Voltage-controlled oscillator

SPECIFICATION

1 FEATURES

- iHP SiGe BiCMOS 0.25 um
- Wide frequency range (100…1000 MHz)
- Wide range of control voltage (300…1500 mV)
- Built-in switched capacitor sections for VCO frequency adjustment
- Portable to other technologies (upon request)

2 APPLICATION

- Phase-locked loop synthesizer
- Functional signal generators

3 OVERVIEW

Voltage–controlled oscillator (VCO) is the generator that can be tuned over a wide range of frequencies by applying a control voltage to it. An external oscillation circuit is used for a subband frequency select. Frequency tuning range is defined by a control voltage of a built-in switched capacitor sections, and the built-in varicap is used for a fine adjustment.
The block is fabricated on iHP SiGe BiCMOS 0.25 um technology.

4 STRUCTURE

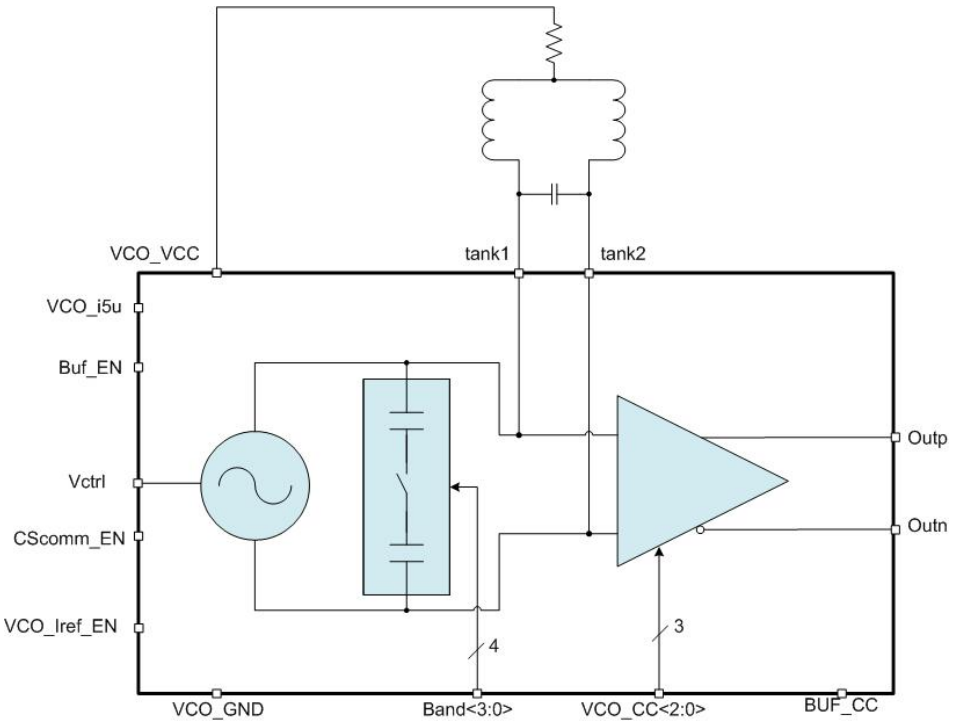

Figure 1: Voltage-controlled oscillator structure

5 PIN DESCRIPTION

Name	Direction	Description
VCO_i5u	IO	Reference current (5 uA)
Vctrl	IO	Control voltage input
Buf_EN	I	Buffer enable / disable
CScomm_EN	I	Current source enable / disable
VCO_Iref_EN	I	VCO core current enable / disable
BUF_CC	IO	Buffer current enable
Band<3:0>	I	Subband select
VCO_CC<2:0>	IO	VCO core current consumption control
tank1	IO	VCO core outputs
tank2	IO	
Outp	IO	VCO core differential output
Outn	IO	
VCO_VCC	IO	Supply voltage
VCO_GND	IO	Ground

6 LAYOUT DESCRIPTION

The block dimensions are given in the table 1.

Table 1: Block dimensions.

Dimension	Value	Unit
Height	452.58	um
Width	560.88	um

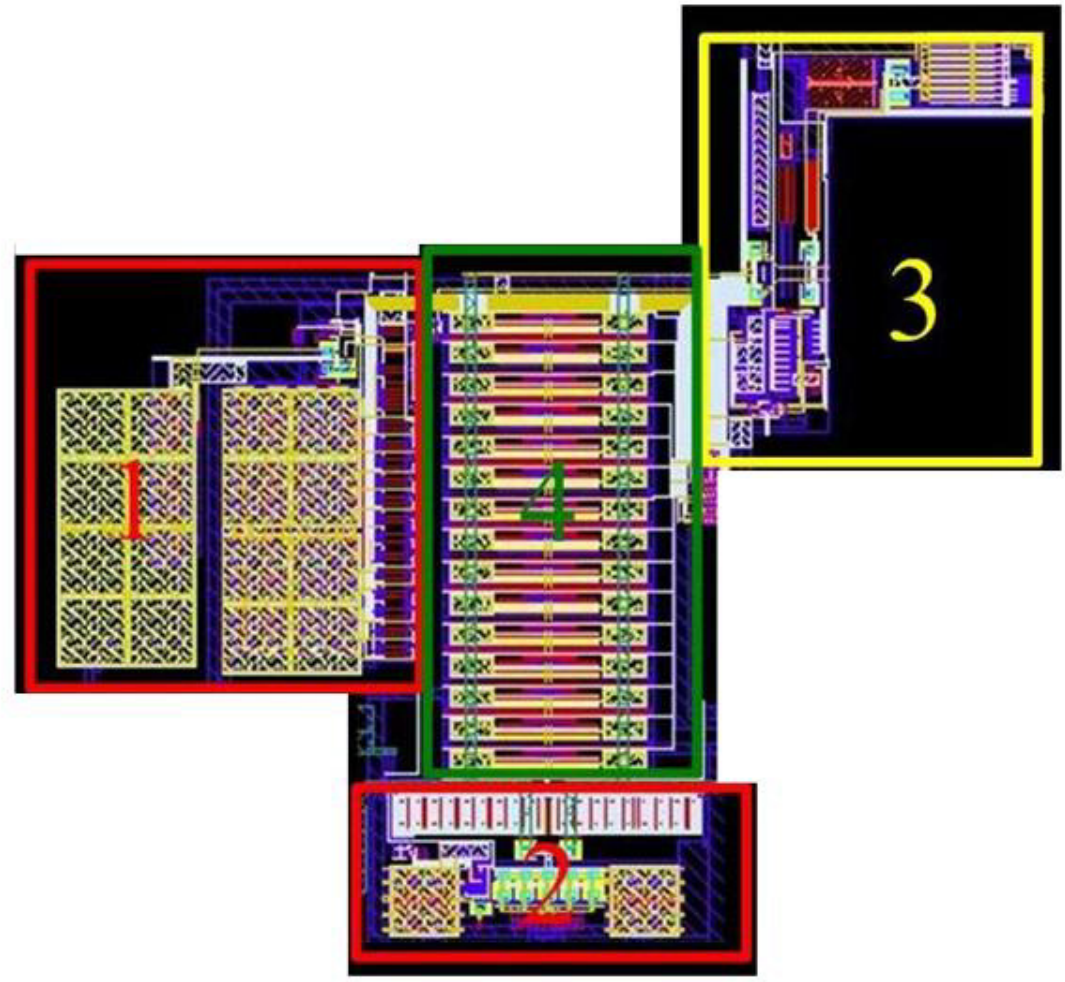

Figure 2: Device layout view

1. VCO current source
2. VCO core
3. VCO output buffer
4. Switched capacitor sections

7 OPERATING CHARACTERISTICS

7.1 TECHNICAL CHARACTERISTICS

Technology _____ iHP SiGe BiCMOS 0.25 um
Status _____ silicon proven
Area _____ 0.1 mm^2

7.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for V_{cc} = 1.9 ÷ 2.3 V and T_a = -45 ÷ +85 °C. Typical values are at V_{cc} = 2.2 V, T_a = 27 °C, unless otherwise specified.

Parameter	Symbol	Condition	Value			Unit
			min	typ.	max	
Supply voltage	V_{cc}	-	1.9	2.2	2.3	V
Operating temperature range	T_a	-	-45	27	85	°C
Oscillation frequency	F_{VCO}	Note 1	100	-	1000	MHz
Output amplitude	A_{VCO}	F_{VCO} = 140 MHz	500	570	-	mV
		F_{VCO} = 450 MHz	600	750	-	
		F_{VCO} = 920 MHz	300	330	-	
Control voltage	V_{ctrl}	-	0.3	-	1.5	V
Phase noise	PhN_{100K}	at 100 kHz	-	-90	-	dBc/Hz
Tuning sensitivity	K_{VCO}	-	2.5	-	19	MHz/V
Current consumption in an active mode	I_{cc}	F_{VCO} = 140 MHz	-	0.31	0.34	mA
		F_{VCO} = 450 MHz	-	0.52	0.56	
		F_{VCO} = 920 MHz	-	0.66	0.71	
Current consumption in a standby mode	I_{stb}	-	-	1	10	nA
Input logic-high level	V_{IH}	For digital inputs	$0.7V_{cc}$	-	V_{cc}+0.25	V
Input logic-low level	V_{IL}		-0.25	-	0.3	V

Note: 1 Depends on external components

8 DELIVERABLES

IP contents:

- Schematic or NetList
- Layout or blackbox
- Extracted view (optional)
- GDSII
- DRC, LVS, antenna report
- Test bench with saved configurations (optional)
- Documentation

REVISION HISTORY

From version 1.1:

- Subsection 7.1 update