Ceramic

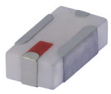
Bandpass Filter

BFCN-1860+

50Ω 1580 to 2200 MHz

The Big Deal

- LTCC construction
- Temperature stable from -55 to +100°C
- Small size (0.126 x .063 X .037")



CASE STYLE: FV1206-4

Product Overview

The BFCN-1860+ LTCC bandpass filter covers the 1580 to 2200 MHz passband with 2 dB passband insertion loss and 20 dB upper/lower stopband rejection. This model handles up to 2.5W RF input power and provides a wide operating temperature range from -55 to +100°C. Utilizing LTCC multi-layer construction, the filter achieves excellent repeatability of performance and comes in a tiny 1206 ceramic package with wraparound terminations, minimizing performance variations due to parasitics and saving space in dense PCB layouts.

Key Features

Feature	Advantages
LTCC Construction	Provides a rugged package well suited for tough environments such as high humidity and temperature extremes.
Tiny size (0.126 x .063 x .037")	Saves space in dense circuit boards and minimizes the effects of parasitics.
Wrap-around terminations	Provides excellent solderability and easy visual inspection
Wide operating temperature range, -55 to +100°C	Enables reliable performance in extreme environments

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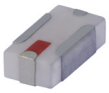


Generic photo used for illustration purposes only

CASE STYLE: FV1206-4

+RoHS Compliant

The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	20, 50, 100, 200, 500, 1000, 3000

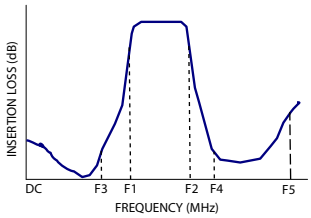
Features

- Good VSWR, 1.5:1 typ. @ passband
- Small size(0.126 x .063 x .037)
- Temperature stable
- LTCC construction

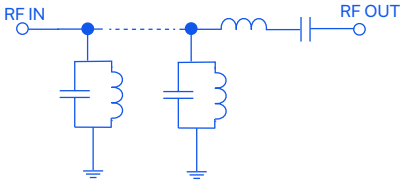
Applications

- Harmonic rejection
- Transmitters / Receivers

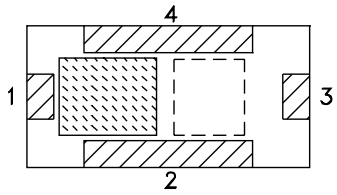
Specification Definition



Functional Schematic



Top View



Pad Connections

Input	1
Output	3
Ground	2,4

Electrical Specifications[1,2] at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—			1860		MHz
	Insertion Loss	F1 - F2	1580 - 2200	—	2.0	3.5	dB
	VSWR	F1 - F2	1580 - 2200	—	1.5	2.5	:1
Stop Band, Lower	Insertion Loss	DC - F3	1300	—	20	—	dB
	VSWR	DC - F3	1300	—	20	—	:1
Stop Band, Upper	Insertion Loss	F4 - F5	2600 - 4800	—	20	—	dB
	VSWR	F4 - F5	2600 - 4800	—	15	—	:1

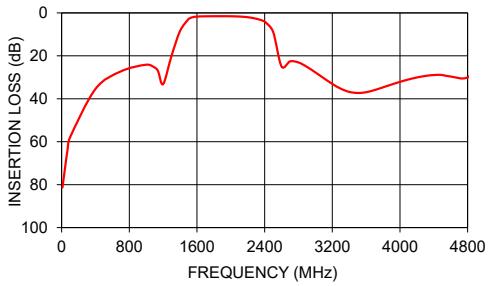
1. Measured on Mini-Circuits Characterization Test Board TB-824+.
2. This filter is not intended for use as a DC Blocking circuit element. In Application where DC voltage is present at either input or output ports, blocking capacitors are required at the corresponding RF port.

Maximum Ratings

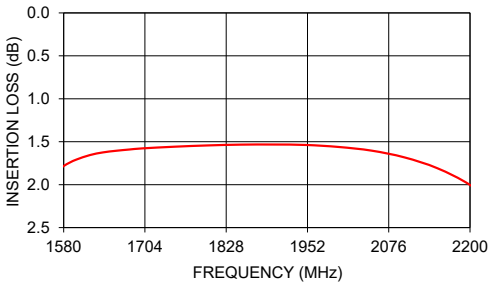
Operating Temperature	-55°C to +100°C
Storage Temperature	-55°C to +100°C
RF Power Input*	2.5W at 25°C

*Passband rating, derate linearly to 0.7W at 100°C ambient
Permanent damage may occur if any of these limits are exceeded.

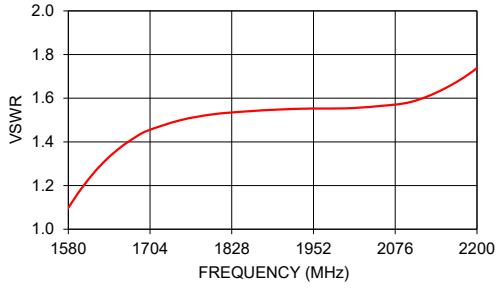
BFCN-1860+
INSERTION LOSS (Full Band)



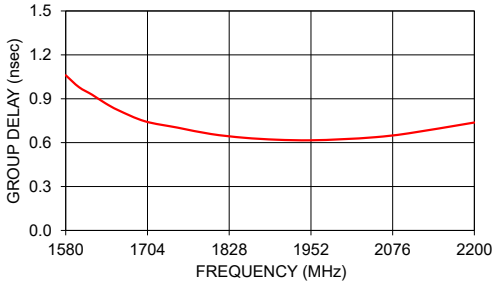
BFCN-1860+
INSERTION LOSS (Pass Band)



BFCN-1860+
VSWR



BFCN-1860+
GROUP DELAY



Full Band Performance

Pass Band Performance

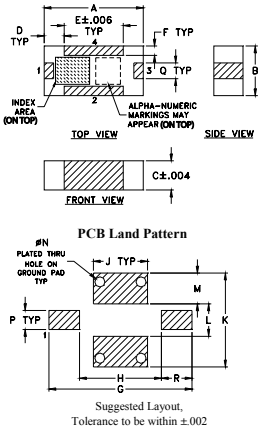
Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Insertion Loss (dB)	Group Delay (nsec)
10	81.30	72.38	1580	1.78	1.06
40	72.24	67.32	1600	1.71	0.98
100	57.92	60.68	1620	1.66	0.93
400	35.41	43.01	1640	1.62	0.87
1000	24.12	22.58	1660	1.61	0.82
1300	19.87	10.75	1700	1.58	0.75
1580	1.78	1.10	1750	1.56	0.70
1660	1.61	1.38	1800	1.54	0.66
2000	1.56	1.55	1850	1.53	0.63
2200	2.00	1.74	1900	1.53	0.62
2600	24.98	5.02	1950	1.54	0.62
3000	27.70	17.47	2000	1.56	0.62
3500	37.29	23.88	2050	1.60	0.64
4100	31.00	24.03	2100	1.68	0.66
4800	30.01	2.93	2200	2.00	0.74

Pad Connections

Input	1
Output	3
Ground	2,4

Product Marking: F8

Outline Drawing

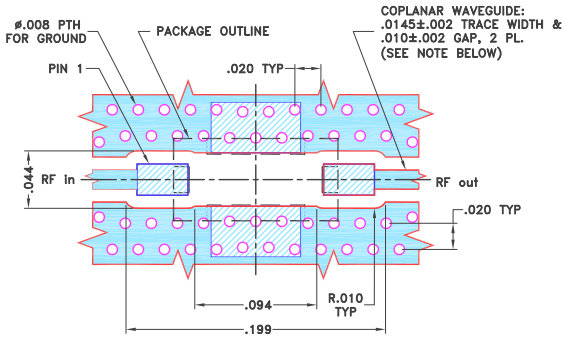


Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J
.126	.063	.037	.026	.075	.012	.182	.104	.069
3.20	1.60	0.94	0.66	1.91	0.30	4.62	2.64	1.75

K	L	M	N	P	Q	R	wt
.119	.041	.039	.013	.024	.020	.039	grams
3.02	1.04	0.99	0.33	0.61	0.51	0.99	.020

Demo Board MCL P/N: TB-824+
Suggested PCB Layout (PL-454)



NOTES:
1. TRACE WIDTH 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 LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

Additional 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/MCLStore/terms.jsp

Ceramic Bandpass Filter BFCN-1860+

Typical Performance Data

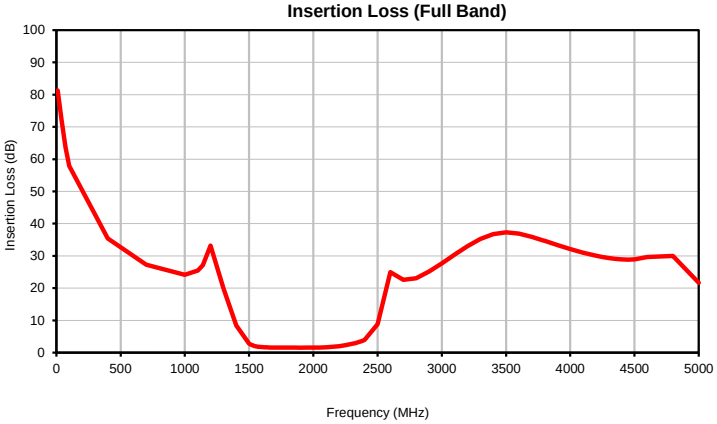
FREQUENCY (MHz)	INSERTION LOSS (dB)	VSWR (:1)
10	81.30	72.38
40	72.24	67.32
70	63.71	63.58
100	57.92	60.68
400	35.41	43.01
700	27.23	32.56
1000	24.12	22.58
1100	25.45	19.33
1140	27.14	17.86
1200	33.18	15.63
1300	19.87	10.75
1400	8.44	4.82
1500	2.84	1.59
1510	2.60	1.46
1520	2.40	1.34
1530	2.23	1.24
1540	2.10	1.16
1550	1.99	1.09
1560	1.91	1.04
1570	1.84	1.05
1580	1.78	1.10
1590	1.74	1.14
1600	1.71	1.19
1620	1.66	1.26
1640	1.62	1.33
1660	1.61	1.38
1680	1.59	1.42
1700	1.58	1.45
1750	1.56	1.50
1800	1.54	1.53
1850	1.53	1.54
1900	1.53	1.55
1950	1.54	1.55
2000	1.56	1.55
2050	1.60	1.56
2100	1.68	1.58
2150	1.81	1.64
2200	2.00	1.74
2250	2.29	1.88
2300	2.70	2.04
2310	2.79	2.07
2320	2.89	2.09
2330	3.00	2.11
2340	3.12	2.13
2350	3.24	2.14
2360	3.37	2.14
2370	3.51	2.13
2380	3.66	2.11
2390	3.82	2.07
2400	4.00	2.02
2500	8.80	1.58
2600	24.98	5.02
2700	22.58	9.23
2800	23.07	12.57
2900	25.13	15.22
3000	27.70	17.47
3100	30.43	19.36
3200	33.06	21.02
3300	35.30	22.22
3400	36.77	23.14
3500	37.29	23.88
3600	36.94	24.56
3700	35.92	25.33
3790	34.79	25.98
3800	34.66	26.05
3900	33.35	25.48
4000	32.12	24.79
4100	31.00	24.03
4200	30.07	23.22
4250	29.69	22.69
4300	29.36	21.74
4350	29.10	20.57
4400	28.93	19.07
4450	28.85	17.33
4500	28.92	15.30
4600	29.63	10.72
4800	30.01	2.93
5000	21.68	3.24

FREQUENCY (MHz)	GROUP DELAY (ns)
1580	1.06
1590	1.02
1600	0.98
1620	0.93
1640	0.87
1660	0.82
1680	0.78
1700	0.75
1750	0.70
1800	0.66
1850	0.63
1900	0.62
1950	0.62
2000	0.62
2050	0.64
2100	0.66
2150	0.70
2200	0.74

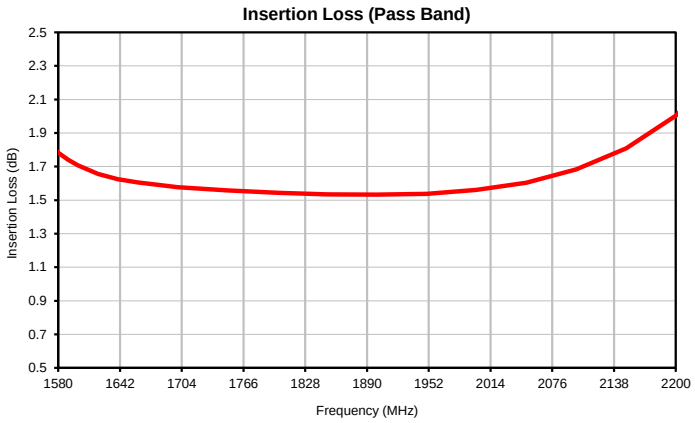
Ceramic Bandpass Filter BFCN-1860+

Typical Performance Curves

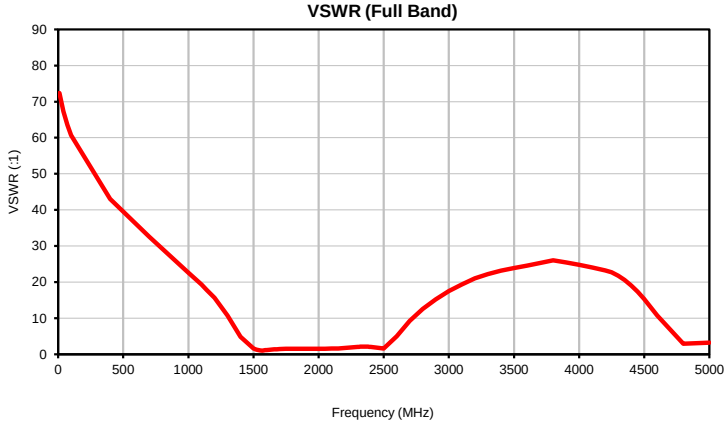
Insertion Loss (Full Band)



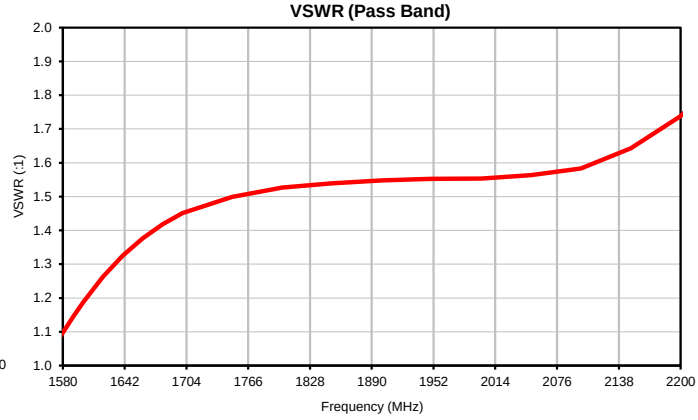
Insertion Loss (Pass Band)



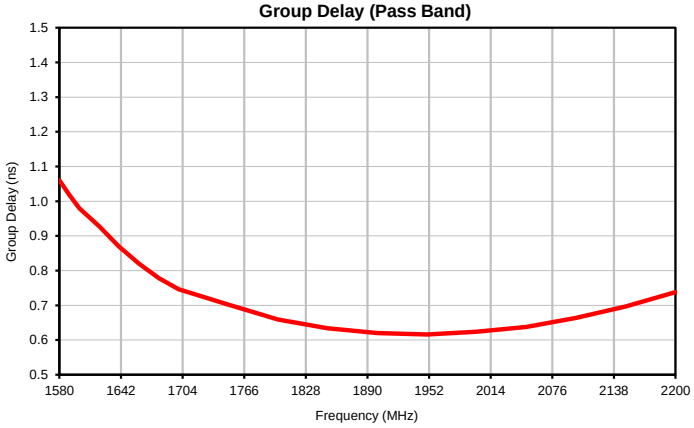
VSWR (Full Band)



VSWR (Pass Band)



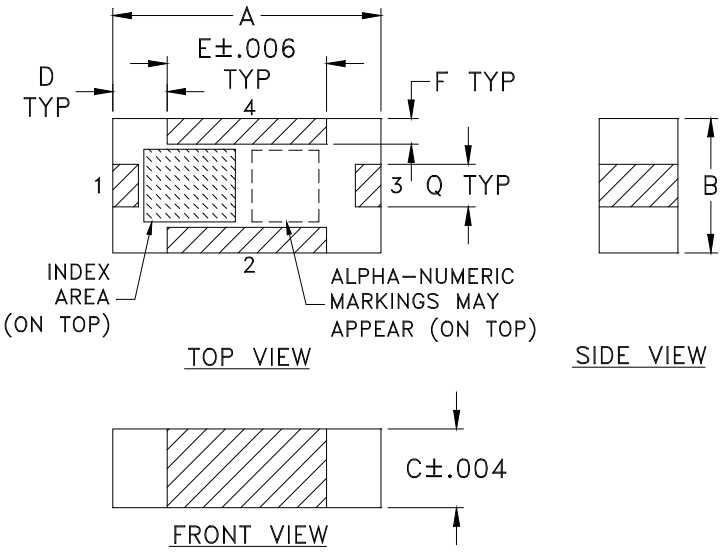
Group Delay (Pass Band)



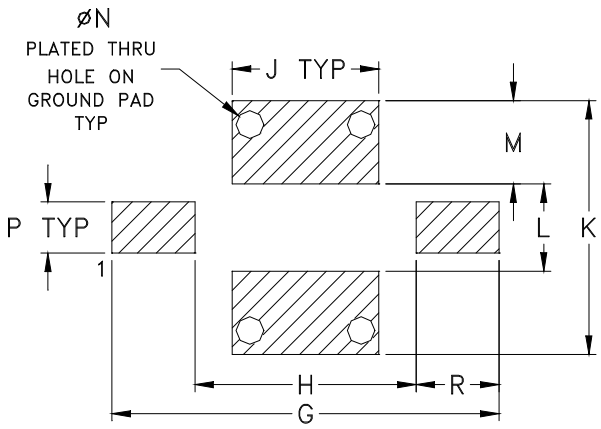
Case Style FV

FV1206-4

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

CASE #	A	B	C	D	E	F	G	H	J	K	L	M
FV1206-4	.126 (3.20)	.063 (1.60)	.037 (0.94)	.026 (0.66)	.075 (1.91)	.012 (0.30)	.182 (4.62)	.104 (2.64)	.069 (1.75)	.119 (3.02)	.041 (1.04)	.039 (0.99)

CASE #	N	P	Q	R	WT. GRAM
FV1206-4	.013 (0.33)	.024 (0.61)	.020 (0.51)	.039 (0.99)	.020

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .01; 3 Pl. ± .005

Notes:

1. Open style, ceramic base.
2. Termination finish: **as shown below or indicated on Data Sheet.**
   For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

Tape & Reel Packaging TR-F75

DEVICE ORIENTATION IN T&R

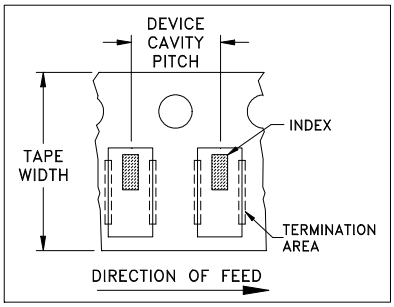


ILLUSTRATION 1

Applicable Case Styles
FV1206-1
FV1206-3

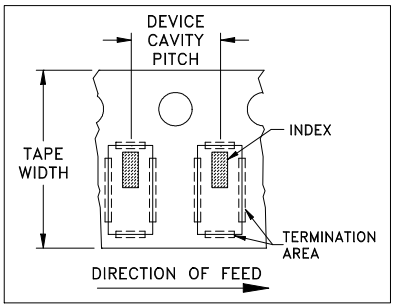


ILLUSTRATION 2

Applicable Case Styles
FV1206-4
FV1206-5
FV1206-6
FV1206-7
FV1206-9

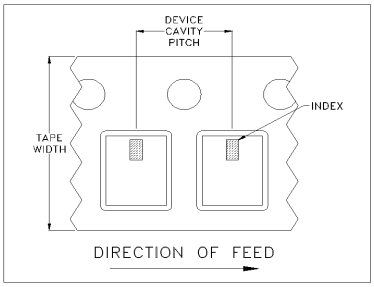


ILLUSTRATION 3

Applicable Case Styles
FV1206-11
FV1206-12
GE0805C-18
NL1008C-6
NL1008C-7
NL1008C-9
NL1008C-10
NL1008C-12

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
8	4	7	Small quantity standards (see note)	20
				50
				100
				200
				500
				1000
			Standard	3000

Note: Please consult individual model data sheet 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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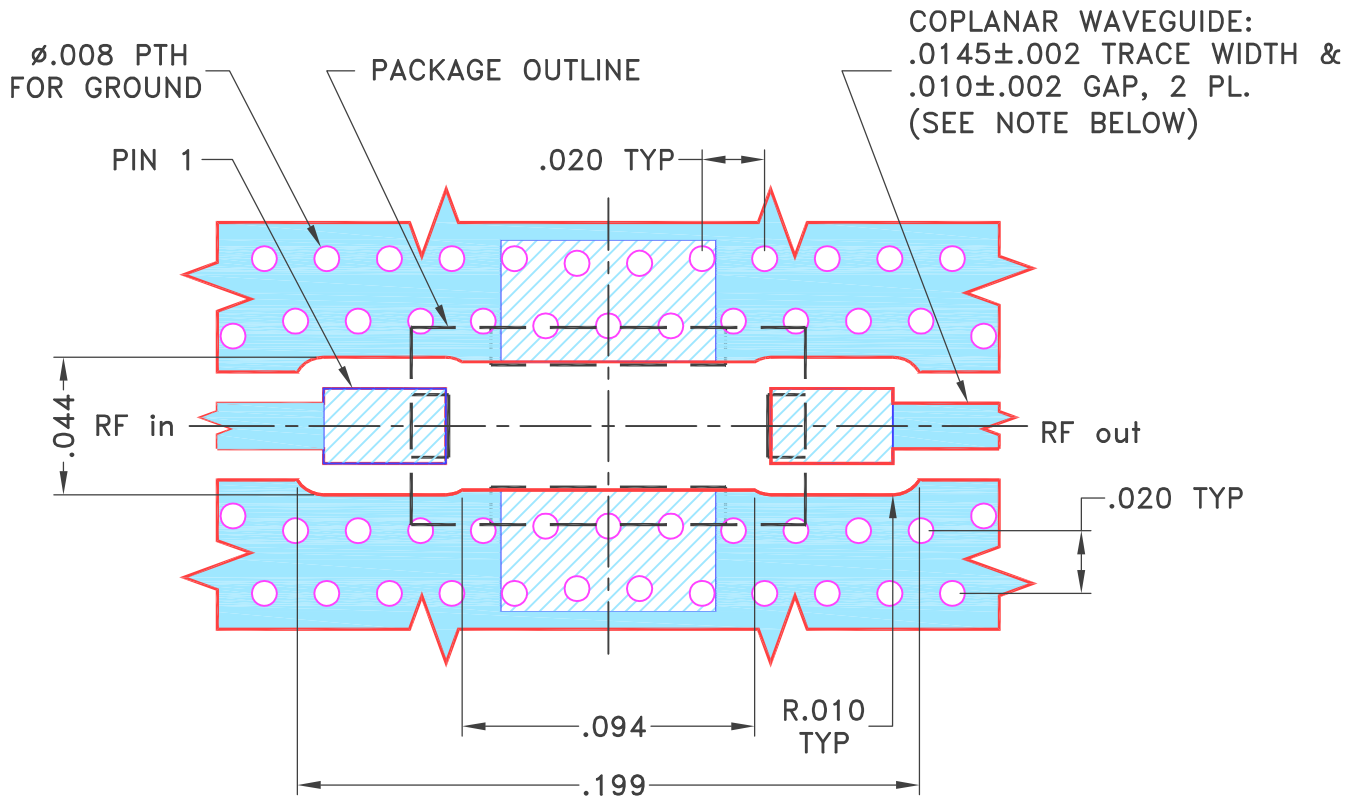
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M152168	NEW RELEASE	07/31/15	ITG	AVB

SUGGESTED MOUNTING CONFIGURATION
FOR FV1206-4 CASE STYLE, "04FL01" PIN CODE



NOTES:

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2. BOTTOM SIDE OF THE PCB IS 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	07/30/15
TOLERANCES ON:	CHECKED	GF	07/31/15
2 PL DECIMALS ±	APPROVED	AVB	07/31/15
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

Mini-Circuits®

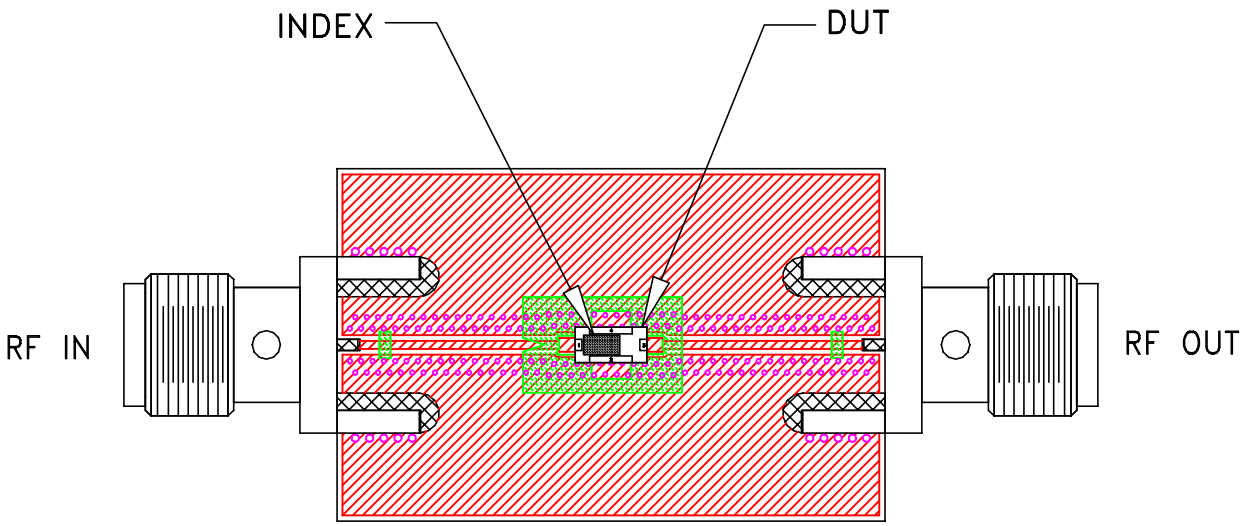
ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

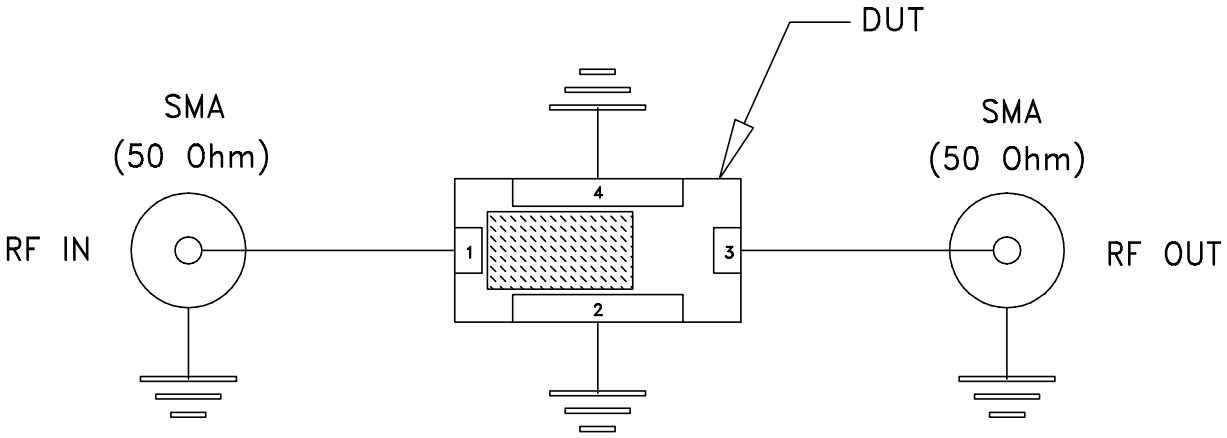
PL, 04FL01, FV1206-4, TB-824+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-454	OR
FILE: 98PL454	SCALE: 16:1	SHEET: 1 OF 1	

Evaluation Board and Circuit



TB-824+



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.0066 inch.

Mini-Circuits®

Mini-Circuits

Environmental Specifications ENV02T1

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	-40° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
Vibration (High Frequency)	20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36)	MIL-STD-202, Method 204, Condition D
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215