

# Ceramic High Pass Filter

## HFCW-242+

50Ω 2400 to 3300 MHz

### The Big Deal

- Very good rejection, 20 dB typical
- Rugged, ceramic construction
- Tiny size, 0.063" x 0.032" x 0.024" (0603)
- Good power handling, 2W



CASE STYLE: JC0603C-4

### Product Overview

Mini-Circuits' HFCW-242+ is a LTCC High Pass Filter with a passband from 2400 to 3300 MHz, supporting a variety of applications. This model provides 1.5 dB typical passband insertion loss and provides a very good stopband rejection due to strategically constructed layout with minimal interaction between components. It provides a wide operating temperature range from -55 to +125°C. Housed in a tiny 0603 ceramic form factor with wrap-around 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 (0.063 x 0.032 x 0.024") | Saves space in dense circuit board layouts and minimizes the effects of parasitics.                                                             |
| Good power handling                | Supports a wide range of system power requirements.                                                                                             |
| Wrap-around terminations           | Provides excellent solderability and easy visual inspection                                                                                     |

#### 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](http://www.minicircuits.com/MCLStore/terms.jsp)



# Ceramic High Pass Filter

50Ω 2400 to 3300 MHz

HFCW-242+



Generic photo used for illustration purposes only

CASE STYLE: JC0603C-4

## Features

- Miniature size 0603
- High stop band rejections
- Low cost
- Aqueous washable

### +RoHS Compliant

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

## Applications

- ISM Band
- WLAN
- Bluetooth
- Zigbee

## Electrical Specifications<sup>1,2</sup> at 25°C

| Parameter |                | F#    | Frequency (MHz) | Min. | Typ. | Max. | Unit |
|-----------|----------------|-------|-----------------|------|------|------|------|
| Stop Band | Rejection Loss | DC-F1 | 10 - 1650       | 20   | 25   | —    | dB   |
|           | Freq. Cut-Off  | F2    | 2200            | —    | 2.5  | —    | dB   |
| Pass Band | Insertion Loss | F4-F5 | 2400 - 3300     | —    | 1.5  | 2.5  | dB   |
|           | Return Loss    | F4-F5 | 2400 - 3300     | —    | 9.5  | —    |      |

1. Tested on Evaluation Board TB-HFCW-242+

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

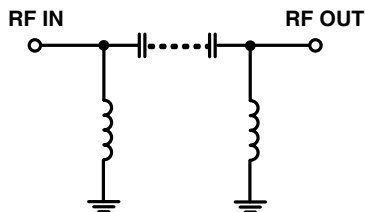
### Maximum Ratings

|                             |                |
|-----------------------------|----------------|
| Operating Temperature       | -55°C to 125°C |
| Storage Temperature         | -55°C to 125°C |
| RF Power Input <sup>3</sup> | 2W at 25°C     |

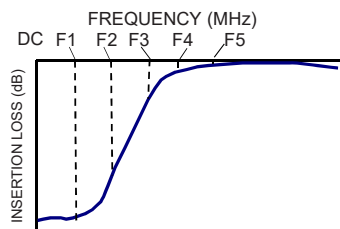
3. Passband rating, derate linearly to 0.5W at 125°C ambient.

Permanent damage may occur if any of these limits exceeded.

### Functional Schematic

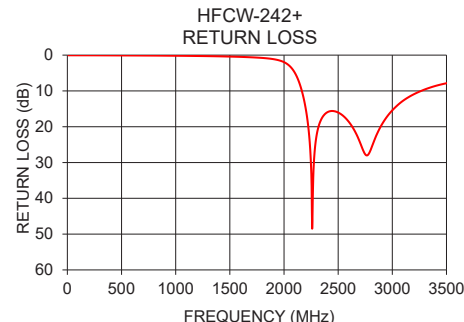
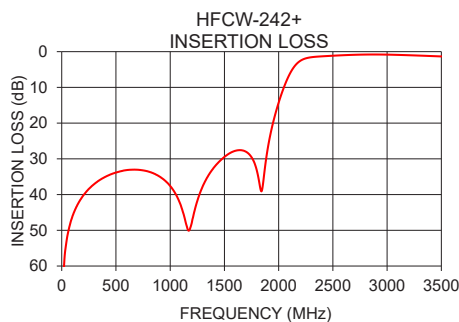
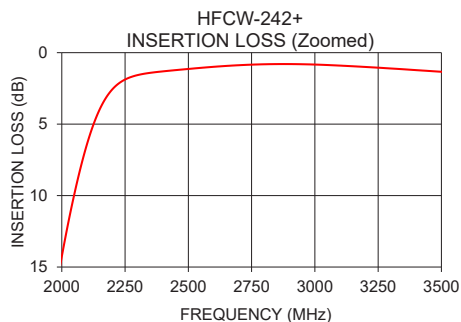


## Typical Frequency Response



## Typical Performance Data at 25°C

| Frequency (MHz) | Insertion Loss (dB) | Return Loss (dB) |
|-----------------|---------------------|------------------|
| 10              | 64.90               | 0.05             |
| 100             | 45.98               | 0.05             |
| 200             | 40.21               | 0.05             |
| 500             | 33.83               | 0.09             |
| 1000            | 37.59               | 0.18             |
| 1200            | 47.78               | 0.24             |
| 1650            | 27.57               | 0.55             |
| 1700            | 28.03               | 0.61             |
| 1800            | 33.42               | 0.78             |
| 2000            | 14.27               | 1.96             |
| 2200            | 2.56                | 14.86            |
| 2400            | 1.31                | 15.96            |
| 2500            | 1.14                | 16.04            |
| 2600            | 0.99                | 18.70            |
| 2700            | 0.88                | 24.27            |
| 2800            | 0.81                | 26.49            |
| 3000            | 0.83                | 15.42            |
| 3100            | 0.91                | 12.72            |
| 3300            | 1.11                | 9.59             |
| 3400            | 1.22                | 8.59             |



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[www.minicircuits.com](http://www.minicircuits.com) P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 [sales@minicircuits.com](mailto:sales@minicircuits.com)

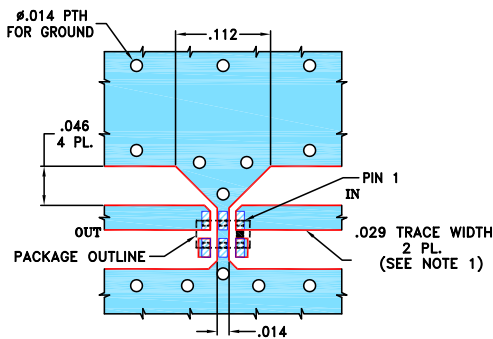
REV. OR  
ECO-004693  
HFCW-242+  
RS/CP/AM  
201104  
Page 2 of 3

Pad Connections

|               |     |
|---------------|-----|
| INPUT         | 1   |
| OUTPUT        | 3   |
| GROUND        | 2,5 |
| NO CONNECTION | 4,6 |

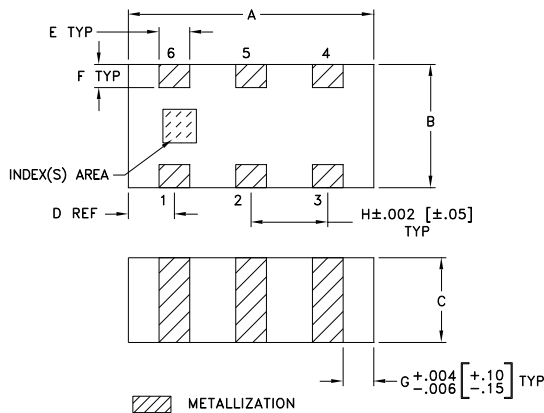
Product Marking: N/A

Evaluation Board MCL P/N: TB-HFCW-242+  
Suggested PCB Layout (PL-553)



- NOTES:
- 1. TRACE WIDTH IS SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS .016±.0015. 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



Outline Dimensions ( inch mm )

|      |      |      |      |       |
|------|------|------|------|-------|
| A    | B    | C    | D    | E     |
| .063 | .032 | .022 | .012 | .008  |
| 1.60 | 0.81 | 0.56 | 0.30 | 0.20  |
| F    | G    | H    |      | wt    |
| .006 | .008 | .020 |      | grams |
| 0.15 | 0.20 | 0.51 |      | .005  |

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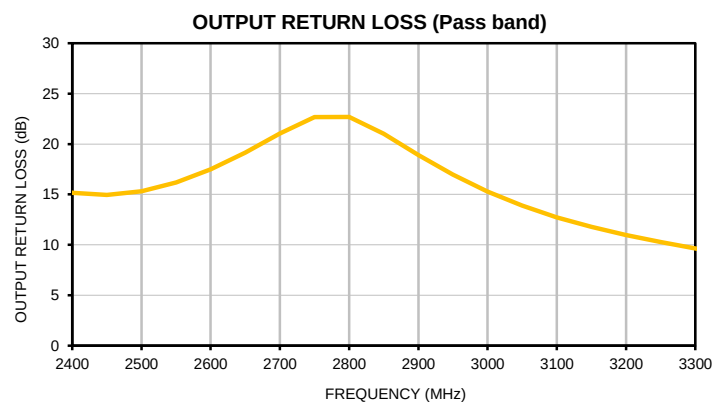
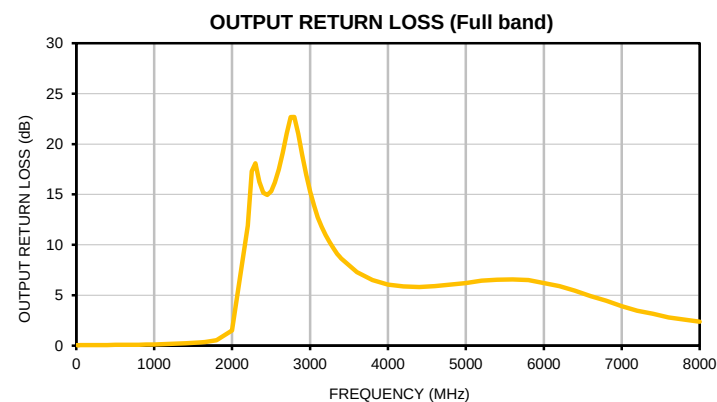
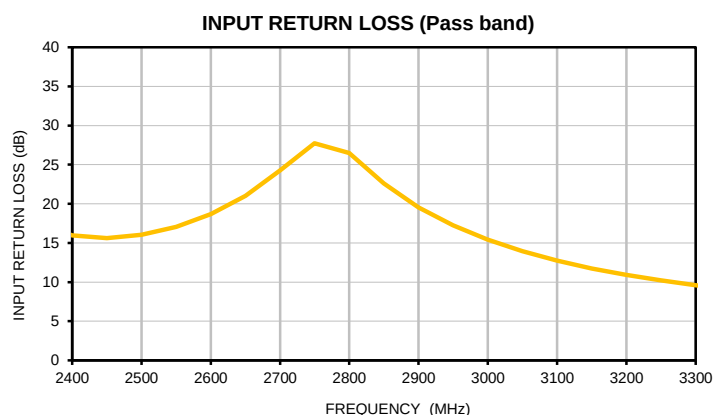
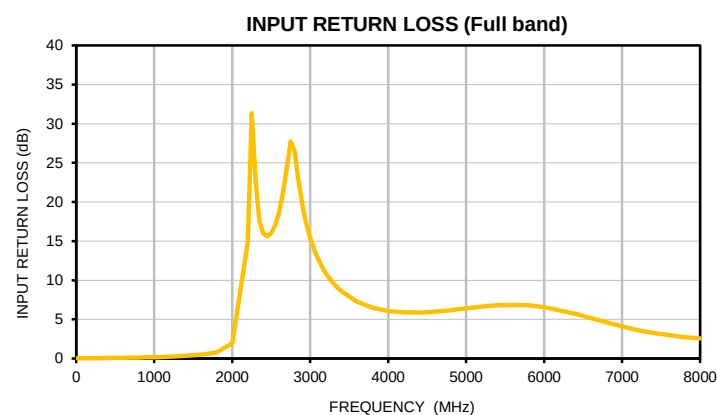
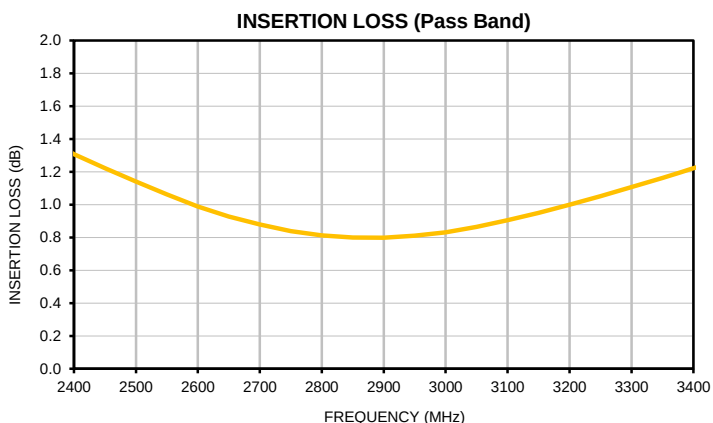
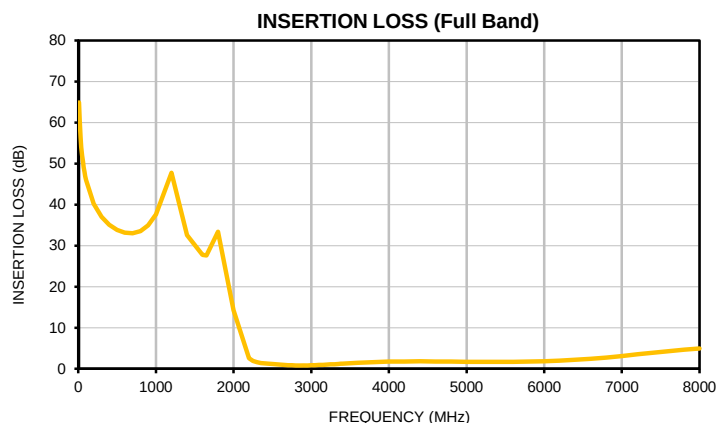
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## Typical Performance Data

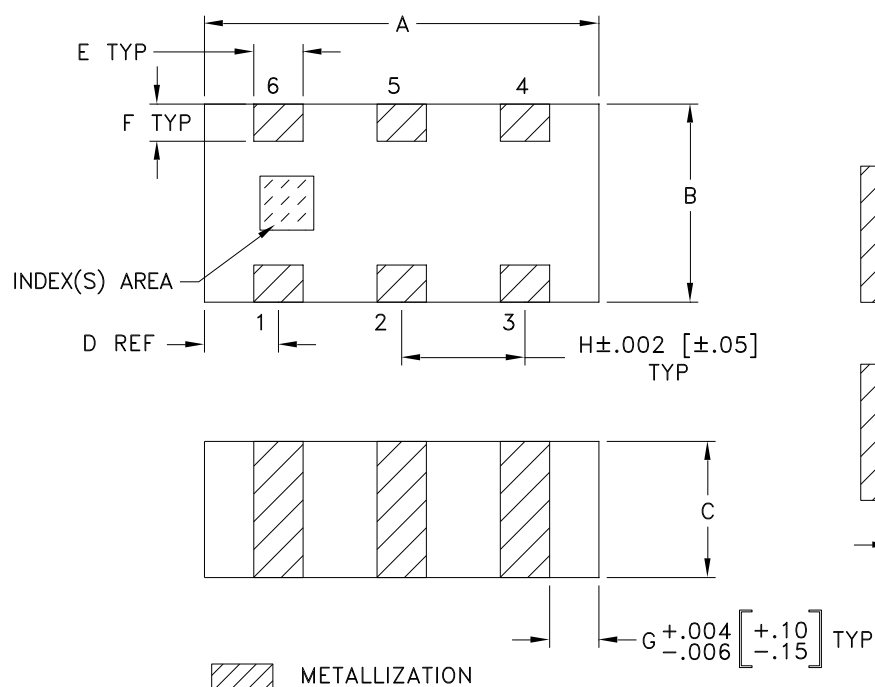
| FREQUENCY<br>(MHz) | INSERTION LOSS<br>(dB) | INPUT RETURN LOSS<br>(dB) | OUTPUT RETURN LOSS<br>(dB) |
|--------------------|------------------------|---------------------------|----------------------------|
| 10                 | 64.90                  | 0.05                      | 0.05                       |
| 20                 | 60.62                  | 0.05                      | 0.04                       |
| 30                 | 56.26                  | 0.05                      | 0.04                       |
| 40                 | 53.96                  | 0.04                      | 0.04                       |
| 50                 | 51.93                  | 0.05                      | 0.05                       |
| 60                 | 50.40                  | 0.05                      | 0.05                       |
| 70                 | 49.08                  | 0.05                      | 0.05                       |
| 80                 | 47.93                  | 0.05                      | 0.05                       |
| 90                 | 46.92                  | 0.05                      | 0.05                       |
| 100                | 45.98                  | 0.05                      | 0.05                       |
| 200                | 40.21                  | 0.05                      | 0.05                       |
| 300                | 37.05                  | 0.06                      | 0.06                       |
| 400                | 35.07                  | 0.07                      | 0.07                       |
| 500                | 33.83                  | 0.09                      | 0.08                       |
| 600                | 33.15                  | 0.10                      | 0.08                       |
| 700                | 33.05                  | 0.11                      | 0.09                       |
| 800                | 33.57                  | 0.13                      | 0.09                       |
| 900                | 34.92                  | 0.15                      | 0.11                       |
| 1000               | 37.59                  | 0.18                      | 0.13                       |
| 1200               | 47.78                  | 0.24                      | 0.17                       |
| 1400               | 32.55                  | 0.34                      | 0.23                       |
| 1600               | 27.75                  | 0.49                      | 0.34                       |
| 1650               | 27.57                  | 0.55                      | 0.37                       |
| 1800               | 33.42                  | 0.78                      | 0.54                       |
| 2000               | 14.27                  | 1.96                      | 1.50                       |
| 2200               | 2.56                   | 14.86                     | 11.90                      |
| 2250               | 1.88                   | 31.34                     | 17.30                      |
| 2300               | 1.57                   | 22.59                     | 18.10                      |
| 2350               | 1.41                   | 17.59                     | 16.24                      |
| 2400               | 1.31                   | 15.96                     | 15.18                      |
| 2450               | 1.22                   | 15.61                     | 14.95                      |
| 2500               | 1.14                   | 16.04                     | 15.32                      |
| 2550               | 1.06                   | 17.07                     | 16.18                      |
| 2600               | 0.99                   | 18.70                     | 17.47                      |
| 2650               | 0.93                   | 21.02                     | 19.13                      |
| 2700               | 0.88                   | 24.27                     | 21.05                      |
| 2750               | 0.84                   | 27.72                     | 22.67                      |
| 2800               | 0.81                   | 26.49                     | 22.69                      |
| 2850               | 0.80                   | 22.60                     | 21.00                      |
| 2900               | 0.80                   | 19.56                     | 18.89                      |
| 2950               | 0.81                   | 17.24                     | 16.97                      |
| 3000               | 0.83                   | 15.42                     | 15.30                      |
| 3050               | 0.87                   | 13.94                     | 13.89                      |
| 3100               | 0.91                   | 12.72                     | 12.73                      |
| 3150               | 0.95                   | 11.74                     | 11.78                      |
| 3200               | 1.00                   | 10.91                     | 10.97                      |
| 3250               | 1.05                   | 10.20                     | 10.27                      |
| 3300               | 1.11                   | 9.59                      | 9.65                       |
| 3350               | 1.16                   | 9.06                      | 9.11                       |
| 3380               | 1.20                   | 8.77                      | 8.82                       |
| 3400               | 1.22                   | 8.59                      | 8.64                       |
| 3600               | 1.44                   | 7.26                      | 7.31                       |
| 3800               | 1.61                   | 6.49                      | 6.50                       |
| 4000               | 1.72                   | 6.07                      | 6.06                       |
| 4200               | 1.77                   | 5.92                      | 5.88                       |
| 4400               | 1.78                   | 5.88                      | 5.81                       |
| 4600               | 1.77                   | 5.98                      | 5.91                       |
| 4800               | 1.72                   | 6.20                      | 6.05                       |
| 5000               | 1.69                   | 6.40                      | 6.20                       |
| 5200               | 1.65                   | 6.64                      | 6.44                       |
| 5400               | 1.64                   | 6.81                      | 6.53                       |
| 5600               | 1.67                   | 6.84                      | 6.56                       |
| 5800               | 1.71                   | 6.81                      | 6.50                       |
| 6000               | 1.82                   | 6.56                      | 6.21                       |
| 6200               | 1.98                   | 6.16                      | 5.92                       |
| 6400               | 2.17                   | 5.71                      | 5.47                       |
| 6600               | 2.44                   | 5.15                      | 4.91                       |
| 6800               | 2.74                   | 4.62                      | 4.46                       |
| 7000               | 3.09                   | 4.11                      | 3.92                       |
| 7200               | 3.50                   | 3.62                      | 3.47                       |
| 7400               | 3.90                   | 3.25                      | 3.17                       |
| 7600               | 4.23                   | 2.98                      | 2.79                       |
| 7800               | 4.60                   | 2.71                      | 2.59                       |
| 8000               | 4.93                   | 2.59                      | 2.38                       |

## Typical Performance Curves

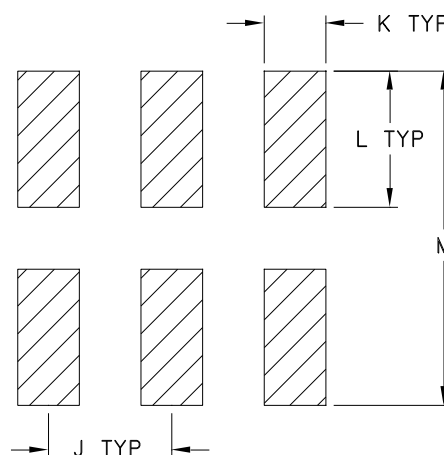


## Outline Dimensions

JC0603C-4



## PCB Land Pattern



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

| CASE #    | A              | B              | C              | D              | E              | F              | G              | H              | J              | K              | L              | M              | WT. GRAMS |
|-----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------|
| JC0603C-4 | .063<br>(1.60) | .032<br>(0.80) | .022<br>(0.55) | .012<br>(0.30) | .008<br>(0.20) | .006<br>(0.15) | .008<br>(0.20) | .020<br>(0.50) | .020<br>(0.50) | .010<br>(0.25) | .022<br>(0.55) | .053<br>(1.35) | .005      |

Dimensions are in inches (mm). Tolerances: 3 Pl.  $\pm .004$

### Notes:

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



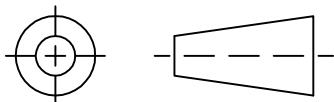
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

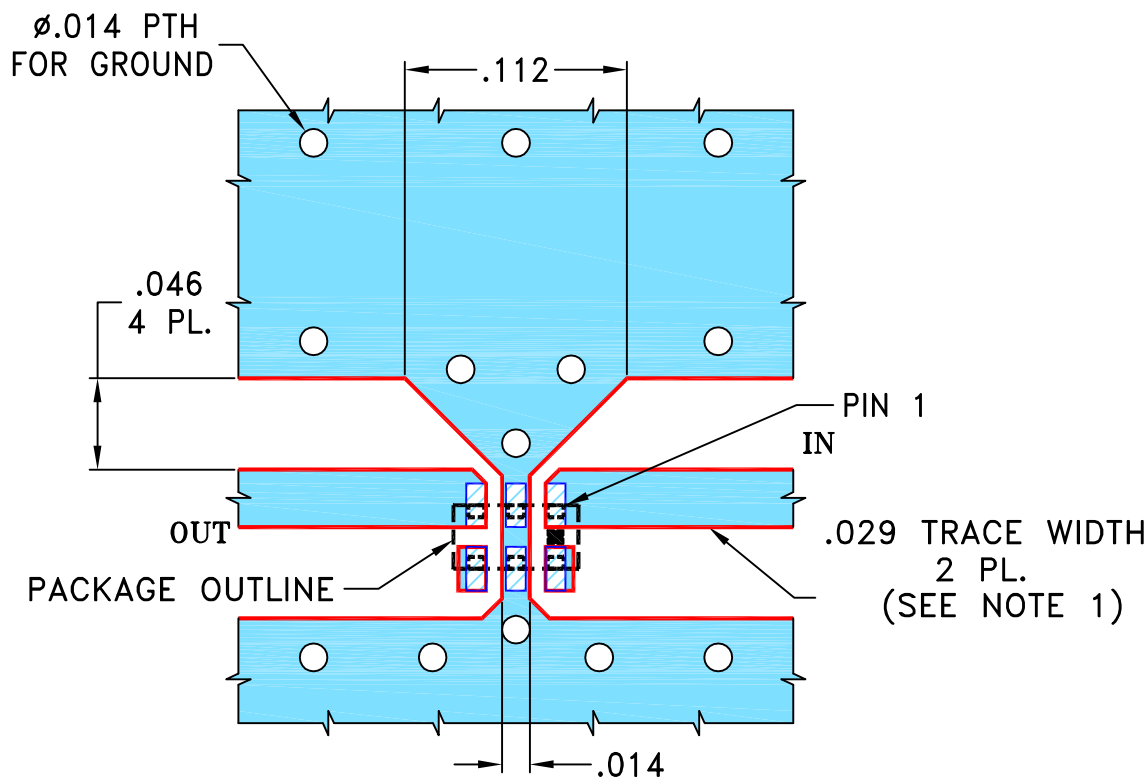
## THIRD ANGLE PROJECTION



## REVISIONS

| REV | ECN No. | DESCRIPTION | DATE     | DR | AUTH |
|-----|---------|-------------|----------|----|------|
| OR  | M168200 | NEW RELEASE | 05/31/18 | NP | SL   |
|     |         |             |          |    |      |
|     |         |             |          |    |      |
|     |         |             |          |    |      |

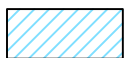
SUGGESTED MOUNTING CONFIGURATION  
FOR JC0603C-4 CASE STYLE, "06FL13" PIN CODE

**NOTES:**

- TRACE WIDTH IS SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS  $.016 \pm .0015$ . COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
- 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

DIMENSIONS ARE IN INCHES  
 TOLERANCES ON:  
 2 PL DECIMALS  $\pm$   
 3 PL DECIMALS  $\pm$  .005  
 ANGLES  $\pm$   
 FRACTIONS  $\pm$



## INITIALS

## DATE

DRAWN

NP

05/30/18

CHECKED

GF

05/30/18

APPROVED

SL

05/31/18



**Mini-Circuits®**

13 Neptune Avenue  
 Brooklyn NY 11235

PL, 06FL13, JC0603C-4, TB-1025+

SIZE  
 A

CODE IDENT  
 15542

DRAWING NO:

98-PL-553

REV:

OR

FILE:

98PL553

SCALE:

10:1

SHEET:

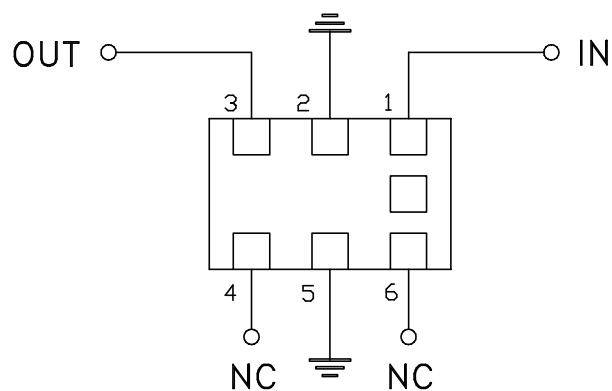
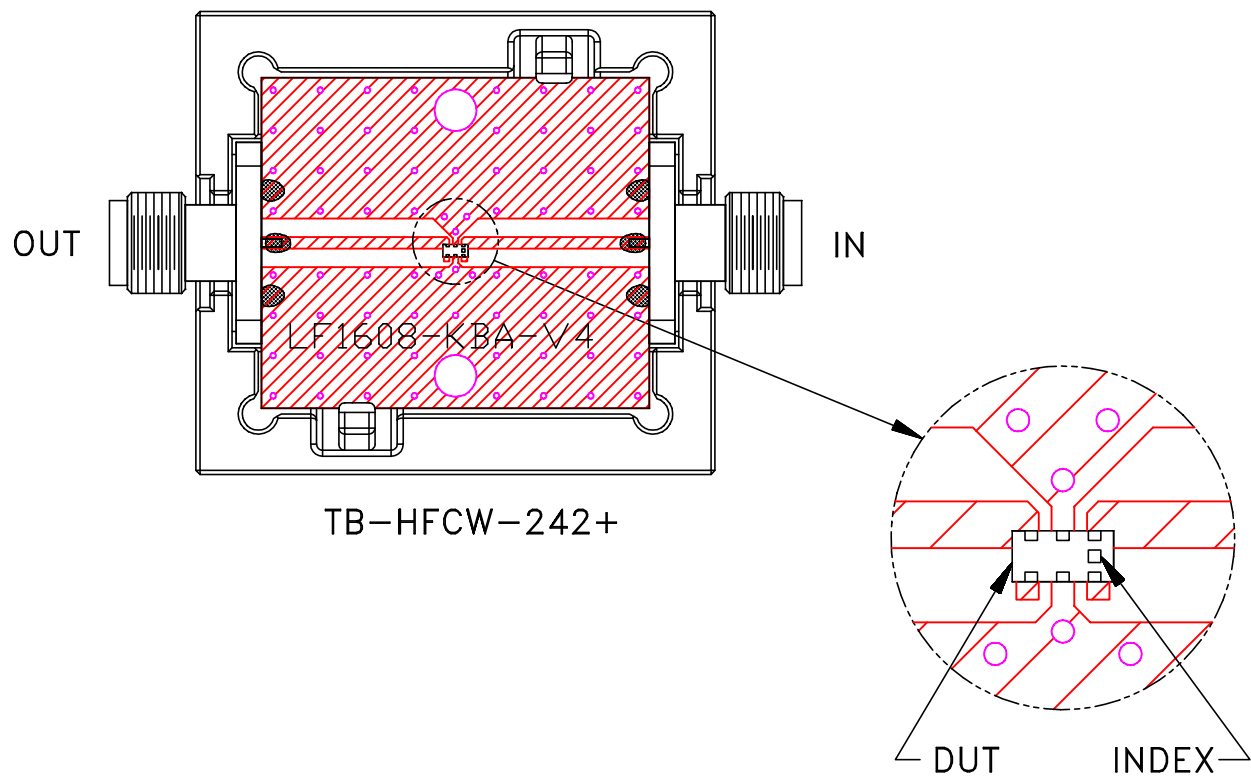
1 OF 1

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

# Evaluation Board and Circuit



Schematic Diagram

## Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: FR4 or equivalent,  
Dielectric Constant=4.5, Thickness=.016 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 125° C<br>Ambient Environment                                               | Individual Model Data Sheet                                                                          |
| Storage Temperature        | -55° to 125° 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 Eutectic Process: 225°C peak<br>Pb-Free Process: 250°C peak                   | J-STD-020C, 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                                                                 |