

# Ceramic Balun RF Transformer

50Ω 3000 to 8000 MHz 1:2 Ratio

## NCS2-83-7+

### Features

- wideband, 3000 to 8000 MHz
- miniature size, 0.079"x0.049"x0.033"
- LTCC construction
- low cost
- aqueous washable

### Applications

- Point to Point
- ISM



Generic photo used for illustration purposes only

CASE STYLE: GE0805C-1

#### +RoHS Compliant

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

Available Tape and Reel at no extra cost

| Reel Size | Devices/Reel                      |
|-----------|-----------------------------------|
| 7"        | 20, 50, 100, 200, 500, 1000, 4000 |

### Electrical Specifications at 25°C

| Parameter                           | Frequency (MHz) | Min. | Typ. | Max. | Unit   |
|-------------------------------------|-----------------|------|------|------|--------|
| Impedance Ratio (secondary/primary) |                 |      | 2    |      |        |
| Frequency Range                     |                 | 3000 | —    | 8000 | MHz    |
| Insertion Loss <sup>1</sup>         | 3000-8000       | —    | 1.6  | 1.9  | dB     |
| Amplitude Unbalance                 | 3000-8000       | —    | 1.8  | 2.5  | dB     |
| Phase Unbalance <sup>2</sup>        | 3000-8000       | —    | 12   | 19   | Degree |

1. Insertion Loss is referenced to mid-band loss, 0.6 dB. Reference Demo Board TB-628+.

2. Relative to 180°

### Maximum Ratings

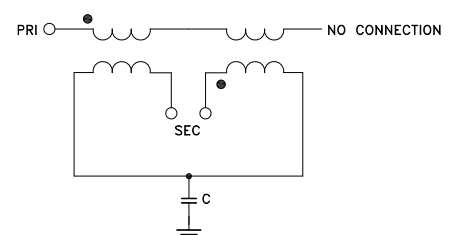
| Parameter             | Ratings        |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C  |
| Storage Temperature   | -55°C to 100°C |
| RF Power              | 3W             |

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

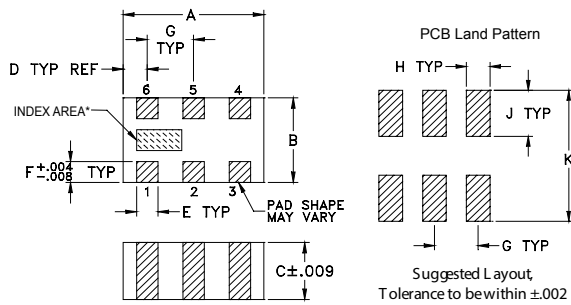
### Pad Connections

| Function                      | Pad Number |
|-------------------------------|------------|
| PRIMARY DOT (Unbalanced Port) | 1          |
| PRIMARY (GND)                 | 2          |
| SECONDARY DOT (Balanced)      | 4          |
| SECONDARY (Balanced)          | 6          |
| NO CONNECTION                 | 3          |
| NOT USED (GND Extremely)      | 5          |

### Configuration R



## Outline Drawing

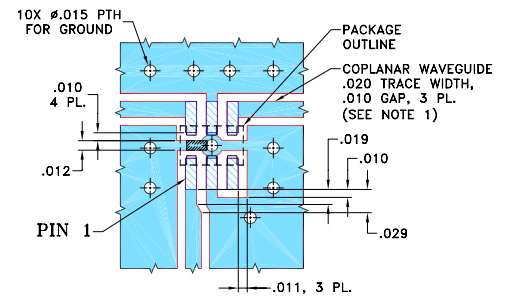


\*Shape of index marking may vary

## Outline Dimensions (Inch/mm)

| A    | B    | C    | D    | E     | F    |
|------|------|------|------|-------|------|
| .079 | .049 | .033 | .014 | .012  | .012 |
| 2.01 | 1.24 | 0.84 | 0.36 | 0.30  | 0.30 |
| G    | H    | J    | K    | wt    |      |
| .026 | .014 | .039 | .110 | grams |      |
| 0.66 | 0.36 | 1.00 | 2.80 | .008  |      |

## Demo Board MCL P/N: TB-628+ Suggested PCB Layout (PL-354)



### NOTES:

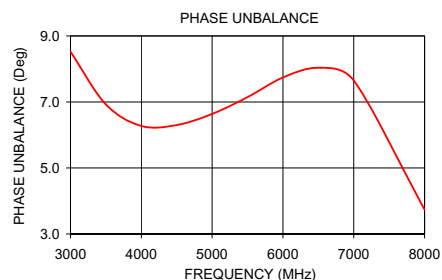
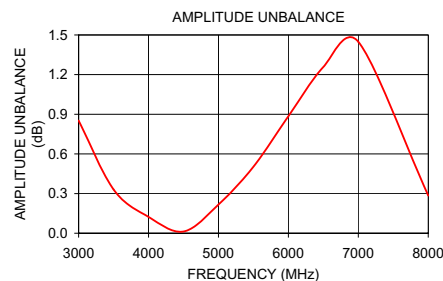
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010" ± .001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

- DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
- DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

## Typical Performance Data at 25°C<sup>3</sup>

| FREQUENCY (MHz) | INSERTION LOSS (dB) | INPUT R. LOSS (dB) | AMPLITUDE UNBALANCE (dB) | PHASE UNBALANCE (Deg.) |
|-----------------|---------------------|--------------------|--------------------------|------------------------|
| 3000.00         | 0.78                | 12.56              | 0.85                     | 8.52                   |
| 3500.00         | 0.83                | 11.58              | 0.33                     | 6.93                   |
| 4000.00         | 0.98                | 10.00              | 0.12                     | 6.27                   |
| 4500.00         | 0.93                | 10.64              | 0.01                     | 6.30                   |
| 5000.00         | 0.65                | 15.90              | 0.22                     | 6.64                   |
| 5500.00         | 0.57                | 24.01              | 0.50                     | 7.15                   |
| 6000.00         | 0.86                | 12.52              | 0.88                     | 7.74                   |
| 6500.00         | 1.16                | 10.54              | 1.26                     | 8.03                   |
| 7000.00         | 1.05                | 12.36              | 1.45                     | 7.65                   |
| 8000.00         | 1.15                | 17.40              | 0.29                     | 3.74                   |

3. Measured with Agilent E5071B network analyzer using impedance conversion and port extension.



### Additional 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-Circuits' 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)

## Typical Performance Data

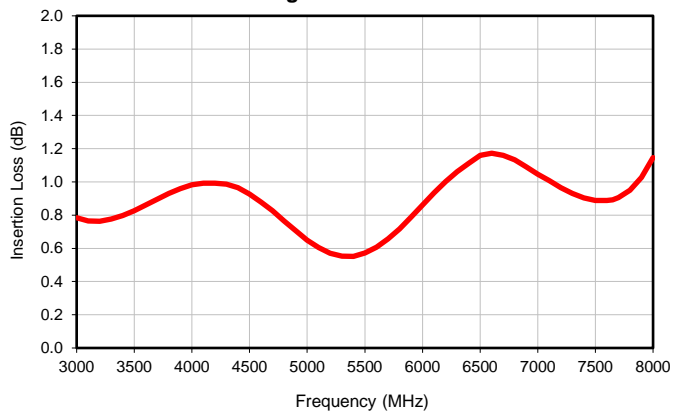
| FREQUENCY<br>(MHz) | AVERAGE<br>INSERTION LOSS*<br>(dB) | INPUT<br>RETURN LOSS<br>(dB) | AMPLITUDE<br>UNBALANCE<br>(dB) | PHASE<br>UNBALANCE**<br>(deg.) |
|--------------------|------------------------------------|------------------------------|--------------------------------|--------------------------------|
| 3000               | 0.78                               | 12.56                        | 0.85                           | 8.52                           |
| 3100               | 0.77                               | 12.66                        | 0.71                           | 8.11                           |
| 3200               | 0.76                               | 12.58                        | 0.58                           | 7.77                           |
| 3300               | 0.78                               | 12.33                        | 0.49                           | 7.42                           |
| 3400               | 0.80                               | 12.00                        | 0.41                           | 7.14                           |
| 3500               | 0.83                               | 11.58                        | 0.33                           | 6.93                           |
| 3600               | 0.86                               | 11.16                        | 0.27                           | 6.75                           |
| 3700               | 0.90                               | 10.78                        | 0.23                           | 6.60                           |
| 3800               | 0.93                               | 10.44                        | 0.18                           | 6.43                           |
| 3900               | 0.96                               | 10.19                        | 0.16                           | 6.38                           |
| 4000               | 0.98                               | 10.00                        | 0.12                           | 6.27                           |
| 4100               | 0.99                               | 9.94                         | 0.10                           | 6.22                           |
| 4200               | 0.99                               | 9.95                         | 0.07                           | 6.28                           |
| 4300               | 0.99                               | 10.04                        | 0.04                           | 6.28                           |
| 4400               | 0.97                               | 10.25                        | 0.01                           | 6.26                           |
| 4500               | 0.93                               | 10.64                        | 0.01                           | 6.30                           |
| 4600               | 0.88                               | 11.21                        | 0.06                           | 6.44                           |
| 4700               | 0.83                               | 11.91                        | 0.09                           | 6.38                           |
| 4800               | 0.76                               | 12.91                        | 0.12                           | 6.49                           |
| 4900               | 0.71                               | 14.15                        | 0.17                           | 6.54                           |
| 5000               | 0.65                               | 15.90                        | 0.22                           | 6.64                           |
| 5100               | 0.60                               | 18.20                        | 0.26                           | 6.70                           |
| 5200               | 0.57                               | 21.57                        | 0.30                           | 6.80                           |
| 5300               | 0.55                               | 26.96                        | 0.38                           | 6.98                           |
| 5400               | 0.55                               | 29.98                        | 0.41                           | 7.03                           |
| 5500               | 0.57                               | 24.01                        | 0.50                           | 7.15                           |
| 5600               | 0.61                               | 19.74                        | 0.56                           | 7.31                           |
| 5700               | 0.66                               | 17.03                        | 0.64                           | 7.30                           |
| 5800               | 0.72                               | 15.12                        | 0.71                           | 7.54                           |
| 5900               | 0.79                               | 13.61                        | 0.78                           | 7.75                           |
| 6000               | 0.86                               | 12.52                        | 0.88                           | 7.74                           |
| 6100               | 0.93                               | 11.68                        | 0.94                           | 7.56                           |
| 6200               | 1.00                               | 11.11                        | 1.02                           | 7.96                           |
| 6300               | 1.06                               | 10.72                        | 1.10                           | 8.01                           |
| 6400               | 1.11                               | 10.57                        | 1.17                           | 8.17                           |
| 6500               | 1.16                               | 10.54                        | 1.26                           | 8.03                           |
| 6600               | 1.17                               | 10.70                        | 1.30                           | 8.11                           |
| 6700               | 1.16                               | 10.91                        | 1.37                           | 8.02                           |
| 6800               | 1.13                               | 11.17                        | 1.44                           | 8.09                           |
| 6900               | 1.09                               | 11.65                        | 1.47                           | 7.85                           |
| 7000               | 1.05                               | 12.36                        | 1.45                           | 7.65                           |
| 7100               | 1.01                               | 13.19                        | 1.45                           | 7.36                           |
| 7200               | 0.97                               | 14.38                        | 1.41                           | 6.84                           |
| 7300               | 0.93                               | 15.96                        | 1.36                           | 6.27                           |
| 7400               | 0.90                               | 18.01                        | 1.28                           | 5.48                           |
| 7500               | 0.89                               | 20.97                        | 1.16                           | 4.69                           |
| 7600               | 0.89                               | 26.17                        | 0.99                           | 3.54                           |
| 7650               | 0.89                               | 30.09                        | 0.87                           | 2.88                           |
| 7700               | 0.90                               | 35.29                        | 0.76                           | 2.16                           |
| 7800               | 0.95                               | 27.19                        | 0.48                           | 0.48                           |
| 7900               | 1.03                               | 21.20                        | 0.14                           | 1.51                           |
| 8000               | 1.15                               | 17.40                        | 0.29                           | 3.74                           |

\* Insertion Loss is referenced to mid-band loss , 0.6 dB.

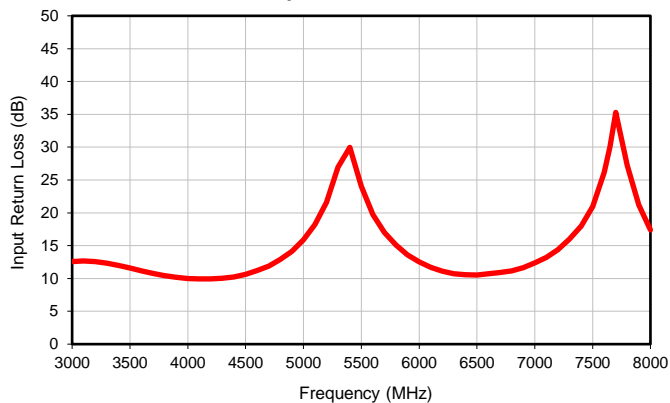
\*\*Phase Unbalance is relative to 180°

## Typical Performance Data

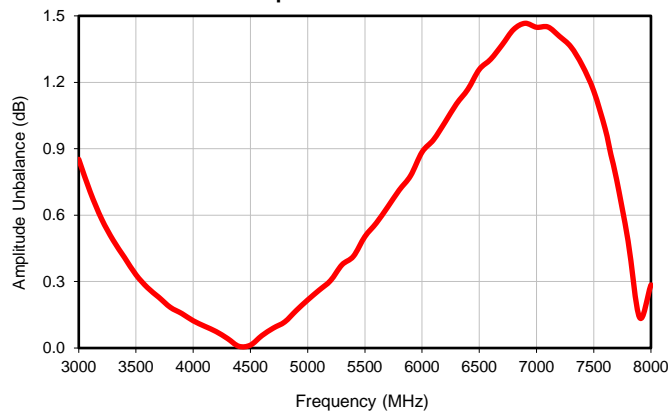
### Average Insertion Loss



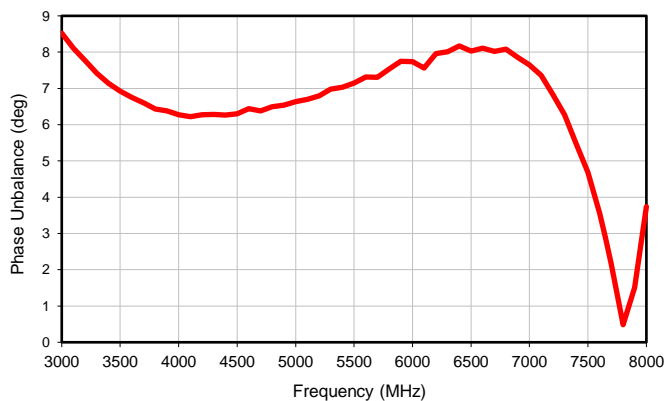
### Input Return Loss



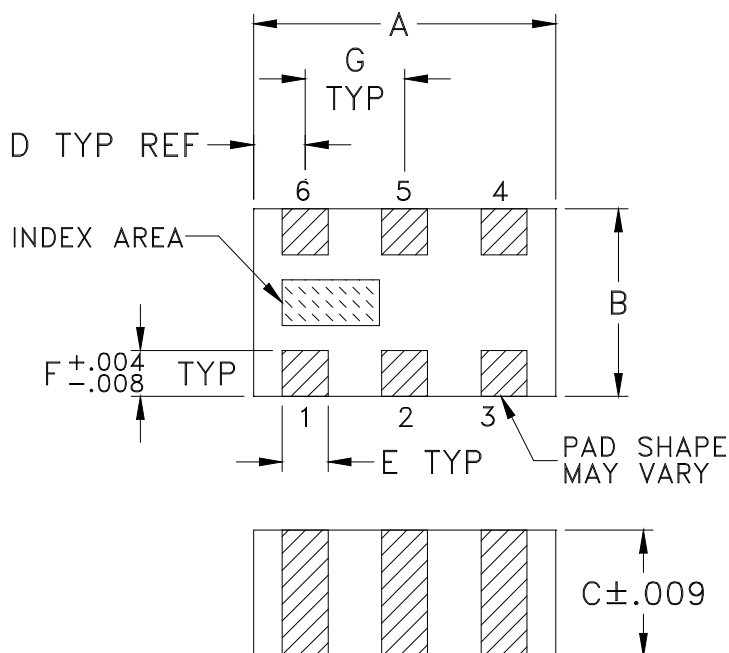
### Amplitude Unbalance



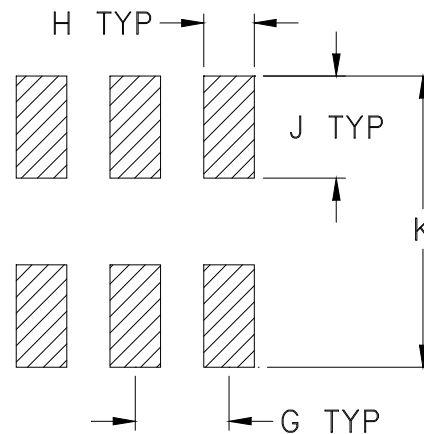
### Phase Unbalance



### Outline Dimensions



### PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm .002$

| CASE #    | A              | B              | C              | D              | E              | F              | G              | H              | J              | K              | WT. GRAM |
|-----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------|
| GE0805C-1 | .079<br>(2.00) | .049<br>(1.25) | .033<br>(0.84) | .014<br>(0.35) | .012<br>(0.30) | .012<br>(0.30) | .026<br>(0.65) | .014<br>(0.35) | .039<br>(1.00) | .110<br>(2.80) | .008     |

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

### Notes:

- Open style, ceramic base.
- Termination finish: For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.  
For RoHS-5 Case Style: Tin-lead plate. All models, no (+) suffix.



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

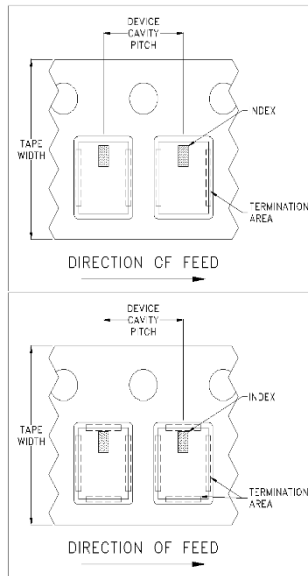


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RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F74

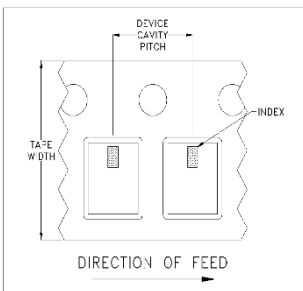
## **DEVICE ORIENTATION IN T&R**



**ILLUSTRATION 1**

### Applicable Case Styles

GE0805C-1  
GE0805C-1AP  
JV1210C-1  
GU2939



**ILLUSTRATION 2**

### Applicable Case Styles

JV1210C  
JV1210C-2  
JV1210C-3  
JV1210C-4  
JV1210C-5  
JV1210C-6  
JV1210C-11

**ILLUSTRATION 3**

### Applicable Case Styles

JC0603C-8  
JC0603C-9  
JV1210C-7  
JV1210C-8  
JV1210C-9  
JV1210C-10  
JV1210C-13  
GE0805C-13  
GE0805C-19  
GE0805C-20

| Tape Width,<br>mm | Device Cavity Pitch,<br>mm | Real Size,<br>inches | Devices per Reel                             |      |
|-------------------|----------------------------|----------------------|--|------|
| 8                 | 4                          | 7                    | Small<br>quantity<br>standards<br>(see note) | 20   |
|                   |                            |                      |  | 50   |
|                   |                            |                      |  | 100  |
|                   |                            |                      |  | 200  |
|                   |                            |                      |  | 500  |
|                   |                            |                      |  | 1000 |
|                   |                            |                      | Standard                                     | 2000 |
|                   |                            |                      |  | 4000 |

Note: Small reel availability varies by model. Refer to pricing and availability on individual model dashboard.

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)

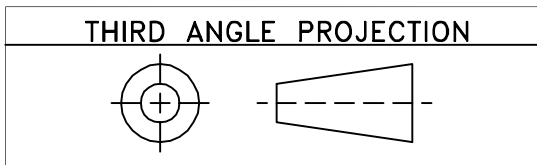


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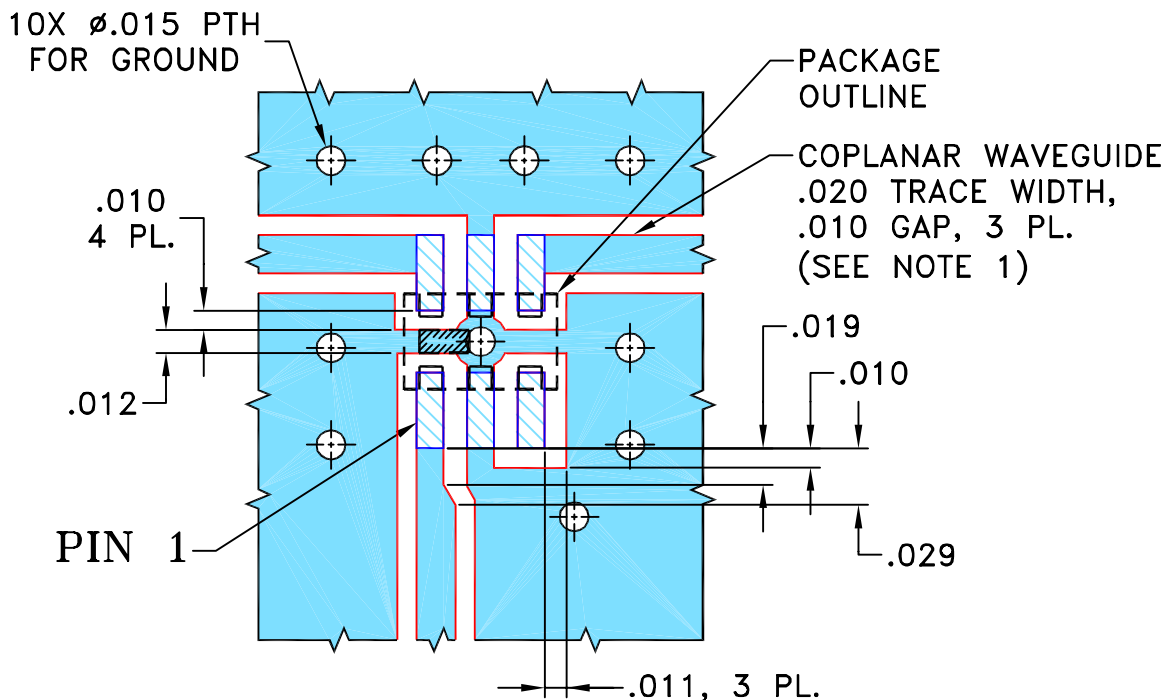
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| REVISIONS |         |             |          |    |      |
|-----------|---------|-------------|----------|----|------|
| REV OR    | ECN No. | DESCRIPTION | DATE     | DR | AUTH |
|           | M133782 | NEW RELEASE | 09/30/11 | AV | WP   |
|           |         |             |          |    |      |
|           |         |             |          |    |      |

**SUGGESTED MOUNTING CONFIGURATION  
FOR GE0805C-1 CASE STYLE, "06TJ02" PIN CODE**

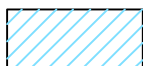


**NOTES:**

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .010" ± .001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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 AV    | 09/27/11 |
| TOLERANCES ON:             | CHECKED PW  | 09/30/11 |
| 2 PL DECIMALS ±            | APPROVED WP | 09/30/11 |
| 3 PL DECIMALS ± .005       |             |          |
| ANGLES ±                   |             |          |
| FRACTIONS ±                |             |          |



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Brooklyn NY 11235

**PL, 06TJ02, GE0805C-1, TB-628+**

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

|                  |                     |                          |            |
|------------------|---------------------|--------------------------|------------|
| SIZE<br>A        | CODE IDENT<br>15542 | DRAWING NO:<br>98-PL-354 | REV:<br>OR |
| FILE:<br>98PL354 | SCALE:<br>10:1      | SHEET:<br>1 OF 1         |            |

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, 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   |