CMD312

4-28 GHz Fundamental Mixer

Product Overview

The CMD312 is a general purpose double balanced mixer die that can be used for up- and downconverting applications between 4 and 28 GHz. The CMD312 has very high isolation to both the RF and IF ports due to the optimized balun structures, and can operate with an LO drive level as low as +13 dBm. The CMD312 can easily be configured as an image reject mixer or single sideband modulator with external hybrids and power splitters.

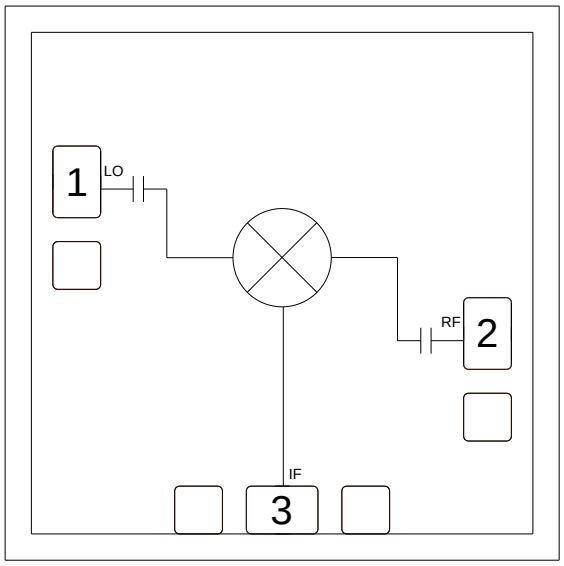
Key Features

- Low Conversion Loss
- High Isolation
- Wide Bandwidth
- Passive Double Balanced Topology
- Small Die Size: 1160 um x 1160 um

Ordering Information

Part No.	Description
CMD312	4-28 GHz Fundamental Mixer, 100 Piece Gel Pack

Functional Block Diagram



Electrical Performance (IF = 900 MHz, USB, LO = +17 dBm, T_A = 25 °C, LO = 16 GHz)

Parameter	Min	Typ	Max	Units
Frequency Range, RF & LO		4 - 28		GHz
Frequency Range, IF	DC		3	GHz
Conversion Loss		8		dB
LO to RF Isolation		43		dB
LO to IF Isolation		50		dB
RF to IF Isolation		30		dB
Input IP3		20		dBm

Unless otherwise noted, all measurements performed as a downconverter, IF = 900 MHz USB

Absolute Maximum Ratings

Parameter	Rating
RF / IF Input Power	+21.5 dBm
LO Drive	+21.5 dBm
Operating Temperature	-55 to 85 °C
Storage Temperature	-55 to 150 °C
Thermal Resistance, θ_{JC}	459 °C/W
Power Dissipation, Pdiss	141 mW

Exceeding any one or combination of the maximum ratings may cause permanent damage to the device.

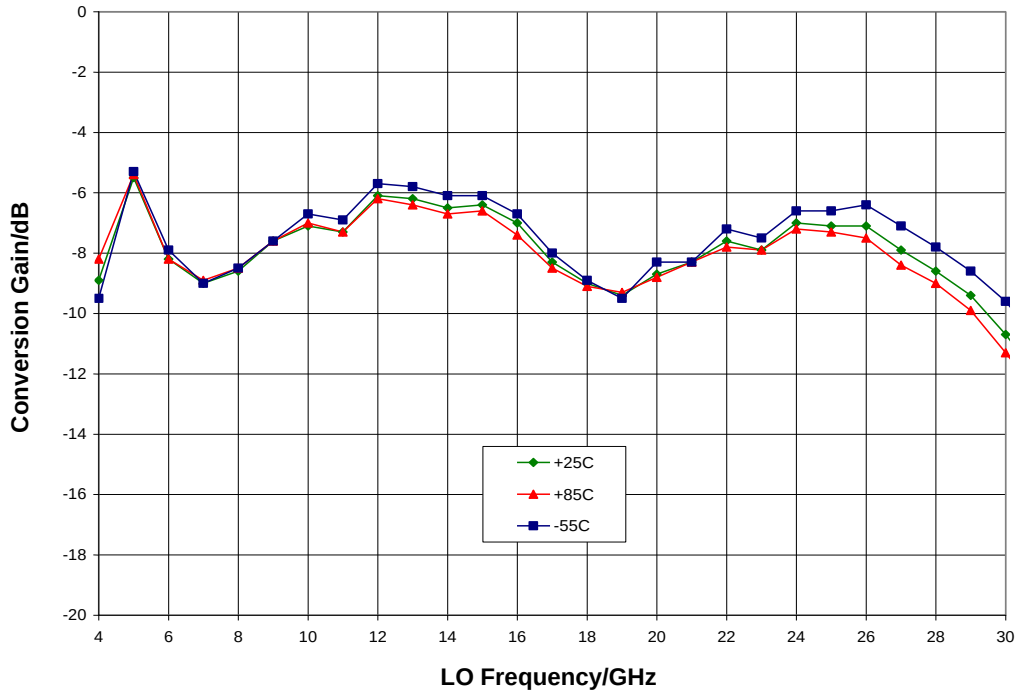
Electrical Specifications (IF = 900 MHz, LO = +17 dBm, T_A = 25 °C)

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range, RF & LO		4 - 17			17 - 28		GHz
Frequency Range, IF	DC		3	DC		3	GHz
Conversion Loss		8.5	10		8	10.5	dB
Noise Figure (SSB)		8.5	10		8	10.5	dB
LO to RF Isolation	29	40		22	32		dB
LO to IF Isolation	28	42		45	50		dB
RF to IF Isolation	7	20		27	40		dB
Input IP3		20			20		dBm

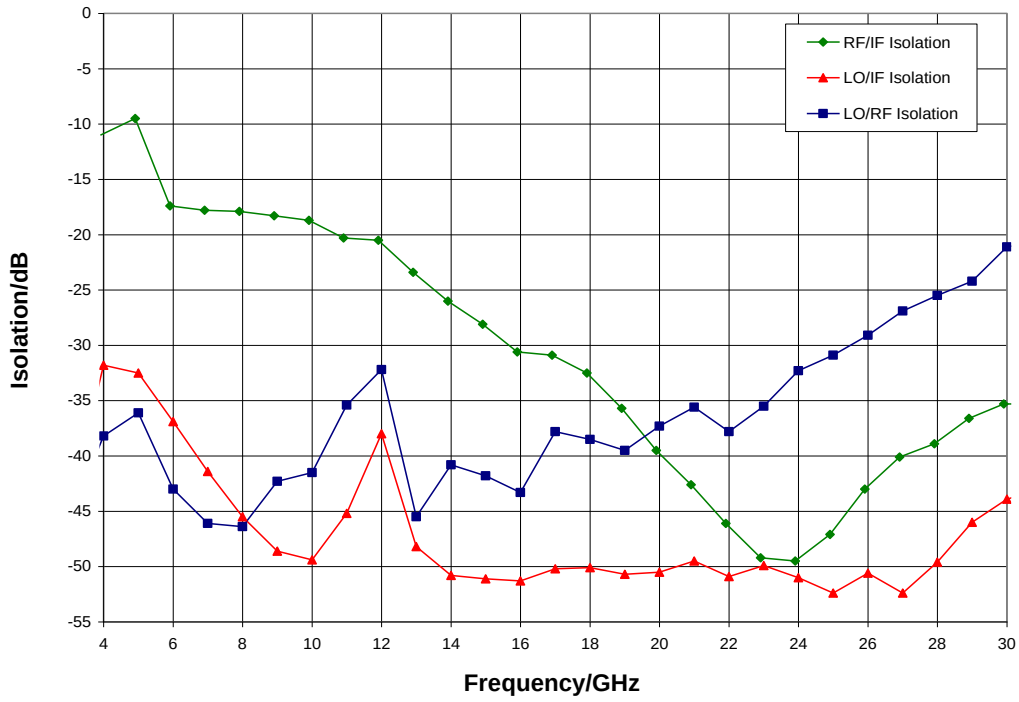
Unless otherwise noted, all measurements performed as a downconverter, IF = 900 MHz

Typical Performance

Conversion Gain vs. Temperature, LO = +17 dBm, IF = 900 MHz USB

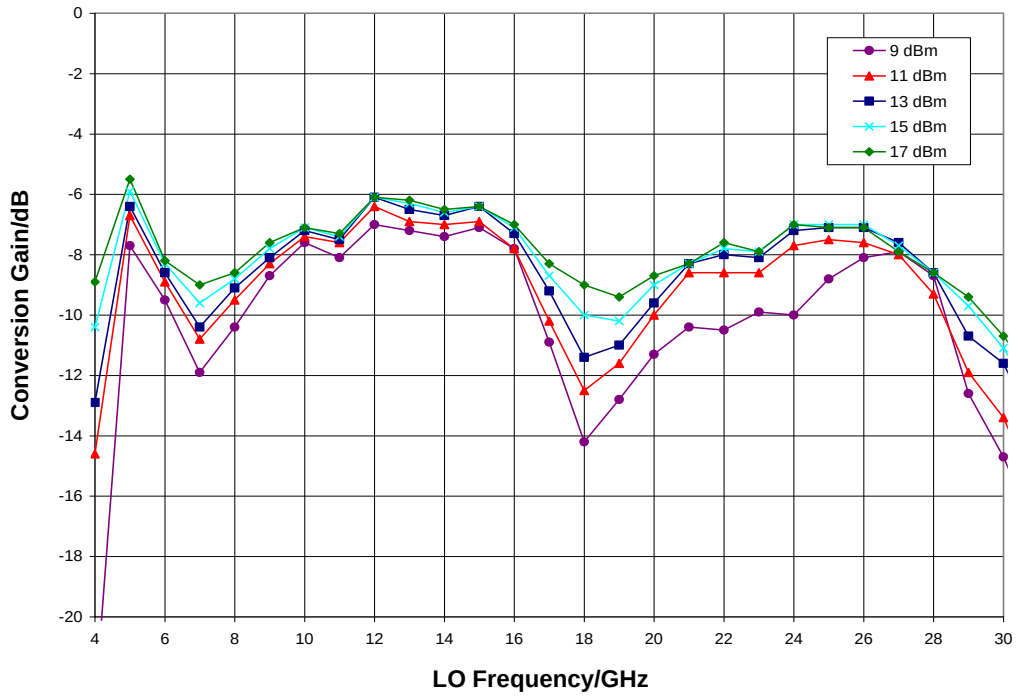


Isolation, LO = +17 dBm

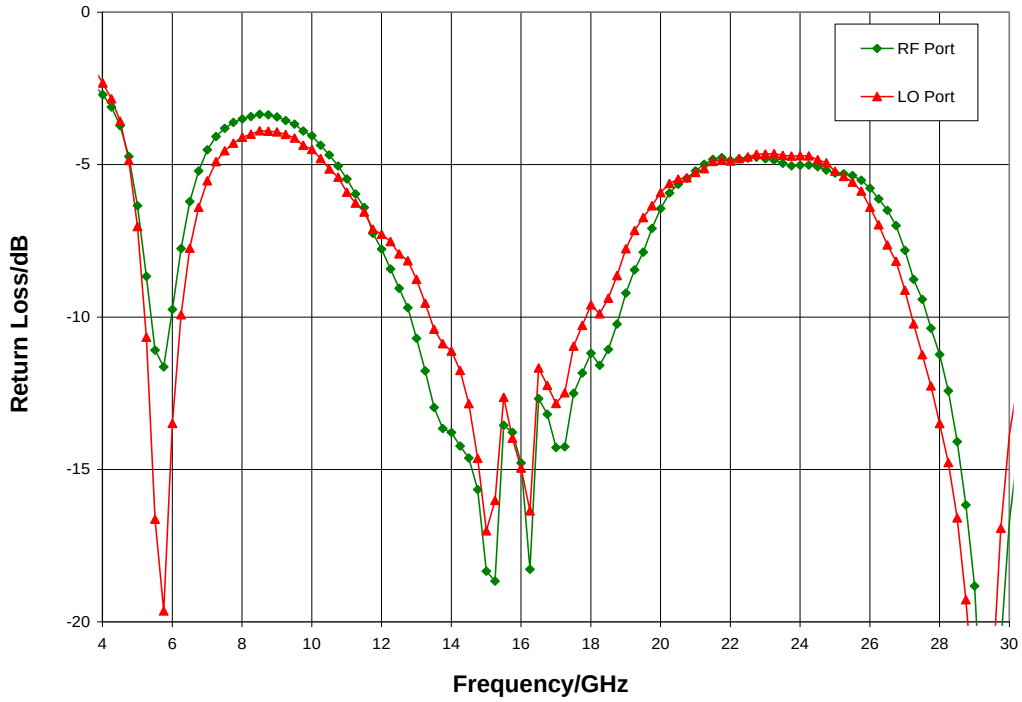


Typical Performance

Conversion Gain vs. LO Drive, IF = 900 MHz USB

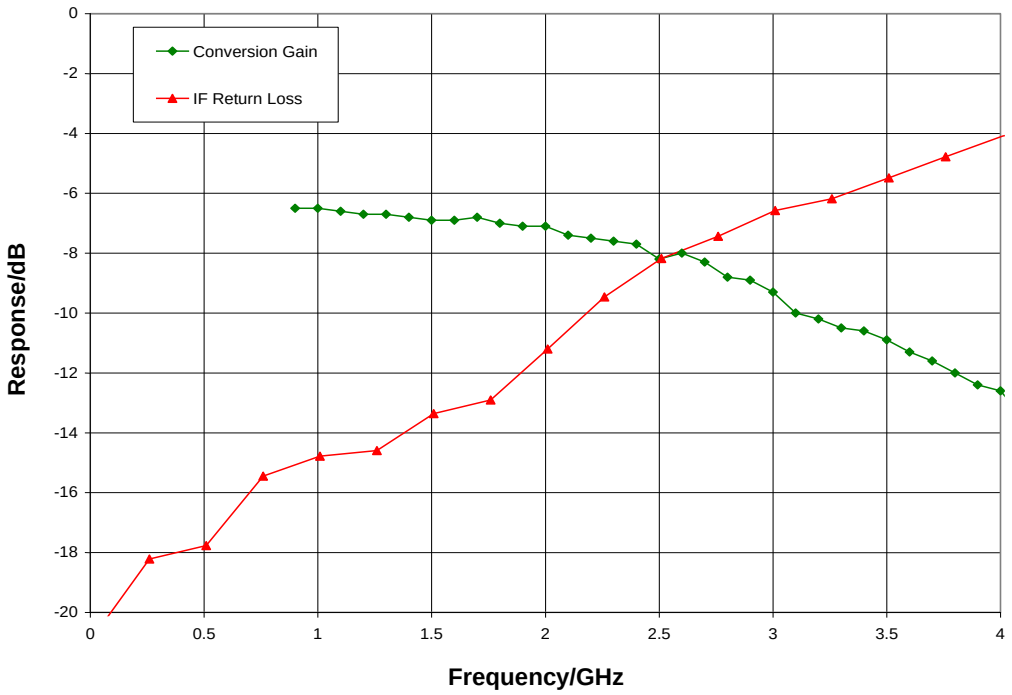


Return Loss, LO = +17 dBm

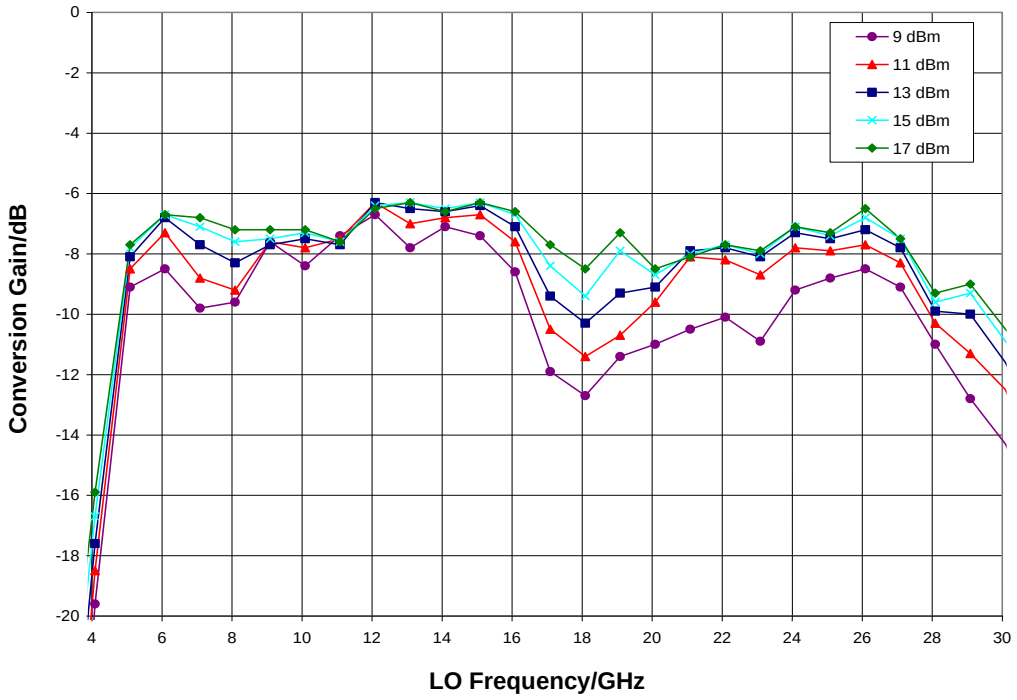


Typical Performance

IF Bandwidth, LO = +17 dBm

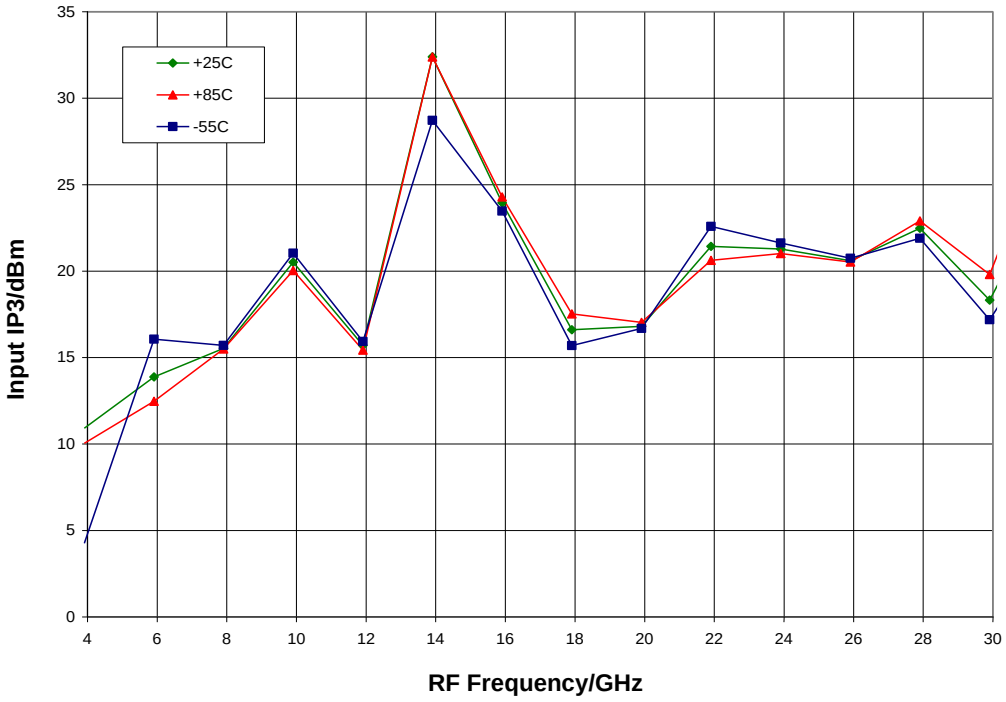


Upconverter Performance, Conversion Gain vs. LO Drive, IF input = 900 MHz

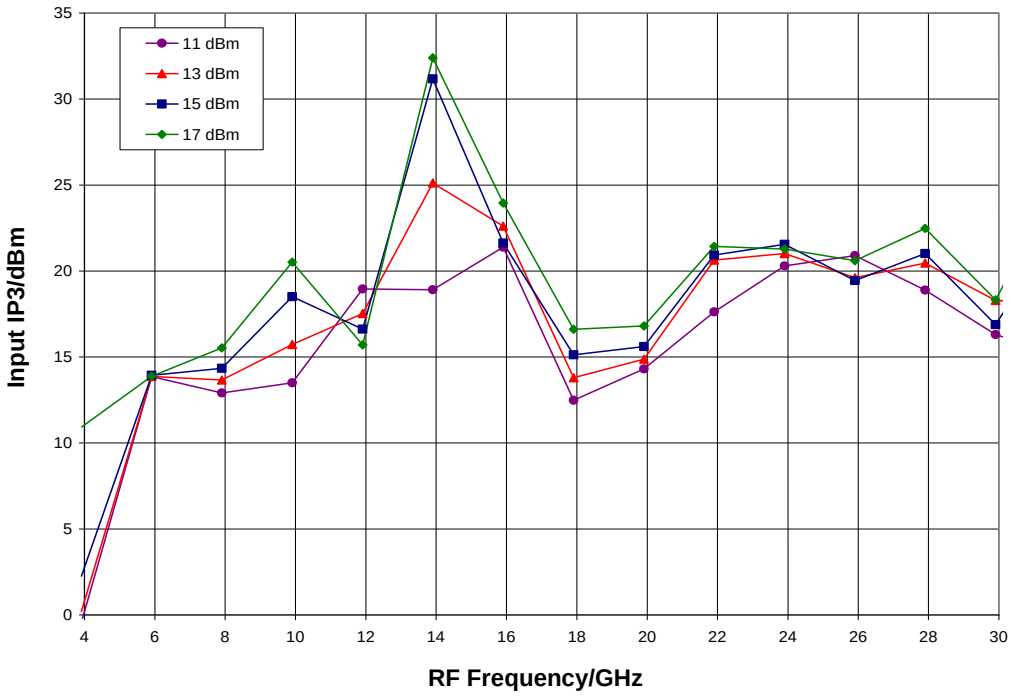


Typical Performance

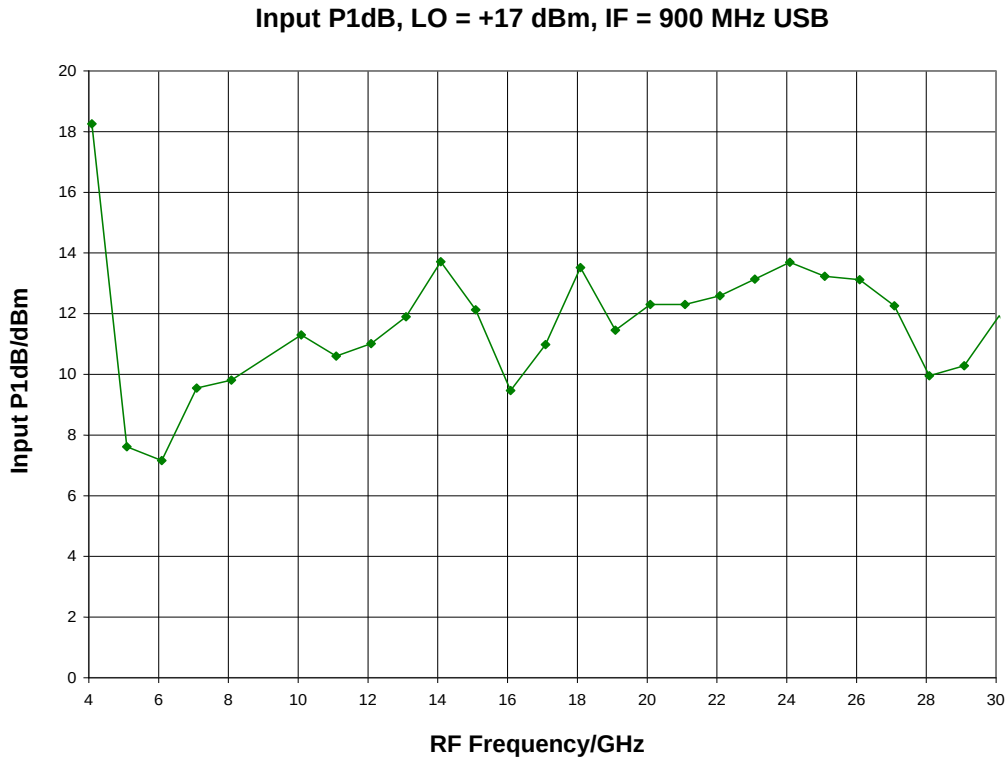
Input IP3 vs. Temperature, LO = +17 dBm, IF = 900 MHz USB



Input IP3 vs. LO Drive, IF = 900 MHz USB



Typical Performance



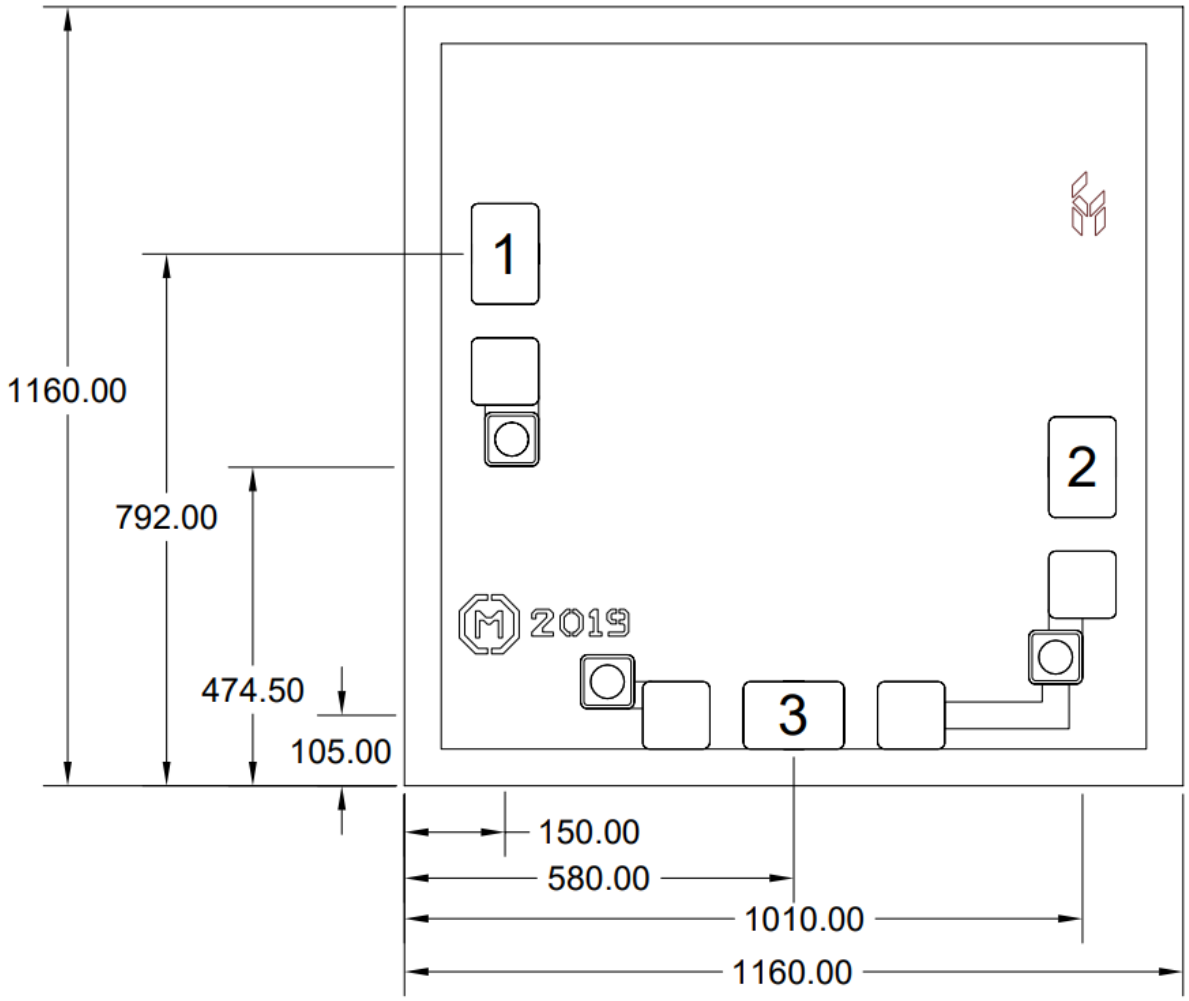
M x N Spur Table

mRF	nLO				
	0	1	2	3	4
0	xx	21	57		
1	25	0	50	45	
2	> 64	> 64	62	> 64	> 64
3		> 64	> 64	> 64	> 64
4			> 64	> 64	> 64

RF = 15.1 GHz @ -10 dBm
LO = 15.0 GHz @ +17 dBm
All values in dBc below the IF output power level (1RF - 1LO)

Mechanical Information

Die Outline (all dimensions in microns)

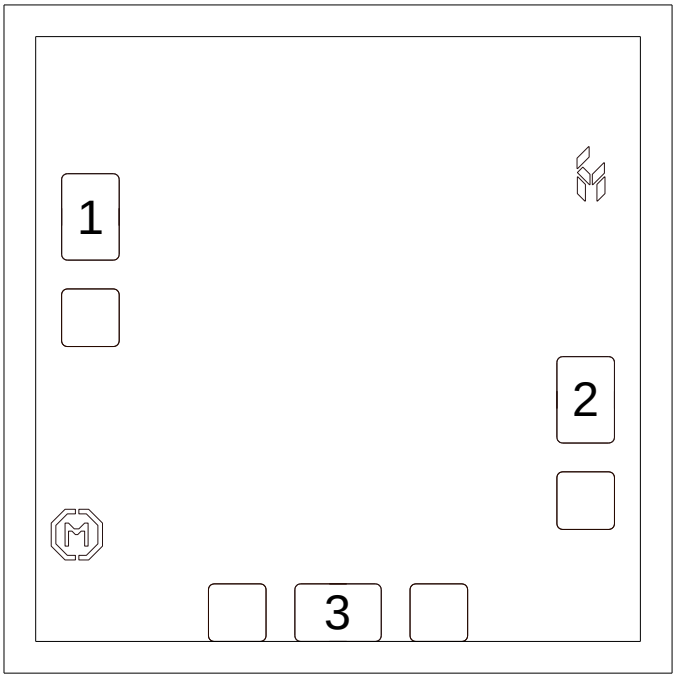


Notes:

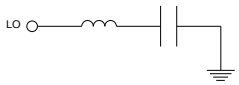
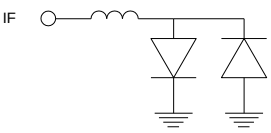
1. No connection required for unlabeled pads
2. Backside is RF and DC ground
3. Backside and bond pad metal: Gold
4. Die is 100 microns thick
5. All bond pads (1, 2, 3) are 100 x 150 microns square

Pin Description

Pad Diagram



Functional Description

Pin	Function	Description	Schematic
1	LO	This pin is AC coupled and matched to 50 ohms	
2	RF	This pin is AC coupled and matched to 50 ohms	
3	IF	This pin is DC coupled. For applications not requiring operation to DC, this port should be DC blocked externally using a series capacitor whose value has been chosen to pass the necessary IF frequency range. For operation to DC, this pin must not source or sink more than 16 mA of current or part non-function or part failure may result	
Backside	Ground	Connect to RF / DC ground	

Applications Information

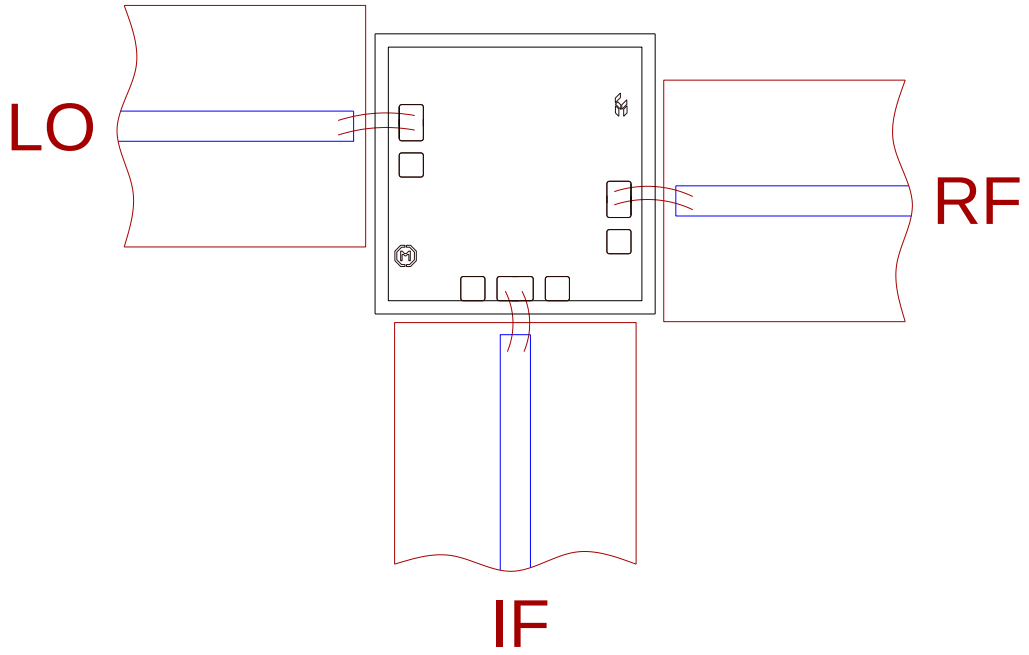
Assembly Guidelines

The backside of the CMD312 is RF ground. Die attach should be accomplished with electrically and thermally conductive epoxy only. Eutectic attach is not recommended. Standard assembly procedures should be followed for high frequency devices. The top surface of the semiconductor should be made planar to the adjacent RF transmission lines.

RF connections should be made as short as possible to reduce the inductive effect of the bond wire. Use of a 0.8 mil thermosonic wedge bonding is highly recommended as the loop height will be minimized.

The semiconductor is 100 um thick and should be handled by the sides of the die or with a custom collet. Do not make contact directly with the die surface as this will damage the monolithic circuitry. Handle with care.

Assembly Diagram



GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 1A	ESDA / JEDEC JS-001-2012

Caution!
ESD-Sensitive Device

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_4O_2$) Free
- SVHC Free
- Halogen Free
- PFOS Free

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

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