THIN FILM SURFACE MOUNT

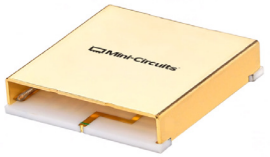
Bandpass Filter

ABF-3R3G+

50Ω 3100 to 3500 MHz

KEY FEATURES

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

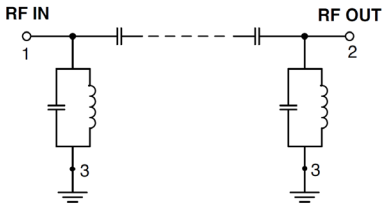


Generic photo used for illustration purposes only

APPLICATIONS

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

FUNCTIONAL DIAGRAM



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.

ELECTRICAL SPECIFICATIONS[1,2,3] AT +25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Passband	Center Frequency[4]	—	—	—	3300	—	MHz
	Insertion Loss	F1-F2	3100 - 3500	—	1.6	2.5	dB
	Return Loss	F1-F2	3100 - 3500	—	15	—	dB
Stopband, Lower	Rejection	DC-F3	DC - 1500	42	54	—	dB
		F3-F4	1500 - 2400	22	35	—	
Stopband, Upper	Rejection	F5-F6	4000 - 4500	22	44	—	dB
		F6-F7	4500 - 6000	40	50	—	
		F7-F8	6000 - 7000	—	35	—	

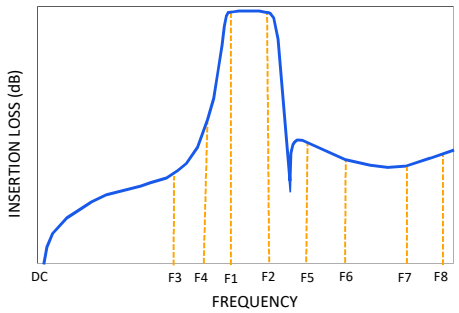
1. Measured on Mini-Circuits Characterization Test Board TB-ABF-3R3G+ with feedline losses removed by normalization of S12 and S21 traces to mesurement of TB thru-line.
2. This filter is bi-directional RF1 and RF2 ports may be interchanged, see S-Parameters for actual performance.
3. This component is 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[5]

Parameter	Ratings
Operating Temperature	-55 °C to +125 °C
Storage Temperature	-55 °C to +125 °C
Input Power[6]	12W 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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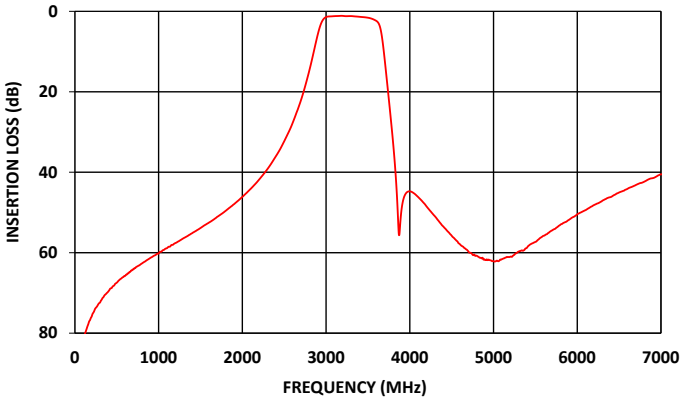
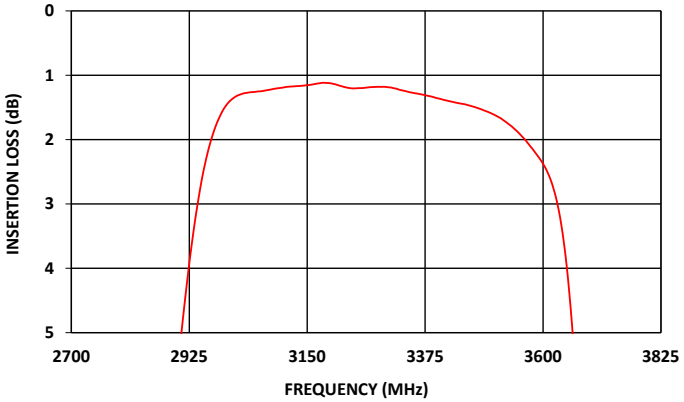
TYPICAL PERFORMANCE GRAPHS AT +25°C

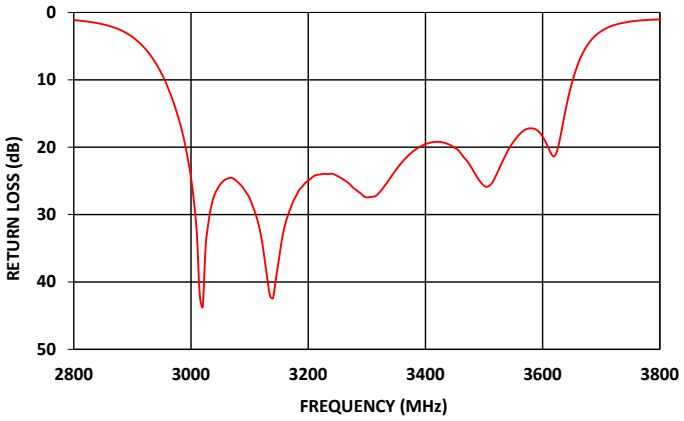
ABF-3R3G+
INSERTION LOSS



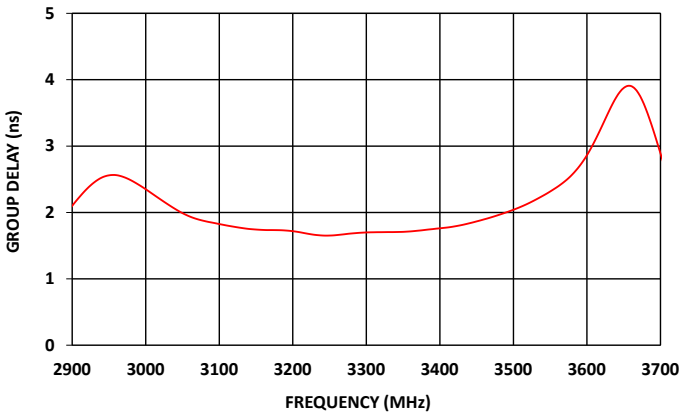
ABF-3R3G+
INSERTION LOSS (Zoomed)



ABF-3R3G+
RETURN LOSS



ABF-3R3G+
GROUP DELAY



THIN FILM SURFACE MOUNT

Bandpass Filter

ABF-3R3G+

50Ω 3100 to 3500 MHz

FUNCTIONAL DIAGRAM

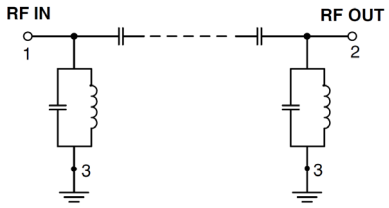
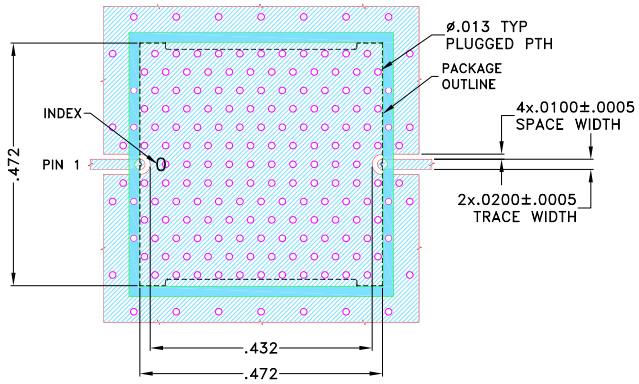


Figure 1. ABF-3R3G+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description
RF1 (Note 2)	1	Connects to RF Input Port
RF2 (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:

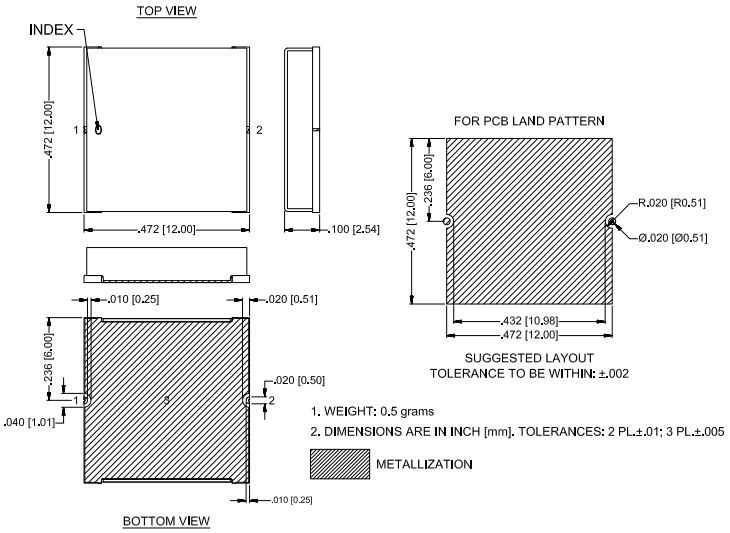
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .010±.001. COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES PCB COPPER PATTERN FREE OF SOLDERMASK

Figure 2. Suggested PCB Layout PL-755

CASE STYLE DRAWING



PRODUCT MARKING*: ABF-3R3G

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

Bandpass Filter

ABF-3R3G+

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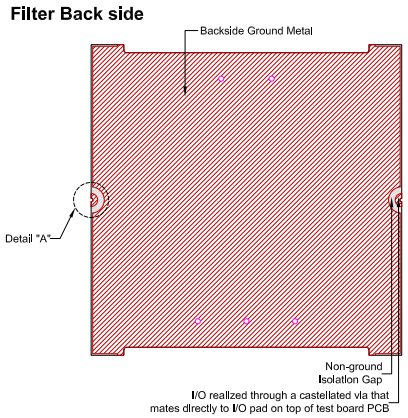
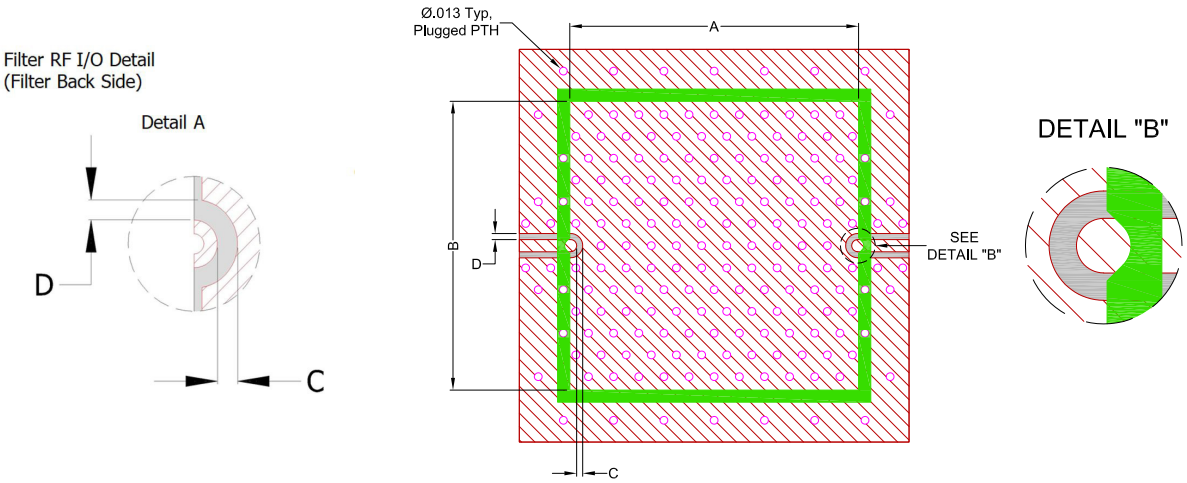
RECOMMENDED PCB LAYOUT PATTERN FOR FILTER



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 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).

Bandpass Filter

ABF-3R3G+

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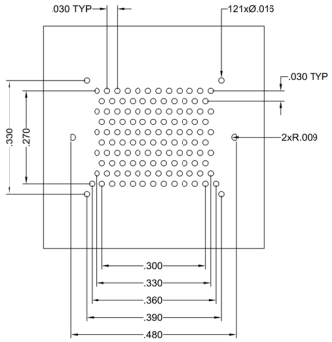
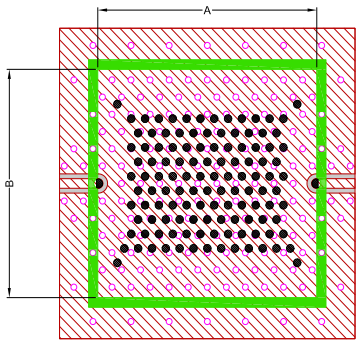
COMMENTS ON COMPONENT HANDLING AND SOLDER ATTACH

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 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

Thin-Film Bandpass Filter ABF-3R3G+

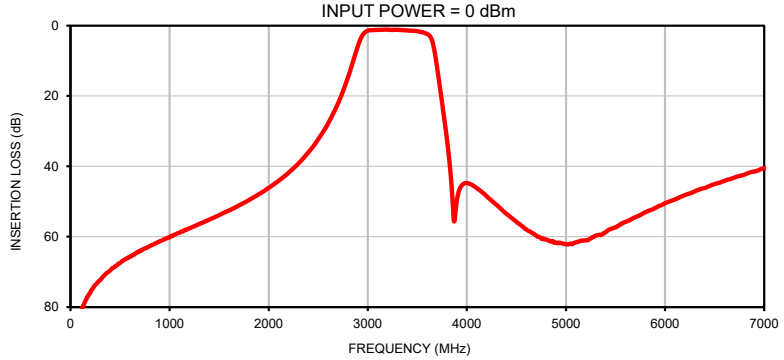
Typical Performance Data

FREQ. (MHz)	Insertion Loss (dB)	Input Return Loss (dB)	Output Return Loss (dB)
10	104.00	0.09	0.10
20	96.49	0.10	0.11
30	90.84	0.13	0.12
40	89.56	0.13	0.14
50	88.14	0.13	0.14
60	85.49	0.15	0.14
70	84.56	0.15	0.15
80	83.49	0.15	0.16
90	82.56	0.15	0.16
100	81.82	0.06	0.08
200	75.87	0.18	0.19
300	72.38	0.22	0.23
400	69.60	0.26	0.26
500	67.45	0.28	0.28
600	65.78	0.30	0.31
700	64.16	0.32	0.31
800	62.68	0.31	0.32
900	61.31	0.31	0.31
1000	60.20	0.31	0.32
1100	58.86	0.30	0.30
1200	57.60	0.28	0.28
1300	56.37	0.27	0.26
1400	55.15	0.26	0.26
1500	53.86	0.25	0.25
1600	52.53	0.24	0.22
1700	51.08	0.22	0.22
1800	49.60	0.22	0.22
1900	47.95	0.19	0.20
2000	46.11	0.20	0.19
2100	44.11	0.20	0.20
2200	41.82	0.22	0.25
2300	39.20	0.27	0.27
2400	36.03	0.25	0.26
2500	32.29	0.32	0.34
2600	27.77	0.44	0.47
2700	22.09	0.61	0.65
2800	14.70	1.12	1.13
2900	5.81	3.64	3.63
3000	1.42	24.51	24.25
3100	1.20	27.54	27.60
3200	1.13	24.97	25.48
3300	1.18	27.45	27.90
3400	1.36	19.54	19.70
3500	1.59	25.73	25.48
3600	2.38	18.45	18.21
3700	11.99	2.77	2.75
3800	32.58	1.03	1.03
3900	49.49	0.77	0.78
4000	44.74	0.70	0.72
4200	48.50	0.70	0.72
4400	53.48	0.72	0.74
4500	55.77	0.74	0.76
4800	60.75	0.77	0.78
5000	62.09	0.75	0.76
5200	61.01	0.75	0.76
5400	58.75	0.71	0.70
5500	57.30	0.71	0.71
6000	50.47	0.62	0.62
6500	45.03	0.63	0.62
7000	40.52	0.68	0.68

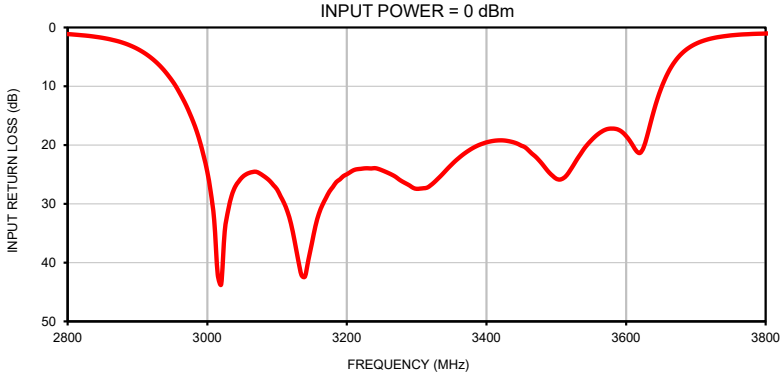
FREQ. (MHz)	Group Delay (ns)
3100	1.83
3105	1.81
3110	1.80
3115	1.79
3120	1.78
3125	1.78
3130	1.77
3135	1.76
3140	1.75
3145	1.75
3150	1.74
3155	1.74
3160	1.74
3165	1.73
3170	1.73
3175	1.73
3180	1.73
3185	1.73
3190	1.73
3195	1.72
3200	1.72
3205	1.71
3210	1.70
3215	1.69
3220	1.68
3225	1.67
3230	1.66
3235	1.66
3240	1.65
3245	1.65
3250	1.65
3255	1.65
3260	1.66
3265	1.67
3270	1.67
3275	1.68
3280	1.68
3285	1.69
3290	1.69
3295	1.70
3300	1.70
3310	1.70
3320	1.70
3330	1.70
3340	1.70
3350	1.71
3360	1.71
3370	1.72
3380	1.74
3390	1.75
3400	1.76
3410	1.77
3420	1.79
3430	1.81
3440	1.84
3450	1.87
3460	1.90
3470	1.93
3480	1.96
3500	2.04

Typical Performance Curves

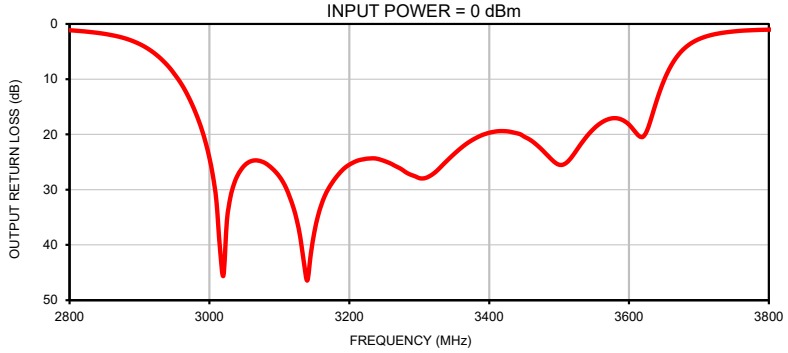
INSERTION LOSS
INPUT POWER = 0 dBm



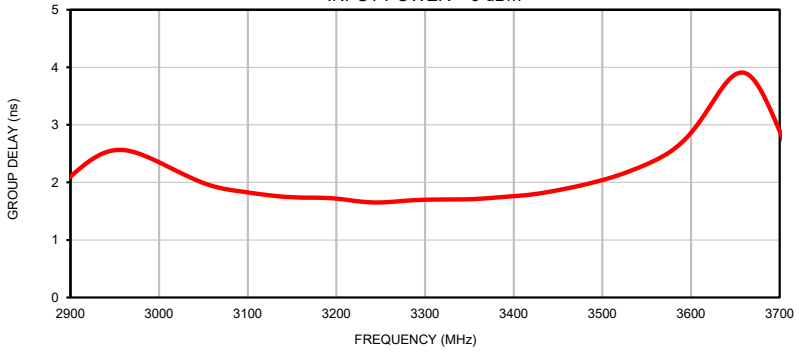
INPUT RETURN LOSS
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS
INPUT POWER = 0 dBm

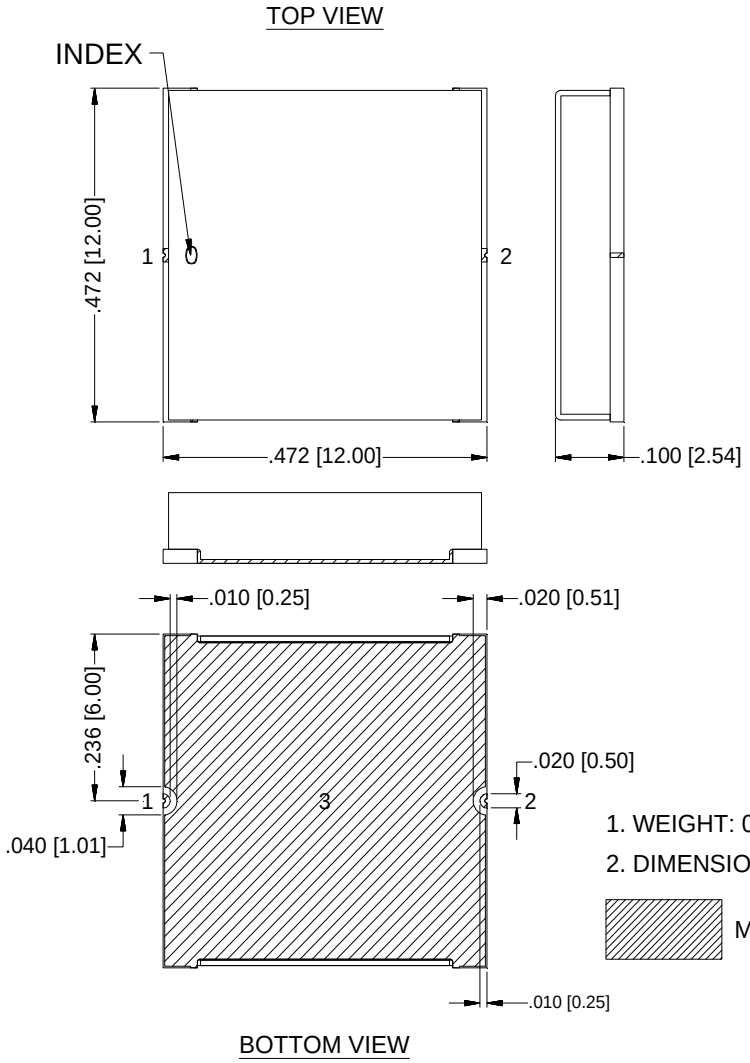


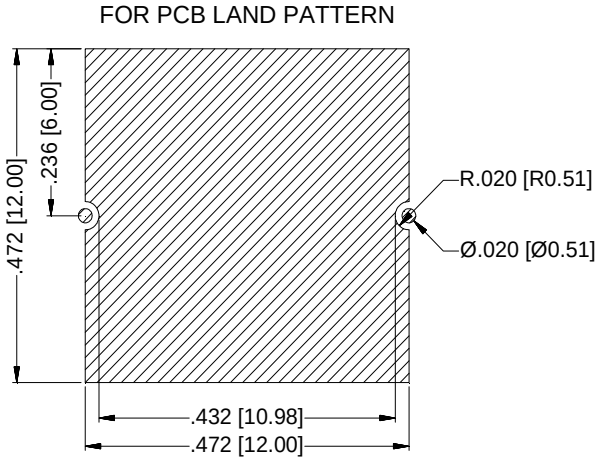
GROUP DELAY
INPUT POWER = 0 dBm



Case Style ZH

Outline Dimensions ZH3433





1. WEIGHT: 0.5 grams
2. DIMENSIONS ARE IN INCH [mm]. TOLERANCES: 2 PL.±.01; 3 PL.±.005

METALLIZATION

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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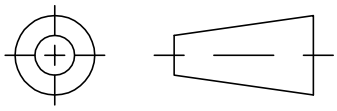
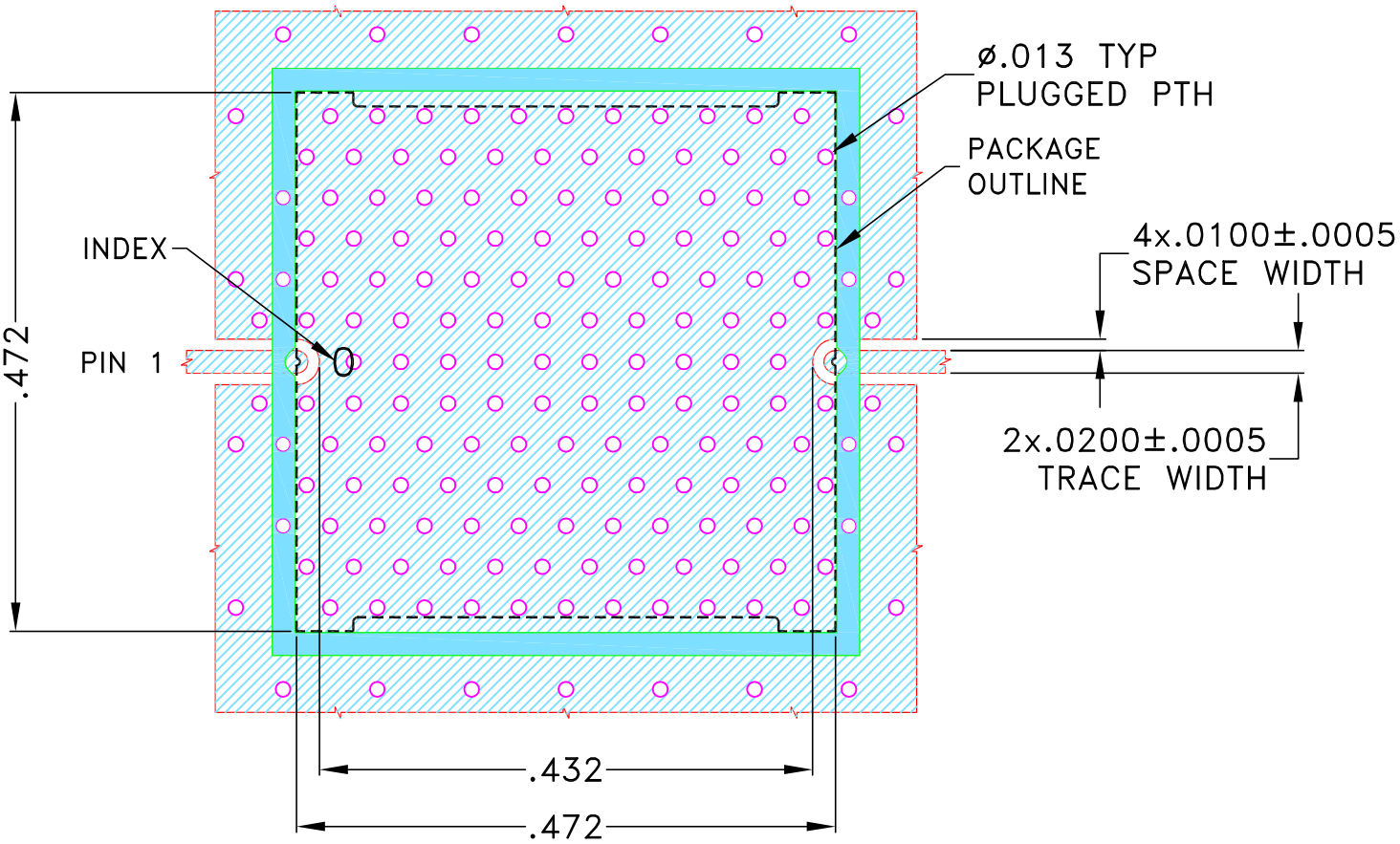
THIRD ANGLE PROJECTION



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:

1. 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.
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	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 ®

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

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

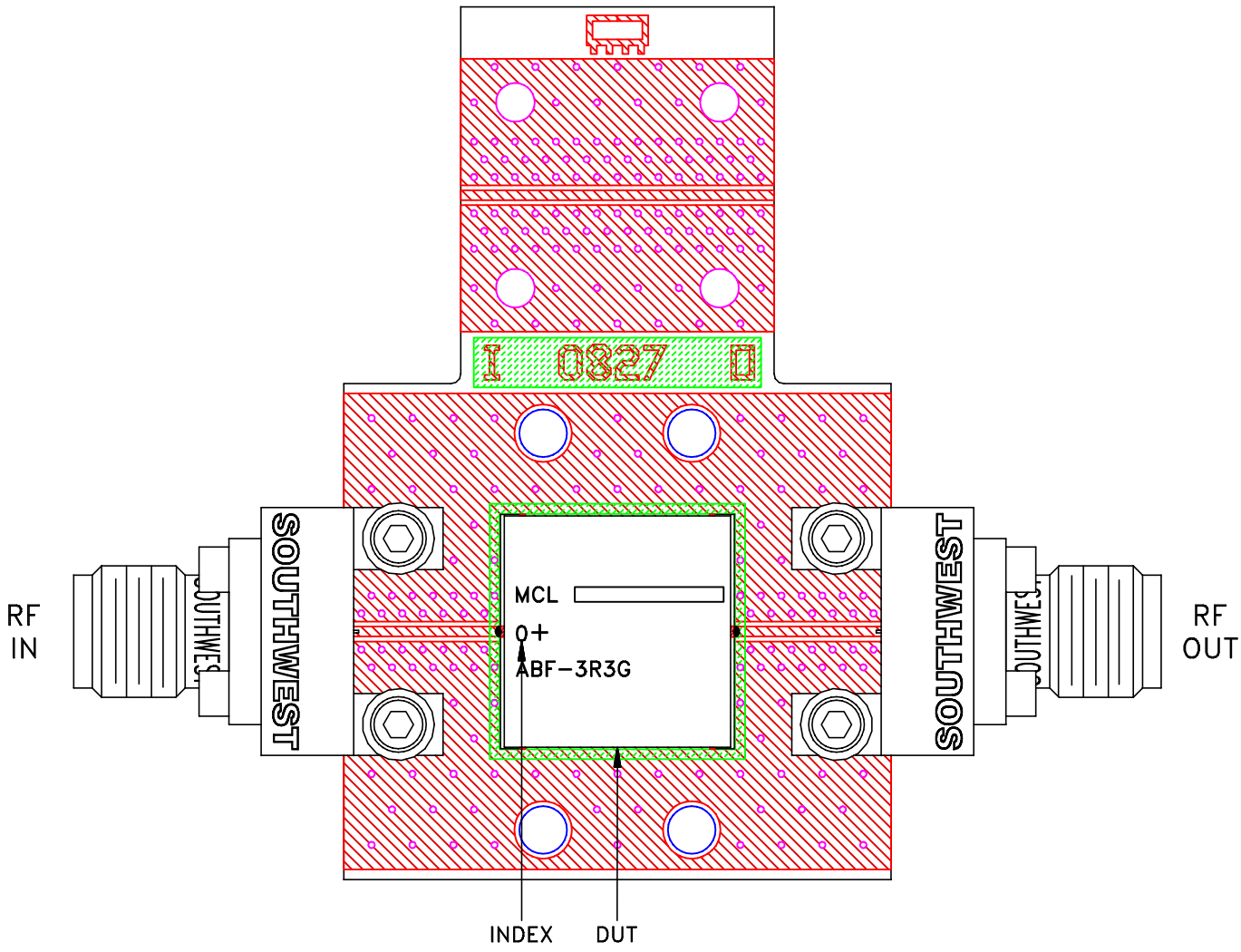
PL DWG, ZH3433 C.S, 50 OHM, ABF

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-755	OR

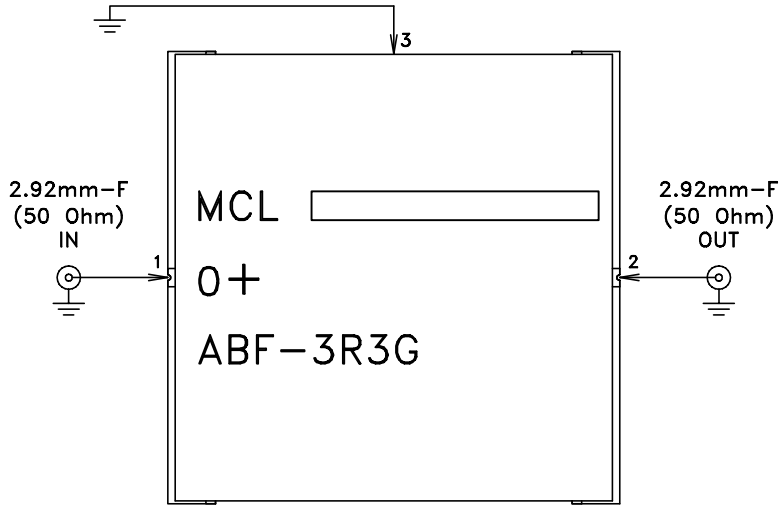
FILE:	SCALE:	SHEET:
98-PL-755	6:1	1 OF 1

Evaluation Board and Circuit

TB-ABF-3R3G+



Schematic diagram



Notes:

1. PCB Material: ROGERS (RO4350B) OR Equivalent, Dielectric Constant=3.48±.05
Dielectric Thickness: .010±.001 inch
2. 50 Ohm 2.92mm Female Connectors.

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Mini-Circuits

Environmental Specifications **ENV120T1**

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

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