

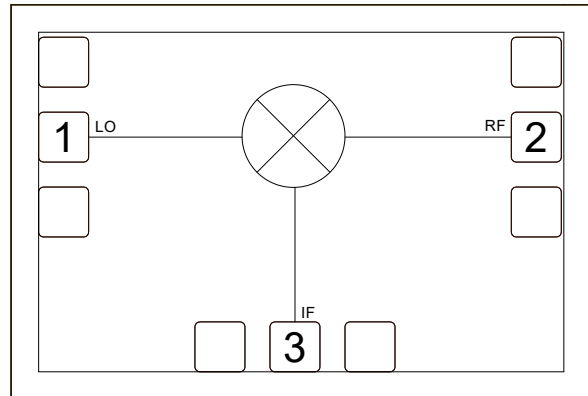
### Features

- ▶ Low conversion loss
- ▶ High IP3
- ▶ High Isolation
- ▶ Wide IF bandwidth
- ▶ Small die size

### Description

The CMD253 is a high IP3 double balanced mixer die that can be used for up- and downconverting applications between 6 and 14 GHz. The CMD253 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 CMD253 can easily be configured as an image reject mixer or single sideband modulator with external hybrids and power splitters.

### Functional Block Diagram



### Electrical Performance - IF = 100 MHz, LO = +19 dBm, T<sub>A</sub> = 25 °C, F = 10 GHz

Parameter	Min	Typ	Max	Units
Frequency Range, RF & LO	6 - 14			GHz
Frequency Range, IF	DC		5	GHz
Conversion Loss		6		dB
LO to RF Isolation		43		dB
LO to IF Isolation		39		dB
RF to IF Isolation		23		dB
Input P1dB		15		dBm
Input IP3		23		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, $\Theta_{JC}$	156 °C/W
Power Dissipation, P <sub>diss</sub>	417 mW

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

#### Electrical Specifications - IF = 100 MHz, LO = +19 dBm, T<sub>A</sub> = 25 °C

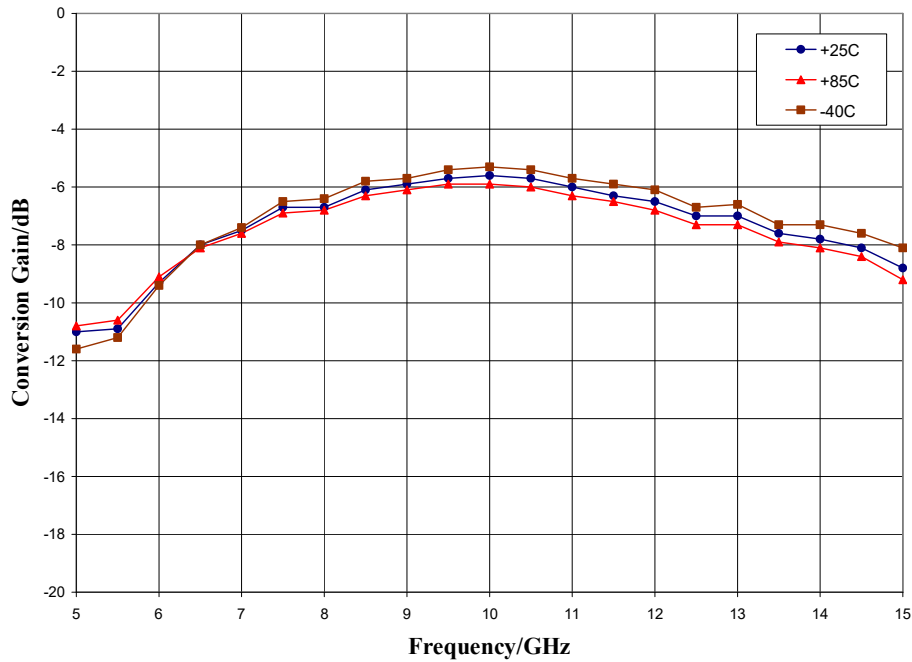
Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range, RF & LO	8 - 12			6 - 14			GHz
Frequency Range, IF	DC		5	DC		5	GHz
Conversion Loss		6.5	8		7	11	dB
Noise Figure (SSB)		6.5			7		dB
LO to RF Isolation	35	43		32	43		dB
LO to IF Isolation	29	39		25	39		dB
RF to IF Isolation	15	23		12	23		dB
Input P <sub>1dB</sub>		15			15		dBm
Input IP <sub>3</sub>		23			23		dBm

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

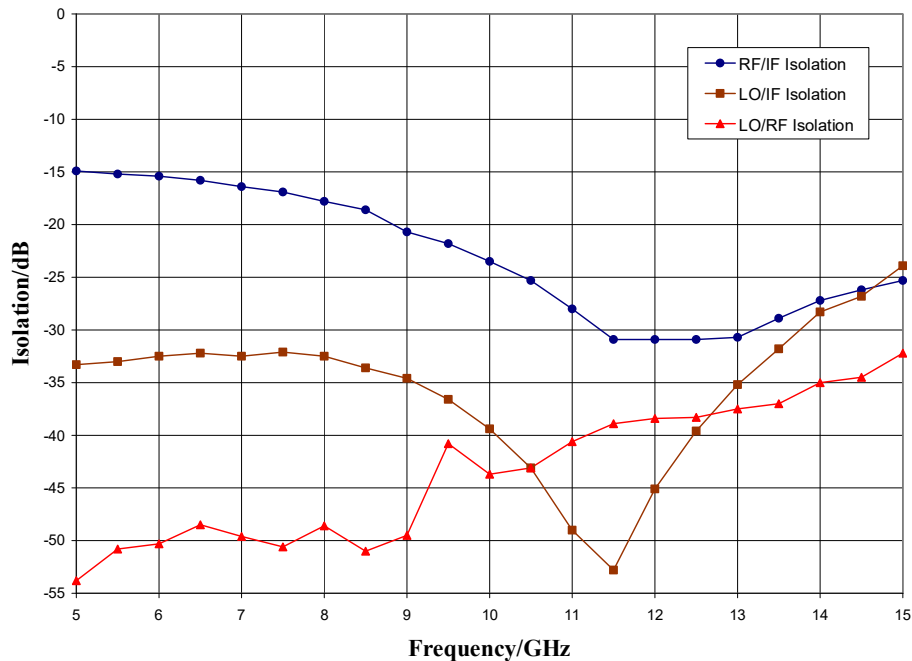
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### Typical Performance

**Conversion Gain vs. Temperature, LO = +19 dBm, IF = 100 MHz USB**



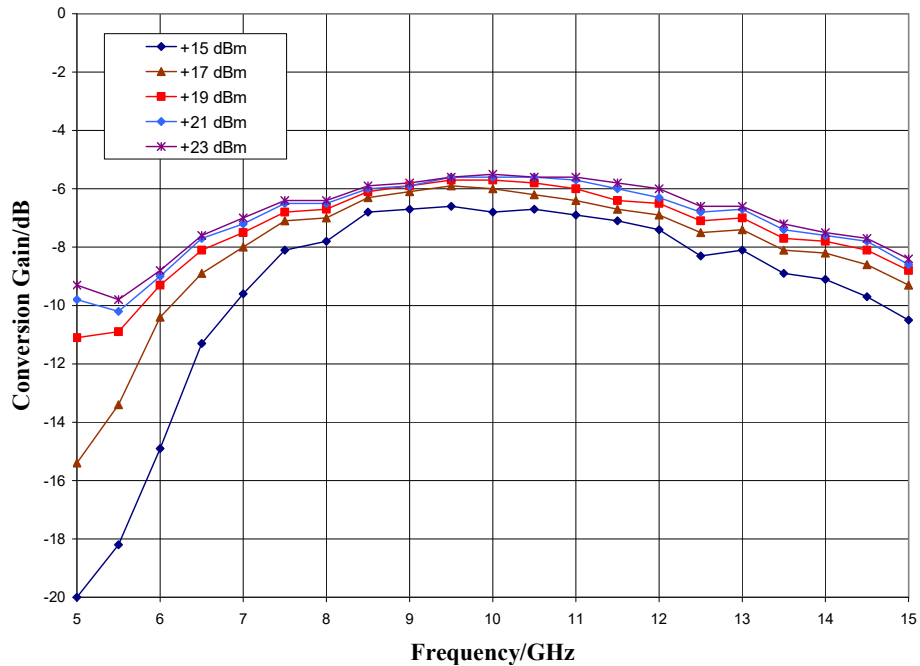
**Isolation, LO = +19 dBm**



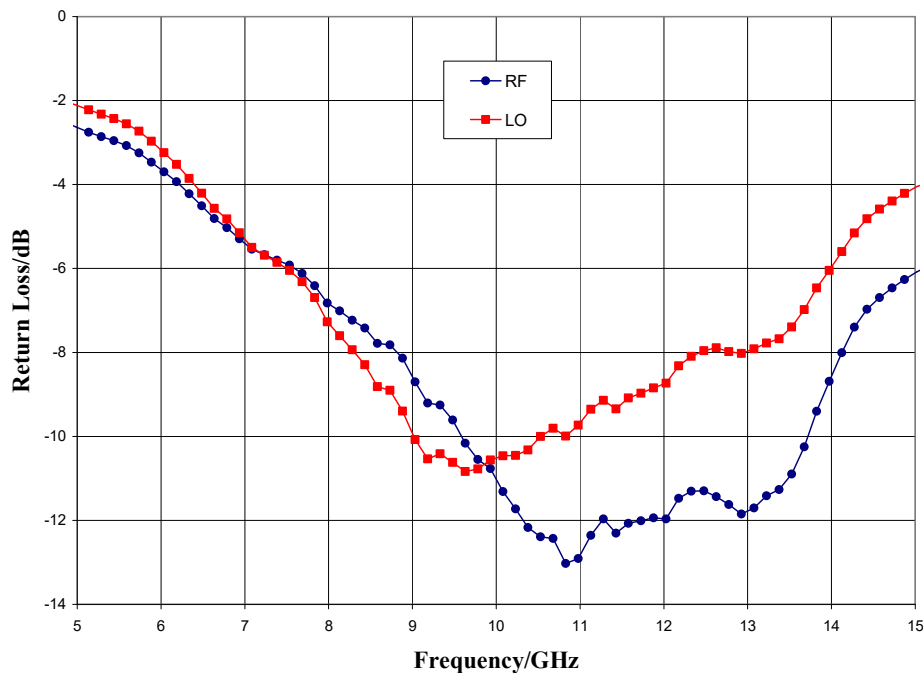
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### Typical Performance

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



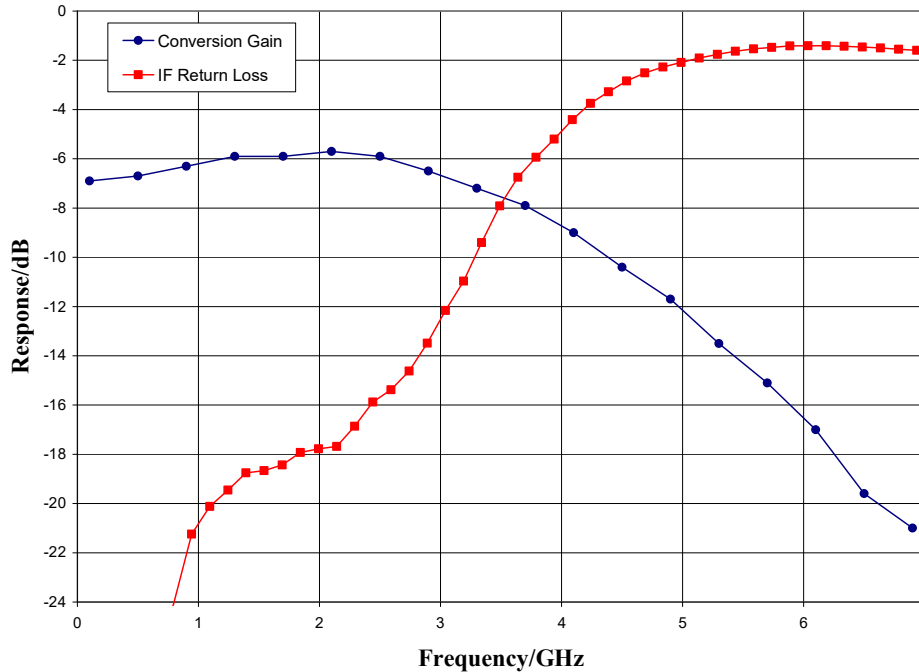
#### Return Loss, LO = + 19 dBm



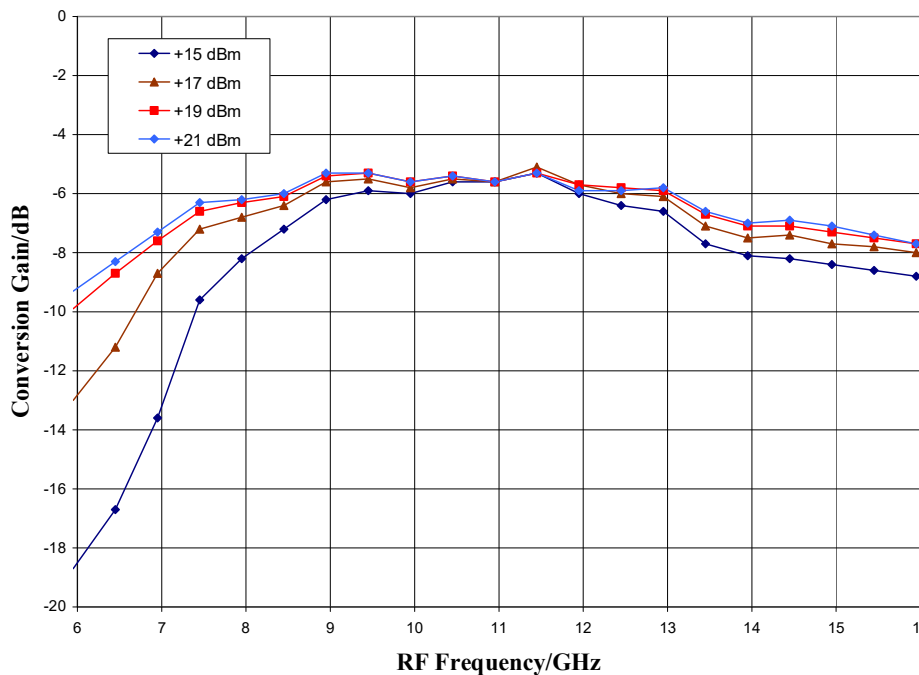
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### Typical Performance

**IF Bandwidth, LO = +19 dBm**



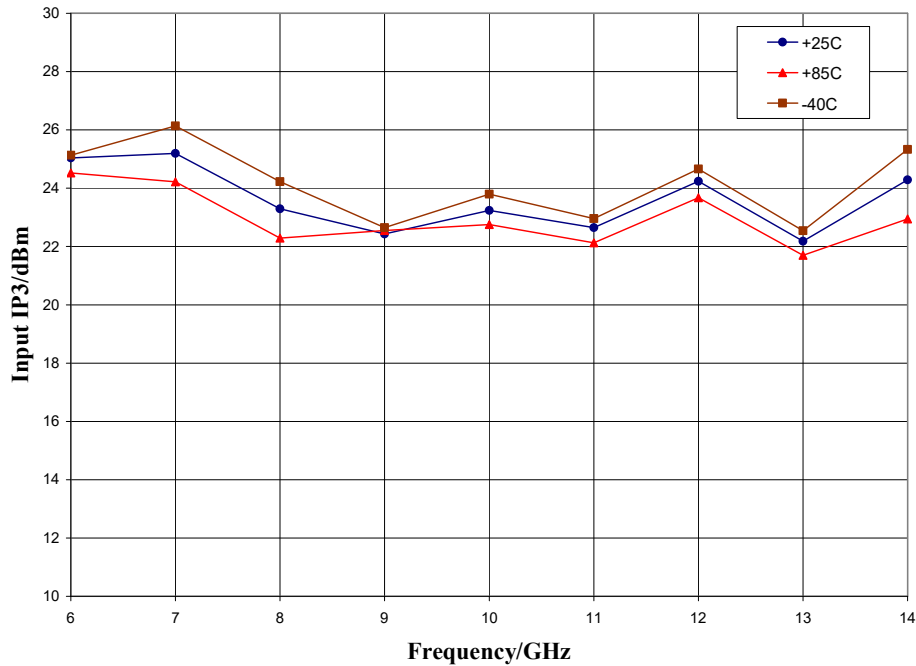
**Upconverter Performance, Conversion Gain vs. LO Drive, IF input = 950 MHz**



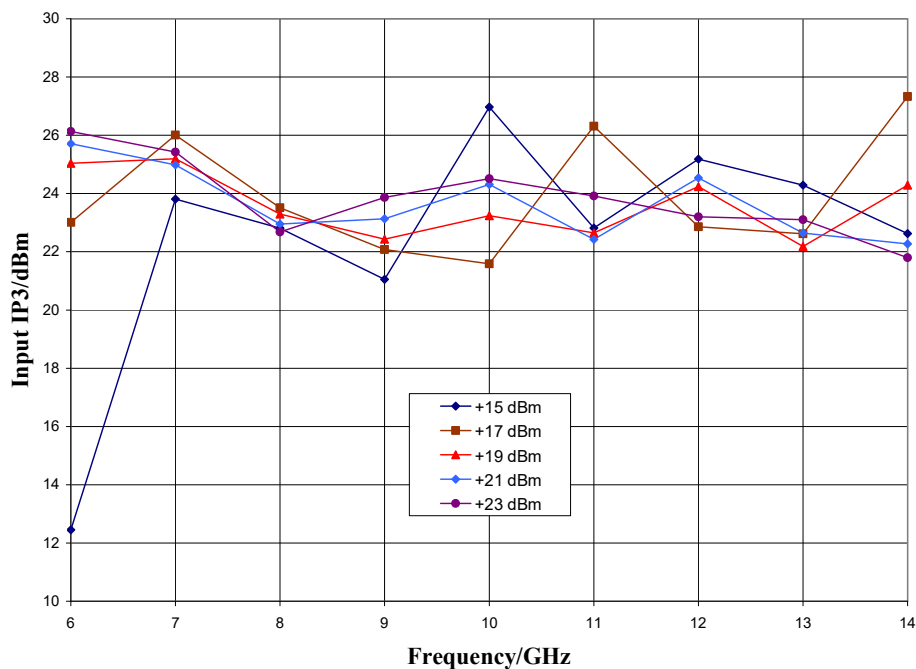
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### Typical Performance

**Input IP3 vs. Temperature, LO = +19 dBm, IF = 100 MHz**



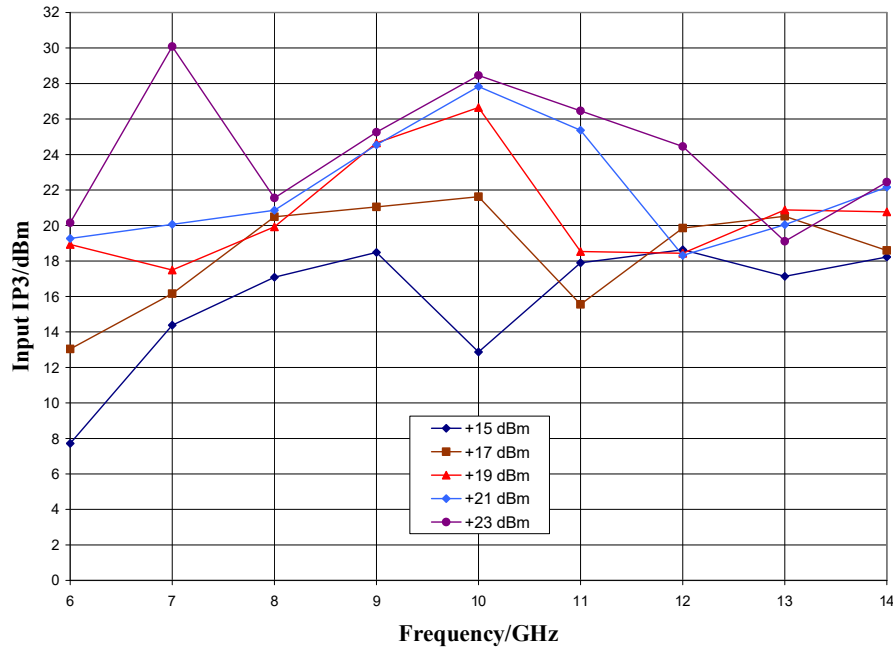
**Input IP3 vs. LO Drive, IF = 100 MHz**



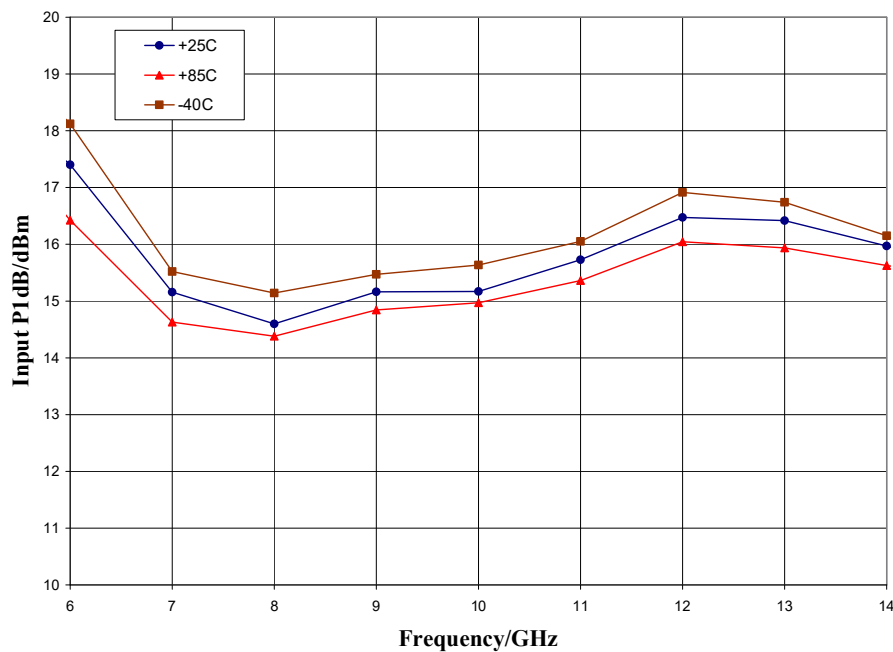
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### Typical Performance

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



#### Input P1dB vs. Temperature, LO = +19 dBm, IF = 100 MHz USB



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### Typical Performance

#### MxN Spurious Outputs

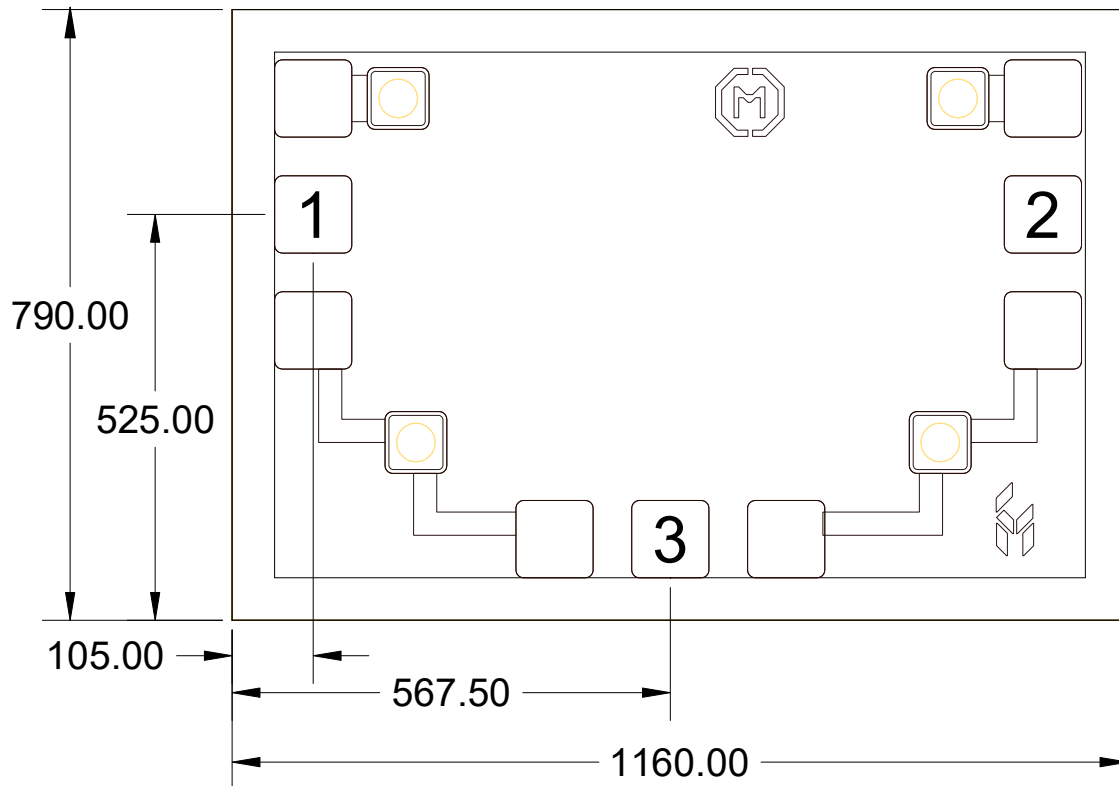
mRF	nLO				
	0	1	2	3	4
0	xx	4	21	31	21
1	18	0	40	37	62
2	>64	>64	>64	>64	>64
3	>64	>64	>64	>64	>64
4		>64	>64	>64	>64

RF = 10.1 GHz @ -10 dBm  
 LO = 10.0 GHz @ +19 dBm  
 All values in dBc below the IF output power level (1RF - 1LO)



### Mechanical Information

#### Die Outline (all dimensions in microns)

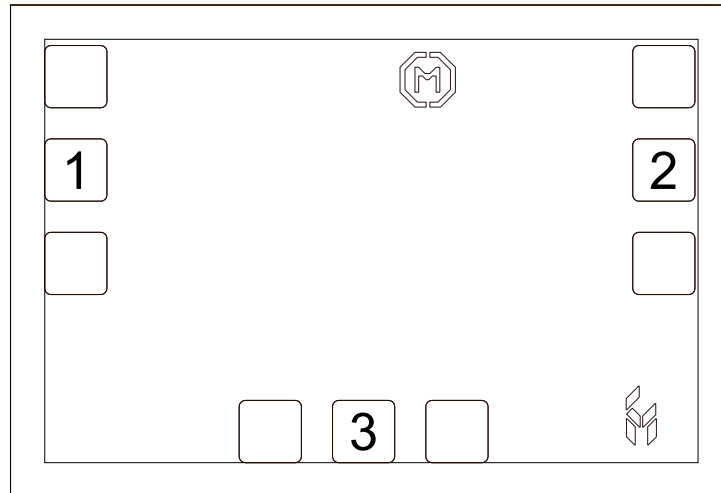


#### Notes:

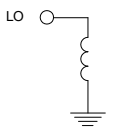
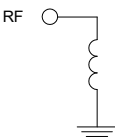
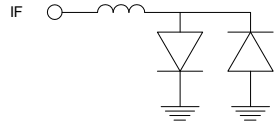

1. No connection required for unlabeled pads
2. Backside is RF and DC ground
3. Backside and bond pad metal: Gold
4. Die is 100 microns thick
5. All bond pads (1, 2, 3) are 100 x 100 microns square

### Pad 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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