

# Miniature Plastic Fixed Attenuator

50Ω 0.5W 4dB DC to 8000 MHz

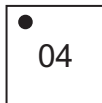
## Maximum Ratings

|                       |                |
|-----------------------|----------------|
| Operating Temperature | -45°C to 85°C  |
| Storage Temperature   | -55°C to 100°C |

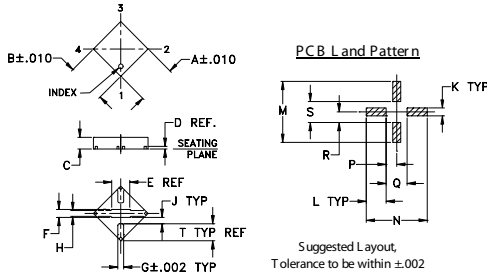
## Pin Connections

|        |     |
|--------|-----|
| INPUT  | 1   |
| OUTPUT | 3   |
| GROUND | 2,4 |

## Product Marking



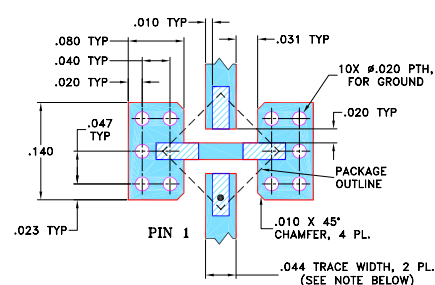
## Outline Drawing



## Outline Dimensions (inch)

| A     | B     | C     | D     | E     | F     | G     | H     | J     |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.118 | 0.118 | 0.035 | 0.008 | 0.07  | 0.024 | 0.017 | 0.018 | 0.021 |       |
| 3.00  | 3.00  | 0.89  | 0.20  | 1.78  | 0.61  | 0.43  | 0.46  | 0.53  |       |
| K     | L     | M     | N     | P     | Q     | R     | S     | T     | wt    |
| 0.024 | 0.061 | 0.186 | 0.186 | 0.032 | 0.064 | 0.032 | 0.064 | 0.05  | grams |
| 0.61  | 1.55  | 4.72  | 4.72  | 0.81  | 1.63  | 0.81  | 1.63  | 1.27  | 0.02  |

## Demo Board MCL P/N: TB-154 Suggested PCB Layout (PL-126)



### NOTES:

- TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .020" ± .0015"; 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.
- 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

- miniature package MCLP™ 3x3 mm
- specified to 8000 MHz, useable to 10000 MHz
- excellent VSWR, 1:15:1 typ.

## Applications

- cellular
- PCS
- communications
- radar
- defense

# GAT-4+



Generic photo used for illustration purposes only

CASE STYLE: FG873

**+RoHS Compliant**

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

| Reel Size | Available Tape and Reel at no extra cost |
|-----------|------------------------------------------|
| 7"        | 20, 50, 100, 200, 500, 1000              |
| 13"       | 2000, 3000, 4000                         |

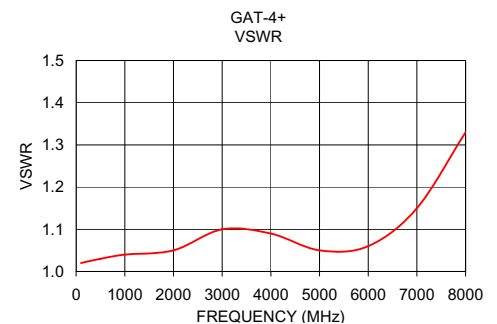
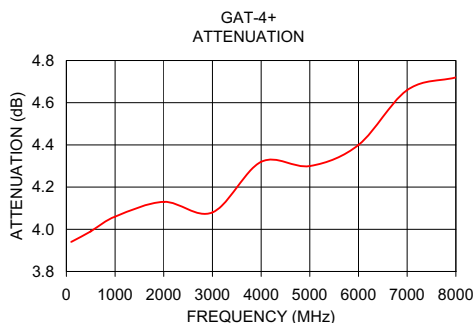
## Electrical Specifications at 25°C

| FREQ.<br>RANGE<br>(MHz)        | ATTENUATION<br>(dB)<br>Flatness |     |      |     |      | VSWR<br>(:1) |      |      |      |     | MAX.<br>INPUT<br>POWER <sup>1</sup><br>(W) |
|--------------------------------|---------------------------------|-----|------|-----|------|--------------|------|------|------|-----|--------------------------------------------|
|                                | DC-1                            |     | 1-5  | 5-8 | DC-1 |              | 1-5  | 5-8  |      |     |                                            |
|                                | GHz                             |     | GHz  | GHz | GHz  |              | GHz  | GHz  |      |     |                                            |
|                                | Typ.                            |     | Typ. |     | Typ. | Max.         | Typ. | Max. | Typ. |     |                                            |
| f <sub>L</sub> -f <sub>U</sub> | Nom.                            |     |      |     |      |              |      |      |      |     |                                            |
| DC-8000                        | 4±0.3                           | 0.1 | 0.2  | 0.2 | 1.05 | 1.2          | 1.15 | 1.3  | 1.35 | 0.5 |                                            |

- RF power at 25°C case temperature: ½Watt. Derate linearly to 0.2 Watt at 85°C.
- Flatness= variation over band divided by 2

## Typical Performance Data

| Frequency (MHz) | Attenuation (dB) | VSWR (:1) |
|-----------------|------------------|-----------|
| 100.00          | 3.94             | 1.02      |
| 500.00          | 3.99             | 1.03      |
| 1000.00         | 4.06             | 1.04      |
| 2000.00         | 4.13             | 1.05      |
| 3000.00         | 4.08             | 1.10      |
| 4000.00         | 4.32             | 1.09      |
| 5000.00         | 4.30             | 1.05      |
| 6000.00         | 4.40             | 1.06      |
| 7000.00         | 4.66             | 1.15      |
| 8000.00         | 4.72             | 1.33      |



## Typical Performance Data

| FREQUENCY<br>(MHz) | ATTENUATION<br>(dB) | RETURN LOSS<br>(dB) |
|--------------------|---------------------|---------------------|
| 100.00             | 3.94                | 40.09               |
| 500.00             | 3.99                | 36.61               |
| 1000.00            | 4.06                | 34.15               |
| 2000.00            | 4.13                | 32.26               |
| 3000.00            | 4.08                | 26.44               |
| 4000.00            | 4.32                | 27.32               |
| 5000.00            | 4.30                | 32.26               |
| 6000.00            | 4.40                | 30.71               |
| 7000.00            | 4.66                | 23.13               |
| 8000.00            | 4.72                | 16.98               |

REV. X1

GAT-4+

061107

Page 1 of 1



IF/RF MICROWAVE COMPONENTS • ISO 9001 ISO 14001 AS 9100 CERTIFIED RoHS compliant

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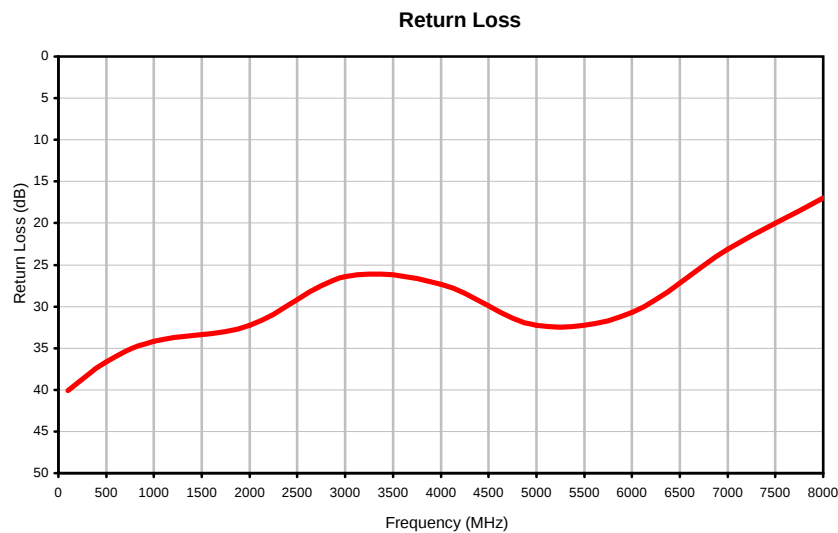
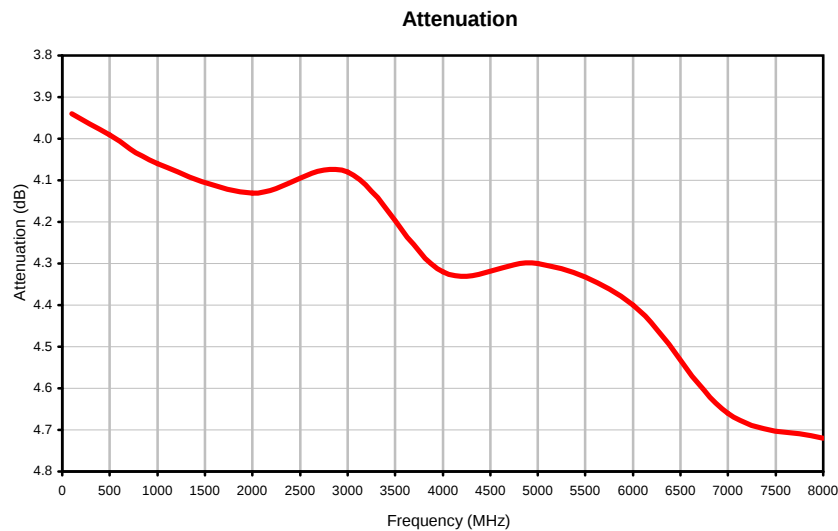


Patent Pending

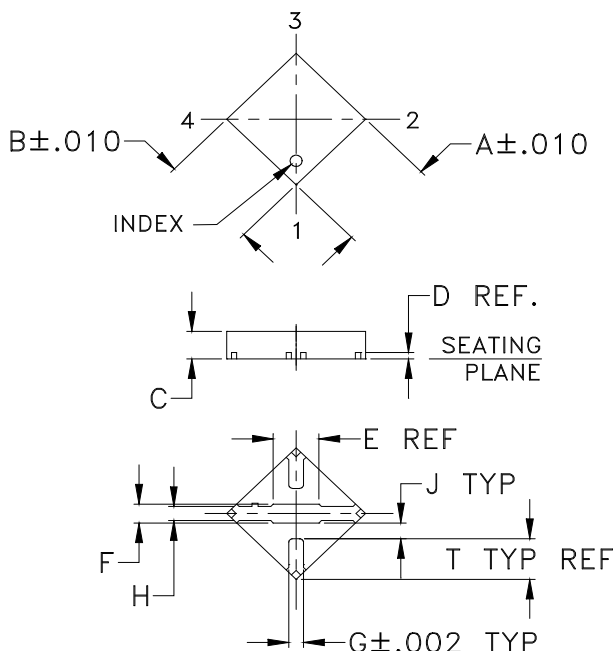
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see



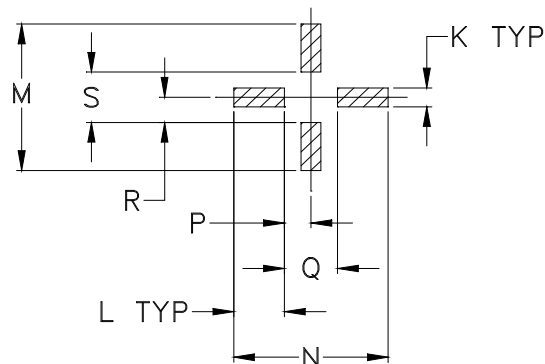
## Typical Performance Curves



### Outline Dimensions



### 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              |
|--------|----------------|----------------|----------------|----------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| FG873  | .118<br>(3.00) | .118<br>(3.00) | .035<br>(0.89) | .008<br>(0.20) | .07<br>(1.78) | .024<br>(0.60) | .017<br>(0.43) | .018<br>(0.46) | .021<br>(0.52) | .024<br>(0.61) | .061<br>(1.55) | .186<br>(4.72) | .186<br>(4.72) | .032<br>(0.81) |

| CASE # | Q              | R              | S              | T              | WT. GRAM |
|--------|----------------|----------------|----------------|----------------|----------|
| FG873  | .064<br>(1.63) | .032<br>(0.81) | .064<br>(1.63) | .050<br>(1.27) | .02      |

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm .01$ ; 3Pl.  $\pm .004$

#### Notes:

- Case material: Plastic.
- Termination finish:  
For RoHS Case Styles: Tin-Silver alloy plate over Nickel barrier or Matte-Tin per Data Sheet.  
All models, (+) suffix.  
For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



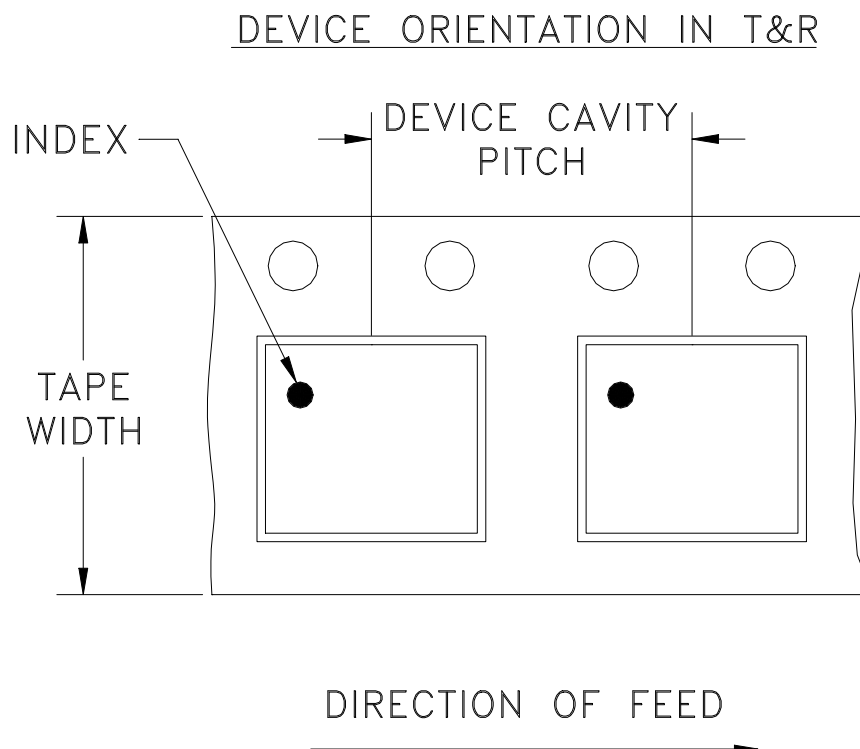
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Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F68



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel see note |      |
|----------------|-------------------------|-------------------|---------------------------|------|
| 12             | 8                       | 7                 | Small quantity standard   | 20   |
|                |                         |                   |                           | 50   |
|                |                         |                   |                           | 100  |
|                |                         |                   |                           | 200  |
|                |                         |                   |                           | 500  |
|                |                         | 7                 | Standard                  | 1000 |
|                |                         | 13                | Standard                  | 2000 |
|                |                         |                   |                           | 3000 |
|                |                         |                   |                           | 4000 |

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)

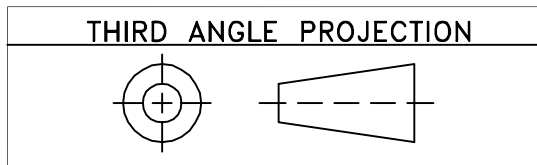


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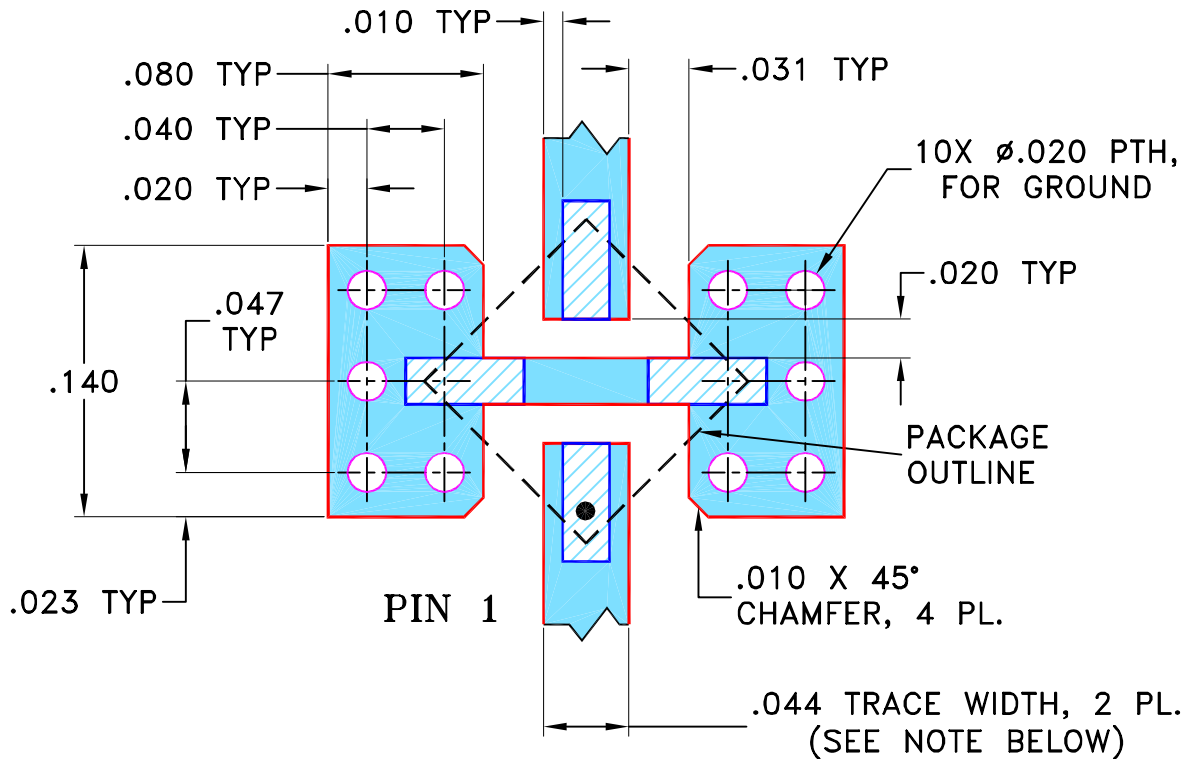
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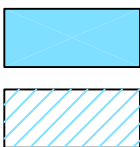
| REVISIONS |         |                                 |          |     |      |
|-----------|---------|---------------------------------|----------|-----|------|
| REV       | ECN No. | DESCRIPTION                     | DATE     | DR  | AUTH |
| OR        | M85378  | NEW RELEASE                     | 02/12/03 | MMG | MM   |
| A         | M102713 | ADDED "... WITH SMOBC"          | 10/27/06 | MMG | MM   |
| B         | M108435 | REMOVED "CB" PIN CONN AND "LEE" | 11/14/06 | PW  | IG   |

**SUGGESTED MOUNTING CONFIGURATION  
FOR FG873 CASE STYLE, "hl" PIN CONNECTION**



**NOTES:**

1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020"  $\pm$  .0015"; 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<br>TOLERANCES ON:<br>2 PL DECIMALS $\pm$<br>3 PL DECIMALS $\pm$ .005<br>ANGLES $\pm$<br>FRACTIONS $\pm$ | DRAWN    | MMG | 02/06/03 |
|                                                                                                                                  | CHECKED  | AY  | 02/10/03 |
|                                                                                                                                  | APPROVED | MM  | 02/12/03 |
|                                                                                                                                  |          |     |          |



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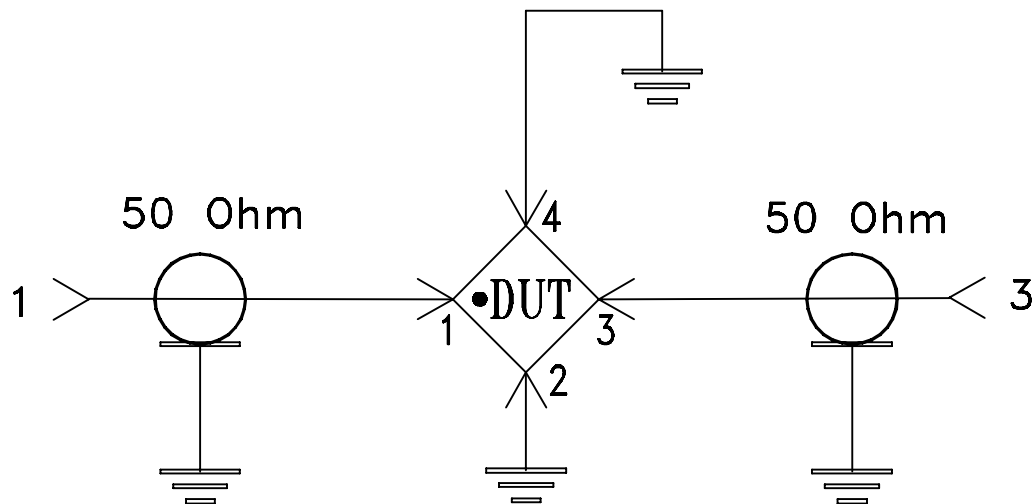
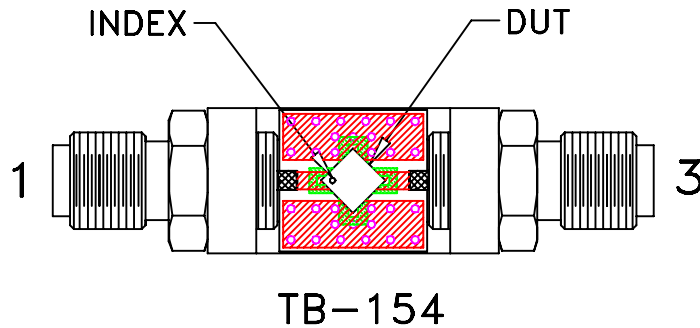
**PL, hl, FG873, GAT, TB-154**

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

| SIZE  | CODE IDENT | DRAWING NO: | REV:   |
|-------|------------|-------------|--------|
| A     | 15542      | 98-PL-126   | B      |
| FILE: | 98PL126    | SCALE:      | 10:1   |
|       |            | SHEET:      | 1 OF 1 |

# Characterization Test Board

For Pins Connections refer to Data Sheet of the DUT



Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.020 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          | -45° to 85°C or -40° to 85°C<br>Ambient Environment                                                                            | Individual Model Data Sheet                                     |
| Storage Temperature            | -55° to 100° C<br>Ambient Environment                                                                                          | Individual Model Data Sheet                                     |
| Thermal Shock                  | -55° to 100°C, 100 cycles                                                                                                      | MIL-STD-202, Method 107, Condition A-3, except +100°C           |
| Mechanical Shock               | 1.5Kg, 0.5 ms, 5 shock pulses, Y1 direction only                                                                               | MIL-STD-883, Method 2002, Condition B, except Y1 direction only |
| Vibration (Variable Frequency) | 50g peak                                                                                                                       | MIL-STD-883, Method 2007, Condition B                           |
| Autoclave                      | 15 psig, 100% RH, 121°C, 96 hours                                                                                              | JESD22-A102, Condition C                                        |
| HAST                           | 130°C, 85% RH, 96 hours                                                                                                        | JESD22-A110                                                     |
| Solderability                  | 10X Magnification                                                                                                              | J-STD-002, Para 4.2.5, Test S, 95% Coverage                     |
| Solder Reflow Heat             | Sn-Pb Eutetic Process: 240°C peak<br>Pb-Free Process: 260°C peak                                                               | J-STD-020, Table 4-1, 4-2 and 5-2; Figure 5-1                   |
| Moisture Sensitivity: Level 1  | Bake at 125°C for 24 hours<br>Soak at 85°C/85% RH for 168 hours, Reflow 3 cycles at 260°C peak                                 | J-STD-020                                                       |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C;<br>distilled water + proylene glycol monomethyl ether + | MIL-STD-202, Method 215                                         |



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| Specification | Test/Inspection Condition        | Reference/Spec |
|---------------|----------------------------------|----------------|
|               | monoethanolamine at 63°C to 70°C |                |