

# Voltage-controlled oscillator

## SPECIFICATION

### 1 FEATURES

- AMS035 BiCMOS 0.35  $\mu\text{m}$
- Low phase noise level
- Wide frequency range (2096...2916 MHz)
- Adjustable output voltage swing
- Low current consumption
- Portable to other technologies (upon request)

### 2 APPLICATIONS

- Frequency synthesizer with PLL

### 3 OVERVIEW

Voltage-controlled oscillator (VCO) is generator that can be tuned over a wide range of frequencies by applying a control voltage to it.

The block is fabricated on AMS035 BiCMOS 0.35  $\mu\text{m}$  technology.

### 4 STRUCTURE

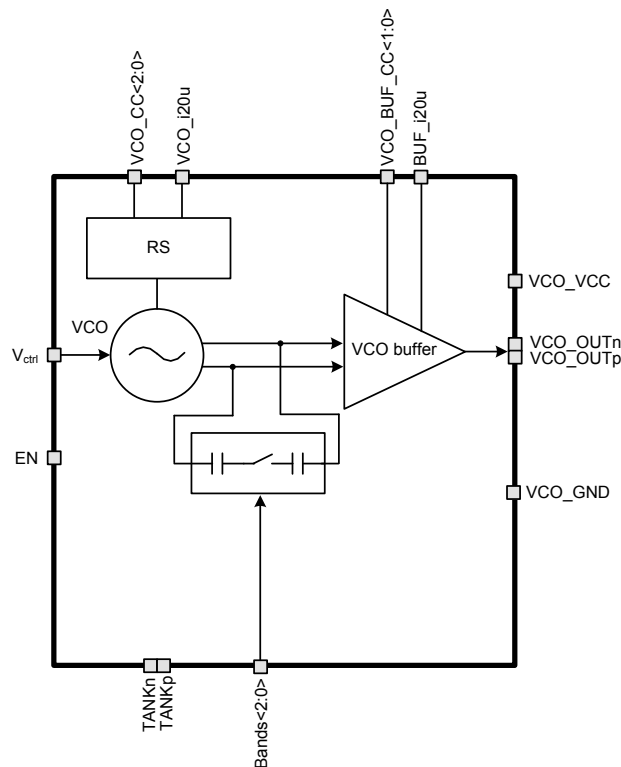


Figure 1: Voltage-controlled oscillator structure

## 5 PIN DESCRIPTION

Name	Direction	Description
VCO_i20u	IO	VCO core reference current
BUF_i20u	IO	VCO output buffer reference current
EN	I	VCO enable/disable
V <sub>ctrl</sub>	I	Control voltage
Bands<2:0>	I	Subband selection system
VCO_BUF_CC<1:0>	I	VCO buffer current consumption
VCO_CC<2:0>	I	VCO core current consumption
TANK <sub>p</sub>	O	VCO core differential output; don't use
TANK <sub>n</sub>	O	
VCO_OUT <sub>p</sub>	O	VCO buffer differential output
VCO_OUT <sub>n</sub>	O	
VCO_VCC	IO	Supply voltage 2.7 V
VCO_GND	IO	Ground

## 6 LAYOUT DESCRIPTION

VCO dimensions are given in table 1.

Table 1: VCO dimensions.

Dimension	Value	Unit
Height	620	$\mu\text{m}$
Width	345	$\mu\text{m}$

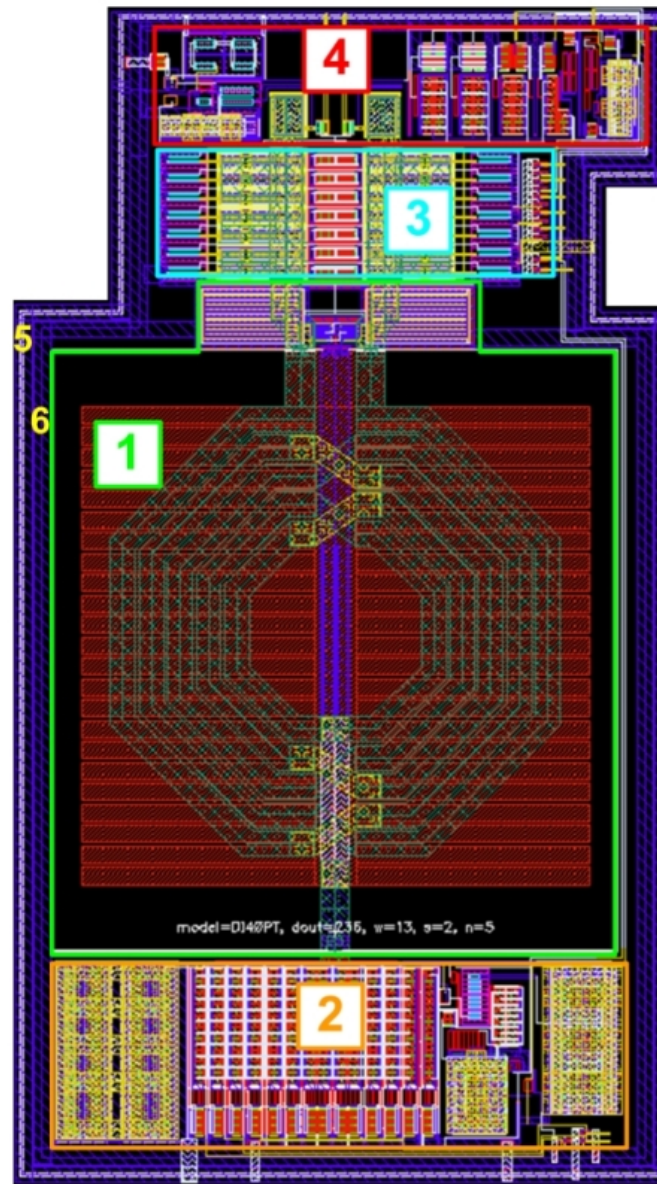


Figure 2: Voltage-controlled oscillator layout view

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

## 7 OPERATION CHARACTERISTICS

### 7.1 TECHNICAL CHARACTERISTICS

Technology \_\_\_\_\_ AMS035 BiCMOS 0.35  $\mu\text{m}$   
 Status \_\_\_\_\_ silicon proven  
 Area \_\_\_\_\_ 0.225  $\text{mm}^2$

### 7.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for  $V_{cc} = 2.65 \div 3.15 \text{ V}$  and  $T = -40 \div +85^\circ\text{C}$ . Typical values are at  $V_{cc} = 3.15 \text{ V}$  and  $T_a = +27^\circ\text{C}$ , unless otherwise specified.

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Supply voltage	$V_{cc}$	-	2.65	2.7	3.15	V
Operating temperature range	T	-	-40	+27	+85	$^\circ\text{C}$
VCO frequency tuning range	F	Min. frequency	-	2096	2238	MHz
		Max. Frequency	2715	2916	-	MHz
Phase noise level	NF	100 KHz	-	-98.2	-	dBc
		1 MHz	-	-118	-	dBc
Control voltage	$U_{VCO}$	-	0.27	-	2.34	V
Current consumption	$I_{cc}$	-	1.9	2.2	3.6	mA
Stand-by current	$I_{stb}$	-	-	5	-	nA
Input logic level HIGH	$V_{IH}$	For inputs EN, VCO_BUF_CC<1:0>, VCO_CC<2:0>,Bands<2:0>	$0.9V_{cc}$	-	$V_{cc}$	V
Input logic level LOW	$V_{IL}$	For inputs EN, VCO_BUF_CC<1:0>, VCO_CC<2:0>, Bands<2:0>	-0.2	0	0.2	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

## REVISION HISTORY

1. From version 1.0:
  - Section “Technical characteristics” (refer to [page 4](#))