

# Low pass filter

## SPECIFICATION

### 1 FEATURES

- AMS035 BiCMOS 0.35  $\mu\text{m}$
- Wide pass band frequency adjustment range (9.6 MHz...25 MHz)
- Low group delay time ripple vs. Frequency
- Low pass filter cut-off frequency adjustment system (LPF CFAS)
- Portable to other technologies (upon request)

### 2 APPLICATION

- Signal processing systems
- Navigation systems

### 3 OVERVIEW

Low pass filter (3<sup>rd</sup> order Chebyshev filter) is based on the gyrators with cut-off frequency adjustment in wide range. 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 fixed by the digital code CFAS\_Code<6:0>.

The block fabricated on AMS035 BiCMOS 0.35  $\mu\text{m}$  technology.

### 4 STRUCTURE

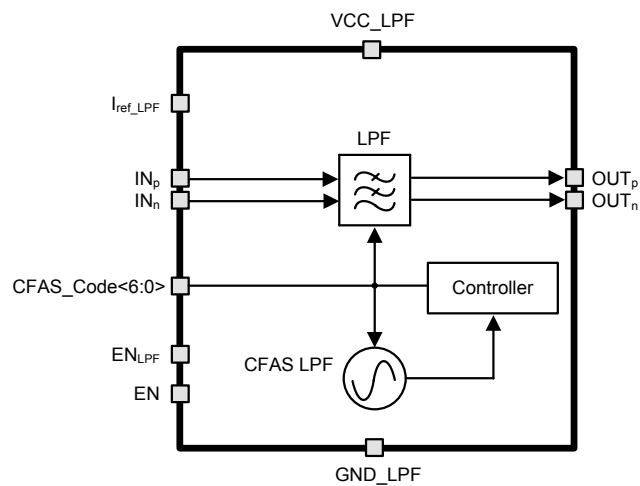


Figure 1: Low pass filter structure.

## 5 PIN DESCRIPTION

Name	Direction	Description
I <sub>ref_LPF</sub>	I	Reference current 20 $\mu$ A
IN <sub>p</sub>	I	LPF differential input
IN <sub>n</sub>	I	
CFAS_Code<6:0>	I	Cut-off frequency preset
EN	I	LPF enable/disable
OUT <sub>p</sub>	O	LPF differential output
OUT <sub>n</sub>	O	
VCC_LPF	IO	Supply voltage
GND_LPF	IO	Ground

## 6 LAYOUT DESCRIPTION

Low pass filter dimensions are given in the table 1.

Table 1: Block dimensions.

Dimension	Value	Unit
Height	450	$\mu\text{m}$
Width	250	$\mu\text{m}$

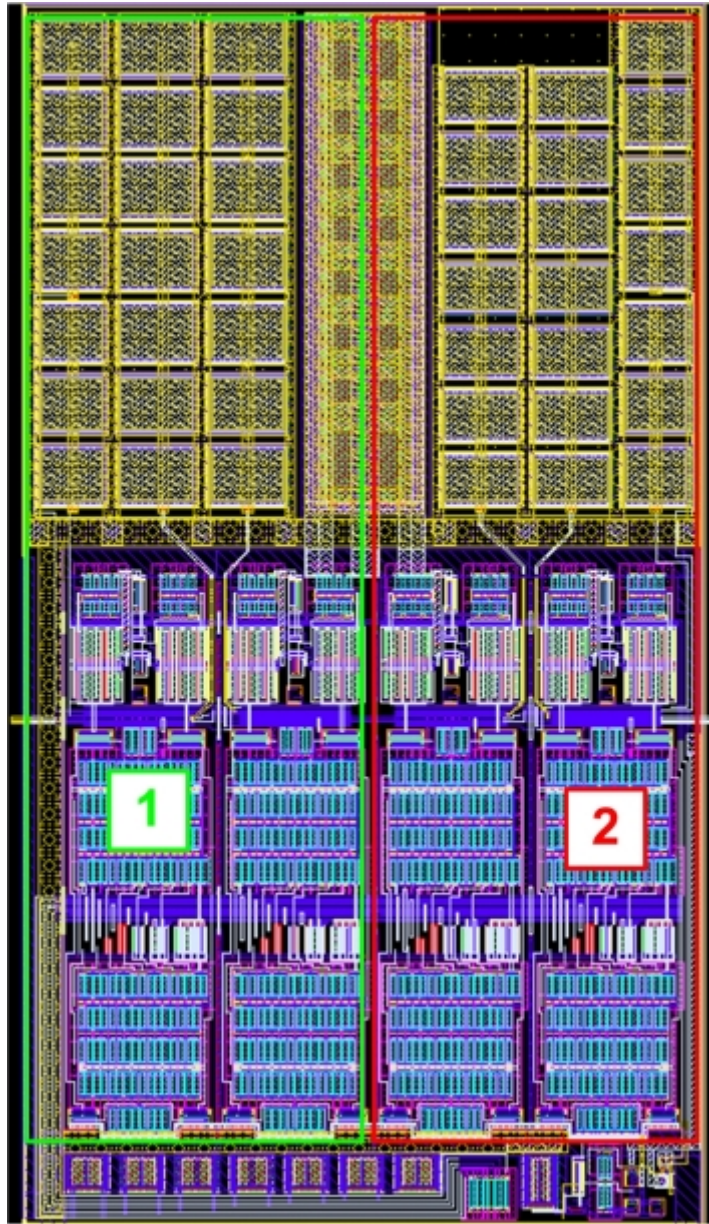


Figure 2: Low pass filter layout view.

1. Gyrator 1
2. Gyrator 2

LPF oscillator dimensions are given in the table 2.

Table 2: Block dimensions.

Dimension	Value	Unit
Height	445	$\mu\text{m}$
Width	345	$\mu\text{m}$

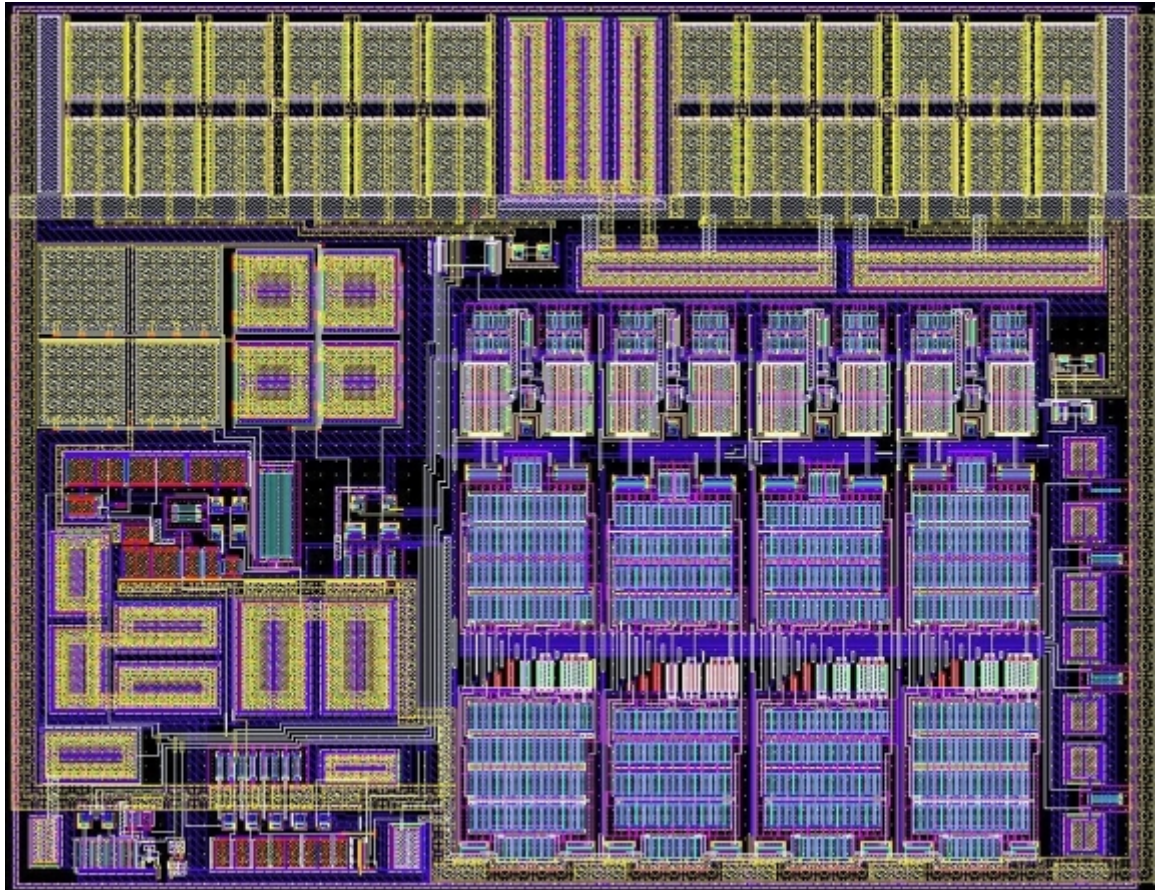


Figure 3: LPF oscillator layout view.

## 7 OPERATING CHARACTERISTICS

### 7.1 TECHNICAL CHARACTERISTICS

Technology \_\_\_\_\_ AMS035 BiCMOS 0.35 um  
 Status \_\_\_\_\_ silicon proven  
 Area \_\_\_\_\_ 0.267mm<sup>2</sup>

### 7.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for  $V_{cc} = 2.65 \div 3.15$  V,  $T = -40 \div +85^{\circ}\text{C}$ . Typical values are at  $V_{cc} = 2.7$  V,  $T = +27^{\circ}\text{C}$ , unless otherwise specified.

Parameter	Symbol	Condition	Value			Unit
			min	typ	max	
Supply voltage	$V_{cc}$	-	2.65	2.7	3.15	V
Operating temperature range	T	-	-40	27	85	$^{\circ}\text{C}$
Cut-off frequency	F	-1dB	9.6	-	25	MHz
Group delay time ripple	$t_{del}$	-	-	2	-	ns
Noise figure	NF	-	-	12.7	16	dB
Transmission gain	G	-	-1.5	-0.3	+0.3	dB
Input/output impedance	R	-	-	2000	-	$\Omega$
Supply current	$I_{cc}$	-	-	1.32	1.33	mA
Stand-by current	$I_{stb}$	-	-	0.01	0.02	$\mu\text{A}$
Input logic-level high	$V_{IH}$	For digital inputs	$0.9V_{cc}$	-	$V_{cc}$	V
Input logic-level low	$V_{IL}$		-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