Multiplexer - amplifier

SPECIFICATION

1 FEATURES

- SMIC CMOS 0.18μm
- Input and output matching 50 Ω
- No external matching components required
- Built-in adjustment of matching
- Gain temperature compensation mode
- Adjusted gain
- Supported foundries: TSMC, UMC, Global Foundries, SMIC, iHP, AMS, Vanguard, SilTerra

2 APPLICATION

- Navigation receiver

3 OVERVIEW

The cell is combined into one block multiplexer and amplifier. The multiplexer selects one of the required inputs by a combination of control signals and transmits the amplified signal to the output.

Temperature compensation mode is used to compensate gain vs. environment temperature.

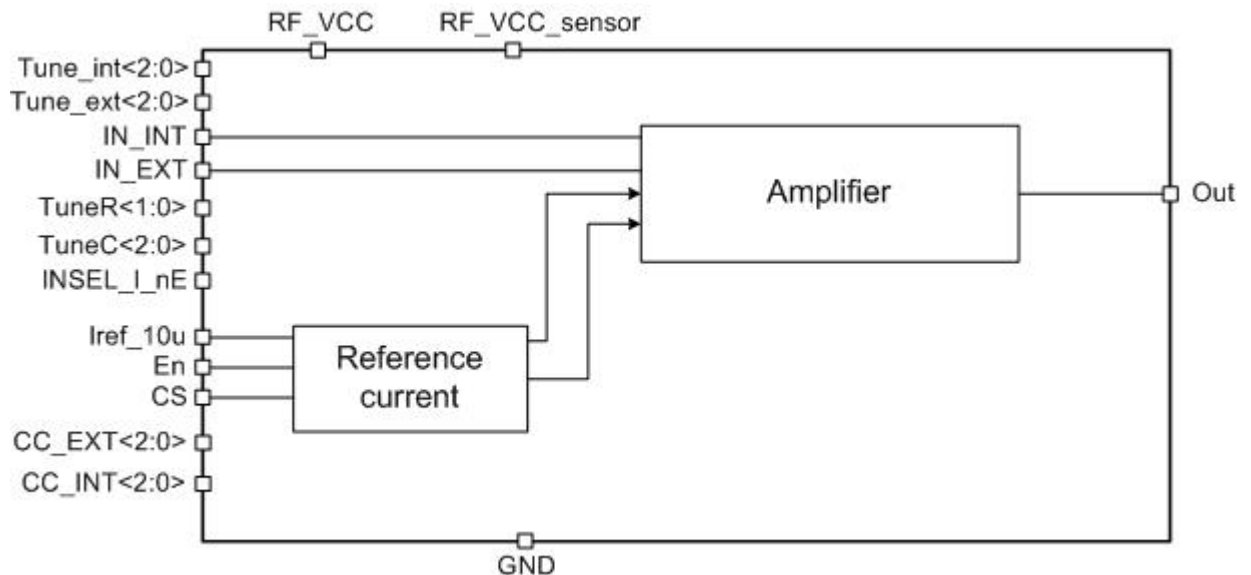The block is fabricated on SMIC CMOS 0.18μm technology.

4 STRUCTURE

Figure 1: Multiplexer - amplifier structure.

5   PIN DESCRIPTION

Name	Direction	Description
Iref_10u	I	Reference current (10 µA)
CC_Int<2:0>	I	Amplifier current control in an active antenna mode
CC_Ext<2:0>	I	Amplifier current control in an external low-noise amplifier mode
CS	I	Temperature compensation mode enable
En	I	Enable/disable
TuneR<1:0>	I	Output circuit impedance adjustment
TuneC<2:0>	I	Output circuit capacitor adjustment
INSEL_I_nE	I	Input select
Tune_int<2:0>	I	External active antenna input adjustment
Tune_ext<2:0>	I	External low-noise amplifier input adjustment
IN_INT	I	External active antenna input
IN_EXT	I	External low-noise amplifier input
Out	O	Output
RF_VCC_sensor	IO	Supply voltage feedback
RF_VCC	IO	Supply voltage
GND	IO	Ground

6 LAYOUT DESCRIPTION

The block dimensions are given in the table 1.

Table 1: Block dimensions.

Dimension	Value	Unit
Height	934.23	μm
Width	734.65	μm
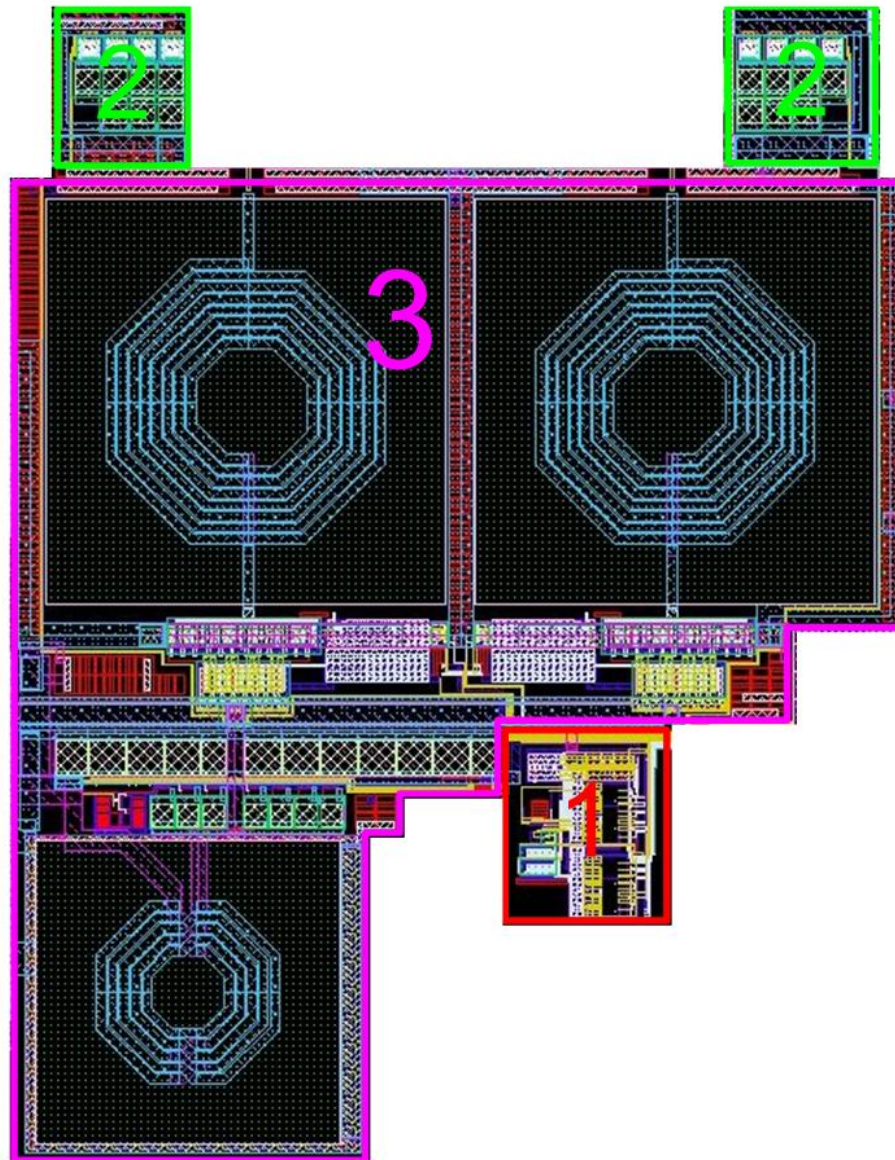
Figure 2: Device layout view.

1. Reference current source
2. Tuned capacitors
3. Amplifier

7   OPERATING CHARACTERISTICS

7.1   TECHNICAL CHARACTERISTICS

Technology _____SMIC CMOS 0.18 μm
Status_____ silicon proven
Area_____0.5mm^2

7.2   ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for V_{cc} = 1.7 ÷ 1.9 V and T = -45 ÷ +85 ℃. Typical values are at V_{cc} = 1.8 V and T = +27° C, unless otherwise specified..

Parameter	Symbol	Condition	Value			Unit
			min	typ	max	
Supply voltage	V_{cc}	-	1.7	1.8	1.9	V
Operating temperature range	T	-	-45	27	85	℃
Input frequency range	F_{in}	Band L1	1571	-	1579	MHz
		Band L2	1598	-	1606	
Input VSWR	$VSWR_{MA\_IN}$	-	-	1.1	2.0	-
Output VSWR	$VSWR_{MA\_OUT}$	-	-	1.6	2.0	-
Input 1dB compression point *	P_{1dB_MA}	-	-	-12.6	-	dBm
Insertion loss	G_{MA}	-	-	7.1	-	dB
Noise figure	NF_{MA}	-	-	4.2	-	dB
Current consumption in an active mode	Icc	-	-	2.7	-	mA
Current consumption in a standby mode	Istb	-	-	7	800	nA
Input logic-high level	V_{IH}	For digital inputs	0.7 V_{cc}	-	3.6	V
Input logic-low level	V_{IL}		-0.25	-	0.3	V

* For inputs IN_INT and IN_EXT

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:
   - Table "Electrical characteristics" (refer to page 4)
   - Added parameter "Input frequency range"