Very Wideband top hat®
RF Choke

TCCH-80+

50Ω 50 to 8200 MHz

CASE STYLE: GU1604

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

Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
DC Current	300 mA

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

Pad Terminations

RF-IN & DC	1
DC	3
NOT USED	2,4

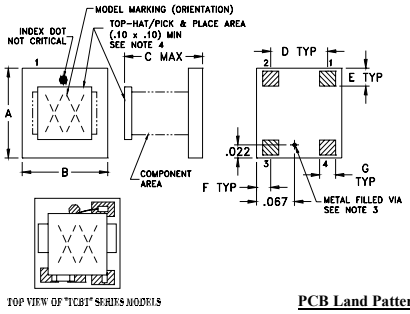
Features

- very broadband
- miniature size, 0.15"x0.15"
- low parasitic capacitance 0.1 pf typ.
- effective parallel resistance, Rch 500 ohm typ.
- usable up to 10GHz
- aqueous washable
- protected by U.S. Patent 7,012,485
- low DC resistance, 0.1Ω

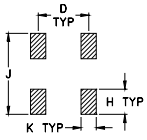
Applications

- biasing amplifiers
- biasing of laser diodes
- biasing of active antennas

Outline Drawing



PCB Land Pattern



Suggested Layout, Tolerance to be within ±.002

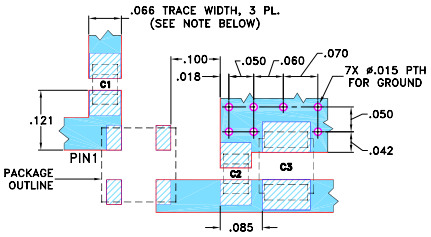
Notes:
1. Open style, Ceramic Base.
2. Termination Finish: Palladium Silver.
3. Must be isolated from external conductors on mounting surface. Suggested solder mask area is .025 x .025
At Mini-Circuits option via may be removed.
4. Top-Hat total thickness: .013 inches MAX.

Outline Dimensions (inch / mm)

A	B	C	D	E	F
.150	.150	.150	.100	.030	.025
3.81	3.81	3.81	2.54	0.76	0.64

G	H	J	K	wt
.028	.050	.160	.030	grams
0.71	1.27	4.06	0.76	0.10

Demo Board MCL P/N: TB-272
Suggested PCB Layout (PL-147)



CAPACITORS C1,C2: 39000 pF, EIA CODE (MM): 2012
CAPACITORS C3: TANT, 1 uF, EIA CODE (MM): 3528

NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH 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

Electrical Specifications @ 25°C

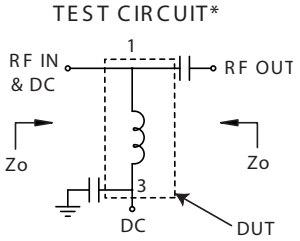
FREQ. RANGE (MHz)	INSERTION LOSS* (dB)		VSWR* (:1)		DC CURRENT (mA)	INDUCTANCE (µH) Typ. at			
	Typ.	Max.	Typ.	Max.	Max.	0mA	50mA	100mA	200mA
50-8200	0.5	1.1	1.1	1.7	200	4	1.3	0.9	0.5

*tested with circuit shown below, Zo=50 ohms

Typical Performance Data

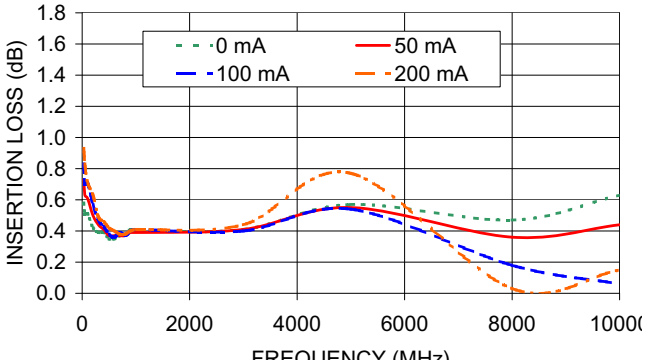
FREQUENCY (MHz)	INSERTION LOSS (dB) with current				VSWR (:1) with current			
	0mA	50mA	100mA	200mA	0mA	50mA	100mA	200mA
30	0.58	0.73	0.83	0.93	1.20	1.31	1.45	1.56
50	0.51	0.63	0.70	0.83	1.16	1.23	1.31	1.37
100	0.51	0.61	0.71	0.71	1.12	1.16	1.20	1.25
200	0.42	0.50	0.57	0.63	1.10	1.12	1.15	1.17
300	0.39	0.44	0.47	0.49	1.12	1.13	1.14	1.16
400	0.39	0.41	0.43	0.46	1.09	1.09	1.10	1.14
500	0.35	0.37	0.38	0.42	1.08	1.08	1.07	1.12
600	0.35	0.37	0.36	0.40	1.08	1.08	1.08	1.12
700	0.37	0.37	0.39	0.38	1.07	1.07	1.07	1.12
800	0.38	0.37	0.37	0.38	1.09	1.09	1.09	1.11
900	0.41	0.39	0.40	0.40	1.11	1.11	1.11	1.12
1000	0.40	0.39	0.41	0.41	1.12	1.12	1.11	1.11
3000	0.41	0.41	0.40	0.44	1.12	1.12	1.12	1.14
5000	0.57	0.55	0.54	0.77	1.16	1.17	1.16	1.26
8000	0.47	0.36	0.18	0.03	1.49	1.57	1.63	1.57
10000	0.63	0.44	0.06	0.15	1.61	1.54	1.41	1.56

Electrical Schematic

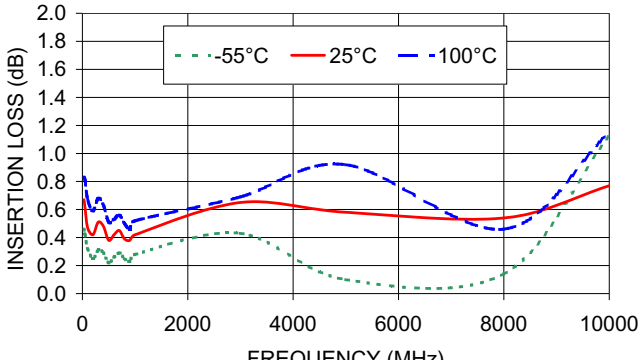


Notes
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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/MCLStore/terms.jsp

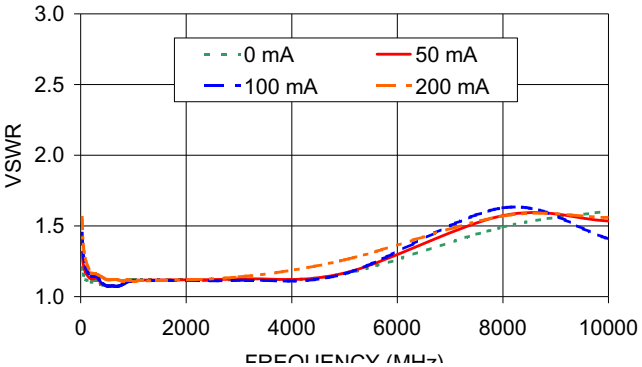
TCCH-80+
INSERTION LOSS vs. CURRENT



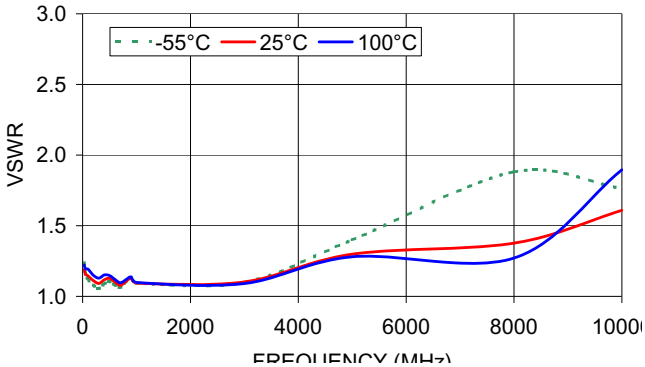
TCCH-80+
INSERTION LOSS vs. TEMPERATURE



TCCH-80+
VSWR vs. CURRENT



TCCH-80+
VSWR vs. TEMPERATURE



Very Wideband

RF CHOKE

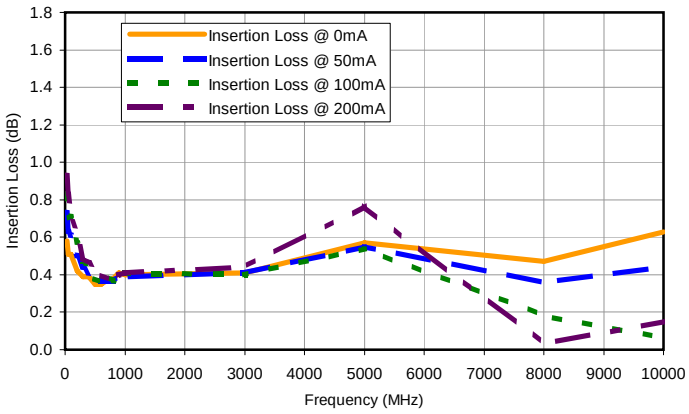
TCCH-80+

Typical Performance Data

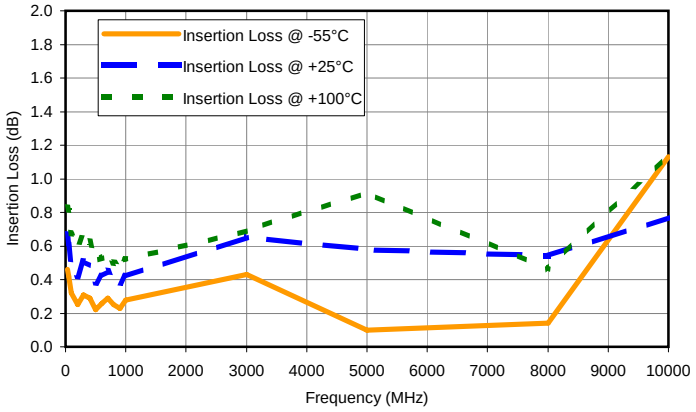
Frequency	Insertion Loss vs. Current (dB)				Return Loss vs. Current (:1)				Insertion Loss vs. Temperature (dB)			Return Loss vs. Temparature (:1)		
(MHz)	0mA	50mA	100mA	200mA	0mA	50mA	100mA	200mA	-55°C	+25°C	+100°C	-55°C	+25°C	+100°C
30.0	0.58	0.73	0.83	0.93	20.64	17.34	14.75	13.20	0.46	0.67	0.83	19.48	21.24	19.96
50.0	0.51	0.63	0.70	0.83	22.63	19.65	17.46	16.13	0.42	0.61	0.81	22.55	22.60	20.98
100.0	0.51	0.61	0.71	0.71	24.86	22.42	20.88	19.08	0.32	0.47	0.67	24.99	23.43	21.13
200.0	0.42	0.50	0.57	0.63	26.17	24.63	23.36	22.12	0.25	0.42	0.59	28.35	25.56	23.17
300.0	0.39	0.44	0.47	0.49	25.18	24.31	23.50	22.61	0.31	0.51	0.68	31.37	27.15	24.38
400.0	0.39	0.41	0.43	0.46	27.76	27.20	26.53	23.69	0.29	0.48	0.63	27.50	25.11	23.06
500.0	0.35	0.37	0.38	0.42	28.57	28.82	28.88	24.94	0.22	0.38	0.51	26.06	24.44	23.26
600.0	0.35	0.37	0.36	0.40	28.33	28.59	28.75	24.94	0.26	0.42	0.53	28.12	26.32	24.93
700.0	0.37	0.37	0.39	0.38	29.02	29.11	29.03	24.94	0.29	0.45	0.56	30.30	28.60	26.79
800.0	0.38	0.37	0.37	0.38	27.21	27.54	27.66	25.66	0.25	0.39	0.50	26.22	26.03	25.15
900.0	0.41	0.39	0.40	0.40	25.47	25.72	25.95	24.94	0.23	0.38	0.46	24.33	24.38	23.82
1000.0	0.40	0.39	0.41	0.41	24.86	25.16	25.62	25.66	0.28	0.42	0.52	26.94	26.97	26.60
3000.0	0.41	0.41	0.40	0.44	24.97	24.64	25.22	23.69	0.43	0.65	0.69	26.54	26.24	27.25
5000.0	0.57	0.55	0.54	0.77	22.48	22.24	22.48	18.78	0.10	0.58	0.92	15.56	17.73	18.21
8000.0	0.47	0.36	0.18	0.03	14.09	13.04	12.43	13.08	0.14	0.54	0.46	10.29	15.99	18.47
10000.0	0.63	0.44	0.06	0.15	12.67	13.51	15.39	13.20	1.13	0.77	1.15	11.17	12.64	10.19

Typical Performance Curves

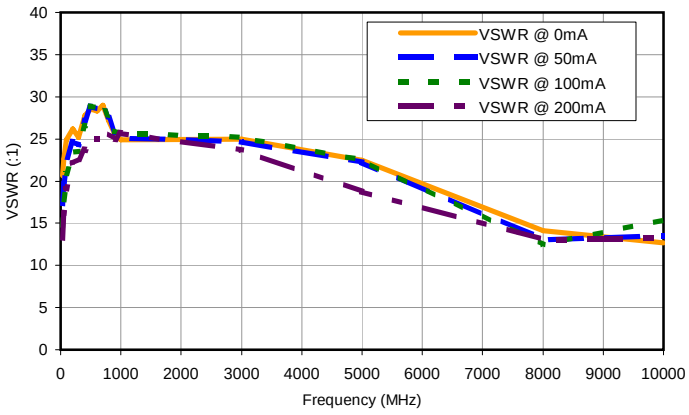
Insertion Loss vs. Frequency & Current



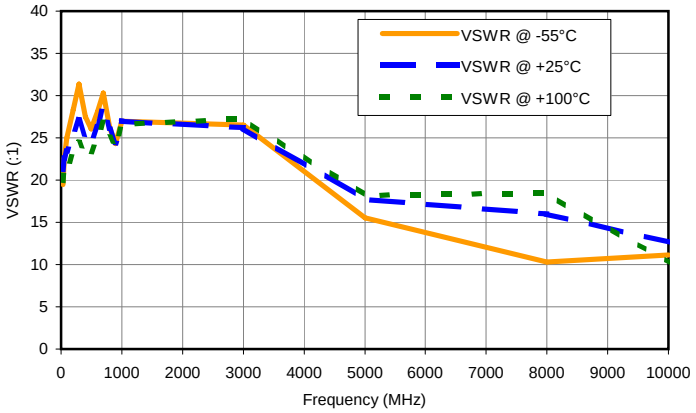
Insertion Loss vs. Frequency & Temperature



Return Loss vs. Frequency & Current



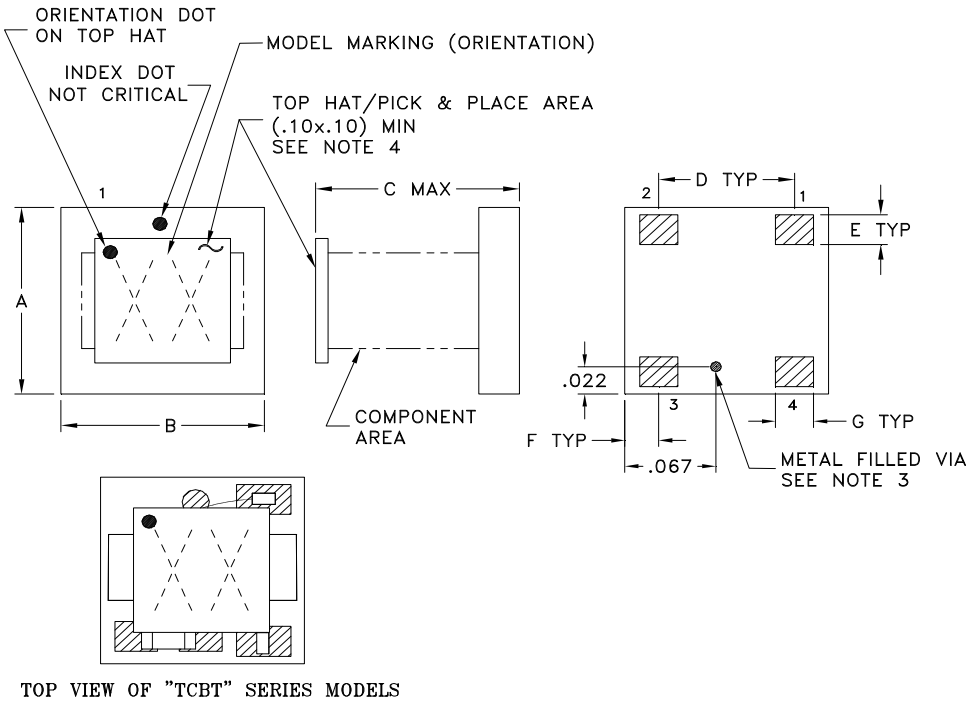
Return Loss vs. Frequency & Temperature



Case Style GU

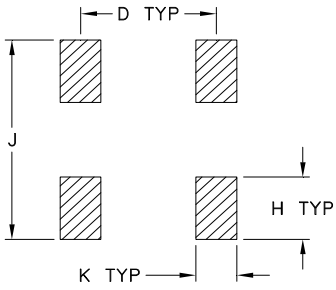
Outline Dimensions

GU1604



TOP VIEW OF "TCBT" SERIES MODELS

PCB Land Pattern



SUGGESTED LAYOUT
TOLERANCE TO BE WITHIN ±.002

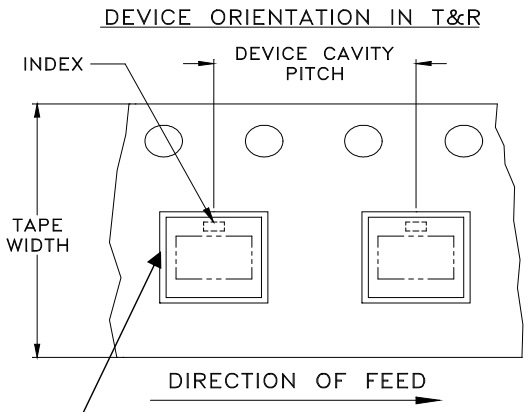
CASE #	A	B	C	D	E	F	G	H	J	K	WT.GRAMS
GU1604	.150 (3.81)	.150 (3.81)	.150 (3.81)	.100 (2.54)	.030 (.76)	.025 (.64)	.028 (.71)	.050 (1.27)	.160 (4.06)	.030 (.76)	.10

Dimensions are in inches (mm). Tolerances: 2 Pl. ± .01; 3 Pl. ± .005

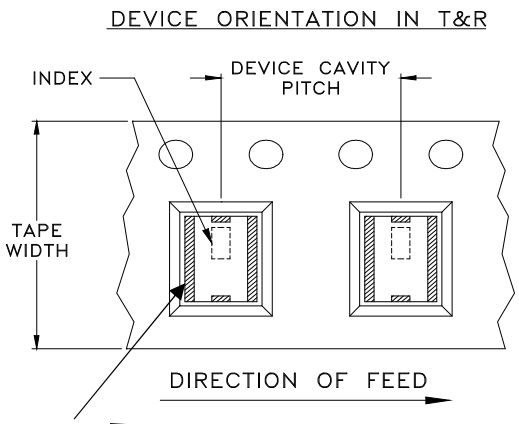
Notes:

1. Open style, Ceramic Base.
2. Termination finish: Silver Palladium or Gold Over Nickel based on stock availability.
3. Must be isolated from external conductors on mounting surface. Suggested solder mask area is .025 x .025. At Mini-Circuits option via may be removed.
4. Top-Hat total thickness: .013 inches MAX.
5. Orientation Dot on Top Hat corresponds to Pin #1.

Tape & Reel Packaging TR-F77



Note: The shape of the pocket may differ



Note: The location and shape of the metallization may differ

Applicable Case Styles
GU1604, GU1804, GU2644, TT1618-2

Applicable Case Styles
MZ4532C, NM1812C, NM1812C-1, NM1812C-2, NM1812C-3, NM1812C-5, NM1812C-6, NM3237

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
12	8	7	Small quantity standards (see note)	20
				50
				100
				200
				500
				1000
		13	Standard	2000

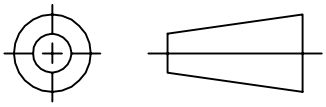
Note: Please Consult individual model data sheet to determine device per reel availability.

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

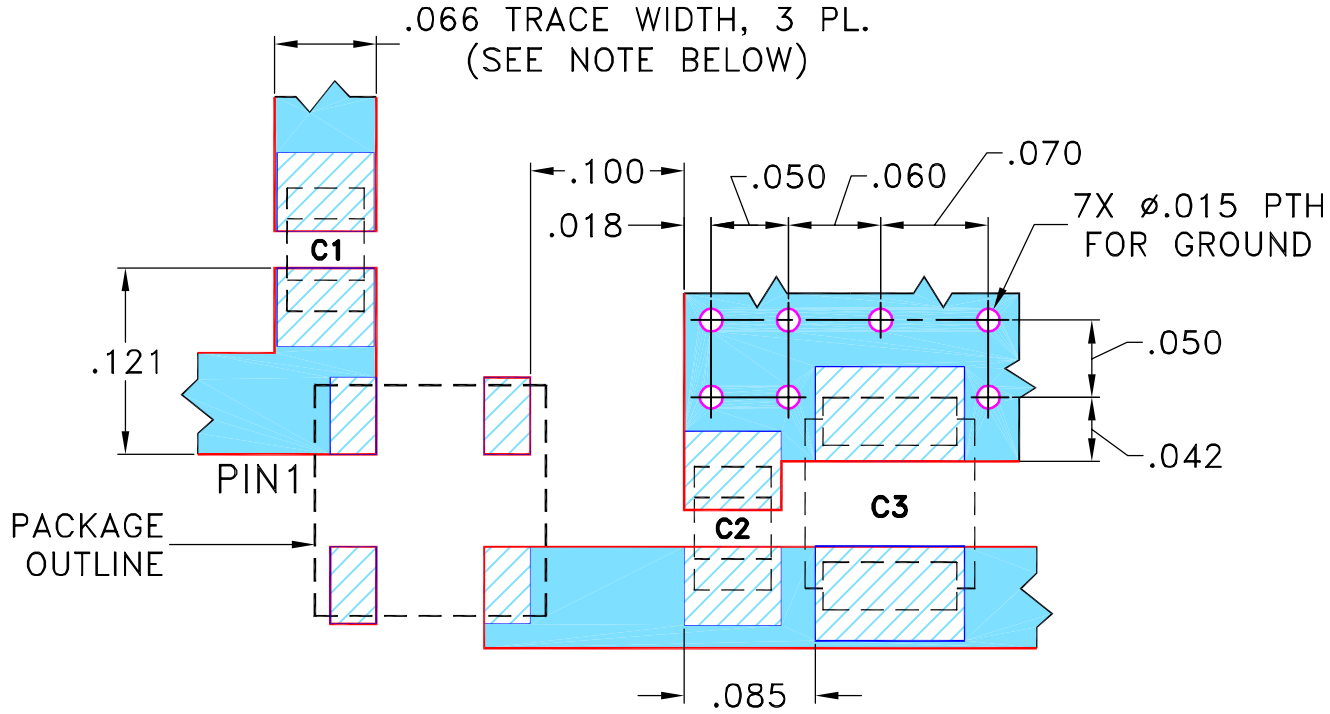
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M89280	NEW RELEASE	12/31/03	MMG	DJ
A	M90577	TCCH-80 WAS TCH-80 IN TITLE	01/19/04	AV	DJ
B	M102713	ADDED "...WITH SMOBC"	01/12/06	GF	IL

SUGGESTED MOUNTING CONFIGURATION
FOR GU1041 CASE STYLE, "pe" PIN CONNECTION



CAPACITORS C1,C2: 39000 pF, EIA CODE (MM): 2012
CAPACITORS C3: TANT, 1 uF, EIA CODE (MM): 3528

NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH 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

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	MMG	12/30/03
TOLERANCES ON:	CHECKED	AV	12/31/03
2 PL DECIMALS ±	APPROVED	DJ	12/31/03
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

ASHEETA1.DWG REV:A DATE:01/12/95

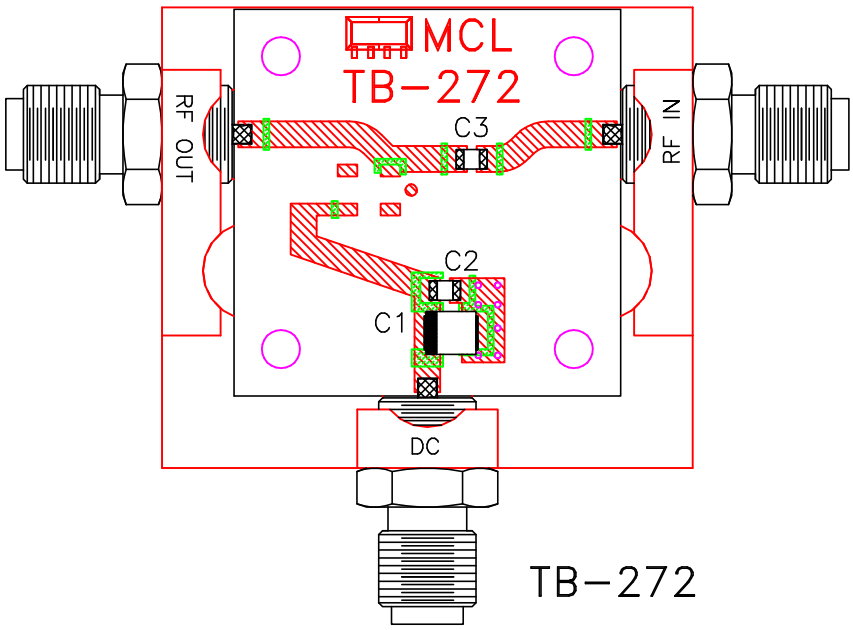
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, pe, GU1041, TCCH-80, TB-272

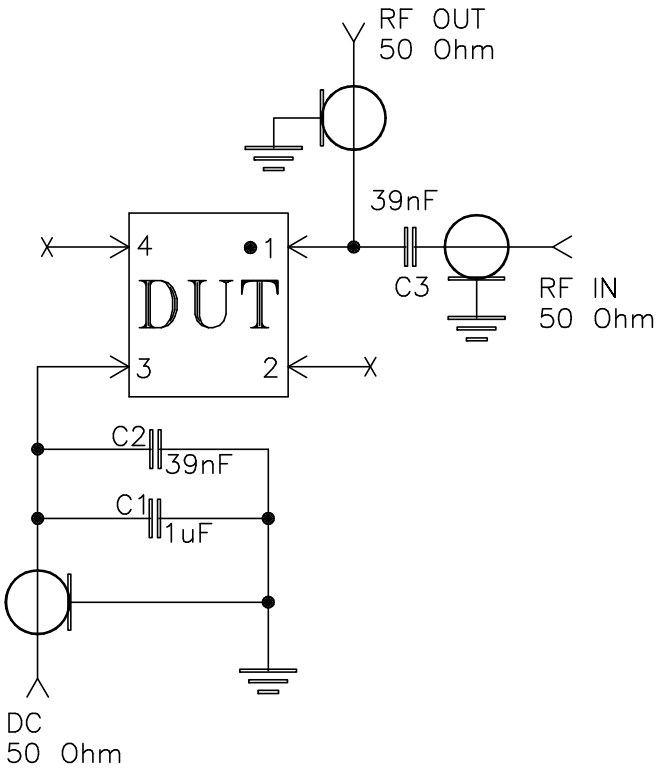
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-147	B

FILE:	SCALE:	SHEET:
98PL147	8:1	1 OF 1

Evaluation Board and Circuit



TB-272



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

Mini-Circuits®

Mini-Circuits

Environmental Specifications ENV02T1

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	-40° to 85°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
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
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, 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
Marking Resistance to Solvents	Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215