*Ceramic*

# Bandpass Filter

## BFCN-3491+

50Ω 2790 to 4370 MHz

## The Big Deal

- Small size 3.2mm x 1.6mm
- Pass band (2790-3470 MHz)
- High rejection in upper stopband

CASE STYLE: FV1206-7

## Product Overview

The BFCN-3491+ LTCC Band Pass Filter achieves a miniature size and high repeatability of performance. Wrap-around terminations minimize variations in performance due to parasitics. Covering 2790 to 4370 MHz, these units offer excellent rejection over a deep stopband.

## Key Features

| Feature | Advantages |
|---|---|
| Small Size (3.20mm x1.6 mm) | Allows for high layout density of circuit boards, while minimizing effects of parasitics. |
| Rejection peaks close to pass band | Provides good rejection of signals close to the pass band, for improved system performance. |
| Deep stopband | Upper stopband features transmission zeroes for high rejection. |
| LTCC construction | Provides a rugged package that is well suited for tough environments including high humidity and high temperature extremes. |

*Ceramic*

# Bandpass Filter

## BFCN-3491+

50Ω 2790 to 4370 MHz

### Features

- Small size
- Temperature stable
- Hermetically sealed
- LTCC construction

### Applications

- Harmonic Rejection
- Transmitters / Receivers

*Generic photo used for illustration purposes only*

CASE STYLE: FV1206-7

***+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*

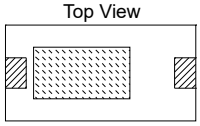
| Reel Size | Devices/Reel |
|---|---|
| 7" | 20, 50, 100, 200, 500,1000, 3000 |

### Maximum Ratings

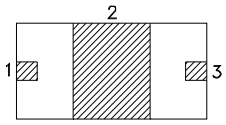
| | |
|---|---|
| Operating Temperature | -55°C to +100°C |
| Storage Temperature | -55°C to +100°C |
| RF Power Input | 1W max. |

Permanent damage may occur if any of these limits are exceeded.

Top View



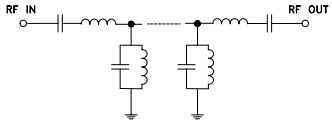
Bottom View




### Pad Connections

| | |
|---|---|
| Input | 1 |
| Output | 3 |
| Ground | 2 |

### Functional Schematic




### Electrical Specifications[1,2] at 25°C

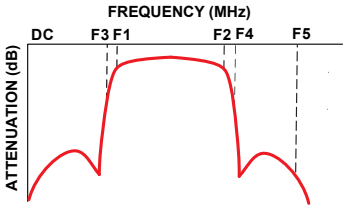
| Parameter | | F# | Frequency (MHz) | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Pass Band | Center Frequency | — | | | 3489 | | MHz |
| | Insertion Loss | F1-F2 | 2790-4370 | — | 1.5 | 3.0 | dB |
| | Return Loss | F1-F2 | 2790-4370 | — | 12 | — | dB |
| Stop Band, Lower | Insertion Loss | DC-F3 | DC-2150 | 18 | 21 | — | dB |
| Stop Band, Upper | Insertion Loss | F4-F5 | 5950-7200 | 20 | 30 | — | dB |
| | | F5-F6 | 7200-10000 | 15 | 20 | — | |

1. Measured on Mini-Circuits Characterization Test Board TB-812+.
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.

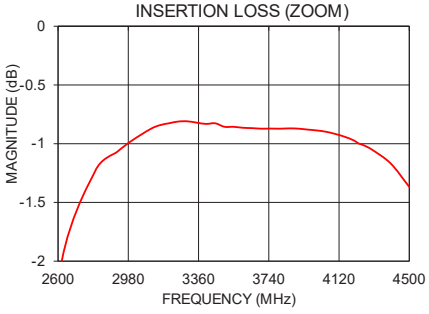
### Typical Performance Data at 25°C

| Frequency (MHz) | Insertion Loss (dB) | Return Loss (dB) |
|---|---|---|
| 600 | -42.91 | -0.11 |
| 1200 | -26.66 | -0.24 |
| 2200 | -28.41 | -0.73 |
| 2600 | -2.25 | -15.09 |
| 3000 | -0.97 | -17.51 |
| 3600 | -0.86 | -17.76 |
| 4400 | -1.17 | -17.03 |
| 4500 | -1.37 | -14.16 |
| 4750 | -2.98 | -6.20 |
| 5250 | -14.02 | -0.85 |
| 6000 | -32.75 | -0.42 |
| 7000 | -45.26 | -0.40 |
| 8000 | -25.20 | -0.42 |
| 9000 | -28.29 | -0.37 |
| 10000 | -29.03 | -0.33 |

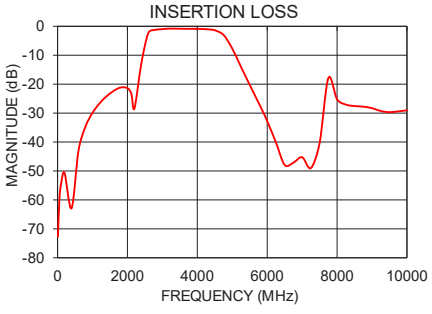
### Specification Definition



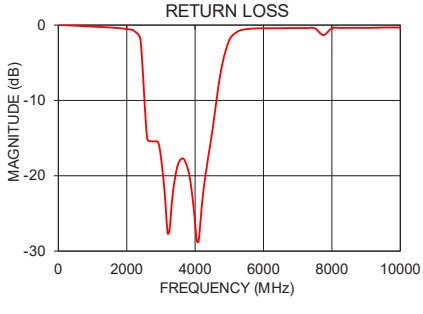

BFCN-3491+
INSERTION LOSS (ZOOM)



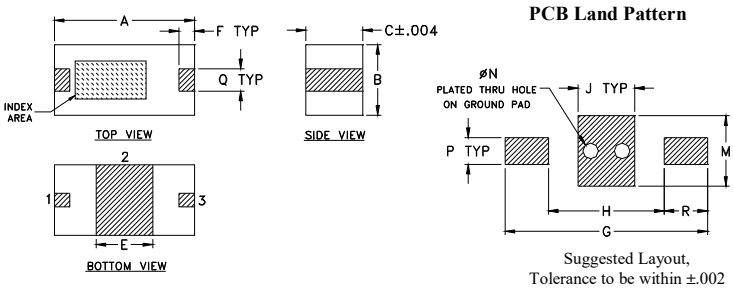

BFCN-3491+
INSERTION LOSS




BFCN-3491+
RETURN LOSS



## Outline Drawing




## Product Marking: N/A

### Pad Connections

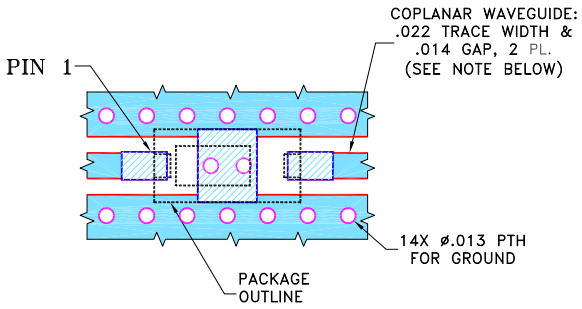
| | |
|---|---|
| Input | 1 |
| Output | 3 |
| Ground | 2 |

## Outline Dimensions (inch / mm)

| A | B | C | E | F | G | H |
|---|---|---|---|---|---|---|
| .126 | .063 | .051 | .051 | .014 | .183 | .104 |
| 3.20 | 1.60 | 1.30 | 1.30 | 0.36 | 4.65 | 2.64 |

| J | M | N | P | Q | R | wt |
|---|---|---|---|---|---|---|
| .051 | .063 | .014 | .024 | .020 | .039 | grams |
| 1.30 | 1.60 | 0.36 | 0.61 | 0.51 | 0.99 | .020 |

***Demo Board MCL P/N: TB- 812+***
***Suggested PCB Layout (PL-439)***




NOTES:

1. COPLANAR WAVEGUIDE IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010" ± .001". 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

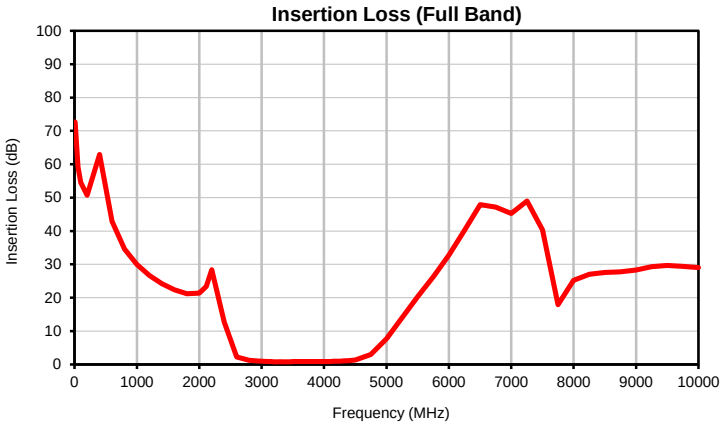
# Ceramic Bandpass Filter BFCN-3491+

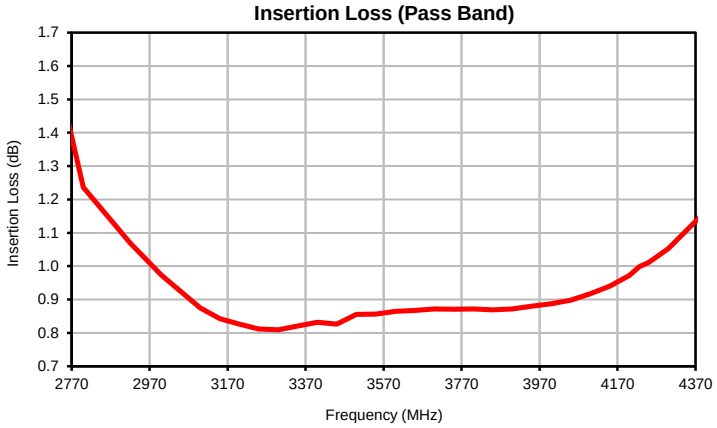
*Typical Performance Data*

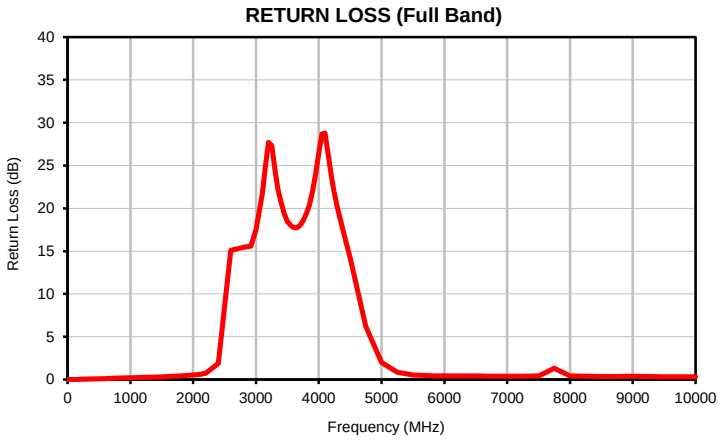
| FREQUENCY (MHz) | INSERTION LOSS (dB) | RETURN LOSS (dB) |
|---|---|---|
| 10 | 72.66 | 0.01 |
| 55 | 59.23 | 0.00 |
| 100 | 54.52 | 0.01 |
| 200 | 50.70 | 0.02 |
| 400 | 62.91 | 0.06 |
| 600 | 42.91 | 0.11 |
| 800 | 34.63 | 0.16 |
| 1000 | 29.91 | 0.20 |
| 1200 | 26.66 | 0.24 |
| 1400 | 24.23 | 0.29 |
| 1600 | 22.38 | 0.34 |
| 1800 | 21.18 | 0.42 |
| 2000 | 21.37 | 0.52 |
| 2113 | 23.37 | 0.61 |
| 2200 | 28.41 | 0.73 |
| 2400 | 12.70 | 1.89 |
| 2600 | 2.25 | 15.09 |
| 2800 | 1.24 | 15.43 |
| 2920 | 1.07 | 15.57 |
| 3000 | 0.97 | 17.51 |
| 3100 | 0.88 | 21.75 |
| 3150 | 0.84 | 24.93 |
| 3200 | 0.83 | 27.69 |
| 3250 | 0.81 | 27.33 |
| 3300 | 0.81 | 24.61 |
| 3350 | 0.82 | 22.24 |
| 3400 | 0.83 | 20.64 |
| 3450 | 0.83 | 19.37 |
| 3500 | 0.86 | 18.45 |
| 3550 | 0.86 | 17.99 |
| 3600 | 0.86 | 17.76 |
| 3650 | 0.87 | 17.71 |
| 3700 | 0.87 | 18.01 |
| 3750 | 0.87 | 18.58 |
| 3800 | 0.87 | 19.32 |
| 3850 | 0.87 | 20.42 |
| 3900 | 0.87 | 22.03 |
| 3950 | 0.88 | 23.97 |
| 4000 | 0.89 | 26.33 |
| 4050 | 0.90 | 28.68 |
| 4100 | 0.92 | 28.78 |
| 4150 | 0.94 | 26.40 |
| 4200 | 0.97 | 23.77 |
| 4226 | 1.00 | 22.66 |
| 4250 | 1.01 | 21.74 |
| 4300 | 1.05 | 20.02 |
| 4400 | 1.17 | 17.03 |
| 4500 | 1.37 | 14.16 |
| 4750 | 2.98 | 6.20 |
| 5000 | 7.70 | 1.99 |
| 5250 | 14.02 | 0.85 |
| 5500 | 20.25 | 0.54 |
| 5750 | 26.34 | 0.45 |
| 5840 | 28.59 | 0.44 |
| 6000 | 32.75 | 0.42 |
| 6250 | 40.14 | 0.42 |
| 6500 | 47.91 | 0.41 |
| 6750 | 47.12 | 0.40 |
| 7000 | 45.26 | 0.40 |
| 7250 | 49.02 | 0.40 |
| 7500 | 40.35 | 0.43 |
| 7750 | 17.93 | 1.32 |
| 8000 | 25.20 | 0.42 |
| 8250 | 27.05 | 0.38 |
| 8500 | 27.56 | 0.37 |
| 8750 | 27.78 | 0.37 |
| 9000 | 28.29 | 0.37 |
| 9250 | 29.29 | 0.36 |
| 9500 | 29.68 | 0.32 |
| 9750 | 29.40 | 0.32 |
| 10000 | 29.03 | 0.33 |

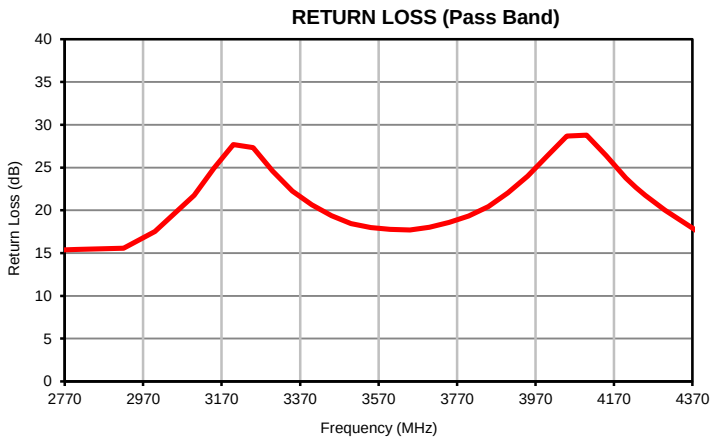
# Ceramic Bandpass Filter BFCN-3491+

*Typical Performance Curves*



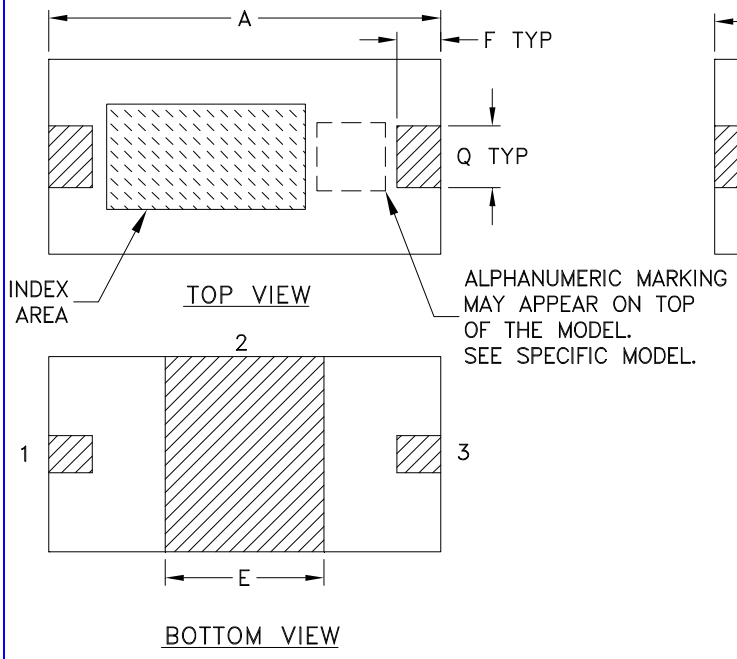



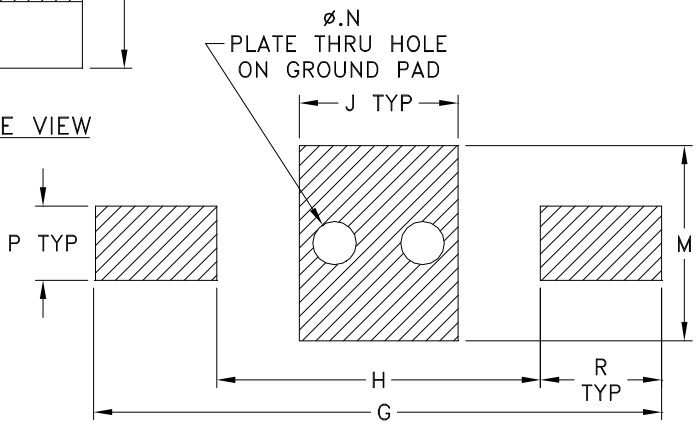
# Case Style FV

**FV1206-7**

## 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FV1206-7 | .126 (3.20) | .063 (1.60) | .051 (1.30) | -- -- | .051 (1.30) | .014 (0.35) | .183 (4.65) | .104 (2.65) | .051 (1.30) | -- -- | -- -- | .063 (1.60) |

| CASE # | N | P | Q | R | S | WT. GRAM |
|---|---|---|---|---|---|---|
| FV1206-7 | .014 (0.35) | .024 (0.60) | .020 (0.50) | .039 (1.00) | -- -- | .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.
3. Line width should be designed to match 50Ω characteristic impedance, depending on PCB material and thickness.

# Tape & Reel Packaging TR-F75

DEVICE ORIENTATION IN T&R

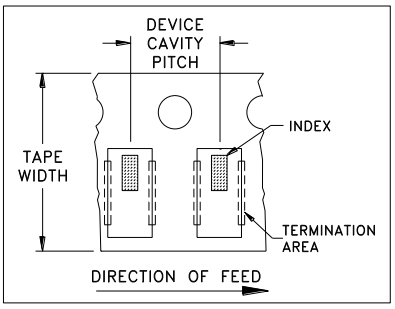



ILLUSTRATION 1

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

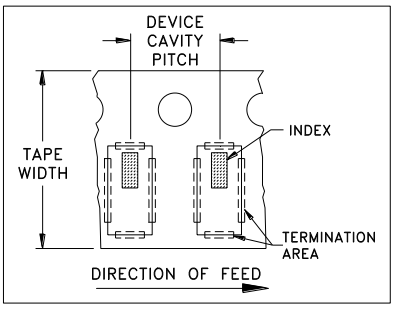



ILLUSTRATION 2

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

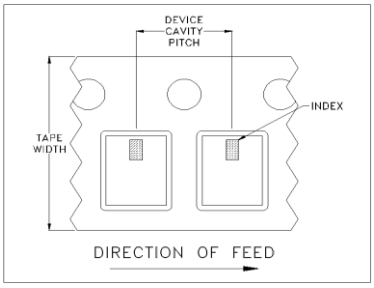



ILLUSTRATION 3

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

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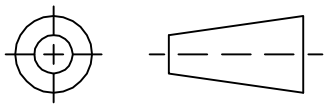
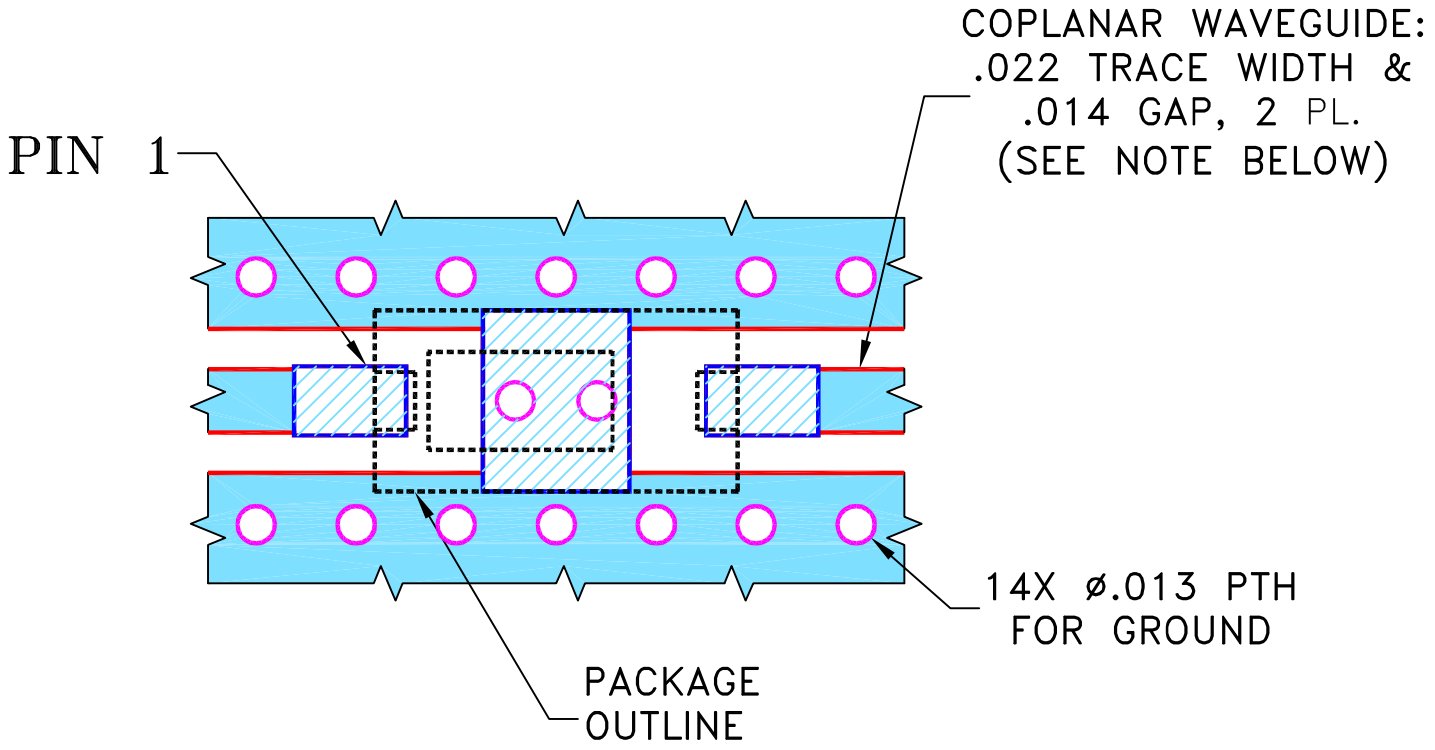
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

THIRD ANGLE PROJECTION



| REVISIONS | | | | | |
|---|---|---|---|---|---|
| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
| OR | M148536 | NEW RELEASE | 10/14/14 | GF | MY |
| | | | | | |
| | | | | | |
| | | | | | |

# SUGGESTED MOUNTING CONFIGURATION
# FOR FV1206-7 CASE STYLE, "03FL02" PIN CODE




## NOTES:

1. COPLANAR WAVEGUIDE IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010" ± .001". 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.

| UNLESS OTHERWISE SPECIFIED | | INITIALS | DATE |
|---|---|---|---|
| DIMENSIONS ARE IN INCHES | DRAWN | GF | 10/07/14 |
| TOLERANCES ON: | CHECKED | AV | 10/14/14 |
| 2 PL DECIMALS ± | APPROVED | MY | 10/14/14 |
| 3 PL DECIMALS ± .005 | | | |
| ANGLES ± | | | |
| FRACTIONS ± | | | |



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

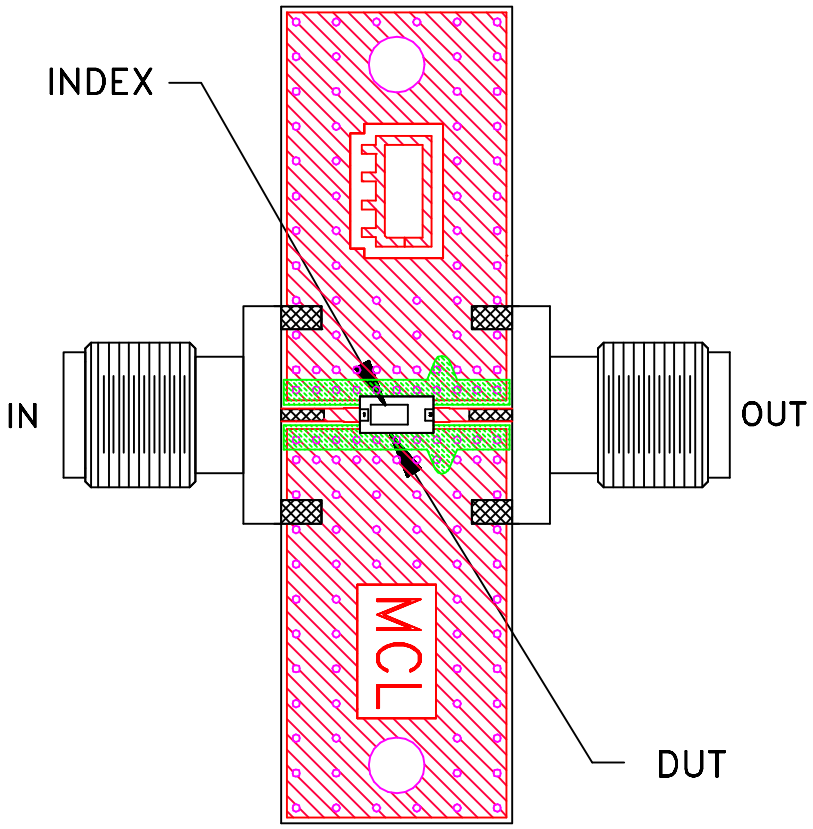
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 03FL02, FV1206-7, TB-812+

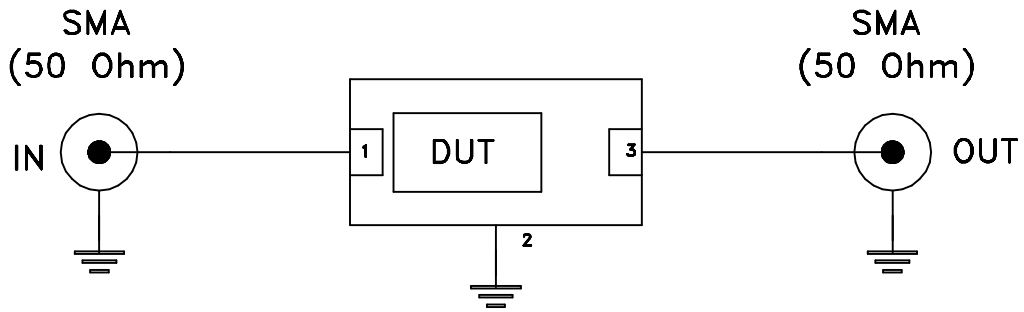
| SIZE | CODE IDENT | DRAWING NO: | REV: |
|---|---|---|---|
| A | 15542 | 98-PL-439 | OR |

| FILE: | SCALE: | SHEET: |
|---|---|---|
| 98PL439 | 15:1 | 1 OF 1 |

# Evaluation Board and Circuit




TB-812+




Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent,
   Dielectric Constant=3.5, Thickness=.010 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<br>Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C<br>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<br>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 |