



Mini-Circuits

SURFACE MOUNT

Bias Tee

TCBT-14+

50Ω Wideband 10 MHz to 10 GHz

THE BIG DEAL

- Wideband, 10 MHz to 10 GHz
- Low Insertion Loss, 0.5 dB Typ.
- Excellent VSWR, 1.25:1 Typ.
- Miniature Surface Mount 0.15x0.15"
- Aqueous Washable
- Protected by US Patent 8,644,029

APPLICATIONS

- Biasing Amplifiers
- Biasing of Laser Diodes
- Biasing of Active Antennas



Generic photo used for illustration purposes only

CASE STYLE: GU1414

+RoHS Compliant

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

PRODUCT OVERVIEW

TCBT-14+ is the world's smallest footprint wideband Bias-Tee measuring 3.8x3.8 mm which utilizes a unique design to cover a frequency range of 10 MHz to 10 GHz without resonances that are typically observed over such broad bands. It is designed to handle 1 W of RF power and 200 mA current and is suitable for automated pick and place operation.

KEY FEATURES

Feature	Advantages
Extremely Wideband, 10 MHz to 10 GHz	Broad bandwidth enables biasing of wideband MMIC amplifiers or other active circuits starting at extremely low frequencies through microwave bands.
DC Current, 200 mA	Able to support most Class-A MMIC amplifiers with a P1dB of up to +22 dBm need less than 200 mA.
Low Insertion Loss: • 0.2 dB Typ. to 3 GHz • 0.5 dB Typ. to 5 GHz • 1.0 dB Typ. at 10 GHz	When used at the output of the amplifiers in a typical bias application, the low loss of the TCBT-14+ exhibits minimal impact on gain and over temperature improving reliability.
Excellent Matching: • 1:1.1 over 0.1-4 GHz • 1.2:1 over Entire Band	Excellent VSWR of TCBT minimizes interaction effects and resulting gain ripple. Use of TCBT-14+ with Mini-Circuits MMIC amplifiers has shown performance improvements over traditional L-C networks over the entire band.





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ELECTRICAL SPECIFICATIONS AT +25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		10		10000	MHz
Insertion Loss	10-100		0.1	0.5	dB
	100-5000		0.35	0.8	
	5000-10000		0.8	1.6	
Isolation (RF Port to DC Port) (RF & DC Port to DC Port)	10-100	30	55		dB
	100-5000	18	33		
	5000-10000	15	22		
VSWR	10-100		1.05	1.3	:1
	100-5000		1.2	1.5	
	5000-10000		1.3	1.5	

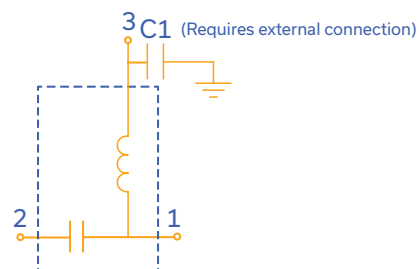
External C1(0.01 µF) is required. See functional schematic and PCB layout.

ABSOLUTE MAXIMUM RATINGS

Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C
RF Power	+30 dBm max.
Voltage at DC Port	+25 V max.
Input Current	200 mA

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

FUNCTIONAL SCHEMATIC





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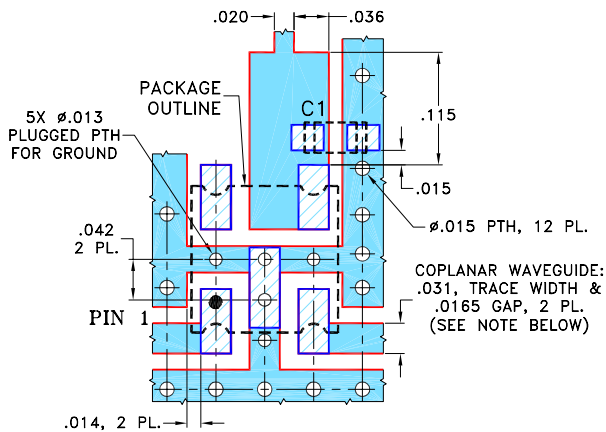
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PAD CONNECTIONS

RF	2
RF & DC	1
DC	3
NOT USED	4

PRODUCT MARKING: N/A

DEMO BOARD MCL P/N: TB-510+
SUGGESTED PCB LAYOUT (PL-321)

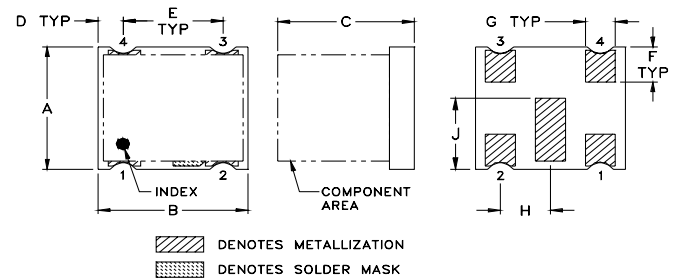
CAPACITOR C1: .010 uF, 0603 SIZE.

- NOTES:
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020" $\pm$.0015"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
 2. FOOTPRINT OF C1 IS SHOWN FOR REFERENCE.
 3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

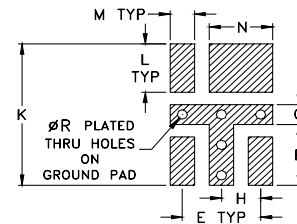
 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

OUTLINE DRAWING



PCB Land Pattern

Suggested Layout,
Tolerance to be within $\pm .002$ OUTLINE DIMENSIONS (Inches
mm)

A	B	C	D	E	F	G	H	J
.150	.150	.14	.025	.100	.043	.030	.050	.087
3.81	3.81	3.56	0.64	2.54	1.09	0.76	1.27	2.21
K	L	M	N	P	Q	R	wt	
.193	.066	0.031	.081	.083	.027	0.013	grams	
4.90	1.68	0.79	2.06	2.11	0.69	0.33	0.06	



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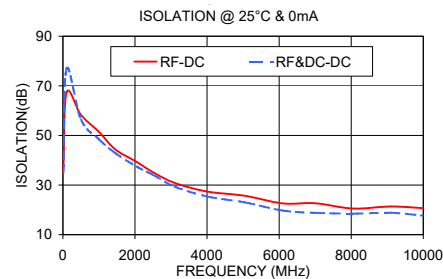
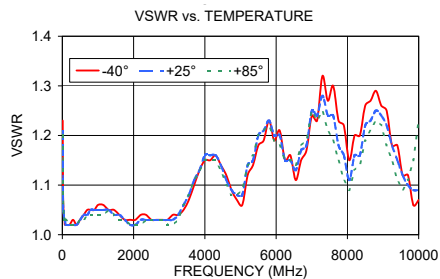
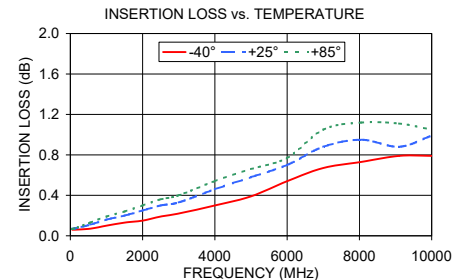
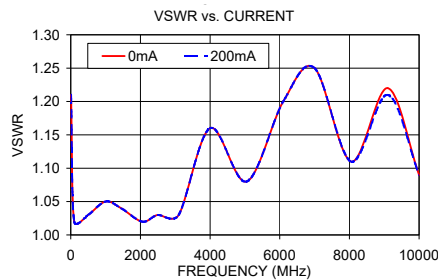
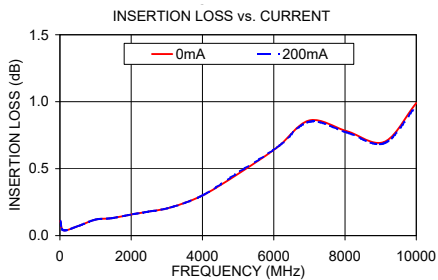
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TYPICAL PERFORMANCE DATA

Frequency (MHz)	Insertion Loss (dB) with Current		VSWR (:1) with Current		Isolation (dB) 0 mA	
	0 mA	200 mA	0 mA	200 mA	RF-DC	RF & DC - DC
10	0.11	0.11	1.21	1.21	35.29	34.85
100	0.04	0.04	1.02	1.02	67.27	76.84
500	0.07	0.07	1.03	1.03	58.28	56.42
1000	0.12	0.12	1.05	1.05	51.44	48.45
1450	0.13	0.13	1.04	1.04	44.41	42.96
2050	0.16	0.16	1.02	1.02	39.31	37.44
2500	0.18	0.18	1.03	1.03	35.19	34.15
3100	0.21	0.21	1.03	1.03	30.85	29.35
4000	0.30	0.30	1.16	1.16	27.39	25.43
5050	0.47	0.48	1.08	1.08	25.68	23.02
6100	0.66	0.66	1.20	1.20	22.61	19.71
7000	0.86	0.85	1.25	1.25	22.68	18.80
8050	0.78	0.77	1.11	1.11	20.55	18.49
9100	0.70	0.69	1.22	1.21	21.37	18.82
10000	0.99	0.97	1.09	1.09	20.70	17.68



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

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