Surface Mount

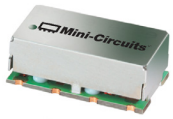
Low Pass Filter

SXLP-400+

50Ω DC to 400 MHz

The Big Deal

- Low Insertion Loss (0.7 dB typical)
- High rejection (60 dB typical)
- Good VSWR (1.36:1 typical)
- Miniature shielded package



CASE STYLE: HF1139

Product Overview

SXLP-400+ is a lowpass filter fabricated using SMT technology. Covering up to 400 MHz, these units offer low insertion loss, good matching within the passband and high rejection This model also offers flat group delay characteristics. This unit uses a miniature high Q capacitors and wire welded inductors for high reliability. In addition it has repeatable performance across production lots and consistent performance across temperature.

Key Features

Feature	Advantages
Wide rejection up to 6000 MHz	This enables the filter to attenuate spurious signals and reject harmonics over a broad band of frequency.
Good VSWR, 1.36:1 typical over Passband	The model has very good return loss which provides good matching when used with other devices.
Sharp roll off shape factor, 1.2	Sharp shape factor helps in adjacent channel rejection and hence icreased selectivity.
Small size, 0.44" x 0.74" x 0.27"	The small surface mount package enables the SXLP-400+ to be used in compact designs.

Surface Mount

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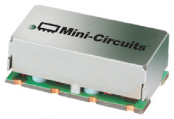
SXLP-400+

50Ω DC to 400 MHz



CASE STYLE: HF1139

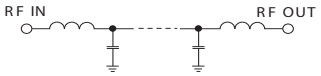
Features

- Flat group delay over passband
- Good VSWR, 1.36:1 typical over passband
- High rejection, 60 dB typical
- Shielded case
- Aqueous washable

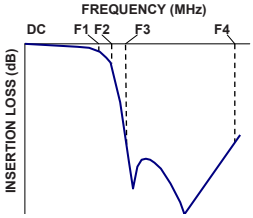
Applications

- Test equipment
- Receivers/transmitters
- Harmonic rejection
- Military

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

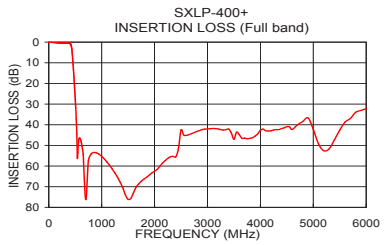
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss	DC-F1	DC - 400	—	0.7	1.5	dB
	Freq. Cut-Off	F2	435	—	3.5	—	dB
	VSWR	DC-F1	DC - 400	—	1.36	—	:1
Stop Band	Rejection Loss	F3-F4	500 - 2400	20	27	—	dB
	VSWR	F3-F4	500 - 2400	—	20	—	:1

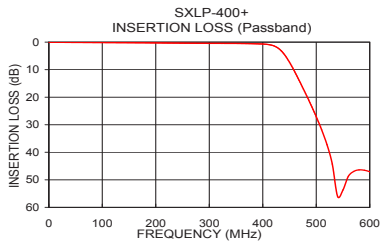
Maximum Ratings	
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	1W max.

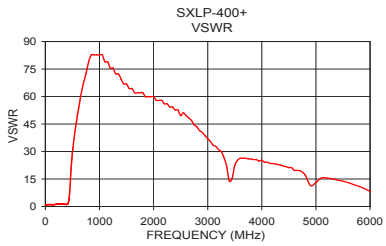
Permanent damage may occur if any of these limits are exceeded.

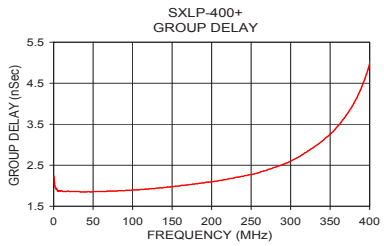
Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
0.5	0.03	1.01	0.5	2.24
26.0	0.08	1.03	20.0	1.86
100.0	0.16	1.05	40.0	1.85
220.0	0.32	1.20	80.0	1.87
360.0	0.50	1.15	100.0	1.90
400.0	0.69	1.11	120.0	1.92
422.0	1.47	1.87	130.0	1.94
435.0	3.27	3.49	140.0	1.96
448.0	6.72	7.25	160.0	2.00
464.0	12.43	15.00	200.0	2.10
484.0	20.36	24.14	220.0	2.16
500.0	27.18	29.46	240.0	2.23
550.0	53.70	41.37	280.0	2.45
700.0	81.04	66.82	290.0	2.52
1000.0	55.96	82.73	300.0	2.60
1500.0	75.12	66.82	320.0	2.82
1750.0	67.54	62.05	340.0	3.09
2000.0	62.91	59.91	360.0	3.46
2200.0	57.66	56.04	380.0	4.01
2400.0	55.66	52.65	400.0	4.98









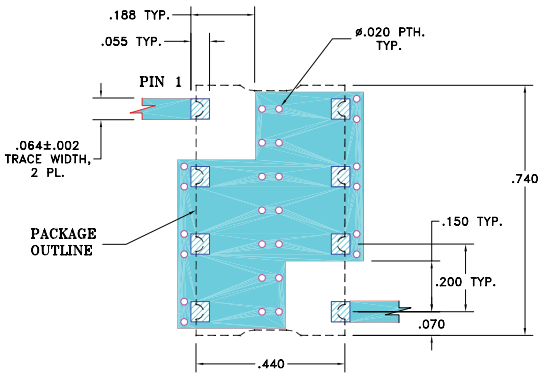
Notes

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-368
Suggested PCB Layout (PL-230)



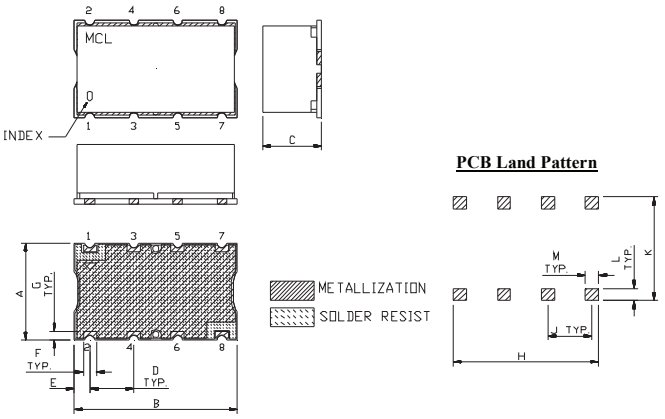
NOTE:

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

Outline Drawing



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

Surface Mount Low Pass Filter SXLP-400+

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	51.60	48.87	47.83	48.98	47.06	45.79
10	0.04	0.05	0.05	44.34	41.84	39.93	46.09	42.41	39.91
20	0.05	0.07	0.07	39.64	37.74	35.94	42.28	38.43	35.69
26	0.06	0.08	0.08	37.78	36.28	34.61	39.88	36.58	33.96
30	0.07	0.08	0.09	36.73	35.57	34.05	38.57	35.68	33.18
40	0.08	0.10	0.10	34.13	33.97	33.20	35.41	33.72	31.67
50	0.09	0.11	0.11	32.14	32.93	33.16	32.92	32.38	30.98
100	0.13	0.15	0.17	29.91	35.08	43.30	29.28	34.23	42.12
150	0.16	0.20	0.22	38.76	34.04	30.33	37.14	33.95	30.43
200	0.22	0.28	0.32	23.17	21.50	20.39	23.27	21.54	20.36
220	0.26	0.33	0.37	19.91	18.99	18.18	20.02	19.04	18.22
250	0.34	0.40	0.44	16.43	16.55	16.40	16.53	16.61	16.44
300	0.43	0.48	0.50	14.94	15.83	16.56	15.01	15.91	16.66
350	0.40	0.49	0.54	20.10	21.39	22.46	20.18	21.43	22.59
360	0.40	0.51	0.56	22.34	23.88	25.02	22.34	23.76	24.93
400	0.55	0.70	0.79	27.73	26.38	25.57	29.80	28.35	27.16
422	1.21	1.51	1.73	10.78	10.11	9.52	10.97	10.31	9.68
448	6.45	7.06	7.57	2.22	2.24	2.18	2.25	2.26	2.20
464	12.37	12.95	13.47	0.97	1.08	1.13	0.98	1.08	1.12
470	14.76	15.32	15.82	0.78	0.90	0.96	0.79	0.90	0.95
500	27.37	27.90	28.33	0.45	0.56	0.63	0.45	0.55	0.61
560	50.04	50.05	49.88	0.28	0.39	0.45	0.30	0.38	0.43
600	48.40	48.64	48.69	0.23	0.33	0.39	0.25	0.32	0.37
650	57.07	57.27	57.40	0.18	0.29	0.34	0.20	0.28	0.32
700	65.22	65.07	65.20	0.15	0.26	0.31	0.17	0.25	0.29
750	55.35	55.60	55.80	0.12	0.24	0.29	0.15	0.23	0.27
800	53.18	53.34	53.58	0.11	0.22	0.28	0.14	0.22	0.26
850	52.68	52.81	53.14	0.09	0.21	0.27	0.13	0.21	0.25
900	53.00	53.32	53.52	0.09	0.21	0.27	0.12	0.21	0.25
950	53.83	54.13	54.38	0.08	0.20	0.27	0.12	0.20	0.25
1000	54.79	55.16	55.45	0.07	0.20	0.27	0.12	0.21	0.25
1050	56.24	56.51	56.84	0.07	0.21	0.28	0.11	0.20	0.25
1100	57.87	58.09	58.53	0.07	0.21	0.28	0.12	0.21	0.26
1150	59.55	59.72	60.15	0.07	0.21	0.28	0.12	0.22	0.26
1200	61.36	61.75	62.14	0.07	0.22	0.29	0.12	0.22	0.27
1250	63.66	63.93	64.64	0.07	0.22	0.29	0.13	0.23	0.27
1300	66.70	66.70	67.36	0.07	0.23	0.30	0.13	0.23	0.28
1350	70.07	70.54	70.84	0.08	0.23	0.31	0.13	0.24	0.29
1400	74.70	75.83	75.50	0.08	0.23	0.31	0.14	0.24	0.29
1450	88.81	89.72	85.74	0.08	0.24	0.32	0.15	0.25	0.30
1500	81.18	85.81	84.55	0.09	0.25	0.33	0.15	0.26	0.31
1550	76.81	75.86	76.19	0.08	0.25	0.34	0.15	0.26	0.31
1600	72.23	72.73	72.68	0.09	0.26	0.35	0.16	0.26	0.32
1650	70.41	70.41	71.40	0.09	0.27	0.36	0.17	0.27	0.33
1700	69.78	69.52	69.46	0.10	0.27	0.36	0.17	0.28	0.34
1750	68.16	67.23	67.97	0.10	0.27	0.37	0.17	0.28	0.34
1800	64.63	65.18	64.98	0.10	0.27	0.38	0.17	0.28	0.35
1850	63.67	63.80	64.56	0.10	0.28	0.39	0.18	0.29	0.36
1900	65.06	65.04	64.73	0.10	0.29	0.40	0.18	0.29	0.37
2000	65.57	65.89	65.66	0.11	0.30	0.44	0.19	0.30	0.38
2100	65.33	68.22	66.91	0.12	0.31	0.45	0.19	0.31	0.40
2200	57.87	59.93	61.44	0.12	0.32	0.47	0.21	0.32	0.43
2300	56.56	54.96	54.73	0.12	0.33	0.50	0.21	0.34	0.45
2400	61.01	63.50	58.78	0.12	0.34	0.53	0.21	0.35	0.47

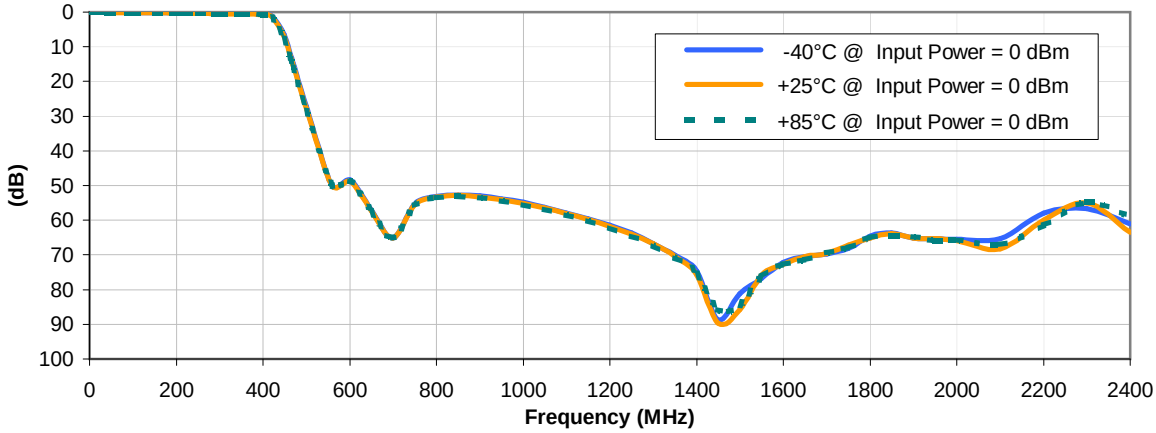
Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
0.5	2.75	2.40	2.53
10	1.78	1.77	1.77
20	1.77	1.76	1.76
30	1.76	1.76	1.75
40	1.76	1.75	1.75
50	1.76	1.76	1.75
60	1.77	1.76	1.76
70	1.77	1.77	1.76
80	1.78	1.78	1.77
90	1.79	1.79	1.78
100	1.80	1.80	1.79
110	1.81	1.81	1.80
120	1.83	1.82	1.82
130	1.85	1.84	1.84
140	1.87	1.86	1.85
150	1.89	1.88	1.87
160	1.91	1.90	1.89
170	1.93	1.93	1.92
180	1.96	1.95	1.94
190	1.99	1.98	1.96
200	2.02	2.00	1.99
210	2.05	2.03	2.02
220	2.08	2.06	2.05
230	2.12	2.10	2.09
240	2.15	2.14	2.12
246	2.17	2.16	2.15
250	2.18	2.17	2.16
256	2.21	2.20	2.19
260	2.22	2.22	2.22
266	2.26	2.26	2.26
270	2.29	2.29	2.29
276	2.32	2.32	2.32
280	2.34	2.35	2.35
286	2.38	2.39	2.40
290	2.41	2.42	2.43
300	2.49	2.50	2.51
306	2.55	2.56	2.57
310	2.60	2.61	2.62
316	2.67	2.68	2.69
320	2.72	2.73	2.74
326	2.80	2.81	2.82
330	2.85	2.86	2.87
336	2.94	2.95	2.96
340	3.00	3.01	3.02
346	3.10	3.11	3.12
350	3.18	3.19	3.20
356	3.30	3.31	3.32
360	3.38	3.39	3.41
366	3.52	3.54	3.56
370	3.63	3.65	3.66
376	3.80	3.82	3.85
380	3.93	3.95	3.98
386	4.15	4.18	4.22
390	4.32	4.36	4.40
400	4.88	4.95	5.02

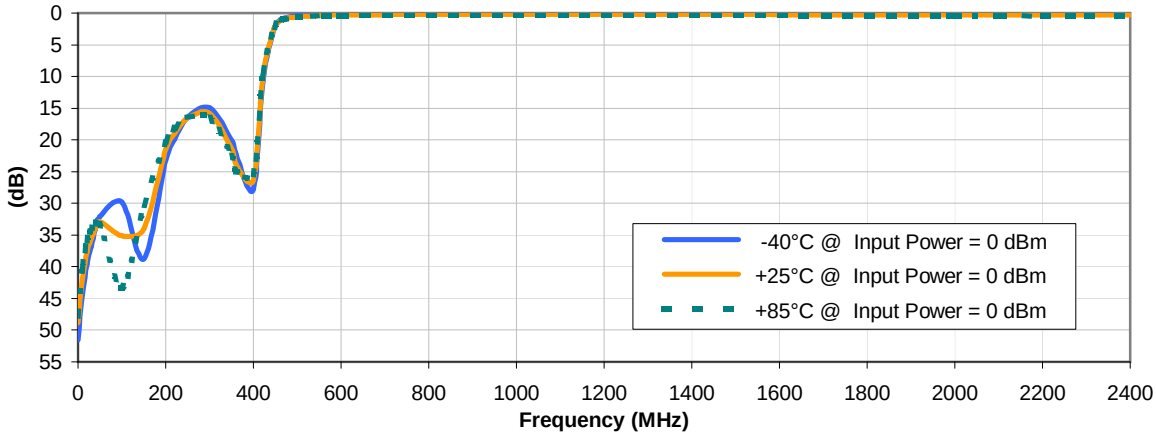
Surface Mount Low Pass Filter SXLP-400+

Typical Performance Curves

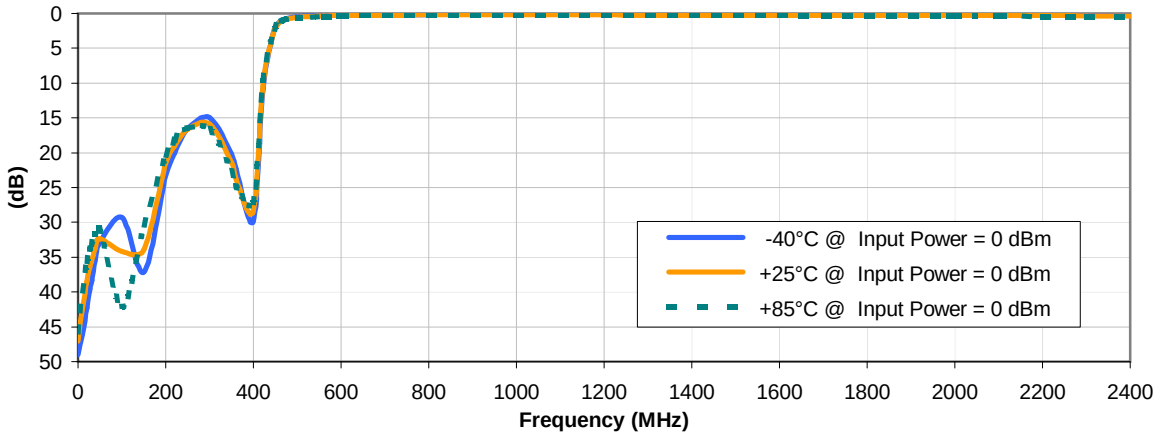
INSERTION LOSS vs. TEMPERATURE



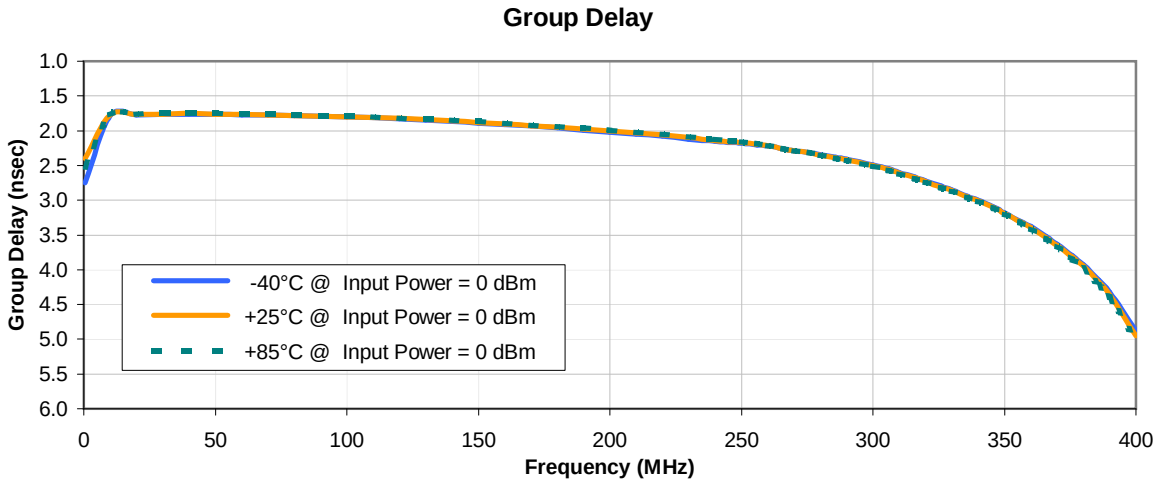
INPUT RETURN LOSS vs. TEMPERATURE



OUTPUT RETURN LOSS vs. TEMPERATURE



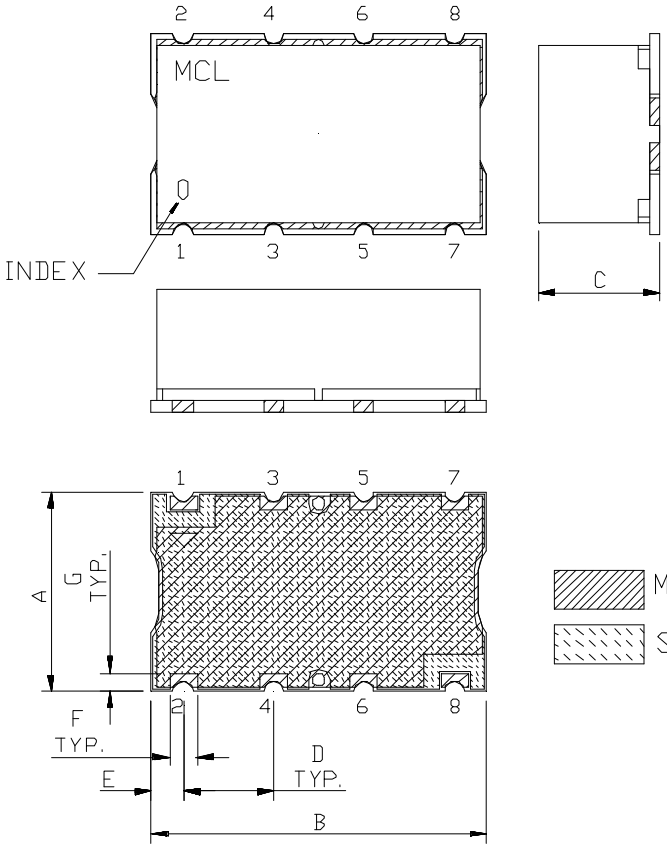
Typical Performance Curves



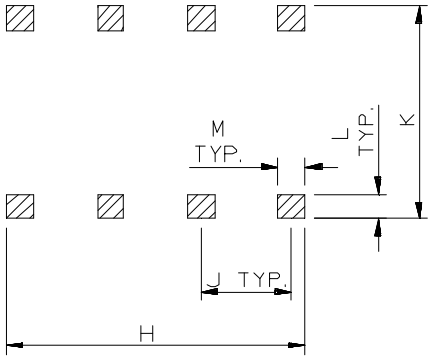
Case Style HF

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

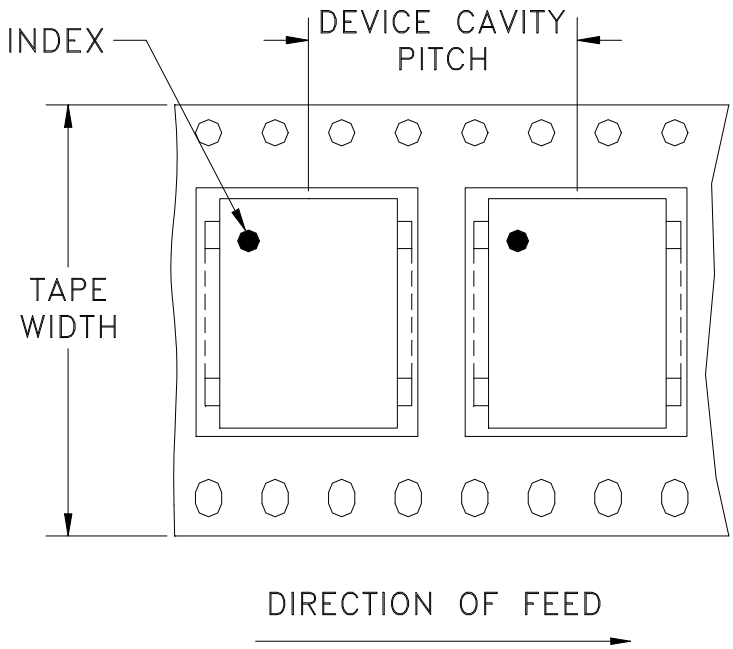
Dimensions are in inches (mm). Tolerances: 2 Pl. ±.015"; 3 Pl. ±.01"

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.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

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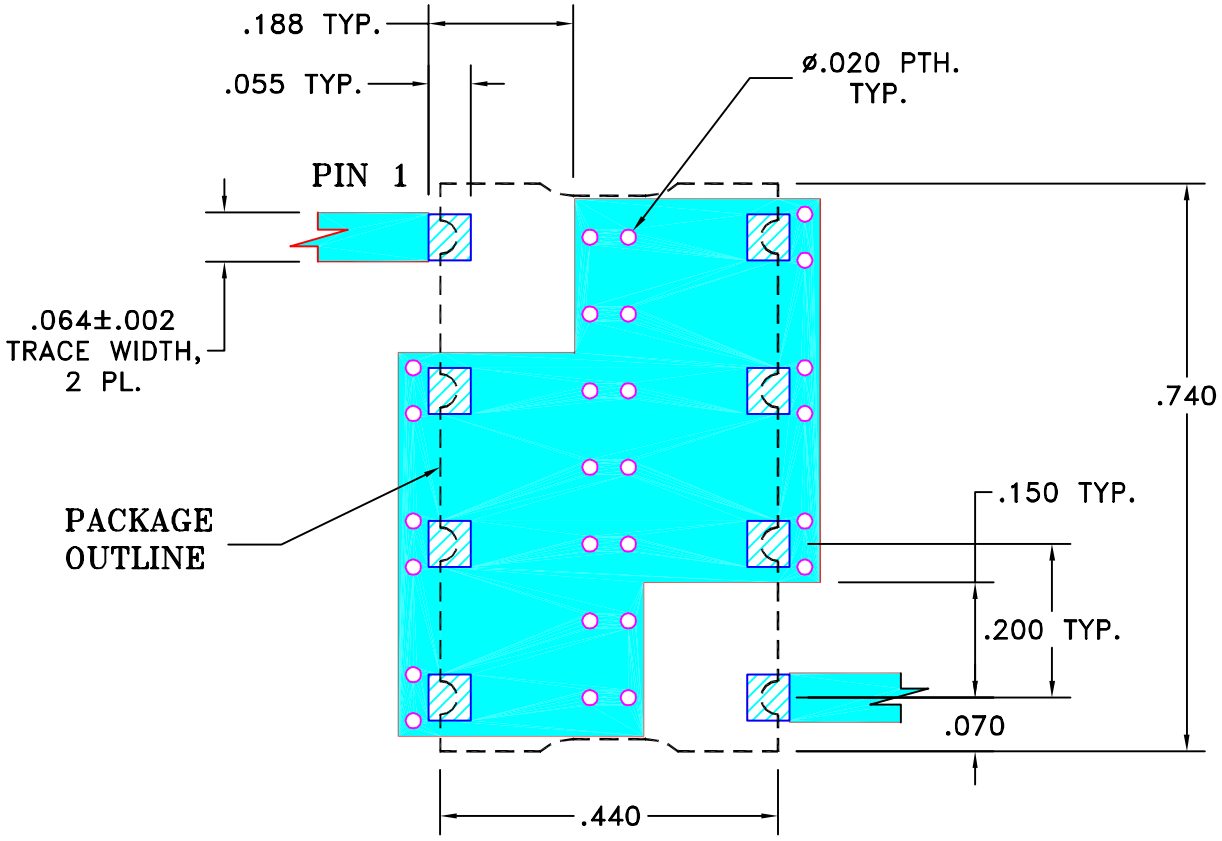
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	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:

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

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 ±			

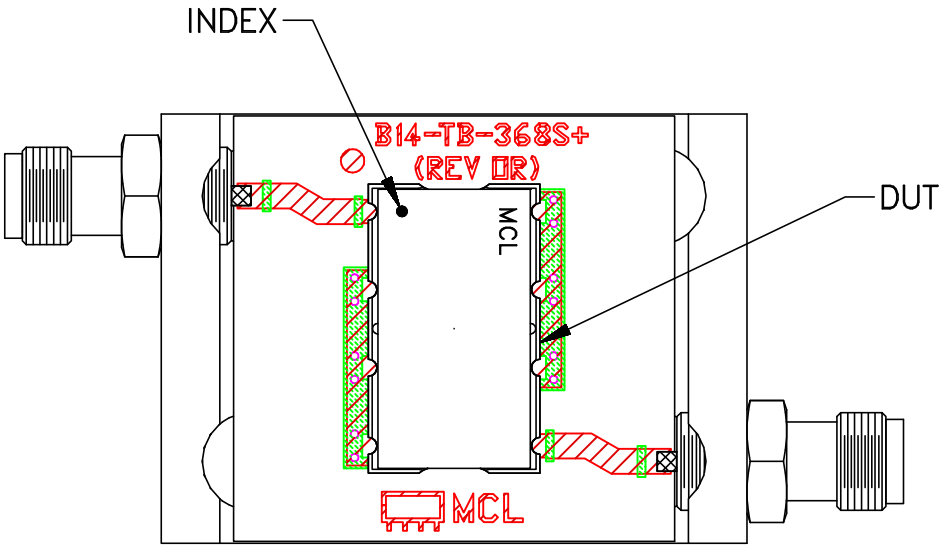
ASHEETA1.DWG REV:A DATE:01/12/95

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



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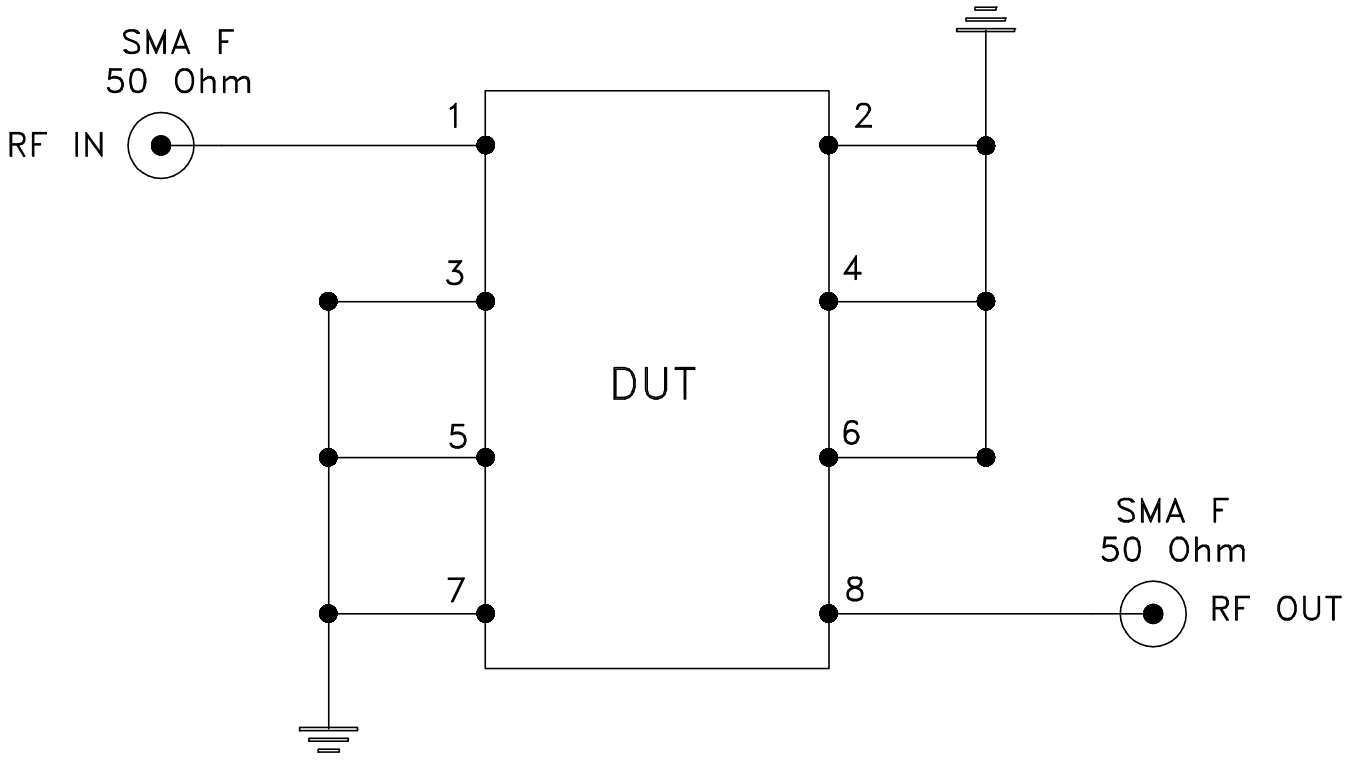

Schematic Diagram

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