



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°.

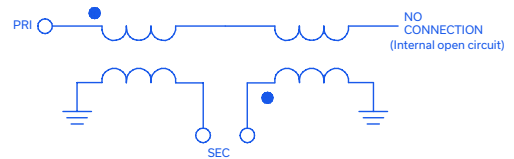
ABSOLUTE MAXIMUM RATINGS

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





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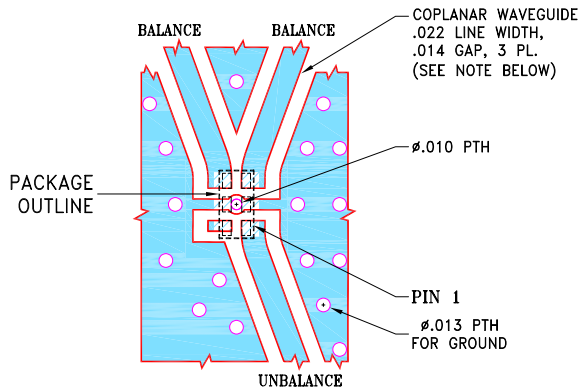
50Ω 2400 to 7125 MHz 1:2 Ratio

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

PRODUCT MARKING: N/A

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

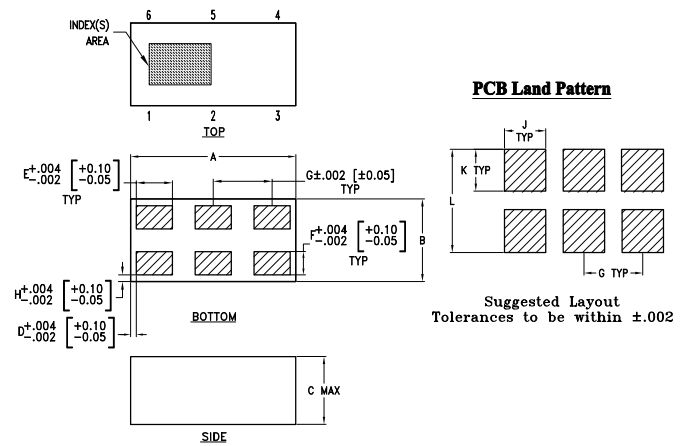


NOTES:

- 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.
- 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



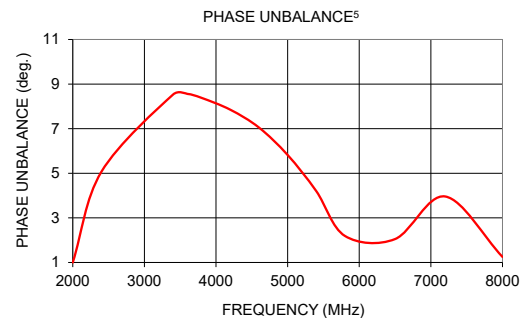
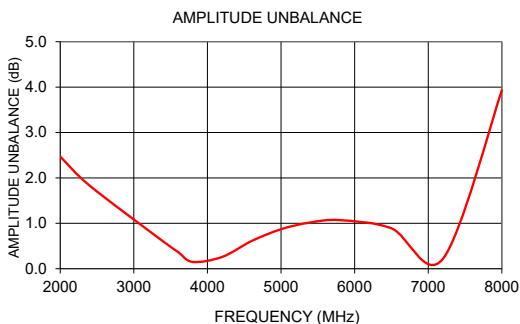
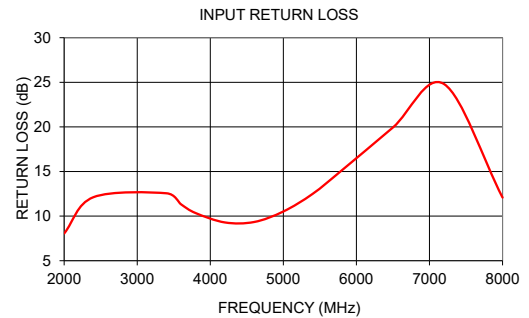
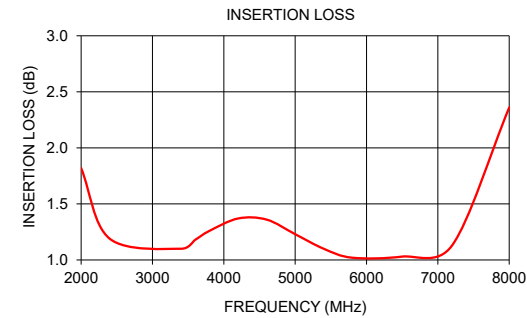


TYPICAL PERFORMANCE DATA⁴

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



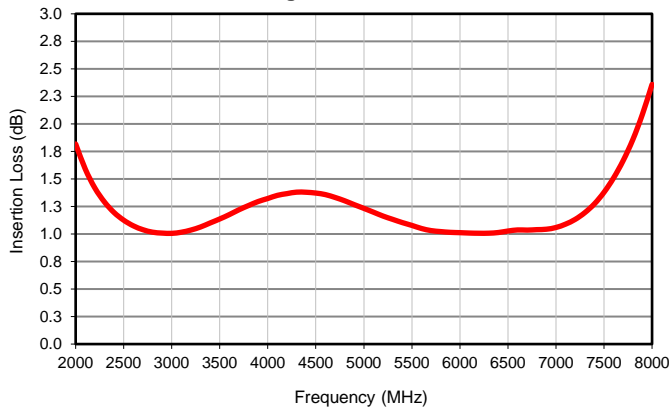
Typical Performance Data

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

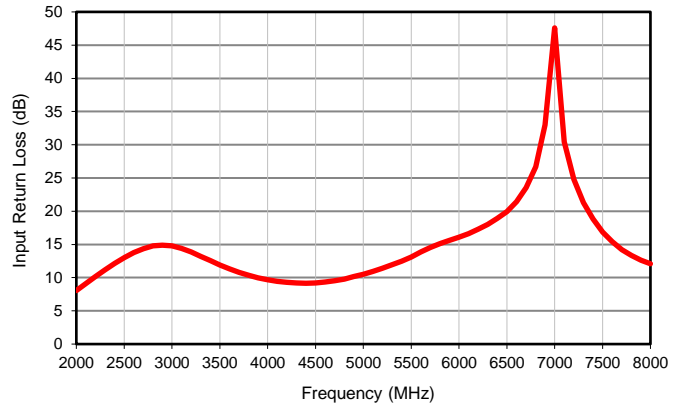
⁽¹⁾ Relative to 180°

Typical Performance Data

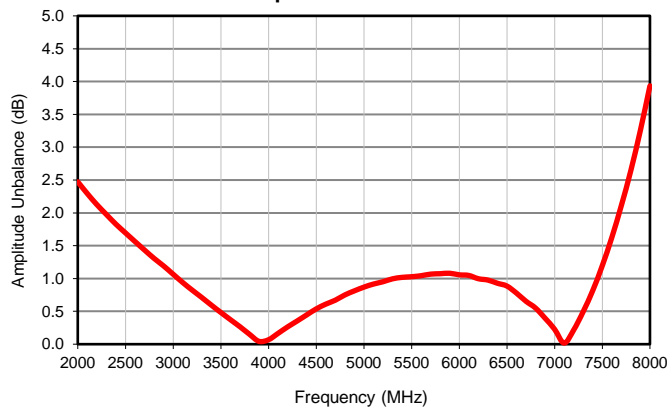
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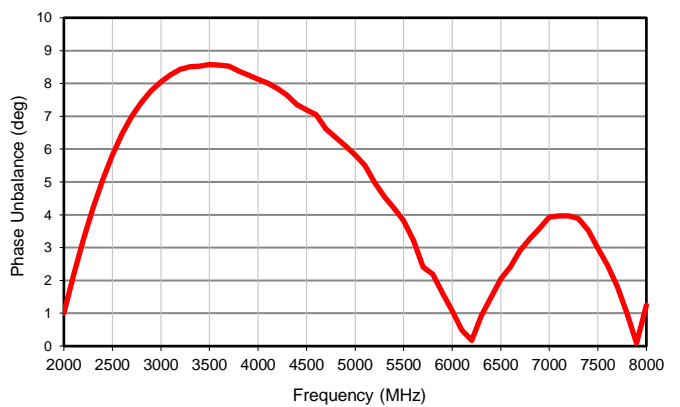
Input Return Loss



Amplitude Unbalance



Phase Unbalance

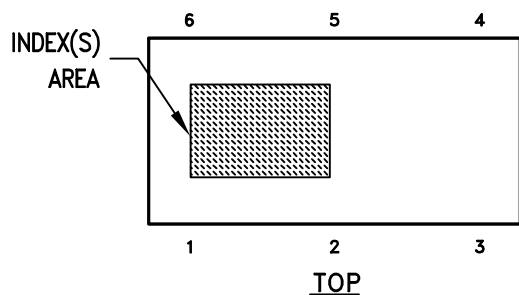


Case Style

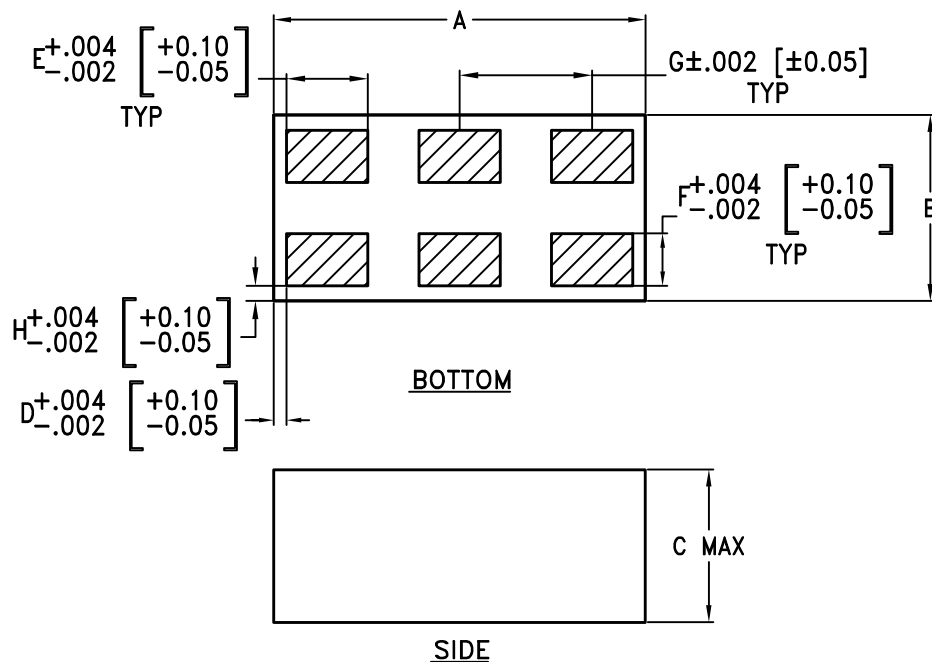
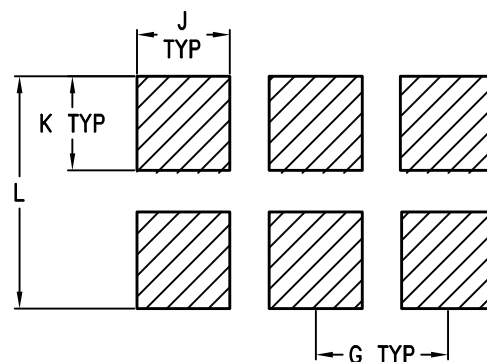
JC

Outline Dimensions

JC0603C-8



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.

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RF/IF MICROWAVE COMPONENTS

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.

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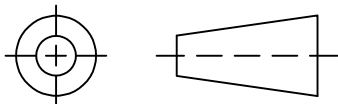
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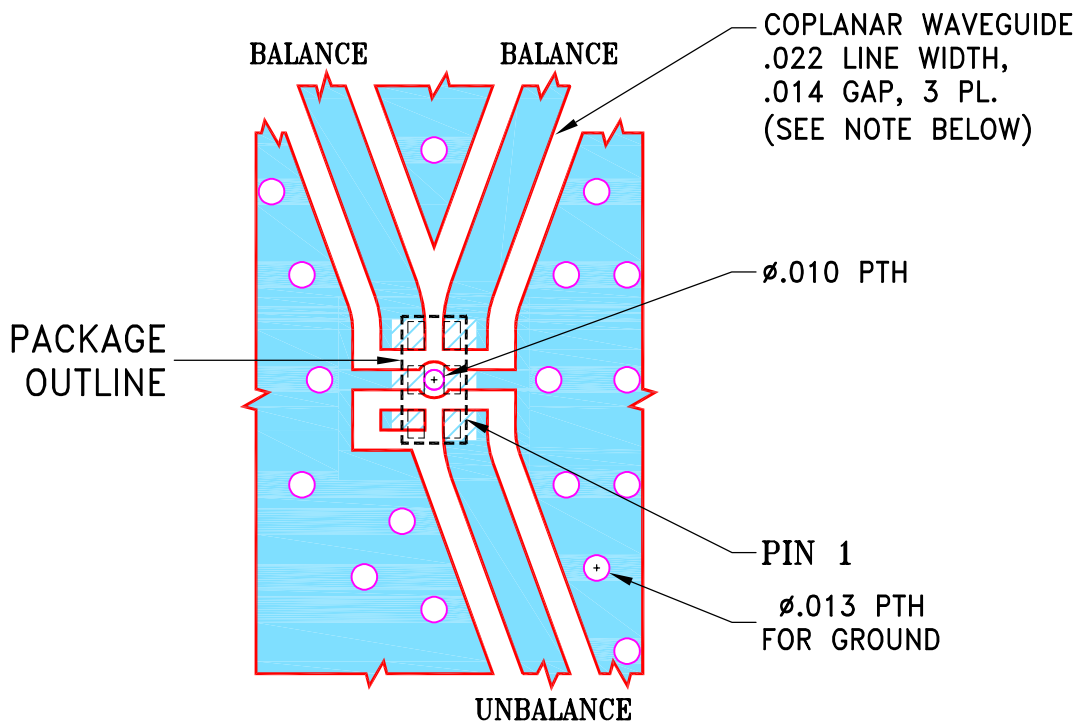
THIRD ANGLE PROJECTION



REVISIONS

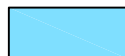
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-003271	NEW RELEASE	07/29/20	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR
JC0603C-8 CASE STYLE

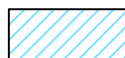


NOTES:

- 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.
- 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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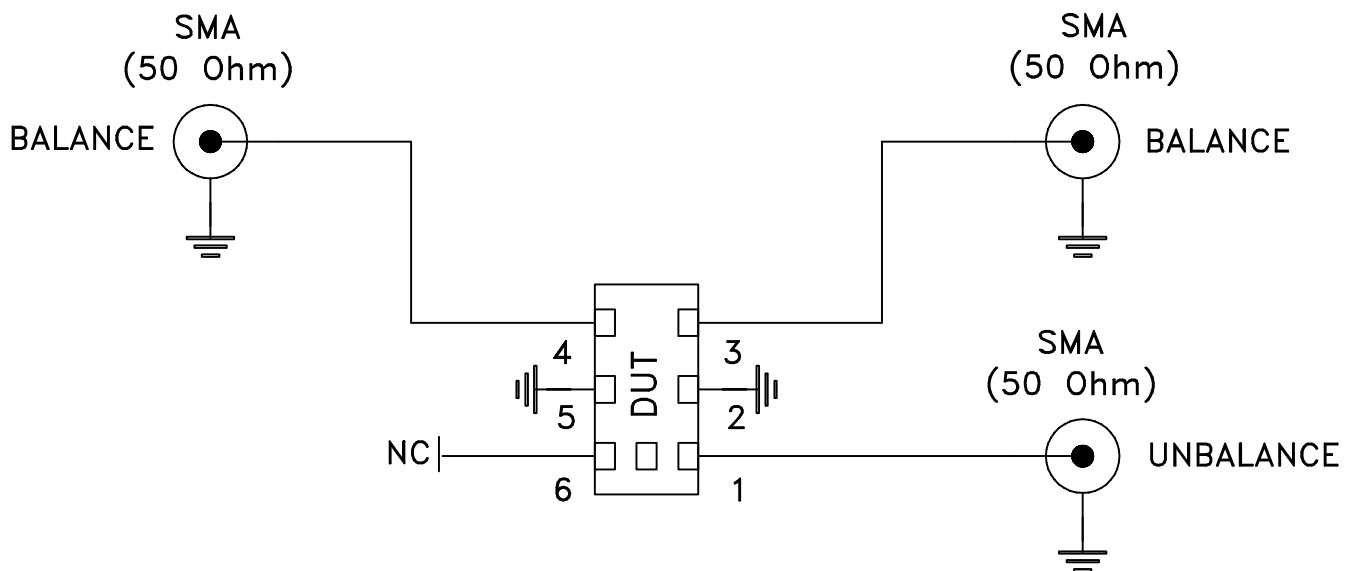
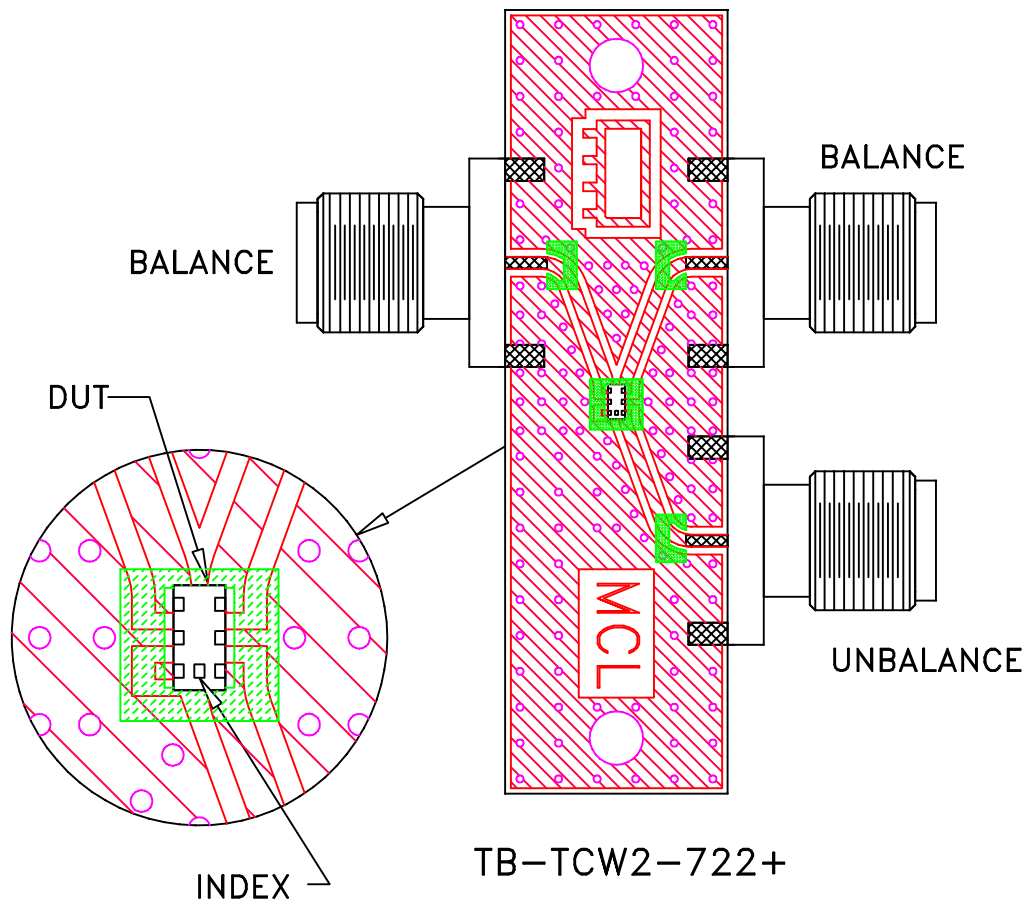
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PL, JC0603C-8, TB-TCW2-722

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SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-681	OR
FILE:	98PL681	SCALE:	SHEET:
		10:1	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=.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