

K Band Mixer

GaAs Monolithic Microwave IC

preliminary

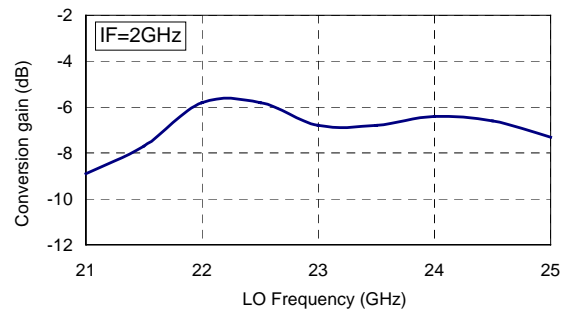
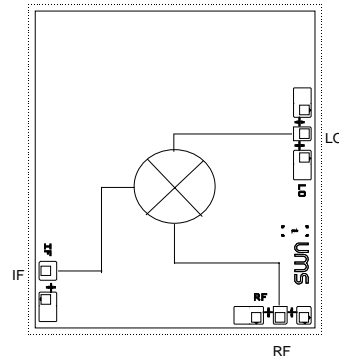
Description

The CHM1191 is a balanced Schottky diode mixer based on a six quarter wave ring structure. It could be use in receiver or transmitter part.

This circuit is manufactured with the BES-MMIC process: 1 μm Schottky diode device, air bridges, via holes through the substrate, stepper lithography.

An electrically identical chip with a mirror drawing versus de LO side is available under the part number CHM1190. These two MMICs could be helpful in a TX, RX architecture module.

It is available in chip form.



Typical conversion characteristic
(measurement in test fixture)

Main Features

- 22-24 GHz LO frequency range
- IF from 1 to 3 GHz
- Low conversion loss up & down
- High LO/RF isolation
- Low LO input power
- Small chip size: 1.73 x 1.53 x 0.10 mm

Main Characteristics

Tamb. = 25°C

Symbol	Parameter	Typ	Unit
F_LO,	LO frequency range	22-24	GHz
F_IF	IF frequency range	1 - 3	GHz
Lc	Conversion loss @ P-LO = 7dBm	7	dB
I_LO/RF	LO/RF isolation	30	dBc

ESD Protection : Electrostatic discharge sensitive device. Observe handling precautions !

Electrical Characteristics

Tamb. = 25°C

Symbol	Parameter	Min	Typ	Max	Unit
F_LO	LO frequency range	22		24	GHz
F_IF	IF frequency range	1		3	GHz
Lc	Conversion loss @ P-LO = 7dBm (1)		7		dB
P_LO	LO input power	5	7	9	dBm
P-1dB	Input 1dB compression		7		dBm
VSWR_LO	LO port VSWR (50Ω) (2)		2.5:1		
VSWR_RF	RF port VSWR (50Ω) (2)		2.5:1		
VSWR_IF	RF port VSWR (50Ω) (2)		2.5:1		
I_LO/RF	LO/RF isolation		30		dBc

(1) On wafer measurements.

(2) Depends on the wire bonding conditions and on the external matching network.

Absolute Maximum Ratings (1)

Tamb = +25°C

Symbol	Parameter	Values	Unit
P_LO	Maximum peak input power overdrive at LO port (2)	10	dBm
P_RF	Maximum peak input power overdrive at RF port (2)	10	dBm
P_IF	Maximum peak input power overdrive at IF port (2)	10	dBm
Top	Operating temperature range	-40 to +85	°C
Tstg	Storage temperature range	-55 to +125	°C

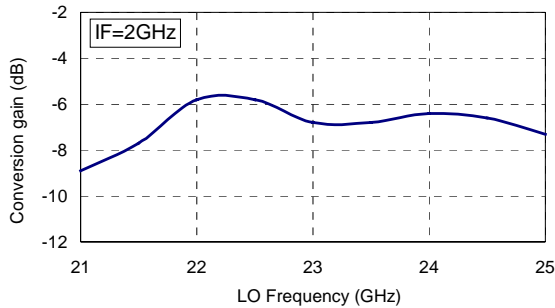
(1) Operation of this device above any of these parameters may cause permanent damage.

(2) Duration < 1s

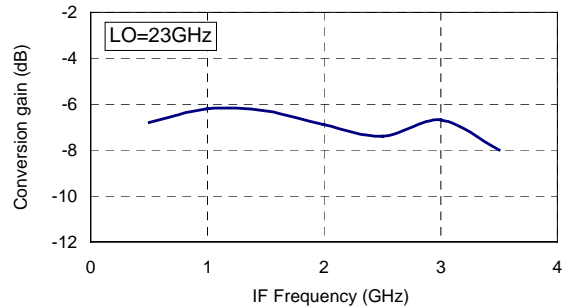
Typical test fixture measurements

Tamb. = 25°C

A) Down- converter

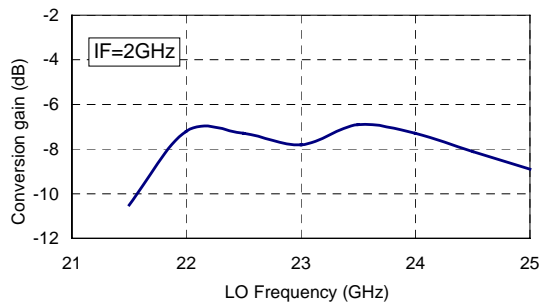


Conversion gain versus LO frequency
LO Input power= 9dBm (1)

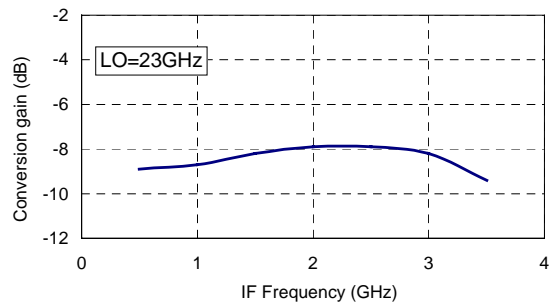


Conversion gain versus IF frequency
LO Input power= 9dBm (1)

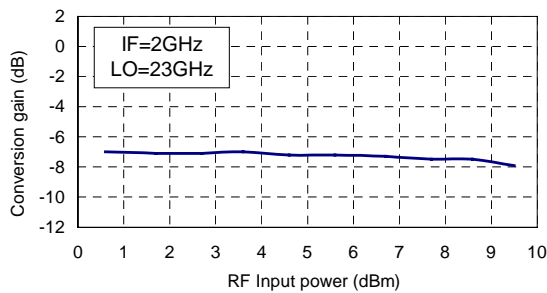
B) Up- converter



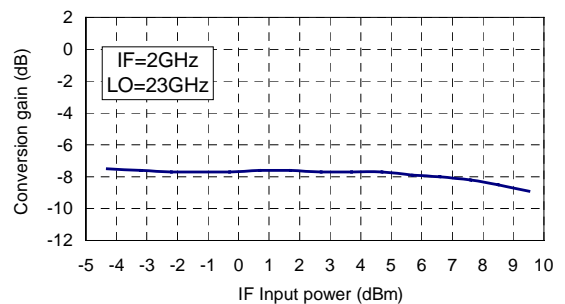
Conversion gain versus LO frequency
LO Input power= 9dBm (1)



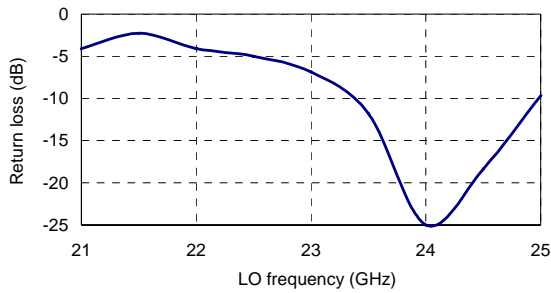
Conversion gain versus IF frequency
LO Input power= 9dBm (1)



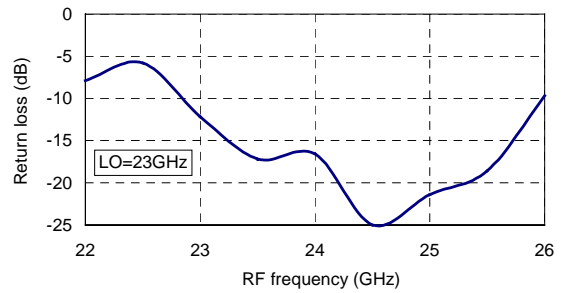
Input compression point versus RF power
LO Input power= 9dBm (1)



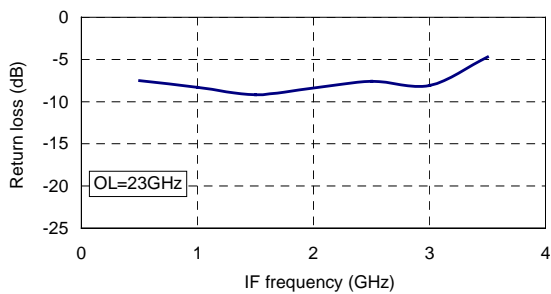
Input compression point versus IF power
LO Input power= 9dBm (1)



LO Return loss (1)
LO input power = 9dBm



RF Return loss (1)
LO input power = 9dBm

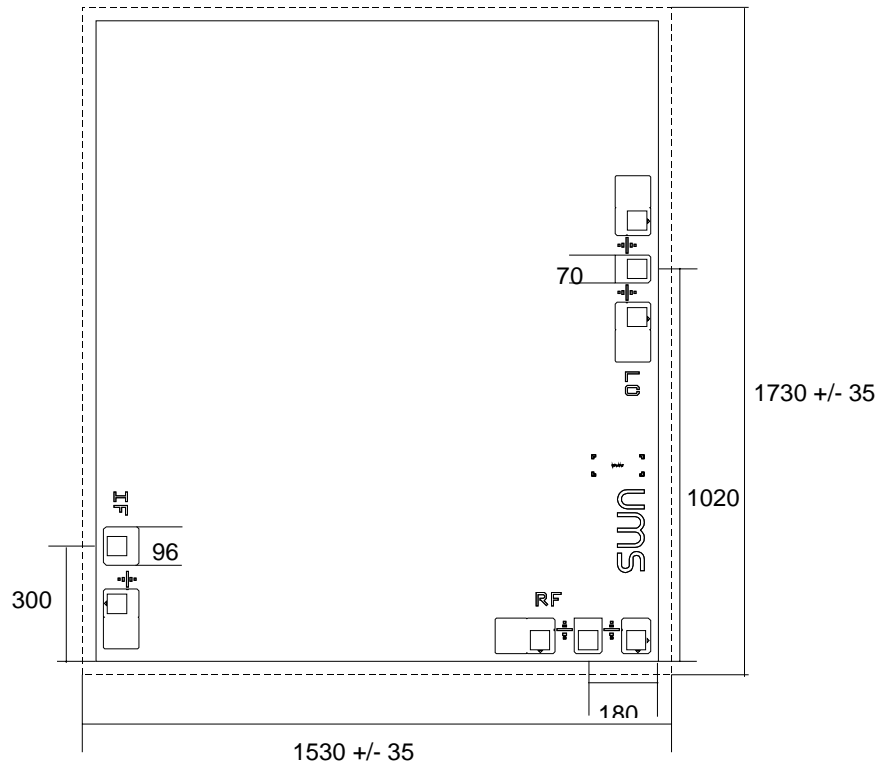


IF Return loss
LO input power = 9dBm

(1) This measurement is made with an external matching network. See application note for further information.

Chip Mechanical Data

(dimensions are in μm)

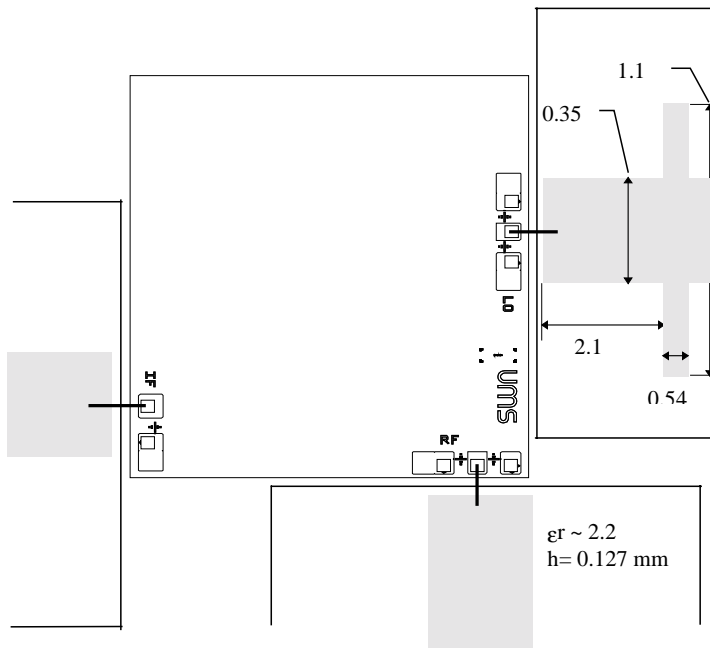


Chip size (including saw streets) : $1730 \times 1530 \pm 35\mu\text{m}$
 Thickness: $100\mu\text{m} \pm 10\mu\text{m}$

Pin	Description
LO	LO input signal
RF	RF input or output signal
IF	IF input or output signal

An electrically identical chip with a mirror drawing versus de LO side is available under the part number CHM1190.

Application note



*Example of integration using low dielectric constant substrate : $\epsilon_r=2.2$,
height=0.127mm (dimensions are in mm)*

In order to use acceptable wire bonding length, an external matching network is proposed for the LO input on low dielectric constant substrat.

Ordering Information

Chip form : CHM1191-99F/00

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