Cavity

Bandpass Filters

50Ω DC to 40 GHz

The Big Deal

- Very low insertion loss with excellent power handling
- Very fast roll-off with wide stopband
- Passbands up to 36 GHz
- Stopbands up to 40 GHz

Product Overview

Mini-Circuits' cavity filters are designed by implementing resonant structures with very high Q and are ideal for narrow-band, high-selectivity applications. These designs can provide bandwidths as narrow as 1% with very high selectivity and excellent low noise floor. Low insertion loss combined with excellent power handling makes them well-suited for transmitter and receiver front end. Advanced filter design and construction enables stopband width greater than 3x the center frequency.

Mini-Circuits' cavity filters feature a special protective assembly to prevent accidental de-tuning that would otherwise require expensive replacement or return to factory for re-tuning. Custom integrated assembly with LNA and bias tees results in greatly simplifying system integration. Precise machining allows realization of cavity filters with small form factors 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 transmitter
Fast roll-off	Higher selectivity results in better adjacent channel rejection and dynamic range
Wide stopband	Wide spur free band results in better receiver sensitivity
High power handling	Well suited for transmitter application
Protective assembly	Prevents accidental de-tuning of precisely tuned resonant circuit

Cavity

Bandpass Filter

ZVBP-5310-S+

50Ω 5250 to 5370 MHz

Generic photo used for illustration purposes only

CASE STYLE: ME1656

Connectors	Model
SMA-F	ZVBP-5310-S+

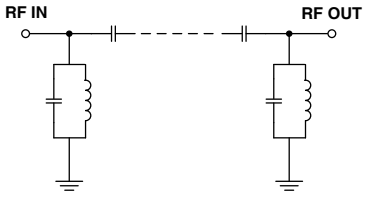
Features

- Low insertion loss, 0.6 dB typical
- Good VSWR, 1.3:1 typical
- High rejection
- Fast roll-off
- Connectorized package

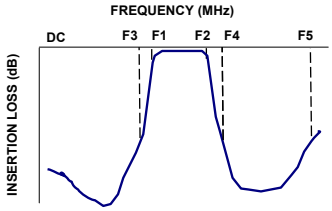
Applications

- Radio Location
- Position fixing
- Aviation/Aeronautical

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
Pass Band	Center Frequency	-	-	-	5310	-	MHz
	Insertion Loss	F1-F2	5250-5370	-	0.6	1.5	dB
	VSWR	F1-F2	5250-5370	-	1.3	1.5	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 5080	20	32	-	dB
	VSWR	DC-F3	DC - 5080	-	20	-	:1
Stop Band, Upper	Insertion Loss	F4-F5	5530-8250	20	31	-	dB
	VSWR	F4-F5	5530-8250	-	20	-	:1

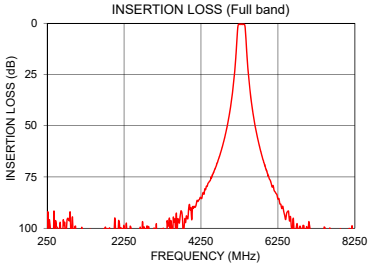
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	10 W max.

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

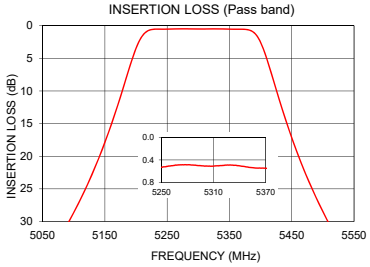
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
250	100.70	158.86	5250	5.27
2010	95.03	223.55	5255	5.14
4010	95.88	95.08	5260	5.06
5010	41.89	94.59	5265	4.98
5080	32.10	83.71	5270	4.92
5110	26.77	77.82	5275	4.87
5160	15.24	37.29	5280	4.81
5200	3.47	4.63	5285	4.77
5216	0.97	1.68	5290	4.73
5250	0.53	1.22	5300	4.69
5310	0.51	1.20	5310	4.69
5370	0.55	1.11	5315	4.72
5420	8.19	12.44	5320	4.77
5450	17.17	33.35	5330	4.88
5480	24.44	47.92	5340	5.01
5530	33.83	60.04	5350	5.18
5700	54.16	80.28	5355	5.30
6500	91.85	121.28	5360	5.46
7500	109.62	127.02	5365	5.70
8250	102.18	104.05	5370	6.02

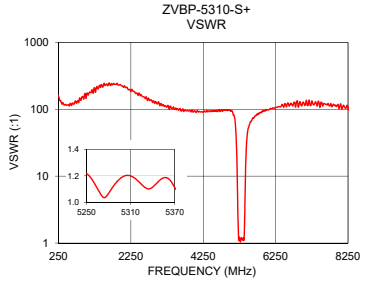
ZVBP-5310-S+
INSERTION LOSS (Full band)



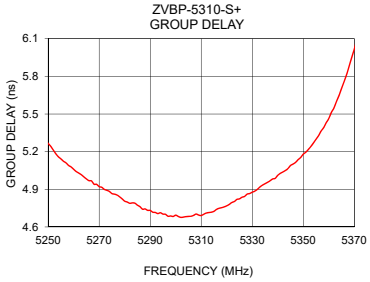
ZVBP-5310-S+
INSERTION LOSS (Pass band)



ZVBP-5310-S+
VSWR



ZVBP-5310-S+
GROUP DELAY



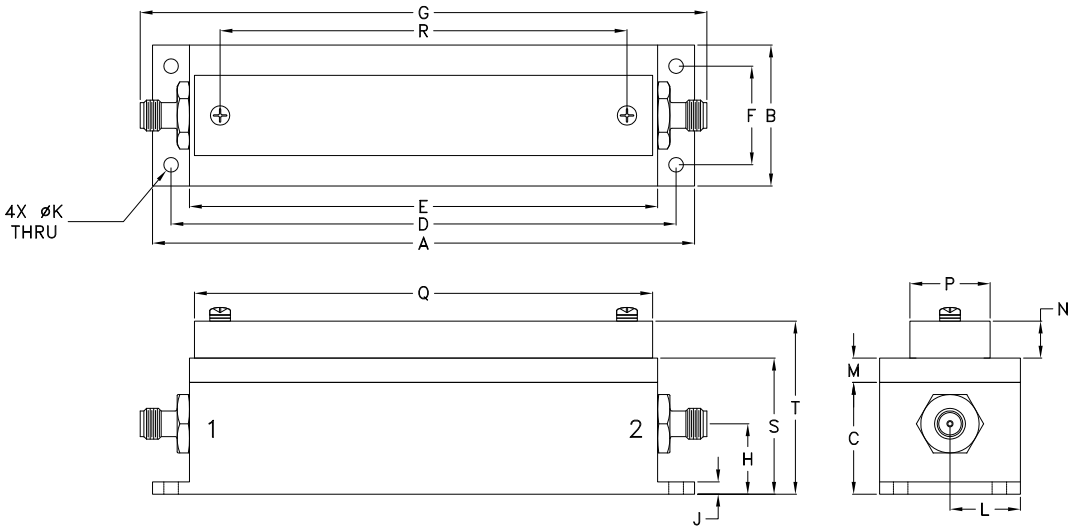
Notes

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-FEMALE
PORT - 2	SMA-FEMALE

Outline Drawing



Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J	K
4.40	**1.14**	**0.91**	**4.096**	**3.80**	**0.800**	**4.60**	**0.57**	**0.10**	**0.118**
111.66	29.03	23.01	104.04	96.42	20.32	116.74	14.50	2.54	3.00

L	M	N	P	Q	R	S	T		Wt.
0.57	**0.20**	**0.30**	**0.65**	**3.72**	**3.30**	**1.10**	**1.40**		grams
14.53	5.00	7.62	16.51	94.39	83.82	28.02	35.64		**160**

Note: Please refer to case style drawing for details

Cavity Band Pass Filter ZVBP-5310-S+

Typical Performance Data

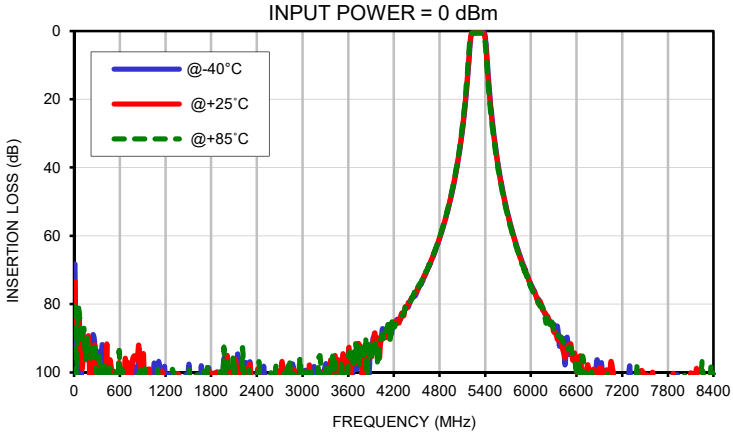
FREQ. (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURN LOSS (dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
10	68.30	73.40	80.73	0.01	0.00	0.02	0.00	0.01	0.01
110	88.28	98.76	87.82	0.04	0.04	0.03	0.03	0.03	0.02
210	96.04	104.99	95.82	0.10	0.10	0.08	0.08	0.08	0.07
310	93.99	95.86	100.29	0.11	0.13	0.12	0.10	0.12	0.11
410	116.85	114.23	105.28	0.12	0.15	0.15	0.11	0.14	0.13
510	107.09	99.60	99.98	0.12	0.15	0.16	0.11	0.14	0.14
610	102.98	103.54	102.62	0.12	0.15	0.16	0.11	0.14	0.15
710	100.81	97.25	101.32	0.10	0.13	0.14	0.09	0.13	0.13
810	101.80	96.04	107.54	0.10	0.14	0.15	0.10	0.13	0.14
910	98.29	94.52	109.17	0.07	0.11	0.12	0.07	0.11	0.12
1010	102.83	109.07	112.04	0.08	0.12	0.13	0.08	0.12	0.13
1210	111.18	115.60	112.77	0.06	0.10	0.11	0.05	0.10	0.11
1410	105.39	110.32	102.49	0.03	0.08	0.10	0.02	0.08	0.10
1610	106.22	106.51	101.41	0.02	0.08	0.10	0.00	0.07	0.09
2010	103.19	95.03	97.93	0.01	0.08	0.11	0.01	0.07	0.10
2510	105.58	108.73	103.68	0.03	0.11	0.15	0.01	0.10	0.14
3510	103.97	108.82	97.14	0.08	0.18	0.22	0.06	0.16	0.20
3810	98.03	99.89	94.33	0.09	0.18	0.23	0.07	0.17	0.20
4010	92.74	95.88	90.61	0.09	0.18	0.23	0.07	0.16	0.20
4310	83.12	82.57	83.33	0.10	0.19	0.24	0.08	0.18	0.21
4510	76.02	75.57	75.50	0.09	0.19	0.23	0.07	0.17	0.19
4600	72.03	71.64	71.71	0.09	0.18	0.22	0.07	0.16	0.19
4750	63.92	63.80	63.60	0.09	0.18	0.21	0.06	0.16	0.18
5000	43.60	43.10	42.74	0.09	0.18	0.21	0.07	0.16	0.18
5050	37.30	36.68	36.22	0.09	0.18	0.22	0.07	0.17	0.19
5080	32.83	32.10	31.56	0.12	0.21	0.23	0.09	0.19	0.21
5090	31.18	30.41	29.83	0.12	0.21	0.24	0.10	0.20	0.22
5120	25.68	24.77	24.05	0.13	0.24	0.28	0.11	0.22	0.25
5140	21.40	20.36	19.51	0.19	0.31	0.36	0.16	0.28	0.32
5150	19.03	17.90	16.97	0.24	0.37	0.44	0.21	0.34	0.40
5180	10.76	9.35	8.17	0.70	1.04	1.36	0.66	1.01	1.31
5200	4.67	3.47	2.61	2.51	3.81	5.32	2.44	3.72	5.18
5225	0.61	0.59	0.62	14.68	22.16	27.60	14.40	21.32	26.09
5250	0.38	0.53	0.61	22.15	20.18	19.50	22.34	20.06	19.11
5300	0.37	0.51	0.58	20.36	21.01	20.77	19.41	19.81	19.48
5310	0.38	0.51	0.58	19.75	20.86	21.05	19.29	20.26	20.41
5350	0.39	0.53	0.60	21.41	22.18	23.73	22.57	23.14	24.08
5370	0.43	0.55	0.64	19.58	25.56	27.33	19.28	23.26	22.83
5405	2.24	3.72	4.97	5.36	3.64	2.83	5.43	3.72	2.90
5415	4.78	6.61	8.02	2.50	1.87	1.58	2.55	1.94	1.64
5450	15.65	17.17	18.32	0.42	0.52	0.58	0.44	0.55	0.60
5470	20.91	22.19	23.18	0.27	0.40	0.47	0.28	0.41	0.47
5510	29.39	30.38	31.15	0.19	0.32	0.38	0.18	0.31	0.37
5530	32.95	33.83	34.53	0.16	0.29	0.35	0.15	0.28	0.34
5750	58.01	58.47	58.87	0.09	0.20	0.25	0.07	0.19	0.22
6000	74.21	74.28	74.83	0.06	0.18	0.22	0.04	0.16	0.19
6200	83.61	83.05	85.60	0.06	0.17	0.21	0.03	0.14	0.17
6400	90.85	91.81	89.70	0.04	0.16	0.20	0.03	0.14	0.17
6600	99.08	99.64	99.66	0.02	0.14	0.18	0.00	0.12	0.15
6800	102.90	100.57	99.92	0.05	0.16	0.19	0.02	0.14	0.15
7000	101.79	99.40	99.49	0.02	0.14	0.18	0.01	0.13	0.15
7200	105.76	108.84	110.52	0.04	0.15	0.18	0.00	0.12	0.14
7400	112.90	110.16	97.62	0.04	0.16	0.19	0.03	0.15	0.17
7600	131.60	100.01	112.14	0.03	0.14	0.18	0.00	0.13	0.15
7800	108.45	110.64	106.44	0.04	0.16	0.20	0.01	0.14	0.16
8000	111.29	111.62	110.62	0.05	0.17	0.21	0.01	0.15	0.17
8100	109.71	100.16	109.26	0.04	0.16	0.20	0.01	0.15	0.18
8150	117.37	116.93	102.57	0.04	0.16	0.20	0.01	0.15	0.18
8200	105.56	112.62	108.61	0.04	0.17	0.21	0.01	0.16	0.18
8250	110.66	102.18	96.80	0.04	0.17	0.22	0.01	0.15	0.17

Typical Performance Data

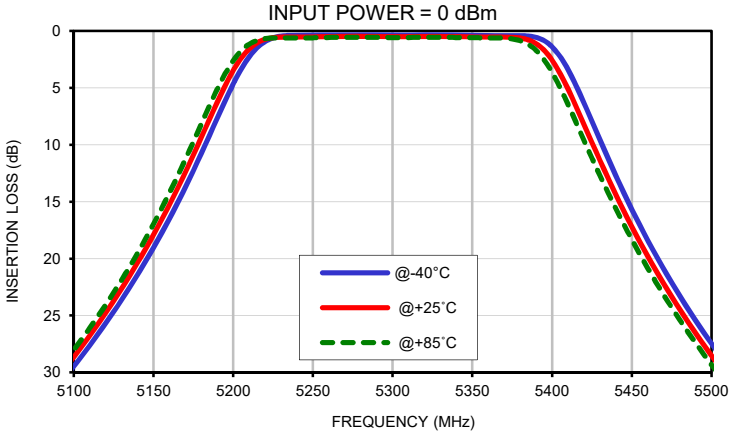
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
5250	5.47	5.27	5.15
5252	5.40	5.21	5.11
5254	5.33	5.16	5.07
5256	5.27	5.12	5.04
5258	5.22	5.09	5.02
5260	5.18	5.06	4.99
5262	5.14	5.03	4.97
5264	5.10	5.00	4.94
5266	5.07	4.97	4.92
5268	5.03	4.94	4.89
5270	5.01	4.92	4.88
5272	4.98	4.90	4.86
5274	4.96	4.88	4.84
5276	4.93	4.86	4.82
5278	4.91	4.84	4.80
5280	4.87	4.81	4.78
5282	4.86	4.79	4.76
5284	4.84	4.79	4.75
5286	4.81	4.76	4.74
5288	4.79	4.74	4.72
5290	4.77	4.73	4.71
5292	4.75	4.72	4.70
5294	4.74	4.71	4.70
5296	4.72	4.70	4.69
5298	4.71	4.69	4.68
5300	4.70	4.69	4.69
5302	4.69	4.68	4.68
5304	4.69	4.68	4.69
5306	4.68	4.69	4.70
5308	4.69	4.70	4.71
5310	4.68	4.69	4.71
5320	4.74	4.77	4.80
5330	4.85	4.88	4.93
5340	4.96	5.01	5.08
5350	5.09	5.18	5.29
5360	5.27	5.46	5.68
5370	5.64	6.02	6.38

Typical Performance Curves

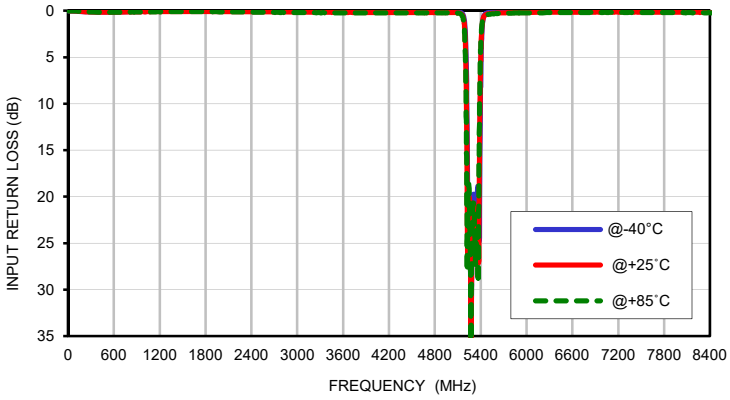
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



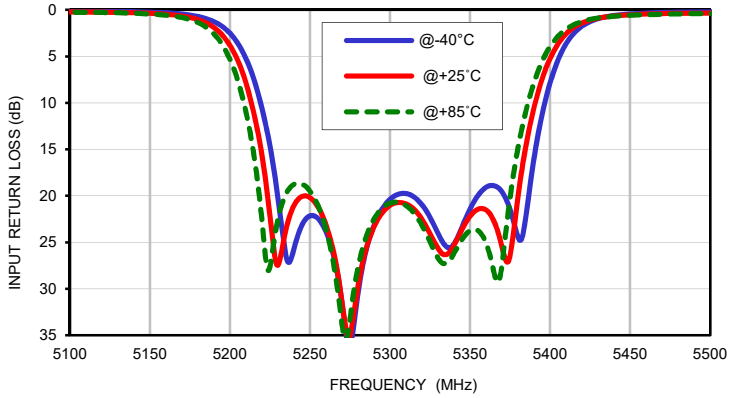
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



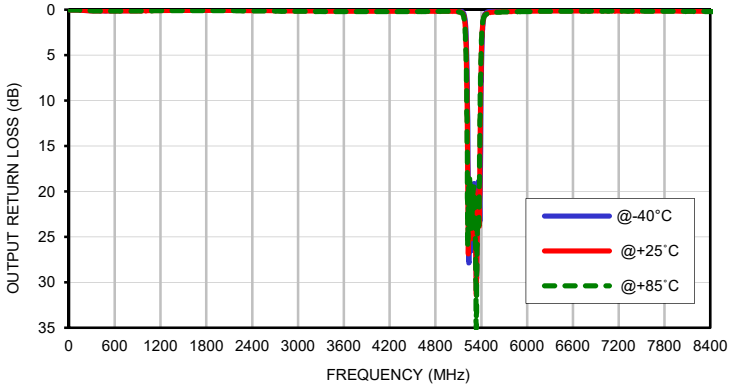
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



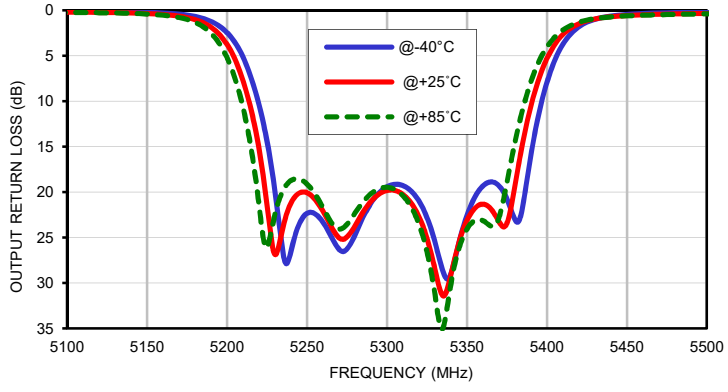
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



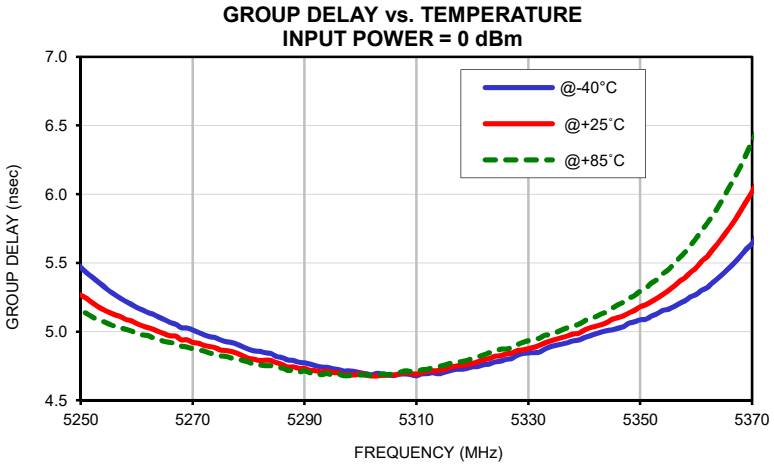
OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



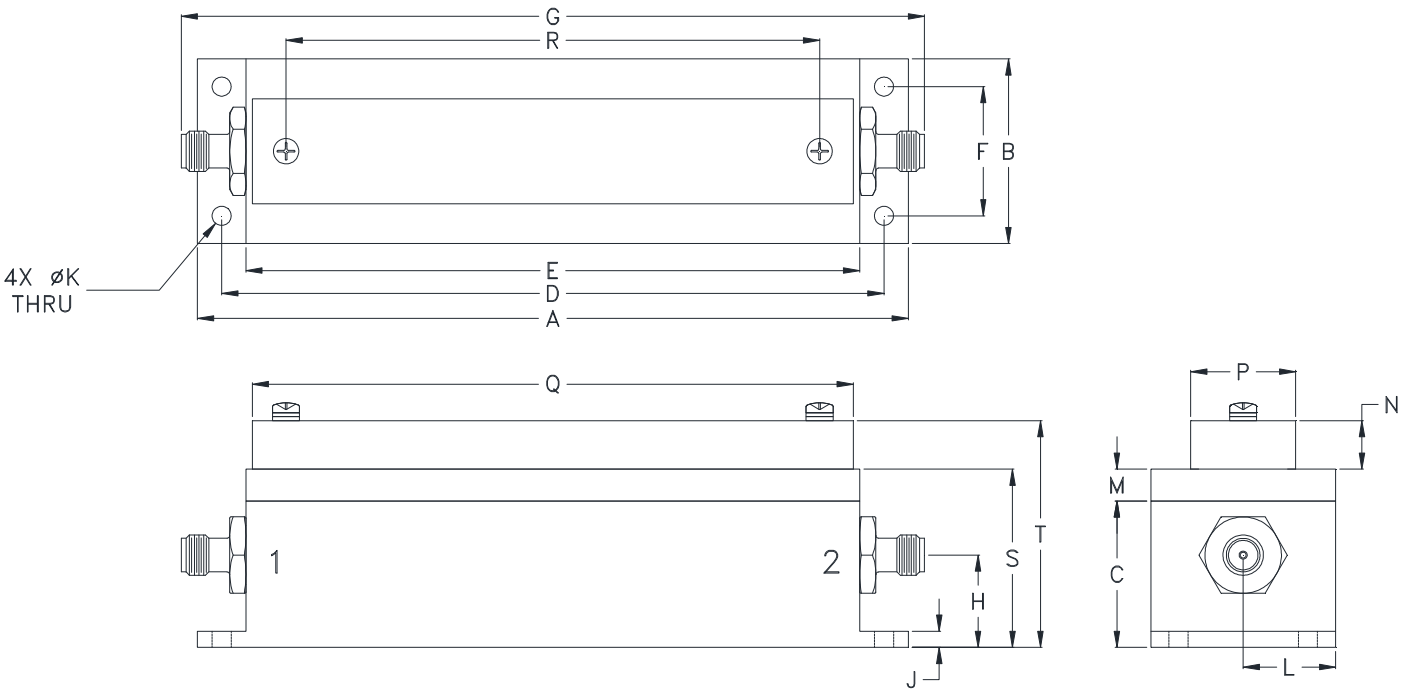
Typical Performance Curves



Case Style ME

ME1656

Outline Dimensions



CASE #.	A	B	C	D	E	F	G	H	J	K	L	M	N	P
ME1656	4.40 (111.66)	1.14 (29.03)	0.91 (23.01)	4.096 (104.04)	3.80 (96.42)	0.800 (20.32)	4.60 (116.74)	0.57 (14.50)	0.10 (2.54)	0.118 (3.00)	0.57 (14.53)	0.20 (5.00)	0.30 (7.62)	0.65 (16.51)

CASE #.	Q	R	S	T	WT, GRAM
ME1656	3.72 (94.39)	3.30 (83.82)	1.10 (28.02)	1.40 (35.64)	160

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

Notes:

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

Mini-Circuits®
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Mini-Circuits

Environmental Specifications ENV02T1

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
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
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, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215