

2 Way-90° Power Splitter

QCV-151+

50Ω 90 to 150 MHz



CASE STYLE: JV1210C-1

The Big Deal

- High Power handling (10W)
- Low Unbalance, 0.5 dB & 4 deg. typ.
- Industry leading combination of size/bandwidth

Product Overview

Mini-Circuits new 90° Power Splitter, model QCV-151+, offers an industry leading combination of operating bandwidth and size; supporting nearly an octave band in a miniature EIA-1210 form factor. The outstanding phase and amplitude unbalance make this component a versatile building block for use in a variety of systems and sub-system designs.

Key Features

Feature	Advantages
Small Size	Offered in the EIA-1210 package size, the QCV-151+ offers an industry leading combination of size, bandwidth and frequency. The small footprint (3.2mm x 2.0mm) allows for reduced parasitics in systems with improved performance and simplified layout.
Low Phase and Amplitude Unbalance	Supporting 4 deg. and 0.5 dB unbalance make this 90° hybrid applicable for use in higher level integrated components such as image reject mixers, single sideband modulators, phase shifters, variable attenuators, and balance amplifiers.
High Power Handling	Capable of operating up to 10W, the LTCC construction of the QCV-151+ makes this 90° hybrid a robust, rugged product that can be used effectively in either the transmit or receive paths.

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



Power Splitter/Combiner

QCV-151+

2 Way-90° 50Ω 90 to 150 MHz



Generic photo used for illustration purposes only
CASE STYLE: JV1210C-1

Maximum Ratings

Operating Temperature	-55°C to 100°C
Storage Temperature	-55°C to 100°C
Power Input (as a splitter)	10W* max.

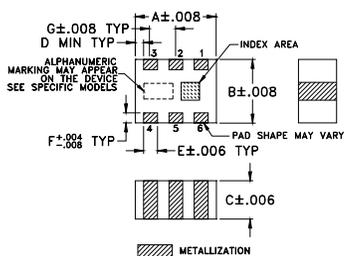
* Derate linearly to 3W at 100°C ambient.
Permanent damage may occur if any of these limits are exceeded.

Pin Connections

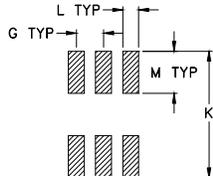
SUM PORT	1
PORT 1 (0°)	4
PORT 2 (+90°)	6
GROUND	2,5
50 OHM TERM EXTERNAL	3

Product Marking: CB

Outline Drawing



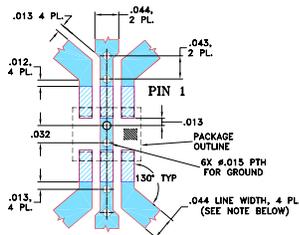
PCB Land Pattern



Outline Dimensions (inch/mm)

A	B	C	D	E	F	G
.126	.098	.059	.004	.022	.016	.039
3.2	2.5	1.50	0.1	0.56	0.4	1.0
H	J	K	L	M	wt	
-	-	.177	.024	.059	grams	
-	-	4.5	0.6	1.5	0.03	

Demo Board MCL P/N: TB-610+ Suggested PCB Layout (PL-340)



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; 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.

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Features

- low insertion loss, 0.4 dB typ.
- high isolation, 20 dB typ.
- ultra small size, 0.12x0.10x.059"
- wrap-around terminal for excellent solderability

Applications

- I&Q modulators
- image reject mixers
- balanced amplifiers
- avionics

+RoHS Compliant

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



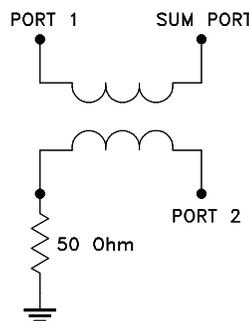
Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	20, 50, 100, 200, 500, 1000, 2000

Electrical Specifications at 25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		90		150	MHz
Insertion Loss (Avg. of coupled outputs above 3 dB)	90-118	—	0.5	0.8	dB
	118-138	—	0.6	0.95	
	138-150	—	0.9	1.35	
Isolation	90-118	17	20	—	dB
	118-138	14	17	—	
	138-150	11	15	—	
Phase Unbalance	90-118	—	3.0	4.0	Degree
	118-138	—	2.8	5.5	
	138-150	—	4.0	10.8	
Amplitude Unbalance	90-118	—	1.1	1.6	dB
	118-138	—	0.3	0.75	
	138-150	—	0.9	1.7	
VSWR (Port S)	90-118	—	1.2	1.4	:1
	118-138	—	1.3	1.55	
VSWR (Port 1-2)	90-118	—	1.45	1.8	:1
	118-138	—	1.3	1.6	
	138-150	—	1.5	1.9	

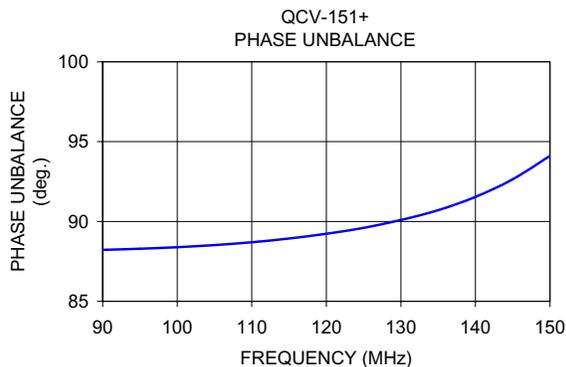
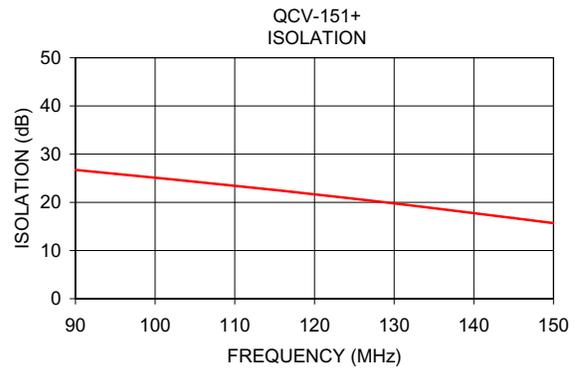
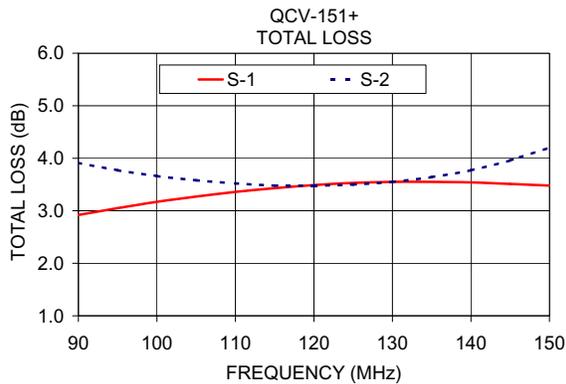
Electrical Schematic



Typical Performance Data

Frequency (MHz)	Total Loss ¹ (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR S	VSWR 1	VSWR 2
	S-1	S-2						
90.00	2.92	3.91	0.99	26.73	88.22	1.13	1.13	1.15
95.00	3.05	3.77	0.72	25.92	88.29	1.14	1.14	1.16
100.00	3.17	3.66	0.49	25.10	88.39	1.15	1.15	1.17
105.00	3.27	3.58	0.30	24.27	88.52	1.16	1.16	1.18
110.00	3.36	3.52	0.15	23.42	88.70	1.18	1.17	1.20
115.00	3.43	3.48	0.05	22.56	88.93	1.19	1.19	1.22
120.00	3.49	3.48	0.01	21.66	89.23	1.21	1.20	1.24
125.00	3.53	3.50	0.03	20.73	89.60	1.24	1.23	1.27
130.00	3.55	3.55	0.01	19.77	90.09	1.27	1.26	1.29
135.00	3.55	3.64	0.09	18.77	90.71	1.30	1.29	1.33
140.00	3.54	3.77	0.24	17.76	91.54	1.34	1.33	1.37
145.00	3.51	3.96	0.45	16.73	92.64	1.38	1.37	1.42
150.00	3.48	4.20	0.73	15.68	94.11	1.44	1.43	1.48

1. Total Loss = Insertion Loss + 3 dB splitter loss.



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2 Way-90° Power Splitter/Combiner

QCV-151+

Typical Performance Data

FREQ. (MHz)	TOTAL LOSS ¹ (dB)		AMP. UNBAL. (dB)	ISOLATION (dB)	PHASE UNBAL. (Deg.)	FREQ. (MHz)	VSWR (:1)		
	S-1	S-2		1-2			S	1	2
60.0	1.91	5.53	3.62	31.31	88.03	60.0	1.10	1.10	1.11
65.0	2.10	5.14	3.05	30.56	88.04	65.0	1.11	1.10	1.11
70.0	2.28	4.81	2.53	29.80	88.06	70.0	1.11	1.11	1.12
75.0	2.45	4.53	2.08	29.06	88.08	75.0	1.12	1.11	1.13
80.0	2.62	4.29	1.67	28.29	88.12	80.0	1.12	1.12	1.13
85.0	2.78	4.09	1.31	27.51	88.16	85.0	1.13	1.12	1.14
90.0	2.92	3.91	0.99	26.73	88.22	90.0	1.13	1.13	1.15
95.0	3.05	3.77	0.72	25.92	88.29	95.0	1.14	1.14	1.16
100.0	3.17	3.66	0.49	25.10	88.39	100.0	1.15	1.15	1.17
105.0	3.27	3.58	0.30	24.27	88.52	105.0	1.16	1.16	1.18
110.0	3.36	3.52	0.15	23.42	88.70	110.0	1.18	1.17	1.20
115.0	3.43	3.48	0.05	22.56	88.93	115.0	1.19	1.19	1.22
120.0	3.49	3.48	0.01	21.66	89.23	120.0	1.21	1.20	1.24
125.0	3.53	3.50	0.03	20.73	89.60	125.0	1.24	1.23	1.27
130.0	3.55	3.55	0.01	19.77	90.09	130.0	1.27	1.26	1.29
135.0	3.55	3.64	0.09	18.77	90.71	135.0	1.30	1.29	1.33
140.0	3.54	3.77	0.24	17.76	91.54	140.0	1.34	1.33	1.37
145.0	3.51	3.96	0.45	16.73	92.64	145.0	1.38	1.37	1.42
150.0	3.48	4.20	0.73	15.68	94.11	150.0	1.44	1.43	1.48
155.0	3.44	4.53	1.09	14.63	96.14	155.0	1.50	1.50	1.55
160.0	3.41	4.94	1.53	13.60	98.91	160.0	1.58	1.58	1.64

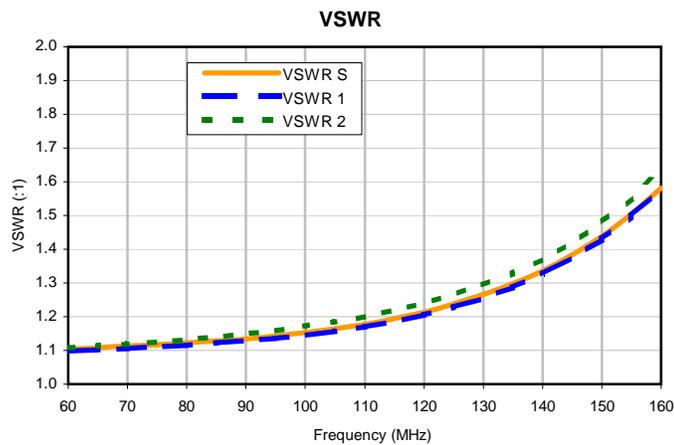
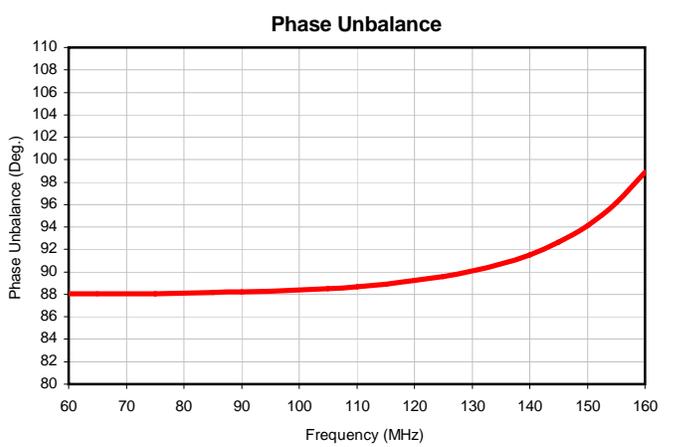
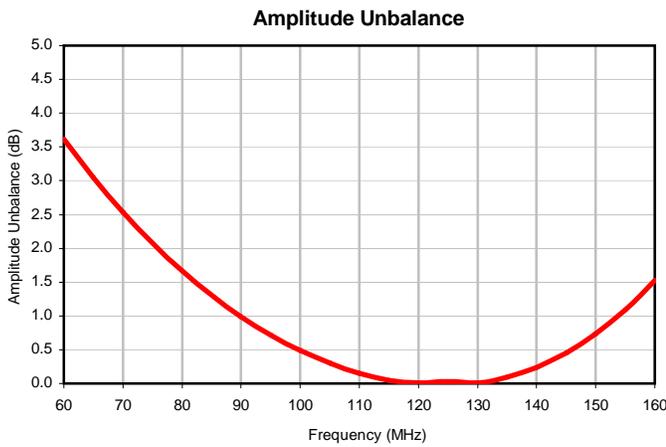
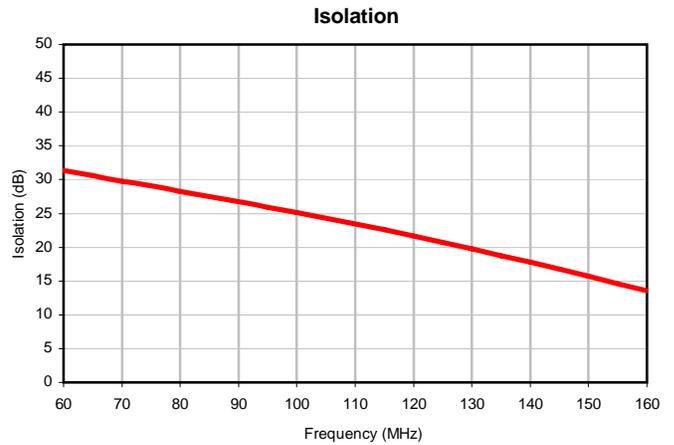
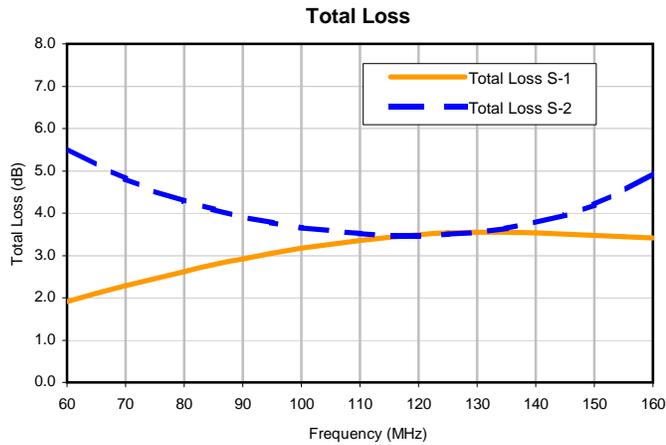
¹Total Loss = Insertion Loss + 3dB Splitter Loss



2 Way-90° Power Splitter/Combiner

QCV-151+

Typical Performance Curves



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 • Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site
 The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com



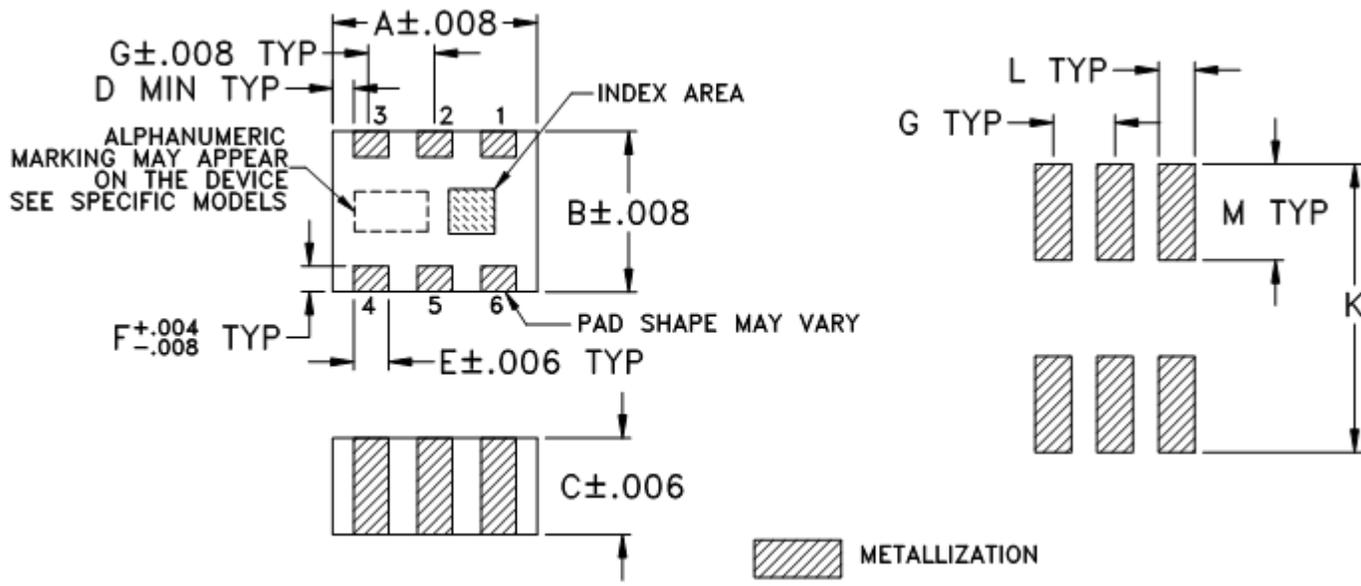
IF/RF MICROWAVE COMPONENTS

REV. X1
 QCV-151+
 5/5/2011
 Page 1 of 1

Outline Dimensions

JV1210C-1

PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm.002$

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	WT. GRAM
JV1210C-1	.126 (3.2)	.098 (2.5)	.059 (1.50)	.004 (.1)	.022 (.56)	.016 (.4)	.039 (1.0)	- -	- -	.177 (4.5)	.024 (.6)	.059 (1.5)	.03

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

Notes:

- Open style, ceramic base.
- Termination finish: **as shown below or indicated on Data Sheet.**
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.
- Pad tolerance is non-cumulative. Minimum spacing between each pad is .004.



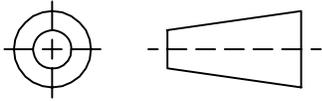
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

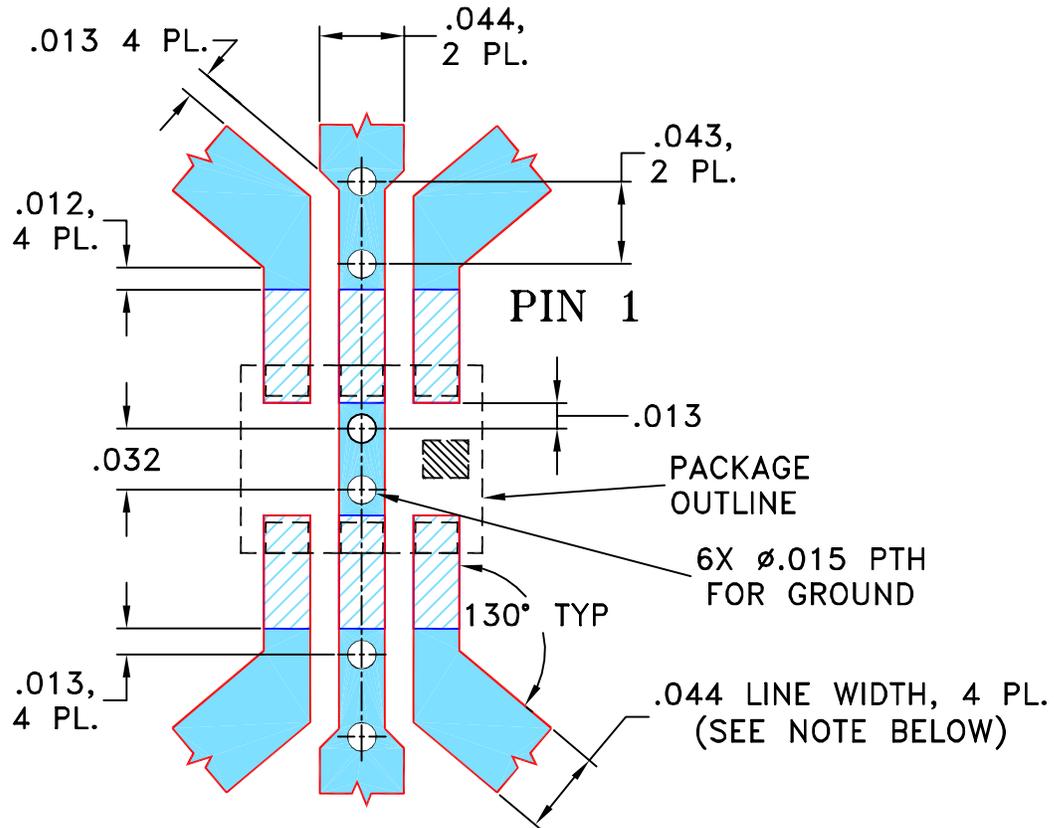
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M130278	NEW RELEASE	02/16/11	PW	ABD

**SUGGESTED MOUNTING CONFIGURATION
FOR JV1210C-1 CASE STYLE, "06SQ07" PIN CONNECTION**



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; 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 TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	PW	02/04/11
	CHECKED	IL	02/16/11
	APPROVED	ABD	02/16/11



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13 Neptune Avenue
Brooklyn NY 11235

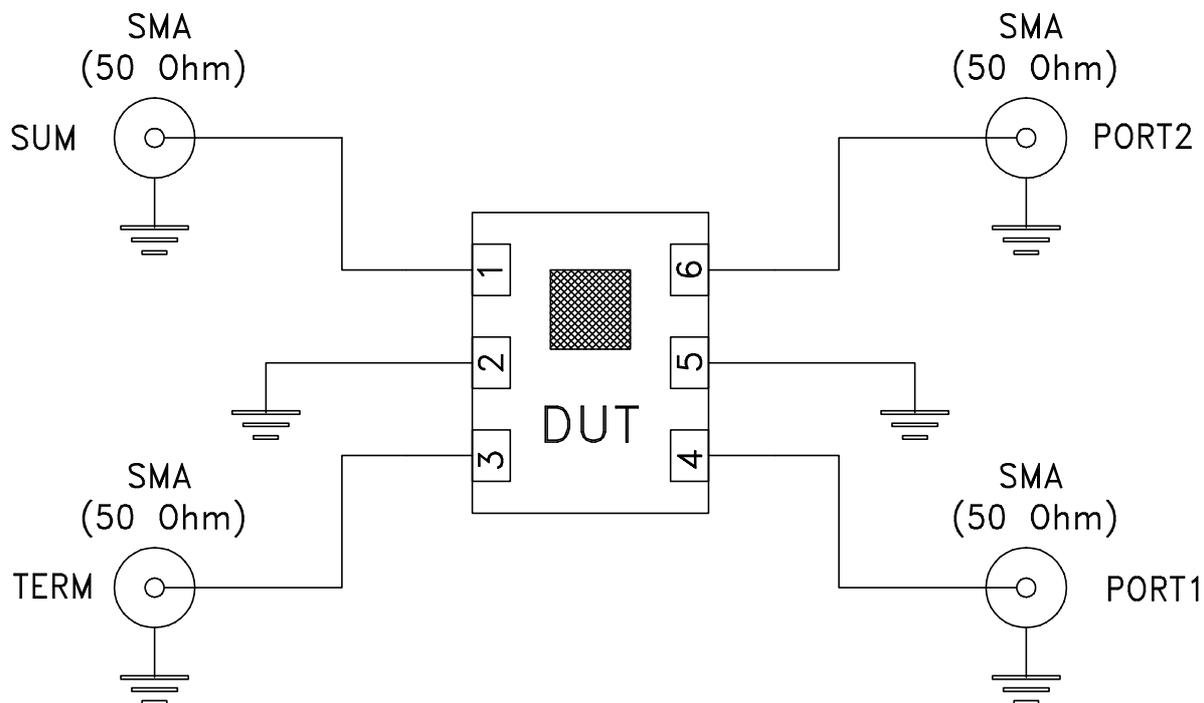
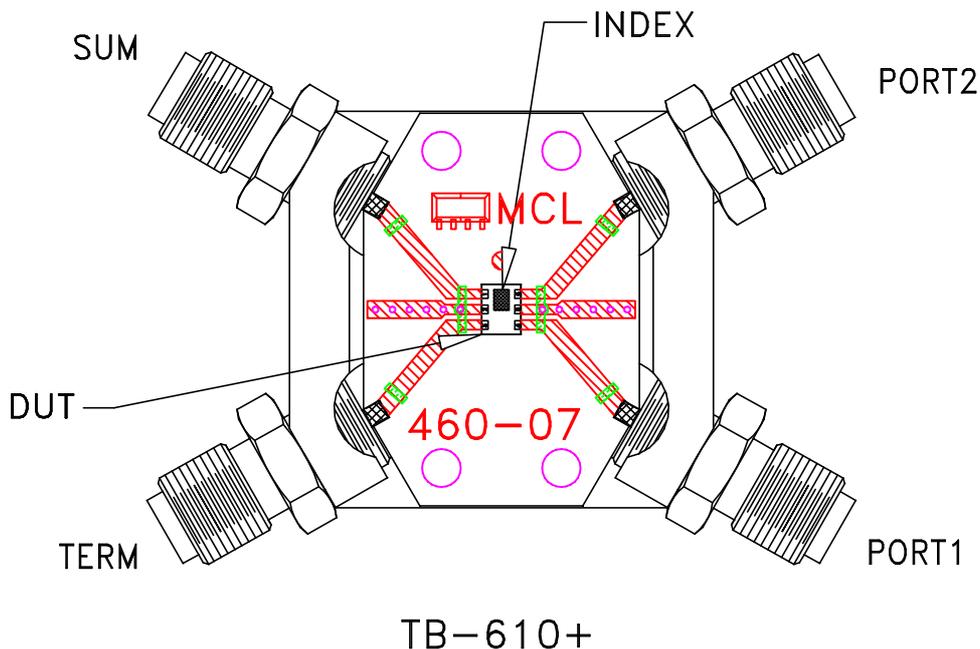
PL, 06SQ07, JV1210C-1, TB-610+

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

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-340	OR
FILE:	98PL340	SCALE:	10:1
SHEET:	1	OF	1

Evaluation Board and Circuit



Schematic Diagram

NOTES:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.020 inch.

Mini-Circuits®

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	-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