CAVITY

Bandpass Filter

ZVBP MODEL SERIES

50Ω DC to 57 GHz

THE BIG DEAL

- Very low insertion loss with excellent power handling
- Very fast roll-off with wide stopband
- Passbands upto 36 GHz
- Stopband up to 57 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 0.5% 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

REV. A
ECO-015165
ZVBP-4450-S+
EDU2687
URJ
221001

CAVITY

Bandpass Filter

ZVBP-4450-S+

50Ω 4050 to 4850 MHz SMA-Female

FEATURES

- Low Insertion loss, 0.3dB typ.
- Good Return loss, 25dB typ.
- Great Rejection (50 to 100 dB typ.)
- Wide stopband up to 15000 MHz

Generic photo used for illustration purposes only

Model No.	ZVBP-4450-S+
Case Style	WH3317
Connectors	SMA-FEMALE

APPLICATIONS

- Test & Measurement Equipment
- Radar, EW, and ECM Defense Systems

+RoHS Compliant

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

ELECTRICAL SPECIFICATIONS AT 25°C

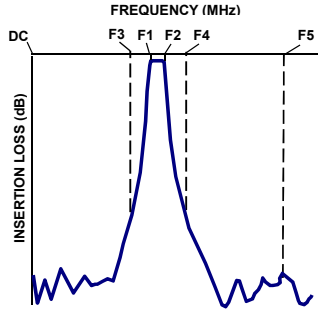
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Units
	Center Frequency	Fc	-	-	4450	-	MHz
Passband	Insertion Loss	F1-F2	4050 - 4850	-	0.3	0.6	dB
	Return Loss	F1-F2	4050 - 4850	18	25	-	dB
Stop Band, Lower	Rejection	DC-F3	DC - 2900	50	57	-	dB
Stop Band, Upper	Rejection	F4-F5	5700 - 15000	50	61	-	dB

MAXIMUM RATINGS

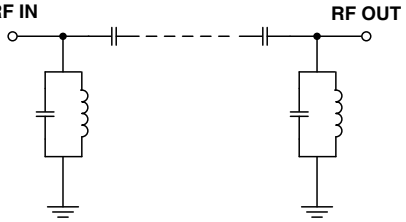
Parameter	Ratings
Operating temperature	-40°C to +85°C
Storage temperature	-55°C to +100°C
RF Power Input	15W max. at 25°C

Permanent damage may occur if any of these limits are exceeded
Input and output ports are DC short to ground.

TYPICAL FREQUENCY RESPONSE



FUNCTIONAL SCHEMATIC



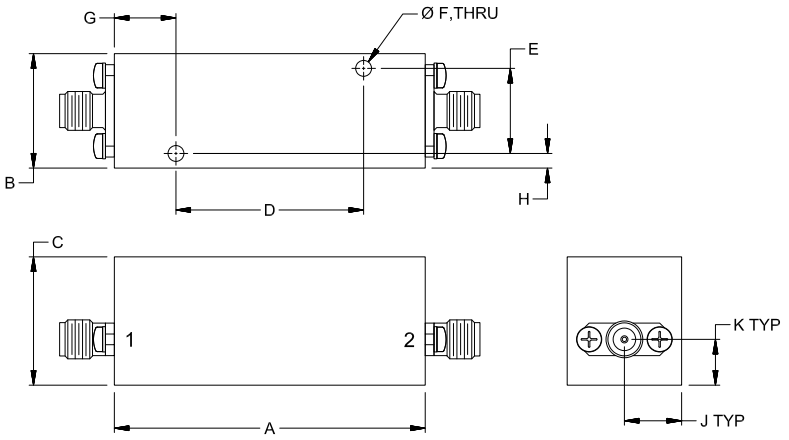
Bandpass Filter

ZVBP-4450-S+

COAXIAL CONNECTIONS

PORT 1	SMA-Female
PORT 2	SMA-Female

OUTLINE DRAWING



OUTLINE DIMENSIONS (Inches / mm)

A	B	C	D	E	F
2.12	**.78**	**.87**	**1.280**	**.580**	**.110**
53.8	19.8	22.2	32.51	14.73	2.79
G	H	J	K		Wt.
.42	**.10**	**.39**	**.31**		grams
10.7	2.5	9.9	7.9		62

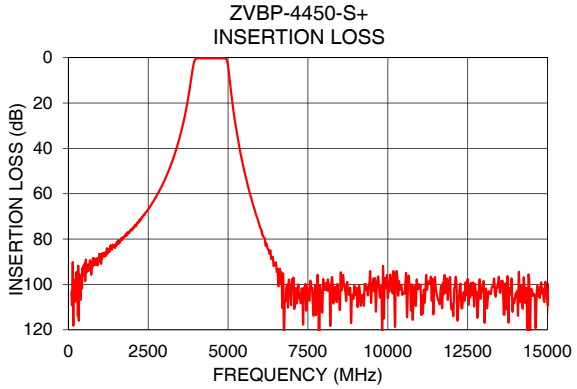
Note. Please refer to case style drawing for details

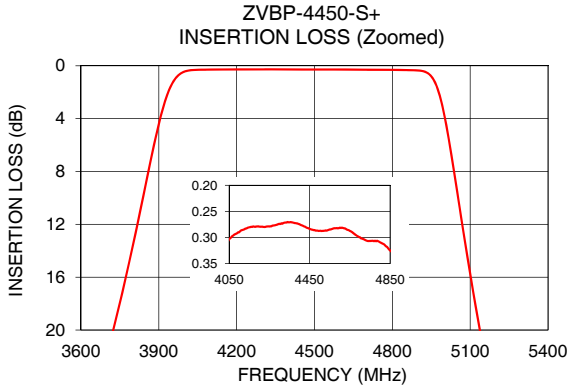
Bandpass Filter

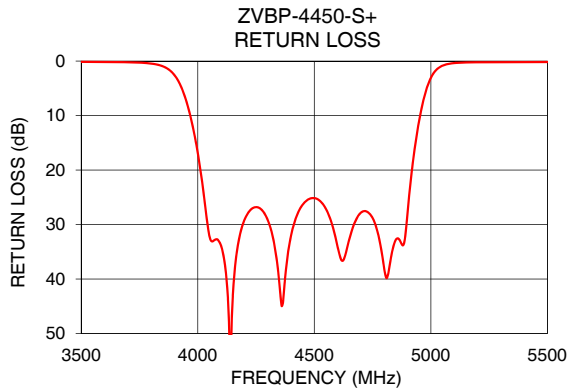
ZVBP-4450-S+

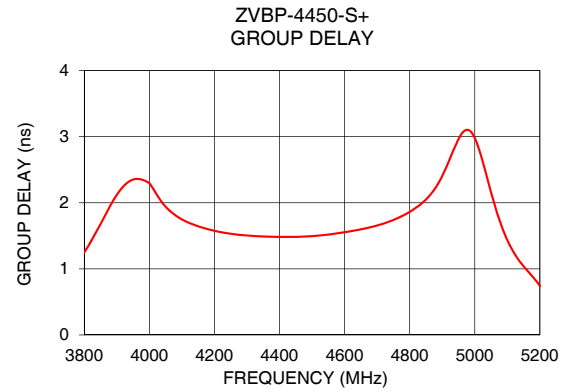
TYPICAL PERFORMANCE DATA AT 25°C

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)	Frequency (MHz)	Group Delay (ns)
100	103.21	0.06	4050	1.94
1000	88.51	0.09	4070	1.85
2900	57.34	0.12	4100	1.75
3560	31.10	0.16	4150	1.64
3910	3.64	3.18	4350	1.49
4050	0.30	32.08	4400	1.48
4250	0.28	26.80	4450	1.48
4450	0.28	26.35	4500	1.50
4650	0.29	32.73	4550	1.52
4850	0.32	32.76	4600	1.55
4995	3.23	3.54	4650	1.60
5140	20.32	0.27	4700	1.66
5250	31.07	0.21	4750	1.74
5700	60.67	0.15	4800	1.86
15000	109.19	0.29	4850	2.05









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

Cavity Bandpass Filter ZVBP-4450-S+

Typical Performance Data

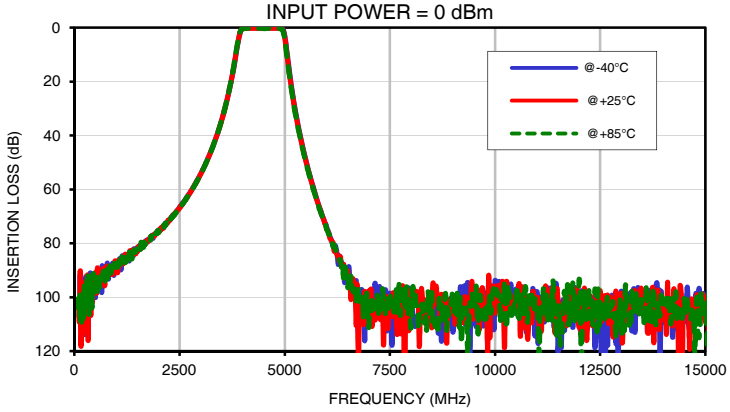
FREQ. (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURN LOSS (dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
100	103.77	103.21	100.42	0.04	0.06	0.07	0.04	0.07	0.06
200	106.06	97.96	101.70	0.06	0.08	0.10	0.06	0.10	0.09
300	101.48	113.97	96.94	0.07	0.09	0.11	0.07	0.10	0.10
400	93.17	100.80	95.60	0.06	0.09	0.11	0.07	0.11	0.11
500	100.09	96.26	93.31	0.06	0.09	0.11	0.07	0.10	0.11
600	93.10	91.48	92.67	0.07	0.10	0.12	0.07	0.11	0.11
700	90.22	92.19	91.52	0.07	0.10	0.12	0.07	0.12	0.11
800	91.27	90.99	90.46	0.06	0.10	0.12	0.07	0.12	0.11
900	87.98	89.36	87.66	0.05	0.09	0.11	0.06	0.12	0.10
1000	87.07	88.51	87.36	0.05	0.09	0.11	0.05	0.11	0.10
1200	86.38	85.03	85.29	0.04	0.09	0.11	0.05	0.11	0.09
1400	84.71	83.19	83.47	0.04	0.08	0.11	0.05	0.10	0.10
1600	80.62	81.76	81.48	0.03	0.09	0.12	0.04	0.10	0.10
1800	78.57	77.79	78.40	0.03	0.09	0.12	0.04	0.11	0.10
2000	75.67	75.77	75.54	0.03	0.09	0.13	0.03	0.11	0.10
2200	72.35	72.40	72.65	0.03	0.10	0.14	0.04	0.11	0.12
2500	66.67	66.85	66.97	0.04	0.11	0.16	0.04	0.13	0.13
2700	62.37	62.46	62.42	0.04	0.12	0.17	0.05	0.14	0.15
2900	57.22	57.34	57.42	0.04	0.12	0.18	0.05	0.14	0.15
3000	54.36	54.42	54.48	0.04	0.12	0.18	0.05	0.14	0.16
3200	47.67	47.73	47.78	0.05	0.13	0.19	0.06	0.16	0.17
3580	29.98	29.92	29.87	0.09	0.17	0.21	0.11	0.20	0.20
3720	20.52	20.35	20.18	0.17	0.24	0.27	0.19	0.27	0.27
3840	10.21	9.89	9.52	0.68	0.81	0.89	0.69	0.82	0.87
3920	3.19	2.94	2.62	3.44	3.93	4.47	3.43	3.91	4.40
4050	0.21	0.30	0.33	30.79	32.08	32.16	33.06	35.51	36.39
4100	0.19	0.29	0.32	34.12	33.87	35.35	34.97	35.39	38.38
4200	0.18	0.28	0.32	31.96	29.18	25.28	31.97	28.99	25.24
4300	0.17	0.27	0.31	31.95	29.13	25.72	32.49	29.79	26.28
4400	0.18	0.27	0.31	30.48	32.06	33.89	29.51	31.32	32.40
4450	0.18	0.28	0.32	25.78	26.35	25.85	25.44	26.06	25.52
4500	0.19	0.29	0.33	25.10	25.15	23.82	24.88	25.05	23.76
4600	0.18	0.28	0.33	36.51	34.09	28.55	37.51	36.21	30.19
4700	0.20	0.30	0.34	25.27	27.80	30.38	25.33	27.76	30.32
4800	0.20	0.31	0.36	32.43	38.10	45.85	32.42	35.76	36.30
4850	0.21	0.32	0.37	32.54	32.76	35.32	32.82	32.83	41.14
4995	2.51	3.23	3.87	4.23	3.54	3.02	4.27	3.57	3.00
5055	9.24	10.18	10.94	0.75	0.75	0.76	0.77	0.76	0.71
5140	19.56	20.32	20.94	0.16	0.27	0.37	0.16	0.28	0.31
5225	28.22	28.83	29.36	0.09	0.22	0.32	0.10	0.23	0.27
5700	60.38	60.67	61.05	0.03	0.15	0.25	0.06	0.19	0.22
6000	74.21	74.75	74.87	0.02	0.13	0.21	0.05	0.17	0.19
6200	80.82	81.90	81.82	0.02	0.12	0.20	0.04	0.16	0.18
6400	87.99	87.88	92.96	0.02	0.12	0.19	0.04	0.15	0.17
6600	94.69	94.12	96.59	0.04	0.13	0.19	0.04	0.15	0.16
6800	103.69	107.27	101.65	0.06	0.15	0.20	0.05	0.16	0.17
7000	110.95	97.82	111.08	0.07	0.17	0.21	0.07	0.18	0.18
7500	98.55	102.34	98.17	0.10	0.19	0.23	0.12	0.22	0.22
8000	105.65	100.28	111.44	0.07	0.16	0.19	0.12	0.22	0.21
8500	102.01	111.05	98.40	0.01	0.10	0.14	0.06	0.18	0.16
9000	112.94	104.58	97.45	0.00	0.11	0.16	0.01	0.13	0.12
9500	98.99	99.57	104.76	0.05	0.17	0.23	0.02	0.15	0.14
10000	93.84	105.92	98.37	0.09	0.22	0.31	0.05	0.19	0.20
10500	97.00	103.61	98.66	0.08	0.23	0.36	0.07	0.22	0.25
11000	98.33	101.40	102.93	0.05	0.22	0.37	0.06	0.21	0.24
11500	120.33	101.76	103.18	0.04	0.23	0.41	0.02	0.19	0.24
12000	103.38	111.12	93.28	0.10	0.30	0.50	0.05	0.22	0.30
12500	99.00	97.71	102.12	0.15	0.35	0.57	0.10	0.29	0.38
13000	97.77	98.67	104.23	0.13	0.34	0.57	0.14	0.34	0.45
15000	105.18	109.19	102.34	0.08	0.29	0.47	0.12	0.35	0.47

Typical Performance Data

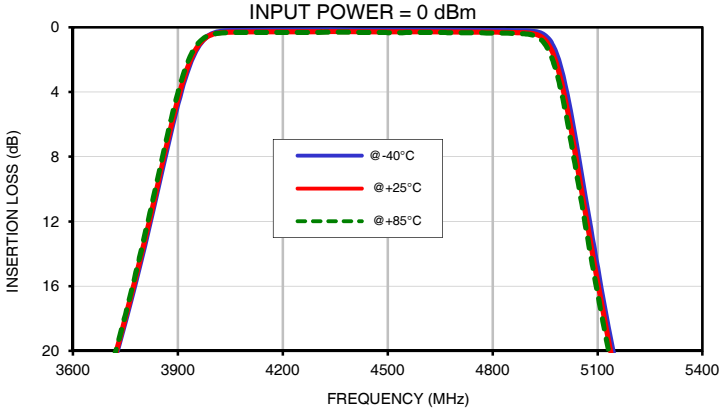
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
4050	1.97	1.94	1.92
4070	1.87	1.85	1.83
4090	1.79	1.78	1.77
4110	1.73	1.72	1.72
4130	1.69	1.68	1.67
4150	1.65	1.64	1.64
4170	1.62	1.61	1.61
4190	1.59	1.59	1.58
4210	1.57	1.57	1.56
4230	1.55	1.55	1.54
4250	1.53	1.53	1.53
4270	1.52	1.52	1.52
4290	1.51	1.51	1.51
4310	1.50	1.50	1.50
4330	1.50	1.49	1.50
4350	1.49	1.49	1.49
4370	1.49	1.49	1.49
4390	1.48	1.48	1.49
4410	1.48	1.48	1.49
4430	1.48	1.48	1.49
4450	1.48	1.48	1.49
4470	1.49	1.49	1.49
4490	1.49	1.49	1.50
4510	1.50	1.50	1.50
4530	1.51	1.51	1.51
4550	1.52	1.52	1.52
4570	1.53	1.53	1.54
4590	1.54	1.55	1.55
4610	1.56	1.56	1.57
4630	1.57	1.58	1.59
4650	1.59	1.60	1.61
4670	1.61	1.62	1.63
4690	1.63	1.64	1.65
4710	1.66	1.67	1.68
4730	1.69	1.70	1.72
4750	1.73	1.74	1.75
4770	1.77	1.78	1.80
4790	1.82	1.83	1.85
4810	1.87	1.89	1.91
4830	1.94	1.96	1.99
4850	2.02	2.05	2.08

Typical Performance Curves

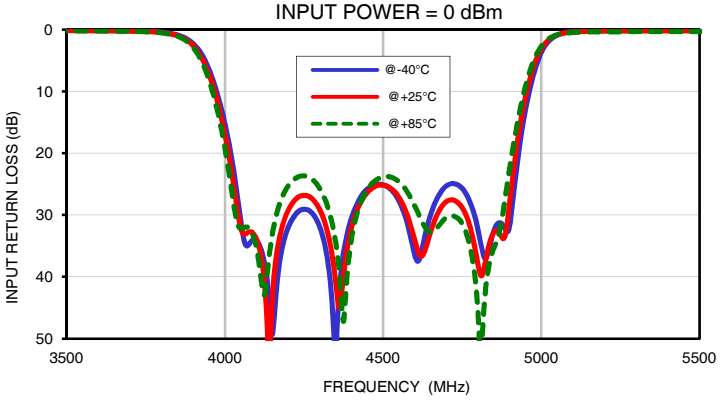
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



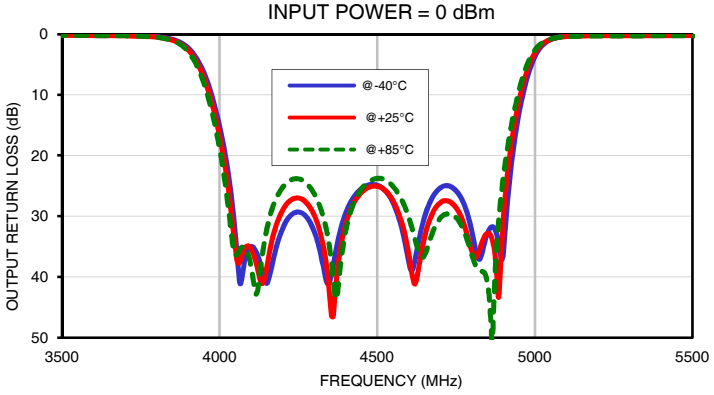
INSERTION LOSS vs. TEMPERATURE (Zoomed)
INPUT POWER = 0 dBm



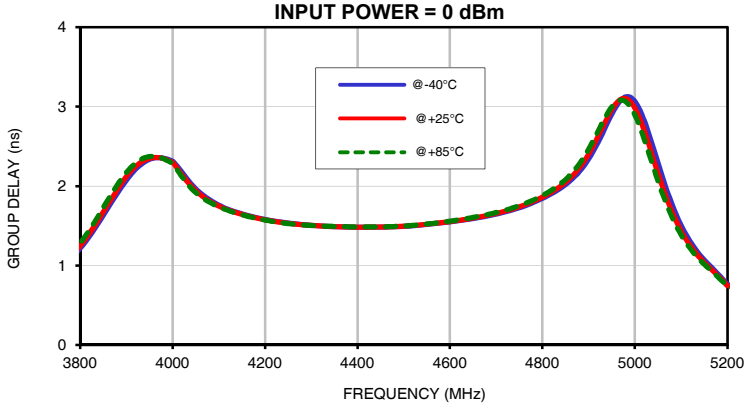
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



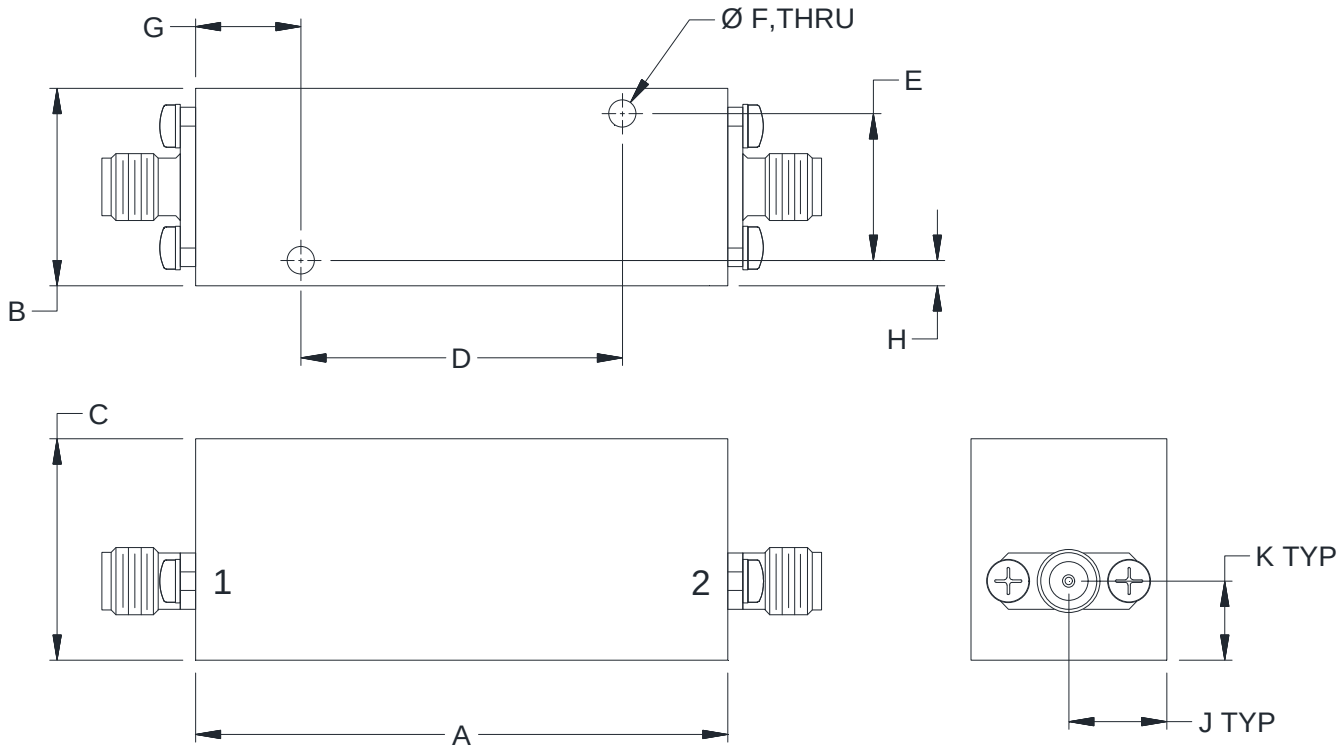
GROUP DELAY vs. TEMPERATURE
INPUT POWER = 0 dBm



Case Style WH

Outline Dimensions

WH3317



CASE#	A	B	C	D	E	F
WH3317	2.12 (53.8)	.78 (19.8)	.87 (22.2)	1.280 (32.51)	.580 (14.73)	.110 (2.79)

CASE#	G	H	J	K	WT. GRAMS
WH3317	.42 (10.7)	.10 (2.5)	.39 (9.9)	.31 (7.9)	62

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .100; 3 Pl. ± .015

Notes:

1. Case material: Aluminum.
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