Coaxial

Bandpass Filter

ZFBP-2400-S+

50Ω 2300 to 2500 MHz

Generic photo used for illustration purposes only

CASE STYLE: H16

The Big Deal

- Narrow bandwidth
- Good VSWR, 1.3:1 typical
- High rejection, 50 dB typical
- Flat group delay, 0.3 ns typical
- High power, 8.5W

Product Overview

ZFBP-2400-S+ is a 50Ω narrow band filter built into a shielded (size: 1.25" x 1.25" x 0.75") case. Covering a bandwidth of 2400 MHz ± 100 MHz, this filter offers good matching in the passband and high rejection in the stopband. Power handling capacity is as high as 8.5W at 25°C.

Key Features

Feature	Advantages
Narroe bandwidth (Fractional bandwidth of 8.3%)	Suitable for Narrow bandwidth applications like Wireless Communication Service and ISM.
Good VSWR, 1.3:1 typical	The model has good return loss for a narrow bandwidth which provides good matching when used with other devices.
High rejection (50 dB typical on lower side band and > 35 dB rejection till 6000 MHz on upper side band)	This enables the filter to attenuate sub harmonics and spurious signals.
Flat group delay characteristics (0.3 ns typical)	The model has a group delay flatness of 0.3 ns which helps in reducing the signal distortion.
High power (8.5W)	Suitable for base station and long-haul applications and test labs.

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Connectors	Model
SMA-FEMALE BRACKET (OPTION "B")	ZFBP-2400-S+

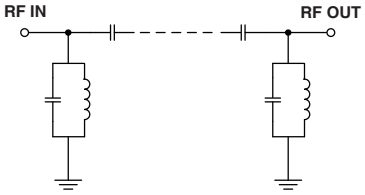
Features

- High rejection, 50 dB typical
- Flat group delay over passband, 0.3 ns typical
- Good VSWR, 1.3:1 typical in passband
- Connectorized package

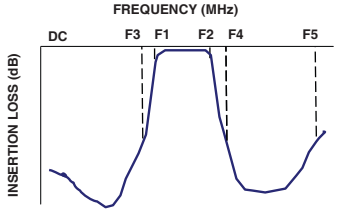
Applications

- Harmonic rejection
- Transmitters / receivers
- Lab use

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

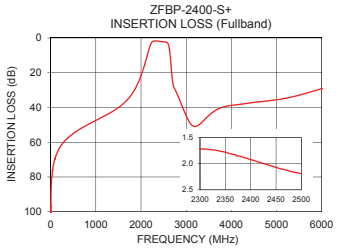
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—	—	—	2400	—	MHz
	Insertion Loss	F1-F2	2300-2500	—	2.2	3.5	dB
	VSWR	F1-F2	2300-2500	—	1.3	1.65	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC-1800	20	30	—	dB
	VSWR	DC-F3	DC-1800	—	50	—	:1
Stop Band, Upper	Insertion Loss	F4-F5	2800-6000	20	28	—	dB
	VSWR	F4-F5	2800-6000	—	16	—	:1

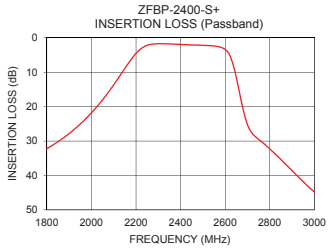
Maximum Ratings	
Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
RF Power Input*	8.5W max. at 25°C

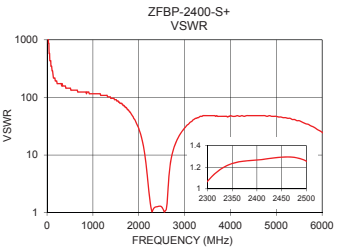
* Derate linearly to 4W at 100°C ambient.
Permanent damage may occur if any of these limits are exceeded.

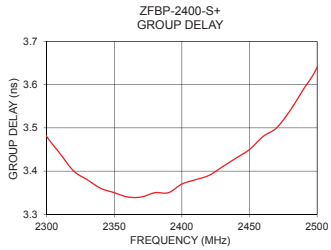
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
0.5	95.43	1737.18	2300.0	3.48
500.0	55.03	144.77	2310.0	3.44
1100.0	46.14	115.81	2320.0	3.40
1800.0	32.22	56.04	2330.0	3.38
2070.0	16.34	18.70	2340.0	3.36
2150.0	8.89	7.94	2350.0	3.35
2200.0	4.52	3.42	2360.0	3.34
2270.0	1.86	1.19	2370.0	3.34
2300.0	1.72	1.07	2380.0	3.35
2400.0	1.92	1.27	2390.0	3.35
2500.0	2.19	1.26	2400.0	3.37
2600.0	3.40	1.14	2410.0	3.38
2620.0	5.02	1.52	2420.0	3.39
2660.0	14.64	4.39	2430.0	3.41
2800.0	32.28	15.81	2440.0	3.43
3050.0	47.48	32.79	2450.0	3.45
3300.0	49.58	44.55	2460.0	3.48
4800.0	36.24	46.96	2470.0	3.50
5600.0	32.22	36.20	2480.0	3.54
6000.0	29.22	24.83	2500.0	3.64









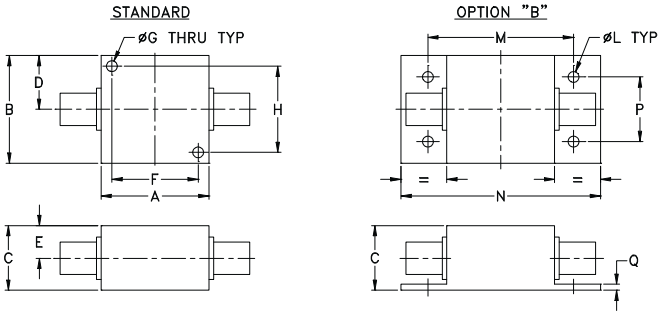
Notes

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
1.25	1.25	.75	.63	.38	1.000	.125	1.000
31.75	31.75	19.05	16.00	9.65	25.40	3.18	25.40

J	K	L	M	N	P	Q	wt
--	--	.125	1.688	2.18	.750	.06	grams
--	--	3.18	42.88	55.37	19.05	1.52	70.0

Note: Please refer to case style drawing for details

Coaxial Bandpass Filter ZFBP-2400-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
0.5	96.14	94.39	97.38	0.02	0.01	0.01	0.02	0.01	0.00
1.0	106.73	99.83	96.21	0.01	0.01	0.01	0.01	0.00	0.00
50.0	75.41	74.89	74.81	0.01	0.03	0.04	0.00	0.02	0.04
100.0	69.45	69.25	69.08	0.03	0.05	0.06	0.01	0.04	0.06
1000.0	47.29	47.30	47.22	0.09	0.14	0.19	0.01	0.14	0.22
1100.0	45.91	45.90	45.88	0.09	0.14	0.19	0.00	0.14	0.23
1200.0	44.51	44.50	44.42	0.09	0.15	0.20	0.00	0.15	0.24
1300.0	43.03	43.02	42.94	0.09	0.16	0.21	0.01	0.16	0.26
1400.0	41.43	41.41	41.30	0.10	0.17	0.23	0.00	0.17	0.28
1500.0	39.61	39.61	39.50	0.11	0.18	0.25	0.01	0.19	0.31
1600.0	37.50	37.45	37.41	0.13	0.21	0.28	0.02	0.22	0.34
1700.0	34.91	34.85	34.87	0.16	0.25	0.32	0.04	0.25	0.39
1800.0	31.56	31.80	31.60	0.21	0.32	0.40	0.09	0.32	0.47
1900.0	27.12	27.45	27.24	0.31	0.42	0.51	0.18	0.42	0.58
2000.0	21.32	21.49	21.31	0.56	0.63	0.73	0.40	0.62	0.79
2050.0	18.16	17.77	17.57	0.78	0.84	0.95	0.60	0.81	0.99
2100.0	14.12	13.50	13.26	1.09	1.23	1.37	0.91	1.19	1.40
2150.0	9.31	8.77	8.50	1.92	2.22	2.48	1.73	2.17	2.50
2200.0	4.70	4.41	4.23	4.55	5.32	6.01	4.34	5.29	6.08
2250.0	2.02	2.12	2.20	12.89	14.83	16.68	12.87	15.24	17.42
2300.0	1.50	1.76	1.92	24.36	22.45	21.85	25.75	23.00	22.36
2310.0	1.50	1.77	1.93	21.73	20.56	20.49	22.05	20.66	20.64
2320.0	1.51	1.78	1.94	19.98	19.34	19.65	20.00	19.30	19.68
2340.0	1.54	1.81	1.97	18.39	18.41	19.22	18.22	18.28	19.22
2360.0	1.56	1.84	1.99	18.26	18.69	19.96	18.05	18.57	19.96
2370.0	1.57	1.85	2.01	18.46	19.08	20.50	18.27	19.01	20.60
2380.0	1.58	1.86	2.02	18.80	19.61	21.13	18.68	19.64	21.38
2390.0	1.59	1.87	2.04	19.34	20.31	21.92	19.30	20.46	22.34
2400.0	1.60	1.88	2.05	20.06	21.18	22.88	20.12	21.48	23.49
2410.0	1.62	1.90	2.07	20.90	22.17	23.91	21.10	22.66	24.76
2420.0	1.63	1.92	2.10	21.73	23.16	24.78	22.11	23.90	25.83
2440.0	1.67	1.95	2.14	23.55	25.15	26.26	24.30	26.33	27.28
2460.0	1.71	2.00	2.20	25.77	27.35	27.64	26.63	28.34	27.70
2470.0	1.74	2.03	2.23	27.07	28.57	28.31	27.71	28.98	27.69
2480.0	1.76	2.06	2.26	28.51	29.91	29.02	28.75	29.51	27.75
2490.0	1.79	2.09	2.29	29.98	31.20	29.72	29.82	30.17	28.03
2500.0	1.82	2.13	2.33	31.42	32.61	30.70	31.01	31.12	28.71
2520.0	1.89	2.21	2.42	33.62	35.62	35.57	34.72	35.29	33.17
2560.0	2.14	2.51	2.74	27.47	28.09	29.34	29.34	29.93	31.05
2580.0	2.38	2.81	3.09	25.49	26.41	26.63	26.61	28.22	28.22
2600.0	2.84	3.43	3.82	25.38	23.22	22.30	28.78	26.67	24.93
2620.0	4.00	5.03	5.73	15.61	13.16	12.36	16.44	13.92	13.04
2640.0	7.02	8.85	9.96	7.99	6.89	6.58	8.13	7.11	6.83
2660.0	12.46	14.87	16.08	4.44	4.11	4.08	4.40	4.17	4.20
2780.0	29.77	30.14	30.25	1.24	1.33	1.42	1.01	1.26	1.44
2800.0	30.71	31.13	31.29	1.11	1.20	1.29	0.88	1.14	1.33
2820.0	31.78	32.21	32.40	1.00	1.10	1.18	0.78	1.05	1.23
2840.0	32.93	33.35	33.56	0.91	1.01	1.09	0.69	0.96	1.14
2860.0	34.10	34.52	34.71	0.84	0.94	1.02	0.62	0.89	1.08
2880.0	35.32	35.72	35.90	0.77	0.87	0.95	0.55	0.83	1.02
2900.0	36.52	36.91	37.07	0.71	0.81	0.89	0.50	0.78	0.97
2920.0	37.72	38.08	38.25	0.67	0.77	0.85	0.45	0.74	0.93
2960.0	40.03	40.39	40.61	0.58	0.68	0.76	0.38	0.66	0.84
3000.0	42.26	42.64	42.87	0.52	0.62	0.70	0.32	0.60	0.79
3500.0	44.76	44.46	44.97	0.21	0.33	0.44	0.03	0.35	0.57
4000.0	37.05	36.80	37.74	0.24	0.39	0.53	0.03	0.41	0.67
4500.0	35.99	36.09	36.77	0.19	0.36	0.54	0.04	0.38	0.72
5000.0	34.97	35.23	35.93	0.18	0.37	0.58	0.06	0.40	0.77
5500.0	32.58	32.85	33.43	0.26	0.47	0.69	0.01	0.49	0.89
6000.0	28.90	29.13	29.43	0.53	0.74	0.94	0.26	0.76	1.15

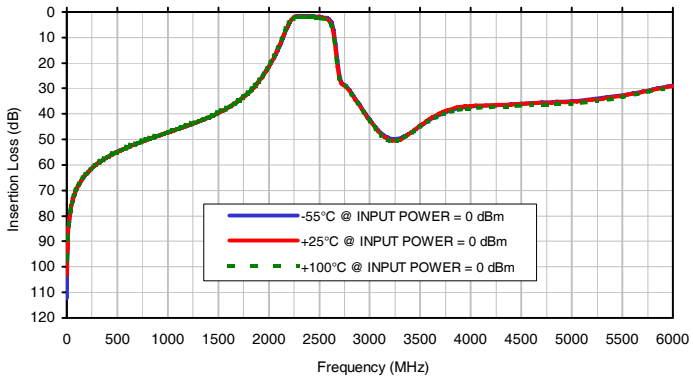
Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@-55°C	@+25°C	@+100°C
2300.0	3.51	3.46	3.42
2310.0	3.45	3.41	3.38
2320.0	3.41	3.37	3.35
2330.0	3.37	3.34	3.32
2340.0	3.35	3.32	3.31
2350.0	3.33	3.31	3.31
2360.0	3.32	3.31	3.30
2370.0	3.32	3.31	3.31
2380.0	3.32	3.31	3.31
2390.0	3.33	3.32	3.33
2400.0	3.34	3.34	3.34
2410.0	3.35	3.35	3.35
2420.0	3.36	3.36	3.36
2430.0	3.38	3.38	3.38
2440.0	3.40	3.40	3.40
2450.0	3.42	3.43	3.43
2460.0	3.45	3.45	3.45
2470.0	3.47	3.48	3.48
2480.0	3.50	3.51	3.52
2490.0	3.54	3.55	3.56
2500.0	3.58	3.60	3.61

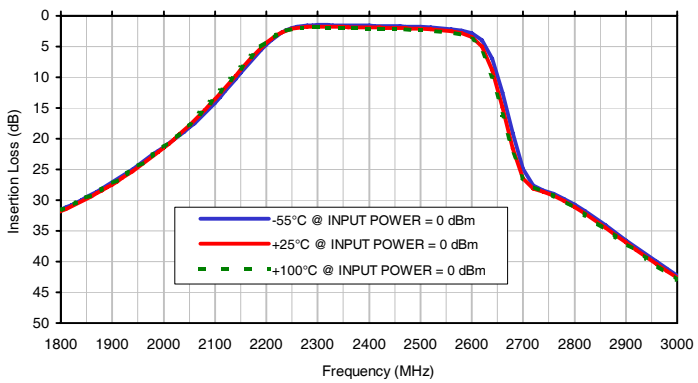
Coaxial Bandpass Filter ZFBP-2400-S+

Typical Performance Curves

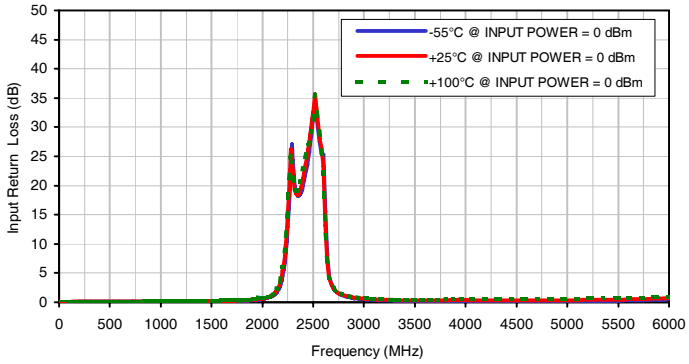
Insertion Loss vs. Temperature (Full band)



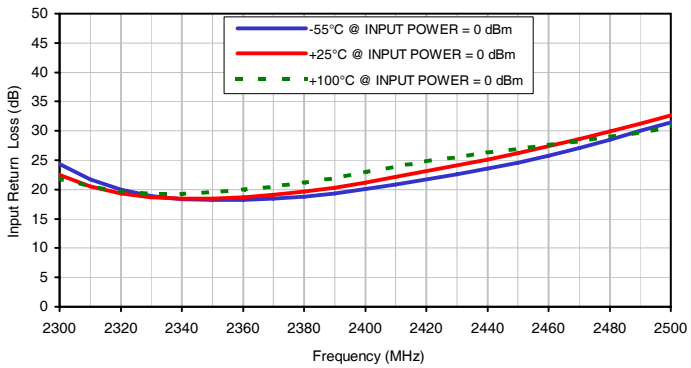
Insertion Loss vs. Temperature (Pass band)



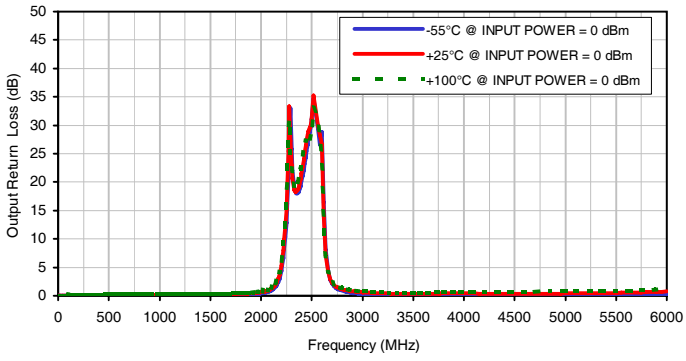
Input Return Loss vs. Temperature



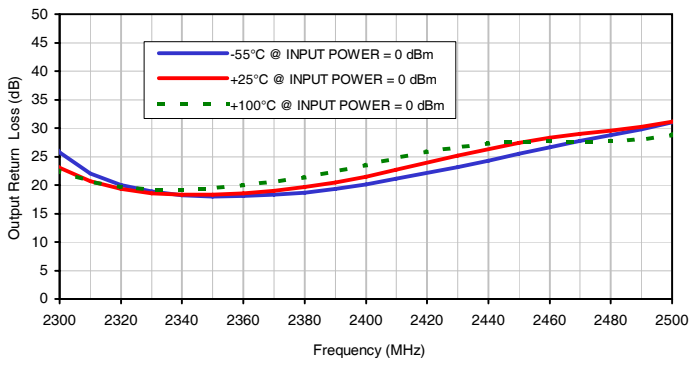
Input Return Loss vs. Temperature



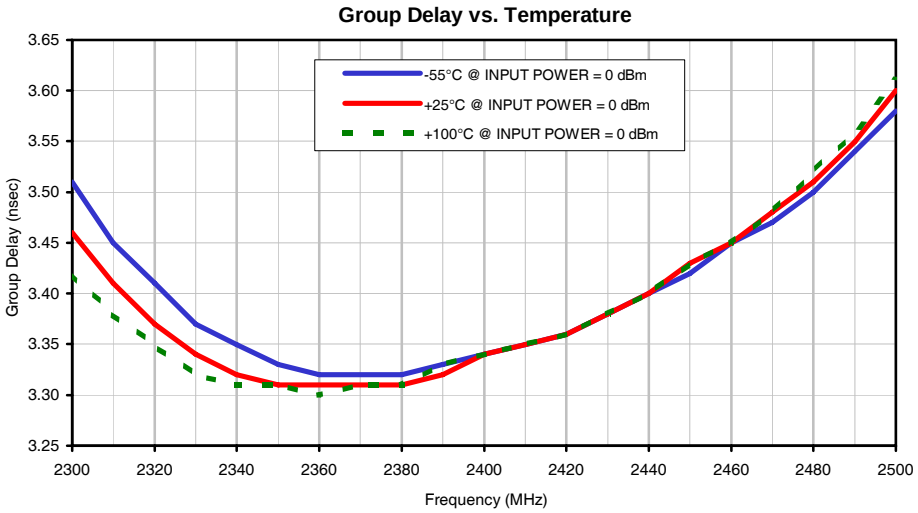
Output Return Loss vs. Temperature



Output Return Loss vs. Temperature



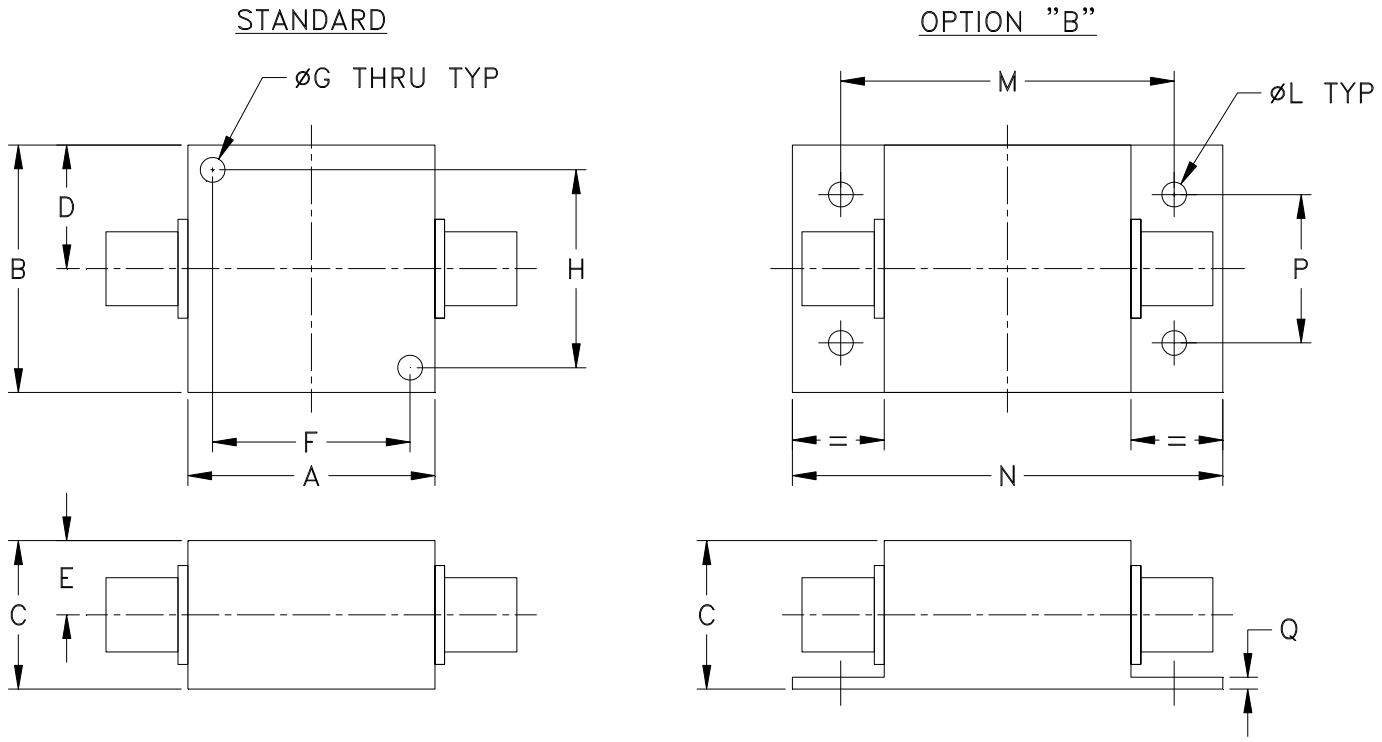
Typical Performance Curves



Case Style H

Outline Dimensions

H16



CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
H16	1.25 (31.75)	1.25 (31.75)	.750 (19.05)	.63 (16.00)	.38 (9.65)	1.000 (25.40)	.125 (3.18)	1.000 (25.40)	--	--	.125 (3.18)	1.688 (42.88)	2.18 (55.37)

CASE#	P	Q	WT.GRAMS
H16	.750 (19.05)	.06 (1.52)	70

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

Notes:

1. Case material: Aluminum alloy.
2. Case finish:
   For RoHS Case Styles: Clear chemical conversion coating, non-chrome or trivalent chrome based.
3. Mounting bracket available on request. Add suffix B to part number.
4. Bracket version, option B, dimension "C" changes from .75 to .94 inches when connectors are type N.
5. 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