

# Ceramic Balun RF Transformer

50Ω 700 to 2800 MHz 1:2 Ratio

## TCW2-282-2+



Generic photo used for illustration purposes only

CASE STYLE: JC0603C

**+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

### Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
Input RF Power	0.5W

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

### Pad Connections

PRIMARY DOT (Unbalanced Port)	1
GND or DC feed + RF	2
SECONDARY DOT (Balanced)	3
SECONDARY (Balanced)	4
NO CONNECTION	6
GND	5

### Features

- wideband, 700 to 2800 MHz
- miniature size 0603 (1.6x0.8mm)
- LTCC construction
- low cost
- aqueous washable

### Applications

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

### Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Impedance Ratio			2		
Frequency Range		700		2800	MHz
Insertion Loss*	700 - 2800		1.2	2.0	dB
Amplitude Unbalance	700 - 2800		1	2	dB
Phase Unbalance †	700 - 2800		13	16	Degree

\* Reference Demo Board TB-828+  
† Relative to 180°

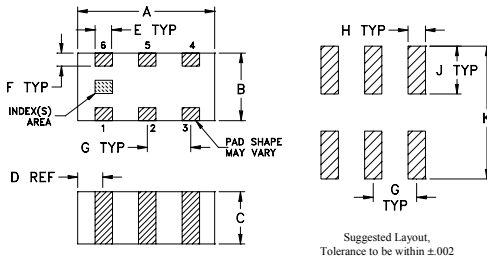
### Typical Performance Data at 25°C\*\*

FREQUENCY (MHz)	INSERTION LOSS (dB)	INPUT R. LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (Deg.)
700.0	4.13	10.83	1.53	8.14
800.0	3.95	12.71	1.43	8.93
1000.0	3.88	13.48	1.20	9.97
1200.0	3.90	13.29	0.93	10.03
1400.0	3.92	13.63	0.65	9.31
1600.0	3.93	14.63	0.37	7.93
1800.0	3.92	16.13	0.10	5.85
2100.0	3.92	18.25	0.17	1.75
2400.0	3.97	17.39	0.23	2.83
2800.0	4.10	14.72	0.26	9.13

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

### Outline Drawing

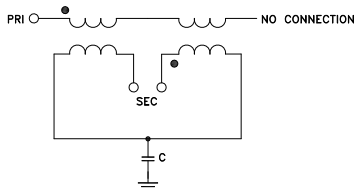
PCB Land Pattern



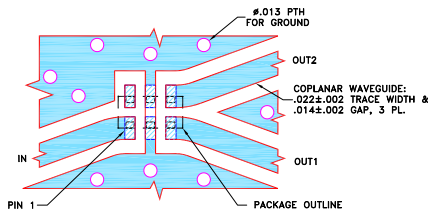
### Outline Dimensions (inch/mm)

A	B	C	D	E	F
.063	.031	.024	.012	.008	.006
1.60	0.79	0.61	0.30	0.20	0.15
G	H	J	K	wt	
.020	.010	.022	.053	grams	
0.51	0.25	0.56	1.35	0.005	

### Configuration R



Demo Board MCL P/N: TB-828+  
Suggested PCB Layout (PL-513)



1. TRACE WIDTH AND GAP PARAMETERS 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.

### 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.
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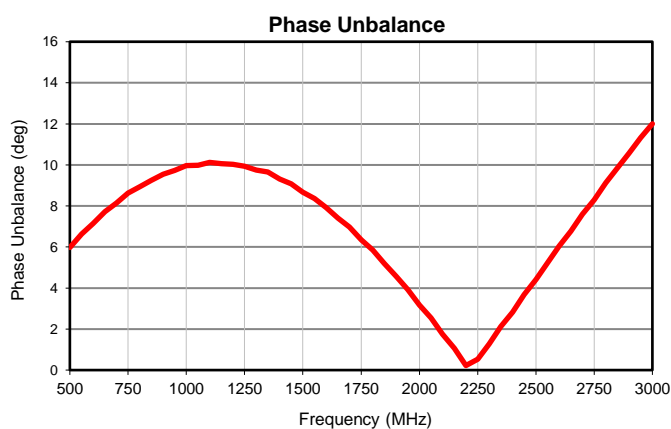
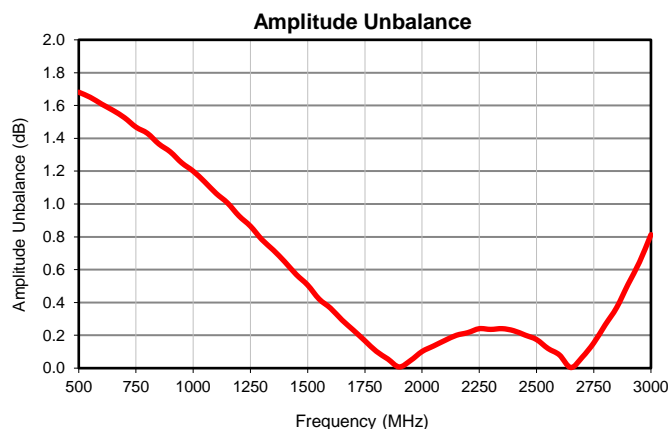
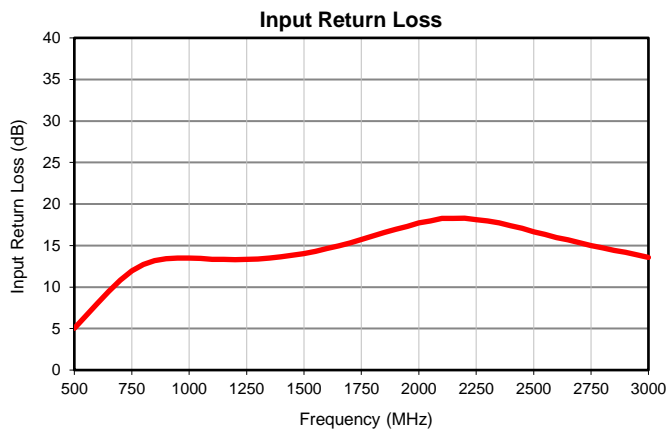
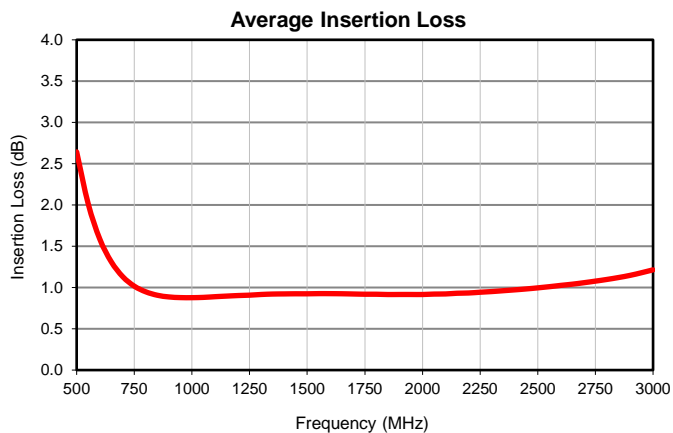
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REV. A  
ECO-005412  
TCW2-282-2+  
AVB/CP/AM  
20217

## Typical Performance Data

FREQUENCY (MHz)	AVERAGE INSERTION LOSS (dB)	INPUT RETURN LOSS (dB)	AMPLITUDE UNBALANCE (dB)	PHASE UNBALANCE (deg.)
500	2.64	5.03	1.68	5.97
550	2.01	6.50	1.65	6.63
600	1.59	8.01	1.61	7.14
650	1.31	9.49	1.57	7.72
700	1.13	10.83	1.53	8.14
750	1.02	11.93	1.47	8.63
800	0.95	12.71	1.43	8.93
850	0.91	13.18	1.37	9.24
900	0.89	13.42	1.32	9.54
950	0.88	13.49	1.25	9.73
1000	0.88	13.48	1.20	9.97
1050	0.88	13.43	1.13	9.98
1100	0.89	13.34	1.06	10.13
1150	0.90	13.32	1.01	10.05
1200	0.90	13.29	0.93	10.03
1250	0.91	13.34	0.87	9.93
1300	0.92	13.38	0.78	9.75
1350	0.92	13.49	0.72	9.66
1400	0.92	13.63	0.65	9.31
1450	0.92	13.82	0.57	9.08
1500	0.92	14.04	0.51	8.68
1550	0.93	14.31	0.42	8.35
1600	0.93	14.63	0.37	7.93
1650	0.92	14.94	0.29	7.40
1700	0.92	15.31	0.23	6.97
1750	0.92	15.71	0.17	6.35
1800	0.92	16.13	0.10	5.85
1850	0.92	16.56	0.06	5.19
1900	0.92	16.97	0.01	4.57
1950	0.92	17.32	0.05	3.93
2000	0.92	17.71	0.10	3.17
2050	0.92	17.95	0.14	2.55
2100	0.92	18.25	0.17	1.75
2150	0.93	18.25	0.20	1.06
2200	0.93	18.29	0.22	0.22
2250	0.94	18.11	0.24	0.53
2300	0.95	17.97	0.24	1.28
2350	0.96	17.73	0.24	2.12
2400	0.97	17.39	0.23	2.83
2450	0.98	17.07	0.20	3.69
2500	1.00	16.63	0.17	4.41
2550	1.01	16.33	0.12	5.22
2600	1.03	15.96	0.08	6.03
2650	1.04	15.69	0.00	6.77
2700	1.06	15.34	0.07	7.60
2750	1.08	15.01	0.15	8.30
2800	1.10	14.72	0.26	9.13
2850	1.12	14.42	0.37	9.84
2900	1.15	14.20	0.51	10.58
2950	1.18	13.86	0.65	11.32
3000	1.21	13.57	0.81	12.00

## Typical Performance Data





# Tape & Reel Packaging TR-F114

## DEVICE ORIENTATION IN T&R



ILLUSTRATION 1

Applicable Case Styles	
GE0805C	JC0603C
GE0805C-1	JC0603C-4
GE0805C-1AP	JC0603C-6
GE0805C-7	
GE0805C-9	
GE0805C-10	
GE0805C-11	
GE0805C-12	

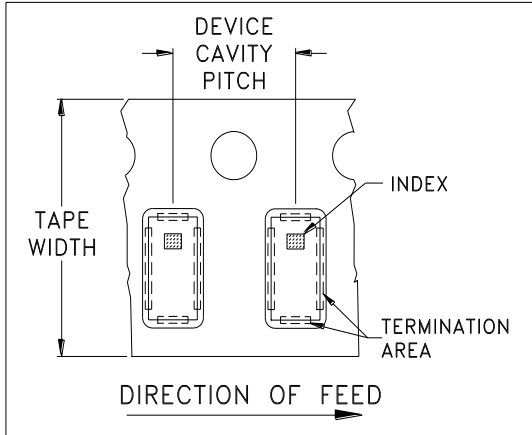


ILLUSTRATION 2

Applicable Case Styles	
GE0805C-2	JC0603C-1
GE0805C-3	JC0603C-2
GE0805C-4	JC0603C-3
GE0805C-5	JC0603C-5
GE0805C-6	JC0603C-7
GE0805C-8	
GE0805C-15	

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

Note: Please Consult individual model data sheet to determine device per reel availability.

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](http://www.minicircuits.com/pages/pdfs/tape.pdf)



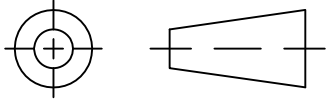
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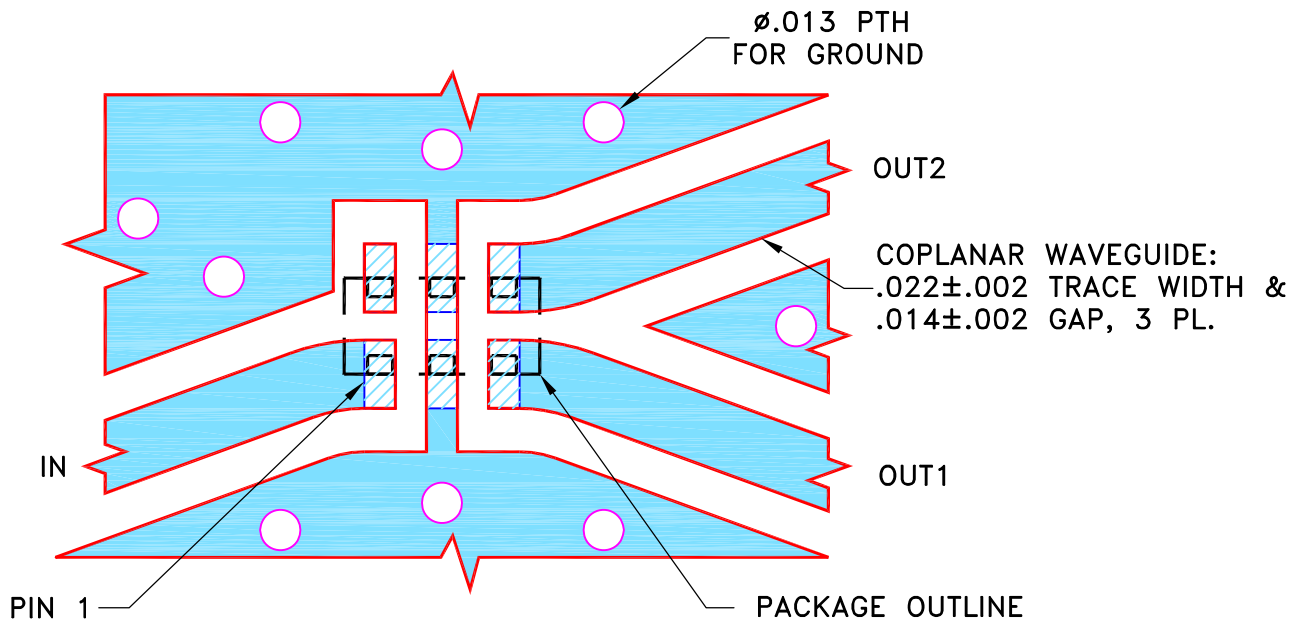
THIRD ANGLE PROJECTION




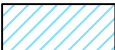
REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M162337	NEW RELEASE	06/15/17	ITG	AVB

**SUGGESTED MOUNTING CONFIGURATION  
FOR JC0603C CASE STYLE, "06TR01" PIN CODE**



- TRACE WIDTH AND GAP PARAMETERS ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS  $.010 \pm .001$ ". 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.

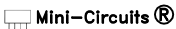
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 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

UNLESS OTHERWISE SPECIFIED	INITIALS		DATE
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	ITG	06/14/17
	CHECKED	GF	06/15/17
	APPROVED	AVB	06/15/17

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**PL, 06TR01, JC0603C, TB-828+**

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-513	OR
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<b>Specification</b>	<b>Test/Inspection Condition</b>	<b>Reference/Spec</b>
Operating Temperature	-55° to 100°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
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, 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