Surface Mount

Bandpass Filter

BPF-C550+

50Ω 100 to 1000 MHz

Generic photo used for illustration purposes only

CASE STYLE: HU1186

The Big Deal

- Sharp roll-off
- Ultra wide bandwidth
- Good VSWR
- Miniature shielded package

Product Overview

The BPF-C550+ is an ultra 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 good rejection for use in receiver front end applications.

Key Features

Feature	Advantages
Sharp roll-off	BPF-C550+ attenuates spurious signals and rejects harmonics for wide band of frequency.
Good VSWR over ultra wide bandwidth	This filter maintains typical 1.5 VSWR over ultra wide 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-C550+ to be used in compact design.

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BPF-C550+

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CASE STYLE: HU1186

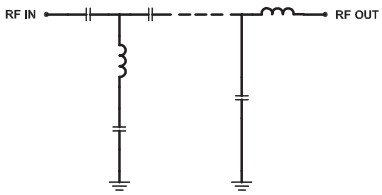
Features

- Sharp roll-off
- Ultra wide bandwidth
- Good VSWR
- Miniature shielded package

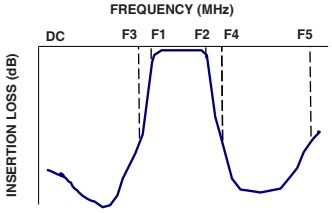
Applications

- Test and measurement
- Receiver front end applications
- Cellular network
- Civil aircraft communication radio

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

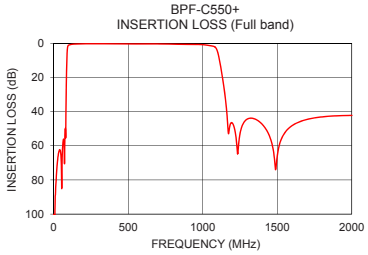
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center Frequency	—	—	—	550	—	MHz
	Insertion Loss	F1-F2	100-1000	—	1.1	2.2	dB
	VSWR	F1-F2	100-1000	—	1.5	2.1	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC-80	35	46	—	dB
	VSWR	DC-F3	DC-80	—	20	—	:1
Stop Band, Upper	Insertion Loss	F4-F5	1200-2000	30	39	—	dB
	VSWR	F4-F5	1200-2000	—	20	—	:1

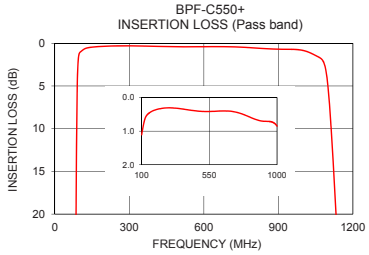
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	1W

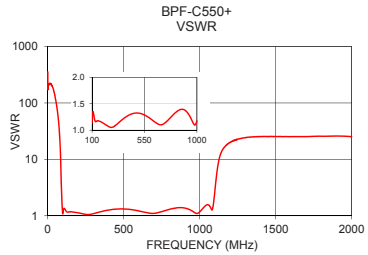
Permanent damage may occur if any of these limits are exceeded.

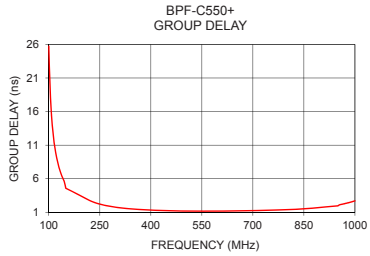
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
1.0	104.03	203.05	100	25.74
50.0	68.47	120.93	150	4.59
80.0	54.18	21.35	200	3.29
83.5	30.52	12.73	250	2.22
85.5	20.18	8.56	300	1.74
88.0	10.30	4.68	350	1.48
92.0	3.15	2.19	400	1.33
100.0	1.11	1.14	450	1.24
550.0	0.42	1.29	500	1.19
1000.0	0.85	1.17	550	1.18
1090.0	3.01	1.61	600	1.18
1112.0	9.84	5.59	650	1.21
1120.0	13.67	7.94	700	1.26
1133.0	20.55	11.45	750	1.32
1149.0	30.36	14.60	800	1.40
1200.0	46.91	20.01	850	1.52
1350.0	44.37	25.02	900	1.74
1500.0	65.83	25.38	950	1.96
1800.0	43.14	25.65	975	2.35
2000.0	42.26	25.13	1000	2.71









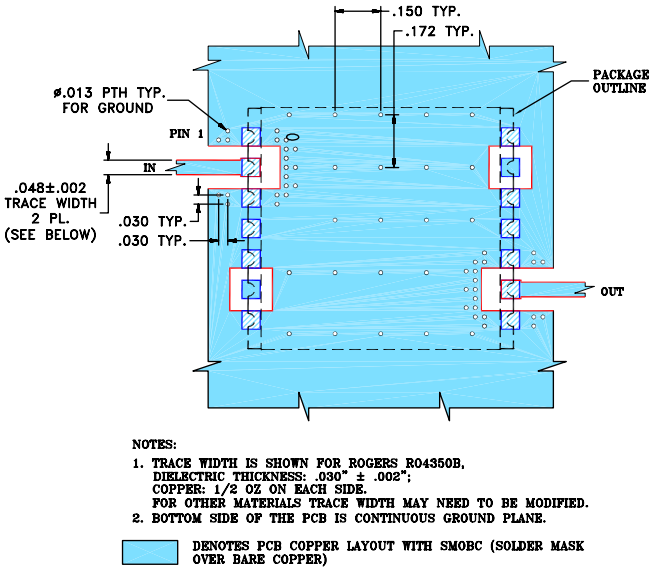
Notes

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

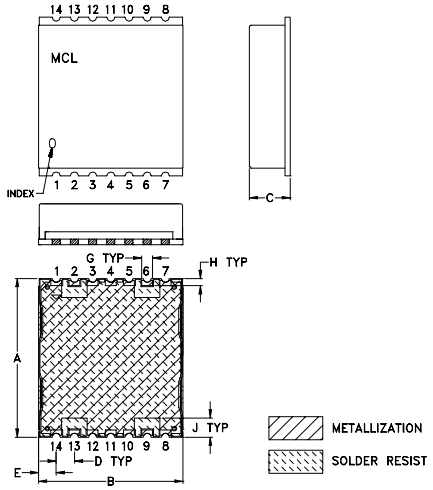
Demo Board MCL P/N: TB-500+
Suggested PCB Layout (PL-294)



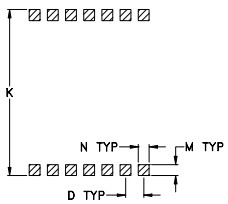
NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B, DIELECTRIC THICKNESS: .030" ± .002"; COPPER: 1/2 OZ ON EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

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

Surface Mount Band Pass Filter BPF-C550+

Typical Performance Data

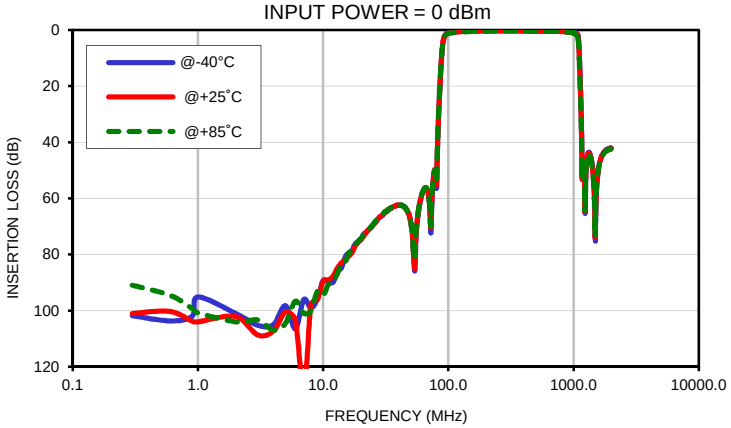
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
0.3	101.84	101.01	90.96	0.05	0.05	0.05	0.05	0.05	0.05
0.9	102.03	103.82	99.28	0.09	0.09	0.09	0.09	0.09	0.09
1.0	95.13	104.03	100.80	0.09	0.09	0.09	0.09	0.09	0.09
10.0	89.27	89.60	94.58	0.08	0.08	0.08	0.09	0.09	0.09
11.0	89.69	89.07	90.71	0.08	0.08	0.08	0.09	0.09	0.09
17.0	78.54	79.38	78.50	0.08	0.08	0.08	0.09	0.09	0.09
30.0	65.90	65.82	65.67	0.08	0.09	0.09	0.11	0.12	0.12
42.0	62.38	62.45	62.46	0.10	0.11	0.12	0.16	0.18	0.19
50.0	68.30	68.47	68.19	0.13	0.14	0.15	0.22	0.25	0.27
53.0	80.96	82.08	81.51	0.14	0.16	0.17	0.24	0.28	0.30
57.0	66.83	66.17	66.06	0.16	0.18	0.20	0.28	0.33	0.36
64.0	56.83	56.71	56.65	0.21	0.25	0.27	0.38	0.44	0.49
70.0	59.55	59.76	59.95	0.30	0.34	0.38	0.51	0.59	0.66
72.0	68.98	69.18	69.63	0.34	0.39	0.43	0.57	0.65	0.72
76.0	52.76	52.54	52.46	0.46	0.53	0.59	0.70	0.81	0.90
77.0	50.76	50.67	50.72	0.51	0.59	0.65	0.74	0.86	0.95
80.0	53.70	54.18	54.65	0.70	0.81	0.90	0.90	1.04	1.15
81.0	52.96	50.70	48.74	0.80	0.93	1.03	0.97	1.11	1.23
85.0	23.03	22.55	22.04	1.56	1.83	2.04	1.39	1.60	1.78
96.0	1.34	1.50	1.61	17.38	17.96	18.73	20.89	22.33	23.94
98.0	1.09	1.24	1.34	26.71	27.20	28.05	32.22	31.81	30.69
100.0	0.97	1.11	1.21	24.15	23.78	23.34	22.62	22.02	21.50
105.0	0.86	0.97	1.06	17.06	16.95	16.82	17.65	17.42	17.23
116.0	0.64	0.72	0.79	18.51	18.56	18.59	21.57	21.80	21.79
126.0	0.51	0.58	0.64	21.65	22.09	22.65	24.45	25.79	27.13
155.0	0.38	0.44	0.50	23.13	21.83	21.07	22.91	21.48	20.74
270.0	0.26	0.31	0.35	27.78	31.98	33.94	25.64	28.21	29.29
315.0	0.27	0.31	0.35	22.83	25.26	26.74	22.62	25.15	27.17
490.0	0.32	0.41	0.47	17.56	17.11	17.22	17.17	16.58	16.54
550.0	0.33	0.42	0.48	18.15	18.06	18.10	17.24	17.00	16.86
690.0	0.30	0.41	0.48	27.39	26.41	25.03	27.57	26.97	25.73
755.0	0.35	0.47	0.55	21.34	20.98	20.51	23.59	23.21	22.69
865.0	0.51	0.66	0.76	16.10	15.68	15.53	16.06	15.62	15.45
978.0	0.58	0.75	0.89	27.23	26.31	24.64	26.84	27.32	26.38
1000.0	0.65	0.85	1.00	23.08	21.96	20.71	25.21	23.91	22.61
1032.0	0.94	1.18	1.36	14.86	14.57	14.34	14.95	14.58	14.37
1065.0	1.39	1.67	1.89	13.30	14.04	15.00	11.75	12.00	12.38
1074.0	1.54	1.86	2.13	14.85	16.52	18.79	11.69	11.97	12.27
1093.0	2.77	3.51	4.25	11.04	10.36	9.35	7.65	7.01	6.35
1095.0	3.10	3.92	4.73	9.73	9.07	8.18	6.86	6.24	5.63
1114.0	9.39	10.75	12.06	2.80	2.84	2.80	1.93	1.91	1.86
1135.0	20.26	21.67	23.06	1.27	1.46	1.57	0.76	0.89	0.96
1151.0	30.25	31.79	33.34	0.99	1.17	1.29	0.55	0.68	0.75
1153.0	31.70	33.27	34.86	0.96	1.14	1.26	0.53	0.66	0.74
1155.0	33.23	34.83	36.49	0.94	1.12	1.24	0.52	0.65	0.72
1160.0	37.51	39.23	41.14	0.90	1.07	1.20	0.49	0.61	0.69
1252.0	52.77	52.05	51.45	0.59	0.76	0.89	0.23	0.34	0.40
1308.0	43.80	44.04	44.23	0.53	0.71	0.85	0.17	0.28	0.34
1400.0	47.00	47.56	48.09	0.50	0.69	0.83	0.12	0.22	0.28
1404.0	47.39	47.95	48.50	0.51	0.69	0.83	0.12	0.22	0.27
1420.0	49.10	49.81	50.36	0.51	0.69	0.83	0.11	0.21	0.26
1450.0	53.83	54.92	55.96	0.51	0.69	0.83	0.10	0.21	0.26
1474.0	61.16	63.02	65.01	0.51	0.68	0.83	0.10	0.20	0.25
1490.0	73.29	73.68	70.68	0.51	0.68	0.83	0.09	0.20	0.25
1500.0	68.38	65.83	63.94	0.51	0.68	0.83	0.09	0.19	0.25
1650.0	45.87	45.94	46.03	0.51	0.69	0.82	0.07	0.18	0.23
1700.0	44.40	44.58	44.78	0.51	0.69	0.81	0.07	0.18	0.23
1820.0	42.72	42.96	43.13	0.51	0.68	0.81	0.08	0.19	0.24
1900.0	42.34	42.51	42.73	0.50	0.67	0.80	0.09	0.19	0.24
2000.0	42.10	42.26	42.44	0.50	0.69	0.83	0.09	0.19	0.24

Typical Performance Data

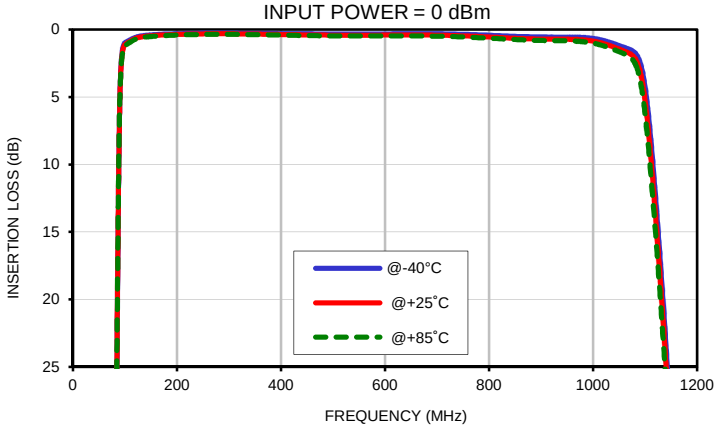
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
100	26.11	25.74	25.39
110	14.20	14.09	13.99
120	10.03	9.98	9.93
130	7.72	7.69	7.67
140	6.25	6.22	6.20
150	4.61	4.59	4.57
160	4.36	4.34	4.32
170	4.10	4.08	4.07
180	3.83	3.82	3.80
190	3.57	3.55	3.54
200	3.30	3.29	3.28
220	2.77	2.76	2.75
240	2.38	2.37	2.36
260	2.10	2.09	2.09
280	1.89	1.89	1.89
300	1.74	1.74	1.73
320	1.62	1.62	1.61
340	1.52	1.52	1.52
360	1.45	1.45	1.44
380	1.39	1.38	1.38
400	1.34	1.33	1.33
420	1.30	1.29	1.29
440	1.26	1.26	1.25
460	1.24	1.23	1.23
480	1.22	1.21	1.21
500	1.20	1.19	1.19
520	1.19	1.18	1.18
530	1.18	1.18	1.18
550	1.18	1.18	1.17
570	1.18	1.18	1.17
600	1.19	1.18	1.18
620	1.20	1.19	1.19
640	1.21	1.21	1.20
660	1.22	1.22	1.22
680	1.24	1.24	1.24
700	1.26	1.26	1.25
710	1.27	1.27	1.27
720	1.28	1.28	1.28
730	1.29	1.29	1.29
740	1.30	1.30	1.30
750	1.32	1.32	1.32
760	1.33	1.33	1.33
770	1.35	1.35	1.35
780	1.36	1.36	1.36
790	1.38	1.38	1.38
800	1.40	1.40	1.40
810	1.42	1.42	1.42
820	1.44	1.44	1.44
830	1.47	1.47	1.47
840	1.49	1.49	1.50
850	1.52	1.52	1.53
860	1.56	1.56	1.56
870	1.59	1.60	1.60
880	1.64	1.64	1.65
890	1.68	1.69	1.70
900	1.73	1.74	1.75
920	1.83	1.83	1.85
940	1.91	1.92	1.94
960	2.16	2.18	2.20
1000	2.68	2.71	2.74

Typical Performance Curves

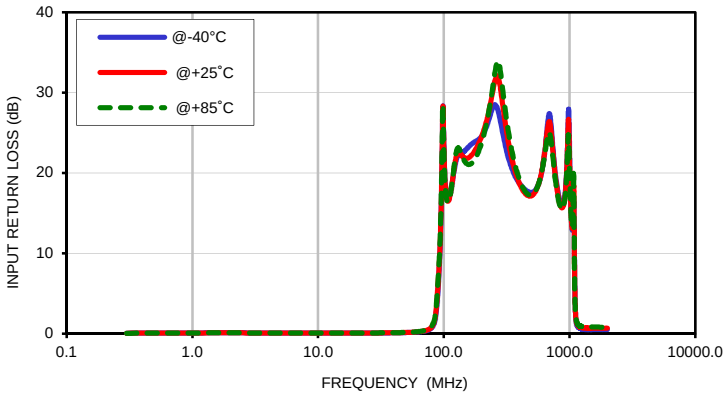
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



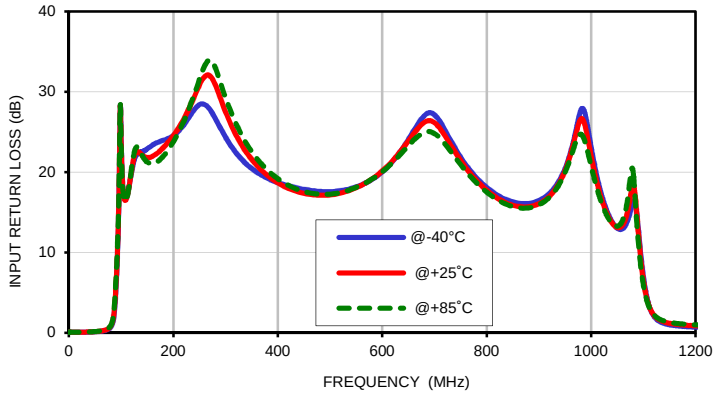
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



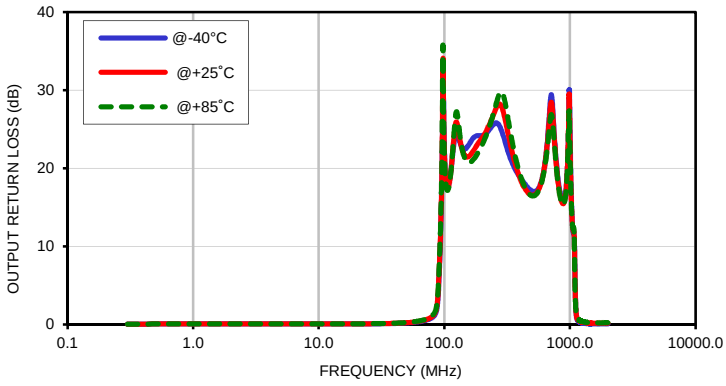
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



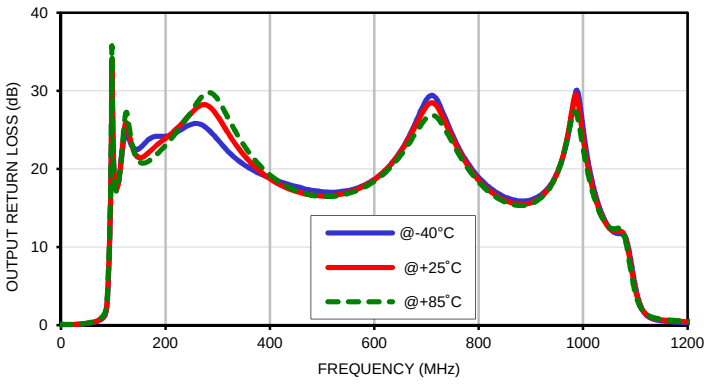
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



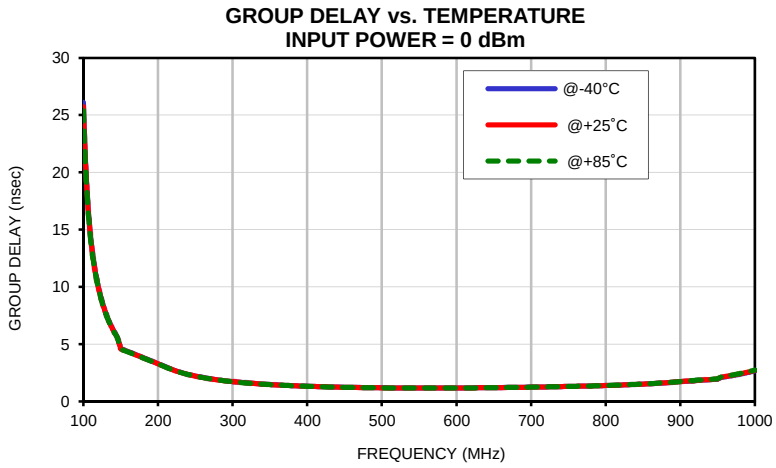
OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



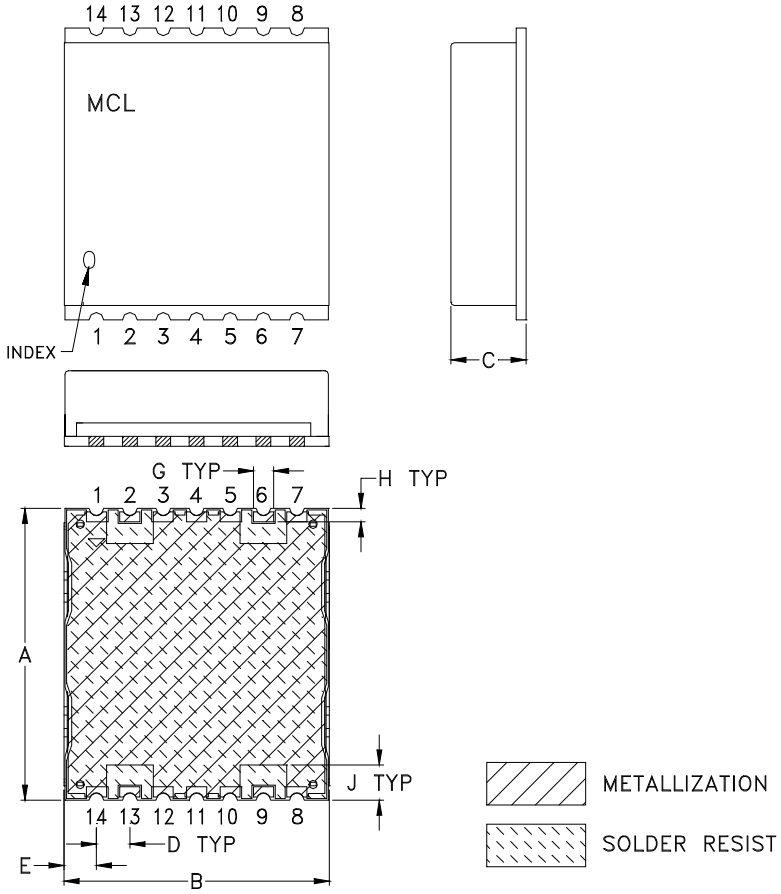
Typical Performance Curves



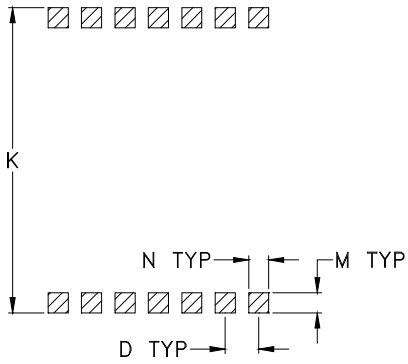
Case Style HU

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

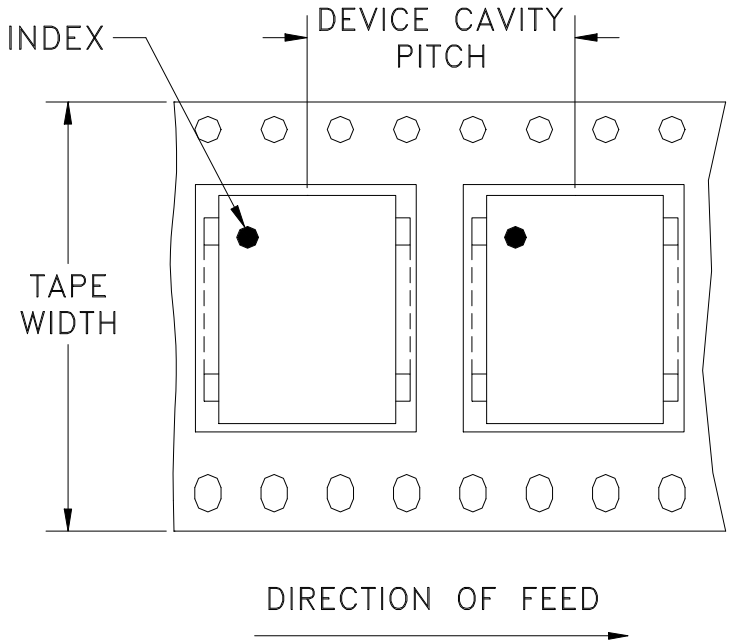
Dimensions are in inches (mm). Tolerances: 2PL. +/- .03; 3PL. +/- .015

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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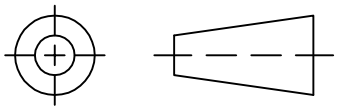
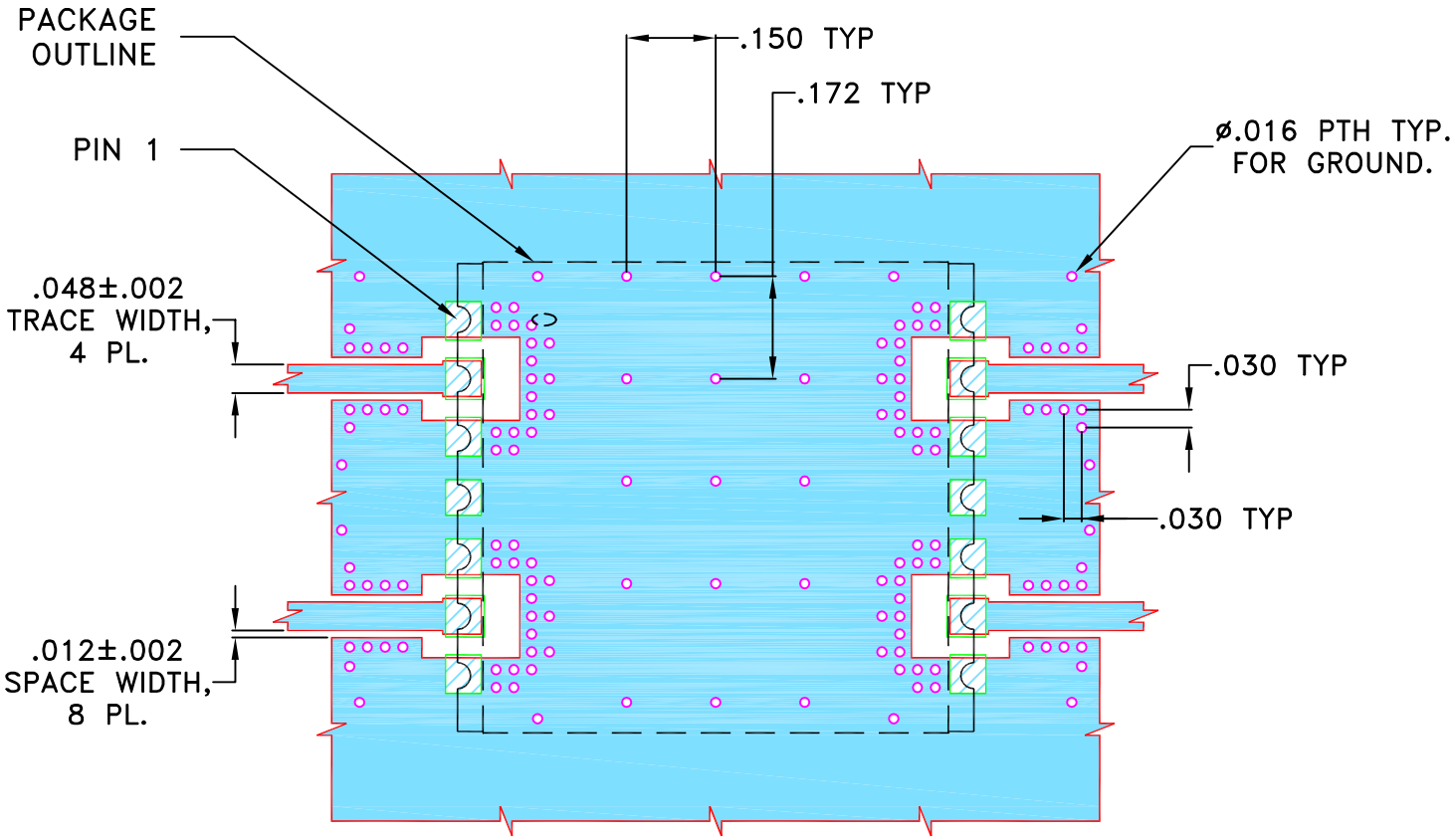
THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M150738	NEW RELEASE	APR 15	TM	MD
A	M174984	DIM UPDATED AND PIN 1 ADDED	JUN 19	TM	VC

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



NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS(RO4350B) WITH 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 SOLDERMASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	TM	22 APR 15
TOLERANCES ON:	CHECKED	MD	22 APR 15
2 PL DECIMALS ±	APPROVED	MD	22 APR 15
3 PL DECIMALS ± .005"			
ANGLES ±			
FRACTIONS ±			

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

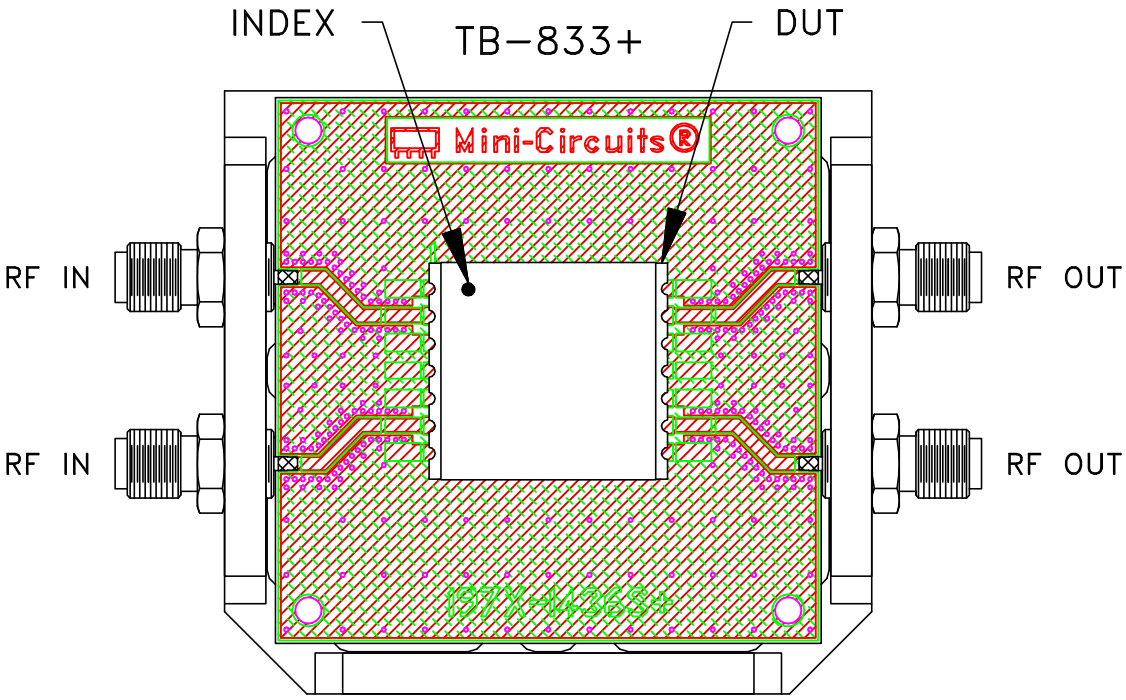
Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

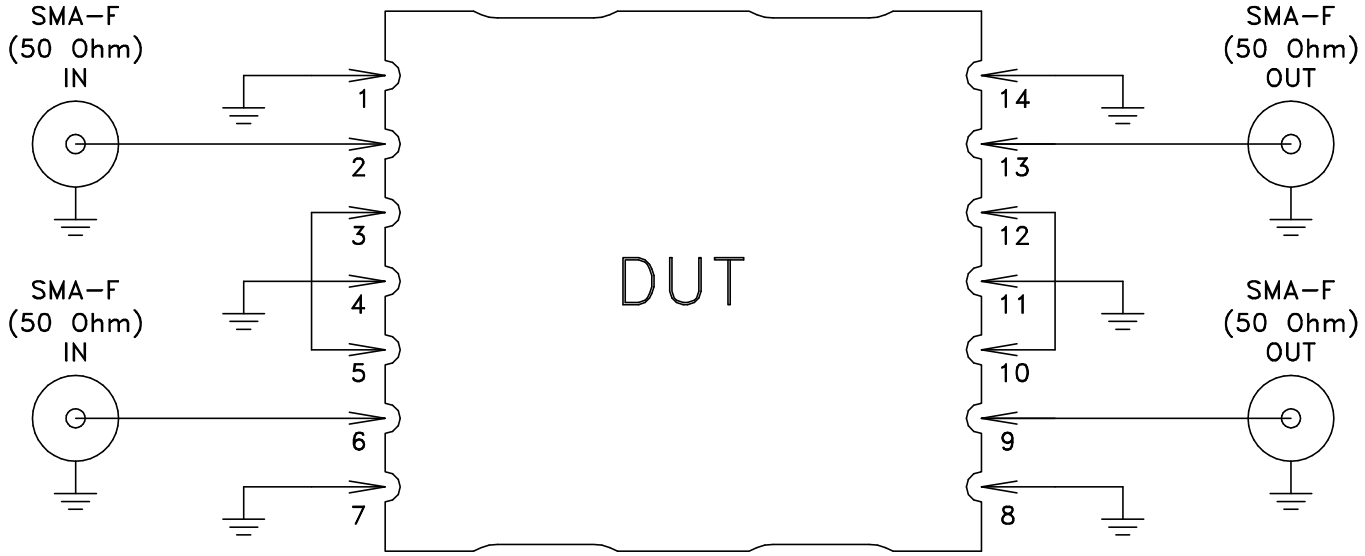
PL, 14FL03, HU1186
TB-833+, 50 Ohm

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-450	A

FILE:	SCALE:	SHEET:
98PL450	3:1	1 OF 1

Evaluation Board and Circuit





Notes:
1. 50 Ohm SMA Female connectors.
2. PCB Material: ROGERS (R04350) or Equivalent
   Dielectric Constant=3.48±.05, 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