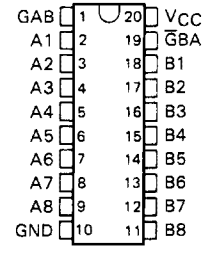
D2932, MARCH 1987—REVISED JANUARY 1989

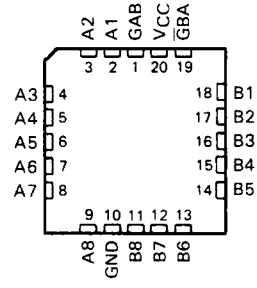
- **Local Bus-Latch Capability**
- **Choice of Inverting or Noninverting Logic**
- **Choice of 3-State or Open-Collector Outputs**
- **Package Options Include Plastic "Small Outline" Packages, Ceramic Chip Carriers and Standard Plastic and Ceramic 300-mil DIPs**
- **Dependable Texas Instruments Quality and Reliability**

DEVICE	OUTPUT	LOGIC
'F620	3-State	Inverting
'F621	Open-Collector	Noninverting
'F622	Open-Collector	Inverting
'F623	3-State	Noninverting

SN54F' . . . J PACKAGE
SN74' . . . DW OR N PACKAGE
(TOP VIEW)



SN54F' . . . FK PACKAGE
(TOP VIEW)



description

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

These devices allow 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 ($\overline{G}$BA and GAB).

The enable inputs can be used to disable the device so that the buses are effectively isolated. The dual-enable configuration gives the octal bus transceivers the capability to store data by simultaneous activation of $\overline{G}$BA and GAB. Each output reinforces its input in this transceiver configuration. 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 (16 in all) will remain at their last states. The 8-bit codes appearing on the two sets of buses will be identical for 'F621 and 'F623, or complementary for the 'F620 and 'F622.

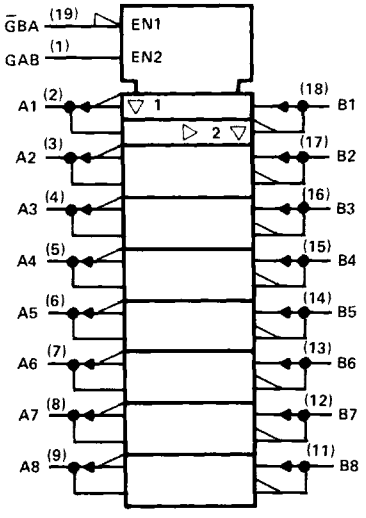
The SN54F620 through SN54F623 are characterized for operation over the full military temperature range of −55°C to 125°C. The SN74F620 and SN74F623 are characterized for operation from 0°C to 70°C.

FUNCTION TABLE

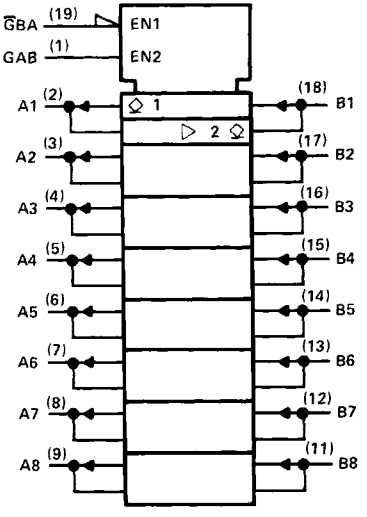
ENABLE INPUTS		OPERATION	
$\overline{G}$BA	GAB	'F620, 'F622	'F621, 'F623
L	L	$\overline{B}$ data to A bus	B data to A bus
H	H	$\overline{A}$ data to B bus	A data to B bus
H	L	Isolation	Isolation
L	H	$\overline{B}$ data to A bus, $\overline{A}$ data to B bus	B data to A bus, A data to B bus

logic symbols†

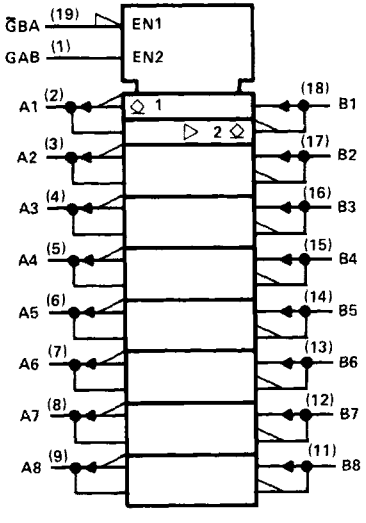
'F620



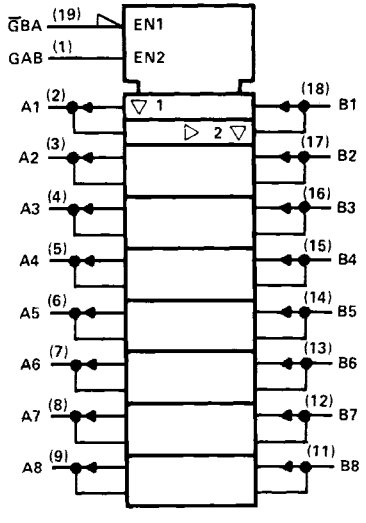
'F621



'F622



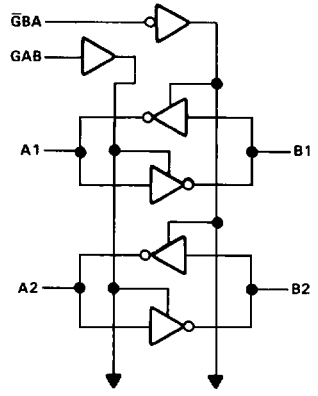
'F623



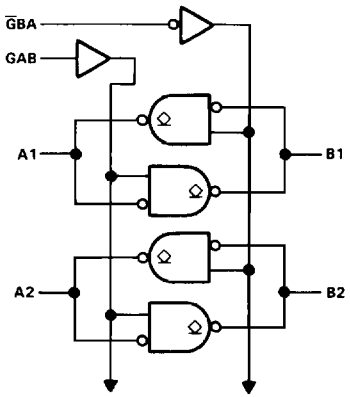
†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

logic diagrams (positive logic)

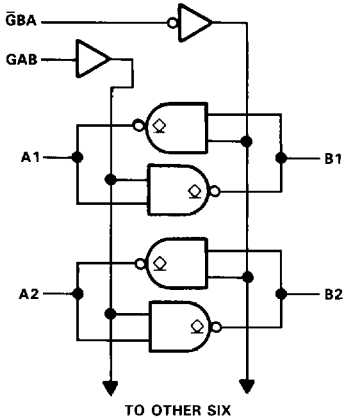
'F620



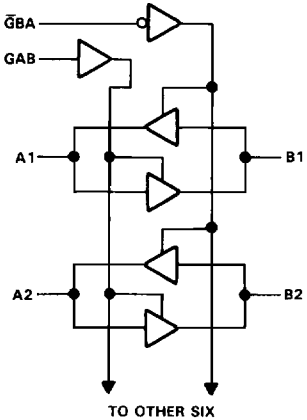
'F621



'F622



'F623



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 V 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: SN54F620, SN54F623 (Any A) . . . . . 40 mA
(Any B) . . . . . 96 mA
SN74F620, SN74F623 (Any A) . . . . . 128 mA
(Any B) . . . . . 48 mA
Operating free-air temperature range: SN54F620, SN54F623 . . . . . −55°C to 125°C
SN74F620, SN74F623 . . . . . 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.

recommended operating conditions

			SN54F620 SN54F623			SN74F620 SN74F623			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	Any A			−3			−3	mA
		Any B			−12			−15	
I_{OL}	Low-level output current	Any A			20			24	mA
		Any B			48			64	
T_A	Operating free-air temperature		−55		125	0		70	°C

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

PARAMETER		TEST CONDITIONS			SN54F620 SN54F623			SN74F620 SN74F623			UNIT
					MIN	TYP†	MAX	MIN	TYP†	MAX	
V_{IK}		V_{CC} = MIN,	I_I = −18 mA				−1.2			−1.2	V
V_{OH}	A and B	V_{CC} = 4.75 V	I_{OH} = −1 mA to −3 mA					2.7			V
	Any A	V_{CC} = 4.5 V	I_{OH} = −1 mA		2.5	3.4		2.5	3.4		
			I_{OH} = −3 mA		2.4	3.3		2.4	3.3		
	Any B		I_{OH} = −3 mA		2.4	3.3		2.4	3.3		
			I_{OH} = −12 mA		2	3.2					
			I_{OH} = −15 mA					2	3.1		
V_{OL}	Any A	V_{CC} = 4.5 V	I_{OL} = 20 mA			0.3	0.5				V
			I_{OL} = 24 mA						0.35	0.5	
	Any B		I_{OL} = 48 mA			0.38	0.55				
			I_{OL} = 64 mA						0.42	0.55	
I_I	A and B	V_{CC} = 5.5 V	V_I = 5.5 V				1			1	mA
	GAB or $\overline{GBA}$		V_I = 7 V				0.1			0.1	
I_{IH}‡	A and B	V_{CC} = 5.5 V,	V_I = 2.7 V				70			70	μA
	GAB or $\overline{GBA}$						20			20	
I_{IL}‡	A and B	V_{CC} = 5.5 V,	V_I = 0.5 V				−0.65			−0.65	mA
	GAB or $\overline{GBA}$						−0.6			−0.6	
I_{OS}§	Any A	V_{CC} = 5.5 V,	V_O = 0		−60		−150	−60		−150	mA
	Any B				−100		−225	−100		−225	
I_{CC}	'F620	V_{CC} = 5.5 V	I_{CCH}	$\overline{GBA}$ = GAB = 4.5 V, $A_1 - A_8$ = GND		70	92		70	92	mA
			I_{CCL}	$\overline{GBA}$ = GAB = 4.5 V, $A_1 - A_8$ = 4.5 V		84	110		84	110	
			I_{CCZ}	GAB = GND, $\overline{GBA}$ = $A_1 - A_8$ = 4.5 V		70	92		70	92	
	'F623		I_{CCH}	$\overline{GBA}$ = GAB = 4.5 V, $A_1 - A_8$ = 4.5 V		110	140		110	140	
			I_{CCL}	$\overline{GBA}$ = GAB = 4.5 V, $A_1 - A_8$ = GND		110	140		110	140	
			I_{CCZ}	GAB = GND, $\overline{GBA}$ = $A_1 - A_8$ = 4.5 V		99	130		99	130	

† 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.

'F620 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = 25°C			V_{CC} = MIN to MAX†, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX†				UNIT
			'F620			SN54F620		SN74F620		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A	B	1.7	4.1	6.5	1.2	8.5	1.2	7.5	ns
t_{PHL}			1	2.1	4.5	1	5.5	1	5	
t_{PLH}	B	A	1.7	4.1	6.5	1.2	8.5	1.2	7.5	ns
t_{PHL}			1	2.1	4.5	1	5.5	1	5	
t_{PZH}	$\overline{G}$BA	A	2.2	7.1	10.5	1.7	12	1.7	11.5	ns
t_{PZL}			3.2	7.1	10.5	2.7	12.5	2.7	11.5	
t_{PHZ}	$\overline{G}$BA	A	1.7	4.1	7.5	1.2	9	1.2	8	ns
t_{PLZ}			1.2	4.1	7	1	8.5	1	7.5	
t_{PZH}	GAB	B	3.7	7.1	10.5	2.5	12	3.2	11.5	ns
t_{PZL}			3.7	7.1	10	3.2	12	3.2	11	
t_{PHZ}	GAB	B	2.2	6.1	9.5	1.7	11	1.7	10.5	ns
t_{PLZ}			3.2	6.1	9.5	2.7	11.5	2.7	10.5	

'F623 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = 25°C			V_{CC} = MIN to MAX†, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX†				UNIT
			'F623			SN54F623		SN74F623		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A	B	1.2	3.6	5.5	1.1	6.8	1.2	6.5	ns
t_{PHL}			2.2	4.6	7	1.6	8	1.7	7.5	
t_{PLH}	B	A	1.2	3.6	5.5	1.1	6.8	1.2	6.5	ns
t_{PHL}			1.7	4.1	6.5	1.6	8	1.7	7.5	
t_{PZH}	$\overline{G}$BA	A	3.1	8.1	10.5	2.7	12.4	3.1	12	ns
t_{PZL}			2.8	7.1	9.5	2.5	10.3	2.8	10	
t_{PHZ}	$\overline{G}$BA	A	1.7	4.1	6.5	1.6	8.3	1.7	7.5	ns
t_{PLZ}			1.7	4.1	6.5	1.5	7.4	1.7	7	
t_{PZH}	GAB	B	2.8	7.6	10	2.7	12	2.8	11.5	ns
t_{PZL}			2.8	6.6	9	2.8	10	2.9	9.5	
t_{PHZ}	GAB	B	2.2	5.6	8.5	1.9	10	2.2	10	ns
t_{PLZ}			3.2	6.6	9	3.1	10.7	3.2	10	

†For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditons.
NOTE 1: Load circuits and waveforms are shown in Section 1.

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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 high state . . . . . −0.5 V to 5.5 V
Current into any output in the low state: SN54F621 (Any A) . . . . . 40 mA
(Any B) . . . . . 96 mA
SN74F621 (Any A) . . . . . 48 mA
(Any B) . . . . . 128 mA
Operating free-air temperature range: SN54F621 . . . . . −55°C to 125°C
SN74F621 . . . . . 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.

recommended operating conditions

			SN54F621			SN74F621			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
V_{OH}	High-level output voltage				5.5			5.5	mA
I_{OL}	Low-level output current	Any A			20			24	mA
		Any B			48			64	
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		SN54F621			SN74F621			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = −18 mA			−1.2			−1.2	V
I_{OH}		V_{CC} = 4.5 V,	V_{OH} = 5.5 V			0.1			0.1	mA
V_{OL}	Any A	V_{CC} = 4.5 V	I_{OL} = 20 mA		0.3	0.5				V
			I_{OL} = 24 mA					0.35	0.5	
	Any B		I_{OL} = 48 mA		0.38	0.55				
			I_{OL} = 64 mA					0.42	0.55	
I_L	A and B	V_{CC} = 5.5 V	V_I = 5.5 V			1			1	mA
	GAB or $\overline{GBA}$		V_I = 7 V			0.1			0.1	
I_{IH}§	A and B	V_{CC} = 5.5 V,	V_I = 2.7 V			70			70	µA
	GAB or $\overline{GBA}$					20			20	
I_{IL}§	A and B	V_{CC} = 5.5 V,	V_I = 0.5 V			−0.65			−0.65	mA
	GAB or $\overline{GBA}$					−0.6			−0.6	
I_{CC}		V_{CC} = 5.5 V	I_{CCH}		105	140		105	140	mA
			I_{CCL}		105	140		105	140	

‡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.

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 high state . . . . . −0.5 V to 5.5 V
Current into any output in the low state: SN54F622 (Any A) . . . . . 40 mA
(Any B) . . . . . 96 mA
SN74F622 (Any A) . . . . . 48 mA
(Any B) . . . . . 128 mA
Operating free-air temperature range: SN54F622 . . . . . −55°C to 125°C
SN74F622 . . . . . 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.

recommended operating conditions

			SN54F622			SN74F622			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
V_{OH}	High-level output voltage				5.5			5.5	mA
I_{OL}	Low-level output current	Any A			20			24	mA
		Any B			48			64	
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		SN54F622			SN74F622			UNIT
				MIN	TYP‡	MAX	MIN	TYP‡	MAX	
V_{IK}		V_{CC} = 4.5 V,	I_I = −18 mA			−1.2			−1.2	V
I_{OH}		V_{CC} = 4.5 V,	V_{OH} = 5.5 V			0.1			0.1	mA
V_{OL}	Any A	V_{CC} = 4.5 V	I_{OL} = 20 mA		0.3	0.5				V
			I_{OL} = 24 mA					0.35	0.5	
	Any B		I_{OL} = 48 mA		0.38	0.55				
			I_{OL} = 64 mA					0.42	0.55	
I_I	A and B	V_{CC} = 5.5 V	V_I = 5.5 V			1			1	mA
	GAB or $\overline{GBA}$		V_I = 7 V			0.1			0.1	
I_{IH}§	A and B	V_{CC} = 5.5 V,	V_I = 2.7 V			70			70	μA
	GAB or $\overline{GBA}$					20			20	
I_{IL}§	A and B	V_{CC} = 5.5 V,	V_I = 0.5 V			−0.65			−0.65	mA
	GAB or $\overline{GBA}$					−0.6			−0.6	
I_{CC}		V_{CC} = 5.5 V	I_{CCH}		37	48		37	48	mA
			I_{CCL}		68	90		68	90	

‡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.

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'F621 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = 25°C			V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX†				UNIT
			'F621			SN54F621		SN74F621		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A	B	6	9.5	12	5.5	13	5.5	13	ns
t_{PHL}			2.5	3.8	8	2	8.5	2	8.5	
t_{PLH}	B	A	6	9	12	5.5	12.5	5.5	12.5	ns
t_{PHL}			2.5	4	7.5	2	8	2	8	
t_{PLH}	$\overline{G}$BA	A	6	10	13.5	5.5	14	5.5	14	ns
t_{PHL}			3.5	6.5	10.5	2.5	11	2.5	11	
t_{PLH}	GAB	B	7	12	15	6	17	6	17	ns
t_{PHL}			3.5	6.5	9.5	3	10	3	10	

'F622 switching characteristics (see Note 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	V_{CC} = 5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = 25°C			V_{CC} = 4.5 V to 5.5 V, C_L = 50 pF, R1 = 500 Ω, R2 = 500 Ω, T_A = MIN to MAX†				UNIT
			'F622			SN54F622		SN74F622		
			MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{PLH}	A	B	7.2	10.6	12.5			7.2	13.5	ns
t_{PHL}			1	3.6	5.5			1	6	
t_{PLH}	B	A	6.7	9.6	12			6.7	12.5	ns
t_{PHL}			1	3.1	5			1	5.5	
t_{PLH}	$\overline{G}$BA	A	7.2	10.1	12			7.2	12.5	ns
t_{PHL}			4	7.6	10			4	10.5	
t_{PLH}	GAB	B	9.2	12.1	14.5			9.2	15.5	ns
t_{PHL}			4	7.1	9			4	9.5	

†For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.
NOTE 1: Load circuits and waveforms are shown in Section 1.