# 35-45GHz Single Side Band Mixer Self biased

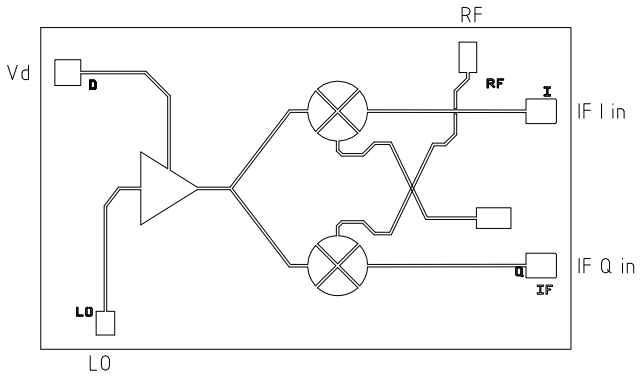
Preliminary

## GaAs Monolithic Microwave IC

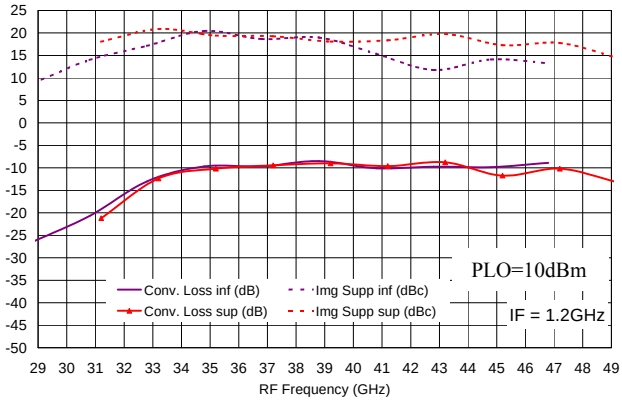
## Description

The MFC_PO10892 is a multifunction chip (MFC) which integrates a self biased LO buffer amplifier and a sub-harmonically balanced diode mixer for 2LO suppression and image rejection. It is usable both for up-conversion and down-conversion.
It is designed for a wide range of applications, typically commercial communication systems for broadband local access. The backside of the chip is both RF and DC grounded. This helps to simplify the assembly process.

The circuit is manufactured with a P-HEMT process, 0.25µm gate length.
It is available in chip form.




Up converter in Infradyne & supradyne mode




## Main Features

- Broadband performances : 35-45GHz
- 11dB conversion Loss
- 15dBc image rejection
- +10dBm LO input power
- +0dBm input power (1dB gain comp.)
- Power consumption 60mA@4V
- Chip size : 2.06 x 1.25 x 0.10 mm

## Main Characteristics

Tamb. = 25°C

| | Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| $F_{RF}$ | RF frequency range | 35 | | 45 | GHz |
| $F_{LO}$ | LO frequency range | 16 | | 24 | GHz |
| $F_{IF}$ | IF frequency range | DC | | 3 | GHz |
| $L_c$ | Conversion Loss | | 11 | | dB |

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



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## Electrical Characteristics for Broadband Operation

Tamb = +25℃

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| Symbol | Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| $F_{LO}$ | LO frequency range | 16 | | 24 | GHz |
| $F_{IF}$ | IF frequency range | DC | | 3 | GHz |
| $L_c$ | Conversion Loss | | 11 | | dB |
| $P_{LO}$ | LO Input power | | +10 | | dBm |
| 2xLO Leak | 2xLO Leakage (for $P_{LO}$=+10dBm) | | -35 | - | dBm |
| Img Rej | Image Rejection (1) | | 15 | | dBc |
| P1dB | Input power at 1dB compression | | +0 | | dBm |
| LO Match | LO VSWR* | | 2.0:1 | | |
| RF Match | RF VSWR* | | 2.0:1 | | |
| IF Match | IF VSWR* | | 2.0:1 | | |
| Vd | Drain bias supply | | 4 | | V |
| Id | Bias current | | 60 | | mA |

(1) With external quadrature hybrid coupler (reference on request). The minimal value depends on the quality of the external quadrature combiner.

* A bonding wire of typically 0.1 to 0.15 nH will improve the accesses matching.

## Absolute Maximum Ratings

Tamb. = 25℃ (1)

| Symbol | Parameter | Values | Unit |
|---|---|---|---|
| Vd | Drain bias voltage | 4.5 | V |
| Id | Drain bias current | 90 | mA |
| $P_{LO}$ | Maximum LO input power | 15 | dBm |
| Ta | Operating temperature range | -40 to +85 | ℃ |
| Tstg | Storage temperature range | -55 to +125 | ℃ |

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



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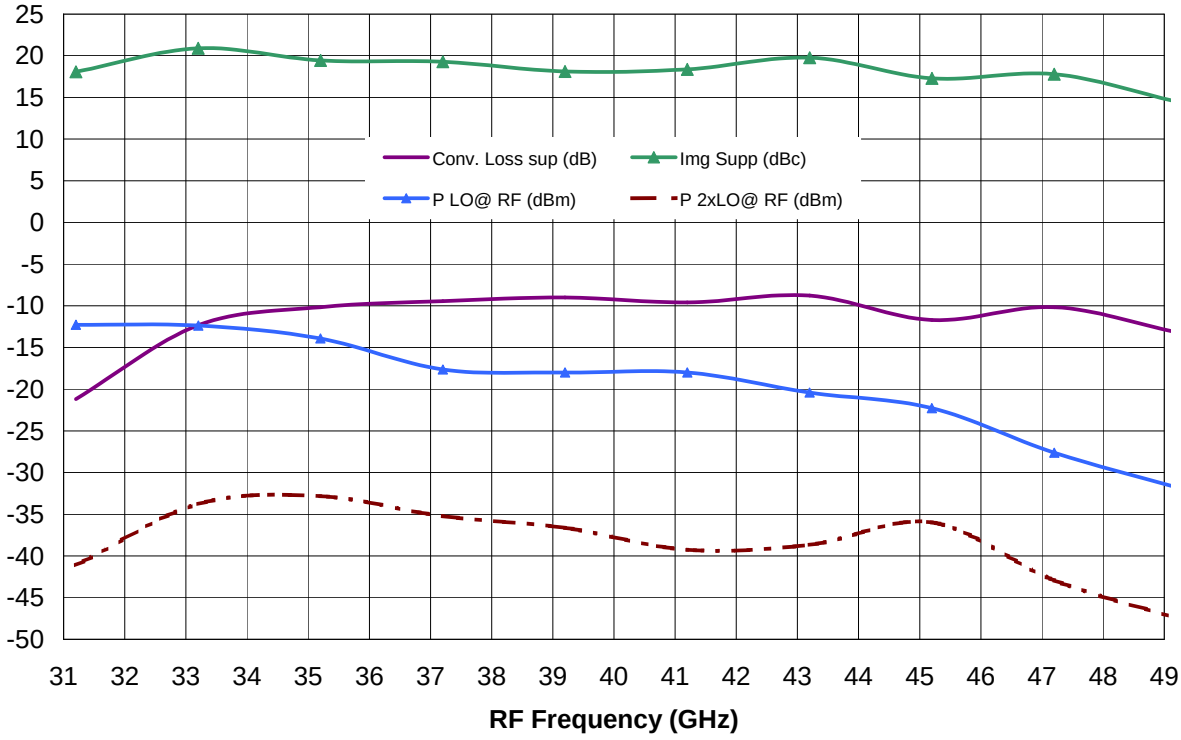
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## Typical on wafer measurement

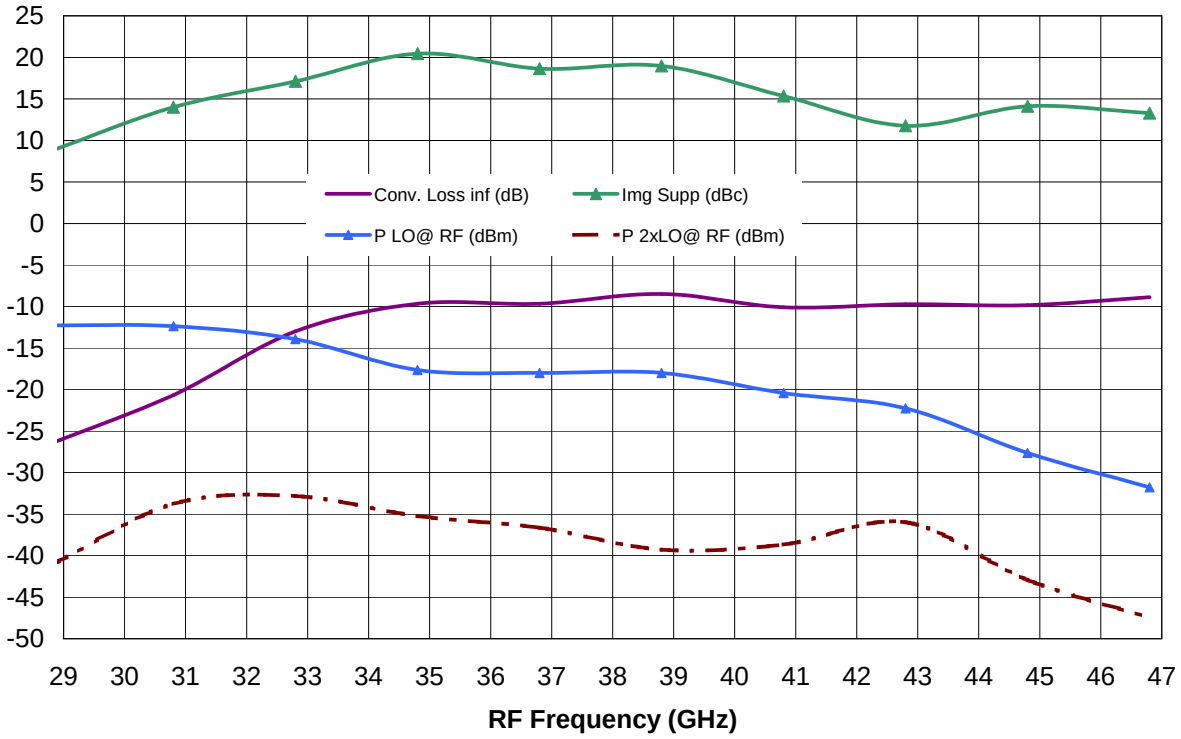
Tamb= 25℃, Vd=4V, Id=60mA, Freq IF=1.2GHz, P_LO=10 dBm

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### Up Converter in Supradyne mode




### Up Converter in Infradyne mode



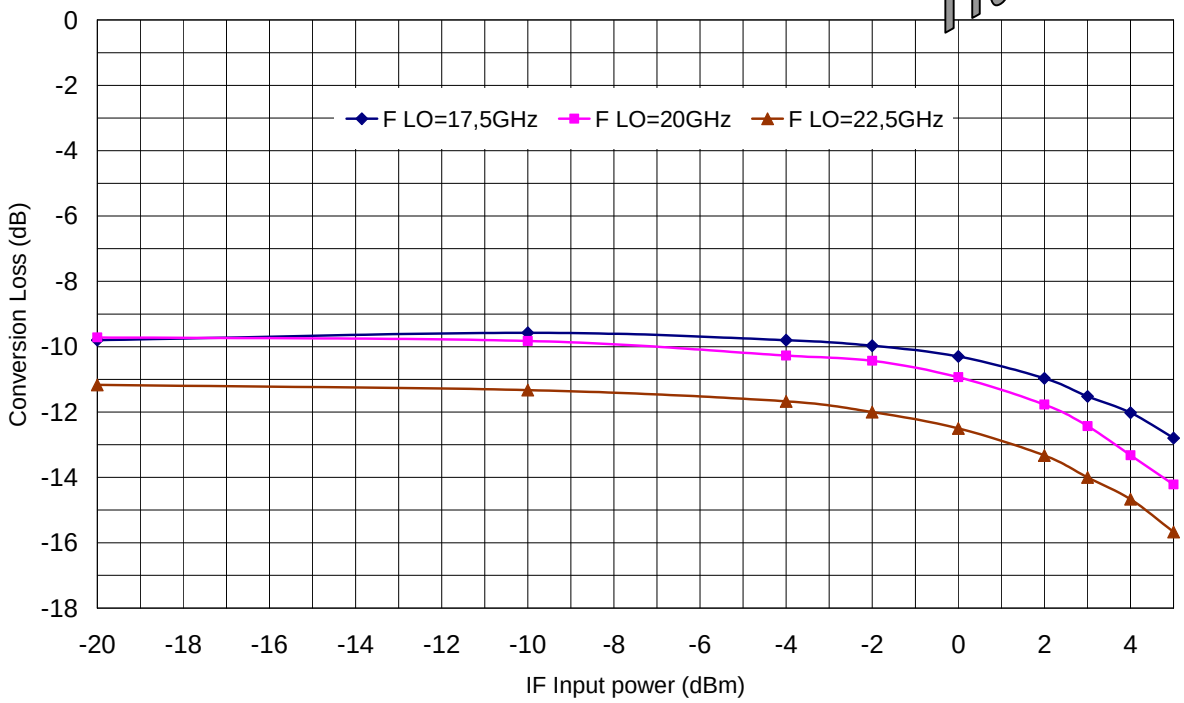



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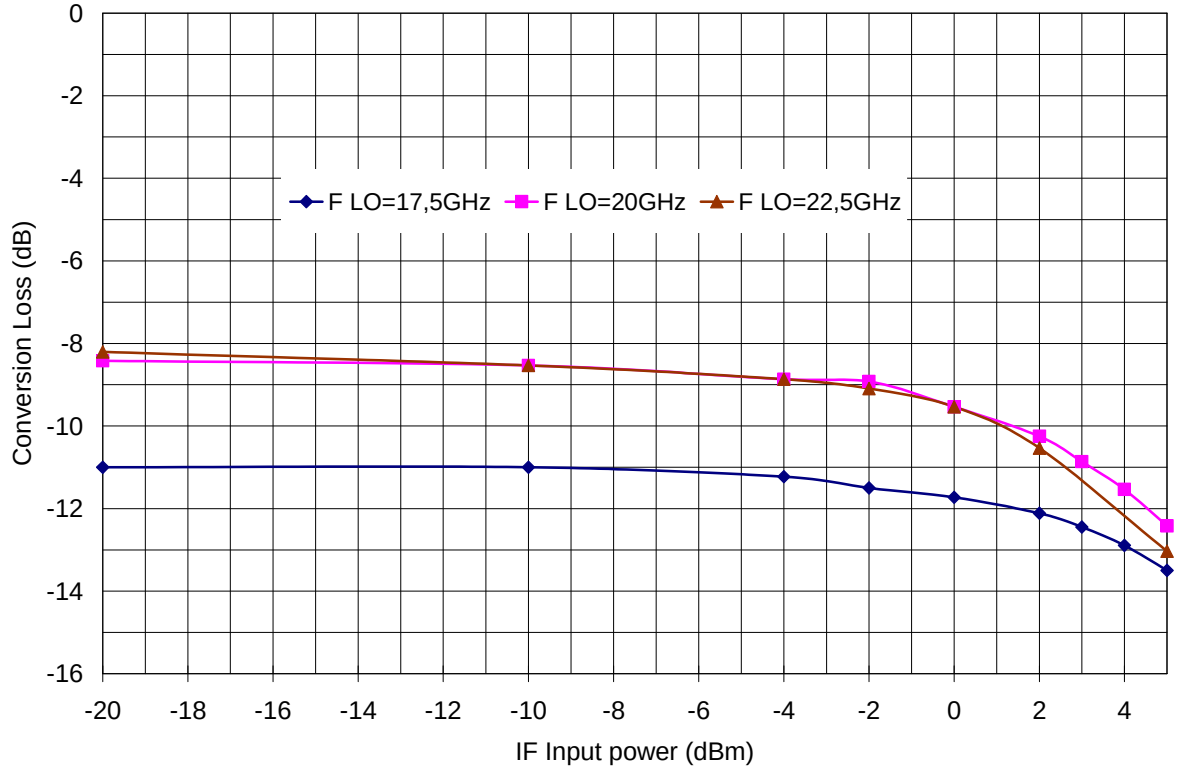
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## Up Converter compression in Supradyne mode




## Up Converter compression in Infradyne mode

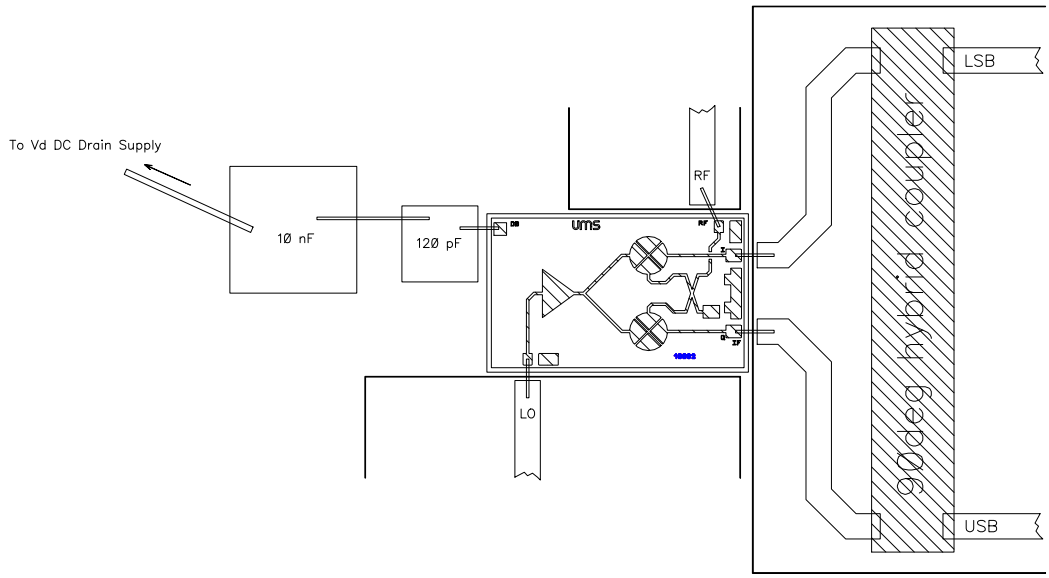




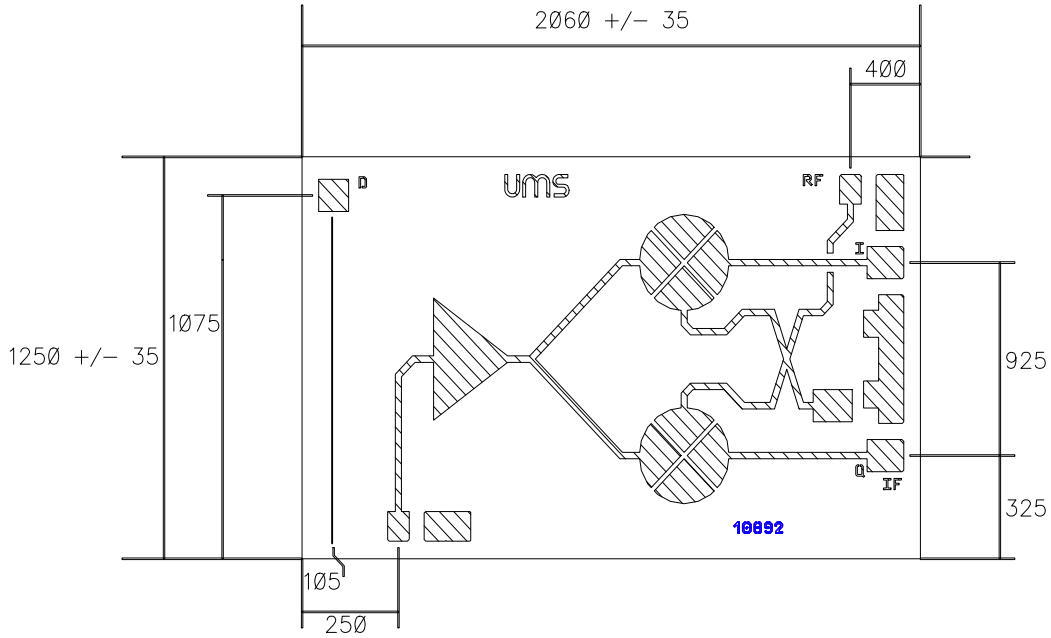

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## Chip Assembly and Mechanical Data




Note : Supply feed should be capacitively bypassed. 25µm diameter gold wire is recommended




**Chip Mechanical Data and Pin references**

( Chip thickness : 100µm. All dimensions are in micrometers )



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## Ordering Information

Chip form: MFC-PO10892-99F/00

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