

# Bandpass Filter

## BPF-A69+

50Ω 55 to 83 MHz

### Maximum Ratings

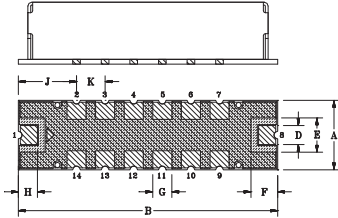
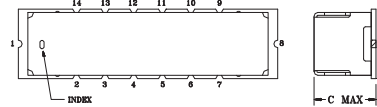
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input*	0.5W at 25°C

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

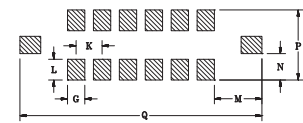
### Pin Connections

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

### Outline Drawing



PCB Land Pattern



Suggested Layout  
Tolerance to be within ±.002

METALLIZATION  
 SOLDER RESIST

### Outline Dimensions (inch/mm)

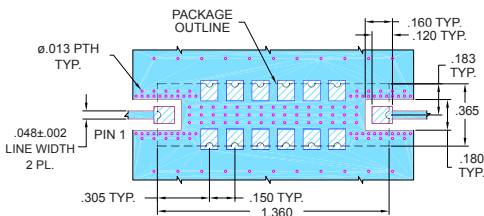
A	B	C	D	E	F	G	H
.365	1.360	.35	.100	.180	.140	.100	.100
9.27	34.54	8.89	2.54	4.57	3.56	2.54	2.54

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

#### 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.
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### Features

- Good VSWR, 1.3:1 typ @ passband
- High stop band rejection

### Application

- Harmonic rejection
- Transmitters/receivers



Generic photo used for illustration purposes only

CASE STYLE: HQ1157

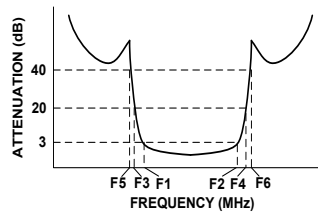
+RoHS Compliant

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

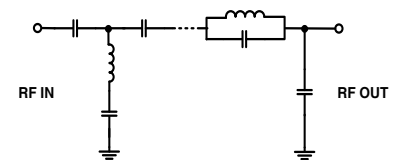
### Bandpass Filter Electrical Specifications (T<sub>AMB</sub> = 25°C)

CENTER FREQ. (MHz)	PASSBAND (MHz) (Loss < 3dB) F1 - F2	STOPBANDS (MHz)		VSWR (:1)	
		Loss > 20dB F3 F4	Loss > 40dB F5 F6	Passband Max.	Stopband Typ.
69	55 - 83	40 97	32 103 - 500	1.6	20

### Typical Frequency Response



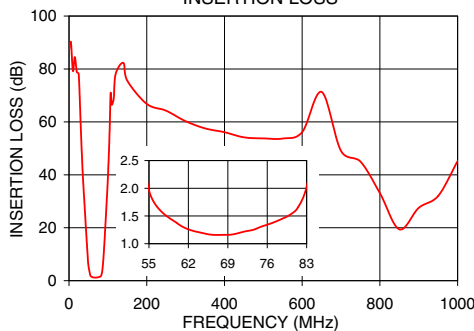
### Functional Schematic



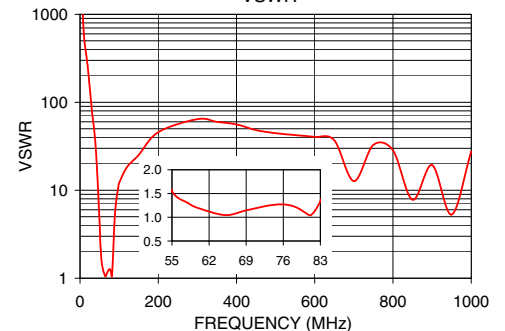
### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
1	87.50	1737.18
25	78.02	157.93
32	50.82	69.49
40	28.30	31.03
43	21.02	21.46
48	9.52	7.80
50	5.80	4.30
52	3.40	2.47
55	1.97	1.55
69	1.16	1.15
83	2.03	1.34
85	3.20	2.06
87	5.74	3.37
89	9.56	5.07
94	21.75	8.43
97	29.95	10.31
103	49.46	13.70
120	78.14	18.30
500	53.55	44.55

### INSERTION LOSS



### VSWR



# Surface Mount Band Pass Filter

# BPF-A69+

## 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
0.5	96.07	94.68	96.71	0.01	0.01	0.01	0.00	0.00	0.00
2	93.14	91.02	92.18	0.01	0.00	0.01	0.00	0.00	0.00
4	94.17	94.63	96.34	0.01	0.02	0.03	0.05	0.06	0.06
6	90.19	88.53	88.32	0.03	0.03	0.01	0.04	0.03	0.06
8	101.44	98.43	97.46	0.02	0.01	0.02	0.06	0.08	0.09
10	86.86	89.85	88.25	0.02	0.03	0.04	0.10	0.12	0.12
20	74.74	74.85	76.89	0.07	0.07	0.09	0.17	0.21	0.25
30	60.03	60.05	59.56	0.21	0.24	0.27	0.42	0.46	0.51
40	27.40	27.22	27.09	0.53	0.60	0.69	0.74	0.86	0.96
50	5.73	5.81	5.88	4.13	4.49	4.82	4.28	4.66	5.01
60	1.19	1.35	1.48	29.27	29.60	29.54	29.72	29.10	28.45
70	1.10	1.23	1.35	17.76	17.49	17.41	18.18	18.03	17.97
80	1.33	1.47	1.62	20.86	21.10	21.39	22.76	23.27	23.65
90	6.59	7.03	7.41	4.33	4.36	4.42	4.77	4.71	4.81
100	34.37	34.94	35.31	1.05	1.16	1.26	1.13	1.22	1.31
110	63.19	63.42	62.55	0.82	0.91	1.02	0.61	0.66	0.71
120	77.32	76.21	81.95	0.76	0.86	0.95	0.40	0.45	0.50
130	74.56	73.97	77.85	0.72	0.81	0.90	0.27	0.31	0.36
140	76.07	84.82	76.73	0.68	0.78	0.86	0.21	0.25	0.30
150	92.80	86.01	101.11	0.60	0.70	0.77	0.19	0.22	0.26
160	80.46	78.77	78.11	0.53	0.63	0.69	0.18	0.22	0.28
170	80.24	76.42	76.14	0.46	0.55	0.63	0.13	0.17	0.22
180	79.87	74.35	78.39	0.42	0.50	0.57	0.11	0.16	0.23
190	78.10	78.45	79.11	0.36	0.47	0.53	0.12	0.14	0.20
200	83.34	79.57	85.96	0.37	0.42	0.50	0.13	0.19	0.24
210	84.94	83.63	81.64	0.30	0.40	0.45	0.12	0.14	0.20
220	81.29	85.98	87.46	0.29	0.35	0.42	0.10	0.15	0.21
230	85.13	90.41	99.43	0.27	0.34	0.40	0.10	0.15	0.21
240	85.08	92.09	90.66	0.24	0.33	0.39	0.11	0.13	0.20
250	91.25	90.51	85.89	0.24	0.29	0.35	0.11	0.16	0.23
260	87.83	92.88	91.64	0.22	0.30	0.37	0.11	0.15	0.21
270	89.63	87.85	87.62	0.24	0.29	0.36	0.09	0.12	0.18
280	90.93	98.92	95.91	0.22	0.27	0.33	0.11	0.17	0.24
290	87.54	90.36	103.39	0.22	0.29	0.35	0.11	0.14	0.21
300	96.79	100.77	79.12	0.21	0.23	0.32	0.10	0.16	0.22
310	82.18	79.81	84.04	0.20	0.29	0.33	0.08	0.15	0.22
320	83.86	80.62	83.19	0.23	0.30	0.35	0.11	0.12	0.21
330	80.52	82.26	81.57	0.21	0.23	0.31	0.10	0.18	0.24
340	78.41	79.38	77.44	0.22	0.30	0.33	0.11	0.15	0.23
350	77.16	75.97	75.36	0.23	0.25	0.33	0.11	0.15	0.21
360	76.65	73.06	75.57	0.18	0.23	0.28	0.10	0.18	0.24
370	74.61	72.93	74.35	0.24	0.32	0.34	0.10	0.14	0.21
380	73.09	72.65	73.09	0.23	0.24	0.32	0.10	0.15	0.21
390	72.12	72.11	71.54	0.18	0.25	0.28	0.10	0.18	0.24
400	71.77	72.08	69.83	0.24	0.30	0.35	0.10	0.14	0.21
410	70.02	70.76	69.98	0.21	0.24	0.31	0.11	0.16	0.23
420	70.11	70.33	68.64	0.19	0.28	0.29	0.12	0.20	0.26
430	68.68	69.86	69.11	0.26	0.28	0.35	0.10	0.13	0.22
440	69.18	69.79	68.43	0.22	0.24	0.30	0.11	0.18	0.24
450	67.82	67.94	69.53	0.20	0.28	0.30	0.11	0.18	0.26
460	66.90	68.33	68.15	0.27	0.27	0.36	0.10	0.14	0.21
470	67.70	67.00	68.47	0.19	0.26	0.29	0.12	0.20	0.26
480	67.84	67.95	68.07	0.24	0.29	0.32	0.13	0.19	0.26
490	68.57	68.45	68.56	0.28	0.28	0.36	0.10	0.15	0.21
500	67.48	67.81	68.33	0.21	0.28	0.29	0.11	0.20	0.26

REV. X1

BPF-A69+

090226

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# Surface Mount Band Pass Filter

# BPF-A69+

## Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
55.0	45.41	44.86	44.47
55.5	43.85	43.45	43.04
56.0	42.40	41.95	41.64
56.5	41.02	40.63	40.36
57.0	39.75	39.44	39.20
57.5	38.61	38.39	38.17
58.0	37.61	37.35	37.17
58.5	36.65	36.52	36.41
59.0	35.98	35.83	35.71
59.5	35.29	35.13	35.01
60.0	34.77	34.65	34.48
60.5	34.17	34.08	33.98
61.0	33.76	33.57	33.45
61.5	33.19	33.11	33.02
62.0	32.78	32.71	32.68
62.5	32.33	32.24	32.25
63.0	32.01	31.94	31.94
63.5	31.68	31.67	31.68
64.0	31.37	31.37	31.29
64.5	31.13	31.12	31.04
65.0	30.91	30.83	30.82
65.5	30.70	30.61	30.64
66.0	30.44	30.39	30.39
66.5	30.31	30.22	30.25
67.0	30.14	30.15	30.13
67.5	30.01	30.06	30.03
68.0	29.90	29.94	29.87
68.5	29.87	29.92	29.82
69.0	29.79	29.77	29.77
69.5	29.73	29.76	29.69
70.0	29.71	29.69	29.64
70.5	29.66	29.66	29.67
71.0	29.63	29.64	29.67
71.5	29.69	29.79	29.76
72.0	29.81	29.80	29.91
72.5	29.91	29.95	30.01
73.0	30.07	30.13	30.12
73.5	30.31	30.32	30.41
74.0	30.43	30.47	30.56
74.5	30.63	30.66	30.70
75.0	30.83	30.92	30.99
75.5	31.14	31.21	31.27
76.0	31.38	31.52	31.48
76.5	31.70	31.83	31.86
77.0	32.11	32.26	32.29
77.5	32.52	32.63	32.70
78.0	32.95	33.08	33.15
78.5	33.41	33.55	33.66
79.0	33.97	34.08	34.18
79.5	34.48	34.68	34.77
80.0	35.12	35.34	35.45
80.5	35.79	36.09	36.19
81.0	36.57	36.83	36.99
82.0	38.25	38.48	38.76
83.0	40.39	40.68	40.93

REV. X1  
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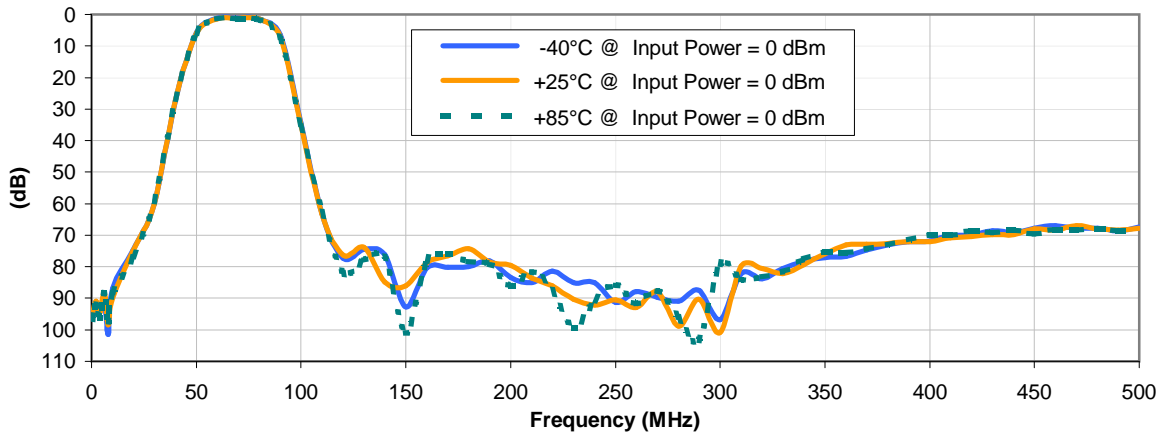


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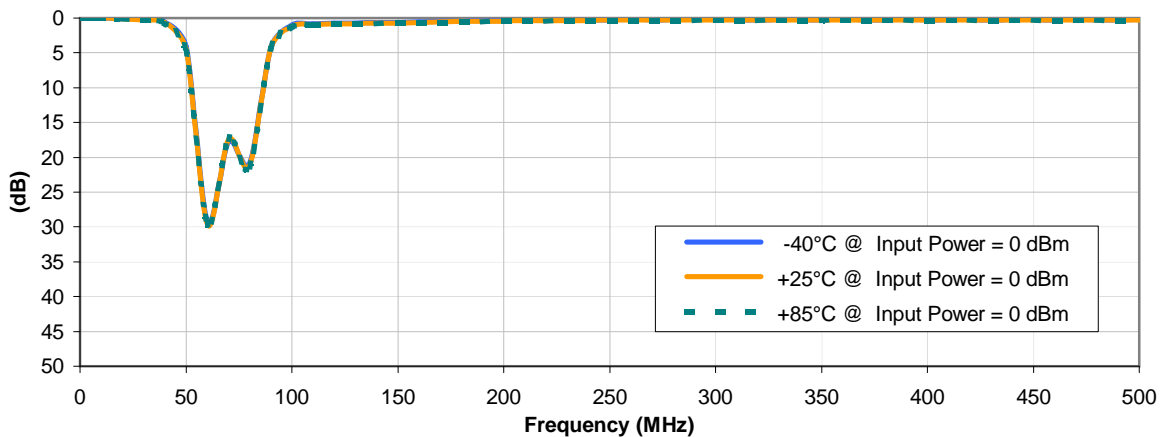


## Typical Performance Curves

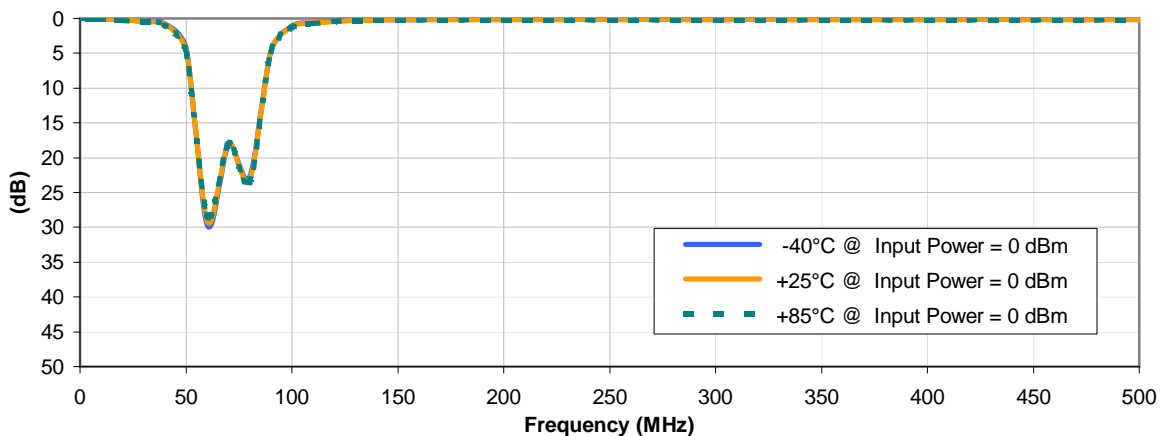
### INSERTION LOSS vs. TEMPERATURE



### INPUT RETURN LOSS vs. TEMPERATURE



### OUTPUT RETURN LOSS vs. TEMPERATURE



REV. X1  
BPF-A69+  
090226  
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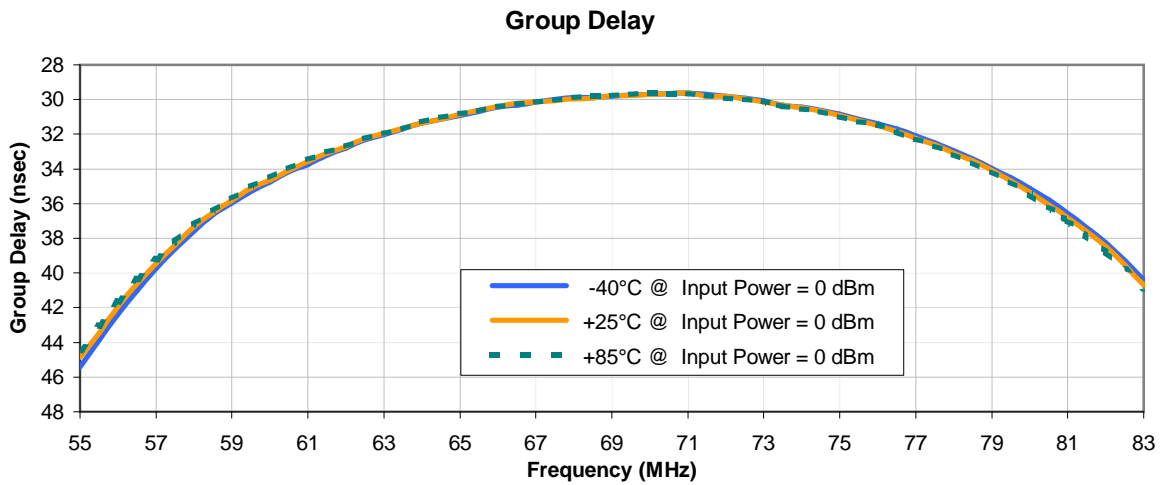
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## Typical Performance Curves



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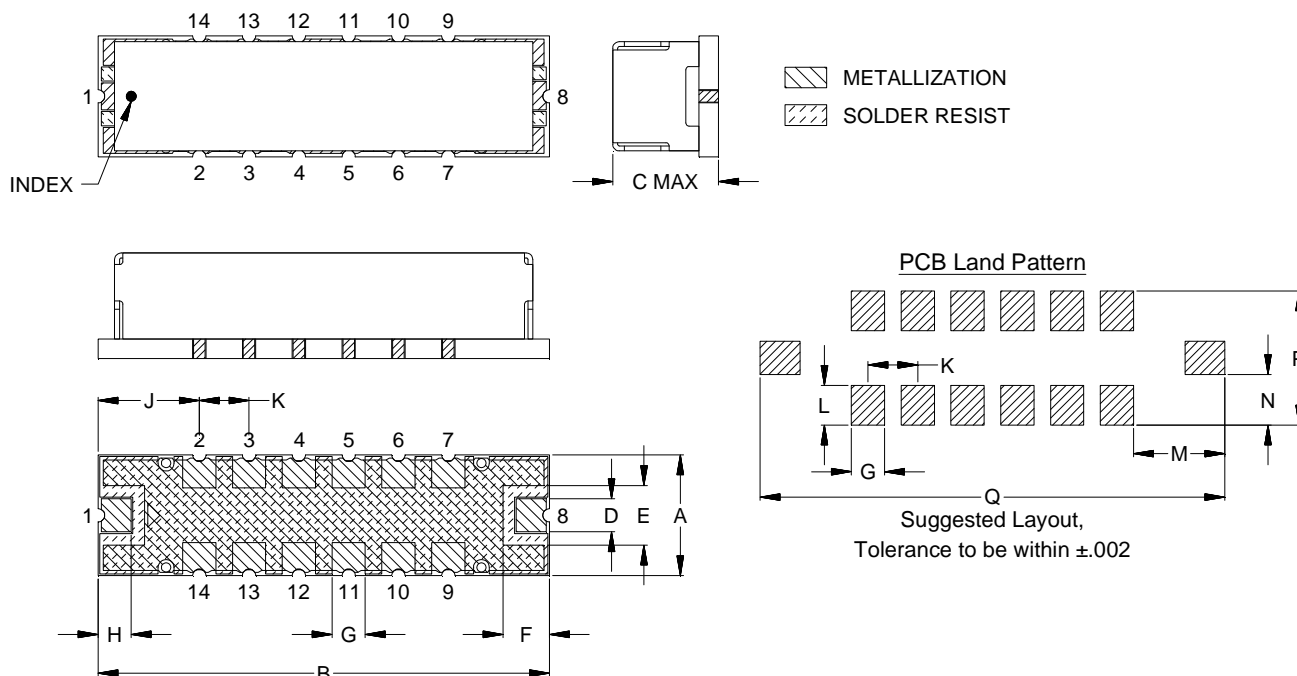


# Case Style

# 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:

- 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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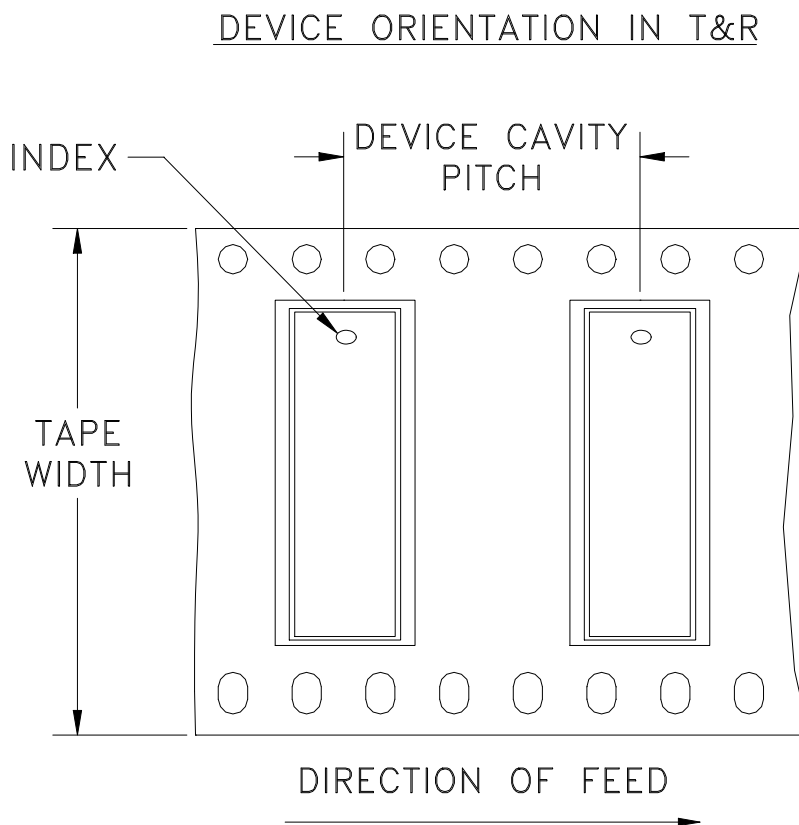
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RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F83



<b>Tape Width, mm</b>	<b>Device Cavity Pitch, mm</b>	<b>Reel Size, inches</b>	<b>Devices per Reel</b>
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.

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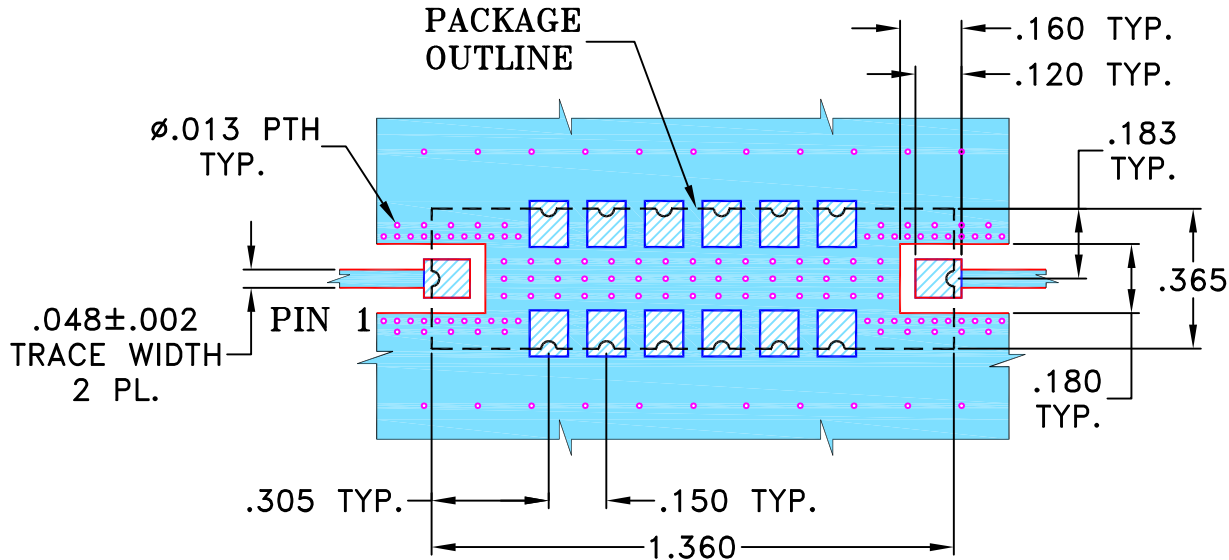
THIRD ANGLE PROJECTION



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	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 ±		

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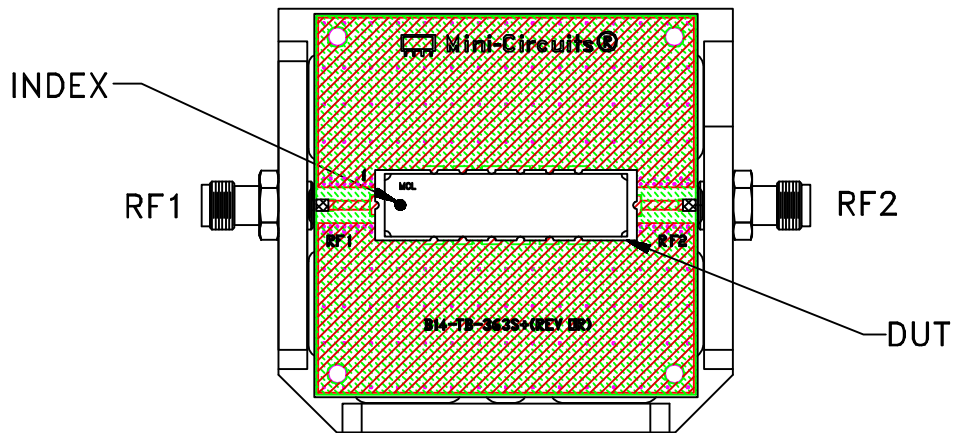
**PL, rf, HQ1157, TB-363+, 50 OHM**

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

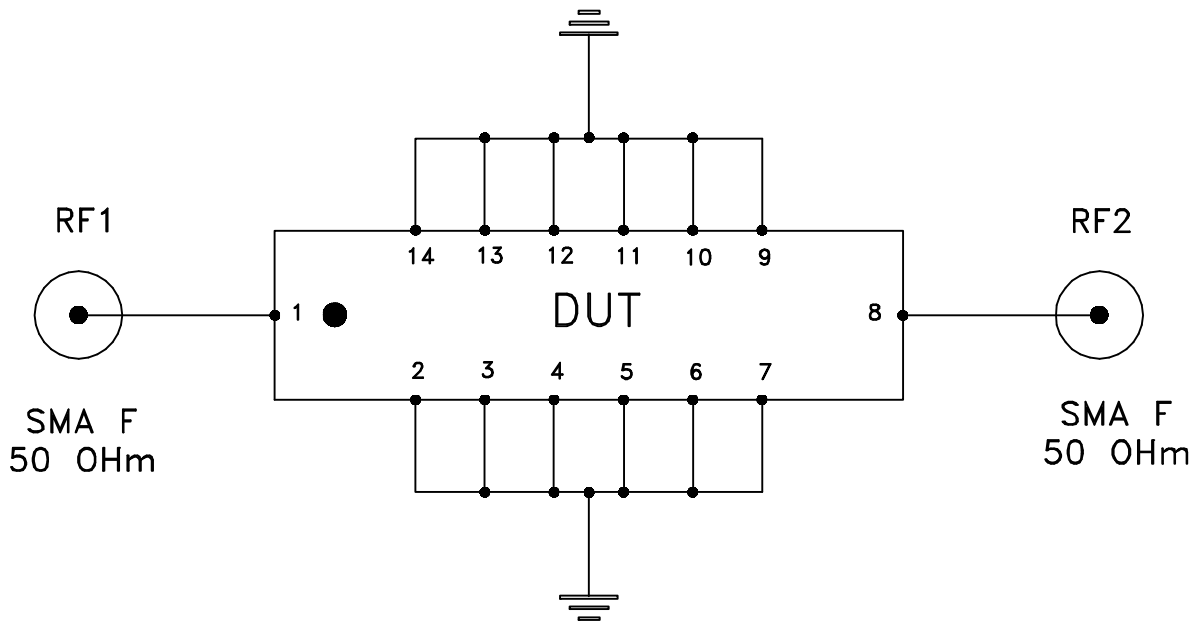
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# Evaluation Board and Circuit



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®**

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