National Semiconductor

DM54LS242/DM74LS242, DM54LS243/DM74LS243 Quadruple Bus Transceivers

General Description

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

Features

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

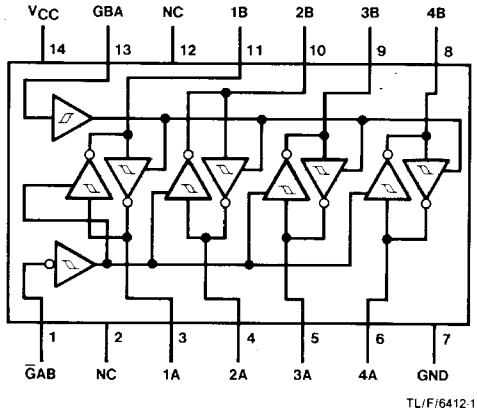
Absolute Maximum Ratings (Note 1)

Supply Voltage	7V
Input Voltage	
Any G	7V
A or B	5.5V
Storage Temperature Range	−65°C to 150°C

Note 1: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Connection Diagrams

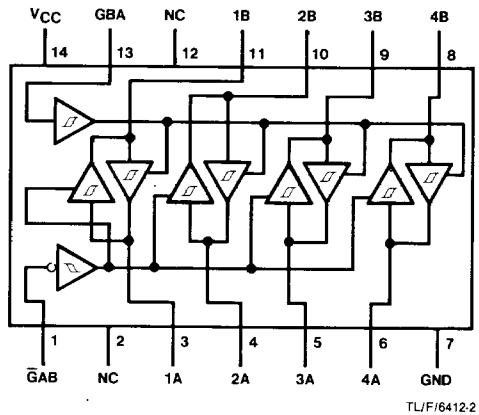
Dual-In-Line Package



TL/F/6412-1

54LS242 (J) **74LS242 (N)**

Dual-In-Line Package



TL/F/6412-2

54LS243 (J) **74LS243 (N)**

Function Table

Control Inputs		LS242 Data Port Status		LS243 Data Port Status	
$\overline{G}AB$	GBA	A	B	A	B
H	H	$\overline{O}$	I	O	I
L	H	•	•	•	•
H	L	ISOLATED		ISOLATED	
L	L	I	$\overline{O}$	I	O

*Possibly destructive oscillation may occur if the transceivers are enabled in both directions at once.

I = Input, O = Output, $\overline{O}$ = Inverting Output

H = High Logic Level, L = Low Logic Level

Recommended Operating Conditions

Symbol	Parameter	DM54LS242, 243			DM74LS242, 243			Units
		Min	Nom	Max	Min	Nom	Max	
V_{CC}	Supply Voltage	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	Free Air Operating Temperature	−55		125	0		70	°C

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

Symbol	Parameter	Conditions			Min	Typ (Note 1)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −18 mA					−1.5	V
HYS	Hysteresis ($V_{T+} - V_{T-}$)	V_{CC} = Min			0.2	0.4		V
V_{OH}	High Level Output Voltage	V_{CC} = Min, V_{IH} = Min, V_{IL} = Max, I_{OH} = −1 mA		DM74	2.7			V
		V_{CC} = Min, V_{IH} = Min, V_{IL} = Max, I_{OH} = −3 mA		DM54/DM74	2.4	3.4		
		V_{CC} = Min, V_{IH} = Min, V_{IL} = 0.5V, I_{OH} = Max		DM54/DM74	2			
V_{OL}	Low Level Output Voltage	V_{CC} = Min, V_{IL} = Max, V_{IH} = Min	I_{OL} = 12 mA	DM74			0.4	V
			I_{OL} = Max	DM54			0.4	
				DM74			0.5	
I_{OZH}	Off-State Output Current, High Level Voltage Applied	V_{CC} = Max, V_{IL} = Max, V_{IH} = Min	V_O = 2.7V				40	μA
I_{OZL}	Off-State Output Current, Low Level Voltage Applied		V_O = 0.4V				−200	μA
I_I	Input Current at Maximum Input Voltage	V_{CC} = Max	V_I = 5.5V	A or B			0.1	mA
			V_I = 7V	Any G			0.1	mA
I_{IH}	High Level Input Current	V_{CC} = Max, V_I = 2.7V					20	μA
I_{IL}	Low Level Input Current	V_{CC} = Max, V_I = 0.4V					−0.2	mA
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 2)			−40		−225	mA
I_{CC}	Supply Current	V_{CC} = Max, Outputs Open	Outputs High	LS242, LS243		22	38	mA
			Outputs Low	LS242		29	50	
				LS243				
			Outputs Disabled	LS242		29	50	
				LS243		32	54	

Note 1: All typicals are at V_{CC} = 5V, T_A = 25°C.

Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.

Switching Characteristics $V_{CC} = 5V$, $T_A = 25°C$ (See Section 1 for Test Waveforms and Output Load)

Symbol	Parameter	Conditions		Min	Typ (Note 1)	Max	Units
t_{PLH}	Propagation Delay Time Low to High Level Output	$C_L = 45$ pF, $R_L = 667\Omega$	LS242	3	9	14	ns
			LS243	5	12	18	
t_{PHL}	Propagation Delay Time High to Low Level Output	$C_L = 45$ pF, $R_L = 667\Omega$	LS242	5	12	18	ns
			LS243	7	12	18	
t_{PZL}	Output Enable Time to Low Level	$C_L = 45$ pF, $R_L = 667\Omega$	LS242	10	20	30	ns
			LS243	10	20	30	
t_{PZH}	Output Enable Time to High Level	$C_L = 45$ pF, $R_L = 667\Omega$	LS242	5	15	23	ns
			LS243	10	15	23	
t_{PLZ}	Output Disable Time from Low Level	$C_L = 5$ pF, $R_L = 667\Omega$	LS242	7	15	25	ns
			LS243	8	15	25	
t_{PHZ}	Output Disable Time from High Level	$C_L = 5$ pF, $R_L = 667\Omega$	LS242	5	10	18	ns
			LS243	5	10	18	
t_{PLH}	Propagation Delay Time Low to High Level Output	$C_L = 150$ pF, $R_L = 667\Omega$	LS242	5	11	18	ns
			LS243	6	14	21	
t_{PHL}	Propagation Delay Time High to Low Level Output	$C_L = 150$ pF, $R_L = 667\Omega$	LS242	6	15	22	ns
			LS243	6	15	22	
t_{PZL}	Output Enable Time to Low Level	$C_L = 150$ pF, $R_L = 667\Omega$	LS242	12	22	33	ns
			LS243	12	22	33	
t_{PZH}	Output Enable Time to High Level	$C_L = 150$ pF, $R_L = 667\Omega$	LS242	6	18	26	ns
			LS243	11	18	26	