



**SURFACE MOUNT**

# RF Transformer

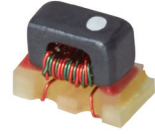
## TTC1-682W+

**Mini-Circuits**

50Ω 800 to 6800 MHz 1:1 Ratio

### THE BIG DEAL

- Wideband, 800 to 6800 MHz
- Small size, 1.4 x 2.5mm
- Good amplitude unbalance,  $\pm 0.8$  dB typ.
- Low phase unbalance,  $6^\circ$  typ.
- Excellent common mode rejection, 21 dB typ.



*Generic photo used for illustration purposes only*

CASE STYLE: GU2939

### +RoHS Compliant

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

### APPLICATIONS

- Sub- 6GHz 5G Infrastructure
- Broadband Telecom & SATCOM
- Test & Measurement Equipment
- WiFi 6
- Communications, Radar, EW, and ECM Defense Systems

### PRODUCT OVERVIEW

Mini-Circuits' TTC1-682W+ is a tiny surface-mount transmission line core and wire transformer covering a very wide frequency range from 800 to 6800 MHz. The transformer provides low insertion loss. It achieves low phase and amplitude unbalance and excellent common mode rejection performance. Featuring core and wire construction on 5 terminal carrier, the unit measures 0.10 x 0.06 x 0.07", accommodating dense circuit board layouts.

### KEY FEATURES

Feature	Advantages
Wideband, 800 to 6800 MHz	Very wide frequency range covers bandwidth requirements for many broadband applications.
Low insertion loss, 2.5 dB typ.	TTC1-682W+ provides excellent signal transmission from input to output with consistent performance across its entire frequency range.
Excellent common mode rejection, 21 dB typ.	Provides good IP2, IP3.
Small footprint (0.10 x 0.06 x 0.07")	Accommodates tight space requirements for dense PCB layouts.





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### ELECTRICAL SPECIFICATIONS AT 25°C

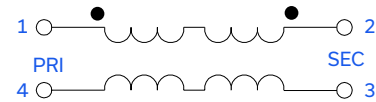
Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Impedance Ratio		1			
Frequency Range		800		6800	MHz
Average Insertion Loss (above 0.60 dB midband loss)	800-4500	–	1.2	1.9	dB
	4500-6800	–	2.8	3.9	
Phase Unbalance (±)	800-6800	–	6	12	Degree
Amplitude Unbalance	1000-4500	–	0.8	1.5	dB
	800-6800	–	1.2	1.9	
Common Mode Rejection	800-6800	17	21	–	dB

### ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power	0.5W

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

### FUNCTIONAL DIAGRAM CONFIGURATION G





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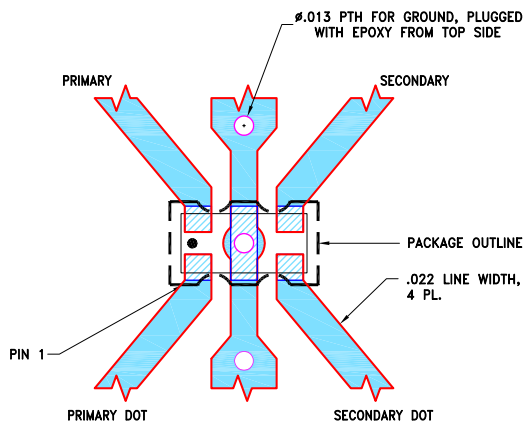
50Ω 800 to 6800 MHz 1:1 Ratio

### PIN CONNECTIONS

PRIMARY DOT	1
PRIMARY	4
SECONDARY DOT	2
SECONDARY	3
NOT USED	5

**PRODUCT MARKING:** N/A

**EVALUATION BOARD MCL P/N:** TB-TTC1-682W+  
**SUGGESTED PCB LAYOUT (PL-657)**

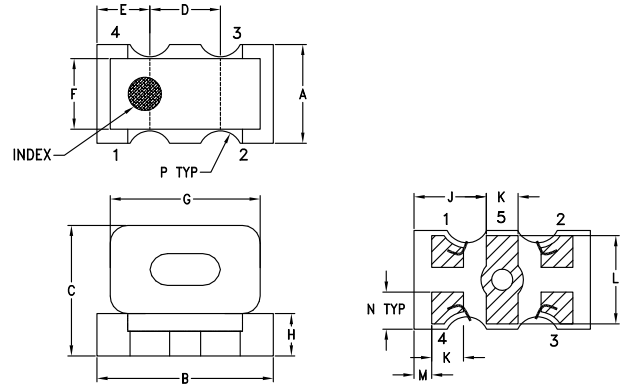


**NOTES:**

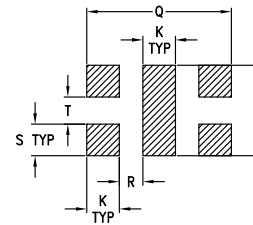
- TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010"±.001". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

### OUTLINE DRAWING



### PCB Land Pattern



**Suggested Layout**

Tolerance to be within ±.002

### OUTLINE DIMENSIONS (Inches/mm)

A	B	C	D	E	F	G	H	J	K
.056	.100	.074	.040	.030	.040	.085	.024	.041	.018
1.42	2.54	1.88	1.02	0.76	1.02	2.16	0.61	1.04	0.46
L	M	N	P	Q	R	S	T		wt
.050	.010	.021	.013	.080	0.013	.018	0.014		grams
1.27	0.25	0.53	0.33	2.03	0.33	0.46	0.36		0.04

**TAPE & REEL INFORMATION: F74**



SURFACE MOUNT

# RF Transformer

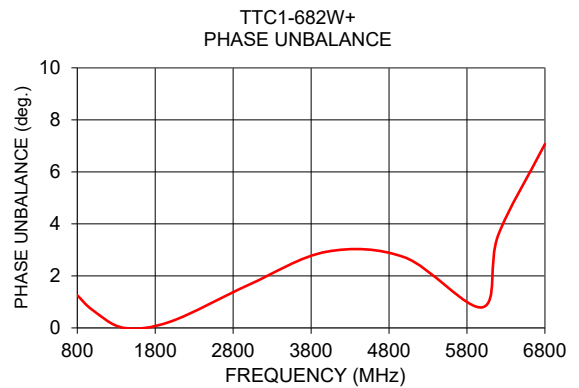
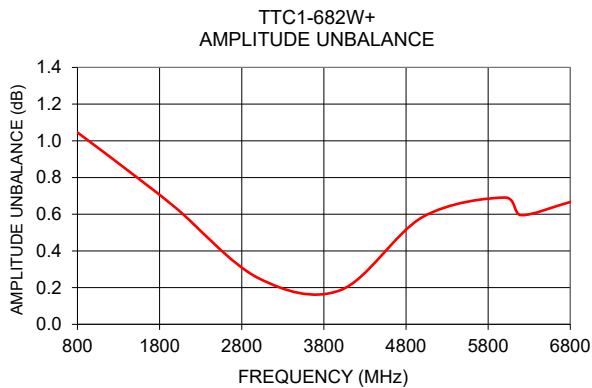
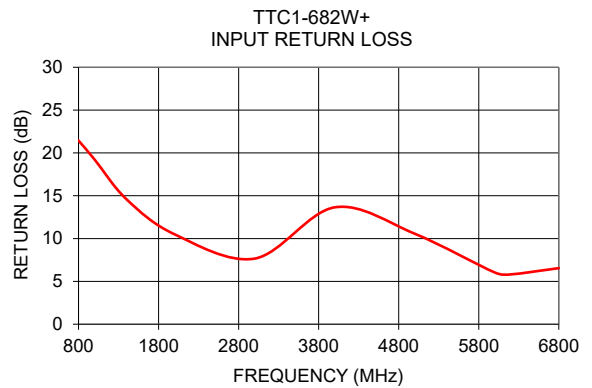
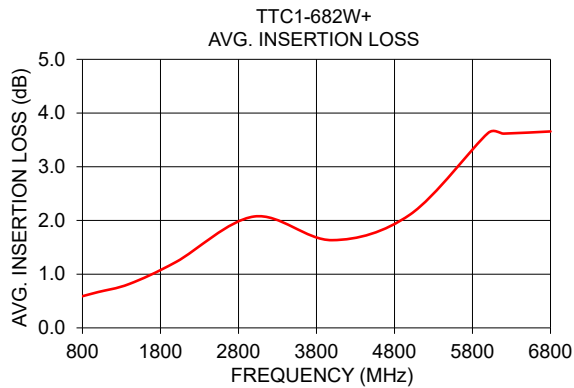
## TTC1-682W+

Mini-Circuits

50Ω 800 to 6800 MHz 1:1 Ratio

### TYPICAL PERFORMANCE DATA

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance (deg)
800	0.59	21.44	1.05	1.26
1000	0.67	19.23	0.98	0.68
1400	0.82	14.58	0.84	0.00
2000	1.23	10.50	0.63	0.25
3000	2.07	7.66	0.25	1.66
4000	1.63	13.65	0.19	2.93
5000	2.11	10.57	0.58	2.71
6000	3.63	6.04	0.69	0.79
6200	3.62	5.82	0.60	3.56
6800	3.66	6.54	0.67	7.07



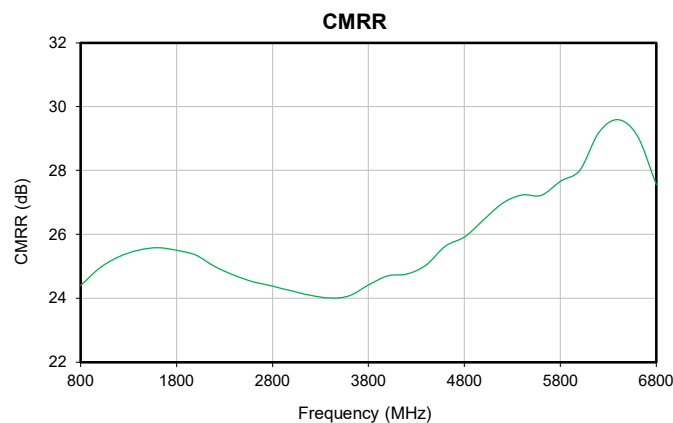
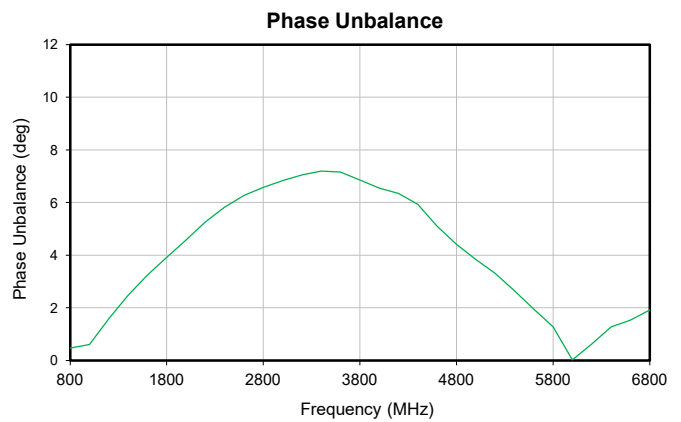
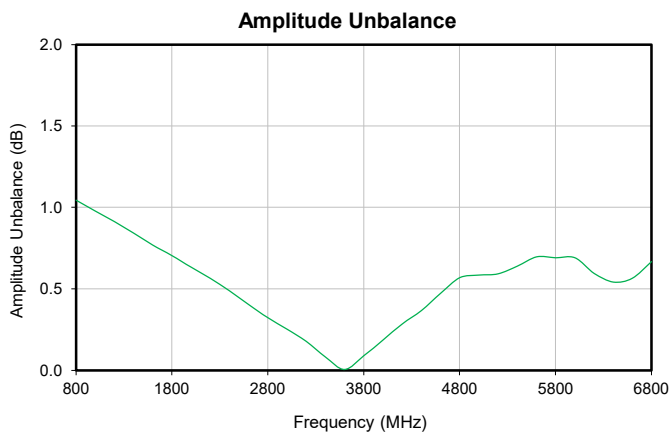
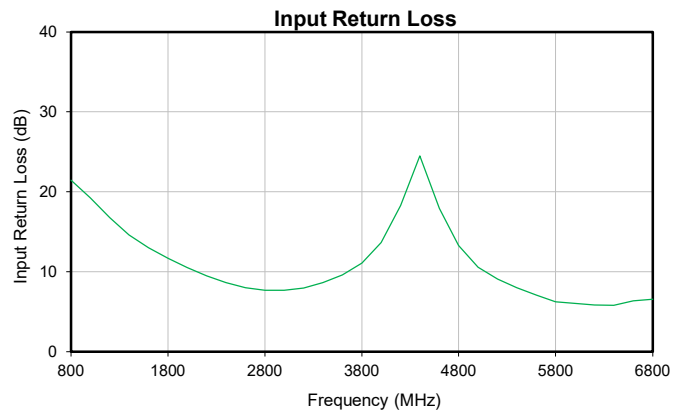
- NOTES**
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  - B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
  - C. The parts covered by this specification 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)



**RF Transformer****TTC1-682W+***Typical Performance Data*

FREQUENCY MHz	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (deg.)	CMRR (dB)
800	0.59	21.44	1.05	0.47	24.40
1000	0.67	19.23	0.98	0.60	24.96
1200	0.75	16.74	0.91	1.58	25.30
1400	0.82	14.58	0.84	2.46	25.51
1600	0.90	12.98	0.77	3.25	25.58
1800	1.03	11.68	0.71	3.92	25.50
2000	1.23	10.50	0.63	4.56	25.35
2200	1.45	9.48	0.57	5.26	24.99
2400	1.68	8.62	0.49	5.82	24.72
2600	1.88	7.99	0.40	6.27	24.51
2800	2.02	7.68	0.32	6.58	24.38
3000	2.07	7.66	0.25	6.84	24.23
3200	2.04	7.95	0.18	7.05	24.09
3400	1.94	8.63	0.08	7.19	24.01
3600	1.82	9.58	0.01	7.15	24.08
3800	1.70	11.08	0.09	6.86	24.42
4000	1.63	13.65	0.19	6.55	24.70
4200	1.60	18.28	0.28	6.35	24.76
4400	1.64	24.50	0.37	5.93	25.05
4600	1.75	17.94	0.47	5.11	25.64
4800	1.89	13.29	0.57	4.42	25.92
5000	2.11	10.57	0.58	3.85	26.46
5200	2.37	9.06	0.59	3.32	26.99
5400	2.72	7.99	0.64	2.65	27.24
5600	3.11	7.06	0.70	1.95	27.22
5800	3.45	6.23	0.69	1.28	27.67
6000	3.63	6.04	0.69	0.03	28.01
6200	3.62	5.82	0.60	0.62	29.20
6400	3.53	5.80	0.54	1.28	29.59
6600	3.57	6.33	0.57	1.53	29.08
6800	3.66	6.54	0.67	1.92	27.56

## Typical Performance Data

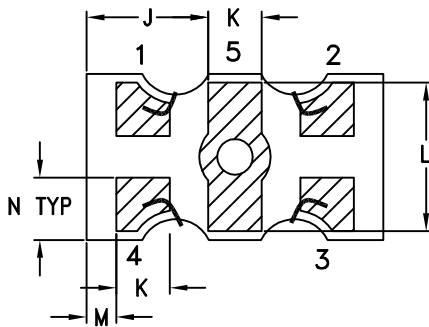
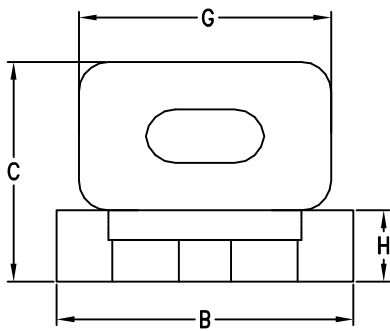
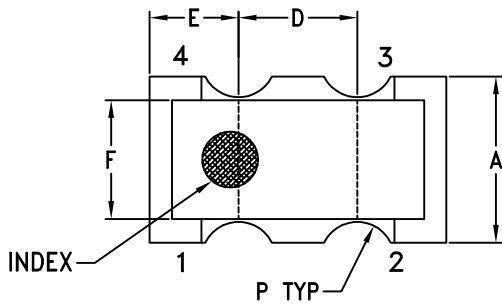


# Case Style

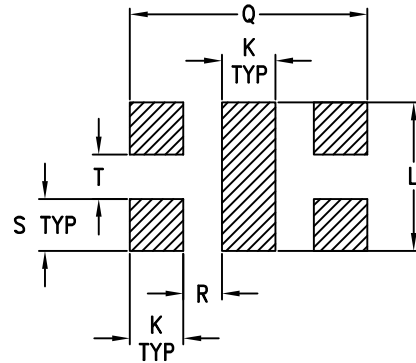
# GU

## Outline Dimensions

## GU2939



## PCB Land Pattern



## Suggested Layout

Tolerance to be within  $\pm 0.002$

Wires shown are for reference only.

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N	P
GU2939	.056 (1.42)	.100 (2.54)	.074 (1.88)	.040 (1.02)	.030 (0.76)	.040 (1.02)	.085 (2.16)	.024 (0.61)	.041 (1.04)	.018 (0.46)	.050 (1.27)	.010 (0.25)	.021 (0.53)	.013 (0.33)

CASE #	Q	R	S	T	WT, GRAM
GU2939	.080 (2.03)	.013 (0.33)	.018 (0.46)	.014 (0.36)	.040

Dimensions are in inches (mm). Tolerances: 2 Pl.  $\pm 0.01$ ; 3 Pl.  $\pm 0.005$

### Notes:

- Case material: Plastic Base.
- Termination finish: Gold Plating.

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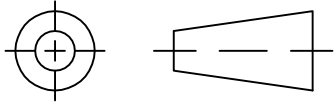
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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

RF/IF MICROWAVE COMPONENTS

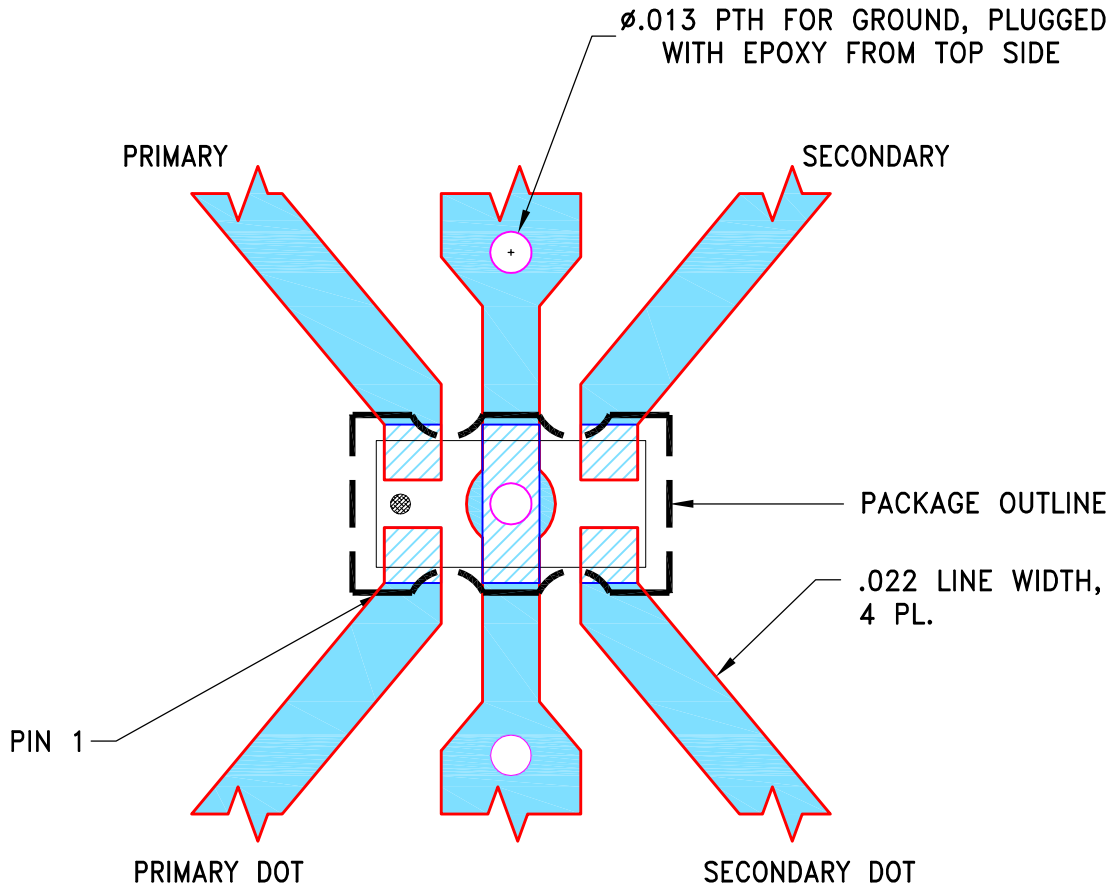
THIRD ANGLE PROJECTION



REVISIONS

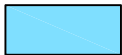
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-001192	NEW RELEASE	12/26/19	ITG	IL

SUGGESTED MOUNTING CONFIGURATION  
FOR GU2939 CASE STYLE

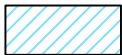


**NOTES:**

- TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .010"±.001".  
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 SOLDER MASK.

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	ITG 12/24/19
TOLERANCES ON:	CHECKED	GF 12/24/19
2 PL DECIMALS ±	APPROVED	IL 12/26/19
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		



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13 Neptune Avenue  
Brooklyn NY 11235

PL, GU2939, TB-1111+

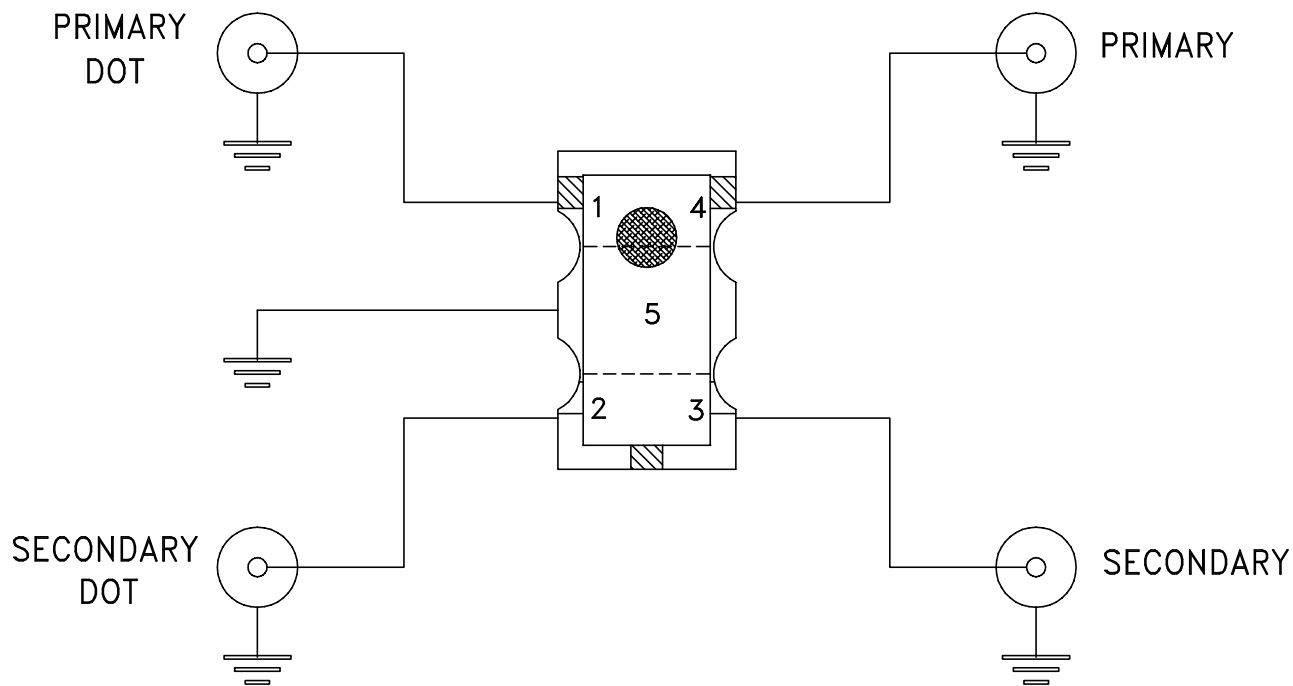
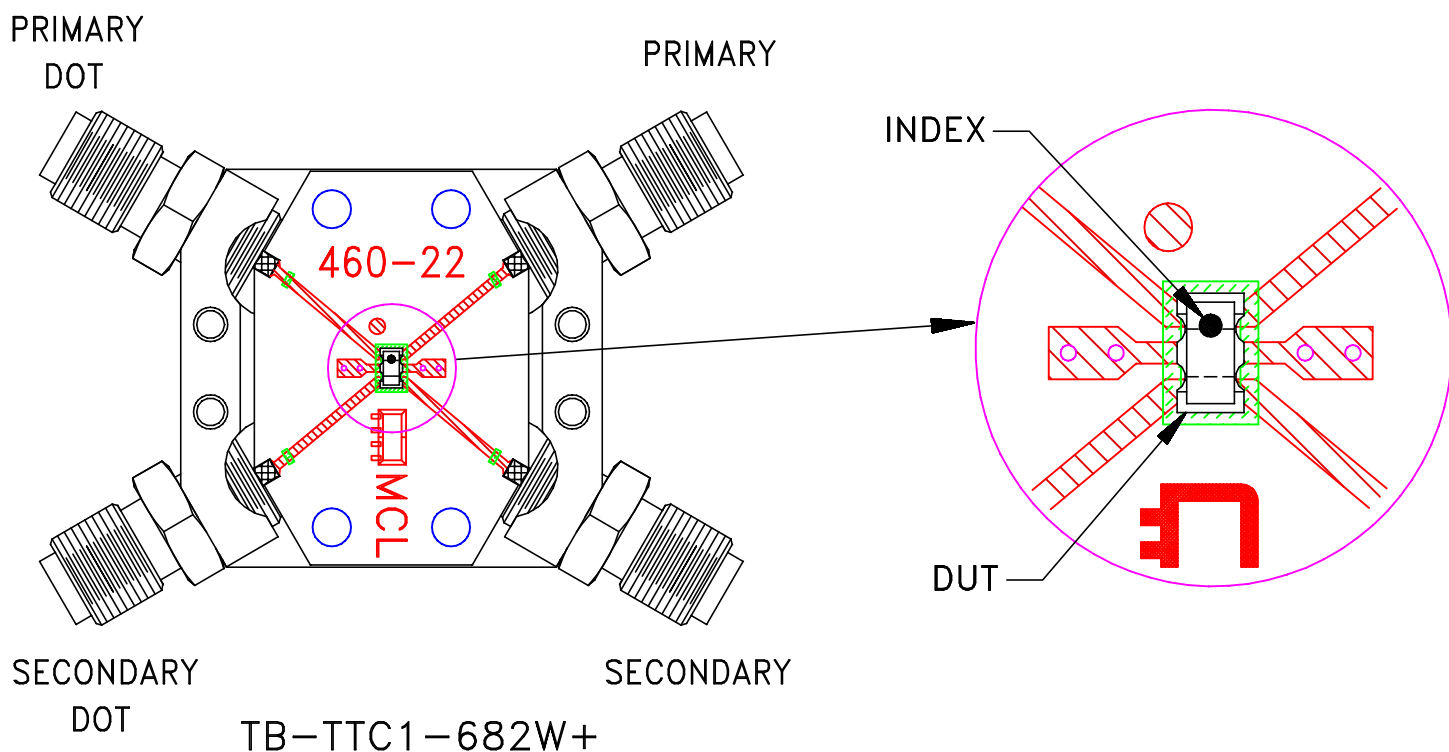
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ASHEETA1.DWG REV:A DATE:01/12/95

SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-657	REV: OR
FILE: 98PL657	SCALE: 16:1	SHEET: 1 OF 1	




# Evaluation Board and Circuit



Schematic Diagram

## Notes:

1. SMA Female connectors.
2. PCB Material: R043504 or equivalent,  
Dielectric Constant=3.5, Thickness=.010 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