

Fifth-order passive LPF

SPECIFICATION

1 FEATURES

- TSMC CMOS 0.065 μm
- Differential inputs, outputs
- Fixed cut-off frequency 150MHz
- High linearity
- Low noise figure
- Supported foundries: TSMC, UMC, Global Foundries, SMIC

2 APPLICATION

- IF signal processing

3 OVERVIEW

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

4 STRUCTURE

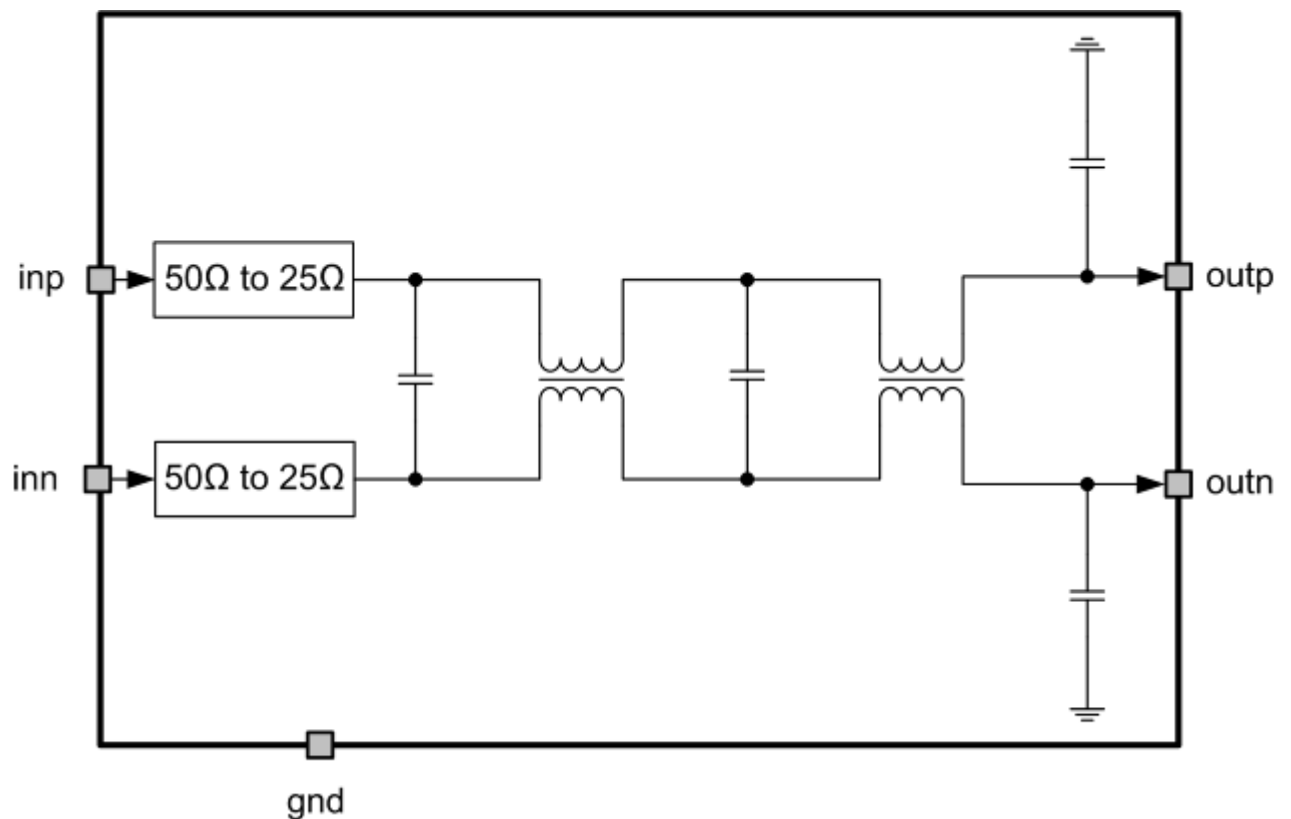


Figure 1: Fifth-order passive LPF structure.

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	μm
Width	1335	μm

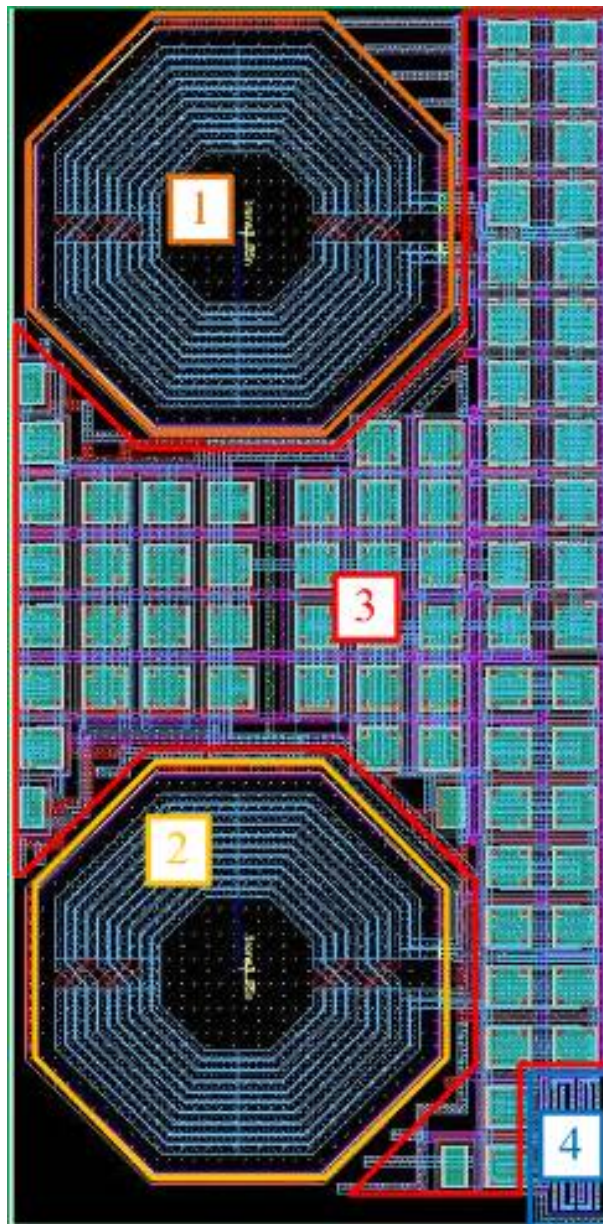


Figure 2: Device layout view.

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 mm²

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	°C
Filter order	k	-	-	5	-	-
Insertion loss	G	-	-15.0	-15.1	-15.1	dB
Input signal bandwidth	F	-	-	150	-	MHz
Amplitude ripple	ΔA	-	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	-	Ω
Output impedance	R_{out}	Differential	-	25	-	Ω

8 TYPICAL CHARACTERISTICS

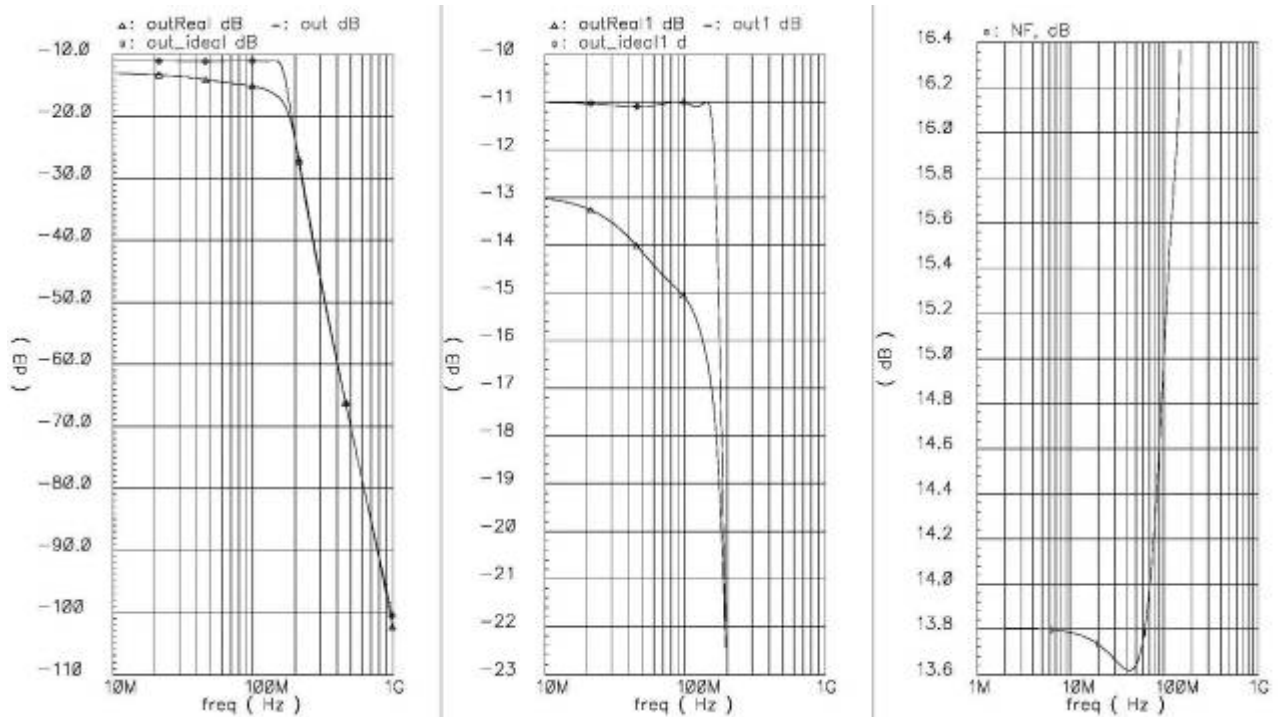


Figure 3: Amplitude frequency characteristics and noise figure for band pass 150MHz.

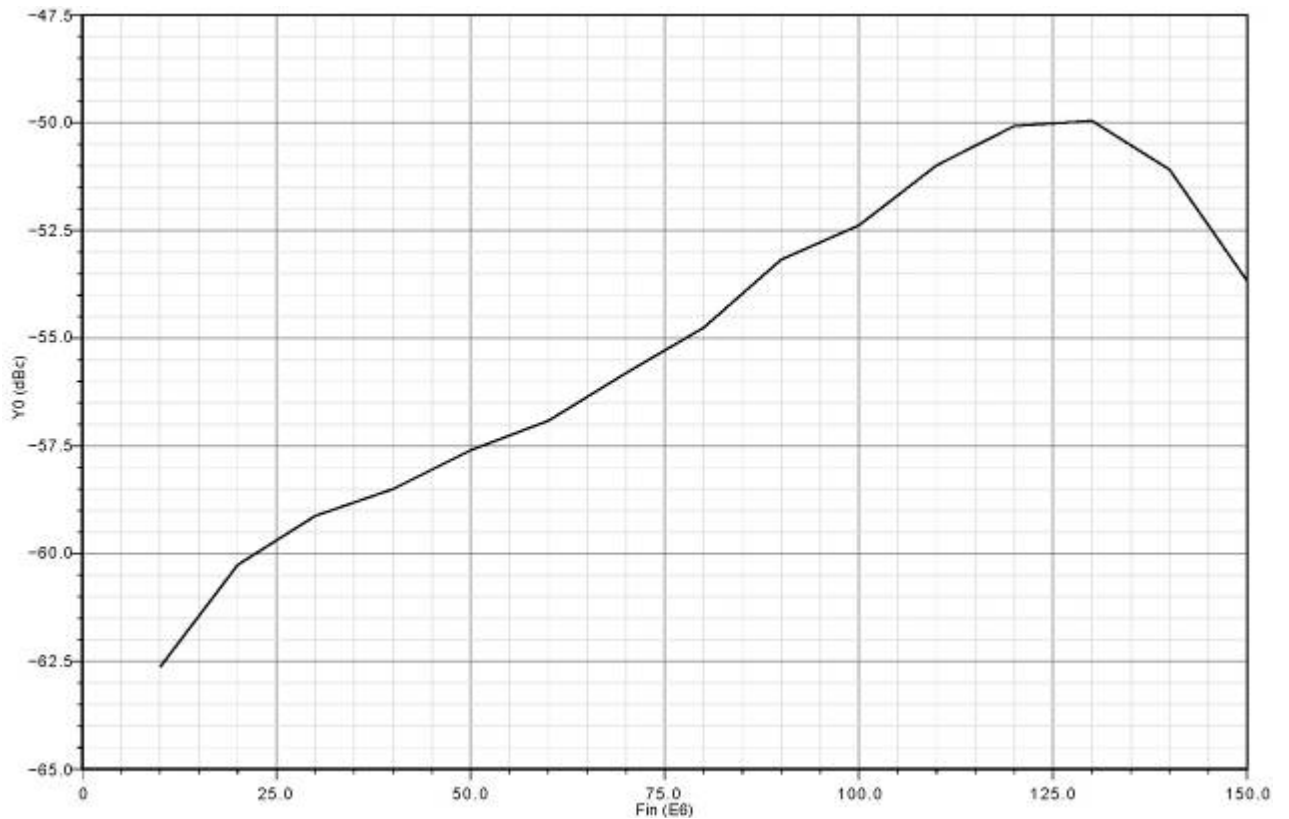


Figure 4: IM3, $V_{out}=2V$ (peak-peak).

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