

Coaxial Reflectionless High Pass Filter

VXHF-292M+

50Ω

2900 to 8700 MHz

The Big Deal

- Match to 50Ω in the stop band, eliminates undesired reflections
- Cascadable
- Good stop band rejection, 36dB typ.
- Temperature stable up to 100°C



Generic photo used for illustration purposes only

CASE STYLE: FF704

+RoHS Compliant

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

Product Overview

Mini-Circuits' VXHF-292M+ of reflection filters now includes 2- and 3-section models, giving you ultra-high rejection in the stopband – up to 50 dB! Reflectionless filters employ a patented filter topology which absorbs and terminates stopband signals internally rather than reflecting them back to the source. This new capability enables unique applications for filter circuits beyond those suited to traditional approaches. Traditional filters are reflective in the stopband, sending signals back to the source at 100% power. These reflections interact with neighboring components and often result in intermodulation and other interferences. By eliminating stopband reflections, reflectionless filters can readily be paired with sensitive devices and used in applications that otherwise require circuits such as isolation amplifiers or attenuators

Key Features

Feature	Advantages
Easy integration with sensitive reflective components, e.g. mixers, multipliers	Reflectionless filters absorb unwanted signals falling in filter stopband, 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 and saving board space.
High stopband rejection, up to 50 dB	Ideal for applications where suppression of strong spurious signals and intermodulation products is needed.
Enables stable integration of wideband amplifiers	Because reflectionless filters maintain good impedance in the stopband; they can be integrated with high gain, wideband amplifiers without the risk of creating instabilities in these out of band regions.
Cascadable	Reflectionless filters can be cascaded in multiple sections to provide sharper and higher attenuation, while also preventing any standing waves that could affect passband signals.
Excellent power handling	High power handling extends the usability of these filters to the transmit path for inter-stage filtering.
Excellent repeatability of RF performance	Through semiconductor IPD process, X-series filters are inherently repeatable for large volume production.
Excellent stability over temperature	With ± 0.3 dB variation over temperature ideal for use in wide temperature range applications without the need for additional temperature compensation.
Operating temperature up to 100 °C	Suitable for operation close to high power components.
Connectorized package	The connectorized package is easy to interface with other devices and well suited for test setups.

*IPD – Integrated Passive Device, is a GaAs semiconductor process

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



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High Pass Filter

50Ω 2900 to 8700 MHz

VXHF-292M+



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Connectors	Model
SMA M/F	VXHF-292M+

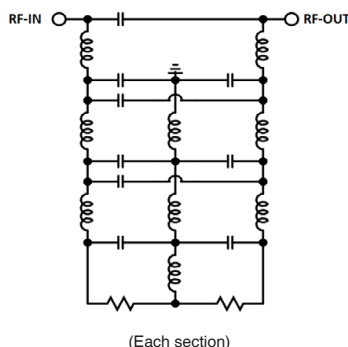
Features

- Match to 50Ω in the stop band, eliminates undesired reflections
- Cascadable
- Good stopband rejection, 36 dB typ.
- Temperature stable, up to 100°C
- Protected by US Patents 8,392,495; 9,705,467, additional patent pending
- Protected by China Patent 201080014266.1
- Protected by Taiwan Patent I581494

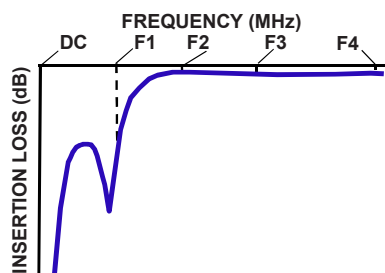
Applications

- Mobile (LTE B42/B43)
- ISM applications
- Satellite
- WiFi WiMAX

Functional Schematic



Typical Frequency Response



+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
Stop Band	Rejection	DC-F1	23	36	-	dB
	VSWR	DC-F1	-	1.5	-	:1
Pass Band	Insertion Loss	F2-F4	-	1.5	2.2	dB
	VSWR	F2-F3	-	1.5	-	:1
	VSWR	F3-F4	-	1.9	-	:1

Absolute Maximum Ratings³

Parameter	Ratings
Operating Temperature	-55°C to +100°C
Storage Temperature	-55°C to +100°C
RF Power Input, Passband (F2-F4) ¹	32 dBm at 25°C
RF Power Input, Stopband (DC-F1) ²	35 dBm at 25°C

¹ Passband rating derates linearly to 29 dBm at 100°C ambient

² Stopband rating derates linearly to 32 dBm at 100°C ambient

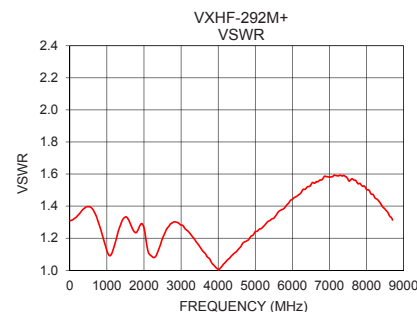
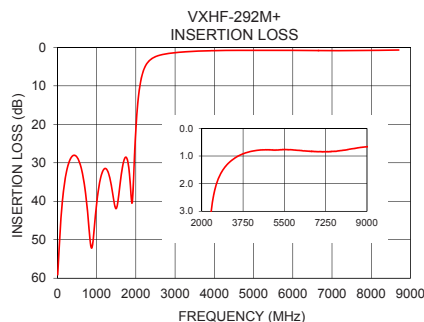
³ Permanent damage may occur if any of these limits are exceeded

ESD rating

Human body model (HBM): Class 2 (2000 V) in accordance with ANSI/ESD 5.1-2001

Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
10	59.11	1.31
100	43.44	1.32
500	28.52	1.40
1000	40.75	1.12
1500	41.89	1.33
1950	32.18	1.29
2000	21.42	1.26
2200	5.88	1.09
2400	2.99	1.13
2500	2.42	1.20
2800	1.64	1.30
2900	1.50	1.30
3000	1.38	1.28
4500	0.78	1.12
5500	0.76	1.32
6500	0.82	1.53
7000	0.84	1.58
7100	0.85	1.59
8000	0.79	1.50
8700	0.69	1.31



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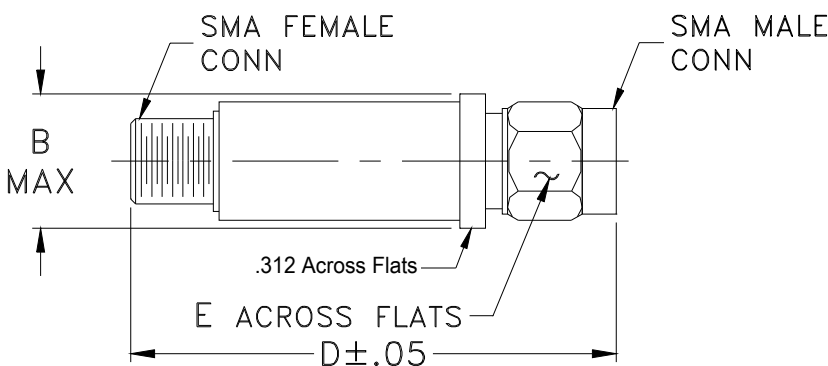
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Coaxial Connections

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

Outline Drawing



Outline Dimensions (^{inch}_{mm})

B	D	E	wt
.410	1.43	.312	grams
10.41	36.32	7.92	10.0

Note: Please refer to case style drawing for details

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VXHF-292M+

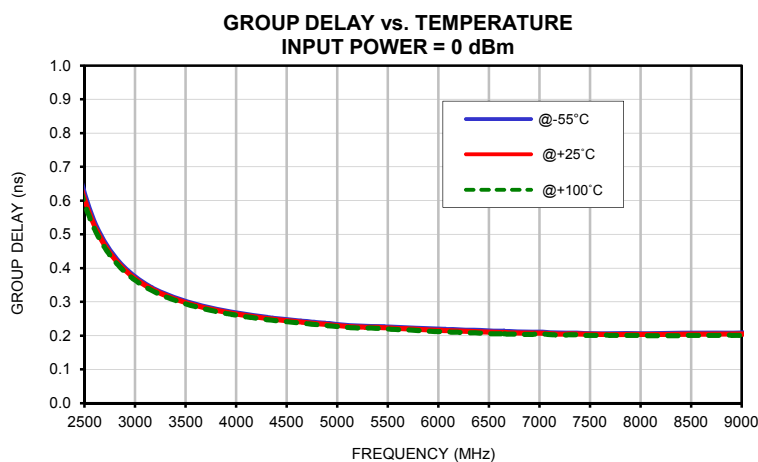
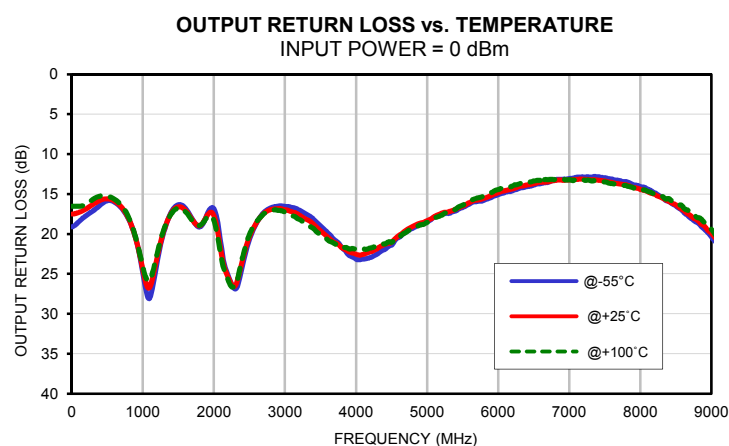
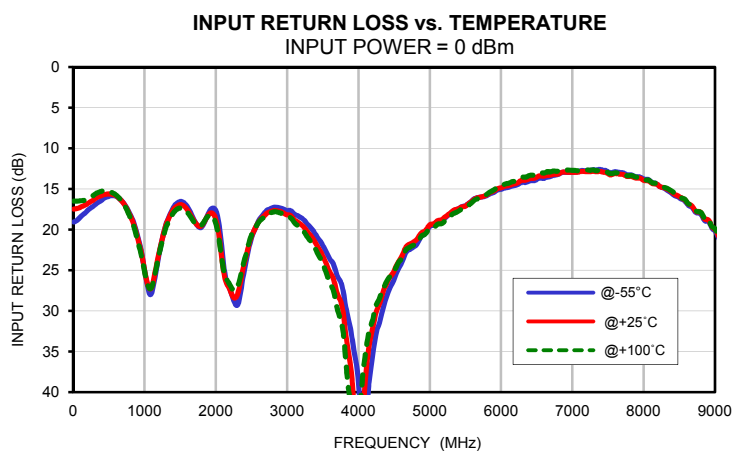
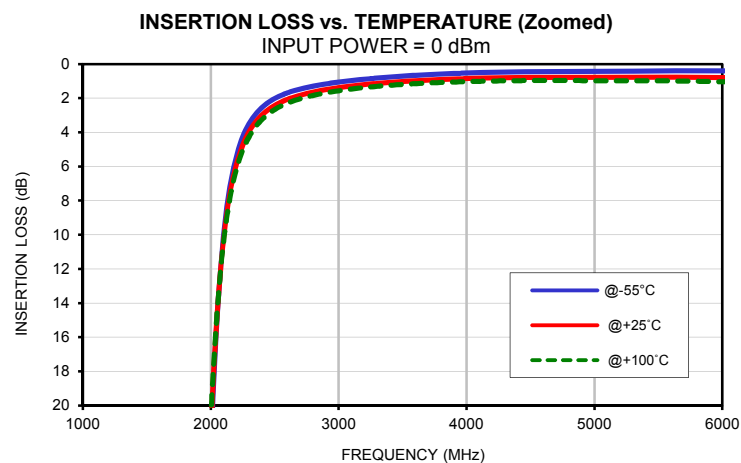
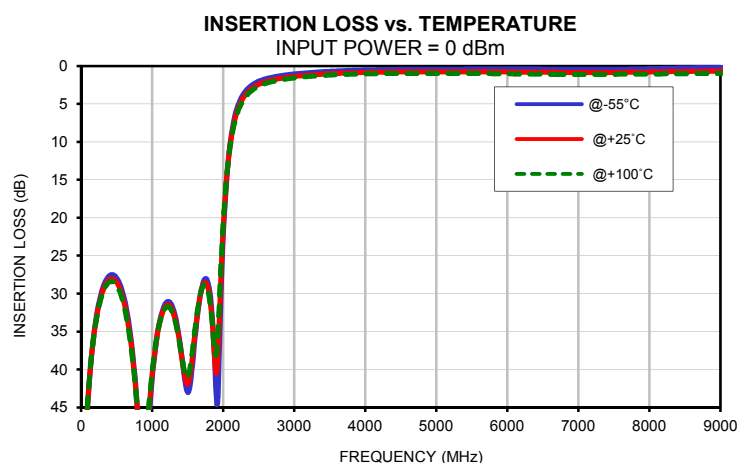
Typical Performance Data

FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-55°C	@+25°C	@+100°C	@-55°C	@+25°C	@+100°C	@-55°C	@+25°C	@+100°C
10	61.10	59.11	55.79	19.05	17.46	16.47	19.09	17.51	16.54
20	60.01	57.11	55.57	19.03	17.45	16.48	19.07	17.49	16.53
100	43.59	43.44	43.20	18.48	17.25	16.44	18.48	17.31	16.54
150	37.81	37.90	37.88	18.07	17.06	16.39	18.07	17.12	16.47
200	33.91	34.15	34.23	17.67	16.81	16.23	17.72	16.88	16.29
250	31.23	31.54	31.71	17.32	16.54	15.97	17.41	16.59	15.97
300	29.38	29.79	30.01	16.99	16.25	15.68	17.11	16.29	15.66
350	28.22	28.68	28.97	16.66	15.96	15.41	16.77	16.02	15.40
400	27.62	28.13	28.46	16.37	15.79	15.27	16.40	15.79	15.25
500	27.93	28.52	28.90	15.90	15.63	15.29	15.84	15.59	15.26
600	30.37	31.04	31.47	15.88	15.82	15.71	15.99	15.85	15.63
650	32.60	33.29	33.72	16.18	16.18	16.14	16.30	16.17	15.95
700	35.77	36.44	36.84	16.63	16.66	16.72	16.74	16.61	16.41
750	40.17	40.72	40.98	17.27	17.35	17.48	17.33	17.22	17.04
800	46.28	46.29	46.10	18.11	18.27	18.44	18.10	18.04	17.89
900	53.46	51.17	49.61	20.60	20.83	21.13	20.51	20.51	20.44
1000	41.28	40.75	40.35	24.81	24.82	25.03	24.79	24.39	24.07
1250	31.16	31.63	31.91	21.17	21.13	21.40	21.42	21.08	20.80
1500	43.03	41.89	41.01	16.54	16.92	17.33	16.35	16.60	16.78
1750	28.02	28.54	28.85	19.55	19.49	19.49	18.86	18.80	18.84
1900	43.23	40.49	38.11	17.95	18.15	18.27	17.66	17.78	17.95
1950	35.95	32.18	30.14	17.37	17.95	18.28	16.84	17.28	17.72
2000	22.52	21.42	20.78	17.62	18.67	19.18	16.83	17.68	18.29
2050	14.70	14.56	14.49	19.58	20.97	21.42	18.33	19.44	20.18
2100	10.01	10.28	10.46	23.39	24.48	24.41	21.24	22.16	22.73
2200	5.39	5.88	6.18	27.32	27.41	26.80	25.21	25.40	25.73
2250	4.25	4.74	5.05	28.66	28.34	27.46	26.30	26.32	26.60
2300	3.48	3.96	4.25	29.31	28.08	27.07	26.88	26.50	26.44
2400	2.55	2.99	3.25	25.03	24.15	23.80	24.08	23.37	23.08
2500	2.02	2.42	2.67	21.06	20.86	20.70	20.68	20.36	20.08
2750	1.37	1.72	1.93	17.48	17.85	18.01	16.97	17.14	17.25
2800	1.29	1.64	1.84	17.28	17.67	17.83	16.75	16.96	17.09
2900	1.16	1.50	1.69	17.31	17.74	17.93	16.53	16.82	17.04
3000	1.05	1.38	1.57	17.65	18.17	18.41	16.55	16.96	17.27
3250	0.85	1.17	1.34	18.94	19.83	20.42	17.25	17.91	18.46
3500	0.71	1.02	1.19	21.93	23.22	24.15	18.99	19.62	20.06
3750	0.60	0.92	1.09	26.39	28.79	31.01	21.10	21.30	21.34
4000	0.53	0.85	1.03	38.62	54.25	47.04	23.15	22.54	21.95
4250	0.48	0.81	0.99	32.66	30.12	29.27	22.73	22.06	21.63
4500	0.44	0.78	0.97	26.13	25.08	25.08	21.39	21.03	21.04
4750	0.43	0.78	0.97	22.27	21.64	21.99	19.50	19.29	19.50
5000	0.42	0.78	0.97	19.58	19.39	19.82	18.42	18.33	18.55
5250	0.42	0.78	0.98	18.31	18.22	18.66	17.41	17.29	17.39
5500	0.40	0.76	0.98	17.07	17.11	17.33	16.69	16.50	16.40
5750	0.39	0.77	1.00	15.95	15.91	15.92	15.89	15.69	15.41
6000	0.40	0.79	1.03	15.03	14.84	14.61	15.08	14.84	14.45
6250	0.40	0.80	1.06	14.36	14.13	13.77	14.43	14.22	13.82
6500	0.41	0.82	1.08	13.81	13.54	13.15	13.88	13.71	13.36
6750	0.42	0.84	1.10	13.29	13.17	12.79	13.35	13.36	13.15
7000	0.43	0.84	1.09	12.94	12.96	12.70	13.05	13.23	13.18
7100	0.44	0.85	1.10	12.81	12.88	12.70	12.89	13.17	13.17
7500	0.42	0.83	1.08	12.89	13.12	12.99	12.96	13.38	13.49
7750	0.40	0.82	1.07	13.20	13.39	13.30	13.42	13.80	13.94
8000	0.36	0.79	1.06	13.78	13.93	13.88	14.09	14.41	14.48
8250	0.31	0.75	1.03	14.79	14.77	14.72	15.12	15.28	15.21
8300	0.30	0.75	1.03	14.97	14.89	14.83	15.38	15.47	15.27
8400	0.28	0.73	1.02	15.58	15.43	15.28	15.92	15.93	15.57
8500	0.27	0.72	1.01	16.07	15.93	15.87	16.49	16.37	16.07
8600	0.24	0.71	0.99	16.73	16.57	16.55	17.19	16.99	16.62
8700	0.23	0.69	0.98	17.52	17.36	17.37	17.96	17.68	17.37

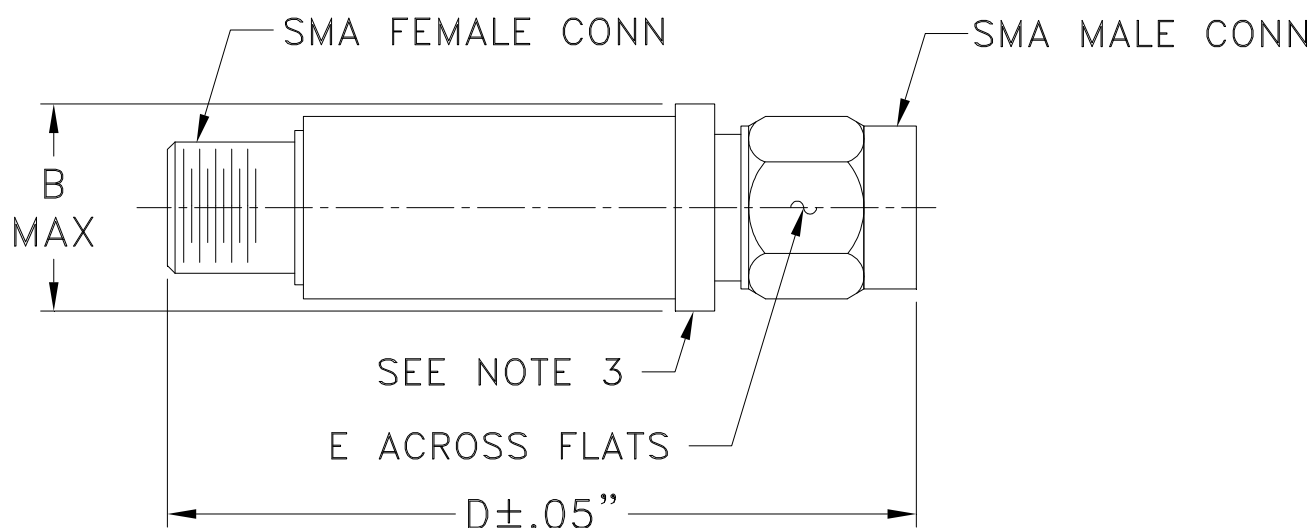
Typical Performance Data

FREQ.	GROUP DELAY		
(MHz)	(nsec)		
	@-55°C	@+25°C	@+100°C
2500	0.62	0.60	0.59
2600	0.54	0.52	0.51
2700	0.48	0.47	0.46
2750	0.45	0.45	0.44
2800	0.43	0.43	0.42
2900	0.40	0.39	0.39
3000	0.37	0.37	0.36
3100	0.35	0.35	0.34
3200	0.34	0.33	0.33
3300	0.32	0.32	0.32
3400	0.31	0.31	0.30
3500	0.30	0.30	0.29
3600	0.29	0.29	0.29
3700	0.29	0.28	0.28
3800	0.28	0.27	0.27
3900	0.27	0.27	0.27
4000	0.27	0.26	0.26
4100	0.26	0.26	0.26
4200	0.26	0.25	0.25
4300	0.25	0.25	0.25
4400	0.25	0.25	0.24
4500	0.25	0.24	0.24
4600	0.24	0.24	0.24
4700	0.24	0.24	0.24
4800	0.24	0.24	0.23
4900	0.24	0.23	0.23
5000	0.23	0.23	0.23
5100	0.23	0.23	0.22
5200	0.23	0.23	0.22
5300	0.23	0.22	0.22
5400	0.23	0.22	0.22
5500	0.23	0.22	0.22
5600	0.22	0.22	0.22
5700	0.22	0.22	0.22
5800	0.22	0.22	0.21
5900	0.22	0.22	0.21
6000	0.22	0.22	0.21
6100	0.22	0.21	0.21
6200	0.22	0.21	0.21
6400	0.22	0.21	0.21
6600	0.21	0.21	0.21
6800	0.21	0.21	0.20
7000	0.21	0.21	0.20
7200	0.21	0.20	0.20
7400	0.21	0.21	0.20
7600	0.21	0.20	0.20
7800	0.21	0.20	0.20
8000	0.21	0.20	0.20
8200	0.21	0.20	0.20
8500	0.21	0.20	0.20
8700	0.21	0.20	0.20

Typical Performance Curves



Outline Dimensions



CASE #.	A	B	C	D	E	WT GRAMS
FF704	--	.410 (10.41)	--	1.43 (36.32)	.312 (7.92)	10.0

Dimensions are in inches (mm). Tolerances: 2Pl. ± .04; 3Pl. ± .030

Notes:

1. Case material: Stainless steel.
2. Case finish: Gold plated.
3. Round Flange may have .312 Across Flats in some models.



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The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: 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	-55° to 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Thermal Shock	-55° to 85°C, 25 cycles	MIL-STD-202F: Method 107G