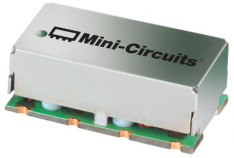
Band Stop Filter

BSF-108+

50Ω 88 to 108 MHz

The Big Deal

- High rejection, 60 dB typ.
- FM radio rejection (88 to 108 MHz)
- Miniature shielded package



Generic photo used for illustration purposes only

CASE STYLE: HF1139

Product Overview

The BSF-108+ is an SMT stopband filter, designed to reject FM radio broadcasts from 88 to 108 MHz. With over 20 dB rejection at stop band, low insertion loss at passband and good input and output return loss. The BSF-108+ has good repeatability across production lots, consistent performance over temperature and is cased in a metal case (size of 0.44" x 0.74" x 0.27").

Key Features

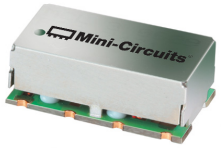
Feature	Advantages
High rejection, 60 dB typical	Reduces the effect of harmonics and unwanted signals
FM radio rejection	The BSF-108+ is highly suited for applications where interference from FM radio transmissions is a concern.
Shielded case	Reduced interference with the surrounding components.
Small size, 0.44" x 0.74" x 0.27"	The small surface mount package enables the BSF-108+ to be used in compact designs

Surface Mount

Band Stop Filter

BSF-108+

50Ω 88 to 108 MHz



Generic photo used for illustration purposes only
CASE STYLE: HF1139

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	1
OUTPUT	8
GROUND	2, 3, 4, 5, 6, 7

Features

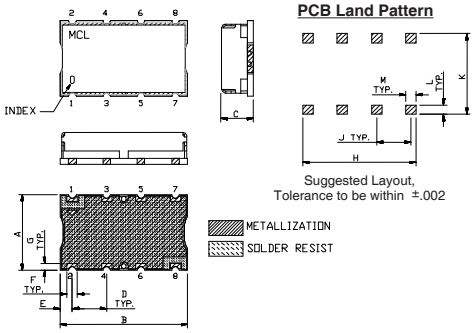
- high FM frequency rejection
- good VSWR, 1.3:1 typ. @ passband

Applications

- FM radio rejection
- receivers / transmitters

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

Outline Drawing



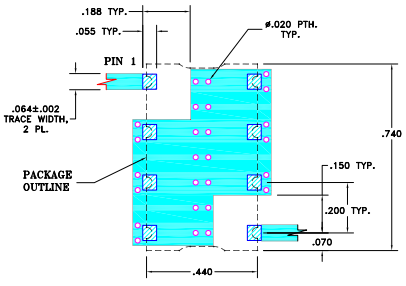
Outline Dimensions (inch / mm)

A	B	C	D	E	F
.44	.74	.27	.200	.07	.060
11.18	18.80	6.86	5.08	1.78	1.52

G	H	J	K	L	M	wt.
.040	.660	.200	.470	.055	.060	grams
1.02	16.76	5.08	11.94	1.40	1.52	3.0

Note: Please refer to case style drawing for details

Demo Board MCL P/N: TB-368
Suggested PCB Layout (PL-230)



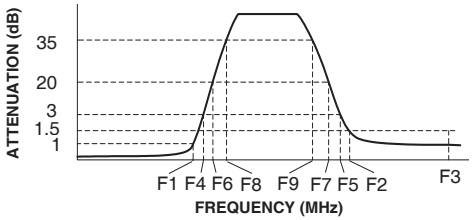
NOTE:
1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS: .025"±.002". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

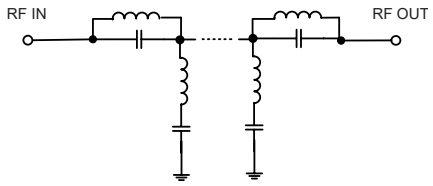
Band Stop Filter Electrical Specifications

STOPBANDS (MHz)		Loss 3dB	PASSBANDS (MHz)		VSWR (:1)	
(Loss > 20dB) F6 - F7	(Loss > 35dB) F8 - F9	Typ. F4, F5	Loss < 1dB F1	Loss < 1.5dB F2 - F3	Stopband Typ.	Passband Typ.
88 - 108	90 - 105	81 & 120	65	140-1000	6.0	1.3

Typical Frequency Response



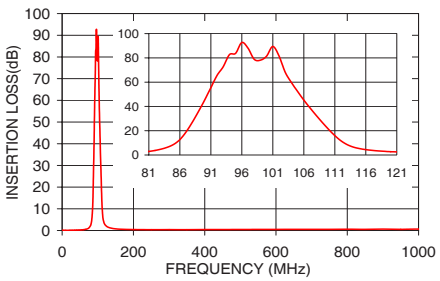
Functional Schematic



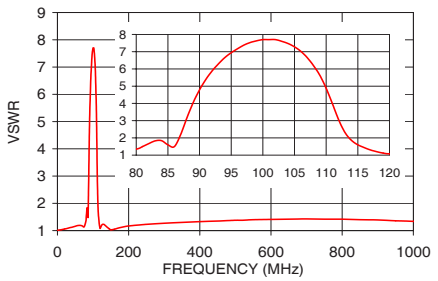
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)
1	0.05	1.01
50	0.25	1.16
65	0.51	1.19
75	1.16	1.14
81	2.94	1.50
83	4.86	1.83
85	8.73	1.60
87	18.96	2.18
88	26.90	3.16
90	45.21	4.79
105	52.30	7.28
108	32.63	6.19
111	15.97	3.97
113	8.50	2.30
116	4.43	1.44
120	2.72	1.08
140	1.00	1.12
500	0.49	1.38
1000	0.66	1.34

BSF-108+
INSERTION LOSS



BSF-108+
VSWR



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 Stop Filter BSF-108+

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	0.03	0.03	0.04	59.36	55.46	52.91	56.94	53.29	51.60
1	0.01	0.02	0.02	51.86	50.01	48.86	53.30	50.95	49.80
10	0.04	0.05	0.05	37.85	36.85	36.08	37.86	36.57	36.09
20	0.06	0.08	0.09	32.81	32.12	31.55	32.67	31.82	31.48
30	0.09	0.11	0.12	29.85	29.54	29.25	29.57	29.20	29.08
40	0.12	0.15	0.17	28.13	28.20	28.29	27.68	27.84	27.98
50	0.17	0.21	0.23	28.49	29.07	29.72	27.56	28.32	28.83
60	0.28	0.33	0.37	38.92	42.48	45.38	33.10	33.77	33.81
62	0.32	0.37	0.41	43.84	41.01	38.03	34.75	33.55	32.69
63	0.34	0.39	0.44	39.63	36.57	34.40	34.27	32.30	31.26
64	0.36	0.42	0.47	35.22	33.08	31.47	32.94	30.72	29.67
65	0.39	0.45	0.51	31.90	30.34	29.10	31.04	28.98	28.05
66	0.42	0.49	0.55	29.25	28.04	27.08	28.96	27.25	26.45
67	0.45	0.53	0.59	27.03	26.08	25.31	27.05	25.64	24.96
68	0.50	0.57	0.64	25.14	24.39	23.76	25.31	24.16	23.60
69	0.54	0.63	0.70	23.49	22.88	22.37	23.71	22.79	22.33
70	0.60	0.69	0.77	22.02	21.54	21.13	22.27	21.53	21.16
71	0.66	0.76	0.84	20.77	20.39	20.06	21.04	20.44	20.16
72	0.73	0.83	0.92	19.69	19.41	19.15	19.94	19.49	19.27
73	0.80	0.92	1.02	18.81	18.60	18.43	19.04	18.71	18.57
74	0.89	1.02	1.12	18.14	18.02	17.92	18.33	18.11	18.04
75	0.99	1.12	1.24	17.75	17.72	17.71	17.91	17.81	17.80
76	1.10	1.24	1.37	17.73	17.82	17.92	17.80	17.82	17.89
77	1.22	1.38	1.53	18.32	18.57	18.82	18.18	18.32	18.48
78	1.37	1.55	1.72	19.96	20.52	21.09	19.24	19.50	19.70
79	1.55	1.76	1.97	24.10	25.52	27.10	20.92	21.03	20.93
80	1.84	2.10	2.35	31.08	29.96	28.32	20.60	19.84	19.09
81	2.30	2.63	2.95	19.23	18.21	17.39	16.06	15.27	14.62
83	4.29	4.81	5.30	8.68	8.48	8.34	8.23	8.15	8.04
85	7.69	8.37	9.06	4.86	4.96	5.05	6.12	6.84	7.33
88	25.06	27.01	28.80	2.36	2.50	2.61	4.77	4.74	4.65
90	47.16	48.98	50.70	1.83	1.99	2.12	2.35	2.59	2.68
95	76.85	76.45	76.85	1.54	1.69	1.82	1.59	1.81	1.92
100	79.57	81.33	79.21	1.65	1.82	1.96	1.59	1.79	1.89
105	50.12	49.09	48.15	2.29	2.50	2.70	1.92	2.12	2.24
108	30.18	29.46	28.87	3.46	3.79	4.10	2.41	2.64	2.80
110	19.16	18.64	18.23	5.48	6.02	6.57	3.14	3.44	3.66
120	2.32	2.41	2.51	16.34	16.70	17.01	15.99	16.34	16.59
130	1.12	1.18	1.23	27.94	27.72	27.67	21.92	22.02	21.88
140	0.75	0.80	0.84	26.05	25.95	25.91	22.58	22.68	22.57
150	0.59	0.63	0.66	23.59	23.54	23.56	21.94	22.09	22.04
160	0.49	0.53	0.55	22.62	22.59	22.60	21.58	21.74	21.70
170	0.42	0.46	0.49	22.32	22.28	22.25	21.53	21.65	21.58
180	0.38	0.42	0.45	22.32	22.23	22.14	21.72	21.75	21.65
190	0.35	0.39	0.42	22.55	22.37	22.18	22.00	21.89	21.74
200	0.33	0.37	0.39	22.85	22.53	22.23	22.38	22.09	21.85
300	0.25	0.31	0.34	25.62	24.12	23.08	25.45	23.80	22.89
400	0.24	0.32	0.36	26.69	24.35	22.82	26.51	23.99	22.68
500	0.25	0.34	0.39	26.03	23.54	21.93	25.98	23.34	21.98
600	0.27	0.37	0.43	24.59	22.30	20.75	24.69	22.24	20.97
700	0.29	0.40	0.48	22.78	20.77	19.40	23.24	21.04	19.88
800	0.32	0.45	0.53	20.90	19.33	18.13	21.53	19.79	18.80
900	0.36	0.49	0.58	19.21	17.94	16.95	19.98	18.56	17.77
1000	0.39	0.54	0.64	17.81	16.74	15.93	18.65	17.51	16.85

Typical Performance Data

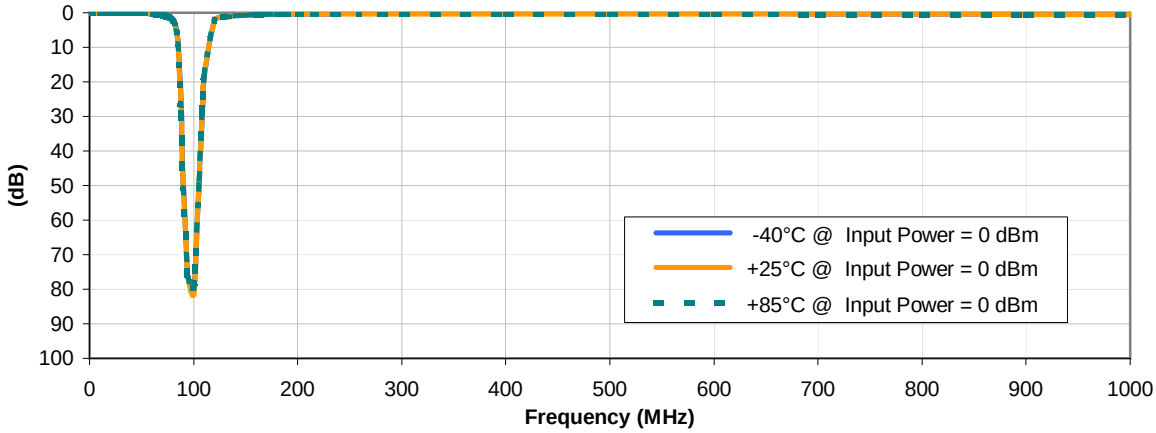
FREQ. (MHz)	GROUP DELAY 1 (nsec)		
	@ -40˚ C	@ +25˚ C	@ +85˚ C
65.0	12.01	12.11	12.21
66.0	12.76	12.86	12.97
67.0	13.53	13.65	13.77
68.0	14.31	14.44	14.56
69.0	15.11	15.26	15.39
70.0	15.91	16.06	16.22
70.5	16.71	16.89	17.04
71.0	17.53	17.71	17.88
71.5	18.34	18.54	18.73
72.0	19.16	19.37	19.56

FREQ. (MHz)	GROUP DELAY 2 (nsec)		
	@ -40˚ C	@ +25˚ C	@ +85˚ C
140	8.16	8.09	8.03
141	7.78	7.72	7.67
142	7.44	7.38	7.33
143	7.12	7.06	7.02
144	6.82	6.77	6.73
145	6.54	6.48	6.45
146	6.28	6.24	6.20
147	6.00	5.96	5.93
148	5.67	5.64	5.61
149	5.33	5.29	5.27
150	4.96	4.93	4.90
155	4.58	4.55	4.53
160	4.20	4.18	4.16
165	3.82	3.80	3.79
170	3.44	3.42	3.41
175	3.06	3.05	3.04
180	2.73	2.72	2.71
185	2.44	2.43	2.42
190	2.17	2.16	2.16
195	1.93	1.92	1.92
200	1.72	1.71	1.70
250	1.35	1.34	1.34
300	1.04	1.04	1.03
350	0.81	0.80	0.80
400	0.70	0.69	0.69
450	0.64	0.63	0.63
500	0.60	0.59	0.59
550	0.57	0.57	0.57
600	0.56	0.55	0.55
650	0.54	0.54	0.53
700	0.53	0.53	0.52
750	0.52	0.52	0.52
800	0.52	0.51	0.51
850	0.51	0.51	0.51
900	0.51	0.50	0.50
950	0.51	0.50	0.50
1000	0.50	0.50	0.50

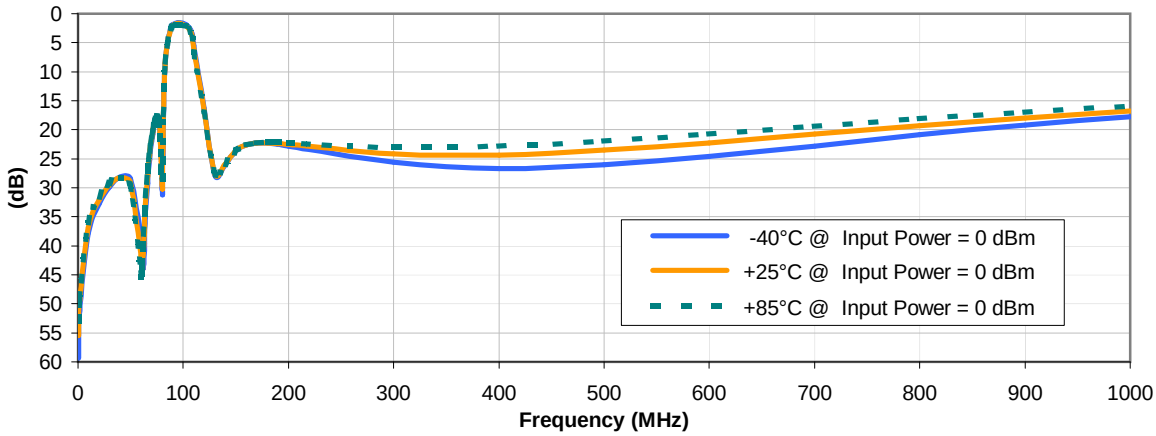
Surface Mount Band Stop Filter BSF-108+

Typical Performance Curves

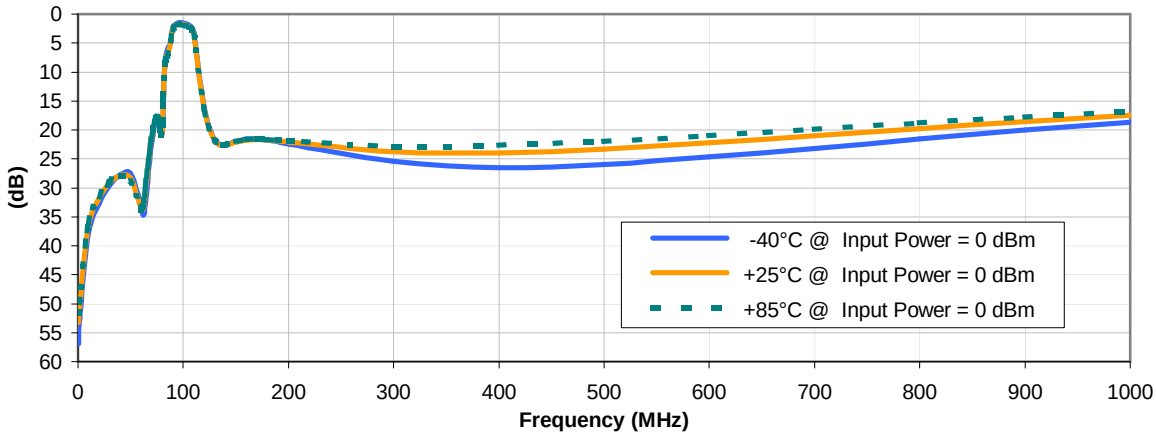
INSERTION LOSS vs. TEMPERATURE



INPUT RETURN LOSS vs. TEMPERATURE

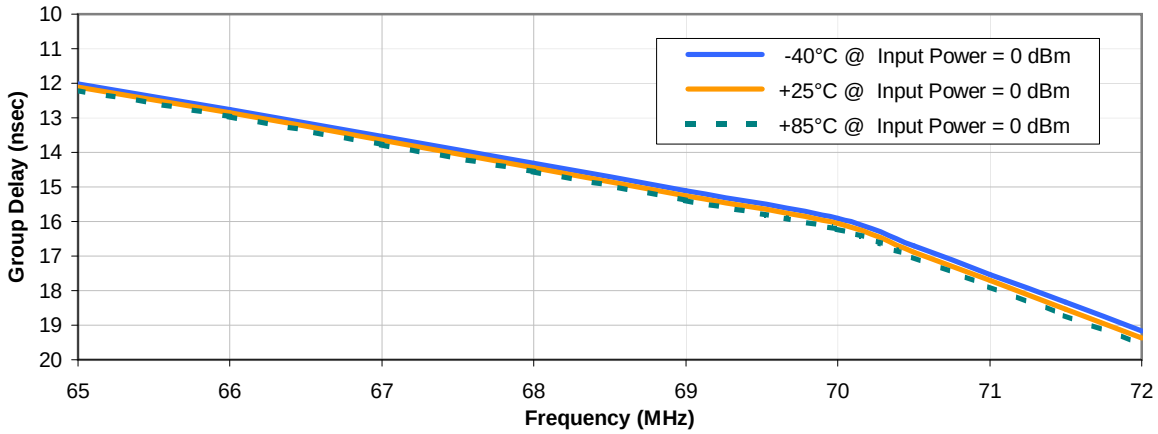


OUTPUT RETURN LOSS vs. TEMPERATURE

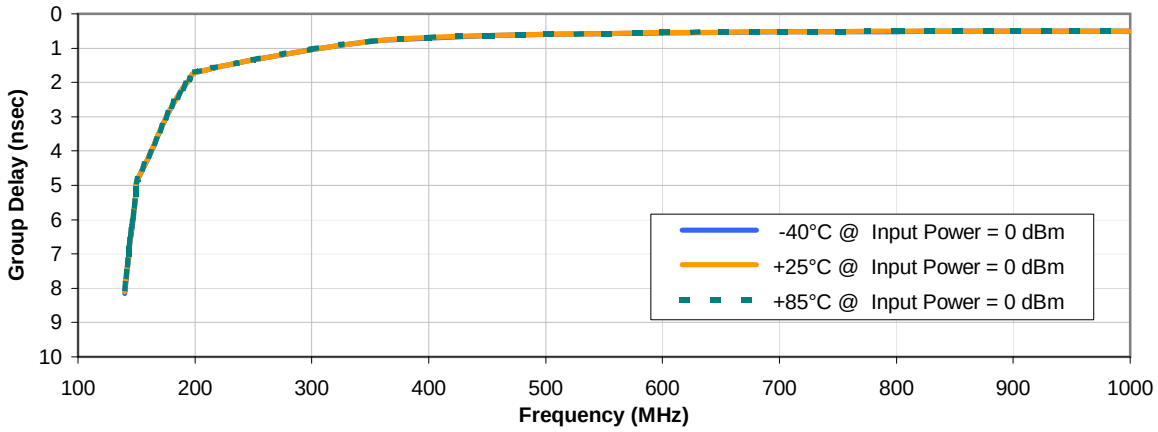


Typical Performance Curves

Group Delay 1



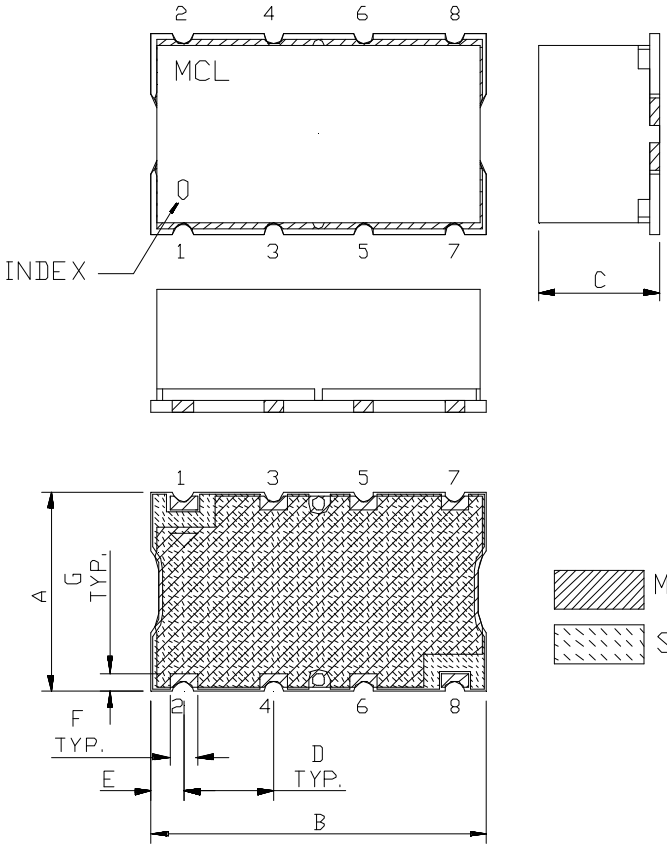
Group Delay 2



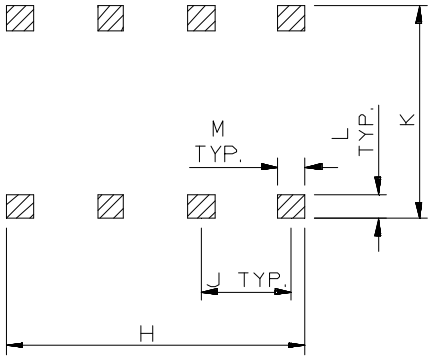
Case Style HF

HF1139

Outline Dimensions



PCB Land Pattern



CASE #	A	B	C	D	E	F	G	H	J	K	L	M	WT. GRAMS
HF1139	.44 (11.18)	.74 (18.80)	.27 (6.86)	.200 (5.08)	.07 (1.78)	.060 (1.52)	.040 (1.02)	.660 (16.76)	.200 (5.08)	.470 (11.94)	.055 (1.40)	.060 (1.52)	3.0

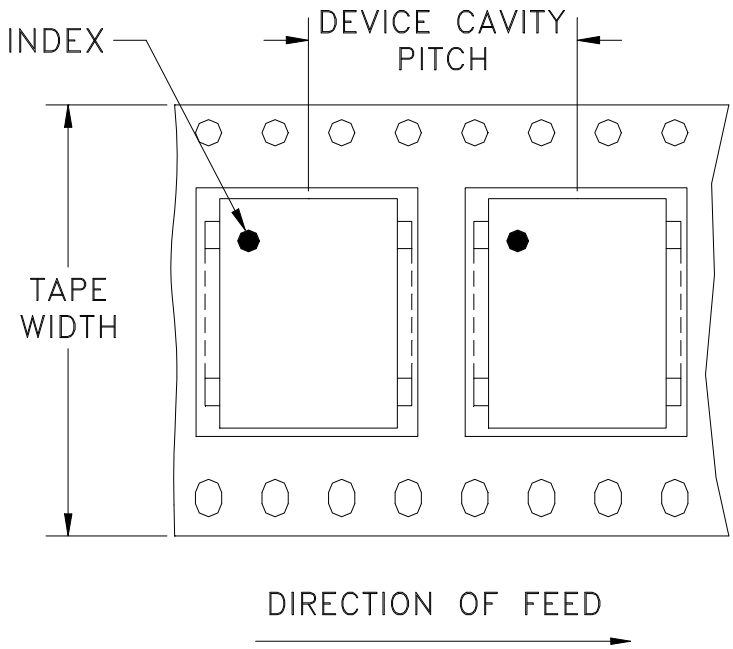
Dimensions are in inches (mm). Tolerances: 2 Pl. ±.015"; 3 Pl. ±.01"

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-F5

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
32	16	13	500

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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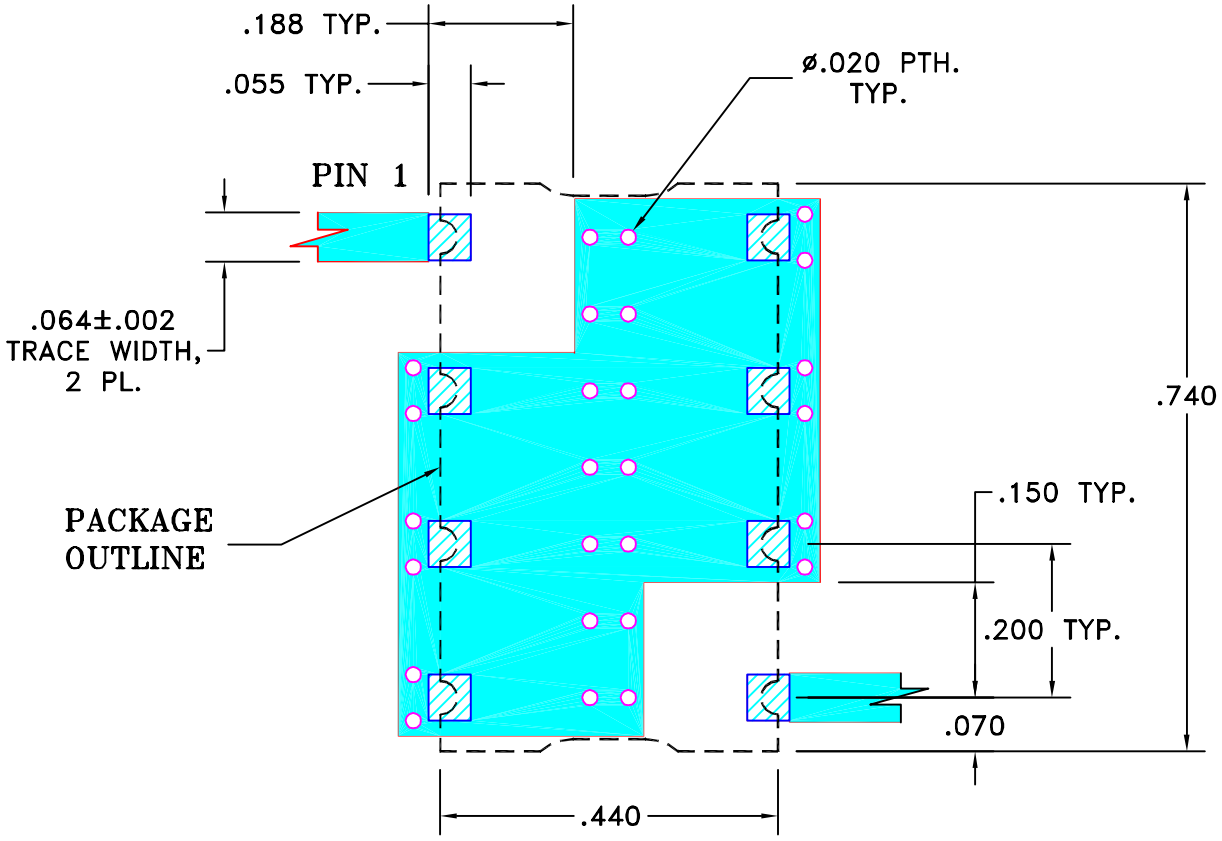
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M101757	NEW RELEASE (FROM RAVON)	11/05	DK	HH
OR	R62293	NEW RELEASE (FROM RAVON)	11/05	DK	HH

SUGGESTED MOUNTING CONFIGURATION
FOR HF1139 CASE STYLE, cr PIN CONNECTION, 50 OHM.



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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

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	DK (RAVON)	29 NOV 05
TOLERANCES ON:	CHECKED	RZ (RAVON)	29 NOV 05
2 PL DECIMALS ±	APPROVED	HH (RAVON)	29 NOV 05
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

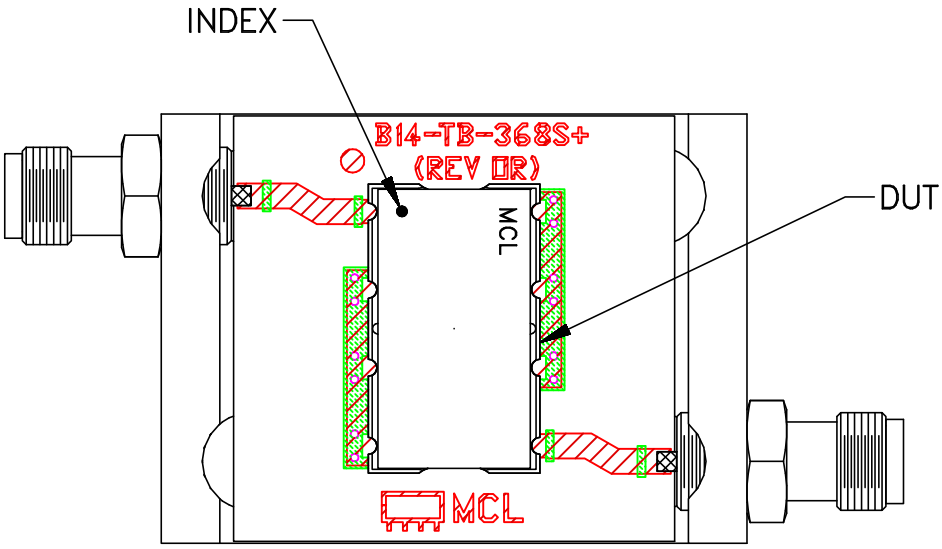
ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

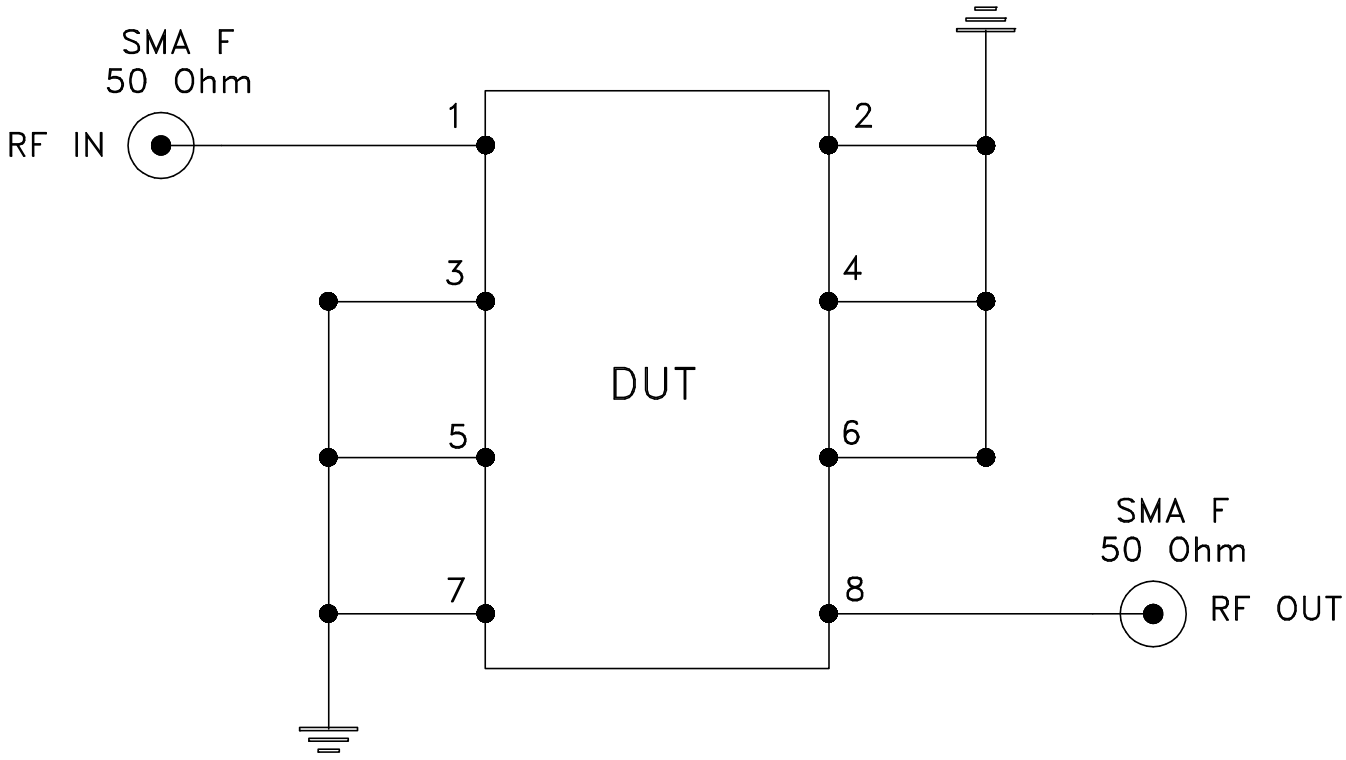
PL, cr, HF1139, SCLF, TB-368

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-230	OR
FILE: 98PL230	SCALE: 4:1	SHEET: 1 OF 1	

Evaluation Board and Circuit



TB-368



Schematic Diagram

Notes:
1. SMA Female connectors.
2. PCB Material: ROGERS R04350B or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

Mini-Circuits®

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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