



CERAMIC

High Pass Filter

HFCN-8400+

Mini-Circuits

50Ω 9000 to 13000 MHz

THE BIG DEAL

- Small size
- 5 sections
- Temperature stable
- Excellent power handling, 7W
- Hermetically sealed
- LTCC construction
- Low cost
- Protected by US Patent 7,760,485



Generic photo used for illustration purposes only

CASE STYLE: FV1206-1

+RoHS Compliant

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

APPLICATIONS

- Sub-harmonic rejection
- Transmitters/receivers

ELECTRICAL SPECIFICATIONS^{1,2} AT 25°C

| Parameter | Frequency (MHz) | Min. | Typ. | Max. | Units | |
|-----------|-----------------|------------|------|------|-------|----|
| Stop Band | Rejection Loss | 5700 | — | 30 | — | dB |
| | | 6000 | 20 | — | — | |
| | Freq. Cut-Off | 8400 | — | 3.0 | — | dB |
| | VSWR | 5700-6000 | — | 20 | — | :1 |
| Pass Band | Insertion Loss | 9000-13000 | — | — | 3.0 | dB |
| | | 9500-13000 | — | — | 2.5 | dB |
| | VSWR | 9000-13000 | — | 1.5 | — | :1 |

1. In Application where DC voltage is present at either input or output ports, coupling capacitors are required. Alternatively, Mini-Circuits' "D" suffix version of this model will provide >100 MOhm isolation to ground.

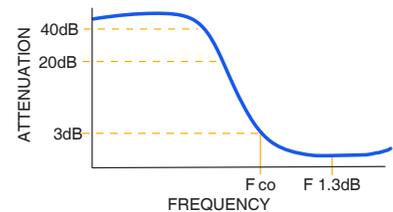
2. Measured on Mini-Circuits Characterization Test Board TB-285.

MAXIMUM RATINGS

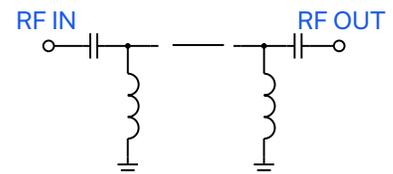
| Parameter | Ratings |
|-----------------------------|------------------|
| Operating temperature | -55°C to 100°C |
| Storage temperature | -55°C to 100°C |
| RF Power Input ³ | 7 W max. at 25°C |

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

TYPICAL FREQUENCY RESPONSE



FUNCTIONAL SCHEMATIC



REV. J
ECO-025301
HFCN-8400+
MCL NY
250428



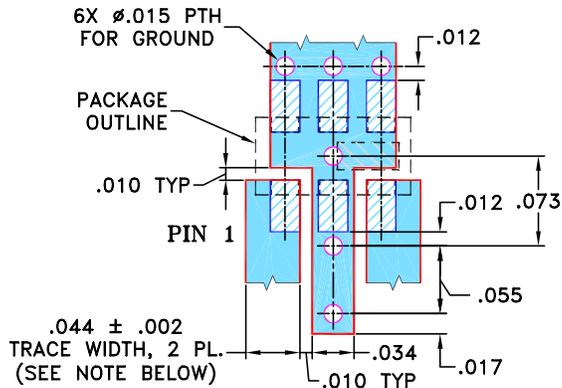


PIN CONNECTIONS

| | |
|--------|---------|
| RF IN | 1 |
| RF OUT | 3 |
| GROUND | 2,4,5,6 |

PRODUCT MARKING: MT

DEMO BOARD MCL P/N: TB-285
SUGGESTED PCB LAYOUT (PL-158)

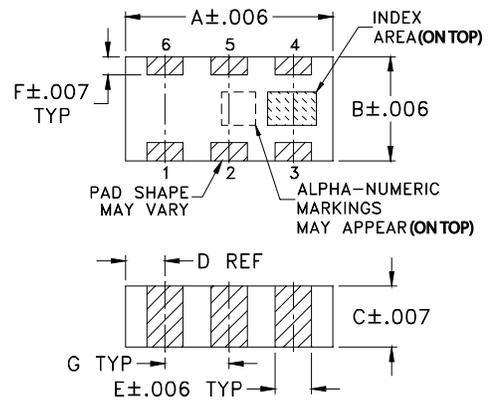


NOTE: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350 WITH DIELECTRIC THICKNESS: $.020 \pm .0015$; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

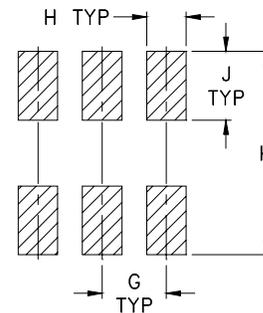
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

- DENOTES PCB COPPER LAYOUT
- DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

OUTLINE DRAWING



PCB Land Pattern



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

OUTLINE DIMENSIONS (Inches mm)

| | | | | | |
|------|------|------|------|------|-------|
| A | B | C | D | E | F |
| .126 | .063 | .035 | .024 | .022 | .011 |
| 3.20 | 1.60 | 0.89 | 0.61 | 0.56 | 0.28 |
| G | H | J | K | | wt |
| .039 | .024 | .042 | .123 | | grams |
| 0.99 | 0.61 | 1.07 | 3.12 | | .020 |

TAPE & REEL INFORMATION: F75



CERAMIC

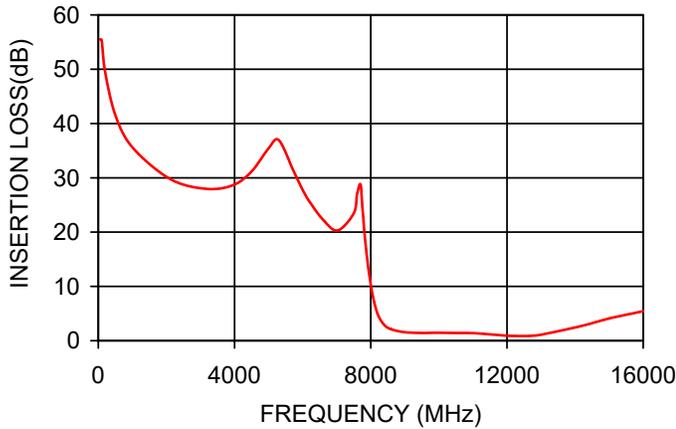
High Pass Filter

HFCN-8400+

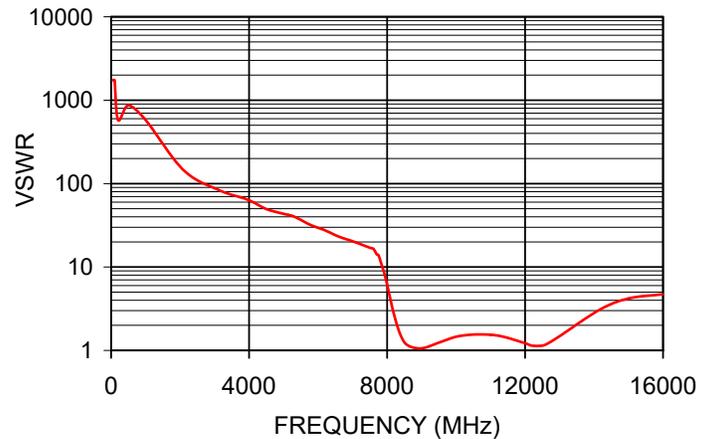
TYPICAL PERFORMANCE DATA AT 25°C

| Frequency (MHz) | Insertion Loss (dB) | VSWR (:1) |
|-----------------|---------------------|-----------|
| 50 | 55.48 | 1737.18 |
| 500 | 41.57 | 868.59 |
| 4500 | 31.17 | 49.64 |
| 5700 | 36.69 | 31.60 |
| 6000 | 27.78 | 29.46 |
| 7500 | 23.46 | 17.05 |
| 8020 | 9.65 | 5.68 |
| 8400 | 2.88 | 1.50 |
| 8600 | 2.11 | 1.15 |
| 9000 | 1.57 | 1.06 |
| 9500 | 1.43 | 1.24 |
| 10000 | 1.47 | 1.46 |
| 12000 | 0.92 | 1.22 |
| 13000 | 1.10 | 1.48 |
| 16000 | 5.43 | 4.72 |

INSERTION LOSS



VSWR



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 High Pass Filter

HFCN-8400+

Typical Performance Data

| FREQ. (MHz) | INSERTION LOSS (dB) | | | INPUT RETURN LOSS (dB) | | | OUTPUT RETURNLOSS (dB) | | |
|----------------|------------------------|----------|----------|---------------------------|----------|----------|---------------------------|----------|----------|
| | @ -40° C | @ +25° C | @ +85° C | @ -40° C | @ +25° C | @ +85° C | @ -40° C | @ +25° C | @ +85° C |
| 50 | 62.39 | 60.58 | 61.01 | 0.02 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| 100 | 56.09 | 55.68 | 55.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| 200 | 50.16 | 50.02 | 49.77 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 |
| 300 | 46.55 | 46.48 | 46.25 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.02 |
| 400 | 44.01 | 43.99 | 43.89 | 0.00 | 0.01 | 0.02 | 0.01 | 0.01 | 0.03 |
| 500 | 42.06 | 42.05 | 42.04 | 0.00 | 0.01 | 0.03 | 0.01 | 0.01 | 0.04 |
| 600 | 40.48 | 40.49 | 40.49 | 0.00 | 0.02 | 0.04 | 0.01 | 0.02 | 0.04 |
| 700 | 39.15 | 39.18 | 39.20 | 0.00 | 0.02 | 0.04 | 0.02 | 0.02 | 0.05 |
| 800 | 38.02 | 38.05 | 38.09 | 0.00 | 0.03 | 0.05 | 0.02 | 0.02 | 0.05 |
| 900 | 37.02 | 37.04 | 37.11 | 0.01 | 0.04 | 0.06 | 0.02 | 0.02 | 0.05 |
| 1000 | 36.17 | 36.16 | 36.25 | 0.01 | 0.03 | 0.06 | 0.03 | 0.01 | 0.06 |
| 1200 | 34.67 | 34.66 | 34.78 | 0.01 | 0.05 | 0.08 | 0.03 | 0.02 | 0.06 |
| 1300 | 34.04 | 34.04 | 34.15 | 0.01 | 0.05 | 0.09 | 0.05 | 0.01 | 0.06 |
| 1400 | 33.45 | 33.45 | 33.55 | 0.03 | 0.08 | 0.11 | 0.05 | 0.02 | 0.06 |
| 1500 | 32.91 | 32.92 | 33.00 | 0.02 | 0.07 | 0.11 | 0.06 | 0.01 | 0.06 |
| 1600 | 32.42 | 32.45 | 32.49 | 0.04 | 0.09 | 0.13 | 0.06 | 0.01 | 0.06 |
| 1700 | 31.98 | 32.01 | 32.04 | 0.03 | 0.08 | 0.13 | 0.04 | 0.03 | 0.08 |
| 1800 | 31.56 | 31.62 | 31.64 | 0.05 | 0.10 | 0.14 | 0.06 | 0.01 | 0.07 |
| 1900 | 31.17 | 31.27 | 31.26 | 0.06 | 0.11 | 0.16 | 0.05 | 0.02 | 0.07 |
| 2000 | 30.82 | 30.97 | 30.94 | 0.07 | 0.12 | 0.16 | 0.05 | 0.02 | 0.08 |
| 2200 | 30.21 | 30.44 | 30.37 | 0.08 | 0.13 | 0.18 | 0.03 | 0.03 | 0.09 |
| 2300 | 29.95 | 30.22 | 30.13 | 0.10 | 0.14 | 0.19 | 0.03 | 0.02 | 0.09 |
| 2400 | 29.88 | 30.03 | 29.92 | 0.12 | 0.16 | 0.20 | 0.00 | 0.03 | 0.11 |
| 2500 | 30.14 | 29.90 | 29.78 | 0.12 | 0.16 | 0.21 | 0.01 | 0.04 | 0.12 |
| 2600 | 30.21 | 29.77 | 29.67 | 0.12 | 0.16 | 0.20 | 0.04 | 0.09 | 0.19 |
| 2700 | 30.12 | 29.72 | 29.79 | 0.14 | 0.19 | 0.25 | 0.01 | 0.03 | 0.12 |
| 2800 | 30.02 | 29.65 | 29.89 | 0.14 | 0.19 | 0.24 | 0.04 | 0.09 | 0.18 |
| 2900 | 29.97 | 29.63 | 30.05 | 0.15 | 0.19 | 0.24 | 0.02 | 0.06 | 0.15 |
| 3000 | 29.96 | 29.65 | 30.17 | 0.16 | 0.21 | 0.25 | 0.04 | 0.09 | 0.17 |
| 3200 | 30.05 | 29.79 | 30.35 | 0.17 | 0.23 | 0.28 | 0.06 | 0.09 | 0.17 |
| 3300 | 30.17 | 29.90 | 30.45 | 0.19 | 0.23 | 0.27 | 0.10 | 0.15 | 0.24 |
| 3400 | 30.35 | 30.06 | 30.61 | 0.19 | 0.25 | 0.29 | 0.08 | 0.12 | 0.20 |
| 3500 | 30.52 | 30.21 | 30.79 | 0.18 | 0.25 | 0.30 | 0.10 | 0.13 | 0.20 |
| 3600 | 30.80 | 30.46 | 31.03 | 0.21 | 0.26 | 0.31 | 0.12 | 0.17 | 0.25 |
| 3700 | 31.02 | 30.74 | 31.34 | 0.17 | 0.26 | 0.31 | 0.12 | 0.14 | 0.22 |
| 3800 | 31.35 | 31.04 | 31.68 | 0.20 | 0.27 | 0.33 | 0.14 | 0.16 | 0.24 |
| 3900 | 31.73 | 31.45 | 32.16 | 0.21 | 0.29 | 0.34 | 0.15 | 0.17 | 0.25 |
| 4000 | 32.14 | 31.86 | 32.67 | 0.22 | 0.30 | 0.36 | 0.17 | 0.18 | 0.26 |
| 4500 | 35.97 | 35.42 | 37.29 | 0.24 | 0.35 | 0.44 | 0.25 | 0.26 | 0.34 |
| 5000 | 49.96 | 47.25 | 56.48 | 0.26 | 0.43 | 0.53 | 0.41 | 0.42 | 0.48 |
| 5700 | 32.18 | 31.77 | 31.40 | 0.23 | 0.51 | 0.68 | 0.61 | 0.69 | 0.80 |
| 6000 | 28.19 | 27.77 | 27.68 | 0.22 | 0.53 | 0.75 | 0.60 | 0.76 | 0.91 |
| 7000 | 21.23 | 21.33 | 21.69 | 0.32 | 0.53 | 0.81 | 0.86 | 1.03 | 1.38 |
| 7500 | 27.25 | 28.94 | 33.14 | 0.66 | 0.74 | 1.00 | 0.66 | 1.04 | 1.59 |
| 8020 | 9.33 | 7.67 | 6.29 | 2.49 | 3.41 | 4.75 | 1.83 | 2.59 | 3.92 |
| 8400 | 2.25 | 2.09 | 2.10 | 9.45 | 11.74 | 13.71 | 8.57 | 10.10 | 11.68 |
| 8600 | 1.33 | 1.41 | 1.60 | 13.55 | 15.64 | 16.68 | 12.70 | 14.50 | 15.16 |
| 9000 | 0.92 | 1.09 | 1.31 | 13.21 | 15.59 | 15.53 | 14.00 | 17.46 | 16.36 |
| 9500 | 0.80 | 1.42 | 1.32 | 12.21 | 11.16 | 11.53 | 13.14 | 15.40 | 12.97 |
| 10000 | 0.74 | 1.14 | 1.39 | 11.94 | 9.89 | 9.45 | 12.30 | 11.15 | 10.56 |
| 11000 | 0.96 | 0.84 | 0.98 | 9.36 | 11.03 | 12.05 | 9.94 | 10.88 | 11.88 |
| 12000 | 0.30 | 0.50 | 0.82 | 19.07 | 20.75 | 22.25 | 19.49 | 43.89 | 28.49 |
| 13000 | 1.08 | 1.28 | 1.61 | 8.47 | 8.44 | 8.02 | 10.66 | 9.39 | 8.73 |
| 13500 | 2.22 | 2.18 | 2.42 | 4.75 | 5.23 | 5.45 | 5.09 | 6.48 | 6.71 |

REV. X2

HFCN-8400+

101122

Page 1 of 1



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 CERTIFIED • RoHS compliant

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

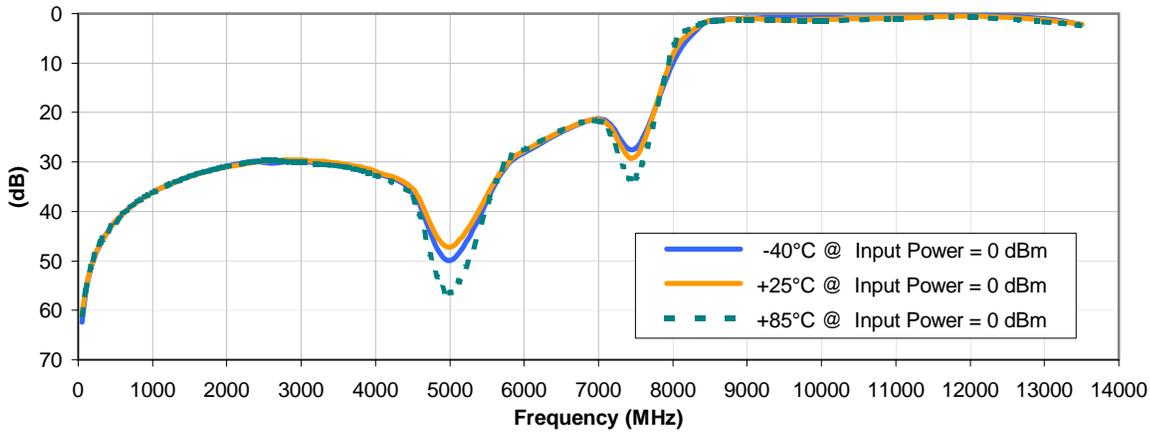


The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see

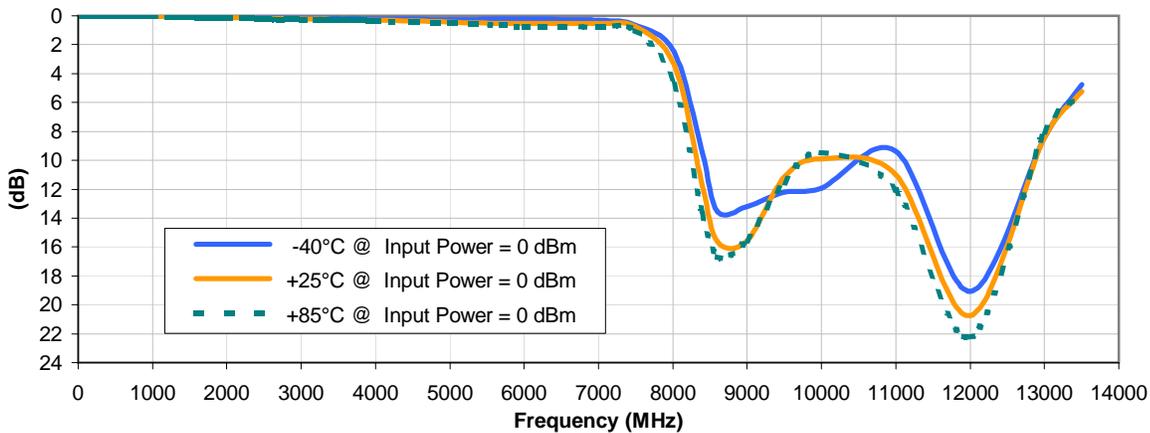


Typical Performance Curves

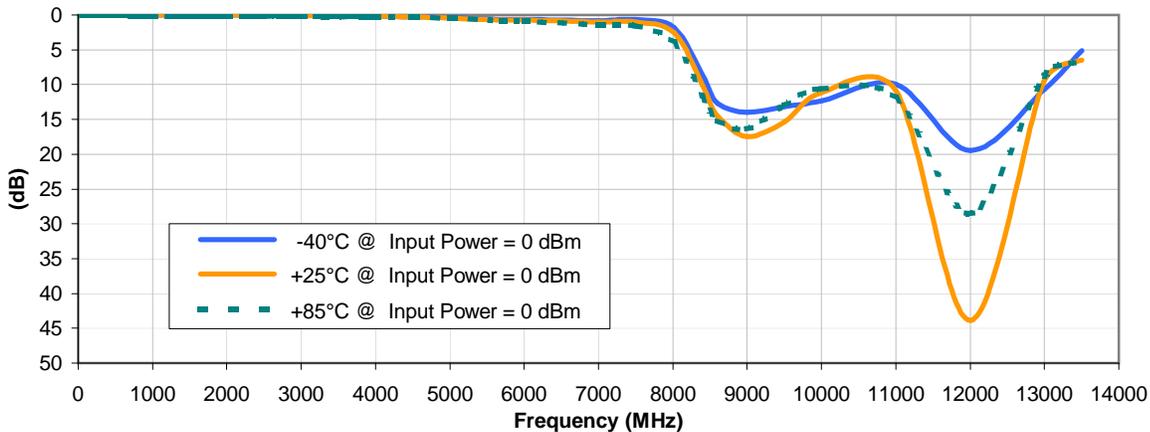
INSERTION LOSS vs. TEMPERATURE



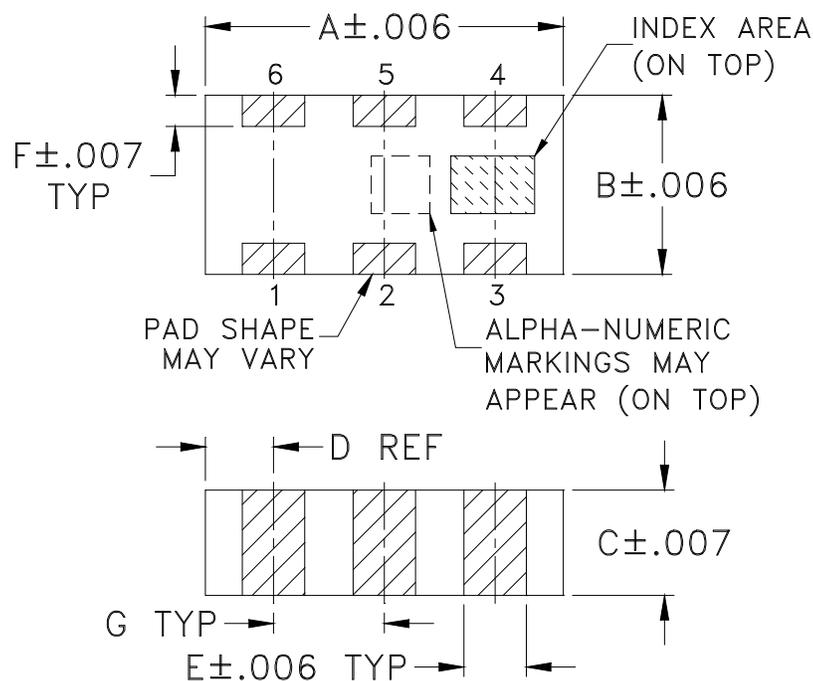
INPUT RETURN LOSS vs. TEMPERATURE



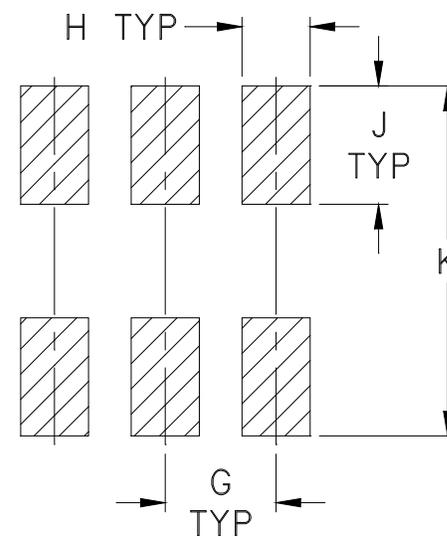
OUTPUT RETURN LOSS vs. TEMPERATURE



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 | N | P | WT. GRAM |
|----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----|----|----|----|----------|
| FV1206-1 | .126 (3.20) | .063 (1.60) | .035 (0.89) | .024 (0.61) | .022 (0.56) | .011 (0.28) | .039 (0.99) | .024 (0.61) | .042 (1.07) | .123 (3.12) | -- | -- | -- | -- | .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

RF/IF MICROWAVE COMPONENTS

DEVICE ORIENTATION IN T&R

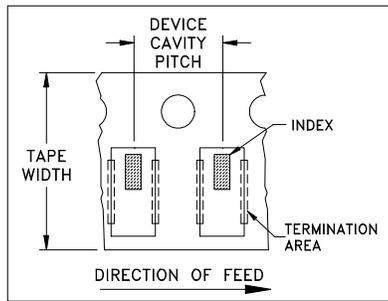


ILLUSTRATION 1

| Applicable Case Styles |
|------------------------|
| FV1206-1 FV1206-3 |

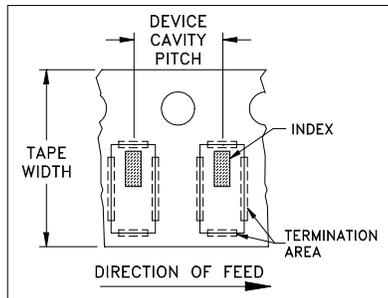


ILLUSTRATION 2

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

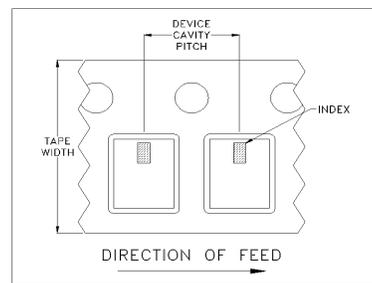


ILLUSTRATION 3

| 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

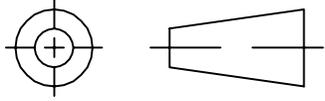


Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • **EUROPE** 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

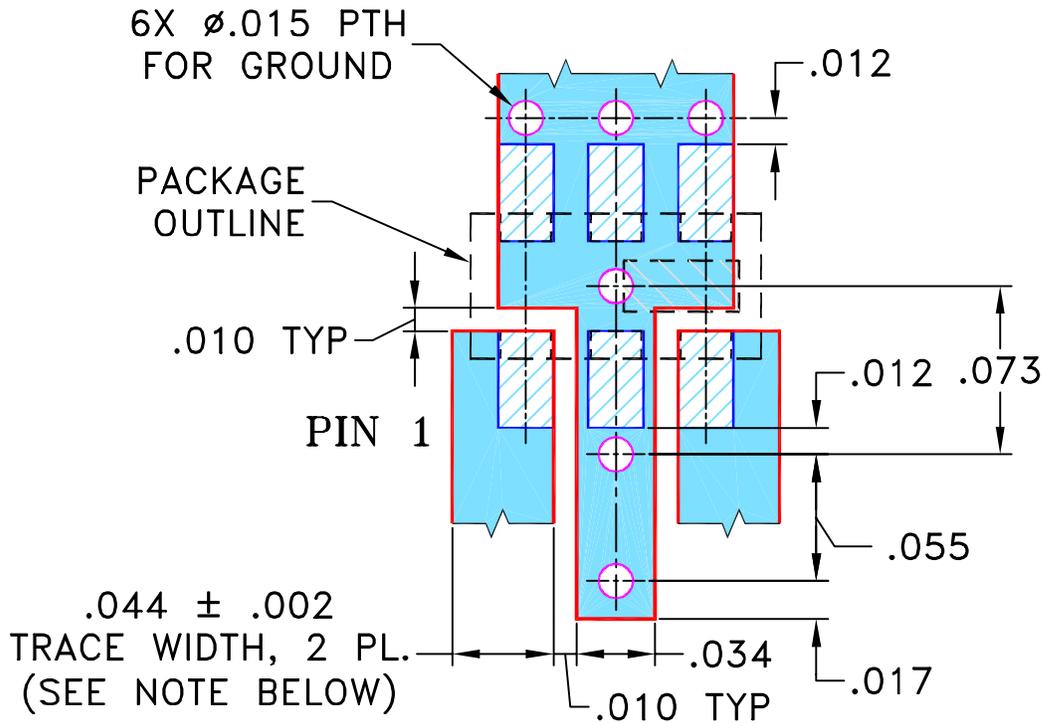
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|-----|---------|-----------------------|----------|----|------|
| OR | M92199 | NEW RELEASE | 05/24/04 | AV | ABD |
| A | M99247 | ADD GROUND PTH | 06/05 | RZ | RZ |
| A | R60782 | ADD GROUND PTH | 06/05 | RZ | RZ |
| B | M102713 | ADDED "...WITH SMOBC" | 01/12/06 | GF | IL |

SUGGESTED MOUNTING CONFIGURATION
FOR FV1206-1 CASE STYLE, "pr" PIN CONNECTION.



- NOTE:** 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020" ± .0015". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH 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

AV

05/03/04

TOLERANCES ON:

CHECKED

IL

05/24/04

2 PL DECIMALS ±

APPROVED

ABD

05/24/04

3 PL DECIMALS ± .005

ANGLES ±

FRACTIONS ±



THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

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



Mini-Circuits®

13 Neptune Avenue
Brooklyn NY 11235

PL, pr, FV1206-1, HFCN, TB-285

SIZE
A

CODE IDENT
15542

DRAWING NO:
98-PL-158

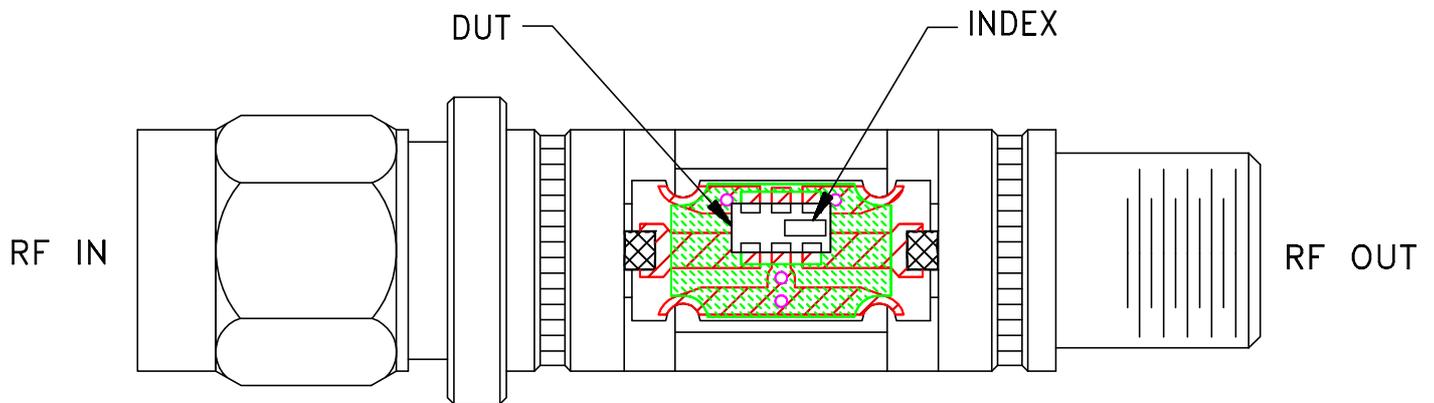
REV:
B

FILE: 98PL158

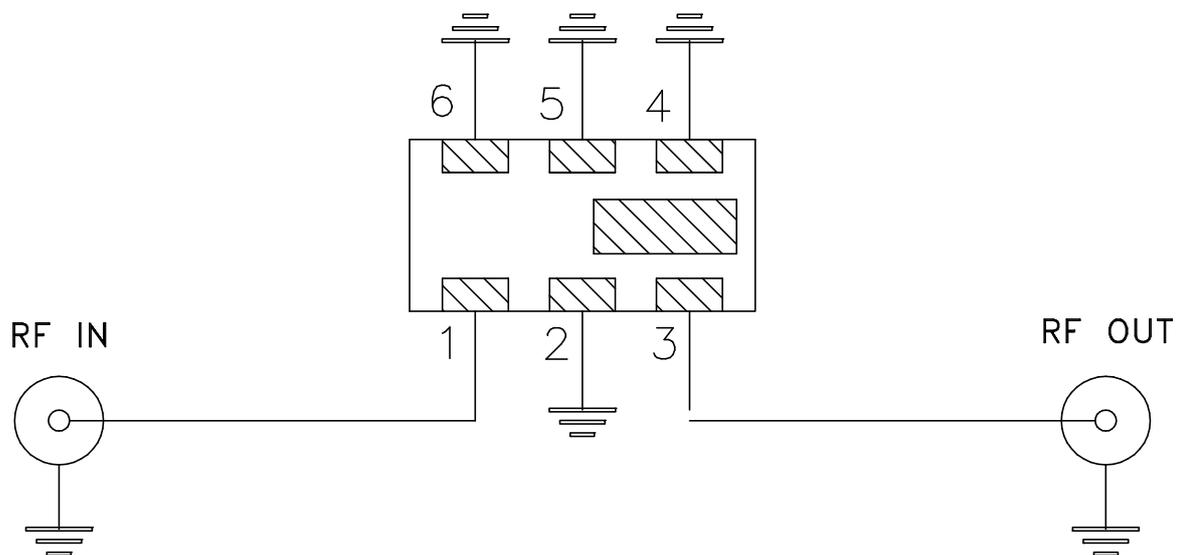
SCALE: 12:1

SHEET: 1 OF 1

Evaluation Board and Circuit



TB-285



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.020 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 |