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-2300A-S+

50Ω 2200 to 2400 MHz

Generic photo used for illustration purposes only

CASE STYLE: QJ2293

Connectors	Model
SMA-F	ZVBP-2300A-S+

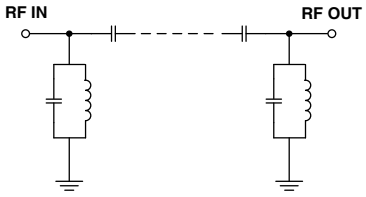
Features

- Low insertion loss, 0.5 dB typical
- Broad stopband performance up to 8 GHz
- Fast roll-off
- Connectorized package
- Small size

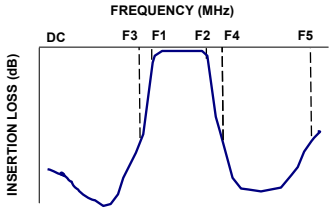
Applications

- Fixed and mobile communication network
- Satellite 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	-	-	-	2300	-	MHz
	Insertion Loss	F1-F2	2200-2400	-	0.5	1.0	dB
	VSWR	F1-F2	2200-2400	-	1.34	1.5	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 2000	30	40	-	dB
	VSWR	DC-F3	DC - 2000	-	20	-	:1
Stop Band, Upper	Insertion Loss	F4-F5	2550-8050	30	40	-	dB
	VSWR	F4-F5	2550-8050	-	20	-	:1

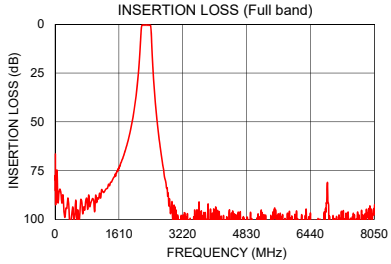
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	15 W

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

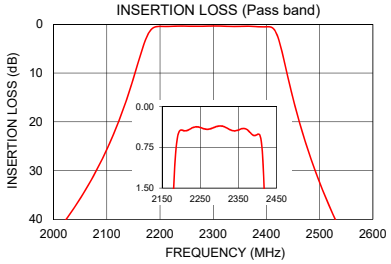
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
10	86.50	1267.87	2200	7.16
750	95.14	153.79	2210	6.29
1500	78.13	200.40	2220	5.82
2000	43.00	205.06	2230	5.56
2080	29.68	152.29	2240	5.37
2120	20.20	88.14	2250	5.20
2150	10.80	26.04	2260	5.06
2173	3.03	4.41	2270	4.97
2200	0.41	1.08	2280	4.95
2300	0.36	1.16	2290	4.97
2400	0.51	1.25	2300	5.01
2427	3.13	4.19	2310	5.05
2440	8.59	14.64	2320	5.08
2460	17.28	44.88	2330	5.12
2500	30.68	85.27	2340	5.22
2550	43.01	110.53	2350	5.41
3000	98.20	163.61	2360	5.67
5000	110.38	128.71	2370	5.97
7500	101.76	168.79	2380	6.29
8050	100.39	146.28	2400	7.64

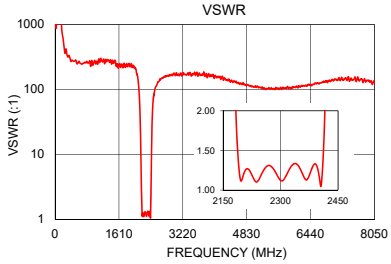
ZVBP-2300A-S+
INSERTION LOSS (Full band)



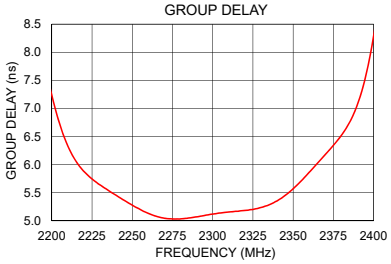
ZVBP-2300A-S+
INSERTION LOSS (Pass band)



ZVBP-2300A-S+
VSWR



ZVBP-2300A-S+
GROUP DELAY



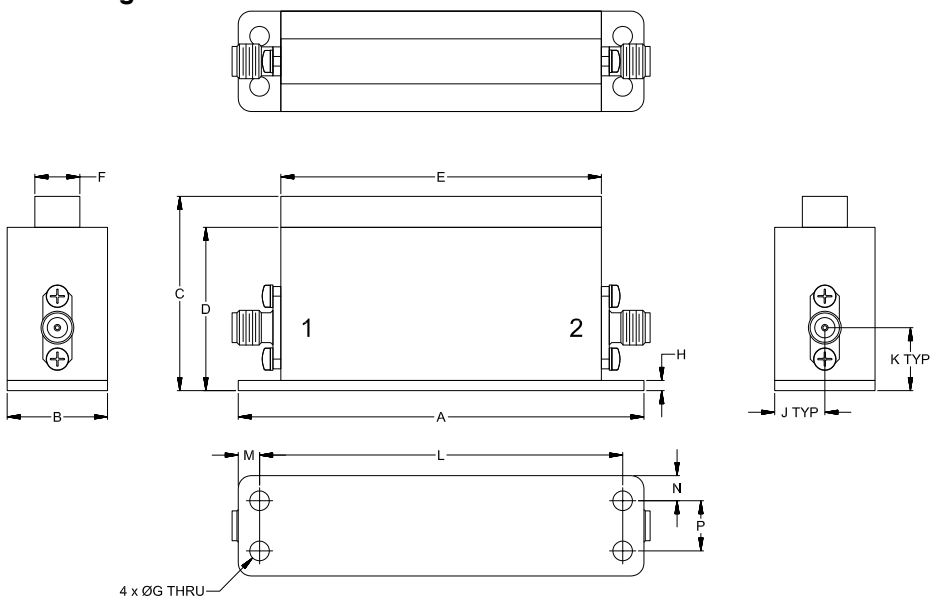
Notes

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
3.10	**.77**	**1.49**	**1.25**	**2.45**	**.34**	**.150**	**.08**
78.81	19.50	37.75	31.75	62.30	8.75	3.81	2.00

J	K	L	M	N	P		Wt.
.38	**.48**	**2.778**	**.16**	**.19**	**.384**		grams
9.75	12.25	70.55	4.13	4.87	9.75		**120**

Note: Please refer to case style drawing for details.

Cavity Band Pass Filter ZVBP-2300A-S+

Typical Performance Data

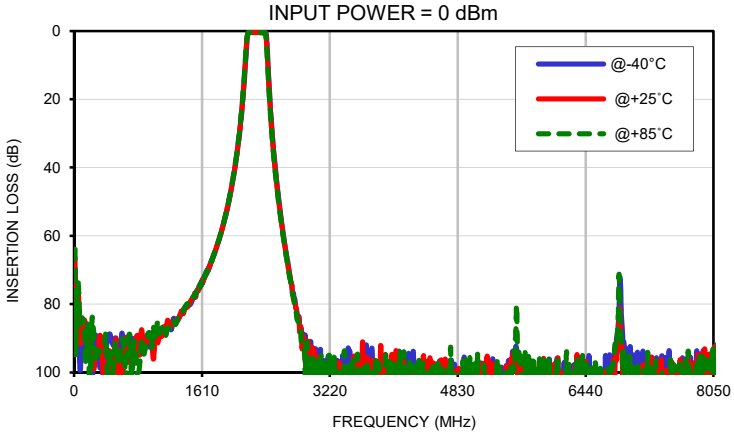
FREQ. (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURN LOSS (dB)		
	@-40°C	@+25˚C	@+85˚C	@-40°C	@+25˚C	@+85˚C	@-40°C	@+25˚C	@+85˚C
10	73.65	66.52	63.93	0.02	0.01	0.03	0.01	0.02	0.00
20	84.12	82.74	96.29	0.02	0.01	0.04	0.02	0.02	0.03
50	82.40	74.81	73.70	0.02	0.02	0.01	0.03	0.05	0.04
100	90.09	86.36	84.02	0.01	0.00	0.00	0.05	0.07	0.06
150	90.04	86.64	97.30	0.01	0.01	0.02	0.07	0.08	0.08
250	90.29	99.00	89.75	0.04	0.05	0.05	0.09	0.11	0.10
500	92.10	97.84	96.14	0.04	0.06	0.08	0.09	0.12	0.12
700	89.57	97.15	88.98	0.04	0.07	0.09	0.09	0.12	0.12
750	90.23	95.21	90.96	0.04	0.07	0.09	0.07	0.11	0.11
1000	88.01	96.08	86.82	0.03	0.06	0.09	0.06	0.10	0.11
1250	84.24	85.70	84.82	0.03	0.07	0.10	0.05	0.10	0.11
1500	78.08	78.04	77.75	0.01	0.06	0.10	0.03	0.09	0.10
1750	66.05	66.09	66.18	0.01	0.07	0.12	0.01	0.08	0.11
2000	43.58	43.38	43.20	0.01	0.08	0.13	0.01	0.09	0.12
2030	39.27	39.01	38.81	0.01	0.08	0.13	0.01	0.09	0.11
2040	37.68	37.42	37.20	0.01	0.08	0.13	0.02	0.10	0.12
2050	36.02	35.74	35.50	0.02	0.10	0.14	0.03	0.10	0.13
2060	34.27	33.95	33.70	0.03	0.10	0.15	0.03	0.11	0.14
2070	32.41	32.08	31.79	0.03	0.10	0.15	0.04	0.11	0.14
2080	30.45	30.08	29.77	0.03	0.11	0.16	0.04	0.12	0.15
2090	28.35	27.95	27.61	0.04	0.12	0.17	0.05	0.13	0.16
2100	26.11	25.67	25.29	0.06	0.14	0.19	0.06	0.15	0.17
2120	21.11	20.57	20.10	0.12	0.20	0.26	0.13	0.21	0.24
2150	11.84	11.08	10.40	0.48	0.64	0.77	0.50	0.67	0.78
2160	8.25	7.45	6.73	1.00	1.30	1.57	1.02	1.34	1.59
2170	4.70	3.99	3.37	2.32	3.00	3.69	2.36	3.07	3.74
2175	3.17	2.59	2.11	3.63	4.68	5.76	3.69	4.78	5.85
2180	1.94	1.55	1.24	5.67	7.24	8.88	5.77	7.40	9.08
2200	0.33	0.43	0.47	25.70	23.52	20.84	27.70	24.19	20.99
2250	0.28	0.38	0.42	21.97	20.95	19.86	20.71	19.96	19.09
2300	0.26	0.36	0.39	24.22	24.76	24.99	27.14	28.04	28.05
2350	0.34	0.43	0.46	17.25	18.26	18.91	17.38	18.31	18.90
2400	0.42	0.51	0.54	17.91	21.08	26.28	17.56	20.83	26.59
2410	0.43	0.65	0.88	27.54	17.49	13.26	29.43	17.91	13.44
2420	1.36	2.19	2.95	8.04	5.84	4.56	8.11	5.91	4.59
2422	1.81	2.79	3.65	6.41	4.68	3.68	6.47	4.74	3.70
2423	2.08	3.13	4.04	5.72	4.19	3.30	5.77	4.25	3.33
2425	2.70	3.87	4.85	4.55	3.36	2.68	4.59	3.40	2.69
2440	9.30	10.72	11.79	0.95	0.84	0.77	0.96	0.86	0.78
2450	13.95	15.24	16.21	0.46	0.48	0.49	0.46	0.50	0.49
2460	18.18	19.34	20.22	0.29	0.34	0.37	0.28	0.35	0.37
2465	20.14	21.24	22.08	0.24	0.30	0.34	0.24	0.31	0.34
2490	28.68	29.56	30.25	0.14	0.21	0.27	0.14	0.23	0.26
2495	30.19	31.05	31.72	0.13	0.21	0.26	0.13	0.22	0.26
2500	31.65	32.48	33.13	0.12	0.20	0.25	0.12	0.21	0.25
2550	44.05	44.69	45.23	0.07	0.15	0.21	0.08	0.17	0.21
2600	53.85	54.43	54.85	0.05	0.13	0.19	0.05	0.15	0.19
2700	69.34	69.60	70.33	0.03	0.12	0.18	0.03	0.13	0.17
3000	108.29	93.12	95.77	0.01	0.10	0.17	0.01	0.12	0.16
3250	107.37	105.51	117.56	0.00	0.10	0.18	0.02	0.12	0.16
3500	102.02	99.01	102.49	0.00	0.10	0.18	0.01	0.12	0.16
3750	92.94	96.57	104.81	0.00	0.09	0.17	0.01	0.12	0.15
4000	98.35	95.09	101.93	0.01	0.11	0.18	0.02	0.12	0.16
4250	104.55	98.23	100.61	0.02	0.12	0.19	0.04	0.15	0.17
5000	105.30	101.56	99.65	0.06	0.16	0.21	0.07	0.17	0.18
5500	97.86	96.10	97.40	0.07	0.17	0.21	0.08	0.18	0.18
6000	105.03	110.39	127.81	0.07	0.16	0.19	0.07	0.17	0.16
7500	96.80	98.87	102.46	0.00	0.12	0.17	0.00	0.14	0.14
8000	94.64	100.77	96.43	0.01	0.15	0.21	0.00	0.17	0.17
8050	97.12	95.28	98.86	0.03	0.13	0.20	0.02	0.15	0.17

Typical Performance Data

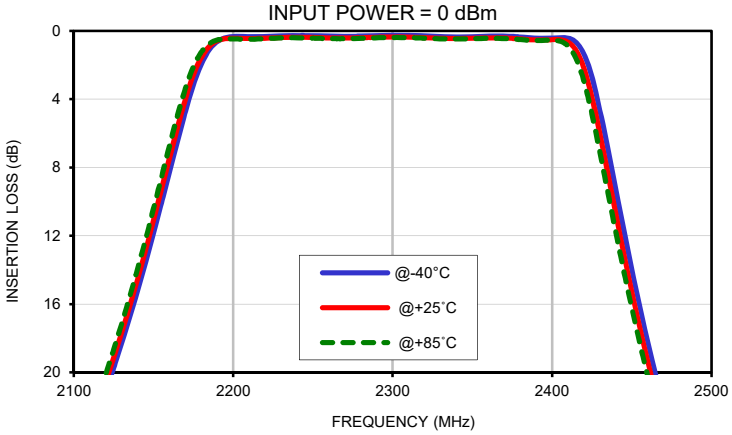
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
2200	7.56	7.24	6.98
2203	7.20	6.90	6.69
2206	6.88	6.62	6.44
2209	6.61	6.40	6.25
2212	6.38	6.21	6.09
2215	6.20	6.06	5.97
2218	6.06	5.94	5.87
2221	5.94	5.85	5.79
2224	5.84	5.77	5.72
2227	5.76	5.70	5.66
2230	5.70	5.64	5.60
2233	5.63	5.58	5.55
2236	5.58	5.53	5.50
2239	5.52	5.47	5.44
2242	5.46	5.42	5.39
2245	5.41	5.36	5.33
2248	5.36	5.31	5.28
2251	5.31	5.26	5.23
2254	5.26	5.22	5.19
2257	5.21	5.17	5.14
2260	5.17	5.13	5.11
2263	5.13	5.10	5.08
2266	5.10	5.07	5.05
2269	5.08	5.05	5.03
2272	5.06	5.04	5.03
2275	5.05	5.03	5.02
2278	5.04	5.03	5.03
2281	5.04	5.04	5.04
2284	5.05	5.04	5.05
2287	5.06	5.06	5.06
2290	5.07	5.07	5.08
2293	5.08	5.08	5.10
2296	5.10	5.10	5.12
2300	5.12	5.12	5.13
2302	5.12	5.13	5.14
2305	5.14	5.14	5.16
2308	5.15	5.15	5.17
2311	5.16	5.16	5.18
2314	5.16	5.17	5.18
2317	5.17	5.18	5.19
2320	5.18	5.19	5.20
2323	5.19	5.20	5.22
2326	5.20	5.21	5.23
2329	5.21	5.23	5.26
2332	5.23	5.25	5.28
2335	5.25	5.28	5.32
2338	5.29	5.32	5.36
2341	5.33	5.37	5.42
2344	5.38	5.43	5.48
2347	5.44	5.50	5.55
2350	5.51	5.57	5.63
2360	5.79	5.86	5.93
2365	5.94	6.02	6.09
2370	6.10	6.18	6.26
2375	6.26	6.34	6.43
2380	6.42	6.52	6.63
2385	6.61	6.75	6.90
2390	6.87	7.08	7.30
2395	7.25	7.56	7.89
2400	7.83	8.29	8.73

Typical Performance Curves

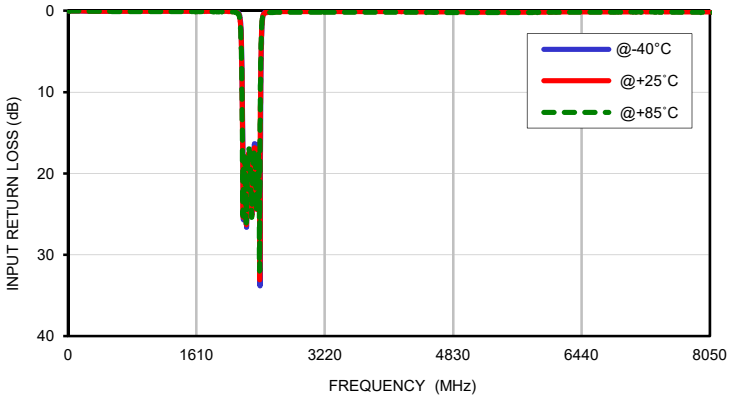
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



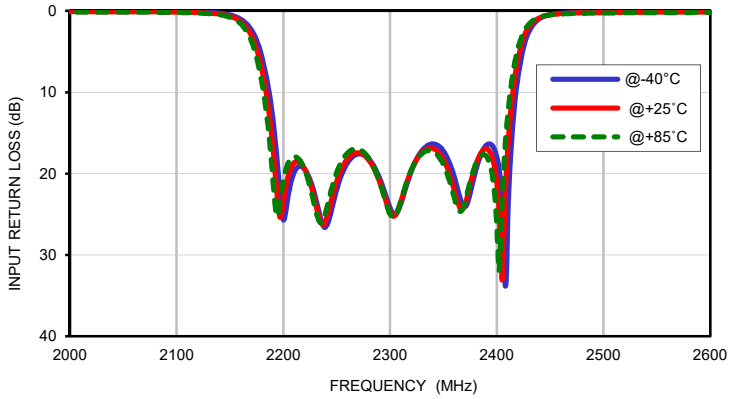
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



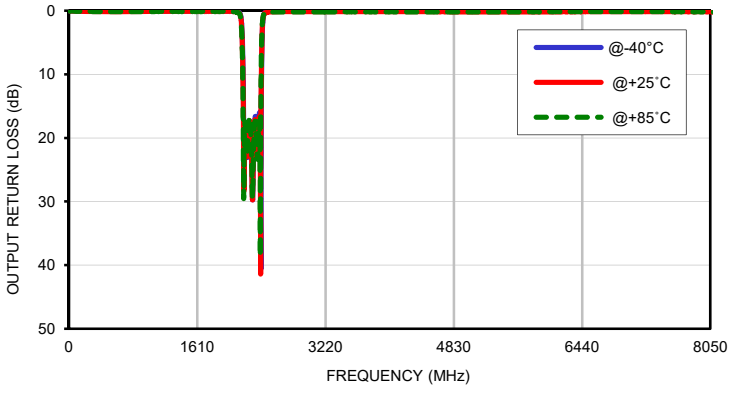
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



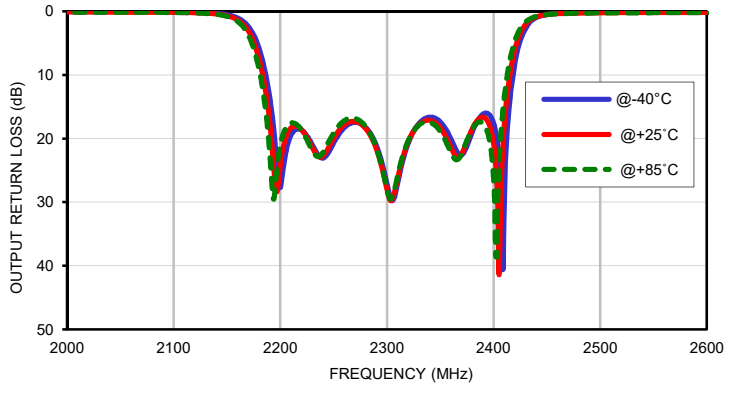
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



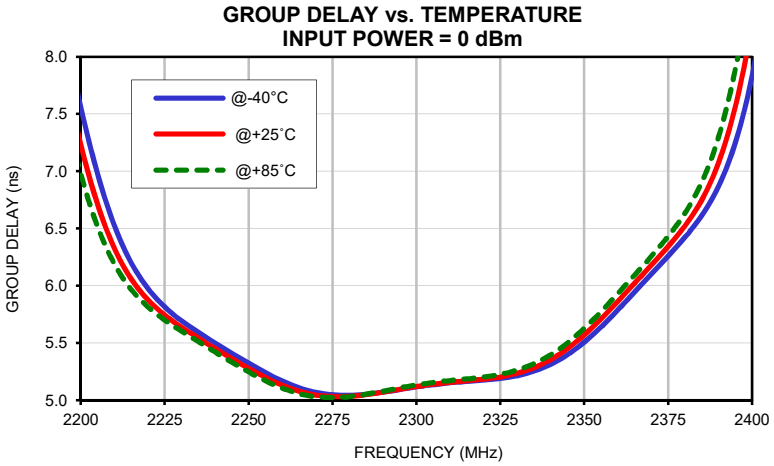
OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



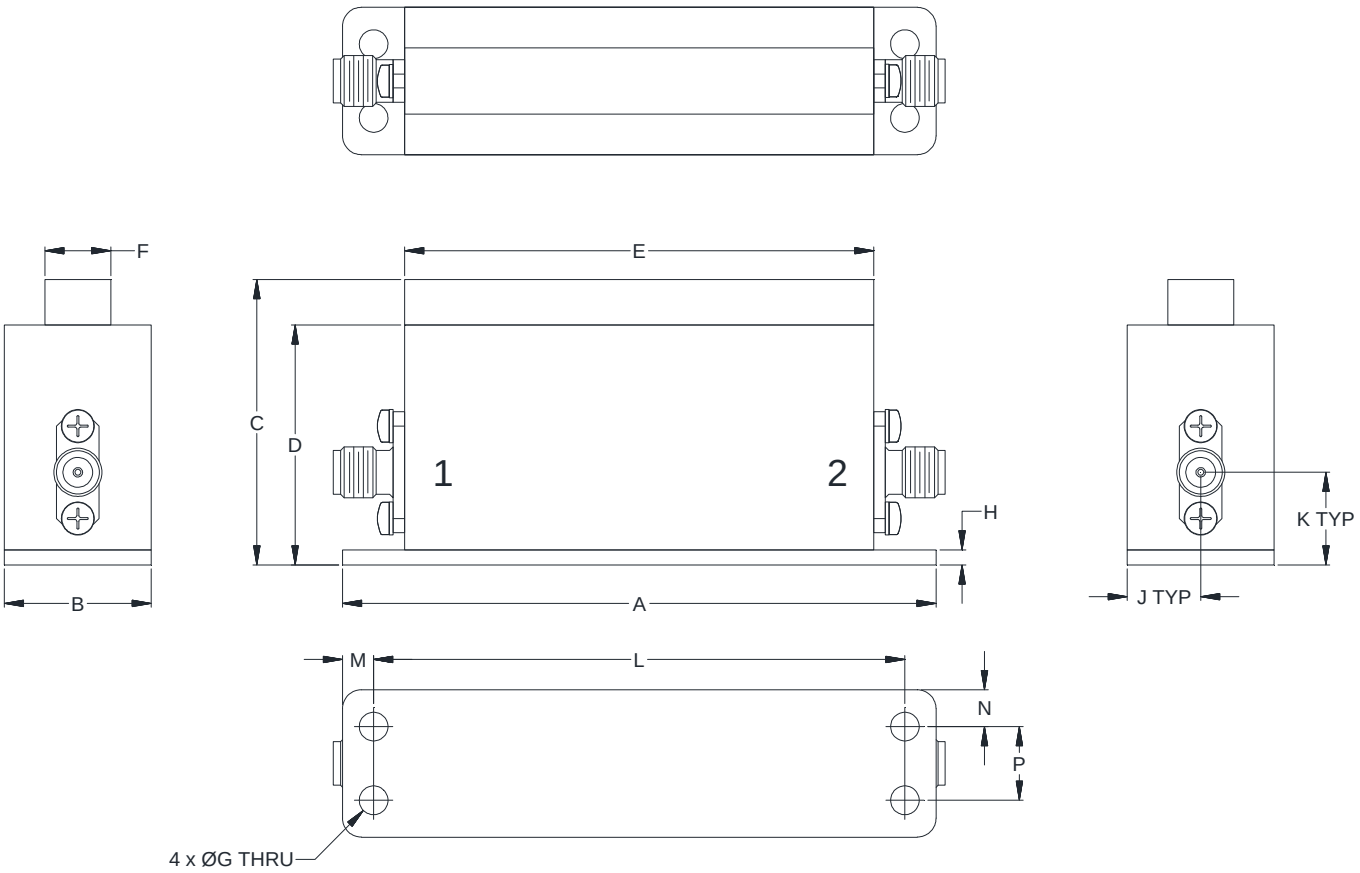
Typical Performance Curves



Case Style QJ

Outline Dimensions

QJ2293



CASE#	A	B	C	D	E	F	G	H	J
QJ2293	3.10 (78.81)	.77 (19.50)	1.49 (37.75)	1.25 (31.75)	2.45 (62.30)	.34 (8.75)	.150 (3.81)	.08 (2.00)	.38 (9.75)

CASE#	K	L	M	N	P	WT. GRAMS
QJ2293	.48 (12.25)	2.778 (70.55)	.16 (4.13)	.19 (4.87)	.384 (9.75)	120

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .06; 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