

Coaxial Bandpass Filter

SBP-20R5+

50Ω 20 to 21 MHz



Generic photo used for illustration purposes only
CASE STYLE: FF99

The Big Deal

- Flat group delay over passband
- Narrow bandwidth
- Good VSWR (1.3:1 typical)

Product Overview

SBP-20R5+ is a 50Ω bandpass filter in a connectorized package. This bandpass filter covers from 20 to 21 MHz, these units offer good matching within the passband and high rejection. This unit uses a miniature high Q capacitors and wire welded inductors for high reliability. It has repeatable performance across production lots and consistent performance across temperature.

Key Features

Feature	Advantages
Flat group delay over passband	The model has group delay over passband around 240 ns
Good VSWR, 1.3:1 typical over passband	This provides well matched input and output ports.
Connectorized package	Connectorized package is easy to interface with other devices and well suited for test setups.

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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Connectors SMA Model SBP-20R5+

Features

- Flat group delay over passband
- Good VSWR, 1.3:1 typical in passband
- High rejection (40dB from 40-380 MHz)
- Insertion loss 2.2 dB typ.

Applications

- Transmitters / Receivers - IF stage
- Harmonic rejection
- Test equipment
- Military

Electrical Specifications at 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Center Frequency	-	-	20.5	-	MHz	
	Insertion Loss	F1-F2	20 - 21	-	2.2	3.0	dB
	VSWR	F1-F2	20 - 21	-	1.3	1.6	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 15.8	40	48	-	dB
	VSWR	F3-F4	15.8 - 17	20	30	-	dB
	VSWR	DC-F4	DC - 17	-	20	-	:1
Stop Band, Upper	Insertion Loss	F5-F6	27 - 40	20	25	-	dB
	VSWR	F6-F7	40 - 380	40	45	-	dB
	VSWR	F5-F7	27 - 380	-	20	-	:1

Maximum Ratings

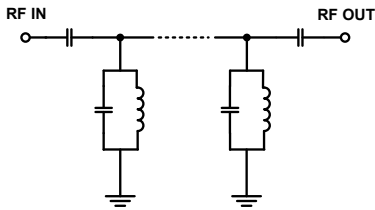
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	0.5 W max.

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

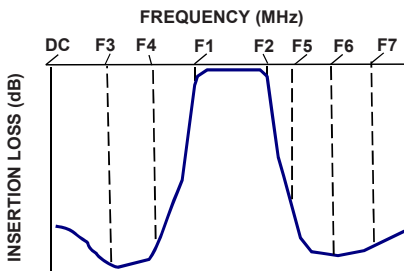
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (ns)
1.0	100.84	3224.22	19.6	336.55
10.0	102.29	1135.46	19.7	320.97
15.0	57.41	199.02	19.8	304.62
15.8	49.61	135.91	19.9	289.27
17.0	36.09	66.20	20.0	275.82
17.4	30.88	48.88	20.1	264.52
17.7	26.63	37.27	20.2	255.09
18.1	20.39	23.56	20.3	247.28
19.2	3.25	1.73	20.4	240.62
20.0	1.81	1.28	20.5	234.94
20.5	1.56	1.11	20.6	229.95
21.0	1.45	1.10	20.7	225.44
23.4	3.41	2.74	20.8	221.52
27.0	25.71	77.96	20.9	217.91
29.0	32.02	127.95	21.0	214.72
40.0	45.92	249.28	21.1	211.84
45.0	48.67	289.77	21.2	209.26
100.0	68.46	220.37	21.3	206.99
200.0	56.18	123.90	21.4	205.01
380.0	50.88	76.78	21.5	203.38

Functional Schematic

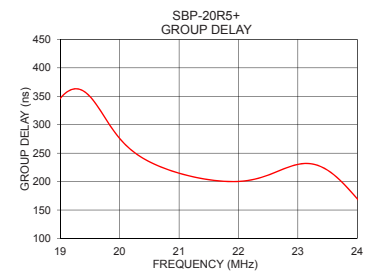
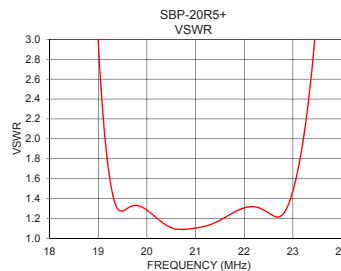
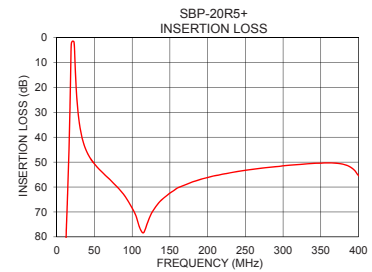
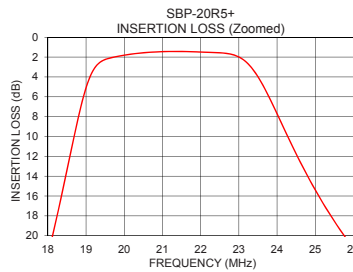


Typical Frequency Response



+RoHS Compliant

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



Notes

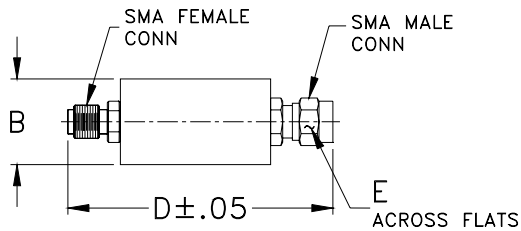
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Coaxial Connections

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

Outline Drawing



Outline Dimensions (inch / mm)

B	D	E	Wt.
.70	1.98	.312	grams
17.78	50.29	7.92	42.0

Note: Please refer to case style drawing for details

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Typical Performance Data

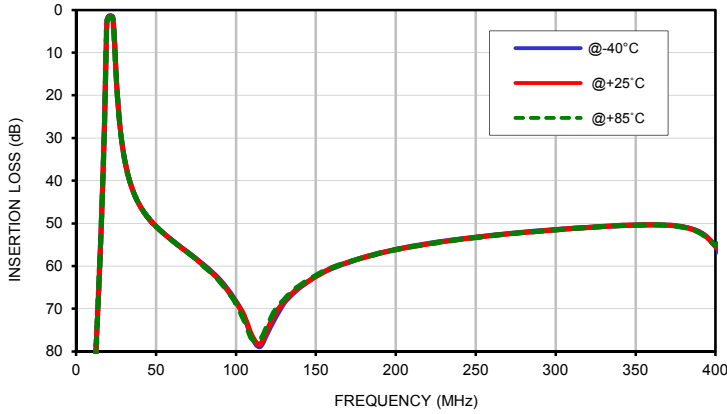
FREQ. (MHz)	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1.0	100.16	100.84	99.10	0.01	0.01	0.01	0.01	0.00	0.00
5.0	96.39	106.12	117.35	0.01	0.01	0.01	0.01	0.01	0.01
10.0	99.98	102.29	97.47	0.01	0.02	0.02	0.01	0.01	0.02
12.0	85.95	84.86	83.10	0.03	0.03	0.03	0.02	0.03	0.03
13.0	74.60	74.68	74.82	0.03	0.04	0.04	0.03	0.04	0.04
14.0	66.70	66.61	66.33	0.05	0.06	0.06	0.05	0.06	0.06
15.0	57.54	57.41	57.35	0.08	0.09	0.10	0.07	0.08	0.09
15.8	49.76	49.61	49.47	0.11	0.13	0.14	0.11	0.12	0.14
17.0	36.33	36.09	35.87	0.23	0.26	0.29	0.23	0.26	0.29
17.1	35.08	34.82	34.60	0.24	0.28	0.31	0.25	0.28	0.31
17.5	29.76	29.50	29.26	0.33	0.39	0.43	0.36	0.40	0.44
17.7	26.91	26.63	26.38	0.41	0.47	0.52	0.43	0.48	0.53
18.0	22.32	22.02	21.75	0.57	0.65	0.72	0.61	0.68	0.75
18.5	13.73	13.41	13.14	1.30	1.48	1.64	1.41	1.58	1.76
18.7	10.07	9.79	9.56	2.13	2.41	2.69	2.32	2.60	2.89
19.0	5.21	5.10	5.05	5.47	6.09	6.66	6.01	6.70	7.37
19.2	3.22	3.25	3.32	10.59	11.47	12.21	12.20	13.47	14.65
19.8	1.83	1.95	2.07	16.96	16.98	17.07	16.74	16.61	16.59
20.0	1.70	1.81	1.93	17.84	18.11	18.42	16.91	16.96	17.11
20.1	1.64	1.75	1.86	18.87	19.24	19.65	17.56	17.65	17.85
20.2	1.58	1.69	1.81	20.21	20.68	21.18	18.46	18.58	18.81
20.3	1.54	1.64	1.76	21.83	22.40	23.00	19.53	19.66	19.92
20.4	1.49	1.60	1.71	23.59	24.23	24.90	20.66	20.82	21.09
20.5	1.46	1.56	1.68	25.27	25.93	26.64	21.81	21.99	22.30
20.6	1.43	1.53	1.64	26.47	27.06	27.69	22.92	23.16	23.51
20.7	1.41	1.51	1.62	26.99	27.44	27.91	23.97	24.31	24.74
20.8	1.39	1.49	1.60	26.92	27.24	27.57	25.04	25.53	26.08
20.9	1.37	1.47	1.58	26.58	26.77	26.99	26.23	26.92	27.64
21.0	1.35	1.45	1.56	26.16	26.25	26.36	27.70	28.57	29.49
21.5	1.33	1.43	1.54	21.92	21.61	21.41	25.68	24.88	24.49
22.0	1.39	1.49	1.61	17.52	17.52	17.53	18.51	18.40	18.40
22.5	1.46	1.57	1.69	18.45	18.92	19.14	20.28	21.09	21.79
22.7	1.52	1.64	1.78	20.13	20.29	20.00	27.88	30.81	32.38
23.0	1.81	1.99	2.18	15.14	14.35	13.71	18.79	17.25	16.31
23.5	3.67	3.98	4.28	5.72	5.46	5.30	6.36	6.02	5.85
24.0	7.35	7.71	8.02	2.22	2.19	2.19	2.50	2.44	2.43
24.5	11.44	11.76	12.02	1.06	1.08	1.11	1.22	1.22	1.25
25.0	15.13	15.40	15.61	0.62	0.65	0.68	0.73	0.74	0.77
25.5	18.32	18.55	18.73	0.42	0.45	0.48	0.49	0.51	0.53
26.0	21.07	21.27	21.42	0.31	0.34	0.36	0.37	0.38	0.40
26.5	23.47	23.63	23.76	0.25	0.27	0.29	0.29	0.30	0.32
27.0	25.57	25.71	25.83	0.21	0.22	0.24	0.24	0.25	0.27
27.5	27.43	27.56	27.66	0.17	0.19	0.21	0.20	0.21	0.23
28.0	29.09	29.20	29.29	0.15	0.17	0.18	0.17	0.18	0.20
28.5	30.58	30.67	30.75	0.14	0.15	0.16	0.15	0.16	0.17
29.0	31.93	32.02	32.08	0.12	0.14	0.15	0.13	0.14	0.16
29.5	33.16	33.23	33.29	0.11	0.12	0.13	0.12	0.13	0.14
30.0	34.27	34.34	34.40	0.10	0.11	0.12	0.11	0.12	0.13
35.0	41.79	41.81	41.81	0.07	0.08	0.09	0.06	0.07	0.08
40.0	45.94	45.92	45.92	0.06	0.07	0.08	0.05	0.06	0.06
45.0	48.70	48.67	48.62	0.05	0.06	0.07	0.04	0.05	0.06
45.6	48.95	48.97	48.94	0.05	0.06	0.06	0.04	0.05	0.06
46.2	49.18	49.20	49.20	0.05	0.06	0.06	0.04	0.05	0.06
46.8	49.45	49.47	49.43	0.04	0.06	0.06	0.04	0.05	0.06
48.0	50.00	49.91	49.93	0.04	0.05	0.06	0.05	0.06	0.06
50.0	50.72	50.70	50.73	0.04	0.05	0.06	0.04	0.05	0.06
100.0	68.27	68.46	68.81	0.06	0.08	0.09	0.04	0.06	0.07
200.0	56.13	56.18	56.19	0.12	0.14	0.15	0.09	0.11	0.12
300.0	51.47	51.48	51.51	0.15	0.19	0.20	0.12	0.15	0.16
380.0	50.83	50.88	50.92	0.18	0.23	0.25	0.15	0.19	0.21

Typical Performance Data

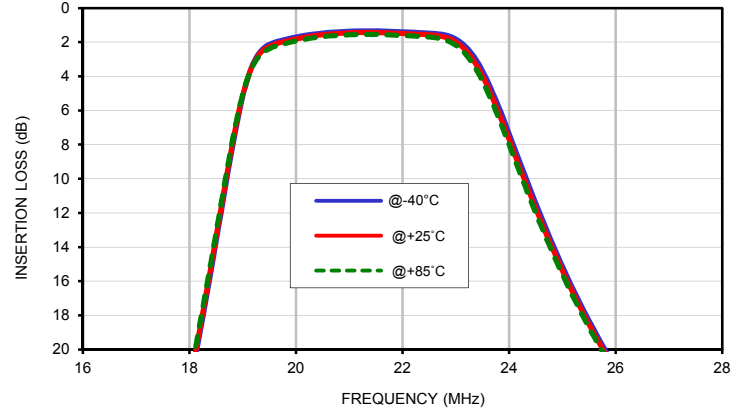
FREQ. (MHz)	GROUP DELAY		
	(nsec)		
	@-40°C	@+25°C	@+85°C
18.0	126.64	130.50	134.26
18.1	141.12	145.56	149.86
18.2	158.18	163.17	167.99
18.3	178.48	184.18	189.50
18.4	202.12	208.22	213.67
18.5	228.41	234.55	240.03
18.6	256.11	261.82	266.84
18.7	283.37	288.31	292.32
18.8	308.03	311.83	314.70
18.9	328.83	331.39	333.04
19.0	345.15	346.43	346.92
19.1	356.75	356.79	356.15
19.2	363.36	362.25	360.55
19.3	365.23	363.00	360.30
19.4	362.02	358.69	355.03
19.5	353.79	349.58	345.28
19.6	341.32	336.55	331.90
19.7	325.79	320.97	316.41
19.8	309.11	304.62	300.52
19.9	293.10	289.27	285.81
20.0	279.02	275.82	273.01
20.1	267.06	264.52	262.25
20.2	257.15	255.09	253.23
20.3	249.02	247.28	245.76
20.4	242.09	240.62	239.34
20.5	236.20	234.94	233.82
20.6	231.02	229.95	228.97
20.7	226.39	225.44	224.59
20.8	222.33	221.52	220.72
20.9	218.62	217.91	217.25
21.0	215.33	214.72	214.08
21.1	212.35	211.84	211.29
21.2	209.72	209.26	208.81
21.3	207.39	206.99	206.59
21.4	205.31	205.01	204.65
21.5	203.61	203.38	203.08
21.6	202.09	201.95	201.74
21.7	200.95	200.91	200.80
21.8	200.16	200.29	200.26
21.9	199.73	199.96	200.08
22.0	199.83	200.26	200.48
22.1	200.50	201.12	201.52
22.2	201.82	202.64	203.13
22.3	203.81	204.84	205.47
22.4	206.57	207.80	208.56
22.5	210.00	211.35	212.13
22.6	213.99	215.42	216.16
22.7	218.37	219.69	220.25
22.8	222.79	223.87	224.19
22.9	226.79	227.53	227.45
23.0	230.06	230.30	229.74

Typical Performance Curves

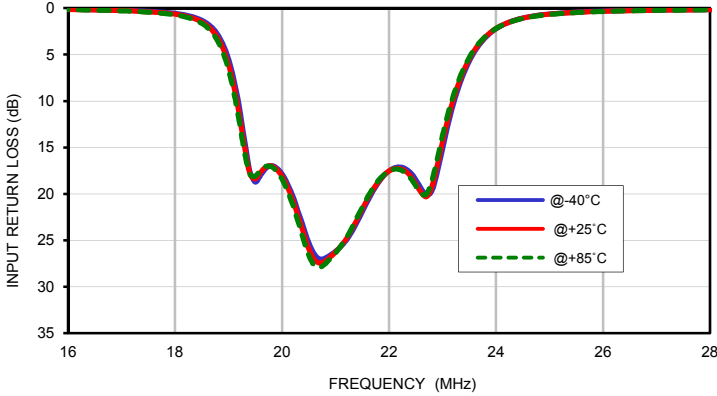
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



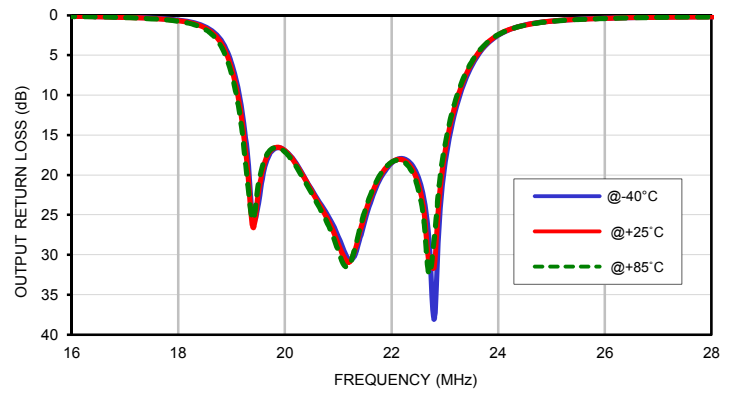
INSERTION LOSS vs. TEMPERATURE (Zoomed)
INPUT POWER = 0 dBm



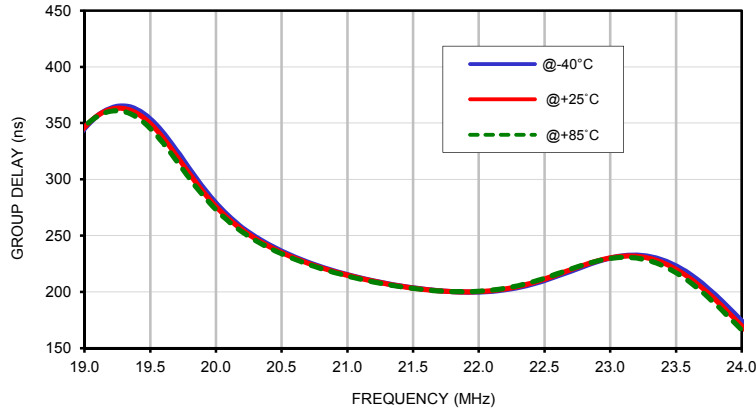
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm

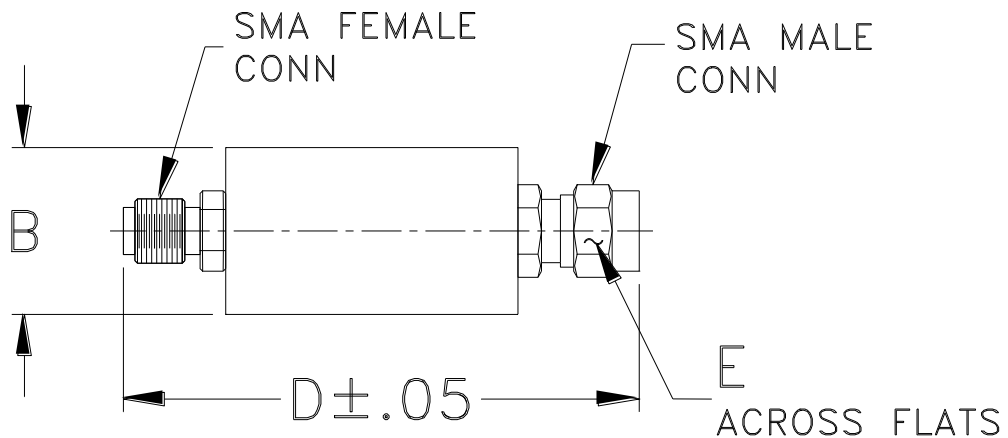


GROUP DELAY vs. TEMPERATURE
INPUT POWER = 0 dBm



FF56
FF99

Outline Dimensions



CASE #.	A	B	C	D	E	WT GRAMS
FF56	--	.46 (11.68)	--	1.70 (43.18)	.312 (7.92)	18.0
FF99	--	.70 (17.78)	--	1.98 (50.29)		42.0

Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015

Notes:

1. Case material: Brass.
2. Case finish: Nickel plate.



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