

# Ceramic Low Pass Filter

50Ω

DC to 5400 MHz

LFTC-5400+



Generic photo used for illustration purposes only

CASE STYLE: FR933

## Maximum Ratings

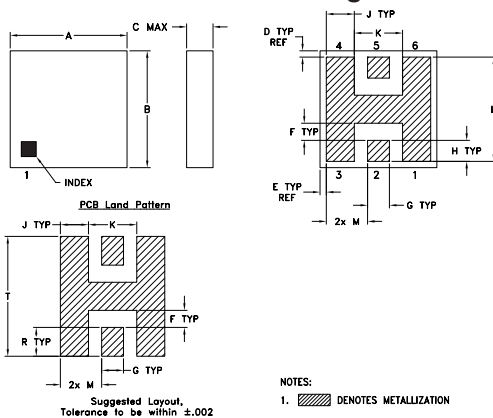
|                                                                 |                |
|-----------------------------------------------------------------|----------------|
| Operating Temperature                                           | -55°C to 100°C |
| Storage Temperature                                             | -55°C to 125°C |
| Permanent damage may occur if any of these limits are exceeded. |                |

## Pin Connections

|        |         |
|--------|---------|
| RF IN  | 2       |
| RF OUT | 5       |
| GROUND | 1,3,4,6 |

## Product Marking: LF5

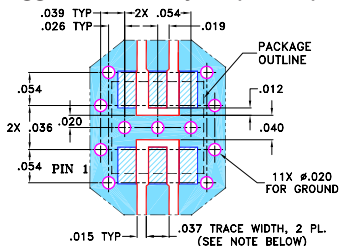
## Outline Drawing



## Outline Dimensions (inch/mm)

| A     | B     | C     | D     | E     | F     | G     | H     |
|-------|-------|-------|-------|-------|-------|-------|-------|
| .150  | .150  | .034  | .008  | .022  | .028  | .027  |       |
| 3.81  | 3.81  | 0.864 | 0.203 | 0.203 | 0.559 | 0.711 | 0.686 |
| J     | K     | L     | M     | R     | T     | wt    |       |
| .036  | .062  | .134  | .053  | .037  | .154  | grams |       |
| 0.914 | 1.575 | 3.404 | 1.346 | 0.940 | 3.912 | 0.15  |       |

## Demo Board MCL P/N: TB-233 Suggested PCB Layout (PL-112)



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; 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.
3. DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)
4. 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.
- C. The parts covered by this specification document are subject to Mini-Circuit's 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-Circuit's website at [www.minicircuits.com/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)

## Features

- miniature size, 0.15"X0.15"X0.034"
- low profile, 0.034" height
- excellent power handling, 19W
- hermetically sealed

## Applications

- harmonic rejection
- internal rejection
- receivers & transmitters

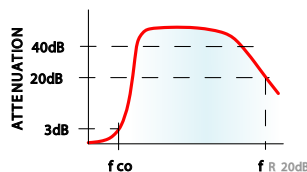
## Electrical Specifications<sup>1</sup> (T<sub>AMB</sub>=25°C)

| PASSBAND (MHz) | f <sub>co</sub> , MHz Nom. | STOP BAND (MHz) | fr20 dB | VSWR (:1) Passband | POWER INPUT* (W) | MARKING | NO. OF SECTIONS |
|----------------|----------------------------|-----------------|---------|--------------------|------------------|---------|-----------------|
| (loss < 1 dB)  | (loss 3 dB)                | ( > 20 dB)      | Typ.    | Typ.               |                  |         |                 |
| DC-5400        | 6410                       | 9000-11000      | 12000   | 1.1                | 19               | LF5     | 7               |

\* Derate linearly to 8W at 100°C ambient.

1. Measured on Mini-Circuits Characterization Test Board TB-233.

## typical frequency response

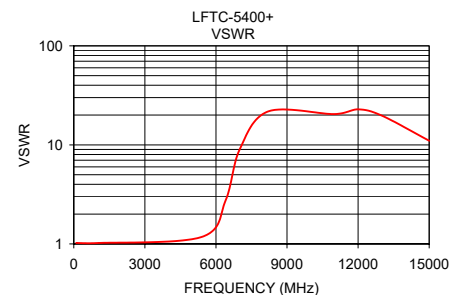
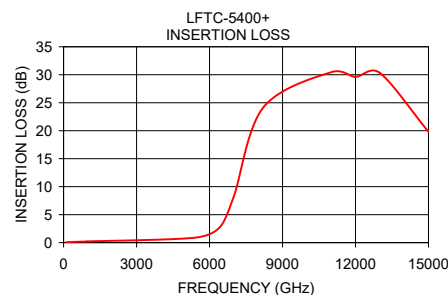


## electrical schematic



## Typical Performance Data at 25°C

| Frequency (MHz) | Insertion Loss (dB) | VSWR (:1) |
|-----------------|---------------------|-----------|
| 100.00          | 0.07                | 1.02      |
| 1000.00         | 0.21                | 1.02      |
| 5400.00         | 0.88                | 1.18      |
| 6410.00         | 2.69                | 2.76      |
| 7000.00         | 8.27                | 8.99      |
| 8200.00         | 24.11               | 21.73     |
| 11000.00        | 30.45               | 20.45     |
| 12000.00        | 29.61               | 22.87     |
| 13000.00        | 30.32               | 19.76     |
| 15000.00        | 19.81               | 11.03     |



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REV. P  
ECO-006052  
LFTC-5400+  
EDB-020540  
AD/YB/CP/AM  
210216

# Ceramic Low Pass Filter

## LFTC-5400+

### Typical Performance Data

| FREQUENCY<br>(MHz) | INSERTION LOSS @ +25° C<br>(dB) | INPUT RETURN LOSS @ +25° C<br>(dB) | OUTPUT RETURNLOSS @ +25° C<br>(dB) |
|--------------------|---------------------------------|------------------------------------|------------------------------------|
| 50                 | 0.06                            | 35.37                              | 36.18                              |
| 100                | 0.07                            | 36.64                              | 36.86                              |
| 1000               | 0.20                            | 30.60                              | 32.14                              |
| 1500               | 0.24                            | 37.68                              | 48.04                              |
| 2000               | 0.29                            | 26.42                              | 26.76                              |
| 3000               | 0.47                            | 16.85                              | 16.78                              |
| 4000               | 0.53                            | 24.04                              | 24.60                              |
| 5000               | 0.90                            | 15.58                              | 15.82                              |
| 5400               | 0.98                            | 17.52                              | 17.57                              |
| 5650               | 1.01                            | 33.96                              | 27.02                              |
| 6260               | 3.46                            | 5.08                               | 4.97                               |
| 6410               | 4.93                            | 3.42                               | 3.33                               |
| 6490               | 5.80                            | 2.81                               | 2.73                               |
| 6950               | 10.97                           | 1.25                               | 1.17                               |
| 7480               | 15.97                           | 0.82                               | 0.72                               |
| 8130               | 20.80                           | 0.74                               | 0.60                               |
| 8820               | 25.69                           | 0.85                               | 0.62                               |
| 9000               | 27.13                           | 0.87                               | 0.64                               |
| 9680               | 30.86                           | 1.08                               | 0.76                               |
| 10000              | 30.03                           | 1.19                               | 0.84                               |
| 10500              | 26.08                           | 1.46                               | 0.94                               |
| 11000              | 21.53                           | 1.94                               | 1.00                               |
| 11500              | 22.07                           | 1.59                               | 0.89                               |
| 12000              | 21.69                           | 1.45                               | 1.22                               |
| 12500              | 18.93                           | 1.41                               | 1.39                               |
| 13000              | 17.40                           | 1.22                               | 1.34                               |
| 13500              | 16.93                           | 1.12                               | 1.34                               |
| 14000              | 16.01                           | 1.10                               | 1.55                               |
| 14500              | 14.87                           | 1.11                               | 2.06                               |
| 15000              | 13.67                           | 1.38                               | 3.02                               |
| 15480              | 12.90                           | 1.90                               | 4.32                               |
| 16000              | 13.84                           | 2.45                               | 4.04                               |
| 16500              | 16.25                           | 2.53                               | 2.62                               |
| 17000              | 18.05                           | 2.68                               | 1.99                               |
| 17500              | 20.86                           | 2.74                               | 1.76                               |
| 18000              | 20.66                           | 2.18                               | 1.53                               |
| 18500              | 19.86                           | 2.00                               | 1.52                               |
| 19000              | 16.69                           | 1.71                               | 1.66                               |
| 19500              | 11.07                           | 2.55                               | 2.51                               |
| 20000              | 5.83                            | 7.72                               | 7.84                               |

REV. X1  
LFTC-5400+  
071007  
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Patent Pending

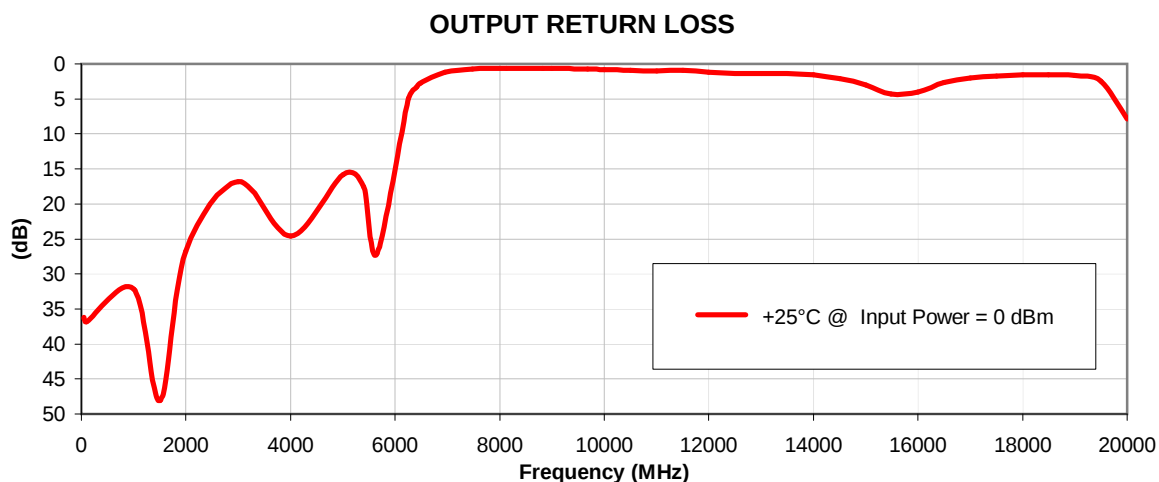
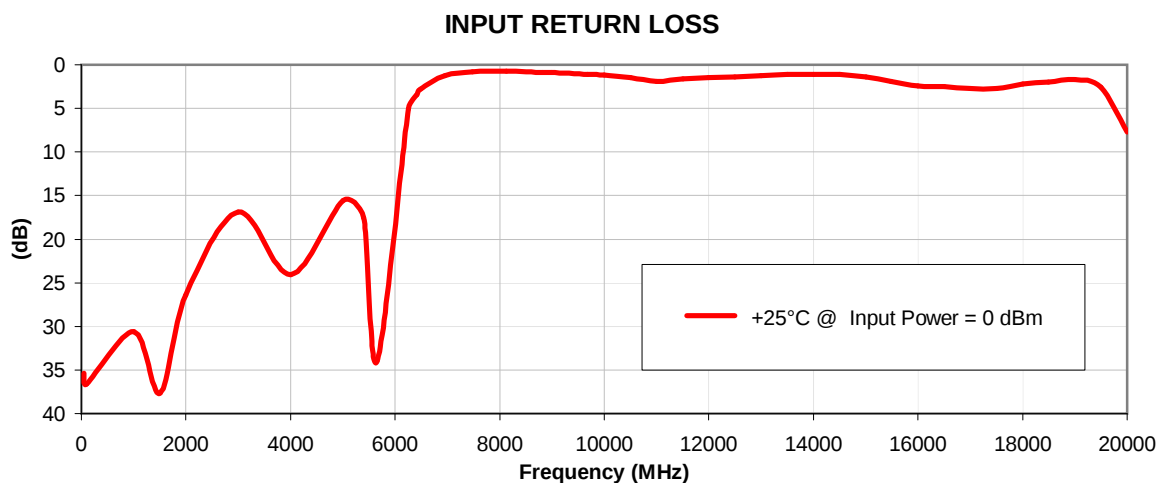
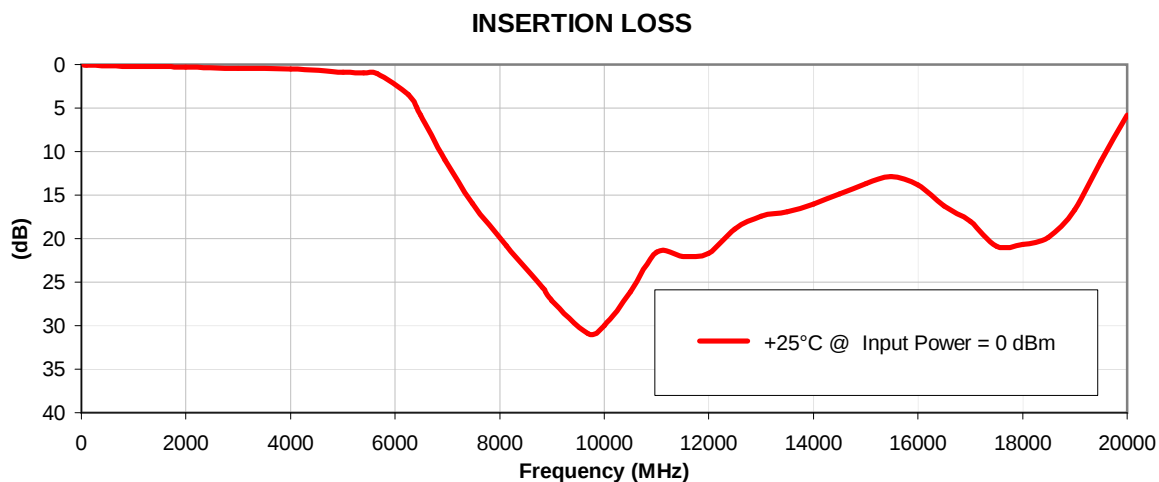
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# Ceramic Low Pass Filter

LFTC-5400+

## Typical Performance Curves



REV. X1  
LFTC-5400+  
071007  
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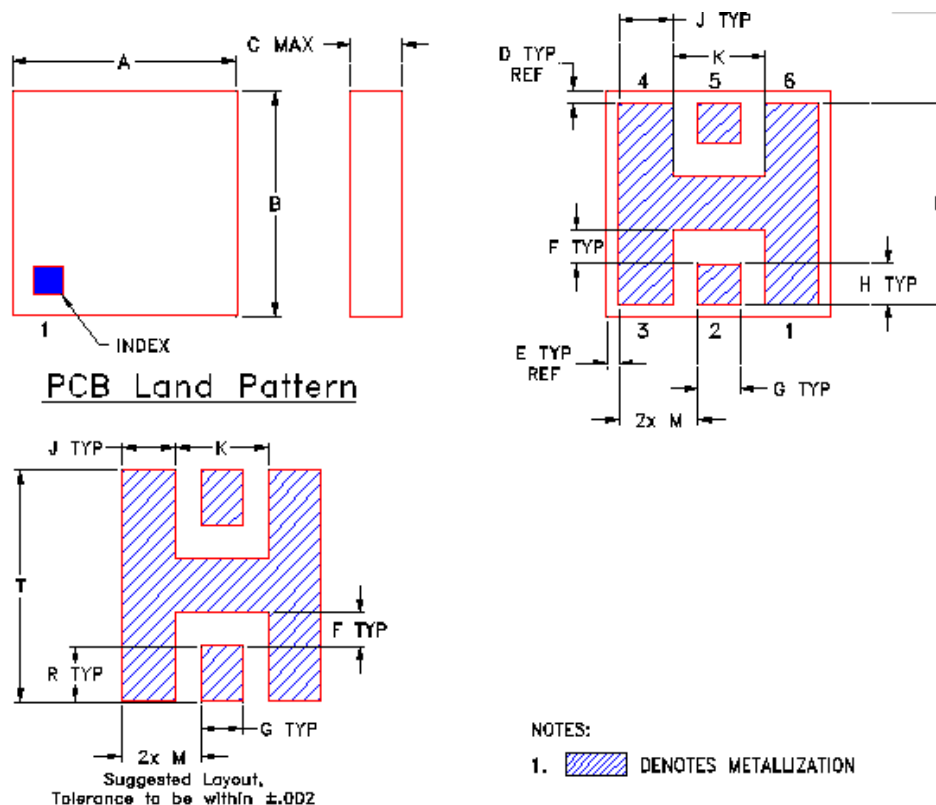


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### Outline Dimensions



| CASE # | A              | B              | C              | D              | E              | F              | G              | H              | J              | K               | L               | M               | R              |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|----------------|
| FR933  | .150<br>(3.81) | .150<br>(3.81) | .034<br>(.864) | .008<br>(.203) | .008<br>(.203) | .022<br>(.559) | .028<br>(.711) | .027<br>(.686) | .036<br>(.914) | .062<br>(1.575) | .134<br>(3.404) | .053<br>(1.346) | .037<br>(.940) |

| CASE # | T               | WT. GRAM |
|--------|-----------------|----------|
| FR933  | .154<br>(3.912) | 0.15     |

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

#### Notes:

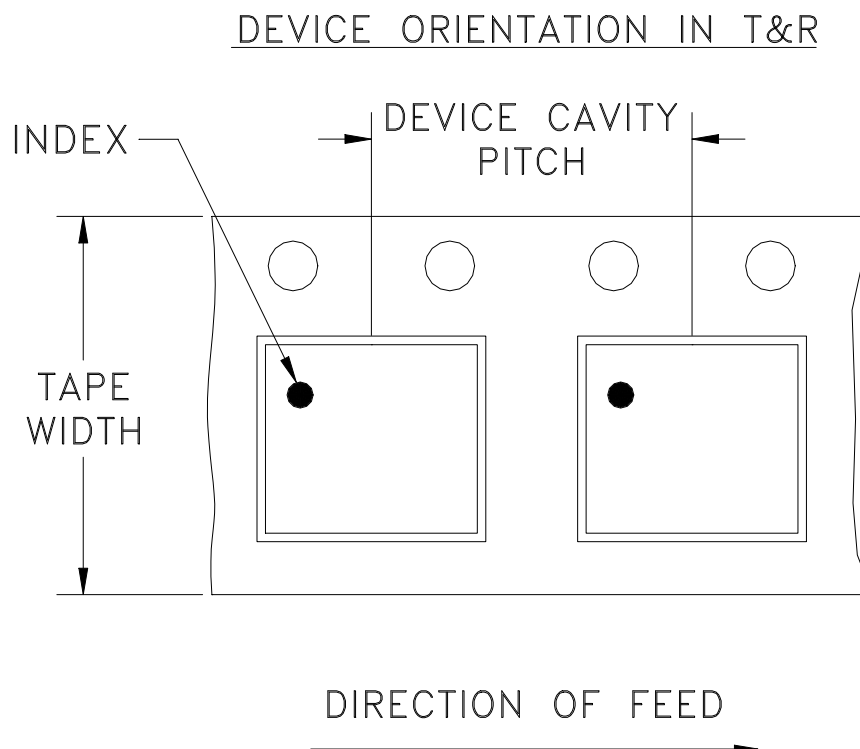
1. Open style, Ceramic Base.
2. Termination finish: Palladium Silver.



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Mini-Circuits ISO 9001 & ISO 14001 Certified

# 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.

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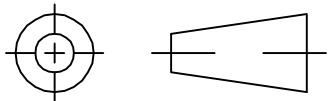
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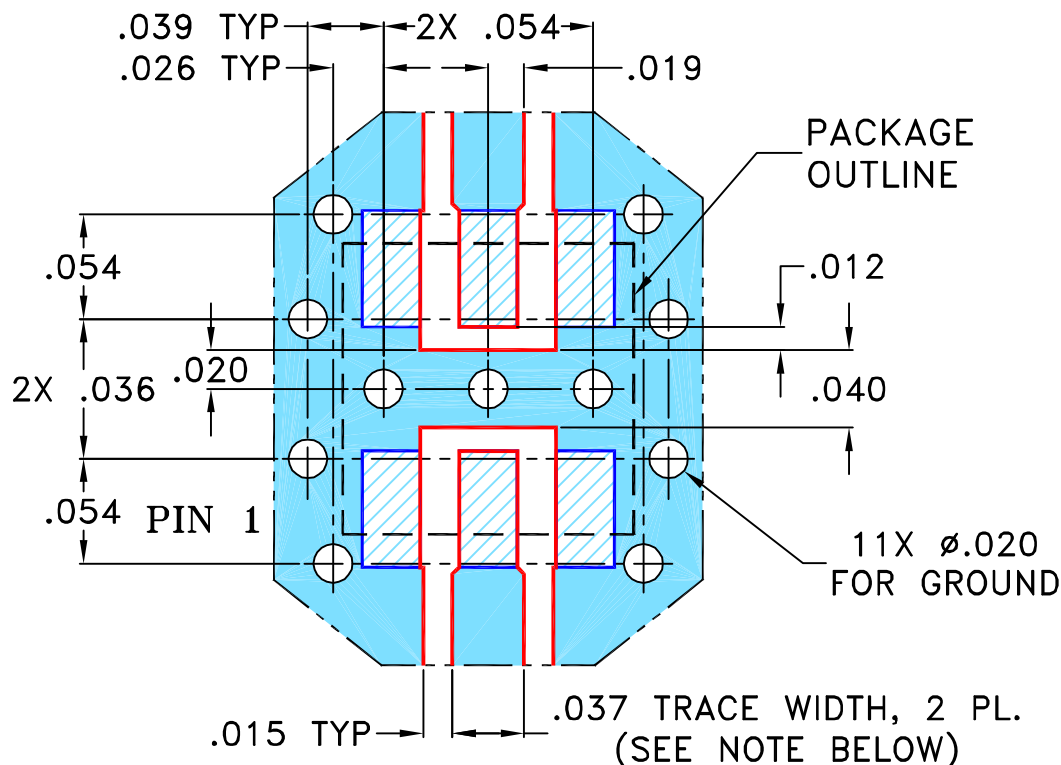
## THIRD ANGLE PROJECTION



## REVISIONS

| REV | ECN No. | DESCRIPTION                  | DATE     | DR  | AUTH |
|-----|---------|------------------------------|----------|-----|------|
| OR  | M83007  | NEW RELEASE                  | 09/04/02 | MMG | LER  |
| A   | M83501  | CNG LAYOUT AS PER B14-TB-233 | 10/01/02 | MMG | ABD  |
| B   | M102713 | ADDED "...WITH SMOBC"        | 01/14/06 | GF  | IL   |
| C   | M164713 | ADDED "933-1 & 06FL03"       | 11/15/17 | CA  | IL   |

**SUGGESTED MOUNTING CONFIGURATION**  
**FOR FR932/933/933-1 CASE STYLE, "06FL03" PIN CONNECTION**



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS 0.020"  $\pm$  0.0015"; 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

DIMENSIONS ARE IN INCHES

TOLERANCES ON:  
 2 PL DECIMALS  $\pm$   
 3 PL DECIMALS  $\pm$   
 ANGLES  $\pm$   
 FRACTIONS  $\pm$



INITIALS

DATE

DRAWN

MMG

09/04/02

CHECKED

APPROVED

LER(BC)

09/04/02

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



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PL, 06FL03, FR932/933/933-1, TB-233

SIZE  
 A

CODE IDENT  
 15542

DRAWING NO:  
 98-PL-112

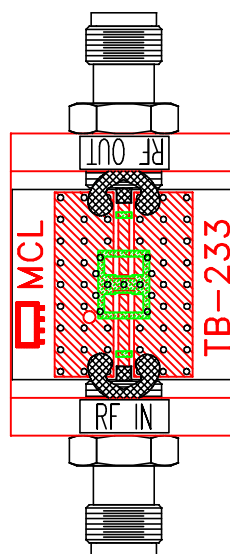
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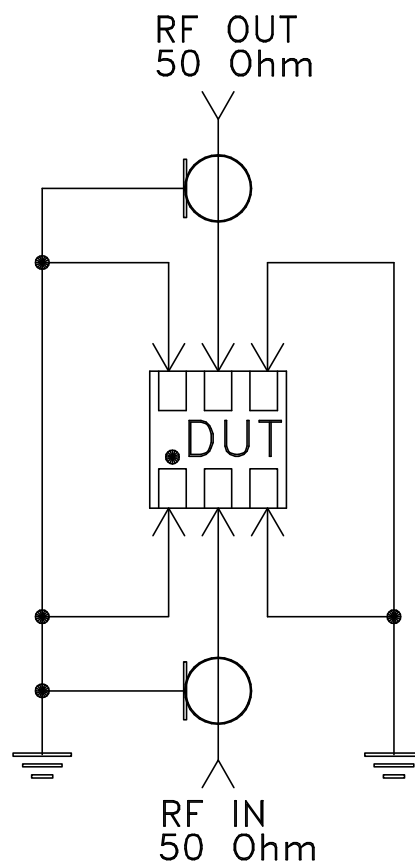
SCALE: 10:1

SHEET: 1 OF 1

# Evaluation Board and Circuit



TB-233



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      | -55° to 100°C<br>Ambient Environment                                                | Individual Model Data Sheet                                                                          |
| Storage Temperature        | -55° to 125° 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, Para 4.2.5, Test S, 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                                                                 |