NON-CATALOG

Surface Mount

# Low Pass Filter

## SALF-146

50Ω DC to 146 MHz

CASE STYLE: YY101

### 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 |

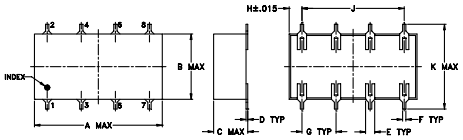
### Features

- 7-section elliptic function
- excellent rejection

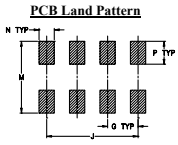
### Applications

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

### Outline Drawing




PCB Land Pattern




Suggested Layout,
Tolerance to be within ±.002

### Outline Dimensions (inch / mm)

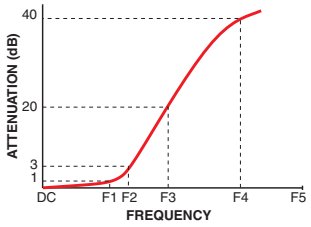
| A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|
| .75 | .38 | .20 | .010 | .050 | .020 | .200 |
| 19.05 | 9.65 | 5.08 | 0.25 | 1.27 | 0.51 | 5.08 |

| 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 |

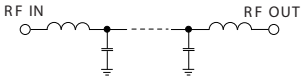
### Electrical Specifications

| Parameter | | F# | Frequency (MHz) | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Pass Band | Insertion Loss | DC-F1 | DC-146 | — | — | 1.0 | dB |
| | Freq. Cut-Off | F2 | 171 | — | 3.0 | — | dB |
| | VSWR | DC-F1 | DC-146 | — | 1.5 | — | :1 |
| Stop Band | Rejection Loss | F3-F4 | 210-240 | 20 | — | — | dB |
| | | F4-F5 | 240-850 | 40 | — | — | dB |
| | VSWR | F3-F5 | 210-850 | — | 18 | — | :1 |

### Typical Frequency Response



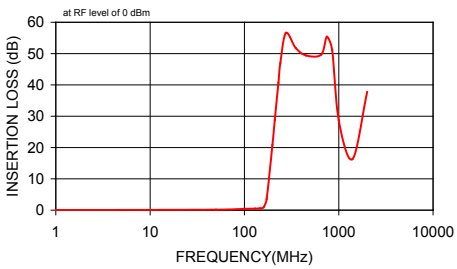

### Electrical Schematic



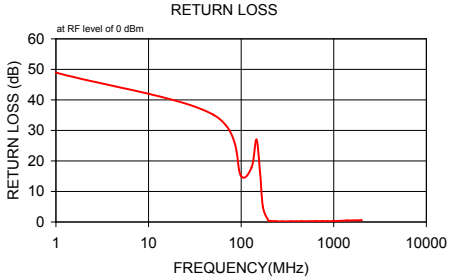

### Typical Performance Data

| Frequency (MHz) | Insertion Loss (dB) x̄ | Insertion Loss (dB) σ | Return Loss (dB) |
|---|---|---|---|
| 1.00 | 0.02 | 0.00 | 48.94 |
| 50.00 | 0.16 | 0.00 | 35.16 |
| 100.00 | 0.42 | 0.01 | 15.01 |
| 130.00 | 0.49 | 0.01 | 17.99 |
| 146.00 | 0.59 | 0.01 | 26.96 |
| 160.00 | 0.98 | 0.06 | 16.42 |
| 172.00 | 3.57 | 0.32 | 4.81 |
| 198.00 | 20.81 | 0.51 | 0.46 |
| 210.00 | 28.81 | 0.51 | 0.31 |
| 229.00 | 40.63 | 0.55 | 0.24 |
| 240.00 | 46.92 | 0.54 | 0.22 |
| 275.00 | 56.59 | 0.32 | 0.20 |
| 350.00 | 51.77 | 0.33 | 0.21 |
| 450.00 | 49.41 | 0.32 | 0.24 |
| 650.00 | 49.65 | 0.45 | 0.26 |
| 750.00 | 55.39 | 0.95 | 0.26 |
| 850.00 | 51.19 | 0.76 | 0.27 |
| 1000.00 | 28.61 | 0.64 | 0.30 |
| 1400.00 | 16.34 | 1.21 | 0.48 |

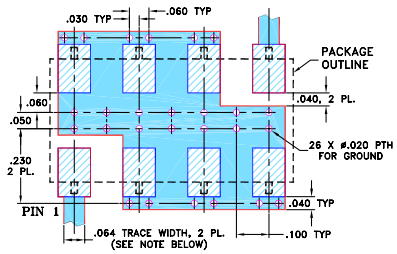
SALF-146
INSERTION LOSS




SALF-146
RETURN LOSS




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




NOTES:
1. 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.
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

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.
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# Surface Mount Low Pass Filter SALF-146

*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 | 0.03 | 0.06 | 49.25 | 48.92 | 43.45 | 49.65 | 49.09 | 43.49 |
| 10 | 0.06 | 0.06 | 0.09 | 37.38 | 38.46 | 37.65 | 36.91 | 37.45 | 37.29 |
| 20 | 0.08 | 0.08 | 0.11 | 32.53 | 33.53 | 33.49 | 31.60 | 32.07 | 32.52 |
| 30 | 0.10 | 0.10 | 0.14 | 31.37 | 32.36 | 32.20 | 29.69 | 29.98 | 30.32 |
| 40 | 0.11 | 0.12 | 0.16 | 33.20 | 34.09 | 33.51 | 29.45 | 29.41 | 29.43 |
| 50 | 0.13 | 0.14 | 0.18 | 35.06 | 35.33 | 35.83 | 28.77 | 28.53 | 28.44 |
| 60 | 0.15 | 0.17 | 0.21 | 28.17 | 28.57 | 30.00 | 25.44 | 25.54 | 25.78 |
| 70 | 0.19 | 0.21 | 0.25 | 22.39 | 22.88 | 23.90 | 21.39 | 21.76 | 22.24 |
| 80 | 0.24 | 0.26 | 0.30 | 18.62 | 19.12 | 19.83 | 18.17 | 18.62 | 19.12 |
| 90 | 0.30 | 0.32 | 0.36 | 16.17 | 16.62 | 17.12 | 15.95 | 16.36 | 16.83 |
| 100 | 0.36 | 0.39 | 0.43 | 14.79 | 15.16 | 15.49 | 14.68 | 15.02 | 15.42 |
| 130 | 0.40 | 0.47 | 0.54 | 17.93 | 17.72 | 17.38 | 18.01 | 17.68 | 17.71 |
| 146 | 0.45 | 0.54 | 0.64 | 25.60 | 24.17 | 22.46 | 26.55 | 24.77 | 23.77 |
| 160 | 0.82 | 0.96 | 1.11 | 14.98 | 14.51 | 13.87 | 15.19 | 14.75 | 14.22 |
| 172 | 3.51 | 3.76 | 4.00 | 4.26 | 4.29 | 4.27 | 4.21 | 4.25 | 4.21 |
| 198 | 20.68 | 20.94 | 21.20 | 0.35 | 0.42 | 0.46 | 0.33 | 0.39 | 0.45 |
| 200 | 22.02 | 22.29 | 22.55 | 0.32 | 0.38 | 0.42 | 0.30 | 0.36 | 0.42 |
| 210 | 28.52 | 28.81 | 29.11 | 0.22 | 0.28 | 0.31 | 0.22 | 0.26 | 0.33 |
| 229 | 40.16 | 40.51 | 40.84 | 0.15 | 0.20 | 0.22 | 0.16 | 0.19 | 0.27 |
| 240 | 46.42 | 46.78 | 47.12 | 0.14 | 0.18 | 0.20 | 0.15 | 0.18 | 0.25 |
| 275 | 57.27 | 57.51 | 57.67 | 0.12 | 0.15 | 0.16 | 0.14 | 0.15 | 0.24 |
| 300 | 56.11 | 56.32 | 56.25 | 0.11 | 0.14 | 0.16 | 0.14 | 0.14 | 0.24 |
| 350 | 53.05 | 53.15 | 53.21 | 0.11 | 0.13 | 0.14 | 0.14 | 0.14 | 0.25 |
| 400 | 51.54 | 51.62 | 51.71 | 0.11 | 0.13 | 0.15 | 0.14 | 0.14 | 0.26 |
| 450 | 50.86 | 50.84 | 50.90 | 0.11 | 0.13 | 0.15 | 0.15 | 0.15 | 0.27 |
| 500 | 50.50 | 50.53 | 50.57 | 0.10 | 0.13 | 0.14 | 0.15 | 0.15 | 0.28 |
| 600 | 51.02 | 51.14 | 51.17 | 0.10 | 0.13 | 0.15 | 0.15 | 0.15 | 0.29 |
| 650 | 52.57 | 52.71 | 52.76 | 0.11 | 0.13 | 0.15 | 0.16 | 0.16 | 0.30 |
| 700 | 55.55 | 55.81 | 55.98 | 0.10 | 0.13 | 0.15 | 0.16 | 0.16 | 0.30 |
| 750 | 66.82 | 68.44 | 69.72 | 0.10 | 0.13 | 0.16 | 0.17 | 0.17 | 0.31 |
| 800 | 58.44 | 57.77 | 57.18 | 0.11 | 0.14 | 0.17 | 0.17 | 0.17 | 0.31 |
| 850 | 47.62 | 47.40 | 47.09 | 0.10 | 0.14 | 0.16 | 0.17 | 0.18 | 0.32 |
| 900 | 40.47 | 40.34 | 40.03 | 0.11 | 0.15 | 0.18 | 0.18 | 0.19 | 0.33 |
| 1000 | 26.26 | 26.04 | 25.54 | 0.18 | 0.23 | 0.28 | 0.27 | 0.31 | 0.48 |
| 1100 | 24.77 | 25.17 | 25.53 | 0.19 | 0.24 | 0.28 | 0.31 | 0.33 | 0.49 |
| 1200 | 37.70 | 38.04 | 38.35 | 0.13 | 0.19 | 0.25 | 0.27 | 0.33 | 0.49 |
| 1300 | 32.44 | 32.29 | 31.98 | 0.15 | 0.22 | 0.29 | 0.56 | 0.67 | 0.86 |
| 1400 | 15.92 | 16.06 | 16.11 | 0.31 | 0.40 | 0.49 | 6.43 | 7.19 | 7.82 |
| 1500 | 21.50 | 21.72 | 21.98 | 0.22 | 0.32 | 0.43 | 0.69 | 0.74 | 0.94 |
| 1600 | 25.73 | 25.90 | 26.15 | 0.23 | 0.33 | 0.46 | 0.35 | 0.41 | 0.62 |
| 1700 | 29.07 | 29.31 | 29.87 | 0.26 | 0.38 | 0.53 | 0.31 | 0.39 | 0.61 |
| 1800 | 35.00 | 35.45 | 36.10 | 0.28 | 0.42 | 0.58 | 0.31 | 0.41 | 0.63 |
| 1900 | 47.49 | 45.10 | 43.26 | 0.33 | 0.47 | 0.66 | 0.31 | 0.43 | 0.67 |
| 2000 | 29.38 | 28.70 | 28.19 | 0.38 | 0.54 | 0.75 | 0.34 | 0.47 | 0.73 |
| 2100 | 21.77 | 21.21 | 20.82 | 0.47 | 0.66 | 0.90 | 0.38 | 0.54 | 0.83 |
| 2200 | 15.87 | 15.31 | 14.91 | 0.69 | 0.94 | 1.25 | 0.52 | 0.73 | 1.06 |
| 2300 | 10.38 | 9.80 | 9.41 | 1.32 | 1.78 | 2.32 | 0.88 | 1.20 | 1.64 |
| 2400 | 5.56 | 5.19 | 5.08 | 3.35 | 4.55 | 5.95 | 1.99 | 2.57 | 3.23 |
| 2500 | 3.22 | 3.44 | 3.88 | 6.36 | 7.50 | 8.53 | 3.51 | 3.83 | 4.12 |
| 2600 | 3.78 | 4.25 | 4.88 | 4.48 | 4.82 | 5.22 | 2.93 | 2.99 | 3.14 |
| 2700 | 4.96 | 5.37 | 6.02 | 2.85 | 3.27 | 3.79 | 2.06 | 2.21 | 2.43 |
| 2800 | 5.92 | 6.30 | 7.11 | 2.21 | 2.82 | 3.71 | 1.61 | 1.81 | 2.08 |
| 2900 | 6.38 | 7.18 | 9.06 | 2.11 | 3.63 | 6.34 | 1.40 | 1.64 | 1.95 |
| 3000 | 7.69 | 10.22 | 7.68 | 4.46 | 8.62 | 5.16 | 1.31 | 1.56 | 2.03 |



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## *Typical Performance Data*

| FREQ. (MHz) | GROUP DELAY (nsec) | | |
|---|---|---|---|
| | @ -40° C | @ +25° C | @ +85° C |
| 0.1 | 4.38 | 4.32 | 4.41 |
| 0.2 | 4.35 | 4.34 | 4.39 |
| 0.3 | 4.32 | 4.34 | 4.35 |
| 0.4 | 4.29 | 4.30 | 4.33 |
| 0.5 | 4.30 | 4.31 | 4.33 |
| 0.6 | 4.29 | 4.30 | 4.32 |
| 0.7 | 4.28 | 4.29 | 4.30 |
| 0.8 | 4.28 | 4.29 | 4.30 |
| 0.9 | 4.27 | 4.28 | 4.29 |
| 1.0 | 4.26 | 4.27 | 4.28 |
| 10.0 | 4.19 | 4.21 | 4.21 |
| 20.0 | 4.20 | 4.21 | 4.22 |
| 30.0 | 4.24 | 4.25 | 4.26 |
| 40.0 | 4.32 | 4.32 | 4.33 |
| 50.0 | 4.42 | 4.43 | 4.43 |
| 60.0 | 4.55 | 4.56 | 4.56 |
| 70.0 | 4.70 | 4.71 | 4.72 |
| 80.0 | 4.87 | 4.88 | 4.90 |
| 90.0 | 5.07 | 5.08 | 5.10 |
| 100.0 | 5.33 | 5.35 | 5.37 |
| 110.0 | 5.68 | 5.70 | 5.72 |
| 120.0 | 6.20 | 6.21 | 6.23 |
| 130.0 | 6.92 | 6.94 | 6.96 |
| 140.0 | 7.93 | 7.96 | 7.99 |
| 146.0 | 8.75 | 8.79 | 8.84 |
| 150.0 | 9.47 | 9.53 | 9.58 |
| 160.0 | 12.36 | 12.40 | 12.44 |
| 170.0 | 15.00 | 14.88 | 14.78 |
| 172.0 | 14.82 | 14.68 | 14.57 |
| 180.0 | 11.62 | 11.51 | 11.45 |
| 190.0 | 7.29 | 7.25 | 7.26 |
| 198.0 | 5.30 | 5.28 | 5.28 |
| 200.0 | 4.95 | 4.93 | 4.93 |
| 210.0 | 3.73 | 3.70 | 3.69 |
| 220.0 | 3.00 | 2.98 | 2.95 |
| 229.0 | 2.58 | 2.57 | 2.57 |
| 230.0 | 2.58 | 2.53 | 2.53 |
| 240.0 | 2.41 | 2.35 | 2.37 |
| 250.0 | 2.33 | 2.29 | 2.35 |
| 275.0 | 1.63 | 1.58 | 1.82 |
| 300.0 | 1.10 | 0.92 | 0.97 |
| 350.0 | 0.57 | 0.52 | 0.52 |
| 400.0 | 0.36 | 0.45 | 0.55 |
| 450.0 | 0.43 | 0.33 | 0.39 |
| 500.0 | 0.30 | 0.23 | 0.22 |
| 550.0 | 0.18 | 0.19 | 0.21 |
| 600.0 | 0.26 | 0.15 | 0.32 |
| 650.0 | 0.25 | 0.14 | 0.05 |
| 700.0 | 0.17 | 0.30 | 0.20 |
| 750.0 | 4.62 | 7.04 | 11.42 |
| 800.0 | 3.35 | 2.56 | 2.07 |
| 850.0 | 0.12 | 0.10 | 0.10 |
| 900.0 | 0.38 | 0.13 | 0.45 |




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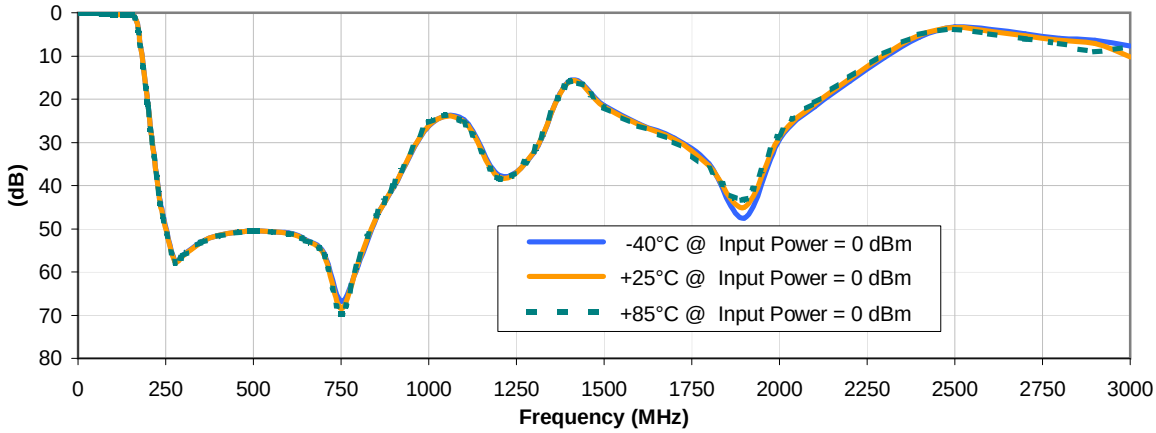
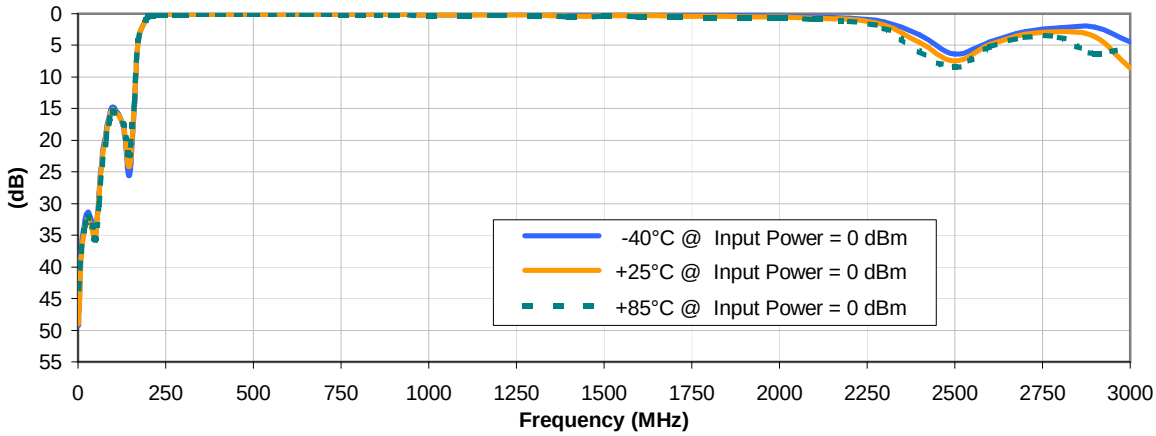
# Surface Mount Low Pass Filter SALF-146

## *Typical Performance Curves*

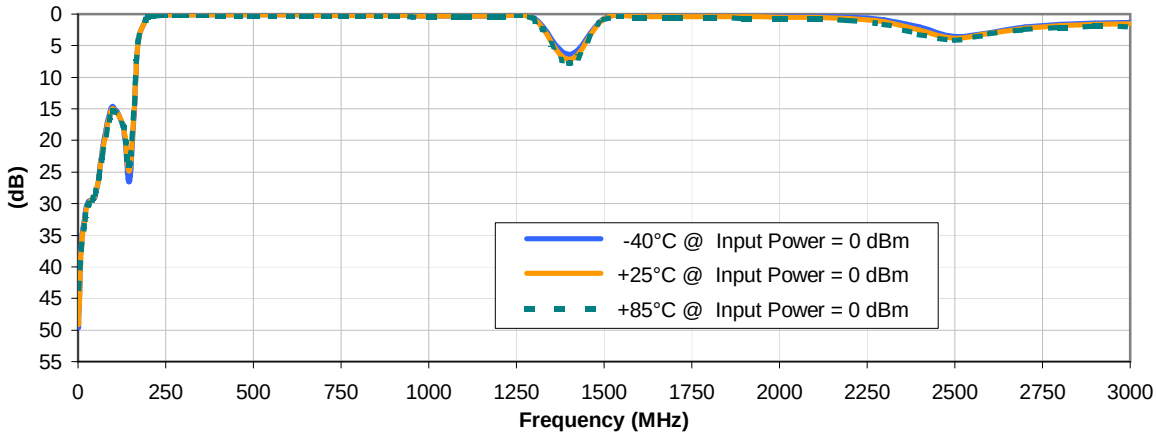
**INSERTION LOSS vs. TEMPERATURE**




**INPUT RETURN LOSS vs. TEMPERATURE**




**OUTPUT RETURN LOSS vs. TEMPERATURE**







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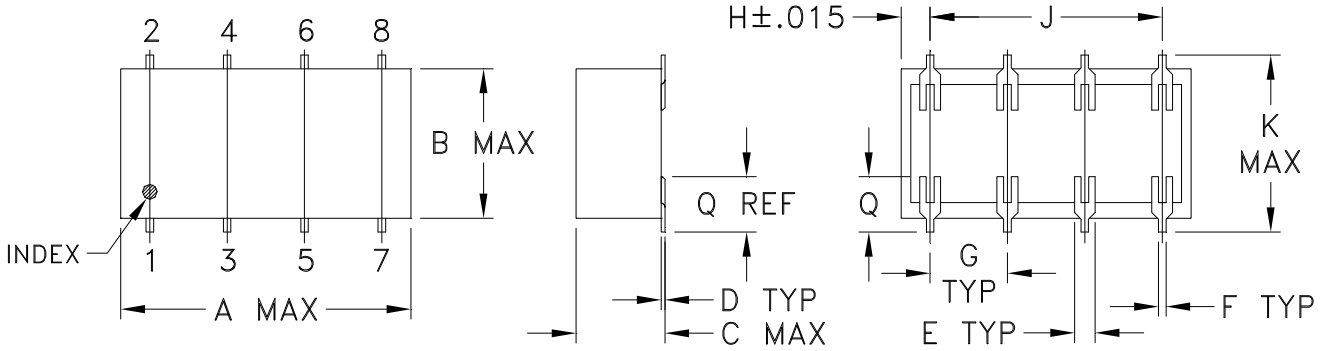
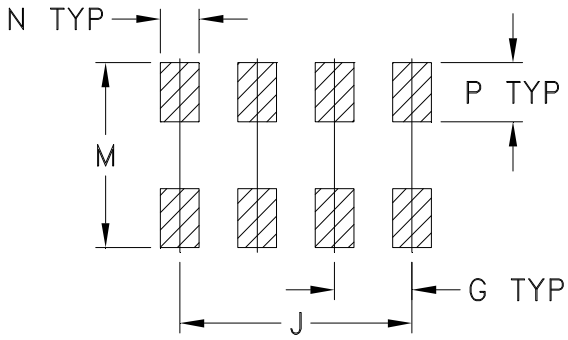
# Case Style YY

## Outline Dimensions

**YY101**
**YY109**
**YY161**




## PCB Land Pattern




Suggested Layout
Tolerance to be within ±.002

| CASE# | A | B | C | D | E | F | G | H | J | K | L | M | N | P | Q | WT. GRAMS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| YY101* | .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) | .450 (11.43) | -- -- | .470 (11.94) | .100 (2.54) | .150 (3.81) | .148 (3.76) | 1.6 |
| YY109* | | | .20 (5.08) | | | | | | | .720 (18.29) | -- -- | .740 (18.80) | | | | 1.6 |
| YY161 | | | .28 (7.11) | | | | | | | .450 (11.43) | -- -- | .470 (11.94) | | | | 1.6 |

**Dimensions are in inches (mm). Tolerances: 2 Pl. ± .01; 3 Pl. ± .005**

### Notes:

1. Case material: Plastic.
2. Termination finish:
   For RoHS Case Styles: Tin plate over Nickel plate.
   For RoHS-5 Case Styles: Tin-Lead plate.
3. Special Tolerances: Termination thickness ± .003 inch.
4. * 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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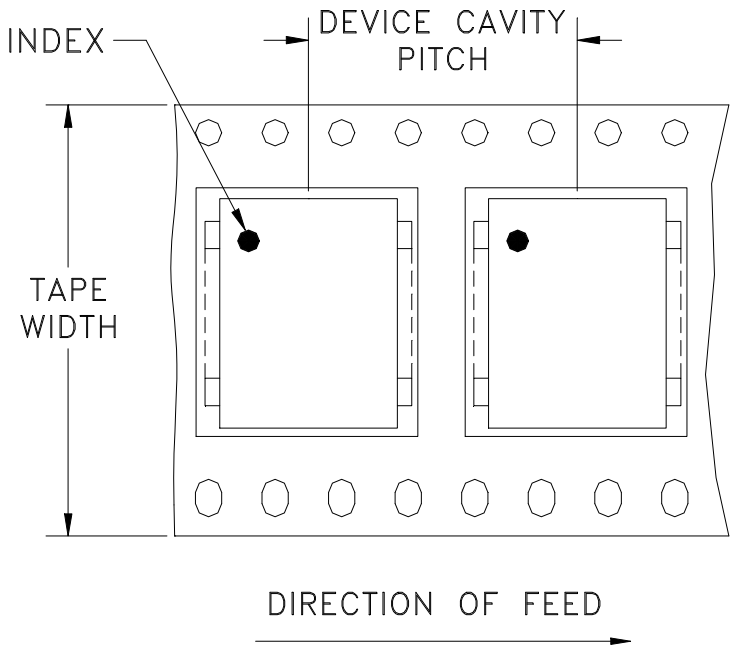
# Tape & Reel Packaging TR-F5

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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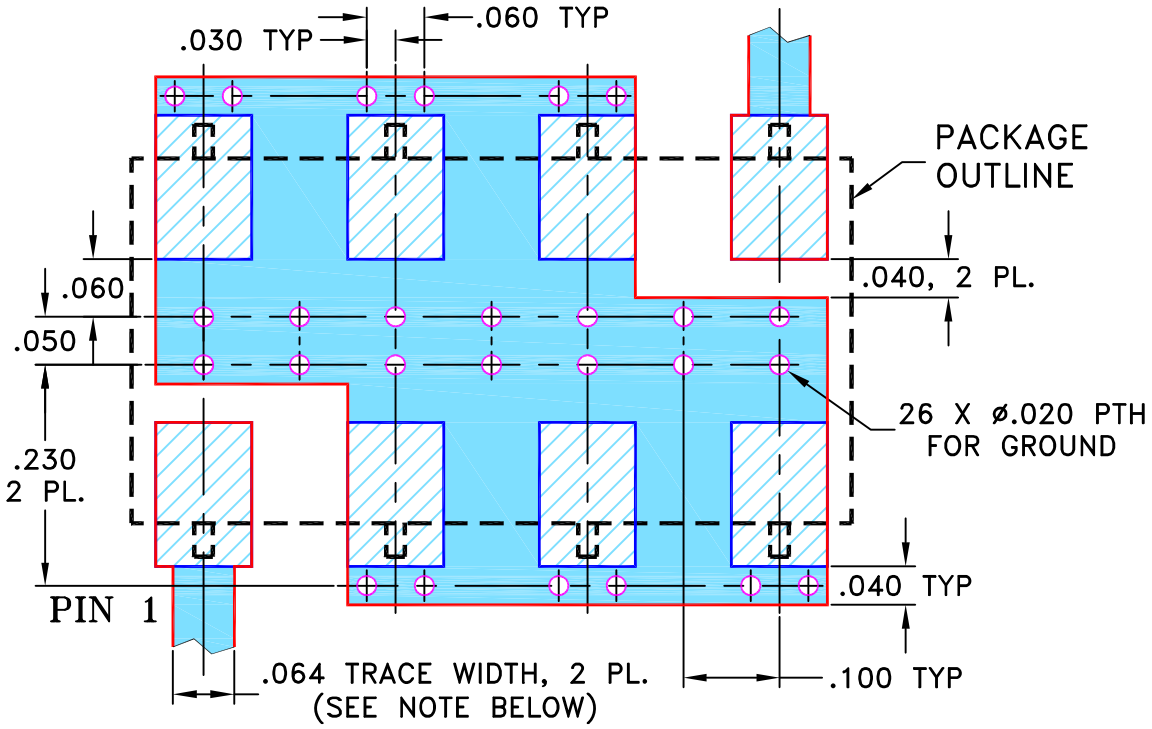
THIRD ANGLE PROJECTION

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
| OR | 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:
1. 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.
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 | GF | 08/12/02 |
| TOLERANCES ON: | CHECKED | AV | 09/11/02 |
| 2 PL DECIMALS ± | APPROVED | ABD | 09/11/02 |
| 3 PL DECIMALS ± .005 | | | |
| ANGLES ± | | | |
| FRACTIONS ± | | | |

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

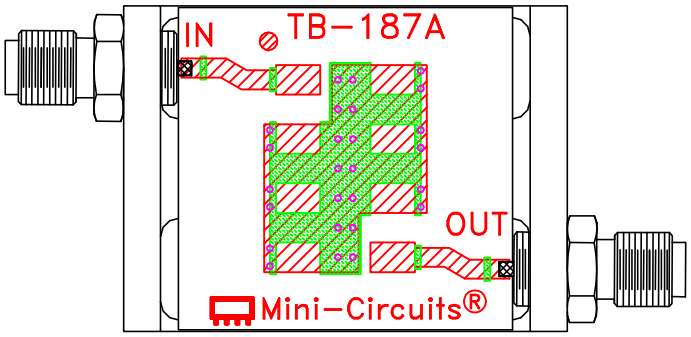
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

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

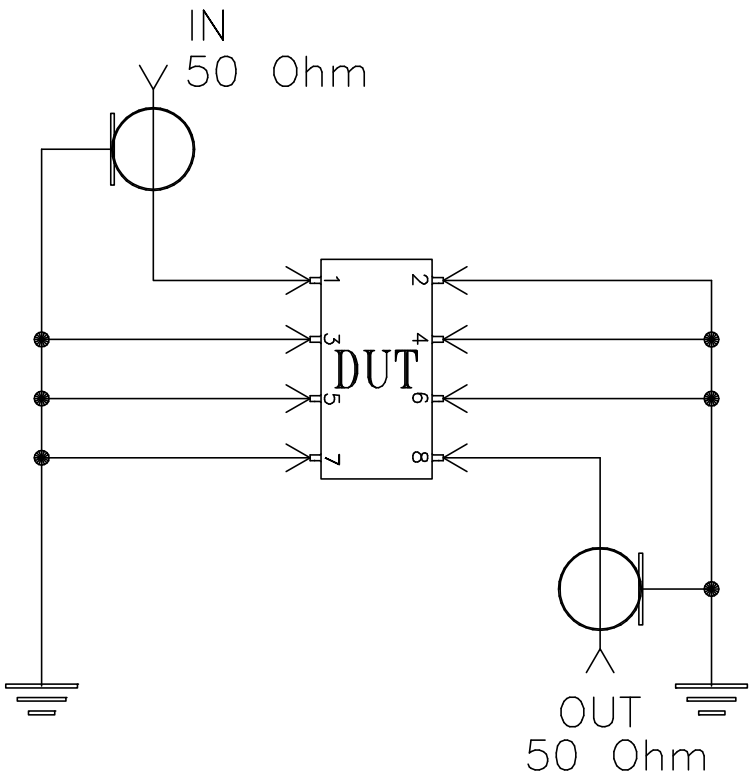
| SIZE | CODE IDENT | DRAWING NO: | REV: |
|---|---|---|---|
| A | 15542 | 98-PL-049 | C |

| FILE: | SCALE: | SHEET: |
|---|---|---|
| 98PL049 | 5:1 | 1 OF 1 |

# Evaluation Board and Circuit




TB-187+




Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 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<br>Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C<br>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<br>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;<br>distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215 |


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