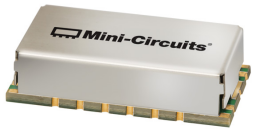
Surface Mount

Bandpass Filter

BPF-F100+

50Ω 95 to 105 MHz



Generic photo used for illustration purposes only
CASE STYLE: HP1156

The Big Deal

- Narrow bandwidth
- High Rejection
- Good VSWR
- Shielded package

Product Overview

BPF-F100+ is a 50Ω bandpass filter in a shielded package fabricated using SMT technology. This bandpass filter covers from 95 to 105 MHz. This unit uses a miniature high Q capacitors and wire welded inductors for high reliability, It has repeatable performance across production lots and consistent performance across temperature.

Key Features

Feature	Advantages
Narrow bandwidth filter	Narrow bandwidth with fast roll-off, this will attenuate frequencies closer to the passband with good rejection value of > 40 dB which increases selectivity on the adjacent channel
Good rejection	This enables the filter attenuate spurious signals and reject harmonics for broad frequency band.
Shielded package	The small surface mount package enables the BPF-F100+ to used in compact design

Surface Mount

Bandpass Filter

BPF-F100+

50Ω 95 to 105 MHz

Generic photo used for illustration purposes only
CASE STYLE: HP1156

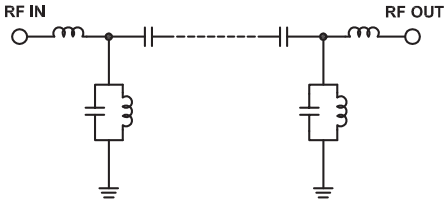
Features

- Narrow bandwidth
- Sharper cut-off
- Shielded package

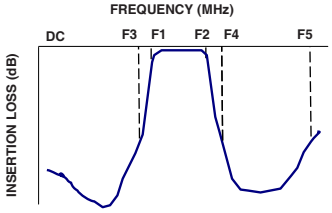
Applications

- Radio test equipment
- Receiver \ Transmitter
- Harmonic rejection

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

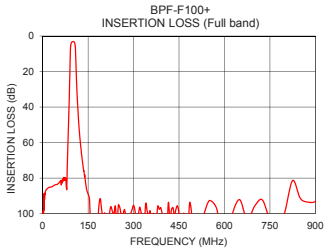
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—	—	—	100	—	MHz
	Insertion Loss	F1-F2	95-105	—	5	6	dB
	VSWR	F1-F2	95-105	—	1.58	1.92	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC-85	40	45	—	dB
	VSWR	DC-F3	DC-85	—	20	—	:1
Stop Band, Upper	Insertion Loss	F4-F5	120-900	40	44	—	dB
	VSWR	F4-F5	120-900	—	20	—	:1

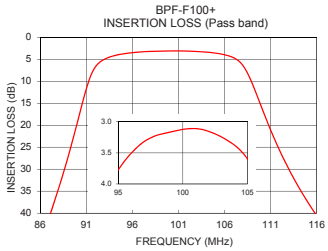
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	1 W

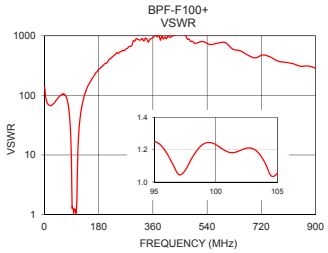
Permanent damage may occur if any of these limits are exceeded.

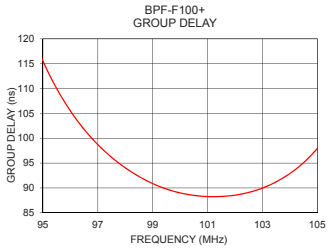
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
1.0	104.96	138.75	95.0	115.55
50.0	83.35	96.51	95.5	110.00
85.0	52.26	35.19	96.0	105.51
88.5	30.98	14.40	96.5	101.78
89.5	23.60	9.11	97.0	98.71
90.0	19.64	6.69	97.5	96.16
92.0	6.69	1.26	98.0	94.05
95.0	3.78	1.25	98.5	92.29
100.0	3.12	1.23	99.0	90.87
105.0	3.60	1.06	99.5	89.78
108.0	6.46	1.98	100.0	88.99
110.5	18.56	9.15	100.5	88.50
111.0	21.13	11.14	101.0	88.26
112.0	25.88	15.20	101.5	88.29
113.0	30.12	19.30	102.0	88.54
116.0	40.59	31.70	102.5	89.10
120.0	51.10	48.50	103.0	89.96
300.0	95.33	817.79	103.5	91.23
500.0	103.03	744.47	104.0	92.91
900.0	93.09	286.61	105.0	97.97







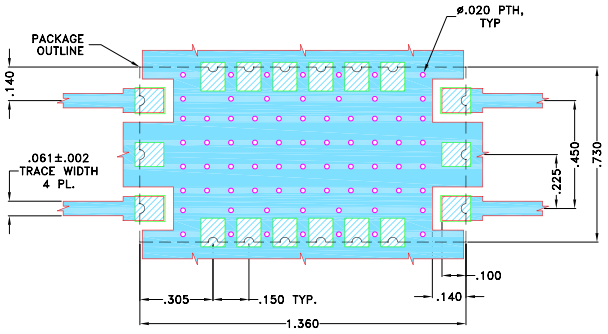


Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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

Pad Connections

INPUT	18
OUTPUT	9
GROUND	1,3,4,5,6,7,8,10,12,13,14,15,16,17
NO CONNECTION	2,11

Demo Board MCL P/N: TB-695+
Suggested PCB Layout (PL-418)

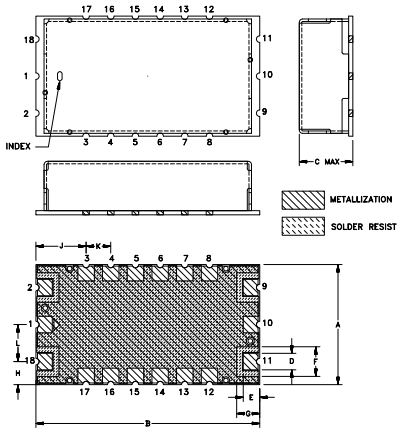


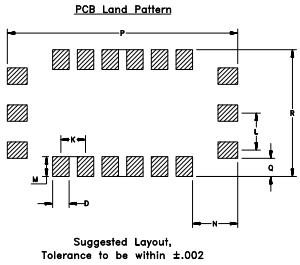
NOTES:
1. TRACE WIDTH IS SHOWN FOR OAK-602, WITH DIELECTRIC THICKNESS .022"±.0015". COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

Outline Drawing





Outline Dimensions (inch / mm)

A	B	C	D	E	F	G	H	J
.730	**1.360**	**.350**	**.100**	**.100**	**.180**	**.140**	**.140**	**.305**
18.54	34.54	8.89	2.54	2.54	4.57	3.56	3.56	7.75

K	L	M	N	P	Q	R	Wt.
.150	**.225**	**.120**	**.275**	**1.400**	**.110**	**.770**	grams
3.81	5.72	3.05	6.99	35.56	2.79	19.56	6.0

Note: Please refer to case style drawing for details

Surface Mount Bandpass Filter BPF-F100+

Typical Performance Data

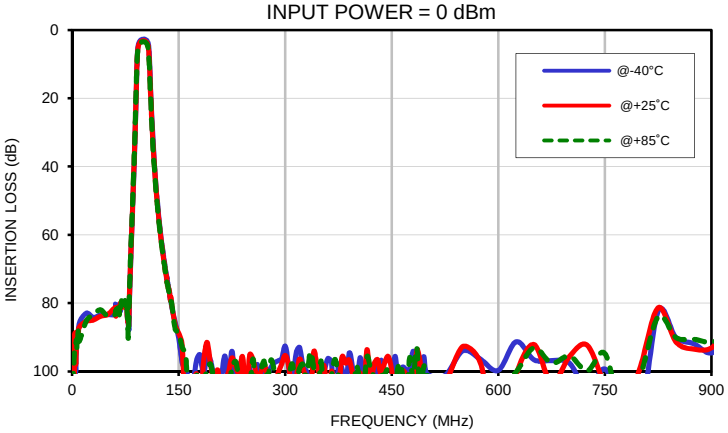
FREQ. (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURN LOSS (dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1.0	97.69	104.96	103.56	0.11	0.13	0.13	0.11	0.12	0.13
10.0	85.94	87.07	91.22	0.21	0.24	0.26	0.21	0.24	0.26
20.0	82.96	85.34	85.22	0.23	0.26	0.28	0.23	0.25	0.28
30.0	84.25	84.94	83.37	0.21	0.24	0.26	0.21	0.24	0.26
40.0	83.47	83.89	81.96	0.19	0.21	0.22	0.18	0.20	0.23
50.0	83.33	83.35	83.88	0.16	0.18	0.19	0.16	0.18	0.20
60.0	83.18	81.37	83.43	0.15	0.16	0.18	0.14	0.16	0.18
70.0	79.89	79.60	79.52	0.15	0.18	0.18	0.15	0.17	0.19
80.0	87.81	85.38	84.15	0.23	0.27	0.30	0.22	0.27	0.30
81.0	77.04	75.45	74.86	0.25	0.30	0.32	0.25	0.29	0.33
82.0	69.66	69.21	68.40	0.27	0.33	0.36	0.27	0.32	0.37
83.0	64.08	63.19	62.52	0.31	0.37	0.41	0.30	0.36	0.42
84.0	58.52	57.73	56.91	0.35	0.42	0.47	0.35	0.42	0.48
85.0	53.04	52.26	51.48	0.41	0.49	0.56	0.40	0.49	0.56
86.0	47.42	46.66	45.82	0.49	0.60	0.68	0.48	0.59	0.68
87.0	41.58	40.76	39.88	0.62	0.76	0.86	0.60	0.74	0.85
88.0	35.24	34.38	33.45	0.82	1.01	1.17	0.78	0.96	1.12
88.5	31.86	30.98	30.01	0.98	1.21	1.41	0.92	1.14	1.33
89.0	28.28	27.39	26.40	1.20	1.49	1.76	1.11	1.38	1.62
90.0	20.49	19.64	18.68	2.06	2.61	3.18	1.81	2.29	2.75
91.0	12.18	11.75	11.20	4.96	6.33	7.85	3.98	4.99	5.98
92.0	6.34	6.69	6.83	17.52	18.67	19.24	10.46	11.48	12.34
93.0	4.47	4.97	5.25	16.03	16.25	16.54	15.44	16.64	17.99
94.0	3.71	4.20	4.50	17.74	18.08	18.44	27.63	30.56	32.02
95.0	3.32	3.78	4.07	18.47	19.00	19.61	22.15	22.25	22.31
98.0	2.79	3.22	3.50	25.44	23.69	22.47	21.54	21.38	21.79
100.0	2.71	3.12	3.41	18.78	19.67	20.80	20.32	22.47	24.98
103.0	2.78	3.24	3.58	20.56	20.55	21.09	21.42	20.43	19.78
105.0	3.05	3.60	4.01	38.38	31.37	25.49	20.31	19.36	18.36
107.0	3.90	4.68	5.34	16.35	15.30	14.11	20.90	20.55	19.90
108.0	5.27	6.46	7.54	10.98	9.69	8.45	15.35	12.74	10.83
109.0	8.95	10.52	11.93	4.89	4.53	4.11	5.78	5.27	4.77
110.0	14.35	15.88	17.26	2.41	2.42	2.33	2.73	2.69	2.59
111.0	19.79	21.13	22.36	1.49	1.56	1.56	1.64	1.70	1.70
111.5	22.32	23.57	24.73	1.24	1.32	1.34	1.35	1.42	1.44
112.0	24.71	25.88	26.96	1.06	1.14	1.16	1.15	1.22	1.25
113.0	29.09	30.12	31.11	0.82	0.90	0.93	0.88	0.95	0.99
113.5	31.11	32.09	33.01	0.74	0.82	0.84	0.79	0.86	0.89
115.0	36.57	37.41	38.21	0.57	0.63	0.66	0.60	0.66	0.69
120.0	50.51	51.10	51.63	0.32	0.36	0.38	0.33	0.37	0.40
130.0	68.17	68.65	68.80	0.17	0.20	0.21	0.17	0.20	0.22
150.0	90.09	88.89	88.74	0.09	0.11	0.11	0.09	0.11	0.12
175.0	96.97	100.70	101.30	0.05	0.07	0.07	0.05	0.07	0.08
200.0	101.95	102.28	103.15	0.03	0.05	0.06	0.03	0.05	0.06
225.0	94.11	96.05	99.08	0.02	0.04	0.04	0.02	0.04	0.05
250.0	99.12	95.19	104.96	0.01	0.03	0.04	0.01	0.03	0.04
300.0	92.59	95.33	103.74	0.00	0.02	0.03	0.01	0.02	0.03
350.0	104.82	101.17	96.97	0.00	0.02	0.02	0.01	0.02	0.03
400.0	107.19	107.34	98.38	0.01	0.02	0.02	0.01	0.02	0.03
450.0	101.02	99.86	104.20	0.01	0.02	0.02	0.01	0.02	0.02
500.0	100.79	103.03	101.25	0.01	0.02	0.03	0.01	0.02	0.03
550.0	93.97	92.68	102.70	0.01	0.02	0.03	0.01	0.03	0.03
600.0	99.70	124.25	105.11	0.01	0.02	0.03	0.01	0.03	0.03
650.0	96.59	92.14	93.10	0.01	0.03	0.05	0.00	0.04	0.04
700.0	97.55	95.64	95.50	0.00	0.04	0.05	0.00	0.05	0.05
750.0	99.32	103.98	94.80	0.00	0.04	0.05	0.00	0.05	0.05
800.0	112.31	98.51	101.11	0.00	0.05	0.07	0.01	0.06	0.06
850.0	90.17	91.38	90.12	0.01	0.06	0.07	0.01	0.07	0.07
875.0	91.90	93.51	90.57	0.01	0.06	0.07	0.01	0.06	0.07
900.0	94.60	93.09	91.46	0.01	0.06	0.08	0.01	0.07	0.07

Typical Performance Data

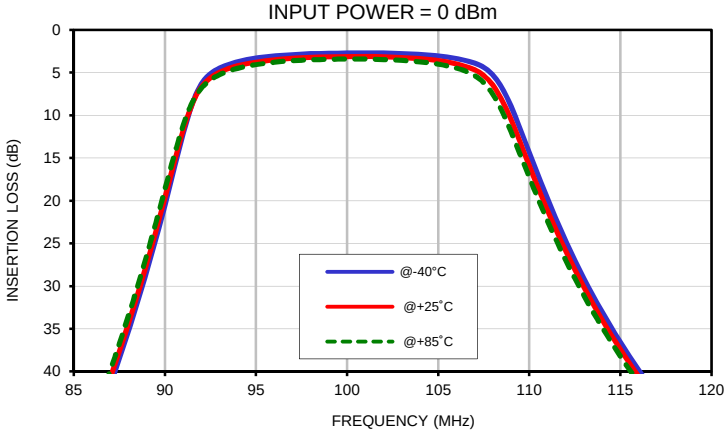
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
95.0	117.76	115.55	113.55
95.5	111.72	110.00	108.44
96.0	106.86	105.51	104.25
96.5	102.86	101.78	100.78
97.0	99.57	98.71	97.91
97.5	96.87	96.16	95.52
98.0	94.62	94.05	93.53
98.5	92.73	92.29	91.90
99.0	91.18	90.87	90.61
99.5	89.96	89.78	89.63
100.0	89.04	88.99	88.96
100.5	88.47	88.50	88.55
101.0	88.16	88.26	88.39
101.5	88.13	88.29	88.49
102.0	88.33	88.54	88.83
102.5	88.79	89.10	89.49
103.0	89.55	89.96	90.50
103.5	90.68	91.23	91.89
104.0	92.21	92.91	93.73
104.5	94.23	95.11	96.11
105.0	96.86	97.97	99.25

Typical Performance Curves

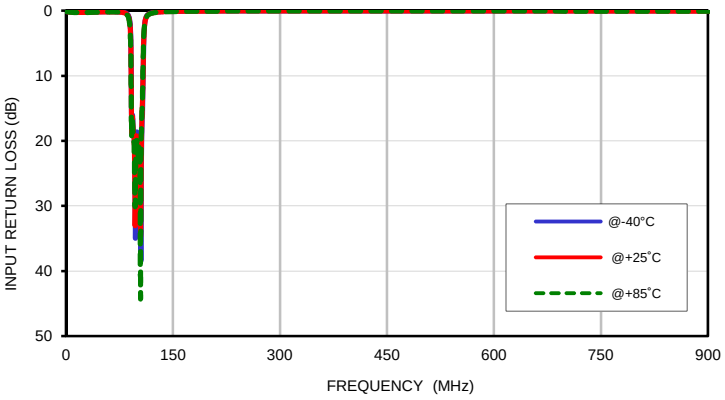
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



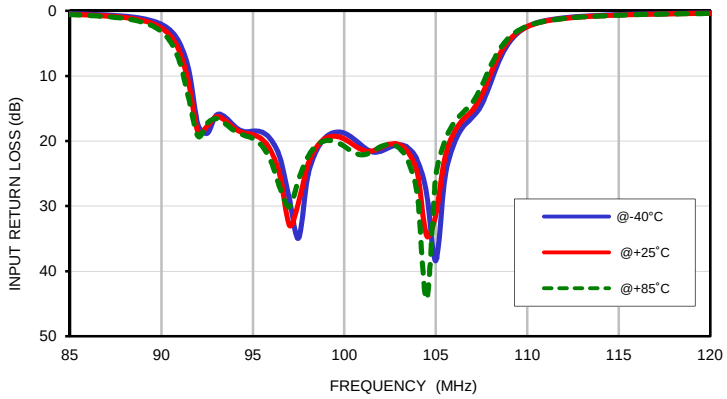
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



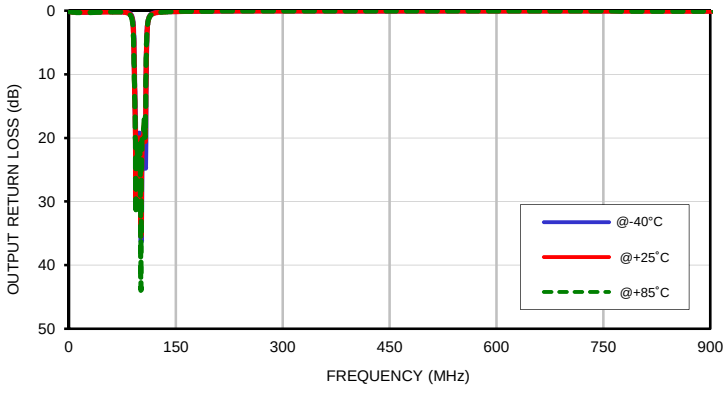
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



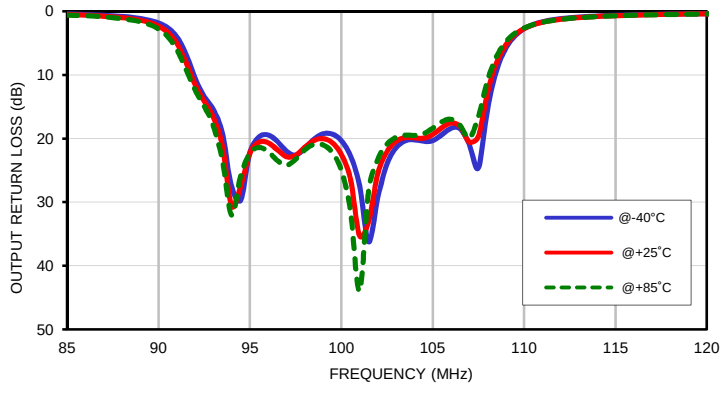
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



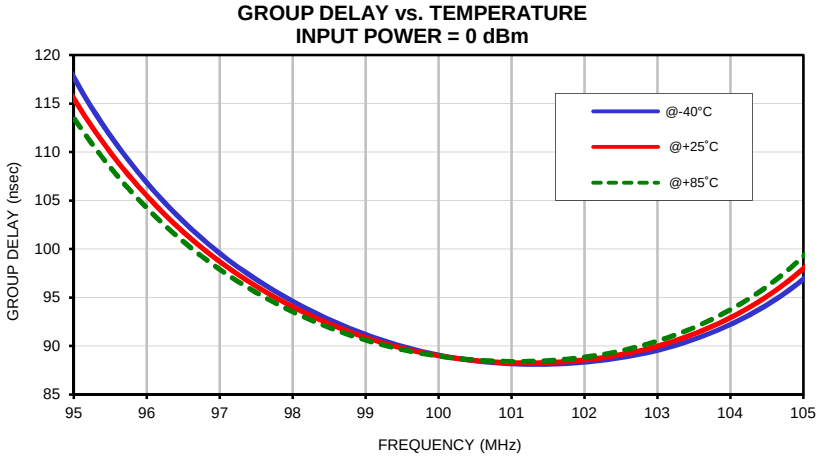
OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm

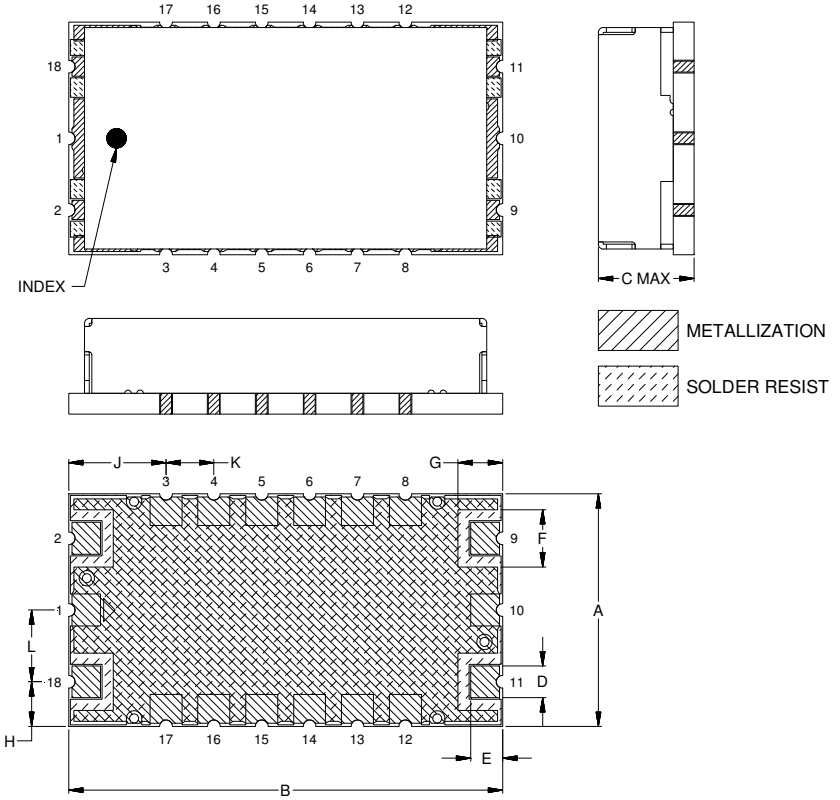


Typical Performance Curves

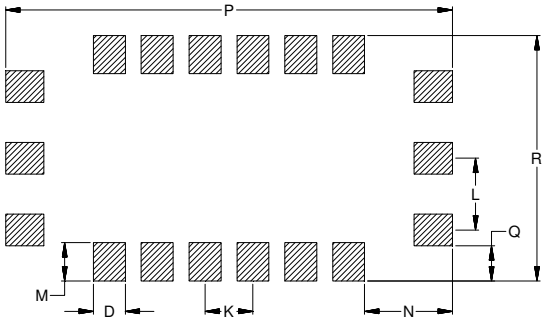


Case Style HP

Outline Dimensions HP1156



PCB Land Pattern



Suggested Layout,
Tolweance to be within ±.002

CASE#	A	B	C	D	E	F	G	H	J	K	L	M
HP1156	.730 (18.54)	1.360 (34.54)	.350 (8.89)	.100 (2.54)	.100 (2.54)	.180 (4.57)	.140 (3.56)	.140 (3.56)	.305 (7.75)	.150 (3.81)	.225 (5.72)	.120 (3.05)

CASE#	N	P	Q	R	WT.GRAM
HP1156	.275 (6.99)	1.400 (35.56)	.110 (2.79)	.770 (19.56)	6.0

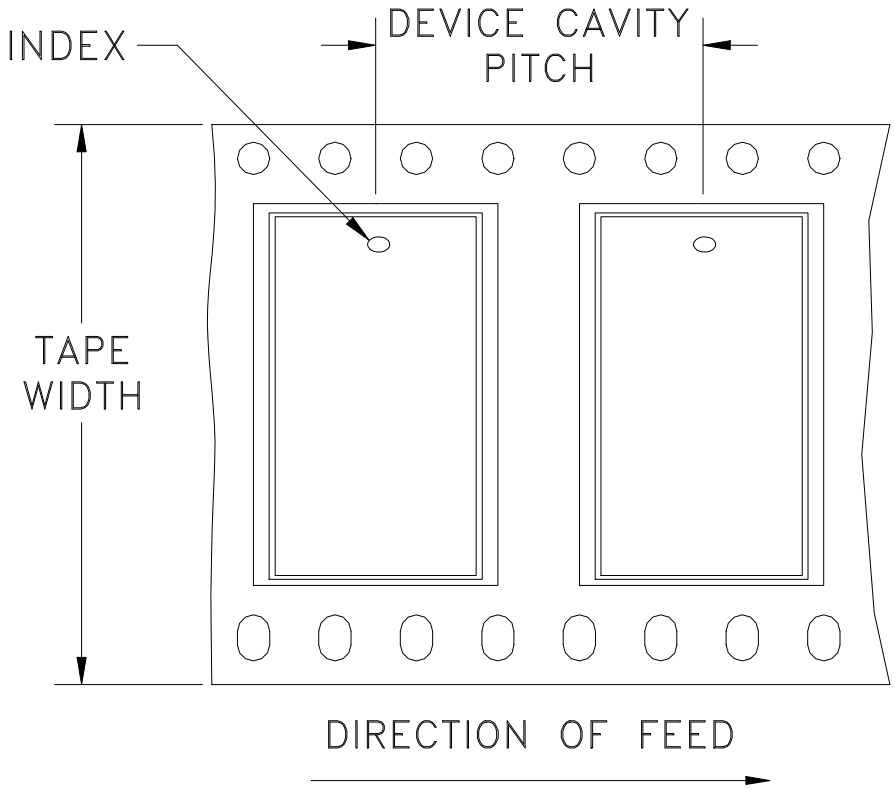
Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015

Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:
   For RoHS Case Styles: 3-5µinch (.08-.13microns) Gold over 120-240µinch (3.05-6.10microns) Nickel plate.
   For RoHS-5 Case Styles: Tin-Lead plate.

Tape & Reel Packaging TR-F89

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
56	32	13	100

Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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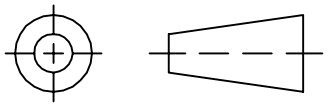
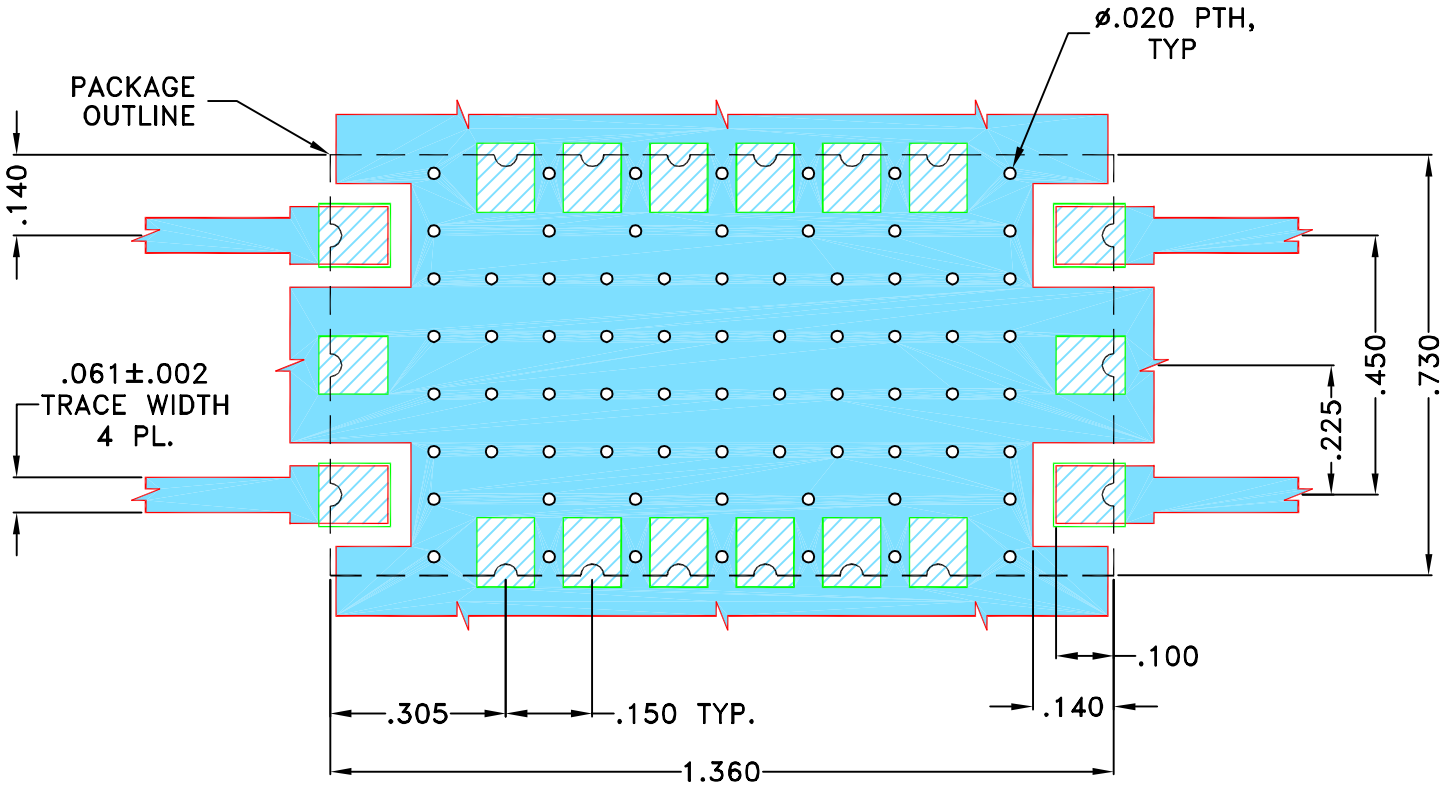
THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M145648	NEW RELEASE	MAR 14	DDR	MD

SUGGESTED MOUNTING CONFIGURATION FOR HP1156 CASE STYLE "18FL01" PIN CODE



NOTES:

1. TRACE WIDTH IS SHOWN FOR OAK-602, WITH DIELECTRIC THICKNESS .022"±.0015". COPPER: 1/2 Oz. EACH SIDE.
   FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	DDR	14 MAR 14
TOLERANCES ON:	CHECKED	MD	14 MAR 14
2 PL DECIMALS ±	APPROVED	MD	14 MAR 14
3 PL DECIMALS ± .005"			
ANGLES ±			
FRACTIONS ±			

Mini-Circuits®

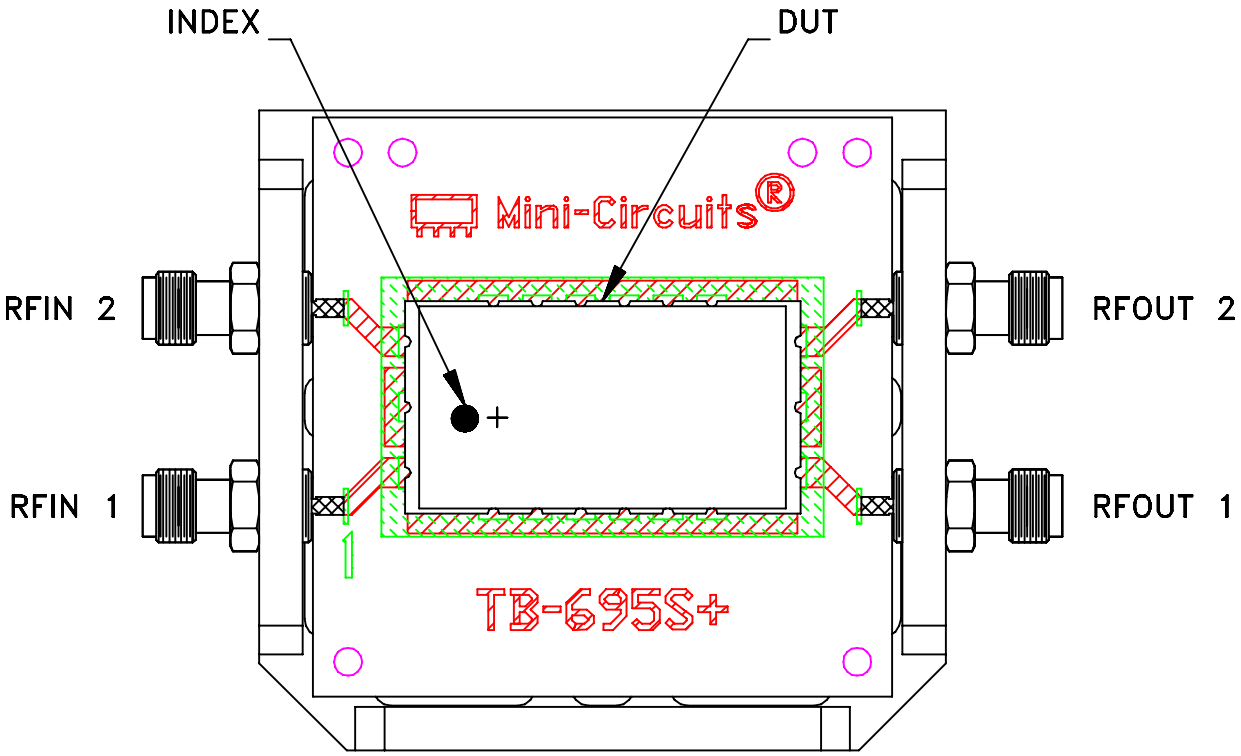
ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

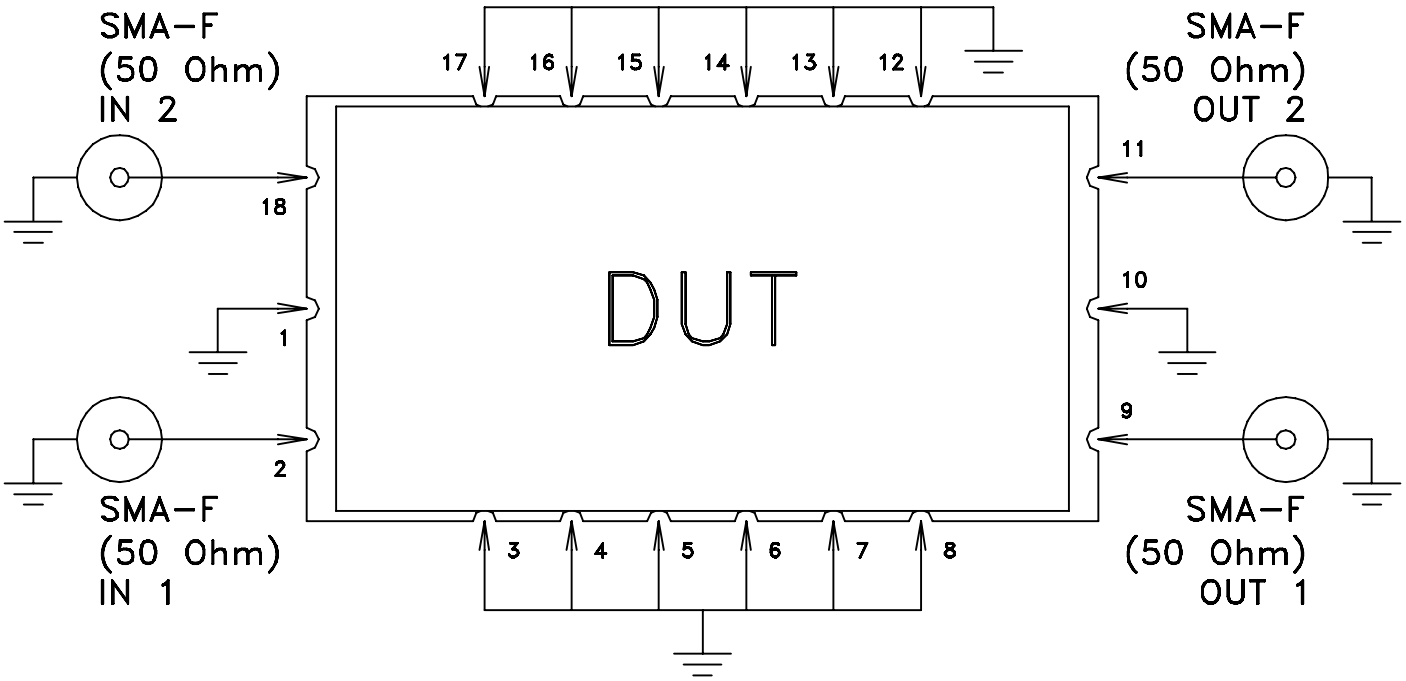
PL, 18FL01, HP1156, BPF
TB-695+, 50 Ohm

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-418	OR
FILE: 98PL418		SCALE: 3:1	SHEET: 1 OF 1

Evaluation Board and Circuit



TB-695+



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: OAK-602 OR Equivalent
   Dielectric Constant=2.50±.04, Thickness=.022 inch.

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Environmental Specifications ENV02T1

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	-40° to 85°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
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, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215