Surface Mount

Band Stop Filter

BSF-C174223+

50Ω 174 to 223 MHz

CASE STYLE: HU1186

The Big Deal

- High rejection, 44 dB typical
- Good VSWR, 1.3:1 typical in passband
- Stopband (174 to 223 MHz)
- Miniature shielded package

Product Overview

The BSF-C174223+ is stopband filter fabricated using SMT Technology. Covering 174 to 223 MHz stopband, this units offer good rejection. This unit uses a miniature high Q capacitors and wire welded inductors for high reliability. It has repeatable performance across production lots and consistent performance across temperature.

Key Features

Feature	Advantages
High rejection, 44 dB typical	BSF-C174223+ enables the filter to attenuate spurious signals and reject harmonics for broadband of frequencies.
Good VSWR, 1.3:1 typical in the pass-band	This filter maintains typical VSWR over a passband frequency range which provided good interface when used with other devices.
Shielded package	Shielded package (Size of .087" x 0.80" x 0.25") reduced interface with and from the surrounding components.

Notes
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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.
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Band Stop Filter

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CASE STYLE: HU1186

Features

- High rejection, 44 dB typical
- Good VSWR, 1.3:1 typical in passband
- Aqueous washable
- Miniature shield package

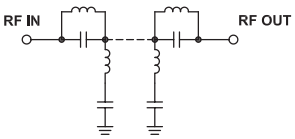
Applications

- FM radio
- Receivers / Transmitters
- Lab use

Electrical Specifications at 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band, Lower	Insertion Loss	DC-F1	DC - 130	-	0.6	1.2	dB
	VSWR	DC-F1	DC - 130	-	1.3	1.7	:1
Stop Band	Rejection	F4-F5	174-223	30	44	-	dB
	VSWR	F4-F5	174-223	-	6	-	:1
Pass Band, Upper	Insertion Loss	F2-F3	330-1000	-	0.6	1.2	dB
	VSWR	F2-F3	330-1000	-	1.3	1.7	:1

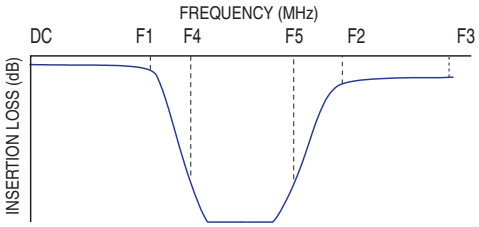
Functional Schematic



Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	250 mW max.

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

Typical Frequency Response



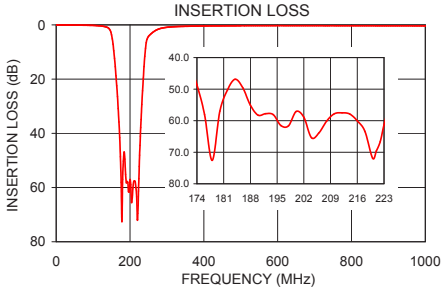
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
1.0	0.02	1.00
5.0	0.02	1.01
30.0	0.08	1.03
88.0	0.16	1.03
114.0	0.30	1.13
130.0	0.58	1.26
150.0	3.67	2.58
160.0	15.42	8.77
168.0	30.86	13.81
174.0	48.66	16.72
200.0	57.09	14.50
223.0	61.29	22.29
228.0	41.06	18.30
238.0	15.37	7.73
254.0	3.66	2.90
280.0	1.42	1.52
330.0	0.61	1.20
500.0	0.32	1.08
800.0	0.33	1.11
1000.0	0.39	1.18

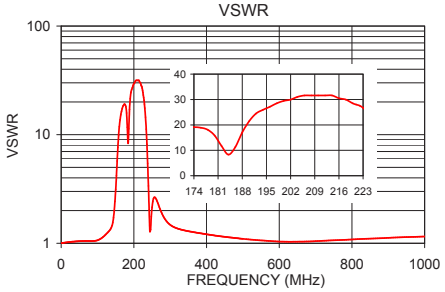
+RoHS Compliant

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

BSF-C174223+
INSERTION LOSS



BSF-C174223+
VSWR



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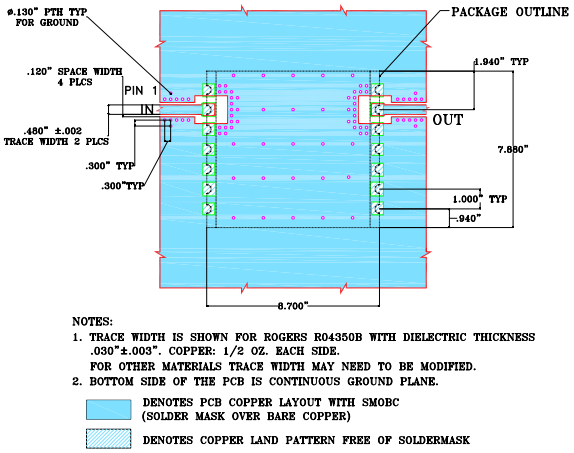
Pin Connections

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

Demo Board MCL P/N: TB-378+
Suggested PCB Layout (PL-347)

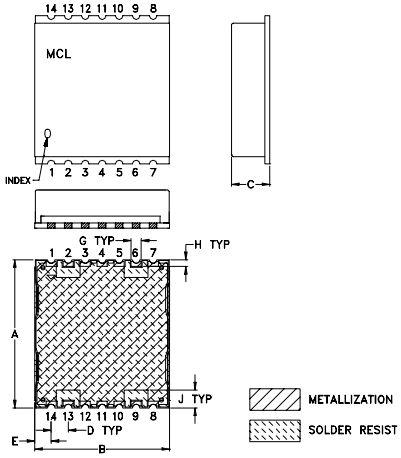


NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030"±.003". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

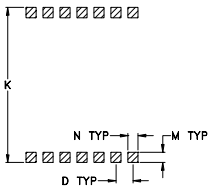
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

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

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Band Stop Filter BSF-C174223+

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
0.5	0.01	0.02	0.02	64.71	60.94	58.49	64.36	60.39	58.04
1.0	0.01	0.02	0.02	59.91	57.29	55.66	59.93	57.27	55.56
10.0	0.03	0.04	0.04	43.98	41.92	40.94	43.85	41.81	40.89
30.0	0.04	0.06	0.07	36.21	34.50	33.49	36.08	34.37	33.47
50.0	0.07	0.09	0.09	32.89	31.70	30.87	32.56	31.51	30.83
70.0	0.10	0.12	0.13	31.78	31.46	31.15	31.22	31.07	30.97
80.0	0.13	0.14	0.15	32.30	32.79	33.04	31.38	31.94	32.45
88.0	0.14	0.17	0.18	33.60	35.38	36.66	32.08	33.36	34.65
100.0	0.18	0.21	0.23	38.08	44.66	47.00	33.70	35.01	35.45
120.0	0.34	0.39	0.43	28.66	27.00	25.71	27.65	25.97	24.69
130.0	0.52	0.60	0.66	23.82	23.47	23.01	23.20	22.42	21.62
140.0	1.05	1.18	1.29	16.52	16.57	16.60	15.35	15.04	14.69
150.0	4.62	5.11	5.54	5.32	5.16	5.00	4.62	4.42	4.23
160.0	17.73	18.49	19.24	1.70	1.76	1.78	1.28	1.33	1.35
168.0	34.69	35.71	36.68	1.19	1.27	1.32	0.88	0.95	0.99
170.0	40.53	41.59	42.78	1.12	1.20	1.24	0.84	0.91	0.95
172.0	47.45	48.69	49.79	1.07	1.15	1.19	0.80	0.87	0.91
174.0	55.45	56.55	56.82	1.03	1.11	1.15	0.77	0.84	0.89
176.0	60.82	60.30	59.45	0.98	1.06	1.12	0.76	0.84	0.88
180.0	55.24	54.62	53.53	0.93	1.01	1.07	0.80	0.90	0.97
184.0	49.35	49.49	50.13	0.92	1.01	1.08	1.11	1.16	1.16
190.0	51.53	51.16	50.84	1.07	1.18	1.29	0.58	0.66	0.70
194.0	52.91	52.69	52.98	1.58	1.80	2.03	0.51	0.59	0.64
196.0	55.44	55.27	55.02	2.38	2.75	3.12	0.50	0.57	0.63
200.0	50.26	50.13	50.46	3.19	2.93	2.65	0.46	0.54	0.60
206.0	58.69	59.45	60.81	0.75	0.84	0.89	0.45	0.52	0.59
210.0	71.57	70.43	71.16	0.58	0.68	0.75	0.45	0.53	0.59
216.0	73.35	67.68	65.78	0.55	0.65	0.72	0.48	0.59	0.65
220.0	58.31	57.48	56.63	0.58	0.68	0.76	0.56	0.67	0.75
223.0	53.06	52.34	51.30	0.63	0.74	0.81	0.66	0.78	0.87
228.0	39.65	38.29	36.87	0.75	0.87	0.96	1.00	1.16	1.30
230.0	33.67	32.45	31.17	0.85	0.96	1.07	1.25	1.45	1.63
238.0	14.51	13.92	13.29	1.82	2.04	2.24	5.74	6.61	7.58
250.0	5.09	5.14	5.12	4.41	4.50	4.63	7.04	6.88	6.82
254.0	4.24	4.30	4.30	5.14	5.22	5.34	6.22	6.18	6.21
260.0	3.22	3.30	3.32	6.64	6.68	6.78	6.60	6.58	6.63
280.0	1.45	1.52	1.56	13.92	13.90	13.82	11.09	11.08	11.03
300.0	0.90	0.95	0.99	21.53	21.99	21.99	15.08	15.11	15.03
320.0	0.69	0.74	0.77	24.76	24.57	24.81	17.48	17.33	17.22
330.0	0.63	0.68	0.71	25.05	24.16	24.17	18.35	18.03	17.85
350.0	0.53	0.59	0.63	25.38	23.52	23.00	19.83	19.13	18.76
400.0	0.42	0.48	0.51	27.40	24.26	22.76	23.07	21.56	20.59
500.0	0.35	0.40	0.43	31.85	28.72	25.80	29.17	26.99	24.81
600.0	0.34	0.39	0.43	32.37	31.39	28.99	38.31	34.11	30.00
700.0	0.34	0.39	0.43	29.26	29.25	28.55	47.77	49.37	36.64
800.0	0.35	0.41	0.45	26.58	26.65	26.32	35.39	42.17	48.69
900.0	0.37	0.44	0.47	24.40	24.76	24.50	30.84	36.57	40.64
1000.0	0.39	0.46	0.51	22.92	23.42	23.22	29.16	34.44	36.13
1200.0	0.44	0.52	0.57	21.85	22.01	21.81	29.93	33.34	33.52
1400.0	0.49	0.59	0.66	21.85	21.85	21.68	33.33	34.55	35.14
1600.0	0.58	0.69	0.76	23.19	22.84	22.62	35.40	37.28	40.28
1800.0	0.68	0.80	0.89	25.70	24.83	23.93	32.52	34.06	32.37
2000.0	0.82	0.96	1.06	27.33	25.54	23.53	28.07	27.54	25.78

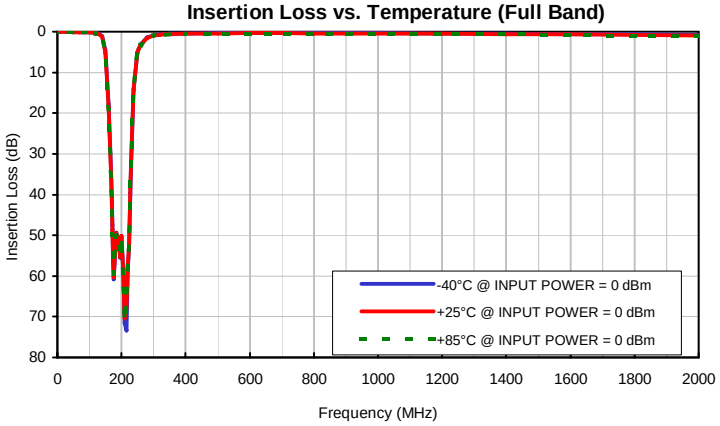
Typical Performance Data

FREQ. (MHz)	GROUP DELAY-1 (nsec)			FREQ. (MHz)	GROUP DELAY-2 (nsec)		
	@-40°C	@+25°C	@+85°C		@-40°C	@+25°C	@+85°C
0.5	1.84	1.90	2.04	330.0	2.16	2.14	2.13
1.0	1.86	1.91	2.02	350.0	1.73	1.71	1.71
5.0	1.82	1.82	1.79	370.0	1.48	1.45	1.44
10.0	1.80	1.83	1.80	400.0	1.20	1.19	1.18
30.0	1.90	1.87	1.84	450.0	0.97	0.95	0.93
32.0	1.88	1.88	1.88	500.0	0.81	0.82	0.81
34.0	1.90	1.88	1.90	550.0	0.75	0.73	0.74
36.0	1.91	1.92	1.90	600.0	0.70	0.69	0.69
38.0	1.91	1.93	1.92	650.0	0.66	0.65	0.65
40.0	1.97	1.94	1.94	700.0	0.63	0.63	0.62
42.0	1.97	1.99	1.97	750.0	0.62	0.61	0.60
44.0	1.99	2.01	2.01	800.0	0.60	0.59	0.58
46.0	2.03	2.02	2.05	850.0	0.59	0.58	0.57
48.0	2.04	2.05	2.07	900.0	0.58	0.57	0.56
50.0	2.06	2.05	2.08	950.0	0.57	0.56	0.56
52.0	2.08	2.09	2.10	955.0	0.57	0.56	0.55
54.0	2.10	2.10	2.11	960.0	0.57	0.56	0.55
56.0	2.15	2.15	2.15	965.0	0.57	0.55	0.55
58.0	2.16	2.17	2.19	970.0	0.57	0.56	0.55
60.0	2.20	2.21	2.22	975.0	0.56	0.56	0.55
62.0	2.26	2.28	2.27	980.0	0.57	0.56	0.55
64.0	2.33	2.32	2.33	985.0	0.56	0.55	0.55
66.0	2.34	2.36	2.34	990.0	0.56	0.55	0.55
68.0	2.37	2.39	2.39	995.0	0.56	0.55	0.55
70.0	2.45	2.46	2.46	1000.0	0.56	0.56	0.55
72.0	2.47	2.48	2.49	1200.0	0.55	0.54	0.53
74.0	2.52	2.53	2.56	1300.0	0.54	0.53	0.53
76.0	2.60	2.61	2.60	1325.0	0.54	0.53	0.53
78.0	2.64	2.65	2.64	1350.0	0.54	0.53	0.53
80.0	2.72	2.71	2.71	1375.0	0.54	0.53	0.52
82.0	2.79	2.79	2.82	1400.0	0.54	0.53	0.52
84.0	2.88	2.89	2.89	1425.0	0.54	0.53	0.53
86.0	2.93	2.94	2.96	1450.0	0.54	0.53	0.52
88.0	3.05	3.06	3.05	1475.0	0.54	0.53	0.52
90.0	3.11	3.12	3.13	1500.0	0.54	0.53	0.52
92.0	3.19	3.23	3.23	1525.0	0.53	0.52	0.52
94.0	3.33	3.35	3.35	1550.0	0.54	0.53	0.52
96.0	3.42	3.44	3.45	1575.0	0.53	0.52	0.52
98.0	3.51	3.52	3.55	1600.0	0.54	0.53	0.52
100.0	3.68	3.67	3.71	1625.0	0.54	0.53	0.52
102.0	3.82	3.84	3.85	1650.0	0.53	0.53	0.52
104.0	3.96	3.98	4.02	1675.0	0.54	0.53	0.53
106.0	4.11	4.13	4.16	1700.0	0.54	0.53	0.52
108.0	4.29	4.30	4.35	1725.0	0.54	0.53	0.52
110.0	4.50	4.52	4.55	1750.0	0.54	0.53	0.53
112.0	4.67	4.71	4.76	1775.0	0.53	0.53	0.52
114.0	4.93	4.98	5.02	1800.0	0.54	0.53	0.52
116.0	5.19	5.21	5.26	1825.0	0.54	0.53	0.52
118.0	5.47	5.50	5.55	1850.0	0.54	0.53	0.52
120.0	5.74	5.80	5.86	1875.0	0.54	0.53	0.53
122.0	6.16	6.19	6.26	1900.0	0.54	0.53	0.53
124.0	6.52	6.60	6.67	1925.0	0.54	0.53	0.53
126.0	6.97	7.05	7.13	1950.0	0.54	0.53	0.53
128.0	7.50	7.60	7.67	1975.0	0.54	0.53	0.53
130.0	8.12	8.23	8.31	2000.0	0.54	0.52	0.52

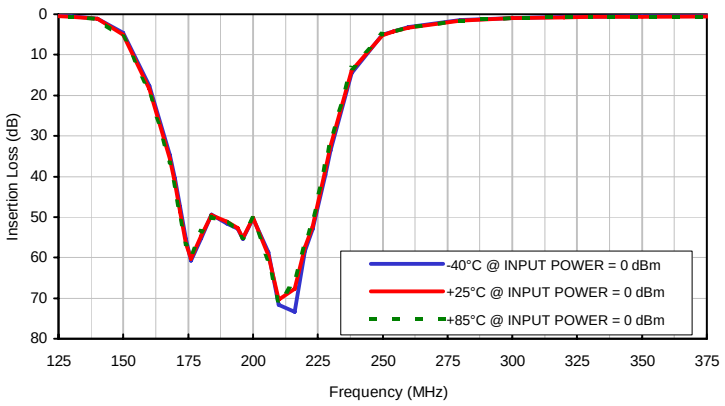
Band Stop Filter BSF-C174223+

Typical Performance Curves

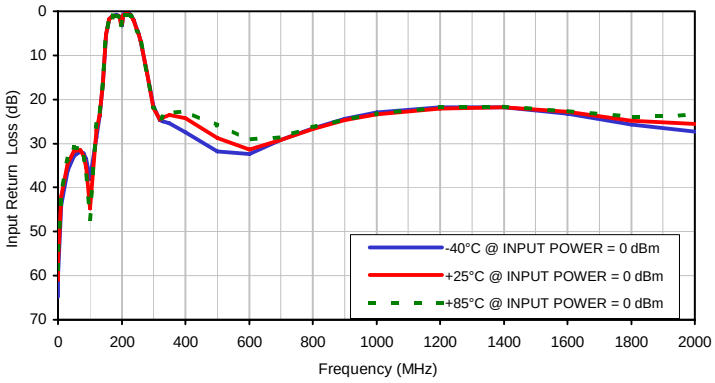
Insertion Loss vs. Temperature (Full Band)



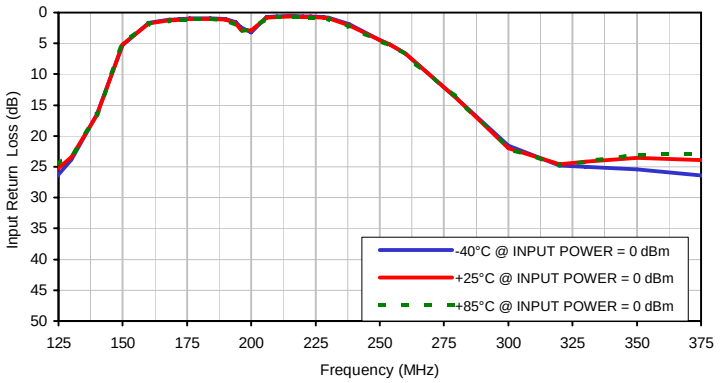
Insertion Loss vs. Temperature (Stop Band)



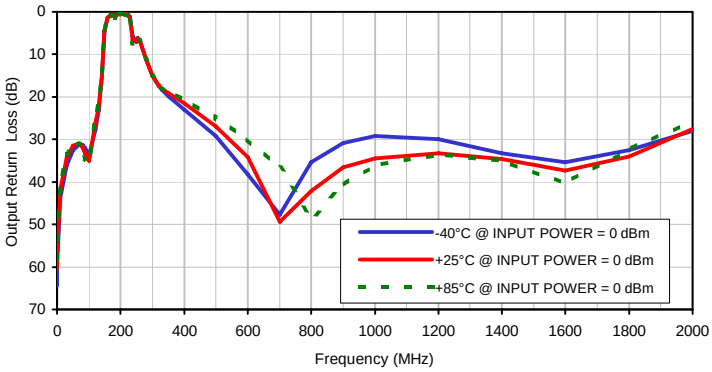
Input Return Loss vs. Temperature



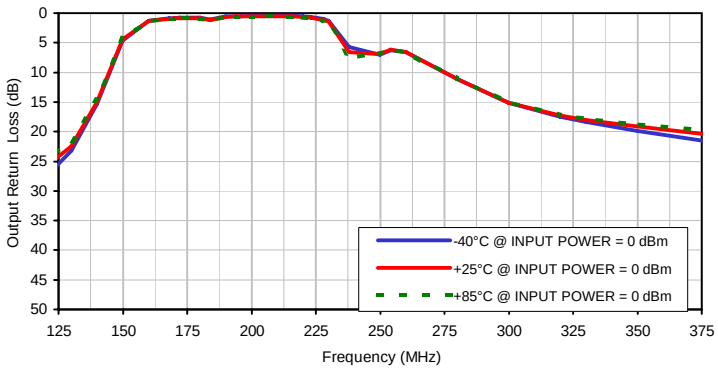
Input Return Loss vs. Temperature



Output Return Loss vs. Temperature

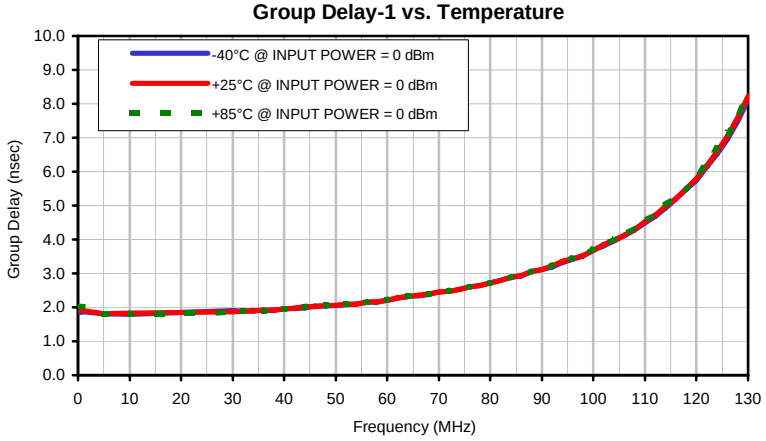


Output Return Loss vs. Temperature

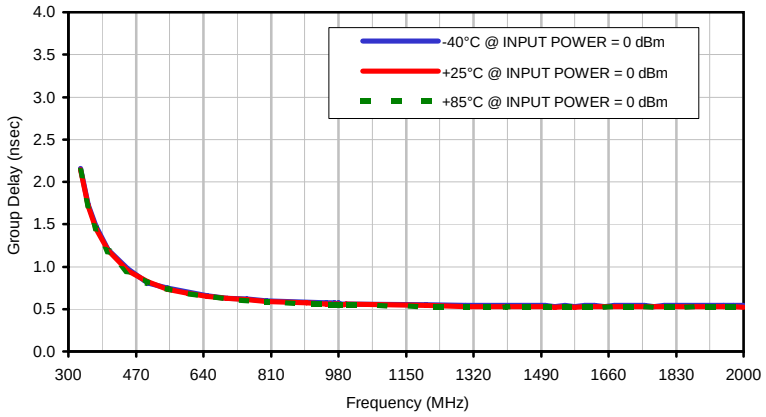


Typical Performance Curves

Group Delay-1 vs. Temperature



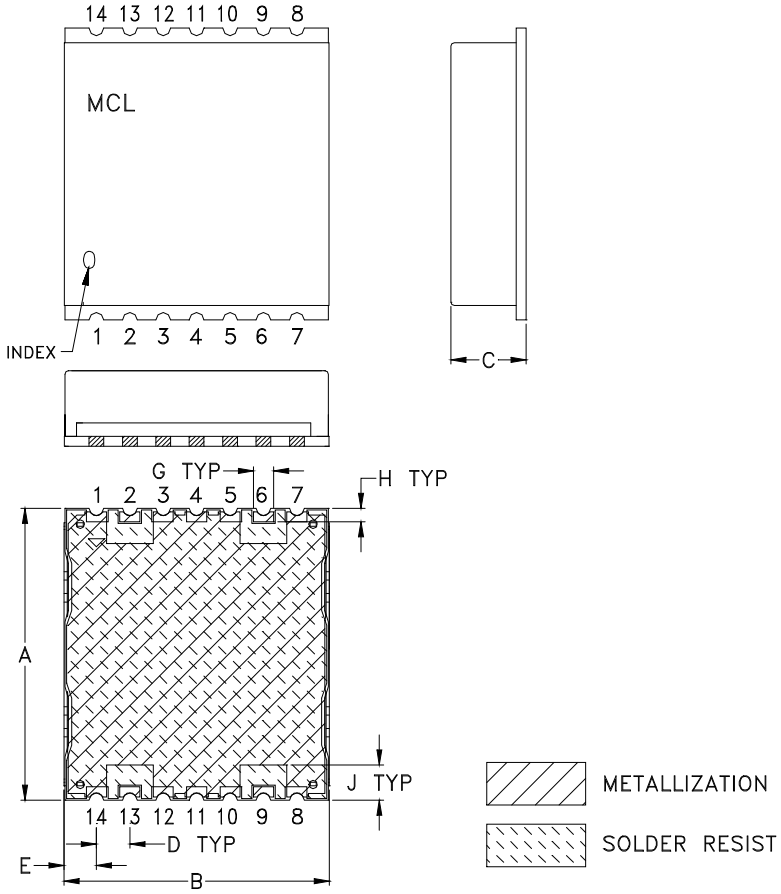
Group Delay-2 vs. Temperature



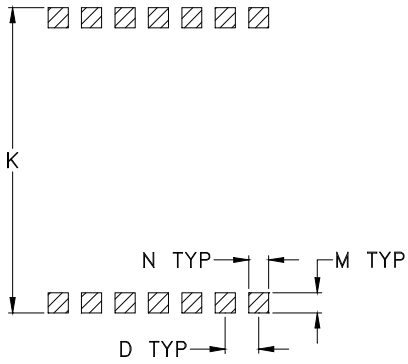
Case Style HU

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.

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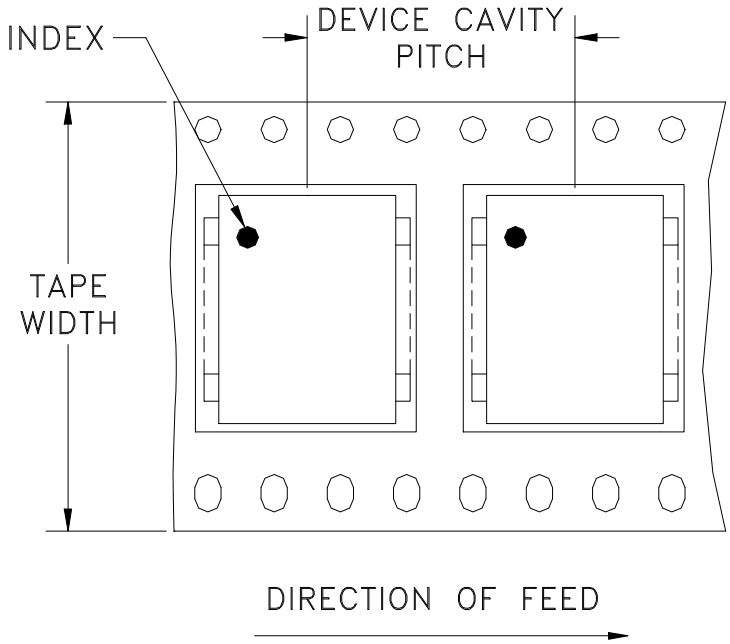
Tape & Reel Packaging TR-F21

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

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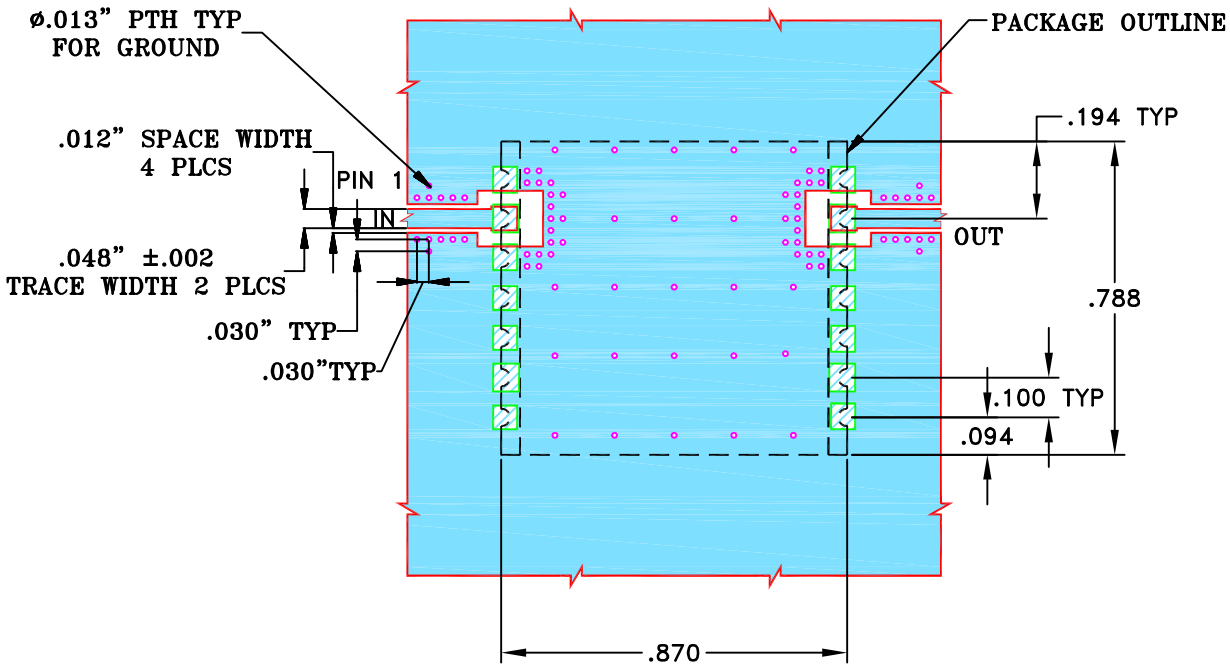
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M132023	NEW RELEASE	MAY 11	MD	KG

SUGGESTED MOUNTING CONFIGURATION FOR HU1186 CASE STYLE "14FL05" PIN CODE



NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030"±.003". 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	MD	24 MAY 11
TOLERANCES ON:	CHECKED	MD	24 MAY 11
2 PL DECIMALS ±	APPROVED	AKR	24 MAY 11
3 PL DECIMALS ± .005"			
ANGLES ±			
FRACTIONS ±			

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

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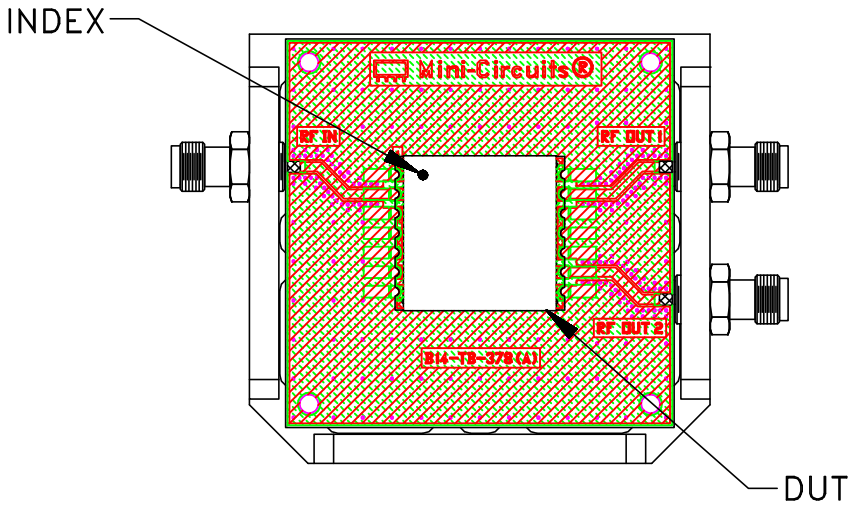
13 Neptune Avenue
Brooklyn NY 11235

PL, 14FL05, HU1186, BSF-C, TB-378S+, 50Ω

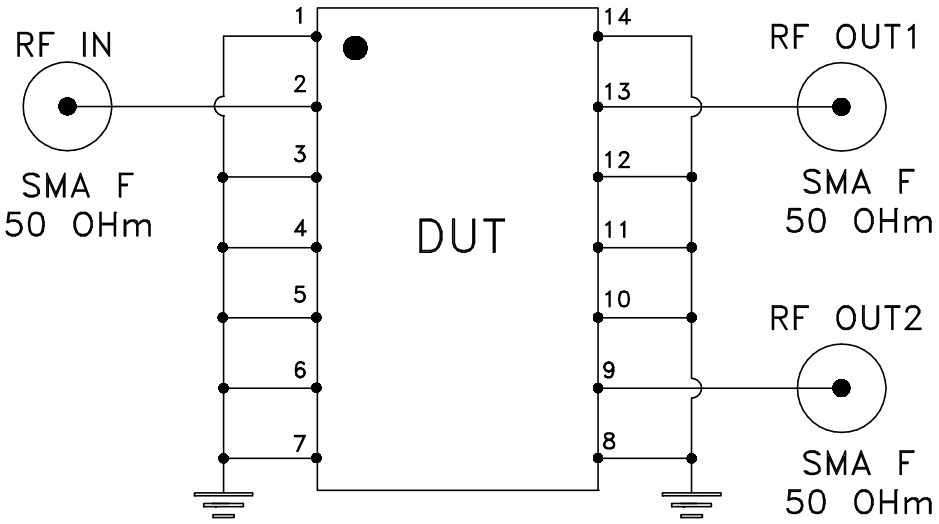
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-347	OR

FILE:	SCALE:	SHEET:
98PL347	2:1	1 OF 1

Evaluation Board and Circuit



TB-378



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

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