CERAMIC

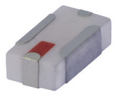
Low Pass Filter

LFCN-9170+

50Ω DC[1] 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



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

APPLICATIONS

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

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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ELECTRICAL SPECIFICATIONS[1,2] 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		
	VSWR	F3-F5	11360-19000		30		:1

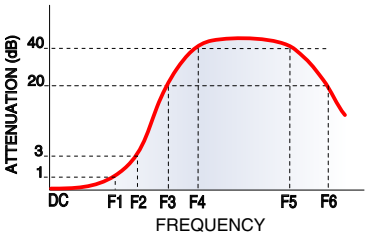
1. In Application where DC voltage is present at either input or output ports, de-coupling capacitors are required.
2. Measured on Mini-Circuits Characterization Test Board TB-810-9170+.

ABSOLUTE MAXIMUM RATINGS

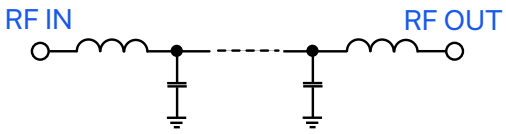
Parameter	Ratings
Operating Temperature	-55°C to +100°C
Storage Temperature	-55°C to +100°C
RF Power Input[3]	8 W max. at +25°C

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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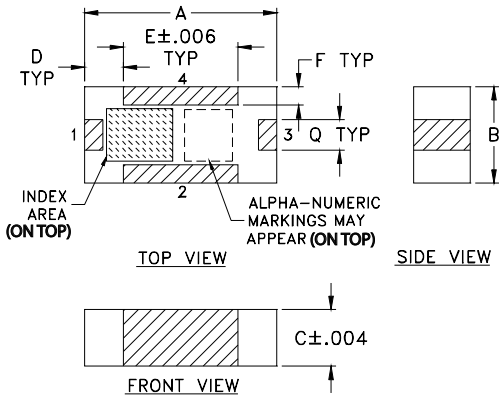
PIN CONNECTIONS

RF IN	1
RF OUT	3
GROUND	2,4

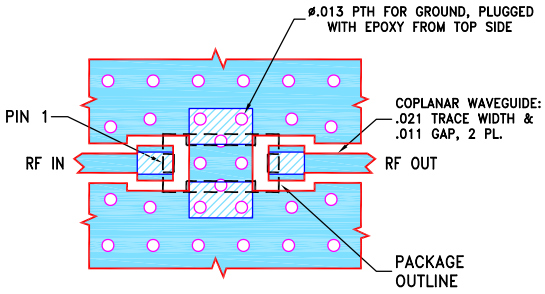
OUTLINE DRAWING



PRODUCT MARKING: BY

DEMO BOARD MCL P/N: TB-810-9170+

SUGGESTED PCB LAYOUT (PL-546)

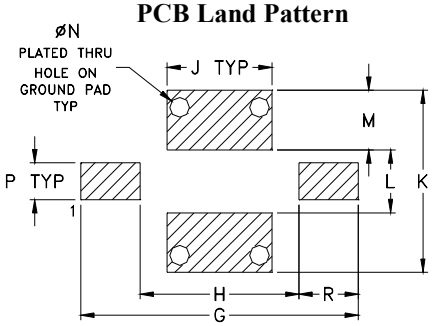


NOTES:
1. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010±.001. COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

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

CERAMIC

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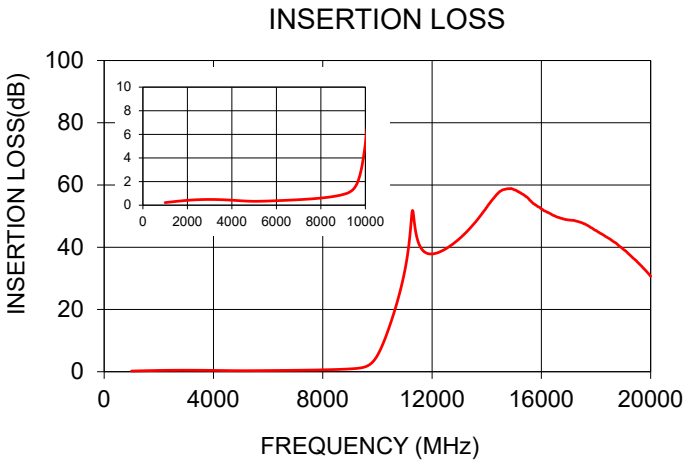
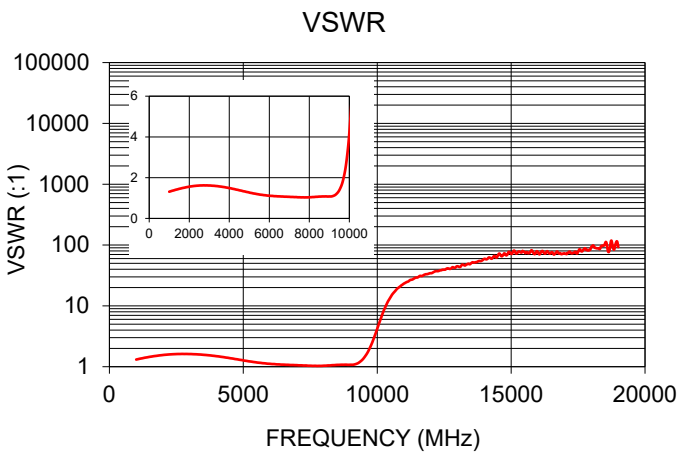
50Ω DC[1] to 9170 MHz

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





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 Low Pass Filter LFCN-9170+

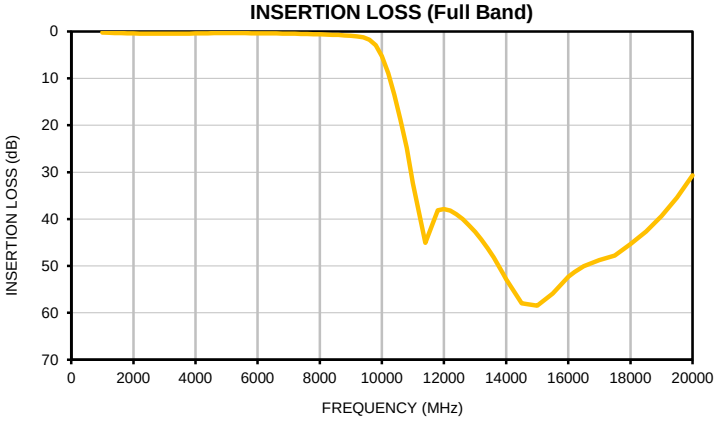
Typical Performance Data

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

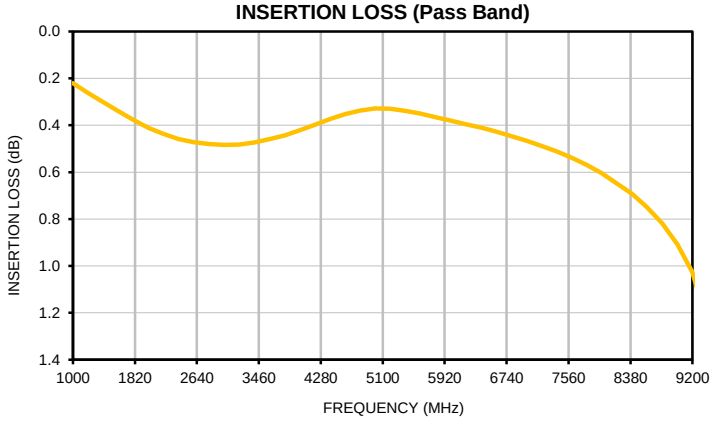
Ceramic Low Pass Filter LFCN-9170+

Typical Performance Curves

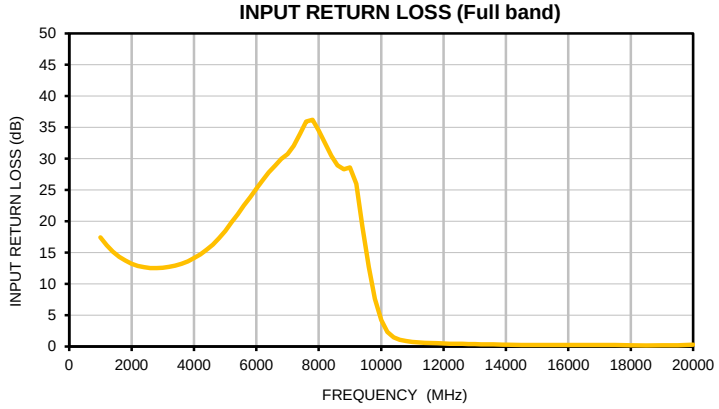
INSERTION LOSS (Full Band)



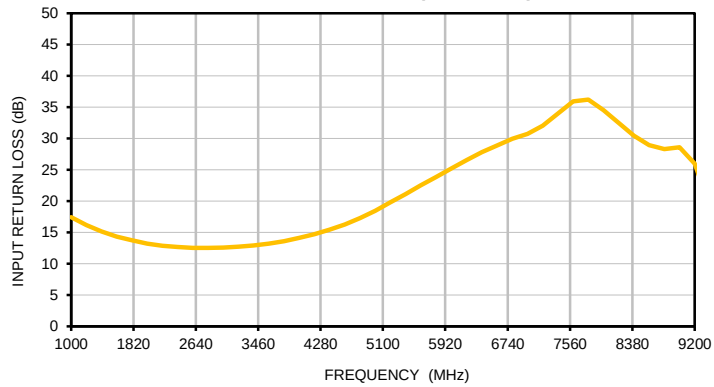
INSERTION LOSS (Pass Band)



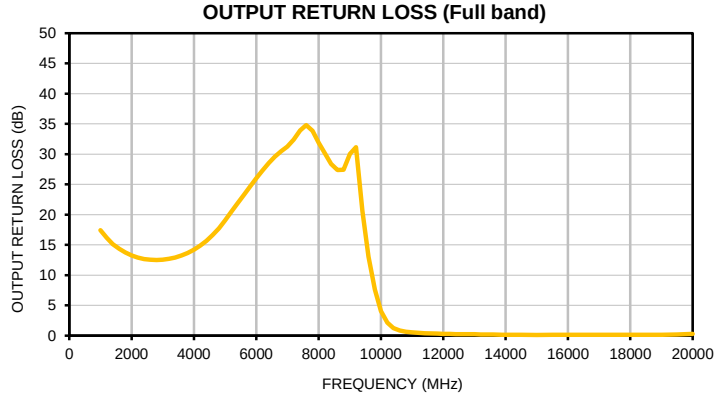
INPUT RETURN LOSS (Full band)



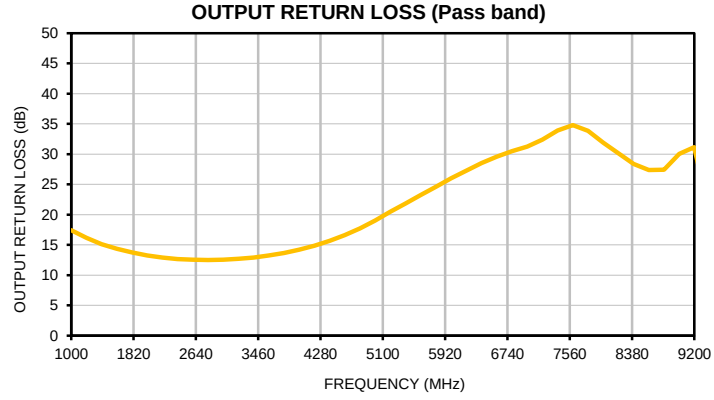
INPUT RETURN LOSS (Pass band)



OUTPUT RETURN LOSS (Full band)



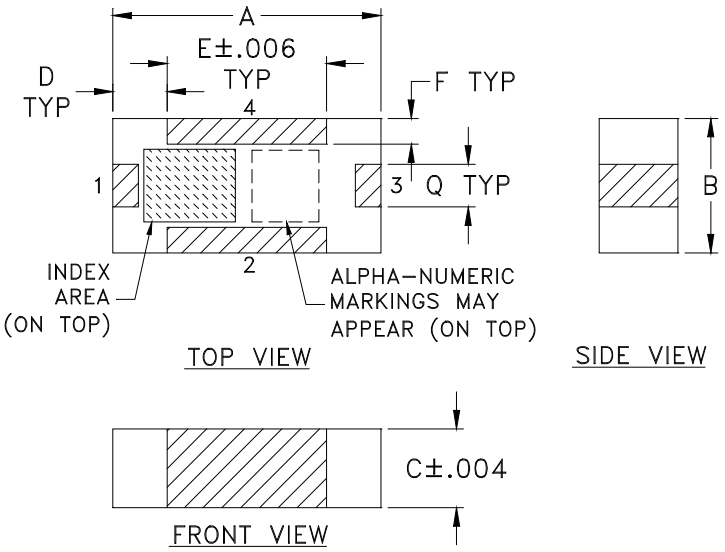
OUTPUT RETURN LOSS (Pass band)



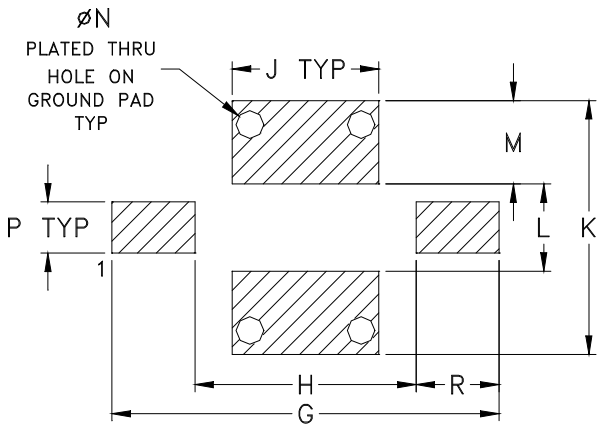
Case Style FV

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.

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Tape & Reel Packaging TR-F75

DEVICE ORIENTATION IN T&R

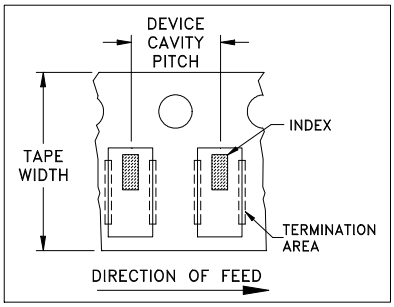

ILLUSTRATION 1

Applicable Case Styles
FV1206-1
FV1206-3

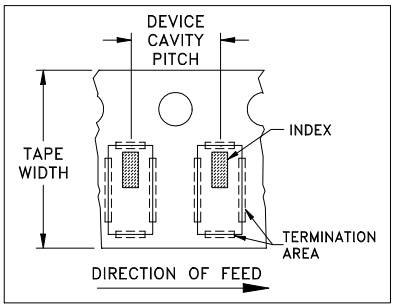

ILLUSTRATION 2

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

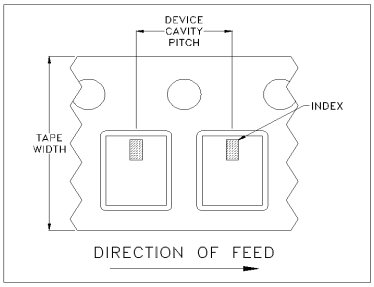

ILLUSTRATION 3

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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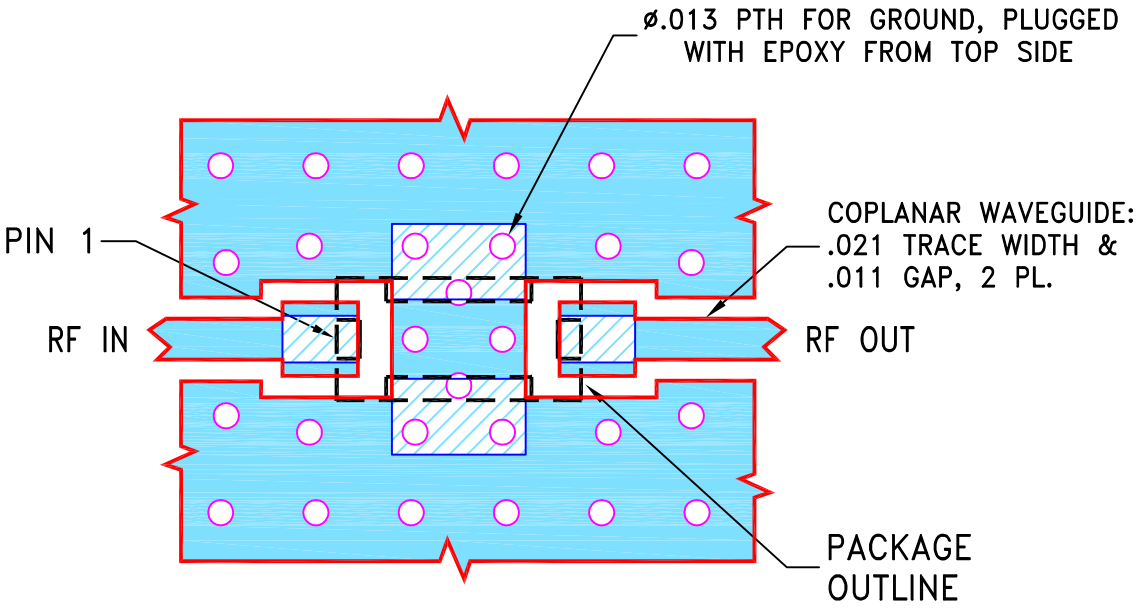
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	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 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.

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

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

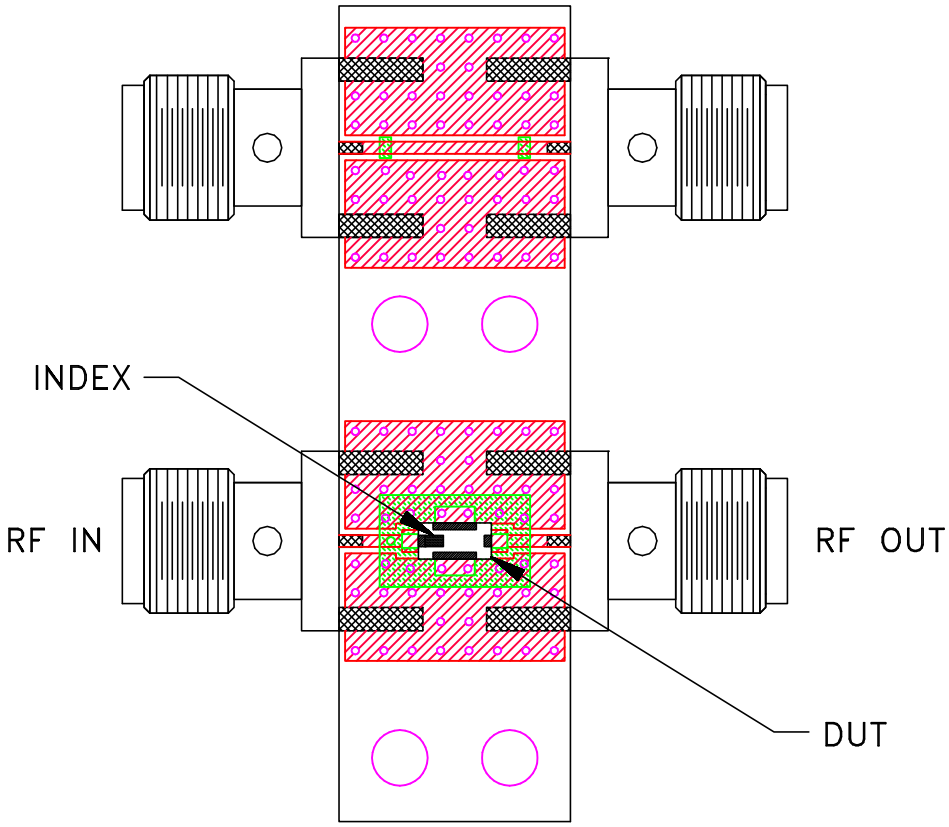
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

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

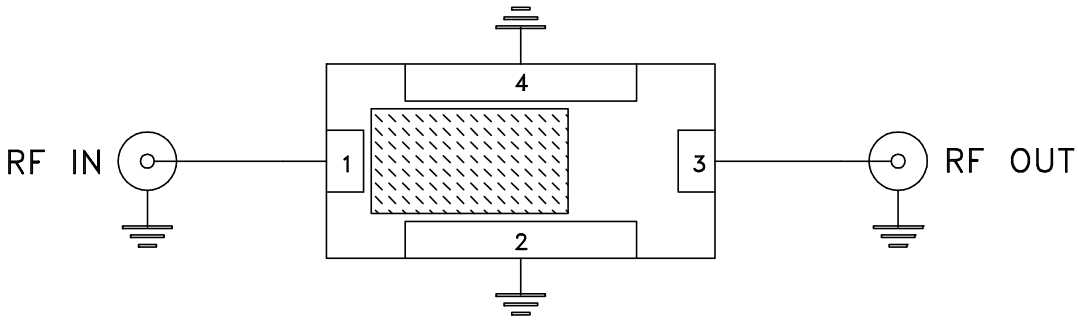
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-546	OR

FILE:	SCALE:	SHEET:
98PL546	10:1	1 OF 1

Evaluation Board and Circuit



TB-810-9170+



Schematic Diagram

Note:

PCB Material: RO4350 or equivalent,
Dielectric Constant=3.5, Thickness=.0010 inch.

Mini-Circuits®

Mini-Circuits

Environmental Specifications ENV06

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

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