Surface Mount

Bandpass Filter

BPF-C510+

50Ω 20 to 1000 MHz

Generic photo used for illustration purposes only

CASE STYLE: HU1186

The Big Deal

- Sharp roll-off
- Wide bandwidth
- Good VSWR
- Miniature shielded package

Product Overview

The BPF-C510+ is a wide band filter in a small shielded package (size of 0.87" x 0.80" x 0.25") fabricated using SMT technology. This filter offers sharp roll-off and rejection of 40dB Typ. for use in receiver front end applications..

Key Features

Feature	Advantages
Sharp roll-off	BPF-C510+ attenuates spurious signals and rejects harmonics for wide band of frequency.
Good 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-C510+ 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

50Ω 20 to 1000 MHz

BPF-C510+

Generic photo used for illustration purposes only

CASE STYLE: HU1186

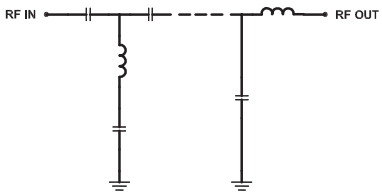
Features

- Sharp roll-off
- Wide bandwidth
- Good VSWR
- Miniature shielded package

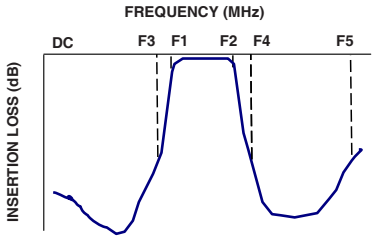
Applications

- Test equipment
- Receiver front end applications
- Harmonic rejection

Functional Schematic



Typical Frequency Response



+RoHS Compliant

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

Electrical Specifications at 25°C

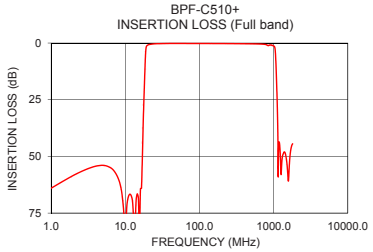
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—	—	—	510	—	MHz
	Insertion Loss	F1-F2	20-1000	—	1.5	2.7	dB
	VSWR	F1-F2	20-1000	—	1.6	2.01	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC-17	20	29	—	dB
	VSWR	DC-F3	DC-17	—	20	—	:1
Stop Band, Upper	Insertion Loss	F4-F5	1150-1800	25	38	—	dB
	VSWR	F4-F5	1150-1800	—	20	—	:1

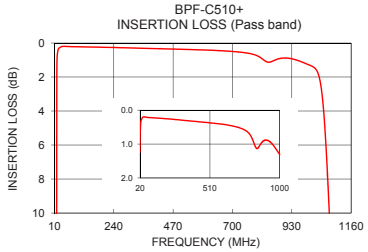
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	1 W

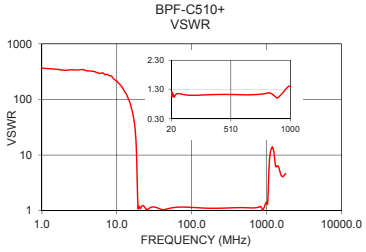
Permanent damage may occur if any of these limits are exceeded.

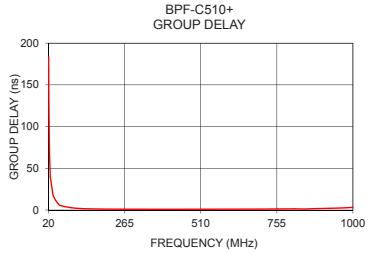
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
1.0	64.03	364.20	20	183.43
10.0	84.00	214.59	21	115.45
17.0	49.57	41.79	22	83.73
17.5	33.17	30.88	23	65.68
18.0	20.49	19.11	24	53.99
18.5	9.11	7.01	25	39.97
18.9	3.08	2.10	30	28.00
20.0	0.95	1.18	40	13.22
100.0	0.22	1.14	50	7.85
250.0	0.27	1.11	75	3.92
510.0	0.37	1.13	100	2.42
750.0	0.58	1.14	200	1.14
1000.0	1.31	1.41	300	0.96
1048.0	3.12	1.94	400	0.93
1080.0	11.63	6.09	500	0.96
1102.0	20.22	9.09	600	1.03
1124.0	30.61	11.09	800	1.39
1150.0	56.84	12.66	900	1.88
1650.0	50.80	4.08	950	2.31
1800.0	44.46	4.62	1000	3.27









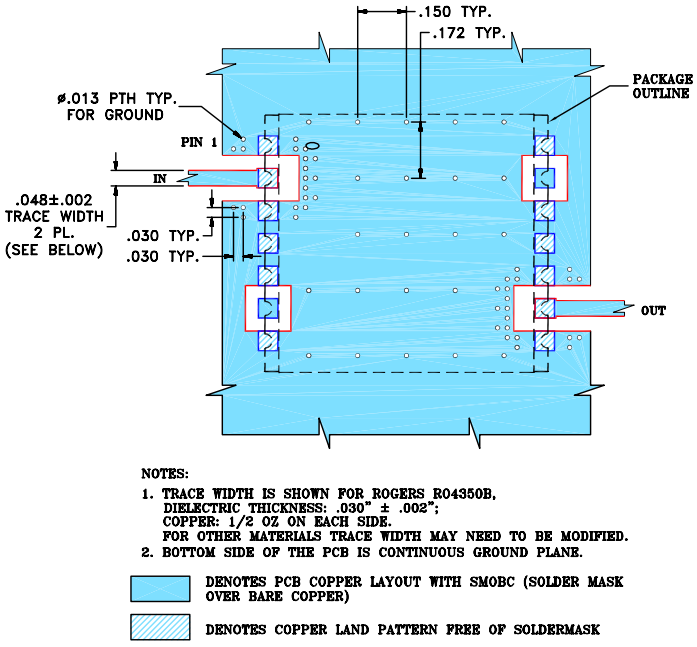
Notes

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

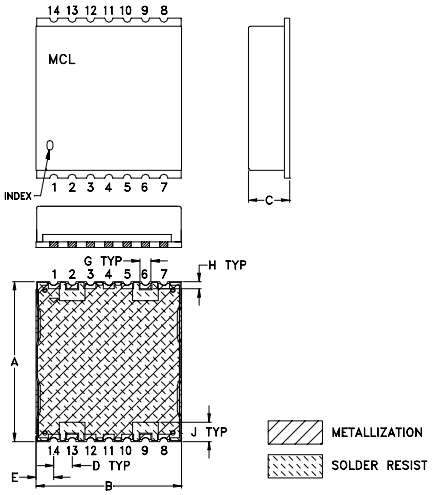
Pad Connections

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

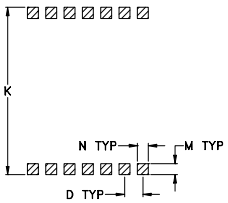
Demo Board MCL P/N: TB-500+
Suggested PCB Layout (PL-294)



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

Surface Mount Band Pass Filter BPF-C510+

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	63.89	64.03	63.98	0.05	0.05	0.05	0.05	0.05	0.05
1.5	60.65	60.66	60.61	0.05	0.05	0.05	0.05	0.05	0.05
2.0	58.42	58.36	58.43	0.05	0.05	0.06	0.05	0.05	0.05
2.5	56.80	56.81	56.86	0.05	0.05	0.05	0.05	0.05	0.05
4.5	54.01	54.03	54.03	0.05	0.05	0.05	0.06	0.06	0.06
5.0	53.96	53.94	53.99	0.06	0.05	0.06	0.06	0.06	0.06
7.5	57.63	57.74	57.72	0.06	0.06	0.06	0.07	0.08	0.08
8.0	59.57	59.63	59.74	0.06	0.07	0.07	0.07	0.08	0.08
12.0	66.96	67.32	67.14	0.10	0.11	0.12	0.13	0.14	0.15
14.0	69.36	69.16	69.33	0.15	0.16	0.17	0.18	0.21	0.23
14.5	66.51	66.52	66.44	0.16	0.18	0.19	0.21	0.23	0.26
15.0	67.70	68.38	68.51	0.19	0.20	0.22	0.23	0.26	0.28
17.0	50.54	49.57	48.50	0.38	0.42	0.46	0.42	0.47	0.52
17.5	33.74	33.17	32.49	0.51	0.56	0.62	0.54	0.60	0.67
18.0	20.97	20.49	19.93	0.82	0.91	1.02	0.81	0.91	1.03
18.5	9.46	9.11	8.73	2.22	2.50	2.84	2.12	2.40	2.73
20.0	0.88	0.95	1.02	21.61	21.82	22.21	21.16	21.39	21.69
25.0	0.33	0.35	0.38	32.02	32.40	32.63	36.28	36.91	37.63
27.0	0.28	0.31	0.33	26.39	26.50	26.46	26.18	26.27	26.21
38.0	0.20	0.21	0.23	28.74	29.22	29.55	32.07	33.19	34.19
55.0	0.19	0.20	0.22	24.33	24.65	24.79	23.76	23.93	23.98
120.0	0.20	0.23	0.24	24.02	24.41	24.87	24.52	24.97	25.44
185.0	0.21	0.25	0.27	28.10	26.19	25.38	32.11	29.10	27.77
255.0	0.22	0.27	0.30	27.30	25.81	24.24	29.18	28.28	26.41
420.0	0.26	0.34	0.38	24.50	24.18	23.82	23.92	23.35	23.17
490.0	0.28	0.36	0.42	24.61	24.16	23.90	23.45	22.68	22.41
500.0	0.28	0.37	0.42	24.72	24.19	23.88	23.45	22.64	22.33
510.0	0.29	0.37	0.43	24.84	24.23	23.88	23.50	22.64	22.28
560.0	0.30	0.40	0.46	25.57	24.52	23.84	23.91	22.88	22.28
695.0	0.37	0.49	0.58	25.79	24.72	23.39	25.54	25.23	24.19
720.0	0.40	0.52	0.62	25.63	24.39	23.17	26.25	25.89	24.93
750.0	0.43	0.58	0.68	25.30	23.77	22.73	27.45	26.75	25.98
800.0	0.57	0.78	0.92	24.34	22.30	21.70	31.45	28.63	28.08
813.0	0.66	0.90	1.04	23.67	21.75	21.48	31.69	28.53	27.91
880.0	0.88	0.93	1.01	27.26	33.20	41.33	22.60	24.12	23.54
911.0	0.74	0.89	1.01	31.64	29.66	26.56	21.32	21.03	20.02
914.0	0.74	0.89	1.02	30.54	28.30	25.57	21.07	20.65	19.65
917.0	0.74	0.89	1.03	29.38	27.06	24.64	20.81	20.30	19.30
945.0	0.79	0.99	1.15	21.55	19.96	18.84	18.04	17.12	16.34
1000.0	1.04	1.31	1.50	15.71	15.37	15.45	14.89	14.57	14.58
1050.0	2.70	3.41	4.09	9.25	9.09	8.59	6.89	6.32	5.68
1056.0	3.62	4.50	5.33	7.11	6.96	6.63	5.09	4.64	4.18
1066.0	5.87	7.02	8.04	4.56	4.57	4.50	2.95	2.74	2.54
1074.0	8.23	9.54	10.65	3.30	3.43	3.49	1.93	1.87	1.79
1130.0	32.03	34.15	36.09	1.25	1.52	1.71	0.51	0.62	0.69
1150.0	49.65	56.84	56.55	1.11	1.37	1.56	0.44	0.56	0.62
1156.0	60.02	53.22	49.36	1.09	1.35	1.53	0.43	0.54	0.61
1162.0	51.24	47.93	45.96	1.06	1.32	1.50	0.42	0.52	0.59
1180.0	44.88	43.78	43.45	1.01	1.28	1.45	0.38	0.49	0.55
1200.0	45.26	44.46	44.32	1.00	1.27	1.43	0.35	0.46	0.52
1220.0	48.56	47.59	47.32	1.02	1.31	1.48	0.32	0.43	0.49
1230.0	51.35	50.05	49.50	1.05	1.36	1.53	0.31	0.41	0.48
1340.0	47.65	48.99	49.86	2.93	2.86	2.87	0.21	0.31	0.37
1375.0	47.45	48.25	48.89	2.90	2.79	2.86	0.19	0.29	0.34
1415.0	47.22	48.22	48.82	2.67	2.75	2.90	0.16	0.26	0.32
1500.0	50.79	52.42	53.32	3.06	3.38	3.63	0.13	0.23	0.29
1510.0	51.44	53.26	54.21	3.16	3.50	3.74	0.13	0.23	0.28
1300.0	49.43	51.05	52.55	2.02	2.42	2.54	0.24	0.34	0.40
1790.0	44.37	44.58	44.49	3.59	3.84	4.18	0.08	0.18	0.24
1800.0	44.24	44.46	44.47	3.55	3.82	4.17	0.07	0.18	0.24

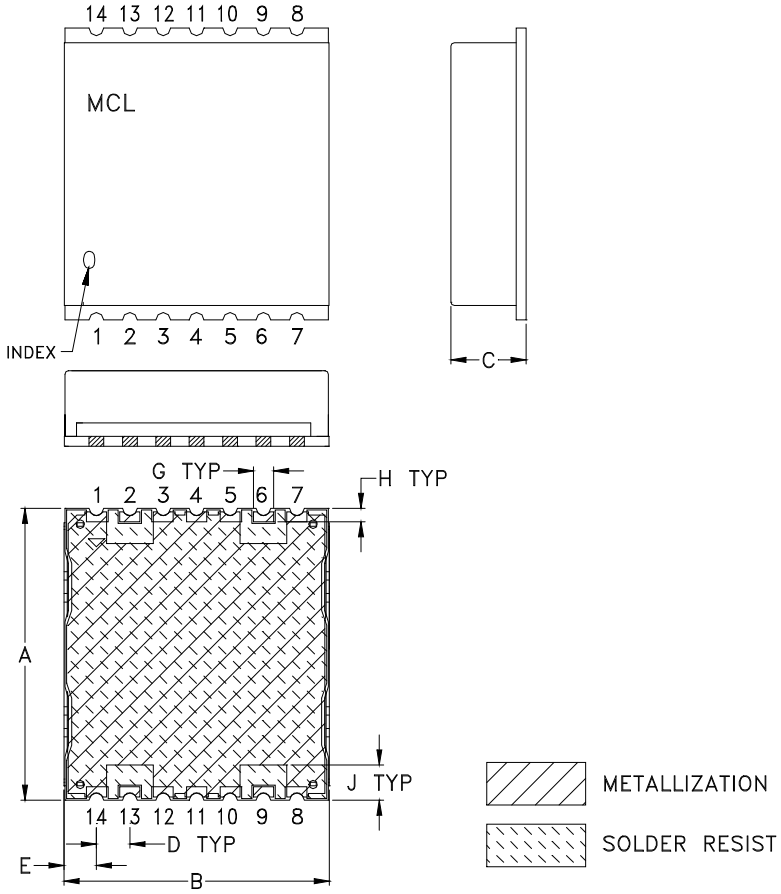
Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
20	185.49	183.43	179.51
40	13.24	13.22	13.18
50	7.85	7.85	7.83
60	5.24	5.24	5.23
80	3.56	3.56	3.56
100	2.42	2.42	2.42
120	1.85	1.85	1.85
140	1.54	1.54	1.54
150	1.43	1.43	1.43
160	1.35	1.35	1.35
180	1.23	1.22	1.22
200	1.14	1.14	1.14
220	1.08	1.08	1.08
240	1.04	1.04	1.03
250	1.02	1.02	1.02
260	1.00	1.00	1.00
280	0.98	0.98	0.98
300	0.96	0.96	0.96
320	0.95	0.95	0.95
340	0.94	0.94	0.94
350	0.94	0.94	0.93
360	0.93	0.93	0.93
380	0.93	0.93	0.93
400	0.93	0.93	0.93
420	0.93	0.93	0.93
440	0.94	0.94	0.94
460	0.94	0.94	0.94
480	0.95	0.95	0.95
500	0.96	0.96	0.96
510	0.96	0.96	0.96
520	0.97	0.97	0.97
540	0.98	0.98	0.98
560	1.00	1.00	1.00
580	1.01	1.01	1.01
600	1.03	1.03	1.03
620	1.05	1.05	1.05
640	1.07	1.08	1.08
660	1.10	1.10	1.10
680	1.13	1.13	1.13
700	1.16	1.16	1.17
720	1.20	1.20	1.21
740	1.24	1.25	1.25
760	1.29	1.30	1.30
780	1.35	1.36	1.33
800	1.40	1.39	1.36
810	1.45	1.42	1.35
820	1.44	1.38	1.29
840	1.30	1.25	1.34
850	1.25	1.30	1.45
860	1.33	1.44	1.57
880	1.66	1.71	1.75
900	1.87	1.88	1.90
910	1.94	1.95	1.97
920	2.02	2.02	2.04
940	2.20	2.21	2.23
950	2.30	2.31	2.34
960	2.42	2.44	2.47
980	2.74	2.76	2.81
990	2.95	2.98	3.06
1000	3.23	3.27	3.39

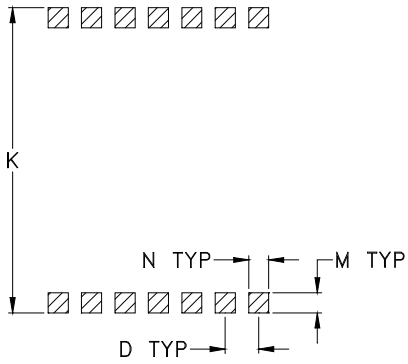
Case Style HU

Outline Dimensions

HU1186



PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.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:

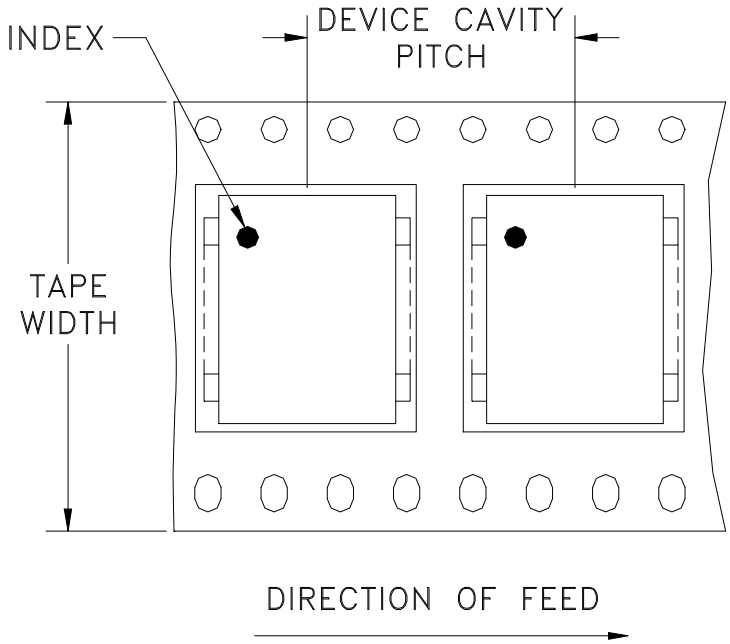
1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:
   For RoHS Case Styles: 2-5 µ inch (.05-.13 microns) Gold over 120-240 µ inch (3.05-6.10 microns) Nickel plate.
   For RoHS-5 Case Styles: Tin-Lead plate.

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

This document and its contents are the property of Mini-Circuits

Tape & Reel Packaging TR-F21

DEVICE ORIENTATION IN T&R



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

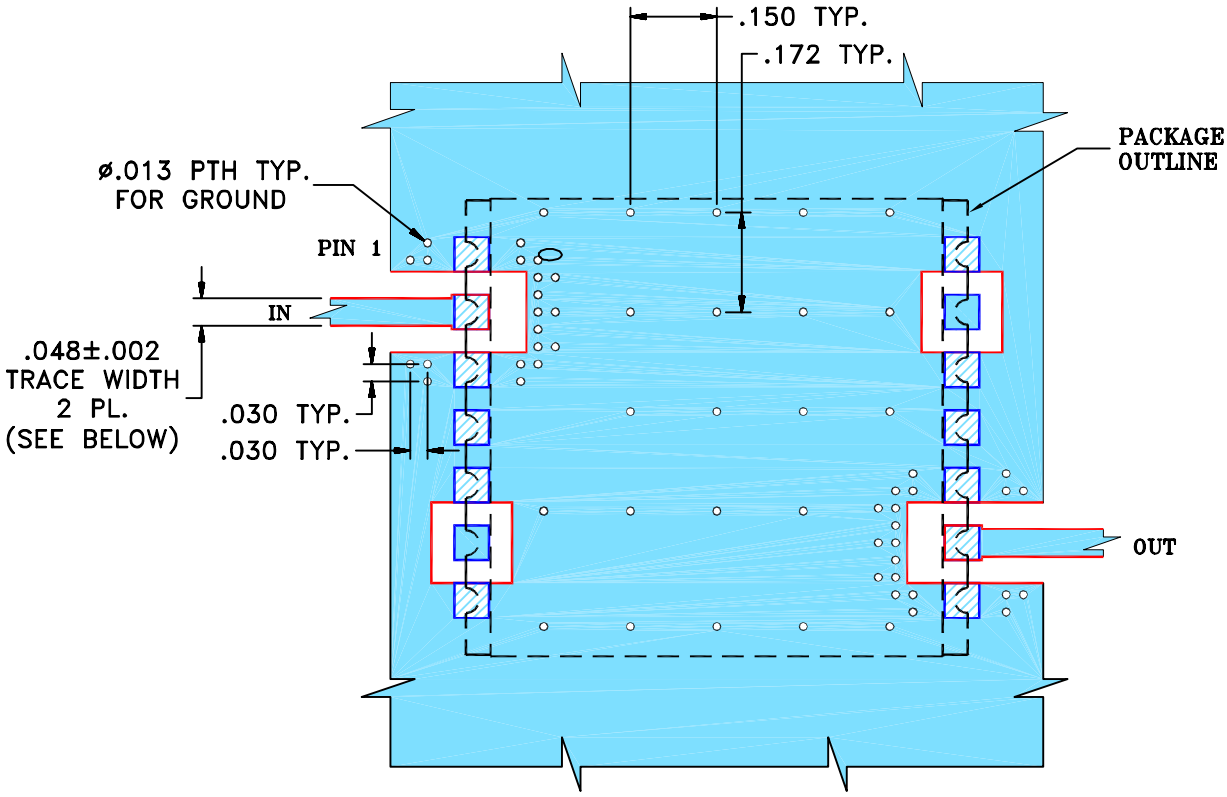
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

This document and its contents are the property of Mini-Circuits.

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:

1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B, 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)

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	DK (RAVON)	02 NOV 08
TOLERANCES ON:	CHECKED	DH (RAVON)	02 NOV 08
2 PL DECIMALS ±	APPROVED	HH (RAVON)	02 NOV 08
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

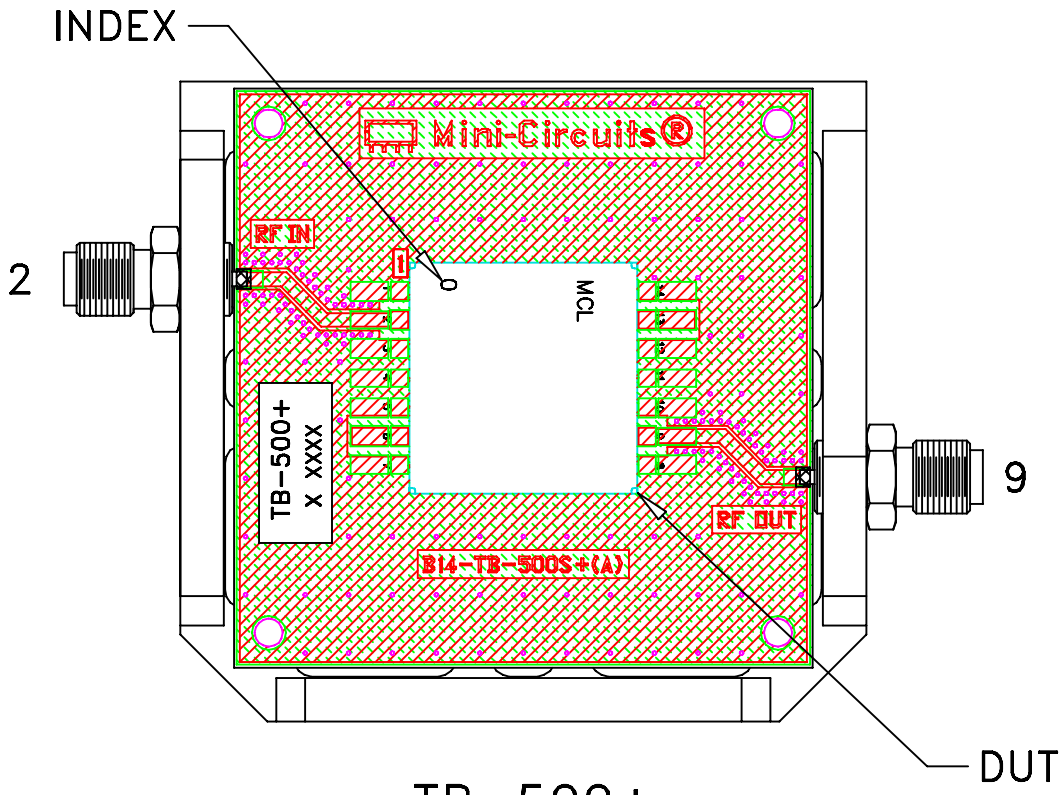
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

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

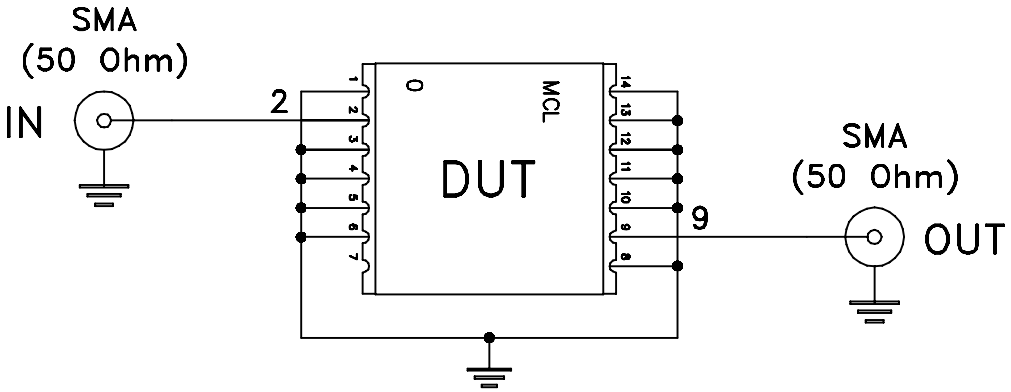
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-294	OR

FILE:	SCALE:	SHEET:
98PL294	3:1	1 OF 1

Evaluation Board and Circuit



TB-500+



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent.
   Dielectric Constant=3.5, Thickness=.030 inch.

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS.

Mini-Circuits

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

This document and its contents are the property of Mini-Circuits.