



CERAMIC

# Low Pass Filter

## LFCN-9170+

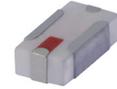
50Ω DC<sup>1</sup> to 9170 MHz

### FEATURES

- Excellent Power Handling, 8 W
- Small Size
- 7 Sections
- Temperature Stable
- Hermetically Sealed
- LTCC Construction
- Protected by U.S. Patent 6,943,646

### APPLICATIONS

- Electronic Warfare (EW)
- Harmonic Rejection
- Transmitters/Receivers
- Lab Use



Generic photo used for illustration purposes only

CASE STYLE: FV1206-4

#### +RoHS Compliant

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

### PRODUCT OVERVIEW

Mini-Circuits' LFCN-9170+ is an LTCC low pass filter with a passband from DC to 9170 MHz, supporting a variety of applications. This model provides 1.0 dB typical passband insertion loss and 30 dB typical stopband rejection. It handles up to 8 W RF input power and provides a wide operating temperature range from -55 to +100°C. Housed in a tiny 1206 ceramic form factor with wraparound terminations, the filter is ideal for dense PCB layouts and with minimal performance variation due to parasitics.

### KEY FEATURES

Feature	Advantages
LTCC Construction	Provides repeatable performance in a rugged, ceramic package well suited for tough environments such as high humidity and temperature extremes.
Tiny Size (0.12x0.06x0.04")	Saves space in dense circuit board layouts and minimizes the effects of parasitics.
High Power Handling, 8 W	Supports a wide range of system power requirements.
Wrap-Around Terminations	Provides excellent solderability and easy visual inspection.
Wide Operating Temperature Range, -55 to +100°C	Enables reliable performance in extreme environments.

REV. B  
ECO-011891  
LFCN-9170+  
MCL NY  
250613





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# Low Pass Filter

## LFCN-9170+

Mini-Circuits

50Ω DC<sup>1</sup> to 9170 MHz

### ELECTRICAL SPECIFICATIONS<sup>1,2</sup> AT +25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Units	
Passband	Insertion Loss	DC-F1	DC-9170		1.0	3.0	dB
	Freq. Cut-Off	F2	9800		3.0		dB
	VSWR	DC-F1	DC-9170		1.6		:1
Stopband	Rejection Loss	F3-F4	11360-19000	20	30		dB
		F4-F5	11630-18770	28	38		dB
	VSWR	F3-F5	11360-19000		30		:1

1. In Application where DC voltage is present at either input or output ports, de-coupling capacitors are required.

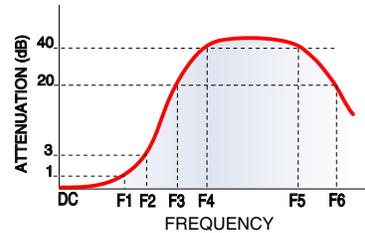
2. Measured on Mini-Circuits Characterization Test Board TB-810-9170+.

### ABSOLUTE MAXIMUM RATINGS

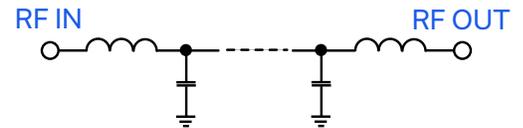
Parameter	Ratings
Operating Temperature	-55°C to +100°C
Storage Temperature	-55°C to +100°C
RF Power Input <sup>3</sup>	8 W max. at +25°C

3. Passband rating, derate linearly to 3 W at +100°C ambient. Permanent damage may occur if any of these limits are exceeded.

### TYPICAL FREQUENCY RESPONSE



### FUNCTIONAL SCHEMATIC





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# Low Pass Filter

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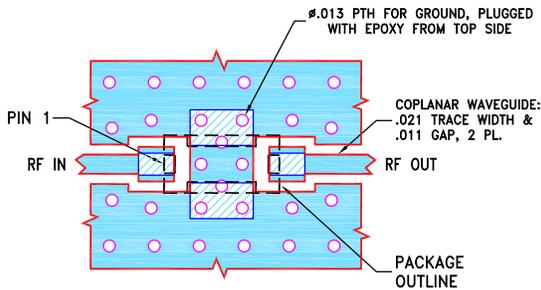
50Ω DC<sup>1</sup> to 9170 MHz

### PIN CONNECTIONS

RF IN	1
RF OUT	3
GROUND	2,4

PRODUCT MARKING: BY

DEMO BOARD MCL P/N: TB-810-9170+  
SUGGESTED PCB LAYOUT (PL-546)

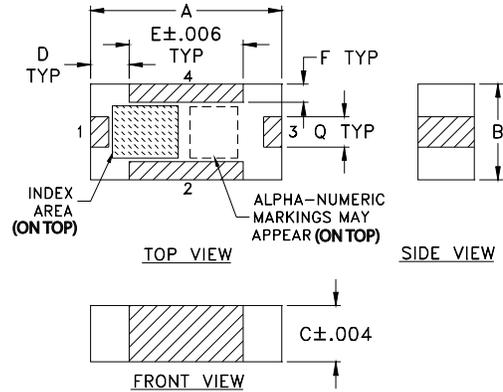


#### NOTES:

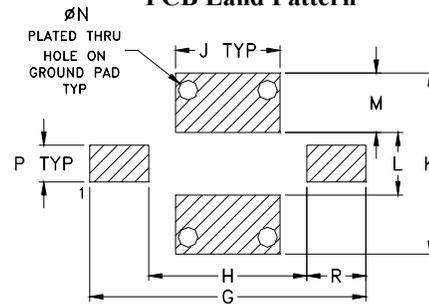
1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010±.001. COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

### OUTLINE DRAWING



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within ±.002

### OUTLINE DIMENSIONS (Inches 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	

TAPE & REEL INFORMATION: F75



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# Low Pass Filter

## LFCN-9170+

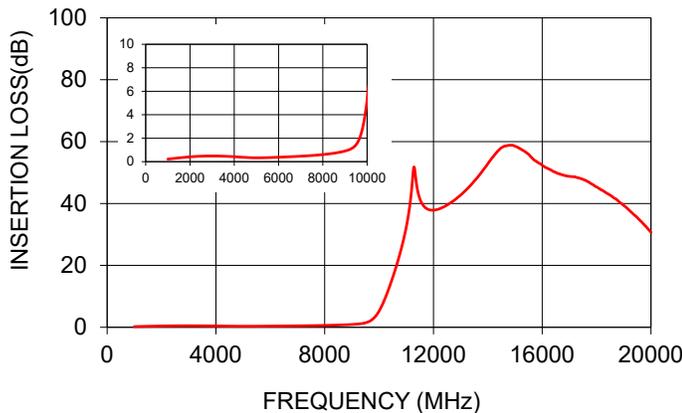
Mini-Circuits

50Ω DC<sup>1</sup> to 9170 MHz

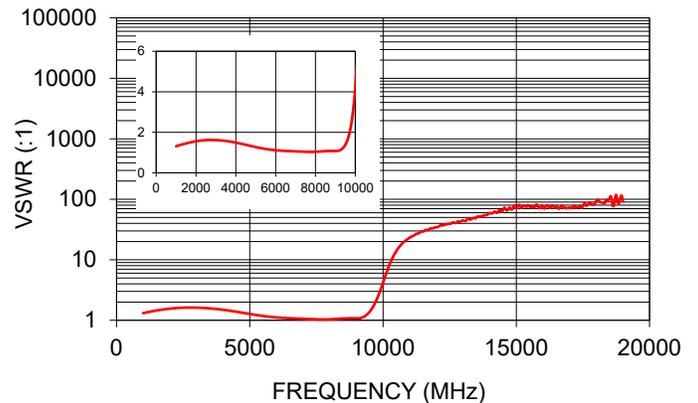
### TYPICAL PERFORMANCE DATA AT +25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
1000	0.22	1.31
2000	0.41	1.56
4000	0.42	1.49
6000	0.38	1.12
9160	1.00	1.09
9800	2.90	2.42
10000	5.24	4.20
11360	47.39	27.89
11620	39.43	31.15
12000	37.84	34.46
14000	52.82	59.27
16000	52.35	76.32
18000	45.35	93.87
18760	41.10	113.28
19000	39.35	92.67

### INSERTION LOSS



### VSWR



#### NOTES

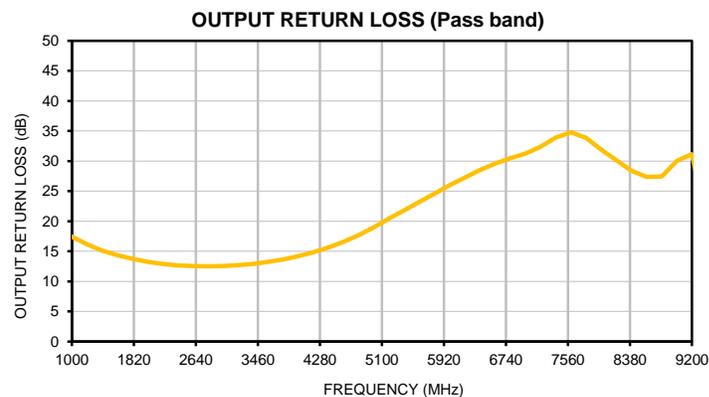
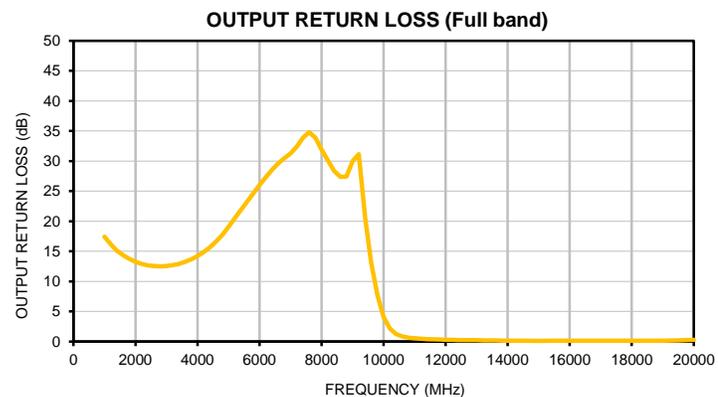
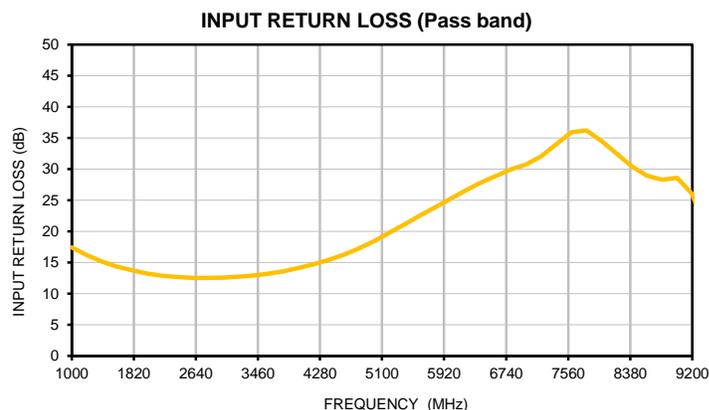
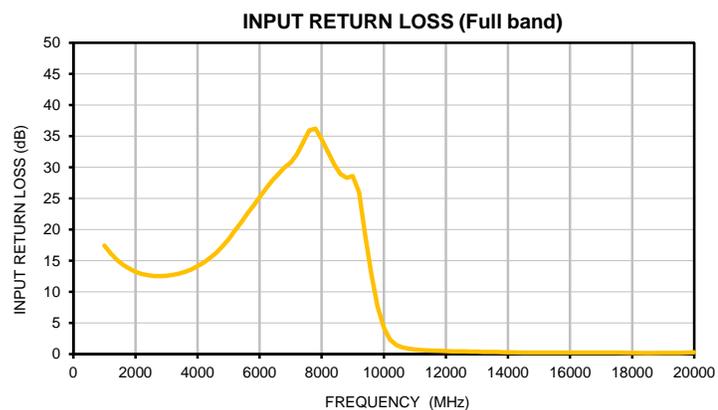
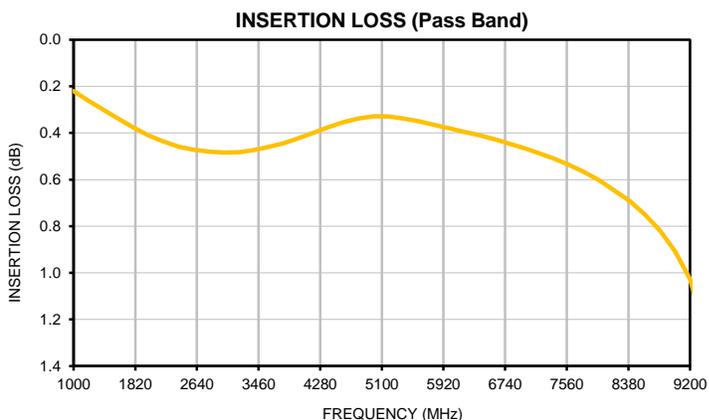
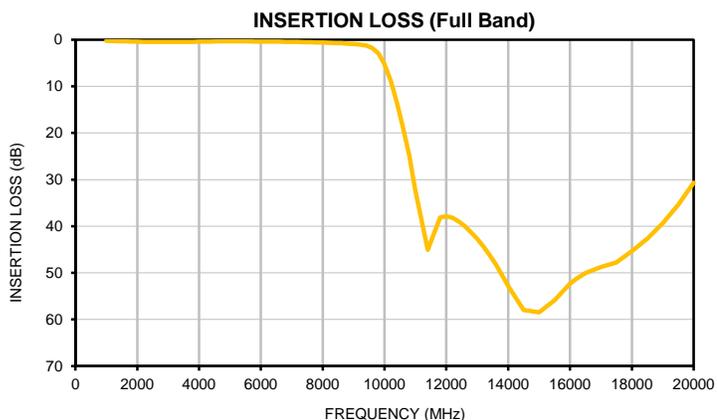
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- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- C. The parts covered by this specification document 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](http://www.minicircuits.com/terms/viewterm.html)



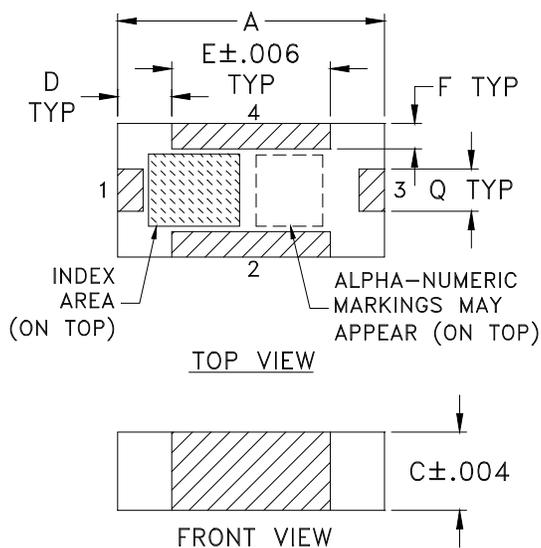
## Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	OUTPUT RETURN LOSS (dB)
1000	0.22	17.42	17.45
1200	0.26	16.15	16.16
1400	0.30	15.14	15.14
1600	0.34	14.34	14.35
1800	0.38	13.74	13.75
2000	0.41	13.23	13.25
2200	0.44	12.89	12.89
2400	0.46	12.67	12.67
2600	0.47	12.54	12.55
2800	0.48	12.53	12.51
3000	0.48	12.57	12.55
3200	0.48	12.70	12.70
3400	0.47	12.90	12.92
3600	0.46	13.22	13.24
3800	0.44	13.62	13.66
4000	0.42	14.14	14.22
4200	0.40	14.73	14.89
4400	0.37	15.44	15.69
4600	0.35	16.28	16.64
4800	0.34	17.28	17.76
5000	0.33	18.47	19.04
5200	0.33	19.83	20.49
5400	0.34	21.13	21.87
5600	0.35	22.54	23.27
5800	0.37	23.84	24.63
6000	0.38	25.21	26.05
6200	0.40	26.55	27.29
6400	0.41	27.83	28.52
6600	0.43	28.88	29.59
6800	0.45	29.95	30.50
7000	0.47	30.74	31.28
7200	0.49	32.04	32.39
7400	0.51	34.00	33.91
7600	0.54	35.93	34.81
7800	0.57	36.21	33.88
8000	0.60	34.54	31.89
8400	0.69	30.43	28.38
8600	0.75	28.92	27.39
8800	0.82	28.29	27.44
9000	0.91	28.58	30.04
9200	1.03	26.00	31.14
9400	1.25	19.15	20.59
9600	1.74	12.73	13.04
9800	2.90	7.65	7.62
10000	5.24	4.22	4.08
10200	8.91	2.34	2.14
10400	13.51	1.47	1.25
10600	18.78	1.07	0.84
10800	24.84	0.87	0.64
11000	32.37	0.75	0.52
11400	45.04	0.61	0.40
11800	38.11	0.53	0.33
12000	37.84	0.50	0.31
12200	38.21	0.47	0.29
12400	38.99	0.45	0.26
12600	40.03	0.42	0.26
12800	41.28	0.40	0.24
13000	42.74	0.39	0.22
13200	44.37	0.36	0.20
13400	46.21	0.35	0.18
13600	48.21	0.34	0.18
13900	51.65	0.31	0.16
14000	52.82	0.29	0.15
14500	58.00	0.26	0.14
15000	58.47	0.24	0.11
15500	55.87	0.23	0.12
16000	52.35	0.23	0.13
16200	51.31	0.22	0.12
16500	50.04	0.23	0.12
17000	48.77	0.24	0.14
17500	47.80	0.23	0.14
18000	45.35	0.19	0.13
18500	42.68	0.17	0.12
19000	39.35	0.19	0.17
19500	35.41	0.20	0.21
20000	30.69	0.27	0.30

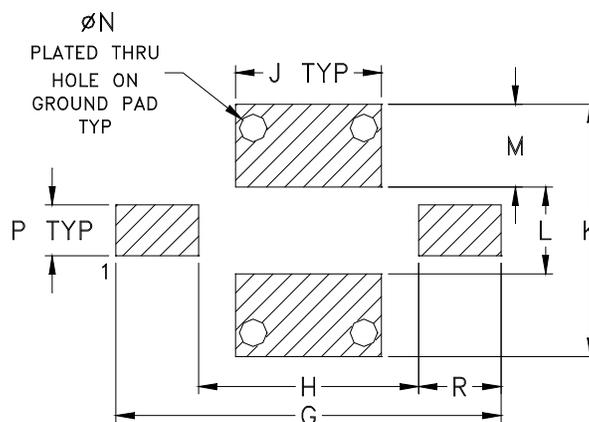
## Typical Performance Curves



### Outline Dimensions



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm .002$

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.  $\pm .01$ ; 3 Pl.  $\pm .005$

#### Notes:

- Open style, ceramic base.
- 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.



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](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

## DEVICE ORIENTATION IN T&R

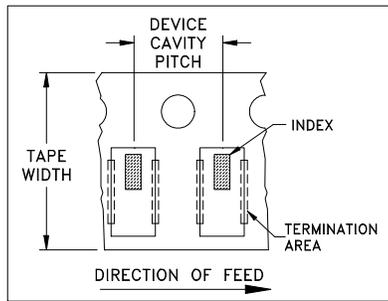


ILLUSTRATION 1

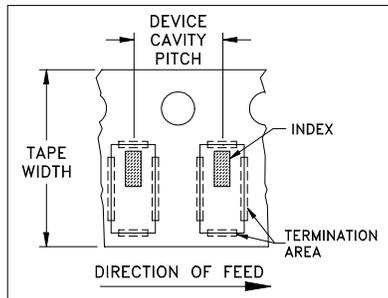


ILLUSTRATION 2

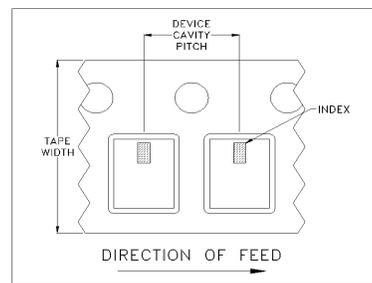


ILLUSTRATION 3

### Applicable Case Styles

FV1206-1  
FV1206-3

### Applicable Case Styles

FV1206-4  
FV1206-5  
FV1206-6  
FV1206-7  
FV1206-9

### 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.

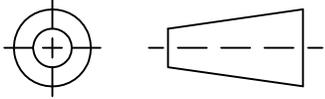
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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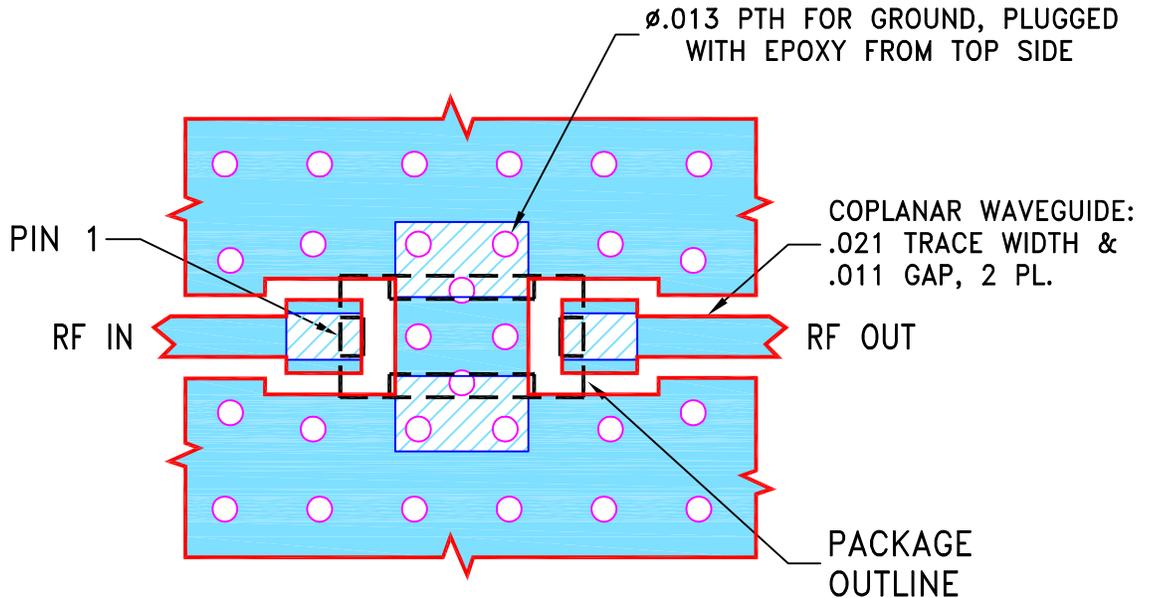
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M166277	NEW RELEASE	02/20/18	ITG	BK

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



NOTES:

1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS  $.010 \pm .001$ . COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & 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.

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	ITG 02/12/18
	CHECKED	GF 02/20/18
	APPROVED	BK 02/20/18



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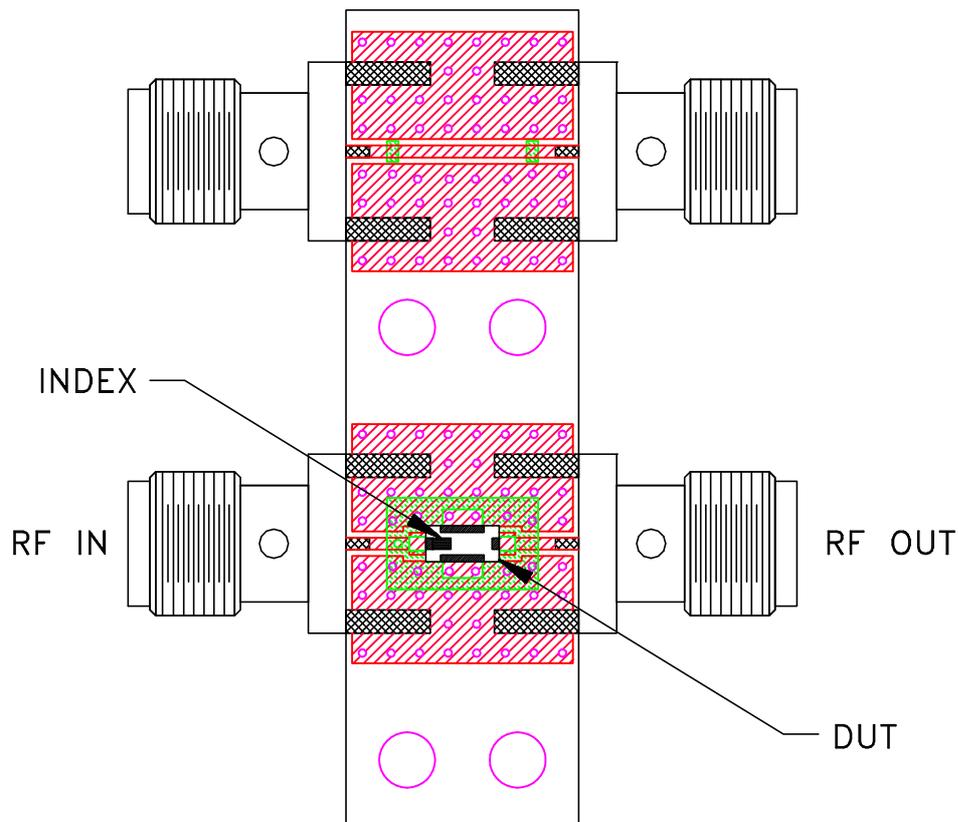
13 Neptune Avenue  
 Brooklyn NY 11235

PL, 04FL01, FV1206-4, TB-810+

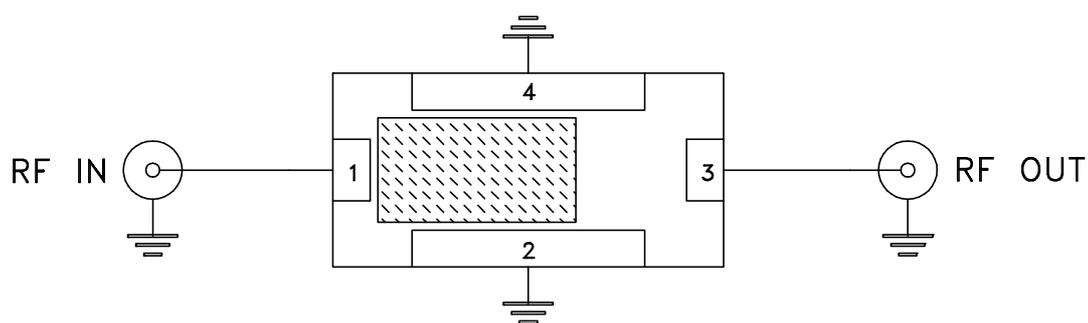
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SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-546	OR
FILE:	98PL546	SCALE: 10:1	SHEET: 1 OF 1

# Evaluation Board and Circuit



TB-810-9170+



Schematic Diagram

## Note:

PCB Material: R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.0010 inch.

 **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 100°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
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, Para 4.2.5, Test S, 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