CERAMIC BALUN

RF Transformer

TCW1-33+

50Ω 2300 to 3000 MHz 1:1 Ratio

THE BIG DEAL

- Wideband, 2300 to 3000 MHz
- Low phase unbalance, 3 deg. and amplitude unbalance, 0.1 dB typ.
- Miniature size 0603 (1.6x0.8mm)
- LTCC construction
- Low cost
- Aqueous washable



Generic photo used for illustration purposes only

CASE STYLE: JC0603C

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

APPLICATIONS

- WLAN
- WiMAX/WiBRO
- ISM
- RADAR
- No conversion

PRODUCT OVERVIEW

Mini-Circuits' TCW1-33+ is a tiny ceramic RF balun transformer with an impedance ratio of 1:1, covering a variety of wireless communications applications from 2300 to 3000 MHz. This model provides low insertion loss, low phase unbalance (relative to 180°), low amplitude unbalance, and RF input power handling up to 2W. It provides DC isolation from input to output allowing it to be used for DC biasing of external circuits at the output. Fabricated using LTCC technology, the unit comes housed in a tiny, rugged ceramic package (0.06 x 0.03 x 0.02") suitable for harsh operating environments.

KEY FEATURES

Feature	Advantages
Low insertion loss, 1.0 dB	Enables excellent signal power transmission from input to output.
Low unbalance, 0.2 dB, 3°	Low unbalance can improve a system's electromagnetic compatibility by rejecting unwanted common-mode noise.
2W power handling	Supports a wide range of power requirements
DC Isolated from input to output	Can be used to DC bias external circuits at the output.
Tiny size, 0603	Accommodates tight space requirements for dense PCB layouts.
LTCC construction	LTCC process enables tiny size and low cost, suitable for high-volume production. Rugged ceramic package provides excellent reliability in harsh operating environments.

REV. B
ECO-010340
TCW1-33+
AVB/CP/AM
221003

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ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Impedance Ratio			1		
Frequency Range		2300		3000	MHz
(Avg) Insertion Loss[1]	2300-3000	—	1.0	1.6	dB
	2440 - 2800	—	1.0	1.3	
Amplitude Unbalance	2300-3000	—	0.2	0.9	dB
	2440 - 2800	—	0.1	0.6	
Phase Unbalance[2]	2300-3000	—	3	10	Degree
	2440 - 2800	—	2	10	

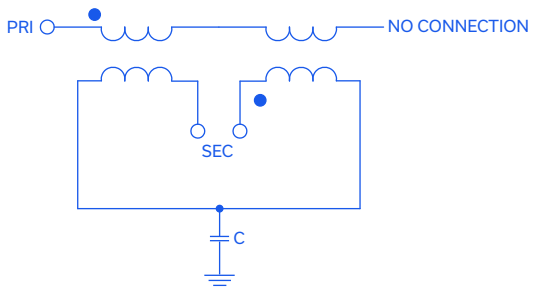
1. Reference Demo Board TB-828+
2. Relative to 180°

MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-45°C to 85°C
RF Power Input	2W

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

CONFIGURATION R



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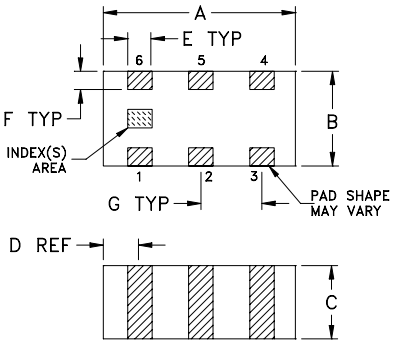
50Ω 2300 to 3000 MHz 1:1 Ratio

PIN CONNECTIONS

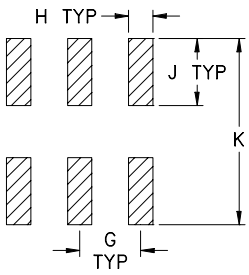
PRIMARY DOT	1
*PRIMARY	2
SECONDARY DOT	3
SECONDARY	4
NO CONNECTION	6
GND	5

*Bypass capacitor to gnd should be connected at pin 2 when feedng DC current.

OUTLINE DRAWING



PCB Land Pattern

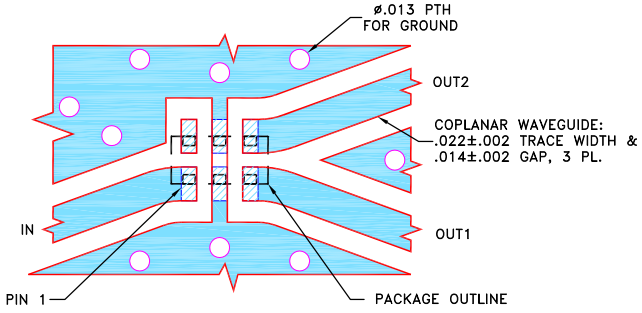


Suggested Layout,
Tolerance to be within ±.002

PRODUCT MARKING: N/A

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.

OUTLINE DIMENSIONS (Inches / 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

TAPE & REEL INFORMATION: F114

RF Transformer

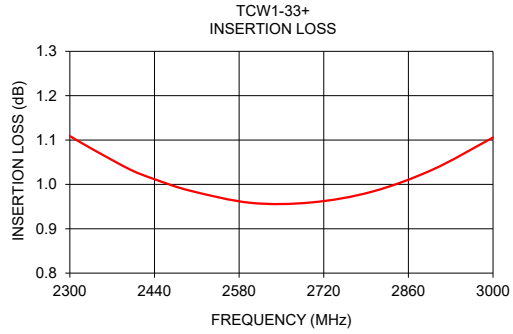
TCW1-33+

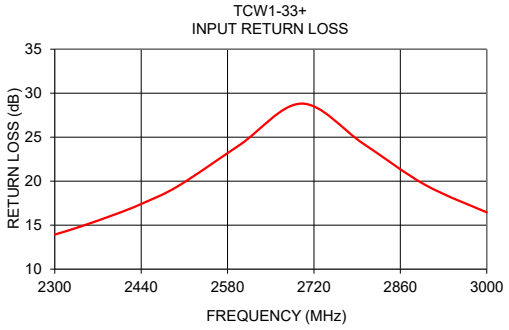
50Ω 2300 to 3000 MHz 1:1 Ratio

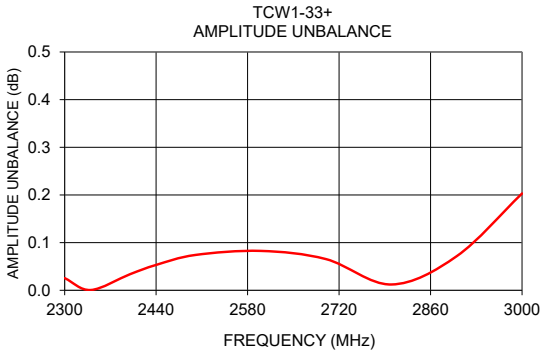
TYPICAL PERFORMANCE DATA**

Frequency (MHz)	Insertion Loss (dB)	Input Return Loss (dB)	Amplitude Unbalance (dB)	Phase Unbalance (deg)
2300	1.11	13.93	0.03	4.12
2340	1.08	14.80	0.00	4.05
2400	1.03	16.28	0.03	3.92
2440	1.01	17.41	0.05	3.80
2500	0.99	19.45	0.07	3.62
2600	0.96	24.14	0.08	3.27
2700	0.96	28.82	0.07	2.81
2800	0.98	24.26	0.01	2.27
2900	1.03	19.59	0.07	1.69
3000	1.11	16.46	0.20	1.01

** Measured with Agilent N5242A 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