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. 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-2450-S+

50Ω 2400 to 2500 MHz

Generic photo used for illustration purposes only

CASE STYLE: QT2302

Connectors	Model
SMA-F	ZVBP-2450-S+

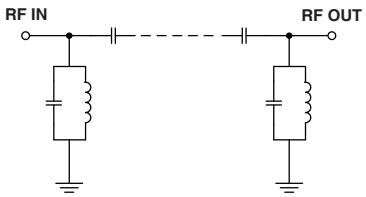
Features

- Low insertion loss
- High rejection
- Connectorized package

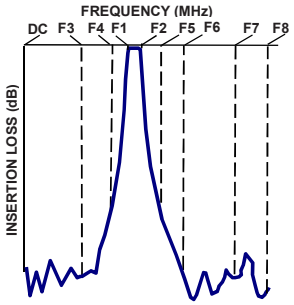
Applications

- ISM applications
- Radio location
- Mobile communication

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

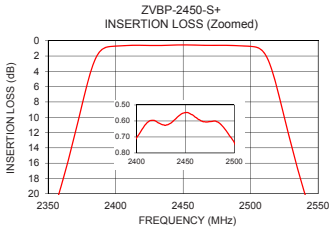
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	-	-	-	2450	-	MHz
	Insertion Loss	F1-F2	2400 - 2500	-	0.7	1.3	dB
	VSWR	F1-F2	2400 - 2500	-	1.3	1.5	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 2120	70	80	-	dB
		F3-F4	2120 - 2260	40	55	-	dB
	VSWR	DC-F4	DC - 2260	-	20	-	:1
Stop Band, Upper	Insertion Loss	F5-F6	2635 - 2780	40	55	-	dB
		F6-F7	2780 - 4000	70	80	-	dB
		F7-F8	4000 - 6000	-	40	-	dB
	VSWR	F5-F8	2635 - 6000	-	20	-	:1

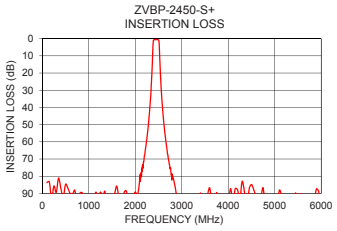
Maximum Ratings	
Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
RF Power Input	15 W max.

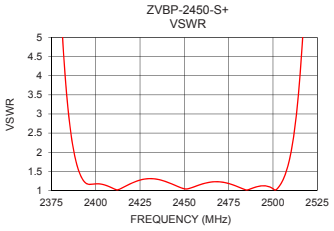
Permanent damage may occur if any of these limits are exceeded.

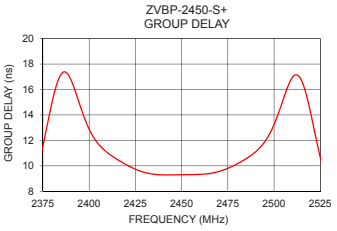
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
100	83.71	1610.03	2400	12.88
500	84.73	200.31	2405	11.71
1000	103.04	235.79	2410	11.02
2000	89.21	307.96	2415	10.52
2120	79.68	298.21	2420	10.09
2260	55.49	223.22	2425	9.74
2340	29.47	97.02	2430	9.48
2358	19.99	54.14	2435	9.34
2375	8.46	12.63	2440	9.29
2382	3.79	4.48	2445	9.29
2400	0.71	1.17	2450	9.30
2450	0.55	1.04	2455	9.31
2500	0.74	1.05	2460	9.33
2515	3.44	3.86	2465	9.40
2540	19.92	42.96	2470	9.55
2558	29.27	71.20	2475	9.81
2635	54.54	147.61	2480	10.15
2780	78.86	212.04	2485	10.57
4000	96.12	200.31	2490	11.10
6000	103.54	204.08	2500	13.25









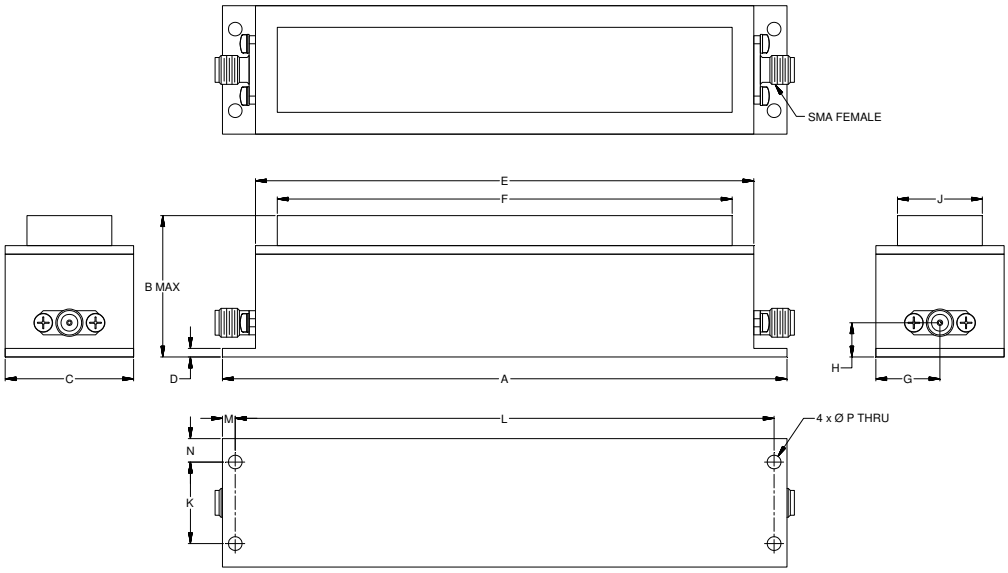
Notes

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-2450-S+

Typical Performance Data

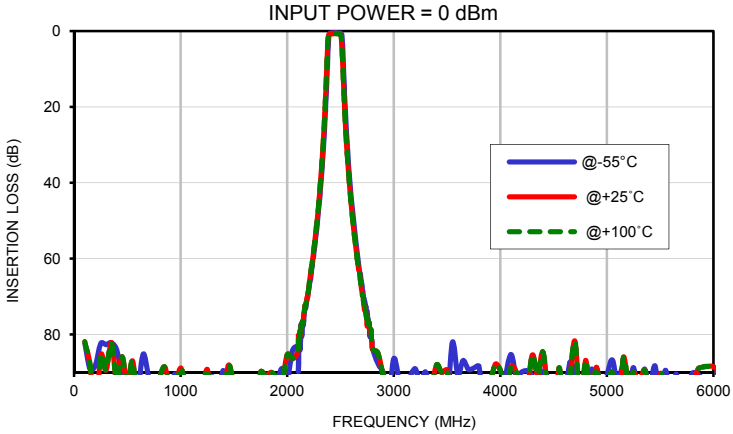
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-55°C	@+25˚C	@+100˚C	@-55°C	@+25˚C	@+100˚C	@-55°C	@+25˚C	@+100˚C
10	62.58	66.23	73.65	0.00	0.01	0.01	0.00	0.02	0.01
100	82.47	83.71	81.93	0.00	0.01	0.02	0.02	0.04	0.04
200	88.17	92.87	101.35	0.04	0.05	0.05	0.04	0.06	0.07
250	82.35	85.71	85.51	0.04	0.06	0.07	0.05	0.07	0.08
300	82.69	89.46	89.43	0.05	0.07	0.08	0.05	0.08	0.09
350	82.17	81.09	82.16	0.05	0.07	0.09	0.06	0.08	0.09
400	84.03	87.21	92.15	0.06	0.08	0.09	0.06	0.09	0.09
450	91.11	92.16	85.87	0.06	0.08	0.09	0.06	0.09	0.09
500	94.73	84.73	93.08	0.06	0.09	0.10	0.05	0.09	0.10
550	92.13	86.96	87.06	0.05	0.09	0.10	0.05	0.09	0.10
600	93.61	90.14	100.13	0.05	0.09	0.10	0.05	0.09	0.10
650	85.12	90.71	97.62	0.05	0.08	0.10	0.05	0.09	0.10
700	91.36	88.26	97.42	0.05	0.08	0.10	0.05	0.08	0.10
750	95.11	97.27	99.02	0.05	0.08	0.10	0.04	0.08	0.10
800	95.37	90.22	91.82	0.04	0.08	0.09	0.04	0.08	0.09
850	97.56	89.45	88.55	0.04	0.08	0.09	0.04	0.08	0.09
900	94.23	92.06	94.08	0.03	0.08	0.09	0.03	0.08	0.09
1000	95.81	103.04	88.84	0.03	0.07	0.09	0.02	0.07	0.09
1200	98.52	92.90	95.88	0.01	0.07	0.09	0.01	0.07	0.08
1400	89.52	107.33	95.21	0.00	0.06	0.09	0.00	0.06	0.08
1600	95.85	85.72	94.37	0.02	0.06	0.08	0.01	0.06	0.08
1800	97.28	88.37	91.01	0.02	0.05	0.09	0.02	0.06	0.09
2000	92.07	89.21	85.33	0.03	0.06	0.09	0.03	0.06	0.10
2120	84.09	79.68	78.98	0.04	0.06	0.09	0.03	0.07	0.11
2200	68.36	67.85	68.31	0.03	0.06	0.11	0.02	0.08	0.12
2260	56.17	55.49	55.26	0.02	0.08	0.12	0.00	0.10	0.14
2300	45.45	44.61	43.97	0.00	0.10	0.14	0.03	0.13	0.17
2320	38.81	37.80	36.97	0.02	0.13	0.17	0.06	0.16	0.21
2340	30.76	29.47	28.39	0.06	0.18	0.23	0.12	0.22	0.28
2355	23.37	21.74	20.35	0.14	0.28	0.35	0.22	0.35	0.43
2370	14.23	12.09	10.26	0.46	0.76	1.06	0.58	0.90	1.22
2382	5.74	3.79	2.51	2.22	3.94	6.27	2.45	4.26	6.78
2390	1.74	1.13	0.93	7.82	13.08	18.85	8.30	14.17	22.12
2400	0.62	0.71	0.76	23.99	22.02	20.49	24.20	21.81	20.39
2450	0.43	0.55	0.60	30.71	33.44	33.48	31.83	36.05	41.54
2500	0.59	0.74	0.87	22.02	32.80	25.46	21.34	30.30	25.88
2510	0.84	1.58	2.58	17.80	9.80	6.36	18.04	9.91	6.42
2518	2.97	5.17	7.11	5.05	2.92	2.01	5.10	2.95	2.04
2530	11.02	13.56	15.43	0.89	0.73	0.65	0.90	0.74	0.66
2542	19.00	21.09	22.64	0.32	0.37	0.39	0.33	0.38	0.39
2550	23.56	25.40	26.79	0.21	0.29	0.32	0.22	0.30	0.33
2560	28.56	30.18	31.41	0.14	0.24	0.27	0.15	0.24	0.27
2600	43.77	44.87	45.82	0.04	0.15	0.19	0.04	0.14	0.19
2635	53.43	54.54	55.22	0.01	0.12	0.17	0.01	0.12	0.17
2700	66.59	67.33	68.52	0.02	0.10	0.15	0.02	0.09	0.15
2750	73.93	75.54	77.82	0.03	0.09	0.14	0.02	0.09	0.15
2780	79.38	78.86	79.31	0.04	0.08	0.14	0.03	0.08	0.14
2800	83.60	79.24	83.95	0.04	0.08	0.13	0.03	0.08	0.14
3000	86.35	95.20	95.76	0.05	0.07	0.13	0.03	0.08	0.14
3500	97.96	92.72	89.46	0.06	0.08	0.14	0.01	0.11	0.16
4000	99.94	96.12	89.58	0.05	0.09	0.14	0.03	0.14	0.19
4250	89.62	93.69	95.02	0.04	0.09	0.14	0.04	0.16	0.20
4500	97.20	84.85	105.38	0.00	0.14	0.19	0.52	0.44	0.41
4750	98.42	86.74	99.94	0.03	0.10	0.14	0.05	0.16	0.20
5000	90.68	96.67	93.10	0.02	0.10	0.13	0.04	0.15	0.19
5250	88.78	92.41	90.01	0.02	0.09	0.12	0.03	0.15	0.18
5500	97.31	96.20	90.50	0.02	0.09	0.11	0.04	0.15	0.18
5750	94.81	91.33	92.01	0.02	0.09	0.10	0.03	0.15	0.17
5800	90.30	93.77	95.32	0.02	0.09	0.10	0.04	0.15	0.17
6000	93.73	103.54	88.54	0.02	0.09	0.09	0.03	0.15	0.17

Typical Performance Data

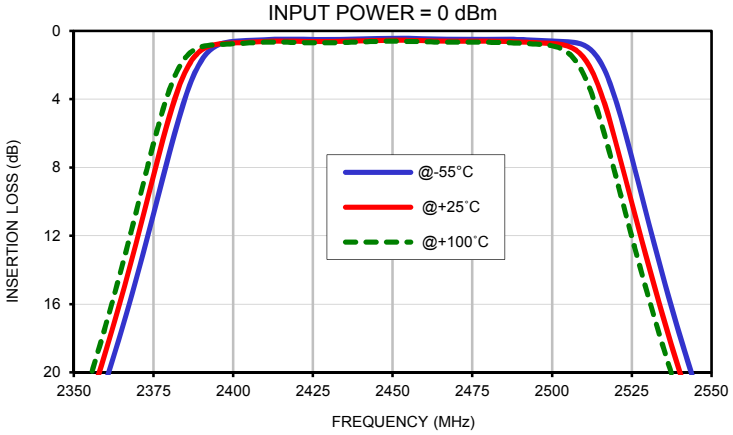
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-55°C	@+25°C	@+100°C
2400	14.09	12.88	12.14
2402	13.35	12.33	11.75
2404	12.73	11.90	11.44
2406	12.22	11.55	11.18
2408	11.81	11.26	10.96
2410	11.47	11.02	10.76
2412	11.19	10.81	10.57
2414	10.95	10.61	10.39
2416	10.73	10.43	10.22
2418	10.54	10.26	10.06
2420	10.35	10.09	9.90
2422	10.18	9.94	9.76
2424	10.02	9.80	9.63
2426	9.88	9.68	9.53
2428	9.75	9.57	9.44
2430	9.64	9.48	9.38
2432	9.54	9.41	9.33
2434	9.47	9.36	9.30
2436	9.41	9.32	9.28
2438	9.37	9.30	9.28
2440	9.34	9.29	9.28
2442	9.32	9.29	9.29
2444	9.31	9.29	9.30
2446	9.31	9.29	9.31
2448	9.31	9.30	9.32
2450	9.31	9.30	9.33
2452	9.31	9.31	9.33
2454	9.31	9.31	9.34
2456	9.30	9.31	9.35
2458	9.30	9.32	9.36
2460	9.30	9.33	9.38
2462	9.30	9.35	9.42
2464	9.31	9.38	9.46
2466	9.33	9.42	9.52
2468	9.36	9.48	9.59
2470	9.41	9.55	9.68
2472	9.48	9.64	9.79
2474	9.56	9.75	9.92
2476	9.66	9.87	10.06
2478	9.78	10.00	10.21
2480	9.91	10.15	10.38
2482	10.06	10.31	10.56
2484	10.21	10.48	10.76
2486	10.37	10.67	10.98
2488	10.54	10.87	11.23
2490	10.72	11.10	11.53
2492	10.92	11.37	11.90
2494	11.15	11.70	12.35
2496	11.42	12.11	12.90
2498	11.75	12.62	13.55
2500	12.18	13.25	14.31

Typical Performance Curves

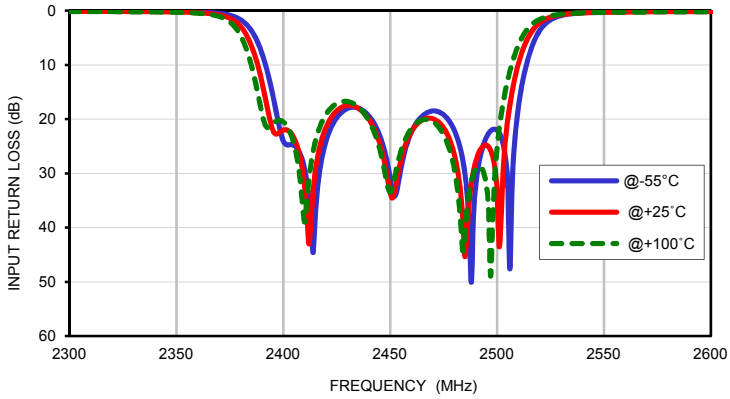
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



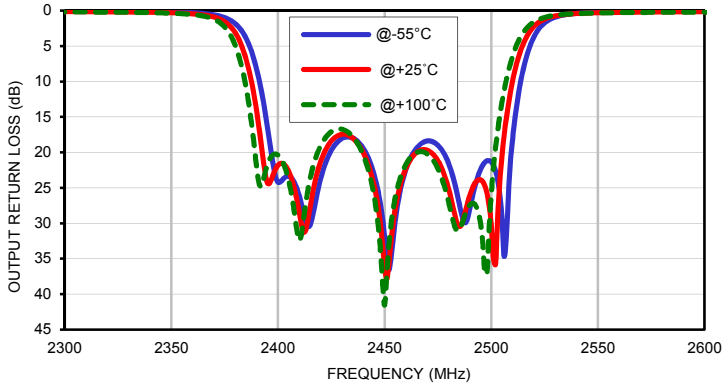
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



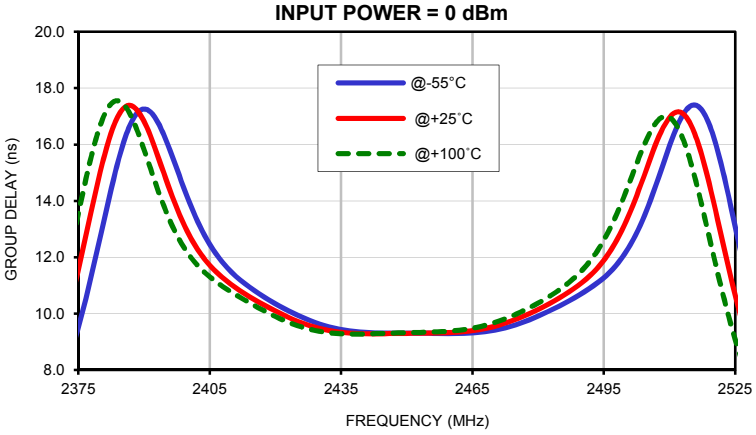
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



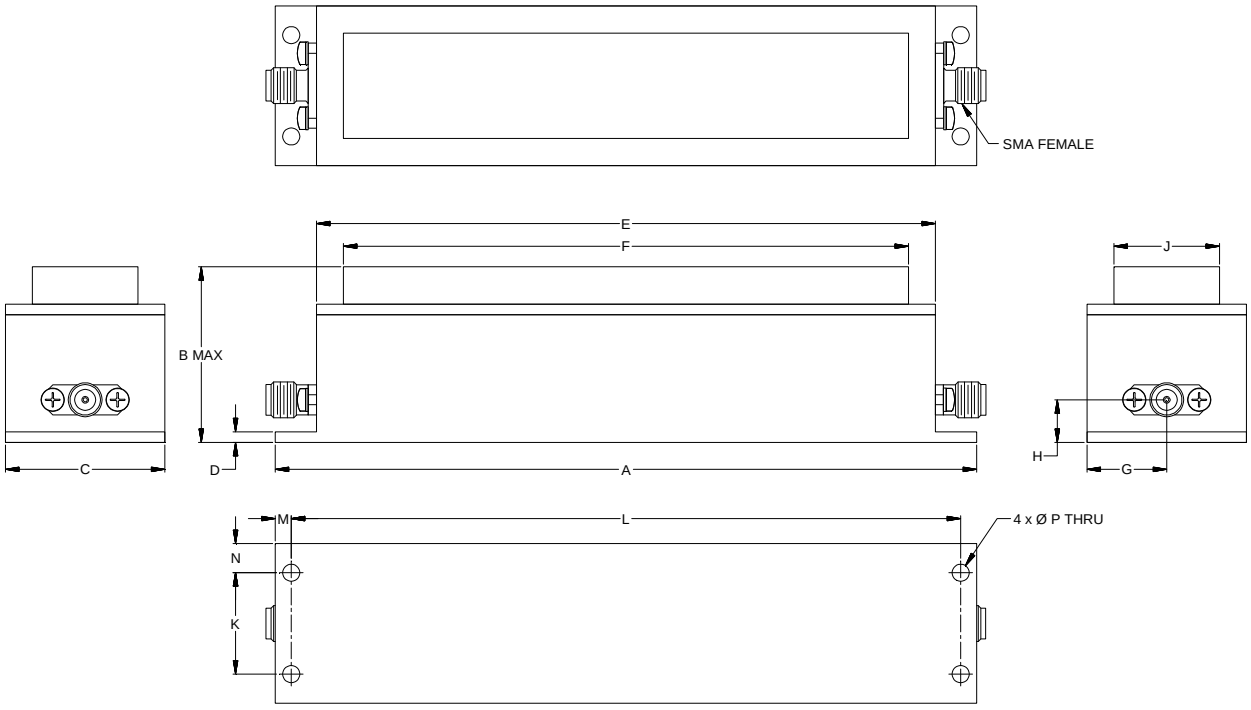
GROUP DELAY vs. TEMPERATURE
INPUT POWER = 0 dBm



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