

Voltage-controlled oscillator

SPECIFICATION

1 FEATURES

- AMS035 BiCMOS 0.35 μ m
- Low phase noise
- Wide frequency range
- Adjustable output amplitude
- Low current consumption
- Supported foundries: TSMC, UMC, Global Foundries, SMIC, iHP, AMS, Vanguard, SiTerra

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 (V_{ctrl}).

Frequency tuning range (1270...1650 MHz) 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 AMS035 BiCMOS 0.35 μ m technology.

4 STRUCTURE

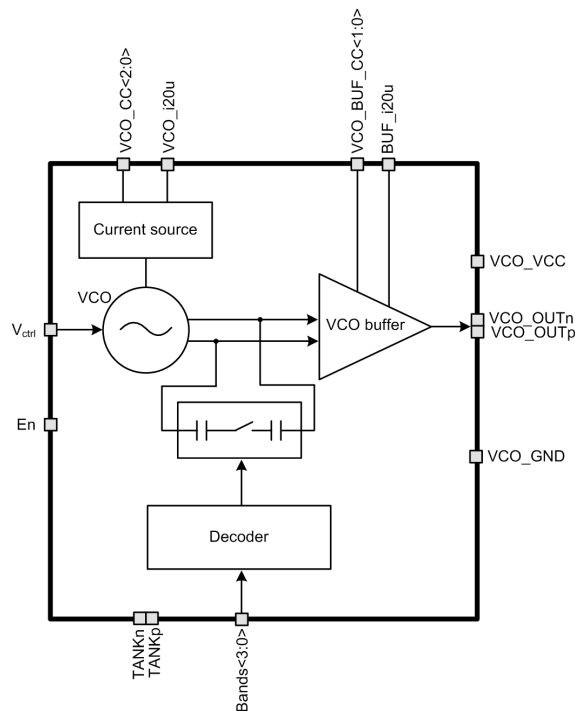


Figure 1: Voltage-controlled oscillator structure.

5 PIN DESCRIPTION

Name	Direction	Description
VCO_i20u	IO	VCO reference current 20 μ A
BUF_i20u	IO	VCO output buffer current 20 μ A
Vctrl	I	Control voltage
EN	I	VCO enable/disable
Bands<3:0>	I	Digital code defined a subband selection
VCO_BUF_CC<1:0>	I	VCO output buffer current consumption control
VCO_CC<2:0>	I	VCO current consumption control
TANKp	O	VCO differential output, unused
TANKn	O	
VCO_OUTp	O	VCO output buffer differential output
VCO_OUTn	O	
VCO_VCC	IO	Supply voltage
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	1020	μm
Width	680	μm

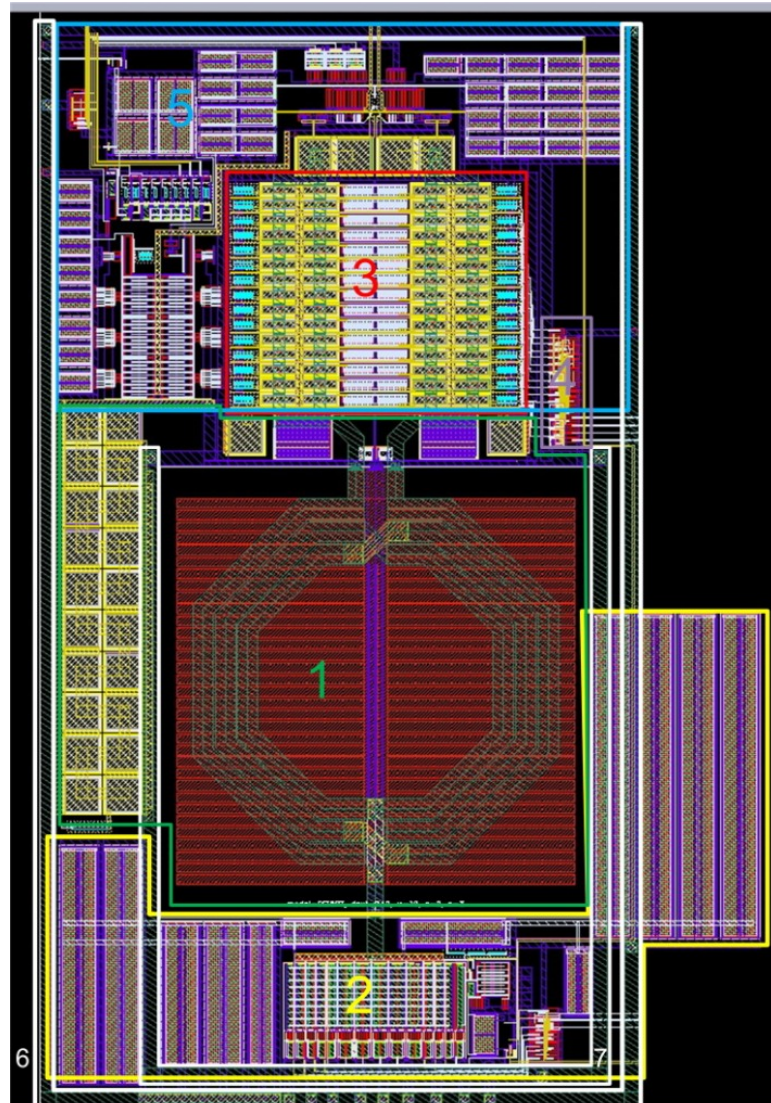


Figure 2: VCO layout view.

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

7 OPERATING CHARACTERISTICS

7.1 TECHNICAL CHARACTERISTICS

Technology _____ AMS035 BiCMOS
 Status _____ silicon proven
 Area _____ 0.7 mm²

7.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for $V_{cc} = 2.85 \div 3.15$ V and $T = -40 \div +85^{\circ}\text{C}$. Typical values are at $V_{cc} = 3.0$ V, $T = +27^{\circ}\text{C}$, unless otherwise specified.

Parameter	Symbol	Condition	Value			Unit
			min	typ	max	
Supply voltage	V_{cc}	-	2.85	3.0	3.15	V
Operating temperature range	T	-	-40	+27	+85	$^{\circ}\text{C}$
VCO frequency tuning range	F	Min. frequency	-	1151	1270	MHz
		Max. frequency	1650	1814	-	MHz
Phase noise	NF	100 KHz	-	-96	-	dBm/Hz
Control voltage	V_{ctrl}	-	0.3	-	2.4	V
Tuning sensitivity	K	$V_{ctrl} = 1$ V	-	90	-	MHz/V
Adjustable output amplitude	$A_{out\ p-p}$	Differential output	200	250	-	mV
DC output operating point	V_{op}	-	-	$V_{cc}-0.4$	-	V
Supply current	I_{cc}	-	-	4.8	-	mA
Stand-by current	I_{stb}	-	-	20	-	nA
Input logic-level high	V_{IH}	For digital inputs	$0.7V_{cc}$	-	$V_{cc}+0.25$	V
Input logic-level low	V_{IL}		-0.25	-	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