CMD258

7.5-13 GHz High IP3 I/Q Mixer

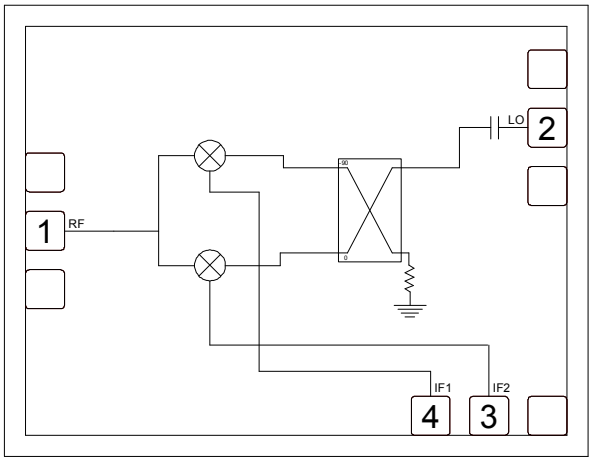
Features

- Low conversion loss
- High IP3
- Image rejection: 29 dB
- Wide IF bandwidth
- Small die size

Description

The CMD258 is a high IP3 I/Q mixer die that can be used as either an image reject mixer or a single sideband upconverter. The CMD258 utilizes two double balanced mixer cells and a 90 degree hybrid. An external IF hybrid is needed to complete the image rejection. The CMD258 offers full passivation for increased reliability and moisture protection.

Functional Block Diagram



Electrical Performance - IF = 100 MHz, LO = +21 dBm , T_A = 25 °C, F = 10 GHz

Parameter	Min	Typ	Max	Units
Frequency Range, RF & LO		7.5 - 13		GHz
Frequency Range, IF	DC		3.5	GHz
Conversion Loss (as IRM)		5.5		dB
Image Rejection		29		dB
LO to RF Isolation		38		dB
LO to IF Isolation		20		dB
Input P1dB		14.5		dBm
Input IP3		25		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	+27 dBm
LO Drive	+27 dBm
Operating Temperature	-55 to 85 °C
Storage Temperature	-55 to 150 °C
Thermal Resistance, Θ_{JC}	135.5 °C/W
Power Dissipation, Pdiss	477 mW

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

Electrical Specifications - IF = 100 MHz, LO = +21 dBm, T_A = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range, RF & LO	9 - 11			7.5 - 13			GHz
Frequency Range, IF	DC		3.5	DC		3.5	GHz
Conversion Loss (as IRM)		5.5	7.5		7	10	dB
Image Rejection	23	28		23	30		dB
LO to RF Isolation	34	38		34	42		dB
LO to IF Isolation	15	19		14	20		dB
Input P1dB		15			16		dBm
Input IP3		24			24		dBm

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

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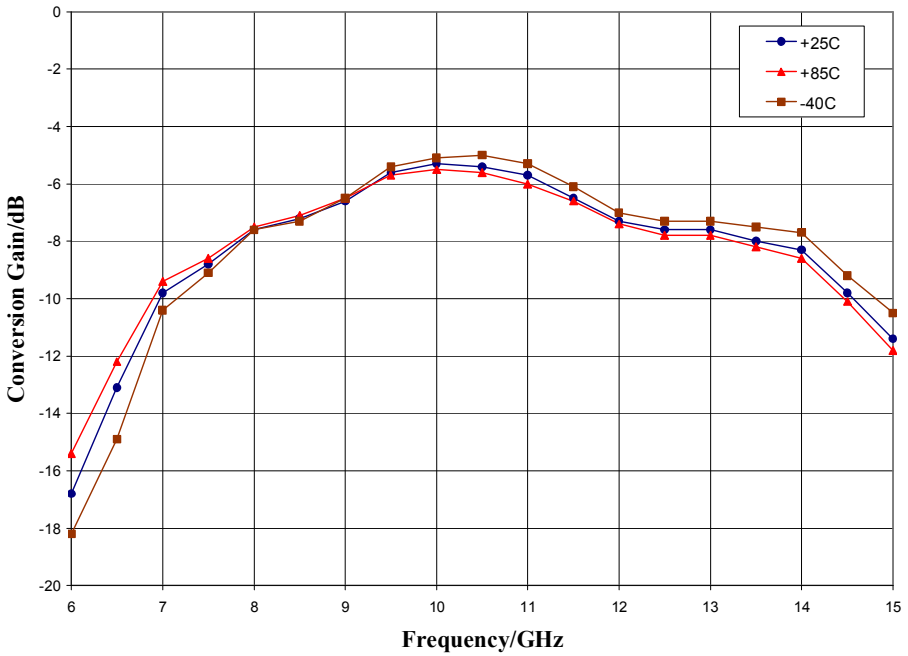
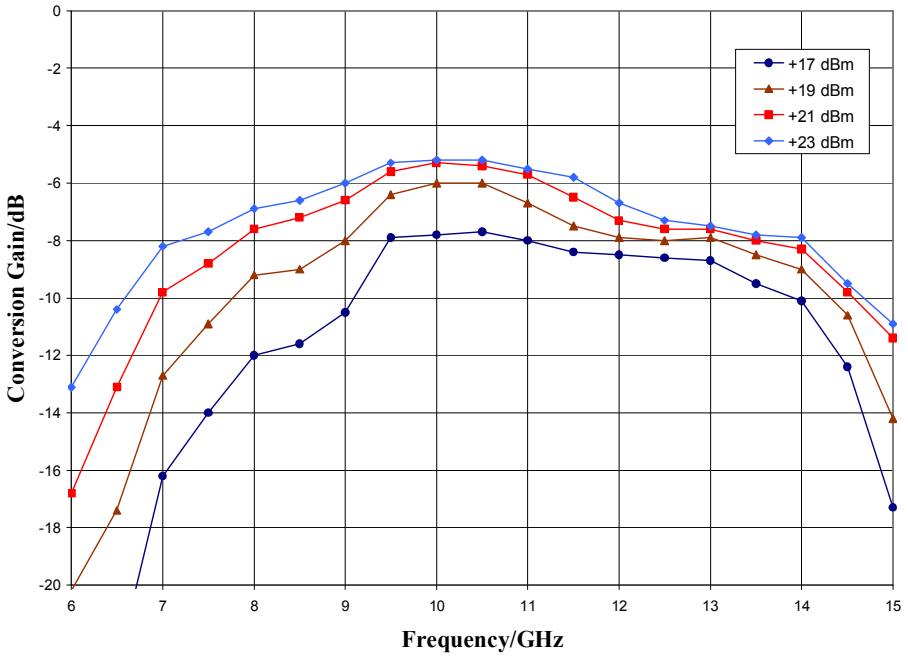
Typical Performance

Data Taken As IRM With External IF Hybrid

Conversion Gain vs. Temperature, LO = +21 dBm, IF = 100 MHz USB



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



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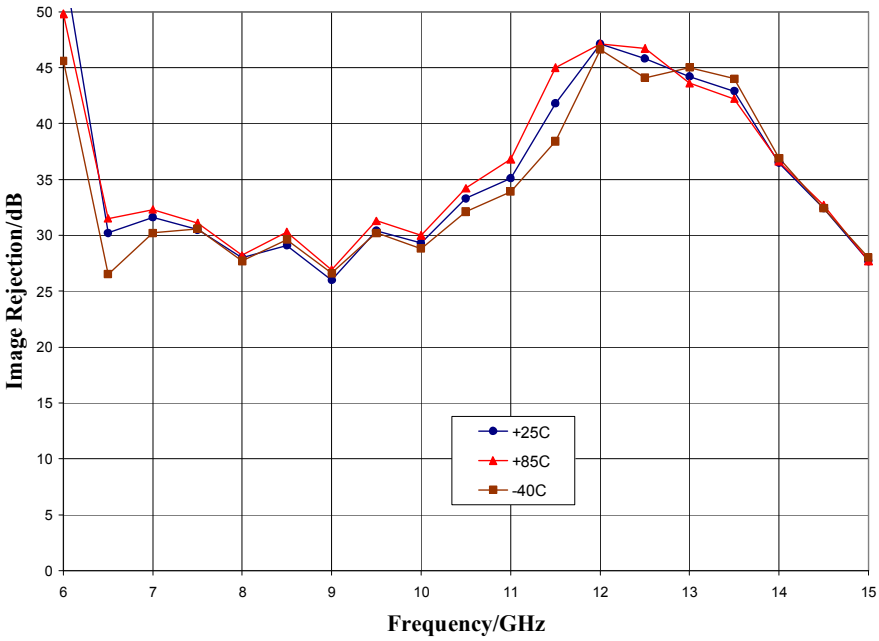
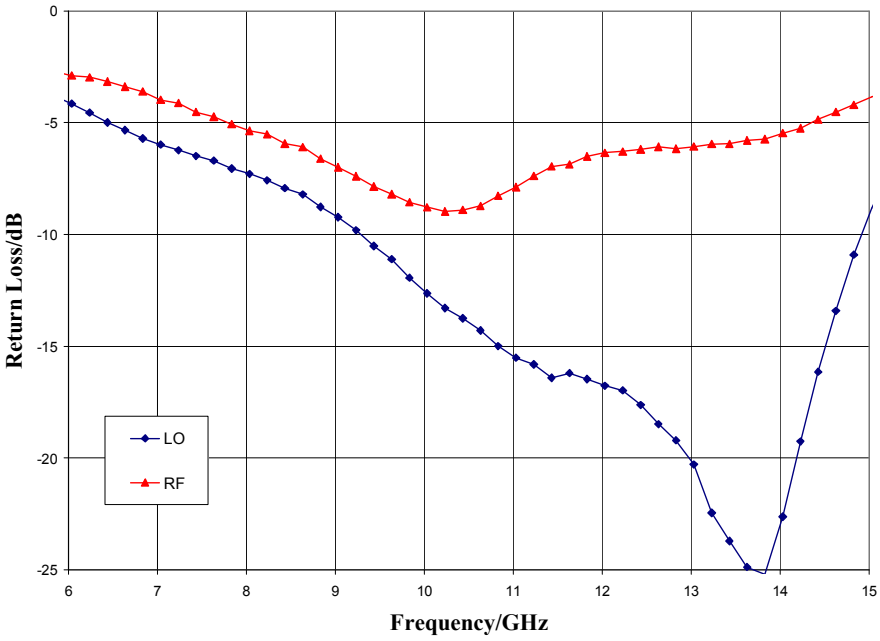
Typical Performance

Data Taken As IRM With External IF Hybrid

Image Rejection, LO = +21 dBm, IF = 100 MHz USB



Return Loss, LO = +21 dBm



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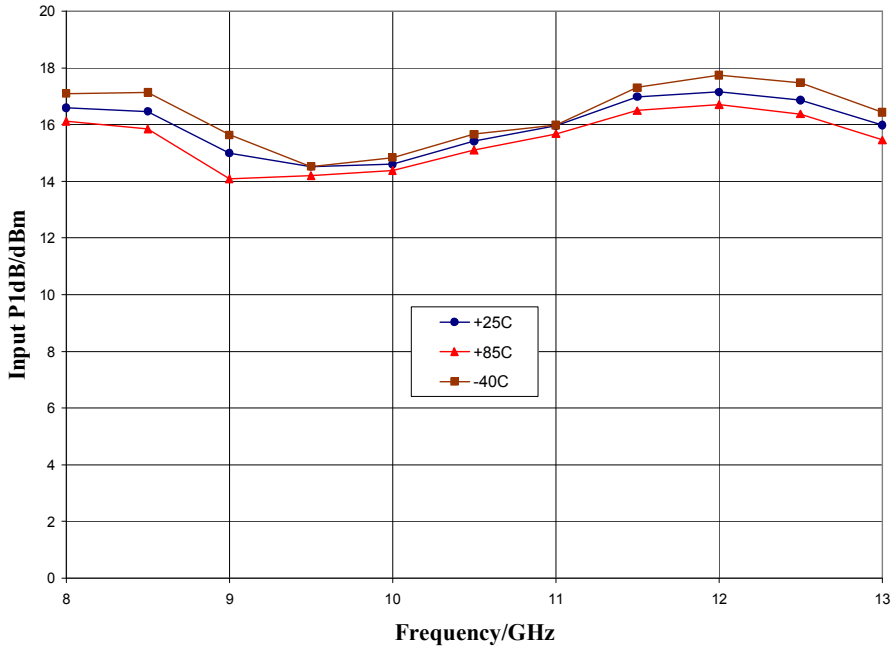
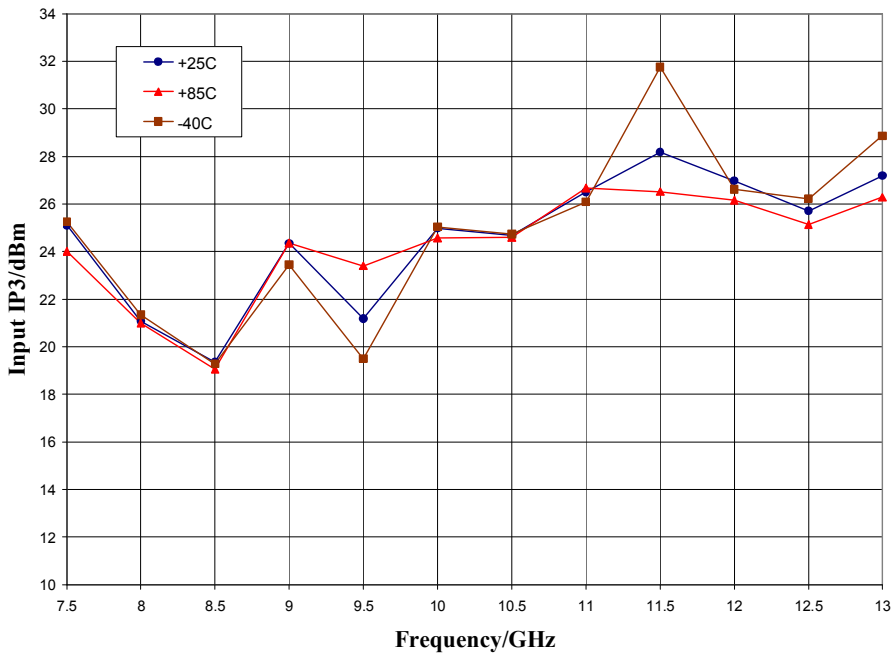
Typical Performance

Data Taken As IRM With External IF Hybrid

Input P1dB vs. Temperature, LO = +21 dBm, IF = 100 MHz USB



Input IP3 vs. Temperature, LO = +21 dBm, IF = 100 MHz USB



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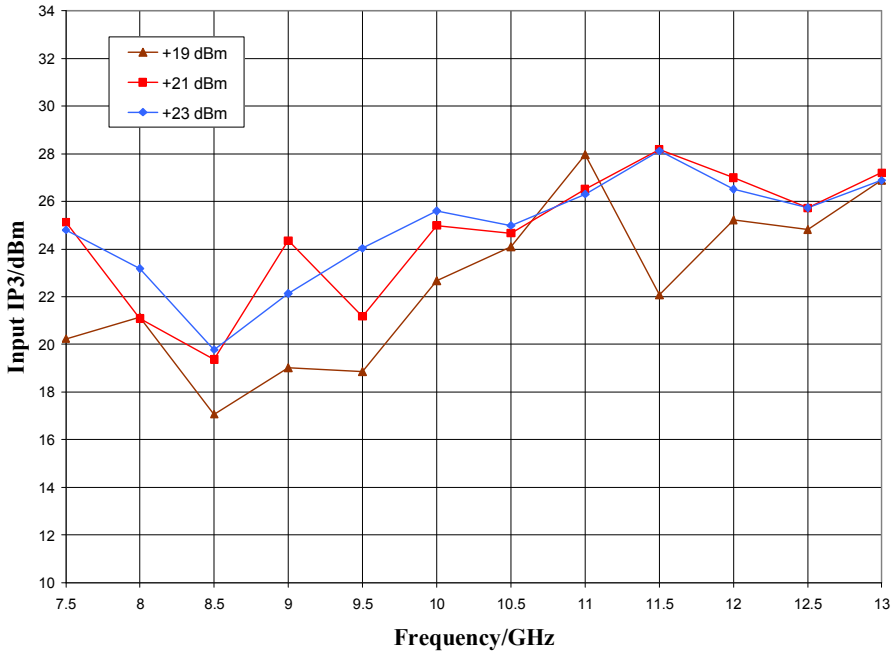
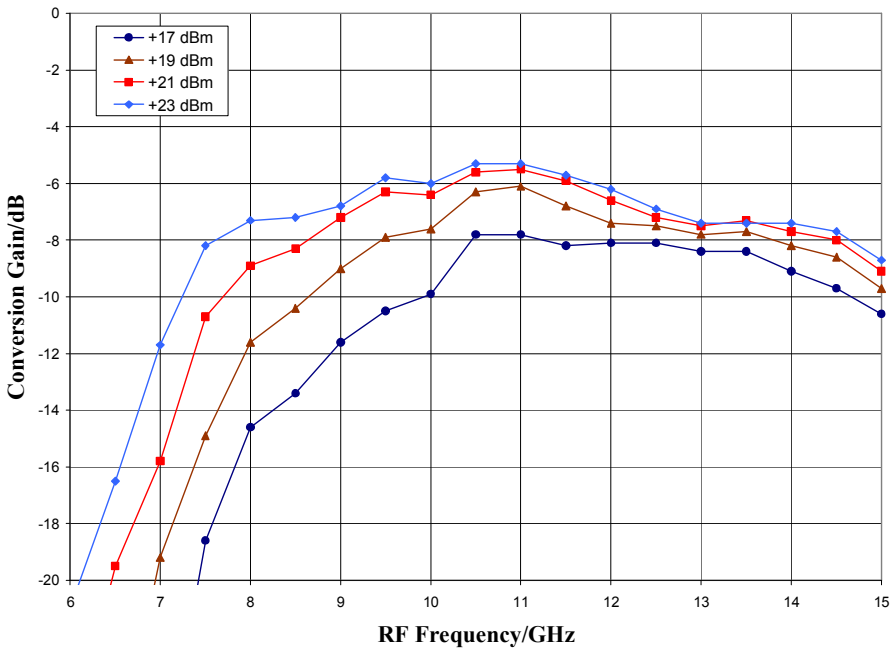
Typical Performance

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 = 950 MHz



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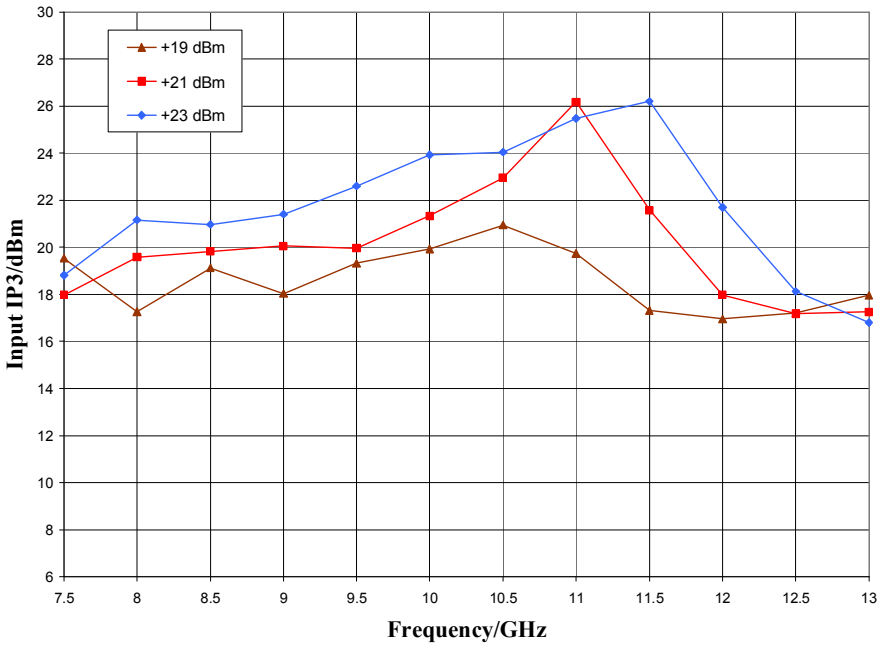
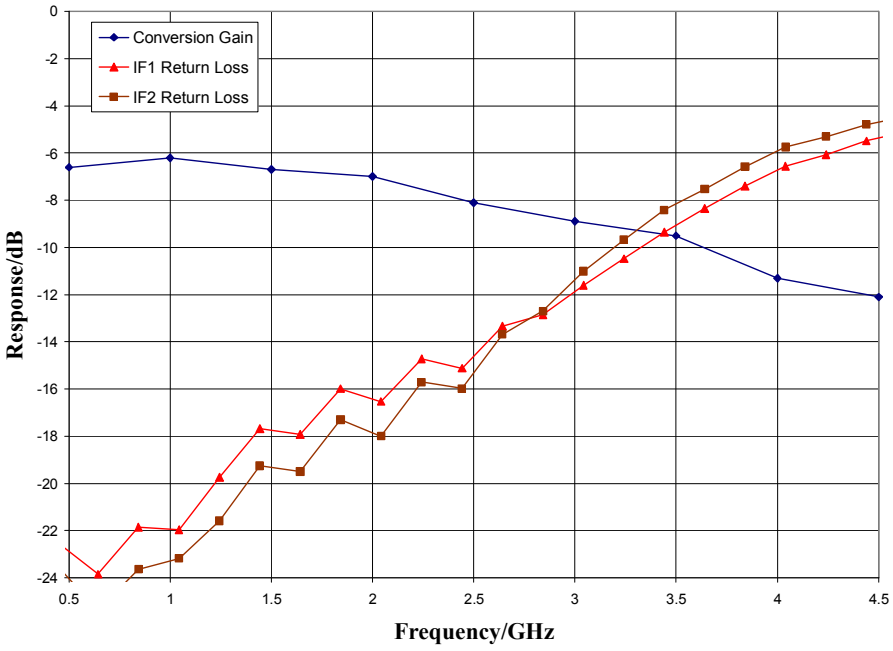
Typical Performance

Data Taken As IRM With External IF Hybrid

Upconverter Performance, Input IP3 vs. LO Drive, IF = 100 MHz



IF Bandwidth, LO = +21 dBm, Return Loss Data Taken Without IF Hybrid



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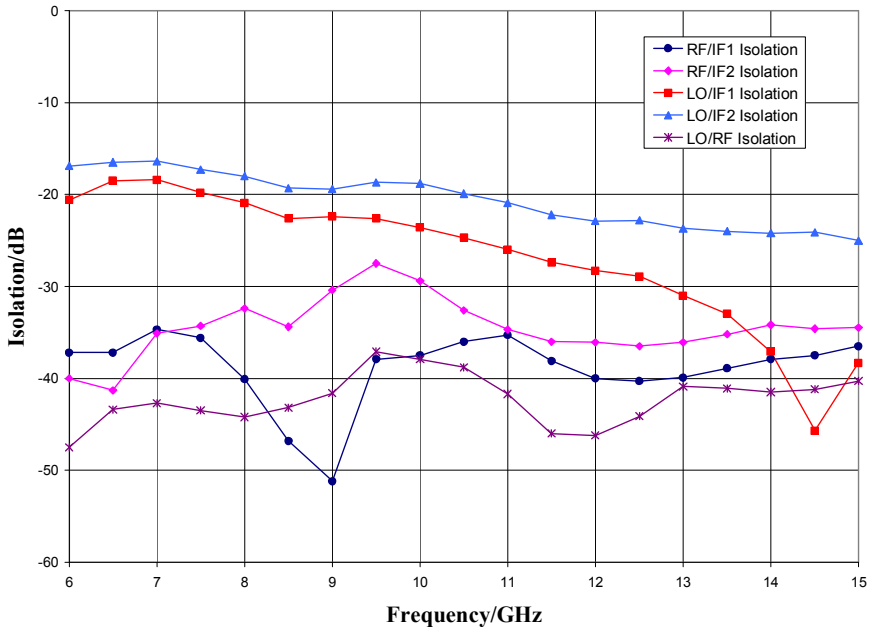
Typical Performance

Isolation, LO = +21 dBm. Data Taken Without IF Hybrid



MxN Spurious Outputs to IF1, IF2

	nLO				
mRF	0	1	2	3	4
0	xx	-13 / -17	35 / 29	-7 / 5	
1	28 / 27	0	31 / 34	51 / 56	51 / 59
2	> 71	60 / 59	> 71	> 71	> 71
3	> 71	> 71	> 71	> 71	> 71
4		> 71	> 71	> 71	> 71

RF = 10.6 GHz @ -10 dBm
LO = 10.5 GHz @ +21 dBm
All values in dBc below the IF1 / IF2 output power level (1RF - 1LO)
Measurement performed without IF hybrid
Where two numbers are listed, they are the spur levels for the IF1 / IF2 ports

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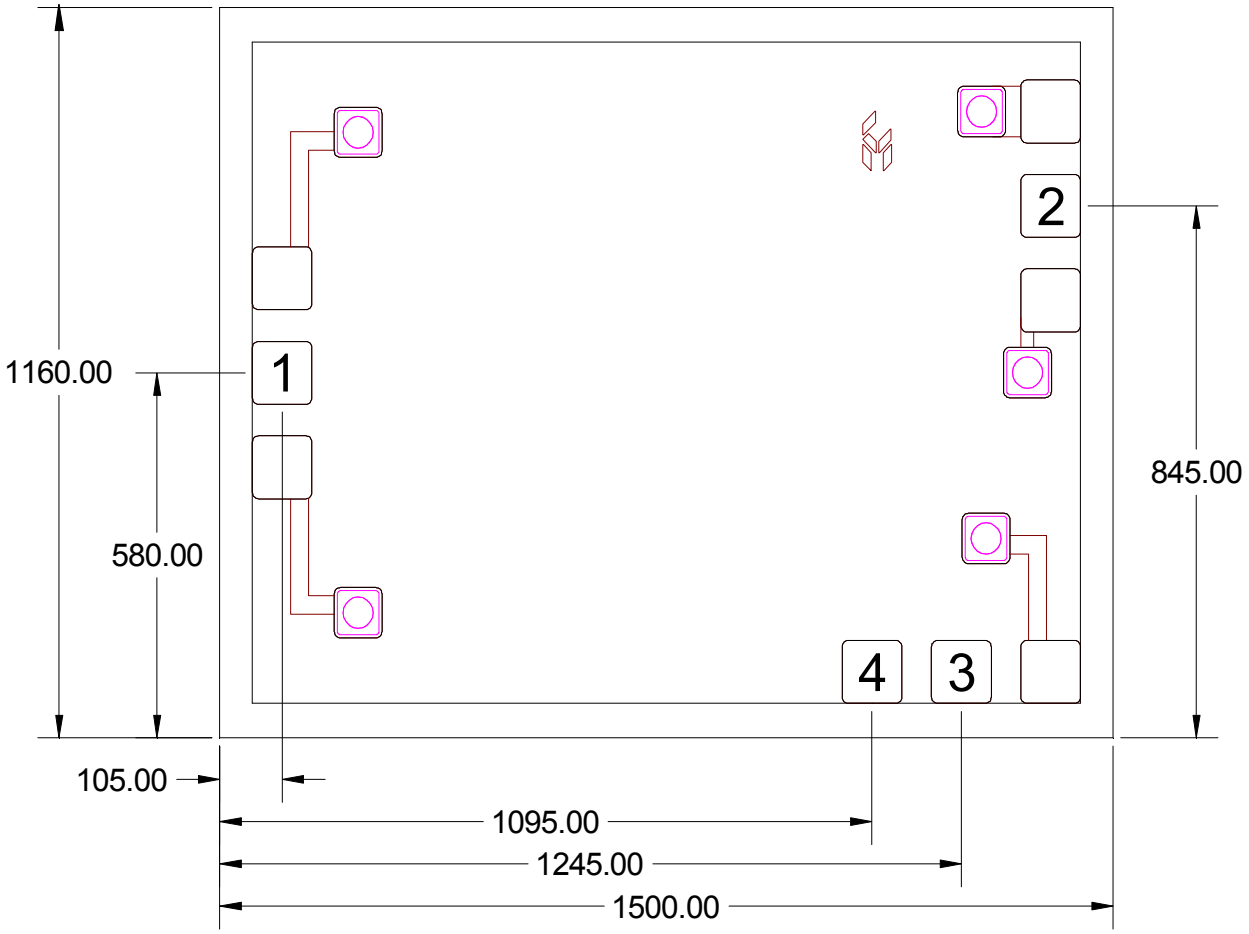
Mechanical Information

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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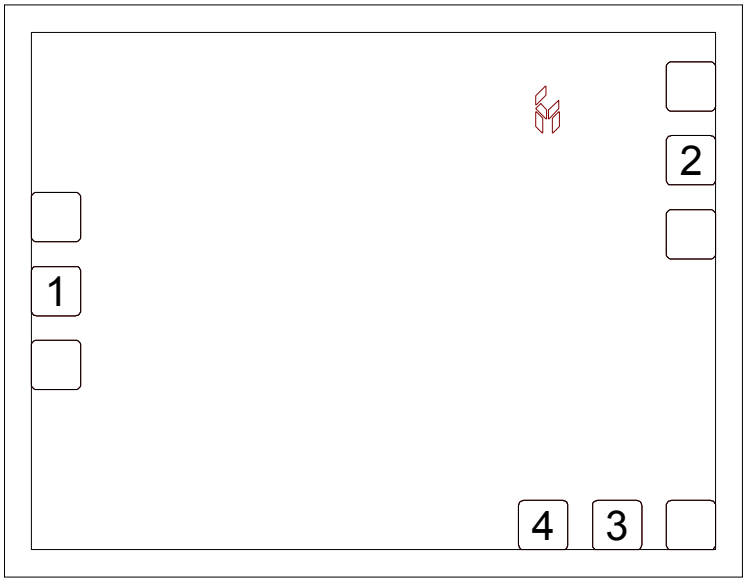
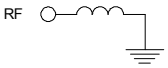
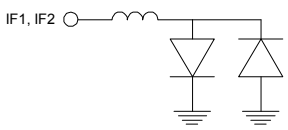
Pad Description

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.	

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Applications Information

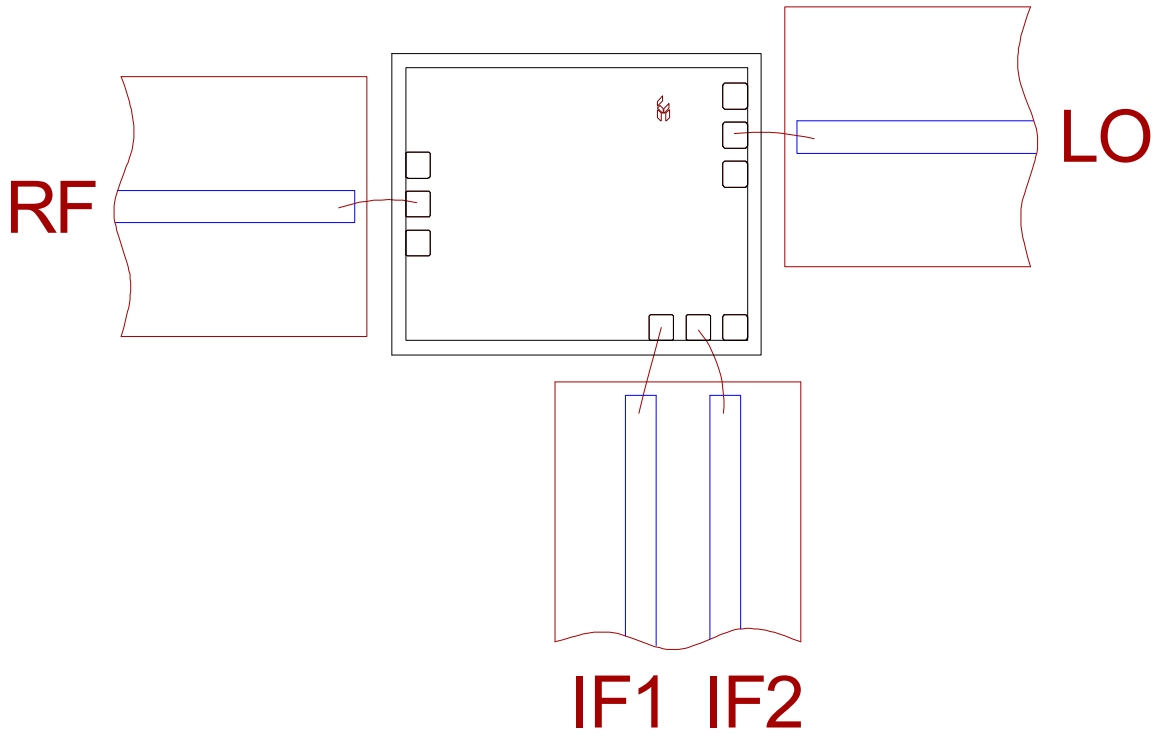
Assembly Guidelines

The backside of the CMD258 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.

Please note, all information contained in this data sheet is subject to change without notice. ver 1.1 0719

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