CMD182

6-10 GHz I/Q Mixer

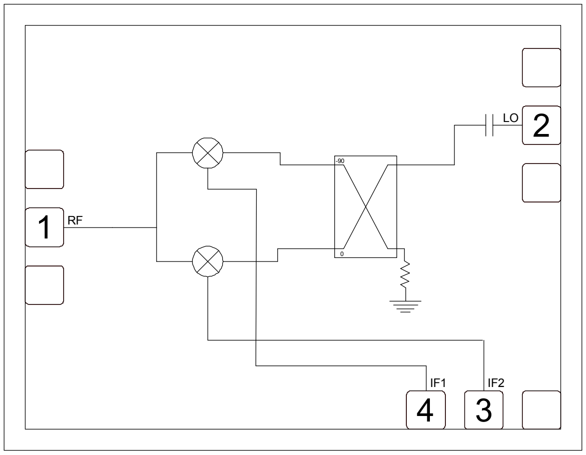
Features

- ► Low conversion loss
- ► High isolation
- ► Image rejection: 30 dB
- ► Wide IF bandwidth
- ► Small die size

Description

The CMD182 is a compact I/Q mixer die that can be used as either an image reject mixer or a single sideband upconverter. The CMD182 utilizes two double balanced mixer cells and a 90 degree hybrid. An external IF hybrid is needed to complete the image rejection. The CMD182 offers full passivation for increased reliability and moisture protection.

Functional Block Diagram



Electrical Performance - IF = 100 MHz, LO = +15 dBm , T_A = 25 °C, F = 8 GHz

Parameter	Min	Typ	Max	Units
Frequency Range, RF & LO		6 - 10		GHz
Frequency Range, IF	DC		3.5	GHz
Conversion Loss (as IRM)		6		dB
Image Rejection		30		dB
LO to RF Isolation		46		dB
LO to IF Isolation		20		dB
Input P1dB		9		dBm

Unless otherwise noted, all measurements performed as a downconverter, IF = 100 MHz

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Specifications

Absolute Maximum Ratings

Parameter	**Rating**
RF / IF Input Power	+25 dBm
LO Drive	+25 dBm
Operating Temperature	-40 to 85 °C
Storage Temperature	-55 to 150 °C
Thermal Resistance, Θ_{JC}	124.25 °C/W
Power Dissipation, Pdiss	347 mW

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

Electrical Specifications - IF = 100 MHz, LO = +15 dBm, T_A = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range, RF & LO		6 - 10			7.1 - 8.5		GHz
Frequency Range, IF	DC		3.5	DC		3.5	GHz
Conversion Loss (as IRM)		6	9		5.5	8	dB
Image Rejection	20	28		25	30		dB
LO to RF Isolation	39	50		39	50		dB
LO to IF Isolation	15	20		15	20		dB
Input P1dB		9			9		dBm
Input IP3		18			17.5		dBm

Unless otherwise noted, all measurements performed as a downconverter, IF = 100 MHz

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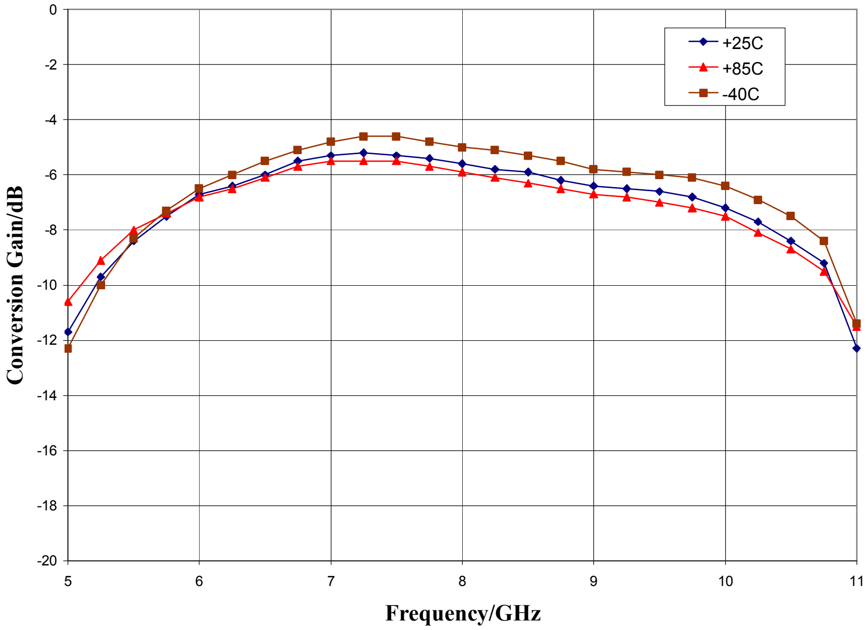
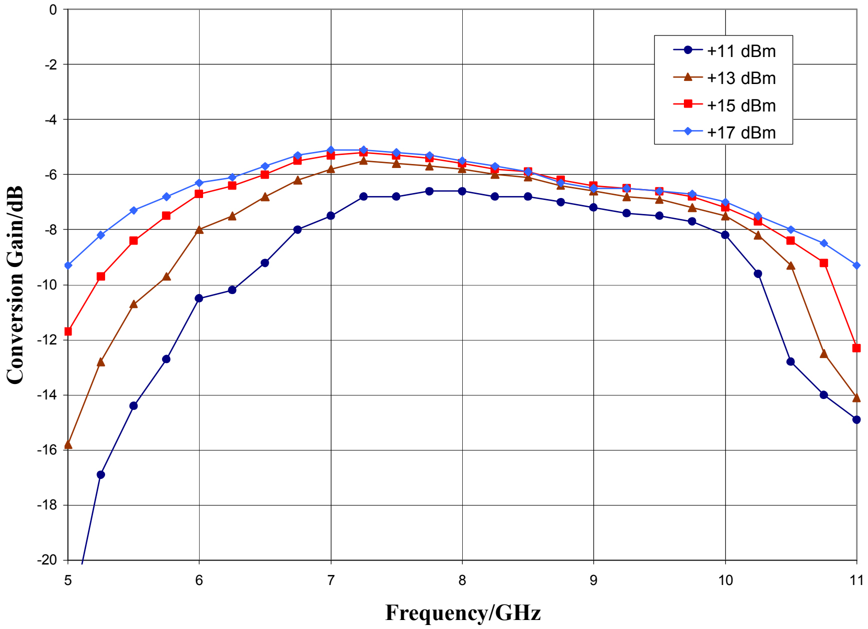
Typical Performance

Data Taken As IRM With External IF Hybrid

Conversion Gain vs. Temperature, LO = +15 dBm, IF = 100 MHz USB



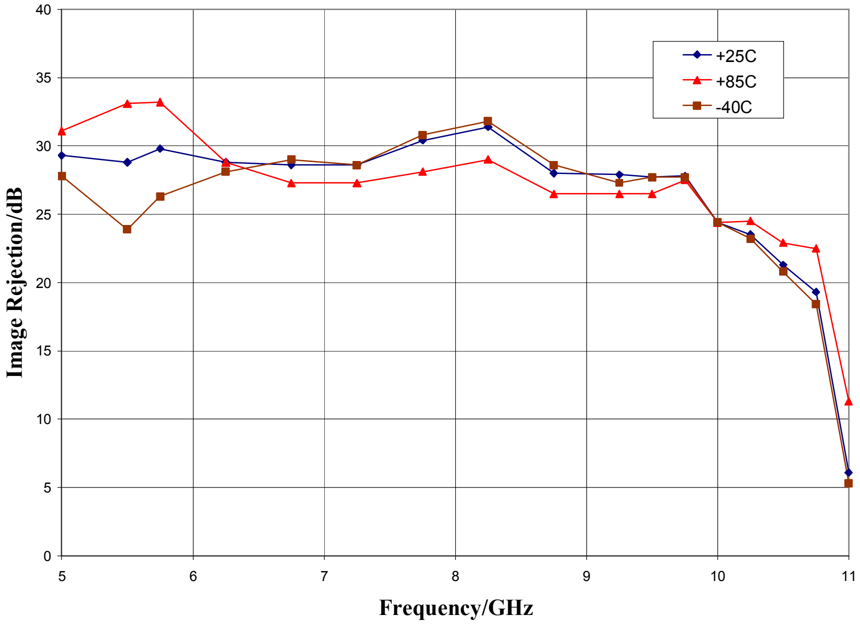
Conversion Gain vs. LO Drive, IF = 100 MHz USB



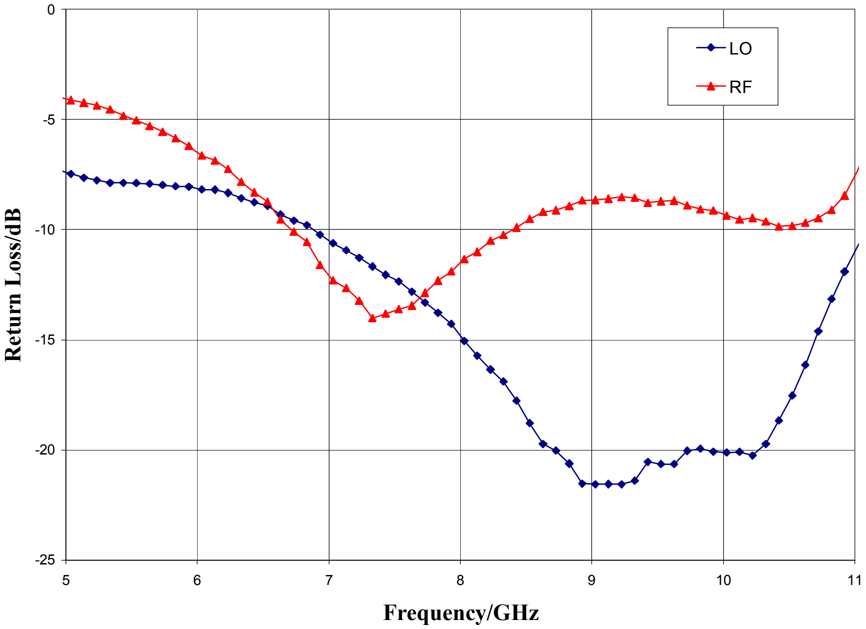
Typical Performance

Data Taken As IRM With External IF Hybrid

Image Rejection, LO = +15 dBm, IF = 100 MHz USB



Return Loss, LO = +15 dBm



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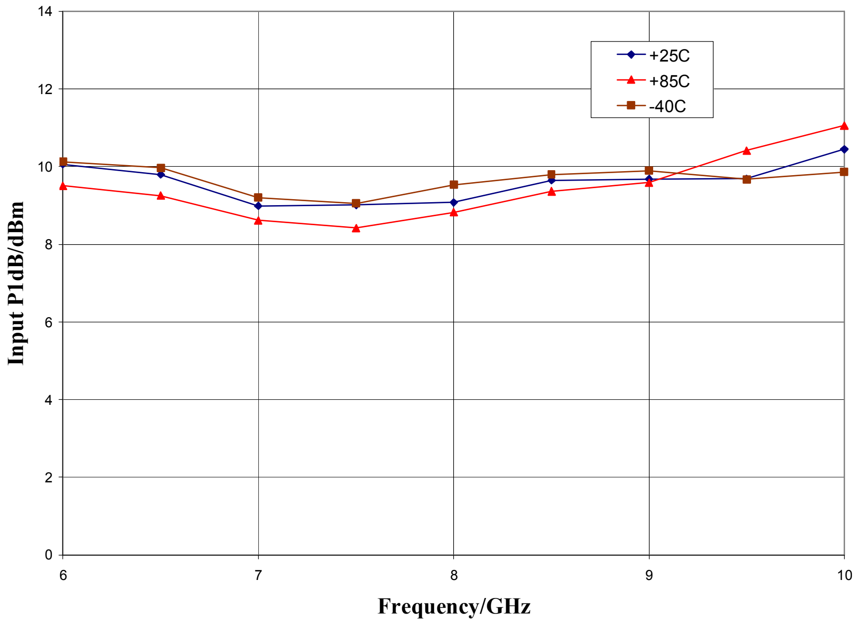
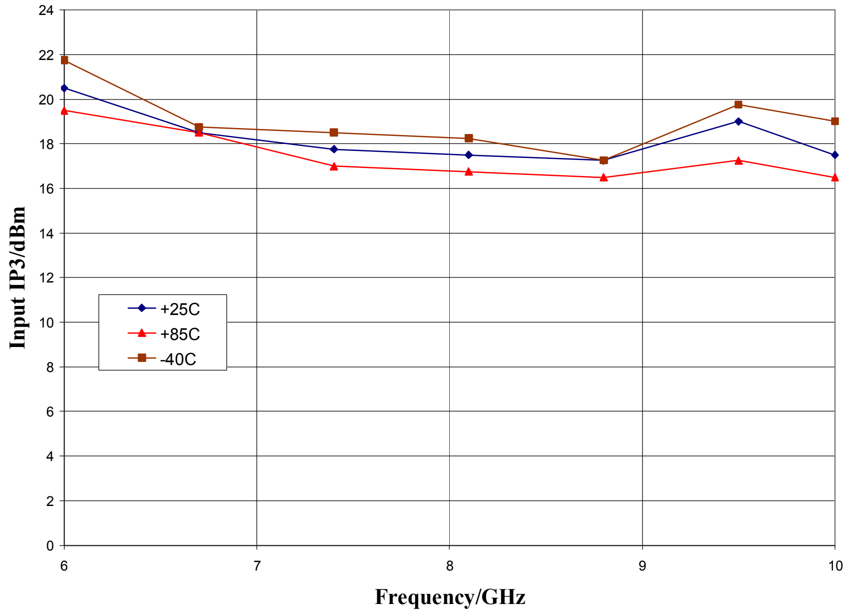
Typical Performance

Data Taken As IRM With External IF Hybrid

Input P1dB vs. Temperature, LO = +15 dBm, IF = 100 MHz USB



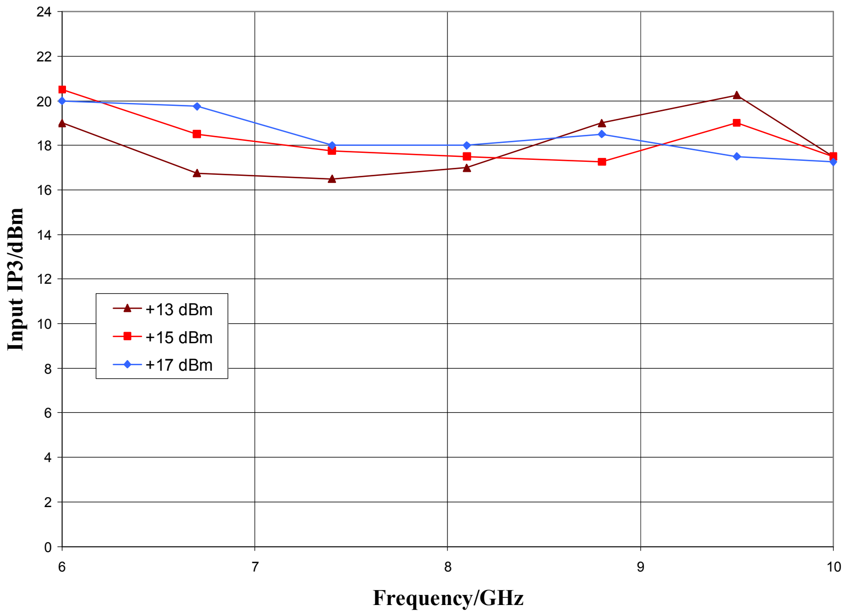
Input IP3 vs. Temperature, LO = +15 dBm, IF = 100 MHz USB



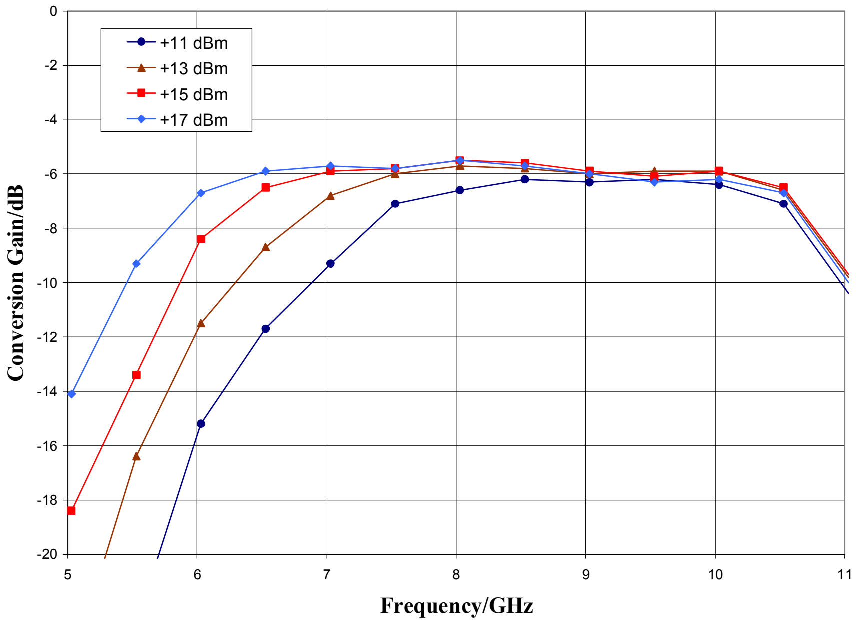
Typical Performance

Data Taken As IRM With External IF Hybrid

Input IP3 vs. LO Drive, IF = 100 MHz USB



Upconverter Performance, Conversion Gain vs. LO Drive, IF = 1 GHz



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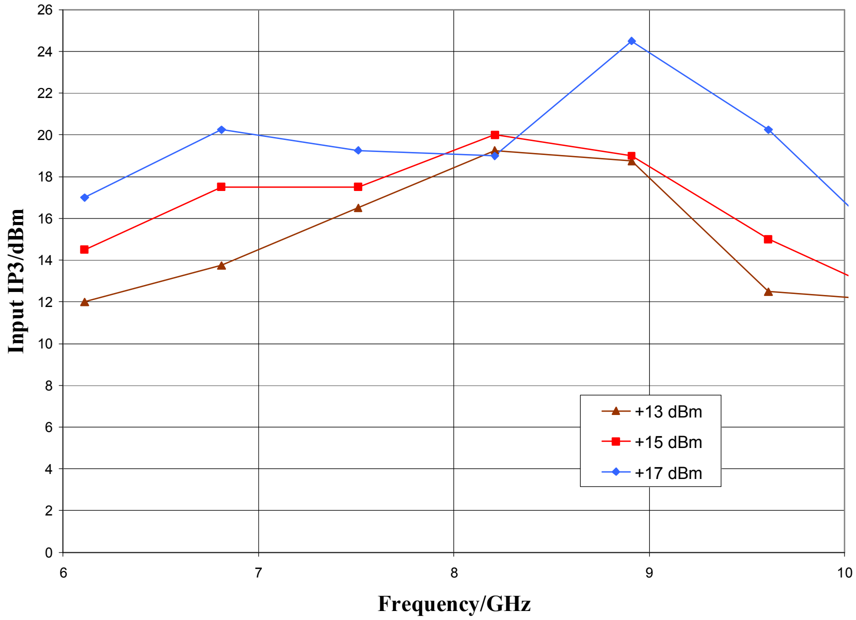
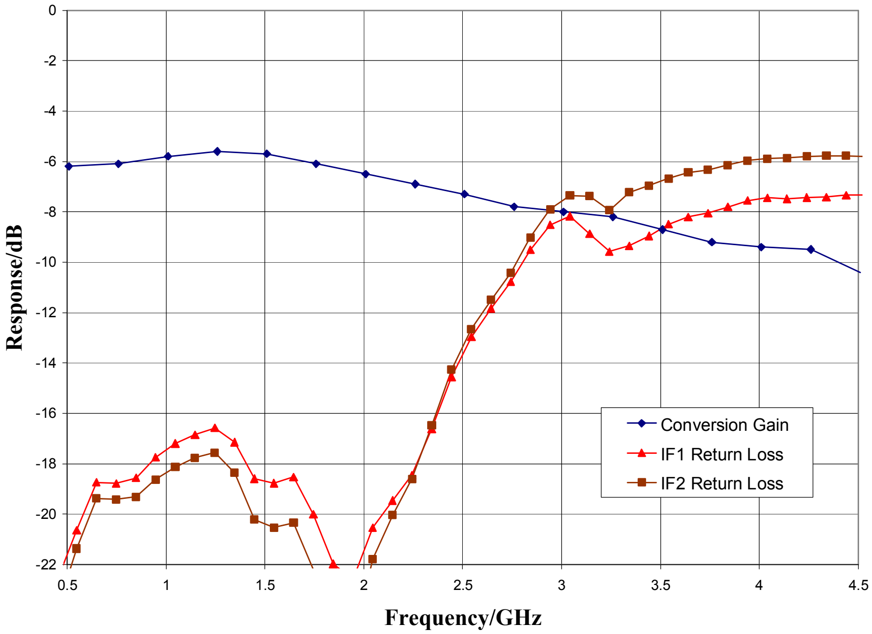
Typical Performance

Data Taken As IRM With External IF Hybrid

Upconverter Performance, Input IP3 vs. LO Drive, IF = 500 MHz



IF Bandwidth, LO = +15 dBm, Return Loss Data Taken Without IF Hybrid



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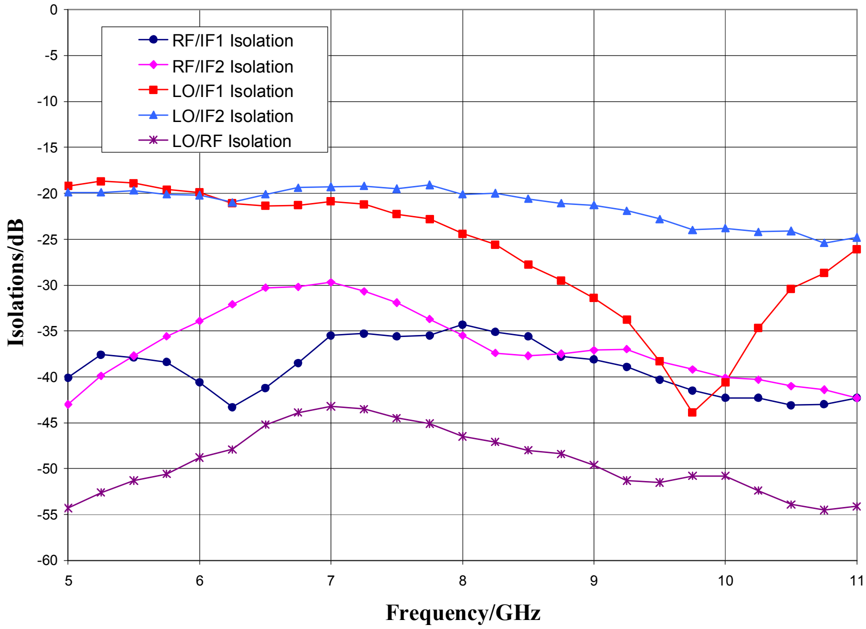
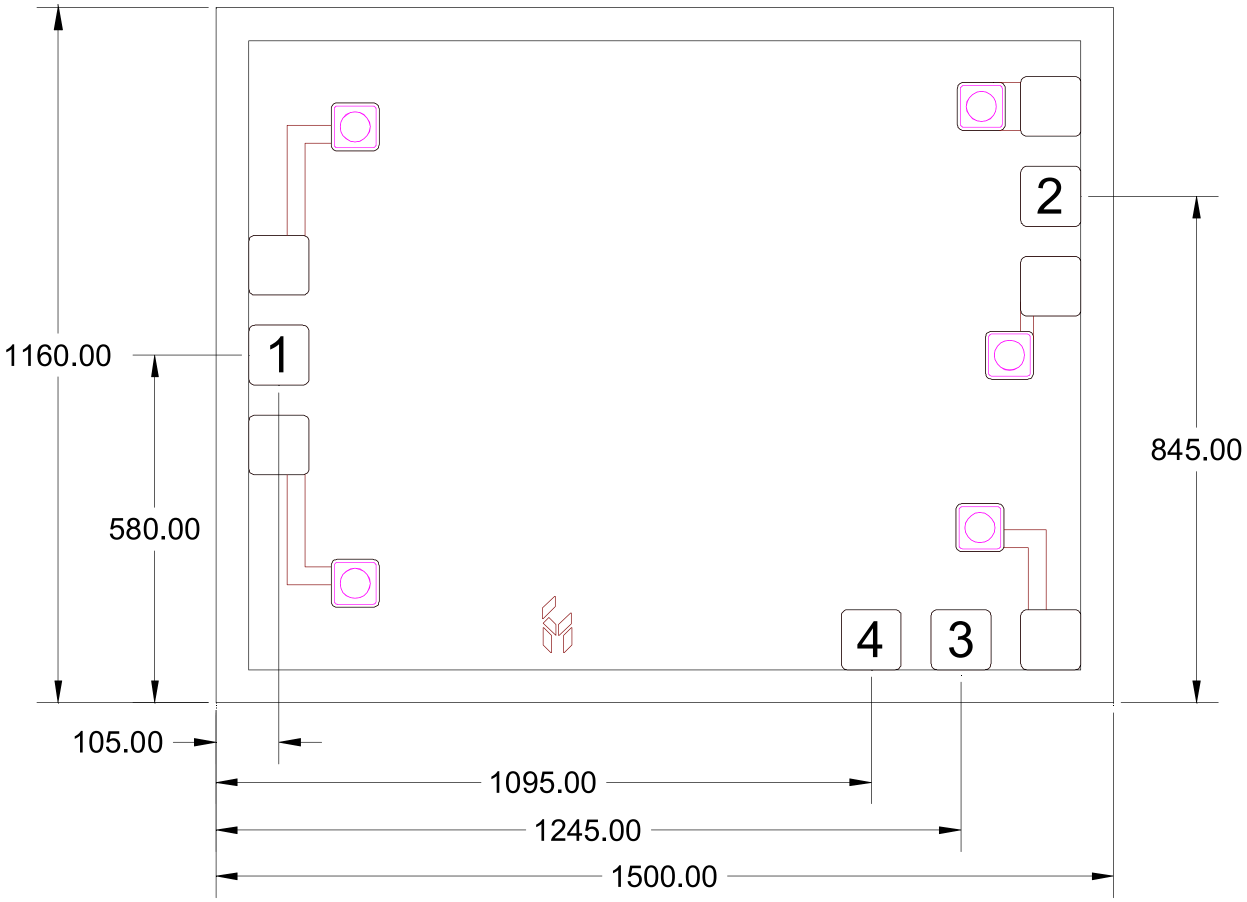
Typical Performance

Isolation, LO = +15 dBm. Data Taken Without IF Hybrid



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 (1-4) are 100 microns square

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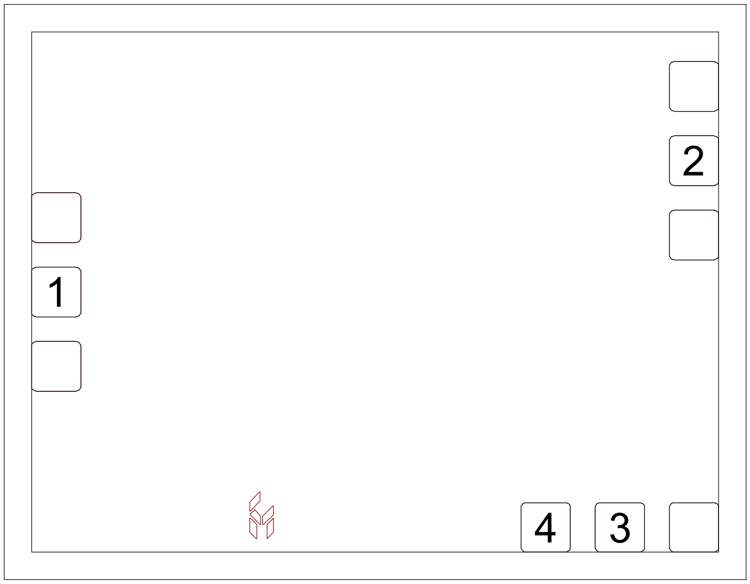
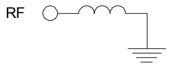
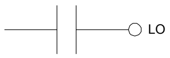
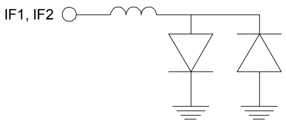
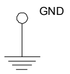
Pin Description

Pad Diagram



Functional Description

Pin	Function	Description	Schematic
1	RF	This pin is DC coupled and matched to 50 ohms.	
2	LO	This pin is AC coupled and matched to 50 ohms.	
3	IF2	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.	
4	IF1		
Backside	Ground	Connect to RF / DC ground.	

Applications Information

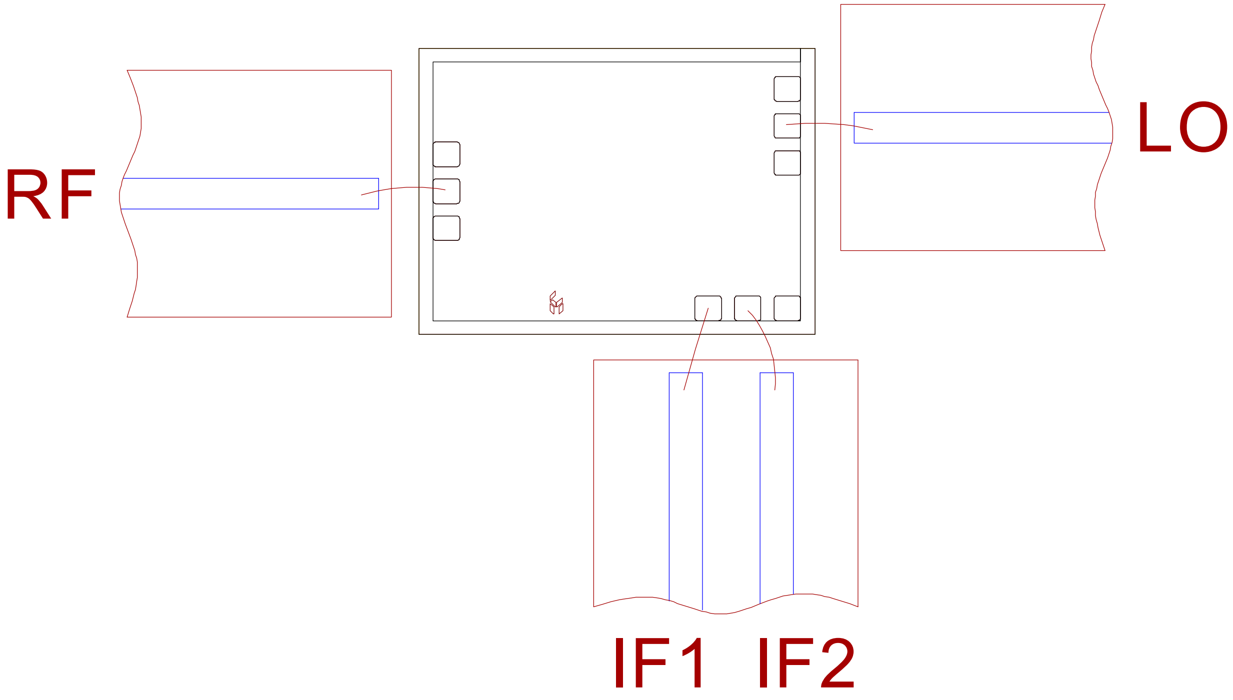
Assembly Guidelines

The backside of the CMD182 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.

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