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.

Surface mount Thin Film

Bandpass Filter

50Ω 6750 to 7500 MHz

ABF-7G+

Generic photo used for illustration purposes only

CASE STYLE: UC2731

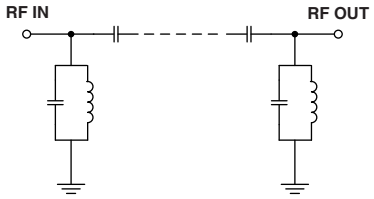
Features

- Low passband insertion loss of 1.3dB typical
- High rejection of 60dB typical
- Good Return loss of 15dB typical
- Small size

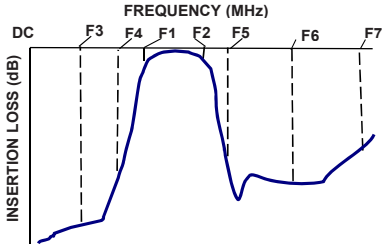
Applications

- 5G
- Wireless communication systems
- Satellite communication
- Military and Defense
- Test and measurement

Functional Schematic



Typical Frequency Response



Electrical Specifications[1] at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss	F1-F2	6750 - 7500	—	1.3	2.5	dB
	Return Loss	F1-F2	6750 - 7500	—	15	—	dB
Stop Band, Lower	Insertion Loss	DC-F3	DC - 5250	40	55	—	dB
		F3-F4	5250 - 5800	20	35	—	dB
Stop Band, Upper	Insertion Loss	F5-F6	8350 - 9000	20	45	—	dB
		F6-F7	9000 - 14000	40	50	—	dB

1. Measured on Mini-Circuits Characterization Test Board TB-ABF-7G+ with feedline losses removed by normalization of S12 and S21 traces to mesurement of TB thru-line.

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

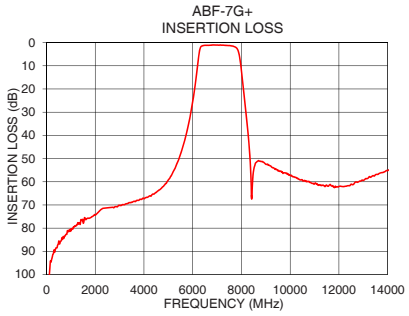
Permanent damage may occur if any of these limits are exceeded.

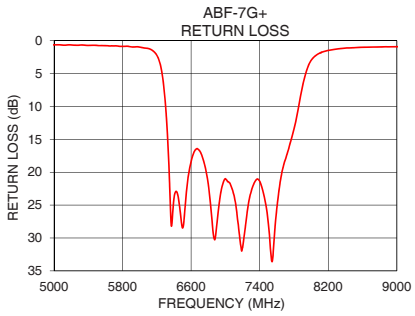
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
10	119.18	0.08
1010	81.13	0.34
3460	69.03	0.33
5250	54.70	0.69
5800	36.59	0.87
5920	30.43	0.96
6075	20.32	1.14
6290	3.12	8.12
6500	1.18	28.48
6750	1.12	18.48
7000	1.06	20.99
7250	1.10	26.55
7500	1.29	27.69
7850	3.15	10.32
8080	19.95	2.03
8180	29.75	1.54
8350	49.47	1.19
9000	52.47	0.92
12000	62.03	0.90
14000	55.20	1.04

+RoHS Compliant

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





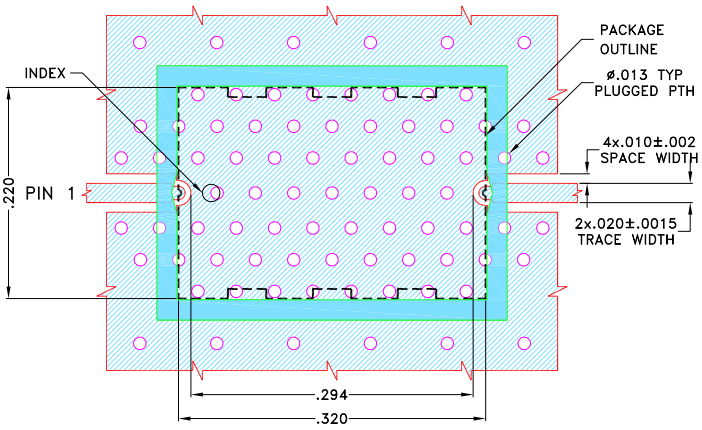
Notes

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

Pad Connections

RF IN	1
RF OUT	2
GROUND	3

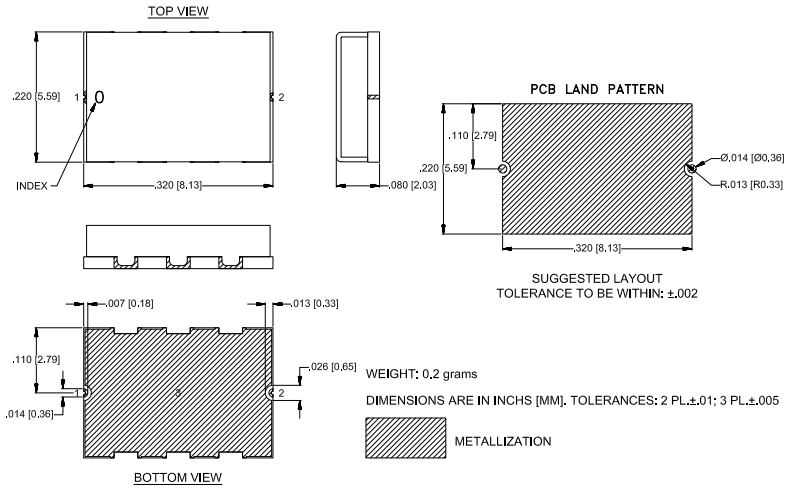
Demo Board MCL P/N: TB-ABF-7G+
Suggested PCB Layout (PL-652)



NOTES:
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4350B) 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.

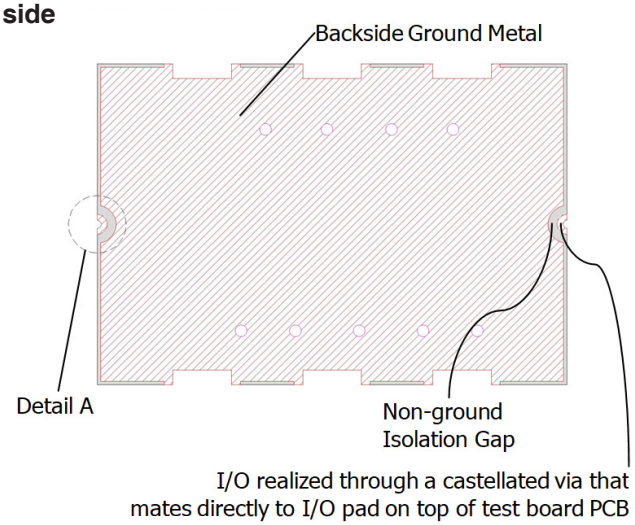
DENOTES PCB COPPER PATTERN WITH SMOBC (SOLDER MASK OVER BARE COPPER)
DENOTES PCB COPPER PATTERN FREE OF SOLDERMASK

Outline Drawing



Recommendations of PCB pattern at customer board

Filter Back side



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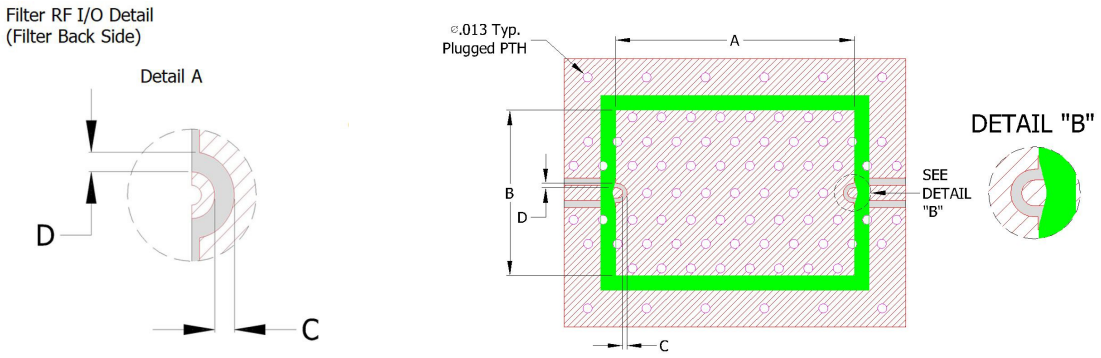
PCB Pattern Recommendations

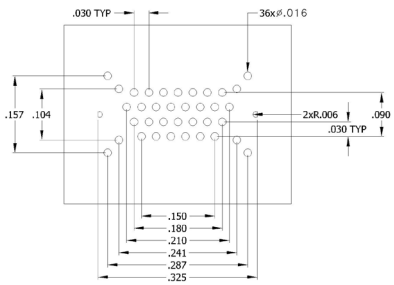


1) Customer PCB's ground pattern length (dimension A) can be similar to filter length.
2) Customer PCB's ground pattern width (dimension B) can be similar filter width.
3) Dimensions C and D on Filter RF I/O detail and Customer PCB pattern can be closely match. The dimensions of C and D on the Customer 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 with a clearance of about 1.25mil at each side. (Tighter registration tolerance required for solder mask)
5) Recommended to use Solder mask at I/O of Customer PCB as per above diagram (refer detail B).

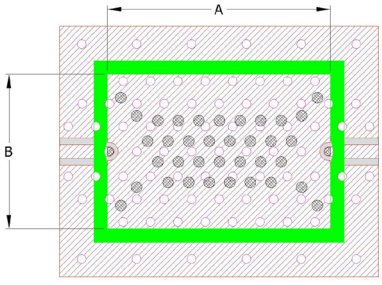
Comments on component handling and solder attach

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.