

Surface Mount

Low Pass Filter

50Ω DC to 78 MHz

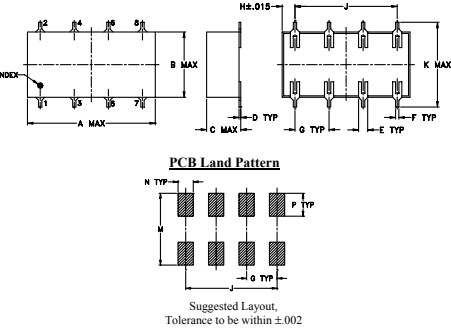
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
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

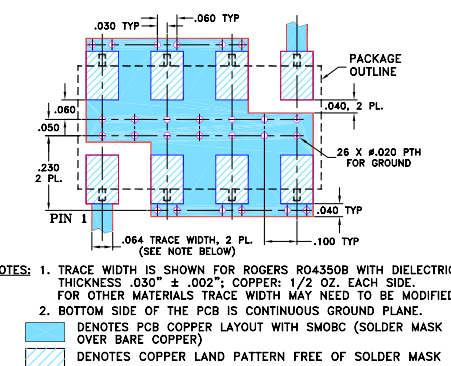
Outline Drawing



Outline Dimensions (inch)

A	B	C	D	E	F	G
.75	.38	.20	.010	.050	.020	.200
19.05	9.65	5.08	0.25	1.27	0.51	5.08
H	J	K	M	N	P	wt
.075	.600	.450	.470	.100	.150	grams
1.91	15.24	11.43	11.94	2.54	3.81	1.6

Demo Board MCL P/N: TB-187+
Suggested PCB Layout (PL-049)



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

Features

- 7-section elliptic function
- excellent rejection

Applications

- defense communications
- receivers/transmitters
- harmonic rejection of VCOs

SALF-78+



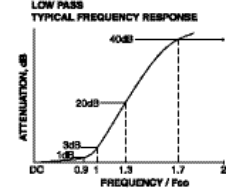
Generic photo used for illustration purposes only
CASE STYLE: YY101

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

Low Pass Filter Electrical Specifications

PASSBAND (MHz)	fco, (MHz) Nom.	STOPBAND (MHz)		VSWR (:1)	
(loss < 1 dB)	(loss 3 dB) Typ.	(loss > 20 dB) Min.	(loss > 40 dB) Min.	Pass band typ.	Stop band typ.
DC-78	93	120-136	136-550	1.3	18

typical frequency response



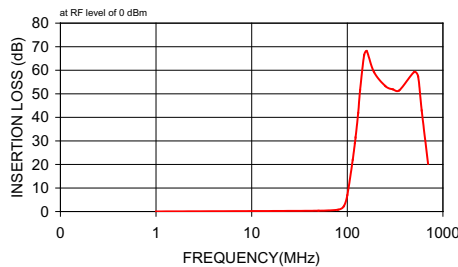
Electrical Schematic



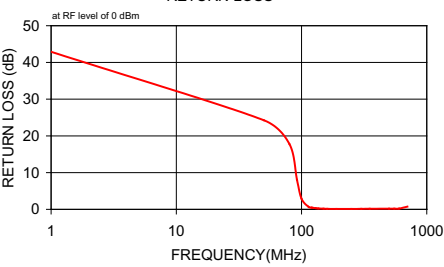
Typical Performance Data

Frequency (MHz)	Insertion Loss (dB)		Return Loss (dB)
	$\bar{x}$	σ	
1.00	0.04	0.01	42.90
50.00	0.33	0.01	24.26
80.00	0.77	0.03	17.79
92.00	2.28	0.12	8.01
100.00	6.90	0.30	2.87
114.00	21.99	0.42	0.67
120.00	29.06	0.48	0.47
122.00	31.44	0.51	0.42
130.00	41.87	0.78	0.31
136.00	51.54	1.40	0.25
150.00	66.41	3.36	0.18
160.00	68.12	2.07	0.14
190.00	59.27	0.50	0.12
250.00	53.27	0.32	0.12
300.00	51.89	0.33	0.14
350.00	51.47	0.35	0.15
500.00	59.23	1.06	0.18
550.00	57.42	1.70	0.19
600.00	42.90	0.84	0.20
700.00	20.29	1.10	0.74

SALF-78
INSERTION LOSS



SALF-78
RETURN LOSS



Surface Mount Low Pass Filter

SALF-78+

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
0.1	0.03	0.06	0.04	49.93	43.60	46.96	50.37	43.83	47.06
1	0.03	0.06	0.04	43.16	40.81	42.54	43.38	41.05	42.69
10	0.09	0.12	0.10	23.95	23.96	24.40	24.08	24.52	24.58
20	0.16	0.20	0.19	19.13	19.12	19.44	19.31	19.74	19.71
30	0.22	0.27	0.26	17.99	17.91	18.13	18.29	18.67	18.52
40	0.24	0.30	0.29	19.44	19.25	19.28	19.99	20.28	19.95
50	0.25	0.32	0.32	23.87	23.63	23.24	25.33	25.23	24.67
60	0.30	0.37	0.37	28.02	28.96	28.91	29.78	29.77	31.19
70	0.39	0.47	0.48	23.55	23.64	24.23	24.35	24.99	25.41
80	0.58	0.70	0.72	17.36	17.03	16.99	18.18	18.27	17.88
92	1.99	2.22	2.35	7.43	7.32	7.20	7.11	7.02	6.82
100	6.56	6.89	7.11	2.45	2.52	2.54	2.10	2.14	2.14
114	21.55	21.86	22.03	0.50	0.58	0.62	0.36	0.43	0.45
120	28.58	28.90	29.06	0.35	0.41	0.44	0.25	0.32	0.33
122	30.98	31.32	31.48	0.31	0.37	0.40	0.23	0.30	0.31
130	41.33	41.75	41.95	0.22	0.27	0.29	0.18	0.24	0.24
136	50.87	51.55	51.84	0.18	0.23	0.24	0.15	0.22	0.21
150	64.44	63.86	63.68	0.13	0.17	0.18	0.12	0.19	0.17
160	65.88	65.37	65.58	0.11	0.15	0.16	0.11	0.19	0.15
170	75.09	75.15	75.23	0.11	0.14	0.14	0.10	0.19	0.14
180	65.57	66.60	65.93	0.10	0.13	0.14	0.10	0.19	0.14
190	60.66	61.31	61.10	0.10	0.13	0.13	0.10	0.19	0.13
200	58.00	58.77	58.52	0.10	0.12	0.13	0.10	0.19	0.13
250	53.88	54.52	54.57	0.09	0.12	0.12	0.10	0.21	0.13
300	52.67	53.38	53.29	0.10	0.12	0.12	0.11	0.22	0.14
350	52.31	53.08	52.95	0.10	0.13	0.13	0.12	0.23	0.15
400	52.69	53.61	53.37	0.10	0.13	0.13	0.12	0.23	0.15
500	64.56	70.13	68.53	0.10	0.13	0.14	0.12	0.25	0.17
550	53.73	52.50	52.59	0.11	0.15	0.15	0.13	0.26	0.18
600	41.37	41.02	40.94	0.11	0.15	0.15	0.14	0.27	0.20
700	21.09	21.70	22.06	0.35	0.37	0.37	0.57	0.68	0.57
800	33.28	33.74	33.66	0.12	0.17	0.18	0.15	0.29	0.22
900	38.04	38.62	38.66	0.12	0.18	0.19	0.16	0.31	0.24
1000	50.21	52.33	52.47	0.13	0.20	0.22	0.23	0.39	0.34
1100	31.90	31.68	31.36	0.15	0.24	0.27	1.22	1.53	1.58
1200	34.32	35.21	35.20	0.18	0.29	0.33	0.90	1.08	1.01
1300	33.68	33.30	33.08	0.25	0.39	0.45	0.28	0.46	0.42
1400	22.59	22.40	22.36	0.46	0.64	0.73	0.26	0.45	0.42
1500	13.97	13.83	13.81	1.30	1.64	1.85	0.46	0.69	0.68
1600	7.56	7.69	7.84	4.24	4.70	4.94	1.22	1.47	1.44
1700	8.93	9.15	9.39	1.82	1.97	2.04	0.90	1.11	1.09
1800	10.99	11.05	11.27	0.95	1.13	1.22	0.65	0.87	0.89
1900	11.94	11.96	12.09	0.73	0.93	1.05	0.57	0.81	0.85
2000	12.34	12.27	12.39	0.66	0.88	1.02	0.56	0.82	0.87
2100	12.39	12.33	12.39	0.65	0.89	1.04	0.58	0.86	0.92
2200	12.38	12.31	12.36	0.67	0.90	1.10	0.61	0.89	0.98
2300	12.06	11.97	12.02	0.66	0.92	1.13	0.60	0.89	1.00
2400	11.52	11.45	11.48	0.69	0.98	1.21	0.61	0.92	1.05
2500	10.95	10.83	10.86	0.73	1.06	1.33	0.64	0.96	1.11
2600	10.54	10.28	10.36	0.81	1.26	1.62	0.68	1.03	1.21
2700	9.91	9.97	10.37	1.06	2.14	2.53	0.75	1.19	1.35
2800	10.68	10.68	10.41	3.25	1.87	2.02	0.97	1.18	1.32
2900	10.21	9.28	9.15	1.14	1.59	1.98	0.77	1.20	1.44
3000	8.75	8.14	8.09	1.22	1.85	2.32	0.92	1.42	1.68

REV. X2

SALF-78+

101021

Page 1 of 2



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Surface Mount Low Pass Filter

SALF-78+

Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
0.1	7.02	7.09	7.37
1	7.25	7.27	7.26
10	7.12	7.14	7.16
11	7.10	7.14	7.15
12	7.11	7.14	7.14
13	7.12	7.14	7.15
14	7.12	7.14	7.16
15	7.13	7.16	7.17
16	7.13	7.15	7.17
17	7.14	7.16	7.18
18	7.15	7.17	7.18
19	7.16	7.19	7.20
20	7.17	7.18	7.21
21	7.19	7.21	7.23
22	7.21	7.23	7.24
23	7.22	7.24	7.26
24	7.23	7.25	7.27
25	7.26	7.28	7.30
26	7.29	7.31	7.33
27	7.31	7.33	7.34
28	7.32	7.34	7.36
29	7.37	7.38	7.39
30	7.40	7.42	7.44
40	7.86	7.87	7.88
50	8.55	8.57	8.58
60	9.51	9.54	9.56
70	11.01	11.06	11.09
80	13.77	13.86	13.93
90	19.32	19.36	19.38
92	20.59	20.55	20.51
100	20.26	19.98	19.68
110	11.82	11.77	11.70
111	11.20	11.14	11.10
112	10.56	10.55	10.51
113	10.05	10.00	9.96
114	9.54	9.49	9.47
115	9.07	9.03	9.04
116	8.63	8.62	8.58
117	8.20	8.18	8.15
118	7.88	7.83	7.86
119	7.49	7.42	7.40
120	7.16	7.11	7.12
121	6.77	6.78	6.71
122	6.57	6.50	6.43
123	6.23	6.20	6.26
124	5.96	5.82	5.93
125	5.68	5.65	5.65
126	5.39	5.39	5.58
127	5.17	5.12	5.10
128	4.90	4.94	4.68
129	4.72	4.65	4.33
130	5.96	6.61	6.09

REV. X2

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Page 2 of 2



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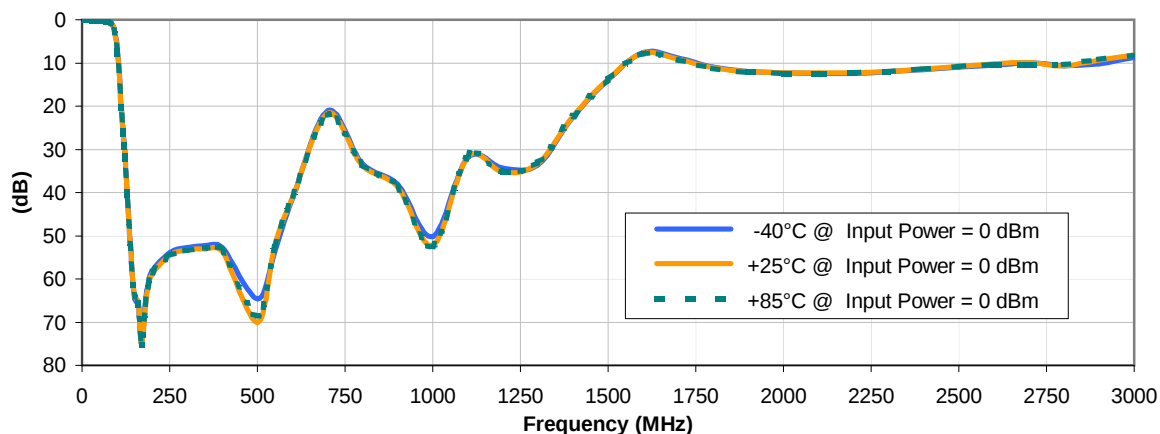


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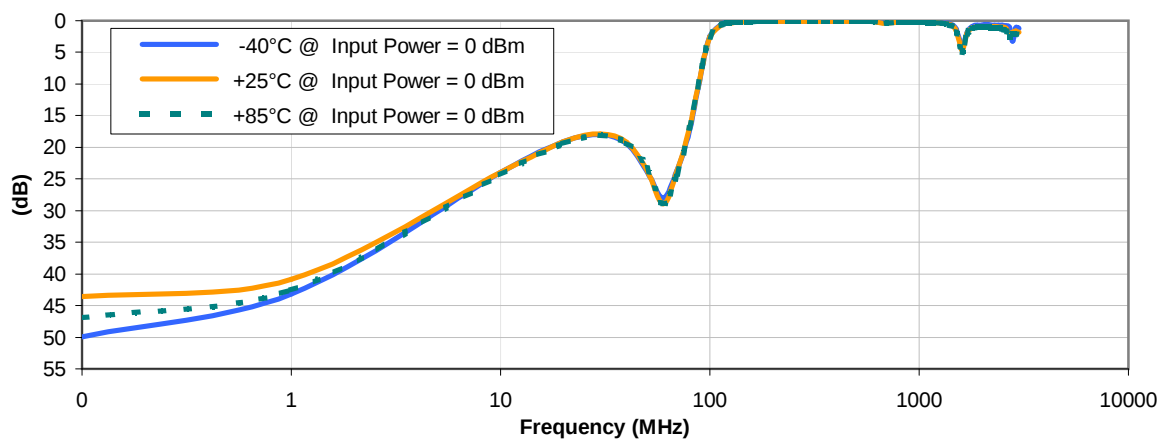


Typical Performance Curves

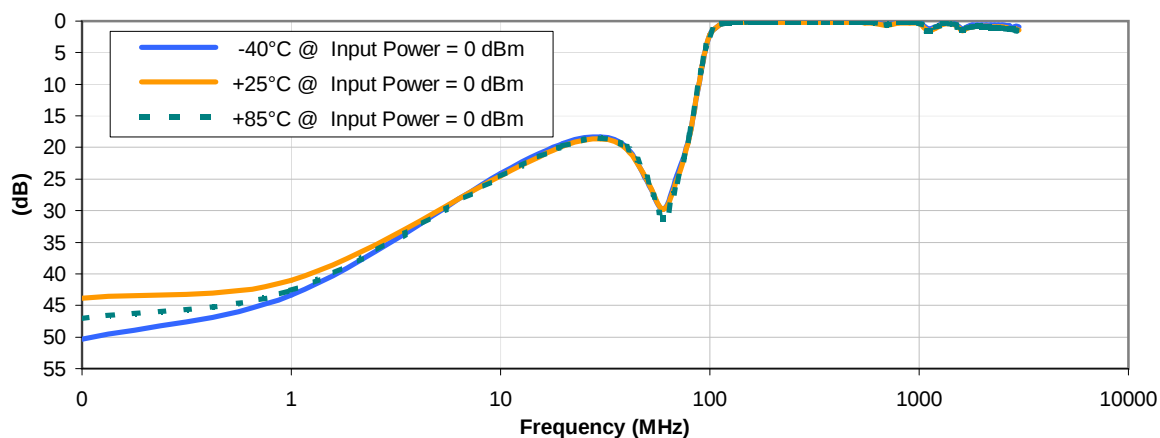
INSERTION LOSS vs. TEMPERATURE



INPUT RETURN LOSS vs. TEMPERATURE



OUTPUT RETURN LOSS vs. TEMPERATURE



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Page 1 of 1



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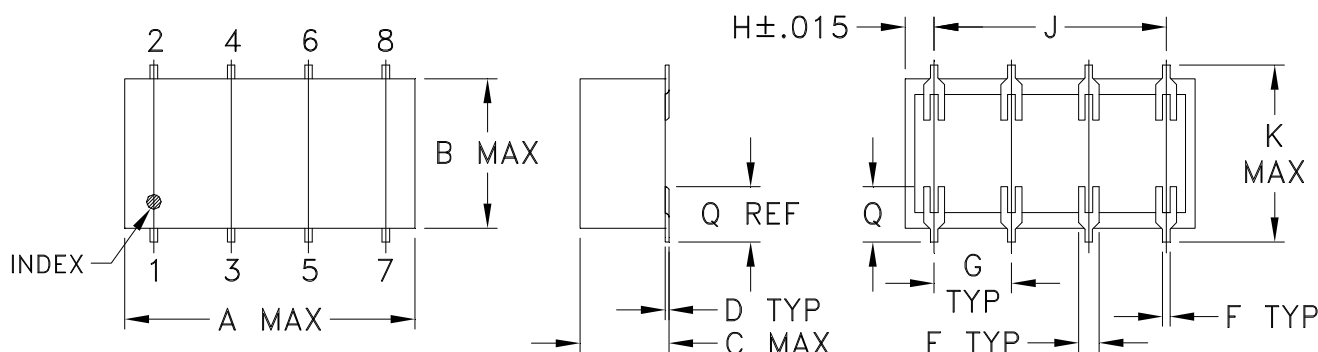


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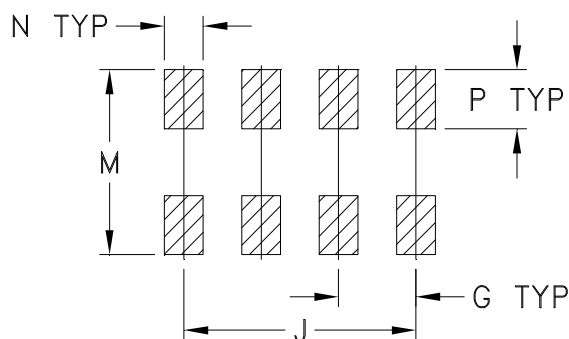


Outline Dimensions

YY101
YY109
YY161



PCB Land Pattern



Suggested Layout
Tolerance to be within $\pm.002$

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	WT. GRAM S
YY101*			.20 (5.08)							.450 (11.43)	--	.470 (11.94)				1.6
YY109*	.75 (19.05)	.38 (9.65)	.20 (5.08)	.010 (0.25)	.050 (1.27)	.020 (0.51)	.200 (5.08)	.075 (1.91)	.600 (15.24)	.720 (18.29)	--	.740 (18.80)	.100 (2.54)	.150 (3.81)	.148 (3.76)	1.6
YY161			.28 (7.11)							.450 (11.43)	--	.470 (11.94)				1.6

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .01$; 3 Pl. $\pm .005$

Notes:

- Case material: Plastic.
- Termination finish:
For RoHS Case Styles: Tin plate over Nickel plate.
For RoHS-5 Case Styles: Tin-Lead plate.
- Special Tolerances: Termination thickness $\pm .003$ inch.
- * Denotes: For SCM mixers, long termination version (case YY109) is available upon request, consult factory. To order short termination version (case YY101) add -NL suffix.



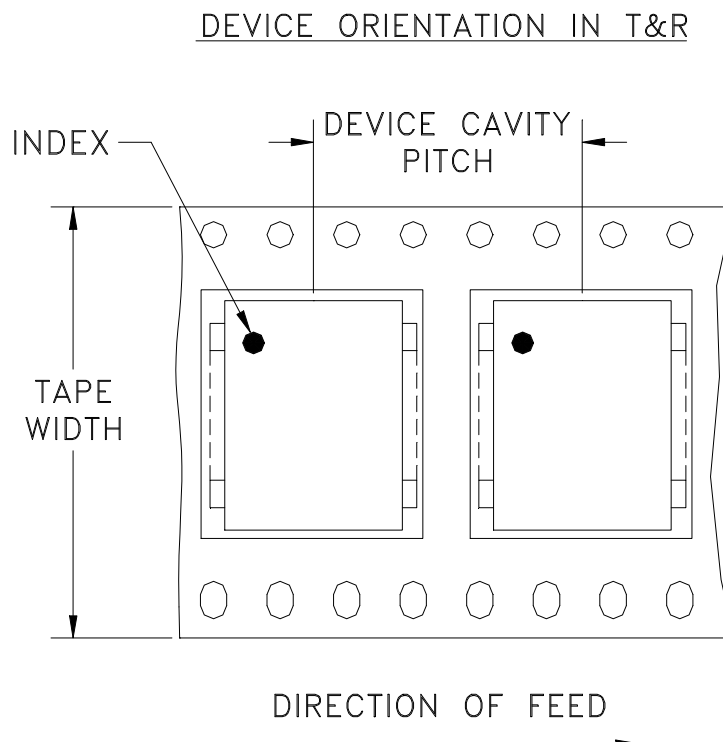
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Tape & Reel Packaging TR-F5



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

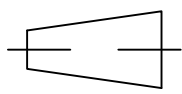


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REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M81561	NEW RELEASE	09/11/02	GF	ABD
A	M101145	ADDED YY101 CASE STYLE & NOTE 2	10/07/05	MMG	ABD
B	M102713	ADDED "...WITH SMOBC"	01/16/06	GT	IL
C	M165986	TB-187+ (WAS TB-187)	02/01/18	ITG	IL

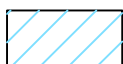
.030 TYP
 .060 TYP
 .060
 .050
 .230
 2 PL.
 PIN 1
 .064 TRACE WIDTH, 2 PL.
 (SEE NOTE BELOW)
 .100 TYP
 .040 TYP
 .040, 2 PL.
 PACKAGE OUTLINE
 26 X ϕ .020 PTH FOR GROUND

NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" $\pm$.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 TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	GF	08/12/02
	CHECKED	AV	09/11/02
	APPROVED	ABD	09/11/02



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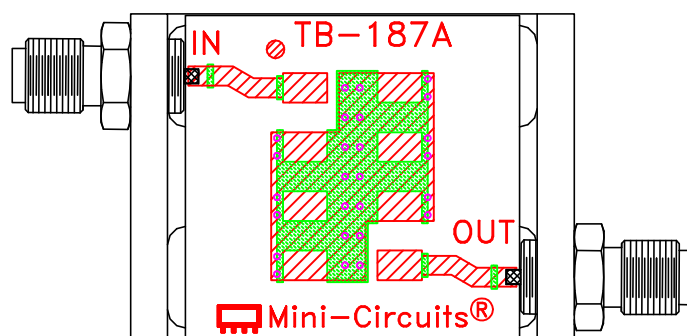
PL, cr, YY101/YY161, SCLF, TB-187+

SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-049		REV: C
FILE: 98PL049		SCALE: 5:1	SHEET: 1 OF 1	

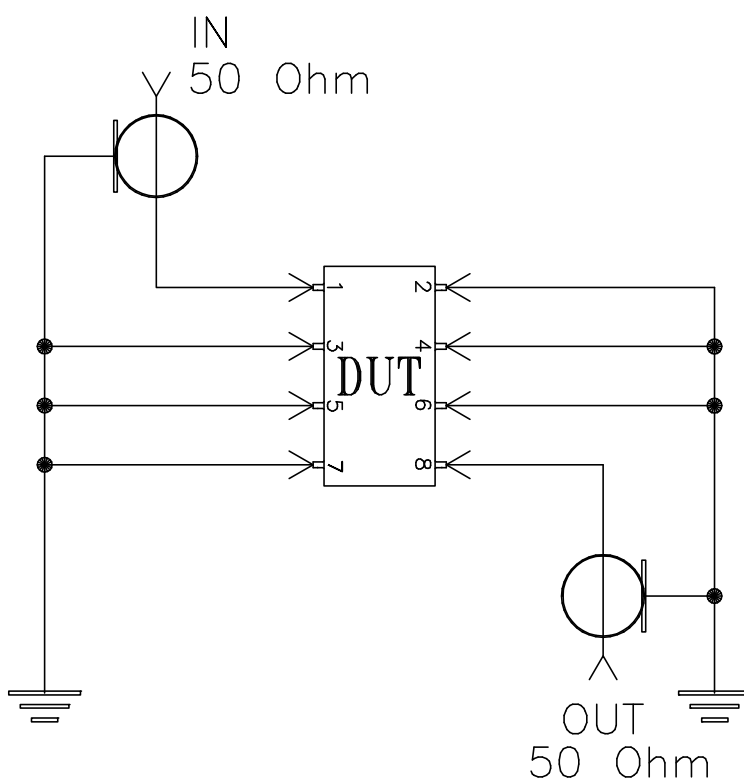
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ASHEETA1.DWG REV:A DATE:01/12/95

Evaluation Board and Circuit



TB-187+



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.030 inch.

 **Mini-Circuits®**



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