

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



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

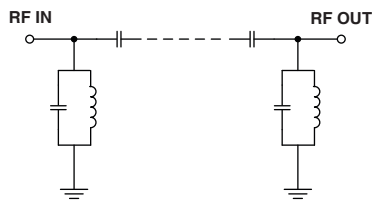
- Receivers
- Satellite

Electrical Specifications⁽¹⁾ at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss	F1-F2	14200 - 17400	—	1.5	3.0	dB
	Return Loss	F1-F2	14200 - 17400	—	10	—	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+ with feedline losses removed by normalization of S12 and S21 traces to measurement of TB thru-line.

Functional Schematic



Maximum Ratings

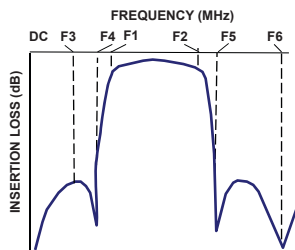
Operating Temperature	-55°C to 125°C
Storage Temperature	-55°C to 125°C
RF Power Input	1W Max. @ 25°C

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

Typical Performance Data at 25°C

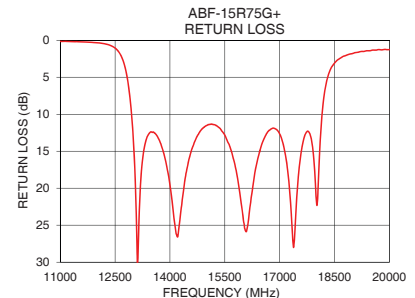
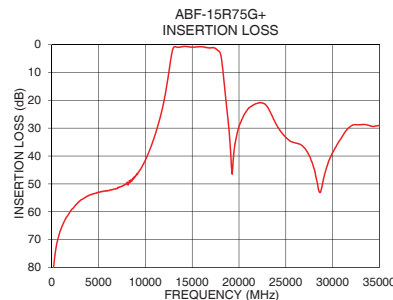
Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
10	105.30	0.05
3000	56.09	0.18
7000	51.59	0.04
10000	41.41	0.02
11200	30.68	0.17
12000	20.03	0.34
12830	3.03	5.01
14200	0.67	26.56
15000	0.94	11.53
15750	0.78	16.28
16500	1.05	14.25
17400	1.24	27.13
17990	3.00	20.60
18610	20.15	2.57
18920	30.04	1.87
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



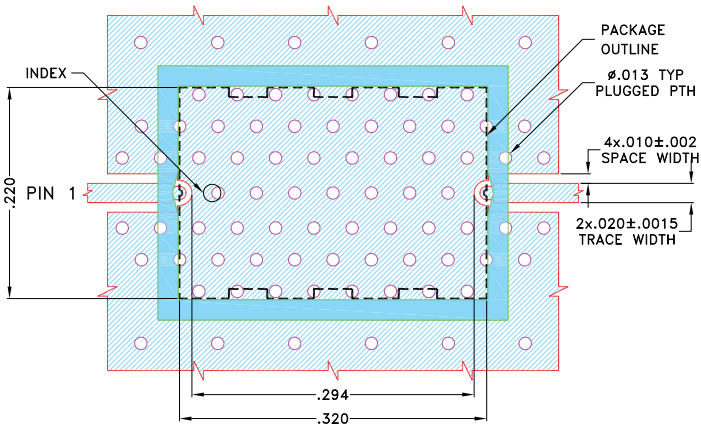
www.minicircuits.com P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

REV.A
ECO-010633
ABF-15R75G+
EDU3282
URJ
211113
Page 2 of 4

Pad Connections

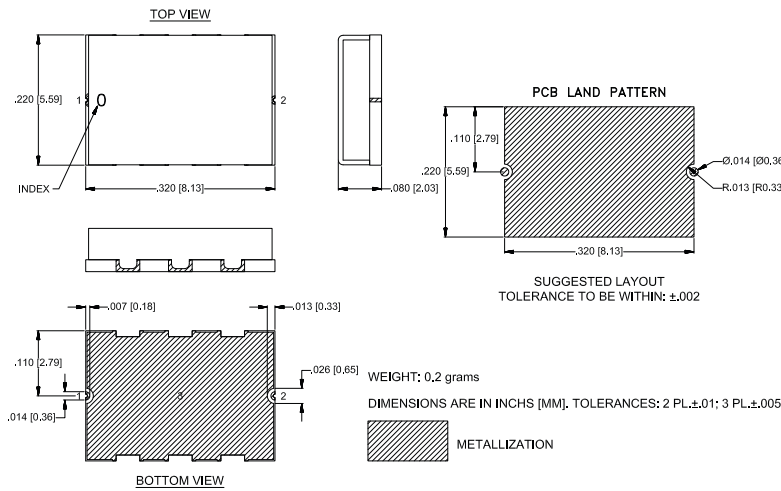
RF IN	1
RF OUT	2
GROUND	3

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



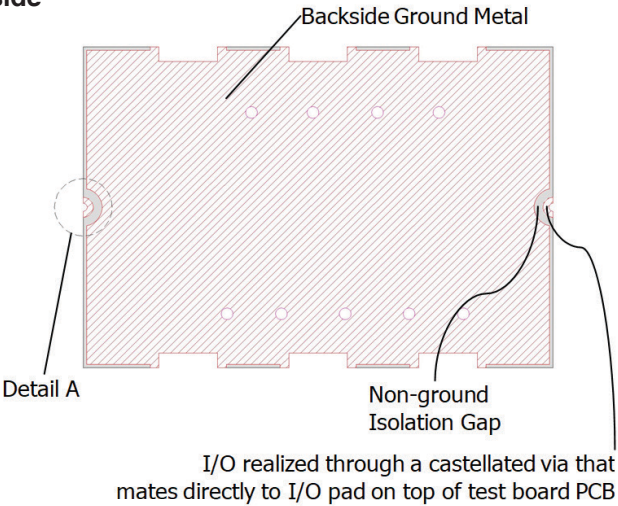
- NOTES:
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS $.010 \pm .0010$. COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
 2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB COPPER PATTERN WITH SMOBC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

Outline Drawing



Recommendations of PCB pattern at customer board

Filter Back side



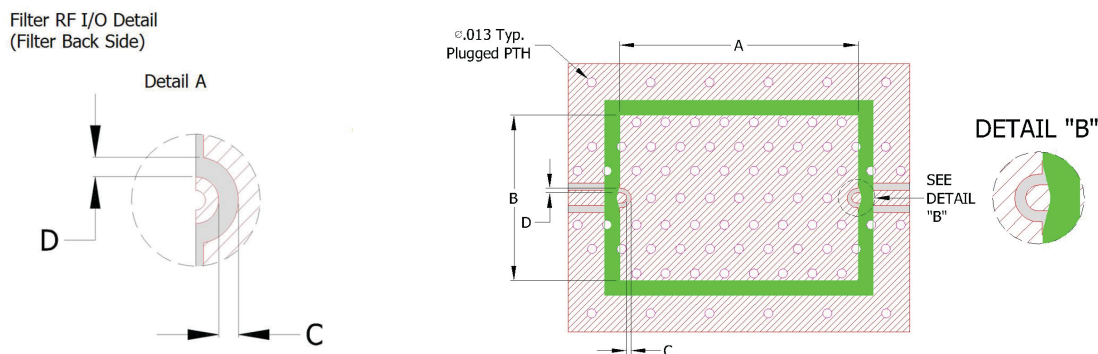
Notes

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

PCB Pattern Recommendations

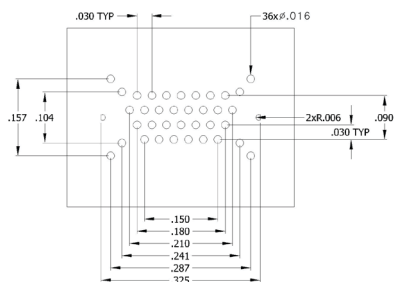


- 1) Customer PCB's ground pattern length (dimension A) can be similar to filter length.
- 2) Customer PCB's ground pattern width (dimension B) can be similar filter width.
- 3) Dimensions C and D on Filter RF I/O detail and Customer PCB pattern can be closely match. The dimensions of C and D on the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

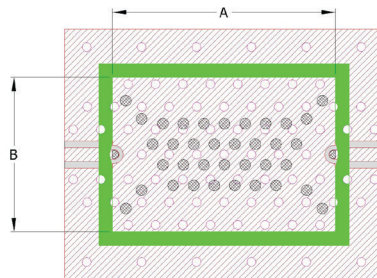
Comments on component handling and solder attach

- 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.

Notes

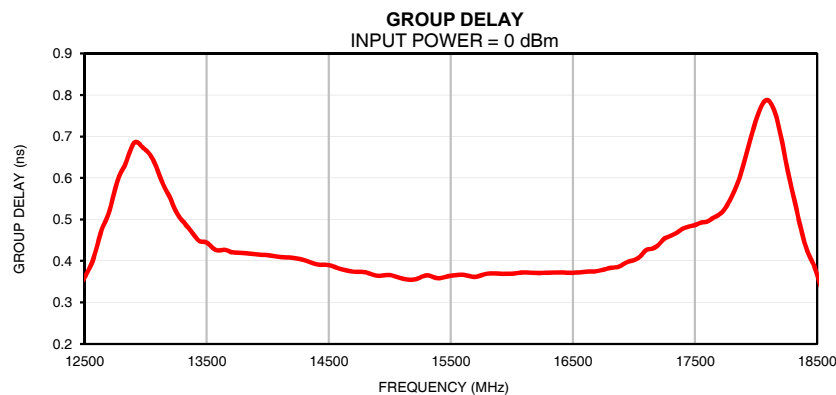
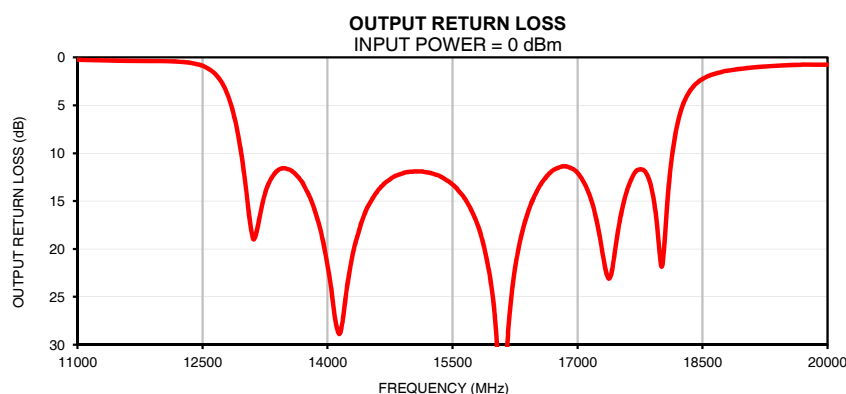
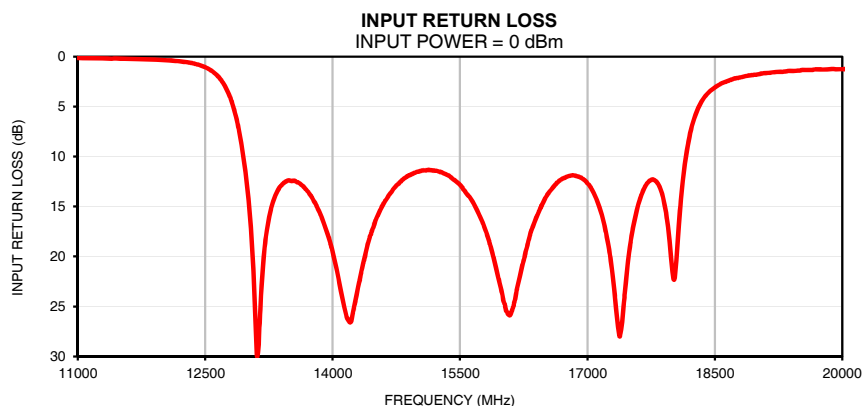
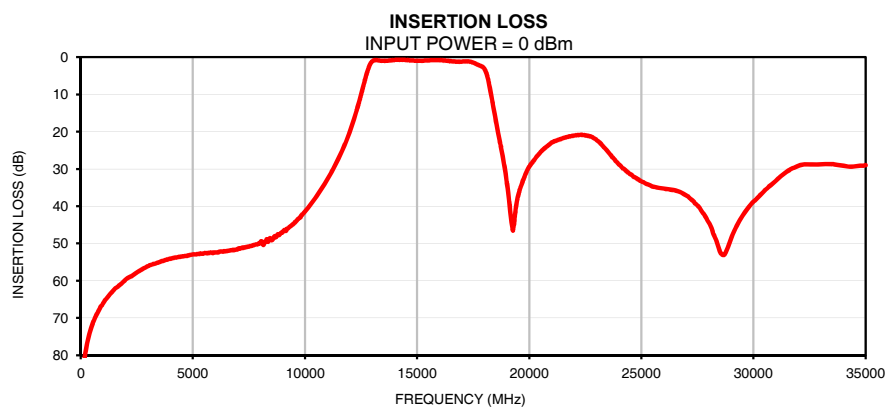
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
 B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's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



Typical Performance Data

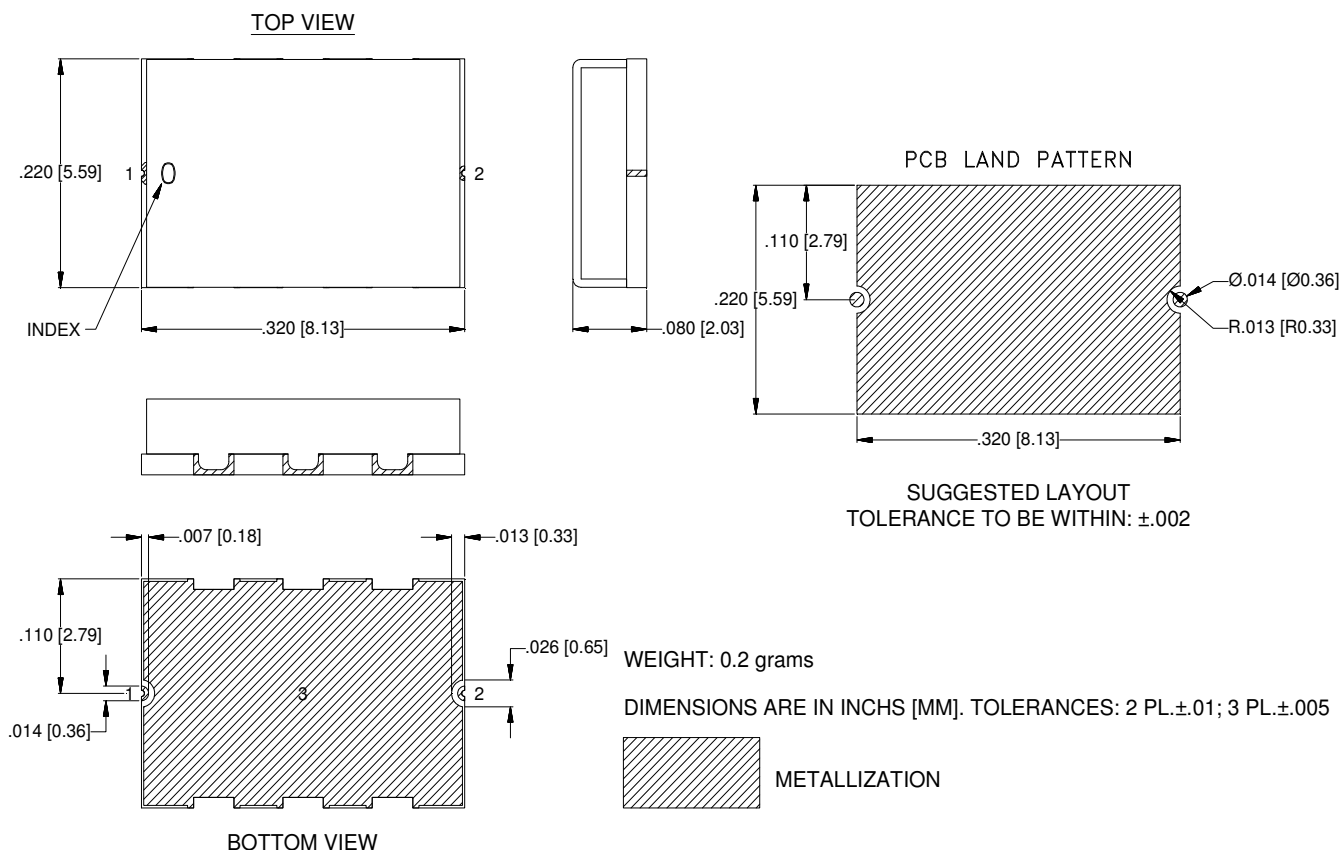
FREQ.	Insertion Loss	Input Return Loss	Output Return Loss	FREQ.	Group Delay
(MHz)	(dB)	(dB)	(dB)	(MHz)	(ns)
10	105.30	0.05	0.08	14200	0.40
50	89.69	0.04	0.05	14250	0.40
100	86.13	0.03	0.01	14300	0.40
500	72.19	0.08	0.10	14350	0.40
1000	66.10	0.07	0.10	14400	0.39
1500	62.33	0.02	0.03	14450	0.39
2000	59.73	0.02	0.02	14500	0.39
2500	57.81	0.07	0.06	14550	0.38
3000	56.09	0.18	0.21	14600	0.38
4000	54.12	0.13	0.13	14650	0.38
5000	52.96	0.01	0.04	14700	0.37
6000	52.40	0.04	0.02	14750	0.37
7000	51.59	0.04	0.00	14800	0.37
7500	50.85	0.07	0.11	14850	0.37
8000	49.97	0.10	0.10	14900	0.36
8500	49.09	0.09	0.14	14950	0.37
9000	47.07	0.08	0.15	15000	0.37
9500	44.73	0.03	0.10	15050	0.36
10000	41.41	0.02	0.03	15100	0.36
11000	32.79	0.15	0.23	15150	0.36
11200	30.68	0.17	0.30	15200	0.36
12000	20.03	0.34	0.38	15250	0.36
12500	10.13	1.06	0.87	15300	0.37
12830	3.03	5.01	4.58	15350	0.36
14200	0.67	26.56	26.28	15400	0.36
14700	0.84	13.45	13.05	15450	0.37
15000	0.94	11.53	11.94	15500	0.36
15500	0.85	12.83	13.26	15550	0.36
15750	0.78	16.28	16.42	15600	0.37
16000	0.78	23.88	26.29	15650	0.37
16300	0.92	18.62	19.59	15700	0.36
16700	1.17	12.25	11.82	15750	0.37
17000	1.17	12.68	12.04	15800	0.37
17400	1.24	27.13	22.78	15850	0.37
17990	3.00	20.60	20.87	15900	0.37
18310	10.30	5.05	4.06	15950	0.37
18610	20.15	2.57	1.80	16000	0.37
18920	30.04	1.87	1.22	16050	0.37
19000	33.56	1.79	1.15	16100	0.37
19500	37.33	1.39	0.84	16150	0.37
20000	29.40	1.26	0.76	16200	0.37
20500	25.52	1.43	0.89	16250	0.37
21000	22.90	1.61	1.07	16300	0.37
21500	21.73	1.49	1.22	16350	0.37
22000	21.03	1.30	1.52	16400	0.37
22500	20.97	1.16	1.83	16450	0.37
23000	22.21	0.88	1.61	16500	0.37
23500	25.31	0.53	0.94	16550	0.37
24000	28.77	0.30	0.49	16600	0.37
25000	33.33	0.28	0.24	16650	0.38
26000	35.27	0.53	0.24	16700	0.38
27000	37.13	0.65	0.46	16750	0.38
28000	44.37	0.42	0.71	16800	0.38
29000	48.67	0.32	0.70	16850	0.38
30000	38.75	0.32	0.40	16900	0.39
31000	33.14	0.44	0.15	17000	0.40
32000	29.16	0.61	0.14	17100	0.43
33000	28.77	0.66	0.33	17200	0.44
34000	29.15	0.75	0.67	17300	0.46
35000	28.98	1.14	1.39	17400	0.48

Typical Performance Curves



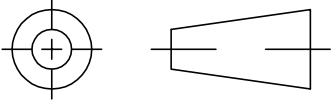
Outline Dimensions

UC2731

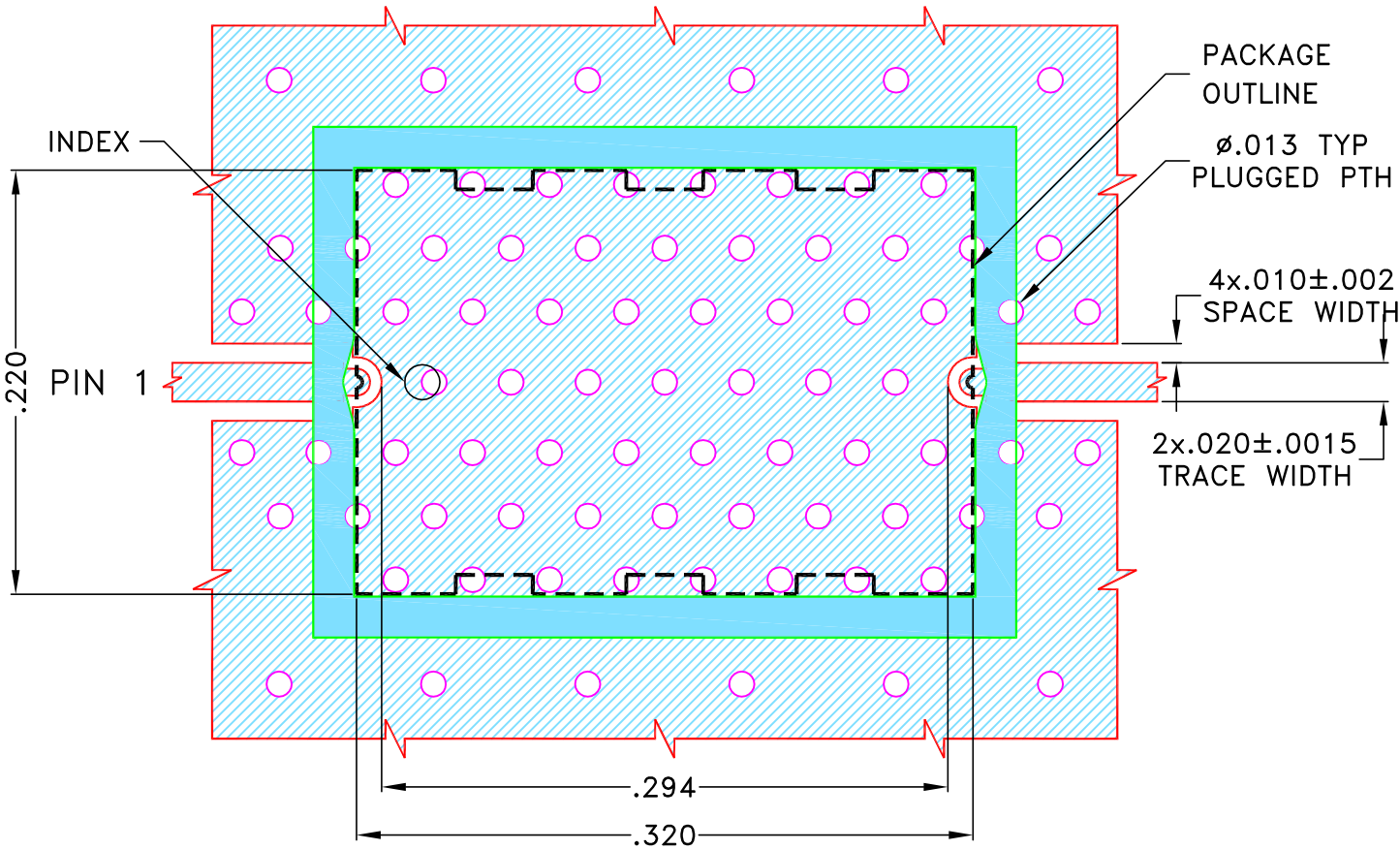


Notes:

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.



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

SUGGESTED MOUNTING CONFIGURATION
FOR UC2731 CASE STYLE



NOTES:

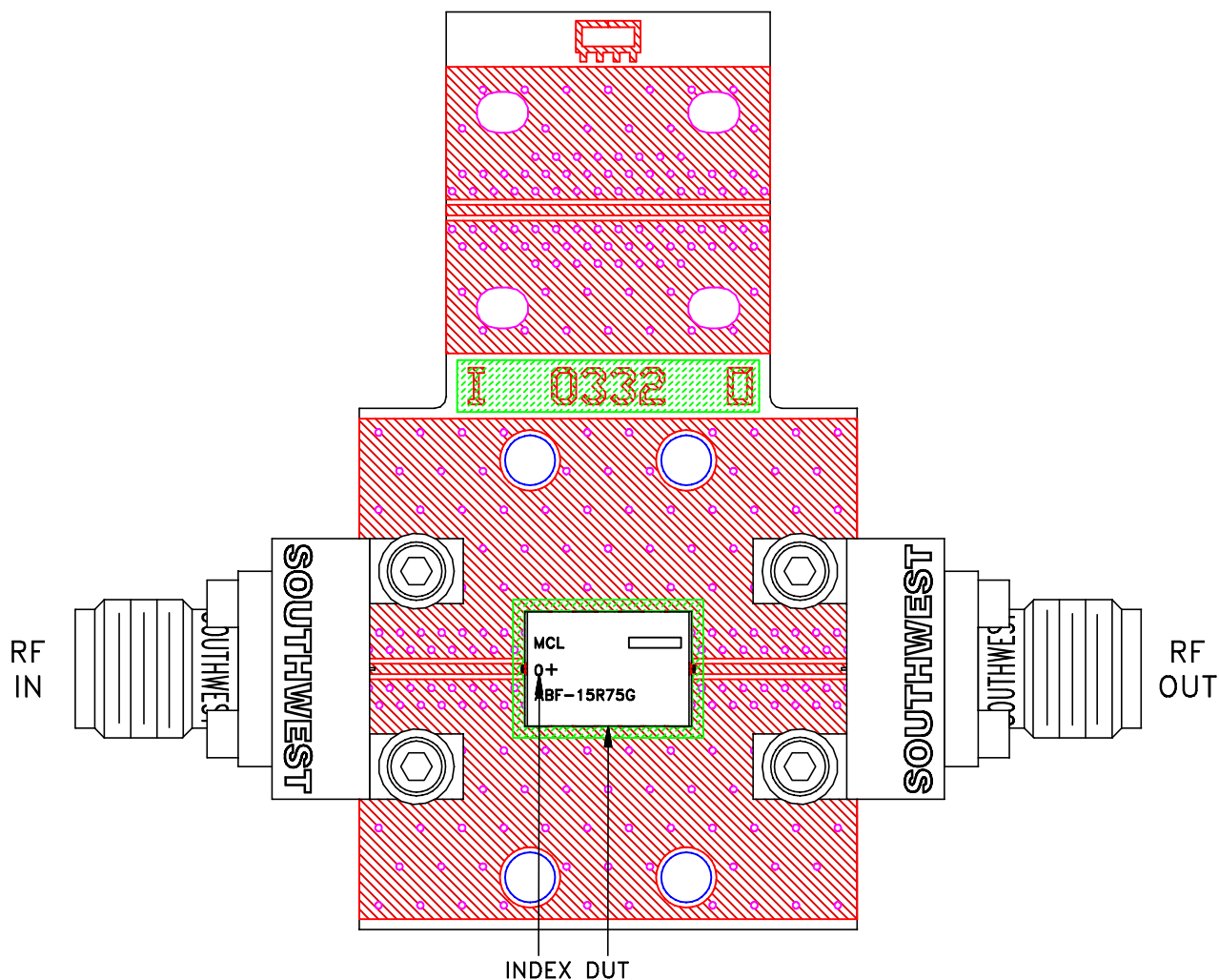
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS .010±.0010. COPPER: 1/2 Oz. EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

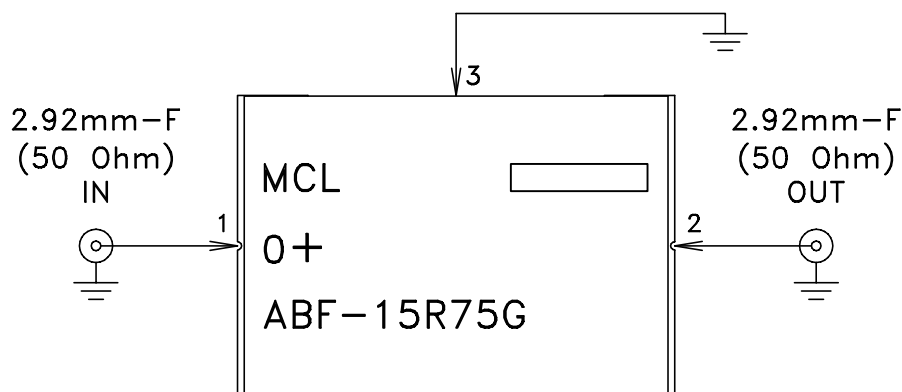
UNLESS OTHERWISE SPECIFIED		INITIALS		DATE		<div><div><div></div><div></div><div></div><div></div></div><div>Mini-Circuits®</div><div>13 Neptune Avenue Brooklyn NY 11235</div></div>			
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ± <div><div></div><div></div></div>	DRAWN	DDR	29	MAR	21				
	CHECKED	RR	29	MAR	21				
	APPROVED	NN	29	MAR	21				
<div><div></div><div>Mini-Circuits®</div></div> <p>THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE , MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.</p> <div>ASHEETA1.DWG REV:A DATE:01/12/95</div>						PL DWG, UC2731 C.S, 50 OHM, ABF			
SIZE A		CODE IDENT 15542		DRAWING NO: 98-PL-652		REV: A			
FILE: 98-PL-652		SCALE: 10:1		SHEET: 1 OF 1					

Evaluation Board and Circuit

TB-ABF-15R75G+




Schematic diagram



Notes:

1. PCB Material: ROGERS (R04350B) OR Equivalent, Dielectric Constant= $3.48 \pm .05$
Dielectric Thickness: $.010 \pm .001$
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.

Specification	Test/Inspection Condition	Reference/Spec
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