MOTOROLA

SN54LS/74LS620
SN54LS/74LS621
SN54LS/74LS622
SN54LS/74LS623

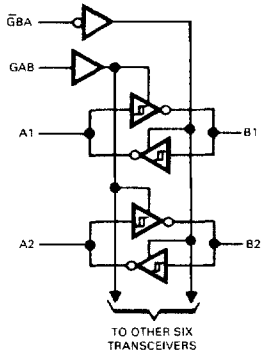
OCTAL BUS TRANSCEIVERS

LOW POWER SCHOTTKY

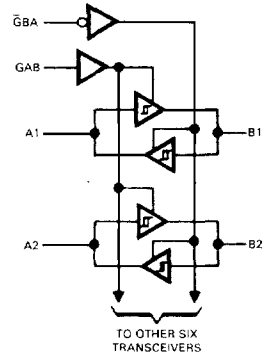
DESCRIPTION — The SN54LS/74LS620 thru SN54LS/74LS623 series are octal bus transceivers designed for asynchronous two-way communication between data buses. Control function implementation allows maximum timing flexibility. Enable inputs may be used to disable the device so that buses are effectively isolated. Depending on the Logic Levels at the enable inputs, Data transmission is allowed from the A bus to the B bus or from the B bus to the A bus. The dual-enable configuration gives the LS620 thru LS623 the capability to store 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 all other data sources to the two 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 LS621 and LS623 devices or complementary for the LS620 and LS622.

BLOCK DIAGRAMS

$^1/_4$ LS620, $^1/_4$ LS622

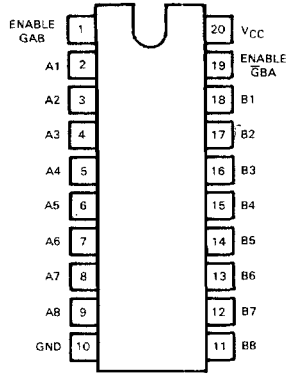


$^1/_4$ LS621, $^1/_4$ LS623



CONNECTION DIAGRAM

(TOP VIEW)



J Suffix — Case 732-03 (Ceramic)
N Suffix — Case 738-01 (Plastic)

FUNCTION TABLE

ENABLE INPUTS		OPERATION	
$\overline{G}BA$	GAB	LS620, LS622	LS621, LS623
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

H = high level, L = low level, X = irrelevant

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GUARANTEED OPERATING RANGES

SYMBOL	PARAMETER		MIN	TYP	MAX	UNIT
V_{CC}	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
T_A	Operating Ambient Temperature Range	54 74	−55 0	25 25	125 70	°C
I_{OH}	Output Current — High	54,74			−3.0	mA
		54 74			−12 −15	mA
I_{OL}	Output Current — Low	54 74			12 24	mA

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

SYMBOL	PARAMETER		LIMITS MIN	LIMITS TYP	LIMITS MAX	UNITS	TEST CONDITIONS
V_{IH}	Input HIGH Voltage		2.0			V	Guaranteed Input HIGH Voltage for All Inputs
V_{IL}	Input LOW Voltage	54			0.5	V	Guaranteed Input LOW Voltage for All Inputs
		74			0.6		
$V_{T+}-V_{T-}$	Hysteresis		0.2	0.4		V	V_{CC} = MIN
V_{IK}	Input Clamp Diode Voltage			−0.65	−1.5	V	V_{CC} = MIN, I_{IN} = −18 mA
V_{OH}	Output HIGH Voltage	54,74	2.4	3.4		V	V_{CC} = MIN, I_{OH} = −3.0 mA
		54,74	2.0			V	V_{CC} = MIN, I_{OH} = MAX
V_{OL}	Output LOW Voltage	54,74		0.25	0.4	V	I_{OL} = 12 mA; V_{CC} = V_{CC} MIN, V_{IN} = V_{IL} or V_{IH} per Truth Table
		74		0.35	0.5	V	I_{OL} = 24 mA; V_{CC} = V_{CC} MIN, V_{IN} = V_{IL} or V_{IH} per Truth Table
I_{OZH}	Output Off Current HIGH				20	μA	V_{CC} = MAX, V_{OUT} = 2.4 V
I_{OZL}	Output Off Current LOW				−400	μA	V_{CC} = MAX, V_{OUT} = 4.0 V
I_{IH}	Input HIGH Current	A or B, $\overline{G}$BA or GAB			20	μA	V_{CC} = MAX, V_{IN} = 2.7 V
		$\overline{G}$BA or GAB			0.1	mA	V_{CC} = MAX, V_{IN} = 7.0 V
		A or B			0.1	mA	V_{CC} = MAX, V_{IN} = 5.5 V
I_{IL}	Input LOW Current				−0.4	mA	V_{CC} = MAX, V_{IN} = 0.4 V
I_{OS}	Short Circuit Current		−40		−225	mA	V_{CC} = MAX
I_{CC}	Power Supply Current Total Output HIGH				70	mA	V_{CC} = MAX
	Total Output LOW				90		
	Total at HIGH Z				95		

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AC CHARACTERISTICS: $T_A = 25°C$, $V_{CC} = 5.0\ V$

SYMBOL	PARAMETER	LS620 LIMITS			LS623 LIMITS			UNITS	TEST CONDITIONS
		MIN	TYP	MAX	MIN	TYP	MAX		
t_{PLH} t_{PHL}	Propagation Delay A to B		6.0 8.0	10 15		8.0 11	15 15	ns	$C_L = 45\ pF$, $R_L = 667\ \Omega$
t_{PLH} t_{PHL}	Propagation Delay B to A		6.0 8.0	10 15		8.0 11	15 15	ns	
t_{PZL} t_{PZH}	Output Enable Time $\overline{G}$BA to A		31 23	40 40		31 26	40 40	ns	
t_{PZL} t_{PZH}	Output Enable Time GAB to B		31 23	40 40		31 26	40 40	ns	
t_{PLZ} t_{PHZ}	Output Disable Time $\overline{G}$BA to A		15 15	25 25		15 15	25 25	ns	$C_L = 5.0\ pF$
t_{PLZ} t_{PHZ}	Output Disable Time GAB to B		15 15	25 25		15 15	25 25	ns	

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GUARANTEED OPERATING RANGES

SYMBOL	PARAMETER		MIN	TYP	MAX	UNIT
V_{CC}	Supply Voltage	54 74	4.5 4.75	5.0 5.0	5.5 5.25	V
T_A	Operating Ambient Temperature Range	54 74	−55 0	25 25	125 70	°C
V_{OH}	Output Voltage — High	54,74			5.5	mA
I_{OL}	Output Current — Low	54 74			12 24	mA

DC CHARACTERISTICS OVER OPERATING TEMPERATURE RANGE (unless otherwise specified)

SYMBOL	PARAMETER		LIMITS MIN	LIMITS TYP	LIMITS MAX	UNITS	TEST CONDITIONS	
V_{IH}	Input HIGH Voltage		2.0			V	Guaranteed Input HIGH Voltage for All Inputs	
V_{IL}	Input LOW Voltage	54			0.5	V	Guaranteed Input LOW Voltage for All Inputs	
		74			0.6			
$V_{T+}-V_{T-}$	A or B Input		0.2	0.4		V	V_{CC} = MIN	
V_{IK}	Input Clamp Diode Voltage			−0.65	−1.5	V	V_{CC} = MIN, I_{IN} = −18 mA	
I_{OH}	Output HIGH Current	54,74			100	μA	V_{CC} = MIN, V_{OH} = MAX	
V_{OL}	Output LOW Voltage	54,74		0.25	0.4	V	I_{OL} = 12 mA	V_{CC} = V_{CC} MIN, V_{IN} = V_{IL} or V_{IH} per Truth Table
		74		0.35	0.5	V	I_{OL} = 24 mA	
I_{IH}	Input HIGH Current				20	μA	V_{CC} = MAX, V_{IN} = 2.7 V	
					+0.1	mA	V_{CC} = MAX, V_{IN} = 7.0 V	
I_{IL}	Input LOW Current				−0.4	mA	V_{CC} = MAX, V_{IN} = 0.4 V	
I_{CC}	Power Supply Current Total, Output HIGH				70	mA	V_{CC} = MAX	
	Total, Output LOW				90	mA	V_{CC} = MAX	

AC CHARACTERISTICS: T_A = 25°C, V_{CC} = 5.0 V

SYMBOL	PARAMETER	LS621 LIMITS MIN	LS621 LIMITS TYP	LS621 LIMITS MAX	LS622 LIMITS MIN	LS622 LIMITS TYP	LS622 LIMITS MAX	UNITS	TEST CONDITIONS
t_{PLH} t_{PHL}	Propagation Delay A to B		17 16	25 25		19 14	25 25	ns	C_L = 45 pF, R_L = 667 Ω
t_{PLH} t_{PHL}	Propagation Delay B to A		17 16	25 25		19 14	25 25	ns	
t_{PLH} t_{PHL}	Output Disable Time $\overline{G}$BA to A		23 34	40 50		26 43	40 60	ns	
t_{PLH} t_{PHL}	Output Disable Time GAB to B		25 37	40 50		28 39	40 60	ns	

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