Surface Mount

Bandpass Filter

BPF-A120+

50Ω 100 to 140 MHz

Generic photo used for illustration purposes only

CASE STYLE: HQ1157

The Big Deal

- Broader bandwidth
- High Rejection
- Miniature shielded package

Product Overview

BPF-A120+ is a 50Ω bandpass filter in a shielded package fabricated using SMT technology. This bandpass filter covers from 100 to 140 MHz. This filter build with high Q capacitors and wire welded inductors for high reliability. This filter offers sharp rejection and low insertion loss for use in Test and measurement system applications.

Key Features

Feature	Advantages
Low insertion loss	Can be used in Transmitters/Receivers application
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-A120+ to used in compact design

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CASE STYLE: HQ1157

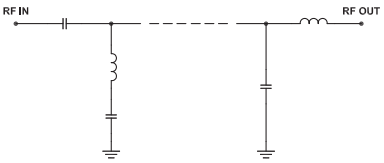
Features

- Broader bandwidth
- High rejection
- Miniature shielded package

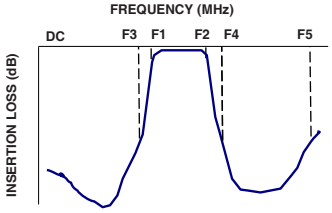
Applications

- Test and measurement
- Harmonic rejection
- Transmitters / Receivers

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

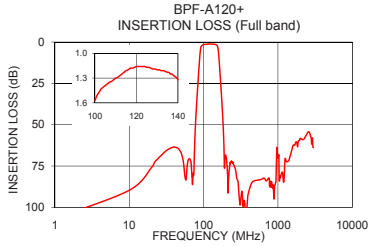
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—	—	—	120	—	MHz
	Insertion Loss	F1-F2	100-140	—	1.7	2.5	dB
	VSWR	F1-F2	100-140	—	1.3	1.92	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC-82	20	28.1	—	dB
	VSWR	DC-F3	DC-82	—	20	—	:1
Stop Band, Upper	Insertion Loss	F4-F5	174-3000	20	31.7	—	dB
	VSWR	F4-F5	174-3000	—	20	—	:1

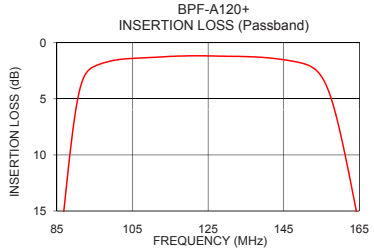
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	0.5 W

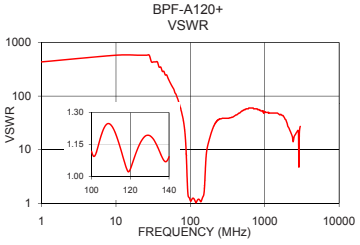
Permanent damage may occur if any of these limits are exceeded.

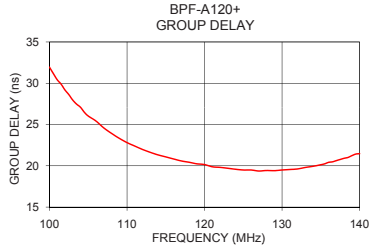
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
1.0	106.85	434.30	100.0	31.95
50.0	67.11	217.15	102.0	29.18
82.0	31.80	29.96	104.0	27.09
82.5	29.94	28.03	106.0	25.42
85.5	19.39	17.22	108.0	23.93
92.0	3.14	1.75	110.0	22.81
100.0	1.57	1.12	112.0	21.98
120.0	1.16	1.04	114.0	21.32
140.0	1.32	1.09	116.0	20.83
155.0	3.02	2.02	118.0	20.43
167.0	19.91	10.13	120.0	20.15
173.0	30.40	12.71	122.0	19.81
174.0	32.17	13.09	124.0	19.58
250.0	73.64	37.77	126.0	19.49
650.0	82.27	59.91	128.0	19.43
1000.0	70.10	51.10	130.0	19.49
1600.0	62.49	44.55	134.0	19.94
2000.0	58.26	31.03	136.0	20.42
2600.0	54.27	19.54	138.0	20.91
3000.0	63.84	27.16	140.0	21.47









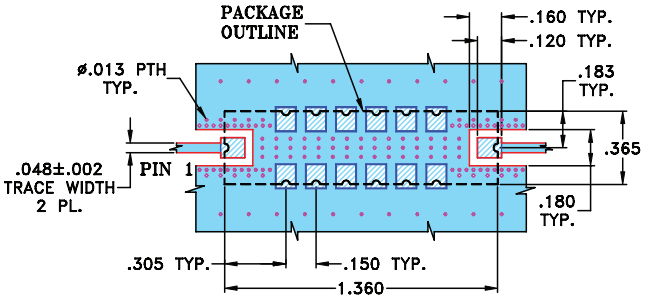
Notes

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	1
OUTPUT	8
GROUND	2-7,9-4

Demo Board MCL P/N: TB-363+
Suggested PCB Layout (PL-227)



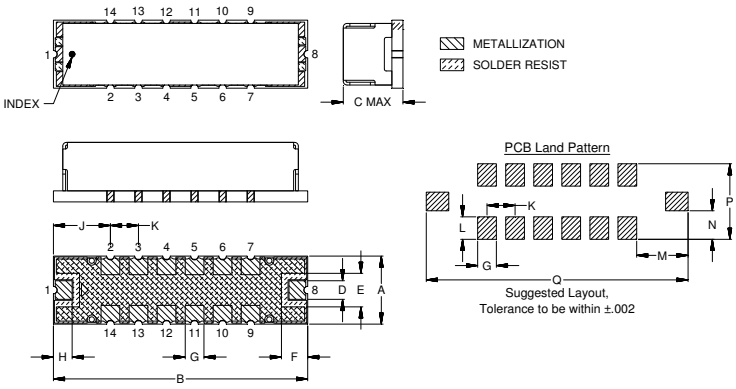
NOTE:

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.

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
.365	**1.360**	**.35**	**.100**	**.180**	**.140**	**.100**	**.100**
9.27	34.54	8.89	2.54	4.57	3.56	2.54	2.54

J	K	L	M	N	P	Q	Wt.
.305	**.150**	**.120**	**.275**	**.152**	**.405**	**1.400**	grams
7.75	3.81	3.05	6.99	3.86	10.29	35.56	4.0

Note: Please refer to case style drawing for details

Band Pass Filter BPF-A120+

Typical Performance Data

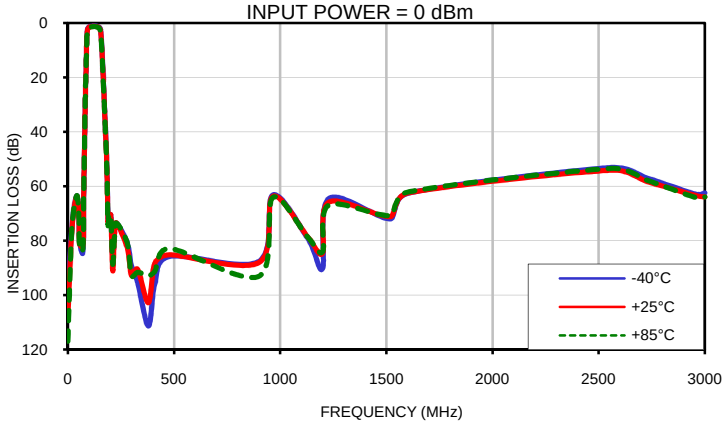
FREQ. (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURN LOSS (dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1	98.66	106.85	116.84	0.04	0.04	0.04	0.05	0.04	0.05
20	74.76	75.81	75.12	0.03	0.03	0.03	0.22	0.26	0.28
42	63.56	63.69	63.48	0.04	0.06	0.06	0.64	0.73	0.80
52	69.36	69.86	70.10	0.07	0.09	0.10	0.62	0.72	0.79
56	80.34	81.13	82.74	0.09	0.11	0.12	0.63	0.73	0.80
70	84.74	82.29	83.76	0.19	0.23	0.25	1.04	1.24	1.38
74	80.46	79.41	78.07	0.24	0.29	0.33	1.37	1.62	1.80
76	61.54	60.74	60.06	0.28	0.34	0.38	1.57	1.85	2.05
82	31.97	31.80	31.60	0.49	0.58	0.64	2.24	2.58	2.82
84	24.67	24.57	24.42	0.65	0.76	0.84	2.47	2.83	3.09
90	5.76	5.91	6.00	4.47	4.91	5.24	6.34	7.14	7.73
91	3.97	4.19	4.33	7.15	7.65	8.05	9.19	10.21	10.95
93	2.28	2.57	2.76	14.82	14.86	14.98	19.32	20.87	22.05
97	1.58	1.82	1.98	19.28	18.92	18.77	23.56	23.77	24.13
100	1.35	1.57	1.71	25.56	25.00	24.51	33.54	36.33	38.43
101	1.30	1.51	1.65	28.23	26.78	25.86	41.72	37.42	35.19
102	1.26	1.47	1.60	28.20	26.22	25.22	31.88	29.43	28.33
104	1.20	1.41	1.54	23.62	22.45	21.90	23.88	22.77	22.28
109	1.13	1.32	1.44	19.53	19.13	18.99	18.93	18.44	18.24
120	0.99	1.16	1.27	35.72	35.19	34.31	26.27	26.20	25.78
121	0.98	1.16	1.27	31.89	30.61	29.83	26.60	26.44	25.95
125	0.99	1.17	1.28	23.85	22.83	22.36	24.44	23.89	23.47
129	1.01	1.19	1.31	22.01	21.06	20.64	23.05	22.36	22.03
134	1.03	1.22	1.34	24.66	23.61	23.18	25.45	24.52	24.18
138	1.07	1.27	1.40	29.05	29.33	29.61	28.05	27.58	27.24
140	1.12	1.32	1.45	26.13	27.02	27.66	25.43	25.45	25.25
141	1.14	1.34	1.48	24.22	24.91	25.39	23.80	23.88	23.73
145	1.29	1.51	1.66	18.77	18.96	19.08	19.16	19.29	19.29
147	1.38	1.62	1.78	17.27	17.40	17.48	18.06	18.32	18.45
149	1.49	1.75	1.93	16.21	16.34	16.41	17.62	18.17	18.53
154	2.21	2.59	2.87	11.25	11.14	10.99	12.79	12.99	13.01
155	2.59	3.02	3.35	9.57	9.42	9.27	10.64	10.65	10.55
156	3.12	3.62	4.01	7.93	7.78	7.64	8.59	8.51	8.39
162	10.44	11.28	11.91	2.44	2.58	2.66	2.14	2.23	2.27
168	20.87	21.65	22.28	1.45	1.64	1.76	1.02	1.13	1.20
174	31.48	32.17	32.76	1.14	1.33	1.44	0.73	0.84	0.90
184	51.24	52.01	52.69	0.83	1.00	1.11	0.54	0.64	0.69
190	71.99	73.15	74.08	0.71	0.86	0.97	0.48	0.56	0.61
194	70.89	70.41	70.21	0.65	0.79	0.89	0.44	0.52	0.57
203	70.50	70.45	71.35	0.54	0.66	0.76	0.37	0.45	0.50
212	85.62	90.99	88.50	0.47	0.58	0.67	0.33	0.40	0.45
220	77.88	77.86	78.99	0.44	0.54	0.61	0.29	0.37	0.41
229	73.46	73.40	73.47	0.41	0.50	0.57	0.26	0.33	0.38
280	80.71	82.53	80.71	0.37	0.45	0.49	0.15	0.22	0.27
300	89.02	92.70	92.79	0.37	0.45	0.49	0.12	0.19	0.25
330	95.55	90.51	91.53	0.36	0.45	0.49	0.10	0.16	0.22
380	111.32	102.73	92.80	0.32	0.42	0.47	0.06	0.13	0.19
410	95.97	88.25	91.17	0.29	0.39	0.46	0.05	0.12	0.18
480	85.76	85.13	82.83	0.23	0.34	0.43	0.02	0.10	0.17
900	87.57	87.97	93.02	0.14	0.33	0.46	0.01	0.11	0.21
966	63.14	63.61	64.06	0.16	0.36	0.48	0.01	0.12	0.22
1130	79.07	78.49	78.59	0.17	0.35	0.47	0.01	0.13	0.24
1200	90.22	84.62	84.04	0.19	0.36	0.47	0.00	0.14	0.26
1230	64.45	65.76	66.82	0.19	0.36	0.47	0.04	0.17	0.28
1520	71.97	71.12	70.68	0.21	0.37	0.47	0.00	0.15	0.27
1600	62.57	62.49	62.10	0.22	0.39	0.49	0.00	0.15	0.27
2560	53.07	54.06	53.42	0.54	0.92	1.22	0.05	0.09	0.20
2720	56.70	57.99	57.49	0.46	0.80	1.04	0.07	0.08	0.19
2960	62.93	63.42	64.16	0.42	0.69	0.89	0.09	0.06	0.17
3000	62.41	63.84	63.87	0.38	0.64	0.83	0.09	0.06	0.18

Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
100	32.25	31.95	31.93
101	31.48	31.17	31.18
101	30.75	30.42	30.47
102	30.07	29.89	29.81
102	29.43	29.18	29.19
103	28.83	28.62	28.59
103	28.26	27.96	28.03
104	27.69	27.47	27.47
104	27.10	27.09	26.90
105	26.51	26.48	26.32
105	25.92	26.03	25.74
106	25.34	25.42	25.17
107	24.77	24.59	24.61
108	24.19	23.93	24.05
109	23.65	23.33	23.52
110	23.11	22.81	23.01
111	22.62	22.39	22.53
112	22.19	21.98	22.12
113	21.81	21.63	21.76
114	21.48	21.32	21.44
115	21.18	21.08	21.16
116	20.92	20.83	20.91
117	20.69	20.59	20.69
118	20.48	20.43	20.49
119	20.29	20.24	20.31
120	20.12	20.15	20.15
121	19.97	19.88	20.00
122	19.85	19.81	19.87
123	19.73	19.70	19.76
124	19.64	19.58	19.67
125	19.56	19.49	19.60
126	19.51	19.49	19.55
127	19.48	19.37	19.53
128	19.47	19.43	19.53
129	19.49	19.41	19.55
130	19.54	19.49	19.61
131	19.60	19.55	19.69
132	19.70	19.62	19.79
133	19.80	19.80	19.90
134	19.91	19.94	20.03
135	20.03	20.13	20.16
136	20.16	20.24	20.30
136	20.30	20.42	20.45
137	20.43	20.48	20.59
137	20.56	20.63	20.74
138	20.70	20.77	20.88
138	20.83	20.91	21.02
139	20.96	21.01	21.16
139	21.11	21.23	21.31
140	21.26	21.42	21.48
140	21.41	21.47	21.64

Typical Performance Curves

INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



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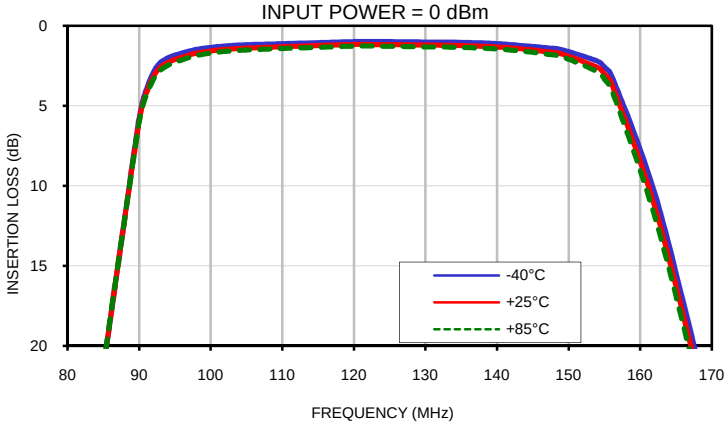
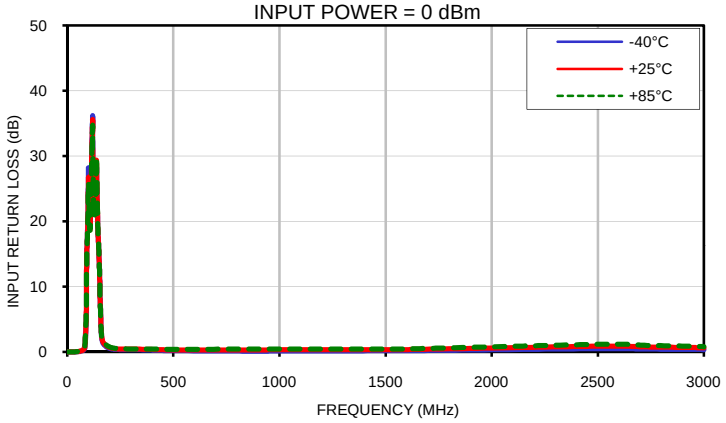


INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



INPUT RETURN LOSS vs. TEMPERATURE
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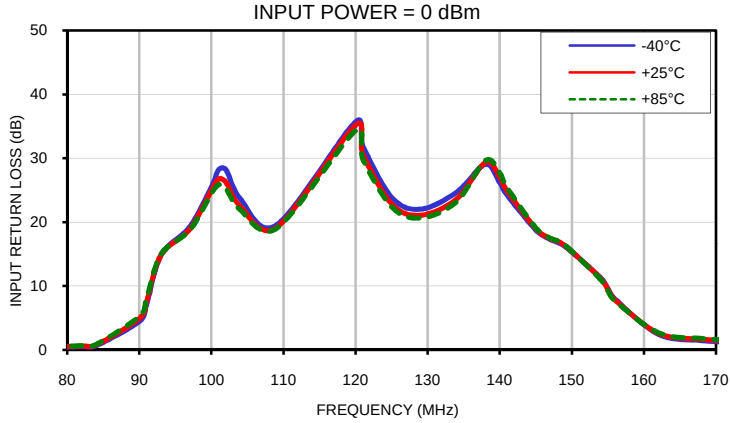
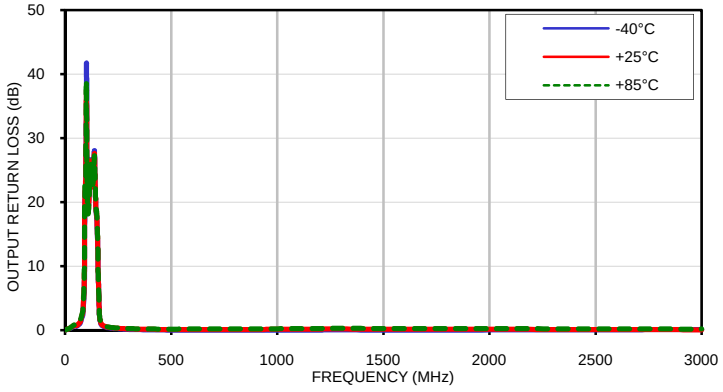


OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
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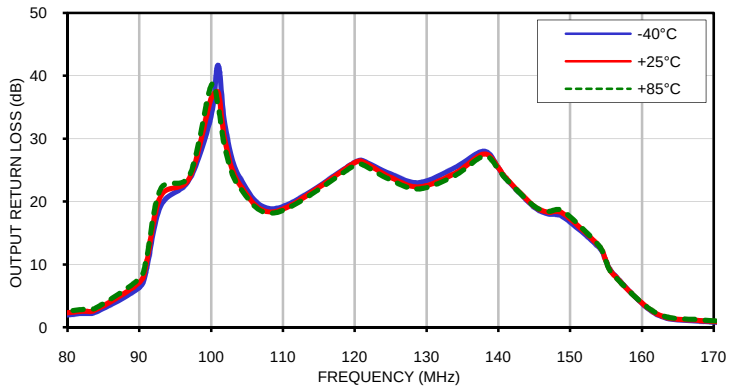
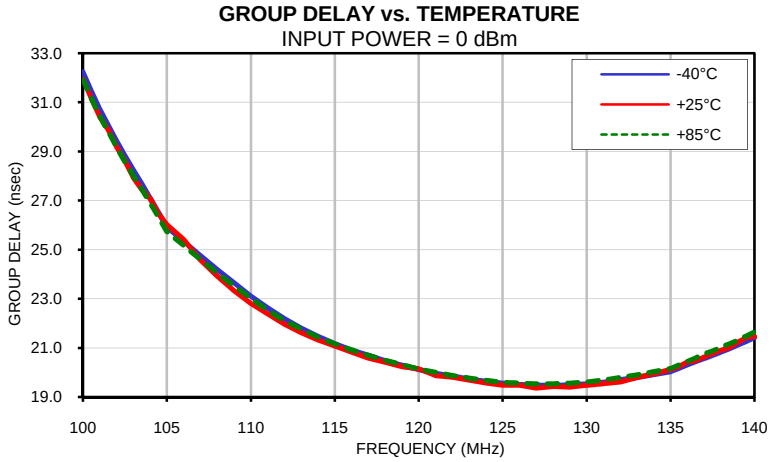


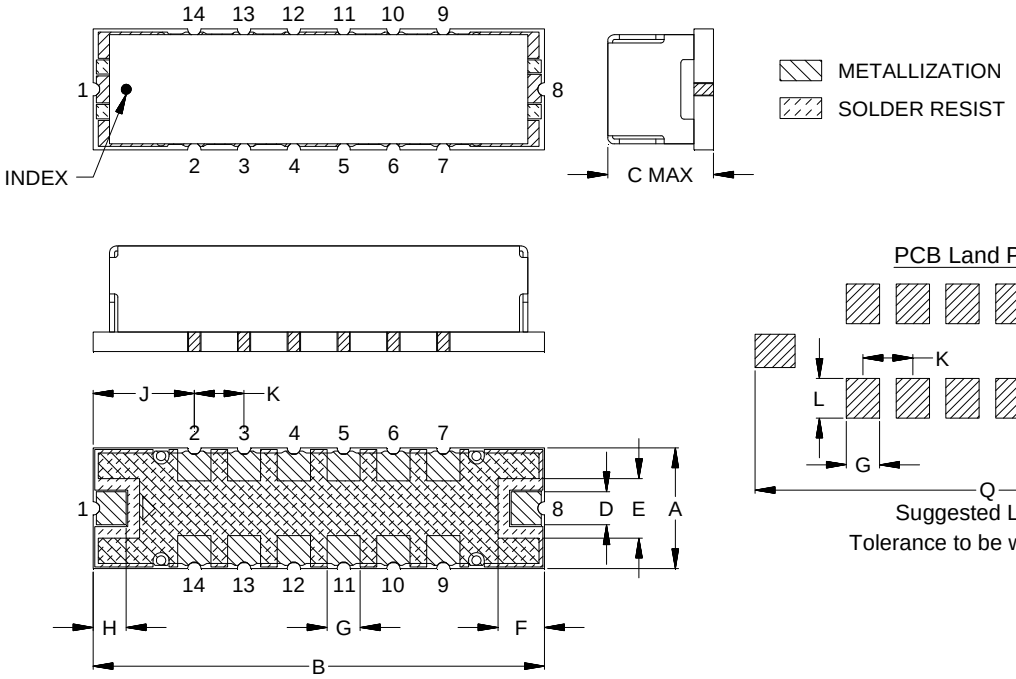
Typical Performance Curves



Case Style HQ

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

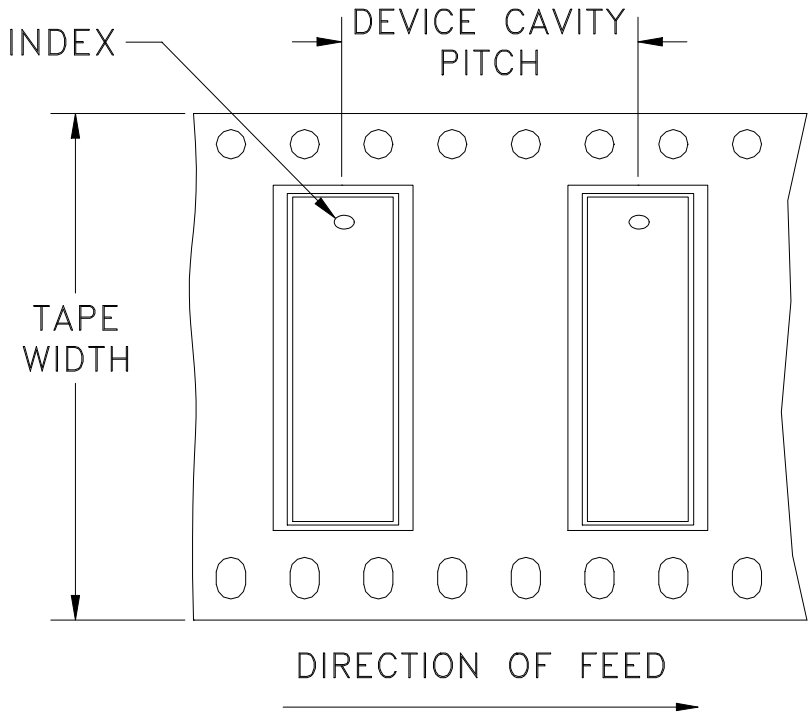
Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015

Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. 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.

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

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.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

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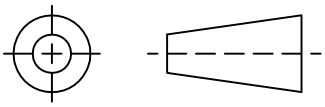
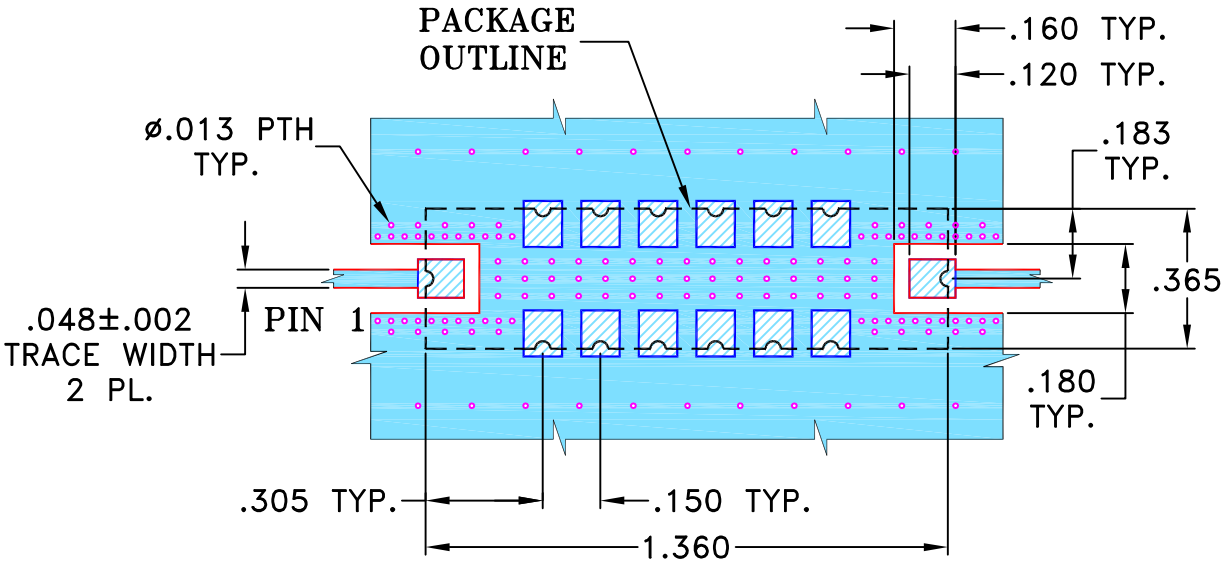
THIRD ANGLE PROJECTION



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



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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.

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	HB (RAVON)	12 JUN 2008
TOLERANCES ON:	CHECKED	RZ (RAVON)	12 JUN 2008
2 PL DECIMALS ±	APPROVED	HH (RAVON)	12 JUN 2008
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

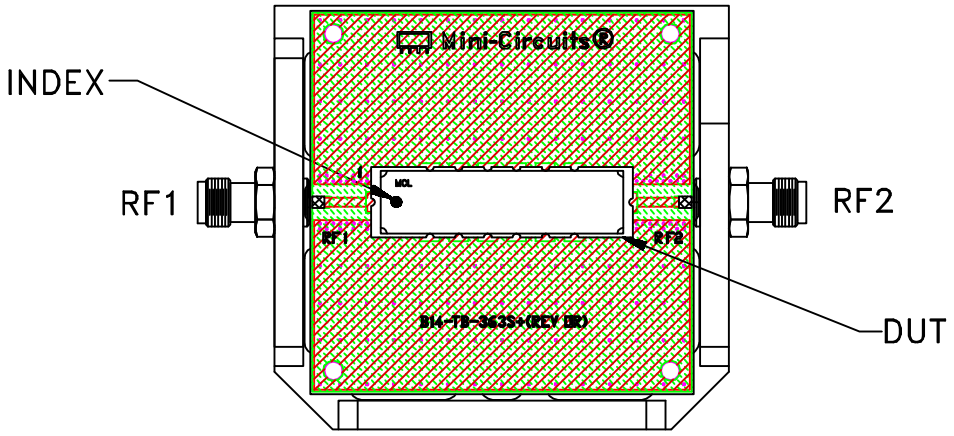
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

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

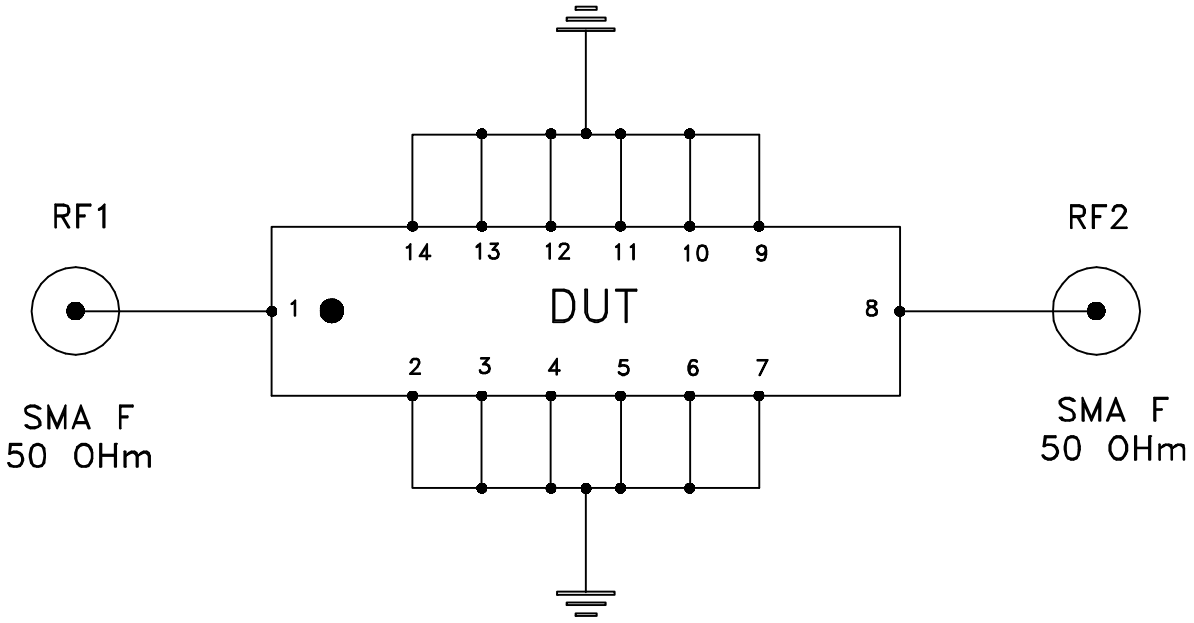
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-227	C

FILE:	SCALE:	SHEET:
98PL227	2:1	1 OF 1

Evaluation Board and Circuit



TB-363+



Schematic Diagram

Notes:
1. 50 Ohm SMA Female connectors.
2. PCB Material: ROGERS R04350 or equivalent, Dielectric Constant=3.48, Thickness=.030 inch.

Mini-Circuits®

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Environmental Specifications ENV12

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	-65° to 150° C Ambient Environment	Individual Model Data Sheet
Autoclave	15 psig, 100% RH, 121°C, 96 hours	JESD22-A102-C, Condition C
Temperature Cycling	-65° to 150°C, 100 cycles	JESD22-A104
Temperature Humidity	85°C/ 85% RH, 168 hours	JESD22-113
Solder Reflow Heat	Sn-Pb Eutetic Process: 240°C peak Pb-Free Process: 260°C peak	J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1
Moisture Sensitivity: Level 1	Bake at 125°C for 24 hours Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 240°C peak (Non-RoHS) or 260°C (RoHS)	J-STD-020
Solderability	10X magnification, 95% coverage	JESD22-B102, Method 1: Dip and Look Test
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
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