Low Power Spread Spectrum Frequency Multiplier

Features

- Produces a 4-time spread spectrum clock signal from input frequency
- Operates on 2.5V or 3.3V Power Supply
- 12MHz to 30MHz Input frequency range
- Frequency Spreading Ratio : -1.2% (Typical @ 66MHz output frequency)
- Modulation Rate : Fin/640
- Low power consumption design
- Packaging (Pb-Free & Green): 6-pin SOT-23 & TDFN

Description

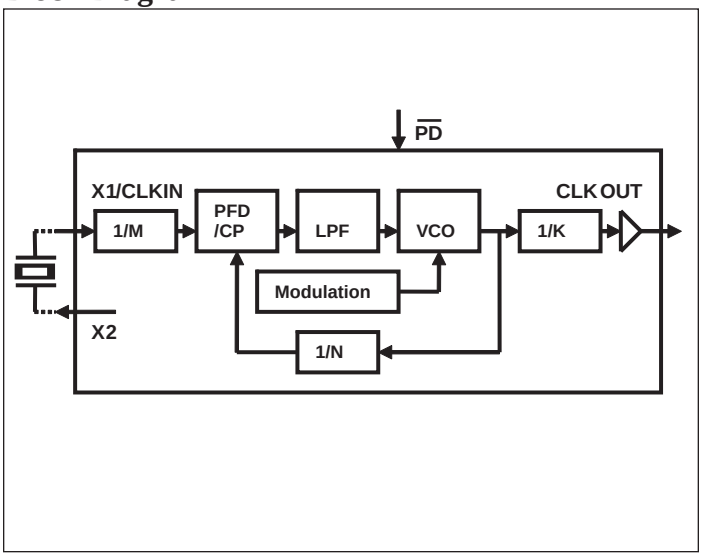
The PI6C3501 is a Low Power Frequency Multiplier with Spread Spectrum function to reduce EMI interference. The PI6C3501 provides a 4 times Spread Spectrum modulated output from a single clock source or a crystal. The PI6C3501 can reduce EMI at the clock output and it allows significant system cost savings 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.

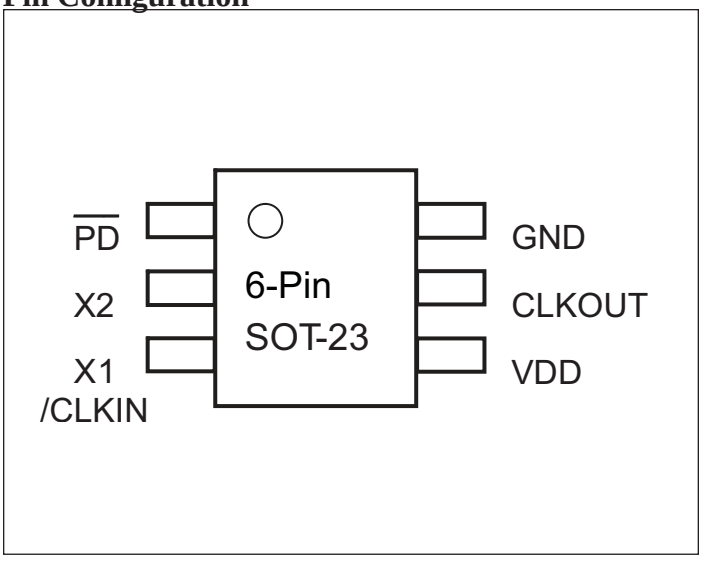
The PI6C3501 can be used in most portable devices with low ower requirements like PDA, DSC, MFP, Media player, portable-TV, and LCM (LCD Panel Module).

PI6C3501 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



Pin Description

Pin Name	Pin No.	IO Type	Descriptions
$\overline{PD}$	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 reference frequency input. This pin has multiple 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.

Electrical Specification

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_{DD}	Operating Voltage		2.375	2.5	2.625	V
V_{IH}	Input High Voltage		2.0	–	–	V
V_{IL}	Input Low Voltage		–	–	0.8	V
V_{OH}	Output High Voltage	VDD=2.5V, I_{OH}=-8mA	1.8	–	–	V
V_{OL}	Output Low Voltage	VDD=2.5V, I_{OL}=8mA	–	–	0.6	V
IDD	Supply Current	48MHz output and no load	–	3.8	4.6	mA
IDDq	Power down static current	$\overline{PD}$ = low			1	µA
Z_{OUT_DOWN}	Nominal output impedance	Down side buffer	–	47	–	Ω
Z_{OUT_UP}	Nominal output impedance	Up side buffer	–	51	–	Ω
C_{IN}	Input Capacitance	X1 input pin	–	5	–	pF
T_{ON}	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		12	–	30	MHz
CLKOUT	Output Frequency		48	–	120	MHz
S_{Ratio}	Spreading ratio	Output Frequency= 48MHz	–	-1.3	–	%
		Output Frequency= 120MHz	–	-0.75	–	
t_{Rise}	Output rise time	Measured from 20% to 80% VDD, 15pF load.	–	1.9	–	ns
t_{Fall}	Output fall time	Measured from 80% to 20% VDD. 15pF load.	–	1.9	–	ns
t_{J_Short}	Short term jitter	Cycle to cycle jitter	–	–	300	ps
T_{DCIN}	Input duty cycle		35	50	65	%
T_{DCOUT}	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_{DD}	Operating Voltage		3.0	3.3	3.6	V
V_{IH}	Input High Voltage		2.0	–	–	V
V_{IL}	Input Low Voltage		–	–	0.8	V
V_{OH}	Output High Voltage	VDD=3.3V, I_{OH}=-8mA	2.5	–	–	V
V_{OL}	Output Low Voltage	VDD=3.3V, I_{OL}=-8mA	–	–	0.4	V
IDD	Supply Current	48MHz output and no load	–	5.5	6.6	mA
IDDq	Power down static current	$\overline{PD}$ = low			1	µA
Z_{OUT_DOWN}	Nominal output impedance	Down side buffer	–	44	–	Ω
Z_{OUT_UP}	Nominal output impedance	Up side buffer	–	46	–	Ω
C_{IN}	Input Capacitance	X1 input pin	–	5	–	pF
T_{ON}	Power on time	$\overline{PD}$ from low to high		2		ms

AC Characteristics

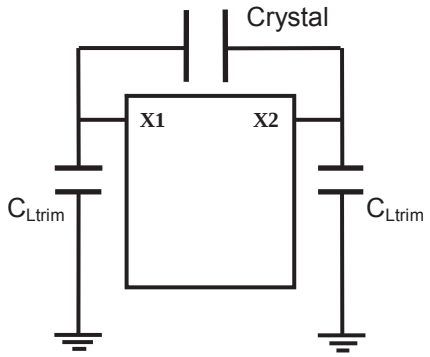
VDD = 3.3V ±10%, Ambient Temperature 0 to +70°C

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
CLKIN	Input Frequency		12	–	30	MHz
CLKOUT	Output Frequency		48	–	120	MHz
S_{Ratio}	Spreading ratio	Output Frequency= 48MHz	–	-1.4	–	%
		Output Frequency= 120MHz	–	-0.8	–	
t_{Rise}	Output rise time	Measured from 20% to 80% VDD, 15pF load.	–	1.6	–	ns
t_{Fall}	Output fall time	Measured from 80% to 20% VDD. 15pF load.	–	1.7	–	ns
t_{J_Short}	Short term jitter	Cycle to cycle jitter	–	–	300	ps
T_{DCIN}	Input duty cycle		30	50	70	%
T_{DCOUT}	Output duty cycle		45	50	55	%

Application Information

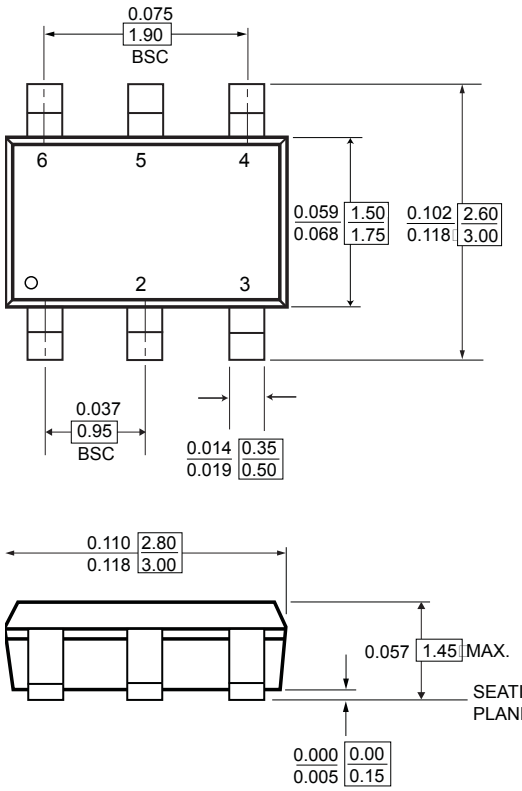
Crystal Load Capacitors

If a crystal is used with the device, the external trim capacitors C_{Ltrim} are used to adjust the effective capacitance to match the required crystal load capacitance. The C_{Ltrim} value can be derived from formula C_{Ltrim}= 2* CL –(CS + Ci). Typical C_{Ltrim}= 28 pF when crystal load = 18pF, stray capacitance C_s = 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
X.XX DENOTES DIMENSIONS 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”

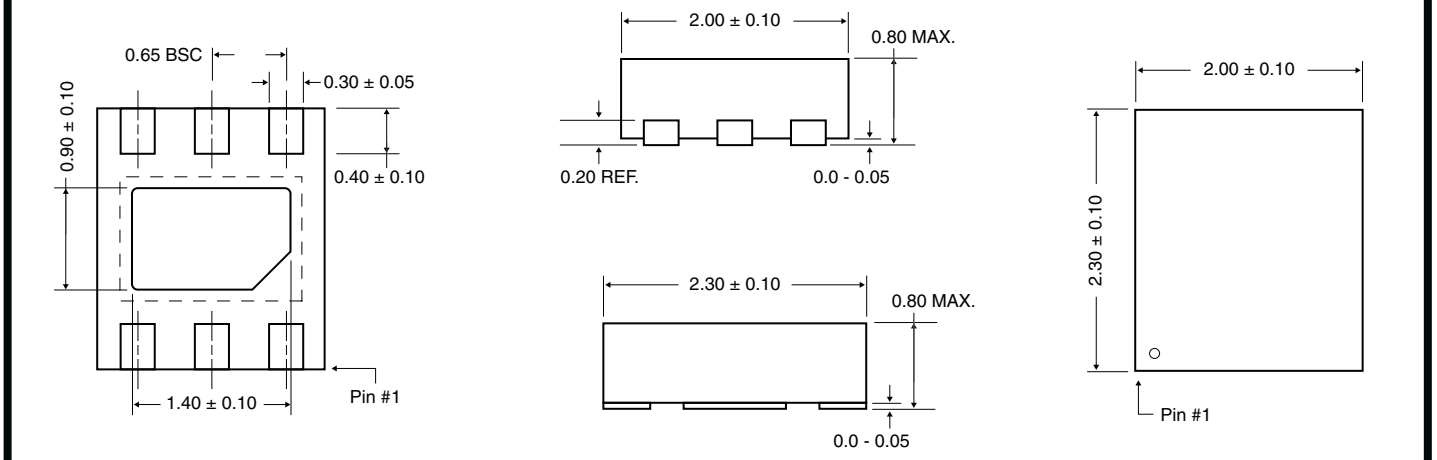
Pericom Semiconductor Corporation
3545 N. 1st Street, San Jose, CA 95134
1-800-435-2335 • www.pericom.com

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

PACKAGE CODE: T

Physical Dimensions

Packaging Mechanical: 6-Pin, TDFN



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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

Ordering Information

Ordering Code	Packaging Code	Package Description
PI6C3501TE	T	Pb-Free & Green, 6-Pin SOT-23
PI6C3501ZCE	ZC	Pb-Free & Green, 6-Pin TDFN

Notes:

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