

# Surface Mount Low Pass Filter

50Ω DC to 325 MHz

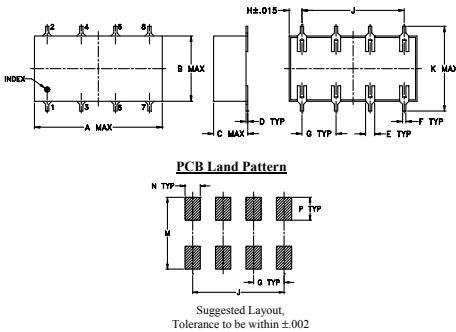
## Maximum Ratings

|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| 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 |

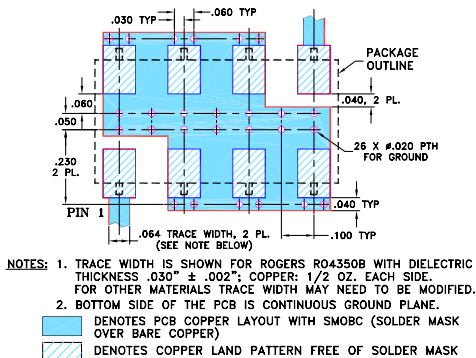
## Outline Drawing



## 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

- 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.
- 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](http://www.minicircuits.com/MCLStore/terms.jsp)

## Features

- 7-section elliptic function
- excellent rejection

## Applications

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



Generic photo used for illustration purposes only

CASE STYLE: YY101

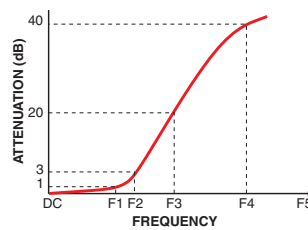
**+RoHS Compliant**

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

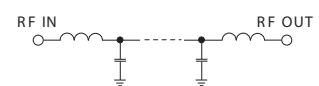
## Electrical Specifications

| Parameter | F#             | Frequency (MHz) | Min.     | Typ. | Max. | Unit   |
|-----------|----------------|-----------------|----------|------|------|--------|
| Pass Band | Insertion Loss | DC-F1           | DC-325   | —    | —    | 1.0 dB |
|           | Freq. Cut-Off  | F2              | 383      | —    | 3.0  | dB     |
|           | VSWR           | DC-F1           | DC-325   | —    | 1.3  | :1     |
| Stop Band | Rejection Loss | F3-F4           | 480-580  | 20   | —    | dB     |
|           |                | F4-F5           | 580-1250 | 40   | —    | dB     |
|           | VSWR           | F3-F5           | 480-1250 | —    | 18   | :1     |

## Typical Frequency Response



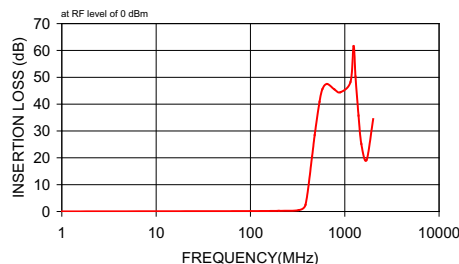
## Electrical Schematic



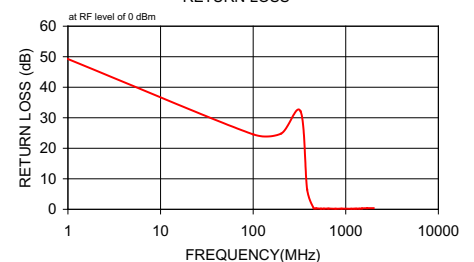
## Typical Performance Data

| Frequency (MHz) | Insertion Loss (dB) |          | Return Loss (dB) |
|-----------------|---------------------|----------|------------------|
|                 | $\bar{x}$           | $\sigma$ |                  |
| 1               | 0.03                | 0.00     | 49.25            |
| 100             | 0.14                | 0.00     | 24.56            |
| 200             | 0.25                | 0.00     | 24.79            |
| 325             | 0.53                | 0.01     | 32.09            |
| 383             | 2.48                | 0.15     | 6.52             |
| 450             | 20.40               | 0.39     | 0.41             |
| 480             | 28.51               | 0.42     | 0.33             |
| 540             | 40.90               | 0.45     | 0.23             |
| 580             | 45.61               | 0.44     | 0.22             |
| 650             | 47.49               | 0.43     | 0.23             |
| 775             | 45.50               | 0.45     | 0.18             |
| 900             | 44.43               | 0.49     | 0.20             |
| 1150            | 48.25               | 1.01     | 0.19             |
| 1240            | 61.59               | 3.99     | 0.19             |
| 1300            | 50.26               | 1.97     | 0.20             |
| 1400            | 35.73               | 0.73     | 0.22             |
| 1500            | 25.20               | 0.88     | 0.30             |
| 1700            | 19.14               | 0.76     | 0.37             |
| 2000            | 34.41               | 0.57     | 0.38             |

## SALF-325 INSERTION LOSS



## SALF-325 RETURN LOSS



# Surface Mount Low Pass Filter

# SALF-325+

## Typical Performance Data

| FREQ.<br>(MHz) | INSERTION LOSS<br>(dB) |          |          | INPUT RETURN LOSS<br>(dB) |          |          | OUTPUT RETURN LOSS<br>(dB) |          |          |
|----------------|------------------------|----------|----------|---------------------------|----------|----------|----------------------------|----------|----------|
|                | @ -40° C               | @ +25° C | @ +85° C | @ -40° C                  | @ +25° C | @ +85° C | @ -40° C                   | @ +25° C | @ +85° C |
| 1              | 0.03                   | 0.03     | 0.03     | 49.48                     | 50.00    | 48.19    | 50.28                      | 50.76    | 48.94    |
| 10             | 0.04                   | 0.04     | 0.05     | 39.74                     | 40.73    | 41.36    | 39.88                      | 40.78    | 41.58    |
| 20             | 0.05                   | 0.06     | 0.06     | 33.95                     | 34.90    | 35.78    | 34.04                      | 34.81    | 35.80    |
| 30             | 0.07                   | 0.07     | 0.08     | 30.65                     | 31.48    | 32.28    | 30.76                      | 31.39    | 32.30    |
| 40             | 0.08                   | 0.08     | 0.09     | 28.52                     | 29.18    | 29.82    | 28.71                      | 29.14    | 29.90    |
| 50             | 0.09                   | 0.10     | 0.11     | 27.10                     | 27.58    | 28.01    | 27.34                      | 27.59    | 28.13    |
| 60             | 0.10                   | 0.11     | 0.12     | 26.21                     | 26.47    | 26.66    | 26.47                      | 26.49    | 26.79    |
| 70             | 0.11                   | 0.12     | 0.13     | 25.76                     | 25.76    | 25.69    | 26.01                      | 25.74    | 25.78    |
| 80             | 0.12                   | 0.13     | 0.15     | 25.67                     | 25.38    | 25.02    | 25.84                      | 25.28    | 25.01    |
| 90             | 0.12                   | 0.14     | 0.16     | 25.90                     | 25.27    | 24.58    | 26.02                      | 25.12    | 24.54    |
| 100            | 0.13                   | 0.15     | 0.17     | 26.52                     | 25.51    | 24.47    | 26.59                      | 25.31    | 24.37    |
| 110            | 0.14                   | 0.16     | 0.18     | 27.56                     | 26.08    | 24.63    | 27.60                      | 25.84    | 24.51    |
| 120            | 0.14                   | 0.17     | 0.20     | 29.16                     | 27.07    | 25.13    | 29.20                      | 26.79    | 25.02    |
| 130            | 0.15                   | 0.18     | 0.21     | 31.57                     | 28.61    | 26.06    | 31.59                      | 28.33    | 25.98    |
| 150            | 0.16                   | 0.20     | 0.22     | 44.15                     | 35.27    | 30.11    | 38.23                      | 33.97    | 29.88    |
| 200            | 0.22                   | 0.27     | 0.30     | 25.68                     | 26.12    | 27.13    | 25.41                      | 25.87    | 26.80    |
| 250            | 0.30                   | 0.37     | 0.42     | 21.92                     | 21.07    | 20.13    | 22.39                      | 21.36    | 20.45    |
| 300            | 0.38                   | 0.47     | 0.54     | 24.96                     | 24.66    | 23.50    | 27.84                      | 27.34    | 26.03    |
| 325            | 0.46                   | 0.58     | 0.67     | 26.28                     | 26.24    | 25.81    | 28.28                      | 28.54    | 28.40    |
| 350            | 0.65                   | 0.81     | 0.93     | 20.88                     | 21.30    | 21.40    | 20.06                      | 20.12    | 19.94    |
| 383            | 2.72                   | 3.13     | 3.46     | 5.53                      | 5.44     | 5.34     | 5.41                       | 5.29     | 5.16     |
| 400            | 6.43                   | 7.03     | 7.53     | 2.17                      | 2.22     | 2.21     | 2.13                       | 2.16     | 2.14     |
| 450            | 21.02                  | 21.62    | 22.23    | 0.36                      | 0.46     | 0.51     | 0.36                       | 0.46     | 0.51     |
| 480            | 29.15                  | 29.68    | 30.27    | 0.25                      | 0.34     | 0.38     | 0.27                       | 0.35     | 0.39     |
| 500            | 34.00                  | 34.50    | 35.04    | 0.22                      | 0.30     | 0.34     | 0.24                       | 0.31     | 0.36     |
| 540            | 41.77                  | 42.15    | 42.56    | 0.18                      | 0.25     | 0.28     | 0.21                       | 0.27     | 0.31     |
| 550            | 43.29                  | 43.64    | 43.99    | 0.17                      | 0.24     | 0.27     | 0.21                       | 0.26     | 0.30     |
| 580            | 46.63                  | 46.88    | 47.03    | 0.16                      | 0.22     | 0.25     | 0.21                       | 0.25     | 0.29     |
| 590            | 47.33                  | 47.51    | 47.57    | 0.16                      | 0.21     | 0.24     | 0.21                       | 0.25     | 0.29     |
| 600            | 47.80                  | 47.95    | 47.98    | 0.15                      | 0.21     | 0.24     | 0.21                       | 0.25     | 0.29     |
| 650            | 48.73                  | 48.73    | 48.57    | 0.14                      | 0.19     | 0.22     | 0.21                       | 0.24     | 0.27     |
| 700            | 48.05                  | 48.14    | 47.93    | 0.13                      | 0.18     | 0.21     | 0.21                       | 0.23     | 0.27     |
| 750            | 47.51                  | 47.57    | 47.36    | 0.13                      | 0.17     | 0.20     | 0.21                       | 0.23     | 0.27     |
| 775            | 47.60                  | 47.70    | 47.45    | 0.13                      | 0.18     | 0.20     | 0.22                       | 0.24     | 0.27     |
| 800            | 46.64                  | 46.76    | 46.54    | 0.13                      | 0.17     | 0.20     | 0.21                       | 0.23     | 0.27     |
| 850            | 46.47                  | 46.65    | 46.39    | 0.12                      | 0.16     | 0.19     | 0.22                       | 0.23     | 0.27     |
| 900            | 46.36                  | 46.59    | 46.38    | 0.12                      | 0.16     | 0.19     | 0.21                       | 0.23     | 0.27     |
| 950            | 46.73                  | 46.92    | 46.64    | 0.12                      | 0.16     | 0.19     | 0.22                       | 0.24     | 0.28     |
| 1000           | 47.37                  | 47.70    | 47.46    | 0.12                      | 0.16     | 0.19     | 0.22                       | 0.24     | 0.28     |
| 1050           | 48.41                  | 48.73    | 48.52    | 0.11                      | 0.16     | 0.19     | 0.22                       | 0.24     | 0.28     |
| 1100           | 51.37                  | 51.97    | 51.71    | 0.11                      | 0.17     | 0.20     | 0.21                       | 0.24     | 0.29     |
| 1150           | 53.40                  | 54.48    | 54.52    | 0.11                      | 0.17     | 0.21     | 0.22                       | 0.25     | 0.30     |
| 1200           | 74.31                  | 69.28    | 68.23    | 0.11                      | 0.17     | 0.21     | 0.21                       | 0.25     | 0.30     |
| 1240           | 54.10                  | 53.09    | 52.52    | 0.11                      | 0.17     | 0.22     | 0.21                       | 0.25     | 0.32     |
| 1300           | 42.82                  | 42.40    | 41.99    | 0.11                      | 0.19     | 0.24     | 0.21                       | 0.27     | 0.33     |
| 1400           | 32.90                  | 32.55    | 32.04    | 0.13                      | 0.21     | 0.28     | 0.24                       | 0.31     | 0.39     |
| 1500           | 21.56                  | 20.95    | 20.10    | 0.25                      | 0.38     | 0.52     | 0.41                       | 0.56     | 0.75     |
| 1600           | 12.68                  | 14.16    | 15.37    | 0.84                      | 0.80     | 0.78     | 1.33                       | 1.18     | 1.12     |
| 1700           | 22.97                  | 23.44    | 23.84    | 0.23                      | 0.35     | 0.46     | 0.35                       | 0.45     | 0.56     |
| 1800           | 27.69                  | 28.01    | 28.23    | 0.23                      | 0.36     | 0.49     | 0.34                       | 0.45     | 0.58     |
| 1900           | 31.66                  | 31.94    | 32.09    | 0.26                      | 0.40     | 0.55     | 0.34                       | 0.47     | 0.62     |
| 2000           | 38.14                  | 38.70    | 38.95    | 0.29                      | 0.45     | 0.62     | 0.36                       | 0.51     | 0.68     |
| 2500           | 2.20                   | 2.57     | 2.93     | 6.22                      | 6.27     | 6.39     | 6.43                       | 6.62     | 6.87     |
| 3000           | 3.72                   | 3.93     | 4.23     | 3.12                      | 3.61     | 4.02     | 3.28                       | 3.67     | 4.02     |

REV. X2  
SALF-325+  
101021  
Page 1 of 2



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# Surface Mount Low Pass Filter

# SALF-325+

## Typical Performance Data

| FREQ.<br>(MHz) | GROUP DELAY<br>(nsec) |          |          |
|----------------|-----------------------|----------|----------|
|                | @ -40° C              | @ +25° C | @ +85° C |
| 0.1            | 1.56                  | 1.70     | 1.75     |
| 1              | 1.82                  | 1.84     | 1.84     |
| 10             | 1.82                  | 1.83     | 1.84     |
| 20             | 1.81                  | 1.82     | 1.82     |
| 30             | 1.81                  | 1.82     | 1.82     |
| 40             | 1.81                  | 1.82     | 1.82     |
| 50             | 1.82                  | 1.82     | 1.82     |
| 60             | 1.83                  | 1.83     | 1.83     |
| 70             | 1.84                  | 1.84     | 1.84     |
| 80             | 1.85                  | 1.85     | 1.86     |
| 90             | 1.87                  | 1.87     | 1.87     |
| 100            | 1.89                  | 1.89     | 1.89     |
| 110            | 1.91                  | 1.91     | 1.91     |
| 120            | 1.93                  | 1.93     | 1.93     |
| 130            | 1.96                  | 1.96     | 1.96     |
| 140            | 1.99                  | 1.99     | 2.00     |
| 150            | 2.03                  | 2.03     | 2.03     |
| 200            | 2.24                  | 2.25     | 2.26     |
| 250            | 2.58                  | 2.59     | 2.60     |
| 300            | 3.23                  | 3.25     | 3.28     |
| 325            | 3.77                  | 3.81     | 3.85     |
| 350            | 4.79                  | 4.87     | 4.94     |
| 360            | 5.43                  | 5.53     | 5.61     |
| 370            | 6.15                  | 6.24     | 6.32     |
| 380            | 6.66                  | 6.66     | 6.69     |
| 383            | 6.69                  | 6.66     | 6.66     |
| 390            | 6.51                  | 6.39     | 6.32     |
| 400            | 5.67                  | 5.49     | 5.36     |
| 410            | 4.65                  | 4.46     | 4.33     |
| 420            | 3.79                  | 3.64     | 3.52     |
| 430            | 3.18                  | 3.06     | 2.97     |
| 440            | 2.75                  | 2.66     | 2.57     |
| 450            | 2.41                  | 2.34     | 2.27     |
| 460            | 2.09                  | 2.04     | 1.98     |
| 470            | 1.81                  | 1.77     | 1.72     |
| 480            | 1.57                  | 1.54     | 1.50     |
| 500            | 1.25                  | 1.26     | 1.22     |
| 510            | 1.18                  | 1.20     | 1.18     |
| 520            | 1.22                  | 1.21     | 1.18     |
| 530            | 1.18                  | 1.17     | 1.19     |
| 540            | 1.15                  | 1.15     | 1.18     |
| 550            | 1.10                  | 1.09     | 1.06     |
| 560            | 1.08                  | 1.05     | 1.03     |
| 570            | 0.90                  | 0.92     | 0.99     |
| 580            | 0.87                  | 0.87     | 0.76     |
| 590            | 0.79                  | 0.79     | 0.92     |
| 600            | 0.75                  | 0.73     | 0.72     |
| 650            | 0.34                  | 0.34     | 0.41     |
| 700            | 0.38                  | 0.42     | 0.33     |
| 750            | 0.32                  | 0.36     | 0.38     |
| 775            | 0.72                  | 0.65     | 0.65     |
| 800            | 0.75                  | 0.69     | 0.63     |
| 850            | 0.18                  | 0.24     | 0.19     |
| 900            | 0.58                  | 0.24     | 0.08     |

REV. X2  
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Page 2 of 2



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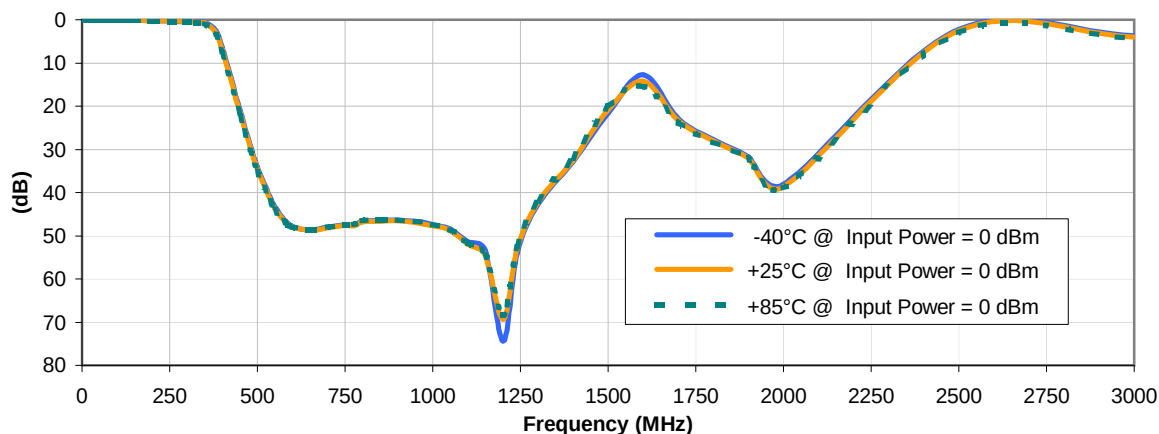


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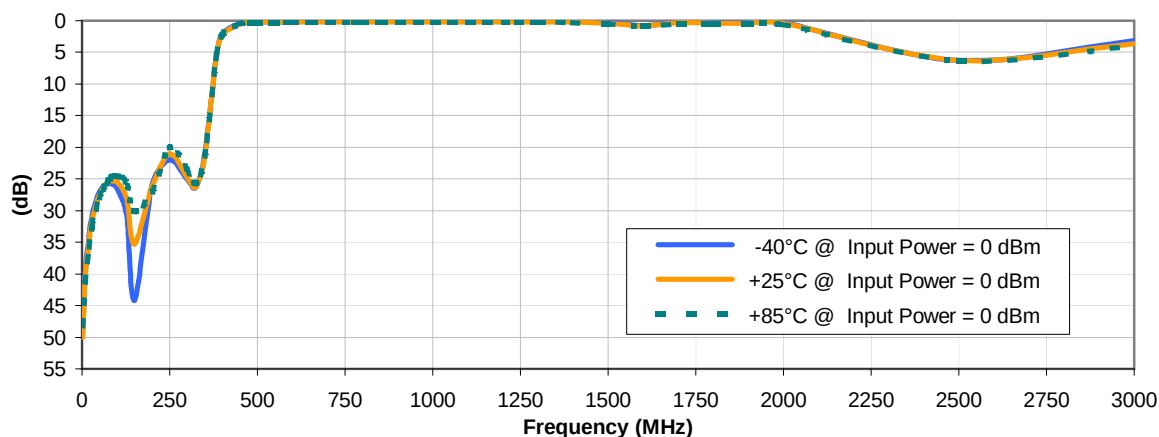


## Typical Performance Curves

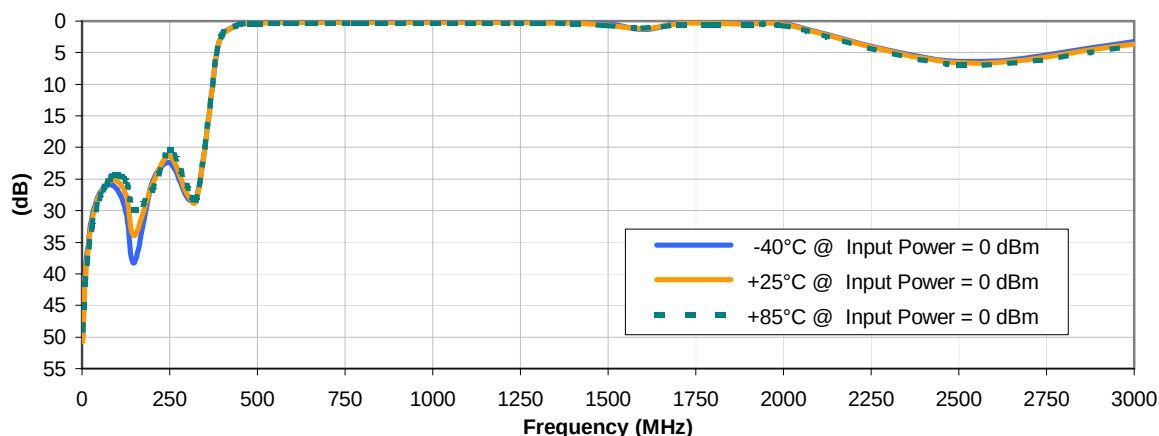
INSERTION LOSS vs. TEMPERATURE



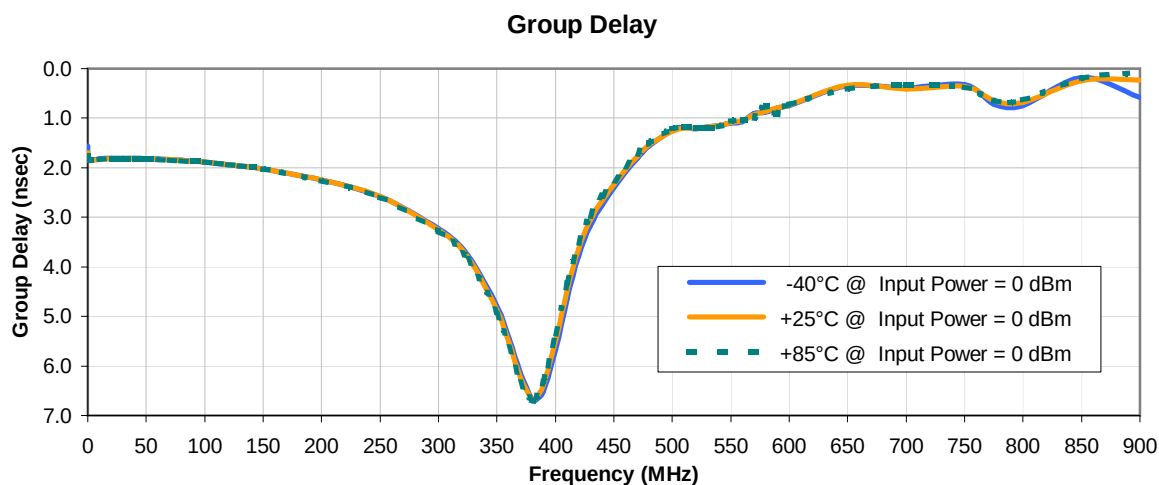
INPUT RETURN LOSS vs. TEMPERATURE



OUTPUT RETURN LOSS vs. TEMPERATURE



## Typical Performance Curves



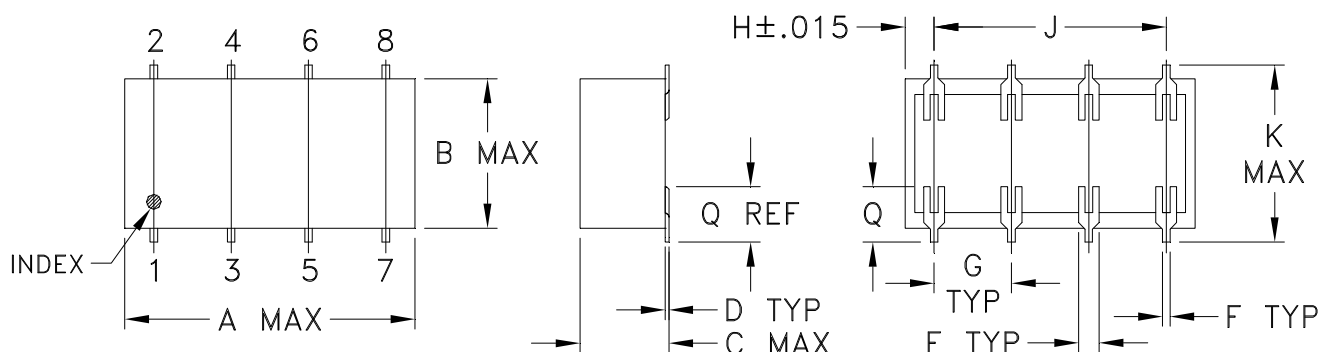
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Page 2 of 2

# Case Style

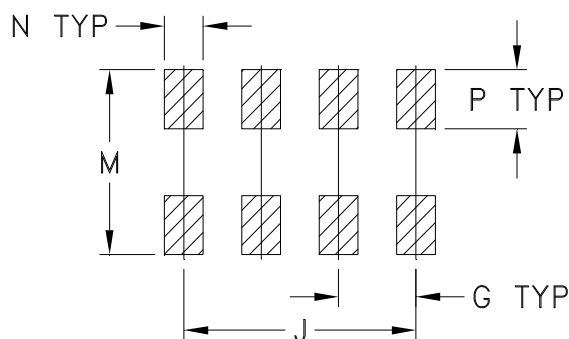
YY

## 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.<br>GRAM<br>S |
|--------|----------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|----|-----------------|----------------|----------------|----------------|------------------|
| YY101* |                |               | .20<br>(5.08) |                |                |                |                |                |                 | .450<br>(11.43) | -- | .470<br>(11.94) |                |                |                | 1.6              |
| YY109* | .75<br>(19.05) | .38<br>(9.65) | .20<br>(5.08) | .010<br>(0.25) | .050<br>(1.27) | .020<br>(0.51) | .200<br>(5.08) | .075<br>(1.91) | .600<br>(15.24) | .720<br>(18.29) | -- | .740<br>(18.80) | .100<br>(2.54) | .150<br>(3.81) | .148<br>(3.76) | 1.6              |
| YY161  |                |               | .28<br>(7.11) |                |                |                |                |                |                 | .450<br>(11.43) | -- | .470<br>(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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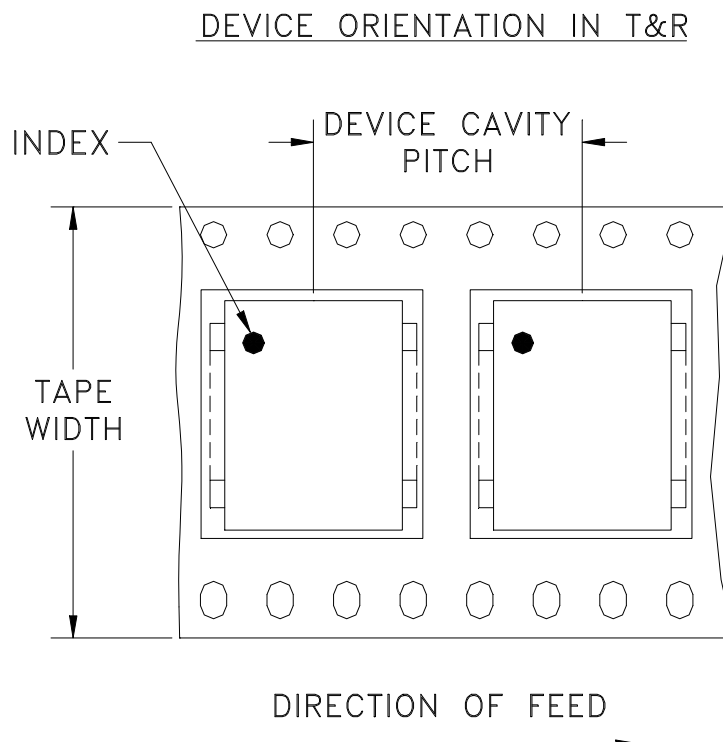
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# Tape & Reel Packaging TR-F5



| Tape Width,<br>mm | Device Cavity<br>Pitch, mm | Reel Size,<br>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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A diagram of a tapered shaft, represented by a trapezoid with a horizontal centerline passing through its middle. The left end is narrower than the right end.

| 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  $\phi$ .020 PTH FOR GROUND



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

| UNLESS OTHERWISE SPECIFIED                                                                                       |          | INITIALS | DATE     |
|------------------------------------------------------------------------------------------------------------------|----------|----------|----------|
| DIMENSIONS ARE IN INCHES<br>TOLERANCES ON:<br>2 PL DECIMALS ±<br>3 PL DECIMALS ± .005<br>ANGLES ±<br>FRACTIONS ± | DRAWN    | GF       | 08/12/02 |
|                                                                                                                  | CHECKED  | AV       | 09/11/02 |
|                                                                                                                  | APPROVED | ABD      | 09/11/02 |
|                                                                                                                  |          |          |          |

11

# Mini-Circuits®

13 Neptune Avenue  
Brooklyn NY 11235

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

**SIZE**  
**A**

CODE IDENT  
15542

DRAWING NO:  
98-PL-049

|      |   |
|------|---|
| REV: | C |
|------|---|

FILE: 98PL049

SCALE: 5:1

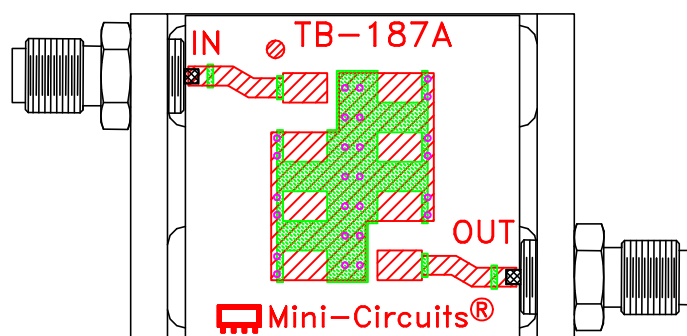
|        |        |
|--------|--------|
| SHEET: | 1 OF 1 |
|--------|--------|

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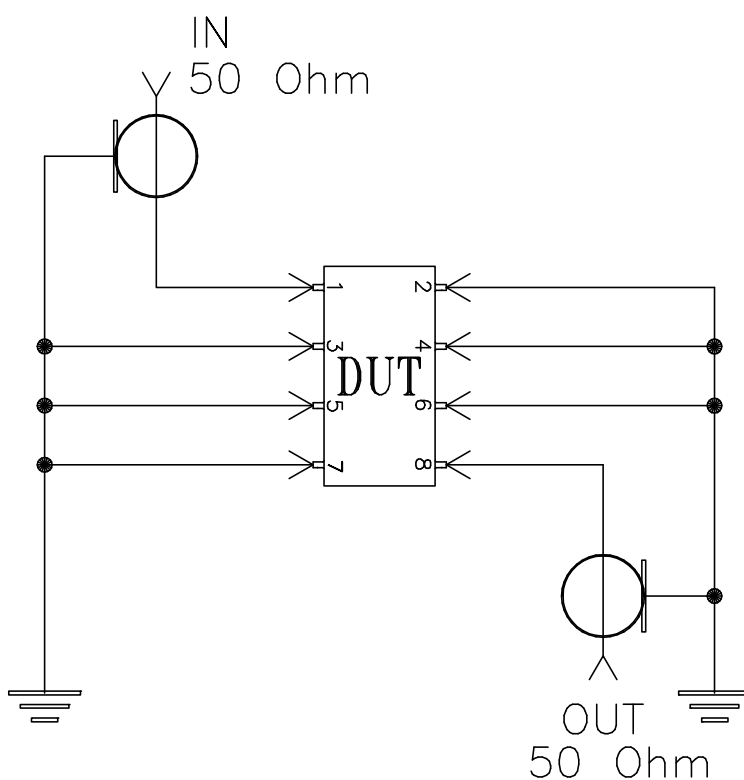
ASHEETA1.DWG REV:A DATE:01/12/95



# 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<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                                                                              |