



**SURFACE MOUNT**

# RF Transformer

## SCTX2-93-2W+

**Mini-Circuits**

50Ω 10 to 9000 MHz 1:2 Ratio

### THE BIG DEAL

- Super wideband, 10 to 9000 MHz
- Low Insertion Loss, 2.8 dB typ. up to 8 GHz
- Amplitude Unbalance, ±0.9 dB typ. up to 6 GHz
- Good Input Return Loss, 14 dB typ.
- Low Phase Unbalance, ±9° typ.
- Common Mode Rejection, 20 dB typ.



*Generic photo used for illustration purposes only*

CASE STYLE: SN2595

### +RoHS Compliant

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

### APPLICATIONS

- Defense Communication
- Defense Radar
- Line of sight links
- PCS
- Cellular
- Wideband push-pull amplifiers
- ADC (Analog to Digital Converter)
- Balanced Receivers

### PRODUCT OVERVIEW

Mini-Circuits' SCTX2-93-2W+ is a surface-mount transmission line transformer (core and Semi-Rigid cable) covering a very wide frequency range from 10 to 9000 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 9000 MHz	Super wide frequency range covers bandwidth requirements for many broadband applications.
Low insertion loss, 2.8 dB	SCTX2-93-2W+ 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.

REV. B  
ECO-019969  
SCTX2-93-2W+  
MCL NY  
240410





SURFACE MOUNT

# RF Transformer

## SCTX2-93-2W+



50Ω 10 to 9000 MHz 1:2 Ratio

### ELECTRICAL SPECIFICATIONS AT 25°C

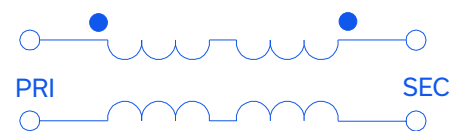
Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Impedance Ratio (secondary/primary)			2		
Frequency Range		10		9000	MHz
Insertion Loss (Average)	10 - 3000	—	2.2	3.2	dB
	3000 - 6000	—	3.3	3.9	
	6000 - 8000	—	3.9	4.5	
	6000 - 9000	—	4.1	5.9	
Amplitude Unbalance (±)	10 - 3000	—	0.3	0.6	dB
	3000 - 6000	—	0.7	1.1	
	6000 - 9000	—	1.0	1.5	
Phase Unbalance (±)	10 - 3000	—	3	6	Degree
	3000 - 6000	—	5	9	
	6000 - 9000	—	9	12	
Common mode rejection	10 - 4500	20	25	—	dB
	4500 - 9000	16	20	—	

### ABSOLUTE MAXIMUM RATINGS

Parameter	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.

### CONFIGURATION G





SURFACE MOUNT

# RF Transformer

## SCTX2-93-2W+

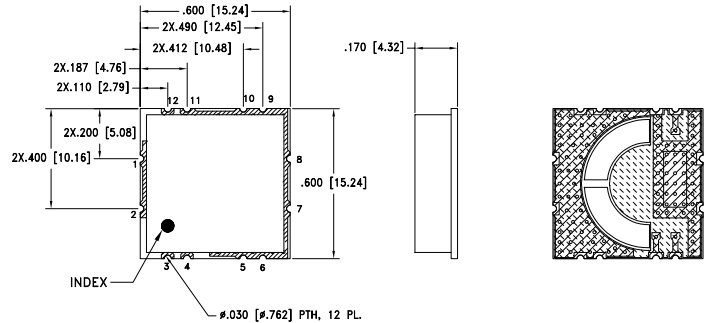
Mini-Circuits

50Ω 10 to 9000 MHz 1:2 Ratio

### PIN CONNECTIONS

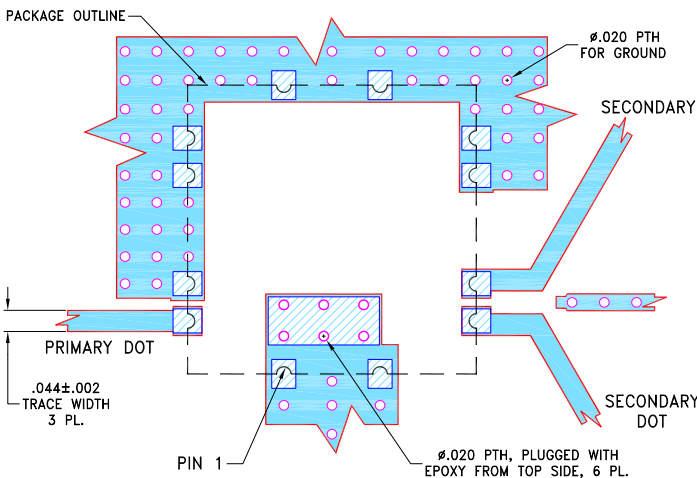
PRIMARY DOT	12
PRIMARY (GND)	11
SECONDARY DOT	3
SECONDARY	4
GROUND	ALL OTHERS

### OUTLINE DRAWING



PRODUCT MARKING: SCTX2-93-2W+

DEMO BOARD MCL P/N: TB-SCTX2-93-2W+  
SUGGESTED PCB LAYOUT (PL-595)



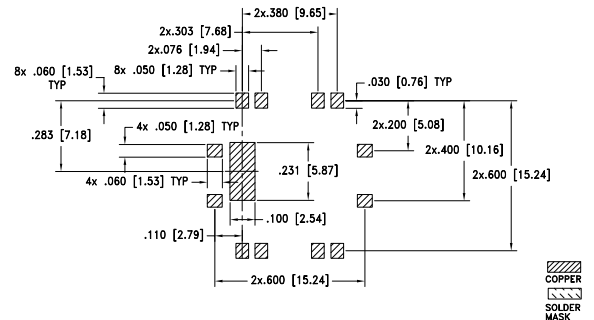
#### NOTES:

- 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 SOLDERMASK

### TOP VIEW

### BOTTOM VIEW



PCB LAND PATTERN  
SUGGESTED LAYOUT  
TOLERANCE TO BE WITHIN ±.002



Weight: 1.2 gram

Dimensions are in inches [mm]. Tolerances: 3 PL ±.005 Inch

### TAPE & REEL INFORMATION: F95

Mini-Circuits



SURFACE MOUNT

# RF Transformer

## SCTX2-93-2W+

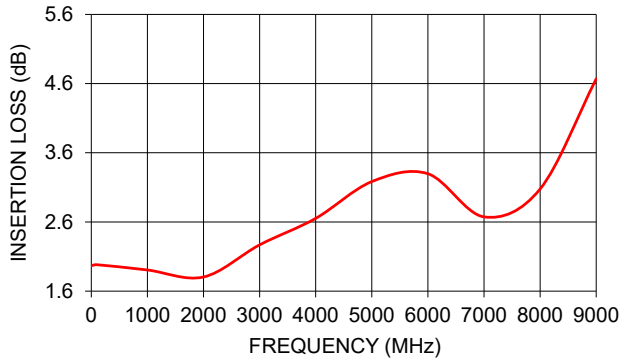
Mini-Circuits

50Ω 10 to 9000 MHz 1:2 Ratio

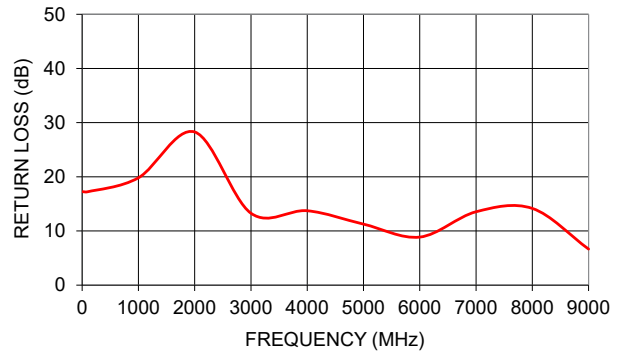
### TYPICAL PERFORMANCE DATA

Frequency (MHz)	Insertion Loss (dB)	Input Return Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance (deg)
10	1.97	17.26	0.11	2.50
100	1.98	17.24	0.09	0.43
1000	1.91	19.81	-0.02	0.33
2000	1.80	28.27	-0.26	0.03
3000	2.27	13.27	-0.32	3.05
4000	2.65	13.73	0.29	4.56
5000	3.18	11.26	0.84	0.28
6000	3.30	8.87	0.26	6.47
7000	2.67	13.55	-0.85	4.67
8000	3.08	14.16	-1.06	1.57
9000	4.67	6.66	-0.44	9.01

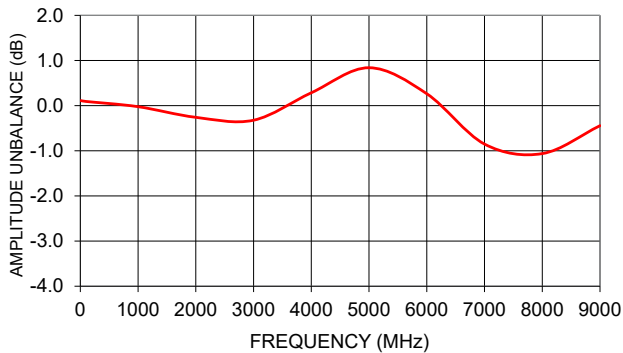
SCTX2-93-2W+  
INSERTION LOSS



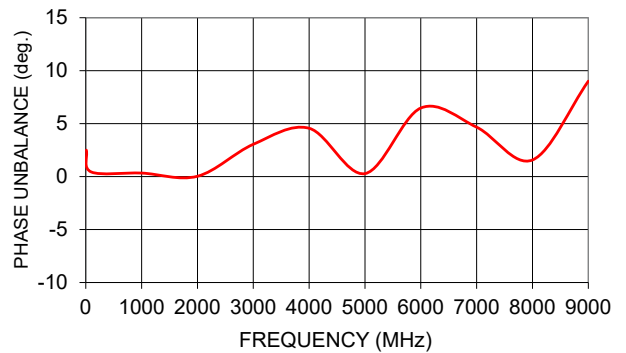
SCTX2-93-2W+  
INPUT RETURN LOSS



SCTX2-93-2W+  
AMPLITUDE UNBALANCE



SCTX2-93-2W+  
PHASE UNBALANCE



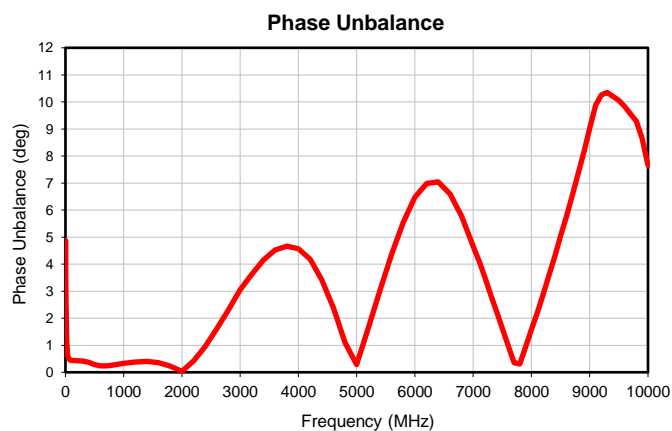
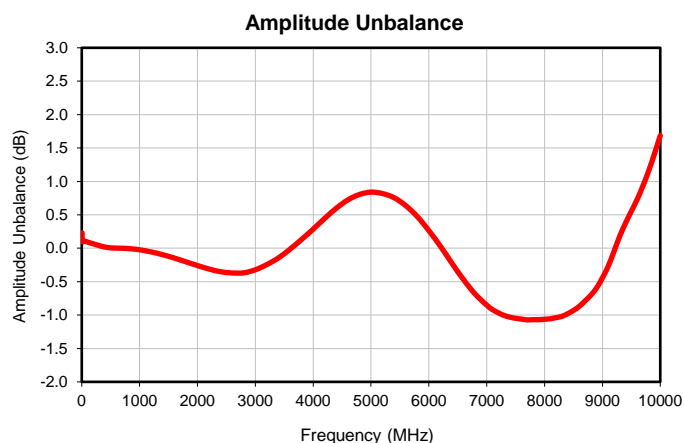
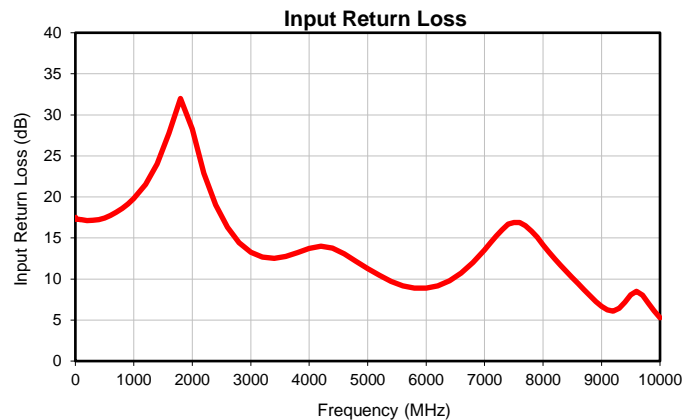
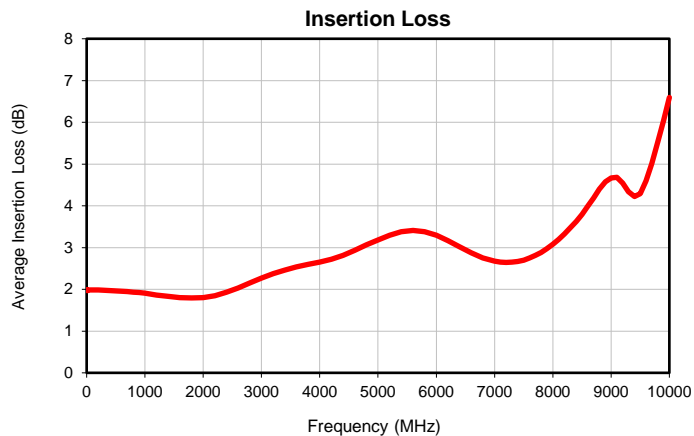
- NOTES**
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
  - B. Electrical specifications and performance data contained in this specification document are based 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](http://www.minicircuits.com/terms/viewterm.html)



## Typical Performance Data

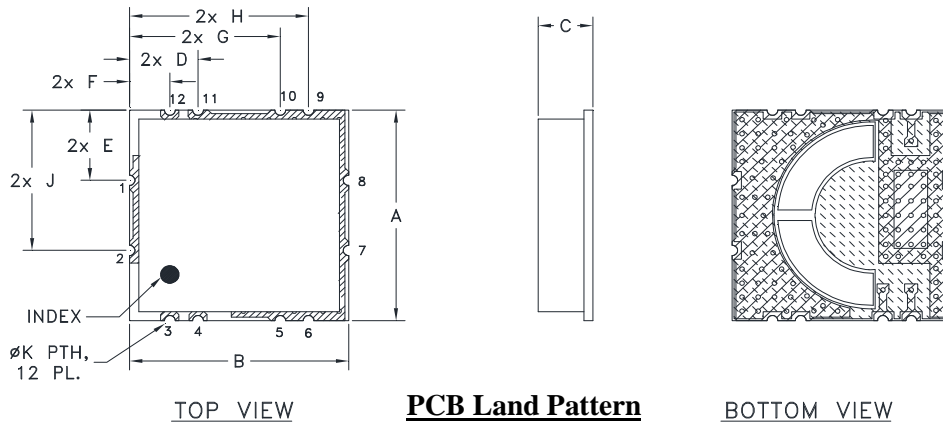
FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (Deg)
5	2.00	17.52	0.23	4.87
7	1.98	17.35	0.15	3.57
10	1.97	17.26	0.11	2.50
20	1.97	17.26	0.10	1.16
30	1.98	17.29	0.10	0.78
40	1.98	17.29	0.11	0.63
50	1.98	17.28	0.11	0.54
60	1.99	17.27	0.10	0.50
70	1.99	17.25	0.10	0.47
80	1.99	17.24	0.10	0.45
90	1.99	17.23	0.10	0.44
100	1.98	17.24	0.09	0.43
200	1.99	17.13	0.07	0.43
300	1.98	17.15	0.04	0.41
400	1.97	17.23	0.02	0.36
500	1.96	17.43	0.01	0.29
600	1.95	17.73	0.00	0.23
700	1.95	18.11	0.00	0.23
800	1.93	18.59	0.00	0.26
900	1.92	19.14	-0.01	0.29
1000	1.91	19.81	-0.02	0.33
1200	1.87	21.52	-0.06	0.38
1400	1.83	24.03	-0.10	0.40
1600	1.80	27.78	-0.15	0.35
1800	1.79	31.99	-0.20	0.22
2000	1.80	28.27	-0.26	0.03
2200	1.85	22.90	-0.31	0.42
2400	1.93	19.03	-0.35	0.96
2600	2.03	16.30	-0.37	1.60
2800	2.15	14.44	-0.37	2.32
3000	2.27	13.27	-0.32	3.05
3200	2.38	12.67	-0.24	3.64
3400	2.46	12.50	-0.14	4.16
3600	2.54	12.74	-0.01	4.52
3800	2.60	13.21	0.13	4.66
4000	2.65	13.73	0.29	4.56
4200	2.72	14.01	0.45	4.18
4400	2.82	13.77	0.60	3.42
4600	2.94	13.05	0.72	2.36
4800	3.06	12.16	0.80	1.09
5000	3.18	11.26	0.84	0.28
5200	3.30	10.44	0.82	1.66
5400	3.38	9.72	0.76	3.03
5600	3.41	9.18	0.64	4.39
5800	3.38	8.88	0.47	5.55
6000	3.30	8.87	0.26	6.47
6200	3.17	9.15	0.03	6.98
6400	3.02	9.79	-0.23	7.04
6600	2.87	10.74	-0.47	6.59
6800	2.75	12.01	-0.69	5.77
7000	2.67	13.55	-0.85	4.67
7100	2.65	14.42	-0.92	4.11
7200	2.65	15.26	-0.97	3.50
7300	2.65	15.98	-1.01	2.86
7400	2.67	16.67	-1.03	2.26
7500	2.70	16.89	-1.05	1.63
7600	2.75	16.89	-1.06	0.97
7700	2.81	16.50	-1.07	0.36
7800	2.88	15.85	-1.07	0.30
7900	2.97	15.07	-1.07	0.93
8000	3.08	14.16	-1.06	1.57
8100	3.20	13.28	-1.06	2.21
8200	3.33	12.44	-1.04	2.88
8300	3.47	11.66	-1.02	3.59
8400	3.63	10.91	-0.98	4.27
8500	3.80	10.19	-0.93	5.03
8600	3.99	9.42	-0.87	5.78
8700	4.19	8.70	-0.79	6.55
8800	4.40	7.99	-0.70	7.34
8900	4.57	7.25	-0.59	8.13
9000	4.67	6.66	-0.44	9.01
9100	4.68	6.24	-0.27	9.88
9200	4.55	6.09	-0.05	10.26
9300	4.34	6.43	0.18	10.35
9400	4.22	7.17	0.38	10.21
9500	4.29	8.05	0.55	10.04
9600	4.60	8.49	0.73	9.82
9700	5.01	8.02	0.93	9.55
9800	5.51	7.07	1.16	9.28
9900	6.05	6.12	1.41	8.66
10000	6.59	5.28	1.69	7.65

## Typical Performance Data



## Outline Dimensions

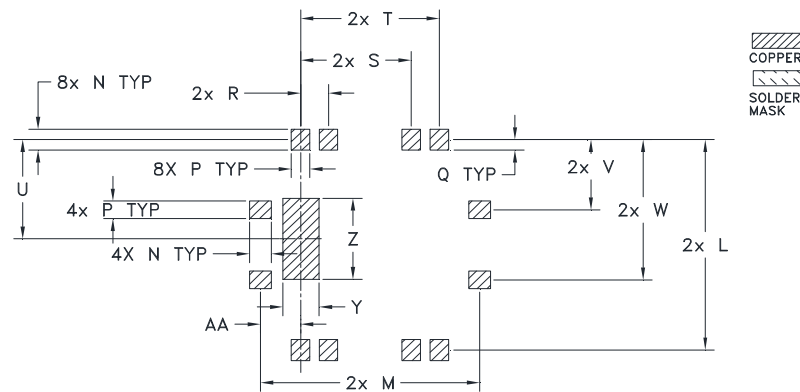
SN2595



TOP VIEW

PCB Land Pattern

BOTTOM VIEW



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

CASE #	A	B	C	D	E	F	G	H	J	K
SN2595	.600 (15.24)	.600 (15.24)	.170 (3.81)	.187 (4.76)	.200 (5.08)	.110 (2.79)	.412 (10.48)	.490 (12.45)	.400 (10.16)	.030 (0.762)

CASE #	L	M	N	P	Q	R	S	T	U	V
SN2595	.600 (15.24)	.600 (15.24)	.060 (1.53)	.050 (1.28)	.030 (.76)	.076 (1.94)	.303 (7.68)	.380 (9.65)	.283 (7.18)	.200 (5.08)

CASE #	W	Y	Z	AA	WT. GRAM
SN2595	.400 (10.16)	.100 (2.54)	.231 (5.87)	.110 (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

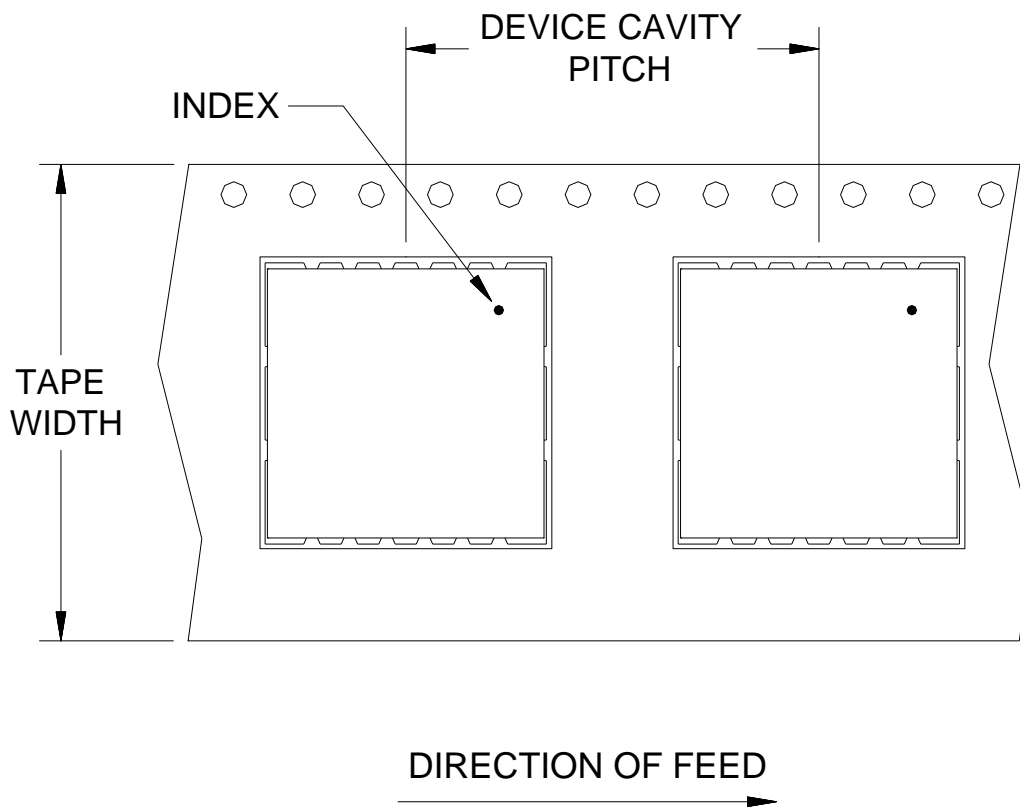


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RF/IF MICROWAVE COMPONENTS

# 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>

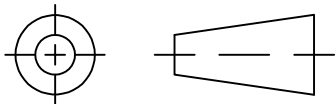
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

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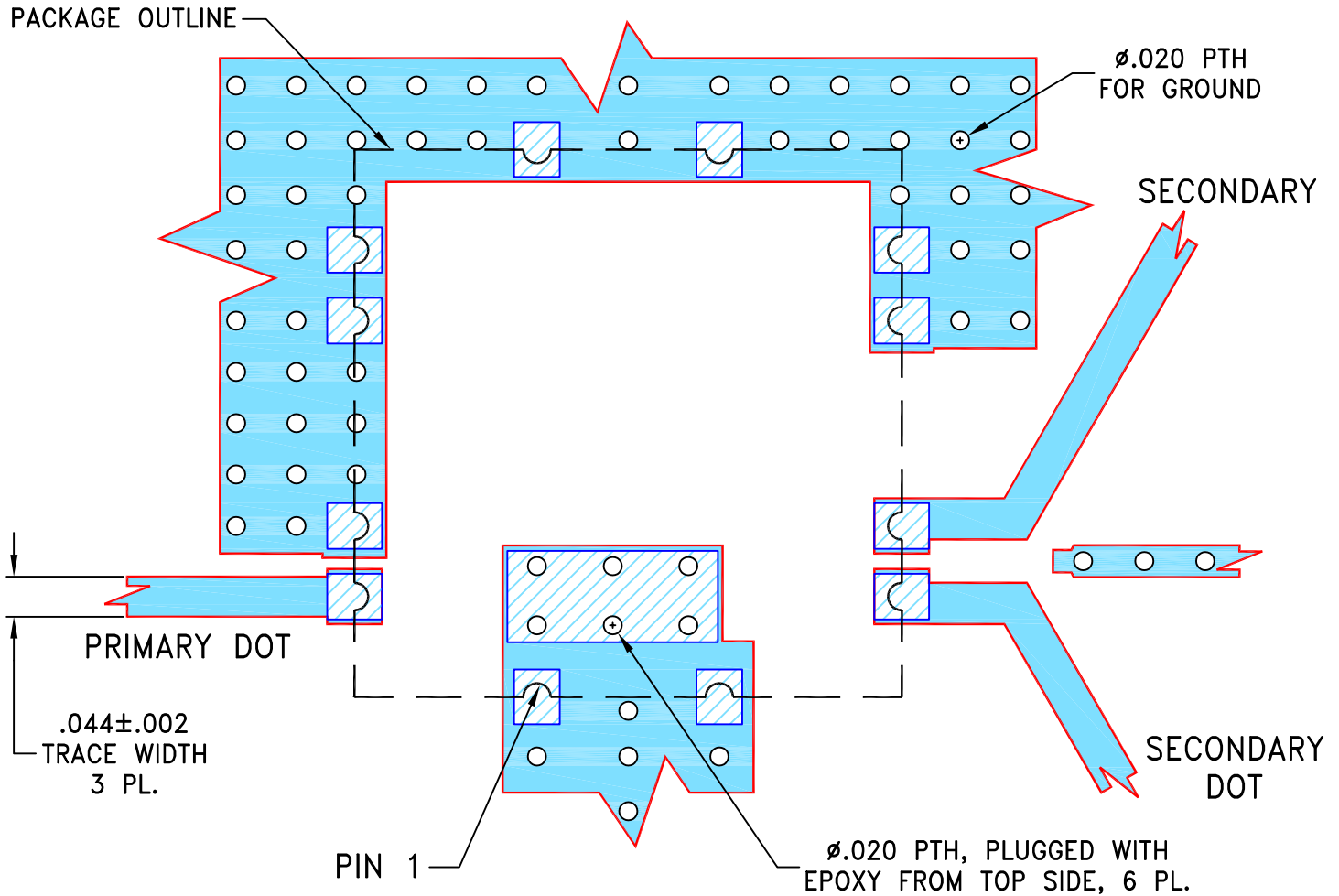
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M168695	NEW RELEASE	06/28/18	ITG	WP
A	ECO-019969	CHANGED P/N OF TB, WAS TB-1005+	11/21/23	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR SN2595 CASE STYLE



NOTES:

- 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.
- 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 ±			

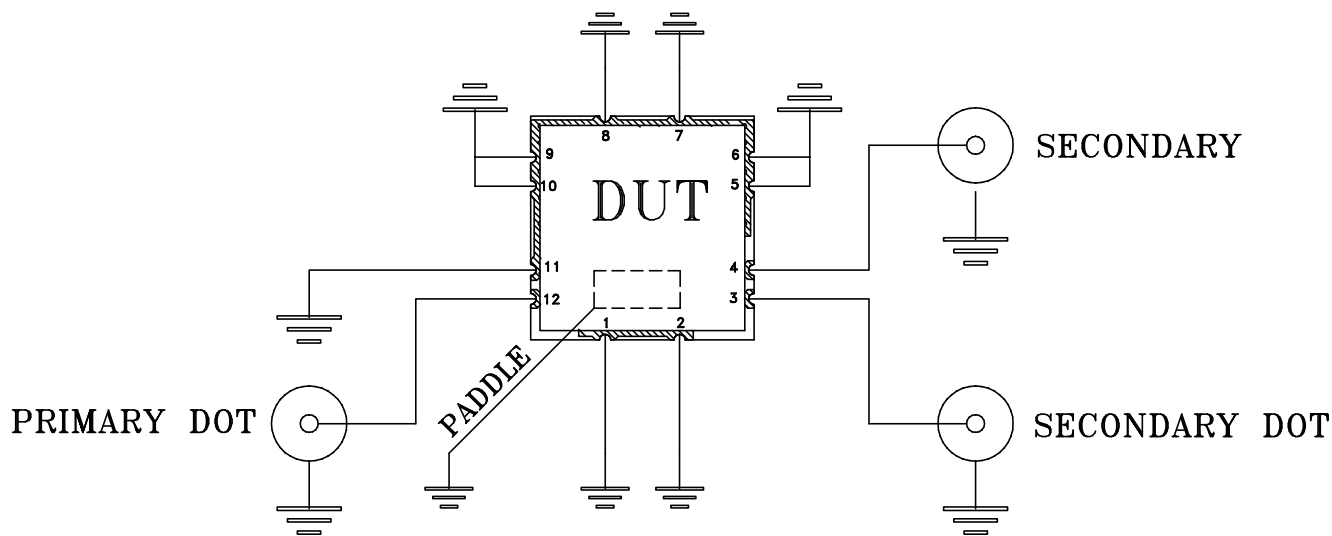
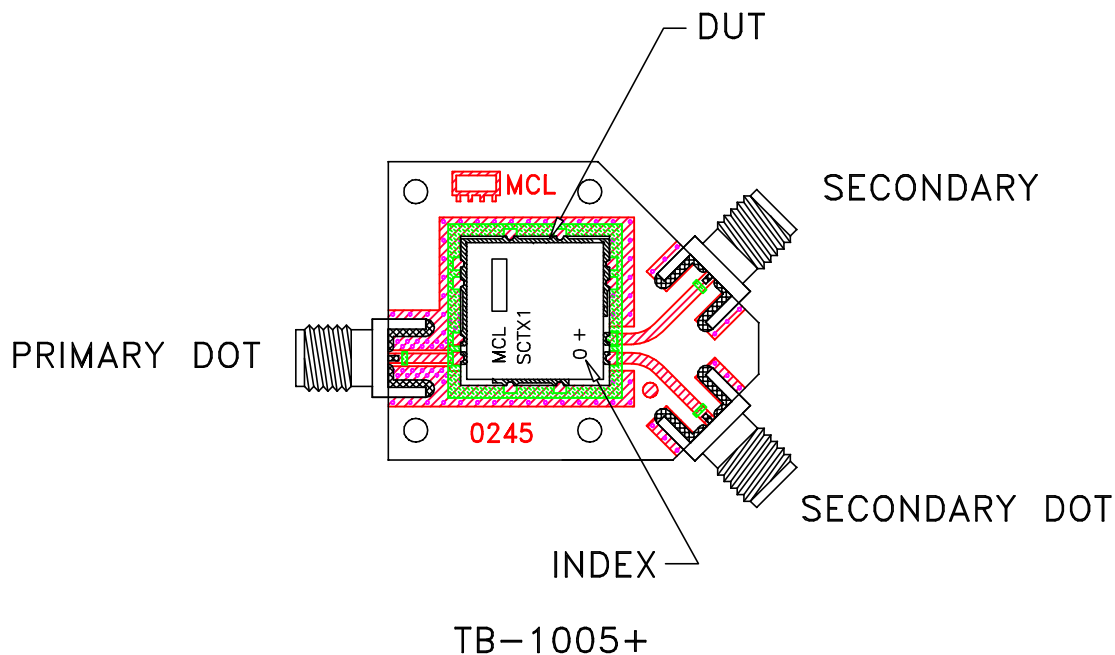
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Brooklyn NY 11235

PL, SN2595, TB-SCTX2-93-2W+

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SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-595	A
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.

 **Mini-Circuits®**

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 Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° C 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 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; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215