

### Features

- Maximum rated frequency: 133 MHz
- Low cycle-to-cycle jitter
- Input to output delay, less than 200ps
- Internal feedback allows outputs to be synchronized to the clock input
- Operates at 3.3V V<sub>DD</sub>
- Space-saving Package: (Pb-free & Green available)
  - 16-Pin TSSOP (L)
  - 16-Pin SOIC (W)

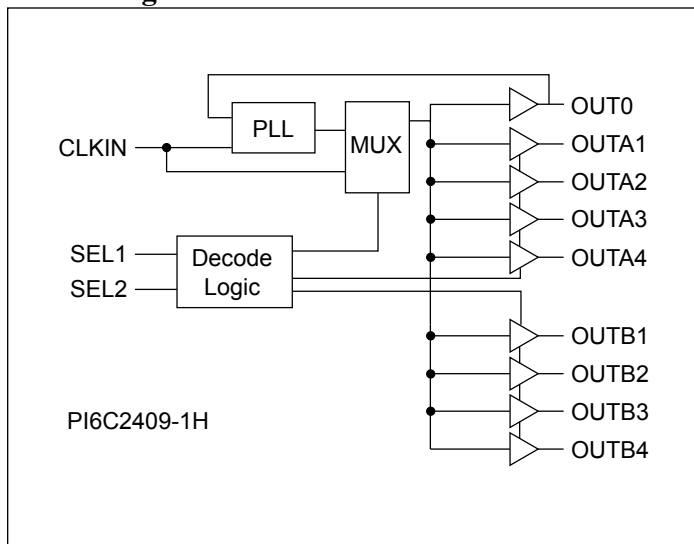
### Description

The PI6C2409-1H is a PLL based, zero-delay buffer, with the ability to distribute nine outputs of up to 133 MHz at 3.3V. All the outputs are distributed from a single clock input CLKIN and output OUT0 performs zero delay by connecting a feedback to PLL.

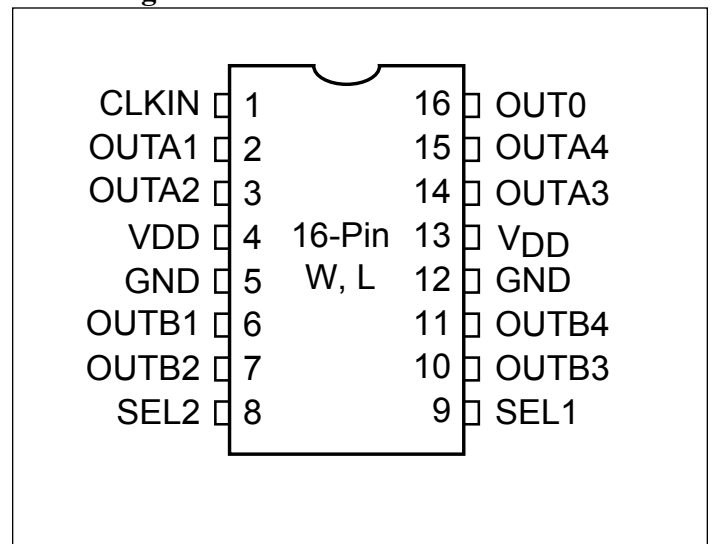
PI6C2409-1H has two banks of four outputs that can be controlled by the selection inputs, SEL1 & SEL2. It also has a power sparing feature: when input SEL1 is 0 and SEL2 is 1, PLL is turned off and all outputs are referenced from CLKIN. PI6C2409-1H is available in high drive and industrial environment versions.

An internal feedback on OUT0 is used to synchronize the outputs to the input; the relationship between loading of this signal and the outputs determines the input-output delay. PI6C2409-1H are characterized for both commercial and industrial operation

### Block Diagram



### Pin Configuration



### Input Select Decoding

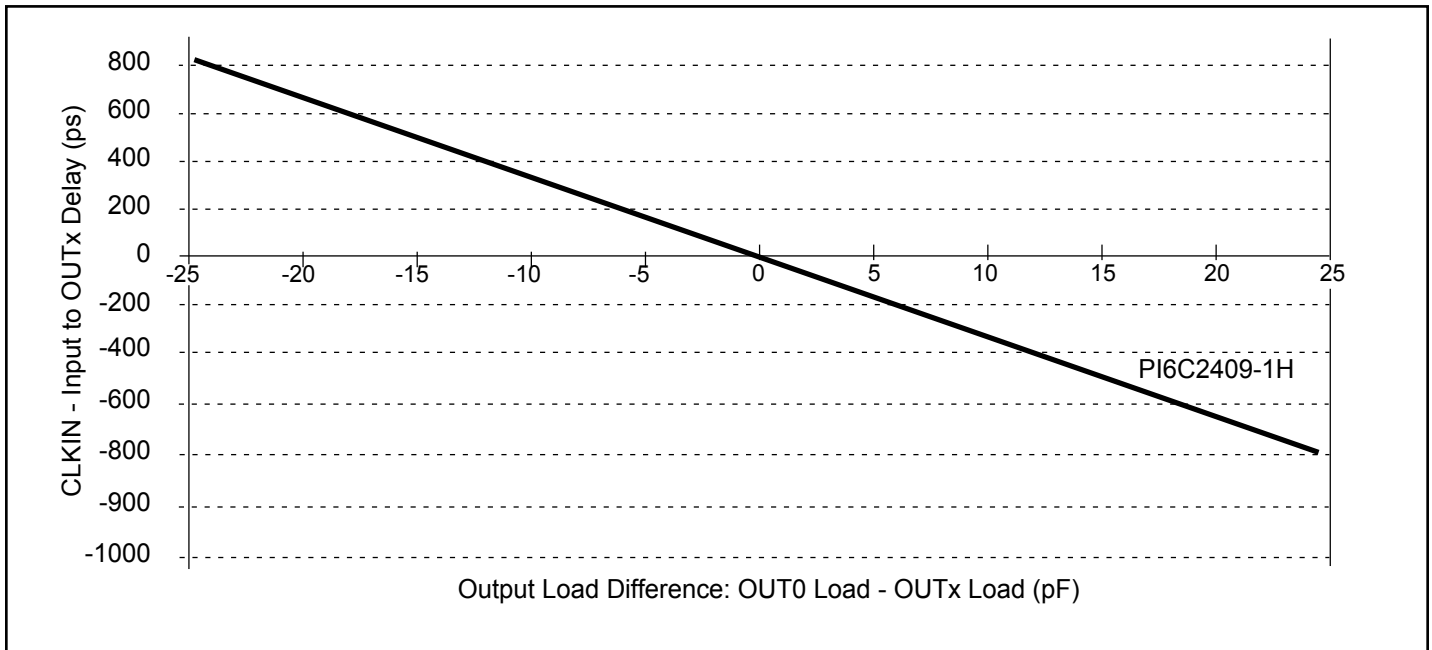
SEL2	SEL1	OUTA [1-4]	OUTB [1-4]	Output Source (OUT0)	PLL
0	0	3-State	3-State	PLL	ON
0	1	PLL	3-State	PLL	ON
1	0	CLKIN	CLKIN	CLKIN	OFF
1	1	PLL	PLL	PLL	ON

### Pin Description

Pin	Signal	Description
1	CLKIN	Input clock reference frequency (weak pull-down)
2, 3, 14, 15	OUTA[1-4]	Clock outputs, Bank A
4, 13	VDD	3.3V supply
5, 12	GND	Ground
6, 7, 10, 11	OUTB[1-4]	Clock outputs, Bank B
8	SEL2	Select input, bit 2 (weak pull-up)
9	SEL1	Select input, bit 1 (weak pull-up)
16	OUT0	Clock Output , internal PLL feedback

**Zero-Delay and Skew Control**

CLKIN Input to OUTx Delay vs. Difference in Loading between OUT0 pin and OUTx pins



The relationship between loading of the OUT0 signal and other outputs determines the input-output delay. Zero delay is achieved when all outputs, including feedback, are loaded equally.

**Maximum Ratings**

Supply Voltage to Ground Potential.....	-0.5V to +7.0V
DC Input Voltage (Except CLKIN).....	-0.5V to V <sub>DD</sub> +0.5V
DC Input Voltage CLKIN .....	-0.5 to 7V
Storage Temperature .....	-65°C to +150°C
Maximum Soldering Temperature (10 seconds) .....	260°C
Junction Temperature .....	150°C
Static Discharge Voltage (per MIL-STD-883, Method 3015).....	>2000V

**Operating Conditions** (V<sub>CC</sub> = 3.3V ±0.3V)

Parameter	Description	Min.	Max.	Units
V <sub>DD</sub>	Supply Voltage	3.0	3.6	V
T <sub>A</sub>	Commercial Operating Temperature	0	70	°C
	Industrial Operating Temperature	-40	85	
C <sub>L</sub>	Load Capacitance, below 100 MHz		30	pF
	Load Capacitance, from 100 MHz to 133 MHz	-	15	
C <sub>IN</sub>	Input Capacitance	-	7	

**DC Electrical Characteristics for Industrial Temperature Devices**

Parameters	Description	Test Conditions	Min.	Max.	Units
V <sub>IL</sub>	Input LOW Voltage			0.8	V
V <sub>IH</sub>	Input HIGH Voltage		2.0		
I <sub>IL</sub>	Input LOW Current	V <sub>IN</sub> = 0V		50.0	μA
I <sub>IH</sub>	Input HIGH Current	V <sub>IN</sub> = V <sub>DD</sub>		125	
V <sub>OL</sub>	Output LOW Voltage	I <sub>OL</sub> = 12mA		0.4	V
V <sub>OH</sub>	Output HIGH Voltage	I <sub>OH</sub> = -12mA	2.4		
I <sub>DD</sub>	Bypass, PLL OFF	SEL1 = 0, SEL2 = 1		1.0	mA
	Supply Current	Unloaded outputs 100 MHz, Select inputs at V <sub>DD</sub> or GND		54.0	
		Unloaded outputs 66 MHz, CLKIN		39.0	

**AC Electrical Characteristics for Industrial Temperature Devices**

Parameters	Name	Test Conditions	Min.	Typ.	Max.	Units
F <sub>O</sub>	Output Frequency	30pF load	10.0		100	MHz
		10pF load			133	
t <sub>DC</sub>	Duty Cycle <sup>(1)</sup>	Measured at V <sub>DD</sub> /2, F <sub>OUT</sub> = 66.67 MHz	40.0	50	60.0	%
	Duty Cycle <sup>(1)</sup>	Measured at V <sub>DD</sub> /2V, F <sub>OUT</sub> < 50MHz	45.0		55.0	
t <sub>R</sub>	Rise Time <sup>(1)</sup>	Measured between 0.8V and 2.0V			1.5	ns
t <sub>F</sub>	Fall Time <sup>(1)</sup>	Measured between 0.8V and 2.0V			1.5	
t <sub>SK(O)</sub>	Output to Output Skew <sup>(1)</sup>	All outputs equally loaded			250	ps
t <sub>0</sub>	Delay, CLKIN Rising Edge to OUT0 Rising Edge <sup>(1)</sup>	Measured at V <sub>DD</sub> /2		0	±350	
t <sub>SK(D)</sub>	Device-to-Device Skew <sup>(1)</sup>	Measured at V <sub>DD</sub> /2 on OUT0 pins of devices		0	700	
t <sub>SLEW</sub>	Output Slew Rate <sup>(1)</sup>	Measured between 0.8V & 2.0V on -1H device using Test Crt #2	1			V/ns
t <sub>JIT</sub>	Cycle-to-Cycle Jitter <sup>(1)</sup>	Measured at 66.67 MHz, loaded 30pF load			200	ps
t <sub>LOCK</sub>	PLL Lock Time <sup>(1)</sup>	Stable power supply, valid clocks presented on CLKIN pin			1.0	ms

**Note:**

1. See Switching Waveforms on page 6.

**DC Electrical Characteristics for Commercial Temperature Devices**

Parameters	Description	Test Conditions	Min.	Max.	Units
V <sub>IL</sub>	Input LOW Voltage	-	-	0.8	V
V <sub>IH</sub>	Input HIGH Voltage	-	2.0	-	
I <sub>IL</sub>	Input LOW Current	V <sub>IN</sub> = 0V	-	50	μA
I <sub>IH</sub>	Input HIGH Current	V <sub>IN</sub> = V <sub>DD</sub>	-	125	
V <sub>OL</sub>	Output LOW Voltage	I <sub>OL</sub> = 12mA	-	0.4	V
V <sub>OH</sub>	Output HIGH Voltage	I <sub>OH</sub> = -12mA	2.4	-	
I <sub>DD</sub>	Bypass, PLL off	SEL1 = 0 SEL2 = 1	-	1.0	mA
	Supply Current	Unloaded outputs, 66.67 MHz, Select inputs at V <sub>DD</sub> or GND	-	39	
		Unloaded outputs 100 MHz Select Inputs @ V <sub>DD</sub> or GND	-	54	

**AC Electrical Characteristics for Commercial Temperature Devices**

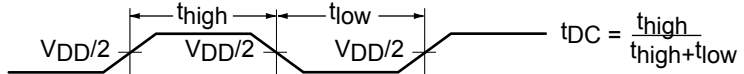
Parameters	Name	Test Conditions	Min.	Typ.	Max.	Units
F <sub>O</sub>	Output Frequency	30pF load	10.0		100	MHz
		10pF load			133	
t <sub>DC</sub>	Duty Cycle <sup>(1)</sup>	Measured at V <sub>DD</sub> /2, F <sub>O</sub> = 66.67 MHz	40.0	50	60.0	%
	Duty Cycle <sup>(1)</sup>	Measured at V <sub>DD</sub> /2V, F <sub>O</sub> < 50 MHz	45.0		55.0	
t <sub>R</sub>	Rise Time <sup>(1)</sup>	Measured between 0.8V and 2.0V			1.5	ns
t <sub>F</sub>	Fall Time <sup>(1)</sup>				1.5	
t <sub>SK(O)</sub>	Output to Output Skew <sup>(1)</sup>	All outputs equally loaded			250	ps
t <sub>0</sub>	Delay, CLKIN Rising Edge to OUT0 Rising Edge <sup>(1)</sup>	Measured at V <sub>DD</sub> /2		0	±350	
t <sub>SK(D)</sub>	Device-to-Device Skew <sup>(1)</sup>	Measured at V <sub>DD</sub> /2 on OUT0 pins of devices		0	700	
t <sub>SLEW</sub>	Output Slew Rate <sup>(1)</sup>	Measured between 0.8V & 2.0V on -1H device using Test Crt #2	1			V/ns
t <sub>JIT</sub>	Cycle-to-Cycle Jitter <sup>(1)</sup>	Measured at 66.67 MHz, loaded 30pF load			200	ps
t <sub>LOCK</sub>	PLL Lock Time <sup>(1)</sup>	Stable power supply, valid clocks presented on CLKIN pin			1.0	ms

**Note:**

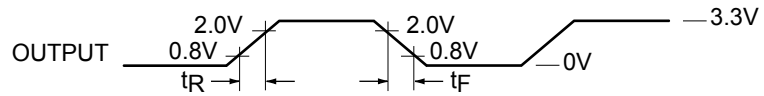
1. See Switching Waveforms on page 6.

**Switching Waveforms**

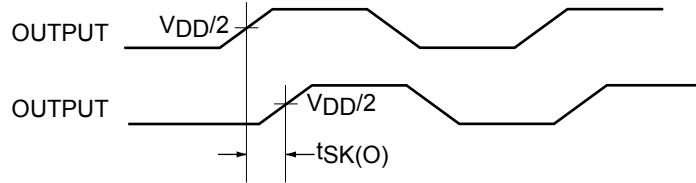
Duty Cycle Timing



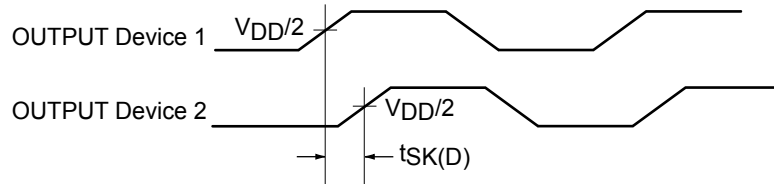
All Outputs Rise/Fall Time



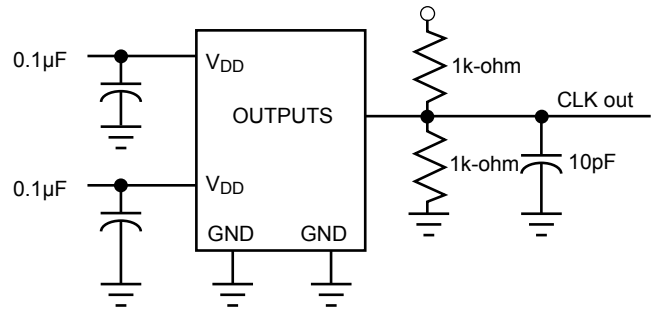
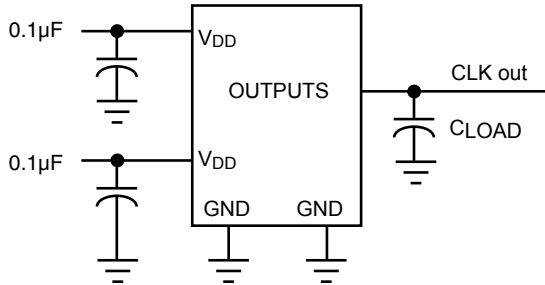
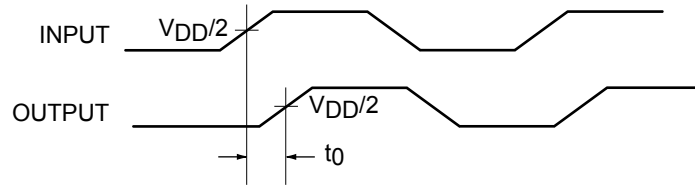
Output-Output Skew



Device-Device Skew



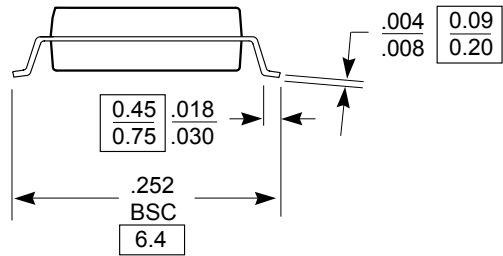
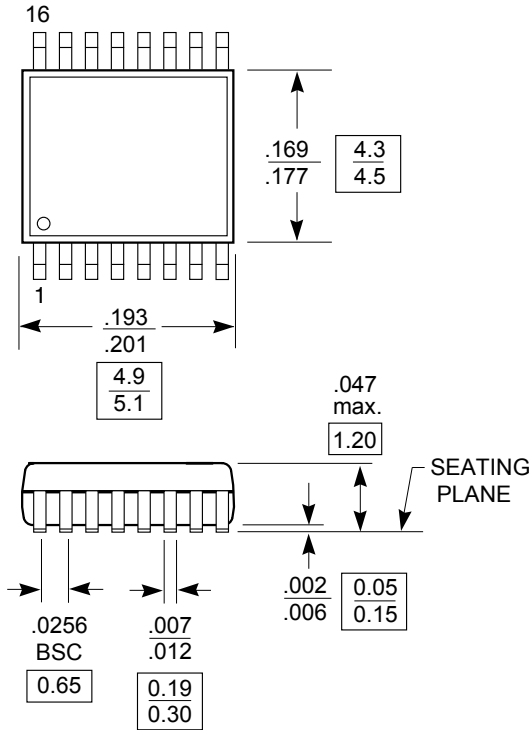
Input-Output Propagation Delay



**Packaging Mechanical: 16-Pin TSSOP (L)**

DOCUMENT CONTROL NO.  
PD - 1310

REVISION: E  
DATE: 03/09/05



**Note:**

1. Package Outline Exclusive of Mold Flash and Metal Burr
2. Controlling dimensions in millimeters
3. Ref: JEDEC MO-153F/AB

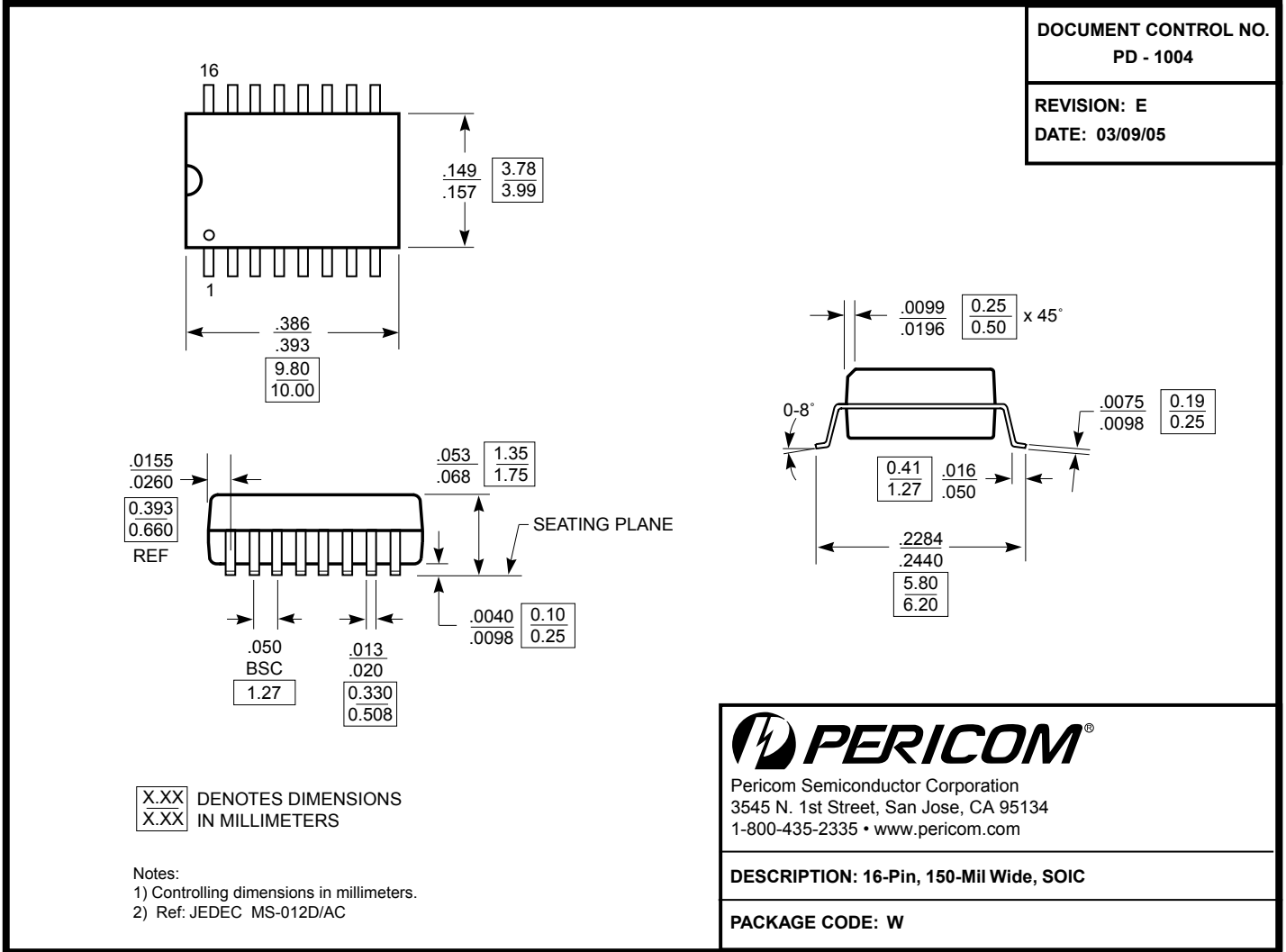


Pericom Semiconductor Corporation  
 3545 N. 1st Street, San Jose, CA 95134  
 1-800-435-2335 • www.pericom.com

DESCRIPTION: 16-Pin, 173-Mil Wide, TSSOP

PACKAGE CODE: L

**Packaging Mechanical: 16-Pin SOIC (W)**



**Note:**  
Controlling dimensions in millimeters. Ref: JEDEC MS - 012 AC

**Ordering Information**

Ordering Code	Package Code	Package Description	Operating Range
PI6C2409-1HLE	L	Pb-free and Green, 16-pin 173-mil TSSOP	Commercial
PI6C2409-1HWE	W	Pb-free and Green, 16-pin 150-mil SOIC	Commercial
PI6C2409-1HWIE	W	Pb-free and Green, 16-pin 150-mil SOIC	Industrial

**Notes:**  
Thermal characteristics can be found on the company web site at [www.pericom.com/packaging/](http://www.pericom.com/packaging/)  
E = Pb-free and Green  
Adding an X suffix = Tape/Reel