

Surface Mount Power Splitter/Combiner

ADQ-90+

2 Way-90° 50Ω 55 to 90 MHz



Generic photo used for illustration purposes only

CASE STYLE: CJ725

+RoHS Compliant

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

Reel Size	Devices/Reel
7"	10, 20, 50, 100, 200
13"	500

Maximum Ratings

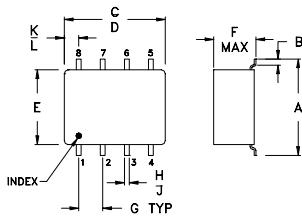
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Power Input (as a splitter)	0.5W max.

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

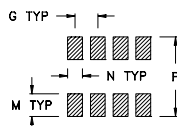
Pin Connections

SUM PORT	1
PORT 1 (+90°)	8
PORT 2 (0°)	4
GROUND	2,3,6,7
50 OHM TERM EXTERNAL	5

Outline Drawing



PCB Land Pattern



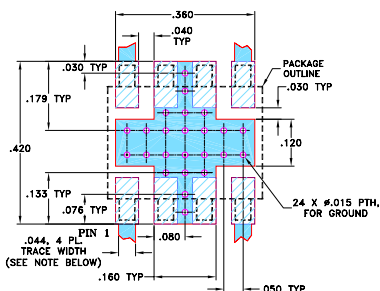
Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch/mm)

A	B	C	D	E	F	G
.397	.032	.385	.435	.310	.215	.100
10.08	0.81	9.78	11.05	7.87	5.46	2.54

H	J	K	L	M	N	P	wt
.015	.025	.035	.075	.120	.060	.420	grams
0.38	0.64	0.89	1.91	3.05	1.52	10.67	0.45

Demo Board MCL P/N: TB-83 Suggested PCB Layout (PL-063)



- NOTES:
- 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.
 - 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

Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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

- good isolation, 26 dB typ.
- good input port matching VSWR, 1.12 typ.
- good output port matching VSWR, 1.10 typ.
- excellent phase unbalance, 1 deg. typ.
- small surface mount package
- protected under U.S. Patent 6,133,525

Applications

- VHF
- image rejection
- IF signal processing

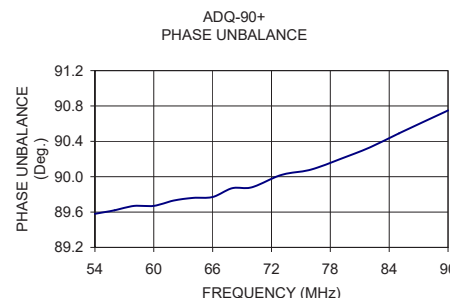
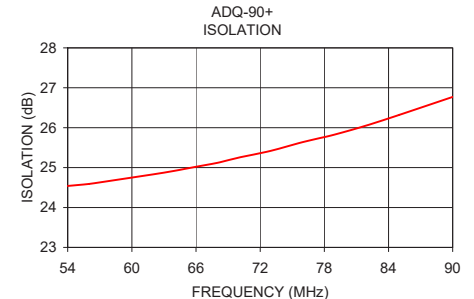
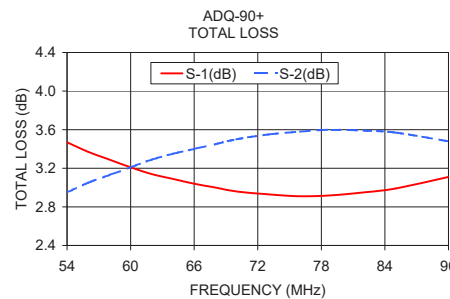
Electrical Specifications

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.
55-90	26 20	0.2 0.7	4	1.2

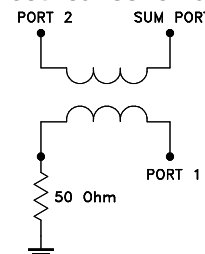
Typical Performance Data

Frequency (MHz)	Total Loss ¹ (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR S	VSWR 1	VSWR 2
	S-1	S-2						
54.00	3.47	2.95	0.53	24.54	89.58	1.11	1.13	1.11
56.00	3.37	3.05	0.33	24.59	89.62	1.11	1.13	1.11
58.00	3.29	3.13	0.16	24.67	89.67	1.11	1.13	1.11
60.00	3.21	3.21	0.00	24.75	89.67	1.11	1.13	1.11
62.00	3.14	3.29	0.14	24.83	89.73	1.11	1.13	1.11
64.00	3.09	3.35	0.26	24.92	89.76	1.10	1.13	1.10
66.00	3.04	3.40	0.37	25.02	89.77	1.10	1.13	1.10
68.00	3.00	3.45	0.46	25.12	89.87	1.10	1.13	1.10
70.00	2.96	3.50	0.54	25.25	89.88	1.09	1.13	1.10
73.00	2.93	3.55	0.62	25.42	90.02	1.09	1.14	1.10
76.00	2.91	3.58	0.67	25.64	90.08	1.08	1.14	1.10
79.00	2.92	3.60	0.67	25.83	90.20	1.08	1.14	1.10
82.00	2.95	3.59	0.64	26.06	90.33	1.08	1.14	1.10
85.00	2.99	3.57	0.58	26.32	90.49	1.07	1.15	1.11
90.00	3.11	3.48	0.37	26.77	90.75	1.06	1.16	1.11

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



electrical schematic



2 Way-90° Power Splitter/Combiner

ADQ-90+

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	AVG.				S	1	2
30	6.08	1.35	3.71	4.73	0.63	25.10	1.13	1.11	1.11
35	5.25	1.68	3.47	3.57	0.62	24.62	1.14	1.12	1.11
40	4.62	2.01	3.31	2.61	0.61	24.32	1.14	1.13	1.11
45	4.13	2.31	3.22	1.82	0.58	24.18	1.14	1.13	1.11
50	3.76	2.59	3.17	1.16	0.54	24.14	1.14	1.13	1.11
51	3.69	2.65	3.17	1.04	0.52	24.14	1.14	1.13	1.11
52	3.63	2.70	3.16	0.93	0.52	24.15	1.14	1.13	1.11
53	3.57	2.75	3.16	0.82	0.50	24.15	1.14	1.13	1.11
54	3.52	2.80	3.16	0.72	0.51	24.16	1.13	1.13	1.11
55	3.47	2.84	3.16	0.63	0.51	24.17	1.13	1.13	1.11
56	3.42	2.89	3.16	0.53	0.49	24.20	1.13	1.13	1.11
57	3.38	2.93	3.15	0.44	0.48	24.21	1.13	1.13	1.11
58	3.33	2.98	3.15	0.36	0.46	24.22	1.13	1.13	1.11
59	3.29	3.02	3.15	0.28	0.44	24.25	1.13	1.13	1.11
60	3.26	3.05	3.15	0.20	0.45	24.27	1.13	1.13	1.11
61	3.22	3.09	3.16	0.13	0.42	24.28	1.13	1.13	1.11
62	3.19	3.13	3.16	0.06	0.44	24.31	1.13	1.13	1.11
63	3.16	3.16	3.16	0.00	0.40	24.34	1.13	1.13	1.11
64	3.13	3.19	3.16	0.07	0.42	24.37	1.13	1.13	1.10
65	3.10	3.22	3.16	0.12	0.38	24.40	1.12	1.13	1.10
66	3.08	3.25	3.16	0.17	0.36	24.42	1.12	1.13	1.10
67	3.06	3.28	3.17	0.22	0.36	24.45	1.12	1.13	1.10
68	3.04	3.30	3.17	0.27	0.36	24.49	1.12	1.13	1.10
69	3.02	3.33	3.17	0.31	0.30	24.52	1.12	1.13	1.10
70	3.01	3.35	3.18	0.34	0.29	24.56	1.12	1.13	1.10
72	2.98	3.39	3.18	0.40	0.26	24.63	1.12	1.13	1.10
74	2.96	3.41	3.19	0.45	0.21	24.71	1.11	1.13	1.10
76	2.95	3.43	3.19	0.48	0.16	24.80	1.11	1.13	1.10
78	2.96	3.44	3.20	0.49	0.10	24.88	1.11	1.13	1.10
80	2.96	3.45	3.20	0.49	0.08	24.97	1.10	1.13	1.10
82	2.97	3.44	3.21	0.47	0.01	25.08	1.10	1.13	1.10
84	3.00	3.43	3.21	0.43	0.07	25.19	1.10	1.13	1.10
86	3.03	3.41	3.22	0.37	0.13	25.30	1.09	1.14	1.10
88	3.08	3.37	3.23	0.30	0.22	25.43	1.09	1.14	1.10
90	3.13	3.34	3.23	0.20	0.33	25.57	1.09	1.14	1.10
92	3.20	3.28	3.24	0.08	0.46	25.72	1.08	1.15	1.11
94	3.28	3.22	3.25	0.05	0.57	25.88	1.08	1.15	1.11
96	3.37	3.16	3.26	0.21	0.70	26.07	1.08	1.16	1.11
98	3.48	3.08	3.28	0.40	0.85	26.26	1.08	1.16	1.12
100	3.61	2.99	3.30	0.62	1.04	26.50	1.07	1.17	1.12
105	4.03	2.73	3.38	1.29	1.58	27.21	1.07	1.19	1.14
110	4.63	2.42	3.53	2.21	2.40	28.13	1.07	1.22	1.16
115	5.52	2.07	3.80	3.45	3.64	29.26	1.09	1.25	1.18
120	6.88	1.70	4.29	5.18	5.69	30.04	1.12	1.30	1.21

¹Total Loss = Insertion Loss + 3dB Splitter Loss

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2 Way-90° Power Splitter/Combiner

ADQ-90+

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	AVG.				S	1	2
30	6.07	1.32	3.70	4.75	0.50	25.74	1.13	1.12	1.11
35	5.24	1.65	3.44	3.59	0.47	25.33	1.12	1.12	1.10
40	4.60	1.97	3.29	2.63	0.42	25.08	1.12	1.13	1.10
45	4.11	2.28	3.19	1.83	0.37	24.94	1.12	1.13	1.09
50	3.73	2.56	3.14	1.17	0.30	24.86	1.11	1.13	1.09
51	3.67	2.61	3.14	1.05	0.28	24.84	1.11	1.13	1.09
52	3.60	2.66	3.13	0.94	0.26	24.84	1.11	1.13	1.09
53	3.55	2.71	3.13	0.83	0.27	24.83	1.11	1.13	1.09
54	3.49	2.76	3.13	0.73	0.26	24.82	1.11	1.13	1.09
55	3.44	2.80	3.12	0.64	0.25	24.81	1.11	1.13	1.08
56	3.39	2.85	3.12	0.54	0.22	24.82	1.11	1.13	1.08
57	3.35	2.90	3.12	0.45	0.23	24.81	1.11	1.13	1.08
58	3.30	2.94	3.12	0.37	0.21	24.80	1.11	1.13	1.08
59	3.26	2.98	3.12	0.29	0.19	24.80	1.11	1.13	1.08
60	3.23	3.02	3.12	0.21	0.17	24.81	1.11	1.13	1.08
61	3.19	3.06	3.12	0.13	0.16	24.80	1.11	1.13	1.08
62	3.16	3.09	3.12	0.07	0.15	24.81	1.11	1.13	1.08
63	3.13	3.12	3.13	0.00	0.14	24.81	1.11	1.13	1.08
64	3.09	3.16	3.13	0.06	0.13	24.81	1.11	1.13	1.08
65	3.07	3.19	3.13	0.12	0.10	24.82	1.11	1.13	1.08
66	3.04	3.21	3.13	0.17	0.09	24.82	1.11	1.13	1.08
67	3.03	3.24	3.13	0.22	0.09	24.82	1.11	1.13	1.08
68	3.00	3.27	3.14	0.26	0.07	24.84	1.11	1.13	1.08
69	2.99	3.29	3.14	0.30	0.03	24.85	1.10	1.13	1.08
70	2.97	3.31	3.14	0.34	0.01	24.87	1.10	1.13	1.08
72	2.95	3.35	3.15	0.40	0.01	24.89	1.10	1.13	1.08
74	2.93	3.38	3.15	0.45	0.06	24.93	1.10	1.13	1.08
76	2.92	3.40	3.16	0.48	0.11	24.98	1.10	1.13	1.08
78	2.92	3.41	3.16	0.49	0.15	25.03	1.10	1.13	1.08
80	2.92	3.41	3.17	0.49	0.19	25.09	1.10	1.13	1.09
82	2.93	3.41	3.17	0.47	0.25	25.17	1.10	1.13	1.09
84	2.96	3.39	3.18	0.43	0.34	25.26	1.10	1.13	1.09
86	2.99	3.37	3.18	0.38	0.40	25.36	1.09	1.13	1.09
88	3.03	3.34	3.19	0.31	0.48	25.47	1.09	1.13	1.10
90	3.09	3.30	3.19	0.21	0.59	25.60	1.09	1.13	1.10
92	3.16	3.25	3.20	0.09	0.70	25.75	1.09	1.14	1.10
94	3.23	3.19	3.21	0.04	0.81	25.92	1.09	1.14	1.11
96	3.32	3.12	3.22	0.20	0.95	26.11	1.08	1.15	1.11
98	3.43	3.04	3.24	0.39	1.08	26.30	1.08	1.15	1.12
100	3.55	2.95	3.25	0.60	1.25	26.55	1.08	1.16	1.13
105	3.97	2.69	3.33	1.27	1.78	27.26	1.08	1.18	1.14
110	4.56	2.38	3.47	2.18	2.54	28.11	1.09	1.21	1.17
115	5.44	2.02	3.73	3.42	3.69	28.93	1.10	1.25	1.19
120	6.78	1.65	4.21	5.13	5.60	29.01	1.13	1.30	1.22

¹Total Loss = Insertion Loss + 3dB Splitter Loss

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2 Way-90° Power Splitter/Combiner

ADQ-90+

Typical Performance Data

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

FREQ. (MHz)	TOTAL LOSS ¹			AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB) 1-2	VSWR		
	(dB)						S	(:1)	
	S-1	S-2	AVG.					1	2
30	6.08	1.37	3.72	4.71	0.78	24.52	1.13	1.11	1.10
35	5.25	1.71	3.48	3.55	0.80	23.95	1.14	1.12	1.11
40	4.63	2.04	3.33	2.59	0.81	23.61	1.16	1.12	1.13
45	4.14	2.35	3.25	1.80	0.80	23.44	1.16	1.13	1.13
50	3.77	2.63	3.20	1.14	0.81	23.42	1.17	1.13	1.14
51	3.71	2.68	3.20	1.03	0.77	23.42	1.17	1.13	1.14
52	3.65	2.73	3.19	0.92	0.78	23.44	1.16	1.13	1.14
53	3.59	2.78	3.19	0.81	0.79	23.45	1.16	1.13	1.14
54	3.54	2.83	3.19	0.71	0.78	23.47	1.16	1.13	1.14
55	3.49	2.88	3.18	0.62	0.77	23.49	1.16	1.13	1.14
56	3.44	2.92	3.18	0.52	0.77	23.53	1.16	1.13	1.14
57	3.40	2.97	3.18	0.43	0.77	23.55	1.16	1.13	1.14
58	3.36	3.01	3.18	0.35	0.74	23.58	1.16	1.13	1.14
59	3.32	3.05	3.18	0.27	0.76	23.62	1.16	1.13	1.14
60	3.28	3.09	3.18	0.19	0.72	23.66	1.16	1.13	1.14
61	3.24	3.13	3.19	0.12	0.71	23.69	1.16	1.13	1.14
62	3.21	3.16	3.18	0.05	0.71	23.75	1.15	1.13	1.14
63	3.18	3.19	3.19	0.01	0.71	23.78	1.15	1.13	1.14
64	3.15	3.23	3.19	0.08	0.72	23.84	1.15	1.13	1.13
65	3.13	3.25	3.19	0.13	0.69	23.88	1.15	1.12	1.13
66	3.10	3.28	3.19	0.18	0.65	23.93	1.15	1.13	1.13
67	3.08	3.31	3.20	0.23	0.67	23.98	1.14	1.13	1.13
68	3.06	3.33	3.20	0.27	0.65	24.04	1.14	1.13	1.13
69	3.05	3.36	3.20	0.31	0.61	24.10	1.14	1.13	1.13
70	3.03	3.38	3.20	0.35	0.60	24.16	1.14	1.13	1.13
72	3.01	3.41	3.21	0.41	0.57	24.27	1.13	1.13	1.13
74	2.99	3.44	3.22	0.45	0.53	24.40	1.13	1.13	1.12
76	2.98	3.46	3.22	0.48	0.49	24.53	1.12	1.13	1.12
78	2.98	3.47	3.23	0.49	0.44	24.65	1.12	1.13	1.12
80	2.99	3.47	3.23	0.48	0.41	24.78	1.11	1.13	1.12
82	3.01	3.47	3.24	0.46	0.32	24.93	1.11	1.14	1.12
84	3.03	3.45	3.24	0.42	0.26	25.07	1.10	1.14	1.12
86	3.07	3.43	3.25	0.36	0.18	25.21	1.10	1.14	1.11
88	3.11	3.40	3.26	0.29	0.09	25.36	1.09	1.15	1.11
90	3.17	3.36	3.26	0.19	0.02	25.52	1.09	1.15	1.12
92	3.24	3.31	3.27	0.07	0.12	25.67	1.09	1.16	1.12
94	3.31	3.25	3.28	0.07	0.26	25.85	1.08	1.16	1.12
96	3.41	3.18	3.29	0.23	0.41	26.03	1.08	1.17	1.12
98	3.52	3.10	3.31	0.42	0.56	26.22	1.07	1.17	1.12
100	3.65	3.01	3.33	0.64	0.75	26.44	1.07	1.18	1.13
105	4.08	2.76	3.42	1.32	1.33	27.10	1.06	1.20	1.14
110	4.69	2.45	3.57	2.24	2.20	27.97	1.06	1.23	1.16
115	5.60	2.10	3.85	3.50	3.52	29.14	1.08	1.26	1.18
120	6.98	1.74	4.36	5.24	5.70	30.24	1.11	1.31	1.21

¹Total Loss = Insertion Loss + 3dB Splitter Loss

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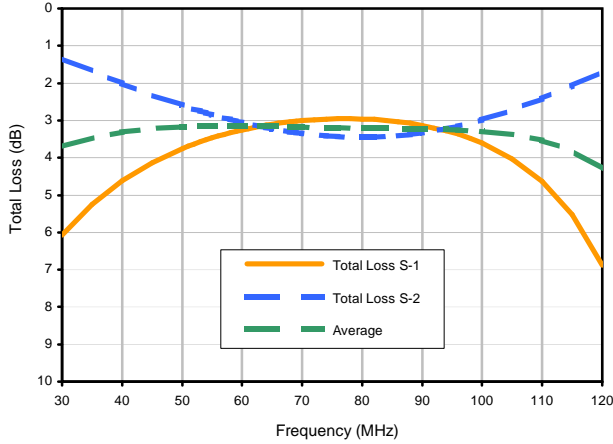


2 Way-90° Power Splitter/Combiner

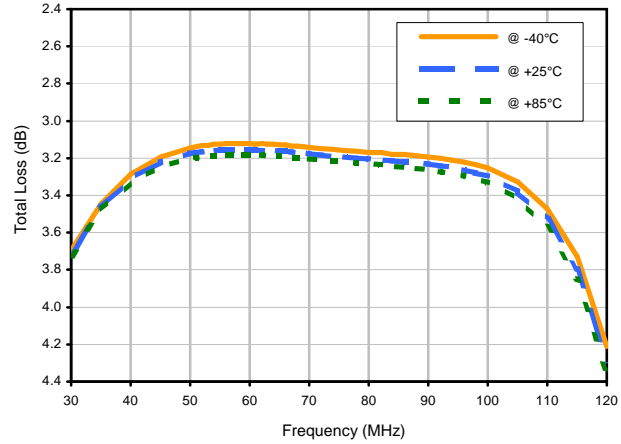
ADQ-90+

Typical Performance Curves

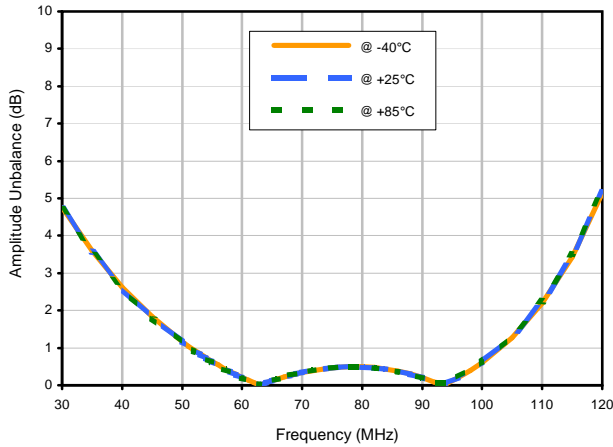
Total Loss



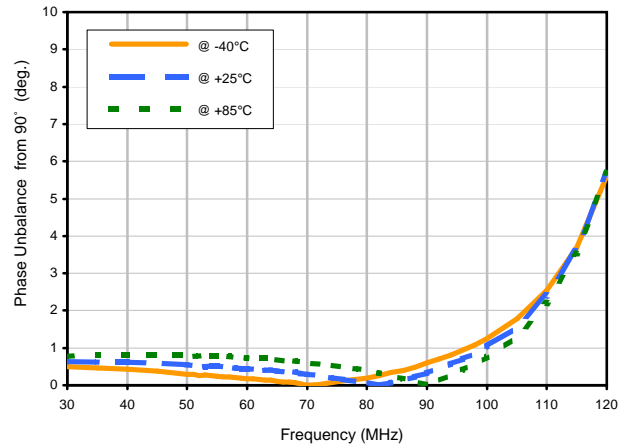
Average Total Loss vs. TEMPERATURE



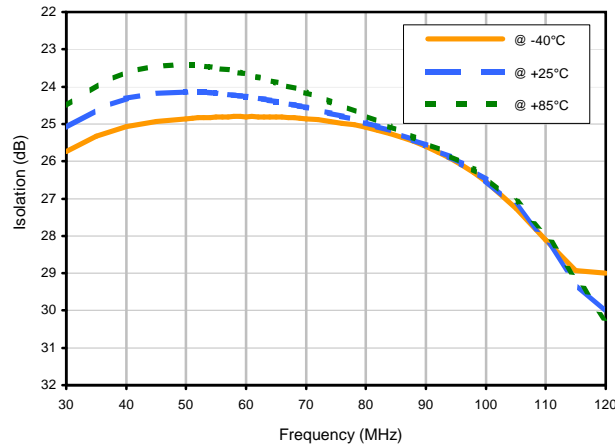
Amplitude Unbalance vs. TEMPERATURE



Phase Unbalance vs. TEMPERATURE



Isolation 1-2 vs. TEMPERATURE



REV. X2
ADQ-90+
100623
Page 1 of 2



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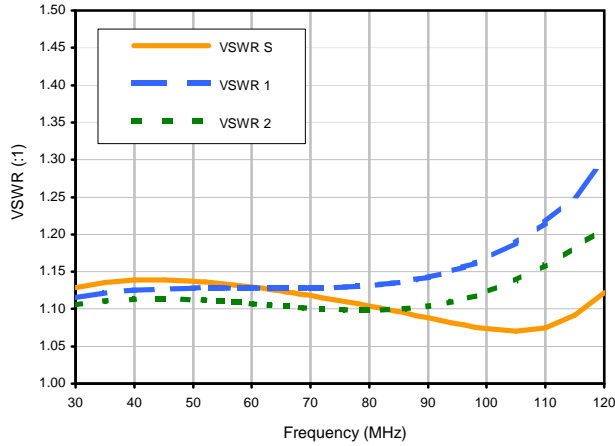


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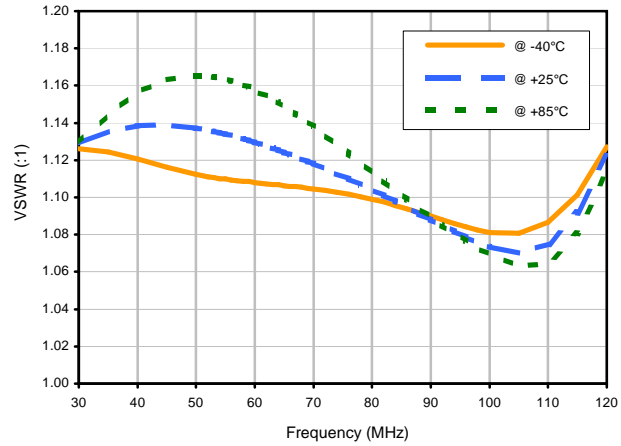


Typical Performance Curves

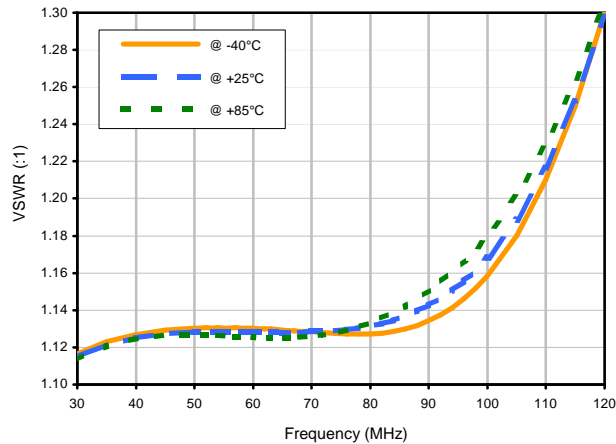
VSWR



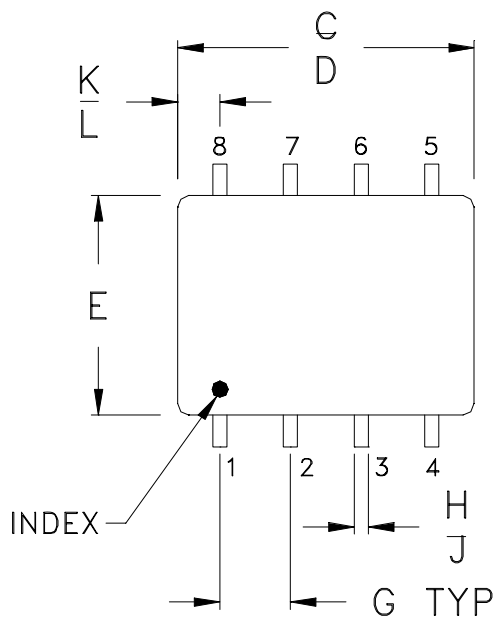
VSWR SUM vs. TEMPERATURE



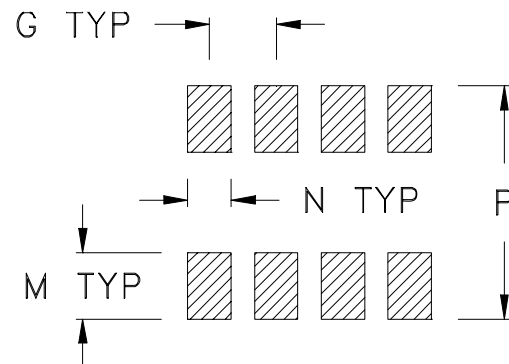
VSWR OUT1 vs. TEMPERATURE



Outline Dimensions



PCB Land Pattern



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

CASE #	A	B	C	D	E	F	G	H	J	K
CJ608	.397 (10.08)	.032 (.813)	.385 (9.78)	.435 (11.05)	.310 (7.87)	.175 (4.45)	.100 (2.54)	.015 (0.38)	.025 (0.64)	.035 (0.89)
CJ725						.215 (5.46)				

CASE #	L	M	N	P	WT. GRAM
CJ608	.075 (1.91)	.120 (3.05)	.060 (1.52)	.420 (10.67)	.40
CJ725					.45

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

Notes:

- Case material: Plastic.
- Termination finish:
Tin plate over Nickel plate.



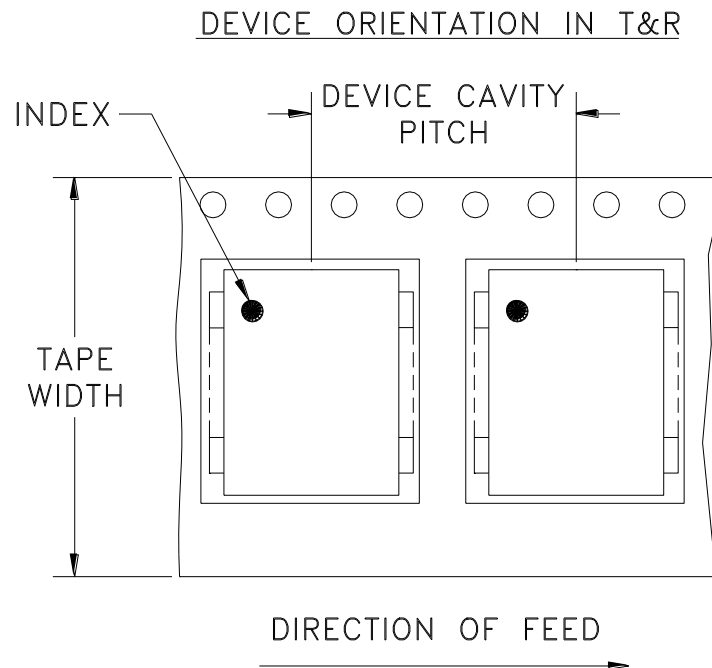
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Tape & Reel Packaging TR-F10



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
24	16	7	10,20,50,100,200
		13	500

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



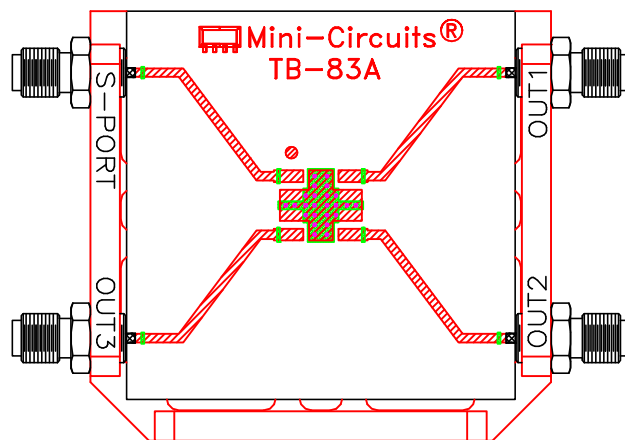
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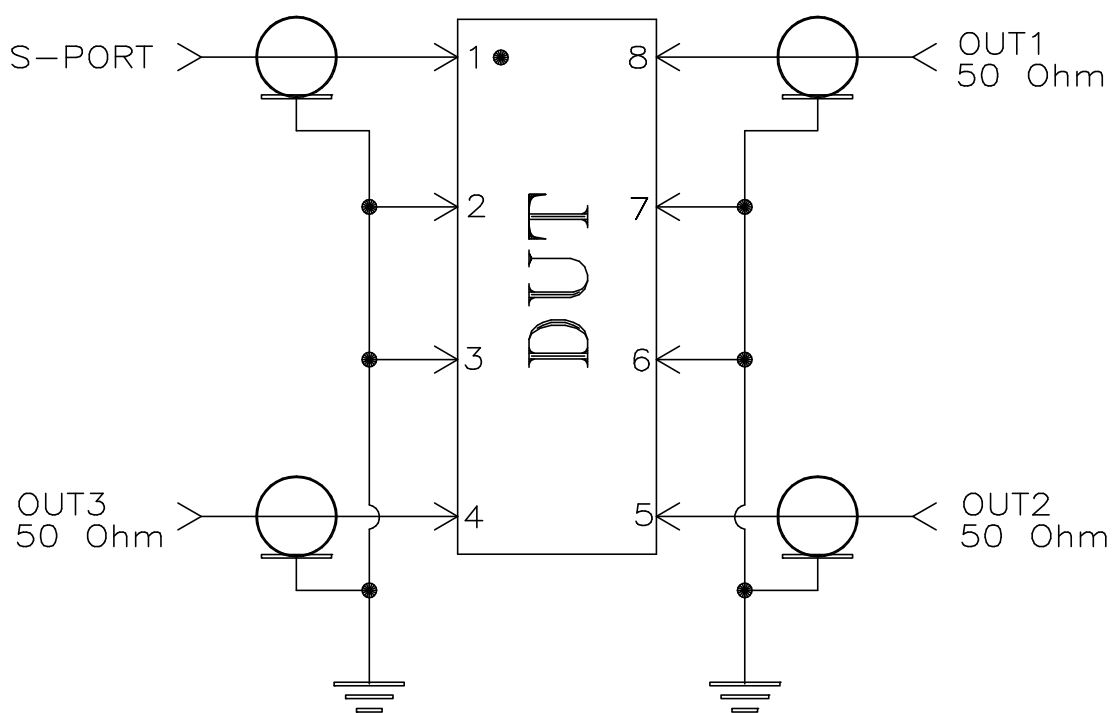
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Evaluation Board and Circuit




TB-83



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	-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