

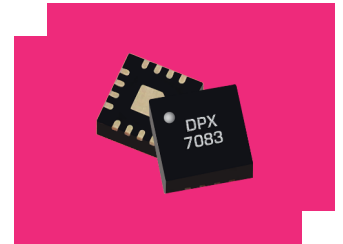
# MDPX-0305PSM-1

## Passive MMIC 3GHz Diplexer/Reflectionless Filter

### DEVICE OVERVIEW

#### General Description

The MDPX-0305PSM is a MMIC surface mount diplexer capable of multiplexing low frequency DC to 3 GHz and high frequency 5 to 26.5 GHz signals. Passive GaAs MMIC technology allows production of smaller filter constructions that replace larger form factor circuit board constructions. Tight fabrication tolerances allow for less unit-to-unit variation than traditional filter technologies. The MDPX-0305PSM is available as a 3x3mm QFN and connectorized evaluation board. Low unit to unit variation allows for accurate simulations using the provided S3P file taken from measured production units.



[Download s-parameters here](#)

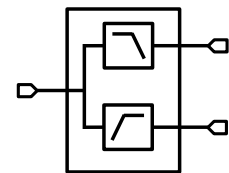
#### Features

- Excellent  $\leq 1$ dB Insertion Loss
- 4 GHz Crossover Point
- High Stop Band Suppression
- Reflectionless Filter

#### Applications

- SATCOM
- Reflectionless Filter Applications
- Electronic Warfare

#### Functional Block Diagram



#### Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
MDPX-0305PSM-1	Passive MMIC 3GHz Diplexer/Reflectionless Filter	QFN	RoHS REACH	Released	EAR99
<u>EVB-MDPX-0305P</u>	Passive MMIC 3 GHz Diplexer/Reflectionless Filter	EVB	RoHS REACH	Released	EAR99

### Table Of Contents

- **Device Overview**
  - General Description
  - Features
  - Applications
  - Functional Block Diagram
- **Port Configuration and Functions**
  - Port Diagram
  - Port Functions
- **Revision History**
- **Specifications**
  - Absolute Maximum Ratings
  - Package Information
  - Electrical Specifications
  - Typical Performance Plots
- **Operation**
  - Application Information
- **Mechanical Data**
  - Outline Drawing
- **Footprint Image**
- **Evaluation Board**
  - Evaluation Board Outline Drawing

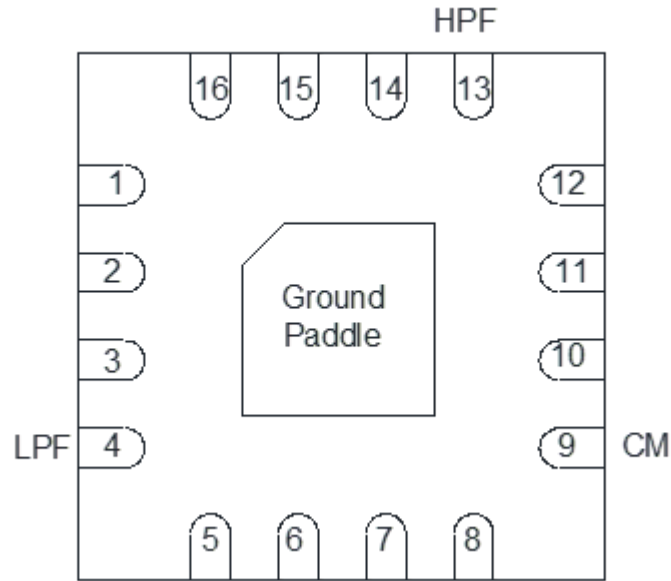
### Revision History

Revision Code	Revision Date	Comment
-	2023-03-01	Datasheet Initial Release


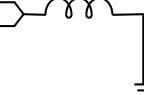


## Port Configuration and Functions

### Port Diagram

A top-down x-ray view of the MDPX-0305PSM's PSM package outline drawing is shown below. Input to the diplexer is on Pin 9, Pin 13 will be the output after passing through a high pass filter and Pin 4 will be the output after passing through the low pass filter.



### Port Functions

Port	Function	Description	DC Equivalent Circuit
Ground Paddle	Ground	PSM package ground path is provided through the ground paddle and should be connected to RF ground.	
Pin 13	High Pass Filter	Pin 13 is DC short to GND and open to the other ports.	
Pin 4	Low Pass Filter	Pin 4 is DC short to Pin 9 and open to GND and Pin 13.	
Pin 9	Common/Input	Pin 9 is DC short to Pin 4 and open to GND and Pin 13.	

**Specifications**

**Absolute Maximum Ratings**

The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. If these limits are exceeded or met simultaneously the device may be inoperable or have a reduced lifetime.

Parameter	Maximum Rating	Unit
Maximum Operating Temperature	100	°C
Maximum Storage Temperature	100	°C
Minimum Operating Temperature	-65	°C
Minimum Storage Temperature	-65	°C
RF Power Handling	30	dBm

**Package Information**

Parameter	Details	Rating
ESD	This device is not sensitive to ESD.	N/A
Dimensions	-	3 x 3 mm
Moisture Sensitivity Level	-	MSL 1

**Electrical Specifications**

The electrical specifications apply at TA=+25°C in a 50Ω system. Typical data shown is for the filter in a PSM package with a sine wave input applied to Pin 9. Min and Max limits are guaranteed at TA=+25°C.

Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
1 dBc High Passband <sup>1</sup>	Configuration A, Temp = 25°C	-	-	3.95	-	-	GHz
3 dBc High Passband <sup>2</sup>	Configuration A, Temp = 25°C	-	-	3.86	-	-	GHz
30 dBc High Pass Rejection Point <sup>3</sup>	Configuration A, Temp = 25°C	-	-	2.87	-	-	GHz
High Passband Return Loss <sup>4</sup>	Configuration A, Temp = 25°C	-	-	-	14	-	dB
High Pass Isolation <sup>5</sup>	Configuration A, Temp = 25°C	-	-	-	8	-	dB
High Pass Group Delay <sup>6</sup>	Configuration A, Temp = 25°C	-	-	-	359	-	ps
1 dBc Low Passband <sup>7</sup>	Configuration A, Temp = 25°C	-	-	-	-	4.00	GHz
3 dBc Low Passband <sup>8</sup>	Configuration A, Temp = 25°C	-	-	-	-	3.84	GHz
30 dBc Low Pass Rejection Point <sup>9</sup>	Configuration A, Temp = 25°C	-	-	-	-	3.84	GHz
Low Passband Return Loss <sup>10</sup>	Configuration A, Temp = 25°C	-	-	-	11	-	dB
Low Pass Isolation <sup>11</sup>	Configuration A, Temp = 25°C	-	-	-	5	-	dB
Low Pass Group Delay <sup>12</sup>	Configuration A, Temp = 25°C	-	-	-	739	-	ps
Crossover Isolation <sup>13</sup>	Configuration A, Temp = 25°C	-	-	-	7	-	dB
Crossover Frequency <sup>14</sup>	Configuration A, Temp = 25°C	-	-	-	1.38	-	GHz
Common Port Return Loss <sup>15</sup>	Configuration A, Temp = 25°C	-	-	-	1	-	dB
Impedance <sup>16</sup>	Configuration A, Temp = 25°C	-	-	-	50	-	Ω
30 dBc Low Pass Rejection Point	2.5 to 5 GHz	2.5	5	-	11	-	dB
30 dBc Low Pass Rejection Point	DC to 2.5 GHz	0	2.5	25	38	-	dB
Common Port Return Loss	5 to 26.5 GHz	5	26.5	10	15	-	dB
Common Port Return Loss	DC to 3 GHz	0	3	10	24	-	dB
High Pass Filter, Pass Band Insertion Loss	5 to 26.5 GHz	5	26.5	-	0.5	-	dB
High Pass Filter, Pass Band Return Loss	5 to 26.5 GHz	5	26.5	10	17	-	dB
Impedance	-	-	-	-	50	-	Ω
Isolation	16 to 26.5 GHz	16	26.5	25	48	-	dB
Isolation	5 to 16 GHz	5	16	30	53	-	dB

## MDPX-0305PSM-1

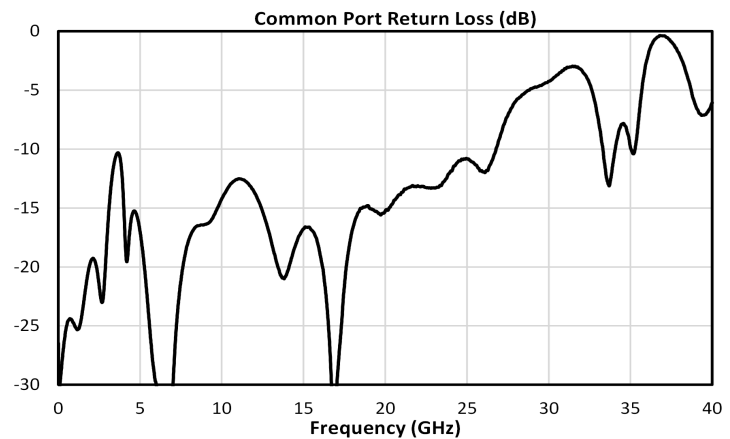
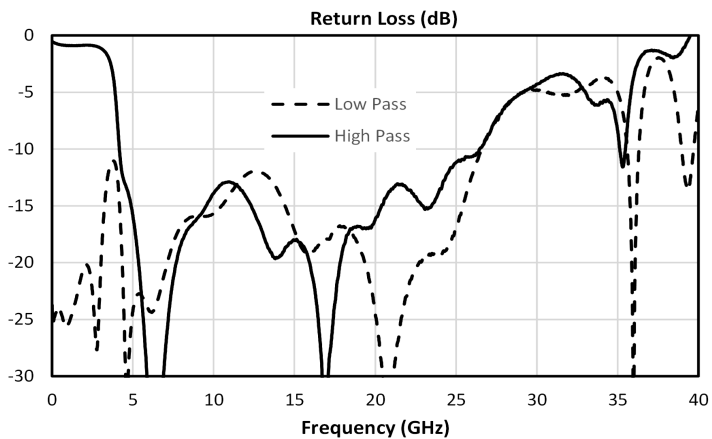
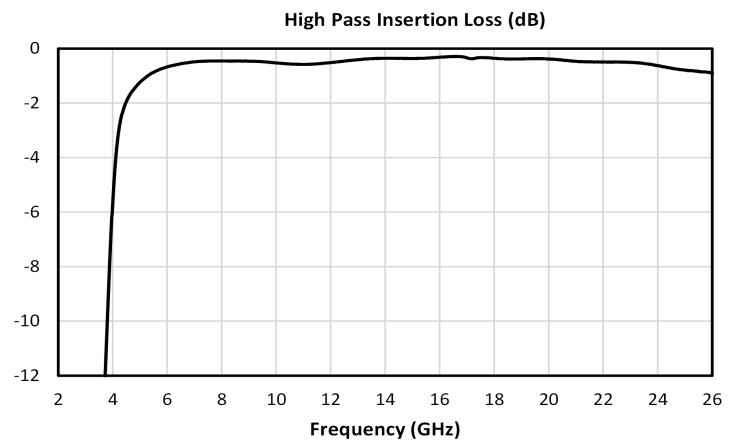
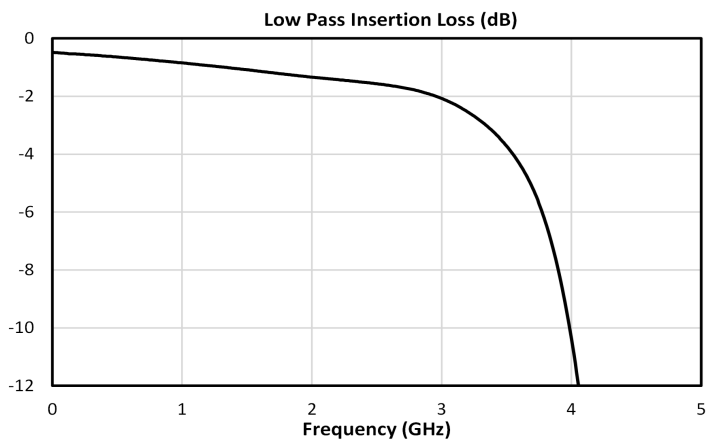
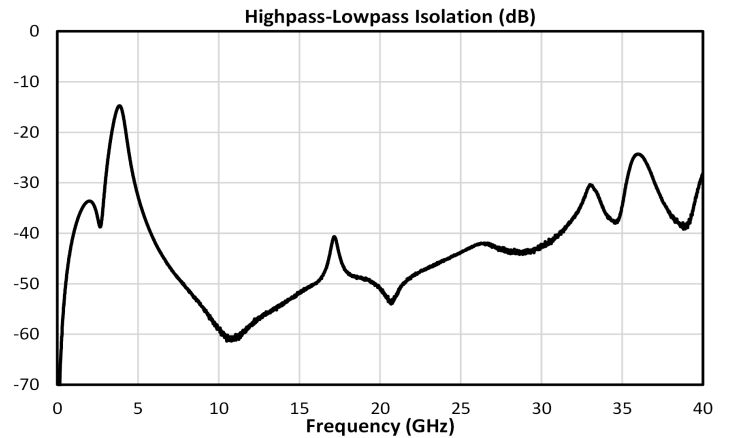
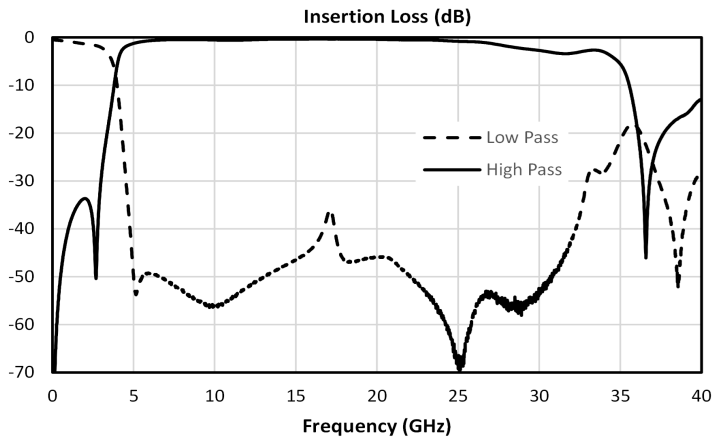
### Passive MMIC 3GHz Diplexer/Reflectionless Filter

Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Isolation	DC to 2.5 GHz	0	2.5	25	37	-	dB
Low Pass Filter, Pass Band Insertion Loss	DC to 3 GHz	0	3	-	1	-	dB
Low Pass Filter, Pass Band Return Loss	DC to 3 GHz	0	3	10	24	-	dB
Low Pass Filter, Stop Band Rejection	16 to 26.5 GHz	16	26.5	20	47	-	dB
Low Pass Filter, Stop Band Rejection	5 to 16 GHz	5	16	25	51	-	dB
1 dBc High Passband	-	-	-	5	-	26.5	GHz
1 dBc Low Passband	-	-	-	0	-	3	GHz

[1][2][3][4][5][6][7][8][9][10][11][12][13][14][15][16] No

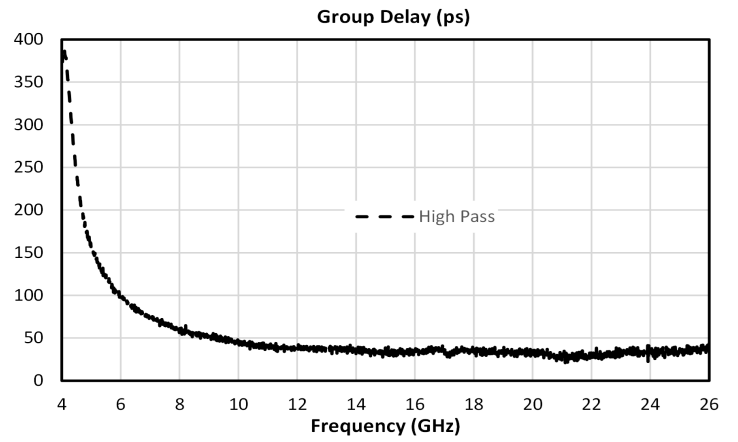
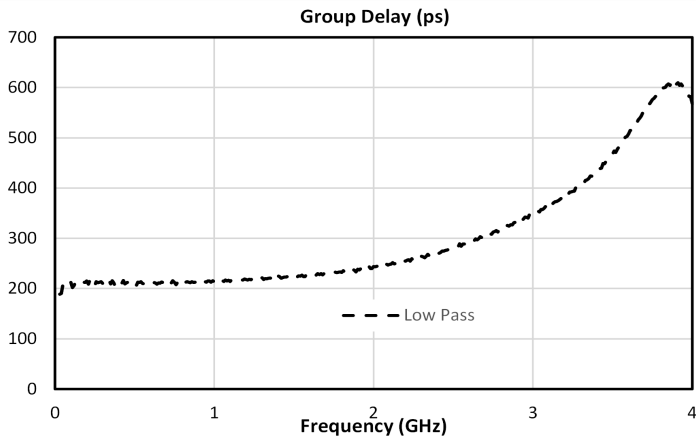
### Typical Performance Plots

Typical performance plots are evaluation board measurements with fixturing to the device pads de-embedded.



## MDPX-0305PSM-1

### Passive MMIC 3GHz Diplexer/Reflectionless Filter

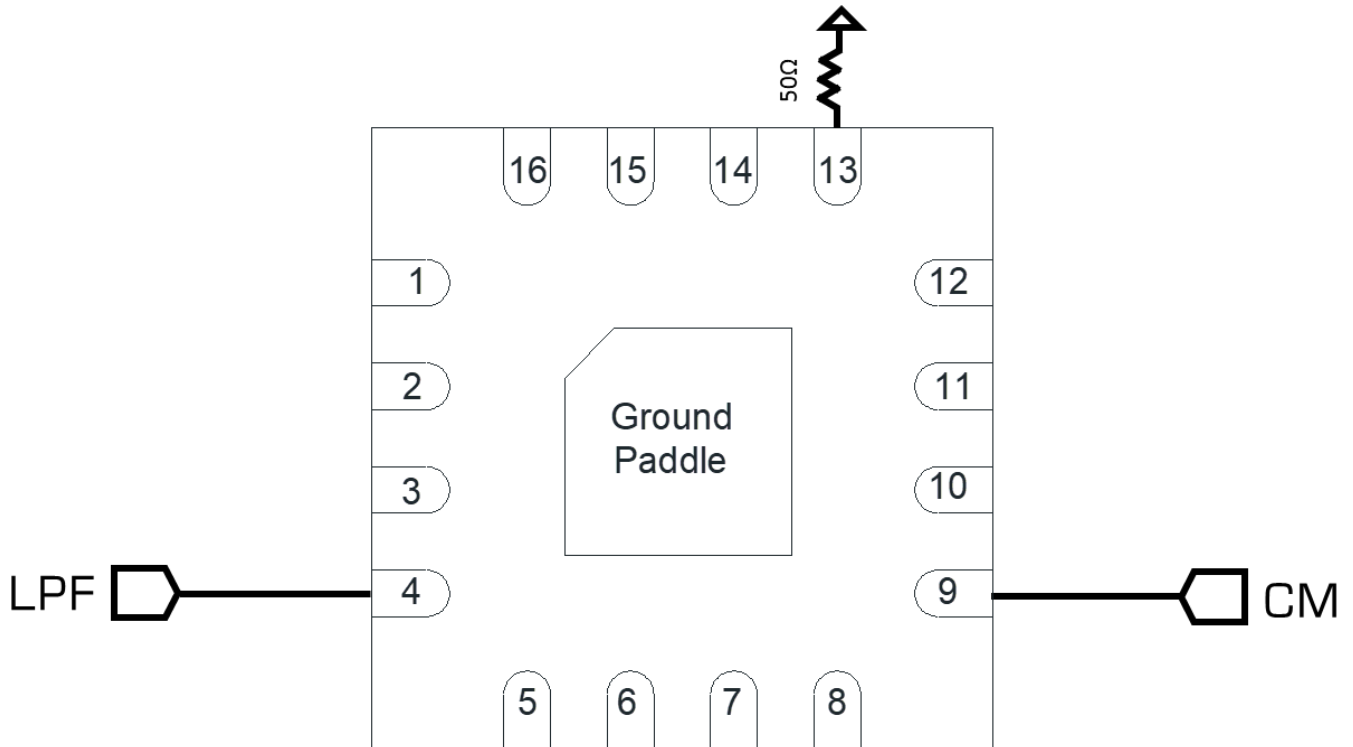


**Application Information**

**Example Reflectionless Filter**

Terminating the High-Pass port (Pin 13) with 50  $\Omega$  enables one-way reflectionless low-pass filtering from the Common port (Pin 9) to the Low-Pass port (Pin 4).

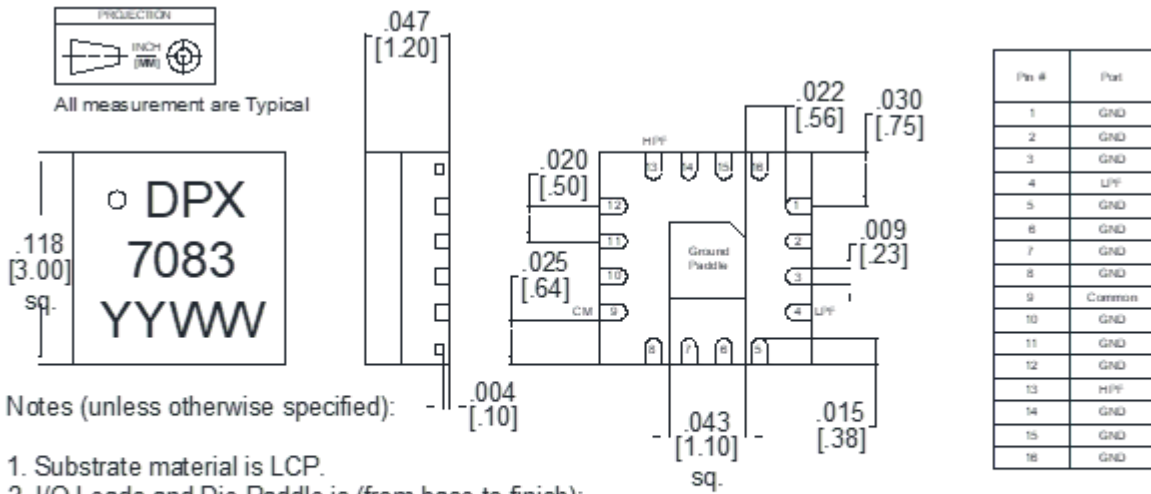
Terminating the Low-Pass port (Pin 4) with 50  $\Omega$  enables one-way reflectionless high-pass filtering from the Common port (Pin 9) to the High-Pass port (Pin 13).



### Mechanical Data

### Outline Drawing

Download : [Outline 2D Drawing](#) | [Outline 3D Drawing](#) | [Outline 3D STP](#)



Notes (unless otherwise specified):

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

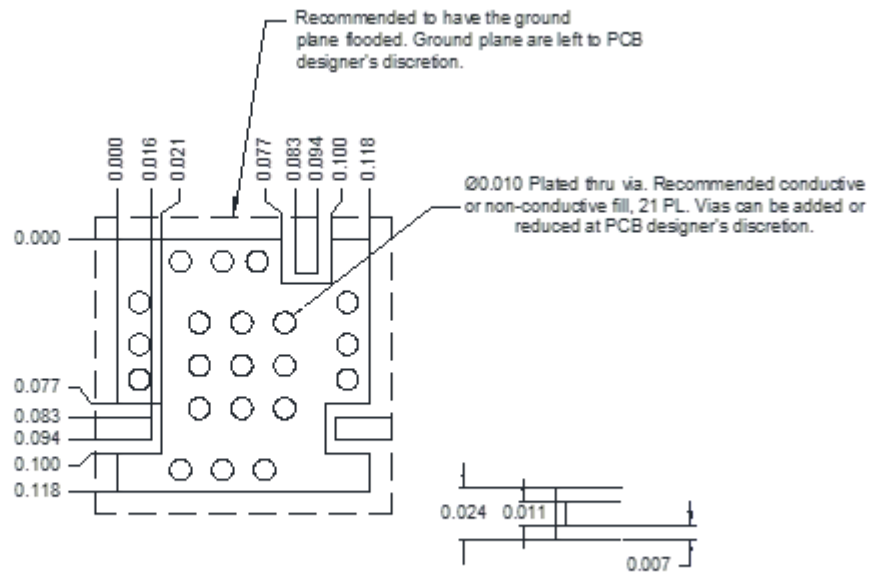
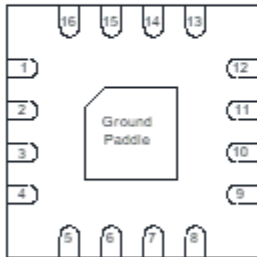
## MDPX-0305PSM-1

### Passive MMIC 3GHz Diplexer/Reflectionless Filter

#### Footprint Image

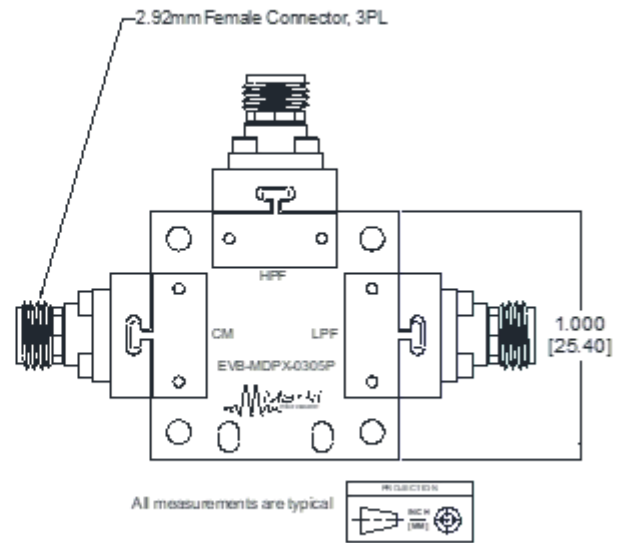
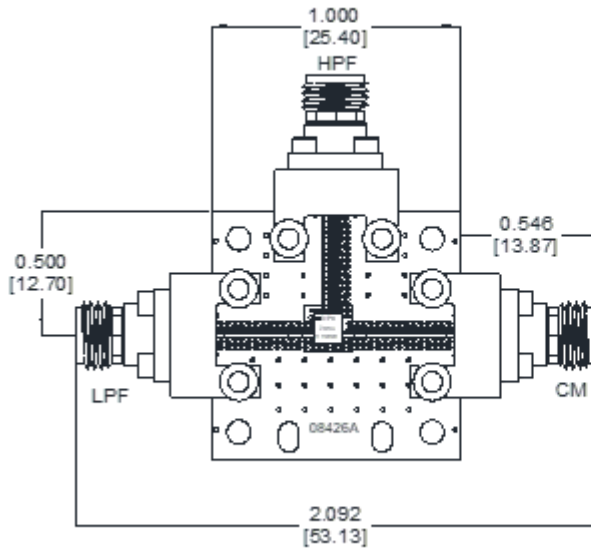
Download : [Footprint Drawing](#)

QFN 3mm Sample Drawing  
X-Ray view



Material Rogers 4003 008"  $\frac{1}{2}$  Oz Cu.

### Evaluation Board - Outline Drawing



**DISCLAIMER**

MARKI MICROWAVE, LLC., ("MARKI") PROVIDES TECHNICAL SPECIFICATIONS AND DATA (INCLUDING DATASHEETS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, AND OTHER INFORMATION AND RESOURCES "AS IS" AND WITH ALL FAULTS. MARKI DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT.

These resources are intended for developers skilled in the art designing with Marki products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards and other requirements. Marki makes no guarantee regarding the suitability of its products for any particular purpose, nor does Marki assume any liability whatsoever arising out of your use or application of any Marki product.

Marki grants you permission to use these resources only for development of an application that uses Marki products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Marki intellectual property or to any third-party intellectual property. Marki reserves the right to make changes to the product(s) or information contained herein without notice.

MARKI MICROWAVE and T3 MIXER are trademarks or registered trademarks of Marki Microwave, LLC. All other trademarks used are the property of their respective owners.

© 2023, Marki Microwave, LLC