# 17-20GHz Integrated Down Converter

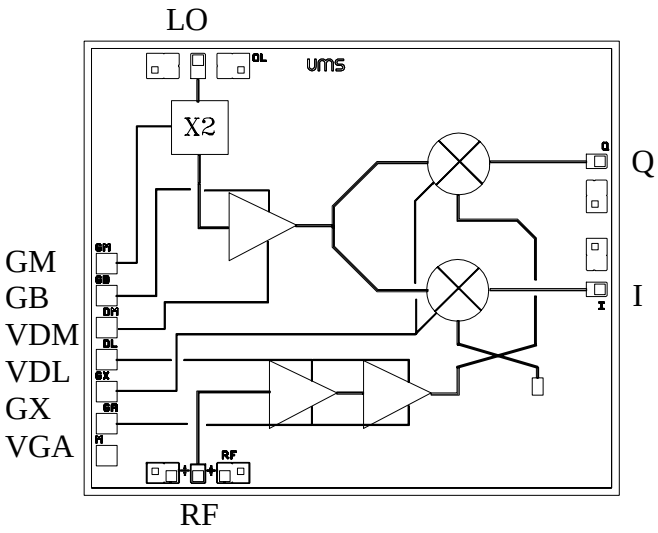
## GaAs Monolithic Microwave IC

preliminary

## Description

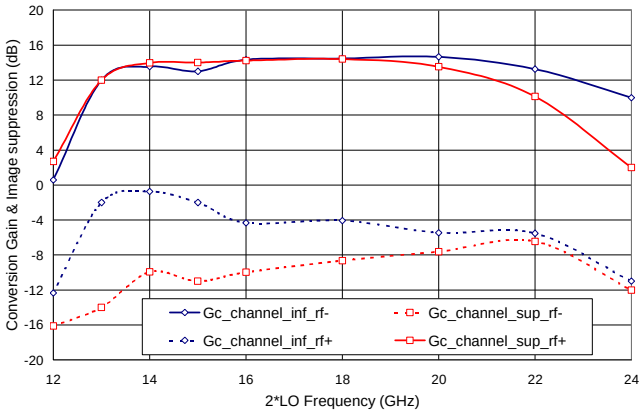
The CHR2292 is a multifunction chip which integrates a LO time two multiplier, a balanced cold FET mixer, and a RF LNA. It is designed for a wide range of applications, typically commercial communication systems. The backside of the chip is both RF and DC grounds. This helps simplify the assembly process.

The circuit is manufactured with a PM-HEMT process, 0.25µm gate length, via holes through the substrate, air bridges and electron beam gate lithography.
It is available in chip form.




## Main Features

- Broadband performances : 17-20GHz
- 13dB conversion gain
- 4.0dB noise figure
- 10dBm LO input power
- -10dBm RF input power (1dB gain comp.)
- Low DC power consumption, 110mA@3.5V
- Chip size : 2.49 X 2.13 X 0.10 mm




Conversion Gain for F_IF=1GHz (on wafer meas.)
P_LO=+10dBm / P_RF= -20dBm

## Main Characteristics

Tamb. = 25°C

| | Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| $F_{RF}$ | RF frequency range | 17 | | 20 | GHz |
| $F_{LO}$ | LO frequency range | 7.5 | | 10 | GHz |
| $F_{IF}$ | IF frequency range | 0.25 | | 1.5 | GHz |
| $G_c$ | Conversion gain | | 13 | | dB |

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



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## Electrical Characteristics for Broadband Operation

Tamb = +25°C, Vd = 3.5V

| Symbol | Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| $F_{RF}$ | RF frequency range | 17 | | 20 | GHz |
| $F_{LO}$ | LO frequency range | 7.5 | | 10 | GHz |
| $F_{IF}$ | IF frequency range | 0.25 | | 1.5 | GHz |
| $P_{LO}$ | LO Input power | | +10 | | dBm |
| $G_c$ | Conversion gain (1) | | 13 | | dB |
| NF | Noise Figure (1) | | 4.0 | | dB |
| Img Sup | Image Suppression (1) | | 15 | | dBc |
| P1dB | RF Input power at 1dB gain compression (1) | | -10 | | dBm |
| LO VSWR | Input LO VSWR (1) | | 1.5:1 | | |
| RF VSWR | Input RF VSWR (1) | | 2.5:1 | | |
| Id | Bias current (2) | | 110 | | mA |

(1) On Wafer measurements without bonding wires at the RF ports.

(2) Current source biasing network is recommended. Optimum performances for Idm=50mA and Idl=60mA

## Absolute Maximum Ratings

Tamb. = 25°C (1)

| Symbol | Parameter | Values | Unit |
|---|---|---|---|
| Vd | Drain bias voltage | 4.0 | V |
| Id | Drain bias current | 200 | mA |
| Vg | Gate bias voltage | -2.0 to +0.4 | V |
| Pin | Maximum peak input power overdrive (2) | +15 | dBm |
| Ta | Operating temperature range | -40 to +85 | °C |
| Tstg | Storage temperature range | -55 to +155 | °C |

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



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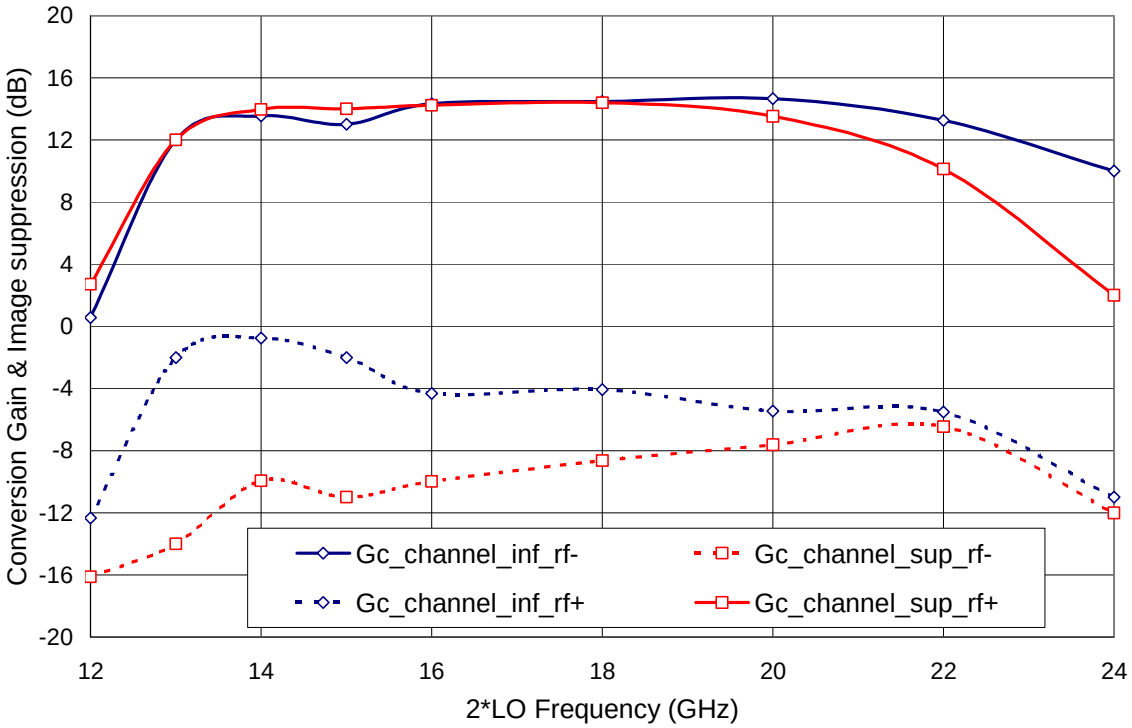
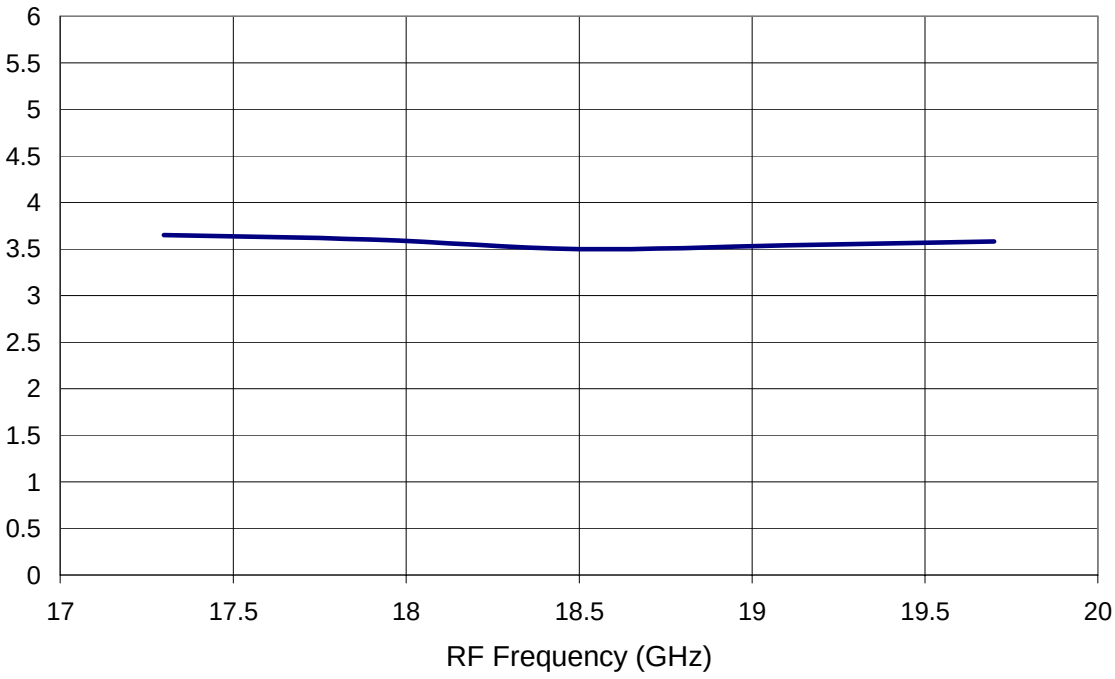
## Typical On-wafer Measurements

Bias Conditions :Vdm= Vdl= 3.5 V, Vgm= -0.9V, Vgb= 0.4V, Vgx= -0.7V, Vga= -0.35V




**Conversion Gain & Image Suppresion @ IF=1GHz**




**Noise figure (dB) by channel**



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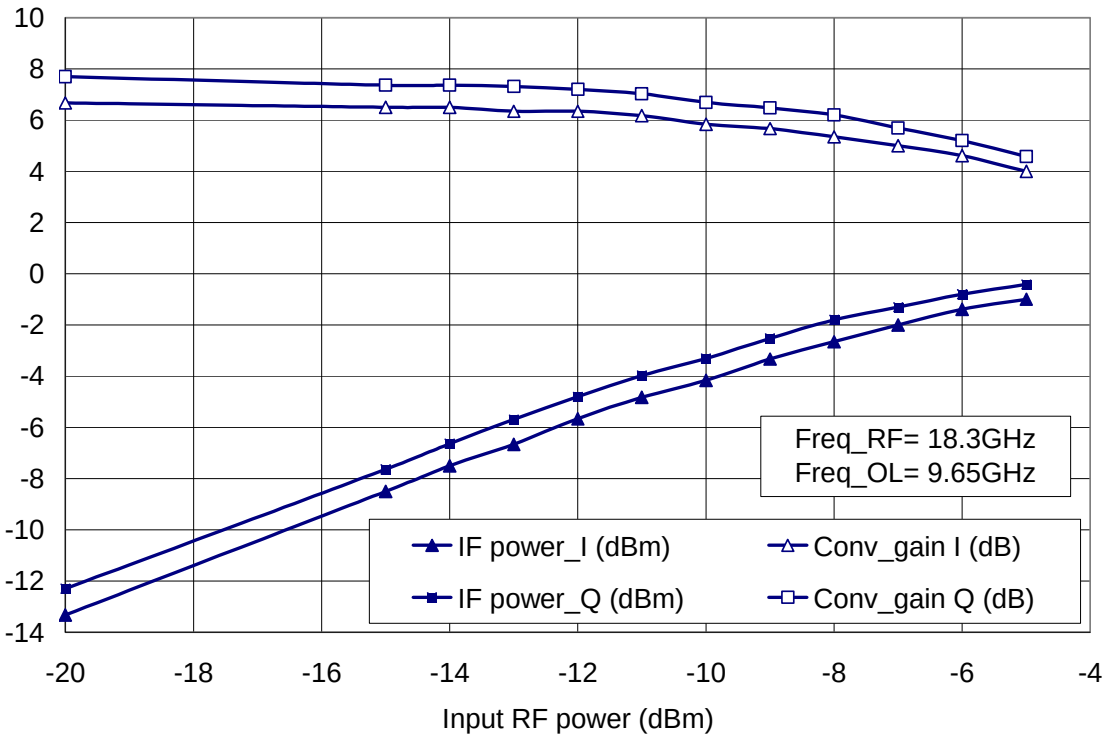


**Input RF compression by channel**



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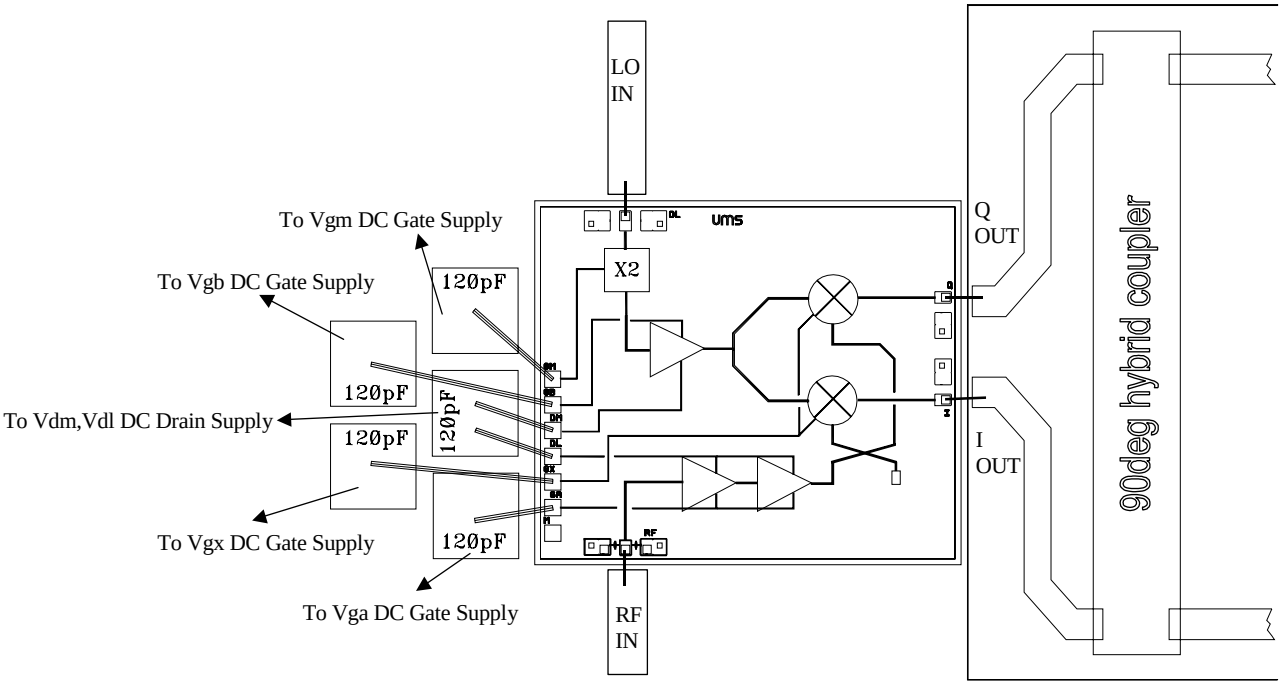
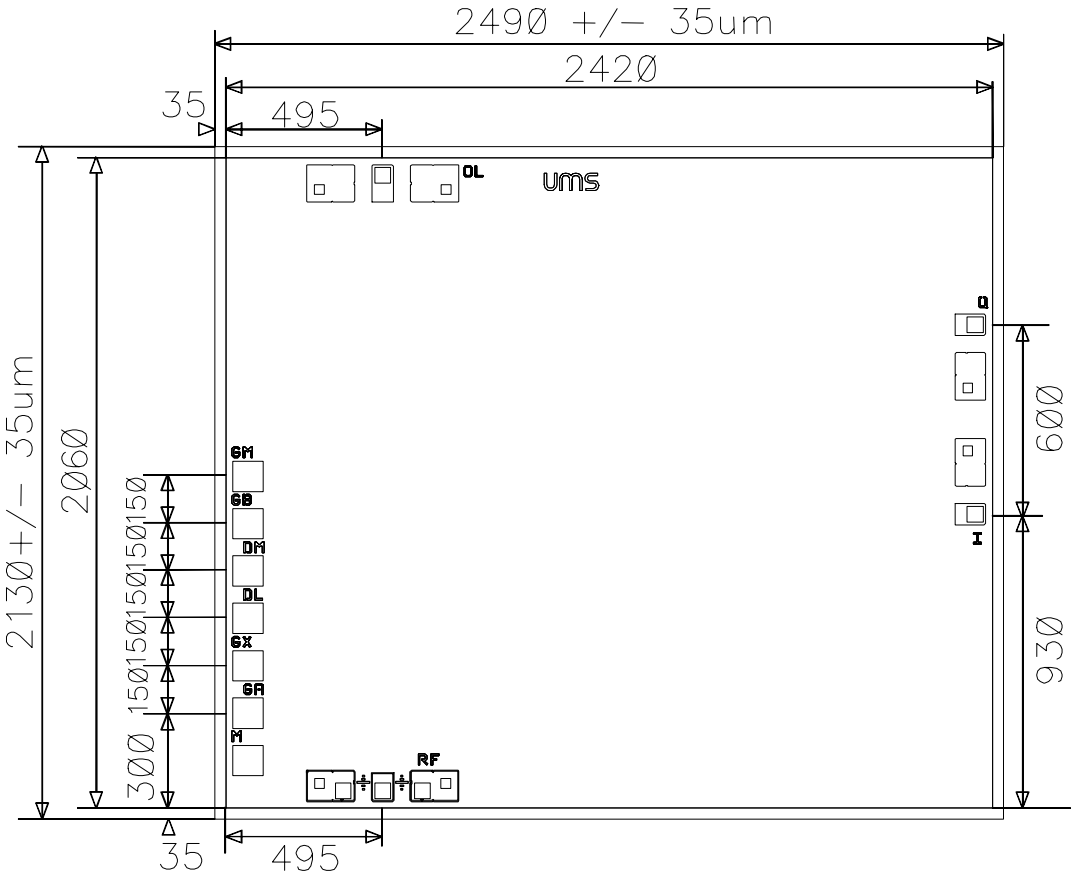
## Chip Assembly and Mechanical Data




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




**Bonding pad positions**

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



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## Ordering Information

Chip form : CHR2292-99F/00

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