

Surface Mount

# RF Transformer

## SCTX1.33-33-2W+

75Ω 10 to 3000 MHz

### The Big Deal

- 75 ohm single-ended to 100 ohm differential outputs
- Super wideband, 10 to 3000 MHz
- Low insertion loss, 2.0 dB typ. up to 3 GHz
- Amplitude Unbalance,  $\pm 0.3$  dB typ. up to 3 GHz
- Good input return loss, 14 dB typ.
- Low phase unbalance,  $\pm 3^\circ$  typ.
- Common mode rejection, 28 dB typ.



CASE STYLE: SN2595

### Product Overview

Mini-Circuits' SCTX1.33-33-2W+ is a surface-mount transmission line transformer (core and Semi-Rigid cable) covering a very wide frequency range from 10 to 3000 MHz. The transformer provides low insertion loss with excellent phase and amplitude performance. Featuring core and cable construction on a 12-lead PCB unit measures 0.60 x 0.60 x 0.15 accommodating dense circuit board layouts.

### Key Features

| Feature                            | Advantages   |
|------------------------------------|--|
| Wideband, 10 to 3000 MHz           | Super wide frequency range covers bandwidth requirements for many broadband applications.  |
| Low insertion loss, 2.0 dB         | SCTX1.33-33-2W+ provides excellent signal transmission from input to output with consistent performance across its entire frequency range. |
| Good Phase and Amplitude Unbalance | Provides good CMRR and IP2.  |
| Small size (0.60 x 0.60 x 0.15)    | Provide good solderability and tight layouts.  |

#### 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-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)



# Surface Mount RF Transformer

## SCTX1.33-33-2W+

75Ω 10 to 3000 MHz 1:1.33 Ratio

### Maximum Ratings

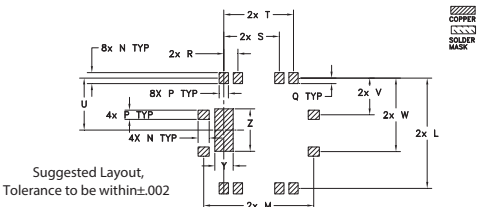
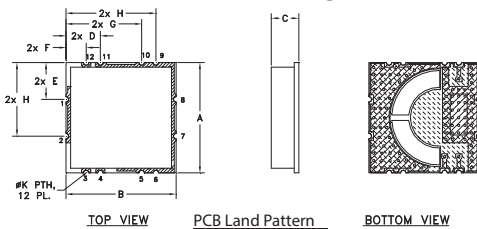
|                       |                |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C  |
| Storage Temperature   | -55°C to 100°C |
| RF Power              | 2W             |

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

### Pin Connections

|               |                  |
|---------------|------------------|
| PRIMARY DOT   | 12               |
| PRIMARY (GND) | 11               |
| SECONDARY DOT | 3                |
| SECONDARY     | 4                |
| GROUND        | 1,2,5,6,7,8,9,10 |

### Outline Drawing



### Outline Dimensions (inch/mm)

| A     | B     | C    | D    | E    | F    | G     | H     | J     | K    | L     | M     |
|-------|-------|------|------|------|------|-------|-------|-------|------|-------|-------|
| .600  | .600  | .150 | .187 | .200 | .110 | .412  | .490  | .400  | .030 | .600  | .600  |
| 15.24 | 15.24 | 3.81 | 4.75 | 5.08 | 2.79 | 10.46 | 12.45 | 10.16 | 0.76 | 15.24 | 15.24 |
| N     | P     | Q    | R    | S    | T    | U     | V     | W     | Y    | Z     | wt    |
| .060  | .050  | .030 | .076 | .303 | .380 | .283  | .200  | .400  | .100 | .231  | grams |
| 1.52  | 1.27  | 0.76 | 1.93 | 7.70 | 9.65 | 7.19  | 5.08  | 10.16 | 2.54 | 5.87  | 1.2   |

### Features

- 75 ohm single-ended to 100 ohm differential outputs
- wide bandwidth 10 to 3000 MHz
- unbalanced to balanced transformer
- excellent amplitude and phase unbalance
- aqueous washable

### Applications

- defense communication
- CATV
- DOCSIS 3.1
- cellular
- line of sight links
- wideband push-pull amplifiers

### Electrical Specifications at 25°C

| Parameter                           | Frequency (MHz) | Min. | Typ. | Max. | Unit   |
|-------------------------------------|-----------------|------|------|------|--------|
| Impedance Ratio (secondary/primary) |                 |      | 1.33 |      |        |
| Frequency Range                     |                 | 10   |      | 3000 | MHz    |
| Insertion Loss (Average)            | 10-50           | —    | 1.8  | 2.4  | dB     |
|                                     | 50-1250         | —    | 1.9  | 2.5  |        |
|                                     | 1250-3000       | —    | 2.1  | 2.8  |        |
| Amplitude Unbalance (±)             | 10-50           | —    | 0.05 | 0.2  | dB     |
|                                     | 50-1250         | —    | 0.1  | 0.3  |        |
|                                     | 1250-3000       | —    | 0.3  | 0.7  |        |
| Phase Unbalance (±)                 | 10-50           | —    | 2    | 5    | Degree |
|                                     | 50-1250         | —    | 1.5  | 3    |        |
|                                     | 1250-3000       | —    | 3    | 6    |        |
| Common mode rejection               | 10-3000         | 21   | 28   | —    | dB     |

### Typical Performance Data

| FREQ. (MHz) | INS. LOSS (dB) | INPUT R. LOSS (dB) | AMP. UNBAL. (dB) | PHASE UNBAL. (deg.) |
|-------------|----------------|--------------------|------------------|---------------------|
| 10          | 1.89           | 23.34              | 0.16             | 5.67                |
| 50          | 1.90           | 24.10              | 0.14             | 1.14                |
| 100         | 1.90           | 23.89              | 0.11             | 0.81                |
| 300         | 1.91           | 21.31              | 0.02             | 0.66                |
| 500         | 1.93           | 18.38              | 0.04             | 0.31                |
| 1000        | 2.00           | 14.71              | 0.07             | 0.07                |
| 1400        | 2.01           | 13.80              | 0.16             | 0.04                |
| 2000        | 2.04           | 13.01              | 0.38             | 0.86                |
| 2400        | 2.14           | 12.43              | 0.47             | 2.50                |
| 3000        | 2.34           | 12.44              | 0.28             | 5.78                |

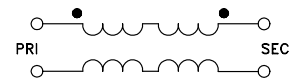


CASE STYLE: SN2595

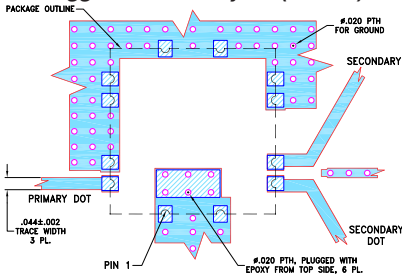
**+RoHS Compliant**

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

### Config. G



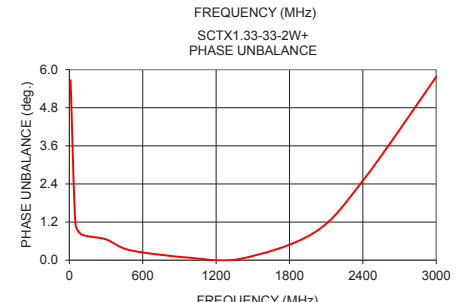
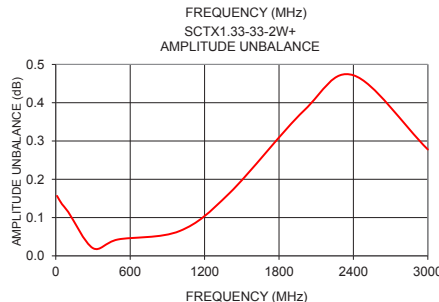
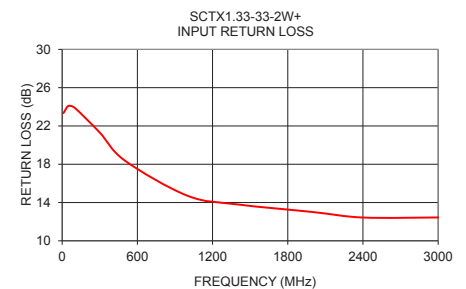
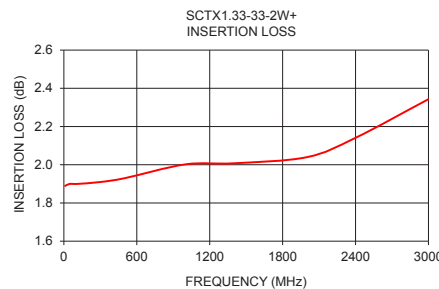
### Demo Board MCL P/N: TB-1005+ Suggested PCB Layout (PL-595)



- NOTES:
1. 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.
  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 SOLDERMASK

### 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)



# RF Transformer

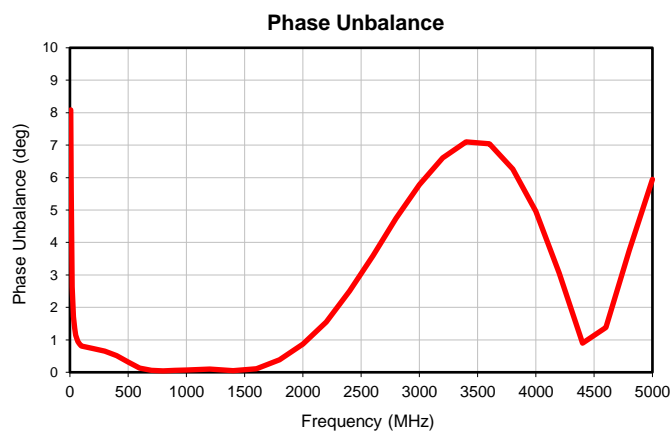
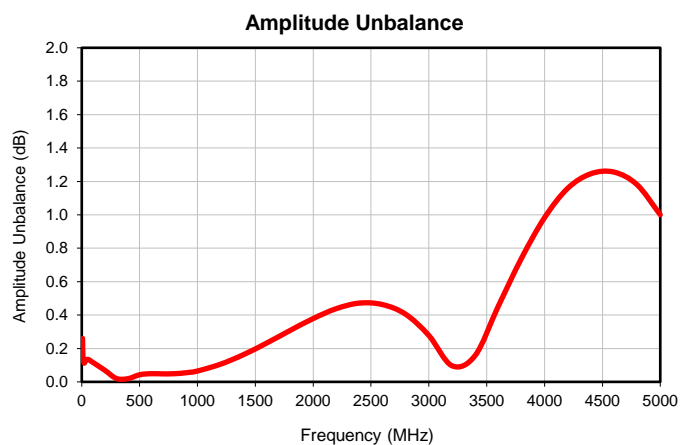
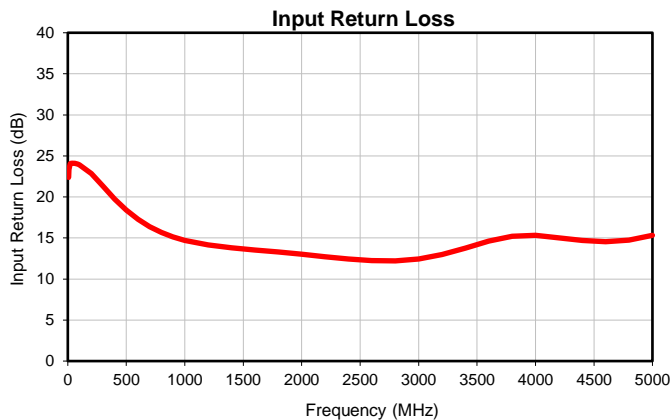
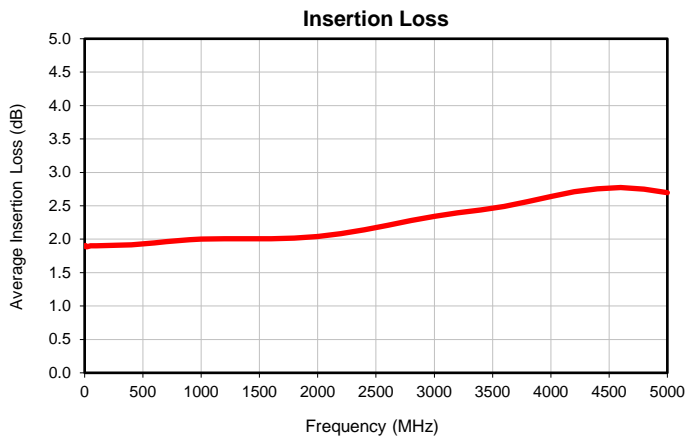
# SCTX1.33-33-2W+

## Typical Performance Data

| FREQUENCY<br>(MHz) | INSERTION LOSS<br>(dB) | INPUT RETURN LOSS<br>(dB) | AMPLITUDE<br>UNBALANCE<br>(dB) | PHASE<br>UNBALANCE <sup>(1)</sup><br>(Deg) |
|--------------------|------------------------|---------------------------|--------------------------------|--|
| 7                  | 1.90                   | 22.39                     | 0.26                           | 8.09                                       |
| 10                 | 1.89                   | 23.34                     | 0.16                           | 5.67                                       |
| 20                 | 1.89                   | 24.06                     | 0.11                           | 2.64                                       |
| 30                 | 1.89                   | 24.10                     | 0.12                           | 1.72                                       |
| 40                 | 1.90                   | 24.10                     | 0.13                           | 1.35                                       |
| 50                 | 1.90                   | 24.10                     | 0.14                           | 1.14                                       |
| 60                 | 1.90                   | 24.09                     | 0.13                           | 1.02                                       |
| 70                 | 1.90                   | 24.06                     | 0.13                           | 0.95                                       |
| 80                 | 1.90                   | 24.02                     | 0.12                           | 0.89                                       |
| 90                 | 1.90                   | 23.97                     | 0.12                           | 0.84                                       |
| 100                | 1.90                   | 23.89                     | 0.11                           | 0.81                                       |
| 200                | 1.91                   | 22.84                     | 0.07                           | 0.73                                       |
| 300                | 1.91                   | 21.31                     | 0.02                           | 0.66                                       |
| 400                | 1.92                   | 19.75                     | 0.02                           | 0.51                                       |
| 500                | 1.93                   | 18.38                     | 0.04                           | 0.31                                       |
| 600                | 1.95                   | 17.28                     | 0.05                           | 0.13                                       |
| 700                | 1.96                   | 16.39                     | 0.05                           | 0.06                                       |
| 800                | 1.98                   | 15.69                     | 0.05                           | 0.04                                       |
| 900                | 1.99                   | 15.15                     | 0.05                           | 0.06                                       |
| 1000               | 2.00                   | 14.71                     | 0.07                           | 0.07                                       |
| 1200               | 2.01                   | 14.14                     | 0.11                           | 0.10                                       |
| 1400               | 2.01                   | 13.80                     | 0.16                           | 0.04                                       |
| 1600               | 2.01                   | 13.54                     | 0.23                           | 0.11                                       |
| 1800               | 2.02                   | 13.28                     | 0.31                           | 0.38                                       |
| 2000               | 2.04                   | 13.01                     | 0.38                           | 0.86                                       |
| 2200               | 2.08                   | 12.70                     | 0.44                           | 1.55                                       |
| 2400               | 2.14                   | 12.43                     | 0.47                           | 2.50                                       |
| 2600               | 2.21                   | 12.23                     | 0.46                           | 3.59                                       |
| 2800               | 2.28                   | 12.21                     | 0.40                           | 4.74                                       |
| 3000               | 2.34                   | 12.44                     | 0.28                           | 5.78                                       |
| 3200               | 2.39                   | 12.98                     | 0.10                           | 6.61                                       |
| 3400               | 2.44                   | 13.75                     | 0.16                           | 7.10                                       |
| 3600               | 2.49                   | 14.61                     | 0.45                           | 7.04                                       |
| 3800               | 2.56                   | 15.19                     | 0.74                           | 6.26                                       |
| 4000               | 2.64                   | 15.30                     | 0.98                           | 4.96                                       |
| 4200               | 2.71                   | 15.02                     | 1.16                           | 3.06                                       |
| 4400               | 2.75                   | 14.69                     | 1.25                           | 0.89                                       |
| 4600               | 2.77                   | 14.54                     | 1.26                           | 1.38                                       |
| 4800               | 2.75                   | 14.74                     | 1.18                           | 3.76                                       |
| 5000               | 2.70                   | 15.34                     | 1.00                           | 5.94                                       |

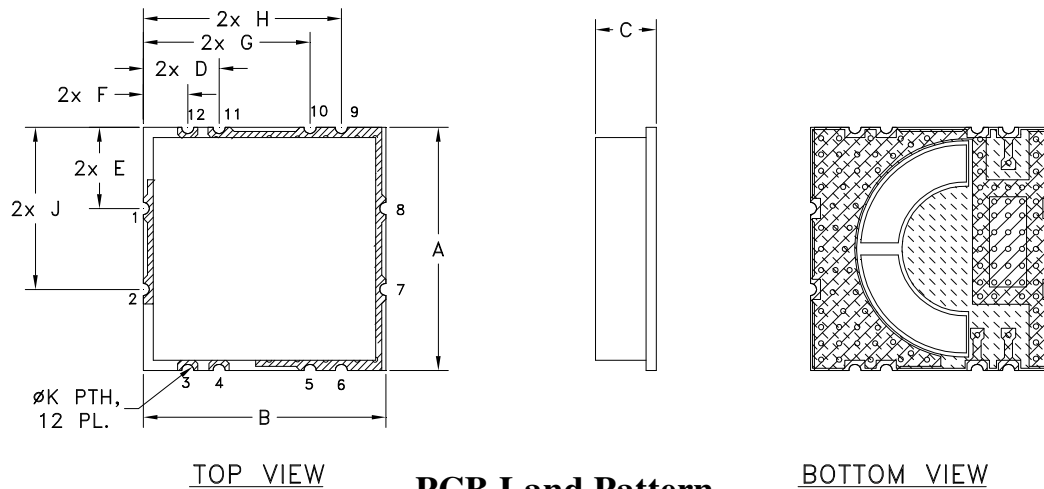
<sup>(1)</sup> Relative to 180°

## Typical Performance Data

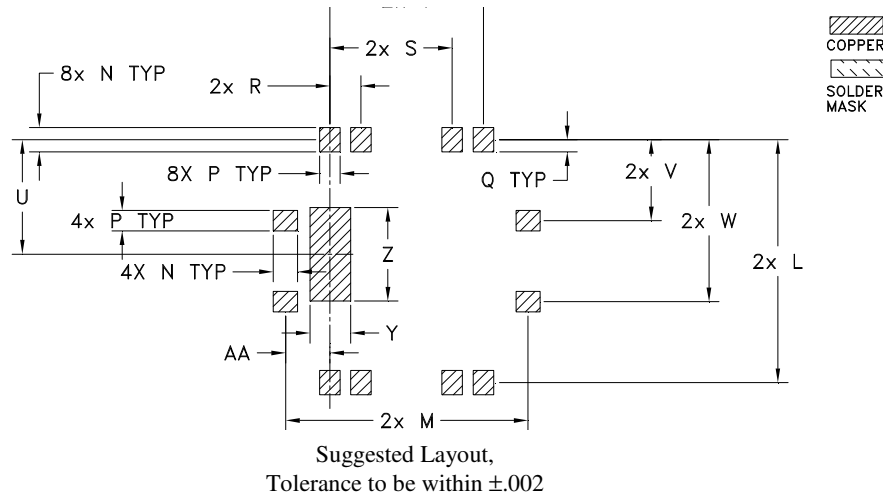


## Outline Dimensions

SN2595



## PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm 0.002$

| CASE # | A               | B               | C              | D              | E              | F              | G               | H               | J               | K               |
|--------|-----------------|-----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|
| SN2595 | .600<br>(15.24) | .600<br>(15.24) | .150<br>(3.81) | .187<br>(4.76) | .200<br>(5.08) | .110<br>(2.79) | .412<br>(10.48) | .490<br>(12.45) | .400<br>(10.16) | .030<br>(0.762) |
| CASE # | L               | M               | N              | P              | Q              | R              | S               | T               | U               | V               |
| SN2595 | .600<br>(15.24) | .600<br>(15.24) | .060<br>(1.53) | .050<br>(1.28) | .030<br>(.76)  | .076<br>(1.94) | .303<br>(7.68)  | .380<br>(9.65)  | .283<br>(7.18)  | .200<br>(5.08)  |
| CASE # | W               | Y               | Z              | AA             | WT. GRAM       |                |                 |                 |                 |                 |
| SN2595 | .400<br>(10.16) | .100<br>(2.54)  | .231<br>(5.87) | .110<br>(2.79) | 1.2            |                |                 |                 |                 |                 |

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

### Notes:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- Termination finish:  
For RoHS Case Styles: 3-5  $\mu$  inch (.08-.13 microns) Gold over 120-240  $\mu$  inch (3.05-6.10 microns) Nickel plate.



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

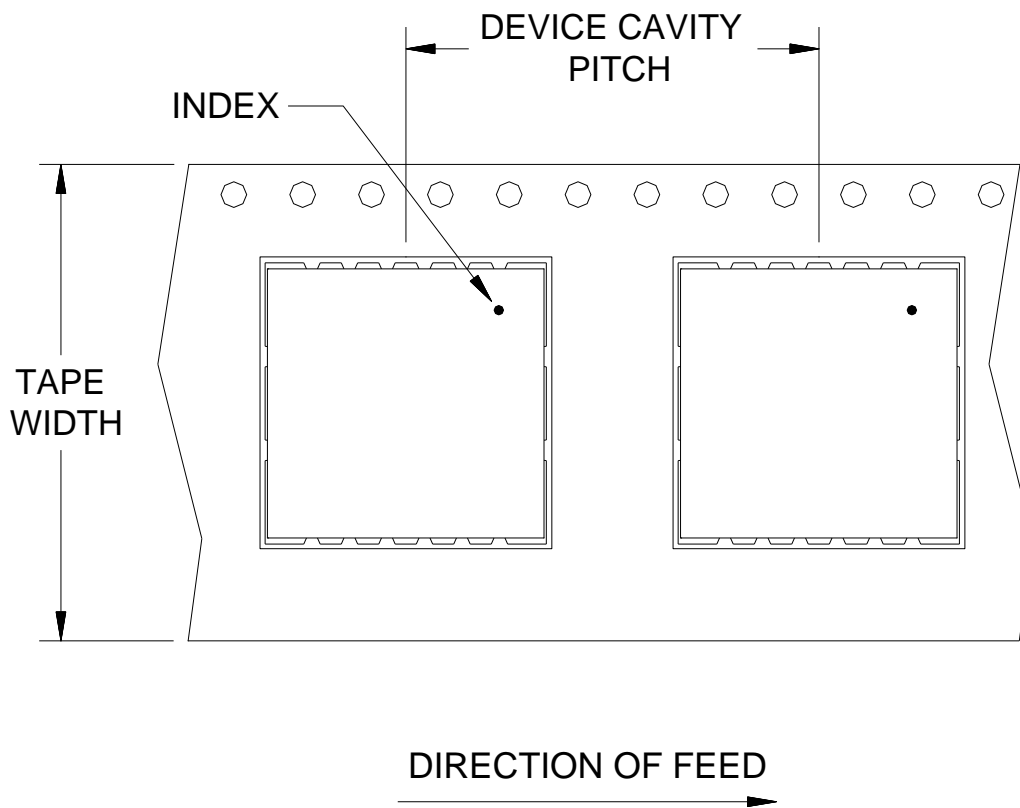


The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F95

## DEVICE ORIENTATION IN T&R



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel                    |     |
|----------------|-------------------------|-------------------|-------------------------------------|-----|
| 24             | 24                      | 13                | Small quantity standards (see note) | 20  |
|                |                         |                   |                                     | 50  |
|                |                         |                   |                                     | 100 |
|                |                         |                   |                                     | 200 |
|                |                         |                   | Standard                            | 500 |

Note: Please consult individual model data sheet to determine device per reel availability.

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)



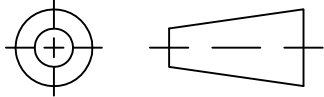
INTERNET <http://www.minicircuits.com>

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010

Mini-Circuits ISO 9001 & ISO 14001 Certified

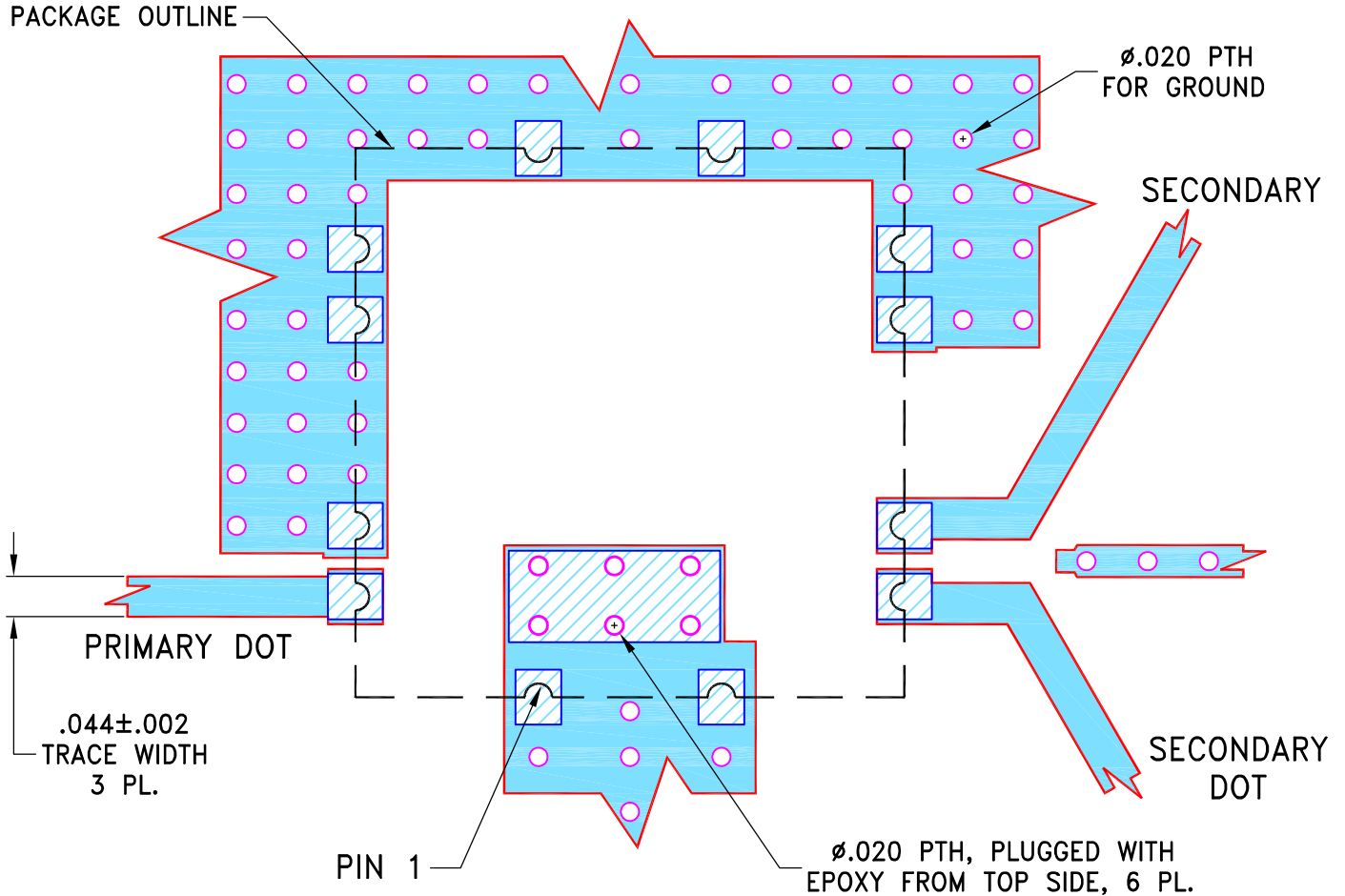
THIRD ANGLE PROJECTION



REVISIONS



| REV | ECN No. | DESCRIPTION | DATE     | DR  | AUTH |
|-----|---------|-------------|----------|-----|------|
| OR  | M168695 | NEW RELEASE | 06/28/18 | ITG | WP   |
|     |         |             |          |     |      |
|     |         |             |          |     |      |

SUGGESTED MOUNTING CONFIGURATION FOR  
SN2595 CASE STYLE "12TG01" PIN CODE



NOTES:

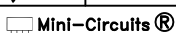
1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B, WITH DIELECTRIC THICKNESS .020"±.0015". COPPER: 1/2 Oz. EACH SIDE.  
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

| UNLESS OTHERWISE SPECIFIED | INITIALS |     | DATE     |
|----------------------------|----------|-----|----------|
| DIMENSIONS ARE IN INCHES   | DRAWN    | ITG | 06/28/18 |
| TOLERANCES ON:             | CHECKED  | GF  | 06/28/18 |
| 2 PL DECIMALS ±            | APPROVED | WP  | 06/28/18 |
| 3 PL DECIMALS ± .005"      |          |     |          |
| ANGLES ±                   |          |     |          |
| FRACTIONS ±                |          |     |          |

 **Mini-Circuits®** 13 Neptune Avenue  
Brooklyn NY 11235

PL, 12TG01, SN2595, TB-1005+

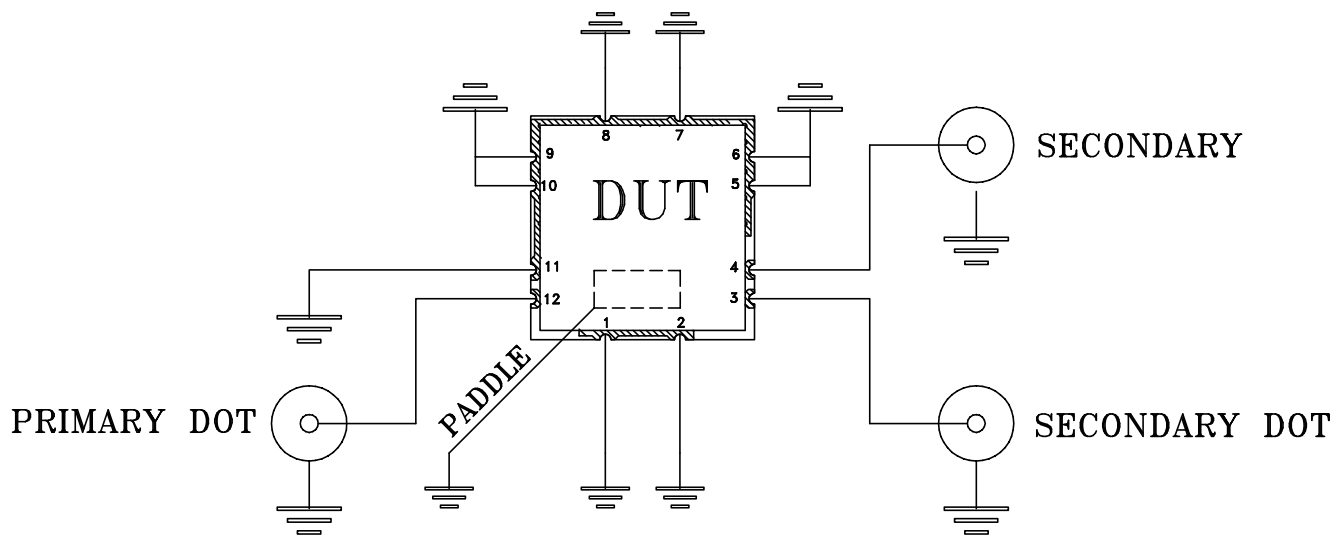
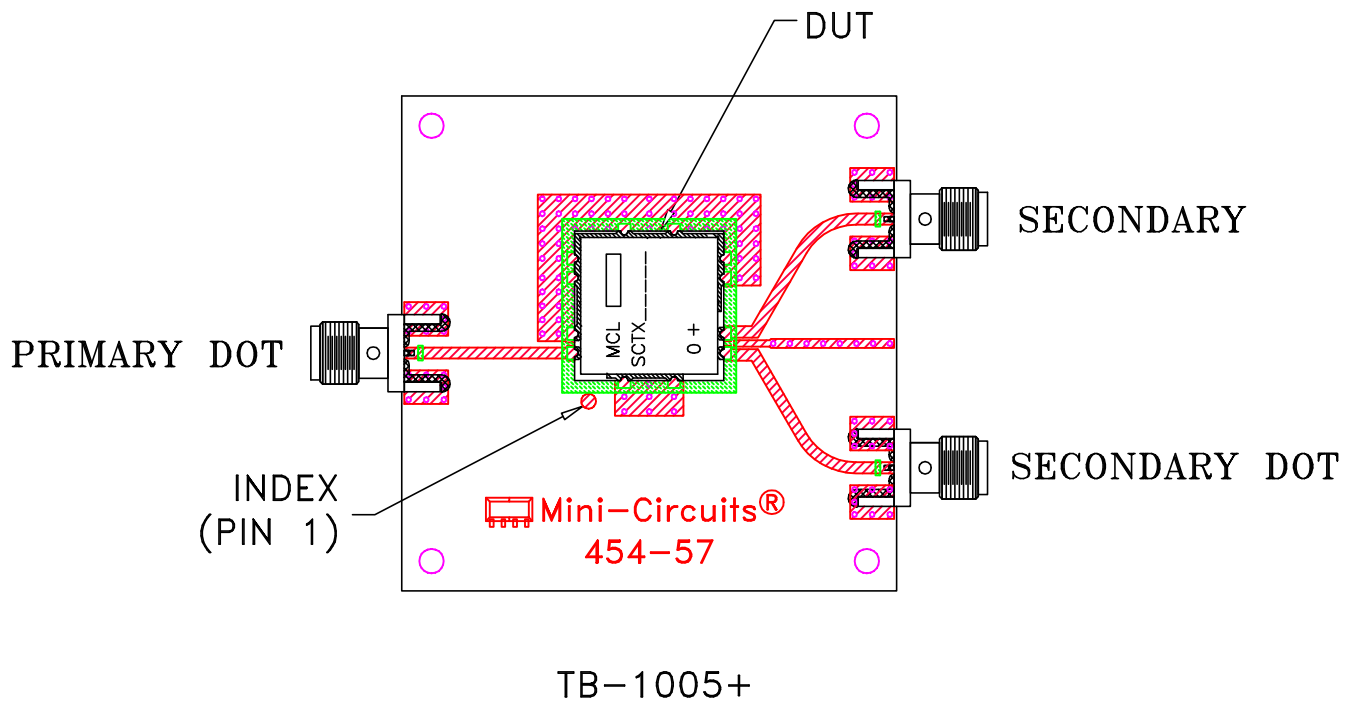
 Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE, MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

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

| SIZE  | CODE IDENT | DRAWING NO: | REV:   |
|-------|------------|-------------|--------|
| A     | 15542      | 98-PL-595   | OR     |
| FILE: | 98PL595    | SCALE:      | SHEET: |
|       |            | 5:1         | 1 OF 1 |

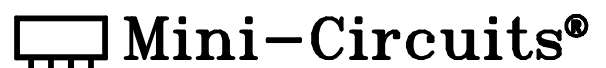
# Evaluation Board and Circuit



Schematic Diagram

**Notes:**

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 or equivalent, Dielectric Constant=3.5, Thickness=.020 inch.





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  |