

Octal Bus Transceiver

TC74HC623A 3-State, Non-Inverting

The TC74HC623A is a high speed CMOS QUAD TRANSCEIVER fabricated with silicon gate C²MOS technology.

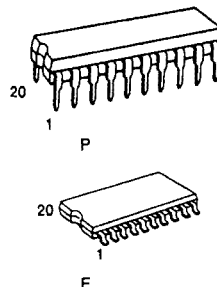
It achieves the high speed operation similar to equivalent LSTTL while maintaining the CMOS low power dissipation.

This IC is intended for two-way asynchronous communication between data buses, and direction of data transmission is determined by \overline{GAB} , \overline{GBA} .

\overline{GAB} and \overline{GBA} inputs are equipped with protection circuits against static discharge or transient excess voltage.

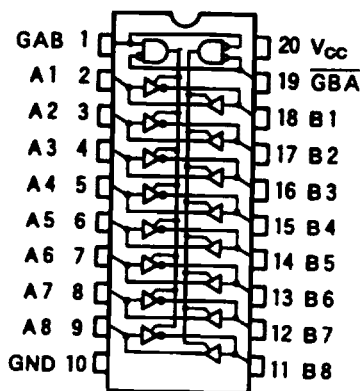
Features

- High Speed: $t_{pd} = 10\text{ns}$ (Typ.) at $V_{CC} = 5\text{V}$
- Low Power Dissipation: $I_{CC} = 4\mu\text{A}$ (Max.) at $T_a = 25^\circ\text{C}$
- High Noise Immunity: $V_{NIH} = V_{NIL} = 28\% V_{CC}$ (Min)
- Output Drive Capability: 15 LSTTL Loads
- Symmetrical Output Impedance: $I_{OH1} = I_{OL} = 6\text{mA}$ (Min.)
- Balanced Propagation Delays: $t_{pLH} = t_{pHL}$
- Wide Operating Voltage Range: $V_{CC}(\text{opr}) = 2\text{V} \sim 6\text{V}$
- Pin and Function Compatible with 74LS620/623

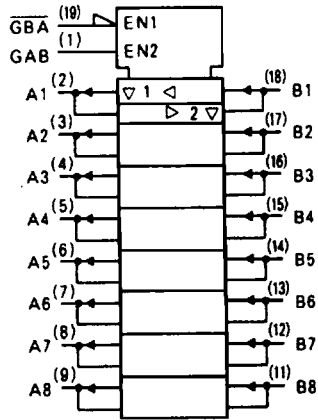


Application Notes

- 1) Do not apply a signal to any bus terminal when it is in the output mode. Damage may result.
- 2) All floating (high impedance) bus terminals must have their input levels fixed by means of pull up or pull down resistors or bus terminator ICs such as the Toshiba TC40117BP.



Pin Assignment



IEC Logic Symbol

Truth Table

Inputs		Function		Outputs
GAB	$\overline{\text{GAB}}$	A BUS	B BUS	
L	L	Output	Input	A = B
H	H	Input	Output	B = A
L	H	High Impedance		Z
H	L	High Impedance		Z

Z: High Impedance

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Supply Voltage Range	V_{CC}	-0.5 - 7	V
DC Input Voltage	V_{IN}	-0.5 - $V_{CC} + 0.5$	V
DC Output Voltage	V_{OUT}	-0.5 - $V_{CC} + 0.5$	V
Input Diode Current	I_{IK}	± 20	mA
Output Diode Current	I_{OK}	± 20	mA
DC Output Current	I_{OUT}	± 35	mA
DC V_{CC} /Ground Current	I_{CC}	± 75	mA
Power Dissipation	P_D	500(DIP)*/180(SOIC)	mW
Storage Temperature	T_{stg}	-65 - 150	°C
Lead Temperature 10sec	T_L	300	°C

*500mW in the range of $T_a = -40^\circ\text{C} \sim 65^\circ\text{C}$. From $T_a = 65^\circ\text{C}$ to 85°C a derating factor of -10mW/°C shall be applied until 300mW.

Recommended Operating Conditions

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	2 - 6	V
Input Voltage	V_{IN}	0 - V_{CC}	V
Output Voltage	V_{OUT}	0 - V_{CC}	V
Operating Temperature	T_{opr}	-40 - 85	°C
Input Rise and Fall Time	t_r, t_f	0 - 1000($V_{CC} = 2.0\text{V}$) 0 - 500($V_{CC} = 4.5\text{V}$) 0 - 400($V_{CC} = 6.0\text{V}$)	ns

DC Electrical Characteristics

Parameter	Symbol	Test Condition	$T_a = 25^\circ\text{C}$				$T_a = -40 \sim 85^\circ\text{C}$		Unit	
			V_{CC}	Min.	Typ.	Max.	Min.	Max.		
High-Level Input Voltage	V_{IH}	-	2.0	1.5	-	-	1.5	-	V	
			4.5	3.15	-	-	3.15	-		
			6.0	4.2	-	-	4.2	-		
Low-Level Input Voltage	V_{IL}	-	2.0	-	-	0.5	-	0.5	V	
			4.5	-	-	1.35	-	1.35		
			6.0	-	-	1.8	-	1.8		
High-Level Output Voltage	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -20\mu\text{A}$	2.0	1.9	2.0	-	1.9	-	V
				4.5	4.4	4.5	-	4.4	-	
			$I_{OH} = -6\text{mA}$	4.5	4.18	4.31	-	4.13	-	
				6.0	5.68	5.80	-	5.63	-	
			$I_{OH} = -7.8\text{mA}$	4.5	-	-	-	-	-	
				6.0	-	-	-	-	-	
Low-Level Output Voltage	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 20\mu\text{A}$	2.0	-	0.0	0.1	-	0.1	V
				4.5	-	0.0	0.1	-	0.1	
			$I_{OL} = 6\text{mA}$	4.5	-	0.17	0.26	-	0.33	
				6.0	-	0.18	0.26	-	0.33	
			$I_{OL} = 7.8\text{mA}$	4.5	-	-	-	-	-	
				6.0	-	-	-	-	-	
3-State Output Off-State Current	I_{OZ}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = V_{CC}$ or GND	6.0	-	-	± 0.5	-	± 5.0	μA	
Input Leakage Current	I_{IN}	$V_{IN} = V_{CC}$ or GND	6.0	-	-	± 0.1	-	± 1.0		
Quiescent Supply Current	I_{CC}	$V_{IN} = V_{CC}$ or GND	6.0	-	-	4.0	-	40.0		

AC Electrical Characteristics ($C_L = 50\text{pF}$, Input $t_r = t_f = 6\text{ns}$)

Parameter	Symbol	Test Condition				Ta = 25°C			Ta = -40 ~ 85°C		Unit
			CL	VCC		Min.	Typ.	Max.	Min.	Max.	
Output Transition Time	t_{TLH} t_{THL}	-	50	2.0	-	25	60	-	75	ns	
				4.5	-	7	12	-	15		
				6.0	-	6	10	-	13		
Propagation Delay Time	t_{PLH}	TC74HC623A	50	2.0	-	38	85	-	105	ns	
				4.5	-	12	17	-	21		
				6.0	-	10	14	-	18		
	t_{PHL}		150	2.0	-	54	125	-	155		
				4.5	-	17	25	-	31		
				6.0	-	14	21	-	26		
3-State Output Enable Time	t_{pZL}	$R_L = 1\text{k}\Omega$	50	2.0	-	48	150	-	190	ns	
				4.5	-	19	30	-	38		
				6.0	-	16	26	-	33		
	t_{pZH}		150	2.0	-	61	190	-	240		
				4.5	-	24	38	-	48		
				6.0	-	20	32	-	41		
3-State Output Output Disable Time	t_{pLZ} t_{pHZ}	$R_L = 1\text{k}\Omega$	50	2.0	-	45	150	-	190	ns	
				4.5	-	20	30	-	38		
				6.0	-	18	26	-	33		
Input Capacitance	C_{IN}		GAB, GBA	-	5	10	-	10	pF		
Bus Input Capacitance	C_{iD}		An, Bn	-	10	-	-	-			
Power Dissipation Capacitance	$C_{PD}(1)$		-	-	35	-	-	-			

Note (1) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

Average operating current can be obtained by the equation:

$$I_{CC(oper)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/8(\text{per bit})$$