SN54LS242, SN54LS243, SN74LS242, SN74LS243
QUADRUPLE BUS TRANSCEIVERS

- **Two-Way Asynchronous Communication Between Data Buses**

- **PNP Inputs Reduce D-C Loading**

- **Hysteresis (Typically 400 mV) at Inputs Improves Noise Margin**
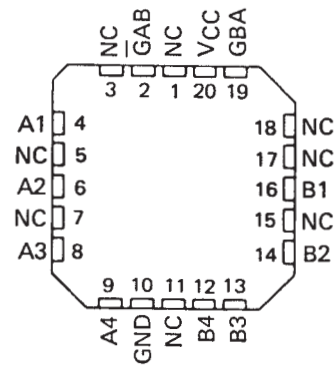
description

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°C to 125°C. The SN74' family is characterized for operation from 0°C to 70°C.

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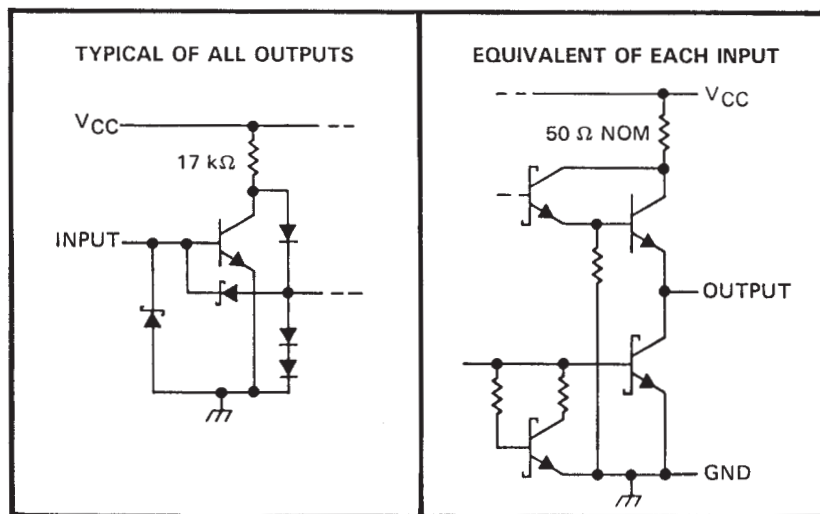**SN74LS242, SN74LS243 . . . D OR N PACKAGE**
(TOP VIEW)

GAB	1	14	V_CC
NC	2	13	GBA
A1	3	12	NC
A2	4	11	B1
A3	5	10	B2
A4	6	9	B3
GND	7	8	B4

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

Top pins (3, 2, 1, 20, 19): NC, GAB, NC, V_CC, GBA

Left pins: A1 [4], NC [5], A2 [6], NC [7], A3 [8]

Right pins: 18 NC, 17 NC, 16 B1, 15 NC, 14 B2

Bottom pins (9, 10, 11, 12, 13): A4, GND, NC, B4, B3

NC–No internal connection

FUNCTION TABLE (EACH TRANSCEIVER)

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

schematics of inputs and outputs

TYPICAL OF ALL OUTPUTS: V_CC, 17 kΩ, INPUT

EQUIVALENT OF EACH INPUT: V_CC, 50 Ω NOM, OUTPUT, GND

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SN54LS242, SN54LS243, SN74LS242, SN74LS243
QUADRUPLE BUS TRANSCEIVERS

logic symbols†

'LS242

'LS243
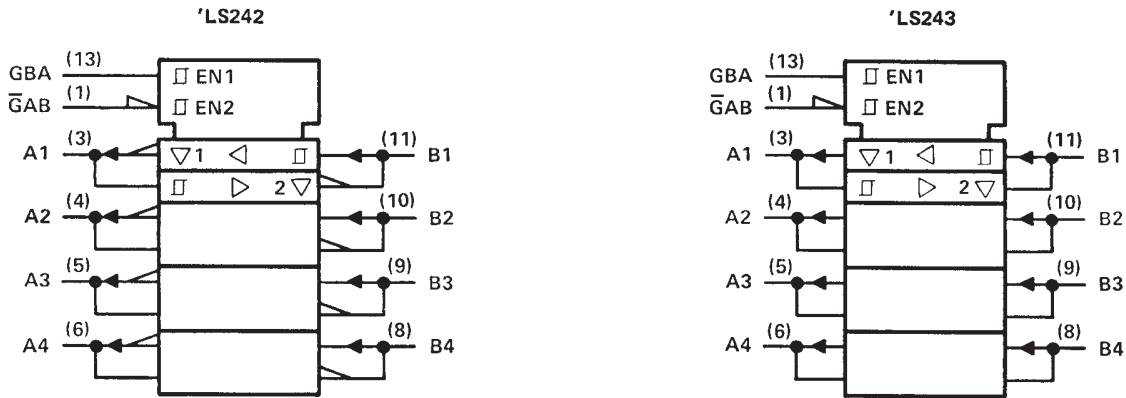
†These symbols are in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.

logic diagrams (positive logic)

'LS242

'LS243
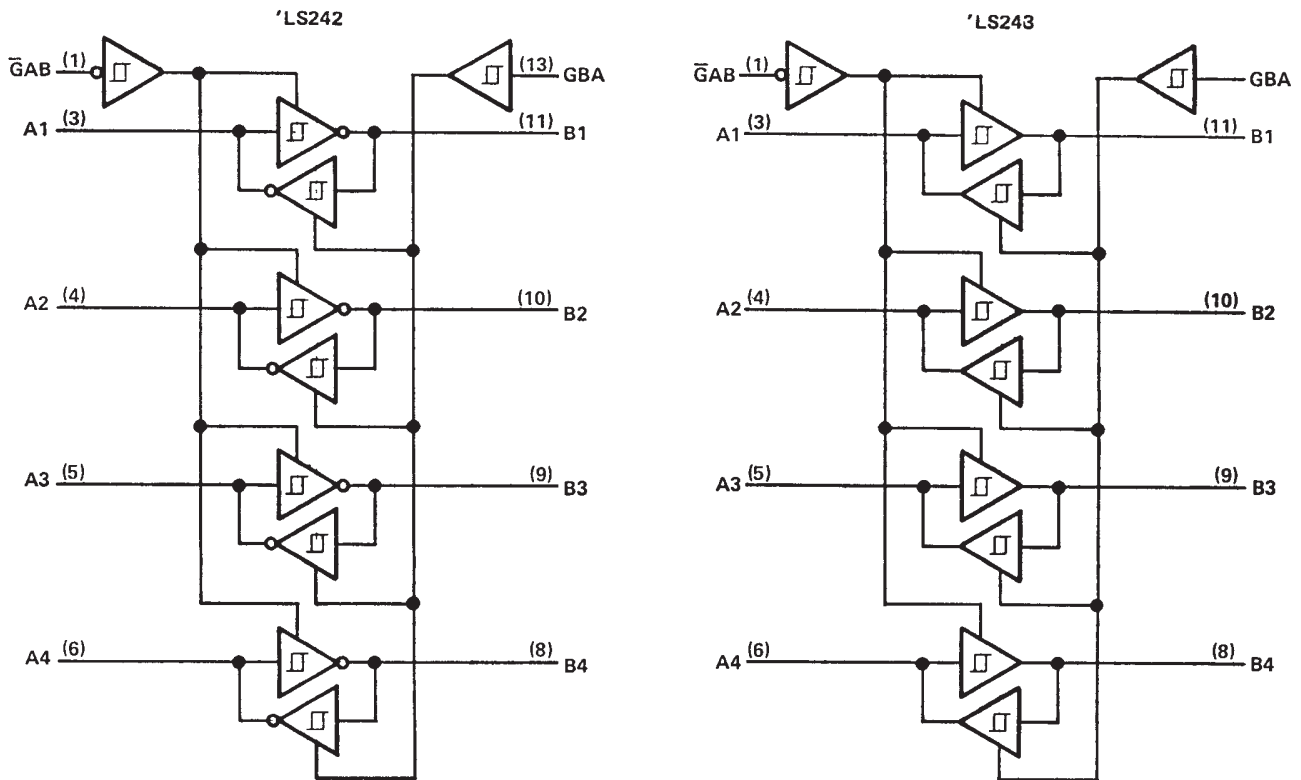
Pin numbers shown are for D, J, N, and W packages.

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.

TEXAS INSTRUMENTS

recommended operating conditions

		SN54LS' MIN	SN54LS' NOM	SN54LS' MAX	SN74LS' MIN	SN74LS' NOM	SN74LS' MAX	UNIT
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' MIN	SN54LS' TYP‡	SN54LS' MAX	SN74LS' MIN	SN74LS' TYP‡	SN74LS' MAX	UNIT
V_{IK}	A or B	V_{CC} = MIN,	I_I = − 18 mA			− 1.5			− 1.5	V
Hysteresis $(V_{T+} - V_{T-})$		V_{CC} = MIN		0.2	0.4		0.2	0.4		V
V_{OH}		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = MAX, I_{OH} = − 3 mA		2.4	3.1		2.4	3.1		V
		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = 0.5 V, I_{OH} = MAX		2			2			
V_{OL}		V_{CC} = MIN, V_{IH} = 2 V, V_{IL} = MAX	I_{OL} = 12 mA		0.25	0.4		0.25	0.4	V
			I_{OL} = 24 mA					0.35	0.5	
I_{OZH}		V_{CC} = MAX, V_{IH} = 2 V, V_{IL} = MAX	V_O = 2.7 V			40			40	µA
I_{OZL}			V_O = 0.4 V			− 200			− 200	µA
I_I	A or B	V_{CC} = MAX,	V_I = 5.5 V			0.1			0.1	mA
	$\overline{GAB}$ or GBA		V_I = 7 V			0.1			0.1	
I_{IH}		V_{CC} = MAX, V_I = 2.7 V				20			20	µA
I_{IL}	A inputs	V_{CC} = MAX, V_I = 0.4 V, GAB and GBA at 0 V				− 0.2			− 0.2	mA
	B inputs	V_{CC} = MAX, V_I = 0.4 V, GAB and GBA at 4.5 V				− 0.2			− 0.2	
	$\overline{GAB}$ or GBA	V_{CC} = MAX, V_I = 0.4 V				− 0.2			− 0.2	
I_{OS}§		V_{CC} = MAX		− 40		− 225	− 40		− 225	mA
I_{CC}	Outputs high	V_{CC} = 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 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.
NOTE 2: I_{CC} is measured with transceivers enabled in one direction only, or with all transceivers disabled.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

PARAMETER	TEST CONDITIONS		'LS242 MIN	'LS242 TYP	'LS242 MAX	'LS243 MIN	'LS243 TYP	'LS243 MAX	UNIT
t_{PLH}	R_L = 667 Ω, See Note 3	C_L = 45 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 Ω, See Note 3	C_L = 5 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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PACKAGE OPTION ADDENDUM

PACKAGING INFORMATION

Orderable Device	Status [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
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 [1]	Package Type	Package Drawing	Pins	Package Qty	Eco Plan [2]	Lead/Ball Finish	MSL Peak Temp [3]
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

[1] 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.

[2] 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)

[3] MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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