*Ceramic*

# Bandpass Filter

# BPJC-542R+

50Ω 4900 to 5900 MHz

## The Big Deal

- Passband optimized for high band Wi-Fi
- Tiny size, 0603
- High rejection, 40 dB in lower stopband; 34 dB in upper stopband
- Low cost



CASE STYLE: JC0603C-1

## Product Overview

Mini-Circuits' BPJC-542R+ is an LTCC bandpass filter with a passband from 4900 to 5900 MHz, optimized for use in Wi-Fi high-band applications. This model provides 1.0 dB passband insertion loss, 40 dB lower stopband rejection and 34 dB upper stopband rejection. The filter is capable of handling up to 1W RF input power and provides a wide operating temperature range from -55 to +100°C. Utilizing LTCC construction, the unit is fabricated in a tiny ceramic monolith (0.08 x 0.05 x 0.02") with excellent repeatability and low cost, suitable for volume production.

## Key Features

| Feature | Advantages |
|---|---|
| Passband optimized for high band Wi-Fi. | Optimized for the 4900 to 5900 MHz passband, this model is ideal for cleaning signal in high band Wi-Fi applications. |
| Tiny size (0.06 x 0.04 x 0.02") | Minimizes performance variations due to parasitics and saves space in dense circuit board layouts. |
| High stopband rejection | Effective suppression of unwanted out-of-band spurs over a wide stopband range results in better receiver sensitivity and dynamic range. |
| Wraparound terminations | Excellent solderability and easy visual inspection. |
| Wide operating temperature range, -55 to +100°C | Reliable performance in extreme environments. |

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# Bandpass Filter

## BPJC-542R+

50Ω 4900 to 5900 MHz



CASE STYLE: JC0603C-1

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

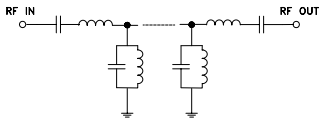
### Features

- High Rejection.
- miniature size 0603 (1.6x0.8mm)
- LTCC construction
- low cost
- aqueous washable

### Applications

- ISM Band
- WLAN
- Bluetooth
- Zigbee

### Functional Schematic




### Pad Connections

| | |
|---|---|
| Input | 1 |
| Output | 3 |
| Ground | 2,4 |

### Electrical Specifications at 25°C

| Parameter | | Frequency (MHz) | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Pass Band** | Center Frequency | — | — | 5400 | — | MHz |
| | Insertion Loss | 4900 – 5900 | — | 1.0 | 1.5 | dB |
| | VSWR | 4900 – 5900 | — | 1.4 | 2 | :1 |
| **Stop Band, Lower** | Rejection | DC – 2700 | 29 | 40 | — | dB |
| **Stop Band, Upper** | Rejection | 9800 - 12000 | 30 | 34 | — | dB<br>dB |

1. Tested on Evaluation Board TB-BPJC-542R+

### Maximum Ratings

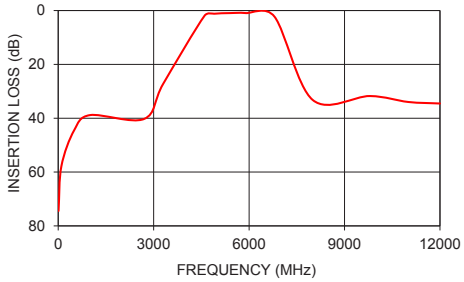
| | |
|---|---|
| Operating Temperature | -55°C to +100°C |
| Storage Temperature* | -55°C to +100°C |
| RF Power Input | 1W |

* Refer to product storage temperature after installation
Suggestion for T&R unused product storage condition:
+5 ~ +35 °C, Humidity 45~75%RH, 12 month Max

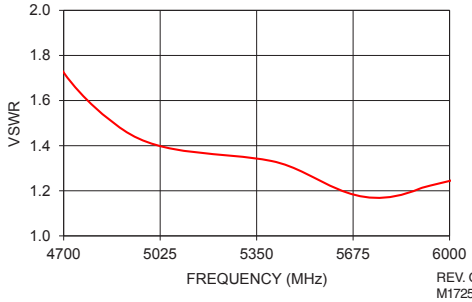
### Typical Performance Data at 25°C

| Frequency (GHz) | Insertion Loss (dB) | VSWR (:1) |
|---|---|---|
| 10 | 74.45 | 252.64 |
| 100 | 57.82 | 226.98 |
| 500 | 44.50 | 128.68 |
| 1000 | 38.84 | 96.27 |
| 2700 | 40.27 | 65.23 |
| 3300 | 27.22 | 41.86 |
| 4600 | 1.93 | 2.07 |
| 4900 | 1.19 | 1.47 |
| 5400 | 0.95 | 1.33 |
| 5900 | 0.95 | 1.21 |
| 6800 | 2.30 | 2.10 |
| 8000 | 33.22 | 15.80 |
| 9800 | 31.76 | 29.52 |
| 11000 | 33.96 | 34.59 |
| 12000 | 34.54 | 38.23 |

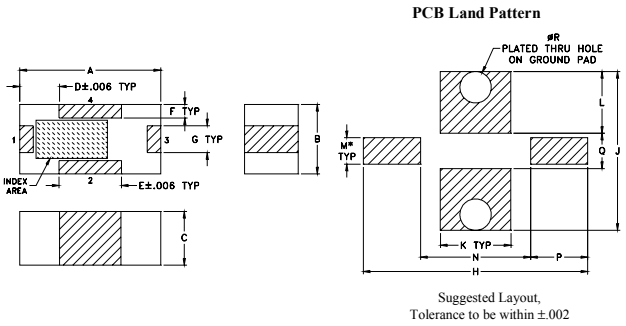
BPJC-542R+
INSERTION LOSS (Full Band)




BPJC-542R+
VSWR



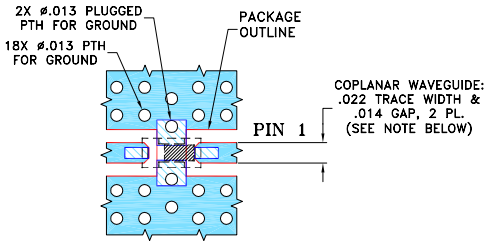
## Outline Drawing




### Pad Connections

| | |
|---|---|
| Input | 1 |
| Output | 3 |
| Ground | 2,4 |

## *Evaluation Board MCL P/N: TB-BPJC-542R+*
## *Suggested PCB Layout (PL-412)*




NOTES:

1. TRACE WIDTH 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.

## Outline Dimensions ( inch / mm )

| A | B | C | D | E | F | G | H | J |
|---|---|---|---|---|---|---|---|---|
| .063 | .031 | .024 | .018 | .028 | .006 | .012 | .100 | .071 |
| 1.60 | 0.79 | 0.61 | 0.46 | 0.71 | 0.15 | 0.30 | 2.54 | 1.80 |

| K | L | M | N | P | Q | R | wt |
|---|---|---|---|---|---|---|---|
| .032 | .028 | .012 | .049 | .026 | .016 | .014 | grams |
| 0.81 | 0.71 | 0.30 | 1.24 | 0.66 | 0.41 | 0.36 | 0.005 |

## 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.

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# Ceramic Bandpass Filter BPJC-542R+

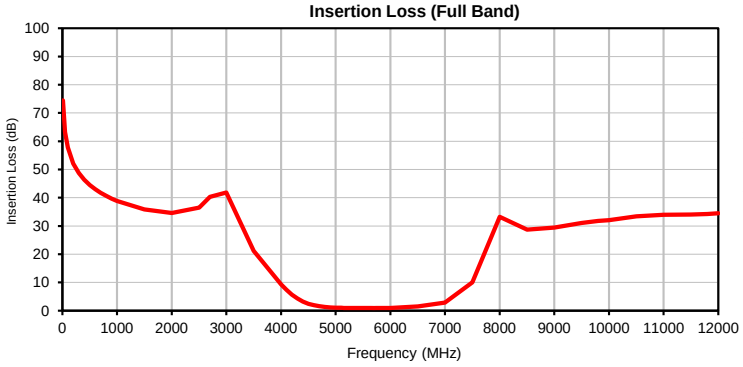
*Typical Performance Data*

| FREQUENCY (MHz) | INSERTION LOSS (dB) | INPUT VSWR (:1) | OUTPUT VSWR (:1) |
|---|---|---|---|
| 10 | 74.45 | 252.64 | 217.31 |
| 50 | 63.21 | 251.08 | 219.06 |
| 100 | 57.82 | 226.98 | 196.33 |
| 200 | 52.10 | 189.03 | 161.21 |
| 300 | 48.76 | 164.27 | 132.70 |
| 400 | 46.38 | 135.44 | 117.67 |
| 500 | 44.50 | 128.68 | 105.55 |
| 600 | 42.99 | 120.13 | 97.92 |
| 700 | 41.71 | 109.01 | 89.62 |
| 800 | 40.63 | 102.54 | 85.31 |
| 900 | 39.68 | 97.21 | 79.52 |
| 1000 | 38.84 | 96.27 | 77.36 |
| 1500 | 35.86 | 83.92 | 68.43 |
| 2000 | 34.60 | 76.62 | 66.47 |
| 2500 | 36.51 | 69.21 | 69.74 |
| 2700 | 40.27 | 62.97 | 65.23 |
| 3000 | 41.83 | 51.31 | 55.87 |
| 3500 | 21.18 | 29.14 | 32.31 |
| 4000 | 9.28 | 9.43 | 10.63 |
| 4100 | 7.36 | 6.99 | 7.84 |
| 4200 | 5.69 | 5.13 | 5.70 |
| 4300 | 4.30 | 3.82 | 4.21 |
| 4400 | 3.24 | 2.92 | 3.19 |
| 4500 | 2.45 | 2.32 | 2.51 |
| 4600 | 1.93 | 1.94 | 2.07 |
| 4700 | 1.57 | 1.69 | 1.78 |
| 4800 | 1.34 | 1.54 | 1.59 |
| 4900 | 1.19 | 1.45 | 1.47 |
| 5000 | 1.09 | 1.39 | 1.39 |
| 5050 | 1.05 | 1.37 | 1.37 |
| 5100 | 1.03 | 1.36 | 1.34 |
| 5150 | 1.00 | 1.35 | 1.33 |
| 5200 | 0.98 | 1.34 | 1.32 |
| 5250 | 0.97 | 1.33 | 1.31 |
| 5300 | 0.96 | 1.34 | 1.30 |
| 5350 | 0.95 | 1.34 | 1.30 |
| 5400 | 0.95 | 1.33 | 1.30 |
| 5450 | 0.94 | 1.33 | 1.30 |
| 5500 | 0.94 | 1.33 | 1.30 |
| 5550 | 0.94 | 1.33 | 1.30 |
| 5600 | 0.94 | 1.31 | 1.29 |
| 5650 | 0.94 | 1.30 | 1.28 |
| 5700 | 0.94 | 1.29 | 1.27 |
| 5750 | 0.94 | 1.28 | 1.25 |
| 5800 | 0.94 | 1.26 | 1.23 |
| 5850 | 0.94 | 1.24 | 1.21 |
| 5900 | 0.95 | 1.21 | 1.18 |
| 6000 | 0.97 | 1.16 | 1.12 |
| 6500 | 1.49 | 1.54 | 1.49 |
| 7000 | 2.87 | 2.18 | 2.28 |
| 7500 | 10.07 | 3.49 | 4.58 |
| 8000 | 33.22 | 14.46 | 15.80 |
| 8500 | 28.69 | 22.66 | 23.93 |
| 9000 | 29.46 | 27.73 | 30.70 |
| 9500 | 31.04 | 29.62 | 31.56 |
| 9800 | 31.76 | 28.40 | 29.52 |
| 10000 | 32.07 | 28.39 | 28.39 |
| 10500 | 33.42 | 30.07 | 27.10 |
| 11000 | 33.96 | 34.59 | 28.52 |
| 11500 | 34.00 | 38.49 | 33.14 |
| 11800 | 34.21 | 37.65 | 35.34 |
| 12000 | 34.54 | 35.64 | 38.23 |

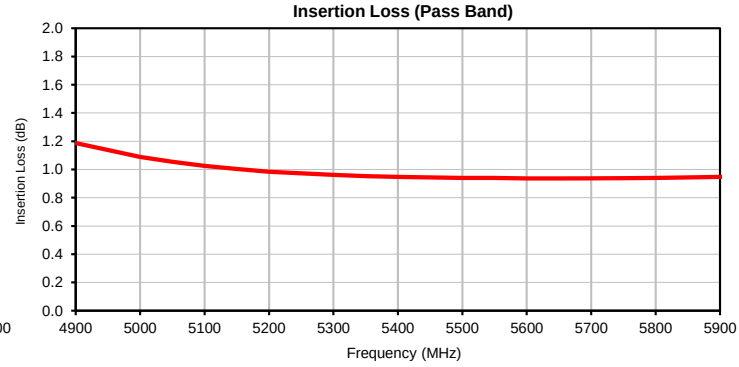
# Ceramic Bandpass Filter BPJC-542R+

*Typical Performance Curves*

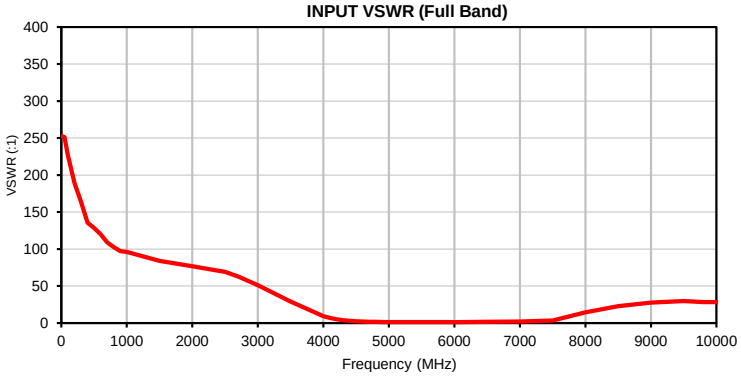
**Insertion Loss (Full Band)**



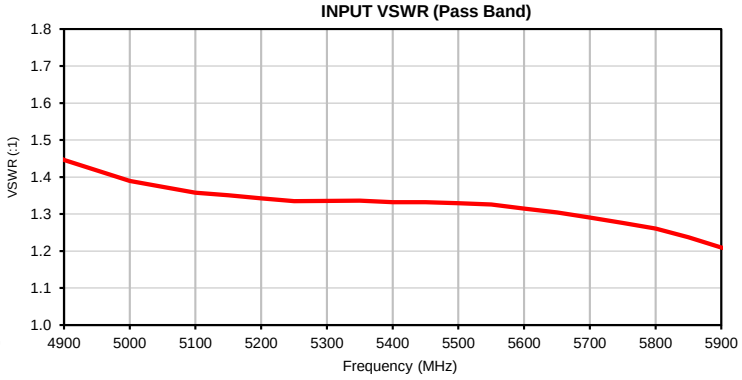

**Insertion Loss (Pass Band)**



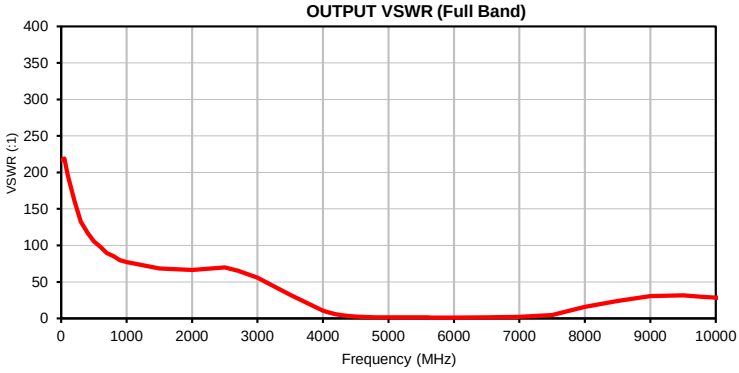

**INPUT VSWR (Full Band)**



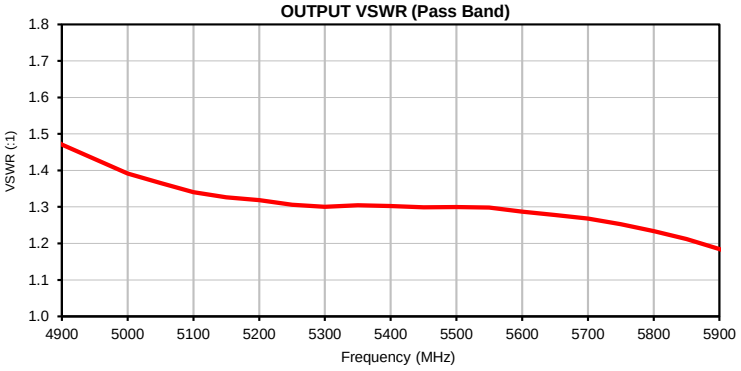

**INPUT VSWR (Pass Band)**




**OUTPUT VSWR (Full Band)**



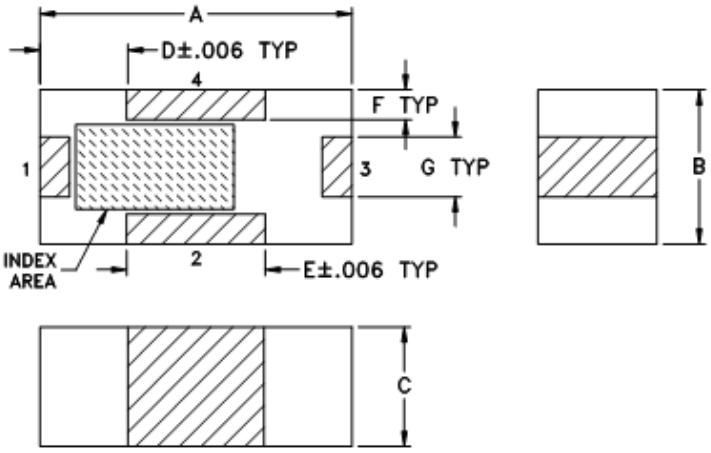

**OUTPUT VSWR (Pass Band)**



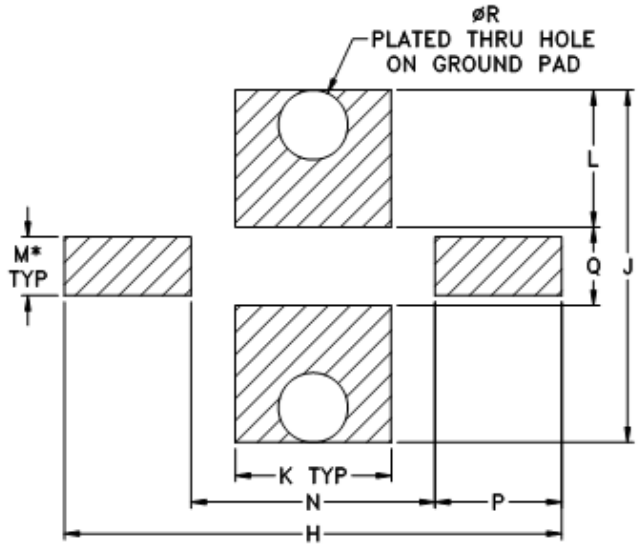
# Case Style JC

## Outline Dimensions

**JC0603C-1**




### PCB Land Pattern




Suggested Layout,
Tolerance to be within ±.002

| CASE # | A | B | C | D | E | F | G | H | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|
| JC0603C-1 | .063 (1.60) | .031 (0.80) | .024 (0.60) | .018 (0.45) | .028 (0.70) | .006 (0.15) | .012 (0.30) | .100 (2.54) | .071 (1.80) | .032 (0.80) | .028 (0.70) |

| CASE # | M* | N | P | Q | R | WT. GRAMS |
|---|---|---|---|---|---|---|
| JC0603C-1 | .012 (0.30) | .049 (1.24) | .026 (0.65) | .016 (0.40) | .014 (0.35) | .005 |

**Dimensions are in inches (mm). Tolerances: 3 Pl. ± .004**

**Notes:**

1. Open style, ceramic base.
2. Termination finish:
   For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
3. * - Line width should be designed to match 50 OHMS characteristic impedance, depending on PCB material & thickness.



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# Tape & Reel Packaging TR-F114

DEVICE ORIENTATION IN T&R

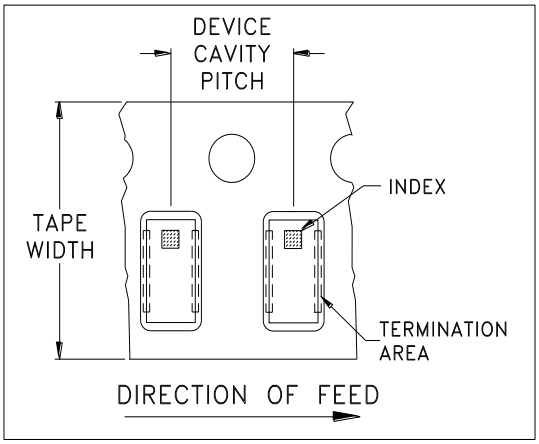



ILLUSTRATION 1

| Applicable Case Styles | |
|---|---|
| GE0805C | JC0603C |
| GE0805C-1 | JC0603C-4 |
| GE0805C-1AP | JC0603C-6 |
| GE0805C-7 | |
| GE0805C-9 | |
| GE0805C-10 | |
| GE0805C-11 | |
| GE0805C-12 | |

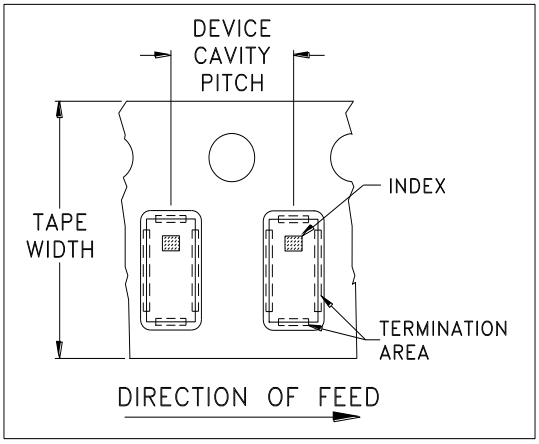



ILLUSTRATION 2

| Applicable Case Styles | |
|---|---|
| GE0805C-2 | JC0603C-1 |
| GE0805C-3 | JC0603C-2 |
| GE0805C-4 | JC0603C-3 |
| GE0805C-5 | JC0603C-5 |
| GE0805C-6 | JC0603C-7 |
| GE0805C-8 | |
| GE0805C-15 | |

| 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 | 4000 |

Note: Please Consult individual model data sheet to determine device per reel availability.

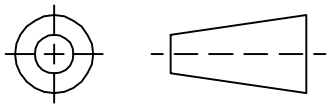
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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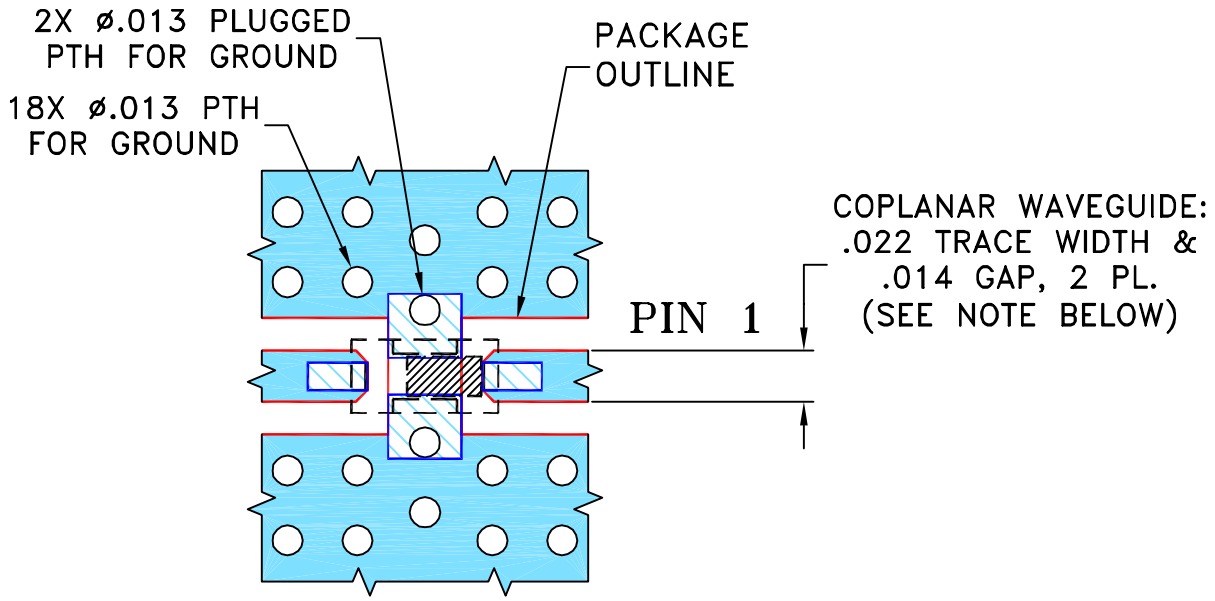
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|---|---|---|---|---|---|
| OR | M144975 | NEW RELEASE | 02/04/14 | AV | RS |
| | | | | | |
| | | | | | |
| | | | | | |

# SUGGESTED MOUNTING CONFIGURATION FOR JC0603C-1 CASE STYLE, "04FL01" PIN CODE

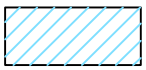



## NOTES:

1. TRACE WIDTH 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 | AV | 01/24/14 |
| TOLERANCES ON: | CHECKED | IL | 02/03/14 |
| 2 PL DECIMALS ± | APPROVED | RS | 02/04/14 |
| 3 PL DECIMALS ± .005 | | | |
| ANGLES ± | | | |
| FRACTIONS ± | | | |

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

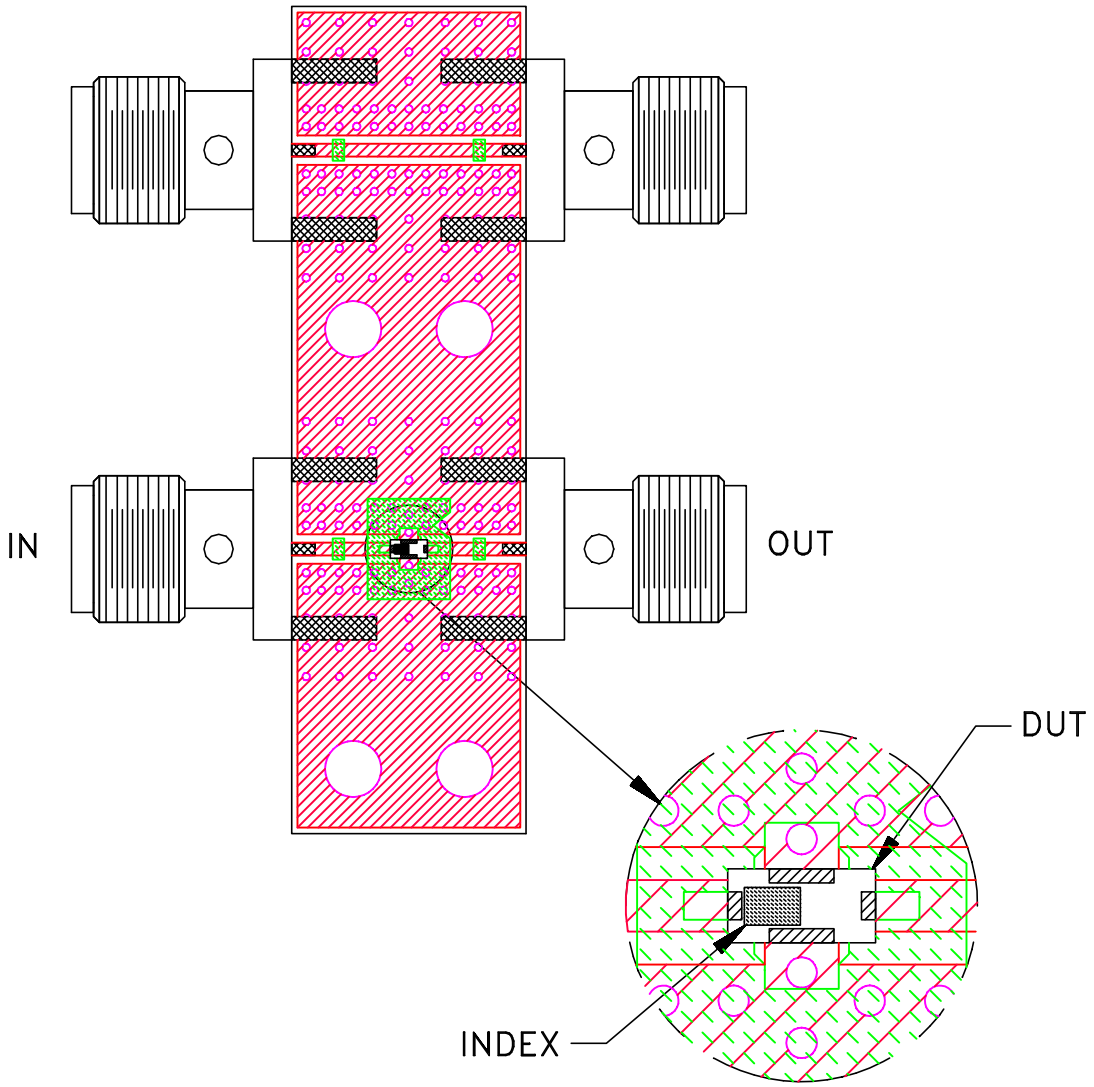
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 04FL01, JC0603C-1, TB-720+

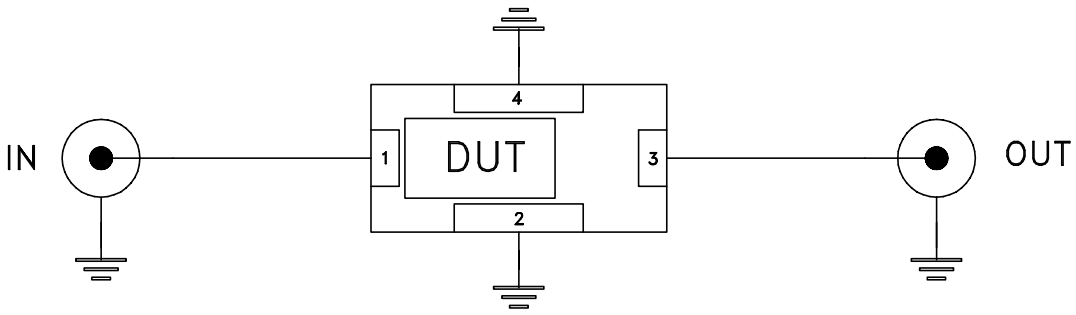
| SIZE | CODE IDENT | DRAWING NO: | REV: |
|---|---|---|---|
| A | 15542 | 98-PL-412 | OR |

| FILE: | SCALE: | SHEET: |
|---|---|---|
| 98PL412 | 12:1 | 1 OF 1 |

# Evaluation Board and Circuit




TB-BPJC-542R+




Schematic Diagram

Notes:

1. 50 Ohm 2.92 mm End Launch Female connectors.
2. PCB Material: RO4350 or equivalent,
   Dielectric Constant=3.5, Thickness=.010 inch.

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# 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 |


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