



LTCC SURFACE MOUNT

# Band Pass Filter

## BFHKI-2162+

50Ω 19.4 to 23.8 GHz

### THE BIG DEAL

- LTCC Band Pass Filter with Integrated Interposer Board
- Ultra-High Stopband Rejection, Typ. 49 dB
- Small Size, 4.95x3.65 mm
- Rugged Ceramic Construction
- Protected by US Patents 11,638,370 and 11,744,057

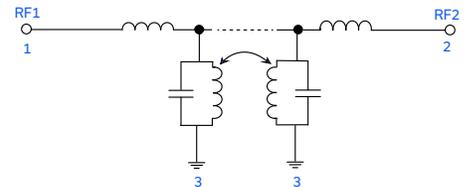


Generic photo used for illustration purposes only

### APPLICATIONS

- Test & Measurement Equipment
- Satellite Communications
- Aerospace and Defense Signal Conditioning

### FUNCTIONAL DIAGRAM



### PRODUCT OVERVIEW

BFHKI-2162+ is a miniature low temperature co-fired ceramic (LTCC) ultra-high stopband rejection band pass filter with a 19.4 to 23.8 GHz passband supporting a variety of applications. This model achieves a stopband rejection of 72 dB up to 10.3 GHz and 49 dB up to 40 GHz. Housed in a small 4.95 by 3.65 mm ceramic form factor, the filter is ideal for dense signal chain PCB layouts where it complements MMIC size and performance. The BFHKI family with integrated interposer board enables installation onto PCB layouts with automated manufacturing equipment. This model provides 2.8 dB typical insertion loss over a wide band due to its rugged monolithic construction. The LTCC fabrication process assures minimal RF performance variation while delivering a product that is well suited for environmental extremes of high humidity and temperature. This model handles up to 1 W RF input power and has a wide operating temperature range of -55°C to +125°C.

### ELECTRICAL SPECIFICATIONS<sup>1,2,3</sup> AT +25°C, Z<sub>0</sub> = 50Ω

Parameter	F#	Frequency (GHz)	Min.	Typ.	Max.	Units
Passband	Center Frequency <sup>4</sup>	-	-	21.6	-	GHz
	Insertion Loss	F5-F6	19.4-23.8	2.8	4.5	dB
	Return Loss	F5-F6	19.4-23.8	-	8.5	dB
Stopband, Lower	Insertion Loss	DC-F1	0.1-5.5	64	74	dB
		F1-F2	5.5-10.3	64	72	
		F2-F3	10.3-12.7	52	62	
		F3-F4	12.7-15	41	51	
Stopband, Upper	Insertion Loss	F7-F8	29.1-30.9	40	49	dB
		F8-F9	30.9-34	46	56	
		F9-F10	34-36.3	54	64	
		F10-F11	36.3-40	49	59	

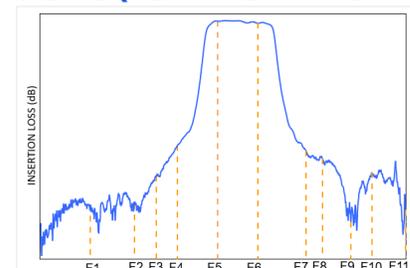
1. Tested on Evaluation Board P/N TB-BFHKI-2162C+ with the connector and feedline effects de-embedded using the 2X Thru IEEE P370 method.
2. Bi-directional, RF1 and RF2 ports can be interchanged.
3. In applications where DC voltage and/or current is present at either the input or output ports, external DC blocking capacitors are required.
4. Typical variation ±3%.

### ABSOLUTE MAXIMUM RATINGS<sup>5</sup>

Operating Temperature	-55 °C to +125 °C
Storage Temperature	-55 °C to +125 °C
Input Power <sup>6</sup>	1 W

5. Permanent damage may occur if any of these limits are exceeded.
6. Power rating applies only to signals within the passband. Power rating above +25°C operating temperature decreases linearly to 0.5 W at +125°C.

### TYPICAL FREQUENCY RESPONSE AT +25°C





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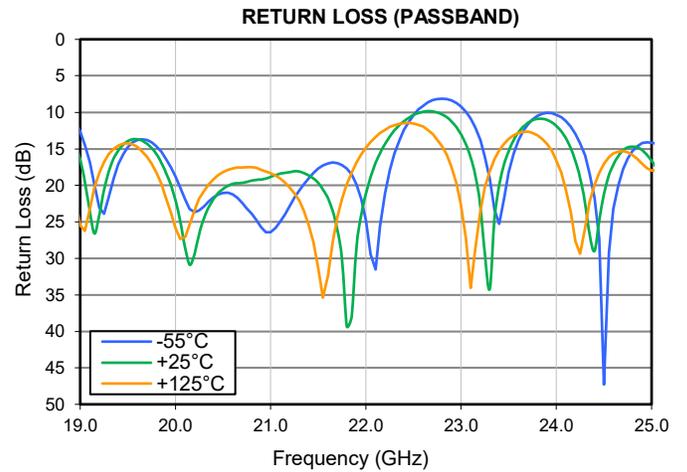
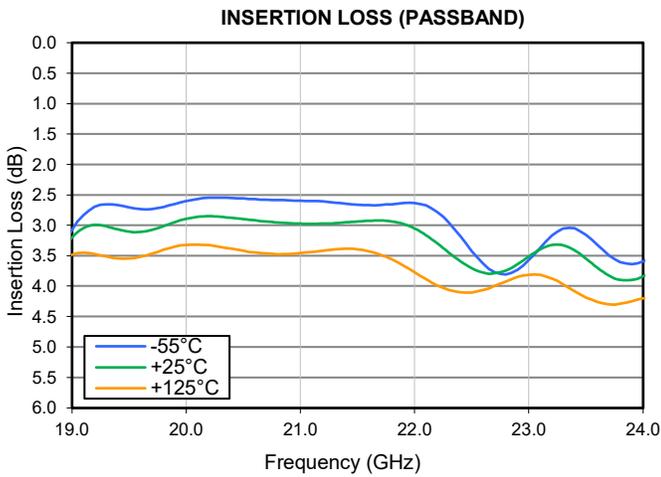
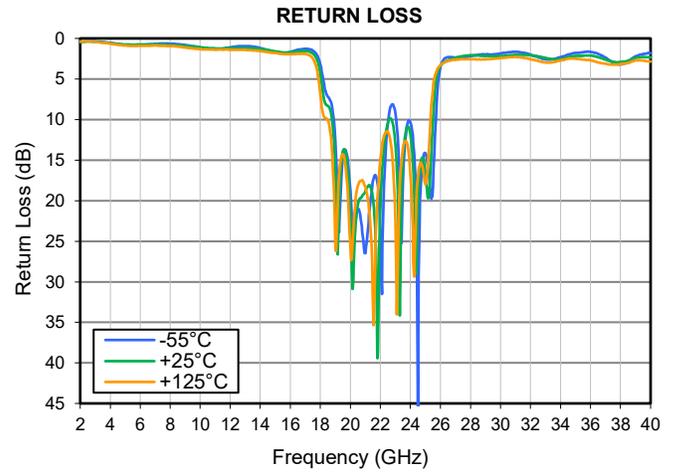
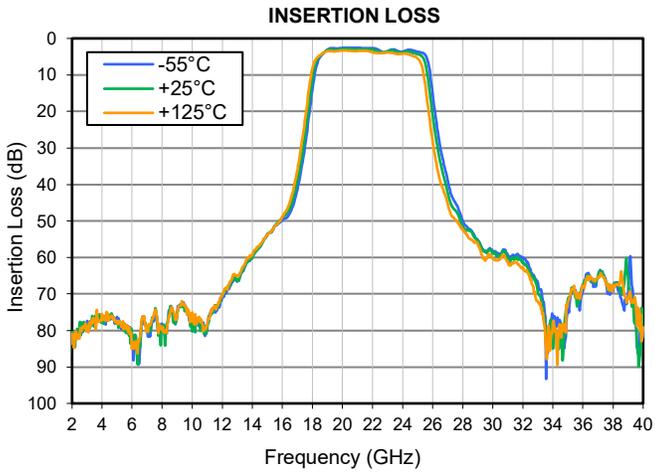
# Band Pass Filter

## BFHKI-2162+

Mini-Circuits

50Ω 19.4 to 23.8 GHz

### TYPICAL PERFORMANCE GRAPHS





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## FUNCTIONAL DIAGRAM

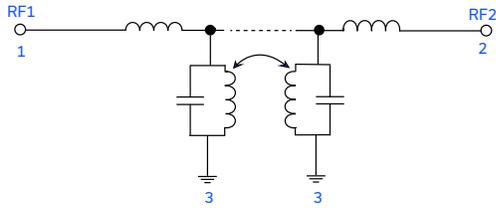
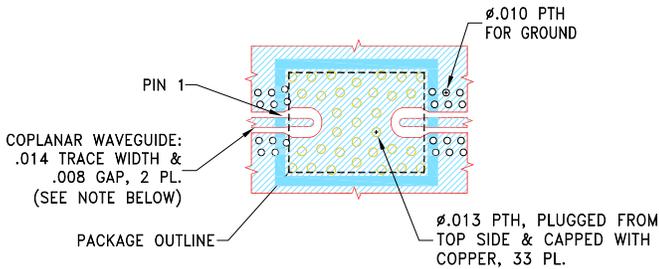


Figure 1. BFHKI-2162+ Functional Diagram

## PAD DESCRIPTION

Function	Pad Number	Description
RF1 <sup>2</sup>	1	Connects to RF Input Port
RF2 <sup>2</sup>	2	Connects to RF Output Port
GROUND	3	Connects to Ground on PCB, (See drawing PL-767)

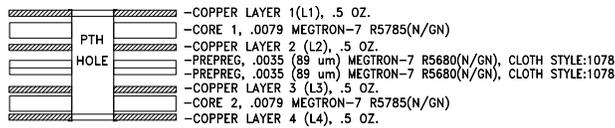
## SUGGESTED PCB LAYOUT (PL-767)



- NOTES:
- PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
  - TRACE WIDTH & GAP ARE SHOWN FOR .0079 MEGTRON-7 R5785(N/GN), COPPER: 1/2 OZ. EACH LAYER. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
  - LAYERS L2, L3 & L4 OF PCB ARE CONTINUOUS GROUND PLANES.

- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

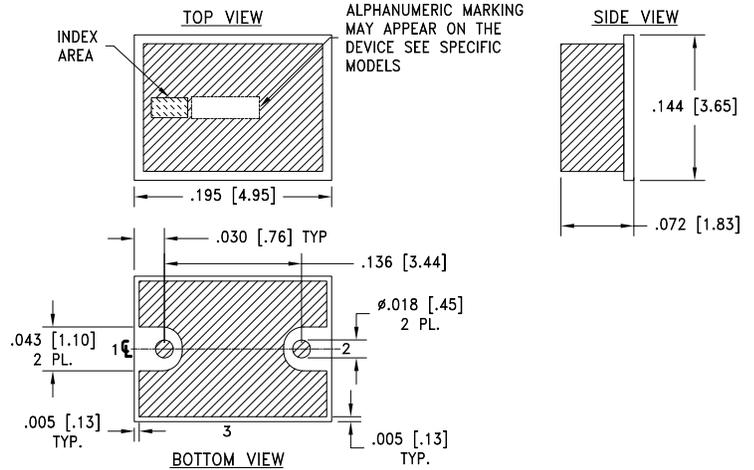
### STACK-UP DIAGRAM



- TOTAL FINISHED THICKNESS 0.026 ± 10%.
- PTH PRESENT FROM COPPER LAYER 1 TO COPPER LAYER 4.

Figure 2. Suggested PCB Layout

## CASE STYLE DRAWING



METALLIZATION

Weight: .135 grams.

Dimensions are in inches [mm]. Tolerances: 2 Pl. ±.01; 3 Pl. ±.005

## PRODUCT MARKING\*: F560

\*Marking may contain other features or characters for internal lot control.



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ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD

[CLICK HERE](#)

Performance Data & Graphs	Data Graphs S-Parameter (S2P Files) Data Set (.zip file) De-embedded to device pads
Case Style	NM3237 Finish: Gold over Nickel Plating
RoHS/REACH Status	Compliant
Tape and Reel	TR-F77
Suggested Layout for PCB Design	PL-767
Evaluation Board	TB-BFHKI-2162C+ Gerber File
Environmental Rating	ENV06T12

#### NOTES

- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' applicable established test performance criteria and measurement instructions.
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