

# Surface Mount Bandpass Filter

## BPF-A587R5+

50Ω 475 to 700 MHz

### The Big Deal

- Low insertion loss
- Good rejection
- Miniature shielded package



Generic photo used for illustration purposes only  
CASE STYLE: HQ1157

### Product Overview

The BPF-A587R5+ is a 50Ω bandpass filter fabricated using SMT technology. This bandpass filter covers from 475-700 MHz. This filter is built with high Q capacitors, air-coil inductors and transformers for superior performance. It has repeatable performance across lots and consistent performance across temperature. This filter will be suitable for applications such as military radio communication, radio microphones and TV broadcasting.

### Key Features

Feature	Advantages
Low insertion loss	Can be used in high performance applications.
Good rejection	This enables the filter to attenuate spurious signals and reject harmonics for broad frequency band.
Shielded case	Reduced interference with and from the surrounding components.

#### 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](http://www.minicircuits.com/MCLStore/terms.jsp)



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## BPF-A587R5+

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CASE STYLE: HQ1157

### Features

- Very low insertion loss
- Good rejection
- Miniature shielded package

### Applications

- Military radio communication
- Radio microphones
- TV broadcasting

### Electrical Specifications at 25°C

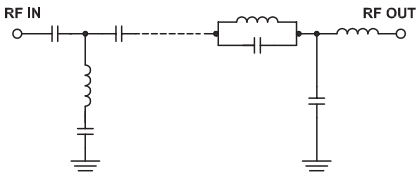
Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Center Frequency	—	—	587.5	—	MHz	
	Insertion Loss	F1-F2	475 - 700	—	1.20	1.8	dB
	VSWR	F1-F2	475 - 700	—	1.35	1.67	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 100	45	55	—	dB
		F3-F4	100 - 390	30	35	—	dB
	VSWR	DC-F4	DC - 390	—	20	—	:1
Stop Band, Upper	Insertion Loss	F5-F6	820 - 1000	30	39	—	dB
		F6-F7	1000 - 1500	45	50	—	dB
	VSWR	F5-F8	820 - 3800	—	20	—	:1

### Maximum Ratings

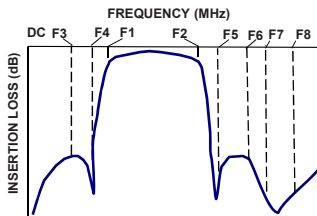
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input*	3 W Max. @ 25°C

\*Passband rating, derate linearly to 1 W at 85°C ambient  
Permanent damage may occur if any of these limits are exceeded.

### Functional Schematic



### Typical Frequency Response

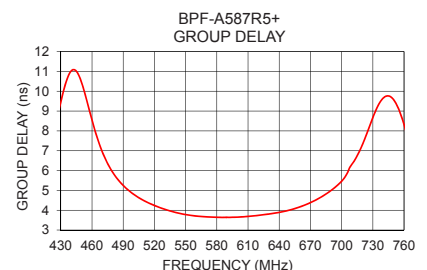
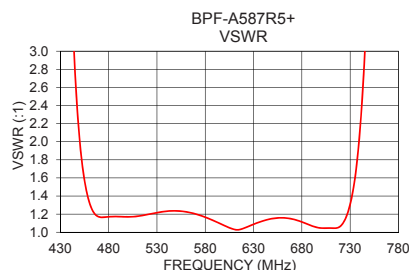
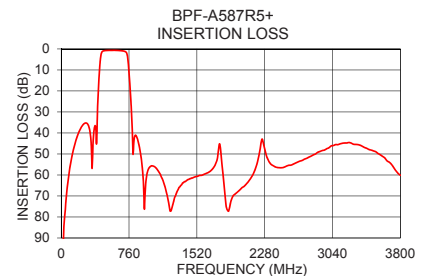
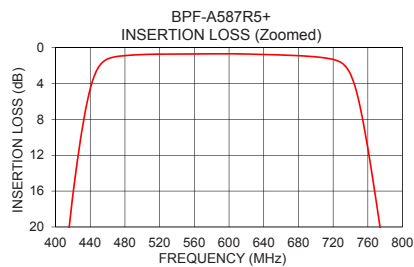


### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
10.0	101.53	532.93	475.0	6.35
100.0	55.89	1021.02	485.0	5.54
390.0	39.13	52.87	495.0	5.01
405.0	31.77	38.65	505.0	4.63
415.0	20.62	27.37	515.0	4.36
445.0	3.06	2.81	525.0	4.14
475.0	0.93	1.17	535.0	3.97
587.5	0.68	1.13	545.0	3.83
700.0	1.02	1.05	555.0	3.74
776.0	21.36	14.57	565.0	3.69
788.0	30.44	18.11	575.0	3.65
800.0	43.93	20.86	587.5	3.64
820.0	42.25	24.60	590.0	3.64
900.0	53.21	34.10	600.0	3.65
1000.0	55.96	39.43	610.0	3.69
1500.0	60.89	39.29	620.0	3.74
1700.0	56.90	39.59	630.0	3.81
2000.0	67.18	50.15	650.0	4.01
3000.0	47.05	12.06	670.0	4.38
3800.0	60.09	28.27	700.0	5.46

### +RoHS Compliant

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



### Notes

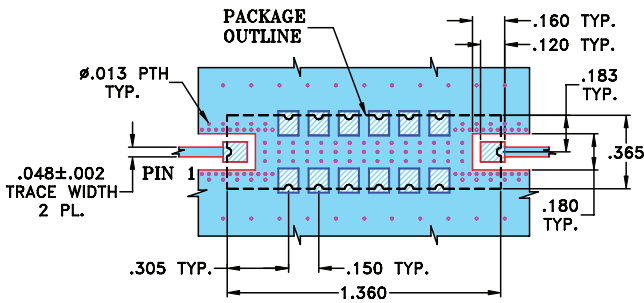
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## Pad Connections

INPUT	1
OUTPUT	8
GROUND	2,3,4,5,6,7,9,10,11,12,13,14

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

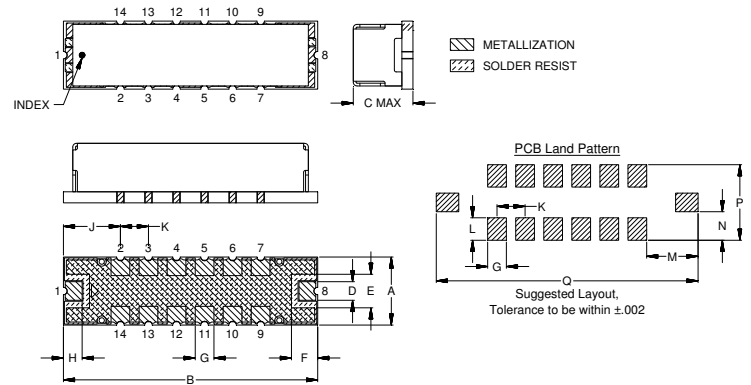


### NOTE:

- 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

## 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

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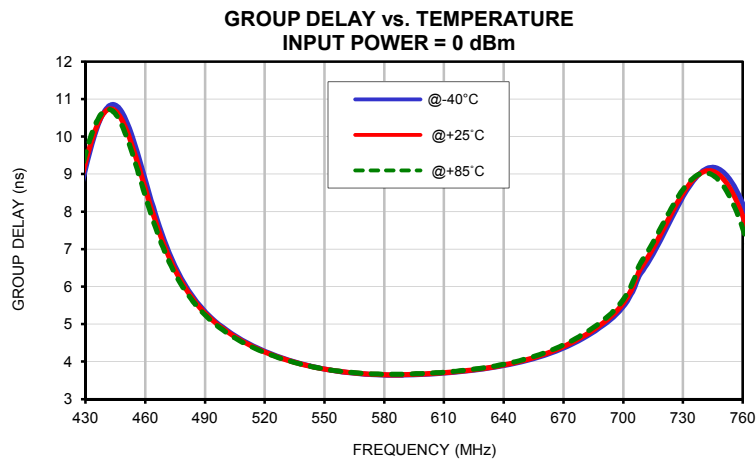
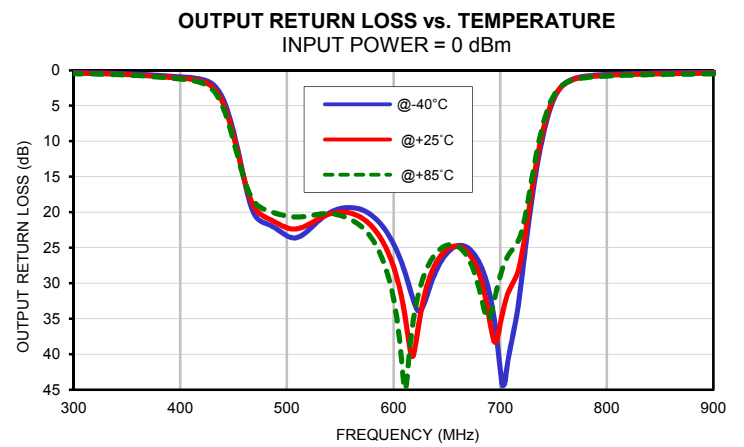
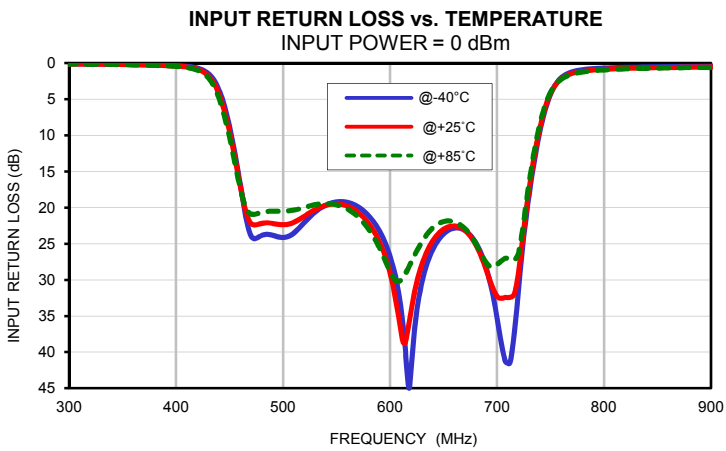
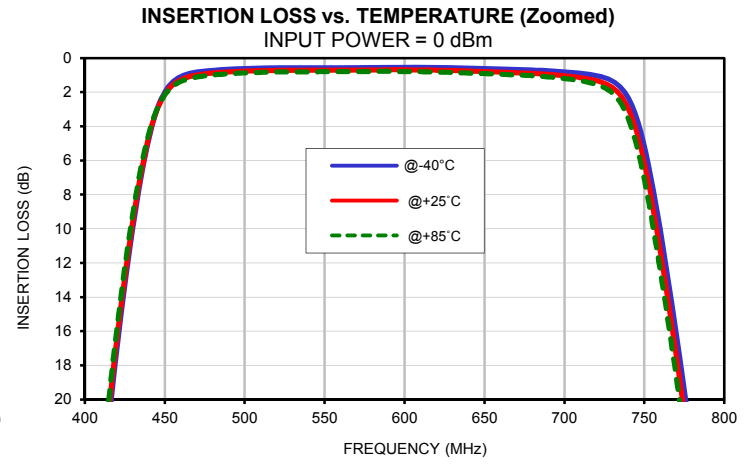
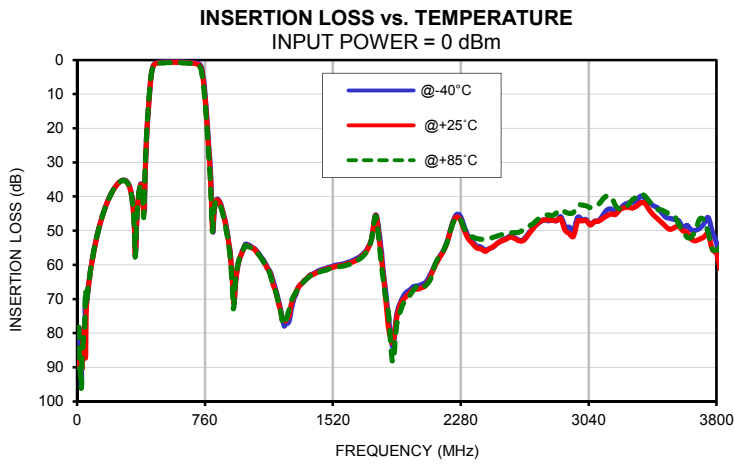
*Typical Performance Data*

FREQ.  (MHz)	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
10.0	79.65	86.14	78.28	0.04	0.04	0.04	0.04	0.04	0.04
20.0	86.70	87.47	91.67	0.03	0.03	0.03	0.03	0.04	0.03
40.0	78.44	82.05	79.39	0.02	0.02	0.04	0.03	0.04	0.05
100.0	55.93	56.05	55.46	0.01	0.02	0.03	0.11	0.13	0.15
120.0	51.21	51.18	51.15	0.00	0.02	0.03	0.16	0.18	0.20
300.0	35.88	36.02	36.13	0.08	0.11	0.12	0.31	0.41	0.49
390.0	38.41	39.10	39.76	0.28	0.33	0.37	0.83	1.00	1.10
400.0	44.15	41.36	39.41	0.34	0.41	0.45	0.93	1.12	1.24
415.0	21.32	20.61	19.97	0.53	0.65	0.75	1.13	1.38	1.57
419.0	17.86	17.23	16.65	0.64	0.79	0.91	1.23	1.51	1.73
445.0	3.05	3.08	3.02	5.81	6.49	7.21	6.03	6.66	7.34
475.0	0.76	0.93	1.04	24.24	22.38	20.87	21.22	20.24	19.31
587.5	0.55	0.69	0.78	22.58	23.95	24.82	21.58	23.55	25.89
600.0	0.54	0.69	0.79	26.73	29.02	28.84	24.46	27.67	32.21
620.0	0.55	0.71	0.82	41.77	33.91	27.45	33.06	39.24	33.91
640.0	0.59	0.76	0.88	25.76	24.57	22.78	28.21	27.10	25.74
700.0	0.80	1.03	1.20	35.24	32.27	27.90	42.20	35.80	28.98
776.0	20.10	21.43	22.76	1.00	1.22	1.32	0.93	1.05	1.12
780.0	22.89	24.26	25.63	0.90	1.12	1.22	0.83	0.96	1.04
788.0	29.05	30.55	32.11	0.78	0.98	1.08	0.71	0.84	0.92
800.0	42.01	44.16	46.45	0.68	0.85	0.94	0.60	0.72	0.81
820.0	42.19	42.11	42.06	0.58	0.73	0.80	0.48	0.60	0.70
840.0	40.93	41.25	41.59	0.52	0.65	0.72	0.41	0.53	0.63
900.0	52.83	53.31	54.11	0.44	0.54	0.59	0.28	0.41	0.51
960.0	59.06	59.10	58.96	0.38	0.48	0.55	0.21	0.35	0.46
1000.0	53.99	54.35	54.32	0.35	0.47	0.55	0.18	0.33	0.44
1100.0	58.14	58.48	58.50	0.29	0.45	0.57	0.13	0.31	0.42
1150.0	62.37	62.83	63.41	0.26	0.46	0.59	0.12	0.30	0.42
1160.0	63.94	64.82	64.92	0.26	0.46	0.59	0.12	0.30	0.42
1180.0	67.07	67.79	67.84	0.25	0.46	0.60	0.12	0.30	0.42
1200.0	71.25	71.96	71.74	0.25	0.47	0.61	0.11	0.30	0.42
1300.0	68.70	67.99	68.05	0.23	0.48	0.63	0.11	0.30	0.42
1400.0	62.71	62.88	62.94	0.23	0.49	0.64	0.11	0.30	0.42
1500.0	60.75	60.88	61.16	0.23	0.49	0.63	0.11	0.31	0.43
1700.0	56.70	57.10	57.42	0.26	0.50	0.62	0.11	0.30	0.42
1800.0	52.54	54.48	56.27	0.96	1.08	1.09	0.11	0.30	0.41
1875.0	83.91	82.91	88.43	0.23	0.45	0.57	0.10	0.29	0.41
1900.0	74.38	75.34	77.29	0.21	0.43	0.54	0.10	0.29	0.40
1900.0	74.38	75.34	77.29	0.21	0.43	0.54	0.10	0.29	0.40
2000.0	66.36	67.15	67.33	0.17	0.39	0.49	0.09	0.27	0.38
2100.0	62.79	63.37	64.15	0.16	0.37	0.48	0.08	0.26	0.36
2125.0	60.11	60.48	60.26	0.17	0.38	0.49	0.08	0.25	0.36
2175.0	55.86	56.19	56.00	0.23	0.45	0.58	0.07	0.25	0.35
2200.0	53.09	53.25	53.16	0.31	0.56	0.73	0.07	0.24	0.35
2300.0	48.75	49.81	49.22	0.52	0.69	0.74	0.05	0.22	0.32
2400.0	54.79	55.32	52.49	0.14	0.36	0.48	0.03	0.20	0.29
2500.0	53.60	53.62	51.52	0.11	0.35	0.48	0.01	0.18	0.27
2600.0	52.02	52.29	50.58	0.14	0.42	0.55	0.00	0.16	0.26
2700.0	49.70	49.94	48.28	0.16	0.48	0.70	0.03	0.14	0.24
2800.0	47.13	46.81	45.36	0.29	0.70	0.98	0.05	0.12	0.22
2900.0	48.78	49.85	44.54	0.57	1.12	1.51	0.07	0.10	0.21
3000.0	46.79	47.14	42.49	0.82	1.56	2.28	0.09	0.08	0.19
3100.0	47.02	47.21	42.20	1.10	2.07	2.91	0.11	0.07	0.17
3200.0	44.50	45.26	42.66	1.43	2.38	3.19	0.13	0.05	0.17
3300.0	41.78	43.39	40.94	1.55	2.30	2.60	0.14	0.03	0.16
3400.0	41.62	43.96	41.40	1.59	2.13	2.34	0.14	0.05	0.20
3500.0	46.09	48.87	44.62	1.39	1.75	1.88	0.15	0.04	0.19
3600.0	49.06	50.05	50.07	0.77	1.13	1.27	0.15	0.05	0.19
3700.0	49.29	52.47	46.56	0.45	0.80	0.95	0.17	0.04	0.22
3800.0	53.63	56.71	55.67	0.28	0.62	0.79	0.17	0.05	0.19

*Typical Performance Data*

FREQ.	GROUP DELAY		
	(ns)		
	@-40°C	@+25°C	@+85°C
(MHz)			
475.0	6.54	6.44	6.34
481.0	5.96	5.88	5.82
487.0	5.52	5.46	5.41
493.0	5.18	5.14	5.10
499.0	4.91	4.88	4.84
505.0	4.69	4.66	4.63
511.0	4.50	4.48	4.46
517.0	4.35	4.32	4.31
523.0	4.21	4.19	4.18
529.0	4.09	4.08	4.07
535.0	3.99	3.98	3.98
541.0	3.90	3.90	3.90
547.0	3.83	3.83	3.83
553.0	3.77	3.77	3.78
559.0	3.73	3.73	3.73
565.0	3.69	3.70	3.70
571.0	3.66	3.67	3.68
577.0	3.65	3.66	3.67
583.0	3.64	3.65	3.66
585.0	3.64	3.65	3.66
587.5	3.64	3.65	3.66
590.0	3.64	3.65	3.67
592.0	3.64	3.66	3.67
594.0	3.65	3.66	3.67
596.0	3.65	3.66	3.68
598.0	3.66	3.67	3.68
600.0	3.66	3.67	3.68
602.0	3.67	3.68	3.69
604.0	3.67	3.68	3.70
606.0	3.68	3.69	3.70
608.0	3.69	3.70	3.71
610.0	3.69	3.70	3.72
612.0	3.70	3.71	3.73
614.0	3.71	3.72	3.73
616.0	3.72	3.73	3.74
618.0	3.73	3.74	3.75
620.0	3.74	3.75	3.77
622.0	3.75	3.76	3.78
624.0	3.77	3.78	3.79
626.0	3.78	3.79	3.80
628.0	3.79	3.80	3.82
630.0	3.81	3.82	3.83
632.0	3.82	3.83	3.85
634.0	3.84	3.85	3.87
644.0	3.94	3.95	3.98
654.0	4.06	4.09	4.12
664.0	4.23	4.27	4.31
674.0	4.46	4.50	4.55
684.0	4.75	4.81	4.87
694.0	5.14	5.21	5.29
700.0	5.46	5.55	5.65

## Typical Performance Curves

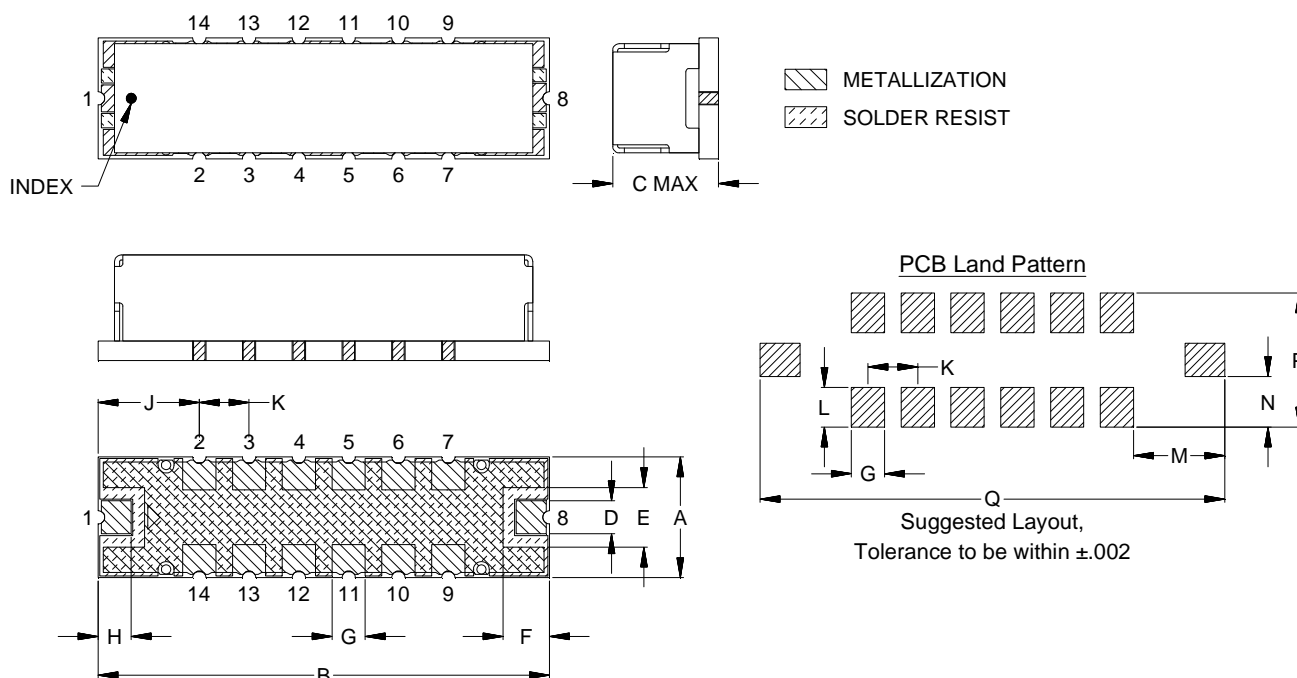


# Case Style

# 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:

- 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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ISO 9001 ISO 14001 CERTIFIED

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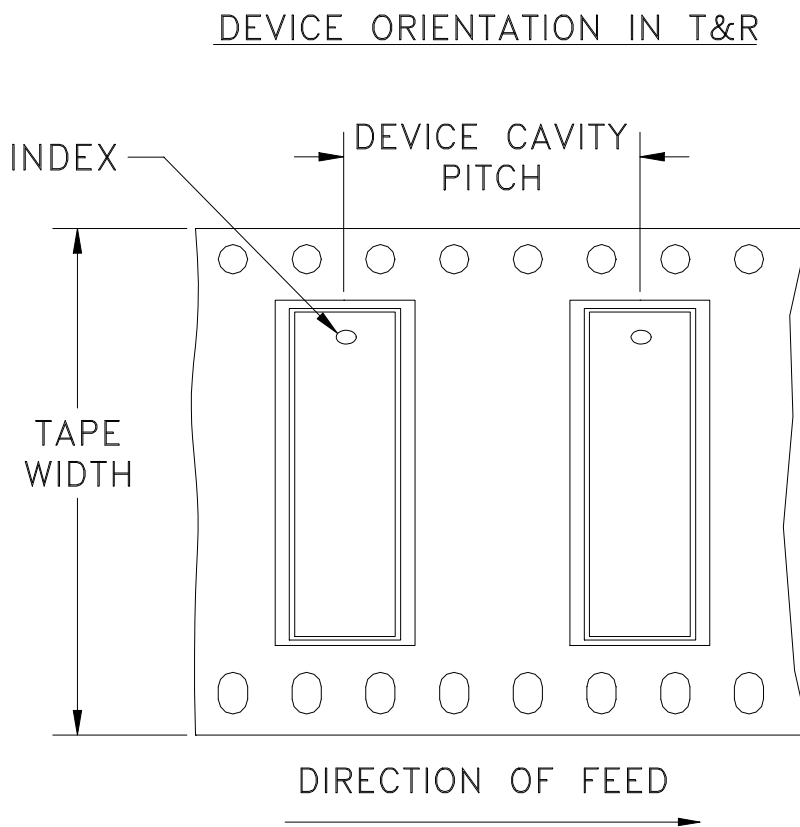
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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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.

Go to: [www.minicircuits.com/pages/pdfs/tape.pdf](http://www.minicircuits.com/pages/pdfs/tape.pdf)



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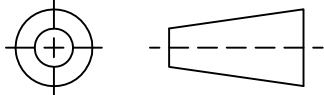
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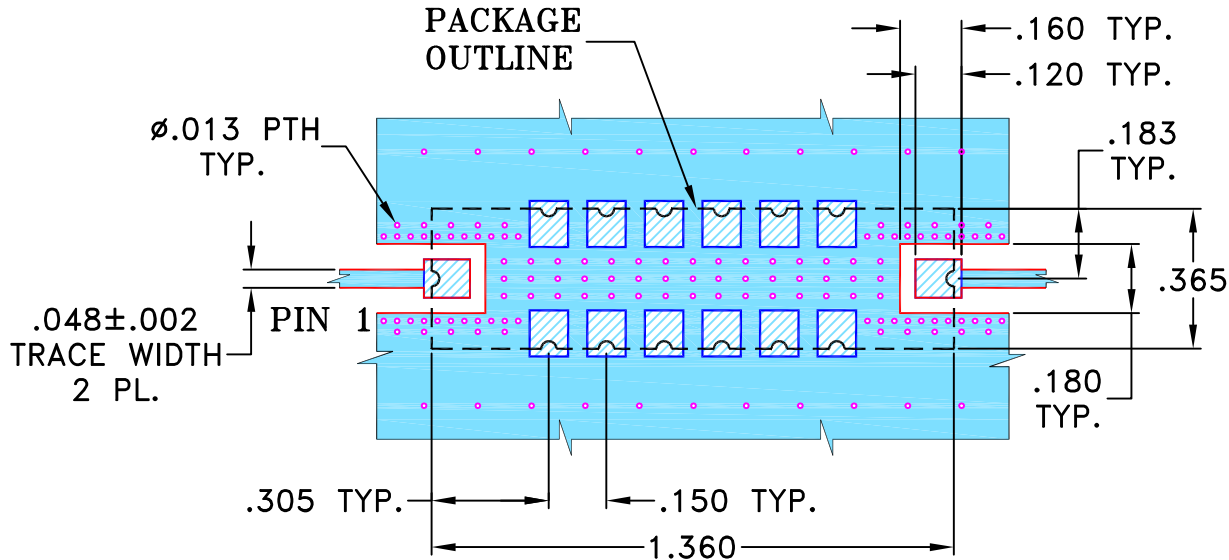
THIRD ANGLE PROJECTION



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

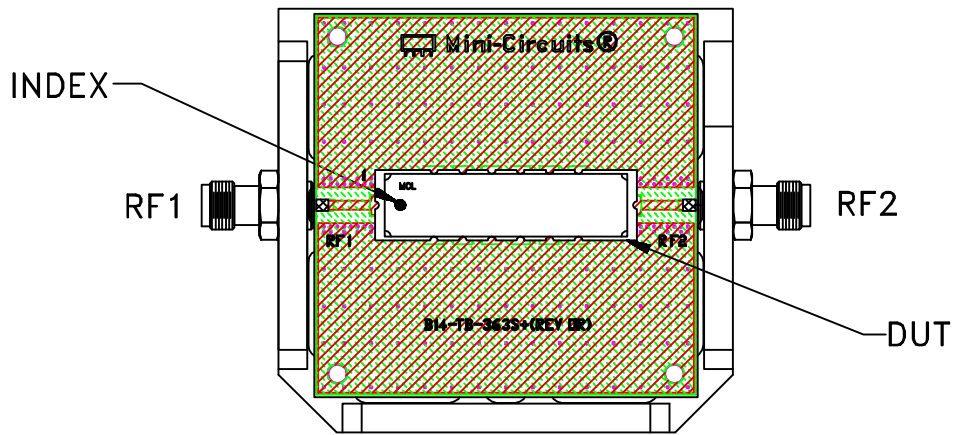
**Mini-Circuits®** 13 Neptune Avenue  
Brooklyn NY 11235

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

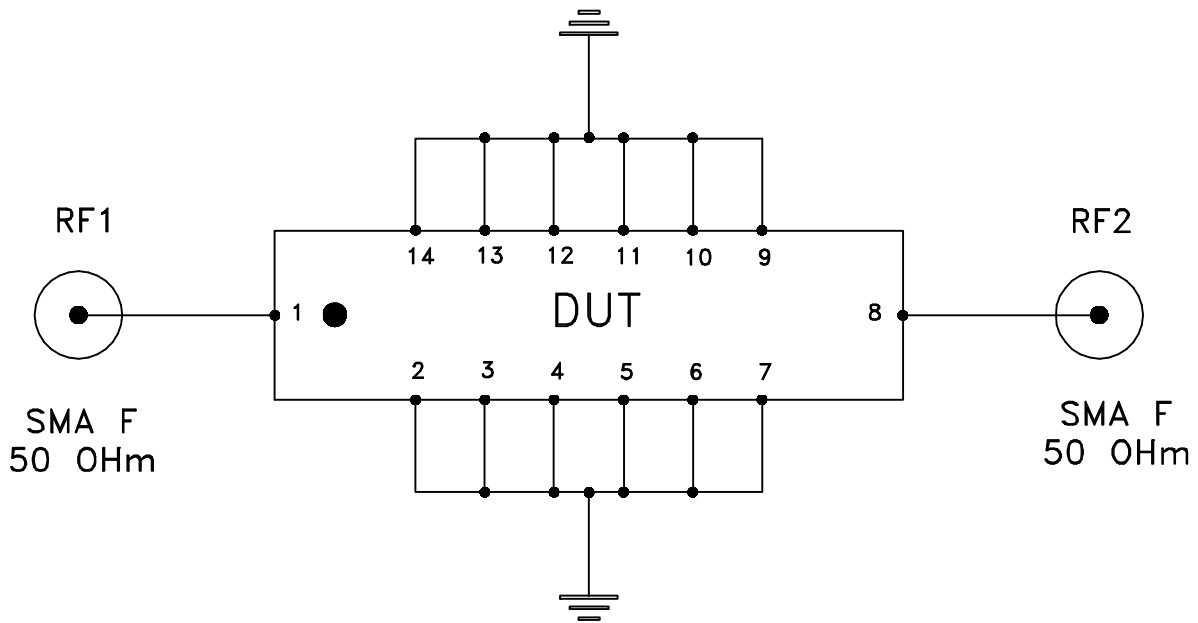
SIZE <b>A</b>	CODE IDENT <b>15542</b>	DRAWING NO: <b>98-PL-227</b>	REV: <b>C</b>
FILE: <b>98PL227</b>	SCALE: <b>2:1</b>	SHEET: <b>1 OF 1</b>	

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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	-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