

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%
- 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

All our coaxial-ceramic resonator filters are built with rugged construction. 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. |

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



Coaxial Bandpass Filter

ZX75BP-2250-S+

50Ω 2000 to 2500 MHz



Generic photo used for illustration purposes only
CASE STYLE: HY1238

Features

- Low insertion loss
- High rejection
- Wide stopband
- Connectorized package

Applications

- Amateur radio
- 5G Sub 6 GHz
- ISM

Electrical Specifications at 25°C

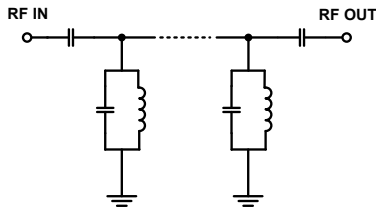
| Parameter | F# | Frequency (MHz) | Min. | Typ. | Max. | Unit |
|------------------|------------------|-----------------|-------------|------|------|------|
| Pass Band | Center Frequency | — | — | 2250 | — | MHz |
| | Insertion Loss | F1-F2 | 2000 - 2500 | 0.85 | 1.5 | dB |
| | VSWR | F1-F2 | 2000 - 2500 | — | 1.4 | :1 |
| Stop Band, Lower | Insertion Loss | DC-F3 | DC - 1000 | 70 | 80 | dB |
| | | F4-F5 | 1000 - 1500 | 40 | 50 | dB |
| Stop Band, Upper | Insertion Loss | F6-F7 | 1500 - 1630 | 20 | 29 | dB |
| | | F6-F7 | 2950 - 3600 | 20 | 28 | dB |
| | | F7-F8 | 3600 - 3900 | — | 65 | dB |
| | | F8-F9 | 3900 - 6000 | — | 25 | dB |

Maximum Ratings

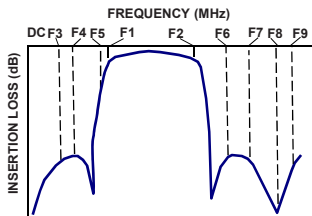
| | |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature | -55°C to 100°C |
| RF Power Input | 2 W Max. |

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

Functional Schematic



Typical Frequency Response

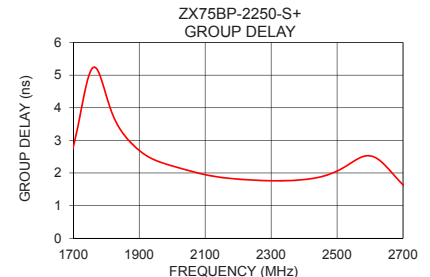
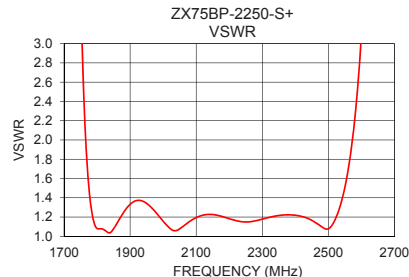
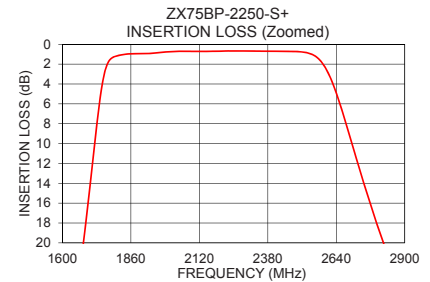
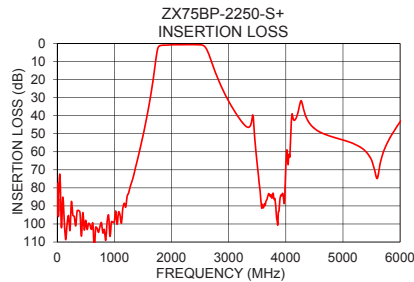


Typical Performance Data at 25°C

| Frequency (MHz) | Insertion Loss (dB) | VSWR (:1) | Frequency (MHz) | Group Delay (nSec) |
|-----------------|---------------------|-----------|-----------------|--------------------|
| 10 | 77.58 | 6328.06 | 2000 | 2.22 |
| 1000 | 99.13 | 266.98 | 2025 | 2.14 |
| 1500 | 51.42 | 74.20 | 2050 | 2.07 |
| 1630 | 30.14 | 42.77 | 2075 | 2.01 |
| 1675 | 21.08 | 28.96 | 2100 | 1.95 |
| 1755 | 3.50 | 2.96 | 2125 | 1.90 |
| 2000 | 0.76 | 1.16 | 2150 | 1.86 |
| 2100 | 0.72 | 1.19 | 2175 | 1.83 |
| 2250 | 0.68 | 1.15 | 2200 | 1.81 |
| 2400 | 0.71 | 1.22 | 2225 | 1.79 |
| 2500 | 0.75 | 1.08 | 2250 | 1.78 |
| 2615 | 3.21 | 4.06 | 2275 | 1.77 |
| 2820 | 20.10 | 59.57 | 2300 | 1.76 |
| 2950 | 28.96 | 78.38 | 2325 | 1.76 |
| 2980 | 30.77 | 79.70 | 2350 | 1.76 |
| 3600 | 90.80 | 73.68 | 2375 | 1.78 |
| 3900 | 85.67 | 68.27 | 2400 | 1.80 |
| 4000 | 69.47 | 48.77 | 2425 | 1.83 |
| 5000 | 53.48 | 57.92 | 2450 | 1.88 |
| 6000 | 43.44 | 32.48 | 2500 | 2.06 |

+RoHS Compliant

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



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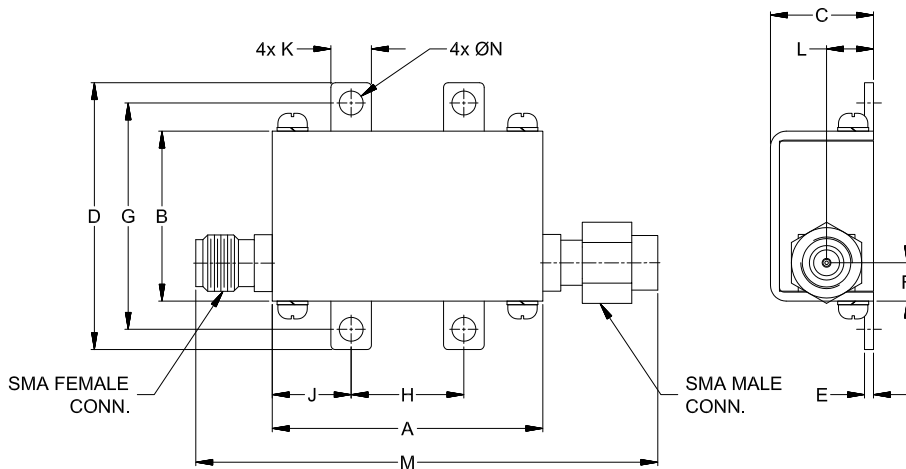
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Coaxial Connections

| | |
|----------|------------|
| PORT - 1 | SMA-Male |
| PORT - 2 | SMA-Female |

Outline Drawing



Outline Dimensions (inch/mm)

| A | B | C | D | E | F | G |
|-------|-------|-------|-------|-------|------|-------|
| 1.20 | .75 | .46 | 1.18 | .04 | .17 | 1.00 |
| 30.48 | 19.05 | 11.68 | 29.97 | 1.02 | 4.32 | 25.40 |
| H | J | K | L | M | N | Wt. |
| .50 | .35 | .18 | .21 | 2.05 | .106 | grams |
| 12.70 | 8.89 | 4.57 | 5.28 | 52.07 | 2.69 | 35.0 |

Note: Please refer to case style drawing for details

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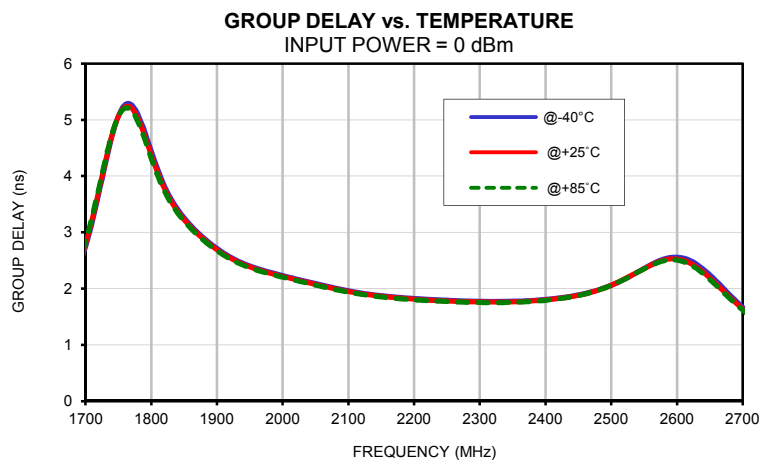
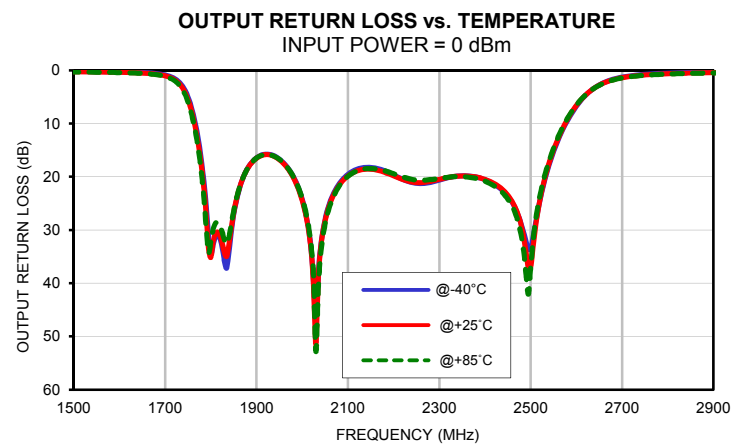
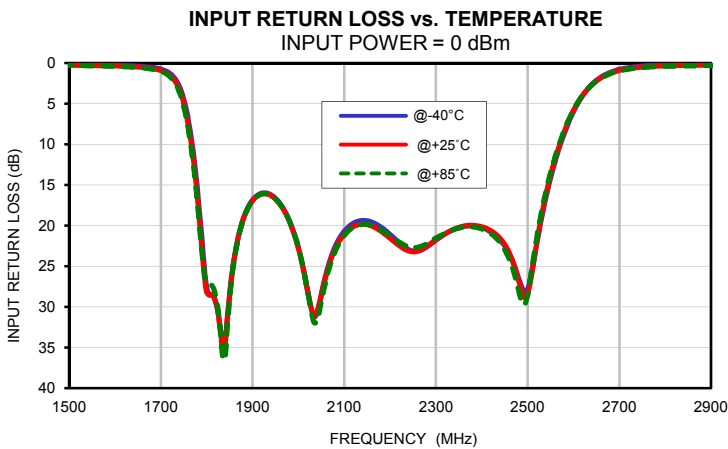
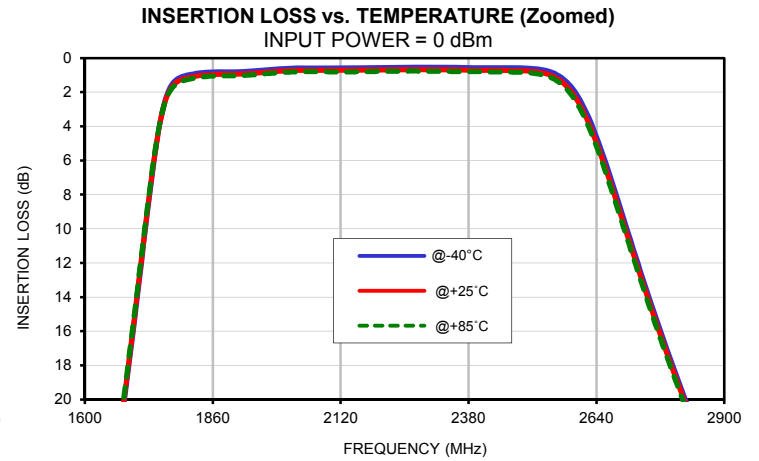
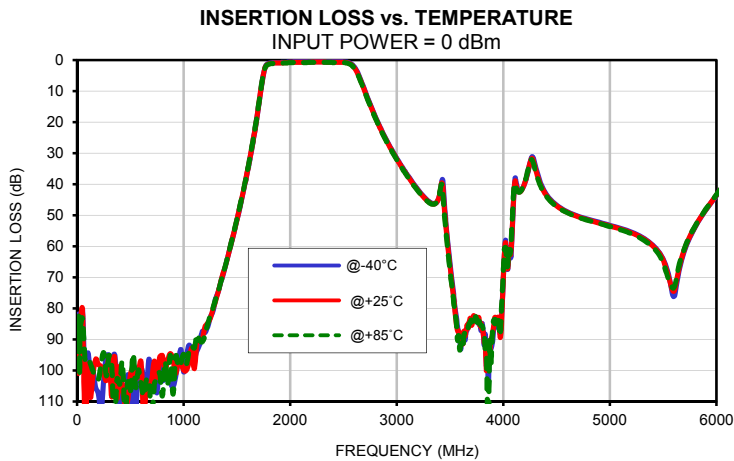
Typical Performance Data

| FREQ. (MHz) | INSERTION LOSS | | | INPUT RETURN LOSS | | | OUTPUT RETURN LOSS | | |
|--------------------|----------------|--------|--------|-------------------|--------|--------|--------------------|--------|--------|
| | (dB) | | | (dB) | | | (dB) | | |
| | @-40°C | @+25°C | @+85°C | @-40°C | @+25°C | @+85°C | @-40°C | @+25°C | @+85°C |
| 10 | 80.47 | 77.58 | 79.77 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| 20 | 83.66 | 92.38 | 83.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| 50 | 73.26 | 72.87 | 72.82 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| 75 | 95.04 | 101.94 | 99.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 100 | 85.58 | 85.22 | 87.31 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 150 | 91.09 | 108.68 | 89.91 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 |
| 200 | 95.10 | 95.44 | 98.30 | 0.02 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 |
| 250 | 91.04 | 87.71 | 87.48 | 0.02 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 |
| 300 | 93.73 | 95.86 | 91.60 | 0.02 | 0.00 | 0.00 | 0.00 | 0.01 | 0.02 |
| 350 | 90.15 | 92.78 | 87.79 | 0.02 | 0.00 | 0.01 | 0.01 | 0.03 | 0.03 |
| 400 | 90.12 | 93.60 | 92.10 | 0.02 | 0.01 | 0.01 | 0.02 | 0.04 | 0.05 |
| 500 | 111.53 | 98.01 | 97.43 | 0.02 | 0.01 | 0.02 | 0.04 | 0.07 | 0.08 |
| 1000 | 100.88 | 99.13 | 94.07 | 0.00 | 0.07 | 0.09 | 0.22 | 0.28 | 0.31 |
| 1100 | 93.11 | 95.08 | 98.15 | 0.02 | 0.08 | 0.11 | 0.23 | 0.28 | 0.32 |
| 1150 | 93.27 | 91.12 | 90.25 | 0.03 | 0.09 | 0.12 | 0.22 | 0.28 | 0.32 |
| 1200 | 85.51 | 90.64 | 86.14 | 0.04 | 0.11 | 0.13 | 0.22 | 0.28 | 0.31 |
| 1250 | 83.27 | 82.91 | 83.52 | 0.05 | 0.12 | 0.15 | 0.21 | 0.27 | 0.31 |
| 1300 | 77.45 | 77.23 | 78.05 | 0.07 | 0.14 | 0.17 | 0.20 | 0.26 | 0.30 |
| 1500 | 51.58 | 51.42 | 51.20 | 0.16 | 0.23 | 0.27 | 0.21 | 0.28 | 0.32 |
| 1550 | 44.01 | 43.83 | 43.63 | 0.20 | 0.28 | 0.32 | 0.23 | 0.31 | 0.36 |
| 1630 | 30.35 | 30.14 | 29.94 | 0.31 | 0.41 | 0.47 | 0.36 | 0.45 | 0.52 |
| 1675 | 21.29 | 21.08 | 20.87 | 0.48 | 0.60 | 0.68 | 0.57 | 0.69 | 0.77 |
| 1700 | 15.64 | 15.43 | 15.22 | 0.73 | 0.89 | 1.01 | 0.89 | 1.04 | 1.16 |
| 1755 | 3.47 | 3.50 | 3.48 | 5.54 | 6.10 | 6.58 | 6.16 | 6.72 | 7.25 |
| 1900 | 0.81 | 0.95 | 1.04 | 16.84 | 16.92 | 16.95 | 16.43 | 16.51 | 16.50 |
| 1950 | 0.75 | 0.89 | 0.98 | 16.61 | 16.71 | 16.71 | 16.64 | 16.77 | 16.71 |
| 2000 | 0.63 | 0.76 | 0.85 | 22.66 | 22.77 | 22.69 | 24.18 | 24.39 | 24.04 |
| 2050 | 0.58 | 0.71 | 0.80 | 28.47 | 28.56 | 29.39 | 28.11 | 28.34 | 28.94 |
| 2100 | 0.59 | 0.72 | 0.80 | 20.70 | 21.05 | 21.22 | 19.56 | 19.85 | 19.92 |
| 2150 | 0.59 | 0.72 | 0.80 | 19.39 | 19.87 | 19.84 | 18.25 | 18.59 | 18.46 |
| 2200 | 0.57 | 0.70 | 0.79 | 21.08 | 21.54 | 21.25 | 19.63 | 19.83 | 19.44 |
| 2250 | 0.54 | 0.68 | 0.77 | 23.13 | 23.20 | 22.71 | 21.27 | 21.11 | 20.62 |
| 2300 | 0.54 | 0.68 | 0.77 | 21.79 | 21.74 | 21.53 | 20.62 | 20.50 | 20.33 |
| 2400 | 0.56 | 0.71 | 0.79 | 20.23 | 20.12 | 20.39 | 20.56 | 20.49 | 20.83 |
| 2450 | 0.57 | 0.72 | 0.81 | 22.47 | 22.32 | 22.95 | 23.65 | 23.46 | 24.18 |
| 2500 | 0.59 | 0.75 | 0.85 | 27.81 | 28.49 | 28.50 | 33.48 | 36.98 | 37.03 |
| 2600 | 2.12 | 2.43 | 2.62 | 5.95 | 5.83 | 5.74 | 6.74 | 6.60 | 6.53 |
| 2615 | 2.88 | 3.21 | 3.42 | 4.41 | 4.36 | 4.33 | 5.15 | 5.07 | 5.05 |
| 2700 | 9.74 | 10.06 | 10.27 | 0.78 | 0.90 | 0.96 | 1.29 | 1.39 | 1.45 |
| 2800 | 18.34 | 18.56 | 18.75 | 0.19 | 0.32 | 0.39 | 0.54 | 0.65 | 0.71 |
| 2820 | 19.89 | 20.10 | 20.29 | 0.16 | 0.29 | 0.37 | 0.49 | 0.59 | 0.65 |
| 2950 | 28.75 | 28.96 | 29.15 | 0.09 | 0.22 | 0.30 | 0.29 | 0.39 | 0.45 |
| 3000 | 31.72 | 31.93 | 32.12 | 0.09 | 0.22 | 0.30 | 0.25 | 0.35 | 0.41 |
| 3100 | 37.14 | 37.35 | 37.54 | 0.08 | 0.22 | 0.31 | 0.19 | 0.29 | 0.36 |
| 3200 | 41.90 | 42.11 | 42.30 | 0.09 | 0.22 | 0.31 | 0.15 | 0.25 | 0.32 |
| 3300 | 45.66 | 45.82 | 45.96 | 0.09 | 0.22 | 0.32 | 0.12 | 0.22 | 0.29 |
| 3400 | 43.88 | 43.59 | 43.24 | 0.10 | 0.24 | 0.33 | 0.13 | 0.24 | 0.32 |
| 3550 | 80.77 | 81.46 | 82.63 | 0.11 | 0.23 | 0.32 | 0.08 | 0.18 | 0.26 |
| 3600 | 92.01 | 90.80 | 93.35 | 0.11 | 0.24 | 0.31 | 0.07 | 0.18 | 0.25 |
| 3700 | 83.41 | 83.23 | 84.15 | 0.12 | 0.24 | 0.31 | 0.06 | 0.17 | 0.25 |
| 3800 | 88.48 | 86.43 | 87.90 | 0.13 | 0.25 | 0.31 | 0.06 | 0.16 | 0.24 |
| 3900 | 87.66 | 85.67 | 87.03 | 0.13 | 0.25 | 0.32 | 0.06 | 0.16 | 0.24 |
| 4000 | 70.37 | 69.47 | 67.40 | 0.22 | 0.36 | 0.45 | 0.06 | 0.16 | 0.24 |
| 4100 | 42.34 | 41.90 | 40.75 | 1.24 | 1.57 | 1.93 | 0.06 | 0.16 | 0.24 |
| 4200 | 39.80 | 39.73 | 39.42 | 0.65 | 0.90 | 1.12 | 0.06 | 0.16 | 0.23 |
| 4300 | 34.13 | 34.98 | 35.79 | 3.36 | 3.18 | 2.87 | 0.06 | 0.16 | 0.24 |
| 4400 | 43.14 | 43.54 | 43.84 | 0.43 | 0.59 | 0.67 | 0.06 | 0.16 | 0.23 |
| 5000 | 53.18 | 53.48 | 53.64 | 0.05 | 0.30 | 0.50 | 0.09 | 0.18 | 0.24 |
| 5500 | 64.40 | 64.59 | 65.49 | 0.07 | 0.31 | 0.50 | 0.11 | 0.21 | 0.26 |
| 6000 | 43.62 | 43.44 | 43.38 | 0.35 | 0.53 | 0.60 | 0.13 | 0.22 | 0.27 |

Typical Performance Data

| FREQ. (MHz) | GROUP DELAY | | |
|--------------------|-------------|--------|--------|
| | (ns) | | |
| | @-40°C | @+25°C | @+85°C |
| 2000 | 2.23 | 2.22 | 2.20 |
| 2010 | 2.20 | 2.19 | 2.17 |
| 2020 | 2.17 | 2.16 | 2.15 |
| 2030 | 2.15 | 2.13 | 2.12 |
| 2040 | 2.12 | 2.10 | 2.09 |
| 2050 | 2.09 | 2.07 | 2.06 |
| 2060 | 2.06 | 2.05 | 2.04 |
| 2070 | 2.04 | 2.02 | 2.01 |
| 2080 | 2.01 | 2.00 | 1.98 |
| 2090 | 1.99 | 1.97 | 1.96 |
| 2100 | 1.96 | 1.95 | 1.94 |
| 2110 | 1.94 | 1.93 | 1.92 |
| 2120 | 1.92 | 1.91 | 1.90 |
| 2130 | 1.90 | 1.89 | 1.88 |
| 2140 | 1.89 | 1.88 | 1.87 |
| 2150 | 1.87 | 1.86 | 1.85 |
| 2160 | 1.86 | 1.85 | 1.84 |
| 2170 | 1.85 | 1.84 | 1.83 |
| 2180 | 1.84 | 1.83 | 1.82 |
| 2190 | 1.83 | 1.82 | 1.81 |
| 2200 | 1.82 | 1.81 | 1.80 |
| 2210 | 1.82 | 1.80 | 1.79 |
| 2220 | 1.81 | 1.80 | 1.79 |
| 2230 | 1.80 | 1.79 | 1.78 |
| 2240 | 1.80 | 1.79 | 1.78 |
| 2250 | 1.79 | 1.78 | 1.77 |
| 2260 | 1.79 | 1.78 | 1.77 |
| 2270 | 1.78 | 1.77 | 1.76 |
| 2280 | 1.78 | 1.77 | 1.76 |
| 2290 | 1.78 | 1.76 | 1.75 |
| 2300 | 1.77 | 1.76 | 1.75 |
| 2310 | 1.77 | 1.76 | 1.75 |
| 2320 | 1.77 | 1.76 | 1.75 |
| 2330 | 1.77 | 1.76 | 1.75 |
| 2340 | 1.77 | 1.76 | 1.75 |
| 2350 | 1.77 | 1.76 | 1.76 |
| 2360 | 1.78 | 1.77 | 1.76 |
| 2370 | 1.78 | 1.77 | 1.77 |
| 2380 | 1.79 | 1.78 | 1.77 |
| 2390 | 1.80 | 1.79 | 1.78 |
| 2400 | 1.81 | 1.80 | 1.79 |
| 2410 | 1.82 | 1.81 | 1.80 |
| 2420 | 1.83 | 1.82 | 1.82 |
| 2430 | 1.85 | 1.84 | 1.84 |
| 2440 | 1.87 | 1.86 | 1.85 |
| 2450 | 1.89 | 1.88 | 1.88 |
| 2460 | 1.91 | 1.91 | 1.90 |
| 2470 | 1.94 | 1.94 | 1.93 |
| 2480 | 1.98 | 1.97 | 1.97 |
| 2490 | 2.02 | 2.01 | 2.01 |
| 2500 | 2.06 | 2.06 | 2.06 |

Typical Performance Curves

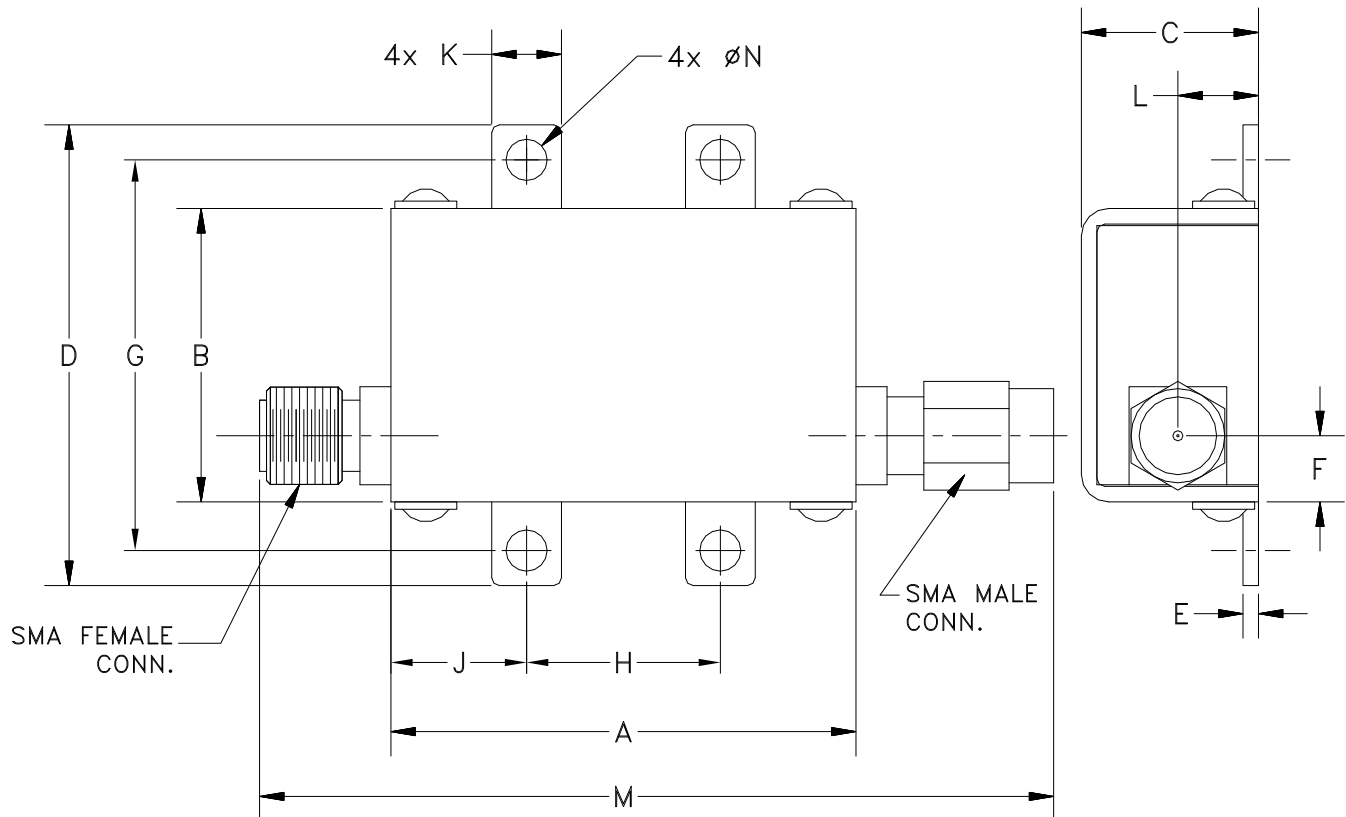


Case Style

HY

Outline Dimensions

HY1238



| CASE #. | A | B | C | D | E | F | G | H | J | K | L | M | N | WT GRAMS |
|---------|-----------------|----------------|----------------|-----------------|---------------|---------------|-----------------|----------------|---------------|---------------|---------------|-----------------|----------------|----------|
| HY1238 | 1.20 (30.48) | .75 (19.05) | .46 (11.68) | 1.18 (29.97) | .04 (1.02) | .17 (4.32) | 1.00 (25.40) | .50 (12.70) | .35 (8.89) | .18 (4.57) | .21 (5.28) | 2.05 (52.07) | .106 (2.69) | 35.0 |

Dimensions are in inches (mm). Tolerances: 2Pl. $\pm .03$; 3Pl. $\pm .015$
 Tolerance on hole size and interaxes dimensions to be $\pm .005$.

Note:

1. Case material: Brass
2. Case finish: Nickel plate

Mini-Circuits®

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Mini-Circuits ISO 9001 & ISO 14001 Certified

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 100°C Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C Ambient Environment | Individual Model Data Sheet |
| Humidity | 90 to 95% RH, 40°C, 96 hours; Units may require bake-out after humidity to restore full performance. | MIL-STD-202, Method 103, Condition B |
| Thermal Shock | -55° to 100°C, 100 cycles | MIL-STD-202, Method 107, Condition A-3, except +100°C |
| Vibration (High Frequency) | 20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36) | MIL-STD-202, Method 204, Condition D |
| Mechanical Shock | 50g, 11ms half-sine, 3 shocks each direction 3 axes (total 18) | MIL-STD-202, Method 213, Condition A |