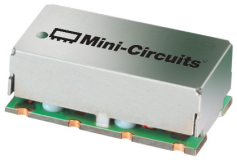
Surface Mount

Bandpass Filter

SXBP-169+

50Ω 164 to 174 MHz



Generic photo used for illustration purposes only

CASE STYLE: HF1139

+RoHS Compliant

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

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

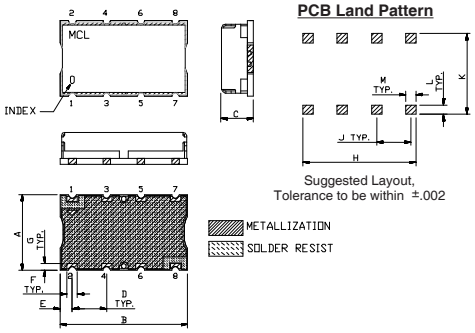
Features

- high rejection
- good VSWR, 1.3:1 typ @ passband
- aqueous washable

Applications

- radio link
- receivers / transmitters
- professional mobile radio / public access mobile radio (PMR/ PAMR)

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

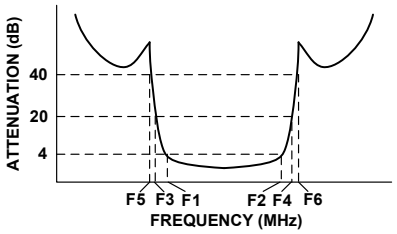
G	H	J	K	L	M	wt.
.040	.660	.200	.470	.055	.060	grams
1.02	16.76	5.08	11.94	1.40	1.52	3.0

Note: Please refer to case style drawing for details

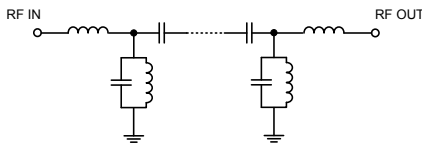
Bandpass Filter Electrical Specifications (T_{AMB}= 25°C)

CENTER FREQ. (MHz)	PASSBAND (MHz) (Loss < 4dB)	STOPBANDS (MHz)				VSWR (:1)		
		Loss > 20dB		Loss > 40dB		Passband		Stopband
Fc	F1 - F2	F3	F4	F5	F6	Typ.	Max.	Typ.
169	164 - 174	137	205	122	240 - 2500	1.3	1.9	18

Typical Frequency Response



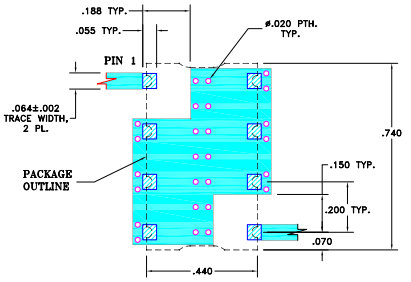
Functional Schematic



Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB) x̄	Insertion Loss (dB) σ	Return Loss (dB)	Frequency (MHz)	Group Delay (nSec)
1.0	82.10	2.30	0.38	155.0	41.11
110.0	62.23	0.84	0.15	156.0	38.37
122.0	50.32	0.82	0.15	158.0	34.97
126.0	45.85	0.92	0.17	160.0	32.58
137.0	31.35	1.24	0.40	161.0	31.67
140.0	26.73	1.37	0.53	162.0	31.02
150.0	7.41	1.62	5.90	163.0	30.49
152.0	4.56	1.09	12.24	164.0	30.13
164.0	2.04	0.03	18.54	165.0	29.92
169.0	2.00	0.02	20.31	166.0	29.86
174.0	2.28	0.07	14.37	167.0	29.85
185.0	7.34	1.60	3.16	168.0	29.85
190.0	15.14	1.79	1.33	169.0	29.87
205.0	31.92	1.00	0.52	170.0	29.85
240.0	51.59	0.57	0.22	172.0	29.68
1000.0	79.07	3.14	0.10	174.0	30.40
2000.0	60.93	0.84	0.32	175.0	31.30
2500.0	52.98	0.33	0.37	180.0	42.56

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

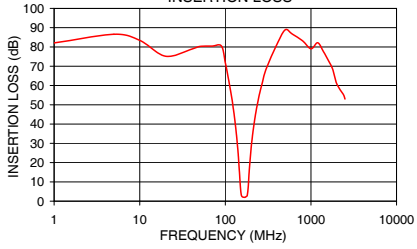


NOTE:
1. TRACE WIDTH IS SHOWN FOR FR4 WITH DIELECTRIC THICKNESS: .025"±.002". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

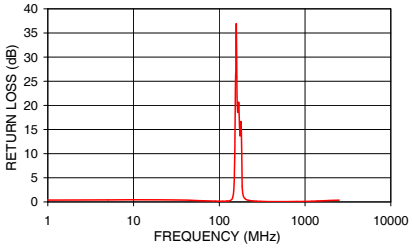
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

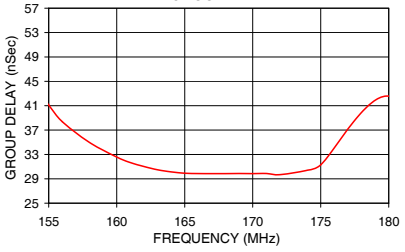
SXBP-169+
INSERTION LOSS



SXBP-169+
RETURN LOSS



SXBP-169+
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

Surface Mount Band Pass Filter SXBP-169+

Typical Performance Data

FREQ. (MHz)	INSERTION LOSS (dB)			INPUT RETURN LOSS (dB)			OUTPUT RETURN LOSS (dB)		
	@ -40° C	@ +25° C	@ +85° C	@ -40° C	@ +25° C	@ +85° C	@ -40° C	@ +25° C	@ +85° C
1	95.93	94.03	103.06	0.30	0.38	0.47	0.28	0.39	0.47
10	84.42	87.68	89.83	0.35	0.44	0.53	0.33	0.44	0.52
50	78.59	89.18	84.19	0.27	0.31	0.33	0.26	0.31	0.34
100	71.87	71.80	71.29	0.10	0.15	0.18	0.10	0.15	0.19
110	62.15	61.54	61.61	0.10	0.15	0.18	0.09	0.14	0.18
122	50.03	49.56	49.39	0.12	0.18	0.21	0.11	0.17	0.20
126	45.26	45.00	44.75	0.14	0.21	0.25	0.13	0.19	0.23
137	30.45	30.09	29.69	0.33	0.44	0.51	0.27	0.37	0.42
140	25.48	25.08	24.63	0.48	0.63	0.74	0.38	0.51	0.60
150	5.42	5.44	5.32	6.45	7.83	9.18	5.28	6.31	7.30
152	3.16	3.44	3.57	14.72	17.27	20.04	11.53	12.93	14.32
164	1.80	2.13	2.33	15.75	15.99	16.20	14.83	15.23	15.67
169	1.74	2.09	2.34	19.37	19.31	19.02	26.07	31.11	35.30
174	1.99	2.39	2.66	15.13	14.75	14.54	16.44	16.11	16.03
185	9.04	10.15	11.11	2.52	2.52	2.44	3.17	3.19	3.11
190	16.92	17.79	18.58	1.01	1.13	1.19	1.26	1.40	1.46
205	32.98	33.48	33.91	0.36	0.46	0.50	0.43	0.53	0.59
220	42.83	43.18	43.46	0.22	0.30	0.35	0.26	0.34	0.39
230	47.88	48.09	48.38	0.18	0.25	0.29	0.19	0.27	0.32
240	51.98	52.36	52.67	0.14	0.21	0.25	0.16	0.23	0.28
300	68.73	69.59	69.29	0.05	0.13	0.16	0.06	0.13	0.17
400	89.03	83.54	86.29	0.01	0.08	0.13	0.01	0.08	0.13
500	92.95	99.73	108.34	0.02	0.07	0.12	0.00	0.08	0.13
600	99.20	92.64	84.54	0.01	0.08	0.14	0.02	0.09	0.15
700	86.40	90.55	92.70	0.01	0.10	0.16	0.02	0.09	0.16
800	87.72	98.28	90.97	0.01	0.11	0.17	0.02	0.11	0.18
900	83.31	95.42	83.15	0.00	0.12	0.19	0.01	0.14	0.20
1000	78.07	90.30	80.33	0.00	0.14	0.21	0.01	0.14	0.21
1200	75.00	89.33	74.88	0.01	0.17	0.25	0.02	0.19	0.28
1300	77.41	80.23	78.32	0.02	0.19	0.27	0.04	0.21	0.29
1400	69.00	79.61	69.81	0.02	0.20	0.31	0.02	0.20	0.31
1500	73.93	81.42	75.06	0.03	0.22	0.31	0.04	0.23	0.33
1600	80.64	72.69	86.53	0.03	0.23	0.33	0.05	0.24	0.36
1700	66.57	70.81	68.55	0.06	0.24	0.36	0.06	0.26	0.38
1800	66.45	76.49	75.28	0.07	0.27	0.37	0.05	0.28	0.39
1900	59.17	63.40	61.05	0.07	0.27	0.39	0.06	0.28	0.41
2000	66.70	65.29	65.07	0.06	0.29	0.40	0.04	0.29	0.39
2200	63.07	59.70	62.04	0.08	0.31	0.44	0.06	0.31	0.43
2300	56.58	51.76	53.87	0.09	0.34	0.47	0.07	0.33	0.46
2400	56.13	60.33	56.14	0.10	0.33	0.49	0.08	0.33	0.48
2500	52.45	56.36	52.39	0.09	0.35	0.51	0.08	0.33	0.50
2600	45.41	45.72	43.59	0.11	0.37	0.52	0.11	0.37	0.53
2700	48.32	49.59	46.66	0.12	0.36	0.53	0.12	0.37	0.58
2800	40.19	43.88	39.91	0.15	0.41	0.59	0.07	0.35	0.53
2900	43.61	45.20	47.93	0.12	0.40	0.58	0.11	0.38	0.58
3000	41.32	41.79	40.69	0.08	0.41	0.55	0.13	0.40	0.62
3200	39.89	37.57	37.83	0.13	0.53	0.66	0.13	0.47	0.68
3300	38.93	39.66	40.15	0.23	0.56	0.86	0.11	0.49	0.70
3400	41.15	36.88	38.60	0.36	0.95	1.28	0.17	0.64	0.80
3500	35.87	36.46	36.93	1.68	1.38	1.50	0.43	1.03	1.27
3600	34.59	34.56	35.25	0.47	0.71	0.97	0.64	0.82	0.97
3700	34.73	31.70	32.76	0.25	0.69	0.94	0.30	0.71	1.01
3800	32.87	32.17	30.87	0.31	0.67	1.03	0.35	0.70	1.10
4000	30.62	28.65	30.68	0.43	0.82	1.18	0.31	0.75	1.05

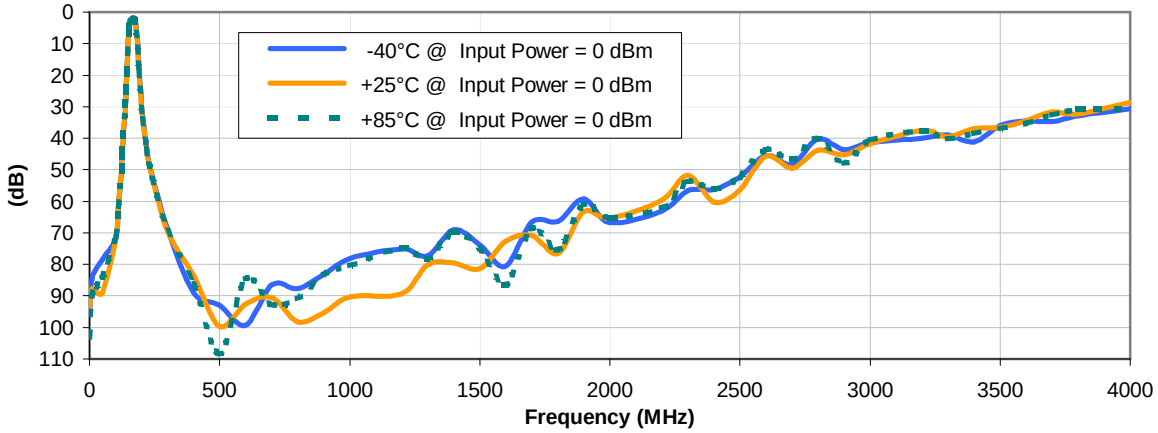
Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
60	4.42	2.97	6.78
70	21.82	7.65	24.77
80	18.15	25.64	27.14
90	6.11	17.63	15.63
100	7.48	4.76	9.74
110	2.37	2.97	3.28
120	2.74	3.68	2.92
130	5.17	5.45	5.70
140	11.37	11.98	12.62
150	45.89	46.16	46.54
160	33.20	32.83	32.56
161	32.19	31.93	31.68
162	31.32	31.10	30.95
163	30.58	30.45	30.39
164	30.06	30.02	30.00
165	29.67	29.73	29.75
166	29.50	29.55	29.65
167	29.47	29.55	29.67
168	29.52	29.63	29.72
169	29.68	29.77	29.84
170	29.81	29.87	29.96
171	29.97	30.04	30.14
172	30.08	30.24	30.38
173	30.44	30.66	30.90
174	30.88	31.19	31.61
175	31.65	32.13	32.72
176	32.84	33.53	34.23
177	34.58	35.28	36.08
178	36.57	37.17	37.81
179	38.61	38.91	39.16
180	40.25	40.03	39.72
190	14.68	14.01	13.34
192	11.35	10.91	10.64
193	10.22	9.82	9.61
194	9.18	8.89	8.69
195	8.31	8.07	7.87
196	7.50	7.40	7.26
197	6.94	6.81	6.63
198	6.27	6.27	6.13
199	5.93	5.83	5.72
200	5.50	5.44	5.39
202	4.81	4.73	4.62
203	4.49	4.53	4.47
204	4.18	4.17	4.21
206	3.76	3.80	3.64
207	3.60	3.53	3.70
208	3.35	3.32	3.36
209	3.20	3.23	3.22
210	3.10	3.03	3.09
220	2.19	2.41	2.17
230	1.66	1.67	1.90
240	1.82	1.06	1.50
250	0.92	1.81	0.94
300	0.90	0.07	1.04

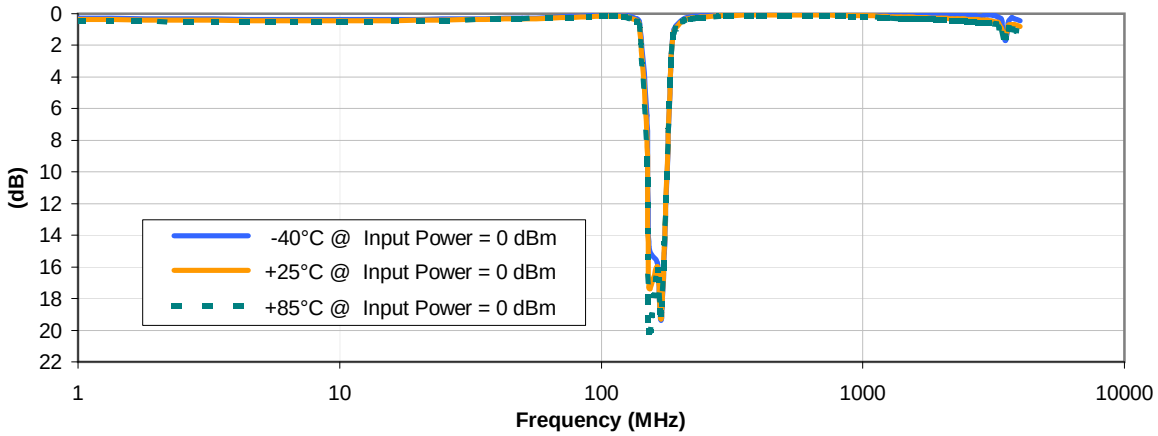
Surface Mount Band Pass Filter SXBP-169+

Typical Performance Curves

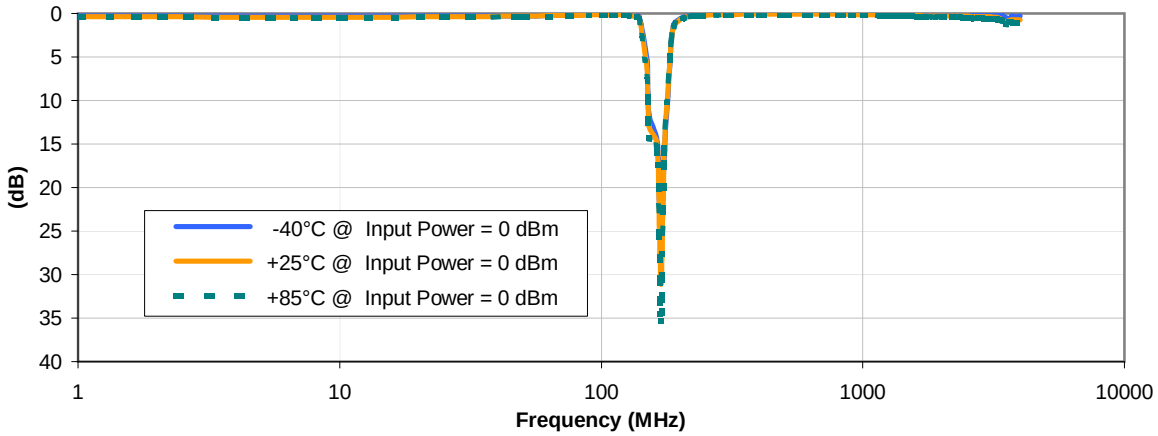
INSERTION LOSS vs. TEMPERATURE



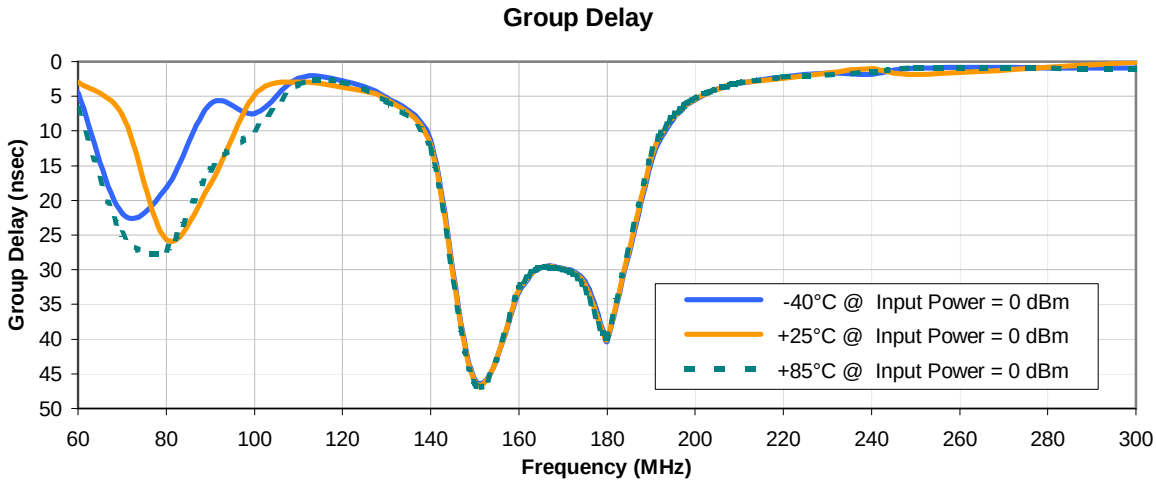
INPUT RETURN LOSS vs. TEMPERATURE



OUTPUT RETURN LOSS vs. TEMPERATURE



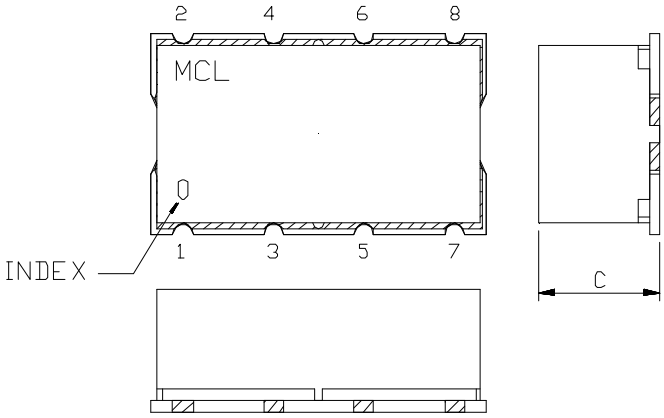
Typical Performance Curves

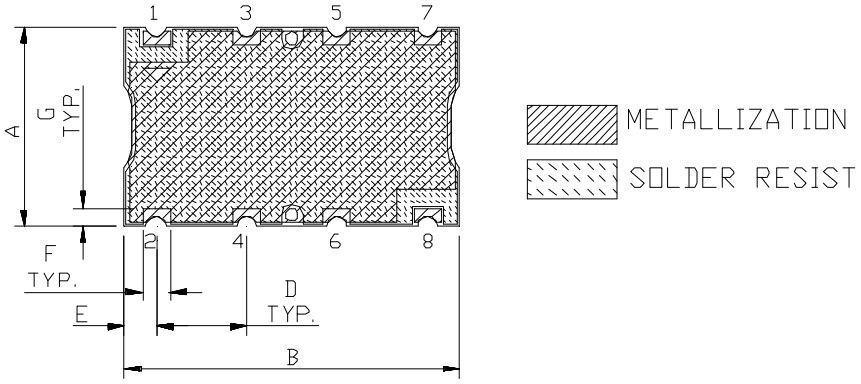


Case Style HF

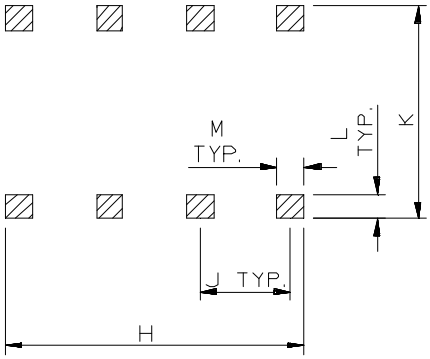
HF1139

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

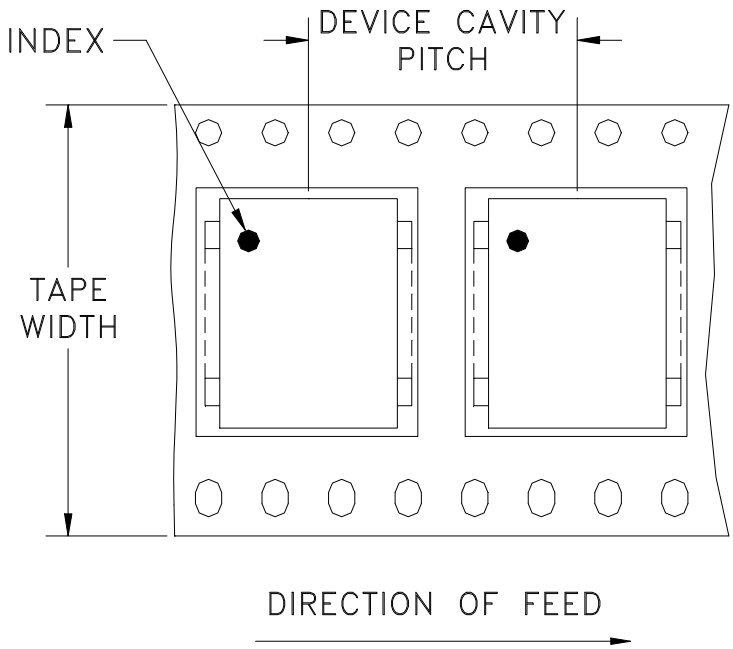
Dimensions are in inches (mm). Tolerances: 2 Pl. ±.015"; 3 Pl. ±.01"

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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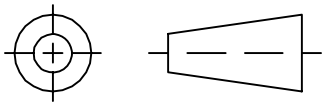
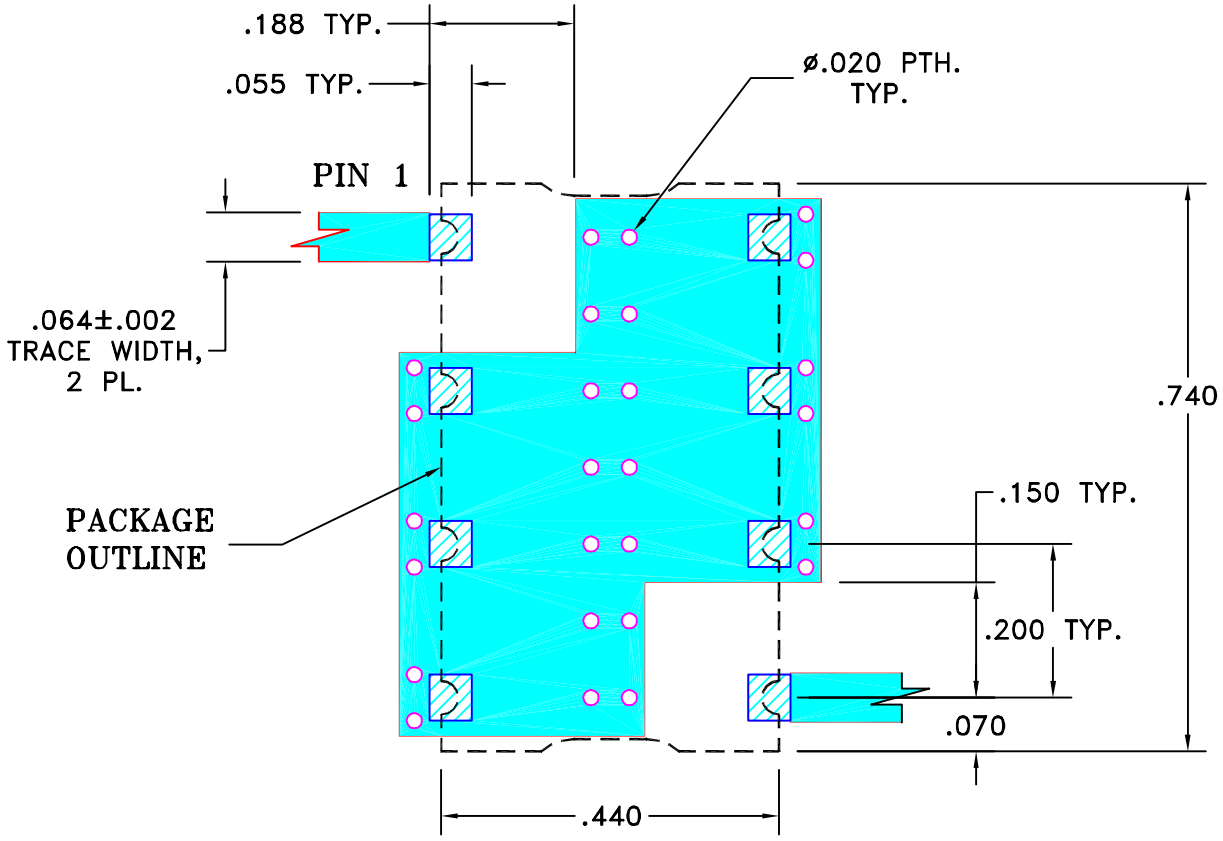
THIRD ANGLE PROJECTION



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.



NOTE:

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   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

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 ±			

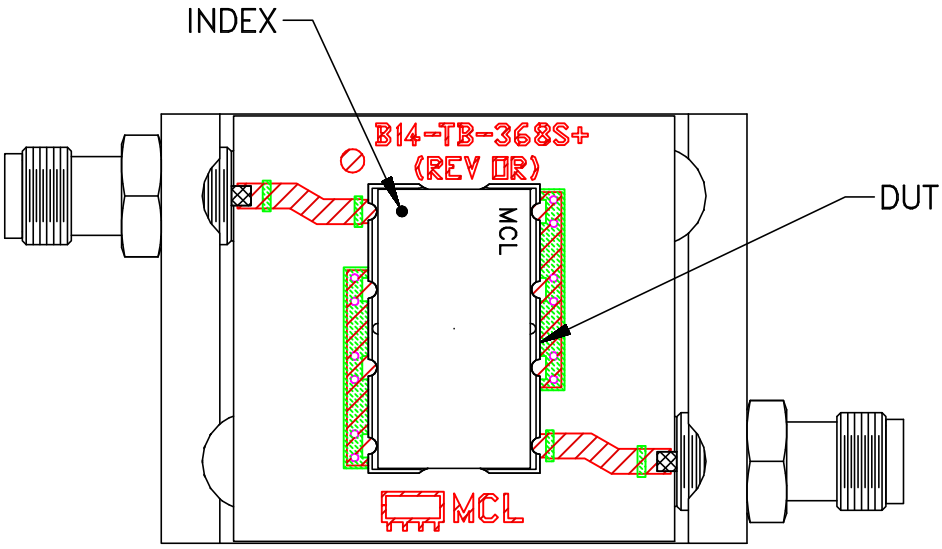
ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

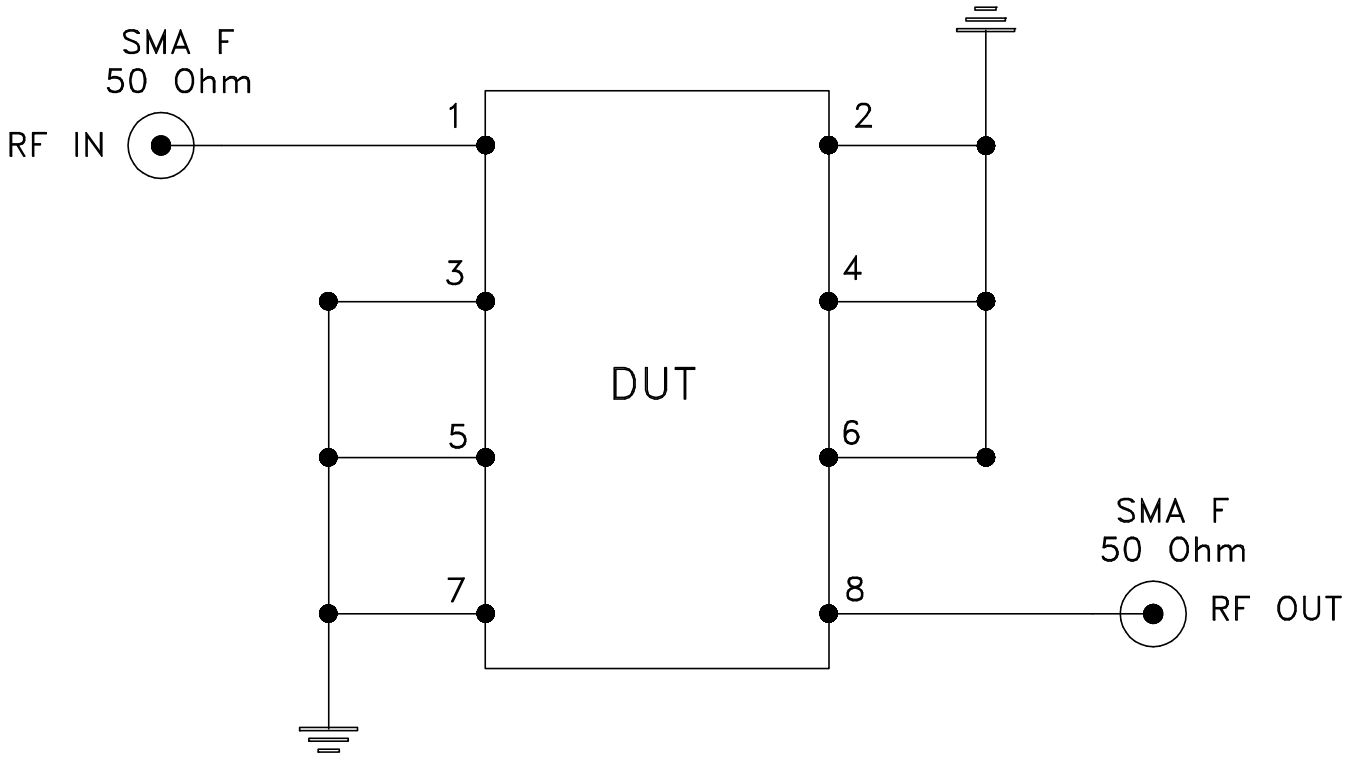
PL, cr, HF1139, SCLF, TB-368

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 ENV02T1

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	-55° to 100° C Ambient Environment	Individual Model Data Sheet
Humidity	90 to 95% RH, 240 hours, 50°C	MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, 95% Coverage
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
Mechanical Shock	50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes	MIL-STD-202, Method 213, Condition A
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215