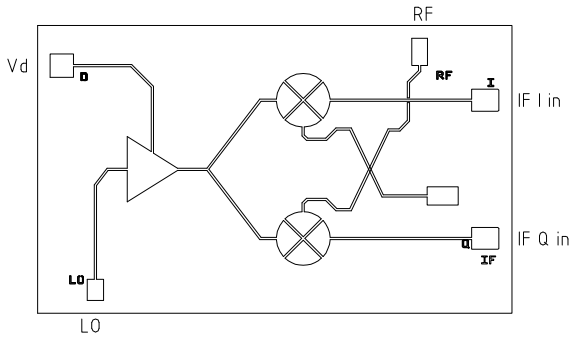
25-35GHz Single Side Band Mixer
Self biased

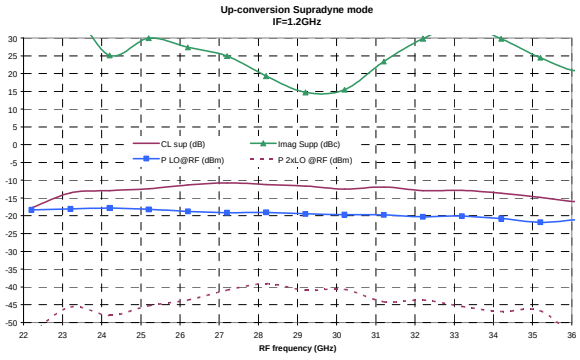
GaAs Monolithic Microwave IC

Description

The CHR2294 is a multifunction chip (MFC) which integrates a self biased LO buffer amplifier and a sub-harmonically balanced diodes mixer for 2LO suppression and image rejection. It is usable for both 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 pHEMT 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: 25-35GHz
- 11dB conversion Loss
- 15dBc image rejection
- +9dBm LO input power
- +2.5dBm input power (1dB gain comp.)
- Low DC power consumption, 55mA@4V
- Chip size: 2.06 x 1.25 x 0.10mm

Main Characteristics

Tamb. = 25°C

	Parameter	Min	Typ	Max	Unit
F_{RF}	RF frequency range	25		35	GHz
F_{LO}	LO frequency range	11		19	GHz
F_{IF}	IF frequency range	DC		3.5	GHz
L_c	Conversion Loss	15	11		dB

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

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Electrical Characteristics for Broadband Operation

Tamb = +25℃

Symbol	Parameter	Min	Typ	Max	Unit
FRF	RF frequency range	25		35	GHz
FLO	LO frequency range	11		19	GHz
FIF	IF frequency range	DC		3.5	GHz
Lc	Conversion Loss	15	11		dB
PLO	LO Input power		+9		dBm
2xLO Leak	2xLO Leakage (for PLO=+5dBm)		-35		dBm
Img Rej	Image Rejection (1)		15		dBc
P1dB	Input power at 1dB gain compression		+2.5		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 voltage		4		V
Id	Bias current		55		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 0.15nH will improve the accesses matching.

Absolute Maximum Ratings

Tamb. = 25℃ (1)

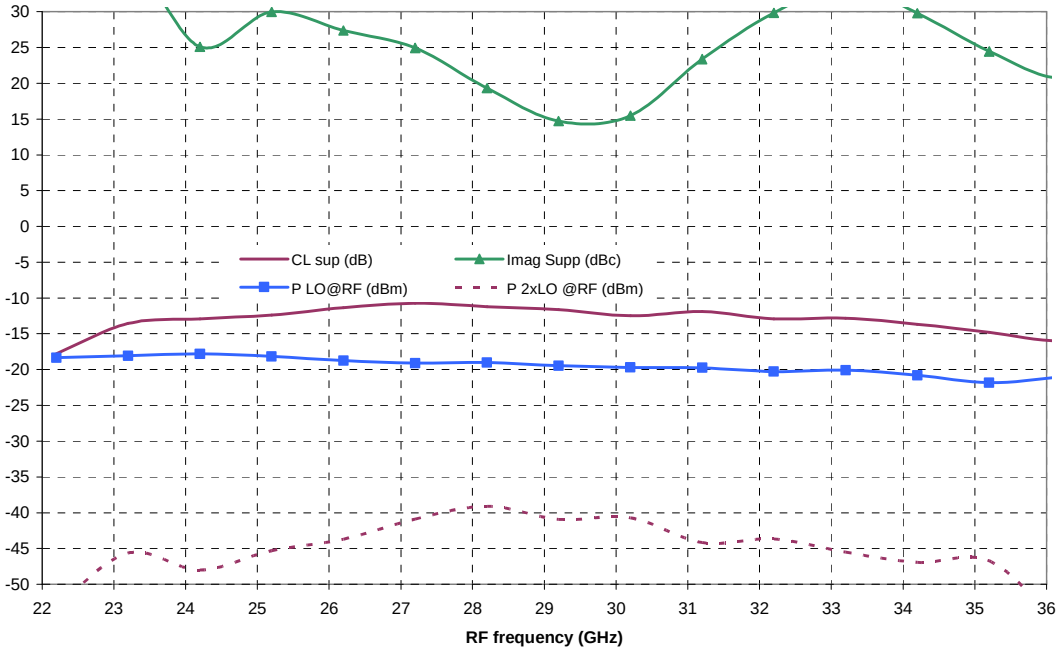
Symbol	Parameter	Values	Unit
Vd	Drain bias voltage	4.25	V
Id	Drain bias current	75	mA
Tj	Junction temperature	175	℃
Ta	Operating temperature range (chip backside)	-40 to +85	℃
Tstg	Storage temperature range	-55 to +125	℃

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

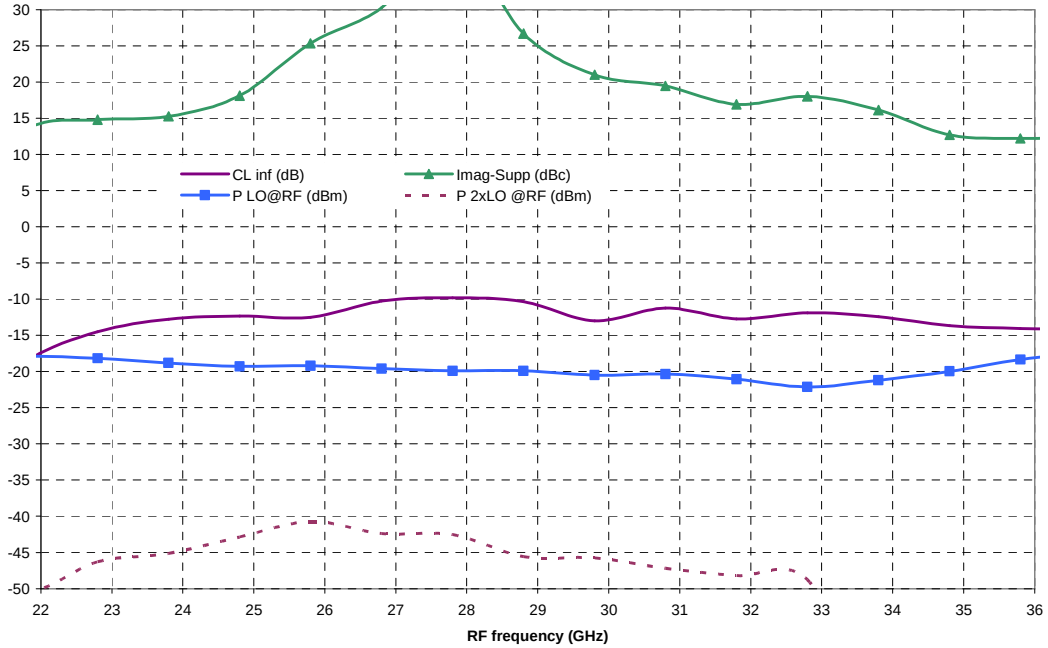
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Typical Measured Performances with external 90°IQ combiner

Tamb = +25℃, VD=4V, P_LO = 9dBm
These values are representative of de-embedded onboard measurements as defined on the Evaluation mother board section.



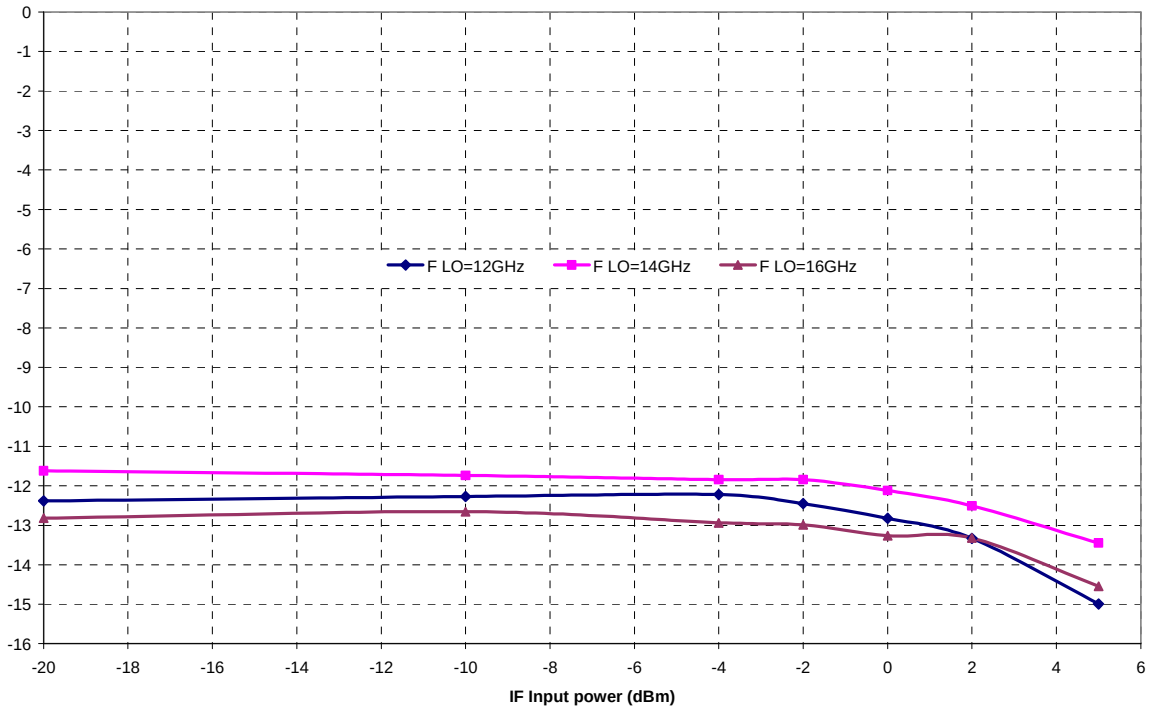
Conversion Loss, Image suppression & LO rejection
UP Conversion - Supra-dyne mode - IF =1.2GHz



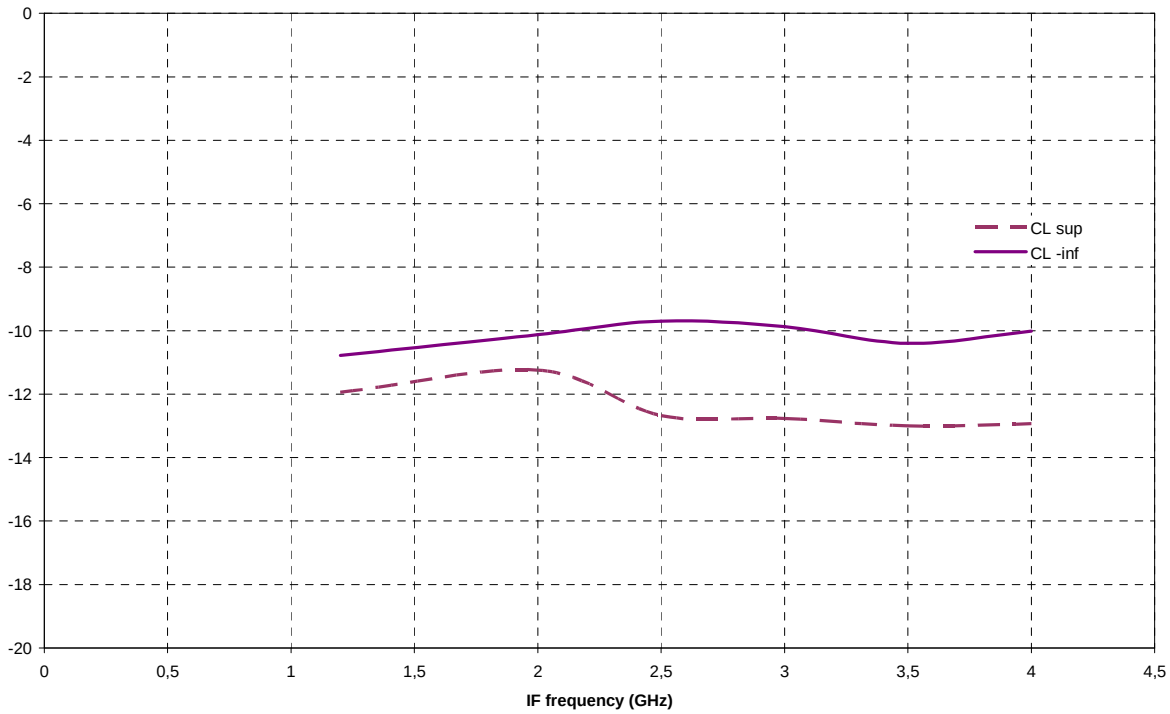
Conversion Loss, Image suppression & LO rejection
UP Conversion - Infra-dyne mode - IF =1.2GHz

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Gain compression versus IF input power
UP Conversion – Supra-dyne mode - IF =1.2GHz

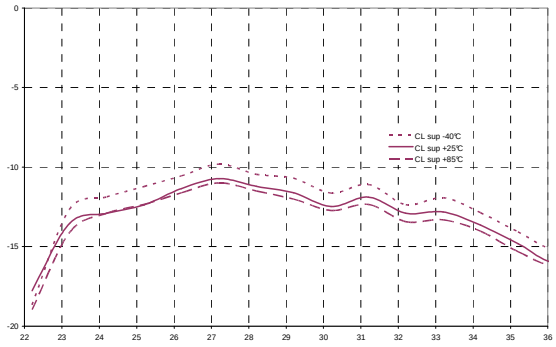


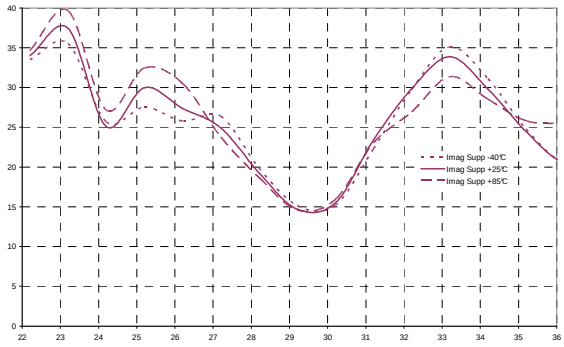
Conversion Loss versus IF frequency
Supra-dyne and Infra-dyne mode – OL=15GHz

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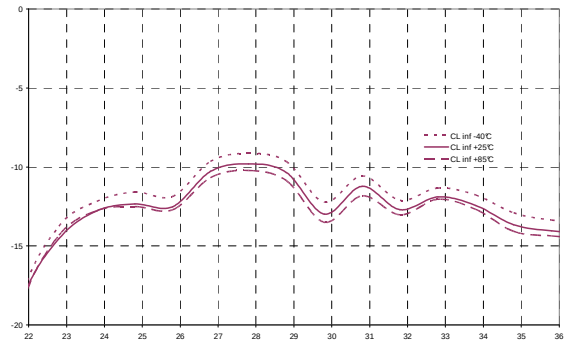
Temperature Measurements

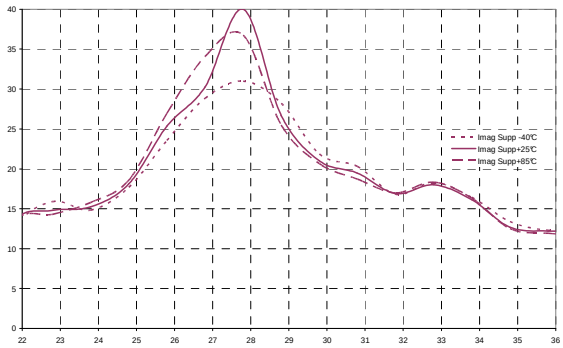
T = -40, +25, 85℃, VD =4V, P_LO = 9dBm





Conversion Loss, Image suppression
UP Conversion – Supra-dyne mode - IF =1.2GHz



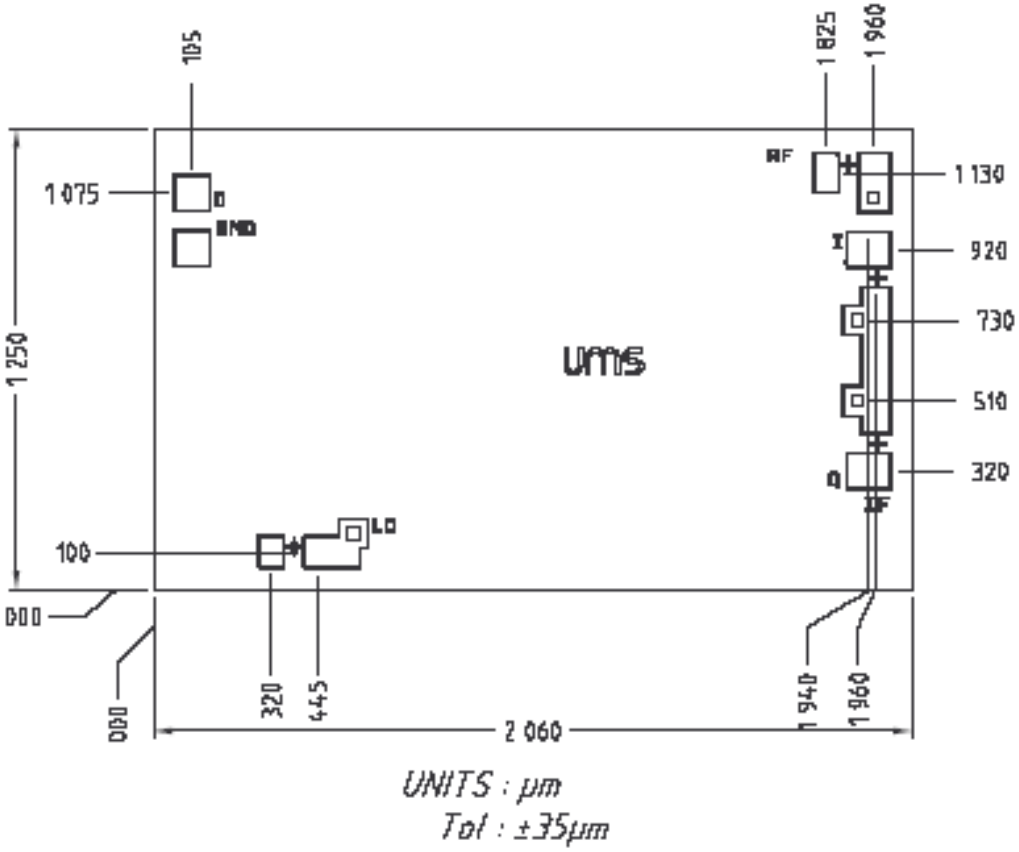


Conversion Loss, Image suppression
UP Conversion – Infra-dyne mode - IF =1.2GHz

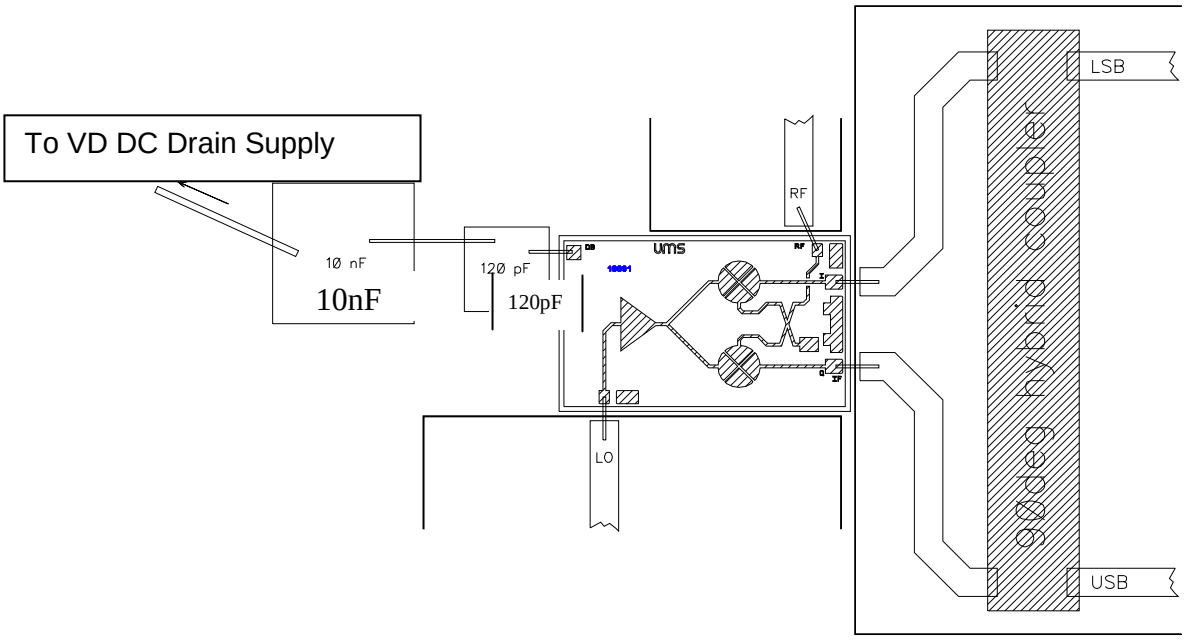
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Chip Assembly and Mechanical Data

Bonding pad positions



(Chip thickness: 100µm)



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

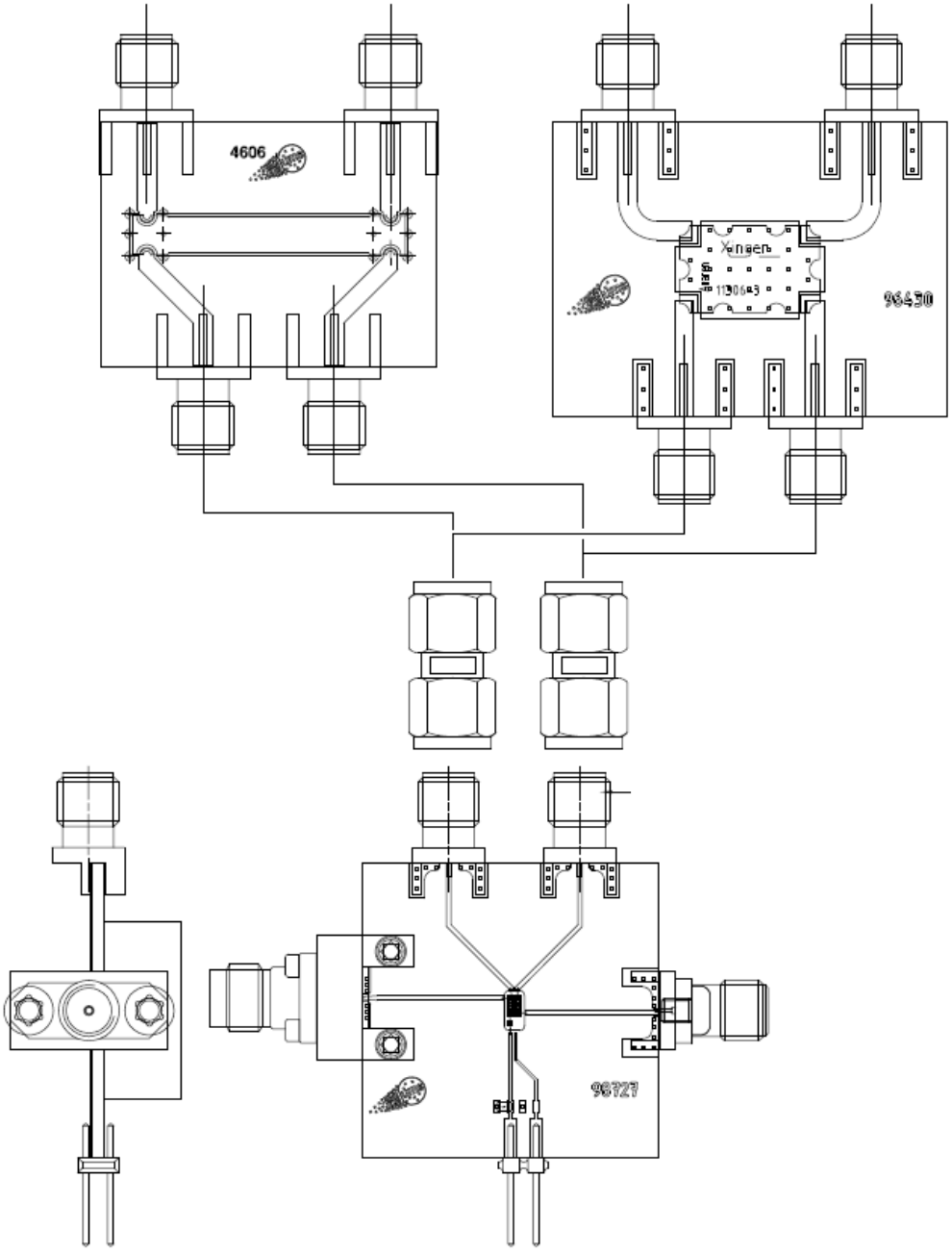
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Evaluation mother board

- Based on typically Ro4003 / 8mils or equivalent.
- Decoupling capacitors of 120pF±10% + 10nF ±10% are recommended for all DC accesses.

Hybrid coupler Mid-Atlantic 90°1.5-2.1GHz

Hybrid coupler Anaren 90°2-4GHz



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Recommended ESD management

Refer to the application note AN0020 available at http://www.ums-gaas.com for ESD sensitivity and handling recommendations for the UMS products.

Ordering Information

Chip form: CHR2294-99F/00

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