

# SN54LS242, SN54LS243, SN74LS242, SN74LS243 QUADRUPLE BUS TRANSCEIVERS

SDLS145 – APRIL 1985 – REVISED MARCH 1988

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

## description

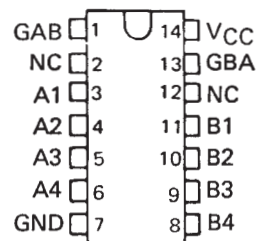
These four-data-line transceivers are designed for asynchronous two-way communications between data buses. The SN74LS' can be used to drive terminated lines down to 133 ohms.

The SN54' family is characterized for operation over the full military temperature range of  $-55^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ . The SN74' family is characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

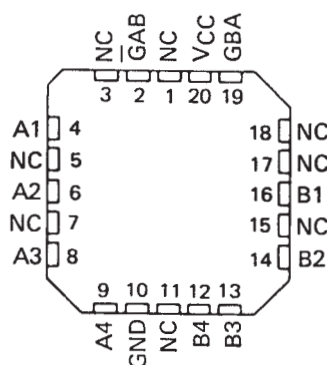
FUNCTION TABLE (EACH TRANSCEIVER)

INPUTS		'LS242	'LS243
$\overline{\text{GAB}}$	GBA		
L	L	$\overline{\text{A}}$ to B	A to B
H	H	$\overline{\text{B}}$ to A	B to A
H	L	Isolation	Isolation
L	H	Latch A and B ( $\text{A} = \overline{\text{B}}$ )	Latch A and B ( $\text{A} = \text{B}$ )

SN54LS242, SN54LS243 . . . J OR W PACKAGE  
SN74LS242, SN74LS243 . . . D OR N PACKAGE  
(TOP VIEW)

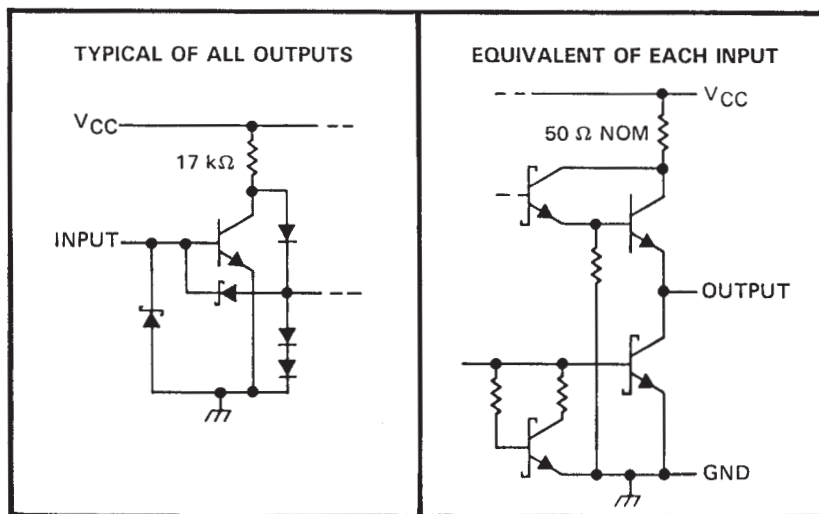


SN54LS242, SN54LS243 . . . FK PACKAGE  
(TOP VIEW)



NC—No internal connection

## schematics of inputs and outputs



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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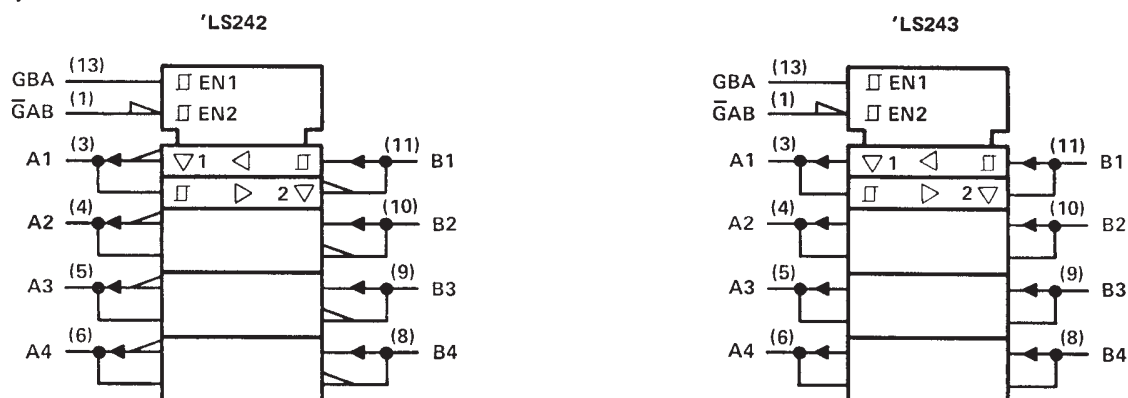
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# SN54LS242, SN54LS243, SN74LS242, SN74LS243

## QUADRUPLE BUS TRANSCEIVERS

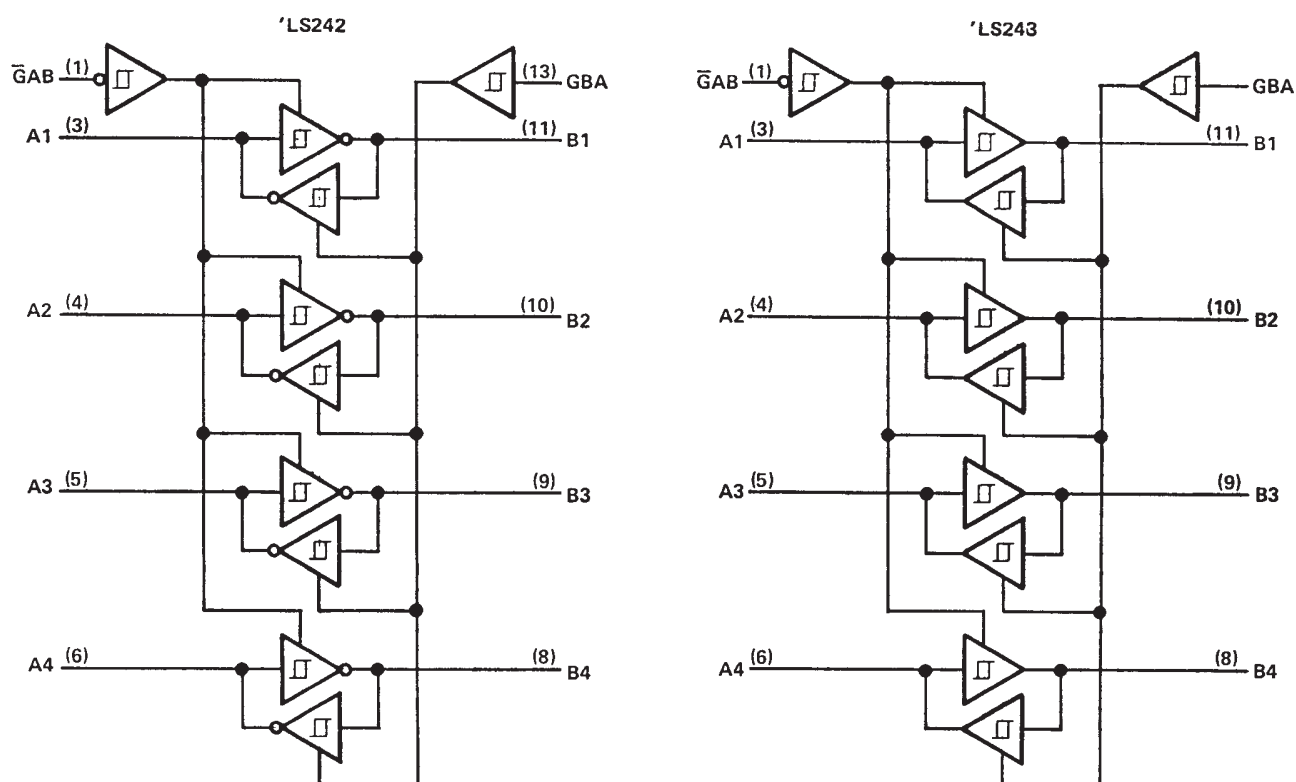
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### logic symbols†



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

### logic diagrams (positive logic)



Pin numbers shown are for D, J, N, and W packages.

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

Supply voltage, $V_{CC}$ (see Note 1)	7 V
Input voltage	7 V
Off-state output voltage	5.5 V
Operating free-air temperature range: SN54LS'	– 55°C to 125°C
SN74LS'	0°C to 70°C
Storage temperature range	– 65°C to 150°C

NOTE 1: Voltage values are with respect to network ground terminal.



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# SN54LS242, SN54LS243, SN74LS242, SN74LS243 QUADRUPLE BUS TRANSCEIVERS

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## recommended operating conditions

		SN54LS'			SN74LS'			UNIT
		MIN	NOM	MAX	MIN	NOM	MAX	
$V_{CC}$	Supply voltage, (see Note 1)	4.5	5	5.5	4.75	5	5.25	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

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

PARAMETER		TEST CONDITIONS†		SN54LS'			SN74LS'			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
$V_{IK}$	A or B	$V_{CC} = \text{MIN}, I_I = -18 \text{ mA}$				– 1.5			– 1.5	V
Hysteresis ( $V_{T+} - V_{T-}$ )		$V_{CC} = \text{MIN}$		0.2	0.4		0.2	0.4		V
$V_{OH}$		$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = \text{MAX}, I_{OH} = -3 \text{ mA}$		2.4	3.1		2.4	3.1		V
		$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = 0.5 \text{ V}, I_{OH} = \text{MAX}$		2			2			
$V_{OL}$		$V_{CC} = \text{MIN}, V_{IH} = 2 \text{ V}, V_{IL} = \text{MAX}$	$I_{OL} = 12 \text{ mA}$	0.25	0.4		0.25	0.4		V
			$I_{OL} = 24 \text{ mA}$				0.35	0.5		
$I_{OZH}$		$V_{CC} = \text{MAX}, V_{IH} = 2 \text{ V}, V_{IL} = \text{MAX}$				40			40	μA
$I_{OZL}$						– 200			– 200	μA
$I_I$	A or B	$V_{CC} = \text{MAX},$	$V_I = 5.5 \text{ V}$			0.1			0.1	mA
	$\overline{\text{GAB}}$ or GBA		$V_I = 7 \text{ V}$			0.1			0.1	
$I_{IH}$		$V_{CC} = \text{MAX}, V_I = 2.7 \text{ V}$				20			20	μA
$I_{IL}$	A inputs	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}, \text{GAB and GBA at } 0 \text{ V}$				– 0.2			– 0.2	mA
	B inputs	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}, \text{GAB and GBA at } 4.5 \text{ V}$				– 0.2			– 0.2	
	$\overline{\text{GAB}}$ or GBA	$V_{CC} = \text{MAX}, V_I = 0.4 \text{ V}$				– 0.2			– 0.2	
$I_{OS}§$		$V_{CC} = \text{MAX}$		– 40		– 225	– 40		– 225	mA
$I_{CC}$	Outputs high	$V_{CC} = \text{MAX},$ Outputs open, See Note 2	'LS242, 'LS243	22	38		22	38		mA
	Outputs low		'LS242, 'LS243	29	50		29	50		
	All outputs disabled		'LS242	29	50		29	50		
			'LS243	32	54		32	54		

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

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

§ Not more than one output should be shorted at a time, and duration of the short-circuit should not exceed one second.

NOTE 2:  $I_{CC}$  is measured with transceivers enabled in one direction only, or with all transceivers disabled.

## switching characteristics, $V_{CC} = 5 \text{ V}, T_A = 25^\circ \text{C}$

PARAMETER	TEST CONDITIONS	'LS242			'LS243			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
$t_{PLH}$	$R_L = 667 \Omega$ See Note 3 $C_L = 45 \text{ pF},$		9	14		12	18	ns
$t_{PHL}$			12	18		12	18	ns
$t_{PZL}$			20	30		20	30	ns
$t_{PZH}$			15	23		15	23	ns
$t_{PLZ}$	$R_L = 667 \Omega,$ See Note 3 $C_L = 5 \text{ pF},$		10	20		10	20	ns
$t_{PHZ}$			15	25		15	25	ns

NOTE 3: Load circuits and voltage waveforms are shown in Section 1.



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**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>
80020012A	OBSOLETE	LCCC	FK	20		TBD	Call TI	Call TI
8002001CA	OBSOLETE	CDIP	J	14		TBD	Call TI	Call TI
8002001CA	OBSOLETE	CDIP	J	14		TBD	Call TI	Call TI
8002001DA	OBSOLETE	CFP	W	14		TBD	Call TI	Call TI
8002001DA	OBSOLETE	CFP	W	14		TBD	Call TI	Call TI
80020022A	OBSOLETE			20		TBD	Call TI	Call TI
80020022A	OBSOLETE			20		TBD	Call TI	Call TI
8002002CA	ACTIVE	CDIP	J	14	1	TBD	Call TI	N / A for Pkg Type
8002002CA	ACTIVE	CDIP	J	14	1	TBD	Call TI	N / A for Pkg Type
8002002DA	ACTIVE	CFP	W	14	1	TBD	Call TI	N / A for Pkg Type
8002002DA	ACTIVE	CFP	W	14	1	TBD	Call TI	N / A for Pkg Type
SN54LS243J	ACTIVE	CDIP	J	14	1	TBD	Call TI	N / A for Pkg Type
SN54LS243J	ACTIVE	CDIP	J	14	1	TBD	Call TI	N / A for Pkg Type
SN74LS242D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI
SN74LS242D	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI
SN74LS242DR	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI
SN74LS242DR	OBSOLETE	SOIC	D	14		TBD	Call TI	Call TI
SN74LS242N	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN74LS242N	OBSOLETE	PDIP	N	14		TBD	Call TI	Call TI
SN74LS243D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
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
SN74LS243DE4	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
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
SN74LS243DRE4	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
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
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
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

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>
SN74LS243NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SNJ54LS243FK	OBSOLETE			20		TBD	Call TI	Call TI
SNJ54LS243FK	OBSOLETE			20		TBD	Call TI	Call TI
SNJ54LS243J	ACTIVE	CDIP	J	14	1	TBD	Call TI	N / A for Pkg Type
SNJ54LS243J	ACTIVE	CDIP	J	14	1	TBD	Call TI	N / A for Pkg Type
SNJ54LS243W	ACTIVE	CFP	W	14	1	TBD	Call TI	N / A for Pkg Type
SNJ54LS243W	ACTIVE	CFP	W	14	1	TBD	Call TI	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.

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