Coaxial

Low Pass Filter

SLP-23+

50Ω DC to 23 MHz

Generic photo used for illustration purposes only

CASE STYLE: FF99

The Big Deal

- Low insertion loss, 0.6 dB typ.
- High rejection, 48 dB typ.
- Sharp cut-off
- Good VSWR, 1.2:1 typ. in passband
- Connectorized package

Product Overview

SLP-23+ is a 50Ω Low pass filter in a connectorized package covering DC to 23 MHz. This filter uses miniature high Q capacitors and wire welded inductors for high reliability. This filter offers high rejection and low insertion loss. It has consistent performance across temperature and repeatable performance across production lots.

Key Features

Feature	Advantages
Low insertion loss, 0.6 dB typ.	It enables the filter to be used in high performance applications.
High rejection, 48 dB typ.	Attenuates unwanted spurious signals and harmonics.
Sharp cut-off	This enables the filter rejects the near band interaction and provides the high selectivity.
Good VSWR, 1.2:1 typical in passband	This provides good matching when used with other devices.
Connectorized package	Easy to interface with other devices and well suited for test setups.

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CASE STYLE: FF99

Connectors	Model
SMA	SLP-23+

Features

- Low insertion loss, 0.6 dB typ.
- High rejection, 48 dB typ.
- Good VSWR, 1.2:1 typical in passband
- Sharp cut-off
- Rugged shielded case
- Connectorized package

Applications

- Defense communications
- Transmitters / Receivers
- Harmonic rejection

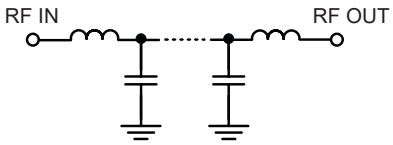
Electrical Specifications at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss	DC-F1	DC - 23	—	0.6	1	dB
	Freq. Cut-Off	F2	25	—	3.0	—	dB
	VSWR	DC-F1	DC - 23	—	1.2	1.5	:1
Stop Band	Rejection Loss	F3-F4	31 - 34	20	30	—	dB
		F4-F5	34 - 500	40	48	—	dB

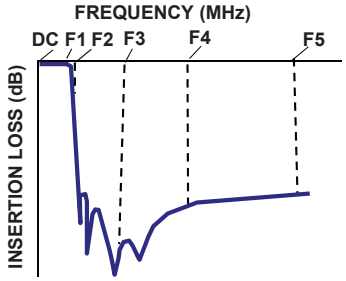
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	0.5 W max.

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

Functional Schematic



Typical Frequency Response

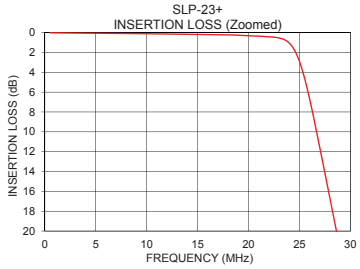


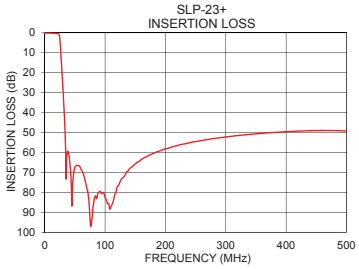
+RoHS Compliant

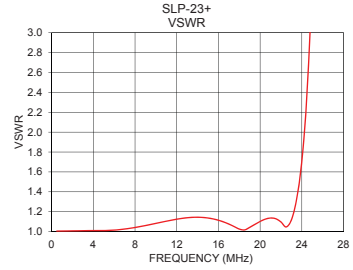
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

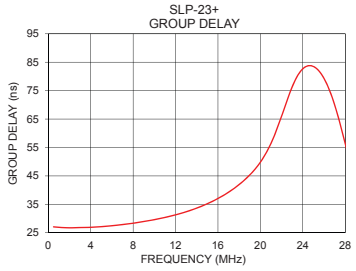
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (ns)
0.5	0.02	1.01	0.5	27.07
10.0	0.12	1.08	1.0	26.91
20.0	0.31	1.10	2.0	26.75
22.0	0.43	1.10	3.0	26.84
23.0	0.55	1.12	4.0	26.92
24.0	1.07	1.71	5.0	27.14
25.0	2.93	3.61	6.0	27.47
25.5	4.62	5.72	7.0	27.88
29.0	21.94	56.58	8.0	28.36
31.0	32.33	90.96	9.0	28.94
34.0	51.69	141.05	10.0	29.61
50.0	67.41	338.06	11.0	30.39
80.0	87.82	354.15	12.0	31.31
90.0	79.78	328.30	13.0	32.38
100.0	82.45	318.03	14.0	33.66
200.0	58.21	177.36	15.0	35.20
300.0	52.26	145.13	18.0	41.97
400.0	49.60	131.31	20.0	49.83
450.0	49.03	126.66	23.0	76.34
500.0	49.25	121.52	25.0	83.50









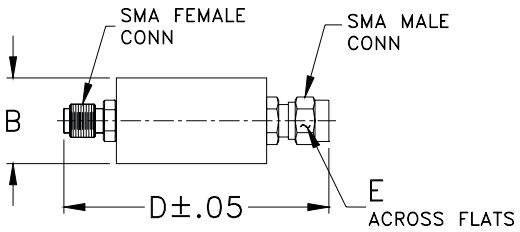
Notes

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

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

Coaxial Low Pass Filter SLP-23+

Typical Performance Data

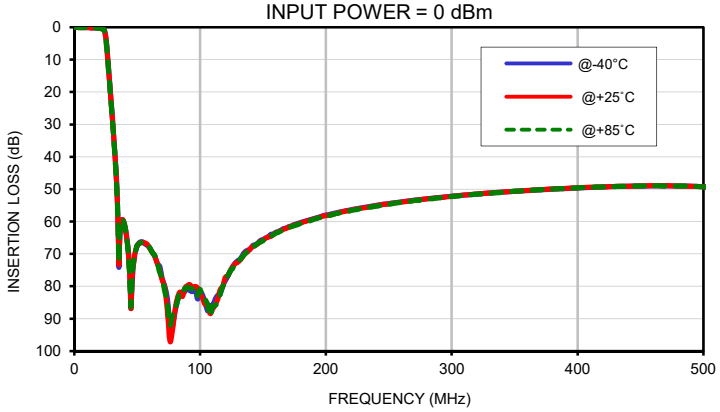
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
0.5	0.01	0.02	0.03	55.27	51.26	49.37	48.66	46.60	45.37
1.0	0.02	0.03	0.03	53.23	50.70	49.02	47.49	45.92	44.82
2.0	0.03	0.04	0.04	48.97	48.50	47.60	45.49	44.74	43.97
2.5	0.03	0.04	0.05	47.72	47.60	46.91	44.61	44.06	43.44
3.0	0.04	0.05	0.05	46.95	46.84	46.21	43.92	43.48	42.92
10.0	0.11	0.12	0.13	28.16	28.03	27.98	27.87	27.67	27.61
15.0	0.18	0.19	0.20	23.56	23.85	24.07	23.59	23.82	24.01
20.0	0.29	0.31	0.34	26.66	26.25	25.94	26.67	26.28	25.96
22.0	0.40	0.43	0.46	26.35	26.70	26.85	26.83	27.14	27.25
23.0	0.51	0.55	0.59	26.19	25.14	24.65	27.46	26.43	25.94
24.0	0.99	1.07	1.15	12.05	11.65	11.45	12.11	11.78	11.61
25.0	2.78	2.93	3.07	5.11	4.94	4.87	5.11	4.98	4.93
25.5	4.43	4.62	4.79	3.17	3.07	3.05	3.17	3.10	3.09
26.0	6.53	6.74	6.92	1.97	1.91	1.92	1.96	1.94	1.95
29.0	21.74	21.94	22.10	0.30	0.31	0.33	0.30	0.32	0.35
30.0	26.87	27.08	27.24	0.23	0.23	0.25	0.22	0.24	0.27
31.0	32.11	32.33	32.49	0.18	0.19	0.21	0.18	0.20	0.22
32.0	37.65	37.89	38.07	0.15	0.16	0.18	0.15	0.17	0.19
33.0	43.81	44.07	44.30	0.13	0.14	0.15	0.13	0.14	0.16
34.0	51.37	51.69	52.03	0.12	0.12	0.14	0.11	0.13	0.14
35.0	63.37	64.34	64.95	0.10	0.11	0.12	0.10	0.11	0.13
40.0	61.10	61.18	61.20	0.06	0.07	0.08	0.06	0.07	0.09
42.0	65.77	66.09	66.09	0.06	0.06	0.07	0.05	0.07	0.08
45.0	86.85	86.88	86.33	0.05	0.06	0.06	0.04	0.06	0.07
48.0	70.40	70.43	69.76	0.04	0.05	0.06	0.04	0.05	0.06
50.0	67.66	67.41	67.33	0.04	0.05	0.06	0.03	0.04	0.05
56.0	66.86	66.54	66.60	0.04	0.05	0.05	0.03	0.04	0.05
60.0	68.18	68.29	68.04	0.04	0.04	0.05	0.02	0.04	0.05
62.0	69.59	69.46	69.56	0.04	0.04	0.05	0.02	0.03	0.04
64.0	70.72	70.83	70.44	0.04	0.05	0.05	0.02	0.03	0.04
70.0	77.74	78.15	77.67	0.04	0.05	0.05	0.02	0.03	0.04
76.0	91.25	96.95	91.96	0.04	0.05	0.05	0.02	0.03	0.04
78.0	92.46	94.12	89.14	0.04	0.05	0.05	0.01	0.03	0.04
80.0	88.20	87.82	87.08	0.04	0.05	0.05	0.01	0.03	0.04
100.0	81.86	82.45	80.95	0.05	0.05	0.05	0.01	0.03	0.04
110.0	85.81	87.03	86.16	0.06	0.06	0.06	0.01	0.03	0.04
150.0	65.53	65.78	65.90	0.07	0.08	0.07	0.03	0.04	0.05
180.0	60.31	60.44	60.60	0.08	0.09	0.08	0.04	0.05	0.06
200.0	58.00	58.21	58.42	0.09	0.10	0.09	0.04	0.06	0.07
220.0	56.32	56.47	56.61	0.09	0.10	0.10	0.05	0.07	0.07
240.0	55.05	55.13	55.30	0.09	0.11	0.11	0.06	0.07	0.08
260.0	53.92	54.04	54.10	0.09	0.11	0.11	0.06	0.08	0.09
280.0	53.00	53.01	53.13	0.09	0.12	0.12	0.07	0.08	0.09
300.0	52.21	52.26	52.32	0.09	0.12	0.12	0.07	0.09	0.10
310.0	51.84	51.83	51.95	0.09	0.12	0.13	0.08	0.09	0.10
320.0	51.53	51.51	51.58	0.09	0.12	0.13	0.08	0.10	0.11
330.0	51.27	51.18	51.23	0.09	0.12	0.13	0.08	0.10	0.11
340.0	50.94	50.95	50.97	0.10	0.13	0.13	0.08	0.10	0.11
350.0	50.64	50.66	50.65	0.10	0.13	0.13	0.09	0.11	0.12
360.0	50.44	50.40	50.45	0.10	0.13	0.14	0.09	0.11	0.12
370.0	50.19	50.13	50.23	0.09	0.13	0.14	0.09	0.11	0.12
380.0	50.04	49.95	49.99	0.10	0.13	0.14	0.09	0.11	0.12
390.0	49.80	49.78	49.77	0.10	0.13	0.14	0.09	0.12	0.13
400.0	49.63	49.60	49.58	0.10	0.13	0.14	0.10	0.12	0.13
410.0	49.49	49.42	49.47	0.10	0.13	0.15	0.10	0.12	0.13
420.0	49.33	49.28	49.31	0.10	0.14	0.15	0.10	0.12	0.14
430.0	49.23	49.16	49.18	0.10	0.14	0.15	0.10	0.13	0.14
440.0	49.12	49.10	49.07	0.10	0.14	0.15	0.10	0.13	0.14
450.0	49.01	49.03	49.03	0.10	0.14	0.15	0.10	0.13	0.14
500.0	49.23	49.25	49.31	0.10	0.14	0.16	0.11	0.14	0.16

Typical Performance Data

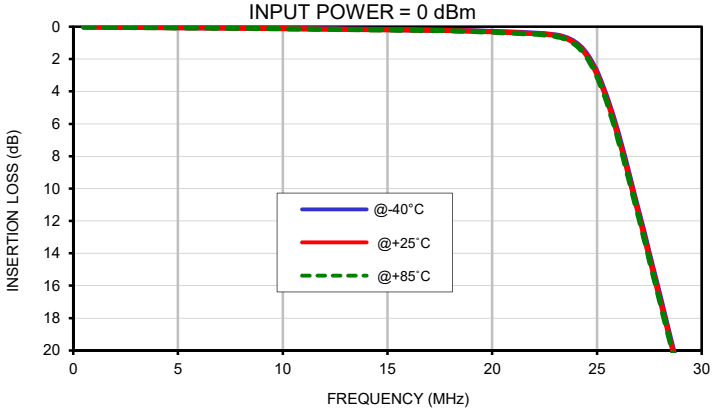
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25˚C	@+85˚C
0.5	27.05	27.07	27.05
2.0	26.72	26.75	26.77
3.0	26.81	26.84	26.86
3.5	26.83	26.87	26.89
4.0	26.88	26.92	26.94
4.5	26.98	27.02	27.05
5.0	27.11	27.14	27.17
5.5	27.26	27.29	27.32
6.0	27.44	27.47	27.49
6.5	27.64	27.67	27.69
7.0	27.85	27.88	27.90
7.5	28.08	28.11	28.13
8.0	28.33	28.36	28.38
8.5	28.61	28.65	28.66
9.0	28.91	28.94	28.96
9.5	29.23	29.26	29.29
10.0	29.58	29.61	29.63
10.5	29.95	29.98	30.01
11.0	30.35	30.39	30.42
11.5	30.79	30.83	30.85
12.0	31.26	31.31	31.34
12.5	31.77	31.81	31.85
13.0	32.34	32.38	32.42
13.5	32.95	33.00	33.04
14.0	33.61	33.66	33.71
14.5	34.34	34.41	34.46
15.0	35.13	35.20	35.26
15.5	36.01	36.08	36.14
16.0	36.97	37.05	37.11
16.5	38.03	38.11	38.17
17.0	39.17	39.27	39.33
17.5	40.44	40.54	40.62
18.0	41.85	41.97	42.04
18.5	43.41	43.54	43.62
19.0	45.19	45.33	45.43
19.5	47.23	47.40	47.51
20.0	49.64	49.83	49.97
21.0	56.13	56.44	56.63
22.0	65.61	65.99	66.21
23.0	76.09	76.34	76.44
25.0	83.72	83.50	83.26

Typical Performance Curves

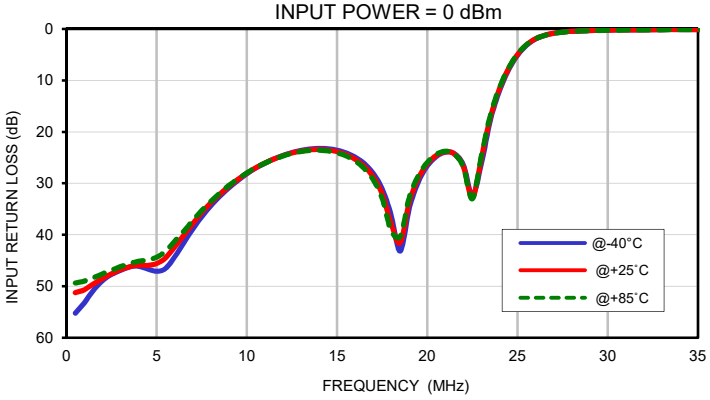
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



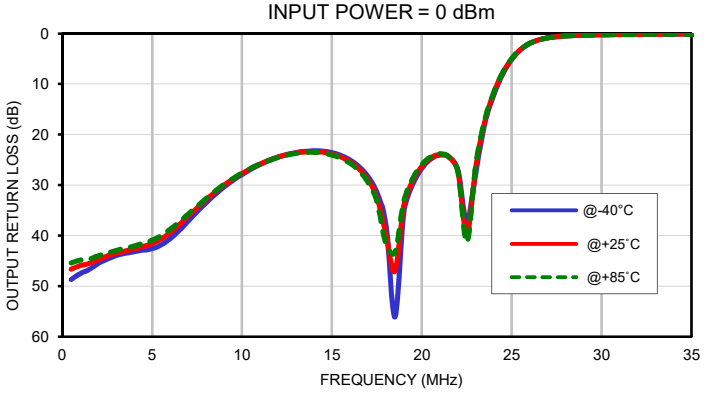
INSERTION LOSS vs. TEMPERATURE (Zoomed)
INPUT POWER = 0 dBm



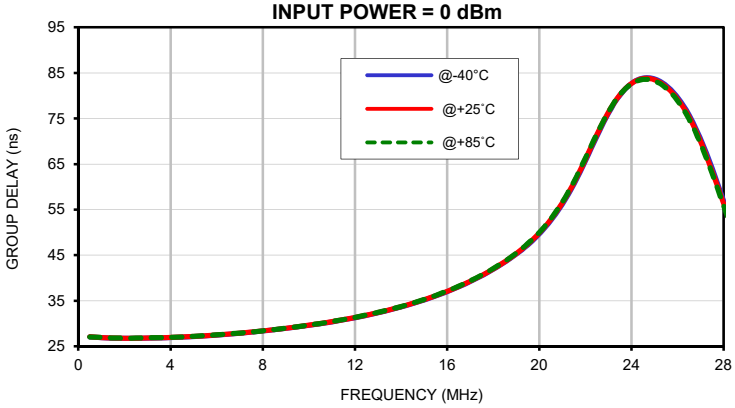
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm

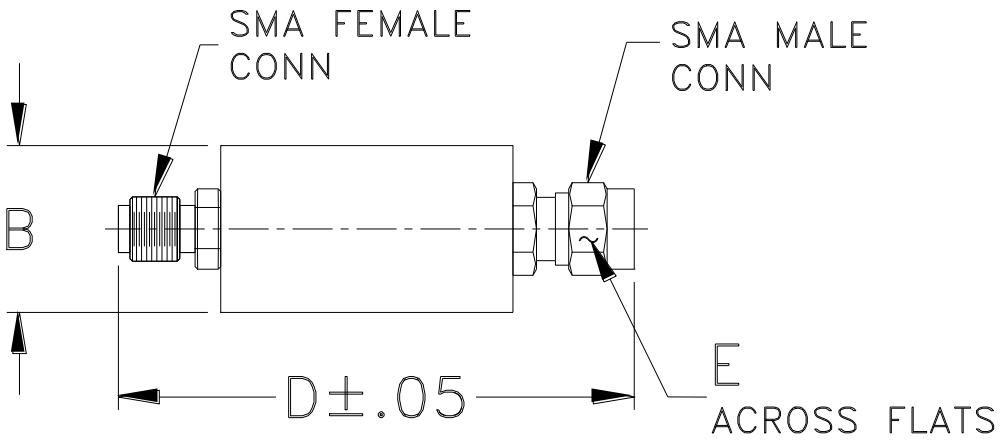


GROUP DELAY vs. TEMPERATURE
INPUT POWER = 0 dBm



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.

Mini-Circuits

Environmental Specifications **ENV105**

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