

Bandpass Filter

BPF-A176+

50Ω 175 to 177 MHz

Maximum Ratings

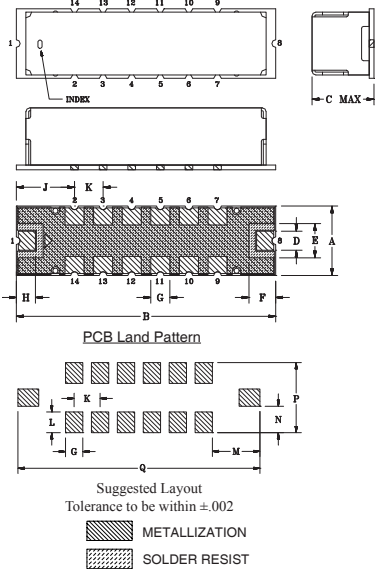
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input*	0.5W at 25°C

*Passband rating, derate linearly to 0.25W at 100°C ambient.
Permanent damage may occur if any of these limits are exceeded.

Pin Connections

RF IN	1
RF OUT	8
GROUND	2,3,4,5,6,7,9,10,11,12,13,14

Outline Drawing



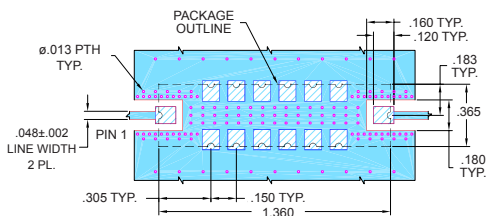
Outline Dimensions (inch/mm)

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

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



NOTES:

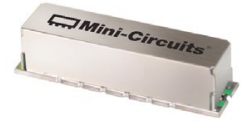
- TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS: .025" ± .002". COPPER: 1/2 OZ. EACH SIDE.
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
 - BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.
- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Features

- High rejection
- Shielded case
- Aqueous washable

Applications

- Military radio
- Harmonic rejection
- Transmitters/receivers



Generic photo used for illustration purposes only

CASE STYLE: HQ1157

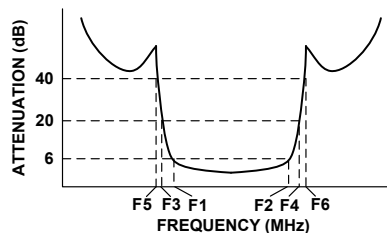
+RoHS Compliant

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

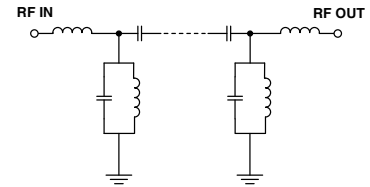
Bandpass Filter Electrical Specifications (T_{AMB} = 25°C)

CENTER FREQ. (MHz)	PASSBAND (MHz) (Loss < 6dB)	STOPBANDS (MHz)				VSWR (:1)		
		Loss > 20dB		Loss > 40dB		Passband		Stopband
F _c	F ₁ - F ₂	F ₃	F ₄	F ₅	F ₆	Typ.	Max.	Typ.
176	175 - 177	162	190	155	200 - 2000	1.4	1.7	20

Typical Frequency Response

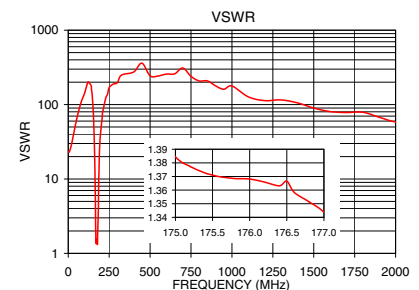


Functional Schematic



Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
1.0	97.12	23.39
60.0	93.06	76.34
155.0	60.47	62.82
162.0	38.33	18.06
166.0	19.89	4.39
168.5	11.38	1.72
170.0	6.28	1.37
175.0	4.70	1.38
175.5	4.70	1.37
176.0	4.71	1.37
176.5	4.73	1.37
177.0	4.77	1.34
182.5	9.02	2.87
185.0	17.79	5.59
190.0	36.19	21.01
200.0	57.09	46.80
1000.0	89.30	177.89
2000.0	75.29	58.33



Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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



Surface Mount Band Pass Filter

BPF-A176+

Typical Performance Data

FREQ. (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURNLOSS (dB)		
	@ -40° C	@ +25° C	@ +85° C	@ -40° C	@ +25° C	@ +85° C	@ -40° C	@ +25° C	@ +85° C
1.0	88.21	100.33	89.46	0.57	0.76	0.90	0.55	0.76	0.90
10.0	93.82	88.99	88.73	0.58	0.75	0.88	0.59	0.77	0.89
15.0	96.29	95.08	87.82	0.55	0.71	0.82	0.54	0.69	0.80
20.0	82.74	90.24	86.57	0.48	0.61	0.71	0.48	0.61	0.70
25.0	83.77	84.01	88.89	0.43	0.55	0.62	0.43	0.54	0.61
30.0	89.88	92.79	88.05	0.39	0.48	0.54	0.39	0.48	0.54
35.0	95.75	93.40	91.36	0.34	0.42	0.47	0.34	0.41	0.47
40.0	92.84	94.86	94.48	0.30	0.37	0.42	0.30	0.36	0.41
45.0	89.21	83.84	96.27	0.27	0.33	0.37	0.28	0.33	0.37
50.0	82.65	101.10	88.16	0.25	0.29	0.33	0.24	0.30	0.34
55.0	95.19	91.92	95.01	0.22	0.26	0.31	0.22	0.28	0.31
60.0	92.63	89.22	95.06	0.21	0.25	0.28	0.19	0.25	0.27
65.0	85.65	91.61	88.57	0.18	0.22	0.24	0.16	0.22	0.25
70.0	88.73	88.96	94.56	0.17	0.21	0.23	0.16	0.21	0.24
80.0	89.48	94.88	89.19	0.13	0.17	0.18	0.11	0.17	0.20
90.0	86.74	84.53	97.70	0.12	0.15	0.17	0.10	0.15	0.17
100.0	91.02	90.67	109.36	0.10	0.13	0.16	0.07	0.12	0.15
150.0	71.97	70.09	69.82	0.14	0.21	0.25	0.11	0.18	0.22
155.0	59.64	58.81	57.95	0.22	0.33	0.40	0.17	0.28	0.34
160.0	45.01	43.38	42.20	0.51	0.72	0.87	0.35	0.53	0.64
162.0	37.53	35.71	34.33	0.81	1.15	1.40	0.53	0.77	0.94
166.0	17.82	15.94	14.71	4.06	6.41	8.38	2.05	3.13	4.06
168.5	7.00	7.30	7.43	19.79	16.30	15.91	9.01	11.05	12.35
170.0	5.22	5.89	6.24	15.09	15.59	15.77	15.57	15.64	14.99
175.0	4.10	4.86	5.31	17.06	18.42	19.15	16.45	17.23	17.44
175.5	4.06	4.85	5.31	19.07	19.39	19.57	17.69	17.74	17.84
176.0	4.05	4.87	5.35	20.03	19.46	19.39	18.13	17.96	18.32
176.5	4.06	4.90	5.40	19.72	19.02	18.99	18.06	18.41	19.33
177.0	4.11	4.97	5.48	19.01	18.57	18.45	18.23	19.52	21.24
180.0	4.89	6.06	6.78	12.57	11.11	10.48	15.96	14.14	13.58
182.5	6.81	8.91	10.42	7.89	6.97	6.28	18.54	19.29	14.71
185.0	15.98	18.91	20.65	2.44	2.35	2.31	4.33	3.94	3.70
190.0	35.33	36.86	37.86	0.76	0.88	0.95	1.01	1.17	1.23
200.0	56.67	57.48	58.08	0.32	0.41	0.46	0.35	0.47	0.54
250.0	89.50	92.20	86.09	0.10	0.16	0.21	0.08	0.16	0.21
300.0	90.90	85.59	90.33	0.07	0.14	0.18	0.03	0.13	0.18
350.0	88.77	92.96	83.90	0.06	0.13	0.19	0.02	0.13	0.19
400.0	88.69	86.78	98.07	0.06	0.13	0.20	0.01	0.14	0.19
500.0	88.07	92.38	88.48	0.06	0.17	0.22	0.01	0.16	0.23
600.0	89.52	85.05	95.54	0.07	0.18	0.25	0.01	0.18	0.25
700.0	95.99	84.28	85.70	0.10	0.22	0.31	0.03	0.21	0.30
800.0	87.75	88.60	88.11	0.12	0.25	0.35	0.04	0.24	0.34
900.0	86.85	90.52	92.75	0.14	0.29	0.38	0.05	0.26	0.36
1000.0	81.48	94.83	101.37	0.15	0.29	0.40	0.06	0.29	0.39
1100.0	92.46	85.57	79.83	0.16	0.33	0.43	0.06	0.29	0.40
1200.0	86.82	86.57	93.08	0.17	0.33	0.44	0.09	0.33	0.42
1300.0	76.18	87.48	76.25	0.22	0.37	0.49	0.10	0.35	0.43
1400.0	76.29	70.63	74.49	0.21	0.38	0.51	0.12	0.37	0.46
1500.0	75.13	81.14	81.10	0.23	0.40	0.53	0.12	0.37	0.46
1600.0	71.36	73.93	70.20	0.24	0.42	0.53	0.12	0.38	0.47
1700.0	72.13	75.05	72.63	0.24	0.42	0.55	0.14	0.40	0.50
1800.0	78.03	66.36	78.68	0.24	0.43	0.56	0.12	0.38	0.49
1900.0	63.06	68.33	64.55	0.24	0.43	0.57	0.27	0.44	0.54
2000.0	48.64	46.81	47.74	0.28	0.48	0.61	0.13	0.42	0.54

REV. X1
BPF-A176+
100824
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Typical Performance Data

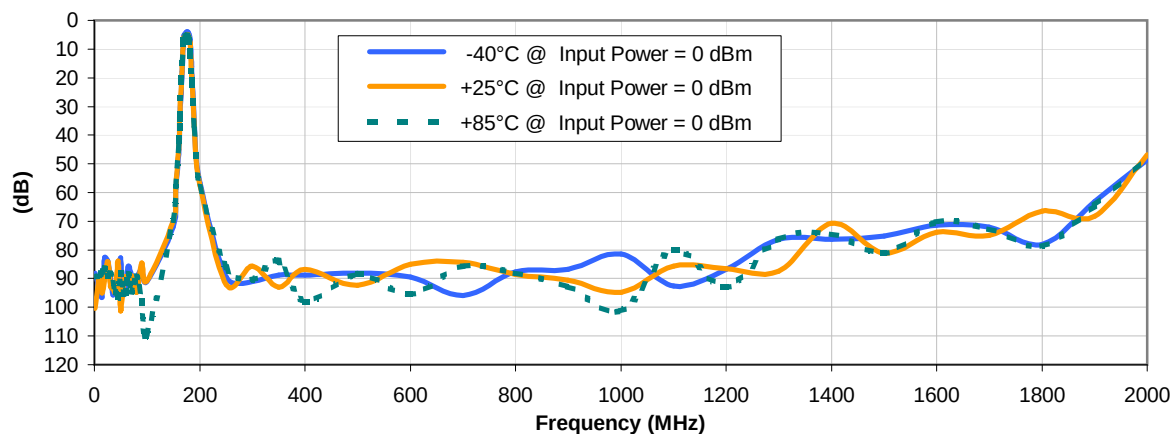
FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
174.00	81.01	80.31	79.86
174.25	80.77	80.20	79.64
174.50	80.72	80.01	79.54
174.75	80.52	79.96	79.38
175.00	80.43	79.78	79.44
175.25	80.32	79.61	79.22
175.50	80.32	79.78	79.41
175.75	80.25	79.72	79.51
176.00	80.01	79.62	79.56
176.25	80.08	79.84	79.75
176.50	80.16	80.10	80.06
176.75	80.00	80.25	80.33
177.00	80.37	80.53	80.66
177.25	80.57	80.90	80.90
177.50	80.86	81.26	81.25
177.75	81.25	81.72	81.96
178.00	81.83	82.11	82.44

REV. X1
BPF-A176+
100824
Page 2 of 2

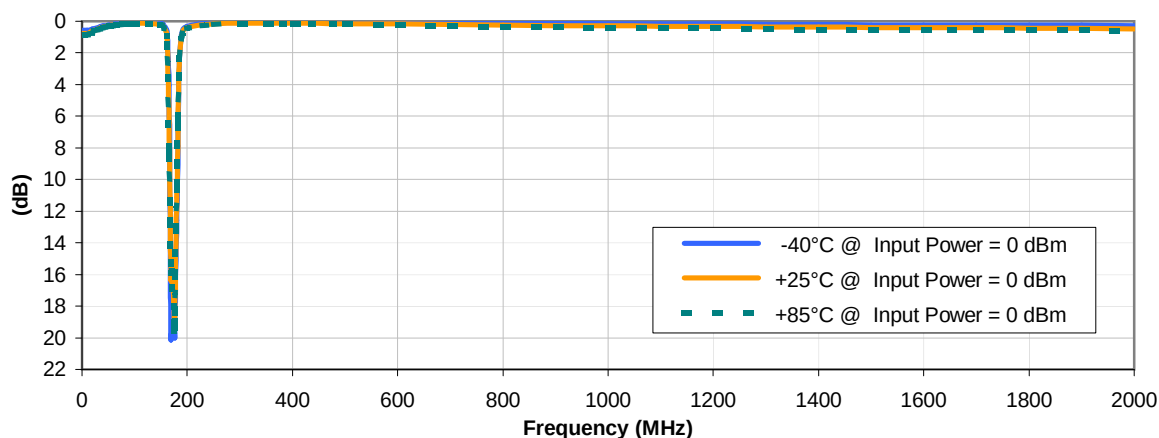


Typical Performance Curves

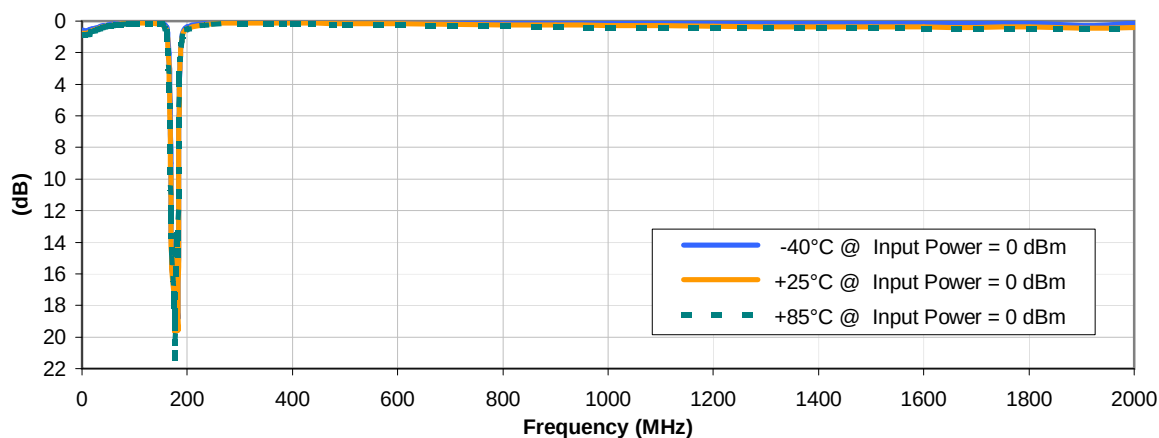
INSERTION LOSS vs. TEMPERATURE



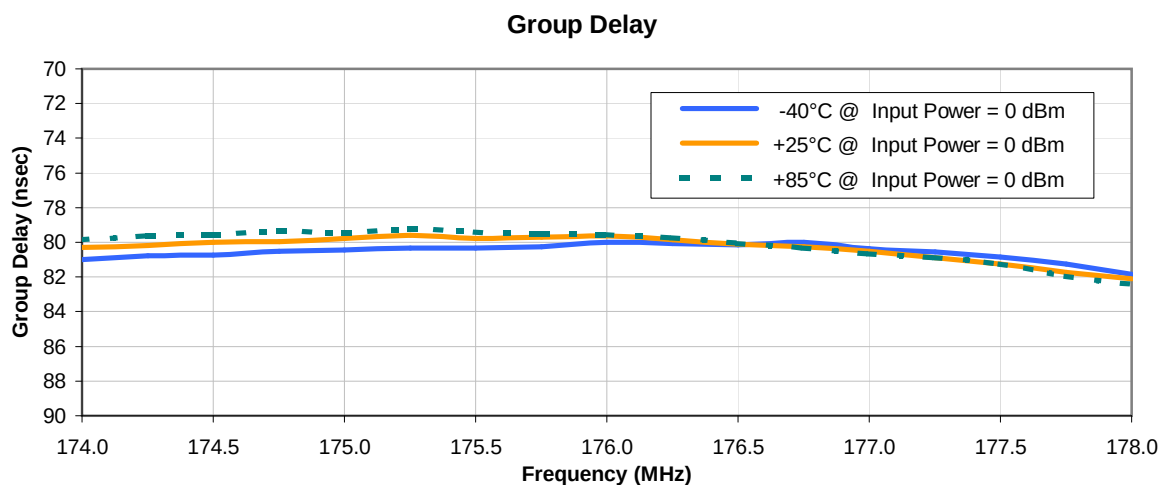
INPUT RETURN LOSS vs. TEMPERATURE



OUTPUT RETURN LOSS vs. TEMPERATURE

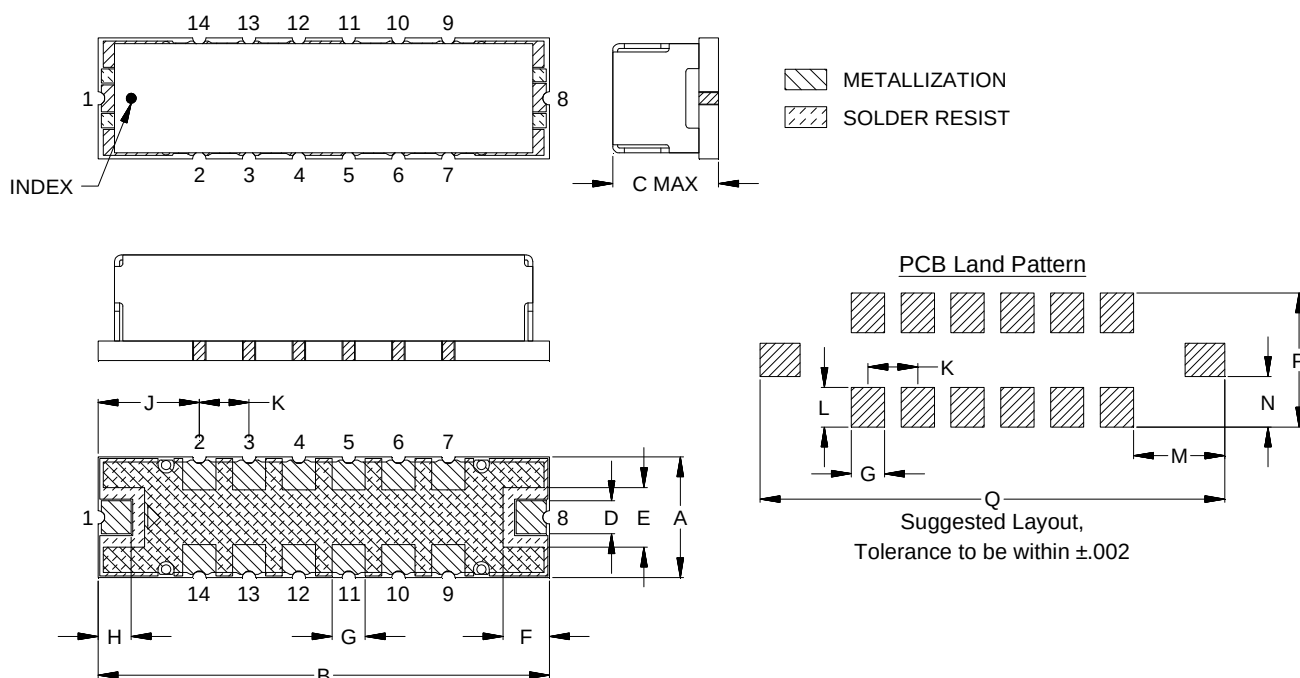


Typical Performance Curves



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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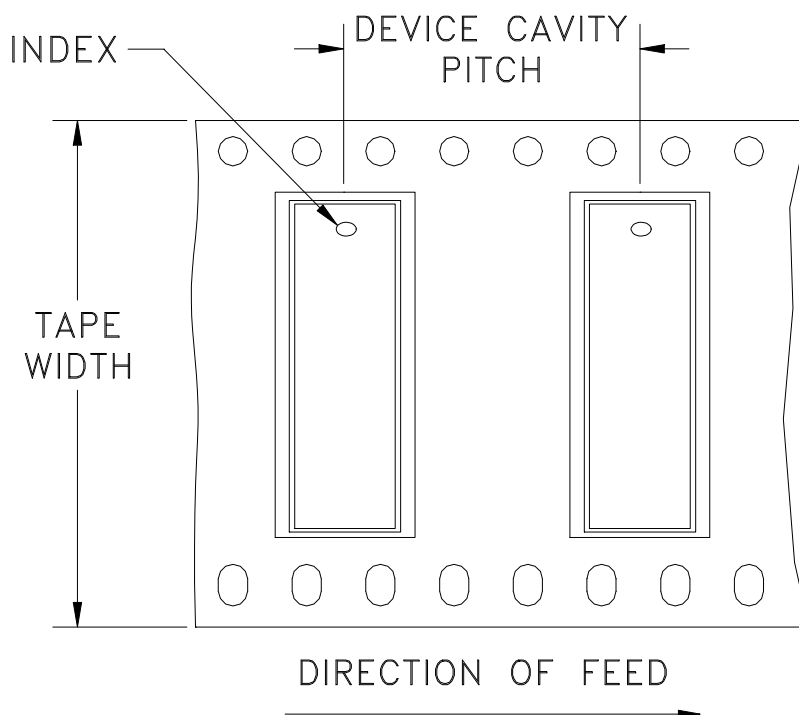


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DEVICE ORIENTATION IN T&R



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

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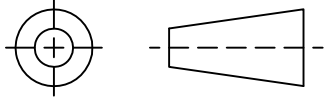
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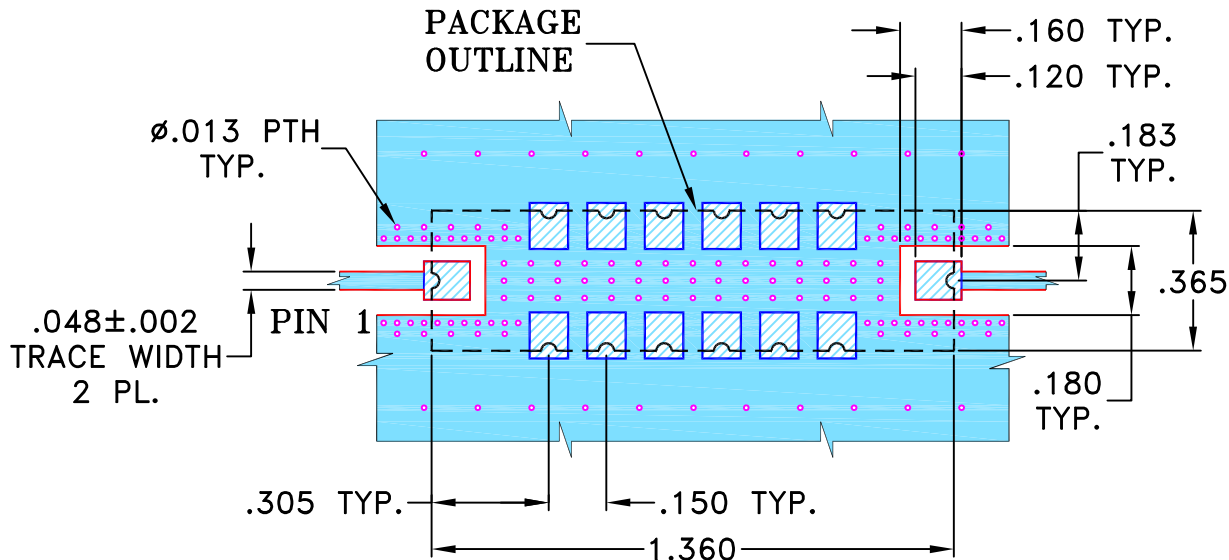
THIRD ANGLE PROJECTION



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 $.025" \pm .002"$. 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 $\pm$ 3 PL DECIMALS $\pm .005$ ANGLES $\pm$ FRACTIONS $\pm$	DRAWN	HB (RAVON)	12 JUN 2008
	CHECKED	RZ (RAVON)	12 JUN 2008
	APPROVED	HH (RAVON)	12 JUN 2008



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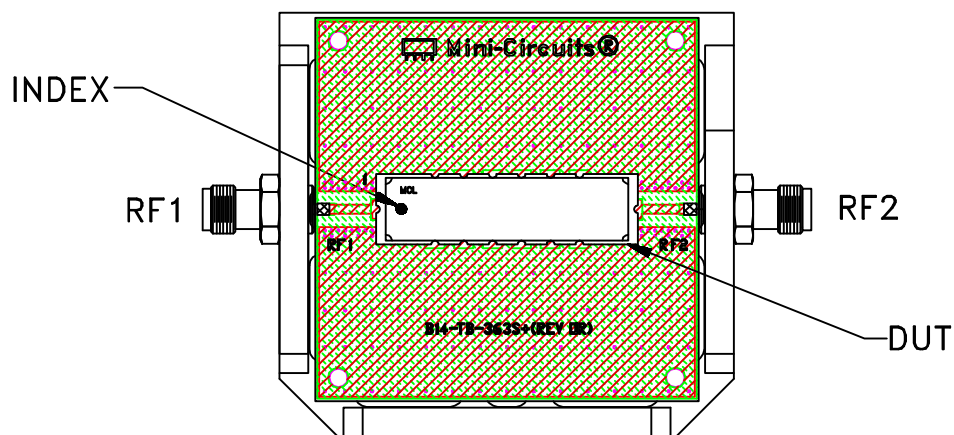
PL, rf, HQ1157, TB-363+, 50 OHM

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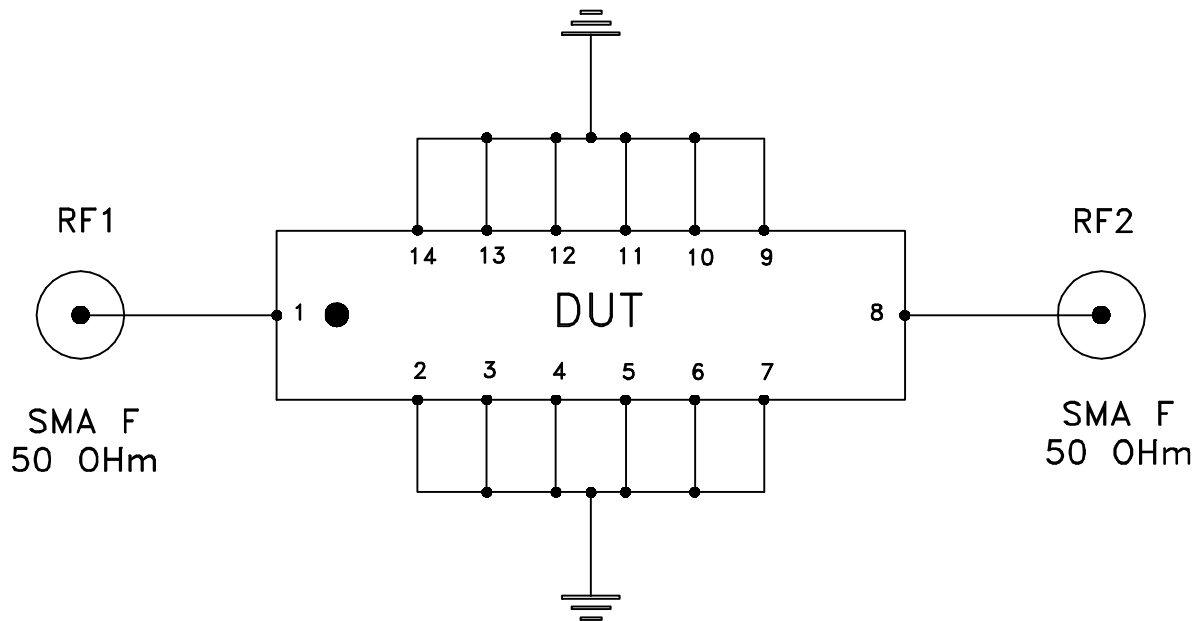
ASHEETA1.DWG REV:A DATE:01/12/95

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-363+



Schematic Diagram

Notes:

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

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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