

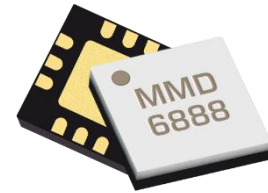
## GaAs MMIC Doubler

## MMD-1030LC5M

### 1. Device Overview

#### 1.1 General Description

The MMD-1030LC5M is a MMIC doubler fabricated with GaAs Schottky diodes. This part operates over a 5 to 15 GHz input frequency range or a doubled output frequency range of 10 to 30 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.



QFN

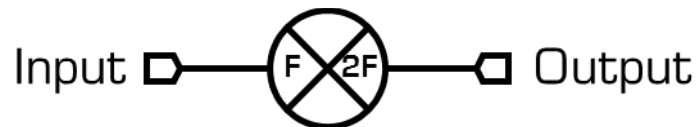
#### 1.2 Features

- High Fundamental Rejection
- Low 2F Conversion Loss
- Low Input Drive

#### 1.3 Applications

- Test and Measurement
- High Frequency Synthesis
- LO Signal Chain

#### 1.4 Functional Block Diagram



#### 1.5 Part Ordering Options<sup>1</sup>

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
MMD-1030LC5M	3x3 mm QFN	CSM	RoHS	Active	EAR99
EVB-MMD-1030LC	Connectorized Evaluation Fixture	EVB		Active	EAR99

<sup>1</sup> Refer to our [website](#) for a list of definitions for terminology presented in this table.

## Table of Contents

1. Device Overview .....	1	3.1 Absolute Maximum Ratings.....	4
1.1 General Description.....	1	3.2 Package Information .....	4
1.2 Features .....	1	3.3 Recommended Operating Conditions .	4
1.3 Applications .....	1	3.4 Sequencing Requirements .....	4
1.4 Functional Block Diagram .....	1	3.5 Electrical Specifications .....	5
1.5 Part Ordering Options.....	1	3.6 Typical Performance Plots .....	6
2. Port Configurations and Functions .....	3	4. Mechanical Data.....	7
2.1 Port Diagram.....	3	4.1 CSM Package Outline Drawing.....	7
2.2 Port Functions .....	3	4.2 CSM Package Footprint .....	7
3. Specifications .....	4	4.3 Evaluation Board Outline Drawing.....	8

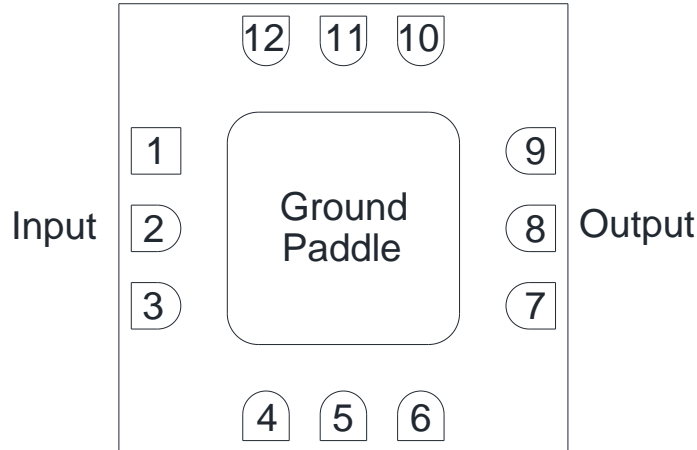
### Revision History

Revision Code	Revision Date	Comment
-	February 2023	Datasheet Initial Release

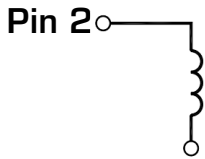
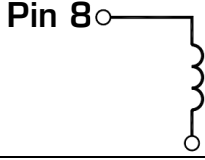
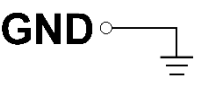
## 2. Port Configurations and Functions

### 2.1 Port Diagram

A top-down x-ray view of the MMD-1030LCSM's CSM package outline drawing is shown below. The MMD-1030LCSM should only be used in the forward direction, with the input and output ports given in Port Functions.



### 2.2 Port Functions

Port	Function	Description	Equivalent Circuit for Package
Pin 2	1F Input	Pin 2 is DC open, and AC matched to 50 Ohms from 5 to 15 GHz for the CSM Package.	
Pin 8	2F Output	Pin 8 is DC open, and AC matched to 50 Ohms from 10 to 30 GHz for the CSM package.	
GND	Ground	CSM Package ground path is provided through the ground paddle.	

### 3. Specifications

#### 3.1 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, the device may be inoperable or have a reduced lifetime.

Parameter	Maximum Rating	Units
Port 1 DC Current	N/A	mA
Port 2 DC Current	N/A	mA
Power Handling, at any Port	+25 <sup>2</sup>	dBm
Operating Temperature	-55 to +100	°C
Storage Temperature	-65 to +125	°C

#### 3.2 Package Information

Parameter	Details	Rating
Weight	EVB Package	10 g

#### 3.3 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.

	Min	Nominal	Max	Units
Operating Temperature	-55	+25	+100	°C
Input Power	+5	+7	+11	dBm

#### 3.4 Sequencing Requirements

There is no requirement to apply power to the ports in a specific order. However, it is recommended to provide a 50Ω termination to each port before applying power. This is a passive diode doubler that requires no DC bias.

<sup>2</sup> +25 dBm at +25°C, derated linearly to +20 dBm at +100°C

### 3.5 Electrical Specifications

The electrical specifications apply at  $T_A=+25^{\circ}\text{C}$  in a  $50\Omega$  system. Typical data shown is for the connectorized EVB package doubler used in the forward direction with a +7 dBm sine wave input.

Min and Max limits apply only to our connectorized units and are guaranteed at  $T_A=+25^{\circ}\text{C}$ .

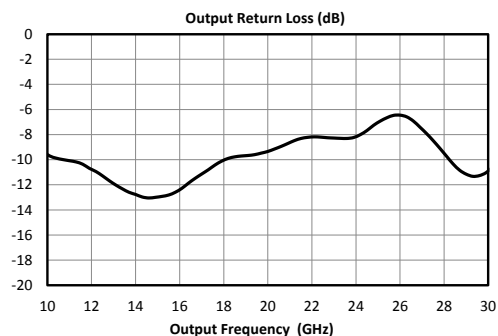
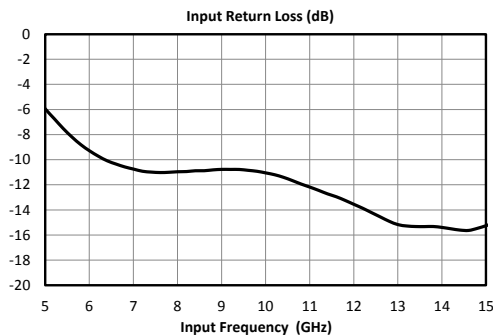
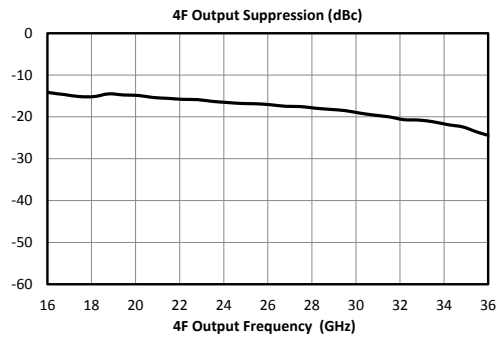
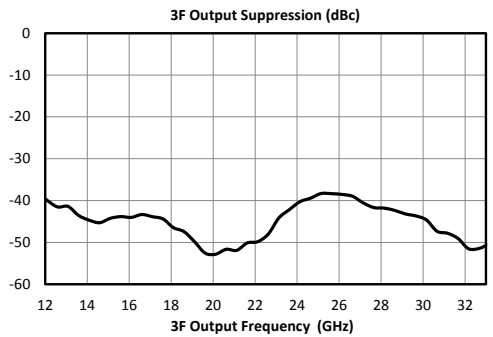
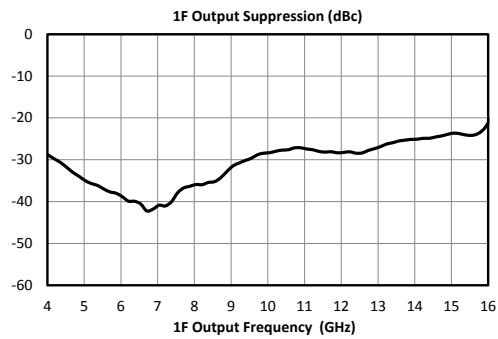
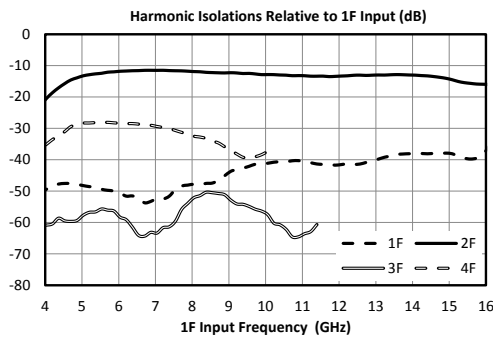
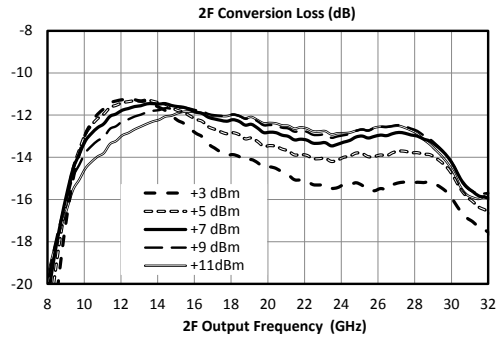
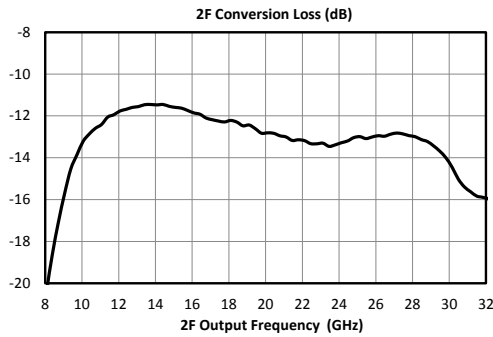
Parameter	Test Conditions		Min	Typical	Max	Units
Input (Port 1) Frequency Range			5		15	GHz
Output (Port 2) Frequency Range			10		30	
Input Power			+5	+7	+11	dBm
2F Conversion Loss (CL)	Input = 5 – 15 GHz Output = 10 - 30 GHz			12.5	16	dB
Suppression <sup>3,4</sup>	1F	Input = 5 – 15 GHz Output = 5 - 15 GHz		31		dBc
	3F	Input = 5 – 10 GHz Output = 15 - 30 GHz		43		
	4F	Input = 5 – 7.5 GHz Output = 20 - 30 GHz		17		
Isolations <sup>5</sup>	1F	Input = 5 - 15 GHz Output = 5 - 15 GHz		44		dB
	3F	Input = 5 – 10 GHz Output = 15 - 30 GHz		56		
	4F	Input = 5 – 7.5 GHz Output = 20 - 30 GHz		31		

<sup>3</sup> Suppressions and isolations measured with an input source with >60dBc (relative to fundamental input) harmonic suppression.

<sup>4</sup> Suppression is defined as the harmonic power relative to the 2F doubled output power.

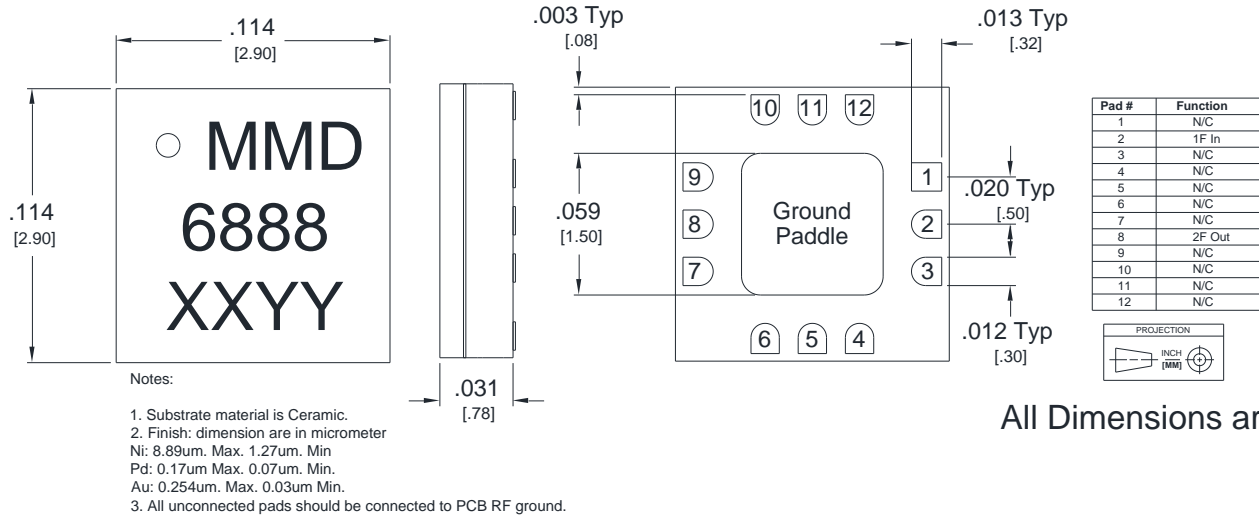
<sup>5</sup> Isolation is defined as the harmonic power relative to the 1F fundamental input power.

### 3.6 Typical Performance Plots

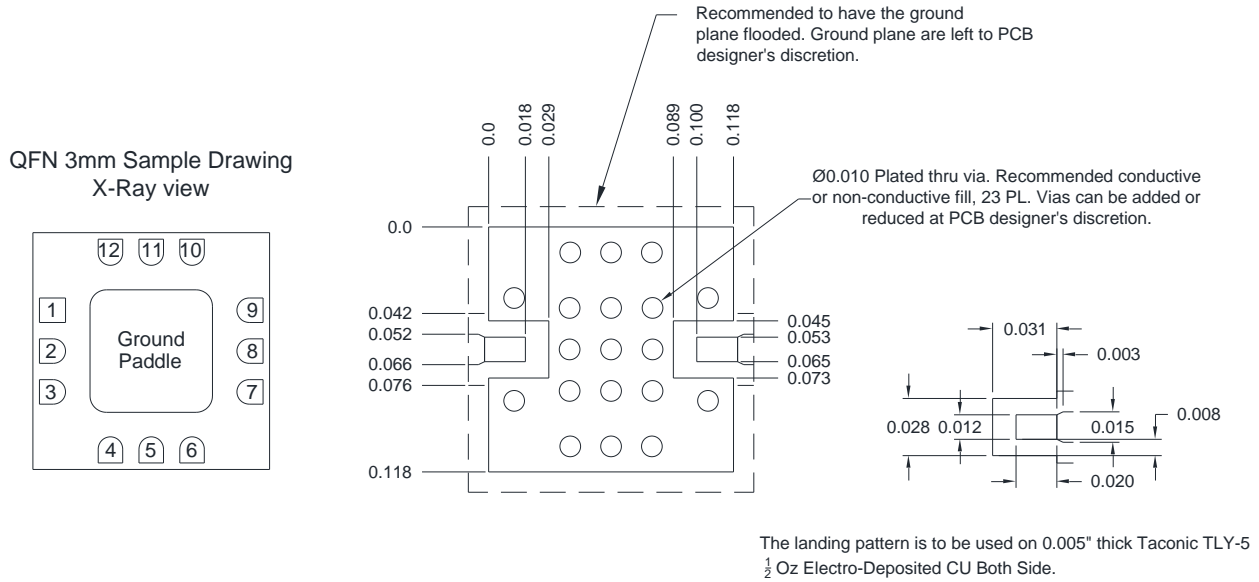


## 4. Mechanical Data

### 4.1 CSM Package Outline Drawing



### 4.2 CSM Package Footprint



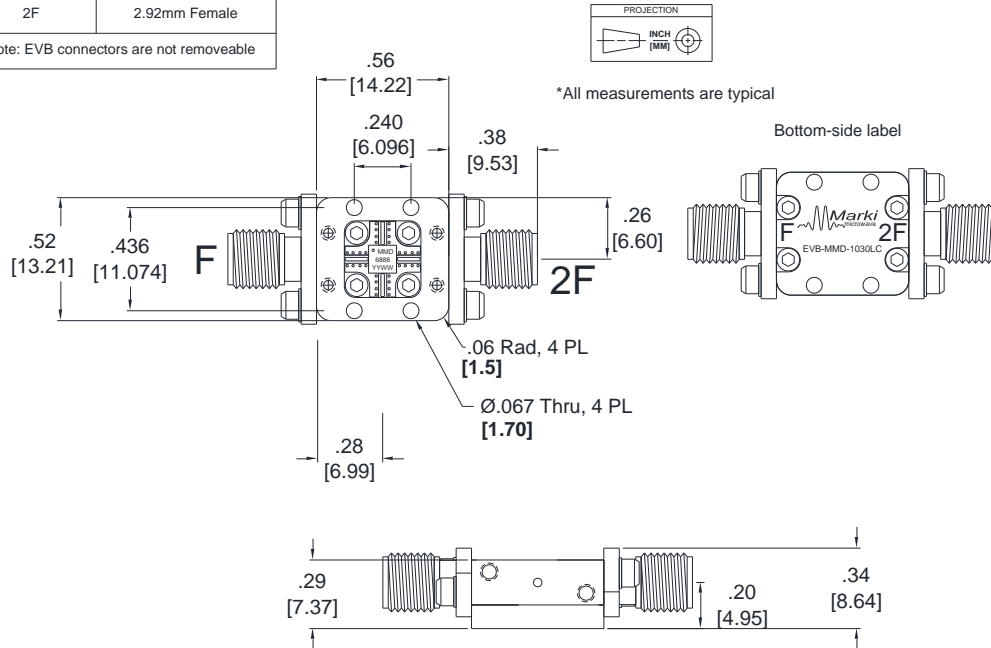
QFN-Package Surface-Mount Landing Pattern

[Click Here for a DXF of the above layout.](#)  
[Click here for leaded solder reflow.](#) [Click here for lead-free solder reflow.](#)

### 4.3 Evaluation Board Outline Drawing

Ports	Connector Type
F	SMA Female
2F	2.92mm Female

Note: EVB connectors are not removeable



Marki Microwave reserves the right to make changes to the product(s) or information contained herein without notice.

Marki Microwave makes no warranty, representation, or guarantee regarding the suitability of its products for any particular purpose, nor does Marki Microwave assume any liability whatsoever arising out of the use or application of any product.