

FEATURES:

- 0.5 MICRON CMOS Technology
- ESD > 2000V per MIL-STD-883, Method 3015;
> 200V using machine model (C = 200pF, R = 0)
- 1.27mm pitch SOIC, 0.65mm pitch SSOP,
0.635mm pitch QSOP, 0.65mm pitch TSSOP packages
- Extended commercial range of -40°C to +85°C
- V_{CC} = 3.3V ± 0.3V, Normal Range
- V_{CC} = 2.3V to 3.6V, Extended Range
- CMOS power levels (0.4µW typ. static)
- Rail-to-Rail output swing for increased noise margin
- All inputs, outputs and I/O are 5 Volt tolerant
- Supports hot insertion

Drive Features for LVC623A:

- High Output Drivers: ±24mA
- Reduced system switching noise

APPLICATIONS:

- 5V and 3.3V mixed voltage systems
- Data communication and telecommunication systems

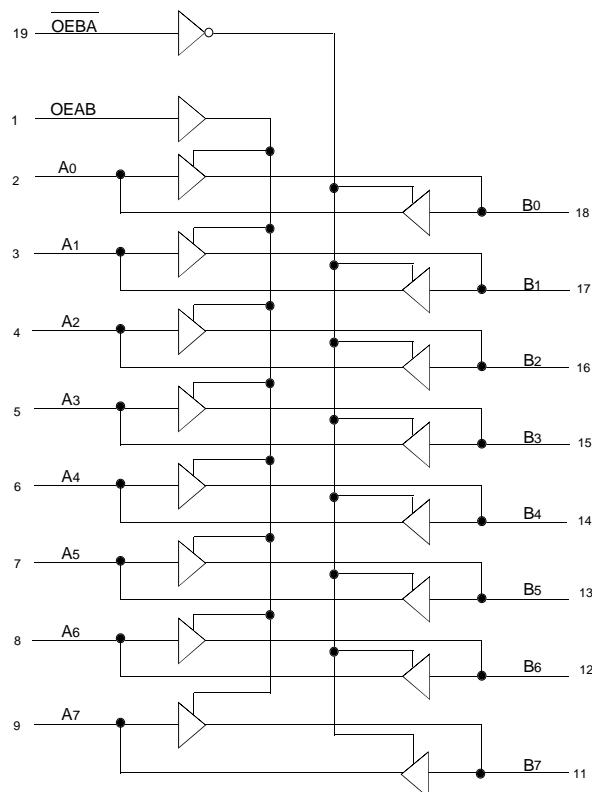
DESCRIPTION:

This octal transceiver is built using advanced dual metal CMOS technology. This high-speed, low power transceiver is ideal for asynchronous communication between two busses (A and B). The control function implementation allows maximum flexibility in timing. This device allows data transmission from the A bus to the B bus, or from the B bus to the A bus, depending upon the levels at the enable inputs (OEAB, \overline{OEBA}). The enable inputs can be used to disable the device so that the buses are effectively isolated. The capability to store data by simultaneous enabling of OEAB and \overline{OEBA} . 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 the bus lines are at high impedance OFF-state, both sets of bus lines will remain at their last states. The 8-bit codes appearing on the two sets of buses will be identical.

The LVC623A has been designed with a ±24mA output driver. This driver is capable of driving a moderate to heavy load while maintaining speed performance.

All pins can be driven from either 3.3V or 5V devices. This feature allows the use of this device as a translator in a mixed 3.3V/5V supply system.

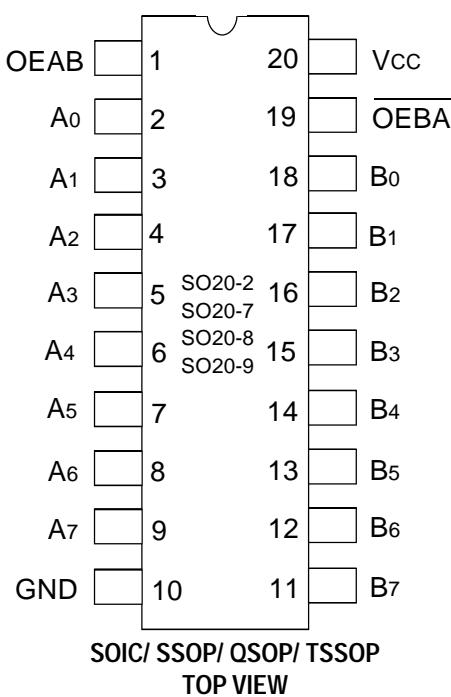
FUNCTIONAL BLOCK DIAGRAM



EXTENDED COMMERCIAL TEMPERATURE RANGE

OCTOBER 1999

PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS (1)

Symbol	Description	Max.	Unit
VTERM	Terminal Voltage with Respect to GND	- 0.5 to +6.5	V
TSTG	Storage Temperature	- 65 to +150	°C
IOUT	DC Output Current	- 50 to +50	mA
I _{IK} I _{OK}	Continuous Clamp Current, V _I < 0 or V _O < 0	- 50	mA
I _{CC}	Continuous Current through each V _{CC} or GND	±100	mA
I _{SS}			

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NOTE:

- Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

CAPACITANCE (T_A = +25°C, f = 1.0MHz)

Symbol	Parameter ⁽¹⁾	Conditions	Typ.	Max.	Unit
C _{IN}	Input Capacitance	V _{IN} = 0V	4.5	6	pF
C _{OUT}	Output Capacitance	V _{OUT} = 0V	5.5	8	pF
C _{I/O}	I/O Port Capacitance	V _{IN} = 0V	6.5	8	pF

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NOTE:

- As applicable to the device type.

PIN DESCRIPTION

Pin Names	Description
OEBA	Output Enable Input A Port (Active LOW)
OEAB	Output Enable Input B Port
A _x	Side A Inputs or 3-State Outputs
B _x	Side B Inputs or 3-State Outputs
GND	Ground (0V)
V _{CC}	Positive Power Supply Voltage

FUNCTION TABLE (1)

Inputs		Inputs/Outputs	
OEAB	OEBA	A _x	B _x
L	L	A = B	Inputs
H	H	Inputs	B = A
L	H	Z	Z
H	L	A = B Inputs	B = A

NOTE:

- H = HIGH Voltage Level
L = LOW Voltage Level
X = Don't Care
Z = High-Impedance

DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE

Following Conditions Apply Unless Otherwise Specified:

Operating Condition: $T_A = -40^\circ\text{C}$ To $+85^\circ\text{C}$

Symbol	Parameter	Test Conditions		Min.	Typ. ⁽¹⁾	Max.	Unit
V _{IH}	Input HIGH Voltage Level	V _{CC} = 2.3V to 2.7V		1.7	—	—	V
		V _{CC} = 2.7V to 3.6V		2	—	—	
V _{IL}	Input LOW Voltage Level	V _{CC} = 2.3V to 2.7V		—	—	0.7	V
		V _{CC} = 2.7V to 3.6V		—	—	0.8	
I _{IH} I _{IL}	Input Leakage Current	V _{CC} = 3.6V	V _I = 0 to 5.5V	—	—	± 5	μA
I _{OZH} I _{OZL}	High Impedance Output Current (3-State Output pins)	V _{CC} = 3.6V	V _O = 0 to 5.5V	—	—	± 10	μA
I _{OFF}	Input/Output Power Off Leakage	V _{CC} = 0V, V _{IN} or V _O \leq 5.5V		—	—	± 50	μA
V _{IK}	Clamp Diode Voltage	V _{CC} = 2.3V, I _{IN} = -18mA		—	-0.7	-1.2	V
V _H	Input Hysteresis	V _{CC} = 3.3V		—	100	—	mV
I _{CCL} I _{CCH} I _{CCZ}	Quiescent Power Supply Current	V _{CC} = 3.6V	V _{IN} = GND or V _{CC}	—	—	10	μA
			3.6 \leq V _{IN} \leq 5.5V ⁽²⁾	—	—	10	
ΔI_{CC}	Quiescent Power Supply Current Variation	One input at V _{CC} - 0.6V, other inputs at V _{CC} or GND V _{CC} = 3.0 – 3.6V		—	—	500	μA

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NOTES:

1. Typical values are at V_{CC} = 3.3V, $+25^\circ\text{C}$ ambient.

2. This applies in the disabled state only.

OUTPUT DRIVE CHARACTERISTICS

Symbol	Parameter	Test Conditions ⁽¹⁾		Min.	Max.	Unit
V _{OH}	Output HIGH Voltage	V _{CC} = 2.3V to 3.6V	I _{OH} = -0.1mA	V _{CC} – 0.2	—	V
		V _{CC} = 2.3V	I _{OH} = -6mA	2	—	
		V _{CC} = 2.3V	I _{OH} = -12mA	1.7	—	
		V _{CC} = 2.7V		2.2	—	
		V _{CC} = 3.0V		2.4	—	
		V _{CC} = 3.0V	I _{OH} = -24mA	2.2	—	
V _{OL}	Output LOW Voltage	V _{CC} = 2.3V to 3.6V	I _{OL} = 0.1mA	—	0.2	V
		V _{CC} = 2.3V	I _{OL} = 6mA	—	0.4	
			I _{OL} = 12mA	—	0.7	
		V _{CC} = 2.7V	I _{OL} = 12mA	—	0.4	
		V _{CC} = 3.0V	I _{OL} = 24mA	—	0.55	

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NOTE:

1. V_{IH} and V_{IL} must be within the min. or max. range shown in the DC ELECTRICAL CHARACTERISTICS OVER OPERATING RANGE table for the appropriate V_{CC} range. $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$.

OPERATING CHARACTERISTICS, $T_A = 25^\circ\text{C}$

Symbol	Parameter	Test Conditions	$V_{CC} = 2.5V \pm 0.2V$	$V_{CC} = 3.3V \pm 0.3V$	Unit
			Typical	Typical	
CPD	Power dissipation capacitance per transceiver outputs enabled	$CL = 0\text{pF}, f = 10\text{Mhz}$	—	—	pF
CPD	Power dissipation capacitance per transceiver outputs disabled		—	—	pF

SWITCHING CHARACTERISTICS ⁽¹⁾

Symbol	Parameter	$V_{CC} = 2.5V \pm 0.2V$		$V_{CC} = 2.7V$		$V_{CC} = 3.3V \pm 0.3V$		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
t_{PLH}	Propagation Delay A_x to B_x, B_x to A_x	—	—	1.5	7	1.5	6	ns
t_{PHL}	Output Enable Time OE_{AB} to B_x	—	—	1.5	8.6	1.5	7.6	ns
t_{PHZ}	Output Disable Time OE_{AB} to B_x	—	—	1.5	7.5	1.5	6.5	ns
t_{PZH}	Output Enable Time OE_{BA} to A_x	—	—	1.5	8.9	1.5	7.9	ns
t_{PLZ}	Output Disable Time OE_{BA} to A_x	—	—	1.5	7.5	1.5	6.5	ns
$tsk(o)$	Output Skew ⁽²⁾	—	—	—	—	—	500	ps

NOTES:

1. See test circuits and waveforms. $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$.
2. Skew between any two outputs of the same package and switching in the same direction.

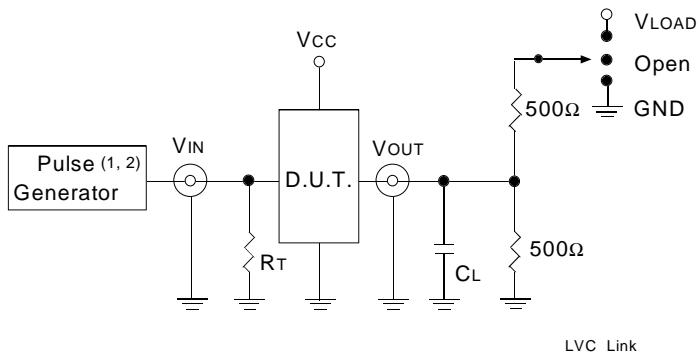
TEST CIRCUITS AND WAVEFORMS

TEST CONDITIONS

Symbol	$V_{CC(1)} = 3.3V \pm 0.3V$	$V_{CC(1)} = 2.7V$	$V_{CC(2)} = 2.5V \pm 0.2V$	Unit
V_{LOAD}	6	6	$2 \times V_{CC}$	V
V_{IH}	2.7	2.7	V_{CC}	V
V_T	1.5	1.5	$V_{CC}/2$	V
V_{LZ}	300	300	150	mV
V_{HZ}	300	300	150	mV
C_L	50	50	30	pF

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TEST CIRCUITS FOR ALL OUTPUTS



DEFINITIONS:

CL = Load capacitance: includes jig and probe capacitance.
 RT = Termination resistance: should be equal to Z_{OUT} of the Pulse Generator.

NOTES:

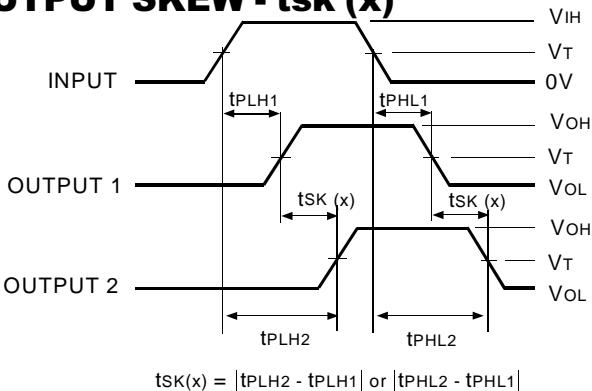
1. Pulse Generator for All Pulses: Rate ≤ 10 MHz; $t_f \leq 2.5$ ns; $t_r \leq 2.5$ ns.
2. Pulse Generator for All Pulses: Rate ≤ 10 MHz; $t_f \leq 2$ ns; $t_r \leq 2$ ns.

SWITCH POSITION

Test	Switch
Open Drain	V_{LOAD}
Disable Low	
Enable Low	
Disable High	GND
Enable High	
All Other tests	Open

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OUTPUT SKEW - $t_{SK}(x)$

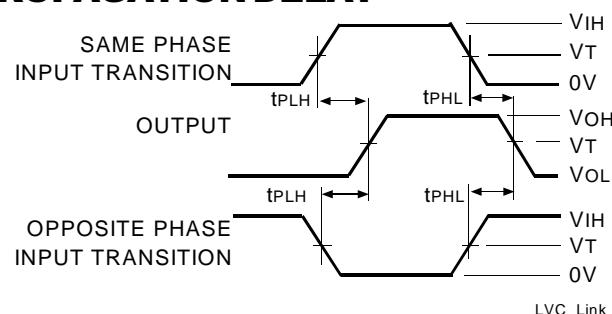


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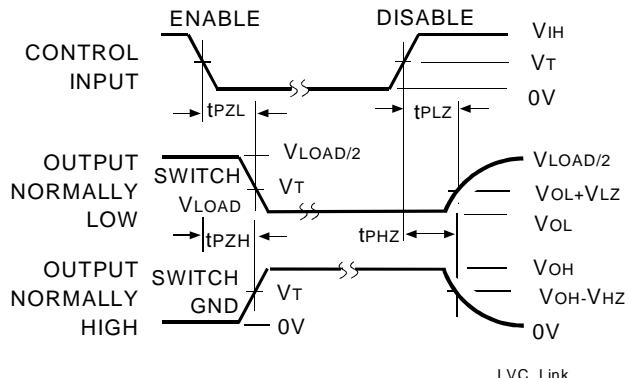
NOTES:

1. For $t_{SK}(o)$ OUTPUT1 and OUTPUT2 are any two outputs.
2. For $t_{SK}(b)$ OUTPUT1 and OUTPUT2 are in the same bank.

PROPAGATION DELAY



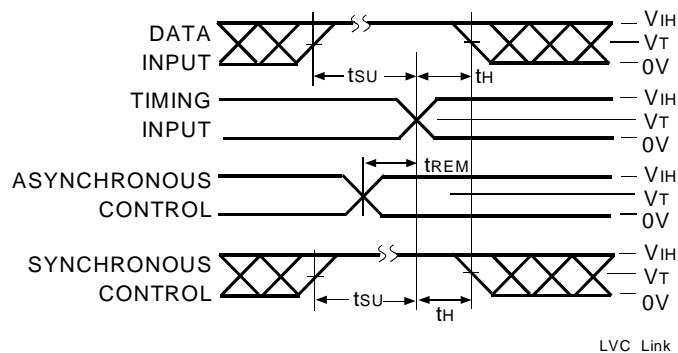
ENABLE AND DISABLE TIMES



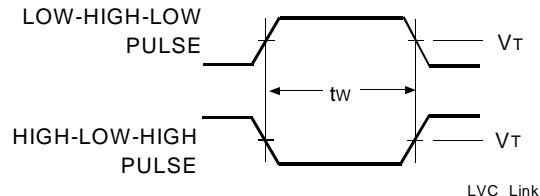
NOTE:

1. Diagram shown for input Control Enable-LOW and input Control Disable-HIGH.

SET-UP, HOLD, AND RELEASE TIMES



PULSE WIDTH



ORDERING INFORMATION

IDT	XX	LVC	X	XXXX	XX	
Temp. Range		Bus-Hold		Device Type	Package	
					SO	Small Outline IC (gull wing) (SO20-2)
					PY	Shrink Small Outline Package (SO20-7)
					Q	Quarter Size Small Outline Package (SO20-8)
					PG	Thin Shrink Small Outline Package (SO20-9)
				623A		Octal Transceiver with Dual Enable, 3-State Outputs, $\pm 24\text{mA}$
					Blank	No Bus-hold
				74		-40°C to $+85^\circ\text{C}$



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