LTCC SURFACE MOUNT

# High Pass Filter

# HFHKI-6600+

50Ω 7.2 to 17 GHz

## THE BIG DEAL

- Integrated CPWG Interposer for Easy SMT Integration
- Insertion Loss, Typ. 1.6 dB
- Strong Stopband Rejection
- Power Handling: 6 W
- Protected by US Patents 11,638,370 and 11,744,057

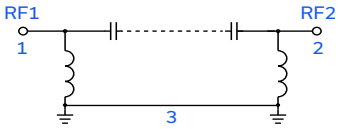


*Generic photo used for illustration purposes only*

## APPLICATIONS

- Test and Measurement Equipment
- Microwave Transmitters / Receivers
- Harmonic Rejection
- Satellite Communications

## FUNCTIONAL DIAGRAM




## PRODUCT OVERVIEW

Mini-Circuits' HFHKI-6600+ is a passive RF high pass filter featuring a CPWG interposer that simplifies board-level implementation and supports compact RF designs. The device provides low insertion loss, good return loss and excellent suppression of adjacent bands and unwanted signals across a broad frequency range. Its shielded LTCC construction helps prevent de-tuning and EMI while maintaining stable performance over temperature. The compact 2.95 × 2.46 mm package is optimized for high-density RF and microwave applications.

## ELECTRICAL SPECIFICATIONS[1,2,3] AT +25 °C $Z_0$ = 50 Ω

| Parameter | | F# | Frequency (GHz) | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|---|
| Passband | Insertion Loss | F4–F5 | 7.2–8.7 | — | 2.5 | — | dB |
| | | F5–F6 | 8.7–15.5 | — | 1.6 | 2.3 | |
| | | F6–F7 | 15.5–17 | — | 3.1 | — | |
| | Freq. Cut-Off[4] | Fc | 6.6 | — | 3 | — | dB |
| | Return Loss | F4-F5 | 7.2–8.7 | - | 8.5 | — | dB |
| | | F5-F6 | 8.7–15.5 | 8.5 | 11 | — | dB |
| | | F6-F7 | 15.5–17 | — | 7 | — | dB |
| Stopband | Rejection | DC–F1 | DC–1.75 | 50 | 60 | — | dB |
| | | F1–F2 | 1.75–3.5 | 37 | 47 | — | |
| | | F2–F3 | 3.5–4.9 | 20 | 27 | — | |

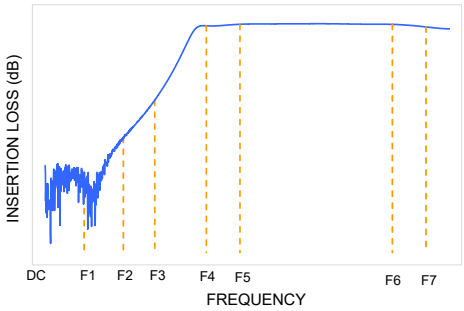
1. Tested in Evaluation Board P/N TB-HFHKI-6600C+ with the connector and feedline effects de-embedded using the 2X Thru IEEE P370 method.
2. This filter is bi-directional RF1 and RF2 ports may be interchanged, see S-Parameters for actual performance.
3. This component should not be used as a DC-block. In applications where DC voltage and/or current is present at either the input or output ports, external DC blocking capacitors are required.
4. Typical variation ± 5 %

## ABSOLUTE MAXIMUM RATINGS[5]

| Parameter | Ratings |
|---|---|
| Operating Temperature | -55 °C to +125 °C |
| Storage Temperature | -55 °C to +125 °C |
| Input Power[6] | 6 W @ +25 °C |

5. Permanent damage may occur if any of these limits are exceeded.
6. Power rating applies only to signals within the passband. Power rating above +25 °C operating temperature decreases linearly to 1 W at +125 °C.

## TYPICAL FREQUENCY RESPONSE




REV. OR
ECO-030940
HFHKI-6600+
MCL NY
260828

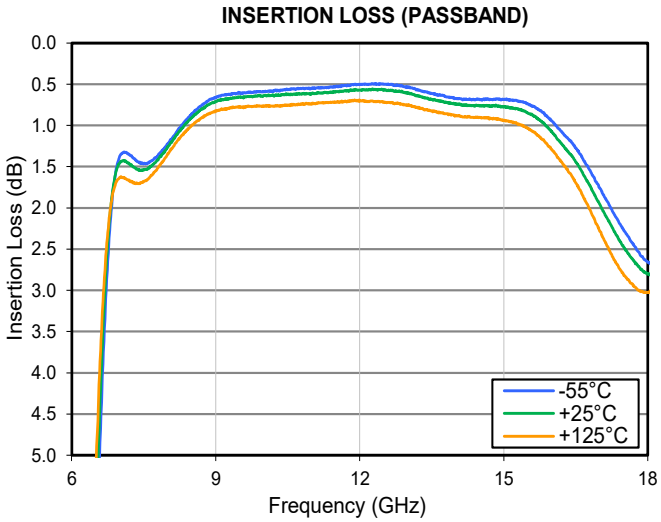
# High Pass Filter

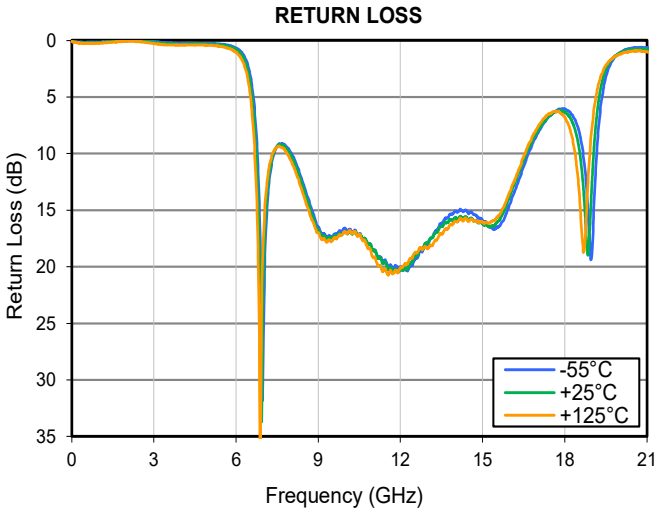
# HFHKI-6600+

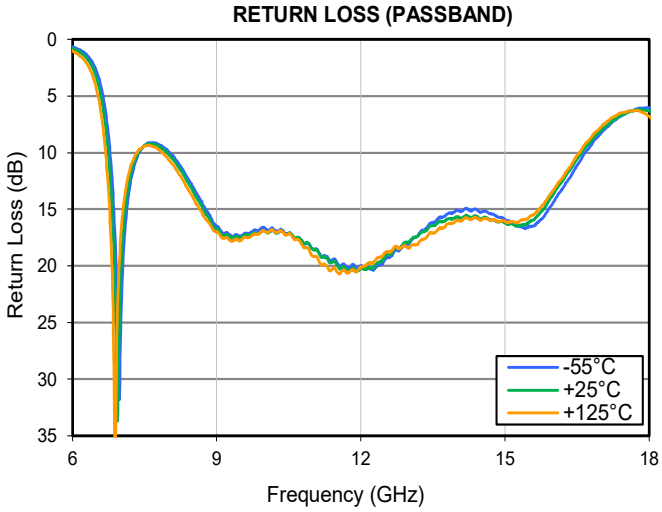
50Ω 7.2 to 17 GHz

## TYPICAL PERFORMANCE GRAPHS



LTCC SURFACE MOUNT

# High Pass Filter

# HFHKI-6600+

50Ω 7.2 to 17 GHz

## FUNCTIONAL DIAGRAM

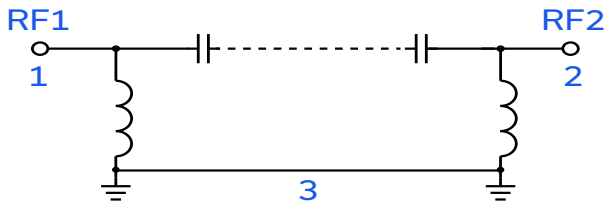
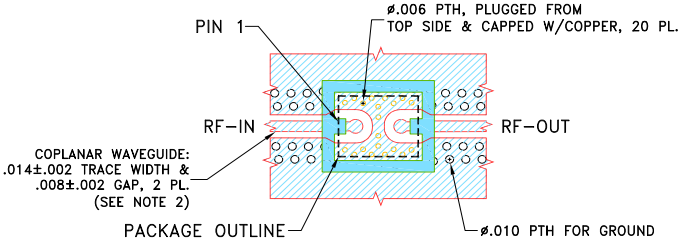



Figure 1. HFHKI-6600+ Functional Diagram

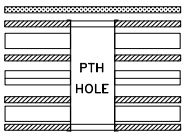
## PAD DESCRIPTION

| Function | Pad Number | Description |
|---|---|---|
| RF1[2] | 1 | Connects to RF Input Port |
| RF2[2] | 2 | Connects to RF Output Port |
| GROUND | 3 | Connects to Ground on PCB, (See drawing PL-837) |

## SUGGESTED PCB LAYOUT (PL-837)




STACK–UP DIAGRAM




–SOLDER MASK (TOP–SLD)
–COPPER LAYER 1(L1), .5 OZ.
–CORE 1, .0079 MEGTRON–7 R5785(N/GN)
–COPPER LAYER 2 (L2), .5 OZ.
–PREPREG, .0035 (89 um) MEGTRON–7 R5680(N/GN), CLOTH STYLE:1078
–PREPREG, .0035 (89 um) MEGTRON–7 R5680(N/GN), CLOTH STYLE:1078
–COPPER LAYER 3 (L3), .5 OZ.
–CORE 2, .0079 MEGTRON–7 R5785(N/GN)
–COPPER LAYER 4 (L4), .5 OZ.

1. TOTAL FINISHED THICKNESS 0.026±.004.
2. PTH PRESENT FROM COPPER LAYER 1 TO COPPER LAYER 4.
3. INDICATED ON TOP VIEW PTH's ARE PLUGGED WITH EPOXY AND CAPPED WITH COPPER FROM TOP SIDE.
4. L2, L3, AND L4 ARE CONTINUOUS GROUND PLANES.

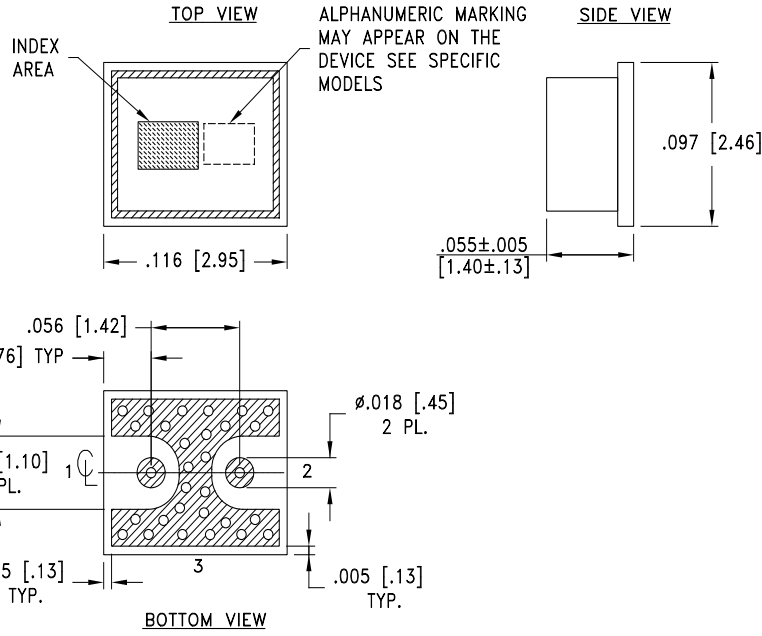
NOTES:
1. PCB IS MULTILAYER PCB, SEE STACK–UP DIAGRAM.
2. TRACE WIDTH & GAP ARE SHOWN FOR MEGTRON–7 R5785(N/GN) WITH DIELECTRIC THICKNESS .0079", COPPER: .5 OZ. EACH LAYER. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
3. LAYERS L2, L3 & L4 OF PCB ARE CONTINUOUS GROUND PLANES.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

Figure 2. HFHKI-6600+ Suggested PCB Layout

## CASE STYLE DRAWING




METALLIZATION

Weight: .021 grams
Dimensions are in inches [mm]. Tolerances: 2 Pl.±.01; 3 Pl. ±.005 Inches

## PRODUCT MARKING*: W4

*Marking may contain other features or characters for internal lot control.

# High Pass Filter

# HFHKI-6600+

50Ω 7.2 to 17 GHz

**ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD.** CLICK HERE

| | |
|---|---|
| **Performance Data & Graphs** | Data<br>Graphs<br>S-Parameter (S2P Files) Data Set (.zip file) De-embedded to device pads |
| **Case Style** | NM3723-1 Lead Finish: Gold Plate over Nickel Plate |
| **RoHS Status** | Compliant |
| **Tape and Reel** | F66-3 |
| **Suggested Layout for PCB Design** | PL-837 |
| **Evaluation Board** | TB-HFHKI-6600C+<br>Gerber File |
| **Environmental Rating** | ENV06T10 |

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-Circuits' applicable established test performance criteria and measurement instructions.

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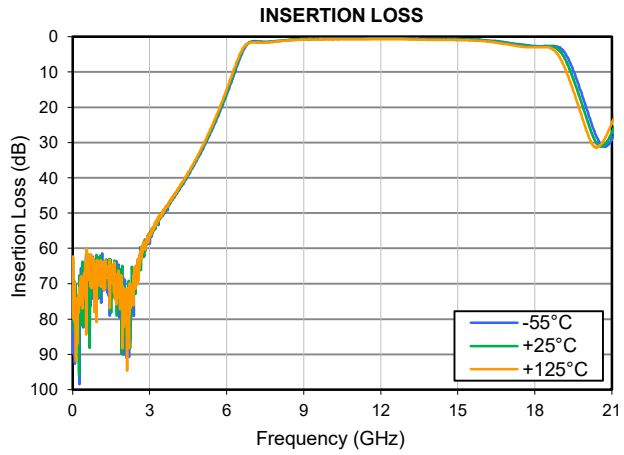
# LTCC High pass Filter HFHKI-6600+

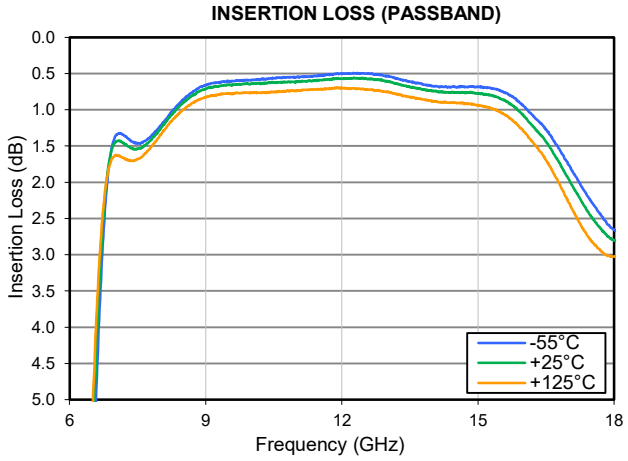
*Typical Performance Data*

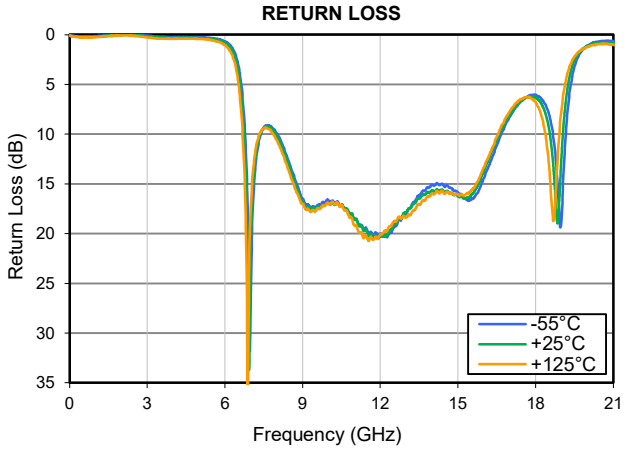
| FREQUENCY (GHz) | INSERTION LOSS (dB) | | | INPUT RETURN LOSS (dB) | | |
|---|---|---|---|---|---|---|
| | @-55°C | @+25°C | @+125°C | @-55°C | @+25°C | @+125°C |
| 0.01 | 66.33 | 62.23 | 71.45 | 0.05 | 0.04 | 0.06 |
| 0.05 | 84.40 | 79.74 | 77.89 | 0.09 | 0.10 | 0.14 |
| 0.50 | 69.84 | 70.28 | 69.90 | 0.18 | 0.22 | 0.26 |
| 1.00 | 69.25 | 74.25 | 65.62 | 0.16 | 0.21 | 0.26 |
| 1.50 | 69.11 | 78.25 | 68.97 | 0.07 | 0.10 | 0.15 |
| 2.00 | 70.83 | 73.87 | 82.25 | -0.02 | 0.04 | 0.09 |
| 2.50 | 65.76 | 66.26 | 66.77 | 0.00 | 0.06 | 0.13 |
| 3.00 | 57.06 | 55.58 | 55.78 | 0.10 | 0.17 | 0.27 |
| 3.50 | 50.79 | 49.95 | 49.98 | 0.20 | 0.28 | 0.38 |
| 4.00 | 44.81 | 44.80 | 44.31 | 0.25 | 0.33 | 0.43 |
| 4.50 | 39.24 | 38.95 | 38.45 | 0.27 | 0.34 | 0.43 |
| 5.00 | 32.74 | 32.43 | 31.86 | 0.26 | 0.33 | 0.44 |
| 5.50 | 25.27 | 24.73 | 24.05 | 0.33 | 0.41 | 0.55 |
| 6.00 | 16.44 | 15.79 | 14.95 | 0.67 | 0.82 | 1.05 |
| 6.50 | 6.46 | 5.86 | 5.22 | 2.84 | 3.46 | 4.46 |
| 7.00 | 1.37 | 1.45 | 1.63 | 25.99 | 21.23 | 17.37 |
| 7.40 | 1.45 | 1.53 | 1.70 | 9.88 | 9.77 | 9.68 |
| 7.80 | 1.36 | 1.42 | 1.51 | 9.29 | 9.46 | 9.75 |
| 8.20 | 1.06 | 1.11 | 1.19 | 10.92 | 11.27 | 11.79 |
| 8.60 | 0.80 | 0.85 | 0.95 | 13.75 | 14.13 | 14.69 |
| 9.00 | 0.66 | 0.71 | 0.83 | 16.48 | 16.74 | 17.00 |
| 9.40 | 0.61 | 0.66 | 0.78 | 17.26 | 17.38 | 17.61 |
| 9.80 | 0.59 | 0.65 | 0.76 | 16.82 | 17.09 | 17.21 |
| 10.20 | 0.58 | 0.63 | 0.76 | 16.84 | 17.00 | 16.97 |
| 10.60 | 0.56 | 0.62 | 0.75 | 17.48 | 17.46 | 17.58 |
| 11.00 | 0.55 | 0.61 | 0.74 | 18.53 | 18.56 | 19.16 |
| 11.40 | 0.53 | 0.60 | 0.72 | 19.44 | 19.65 | 20.24 |
| 11.80 | 0.51 | 0.57 | 0.70 | 19.98 | 20.27 | 20.39 |
| 12.20 | 0.50 | 0.56 | 0.71 | 20.31 | 20.22 | 19.79 |
| 12.60 | 0.51 | 0.57 | 0.72 | 19.24 | 19.00 | 18.75 |
| 13.00 | 0.54 | 0.60 | 0.75 | 18.04 | 17.88 | 18.38 |
| 13.40 | 0.60 | 0.67 | 0.81 | 16.46 | 16.67 | 17.28 |
| 13.80 | 0.66 | 0.72 | 0.86 | 15.42 | 15.88 | 16.32 |
| 14.20 | 0.69 | 0.75 | 0.89 | 14.92 | 15.53 | 15.74 |
| 14.60 | 0.69 | 0.76 | 0.91 | 15.18 | 15.73 | 15.82 |
| 15.00 | 0.69 | 0.78 | 0.94 | 15.90 | 16.20 | 16.08 |
| 15.40 | 0.71 | 0.82 | 1.00 | 16.66 | 16.40 | 15.94 |
| 15.80 | 0.84 | 0.96 | 1.17 | 15.70 | 15.01 | 14.58 |
| 16.20 | 1.07 | 1.22 | 1.44 | 13.18 | 12.50 | 12.21 |
| 16.60 | 1.35 | 1.53 | 1.80 | 10.48 | 10.00 | 9.68 |
| 17.00 | 1.76 | 1.96 | 2.28 | 8.26 | 8.05 | 7.72 |

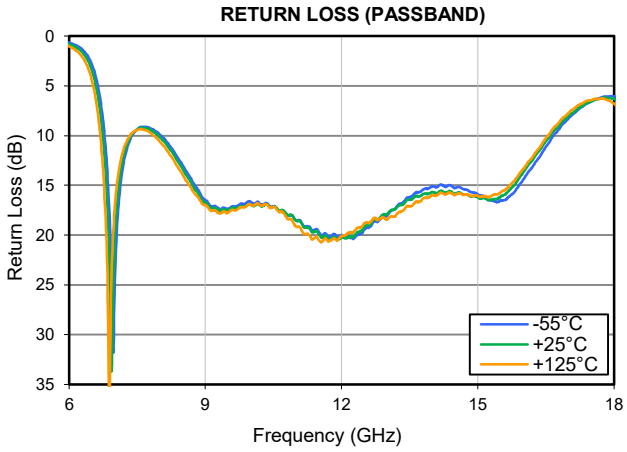
# LTCC High pass Filter HFHKI-6600+

*Typical Performance Data*



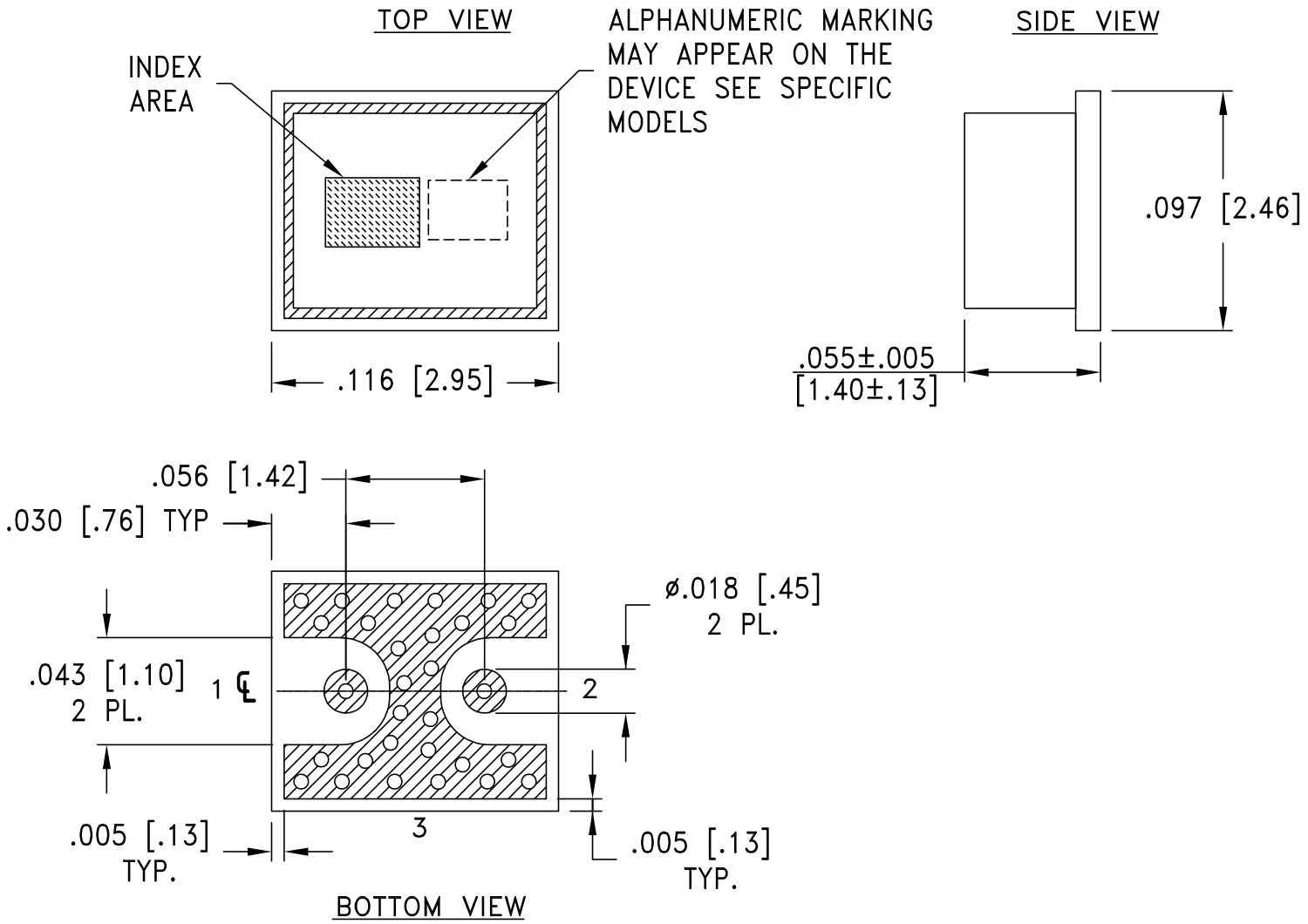



# Case Style NM

## Outline Dimensions

## NM3723-1




Weight: .021 grams

Dimensions are in inches [mm]. Tolerances: 2 Pl.±.01; 3 Pl. ±.005 inches

**Notes**:

1. Case material: LTCC on printed circut board base.
2. Termination Finish: **as shown below or indicated on Data Sheet.**
   For RoHS Case Styles: Gold Plate over Nickel plate. All models, (+) suffix.


Mini-Circuits®

*INTERNET* http://www.minicircuits.com

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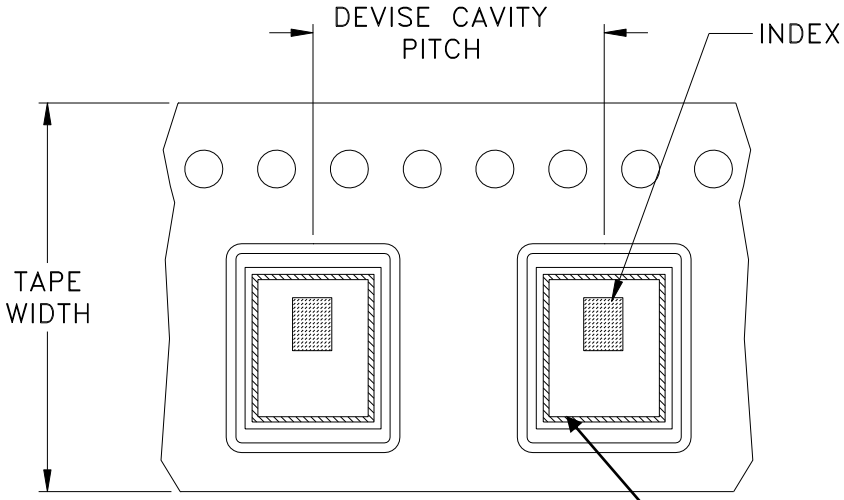
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# Tape & Reel Packaging TR-F66-3




| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel see note | |
|---|---|---|---|---|
| 8 | 4 | 7 | Small quantity standard | 20 |
| | | | | 50 |
| | | | | 100 |
| | | | | 200 |
| | | | | 500 |
| | | 7 | Standard | 1000 |

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

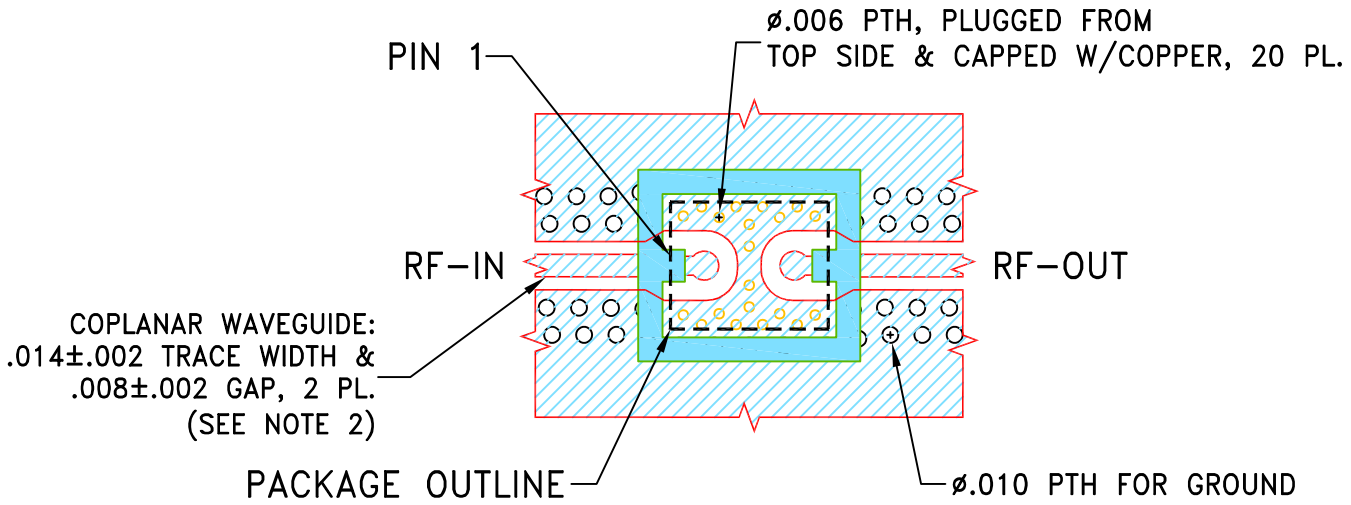
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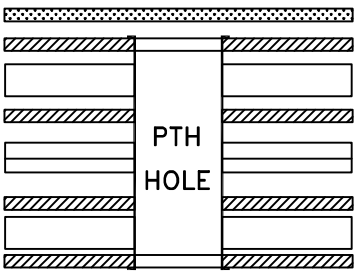
THIRD ANGLE PROJECTION

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
| OR | ECO-026948 | NEW RELEASE | 09/15/25 | ITG | IL |
| | | | | | |
| | | | | | |
| | | | | | |

## SUGGESTED MOUNTING CONFIGURATION FOR NM3723-1 CASE STYLE




### STACK-UP DIAGRAM




-SOLDER MASK (TOP-SLD)
-COPPER LAYER 1(L1), .5 OZ.
-CORE 1, .0079 MEGTRON-7 R5785(N/GN)
-COPPER LAYER 2 (L2), .5 OZ.
-PREPREG, .0035 (89 um) MEGTRON-7 R5680(N/GN), CLOTH STYLE:1078
-PREPREG, .0035 (89 um) MEGTRON-7 R5680(N/GN), CLOTH STYLE:1078
-COPPER LAYER 3 (L3), .5 OZ.
-CORE 2, .0079 MEGTRON-7 R5785(N/GN)
-COPPER LAYER 4 (L4), .5 OZ.

1. TOTAL FINISHED THICKNESS 0.026±.004.
2. PTH PRESENT FROM COPPER LAYER 1 TO COPPER LAYER 4.
3. INDICATED ON TOP VIEW PTH's ARE PLUGGED WITH EPOXY AND CAPPED WITH COPPER FROM TOP SIDE.
4. L2, L3, AND L4 ARE CONTINUOUS GROUND PLANES.

## NOTES:

1. PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
2. TRACE WIDTH & GAP ARE SHOWN FOR MEGTRON-7 R5785(N/GN) WITH DIELECTRIC THICKNESS .0079", COPPER: 1 OZ. EACH LAYER. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
3. LAYERS L2, L3 & L4 OF PCB ARE CONTINUOUS GROUND PLANES.

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 | 09/15/25 |
| TOLERANCES ON: | CHECKED | GF | 09/15/25 |
| 2 PL DECIMALS ± | APPROVED | IL | 09/15/25 |
| 3 PL DECIMALS ± .005 | | | |
| ANGLES ± | | | |
| FRACTIONS ± | | | |

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

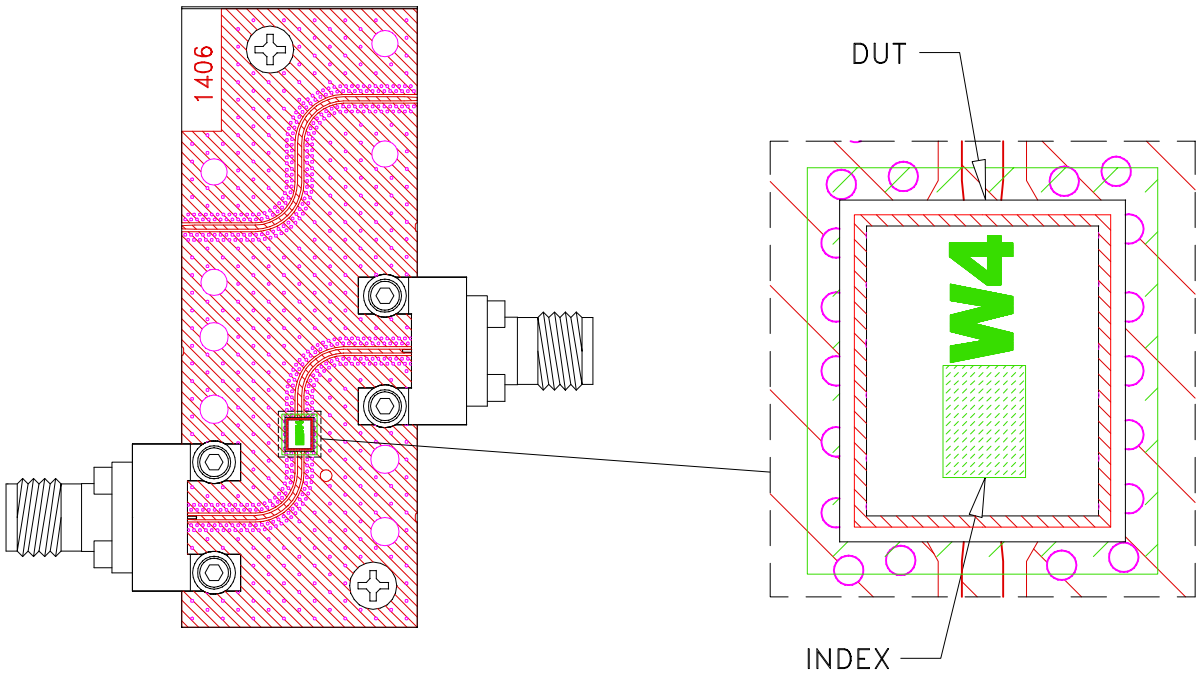
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

# PL, NM3723-1, TB-HFHKI-2200C+

| SIZE | CODE IDENT | DRAWING NO: | REV: |
|---|---|---|---|
| A | 15542 | 98-PL-837 | OR |

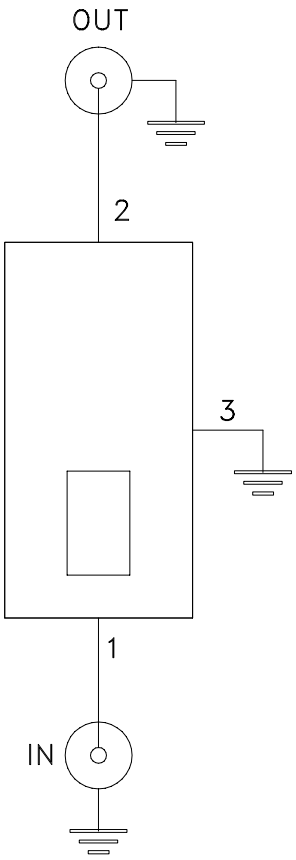
| FILE: | SCALE: | SHEET: |
|---|---|---|
| 98PL837 | 8:1 | 1 OF 1 |

# Evaluation Board and Circuit




(SCALE 15:1)

TB-HFHKI-6600C+




Schematic Diagram

1. 50 Ohm 2.4 mm Female end Launch connectors.
2. PCB Material: MEGTRON-7 R5785 (N or GN) or equivalent, Dielectric Constant= 3.37 Thickness=.0079 inch.

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Mini-Circuits

# Environmental Specifications ENV06T10

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 245° - 250°C peak | J-STD-020C, Table 4-1, 4-2 and 5-2, Figure 5-1 |
| Solderability | 10X Magnification | J-STD-002, Test B,B1, 95% Coverage |
| Thermal Shock | -55° to +125°C, 15 min dwell,250 cycles | MIL-STD-202, Method 107 |
| Bend Test | 1mm, deflection for 5 seconds<br>Span of bending: 2.75" | -- |
| High Temp Storage | 125°C to 1000 Hrs | --- |


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