



### THE BIG DEAL

- Standard small 1008 (2.5mm x 2.0mm) case style
- Low Insertion Loss – Mid band 1.3 dB typical
- Wide rejection band
- Shielded construction preventing filter from de-tuning
- Reduced footprint area by employing LGA (land grid array)
- Surface mountable pick and place standard case style



Generic photo used for illustration purposes only

CASE STYLE: NL1008C-7

### +RoHS Compliant

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

### APPLICATIONS

- Satellite Communications

### PRODUCT OVERVIEW

The BFCQ-1162+ LTCC Band Pass Filter achieves a miniature size and high repeatability of performance by utilizing a proprietary LTCC material system and distributed filter topology. The typical passband loss at 10.7 – 12.7 GHz is as low as 1.3 dB, with typical stopband rejections at 40 dB up to 27 GHz. This model handles up to 1W RF input power, and provides a wide operating temperature range from -55 to +125°C. Utilizing a proprietary LTCC material system and a distributed filter topology, this filter is able to achieve repeatable performance on a lot-to-lot basis.

### KEY FEATURES

| Feature                    | Advantages                                                                                       |
|----------------------------|--------------------------------------------------------------------------------------------------|
| Cost effective             | LTCC is scalable technology that is cost effective due to ease of production in high quantities. |
| Small size (2.5mm x 2.0mm) | Allows for high layout density of circuit boards, while minimizing effects of parasitics.        |
| Surface Mountable          | Suitable for very high volume automated assembly process.                                        |



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# Bandpass Filter

**BFCQ-1162+****50Ω 10.7 to 12.7 GHz****ELECTRICAL SPECIFICATIONS<sup>1</sup> AT 25°C**

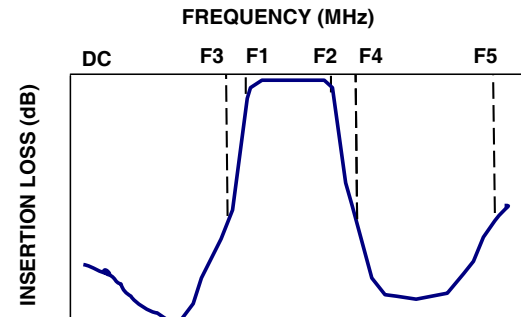
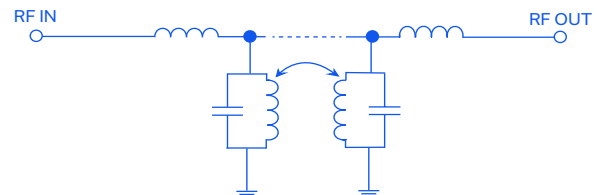
| Parameter        | F#               | Frequency (GHz) | Min.        | Typ. | Max. | Units |
|------------------|------------------|-----------------|-------------|------|------|-------|
| Passband         | Center Frequency | —               | —           | 11.6 | —    | GHz   |
|                  | Insertion Loss   | F1-F2           | 10.7 - 12.7 | 1.3  | 3.0  | dB    |
|                  | Return Loss      | F1-F2           | 10.7 - 12.7 | 13.0 | —    | dB    |
| Stop Band, Lower | Insertion Loss   | DC-F3           | 0.1 - 7.0   | 40   | —    | dB    |
|                  |                  |                 | 7.0 - 8.8   | 40   | —    |       |
| Stop Band, Upper | Insertion Loss   | F4-F5           | 15.1 - 17.0 | 25   | —    | dB    |
|                  |                  |                 | 17.0 - 27.0 | 35   | —    |       |

1. Measured on Mini-Circuits Evaluation Board TB-BFCQ-1162C+ with connectors and feedline de-embedded with 2xThru.

**MAXIMUM RATINGS**

| Parameter             | Ratings         |
|-----------------------|-----------------|
| Operating temperature | -55°C to +125°C |
| Storage temperature   | -55°C to +125°C |
| RF Power Input        | 1W max.         |

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

**TYPICAL FREQUENCY RESPONSE****FUNCTIONAL SCHEMATIC**



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## Bandpass Filter

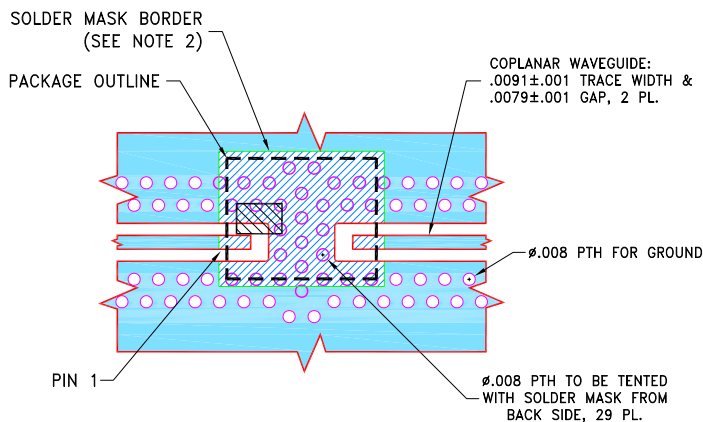
BFCQ-1162+

50Ω 10.7 to 12.7 GHz

## PAD CONNECTIONS

|        |   |
|--------|---|
| INPUT  | 1 |
| OUTPUT | 2 |
| GROUND | 3 |

PRODUCT MARKING: UA

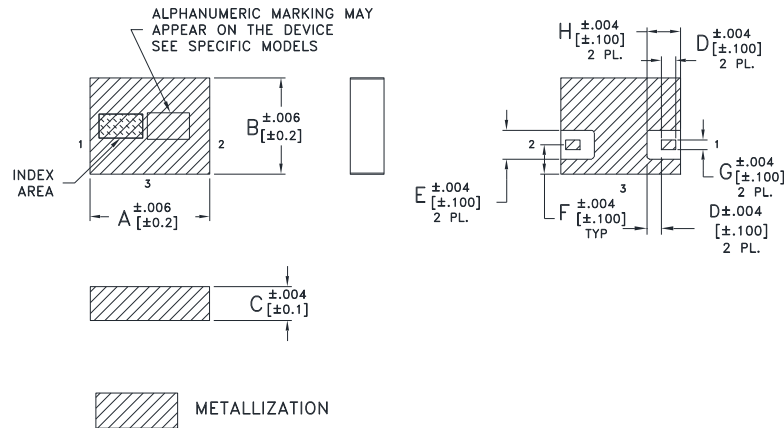
EVALUATION BOARD MCL P/N: TB-BFCQ-1162C+  
SUGGESTED PCB LAYOUT (PL-707)

## NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR MEGTRON-7 R5785(N); DIELECTRIC THICKNESS: .0049±.001; CLOTH STYLE: 2116; COPPER: HVLP/HVLP. FOR OTHER MATERIALS LINE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. SOLDER MASK OPENING FOR COMPONENT SOLDERING HAS BEEN INCREASED AGAINST PCB LAND PATTERN RECOMMENDATIONS PER NL1008C-6 AND CAN BE DEVIATED FROM THIS DRAWING TO COMPLY WITH CUSTOMERS' DESIGN RULES.
3. 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 (Inches  
mm)

| A    | B    | C    | D    | E    | F    | G    | H    | J    | K    | wt    |
|------|------|------|------|------|------|------|------|------|------|-------|
| .098 | .079 | .028 | .012 | .024 | .024 | .008 | .028 | .043 | .024 | grams |
| 2.49 | 2.01 | 0.71 | 0.30 | 0.61 | 0.61 | 0.20 | 0.71 | 1.09 | 0.61 | .019  |



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## Bandpass Filter

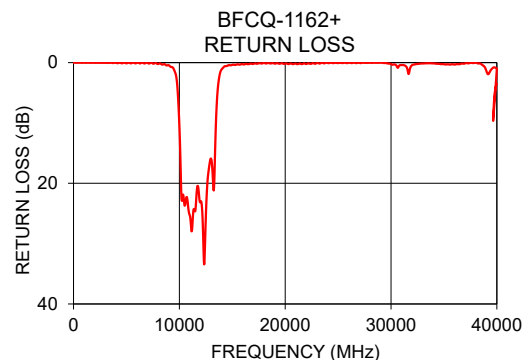
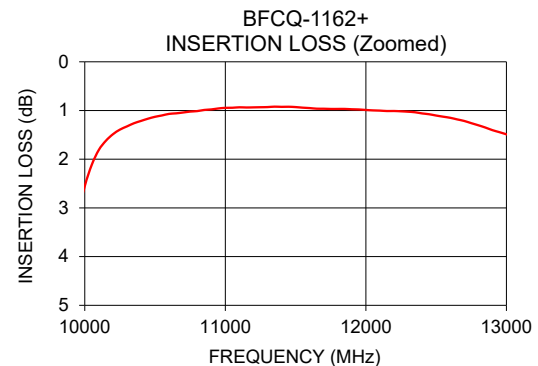
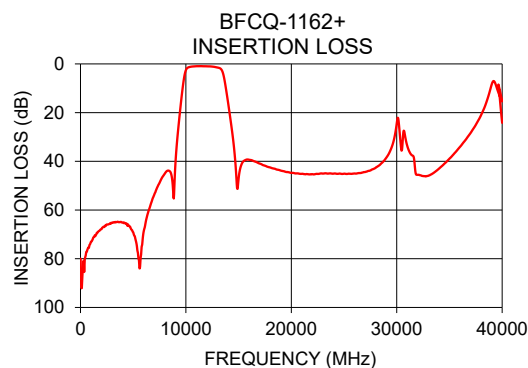
BFCQ-1162+

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50Ω 10.7 to 12.7 GHz

## TYPICAL PERFORMANCE DATA AT 25°C

| Frequency (MHz) | Insertion Loss (dB) | Return Loss (dB) |
|-----------------|---------------------|------------------|
| 10              | 79.96               | 0.02             |
| 1000            | 72.99               | 0.00             |
| 2000            | 67.82               | 0.02             |
| 3000            | 65.21               | 0.01             |
| 4000            | 65.11               | 0.00             |
| 7000            | 53.68               | 0.05             |
| 8800            | 52.98               | 0.46             |
| 9200            | 29.94               | 0.70             |
| 10200           | 1.49                | 22.55            |
| 10700           | 1.04                | 22.26            |
| 11600           | 0.95                | 22.45            |
| 12700           | 1.21                | 18.86            |
| 15100           | 44.00               | 0.33             |
| 17000           | 40.93               | 0.20             |
| 20000           | 44.75               | 0.16             |
| 22000           | 45.29               | 0.22             |
| 27000           | 44.39               | 0.03             |
| 30000           | 24.44               | 0.23             |
| 32000           | 45.53               | 0.41             |
| 36000           | 34.07               | 0.32             |
| 40000           | 15.37               | 1.00             |



## NOTES

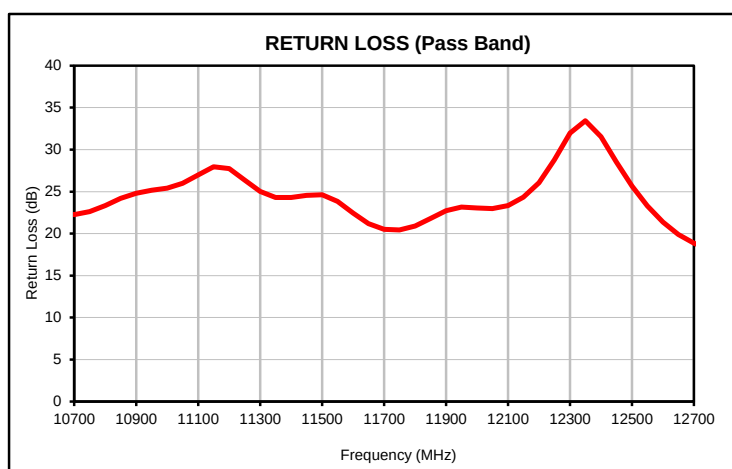
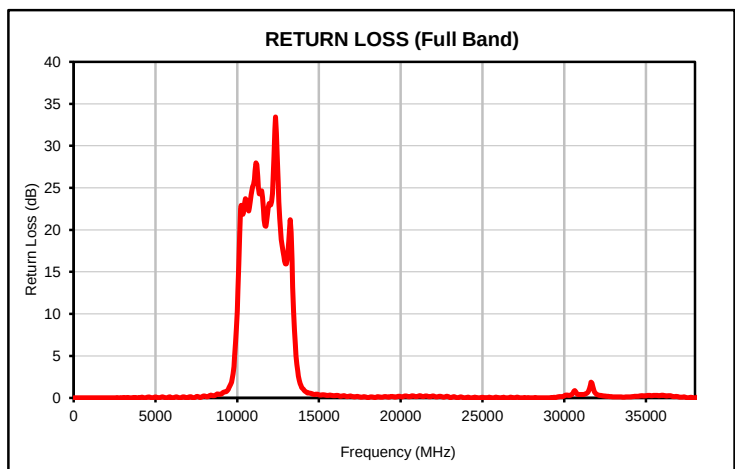
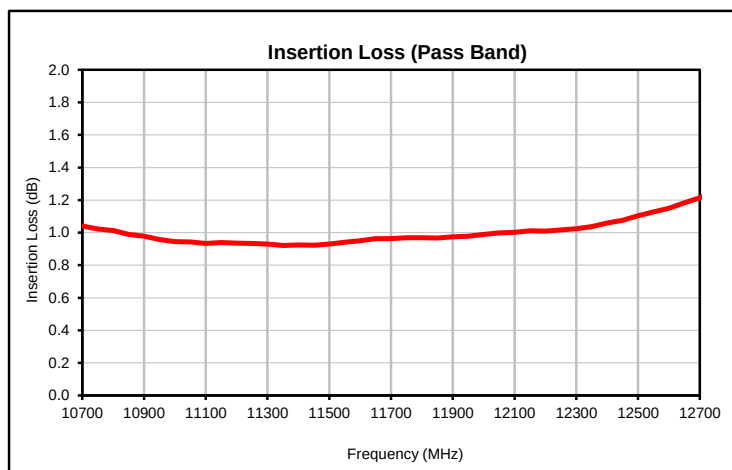
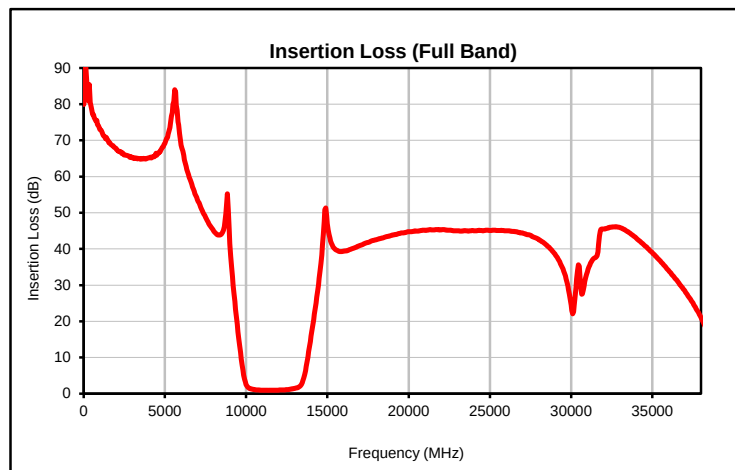
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*Typical Performance Data*

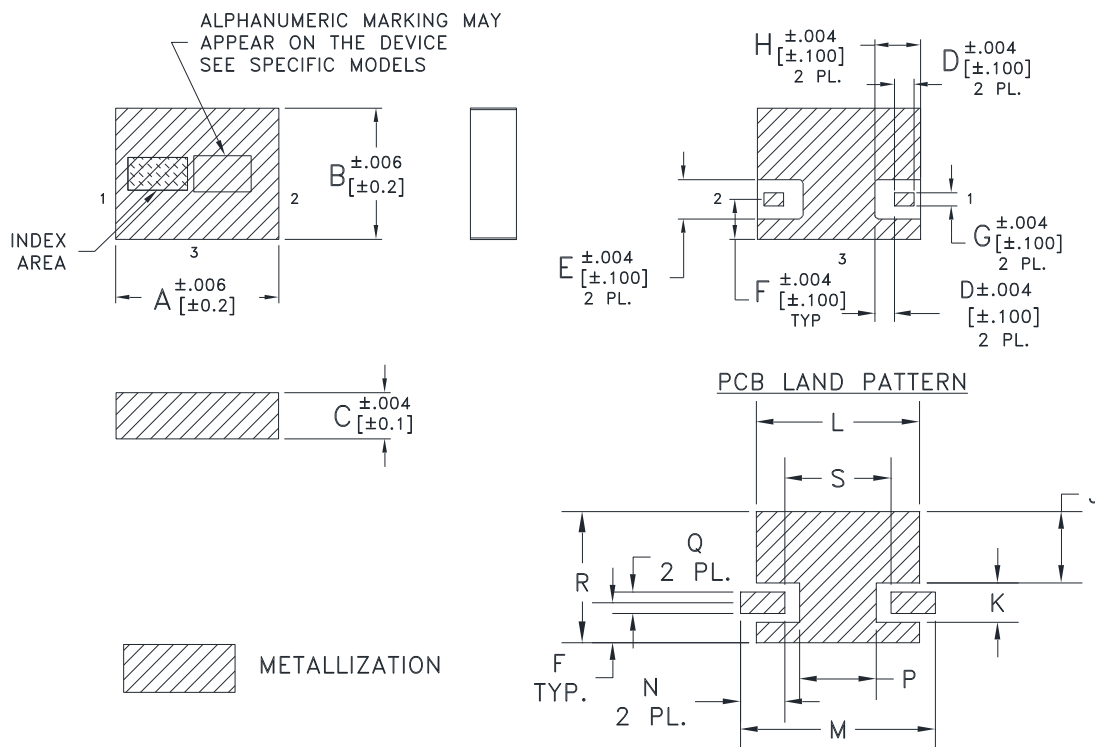
| FREQUENCY<br>(MHz) | INSERTION LOSS<br>(dB) | RETURN LOSS<br>(dB) |
|--------------------|------------------------|---------------------|
| 100                | 92.13                  | 0.00                |
| 500                | 78.54                  | 0.01                |
| 1000               | 72.99                  | 0.00                |
| 2000               | 67.82                  | 0.02                |
| 3000               | 65.21                  | 0.01                |
| 4000               | 65.11                  | 0.00                |
| 5000               | 69.14                  | 0.11                |
| 6000               | 68.70                  | 0.02                |
| 7000               | 53.68                  | 0.05                |
| 8000               | 45.03                  | 0.23                |
| 8800               | 52.98                  | 0.46                |
| 10000              | 2.55                   | 10.34               |
| 10700              | 1.04                   | 22.26               |
| 11600              | 0.95                   | 22.45               |
| 12200              | 1.01                   | 26.06               |
| 12700              | 1.21                   | 18.86               |
| 13000              | 1.49                   | 15.93               |
| 13200              | 1.73                   | 20.28               |
| 13400              | 2.55                   | 13.20               |
| 13600              | 5.27                   | 5.01                |
| 13800              | 10.21                  | 2.10                |
| 14000              | 15.89                  | 1.11                |
| 14200              | 21.95                  | 0.72                |
| 14400              | 28.31                  | 0.58                |
| 14600              | 35.98                  | 0.46                |
| 14800              | 47.57                  | 0.44                |
| 15000              | 47.04                  | 0.37                |
| 15100              | 44.00                  | 0.33                |
| 15500              | 39.83                  | 0.29                |
| 16000              | 39.35                  | 0.27                |
| 16500              | 40.00                  | 0.26                |
| 17000              | 40.93                  | 0.20                |
| 17500              | 41.80                  | 0.11                |
| 18000              | 42.53                  | 0.06                |
| 18500              | 43.15                  | 0.10                |
| 19000              | 43.81                  | 0.16                |
| 19500              | 44.37                  | 0.17                |
| 20000              | 44.75                  | 0.16                |
| 20500              | 44.96                  | 0.14                |
| 21000              | 45.14                  | 0.16                |
| 21500              | 45.24                  | 0.21                |
| 22000              | 45.29                  | 0.22                |
| 22500              | 45.18                  | 0.16                |
| 23000              | 45.04                  | 0.07                |
| 23500              | 45.03                  | 0.03                |
| 24000              | 45.05                  | 0.03                |
| 24500              | 45.08                  | 0.07                |
| 25000              | 45.07                  | 0.07                |
| 25500              | 45.09                  | 0.03                |
| 26000              | 44.99                  | 0.01                |
| 26500              | 44.83                  | 0.01                |
| 27000              | 44.39                  | 0.03                |
| 28000              | 42.66                  | 0.03                |
| 29000              | 38.58                  | 0.00                |
| 30000              | 24.44                  | 0.23                |
| 30500              | 35.20                  | 0.48                |
| 31000              | 33.69                  | 0.40                |
| 31500              | 37.64                  | 0.84                |
| 32000              | 45.53                  | 0.41                |
| 32500              | 46.04                  | 0.22                |
| 33000              | 45.93                  | 0.14                |
| 33500              | 44.75                  | 0.11                |
| 34000              | 43.01                  | 0.13                |
| 35000              | 38.92                  | 0.27                |
| 36000              | 34.07                  | 0.32                |
| 37000              | 28.39                  | 0.12                |
| 38000              | 21.02                  | 0.00                |
| 39000              | 8.54                   | 1.32                |
| 40000              | 15.37                  | 1.00                |

## Typical Performance Curves



## Outline Dimensions

## NL1008C-7



SUGGESTED LAYOUT FOR PCB LAND PATTERN  
TOLERANCE TO BE WITHIN  $\pm .002$

| CASE#     | A              | B              | C             | D             | E             | F             | G             | H             | J              | K             | L              |
|-----------|----------------|----------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|---------------|----------------|
| NL1008C-7 | .098<br>(2.50) | .079<br>(2.00) | .028<br>(.70) | .012<br>(.30) | .024<br>(.61) | .024<br>(.61) | .008<br>(.20) | .028<br>(.70) | .043<br>(1.09) | .024<br>(.60) | .098<br>(2.50) |

| CASE#     | M              | N             | P              | Q             | R              | S              | WT,<br>GRAM |
|-----------|----------------|---------------|----------------|---------------|----------------|----------------|-------------|
| NL1008C-7 | .118<br>(3.00) | .027<br>(.70) | .046<br>(1.20) | .013<br>(.30) | .079<br>(2.00) | .064<br>(1.63) | .019        |

Dimensions are in inches (mm). Tolerances: 2 PL.  $\pm .01$ ; 3 PL.  $\pm .005$

### Notes:

1. Open style, ceramic base.
2. Termination finish:

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. Pad tolerance is non-cumulative. Minimum spacing between each pad is .004.
4. Line width should be designed to match 50 $\Omega$  characteristic depending on PCB material and thickness.



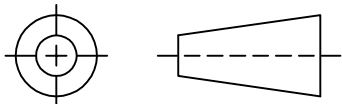
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## THIRD ANGLE PROJECTION



## REVISIONS

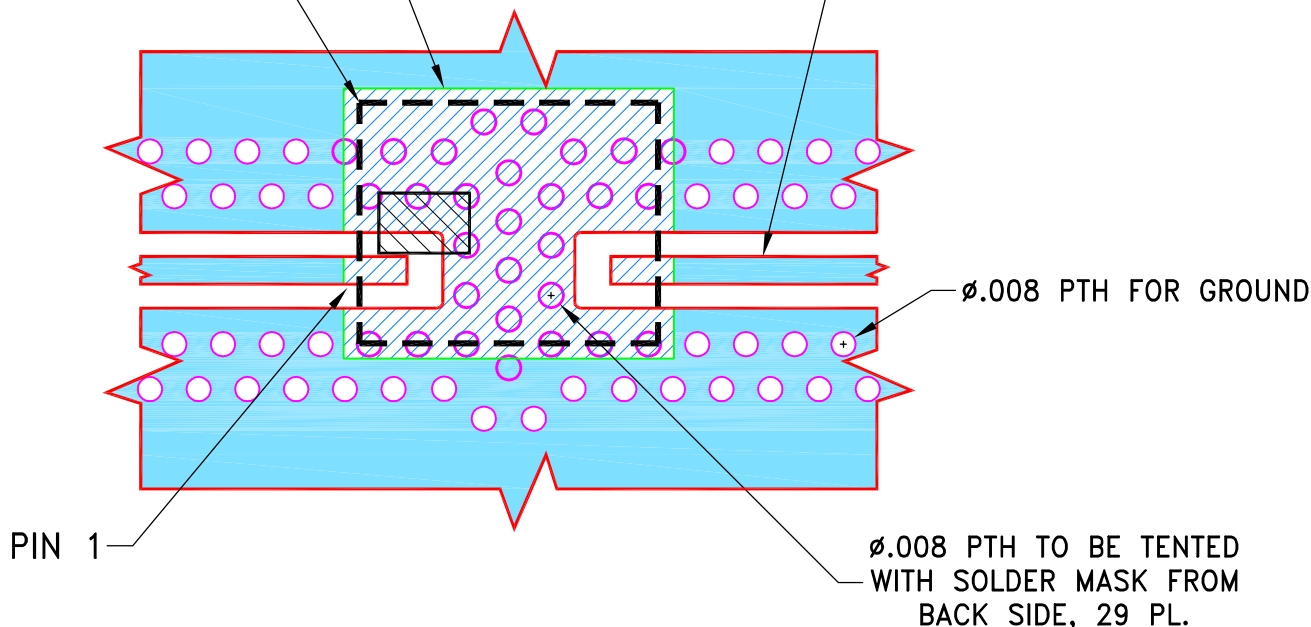
| REV | ECN No.    | DESCRIPTION | DATE     | DR  | AUTH |
|-----|------------|-------------|----------|-----|------|
| OR  | ECO-007756 | NEW RELEASE | 05/12/21 | ITG | IL   |
|     |            |             |          |     |      |
|     |            |             |          |     |      |

SUGGESTED MOUNTING CONFIGURATION  
FOR NL1008C-6 CASE STYLE

SOLDER MASK BORDER  
(SEE NOTE 2)

PACKAGE OUTLINE

COPLANAR WAVEGUIDE:  
.0091±.001 TRACE WIDTH &  
.0079±.001 GAP, 2 PL.

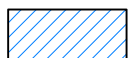


## NOTES:

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3. 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  |
| TOLERANCES ON:             | CHECKED  | GF   |
| 2 PL DECIMALS ±            | APPROVED | IL   |
| 3 PL DECIMALS ± .005       |          |      |
| ANGLES ±                   |          |      |
| FRACTIONS ±                |          |      |

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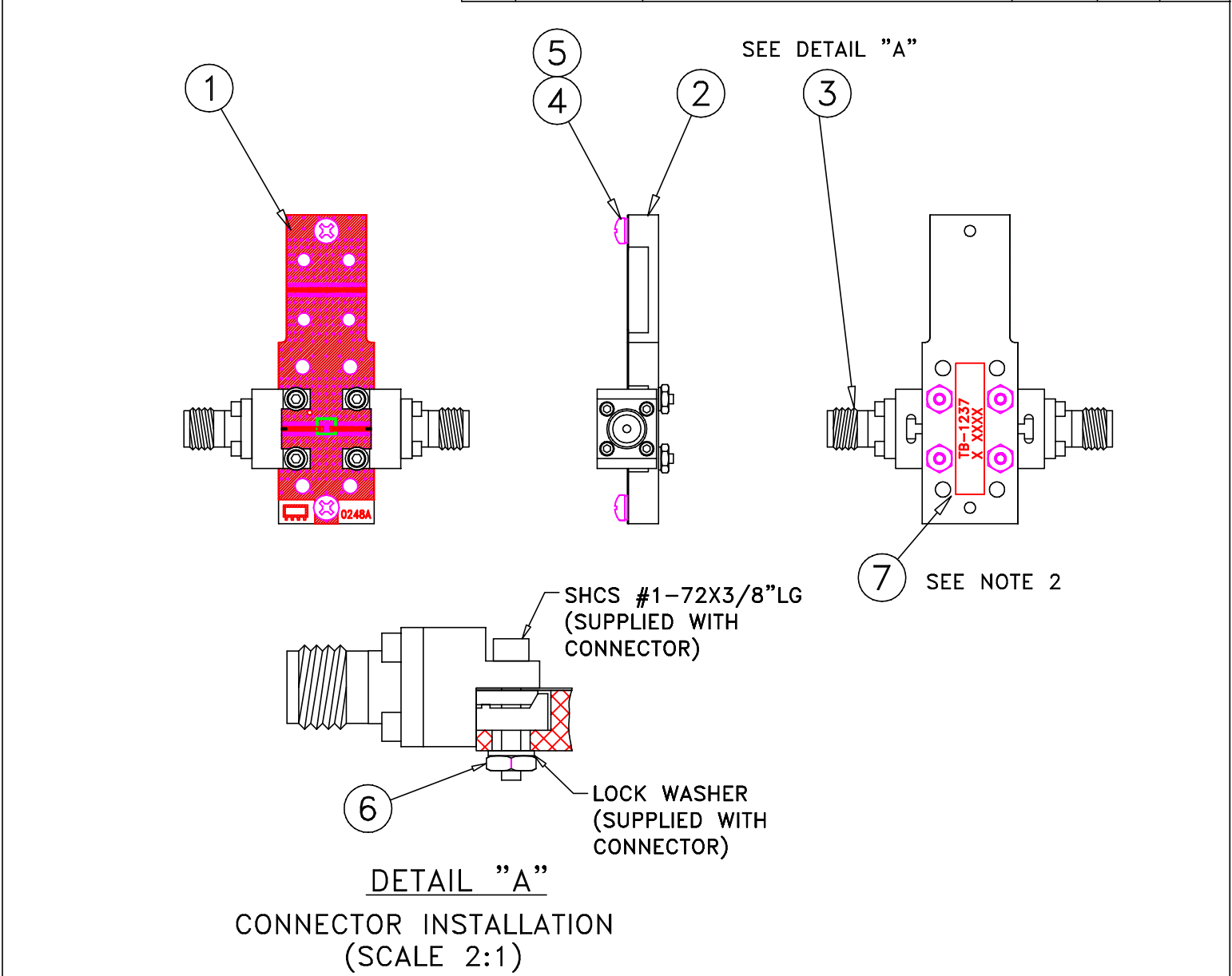
**Mini-Circuits®** 13 Neptune Avenue  
Brooklyn NY 11235

PL, NL1008C-6, TB-BFCQ-XXXX+

| SIZE  | CODE IDENT | DRAWING NO: | REV:          |
|-------|------------|-------------|---------------|
| A     | 15542      | 98-PL-707   | OR            |
| FILE: | 98PL707    | SCALE: 15:1 | SHEET: 1 OF 1 |



| THIRD ANGLE PROJECTION |     | REVISIONS  |             |        |    |      |
|------------------------|-----|------------|-------------|--------|----|------|
|                        | REV | ECN No.    | DESCRIPTION | DATE   | DR | AUTH |
|                        | OR  | NPO-002364 | NEW RELEASE | DEC 21 | SM | CGD  |
|                        |     |            |             |        |    |      |
|                        |     |            |             |        |    |      |

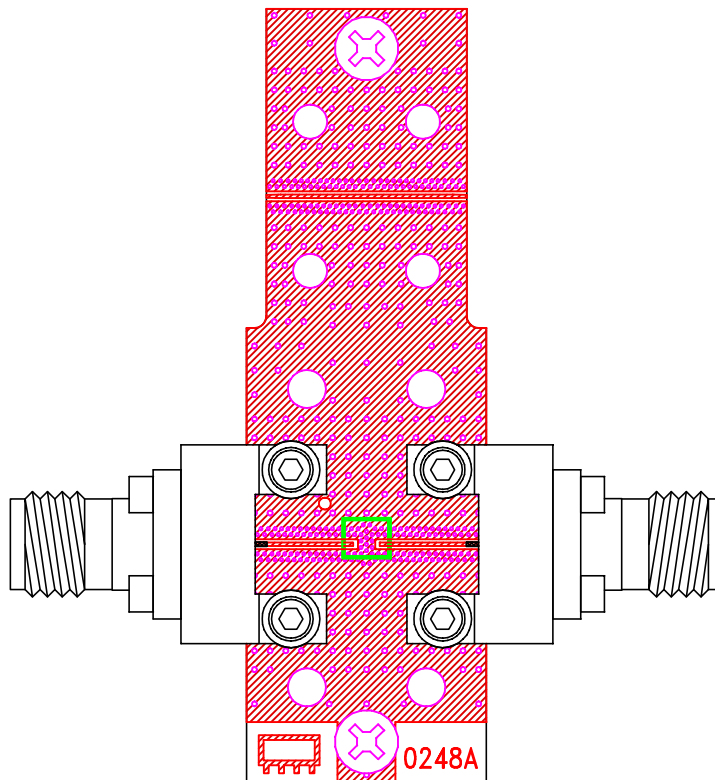


NOTES:

- FOR ITEM DESCRIPTIONS, REFER TO -09 PAGE.  
DESIGNATION NUMBERS ON -20 PAGE CORRESPOND TO THE  
NUMBERS ON -09 PAGE.
- FOR TEXT HEIGHT & STYLE ON THE LABEL, REFER TO  
D3-G209.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |                                                                                     |     |                           |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|-----|---------------------------|--|
| UNLESS OTHERWISE SPECIFIED                                                                                                                                                                                                                                                                                                                                                                                                                                           |  | INITIALS                                                                            |     | DATE                      |  |
| <div>DIMENSIONS ARE IN INCHES</div> <div>TOLERANCES ON:</div> <div>2 PL DECIMALS ±</div> <div>3 PL DECIMALS ±</div> <div>ANGLES ±</div> <div>FRACTIONS ±</div> <div></div>                                                                                                                                                                                                                                                                                           |  | DRAWN                                                                               | SM  | 15 DEC 21                 |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | CHECKED                                                                             | CGD | 15 DEC 21                 |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | APPROVED                                                                            | CGD | 15 DEC 21                 |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |                                                                                     |     |                           |  |
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| <div>ASHEETA1.DWG REV:A DATE:01/12/95</div>                                                                                                                                                                                                                                                                                                                                                                                                                          |  |                                                                                     |     |                           |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | <div>Mini-Circuits®</div> <div>13 Neptune Avenue</div> <div>Brooklyn NY 11235</div> |     |                           |  |
| <div>TEST BOARD FOR BFCQ,</div> <div>NL1008C-7, 50 OHM</div>                                                                                                                                                                                                                                                                                                                                                                                                         |  |                                                                                     |     |                           |  |
| SIZE<br>A                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  | CODE IDENT<br>15542                                                                 |     | DRAWING NO:<br>TB-1237-20 |  |
| FILE:<br>WTB-1237                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  | SCALE:<br>1:1                                                                       |     | REV:<br>OR                |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | SHEET:                                                                              |     | 1 OF 2                    |  |

# Evaluation Board and Circuit



TB-1237

## Notes:

1. 50 Ohm 1.85 Female connectors.
2. PCB Material: Megtron 7(N) or equivalent,  
Dielectric Constant=3.4, Thickness=.005 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            |
| Thermal Cycling       | -55 to 125°C, 100 cycles, Dwell Time 15 minutes.      | MIL-STD-202, Method 107, Condition A-3 |
| Mechanical Shock      | 50g, 11ms half-sine, 18 shocks applied each to 3 axes | MIL-STD-202 Method 213, Condition A    |
| Vibration             | 10-2000Hz sine, 20g, 12 cycles applied each to 3 axes | MIL-STD-202, Method 204, Condition D   |
| Constant Acceleration | 30Kg, Y1 Direction                                    | MIL-STD-883, Method 2001, Condition E  |
| Humidity              | 85°C, 90-95% Relative Humidity, 250hours              |                                        |
| Solderability         | 10X / 30X Magnification                               | J-STD-002C Test S, J-STD-002C Test S1  |
| High Temp Storage     | 125°C, 250 hours                                      |                                        |