

2 Way-90° 50Ω 760 to 860 MHz

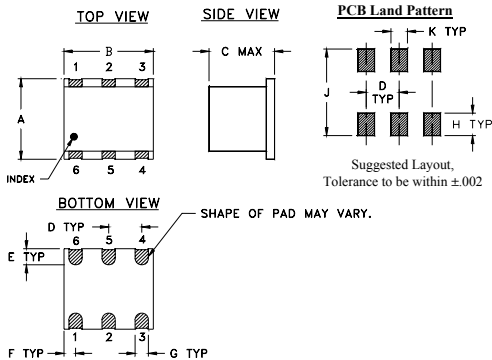
Maximum Ratings

Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Power Input (as a splitter)	1W max.
Permanent damage may occur if any of these limits are exceeded.	

Pin Connections

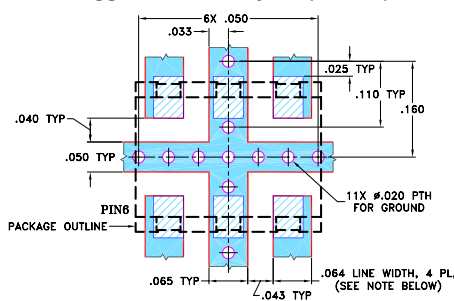
SUM PORT	4
PORT 1 (0°)	1
PORT 2 (+90°)	3
GROUND	2,5
50 OHM TERM EXTERNAL	6

Outline Drawing



Outline Dimensions (inch/mm)

A	B	C	D	E	F
.250	.31	.20	.100	.050	.055
6.35	7.87	5.08	2.54	1.27	1.40
G	H	J	K	wt	
.040	.070	.270	.050	grams	
1.02	1.78	6.86	1.27	0.50	

Demo Board MCL P/N: TB-210
Suggested PCB Layout (PL-111)

- NOTES:
1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.030 ± 0.002; 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.
 3. DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).
 4. DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

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-Circuit's 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-Circuit's website at www.minicircuits.com/MCLStore/terms.jsp

Features

- low insertion loss, 0.15 dB typ.
- good isolation, 22 dB typ.

Applications

- UHF
- modulators
- image rejection mixers



Generic photo used for illustration purposes only

CASE STYLE: TT240

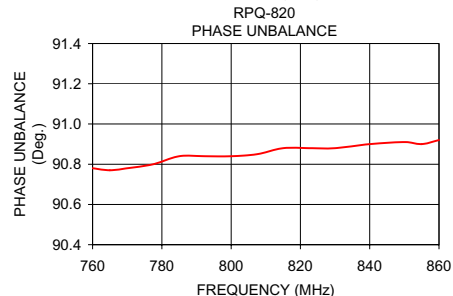
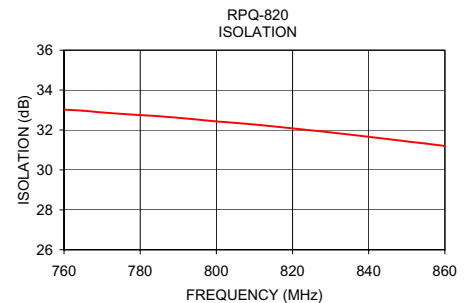
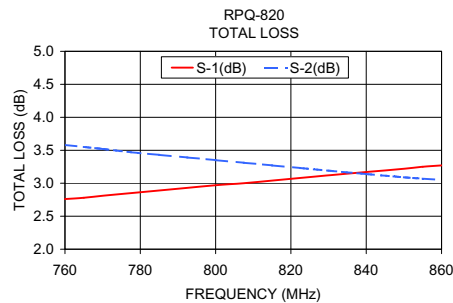
Electrical Specifications

FREQ. RANGE (MHz)	ISOLATION (dB)	INSERTION LOSS (dB) Avg. of Coupled Outputs ABOVE 3 dB	PHASE UNBALANCE (Degrees)	AMPLITUDE UNBALANCE (dB)
f_L - f_U	Typ. Min.	Typ. Max.	Max.	Max.
760-860	22 15	0.15 0.7	4	1

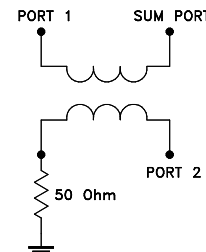
Typical Performance Data

Frequency (MHz)	Total Loss ¹ (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR S	VSWR 1	VSWR 2
	S-1	S-2						
760.00	2.76	3.58	0.82	33.02	90.78	1.072	1.094	1.061
765.00	2.78	3.55	0.76	32.97	90.77	1.073	1.094	1.061
770.00	2.81	3.52	0.71	32.88	90.78	1.073	1.094	1.061
777.50	2.85	3.47	0.62	32.78	90.80	1.074	1.095	1.062
785.00	2.89	3.43	0.54	32.69	90.84	1.074	1.095	1.063
792.50	2.93	3.39	0.46	32.57	90.84	1.075	1.095	1.064
800.00	2.97	3.35	0.38	32.43	90.84	1.076	1.096	1.065
807.50	3.00	3.31	0.31	32.32	90.85	1.077	1.097	1.065
815.00	3.04	3.27	0.22	32.18	90.88	1.078	1.097	1.066
822.50	3.08	3.23	0.15	32.03	90.88	1.079	1.098	1.068
830.00	3.12	3.19	0.08	31.88	90.88	1.080	1.098	1.069
840.00	3.17	3.14	0.03	31.66	90.90	1.082	1.099	1.070
850.00	3.22	3.09	0.13	31.43	90.91	1.083	1.100	1.071
855.00	3.25	3.07	0.18	31.32	90.90	1.084	1.100	1.071
860.00	3.27	3.05	0.23	31.20	90.92	1.085	1.100	1.072

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



electrical schematic



2 Way-90° Power Splitter/Combiner

RPQ-820

Typical Performance Data

TEST CONDITIONS: INPUT POWER = 0dBm @Temperature = +25°C

FREQ. (MHz)	TOTAL LOSS ¹ (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB) 1-2	VSWR (:1)		
	S-1	S-2				S	1	2
300	0.72	9.09	8.37	0.45	28.47	1.03	1.02	1.03
350	0.93	7.97	7.05	0.44	27.48	1.04	1.03	1.03
400	1.15	7.05	5.90	0.44	26.73	1.05	1.03	1.04
450	1.38	6.27	4.89	0.43	26.18	1.06	1.04	1.04
500	1.63	5.61	3.98	0.40	25.77	1.07	1.05	1.05
550	1.88	5.05	3.17	0.40	25.49	1.08	1.06	1.06
600	2.15	4.57	2.41	0.39	25.28	1.09	1.07	1.06
650	2.41	4.15	1.74	0.37	25.20	1.10	1.08	1.07
700	2.69	3.79	1.10	0.34	25.18	1.11	1.09	1.07
710	2.75	3.72	0.98	0.31	25.19	1.11	1.09	1.08
720	2.80	3.66	0.86	0.31	25.19	1.11	1.09	1.08
730	2.85	3.60	0.74	0.33	25.20	1.11	1.09	1.08
740	2.90	3.54	0.63	0.32	25.21	1.11	1.09	1.08
750	2.95	3.48	0.53	0.29	25.23	1.11	1.10	1.08
760	3.01	3.42	0.40	0.28	25.26	1.11	1.10	1.08
770	3.07	3.37	0.30	0.28	25.26	1.12	1.10	1.08
780	3.12	3.31	0.19	0.27	25.29	1.12	1.10	1.09
790	3.18	3.25	0.07	0.25	25.30	1.12	1.10	1.09
800	3.23	3.20	0.03	0.24	25.30	1.12	1.11	1.09
810	3.29	3.15	0.13	0.24	25.30	1.12	1.11	1.09
820	3.34	3.10	0.24	0.22	25.33	1.12	1.11	1.09
830	3.39	3.06	0.34	0.21	25.36	1.12	1.11	1.09
840	3.45	3.01	0.44	0.19	25.42	1.12	1.11	1.09
850	3.51	2.96	0.55	0.20	25.45	1.13	1.11	1.10
860	3.56	2.91	0.65	0.21	25.44	1.13	1.11	1.10
870	3.61	2.87	0.75	0.22	25.45	1.13	1.12	1.10
880	3.67	2.82	0.84	0.21	25.46	1.13	1.12	1.10
890	3.72	2.78	0.94	0.19	25.49	1.13	1.12	1.10
900	3.77	2.74	1.03	0.19	25.50	1.13	1.12	1.10
950	4.03	2.55	1.48	0.09	25.62	1.14	1.13	1.11
1000	4.30	2.39	1.91	0.04	25.57	1.14	1.13	1.12
1050	4.55	2.24	2.32	0.02	25.54	1.14	1.14	1.12
1100	4.81	2.11	2.70	0.08	25.46	1.15	1.15	1.13
1150	5.09	1.99	3.10	0.19	25.47	1.15	1.15	1.13
1200	5.32	1.88	3.44	0.17	25.03	1.15	1.16	1.14
1300	5.79	1.70	4.10	0.30	24.21	1.16	1.17	1.15
1400	6.25	1.55	4.70	0.44	23.07	1.16	1.18	1.16
1500	6.69	1.45	5.24	0.62	21.97	1.17	1.19	1.18
1600	7.08	1.35	5.72	0.76	20.76	1.18	1.19	1.19
1700	7.47	1.29	6.18	1.03	19.77	1.19	1.20	1.20
1800	7.85	1.23	6.62	1.29	18.90	1.20	1.21	1.21
1900	8.16	1.22	6.94	1.76	17.87	1.22	1.22	1.23
2000	8.49	1.18	7.31	2.17	17.12	1.23	1.24	1.25
2100	8.77	1.16	7.61	2.77	16.43	1.25	1.26	1.27
2200	9.06	1.16	7.90	3.47	15.84	1.28	1.28	1.29
2300	9.32	1.17	8.15	4.24	15.28	1.30	1.32	1.31
2400	9.55	1.17	8.38	5.17	14.76	1.33	1.35	1.34
2500	9.77	1.19	8.58	6.20	14.30	1.35	1.39	1.36

¹ Total Loss = Insertion Loss+ 3dB Splitter Loss

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2 Way-90° Power Splitter/Combiner

RPQ-820

Typical Performance Data

TEST CONDITIONS: INPUT POWER = 0dBm @Temperature = -40°C

FREQ. (MHz)	TOTAL LOSS ¹ (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB) 1-2	VSWR (:1)		
	S-1	S-2				S	1	2
300	0.65	9.14	8.49	0.26	29.03	1.03	1.01	1.03
350	0.85	8.00	7.16	0.26	27.94	1.03	1.02	1.03
400	1.06	7.07	6.01	0.26	27.13	1.05	1.03	1.04
450	1.28	6.27	4.99	0.24	26.52	1.06	1.04	1.04
500	1.52	5.61	4.09	0.24	26.02	1.07	1.05	1.05
550	1.78	5.05	3.27	0.21	25.65	1.08	1.06	1.06
600	2.03	4.55	2.51	0.23	25.35	1.09	1.07	1.07
650	2.29	4.12	1.83	0.20	25.23	1.10	1.08	1.07
700	2.56	3.76	1.19	0.17	25.16	1.11	1.09	1.08
710	2.61	3.69	1.08	0.17	25.16	1.11	1.09	1.08
720	2.66	3.63	0.97	0.15	25.14	1.11	1.09	1.08
730	2.71	3.56	0.85	0.17	25.12	1.11	1.09	1.08
740	2.77	3.50	0.73	0.17	25.12	1.12	1.09	1.08
750	2.82	3.44	0.62	0.14	25.15	1.12	1.09	1.09
760	2.88	3.38	0.50	0.14	25.17	1.12	1.10	1.09
770	2.93	3.32	0.39	0.13	25.15	1.12	1.10	1.09
780	2.98	3.27	0.28	0.13	25.16	1.12	1.10	1.09
790	3.04	3.21	0.17	0.11	25.16	1.12	1.10	1.09
800	3.09	3.16	0.06	0.09	25.15	1.13	1.10	1.09
810	3.14	3.09	0.04	0.09	25.14	1.13	1.11	1.10
820	3.20	3.05	0.15	0.08	25.17	1.13	1.11	1.10
830	3.25	3.01	0.25	0.08	25.19	1.13	1.11	1.10
840	3.30	2.95	0.35	0.05	25.24	1.13	1.11	1.10
850	3.36	2.90	0.46	0.06	25.26	1.13	1.11	1.10
860	3.41	2.86	0.55	0.08	25.23	1.13	1.11	1.10
870	3.46	2.82	0.65	0.08	25.24	1.13	1.11	1.10
880	3.52	2.77	0.74	0.07	25.25	1.13	1.11	1.10
890	3.57	2.72	0.85	0.07	25.27	1.13	1.12	1.11
900	3.62	2.68	0.94	0.04	25.27	1.14	1.12	1.11
950	3.88	2.48	1.40	0.04	25.39	1.14	1.13	1.12
1000	4.14	2.32	1.82	0.06	25.30	1.15	1.14	1.12
1050	4.39	2.17	2.23	0.12	25.23	1.15	1.14	1.13
1100	4.64	2.03	2.62	0.22	25.12	1.15	1.15	1.14
1150	4.92	1.90	3.02	0.29	25.16	1.15	1.15	1.14
1200	5.15	1.78	3.36	0.28	24.73	1.16	1.16	1.15
1300	5.61	1.60	4.02	0.39	23.90	1.17	1.17	1.16
1400	6.06	1.44	4.62	0.50	22.73	1.17	1.18	1.17
1500	6.48	1.32	5.16	0.59	21.67	1.17	1.19	1.18
1600	6.88	1.22	5.65	0.76	20.59	1.17	1.18	1.19
1700	7.27	1.15	6.12	1.06	19.59	1.18	1.20	1.20
1800	7.66	1.08	6.58	1.40	18.68	1.19	1.21	1.20
1900	7.94	1.06	6.88	1.71	17.60	1.21	1.23	1.23
2000	8.26	1.02	7.24	2.17	16.87	1.23	1.24	1.25
2100	8.56	0.99	7.56	2.69	16.14	1.25	1.26	1.25
2200	8.83	0.98	7.85	3.33	15.54	1.27	1.29	1.28
2300	9.08	0.99	8.09	4.16	15.03	1.30	1.33	1.32
2400	9.30	0.98	8.32	4.83	14.52	1.31	1.34	1.33
2500	9.55	0.99	8.55	6.06	14.08	1.34	1.43	1.36

¹ Total Loss = Insertion Loss+ 3dB Splitter Loss

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2 Way-90° Power Splitter/Combiner

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Typical Performance Data

TEST CONDITIONS: INPUT POWER = 0dBm @Temperature = +85°C

FREQ. (MHz)	TOTAL LOSS ¹ (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB) 1-2	VSWR (:1)		
	S-1	S-2				S	1	2
300	0.75	9.08	8.33	0.58	28.24	1.03	1.02	1.03
350	0.97	7.97	7.00	0.57	27.33	1.04	1.03	1.04
400	1.19	7.05	5.86	0.59	26.63	1.05	1.04	1.04
450	1.43	6.27	4.84	0.56	26.11	1.06	1.05	1.04
500	1.68	5.62	3.94	0.55	25.74	1.07	1.06	1.05
550	1.94	5.07	3.13	0.52	25.50	1.08	1.06	1.05
600	2.20	4.59	2.38	0.49	25.32	1.09	1.07	1.06
650	2.47	4.18	1.71	0.47	25.29	1.10	1.08	1.06
700	2.74	3.82	1.07	0.44	25.31	1.10	1.09	1.07
710	2.81	3.75	0.95	0.41	25.34	1.10	1.09	1.07
720	2.86	3.69	0.83	0.40	25.35	1.11	1.09	1.07
730	2.91	3.63	0.72	0.41	25.35	1.11	1.10	1.07
740	2.96	3.57	0.60	0.41	25.36	1.11	1.10	1.07
750	3.02	3.51	0.49	0.38	25.39	1.11	1.10	1.08
760	3.07	3.45	0.38	0.37	25.43	1.11	1.10	1.08
770	3.13	3.40	0.27	0.38	25.44	1.11	1.10	1.08
780	3.18	3.35	0.16	0.35	25.46	1.11	1.11	1.08
790	3.24	3.29	0.05	0.33	25.48	1.12	1.11	1.08
800	3.29	3.24	0.06	0.31	25.49	1.12	1.11	1.08
810	3.35	3.18	0.16	0.31	25.48	1.12	1.11	1.08
820	3.40	3.14	0.26	0.29	25.51	1.12	1.11	1.08
830	3.46	3.10	0.37	0.26	25.54	1.12	1.11	1.09
840	3.52	3.04	0.47	0.24	25.60	1.12	1.11	1.09
850	3.57	3.00	0.58	0.25	25.65	1.12	1.12	1.09
860	3.63	2.95	0.68	0.26	25.64	1.12	1.12	1.09
870	3.68	2.91	0.78	0.27	25.65	1.12	1.12	1.09
880	3.74	2.86	0.87	0.26	25.66	1.13	1.12	1.09
890	3.79	2.82	0.97	0.26	25.69	1.13	1.12	1.09
900	3.84	2.78	1.06	0.24	25.69	1.13	1.12	1.10
950	4.10	2.59	1.51	0.16	25.76	1.13	1.13	1.10
1000	4.37	2.44	1.93	0.09	25.70	1.14	1.14	1.11
1050	4.63	2.29	2.34	0.06	25.64	1.14	1.15	1.12
1100	4.89	2.16	2.73	0.04	25.53	1.15	1.15	1.12
1150	5.17	2.04	3.12	0.10	25.51	1.15	1.16	1.13
1200	5.40	1.94	3.47	0.14	25.05	1.15	1.17	1.14
1300	5.88	1.76	4.13	0.27	24.13	1.16	1.18	1.15
1400	6.35	1.63	4.72	0.43	23.04	1.17	1.19	1.17
1500	6.78	1.52	5.26	0.57	21.92	1.18	1.19	1.19
1600	7.18	1.44	5.74	0.83	20.73	1.19	1.20	1.20
1700	7.58	1.37	6.21	1.07	19.77	1.20	1.20	1.22
1800	7.96	1.33	6.64	1.35	18.92	1.21	1.21	1.23
1900	8.28	1.31	6.97	2.02	17.95	1.23	1.23	1.25
2000	8.62	1.27	7.35	2.31	17.25	1.25	1.24	1.26
2100	8.91	1.26	7.65	2.92	16.59	1.26	1.26	1.28
2200	9.20	1.26	7.94	3.59	16.01	1.28	1.28	1.30
2300	9.47	1.27	8.20	4.35	15.45	1.31	1.31	1.31
2400	9.71	1.28	8.43	5.24	14.94	1.33	1.34	1.33
2500	9.93	1.29	8.64	6.19	14.49	1.35	1.37	1.35

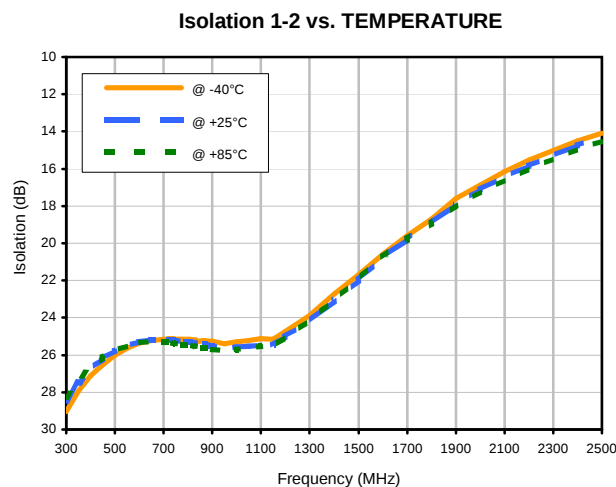
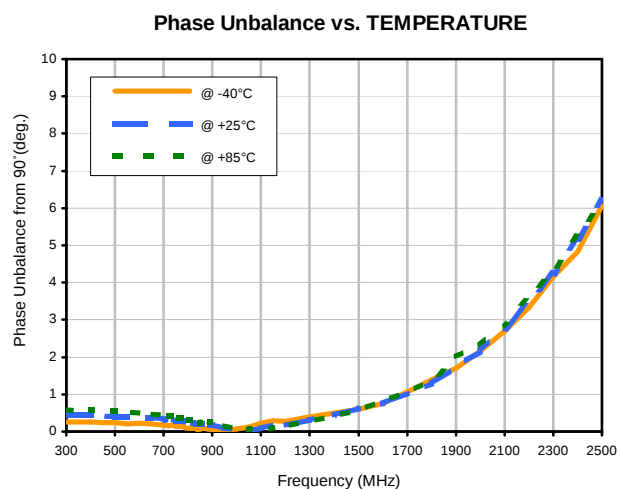
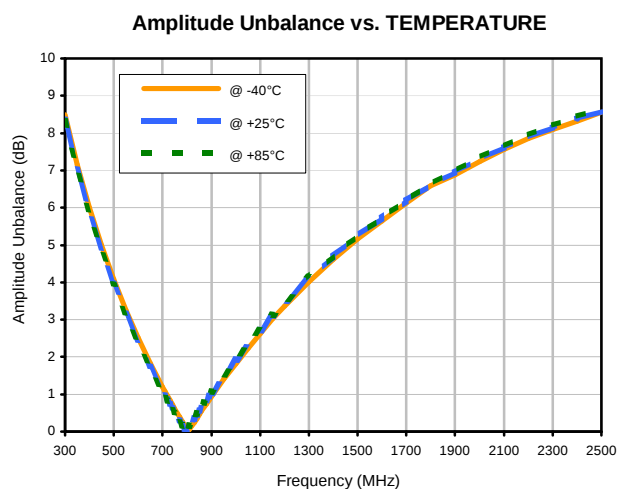
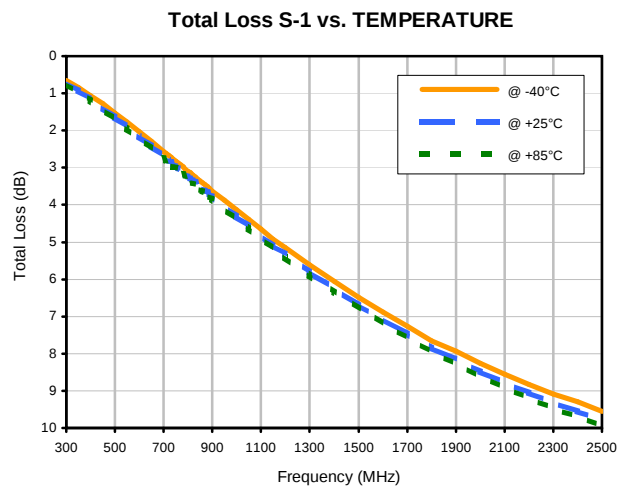
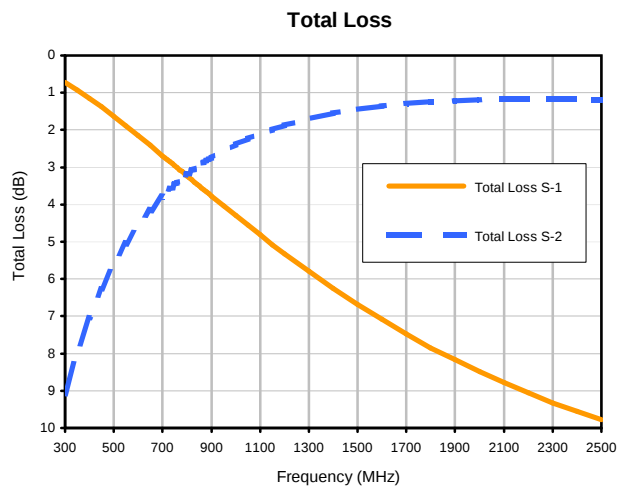
¹ Total Loss = Insertion Loss+ 3dB Splitter Loss

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2 Way-90° Power Splitter/Combiner

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Typical Performance Curves

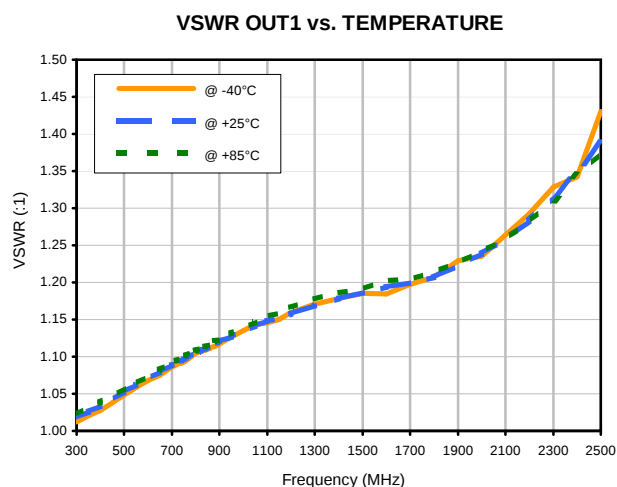
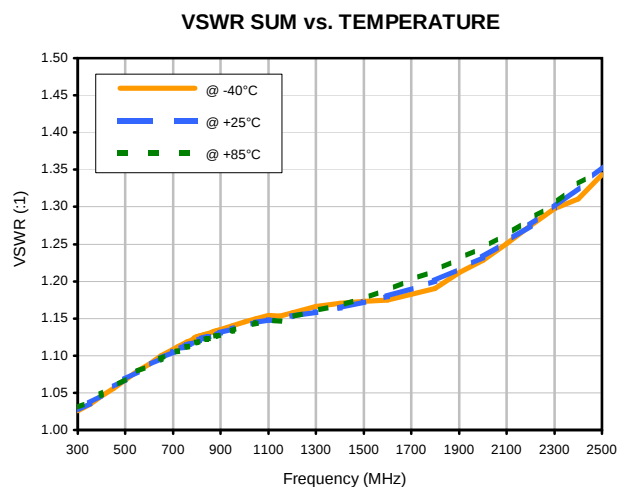
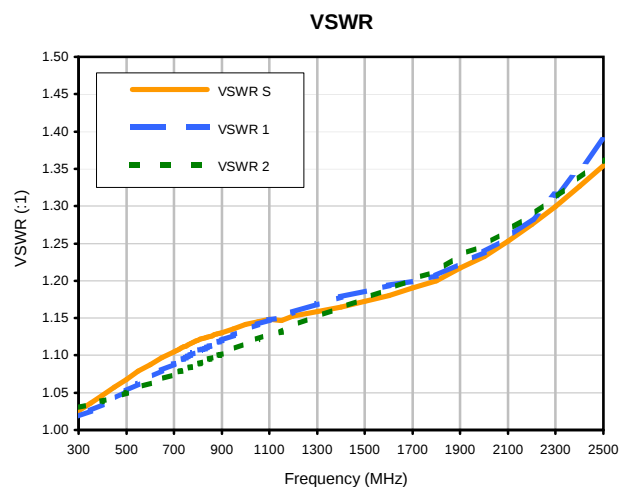


REV. X2
RPQ-820
100627
Page 1 of 2

2 Way-90° Power Splitter/Combiner

RPQ-820

Typical Performance Curves



REV. X2

RPQ-820

100627

Page 2 of 2

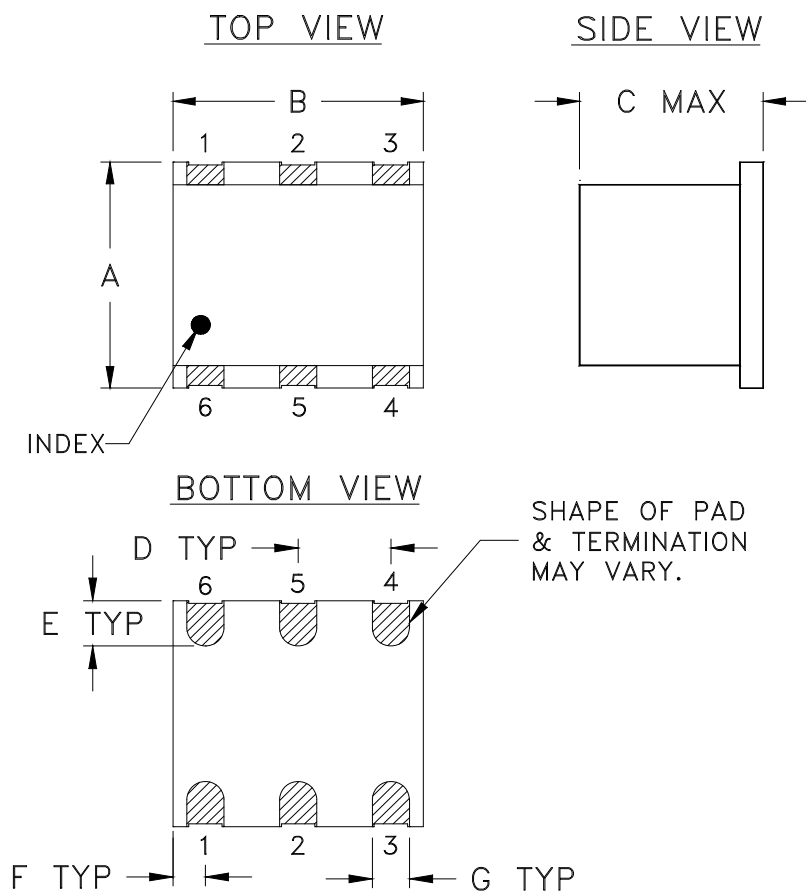


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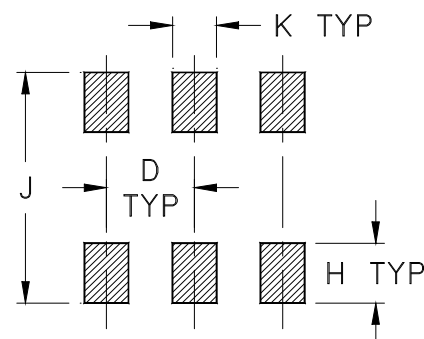
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Outline Dimensions



PCB Land Pattern



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

CASE #	A	B	C	D	E	F	G	H	J	K	WT. GRAM
TT240	.250 (6.35)	.31 (7.87)	.20 (5.08)	.100 (2.54)	.050 (1.27)	.055 (1.40)	.040 (1.02)	.070 (1.78)	.270 (6.86)	.050 (1.27)	.50

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

Notes:

- Case material: Ceramic.
- Termination finish:
 - For RoHS Case Styles: 2-10 μ inch (.05-.25 microns) Gold plate over 100-300 μ inch (2.54-7.62 microns) Nickel plate. All models, (+) suffix.
 - For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.



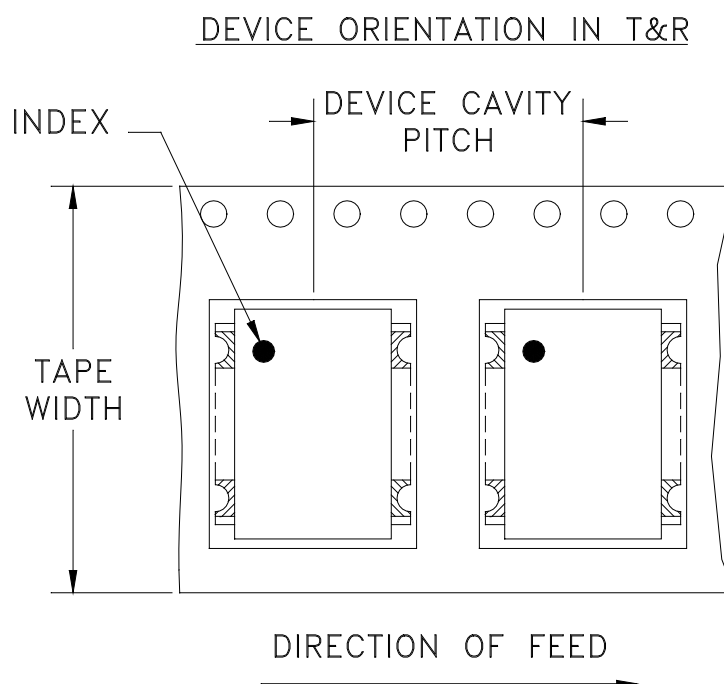
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Tape & Reel Packaging TR-F2



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel See note
16	12	7	10
			20
			50
			100
			200
		13	500
			1000

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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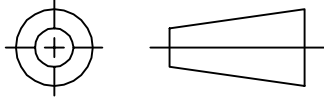
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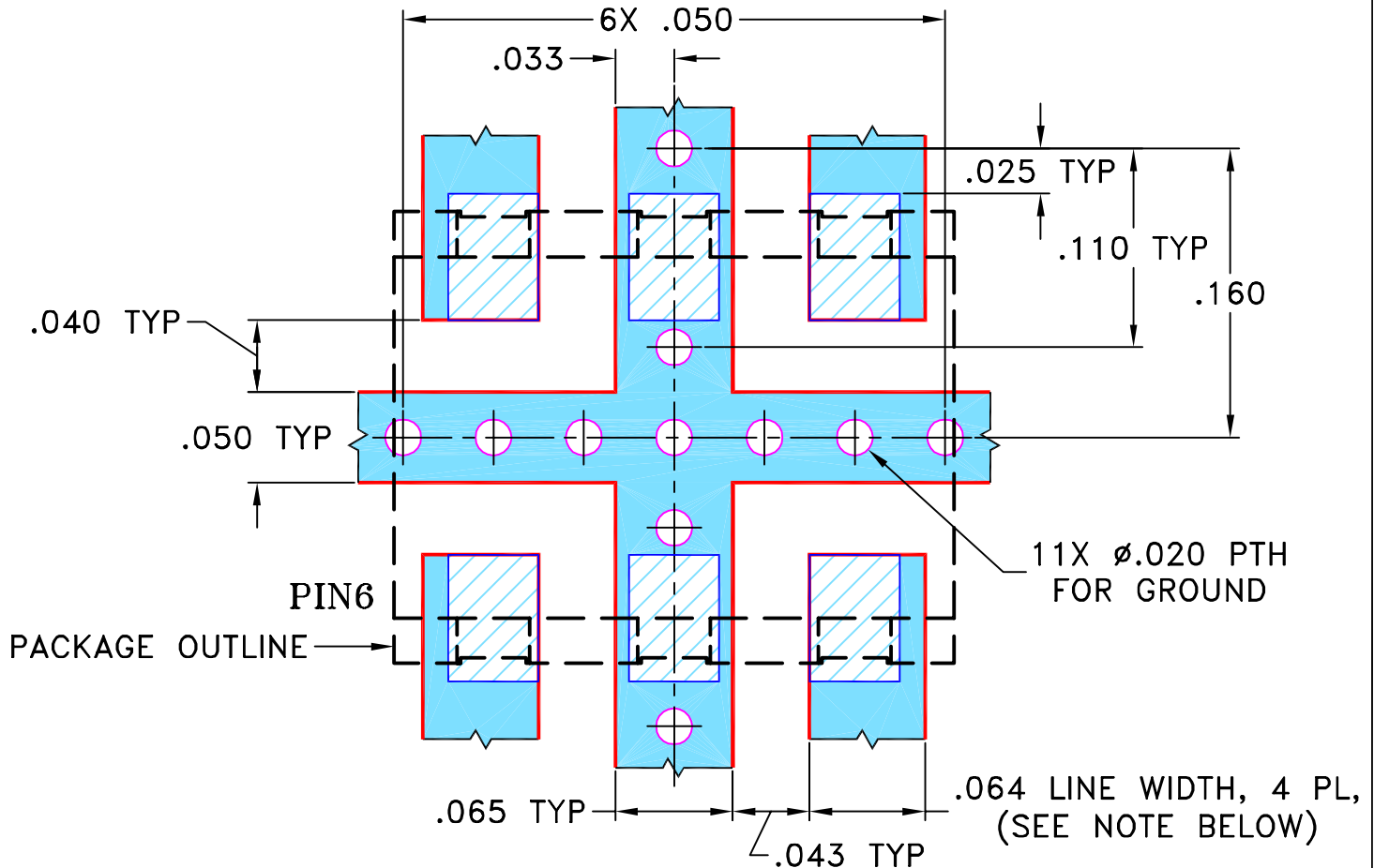
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M82457	NEW RELEASE	12/02/02	MMG	HY
A	M102713	ADDED "...WITH SMOBC"	01/14/06	GF	IL

**SUGGESTED MOUNTING CONFIGURATION
FOR TT240 CASE STYLE, "gp" PIN CONNECTION.**



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS $0.030'' \pm 0.002''$; 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

09/09/02

TOLERANCES ON:

CHECKED

AV

11/29/02

2 PL DECIMALS $\pm$

APPROVED

HY

12/02/02

3 PL DECIMALS $\pm$.005

ANGLES $\pm$

FRACTIONS $\pm$

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



Mini-Circuits®

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Brooklyn NY 11235

PL, gp, TT240, RPQ, TB-210

SIZE

A

CODE IDENT

15542

DRAWING NO:

98-PL-111

REV:

A

FILE:

98PL111

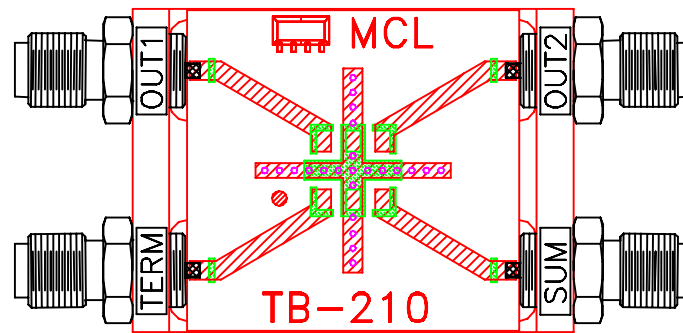
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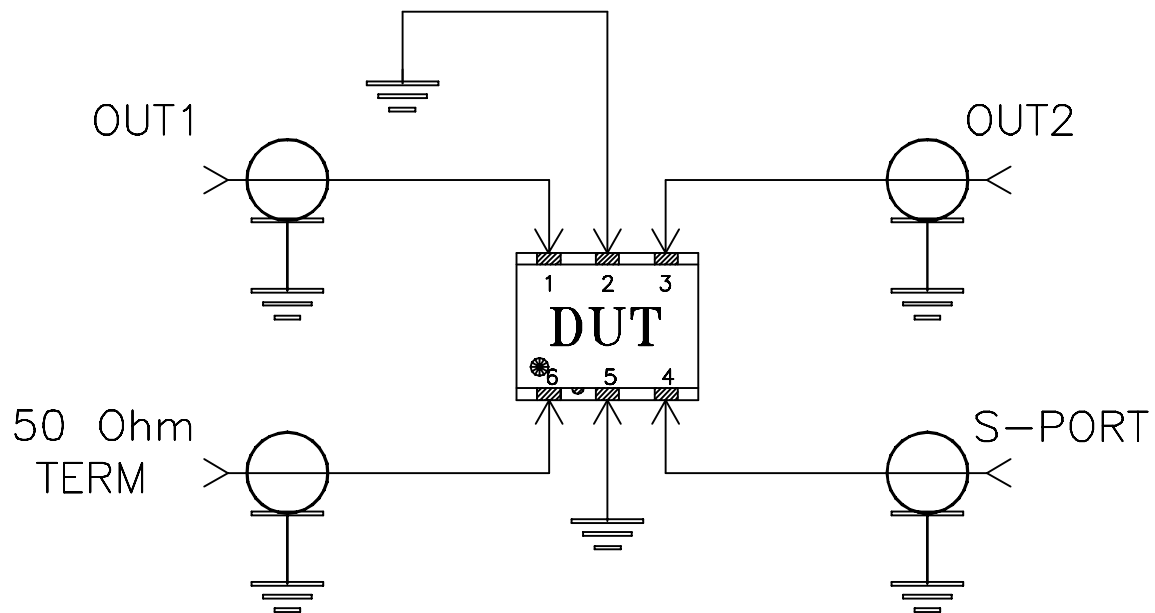
SHEET:

1 OF 1

Evaluation Board and Circuit



TB-210



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.030 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	-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