*Surface Mount*

# Coaxial-Ceramic Resonator Filters and Multiplexers

50Ω DC to 6 GHz

## The Big Deal

- Low insertion loss with excellent power handling
- Passbands up to 6 GHz
- Fractional bandwidth from <1 to 25%
- Low profile designs with min. height of 0.120”
- Excellent temperature stability
- Rugged construction to handle demanding environmental conditions

## Product Overview

Mini-Circuits’ *Coaxial-Ceramic Resonator filters* offer low insertion loss in very small form factors, using ceramic material with high dielectric constant and superior Q factor. Bandpass and bandstop filters,diplexer and multiplexer designs can be constructed using this technology. Low insertion loss combined with excellent power handling makes these filters well suited for transmitter and receiver signal chains. Advanced filter design and construction can achieve stopband width greater than 3x the center frequency as high as 20 GHz.

All our coaxial-ceramic resonator filters are built with rugged construction, qualified to withstand multiple demanding reflow cycles. Excellent repeatability across units is achieved through precise tuning and process control.

## Key Features

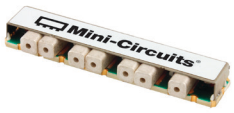
| Feature | Advantages |
|---|---|
| Low insertion loss | Low signal loss results in better SNR in signal chain |
| Fast roll-off | Higher selectivity results in better adjacent channel rejection and dynamic range |
| Wide stop band | Wide spur-free stopband results in better receiver sensitivity |
| Excellent power handling | Well suited for transmitter applications |
| Rugged Construction | These filter assemblies have been qualified over a wide range of thermal, mechanical and environmental conditions including withstanding the stress of extensive solder reflow cycles |
| Small Size | Very well suited for high performance applications where size is a constraint. |
| Temperature stability | Very minimal change in electrical performance across temperature makes these filters suitable for a wide range of operating conditions. |

*Surface Mount*

# Bandpass Filter

## CBP-1423AF+

50Ω 1333 to 1513 MHz




*Generic photo used for illustration purposes only*

CASE STYLE:SV2484

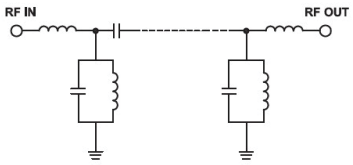
### Features

- High rejection of 50 dB.
- High selectivity
- Miniature shielded package

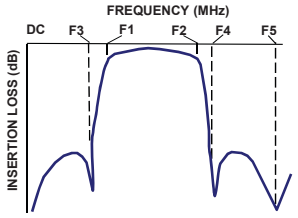
### Applications

- Aviation
- Military radar
- Radio astronomy

### Functional Schematic




### Typical Frequency Response




***+RoHS Compliant***

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

### Electrical Specifications[(1)] at 25°C

| Parameter | | F# | Frequency (MHz) | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Pass Band | Center Frequency | - | - | - | 1423 | - | MHz |
| | Insertion Loss | F1-F2 | 1333-1513 | - | 1.8 | 3.0 | dB |
| | VSWR | F1-F2 | 1333-1513 | - | 1.5 | 1.9 | :1 |
| Stop Band, Lower | Insertion Loss | DC-F3 | DC-1113 | 50 | 60 | - | dB |
| | VSWR | DC-F3 | DC-1113 | - | 20 | - | :1 |
| Stop Band, Upper | Insertion Loss | F4-F5 | 1669-2600 | 50 | 55 | - | dB |
| | VSWR | F4-F5 | 1669-2600 | - | 20 | - | :1 |

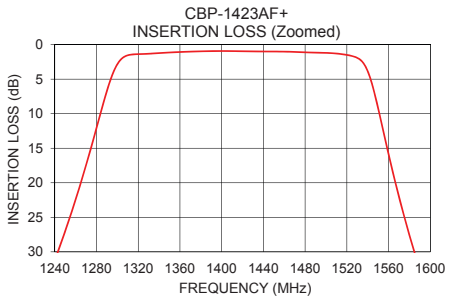
(1) Measured on Mini-Circuits Characterization Test Board TB-1069+.

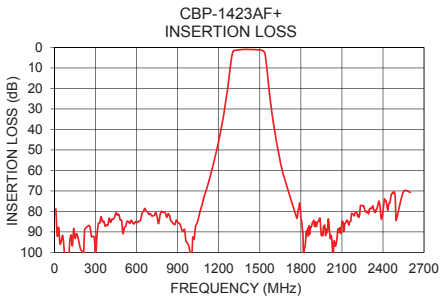
| Maximum Ratings | |
|---|---|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature | -55°C to 100°C |
| RF Power Input | 10 W Max. |

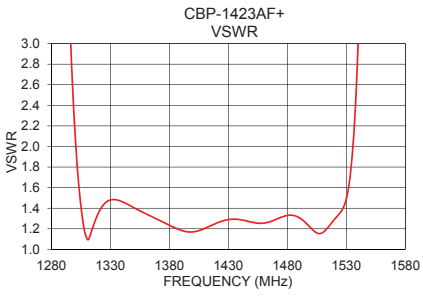
Permanent damage may occur if any of these limits are exceeded.

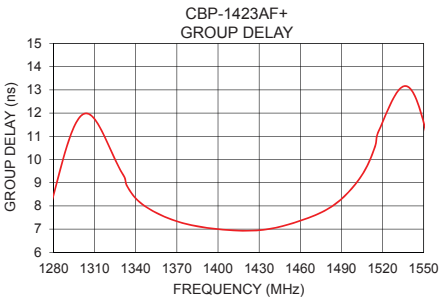
### Typical Performance Data at 25°C

| Frequency (MHz) | Insertion Loss (dB) | VSWR (:1) | Frequency (MHz) | Group Delay (ns) |
|---|---|---|---|---|
| 10 | 78.76 | 283.40 | 1333 | 8.95 |
| 210 | 102.89 | 149.75 | 1345 | 8.06 |
| 1000 | 105.82 | 263.03 | 1353 | 7.76 |
| 1113 | 68.68 | 133.77 | 1355 | 7.70 |
| 1209 | 42.58 | 55.94 | 1391 | 7.06 |
| 1242 | 30.38 | 35.97 | 1401 | 6.99 |
| 1263 | 20.97 | 23.54 | 1411 | 6.95 |
| 1299 | 3.09 | 2.33 | 1417 | 6.93 |
| 1333 | 1.30 | 1.48 | 1423 | 6.93 |
| 1423 | 0.97 | 1.27 | 1427 | 6.94 |
| 1513 | 1.34 | 1.19 | 1429 | 6.95 |
| 1540 | 3.85 | 2.99 | 1431 | 6.96 |
| 1567 | 20.25 | 31.92 | 1451 | 7.19 |
| 1585 | 30.15 | 56.24 | 1461 | 7.38 |
| 1669 | 61.40 | 123.86 | 1469 | 7.55 |
| 2200 | 80.26 | 118.63 | 1479 | 7.83 |
| 2350 | 79.07 | 125.98 | 1487 | 8.15 |
| 2400 | 79.97 | 129.79 | 1501 | 9.00 |
| 2500 | 83.56 | 137.26 | 1509 | 9.75 |
| 2600 | 70.68 | 132.11 | 1513 | 10.31 |




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.

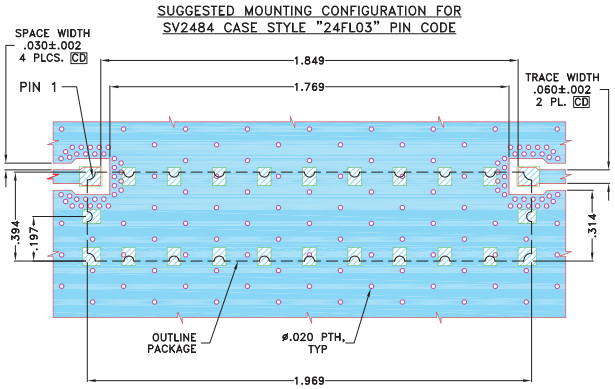
**B.** Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

**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

## Pad Connections

| | |
|---|---|
| INPUT | 1 |
| OUTPUT | 11 |
| GROUND | 2 - 10, 12 - 24 |

### *Demo Board MCL P/N: TB-1069+*
### *Suggested PCB Layout (PL-604)*

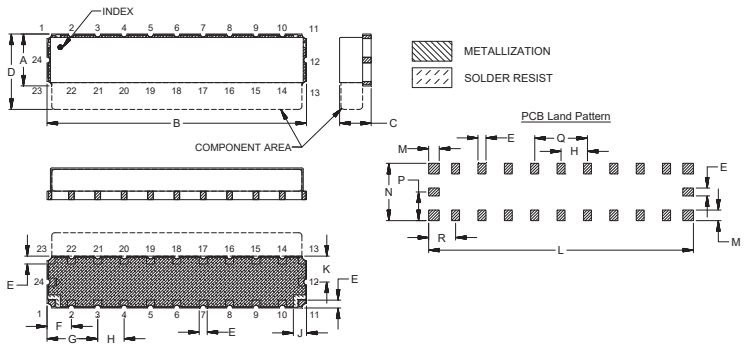



NOTES:
1. TRACE WIDTH IS SHOWN FOR REOGERS (RO4350B), WITH DIELECTRIC THICKNESS .030"±.002". COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

## Outline Drawing




## Outline Dimensions ( inch / mm )

| A | B | C | D | E | F | G | H | J | K |
|---|---|---|---|---|---|---|---|---|---|
| **.394** | **1.969** | **.240** | **.492** | **.060** | **.184** | **.384** | **.200** | **.100** | **.197** |
| 10.00 | 50.00 | 6.10 | 12.50 | 1.52 | 4.68 | 9.76 | 5.08 | 2.54 | 5.00 |

| L | M | N | P | Q | R | Wt. |
|---|---|---|---|---|---|---|
| **2.009** | **.080** | **.434** | **.217** | **.400** | **.204** | grams |
| 51.02 | 2.03 | 11.02 | 5.51 | 10.16 | 5.19 | 7.0 |

*Note: Please refer to case style drawing for details*

# Band Pass Filter CBP-1423AF+

*Typical Performance Data*

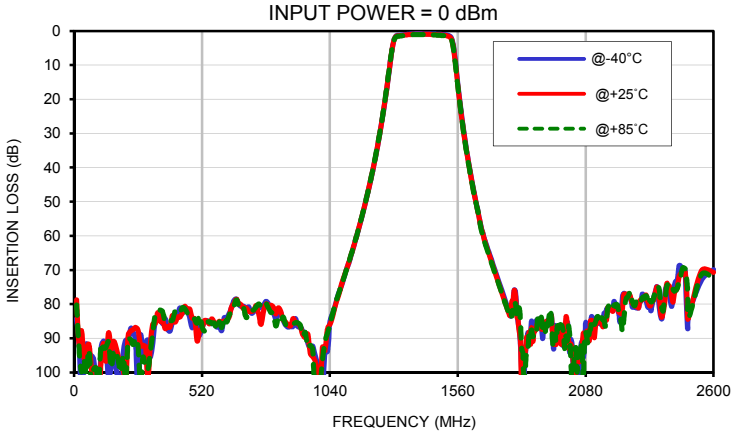
| FREQ. (MHz) | INSERTION LOSS (dB) | | | INPUT RETURN LOSS (dB) | | | OUTPUT RETURN LOSS (dB) | | |
|---|---|---|---|---|---|---|---|---|---|
| | @-40°C | @+25°C | @+85°C | @-40°C | @+25°C | @+85°C | @-40°C | @+25°C | @+85°C |
| 10 | 84.35 | 78.76 | 80.24 | 0.06 | 0.06 | 0.06 | 0.05 | 0.06 | 0.06 |
| 50 | 91.61 | 94.09 | 100.47 | 0.07 | 0.08 | 0.07 | 0.07 | 0.08 | 0.08 |
| 100 | 108.06 | 109.60 | 102.60 | 0.09 | 0.09 | 0.09 | 0.09 | 0.10 | 0.09 |
| 210 | 90.59 | 102.89 | 102.38 | 0.11 | 0.12 | 0.11 | 0.12 | 0.13 | 0.12 |
| 500 | 85.91 | 90.79 | 85.59 | 0.06 | 0.09 | 0.10 | 0.09 | 0.11 | 0.12 |
| 600 | 87.73 | 85.51 | 86.84 | 0.04 | 0.07 | 0.08 | 0.07 | 0.10 | 0.11 |
| 980 | 94.92 | 96.61 | 108.69 | 0.01 | 0.06 | 0.08 | 0.02 | 0.07 | 0.10 |
| 1000 | 104.33 | 105.82 | 105.03 | 0.01 | 0.07 | 0.09 | 0.02 | 0.08 | 0.11 |
| 1113 | 68.78 | 68.68 | 68.58 | 0.07 | 0.13 | 0.16 | 0.07 | 0.13 | 0.16 |
| 1170 | 54.50 | 54.36 | 54.32 | 0.14 | 0.21 | 0.24 | 0.13 | 0.20 | 0.23 |
| 1209 | 42.69 | 42.58 | 42.51 | 0.24 | 0.31 | 0.35 | 0.21 | 0.29 | 0.33 |
| 1242 | 30.49 | 30.38 | 30.26 | 0.40 | 0.48 | 0.53 | 0.35 | 0.43 | 0.48 |
| 1251 | 26.66 | 26.54 | 26.41 | 0.47 | 0.56 | 0.62 | 0.41 | 0.50 | 0.56 |
| 1263 | 21.11 | 20.97 | 20.81 | 0.63 | 0.74 | 0.82 | 0.55 | 0.66 | 0.73 |
| 1299 | 3.08 | 3.09 | 3.12 | 7.06 | 7.95 | 8.63 | 6.51 | 7.20 | 7.72 |
| 1333 | 1.15 | 1.30 | 1.40 | 13.89 | 14.20 | 14.67 | 13.81 | 14.15 | 14.66 |
| 1369 | 0.89 | 1.02 | 1.13 | 17.20 | 17.79 | 17.96 | 17.99 | 18.76 | 18.99 |
| 1375 | 0.85 | 0.99 | 1.10 | 18.20 | 18.70 | 18.80 | 19.33 | 20.01 | 20.14 |
| 1401 | 0.79 | 0.93 | 1.03 | 21.79 | 22.08 | 22.63 | 22.69 | 22.91 | 23.68 |
| 1411 | 0.80 | 0.94 | 1.04 | 19.97 | 20.52 | 21.16 | 19.61 | 20.10 | 20.76 |
| 1419 | 0.82 | 0.96 | 1.06 | 18.46 | 19.09 | 19.62 | 17.86 | 18.44 | 18.95 |
| 1423 | 0.83 | 0.97 | 1.07 | 17.91 | 18.55 | 19.01 | 17.32 | 17.93 | 18.38 |
| 1513 | 1.13 | 1.34 | 1.50 | 21.49 | 21.11 | 21.29 | 29.92 | 28.96 | 29.56 |
| 1540 | 3.33 | 3.85 | 4.19 | 6.37 | 6.05 | 5.95 | 8.42 | 8.19 | 8.23 |
| 1567 | 19.74 | 20.25 | 20.52 | 0.44 | 0.54 | 0.61 | 0.89 | 1.02 | 1.13 |
| 1585 | 29.76 | 30.15 | 30.39 | 0.22 | 0.31 | 0.36 | 0.48 | 0.59 | 0.67 |
| 1603 | 38.11 | 38.42 | 38.65 | 0.14 | 0.23 | 0.27 | 0.31 | 0.41 | 0.48 |
| 1669 | 61.06 | 61.40 | 61.87 | 0.06 | 0.14 | 0.17 | 0.11 | 0.19 | 0.24 |
| 1775 | 83.58 | 82.25 | 82.07 | 0.05 | 0.13 | 0.16 | 0.05 | 0.13 | 0.18 |
| 1780 | 80.95 | 79.20 | 83.49 | 0.06 | 0.13 | 0.16 | 0.05 | 0.13 | 0.18 |
| 1785 | 79.16 | 78.75 | 80.62 | 0.06 | 0.13 | 0.16 | 0.05 | 0.13 | 0.18 |
| 1790 | 75.83 | 75.92 | 79.41 | 0.06 | 0.13 | 0.16 | 0.05 | 0.13 | 0.17 |
| 1795 | 76.43 | 77.88 | 80.04 | 0.06 | 0.13 | 0.16 | 0.05 | 0.13 | 0.17 |
| 1810 | 87.17 | 88.30 | 81.20 | 0.05 | 0.13 | 0.15 | 0.05 | 0.13 | 0.17 |
| 1890 | 84.43 | 85.34 | 85.20 | 0.06 | 0.13 | 0.16 | 0.06 | 0.13 | 0.17 |
| 1895 | 86.78 | 84.37 | 84.65 | 0.06 | 0.13 | 0.16 | 0.06 | 0.13 | 0.17 |
| 1900 | 85.79 | 87.36 | 83.93 | 0.06 | 0.13 | 0.16 | 0.06 | 0.13 | 0.17 |
| 1905 | 90.10 | 85.04 | 87.20 | 0.06 | 0.13 | 0.16 | 0.06 | 0.13 | 0.17 |
| 1920 | 85.13 | 85.17 | 85.76 | 0.06 | 0.13 | 0.16 | 0.06 | 0.14 | 0.18 |
| 1935 | 83.28 | 83.46 | 81.54 | 0.06 | 0.14 | 0.16 | 0.07 | 0.14 | 0.18 |
| 1950 | 93.16 | 91.75 | 92.51 | 0.07 | 0.14 | 0.16 | 0.07 | 0.14 | 0.18 |
| 1965 | 87.98 | 87.47 | 86.37 | 0.07 | 0.14 | 0.16 | 0.07 | 0.14 | 0.18 |
| 1980 | 88.15 | 91.76 | 86.06 | 0.07 | 0.14 | 0.16 | 0.07 | 0.14 | 0.18 |
| 1995 | 90.43 | 89.20 | 93.03 | 0.07 | 0.14 | 0.16 | 0.07 | 0.14 | 0.18 |
| 2010 | 87.93 | 90.06 | 86.40 | 0.07 | 0.14 | 0.17 | 0.08 | 0.15 | 0.18 |
| 2025 | 91.51 | 93.03 | 104.62 | 0.07 | 0.14 | 0.17 | 0.08 | 0.15 | 0.19 |
| 2040 | 94.89 | 94.93 | 92.86 | 0.07 | 0.14 | 0.17 | 0.08 | 0.15 | 0.19 |
| 2055 | 97.68 | 96.72 | 96.11 | 0.07 | 0.14 | 0.17 | 0.08 | 0.15 | 0.19 |
| 2070 | 95.62 | 88.63 | 102.96 | 0.07 | 0.14 | 0.17 | 0.08 | 0.15 | 0.19 |
| 2085 | 87.05 | 87.91 | 89.99 | 0.07 | 0.14 | 0.17 | 0.08 | 0.15 | 0.19 |
| 2100 | 85.32 | 84.89 | 87.27 | 0.07 | 0.14 | 0.17 | 0.09 | 0.16 | 0.19 |
| 2115 | 87.56 | 89.86 | 86.05 | 0.07 | 0.14 | 0.17 | 0.09 | 0.16 | 0.19 |
| 2150 | 84.60 | 86.67 | 84.67 | 0.08 | 0.14 | 0.17 | 0.09 | 0.16 | 0.19 |
| 2170 | 81.67 | 80.97 | 81.07 | 0.08 | 0.14 | 0.17 | 0.09 | 0.16 | 0.19 |
| 2200 | 80.07 | 80.26 | 80.61 | 0.08 | 0.15 | 0.17 | 0.10 | 0.17 | 0.20 |
| 2400 | 78.28 | 79.97 | 78.90 | 0.06 | 0.13 | 0.16 | 0.12 | 0.19 | 0.22 |
| 2450 | 73.65 | 75.76 | 75.77 | 0.06 | 0.13 | 0.16 | 0.13 | 0.20 | 0.24 |
| 2500 | 82.69 | 83.56 | 83.79 | 0.06 | 0.13 | 0.15 | 0.13 | 0.21 | 0.25 |
| 2550 | 73.13 | 70.31 | 71.42 | 0.06 | 0.13 | 0.16 | 0.15 | 0.23 | 0.27 |
| 2600 | 69.91 | 70.68 | 72.37 | 0.06 | 0.13 | 0.16 | 0.17 | 0.26 | 0.30 |

*Typical Performance Data*

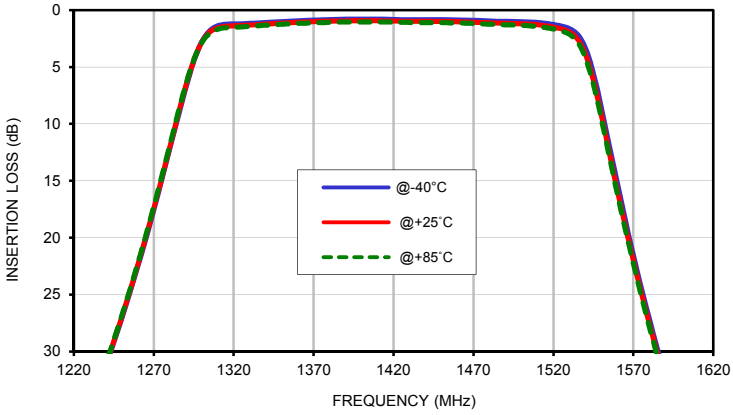
| FREQ. (MHz) | GROUP DELAY (nsec) | | |
|---|---|---|---|
| | @-40°C | @+25°C | @+85°C |
| 1333 | 9.02 | 8.95 | 8.90 |
| 1337 | 8.59 | 8.54 | 8.51 |
| 1341 | 8.30 | 8.26 | 8.24 |
| 1345 | 8.09 | 8.06 | 8.04 |
| 1349 | 7.92 | 7.90 | 7.88 |
| 1353 | 7.78 | 7.76 | 7.74 |
| 1357 | 7.66 | 7.64 | 7.62 |
| 1361 | 7.55 | 7.53 | 7.51 |
| 1365 | 7.46 | 7.44 | 7.42 |
| 1369 | 7.38 | 7.36 | 7.33 |
| 1373 | 7.30 | 7.28 | 7.26 |
| 1377 | 7.24 | 7.22 | 7.20 |
| 1381 | 7.19 | 7.17 | 7.14 |
| 1385 | 7.14 | 7.12 | 7.10 |
| 1389 | 7.10 | 7.08 | 7.06 |
| 1393 | 7.07 | 7.05 | 7.03 |
| 1397 | 7.04 | 7.02 | 7.00 |
| 1401 | 7.01 | 6.99 | 6.98 |
| 1405 | 6.99 | 6.97 | 6.96 |
| 1409 | 6.97 | 6.95 | 6.95 |
| 1413 | 6.95 | 6.94 | 6.93 |
| 1417 | 6.94 | 6.93 | 6.93 |
| 1421 | 6.93 | 6.93 | 6.92 |
| 1423 | 6.93 | 6.93 | 6.93 |
| 1429 | 6.95 | 6.95 | 6.94 |
| 1433 | 6.97 | 6.97 | 6.97 |
| 1437 | 7.00 | 7.00 | 7.00 |
| 1441 | 7.04 | 7.05 | 7.04 |
| 1445 | 7.10 | 7.10 | 7.09 |
| 1449 | 7.16 | 7.16 | 7.15 |
| 1453 | 7.23 | 7.23 | 7.22 |
| 1457 | 7.30 | 7.30 | 7.30 |
| 1461 | 7.38 | 7.38 | 7.38 |
| 1465 | 7.46 | 7.46 | 7.46 |
| 1469 | 7.55 | 7.55 | 7.55 |
| 1473 | 7.65 | 7.65 | 7.66 |
| 1477 | 7.76 | 7.77 | 7.77 |
| 1479 | 7.82 | 7.83 | 7.84 |
| 1481 | 7.89 | 7.90 | 7.91 |
| 1483 | 7.96 | 7.98 | 7.98 |
| 1485 | 8.04 | 8.06 | 8.07 |
| 1487 | 8.13 | 8.15 | 8.16 |
| 1489 | 8.22 | 8.24 | 8.25 |
| 1491 | 8.32 | 8.35 | 8.36 |
| 1493 | 8.43 | 8.46 | 8.47 |
| 1495 | 8.55 | 8.58 | 8.59 |
| 1497 | 8.68 | 8.71 | 8.72 |
| 1499 | 8.82 | 8.85 | 8.86 |
| 1501 | 8.96 | 9.00 | 9.01 |
| 1503 | 9.12 | 9.16 | 9.17 |
| 1513 | 10.25 | 10.31 | 10.34 |

## *Typical Performance Curves*

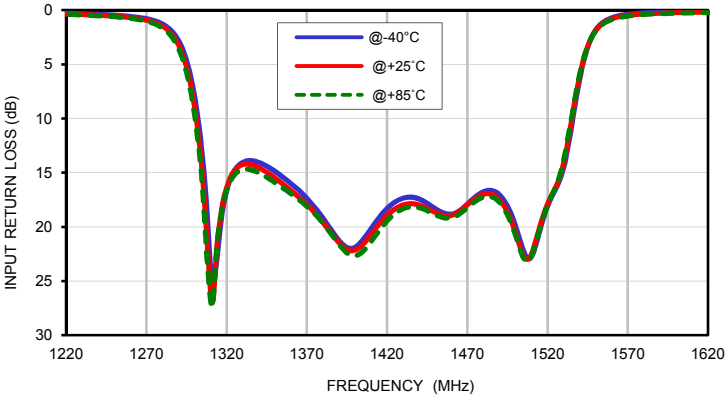
**INSERTION LOSS vs. TEMPERATURE**
INPUT POWER = 0 dBm



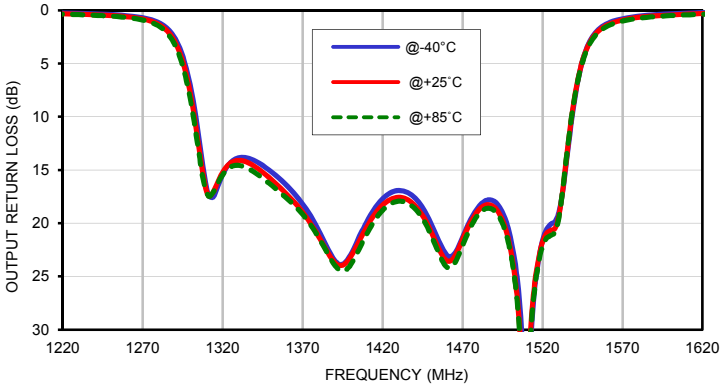

**INSERTION LOSS vs. TEMPERATURE (Zoomed)**
INPUT POWER = 0 dBm



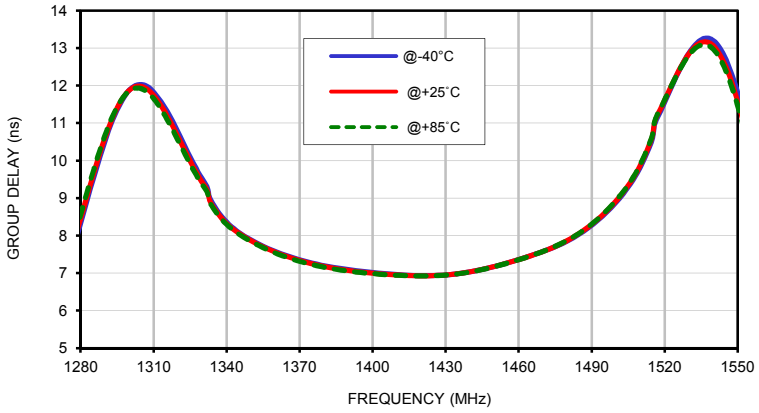

**INPUT RETURN LOSS vs. TEMPERATURE**
INPUT POWER = 0 dBm




**OUTPUT RETURN LOSS vs. TEMPERATURE**
INPUT POWER = 0 dBm



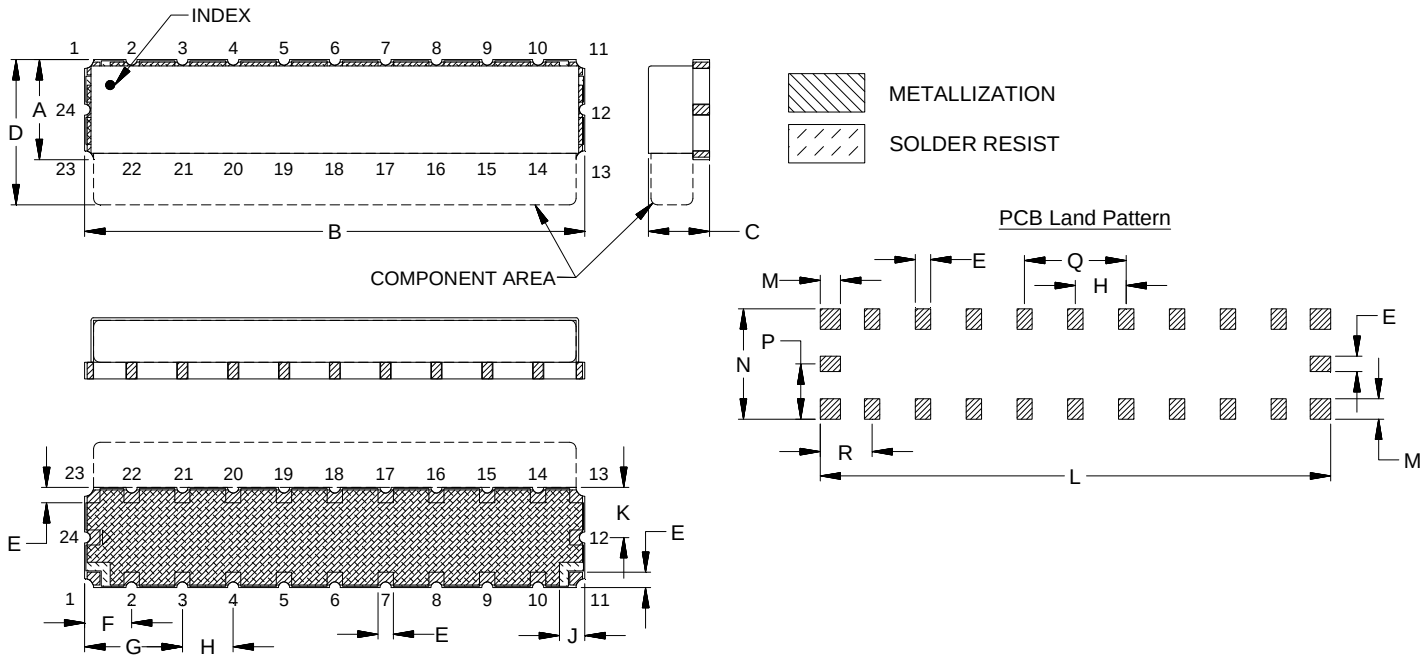

**GROUP DELAY vs. TEMPERATURE**
**INPUT POWER = 0 dBm**



# Case Style SV

**SV2484**

## Outline Dimensions




| CASE# | A | B | C | D | E | F | G | H | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SV2484 | .394 (10.00) | 1.969 (50.00) | .240 (6.10) | .492 (12.50) | .060 (1.52) | .184 (4.68) | .384 (9.76) | .200 (5.08) | .100 (2.54) | .197 (5.00) | 2.009 (51.02) | .080 (2.03) |

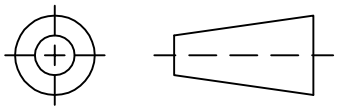
| CASE# | N | P | Q | R | WT. GRAMS |
|---|---|---|---|---|---|
| SV2484 | .434 (11.02) | .217 (5.51) | .400 (10.16) | .204 (5.19) | 7.0 |

**Dimensions are in inches (mm). Tolerances: 2 Pl. ± .03; 3 Pl. ± .015**

### Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:
   For RoHS Case Styles: 3-5 µ inch Gold over 120-240 µ inch Nickel plate.
   For RoHS-5 Case Styles: Tin-Lead plate.

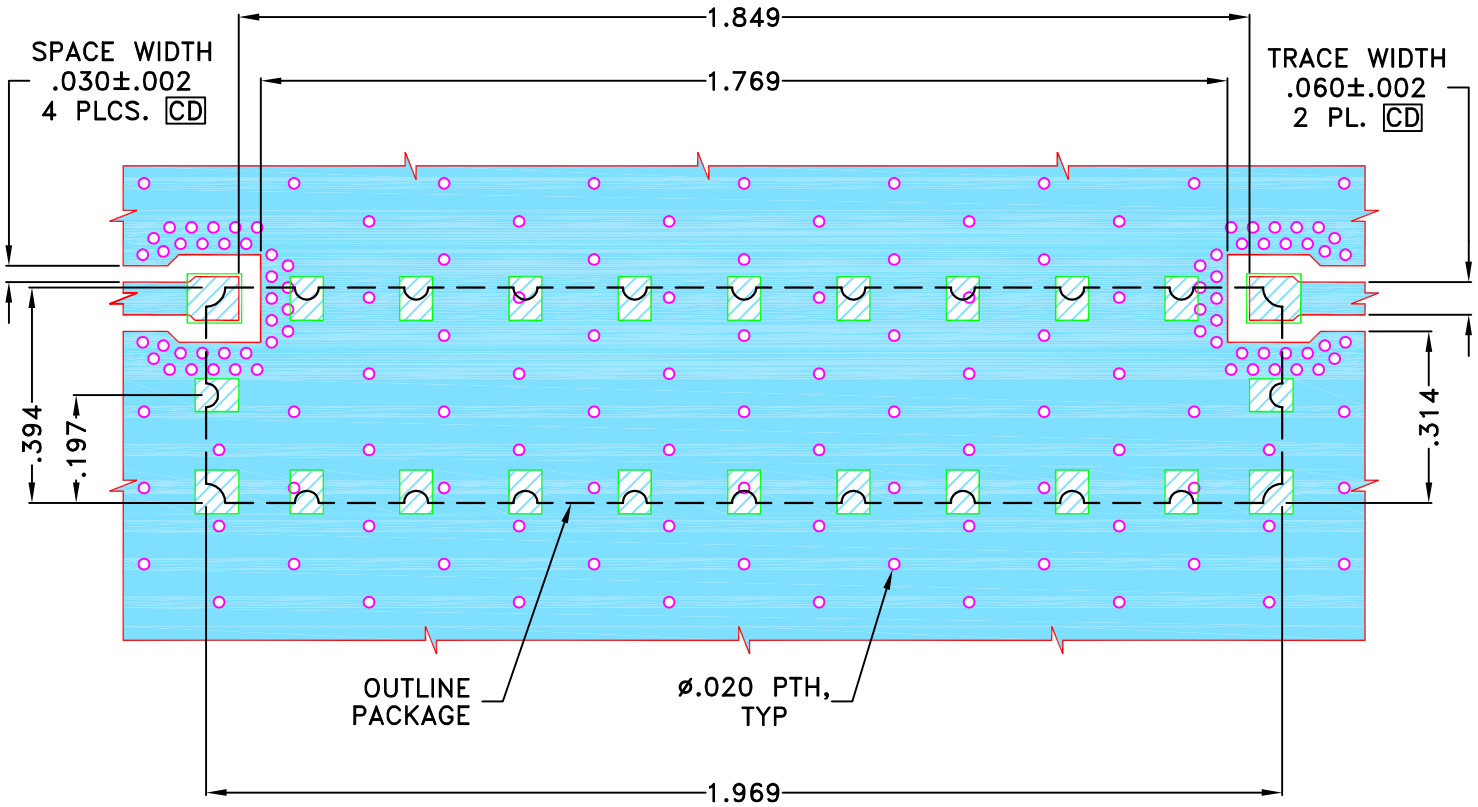
THIRD ANGLE PROJECTION



REVISIONS

| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
|---|---|---|---|---|---|
| OR | M169276 | NEW RELEASE | AUG 18 | TM | MD |
| | | | | | |
| | | | | | |
| | | | | | |

## SUGGESTED MOUNTING CONFIGURATION FOR SV2484 CASE STYLE "24FL03" PIN CODE




NOTES:

1. TRACE WIDTH IS SHOWN FOR REOGERS (RO4350B), WITH DIELECTRIC THICKNESS .030"±.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 SOLDERMASK

| UNLESS OTHERWISE SPECIFIED | | INITIALS | DATE |
|---|---|---|---|
| DIMENSIONS ARE IN INCHES | DRAWN | TM | 16 AUG 18 |
| TOLERANCES ON: | CHECKED | MD | 16 AUG 18 |
| 2 PL DECIMALS ± .005" | APPROVED | KK | 16 AUG 18 |
| 3 PL DECIMALS ± | | | |
| ANGLES ± | | | |
| FRACTIONS ± | | | |



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

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

# PL, 24FL03, SV2484, CBP
# TB-1069+, 50 Ohm

| SIZE | CODE IDENT | DRAWING NO: | REV: |
|---|---|---|---|
| A | 15542 | 98-PL-604 | OR |
| FILE: 98PL604 | | SCALE: 3:1 | SHEET: 1 OF 1 |

Mini-Circuits

# Environmental Specifications ENV54

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<br>Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C<br>Ambient Environment | Individual Model Data Sheet |
| Humidity | 90 to 95% RH, 96 hours, 40°C | MIL-STD-202, Method 103B, Condition B, Except 50°C |
| 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<br>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, 10-2000 Hz, 4 times in each of three axes (total 12) | 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 |