

Voltage-controlled oscillator

SPECIFICATION

1 FEATURES

- TSMC018 SiGe 0.18 μ m
- Low phase noise
- Wide frequency range
- Adjustable output amplitude
- Low current consumption
- Portable to other technologies (upon request)

2 APPLICATION

- Phase-locked loop synthesizer

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.

The block is fabricated on TSMC018 SiGe 0.18 μ m technology.

4 STRUCTURE

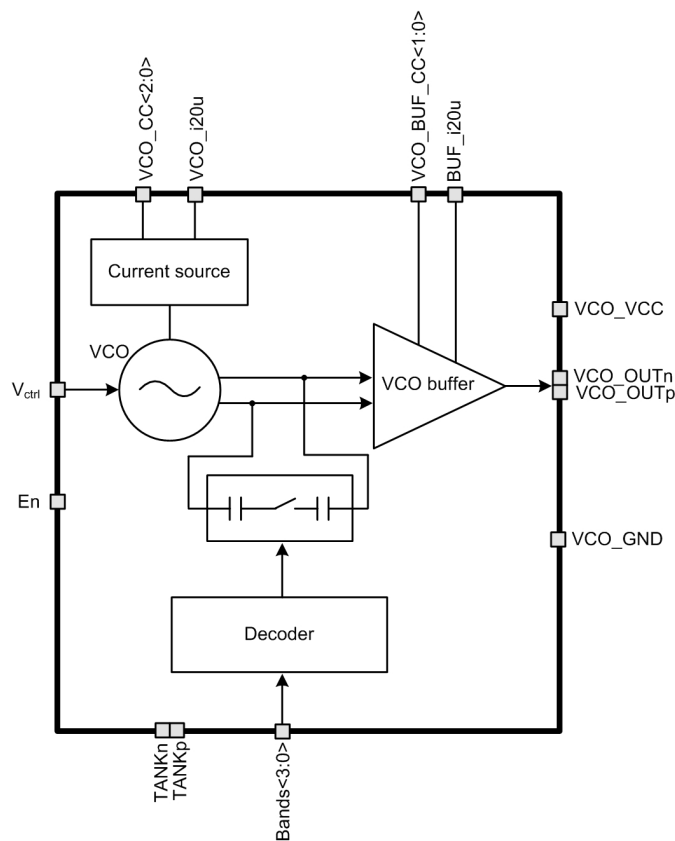


Figure 1: Voltage-controlled oscillator structure

5 PIN DESCRIPTION

Name	Direction	Description
VCO_i20u	IO	VCO reference current
BUF_i20u	IO	VCO output buffer current
Vctrl	I	Control voltage
EN	I	VCO enable/disable
Bands<3:0>	I	Subband select system
VCO_BUF_CC<1:0>	I	VCO output buffer current consumption
VCO_CC<1:0>	I	VCO current consumption
TANKp	O	VCO differential output, unused
TANKn	O	
VCO_OUTp	O	VCO output buffer differential output
VCO_OUTn	O	
VCO_VCC18	IO	Supply voltage 1.8 V
VCO_VCC	IO	Supply voltage 3.0 V
VCO_GND	IO	Ground

6 LAYOUT DESCRIPTION

Voltage controlled oscillator dimensions are given in the table 1.

Table 1: Block dimensions.

Dimension	Value	Unit
Height	370	μm
Width	730	μm

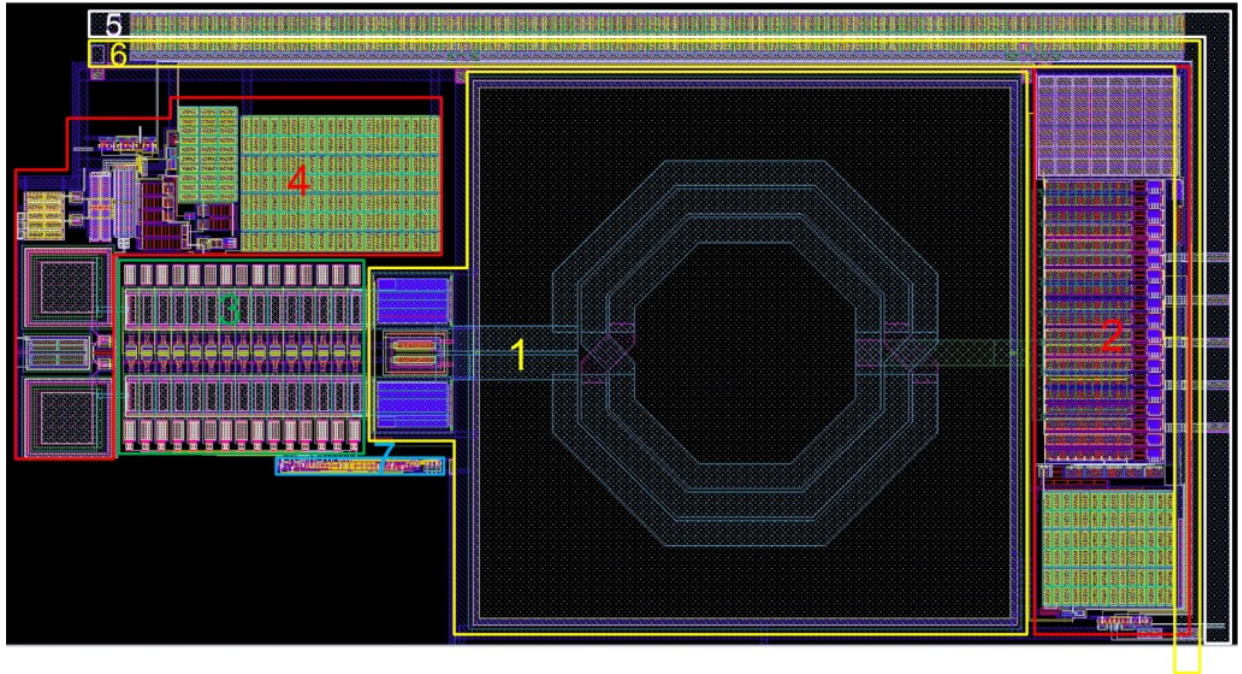


Figure 2: Voltage-controlled oscillator layout view

1. VCO core
2. Current source
3. Band cells
4. VCO buffer
5. Supply voltage bus with filter capacitors
6. Ground bus with filter capacitors
7. Decoder

7 OPERATING CHARACTERISTICS

7.1 TECHNICAL CHARACTERISTICS

Technology _____ TSMC018 SiGe BiCMOS
 Status _____ silicon proven
 Area _____ 0.27 mm²

7.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for $V_{cc_3.0v} = 2.8 \div 3.6$ V, $V_{cc_1.8v} = 1.6 \div 2.0$ V and $T = -40 \div +85^{\circ}\text{C}$. Typical values are at $V_{cc_3.0v} = 3.15$ V, $V_{cc_1.8v} = 1.8$ V, $T_A = +27^{\circ}\text{C}$, unless otherwise specified.

Parameter	Symbol	Condition	Value			Unit
			min	typ.	max	
Supply voltage	$V_{cc_1.8v}$	-	1.6	1.8	2.0	V
	$V_{cc_3.0v}$		2.8	3.15	3.6	
Operating temperature range	T	-	-40	+27	+85	$^{\circ}\text{C}$
VCO frequency tuning range	F	Min. frequency	-	2731	2995	MHz
		Max. frequency	3589	3782	-	MHz
Phase noise	NF	100 KHz	-	-99	-	dBm/Hz
		1 MHz	-	-119	-	dBm/Hz
Control voltage	U_{VCO}	-	0.3	-	2.6	V
Supply current	I_{cc}	-	1.94	2.84	3.34	mA
Stand-by current	I_{stb}	-	-	1.35	-	nA
Input logic-level high	V_{IH}	For inputs EN, VCO_BUF_CC<1:0>, VCO_CC<1:0>, Bands<3:0>	$0.7V_{cc_3.0v}$	-	$V_{cc_3.0v}+0.25$	V
Input logic-level low	V_{IL}	For inputs EN, VCO_BUF_CC<1:0>, VCO_CC<1:0>, Bands<3:0>	0	-	0.3	V

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