

# Surface Mount Low Pass Filter

# SALF-490+ SALF-490

50Ω DC to 490 MHz

## Maximum Ratings

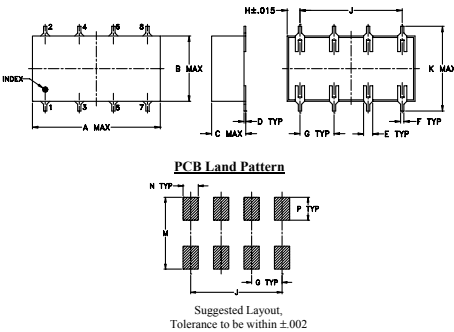
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Power Input	0.5W max.

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

## Pin Connections

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

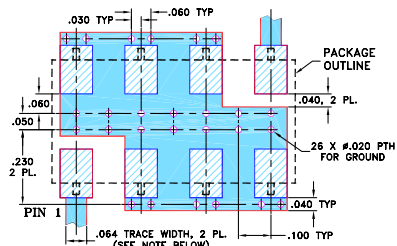
## Outline Drawing



## 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:
- TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  - 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

## Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
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## Features

- 7-section elliptic function
- excellent rejection

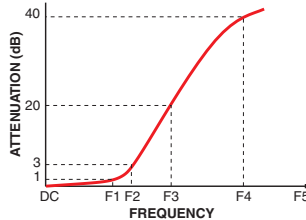
## Applications

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

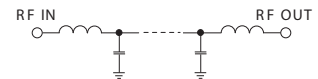
## Electrical Specifications

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Insertion Loss	DC-F1	DC-490	—	—	1.0	dB
	Freq. Cut-Off	F2	620	—	3.0	—	dB
	VSWR	DC-F1	DC-490	—	1.3	—	:1
Stop Band	Rejection Loss	F3-F4	800-900	20	—	—	dB
		F4-F5	900-1600	35	—	—	dB
	VSWR	F3-F5	800-1600	—	18	—	:1

## Typical Frequency Response



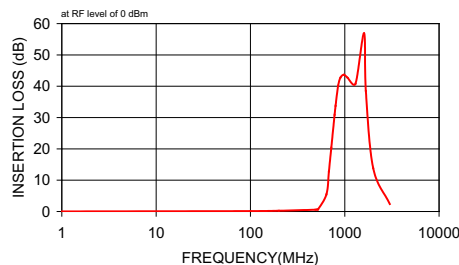
## Electrical Schematic



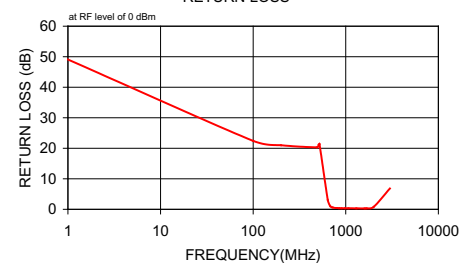
## Typical Performance Data

Frequency (MHz)	Insertion Loss (dB)		Return Loss (dB)
	$\bar{x}$	$\sigma$	
1.00	0.03	0.00	49.08
100.00	0.14	0.00	22.43
200.00	0.22	0.00	20.99
490.00	0.57	0.02	20.32
510.00	0.63	0.03	21.11
520.00	0.66	0.03	21.39
640.00	5.50	0.53	3.04
680.00	12.81	0.71	1.06
720.00	20.36	0.74	0.63
780.00	30.90	0.71	0.44
800.00	33.75	0.68	0.44
850.00	40.14	0.53	0.38
900.00	42.75	0.36	0.35
980.00	43.66	0.39	0.34
1070.00	42.74	0.45	0.34
1300.00	40.82	0.51	0.34
1600.00	56.89	3.08	0.31
1675.00	38.48	0.85	0.32
2000.00	13.88	0.55	0.78
3000.00	2.38	0.20	6.81

## SALF-490 INSERTION LOSS



## SALF-490 RETURN LOSS



# Surface Mount Low Pass Filter

# SALF-490+

## 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	0.03	0.07	0.05	49.04	41.52	44.86	50.77	41.90	45.47
10	0.04	0.08	0.06	40.81	38.79	41.10	40.97	39.37	41.46
20	0.04	0.09	0.07	35.22	34.90	36.52	35.21	35.51	36.77
30	0.05	0.10	0.08	31.83	31.87	33.21	31.84	32.57	33.48
40	0.06	0.11	0.09	29.41	29.58	30.69	29.50	30.33	31.04
50	0.07	0.12	0.10	27.65	27.71	28.64	27.80	28.59	29.07
60	0.08	0.13	0.11	26.28	26.23	26.96	26.49	27.18	27.42
70	0.09	0.14	0.12	25.23	25.02	25.57	25.45	25.99	26.02
80	0.09	0.15	0.14	24.43	24.04	24.38	24.58	24.94	24.76
90	0.10	0.16	0.15	23.77	23.21	23.35	23.90	24.07	23.68
100	0.11	0.18	0.16	23.26	22.51	22.46	23.36	23.34	22.75
200	0.17	0.26	0.28	22.07	20.20	19.09	22.45	21.34	19.52
300	0.21	0.31	0.33	27.42	27.50	27.87	28.02	29.73	29.10
400	0.30	0.43	0.48	24.25	23.85	22.40	24.40	24.29	22.61
460	0.42	0.57	0.63	19.01	19.16	18.77	19.30	20.12	19.35
470	0.44	0.60	0.66	18.62	18.78	18.52	18.98	19.84	19.19
480	0.47	0.63	0.69	18.29	18.44	18.30	18.69	19.57	19.04
490	0.49	0.65	0.72	17.97	18.10	18.06	18.39	19.26	18.83
500	0.51	0.68	0.75	17.64	17.74	17.79	18.04	18.84	18.51
505	0.53	0.70	0.77	17.46	17.53	17.64	17.84	18.61	18.32
510	0.54	0.72	0.79	17.27	17.32	17.46	17.61	18.34	18.10
520	0.58	0.76	0.84	16.80	16.81	17.01	17.10	17.72	17.55
640	6.47	7.09	7.60	2.28	2.38	2.40	2.24	2.34	2.37
680	13.57	14.20	14.81	0.80	0.95	1.04	0.79	0.96	1.05
700	17.44	18.04	18.66	0.57	0.71	0.80	0.57	0.74	0.82
720	21.26	21.83	22.46	0.45	0.59	0.67	0.46	0.62	0.70
780	32.01	32.37	33.04	0.28	0.39	0.46	0.32	0.49	0.52
800	35.05	35.24	35.98	0.26	0.36	0.43	0.30	0.48	0.50
850	41.28	40.67	41.75	0.23	0.31	0.37	0.27	0.45	0.45
900	44.32	42.70	44.26	0.20	0.27	0.32	0.26	0.45	0.43
980	45.14	42.67	44.62	0.18	0.24	0.28	0.25	0.45	0.41
1070	44.09	41.36	43.48	0.15	0.22	0.25	0.25	0.46	0.40
1100	43.71	40.92	43.15	0.15	0.21	0.25	0.24	0.46	0.40
1200	42.60	39.83	42.16	0.14	0.21	0.24	0.23	0.47	0.40
1300	43.63	40.34	43.16	0.13	0.20	0.24	0.23	0.48	0.41
1400	44.87	40.86	44.62	0.13	0.21	0.25	0.22	0.50	0.43
1430	46.39	41.45	45.98	0.13	0.22	0.26	0.22	0.49	0.42
1500	61.22	46.35	58.44	0.14	0.24	0.28	0.24	0.52	0.46
1600	40.19	42.74	39.72	0.16	0.28	0.33	0.27	0.56	0.51
1675	31.79	32.50	31.05	0.18	0.33	0.39	0.31	0.60	0.57
1700	29.19	29.60	28.36	0.21	0.36	0.43	0.34	0.63	0.62
1800	16.01	15.41	14.43	0.58	1.01	1.14	0.97	1.49	1.82
1900	12.33	13.78	14.17	0.78	0.80	0.87	1.20	1.64	1.40
2000	18.91	19.39	19.62	0.34	0.47	0.60	0.45	0.91	0.84
2100	21.71	21.95	22.16	0.31	0.46	0.61	0.40	0.82	0.80
2200	24.04	24.23	24.44	0.34	0.50	0.67	0.40	0.81	0.82
2300	26.73	26.95	27.24	0.34	0.51	0.69	0.41	0.80	0.84
2400	31.22	31.55	31.98	0.35	0.53	0.72	0.42	0.78	0.86
2500	43.25	44.63	46.35	0.38	0.58	0.78	0.45	0.79	0.91
2600	28.09	25.84	23.63	0.75	1.09	1.52	0.74	1.14	1.45
2700	8.02	9.01	9.68	2.21	2.14	2.09	2.05	2.11	2.14
2800	5.39	5.65	5.73	2.26	2.71	2.92	2.75	3.24	3.62
2900	2.17	2.63	2.71	6.73	7.17	7.59	10.16	11.59	12.79
3000	2.28	2.90	3.12	7.05	6.76	6.89	9.49	10.23	9.32

REV. X2  
SALF-490+  
101024  
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# Surface Mount Low Pass Filter

# SALF-490+

## Typical Performance Data

FREQ. (MHz)	GROUP DELAY (nsec)		
	@ -40° C	@ +25° C	@ +85° C
0.1	0.65	0.74	0.78
1	1.02	1.02	1.03
10	1.04	1.05	1.05
20	1.03	1.04	1.04
30	1.03	1.04	1.04
40	1.03	1.03	1.04
50	1.03	1.03	1.03
60	1.03	1.03	1.03
70	1.03	1.03	1.04
80	1.03	1.03	1.04
90	1.04	1.04	1.04
100	1.04	1.04	1.04
200	1.12	1.11	1.11
300	1.27	1.28	1.28
400	1.54	1.55	1.55
460	1.82	1.82	1.83
470	1.87	1.88	1.89
480	1.94	1.95	1.96
490	2.02	2.03	2.05
500	2.11	2.12	2.14
505	2.16	2.18	2.20
510	2.21	2.23	2.25
520	2.33	2.34	2.37
640	3.61	3.48	3.41
680	2.47	2.41	2.33
700	1.99	1.96	1.90
710	1.85	1.81	1.76
720	1.68	1.66	1.59
730	1.51	1.51	1.46
740	1.41	1.42	1.38
750	1.32	1.34	1.30
760	1.21	1.25	1.23
770	1.14	1.18	1.14
780	0.99	1.04	1.04
790	1.00	1.08	1.07
800	1.02	1.11	1.11
810	0.96	1.09	1.11
820	0.95	1.06	1.06
830	0.87	1.01	1.07
840	0.88	1.02	1.12
850	0.85	0.99	1.02
860	0.67	0.83	0.85
870	0.74	0.86	0.93
880	0.88	0.98	1.03
890	0.79	0.89	0.96
892	0.79	0.89	0.93
893	0.79	0.88	0.94
894	0.77	0.89	0.92
895	0.77	0.88	0.94
896	0.73	0.88	0.92
897	0.76	0.83	0.93
898	0.75	0.82	0.87
899	0.69	0.96	1.01
900	0.56	1.08	1.06

REV. X2  
SALF-490+  
101024  
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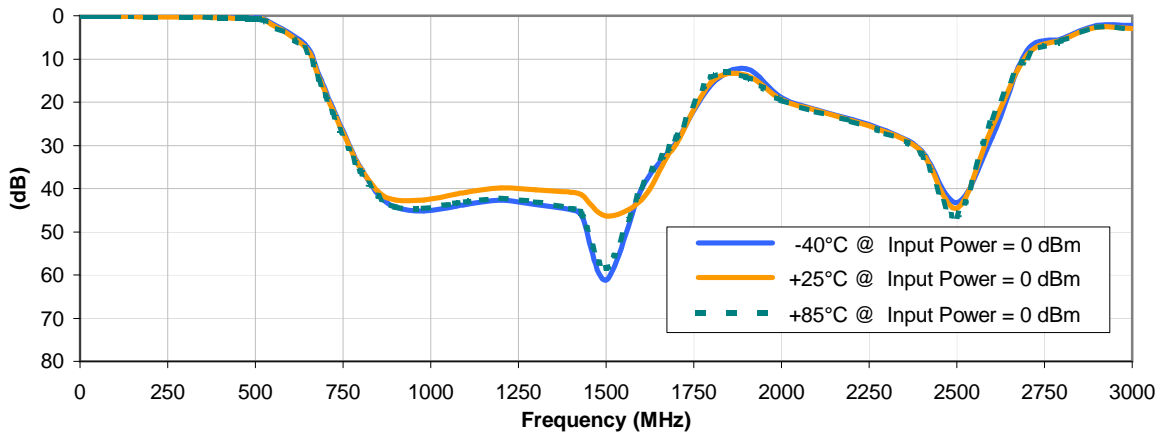


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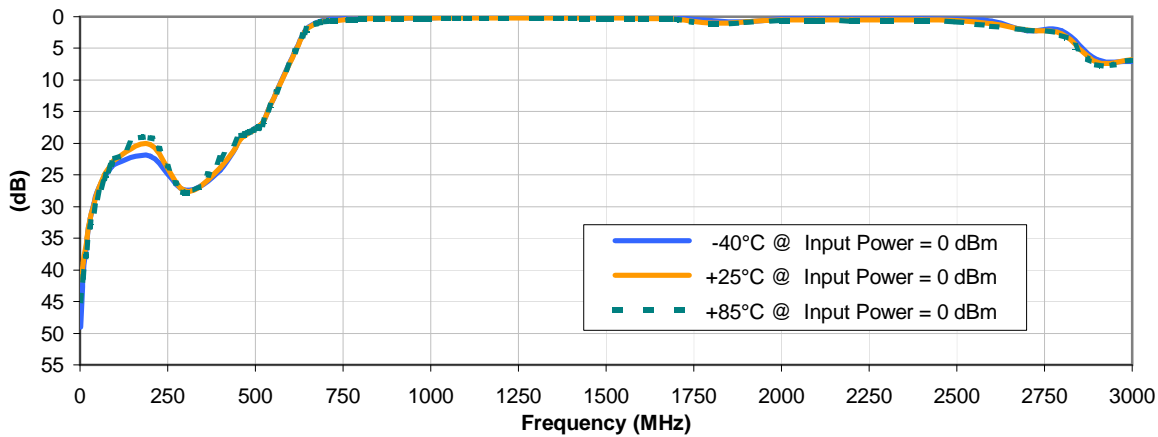


## Typical Performance Curves

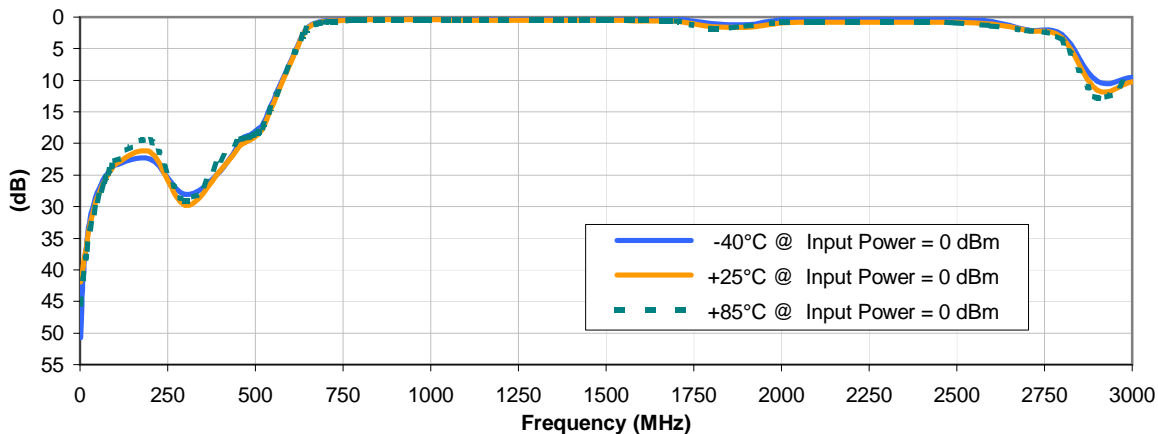
### INSERTION LOSS vs. TEMPERATURE



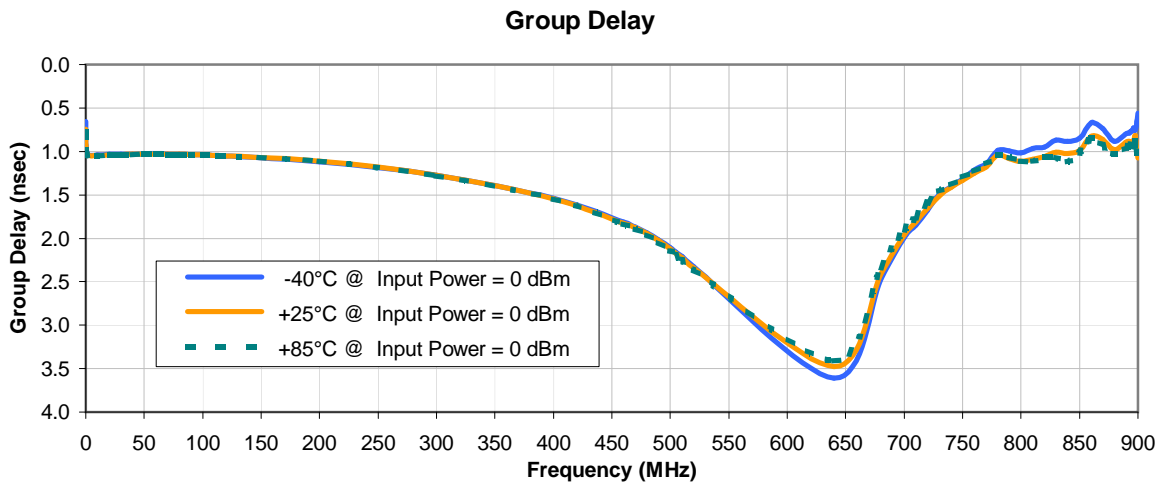
### INPUT RETURN LOSS vs. TEMPERATURE



### OUTPUT RETURN LOSS vs. TEMPERATURE

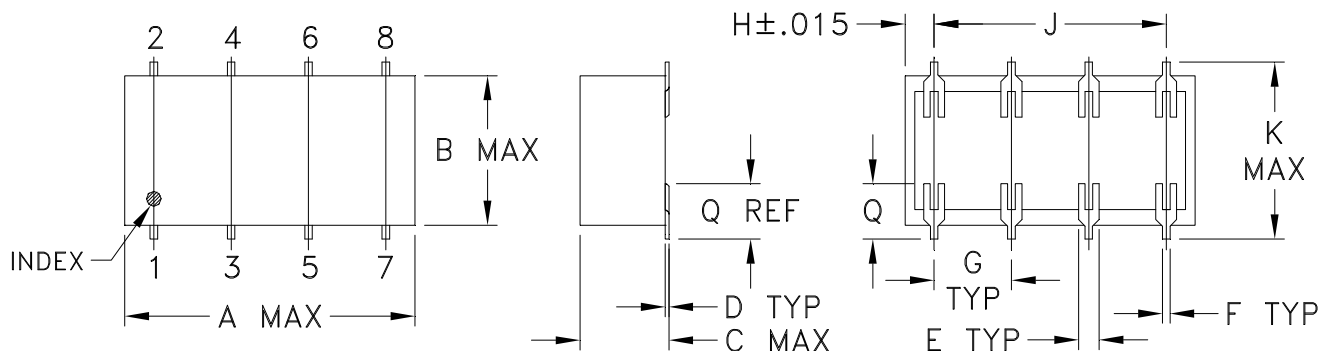


## Typical Performance Curves

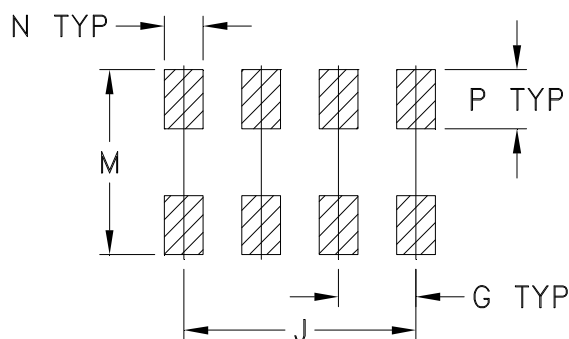


## Outline Dimensions

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. GRAMS
YY101*			.20 (5.08)							.450 (11.43)	-- (11.94)	.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)	-- (18.80)	.740 (18.80)	.100 (2.54)	.150 (3.81)	.148 (3.76)	1.6
YY161			.28 (7.11)							.450 (11.43)	-- (11.94)	.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.

# 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](http://www.minicircuits.com/pages/pdfs/tape.pdf)



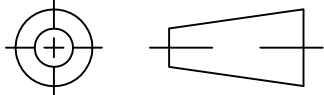
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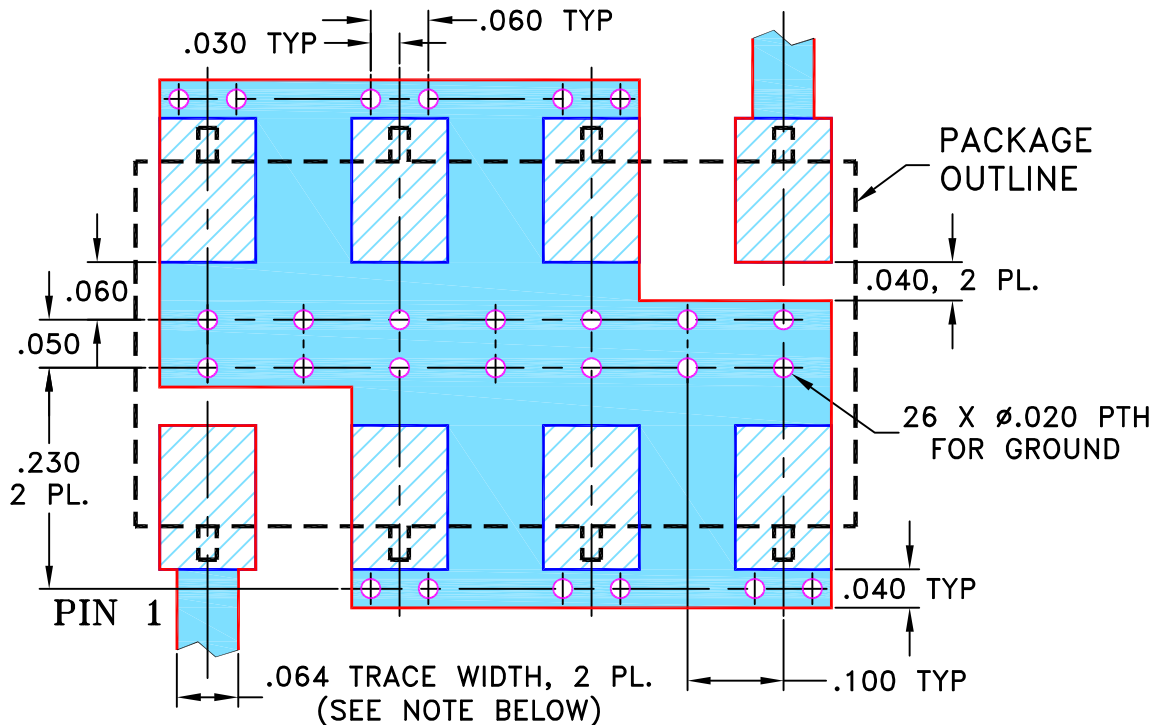
THIRD ANGLE PROJECTION



REVISIONS

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

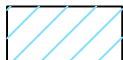
SUGGESTED MOUNTING CONFIGURATION FOR YY101/YY161 CASE STYLE, "cr" PIN CONNECTION



- NOTES:**
- TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
  - 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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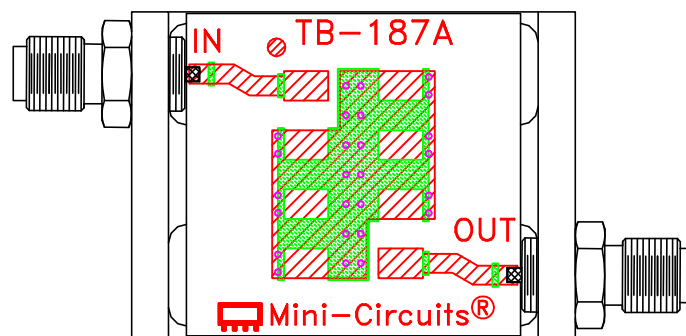
PL, cr, YY101/YY161, SCLF, TB-187+

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

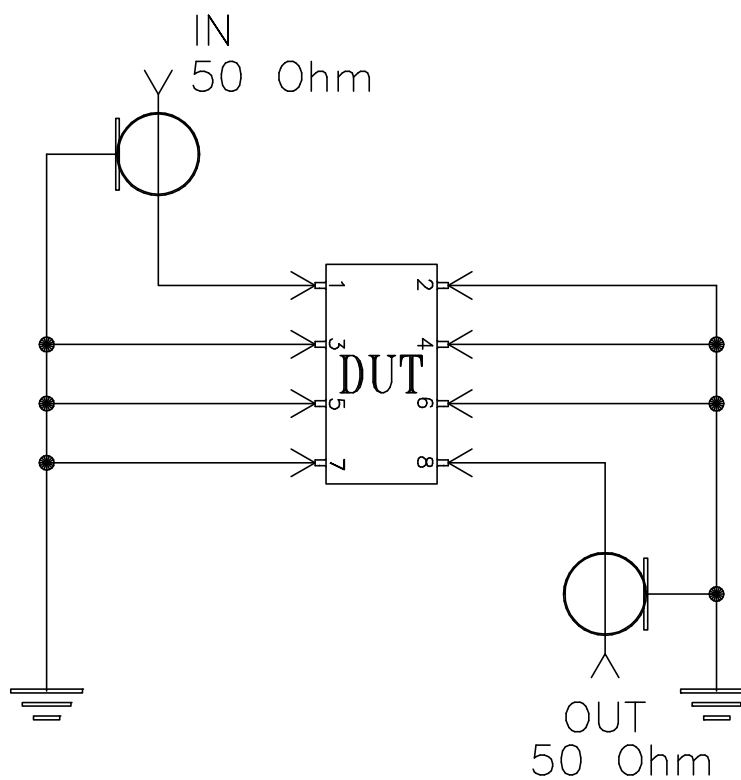
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# Evaluation Board and Circuit




TB-187+



Schematic Diagram

## Notes:

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

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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