CERAMIC

Bandpass Filter

BFHK-1982+

50Ω 17.5 to 22.2 GHz

THE BIG DEAL

- Ultra-High Stopband Rejection Structure – 80 dB typical
- Surface mountable pick and place standard case style
- Standard small 1812 (4.5mm x 3.2mm) case style
- High quality distributed filter topology
- Wide rejection band
- Shielded construction preventing filter from de-tuning
- Reduced footprint area by employing LGA (land grid array)
- Suited for very high-volume production
- Patent Pending

Generic photo used for illustration purposes only

CASE STYLE: NM1812C-3

+RoHS Compliant
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

APPLICATIONS

- Test and Measurement
- Aerospace and Defense Signal Conditioning

PRODUCT OVERVIEW

The BFHK-1982+ LTCC Band Pass Filter achieves a miniature size and high repeatability of performance by utilizing a proprietary LTCC material system and distributed filter topology. The passband loss at 17.5 – 22.2 GHz is as low as 2.8 dB, with typical stopband rejections at 80 dB up to 39 GHz and 55 dB up to 53 GHz. This model handles up to 1W RF input power, and provides a wide operating temperature range from -55 to +125°C. Utilizing a proprietary LTCC material system and a distributed filter topology, this filter is able to achieve repeatable performance on a lot-to-lot basis.

KEY FEATURES

Feature	Advantages
Ultra-High Rejection	Typical stopband rejections at 80 dB up to 39 GHz and 60 dB up to 53 GHz
Cost effective	LTCC is scalable technology that is cost effective due to ease of production in high quantities.
Small size (4.5mm x 3.2mm)	Allows for high layout density of circuit boards, while minimizing effects of parasitics.
Surface Mountable	Suitable for very high volume automated assembly process.

REV. A
ECO-022343
BFHK-1982+
MCL NY
240731

ELECTRICAL SPECIFICATIONS[1] AT 25°C

Parameter		F#	Frequency (GHz)		Min.	Typ.	Max.	Units
Pass Band	Center Frequency	—	—	—	—	19.7	—	GHz
	Insertion Loss	F1-F2	17.5	22.2	—	2.8	4.0	dB
	Return Loss	F1-F2	17.5	22.2	—	12.0	—	dB
Stop Band, Lower	Insertion Loss	DC-F3	0.1	12.6	70	80	—	dB
Stop Band, Upper	Insertion Loss	F4-F5	27.5	39	70	80	—	dB
			39	53	40	55.0	—	

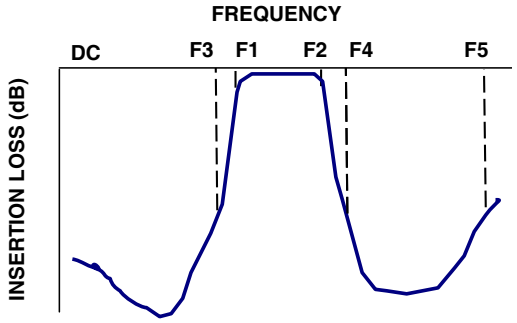
1.Measured on Mini-Circuits Test Board TB-BFHK-1982C+ with connectors and feedlines de-embedded.

MAXIMUM RATINGS

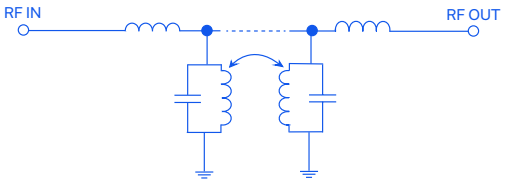
Parameter	Ratings
Operating Temperature	-55°C to 125°C
Storage Temperature	-55°C to 125°C
RF Power Input	1W max.

Permanent damage may occur if any of these limits are exceeded

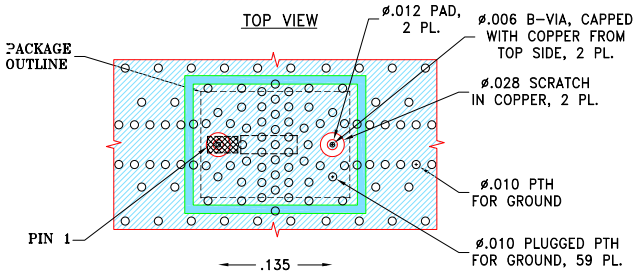
TYPICAL FREQUENCY RESPONSE

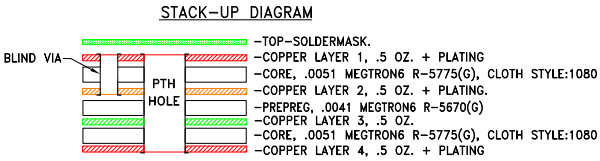


FUNCTIONAL SCHEMATIC



EVALUATION BOARD MCL P/N: TB-BFHK-1982C+
SUGGESTED PCB LAYOUT: PL-730





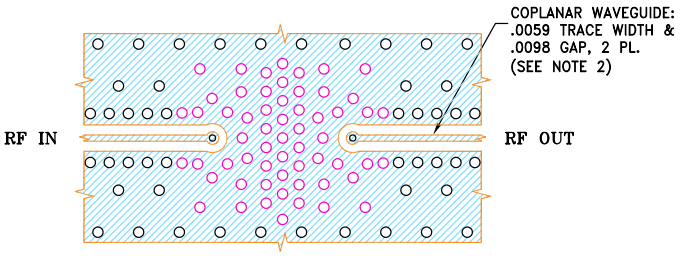
1. TOTAL FINISHED THICKNESS 0.0228±.004.
2. B-VIA PRESENT FROM COPPER LAYER 1 TO COPPER LAYER 2.
3. PTH PRESENT FROM COPPER LAYER 1 TO COPPER LAYER 4.
4. INDICATED PLUGGED PTH's ARE PLUGGED WITH EPOXY AND CAPPED WITH COPPER FROM TOP SIDE.
5. LAYER 4 IS CONTINUOUS GROUND PLANE.

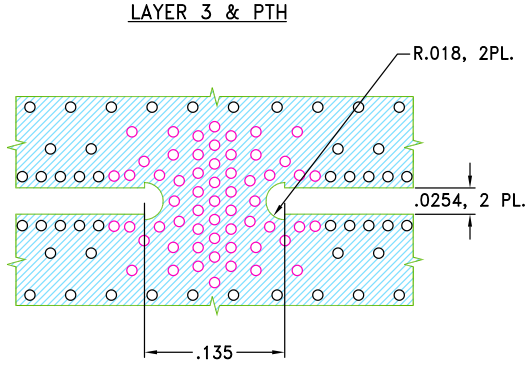
NOTES:

1. PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
2. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR MEGTRON6 R-5775(G), CLOTH STYLE:1080 WITH DIELECTRIC THICKNESS .0051; COPPER: 1/2 OZ.+PLATING. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
3. COPPER LAYER 4 OF THE PCB ARE CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK



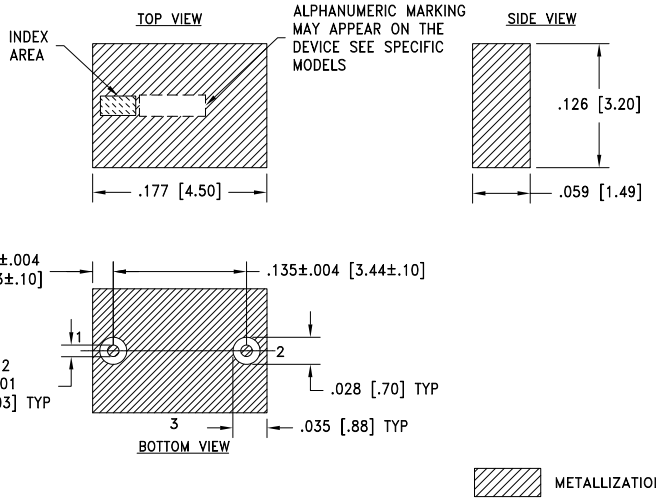


PAD CONNECTIONS

INPUT	1
OUTPUT	2
GROUND	3

PRODUCT MARKING: F471

OUTLINE DRAWING



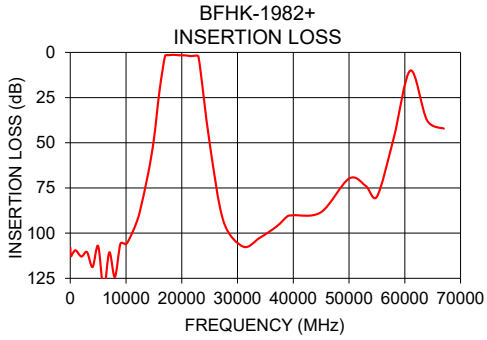
Weight: .126 grams.
Dimensions are in inches [mm]. Tolerances: 2 Pl.±.01; 3 Pl. ±.005 Inches

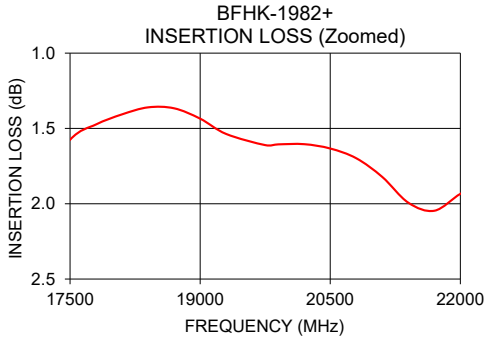
Bandpass Filter

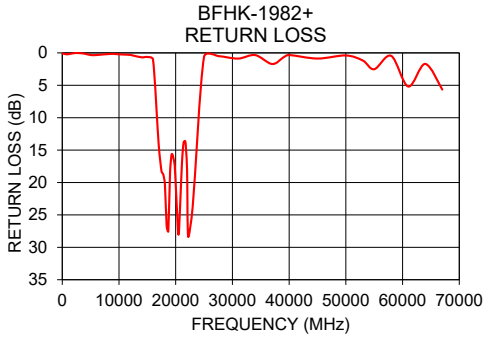
BFHK-1982+

TYPICAL PERFORMANCE DATA

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
25	108.13	0.09
100	112.72	0.10
1000	109.53	0.21
2000	112.97	0.05
3000	110.48	0.03
4000	118.78	0.13
6000	131.18	0.33
7000	110.62	0.25
8000	124.32	0.19
10000	106.09	0.22
11000	100.63	0.26
12000	93.08	0.31
12600	86.54	0.43
14000	66.61	0.69
17500	1.58	18.26
19750	1.61	16.88
22200	1.90	28.36
27500	93.61	0.50
39000	90.57	0.69
40000	90.11	0.33
53000	73.87	1.19







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-Circuit's 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

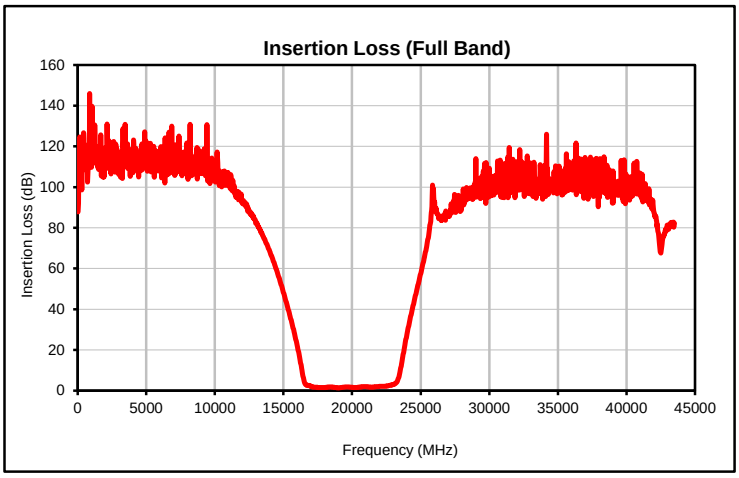
Ceramic Bandpass Filter BFHK-1982+

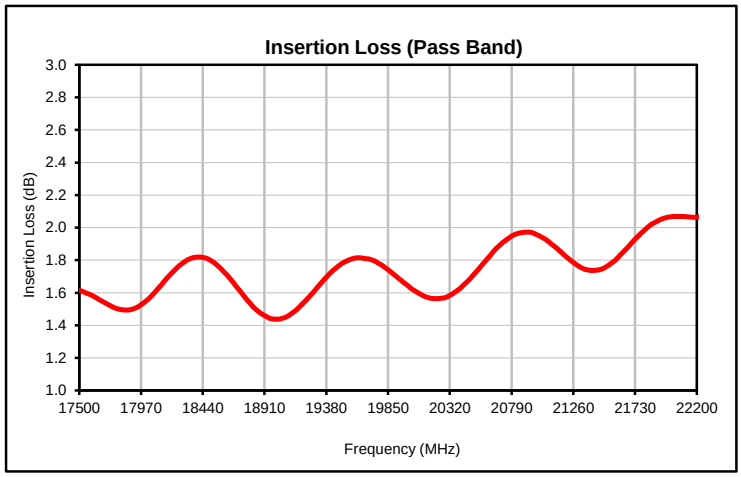
Typical Performance Data

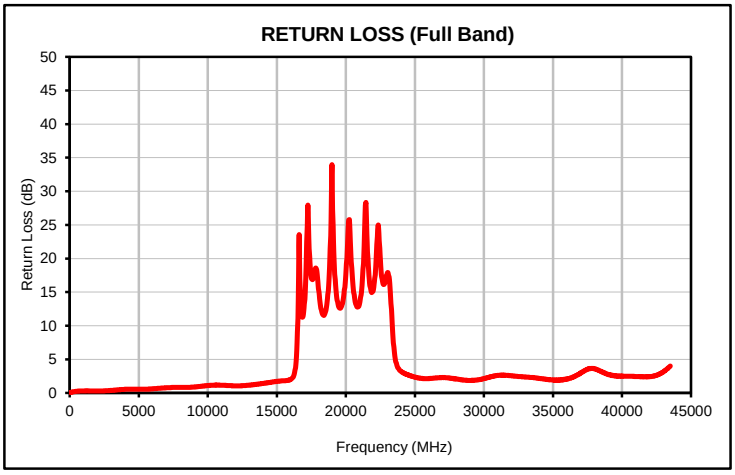
FREQUENCY (MHz)	INSERTION LOSS (dB)	RETURN LOSS (dB)
25	87.91	0.06
50	91.98	0.06
100	102.24	0.10
500	115.89	0.24
1000	109.77	0.31
2000	111.50	0.29
3000	106.19	0.37
4000	115.92	0.54
5000	115.83	0.55
6000	108.24	0.61
7000	107.53	0.77
8000	108.64	0.82
9000	107.39	0.88
10000	108.59	1.10
11000	101.98	1.15
12000	91.97	1.06
12200	92.41	1.05
12400	90.10	1.07
12600	87.02	1.08
12800	85.54	1.12
13000	82.21	1.15
13500	76.03	1.27
14000	68.35	1.40
14500	59.09	1.56
15000	48.26	1.71
15500	36.10	1.81
16000	22.22	2.01
16500	4.83	9.05
17000	2.15	13.22
17500	1.61	17.19
17735	1.53	17.85
17970	1.51	17.11
18205	1.72	12.61
18440	1.82	11.57
18675	1.66	14.04
18910	1.46	23.38
19145	1.48	21.11
19380	1.69	13.81
19615	1.81	12.60
19850	1.74	14.42
20085	1.60	20.06
20320	1.58	23.85
20555	1.76	15.43
20790	1.94	12.92
21025	1.94	13.56
21260	1.79	18.37
21495	1.74	26.95
21730	1.92	16.33
21965	2.06	15.11
22200	2.06	20.06
22500	2.25	19.79
23000	3.00	17.84
23500	9.40	6.31
24000	27.70	3.19
24500	43.24	2.69
25000	57.48	2.34
25500	73.37	2.16
26000	91.64	2.13
26500	85.71	2.22
27000	86.35	2.29
27500	92.19	2.21
28000	92.85	2.06
30000	109.31	2.12
32000	105.58	2.55
34000	103.15	2.17
36000	101.80	2.04
38000	101.79	3.60
40000	101.70	2.49
42000	87.45	2.41
43500	82.21	4.01

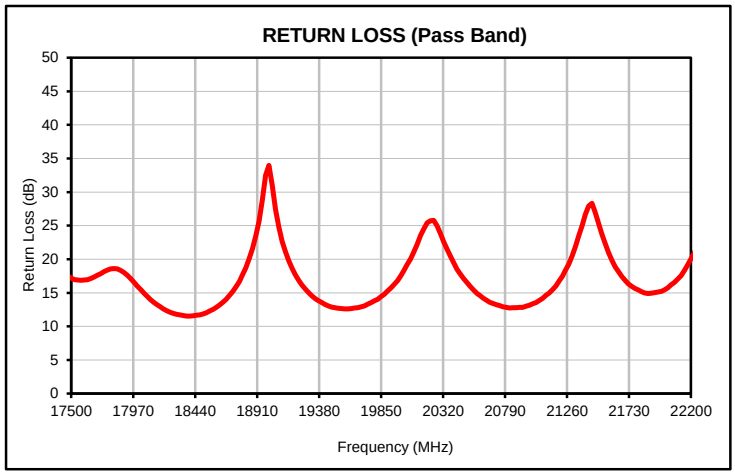
Ceramic Bandpass Filter BFHK-1982+

Typical Performance Curves





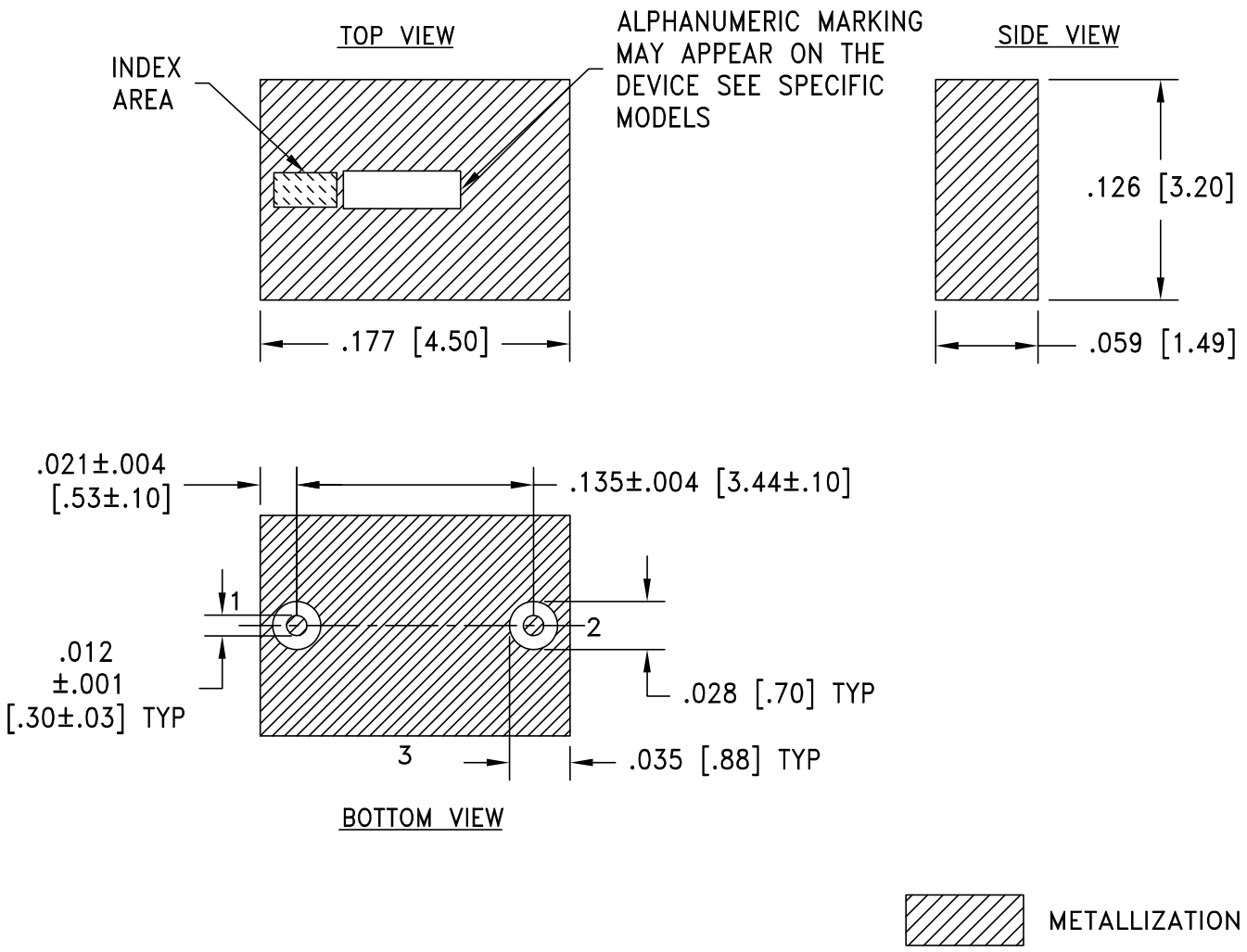




Case Style NM

Outline Dimensions

NM1812C-3



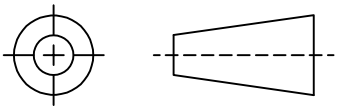
Weight: .126 grams.

Dimensions are in inches [mm]. Tolerances: 2 Pl.±.01; 3 Pl. ±.005 Inches

Notes:

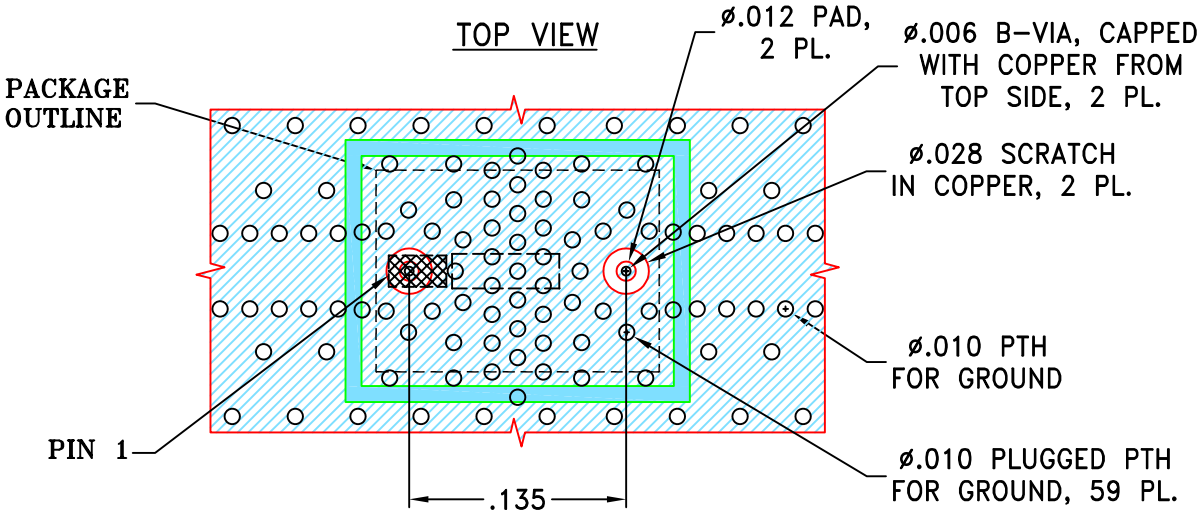
1. Case material: Ceramic.
2. Termination Finish: **as shown below or indicated on Data Sheet.**
   For RoHS Case Styles: Tin Plate over Nickel plate. All models, (+) suffix.

THIRD ANGLE PROJECTION

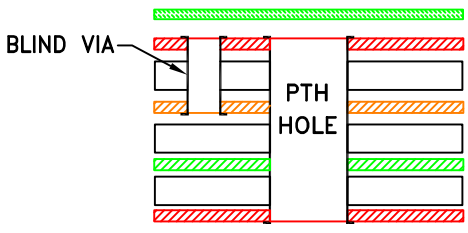


REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-013254	NEW RELEASE	05/16/22	ITG	IL
A	ECO-015587	UPDATED STACK-UP DIAGRAM	11/01/22	ITG	IL
B	ECO-020890	ADDED DIMENSIONS	02/16/24	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR NM1812C-3 CASE STYLE



STACK-UP DIAGRAM



1. TOTAL FINISHED THICKNESS 0.0228±.004.
2. B-VIA PRESENT FROM COPPER LAYER 1 TO COPPER LAYER 2.
3. PTH PRESENT FROM COPPER LAYER 1 TO COPPER LAYER 4.
4. INDICATED PLUGGED PTH's ARE PLUGGED WITH EPOXY AND CAPPED WITH COPPER FROM TOP SIDE.
5. LAYER 4 IS CONTINUOUS GROUND PLANE.

NOTES:

1. PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
2. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR MEGTRON6 R-5775(G), CLOTH STYLE:1080 WITH DIELECTRIC THICKNESS .0051; COPPER: 1/2 OZ.+PLATING. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
3. COPPER LAYER 4 OF THE PCB ARE CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	ITG	05/16/22
TOLERANCES ON:	CHECKED	GF	05/16/22
2 PL DECIMALS ±	APPROVED	IL	05/16/22
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

Mini-Circuits®

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

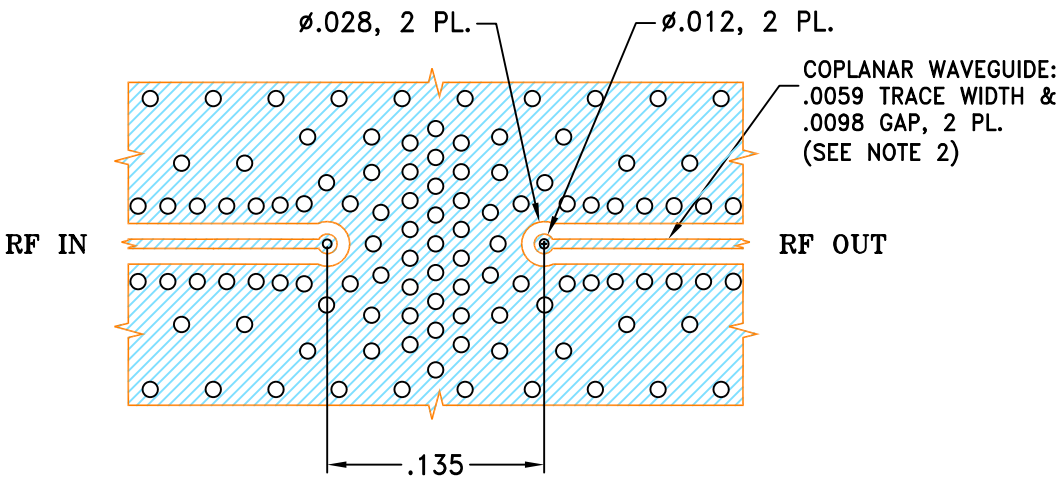
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, NM1812C-3, TB-1239

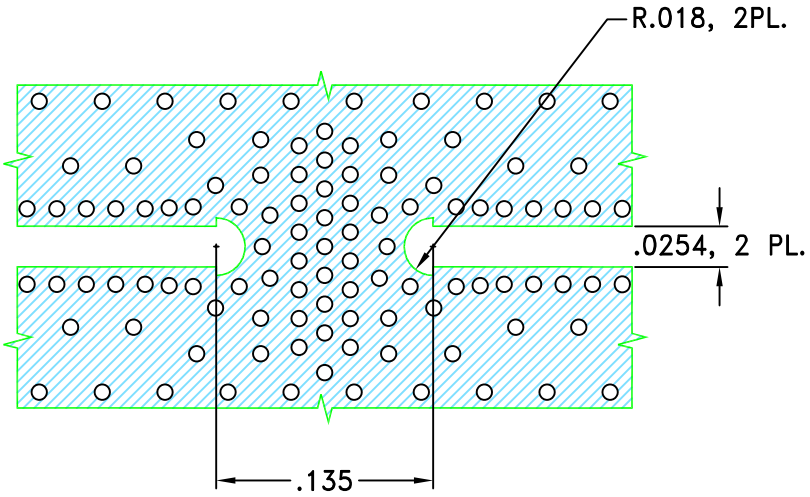
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-730	B

FILE:	SCALE:	SHEET:
98PL730	8:1	1 OF 2

LAYER 2, B-VIA & PTH



LAYER 3 & PTH



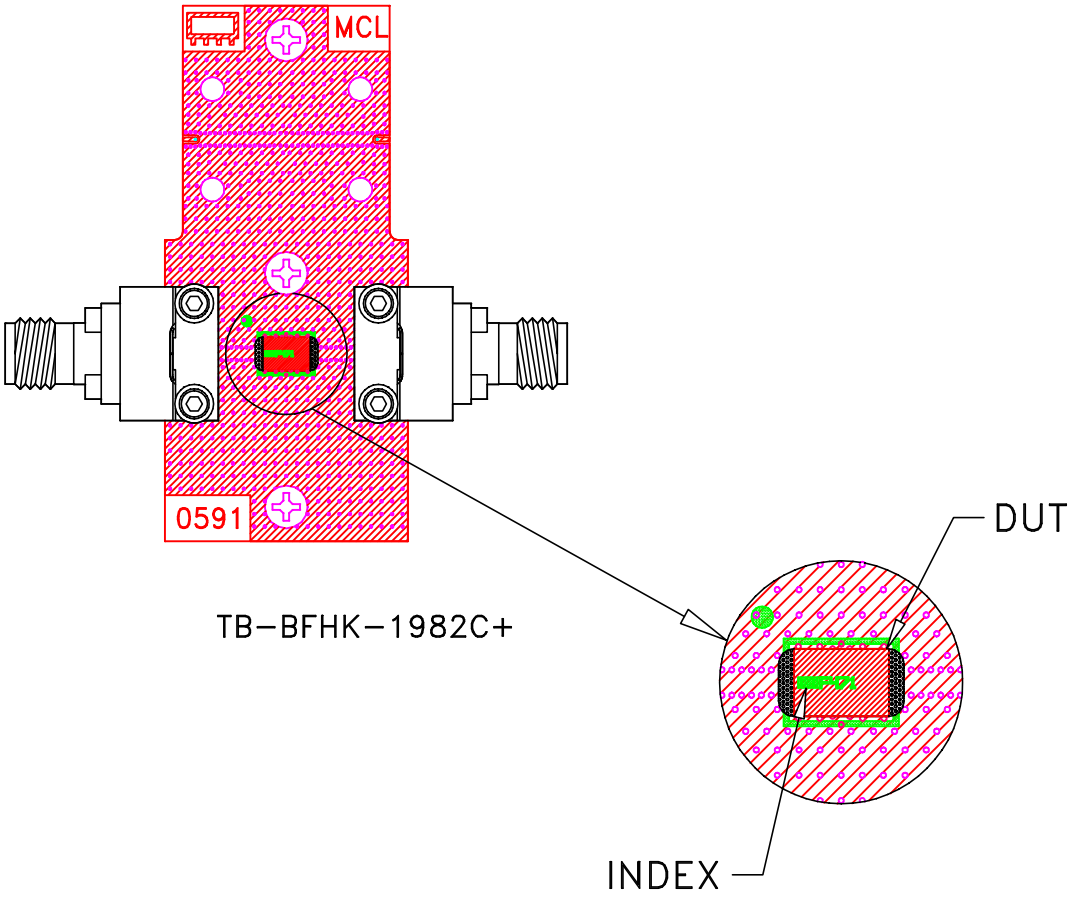
ASHEETA2.DWG REV:A DATE: 01/12/94

ALL DIMENSIONS ARE IN INCHES EXCEPT OTHERWISE SPECIFIED

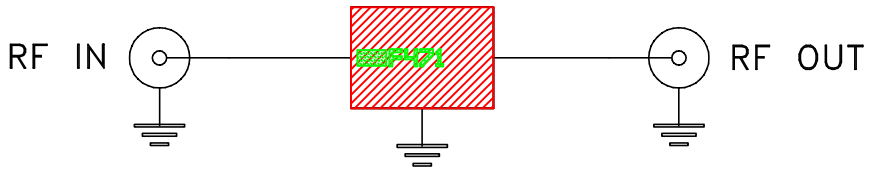
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-730	B

FILE:	SCALE:	SHEET:
98PL730	8:1	2 OF 2

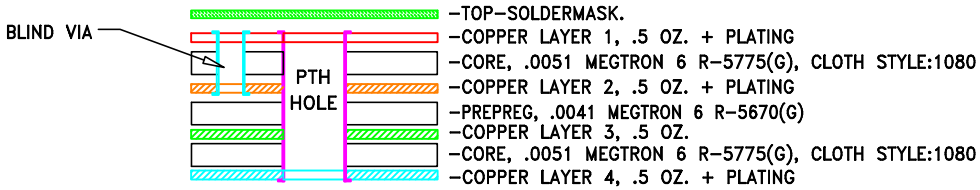
Evaluation Board and Circuit



TB-BFHK-1982C+



Schematic Diagram



STACK-UP DIAGRAM

Notes:

1. 1.85 mm Female End Launch Connector.
2. PCB Material: Megtron 6 R5775(N).
   Dielectric Constant=3.6.
3. Total finished thickness .023".

Mini-Circuits®

Mini-Circuits

Environmental Specifications ENV06T8

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
Thermal Cycling	-55 to 125°C, 100 cycles, Dwell Time 15 minutes.	MIL-STD-202, Method 107, Condition A-3
Mechanical Shock	50g, 11ms half-sine, 18 shocks applied each to 3 axes	MIL-STD-202 Method 213, Condition A
Vibration	10-2000Hz sine, 20g, 12 cycles applied each to 3 axes	MIL-STD-202, Method 204, Condition D
Constant Acceleration	30Kg, Y1 Direction	MIL-STD-883, Method 2001, Condition E
Humidity	85°C, 90-95% Relative Humidity, 250hours	
Solderability	10X / 30X Magnification	J-STD-002C Test S, J-STD-002C Test S1
High Temp Storage	125°C, 250 hours	