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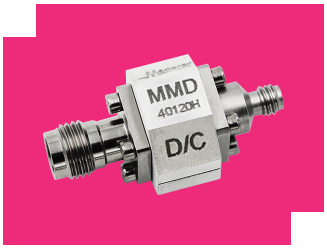
MMD-40120HM

GaAs MMIC Millimeter Wave Doubler

DEVICE OVERVIEW

General Description

MMD-40120H is a MMIC millimeter wave 2x multiplier fabricated with GaAs Schottky diodes. MMD-40120H operates over a 20 to 60 GHz input frequency range or a doubled output frequency range of 40 to 120 GHz. MMD-40120H is available as a connectorized coaxial module using 1.0 mm connectors on the output. Wire bondable die are also available.



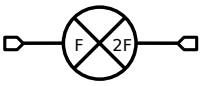
Features

- Low input power requirement
- Low loss die and package
- Up to 120GHz 2nd harmonic output tone
- Coax connector module

Applications

- mmWave frequency synthesis
- LO signal chain for mmWave mixers

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Connectors	Green Status	Product Lifecycle	Export Classification
MMD-40120HM	GaAs MMIC Millimeter Wave Doubler	M	Standard	REACH RoHS	Released	EAR99

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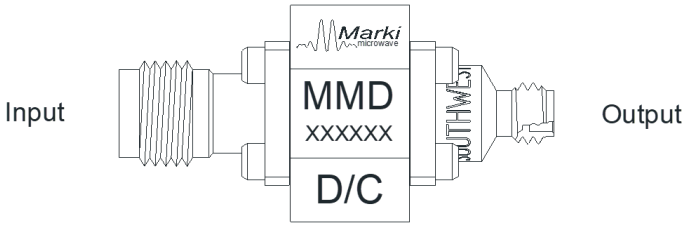
Revision History

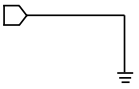
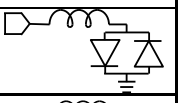
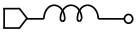
Revision Code	Revision Date	Comment
-	2022-11-01	Initial Datasheet Release
A	2024-03-14	Export Classification Update

Port Configuration and Functions

Port Diagram



Port Functions

Port	Function	Connector Type	Description	DC Equivalent Circuit
GND	Ground	-	CH package ground path is provided through the substrate and ground bond pads. M package ground provided through metal housing and outer coax conductor.	
Port 1	Input	1.85F	Input 1x Frequency Port. Port 1 is DC coupled to the diodes for the CH and M packages. Blocking capacitor is optional.	
Port 2	Output	1.0F	2x Input Frequency output port.Port 2 is DC open for the CH and M package.	

Specifications

Absolute Maximum Ratings

The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. If these limits are exceeded, 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	25	dBm

Package Information

Parameter	Details	Rating
ESD	250 to < 500 Volts	HBM Class 1A
Weight	Package name: M	15g
Dimensions	-	28.81 x 14.30 mm

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
Input Power	10	12	15	dBm
Ambient Temperature	-55	25	100	°C

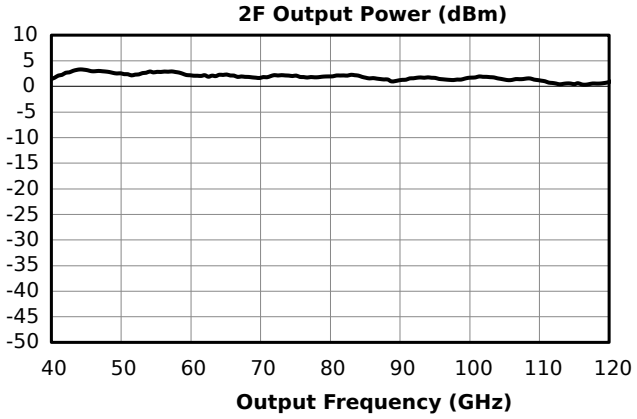
Electrical Specifications

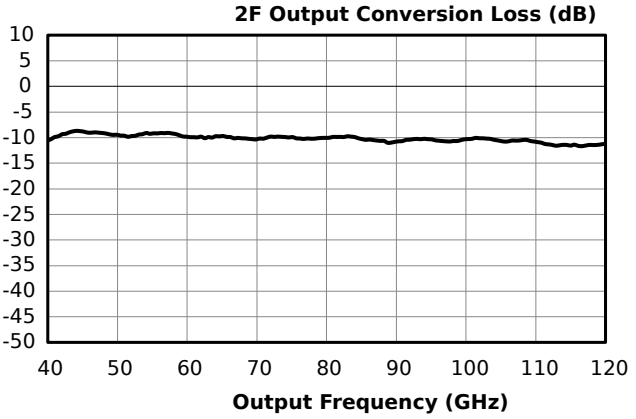
The electrical specifications apply at TA=+25°C in a 50Ω system. Typical data shown is for the connectorized M package doubler used in the forward direction with a nominal +12 dBm sine wave input.Min and Max limits apply only to our connectorized units and are guaranteed at TA=+25°C. RF testing of our die is performed on a sample basis to verify conformance to datasheet guaranteed specifications.

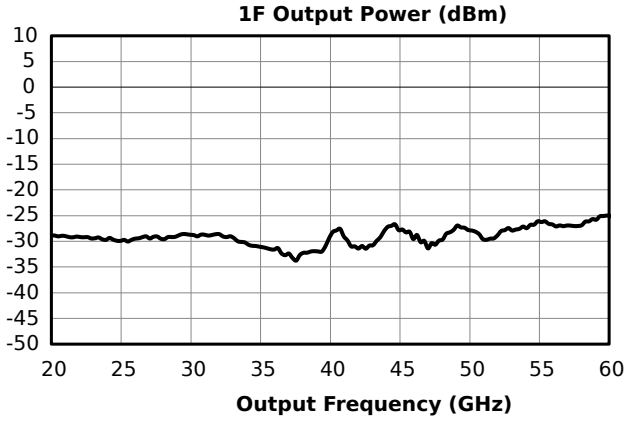
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Conversion Loss	Second Harmonic Output	40	120	-	2	-	dBm
Input Frequency Range	-	-	-	20	-	60	GHz
Input Power	-	-	-	10	12	15	dBm
Isolation, 1F [1]	Input = 20 – 60 GHz Output = 20 – 60 GHz	20	60	-	40	-	dB
Isolation, 3F [2]	Input = 20 – 40 GHz Output = 60 – 120 GHz	60	120	-	50	-	dB
Isolation, 4F [3]	Input = 20 – 30 GHz Output = 80 – 120 GHz	80	120	-	25	-	dB
Output Frequency Range [4]	-	-	-	40	-	120	GHz
Suppression, 1F [5]	Input = 20 – 60 GHz Output = 20 – 60 GHz	20	60	-	30	-	dBc
Suppression, 3F [6]	Input = 20 – 40 GHz Output = 60 – 120 GHz	60	120	-	40	-	dBc
Suppression, 4F [7]	Input = 20 – 30 GHz Output = 80 – 120 GHz	80	120	-	15	-	dBc

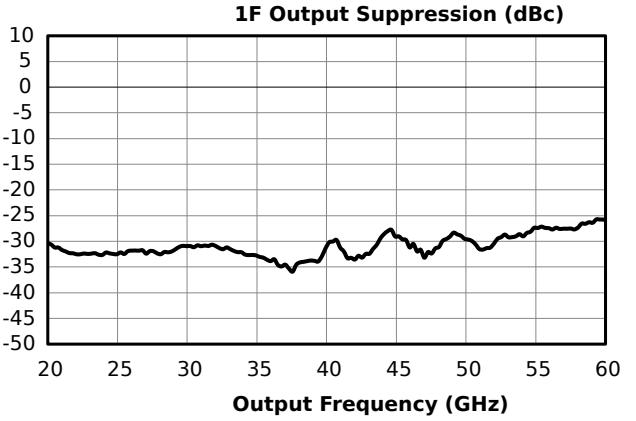
[1][2][3] Isolation is defined as the harmonic power relative to the 1F fundamental input power.
[4] Output return loss measured with a fixed frequency large signal 67 GHz input.
[5][6][7] Suppressions and isolations measured with an input source with >60dBc (relative to fundamental input) harmonic suppression Suppression is defined as the harmonic power relative to the 2F doubled output power.

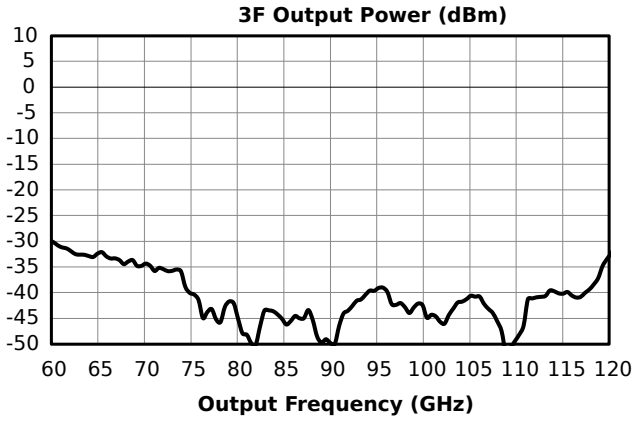
Typical Performance Plots

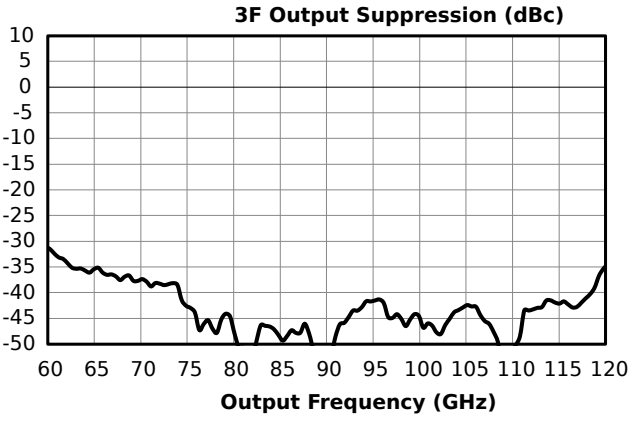


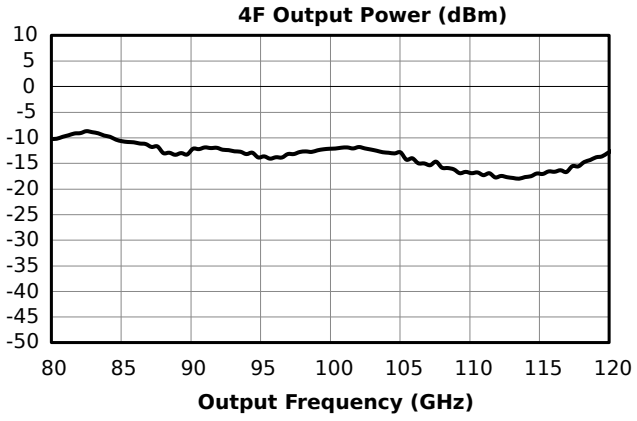


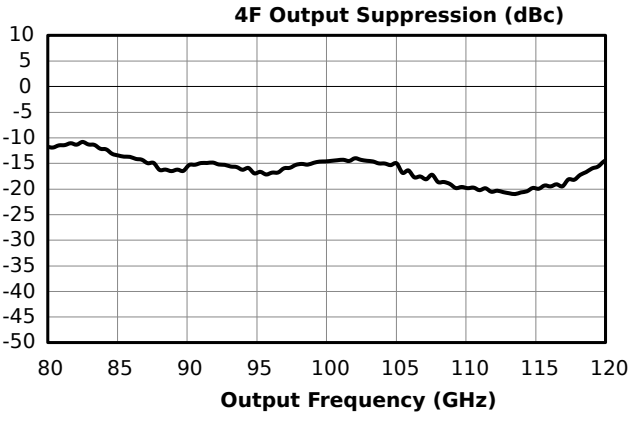


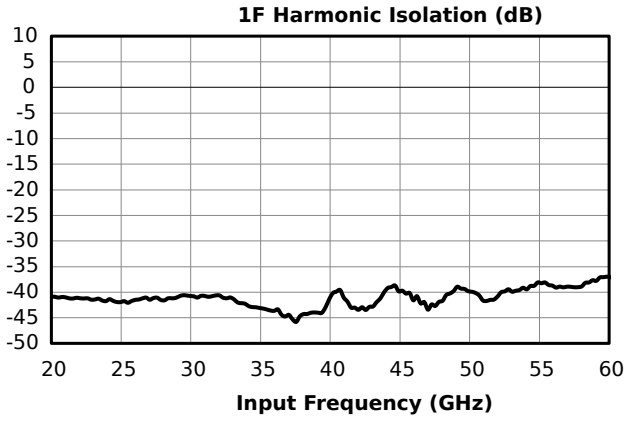


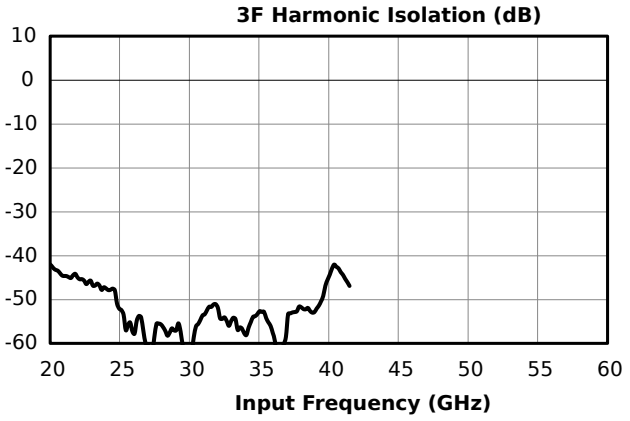


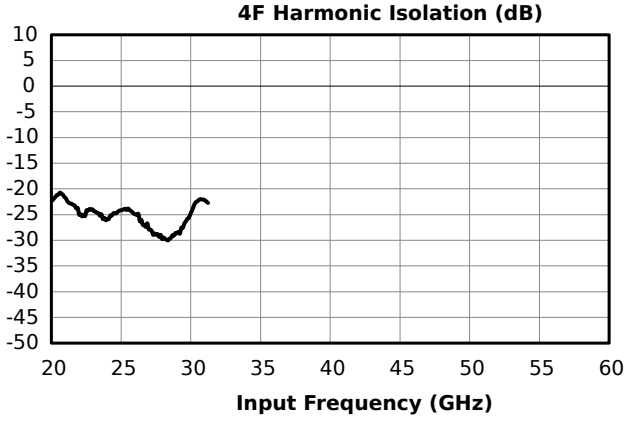


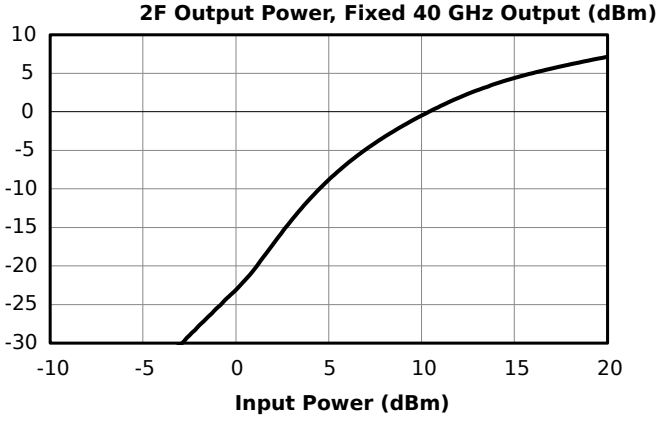


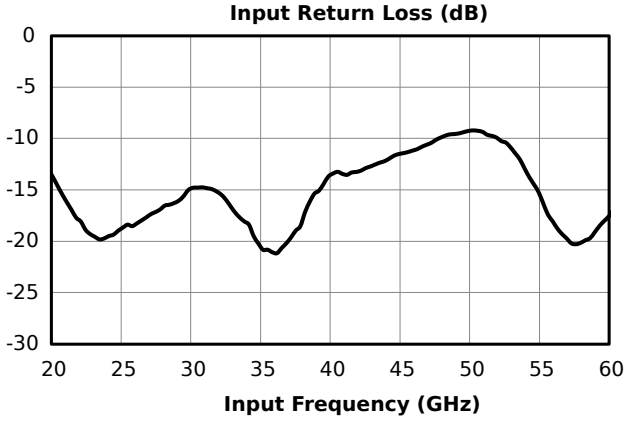


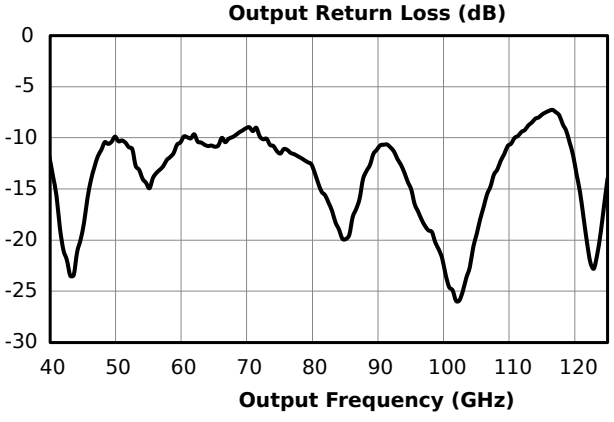








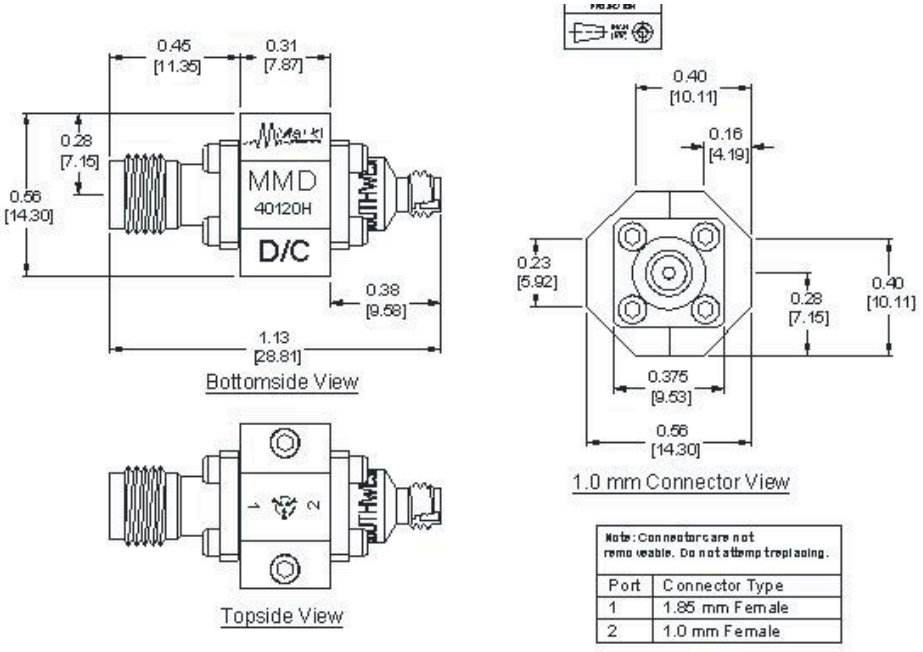




Mechanical Data

Outline Drawing

Download : Outline 2D Drawing | Outline 3D Drawing | Outline 3D STP



Note: Connectors are not removeable. Do not attempt replacing.

Port	Connector Type
1	1.85 mm Female
2	1.0 mm Female

1. All measurements are typical.
2. Attach 1.0mm connectors with 45 N-cm (4 in-lb) torque wrench.

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