THIN FILM SURFACE MOUNT

Bandpass Filter

ABF-28G+

50Ω 26.5 to 29.5 GHz

KEY FEATURES

- Low Mid band Insertion Loss of 1.6 dB Typ.
- High Rejection of 60 dB Typ.
- Good Return Loss of 15 dB Typ.
- Small Size, 3.05 x 11.43 x 2.54 mm

Generic photo used for illustration purposes only

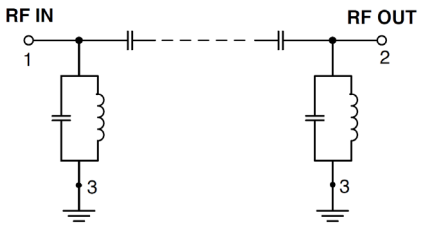
APPLICATIONS

- n257
- 5G Telecommunication

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 40GHz 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.

FUNCTIONAL DIAGRAM



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

Parameter		F#	Frequency (GHz)	Min.	Typ.	Max.	Units
Passband	Center Frequency[4]	Fc	28	—	1.6	3.0	dB
	Insertion Loss	F1-F2	26.5 - 29.5	—	3.5	—	
	Return Loss	F1-F2	26.5 - 29.5	—	15	—	
Stopband, Lower	Rejection	DC-F3	DC - 23	30	45	—	dB
		F3-F4	23 - 24.5	25	45	—	
Stopband ,Upper	Rejection	F5-F6	31.5 - 32.5	25	55	—	dB
		F6-F7	32.5 - 36	40	60	—	
		F7-F8	36 - 40	—	40	—	

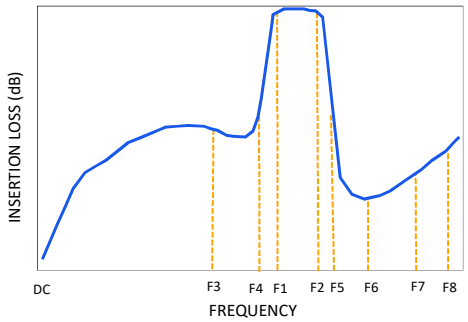
1. Tested on Evaluation Board P/N TB-ABF-28G+.
2. This filter is bi-directional RF1 and RF2 ports may be interchanged, see S-Parameters for actual performance.
3. This component is not intended for use as a DC-blocking circuit element. In applications where DC voltage and/or current is present at either 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]	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



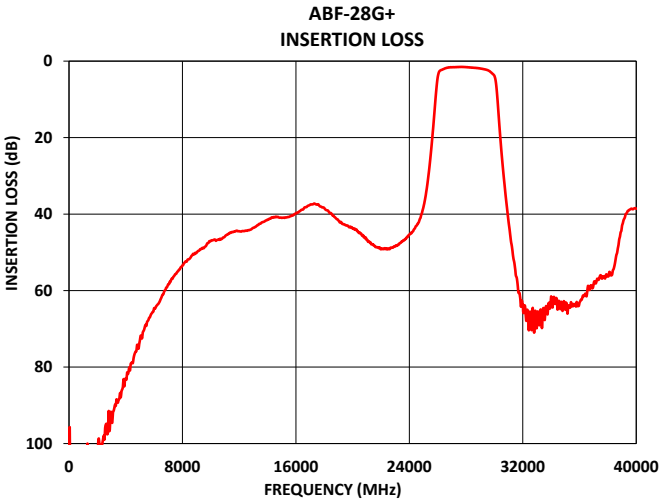
REV. A
ECO-024318
ABF-28G+
EDU3779
URJ
250127

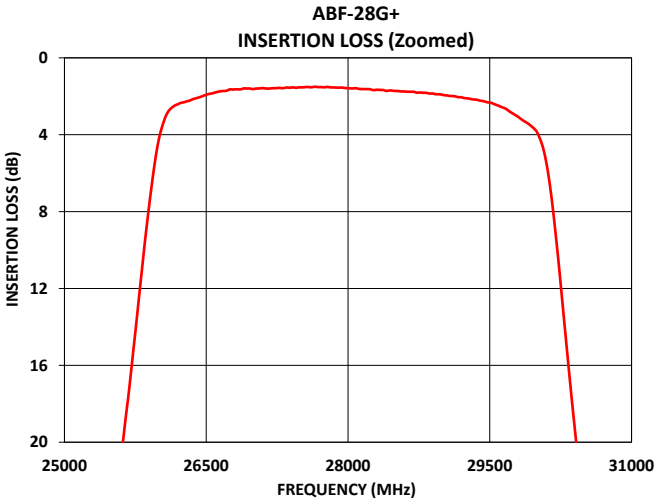
Bandpass Filter

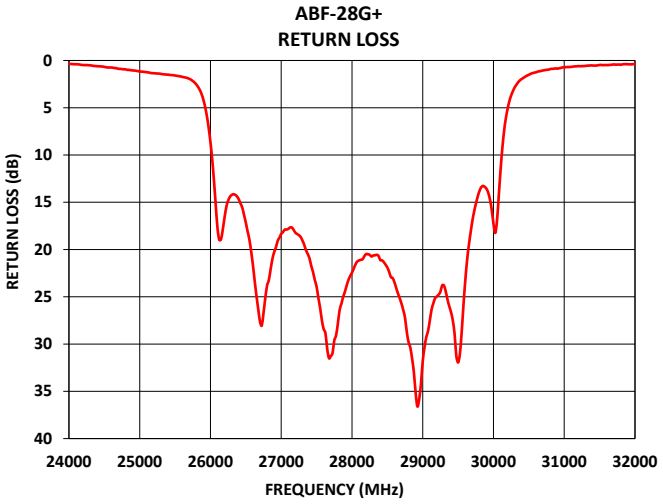
ABF-28G+

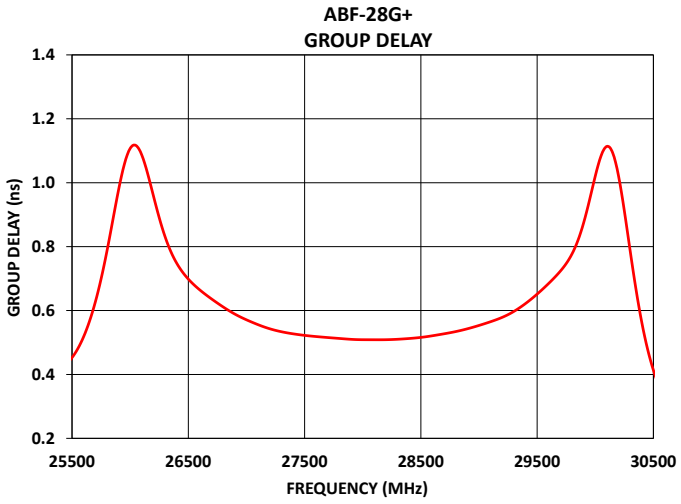
50Ω 26.5 to 29.5 GHz

TYPICAL PERFORMANCE GRAPHS AT +25°C









Bandpass Filter

ABF-28G+

50Ω 26.5 to 29.5 GHz

FUNCTIONAL DIAGRAM

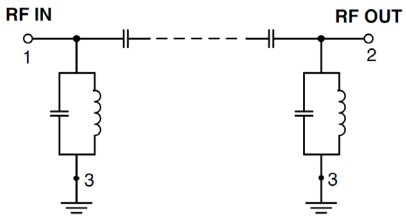
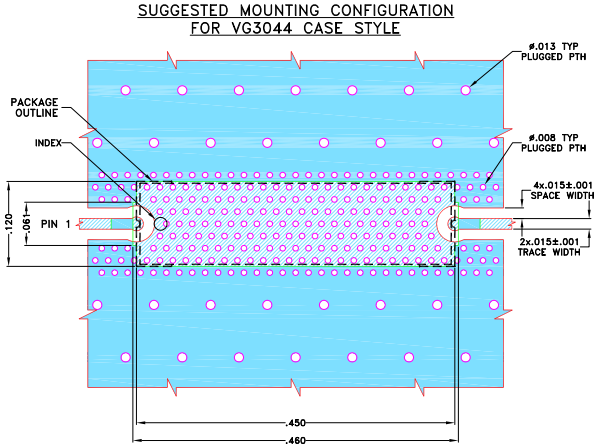


Figure 1. ABF-28G+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description
RF1[2]	1	Connects to RF Input Port
RF2[2]	2	Connects to RF Output Port
GROUND	3	Connects to Ground on PCB, (See drawing PL-713)
NC	—	No connection, not used internally. See drawing PL-713 for connection to PCB

SUGGESTED PCB LAYOUT (PL-713)

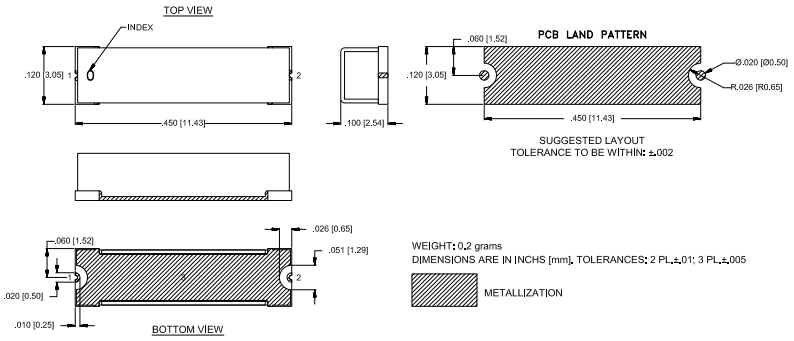


NOTES:
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .0066±.0007. COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

Figure 2. Suggested PCB Layout PL-713

CASE STYLE DRAWING

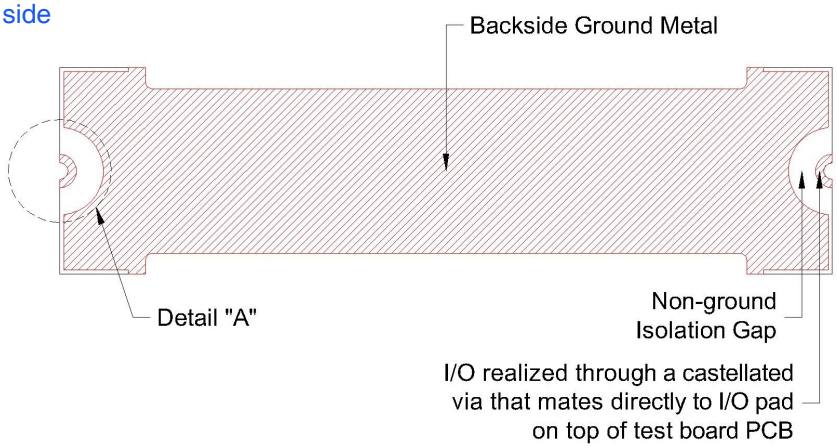


PRODUCT MARKING*: ABF-28G

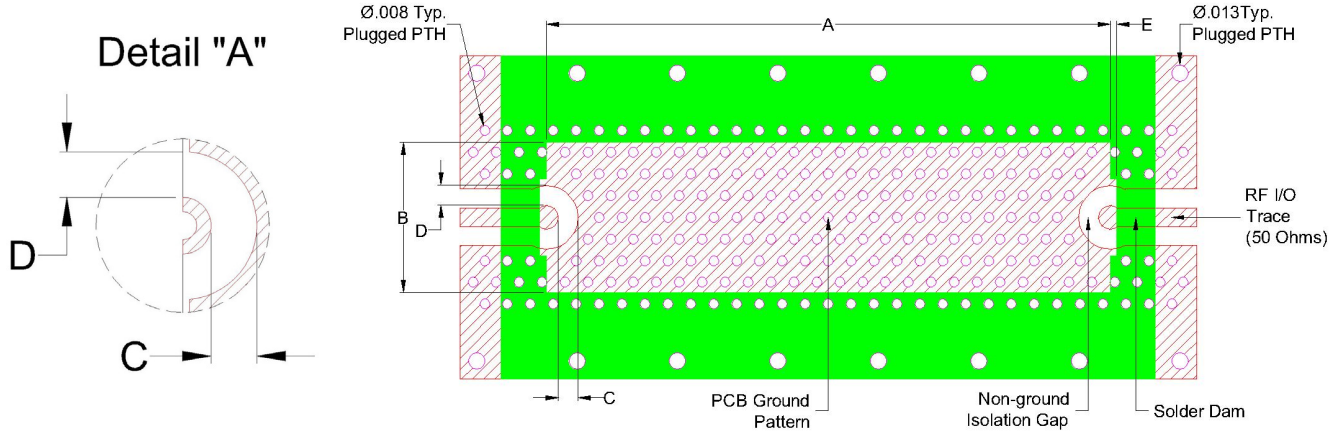
*Marking may contain other features or characters for internal lot control.

RECOMMENDED PCB LAYOUT PATTERN FOR FILTER

Filter Back side



PCB Pattern Recommendations

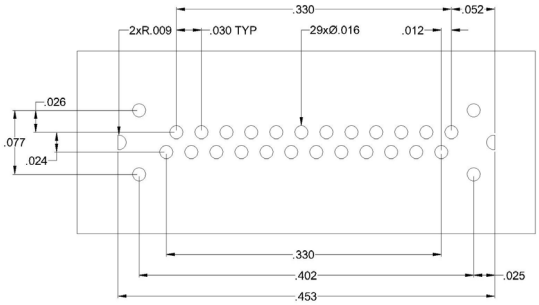


1) Customer PCB's ground pattern length (dimension A) can be similar to filter length.
2) Customer PCB's ground pattern width (dimension B) can be similar to filter width.
3) Dimensions C and D on Filter RF I/O detail and Customer PCB pattern can be closely match. The dimensions of C and D on the Customer 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 without any clearance.
5) Recommended to use Solder mask at I/O of Customer PCB with 5 mil clearance from filter I/O edge (dimension E)

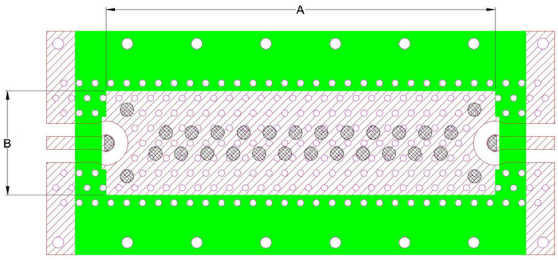
COMMENTS ON COMPONENT HANDLING AND SOLDER ATTACH

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.

THIN FILM SURFACE MOUNT

Bandpass Filter

ABF-28G+

50Ω 26.5 to 29.5 GHz

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	VG3044 Lead Finish: Gold over Nickel Plate
RoHS Status	Compliant
Tape and Reel	TR-F004
Suggested Layout for PCB Design	PL-713
Evaluation Board	TB-ABF-28G+
	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

Thin-Film Bandpass Filter ABF-28G+

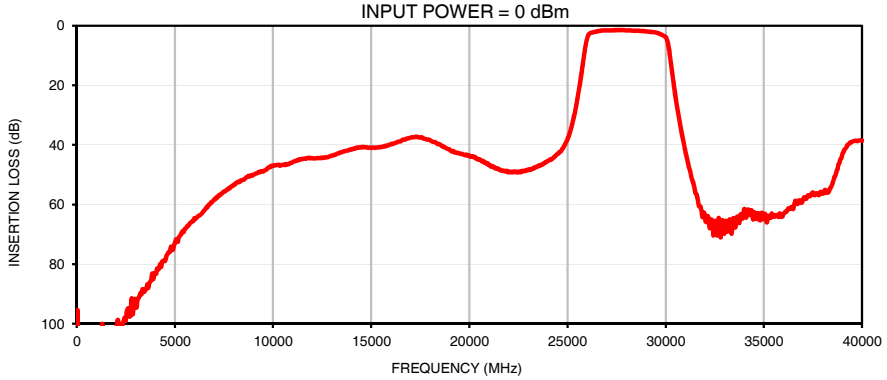
Typical Performance Data

FREQ. (MHz)	Insertion Loss (dB)	Input Return Loss (dB)	Output Return Loss (dB)
10	107.70	0.03	0.03
50	95.69	0.06	0.07
100	113.58	0.12	0.11
500	122.33	0.18	0.18
1000	104.11	0.19	0.18
2000	103.58	0.13	0.14
3000	94.21	0.03	0.05
4000	82.99	0.10	0.10
5000	73.00	0.04	0.06
6000	64.60	0.03	0.02
7000	58.34	0.00	0.04
8000	53.39	0.09	0.04
9000	50.09	0.06	0.03
10000	47.03	0.07	0.07
11000	45.81	0.10	0.10
12000	44.47	0.05	0.05
13000	43.58	0.03	0.02
14000	41.41	0.07	0.05
15000	41.00	0.12	0.11
18000	38.42	0.36	0.40
20000	43.82	0.30	0.30
20500	44.78	0.23	0.22
21000	46.76	0.17	0.14
22000	49.11	0.05	0.05
23000	48.45	0.06	0.06
24500	43.04	0.68	0.71
25350	29.81	1.47	1.54
25600	20.76	1.72	1.79
25825	10.78	2.80	2.92
26100	2.78	17.77	19.97
26500	1.92	17.16	17.54
27000	1.63	18.35	19.06
27500	1.54	23.93	27.89
27800	1.53	27.88	27.99
28000	1.58	22.45	24.38
28200	1.63	20.48	20.67
28500	1.72	21.91	20.53
29000	1.93	31.81	24.42
29500	2.33	31.96	33.18
29800	3.07	13.85	13.37
30225	10.50	4.29	4.17
30425	20.51	1.83	1.80
30650	30.02	1.14	1.22
31000	42.14	0.73	0.87
31200	47.81	0.59	0.76
31500	55.78	0.48	0.65
31800	61.50	0.45	0.60
32000	63.53	0.39	0.56
32300	65.07	0.35	0.50
32500	65.52	0.34	0.48
32800	71.01	0.31	0.41
33000	68.79	0.27	0.38
33500	66.81	0.27	0.28
34000	61.52	0.22	0.16
34500	63.33	0.17	0.07
35000	64.94	0.10	0.02
36000	63.14	0.06	0.04
38000	56.32	0.79	1.29
39000	42.99	4.26	4.69
40000	38.60	1.13	0.89

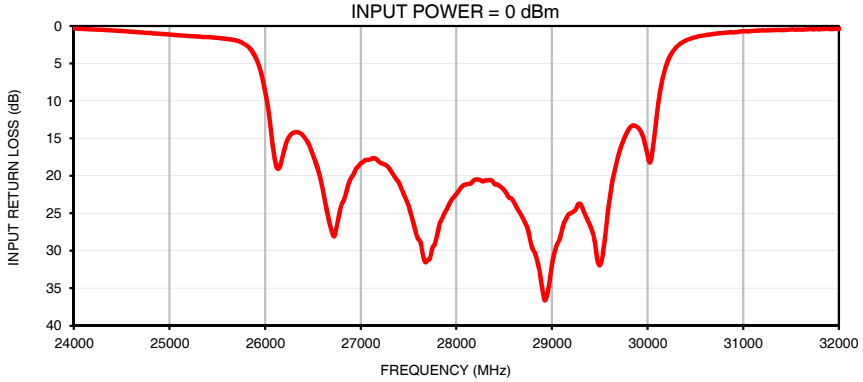
FREQ. (MHz)	Group Delay (ns)
26500	0.70
26550	0.68
26600	0.66
26650	0.65
26700	0.64
26750	0.62
26800	0.61
26850	0.60
26900	0.59
26950	0.58
27000	0.57
27050	0.56
27100	0.56
27150	0.55
27200	0.54
27250	0.54
27300	0.53
27350	0.53
27400	0.53
27450	0.52
27500	0.52
27550	0.52
27600	0.52
27650	0.52
27700	0.52
27750	0.51
27800	0.51
27850	0.51
27900	0.51
27950	0.51
28000	0.51
28050	0.51
28100	0.51
28150	0.51
28200	0.51
28250	0.51
28300	0.51
28350	0.51
28400	0.51
28450	0.51
28500	0.52
28550	0.52
28600	0.52
28650	0.52
28700	0.53
28750	0.53
28800	0.53
28850	0.54
28900	0.54
28950	0.55
29000	0.55
29050	0.56
29100	0.57
29150	0.57
29200	0.58
29250	0.59
29300	0.60
29350	0.61
29400	0.62
29500	0.65

Typical Performance Curves

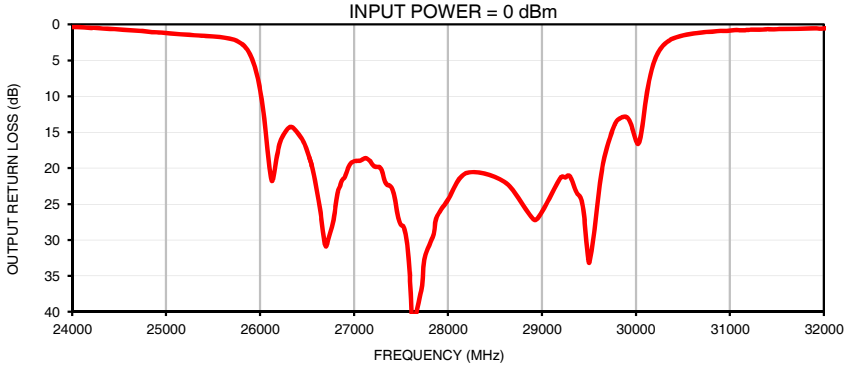
INSERTION LOSS
INPUT POWER = 0 dBm



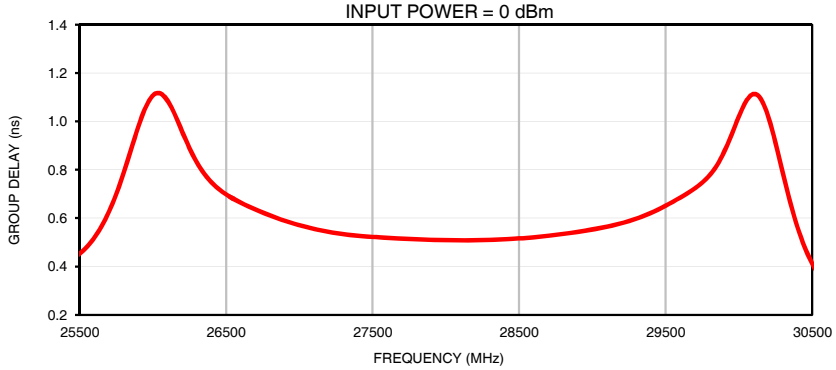
INPUT RETURN LOSS
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS
INPUT POWER = 0 dBm

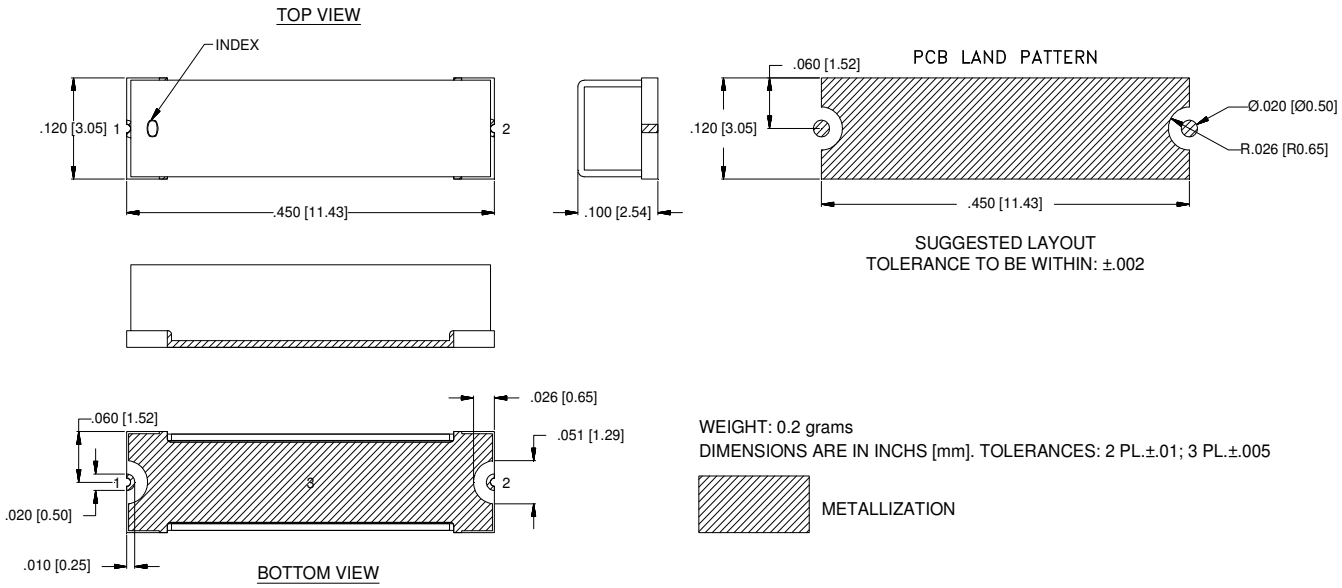


GROUP DELAY
INPUT POWER = 0 dBm



Case Style VG

Outline Dimensions VG3044

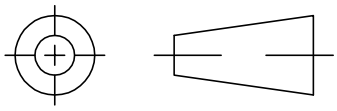


Notes:

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.

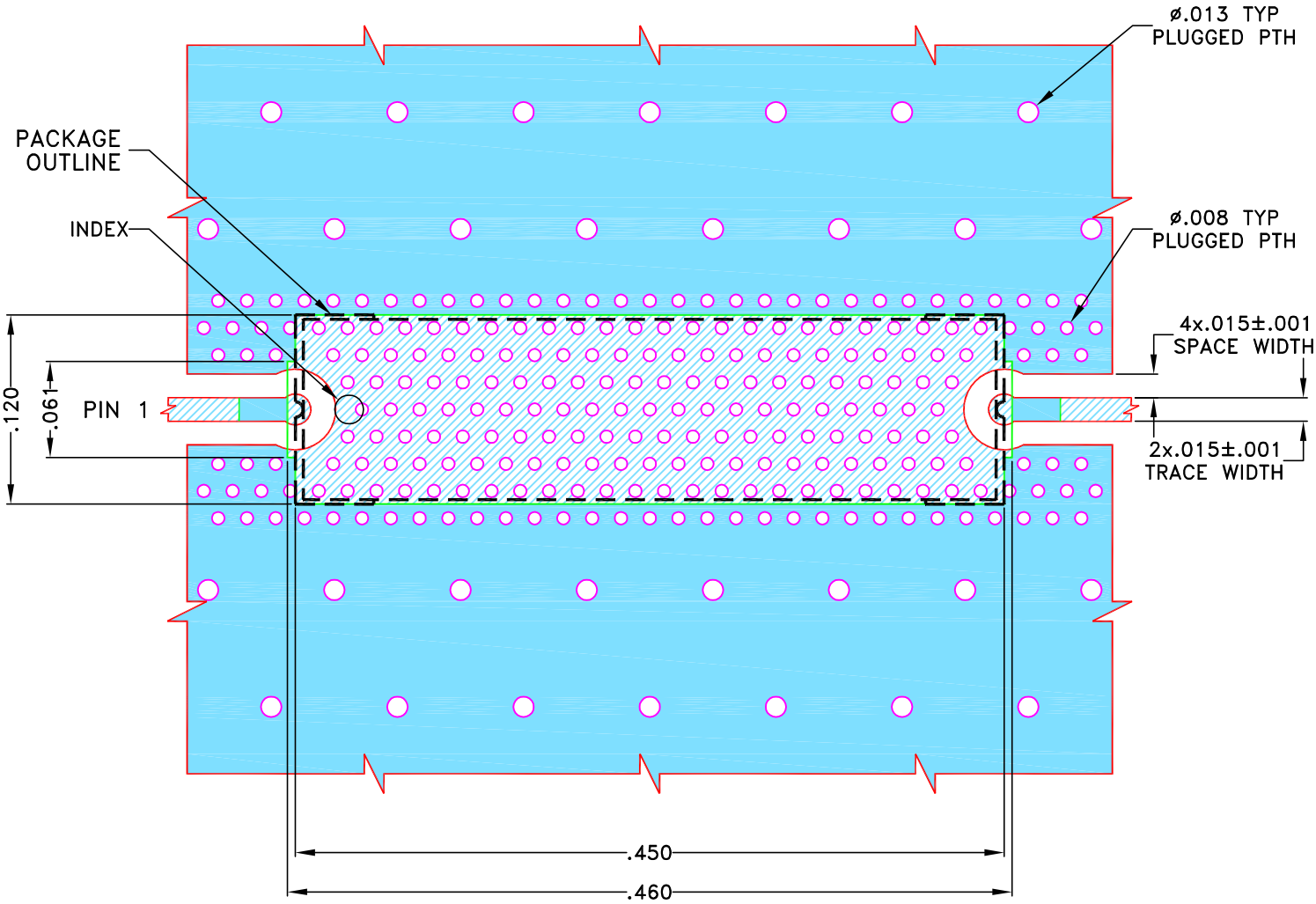
This document and its contents are the property of Mini-Circuits.

THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	NPO-001850	NEW RELEASE	JUL 21	DDR	VC

SUGGESTED MOUNTING CONFIGURATION FOR VG3044 CASE STYLE



NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .0066±.0007. 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	06 JUL 21
TOLERANCES ON:	CHECKED	RR	06 JUL 21
2 PL DECIMALS ±	APPROVED	NN	06 JUL 21
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

Mini-Circuits ®

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.

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

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

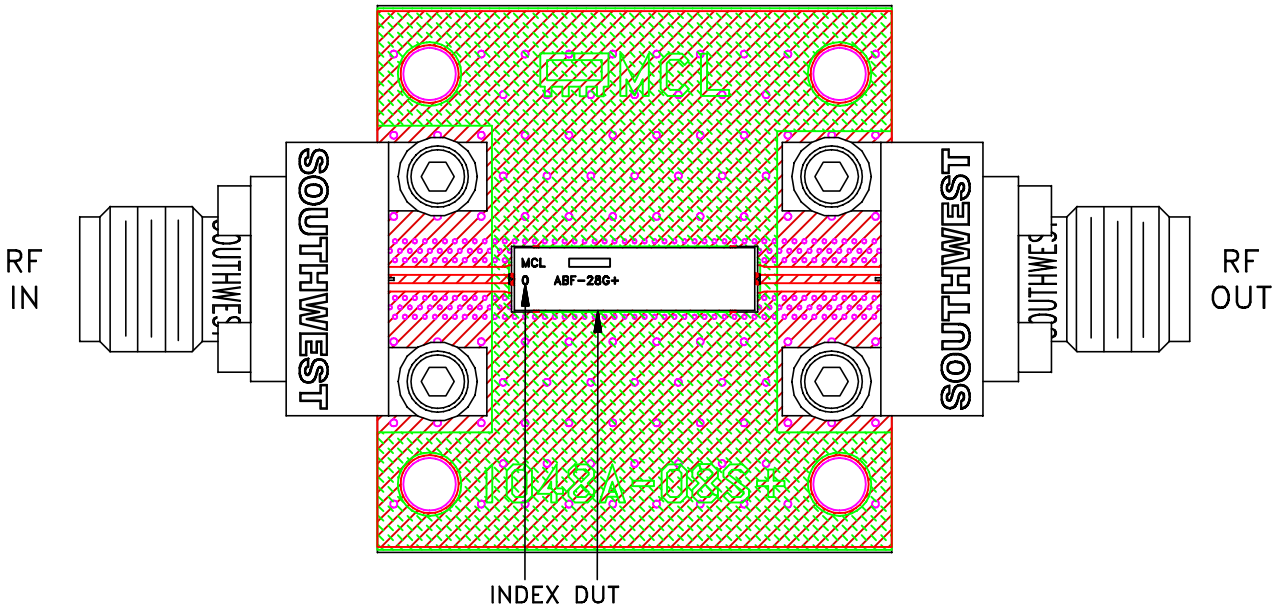
PL DWG, VG3044 C.S, 50 OHM, ABF

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-713	OR

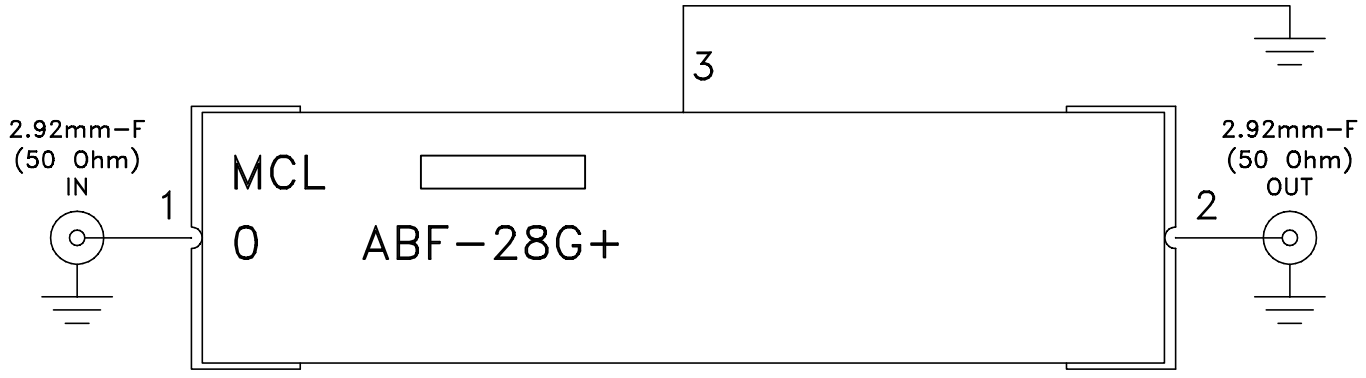
FILE:	SCALE:	SHEET:
98-PL-713	9:1	1 OF 1

Evaluation Board and Circuit

TB-ABF-28G+



Schematic diagram



Notes:

1. PCB Material: ROGERS (RO4350B) OR Equivalent, Dielectric Constant=3.48±.05
Dielectric Thickness: .0066" ± .0007"
2. 50 Ohm 2.92mm Female Connectors.

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS.

Mini-Circuits

Environmental Specifications **ENV120**

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

This document and its contents are the property of Mini-Circuits.