CERAMIC BALUN

RF Transformer

TCW2-722+

50Ω 2400 to 7125 MHz 1:2 Ratio

FEATURES

- Wideband, 2400 to 7125 MHz
- Miniature Size 0603 (1.6x0.8 mm)
- 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

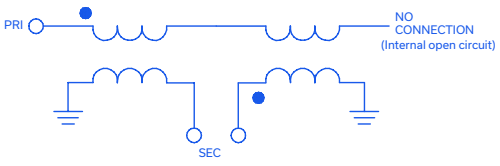
1. Reference Demo Board TB-TCW2-722+.
2. Relative to 180°.

ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-55°C to +125°C
Storage Temperature	-55°C to +125°C
RF Power Input[3]	0.5 W at +25°C

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

CONFIGURATION J



CERAMIC BALUN

RF Transformer

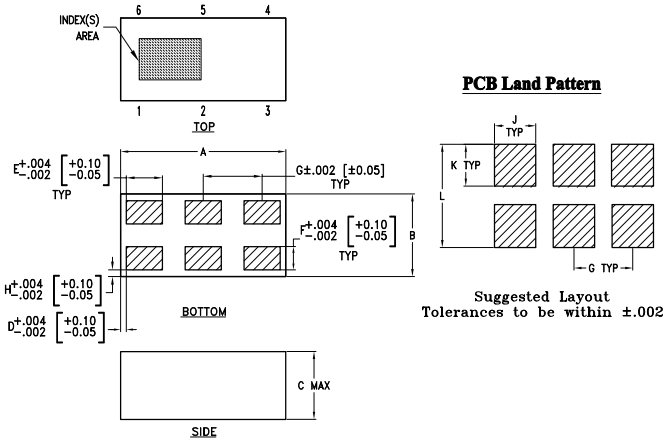
TCW2-722+

50Ω 2400 to 7125 MHz 1:2 Ratio

PAD CONNECTIONS

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

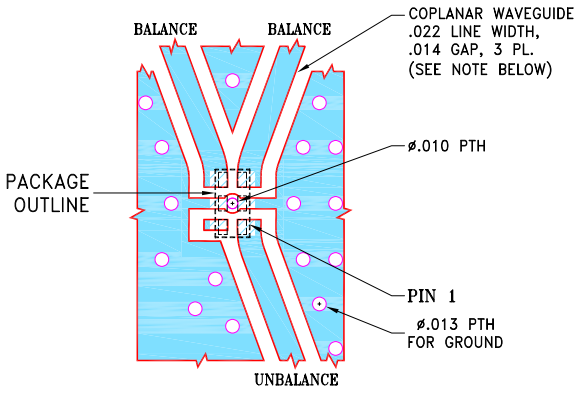
OUTLINE DRAWING



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 RO4350B 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 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

RF Transformer

TCW2-722+

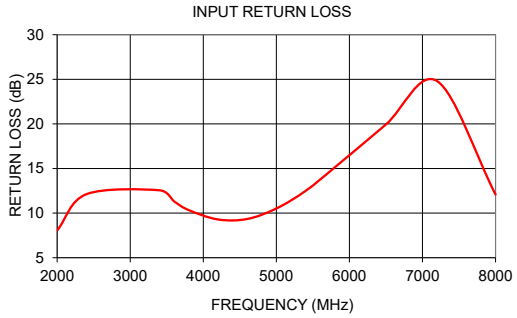
50Ω 2400 to 7125 MHz 1:2 Ratio

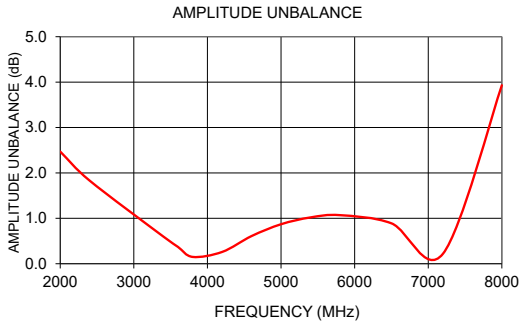
TYPICAL PERFORMANCE DATA[4]

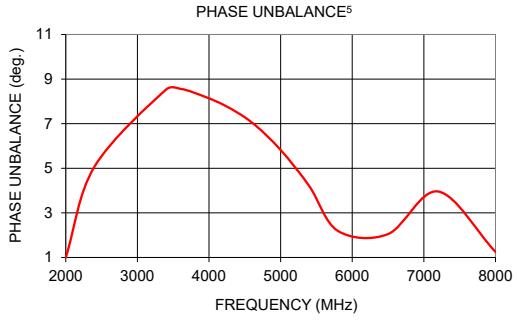
Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance[5] (deg)
2000	1.82	8.05	2.47	1.00
2400	1.19	12.12	1.83	5.07
3400	1.10	12.56	0.60	8.53
3600	1.18	11.32	0.37	8.56
3800	1.26	10.34	0.15	8.38
4200	1.37	9.29	0.26	7.85
4600	1.36	9.34	0.61	7.05
5000	1.23	10.52	0.87	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

4. Measured with Agilent E5071B network analyzer using impedance conversion and port extension.
5. Relative to 180°.









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 TCW2-722+

Typical Performance Data

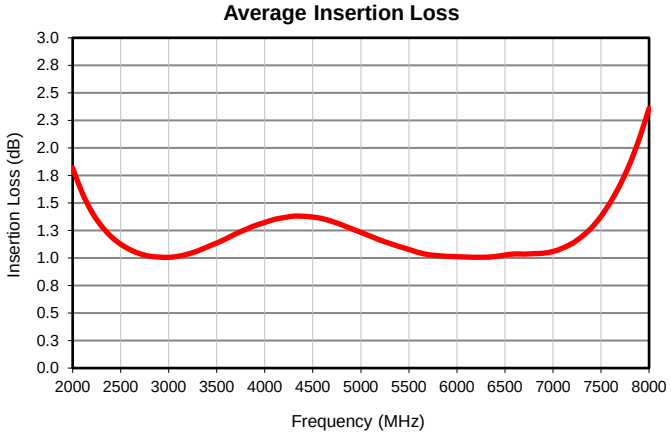
FREQUENCY (MHz)	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE[1] (deg.)
2000	1.82	8.05	2.47	1.00
2100	1.59	9.10	2.29	2.17
2200	1.42	10.15	2.13	3.24
2300	1.29	11.16	1.98	4.19
2400	1.19	12.12	1.83	5.07
2500	1.13	12.99	1.70	5.81
2600	1.07	13.77	1.56	6.46
2700	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°

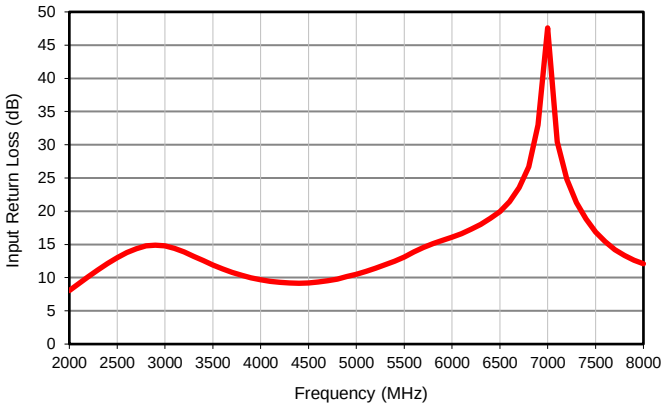
RF Transformer TCW2-722+

Typical Performance Data

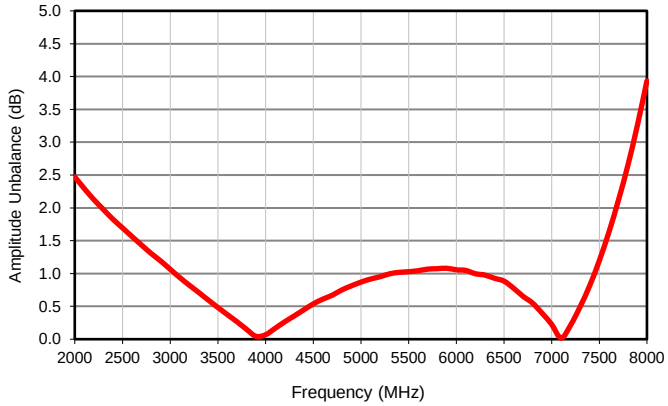
Average Insertion Loss



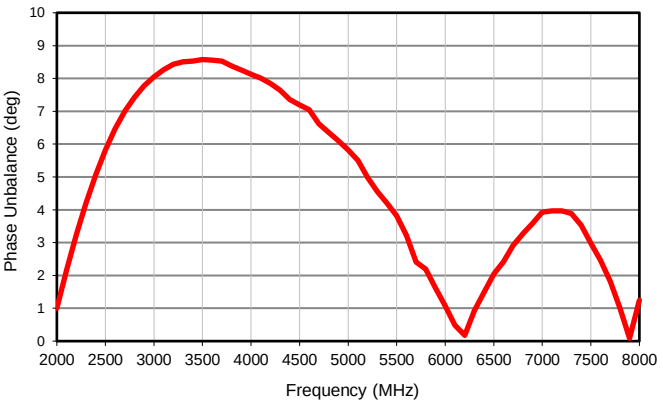
Input Return Loss



Amplitude Unbalance

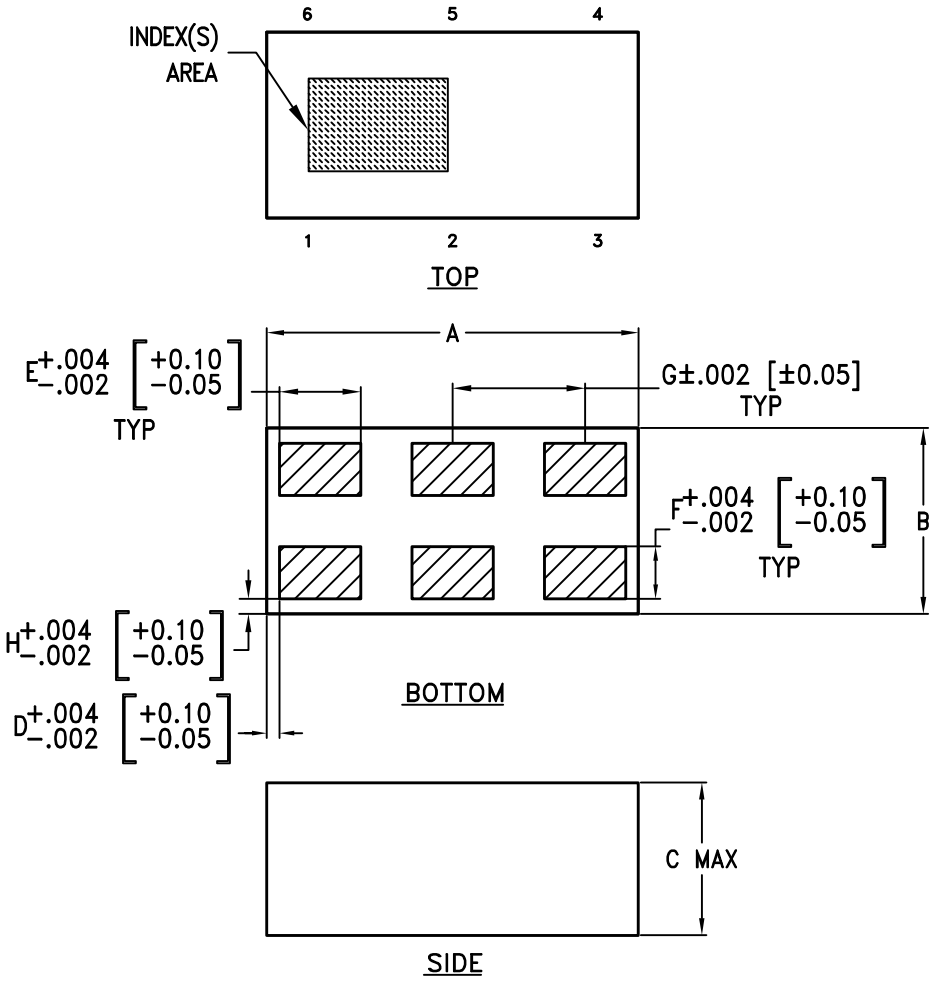


Phase Unbalance

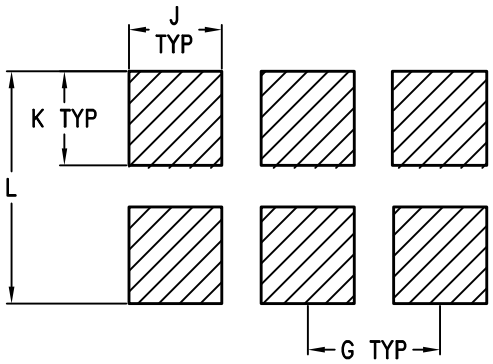


Case Style JC

Outline Dimensions JC0603C-8



PCB Land Pattern



Suggested Layout
Tolerances to be within ±.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. ±.004

Notes:

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

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Tape & Reel Packaging TR-F74

DEVICE ORIENTATION IN T&R

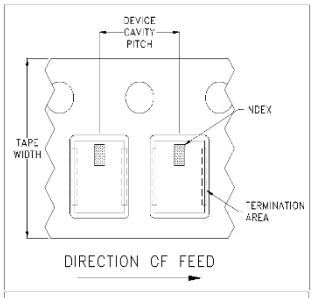


ILLUSTRATION 1

Applicable Case Styles
GE0805C-1
GE0805C-1AP
JV1210C-1
GU2939

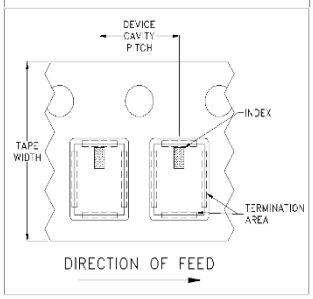


ILLUSTRATION 2

Applicable Case Styles
JV1210C
JV1210C-2
JV1210C-3
JV1210C-4
JV1210C-5
JV1210C-6
JV1210C-11

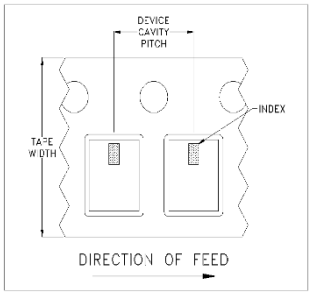


ILLUSTRATION 3

Applicable Case Styles
JC0603C-8
JC0603C-9
JV1210C-7
JV1210C-8
JV1210C-9
JV1210C-10
JV1210C-13
GE0805C-13
GE0805C-19
GE0805C-20

Tape Width, mm	Device Cavity Pitch, mm	Real Size, inches	Devices per Reel	
8	4	7	Small quantity standards **(see note)**	20
				50
				100
				200
				500
				1000
			Standard	2000
				4000

Note: Small reel availability varies by model. Refer to pricing and availability on individual model dashboard.

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

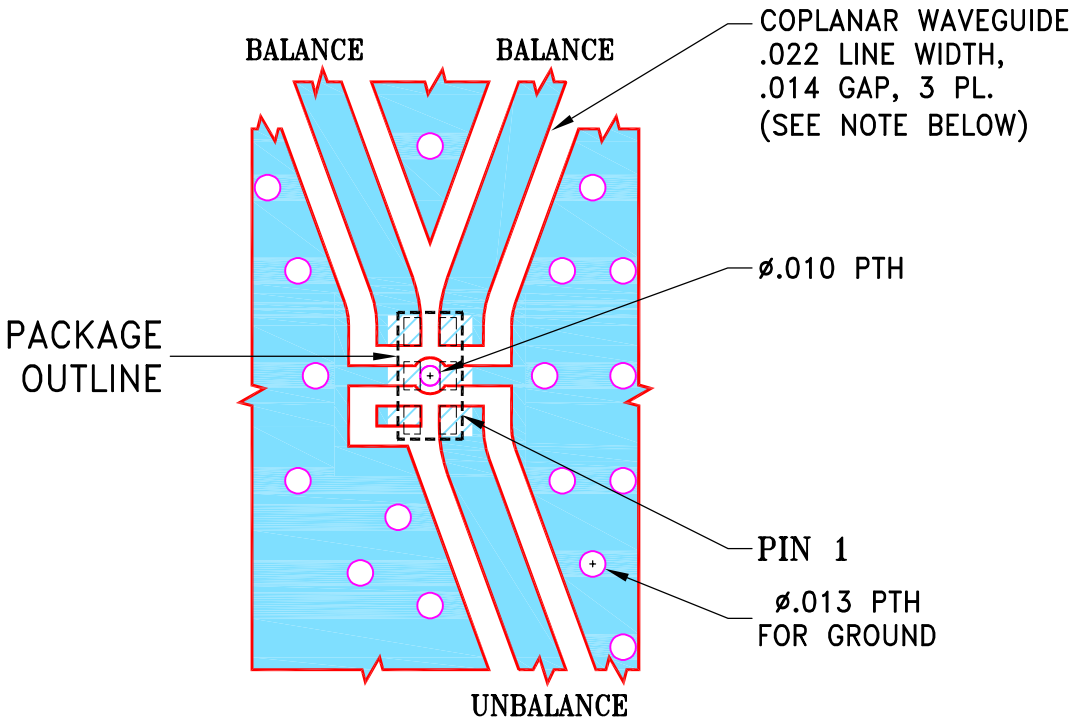
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THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-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 RO4350B 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 ±			

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

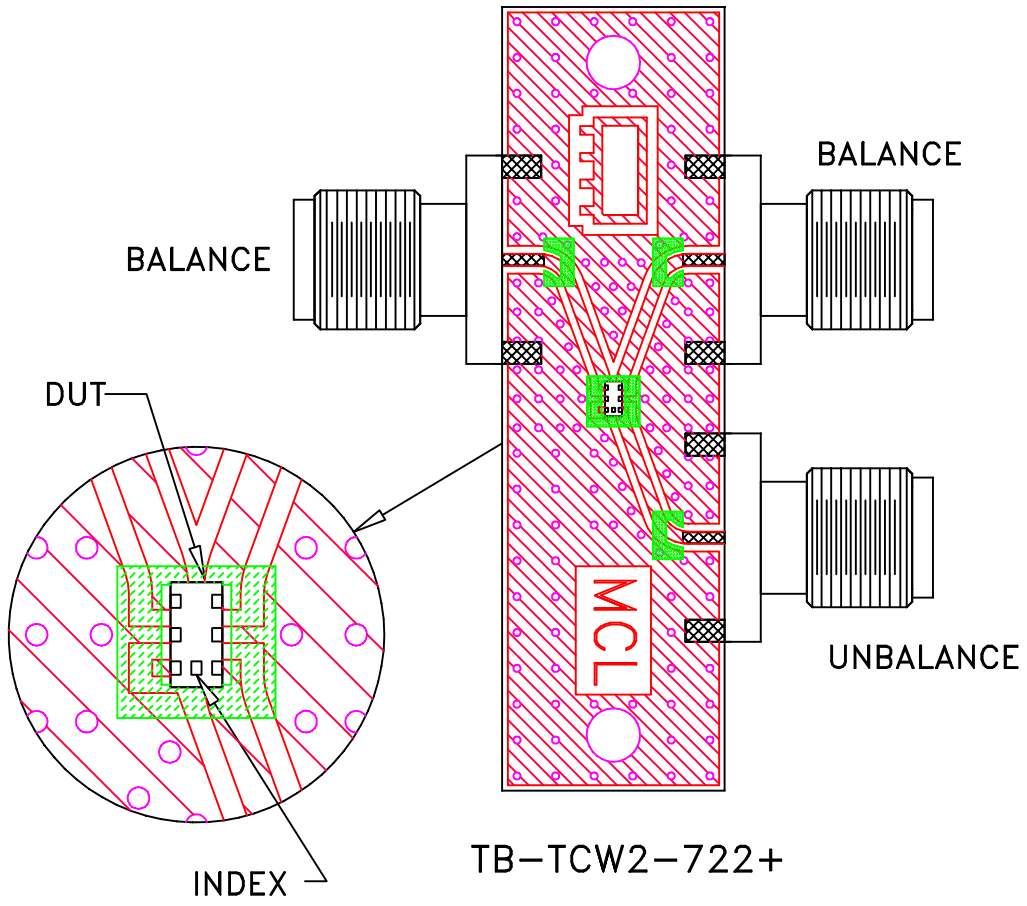
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PL, JC0603C-8, TB-TCW2-722

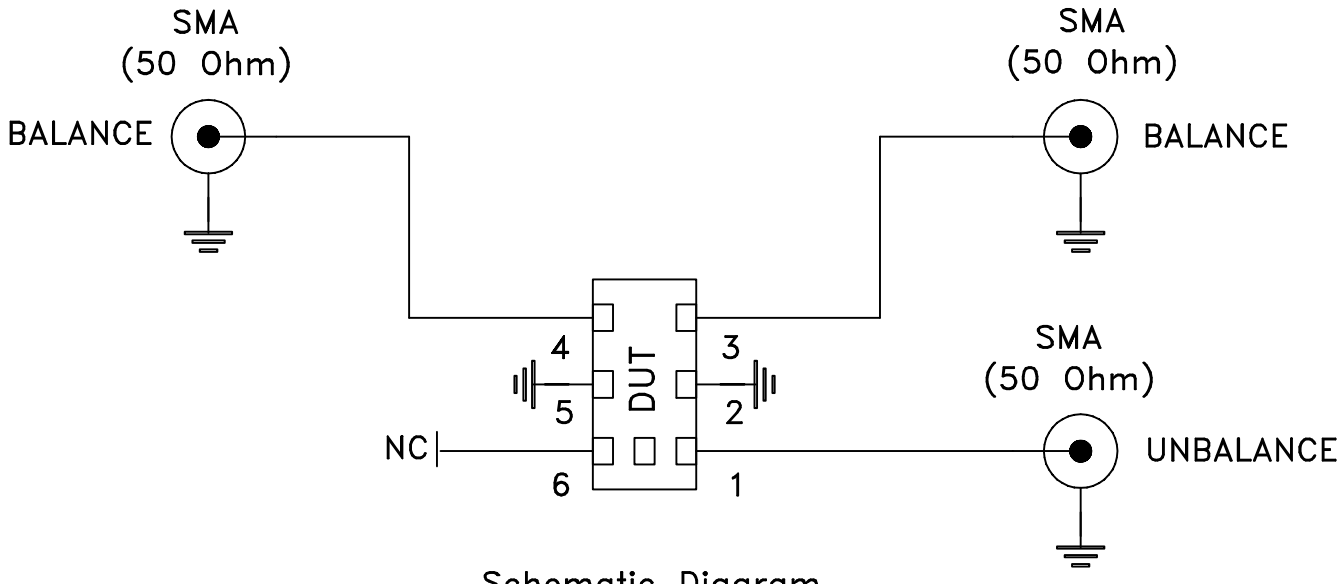
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-681	OR

FILE:	SCALE:	SHEET:
98PL681	10:1	1 OF 1

Evaluation Board and Circuit



TB-TCW2-722+



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent,
   Dielectric Constant=3.5, Thickness=.010 inch.

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Mini-Circuits

Environmental Specifications ENV06T6

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

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