Surface Mount

Bandpass Filter

BPF-C138+

50Ω 105 to 180 MHz

Generic photo used for illustration purposes only

CASE STYLE: HU1186

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	0.5W Max.

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

Pin Connections

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

Features

- High rejection
- Good VSWR, 1.3:1 typ @ passband
- Shielded case
- Aqueous washable

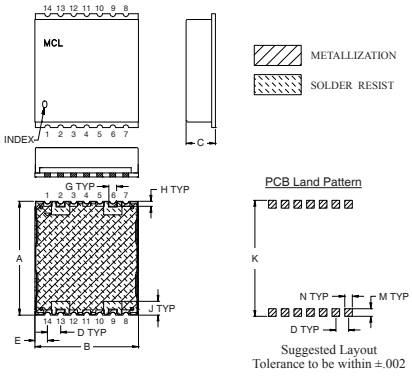
Applications

- Receivers / transmitters
- Wireless communication systems

+RoHS Compliant

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

Outline Drawing

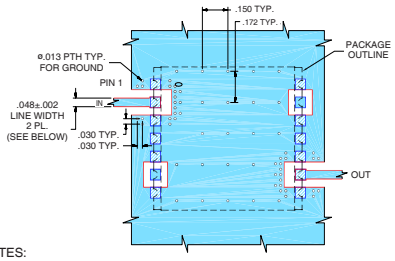


Outline Dimensions (inch/mm)

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

Note: Please refer to case style drawing for details

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



NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B, DIELECTRIC THICKNESS: .030"± .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.

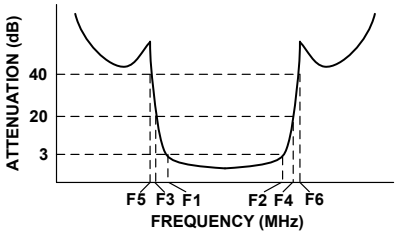
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

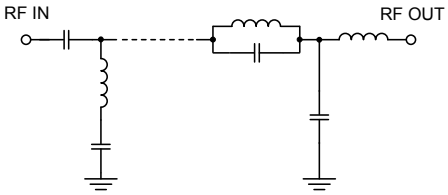
Bandpass Filter Electrical Specifications (T_{AMB}= 25°C)

CENTER FREQ. (MHz)	PASSBAND (MHz) (Loss < 3dB)	STOPBANDS (MHz)				VSWR (:1)		
		Loss > 20dB		Loss > 40dB		Passband		Stopband
Fc	F1 - F2	F3	F4	F5	F6	Typ.	Max.	Typ.
138	105 - 180	87	201	70	220 - 750	1.3	1.5	18

Typical Frequency Response



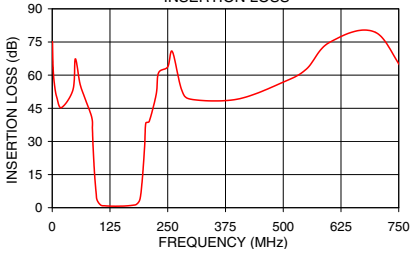
Functional Schematic



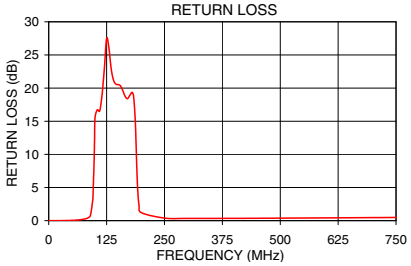
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB) $\bar{x}$	Insertion Loss (dB) σ	Return Loss (dB)	Frequency (MHz)	Group Delay (nSec)
0.5	75.17	2.99	0.00	105.0	22.71
70.0	50.00	1.11	0.15	110.0	17.94
87.0	35.58	4.91	0.53	115.0	15.36
90.0	20.97	2.27	0.79	120.0	13.76
93.0	11.31	1.32	1.56	125.0	12.69
95.0	6.55	0.86	3.07	130.0	11.93
97.0	3.52	0.43	6.44	135.0	11.52
99.0	2.09	0.16	12.18	138.0	11.35
105.0	1.19	0.02	16.74	140.0	11.32
138.0	0.70	0.02	21.71	145.0	11.34
180.0	1.38	0.05	19.36	150.0	11.58
188.0	2.62	0.20	12.94	155.0	11.95
192.0	6.52	0.76	4.97	160.0	12.56
195.0	12.89	1.09	2.34	162.0	12.88
200.0	27.70	1.49	1.21	168.0	14.24
201.0	31.52	1.70	1.12	170.0	14.86
220.0	45.26	1.10	0.58	175.0	17.10
750.0	73.96	8.40	0.48	180.0	20.64

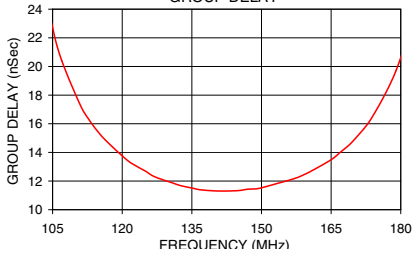
BPF-C138+
INSERTION LOSS



BPF-C138+
RETURN LOSS



BPF-C138+
GROUP DELAY



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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REV. B
M174392
EDR-8830/1AUF1
BPF-C138+
URJ/RAV
190817

Surface Mount Band Pass Filter BPF-C138+

Typical Performance Data

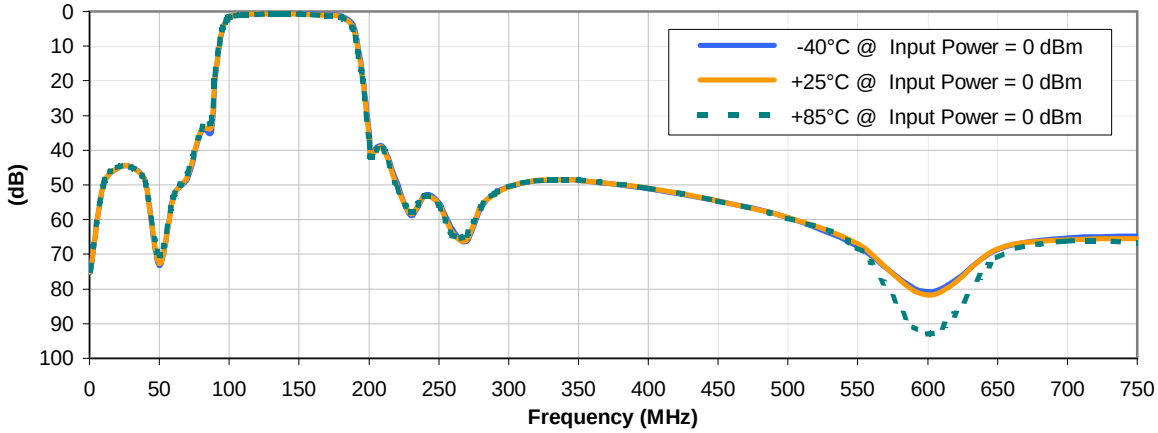
FREQ. (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURNLOSS (dB)		
	@ -40° C	@ +25° C	@ +85° C	@ -40° C	@ +25° C	@ +85° C	@ -40° C	@ +25° C	@ +85° C
0.5	75.19	75.15	74.80	0.01	0.01	0.00	0.00	0.00	0.01
10	49.64	49.67	49.67	0.02	0.01	0.01	0.03	0.03	0.04
20	45.15	45.17	45.08	0.00	0.01	0.00	0.04	0.06	0.08
30	44.85	44.87	44.87	0.01	0.01	0.02	0.11	0.16	0.19
40	48.86	49.06	49.25	0.02	0.03	0.03	0.23	0.28	0.32
50	73.18	72.72	70.38	0.03	0.04	0.04	0.37	0.42	0.45
60	53.41	53.67	53.73	0.07	0.09	0.09	0.44	0.52	0.58
70	48.11	47.40	46.93	0.14	0.17	0.18	0.51	0.61	0.71
80	34.05	33.98	33.98	0.29	0.33	0.36	0.68	0.81	0.95
87	34.85	33.40	31.81	0.59	0.65	0.72	1.03	1.21	1.39
90	19.47	18.88	18.23	0.93	1.04	1.15	1.45	1.73	1.95
93	10.05	9.76	9.42	2.05	2.27	2.53	2.69	3.15	3.57
95	5.68	5.56	5.42	4.07	4.43	4.85	4.84	5.56	6.24
97	3.06	3.10	3.13	7.85	8.32	8.88	8.95	10.00	11.02
99	1.84	1.97	2.06	13.34	13.70	14.18	15.44	16.94	18.55
100	1.54	1.69	1.80	16.34	16.48	16.75	19.79	21.59	23.67
105	1.03	1.16	1.26	19.24	18.88	18.65	21.41	20.98	20.70
110	0.86	0.99	1.07	18.57	18.38	18.21	19.16	19.02	18.85
120	0.69	0.81	0.88	21.65	21.51	21.28	20.36	20.24	19.95
130	0.64	0.73	0.82	21.86	22.25	22.54	20.68	21.03	21.10
138	0.61	0.72	0.79	21.88	22.52	22.89	21.52	22.21	22.36
140	0.61	0.72	0.80	22.30	23.01	23.38	22.13	22.89	23.03
150	0.62	0.74	0.83	29.26	29.01	27.00	28.75	27.63	25.16
160	0.72	0.86	0.97	21.80	21.39	20.62	21.20	20.70	19.79
170	0.95	1.10	1.23	16.57	17.21	17.79	16.78	17.59	18.34
180	1.29	1.53	1.72	18.95	19.81	20.52	20.91	22.61	24.40
188	3.40	4.08	4.70	8.53	8.05	7.68	10.29	9.87	9.48
190	5.75	6.66	7.49	4.76	4.61	4.52	5.86	5.78	5.66
192	9.52	10.59	11.55	2.69	2.74	2.79	3.43	3.54	3.59
195	17.11	18.32	19.36	1.43	1.57	1.68	1.87	2.07	2.18
200	35.19	36.67	37.75	0.87	0.99	1.10	1.09	1.26	1.36
201	40.57	41.60	42.01	0.82	0.95	1.05	1.01	1.18	1.28
210	38.94	39.31	39.69	0.59	0.67	0.76	0.63	0.76	0.83
220	49.02	49.92	50.70	0.47	0.56	0.61	0.46	0.56	0.62
230	58.88	58.34	57.76	0.45	0.51	0.56	0.38	0.48	0.51
240	52.95	53.18	53.19	0.40	0.46	0.49	0.30	0.39	0.42
250	55.14	55.78	55.93	0.37	0.44	0.48	0.26	0.35	0.39
260	62.77	63.70	64.65	0.38	0.44	0.46	0.21	0.30	0.33
270	66.31	65.81	64.36	0.37	0.43	0.46	0.18	0.27	0.31
280	56.82	56.35	56.55	0.35	0.41	0.45	0.16	0.25	0.29
290	52.48	52.72	52.65	0.34	0.41	0.44	0.15	0.22	0.27
300	50.62	50.59	50.57	0.38	0.44	0.47	0.14	0.22	0.27
310	49.40	49.38	49.48	0.37	0.44	0.47	0.13	0.20	0.25
320	48.80	48.76	48.81	0.35	0.42	0.46	0.12	0.20	0.24
330	48.63	48.44	48.49	0.35	0.42	0.47	0.11	0.18	0.23
340	48.57	48.53	48.63	0.34	0.41	0.46	0.09	0.17	0.21
350	48.62	48.64	48.59	0.36	0.43	0.48	0.09	0.17	0.21
400	51.03	50.90	50.88	0.32	0.40	0.46	0.05	0.14	0.18
450	54.64	54.61	54.55	0.30	0.40	0.46	0.03	0.13	0.18
500	59.44	59.41	59.68	0.28	0.39	0.46	0.03	0.13	0.17
550	67.71	66.95	68.11	0.29	0.42	0.49	0.03	0.14	0.18
600	80.83	81.68	92.97	0.30	0.43	0.51	0.03	0.15	0.19
650	68.72	68.48	71.10	0.33	0.48	0.57	0.04	0.16	0.23
700	65.36	65.79	66.23	0.34	0.51	0.60	0.05	0.18	0.23
750	64.76	65.58	66.53	0.37	0.55	0.65	0.06	0.20	0.25

Typical Performance Data

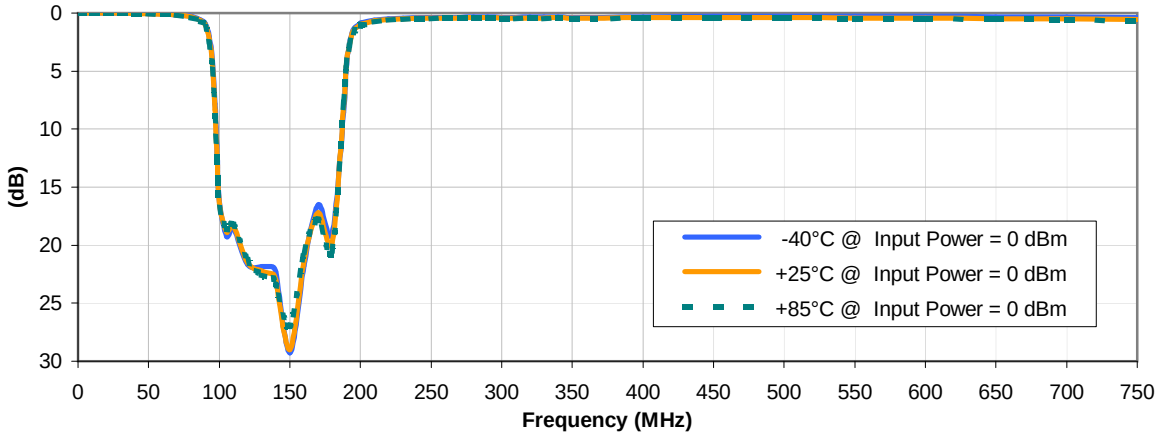
FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
105	22.80	22.48	22.14
106	21.49	21.30	21.01
108	19.40	19.19	19.06
110	17.76	17.65	17.47
112	16.83	16.74	16.61
113	16.32	16.21	16.08
114	15.84	15.71	15.62
115	15.40	15.26	15.21
116	15.02	14.90	14.83
118	14.37	14.25	14.18
120	13.79	13.72	13.62
122	13.31	13.25	13.17
123	13.08	13.07	12.99
124	12.94	12.87	12.82
125	12.76	12.74	12.69
126	12.59	12.56	12.52
128	12.31	12.23	12.19
130	12.06	12.05	11.99
132	11.84	11.80	11.79
133	11.72	11.75	11.73
134	11.66	11.69	11.64
135	11.60	11.61	11.59
136	11.55	11.59	11.58
137	11.55	11.55	11.55
138	11.50	11.50	11.49
140	11.44	11.45	11.43
142	11.43	11.45	11.43
143	11.49	11.45	11.46
144	11.48	11.51	11.50
145	11.47	11.48	11.50
146	11.55	11.55	11.55
147	11.54	11.55	11.54
148	11.55	11.60	11.62
150	11.75	11.76	11.73
152	11.85	11.86	11.88
153	11.95	11.97	11.96
154	12.08	12.05	12.05
155	12.14	12.11	12.15
156	12.26	12.27	12.27
158	12.46	12.50	12.50
160	12.73	12.79	12.77
162	13.09	13.09	13.15
163	13.25	13.27	13.32
164	13.40	13.48	13.53
165	13.62	13.70	13.78
166	13.90	13.97	14.05
168	14.37	14.52	14.60
170	15.01	15.17	15.27
172	15.79	15.99	16.16
173	16.25	16.48	16.66
174	16.81	17.03	17.24
175	17.35	17.61	17.87
176	18.03	18.32	18.59
178	19.66	19.99	20.28
180	21.77	22.23	22.56

Typical Performance Curves

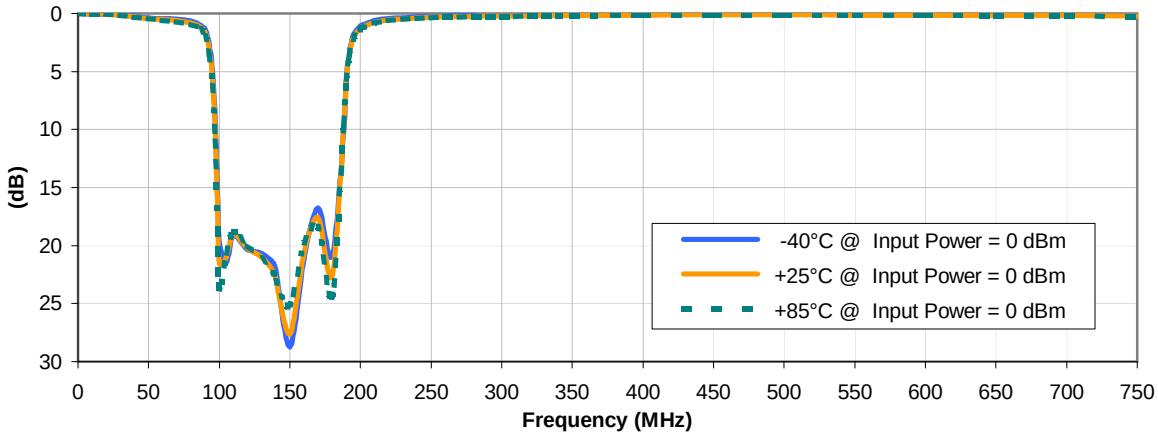
INSERTION LOSS vs. TEMPERATURE



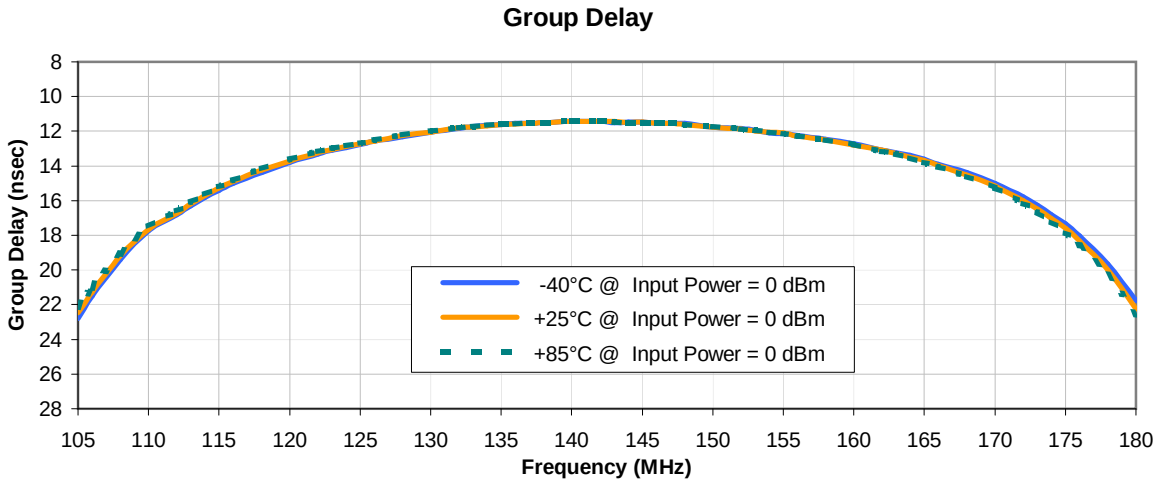
INPUT RETURN LOSS vs. TEMPERATURE



OUTPUT RETURN LOSS vs. TEMPERATURE



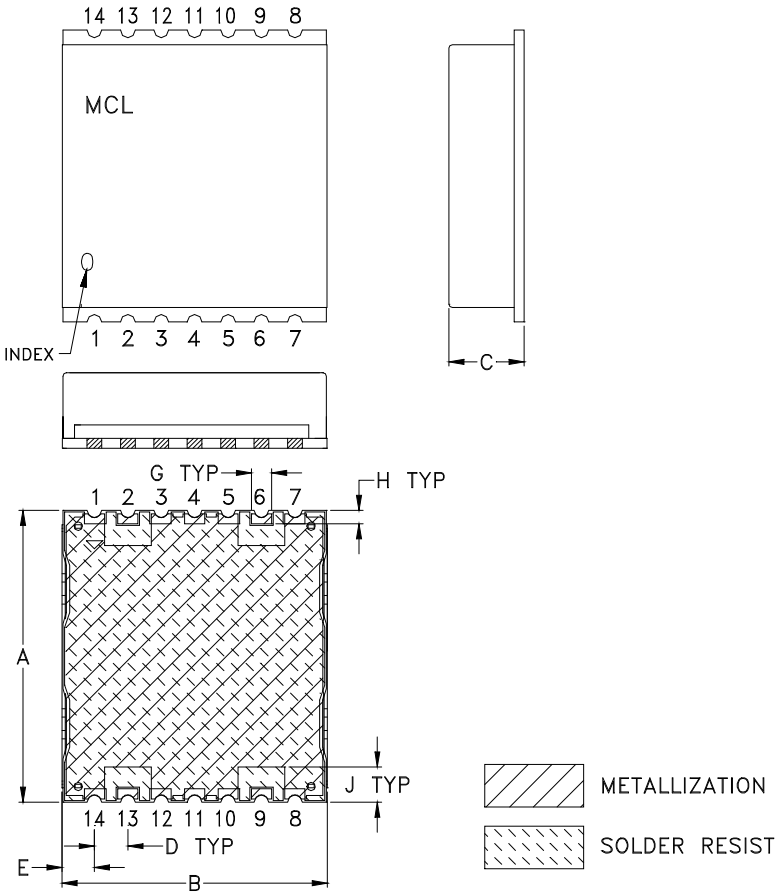
Typical Performance Curves



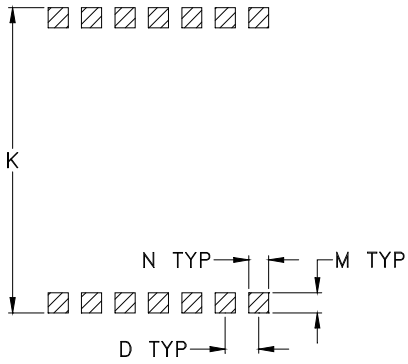
Case Style HU

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

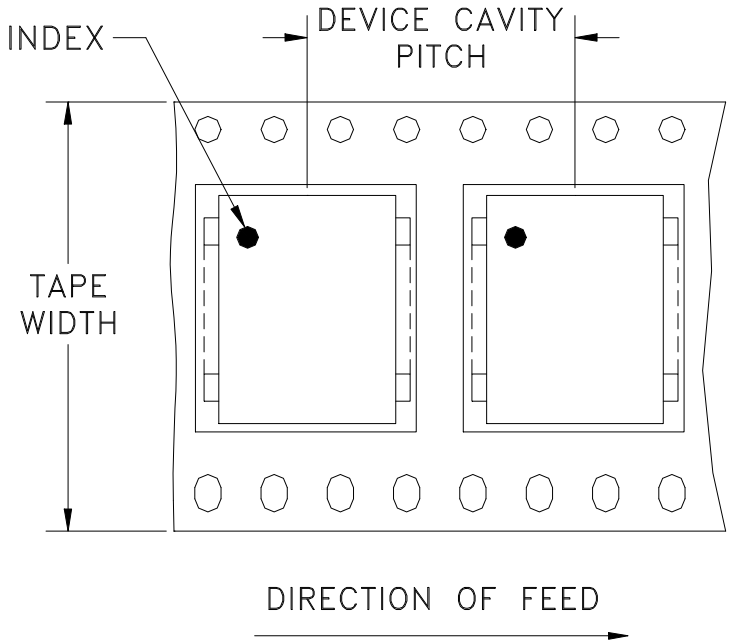
Dimensions are in inches (mm). Tolerances: 2PL. +/- .03; 3PL. +/- .015

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.

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.

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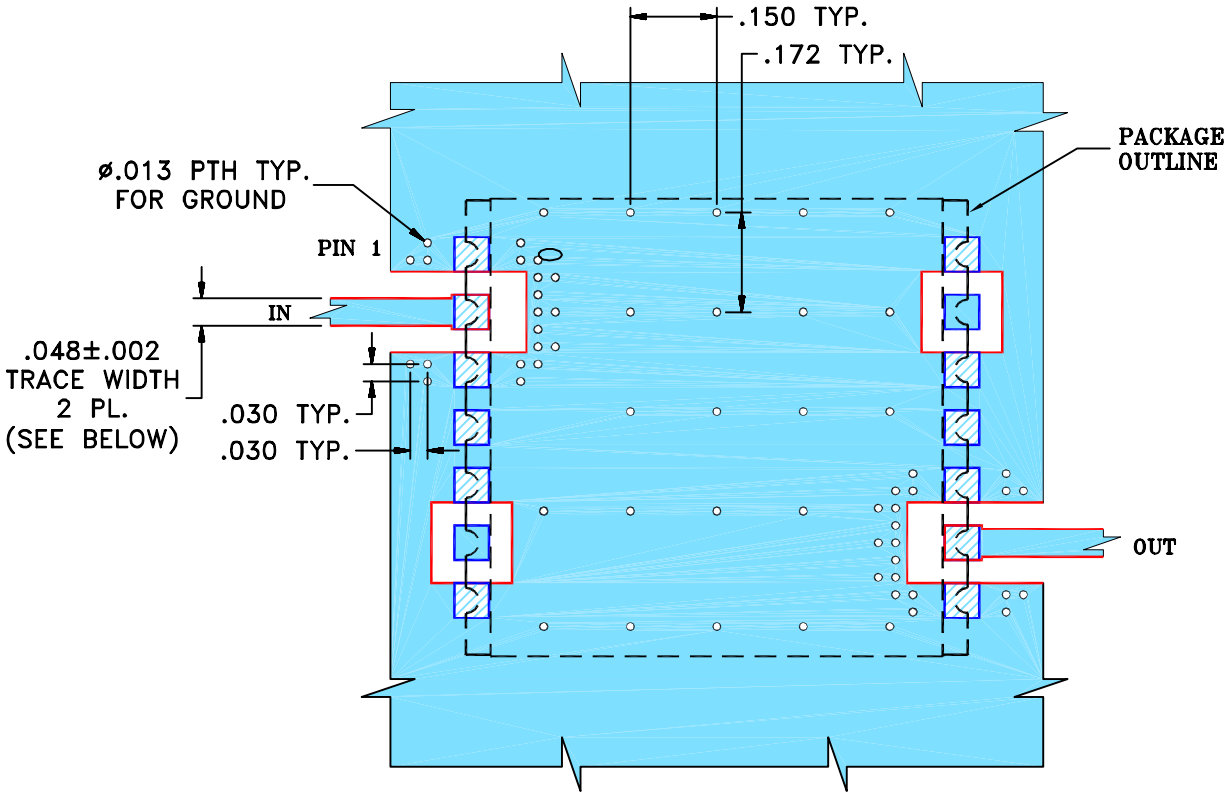
THIRD ANGLE PROJECTION

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 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)

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®

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

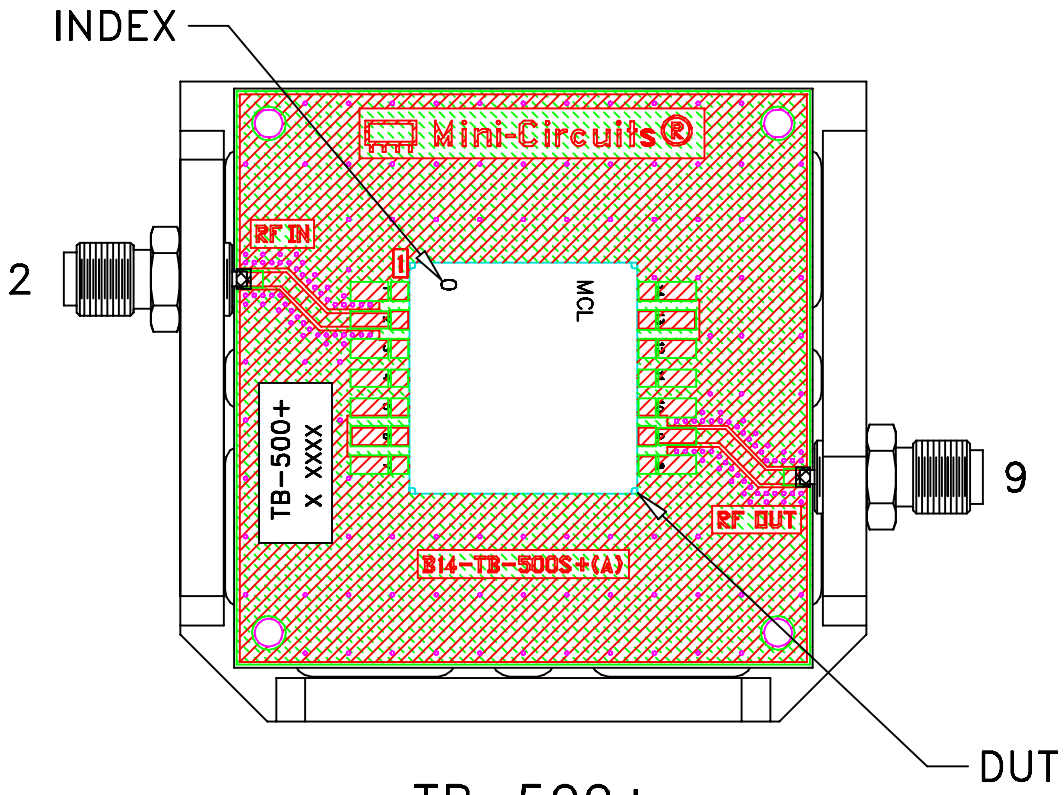
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

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

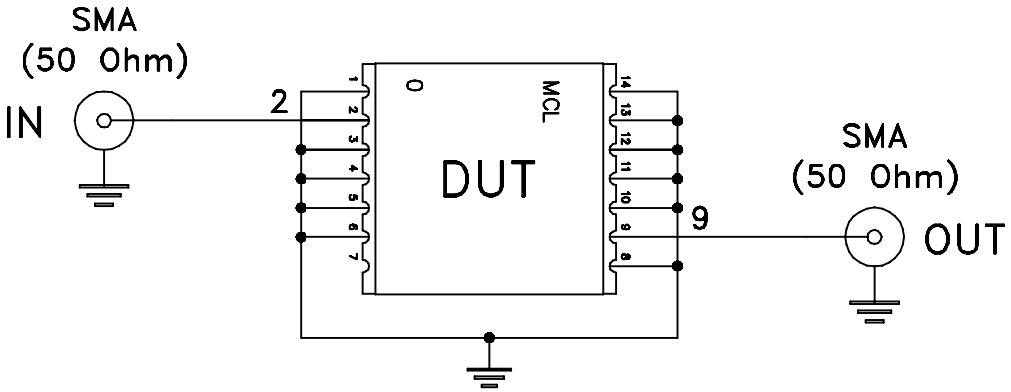
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-294	OR

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.

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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