

SN54F242, SN54F243, SN74F242, SN74F243 QUADRUPLE BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

D2932, MARCH 1987—REVISED AUGUST 1988

- 2-Way Asynchronous Communication Between Data Buses
- Local Bus-Latch Capability
- Choice of True or Inverting Logic
- Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers, and Standard Plastic and Ceramic 300-mil DIPs
- Dependable Texas Instruments Quality and Reliability

description

These quadruple bus transceivers are designed for asynchronous two-way communications between data buses. The control function implementation allows for maximum flexibility in timing.

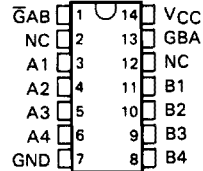
Each device allows data transmission from the A bus to the B bus or from the B bus to the A bus, depending upon the logic levels at the enable inputs GBA and $\overline{\text{GAB}}$. The enable inputs can be used to disable the device so that the buses are effectively isolated.

The dual-enable configuration gives the quadruple bus transceivers the capability to store data by simultaneous activation of GBA and $\overline{\text{GAB}}$. Each output sustains its input in this transceiver configuration. Thus, when both control inputs are activated and all other data sources to the two sets of bus lines are at high impedance, both sets of bus lines (eight in all) will remain at their states. The 4-bit codes appearing on the two sets of buses will be identical for the 'F243, or complementary for the 'F242.

The SN54F242 and SN54F243 are characterized for operation over the full military temperature range of -55°C to 125°C . The SN74F242 and SN74F243 are characterized for operation from 0°C to 70°C .

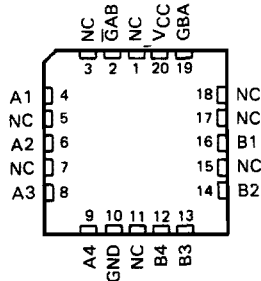
SN54F242, SN54F243 . . . J PACKAGE
SN74F242, SN74F243 . . . D OR N PACKAGE

(TOP VIEW)



SN54F242, SN54F243 . . . FK PACKAGE

(TOP VIEW)



NC—No internal connection

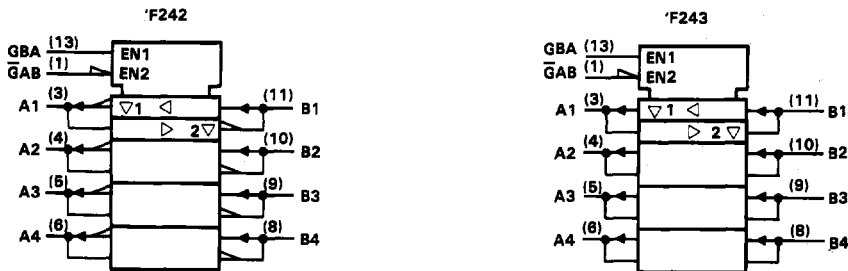
FUNCTION TABLE

ENABLE INPUTS		'F242	'F243
$\overline{\text{GAB}}$	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 (A = $\overline{\text{B}}$)	Latch A and B (A = B)

SN54F242, SN54F243, SN74F242, SN74F243

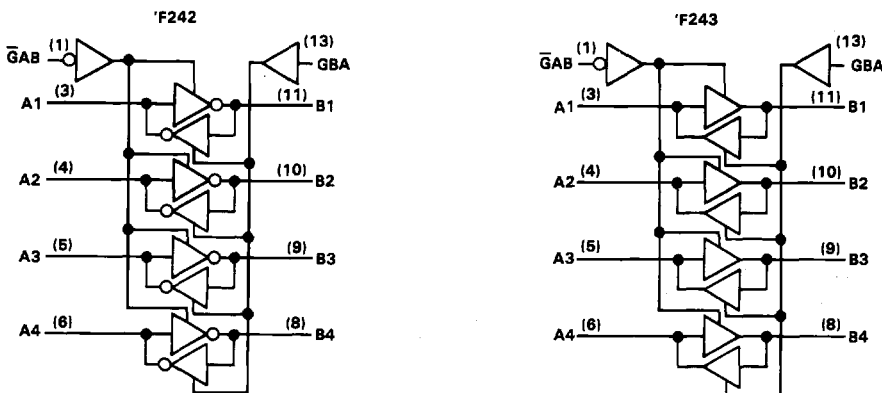
QUADRUPLE BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

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, and N packages.

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

Supply voltage, V_{CC}	-0.5 V to 7 V
Input voltage [‡]	-1.2 V to 7 V
Input current	-30 mA to 5 mA
Voltage applied to any output in the disabled or power-off state	-0.5 to 5.5 V
Voltage applied to any output in the high state	-0.5 V to V_{CC}
Current into any output in the low state: SN54F242, SN54F243	96 mA
SN74F242, SN74F243	128 mA
Operating free-air temperature range: SN54F242, SN54F243	-55°C to 125°C
SN74F242, SN74F243	0°C to 70°C
Storage temperature range	-65°C to 150°C

[‡]The input voltage ratings may be exceeded provided the input current ratings are observed.

SN54F242, SN74F242 QUADRUPLE BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

recommended operating conditions

		SN54F242			SN74F242			UNIT	
		MIN	NOM	MAX	MIN	NOM	MAX		
V _{CC}	Supply voltage	4.5	5	5.5	4.5	5	5.5	V	
V _{IH}	High-level input voltage	2			2			V	
V _{IL}	Low-level input voltage	0.8			0.8			V	
I _{IK}	Input clamp current	-18			-18			mA	
I _{OH}	High-level output current	-12			-15			mA	
I _{OL}	Low-level output current	48			64			mA	
T _A	Operating free-air temperature	-55			125			0	°C

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

PARAMETER		TEST CONDITIONS	SN54F242		SN74F242		UNIT	
			MIN	TYP†	MAX	MIN		TYP†
V _{IK}		V _{CC} = 4.5 V, I _I = -18 mA	-1.2		-1.2		V	
V _{OH}		V _{CC} = 4.5 V, I _{OH} = -3 mA	2.4	3.3	2.4	3.3	V	
		V _{CC} = 4.5 V, I _{OH} = -12 mA	2	3.2				
		V _{CC} = 4.5 V, I _{OH} = -15 mA			2	3.1		
		V _{CC} = 4.75 V, I _{OH} = -3 mA			2.7			
V _{OL}		V _{CC} = 4.5 V, I _{OL} = 48 mA	0.38	0.55			V	
		V _{CC} = 4.5 V, I _{OL} = 64 mA			0.42	0.55		
I _I	A or B port	V _{CC} = 5.5 V, V _I = 5.5 V	1		1		mA	
	Control inputs	V _{CC} = 5.5 V, V _I = 7 V	0.1		0.1		mA	
I _{IH}	A or B port‡	V _{CC} = 5.5 V, V _I = 2.7 V	70		70		μA	
	Control inputs	V _{CC} = 5.5 V, V _I = 2.7 V	20		20		μA	
I _{IL} ‡		V _{CC} = 5.5 V, V _I = 0.5 V	-1		-1		mA	
I _{OS} §		V _{CC} = 5.5 V, V _O = 0	-100	-225	-100	-225	mA	
I _{CC}	V _{CC} = 5.5 V, See Note 1		Outputs high		30	46	30	46
			Outputs low		46	69	46	69
			Outputs disabled		42	63	42	63

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Data Sheets

switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = 25°C			V _{CC} = 4.5 V to 5.5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = MIN to MAX†				UNIT
			'F242			SN54F242		SN74F242		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{PLH}	A or B	B or A	2.2	4.1	6.5	2.2	9	2.2	7.5	ns
t _{PHL}			1	2.6	4.5	0.5	5	1	4.5	ns
t _{PZL}	Enable	A or B	2.7	5.6	7.5	2.2	10	2.7	8.5	ns
t _{PZH}			2.7	6.1	9	2.2	12	2.7	10.5	ns
t _{PHZ}	Disable	A or B	1.8	6.6	9	1.8	11	1.8	9.5	ns
t _{PLZ}			2.7	5.6	9.5	2.3	13.5	2.7	11	ns

† All typical values are at V_{CC} = 5 V, T_A = 25°C.

‡ For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.

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

¶ For conditions shown as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.

NOTES: 1. I_{CC} is measured either with all transceivers enabled in only one direction or all transceivers disabled.

2. Load circuits and waveforms are shown in Section 1.



SN54F243, SN74F243

QUADRUPLE BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

recommended operating conditions

	SN54F243			SN74F243			UNIT
	MIN	NOM	MAX	MIN	NOM	MAX	
V _{CC} Supply voltage	4.5	5	5.5	4.5	5	5.5	V
V _{IH} High-level input voltage	2			2			V
V _{IL} Low-level input voltage			0.8			0.8	V
I _{IK} Input clamp current			-18			-18	mA
I _{OH} High-level output current			-12			-15	mA
I _{OL} Low-level output current			48			64	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	SN54F243			SN74F243			UNIT	
		MIN	TYP†	MAX	MIN	TYP†	MAX		
V _{IK}	V _{CC} = 4.5 V, I _I = -18 mA			-1.2			-1.2	V	
V _{OH}	V _{CC} = 4.5 V, I _{OH} = -3 mA	2.4	3.3		2.4	3.3		V	
	V _{CC} = 4.5 V, I _{OH} = -12 mA	2	3.2						
	V _{CC} = 4.5 V, I _{OH} = -15 mA				2	3.1			
	V _{CC} = 4.75 V, I _{OH} = -3 mA				2.7				
V _{OL}	V _{CC} = 4.5 V, I _{OL} = 48 mA	0.38	0.55					V	
	V _{CC} = 4.5 V, I _{OL} = 64 mA				0.42	0.55			
I _I	A or B port			1			1	mA	
	Control inputs			0.1			0.1	mA	
I _{IH}	A or B port‡			70			70	µA	
	Control inputs			20			20		
I _{IL} ‡	V _{CC} = 5.5 V, V _I = 0.5 V			-1			-1.6	mA	
I _{OS} §	V _{CC} = 5.5 V, V _O = 0	-100		-225	-100		-225	mA	
I _{CC}	V _{CC} = 5.5 V, See Note 1	Outputs high		64	80		64	80	mA
		Outputs low		64	90		64	90	
		Outputs disabled		71	90		71	90	

switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V _{CC} = 5 V, C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = 25°C			V _{CC} = 4.5 V to 5.5 V C _L = 50 pF, R ₁ = 500 Ω, R ₂ = 500 Ω, T _A = MIN to MAX†				UNIT
			'F243			SN54F243		SN74F243		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t _{PLH}	A or B	B or A	1.7	3.6	5.2	1.2	6.5	1.2	6.2	ns
t _{PHL}			1.7	3.6	5.2	1.2	8.5	1.2	6.5	ns
t _{PZH}	Enable	A or B	1.2	3.9	5.7	1.2	8	1.2	6.7	ns
t _{PZL}			1.2	5.4	7.5	1.2	10.5	1.2	8.5	ns
t _{PHZ}	Disable	A or B	1.2	4.1	6	1	7.5	1	7	ns
t _{PLZ}			2	4.5	6	2	8.5	2	7	ns

† All typical values are at V_{CC} = 5 V, T_A = 25°C.

‡ For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.

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

† For conditions shown as MIN or MAX, use the appropriate value specified under Recommended Operating Conditions.

NOTES: 1. I_{CC} is measured either with all transceivers enabled in only one direction or all transceivers disabled.

2. Load circuits and waveforms are shown in Section 1.