

# Ceramic Balun RF Transformer

50Ω 2400 to 7200 MHz 1:2 Ratio

## TCW2-722-1+



Generic photo used for illustration purposes only

CASE STYLE: JC0603C-8

### Features

- wideband, 2400 to 7200 MHz
- miniature size 0603 (1.6x0.8mm)
- LTCC construction
- low cost
- aqueous washable

### Applications

- WLAN
- A/D conversion
- WiFi
- transmitters and receivers
- cellular

### +RoHS Compliant

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



Available Tape and Reel  
at no extra cost

Reel Size	Devices/Reel
7"	20, 50, 100, 200, 500, 1000, 4000

### Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Impedance Ratio (Secondary/Primary)			2		
Frequency Range		2400		7200	MHz
Average Insertion Loss <sup>1</sup>	2400-7125 7125-7200	—	1.6 1.8	2.5 —	dB
Amplitude Unbalance	2400-7125 7125-7200	—	1.8 2.5	2.5 —	dB
Phase Unbalance <sup>2</sup>	2400-5200 5200-7200	—	9 13	15 18	Degree
Return Loss	2400-7200	—	8.5	—	dB

1. Reference Demo Board TB-TCW2-722+

2. Relative to 180°

### Maximum Ratings

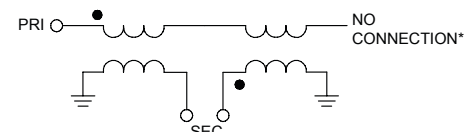
Parameter	Ratings
Operating Temperature	-55°C to 125°C
Storage Temperature	-55°C to 125°C
RF Power	0.5W

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

### Pad Connections

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

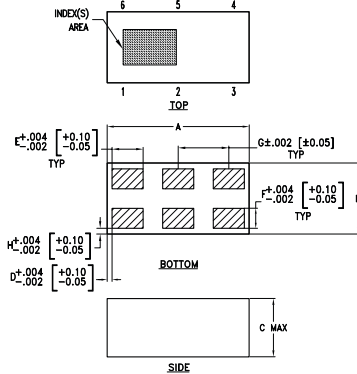
### Configuration J



\*Internal open circuit

# TCW2-722-1+

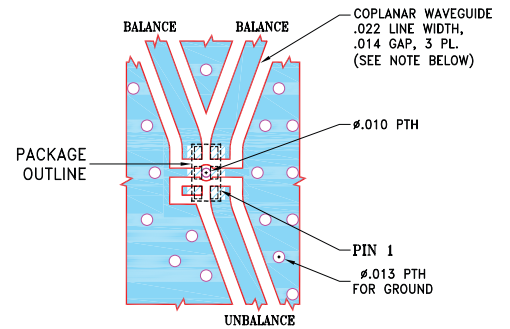
## Outline Drawing



## Outline Dimensions (inch/mm)

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

## Demo Board MCL P/N: TB-TCW2-722+ Suggested PCB Layout (PL-681)



### NOTES:

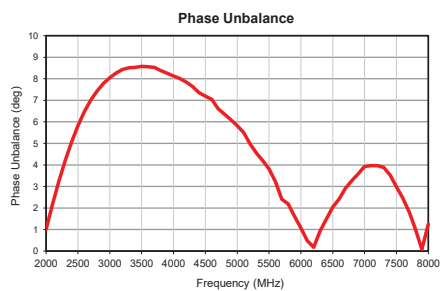
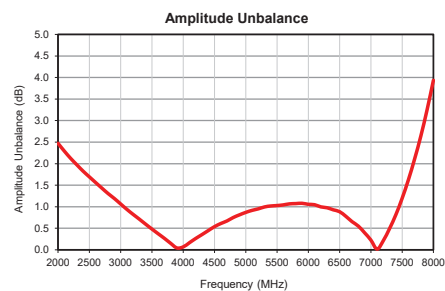
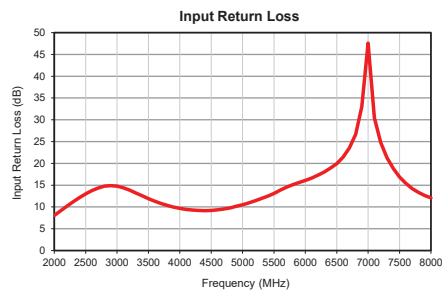
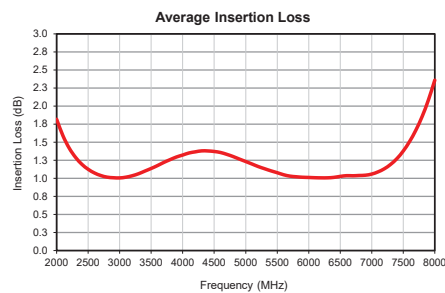
- TRACE WIDTH AND GAP ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .010"±.001"; COPPER: 1/2 OZ. EACH SIDE.  
FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
- BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

## Typical Performance Data<sup>3</sup>

Frequency (MHz)	Insertion Loss (dB)	Input R. Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance (Deg.)
2400	4.19	11.95	1.99	9.21
3400	4.03	13.00	0.59	9.06
3600	4.09	12.07	0.32	8.82
3800	4.13	11.31	0.06	8.46
4200	4.21	10.60	0.41	7.06
4600	4.18	10.92	0.78	4.87
5000	4.10	12.15	1.02	2.65
5400	4.02	14.20	1.12	0.62
5800	3.99	16.33	1.06	3.43
7200	4.12	22.40	0.61	4.69

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



### Additional Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
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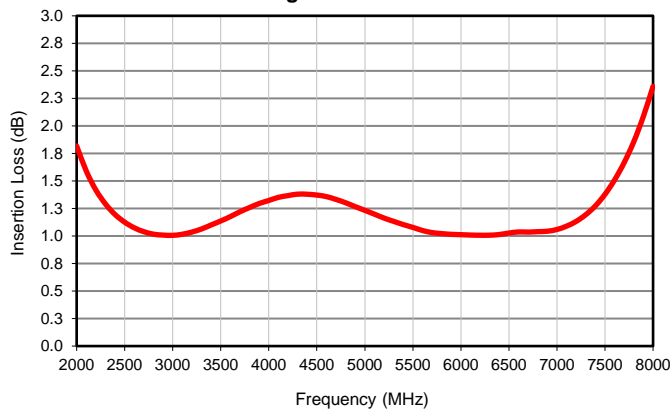
## Typical Performance Data

FREQUENCY (MHz)	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE <sup>(1)</sup> (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

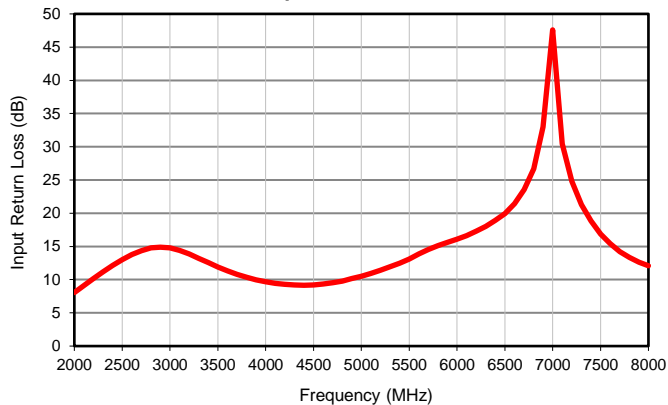
<sup>(1)</sup> Relative to 180°

## Typical Performance Data

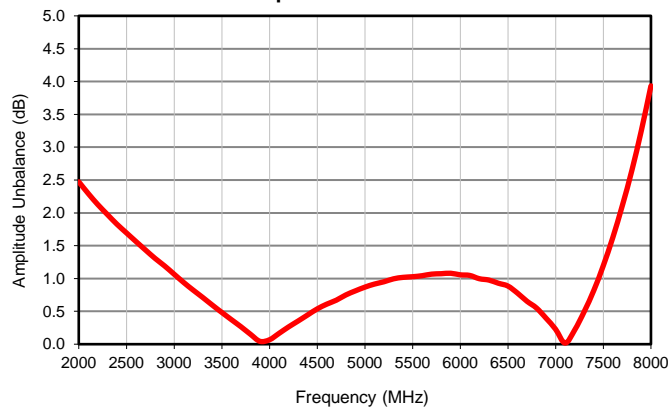
### Average Insertion Loss



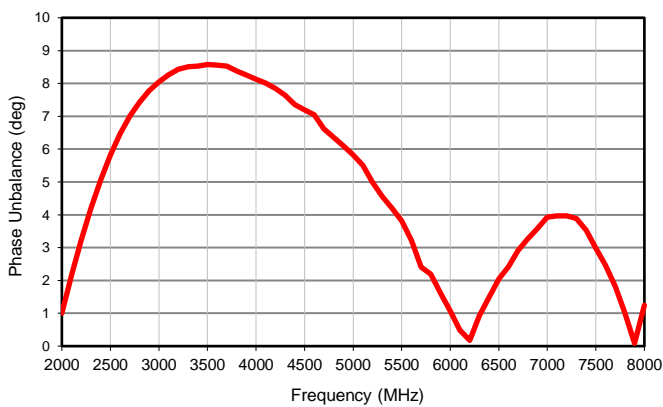
### Input Return Loss



### Amplitude Unbalance



### Phase Unbalance

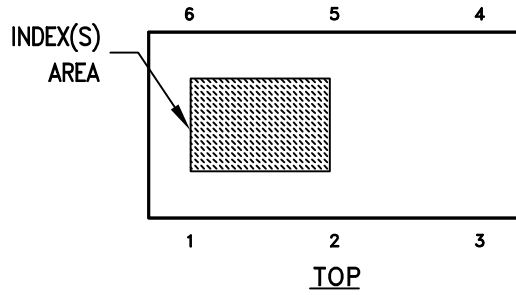


# Case Style

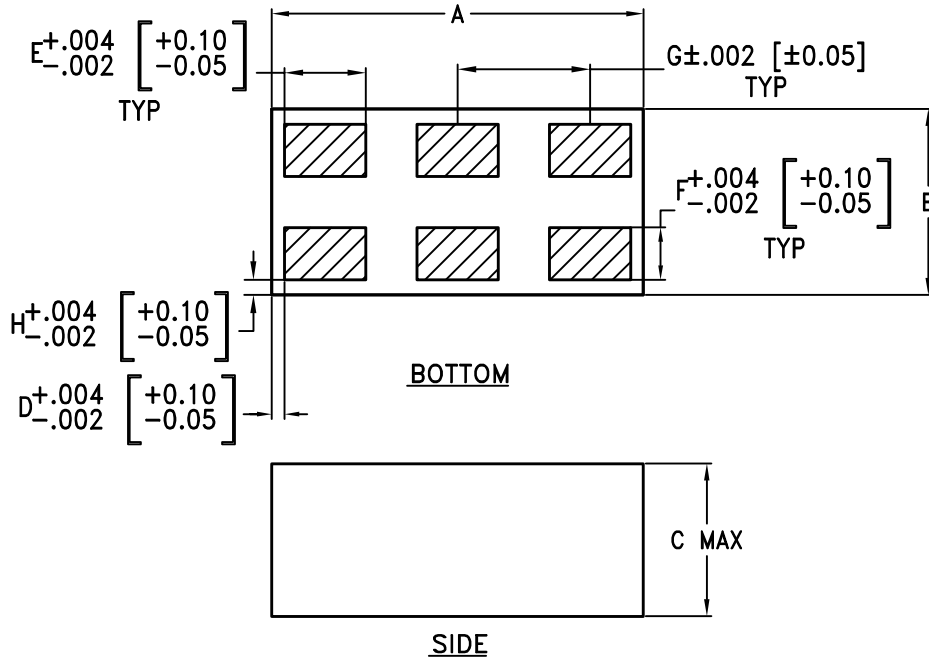
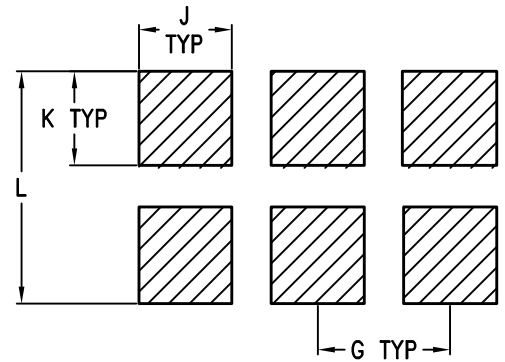
# JC

## Outline Dimensions

## JC0603C-8



### PCB Land Pattern



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

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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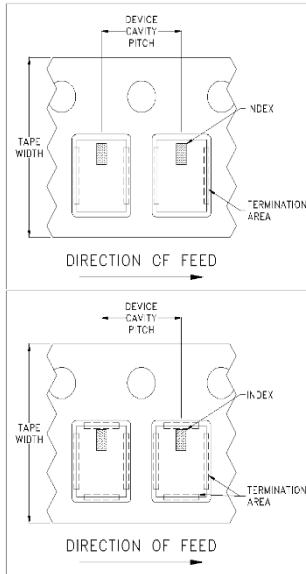


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RF/IF MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F74

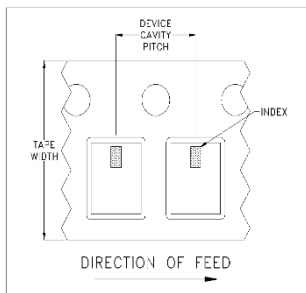
## DEVICE ORIENTATION IN T&R



**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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<b>Specification</b>	<b>Test/Inspection Condition</b>	<b>Reference/Spec</b>
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