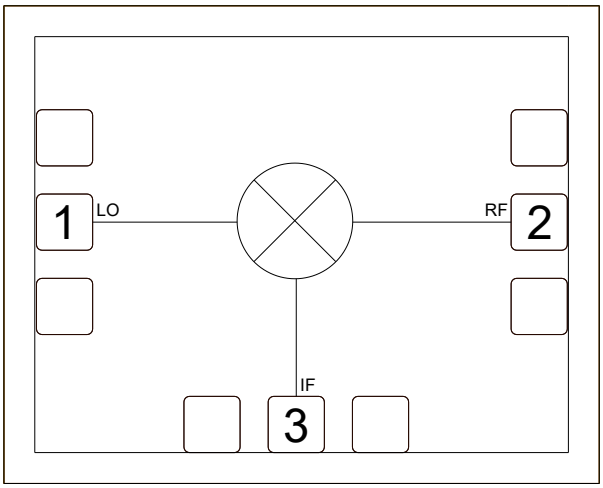
CMD181

26-45 GHz Fundamental Mixer

Features

- Low conversion loss
- High isolation
- Wide IF bandwidth
- Passive double balanced topology
- Small die size

Functional Block Diagram



Description

The CMD181 is a general purpose double balanced mixer die that can be used for up- and downconverting applications between 26 and 45 GHz. The CMD181 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 +15 dBm. The CMD181 can easily be configured as an image reject mixer or single sideband modulator with external hybrids and power splitters.

Electrical Performance – IF = 5 GHz USB, LO = +17 dBm , T_A = 25 °C, LO = 34 GHz

Parameter	Min	Typ	Max	Units
Frequency Range, RF & LO		26 – 45		GHz
Frequency Range, IF	DC		12	GHz
Conversion Loss		6.5		dB
LO to RF Isolation		37		dB
LO to IF Isolation		29		dB
RF to IF Isolation		35		dB
Input IP3		+22		dBm

Unless otherwise noted, all measurements performed as a downconverter, IF = 5 GHz USB

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Specifications

Absolute Maximum Ratings

Parameter	Rating
RF / IF Input Power	+23 dBm
LO Drive	+23 dBm
Operating Temperature	-55 to 85 °C
Storage Temperature	-55 to 150 °C
Thermal Resistance, Θ_{JC}	302.8 ºC / W
Power Dissipation, Pdiss	215 mW

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

Electrical Specifications – IF = 5 GHz, LO = +17 dBm, T_A = 25 °C

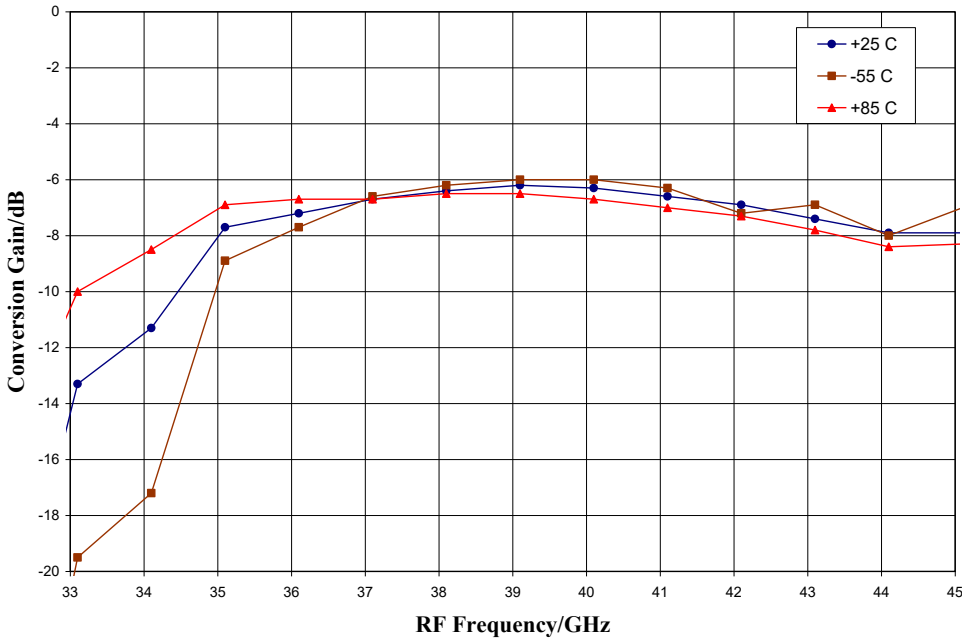
Parameter	Min	Typ	Max	Units
Frequency Range, RF & LO		26 – 45		GHz
Frequency Range, IF	DC		12	GHz
Conversion Loss		6.5	9	dB
Noise Figure (SSB)		6.5	9	dB
LO to RF Isolation	32	37		dB
LO to IF Isolation	22	30		dB
RF to IF Isolation	30	35		dB
Input IP3	20	23		dBm

Unless otherwise noted, all measurements performed as a downconverter, IF = 5 GHz

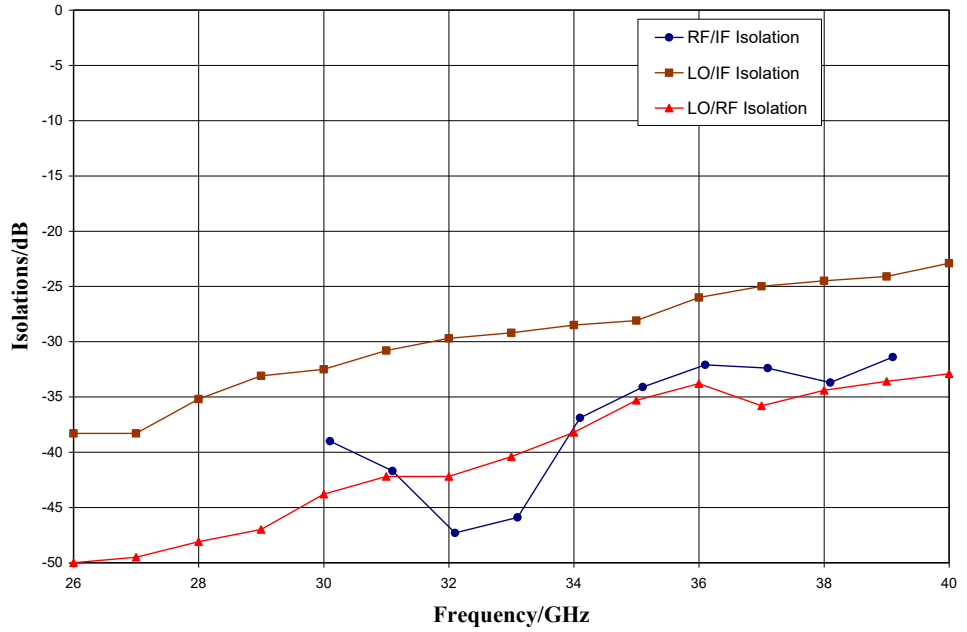
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Typical Performance

Conversion Gain vs. Temperature, LO = +17 dBm, IF = 5 GHz USB



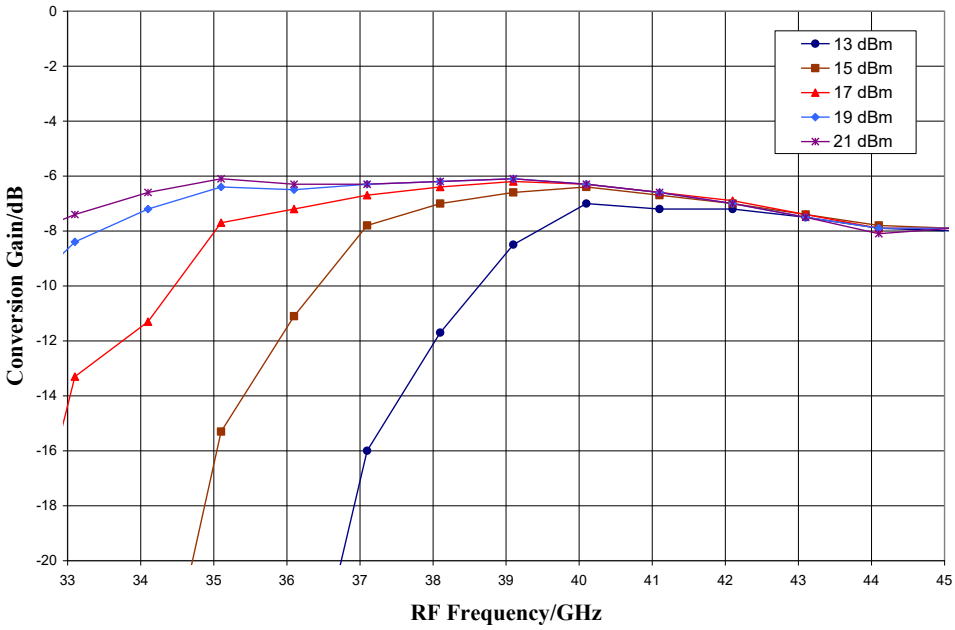
Isolation, LO = +17 dBm



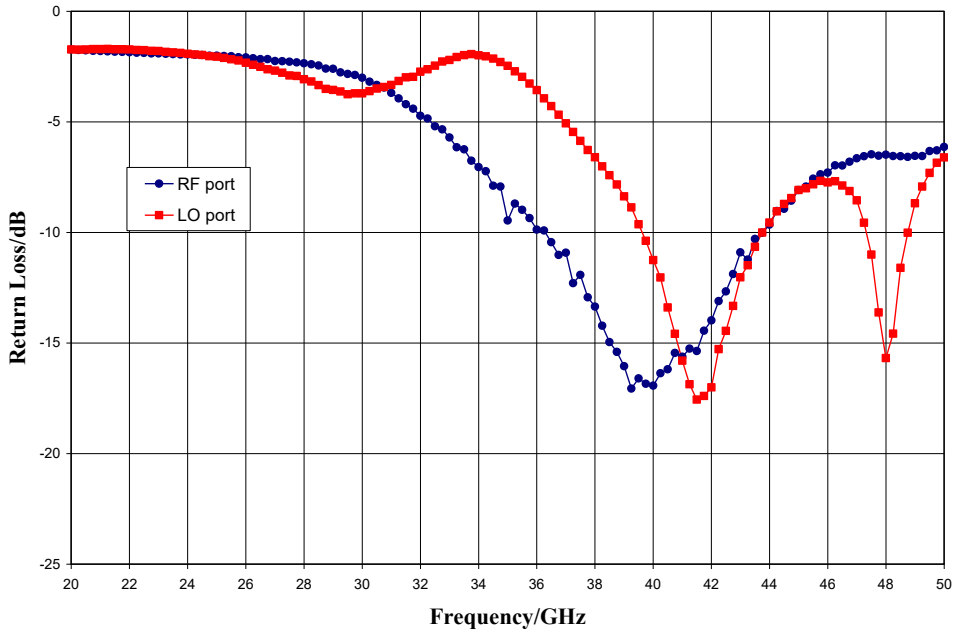
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Typical Performance

Conversion Gain vs. LO Drive, IF = 5 GHz USB



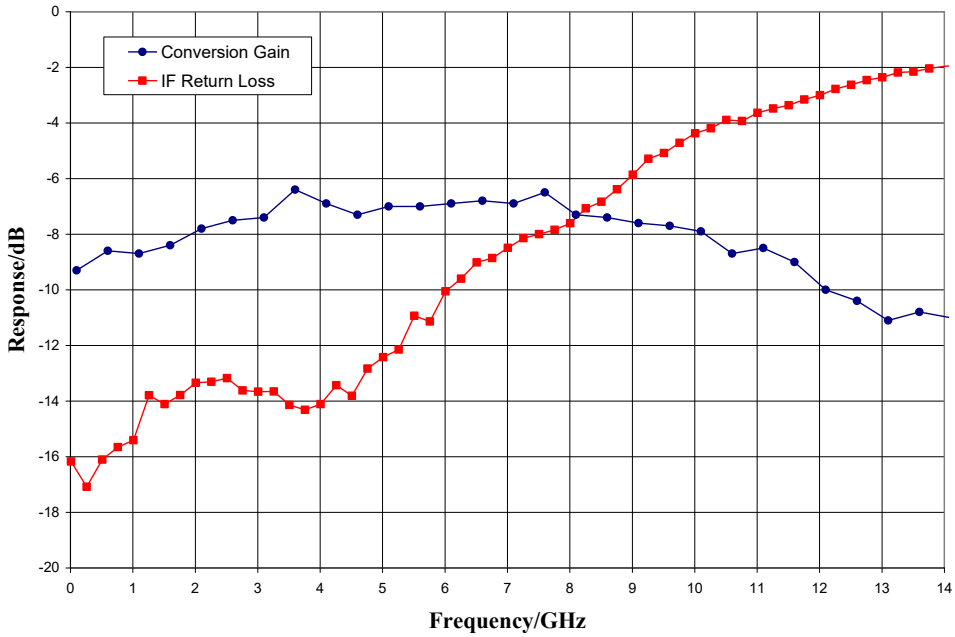
Return Loss, LO = + 17 dBm



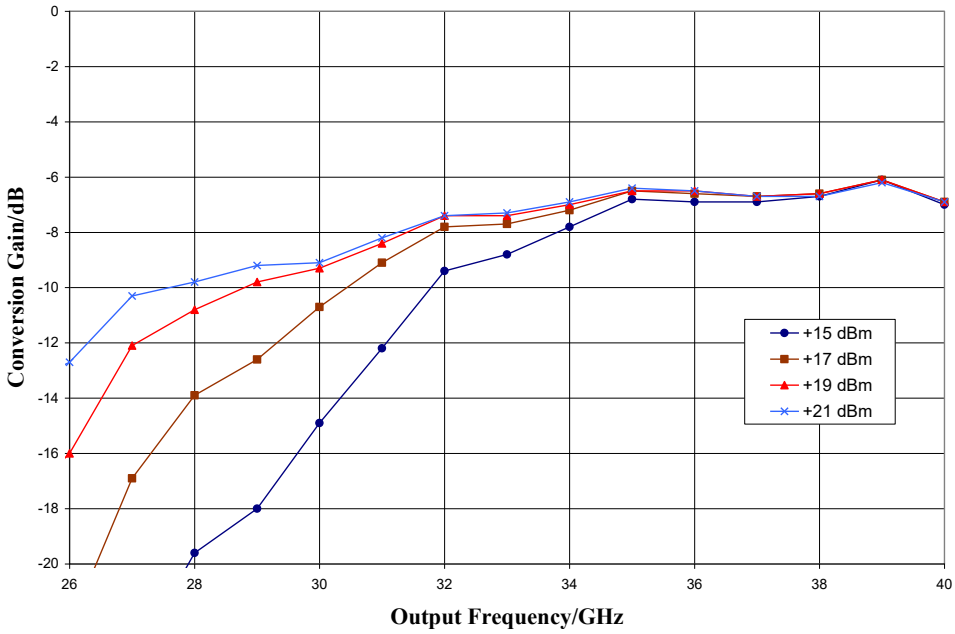
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Typical Performance

IF Bandwidth, LO = +17 dBm



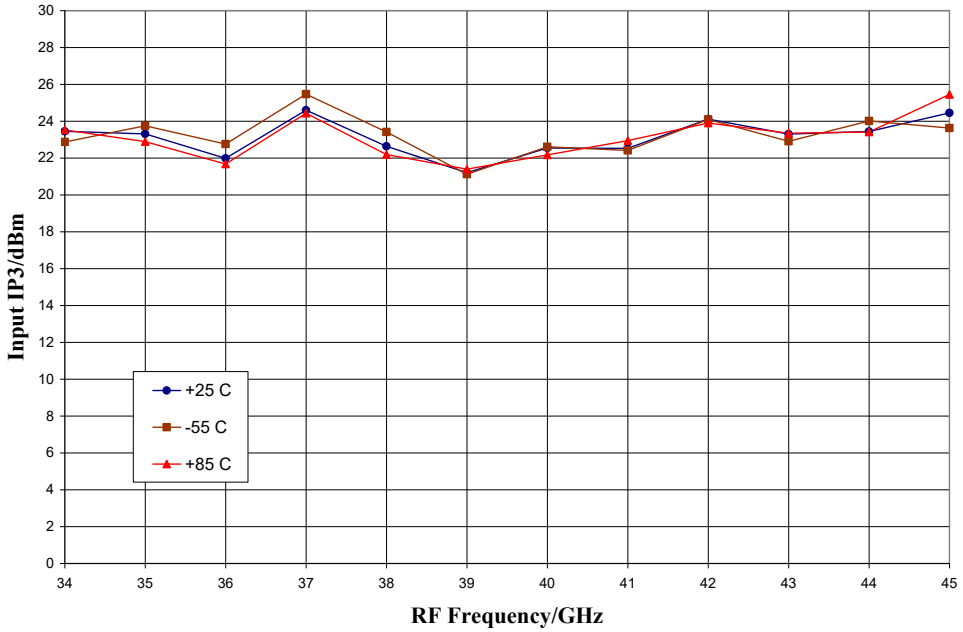
Upconverter Performance, Conversion Gain vs. LO Drive, IF input = 600 MHz



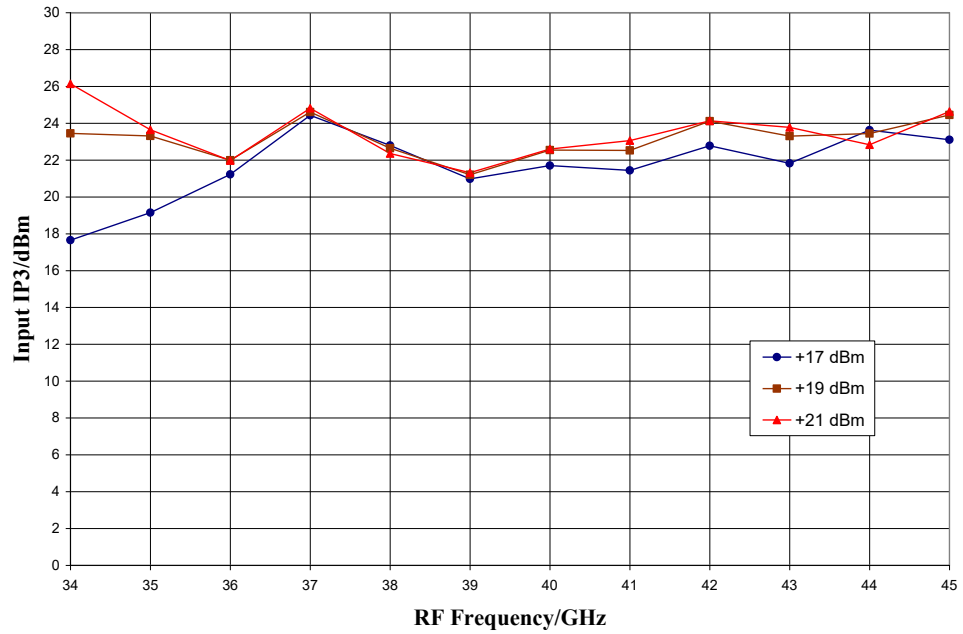
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Typical Performance

Input IP3 vs. Temperature, LO = +19 dBm, IF = 5 GHz USB



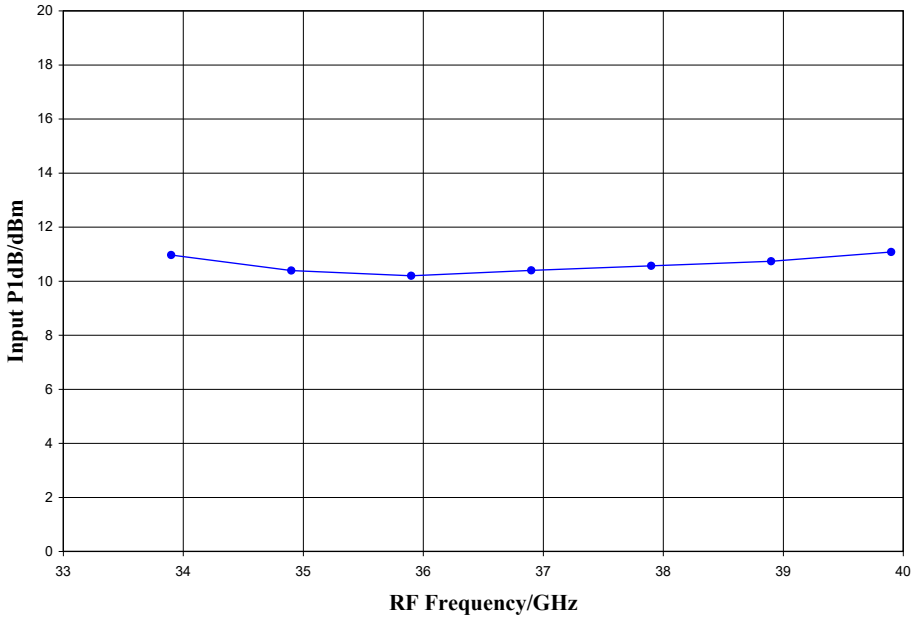
Input IP3 vs. LO Drive, IF = 5 GHz USB



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Typical Performance

Input P1dB, LO=+17 dBm, IF = 5 GHz USB



M x N Spur Table

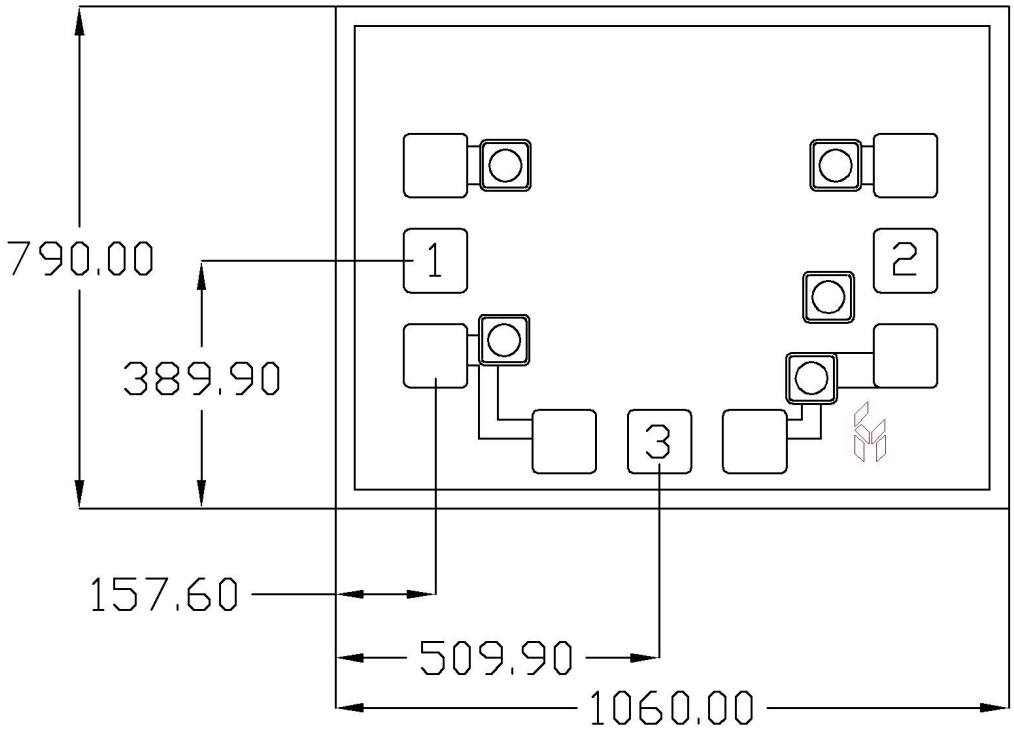
	nLO				
mRF	0	1	2	3	4
0	xx	-3			
1	27	0	50		
2			59	64	
3				74	> 80
4					> 80

RF = 39.1 GHz @ -10 dBm
LO = 34.0 GHz @ +17 dBm
All values in dBc below the IF output power level (1RF - 1LO)

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Mechanical Information

Die Outline (all dimensions in microns)

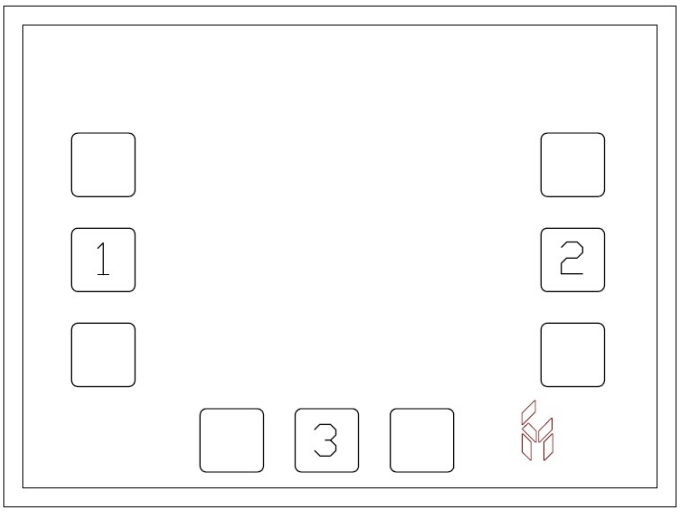


Notes:
1. No connection required for unlabeled pads
2. Backside is RF and DC ground
3. Backside and bond pad metal: Gold
4. Die is 100 microns thick
5. All bond pads (1, 2, 3) are 100 microns square

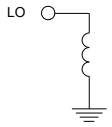
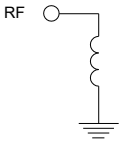
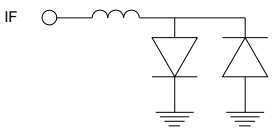
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Pin Description

Pad Diagram



Functional Description

Pin	Function	Description	Schematic
1	LO	This pin is DC coupled and matched to 50 ohms.	
2	RF	This pin is DC 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.	

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Applications Information

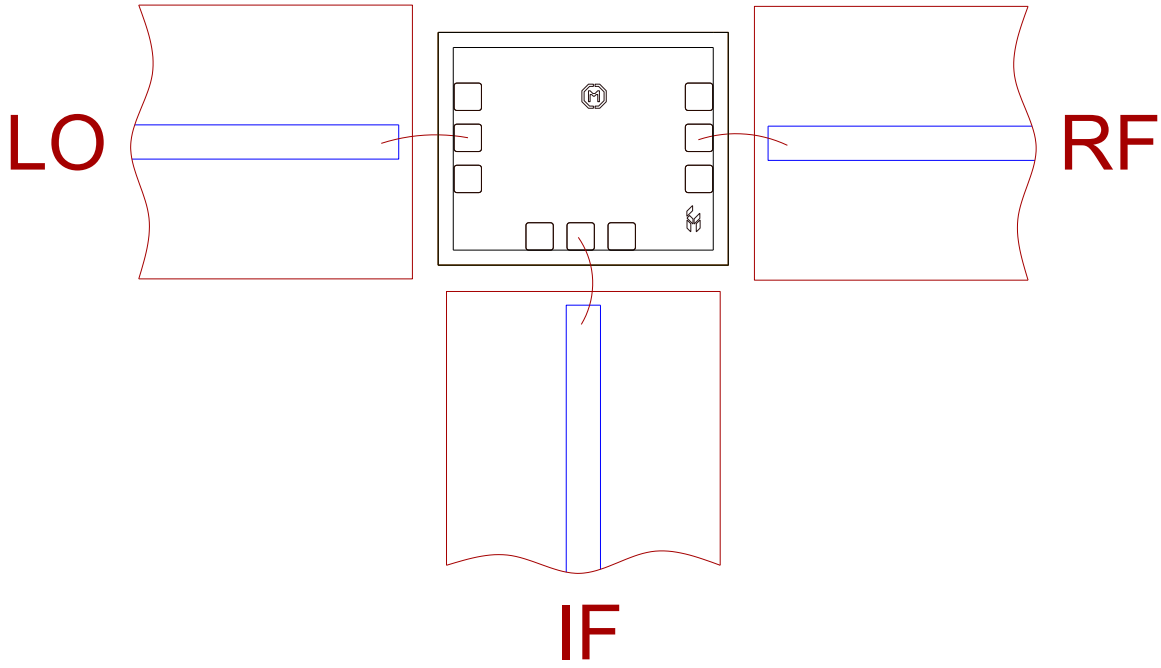
Assembly Guidelines

The backside of the CMD181 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.

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