



THIN-FILM SURFACE MOUNT

# Bandpass Filter

## ABF-3R3G+

50Ω 3100 to 3500 MHz

### KEY FEATURES

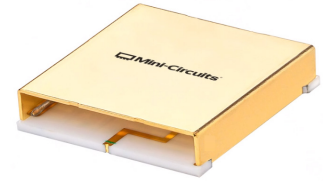
- Low Passband Insertion Loss of 1.6dB Typ.
- High Rejection of 54dB Typ.
- Good Return Loss of 15dB Typ.
- Small Size, 12 x 12 x 2.54 mm.

### APPLICATIONS

- 5G-sub GHz
- S-Band Radar.
- Defence System.
- Test and Measurement Equipment.

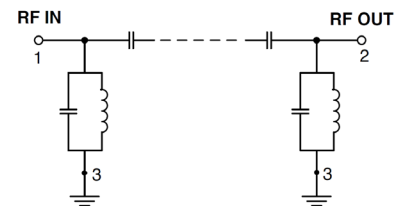
### PRODUCT OVERVIEW

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</sup> AT +25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Units	
Passband	Center Frequency <sup>3</sup>	—	—	3300	—	MHz	
	Insertion Loss	F1-F2	3100 - 3500	1.6	2.5	dB	
	Return Loss	F1-F2	3100 - 3500	—	15	dB	
Stop Band, Lower	Rejection	DC-F3	DC - 1500	42	54	—	dB
		F3-F4	1500 - 2400	22	35	—	dB
Stop Band, Upper	Rejection	F5-F6	4000 - 4500	22	44	—	dB
		F6-F7	4500 - 6000	40	50	—	dB
		F7-F8	6000 - 7000	—	35	—	dB

1. Measured on Mini-Circuits Characterization Test Board TB-ABF-3R3G+ 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. Typical variation ±3%

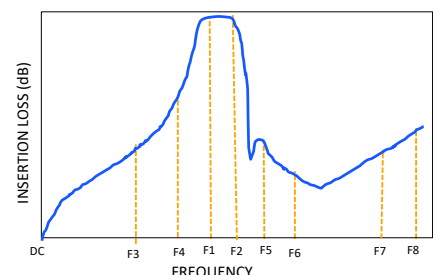
### ABSOLUTE MAXIMUM RATINGS<sup>4</sup>

Parameter	Ratings
Operating Temperature	-55 °C to +125 °C
Storage Temperature	-55 °C to +125 °C
Input Power <sup>5</sup>	12W max. at 25°C

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

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

### TYPICAL FREQUENCY RESPONSE AT +25°C





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# Bandpass Filter

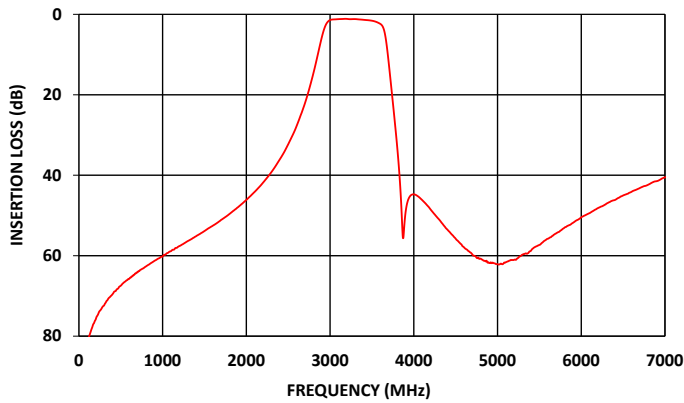
## ABF-3R3G+

Mini-Circuits

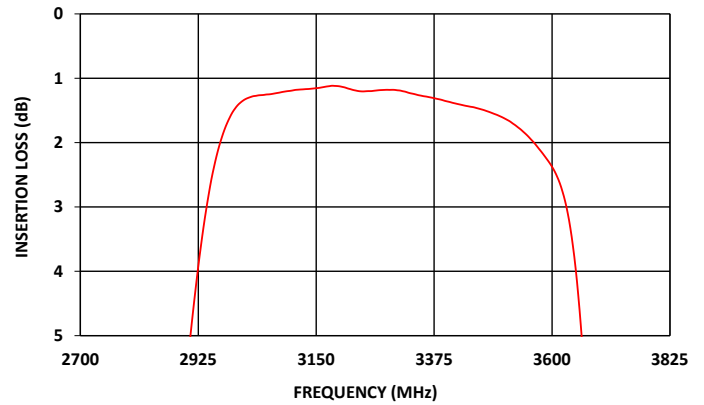
50Ω 3100 to 3500 MHz

### TYPICAL PERFORMANCE GRAPHS AT +25°C

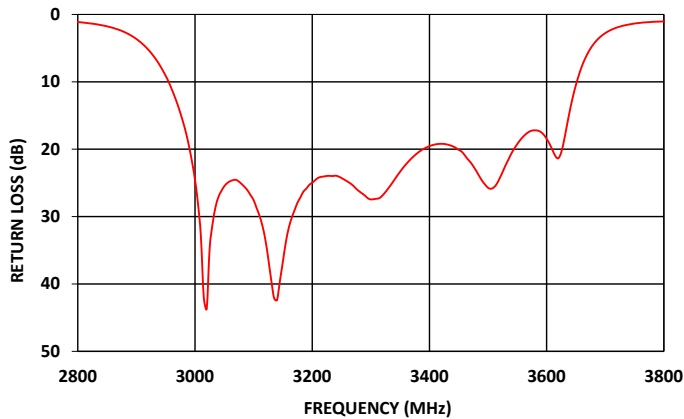
ABF-3R3G+  
INSERTION LOSS



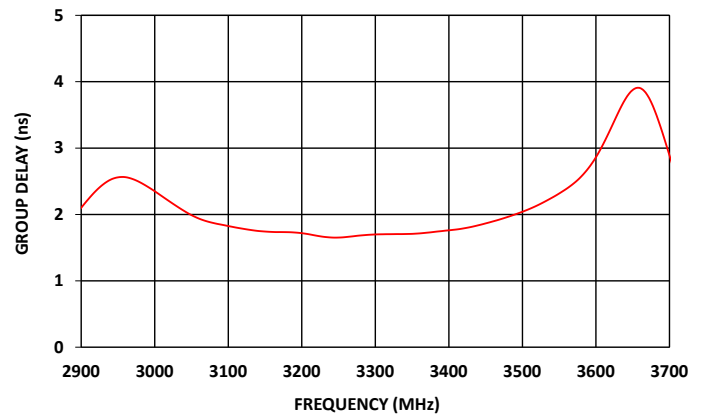
ABF-3R3G+  
INSERTION LOSS (Zoomed)



ABF-3R3G+  
RETURN LOSS



ABF-3R3G+  
GROUP DELAY





### FUNCTIONAL DIAGRAM

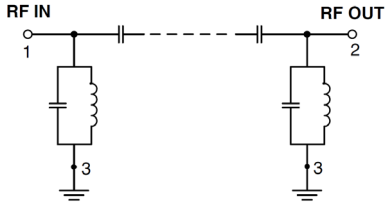
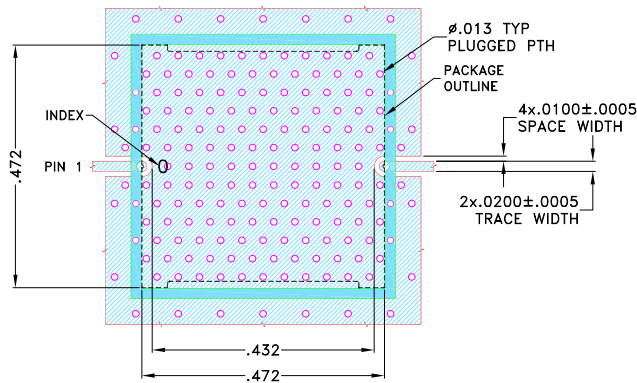


Figure 1. ABF-3R3G+ Functional Diagram

### PAD DESCRIPTION

Function	Pad Number	Description
RF <sub>1</sub> (Note 2)	1	Connects to RF Input Port
RF <sub>2</sub> (Note 2)	2	Connects to RF Output Port
GROUND	3	Connects to Ground on PCB, (See drawing PL-755)
NC	—	No connection, not used internally. See drawing PL-755 for connection to PCB

### SUGGESTED PCB LAYOUT (PL-755)

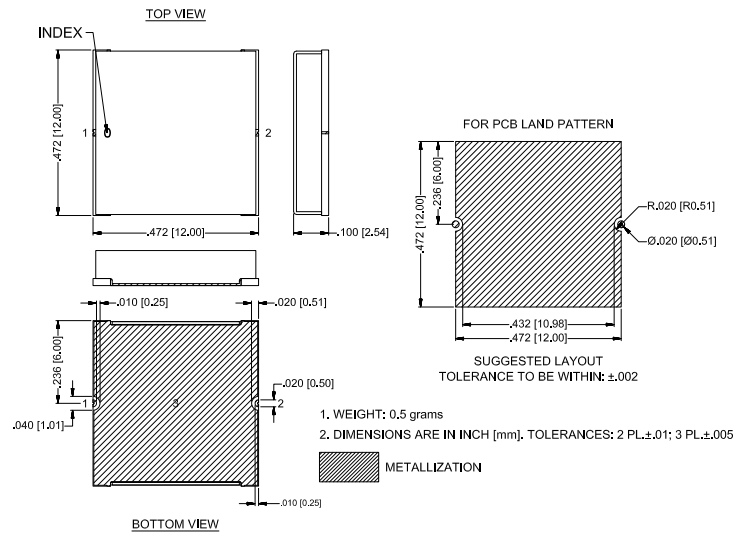


#### NOTES:

- COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .010±.001. 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

Figure 2. Suggested PCB Layout PL-755

### CASE STYLE DRAWING

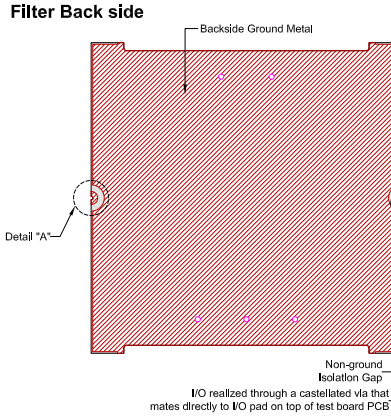


### PRODUCT MARKING\*: ABF-3R3G

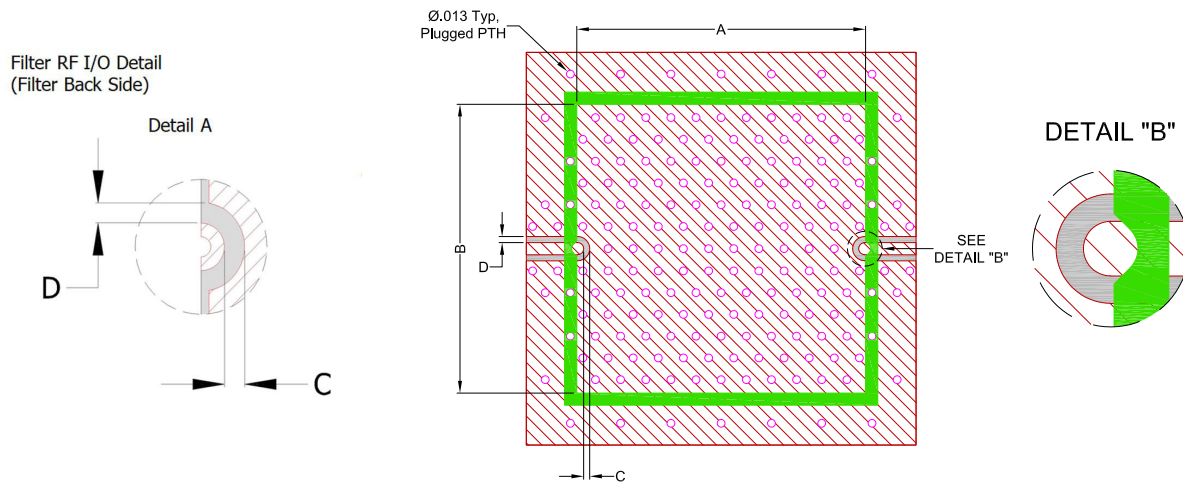
\*Marking may contain other features or characters for internal lot control.



### RECOMMENDED PCB LAYOUT PATTERN FOR FILTER



### PCB Pattern Recommendations

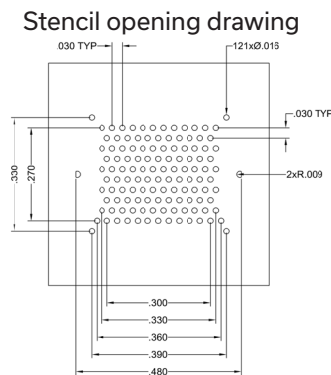


- 1) Customer PCB's ground pattern length (dimension A) can be similar to filter length.
- 2) Customer PCB's ground pattern width (dimension B) can be similar filter width.
- 3) Dimensions C and D on Filter RF I/O detail and Customer PCB pattern can be closely match. The dimensions of C and D on the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

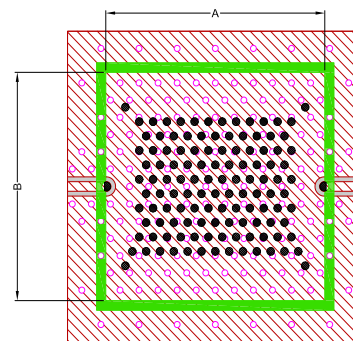


### COMMENTS ON COMPONENT HANDLING AND SOLDER ATTACH

- 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.



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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# Bandpass Filter

## ABF-3R3G+

Mini-Circuits

50Ω 3100 to 3500 MHz

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASH BOARD.

[CLICK HERE](#)

Performance Data and Graphs	Data
	Graphs
	S-Parameter (S2P Files) Data Set (.zip file) De-embedded to device pads
Case Style	ZH3433 Lead Finish: Gold over Nickel Plate
RoHS Status	Compliant
Tape and Reel	TR-F008
Suggested Layout for PCB Design	PL-755
Evaluation Board	TB-ABF-3R3G+
	Gerber File
Environmental Rating	ENV120T1

### 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)



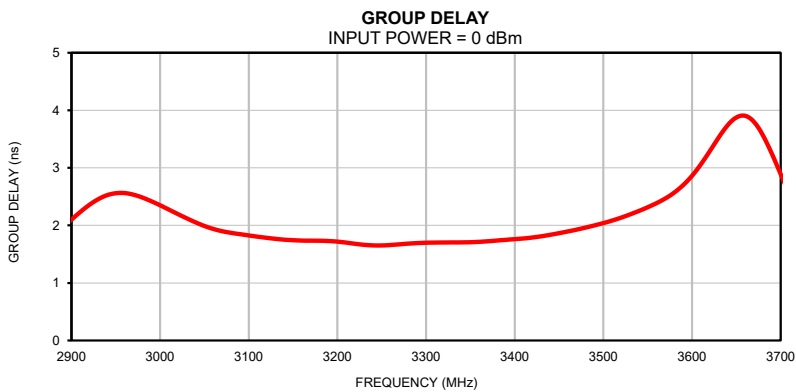
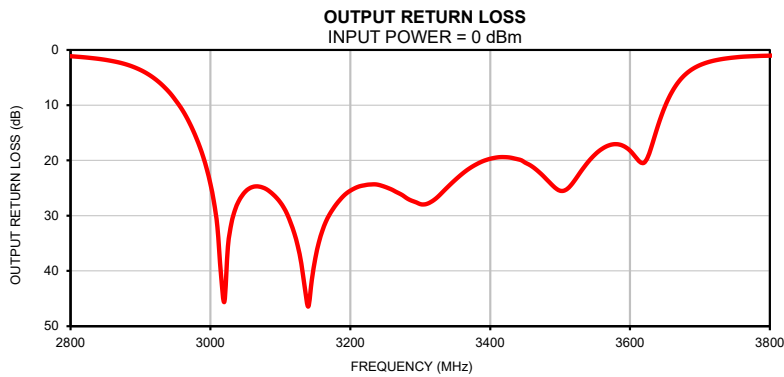
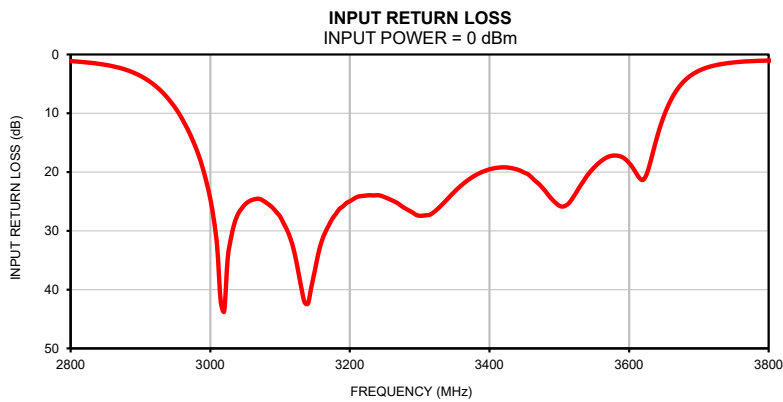
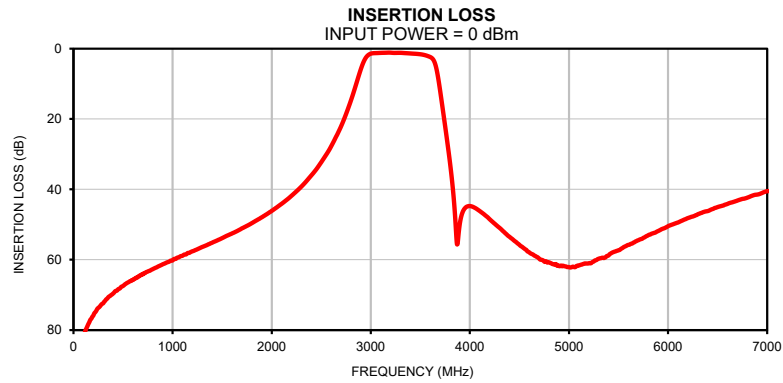
# Thin-Film Bandpass Filter

# ABF-3R3G+

## Typical Performance Data

FREQ.	Insertion Loss	Input Return Loss	Output Return Loss	FREQ.	Group Delay
(MHz)	(dB)	(dB)	(dB)	(MHz)	(ns)
10	104.00	0.09	0.10	3100	1.83
20	96.49	0.10	0.11	3105	1.81
30	90.84	0.13	0.12	3110	1.80
40	89.56	0.13	0.14	3115	1.79
50	88.14	0.13	0.14	3120	1.78
60	85.49	0.15	0.14	3125	1.78
70	84.56	0.15	0.15	3130	1.77
80	83.49	0.15	0.16	3135	1.76
90	82.56	0.15	0.16	3140	1.75
100	81.82	0.06	0.08	3145	1.75
200	75.87	0.18	0.19	3150	1.74
300	72.38	0.22	0.23	3155	1.74
400	69.60	0.26	0.26	3160	1.74
500	67.45	0.28	0.28	3165	1.73
600	65.78	0.30	0.31	3170	1.73
700	64.16	0.32	0.31	3175	1.73
800	62.68	0.31	0.32	3180	1.73
900	61.31	0.31	0.31	3185	1.73
1000	60.20	0.31	0.32	3190	1.73
1100	58.86	0.30	0.30	3195	1.72
1200	57.60	0.28	0.28	3200	1.72
1300	56.37	0.27	0.26	3205	1.71
1400	55.15	0.26	0.26	3210	1.70
1500	53.86	0.25	0.25	3215	1.69
1600	52.53	0.24	0.22	3220	1.68
1700	51.08	0.22	0.22	3225	1.67
1800	49.60	0.22	0.22	3230	1.66
1900	47.95	0.19	0.20	3235	1.66
2000	46.11	0.20	0.19	3240	1.65
2100	44.11	0.20	0.20	3245	1.65
2200	41.82	0.22	0.25	3250	1.65
2300	39.20	0.27	0.27	3255	1.65
2400	36.03	0.25	0.26	3260	1.66
2500	32.29	0.32	0.34	3265	1.67
2600	27.77	0.44	0.47	3270	1.67
2700	22.09	0.61	0.65	3275	1.68
2800	14.70	1.12	1.13	3280	1.68
2900	5.81	3.64	3.63	3285	1.69
3000	1.42	24.51	24.25	3290	1.69
3100	1.20	27.54	27.60	3295	1.70
3200	1.13	24.97	25.48	3300	1.70
3300	1.18	27.45	27.90	3310	1.70
3400	1.36	19.54	19.70	3320	1.70
3500	1.59	25.73	25.48	3330	1.70
3600	2.38	18.45	18.21	3340	1.70
3700	11.99	2.77	2.75	3350	1.71
3800	32.58	1.03	1.03	3360	1.71
3900	49.49	0.77	0.78	3370	1.72
4000	44.74	0.70	0.72	3380	1.74
4200	48.50	0.70	0.72	3390	1.75
4400	53.48	0.72	0.74	3400	1.76
4500	55.77	0.74	0.76	3410	1.77
4800	60.75	0.77	0.78	3420	1.79
5000	62.09	0.75	0.76	3430	1.81
5200	61.01	0.75	0.76	3440	1.84
5400	58.75	0.71	0.70	3450	1.87
5500	57.30	0.71	0.71	3460	1.90
6000	50.47	0.62	0.62	3470	1.93
6500	45.03	0.63	0.62	3480	1.96
7000	40.52	0.68	0.68	3500	2.04

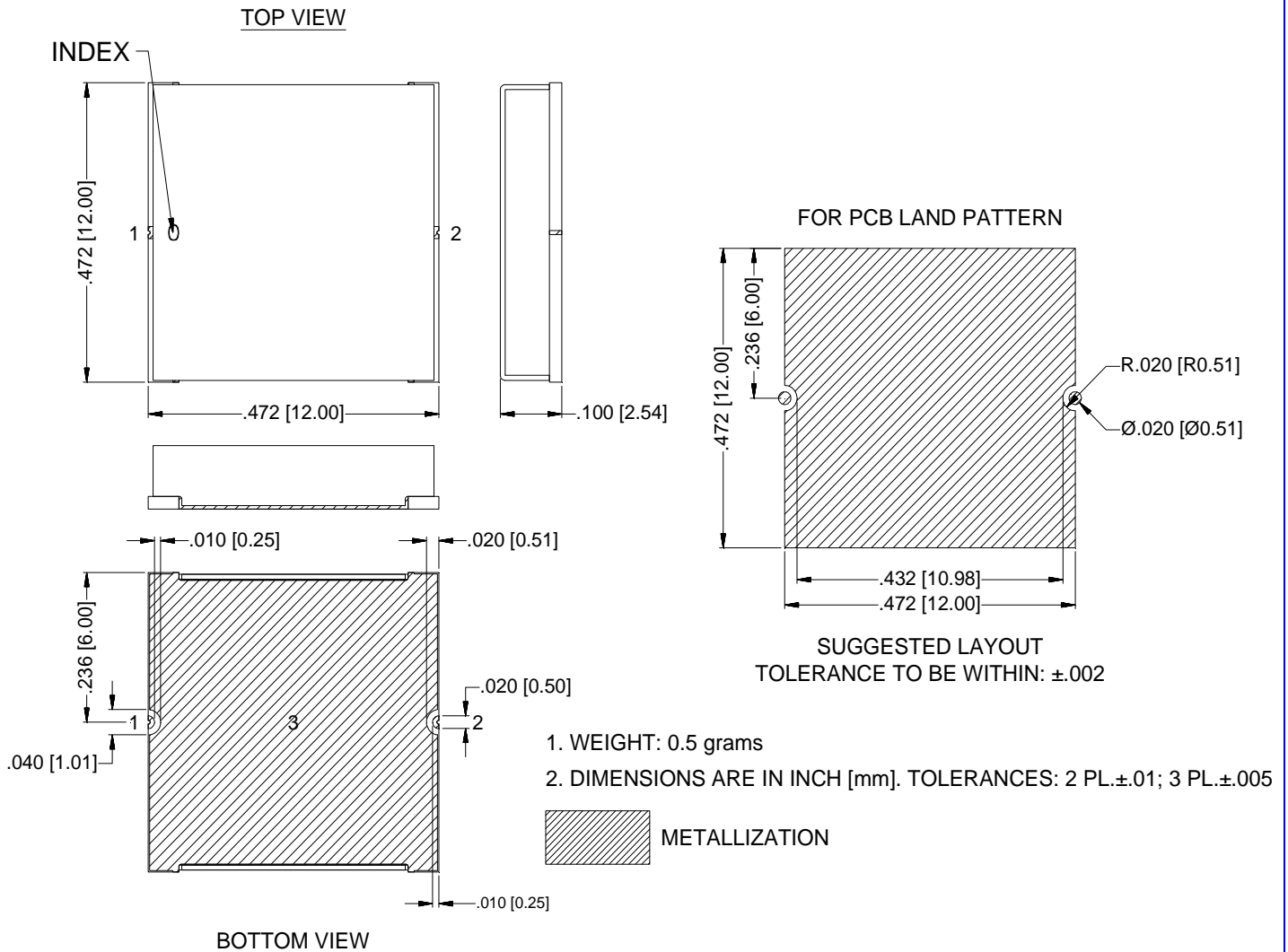
Typical Performance Curves





## Outline Dimensions

## ZH3433



### 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.



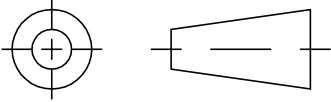
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

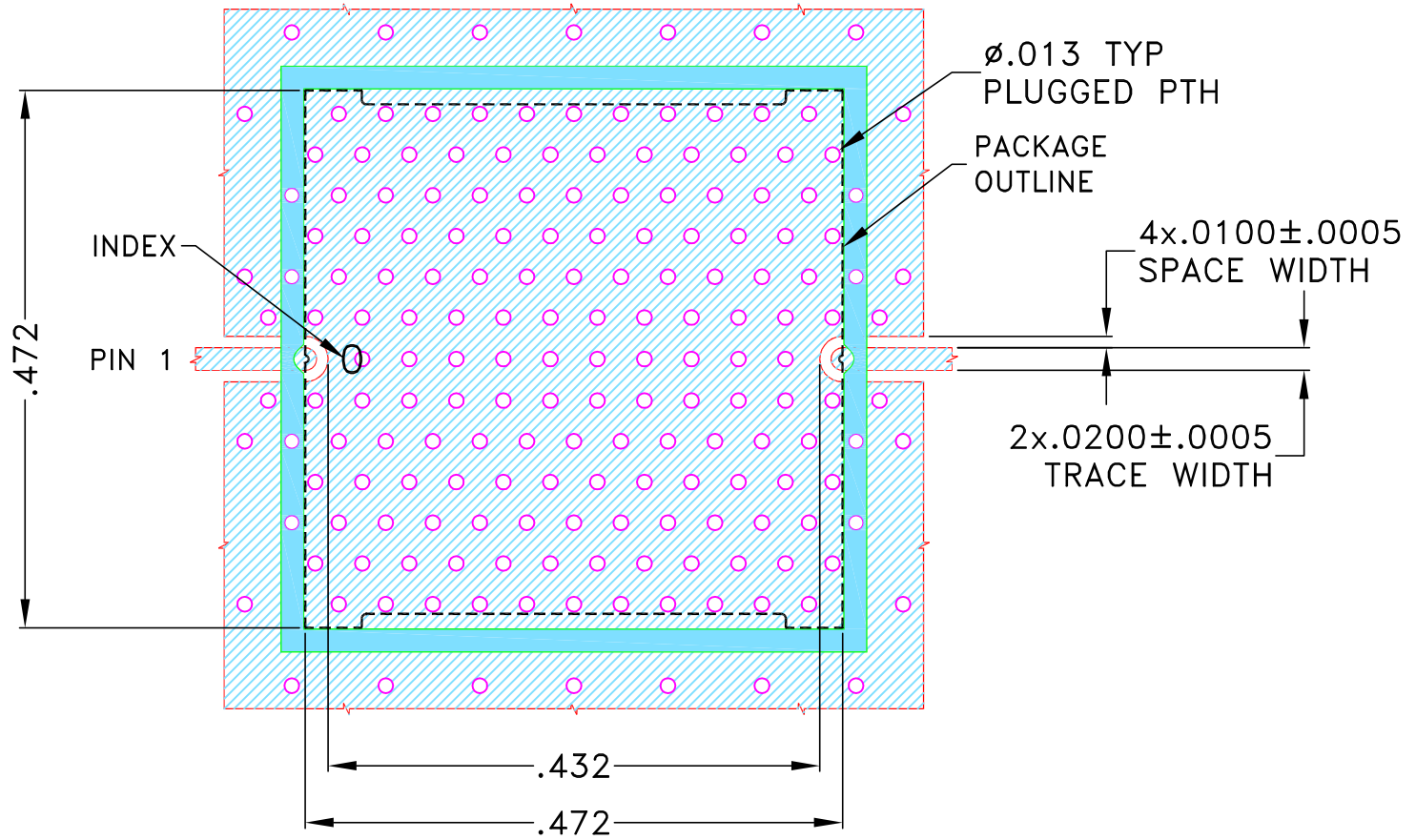
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	NPO-003619	NEW RELEASE	JUN 23	DDR	VC

SUGGESTED MOUNTING CONFIGURATION  
FOR ZH3433 CASE STYLE



NOTES:

- COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS  $.010 \pm .001$ . 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
DIMENSIONS ARE IN INCHES	DRAWN: DDR	10 JUN 23
TOLERANCES ON:	CHECKED: RR	10 JUN 23
2 PL DECIMALS ±	APPROVED: NN	10 JUN 23
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		

**Mini-Circuits®** 13 Neptune Avenue  
Brooklyn NY 11235

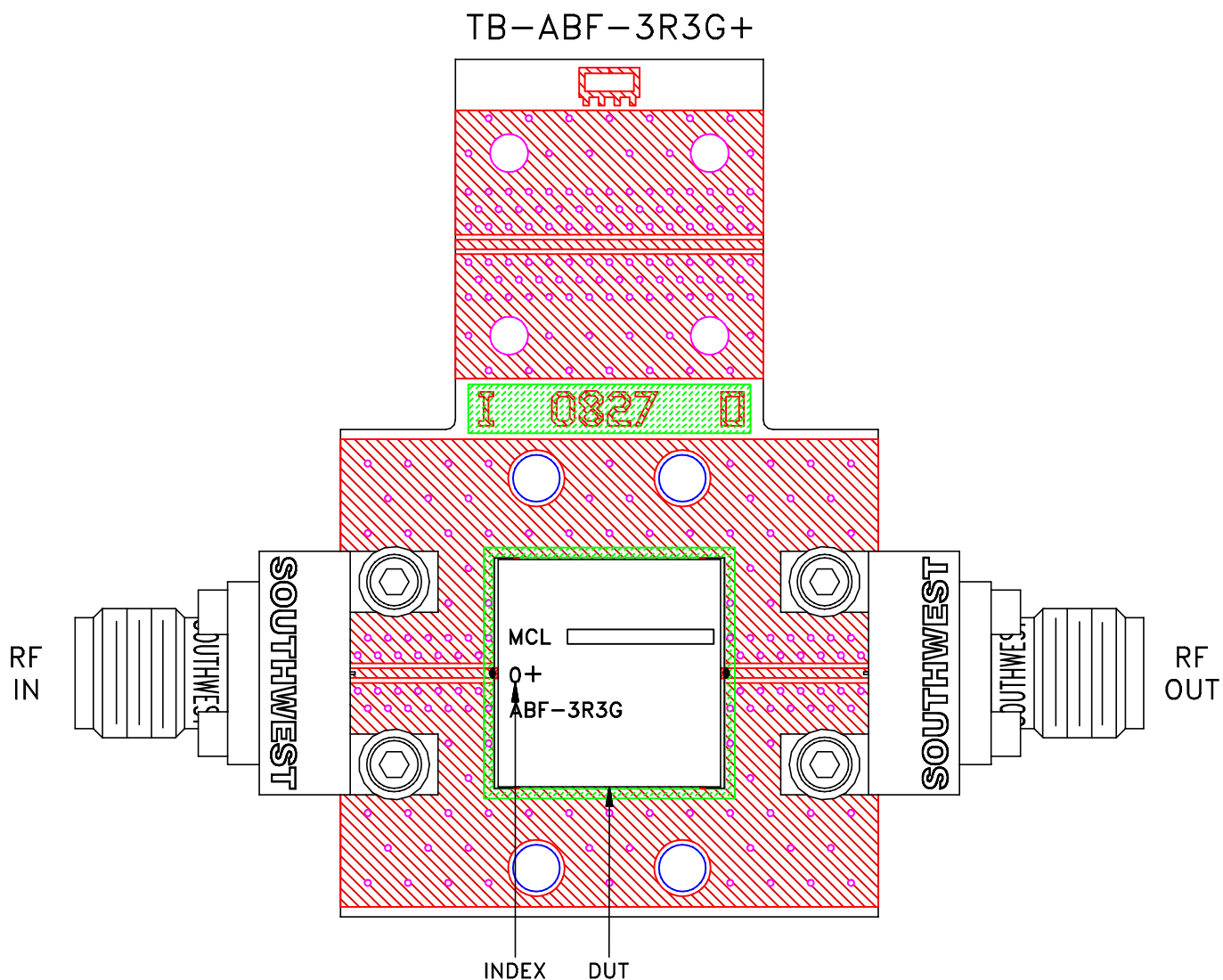
PL DWG, ZH3433 C.S, 50 OHM, ABF

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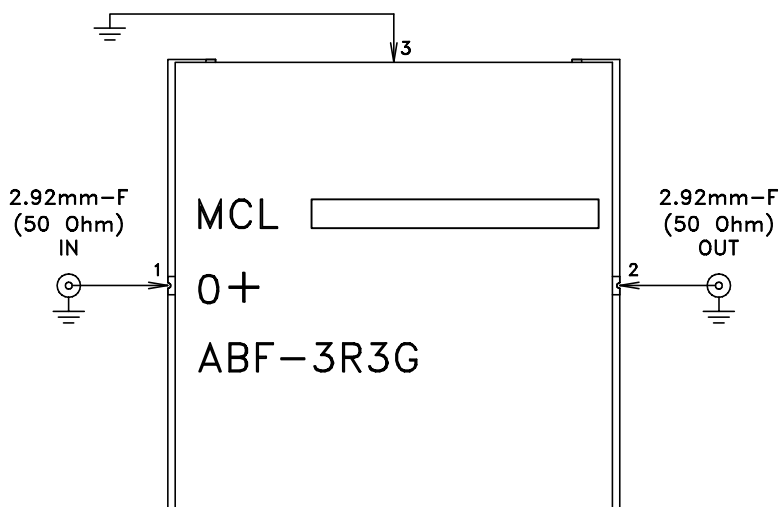
ASHEETA1.DWG REV:A DATE:01/12/95

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-755	OR
FILE:	98-PL-755	SCALE:	6:1
SHEET:	1	OF	1

# Evaluation Board and Circuit




Schematic diagram



Notes:

1. PCB Material: ROGERS (R04350B) OR Equivalent, Dielectric Constant= $3.48 \pm .05$   
Dielectric Thickness:  $.010 \pm .001$  inch
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, 25 cycles	MIL-STD-202, Method 107, Condition A-1, Except +125°C