

## Low Power Spread Spectrum Frequency Multiplier

### Features

- Produces a 1 time spread spectrum clock signal from the input frequency.
- 2.5 V or 3.3V power supply operation.
- Input frequency range from 13MHz to 30MHz.
- Frequency Spreading Ratio :  $\pm 1.15\%$  (Typical @15MHz output frequency)
- Modulation Rate :  $F_{in}/640$
- Low power consumption design
- 6-pin SOT-23, 6-pin TDFN, 8-pin TSSOP, and 8-pin SOIC Packages.

### Description

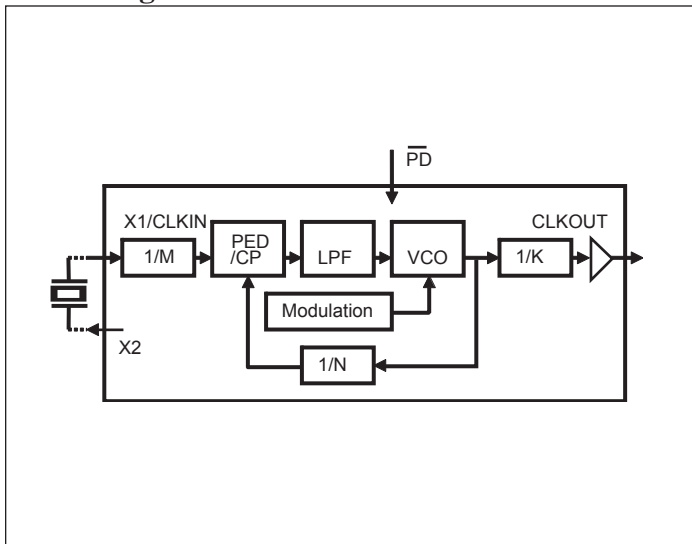
The PI6C3503 is a Low Power Frequency Multiplier with Spread Spectrum function to reduce EMI interference. The PI6C3503 provides a 1 time Spread Spectrum modulated output from a single clock source or a crystal. The PI6C3503 can reduce EMI at the clock output and it allows significant system cost savings by reducing the number of circuit board layers ferrite beads and shielding that are traditionally required to pass EMI regulations.

Power down control is selectable through external logic state setting. The various and small package outlines can save board size and is easy for layout.

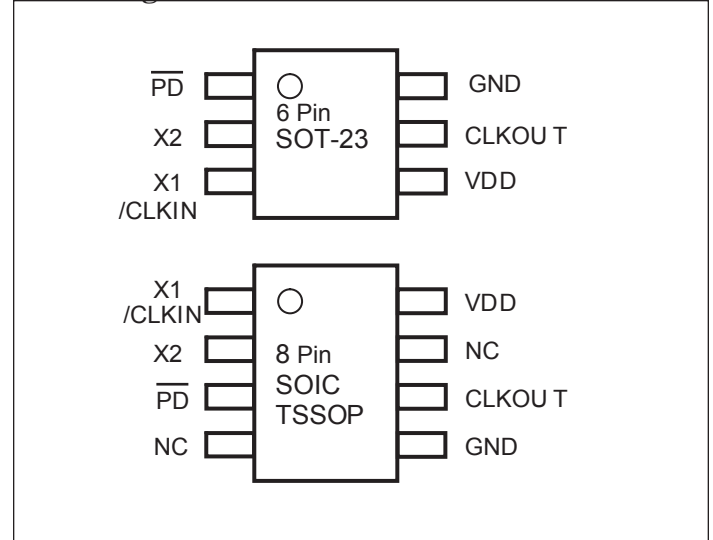
The PI6C3503 can be used in most portable devices with low power requirements like PDA, DSC, MFP, Media player, portable-TV, and LCM(LCD Panel Module).

PI6C3503 is one of Pericom clock products, if you have application need with clock input or output not specified here, please contact with Pericom for further information or custom clock design.

### Block Diagram



### Pin Configuration



### 6 Pin Description

Pin Name	Pin No.	IO TYPE	Descriptions
$\overline{\text{PD}}$	1	I	Power down control pin. Pull low to enable power down mode. Connect to VDD if not used.
X2	2	O	Crystal connection. If using an external reference, this pin must be left unconnected.
X1/CLKIN	3	I	Crystal connection or external reference frequency input. This pin has dual functions. It can be connected either to an external crystal or an external reference clock.
VDD	4	Power	Power Supply.
CLKOUT	5	O	Spread spectrum clock output.
GND	6	GND	Ground.

### 8 Pin Description

Pin Name	Pin No.	IO TYPE	Descriptions
X1/CLKIN	1	I	Crystal connection or external reference frequency input. This pin has dual functions. It can be connected either to an external crystal or an external reference clock.
X2	2	O	Crystal connection. If using an external reference, this pin must be left unconnected.
$\overline{\text{PD}}$	3	I	Power down control pin. Pull low to enable power down mode. Connect to VDD if not used.
NC	4	NC	No Connection.
GND	5	GND	Ground.
CLKOUT	6	O	Spread spectrum clock output.
NC	7	NC	No connection.
VDD	8	Power	Power Supply.

### Electrical Specification

#### Maximum Ratings

Item	Rating
Supply Voltage to Ground	5.5V
All Inputs and Outputs	-0.5V to VDD+0.5V
Storage Temperature	-65 to +150°C
Junction Temperature	150°C
Soldering Temperature	260°C

#### 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 period may affect reliability.

**DC Characteristics**

VDD = 2.5V ±5%, Ambient Temperature 0 to +70°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V <sub>DD</sub>	Operating Voltage	–	2.375	2.5	2.625	V
V <sub>IH</sub>	Input High Voltage	–	2.0	–	–	V
V <sub>IL</sub>	Input Low Voltage	–	–	–	0.8	V
V <sub>OH</sub>	Output High Voltage	I <sub>OH</sub> = –8mA	1.8	–	–	V
V <sub>OL</sub>	Output Low Voltage	I <sub>OL</sub> = 8mA	–	–	0.6	V
I <sub>DD</sub>	Supply Current	13MHz output and no load	–	1.9	2.4	mA
I <sub>DDq</sub>	Power down static current	$\overline{PD}$ = low	–	–	1	μA
Z <sub>OUT_DOWN</sub>	Nominal output impedance	Down side buffer	–	40	–	Ω
Z <sub>OUT_UP</sub>	Nominal output impedance	Up side buffer	–	45	–	Ω
C <sub>IN</sub>	Input Capacitance	X1 input pin	–	5	–	pF
T <sub>ON</sub>	Power on time	$\overline{PD}$ from low to high	–	3	–	ms

**AC Characteristics**

VDD = 2.5V ±5%, Ambient Temperature 0 to +70°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
CLKIN	Input Frequency	–	13	–	30	MHz
CLKOUT	Output Frequency	–	13	–	30	MHz
S <sub>Ratio</sub>	Spreading ratio	Output Frequency = 13MHz	–	±1.15	–	%
		Output Frequency = 30MHz	–	±0.65	–	
t <sub>Rise</sub>	Output rise time	Measured from 20% to 80% VDD, 15pF load.	–	1.7	–	ns
t <sub>Fall</sub>	Output fall time	Measured from 80% to 20% VDD. 15pF load.	–	1.50	–	ns
t <sub>J_Short</sub>	Short term jitter	Cycle to cycle jitter	–	–	200	ps
T <sub>DCIN</sub>	Input duty cycle	–	30	50	70	%
T <sub>DCOUT</sub>	Output duty cycle	–	45	50	55	%

**DC Characteristics**

VDD = 3.3V ±10%, Ambient Temperature 0 to +70°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V <sub>DD</sub>	Operating Voltage	–	3.0	3.3	3.6	V
V <sub>IH</sub>	Input High Voltage	–	2.0	–	–	V
V <sub>IL</sub>	Input Low Voltage	–	–	–	0.8	V
V <sub>OH</sub>	Output High Voltage	I <sub>OH</sub> = –8mA	2.5	–	–	V
V <sub>OL</sub>	Output Low Voltage	I <sub>OL</sub> = 8mA	–	–	0.4	V
I <sub>DD</sub>	Supply Current	13MHz output and no load	–	2.7	3.8	mA
I <sub>DDq</sub>	Power down static current	$\overline{PD}$ = low	–	–	1	μA
Z <sub>OUT_DOWN</sub>	Nominal output impedance	Down side buffer	–	38	–	Ω
Z <sub>OUT_UP</sub>	Nominal output impedance	Up side buffer	–	40	–	Ω
C <sub>IN</sub>	Input Capacitance	X1 input pin	–	5	–	pF
T <sub>ON</sub>	Power on time	$\overline{PD}$ from low to high	–	2	–	ms

### AC Characteristics

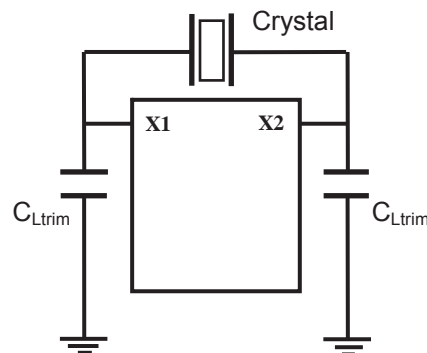
VDD = 3.3V ±10%, Ambient Temperature 0 to +70°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
CLKIN	Input Frequency	–	13	–	30	MHz
CLKOUT	Output Frequency	–	13	–	30	MHz
S <sub>Ratio</sub>	Spreading Ratio	Output frequency = 13MHz	–	±1.25	–	%
		Output frequency = 30MHz	–	±0.7	–	
t <sub>Rise</sub>	Output rise time	Measured from 20% to 80% VDD, 15pF load	–	1.3	–	ns
t <sub>Fall</sub>	Output fall time	Measured from 80% to 20% VDD, 15pF load	–	1.2	–	ns
t <sub>j_Short</sub>	Short term jitter	Cycle to cycle jitter	–	–	150	ps
T <sub>D CIN</sub>	Input duty cycle	–	30	50	70	%
T <sub>D COUT</sub>	Output duty cycle	–	45	50	55	%

### Application Information

#### Crystal Load Capacitors

If a crystal is used with the device, the external trim capacitors C<sub>Ltrim</sub> are used to adjust the effective capacitance to match the required crystal load capacitance. The C<sub>Ltrim</sub> value can be derived from formula  $C_{Ltrim} = 2 * CL - (C_s + C_i)$ . Typical C<sub>Ltrim</sub> = 28pF when crystal load = 18pF, stray capacitance C<sub>s</sub> = 3pF and XTAL pins capacitance = 5pF.

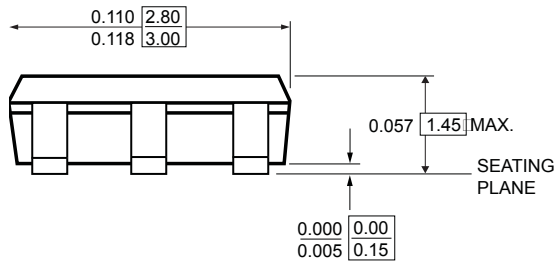
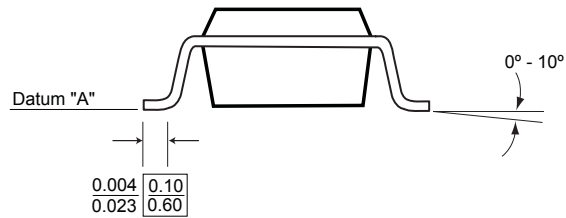
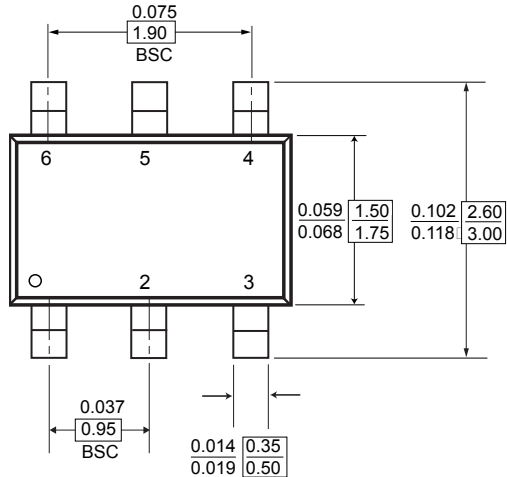


**Physical Dimensions**

**Packaging Mechanical: 6-Pin, SOT-23**

DOCUMENT CONTROL NO.  
PD - 1912

REVISION: C  
DATE: 03/09/05



X.XX DENOTES DIMENSIONS  
X.XX IN MILLIMETERS

**Notes:**

- 1) Controlling dimensions in millimeters
- 2) Ref: EIAJ SC-74A
- 3) Foot length is measured at flat portion of foot, reference to Datum "A"



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

DESCRIPTION: 6-Pin Small Outline Transistor  
Plastic Package, SOT-23

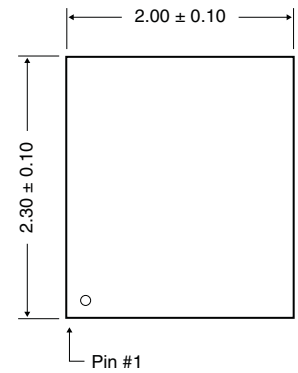
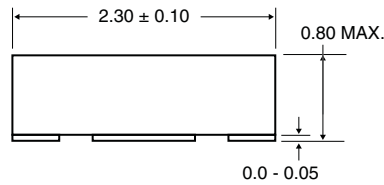
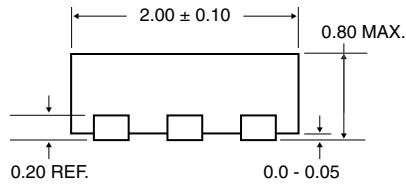
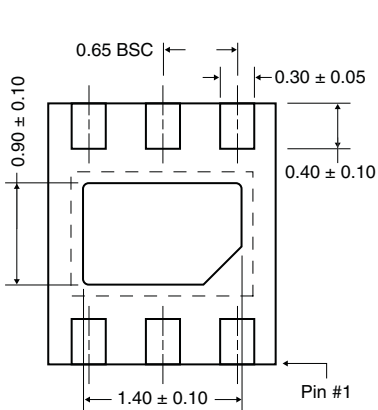
PACKAGE CODE: T

**Physical Dimensions**

**Packaging Mechanical: 6-Pin, TDFN**

DOCUMENT CONTROL NO.  
 PD - 2020

REVISION: A  
 DATE: 03/09/05



**Notes:**

- 1) All dimensions are in millimeters
- 2) Coplanarity shall not exceed 0.08mm.
- 3) Warpage shall not exceed 0.10mm.
- 4) JEDEC MO-229C (Ref)



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

DESCRIPTION: 6-Contact, Thin Dual-in-line Flat No Lead Package, TDFN

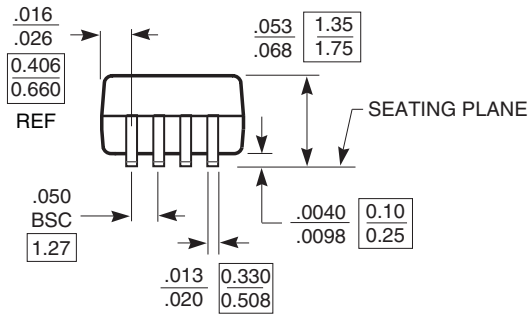
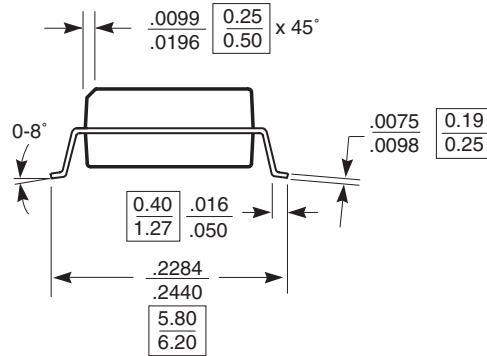
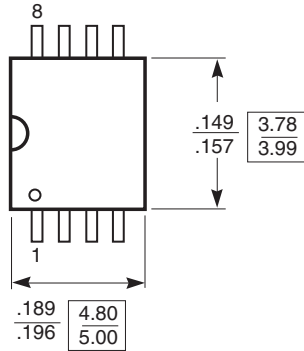
PACKAGE CODE: ZC



**Physical Dimensions**  
**Packaging Mechanical: 8-Pin, SOIC**

**DOCUMENT CONTROL NO.**  
**PD - 1001**

**REVISION: F**  
**DATE: 03/09/05**



X.XX DENOTES DIMENSIONS  
 X.XX IN MILLIMETERS

- Notes:**  
 1) Controlling dimensions in millimeters.  
 2) Ref: JEDEC MS-012D/AA



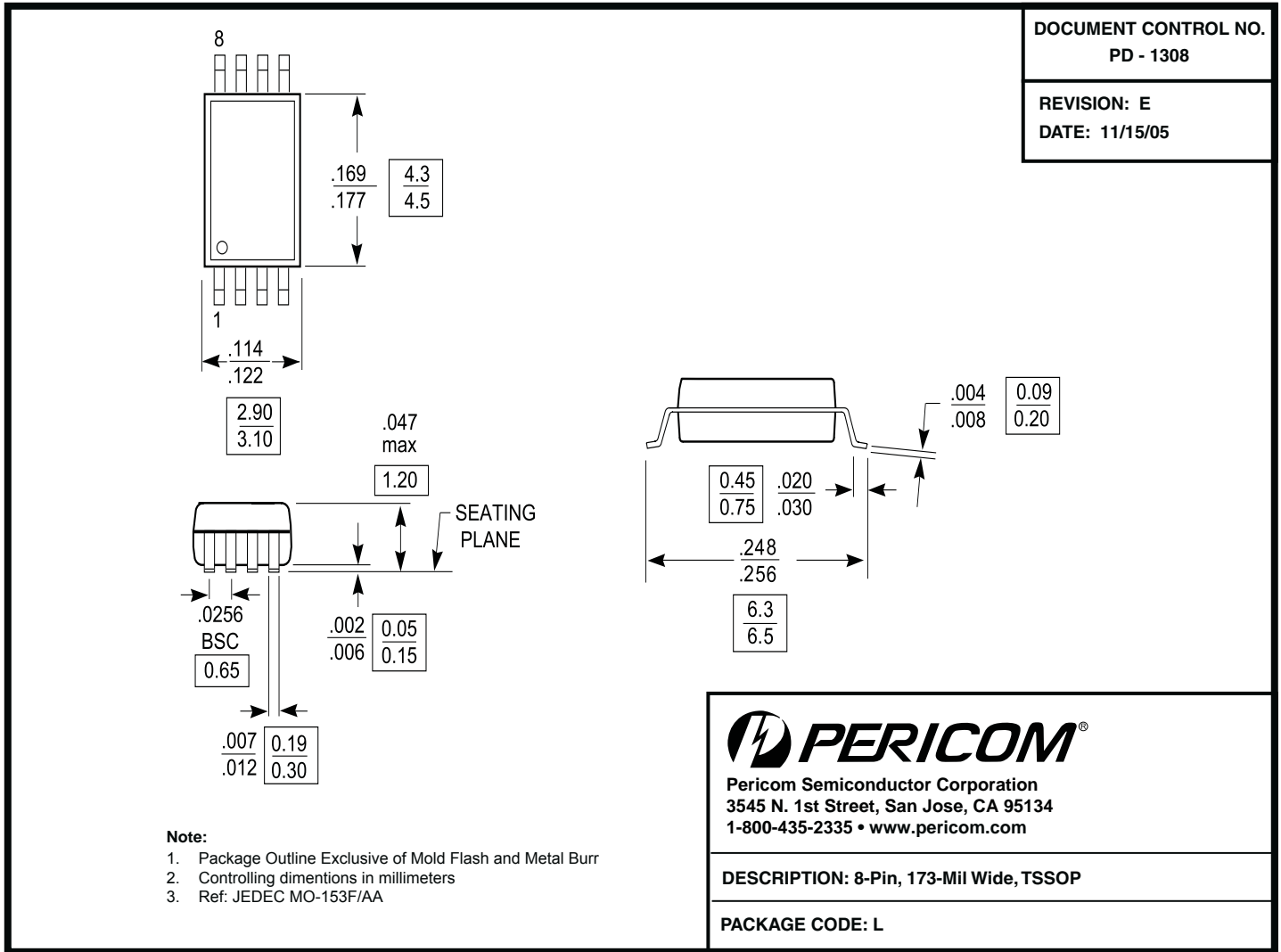
Pericom Semiconductor Corporation  
 3545 N. 1st Street, San Jose, CA 95134  
 1-800-435-2335 • www.pericom.com

**DESCRIPTION: 8-Pin, 150-Mil Wide, SOIC**

**PACKAGE CODE: W**

**Physical Dimensions**

**Packaging Mechanical: 8-Pin, TSSOP**



**Ordering Information**

Ordering Code	Packaging Code	Package Description
PI6C3503TE	T	Pb-Free & Green, 6-Pin SOT-23
PI6C3503ZCE	ZC	Pb-Free & Green, 6-Pin TDFN
PI6C3503WE	W	Pb-free & Green, 8-Pin SOIC
PI6C3503LE	L	Pb-free & Green, 8-Pin TSSOP

**Notes:**

1. Thermal characteristics and package top marking can be found at [www.pericom.com/packaging](http://www.pericom.com/packaging).
2. E=Pb-free and Green package
3. Adding an X suffix = Tape/Reel