

High Pass Filter

RHP-250+

50Ω 400 to 3000 MHz

Maximum Ratings

| | |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature | -55°C to 100°C |
| RF Power Input | 0.5W at 25°C |

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

Pin Connections

| | |
|--------|------------------|
| INPUT | 2 |
| OUTPUT | 6 |
| GROUND | 1, 3, 4, 5, 7, 8 |

Features

- low insertion loss, 0.4dB typ. @ passband
- high rejection
- shielded case
- aqueous washable

Applications

- transmitters / receivers
- sub-harmonic rejection
- military communications



Generic photo used for illustration purposes only
CASE STYLE: GP731

+RoHS Compliant

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

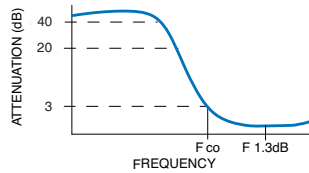
Available Tape and Reel at no extra cost

| Reel Size | Devices/Reel |
|-----------|----------------------|
| 7" | 10, 20, 50, 100, 200 |
| 13" | 500, 1000 |

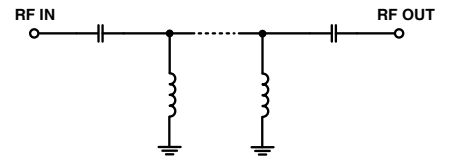
High Pass Filter Electrical Specifications (T_{AMB} = 25°C)

| STOPBAND (MHz) | | f _{co} , MHz Nom. | PASSBAND (MHz) | VSWR (:1) | |
|----------------|---------------|----------------------------|----------------|---------------|---------------|
| (Loss > 40dB) | (Loss > 20dB) | (Loss 3dB) | (Loss < 1dB) | Stopband Typ. | Passband Typ. |
| DC - 135 | DC - 180 | 250 | 400 - 3000 | 18 | 1.2 |

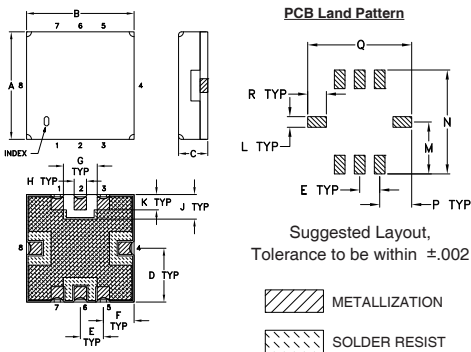
Typical Frequency Response



Functional Schematic



Outline Drawing

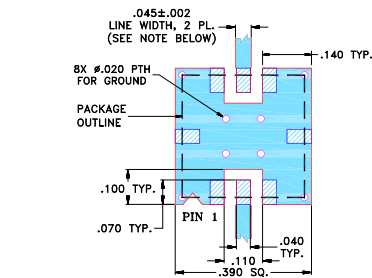


Outline Dimensions (inch/mm)

| | | | | | | | | |
|------|------|------|------|------|------|------|-------|------|
| A | B | C | D | E | F | G | H | J |
| .350 | .350 | .100 | .175 | .075 | .100 | .110 | .040 | .080 |
| 8.89 | 8.89 | 2.54 | 4.45 | 1.91 | 2.54 | 2.79 | 1.02 | 2.03 |
| K | L | M | N | P | Q | R | wt. | |
| .050 | .040 | .195 | .390 | .120 | .390 | .070 | grams | |
| 1.27 | 1.02 | 4.95 | 9.91 | 3.05 | 9.91 | 1.78 | 0.25 | |

Note: Please refer to case style drawing for details

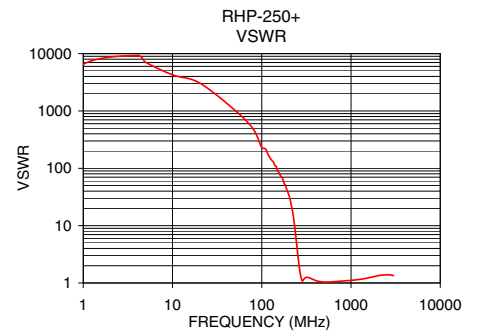
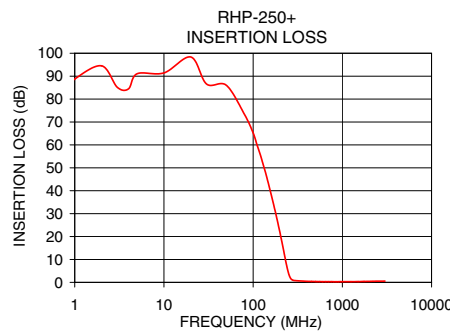
Demo Board MCL P/N: TB-332 Suggested PCB Layout (PL-176)



- NOTES:**
1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .025" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH 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

Typical Performance Data at 25°C

| Frequency (MHz) | Insertion Loss (dB) | VSWR (:1) |
|-----------------|---------------------|-----------|
| 1.0 | 88.73 | 6481.29 |
| 10.0 | 91.41 | 4268.88 |
| 50.0 | 86.03 | 1031.74 |
| 100.0 | 65.23 | 231.93 |
| 120.0 | 55.82 | 164.17 |
| 135.0 | 49.07 | 128.61 |
| 180.0 | 29.70 | 53.26 |
| 200.0 | 21.61 | 34.93 |
| 220.0 | 13.71 | 18.83 |
| 240.0 | 6.51 | 6.87 |
| 250.0 | 3.80 | 3.78 |
| 260.0 | 2.10 | 2.20 |
| 290.0 | 0.79 | 1.11 |
| 400.0 | 0.45 | 1.11 |
| 600.0 | 0.31 | 1.04 |
| 1000.0 | 0.29 | 1.11 |
| 2000.0 | 0.43 | 1.34 |
| 3000.0 | 0.54 | 1.35 |



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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Metal Shield High Pass Filter

RHP-250+

Typical Performance Data

| FREQ. (MHz) | INSERTION LOSS (dB) | | | INPUT RETURN LOSS (dB) | | | OUTPUT RETURN LOSS (dB) | | |
|----------------|------------------------|----------|----------|---------------------------|----------|----------|----------------------------|----------|----------|
| | @ -40° C | @ +25° C | @ +85° C | @ -40° C | @ +25° C | @ +85° C | @ -40° C | @ +25° C | @ +85° C |
| 0.5 | 91.59 | 94.13 | 96.92 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 |
| 1 | 92.31 | 94.01 | 96.32 | 0.01 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 |
| 10 | 103.41 | 100.55 | 91.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 50 | 91.05 | 89.51 | 92.28 | 0.02 | 0.02 | 0.03 | 0.00 | 0.02 | 0.03 |
| 100 | 67.63 | 67.22 | 67.56 | 0.05 | 0.07 | 0.09 | 0.04 | 0.08 | 0.10 |
| 120 | 56.79 | 56.69 | 56.59 | 0.08 | 0.10 | 0.12 | 0.08 | 0.12 | 0.14 |
| 135 | 49.40 | 49.32 | 49.17 | 0.10 | 0.14 | 0.16 | 0.11 | 0.15 | 0.18 |
| 180 | 29.36 | 29.29 | 29.17 | 0.25 | 0.31 | 0.34 | 0.27 | 0.34 | 0.39 |
| 200 | 21.10 | 21.04 | 20.93 | 0.41 | 0.48 | 0.52 | 0.44 | 0.53 | 0.60 |
| 220 | 13.11 | 13.05 | 12.95 | 0.84 | 0.96 | 1.04 | 0.89 | 1.03 | 1.14 |
| 240 | 5.94 | 5.90 | 5.85 | 2.60 | 2.86 | 3.06 | 2.66 | 2.97 | 3.20 |
| 250 | 3.31 | 3.34 | 3.34 | 4.93 | 5.37 | 5.69 | 5.02 | 5.51 | 5.86 |
| 260 | 1.75 | 1.84 | 1.90 | 9.07 | 9.73 | 10.23 | 9.21 | 9.94 | 10.48 |
| 290 | 0.63 | 0.76 | 0.84 | 25.43 | 24.26 | 23.56 | 27.00 | 25.68 | 24.92 |
| 400 | 0.32 | 0.42 | 0.47 | 24.12 | 25.46 | 25.82 | 24.11 | 25.77 | 26.23 |
| 600 | 0.19 | 0.30 | 0.35 | 30.37 | 31.19 | 31.10 | 29.40 | 29.95 | 30.22 |
| 1000 | 0.14 | 0.30 | 0.37 | 30.91 | 25.02 | 23.79 | 31.29 | 25.38 | 24.25 |
| 1200 | 0.14 | 0.32 | 0.40 | 31.16 | 24.02 | 22.67 | 31.48 | 24.14 | 22.79 |
| 1500 | 0.15 | 0.37 | 0.46 | 28.45 | 22.36 | 20.65 | 27.74 | 21.83 | 20.24 |
| 1800 | 0.17 | 0.43 | 0.54 | 24.18 | 20.49 | 18.63 | 23.53 | 19.80 | 18.11 |
| 2000 | 0.20 | 0.48 | 0.59 | 21.87 | 19.42 | 17.65 | 21.37 | 18.79 | 17.24 |
| 2200 | 0.22 | 0.52 | 0.64 | 20.61 | 18.51 | 17.02 | 20.21 | 17.92 | 16.64 |
| 2400 | 0.24 | 0.56 | 0.69 | 19.42 | 18.02 | 16.53 | 18.90 | 17.38 | 16.19 |
| 2500 | 0.25 | 0.58 | 0.72 | 19.08 | 17.70 | 16.16 | 18.37 | 17.04 | 15.83 |
| 2800 | 0.29 | 0.64 | 0.79 | 17.09 | 16.92 | 16.13 | 16.52 | 16.32 | 15.82 |
| 3000 | 0.34 | 0.70 | 0.84 | 16.08 | 16.28 | 15.89 | 15.49 | 15.71 | 15.58 |
| 3200 | 0.36 | 0.75 | 0.90 | 15.41 | 15.83 | 15.52 | 14.96 | 15.31 | 15.11 |
| 3400 | 0.40 | 0.81 | 0.98 | 15.12 | 15.30 | 15.15 | 14.71 | 14.79 | 14.65 |
| 3500 | 0.42 | 0.83 | 0.99 | 14.49 | 15.22 | 15.40 | 14.02 | 14.67 | 14.74 |
| 3800 | 0.52 | 0.93 | 1.11 | 13.10 | 14.39 | 14.73 | 12.62 | 13.93 | 14.14 |
| 4000 | 0.58 | 1.02 | 1.21 | 12.90 | 13.90 | 14.09 | 12.51 | 13.49 | 13.50 |
| 4200 | 0.67 | 1.13 | 1.36 | 12.53 | 13.50 | 13.47 | 12.16 | 13.14 | 12.95 |
| 4400 | 1.18 | 1.70 | 1.98 | 12.41 | 12.98 | 12.78 | 12.79 | 13.67 | 13.17 |
| 4450 | 1.51 | 2.03 | 2.29 | 12.88 | 13.48 | 13.27 | 13.34 | 14.31 | 13.96 |
| 4500 | 1.41 | 1.90 | 2.11 | 14.29 | 15.10 | 14.84 | 13.02 | 14.12 | 13.83 |
| 4800 | 0.66 | 1.23 | 1.51 | 14.41 | 14.44 | 13.68 | 14.05 | 14.20 | 13.47 |
| 5000 | 0.63 | 1.23 | 1.54 | 14.70 | 15.03 | 13.95 | 14.47 | 14.95 | 13.68 |
| 5200 | 0.64 | 1.27 | 1.59 | 15.69 | 15.75 | 14.32 | 15.21 | 15.26 | 14.00 |
| 5400 | 0.64 | 1.27 | 1.64 | 16.91 | 17.02 | 15.41 | 16.13 | 16.73 | 14.69 |
| 5500 | 0.67 | 1.30 | 1.61 | 17.91 | 18.18 | 16.48 | 16.47 | 17.29 | 15.91 |
| 5800 | 0.71 | 1.39 | 1.67 | 19.82 | 21.22 | 19.64 | 17.43 | 19.68 | 18.71 |
| 6000 | 0.73 | 1.38 | 1.67 | 19.72 | 23.24 | 22.73 | 18.13 | 23.13 | 23.07 |
| 6200 | 0.79 | 1.43 | 1.77 | 21.01 | 25.30 | 24.50 | 20.36 | 29.28 | 27.90 |
| 6400 | 0.86 | 1.62 | 2.02 | 19.78 | 25.54 | 27.45 | 22.52 | 37.36 | 40.29 |
| 6500 | 1.04 | 1.81 | 2.09 | 19.65 | 24.14 | 25.90 | 22.42 | 28.87 | 30.45 |
| 6800 | 2.24 | 3.26 | 3.68 | 15.80 | 16.52 | 17.73 | 17.44 | 15.87 | 15.85 |
| 7000 | 4.68 | 5.78 | 6.30 | 10.17 | 11.08 | 11.54 | 9.35 | 9.38 | 9.52 |
| 7200 | 3.52 | 4.46 | 4.90 | 9.50 | 10.51 | 10.77 | 8.00 | 8.77 | 8.80 |
| 7400 | 2.16 | 3.10 | 3.47 | 10.27 | 11.74 | 12.35 | 8.67 | 10.14 | 10.61 |
| 7500 | 2.05 | 2.87 | 3.33 | 10.43 | 12.28 | 12.40 | 8.73 | 10.57 | 10.96 |
| 7800 | 1.93 | 2.69 | 3.24 | 11.02 | 12.26 | 12.88 | 9.07 | 11.21 | 11.54 |
| 8000 | 1.92 | 2.77 | 3.47 | 11.29 | 13.24 | 12.74 | 9.29 | 11.24 | 11.21 |
| 8200 | 2.46 | 3.17 | 3.79 | 11.39 | 11.89 | 12.67 | 8.68 | 10.02 | 10.60 |
| 8500 | 2.35 | 3.27 | 4.16 | 11.56 | 11.59 | 12.08 | 8.92 | 9.61 | 9.49 |

REV. X2

RHP-250+

100901

Page 1 of 2



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Metal Shield High Pass Filter

RHP-250+

Typical Performance Data

| FREQ. (MHz) | GROUP DELAY (nsec) | | |
|----------------|-----------------------|----------|----------|
| | @ -40° C | @ +25° C | @ +85° C |
| 400 | 2.05 | 2.04 | 2.03 |
| 410 | 1.95 | 1.93 | 1.93 |
| 420 | 1.85 | 1.84 | 1.83 |
| 450 | 1.61 | 1.60 | 1.59 |
| 500 | 1.33 | 1.32 | 1.31 |
| 600 | 0.99 | 0.98 | 0.98 |
| 700 | 0.80 | 0.80 | 0.79 |
| 800 | 0.69 | 0.68 | 0.68 |
| 900 | 0.61 | 0.60 | 0.60 |
| 1000 | 0.56 | 0.55 | 0.55 |
| 1200 | 0.49 | 0.48 | 0.48 |
| 1400 | 0.45 | 0.44 | 0.43 |
| 1500 | 0.44 | 0.42 | 0.42 |
| 1700 | 0.42 | 0.41 | 0.40 |
| 1800 | 0.41 | 0.40 | 0.39 |
| 2000 | 0.39 | 0.38 | 0.38 |
| 2200 | 0.39 | 0.37 | 0.37 |
| 2400 | 0.38 | 0.37 | 0.36 |
| 2500 | 0.37 | 0.36 | 0.36 |
| 2700 | 0.37 | 0.36 | 0.35 |
| 2800 | 0.37 | 0.36 | 0.36 |
| 3000 | 0.36 | 0.36 | 0.35 |
| 3150 | 0.36 | 0.35 | 0.35 |
| 3200 | 0.36 | 0.35 | 0.35 |
| 3400 | 0.37 | 0.35 | 0.35 |
| 3500 | 0.36 | 0.35 | 0.35 |
| 3700 | 0.36 | 0.35 | 0.35 |
| 3800 | 0.36 | 0.35 | 0.35 |
| 4000 | 0.36 | 0.35 | 0.35 |
| 4200 | 0.37 | 0.36 | 0.36 |
| 4400 | 0.30 | 0.28 | 0.27 |
| 4500 | 0.24 | 0.24 | 0.24 |
| 4700 | 0.38 | 0.37 | 0.36 |
| 4800 | 0.37 | 0.36 | 0.35 |
| 5000 | 0.36 | 0.35 | 0.36 |
| 5200 | 0.36 | 0.35 | 0.35 |
| 5400 | 0.37 | 0.36 | 0.35 |
| 5500 | 0.37 | 0.35 | 0.34 |
| 5700 | 0.37 | 0.36 | 0.35 |
| 5800 | 0.37 | 0.36 | 0.36 |
| 6000 | 0.38 | 0.37 | 0.37 |
| 6200 | 0.38 | 0.38 | 0.38 |
| 6400 | 0.40 | 0.40 | 0.38 |
| 6500 | 0.39 | 0.40 | 0.40 |
| 6700 | 0.42 | 0.42 | 0.42 |
| 6800 | 0.40 | 0.38 | 0.37 |
| 7000 | 0.08 | 0.05 | 0.04 |
| 7200 | 0.31 | 0.31 | 0.30 |
| 7400 | 0.43 | 0.41 | 0.42 |
| 7500 | 0.41 | 0.41 | 0.41 |
| 7800 | 0.41 | 0.42 | 0.39 |
| 8000 | 0.42 | 0.40 | 0.38 |
| 8200 | 0.39 | 0.40 | 0.38 |
| 8500 | 0.43 | 0.70 | 0.54 |

REV. X2
RHP-250+
100901
Page 2 of 2



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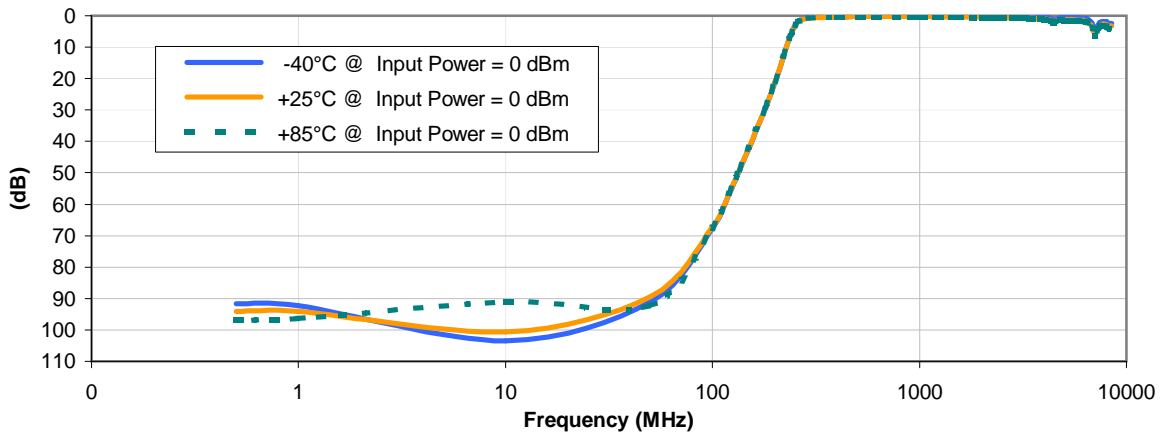


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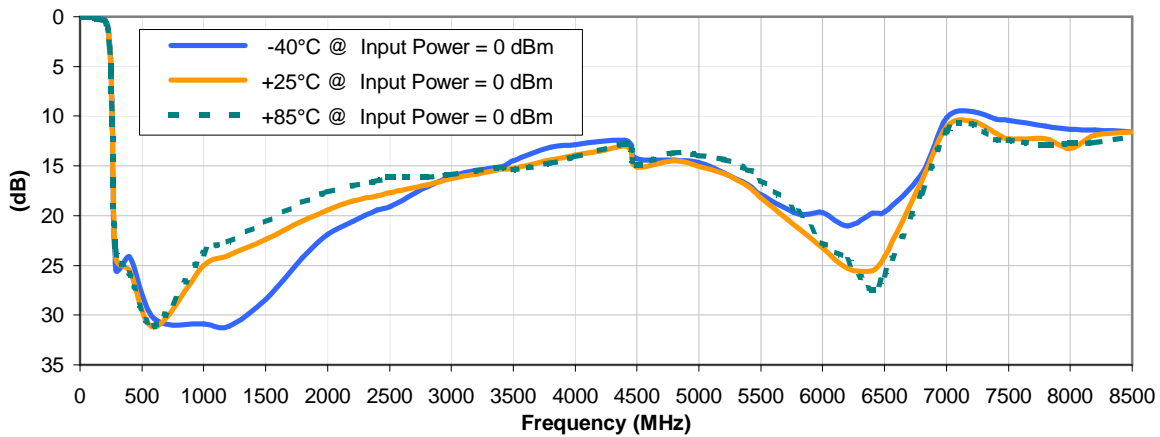


Typical Performance Curves

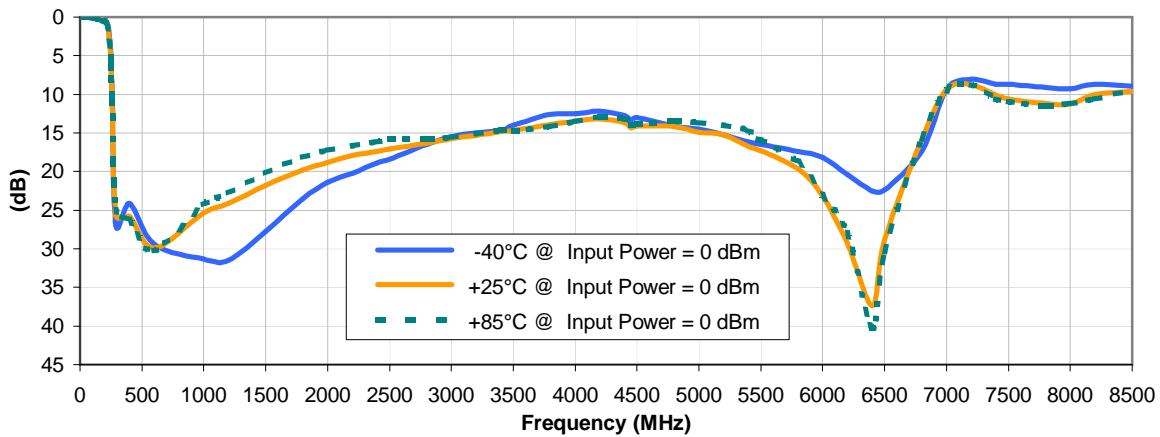
INSERTION LOSS vs. TEMPERATURE



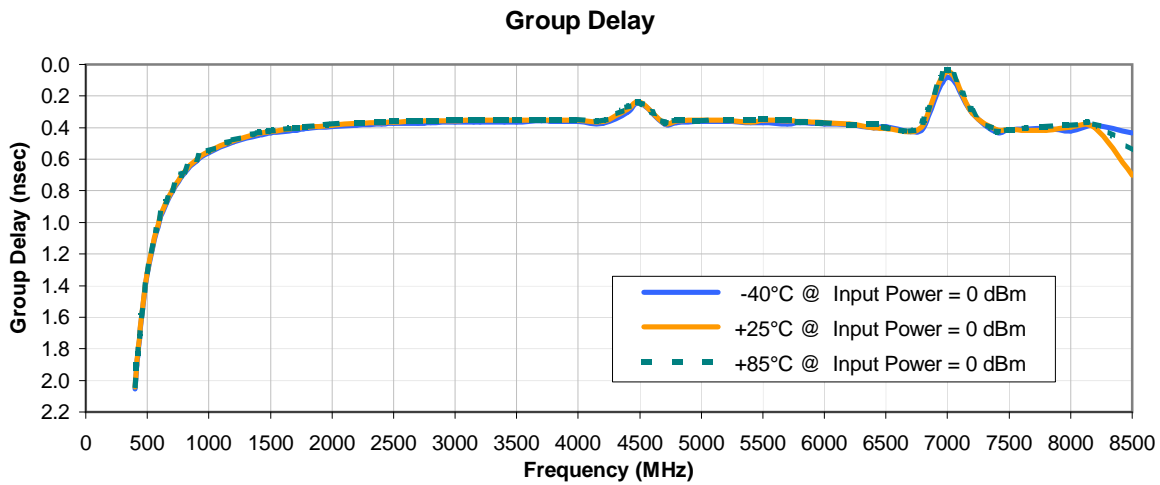
INPUT RETURN LOSS vs. TEMPERATURE



OUTPUT RETURN LOSS vs. TEMPERATURE

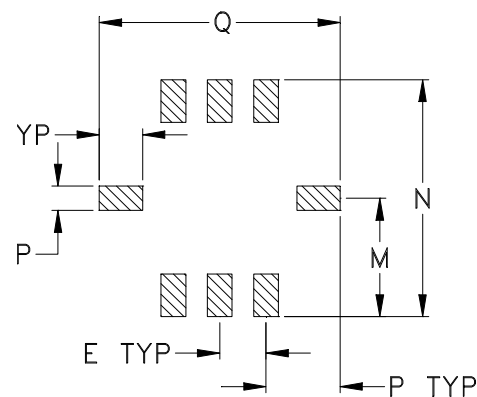
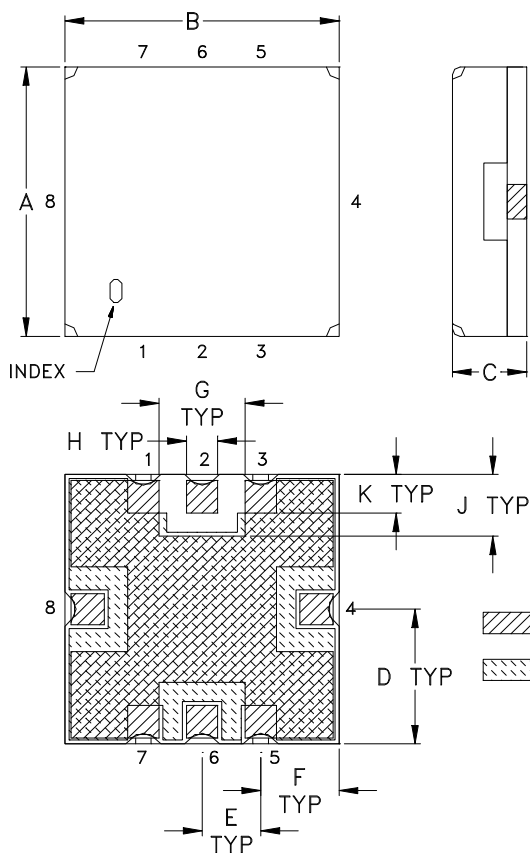


Typical Performance Curves



Outline Dimensions

GP731



| CASE # | A | B | C | D | E | F | G | H | J | K | L | M |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| GP731 | .350 (8.89) | .350 (8.89) | .100 (2.54) | .175 (4.45) | .075 (1.91) | .100 (2.54) | .110 (2.79) | .040 (1.02) | .080 (2.03) | .050 (1.27) | .040 (1.02) | .195 (4.95) |

| CASE # | N | P | Q | R | WT. GRAM |
|--------|----------------|----------------|----------------|----------------|--------------------|
| GP731 | .390 (9.91) | .120 (3.05) | .390 (9.91) | .070 (1.78) | .4 +0.3 -0.0 |

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .03$; 3Pl. $\pm .015$

Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:

For RoHS Case Styles: 3-5 μ inch (.08-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate.
 For RoHS-5 Case Styles: Tin-Lead plate.

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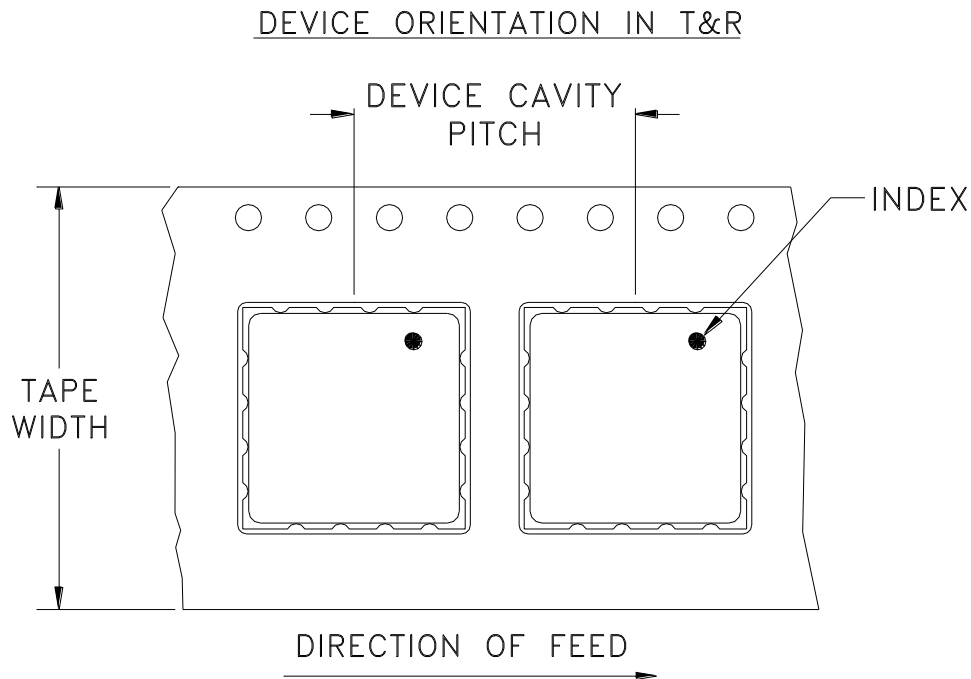
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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F78



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel see note |
|-------------------|----------------------------|----------------------|------------------------------|
| 16 | 12 | 7 | 10 |
| | | | 20 |
| | | | 50 |
| | | | 100 |
| | | | 200 |
| | | 13 | 500, 1000 |

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

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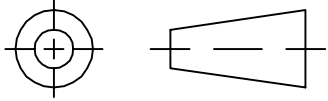
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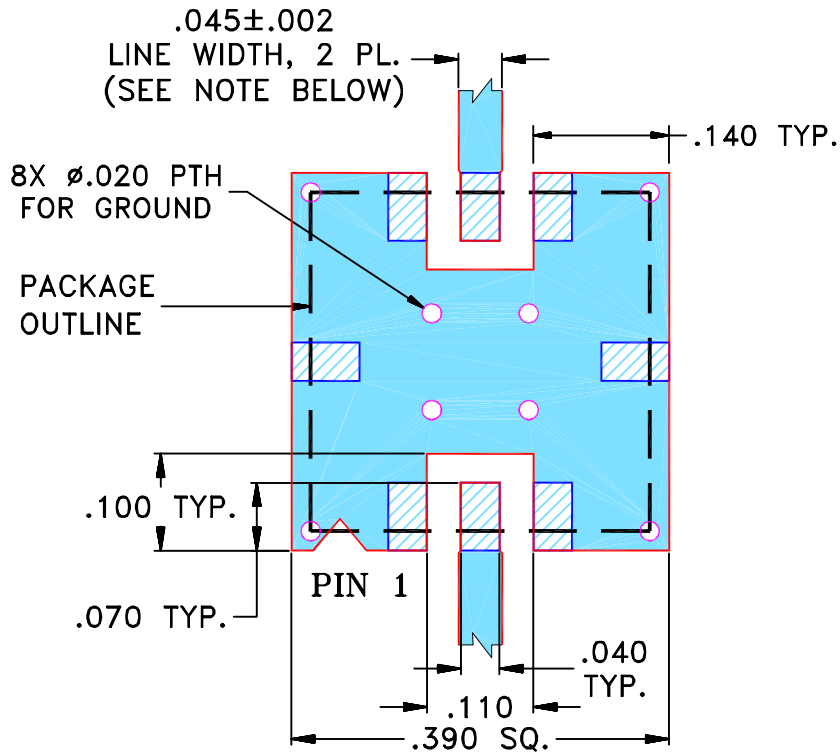
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|-----|---------|--|----------|-----|------|
| OR | R59289 | NEW RELEASE (FROM RAVON) | 02/05 | DK | HH |
| A | M101151 | ADDED "RBP" & CORRECTED PIN CONNECTION TO DESCRIPTION OF PL-DWG. | 10/10/05 | MMG | DJ |
| B | M102713 | UPDATED NOTES, ADDED "...WITH SMOBC" | 01/20/06 | GT | IL |

**SUGGESTED MOUNTING CONFIGURATION
FOR GP731 CASE STYLE, "qf" PIN CONNECTION.**



- NOTES:**
- TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .025" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH 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 | INITIALS | DATE |
|----------------------------|---------------------|-----------|
| DIMENSIONS ARE IN INCHES | DRAWN DK (RAVON) | 10 FEB 05 |
| TOLERANCES ON: | CHECKED RZ (RAVON) | 10 FEB 05 |
| 2 PL DECIMALS ± | APPROVED HH (RAVON) | 10 FEB 05 |
| 3 PL DECIMALS ± .005 | | |
| ANGLES ± | | |
| FRACTIONS ± | | |



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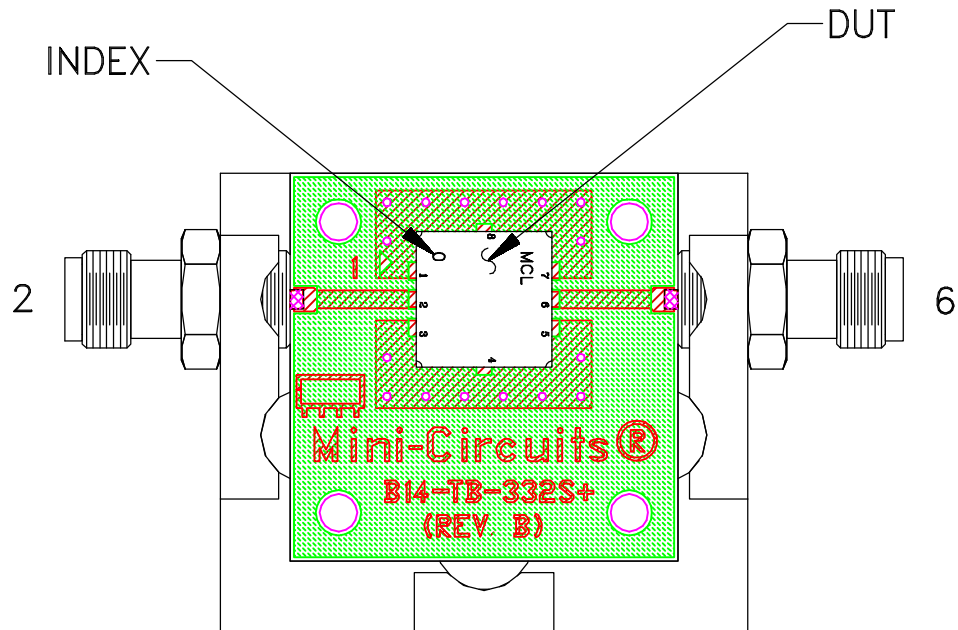
PL, qf, GP731, RBP, TB-332

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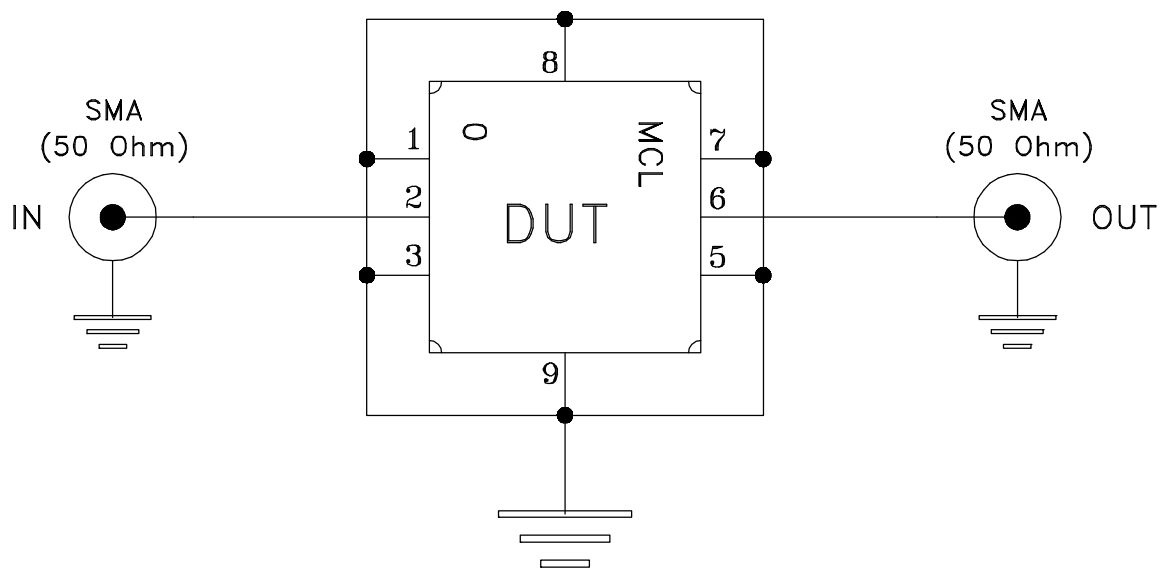
ASHEETA1.DWG REV:A DATE:01/12/95

| SIZE | CODE IDENT | DRAWING NO: | REV: |
|-------|------------|-------------|---------------|
| A | 15542 | 98-PL-176 | B |
| FILE: | 98PL176 | SCALE: 5:1 | SHEET: 1 OF 1 |

Evaluation Board and Circuit




TB-332



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.020 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 | -40° to 85° C Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C Ambient Environment | Individual Model Data Sheet |
| HAST | 130°C, 85% RH, 96 hours | JESD22-A110 |
| 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 |
| Thermal Shock | -55° to 100°C, 100 cycles | MIL-STD-202, Method 107, Condition A-3, except +100°C |
| Solder Reflow Heat | Sn-Pb Eutectic Process: 225°C peak Pb-Free Process, 245°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, 20-2000 Hz, 4 times in each of three axes (total 12) | MIL-STD-883, Method 2007.3, Condition A |
| Mechanical Shock | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes | MIL-STD-202, Method 213, Condition A |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215 |