PERICOM®

PI6C3421A

27MHz Spread Spectrum Clock Synthesizer

Product Features

• 14.318 MHz input frequency, (crystal or external reference)

• Two High Precision outputs:
—27.000 MHz SSC clock output
—27.000 MHz clock output

• Four Down-Spread options:
— Down-spread: -0.25%, -0.5%, -0.75% and -1.0% typical at 14.318MHz input

• Single 3.3V Power Supply

• Modulation Rate: Fin /448

• Industrial and commercial temperature supported

• Packaging (Pb-Free and Green):
— SOTiny™ 6-pin SOT-23 (T)

Applications

The PI6C3421A can be used in most multimedia applications and embedded systems including but not limited to the following:
•   PDAs
•   DSCs
•   Printers/ MFPs
•   Media players
•   Portable-TVs
•   Embedded digital video devices
•   CD-ROM, VCD and DVD players
•   LCD Panel Modules
•   Automotive components
•   Networking devices

Benefits
•   Reduction in EMI
•   System cost saving
•   Reduced system complexity
•   Faster time to market
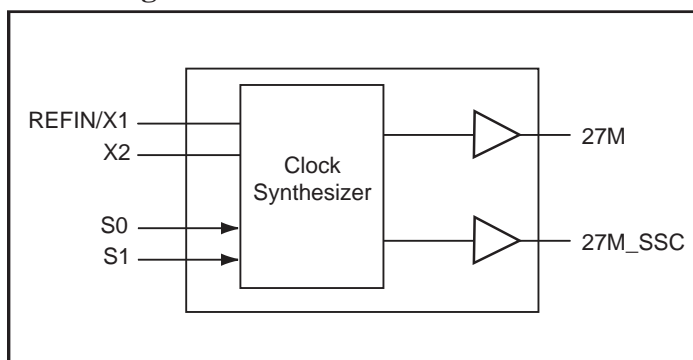
Description

The PI6C3421A is a Spread Spectrum Clock Synthesizer and part of the Pericom SSCG product family. The part generates one high precision 27.000 MHz spread spectrum clock output from a single clock source or a crystal and one 27.000 MHz un-modulated clock output, and is designed to reduce electromagnetic interference (EMI) by spreading the clock. This reduction in EMI can result in significant system cost saving and less design complexity by reducing the number of circuit board layers ferrite beads and shielding. In the absence of a spread spectrum clock, other EMI-reducing components are required in order to comply with regulatory agency requirements.

The spreading ratio is selectable using the selection pins. The PI6C3421A provides -0.25%, -0.5%, -0.75% and -1.0% spread modulation through external logic stage setting. The variety and the reduced size of the package outlines can save precious board space and make layout easier.

PI6C3421A is one of the clock products provided by Pericom. If your application needs a clock product with a different specification not currently provided, please contact us for further information or custom design.

Block Diagram

Pin Configuration
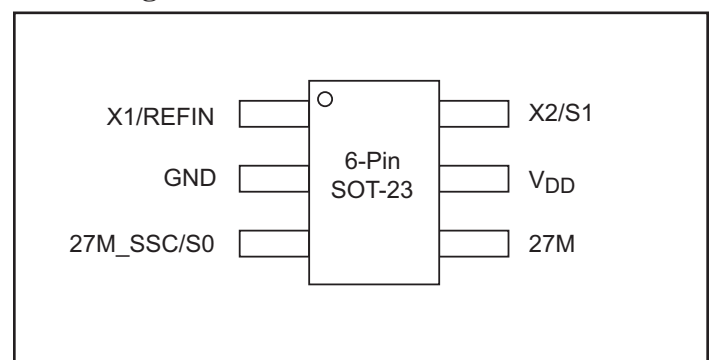
Pin Description

Pin Name	Pin No	I/O Type	Description
X1/REFIN	1	I	Crystal or reference clock input
GND	2	Ground	Ground
27M_SSC/S0	3	I/O	27M_SSC/SO is a multi-functional pin. S0 is active during power on for spreading ratio selection then switches to 27MHz SSC clock output.
27M	4	O	27MHz clock output.
V_{DD}	5	Power	Power Supply
X2/S1	6	I/O	X2/S1 is a multiple function pin. S1 is active during power on selection of SSC spread then switches to crystal input.

Spread Ration Configuration
(V_{DD} = 3.3V± 10%, Ambient Temperature = 25˚C, f_{OUT} = 27 MHz)

S0	S1	Down - Spread(%)
0	0	-0.25
0	1	-0.5
1	0	-0.75
1	1	-1.0

Electrical Specifications

Maximum Ratings[1]

Supply Voltage to Ground 5.5V
All Inputs and Outputs .... -0.5V to V_{DD}+0.5V
Storage Temperature ....-65°C to +150°C
Operating Temperature ....-40 to +85°C
Junction Temperature ....150°C
Soldering Temperature ....260°C

Note:
1. 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.

DC Characteristics (V_{DD} = 3.3V ±10%, Ambient Temperature -40°C to +85°C, f_{IN} = 14.318 MHz)

Symbol	Parameter	Conditions	Min.	Typ.[1]	Max.	Unit
V_{DD}	Operating Voltage		+3.0	+3.3	+3.6	V
V_{IH}	Input High Voltage		2			V
V_{IL}	Input Low Voltage				0.8	V
V_{OH}	Output High Voltage	I_{OH} = -4 mA	2.4			V
V_{OH}	Output High Voltage	I_{OH} = -6 mA	2.0			V
V_{OL}	Output Low Voltage	I_{OL} = 4 mA			0.4	V
V_{OL}	Output Low Voltage	I_{OL} = 6 mA			0.6	V
I_{DD}	Supply Current	All outputs active with C_{L} = 15pF load			55	mA
Z_{OUT_UP}	Nominal Output Impedance	High side buffer		65		Ω
Z_{OUT_LOW}	Nominal Output Impedance	Low side buffer		40		Ω
C_{IN}	Input Capacitance	Input pins		6		pF

AC Characteristics (V_{DD} = 3.3V ±10%, Ambient Temperature –40°C to +85°C)

| Symbol	Parameter	Conditions	Min.	Typ.[1]	Max.	Unit
f_{IN}	REFIN Input Frequency	REFIN Clock Input	8	14.318	24.5	MHz
f_{OUT}	Clock Output Frequency	Multiplication factor (f_{IN}/f_{OUT} = 1.885715)	15.1	27	46.2	MHz
t_{RISE}	Output Clock Rise Time	From 0.4V to 2.4V, C_{L} = 15pF load		3		ns
t_{FALL}	Output Clock Fall Time	From 2.4V to 0.4V, C_{L} = 15pF load		2.7		ns
TJ_SHORT	Short term jitter	Cycle-to-cycle jitter (f_{OUT} = 27 MHz)		250	350	ps
T_{IDC}	Input Clock Duty Cycle	REFIN/X1, Measured @ V_{DD}/2 (f_{OUT} = 27 MHz)	20	50	80	%
T_{ODC}	Output Clock Duty Cycle	Measured @ V_{DD}/2 (f_{OUT} = 27 MHz)	45	50	55	%
$\Delta f/f$	Actual mean frequency error versus target	Input frequency = 14.31818 MHz, Output frequency = 27 MHz		0		ppm

Note:
1. Typical conditions are at 3.3V for room temperature at 25°C

Application Information

Decoupling Capacitor
Two decoupling capacitors of 0.1uF and 1nF must be connected in parallel between VDD and GND. To optimize device performance and to lower output noise, the coupling capacitors should be placed on the component side of the board as close to these pins as possible. There should be no vias placed between the decoupling capacitors and VDD pin. The PCB trace to VDD pin should be as short as possible, and no vias should be placed between VDD and the capacitors in the decoupling circuit. 10kΩ to 50kΩ pull-up or pull-down resistors, depending on the application, should be used on S0 and S1 to select the logical state and corresponding spreading ratio.
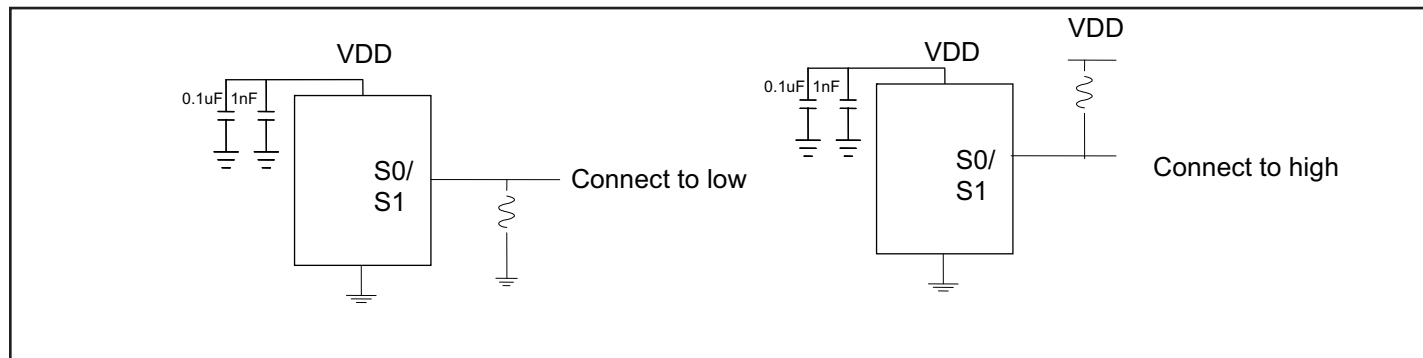
1. PI6C3421A can accept a 14.31818 MHz reference clock or crystal clock.
2. Power supply pin decoupling capacitors should be placed as close as possible to VDD pin. Via's at the VDD pin should be avoided.
3. Spread select pin's (S0 and S1):
   Pin 3 (27M_SSC/S0) and Pin 6 (X2/S1) provide logic state strapping function. When strapping resistor connects to VDD, S0 and S1 are set to logic HIGH. When strapping resistor connects to Ground, S0 or S1 will set to logic LOW.
4. Refer to "Spread Spectrum Selection Table", for more details on the strapping logic.

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 $C_{Ltrim} = 2*C_L - (C_s + C_i)$. Typical $C_{Ltrim} = 28pF$ when crystal load = 18pF, stray capacitance $C_s = 3pF$ and XTAL pins capacitance = 5pF.
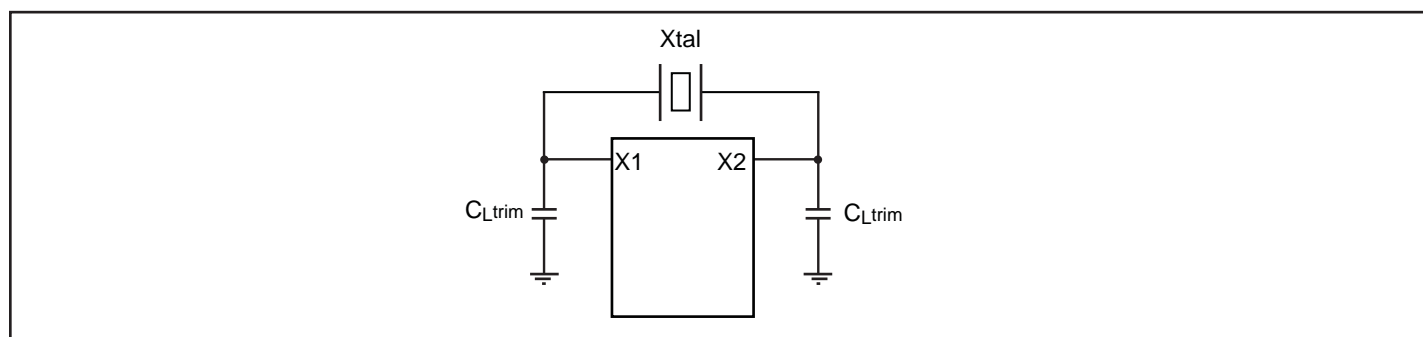
Series Termination Resistor
For optimal performance, a series termination resistor should be used, when the PCB trace between the clock output and the load is over 1 inch. A 10Ω resistor should be used to series terminate a 50Ω trace, a typical trace impedance found on PCB boards. The series termination resistor should be placed in series and as close to the clock output as possible. The nominal impedance measured at the clock output of the part is 40Ω.
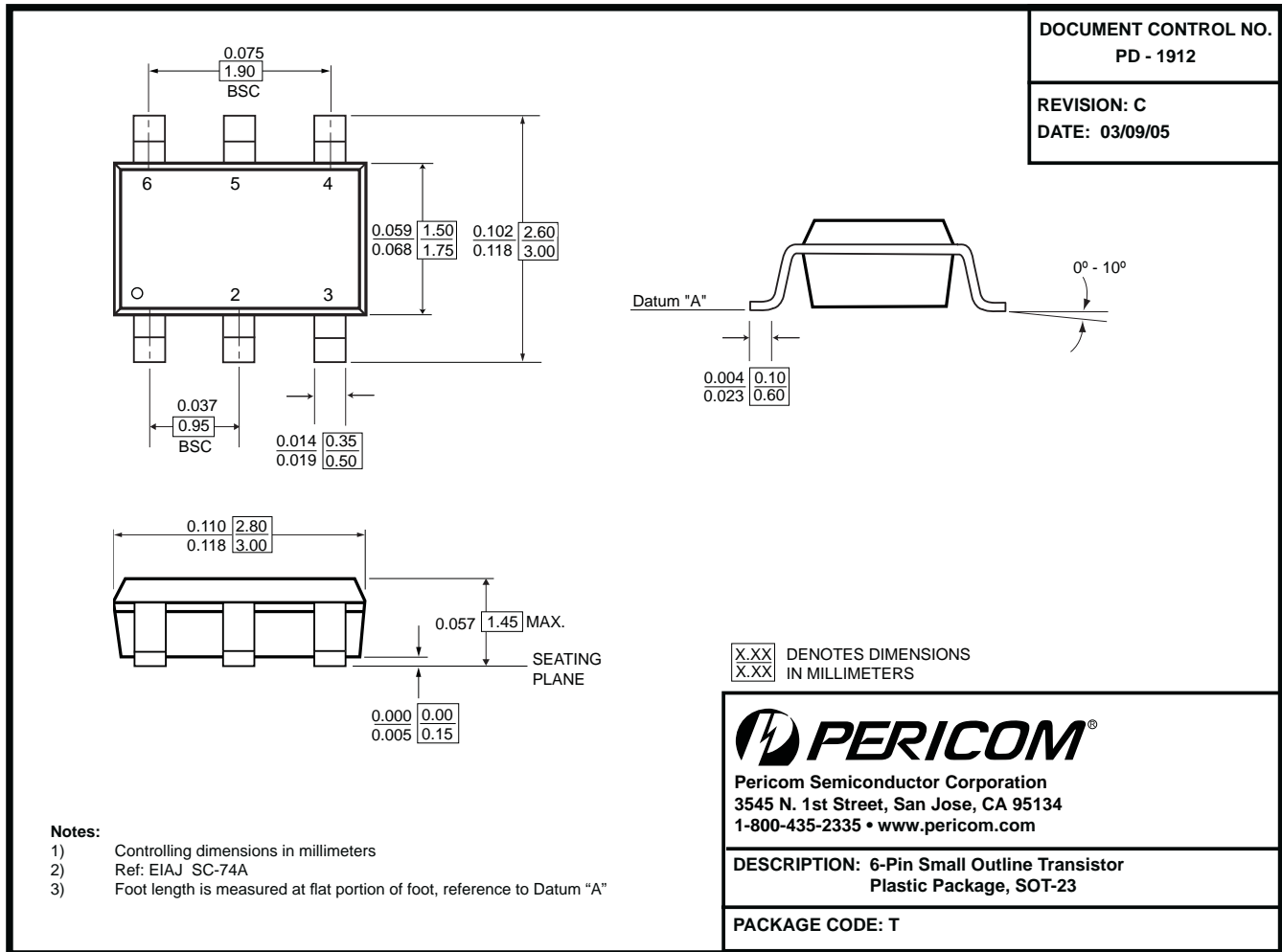
PCB Layout Recommendation
To optimize device performance, all components should be placed on the same side of the board and, therefore, no vias are used through other signal layers. The part should be kept away from other signal traces including ones just underneath the part or on layers adjacent to the ground plane layer used by the part. The PCB trace from the part to the ground via should be kept as short as possible

Recommended Crystal Specification

Pericom recommends SRX7316-E Crystal for optimum performance.

Parameter	Value	Units
Mode of oscillation, and cut	Fundamental AT	
Frequency	14.318	MHz
Frequency Tolerance	±20	PPM
Temperature	±30	PPM
Load Cap	18	pF
Equivalent series resistance	40	Ω
Drive to level	100	μW
Aging Stability	±5	PPM/YR
Size (Length x Width x Height)	11.18(.440) x 4.65(.83) x 13.46(.53)	mm(inch)

Packaging Mechanical: 6-Pin, SOT23

| DOCUMENT CONTROL NO. PD - 1912 |
| REVISION: C |
| DATE: 03/09/05 |

X.XX / X.XX DENOTES DIMENSIONS IN MILLIMETERS

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

PACKAGE CODE: T

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"

Ordering Information[1-3]

Ordering Code	Package Code	PackageType
PI6C3421ATE	T	Pb-free & Green, 6-Pin SOT-23
PI6C3421AITE	T	Pb-free & Green, 6-Pin SOT-23

Notes:
1. Thermal characteristics and package top marking information can be found at http://www.pericom.com/packaging/
2. I= Industrial Temperature (-40~+85°C)
3. E=Pb-free and Green package
4. Adding an X suffix=Tape/Reel

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