

# Coaxial Reflectionless Low Pass Filter

## VXLF-192+

50Ω

DC to 1900 MHz



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CASE STYLE: FF704

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

## The Big Deal

- Match to 50Ω in the stop band, eliminates undesired reflections
- Cascadable
- Excellent Power handling
- Temperature stable up to 100°C

## Product Overview

Mini-Circuits' VXLF-192+ 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 and saving board space.
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 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.  
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# Low Pass Filter

## VXLF-192+

50Ω DC to 1900 MHz



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Connectors	Model
SMA	VXLF-192+

### Features

- Match to 50Ω in the stop band, eliminates undesired reflections
- Cascadable
- Excellent power handling
- Temperature stable, up to 100°C
- Protected by US Patents 8,392,495

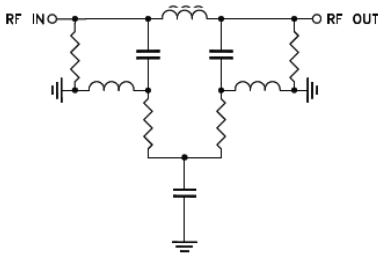
### Electrical Specifications at 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Insertion Loss	DC-F1	DC-1900	-	1.5	2.2	dB
	VSWR	DC-F1	DC-1900	-	1.2	-	:1
Stop Band	Rejection	F2-F3	3480-11200	-	15	-	dB
	VSWR	F2-F3	3480-11200	-	1.6	-	:1

### Applications

- Harmonics Rejection
- Wideband Matching
- Transmitters / Receivers

### Functional Schematic



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

Parameter	Ratings
Operating Temperature	-55°C to +100°C
Storage Temperature	-55°C to +100°C
RF Power Input, Passband (DC-F1) <sup>1</sup>	2 W at 25°C
RF Power Input, Stopband (F2-F3) <sup>2</sup>	0.2 W at 25°C

<sup>1</sup> Passband rating derates linearly to 1 W at 100°C ambient

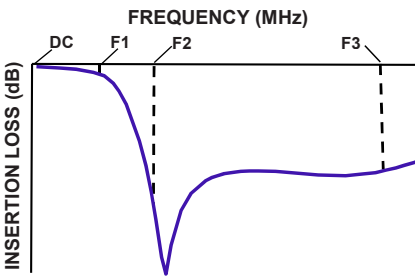
<sup>2</sup> Stopband rating derates linearly to 0.1 W at 100°C ambient

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

### ESD rating

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

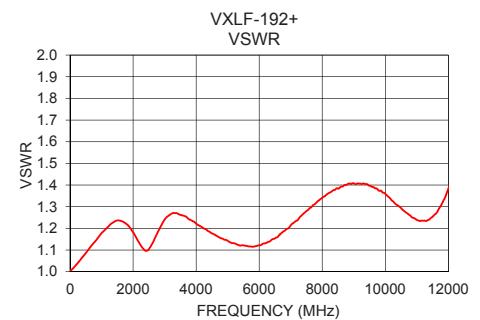
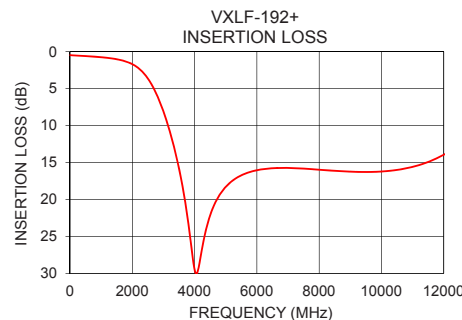
### Typical Frequency Response



### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
10	0.46	1.01
100	0.50	1.02
300	0.54	1.05
600	0.62	1.11
1200	0.83	1.21
1900	1.49	1.20
2400	3.07	1.10
2500	3.62	1.10
3000	8.09	1.24
3480	15.40	1.26
4000	29.49	1.22
4500	22.14	1.18
5000	18.29	1.14
6000	16.04	1.12
7000	15.73	1.21
8000	15.98	1.34
9000	16.23	1.41
10000	16.22	1.36
10500	16.00	1.29
11200	15.35	1.24

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#### Notes

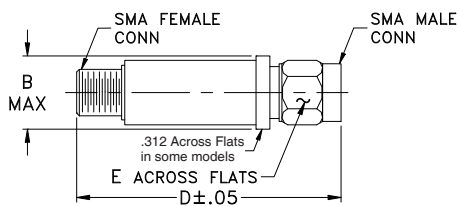
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## Coaxial Connections

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

## Outline Drawing



## Outline Dimensions ( $\frac{\text{inch}}{\text{mm}}$ )

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.  (MHz)	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
	(dB)			(dB)			(dB)		
	@-55°C	@+25°C	@+100°C	@-55°C	@+25°C	@+100°C	@-55°C	@+25°C	@+100°C
10	0.39	0.46	0.51	47.95	48.42	41.51	47.20	49.72	41.69
20	0.39	0.47	0.51	45.17	48.39	41.51	46.21	48.26	41.18
100	0.39	0.50	0.54	40.48	42.06	40.25	40.72	41.58	38.69
150	0.40	0.51	0.55	38.94	38.52	38.39	39.02	38.14	36.75
200	0.41	0.52	0.57	37.57	35.85	35.29	37.62	35.58	34.63
250	0.41	0.53	0.59	36.71	33.86	32.55	36.30	33.66	32.50
300	0.41	0.54	0.60	35.68	32.24	30.34	34.81	32.07	30.63
350	0.42	0.56	0.62	34.12	30.79	28.76	33.35	30.78	29.18
400	0.42	0.57	0.63	32.20	29.61	27.67	31.89	29.63	28.09
500	0.44	0.59	0.66	28.78	27.67	26.34	28.99	27.69	26.49
600	0.46	0.62	0.70	26.60	25.99	25.16	26.90	26.17	25.30
650	0.46	0.63	0.71	25.87	25.28	24.49	26.16	25.50	24.78
700	0.47	0.64	0.73	25.32	24.65	23.95	25.37	24.83	24.19
750	0.48	0.66	0.75	24.89	24.15	23.58	24.66	24.19	23.65
800	0.49	0.67	0.76	24.33	23.65	23.19	24.06	23.66	23.20
900	0.52	0.71	0.80	23.02	22.63	22.39	22.99	22.73	22.38
1000	0.54	0.74	0.85	21.92	21.73	21.70	22.11	21.93	21.69
1250	0.63	0.85	0.97	20.35	20.27	20.54	20.56	20.43	20.48
1500	0.76	1.02	1.15	19.35	19.51	20.09	19.62	19.62	19.81
1750	0.98	1.26	1.42	19.53	19.93	20.37	19.58	19.71	19.71
1900	1.17	1.49	1.67	20.47	20.69	21.07	20.21	20.25	20.16
2000	1.35	1.68	1.87	21.24	21.58	21.84	20.68	20.76	20.62
2200	1.85	2.23	2.45	23.98	24.21	24.08	22.30	22.15	21.92
2400	2.63	3.07	3.33	28.14	26.74	25.91	22.84	22.56	22.57
2600	3.79	4.28	4.58	25.27	24.47	23.91	21.06	20.88	21.00
2800	5.39	5.95	6.28	21.40	21.33	21.15	18.61	18.66	18.86
3000	7.47	8.09	8.46	19.34	19.37	19.45	16.97	17.19	17.43
3200	10.05	10.72	11.13	18.13	18.60	18.85	16.11	16.39	16.66
3480	14.63	15.40	15.87	18.17	18.69	19.09	15.93	16.28	16.51
3600	17.09	17.92	18.42	18.23	18.82	19.27	16.24	16.53	16.77
3800	22.35	23.23	23.72	18.75	19.40	19.95	16.67	16.97	17.13
4000	29.68	29.49	29.10	19.45	20.00	20.52	17.51	17.69	17.87
4200	28.88	27.61	26.89	20.14	20.67	21.18	18.27	18.39	18.52
4400	23.98	23.56	23.27	20.83	21.40	22.02	19.18	19.25	19.30
4600	21.12	21.03	20.94	21.76	22.13	22.52	20.45	20.24	20.32
4800	19.33	19.40	19.42	22.45	22.93	23.27	21.32	20.97	20.94
5000	18.12	18.29	18.37	23.32	23.53	23.71	22.51	21.98	21.90
5200	17.28	17.52	17.63	24.30	24.20	23.95	23.43	22.56	22.59
5400	16.67	16.95	17.10	25.31	24.92	24.29	23.73	22.93	23.00
5600	16.23	16.55	16.71	26.19	24.99	23.75	23.85	23.09	23.35
5800	15.91	16.25	16.44	27.44	25.30	23.71	23.48	22.92	23.32
6000	15.68	16.04	16.25	27.45	24.82	22.89	22.84	22.64	23.16
6200	15.52	15.90	16.12	27.10	24.20	22.15	22.27	22.25	23.09
6400	15.41	15.80	16.04	26.14	23.23	21.33	21.32	21.61	22.50
6600	15.34	15.75	16.00	25.43	22.48	20.57	20.66	21.24	22.11
6800	15.30	15.73	15.98	23.63	21.30	19.69	20.21	20.85	21.89
7000	15.29	15.73	15.99	22.22	20.30	19.12	19.64	20.47	21.47
7200	15.30	15.76	16.02	21.01	19.52	18.53	19.29	20.25	21.24
7400	15.33	15.80	16.06	19.33	18.57	17.91	19.01	20.05	21.05
7600	15.38	15.85	16.11	18.18	17.87	17.61	18.87	19.83	20.79
7800	15.43	15.91	16.17	17.27	17.29	17.28	18.82	19.80	20.65
8000	15.49	15.98	16.23	16.40	16.74	16.91	18.63	19.67	20.37
8200	15.55	16.04	16.30	15.71	16.28	16.63	18.61	19.63	20.18
8400	15.60	16.09	16.36	15.44	15.98	16.41	18.95	19.66	20.28
8500	15.63	16.12	16.40	15.33	15.87	16.31	19.03	19.60	20.13
9000	15.71	16.23	16.54	14.99	15.42	15.98	19.61	19.64	19.89
9500	15.73	16.28	16.59	15.16	15.63	16.50	19.80	19.59	19.60
10000	15.66	16.22	16.53	15.37	16.34	17.89	20.23	20.02	20.13
10500	15.46	16.00	16.30	16.21	17.84	20.07	20.35	20.66	21.11
11200	14.84	15.35	15.65	18.33	19.55	20.66	20.38	21.21	22.02

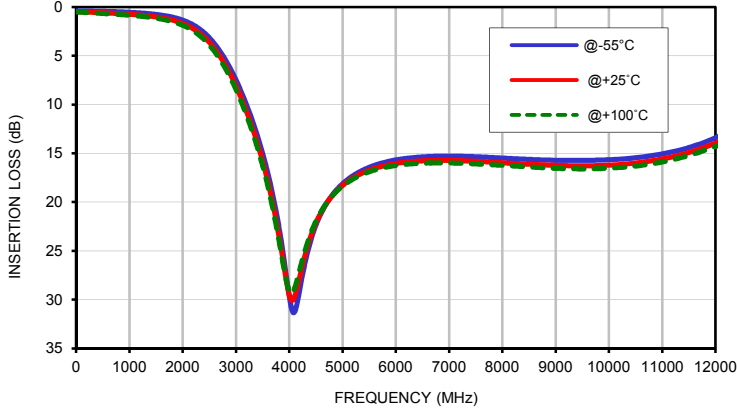


## Typical Performance Data

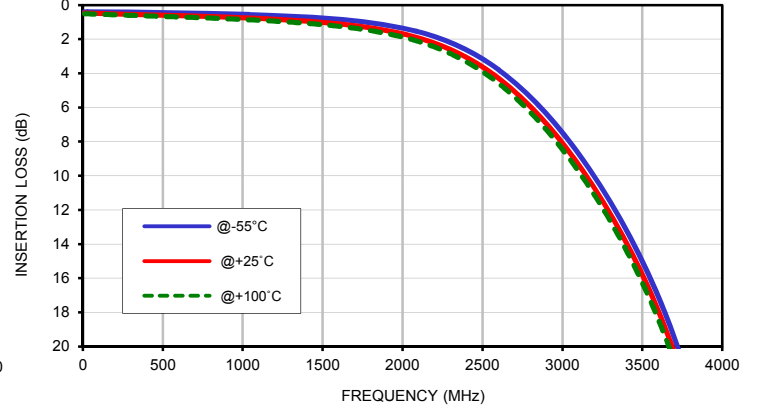
FREQ.  (MHz)	GROUP DELAY		
	(nsec)		
	@-55°C	@+25°C	@+100°C
10	0.26	0.27	0.27
20	0.26	0.27	0.27
40	0.26	0.27	0.27
60	0.27	0.27	0.27
100	0.27	0.27	0.27
150	0.27	0.27	0.27
200	0.27	0.27	0.27
250	0.27	0.27	0.27
300	0.27	0.27	0.26
350	0.27	0.27	0.26
400	0.27	0.27	0.26
450	0.27	0.27	0.26
500	0.27	0.27	0.26
550	0.27	0.27	0.27
600	0.27	0.27	0.27
650	0.27	0.27	0.27
700	0.27	0.27	0.27
750	0.27	0.27	0.27
800	0.27	0.27	0.27
850	0.27	0.27	0.27
900	0.27	0.27	0.27
950	0.27	0.27	0.27
1000	0.27	0.27	0.27
1050	0.28	0.28	0.27
1100	0.28	0.28	0.27
1200	0.28	0.28	0.28
1250	0.28	0.28	0.28
1300	0.28	0.28	0.28
1350	0.29	0.28	0.28
1400	0.29	0.29	0.28
1450	0.29	0.29	0.29
1500	0.29	0.29	0.29
1550	0.29	0.29	0.29
1600	0.30	0.30	0.29
1650	0.30	0.30	0.30
1700	0.30	0.30	0.30
1750	0.31	0.30	0.30
1760	0.31	0.31	0.30
1770	0.31	0.31	0.30
1780	0.31	0.31	0.30
1790	0.31	0.31	0.31
1800	0.31	0.31	0.31
1810	0.31	0.31	0.31
1820	0.31	0.31	0.31
1830	0.31	0.31	0.31
1840	0.31	0.31	0.31
1850	0.31	0.31	0.31
1860	0.31	0.31	0.31
1870	0.31	0.31	0.31
1880	0.32	0.31	0.31
1900	0.32	0.31	0.31

## Typical Performance Curves

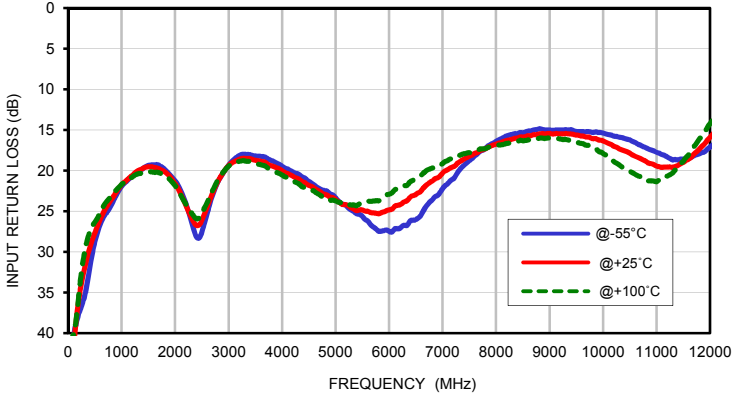
**INSERTION LOSS vs. TEMPERATURE**  
INPUT POWER = 0 dBm



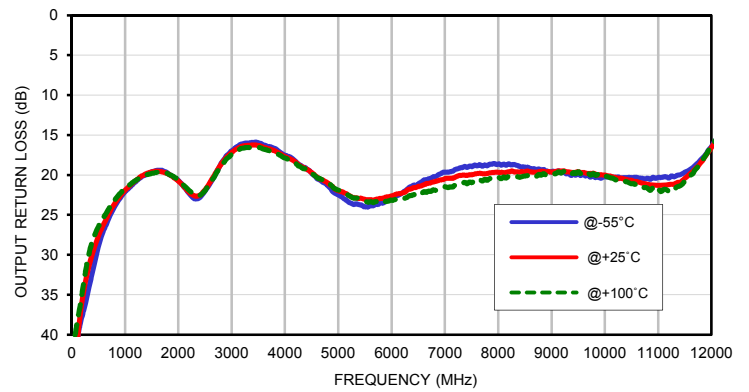
**INSERTION LOSS vs. TEMPERATURE (Zoomed)**  
INPUT POWER = 0 dBm



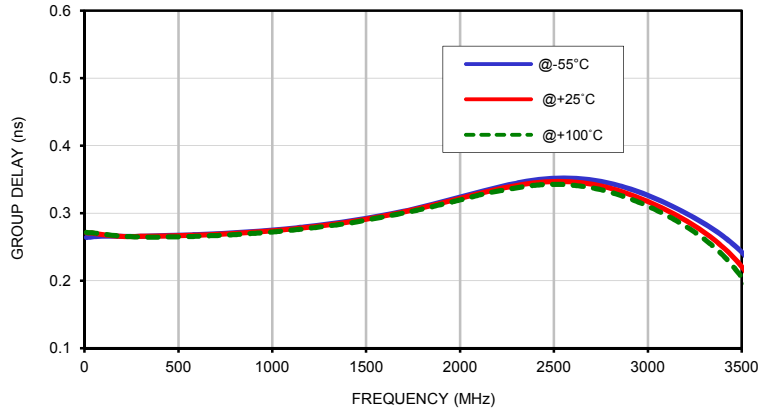
**INPUT RETURN LOSS vs. TEMPERATURE**  
INPUT POWER = 0 dBm



**OUTPUT RETURN LOSS vs. TEMPERATURE**  
INPUT POWER = 0 dBm



**GROUP DELAY vs. TEMPERATURE**  
INPUT POWER = 0 dBm

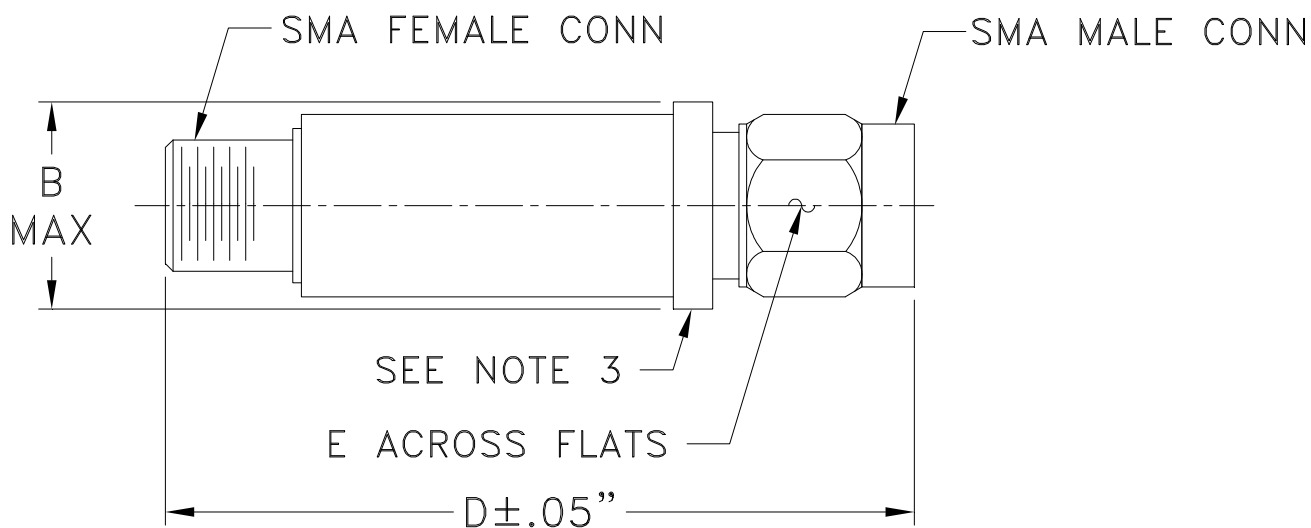


# Case Style

# FF

## FF704

### 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
Thermal Shock	-55° to 85°C, 25 cycles	MIL-STD-202F: Method 107G