THIN FILM SURFACE MOUNT

Bandpass Filter

ABF-22R8G+

50Ω 22.3 to 23.3 GHz

KEY FEATURES

- Low Passband Insertion Loss of 1.5 dB Typ.
- High Rejection of 58 dB Typ.
- Good Return Loss of 15 dB Typ.
- Small Size, 4.48 x 9.48 x 2.36 mm

APPLICATIONS

- Fixed Wireless Access
- mmWave

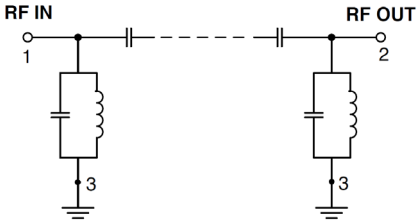


Generic photo used for illustration purposes only

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.

FUNCTIONAL DIAGRAM



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

Parameter		F#	Frequency (GHz)	Min.	Typ.	Max.	Units
Passband	Center Frequency[4]	—	—	—	22.8	—	GHz
	Insertion Loss	F1-F2	22.3 - 23.3	—	1.5	2.5	dB
	Return Loss	F1-F2	22.3 - 23.3	—	15	—	dB
Stopband Lower	Rejection	DC-F3	DC - 18	45	52	—	dB
		F3-F4	18 - 19.6	35	44	—	
		F4-F5	19.6 - 20.3	20	24		
Stopband, Upper	Rejection	F6-F7	25.6 - 26.4	20	28	—	dB
		F7-F8	26.4 - 27	30	40	—	
		F8-F9	27 - 29	40	58	—	
		F9-F10	29 - 33.5	—	30	—	

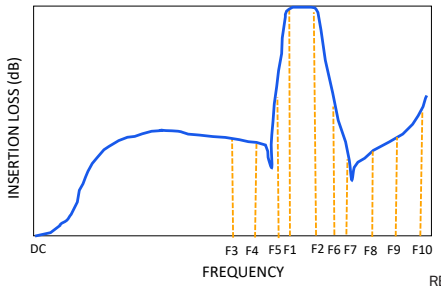
1. Tested on Evaluation Board P/N TB-ABF-22R8G+ with feedline losses removed by normalization of S12 and S21 traces to mesurement of TB thru-line.
2. This filter is bi-directional RF1 and RF2 ports may be interchanged, see S-Parameters for actual performance.
3. This component is not intended for use 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]	1 W 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. OR
ECO-026025
ABF-22R8G+
EDU5080
URJ
250627

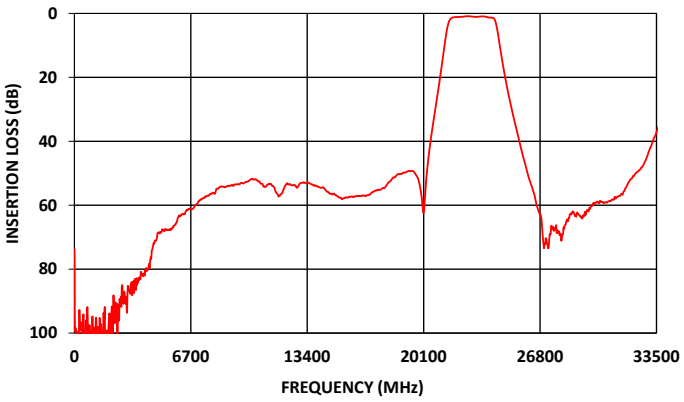
Bandpass Filter

ABF-22R8G+

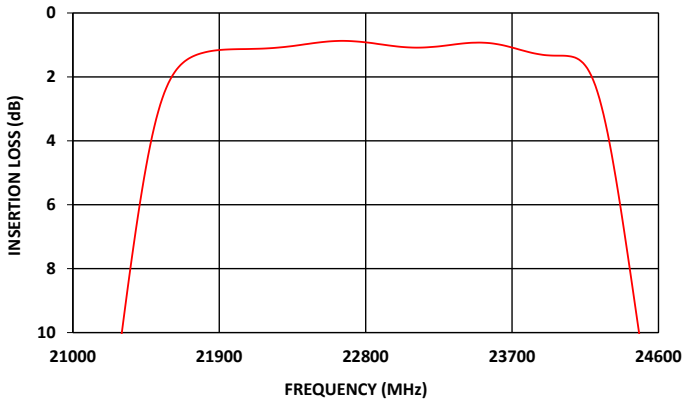
50Ω 22.3 to 23.3 GHz

TYPICAL PERFORMANCE GRAPHS AT +25°C

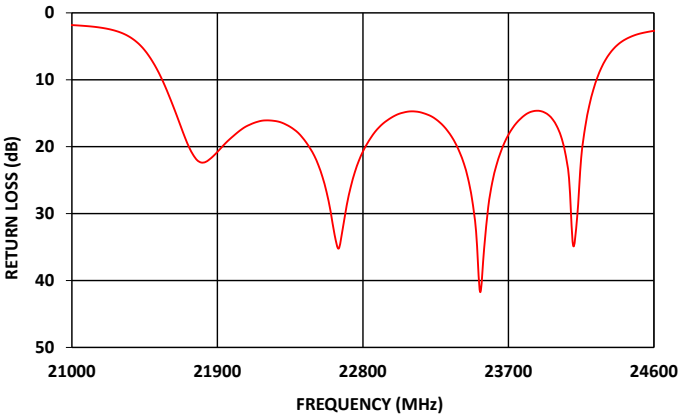
ABF-22R8G+
INSERTION LOSS



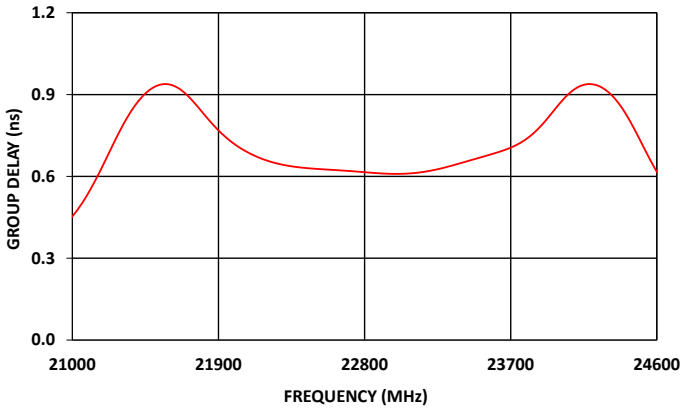
ABF-22R8G+
INSERTION LOSS (Zoomed)



ABF-22R8G+
RETURN LOSS



ABF-22R8G+
GROUP DELAY



THIN FILM SURFACE MOUNT

Bandpass Filter

ABF-22R8G+

50Ω 22.3 to 23.3 GHz

FUNCTIONAL DIAGRAM

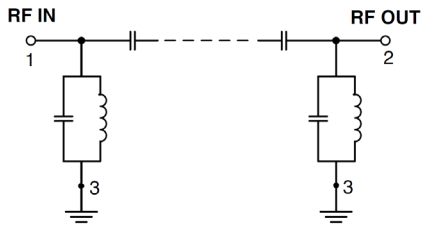
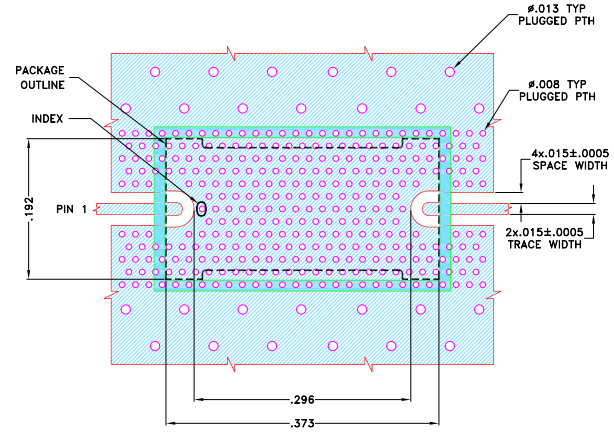


Figure 1. ABF-22R8G+ Functional Diagram

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-778)
NC	—	No connection, not used internally. See drawing PL-778 for connection to PCB

SUGGESTED PCB LAYOUT (PL-778)

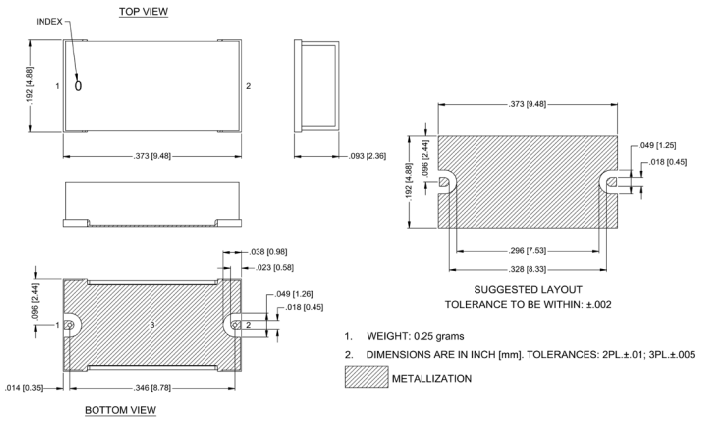


NOTES:
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .0066±.0007; COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

Figure 2. Suggested PCB Layout PL-778

CASE STYLE DRAWING

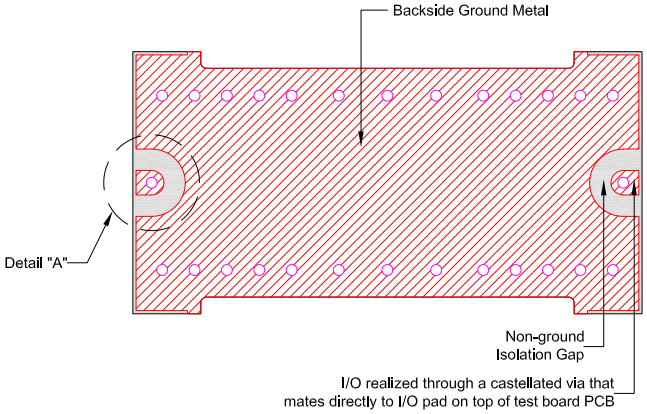


PRODUCT MARKING*: ABF-22R8G

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

RECOMMENDED PCB LAYOUT PATTERN FOR FILTER

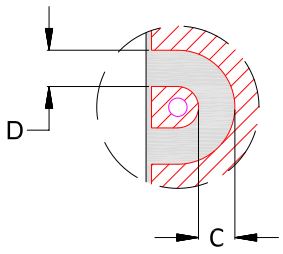
Filter Back side

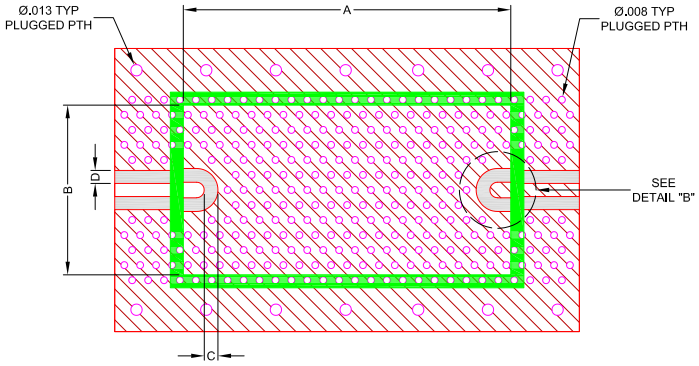


PCB Pattern Recommendations

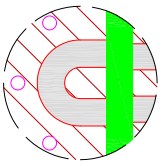
Filter RF I/O Detail
(Filter Back side)

Detail A





DETAIL "B"

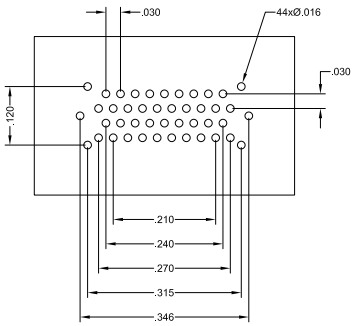


1) Customer PCB's ground pattern length (dimension A) can be similar to filter length.
2) Customer PCB's ground pattern width (dimension B) can be similar to filter width.
3) Dimensions C and D on Filter RF I/O detail and Customer PCB pattern can be closely match. The dimensions of C and D on the Customer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

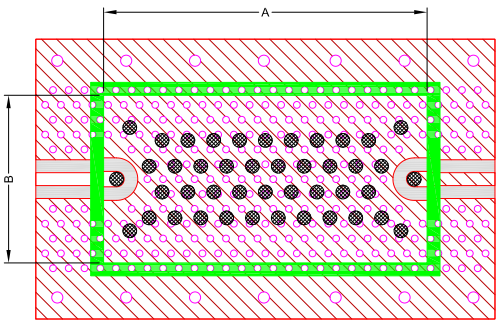
COMMENTS ON COMPONENT HANDLING AND SOLDER ATTACH

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 DASHBOARD. CLICK HERE

Performance Data and Graphs	Data Graphs S-Parameter (S2P Files) Data Set (.zip file) De-embedded to device pads
Case Style	BAS3622 Lead Finish: Gold over Nickel Plate
RoHS Status	Compliant
Tape and Reel	TR-F004
Suggested Layout for PCB Design	PL-778
Evaluation Board	TB-ABF-22R8G+
	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-22R8G+

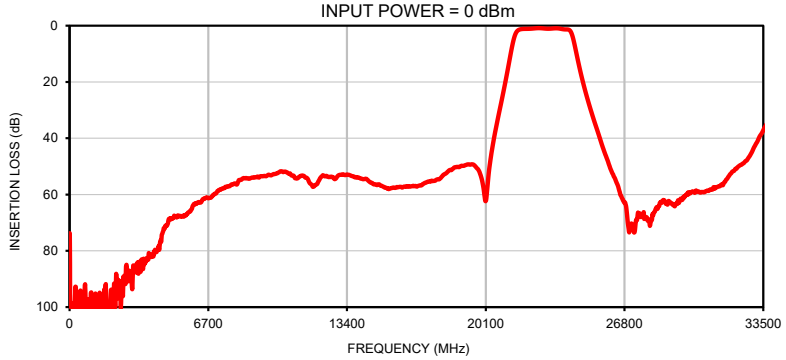
Typical Performance Data

FREQ.	Insertion Loss	Input Return Loss	Output Return Loss
(MHz)	(dB)	(dB)	(dB)
10	73.74	0.00	0.00
20	84.77	0.00	0.00
25	95.10	0.00	0.00
100	102.02	0.00	0.00
200	99.53	0.01	0.01
400	97.40	0.01	0.02
800	103.50	0.06	0.05
900	112.41	0.07	0.07
1000	105.09	0.09	0.08
2000	93.86	0.28	0.24
5000	68.34	0.52	0.51
7500	57.45	0.65	0.59
9000	53.84	0.69	0.65
9650	53.03	0.81	0.74
10075	52.25	0.89	0.81
10575	52.55	0.99	0.88
11600	55.97	1.03	0.93
11800	57.13	1.02	0.92
12000	55.56	1.00	0.91
12400	53.37	0.96	0.89
12600	53.79	0.96	0.88
13000	53.13	0.95	0.88
13500	53.03	0.96	0.90
13600	53.35	0.97	0.90
13800	53.88	1.00	0.93
14000	54.07	1.02	0.96
14200	54.54	1.05	0.99
14400	54.84	1.08	1.03
15000	56.72	1.16	1.14
16000	57.29	1.24	1.25
17000	56.70	1.27	1.24
18000	53.48	1.29	1.18
19600	50.03	1.37	1.30
20000	58.24	1.42	1.40
20300	49.00	1.49	1.50
22300	1.06	16.43	17.34
22400	1.00	17.94	19.21
22500	0.93	21.39	23.44
22600	0.88	29.64	36.89
22700	0.88	28.74	26.92
22800	0.92	20.72	20.13
22900	0.99	17.10	16.96
23000	1.05	15.34	15.40
23100	1.08	14.72	14.98
23200	1.07	15.21	15.59
23300	1.01	16.95	17.51
24000	1.34	16.96	16.64
24275	3.46	8.20	7.84
24800	20.31	2.31	2.38
25175	30.13	2.08	2.02
25600	39.83	1.93	1.75
26400	55.49	1.81	1.55
27000	72.29	1.83	1.60
28000	69.55	1.99	1.83
29000	62.76	2.21	1.99
30000	59.27	2.56	1.86
31000	58.28	3.07	1.61
32000	51.89	3.09	1.56
33000	44.11	2.49	1.89
33500	37.16	2.34	2.22

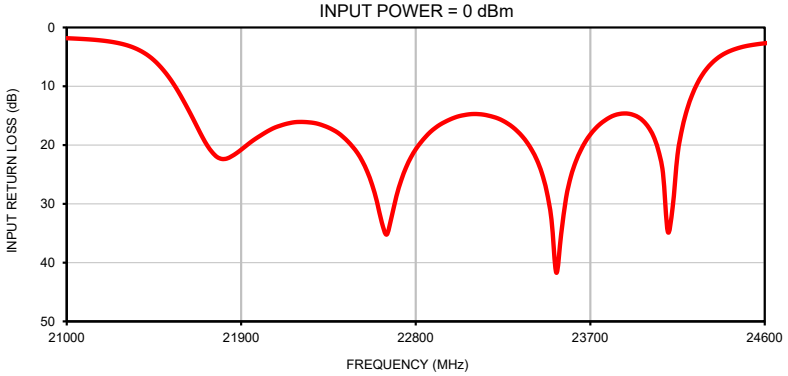
FREQ.	Group Delay
(MHz)	(ns)
22300	0.64
22325	0.64
22350	0.64
22375	0.63
22400	0.63
22425	0.63
22450	0.63
22475	0.63
22500	0.63
22525	0.63
22550	0.63
22575	0.62
22600	0.62
22625	0.62
22650	0.62
22675	0.62
22700	0.62
22725	0.62
22750	0.62
22775	0.62
22800	0.62
22825	0.61
22850	0.61
22875	0.61
22900	0.61
22925	0.61
22950	0.61
22975	0.61
23000	0.61
23025	0.61
23050	0.61
23075	0.61
23100	0.61
23125	0.61
23150	0.62
23175	0.62
23200	0.62
23225	0.62
23250	0.63
23275	0.63
23300	0.63

Typical Performance Curves

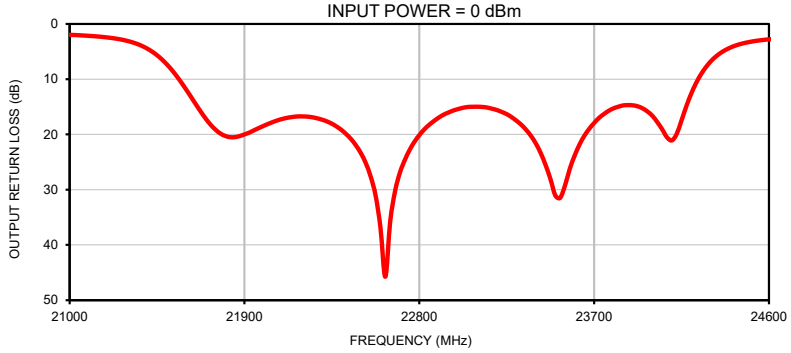
INSERTION LOSS
INPUT POWER = 0 dBm



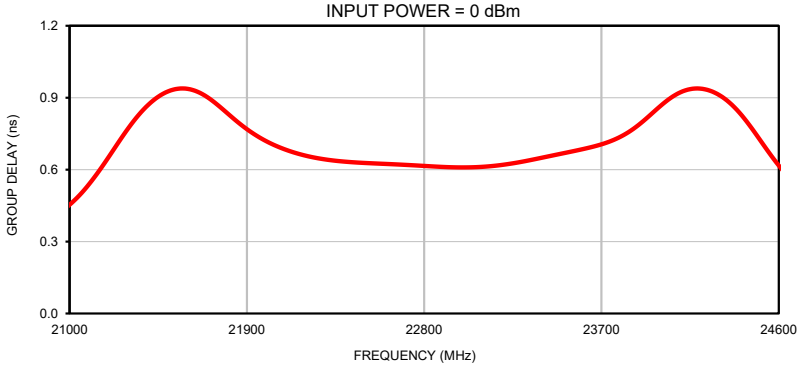
INPUT RETURN LOSS
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS
INPUT POWER = 0 dBm

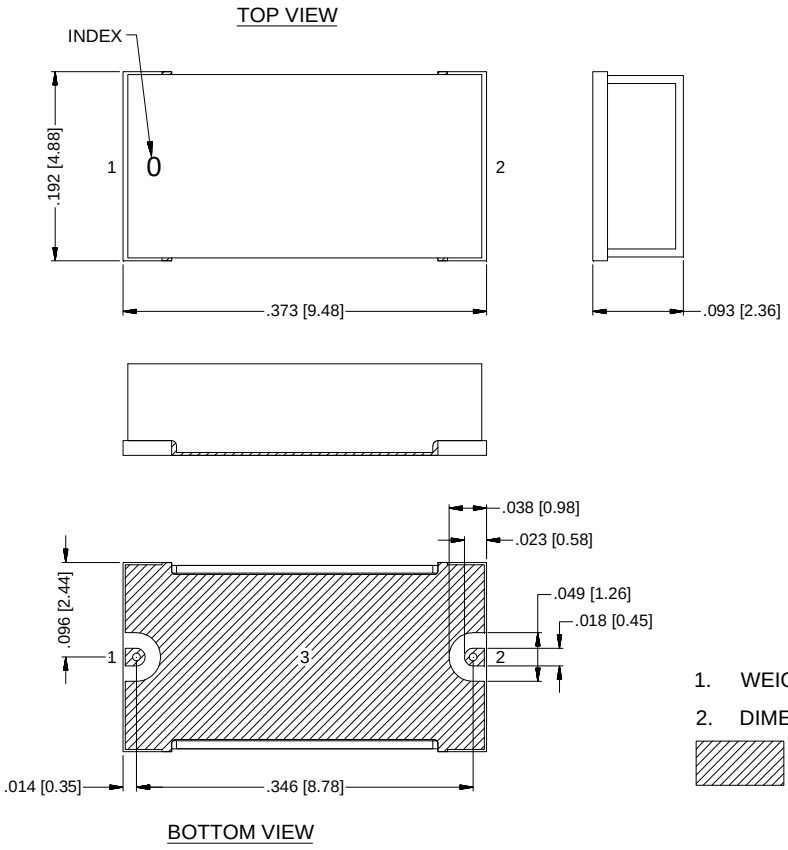


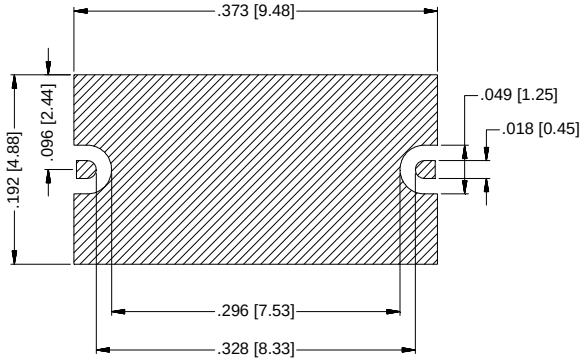
GROUP DELAY
INPUT POWER = 0 dBm



Case Style BAS

Outline Dimensions BAS3622





SUGGESTED LAYOUT
TOLERANCE TO BE WITHIN: ±.002

1. WEIGHT: 0.25 grams
2. DIMENSIONS ARE IN INCH [mm]. TOLERANCES: 2PL.±.01; 3PL.±.005

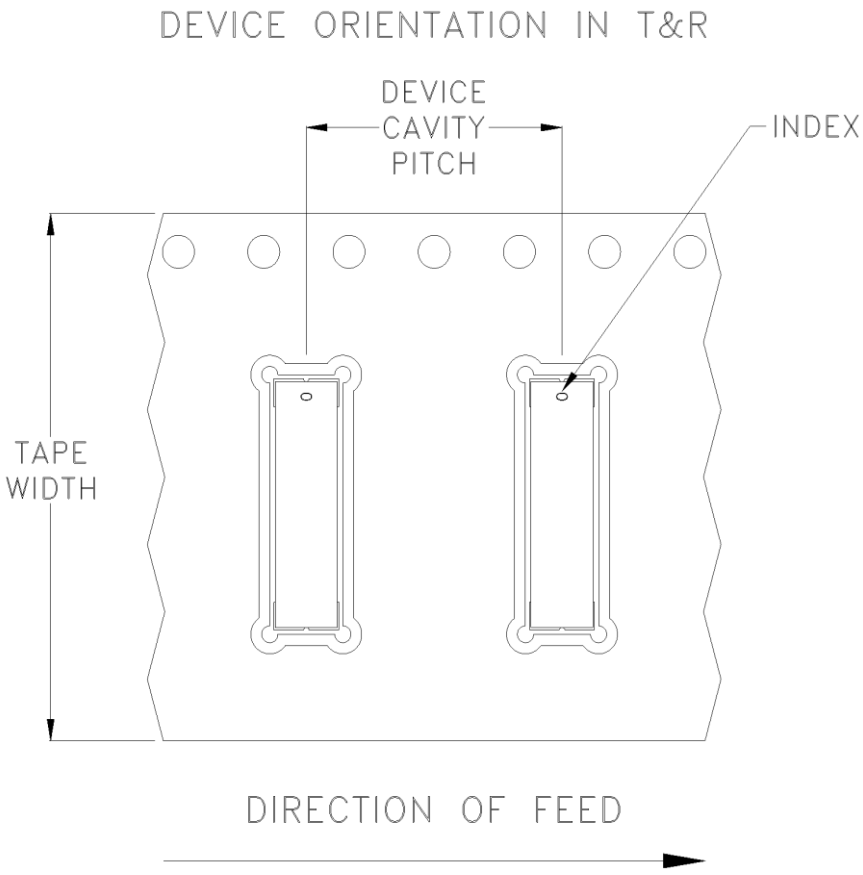
METALLIZATION

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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Tape & Reel Packaging TR-F004



Tape Width, mm	Device Cavity Pitch, mm	Real Size, inches	Devices per Reel See note
24	12	7	10
			20
			50
			100
			200
		13	500

Note: Please consult individual model data sheet/dashboard to determine device per reel availability.

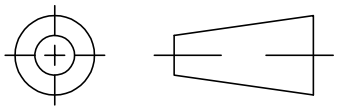
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

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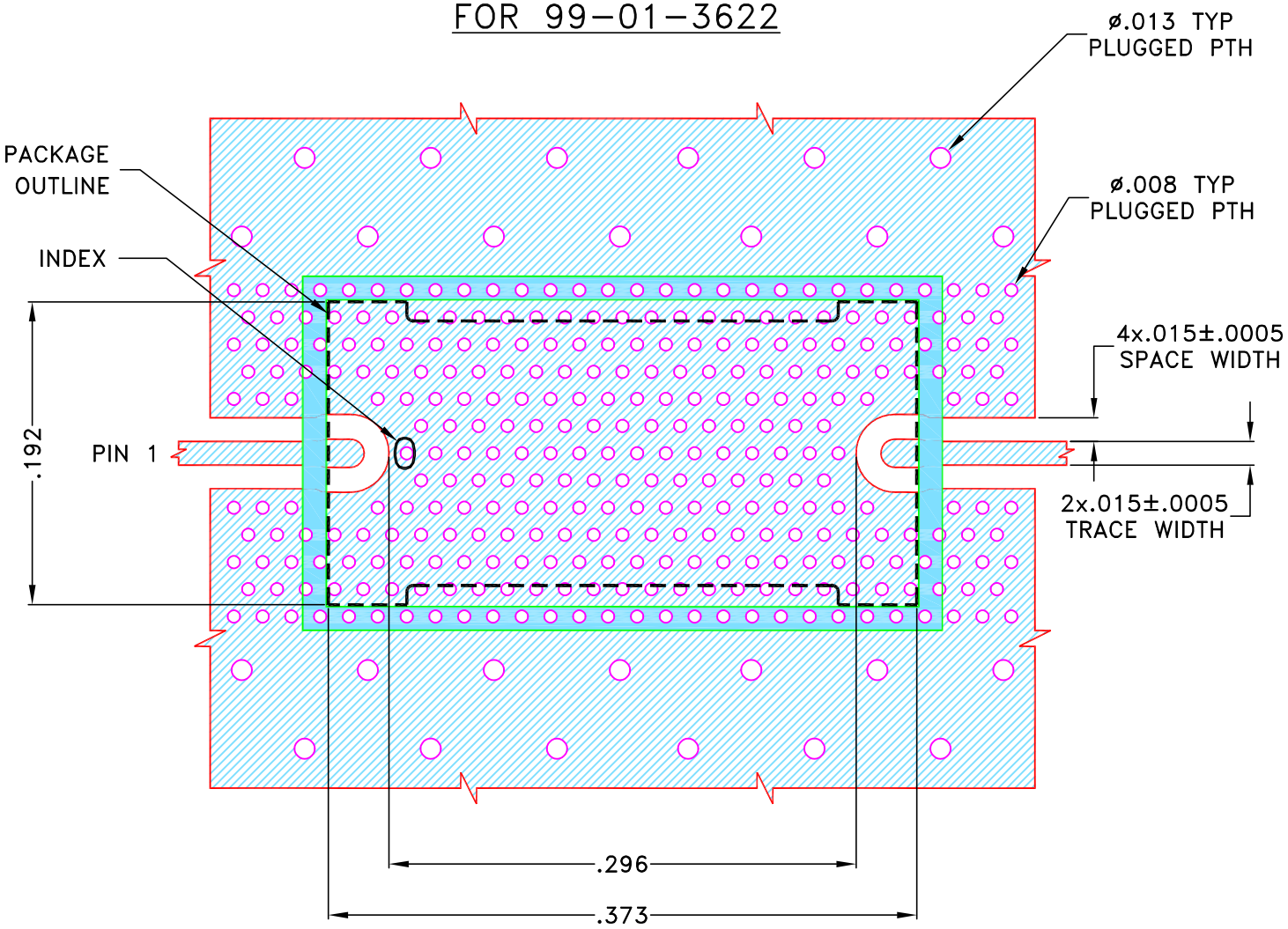
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	NPO-004195	NEW RELEASE	MAR 24	LK	VC

SUGGESTED MOUNTING CONFIGURATION FOR 99-01-3622



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	LK	19 MAR 24
TOLERANCES ON:	CHECKED	MD	19 MAR 24
2 PL DECIMALS ± .002	APPROVED	RR	19 MAR 24
3 PL DECIMALS ±			
ANGLES ±			
FRACTIONS ±			

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

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

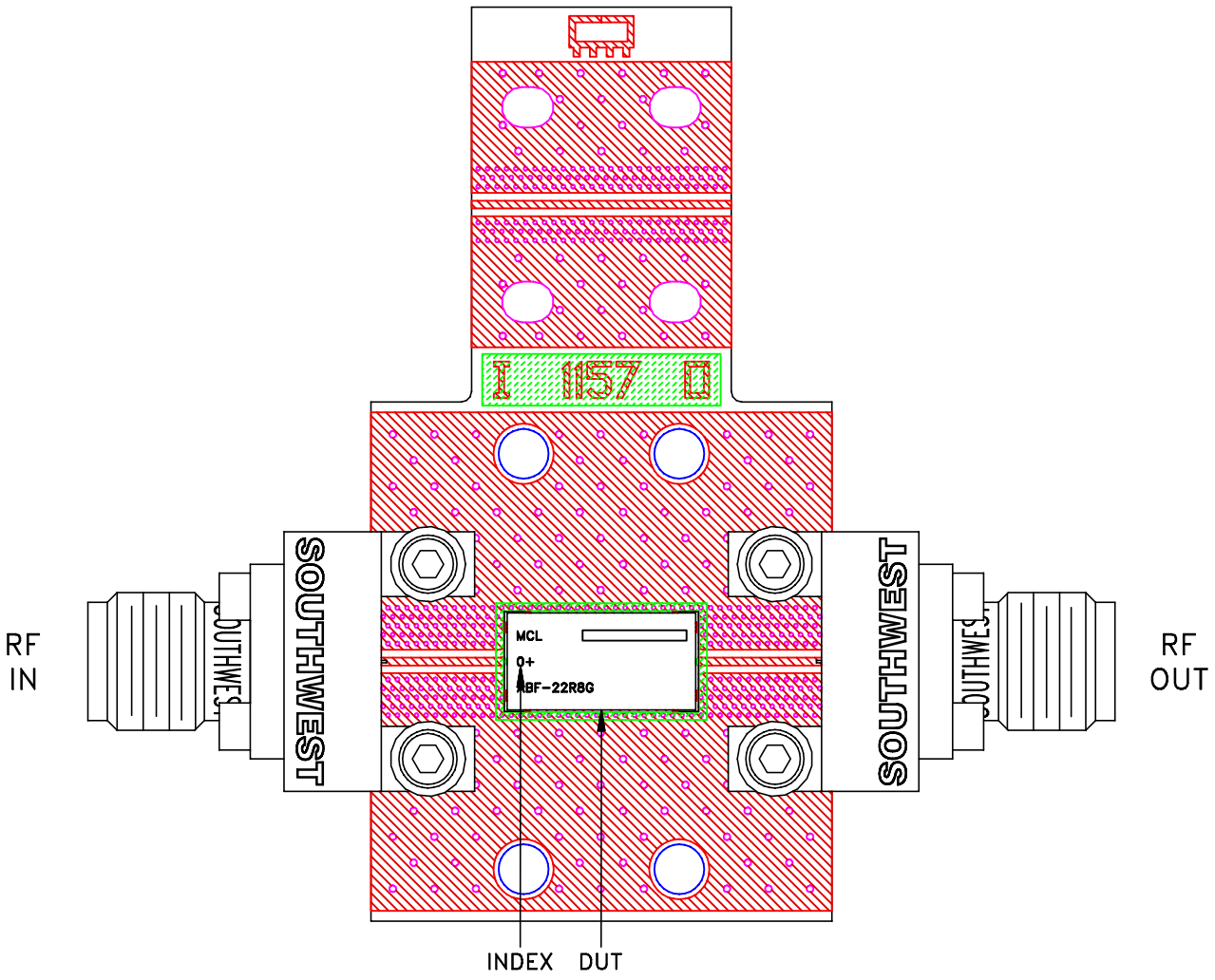
PL, 99-01-3622, TBABF22R825G1+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-778	OR

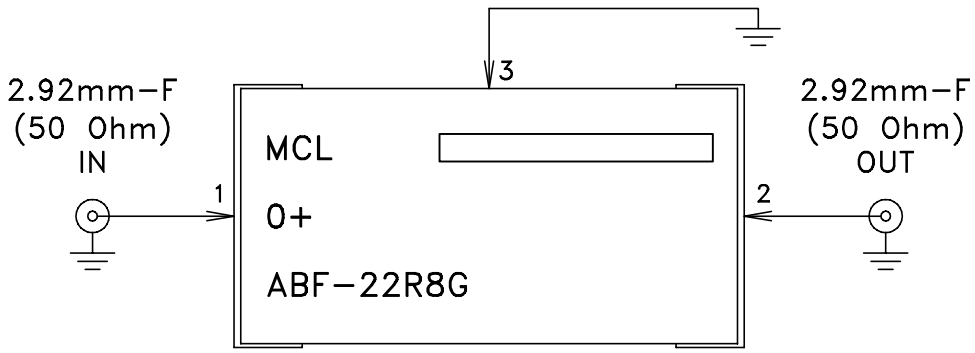
FILE:	SCALE:	SHEET:
98-PL-778	9:1	1 OF 1

Evaluation Board and Circuit

TB-ABF-22R8G+



Schematic diagram



Notes:

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

Mini-Circuits®

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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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