
RC oscillator 100 MHz

SPECIFICATION

1 FEATURES

- Global Foundries CMOS 55 nm
- Low current consumption
- Low temperature dependence
- High accuracy (after trimming)
- Small area
- Portable to other technologies (upon request)

2 APPLICATIONS

- RF ID
- Timekeeping devices
- GPS equipment to reduce time to first fix
- Applications that require an accurate process timing
- Products with long automated unattended operation time

3 OVERVIEW

IP is a low power high resolution RC oscillator nominally operates at 100 MHz output clock from a 1.2 V supply. No external components are required. The oscillator operates in a voltage range of 1.2 V +/-5% and is qualified over a broad temperature range of -40°C to 85°C. The oscillator has excellent nominal duty cycle 50% within +/-10%.

The block is designed on Global Foundries CMOS 55 nm technology.

4 STRUCTURE

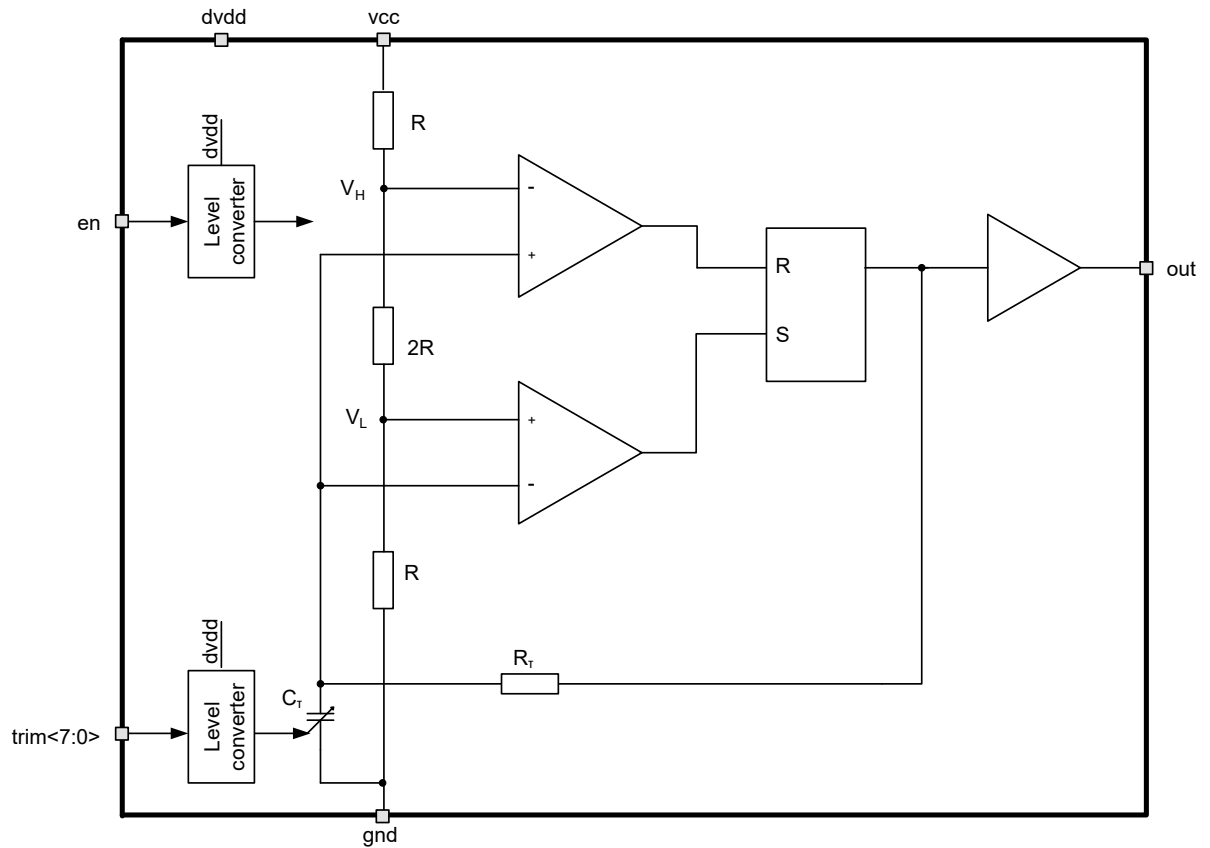


Figure 1: RC oscillator 100MHz structure

5 PIN DESCRIPTION

| Name | Direction | Description |
|-----------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| en | I | 100 MHz oscillator enable: "0" disabled "1" enabled |
| trim<7:0> | I | 100 MHz oscillator trimming value: "0000000" 58.85 MHz ... see Figure 3 "10010011" 100 MHz ... see Figure 3 "1111111" 222.776 MHz |
| out | O | Output |
| dvdd | IO | Supply voltage for level converters |
| vcc | IO | Supply voltage |
| gnd | IO | Ground |

6 LAYOUT DESCRIPTION

6.1 TECHNOLOGY OPTIONS

RC oscillator 100 MHz is designed under Global Foundries CMOS 55 nm technology process with following options:

- 4_02_00_00_LB option
- High-Vt NFET and PFET
- Thin-oxide native NFET
- Thick-oxide I/O NFET and PFET (3.3 V)
- P+ polysilicon OP resistor
- N+ diffusion OP resistor
- APMOM capacitor

6.2 PHYSICAL DIMENTIOS

The block dimensions are given in the table 1.

Table 1: Block dimensions

| Dimension | Value | Unit |
|-----------|-------|------|
| Height | 54 | um |
| Width | 83 | um |

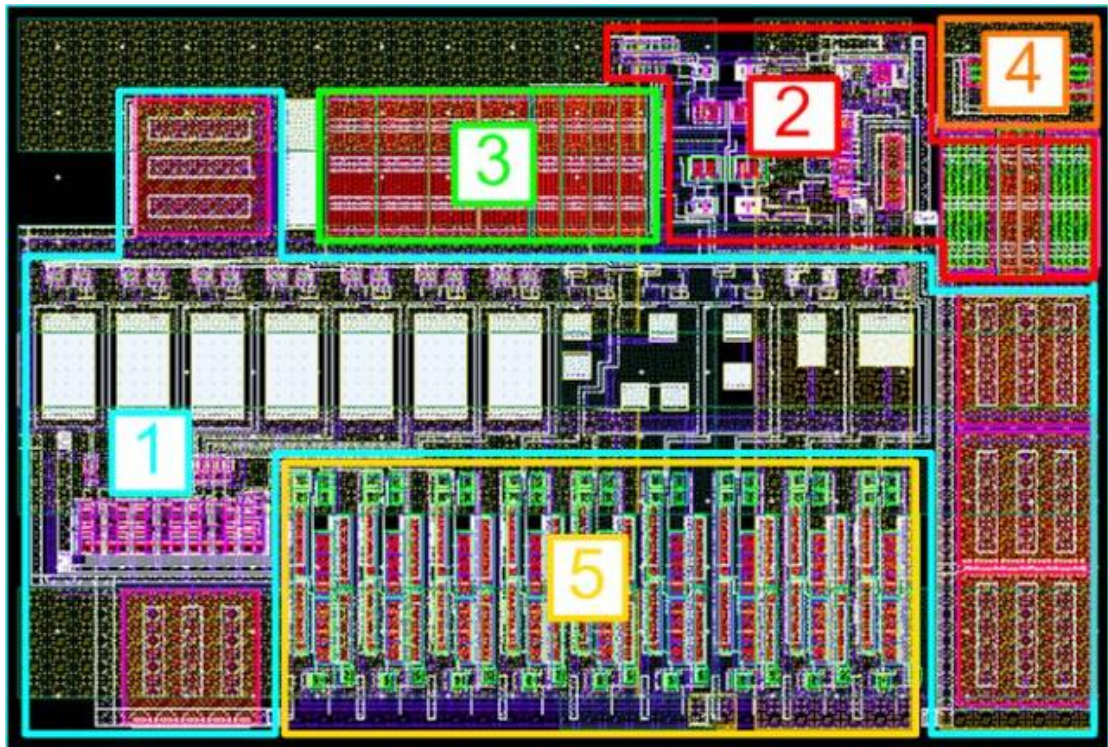


Figure 2: RC oscillator 100 MHz layout

1. Capacitor with trimming structure
2. Trigger and comparators
3. Resistive divider
4. Resistor
5. Level converters

7 INTEGRATION GUIDELINES

7.1 PLACE AND ROUTE GUIDELINES

For stable frequency is necessary to provide stable supply voltage. Wires supply and ground must be shorter as possible.

8 OPERATION CHARACTERISTICS

8.1 TECHNICAL CHARACTERISTICS

Technology _____ Global Foundries CMOS 55 nm
Status _____ silicon proven
Area _____ 0.004 mm²

8.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for $V_{cc} = 1.14 \div 1.26V$ and $T = -40 \div 85^{\circ}C$. Typical values are at $V_{cc} = 1.2 V$ and $T = 27^{\circ}C$, unless otherwise specified

| Parameter | Symbol | Condition | Value | | | Unit |
|-----------------------------|-----------|---------------------|-------------|---------|-------------|-------------|
| | | | min | typ | max | |
| Supply voltage | V_{cc} | - | 1.14 | 1.2 | 1.26 | V |
| Supply voltage | Dv_{dd} | - | - | 1.2 | - | V |
| Operating temperature range | T | - | -40 | 27 | 85 | $^{\circ}C$ |
| Output frequency | F_{out} | After trimming | - | 100 | - | MHz |
| Frequency trim range | | - | - | -20/+10 | - | % |
| Frequency accuracy | | After trimming | - | 3 | - | % |
| Supply current | I_{cc} | - | - | - | 100 | μA |
| Input logic-level low | V_{IL} | For digital signals | - | - | $0.3V_{cc}$ | V |
| Input logic-level high | V_{IH} | For digital signals | $0.7V_{cc}$ | - | - | V |
| Output logic-level low | V_{OL} | Output | 0 | - | $0.2V_{cc}$ | V |
| Output logic-level high | V_{OH} | Output | $0.8V_{cc}$ | - | V_{cc} | V |

9 TYPICAL CHARACTERISTICS

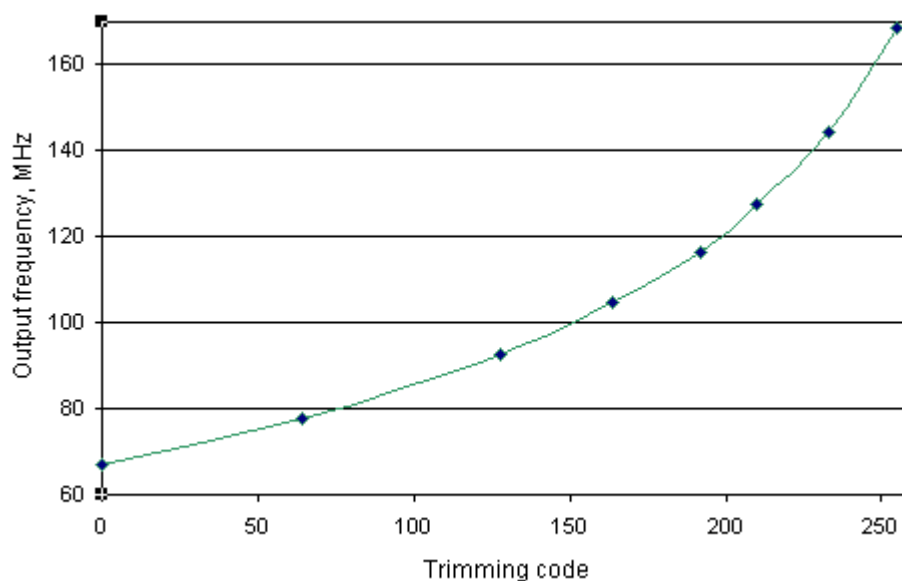


Figure 3: Output frequency vs trimming code

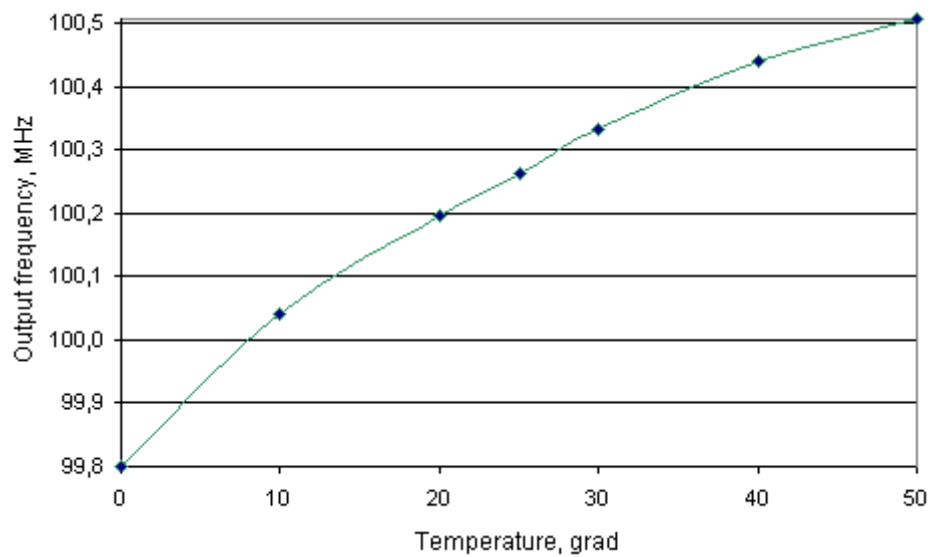


Figure 4: Output frequency vs temperature

10 DELIVERABLES

Depending on license type IP may include:

- Schematic or NetList
- Abstract view (.lef and .lib files)
- Layout (optional)
- Verilog behavior model
- Extracted view (optional)
- GDSII
- DRC, LVS, antenna report
- Test bench with saved configurations (optional)
- Documentation