

Quadrature former 75-750 MHz

SPECIFICATION

1 FEATURES

- TSMC CMOS 65 nm
- Output frequency range 75-750 MHz
- Input signal division (by 8, 16, 32 or 64)
- High accuracy of the phase control
- Operating-temperature range: from -40 °C to + 125 °C
- Portable to other technologies (upon request)

2 APPLICATION

- Quadrature signal processing for mixer

3 OVERVIEW

This device is designed to generate a quadrature heterodyne (oscillator) signal. CML logic quadrature generator consists of pre-switchable divider with the division factor 1, 2, 4, 8, divider by 2, divider by 4 that form quadrature signal, output signal (to the input) strobbing block, and phase adjustment block implemented on signal delay time.

4 STRUCTURE

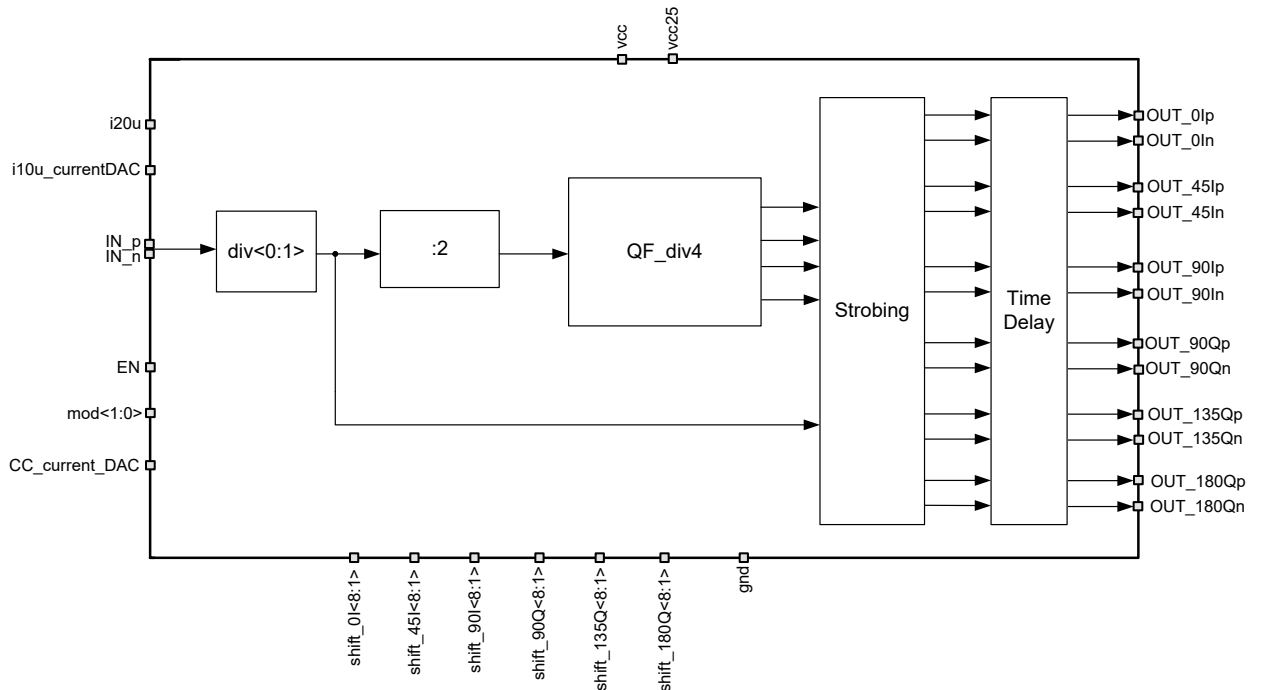


Figure 1: Quadrature former 75-750 MHz structure

5 PIN DESCRIPTION

Name	Direction	Description
i20u	IO	Reference current 20 μ A
i10u_currentDAC	IO	Reference current 10 μ A
EN	I	QF enable quadrature former
mod<1:0>	I	Divider mode
shift_0I<8:1>	I	Phase correction control
shift_45I<8:1>	I	
shift_90I<8:1>	I	
shift_90Q<8:1>	I	
shift_135Q<8:1>	I	
shift_180Q<8:1>	I	
CC_DAC	I	DAC current consumption control
IN_p	I	Differential input
IN_n	I	
OUT_0Ip	O	I+ channel differential output
OUT_0In	O	
OUT_45Ip	O	I0 channel differential output
OUT_45In	O	
OUT_90Ip	O	I- channel differential output
OUT_90In	O	
OUT_90Qp	O	Q- channel differential output
OUT_90Qn	O	
OUT_135Qp	O	Q0 channel differential output
OUT_135Qn	O	
OUT_180Qp	O	Q+ channel differential output
OUT_180Qn	O	
vcc25	IO	Supply voltage 2.5 V
vcc	IO	Supply voltage 1.2 V
gnd	IO	Ground

6 LAYOUT DESCRIPTION

The block dimensions are given in table 1.

Table 1: Block dimensions

Dimension	Value	Unit
Height	230	μm
Width	600	μm

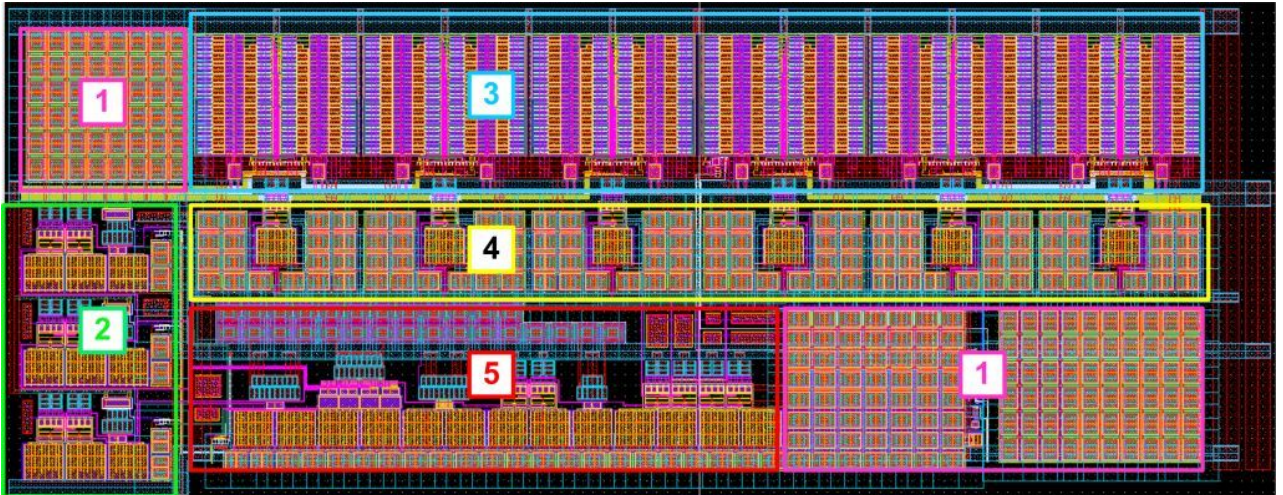


Figure 2: Quadrature former 75-750 MHz layout view

1. Capacitors
2. Divider
3. Time delay
4. Strobing
5. QF and divider by 2

7 OPERATING CHARACTERISTICS

7.1 TECHNICAL CHARACTERISTICS

Technology _____ TSMC CMOS 65 nm
 Status _____ silicon proven
 Area _____ 0.014 mm²

7.2 ELECTRICAL CHARACTERISTICS

The values of electrical characteristics are specified for $V_{cc} = 1.14 \div 1.26$ V and $T = -40 \div 125$ °C. Typical values are at $V_{cc} = 1.2$ V and $T = +85$ °C, unless otherwise specified.

Parameter	Symbol	Condition	Value			Unit
			min	type	max	
Supply voltage	V_{cc}	-	1.14	1.2	1.26	V
Temperature range	T	-	-40	+85	+125	°C
Input frequency range	F_{in}	-	3.0	-	6.0	GHz
Output frequency range	F_{out}	-	75	-	750	MHz
Input frequency division ratio	N	mod= "00"	-	8	-	-
		mod= "01"	-	16	-	
		mod= "10"	-	32	-	
		mod= "11"	-	64	-	
Output amplitude	$V_{out-p-p}$	-	-	0.5	-	V
Input amplitude	V_{in-p-p}	-	0.5	-	-	V
IQ phase error	φ	-	-	-	± 2	degree
Phase adjustment range	$\varphi_{corr.}$	-	-	-	± 5	degree
Current consumption	I_{av}	-	-	15	17	mA
Input logic-level high	V_{IH}	For digital inputs	$0.85V_{cc}$	-	V_{cc}	V
Input logic-level low	V_{IL}		-0.1	-	+0.1	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