

# Fifth-order passive LPF

## SPECIFICATION

### 1 FEATURES

- TSMC CMOS 0.065  $\mu\text{m}$
- Differential inputs, outputs
- Fixed cut-off frequency 150MHz
- High linearity
- Low noise figure
- Portable to other technologies (upon request)

### 2 APPLICATION

- IF signal processing

### 3 OVERVIEW

The 5<sup>th</sup> order passive differential low-pass filter (LPF). LPF is implemented using integrated inductors.

### 4 STRUCTURE

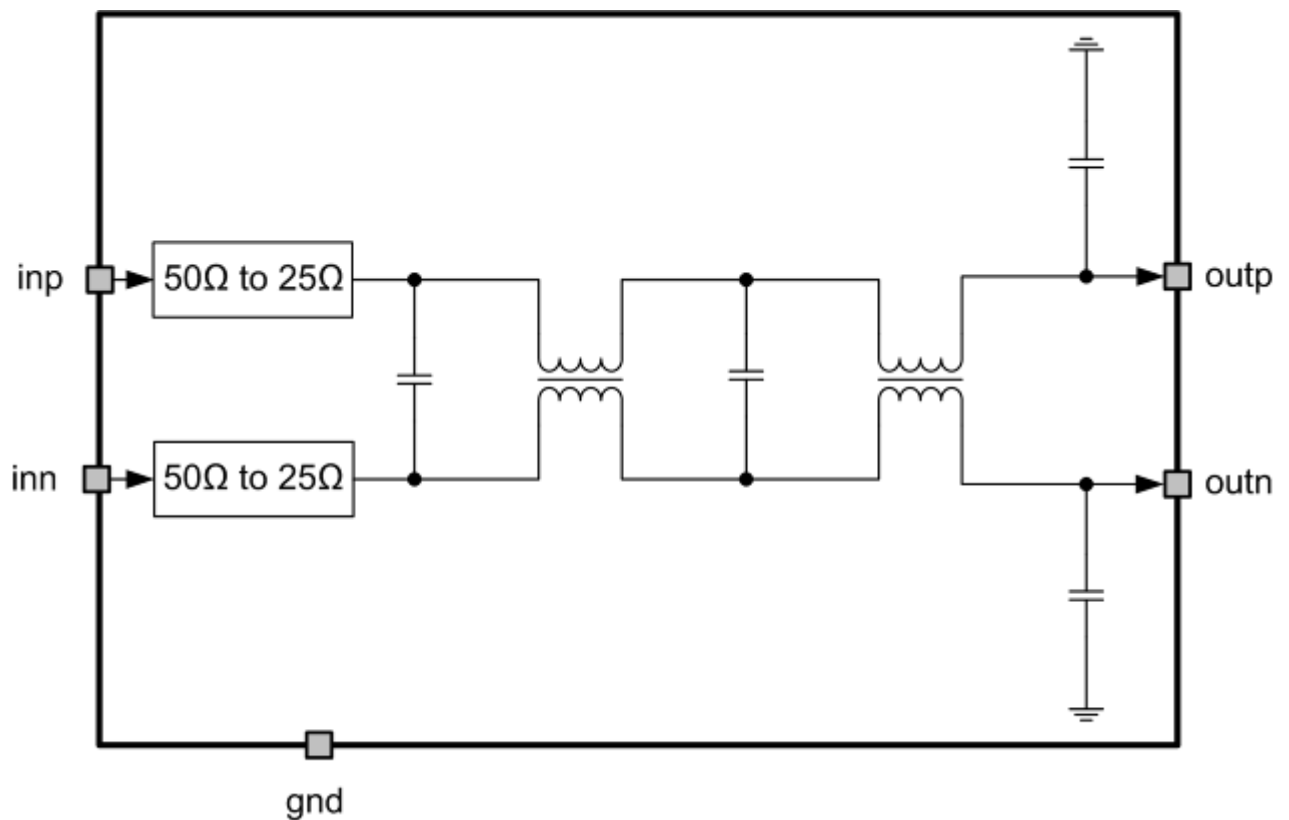


Figure 1: Fifth-order passive LPF structure.

## 5 PIN DESCRIPTION

Name	Direction	Description
inp	I	LPF differential inputs
inn	I	
outp	O	LPF differential outputs
outn	O	
gnd	IO	Ground

## 6 LAYOUT DESCRIPTION

The block dimensions are given in the table 1.

Table 1: Block dimensions.

Dimension	Value	Unit
Height	885	$\mu\text{m}$
Width	1335	$\mu\text{m}$

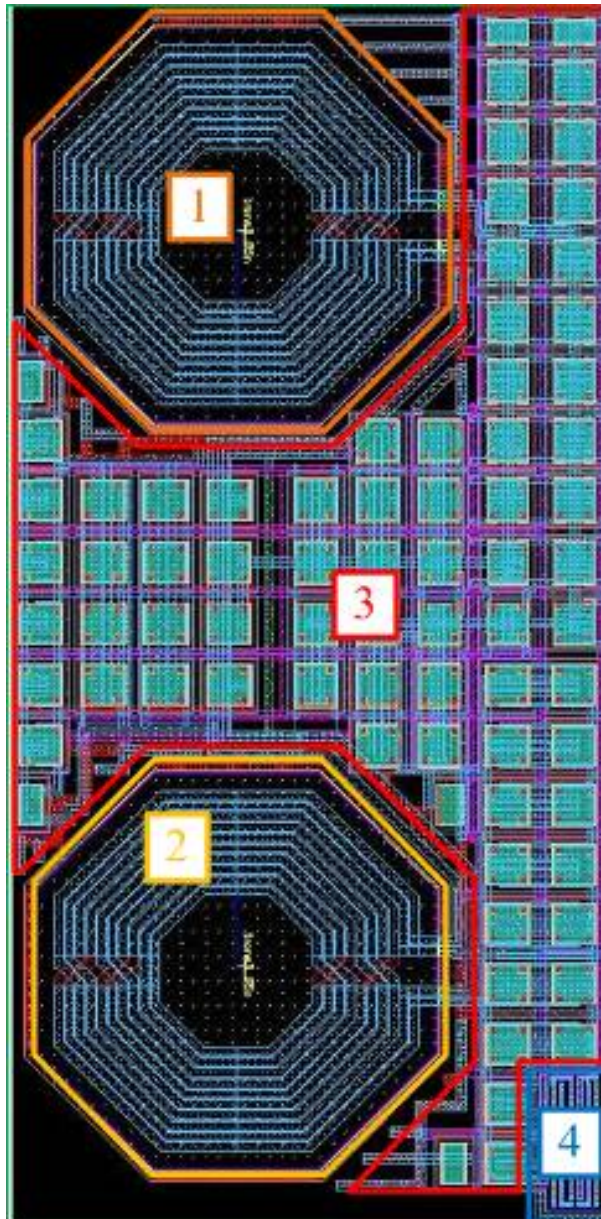


Figure 2: Device layout view.

1. Transformer №1
2. Transformer №2
3. Capacitors
4. Converter

## 7 OPERATING CHARACTERISTICS

### 7.1 TECHNICAL CHARACTERISTICS

Technology \_\_\_\_\_ TSMC CMOS CRN65LP

Status \_\_\_\_\_ silicon proven

 Area \_\_\_\_\_ 1.19 mm<sup>2</sup>

### 7.2 ELECTRICAL CHARACTERISTICS

 The values of electrical characteristics are specified for  $V_{cc} = 2.375 \div 2.625$  V and  $T = -40 \div +125^{\circ}\text{C}$ . Typical values are at  $V_{cc} = 2.5$  V,  $T = +85^{\circ}\text{C}$ , unless otherwise specified.

Parameter	Symbol	Condition	Value			Unit
			min	typ	max	
Supply voltage	$V_{cc}$	-	2.375	2.5	2.625	V
Temperature range	T	-	-40	85	125	$^{\circ}\text{C}$
Filter order	k	-	-	5	-	-
Insertion loss	G	-	-15.0	-15.1	-15.1	dB
Input signal bandwidth	F	-	-	150	-	MHz
Amplitude ripple	$\Delta A$	-	2.9	3.9	5.1	dB
Attenuation >400MHz	$G_A$	-	-46	-50	-54	dB
Noise figure	NF	-	-	13.8	14.0	dB
1 dB compression point	$P_{1dB}$	-	18	18	-	dBm
Input impedance	$R_{in}$	Differential	-	50	-	$\Omega$
Output impedance	$R_{out}$	Differential	-	25	-	$\Omega$

## 8 TYPICAL CHARACTERISTICS

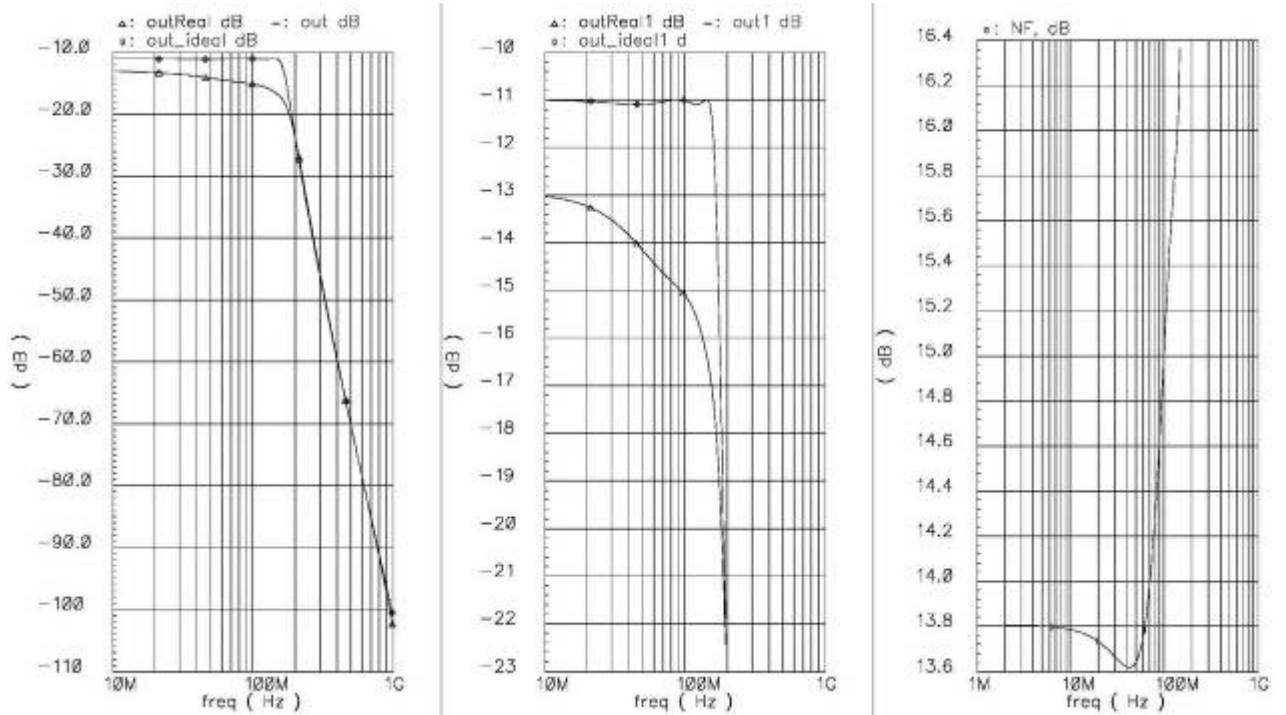


Figure 3: Amplitude frequency characteristics and noise figure for band pass 150MHz.

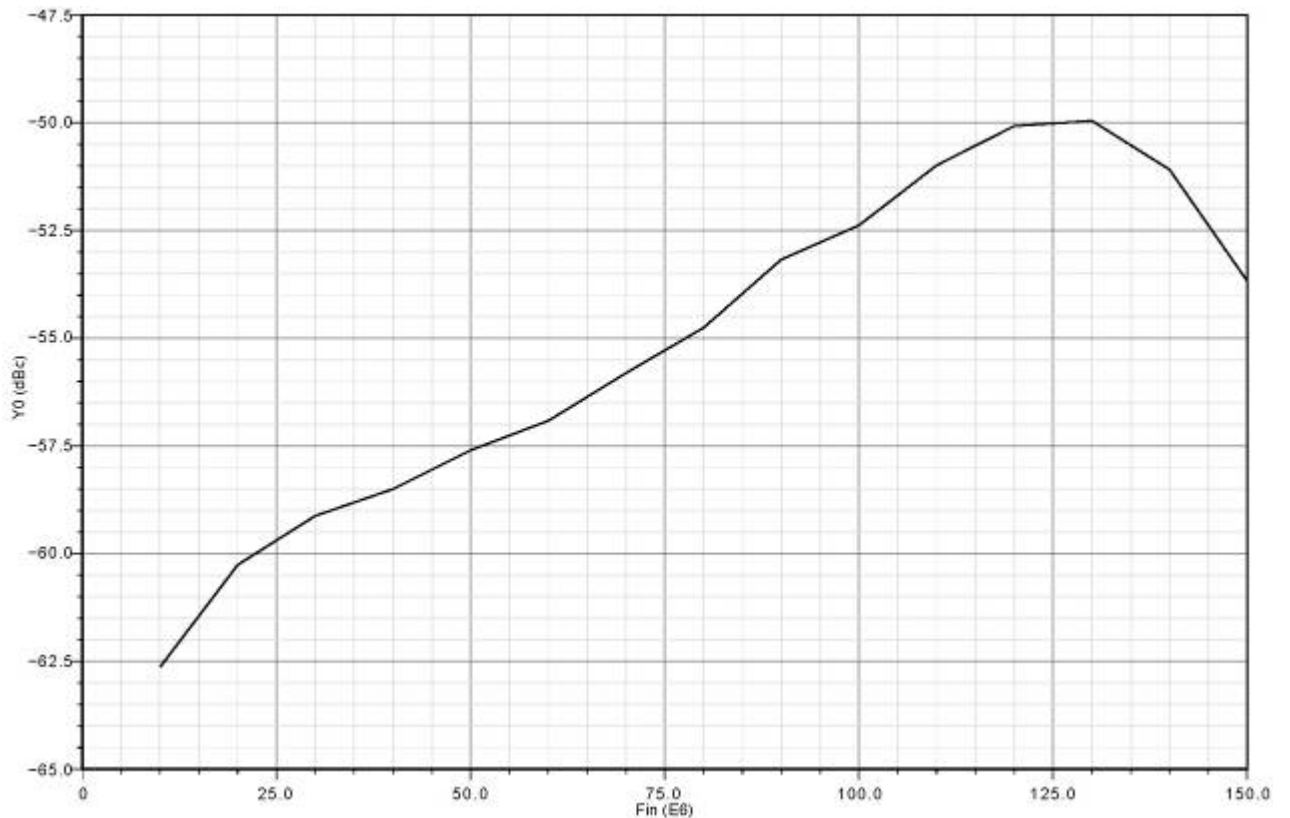


Figure 4: IM3,  $V_{out}=2V(\text{peak-peak})$ .

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## 9 DELIVERABLES

IP contents:

- Schematic or NetList
- Layout or blackbox
- Extracted view (optional)
- GDSII
- DRC, LVS, antenna report
- Test bench with saved configurations (optional)
- Documentation