



Mini-Circuits

LUMPED LC SURFACE MOUNT

Bandpass Filter

BPF-A90+50 Ω

74 to 106 MHz

KEY FEATURES

- Low Insertion Loss, 2.0 dB Typ.
- High Rejection, 64 dB Typ.
- Wide Stopband Rejection, Up to 2000 MHz
- Miniature Shielded Package



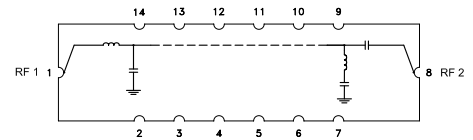
Generic photo used for illustration purposes only

APPLICATIONS

- VHF Radio Transmission

PRODUCT OVERVIEW

Mini-Circuits' Model-BPF-A90+ is a Lumped LC filter that offer a good insertion loss and high rejection. This bandpass filter covers from 74 to 106MHz. This filter has high Q capacitors and inductors to achieve a low insertion loss. It has repeatable performance across production lots.



ELECTRICAL SPECIFICATIONS^{1,2,3} AT +25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Passband	Center Frequency	Fc	—	—	90	—	MHz
	Insertion Loss	F1-F2	74 - 106	—	2.0	3.5	dB
	Return Loss	F1-F2	74 - 106	12	15	—	dB
Stopband, Lower	Rejection	DC-F3	DC - 40	55	64	—	dB
		F3-F4	40 - 64	20	29	—	
Stopband, Upper	Rejection	F5-F6	118 - 200	20	30	—	dB
		F6-F7	200 - 500	40	50	—	
		F7-F8	500 - 2000	50	55	—	

1. Tested in Evaluation Board P/N TB-BPF-A90+.

2. This filter is bi-directional RF1 and RF2 ports may be interchanged, see S-Parameters for actual performance.

3. This component should not be used as a DC-block. In applications where DC voltage and/or current is present at either the input or output ports, external DC blocking capacitors are required.

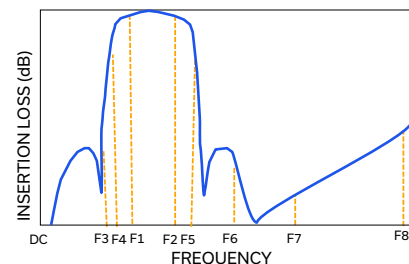
ABSOLUTE MAXIMUM RATINGS⁴

Parameter	Ratings
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C
Input Power ⁵	1 W at +25°C

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

5. Power rating applies only to signals within the passband. Power rating above +25°C operating temperature decreases linearly to 0.5 W at +85°C.

TYPICAL FREQUENCY RESPONSE AT +25°C



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REV. OR
ECO-026012
BPF-A90+
EDU5077
URJ
250626

PAGE 1 OF 4



LUMPED LC SURFACE MOUNT

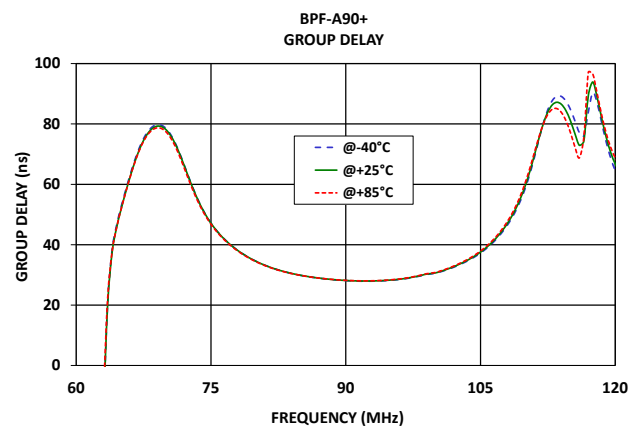
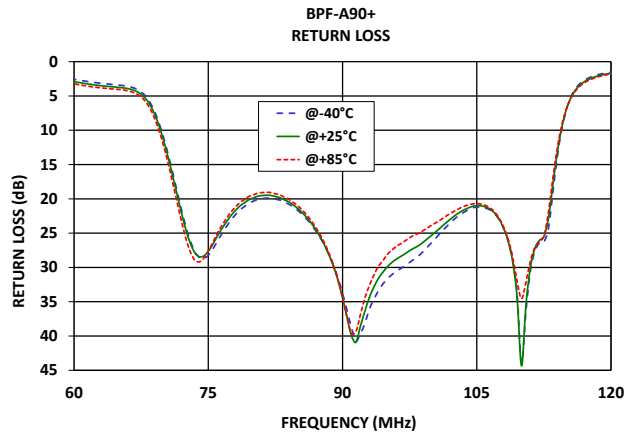
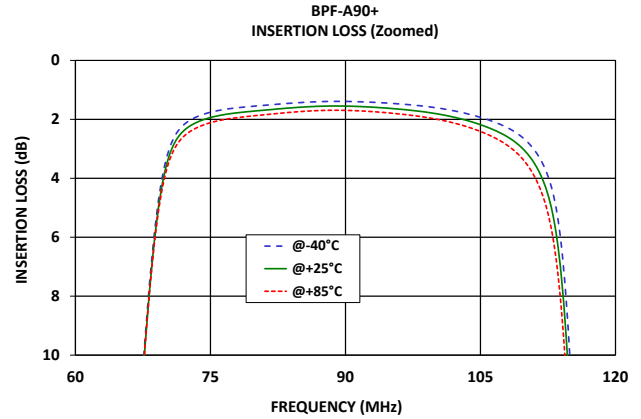
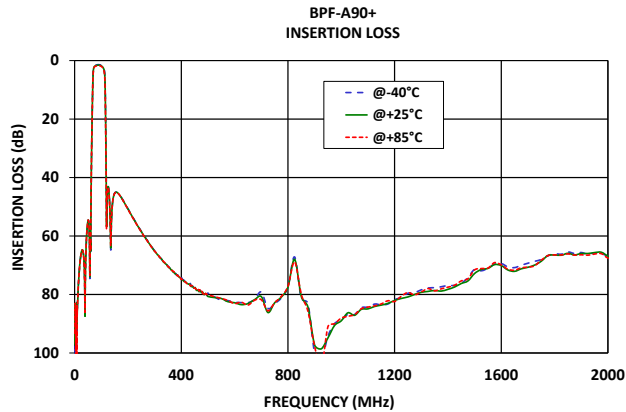
Bandpass Filter

BPF-A90+

50 Ω

74 to 106 MHz

TYPICAL PERFORMANCE GRAPHS



FUNCTIONAL DIAGRAM

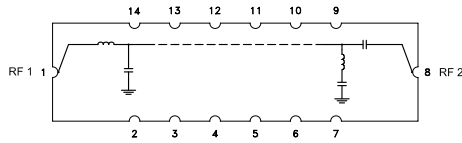


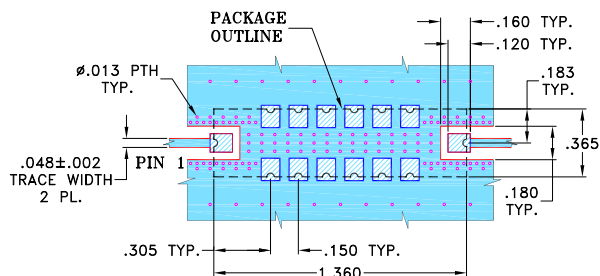
Figure 1. BPF-A90+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description
RF1	1	Connects to RF Input Port
RF2	8	Connects to RF Output Port
GROUND	2-7,9-14	Connects to Ground on PCB, (See drawing PL-227)
NC	—	No connection, not used internally. See drawing PL-227 for connection to PCB

SUGGESTED PCB LAYOUT (PL-227)

SUGGESTED MOUNTING CONFIGURATION
FOR HQ1157 CASE STYLE, rf PIN CONNECTION



NOTE:

1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .025"±.002". 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.

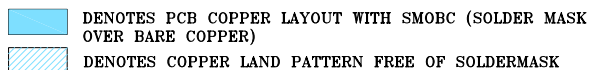
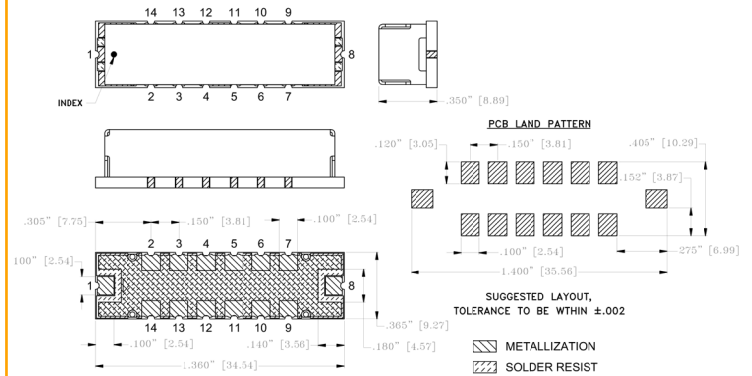


Figure 2. Suggested PCB Layout PL-227

CASE STYLE DRAWING



Weight: 4.0 gram

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

PRODUCT MARKING*: BPF-A90

*Marking may contain other features or characters for internal lot control.



Mini-Circuits

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Bandpass Filter

BPF-A90+

50Ω

74 to 106 MHz

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD.

[CLICK HERE](#)

Performance Data and Graphs	Data
	Graphs
	S-Parameter (S2P Files) Data Set (.zip file) De-embedded to device pads
Case Style	HQ1157 Lead Finish: Gold over Nickel Plate
RoHS Status	Compliant
Tape and Reel	TR-F83
Suggested Layout for PCB Design	PL-227
Evaluation Board	TB-BPF-A90+
	Gerber File
Environmental Rating	ENV02T1

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-Circuits' 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/terms/viewterm.html



Typical Performance Data

FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
10.0	85.47	85.49	84.80	0.13	0.15	0.17	0.03	0.03	0.03
14.0	76.84	76.79	76.61	0.24	0.29	0.33	0.03	0.03	0.03
16.0	73.79	73.71	73.79	0.32	0.37	0.43	0.03	0.03	0.03
18.0	70.99	71.28	71.19	0.40	0.46	0.53	0.03	0.03	0.04
20.0	69.14	69.15	69.03	0.48	0.56	0.63	0.03	0.04	0.04
22.0	67.49	67.45	67.44	0.56	0.65	0.73	0.03	0.04	0.04
24.0	66.18	66.16	66.17	0.63	0.73	0.82	0.04	0.04	0.04
28.0	64.81	64.80	64.94	0.75	0.86	0.96	0.04	0.04	0.05
30.0	64.87	64.90	64.95	0.79	0.90	1.00	0.04	0.05	0.05
32.0	65.57	65.51	65.53	0.82	0.93	1.03	0.04	0.05	0.06
34.0	67.00	67.05	67.21	0.84	0.95	1.04	0.04	0.05	0.06
36.0	70.33	70.51	70.54	0.85	0.96	1.05	0.05	0.06	0.07
38.0	78.79	78.43	79.01	0.86	0.97	1.06	0.05	0.06	0.07
40.0	76.69	76.43	75.73	0.87	0.98	1.08	0.06	0.07	0.08
42.0	66.83	66.66	66.36	0.88	1.00	1.10	0.07	0.08	0.09
44.0	61.71	61.63	61.60	0.91	1.04	1.14	0.08	0.09	0.11
50.0	54.87	54.81	54.76	1.13	1.30	1.45	0.13	0.15	0.17
55.0	59.11	59.10	59.23	1.63	1.88	2.11	0.21	0.23	0.26
60.0	65.30	65.16	65.00	2.58	2.92	3.24	0.37	0.40	0.44
64.0	28.94	29.12	28.88	3.29	3.63	3.94	0.71	0.76	0.84
70.0	3.46	3.68	3.85	11.05	11.47	12.26	10.47	10.73	11.39
74.0	1.85	2.04	2.22	28.54	28.44	29.19	29.47	29.35	29.84
76.0	1.69	1.87	2.04	26.21	25.47	25.07	24.28	23.74	23.49
78.0	1.61	1.78	1.94	22.36	21.74	21.24	21.06	20.58	20.26
80.0	1.55	1.71	1.87	20.37	19.89	19.45	19.90	19.49	19.19
85.0	1.43	1.59	1.74	21.69	21.40	21.02	24.64	24.38	24.06
90.0	1.39	1.55	1.70	33.76	34.41	34.41	31.12	30.38	29.88
95.0	1.46	1.63	1.79	31.69	29.91	28.12	24.06	23.28	22.79
98.0	1.53	1.72	1.89	28.80	27.18	25.30	27.24	26.05	25.15
106.0	2.03	2.30	2.54	21.35	21.20	20.98	22.17	22.32	22.63
111.0	3.05	3.50	3.94	30.45	29.93	29.02	30.93	31.06	31.94
116.5	20.90	22.49	24.13	3.24	3.45	3.60	4.95	5.43	5.82
118.0	34.16	35.91	37.78	2.12	2.30	2.45	3.79	4.19	4.53
200.0	50.66	50.79	50.86	0.23	0.29	0.33	0.45	0.52	0.57
500.0	79.55	80.66	80.07	0.01	0.09	0.13	0.38	0.48	0.55
600.0	82.61	82.81	83.12	0.01	0.08	0.12	0.36	0.48	0.54
700.0	79.14	80.71	81.78	0.01	0.08	0.14	0.35	0.48	0.55
800.0	77.38	77.51	77.21	0.03	0.08	0.14	0.36	0.49	0.56
900.0	99.90	97.25	97.67	0.05	0.07	0.14	0.37	0.50	0.57
1000.0	88.69	89.00	88.07	0.05	0.07	0.14	0.39	0.53	0.59
1100.0	84.33	84.92	84.30	0.06	0.08	0.15	0.44	0.56	0.63
1150.0	83.51	83.62	83.22	0.06	0.07	0.15	0.46	0.58	0.65
1200.0	81.79	82.04	82.39	0.06	0.08	0.15	0.48	0.60	0.67
1250.0	79.57	80.83	79.31	0.07	0.07	0.15	0.51	0.63	0.70
1300.0	78.41	79.25	79.16	0.07	0.07	0.14	0.54	0.66	0.73
1350.0	77.66	78.62	78.76	0.07	0.08	0.15	0.57	0.69	0.77
1400.0	76.92	78.23	77.49	0.08	0.07	0.14	0.61	0.73	0.82
1450.0	76.15	76.24	75.35	0.08	0.07	0.14	0.66	0.78	0.87
1500.0	71.42	72.81	71.58	0.08	0.07	0.15	0.71	0.84	0.94
1550.0	71.07	71.08	70.97	0.08	0.06	0.14	0.76	0.91	1.02
1600.0	69.42	70.09	69.86	0.09	0.06	0.14	0.83	0.99	1.12
1650.0	70.80	72.07	71.69	0.09	0.06	0.13	0.90	1.08	1.22
1700.0	69.30	70.68	70.65	0.09	0.05	0.13	0.95	1.16	1.32
1750.0	68.05	68.62	68.27	0.09	0.06	0.13	1.00	1.24	1.42
1800.0	66.05	66.49	66.45	0.10	0.05	0.13	1.04	1.31	1.52
1825.0	66.22	66.57	66.48	0.09	0.06	0.13	1.06	1.35	1.57
1850.0	65.45	65.91	66.12	0.10	0.05	0.13	1.07	1.38	1.61
1900.0	65.65	65.99	66.40	0.10	0.05	0.13	1.10	1.44	1.68
1950.0	65.76	65.66	66.16	0.10	0.05	0.18	1.11	1.48	1.74
2000.0	66.97	66.90	67.53	0.10	0.05	0.12	1.13	1.50	1.78

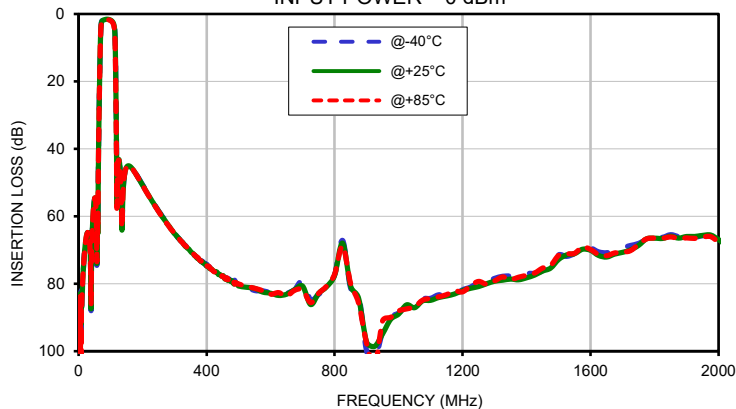
Typical Performance Data

FREQ.	GROUP DELAY		
(MHz)	(nsec)		
	@-40°C	@+25°C	@+85°C
74	52.18	52.10	51.62
75	47.18	47.13	46.78
76	43.40	43.36	43.09
78	38.08	38.05	37.87
79	36.14	36.11	35.96
80	34.54	34.51	34.38
81	33.21	33.19	33.08
82	32.11	32.10	32.02
83	31.21	31.21	31.14
84	30.45	30.47	30.42
85	29.83	29.86	29.83
86	29.33	29.36	29.35
87	28.91	28.95	28.95
88	28.56	28.61	28.63
89	28.29	28.35	28.37
90	28.09	28.15	28.19
91	27.96	28.03	28.07
92	27.91	27.98	28.03
93	27.92	28.00	28.05
94	28.02	28.10	28.16
95	28.22	28.30	28.37
96	28.49	28.58	28.66
97	28.91	29.01	29.10
98	29.46	29.57	29.68
99	30.14	30.27	30.39
100	30.54	30.67	30.80
101	31.44	31.60	31.76
102	32.52	32.71	32.90
104	35.35	35.61	35.89
105	37.25	37.55	37.90
106	39.63	39.99	40.42

Typical Performance Curves

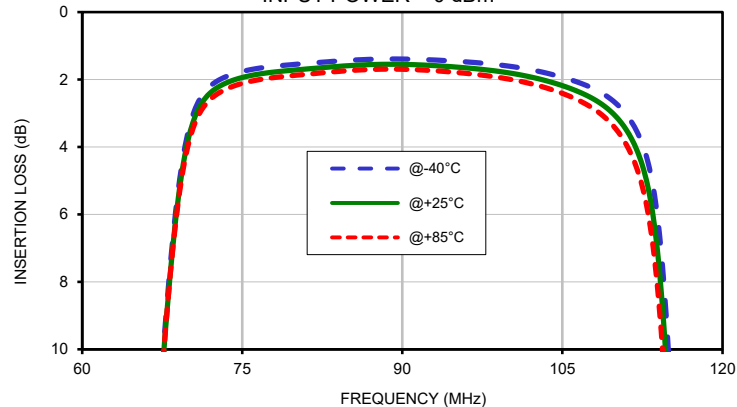
INSERTION LOSS vs. TEMPERATURE

INPUT POWER = 0 dBm



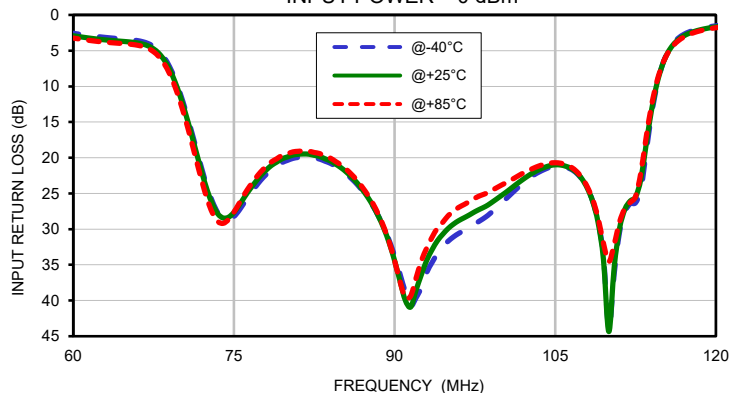
INSERTION LOSS vs. TEMPERATURE (Zoomed)

INPUT POWER = 0 dBm



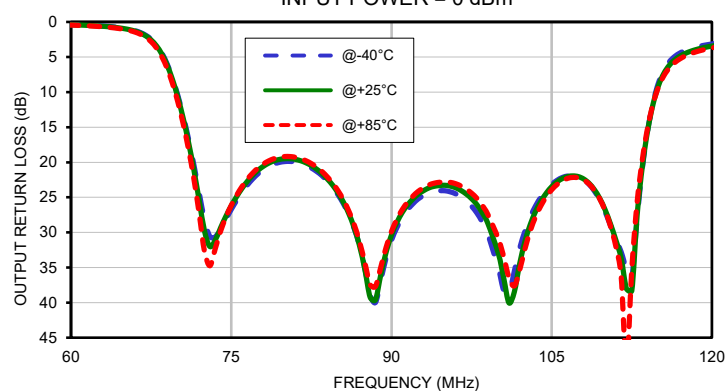
INPUT RETURN LOSS vs. TEMPERATURE

INPUT POWER = 0 dBm



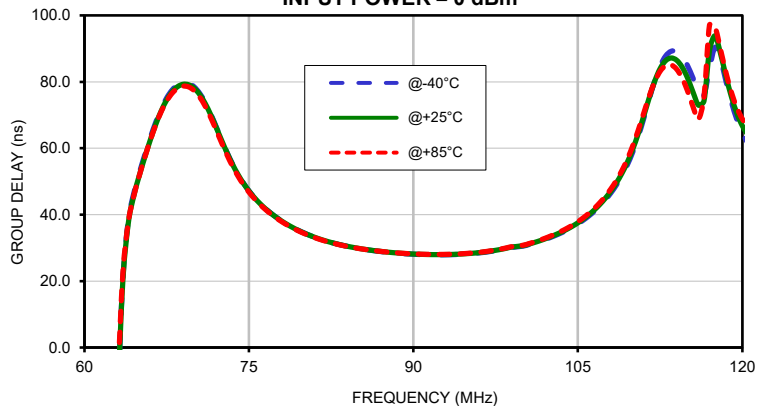
OUTPUT RETURN LOSS vs. TEMPERATURE

INPUT POWER = 0 dBm



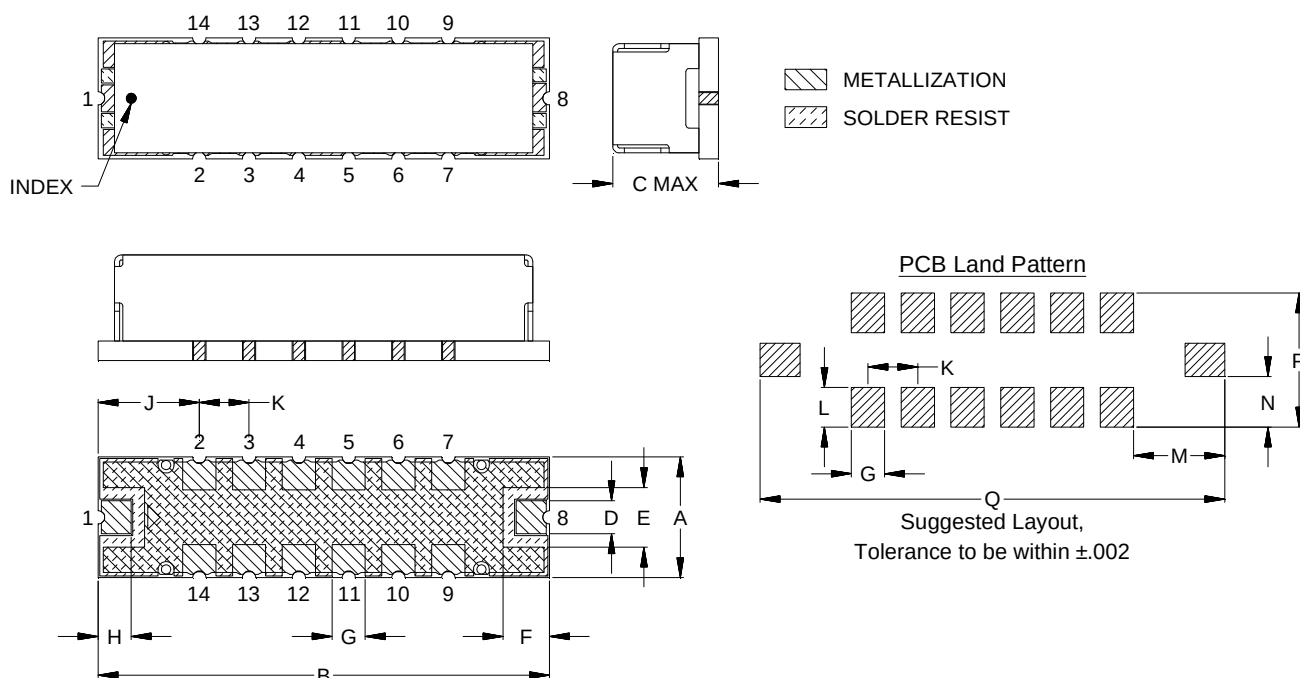
GROUP DELAY vs. TEMPERATURE

INPUT POWER = 0 dBm



Outline Dimensions

HQ1157



CASE#	A	B	C	D	E	F	G	H	J	K	L	M
HQ1157	.365 (9.27)	1.360 (34.54)	.350 (8.89)	.100 (2.54)	.180 (4.57)	.140 (3.56)	.100 (2.54)	.100 (2.54)	.305 (7.75)	.150 (3.81)	.120 (3.05)	.275 (6.99)

CASE#	N	P	Q	WT.GRAM
HQ1157	.152 (3.87)	.405 (10.29)	1.400 (35.56)	4.0

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

Notes:

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

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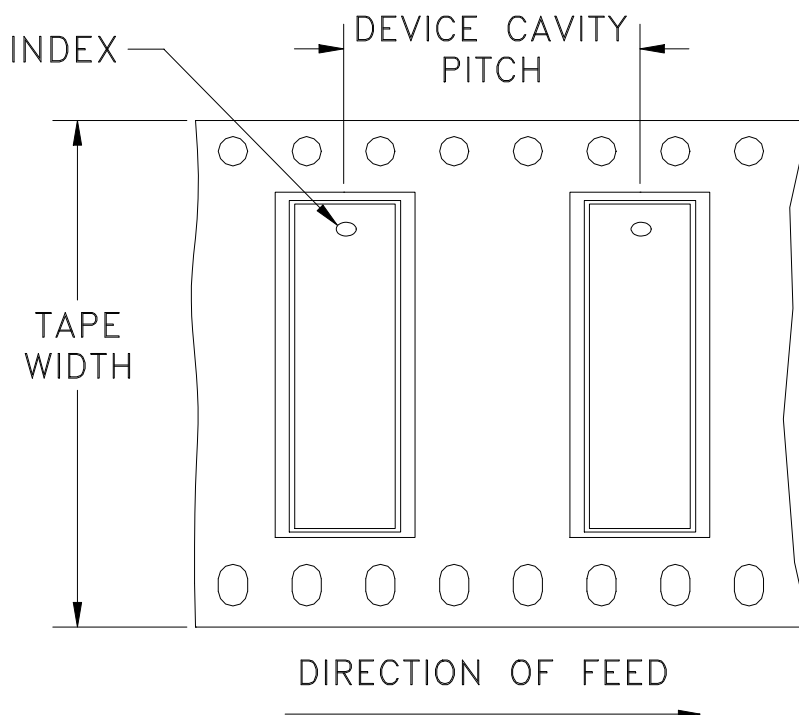


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RFIIF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F83

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
56	16	13	100

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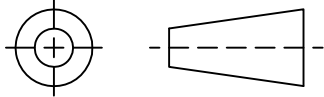
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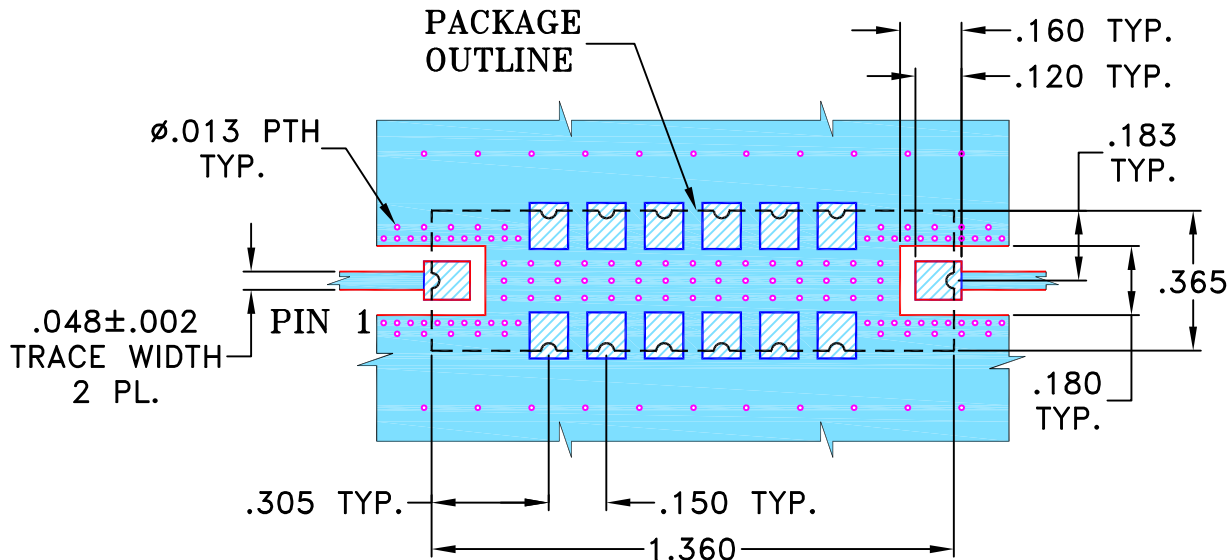
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M101212	NEW RELEASE (FROM RAVON)	11/05	DK	YB
A	M108938	SWITCH HATCHES	12/06	DK	HH
B	M118075	CHANGE LINE PLACES	06/08	HB	HH
C	M173459	CORRECTED CASE STYLE & TB PART#	03/27/19	ITG	IL

SUGGESTED MOUNTING CONFIGURATION
FOR HQ1157 CASE STYLE, rf PIN CONNECTION



NOTE:

- TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS .025"±.002". COPPER: 1/2 OZ. EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- 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 TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	HB (RAVON)	12 JUN 2008
	CHECKED	RZ (RAVON)	12 JUN 2008
	APPROVED	HH (RAVON)	12 JUN 2008



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Brooklyn NY 11235

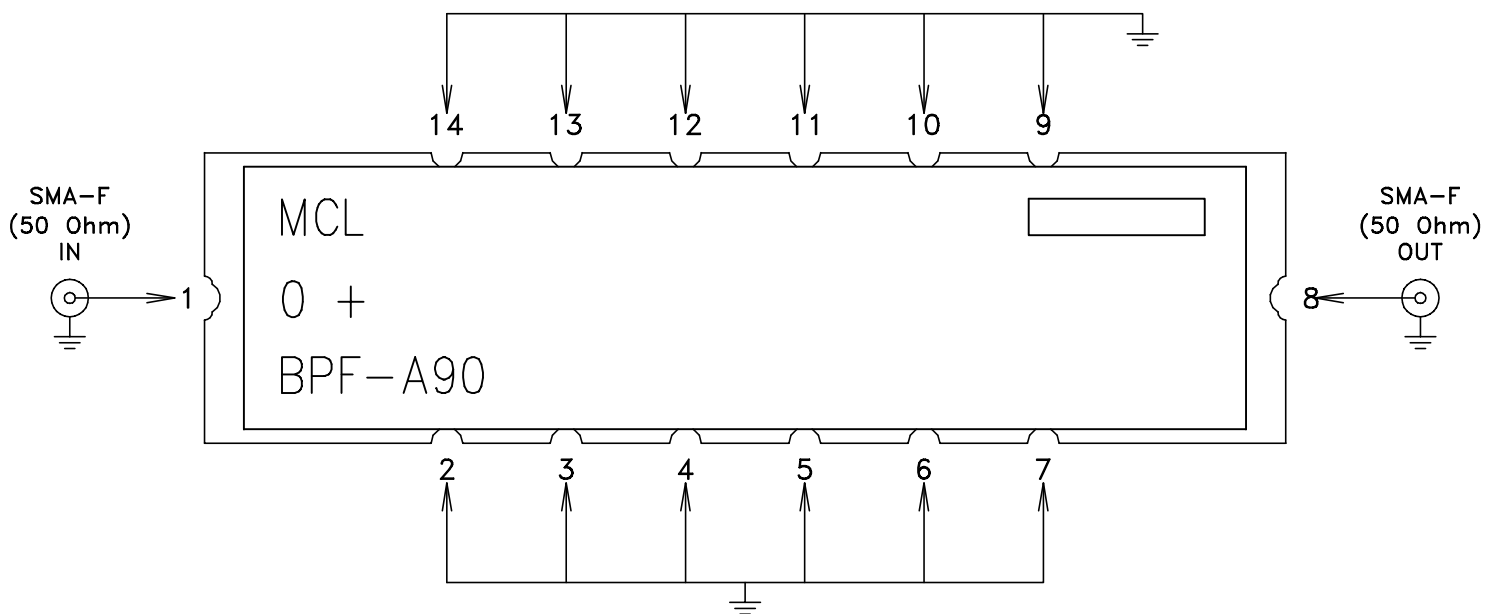
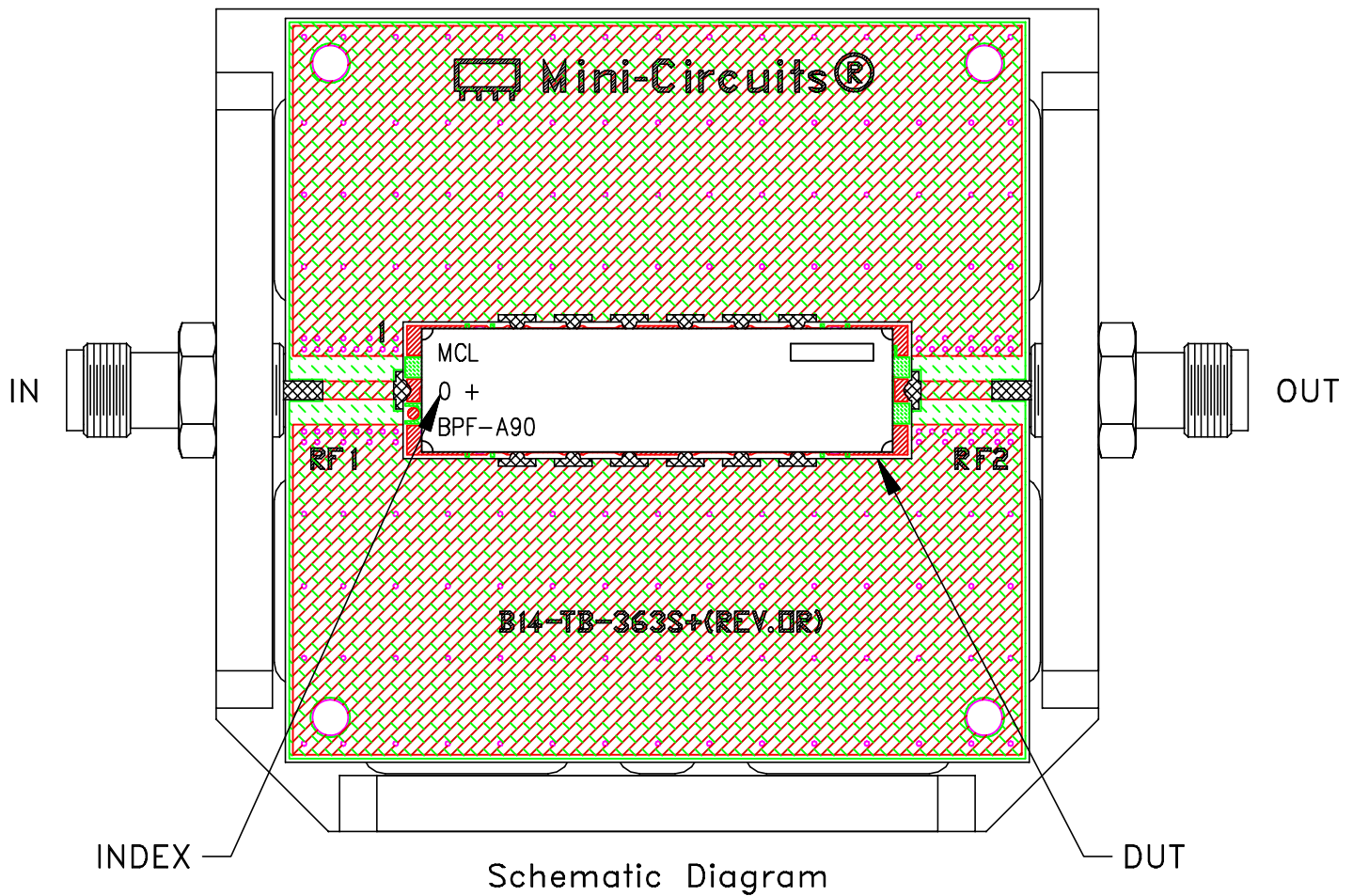
PL, rf, HQ1157, TB-363+, 50 OHM

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

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-227	C
FILE:	98PL227	SCALE:	2:1
SHEET:	1 OF 1		

Evaluation Board and Circuit

TB-BPF-A90+



Notes:

1. PCB Material: FR4 OR Equivalent, Dielectric Constant=4.7
Dielectric Thickness: .025±.002 inch
2. 50 Ohm SMA Female Connectors.

Mini-Circuits®



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