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

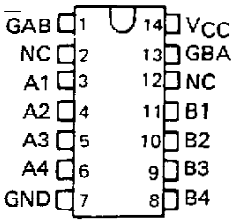
These four-data-line transceivers are designed for asynchronous two-way communications between data buses. The SN74LS' can be used to drive terminated lines down to 133 ohms.

The SN54' family is characterized for operation over the full military temperature range of −55°C to 125°C. The SN74' family is characterized for operation from 0°C to 70°C.

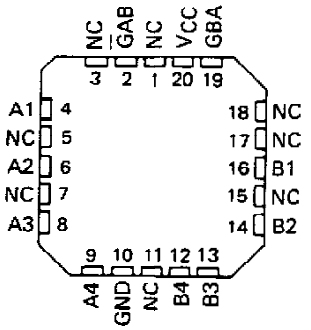
FUNCTION TABLE (EACH TRANSCEIVER)

INPUTS		'LS242	'LS243
$\overline{G}AB$	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 ($A = B$)

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

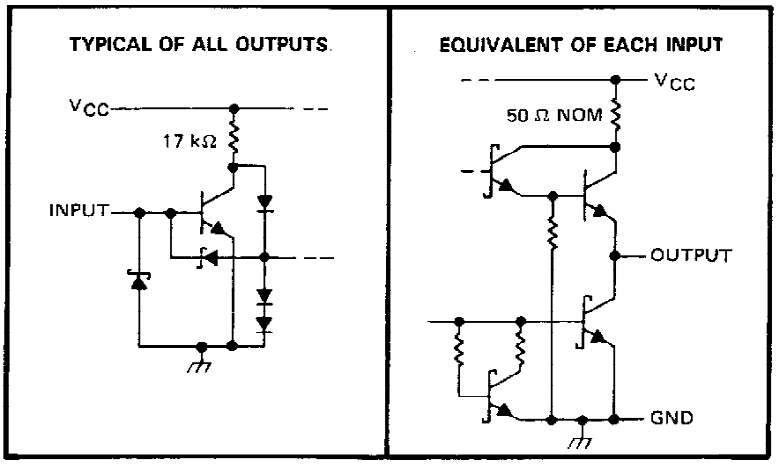


SN54LS242, SN54LS243 . . . FK PACKAGE
(TOP VIEW)



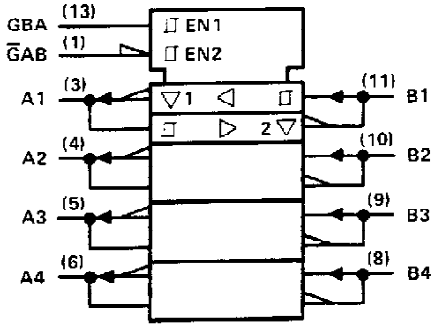
NC–No internal connection

schematics of inputs and outputs

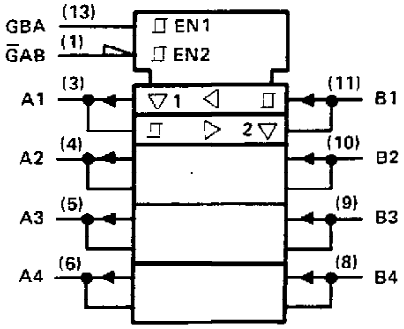


logic symbols†

'LS242



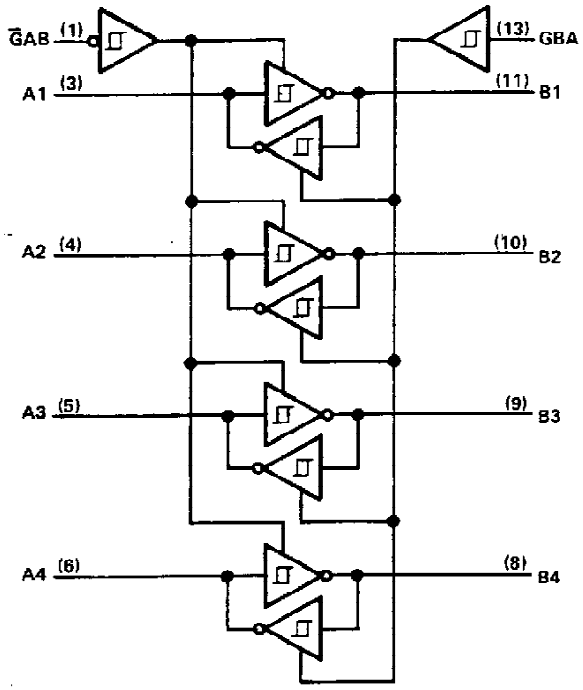
'LS243



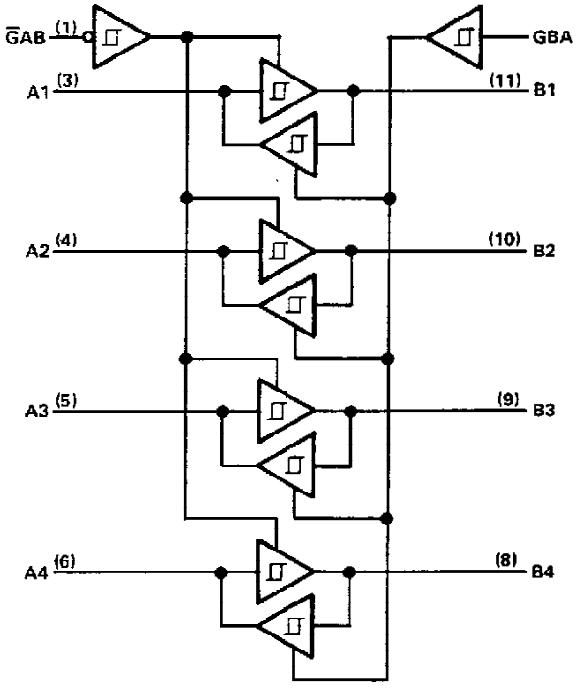
†These symbols are in accordance with ANSI/IEEE Std. 91-1984 and IEC Publication 617-12.

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.

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' 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
	$\overline{G}$AB 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	
	$\overline{G}$AB 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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