National Semiconductor

DM54AS620/DM74AS620, DM54AS621/DM74AS621, DM54AS622/DM74AS622, DM54AS623/DM74AS623 Octal Bus Transceivers

General Description

These octal bus transceivers are designed for asynchronous two-way communication 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 of storing data by simultaneous enabling of $\overline{G}$BA and GAB. Each output reinforces its input in this transceiver configuration. Thus, when both control inputs are enabled 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 the AS621 and AS623, or complementary for the AS620 and AS622.

Features

- Local bus-latch capability
- Choice of true or inverting logic
- Choice of TRI-STATE® or open-collector outputs

Device	Output	Logic
AS620	TRI-STATE	Inverting
AS621	Open-Collector	True
AS622	Open-Collector	Inverting
AS623	TRI-STATE	True

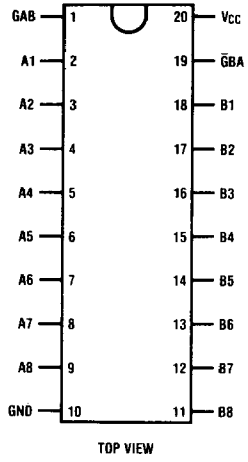
Absolute Maximum Ratings (Note 1)

Supply Voltage	7V
Input Voltage (I/O ports for AS620, AS623)	5.5V
Input Voltage (all other inputs)	7V
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 Diagram

Dual-In-Line Package



TOP VIEW

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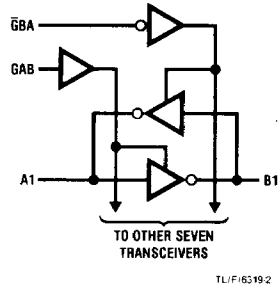
DM54AS620 (J) DM74AS620 (J, N)
DM54AS621 (J) DM74AS621 (J, N)
DM54AS622 (J) DM74AS622 (J, N)
DM54AS623 (J) DM74AS623 (J, N)

Logic Diagrams

AS620



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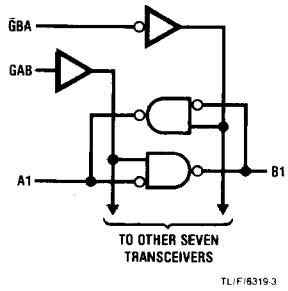
AS621



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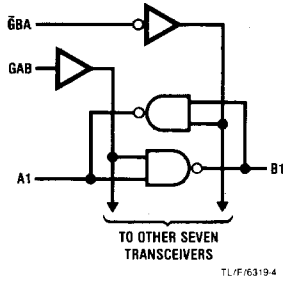
AS622



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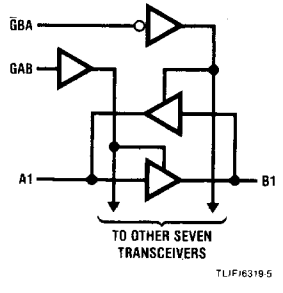
AS623



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Function Table

Enable Inputs		Operation	
$\overline{G}BA$	GAB	AS620, AS622	AS621, AS623
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

Recommended Operating Conditions

Symbol	Parameter	DM54AS620 DM54AS623			DM74AS620 DM74AS623			Units
		Min	Typ	Max	Min	Typ	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_{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)

Symbol	Parameter	Conditions	DM54AS620 DM54AS623			DM74AS620 DM74AS623			Units
			Min	Typ (Note 1)	Max	Min	Typ (Note 1)	Max	
V_{IK}	Input Clamp Voltage	V_{CC} = 4.5V, I_I = −18 mA			−1.2			−1.2	V
V_{OH}	Output High Voltage	V_{CC} = 4.5V to 5.5V, I_{OH} = −2 mA	V_{CC} − 2			V_{CC} − 2			V
		V_{CC} = 4.5V, I_{OH} = −3 mA	2.4	3.2		2.4	3.2		
		V_{CC} = 4.5V, I_{OH} = −12 mA	2						
		V_{CC} = 4.5V, I_{OH} = −15 mA				2			
V_{OL}	Output Low Voltage	V_{CC} = 4.5V, I_{OL} = Max		0.3	0.55		0.35	0.55	V
I_I	Control Inputs	V_{CC} = 5.5V, V_I = 7V			0.1			0.1	mA
	A or B Ports	V_{CC} = 5.5V, V_I = 5.5V			0.1			0.1	
I_{IH}	Control Inputs	V_{CC} = 5.5V, V_I = 2.7V			20			20	μA
	A or B Ports (Note 3)				70			70	
I_{IL}	Control Inputs	V_{CC} = 5.5V, V_I = 0.4V			−0.5			−0.5	mA
	A or B Ports (Note 3)				−0.75			−0.75	

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

Symbol	Parameter	Conditions		DM54AS620 DM54AS623			DM74AS620 DM74AS623			Units
				Min	Typ (Note 1)	Max	Min	Typ (Note 1)	Max	
I_O (Note 2)		V_{CC} = 5.5V, V_O = 2.25V		−50		−150	−50		−150	mA
I_{CC}	AS620	V_{CC} = 5.5V	Outputs High		35	57		35	57	mA
			Outputs Low		74	122		74	122	
			Outputs Disabled		48	77		48	77	
	AS623	V_{CC} = 5.5V	Outputs High		58	93		58	93	
			Outputs Low		116	189		116	189	
			Outputs Disabled		72	116		72	116	

AS620 Switching Characteristics

Parameter	Input	Output	Conditions	DM54AS620			DM74AS620			Units
				Min	Typ	Max	Min	Typ	Max	
t_{PLH}	A	B	V_{CC} = 4.5V to 5.5V, C_L = 50 pF, R1 = 500Ω, R2 = 500Ω, T_A = Min to Max	1		8	1		7	ns
t_{PHL}				2		7	2		6	ns
t_{PLH}	B	A		1		8	1		7	ns
t_{PHL}				2		7	2		6	ns
t_{PZH}	$\overline{G}$BA	A		2		8.5	2		8	ns
t_{PZL}				2		10	2		9	ns
t_{PHZ}	$\overline{G}$BA	A		1		7.5	1		6	ns
t_{PLZ}				2		15	2		12	ns
t_{PZH}	GAB	B		2		9	2		8	ns
t_{PZL}				2		10.5	2		9	ns
t_{PHZ}	GAB	B		1		6.5	1		6	ns
t_{PLZ}				2		16	2		13	ns

AS623 Switching Characteristics

Parameter	Input	Output	Conditions	DM54AS623			DM74AS623			Units
				Min	Typ (Note 1)	Max	Min	Typ (Note 1)	Max	
t_{PLH}	A	B	V_{CC} = 4.5V to 5.5V, C_L = 50 pF, R1 = 500Ω, R2 = 500Ω, T_A = Min to Max	1		10	1		9	ns
t_{PHL}				1		9	1		8	ns
t_{PLH}	B	A		1		10	1		9	ns
t_{PHL}				1		9.5	1		8.5	ns
t_{PZH}	$\overline{G}$BA	A		2		11.5	2		11	ns
t_{PZL}				2		11	2		10	ns
t_{PHZ}	$\overline{G}$BA	A		1		8.5	1		7.5	ns
t_{PLZ}				1		13.5	1		11.5	ns
t_{PZH}	GAB	B		2		13	2		11.5	ns
t_{PZL}				2		12	2		11	ns
t_{PHZ}	GAB	B		1		8	1		7	ns
t_{PLZ}				1		10.5	1		9	ns

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

Note 2: The output conditions have been chosen to produce a current that closely approximates one half of the true short circuit output current, I_{OS}.

Note 3: For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.

Recommended Operating Conditions

Symbol	Parameter	DM54AS621 DM54AS622			DM74AS621 DM74AS622			Units
		Min	Typ	Max	Min	Typ	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
V_{OH}	High Level Output Voltage			5.5			5.5	V
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)

Symbol	Parameter	Conditions		DM54AS621 DM54AS622			DM74AS621 DM74AS622			Units
				Min	Typ (Note 1)	Max	Min	Typ (Note 1)	Max	
V_{IK}	Input Clamp Voltage	V_{CC} = 4.5V, I_I = −18 mA				−1.2			−1.2	V
I_{OH}	Output High Voltage	V_{CC} = 4.5V, V_{OH} = 5.5V				0.1			0.1	mA
V_{OL}	Output Low Voltage	V_{CC} = 4.5V, I_{OL} = Max				0.5			0.5	V
I_I	Control Inputs	V_{CC} = 5.5V, V_I = 7V				0.1			0.1	mA
	A or B Ports	V_{CC} = 5.5V, V_I = 5.5V				0.1			0.1	
I_{IH}	Control Inputs	V_{CC} = 5.5V, V_I = 2.7V				20			20	μA
	A or B Ports (Note 2)					70			70	
I_{IL}	Control Inputs	V_{CC} = 5.5V, V_I = 0.4V				−0.5			−0.5	mA
	A or B Ports (Note 2)					−0.75			−0.75	
I_{CC}	AS621	V_{CC} = 5.5V	Outputs High		48	79		48	79	mA
			Outputs Low		100	189		100	189	
	AS622	V_{CC} = 5.5V	Outputs High		25	39		25	39	mA
			Outputs Low		62	103		62	103	

AS621 Switching Characteristics

Parameter	Input	Output	Conditions	DM54AS621			DM74AS621			Units
				Min	Typ (Note 1)	Max	Min	Typ (Note 1)	Max	
t_{PLH}	A	B	V_{CC} = 4.5V to 5.5V, C_L = 50 pF, R_L = 680Ω, T_A = Min to Max	5		28.5	5		24	ns
t_{PHL}				1		8.5	1		7.5	ns
t_{PLH}	B	A		5		23	5		21	ns
t_{PHL}				1		8.5	1		7.5	ns
t_{PLH}	$\overline{G}$BA	A		5		24	5		21	ns
t_{PHL}				1		10	1		9	ns
t_{PLH}	GAB	B		5		26	5		22	ns
t_{PHL}				1		11	1		10	ns

AS622 Switching Characteristics

Parameter	Input	Output	Conditions	DM54AS622			DM74AS622			Units
				Min	Typ (Note 1)	Max	Min	Typ (Note 1)	Max	
t_{PLH}	A	B	V_{CC} = 4.5V to 5.5V, C_L = 50 pF, R_L = 680Ω, T_A = Min to Max	5		28.5	5		24.5	ns
t_{PHL}				1		8.5	1		8	ns
t_{PLH}	B	A		5		30	5		25	ns
t_{PHL}				1		8.5	1		8	ns
t_{PLH}	$\overline{G}$BA	A		5		26	5		22	ns
t_{PHL}				1		11.5	1		10	ns
t_{PLH}	GAB	B		5		26	5		23	ns
t_{PHL}				1		11.5	1		10.5	ns

Note 1: All typicals are at V_{CC} = 5.0V, T_A = 25°C.

Note 2: For I/O ports, the parameters I_{IH} and I_{IL} include the off-state output current.