1160 to 1610 MHz mixer with poly-phase filters

SPECIFICATION

1 FEATURES

- AMS035 BiCMOS 0.35 um
- Operating frequency range 1220…1610 MHz
- High gain
- Gain temperature compensation mode
- Portable to other technologies (upon request)

2 APPLICATION

- Front-end HF signal amplification in receivers

3 OVERVIEW

The mixer intended to perform a simultaneous RF signal carry, down conversion and image rejection.
The block is fabricated on AMS035 BiCMOS 0.35 um technology.

4 STRUCTURE

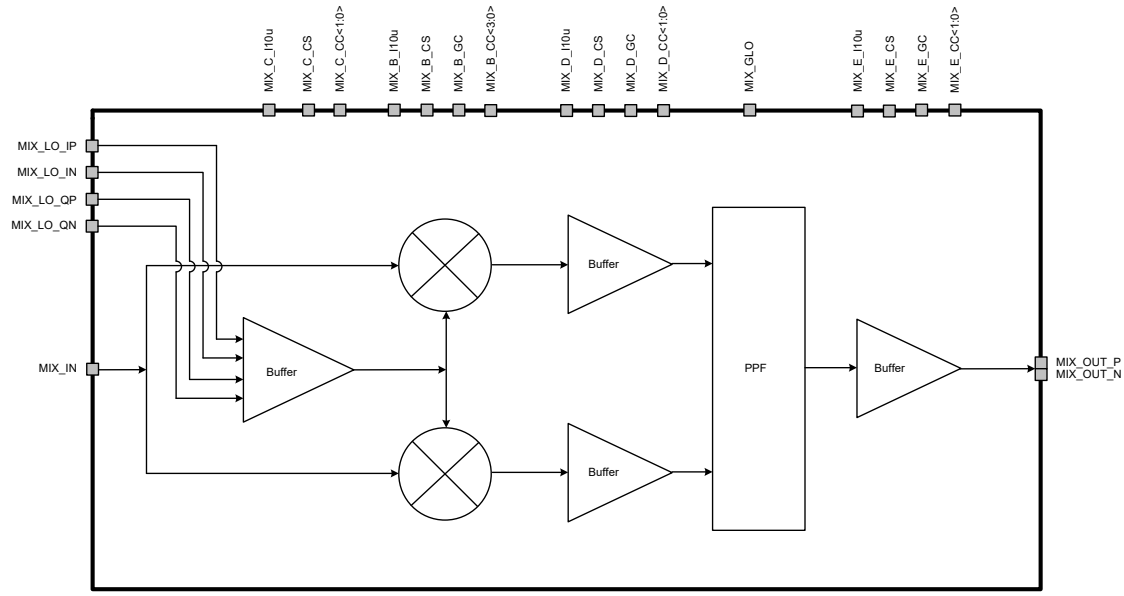


Figure 1: Image-rejection mixer structure

5 PIN DESCRIPTION

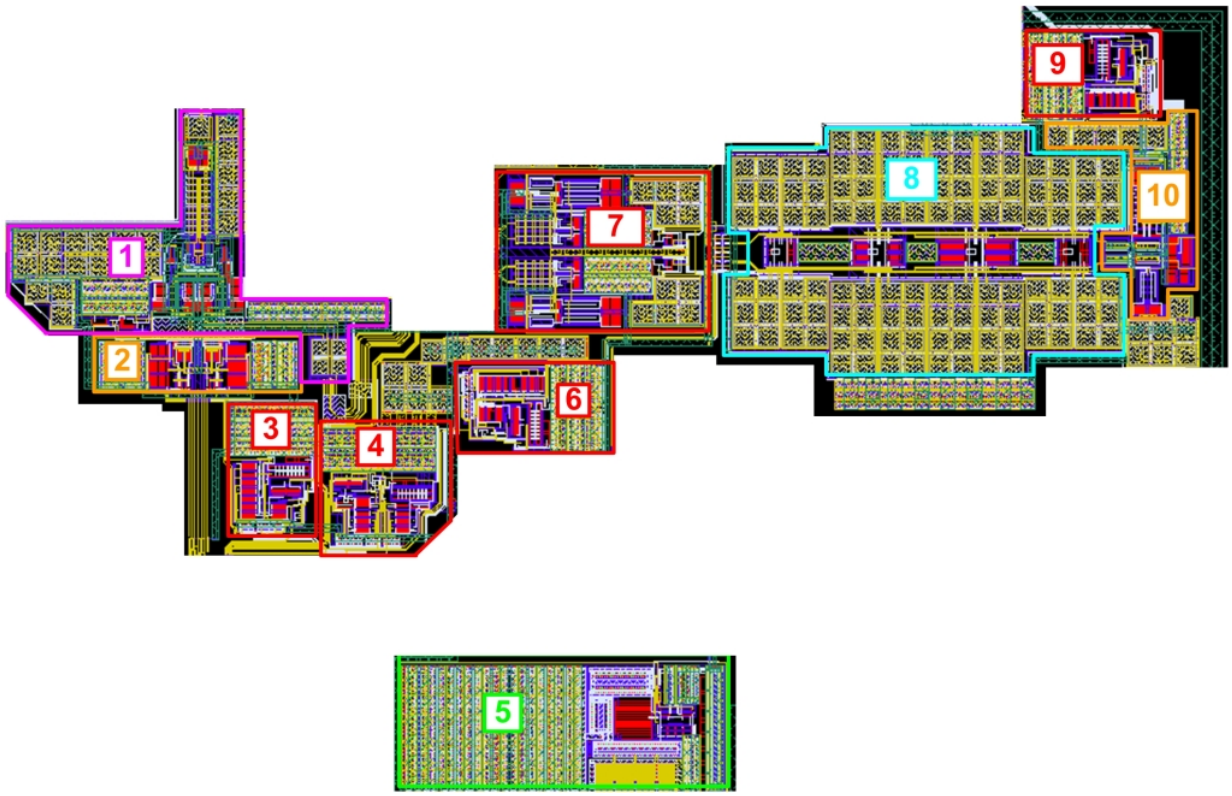
Name	Direction	Description
MIX_B_I10u	IO	Reference current mixer 10 uA
MIX_C_I10u	IO	Local-oscillator buffer reference current 10 uA
MIX_D_I10u	IO	Mixer output buffer reference current 10 uA
MIX_E_I10u	IO	PPF output buffer reference current 10 uA
MIX_IN	I	Mixer input
MIX_LO_IP	I	I channel local-oscillator differential input
MIX_LO_IN		
MIX_LO_QP	I	Q channel local-oscillator differential input
MIX_LO_QN		
MIX_EN	I	Mixer enable/disable
MIX_B_CS	I	Digital code defined the current source type (temperature independent/temperature dependent)
MIX_C_CS	I	Digital code defined the current source type (temperature independent/temperature dependent)
MIX_D_CS	I	Digital code defined the current source type (temperature independent/temperature dependent)
MIX_E_CS	I	Digital code defined the current source type (temperature independent/temperature dependent)
MIX_GLO	I	Attenuation PPF switching mode
MIX_B_GC	I	Mixer gain adjustment
MIX_D_GC	I	Mixer output buffer gain adjustment
MIX_E_GC	I	PPF output buffer gain adjustment
MIX_B_CC<3:0>	I	Mixer current consumption adjustment
MIX_C_CC<1:0>	I	Local-oscillator signal buffer current consumption adjustment
MIX_D_CC<1:0>	I	Mixer output buffer current consumption control
MIX_E_CC<1:0>	I	PPF output buffer current consumption control
MIX_OUT_P	O	Differential output
MIX_OUT_N		
MIX_VCC	IO	Supply voltage
RF_GND	IO	Ground

6 LAYOUT DESCRIPTION

Mixer dimensions are given in the table 1.

Table 1: Block dimensions

Dimension	Value	Unit
Height	1200	µA
Width	1865	µA



Figre 2: Mixer layout

1. Mixer
2. Local-oscillator signal buffer
3. Local-oscillator signal buffer reference source and voltage
4. Mixer reference source and voltage
5. Mixer voltage stabilizer
6. Mixer buffer reference source and voltage
7. Mixer buffer
8. Poly-phase filter
9. Poly-phase filter buffer reference source and voltage
10. Poly-phase filter buffer

7 OPERATING CHARACTERISTICS

7.1 TECHNICAL CHARACTERISTICS

Technology _____ AMS035 BiCMOS 0.35 um
Status _____ silicon proven
Area _____ 0.72 mm^2

7.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for V_{cc} = 2.65 ÷ 3.15 V, T = -40 ÷ +85°C. Typical values are at V_{cc} = 2.7 V, Ta = +27° 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	°C
Operating input frequency	F_{IN}	-	1160	-	1240	MHz
			1560	-	1610	MHz
Operating output frequency	F_{OUT}	-	3	-	25	MHz
Gain	G_{MIX}	-	-	5	-	dB
Noise figure	NF	-	-	12	-	dB
Input resistance	R_{IN}	-	-	300	-	Ω
Output VSWR	$VSWR_{OUT}$	2000 Ω on differential output	-	1.1	-	-
Gain irregularity	G	In the band (3-25MHz)	-	1	-	dB
Image channel rejection	S	In the band (3-25MHz)	-	30	-	dB
Input 1dB compression point	P_{1dB}	-	-	-23	-	dBm
3rd order intercept point	IIP3	-	-	-14	-	dBm
Current consumption	I_{cc}	-	-	6.3	-	mA
Stand-by current	I_{stb}	cmoswp, 100°C	-	-	200	nA
Input logic-level high	V_{IH}	-	$0.9V_{cc}$	-	V_{cc}	V
Input logic-level low	V_{IL}		-0.2	0	0.2	V

8 DELIVERABES

Depending on license type IP may include:

- Schematic or NetList
- Abstract view (.lef and .lib files)
- Layout (optional)
- Verilog behavior model
- Extracted view (optional)
- GDSII
- DRC, LVS, antenna report
- Test bench with saved configurations (optional)
- Documentation

REVISION HISTORY

1. From version 1.0:
   - Section “Technical characteristics” (refer to page 4)