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

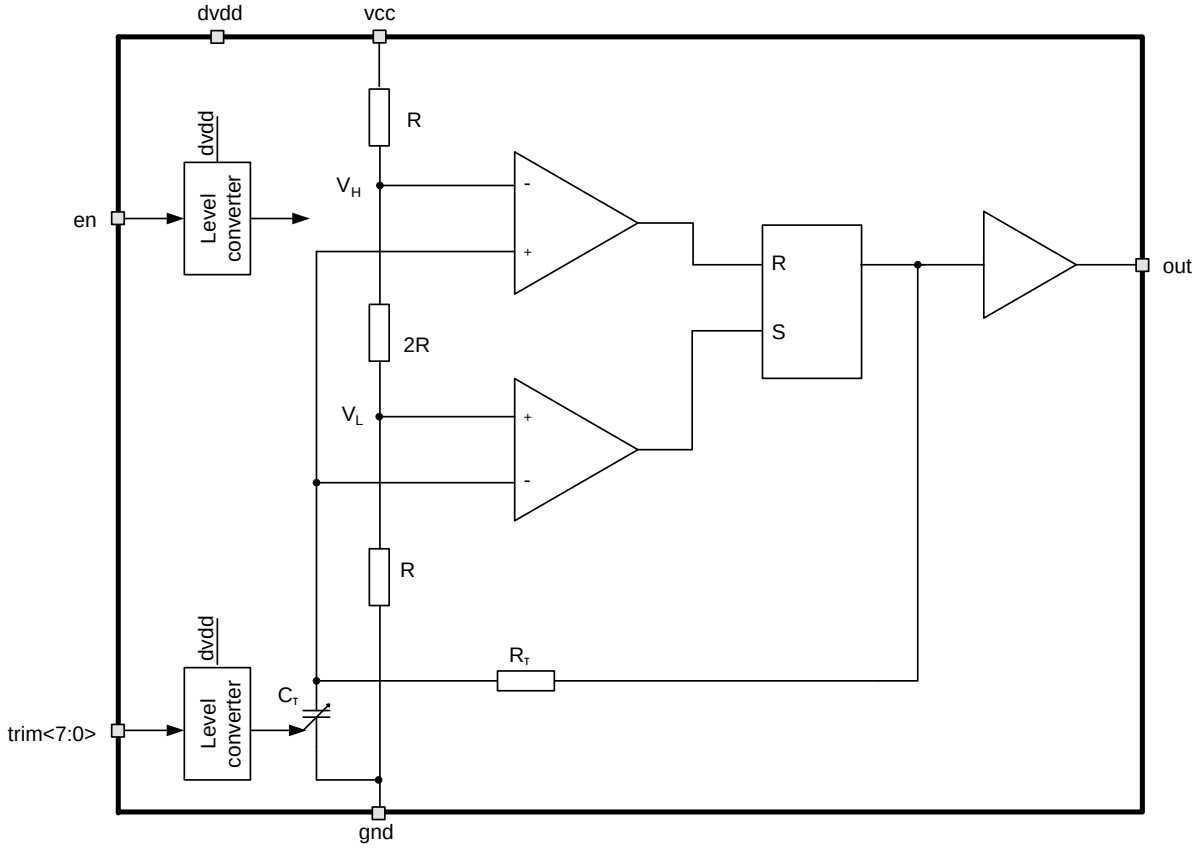

Figure 1: RC oscillator 100MHz structure

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

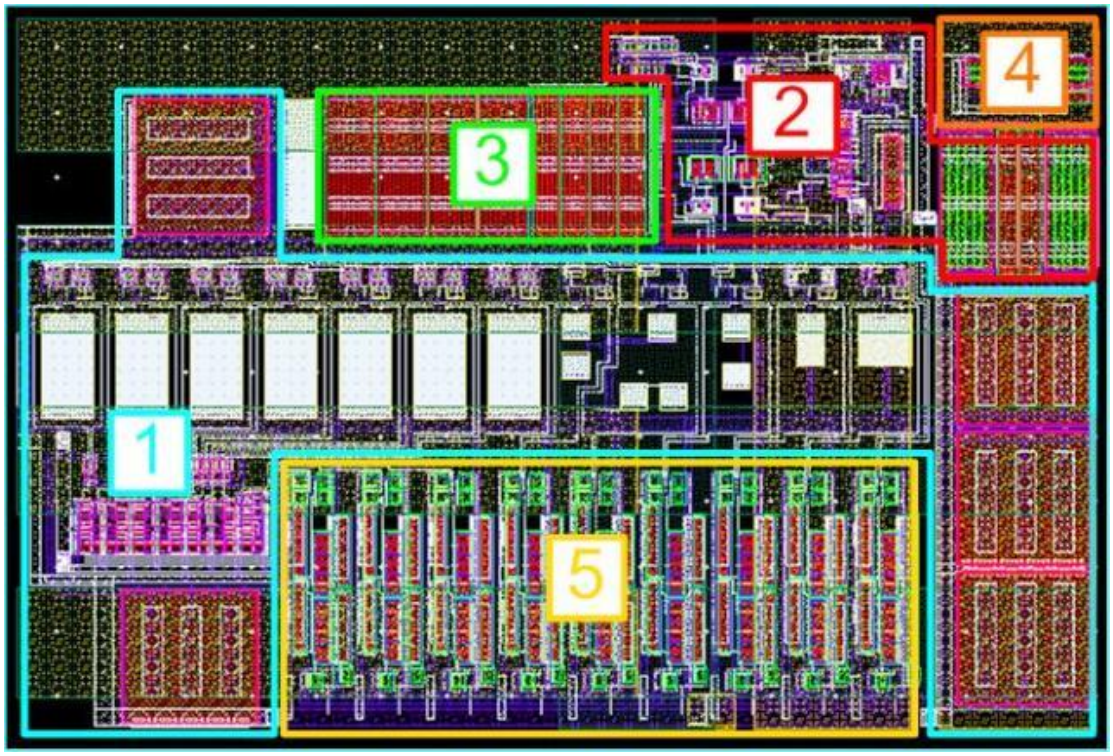

Figure 2: RC oscillator 100 MHz layout

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 mm^2

8.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for Vcc = 1.14 ÷ 1.26V and T = -40 ÷ 85°C. Typical values are at Vcc =1.2 V and T = 27° C, unless otherwise specified

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

9 TYPICAL CHARACTERISTICS

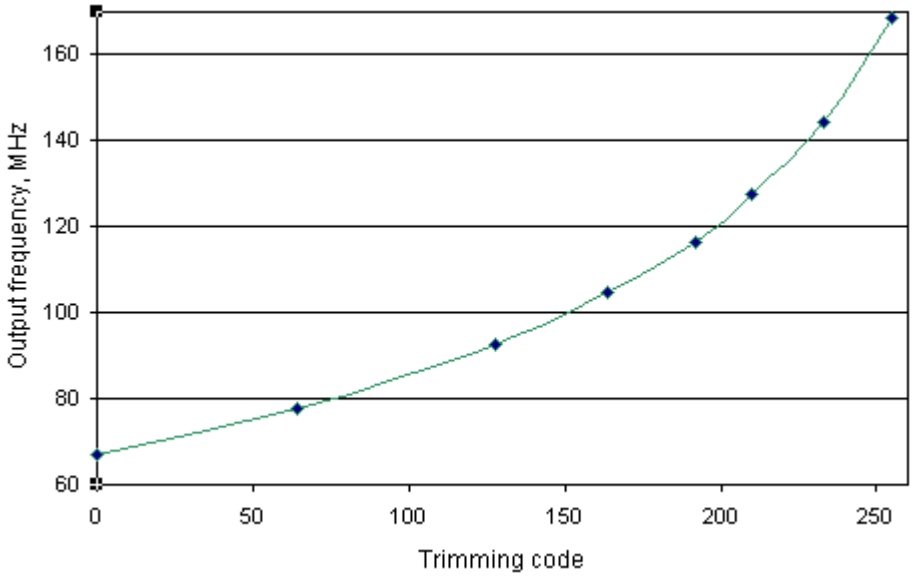

Figure 3: Output frequency vs trimming code

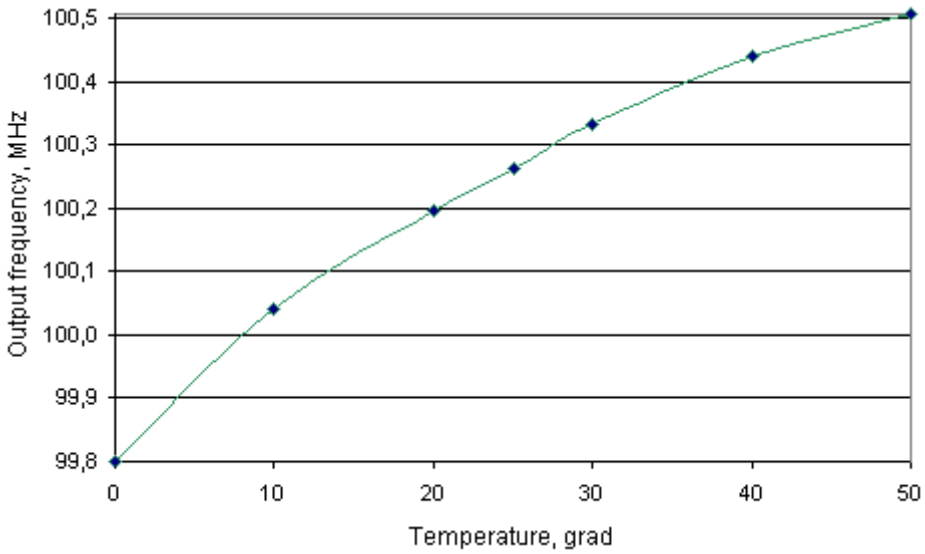

Figure 4: Output frequency vs temperature

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