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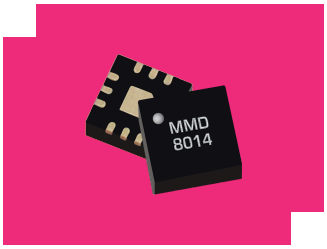
MMD-0415HPSM

GaAs MMIC Doubler

DEVICE OVERVIEW

General Description

The MMD-0415HPSM is a MMIC doubler fabricated with GaAs Schottky diodes. This part operates over a 2 to 7.5 GHz input frequency range or a doubled output frequency range of 4 to 15 GHz. It features excellent conversion loss, superior isolations, and harmonic suppressions across a broad bandwidth. It is available as a 3x3mm QFN and connectorized evaluation board.



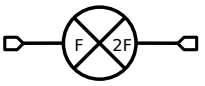
Features

- High fundamental rejection
- Low 2F Conversion Loss

Applications

- Test and Measurement Equipment
- High frequency synthesis
- LO signal chain

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
MMD-0415HPSM	GaAs MMIC Doubler	QFN	REACH RoHS	Released	EAR99
EVB-MMD-0415HP	Evaluation Board, GaAs MMIC 4 - 15 GHz Doubler	EVB	REACH RoHS	Released	EAR99

Table Of Contents

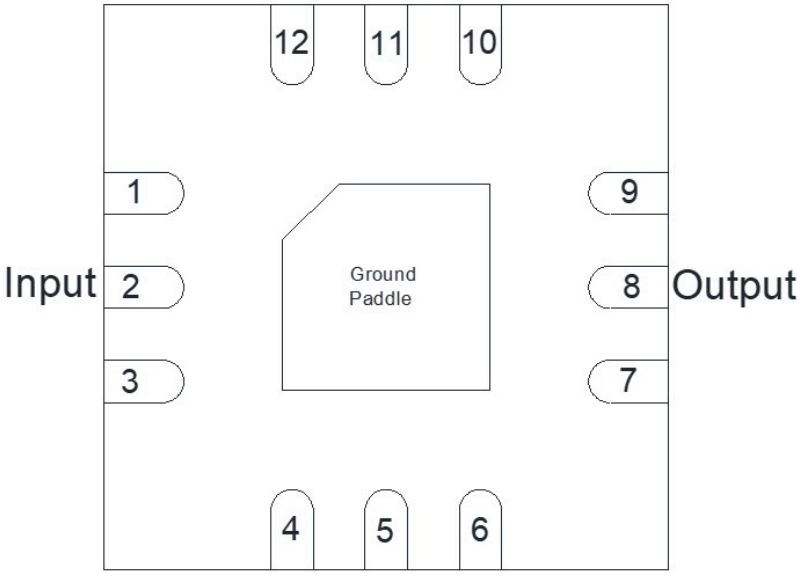
Revision History

Revision Code	Revision Date	Comment
-	2023-01-01	Datasheet Initial Release
A	2023-02-01	Updated Minimum Input Power
B	2023-03-01	EVB Outline Updated

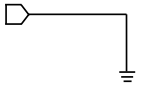
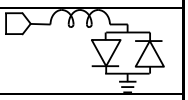
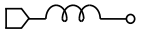
Port Configuration and Functions

Port Diagram

A top-down x-ray view of the MMD-0415HPSM's PSM package outline drawing is shown below. The MMD-0415HPSM should only be used in the forward direction, with the input and output ports given in Port Functions.



Port Functions

Port	Function	Description	DC Equivalent Circuit
GND	Ground	PSM package ground path is provided through the ground paddle.	
Pin 2	1F Input	Input 1x Frequency Port. Pin 2 is DC coupled to the diodes for the PSM package. Blocking capacitor is optional.	
Pin 8	2F Output	2x Input Frequency output port. Pin 8 is DC open for the PSM package.	

Specifications

Absolute Maximum Ratings

The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. All Absolute Maximum Ratings are individual and should not be met in parallel. If these limits are exceeded or multiple are met in parallel the device may be inoperable or have a reduced lifetime.

Parameter	Maximum Rating	Unit
Maximum Operating Temperature	100	°C
Maximum Storage Temperature	125	°C
Minimum Operating Temperature	-55	°C
Minimum Storage Temperature	-65	°C
Port 1 DC Current	25	mA
Power Handling, at any Port	29	dBm

Package Information

Parameter	Details	Rating
ESD	250 to < 500 Volts	HBM Class 1A
Dimensions	-	3 x 3 mm
Moisture Sensitivity Level	-	MSL 1

Recommended Operating Conditions

The Recommended Operating Conditions indicate the limits, inside which the device should be operated, to guarantee the performance given in Electrical Specifications Operating outside these limits may not necessarily cause damage to the device, but the performance may degrade outside the limits of the electrical specifications. For limits, above which damage may occur, see Absolute Maximum Ratings.

Parameter	Min	Nominal	Max	Unit
Ambient Temperature	-55	25	100	°C
Input Power	7	14	20	dBm

Electrical Specifications

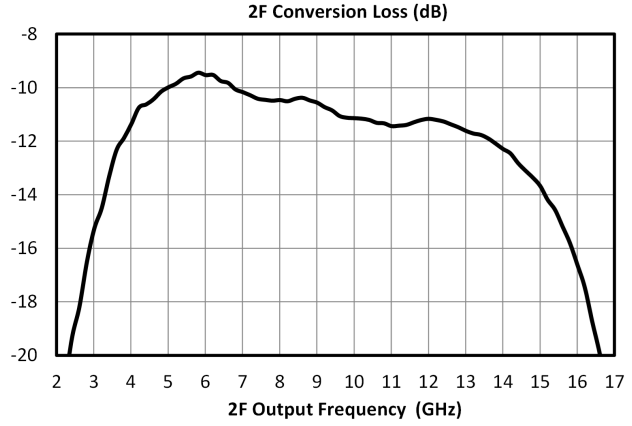
The electrical specifications apply at TA=+25°C in a 50Ω system. Typical data shown is for the connectorized EVB package doubler used in the forward direction with a +14 dBm sine wave input. Min and Max limits apply only to our connectorized units and are guaranteed at TA=+25°C.

Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Conversion Loss	Second Harmonic Output	4	15	-	11	15	dB
Input Frequency Range	-	-	-	2	-	7.5	GHz
Input Power	-	-	-	7	14	20	dBm
Isolation, 1F [1]	Input = 2 – 7.5 GHz Output = 2 – 7.5 GHz	2	7.5	-	39	-	dB
Isolation, 3F [2]	Input = 2 – 5 GHz Output = 6 - 15 GHz	6	15	-	48	-	dB
Isolation, 4F [3]	Input = 2 – 3.75 GHz Output = 8 - 15 GHz	8	15	-	26	-	dB
Output Frequency Range [4]	-	-	-	4	-	15	GHz
Suppression, 1F [5]	Input = 2 – 7.5 GHz Output = 2 – 7.5 GHz	2	7.5	-	27	-	dBc
Suppression, 3F [6]	Input = 2 – 5 GHz Output = 6 - 15 GHz	6	15	-	38	-	dBc
Suppression, 4F [7]	Input = 2 – 3.75 GHz Output = 8 - 15 GHz	8	15	-	16	-	dBc

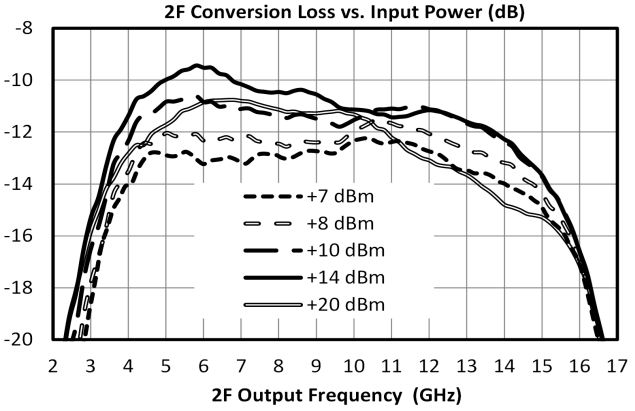
[1][2][3] Isolation is defined as the harmonic power relative to the 1F fundamental input power.
[4] Output return loss measured with a fixed frequency large signal 4.75 GHz input.
[5][6][7] Suppressions and isolations measured with an input source with >60dBc (relative to fundamental input) harmonic suppression. Suppression is defined as the harmonic power relative to the 2F doubled output power.

Typical Performance Plots

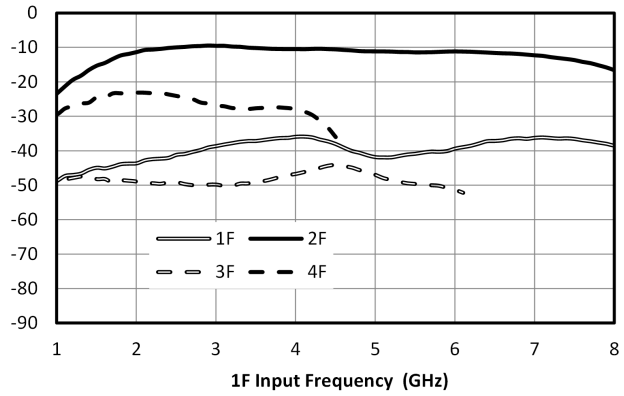
2F Conversion Loss (dB)



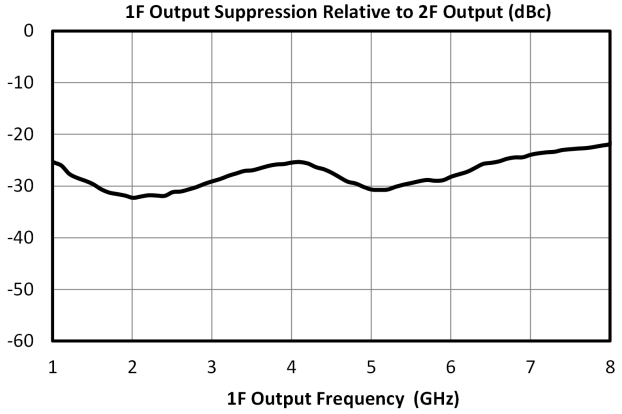
2F Conversion Loss vs. Input Power (dB)



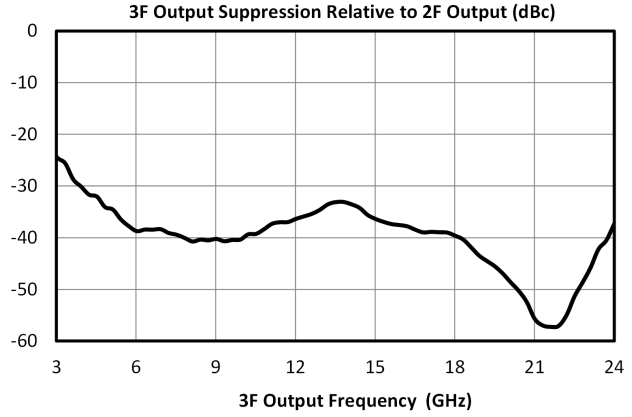
Harmonic Isolations Relative to 1F Input (dB)



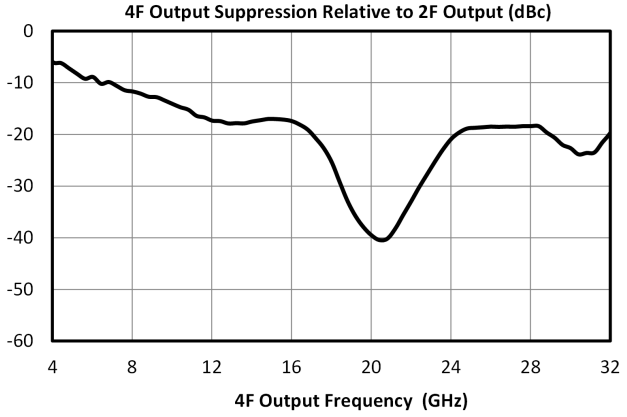
1F Output Suppression Relative to 2F Output (dBc)



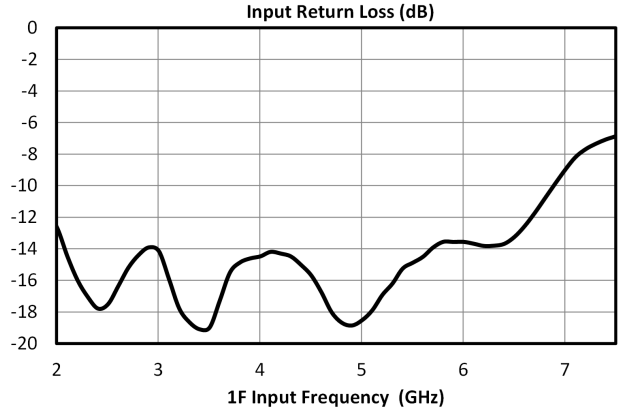
3F Output Suppression Relative to 2F Output (dBc)



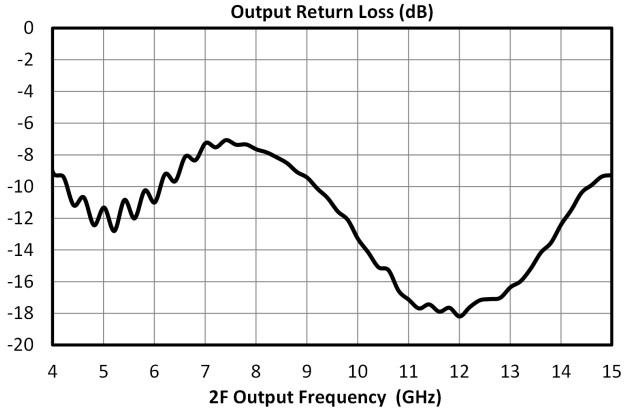
4F Output Suppression Relative to 2F Output (dBc)



Input Return Loss (dB)



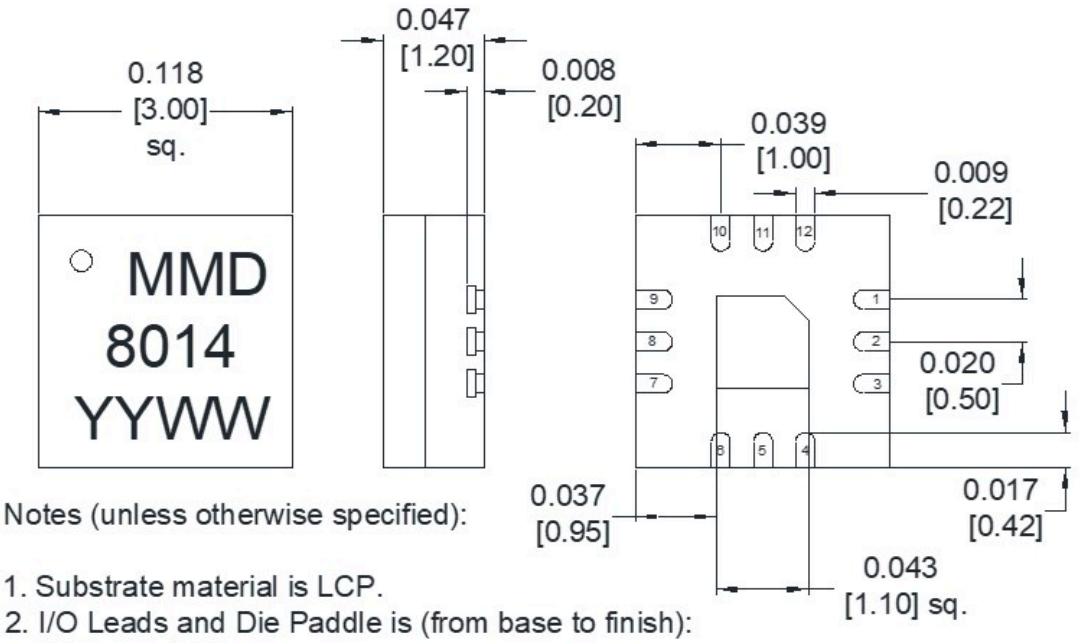
Output Return Loss (dB)



Mechanical Data

Outline Drawing

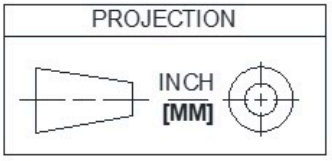
Download : Outline 3D Drawing | Outline 3D STP



Pin #	Function
1	N/C
2	IN
3	N/C
4	N/C
5	N/C
6	N/C
7	N/C
8	OUT
9	N/C
10	N/C
11	N/C
12	N/C

Notes (unless otherwise specified):

1. Substrate material is LCP.
2. I/O Leads and Die Paddle is (from base to finish):
   Ni: 0.5um MIN
   Pd: 0.02um MIN
   Au: 0.05um MAX
3. All unconnected pins should be connected to PCB RF ground.

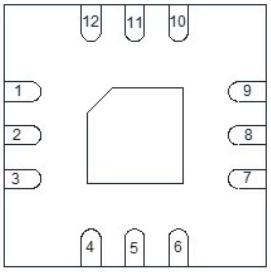


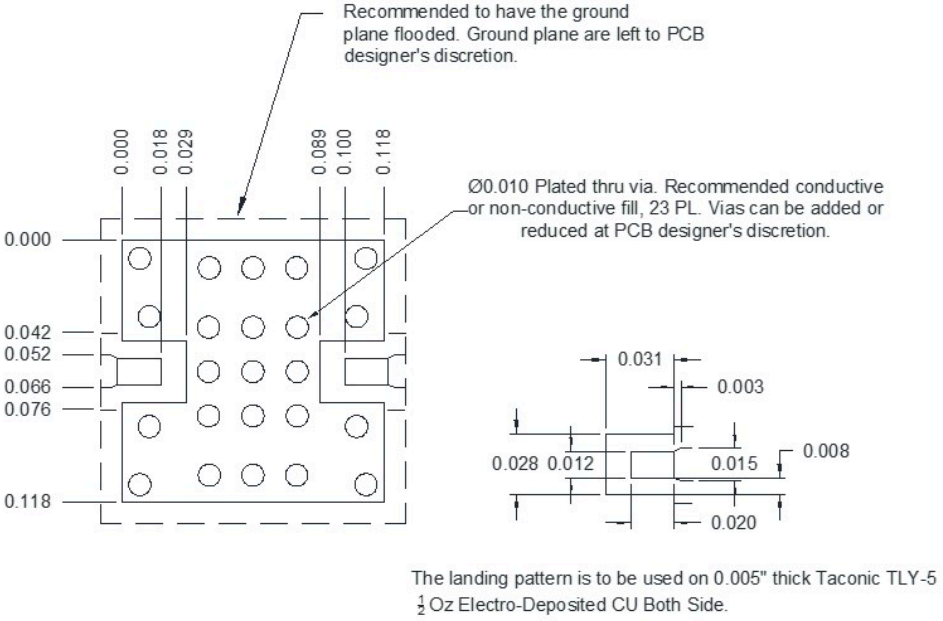
All Dimensions are typical

Footprint Image

Download : Footprint Drawing

QFN 3mm Sample Drawing
X-Ray view



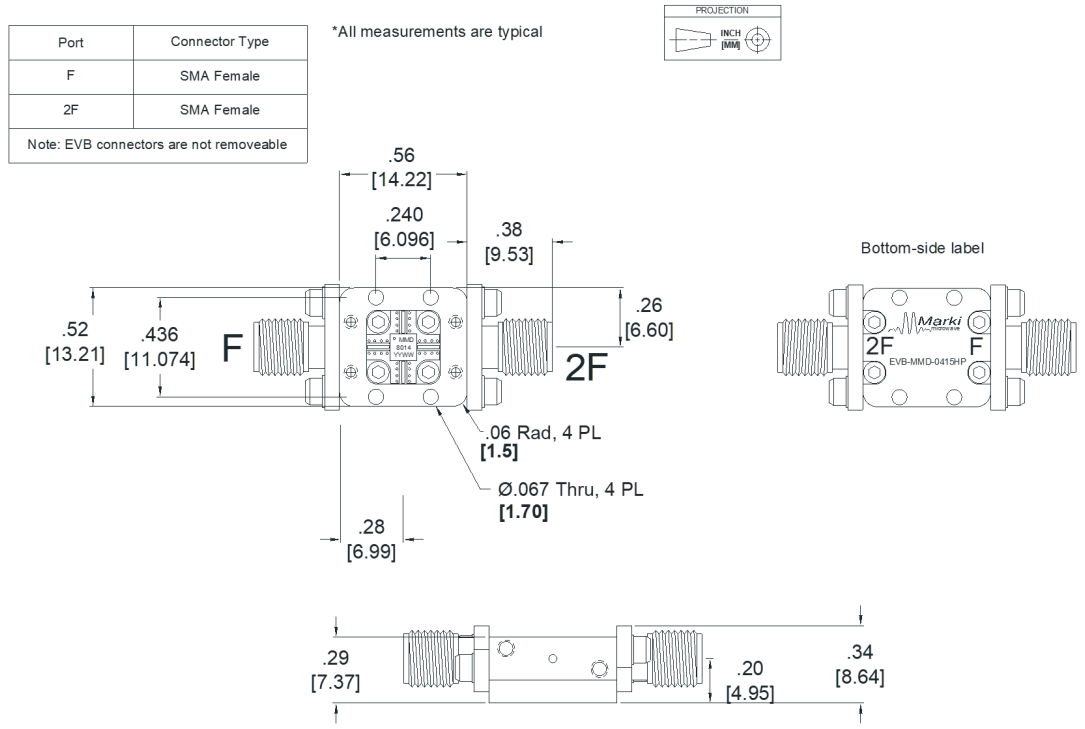


The landing pattern is to be used on 0.005" thick Taconic TLY-5
½ Oz Electro-Deposited CU Both Side.

Evaluation Board - Outline Drawing

Port	Connector Type
F	SMA Female
2F	SMA Female
Note: EVB connectors are not removeable	

*All measurements are typical



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