25MHz Jitter Attenuator

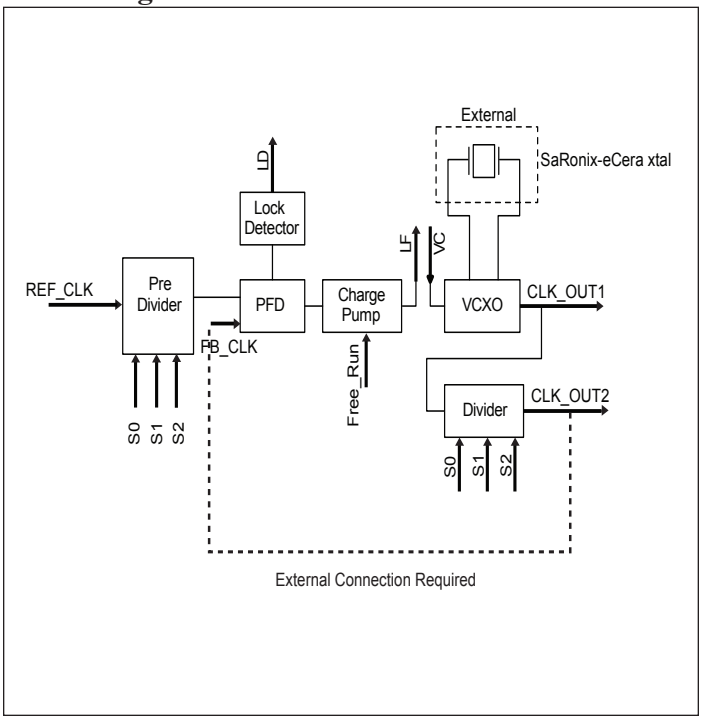
Features

- PLL with quartz stabilized VCXO
- Optimized for 25MHz input/output frequency
- Other frequencies available
- Low phase jitter less than 350fs typical
- Free run mode ±100ppm
- Single ended input and outputs
- 3.3V single supply
- Lock detection
- Industrial Temperature: –40°C to 85°C
- 20-pin TSSOP package

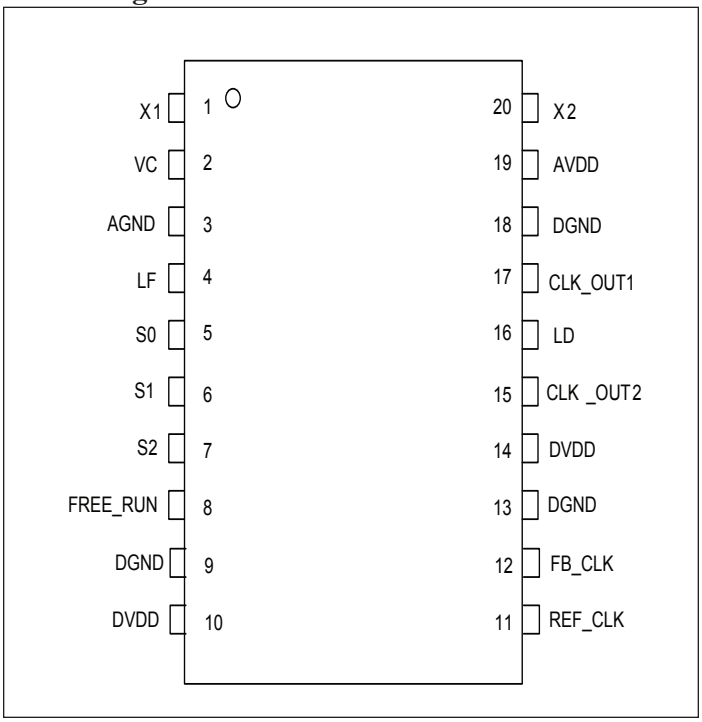
Description

The PI6CX201A is composed of a phase-locked loop with integrated VCXO oscillator for use in the clock jitter attenuation applications. It is optimized for use with a SaRonix-eCera™ crystal of 25MHz, and has typical output phase jitter less than 350fs (RMS).

Block Diagram



Pin Configuration



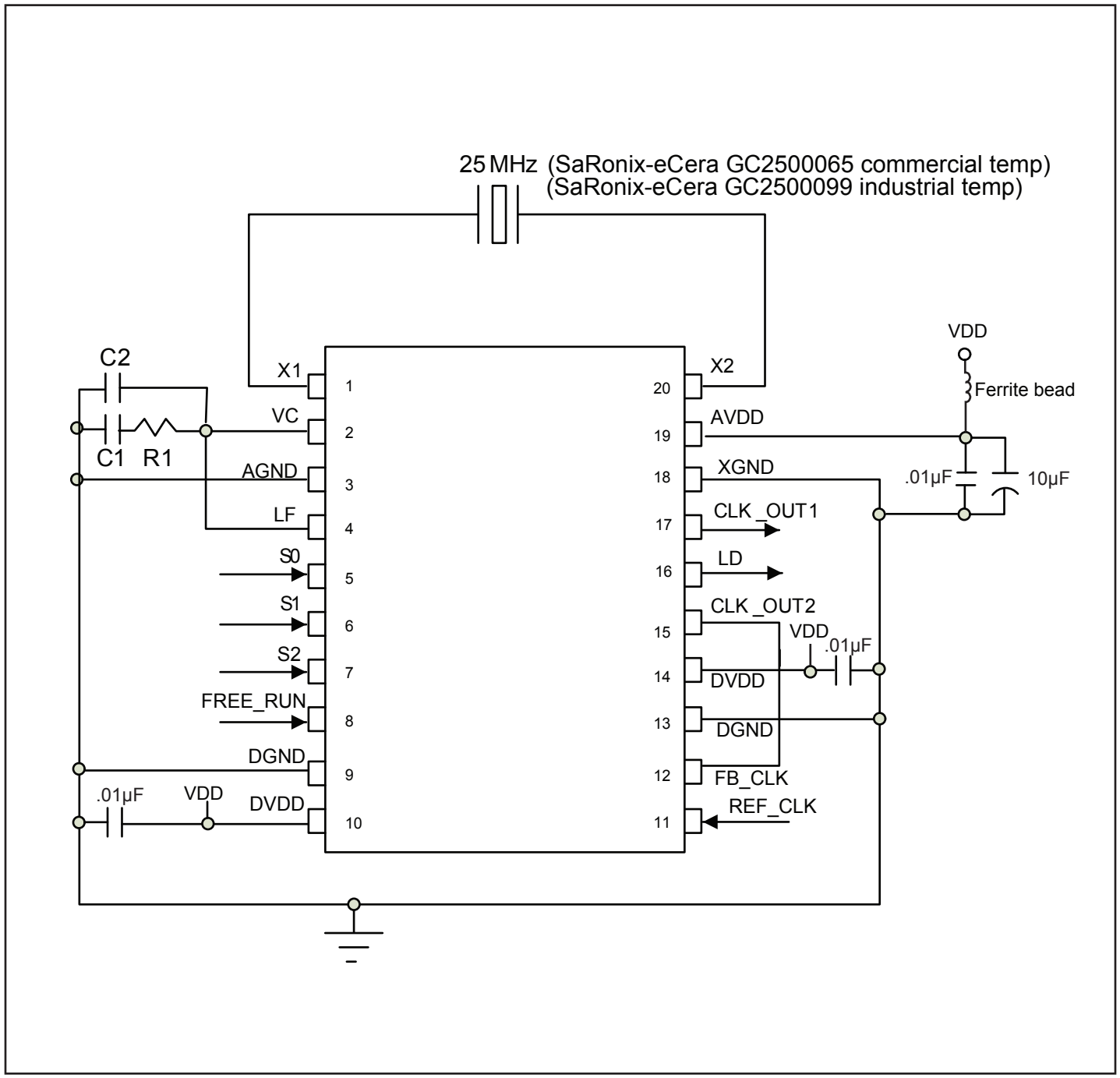
Pin Descriptions for 20-pin TSSOP Package

Pin Name	Type	Pin No	Description
XI	I	1	Crystal input pin
VC	I	2	VCXO control voltage input
LF	I	4	Loop filter pin for external loop filter connection
AGND	PWR	3	Analog ground
S0, S1, S2	I	5, 6, 7	LVCMOS selection pins for internal CLK_OUT2 divider, Pins have internal pull up resistor
REF_CLK	I	11	LVCMOS input clock signal to phase detector
FB_CLK	I	12	LVCMOS feedback clock signal to phase detector
DGND	PWR	9, 13, 18	Digital ground
DVDD	PWR	10, 14	Digital power
CLK_OUT2	O	15	LVCMOS output clock of the internal VCXO with divider controlled by S0 and S1
LD	O	16	LVCMOS lock detect output, LD output is logic ‘0’ when REF_CLKx is greater than 1MHz, and phase difference between REF_CLKx and FB_CLK is more than 2ns for 8 consecutive clock pulses. The clock pulse frequency is equal to the crystal frequency.
CLK_OUT1	O	17	LVCMOS output clock of the internal VCXO
AVDD	PWR	19	Analog power
X2	O	20	Crystal output pin
FREE_RUN	I	8	When FREE_RUN is logic low, chip is in "free run" mode. The output will remain fixed at a fixed frequency with up to a ±100ppm offset from the nominal 25MHz. Logic HIGH is normal mode, with output locked to the input. Internal pull-up.

Frequency Selection Table

Input Frequency	S0	S1	S2	Output Frequency
25MHz	1	0	1	25MHz
12.5MHz	0	0	1	25MHz
33.33MHz	0	1	1	25MHz
66.67MHz	1	1	1	25MHz

Application Diagram



Notes:

1. A feedback clock is required for lock. Pin 15 can be connected to pin 12 as shown above.
2. The network R1, C1:C2 comprises the external loop filter. The loop bandwidth and jitter peaking profiles are set by changing these values. Please consult factory to meet your requirement.
3. The crystal and loop filter components should be placed on the same side of the board as the IC. Components should be placed as close as possible to IC (within 300 mils).
4. A ground ring should enclose the loop filterr components along with pins 2 and 4.

Maximum Ratings (Above which the useful life may be impaired. For user guidelines, not tested)

Storage temperature ..... -65 to +150°C
Supply Voltage to Ground Potential (V_{DD}) ..... -0.5 to +4.6V
Inputs (Referenced to GND) ..... -0.5 to V_{DD}+0.5V
Clock Output (Referenced to GND) ..... -0.5 to V_{DD}+0.5V
Soldering Temperature (Max of 10 seconds) ..... 260°C
Latch up 200mA
ESD Protection (HBM) 2000V

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.

3.3V DC Electrical Characteristics

Parameter	Description	Test Conditions	Min.	Max	Units
V_{DD}	3.3V Supply Voltage		3.135	3.465	V
V_{IL}	Input LOW Voltage			0.8	
V_{IH}	Input HIGH Voltage		2	V_{DD} + 0.3	
I_{IL}	Input LOW Current	V_{IN} = 0V	–50		µA
I_{IH}	Input HIGH Current	V_{IN} = V_{DD}		10	
V_{OL}	Output LOW Voltage	I_{OL} = 8mA		0.4	V
V_{OH}	Output HIGH Voltage	I_{OL} = -8mA	2.4		V
T_A	Ambient Operatin Temperature		-40	85	°C

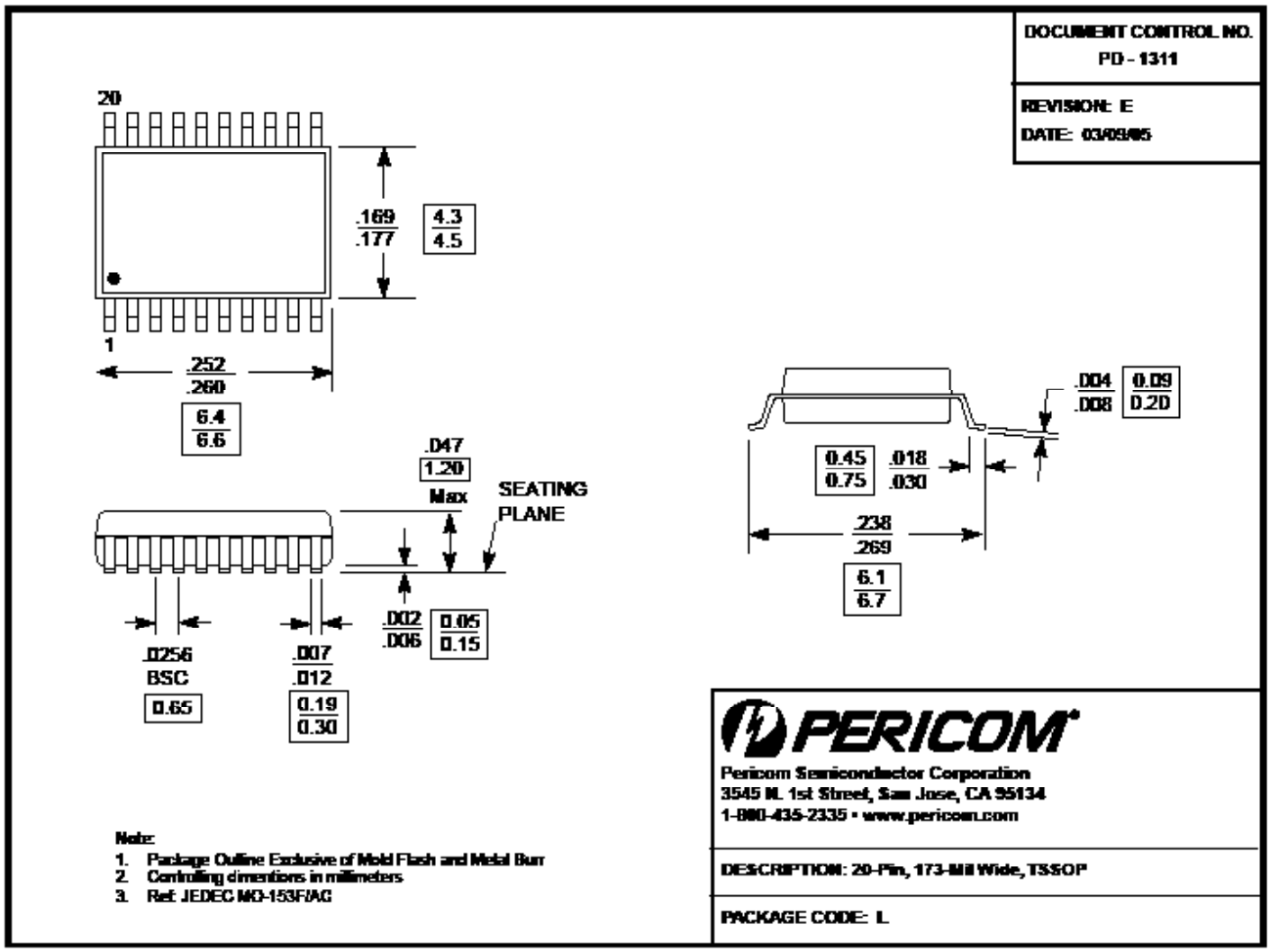
3.3V AC Electrical Characteristics

Parameter	Description	Test Conditions	Min.	Typ	Max	Units
F_O	Output Frequency	CL = 15pF		25		MHz
BW	Control Voltage Band Width	-3 dB, VC=1.65V		25		KHz
ΔFCLK	Control Pull Range	0V ≤ VC ≤ V_{DD}		±140		ppm
t_{IDC}	Input Duty Cycle	Measured at V_{DD}/2	40	50	60	%
t_{DC}	Output Duty Cycle	Measured at V_{DD}/2, 15pF load	45	50	55	%
t_R, t_F	Rise and Fall Time	CLK_OUT1 Measured from 0.5V to 2.5V, C_L = 0pF			2	ns
t_R, t_F	Rise and Fall Time	CLK_OUT1 Measured from 0.5V to 2.5V, C_L = 15pF			3	ns
Jp	Phase Jitter (RMS)	12kHz to 5Mhz		0.35	0.5	ps
F_{free}	Free Run Accuracy				±100	ppm

Loop Filter Selection Table

Loop Band Width	Charge Pump Current	VCO Gain	Feedback Divider	R1	C1	C2
100Hz	32uA	2.5KHz/V	1	5.1K Ohm	1uF	0.1uF

Packaging Mechanicals: 20-Pin TSSOP (L)



Recommended Crystal:
SaRonix-eCERA Part Number: GC2500065

Ordering Information[1-3]

Ordering Code	Package Code	Package Description
PI6CX201ALE	L	20-pin TSSOP, Pb-free & Green
GC2500065	N/A	Commercial temperature 49S SMD Crystal
GC2500099	N/A	Industrial temperature 49S SMD Crystal

Notes:

1. Thermal characteristics can be found on the company web site at www.pericom.com/packaging/
2. E = Pb-free and Green
3. Adding an X suffix = Tape/Reel