

# Surface Mount Thin-Film Filters

50Ω DC to 40 GHz

## The Big Deal

- Low passband insertion loss
- High rejection
- Good power handling
- Temperature stability -55°C to 125°C
- High repeatability
- RoHS complaint
- Small size



## Product Overview

Mini-Circuits' *Surface Mount Thin-Film filters* offer low insertion loss and high rejection realized via Thin-Film on Alumina substrate, using a sputtering process that can guarantee a enhanced Q and repeatable performance.

Low pass, high pass and bandpass surface mount thin-film designs can be realized with this technology. Using thin-film manufacturing, we can guarantee repeatability on large batches of filters. Thin-film filters are small in size with high-quality, precise machining for applications where size is critical.

## Key Features

Feature	Advantages
Low insertion loss	High Q material and sputtering process results in lower insertion loss, better SNR is obtained.
Fast roll-off (steeper skirts)	High selectivity results in better adjacent channel rejection and dynamic range
Wider stopband	Wide spur-free stopband results in better adjacent channel rejection and dynamic range
Temperature stability	Very minimal change in electrical performance across temperature makes these filters suitable for a wide range of operating conditions.
Small Size	Various design techniques are employed to realize small size.

### 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-Circuit's applicable established test performance criteria and measurement instructions.  
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)



# Bandpass Filter

50Ω 14200 to 17400 MHz

## ABF-15R75G+



Generic photo used for illustration purposes only  
CASE STYLE: UC2731

### Features

- Low passband insertion loss of 1.5 dB typical
- 20dB rejection up to 35000 MHz
- 50dB typical rejection on lower Stopband frequency
- Good Return loss of 10dB typical in the Passband

### Applications

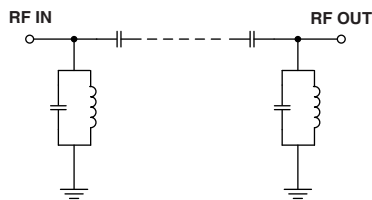
- Receivers
- Satellite

### Electrical Specifications<sup>(1)</sup> at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss	—	—	—	15750	—	MHz
	Return Loss	F1-F2	14200 - 17400	—	1.5	3.0	dB
Stop Band, Lower	Insertion Loss	F1-F2	14200 - 17400	—	10	—	dB
	Return Loss	DC-F3	DC - 7000	40	50	—	dB
Stop Band, Upper	Insertion Loss	F3-F4	7000 - 11200	20	30	—	dB
	Return Loss	F5-F6	20500 - 35000	—	20	—	dB

1. Measured on Mini-Circuits Characterization Test Board TB-ABF-15R75G+

### Functional Schematic



### Maximum Ratings

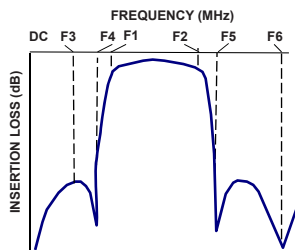
Operating Temperature	-55°C to 125°C
Storage Temperature	-55°C to 125°C
RF Power Input	1W Max. @ 25°C

Permanent damage may occur if any of these limits are exceeded.

### Typical Performance Data at 25°C

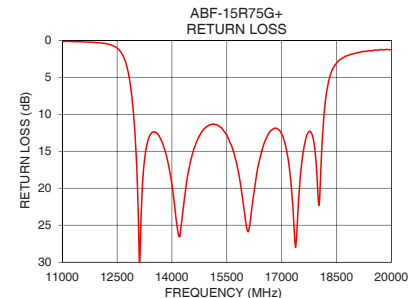
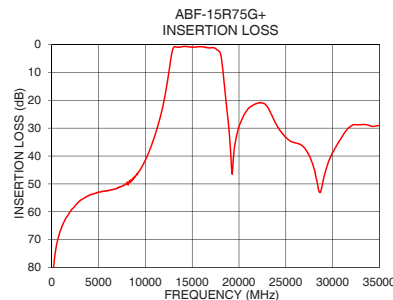
Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
10	105.30	0.05
3000	56.09	0.18
7000	51.59	0.04
10000	41.41	0.02
11200	30.68	0.17
12000	20.03	0.34
12830	3.03	5.01
14200	0.67	26.56
15000	0.94	11.53
15750	0.78	16.28
16500	1.05	14.25
17400	1.24	27.13
17990	3.00	20.60
18610	20.15	2.57
18920	30.04	1.87
20500	25.52	1.43
25000	33.33	0.28
30000	38.75	0.32
33000	28.77	0.66
35000	28.98	1.14

### Typical Frequency Response



### +RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications



### Notes

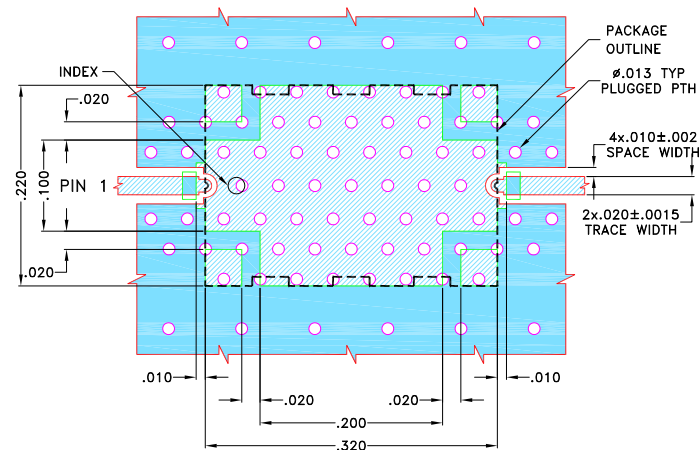
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.  
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.  
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)



## Pad Connections

RF IN	1
RF OUT	2
GROUND	3

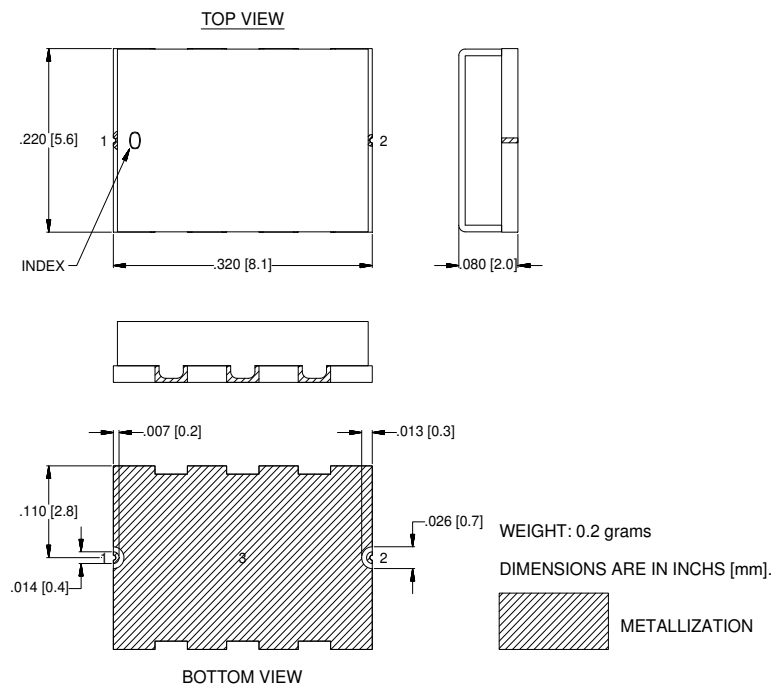
**Demo Board MCL P/N: TB-ABF-15R75G+**  
**Suggested PCB Layout (PL-652)**



### NOTES:

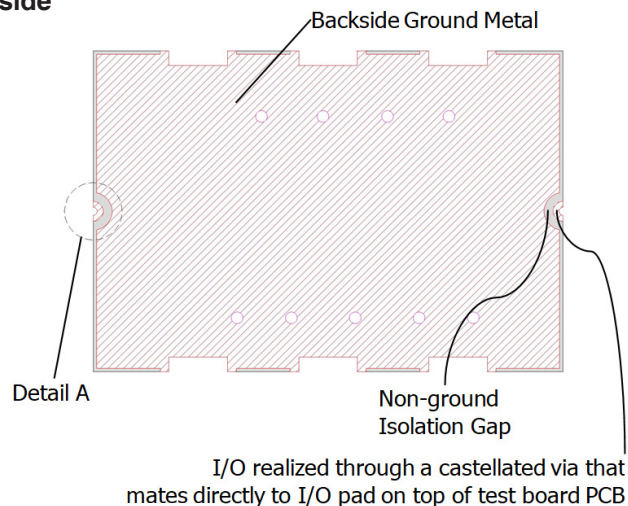
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS .010±.0010. COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
  - DENOTES PCB COPPER PATTERN WITH SMOBC (SOLDER MASK OVER BARE COPPER)
  - DENOTES PCB COPPER PATTERN FREE OF SOLDERMASK

## Outline Drawing



## Recommendations of PCB pattern at customer board

### Filter Back side

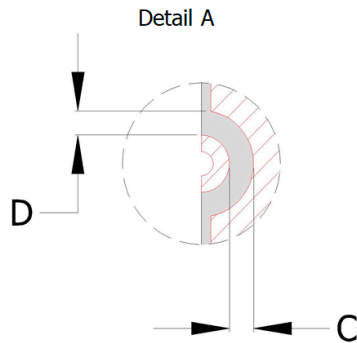


### Notes

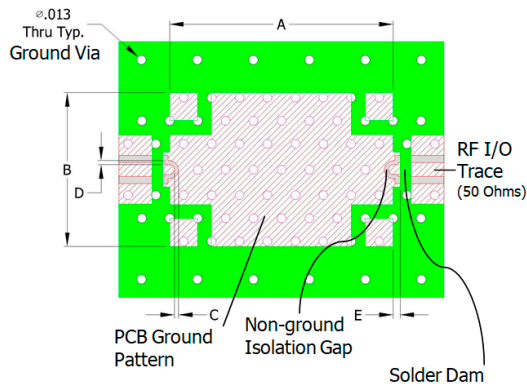
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)

# Bandpass Filter

Filter RF I/O Detail  
(Filter Back Side)



PCB Pattern Recommendations

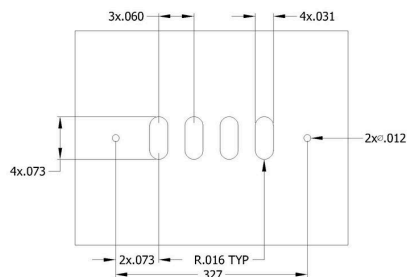


- 1) Customer PCB's ground pattern length (dimension A) can be similar to filter length.
- 2) Customer PCB's ground pattern width (dimension B) can be similar filter width.
- 3) Dimensions C and D on Filter RF I/O detail and Customer PCB pattern can be closely match. The dimensions of C and D on the Customer PCB pattern can be slightly larger to account for component alignment tolerance (ground metal can be pulled back from RF I/O trace).
- 4) Recommend to use Solder mask at Customer PCB at outer area of filter pattern/ footprint without any clearance.
- 5) Recommended to use Solder mask at I/O of Customer PCB with 5mil clearance from filter I/O edge (dimension E).

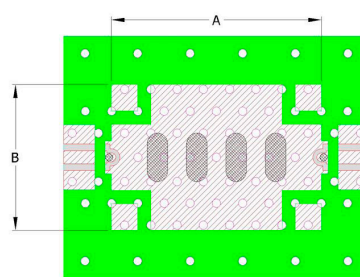
## Comments on component handling and solder attach

- 1) Avoid using soldering iron directly to the ceramic filter. This would lead to development of crack in the component due to thermal shock.
- 2) Vacuum pick-up tool or plastic tweezers are recommended for handling the components. Extra care should be taken not to scratch the filter or metal area.
- 3) Use 2-3 mil thickness stencil plate and screen print the solder. Refer below picture for recommended stencil pattern to get the best solder attachment.

Stencil opening drawing



Solder location after screen print



- 4) Plugged ground vias in the PWB will improve attachment consistency.
- 5) Recommended to have a similar or closer test board material and thickness (refer Mini-Circuits evaluation board for details) to minimize the CTE over the temperature range.

### 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-Circuit's applicable established test performance criteria and measurement instructions.  
C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)

