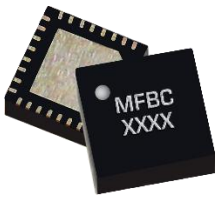
1 Device Overview



PSM

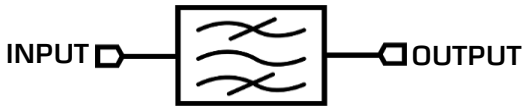
1.1 General Description

The MFBC-0000XPSM family of passive MMIC surface mount bandpass filters are an ideal solution for small form factor, high rejection filtering. 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 MFBC-0000XPSM is available as a 5x5mm plastic QFN. Low unit to unit variation allows for accurate simulations using the provided S2P file taken from measured production units.

1.2 Features

- Excellent Return Loss
- High Stop Band Suppression
- Wide Stop Band with Fast Roll-Off
- S2P data available

1.3 Functional Block Diagram



1.4 Part Ordering Options[1]

Part Number	1dBc Passband (GHz)	Description	Package	Green Status	Product Lifecycle	Export Classification
MFBC-00001PSM	7.40 – 9.90	5 x 5 mm QFN	PSM	RoHS	Active	EAR99
MFBC-00002PSM	9.13 – 12.40					
MFBC-00003PSM	11.85 – 15.90					
MFBC-00004PSM	14.90 – 19.90					
MFBC-00005PSM	18.60 – 25.10					
MFBC-00006PSM	23.60 – 32.20					
MFBC-00007PSM	30.10 – 39.30					

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

EVB-MFBC-00001P	7.40 – 9.90	Connectorized Evaluation Fixture with 2.92mm Connetors	EVB	RoHS	Active	EAR99
EVB-MFBC-00002P	9.13 – 12.40					
EVB-MFBC-00003P	11.85 – 15.90					
EVB-MFBC-00004P	14.90 – 19.90					
EVB-MFBC-00005P	18.60 – 25.10					
EVB-MFBC-00006P	23.60 – 32.20					
EVB-MFBC-00007P	30.10 – 39.30					

Table of Contents

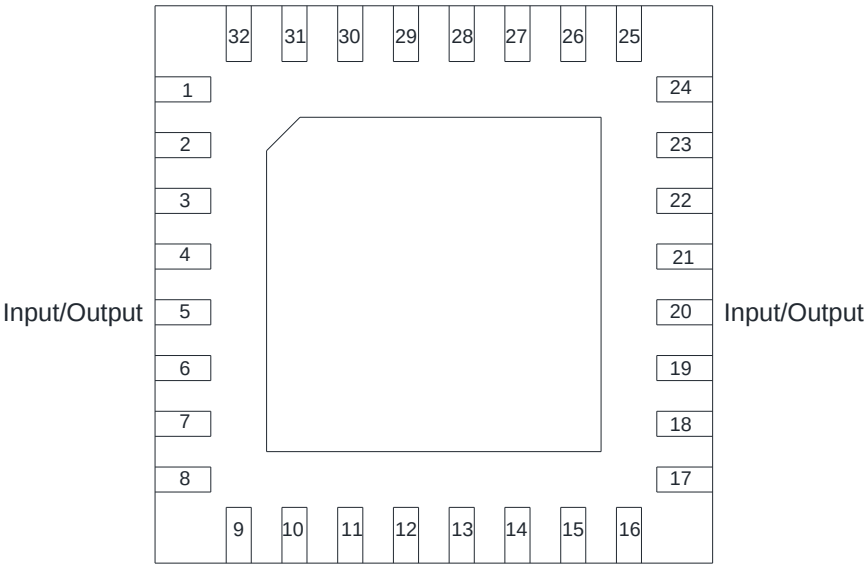
Revision History

Revision Code	Revision Date	Comment
-	December 2022	Datasheet Initial Release

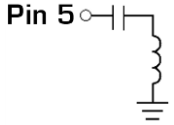
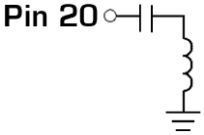
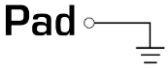
2 Port Configurations and Functions

2.1 Port Diagram

A top-down x-ray view of the MFBC-0000XPSM package outline drawing is shown below. The MMIC bandpass filters are symmetrical allowing Pin 5 or Port 20 to be used as the input.



2.2 Port Functions

Port	Function	Description	Equivalent Circuit
Pin 5	Input/Output	Pin 5 is DC open to ground for the PSM package.	
Pin 20	Input/Output	Pin 20 is DC open to ground for the PSM package.	
Pad	Ground	PSM package ground path is provided through the substrate and ground bond pads.	

3 Specifications

3.1 Absolute Maximum Ratings

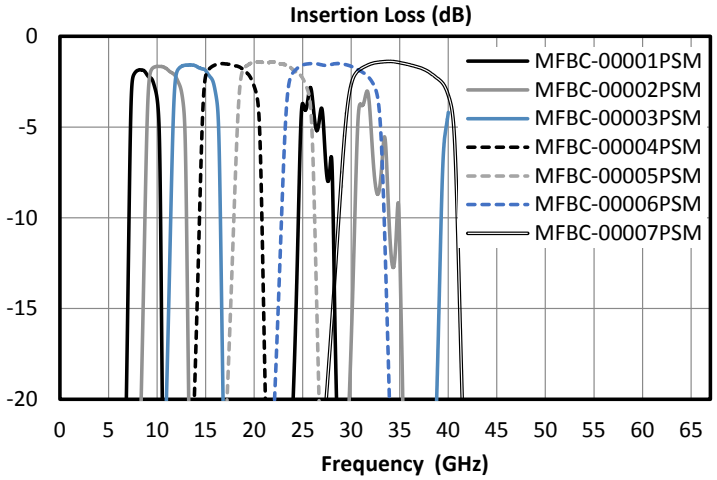
The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. If these limits are exceeded, the device may be inoperable or have a reduced lifetime.

Parameter	Maximum Rating MFBC-00001/2/3/4/5/6PSM	Units MFBC-00007PSM	Units
Port 1 DC Current	800	400	mA
Port 2 DC Current	800	400	mA
Operating Temperature	-55 to +100	-55 to +100	°C
Storage Temperature	-65 to +125	-65 to +125	°C

3.2 Package Information

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

3.3 Passband Comparison



Part Number	1dBc Cutoff Low (GHz)	1dBc Cutoff High (GHz)
MFBC-00001PSM	7.40	9.90
MFBC-00002PSM	9.13	12.40
MFBC-00003PSM	11.85	15.90
MFBC-00004PSM	14.90	19.90
MFBC-00005PSM	18.60	25.10
MFBC-00006PSM	23.60	32.20
MFBC-00007PSM	30.10	39.30

3.4 Electrical Specifications

The electrical specifications apply at T_A=+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 5.

Min and Max limits are guaranteed at T_A=+25°C.

MFBC-00001PSM	Frequency (GHz)	Min	Typ.	Max
Center Frequency, f_c (GHz)			8.70	
1dBc Passband (GHz)			7.40 – 9.90	
3dBc Passband (GHz)			7.25 – 10.25	
Insertion Loss @ f_c (dB)	8.70		2.00	
Passband Return Loss (dB)	7.35 – 10.25		15	
Stopband Suppression (dB)	DC – 5GHz	40	82	
	12.00 – 20.00	40	54	
Group Delay (ps)			673	
Impedance (Ω)			50	

MFBC-00002PSM	Frequency (GHz)	Min	Typ.	Max
Center Frequency, f_c (GHz)			11.00	
1dBc Passband (GHz)			9.13 – 12.40	
3dBc Passband (GHz)			9.00 – 12.85	
Insertion Loss @ f_c (dB)	11.00		1.80	
Passband Return Loss (dB)	9.20 – 12.85		15	
Stopband Suppression (dB)	DC – 6	40	82	
	15.00 – 26.00	40	50	
Group Delay (ps)			508	
Impedance (Ω)			50	

MFBC-00003PSM	Frequency (GHz)	Min	Typ.	Max
Center Frequency, f_c (GHz)			14.15	
1dBc Passband (GHz)			11.85 – 15.90	
3dBc Passband (GHz)			11.65 – 16.30	
Insertion Loss @ f_c (dB)	14.15		1.70	
Passband Return Loss (dB)	11.85 – 16.30		15	
Stopband Suppression (dB)	DC – 8.5	40	82	
	19.00 – 34.00	40	50	
Group Delay (ps)			434	
Impedance (Ω)			50	

MFBC-00004PSM	Frequency (GHz)	Min	Typ.	Max
Center Frequency, f_c (GHz)			17.50	
1dBc Passband (GHz)			14.90 – 19.90	
3dBc Passband (GHz)			14.65 – 20.50	
Insertion Loss @ f_c (dB)	17.50		1.60	
Passband Return Loss (dB)	14.95 – 20.50		15	
Stopband Suppression (dB)	DC – 11.00	40	71	
	23.00 – 40.00	40	52	
Group Delay (ps)			350	
Impedance (Ω)			50	

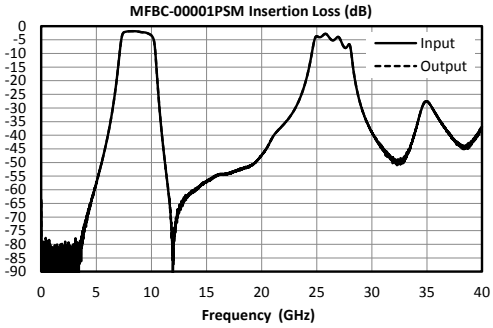
MFBC-00005PSM	Frequency (GHz)	Min	Typ.	Max
Center Frequency, f_c (GHz)			22.00	
1dBc Passband (GHz)			18.60 – 25.10	
3dBc Passband (GHz)			18.30 – 25.90	
Insertion Loss @ f_c (dB)	22.00		1.40	
Passband Return Loss (dB)	18.65 – 25.90		15	
Stopband Suppression (dB)	DC – 14.00	40	71	
	28.00 – 40.00	30	46	
Group Delay (ps)			274	
Impedance (Ω)			50	

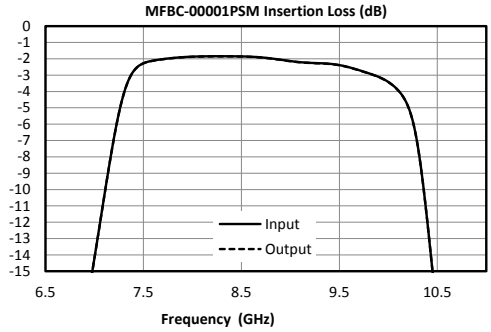
MFBC-00006PSM	Frequency (GHz)	Min	Typ.	Max
Center Frequency, f_c (GHz)			28.00	
1dBc Passband (GHz)			23.60 – 32.20	
3dBc Passband (GHz)			23.25 – 33.00	
Insertion Loss @ f_c (dB)	28.00		1.60	
Passband Return Loss (dB)	23.50 – 32.90		15	
Stopband Suppression (dB)	DC – 18.00	40	67	
	38.00 – 67.00	40	51	
Group Delay (ps)			231	
Impedance (Ω)			50	

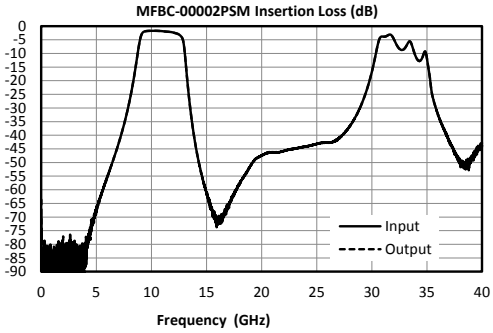
MFBC-00007PSM	Frequency (GHz)	Min	Typ.	Max
Center Frequency, f_c (GHz)			35.00	
1dBc Passband (GHz)			30.10 – 39.30	
3dBc Passband (GHz)			29.50 – 40.50	
Insertion Loss @ f_c (dB)	35.00		1.50	
Passband Return Loss (dB)	30.00 – 40.00		15	
Stopband Suppression (dB)	DC – 21.00	40	63	
	44.00 – 67.00	40	50	
Group Delay (ps)			193	
Impedance (Ω)			50	

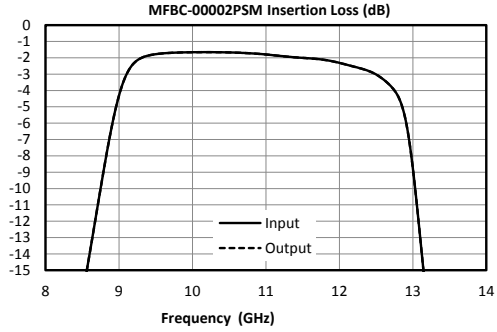
3.5 Typical Performance Plots

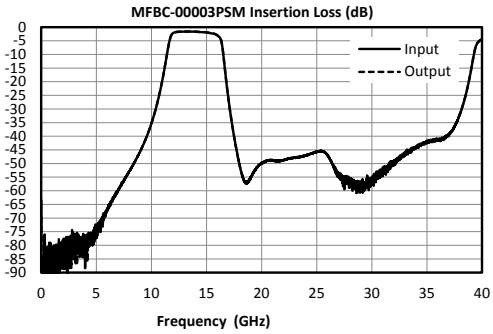
3.5.1 Insertion Loss

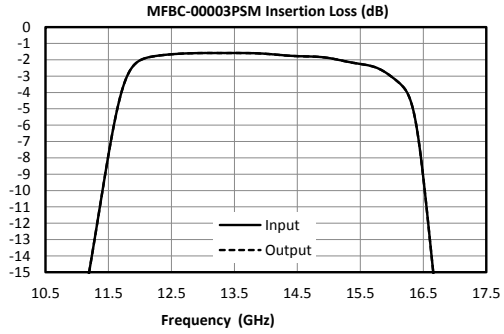


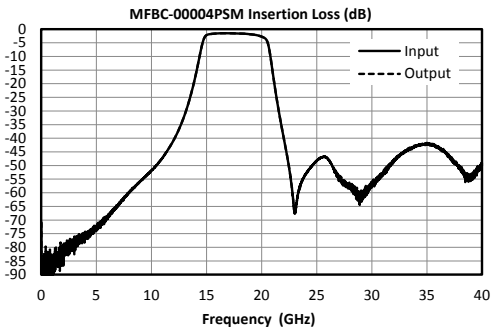


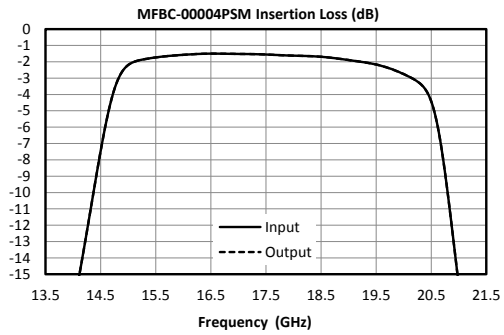


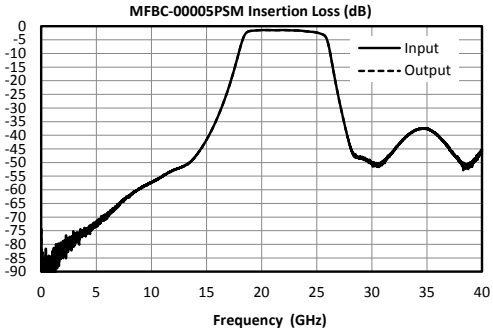


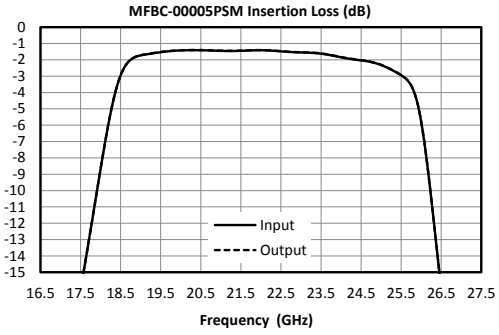


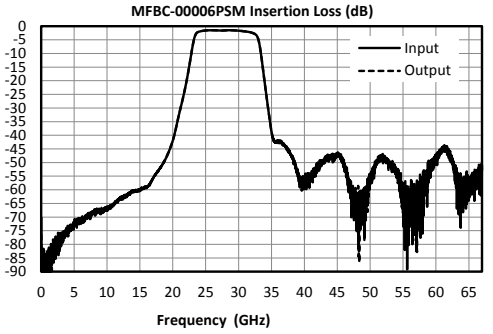


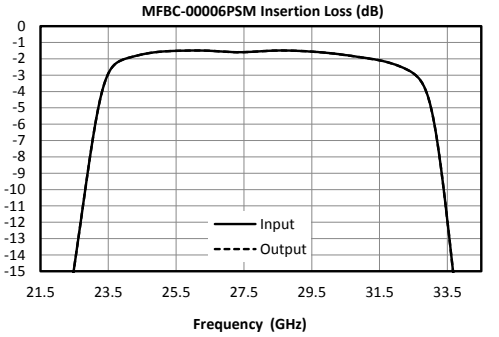


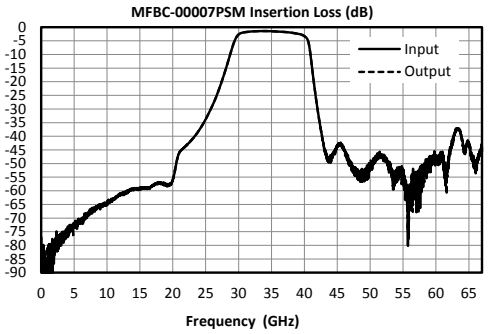


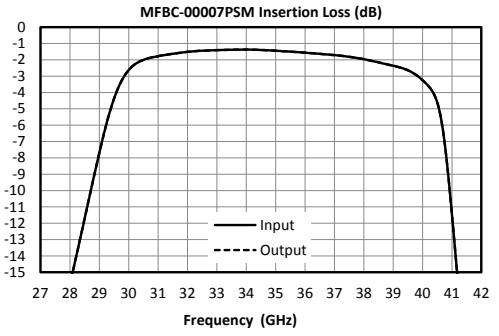




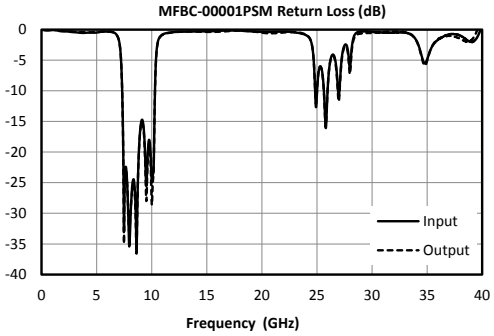


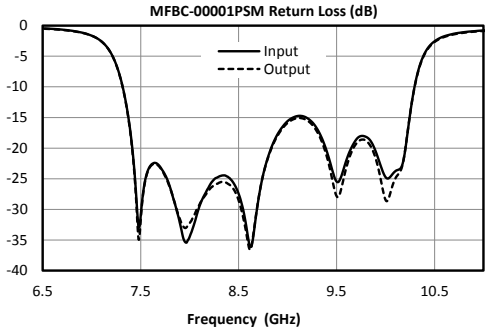


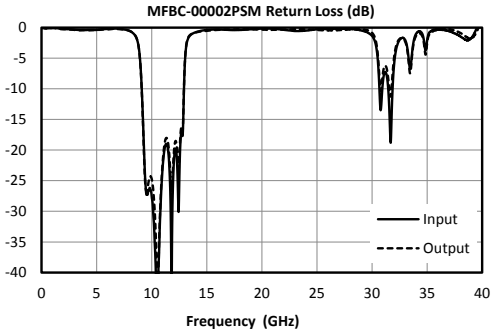


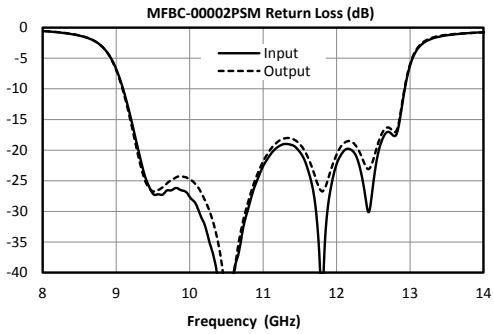


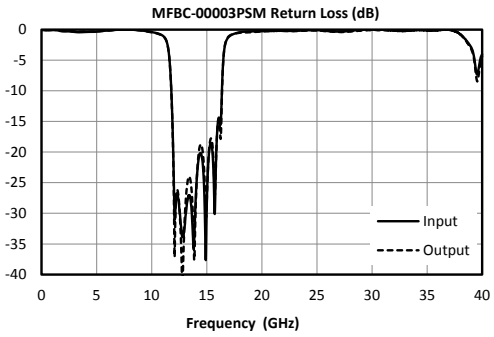
3.5.2 Return Loss

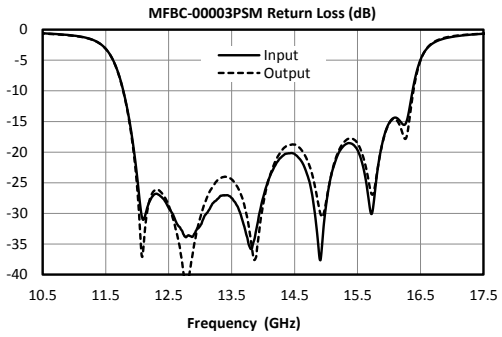


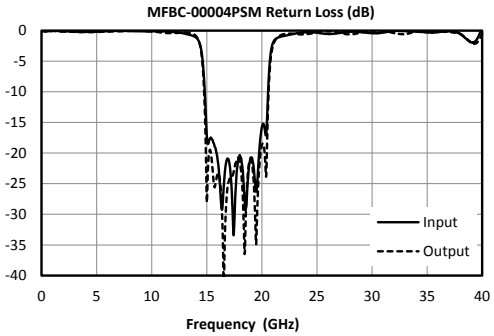


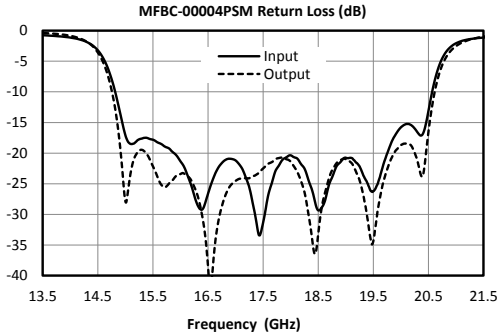


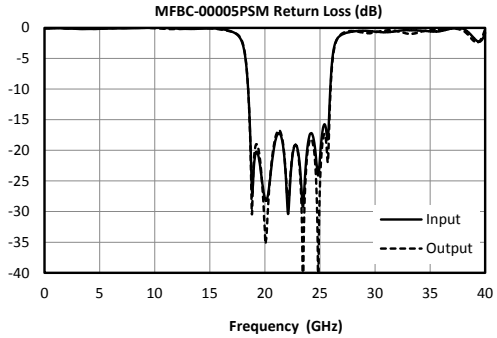


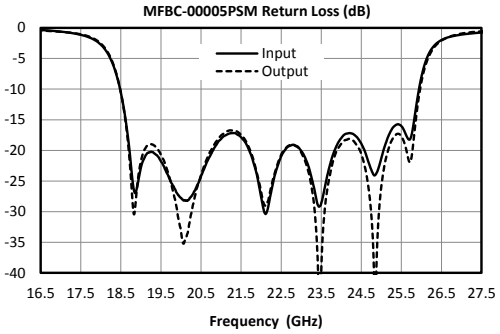


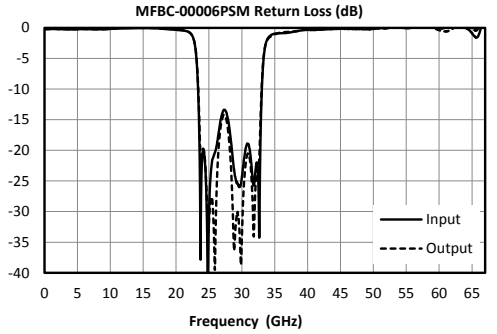


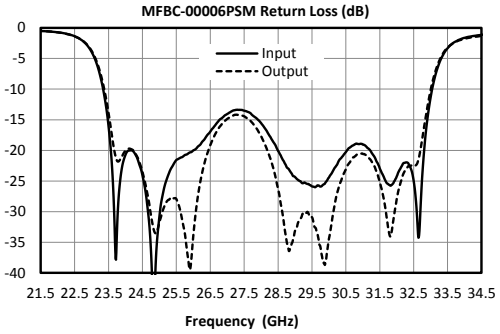


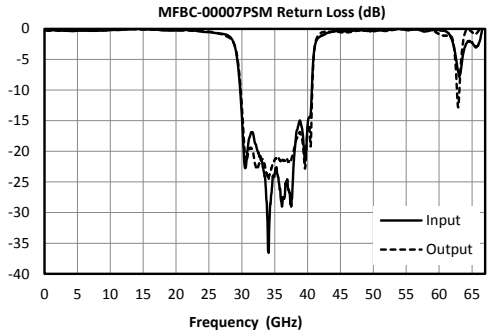


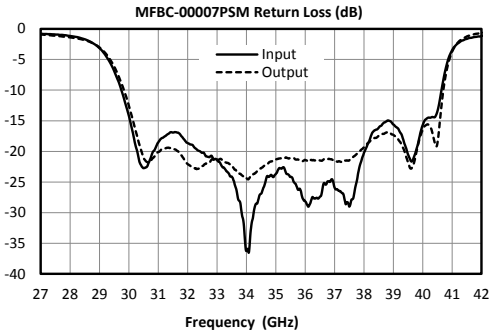




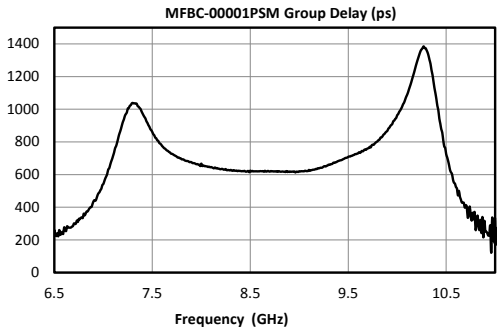


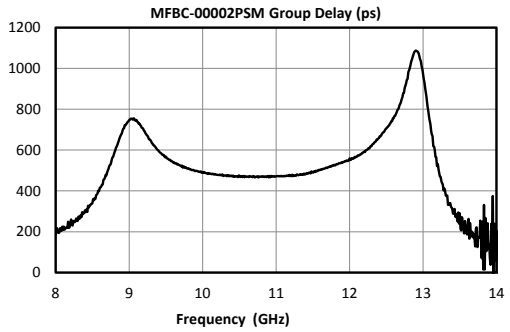


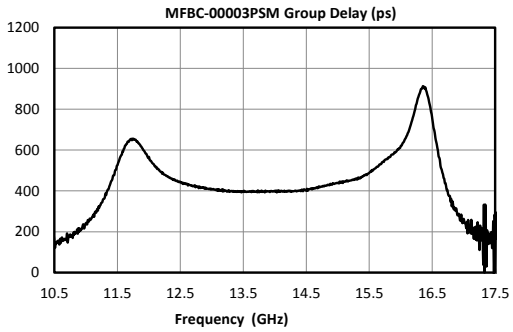


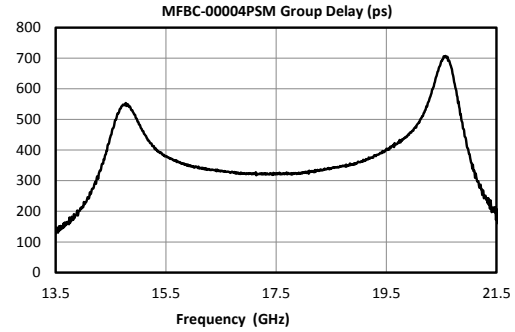


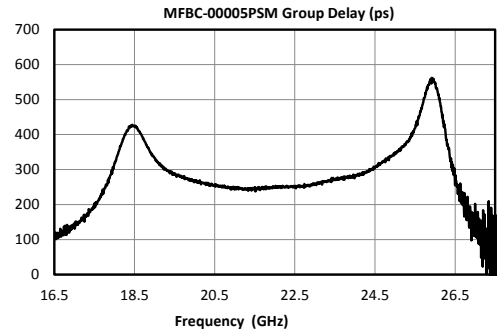
3.5.3 Group Delay

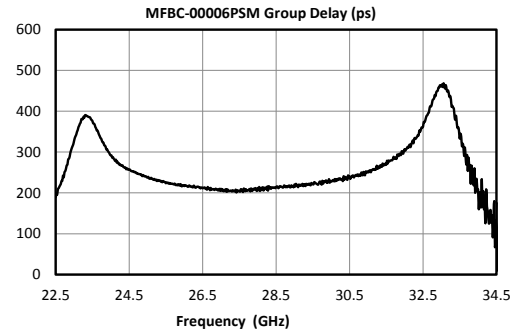


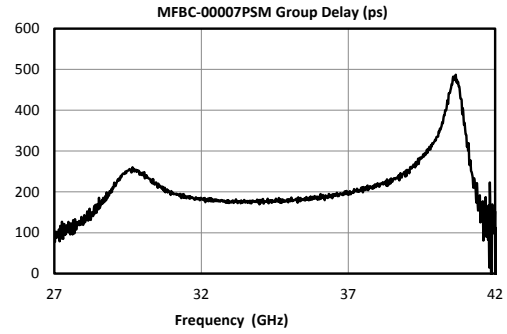








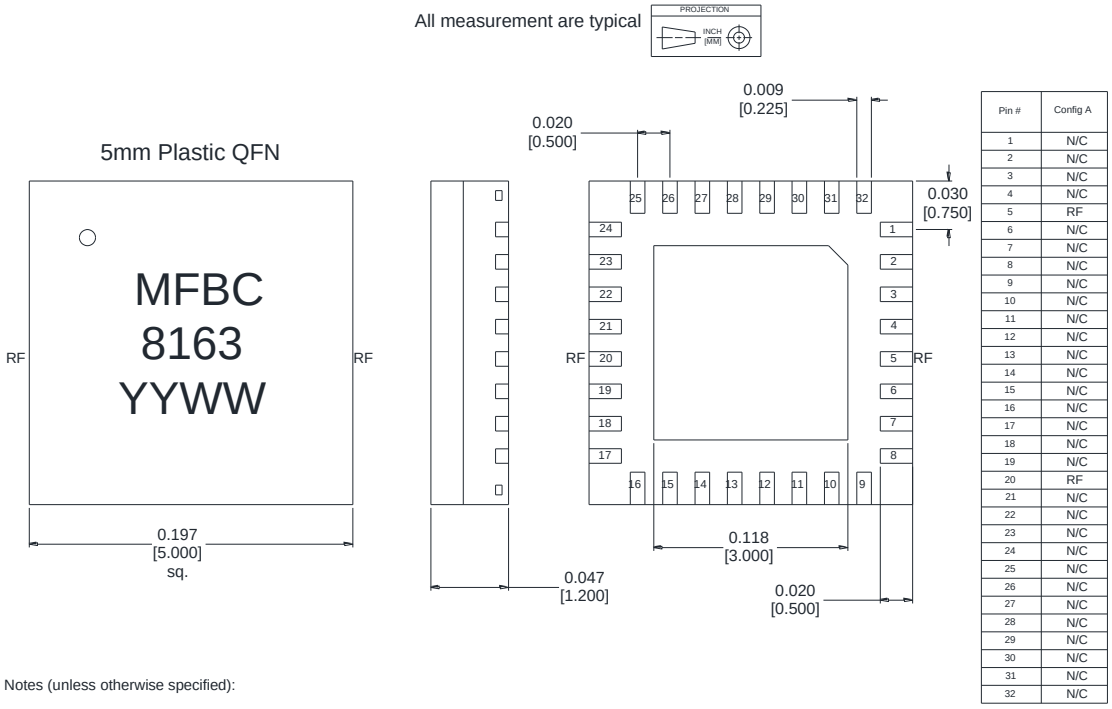




4 Mechanical Data

4.1 PSM Package Outline Drawing

All measurement are typical



Pin #	Config A
1	N/C
2	N/C
3	N/C
4	N/C
5	RF
6	N/C
7	N/C
8	N/C
9	N/C
10	N/C
11	N/C
12	N/C
13	N/C
14	N/C
15	N/C
16	N/C
17	N/C
18	N/C
19	N/C
20	RF
21	N/C
22	N/C
23	N/C
24	N/C
25	N/C
26	N/C
27	N/C
28	N/C
29	N/C
30	N/C
31	N/C
32	N/C

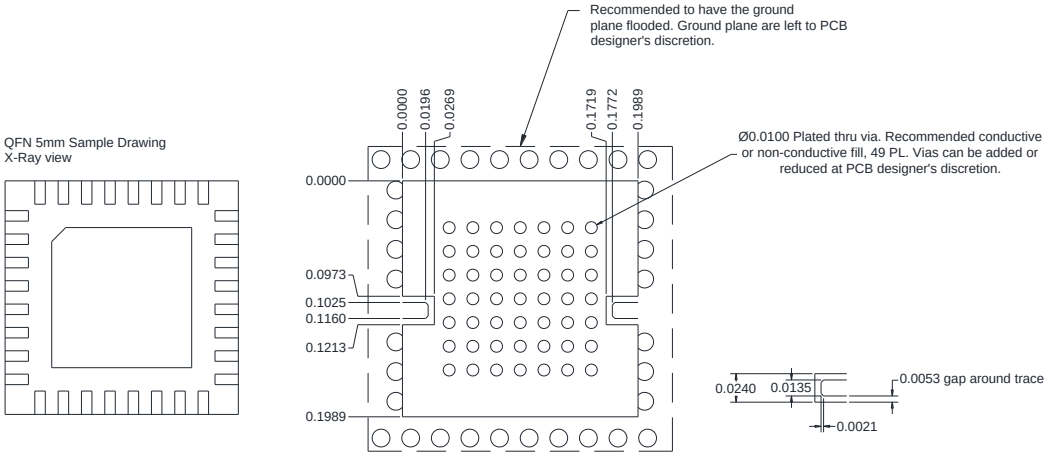
Notes (unless otherwise specified):

1. Substrate material is LCP.
2. I/O Leads and Die Paddle are:
   0.008 - 0.05 µm Gold, over
   0.02 - 0.15 µm Palladium, over
   0.5 - 2.0 µm Nickel.
3. All unconnected pins should be connected to PCB RF ground.

Part Number	Lid Label
MFBC-00001PSM	8163
MFBC-00002PSM	8164
MFBC-00003PSM	8165
MFBC-00004PSM	8166
MFBC-00005PSM	8167
MFBC-00006PSM	8168
MFBC-00007PSM	8169

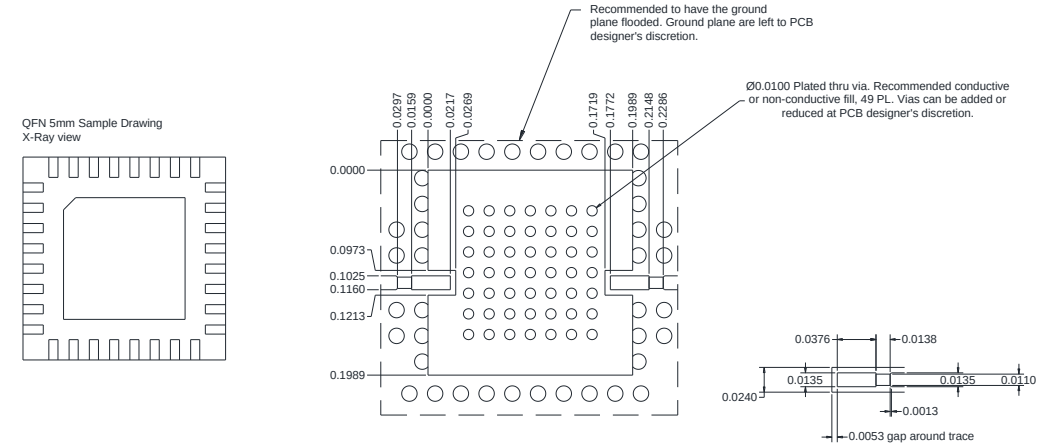
4.2 PSM Package Footprint

MFBC-00001/2/3PSM



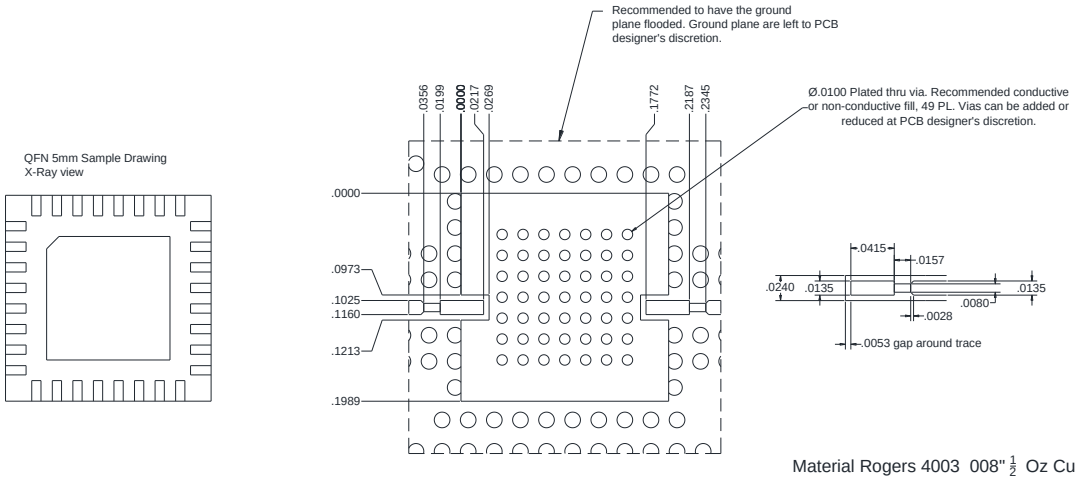
Material Rogers 4003 008" $\frac{1}{2}$ Oz Cu both sides.

MFBC-00004PSM



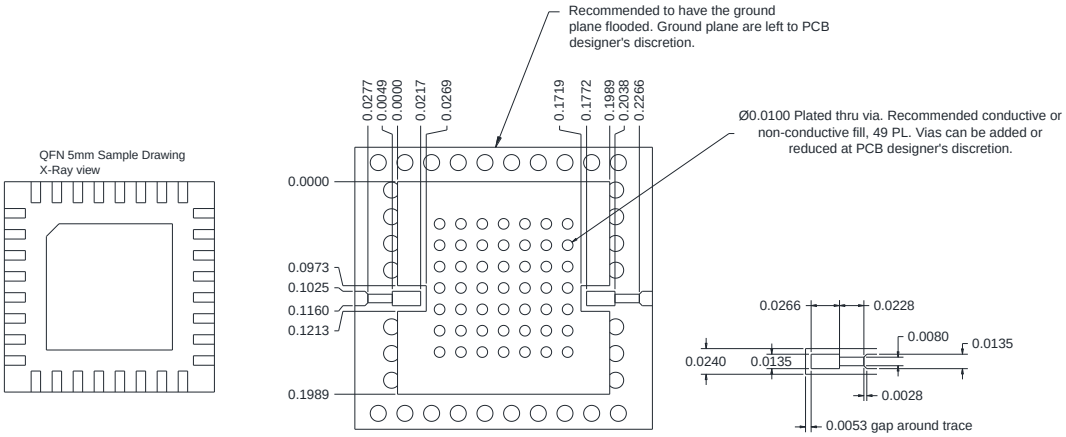
Material Rogers 4003 008" $\frac{1}{2}$ Oz Cu both sides.

MFBC-00005PSM



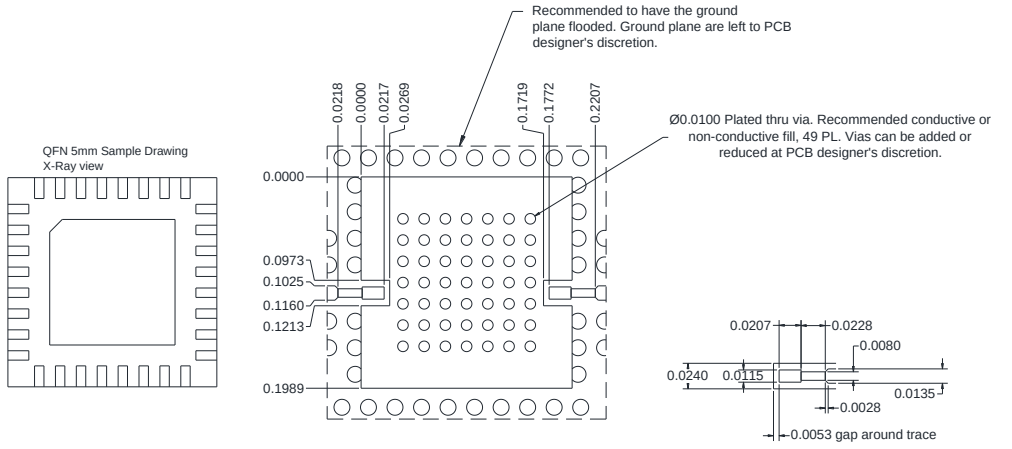
Material Rogers 4003 008" $\frac{1}{2}$ Oz Cu both sides.

MFBC-00006PSM



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

MFBC-00007PSM



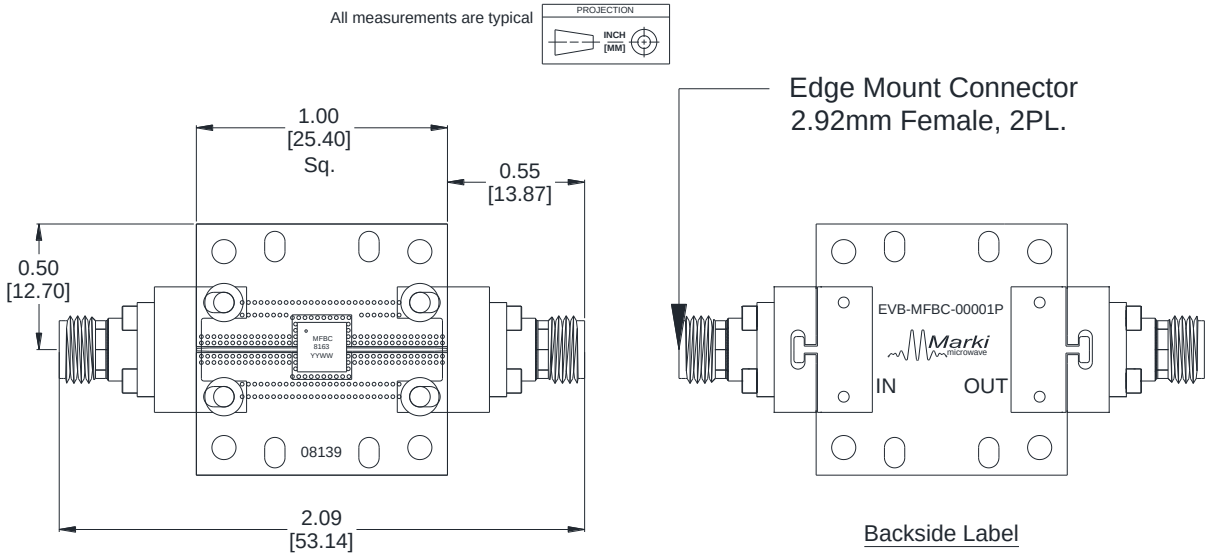
Material Rogers 4003 008" $\frac{1}{2}$ Oz Cu both sides.

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

4.3 EVB Package Outline



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