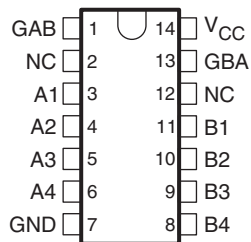


## QUADRUPLE BUS TRANSCEIVERS

### FEATURES

- Two-Way Asynchronous Communication Between Data Buses
- PNP Inputs Reduce D-C Loading
- Hysteresis (Typically 400 mV) at Inputs Improves Noise Margin

SN54LS243 . . . J OR W PACKAGE  
SN74LS243 . . . D, N, OR NS PACKAGE  
(TOP VIEW)



**FUNCTION TABLE  
(EACH TRANSCEIVER)**

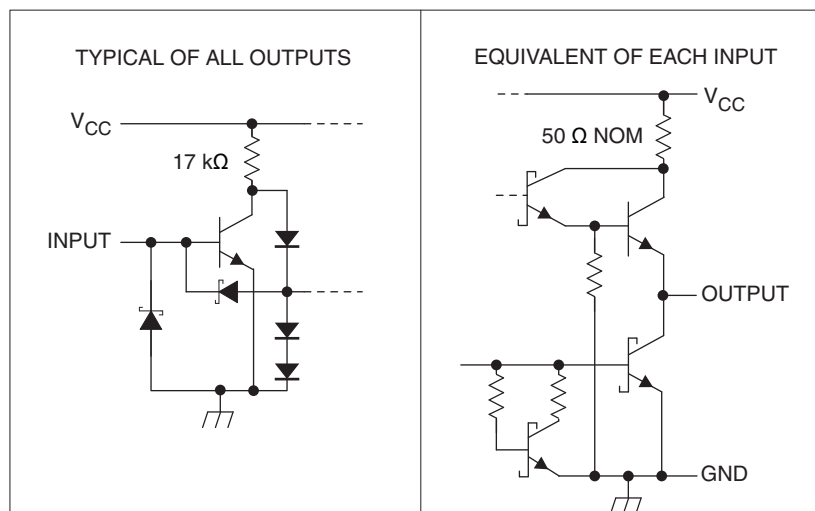
INPUTS		SNxxLS243
$\overline{\text{GAB}}$	GBA	
L	L	A to B
H	H	B to A
H	L	Isolation
L	H	Latch A and B (A = B)

### DESCRIPTION

These four-data-line transceivers are designed for asynchronous two-way communications between data buses. SN74LS243 can be used to drive terminated lines down to 133  $\Omega$ .

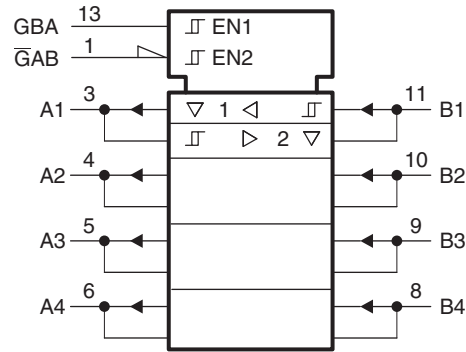
SN54LS243 is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . SN74LS243 is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

### SCHEMATICS OF INPUTS AND OUTPUTS



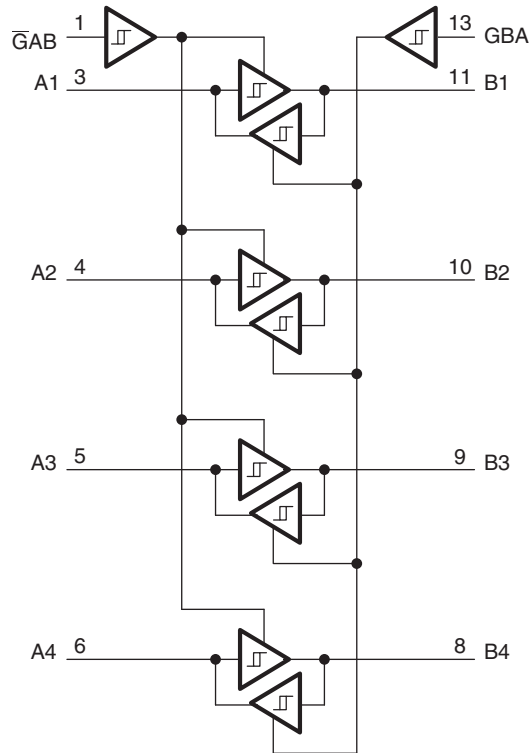
Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

**LOGIC SYMBOL**



A. These symbols are in accordance with ANSI/EEE Std. 91-1984 and IEC Publication 617-12.

**LOGIC DIAGRAM (POSITIVE LOGIC)**



**ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>**

			MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage <sup>(2)</sup>			7	V
V <sub>IN</sub>	Input voltage			7	V
	OFF-state output voltage			5.5	V
T <sub>A</sub>	Operating free-air temperature range	SN54LS243	–55	125	°C
		SN74LS243	0	70	
T <sub>stg</sub>	Storage temperature range		–65	150	°C

- (1) 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.
- (2) Voltage values are with respect to network ground terminal.

**RECOMMENDED OPERATING CONDITIONS**

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

		SN54LS243			SN74LS243			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage <sup>(1)</sup>	4.5	5	5.5	4.75	5	5.25	V
V <sub>IH</sub>	High-level input voltage	2			2			V
V <sub>IL</sub>	Low-level input voltage			0.7			0.8	V
I <sub>OH</sub>	High-level output voltage			–12			–15	mA
I <sub>OL</sub>	Low-level output voltage			12			24	mA
T <sub>A</sub>	Operating free-air temperature	–55		125	0		70	°C

- (1) Voltage values are with respect to network ground terminal.

### ELECTRICAL CHARACTERISTICS

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

PARAMETER		TEST CONDITIONS <sup>(1)</sup>		SN54LS243			SN74LS243			UNIT
				MIN	TYP <sup>(2)</sup>	MAX	MIN	TYP <sup>(2)</sup>	MAX	
V <sub>IK</sub>	A or B	V <sub>CC</sub> = MIN, I <sub>I</sub> = -18 mA		-1.5			-1.5			V
Hysteresis (V <sub>T+</sub> - V <sub>T-</sub> )		V <sub>CC</sub> = MIN,		0.2	0.4		0.2	0.4		V
V <sub>OH</sub>		V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V,	V <sub>IL</sub> = MAX, I <sub>OH</sub> = -3 mA	2.4	3.1		2.4	3.1		V
			V <sub>IL</sub> = 0.5 V, I <sub>OH</sub> = MAX	2		2				
V <sub>OL</sub>		V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX	I <sub>OL</sub> = 12 mA	0.25 0.4		0.25 0.4				V
			I <sub>OL</sub> = 24 mA			0.35 0.5				
I <sub>OZH</sub>		V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX,	V <sub>O</sub> = 2.7 V		40			40		μA
I <sub>OZL</sub>		V <sub>CC</sub> = MIN, V <sub>IH</sub> = 2 V, V <sub>IL</sub> = MAX,	V <sub>O</sub> = 0.4 V		-200			-200		μA
I <sub>I</sub>	A or B	V <sub>CC</sub> = MAX,	V <sub>I</sub> = 5.5 V		0.1			0.1		mA
	$\overline{\text{GAB}}$ or GBA		V <sub>I</sub> = 7 V		0.1			0.1		
I <sub>IH</sub>		V <sub>CC</sub> = MAX,		20			20		μA	
I <sub>IL</sub>	A inputs	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V, GAB and GBA at 0 V		-0.2			-0.2		mA	
	B inputs	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V, GAB and GBA at 4.5 V		-0.2			-0.2			
	$\overline{\text{GAB}}$ or GBA	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.4 V,		-0.2			-0.2			
I <sub>OS</sub>		V <sub>CC</sub> = MAX		-40	-225		-40	-225		mA
I <sub>CC</sub>	Outputs high	V <sub>CC</sub> <sup>(3)</sup> = MAX,	Outputs open,		22	38		22	38	mA
	Outputs low				29	50		29	50	
	All outputs disabled				32	54		32	54	

- (1) For conditions shown as MIN or MAX, use the appropriate value specified under "recommended operating conditions."
- (2) All typical values are at V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C.
- (3) I<sub>CC</sub> is measured with transceivers enabled in one direction only, or with all transceivers disabled.

### SWITCHING CHARACTERISTICS

V<sub>CC</sub> = 5 V, T<sub>A</sub> = 25°C

PARAMETER	TEST CONDITIONS		SN54LS243			SN74LS243			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
t <sub>PLH</sub>	R <sub>L</sub> = 667 Ω,	C <sub>L</sub> = 45 pF	9		14	12		18	ns
t <sub>PHL</sub>			12		18	12		18	ns
t <sub>PZL</sub>			20		30	20		30	ns
t <sub>PZH</sub>			15		23	15		23	ns
t <sub>PLZ</sub>	R <sub>L</sub> = 667 Ω,	C <sub>L</sub> = 5 pF	10		20	10		20	ns
t <sub>PHZ</sub>			15		25	15		25	ns

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
80020022A	OBSOLETE			20		TBD	Call TI	Call TI
8002002CA	ACTIVE	CDIP	J	14	1	TBD	A42 SNPB	N / A for Pkg Type
8002002DA	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type
SN54LS243J	ACTIVE	CDIP	J	14	1	TBD	A42 SNPB	N / A for Pkg Type
SN74LS243D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS243DE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS243DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS243DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS243DRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS243DRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74LS243J	OBSOLETE	CDIP	J	14		TBD	Call TI	Call TI
SN74LS243N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN74LS243N3	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN74LS243NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SNJ54LS243FK	OBSOLETE			20		TBD	Call TI	Call TI
SNJ54LS243J	ACTIVE	CDIP	J	14	1	TBD	A42 SNPB	N / A for Pkg Type
SNJ54LS243W	ACTIVE	CFP	W	14	1	TBD	A42	N / A for Pkg Type

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take

reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

**TAPE AND REEL INFORMATION**



**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74LS243DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1

**TAPE AND REEL BOX DIMENSIONS**



\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74LS243DR	SOIC	D	14	2500	346.0	346.0	33.0



J (R-GDIP-T\*\*)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
  - This drawing is subject to change without notice.
  - This package is hermetically sealed with a ceramic lid using glass frit.
  - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
  - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

W (R-GDFP-F14)

CERAMIC DUAL FLATPACK



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. This package can be hermetically sealed with a ceramic lid using glass frit.
  - D. Index point is provided on cap for terminal identification only.
  - E. Falls within MIL STD 1835 GDFP1-F14 and JEDEC MO-092AB

D (R-PDSO-G14)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 (0,15) per end.
  - D. Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
  - E. Reference JEDEC MS-012 variation AB.

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

### Products

Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
RF/IF and ZigBee® Solutions	<a href="http://www.ti.com/lprf">www.ti.com/lprf</a>

### Applications

Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Broadband	<a href="http://www.ti.com/broadband">www.ti.com/broadband</a>
Digital Control	<a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a>
Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Military	<a href="http://www.ti.com/military">www.ti.com/military</a>
Optical Networking	<a href="http://www.ti.com/opticalnetwork">www.ti.com/opticalnetwork</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Telephony	<a href="http://www.ti.com/telephony">www.ti.com/telephony</a>
Video & Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>
Wireless	<a href="http://www.ti.com/wireless">www.ti.com/wireless</a>

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2008, Texas Instruments Incorporated