Cavity

Bandpass Filters

50Ω DC to 15 GHz

The Big Deal

- Very low insertion loss with excellent power handling
- Very fast roll-off with wide stopband
- Passbands up to 15 GHz
- Stopbands up to 20 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-2400-S+

50Ω 2375 to 2425 MHz

Generic photo used for illustration purposes only

CASE STYLE: QT2302

Connectors	Model
SMA-F	ZVBP-2400-S+

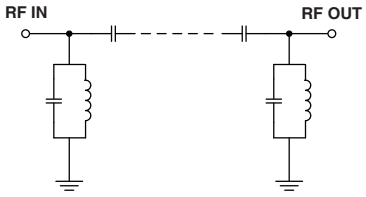
Features

- Low insertion loss
- High rejection
- Connectorized package

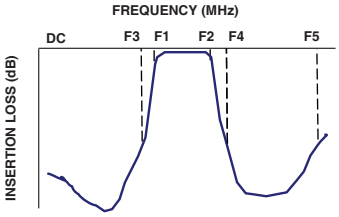
Applications

- ISM applications
- Radio location
- Mobile communication

Functional Schematic



Typical Frequency Response



Electrical Specifications at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	Fc	2400	-	0.6	-	dB
	Insertion Loss	F1-F2	2375 - 2425	-	0.7	1.2	dB
	VSWR	F1-F2	2375 - 2425	-	1.22	1.38	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 2250	40	52	-	dB
	VSWR	DC-F3	DC - 2250	-	20	-	:1
Stop Band, Upper	Insertion Loss	F4-F5	2550- 6000	40	54	-	dB
	VSWR	F4-F5	2550 - 6000	-	20	-	:1

Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	15 W max.

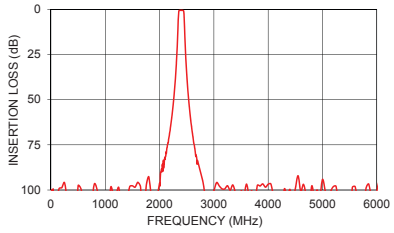
Permanent damage may occur if any of these limits are exceeded.

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
10	99.93	782.50	2375	12.54
2250	52.97	98.55	2378	12.24
2270	46.55	88.00	2380	12.07
2280	42.97	81.22	2382	11.93
2300	34.55	66.48	2384	11.79
2310	29.55	57.72	2386	11.67
2325	20.59	39.47	2388	11.57
2340	9.21	12.78	2390	11.50
2348	3.31	3.73	2392	11.43
2375	0.63	1.04	2394	11.39
2400	0.59	1.04	2396	11.36
2425	0.65	1.09	2398	11.35
2430	0.69	1.16	2400	11.35
2451	3.43	3.74	2402	11.37
2460	10.39	15.24	2404	11.39
2475	21.86	48.24	2406	11.43
2489	30.30	74.20	2410	11.56
2550	54.67	141.12	2415	11.80
4500	99.22	183.94	2420	12.14
6000	100.84	87.48	2425	12.61

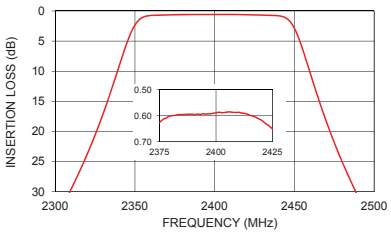
+RoHS Compliant

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

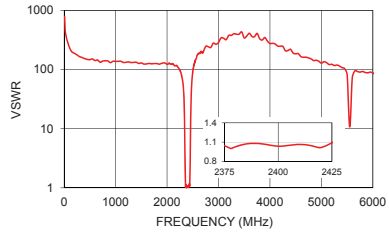
ZVBP-2400-S+
INSERTION LOSS (Full band)



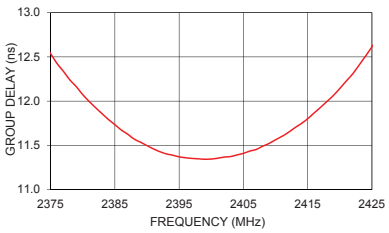
ZVBP-2400-S+
INSERTION LOSS (Pass band)



ZVBP-2400-S+
VSWR



ZVBP-2400-S+
GROUP DELAY



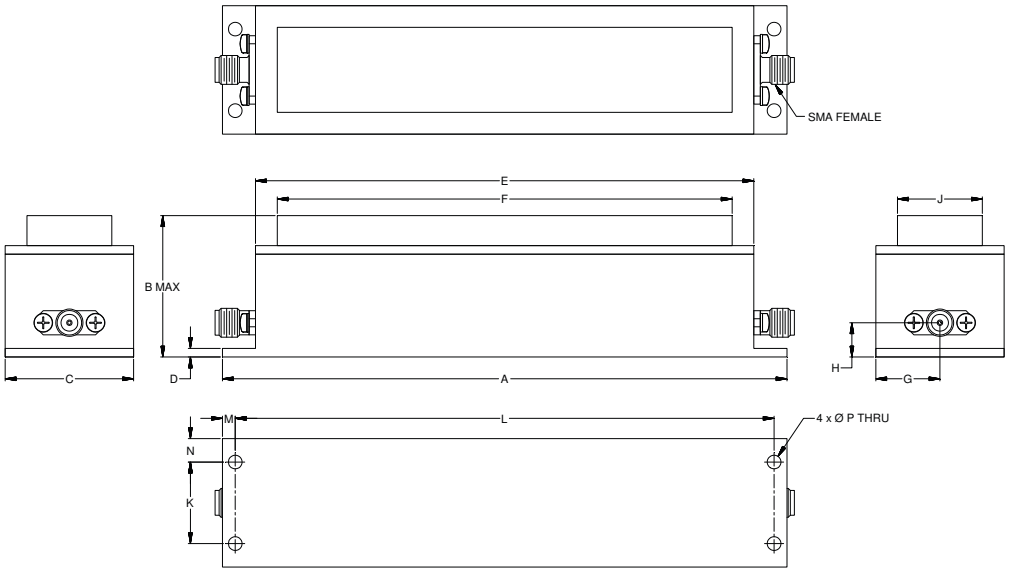
Notes

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
5.20	**1.38**	**1.18**	**.08**	**4.59**	**4.19**	**.59**	**.31**
132.00	35.00	30.00	2.00	116.50	106.34	15.00	8.00

J	K	L	M	N	P		Wt.
.78	**.750**	**4.960**	**.12**	**.22**	**.126**		grams
19.84	19.05	125.98	3.01	5.47	3.20		184

Note: Please refer to case style drawing for details

Cavity Band Pass Filter ZVBP-2400-S+

Typical Performance Data

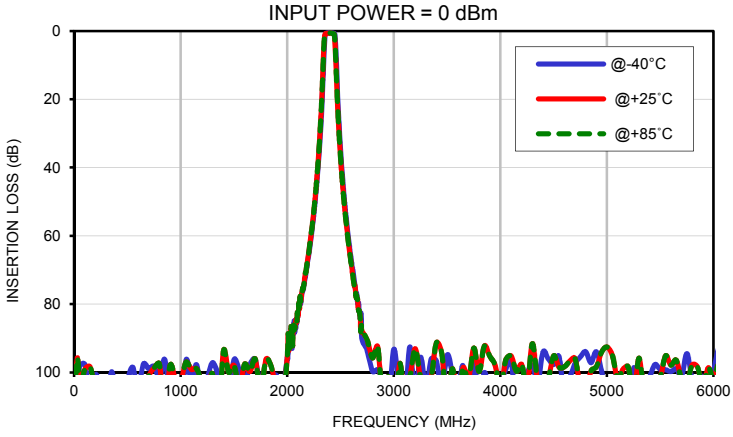
FREQ. (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURN LOSS (dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
10	97.97	99.93	100.93	0.02	0.02	0.02	0.28	0.28	0.28
20	109.88	100.87	99.76	0.03	0.04	0.04	0.24	0.24	0.24
50	98.42	102.98	105.29	0.05	0.05	0.06	0.16	0.17	0.17
100	97.65	105.18	99.19	0.06	0.07	0.08	0.12	0.12	0.12
150	106.41	99.25	98.41	0.08	0.09	0.09	0.10	0.11	0.11
250	105.05	95.97	105.61	0.09	0.10	0.10	0.09	0.11	0.11
500	102.81	97.62	112.04	0.10	0.12	0.12	0.09	0.12	0.12
700	98.92	101.56	100.98	0.11	0.13	0.14	0.09	0.12	0.13
750	98.22	105.55	98.71	0.10	0.13	0.13	0.09	0.12	0.12
1000	111.36	108.62	102.41	0.09	0.13	0.14	0.08	0.11	0.12
1250	101.72	98.74	104.91	0.09	0.13	0.15	0.07	0.11	0.13
1500	96.30	97.68	97.94	0.09	0.13	0.15	0.06	0.11	0.13
1750	104.39	98.95	106.14	0.08	0.14	0.17	0.05	0.11	0.14
2000	95.62	96.23	95.34	0.08	0.14	0.17	0.05	0.12	0.16
2050	86.87	85.89	92.29	0.08	0.14	0.17	0.05	0.12	0.15
2100	83.39	83.08	83.66	0.07	0.14	0.17	0.05	0.12	0.16
2150	75.81	74.55	75.51	0.08	0.15	0.19	0.06	0.13	0.17
2200	65.93	65.46	65.24	0.09	0.15	0.19	0.06	0.13	0.17
2250	53.52	52.97	52.51	0.11	0.18	0.21	0.07	0.15	0.19
2300	35.44	34.55	33.64	0.19	0.26	0.30	0.14	0.22	0.26
2310	30.58	29.55	28.49	0.23	0.30	0.35	0.17	0.25	0.30
2320	25.04	23.82	22.53	0.29	0.37	0.43	0.23	0.32	0.38
2326	21.30	19.92	18.45	0.36	0.46	0.54	0.29	0.40	0.48
2330	18.59	17.09	15.48	0.44	0.56	0.67	0.36	0.50	0.61
2350	3.54	2.32	1.50	4.28	6.72	10.58	4.19	6.66	10.54
2375	0.56	0.63	0.65	32.35	33.40	64.56	27.07	27.56	29.27
2400	0.52	0.59	0.63	32.75	35.01	34.82	45.23	43.31	36.35
2425	0.56	0.65	0.70	32.57	27.45	26.94	31.20	26.84	26.49
2450	1.66	2.88	4.40	9.35	5.69	3.69	9.27	5.64	3.63
2460	8.19	10.39	12.37	1.55	1.14	0.90	1.53	1.13	0.89
2470	16.49	18.35	20.01	0.48	0.47	0.44	0.48	0.47	0.44
2475	20.18	21.86	23.38	0.34	0.36	0.36	0.34	0.37	0.37
2480	23.56	25.08	26.49	0.26	0.30	0.31	0.26	0.31	0.32
2485	26.66	28.06	29.38	0.21	0.26	0.28	0.22	0.27	0.29
2490	29.53	30.84	32.07	0.17	0.23	0.25	0.19	0.24	0.27
2500	34.74	35.88	37.00	0.13	0.19	0.22	0.14	0.21	0.24
2550	53.88	54.67	55.44	0.06	0.12	0.16	0.07	0.14	0.18
2600	67.04	67.50	68.14	0.03	0.09	0.13	0.05	0.12	0.17
2650	76.84	77.21	77.52	0.02	0.09	0.13	0.03	0.11	0.16
2700	90.15	83.77	87.72	0.02	0.09	0.13	0.03	0.11	0.15
3000	93.26	100.47	124.76	0.02	0.06	0.11	0.00	0.08	0.14
3200	107.79	99.42	93.06	0.04	0.05	0.10	0.02	0.06	0.12
3400	96.68	102.85	91.25	0.05	0.04	0.10	0.05	0.05	0.10
3600	105.76	96.75	108.67	0.05	0.04	0.10	0.07	0.03	0.09
3800	108.68	97.48	99.73	0.05	0.05	0.11	0.08	0.03	0.09
4000	102.69	96.82	104.63	0.04	0.06	0.12	0.09	0.02	0.08
4200	111.66	102.35	97.68	0.03	0.07	0.12	0.09	0.03	0.09
4400	94.00	99.67	108.29	0.03	0.08	0.14	0.06	0.05	0.12
4600	107.09	100.74	98.38	0.00	0.11	0.15	0.05	0.07	0.14
4800	93.93	97.97	106.21	0.01	0.12	0.16	0.02	0.11	0.17
5000	109.38	94.15	92.58	0.03	0.14	0.18	0.02	0.15	0.21
5200	119.87	98.11	98.42	0.04	0.14	0.18	0.06	0.17	0.22
5400	101.28	105.60	103.85	0.07	0.16	0.20	0.75	0.61	0.53
5600	99.78	98.10	97.89	0.16	0.24	0.25	0.11	0.21	0.24
5750	94.51	112.64	102.98	0.10	0.19	0.21	0.13	0.22	0.24
5800	102.07	99.20	97.80	0.09	0.19	0.21	0.13	0.21	0.23
5850	101.93	96.70	98.48	0.11	0.20	0.21	0.12	0.21	0.22
5900	101.35	104.29	104.03	0.11	0.20	0.21	0.13	0.20	0.22
5950	109.16	110.85	98.65	0.11	0.19	0.20	0.12	0.20	0.20
6000	99.65	100.84	101.94	0.12	0.20	0.21	0.11	0.19	0.19

Typical Performance Data

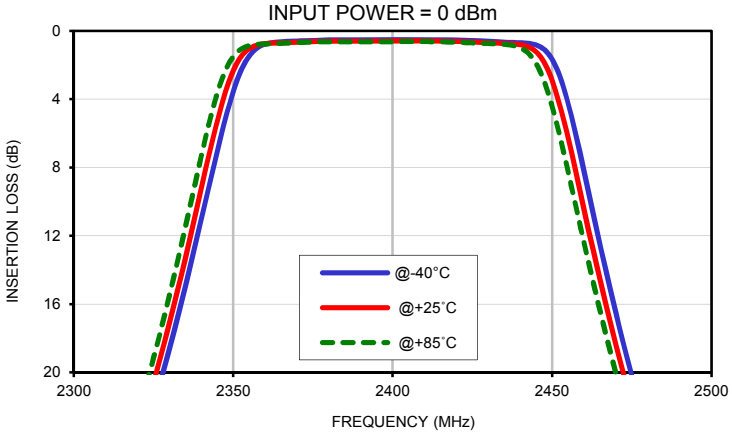
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
2375	12.84	12.54	12.32
2376	12.70	12.43	12.23
2377	12.58	12.34	12.14
2378	12.47	12.24	12.06
2379	12.37	12.16	11.99
2380	12.27	12.07	11.91
2381	12.19	12.00	11.84
2382	12.10	11.93	11.78
2383	12.02	11.86	11.72
2384	11.94	11.79	11.66
2385	11.88	11.73	11.61
2386	11.81	11.67	11.56
2387	11.75	11.63	11.52
2388	11.69	11.57	11.48
2389	11.64	11.53	11.45
2390	11.60	11.50	11.42
2391	11.55	11.46	11.40
2392	11.51	11.43	11.38
2393	11.48	11.40	11.37
2394	11.44	11.39	11.36
2395	11.42	11.37	11.35
2396	11.40	11.36	11.35
2397	11.38	11.35	11.35
2398	11.37	11.35	11.35
2399	11.35	11.34	11.36
2400	11.35	11.35	11.37
2401	11.35	11.35	11.39
2402	11.35	11.37	11.41
2403	11.35	11.37	11.43
2404	11.36	11.39	11.45
2405	11.37	11.41	11.47
2406	11.38	11.43	11.51
2407	11.39	11.45	11.54
2408	11.42	11.49	11.58
2409	11.45	11.52	11.62
2410	11.47	11.56	11.67
2411	11.50	11.60	11.72
2412	11.53	11.65	11.77
2413	11.58	11.70	11.83
2414	11.62	11.75	11.89
2415	11.66	11.80	11.96
2416	11.72	11.87	12.03
2417	11.77	11.93	12.10
2418	11.83	12.00	12.18
2419	11.89	12.06	12.27
2420	11.96	12.14	12.36
2421	12.03	12.23	12.46
2422	12.10	12.31	12.56
2423	12.19	12.41	12.67
2424	12.27	12.51	12.80
2425	12.36	12.61	12.93

Typical Performance Curves

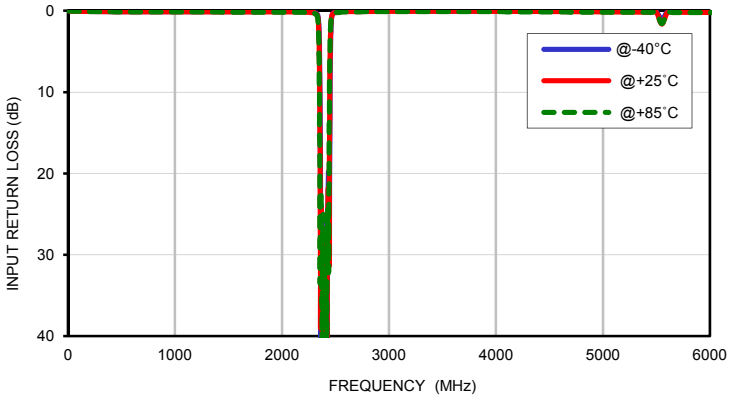
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



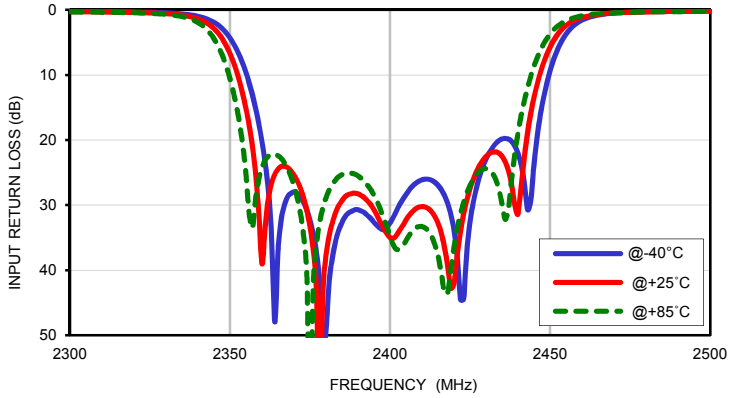
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



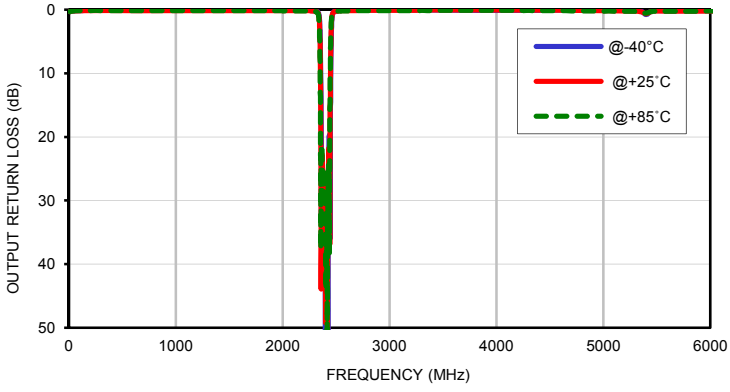
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



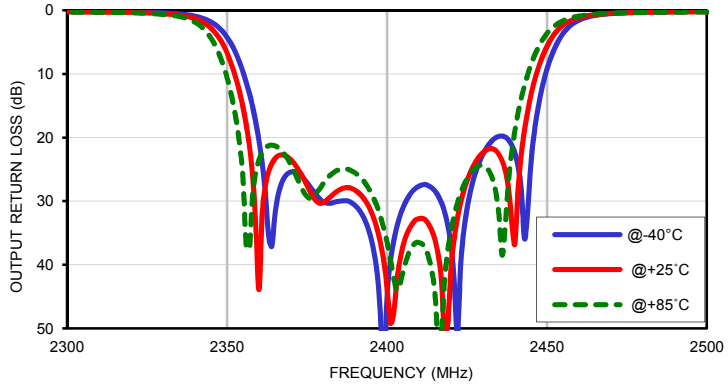
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



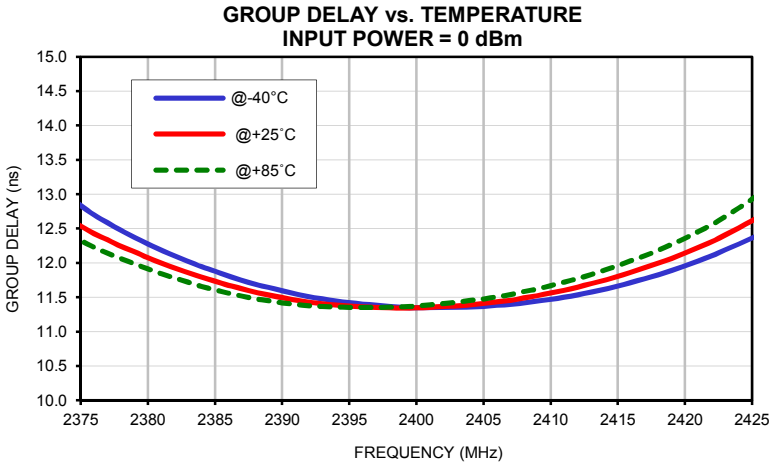
OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



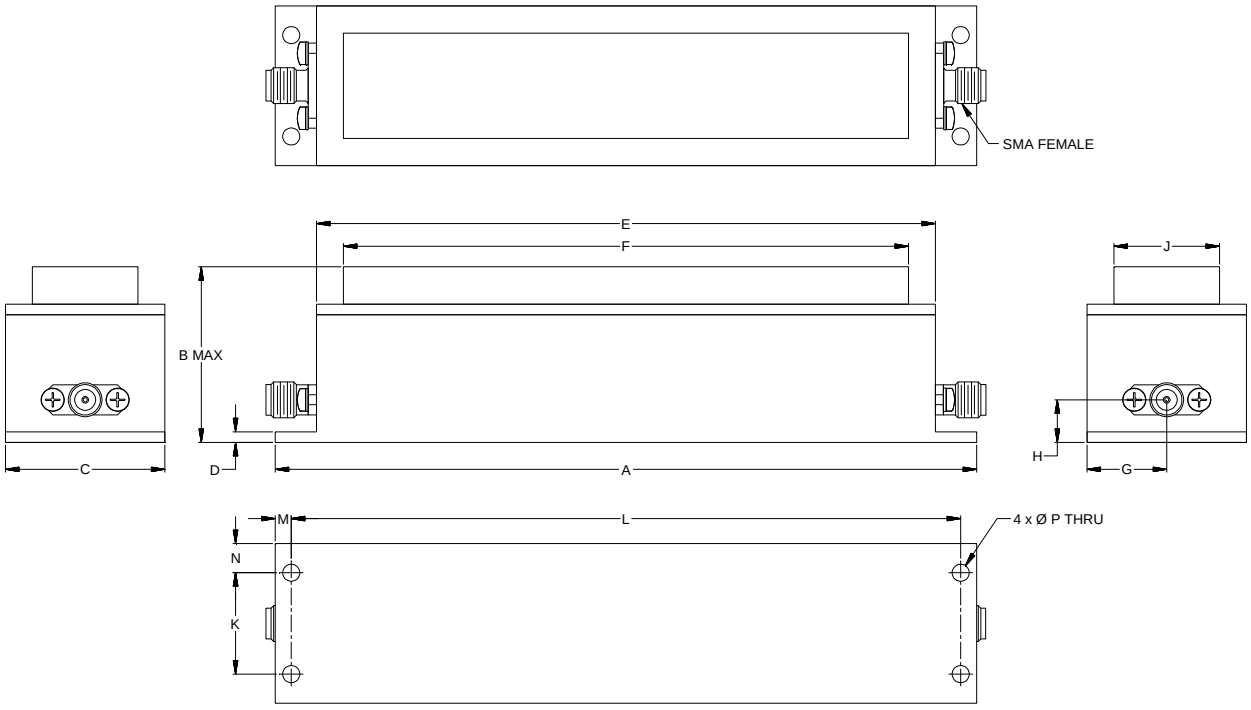
Typical Performance Curves



Case Style QT

Outline Dimensions

QT2302



CASE#	A	B	C	D	E	F	G	H
QT2302	5.20 (132.00)	1.38 (35.00)	1.18 (30.00)	.08 (2.00)	4.59 (116.50)	4.19 (106.34)	.59 (15.00)	.31 (8.00)

CASE#	J	K	L	M	N	P	WT. GRAMS
QT2302	.78 (19.84)	.750 (19.05)	4.960 (125.98)	.12 (3.01)	.22 (5.47)	.126 (3.20)	184

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .100; 3 Pl. ± .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

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