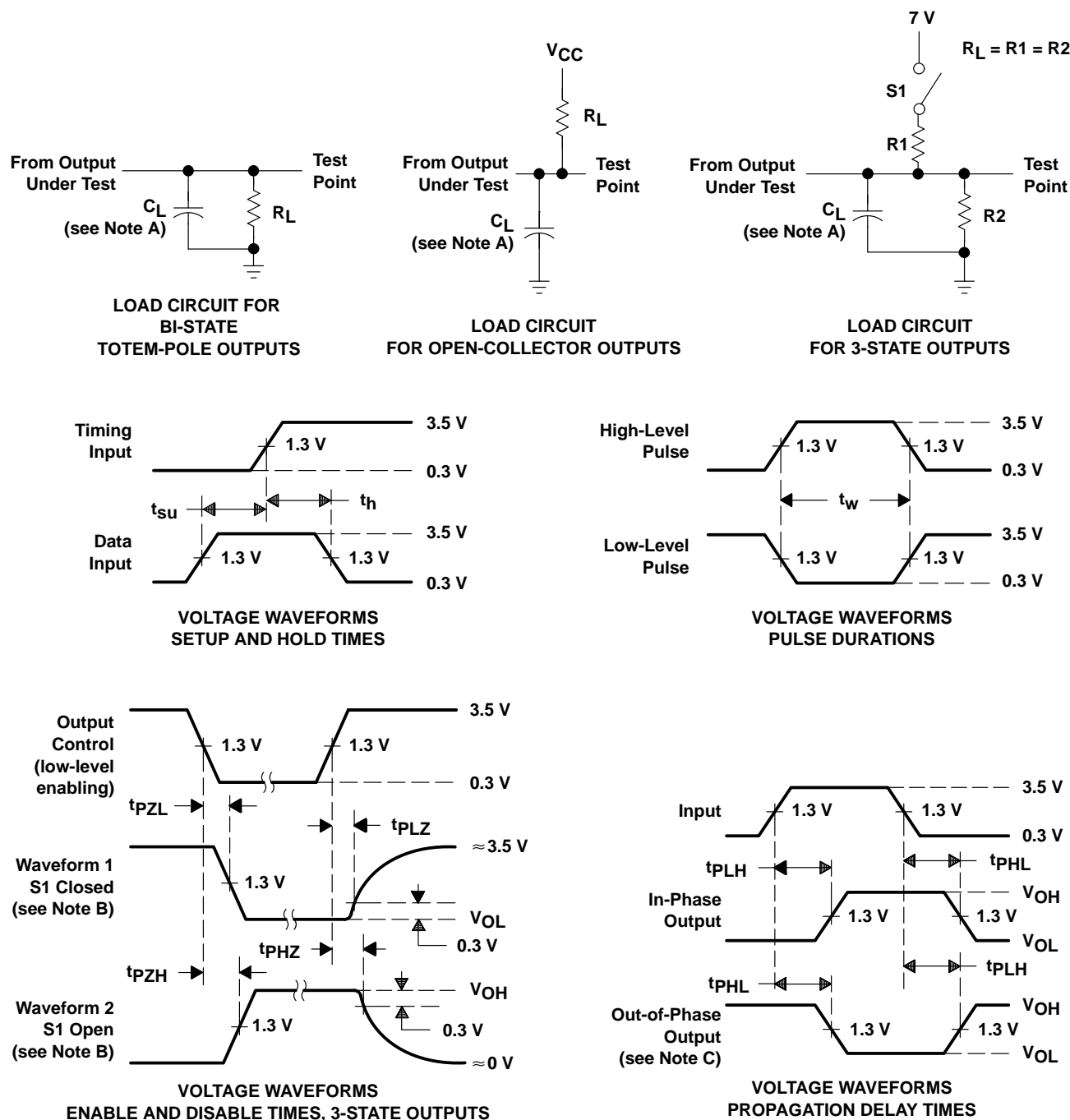
PARAMETER	FROM (INPUT)	TO (OUTPUT)	V <sub>CC</sub> = 4.5 V to 5.5 V, C <sub>L</sub> = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T <sub>A</sub> = MIN to MAX†				UNIT
			SN54ALS243A		SN74ALS243A		
			MIN	MAX	MIN	MAX	
t <sub>PLH</sub>	A or B	B or A	4	15	4	11	ns
t <sub>PHL</sub>			4	15	4	11	
t <sub>PZH</sub>	$\overline{\text{OEAB}}$	B	7	25	7	20	ns
t <sub>PZL</sub>			7	25	7	20	
t <sub>PHZ</sub>	$\overline{\text{OEAB}}$	B	2	16	2	14	ns
t <sub>PLZ</sub>			3	27	3	22	
t <sub>PZH</sub>	OEBA	A	7	25	7	20	ns
t <sub>PZL</sub>			7	25	7	20	
t <sub>PHZ</sub>	OEBA	A	2	16	2	14	ns
t <sub>PLZ</sub>			3	27	3	22	

† For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

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## PARAMETER MEASUREMENT INFORMATION SERIES 54ALS/74ALS AND 54AS/74AS DEVICES



- 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. When measuring propagation delay items of 3-state outputs, switch S1 is open.  
 D. All input pulses have the following characteristics:  $PRR \leq 1$  MHz,  $t_r = t_f = 2$  ns, duty cycle = 50%.  
 E. The outputs are measured one at a time with one transition per measurement.

Figure 1. Load Circuits and Voltage Waveforms

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