



CERAMIC

Bandpass Filter

BFCQ-3852A+

50Ω 37 to 40 GHz

THE BIG DEAL

- Innovative and industry leading
- 5G n260 bandpass filter
- Low Insertion Loss – Mid band 2.5dB typical
- Surface mountable pick and place standard case style
- Small size 2.5mm x 2.0mm
- High quality distributed filter topology
- Wide rejection band



Generic photo used for illustration purposes only

CASE STYLE: NL1008C-6

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

APPLICATIONS

- Test and Measurement

PRODUCT OVERVIEW

The BFCQ-3852A+ LTCC Bandpass Filter covers the 5G n260 band. This corresponds to a passband of 37to 40 GHz, with as low as 2.5dB passband loss, and up to 40dB stopband rejection. This model handles upto 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, up to mmWave frequencies.

KEY FEATURES

| Feature | Advantages |
|--|---|
| 5G n260 band compatible | Designed for 5G Telecommunications, n260 band, 37 – 40 GHz |
| Proprietary mmWave compatible LTCC material system | Low loss and repeatable performance on a lot-to-lot basis up to mmWave frequencies. |
| Cost effective | LTCC is scalable technology that allows for cost reduction at volume. |
| 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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50Ω 37 to 40 GHz

ELECTRICAL SPECIFICATIONS¹ AT 25°C

| Parameter | F# | Frequency (GHz) | Min. | Typ. | Max. | Units |
|------------------|------------------|-------------------|---------|------|------|-------|
| Center Frequency | — | — | — | 38.5 | — | GHz |
| Passband | Insertion Loss | 37 - 38.6 | — | 2.9 | — | dB |
| | | 38.6 - 40 | — | 2.5 | 3.4 | dB |
| | Return Loss (In) | 37 - 40 | — | 10 | — | dB |
| | | Return Loss (Out) | 37 - 40 | — | 10 | — |
| Stop Band, Lower | Insertion Loss | 0.1 - 28 | 45 | 55 | — | dB |
| | | 28 - 33.2 | 30 | 45 | — | dB |
| Stop Band, Upper | Insertion Loss | 44.8 - 47 | 20 | 25 | — | dB |
| | | 47 - 54 | 30 | 36 | — | dB |
| | | 54 - 58 | 20 | 30 | — | dB |

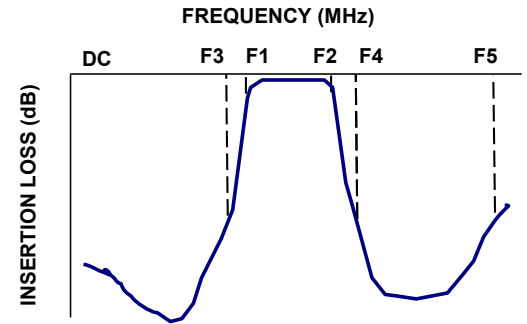
1. Measured on Mini-Circuits Test Board TB-BFCQ-3852AC+ with feedline losses removed by normalization of S12 and S21 traces to measurement of TB thru-line.

MAXIMUM RATINGS

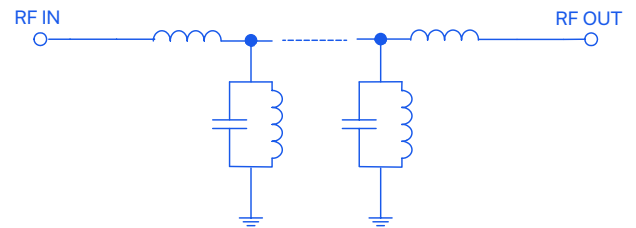
| Parameter | Ratings |
|-----------------------|-----------------|
| Operating Temperature | -55°C to +125°C |
| Storage Temperature | -55°C to +125°C |
| RF Power Input | 1W |

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

TYPICAL FREQUENCY RESPONSE



FUNCTIONAL SCHEMATIC





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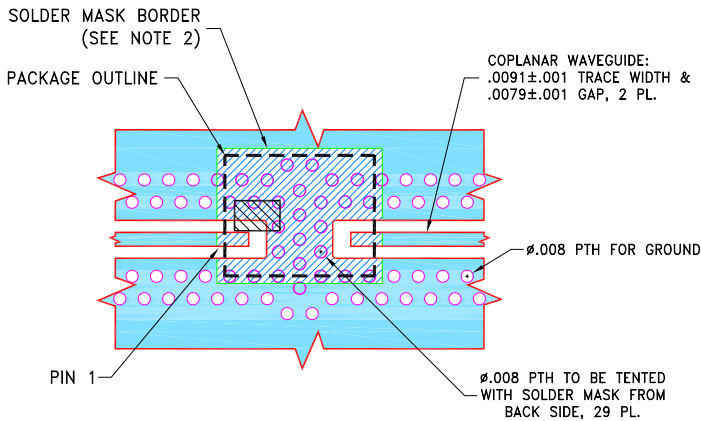
50Ω 37 to 40 GHz

PAD CONNECTIONS

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

PRODUCT MARKING: NS

EVALUATION BOARD MCL P/N: TB-BFCQ-3852AC+ SUGGESTED PCB LAYOUT (PL-707)

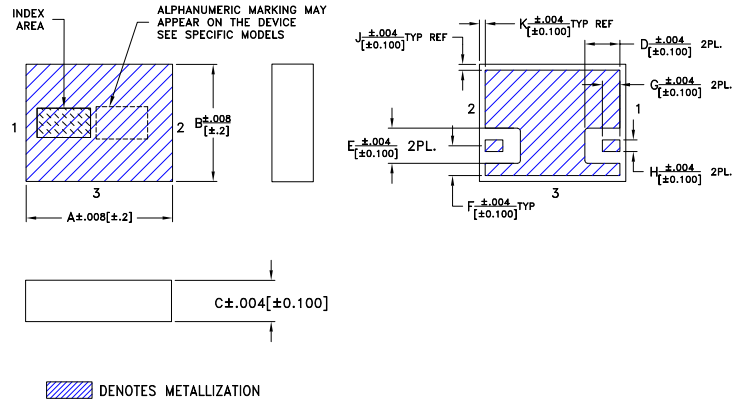


NOTES:

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 | .024 | .024 | .020 | .012 | .008 | .004 | .004 | grams |
| 2.49 | 2.01 | 0.71 | 0.6 | 0.6 | 0.51 | 0.3 | 0.2 | 0.1 | 0.1 | .019 |

TAPE & REEL INFORMATION: F75



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Bandpass Filter

BFCQ-3852A+

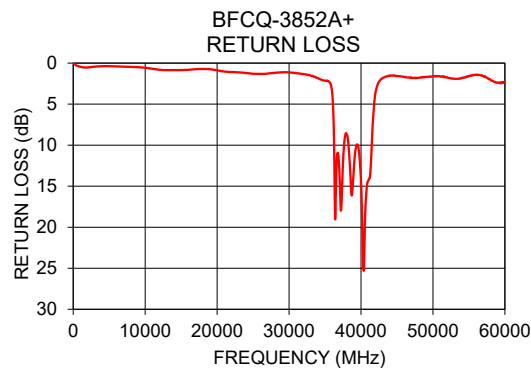
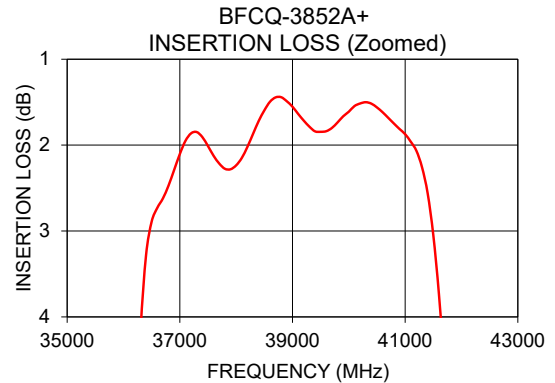
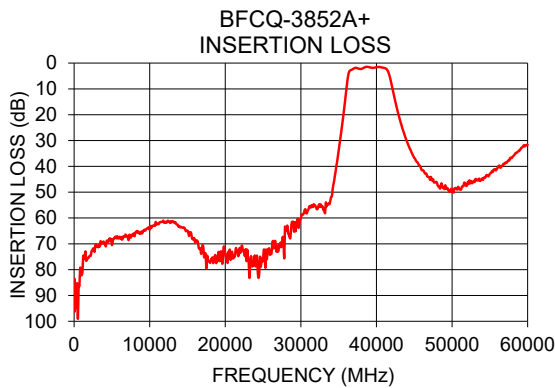
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50Ω

37 to 40 GHz

TYPICAL PERFORMANCE DATA AT 25°C

| Frequency (MHz) | Insertion Loss (dB) | Return Loss (dB) |
|-----------------|---------------------|------------------|
| 10 | 85.26 | 0.05 |
| 5000 | 70.51 | 0.38 |
| 10000 | 64.52 | 0.57 |
| 20000 | 73.53 | 0.88 |
| 25000 | 75.86 | 1.30 |
| 30000 | 60.17 | 1.15 |
| 34000 | 51.82 | 1.82 |
| 37000 | 2.10 | 13.39 |
| 38500 | 1.60 | 13.18 |
| 40000 | 1.61 | 14.39 |
| 45000 | 36.70 | 1.57 |
| 45000 | 36.70 | 1.57 |
| 50000 | 48.91 | 1.59 |
| 58000 | 36.29 | 2.03 |
| 60000 | 31.74 | 2.27 |



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/terms/viewterm.html



Typical Performance Data

| FREQUENCY (MHz) | INSERTION LOSS (dB) | INPUT RETURN LOSS (dB) | OUTPUT RETURN LOSS (dB) |
|--------------------|------------------------|---------------------------|----------------------------|
| 10 | 85.26 | 0.05 | 0.05 |
| 1700 | 75.50 | 0.54 | 0.56 |
| 3400 | 71.00 | 0.41 | 0.44 |
| 5100 | 69.27 | 0.38 | 0.36 |
| 6800 | 66.39 | 0.43 | 0.38 |
| 8500 | 65.21 | 0.47 | 0.46 |
| 10300 | 63.12 | 0.60 | 0.63 |
| 12000 | 61.73 | 0.81 | 0.86 |
| 15400 | 65.47 | 0.83 | 0.84 |
| 17100 | 71.45 | 0.73 | 0.75 |
| 20600 | 72.32 | 0.97 | 0.91 |
| 24000 | 78.75 | 1.21 | 1.26 |
| 27400 | 71.31 | 1.24 | 1.27 |
| 30900 | 57.18 | 1.20 | 1.10 |
| 32600 | 54.67 | 1.43 | 1.35 |
| 34300 | 47.08 | 1.97 | 2.17 |
| 36000 | 10.66 | 3.66 | 3.36 |
| 36200 | 5.86 | 7.46 | 6.11 |
| 36400 | 3.28 | 19.05 | 11.44 |
| 36500 | 2.89 | 15.69 | 11.63 |
| 36600 | 2.73 | 12.32 | 10.77 |
| 36800 | 2.47 | 10.95 | 10.78 |
| 37000 | 2.10 | 13.39 | 13.85 |
| 37100 | 1.95 | 15.76 | 17.54 |
| 37200 | 1.86 | 17.99 | 21.62 |
| 37300 | 1.85 | 16.93 | 20.39 |
| 37400 | 1.91 | 14.32 | 16.23 |
| 37500 | 2.01 | 12.06 | 13.07 |
| 37600 | 2.13 | 10.52 | 11.08 |
| 37700 | 2.21 | 9.44 | 9.96 |
| 37800 | 2.28 | 8.85 | 9.37 |
| 37900 | 2.28 | 8.53 | 8.98 |
| 38000 | 2.24 | 8.66 | 8.98 |
| 38100 | 2.15 | 8.84 | 9.30 |
| 38200 | 2.02 | 9.46 | 10.03 |
| 38300 | 1.87 | 10.46 | 11.31 |
| 38400 | 1.72 | 11.71 | 12.99 |
| 38500 | 1.60 | 13.18 | 15.49 |
| 38600 | 1.50 | 15.04 | 19.69 |
| 38700 | 1.44 | 16.13 | 29.53 |
| 38800 | 1.44 | 15.59 | 26.71 |
| 38900 | 1.49 | 14.32 | 19.76 |
| 39000 | 1.55 | 12.90 | 15.89 |
| 39100 | 1.64 | 11.67 | 13.32 |
| 39200 | 1.72 | 10.80 | 12.04 |
| 39300 | 1.79 | 10.29 | 11.14 |
| 39400 | 1.84 | 9.94 | 10.41 |
| 39500 | 1.85 | 9.92 | 10.05 |
| 39600 | 1.84 | 10.09 | 9.98 |
| 39700 | 1.80 | 10.69 | 10.27 |
| 39800 | 1.74 | 11.54 | 10.80 |
| 39900 | 1.66 | 12.84 | 11.32 |
| 40000 | 1.61 | 14.39 | 11.99 |
| 40500 | 1.56 | 21.36 | 15.30 |
| 41000 | 1.87 | 14.37 | 15.78 |
| 41500 | 3.05 | 9.77 | 14.38 |
| 42000 | 8.28 | 3.67 | 4.34 |
| 42500 | 14.97 | 2.28 | 2.49 |
| 42700 | 17.43 | 2.06 | 2.19 |
| 43000 | 20.88 | 1.83 | 1.92 |
| 43100 | 21.94 | 1.78 | 1.85 |
| 43200 | 22.98 | 1.75 | 1.80 |
| 43300 | 23.93 | 1.70 | 1.73 |
| 43400 | 25.01 | 1.66 | 1.70 |
| 43500 | 25.90 | 1.63 | 1.67 |
| 43600 | 26.75 | 1.63 | 1.62 |
| 43700 | 27.65 | 1.58 | 1.59 |
| 43800 | 28.56 | 1.54 | 1.55 |
| 43900 | 29.40 | 1.54 | 1.54 |
| 44000 | 30.14 | 1.55 | 1.50 |
| 46300 | 42.03 | 1.72 | 1.60 |
| 49800 | 49.12 | 1.65 | 1.96 |
| 51500 | 47.66 | 1.61 | 1.95 |
| 54900 | 43.43 | 1.61 | 1.84 |
| 56600 | 39.90 | 1.47 | 1.63 |
| 60000 | 31.74 | 2.27 | 2.43 |



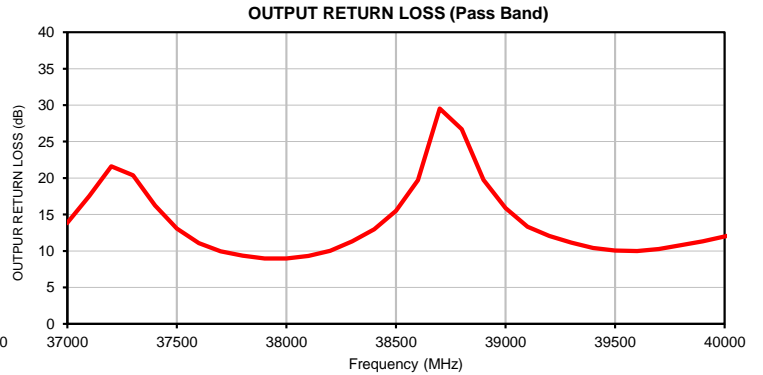
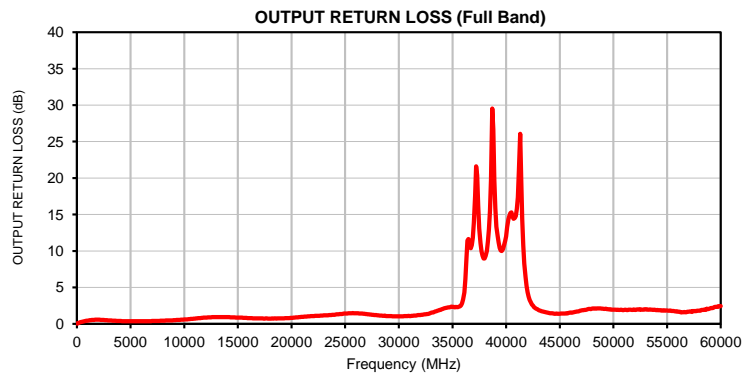
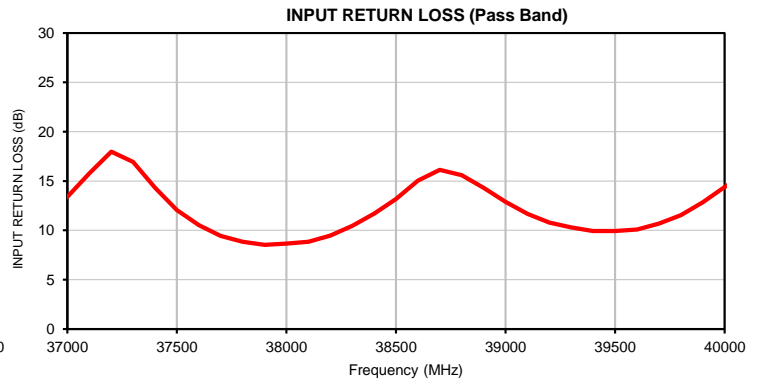
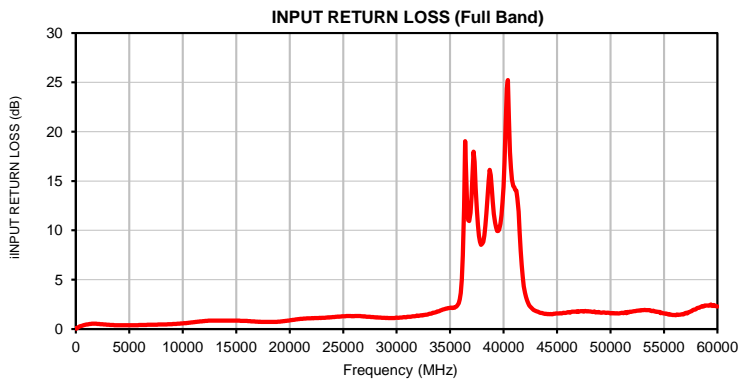
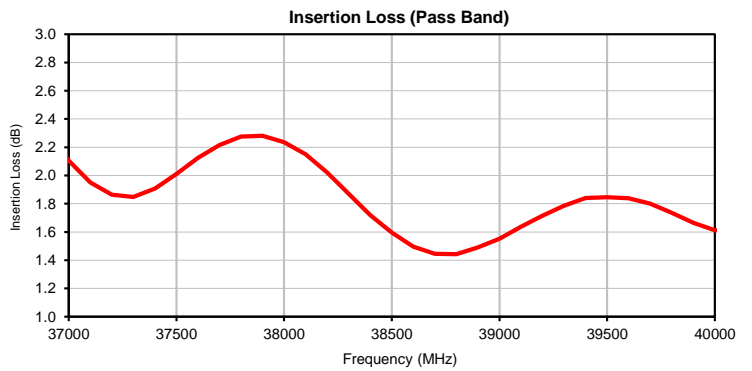
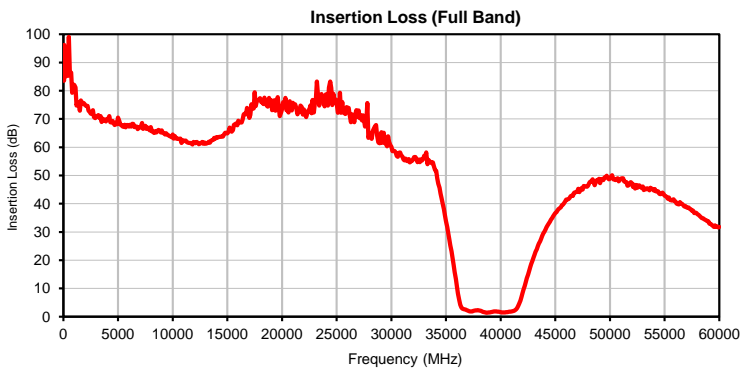
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IF/RF MICROWAVE COMPONENTS

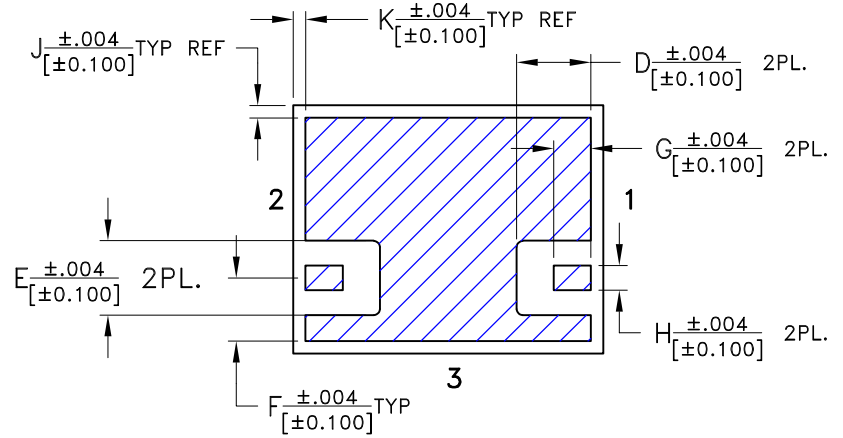
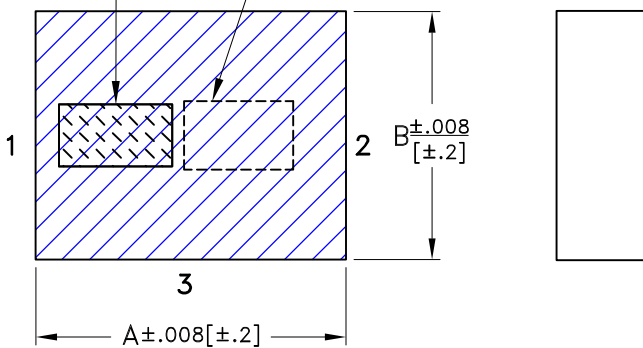
Typical Performance Curves



Outline Dimensions

NL1008C-6

INDEX AREA
ALPHANUMERIC MARKING MAY APPEAR ON THE DEVICE SEE SPECIFIC MODELS



DENOTES METALLIZATION

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

| CASE# | A | B | C | D | E | F | G | H | J | K | L | M | N |
|-----------|----------------|----------------|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| NL1008C-6 | .098 (2.50) | .079 (2.00) | .028 (.705) | .024 (.60) | .024 (.60) | .020 (.51) | .012 (.30) | .008 (.20) | .004 (.10) | .004 (.10) | .079 (2.0) | .098 (2.5) | .118 (3.0) |

| CASE # | P | Q | R | S | T | U | WT, GRAM |
|-----------|----------------|--------------|----------------|---------------|--------------|---------------|----------|
| NL1008C-6 | .064 (1.63) | .013 (.3) | .043 (1.09) | .024 (.60) | .027 (.7) | .046 (1.2) | .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 50Ω characteristic depending on PCB material and thickness.



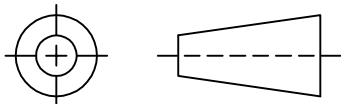
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RF/IF MICROWAVE COMPONENTS

THIRD ANGLE PROJECTION



REVISIONS

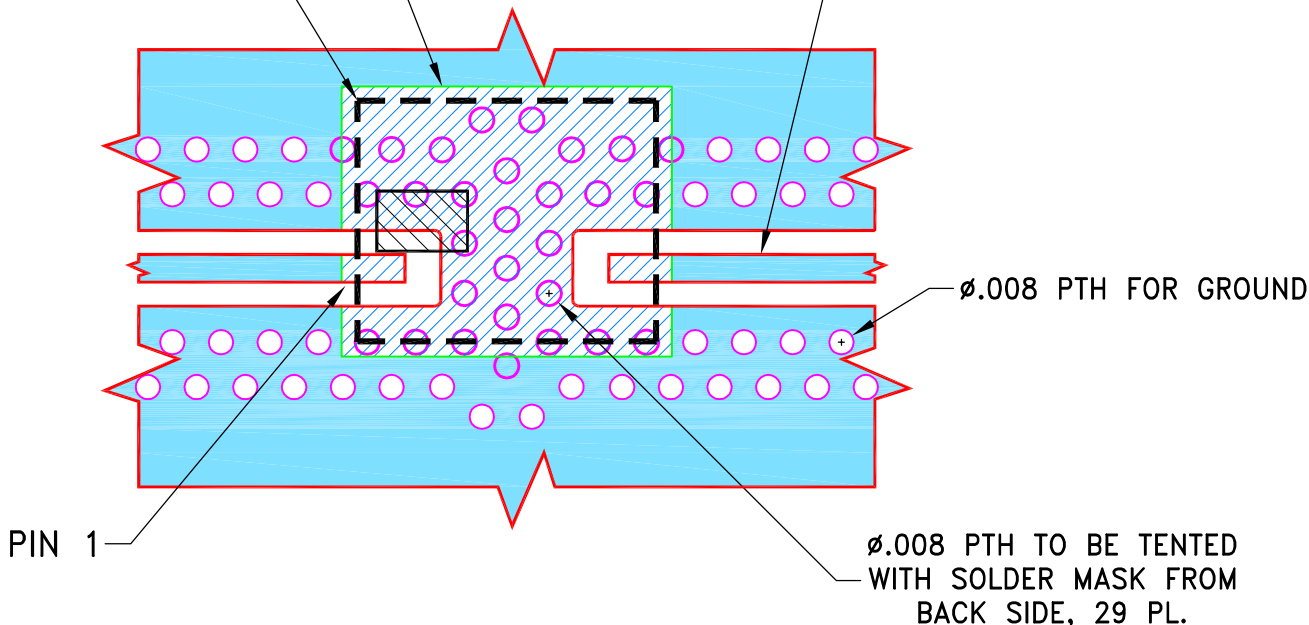
| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|-----|------------|-------------|----------|-----|------|
| OR | ECO-007756 | NEW RELEASE | 05/12/21 | ITG | IL |
| | | | | | |
| | | | | | |

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.



Ø.008 PTH FOR GROUND

Ø.008 PTH TO BE TENTED
WITH SOLDER MASK FROM
BACK SIDE, 29 PL.

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.
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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).



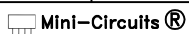
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

| UNLESS OTHERWISE SPECIFIED | INITIALS | | DATE |
|----------------------------|----------|-----|----------|
| DIMENSIONS ARE IN INCHES | DRAWN | ITG | 05/12/21 |
| TOLERANCES ON: | CHECKED | GF | 05/12/21 |
| 2 PL DECIMALS ± | APPROVED | IL | 05/12/21 |
| 3 PL DECIMALS ± .005 | | | |
| ANGLES ± | | | |
| FRACTIONS ± | | | |



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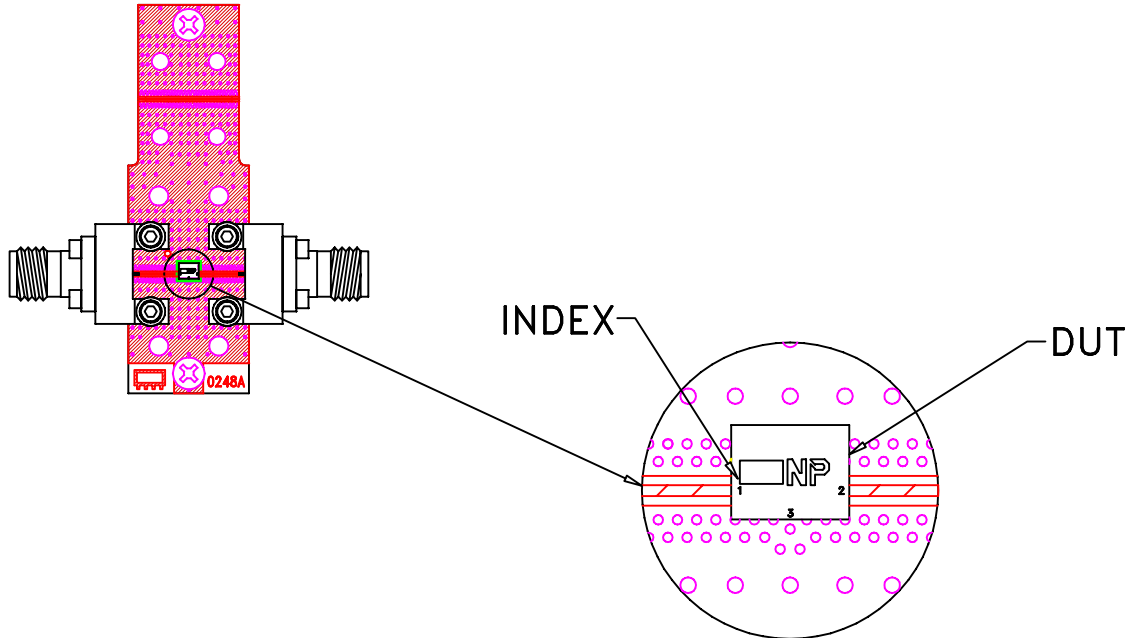
PL, NL1008C-6, TB-BFCQ-XXXX+



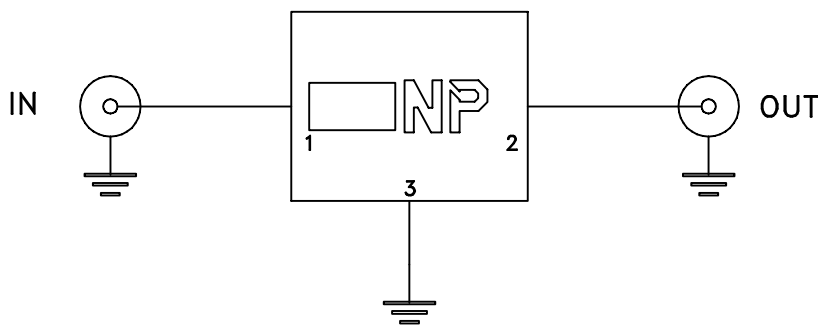
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| SIZE | CODE IDENT | DRAWING NO: | REV: |
|-------|------------|-------------|---------------|
| A | 15542 | 98-PL-707 | OR |
| FILE: | 98PL707 | SCALE: 15:1 | SHEET: 1 OF 1 |

Evaluation Board and Circuit



TB-BFCQ-3852AC+



Schematic Diagram

Notes:

1. 50 Ohm 1.85 Female connectors.
2. PCB Material: Megtron 7(N) or equivalent,
Dielectric Constant=3.6, 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 Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 125° C 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 | |