

Coaxial Reflectionless High Pass Filter

VXHF-392+

50Ω

3940 to 11500 MHz



Generic photo used for illustration purposes only
CASE STYLE: FF704

The Big Deal

- Match to 50Ω in the stop band, eliminates undesired reflections
- Cascadable
- Excellent power handling

Product Overview

Mini-Circuits' VXHF-392+ reflectionless filter employs a novel filter topology which absorbs and terminates stop band 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 stop band, sending signals back to the source at 100% of the power level. These reflections interact with neighboring components and often result in inter-modulation and other interferences. Reflectionless filters eliminate stop band reflections, allowing them to 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, 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.
Enables stable integration of wideband amplifiers	Because reflectionless filters maintain good impedance in the stop band; 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 pass band 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

VXHF-392+

50Ω 3940 to 11500 MHz



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Connectors Model
SMA-M/F VXHF-392+

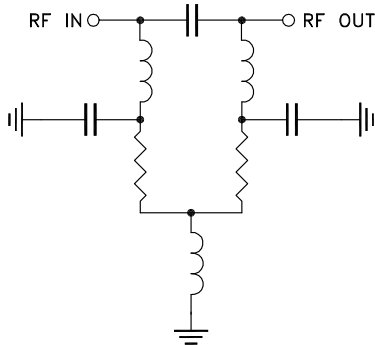
Features

- Match to 50Ω in the stop band, eliminates undesired reflections
- Cascadable
- Excellent power handling

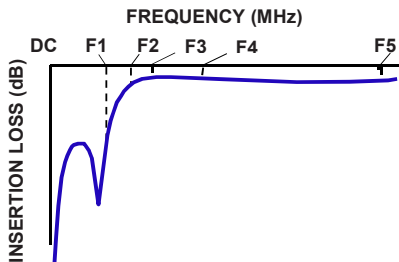
Applications

- Wi-Fi
- Transmitters / Receivers
- Microwave Radio
- Military & Space

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	DC- 2450	11	12.5	- dB
	Freq. Cut-Off	F2	3220	-	3.0	- dB
	VSWR	DC-F1	DC- 2450	-	1.6	- :1
Pass Band	Insertion Loss	F3-F5	3940 - 11500	-	1.8	2.2 dB
	VSWR	F3-F4	3940 - 8000	-	2.3	- :1
		F4-F5	8000-11500	-	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 (F3-F5) ¹	2W at 25°C
RF Power Input, Stopband (DC-F3) ²	0.5W at 25°C

¹ Passband rating derates linearly to 1W at 100°C ambient

² Stopband rating derates linearly to 0.25W at 100°C ambient

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

ESD rating

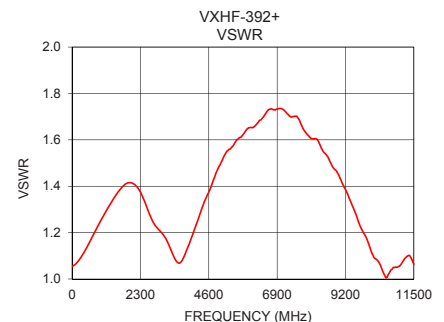
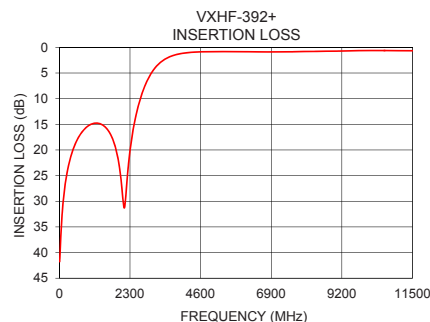
Human body model (HBM): Class 2(2000 to <4000 V) in accordance with ANSI/ESD 5.1-2001

MSL rating

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
10	41.77	1.06
120	30.39	1.06
392	20.92	1.11
440	20.03	1.12
1000	15.09	1.26
2450	14.56	1.33
3220	3.32	1.16
3270	3.05	1.14
3900	1.28	1.14
3940	1.24	1.15
4300	0.97	1.28
4900	0.84	1.47
5500	0.84	1.59
6100	0.85	1.65
6700	0.89	1.73
7300	0.87	1.70
8000	0.81	1.61
9700	0.64	1.23
11000	0.64	1.05
11500	0.66	1.06



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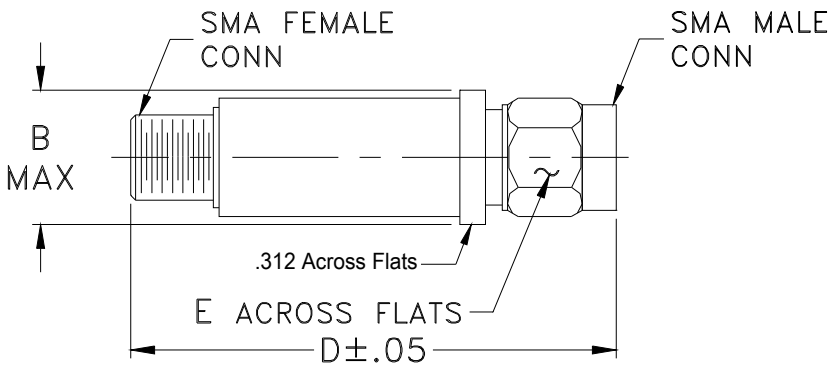
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Coaxial Connections

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

Note: Please refer to case style drawing for details

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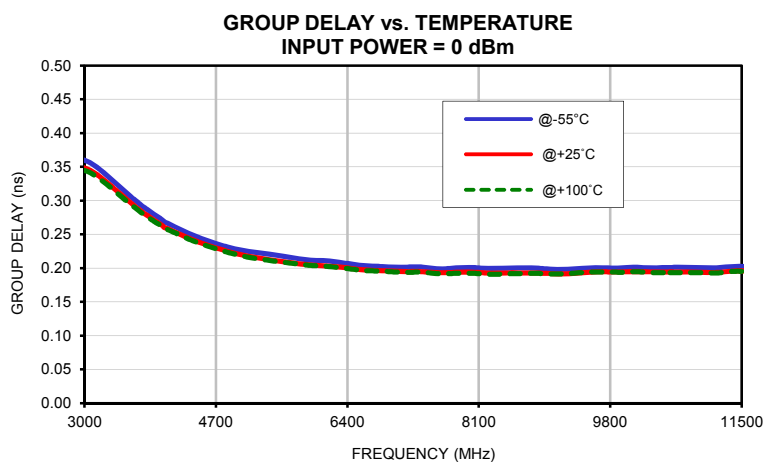
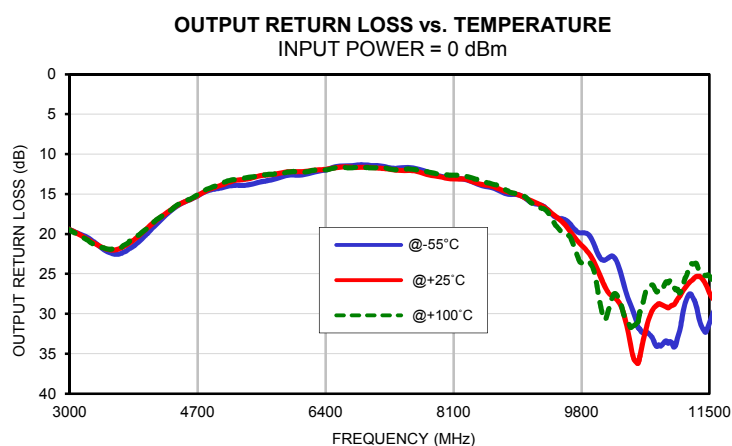
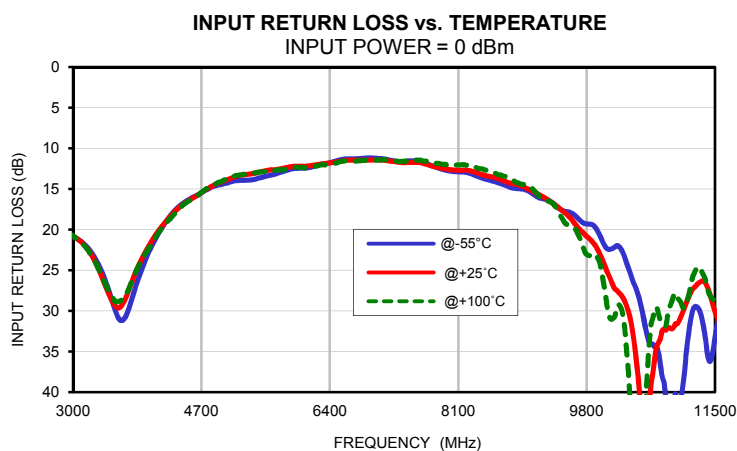
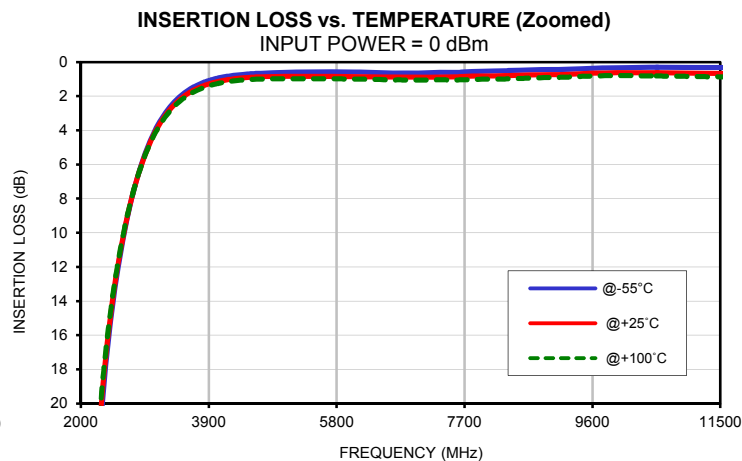
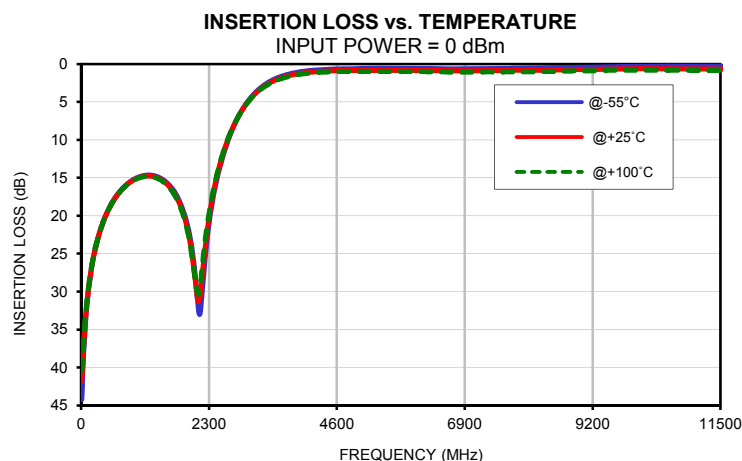
Typical Performance Data

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	44.22	41.77	40.42	32.52	31.34	30.53	32.72	31.52	30.67
20	42.45	40.71	39.62	32.45	31.30	30.55	32.47	31.34	30.58
100	32.00	31.80	31.64	30.56	30.38	30.08	30.56	30.50	30.16
120	30.53	30.39	30.26	30.07	30.10	29.96	30.03	30.20	29.98
440	20.01	20.03	20.04	25.14	24.71	24.58	25.10	24.79	24.67
392	20.90	20.92	20.92	25.99	25.43	25.40	25.92	25.53	25.46
900	15.42	15.49	15.52	19.57	19.52	19.47	19.74	19.65	19.57
1100	14.76	14.85	14.90	18.13	18.15	18.15	18.24	18.22	18.08
1300	14.72	14.84	14.91	17.03	17.06	17.16	17.03	17.00	16.88
1500	15.39	15.56	15.66	16.15	16.20	16.39	16.03	16.06	15.97
1700	17.10	17.36	17.51	15.41	15.59	15.84	15.36	15.38	15.30
1900	20.91	21.36	21.60	15.01	15.30	15.58	15.00	15.00	14.99
2100	31.68	31.07	30.33	15.08	15.43	15.67	14.90	14.99	15.05
2450	14.89	14.56	14.36	16.69	16.95	17.08	16.22	16.27	16.40
2500	13.42	13.16	13.00	17.13	17.35	17.44	16.54	16.59	16.72
2700	8.95	8.88	8.83	19.07	19.02	19.01	17.99	18.01	18.07
2900	5.99	6.03	6.05	20.43	20.26	20.21	19.09	19.08	19.06
3220	3.19	3.32	3.40	22.52	22.75	22.84	20.35	20.58	20.68
3270	2.90	3.05	3.13	23.19	23.53	23.58	20.63	20.86	21.01
3500	1.93	2.10	2.20	28.26	28.47	28.04	22.21	21.92	21.87
3900	1.08	1.28	1.40	25.07	23.75	23.83	21.14	20.39	20.22
3940	1.04	1.24	1.35	24.14	23.07	23.20	20.82	20.06	19.97
4100	0.89	1.09	1.21	20.95	20.53	20.82	19.29	18.69	18.67
4300	0.77	0.97	1.09	18.15	18.24	18.50	17.46	17.29	17.33
4500	0.70	0.90	1.03	16.47	16.60	16.65	16.10	16.07	15.99
4700	0.65	0.86	0.99	15.44	15.44	15.41	15.23	15.19	15.08
4900	0.62	0.84	0.98	14.55	14.37	14.31	14.42	14.25	14.11
5100	0.60	0.84	0.98	14.08	13.63	13.50	14.01	13.56	13.36
5300	0.58	0.83	0.98	13.92	13.20	13.14	13.90	13.18	13.01
5500	0.57	0.84	0.97	13.56	12.83	12.90	13.57	12.78	12.73
5700	0.57	0.84	0.98	13.09	12.58	12.67	13.19	12.55	12.53
5900	0.59	0.85	0.99	12.52	12.23	12.39	12.65	12.21	12.23
6100	0.58	0.85	0.99	12.41	12.16	12.40	12.60	12.19	12.29
6300	0.61	0.86	1.01	11.92	11.89	11.99	12.15	11.97	11.98
6500	0.63	0.88	1.03	11.51	11.63	11.76	11.68	11.75	11.78
6700	0.64	0.89	1.04	11.27	11.43	11.55	11.47	11.62	11.70
6900	0.65	0.89	1.05	11.18	11.43	11.45	11.34	11.65	11.63
7100	0.63	0.88	1.05	11.28	11.45	11.38	11.45	11.75	11.68
7300	0.61	0.87	1.04	11.62	11.69	11.61	11.77	11.96	11.93
7500	0.61	0.86	1.05	11.52	11.71	11.42	11.67	12.05	11.86
7700	0.58	0.84	1.03	11.97	12.02	11.66	12.08	12.41	12.12
7900	0.54	0.82	1.01	12.60	12.46	11.95	12.71	12.81	12.49
8000	0.53	0.81	1.01	12.81	12.61	12.04	12.89	13.00	12.59
8300	0.51	0.80	0.99	13.24	12.85	12.29	13.30	13.25	12.87
8500	0.48	0.77	0.97	13.86	13.41	12.72	14.00	13.84	13.45
8700	0.45	0.75	0.93	14.47	13.97	13.42	14.54	14.35	14.00
8900	0.44	0.74	0.91	14.95	14.50	14.26	15.04	14.91	14.89
9100	0.44	0.73	0.90	15.69	15.38	15.16	15.85	15.71	15.80
9300	0.41	0.71	0.87	16.40	16.40	16.51	16.55	16.63	16.85
9500	0.37	0.67	0.83	17.73	17.83	18.98	18.03	18.11	19.38
9700	0.35	0.64	0.81	18.75	19.88	20.85	19.35	20.34	21.56
9900	0.34	0.63	0.80	19.55	21.78	23.07	20.14	22.46	23.48
10100	0.32	0.62	0.79	22.41	25.76	30.68	23.29	26.35	30.73
10300	0.32	0.62	0.81	23.27	28.66	31.80	24.30	28.62	28.23
10500	0.30	0.62	0.81	28.63	40.12	49.24	30.04	35.74	31.46
10700	0.31	0.63	0.83	34.42	35.90	30.04	32.56	30.44	26.64
10900	0.31	0.64	0.83	41.17	32.07	29.51	33.54	29.03	26.40
11100	0.31	0.65	0.84	37.16	29.49	29.55	32.27	27.87	27.38
11300	0.32	0.66	0.86	30.06	26.45	24.65	28.34	25.47	23.73
11500	0.32	0.66	0.86	33.26	30.12	28.81	31.14	27.39	25.27

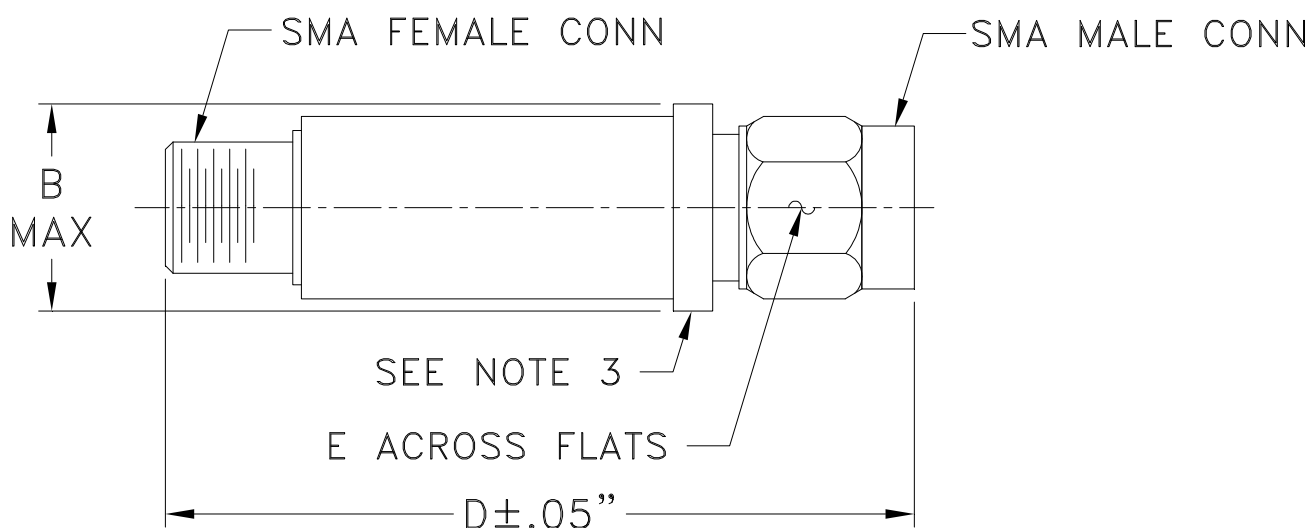
Typical Performance Data

FREQ.	GROUP DELAY		
(MHz)	(nsec)		
	@-55°C	@+25°C	@+100°C
3940	0.28	0.27	0.27
4000	0.27	0.26	0.26
4150	0.26	0.25	0.25
4300	0.25	0.25	0.25
4450	0.25	0.24	0.24
4600	0.24	0.23	0.23
4750	0.23	0.23	0.23
4900	0.23	0.22	0.22
5050	0.23	0.22	0.22
5200	0.22	0.22	0.21
5350	0.22	0.21	0.21
5500	0.22	0.21	0.21
5650	0.22	0.21	0.21
5800	0.21	0.21	0.21
5950	0.21	0.20	0.20
6100	0.21	0.20	0.20
6250	0.21	0.20	0.20
6400	0.21	0.20	0.20
6550	0.20	0.20	0.20
6700	0.20	0.20	0.20
6850	0.20	0.20	0.20
7000	0.20	0.20	0.19
7150	0.20	0.19	0.19
7300	0.20	0.19	0.19
7450	0.20	0.19	0.19
7600	0.20	0.19	0.19
7750	0.20	0.19	0.19
7900	0.20	0.19	0.19
8050	0.20	0.19	0.19
8200	0.20	0.19	0.19
8350	0.20	0.19	0.19
8500	0.20	0.19	0.19
8650	0.20	0.19	0.19
8800	0.20	0.19	0.19
8950	0.20	0.19	0.19
9100	0.20	0.19	0.19
9250	0.20	0.19	0.19
9400	0.20	0.19	0.19
9550	0.20	0.19	0.19
9700	0.20	0.19	0.19
9850	0.20	0.19	0.19
10000	0.20	0.19	0.19
10150	0.20	0.20	0.19
10300	0.20	0.19	0.19
10450	0.20	0.19	0.19
10600	0.20	0.19	0.19
10750	0.20	0.19	0.19
10900	0.20	0.19	0.19
11050	0.20	0.19	0.19
11200	0.20	0.19	0.19
11500	0.20	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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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
Barometric Pressure	100,000 Feet	MIL-STD-202, Method 105, Condition D
Humidity	90% RH, 65°C Units may require bake-out after humidity to restore full performance.	MIL-STD-202, Method 103
Thermal Shock	-65° to 125°C, 5 cycles	MIL-STD-202, Method 107, Condition B
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	100g, 6ms sawtooth, 3 shocks each direction 3 axes (total 18)	MIL-STD-202, Method 213, Condition I