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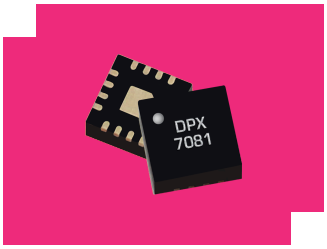
MDPX-0407PSM-2

Passive MMIC 0 - 26.5 GHz Diplexer/Reflectionless Filter

DEVICE OVERVIEW

General Description

The MDPX-0407PSM is a MMIC surface mount diplexer capable of multiplexing low frequency DC to 4 GHz and high frequency 7 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-0407PSM is available as a 3x3mm QFN. Low unit to unit variation allows for accurate simulations using the provided S3P file taken from measured production units.



Download s-parameters here

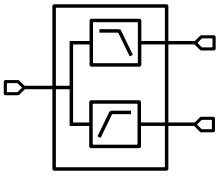
Features

- Excellent Return Loss
- 5.5 GHz Crossover Point
- High Stop Band Suppression
- Reflectionless Filter

Applications

- Satellite Communications
- Reflectionless Filter Applications
- Electronic Warfare

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
MDPX-0407PSM-2	Passive MMIC 0 - 26.5 GHz Diplexer/Reflectionless Filter	QFN	RoHS REACH	Released	EAR99
EVB-MDPX-0407P	Passive MMIC DC-4 GHz Diplexer/Reflectionless Filter	EVB	RoHS REACH	Released	EAR99

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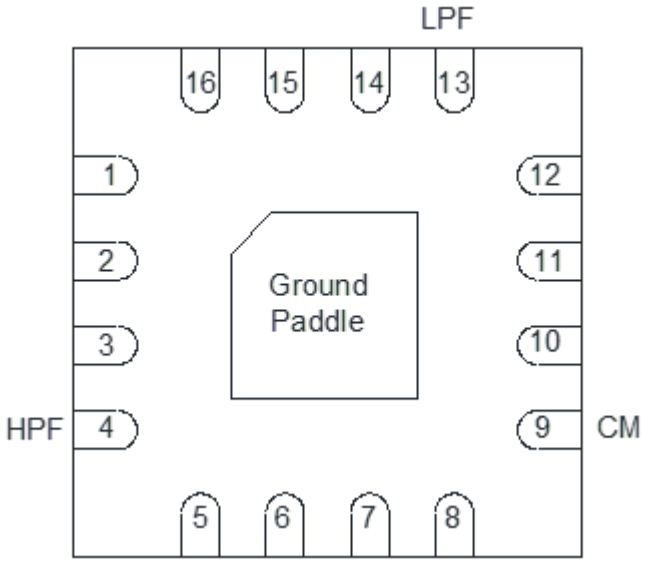
Revision History

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

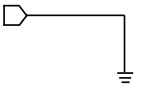
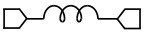
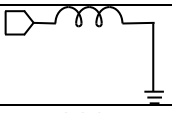
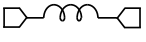
Port Configuration and Functions

Port Diagram

A top-down x-ray view of the MDPX-0407PSM package outline drawing is shown below. Input to the diplexer is on Pin 9, Pin 4 will be the output after passing through the HPF and Pin 13 will be the output after passing through the LPF.



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	Low Pass Filter	Pin 13 is DC short to Pin 9 and open to GND and Pin 4.	
Pin 4	High Pass Filter	Pin 4 is DC short to GND and open to the other ports.	
Pin 9	Common/Input	Pin 9 is DC short to Pin 13 and open to GND and Pin 4.	

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, 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	< 50 Volts	HBM 0Z
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.

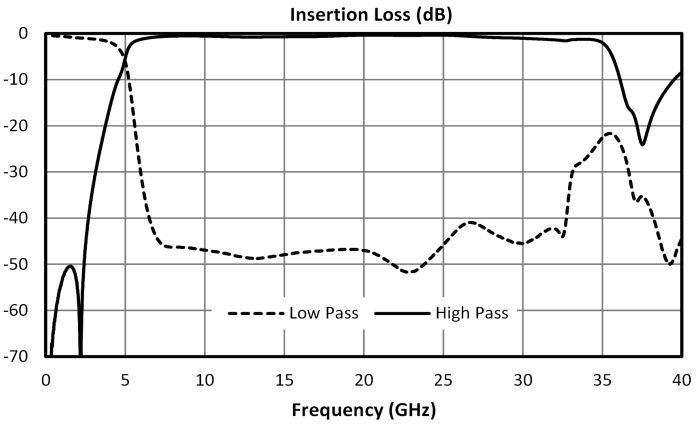
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
1 dBc High Passband [1]	Configuration A, Temp = 25°C	-	-	0.01	-	-	GHz
3 dBc High Passband [2]	Configuration A, Temp = 25°C	-	-	1.66	-	-	GHz
30 dBc High Pass Rejection Point [3]	Configuration A, Temp = 25°C	-	-	1.66	-	-	GHz
High Passband Return Loss [4]	Configuration A, Temp = 25°C	-	-	-	23	-	dB
High Pass Isolation [5]	Configuration A, Temp = 25°C	-	-	-	31	-	dB
High Pass Group Delay [6]	Configuration A, Temp = 25°C	-	-	-	186	-	ps
1 dBc Low Passband [7]	Configuration A, Temp = 25°C	-	-	-	-	5.02	GHz
3 dBc Low Passband [8]	Configuration A, Temp = 25°C	-	-	-	-	5.16	GHz
30 dBc Low Pass Rejection Point [9]	Configuration A, Temp = 25°C	-	-	-	-	12.00	GHz
Low Passband Return Loss [10]	Configuration A, Temp = 25°C	-	-	-	6	-	dB
Low Pass Isolation [11]	Configuration A, Temp = 25°C	-	-	-	8	-	dB
Low Pass Group Delay [12]	Configuration A, Temp = 25°C	-	-	-	613	-	ps
Crossover Frequency [13]	Configuration A, Temp = 25°C	-	-	-	5.27	-	GHz
Common Port Return Loss [14]	Configuration A, Temp = 25°C	-	-	-	17	-	dB
Impedance [15]	Configuration A, Temp = 25°C	-	-	-	50	-	Ω
30 dBc Low Pass Rejection Point	DC to 3	0	3	25	53	-	dB
Common Port Return Loss	7 to 26.5 GHz	7	26	10	14	-	dB
Common Port Return Loss	DC to 4 GHz	0	4	19	23	-	dB
High Pass Filter, Pass Band Insertion Loss	7 to 26.5 GHz	7	26.5	-	0.9	-	dB
High Pass Filter, Pass Band Return Loss	7 to 26.5 GHz	7	26.5	10	14	-	dB
Impedance	-	-	-	-	50	-	Ω
Isolation	3 to 4 GHz	3	4	-	20	-	dB
Isolation	7 to 26.5 GHz	7	26.5	25	38	-	dB
Isolation	DC to 3 GHz	0	3	25	38	-	dB
Low Pass Filter, Pass Band Insertion Loss	DC to 4 GHz	0	4	-	0.9	-	dB

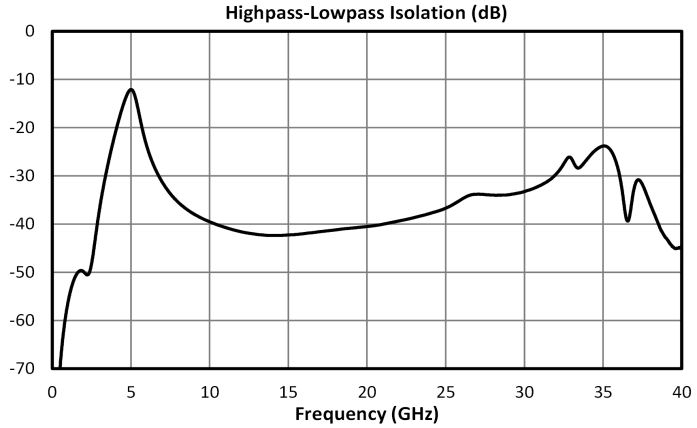
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Low Pass Filter, Pass Band Return Loss	DC to 4 GHz	0	4	22	24	-	dB
Low Pass Filter, Stop Band Rejection	7 to 26.5	7	26.5	25	42	-	dB
1 dBc High Passband	-	-	-	7	-	26.5	GHz
1 dBc Low Passband	-	-	-	0	-	4	GHz

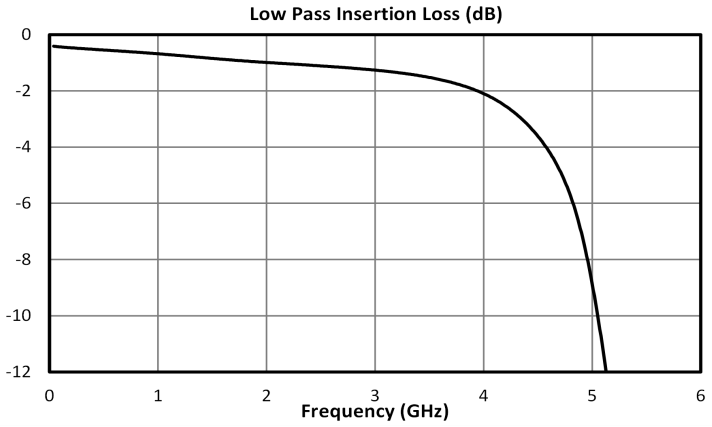
[1][2][3][4][5][6][7][8][9][10][11][12][13][14][15] No

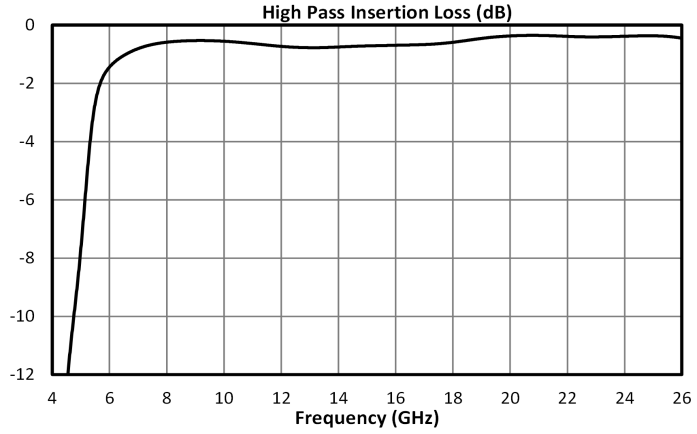
Typical Performance Plots

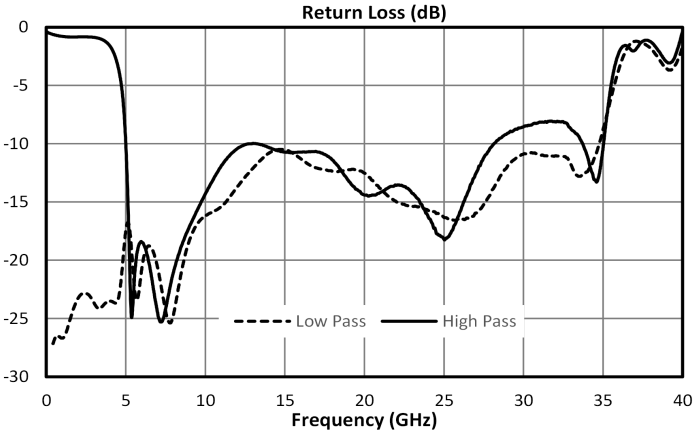
Typical performance plots are evaluation board measurements with fixturing to the device pads de-embedded.

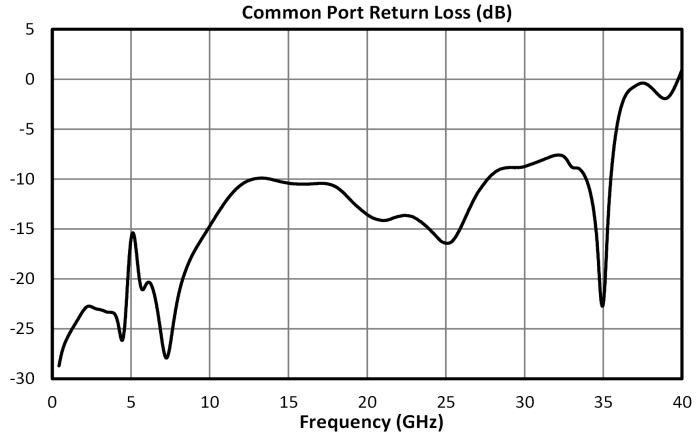








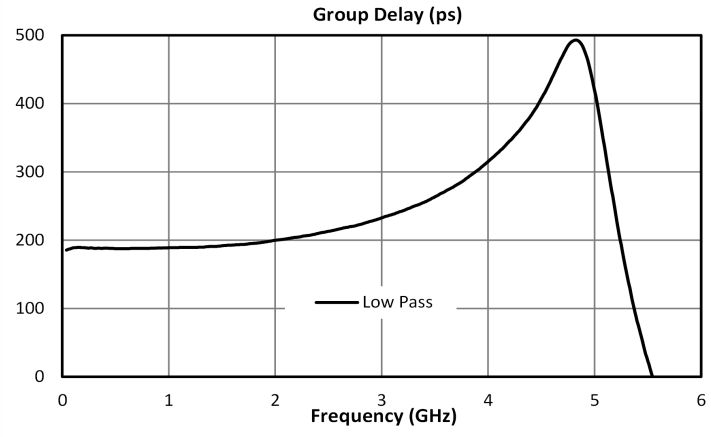


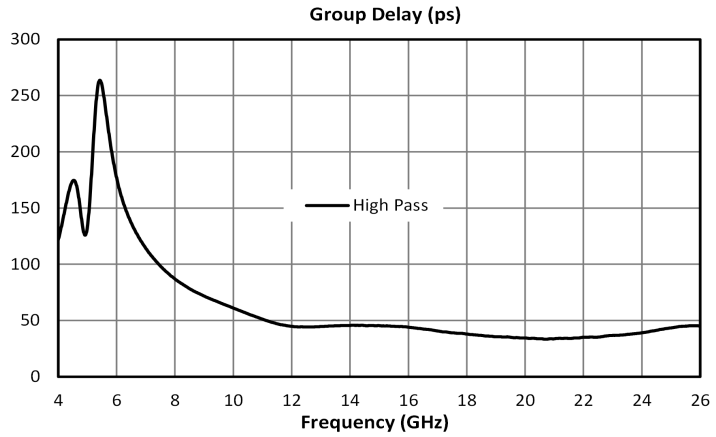


MDPX-0407PSM-2

Passive MMIC 0 - 26.5 GHz

Diplexer/Reflectionless Filter



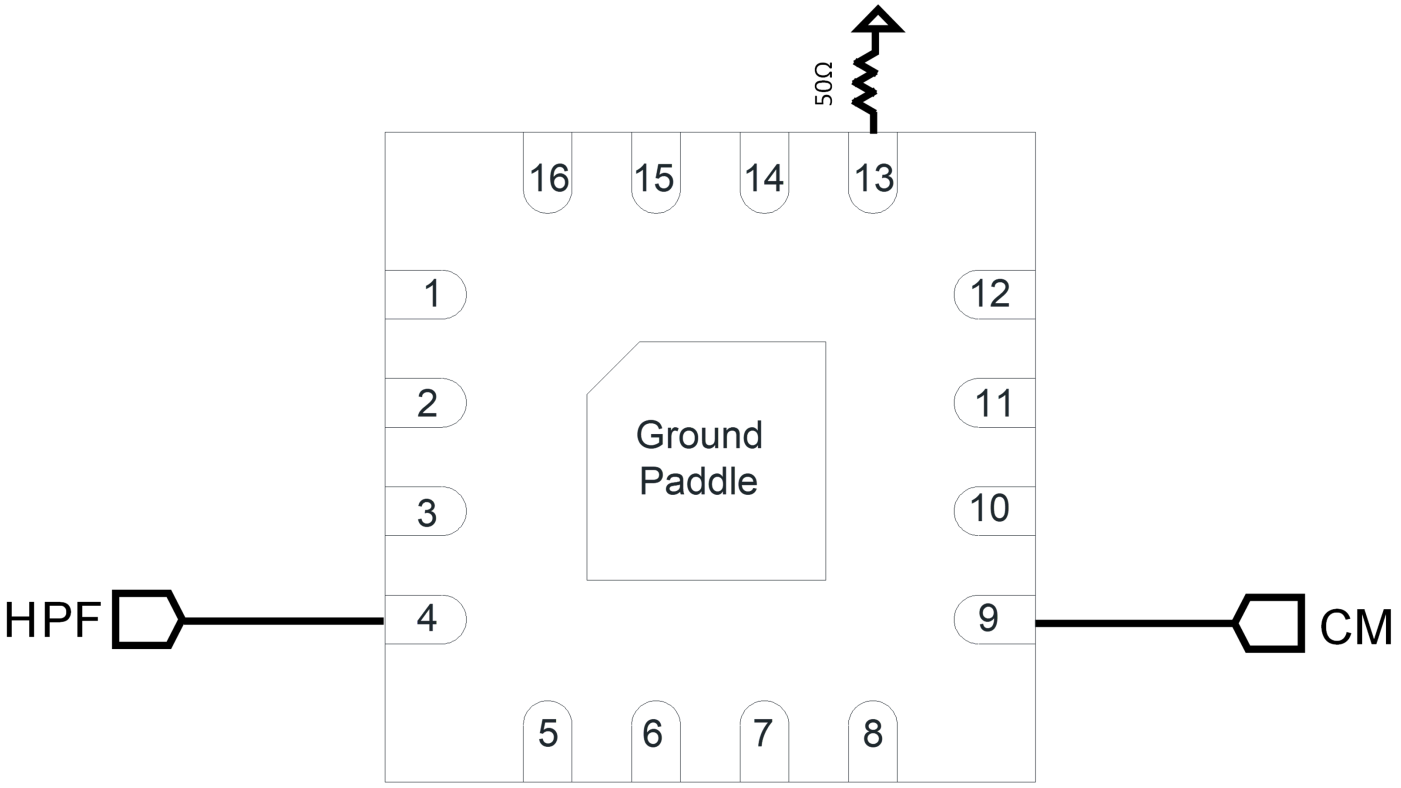


Application Circuit Description

Example Reflectionless Filter

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

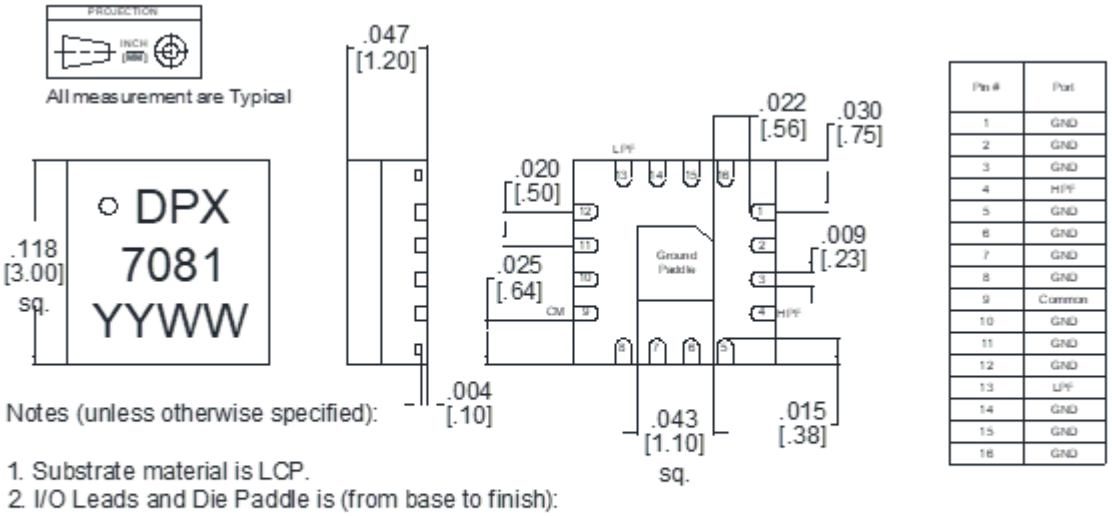
Terminating the Low-Pass port (Pin 13) with 50 Ω enables one-way reflectionless high-pass filtering from the Common port (Pin 9) to the High-Pass port (Pin 4).



Mechanical Data

Outline Drawing

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



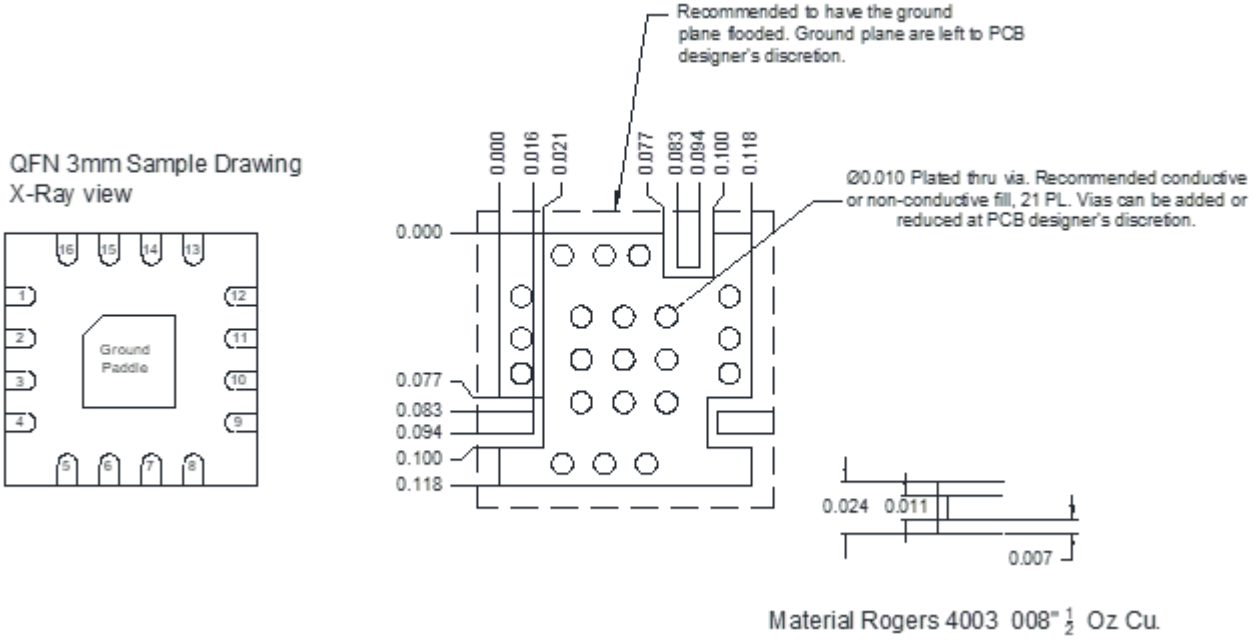
Pin #	Port
1	GND
2	GND
3	GND
4	HPF
5	GND
6	GND
7	GND
8	GND
9	Common
10	GND
11	GND
12	GND
13	LPF
14	GND
15	GND
16	GND

Notes (unless otherwise specified):

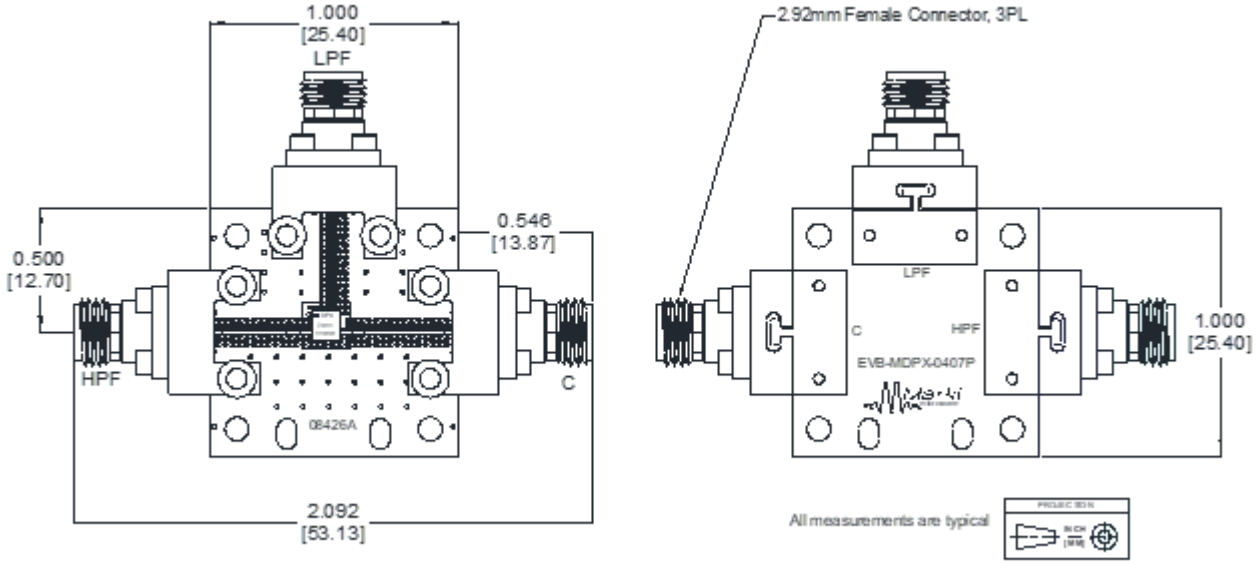
1. Substrate material is LCP.
2. I/O Leads and Die Paddle is (from base to finish):
   Ni: 0.5um MIN
   Pd: 0.02um MIN
   Au: 0.05um MAX
3. All unconnected pins should be connected to PCB RF ground.

Footprint Image

Download : Footprint Drawing



Evaluation Board - Outline Drawing



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