

Surface Mount Bandpass Filter

50Ω 30 to 88 MHz

BPF-C59+



Generic photo used for illustration purposes only
CASE STYLE: HU1186

The Big Deal

- Low insertion loss
- Broader bandwidth
- High Rejection
- Wide stopband
- Miniature shielded package

Product Overview

The BPF-C59+ is a broad band filter in a small shielded package (size of 0.87" x 0.80" x 0.25") fabricated using SMT technology. This filter offers outstanding close in rejection, low insertion loss for use in telecommunication and broadband wireless application. The stopband extends up to 4.5 GHz

Key Features

Feature	Advantages
High Rejection	BPF-C59+ is enables the filter to attenuate spurious signals and rejects harmonics for broad band of frequency.
Low Passband VSWR	This filter maintains typical VSWR over passband frequency range making this filter easier to integrate into receiver and transmitter RF chains with less concerns for in band frequency ripple.
Small size, 0.87" x 0.80" x 0.25"	The unique surface mount package enables the BPF-C59+ to be used in compact design.

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 Bandpass Filter

50 Ω 30 to 88 MHz

BPF-C59+



Generic photo used for illustration purposes only
CASE STYLE: HU1186

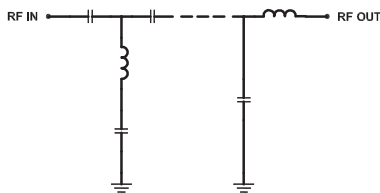
Features

- Broader bandwidth
- Low insertion loss
- High rejection
- Wide stopband
- Miniature shielded package

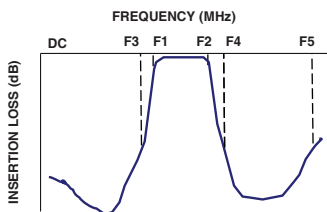
Applications

- Telecommunication and broadband networks
- Air traffic control communication
- Private and public land mobile
- Transmitters / Receivers

Functional Schematic



Typical Frequency Response



Electrical Specifications at 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—	—	59	—	MHz
	Insertion Loss	F1-F2	—	1.40	2.50	dB
	VSWR	F1-F2	—	1.28	1.92	:1
Stop Band, Lower	Insertion Loss	DC-F3	20	29	—	dB
	VSWR	DC-F3	—	20	—	:1
Stop Band, Upper	Insertion Loss	F4-F5	20	25	—	dB
	VSWR	F4-F5	—	20	—	:1

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	0.25 W

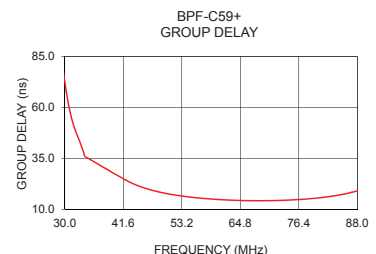
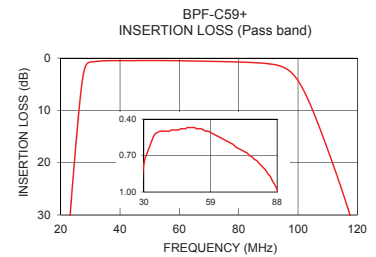
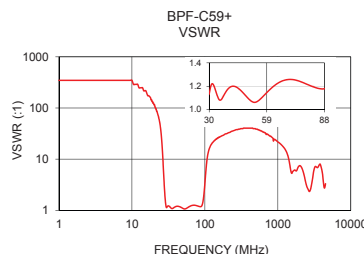
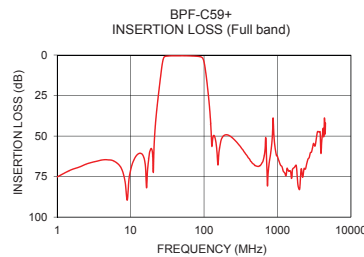
Permanent damage may occur if any of these limits are exceeded.

Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
1.0	75.23	347.44	30.0	72.82
20.0	62.17	115.81	32.0	49.40
22.0	40.46	86.86	34.0	36.01
23.2	29.93	66.82	36.0	33.07
24.6	19.90	41.37	40.0	27.28
26.0	10.92	16.89	42.0	24.49
27.6	3.18	3.52	44.0	22.10
30.0	0.77	1.14	46.0	20.30
59.0	0.51	1.15	50.0	17.84
88.0	0.98	1.18	55.0	15.98
99.0	3.54	2.82	59.0	15.07
105.0	10.06	7.70	62.0	14.61
112.0	20.62	14.15	65.0	14.34
115.0	25.56	16.11	70.0	14.25
118.0	30.89	17.57	72.0	14.34
150.0	59.87	25.94	74.0	14.51
750.0	71.46	29.46	78.0	15.09
1500.0	71.49	6.11	80.0	15.54
3000.0	57.10	4.26	85.0	17.32
4500.0	42.06	3.30	88.0	19.06

+RoHS Compliant

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



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-Circuits' 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/MCStore/terms.jsp



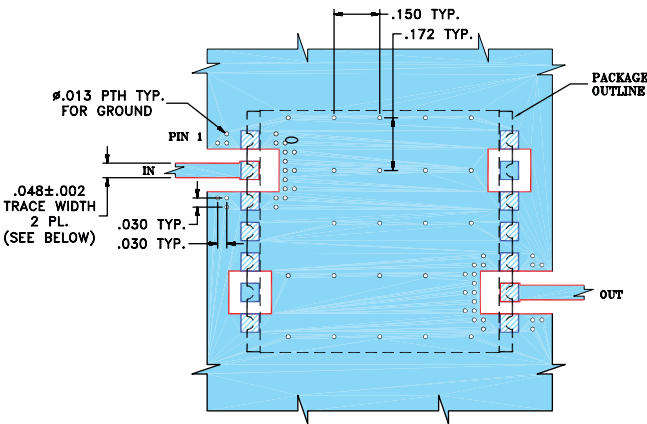
www.minicircuits.com P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

REV.B
M174392
BPF-C59+
EDU1797
URJ
190808
Page 2 of 3

Pad Connections

INPUT	2
OUTPUT	9
GROUND	1,3,4,5,6,7,8,10,11,12,14
NOT CONNECTED	6,13

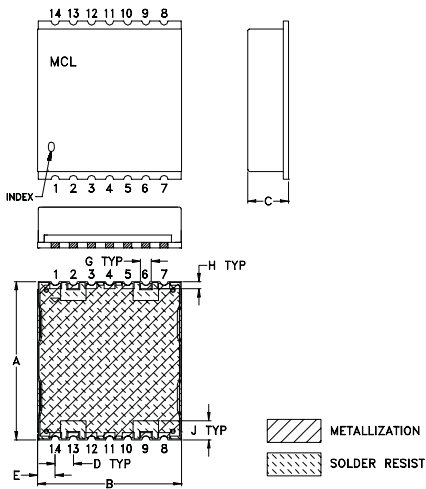
Demo Board MCL P/N: TB-500+
Suggested PCB Layout (PL-294)



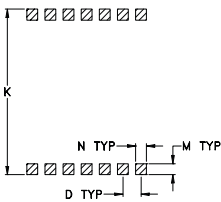
- NOTES:
- 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B, DIELECTRIC THICKNESS: .030" ± .002"; COPPER: 1/2 OZ ON EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
 - 2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

Outline Drawing



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch mm)

A	B	C	D	E	F	G	H
.870	.800	.25	.100	.097	--	.060	.040
22.10	20.32	6.35	2.54	2.46	--	1.52	1.02
J	K	L	M	N	P	wt	
.105	.910	--	.060	.060	--	grams	
2.67	23.11	--	1.52	1.52	--	2.85	

Note: Please refer to case style drawing for details

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

Band Pass Filter

BPF-C59+

Typical Performance Data

FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1.0	74.74	75.23	74.94	0.05	0.05	0.05	0.05	0.05	0.05
22.0	40.59	40.46	40.25	0.18	0.20	0.23	0.62	0.69	0.75
23.2	30.03	29.93	29.78	0.24	0.26	0.29	0.68	0.76	0.82
24.0	24.12	24.03	23.90	0.30	0.33	0.36	0.75	0.82	0.90
24.2	22.72	22.63	22.50	0.32	0.35	0.39	0.77	0.85	0.92
24.4	21.34	21.25	21.13	0.35	0.38	0.42	0.80	0.87	0.95
25.6	13.47	13.38	13.28	0.70	0.75	0.82	1.13	1.22	1.32
26.4	8.66	8.59	8.52	1.41	1.49	1.60	1.83	1.94	2.08
27.2	4.66	4.63	4.61	3.23	3.37	3.57	3.64	3.81	4.02
28.8	1.08	1.13	1.20	14.16	14.51	14.97	14.79	15.25	15.80
29.8	0.74	0.79	0.86	25.03	24.33	24.02	35.26	35.36	36.56
30.0	0.71	0.77	0.84	24.71	23.87	23.41	33.00	31.67	31.08
31.8	0.61	0.66	0.72	20.24	20.09	19.99	21.43	21.31	21.26
35.0	0.48	0.52	0.58	27.14	27.78	28.00	27.93	28.35	28.57
37.0	0.46	0.50	0.55	25.44	25.61	25.55	26.39	26.44	26.43
41.0	0.45	0.50	0.54	21.16	20.96	20.79	21.73	21.40	21.21
49.0	0.42	0.47	0.52	26.82	25.83	25.16	25.23	24.05	23.30
53.0	0.43	0.48	0.53	32.46	30.38	29.15	28.85	27.07	25.91
57.0	0.44	0.50	0.54	25.87	25.59	25.40	26.50	25.94	25.44
59.0	0.46	0.51	0.56	23.48	23.36	23.31	24.63	24.43	24.24
62.0	0.49	0.54	0.59	21.17	21.08	21.08	22.52	22.49	22.49
68.0	0.54	0.60	0.66	19.23	19.03	18.95	20.57	20.46	20.44
71.0	0.57	0.64	0.69	19.15	18.83	18.68	20.47	20.23	20.12
80.0	0.68	0.76	0.83	21.21	20.38	19.87	22.19	21.43	20.92
87.0	0.85	0.94	1.03	22.43	21.80	21.29	23.88	23.36	22.95
88.0	0.89	0.98	1.07	22.22	21.71	21.25	23.90	23.53	23.21
89.0	0.93	1.03	1.12	21.73	21.35	20.94	23.57	23.36	23.14
93.0	1.26	1.37	1.48	16.36	16.28	16.04	17.11	17.10	16.97
98.0	2.74	2.91	3.11	7.75	7.74	7.66	7.66	7.64	7.54
100.0	4.10	4.31	4.56	5.31	5.34	5.32	5.15	5.16	5.11
103.0	7.17	7.45	7.77	3.01	3.09	3.14	2.83	2.87	2.89
106.0	11.15	11.47	11.82	1.89	1.99	2.07	1.71	1.78	1.82
111.0	18.66	19.03	19.43	1.18	1.30	1.39	1.02	1.10	1.15
112.0	20.23	20.62	21.02	1.12	1.23	1.32	0.95	1.03	1.08
115.0	25.14	25.56	26.00	0.97	1.08	1.17	0.82	0.89	0.94
118.0	30.43	30.89	31.38	0.88	0.99	1.07	0.73	0.80	0.85
128.0	56.52	56.43	56.17	0.72	0.82	0.89	0.56	0.63	0.67
138.0	49.64	49.89	50.11	0.64	0.73	0.80	0.47	0.53	0.57
154.0	67.25	67.70	67.90	0.58	0.66	0.71	0.37	0.43	0.46
200.0	49.17	49.17	49.18	0.47	0.55	0.59	0.23	0.28	0.30
330.0	58.00	57.99	57.91	0.36	0.44	0.49	0.09	0.13	0.15
630.0	65.56	65.85	65.48	0.39	0.51	0.58	0.02	0.06	0.09
690.0	51.30	50.92	50.54	0.44	0.57	0.65	0.02	0.07	0.11
730.0	82.41	80.72	78.31	0.44	0.57	0.66	0.01	0.06	0.10
770.0	66.74	66.67	66.68	0.46	0.61	0.69	0.01	0.07	0.10
830.0	56.01	55.96	55.82	0.50	0.65	0.74	0.01	0.07	0.11
870.0	38.87	38.90	39.09	0.60	0.77	0.87	0.12	0.20	0.23
960.0	60.64	61.26	61.78	0.58	0.76	0.87	0.02	0.08	0.12
1320.0	73.05	74.96	74.14	1.04	1.28	1.47	0.05	0.13	0.18
1630.0	66.87	66.38	66.11	2.86	2.89	2.94	0.08	0.16	0.21
1890.0	79.54	89.51	81.14	2.36	2.54	2.70	0.09	0.18	0.24
2055.0	69.43	68.68	66.24	2.09	2.40	2.64	0.10	0.19	0.24
2150.0	92.76	84.07	78.88	2.33	2.67	2.94	0.10	0.19	0.25
2250.0	78.23	76.91	72.43	2.88	3.27	3.59	0.09	0.19	0.25
2380.0	69.44	69.13	66.53	4.24	4.68	5.03	0.08	0.18	0.25
2885.0	55.89	57.06	56.71	6.28	5.80	5.49	0.04	0.18	0.28
3500.0	47.51	47.34	49.11	2.35	2.56	2.62	0.07	0.25	0.34
3975.0	50.10	51.74	58.93	2.63	2.78	2.98	0.19	0.36	0.52
4150.0	42.17	45.40	48.48	3.64	4.10	4.25	0.36	0.40	0.40
4500.0	44.95	42.06	38.80	5.32	5.44	5.75	0.26	0.45	0.75



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
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

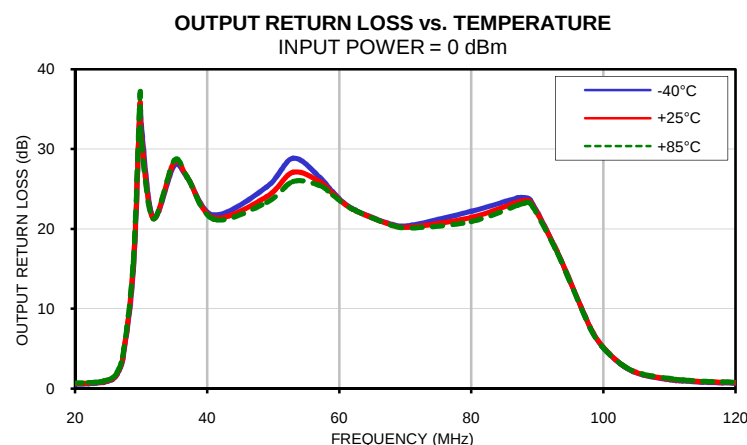
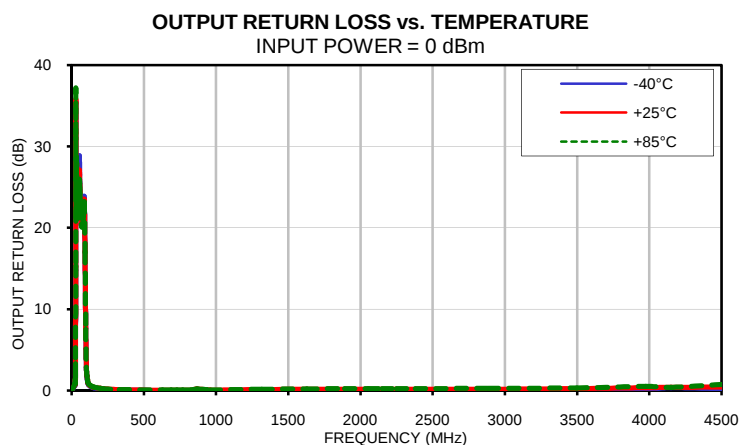
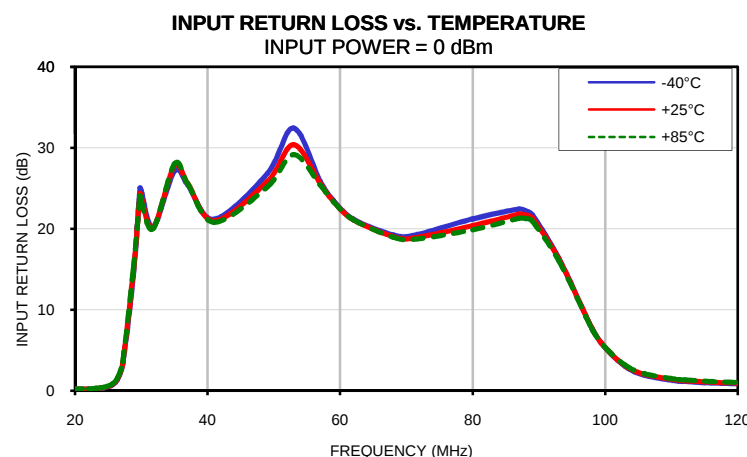
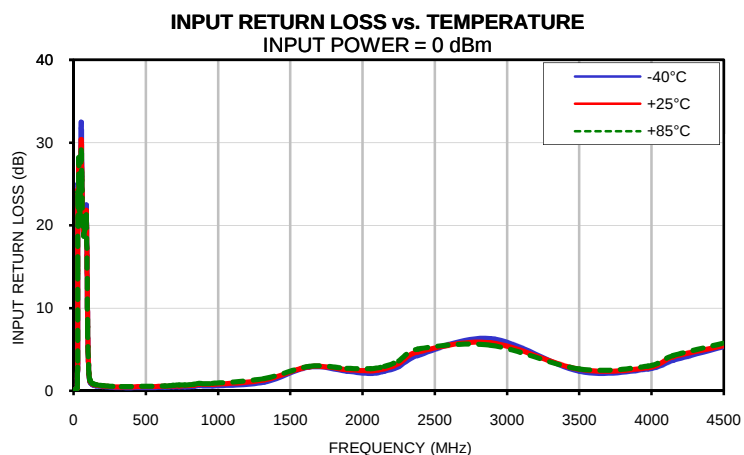
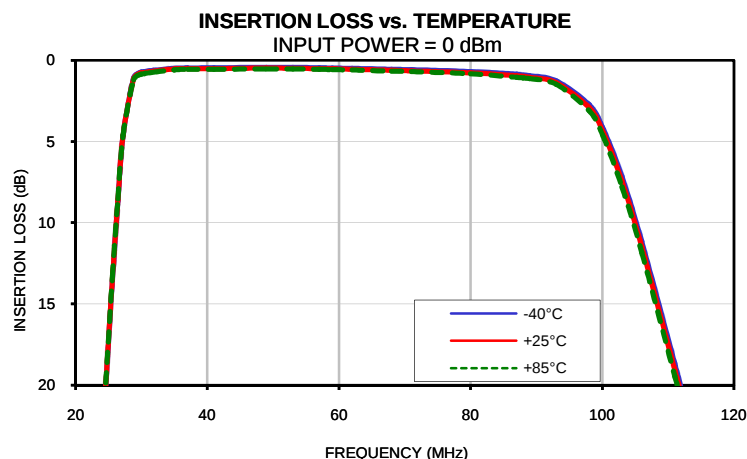
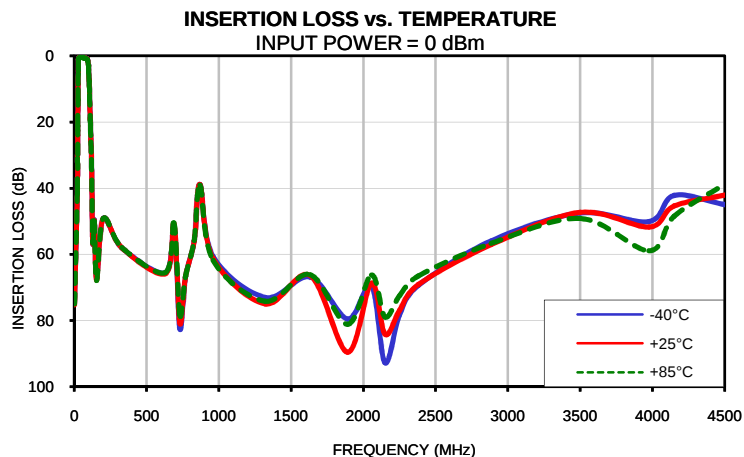
IF/RF MICROWAVE COMPONENTS

REV. OR
BPF-C59+
140304
Page 1 of 2

Band Pass Filter**BPF-C59+****Typical Performance Data**

FREQ.	GROUP DELAY		
(MHz)	(nsec)		
	@-40°C	@+25°C	@+85°C
30.0	73.29	72.82	72.21
30.4	66.71	66.30	65.80
30.6	63.81	63.42	62.98
30.8	61.14	60.80	60.42
31.0	58.74	58.42	58.07
31.4	54.55	54.30	54.03
31.6	52.73	52.51	52.26
31.8	51.09	50.89	50.66
32.0	49.57	49.40	49.20
32.2	48.18	48.02	47.84
32.4	46.87	46.74	46.56
32.6	45.69	45.55	45.40
32.8	44.48	44.36	44.23
33.2	41.83	41.74	41.62
33.4	40.43	40.33	40.23
33.6	38.99	38.91	38.82
33.8	37.54	37.47	37.38
35.0	34.59	34.53	34.46
36.0	33.12	33.07	33.00
38.0	30.20	30.15	30.10
39.0	28.76	28.71	28.67
40.0	27.32	27.28	27.24
42.0	24.52	24.49	24.46
45.0	21.16	21.14	21.12
46.0	20.32	20.30	20.28
48.0	18.94	18.92	18.91
49.0	18.36	18.35	18.34
51.0	17.39	17.38	17.38
52.0	16.98	16.98	16.98
54.0	16.28	16.28	16.28
55.0	15.98	15.98	15.99
56.0	15.71	15.72	15.72
57.0	15.47	15.47	15.49
58.0	15.25	15.26	15.27
59.0	15.05	15.07	15.08
60.0	14.88	14.89	14.91
61.0	14.73	14.74	14.76
62.0	14.60	14.61	14.64
64.0	14.40	14.41	14.44
65.0	14.32	14.34	14.37
67.0	14.23	14.25	14.28
69.0	14.21	14.23	14.26
70.0	14.23	14.25	14.28
72.0	14.32	14.34	14.37
73.0	14.39	14.41	14.45
74.0	14.48	14.51	14.54
75.0	14.59	14.62	14.66
76.0	14.73	14.76	14.80
77.0	14.88	14.91	14.96
78.0	15.06	15.09	15.14
79.0	15.27	15.30	15.35
80.0	15.50	15.54	15.59
81.0	15.77	15.81	15.87
82.0	16.07	16.12	16.18
83.0	16.42	16.47	16.54
84.0	16.81	16.87	16.94
85.0	17.25	17.32	17.41
86.0	17.76	17.83	17.93
87.0	18.32	18.41	18.52
88.0	18.97	19.06	19.18

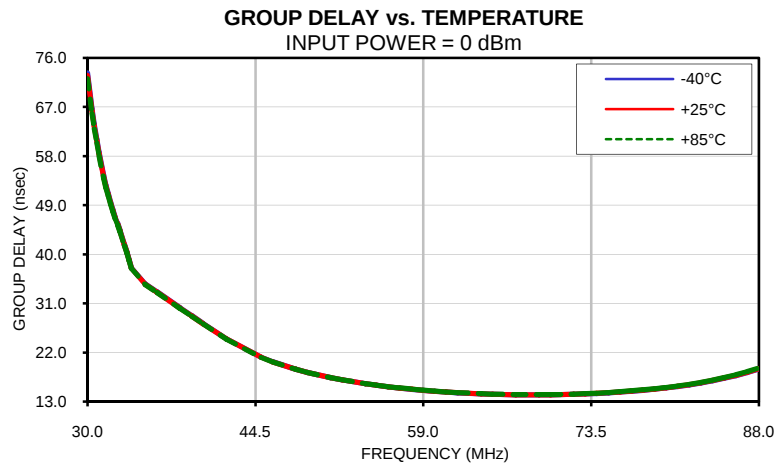
Typical Performance Curves



Band Pass Filter

BPF-C59+

Typical Performance Curves



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
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com



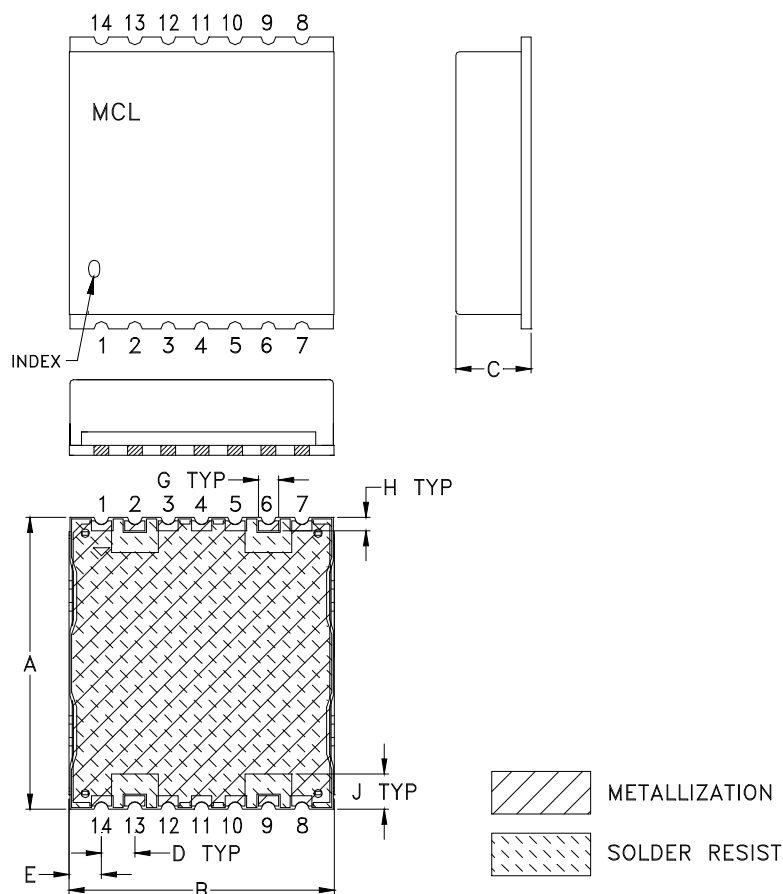
IF/RF MICROWAVE COMPONENTS



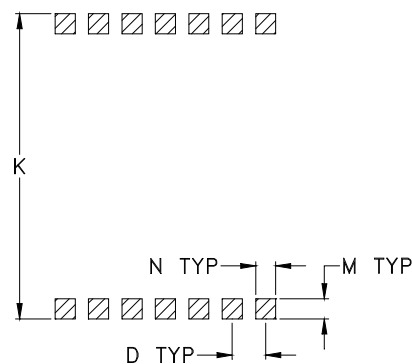
REV. OR
BPF-C59+
140304
Page 2 of 2

Outline Dimensions

HU1186



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm .002$

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	P	WT, GRAM
HU1186	.870 (22.10)	.800 (20.32)	.25 (6.35)	.100 (2.54)	.097 (2.46)	- -	.060 (1.52)	.040 (1.02)	.105 (2.67)	.910 (23.11)	- -	.060 (1.52)	.060 (1.52)	- -	2.85

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: 2-5 μ inch (.05-.13 microns) Gold over 120-240 μ inch (3.05-6.10 microns) Nickel plate.
For RoHS-5 Case Styles: Tin-Lead plate.

Mini-Circuits®
ISO 9001 ISO 14001 CERTIFIED

ALL NEW
minicircuits.com

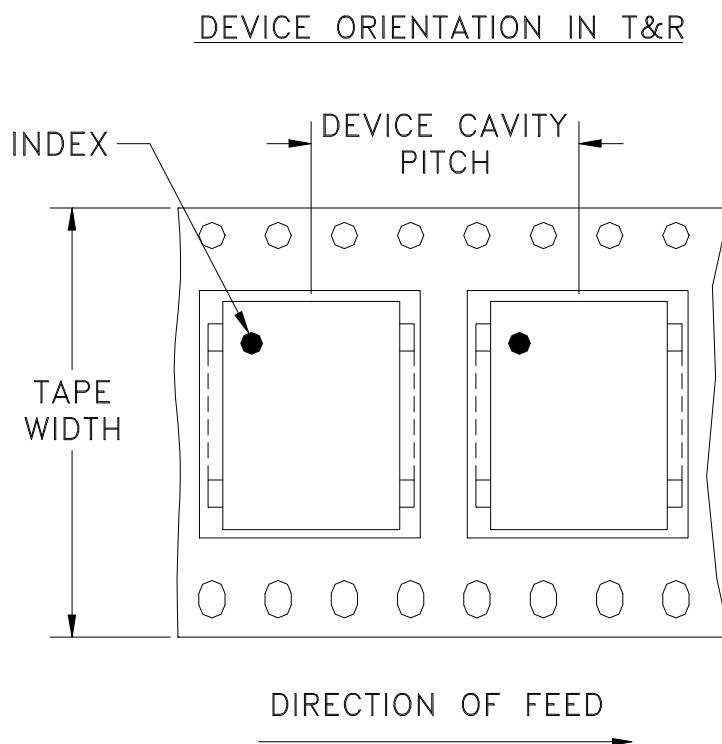
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F21



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
32	32	13	200

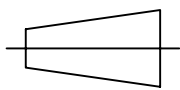
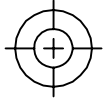
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf



INTERNET <http://www.minicircuits.com>
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

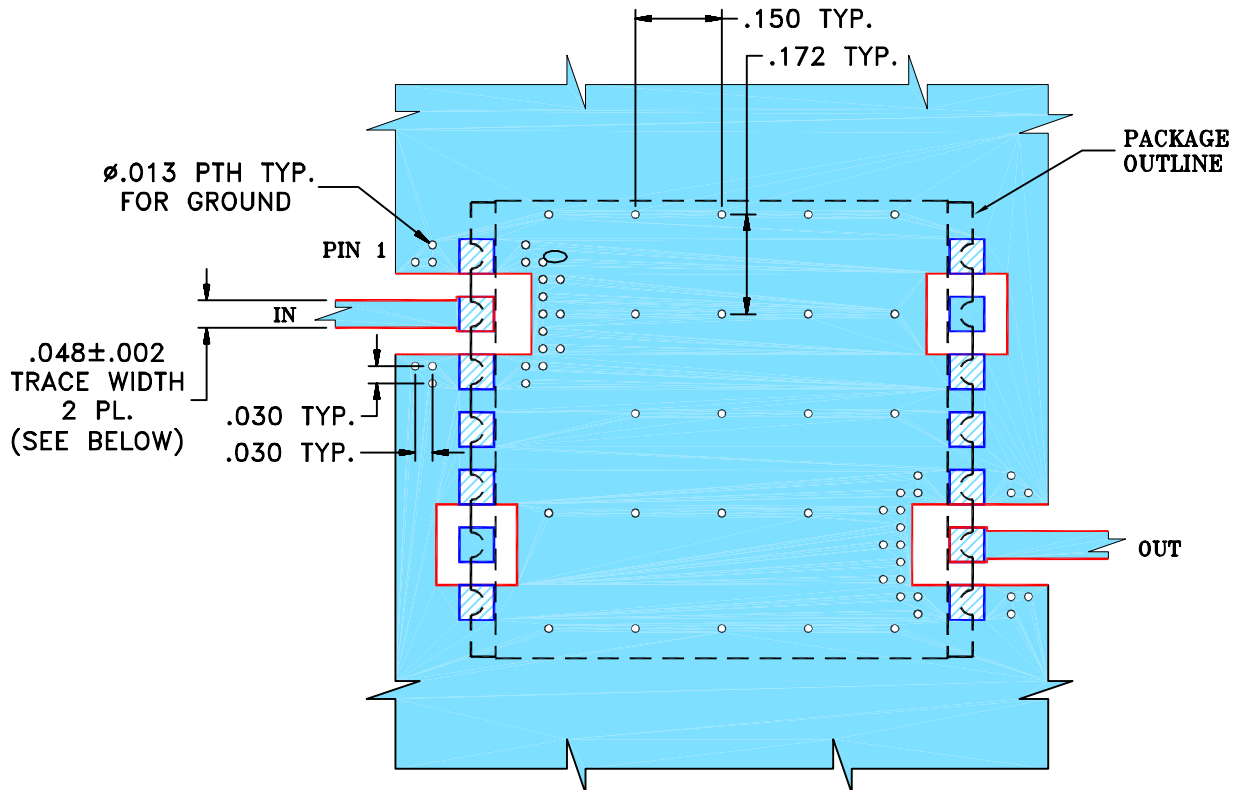
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M119979	NEW RELEASE (FROM RAVON)	11/08	DK	HH
OR	R74463	NEW RELEASE (FROM RAVON)	11/08	DK	HH

**SUGGESTED MOUNTING CONFIGURATION FOR
HU1186 CASE STYLE, "14FL03" PIN CODE**



NOTES:

- TRACE WIDTH IS SHOWN FOR ROGERS R04350B, DIELECTRIC THICKNESS: .030" $\pm$.002"; COPPER: 1/2 OZ ON 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 $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$

DRAWN

DK (RAVON)

02 NOV 08

CHECKED

DH (RAVON)

02 NOV 08

APPROVED

HH (RAVON)

02 NOV 08



Mini-Circuits® 13 Neptune Avenue
Brooklyn NY 11235

**PL, 14FL03, HU1186, BPF-C
TB-500+ (50 OHM)**

SIZE

A

CODE IDENT

15542

DRAWING NO:

98-PL-294

REV:

OR

FILE:

98PL294

SCALE:

3:1

SHEET:

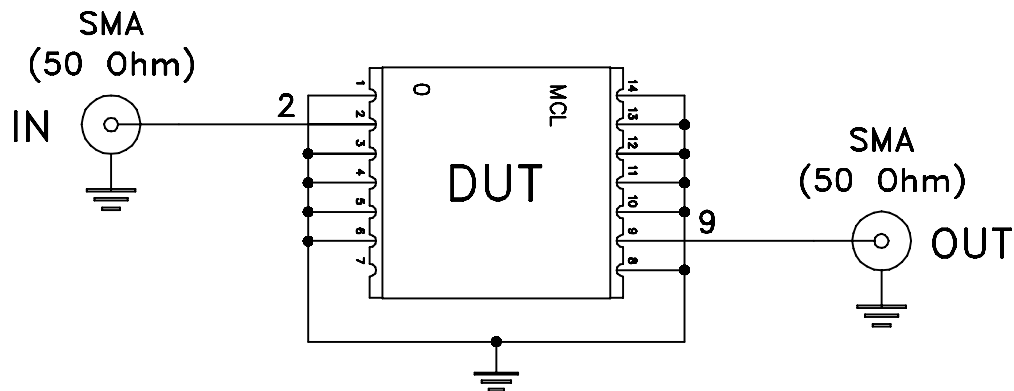
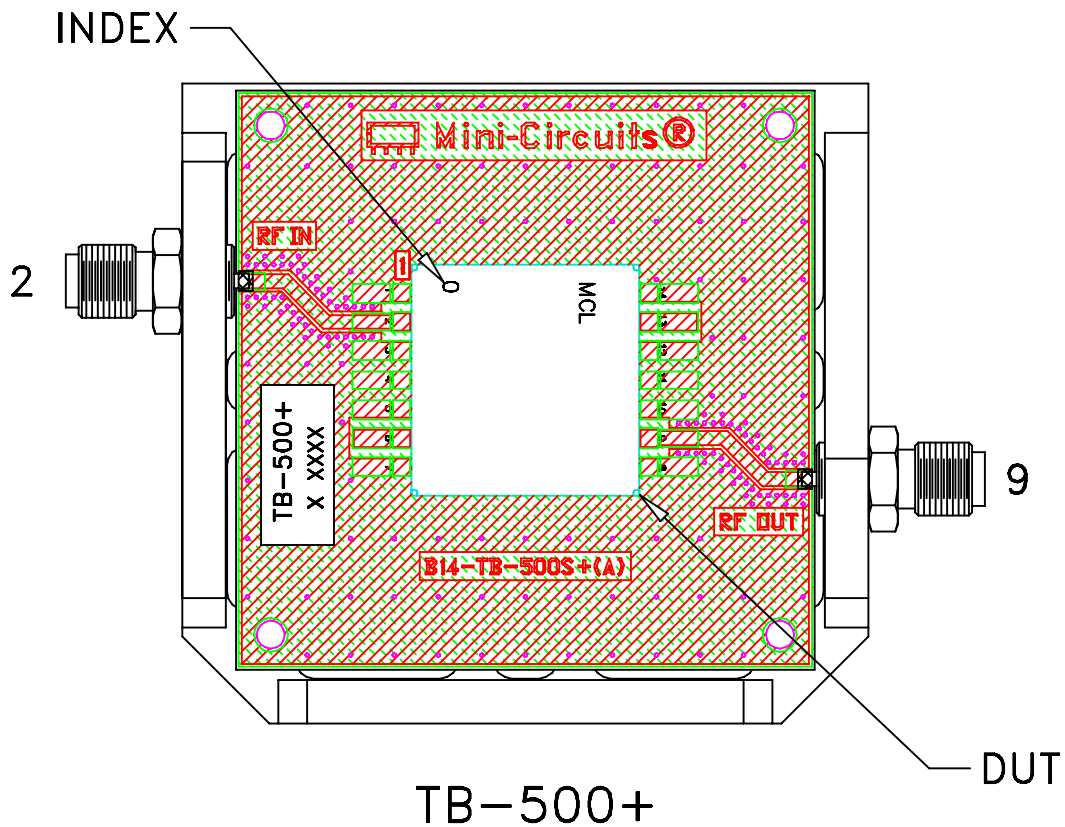
1 OF 1

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

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

Evaluation Board and Circuit



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 or equivalent.
Dielectric Constant=3.5, 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