



Let Performance Drive

CMD168P3

6-12 GHz Dual Mixer



Features

- ▶ Passive double balanced topology
- ▶ Low LO to RF, LO to IF leakages
- ▶ Low conversion loss
- ▶ Wide IF bandwidth
- ▶ Pb-free RoHs compliant 3x3 QFN package

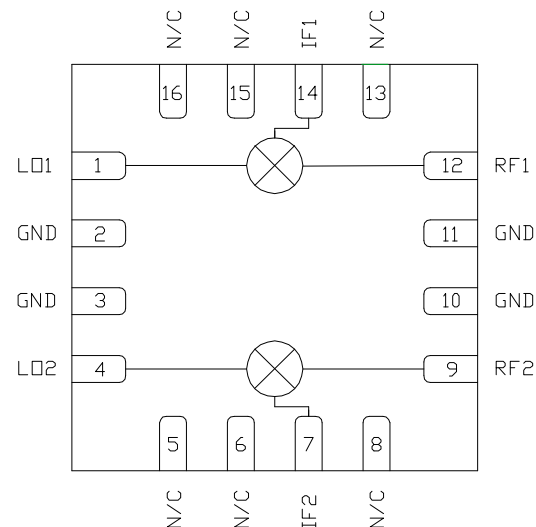
Description

The CMD168P3 is a general purpose, dual double balanced mixer in a leadless 3x3 mm plastic surface mount package that can be used for up- and downconverting applications between 6 and 12 GHz. The two mixers, while fabricated on the same GaAs die, are completely decoupled, thereby allowing for independent operation. The CMD168P3 has very low leakage to both the RF and IF ports due to the optimized balun structures, and each mixer can operate with an LO drive level as low as +9 dBm. The CMD168P3 can easily be configured as an image reject mixer or single side-band modulator with external hybrids and power splitters.

Applications

- ▶ Point-to-point radios
- ▶ Point-to-multi-point radios
- ▶ Test equipment and sensors
- ▶ Military end-use

Functional Block Diagram



Electrical Performance - IF = 100 MHz, LO = +13 dBm, T_A = 25 °C

Parameter	Min	Typ	Max	Units
Frequency Range, RF & LO	6 - 12			GHz
Frequency Range, IF	DC		3.5	GHz
Conversion Loss		7.5		dB
LO to RF Leakage		-25		dBm
LO to IF Leakage		-18		dBm
RF to IF Isolation		-18		dBc
Input IP3 (LO = +17 dBm)		20		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

Operation of this device outside the maximum ratings may cause permanent damage.

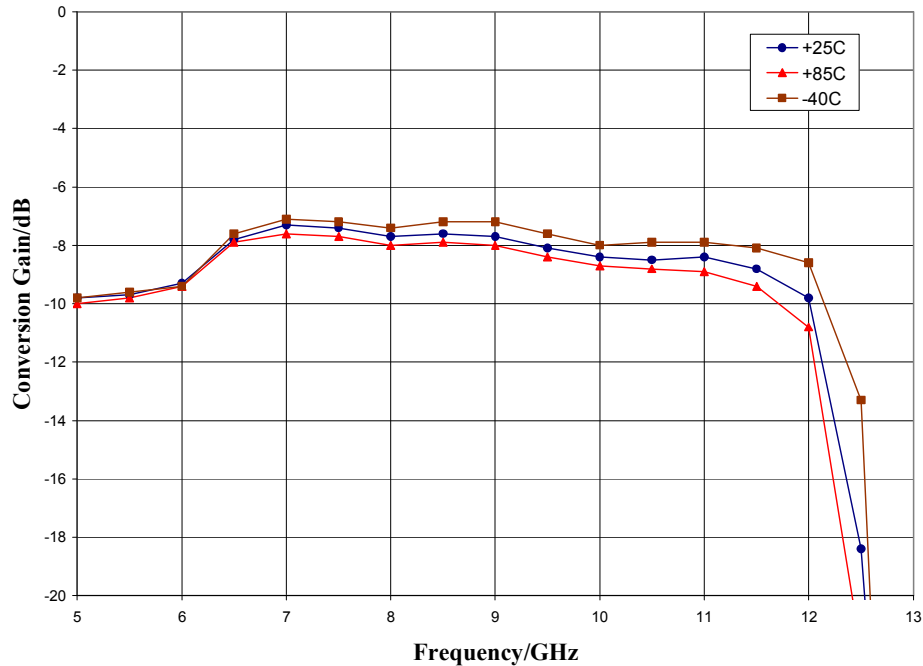
Electrical Specifications - IF = 100 MHz, LO = +13 dBm, T_A = 25 °C

Parameter	Min	Typ	Max	Min	Typ	Max	Units
Frequency Range, RF & LO	6 - 9			9 - 12			GHz
Frequency Range, IF	DC		3.5	DC		3.5	GHz
Conversion Loss		7.5	10		8.5	10.5	dB
Noise Figure (SSB)		7.5	10		8.5	10.5	dB
LO to RF Leakage		-23	-16		-27	-20	dBm
LO to IF Leakage		-15	-9		-18	-13	dBm
RF to IF Isolation		-14	-10		-22	-16	dBc
Input IP3 (LO = +17 dBm)		20			20		dBm
Input P1dB		12			10		dBm

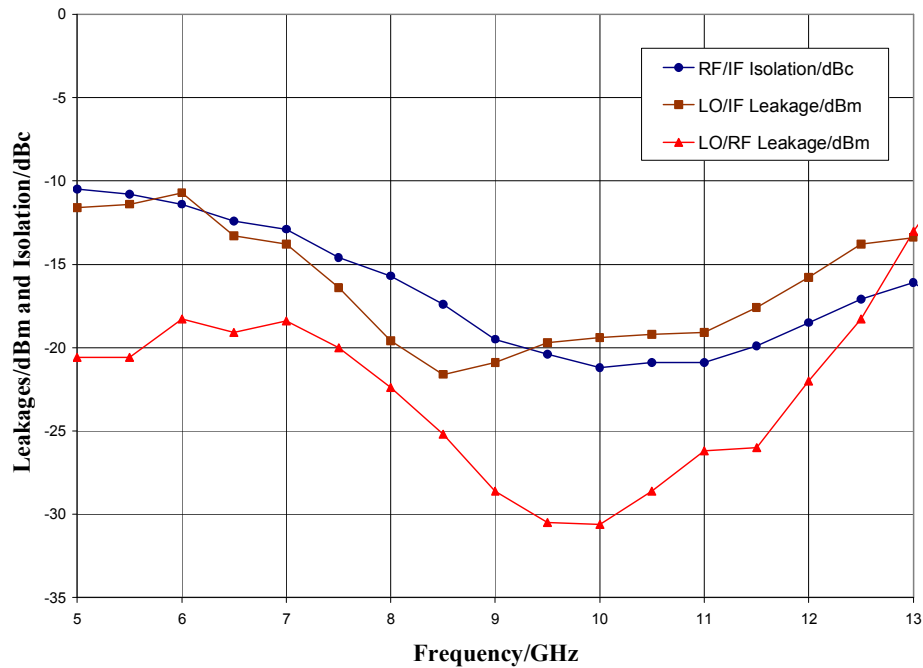
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Typical Performance

Conversion Gain vs. Temperature, LO = +13 dBm, IF = 100 MHz USB



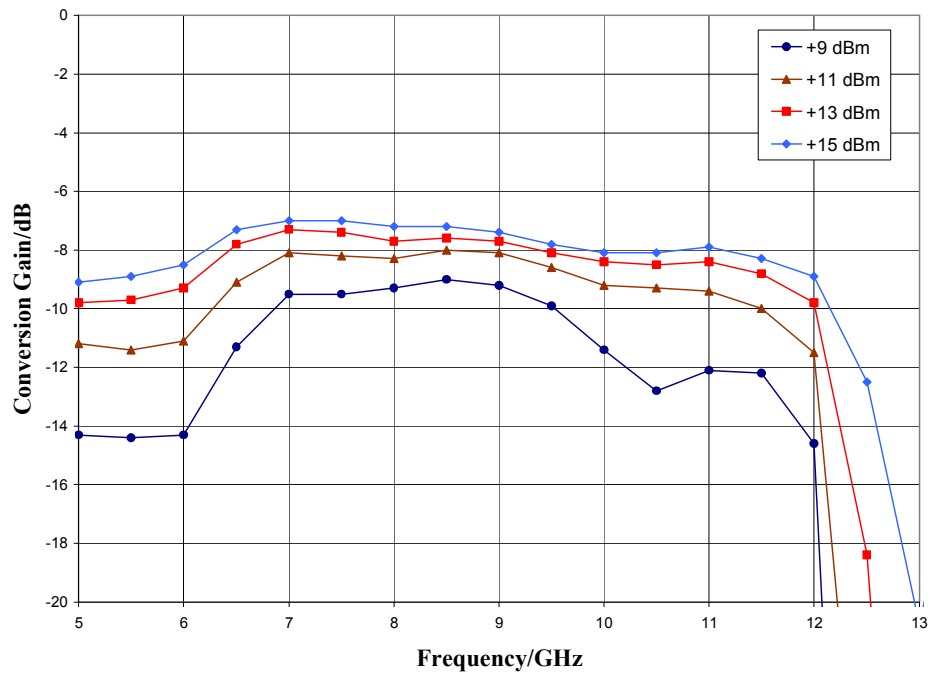
Leakages and Isolation, LO = +13 dBm



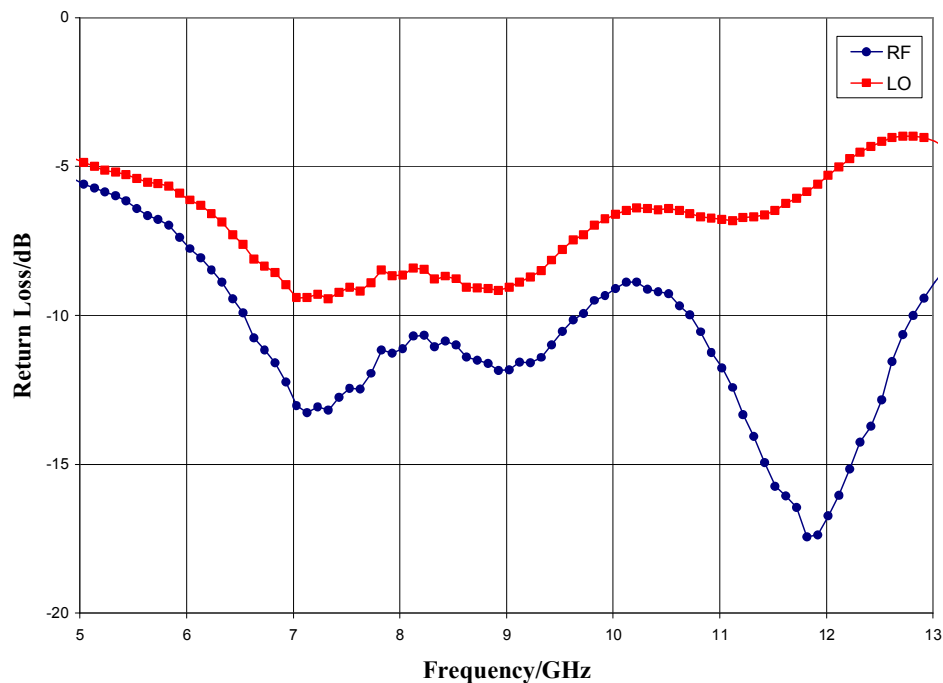
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Typical Performance

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



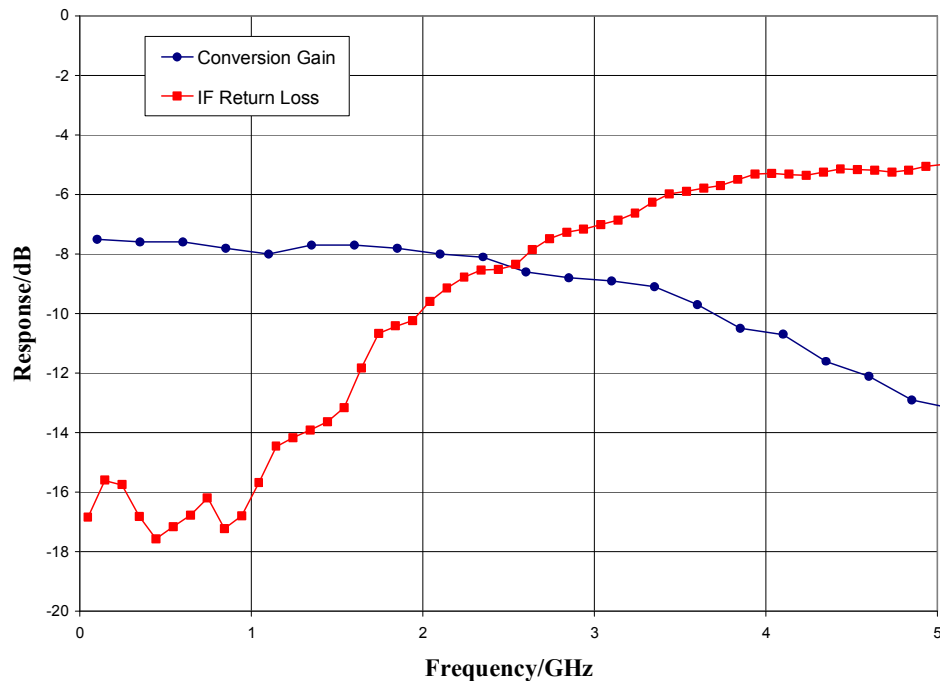
Return Loss, LO = + 13 dBm



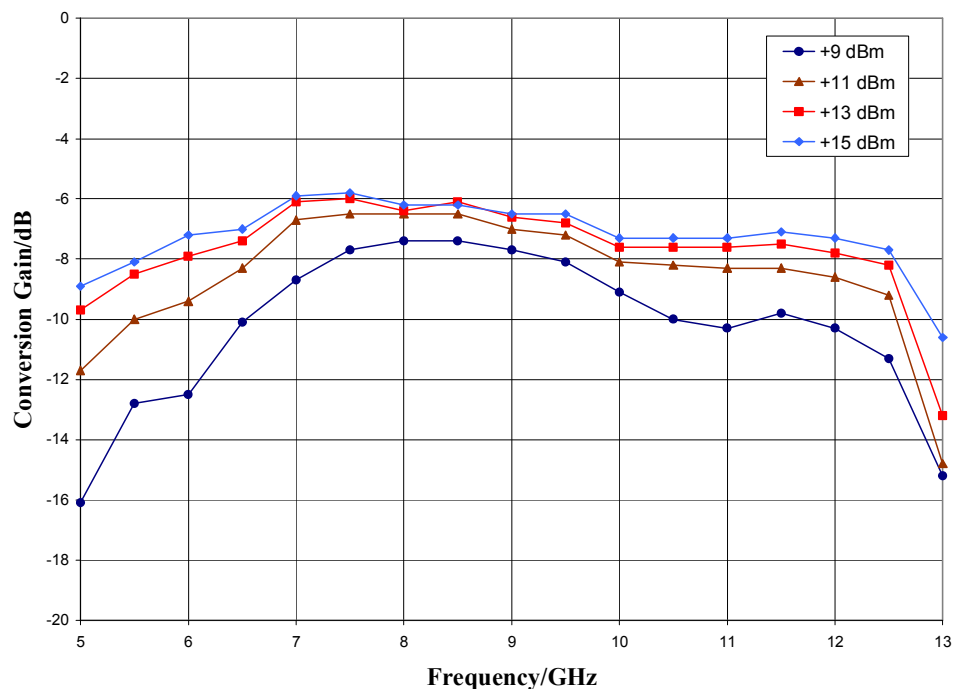
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Typical Performance

IF Bandwidth, LO = +13 dBm



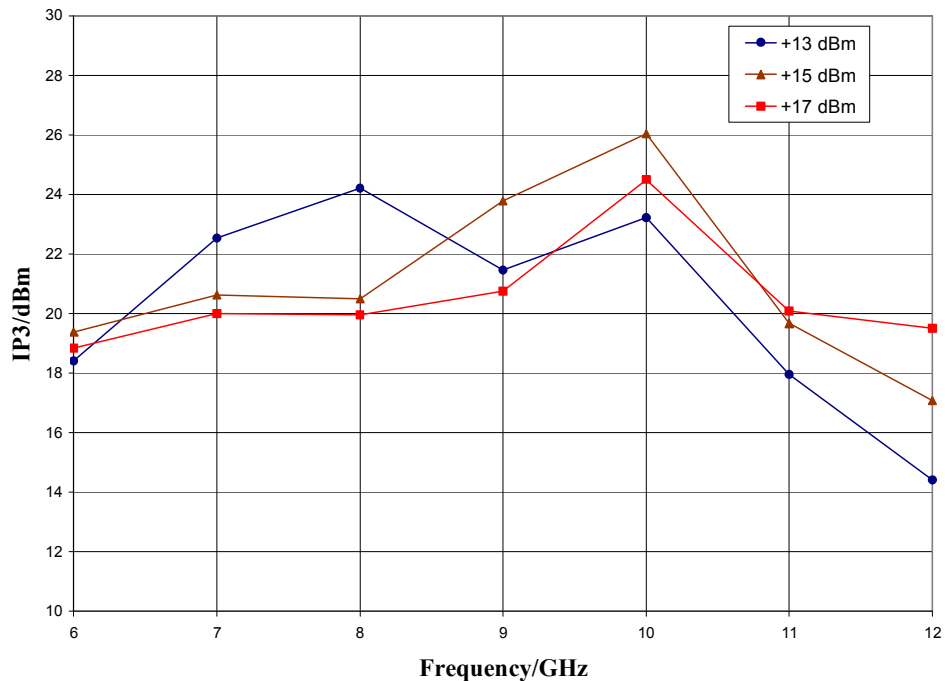
Upconverter Performance, Conversion Gain vs. LO Drive, IF input = 100 MHz



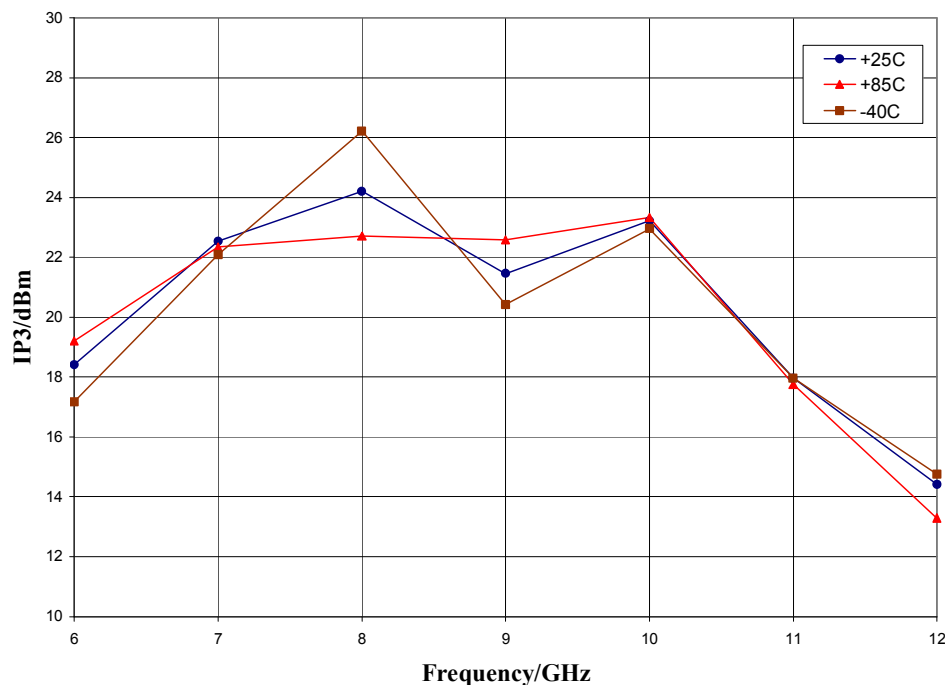
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Typical Performance

Input IP3 vs. LO Drive, IF = 100 MHz USB, RF = -5 dBm each tone



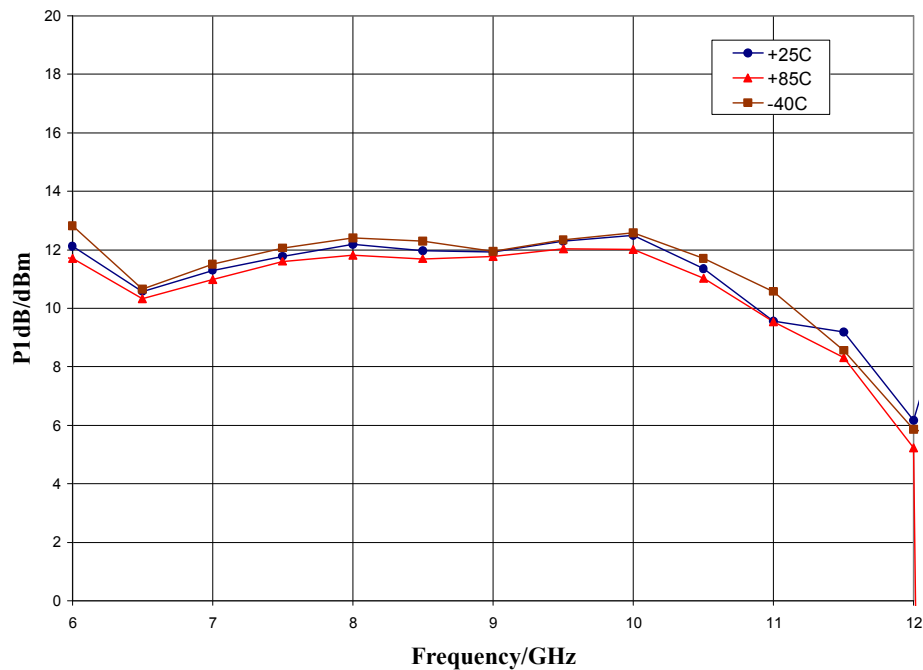
Input IP3 vs. Temperature, LO = +13 dBm, IF = 100 MHz USB, RF = -5 dBm each tone



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Typical Performance

Input P1dB vs. Temperature, LO = +13 dBm, IF = 100 MHz USB



MxN Spurious Outputs

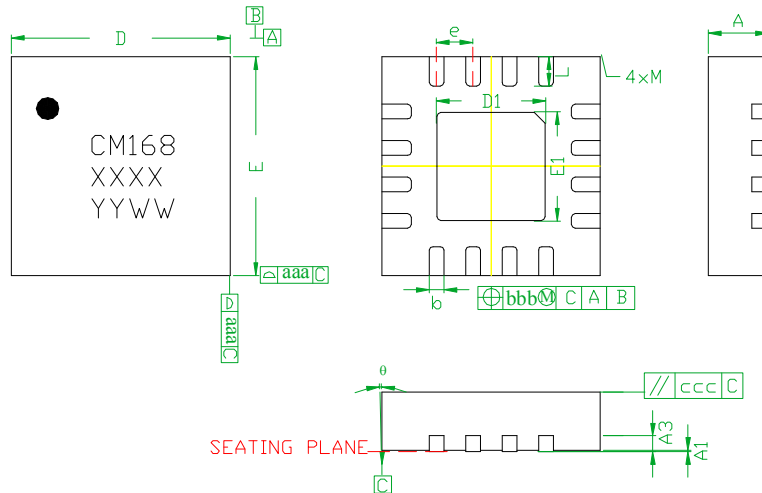
	nLO				
mRF	0	1	2	3	4
0	xx	4	32	15	40
1	17	0	32	50	42
2	72	74	71	72	72
3	76	77	77	69	77
4	68	80	78	81	81

RF = 10 GHz @ -10 dBm
 LO = 9.9 GHz @ +13 dBm
 All values in dBc below the IF output power level (1RF - 1LO)

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Mechanical Information

Package Information and Dimensions

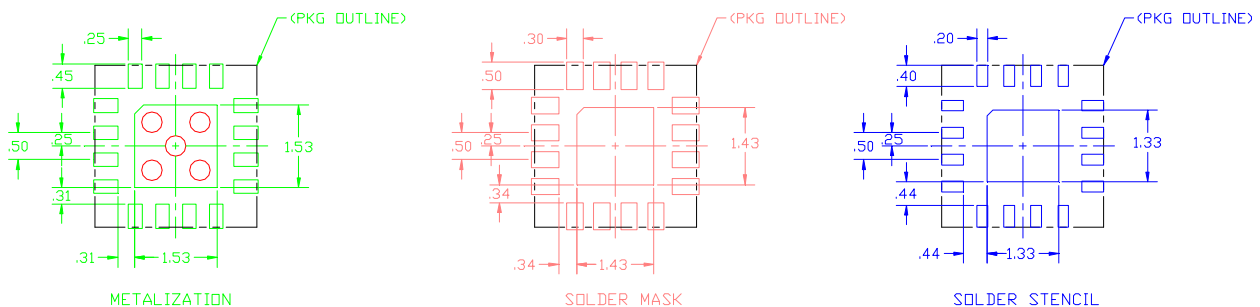


SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.80	0.90	1.00
A1	0	0.02	0.05
A3	—	0.25REF.	—
b	0.18	0.23	0.30
D	2.85	3.00	3.15
D1	—	1.5BSC	—
E	2.85	3.00	3.15
E1	—	1.5BSC	—
e	—	0.50BSC	—
L	0.30	0.40	0.50
theta	0	—	12
aaa	—	0.25	—
bbb	—	0.10	—
ccc	—	0.10	—
M	—	—	0.05

NOTES:

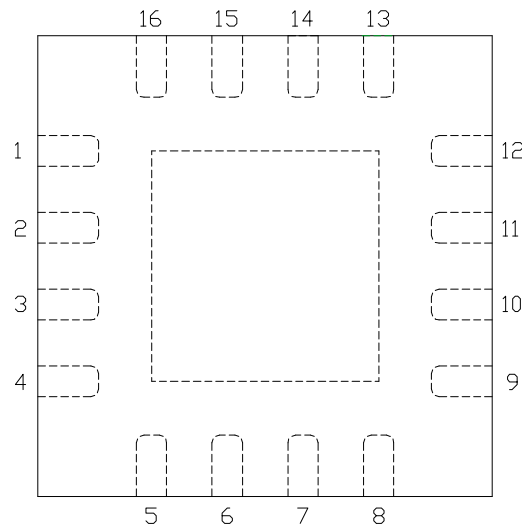
1. DIMENSIONS ARE IN MILLIMETERS
2. RoHS COMPLIANT MOLD COMPOUND
3. LEADFRAME MATERIAL: COPPER ALLOY
4. LEAD FINISH: 100% MATTE Sn
5. INDICATED DIMENSION/TOLERANCE APPLIES TO LEADS AND EXPOSED PAD

Recommended PCB Land Pattern

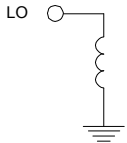
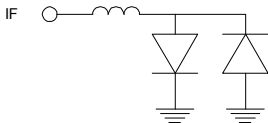
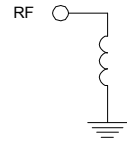


Pin Description

Pin Diagram



Functional Description

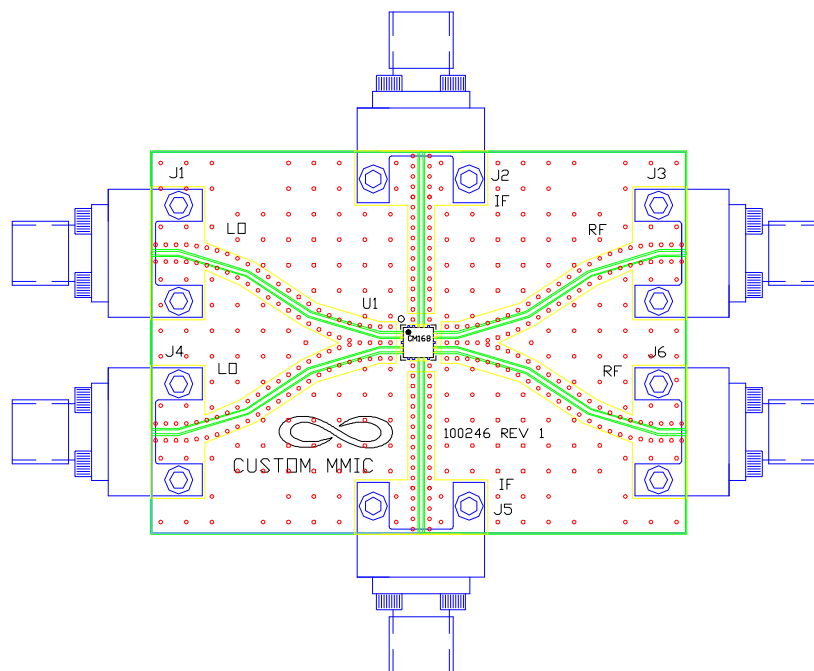
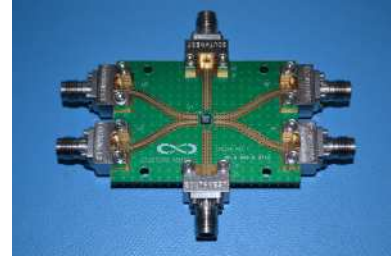
Pin	Function	Description	Schematic
1,4	LO1, LO2	This pin is DC coupled and matched to 50 ohms.	
7,14	IF2, IF1	This pin is DC coupled. For applications not requiring operation to DC, this port should be DC blocked externally using a series capacitor whose value has been chosen to pass the necessary IF frequency range. For operation to DC, this pin must not source or sink more than 2 mA of current or part non-function or part failure may result.	
9,12	RF2, RF1	This pin is DC coupled and matched to 50 ohms.	
2,3,10,11 and die paddle	Ground	Connect to RF / DC ground.	

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Applications Information

Evaluation Board

The circuit board shown has been developed for optimized assembly at CMDS. A sufficient number of via holes should be used to connect the top and bottom ground planes. As surface mount processes vary, careful process development is recommended.



Bill of Material

Designator	Value	Description
J1 - J6		2.4 mm End Launch Connector
U1		CMD168P3 Dual Mixer
PCB		100246 Evaluation PCB

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

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