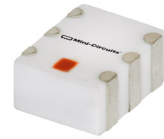


2 Way-90° Power Splitter

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

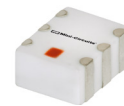
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Power Splitter/Combiner

2 Way-90° 50Ω 90 to 150 MHz

QCV-151+



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.

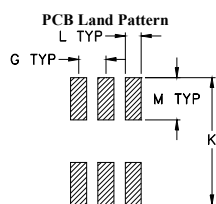
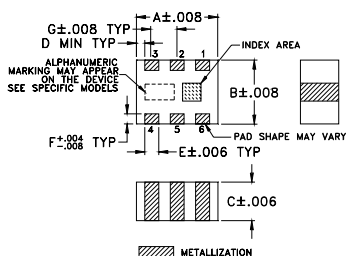
* Derate linearly to 3W at 100°C ambient.
Permanent damage may occur if any of these limits are exceeded.

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

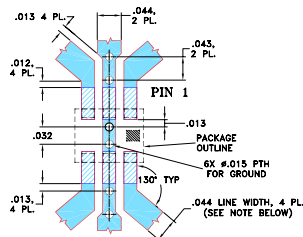


Suggested Layout,
Tolerance to be within ± 0.002

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.

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

4. DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

Notes

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Features

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

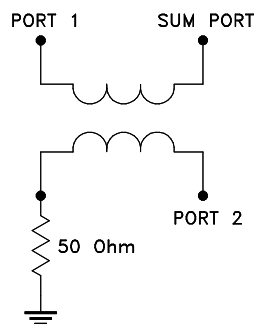
Applications

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

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	
	138-150	—	1.45	1.8	
VSWR (Port 1-2)	90-118	—	1.2	1.4	:1
	118-138	—	1.3	1.6	
	138-150	—	1.5	1.9	

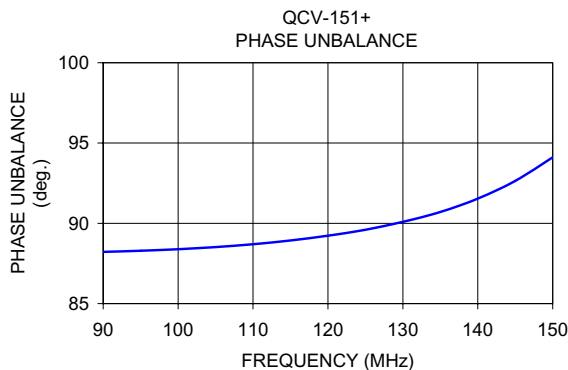
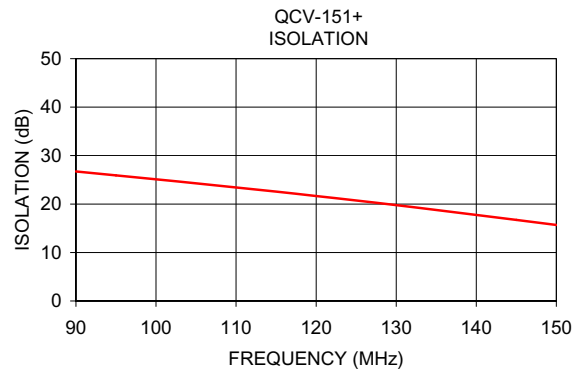
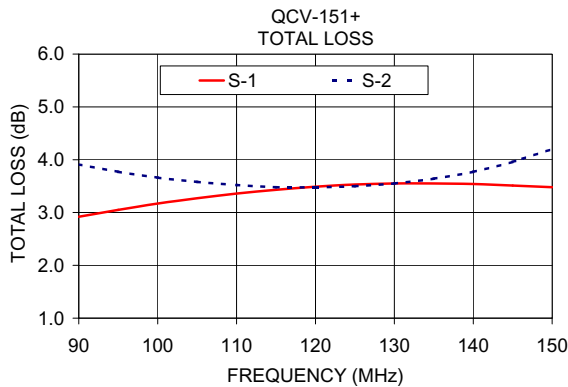
Electrical Schematic



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.



Notes

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2 Way-90° Power Splitter/Combiner

QCV-151+

Typical Performance Data

FREQ.	TOTAL LOSS ¹		AMP. UNBAL.	ISOLATION	PHASE UNBAL.	FREQ.	VSWR		
(MHz)	(dB)		(dB)	(dB)	(Deg.)	(MHz)	(: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



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IF/RF MICROWAVE COMPONENTS

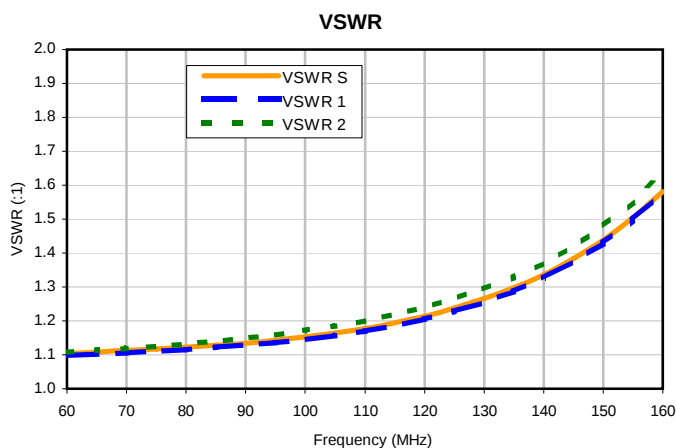
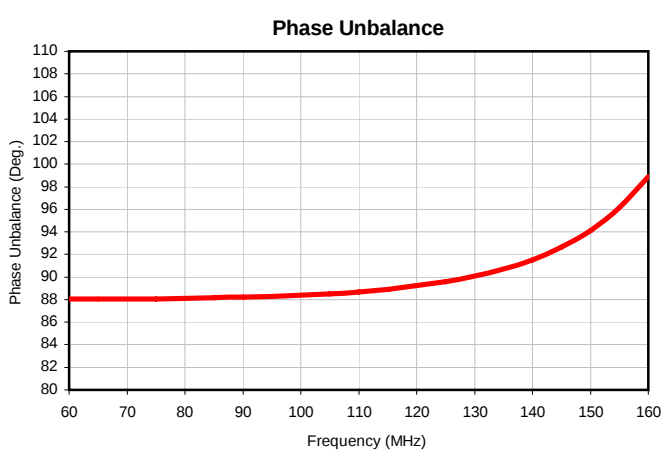
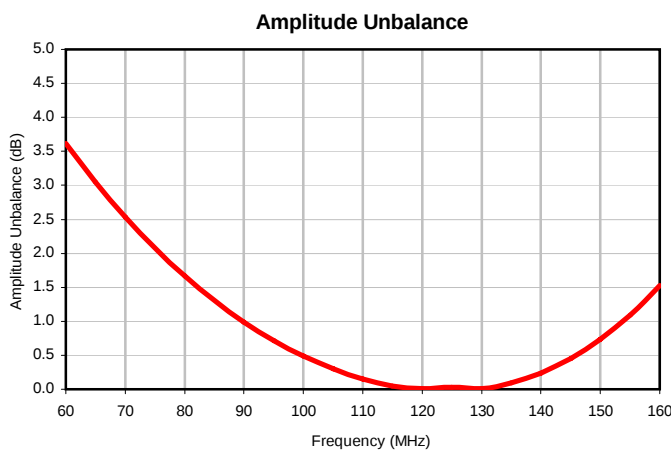
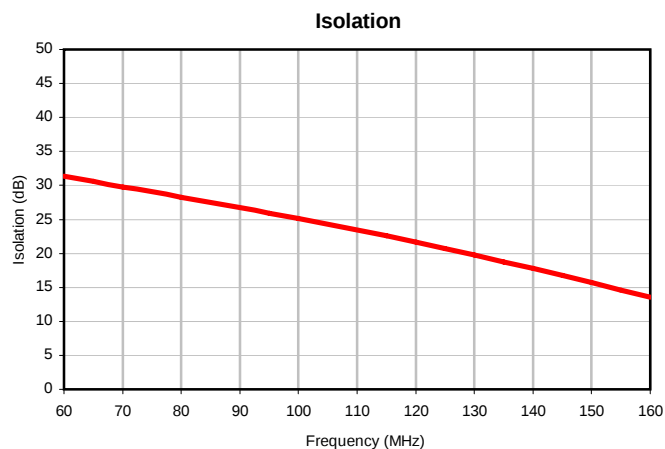
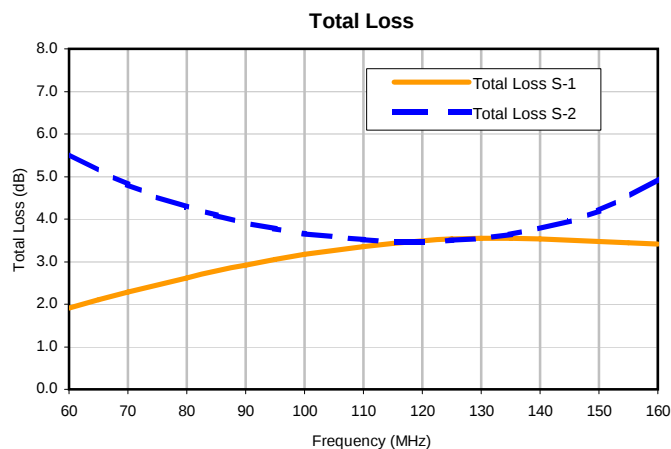


REV. X1
 QCV-151+
 5/5/2011
 Page 1 of 1

2 Way-90° Power Splitter/Combiner

QCV-151+

Typical Performance Curves



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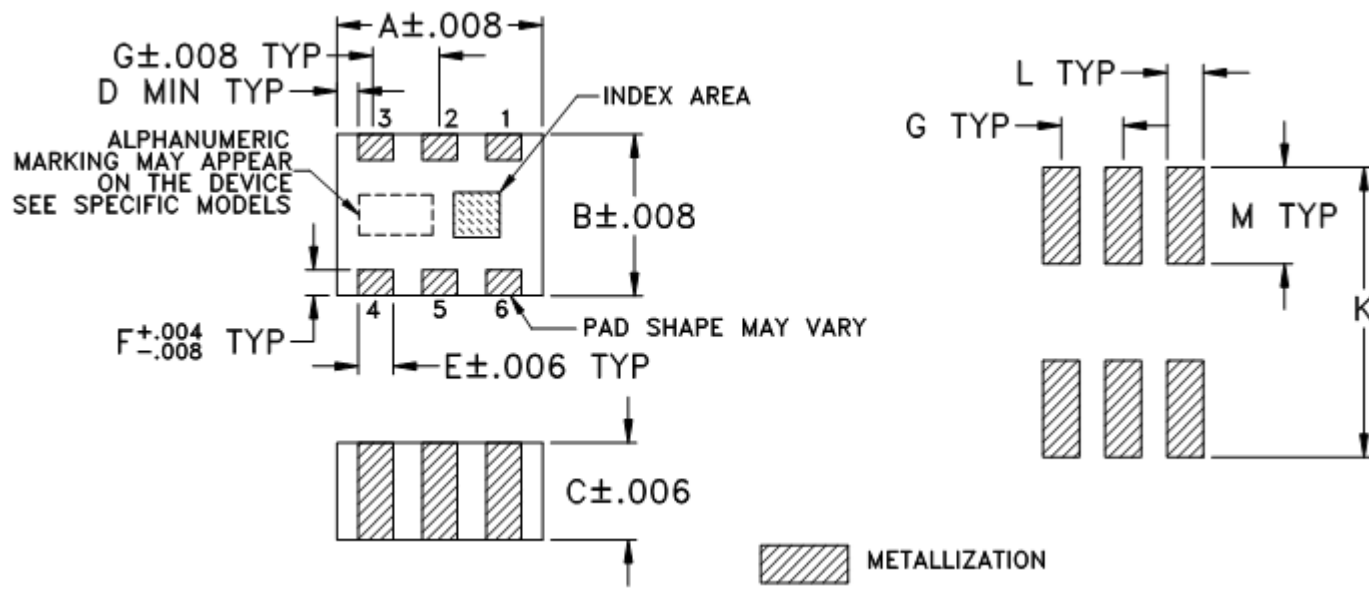


REV. X1
QCV-151+
5/5/2011
Page 1 of 1

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.



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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F74

DEVICE ORIENTATION IN T&R

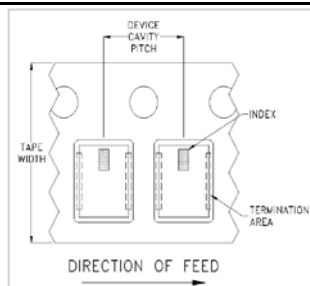


ILLUSTRATION 1

Applicable Case Styles

GE0805C-1
GE0805C-1AP
JV1210C-1
GU2939

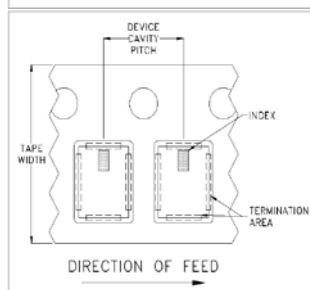


ILLUSTRATION 2

Applicable Case Styles

JV1210C
JV1210C-2
JV1210C-3
JV1210C-4
JV1210C-5
JV1210C-6
JV1210C-11

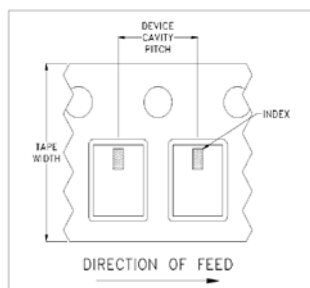


ILLUSTRATION 3

Applicable Case Styles

JC0603C-8
JV1210C-7
JV1210C-8
JV1210C-9
JV1210C-10
JV1210C-13
GE0805C-13

Tape Width, mm	Device Cavity Pitch, mm	Real Size, inches	Devices per Reel	
8	4	7	Small quantity standards (see note)	20
				50
				100
				200
				500
				1000
			Standard	2000
				4000

Note: Small reel availability varies by model. Refer to pricing and availability on individual model dashboard.

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.

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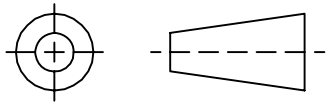
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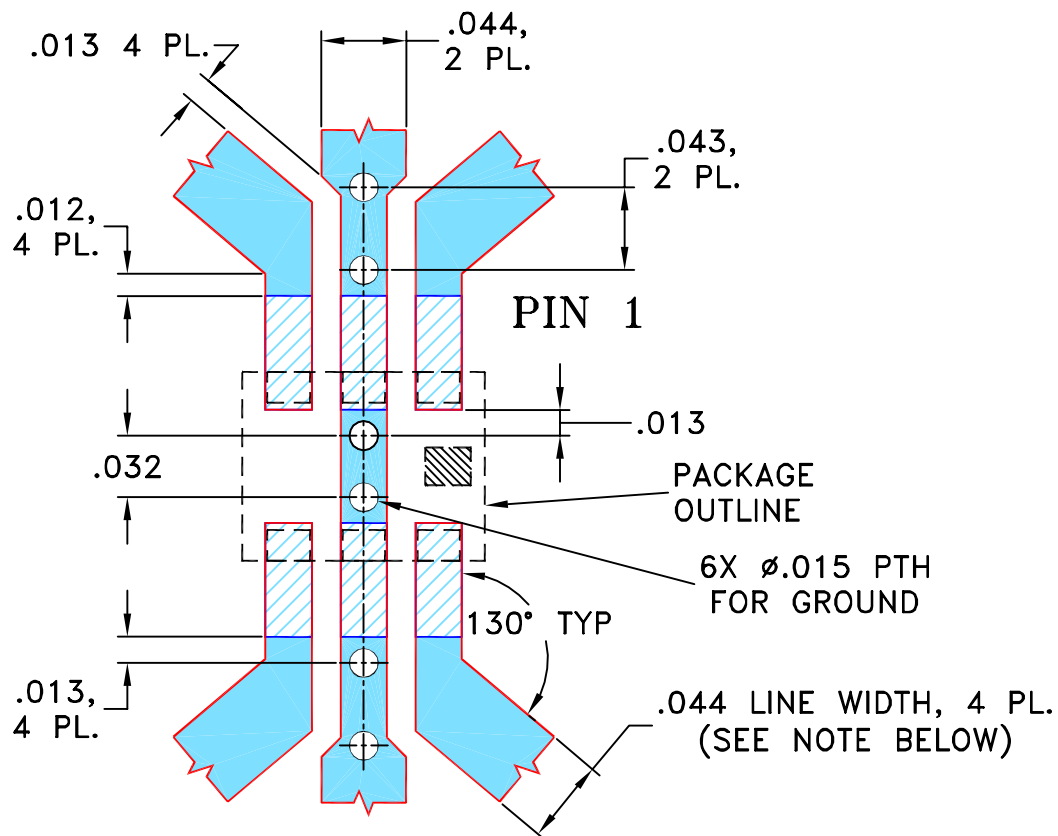
THIRD ANGLE PROJECTION



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" $\pm$ 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

DRAWN

PW

02/04/11

TOLERANCES ON:

CHECKED

IL

02/16/11

2 PL DECIMALS $\pm$.005

APPROVED

ABD

02/16/11

ANGLES $\pm$

FRACTIONS $\pm$

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



Mini-Circuits®

13 Neptune Avenue
Brooklyn NY 11235

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

SIZE
A

CODE IDENT
15542

DRAWING NO:
98-PL-340

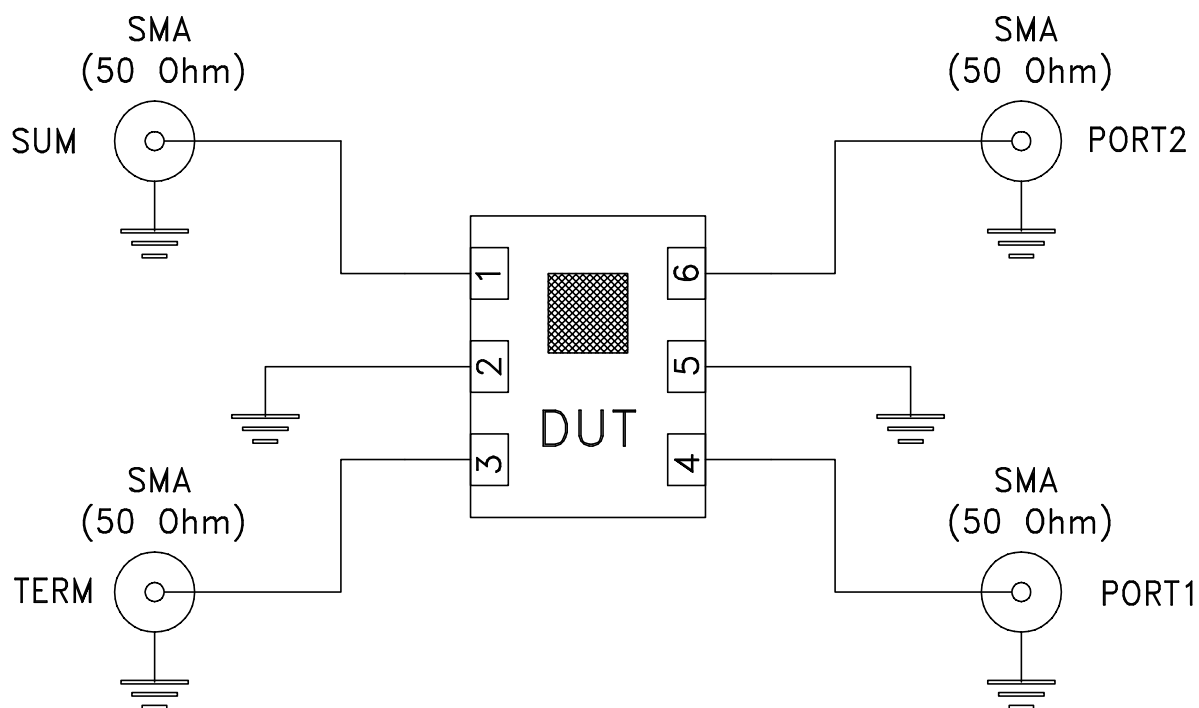
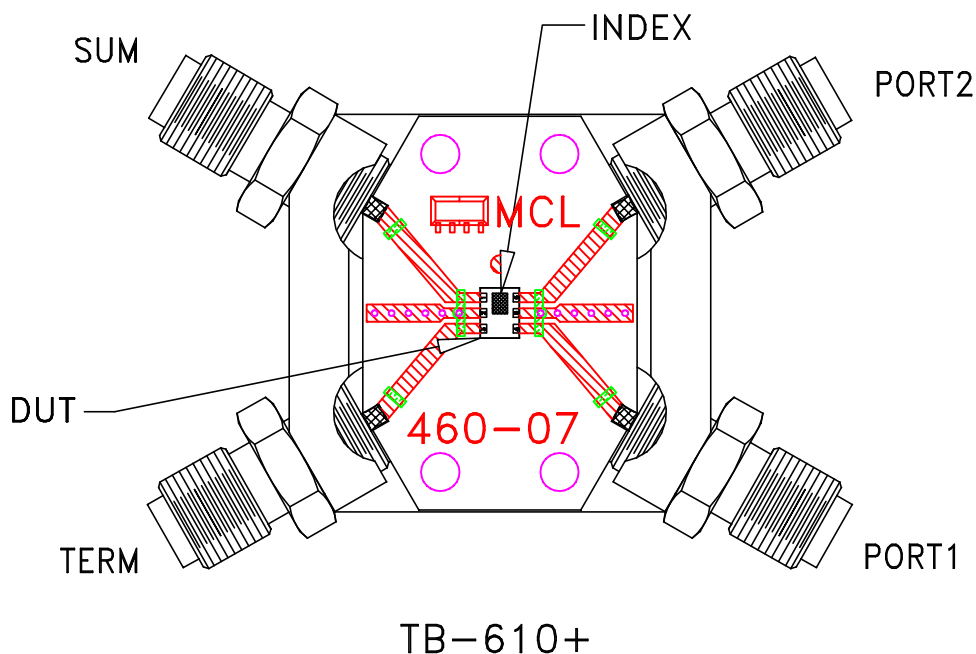
REV:
OR

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.

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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