



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 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.

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)	Higher 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.



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SURFACE MOUNT THIN-FILM

Bandpass Filter

ABF-10R125G+

50Ω

9.35 to 10.9 GHz

FEATURES

- Low Passband Insertion Loss of 1dB Typ.
- High Rejection of 57dB Typ.
- Good Return Loss of 11dB Typ.
- Small Size, 5.59 x 8.13 x 2.03 mm

APPLICATIONS

- X-Band Radar
- Terrestrial Communication Systems
- Aerospace and Defense Signal Conditioning
- Test and Measurement Equipment



Generic photo used for illustration purposes only

CASE STYLE: UC2731

+RoHS Compliant

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

ELECTRICAL SPECIFICATIONS¹ AT 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Pass Band	Insertion Loss	F1-F2	9350 - 10900	—	1.0	2.5	dB
	Return Loss	F1-F2	9350 - 10900	—	11	—	dB
Stop Band, Lower	Rejection	DC-F3	DC - 6000	40	57	—	dB
		F3-F4	6000 - 7500	20	38	—	
Stop Band, Upper	Rejection	F5-F6	13000 - 15500	20	44	—	dB
		F6-F7	15500 - 18000	40	53	—	
		F7-F8	18000 - 23000	—	30	—	

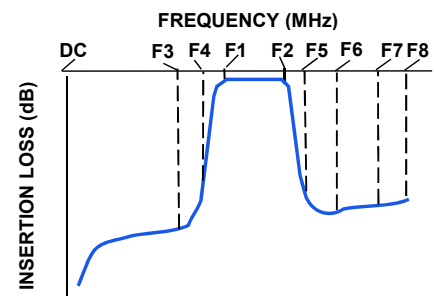
1. Measured on Mini-Circuits Characterization Test Board TB-ABF-10R125G+ with feedline losses removed by normalization of S12 and S21 traces to measurement of TB thru-line.

ABSOLUTE MAXIMUM RATINGS

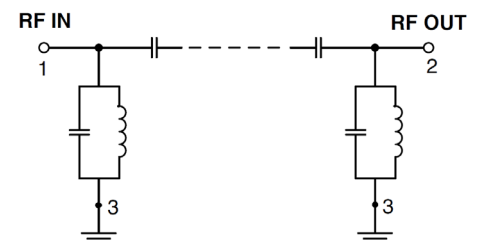
Parameter	Ratings
Operating temperature	-55°C to +125°C
Storage temperature	-55°C to +125°C
RF Power Input at Passband	1W Max. at 25°C

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

TYPICAL FREQUENCY RESPONSE



FUNCTIONAL DIAGRAM



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SURFACE MOUNT THIN-FILM

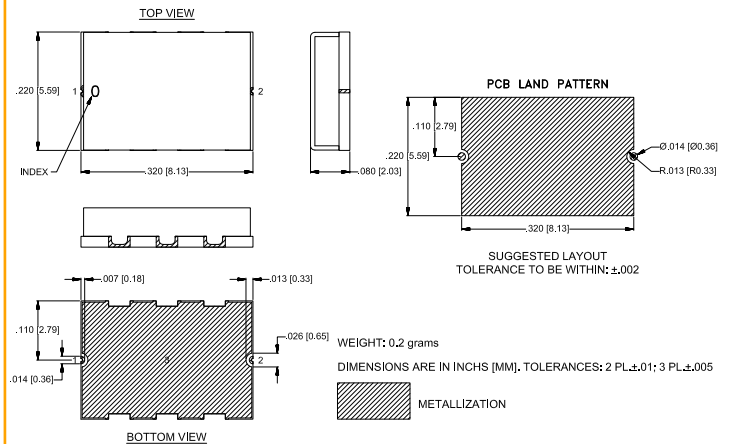
Bandpass Filter

ABF-10R125G+

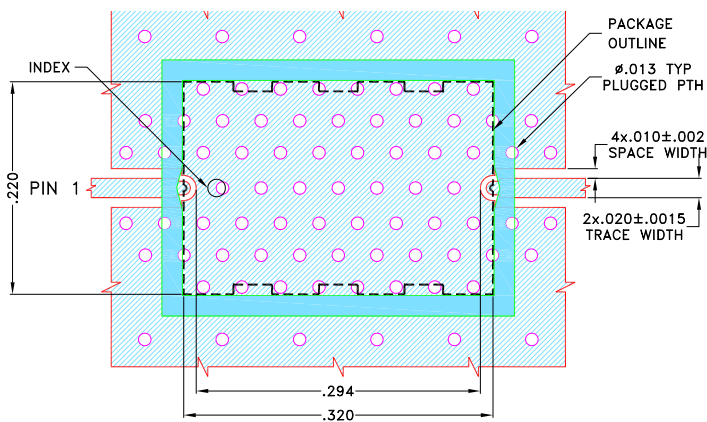
PAD CONNECTIONS

RF IN	1
RF OUT	2
GROUND	3

OUTLINE DRAWING



DEMO BOARD MCL P/N: TB-ABF-10R125G+ 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.

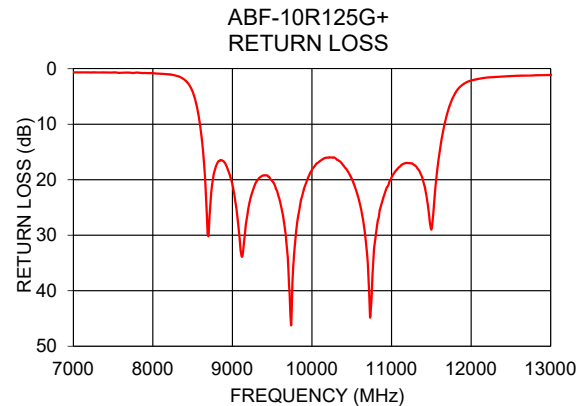
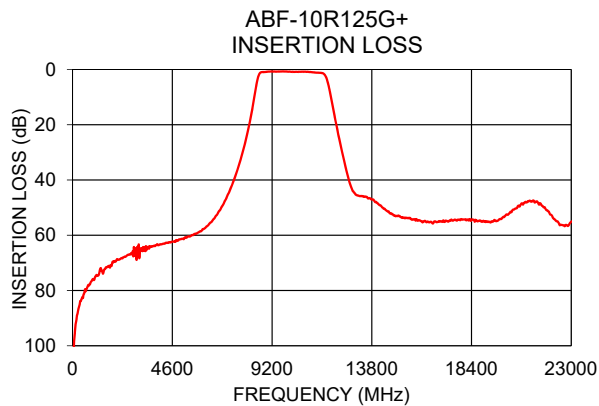
- DENOTES PCB COPPER PATTERN WITH SMOBC (SOLDER MASK OVER BARE COPPER)
- DENOTES PCB COPPER PATTERN FREE OF SOLDERMASK





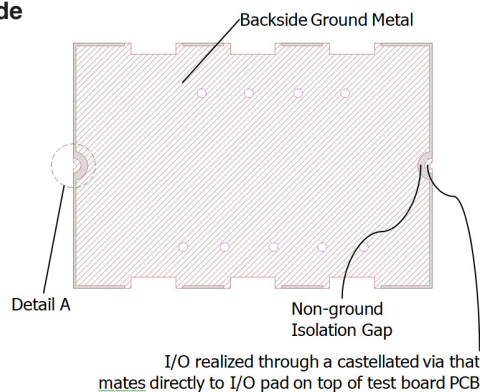
TYPICAL PERFORMANCE DATA AT 25°C

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
10	118.86	0.03
1000	76.06	0.18
6000	57.79	0.60
7500	38.74	0.68
8100	21.76	0.91
9350	0.79	19.54
10000	0.79	18.24
10125	0.86	16.39
11250	1.17	17.03
10900	0.92	23.09
12200	21.31	1.59
13000	44.69	1.12
15500	53.76	1.18
18000	54.32	1.27
23000	55.15	1.44



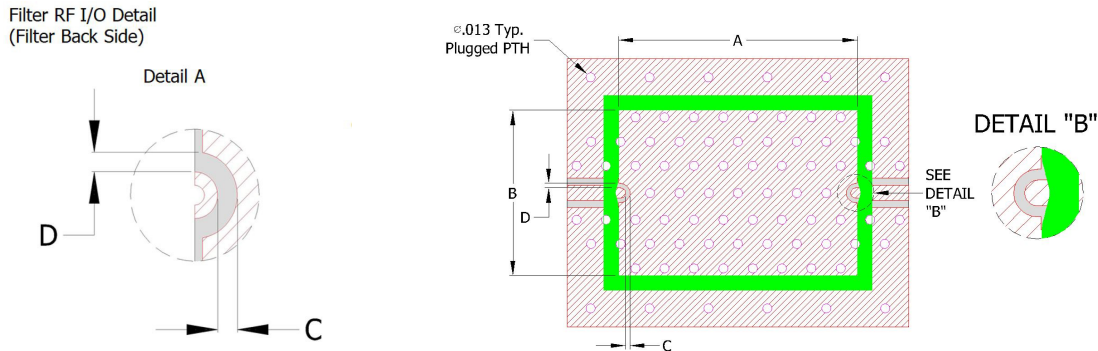
Recommended PCB Layout Pattern for Filter

Filter Back side





PCB Pattern Recommendations

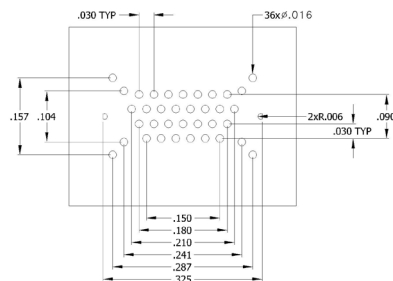


- 1) Customer PCB's ground pattern length (dimension A) can be similar to filter length.
- 2) Customer PCB's ground pattern width (dimension B) can be similar filter width.
- 3) Dimensions C and D on Filter RF I/O detail and Customer PCB pattern can be closely match. The dimensions of C and D on the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

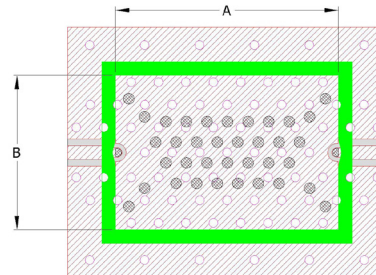
Comments on component handling and solder attach

- 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

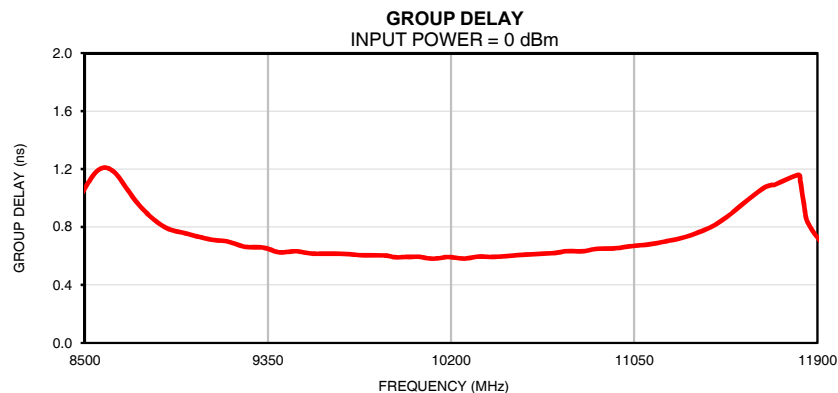
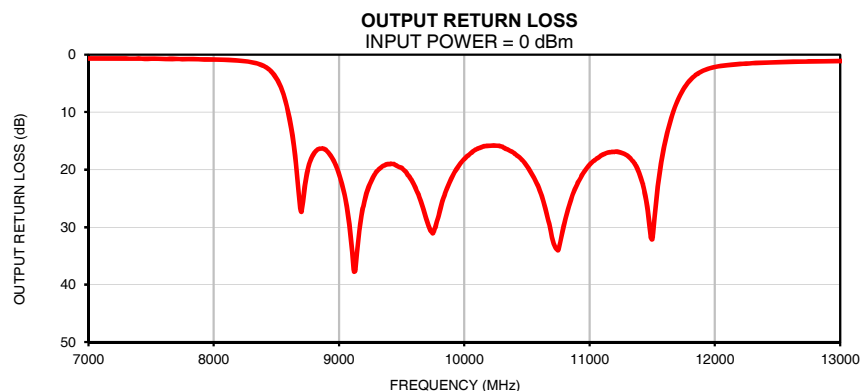
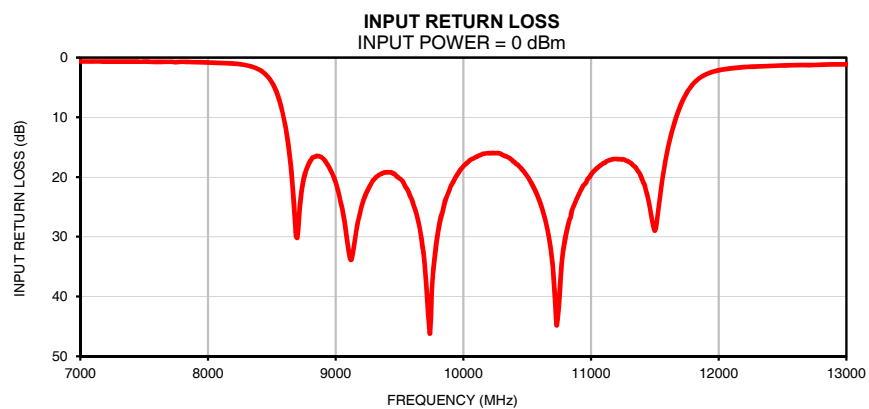
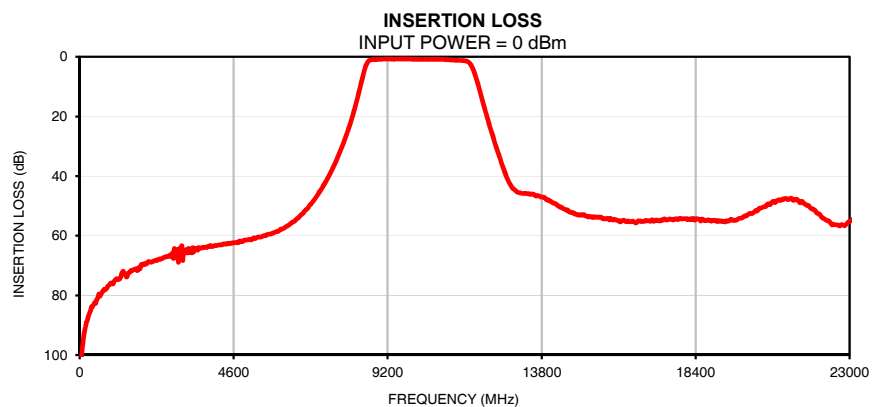
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's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

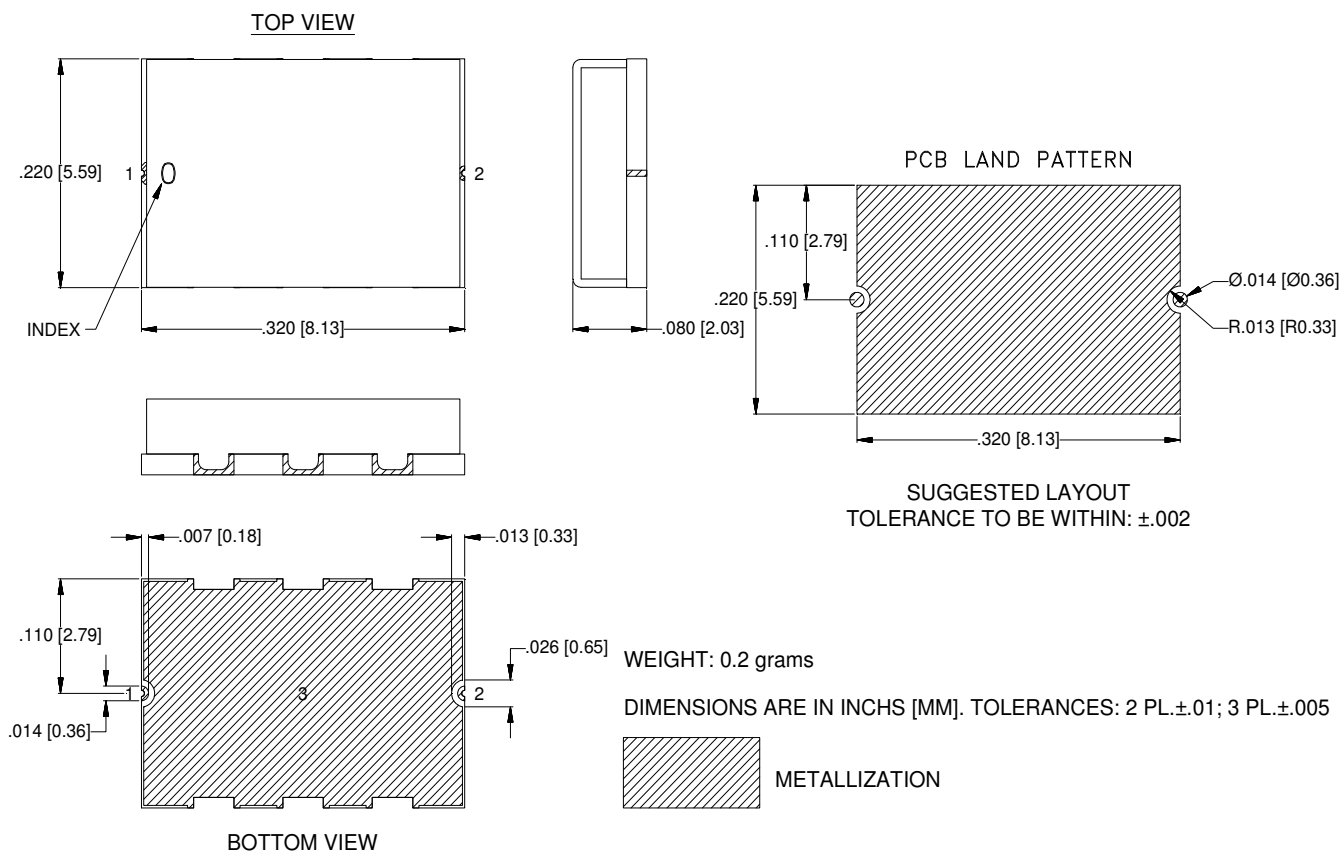
FREQ.	Insertion Loss	Input Return Loss	Output Return Loss
(MHz)	(dB)	(dB)	(dB)
10	118.86	0.03	0.03
100	95.54	0.07	0.07
200	89.04	0.10	0.10
300	85.81	0.11	0.11
500	81.53	0.14	0.15
700	78.41	0.14	0.14
1000	76.06	0.18	0.18
1200	74.41	0.22	0.21
1400	73.90	0.20	0.22
1600	71.46	0.21	0.20
1800	71.05	0.24	0.21
2000	69.39	0.23	0.19
2500	67.39	0.20	0.19
3000	66.68	0.17	0.16
3500	64.20	0.15	0.14
4000	63.41	0.21	0.20
6000	57.79	0.60	0.58
7500	38.74	0.68	0.69
7800	31.13	0.70	0.78
8100	21.76	0.91	0.89
8400	9.08	2.00	1.95
8550	2.93	6.57	6.52
9000	0.82	20.82	20.71
9200	0.76	25.21	25.89
9350	0.79	19.54	19.36
9380	0.81	19.27	19.07
9400	0.81	19.23	19.05
9500	0.78	20.24	19.68
9700	0.74	34.98	28.80
10000	0.79	18.24	18.14
10125	0.86	16.39	16.19
10400	0.87	17.49	17.18
10600	0.84	24.21	23.52
10900	0.92	23.09	22.58
11000	0.97	19.59	19.12
11250	1.17	17.03	17.03
11700	2.96	8.05	8.09
11925	10.38	2.58	2.61
12200	21.31	1.59	1.60
12500	32.25	1.32	1.31
13000	44.69	1.12	1.09
13200	45.72	1.13	1.08
13400	45.98	1.09	1.07
13600	46.45	1.12	1.07
13800	47.04	1.09	1.07
14000	47.95	1.11	1.07
14500	51.23	1.09	1.08
15000	53.07	1.12	1.13
15500	53.76	1.18	1.13
16000	54.62	1.18	1.11
16500	55.20	1.19	1.14
17000	54.98	1.20	1.12
17500	54.56	1.24	1.15
18000	54.32	1.27	1.21
18500	54.42	1.28	1.25
19000	55.03	1.31	1.31
19500	54.75	1.39	1.37
20000	52.55	1.43	1.41
21000	47.68	1.49	1.36
23000	55.15	1.44	1.41

FREQ.	Group Delay
(MHz)	(ns)
9350	0.65
9370	0.64
9390	0.63
9410	0.62
9430	0.63
9450	0.63
9470	0.63
9490	0.63
9510	0.63
9530	0.62
9550	0.62
9570	0.62
9590	0.62
9610	0.62
9630	0.62
9650	0.62
9670	0.62
9690	0.62
9710	0.61
9730	0.61
9750	0.61
9770	0.61
9790	0.60
9810	0.60
9830	0.61
9850	0.61
9870	0.61
9890	0.61
9910	0.60
9930	0.59
9950	0.59
9970	0.59
9990	0.59
10000	0.59
10030	0.60
10050	0.59
10070	0.59
10090	0.58
10100	0.58
10125	0.58
10150	0.59
10170	0.59
10190	0.59
10210	0.59
10230	0.59
10250	0.58
10270	0.58
10290	0.59
10310	0.59
10330	0.60
10350	0.60
10370	0.59
10390	0.59
10410	0.59
10500	0.60
10600	0.61
10700	0.63
10800	0.63
10850	0.64
10900	0.65

Typical Performance Curves



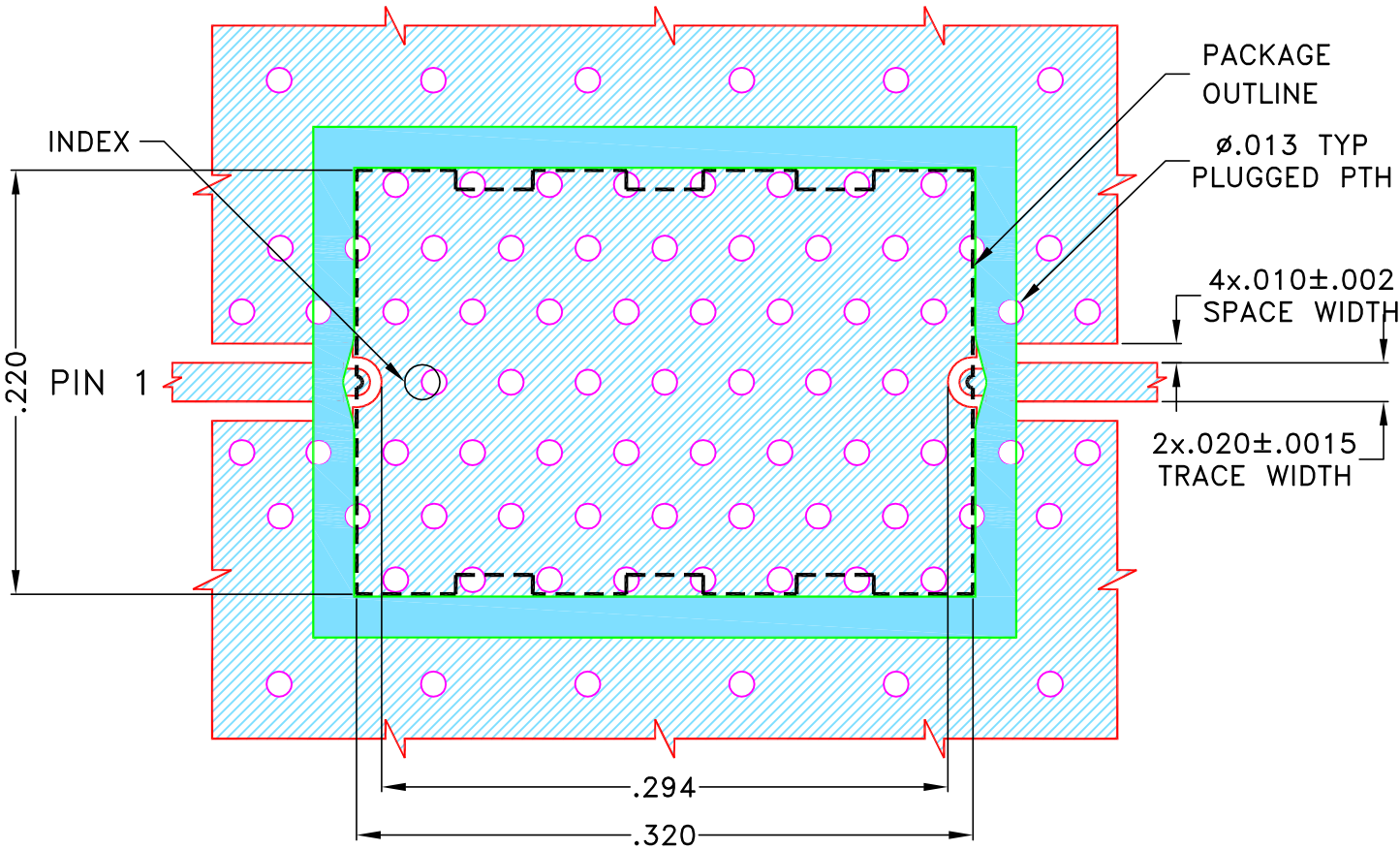
UC2731



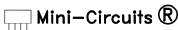
1. Case material: Gold over Nickel over Annealed Stainless Steel.
2. Base: Ceramic
3. Termination finish: **as shown below or indicated on Data Sheet.**
For RoHS Case Styles: Gold over Nickel plate. All models, (+) suffix.

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

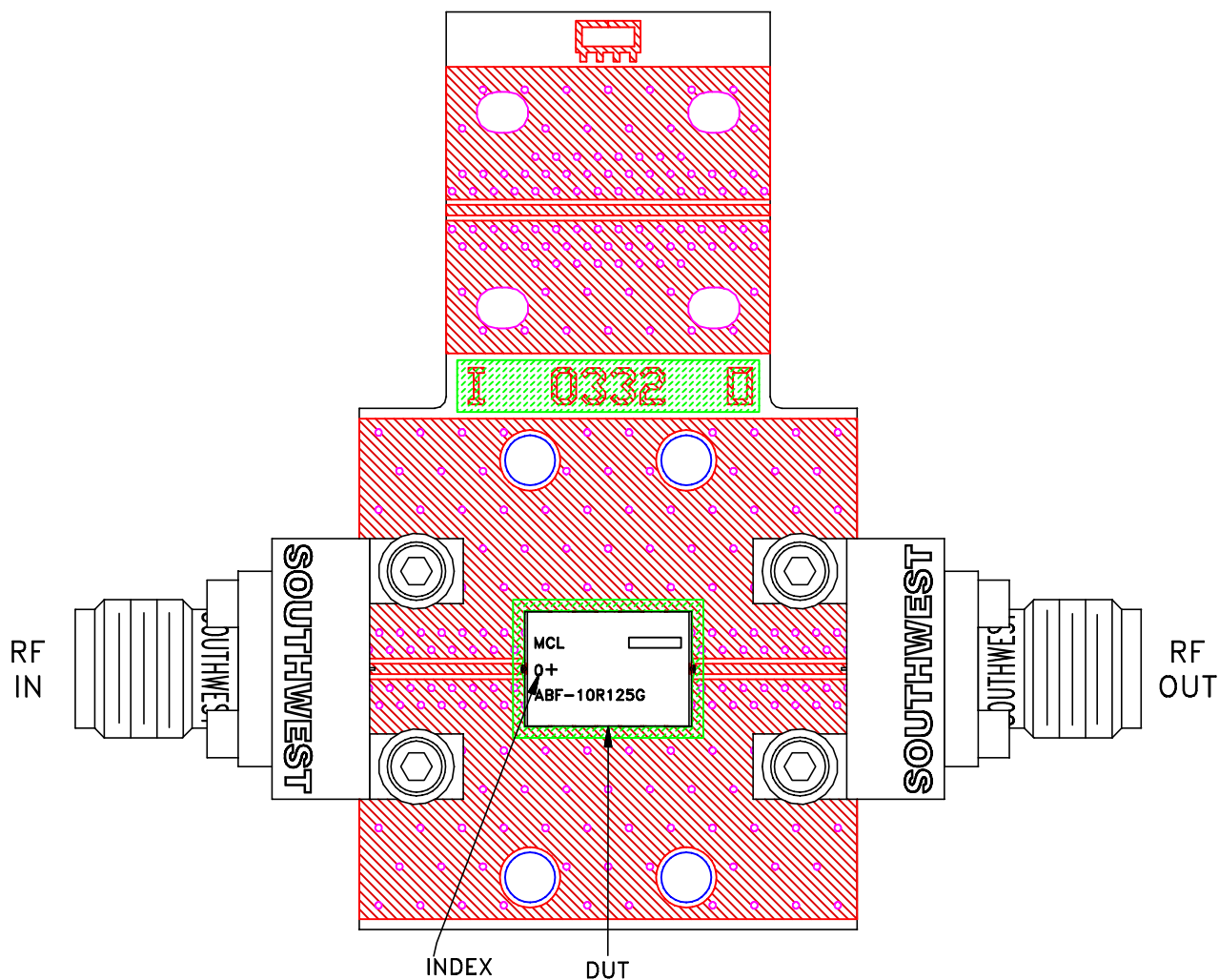


- NOTES:
- COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS .010±.0010. COPPER: 1/2 Oz. EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
 - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
-  DENOTES PCB COPPER PATTERN WITH SMOBC (SOLDER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

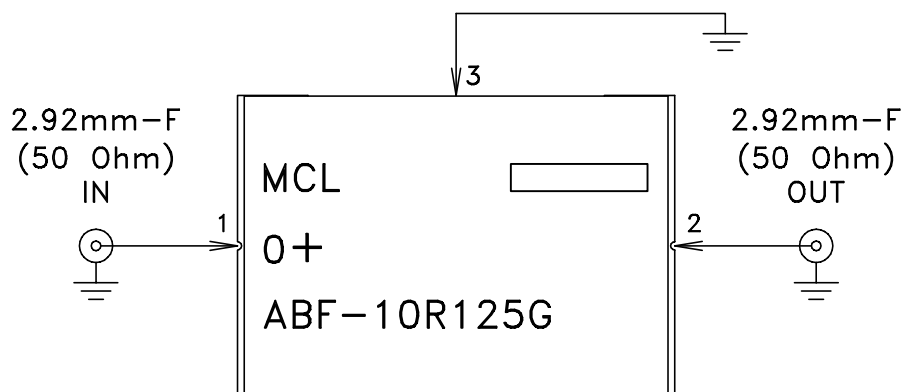
UNLESS OTHERWISE SPECIFIED		INITIALS	DATE	 Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235		
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	DDR	29 MAR 21			
	CHECKED	RR	29 MAR 21			
	APPROVED	NN	29 MAR 21			
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		SIZE	CODE IDENT	DRAWING NO:	REV:	
		A	15542	98-PL-652	A	
		FILE:	98-PL-652	SCALE:	SHEET:	1 OF 1
		ASHEETA1.DWG REV:A DATE:01/12/95				

Evaluation Board and Circuit

TB-ABF-10R125G+



Schematic diagram



Notes:

1. PCB Material: ROGERS (R04350B) OR Equivalent, Dielectric Constant= 3.48 ± 0.05
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