

# 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](http://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

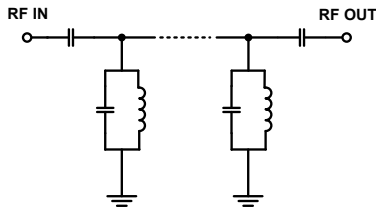
Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
<b>Pass Band</b>	Center Frequency	—	—	2250	—	MHz
	Insertion Loss	F1-F2	2000 - 2500	0.85	1.5	dB
	VSWR	F1-F2	2000 - 2500	—	1.4	:1
<b>Stop Band, Lower</b>	Insertion Loss	DC-F3	DC - 1000	70	80	dB
		F3-F4	1000 - 1500	40	50	dB
	F4-F5	1500 - 1630	20	29	dB	
<b>Stop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

### Maximum Ratings

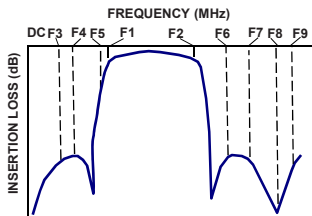
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	2 W Max.

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

### Functional Schematic



### Typical Frequency Response

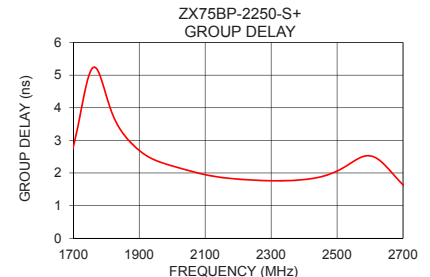
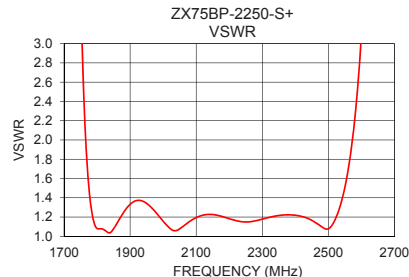
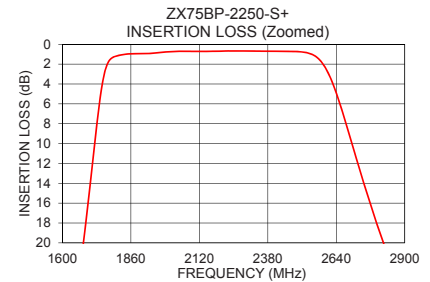
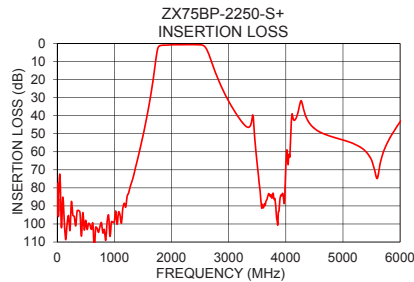


### Typical Performance Data at 25°C

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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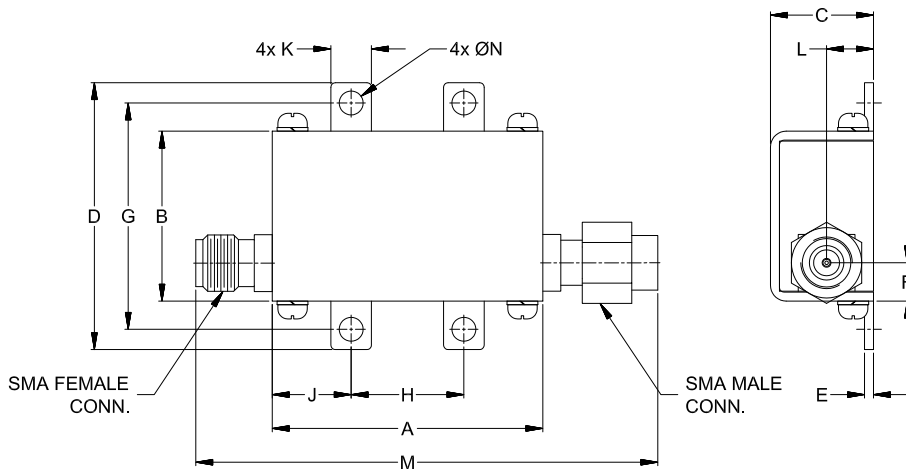
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## Coaxial Connections

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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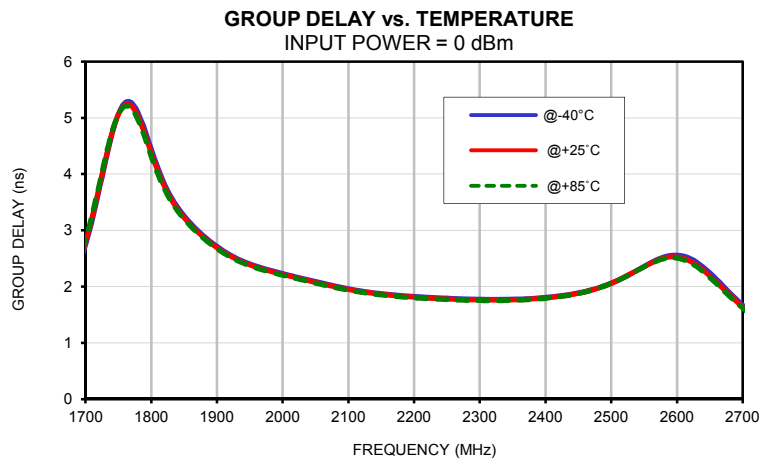
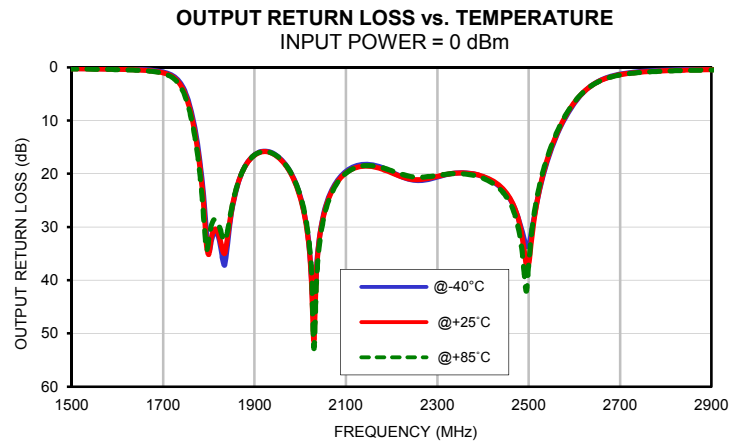
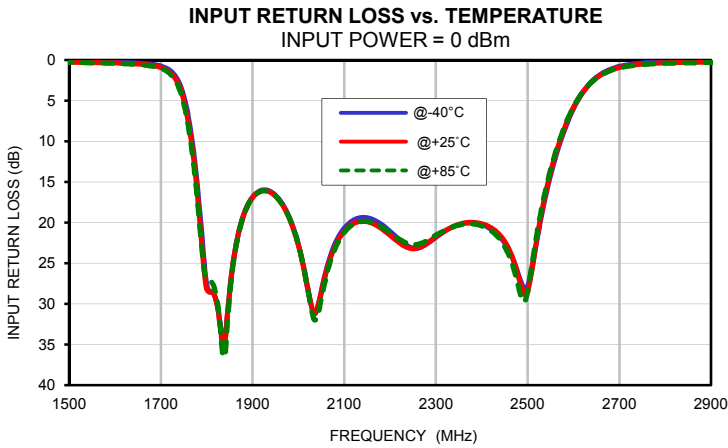
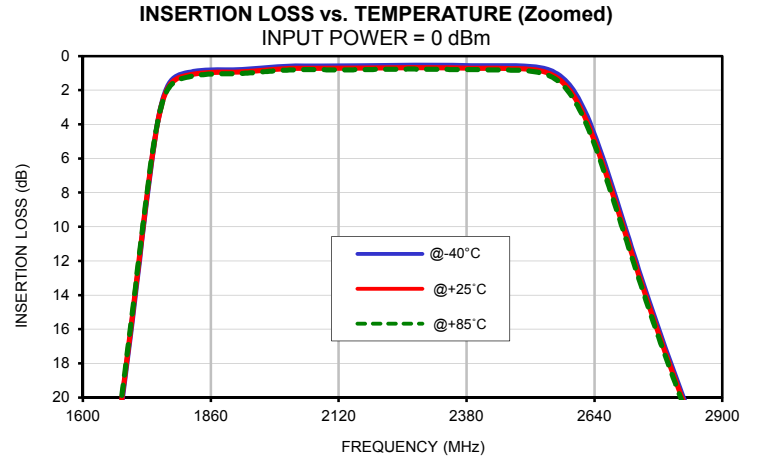
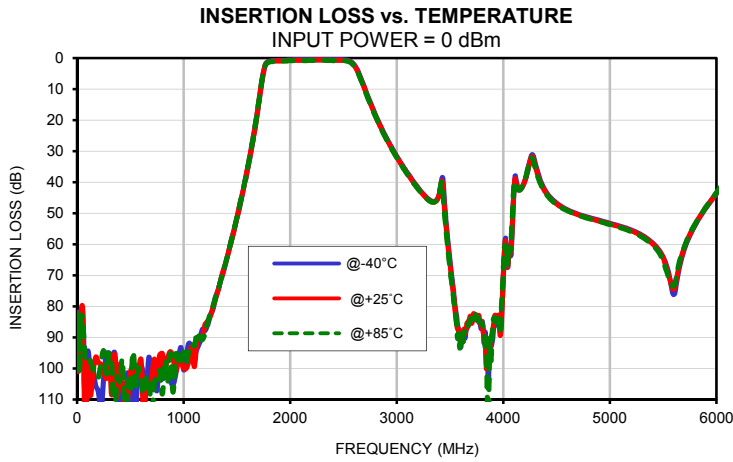
*Typical Performance Data*

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

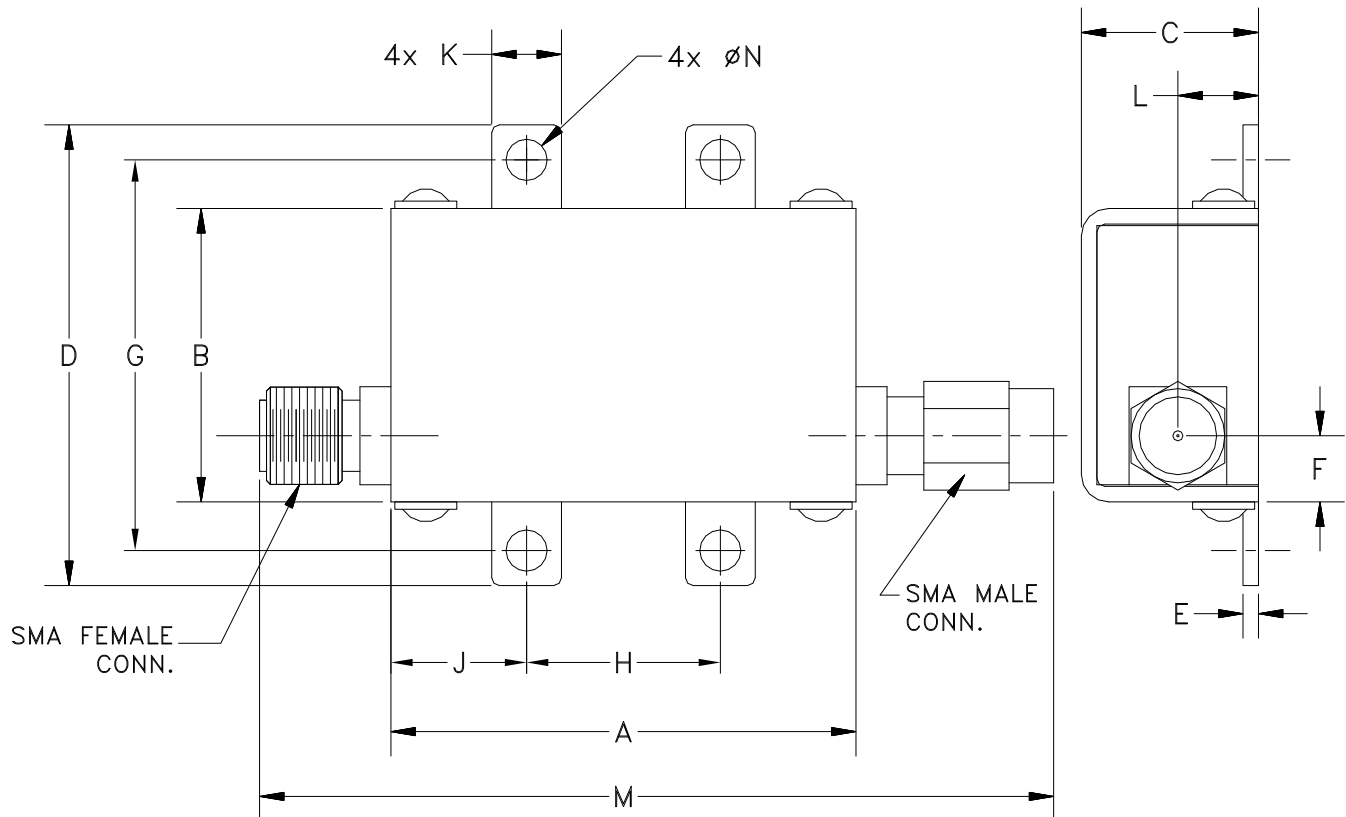


# Case Style

# 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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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