SURFACE MOUNT top hat

# RF Transformer

# SCTX4-52HP-20W+

12.5/50Ω 30 to 512 MHz 20 Watt 1:4 Ratio

## THE BIG DEAL

- High Power Input, 20 Watt max.
- Low Insertion Loss, 0.3 dB typ.
- Small size, 0.50 x 0.50 x 0.20"
- Excellent Return Loss, 23 dB typ.

*Generic photo used for illustration purposes only*

CASE STYLE: CK2335-1

**+RoHS Compliant**
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

## APPLICATIONS

- VHF/UHF Radios & Aircraft Communications
- BALUN
- Diode matching

## PRODUCT OVERVIEW

Mini-Circuits' SCTX4-52HP-20W+ is a high-power, surface-mount transformer with a primary/secondary impedance ratio of 1:4, covering the 30 to 512 MHz band. The transformer is capable of handling RF input power up to 20W across entire bandwidth. It provides low insertion loss (0.3 dB) as well as good matching VSWR 1.10:1. Featuring core and wire construction mounted on PCB, the unit comes enclosed in a miniature, shielded package measuring just 0.50 x 0.50 x 0.20", ideal for dense circuit board layouts.

## KEY FEATURES

| Feature | Advantages |
|---|---|
| High RF Power Handling (20W) | Supports systems with high power requirements in small device size. |
| Low Insertion Loss, 0.3 dB | Provides excellent transmission of signal power from input to output. |
| Good Return Loss, 20 dB typ | Provide good in to output impedance matching. |
| Small Footprint, 0.50 x 0.50 x 0.20" | Accommodates tight space requirements for dense PCB layouts. |

REV. E
ECO-020468
SCTX4-52HP-20W+
MCL NY
240104

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# RF Transformer

# SCTX4-52HP-20W+

12.5/50Ω 30 to 512 MHz 20 Watt 1:4 Ratio

## ELECTRICAL SPECIFICATIONS AT 25°C

| Parameter | Frequency (MHz) | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Impedance Ratio (secondary/primary) | | | 4 | | |
| Frequency Range | | 30 | — | 512 | MHz |
| Insertion Loss | 30 - 100 | — | 0.3 | 0.5 | dB |
| | 30 - 512 | — | 0.5 | 0.9 | |
| Return Loss* (Primary) | 30 - 100 | 20 | 30 | — | dB |
| | 30 - 512 | 12 | 20 | — | |
| Input Power | 30 - 512 | — | — | 20 | Watt |

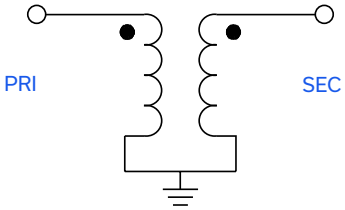
* For the frequency range from 450 to 512MHz, the Return loss may go up to the Min. spec.

## ABSOLUTE MAXIMUM RATINGS

| Parameter | Ratings |
|---|---|
| Operating Temperature | -40°C to 85°C case* |
| Storage Temperature | -55°C to 100°C |

*Case temperature is defined as temperature on ground leads.
Permanent damage may occur if any of these limits are exceeded.

## CONFIGURATION D



SURFACE MOUNT top hat

# RF Transformer SCTX4-52HP-20W+

12.5/50Ω 30 to 512 MHz 20 Watt 1:4 Ratio

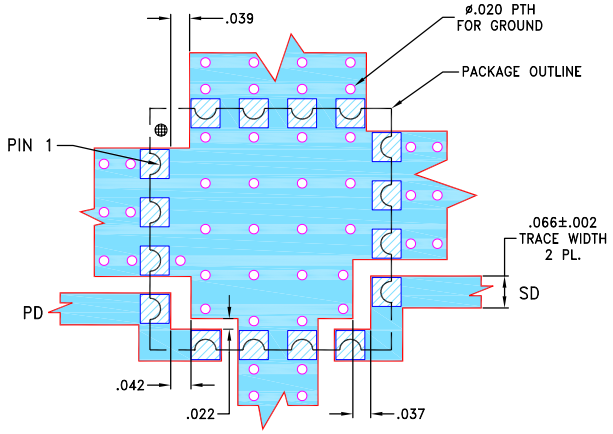
## PAD CONNECTIONS

| | |
|---|---|
| PRIMARY (12.5 ohm) | 4,5 |
| SECONDARY (50 ohm) | 8,9 |
| GND | all others |

## PRODUCT MARKING: VN

## DEMO BOARD MCL P/N: TB-SCTX452HP20W

## SUGGESTED PCB LAYOUT: (PL-698)



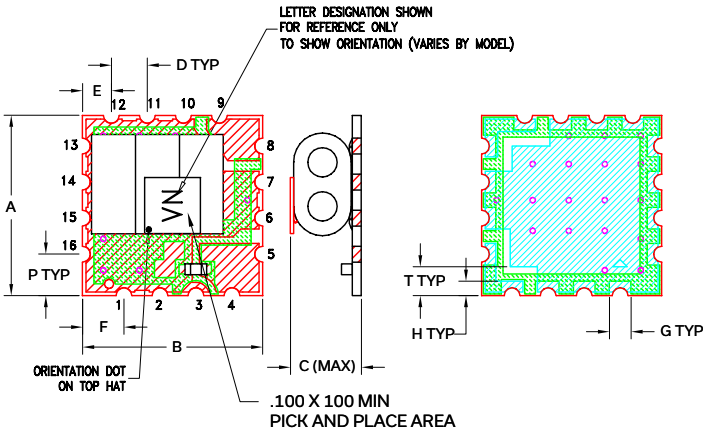

NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B, WITH DIELECTRIC THICKNESS .030"±.002". 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

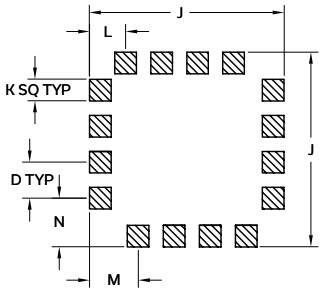
## OUTLINE DRAWING




DENOTES METALLIZATION.

DENOTES SOLDER MASK.

## PCB Land Pattern




Suggested Layout
Tolerance to be within ±.002

## OUTLINE DIMENSIONS (Inch / mm)

| A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|
| .500 | .500 | .209 | .100 | .080 | .115 | .060 | .040 |
| 12.70 | 12.70 | 5.31 | 2.54 | 2.03 | 2.92 | 1.52 | 1.02 |

| J | K | L | M | N | P | T | wt. |
|---|---|---|---|---|---|---|---|
| .540 | .060 | .100 | .135 | .135 | .115 | .080 | grams |
| 13.72 | 1.52 | 2.54 | 3.43 | 3.43 | 2.92 | 2.03 | 1.0 |

## TAPE & REEL INFORMATION: F37

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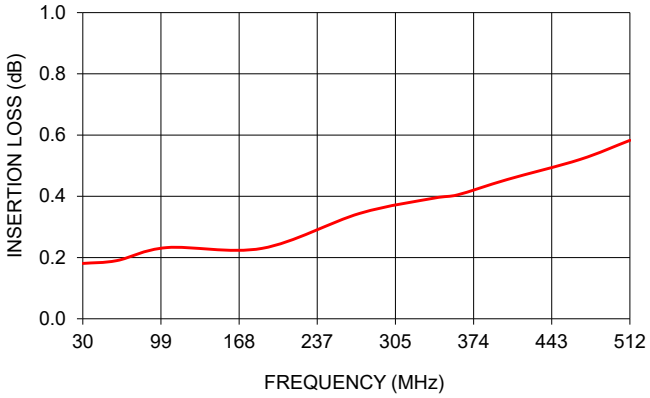
# RF Transformer SCTX4-52HP-20W+

12.5/50Ω 30 to 512 MHz 20 Watt 1:4 Ratio

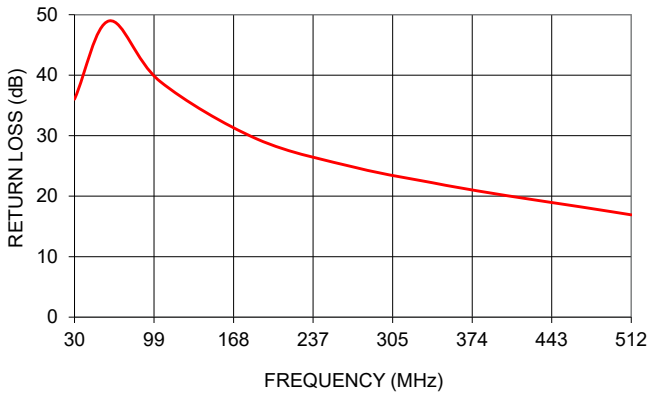
## TYPICAL PERFORMANCE DATA

| Frequency (MHz) | Insertion Loss (dB) | Primary Return Loss (dB) |
|---|---|---|
| 30 | 0.18 | 36.03 |
| 60 | 0.19 | 48.98 |
| 104 | 0.23 | 38.98 |
| 188 | 0.23 | 29.44 |
| 274 | 0.34 | 24.71 |
| 340 | 0.39 | 22.22 |
| 360 | 0.40 | 21.50 |
| 404 | 0.45 | 20.09 |
| 468 | 0.52 | 18.23 |
| 512 | 0.58 | 16.91 |

SCTX4-52HP-20W+
INSERTION LOSS




SCTX4-52HP-20W+
INPUT RETURN LOSS




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/terms/viewterm.html

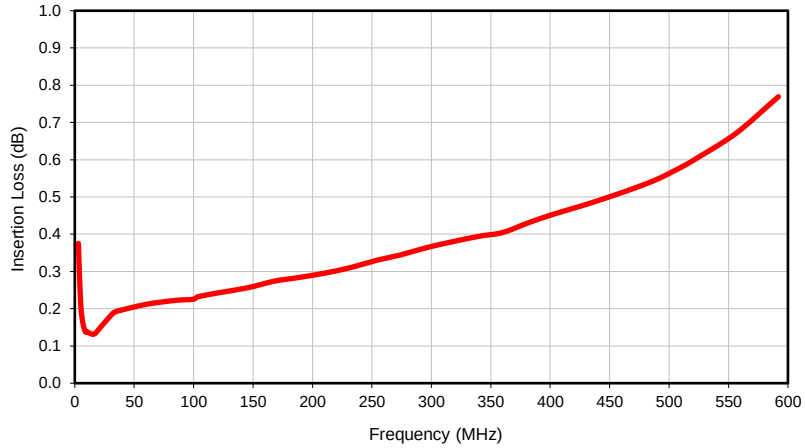
# RF Transformer SCTX4-52HP-20W+

*Typical Performance Data*

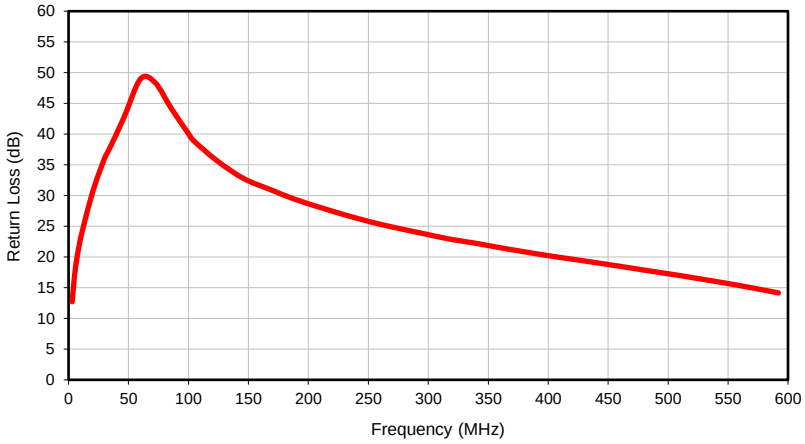
| FREQUENCY (MHz) | INSERTION LOSS (dB) | RETURN LOSS (dB) |
|---|---|---|
| 3 | 0.38 | 12.71 |
| 5 | 0.21 | 16.98 |
| 7 | 0.16 | 19.85 |
| 9 | 0.14 | 22.03 |
| 10 | 0.14 | 23.03 |
| 16 | 0.13 | 27.72 |
| 22 | 0.15 | 31.75 |
| 30 | 0.18 | 36.03 |
| 34 | 0.19 | 37.58 |
| 46 | 0.20 | 42.61 |
| 60 | 0.21 | 48.98 |
| 72 | 0.22 | 48.42 |
| 86 | 0.22 | 44.08 |
| 100 | 0.23 | 40.07 |
| 104 | 0.23 | 38.98 |
| 124 | 0.24 | 35.63 |
| 146 | 0.26 | 32.77 |
| 168 | 0.27 | 30.98 |
| 188 | 0.28 | 29.44 |
| 210 | 0.30 | 28.05 |
| 232 | 0.31 | 26.76 |
| 254 | 0.33 | 25.60 |
| 274 | 0.34 | 24.71 |
| 296 | 0.36 | 23.80 |
| 318 | 0.38 | 22.90 |
| 340 | 0.39 | 22.22 |
| 360 | 0.40 | 21.50 |
| 382 | 0.43 | 20.78 |
| 404 | 0.45 | 20.09 |
| 426 | 0.48 | 19.47 |
| 446 | 0.50 | 18.89 |
| 468 | 0.52 | 18.23 |
| 490 | 0.55 | 17.56 |
| 512 | 0.58 | 16.91 |
| 520 | 0.60 | 16.65 |
| 556 | 0.67 | 15.47 |
| 592 | 0.77 | 14.15 |

## *Typical Performance Data*

**Insertion Loss**



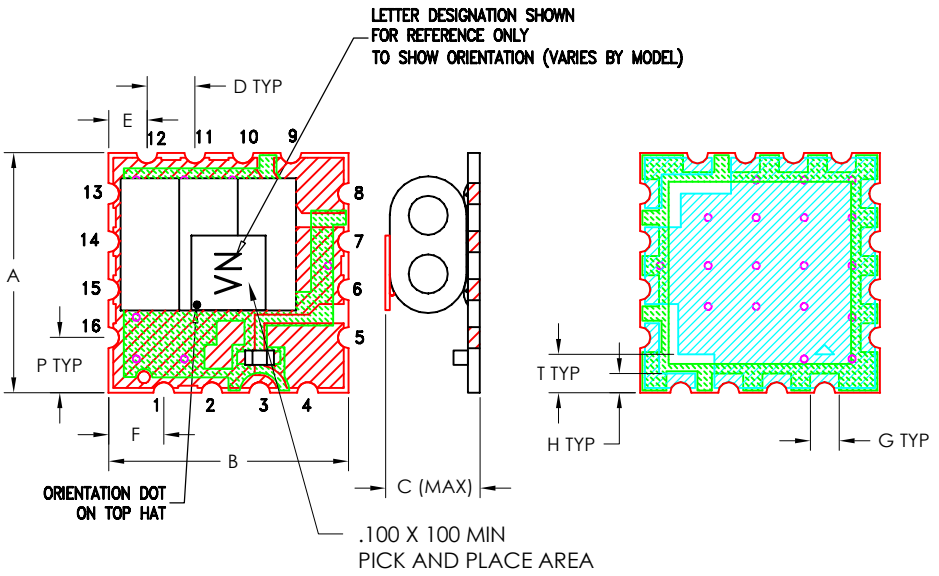

**Return Loss**



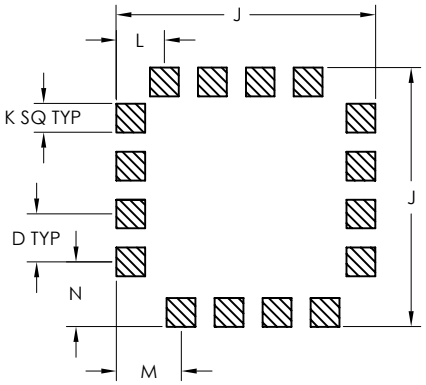
# Case Style CK

## Outline Dimensions

**CK2335-1**




### PCB Land Pattern




**Suggested Layout**
**Tolerance to be within ±.002**

DENOTES METALLIZATION.

DENOTES SOLDER MASK.

| CASE # | A | B | C | D | E | F | G | H | J | K | L | M | N | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CK2335-1 | .500 (12.70) | .500 (12.70) | .209 (5.31) | .100 (2.54) | .080 (2.03) | .115 (2.92) | .060 (1.52) | .040 (1.02) | .540 (13.72) | .060 (1.52) | .100 (2.54) | .135 (3.43) | .135 (3.43) | .115 (2.92) |

| CASE # | Q | R | S | T | WT, GRAM |
|---|---|---|---|---|---|
| CK2335-1 | - - | - - | - - | .080 (2.03) | 1.0 |

**Dimensions are in inches (mm). Tolerances: 2 Pl.±.03; 3 Pl. ±.015**

**Notes**:
1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:
   For RoHS Case Styles: 3-5 µ inch (.08-.13 microns) Gold over 120-240 µ inch (3.05-6.10 microns) Nickel plate. All models, (+) suffix.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RF/IF MICROWAVE COMPONENTS




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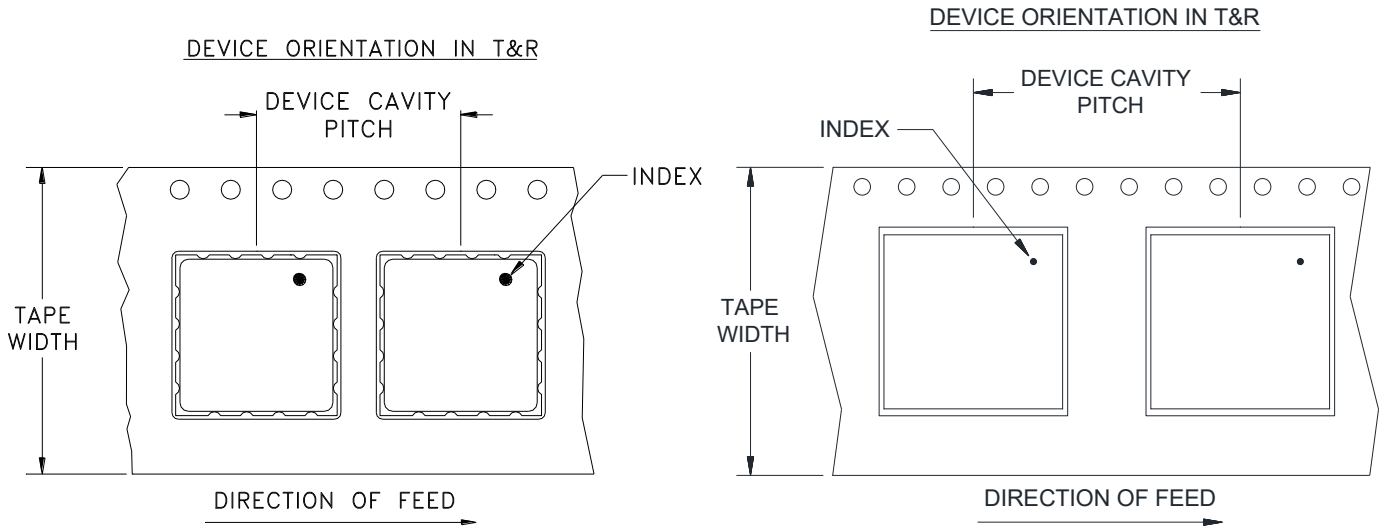
# Tape & Reel Packaging TR-F37




| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel | |
|---|---|---|---|---|
| 24 | 16 | 7 | Small quantity standards (see note) | 10 |
| | | | | 20 |
| | | | | 50 |
| | | | | 100 |
| | | 13 | Standard | 200 |
| | | | | 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

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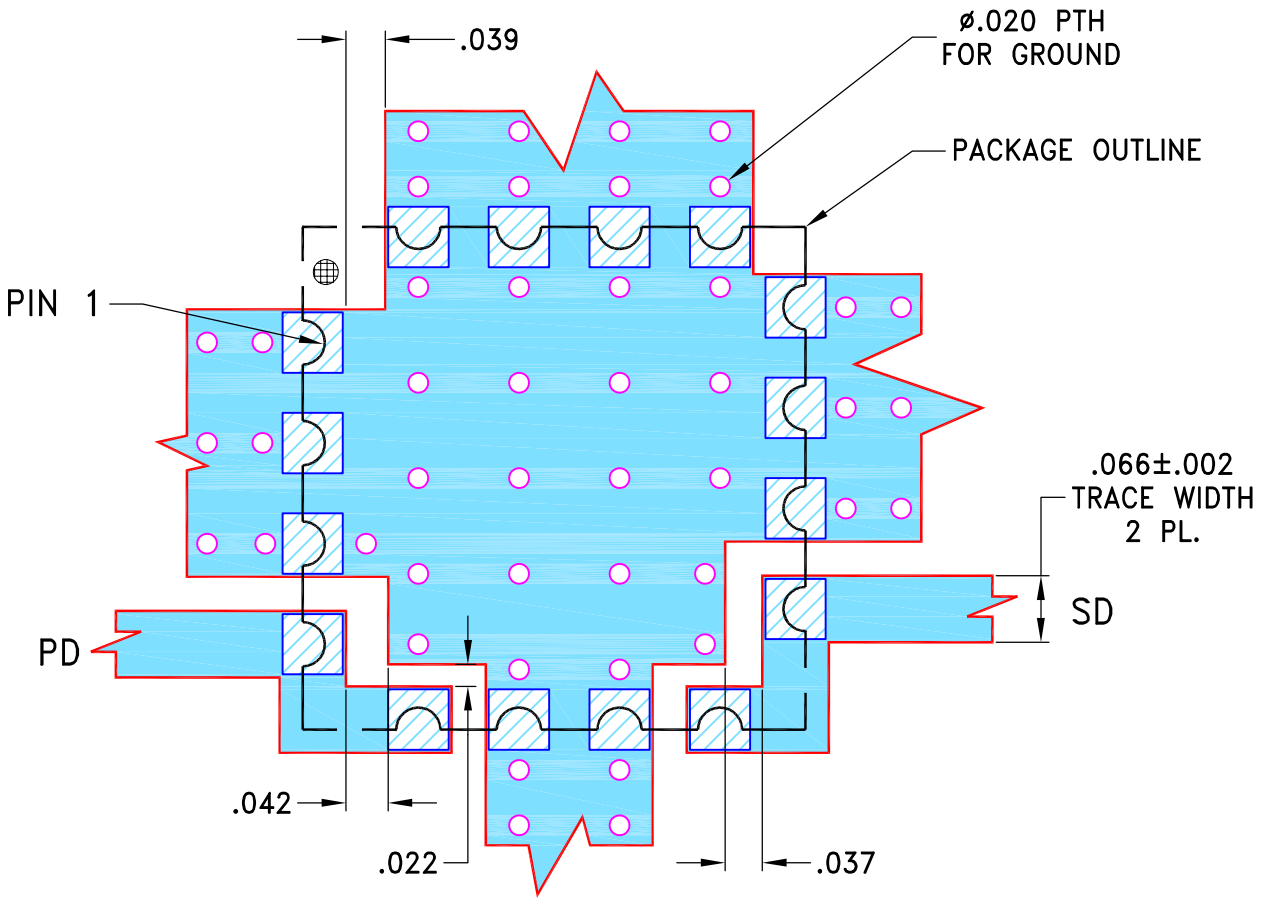
THIRD ANGLE PROJECTION

| REVISIONS | | | | | |
|---|---|---|---|---|---|
| REV | ECN No. | DESCRIPTION | DATE | DR | AUTH |
| OR | ECO-005116 | NEW RELEASE | 03/15/21 | ITG | RonS |
| | | | | | |
| | | | | | |
| | | | | | |

# SUGGESTED MOUNTING CONFIGURATION FOR CK2335-1 CASE STYLE




## NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B, WITH DIELECTRIC THICKNESS .030"±.002". 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 | 03/15/21 |
| TOLERANCES ON: | CHECKED | GF | 03/15/21 |
| 2 PL DECIMALS ± .005" | APPROVED | RonS | 03/15/21 |
| 3 PL DECIMALS ± | | | |
| ANGLES ± | | | |
| FRACTIONS ± | | | |

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

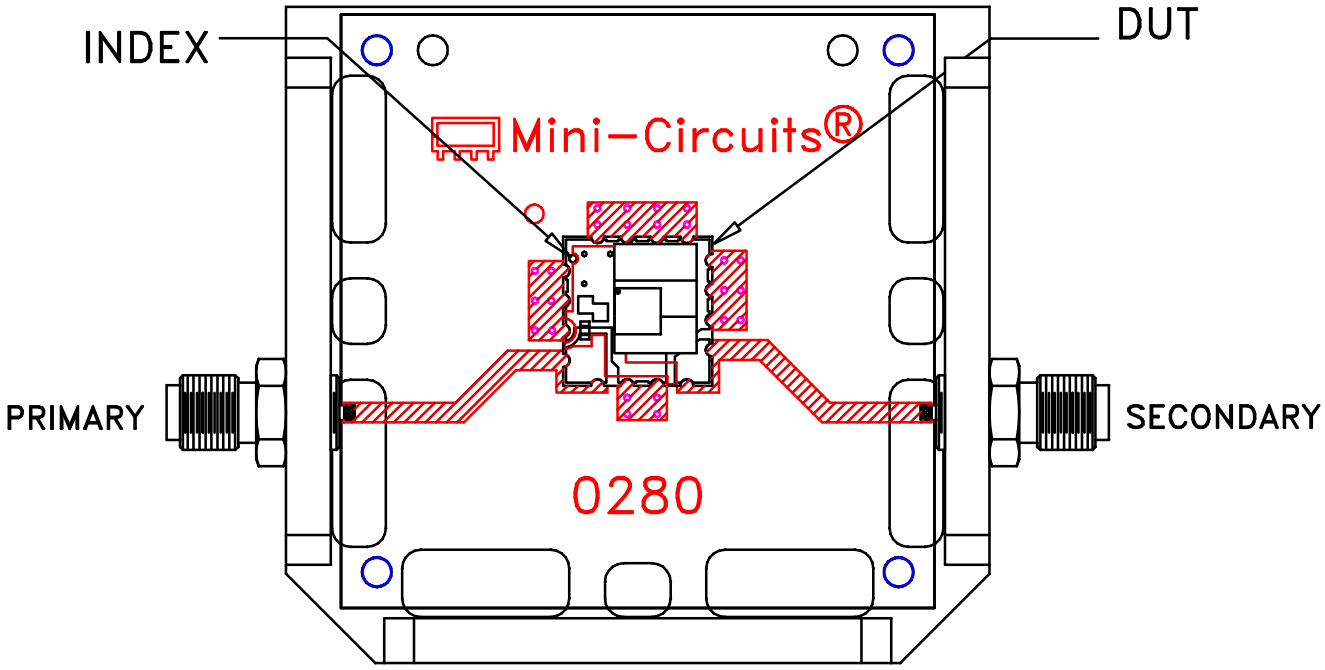
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, CK2335-1, TB-1184

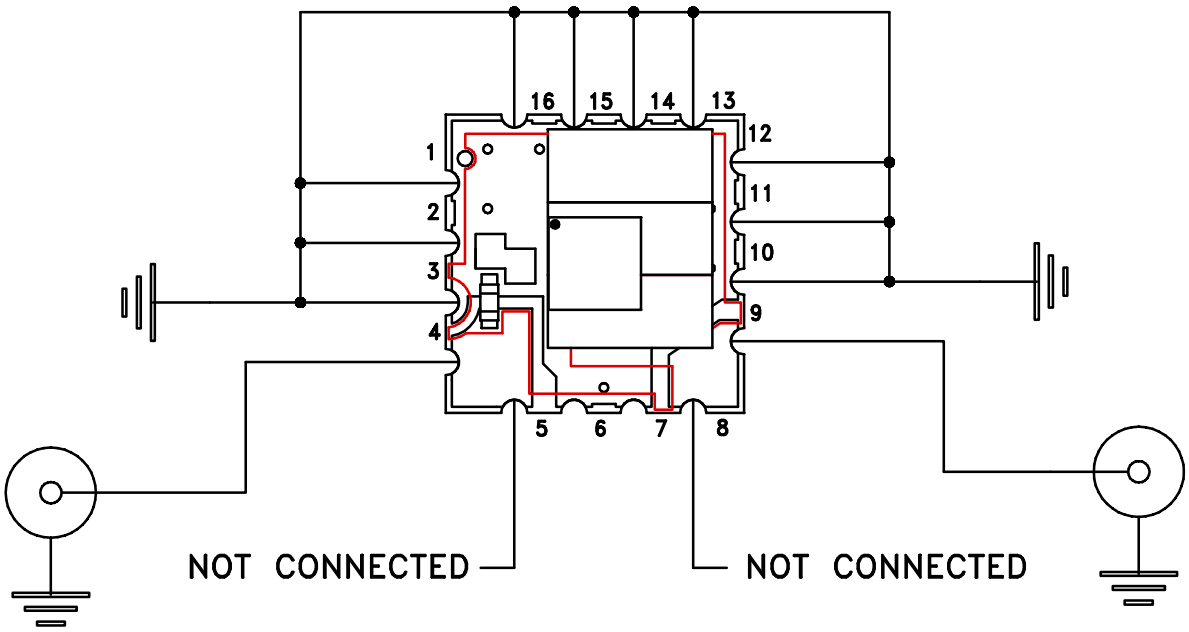
| SIZE | CODE IDENT | DRAWING NO: | REV: |
|---|---|---|---|
| A | 15542 | 98-PL-698 | OR |

| FILE: | SCALE: | SHEET: |
|---|---|---|
| 98PL698 | 5:1 | 1 OF 1 |

# Evaluation Board and Circuit




TB-1184




Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent.
   Dielectric Constant=3.5, Thickness=.030 inch.

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**Environmental Specifications** **ENV23T16**

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 65° C<br>Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C<br>Ambient Environment | Individual Model Data Sheet |
| Stabilization Bake | (non-operating)<br>125°C, 24 hours | - - - |
| Burn-in at Elevated Temp. | (DC on)<br>160 hours at 85° C | MIL-STD-202, Method 108 |
| Thermal Shock | -55° to 100°C, 5 cycles | MIL-STD-202, Method 107, Condition A, except 100°C |



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