

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 an 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



Surface mount Thin Film 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

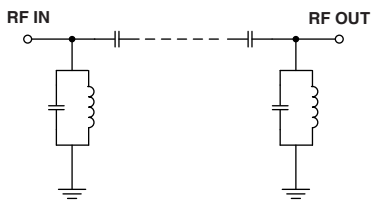
- Receivers
- Satellite

Electrical Specifications⁽¹⁾ at 25°C

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

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

Functional Schematic



Maximum Ratings

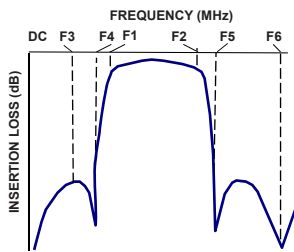
| | |
|-----------------------|----------------|
| Operating Temperature | -55°C to 125°C |
| Storage Temperature | -55°C to 125°C |
| RF Power Input | 1W Max. @ 25°C |

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

Typical Performance Data at 25°C

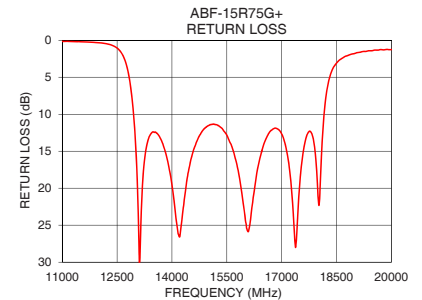
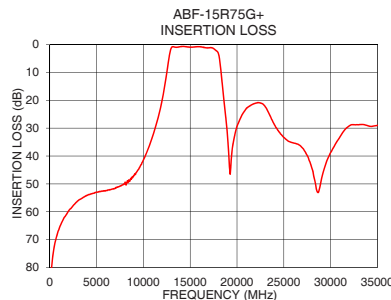
| Frequency (MHz) | Insertion Loss (dB) | Return Loss (dB) |
|-----------------|---------------------|------------------|
| 10 | 105.30 | 0.05 |
| 3000 | 56.09 | 0.18 |
| 7000 | 51.59 | 0.04 |
| 10000 | 41.41 | 0.02 |
| 11200 | 30.68 | 0.17 |
| 12000 | 20.03 | 0.34 |
| 12830 | 3.03 | 5.01 |
| 14200 | 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

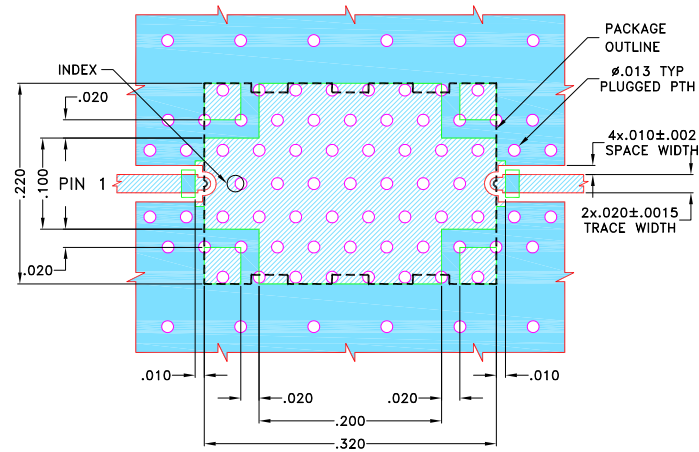
- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's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



Pad Connections

| | |
|--------|---|
| RF IN | 1 |
| RF OUT | 2 |
| GROUND | 3 |

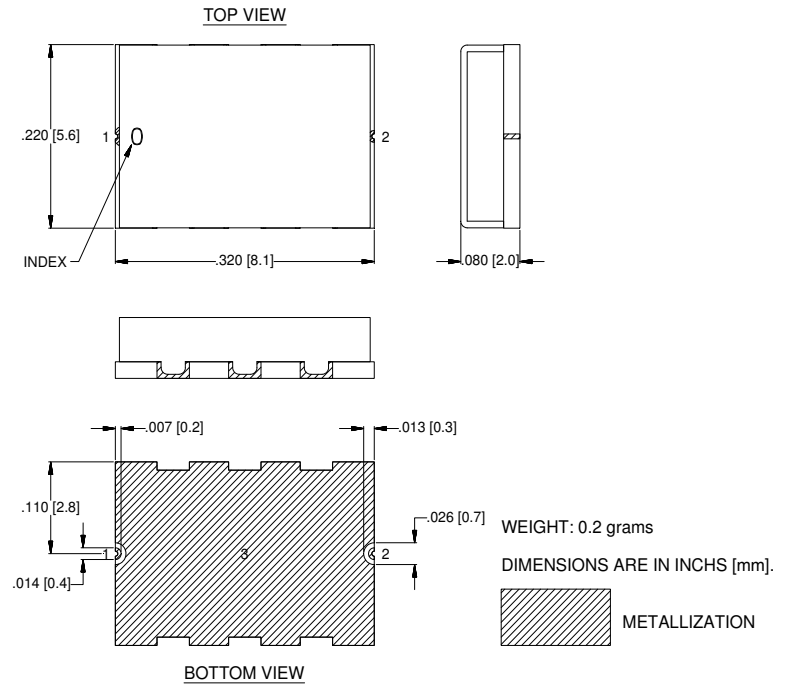
Demo Board MCL P/N: TB-ABF-15R75G+
Suggested PCB Layout (PL-652)



NOTES:

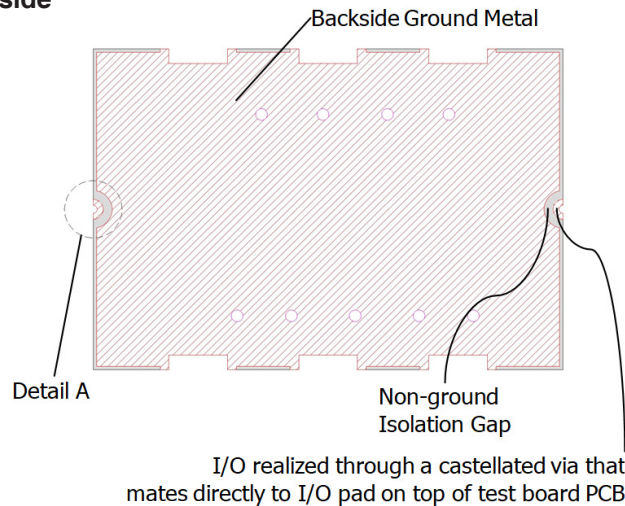
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS .010 ± .0010. COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
 - DENOTES PCB COPPER PATTERN WITH SMOBC (SOLDER MASK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

Outline Drawing



Recommendations of PCB pattern at customer board

Filter Back side

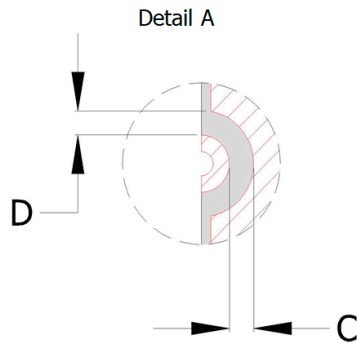


Notes

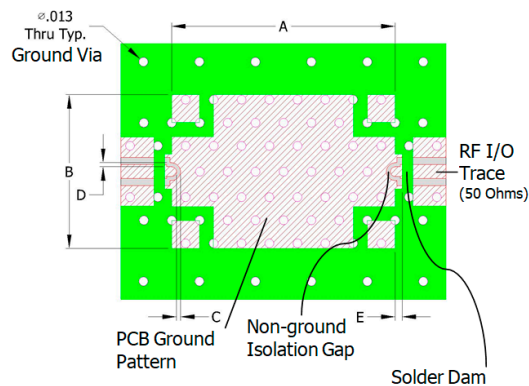
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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

Bandpass Filter

Filter RF I/O Detail
(Filter Back Side)



PCB Pattern Recommendations

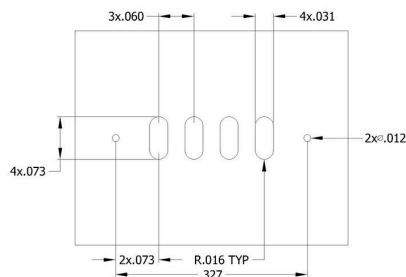


- 1) Customer PCB's ground pattern length (dimension A) can be similar to filter length.
- 2) Customer PCB's ground pattern width (dimension B) can be similar filter width.
- 3) Dimensions C and D on Filter RF I/O detail and Customer PCB pattern can be closely match. The dimensions of C and D on the 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).

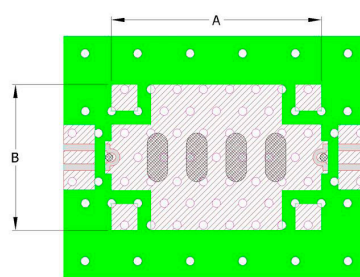
Comments on component handling and solder attach

- 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

