Surface Mount

Bandpass Filter

BPF-A490+

50Ω 400 to 600 MHz

Generic photo used for illustration purposes only

CASE STYLE: HQ1157

Maximum Ratings

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

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

Features

- Good VSWR, 1.5:1 typ @ passband
- High rejection
- Shielded case
- Aqueous washable

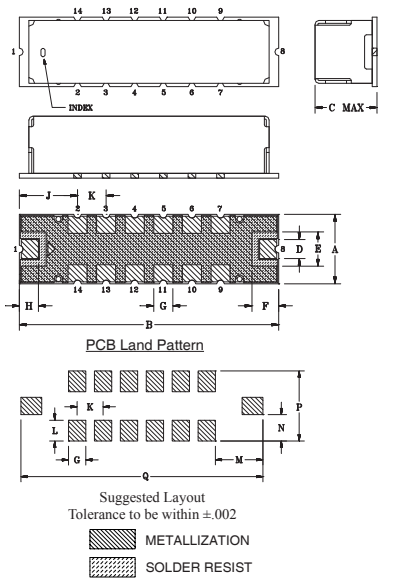
Applications

- Industrial microwave and RF
- Harmonic rejection
- Transmitters/receivers

+RoHS Compliant

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

Outline Drawing



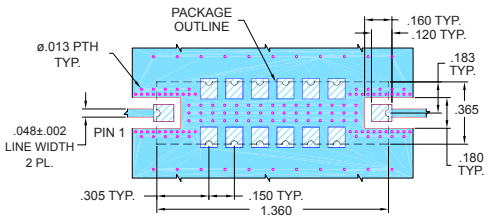
Outline Dimensions (inch / mm)

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 case to style drawing for details

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



NOTES:

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.

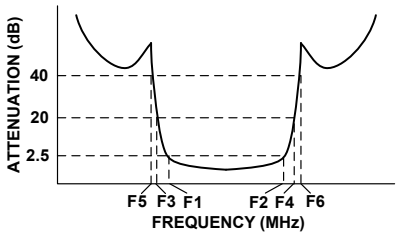
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

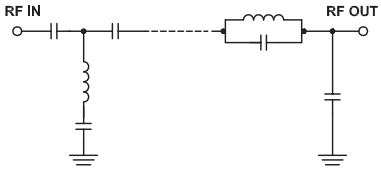
Bandpass Filter Electrical Specifications (T_{AMB}= 25ºC)

CENTER FREQ. (MHz)	PASSBAND (MHz) (Loss < 2.5dB)	STOPBANDS (MHz)				VSWR (:1)		
		Loss > 20dB		Loss > 40dB		Passband		Stopband
Fc	F1 - F2	F3	F4	F5	F6	Typ.	Max.	Typ.
490	400 - 600	280	680	250	710 - 2000	1.5	2.0	20

Typical Frequency Response

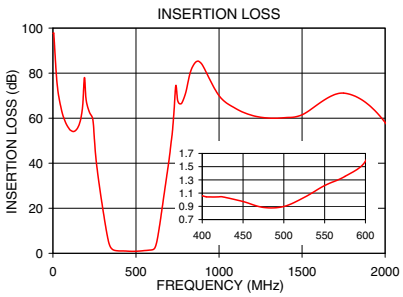


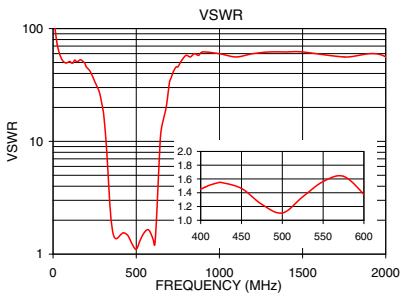
Functional Schematic



Typical Performance Data at 25ºC

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
0.5	97.60	157.93
250	50.45	34.07
280	29.80	26.74
305	17.53	16.89
325	8.65	7.14
335	5.20	3.98
350	2.39	1.94
400	1.06	1.45
450	0.97	1.46
490	0.89	1.14
550	1.21	1.56
600	1.58	1.37
620	3.55	1.80
630	6.82	3.69
650	16.16	12.52
680	31.67	20.03
710	48.29	36.58
2000	58.12	56.04





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

Surface Mount Band Pass Filter BPF-A490+

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	90.54	103.84	101.96	0.01	0.00	0.00	0.07	0.11	0.13
10	96.58	90.90	93.43	0.01	0.00	0.00	0.13	0.18	0.20
50	64.71	64.07	63.14	0.01	0.02	0.02	0.29	0.34	0.35
100	55.15	54.89	55.14	0.01	0.03	0.05	0.30	0.40	0.46
150	56.33	56.16	56.32	0.04	0.07	0.10	0.27	0.38	0.42
200	65.71	66.02	65.44	0.10	0.14	0.17	0.30	0.43	0.44
250	50.85	50.51	50.36	0.21	0.26	0.30	0.40	0.57	0.57
280	30.78	30.52	30.43	0.36	0.43	0.49	0.54	0.77	0.77
305	18.05	17.81	17.65	0.71	0.83	0.93	0.87	1.24	1.27
325	8.94	8.80	8.58	1.89	2.17	2.43	2.09	2.75	2.94
335	5.27	5.34	5.19	3.60	3.98	4.45	3.87	4.68	5.07
350	2.27	2.59	2.57	8.29	8.50	9.30	8.60	8.94	9.53
400	1.06	1.40	1.47	13.06	12.37	12.22	12.31	11.62	11.41
450	0.91	1.20	1.22	14.14	14.58	14.67	13.87	14.44	14.59
490	0.71	1.06	1.07	32.67	26.13	23.18	26.45	25.57	24.44
500	0.74	1.11	1.13	21.40	19.61	18.22	20.84	19.60	18.77
510	0.81	1.21	1.22	16.97	16.23	15.34	16.98	16.30	15.76
520	0.89	1.30	1.30	14.44	14.24	13.57	14.58	14.32	13.99
530	1.00	1.42	1.41	12.92	13.06	12.52	13.08	13.15	12.97
550	1.17	1.61	1.56	11.67	12.44	11.97	11.84	12.50	12.53
560	1.18	1.65	1.58	11.84	12.91	12.43	11.99	12.98	13.11
570	1.20	1.71	1.60	12.59	13.94	13.43	12.77	14.17	14.44
580	1.21	1.78	1.65	14.02	15.47	14.96	14.41	16.50	16.89
590	1.21	1.90	1.72	16.09	16.78	16.30	17.69	20.97	21.12
600	1.32	2.24	1.97	16.73	15.38	15.09	21.94	20.06	19.85
610	1.78	3.10	2.63	12.49	11.20	11.33	14.29	11.71	12.31
620	3.02	4.95	4.14	7.55	7.19	7.46	7.59	6.39	6.96
630	5.64	8.17	7.02	4.25	4.57	4.71	3.79	3.48	3.78
650	14.61	17.48	16.27	1.78	2.38	2.40	1.20	1.46	1.54
660	19.36	22.26	21.16	1.35	1.90	1.91	0.86	1.14	1.21
670	24.36	27.24	26.20	1.12	1.61	1.64	0.69	0.96	1.05
680	29.62	32.55	31.53	0.95	1.40	1.42	0.59	0.87	0.95
690	34.95	37.95	36.98	0.84	1.24	1.28	0.51	0.77	0.87
700	40.26	43.42	42.48	0.75	1.11	1.15	0.46	0.71	0.81
710	46.04	49.58	48.46	0.67	1.00	1.06	0.43	0.67	0.76
720	53.21	57.08	55.82	0.61	0.92	0.98	0.39	0.63	0.72
730	62.08	69.45	66.09	0.57	0.87	0.91	0.36	0.59	0.69
750	69.04	67.96	69.11	0.54	0.81	0.86	0.33	0.57	0.67
760	66.52	67.28	67.18	0.51	0.76	0.81	0.31	0.54	0.65
770	66.98	67.20	68.05	0.49	0.73	0.78	0.29	0.52	0.62
780	68.95	71.71	69.21	0.48	0.71	0.76	0.29	0.52	0.61
790	71.13	72.38	71.64	0.46	0.68	0.72	0.27	0.48	0.59
800	76.95	77.39	75.04	0.46	0.67	0.72	0.27	0.48	0.58
900	76.48	75.28	73.49	0.42	0.61	0.62	0.20	0.40	0.46
1000	90.41	86.23	85.18	0.44	0.67	0.65	0.17	0.35	0.40
1100	71.18	72.41	72.38	0.51	0.86	0.80	0.16	0.32	0.36
1200	63.02	69.91	63.62	0.64	1.19	1.12	0.17	0.32	0.34
1300	64.57	64.94	64.84	0.73	1.48	1.45	0.15	0.30	0.33
1400	63.02	63.49	63.95	0.81	1.62	1.61	0.15	0.30	0.34
1500	64.24	66.73	66.98	0.77	1.53	1.54	0.14	0.29	0.35
1600	67.32	72.24	71.15	0.70	1.39	1.42	0.13	0.32	0.37
1700	81.95	75.21	83.77	0.64	1.27	1.29	0.09	0.30	0.35
1800	73.59	70.82	71.62	0.59	1.17	1.21	0.07	0.28	0.39
1900	65.35	59.67	57.04	0.55	1.12	1.14	0.08	0.36	0.42
2000	74.20	67.13	68.86	0.54	1.08	1.09	0.07	0.34	0.47

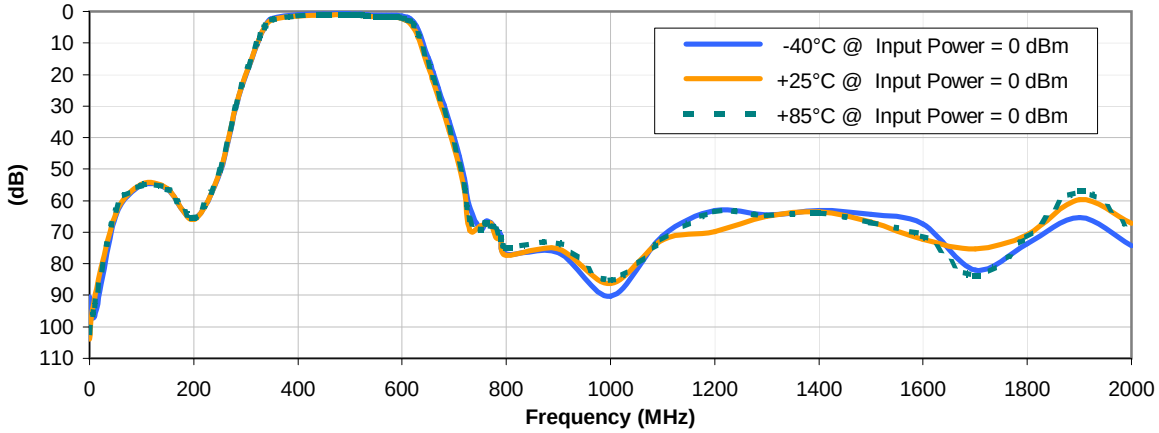
Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
400	5.37	5.34	5.29
405	5.22	5.18	5.13
410	5.07	5.03	4.98
415	4.94	4.92	4.87
420	4.85	4.83	4.78
425	4.75	4.75	4.71
430	4.69	4.68	4.64
435	4.61	4.62	4.59
440	4.56	4.57	4.54
445	4.52	4.55	4.52
450	4.51	4.53	4.52
455	4.51	4.56	4.53
460	4.52	4.57	4.54
465	4.55	4.59	4.58
470	4.56	4.61	4.58
475	4.57	4.62	4.59
480	4.59	4.63	4.60
485	4.59	4.63	4.61
490	4.61	4.65	4.61
495	4.62	4.66	4.62
500	4.65	4.67	4.63
505	4.66	4.69	4.64
510	4.69	4.72	4.65
515	4.71	4.75	4.69
520	4.74	4.77	4.71
525	4.76	4.80	4.75
530	4.78	4.83	4.78
535	4.81	4.88	4.84
540	4.86	4.94	4.88
545	4.93	5.03	4.98
550	5.02	5.15	5.08
555	5.14	5.29	5.23
560	5.31	5.46	5.40
565	5.48	5.67	5.60
570	5.66	5.87	5.79
575	5.89	6.12	6.05
580	6.16	6.42	6.33
585	6.48	6.78	6.67
590	6.86	7.20	7.07
595	7.35	7.72	7.56
600	7.89	8.25	8.09

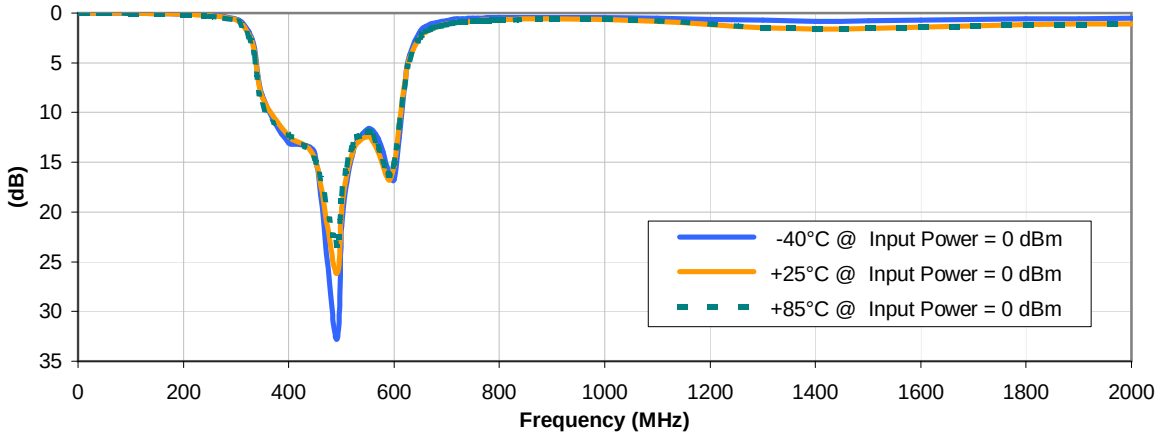
Surface Mount Band Pass Filter BPF-A490+

Typical Performance Curves

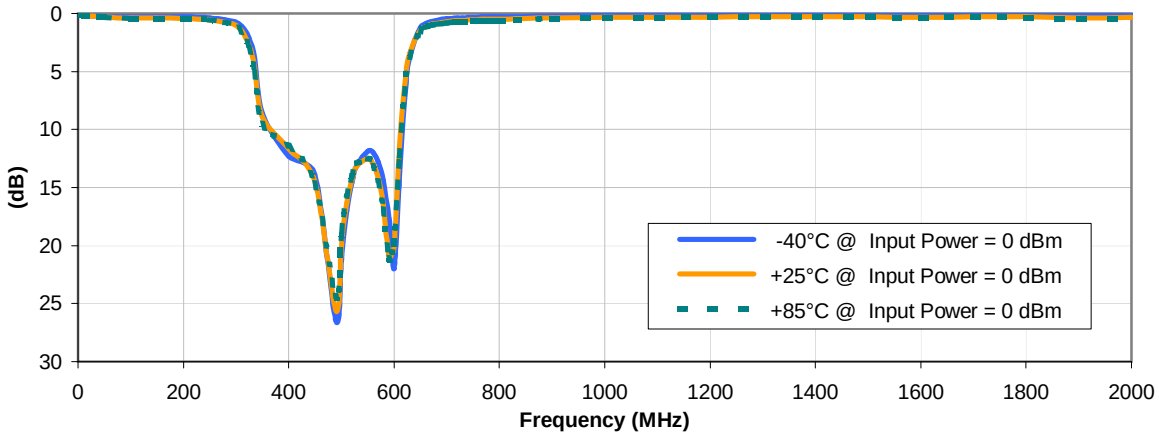
INSERTION LOSS vs. TEMPERATURE



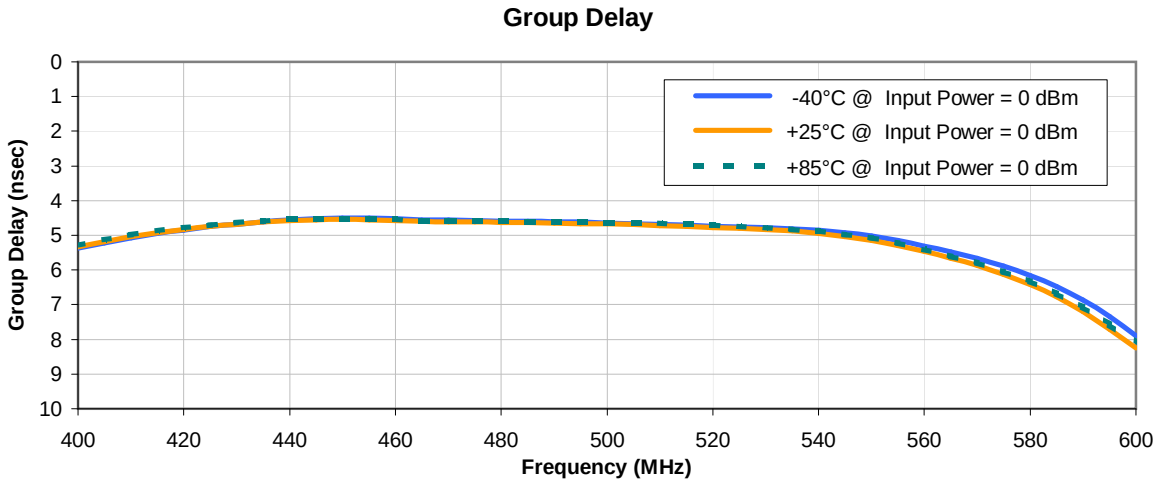
INPUT RETURN LOSS vs. TEMPERATURE



OUTPUT RETURN LOSS vs. TEMPERATURE



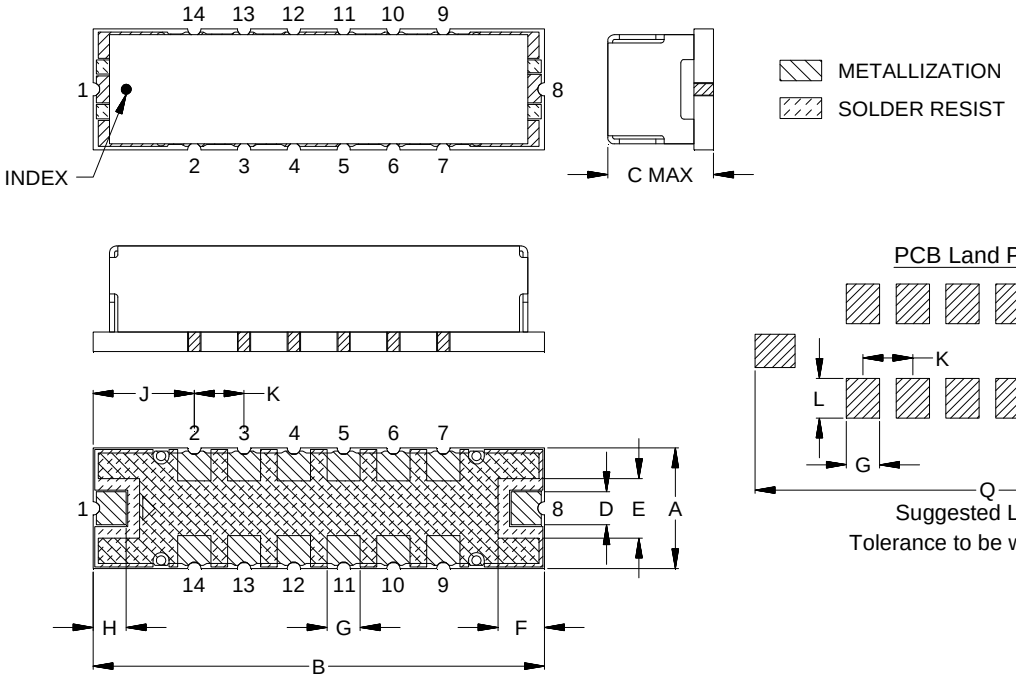
Typical Performance Curves



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

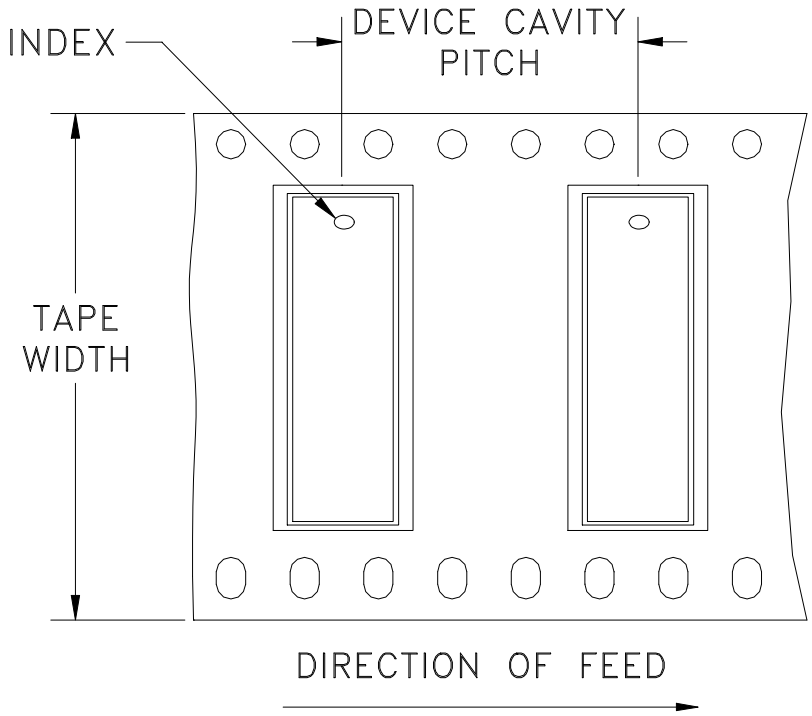
Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015

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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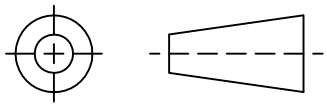
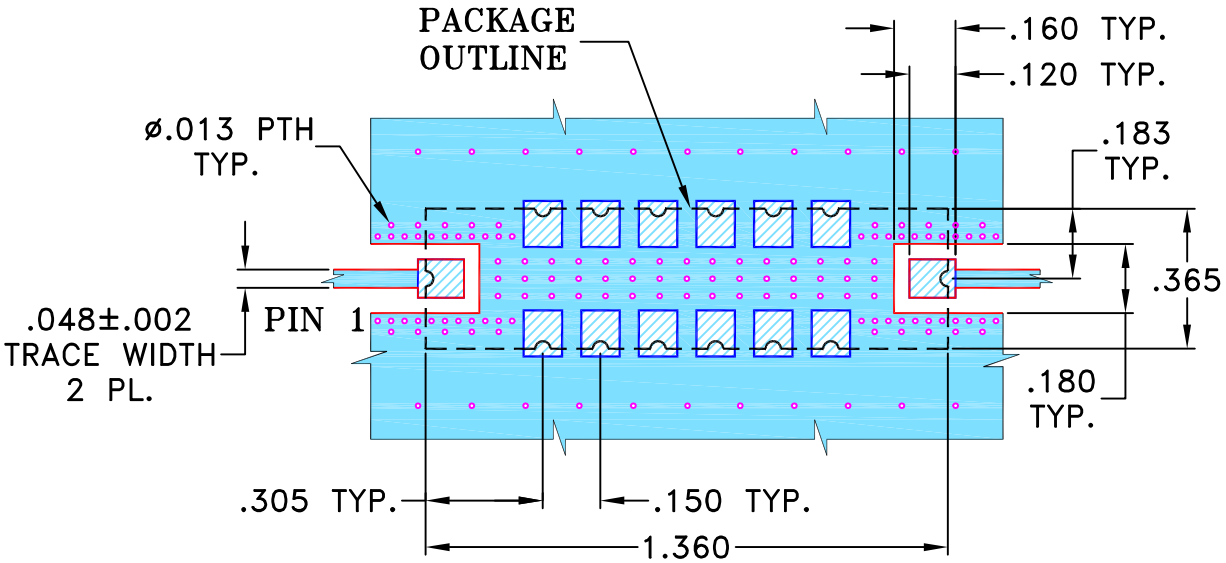
THIRD ANGLE PROJECTION



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



NOTE:

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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

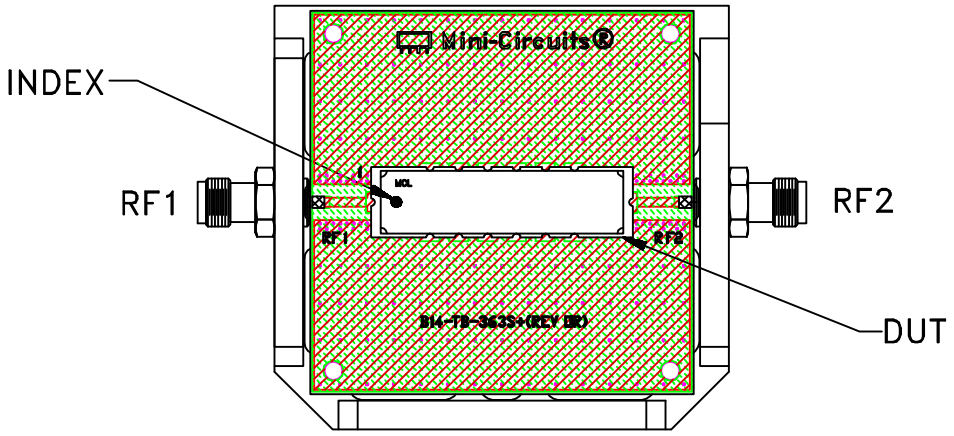
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

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

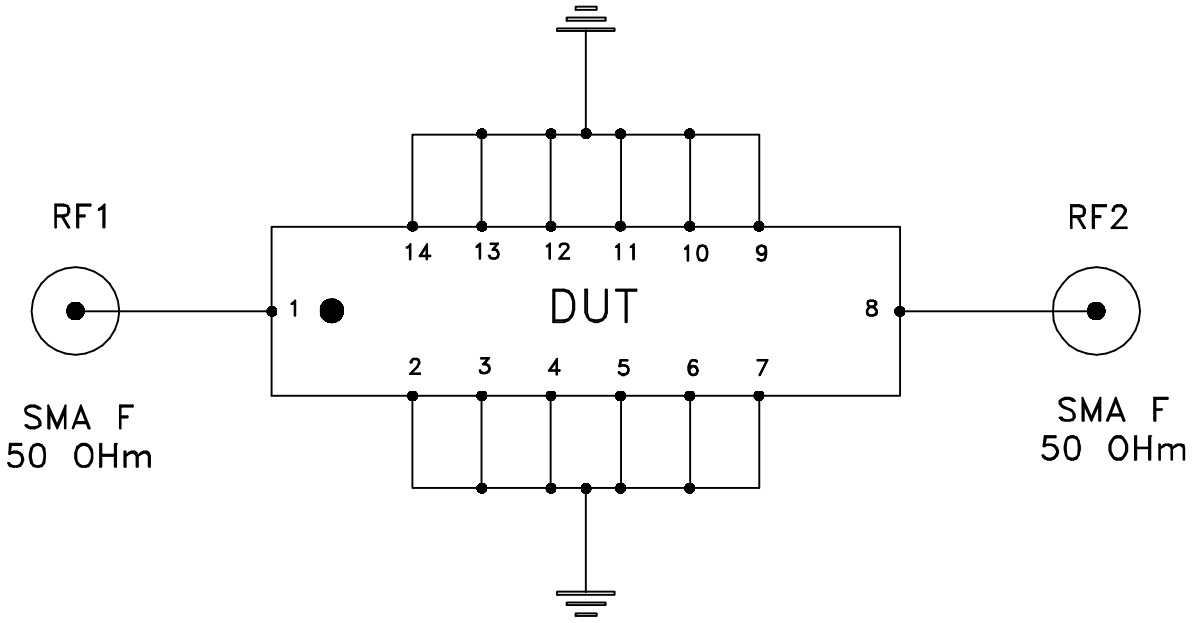
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-227	C

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.

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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