

Low pass filter

SPECIFICATION

1 FEATURES

- AMS BiCMOS 0.35 μm
- Low noise figure
- High linearity
- Low pass filter cut-off frequency adjustment system (LPF CFAS)
- Very low amplitude ripple
- Portable to other technologies (upon request)

2 APPLICATION

- Receivers

3 OVERVIEW

The IP1_LPF_01R5 is the 4th order Butterworth low pass filter with cut-off frequency adjustment. High third-order input intercept point is reached due to using a pseudodifferential circuit and Sallen-Key circuit. There are two modes for cut-off frequency programming: manually and automatically. The generator is used to adjust filter cut-off (CO) frequency in automatic mode. Also CO frequency can be set by the digital code CFAS_Code<6:0>. The block is fabricated on AMS BiCMOS 0.35 μm technology.

4 STRUCTURE

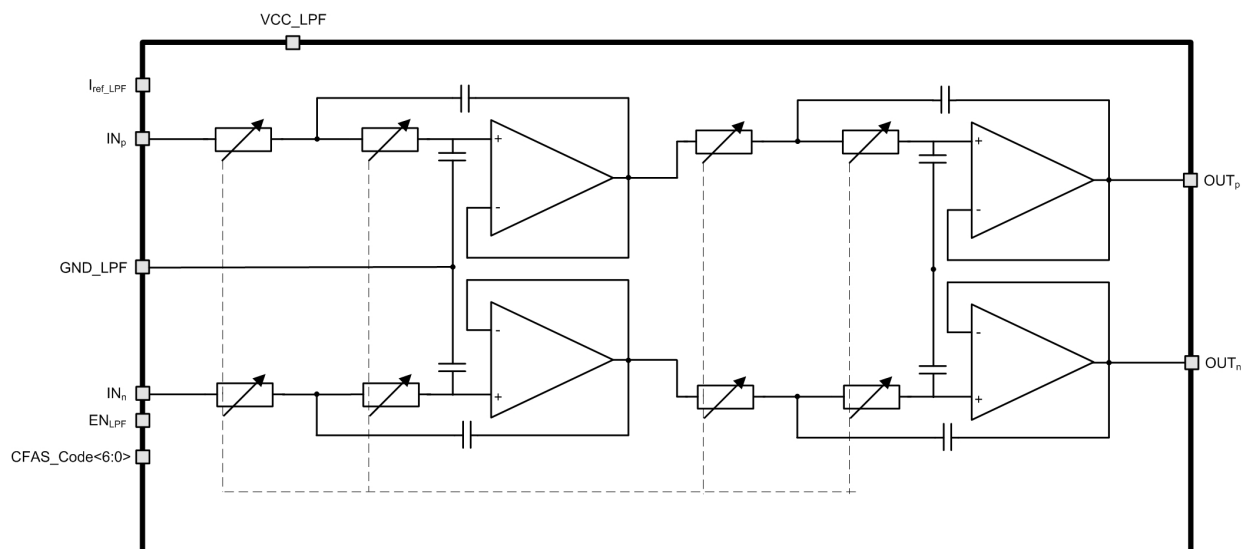


Figure 1: Low pass filter structure

5 PIN DESCRIPTION

Name	Direction	Description
I _{ref_LPF}	IO	Reference current 60 μ A
IN _p	I	Differential input
IN _n	I	
CFAS_Code<6:0>	I	Digital code of LPF cut-off frequency adjustment system
EN	I	LPF enable/disable
EN _{CFAS}	I	LPF cut-off frequency adjustment system enable/disable
OUT _p	O	LPF differential output
OUT _n	O	
VCC_LPF	IO	LPF supply voltage
GND_LPF	IO	LPF ground

6 LAYOUT DESCRIPTION

Low pass filter dimensions are given in the table 1.

Table 1: Block dimensions.

Dimension	Value	Unit
Height	410	μm
Width	645	μm

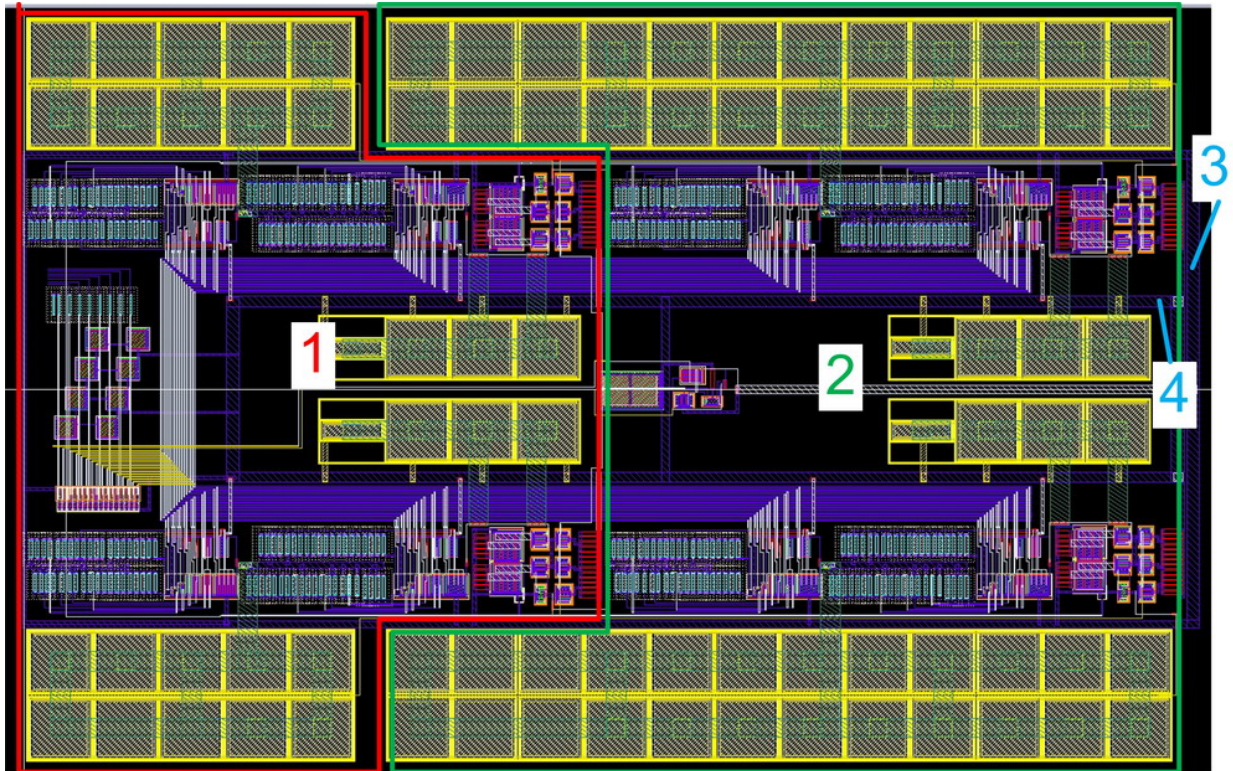


Figure 2: Low pass filter layout view

1. The 1st pseudodifferential stage
2. The 2nd pseudodifferential stage
3. Supply voltage bus
4. Ground bus

7 OPERATING CHARACTERISTICS

7.1 TECHNICAL CHARACTERISTICS

Technology _____ AMS BiCMOS 0.35 μ m
 Status _____ silicon proven
 Area _____ 0.27 mm²

7.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for $V_{cc} = 2.75 \div 3.2$ V and $T = -45 \div +85^{\circ}\text{C}$. Typical values are at $V_{cc} = 3.0$ V, $T = +27^{\circ}\text{C}$, unless otherwise specified.

Parameter	Symbol	Condition	Value			Unit
			min	typ.	max	
Supply voltage	V_{cc}	-	2.75	3.0	3.2	V
Operating temperature range	T	-	-45	+27	+85	$^{\circ}\text{C}$
Filter order	O_f	-	-	4	-	-
Insertion loss	G	In passband	-0.5	-1.4	-2.3	dB
Filter bandwidth	F	-1 dB	21.8	23	23.9	MHz
		-4 dB	-	30	-	MHz
		-17 dB	-	50	-	MHz
Group delay ripple	t_{del}	2.5...18.5 MHz	-	4.7	5.3	ns
		4.5...22.5 MHz	-	5.4	5.6	
Input referred noise	RN	Differential input 100 Ω	-	14.5	21.5	$\frac{\text{nV}}{\sqrt{\text{Hz}}}$
1 dB compression point	P_{1dB}	1 dB	7.8	10.5	-	dBm
3 rd order input intercept point	IP3	Differential input	-	26	-	dBm
Input impedance	R	Differential input	78	102	131	Ω
Supply current	I_{cc}	-	-	3.4	3.5	mA
Stand-by current	I_{stb}	-	-	0.01	0.1	μA
Input logic-level low	V_{IL}	For digital inputs	-0.25	-	0.3	V
Input logic-level high	V_{IH}		$0.7V_{cc}$	-	$V_{cc} + 0.25$	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