

**Fast CMOS 16-Bit Registered Transceivers**

**Product Features**

- Functionally compatible with FCT3, LVT, and 74 series 16652 families of products
- Tri-State outputs
- 5V Tolerant inputs and outputs
- 2.0V-3.6V Vcc 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)

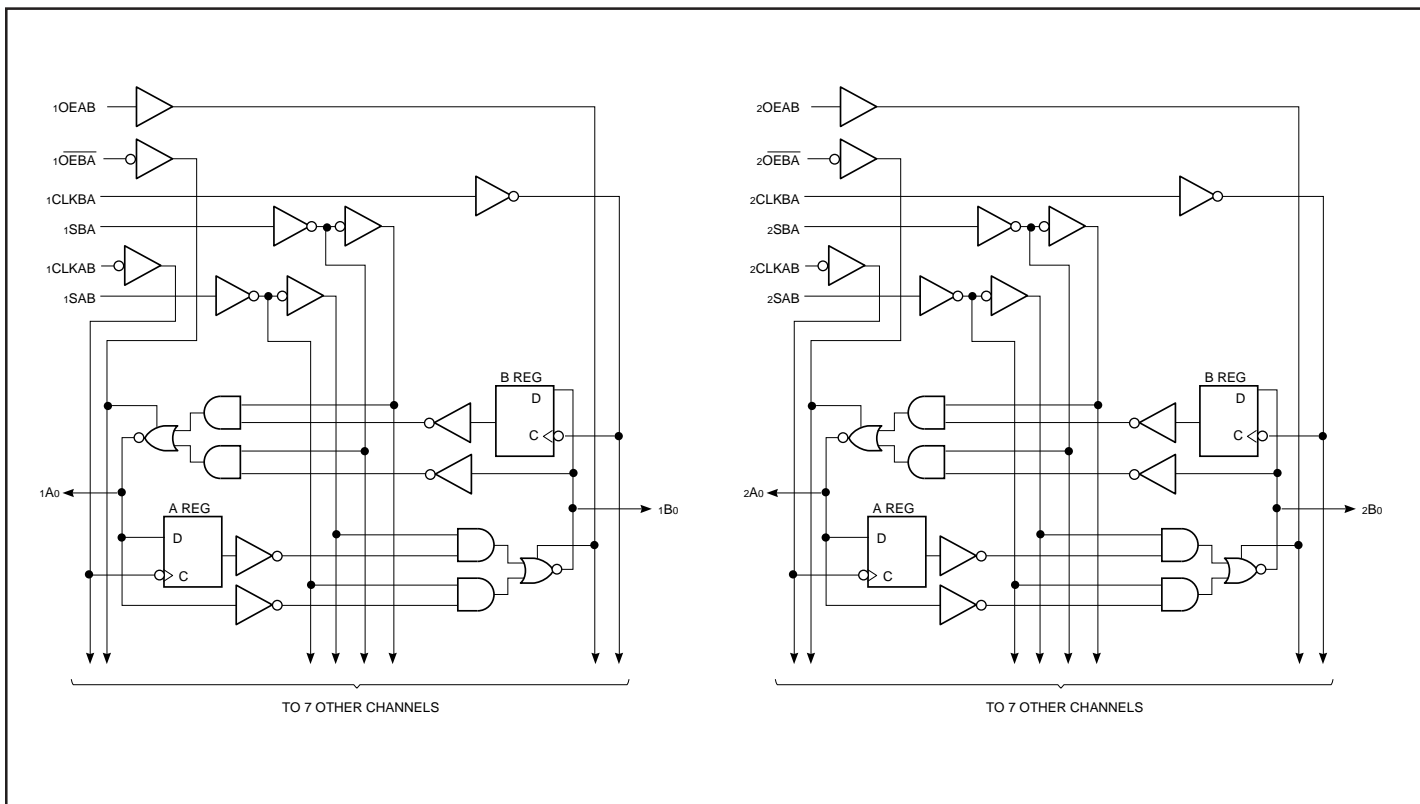
**Product Description**

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 PI74LCX16652 is 16-bit non-inverting, bidirectional bus transceiver organized as two independent 8-bit bus transceivers designed with 3-state D-type flip-flops and control circuitry arranged for multiplexed transmission of data directly from the data bus or from the internal storage registers. Each 8-bit transceiver utilizes the enable controls (xOEAB and xOEBA) to control the transceiver functions. The Select (xSAB and xSBA) control pins are used to select either real-time or stored data transfer. The circuitry used for select control will eliminate the typical decoding glitch that occurs in a multiplexer during the transition between real-time and stored data. A low input level selects real-time data and a high selects stored data.

The PI74LCX16652 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**



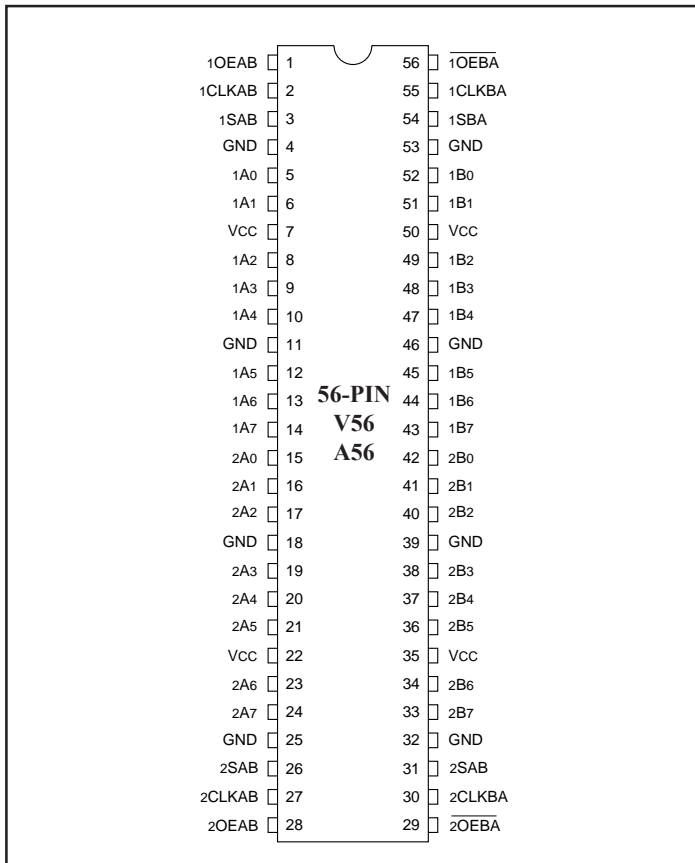
Truth Table<sup>(1)</sup>

Function/Operation	Inputs						Data I/O <sup>(2)</sup>	
	xOEAB	xOEBA	xCLKAB	xCLKBA	xSAB	xSBA	xAx	xBx
Isolation	L	H	H or L	H or L	X	X	Input	Input
Store A and B Data	L	H	↑	↑	X	X		
Store A, Hold B	X	H	↑	H or L	X	X	Input	Unspecified <sup>(1)</sup>
Store A in Both Registers	H	H	↑	↑	X <sup>(2)</sup>	X	Input	Output
Hold A, Store B	L	X	H or L	↑	X	X	Unspecified <sup>(1)</sup>	Input
Store B in Both Registers	L	L	↑	↑	X	X <sup>(2)</sup>	Output	Input
Real Time B Data to A Bus	L	L	X	X	X	L	Output	Input
Stored B Data to A Bus	L	L	X	H or L	X	H		
Real Time A Data to B Bus	H	H	X	X	L	X	Input	Output
Stored A Data to B Bus	H	H	H or L	X	H	X		
Stored A Data to B Bus and Stored B Data to A Bus	H	L	H or L	H or L	H	H	Output	Output

Notes:

- The data output functions may be enabled or disabled by various signals at the xOEAB or xOEBA inputs. Data input functions are always enabled, i.e., data at the bus pins will be stored on every low-to-high transition on the clock inputs.
- Select control = L: clocks can occur simultaneously.  
Select control = H: clocks must be staggered in order to load both registers.  
H = High Voltage Level; L = Low Voltage Level; X = Don't Care; ↑ = LOW-to-HIGH transition

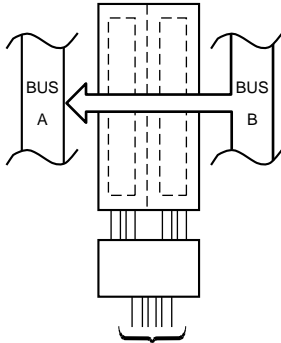
Product Pin Configuration



Product Pin Description

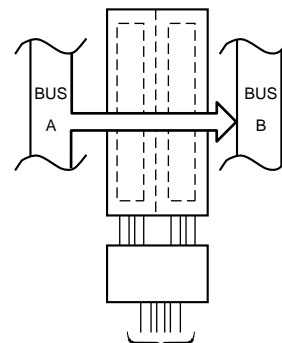
Pin Name	Description
xAx	Data Register A Inputs Data Register B Outputs
xBx	Data Register B Inputs Data Register A Outputs
xCLKAB, xCLKBA	Clock Pulse Inputs
SAB, SBA	Output Data Source Select Inputs
xOEAB, xOEBA	Output Enable Inputs
GND	Ground
Vcc	Power

**REAL-TIME TRANSFER  
 BUS B TO A**



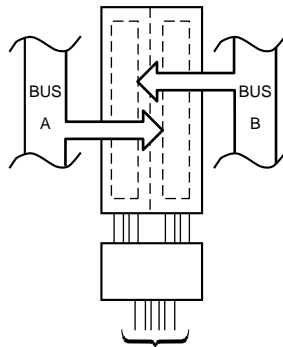
<b>xOEAB</b>	<b>xOEBA</b>	<b>xCLKAB</b>	<b>xCLKBA</b>	<b>xSAB</b>	<b>xSBA</b>
L	L	X	X	X	L

**REAL-TIME TRANSFER  
 BUS A TO B**



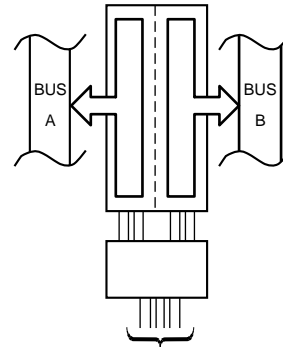
<b>xOEAB</b>	<b>xOEBA</b>	<b>xCLKAB</b>	<b>xCLKBA</b>	<b>xSAB</b>	<b>xSBA</b>
H	H	X	X	L	X

**STORAGE FROM  
 A AND/OR B**



<b>xOEAB</b>	<b>xOEBA</b>	<b>xCLKAB</b>	<b>xCLKBA</b>	<b>xSAB</b>	<b>xSBA</b>
X	H	↑	X	X	X
L	X	X	↑	X	X
L	H	↑	↑	X	X

**TRANSFER STORES  
 DATA TO A AND/OR B**



<b>xOEAB</b>	<b>xOEBA</b>	<b>xCLKAB</b>	<b>xCLKBA</b>	<b>xSAB</b>	<b>xSBA</b>
H	L	H or L	H or L	H	H

### 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 <sub>CC</sub>	Supply Voltage	Operating	2.0	3.6	V
		Data Retention	1.5	3.6	
V <sub>I</sub>	Input Voltage		0	5.5	
V <sub>O</sub>	Output Voltage	HIGH or LOW State	0	V <sub>CC</sub>	
		TRI-State	0	5.5	
I <sub>OH</sub> /I <sub>OL</sub>	Output Current	V <sub>CC</sub> = 3.0V-3.6V	—	±24	mA
		V <sub>CC</sub> = 2.7V	—	±12	
T <sub>A</sub>	Free-Air Operating Temperature		-40	+85	°C
Δt/ΔV	Input Edge Rate	V = 0.8V-2.0V, V <sub>CC</sub> = 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  $3.6\text{V}$ )

Parameters	Description	Test Conditions <sup>(1)</sup>		Min.	Typ <sup>(2)</sup>	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	$0 \leq V_I \leq 5.5\text{V}$	$V_{CC} = 2.7\text{-}3.6$	—	—	$\pm 5$	$\mu\text{A}$
$I_{OZ}$	Tri-State Output Leakage	$0 \leq V_O \leq 5.5\text{V}$ $V_I = V_{IH}$ or $V_{IL}$	$V_{CC} = 2.7\text{-}3.6$	—	—	$\pm 5$	
$I_{OFF}$	Power Down Disable	$V_{CC} = 0\text{V}, V_{IN}$ 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	
$\Delta I_{CC}$	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  $\text{GND}$ .

**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 <sub>CC</sub> = 3.3V ± 0.3V		V <sub>CC</sub> = 2.7V		Units
			Min.	Max.	Min.	Max.	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Bus to Bus	C <sub>L</sub> = 50pF R <sub>L</sub> = 500Ω	1.5	5.7	1.5	6.2	ns
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time xOEAB or xOEBA to Bus		1.5	7.0	1.5	8.0	
t <sub>PHZ</sub> t <sub>P LZ</sub>	Output Disable Time xOEAB or xOEBA to Bus		1.5	6.5	1.5	7.0	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Clock to Bus		1.5	6.2	1.5	7.0	
t <sub>PLh</sub> t <sub>PHL</sub>	Propagation Delay xSBA to xSAB to Bus		1.5	6.5	1.5	7.0	
t <sub>SU</sub>	Setup Time HIGH or LOW, Bus to Clock		2.5	—	2.5	—	
t <sub>H</sub>	Hold Time HIGH or LOW, Bus to Clock		1.5	—	1.5	—	
t <sub>w</sub>	Clock Pulse Width HIGH or LOW		3.0	—	3.0	—	
t <sub>SK(O)</sub>	Output Skew <sup>(1)</sup>		—	1.0	—	—	

**Note:**

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

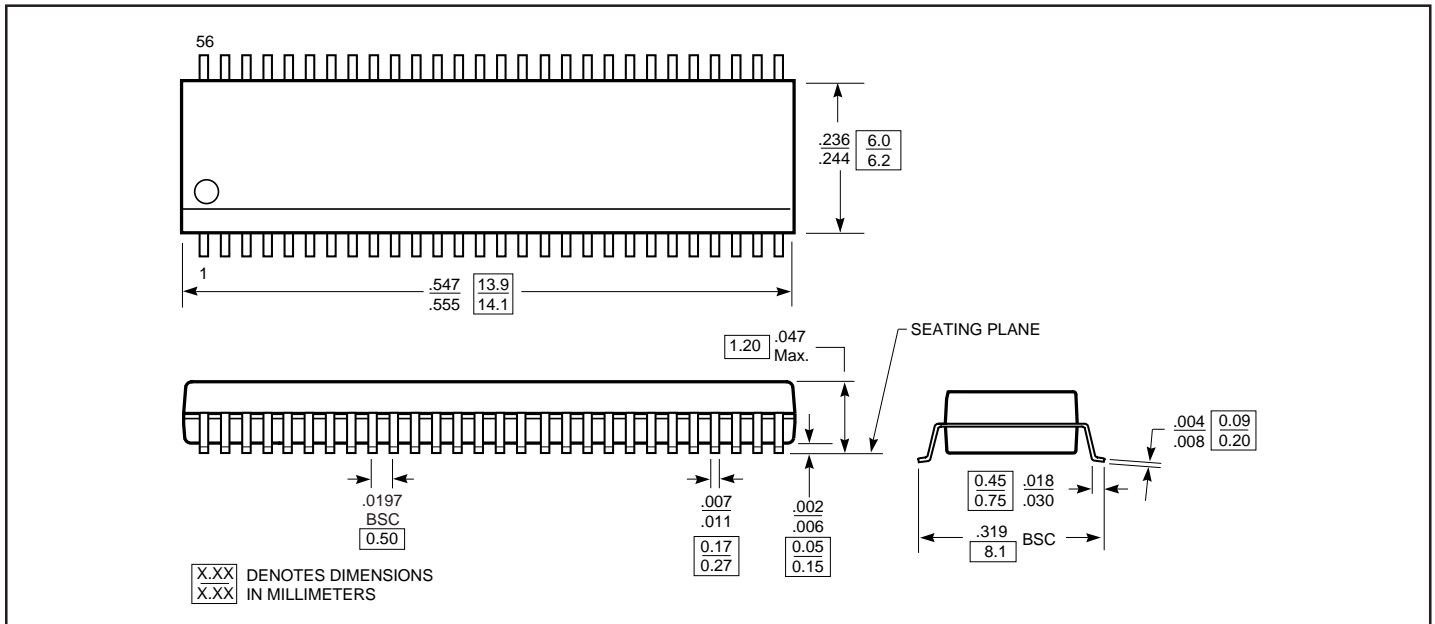
**Dynamic Switching Characteristics (T<sub>A</sub> = +25°C)**

Parameters	Description	Test Conditions <sup>(1)</sup>	Typical	Units
V <sub>OLP</sub>	Dynamic LOW Peak Voltage	V <sub>CC</sub> = 3.3V, C <sub>L</sub> = 50pF V <sub>IH</sub> = 3.3V, V <sub>IL</sub> = 0V	0.8	V
V <sub>OLV</sub>	Dynamic LOW Valley Voltage	V <sub>CC</sub> = 3.3V, C <sub>L</sub> = 50pF V <sub>IH</sub> = 3.3V, V <sub>IL</sub> = 0V		

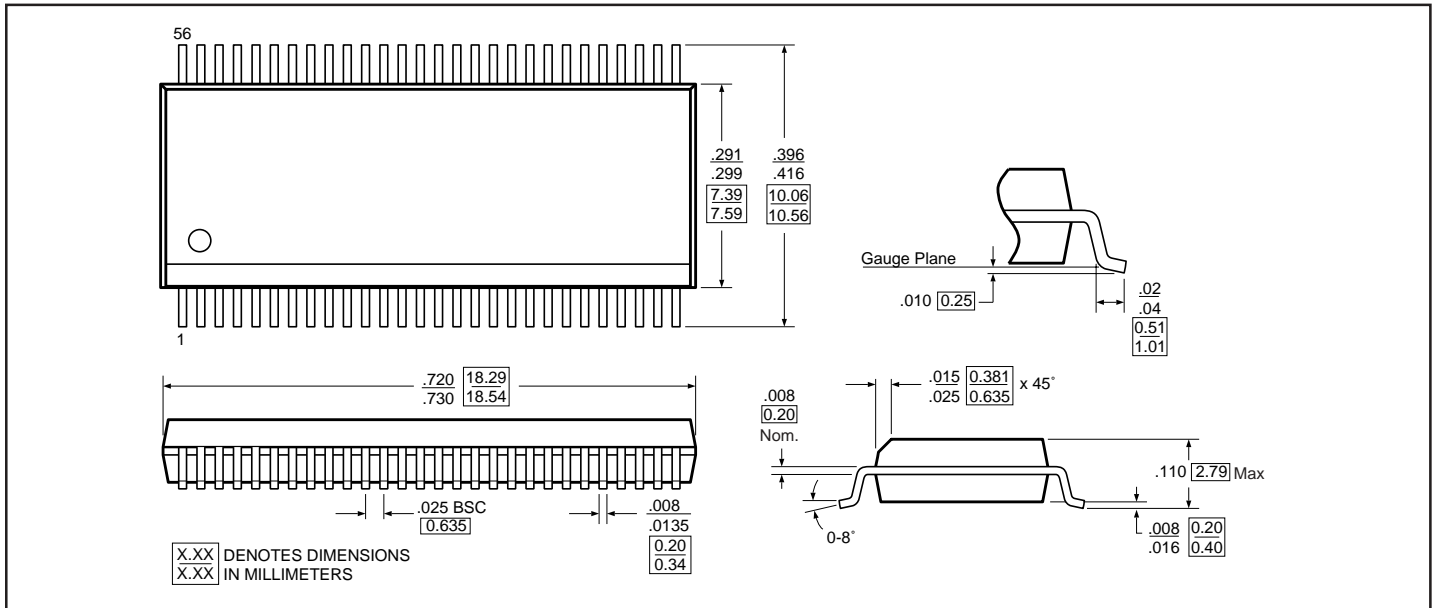
**Note:**

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
PI74LCX16652A	56-pin, 240-mil wide plastic TSSOP	-40°C to 85°C
PI74LCX16652V	56-pin, 300-mil wide plastic SSOP	