

Fast CMOS 3.3V 16-Bit 16-Bit Registered Transceivers

Product Features

- Functionally compatible with FCT3, LVT, and 74 series 16952 families of products
- Tri-State outputs
- 5V Tolerant inputs and outputs
- 2.0V-3.6V V_{CC} supply operation
- Balanced sink and source output drives (24 mA)
- Low ground bounce outputs
- Power Down High Impedance inputs and outputs
- Supports live insertion
- ESD Protection exceeds 2000V, Human Body Model
200V, Machine Model
- Packages available:
 - 56-pin 240-mil wide plastic TSSOP (A)
 - 56-pin 300-mil wide plastic SSOP (V)

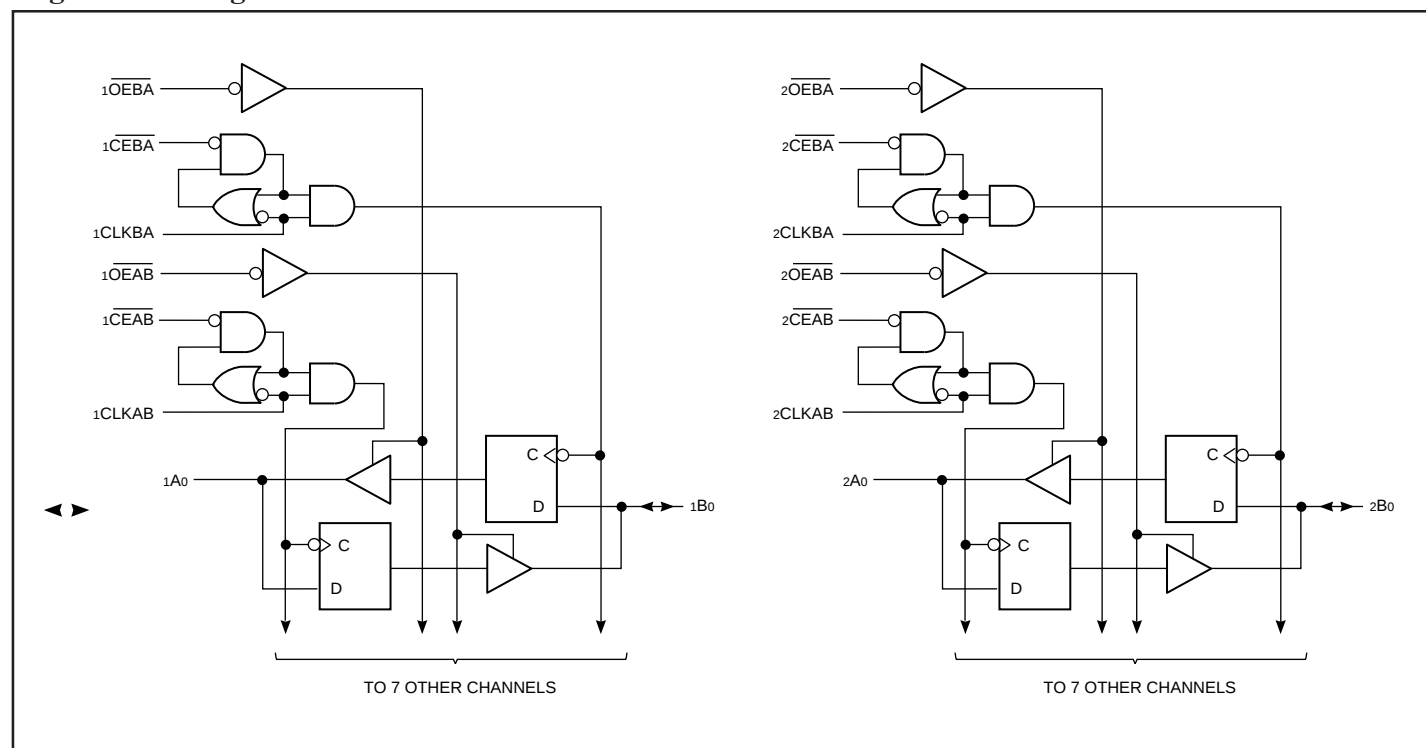
Product Description

Pericom Semiconductor's PI74LCX series of logic circuits are produced using the Company's advanced 0.6 micron CMOS technology, achieving industry leading speed grades.

The PI74LCX16952 is a 16-bit registered transceivers organized with two sets of eight D-type latches with separate input and output controls for each set. For data flow from A to B, for example, the A-to-B Enable ($\overline{xCEAB}$) input must be LOW in order to enter data from xAx . The data present on the A port will be clocked on the B register when $xCLKAB$ toggles from LOW-to-HIGH. The $\overline{xOEAB}$ control performs the output enable function on the B port. Control of data from B to A is similar, but uses the $\overline{xCEAB}$, $\overline{xCLKAB}$, and $\overline{xOEAB}$ inputs. By connecting the control pins of the two independent transceivers together, a full 16-bit operation can be achieved. The output buffers are designed with a Power-Off disable allowing "live insertion" of boards when used as backplane drivers.

The PI74LCX16952 can be driven from either 3.3V or 5.0V devices allowing this device to be used as a translator in a mixed 3.3/5.0V system.

Logic Block Diagram



Product Pin Description

Pin Name	Description
$\overline{\text{xOEAB}}$	A-to-B Output Enable Input (Active LOW)
$\overline{\text{xOEBA}}$	B-to-A Output Enable Input (Active LOW)
$\overline{\text{xCEAB}}$	A-to-B Clock Enable Input (Active LOW)
$\overline{\text{xCEBA}}$	B-to-A Clock Enable Input (Active LOW)
xCLKAB	A-to-B Clock Input
xCLKBA	B-to-A Clock Input
xAx	A-to-B Data Inputs or B-to-A 3-State Outputs
xBx	B-to-A Data Inputs or B-to-A 3-State Outputs
GND	Ground
VCC	Power

Product Pin Configuration

$\overline{1\text{OEAB}}$	1	56	$\overline{1\text{OEBA}}$
$\overline{1\text{CLKAB}}$	2	55	$\overline{1\text{CLKBA}}$
$\overline{1\text{CEAB}}$	3	54	$\overline{1\text{CEBA}}$
GND	4	53	GND
1A0	5	52	1B0
1A1	6	51	1B1
VCC	7	50	VCC
1A2	8	49	1B2
1A3	9	48	1B3
1A4	10	47	1B4
GND	11	46	GND
1A5	12	45	1B5
1A6	13	44	1B6
1A7	14	43	1B7
2A0	15	42	2B0
2A1	16	41	2B1
2A2	17	40	2B2
GND	18	39	GND
2A3	19	38	2B3
2A4	20	37	2B4
2A5	21	36	2B5
VCC	22	35	VCC
2A6	23	34	2B6
2A7	24	33	2B7
GND	25	32	GND
$\overline{2\text{CEAB}}$	26	31	$\overline{2\text{CEBA}}$
$\overline{2\text{CLKAB}}$	27	30	$\overline{2\text{CLKBA}}$
$\overline{2\text{OEAB}}$	28	29	$\overline{2\text{OEBA}}$

Truth Table^(1,2)

Inputs				Outputs
$\overline{\text{xCEAB}}$	xCLKAB	$\overline{\text{xOEAB}}$	xAx	xBx
H	X	L	X	B ⁽³⁾
X	L	L	X	B ⁽³⁾
L	↑	L	L	L
L	↑	L	H	H
X	X	H	X	High-Z

Notes:

- H = High Voltage Level
L = Low Voltage Level
X = Don't Care or Irrelevant
↑ = LOW-to-HIGH Transition
Z = High Impedance
- A-to-B data flow shown. B-to-A flow control is the same, except using $\overline{\text{xCEBA}}$, xCLKBA , and $\overline{\text{xOEBA}}$.
- Level of B before the indicated steady-state input conditions were established.

Maximum Ratings

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature	–65°C to +150°C
Ambient Temperature with Power Applied	–40°C to +85°C
Supply Voltage to Ground Potential (Inputs & Vcc Only)	–0.5V to +7.0V
Supply Voltage to Ground Potential (Outputs & D/O Only) ...	–0.5V to +7.0V
DC Input Voltage	–0.5V to +7.0V
DC Output Current	120 mA
Power Dissipation	1.0W

Note:

Stresses greater than those listed under 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.

Recommended Operating Conditions

Symbol	Parameter		Min.	Max.	Units
V _{CC}	Supply Voltage	Operating	2.0	3.6	V
		Data Retention	1.5	3.6	
V _I	Input Voltage		0	5.5	
V _O	Output Voltage	HIGH or LOW State	0	V _{CC}	
		TRI-State	0	5.5	
I _{OH} /I _{OL}	Output Current	V _{CC} = 3.0V-3.6V	—	±24	mA
		V _{CC} = 2.7V	—	±12	
T _A	Free-Air Operating Temperature		–40	+85	°C
Δt/ΔV	Input Edge Rate	V = 0.8V-2.0V, V _{CC} = 3.0V	0	10	ns/V

DC Electrical Characteristics (Over the Operating Range, $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{CC} = 2.7\text{V}$ to 3.6V)

Parameters	Description	Test Conditions ⁽¹⁾		Min.	Typ ⁽²⁾	Max.	Units
V_{IH}	Input HIGH Voltage	Guaranteed Logic HIGH Level		2.0	—	—	V
V_{IL}	Input LOW Voltage	Guaranteed Logic LOW Level		—	—	0.8	
V_{OH}	Output HIGH Voltage	$V_{CC} = 2.7\text{-}3.6$	$I_{OH} = -0.1\text{mA}$	$V_{CC}-0.2$	—	—	
		$V_{CC} = 2.7$	$I_{OH} = -12\text{mA}$	2.2	—	—	
		$V_{CC} = 3.0$	$I_{OH} = -18\text{mA}$	2.4	—	—	
			$I_{OH} = -24\text{mA}$	2.2	—	—	
V_{OL}	Output LOW Voltage	$V_{CC} = 2.7\text{-}3.6$	$I_{OL} = 0.1\text{mA}$	—	—	0.2	
		$V_{CC} = 2.7$	$I_{OL} = 12\text{mA}$	—	—	0.4	
		$V_{CC} = 3.0$	$I_{OL} = 16\text{mA}$	—	—	0.4	
			$I_{OL} = 24\text{mA}$	—	—	0.55	
V_{IK}	Clamp Diode Voltage	$V_{CC} = \text{Min.}, I_{IN} = -18\text{mA}$		—	-0.7	-1.2	
I_I	Input Leakage Current	$0 \leq V_I \leq 5.5\text{V}$	$V_{CC} = 2.7\text{-}3.6$	—	—	± 5	μA
I_{OZ}	Tri-State Output Leakage	$0 \leq V_O \leq 5.5\text{V}$ $V_I = V_{IH} \text{ or } V_{IL}$	$V_{CC} = 2.7\text{-}3.6$	—	—	± 5	
I_{OFF}	Power Down Disable	$V_{CC} = 0\text{V}, V_{IN} \text{ or } V_{OUT} \leq 5.5\text{V}$		—	—	10	
I_{CC}	Quiescent Power Supply Current	$V_{CC} = \text{Max.}$	$V_{IN} = \text{GND or } V_{CC}$	—	0.1	10	
ΔI_{CC}	Quiescent Power Supply Current TTL Inputs HIGH	$V_{CC} = \text{Max.}$	$V_{IN} = V_{CC} - 0.6\text{V}^{(3)}$	—	—	500	

Notes:

1. For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.
2. Typical values are at $V_{CC} = 3.3\text{V}$, $+25^{\circ}\text{C}$ ambient.
3. Per TTL driven input; all other inputs at V_{CC} or GND.

Capacitance

Parameters	Description	Test Conditions	Typ.	Units
C_{IN}	Input Capacitance	$V_{CC} = \text{Open}, V_I = 0\text{V or } V_{CC}$	7	pF
C_{OUT}	Output Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V or } V_{CC}$	8	
C_{PD}	Power Dissipation Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V or } V_{CC}, F = 10\text{ MHz}$	20	

Switching Characteristics over Operating Range

Parameters	Description	Conditions	V _{CC} = 3.3V ± 0.3V		V _{CC} = 2.7V		Units
			Min.	Max.	Min.	Max.	
t _{PLH} t _{PHL}	Propagation Delay xCLKAB, xCLKBA to xBx, xAx	C _L = 50pF R _L = 500Ω	2.0	6.3	2.0	7.6	ns
t _{PZH} t _{PZL}	Output Enable Time xOEAB, xOEBA to xAx, xBx		1.5	7.0	1.5	8.4	
t _{PHZ} t _{PLZ}	Output Disable Time xOEAB, xOEBA to xAx, xBx		1.5	6.5	1.5	7.8	
t _{su}	Setup Time HIGH or LOW xAx, xBx to xCLKAB, xCLKB		2.5	—	2.5	—	
t _H	Hold Time HIGH or LOW, xAx, xBx to xCLKAB, xCLKBA		2.0	—	2.0	—	
t _{su}	Setup Time HIGH or LOW xCEAB, xCEBA to xCLKAB, xCLKBA		3.0	—	3.0	—	
t _H	Hold Time HIGH or LOW, xCEAB, xCEBA to xCLKAB, xCLKBA		2.0	—	2.0	—	
t _w	Pulse Width HIGH or LOW xCLKAB or CLKBA		3.0	—	3.0	—	
t _{sk(o)}	Output Skew ⁽¹⁾		—	1.0	—	—	

Note:

1. Skew between any two outputs, of the same package, switching in the same direction.

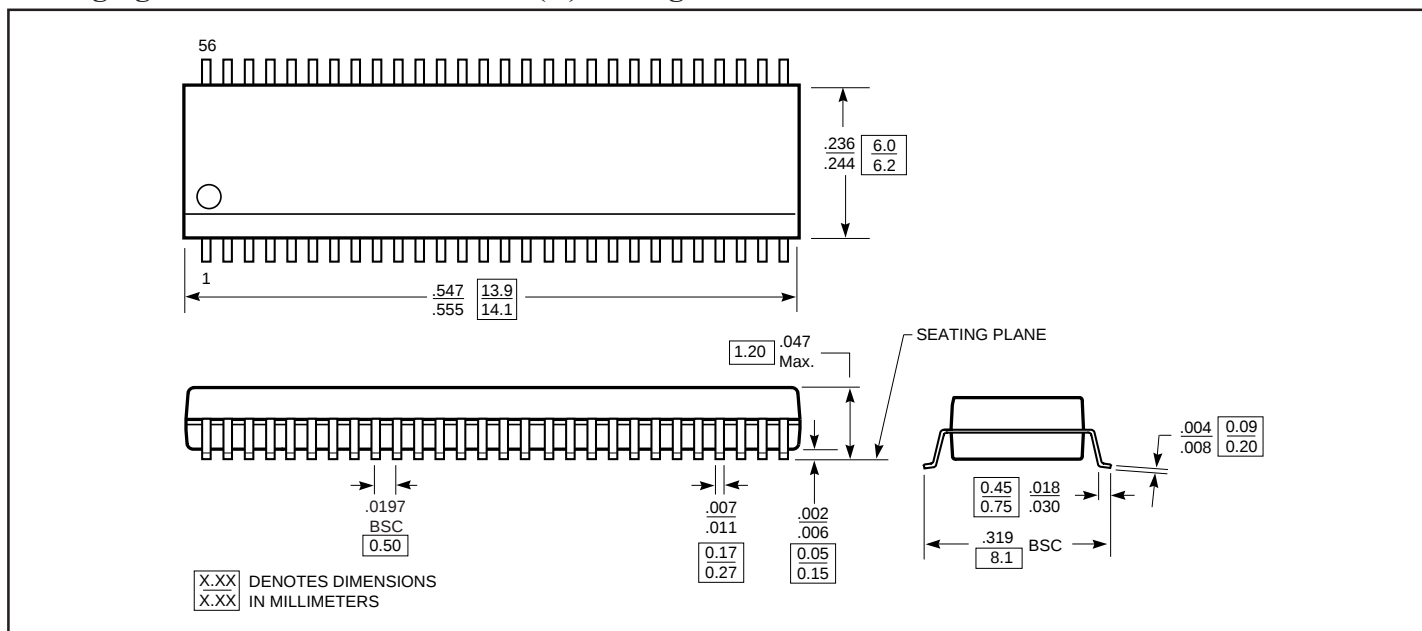
Dynamic Switching Characteristics (T_A = +25°C)

Parameters	Description	Test Conditions ⁽¹⁾	Typ.	Units
VOLP	Dynamic LOW Peak Voltage	V _{CC} = 3.3V, C _L = 50pF V _{IH} = 3.3V, V _{IL} = 0V	0.8	V
VOLV	Dynamic LOW Valley Voltage	V _{CC} = 3.3V, C _L = 50pF V _{IH} = 3.3V, V _{IL} = 0V		

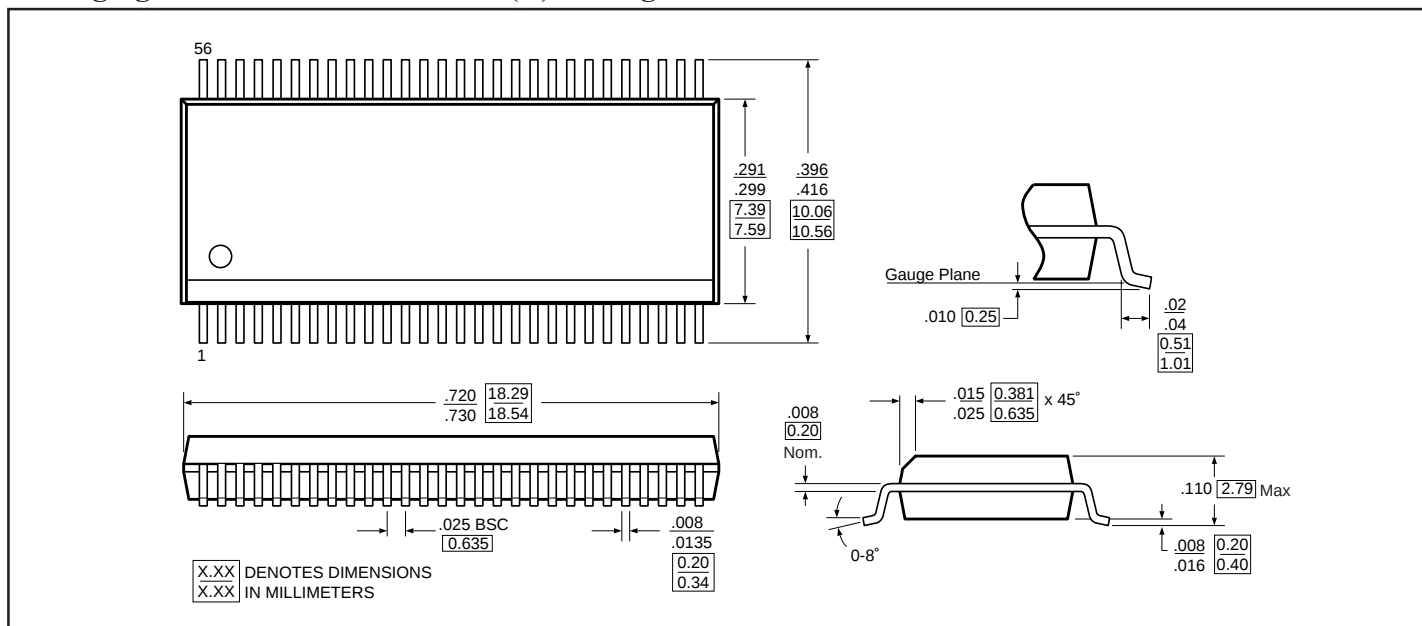
Note:

1. Measured with n–1 outputs switching from High-to-Low or Low-to-High. The remaining output is measured in the LOW state.

Packaging Mechanical: 56-Pin TSSOP (A) Package



Packaging Mechanical: 56-Pin SSOP (V) Package



Ordering Information

Part Number	Description	Operating Range
PI74LCX16952A	56-pin, 240-mil wide plastic TSSOP	-40°C to 85°C
PI74LCX16952V	56-pin, 300-mil wide plastic SSOP	