

CERAMIC BALUN

RF Transformer

TCW2-722+

50Ω 2400 to 7125 MHz 1:2 Ratio

FEATURES

- Wideband, 2400 to 7125 MHz
- Miniature size 0603 (1.6x0.8mm)
- LTCC construction
- Low cost
- Aqueous washable



Generic photo used for illustration purposes only

CASE STYLE: JC0603C-8

+RoHS Compliant

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

APPLICATIONS

- WLAN
- A/D conversion
- WiFi
- Transmitters and receivers
- Cellular

ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Impedance Ratio (Secondary/Primary)		2			
Frequency Range		2400	—	7125	MHz
Avg. Insertion Loss ¹	2400 - 3900	—	—	1.6	dB
	3900 - 7125	—	—	1.9	
Amplitude Unbalance	2400 - 3300	—	—	2.3	dB
	3300 - 3900	—	—	1.2	
	3900 - 5900	—	—	1.5	
	5900 - 7125	—	—	2.3	
Phase Unbalance ²	2400 - 7125	—	—	15	Degree
Return Loss	2400 - 7125	—	12	—	dB

1. Reference Demo Board TB-TCW2-722+

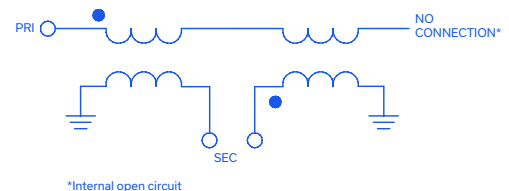
2. Relative to 180°

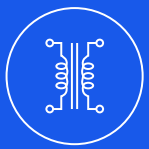
MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-55°C to 125°C
Storage Temperature	-55°C to 125°C
RF Power	0.5W

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

CONFIGURATION J





Mini-Circuits

CERAMIC BALUN

RF Transformer

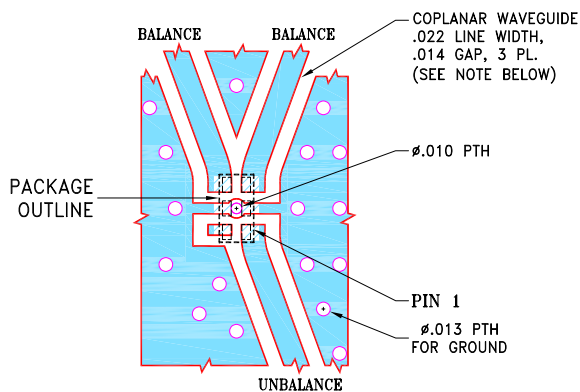
TCW2-722+

50Ω 2400 to 7125 MHz 1:2 Ratio

PAD CONNECTIONS

PRIMARY DOT (Unbalanced Port)	1
GND	2
SECONDARY DOT (Balanced)	3
SECONDARY (Balanced)	4
NO CONNECTION	6
GND	5

PRODUCT MARKING: N/A

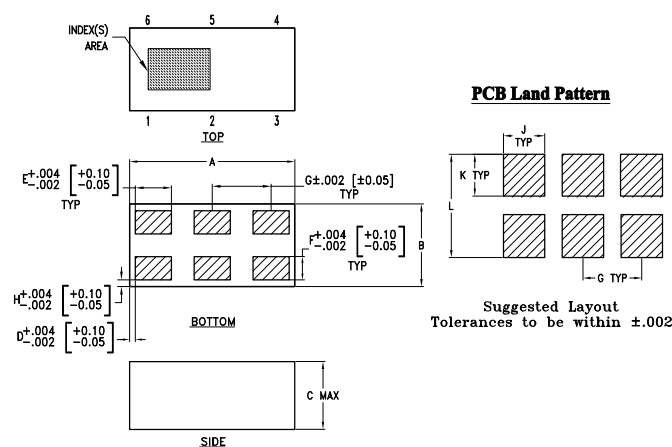
DEMO BOARD MCL P/N: TB-TCW2-722+
SUGGESTED PCB LAYOUT (PL-681)

NOTES:

1. TRACE WIDTH AND GAP 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.

OUTLINE DRAWING

OUTLINE DIMENSIONS (Inches
mm)

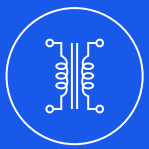
A	B	C	D	E	F
.063	.032	.026	.002	.014	.009
1.60	0.81	0.66	0.05	0.36	0.23
G	H	J	K	L	wt
.022	.003	.016	.016	.039	grams
0.56	0.08	0.41	0.41	0.99	.005

TAPE & REEL INFORMATION: F114

Mini-Circuits

www.minicircuits.com P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

PAGE 2 OF 3



Mini-Circuits

CERAMIC BALUN

RF Transformer

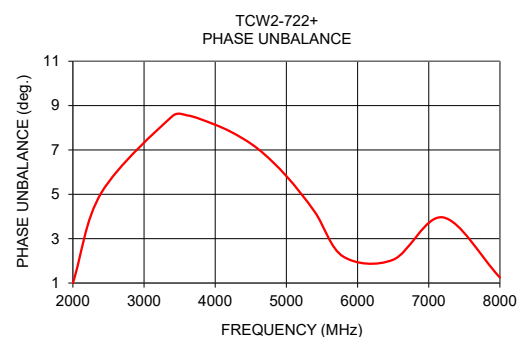
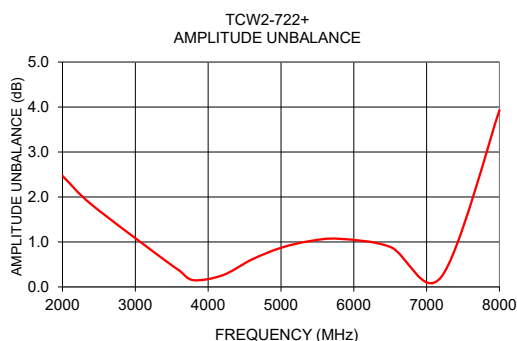
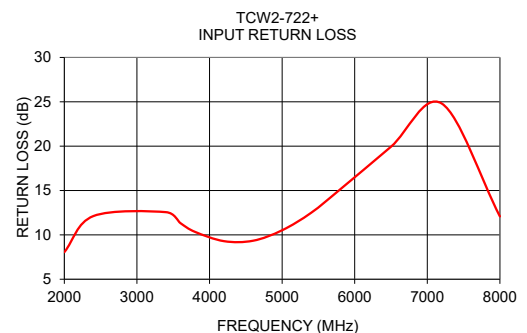
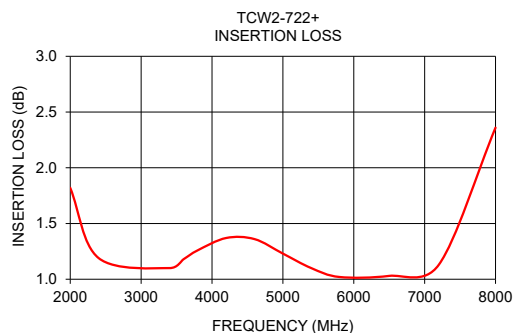
TCW2-722+

50Ω 2400 to 7125 MHz 1:2 Ratio

TYPICAL PERFORMANCE DATA³

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance (deg)
2000	1.82	8.05	2.47	1.00
2400	1.19	12.12	1.83	5.07
3400	1.10	12.56	0.60	8.53
3600	1.18	11.32	0.37	8.56
3800	1.26	10.34	0.15	8.38
4200	1.37	9.29	0.26	7.85
4600	1.36	9.34	0.61	7.05
5000	1.23	10.52	0.87	5.82
5400	1.10	12.49	1.02	4.20
5800	1.02	15.13	1.07	2.19
6500	1.03	19.94	0.89	2.05
7200	1.13	24.80	0.22	3.96
8000	2.36	12.08	3.93	1.25

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



- 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



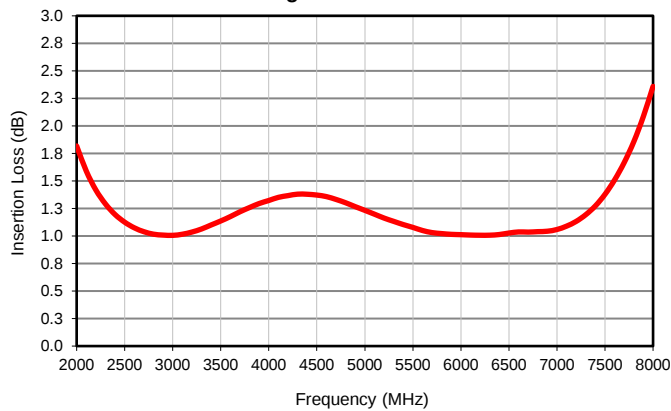
Typical Performance Data

FREQUENCY (MHz)	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE ⁽¹⁾ (deg.)
2000	1.82	8.05	2.47	1.00
2100	1.59	9.10	2.29	2.17
2200	1.42	10.15	2.13	3.24
2300	1.29	11.16	1.98	4.19
2400	1.19	12.12	1.83	5.07
2500	1.13	12.99	1.70	5.81
2600	1.07	13.77	1.56	6.46
2700	1.04	14.37	1.43	7.01
2800	1.02	14.77	1.31	7.42
2900	1.01	14.90	1.19	7.77
3000	1.01	14.78	1.07	8.05
3100	1.02	14.41	0.94	8.26
3200	1.04	13.85	0.82	8.43
3300	1.06	13.21	0.71	8.51
3400	1.10	12.56	0.60	8.53
3500	1.14	11.92	0.48	8.58
3600	1.18	11.32	0.37	8.56
3700	1.22	10.78	0.27	8.53
3800	1.26	10.34	0.15	8.38
3900	1.30	9.96	0.04	8.26
4000	1.32	9.68	0.07	8.13
4100	1.35	9.44	0.16	8.01
4200	1.37	9.29	0.26	7.85
4300	1.38	9.19	0.35	7.64
4400	1.38	9.16	0.45	7.36
4500	1.37	9.22	0.54	7.19
4600	1.36	9.34	0.61	7.05
4700	1.33	9.53	0.67	6.62
4800	1.30	9.80	0.75	6.35
4900	1.27	10.14	0.81	6.10
5000	1.23	10.52	0.87	5.82
5100	1.20	10.95	0.92	5.51
5200	1.16	11.44	0.95	4.99
5300	1.13	11.94	1.00	4.55
5400	1.10	12.49	1.02	4.20
5500	1.08	13.08	1.03	3.82
5600	1.05	13.86	1.04	3.21
5700	1.03	14.56	1.07	2.41
5800	1.02	15.13	1.07	2.19
5900	1.02	15.60	1.08	1.61
6000	1.01	16.10	1.06	1.07
6100	1.01	16.64	1.05	0.48
6200	1.01	17.28	1.00	0.17
6300	1.01	18.02	0.98	0.93
6400	1.01	18.91	0.93	1.48
6500	1.03	19.94	0.89	2.05
6600	1.04	21.42	0.78	2.42
6700	1.04	23.57	0.65	2.91
6800	1.04	26.69	0.55	3.28
6900	1.04	32.99	0.40	3.59
7000	1.06	47.59	0.23	3.93
7100	1.09	30.46	0.02	3.97
7200	1.13	24.80	0.22	3.96
7300	1.19	21.30	0.50	3.89
7400	1.27	18.82	0.82	3.53
7500	1.38	16.87	1.19	2.99
7600	1.51	15.39	1.62	2.47
7700	1.67	14.23	2.11	1.82
7800	1.86	13.34	2.65	1.01
7900	2.09	12.62	3.26	0.09
8000	2.36	12.08	3.93	1.25

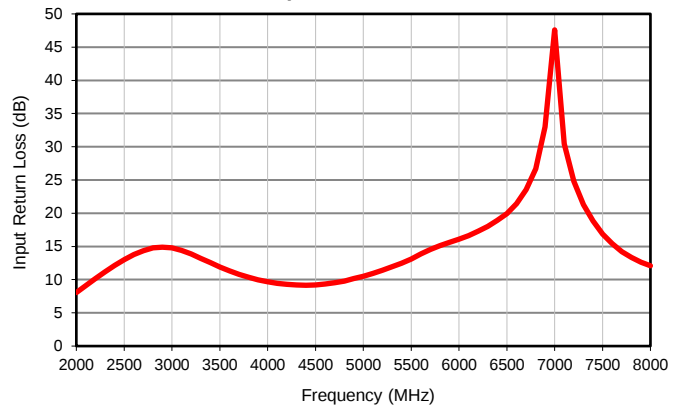
⁽¹⁾ Relative to 180°

Typical Performance Data

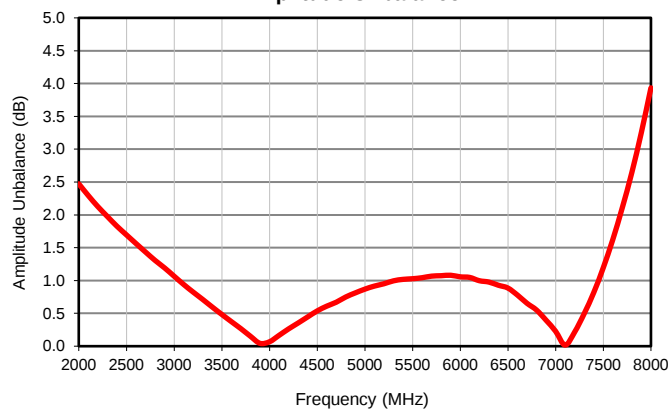
Average Insertion Loss



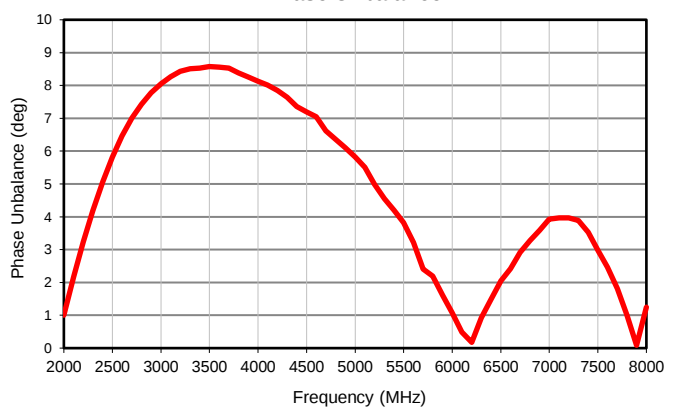
Input Return Loss

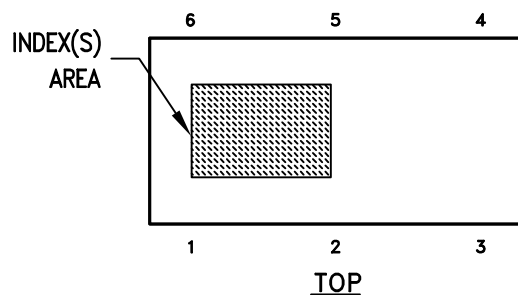


Amplitude Unbalance

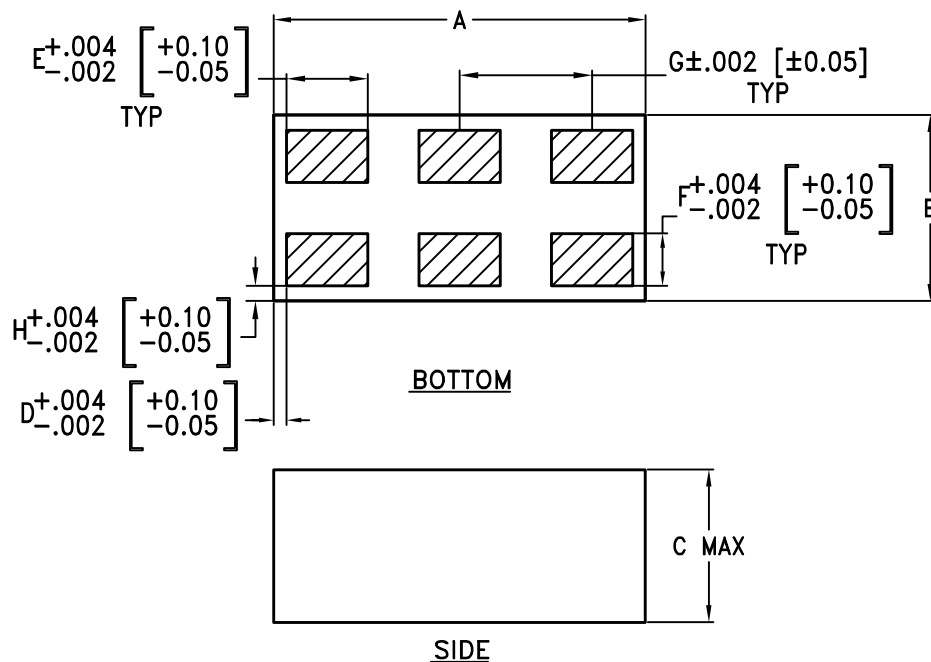
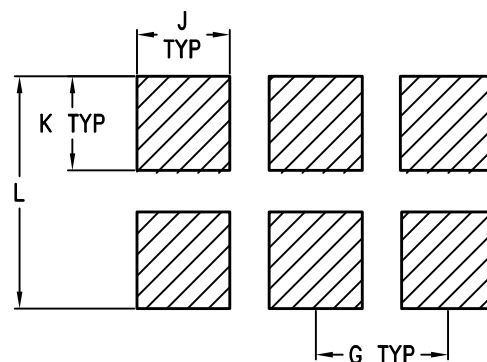


Phase Unbalance





PCB Land Pattern



Suggested Layout
Tolerances to be within $\pm.002$

CASE #	A	B	C	D	E	F	G	H	J	K	L	WT, GRAM
JC0603C-8	.063 (1.60)	.032 (0.80)	.026 (0.66)	.002 (0.05)	.014 (0.35)	.009 (0.22)	.022 (0.57)	.003 (0.07)	.016 (0.41)	.016 (0.41)	.039 (1.00)	.005

Dimensions are in inches (mm). Tolerances: 3 Pl. $\pm.004$

Notes:

- Open style, ceramic base.
- Termination finish:
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
- Line width should be designed to match 50 Ohms characteristic impedance, depending on PCB material & thickness.



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

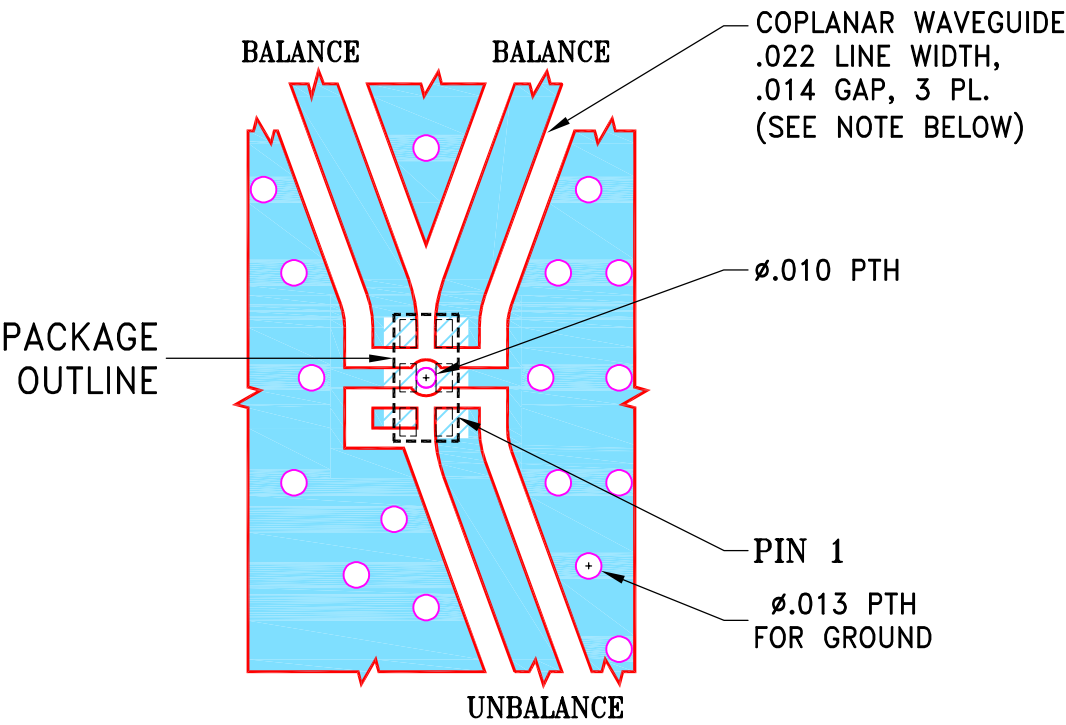
RF/IF MICROWAVE COMPONENTS

THIRD ANGLE PROJECTION

REVISIONS					
REV OR	ECN No.	DESCRIPTION	DATE	DR	AUTH
	ECO-003271	NEW RELEASE	07/29/20	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR

JC0603C-8 CASE STYLE



NOTES:

1. TRACE WIDTH AND GAP 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	ITG	07/29/20
TOLERANCES ON:	CHECKED	GF	07/29/20
2 PL DECIMALS ±	APPROVED	IL	07/29/20
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			



Mini-Circuits®

13 Neptune Avenue
Brooklyn NY 11235

PL, JC0603C-8, TB-TCW2-722

Mini-Circuits®

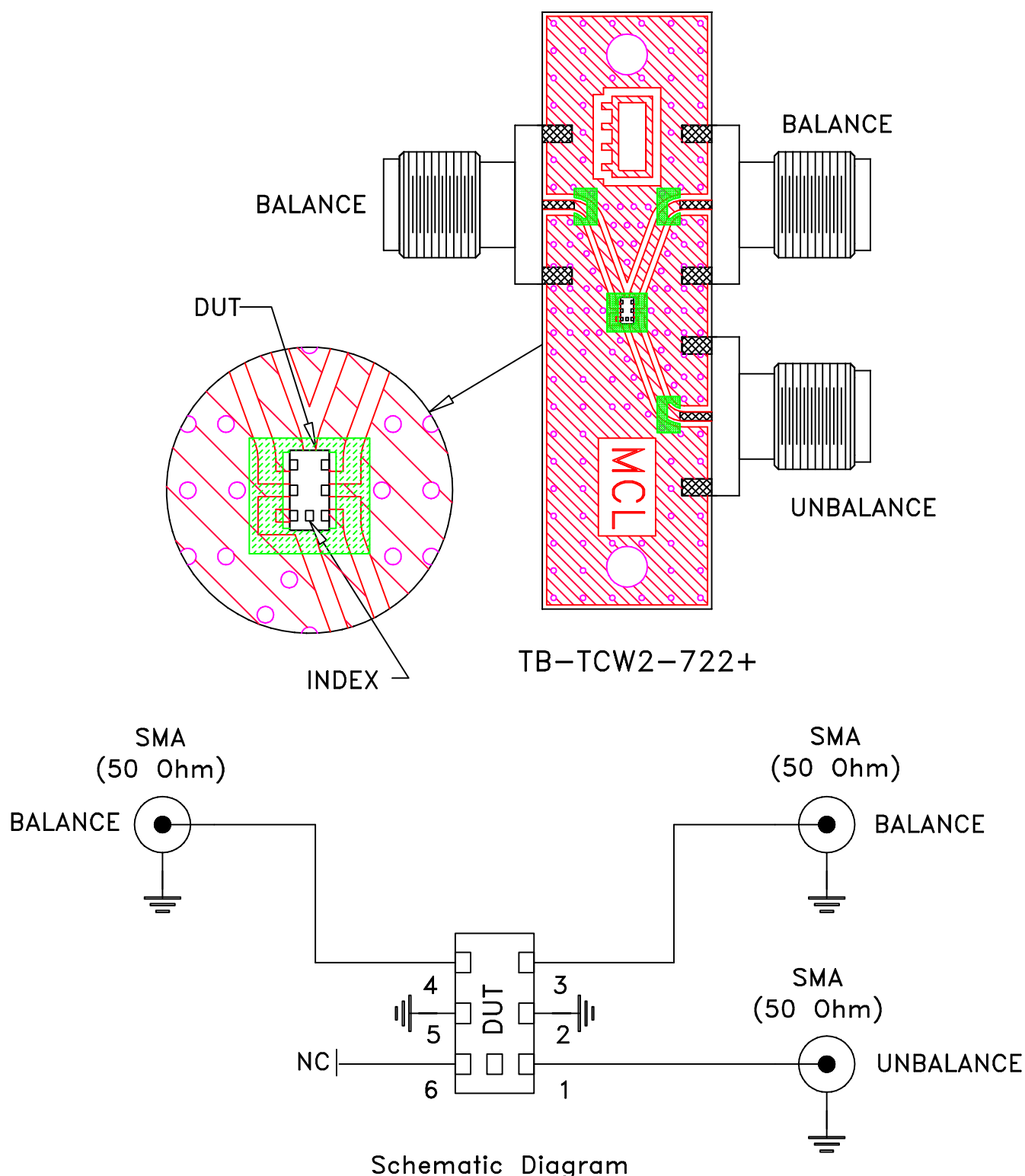
THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE , MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, 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-681	OR
FILE:	98PL681	SCALE:	10:1
		SHEET:	1 OF 1

Evaluation Board and Circuit



Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 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	-55° to 105°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 105°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
Solder Reflow Heat	Sn-Pb Eutectic Process 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020C, 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