



THIN FILM SURFACE MOUNT

# Bandpass Filter

## ABF-7G+

Mini-Circuits

50Ω

6750 to 7500 MHz

### KEY FEATURES

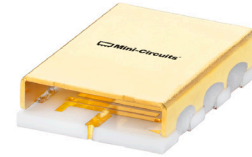
- Low passband Insertion Loss of 1.3 dB Typ.
- High Rejection of 60 dB Typ.
- Good Return Loss of 15 dB Typ.
- Small Size, 5.59 x 8.13 x 2.03 mm

### APPLICATIONS

- 5G
- Wireless Communication Systems
- Satellite Communication
- Military and Defense
- Test and Measurement

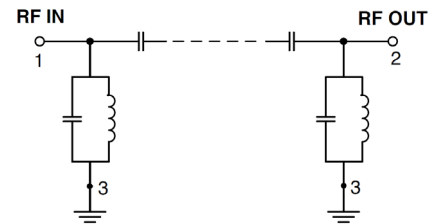
### PRODUCT OVERVIEW

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 up to 40 GHz in a small form factor helping customers achieve their SWaP objectives. Using our high quality thin-film manufacturing process we can guarantee repeatability on large batches of filters.



Generic photo used for illustration purposes only

### FUNCTIONAL DIAGRAM



### ELECTRICAL SPECIFICATIONS<sup>1,2,3</sup> AT +25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Pass Band	Center Frequency <sup>4</sup>	—	—	7125	—	MHz
Pass Band	Insertion Loss	F1-F2	—	1.3	2.5	dB
	Return Loss	F1-F2	—	15	—	dB
Stopband Lower	Rejection	DC-F3	40	55	—	dB
		F3-F4	20	35	—	dB
Stopband, Upper	Rejection	F5-F6	20	45	—	dB
		F6-F7	40	50	—	dB

1. Tested on Evaluation Board P/N TB-ABF-7G+ with feedline losses removed by normalization of S12 and S21 traces to measurement of TB thru-line.

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

3. This component is not intended for use as a DC-blocking circuit element. 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%.

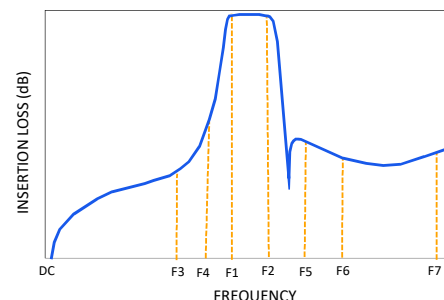
### ABSOLUTE MAXIMUM RATINGS<sup>5</sup>

Parameter	Ratings
Operating Temperature	-55°C to +125°C
Storage Temperature	-55°C to +125°C
Input Power <sup>6</sup>	1W Max. at 25°C

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

6. Power rating applies only to signals within the passband.

### TYPICAL FREQUENCY RESPONSE AT +25°C





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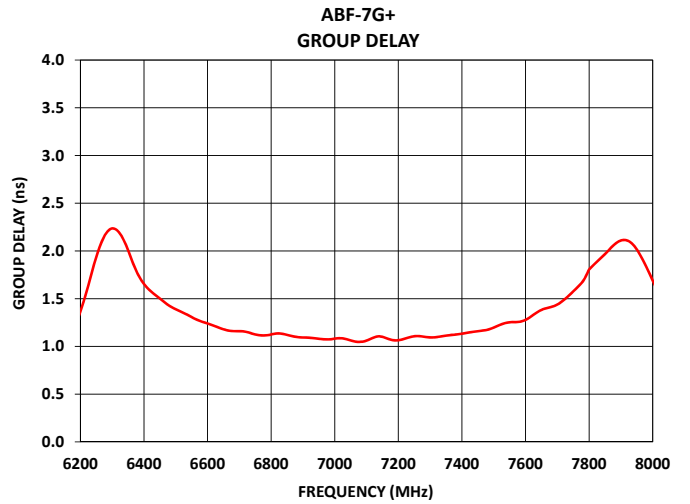
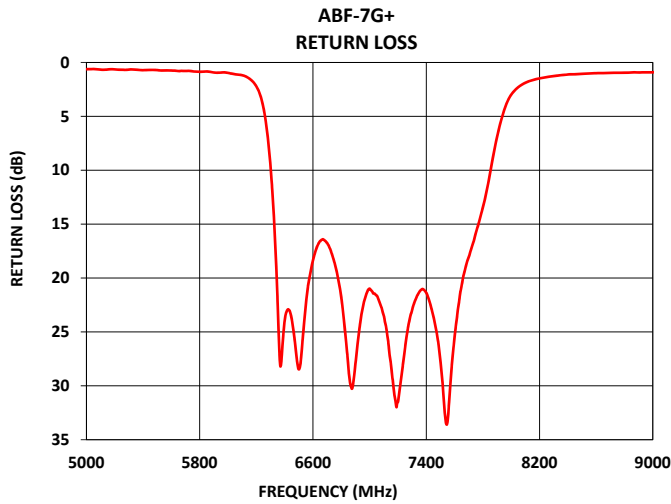
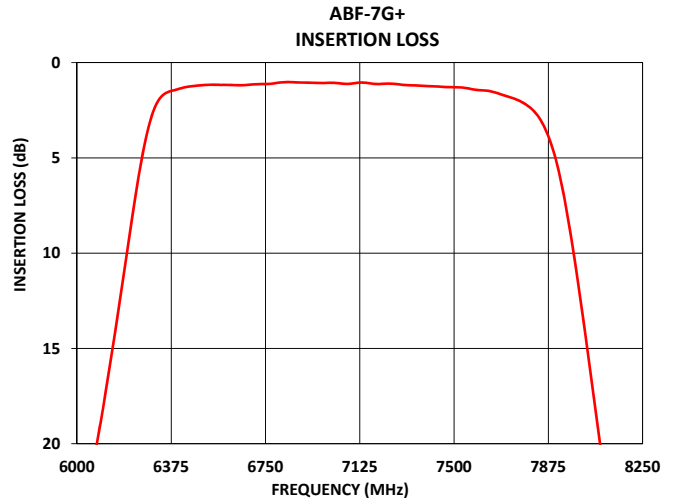
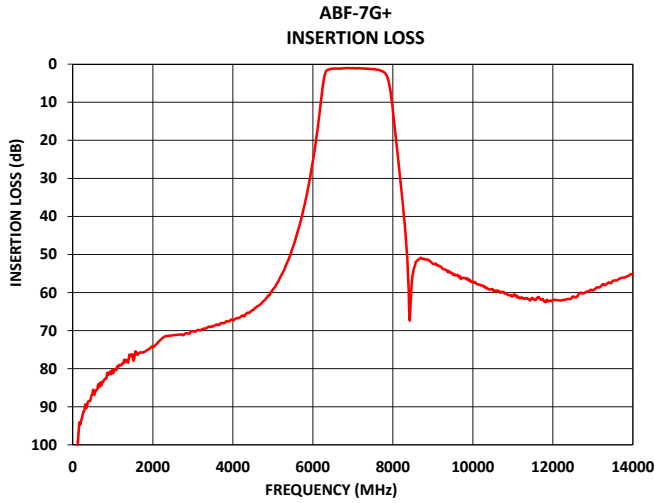
## ABF-7G+

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50Ω

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### TYPICAL PERFORMANCE GRAPHS AT +25°C





### FUNCTIONAL DIAGRAM

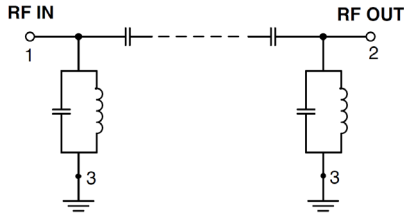
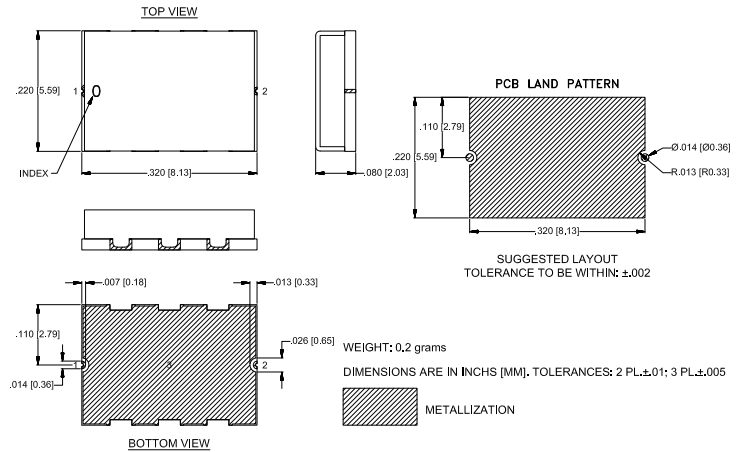


Figure 1. ABF-7G+ Functional Diagram

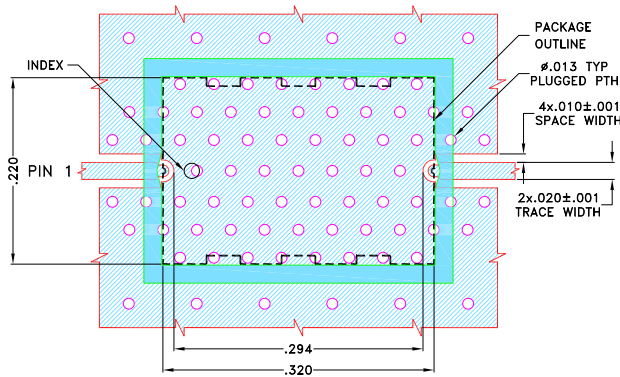
### PAD DESCRIPTION

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-652)
NC	—	No connection, not used internally. See drawing PL-652 for connection to PCB

### CASE STYLE DRAWING



### 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

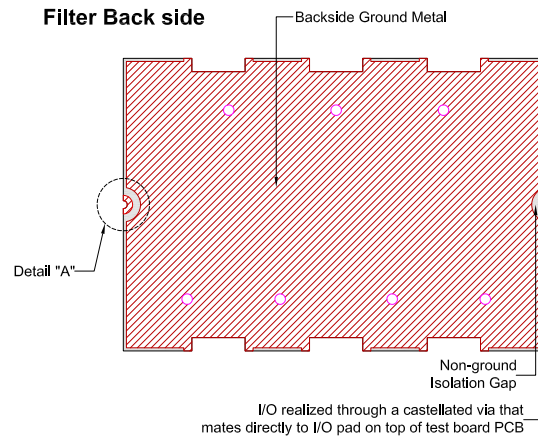
Figure 2. Suggested PCB Layout PL-652

### PRODUCT MARKING\*: ABF-7G

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

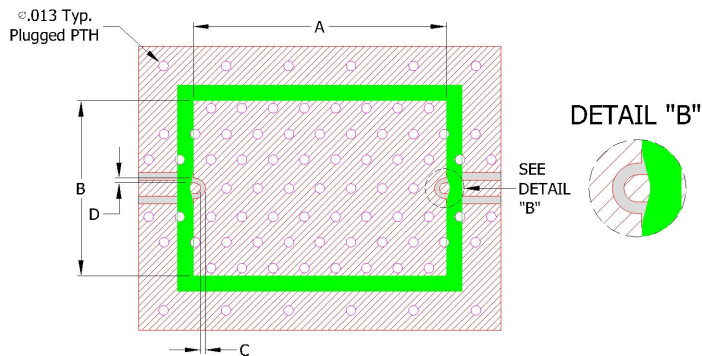
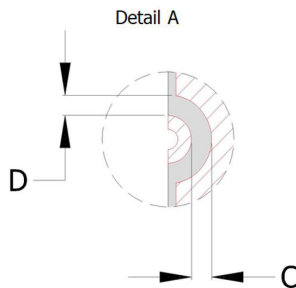


### RECOMMENDED PCB LAYOUT PATTERN FOR FILTER



### PCB Pattern Recommendations

Filter RF I/O Detail (Filter Back Side)



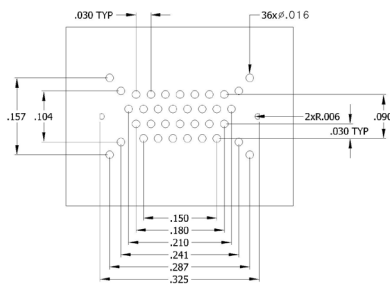
- 1) Customer PCB's ground pattern length (dimension A) can be similar to filter length.
- 2) Customer PCB's ground pattern width (dimension B) can be similar to filter width.
- 3) Dimensions C and D on Filter RF I/O detail and Customer PCB pattern can be closely match. The dimensions of C and D on the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



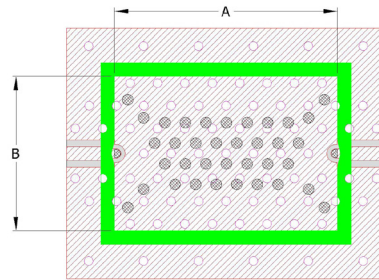
### COMMENTS ON COMPONENT HANDLING AND SOLDER ATTACH

- 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.



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ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD.

[CLICK HERE](#)

Performance Data and Graphs	Data
	Graphs
	S-Parameter (S2P Files) Data Set (.zip file) De-embedded to device pads
Case Style	UC2731    Lead Finish: Gold over Nickel Plate
RoHS Status	Compliant
Tape and Reel	TR-F003
Suggested Layout for PCB Design	PL-652
Evaluation Board	TB-ABF-7G+
	Gerber File
Environmental Rating	ENV120

### 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.
- 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/terms/viewterm.html](http://www.minicircuits.com/terms/viewterm.html)



# Thin-Film Bandpass Filter

# ABF-7G+

## Typical Performance Data

FREQ.	Insertion Loss	Input Return Loss	Output Return Loss
(MHz)	(dB)	(dB)	(dB)
10	119.18	0.08	0.09
60	102.34	0.11	0.11
110	101.24	0.06	0.07
360	89.33	0.23	0.22
610	85.38	0.29	0.28
810	82.63	0.34	0.32
1010	81.13	0.34	0.32
1260	78.57	0.35	0.33
1510	77.86	0.32	0.30
1760	75.72	0.37	0.35
2010	74.35	0.31	0.30
3010	70.21	0.26	0.23
3560	68.56	0.36	0.33
4010	67.32	0.39	0.36
4235	66.10	0.42	0.40
4260	66.01	0.43	0.40
4510	64.55	0.50	0.49
4760	62.26	0.58	0.58
5010	59.03	0.63	0.62
5250	54.70	0.69	0.66
5800	36.59	0.87	0.85
5920	30.43	0.96	0.93
6075	20.32	1.14	1.14
6195	10.33	2.11	2.10
6290	3.12	8.12	8.13
6500	1.18	28.48	47.37
6600	1.17	18.35	18.58
6700	1.15	16.75	16.84
6800	1.06	21.80	22.61
6900	1.05	27.94	30.32
7000	1.06	20.99	21.20
7100	1.08	23.49	24.05
7200	1.12	31.49	38.31
7300	1.17	22.99	22.87
7400	1.23	21.36	21.44
7500	1.29	27.69	29.27
7850	3.15	10.32	10.79
7980	10.39	3.44	3.33
8080	19.95	2.03	1.89
8180	29.75	1.54	1.44
8350	49.47	1.19	1.16
8500	55.07	1.07	1.06
8750	51.14	0.96	0.98
9000	52.47	0.92	0.97
9300	53.92	0.86	0.92
9600	55.39	0.85	0.92
9900	56.82	0.86	0.92
10200	58.13	0.85	0.90
10500	59.21	0.84	0.85
10800	60.24	0.83	0.83
11100	60.81	0.84	0.83
11400	61.74	0.85	0.84
11700	61.83	0.88	0.86
12000	62.03	0.90	0.88
12300	61.92	0.93	0.90
12600	61.12	0.96	0.94
12900	59.70	0.98	0.98
13200	58.39	1.00	1.00
13500	56.96	0.99	1.03
14000	55.20	1.04	1.06

FREQ.	Group Delay
(MHz)	(ns)
6500	1.39
6515	1.37
6530	1.34
6545	1.32
6560	1.29
6575	1.27
6590	1.25
6605	1.23
6620	1.22
6635	1.20
6650	1.18
6665	1.17
6680	1.16
6700	1.16
6715	1.16
6730	1.15
6745	1.13
6760	1.12
6775	1.11
6800	1.13
6815	1.13
6830	1.13
6845	1.13
6860	1.11
6875	1.10
6900	1.09
6915	1.09
6930	1.09
6945	1.08
6960	1.08
6975	1.07
7000	1.08
7015	1.09
7030	1.08
7045	1.07
7060	1.05
7075	1.05
7100	1.06
7115	1.08
7130	1.10
7145	1.10
7160	1.09
7175	1.07
7200	1.06
7215	1.08
7230	1.09
7245	1.10
7260	1.11
7275	1.10
7300	1.09
7315	1.10
7330	1.10
7345	1.11
7360	1.12
7375	1.12
7400	1.13
7415	1.14
7430	1.15
7450	1.16
7500	1.20



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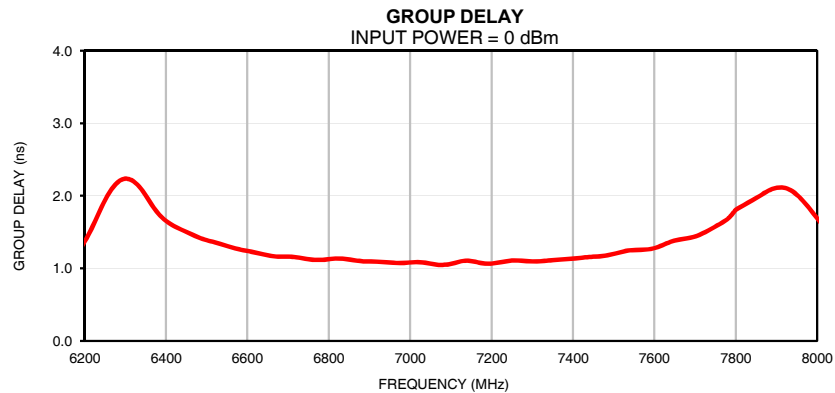
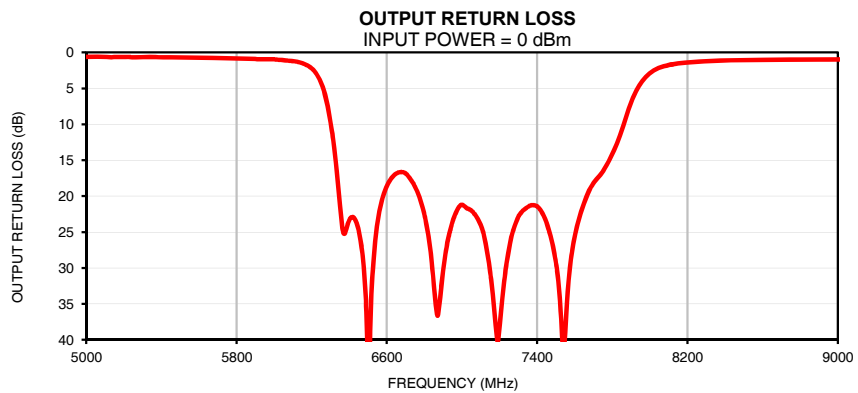
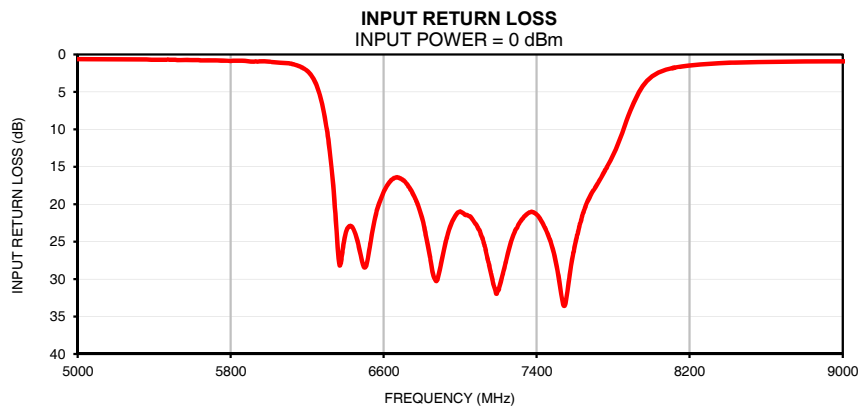


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IF/RF MICROWAVE COMPONENTS

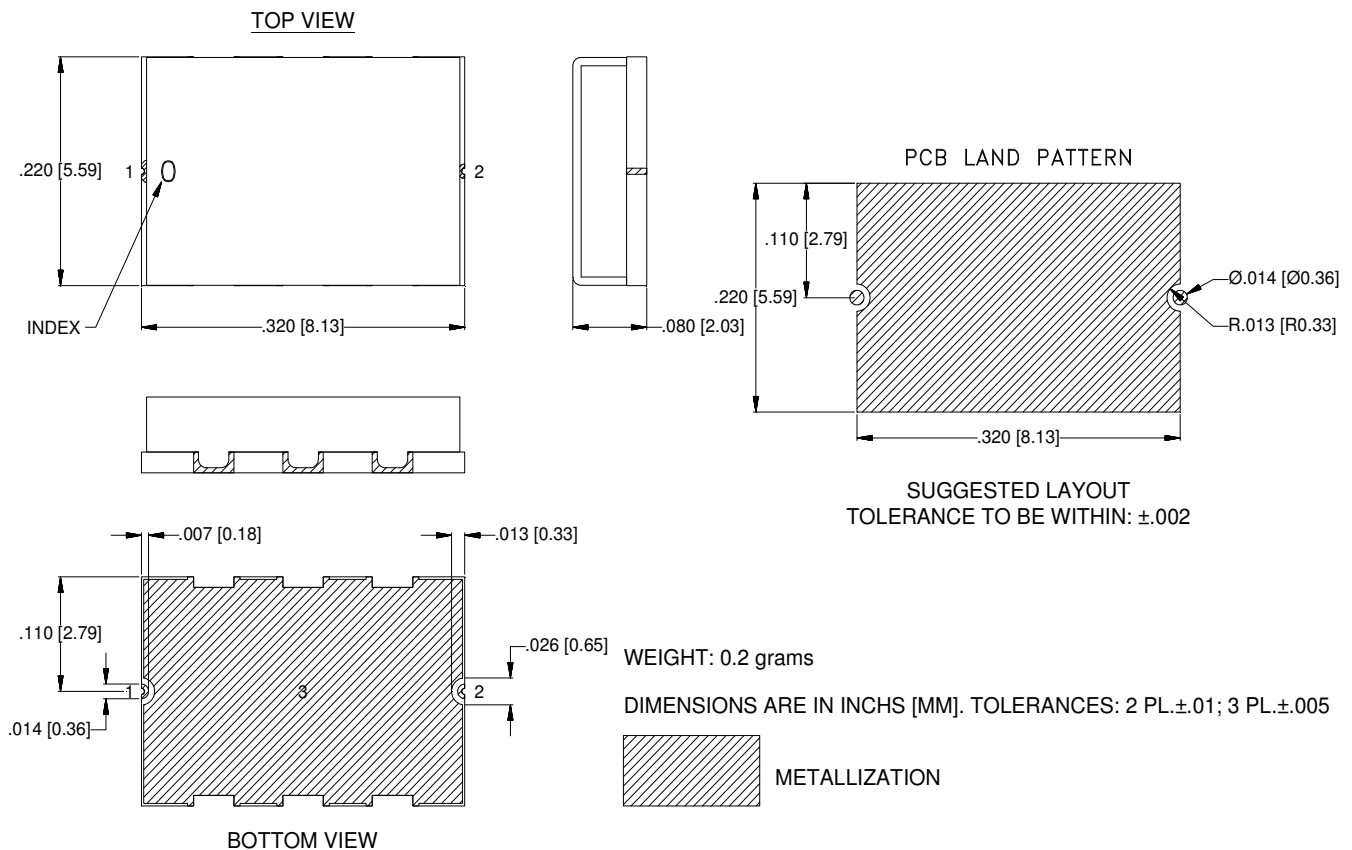
REV.OR  
ABF-7G+  
211112

Typical Performance Curves



## Outline Dimensions

## UC2731



### Notes:

1. Case material: Gold over Nickel over Annealed Stainless Steel.
2. Base: Ceramic
3. Termination finish: **as shown below or indicated on Data Sheet.**  
For RoHS Case Styles: Gold over Nickel plate. All models, (+) suffix.



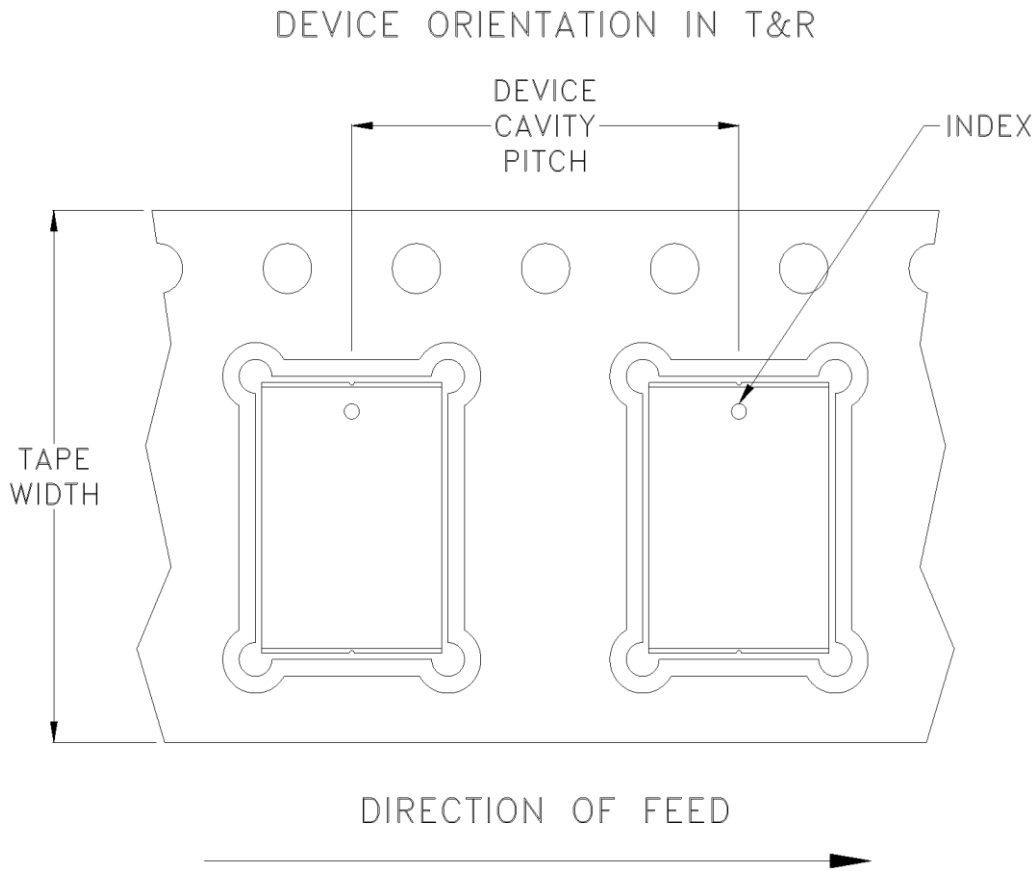
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RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F003



Tape Width, mm	Device Cavity Pitch, mm	Real Size, inches	Devices per Reel See note
16	12	7	10
			20
			50
			100
			200
		13	500

Note: Please consult individual model data sheet/dashboard to determine device per reel availability.

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: [www.minicircuits.com/pages/pdfs/tape.pdf](http://www.minicircuits.com/pages/pdfs/tape.pdf)



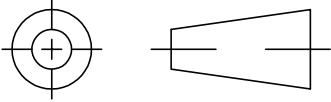
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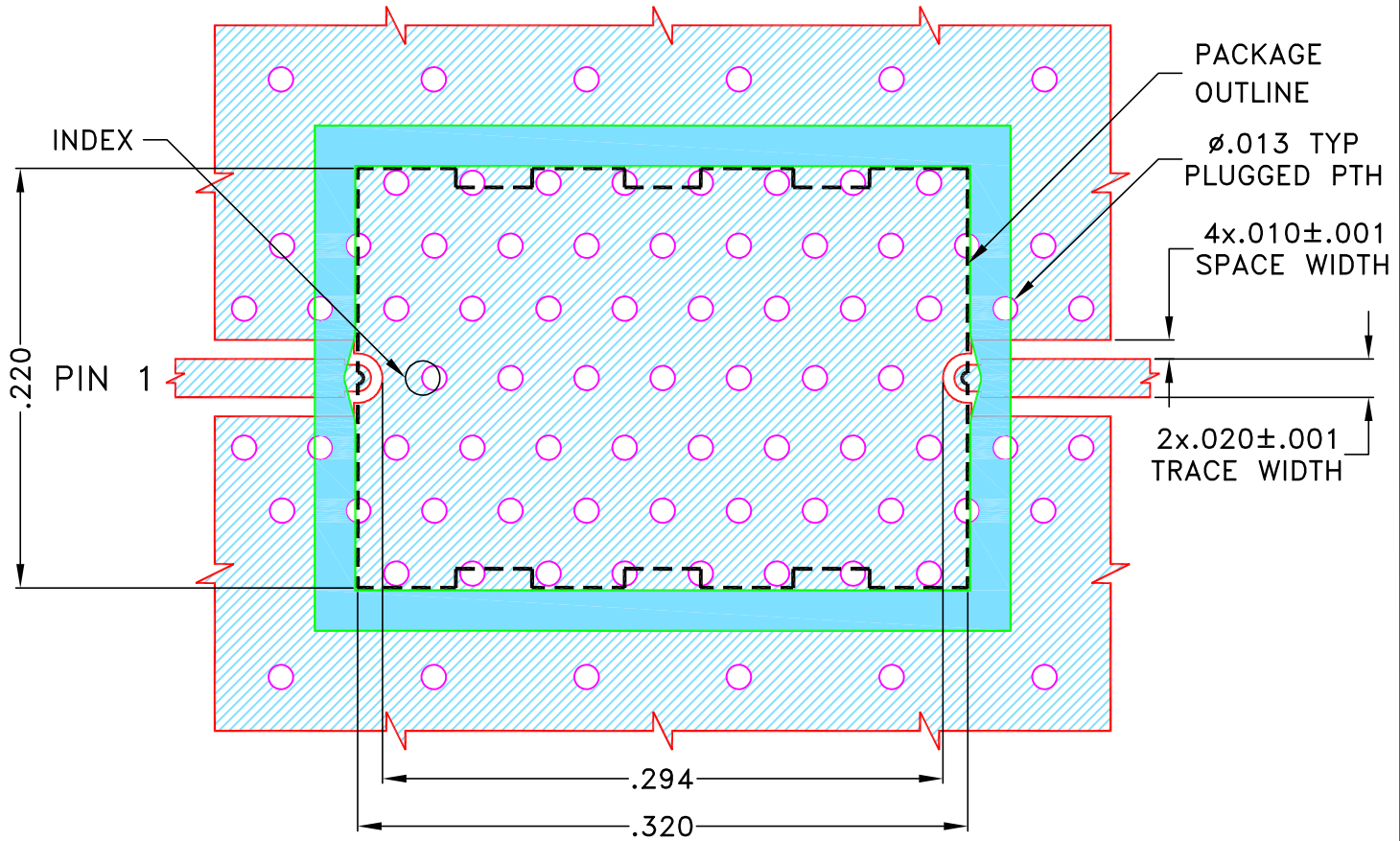
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-007104	NEW RELEASE	MAR 21	DDR	VC
A	ECO-010633	UPDATED AS PER CURRENT TEST BOARD	NOV 21	DDR	VC
B	ECO-019739	UPDATED TRACE AND SPACE WIDTH	OCT 23	LK	VC
		TOLERANCE ONLY NO OTHER CHANGES			

## SUGGESTED MOUNTING CONFIGURATION FOR UC2731 CASE STYLE



### NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS  $.010 \pm .0010$ . 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

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN: DDR	29 MAR 21
TOLERANCES ON:	CHECKED: RR	29 MAR 21
2 PL DECIMALS ±	APPROVED: NN	29 MAR 21
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		

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 Brooklyn NY 11235

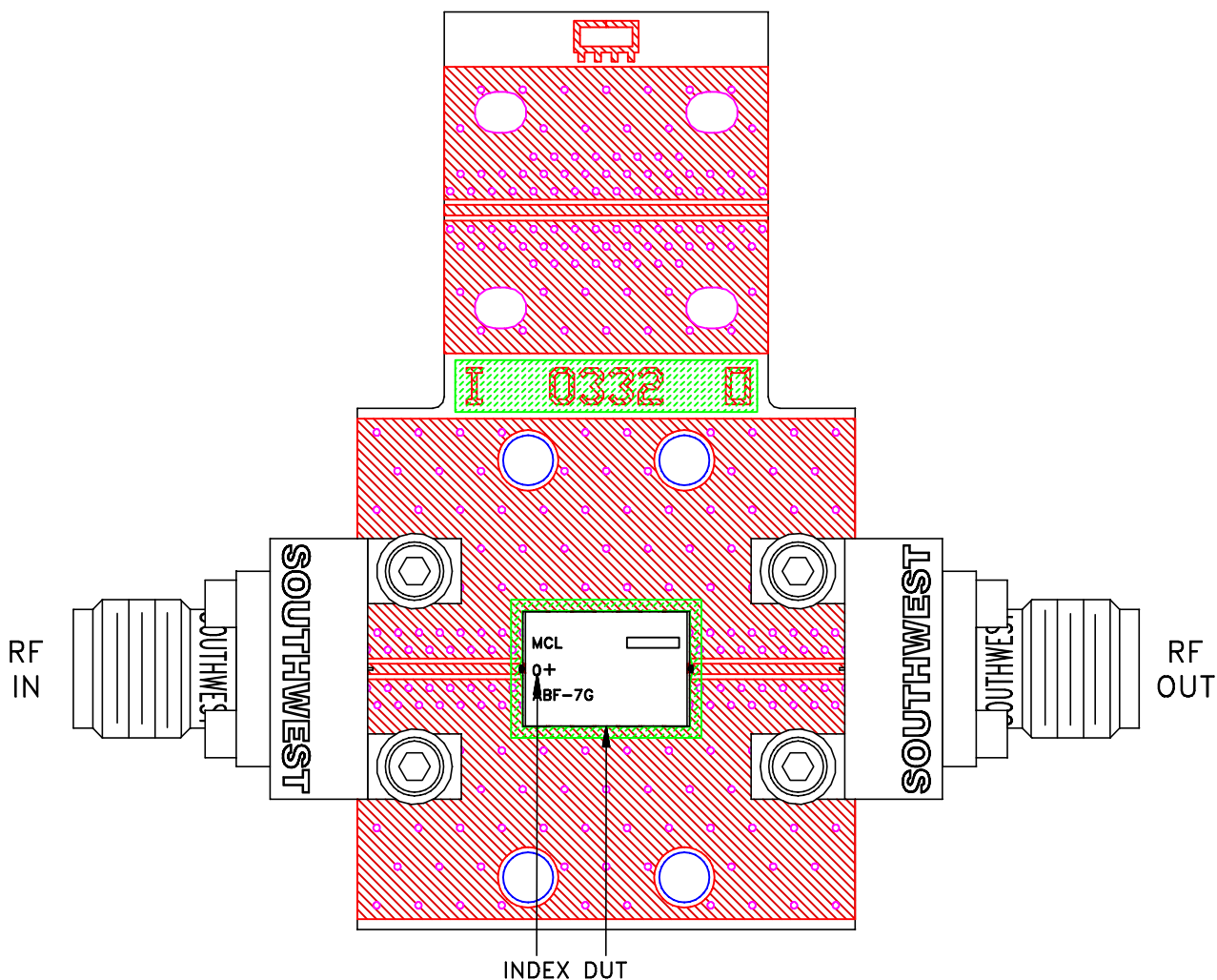
PL DWG, UC2731 C.S, 50 OHM, ABF

SIZE: A	CODE IDENT: 15542	DRAWING NO: 98-PL-652	REV: B
FILE: 98-PL-652	SCALE: 10:1	SHEET: 1 OF 1	

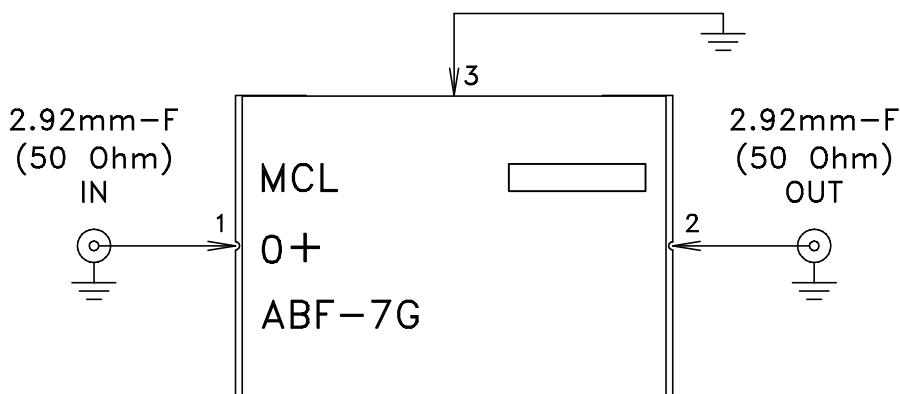
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# Evaluation Board and Circuit

TB-ABF-7G+




Schematic diagram



**Notes:**

1. PCB Material: ROGERS (R04350B) OR Equivalent, Dielectric Constant=3.48±.05  
Dielectric Thickness: .010±.001
2. 50 Ohm 2.92mm Female Connectors.

 **Mini-Circuits®**

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

<b>Specification</b>	<b>Test/Inspection Condition</b>	<b>Reference/Spec</b>
Operating Temperature	-55° to 125° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 125° C Ambient Environment	Individual Model Data Sheet
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Thermal Shock	-55° to 125°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, Except +125°C