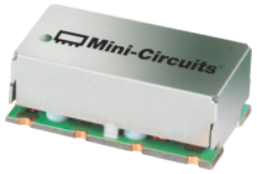
Surface Mount

Bandpass Filter

SXBP-693+

50Ω 663 to 723 MHz



Generic photo used for illustration purposes only

CASE STYLE: HF1139

The Big Deal

- Low insertion loss, 1.4dB typ.
- Good VSWR, 1.3:1 typ.
- Flat group delay response, 1.5ns typ.
- Miniature shielded package
- Wide-band rejection, upto 5 GHz

Product Overview

The SXBP-693+ is a 50Ω bandpass filter in a shielded package fabricated using SMT technology. This bandpass filter covers from 663 to 723 MHz. This filter has high Q capacitors and inductors to achieve a low insertion loss. In addition, roll-off is very sharper to reject adjacent channel resulting in higher selectivity. This filter has sharper cut-off and well suited for IF signal processing applications.

Key Features

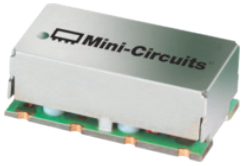
Feature	Advantages
Low insertion loss, 1.4 dB typ.	Can be used in telecommunication and broadband wireless application.
Good broad band rejection	This enables the filter to attenuate spurious signals and reject harmonics for broad frequency band.
Shielded package	The small surface mount package enables the SXBP-693+ to be used in compact designs.

Surface Mount

Bandpass Filter

50Ω 663 to 723 MHz

SXBP-693+



Generic photo used for illustration purposes only
CASE STYLE: HF1139

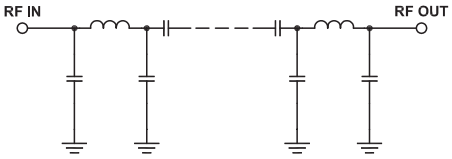
Features

- Low insertion loss, 1.4dB typ.
- Flat group delay response, 1.5ns typ.
- Miniature shielded package

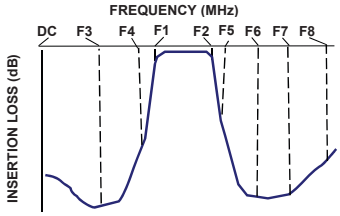
Applications

- IF signal processing
- Military hi-rel systems
- Harmonic rejection
- Transmitters / Receivers
- Telecommunications and Broadband wireless

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

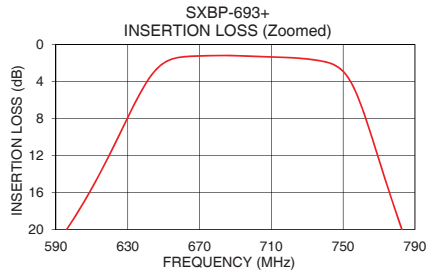
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Center frequency	-	-	-	693	-	MHz
	Insertion Loss	F1-F2	663 - 723	-	1.4	2.2	dB
	VSWR	F1-F2	663 - 723	-	1.3	1.67	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 420	40	46	-	dB
		F3-F4	420 - 565	20	27	-	dB
Stop Band, Upper	Insertion Loss	F5-F6	800 - 850	20	29	-	dB
		F6-F7	850 - 2000	40	48	-	dB
		F7-F8	2000 - 5000	30	38	-	dB

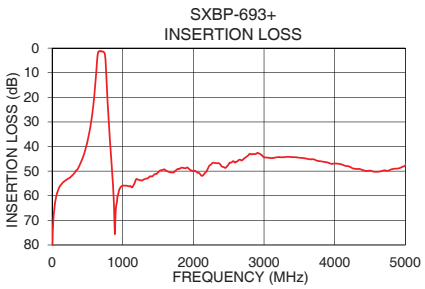
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	6 W max.

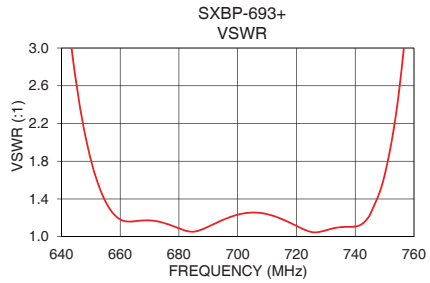
Permanent damage may occur if any of these limits are exceeded.

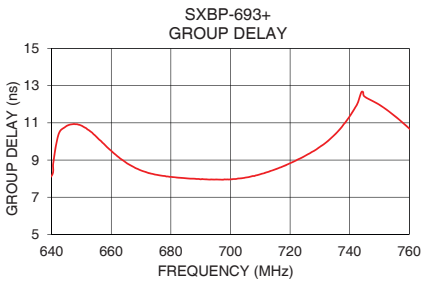
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
1	97.88	355.91	663	9.08
50	61.65	552.19	666	8.76
100	56.72	510.48	669	8.51
420	45.63	140.66	672	8.34
565	27.65	84.10	675	8.21
595	20.28	50.09	678	8.14
644	3.12	2.87	681	8.08
663	1.31	1.16	684	8.04
680	1.21	1.09	687	8.00
693	1.24	1.15	690	7.96
710	1.36	1.24	693	7.95
723	1.46	1.07	696	7.95
750	2.91	1.65	699	7.96
785	21.24	21.99	702	7.98
800	28.78	33.34	705	8.06
850	50.16	63.33	708	8.14
800	28.78	33.34	711	8.28
1000	55.88	119.60	715	8.50
2000	49.91	1189.85	720	8.83
5000	47.57	272.03	723	9.06







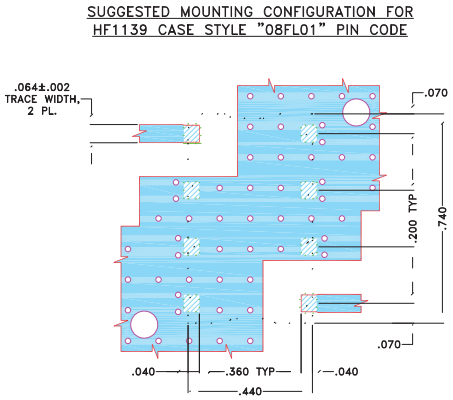


Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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	1
OUTPUT	8
GROUND	2,3,4,5,6,7

Demo Board MCL P/N: TB-SXBP-693+
Suggested PCB Layout (PL-449)



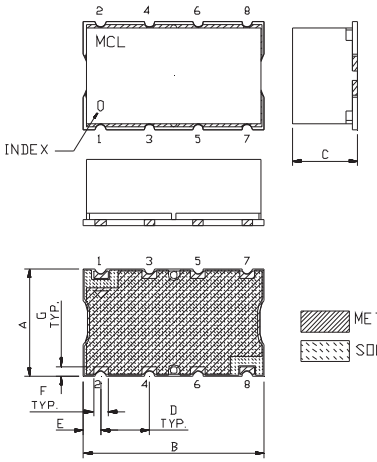
NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS 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.

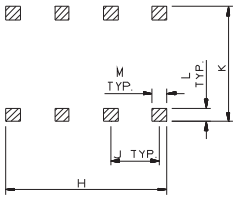
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

Outline Drawing



PCB Land Pattern



Outline Dimensions (inch / mm)

A	B	C	D	E	F	G
.44	.74	.27	.200	.07	.060	.040
11.18	18.80	6.86	5.08	1.78	1.52	1.02
H	J	K	L	M		wt
.660	.200	.470	.055	.060		grams
16.76	5.08	11.94	1.40	1.52		3.0

Note: Please refer to case style drawing for details

Surface Mount Band Pass Filter SXBP-693+

Typical Performance Data

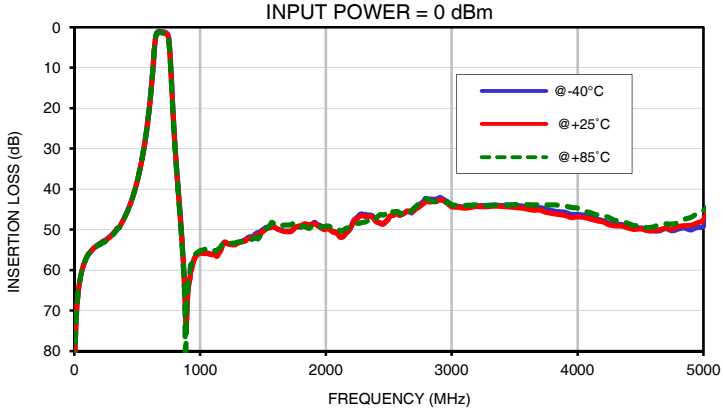
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1	93.30	97.88	98.20	0.05	0.05	0.05	0.05	0.05	0.05
10	75.81	75.19	75.00	0.04	0.04	0.04	0.04	0.04	0.04
20	69.24	69.24	69.20	0.03	0.04	0.03	0.03	0.04	0.04
30	65.67	65.78	65.68	0.03	0.03	0.03	0.03	0.04	0.03
40	63.36	63.38	63.28	0.03	0.03	0.03	0.03	0.03	0.03
50	61.58	61.65	61.65	0.03	0.03	0.03	0.03	0.03	0.03
60	60.25	60.18	60.12	0.02	0.03	0.03	0.03	0.03	0.03
80	58.27	58.14	58.16	0.02	0.03	0.03	0.03	0.04	0.04
100	56.77	56.72	56.73	0.02	0.03	0.04	0.03	0.04	0.04
150	54.76	54.70	54.75	0.04	0.06	0.06	0.04	0.06	0.06
200	53.54	53.58	53.72	0.06	0.08	0.09	0.06	0.08	0.08
250	52.50	52.71	52.87	0.08	0.09	0.10	0.08	0.10	0.10
300	51.23	51.36	51.55	0.09	0.11	0.11	0.09	0.11	0.11
350	49.58	49.60	49.68	0.09	0.12	0.12	0.09	0.11	0.12
400	46.98	47.00	47.11	0.10	0.12	0.13	0.09	0.12	0.12
420	45.69	45.63	45.74	0.09	0.12	0.13	0.10	0.12	0.13
450	43.35	43.30	43.37	0.09	0.13	0.13	0.10	0.12	0.13
500	38.16	38.09	38.09	0.11	0.14	0.15	0.11	0.14	0.15
550	30.69	30.58	30.51	0.14	0.18	0.19	0.14	0.18	0.20
565	27.77	27.65	27.56	0.16	0.21	0.22	0.17	0.21	0.23
595	20.45	20.28	20.14	0.28	0.35	0.38	0.30	0.36	0.39
625	10.09	9.89	9.72	1.11	1.28	1.39	1.18	1.36	1.47
644	3.13	3.12	3.09	5.75	6.33	6.72	6.08	6.70	7.14
663	1.16	1.31	1.39	22.51	22.58	22.71	33.98	31.78	30.95
670	1.10	1.25	1.33	21.61	21.97	22.44	23.32	23.61	24.05
680	1.06	1.21	1.29	26.20	27.44	28.72	27.88	29.37	30.98
690	1.06	1.22	1.31	26.82	25.93	24.97	28.00	26.67	25.54
693	1.08	1.24	1.33	23.59	23.09	22.46	24.03	23.36	22.70
700	1.13	1.29	1.38	19.59	19.61	19.45	19.60	19.53	19.36
710	1.20	1.36	1.45	18.87	19.41	19.72	18.50	18.87	19.07
720	1.25	1.43	1.53	23.75	25.32	26.70	21.96	22.59	23.03
723	1.27	1.46	1.57	27.06	29.28	31.41	23.80	24.27	24.51
750	2.47	2.91	3.20	13.23	12.20	11.56	13.37	12.33	11.69
765	8.64	9.42	9.96	2.58	2.56	2.51	2.51	2.48	2.44
785	20.60	21.24	21.69	0.71	0.79	0.82	0.67	0.74	0.77
800	28.24	28.78	29.18	0.45	0.52	0.55	0.43	0.49	0.52
805	30.55	31.07	31.61	0.41	0.47	0.50	0.38	0.44	0.47
850	49.62	50.16	50.79	0.22	0.27	0.29	0.21	0.25	0.27
900	66.66	66.80	65.33	0.15	0.20	0.21	0.15	0.18	0.20
950	57.39	57.68	56.79	0.12	0.17	0.18	0.11	0.15	0.17
1000	55.77	55.88	55.23	0.10	0.15	0.16	0.09	0.13	0.15
1100	56.09	56.14	54.93	0.06	0.11	0.12	0.07	0.11	0.12
1200	53.07	53.22	53.48	0.04	0.09	0.10	0.05	0.08	0.09
1300	53.18	53.36	53.10	0.02	0.07	0.09	0.03	0.07	0.08
1400	51.82	52.12	52.46	0.01	0.06	0.08	0.02	0.06	0.08
1500	49.97	50.48	50.57	0.01	0.05	0.07	0.01	0.04	0.06
1600	49.60	49.54	48.84	0.02	0.04	0.06	0.02	0.03	0.05
1700	50.40	50.51	48.86	0.03	0.03	0.06	0.03	0.02	0.05
1800	49.37	49.15	49.39	0.05	0.02	0.05	0.03	0.03	0.07
1900	48.36	48.71	49.02	0.06	0.02	0.04	0.05	0.01	0.04
2000	49.47	49.91	49.11	0.06	0.01	0.07	0.07	0.00	0.03
2200	49.28	49.32	49.35	0.07	0.02	0.04	0.06	0.01	0.03
2400	48.00	48.07	47.21	0.06	0.04	0.07	0.07	0.01	0.04
2600	46.14	46.23	46.09	0.05	0.06	0.07	0.06	0.02	0.05
2800	42.33	42.97	42.42	0.04	0.05	0.06	0.04	0.04	0.08
3000	44.13	44.41	43.90	0.03	0.06	0.10	0.04	0.04	0.06
3500	44.09	44.56	43.82	0.02	0.06	0.09	0.05	0.03	0.08
4000	46.24	46.89	44.70	0.04	0.06	0.08	0.07	0.02	0.05
4500	49.57	49.80	49.06	0.09	0.04	0.09	0.08	0.01	0.07
5000	49.20	47.57	45.37	0.09	0.06	0.11	0.10	0.03	0.05

Typical Performance Data

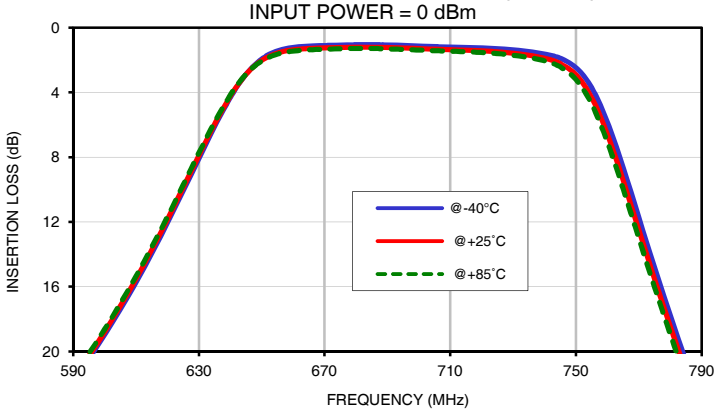
FREQ.	GROUP DELAY		
(MHz)	(nsec)		
	@-40°C	@+25°C	@+85°C
663	9.20	9.08	9.01
664	9.07	8.98	8.90
665	8.95	8.86	8.80
666	8.84	8.76	8.70
667	8.74	8.67	8.61
668	8.65	8.58	8.54
669	8.56	8.51	8.47
670	8.50	8.44	8.41
671	8.43	8.38	8.36
672	8.38	8.34	8.31
673	8.32	8.28	8.27
674	8.28	8.25	8.23
675	8.24	8.21	8.20
676	8.21	8.18	8.17
677	8.17	8.16	8.14
678	8.16	8.14	8.13
679	8.13	8.12	8.10
680	8.11	8.10	8.09
681	8.09	8.08	8.07
682	8.08	8.06	8.05
683	8.07	8.05	8.04
684	8.06	8.04	8.03
685	8.04	8.02	8.02
686	8.02	8.01	8.00
687	8.02	8.00	8.00
688	8.00	8.00	7.98
689	8.00	7.98	7.98
690	7.98	7.96	7.96
691	7.97	7.97	7.96
692	7.97	7.96	7.96
693	7.96	7.95	7.95
694	7.96	7.95	7.95
695	7.95	7.95	7.95
698	7.95	7.96	7.96
700	7.95	7.96	7.97
705	8.03	8.06	8.08
710	8.19	8.23	8.26
715	8.45	8.50	8.54
718	8.62	8.68	8.73
720	8.77	8.83	8.87
723	8.99	9.06	9.11

Typical Performance Curves

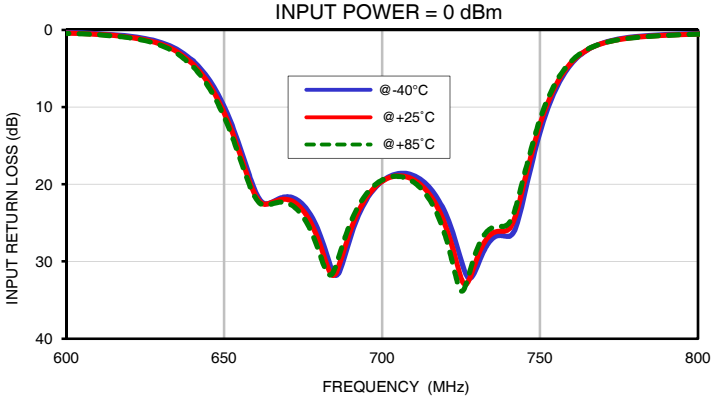
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



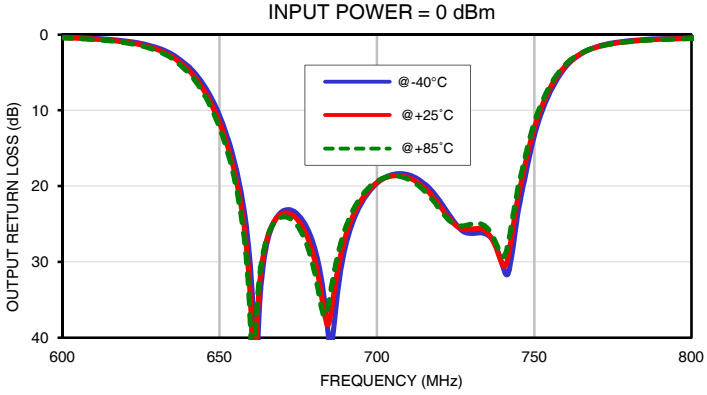
INSERTION LOSS vs. TEMPERATURE (Zoomed)
INPUT POWER = 0 dBm



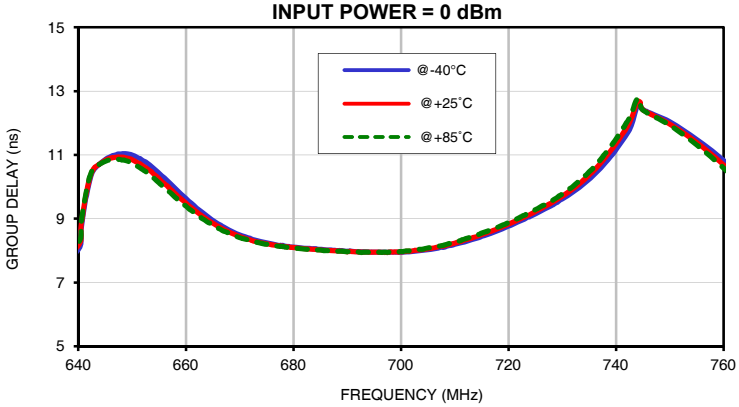
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



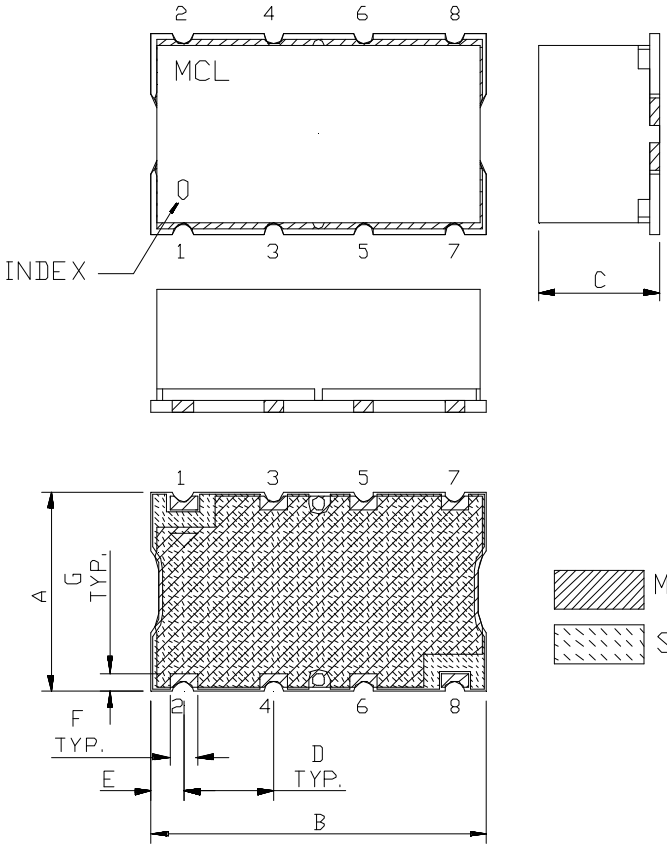
GROUP DELAY vs. TEMPERATURE
INPUT POWER = 0 dBm



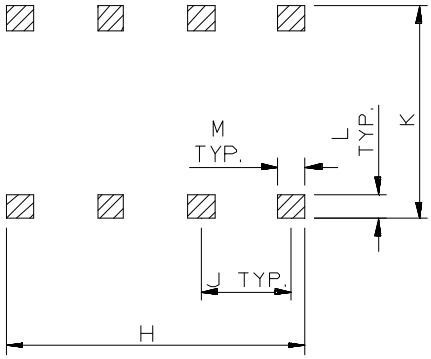
Case Style HF

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

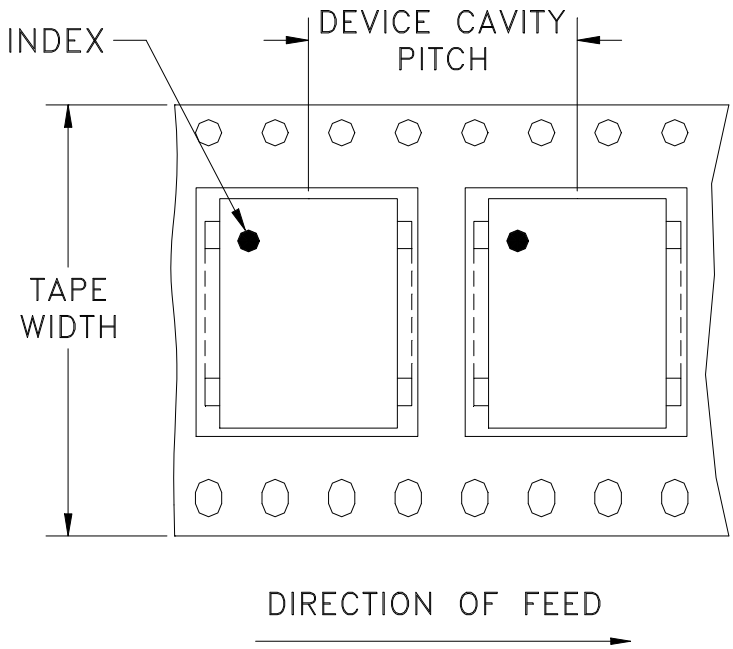
Dimensions are in inches (mm). Tolerances: 2 Pl. ±.015"; 3 Pl. ±.01"

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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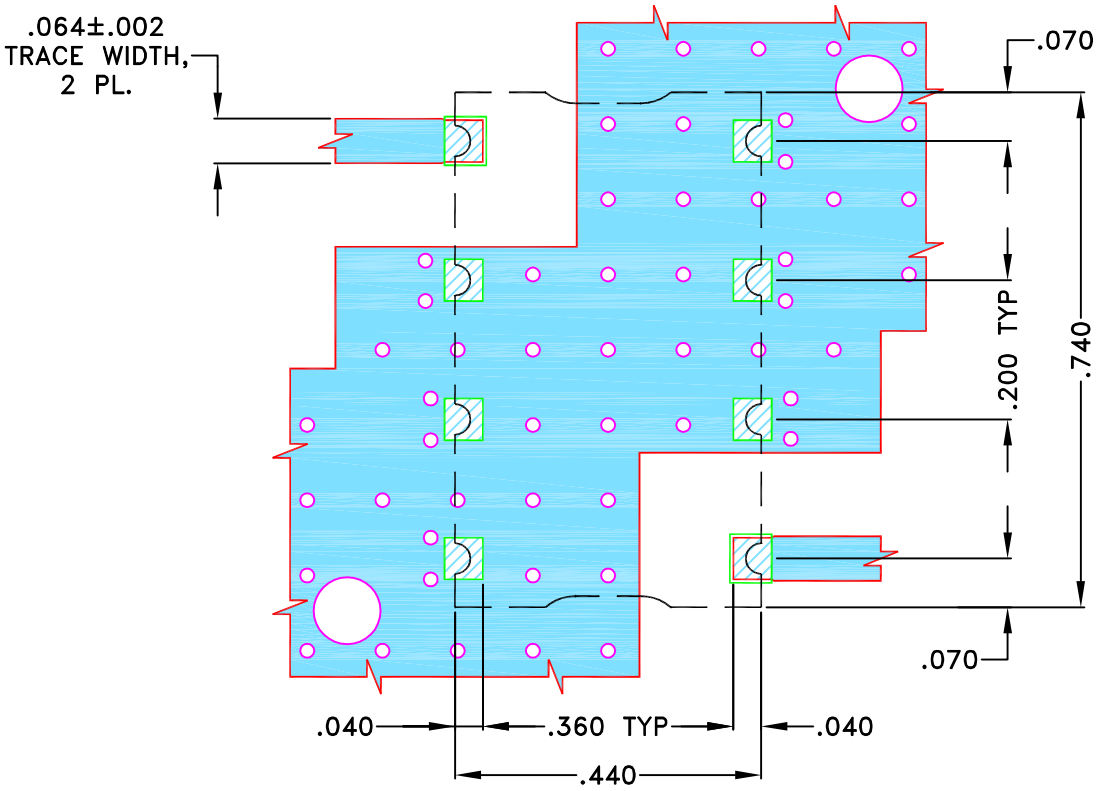
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M150680	NEW RELEASE	APR 15	TM	MD

SUGGESTED MOUNTING CONFIGURATION FOR HF1139 CASE STYLE "08FL01" PIN CODE



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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	10 APR 15
TOLERANCES ON:	CHECKED	MD	10 APR 15
2 PL DECIMALS ± .005"	APPROVED	RK	10 APR 15
3 PL DECIMALS ±			
ANGLES ±			
FRACTIONS ±			

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

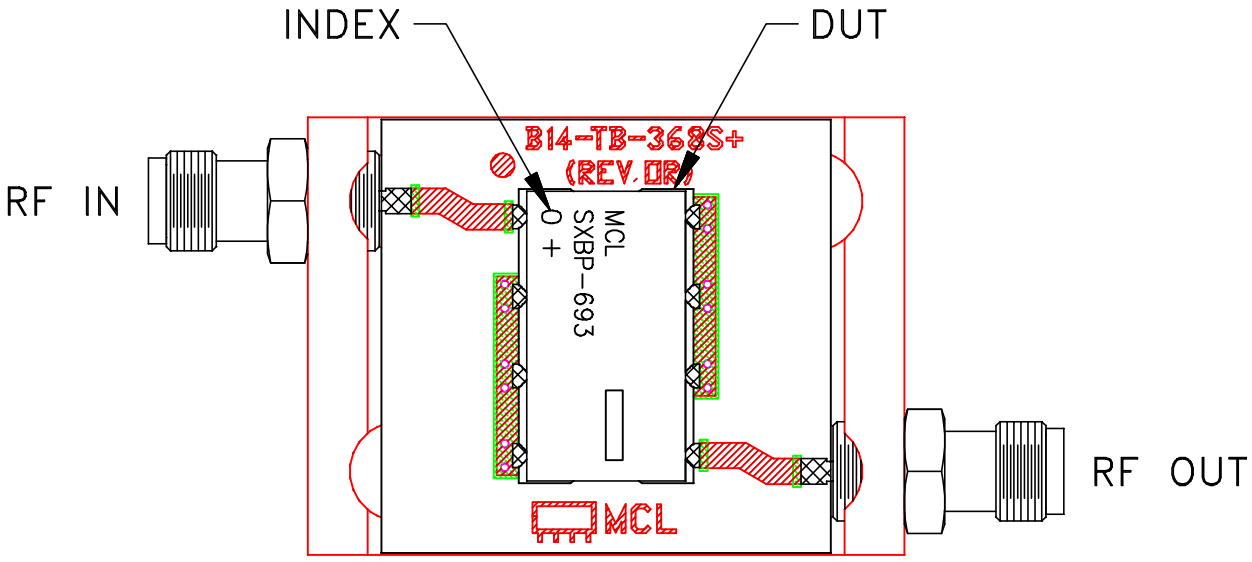
Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

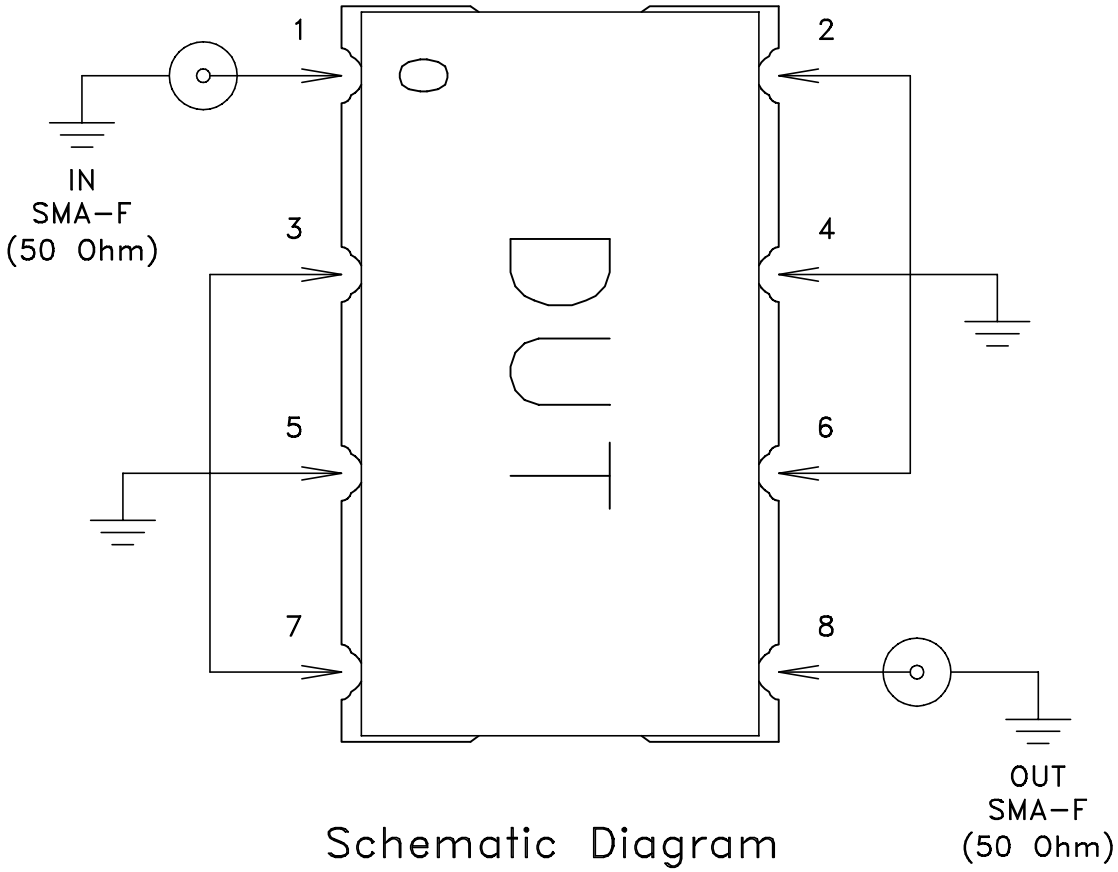
PL, 08FL01, HF1139
TB-368+, 50 OHM

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-449	OR
FILE: 98PL449		SCALE: 3:1	SHEET: 1 OF 1

Evaluation Board and Circuit

TB-SXBP-693+





Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350B OR Equivalent
   Dielectric Constant=3.48±.05, Thickness=.030 inch.

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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