

Passive MMIC Diplexer/Reflectionless Filter

MDPX-0305PSM

1 Device Overview

1.1 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.



PSM

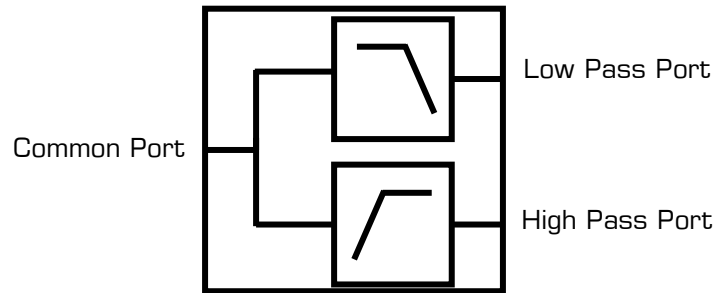
1.2 Features

- Excellent ≤ 1 dB Insertion Loss
- 4 GHz Crossover Point
- High Stop Band Suppression
- Reflectionless Filter
- [S3P](#) data available

1.3 Applications

- Satellite Communications
- Reflectionless Filter Applications
- Electronic Warfare

1.4 Functional Block Diagram



1.5 Part Ordering Options¹

Part Number	Description	Package	Green Status	Product Lifecycle	Export Classification
MDPX-0305PSM-1	3 x 3 mm QFN	PSM	RoHS	Active	EAR99
EVB-MDPX-0305P	Connectorized Evaluation Fixture	EVB	RoHS	Active	EAR99

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

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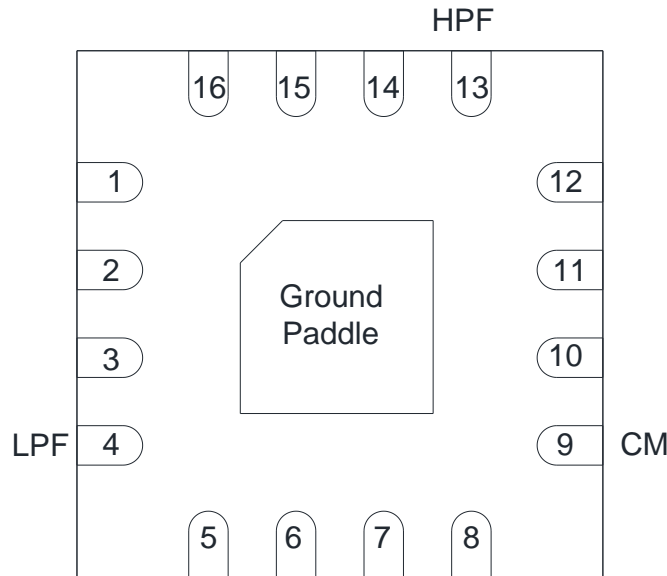
Revision History

Revision Code	Revision Date	Comment
-	March 2023	Datasheet Initial Release

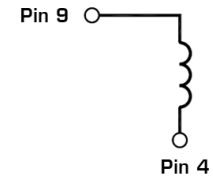
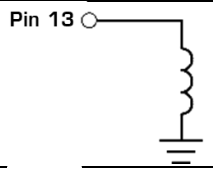
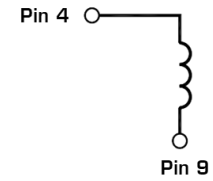
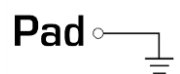
2 Port Configurations and Functions

2.1 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.



2.2 Port Functions

Port	Function	Description	Equivalent Circuit
Pin 9	Common/Input	Pin 9 is DC short to Pin 4 and open to GND and Pin 13.	
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.	
Pad	Ground	PSM package ground path is provided through the substrate and ground bond pads.	

3 Specifications

3.1 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	Units
Low Pass Port DC Current	N/A	mA
Common Port DC Current	N/A	mA
RF Power Handling	+30	dBm
Operating Temperature	-65 to +100	°C
Storage Temperature	-65 to +100	°C

3.2 Package Information

Parameter	Details	Rating
ESD	Human Body Model (HBM), per MIL-STD-750, Method 1020	N/A

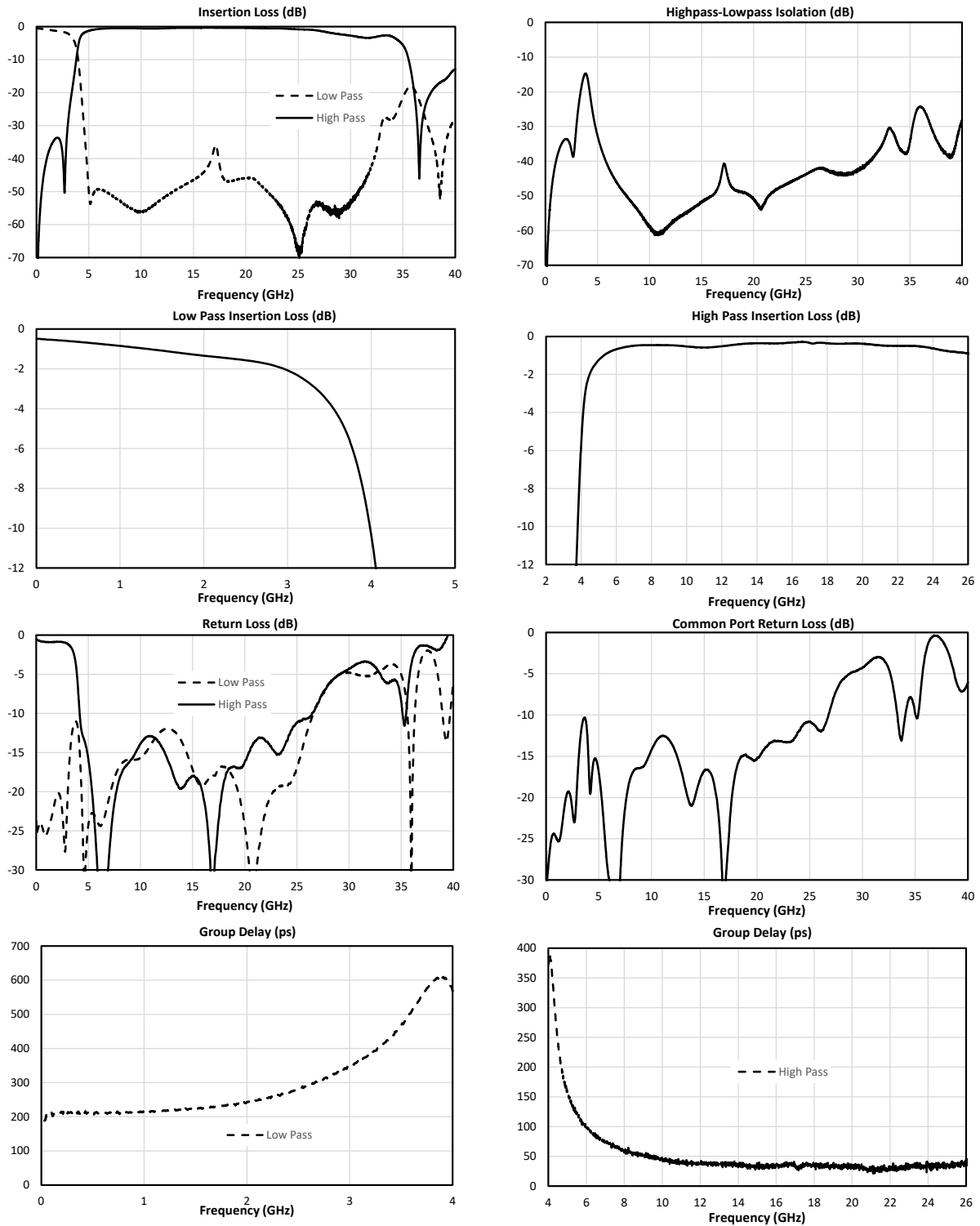
3.3 Electrical Specifications

The electrical specifications apply at $T_A=+25^{\circ}\text{C}$ 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 $T_A=+25^{\circ}\text{C}$.

Parameter	Frequency Range (GHz)	Min	Typ	Max
Low Pass Filter				
Pass Band Insertion Loss (dB)	DC to 3		1	
Stop Band Rejection (dB)	5 to 16	25	51	
	16 to 26.5	20	47	
Pass Band Return Loss (dB)	DC to 3	10	24	
High Pass Filter				
Pass Band Insertion Loss (dB)	5 to 26.5		0.5	
Stop Band Rejection (dB)	DC to 2.5	25	38	
	2.5 to 5		11	
Pass Band Return Loss (dB)	5 to 26.5	10	17	
Common Port Return Loss (dB)	DC to 3	10	24	
	5 to 26.5	10	15	
Isolation (dB)	DC to 2.5	25	37	
	5 to 16	30	53	
	16 to 26.5	25	48	
Impedance (Ω)			50	

3.4 Typical Performance Plots²

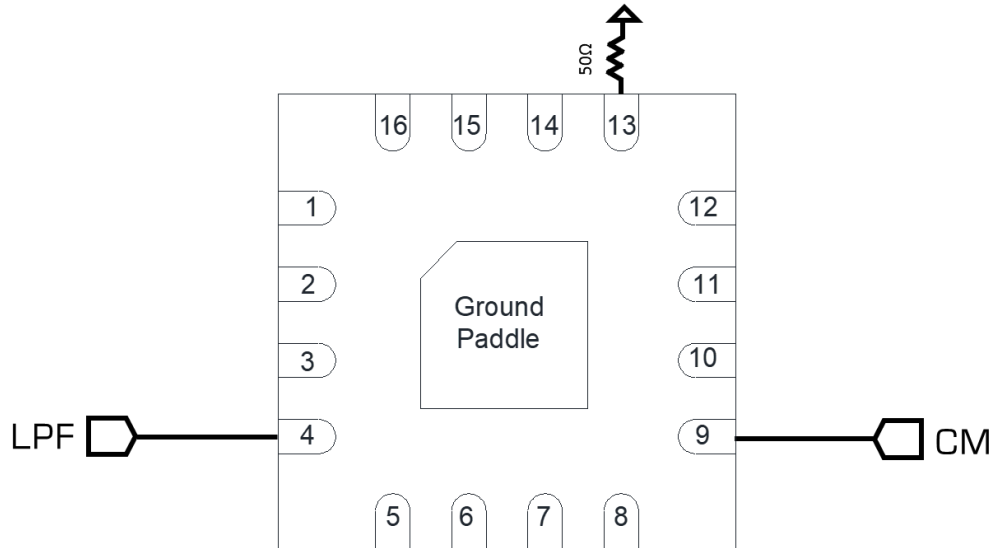


² Typical performance plots are evaluation board measurements with fixturing to the device pads de-embedded.

4 Application

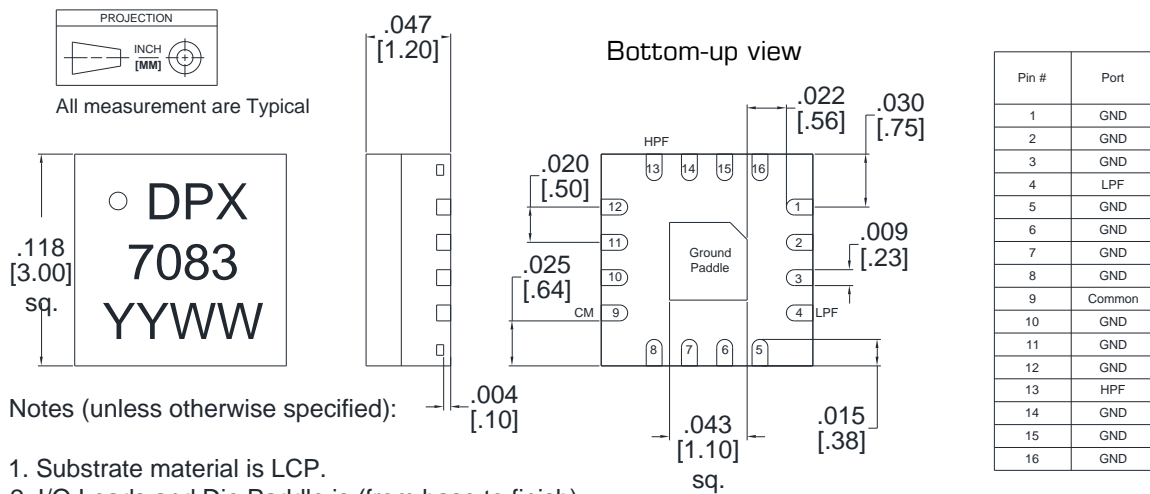
4.1 Example Reflectionless Filter

A top-down x-ray view of the MDPX-0305PSM's PSM package outline drawing is shown below as a low pass reflectionless filter. A high pass reflectionless filter can be achieved by terminating Pin 4 and taking the output at Pin 13 instead.



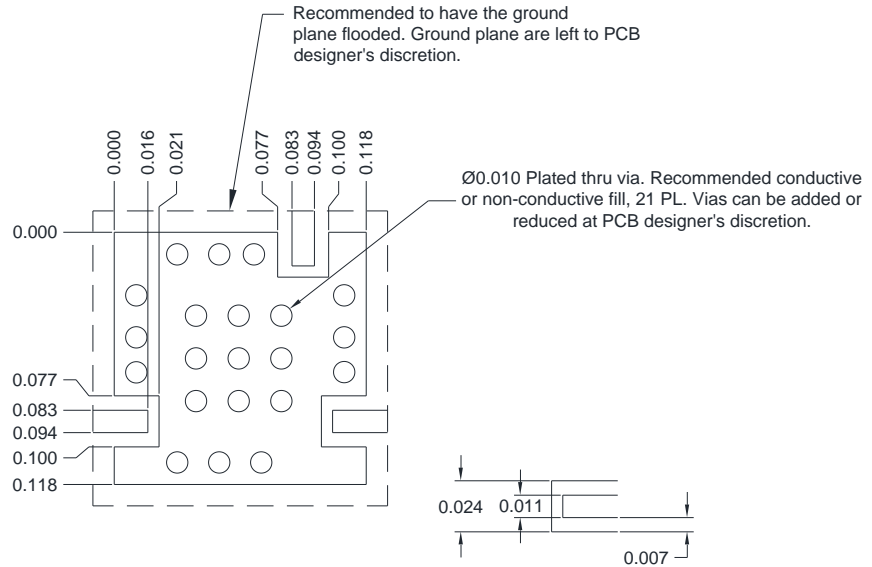
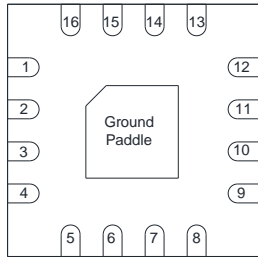
5 Mechanical Data

5.1 PSM Package Outline Drawing



5.2 PSM Package Footprint

QFN 3mm Sample Drawing X-Ray view



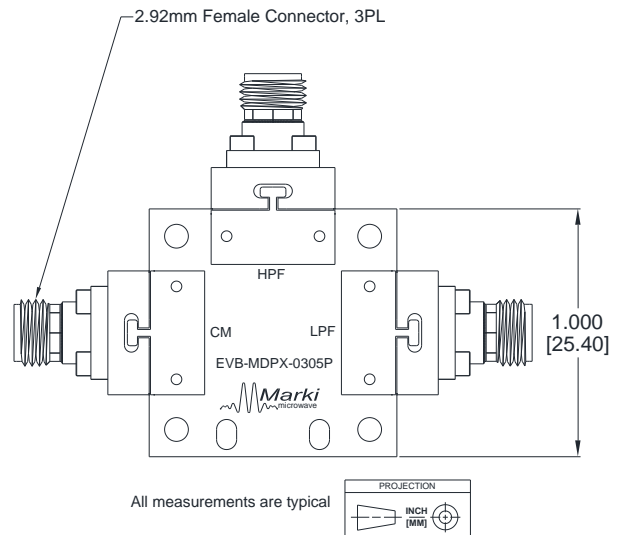
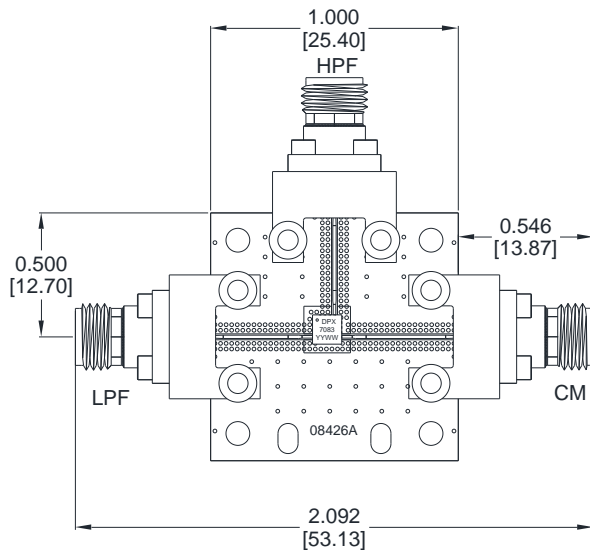
Material Rogers 4003 008" $\frac{1}{2}$ Oz Cu.

QFN-Package Surface-Mount Landing Pattern

[Click here for a DXF of the above layouts.](#)

[Click here for leaded solder reflow.](#) [Click here for lead-free solder reflow](#)

5.3 EVB Package Outline



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