

## Voltage-controlled oscillator

### SPECIFICATION

#### 1 FEATURES

- AMS035 BiCMOS 0.35  $\mu\text{m}$  technology
- Low phase noise level
- Wide frequency range (2693...3753 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

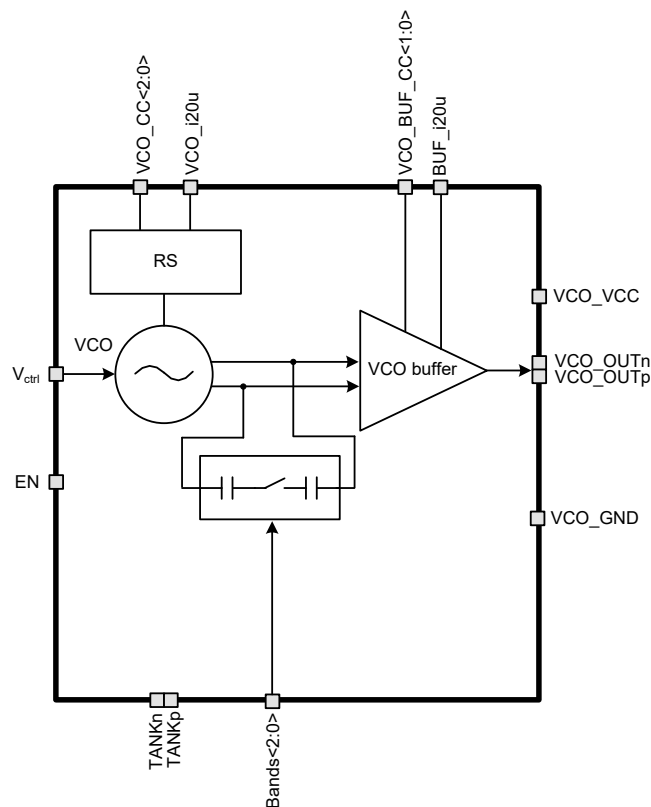


Figure 1: Voltage-controlled oscillator structure

## 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    | 360   | $\mu\text{m}$ |
| Width     | 655   | $\mu\text{m}$ |

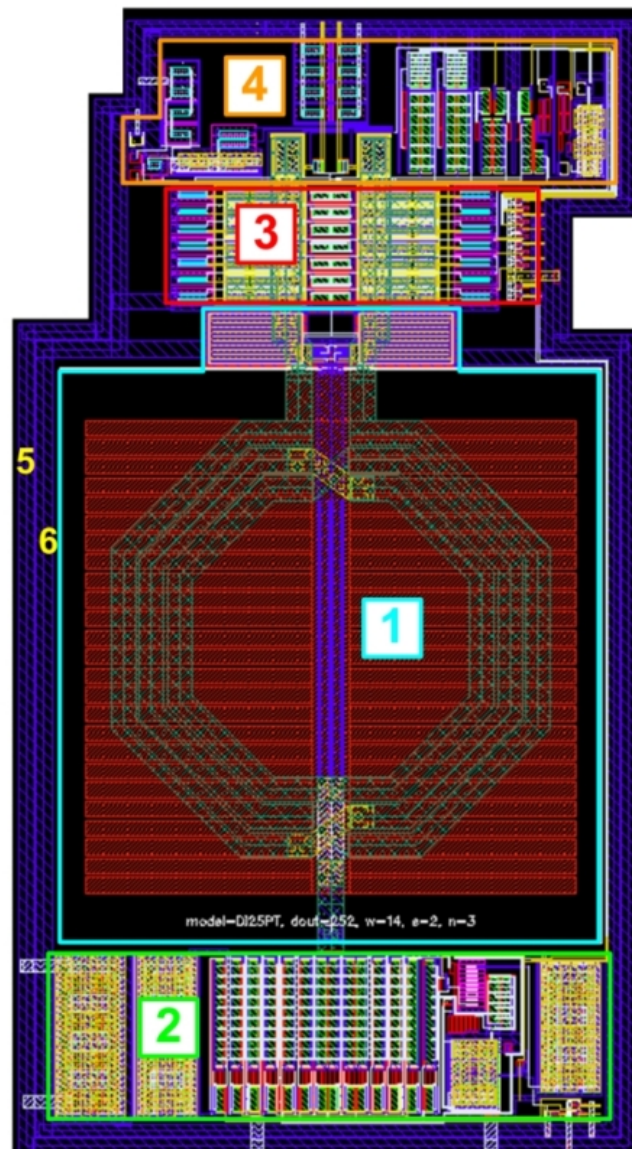


Figure 1: Voltage-controlled oscillator layout view

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  $V_{cc} = 2.65 \div 3.15$  V and  $T = -40 \div +85^\circ\text{C}$ . Typical values are at  $V_{cc} = 2.7$  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  | -           | 2693  | 2829     | MHz              |
|                             |           | Max. Frequency  | 3459        | 3753  | -        | MHz              |
| Phase noise level           | NF        | 100 KHz   | -           | -93.7 | -        | dBc              |
|                             |           | 1 MHz   | -           | -114  | -        | dBc              |
| Control voltage             | $U_{VCO}$ | -   | 0.27        | -     | 2.34     | V                |
| Current consumption         | $I_{cc}$  | -   | 2.1         | 2.4   | 3.8      | mA               |
| Stand-by current            | $I_{stb}$ | -   | -           | 5     | -        | nA               |
| Input logic level high      | $V_{IH}$  | For inputs EN,<br>VCO_BUF_CC<1:0>,<br>VCO_CC<2:0>, Bands<2:0> | $0.9V_{cc}$ | -     | $V_{cc}$ | V                |
| Input logic level low       | $V_{IL}$  | For inputs EN,<br>VCO_BUF_CC<1:0>,<br>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](#))