

## Very Low Phase Noise, Dual Frequency LVCMOS Clock Oscillator

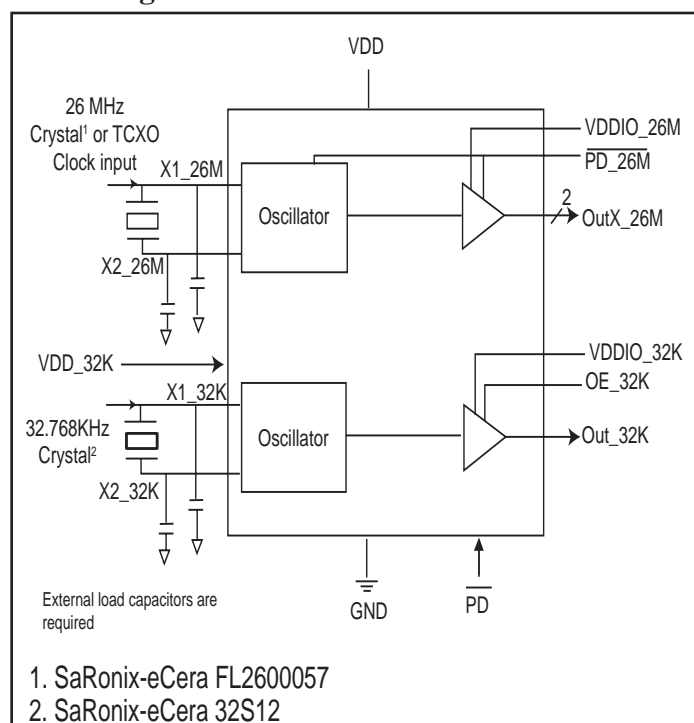
### Features

- Independent 26MHz and 32.768kHz oscillators
- Outputs are weakly pulled down when OE = LOW
- Glitch-free outputs on start-up, release from power down, or when OE pin is set to HIGH (on) state.
- No internal pull-ups on logic inputs
- 10µA 32kHz supply current max
- 26MHz input can be over-driven with external oscillator, TCXO, etc
- Core runs from 1.5V to 1.8V
- One 26MHz output option available
- 3x3mm 20-pad QFN

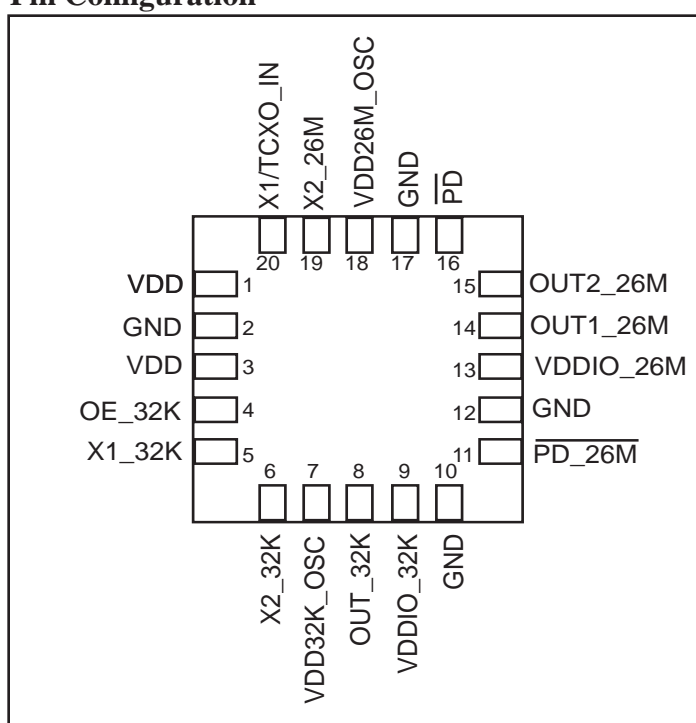
### Description

The PI6C4022 contains two very low phase oscillator circuits with associated circuitry to drive external loads. Power down circuitry allows one or both oscillators to be turned off to minimize power consumption.

### Block Diagram



### Pin Configuration



**Pin Description**

Pin Number	Symbol	I/O Type	Description
1, 3	VDD	Power	Core power supply
2, 10, 12, 17	GND	Power	Ground pins
4	OE_32K	Input	Output Enable for 32 kHz oscillator. High enables output. Low tri-states the output with a 1uA pull down current. There is no pull-up or pull-down resistor on this logic input.
5	X1_32K	Input	32kHz OSC input with a 1pF on-chip Xtal load capacitance
6	X2_32K	Output	32kHz OSC input with a 10pF on-chip Xtal load capacitance
7	VDD32K_OSC	Power	32kHz OSC V <sub>DD</sub> supply
8	OUT_32K	Output	32 kHz buffer output
9	VDDIO_32K	Power	32 kHz buffer supply
11	$\overline{\text{PD}}_{26\text{M}}$	Input	Power down for 26MHz oscillator and output. A low tri-states the 26MHz outputs while providing a 1 uA pull-down. The logic pin has no internal pull-up or pull-down resistor.
13	VDDIO_26M	Power	VDD supply of the two 26MHz buffers
14, 15	OUT1_26M, OUT2_26M	Output	26MHz output
16	$\overline{\text{PD}}$	Input	Power down. A low puts the entire chip in power down. There is no internal pull-up or pull-down resistor
18	VDD26M_OSC		VDD supply of 26MHz OSC
19	X2_25M	Output	26MHz OSC output pin
20	X1/TCXO_IN	Input	26MHz OSC output pin. This pin should be AC driven for TCXO input. Total C <sub>load</sub> of 10pF is integrated into the oscillator.

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

Storage Temperature.....	-65°C to +150°C
V <sub>DDO</sub> , V <sub>DD</sub> Voltage.....	-0.5V to +2.5V
Output Voltage (max 2.5V) .....	-0.5V to V <sub>DD</sub> +0.5V
Input Voltage (max 2.5V) .....	-0.5V to V <sub>DD</sub> +0.5V

**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.

**Characteristics** (Over Operating Range:  $V_{DD}=V_{DDIO}=1.5$  to  $1.8V$ ,  $T_A = -40^\circ$  to  $85^\circ C$ )

Parameters	Description	Test Conditions <sup>(1)</sup>	Min.	Typ.	Max.	Units
$V_{DD}$	Core Supply		1.5		1.8	V
$V_{DDIO}$	I/O Supply Voltage		1.5		1.8	
$V_{IH}$	Input HIGH Voltage	Logic HIGH level	$0.7 \times V_{DD}$		$V_{DD}+0.3$	
$V_{IL}$	Input LOW Voltage	Logic LOW level	-0.3		$0.35 \times V_{DD}$	
$I_L$	Input Current	$V_{DD} = \text{Max}$ , $V_{IN} = V_{DD}$ or GND I pin			15	$\mu A$
$C_{LX1\_32K}$	X1_32 pin internal load capacitance			1		pF
$C_{LX2\_32K}$	X2_32 pin internal load capacitance			10		pF
$C_{L\_26}$	26MHz X1/X2 pin internal load capacitance			10		pF
$I_{DD}$	Total supply current for entire IC				5	mA

**Note:**

1. No runt or short pulses. Output is internally gated such that first clock out meets all specifications.

**32kHz Characteristics** (Over Operating Range:  $V_{DD}=V_{DDIO}=1.5$  to  $1.8V$ ,  $T_A = -40^\circ$  to  $85^\circ C$ )

Parameters	Description	Test Conditions <sup>(1)</sup>	Min.	Typ	Max.	Units
$V_{OH}$	Output High Voltage	$V_{DD} = \text{Min.}$ , $I_{OH} = -3mA$	$.75 \times V_{DD}$			
$V_{OL}$	Output Low Voltage	$V_{DD} = \text{Min.}$ , $I_{OL} = 3mA$			$.25 \times V_{DD}$	
$f_{OUT}$	Output Frequency Synthesis Error	32.768			0	kHz
$t_{DC}$	Output Duty Cycle	@ $V_{DDO}/2$	45		55	%
$t_R/t_F$	CLKn Rise/Fall Time	20% to 80%, $C_L = 10pF$			7.5	ns
$t_{DIS}, t_{EN}^1$	Output Enable/Disable Time				10	ms
$t_{start32}$	32KHz start-up time				500	ms

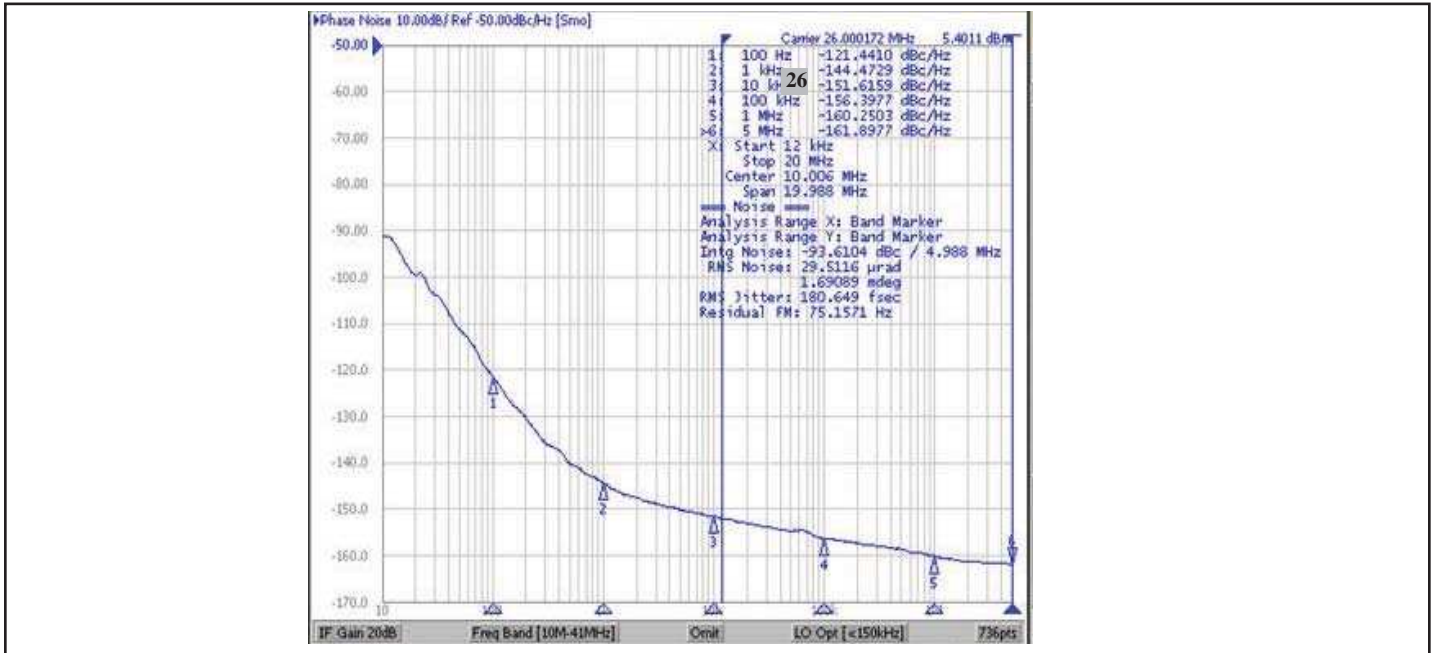
**Note:**

1. No runt or short pulses. Output is internally gated such that first clock out meets all specifications.

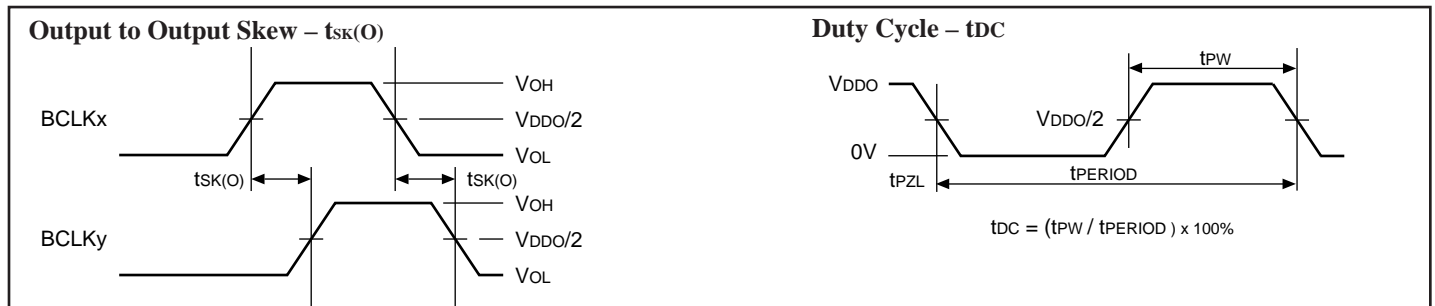
**26MHz Characteristics** (Over Operating Range:  $V_{DD}=V_{DDIO}=1.5$  to  $1.8V$ ,  $T_A = -40^\circ$  to  $85^\circ C$ ,  $C_L = 10pF$ )

Parameters	Description	Test Conditions <sup>(1)</sup>	Min.	Typ	Max.	Units
$f_{OUT}$	Output Frequency Synthesis Error	26			0	MHz
$t_r, t_f$	Rise/Fall Time	20% to 80%			2	ns
$V_{OH}$	Output High Voltage	$I_{OH} = 8mA$	$.75 \times V_{DD}$			V
$V_{OL}$	Output LOW Voltage	$I_{OL} = -8mA$			$.25 \times V_{DD}$	V
$t_{DC}$	Output Duty Cycle	@ $V_{DDO}/2$	45		55	%
$t_{DIS}, t_{EN}$	Power Up/Down Time				10	ms
PN	Phase Noise Power	1 kHz Offset			-120	dBc/Hz
PN	Phase Noise Power	10 kHz Offset			-135	dBc/Hz
$T_{PP}$	Peak-to-Peak Jitter (100K samples)				40	ps
$T_{skew}$	Skew between 26MHz outputs				500	ps

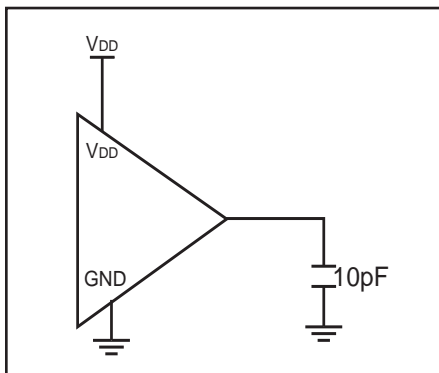
**Phase Jitter (26MHz, 100Hz to 1MHz ≈ 181fs (typical) )**



**Waveforms**



### AC Test Circuit Load



Note:  
 $V_{DD} = V_{DDO} = 1.5V \text{ to } 1.8V$

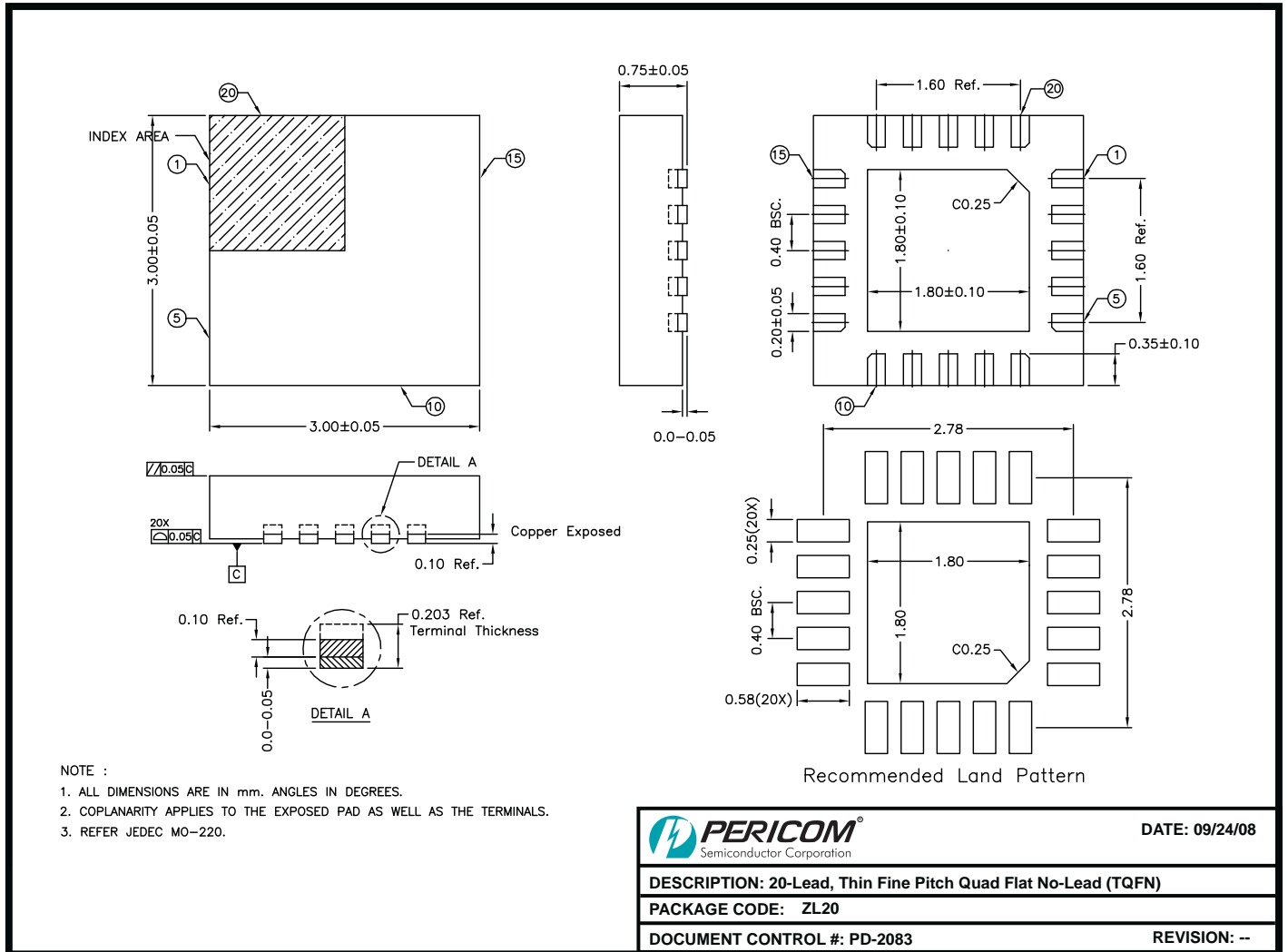
### 26MHz Crystal Characteristic for SaRonix-eCera FL2600057

Parameters	Description	Min	Typ	Max.	Units
OSCMODE	Mode of Oscillation	Fundamental			
FREQ	Frequency		26		MHz
ESR	Equivalent Series Resistance			100	Ohm
CLOAD	Load Capacitance		12		pF
CSHUNT	Shunt Capacitance			7	pF
DRIVE	Drive Level			0.1	$\mu W$

### 32kHz Crystal Characteristic for SaRonix-eCera 32S12

Parameters	Description	Min	Typ	Max.	Units
OSCMODE	Mode of Oscillation	Fundamental			
FREQ	Frequency		32.768		kHz
ESR	Equivalent Series Resistance			50	k-Ohm
CLOAD	Load Capacitance		12.5		pF
DRIVE	Drive Level			0.1	$\mu W$

**Package Mechanical: 20-Lead QFN (ZL)**



08-0479

**PI6C4022 Ordering Information(1,2,3)**

Ordering Code	Package Code	Package Description
PI6C4022ZLE	ZL	Pb-Free and Green 20-Lead QFN

**Notes:**

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