

# Coaxial Reflectionless Low Pass Filter

## ZXLF-Series

50Ω DC to 20 GHz

### The Big Deal

- Patented design terminates stopband signal internally
- Stopband performance up to 40 GHz
- Small In-line package size of 0.80" x 0.56"



CASE STYLE: RA2937

### Product Overview

Mini-Circuits' ZXLF Series of reflectionless filters employ a novel filter topology which absorbs and terminates stop band signals internally rather than reflecting them back to the source. Reflectionless filters minimize the stopband reflections, thereby allowing them to be paired with sensitive devices and be used in applications that otherwise require circuits such as isolation amplifiers or attenuators. This is developed in a new broadband connectorized package that delivers stable performance over temperature.

### Key Features

Feature	Advantages
Easy integration with sensitive reflective components, e.g. mixers, multipliers	Reflectionless filters absorb unwanted signals, preventing reflections back to the source. This reduces generation of additional unwanted signals without the need for extra components like attenuators, improving system dynamic range.
Cascadable	Reflectionless filters can be cascaded in multiple sections to provide sharper and higher attenuation, while also preventing any standing waves that could affect pass band signals.
Excellent stability over temperature	Ensures minimal variation in electrical performance across temperature.
Wide Operating temperature from -40 to +85°C	Suitable for use in wide temperature range applications.
Broadband connectorized package	The connectorized package works well even in high frequencies and easy to interface with other devices. This is well suited for test setups.



# Coaxial Reflectionless Low Pass Filter

50Ω DC to 12 GHz

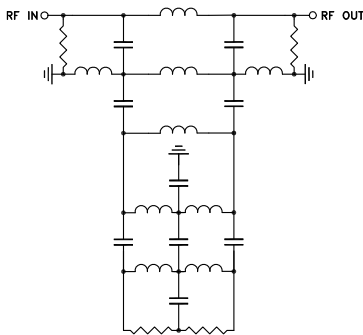
## Features

- Match to 50Ω in the stop band, eliminates undesired reflections
- Cascadable
- Temperature stable, up to 85°C
- Protected by US Patent No. 8,392,495

## Applications

- Harmonics Rejection
- Satellite
- Radar
- Military & Space

## Functional Schematic



# ZXLF-K123+



Generic photo used for illustration purposes only

CASE STYLE: RA2937  
Connectors Model  
2.92mm-F to 2.92mm-M ZXLF-K123+

**+RoHS Compliant**

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

## Electrical Specifications at 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Insertion Loss	DC-F1	DC-12000		1.4	2.5	dB
	Freq. Cut-off	F2	14200		3.0		dB
	VSWR	DC-F1	DC-12000		1.3		:1
Stop Band	Rejection	F3-F4	18100-19000	18.0	20.0		dB
		F4-F5	19000-29000		24.0		dB
	VSWR	F3-F4	18100-19000		1.45		:1
		F4-F5	19000-29000		3.0		:1

## Absolute Maximum Ratings<sup>3</sup>

Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C
RF Power Input, Passband (DC-F1) <sup>1</sup>	2W at 25°C
RF Power Input, Stopband (F2-F5) <sup>2</sup>	50mW at 25°C

<sup>1</sup> Passband rating derates linearly to 1W at 85°C ambient

<sup>2</sup> Stopband rating derates linearly to 25mW at 85°C ambient

<sup>3</sup> Permanent damage may occur if any of these limits are exceeded

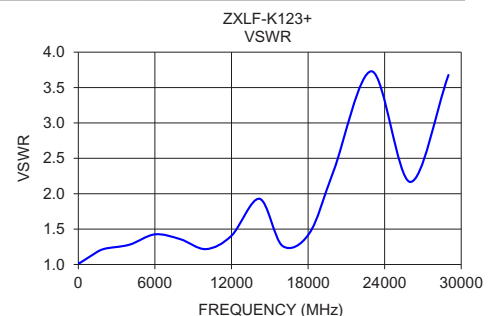
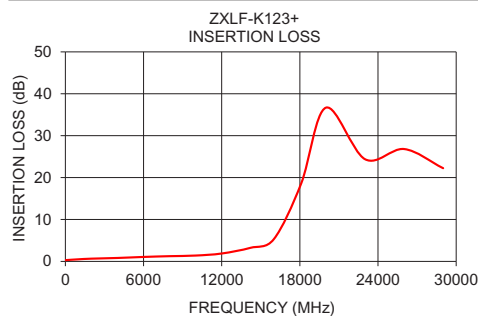
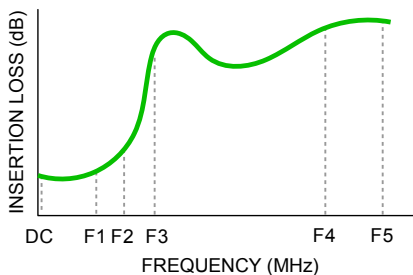
## ESD rating

Human Body Model (HBM): Class 1A (250 to <500V) in accordance with ANSI/ESD 5.1 - 2001

## Typical Performance Data at 25°C

Frequency (GHz)	Insertion Loss (dB)	VSWR (:1)
10	0.30	1.03
100	0.32	1.02
1000	0.50	1.12
2000	0.65	1.22
4000	0.82	1.28
6000	1.07	1.43
8000	1.25	1.36
10000	1.40	1.22
12000	1.88	1.41
14200	3.24	1.93
16000	5.30	1.26
18100	18.57	1.44
20000	36.69	2.32
23000	24.39	3.73
26000	26.82	2.17
29000	22.24	3.68

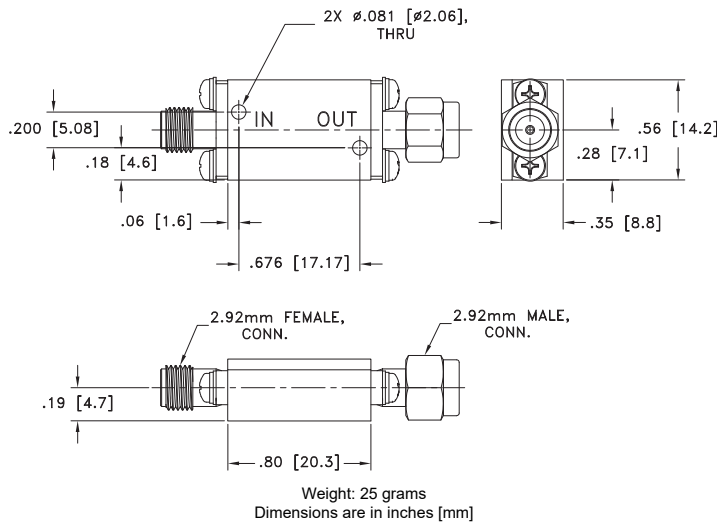
## Specification Definition



## Coaxial Connections

PORT - IN	2.92mm-Fem
PORT - OUT	2.92mm-Male

## Outline Drawing



## Additional Notes

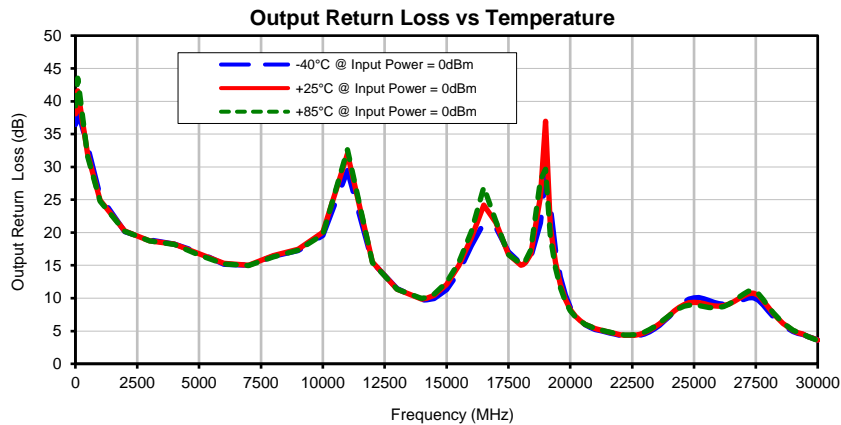
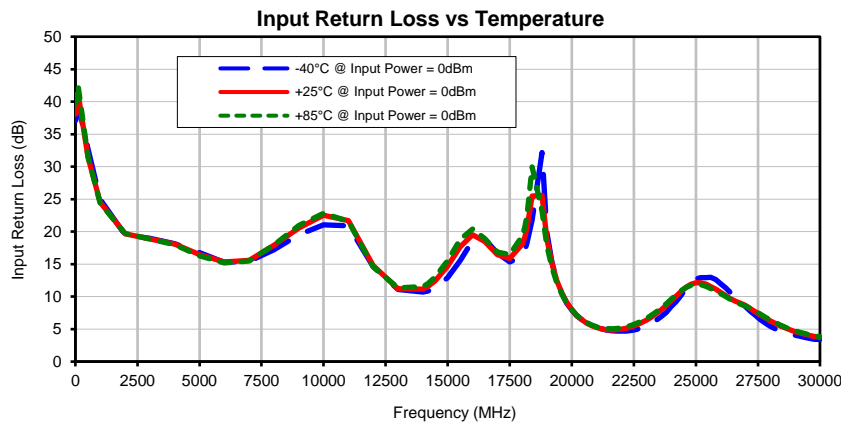
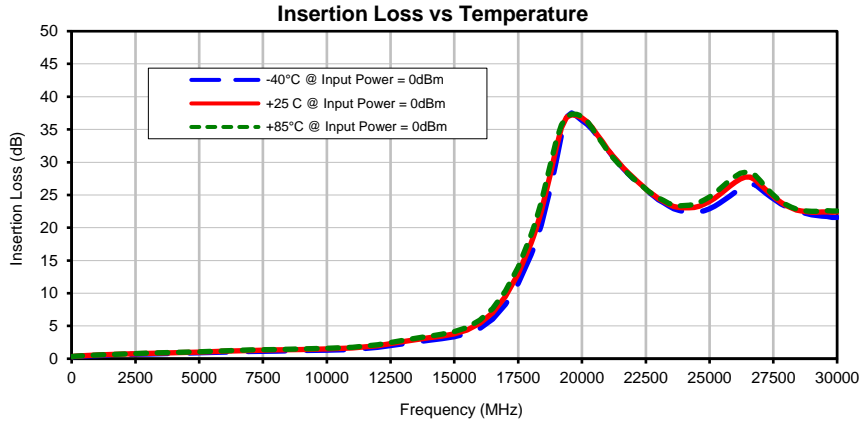
- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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)

*Typical Performance Data*

FREQUENCY (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	0.30	0.31	0.33	37.08	38.09	39.62	36.47	38.06	39.29
50	0.31	0.33	0.35	38.33	39.70	40.59	37.30	39.67	41.18
100	0.33	0.35	0.37	39.66	41.28	42.50	38.64	41.59	43.52
500	0.42	0.46	0.48	32.76	31.51	31.57	33.12	31.95	31.58
1000	0.49	0.55	0.58	24.99	24.53	24.41	25.57	24.91	24.78
2000	0.64	0.71	0.74	19.51	19.69	19.74	20.13	20.25	20.21
3000	0.73	0.81	0.85	18.98	18.88	18.87	18.87	18.74	18.71
4000	0.81	0.90	0.95	18.15	18.09	18.01	18.24	18.25	18.20
5000	0.90	1.01	1.07	16.74	16.48	16.27	16.98	16.79	16.57
6000	1.01	1.14	1.21	15.31	15.34	15.17	15.19	15.32	15.21
7000	1.11	1.26	1.33	15.41	15.56	15.49	15.04	15.04	14.98
8000	1.18	1.34	1.42	17.21	17.90	17.94	16.41	16.48	16.29
9000	1.23	1.41	1.50	19.52	20.93	20.93	17.26	17.46	17.29
10000	1.30	1.50	1.60	21.06	22.52	22.81	19.57	20.02	19.71
11000	1.41	1.64	1.75	20.92	21.69	21.59	20.43	21.99	22.61
12000	1.72	1.99	2.13	14.64	14.78	14.60	15.48	15.53	15.42
13000	2.26	2.62	2.80	11.13	11.18	11.34	11.46	11.35	11.35
14000	2.80	3.22	3.43	10.71	11.13	11.53	9.72	9.84	9.96
14200	2.90	3.31	3.54	10.88	11.53	11.99	9.75	10.01	10.16
14500	3.05	3.47	3.72	11.31	12.43	13.00	9.96	10.44	10.65
15000	3.36	3.81	4.12	12.92	14.67	15.55	11.31	12.12	12.46
15500	3.82	4.39	4.78	15.54	17.64	18.79	13.98	14.98	15.47
16000	4.64	5.39	5.90	18.63	19.52	20.42	18.00	19.17	20.14
16500	6.05	7.01	7.67	18.81	18.49	18.95	21.48	24.17	26.91
17000	8.30	9.50	10.34	16.70	16.49	16.88	20.76	21.48	21.71
17500	11.53	12.98	14.01	15.31	15.86	16.45	17.08	16.69	16.63
18000	15.86	17.61	18.88	16.19	18.06	19.33	15.27	15.03	15.25
18100	16.88	18.70	20.02	17.03	19.13	20.67	15.26	15.12	15.40
18200	17.99	19.89	21.25	18.27	20.57	22.53	15.45	15.45	15.82
18400	20.41	22.45	23.91	21.80	25.47	29.98	16.28	16.75	17.37
18800	26.51	28.72	30.17	32.18	25.59	23.18	21.46	25.48	28.01
19000	30.24	32.21	33.33	19.91	18.91	17.85	28.61	36.95	29.64
19200	34.15	35.24	35.71	15.29	15.12	14.51	23.93	20.89	19.35
19400	36.92	36.88	36.91	12.48	12.50	12.16	17.29	15.45	14.63
19600	37.52	37.26	37.36	10.46	10.58	10.41	13.25	12.14	11.64
19800	36.99	37.09	37.32	9.01	9.13	9.05	10.48	9.81	9.49
20000	36.37	36.75	36.99	7.95	8.00	8.00	8.66	8.30	8.11
20200	35.80	36.19	36.29	7.07	7.13	7.17	7.42	7.28	7.18
20400	35.01	35.28	35.22	6.46	6.45	6.52	6.60	6.59	6.55
20600	34.03	34.16	33.99	5.91	5.92	6.02	5.95	6.02	6.01
20800	33.06	33.13	32.90	5.54	5.52	5.64	5.58	5.69	5.70
21000	31.93	32.00	31.76	5.27	5.23	5.36	5.22	5.35	5.38
21200	30.92	31.00	30.76	5.06	5.03	5.18	5.06	5.18	5.22
21400	30.00	30.11	29.90	4.87	4.92	5.08	4.86	4.97	4.99
21600	29.08	29.22	29.04	4.75	4.87	5.04	4.70	4.79	4.81
21800	28.26	28.41	28.26	4.69	4.89	5.08	4.54	4.62	4.65
22000	27.49	27.66	27.54	4.68	4.97	5.18	4.35	4.45	4.47
22200	26.77	26.94	26.85	4.72	5.13	5.34	4.22	4.33	4.37
22400	26.10	26.25	26.20	4.81	5.35	5.57	4.23	4.36	4.40
22600	25.46	25.60	25.58	4.95	5.62	5.86	4.21	4.36	4.42
22800	24.88	25.02	25.04	5.19	5.96	6.22	4.32	4.51	4.59
23000	24.27	24.47	24.53	5.58	6.37	6.63	4.53	4.74	4.83
23200	23.83	24.04	24.14	5.90	6.83	7.12	4.89	5.13	5.22
23400	23.32	23.58	23.74	6.38	7.38	7.67	5.33	5.56	5.66
23600	22.92	23.25	23.47	6.90	7.97	8.27	5.87	6.10	6.19
23800	22.63	23.07	23.34	7.56	8.64	8.91	6.51	6.70	6.77
24000	22.45	23.02	23.36	8.43	9.32	9.58	7.23	7.36	7.37
24200	22.35	23.02	23.44	9.25	10.07	10.25	8.04	8.03	7.97
24400	22.31	23.09	23.58	10.18	10.76	10.89	8.77	8.58	8.42
24600	22.41	23.31	23.87	11.31	11.43	11.41	9.43	9.04	8.78
24800	22.61	23.60	24.24	12.09	11.88	11.76	9.87	9.30	8.94
25000	22.91	24.01	24.72	12.75	12.14	11.89	10.07	9.38	8.96
25200	23.29	24.48	25.26	12.92	12.13	11.82	10.08	9.32	8.87
25400	23.79	25.08	25.92	12.95	11.93	11.59	9.92	9.17	8.74
25600	24.31	25.71	26.60	12.97	11.56	11.25	9.65	8.98	8.60
25800	24.87	26.34	27.27	12.61	11.14	10.87	9.38	8.84	8.54
26000	25.41	26.92	27.85	12.01	10.65	10.45	9.17	8.80	8.58
26200	25.93	27.44	28.30	11.34	10.14	10.01	9.06	8.86	8.74
26400	26.30	27.73	28.47	10.62	9.66	9.57	9.10	9.08	9.06
26600	26.54	27.72	28.37	9.75	9.30	9.16	9.26	9.45	9.53
26800	26.56	27.28	27.96	8.95	8.98	8.83	9.52	9.88	10.10
27000	25.95	26.56	27.12	8.43	8.63	8.55	9.80	10.32	10.64
27200	25.29	25.84	26.21	7.75	8.13	8.19	10.05	10.68	11.06
27400	24.69	25.12	25.37	7.10	7.65	7.74	10.08	10.77	11.15
27600	24.15	24.47	24.64	6.46	7.15	7.29	9.72	10.42	10.70
27800	23.61	23.85	23.98	5.92	6.70	6.83	9.88	9.61	9.81
28000	23.22	23.39	23.51	5.44	6.26	6.41	8.07	8.63	8.74
28200	22.89	23.04	23.15	5.04	5.87	6.01	7.23	7.72	7.80
28400	22.58	22.72	22.83	4.69	5.49	5.64	6.46	6.89	6.96
28600	22.35	22.56	22.66	4.44	5.18	5.31	5.80	6.15	6.21
28800	22.16	22.44	22.55	4.23	4.88	5.01	5.35	5.62	5.68
29000	21.98	22.36	22.49	4.05	4.62	4.75	4.91	5.09	5.14
29200	21.85	22.37	22.50	3.90	4.39	4.51	4.63	4.75	4.78
29400	21.79	22.39	22.53	3.71	4.19	4.31	4.48	4.54	4.55
29600	21.71	22.43	22.58	3.59	4.02	4.13	4.16	4.17	4.15
29800	21.59	22.36	22.53	3.44	3.85	3.97	3.93	3.90	3.87
30000	21.56	22.39	22.55	3.43	3.72	3.84	3.63	3.61	3.56

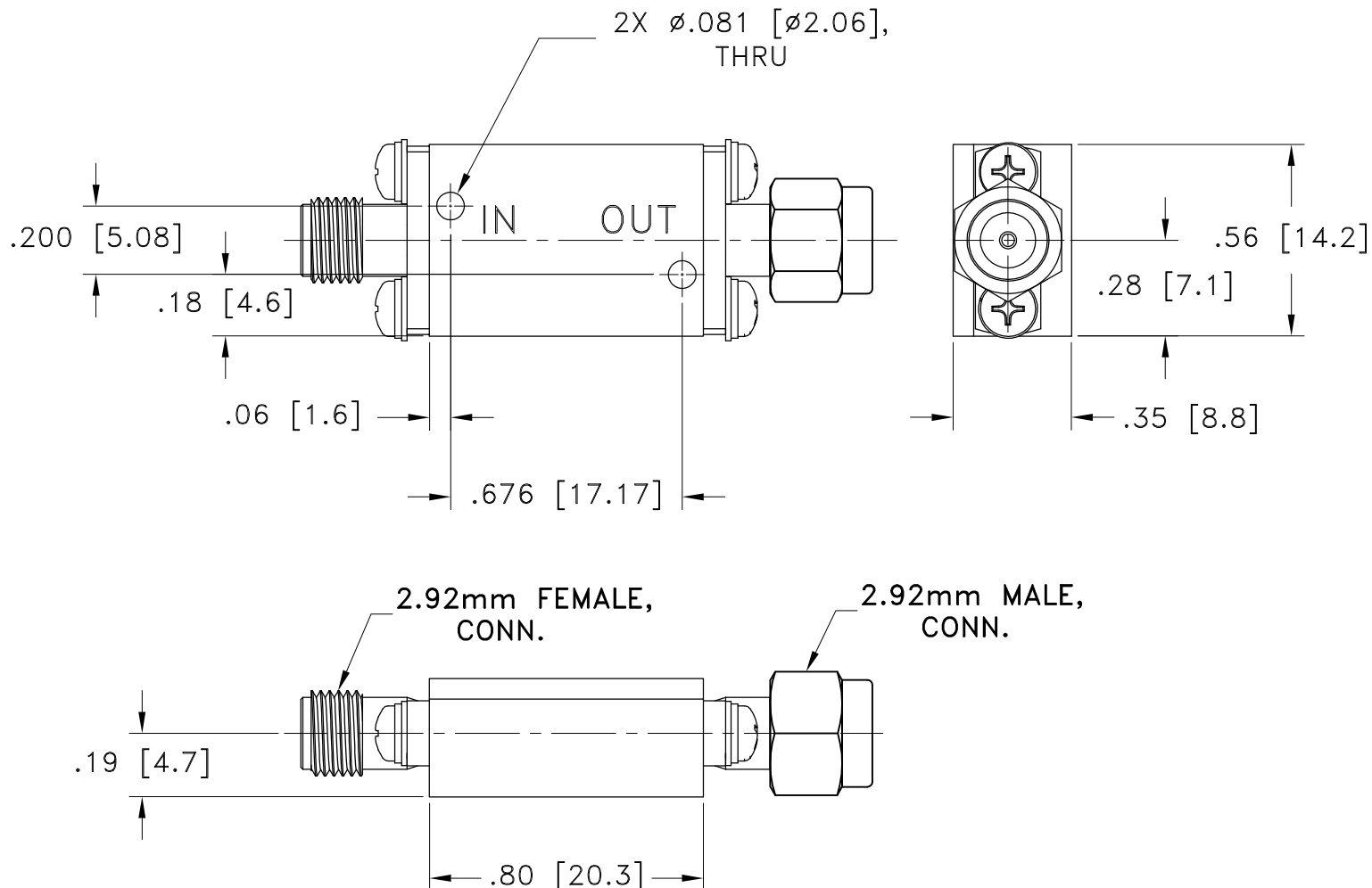


## Typical Performance Curves



## Outline Dimensions

RA2937



Weight: 25 grams

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm$ .015; 3 Pl.  $\pm$ .005

### Notes:

1. Case material: Brass.
2. Case Finish: Gold plate.

**Mini-Circuits**  
ISO 9001 ISO 14001 CERTIFIED

ALL NEW  
minicircuits.com

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS



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
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C