

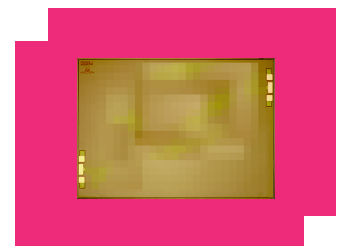
MFBC-00019CH

Passive GaAs MMIC 58.30-77.70 GHz Bandpass Filter

DEVICE OVERVIEW

General Description

The MFBC-00019CH passive MMIC bandpass filters are an ideal solution for small form factor, mmWave, 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



[Download s-parameters here](#)

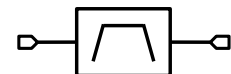
Features

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

Applications

N/A

Functional Block Diagram



Part Ordering Options

Part Number	Description	Package	Packing Size	Green Status	Product Lifecycle	Export Classification
MFBC-00019CH	Passive GaAs MMIC 58.30-77.70 GHz Bandpass Filter	CH	-	RoHS REACH	Released	EAR99

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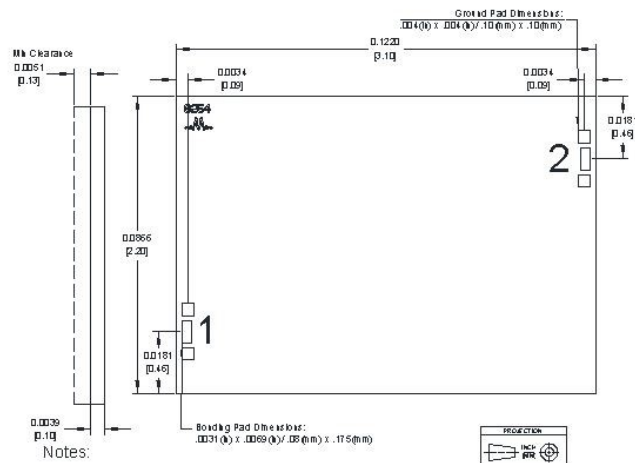
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Revision History

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

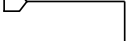
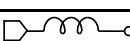
Port Configuration and Functions

Port Diagram



1. CH substrate is .004 Thick GaAs.
2. I/O trace is 5 microns Au. Ground is 4 microns Au.
3. Tolerance for X, Y dimensions is ± 0.002 in.
Tolerance for Z dimension is ± 0.0005 in.
Tolerance for pad location is ± 0.0001 in.

Port Functions

Port	Function	Description	Equivalent Circuit for Package
Pad	Ground	CH package ground path is provided through the substrate and ground bond pads.	
Port 1	Input/Output	Port 1 is DC open to ground for the CH package.	
Port 2	Input/Output	Port 2 is DC open to ground for the CH package.	

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	125	°C
Minimum Operating Temperature	-55	°C
Minimum Storage Temperature	-65	°C

Package Information

Parameter	Details	Rating
Dimensions	-	3.10 x 2.20 mm

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Electrical Specifications

The electrical specifications apply at TA=+25°C in a 50Ω system. Typical data for all filters is shown with a sine wave input applied to port 1. Min and Max limits are guaranteed at TA=+25°C. All bare die are 100% DC tested and visually inspected. Due to measurement limitations of the characterization test setup, performance for the MFBC-00019CH and MFBC-00020CH were measured for their connectorized M-package variants: MFBC-00019M and MFBC-00020M. For the CH die filters, the insertion loss would be expected to improve by approximately 0.5 dB from the data shown below. Improvements may be also seen in rejection steepness and group delay.

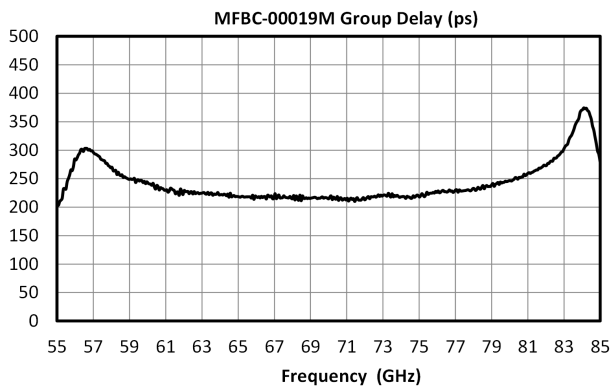
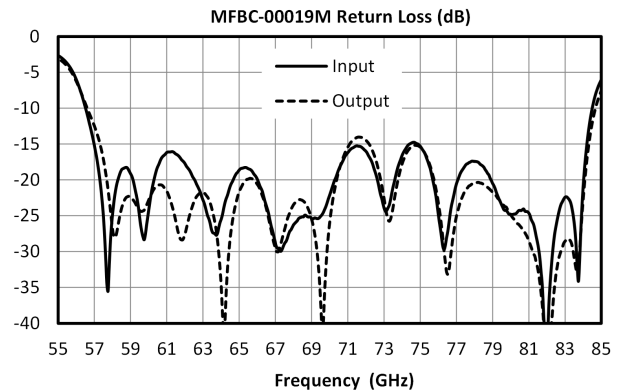
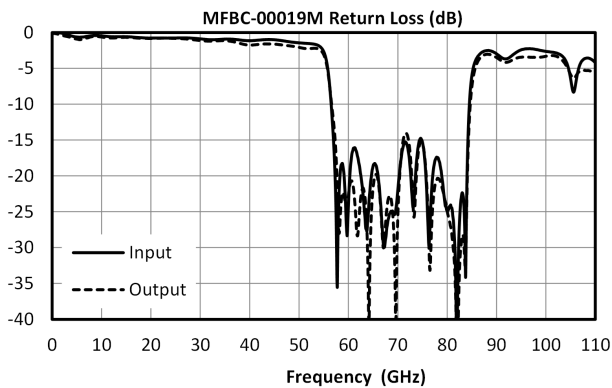
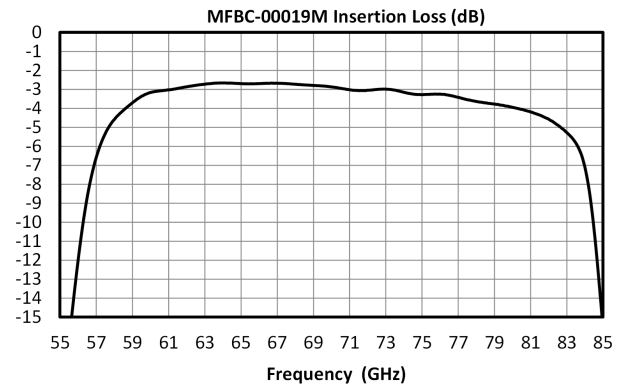
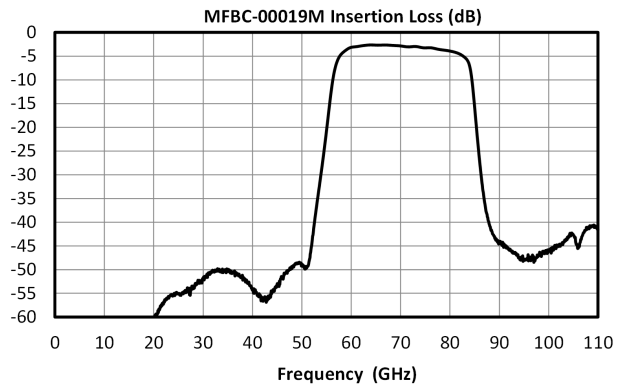
Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
1dBc Passband Low Frequency	-	-	-	-	58.3	-	GHz
1dBc Passband High Frequency	-	-	-	-	77.7	-	GHz
3dBc Passband Low Frequency	-	-	-	-	56.9	-	GHz
3dBc Passband High Frequency	-	-	-	-	83.5	-	GHz
Passband Return Loss	-	58.3	77.7	-	3	-	dB
Group Delay	-	-	-	-	225	-	ps
Impedance	-	-	-	-	50	-	Ω
Center Frequency, f_c	-	-	-	-	70	-	GHz
Stopband Suppression, Low Band	-	0	52	30	58	-	dB
Insertion Loss @ F_c	-	70	70	-	2.85	-	dB
Stopband Suppression, High Band	-	89	110	30	42	-	dB

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Typical Performance Plots



Application Information

The bond wire (BW) specifications for this section refer to bond wires used in the M package filters.

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Application Circuit

Filter Name	Number of Bondwires	Bondwire Length (um)	Bondwire Diameter (mil)	Bondwire Inductance (pH)
MFBC-00019M	3	250	1	30
MFBC-00020M	3	250	1	30

Die Mounting Recommendations

Mounting and Bonding Recommendations

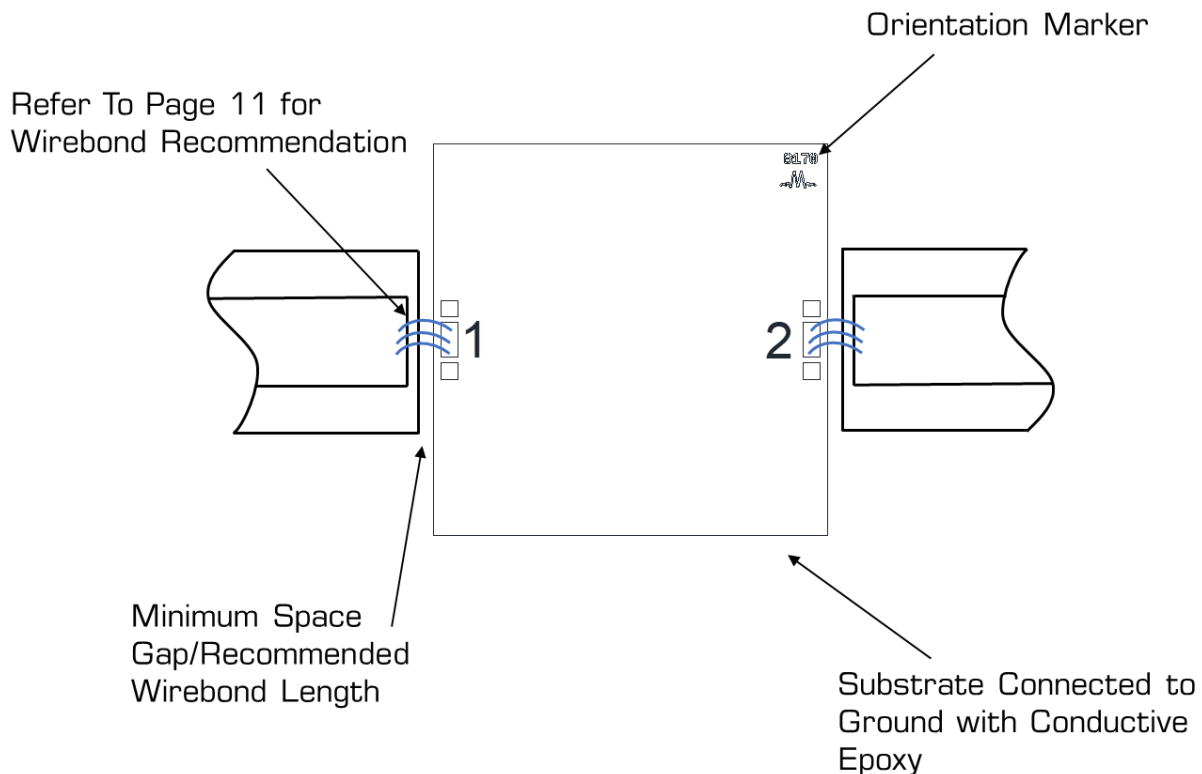
Marki MMICs should be attached directly to a ground plane with conductive epoxy. The ground plane electrical impedance should be as low as practically possible. This will prevent resonances and permit the best possible electrical performance. Datasheet performance is only guaranteed in an environment with a low electrical impedance ground.

Mounting - To epoxy the chip, apply a minimum amount of conductive epoxy to the mounting surface so that a thin epoxy fillet is observed around the perimeter of the chip. Cure epoxy according to manufacturer instructions.

Wire Bonding - Ball or wedge bond with 0.025 mm (1 mil) diameter pure gold wire. Thermosonic wirebonding with a nominal stage temperature of 150 °C and a ball bonding force of 40 to 50 grams or wedge bonding force of 18 to 22 grams is recommended. Use the minimum level of ultrasonic energy to achieve reliable wirebonds. Wirebonds should be started on the chip and terminated on the package or substrate. Bond wire inductance will improve return loss. Bondwire inductance in the range of 30pH to 200pH will improve performance.

Circuit Considerations – 50 Ω transmission lines should be used for all high frequency connections in and out of the chip. Wirebonds should be kept as short as possible, with multiple wirebonds recommended for higher frequency connections to reduce parasitic inductance. Refer to table on page 11 for wirebond recommendation. In circumstances where the chip is more than .001" thinner than the substrate, a heat spreading spacer tab is optional to further reduce bondwire length and parasitic inductance.

Bonding Diagram

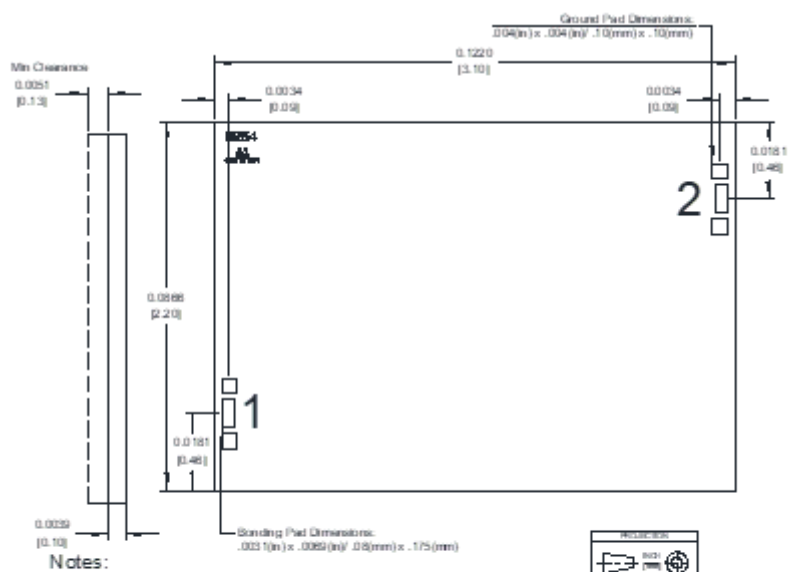


Handling Precautions

General Handling

Chips should be handled with care using tweezers or a vacuum collet. Users should take precautions to protect chips from direct human contact that can deposit contaminants, like perspiration and skin oils on any of the chip's surfaces.

Outline Drawing



1. CH substrate is .004 Thick GaAs.
2. I/O trace is 5 microns Au. Ground is 4 microns Au.
3. Tolerance for X, Y dimensions is ± 0.002 in.
Tolerance for Z dimension is ± 0.0005 in.
Tolerance for pad location is ± 0.0001 in.

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