



Mini-Circuits

THIN FILM SURFACE MOUNT

Bandpass Filter

ABF-16G+

50 Ω

15.75 to 16.25 GHz

KEY FEATURES

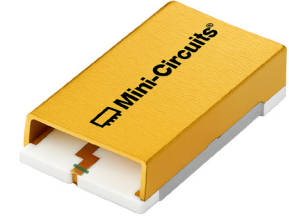
- Low Passband Insertion Loss of 2.5 dB Typ.
- High Rejection of 48 dB Typ.
- Good Return Loss of 15 dB Typ.
- Small Size, 10.16 x 5.08 x 2.25 mm

APPLICATIONS

- X-Band Radar
- Aerospace and Defense

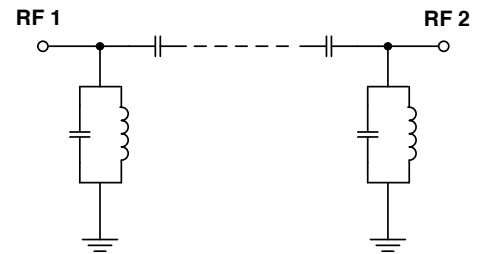
PRODUCT OVERVIEW

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^{1,2,3} AT +25°C

Parameter		F#	Frequency (GHz)	Min.	Typ.	Max.	Units
Passband	Center Frequency ⁴	—	—	—	16	—	GHz
	Insertion Loss	F1-F2	15.75 - 16.25	—	2.5	3.5	dB
	Return Loss	F1-F2	15.75 - 16.25	—	15	—	dB
Stopband, Lower	Rejection	DC-F3	DC - 6.5	45	48	—	dB
		F3-F4	6.5 - 14.25	35	38	—	
		F4-F5	14.25 - 14.4	25	30	—	
Stopband, Upper	Rejection	F6-F7	17.9 - 19.2	35	40	—	dB
		F7-F8	19.2 - 22	—	20	—	

1. Tested on Evaluation Board P/N TB-ABF-16G+ 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. 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 $\pm 3\%$.

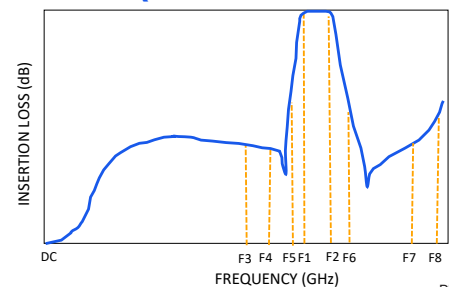
ABSOLUTE MAXIMUM RATINGS⁵

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



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REV. OR
ECO-028985
ABF-16G+
EDU5047
MCINU
260326

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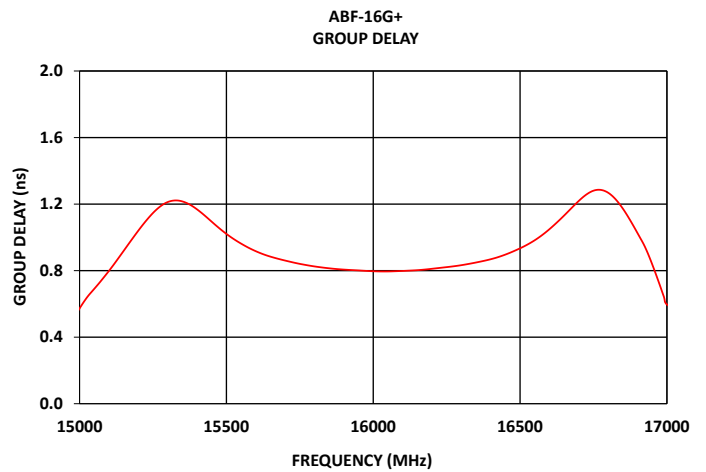
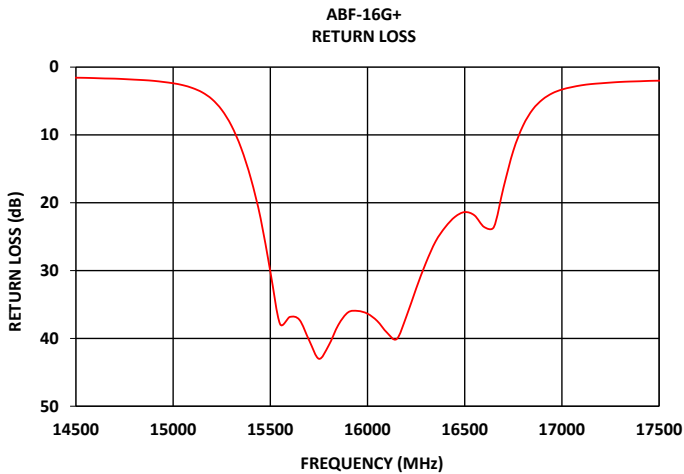
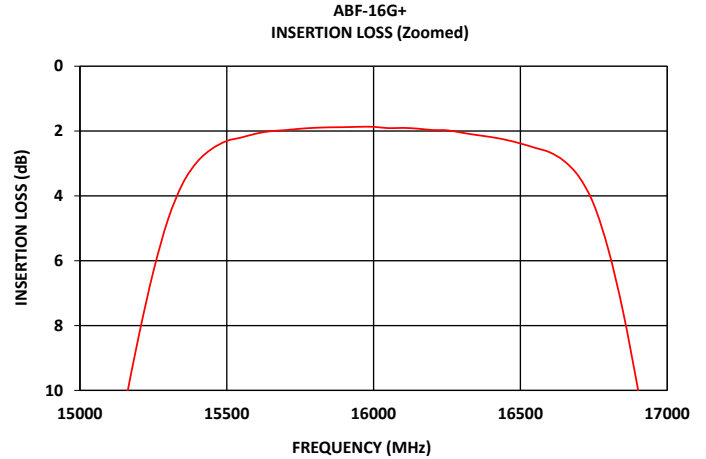
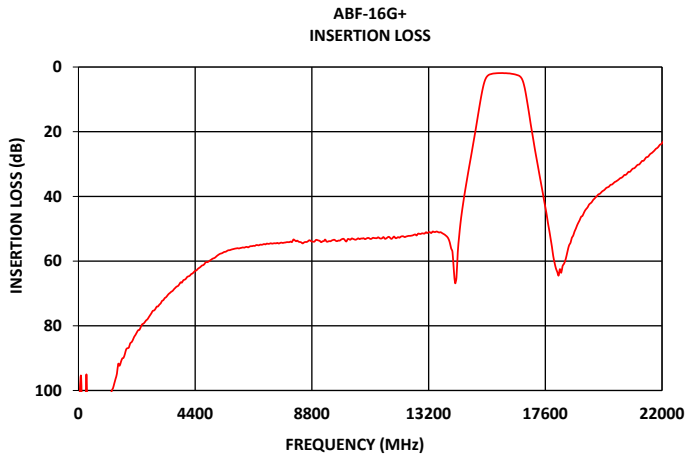
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TYPICAL PERFORMANCE GRAPHS AT +25°C





Bandpass Filter

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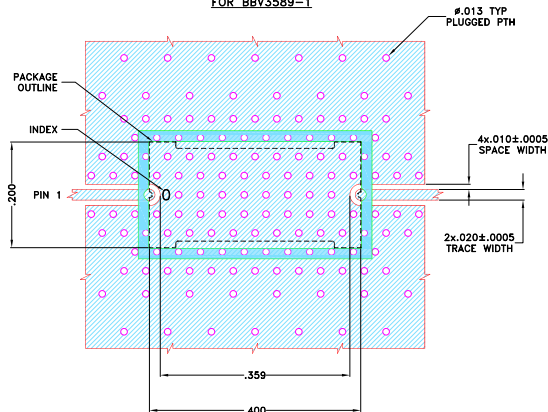
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PAD DESCRIPTION

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-855)

SUGGESTED MOUNTING CONFIGURATION
FOR BBV3589-1

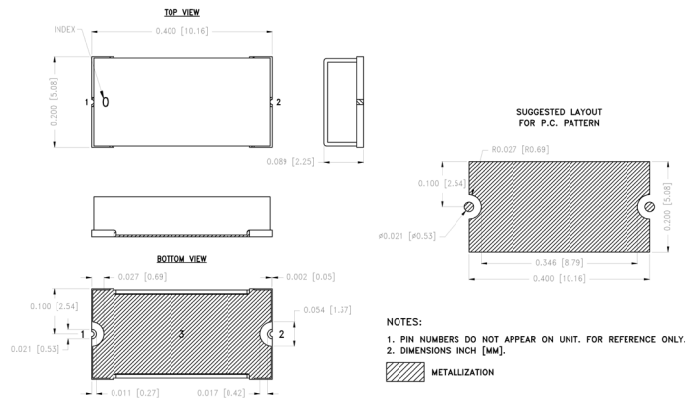


1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS .010±.001; COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.

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

CASE STYLE DRAWING



Dimensions are in inches (mm). Tolerances: 2Pl. $\pm .01$ [.254]; 3Pl. $\pm .005$ [.127]

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



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THIN FILM SURFACE MOUNT

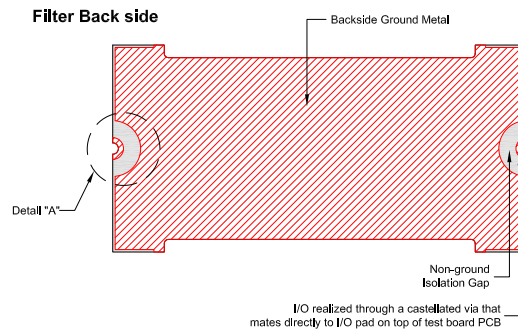
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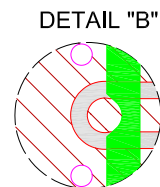
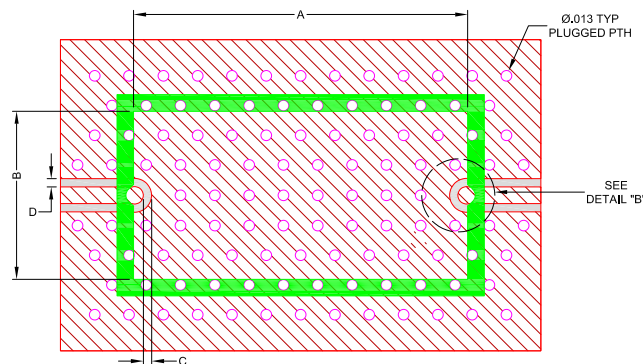
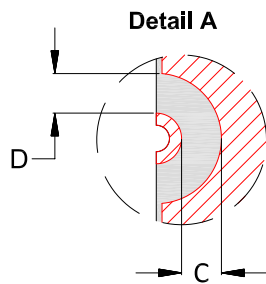
15.75 to 16.25 GHz

RECOMMENDED PCB LAYOUT PATTERN FOR FILTER



PCB Pattern Recommendations

Filter RF I/O Detail (Filter Back side)



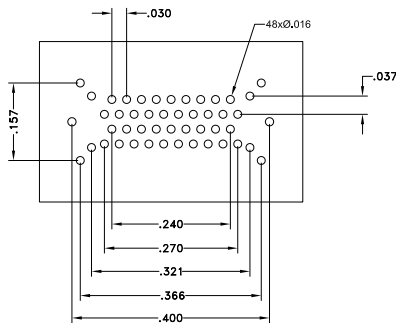
- 1) Customer PCB's ground pattern length (dimension A) can be similar to filter length.
- 2) Customer PCB's ground pattern width (dimension B) can be similar to filter width.
- 3) Dimensions C and D on Filter RF I/O detail and Customer PCB pattern can be closely match. The dimensions of C and D on the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



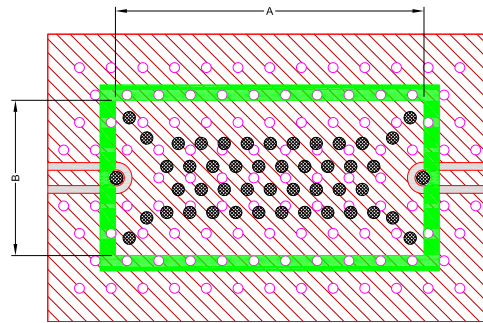
COMMENTS ON COMPONENT HANDLING AND SOLDER ATTACH

- 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	BBV3589-1 Lead Finish: Gold over Nickel Plate
RoHS Status	Compliant
Tape and Reel	F004
Suggested Layout for PCB Design	PL-855
Evaluation Board	TB-ABF-16G+
	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

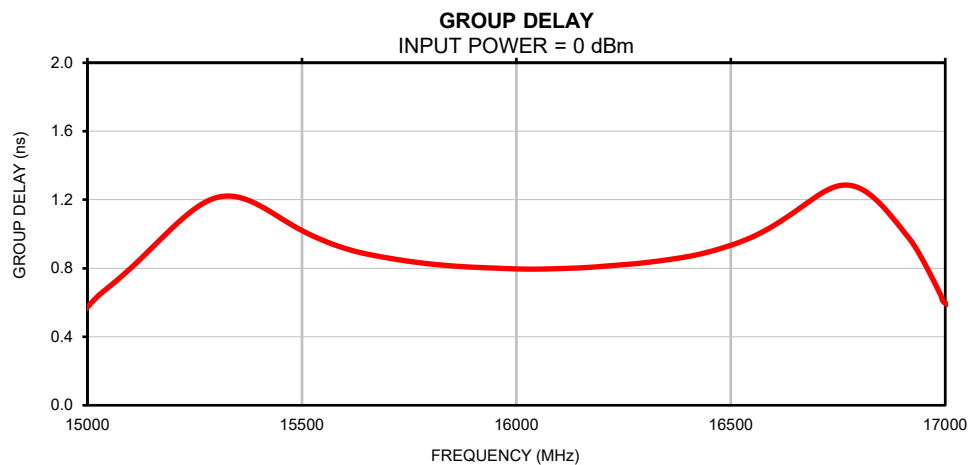
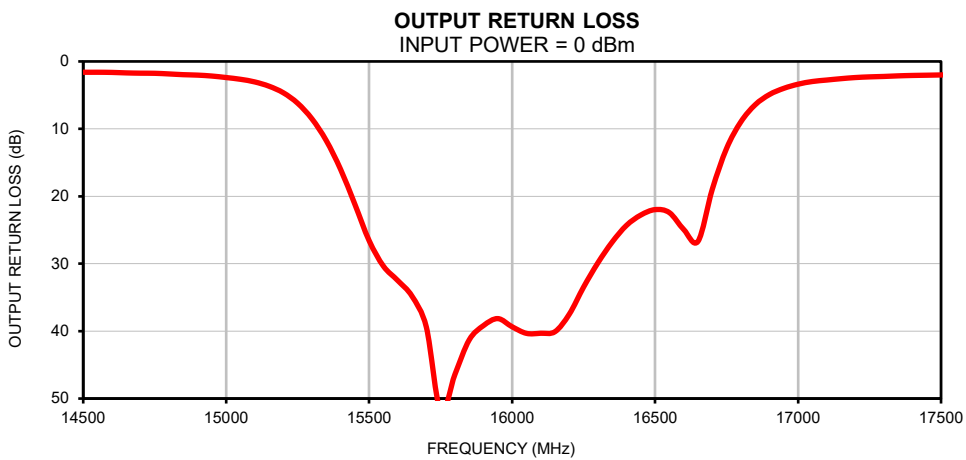
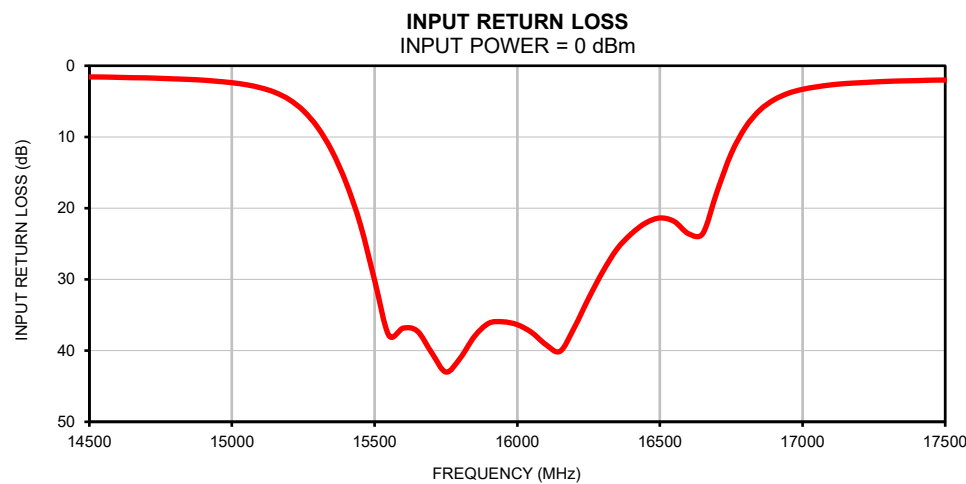
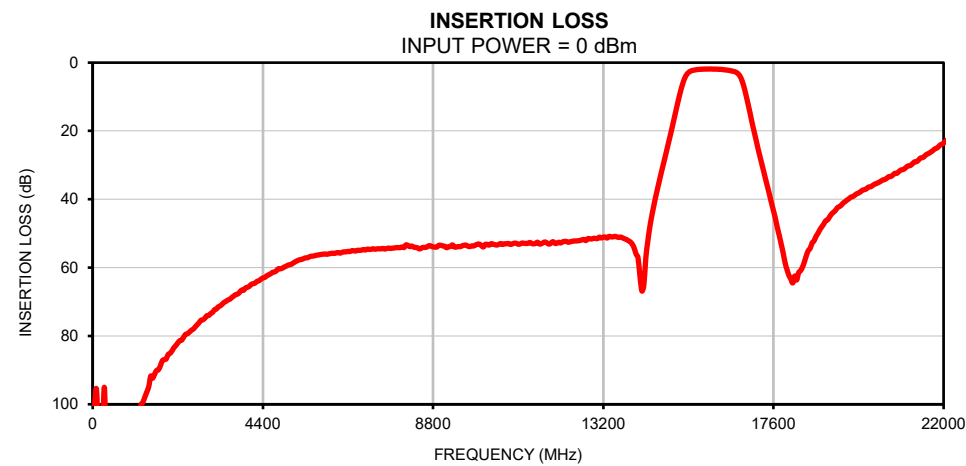
ABF-16G+

Typical Performance Data

FREQ.	Insertion Loss	Input Return Loss	Output Return Loss
(MHz)	(dB)	(dB)	(dB)
10	113.18	0.01	0.00
20	133.01	0.01	0.01
30	115.77	0.01	0.01
40	109.25	0.00	0.01
50	100.38	0.01	0.00
100	95.84	0.01	0.00
200	106.48	0.01	0.00
500	110.60	0.03	0.02
1000	104.74	0.13	0.13
1100	112.37	0.14	0.14
2000	85.09	0.35	0.35
2500	78.89	0.43	0.44
3000	74.01	0.47	0.49
3500	69.46	0.46	0.44
5000	59.59	0.48	0.49
6500	55.39	0.70	0.81
7000	54.72	0.88	0.85
7500	54.37	1.04	0.91
8000	53.95	1.10	0.92
8500	54.25	1.07	0.92
9000	53.49	1.02	0.93
9500	53.87	0.97	0.92
10000	53.13	0.91	0.90
10500	53.19	0.88	0.89
11000	53.14	0.87	0.90
11500	52.56	0.91	0.93
12000	52.85	0.99	1.00
14250	65.11	1.47	1.48
14400	48.42	1.51	1.52
14700	32.23	1.70	1.74
14950	20.50	2.19	2.17
15150	10.61	3.73	3.68
15250	6.34	6.30	6.20
15300	4.73	8.63	8.52
15350	3.62	11.95	11.74
15500	2.31	30.13	26.59
15600	2.08	36.84	32.49
15750	1.93	43.01	51.96
15800	1.90	41.06	46.41
15850	1.89	38.01	41.29
15900	1.88	36.16	39.17
16000	1.87	36.36	39.35
16100	1.90	39.14	40.31
16150	1.93	40.09	40.08
16200	1.97	36.76	37.48
16250	1.98	32.67	33.46
16700	3.42	17.71	18.96
16950	12.42	3.86	3.99
17100	20.14	2.68	2.76
17350	31.95	2.13	2.14
17900	58.51	1.86	1.85
18000	62.27	1.84	1.80
18200	63.63	1.82	1.78
18300	60.90	1.78	1.78
18500	55.03	1.76	1.73
19000	46.03	1.66	1.65
19200	43.30	1.61	1.63
19500	40.25	1.62	1.57
20000	36.97	1.65	1.64
22000	23.55	1.65	1.64

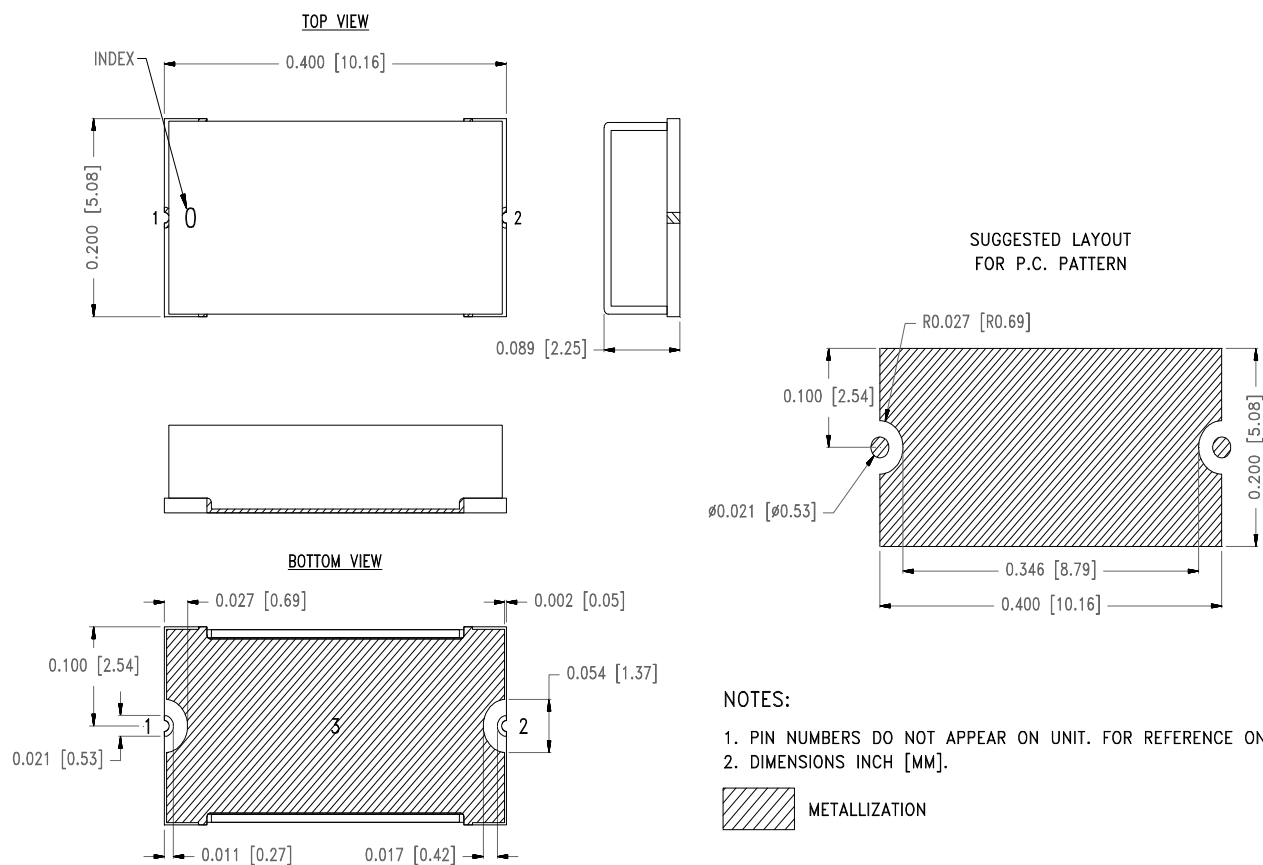
FREQ.	Group Delay
(MHz)	(ns)
15750	0.84
15760	0.84
15770	0.83
15780	0.83
15790	0.83
15800	0.83
15810	0.82
15820	0.82
15830	0.82
15840	0.82
15850	0.81
15860	0.81
15870	0.81
15880	0.81
15890	0.81
15900	0.81
15910	0.81
15920	0.80
15930	0.80
15940	0.80
15950	0.80
15960	0.80
15970	0.80
15980	0.80
15990	0.80
16000	0.80
16010	0.80
16020	0.80
16030	0.80
16040	0.79
16050	0.80
16060	0.80
16070	0.80
16080	0.80
16090	0.80
16100	0.80
16110	0.80
16120	0.80
16130	0.80
16140	0.80
16150	0.80
16160	0.80
16170	0.81
16180	0.81
16190	0.81
16200	0.81
16210	0.81
16220	0.82
16230	0.82
16240	0.82
16250	0.82

Typical Performance Curves



Outline Dimensions

BBV3589-1



Notes:

- Case material: Gold over Nickel over Annealed Stainless Steel.
- Base: Ceramic
- Unit weight: 0.22g
- Termination finish: **as shown below or indicated on Data Sheet.**

For RoHS Case Styles: Gold over Nickel plate. All models, (+) suffix.

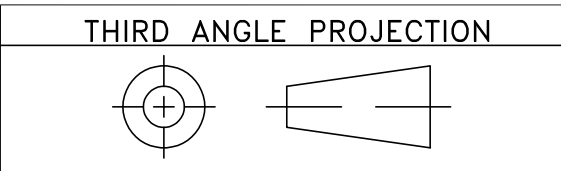


P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



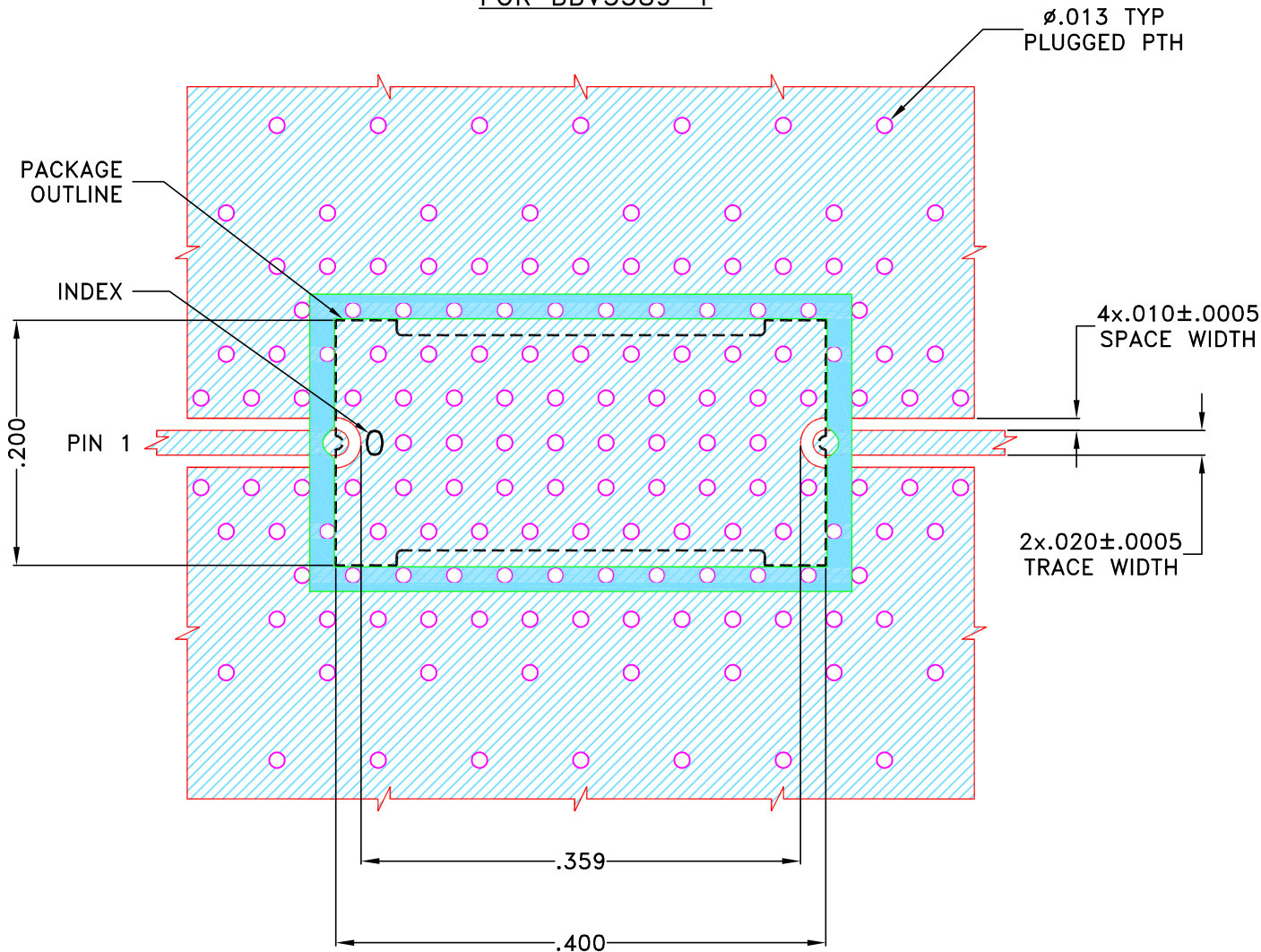
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	NP0-005998	NEW RELEASE	FEB 26	LK	GT

SUGGESTED MOUNTING CONFIGURATION
FOR BBV3589-1



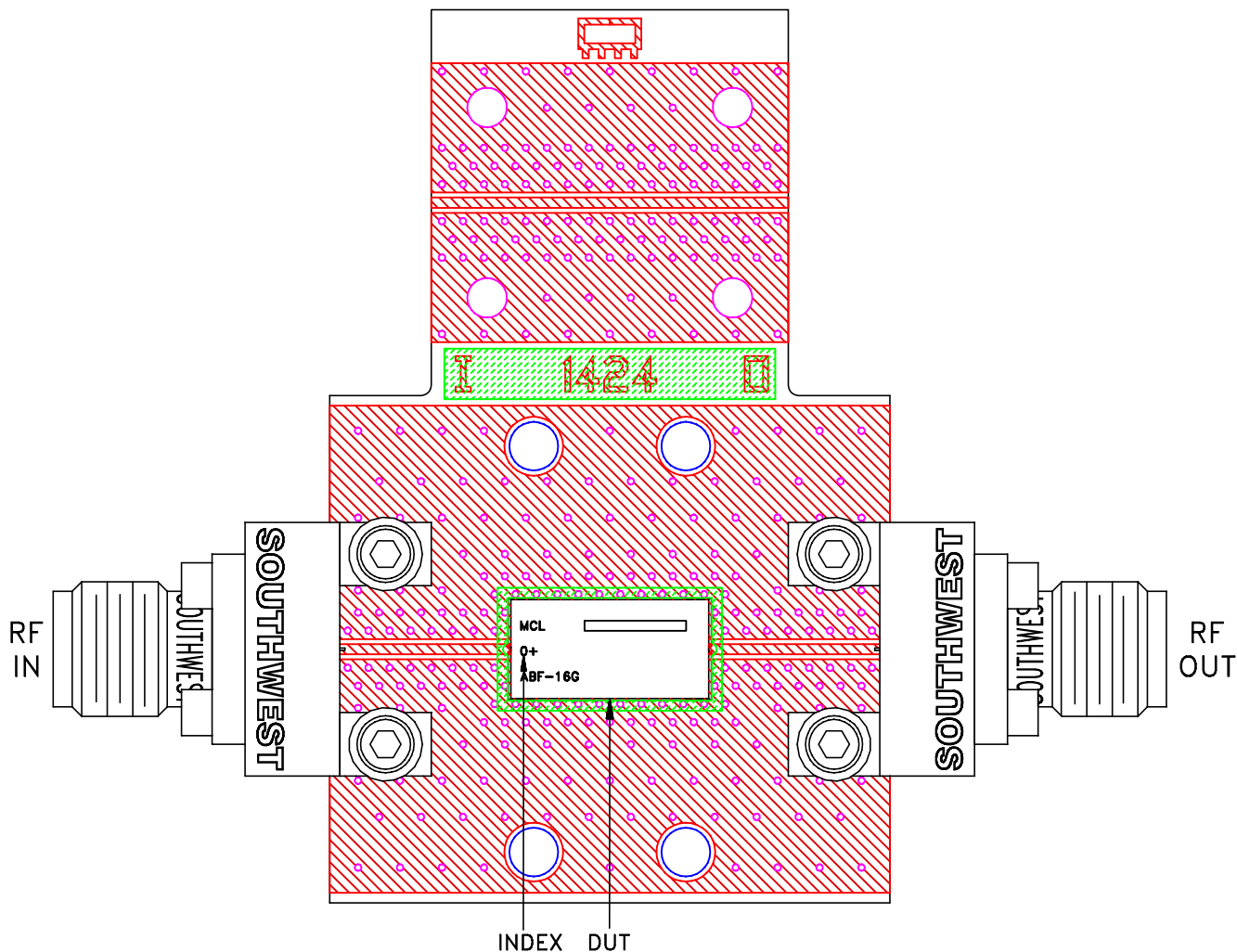
NOTES:

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 - 2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
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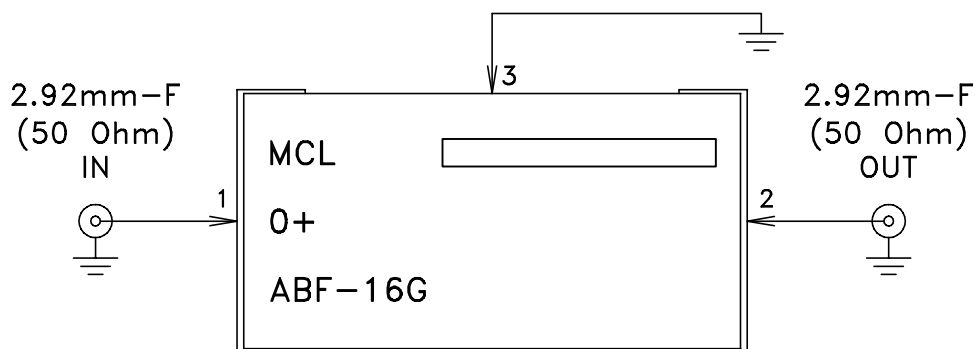
UNLESS OTHERWISE SPECIFIED		INITIALS		DATE		Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235					
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .002 ANGLES ± FRACTIONS ±	DRAWN	LK	02 FEB 26								
	CHECKED	MD	02 FEB 26								
	APPROVED	NRV	02 FEB 26								
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SIZE A		CODE IDENT 15542		DRAWING NO: 98-PL-855						REV: OR	
FILE:		98-PL-855		SCALE:		6.7:1		SHEET:		1 OF 1	
ASHEETA1.DWG REV:A DATE:01/12/95											

Evaluation Board and Circuit

TB-ABF-16G+



Schematic diagram



Notes:

1. PCB Material: ROGERS (R04350B) OR Equivalent, Dielectric Constant= 3.48 ± 0.05
Dielectric Thickness: $.0066 \pm .0007$ 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