



LTCC SURFACE MOUNT

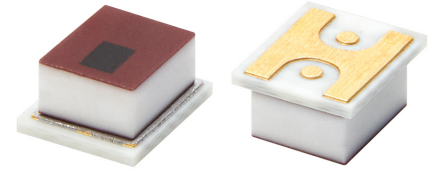
# High Pass Filter

## HFHKI-4000+

50Ω 4.6 to 15 GHz

### THE BIG DEAL

- Low Insertion Loss, Typ. 1.1 dB
- Passband Return Loss, Typ. 17 dB
- Stopband Rejection, Typ. 67 dB
- 1210 Surface Mount Footprint
- Power Handling: 6 W
- Integrated CPWG interposer for easy SMT integration
- Protected by US patents 11,638,370 and 11,744,057

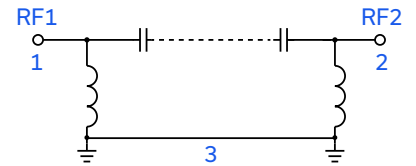


Generic photo used for illustration purposes only

### APPLICATIONS

- 5G/Wi-Fi RF Front Ends
- Radar, EW, ECM Defense Systems
- Test and Measurement Equipment
- Microwave Communication Links

### FUNCTIONAL DIAGRAM



### PRODUCT OVERVIEW

Mini-Circuits' HFHKI-4000+ is a 4.6 to 15 GHz high pass filter with an integrated interposer to support CPWG interface compatibility. The extended upper-frequency range makes it well suited for C-band through Ku-band applications requiring wide instantaneous bandwidth and reliable suppression of lower-frequency signals. The small 1210 form factor makes this filter ideal for dense signal chain PCB layouts where it complements MMIC size and performance. The LTCC fabrication process ensures minimal RF performance variation while delivering a product that is well suited for environmental extremes of high humidity and temperature.

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

Parameter		F#	Frequency (GHz)	Min.	Typ.	Max.	Units
Passband	Insertion Loss	F4-F5	4.6-6.3	—	2	—	dB
		F5-F6	6.3-13.5	—	1.1	1.7	
		F6-F7	13.5-15	—	1.6	2.6	
Passband	Return Loss	F4-F5	4.6-6.3	—	10	—	dB
		F5-F6	6.3-13.5	—	13	—	
		F6-F7	13.5-15	12	17	—	
Stopband	Rejection	DC-F1	DC-1.35	57	67	—	dB
		F1-F2	1.35-2.4	40	48	—	
		F2-F3	2.4-3.25	20	27	—	
	Freq. Cut-Off <sup>4</sup>	Fc	4	—	3	—	dB

1. Tested in Evaluation Board P/N TB-HFHKI-4000C+.

2. This filter is bi-directional RF1 and RF2 ports may be interchanged, see S-Parameters for actual performance.

3. This component should not be used as a DC-block. 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 ± 5%

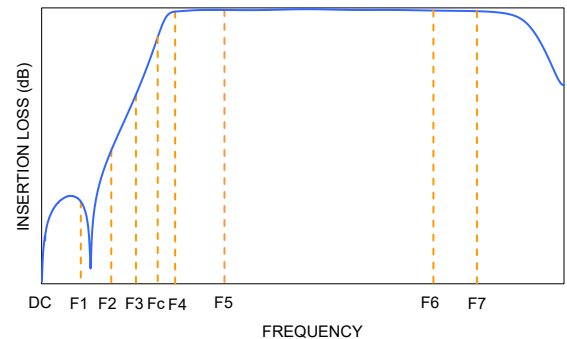
### ABSOLUTE MAXIMUM RATINGS<sup>5</sup>

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

### TYPICAL FREQUENCY RESPONSE





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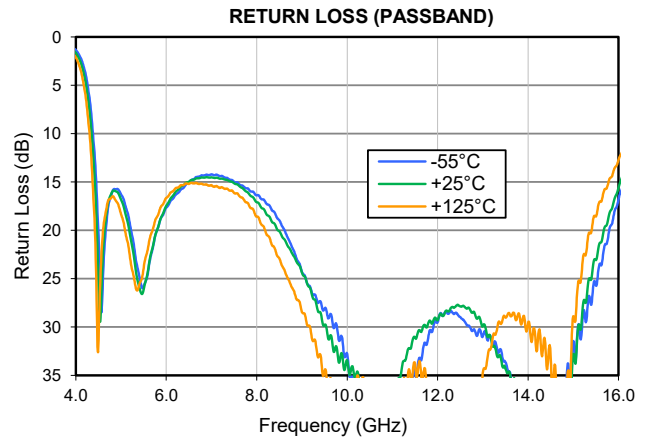
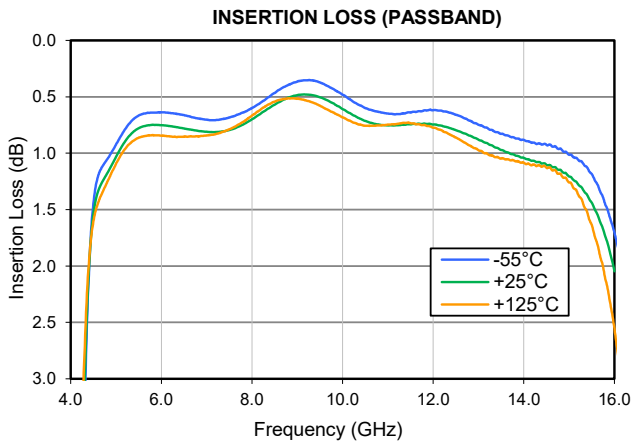
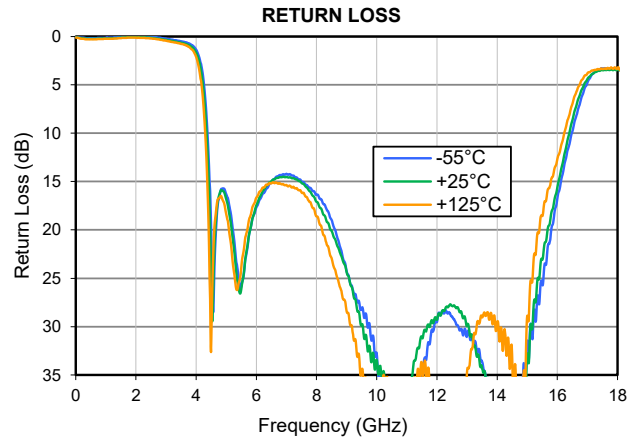
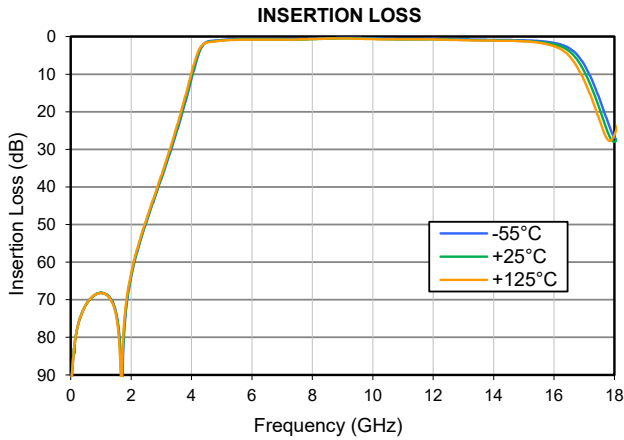
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## HFHKI-4000+

Mini-Circuits

50Ω 4.6 to 15 GHz

### TYPICAL PERFORMANCE GRAPHS





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### FUNCTIONAL DIAGRAM

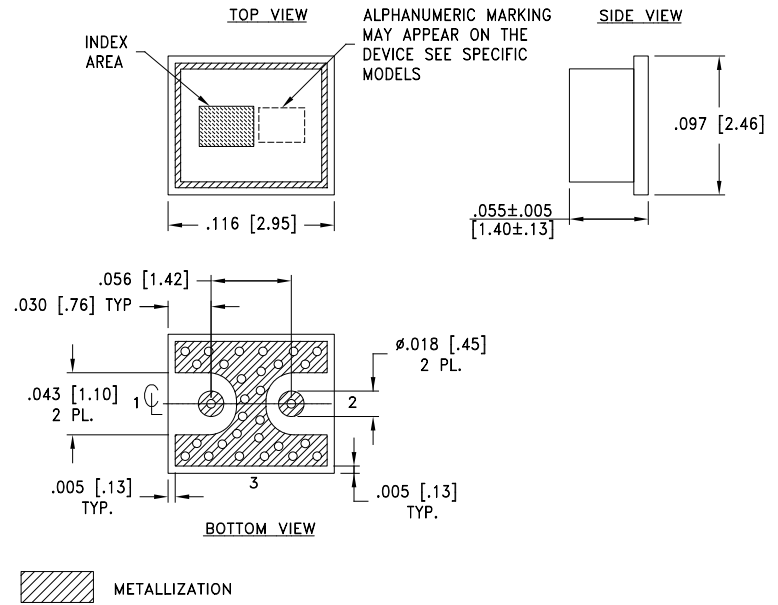


Figure 1. HFHKI-4000+ Functional Diagram

### PAD DESCRIPTION

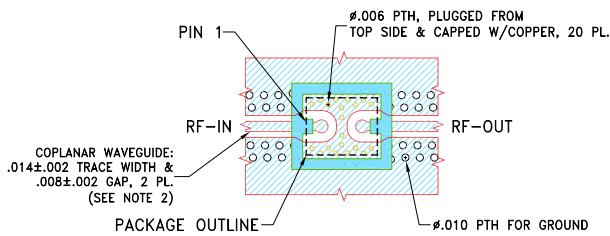
Function	Pad Number	Description
RF1	1	Connects to RF Input Port
RF2	2	Connects to RF Output Port
GROUND	3	Connects to Ground on PCB, (See drawing PL-837)

### CASE STYLE DRAWING

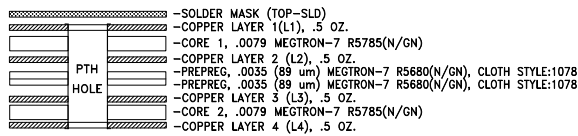


Weight: .021 grams  
Dimensions are in inches [mm]. Tolerances: 2 Pl. ±.01; 3 Pl. ±.005 Inches

### SUGGESTED PCB LAYOUT (PL-837)



#### STACK-UP DIAGRAM



- TOTAL FINISHED THICKNESS 0.026±.004.
- PTH PRESENT FROM COPPER LAYER 1 TO COPPER LAYER 4.
- INDICATED ON TOP VIEW PTH'S ARE PLUGGED WITH EPOXY AND CAPPED WITH COPPER FROM TOP SIDE.
- L2, L3, AND L4 ARE CONTINUOUS GROUND PLANES.

#### NOTES:

- PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
- TRACE WIDTH & GAP ARE SHOWN FOR MEGTRON-7 R5785(N/GN) WITH DIELECTRIC THICKNESS .0079". COPPER: .5 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.

Figure 2. Suggested PCB Layout

### PRODUCT MARKING\*: U1

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



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Mini-Circuits

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	NM3723-1 Lead Finish: Gold Plate over Nickel Plate
RoHS/REACH Status	Compliant
Tape and Reel	F66-3
Suggested Layout for PCB Design	PL-837
Evaluation Board	TB-HFHKI-4000C+ Gerber File
Environmental Rating	ENV06T10

### 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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