

Surface Mount Bandpass Filter

BPF-A1140+

50Ω 840 to 1440 MHz



Generic photo used for illustration purposes only
CASE STYLE: HQ1157

The Big Deal

- Wide bandwidth
- Better rejection
- Miniature shielded package

Product Overview

The BPF-A1140+ is a 50Ω bandpass filter fabricated using SMT technology. This bandpass filter covers from 840-1440 MHz. This filter is built with high Q capacitors and air-coil inductors for superior performance. This filter is developed for square kilometer array telescope systems for radio astronomy. It has repeatable performance across lots and consistent performance across temperature.

Key Features

Feature	Advantages
Low insertion loss	Can be used in high performance applications such as radio astronomy.
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



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Features

- Wide bandwidth
- Better rejection
- Miniature shielded package

Applications

- Radio telescope Applications
- Radio astronomy
- Defense systems
- Space operation / space research
- Wireless medical telemetry

Electrical Specifications at 25°C

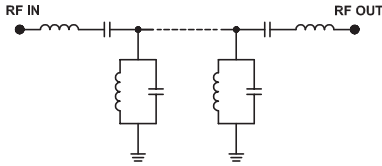
Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Center Frequency	—	—	1140	—	MHz	
	Insertion Loss	F1-F2	840-1440	—	2.5	4.0	dB
	VSWR	F1-F2	840-1440	—	1.5	1.9	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC-711	20	30	—	dB
	VSWR	DC-F3	DC-711	—	10	—	:1
Stop Band, Upper	Insertion Loss	F4-F5	1577-3000	20	30	—	dB
	VSWR	F4-F5	1577-3000	—	7.0	—	:1

Maximum Ratings

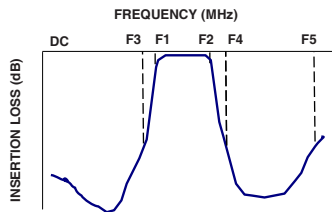
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	1 W

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

Functional Schematic



Typical Frequency Response

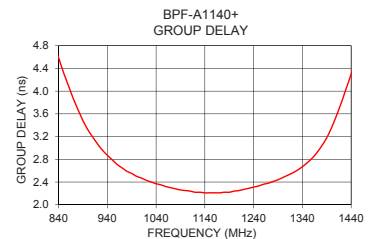
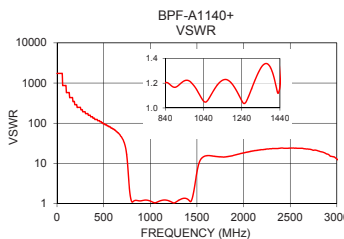
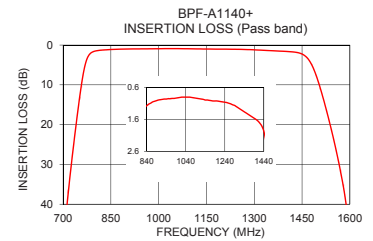
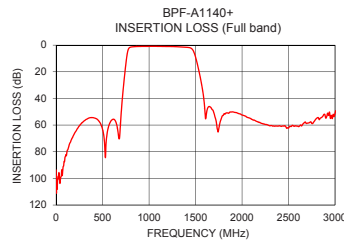


Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
1	93.74	1737.18	840	4.59
316	56.11	173.72	890	3.48
711	41.31	37.77	910	3.19
736	23.17	24.14	930	2.96
756	10.87	9.96	950	2.79
771	4.46	3.35	970	2.65
786	2.08	1.54	1000	2.50
840	1.17	1.20	1030	2.40
990	0.93	1.18	1090	2.26
1140	0.99	1.22	1110	2.24
1300	1.20	1.19	1140	2.21
1440	1.97	1.17	1160	2.21
1477	4.47	2.83	1200	2.24
1502	9.50	6.42	1240	2.31
1542	21.30	12.71	1290	2.44
1577	34.42	14.87	1330	2.61
1752	61.83	14.62	1370	2.92
1977	51.62	17.75	1400	3.36
2500	62.22	23.81	1420	3.80
3000	51.17	12.89	1440	4.30

+RoHS Compliant

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



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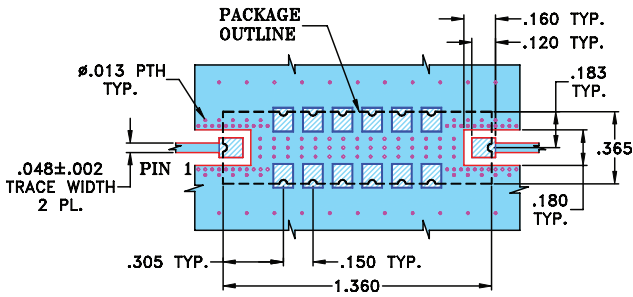
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Page 2 of 3

Pad Connections

INPUT	1
OUTPUT	8
GROUND	2-7,9,-14

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

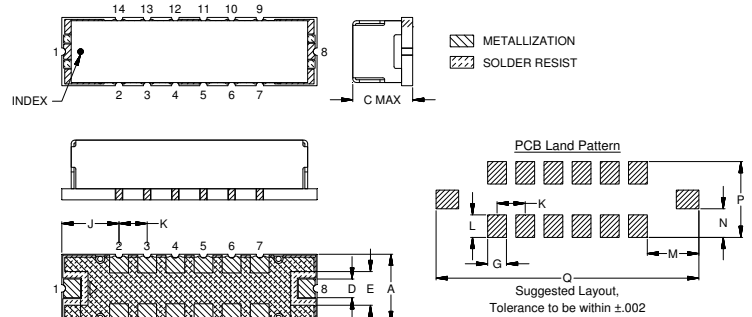


NOTE:

- 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)

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
1	106.84	93.74	104.63	0.00	0.00	0.00	0.00	0.00	0.00
6	98.31	101.98	99.40	0.00	0.00	0.00	0.00	0.00	0.00
16	112.74	101.54	100.56	0.00	0.00	0.01	0.01	0.01	0.01
36	95.28	99.20	108.04	0.01	0.01	0.01	0.01	0.02	0.03
46	123.44	100.95	97.08	0.01	0.01	0.02	0.02	0.03	0.03
101	84.63	83.50	85.23	0.01	0.03	0.04	0.06	0.09	0.11
231	62.37	62.48	62.44	0.04	0.07	0.10	0.31	0.38	0.42
286	57.73	57.84	57.93	0.05	0.09	0.13	0.43	0.52	0.56
321	55.75	55.84	56.02	0.06	0.10	0.14	0.48	0.58	0.64
401	54.34	54.46	54.54	0.09	0.13	0.17	0.47	0.58	0.68
476	58.42	58.57	58.89	0.12	0.16	0.21	0.41	0.52	0.63
506	64.50	64.99	65.66	0.14	0.18	0.22	0.39	0.51	0.62
531	87.75	84.29	80.96	0.15	0.19	0.23	0.39	0.52	0.63
616	55.52	55.59	55.67	0.21	0.25	0.29	0.52	0.67	0.79
671	67.88	68.09	68.52	0.28	0.33	0.38	0.78	0.99	1.14
681	72.36	70.18	68.98	0.29	0.36	0.40	0.86	1.09	1.24
686	69.09	66.48	64.27	0.31	0.37	0.42	0.91	1.14	1.31
711	42.46	41.31	40.13	0.38	0.46	0.53	1.22	1.52	1.74
726	30.89	29.97	28.98	0.47	0.58	0.67	1.50	1.87	2.17
741	20.70	19.92	19.00	0.66	0.83	1.00	1.94	2.42	2.83
751	14.39	13.72	12.91	1.01	1.29	1.58	2.46	3.05	3.61
766	6.39	6.13	5.75	2.98	3.66	4.45	4.51	5.38	6.27
776	3.23	3.29	3.27	6.58	7.60	8.81	7.79	8.72	9.64
791	1.57	1.80	1.97	15.50	17.02	18.63	14.99	15.44	15.58
806	1.18	1.42	1.61	27.70	27.44	24.37	21.73	20.55	18.96
840	0.95	1.17	1.34	21.05	20.71	19.95	20.04	19.82	19.25
860	0.89	1.09	1.25	20.66	21.05	21.24	21.08	21.91	22.65
890	0.81	1.01	1.17	22.14	22.29	22.10	25.94	28.90	32.40
910	0.78	0.98	1.15	22.33	21.51	20.26	26.44	26.44	24.41
1000	0.71	0.92	1.08	24.42	22.71	21.26	23.82	22.56	21.18
1050	0.69	0.90	1.06	36.62	32.78	31.58	37.94	35.26	37.61
1100	0.72	0.94	1.13	24.34	22.68	20.68	25.04	24.28	22.62
1160	0.76	1.00	1.21	21.55	19.77	17.93	21.78	20.85	19.25
1250	0.82	1.07	1.27	30.53	34.87	36.59	27.98	32.08	33.87
1320	0.98	1.28	1.55	19.16	18.72	17.39	19.51	19.35	18.17
1430	1.38	1.81	2.18	24.88	25.09	24.69	30.66	32.29	36.23
1440	1.50	1.97	2.40	22.10	22.15	20.34	26.66	28.72	26.01
1477	3.36	4.47	5.59	7.10	6.41	5.72	8.81	8.08	7.33
1497	6.68	8.28	9.78	3.30	3.17	3.04	4.54	4.42	4.29
1517	11.79	13.58	15.20	1.74	1.90	1.99	2.63	2.84	2.97
1537	17.87	19.68	21.33	1.21	1.43	1.58	1.83	2.13	2.34
1557	24.67	26.50	28.22	1.02	1.25	1.40	1.44	1.75	1.99
1577	32.59	34.42	36.35	0.96	1.17	1.31	1.21	1.52	1.77
1607	52.89	55.17	54.80	0.92	1.12	1.25	0.98	1.28	1.54
1622	49.14	49.25	48.78	0.91	1.11	1.25	0.91	1.20	1.45
1647	45.11	46.04	46.58	0.92	1.12	1.26	0.81	1.10	1.35
1677	47.06	48.28	49.55	0.94	1.15	1.30	0.72	1.00	1.25
1687	48.05	48.85	50.59	0.95	1.15	1.32	0.70	0.98	1.23
1742	66.46	65.16	61.91	0.95	1.19	1.40	0.61	0.88	1.12
1767	57.32	57.06	54.93	0.93	1.20	1.43	0.58	0.85	1.09
1837	50.75	50.81	50.91	0.88	1.17	1.44	0.53	0.79	1.02
2300	60.07	60.53	60.60	0.51	0.75	0.95	0.46	0.67	0.85
2400	61.06	60.52	61.20	0.49	0.72	0.92	0.45	0.65	0.82
2500	60.45	62.22	60.43	0.49	0.73	0.92	0.45	0.64	0.81
2610	60.32	61.12	59.00	0.48	0.73	0.94	0.43	0.62	0.79
2840	54.60	54.89	52.91	0.58	0.90	1.19	0.41	0.59	0.75
2940	49.24	50.26	48.72	0.76	1.16	1.56	0.40	0.58	0.74
2950	54.35	55.00	51.71	0.75	1.17	1.58	0.40	0.58	0.74
2970	58.84	55.12	53.48	0.74	1.19	1.64	0.39	0.57	0.73
3000	54.38	51.17	53.48	0.85	1.35	1.80	0.38	0.57	0.73



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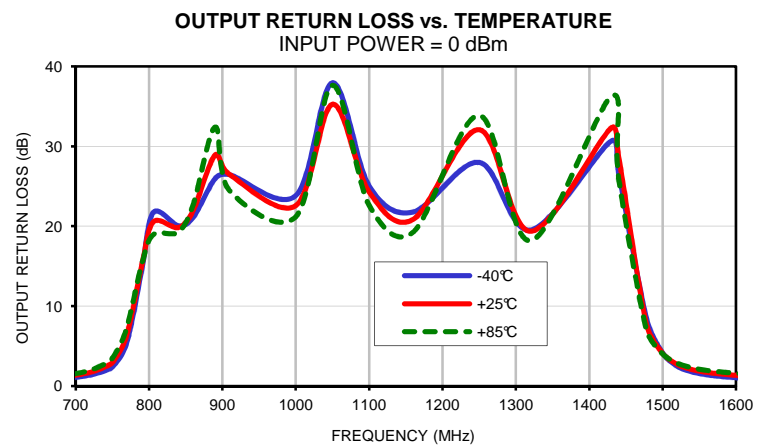
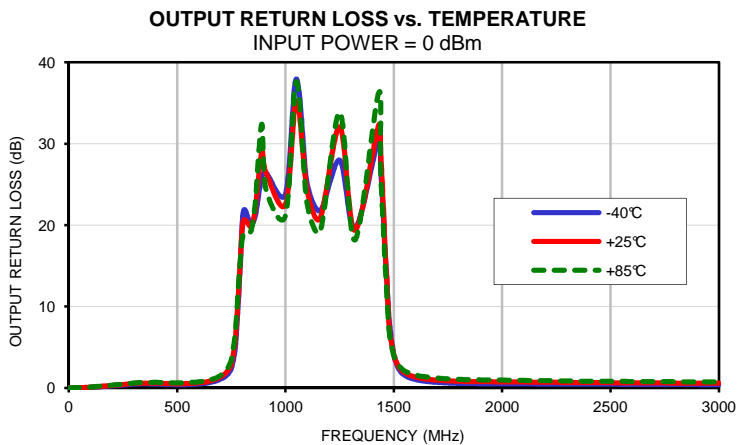
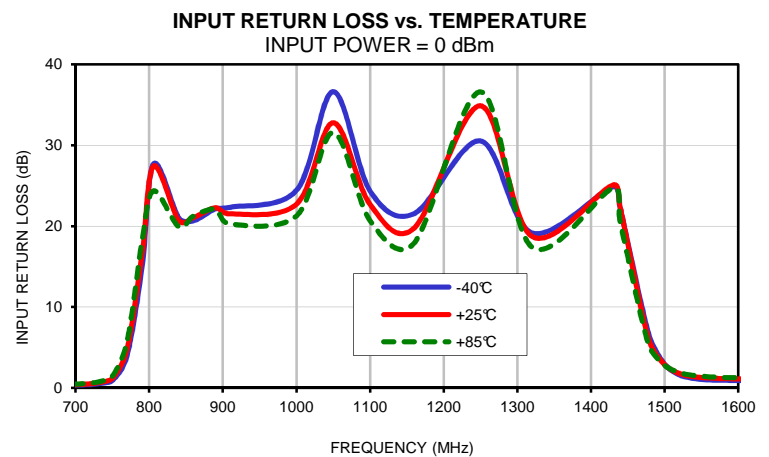
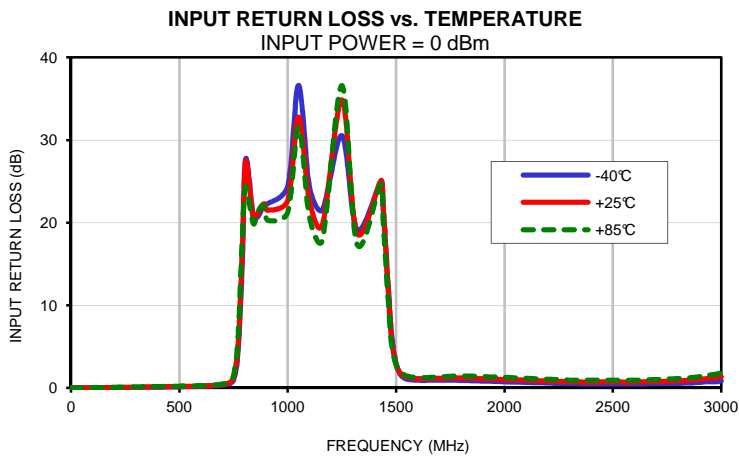
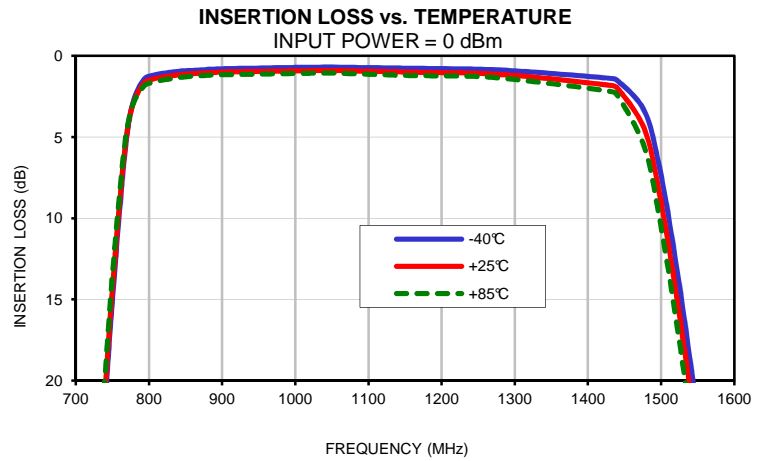
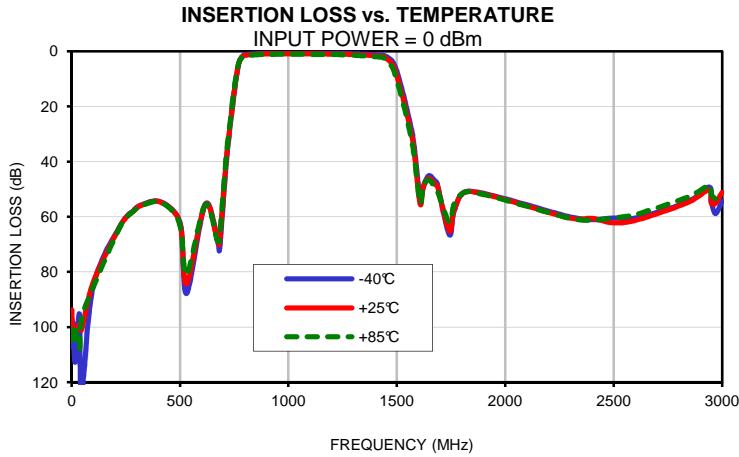
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IF/RF MICROWAVE COMPONENTS

Typical Performance Data

FREQ. (MHz)	GROUP DELAY		
	(nsec)		
	@-40°C	@+25°C	@+85°C
840	4.65	4.59	4.53
850	4.38	4.33	4.28
860	4.14	4.10	4.06
870	3.91	3.87	3.84
880	3.70	3.67	3.64
890	3.50	3.48	3.46
900	3.34	3.32	3.31
910	3.21	3.19	3.17
920	3.08	3.07	3.05
930	2.98	2.96	2.95
940	2.88	2.87	2.85
950	2.80	2.79	2.77
960	2.73	2.71	2.70
970	2.66	2.65	2.64
980	2.61	2.59	2.59
990	2.55	2.55	2.54
1000	2.51	2.50	2.50
1010	2.47	2.47	2.46
1020	2.43	2.43	2.43
1030	2.40	2.40	2.40
1040	2.37	2.37	2.38
1050	2.35	2.35	2.35
1060	2.32	2.32	2.33
1070	2.30	2.30	2.30
1080	2.28	2.28	2.28
1090	2.26	2.26	2.27
1100	2.25	2.25	2.25
1110	2.24	2.24	2.24
1120	2.22	2.22	2.22
1130	2.22	2.22	2.22
1140	2.21	2.21	2.21
1150	2.21	2.21	2.21
1170	2.21	2.21	2.21
1180	2.21	2.22	2.22
1190	2.22	2.22	2.23
1200	2.23	2.24	2.25
1210	2.24	2.25	2.26
1220	2.26	2.27	2.28
1230	2.27	2.29	2.30
1240	2.29	2.31	2.33
1250	2.32	2.33	2.35
1260	2.34	2.36	2.38
1270	2.36	2.38	2.40
1280	2.39	2.41	2.43
1290	2.42	2.44	2.46
1300	2.46	2.48	2.50
1310	2.49	2.52	2.54
1320	2.54	2.56	2.58
1330	2.59	2.61	2.63
1340	2.65	2.67	2.69
1350	2.71	2.74	2.77
1360	2.79	2.82	2.86
1370	2.88	2.92	2.96
1380	2.99	3.04	3.09
1390	3.12	3.18	3.25
1400	3.28	3.36	3.44
1410	3.48	3.57	3.68
1420	3.69	3.80	3.93
1430	3.91	4.05	4.19
1440	4.15	4.30	4.45

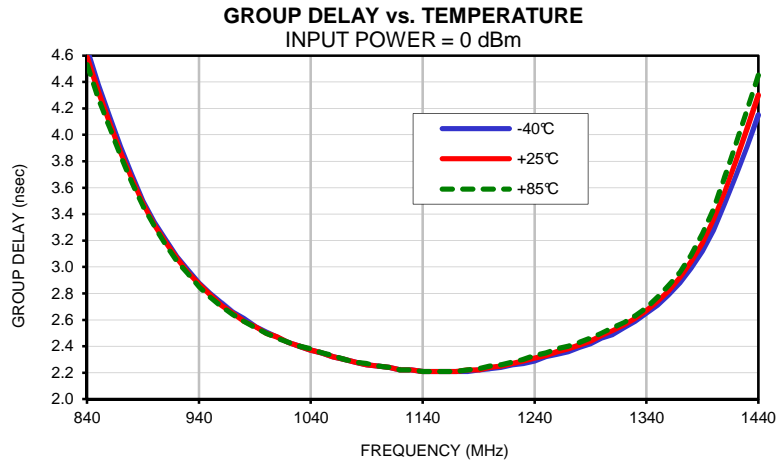
Typical Performance Curves



Band Pass Filter

BPF-A1140+

Typical Performance Curves

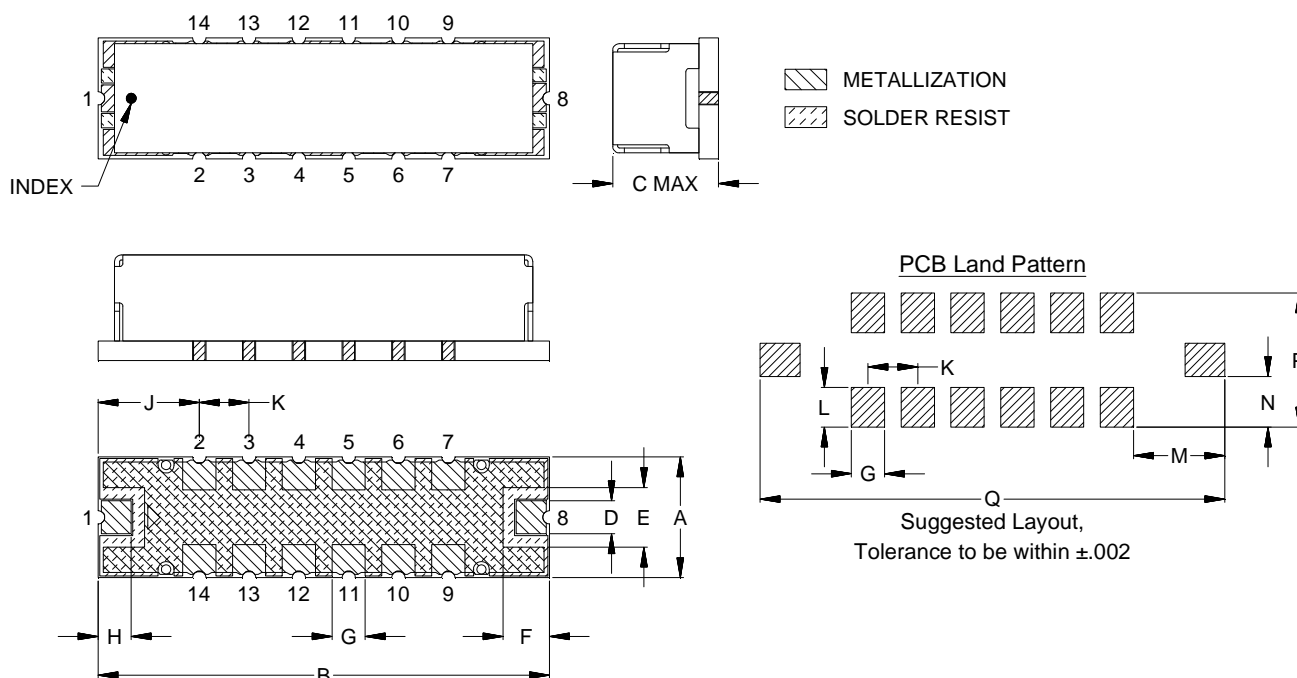


Case Style

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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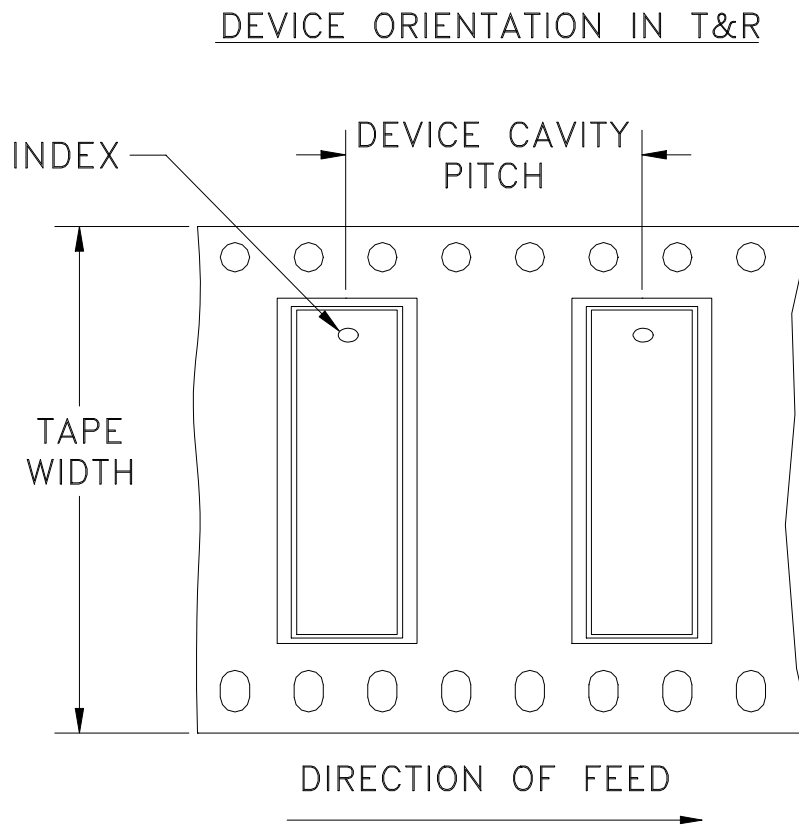
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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F83



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



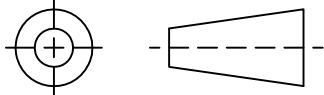
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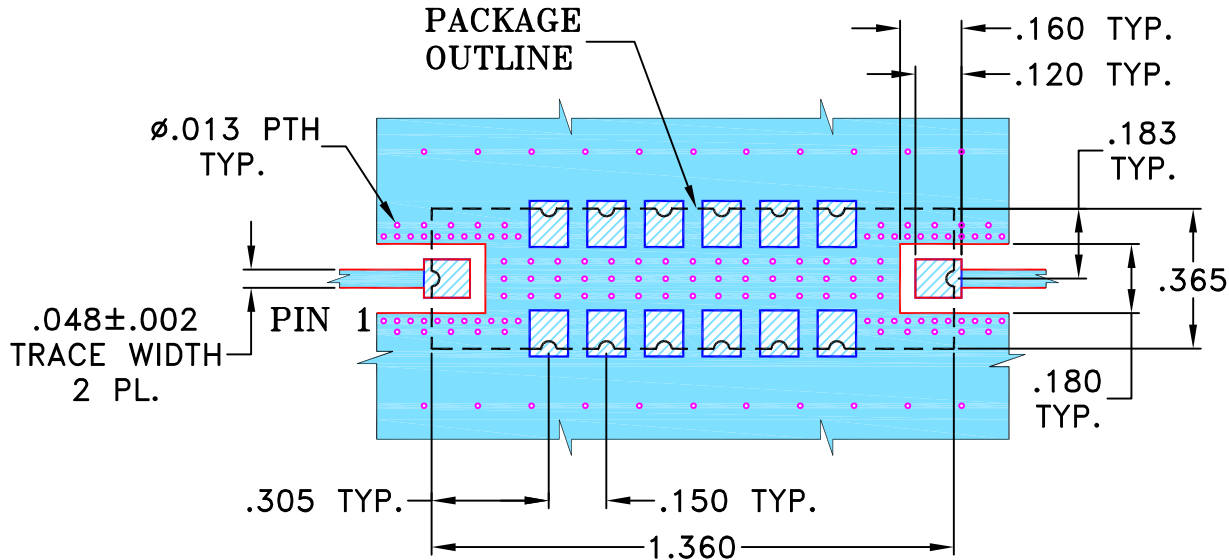
THIRD ANGLE PROJECTION



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**



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

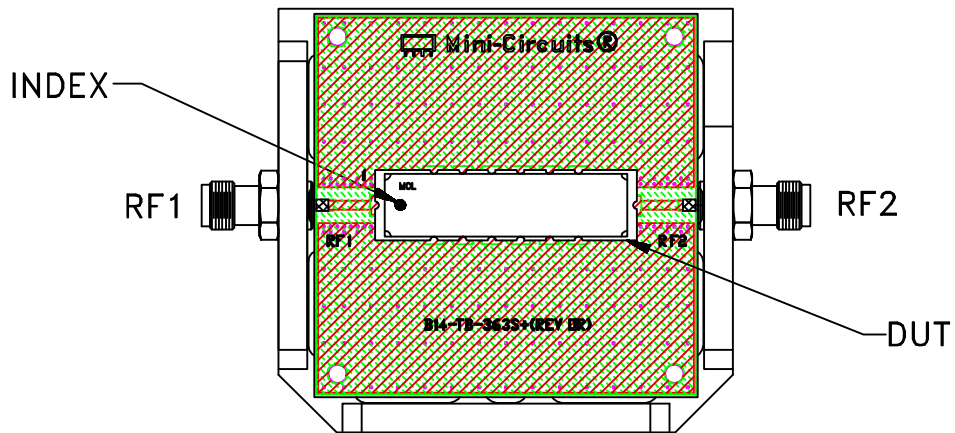
Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

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

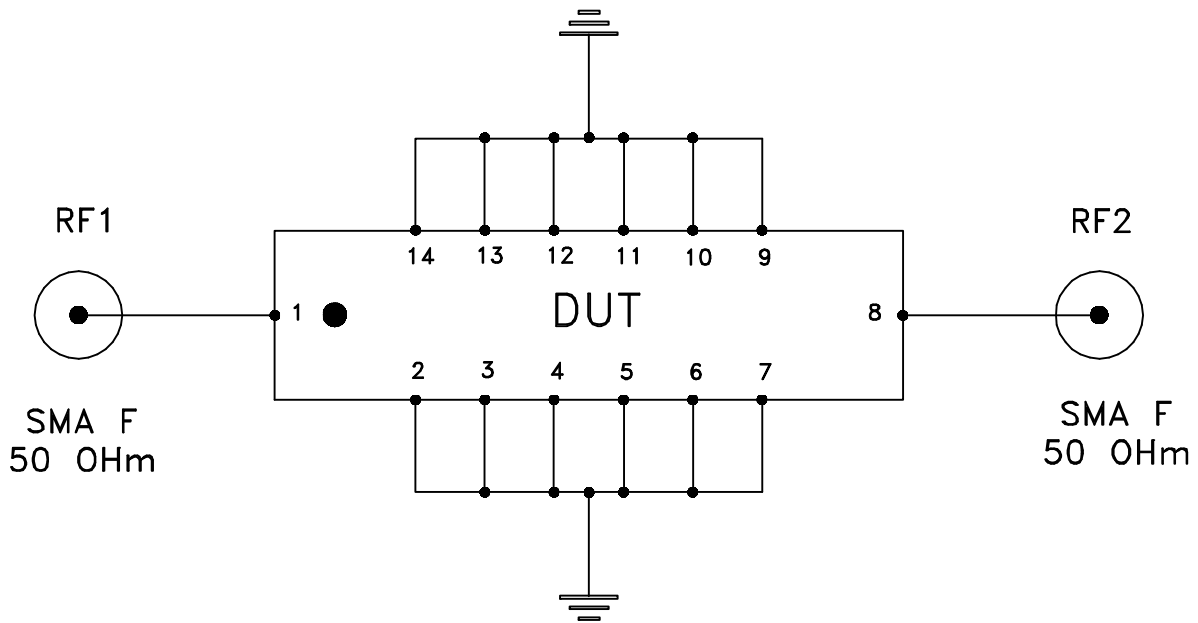
SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-227	REV: C
FILE: 98PL227	SCALE: 2:1	SHEET: 1 OF 1	

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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