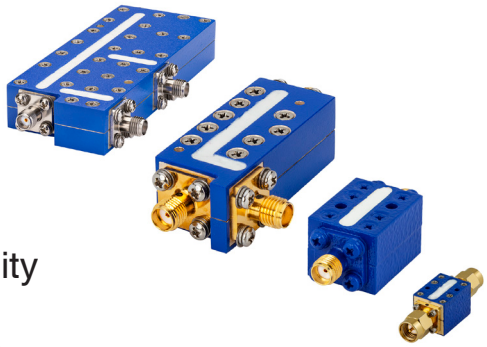
Suspended Substrate Stripline Filters and Multiplexers

50Ω DC to 26 GHz



The Big Deal

- Low insertion loss
- Ultra-wide passband width
- Fast roll-off with wide stopband
- Good power handling and temperature stability
- Passband up to 26 GHz
- Stopband up to 26.5 GHz can extend to 40 GHz

Product Overview

Mini-Circuits' Suspended Substrate Stripline filters offer low insertion loss by implementing printed circuit board suspended between two parallel ground planes, providing high Q. Low insertion loss combined with wide stopband makes them an excellent choice for wideband instruments and systems like ECM, ECCM, ELINT and ultra-broadband receivers.

Low pass, high pass, band pass, band stop, diplexer and multiplexer designs can be realized with this technology. Advanced filter design and construction can achieve stopband width greater than 6x the center frequency, and temperature stability will be better than other printed circuit realizations because the fields are mainly in the air rather than in a dielectric. The inside walls of the housing hold the circuit and prevent movement that could be caused by vibration or mechanical shock, making these designs excellent candidates for harsh operating environments.

Suspended substrate stripline filters can be realized in small form factors with high-quality, precise machining for applications where size is critical. Excellent repeatability across units is achieved through precise tuning and process control.

Key Features

Feature	Advantages
Low insertion loss	Low signal loss results in better SNR in receiver front end and better power delivery to antenna in transmitters
Fast roll-off	Higher selectivity results in better adjacent channel rejection and dynamic range
Wide stopband	Wide, spur-free stop band results in better receiver sensitivity
High power handling	Well suited for transmitter applications
Excellent temperature stability	Ensures minimal variation in electrical performance across temperature

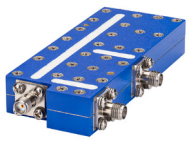
Suspended substrate stripline

Triplexer

Z3SS-7000-S+

50Ω DC to 15000 MHz

(DC-1600, 2600-5500, 7000-15000 MHz)



Generic photo used for illustration purposes only

CASE STYLE: UB2923

Connectors	Model
SMA-F	Z3SS-7000-S+

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	3 W max

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

Coaxial Connections

Common Port	1
Low Pass Port (Channel-1)	2
Band Pass Port (Channel-2)	3
High Pass Port (Channel-3)	4

Features

- Low passband insertion loss of 1.5 dB typical
- Good flatness
- High rejection of 90 dB typical
- Wider passband and stopband

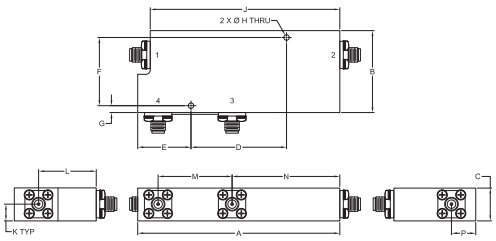
Applications

- Test and measurement
- Wireless communication system

+RoHS Compliant

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

Outline Drawing



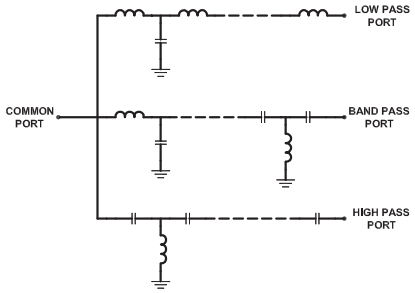
Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H
3.70	**1.50**	**.60**	**1.750**	**.98**	**1.250**	**.13**	**.100**
93.98	38.10	15.24	44.45	24.77	31.75	3.18	2.54

J	K	L	M	N	P	Wt.
3.47	**.31**	**1.06**	**1.35**	**1.97**	**.44**	grams
88.16	7.78	26.81	34.40	50.10	11.29	**416**

Note: Please refer to case style drawing for details

Functional Schematic



Electrical Specifications at 25°C

Parameter		Port	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss	Low Pass, Channel -1	DC - 1600	-	1.5	2.0	dB
		Band Pass, Channel -2	2600 - 5500	-	2.0	3.0	
		High Pass, Channel -3	7000 - 15000	-	2.0	3.0	
	Return Loss	Low Pass, Channel -1	DC - 1600	-	10	-	dB
		Band Pass, Channel -2	2600 - 5500	-	10	-	
		High Pass, Channel -3	7000 - 15000	-	8	-	
		Common	DC - 1600	-	10	-	
			2600 - 5500	-	10	-	
			7000 - 15000	-	8	-	
Stop Band Rejection		Low Pass, Channel-1	2600 - 3400	20	35	-	dB
			3400 - 4000	40	55	-	
			4000 - 15000	-	30	-	
		Band Pass, Channel -2	DC - 1600	25	40	-	
			7000 - 10000	60	80	-	
			10000 - 15000	-	90	-	
		High Pass, Channel -3	DC - 3400	-	90	-	
			3400 - 5500	25	40	-	

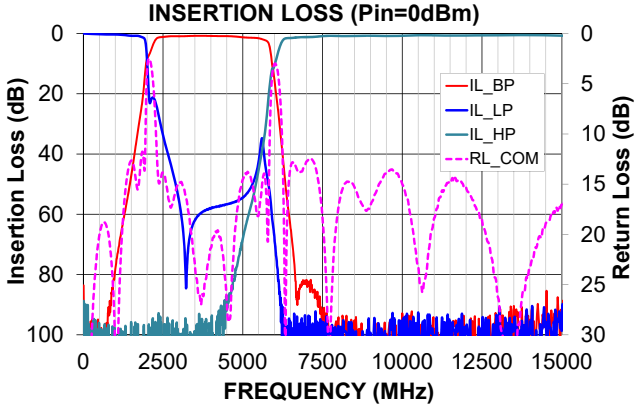
Typical Performance Data at 25°C

FREQ. (MHz)	INSERTION LOSS (dB)			RETURN LOSS (dB)			
	Low Pass Chanel -1	Band Pass Chanel -2	High Pass Chanel -3	Common	Low Pass Chanel -1	Band Pass Chanel -2	High Pass Chanel -3
10	0.03	83.62	88.77	33.69	31.25	0.00	0.01
1600	0.75	40.36	97.40	13.53	13.81	0.23	0.05
1760	0.88	28.96	108.69	14.34	15.20	0.33	0.06
1890	1.43	18.67	100.71	12.55	15.41	0.63	0.07
1970	4.67	9.80	113.04	6.50	6.58	1.63	0.07
2070	22.34	6.94	106.47	2.51	0.96	2.13	0.07
2210	21.47	3.14	105.68	5.81	0.48	6.07	0.08
2460	31.97	1.17	109.17	14.00	0.23	15.63	0.09
2600	37.92	1.02	107.62	15.04	0.19	14.52	0.11
3400	64.50	0.79	101.25	20.23	0.07	20.72	0.15
4000	57.94	0.80	97.27	21.35	0.06	22.28	0.18
5000	54.44	1.25	68.00	14.53	0.12	13.55	0.23
5500	42.27	1.58	44.96	18.00	0.82	24.50	0.31
6000	69.11	16.08	10.41	3.01	0.18	1.85	1.81
6240	101.48	39.23	2.48	11.34	0.14	0.59	9.70
7000	101.95	81.79	1.19	12.74	0.13	0.53	13.19
10000	96.55	92.90	0.73	14.99	0.01	0.95	14.09
12000	98.16	105.41	0.65	15.32	0.00	0.16	15.60
14400	97.83	93.32	0.57	19.55	0.01	0.26	18.98
15000	98.58	95.21	0.71	16.98	0.07	0.40	15.09

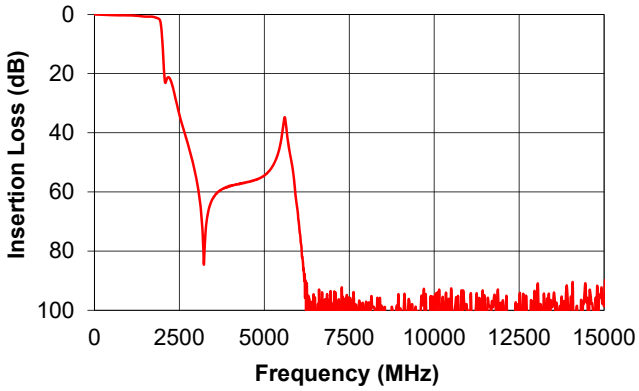
Notes

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

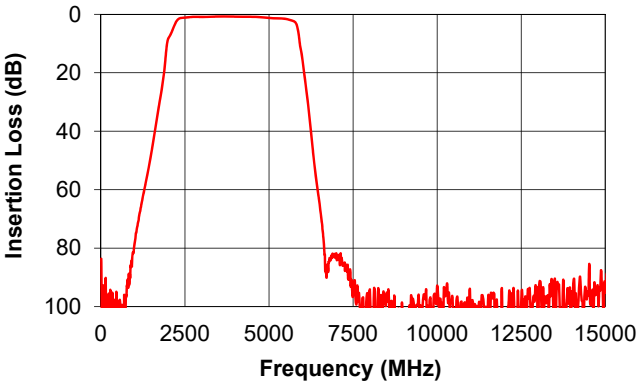
Z3SS-7000-S+ IL-LP Vs IL-HP Vs IL-BP Vs RL-COM INSERTION LOSS (Pin=0dBm)



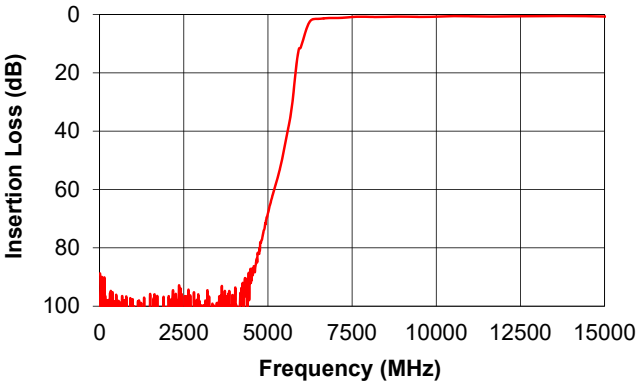
Z3SS-7000-S+ LOW PASS PORT INSERTION LOSS (P_{in}=0dBm)



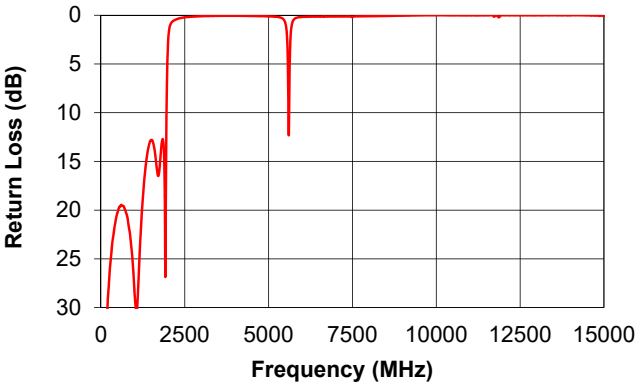
Z3SS-7000-S+ BAND PASS PORT INSERTION LOSS (P_{in}=0dBm)



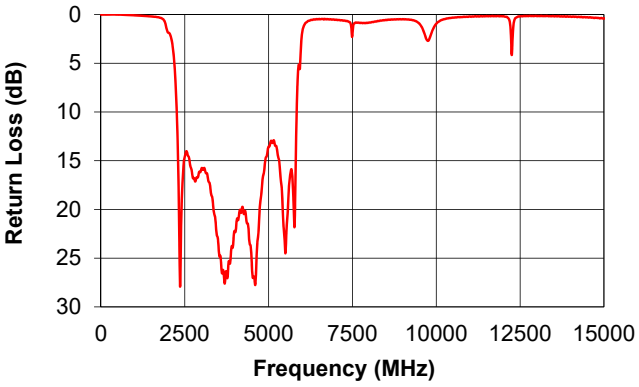
Z3SS-7000-S+ HIGH PASS PORT INSERTION LOSS (P_{in}=0dBm)



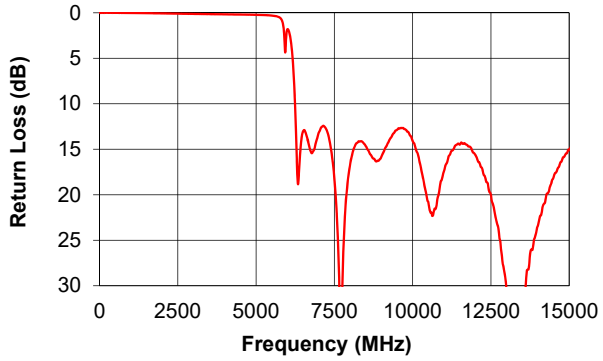
Z3SS-7000-S+ LOW PASS PORT RETURN LOSS (P_{in}=0dBm)



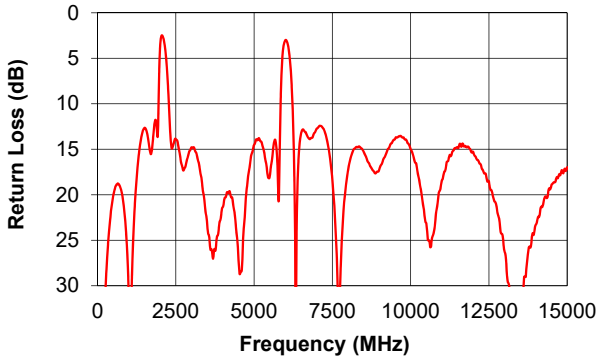
Z3SS-7000-S+ BAND PASS PORT RETURN LOSS (P_{in}=0dBm)



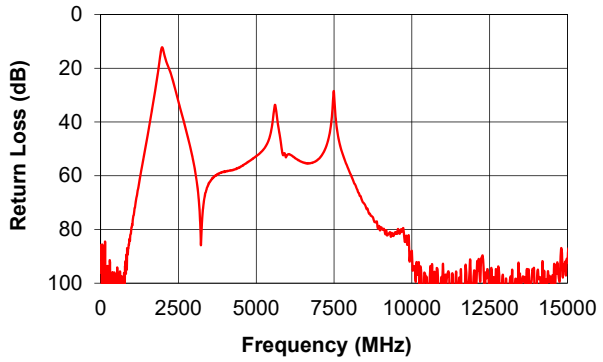
Z3SS-7000-S+ HIGH PASS PORT RETURN LOSS (P_{in}=0dBm)



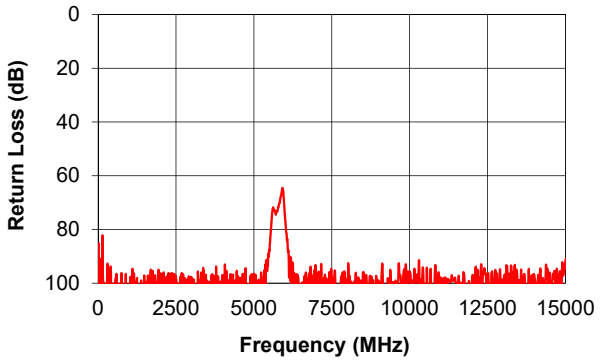
Z3SS-7000-S+ COMMON PORT RETURN LOSS (P_{in}=0dBm)



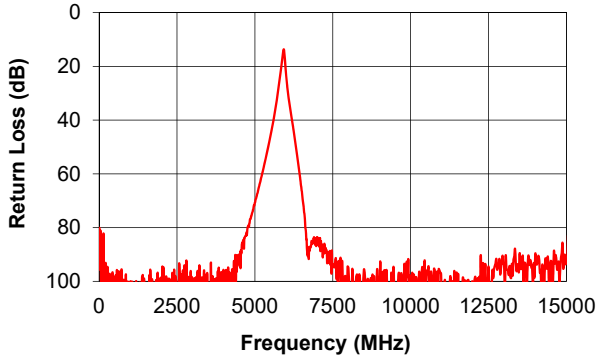
Z3SS-7000-S+ LOW PASS - BAND PASS CROSS OVER ISOLATION (P_{in}=0dBm)



Z3SS-7000-S+ LOW PASS - HIGH PASS CROSS OVER ISOLATION (P_{in}=0dBm)



Z3SS-7000-S+ BAND PASS - HIGH PASS CROSS OVER ISOLATION (P_{in}=0dBm)

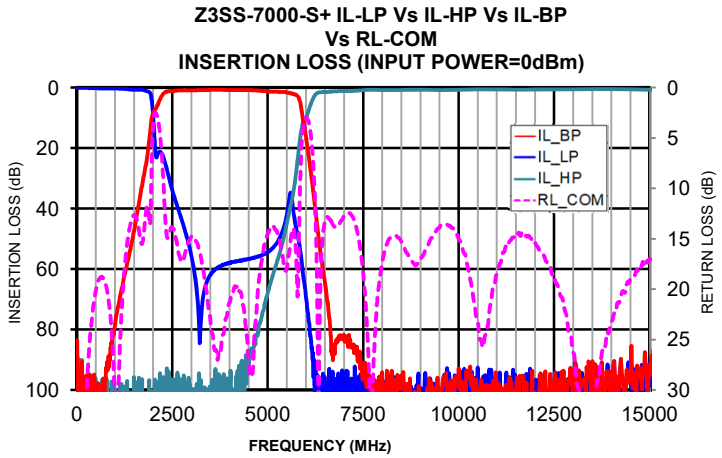


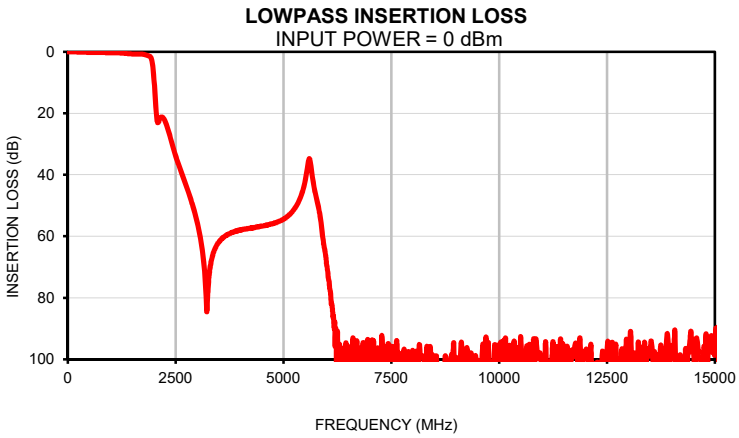
Suspended Substrate Stripline Triplexer Z3SS-7000-S+

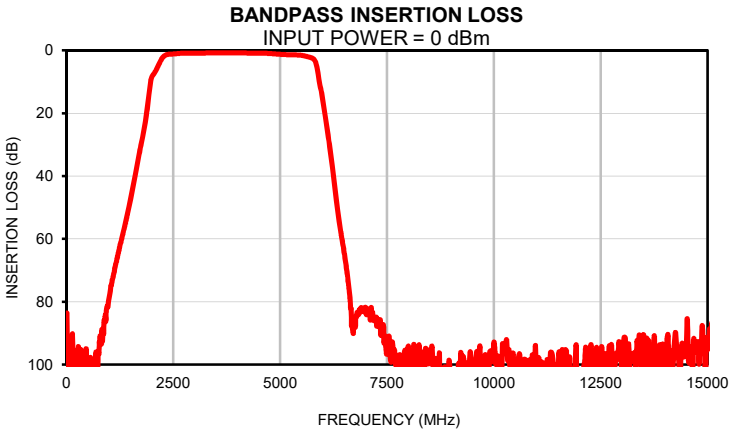
Typical Performance Data

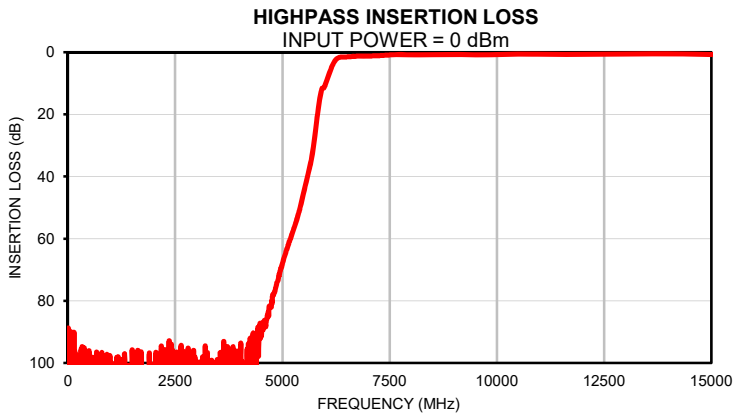
FREQUENCY (MHz)	INSERTIONLOSS (dB)			Cross over isolation (dB)			RETURNLOSS (dB)			
	Lowpass port	Bandpass port	Highpass port	(between LPF and HPF)	(between BPF and HPF)	(between LPF and BPF)	Common port	Lowpass port	Bandpass port	Highpass port
10	0.03	83.62	88.77	85.62	80.10	85.74	33.69	31.25	0.00	0.01
100	0.06	104.02	95.66	99.30	106.37	98.45	50.14	38.35	0.01	0.00
200	0.10	103.18	102.55	103.64	98.74	93.90	35.67	29.61	0.01	0.00
400	0.19	97.69	101.71	93.89	98.35	101.28	22.88	21.84	0.00	0.00
500	0.23	113.85	100.13	100.29	103.19	106.85	20.12	20.20	0.01	0.00
600	0.27	102.02	100.17	106.11	105.79	96.25	18.93	19.47	0.02	0.01
1000	0.33	78.47	100.83	104.92	105.54	79.02	31.36	28.34	0.09	0.02
1200	0.41	65.20	103.53	108.87	105.15	64.95	20.64	21.41	0.12	0.03
1500	0.74	47.41	95.96	104.79	103.62	45.47	12.65	12.81	0.20	0.04
1600	0.75	40.36	97.40	97.17	103.86	38.81	13.53	13.81	0.23	0.05
2000	9.18	8.37	104.53	102.15	102.79	12.78	3.66	2.92	1.85	0.07
2200	21.34	3.39	99.76	99.22	109.07	20.28	5.35	0.50	5.52	0.08
2500	33.80	1.13	104.91	98.27	103.60	32.49	13.88	0.22	14.59	0.10
2600	37.92	1.02	107.62	101.55	104.77	36.79	15.04	0.19	14.52	0.11
3000	55.44	0.90	107.39	97.99	103.24	56.05	14.80	0.10	15.79	0.13
3400	64.50	0.79	101.25	103.73	103.75	65.21	20.23	0.07	20.72	0.15
3800	58.88	0.76	105.68	115.30	109.45	59.23	24.99	0.06	25.68	0.16
4000	57.94	0.80	97.27	103.02	112.13	58.40	21.35	0.06	22.28	0.18
4100	57.72	0.82	101.52	110.70	102.24	58.19	20.22	0.06	21.01	0.18
4300	57.15	0.85	96.49	97.87	97.50	57.66	20.32	0.07	20.16	0.19
4500	56.69	0.86	89.77	102.58	89.95	56.64	26.88	0.08	25.68	0.19
4700	56.08	0.95	82.12	104.34	83.14	55.14	22.52	0.08	22.25	0.21
4900	55.14	1.15	73.24	104.29	75.10	53.60	15.81	0.11	14.97	0.22
5100	53.45	1.32	63.49	103.36	66.28	51.81	13.99	0.13	13.12	0.24
5300	50.10	1.41	55.43	104.02	56.61	49.13	14.98	0.19	14.76	0.26
5500	42.27	1.58	44.96	88.03	45.83	41.91	18.00	0.82	24.50	0.31
5700	43.20	2.22	32.49	74.46	32.83	41.07	14.40	0.85	16.33	0.44
5900	58.84	8.52	12.82	65.58	15.21	51.65	5.09	0.20	5.14	2.56
6000	69.11	16.08	10.41	75.09	22.87	52.23	3.01	0.18	1.85	1.81
6300	95.23	46.08	1.80	98.51	48.47	53.83	21.48	0.15	0.56	16.08
6500	105.46	64.67	1.49	104.26	66.14	55.06	13.29	0.14	0.46	13.03
6700	93.95	87.23	1.29	123.10	88.21	55.39	13.57	0.14	0.48	14.73
6900	105.25	83.08	1.19	112.26	83.61	54.70	13.36	0.13	0.52	14.40
7000	101.95	81.79	1.19	107.17	83.58	53.80	12.74	0.13	0.53	13.19
7300	98.83	86.48	1.05	105.21	88.39	47.16	13.56	0.13	0.66	13.35
7500	101.07	95.34	0.86	99.60	94.30	29.40	18.38	0.19	1.97	18.24
7700	98.28	100.14	0.76	103.65	92.62	49.02	32.86	0.11	0.85	48.03
7900	97.56	96.90	0.77	96.11	98.03	55.77	20.07	0.11	0.87	19.54
8000	97.36	94.21	0.81	119.85	94.87	58.68	17.32	0.11	0.82	16.76
8200	98.93	103.85	0.85	115.82	117.51	63.88	14.95	0.09	0.72	14.35
8500	102.67	95.21	0.80	96.03	95.62	70.93	15.29	0.08	0.54	14.65
9000	99.84	104.39	0.72	98.97	104.93	79.28	17.20	0.05	0.47	15.85
9200	106.54	104.68	0.76	103.60	103.45	82.18	15.64	0.04	0.53	14.37
9500	100.28	99.68	0.81	126.98	102.25	81.01	13.88	0.02	0.95	12.87
10000	96.55	92.90	0.73	95.74	106.34	88.03	14.99	0.01	0.95	14.09
10300	98.93	92.23	0.62	91.48	103.39	95.74	18.97	0.01	0.42	17.67
10600	100.38	96.57	0.57	103.67	105.37	93.72	25.13	0.01	0.30	21.97
10800	93.54	98.87	0.57	99.64	108.46	94.40	22.37	0.02	0.24	20.28
11000	100.19	110.97	0.60	98.07	107.55	92.77	18.39	0.02	0.20	17.41
11200	101.03	132.56	0.65	102.73	101.21	96.86	16.27	0.00	0.21	15.52
11500	101.24	103.35	0.68	100.55	109.05	101.20	14.83	0.02	0.15	14.49
12000	98.16	105.41	0.65	99.27	101.85	95.28	15.32	0.00	0.16	15.60
12500	98.55	98.98	0.60	96.98	94.50	104.59	18.55	0.01	0.19	20.03
13000	108.72	123.30	0.58	105.10	93.70	104.14	26.26	0.01	0.16	30.58
13200	108.68	97.09	0.55	96.85	98.31	103.77	34.81	0.02	0.16	38.52
13500	97.55	90.43	0.53	99.75	89.51	107.18	34.01	0.01	0.17	33.58
13800	107.38	101.05	0.51	102.04	91.65	109.27	25.70	0.01	0.19	26.00
14000	99.36	94.99	0.52	96.85	89.73	108.92	23.28	0.02	0.20	23.39
14500	95.83	95.97	0.58	96.21	92.38	98.33	18.89	0.00	0.27	18.09
15000	98.58	95.21	0.71	91.83	91.64	92.34	16.98	0.07	0.40	15.09

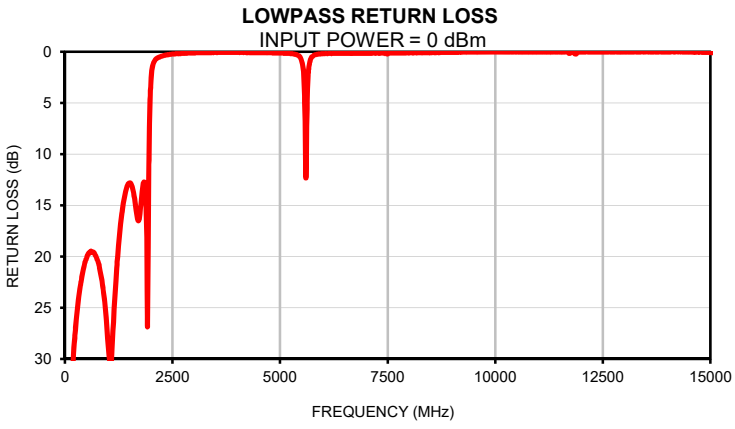
Typical Performance Curves

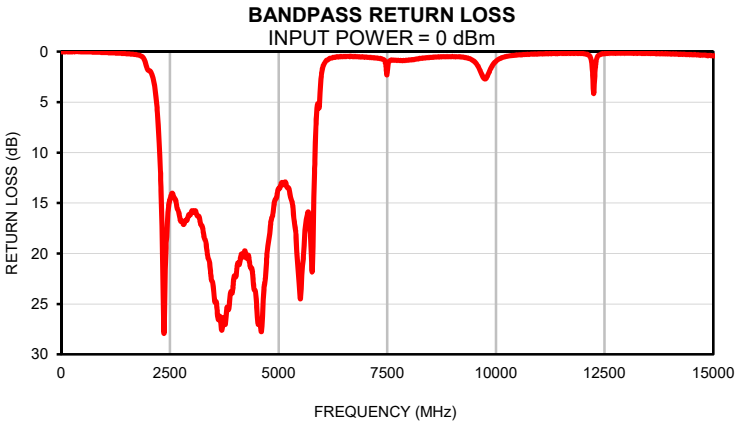






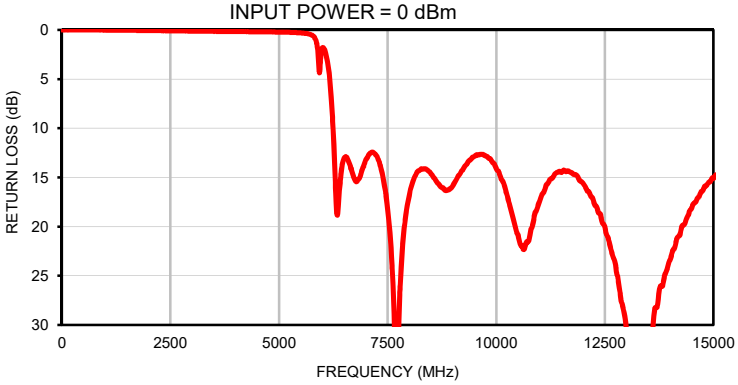




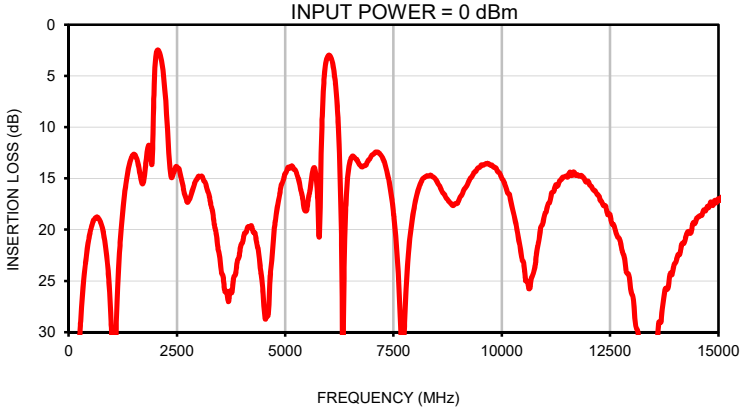


Typical Performance Curves

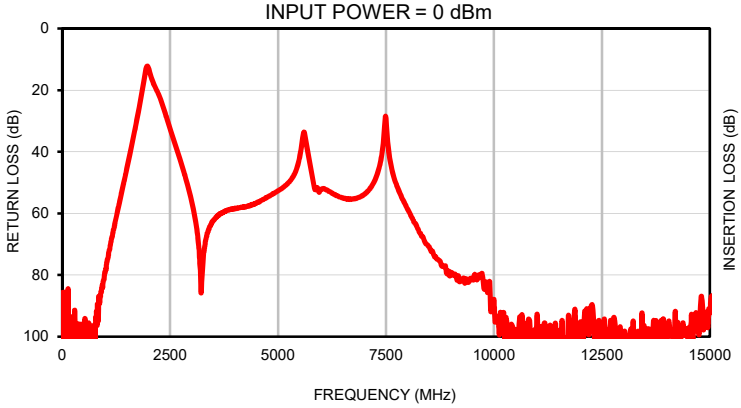
HIGHPASS RETURN LOSS
INPUT POWER = 0 dBm



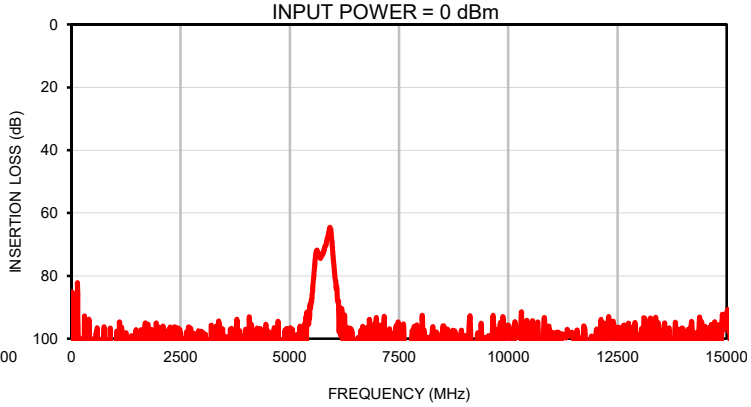
COMMON PORT RETURN LOSS
INPUT POWER = 0 dBm



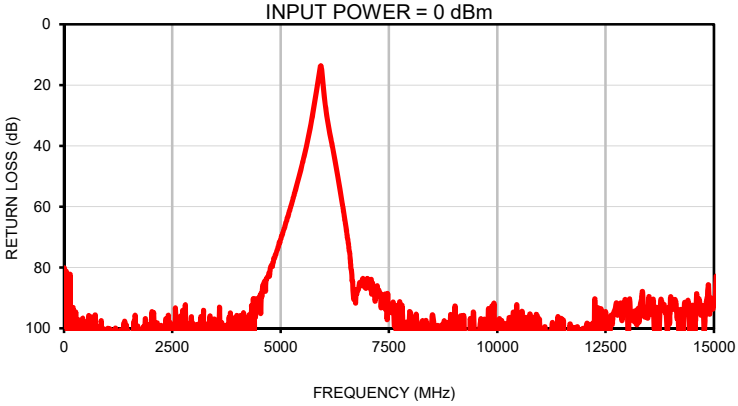
CROSSOVER ISOLATION BETWEEN LPF & BPF
INPUT POWER = 0 dBm



CROSSOVER ISOLATION BETWEEN LPF & HPF
INPUT POWER = 0 dBm



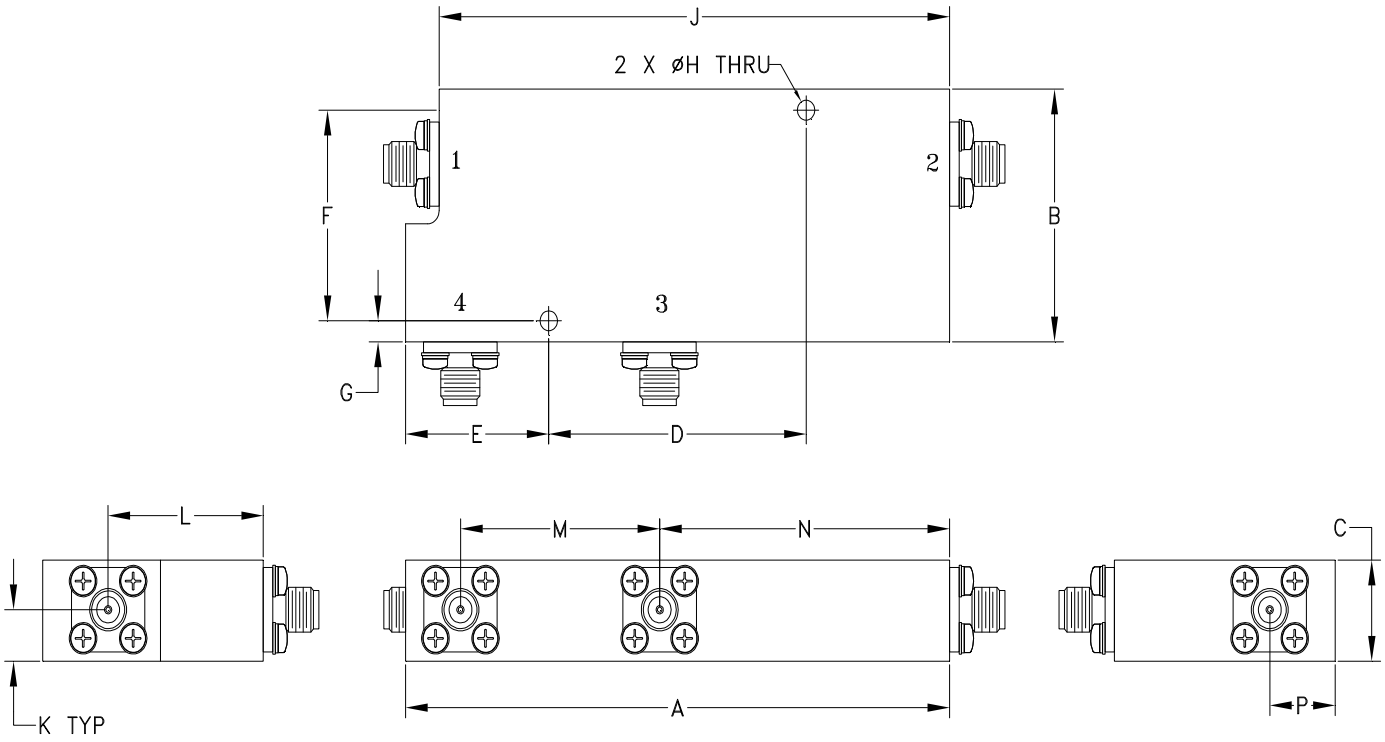
CROSSOVER ISOLATION BETWEEN BPF & HPF
INPUT POWER = 0 dBm



Case Style UB

Outline Dimensions

UB2923



CASE#	A	B	C	D	E	F	G	H
UB2923	3.70 (93.98)	1.50 (38.10)	.60 (15.24)	1.750 (44.45)	.98 (24.77)	1.250 (31.75)	.13 (3.18)	.100 (2.54)

CASE#	J	K	L	M	N	P	WT.GRAMS
UB2923	3.47 (88.16)	.31 (7.78)	1.06 (26.81)	1.35 (34.40)	1.97 (50.10)	.44 (11.29)	416

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .10; 3 Pl. ± .015

Notes:

1. Case material: Aluminum alloy.
2. Case finish: Powder coated over silver plating.
3. Refer to the individual model data sheet for the type of connectors available.

Mini-Circuits

Environmental Specifications ENV46

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
Humidity	90 to 95% RH, 40°C, 96 hours; Units may require bake-out after humidity to restore full performance.	MIL-STD-202, Method 103, Condintion B
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
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	50g, 11ms half-sine, 3 shocks each direction 3 axes (total 18)	MIL-STD-202, Method 213, Condition A