



Mini-Circuits®

SURFACE MOUNT

Power Splitter/Combiner

ADQ-90+

2 Way-90° 50Ω 55 to 90 MHz

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



Generic photo used for illustration purposes only

CASE STYLE: CJ725

+RoHS Compliant

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

APPLICATIONS

- VHF
- Image rejection
- IF signal processing

ELECTRICAL SPECIFICATIONS

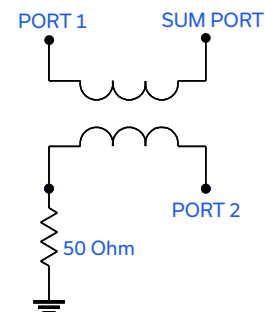
Parameter	Frequency (MHz)	Min.	Typ.	Max.	Unit
Frequency Range	—	55	—	90	MHz
Insertion Loss Avg. of Coupled Outputs above 3 dB	55-90	—	0.2	0.7	dB
Isolation	55-90	20	26	—	dB
Phase Unbalance	55-90	—	—	4	Degree
Amplitude Unbalance	55-90	—	—	1.2	dB

ABSOLUTE MAXIMUM RATINGS

Parameter	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.

ELECTRICAL SCHEMATIC

REV. F
ECO-019621
ADQ-32W+
MCL NY
231017



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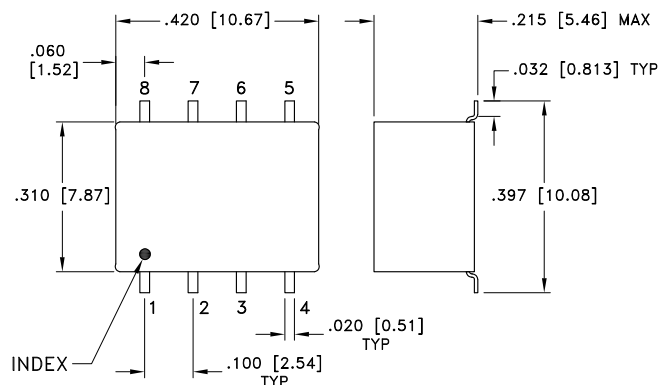
ADQ-90+

2 Way-90° 50Ω 55 to 90 MHz

PIN CONNECTIONS

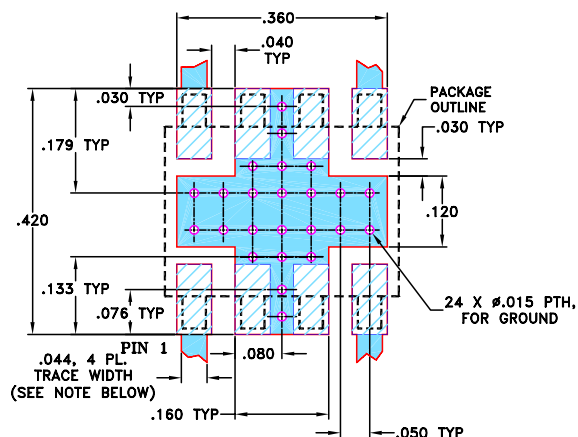
SUM PORT	1
PORT 1 (0°)	8
PORT 2 (+90°)	4
GROUND EXTERNAL	2,3,6,7
50 OHM TERM EXTERNAL	5

OUTLINE DRAWING



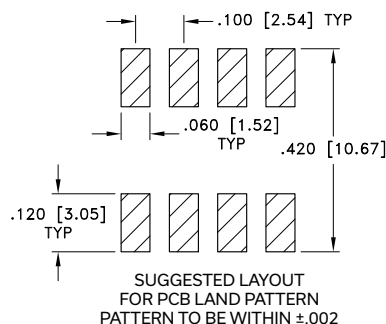
PRODUCT MARKING: N/A

DEMO BOARD MCL P/N: TB-83
SUGGESTED PCB LAYOUT (PL-063)



- 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



Weight: .40 gram
Dimensions are in inches [mm]. Tolerances: 2 Pl. $\pm .01$; 3Pl. $\pm .005$ Inch

- Notes:
- Case material: Plastic.
 - Termination Finish: Tin plate over Nickel plate.

TAPE & REEL INFORMATION: F10



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Power Splitter/Combiner

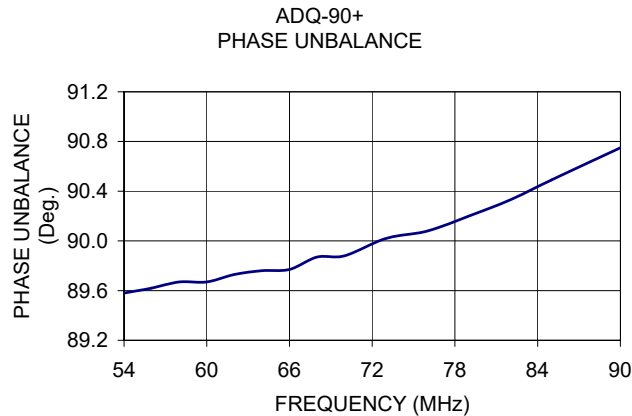
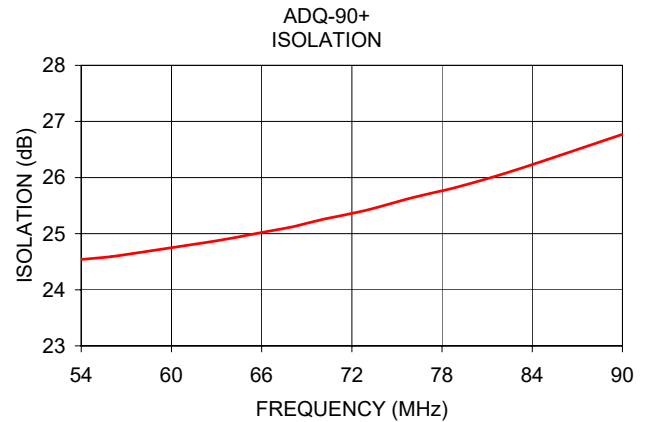
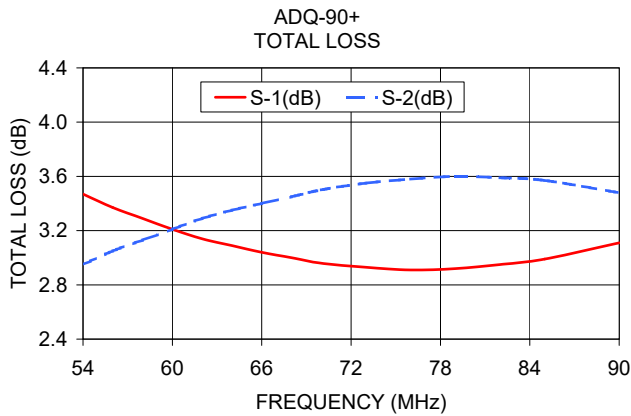
ADQ-90+

2 Way-90° 50Ω 55 to 90 MHz

TYPICAL PERFORMANCE DATA

Frequency (MHz)	Total Loss ¹ (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR (:1)		
	S-1	S-2				S	1	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.



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/terms/viewterm.html



2 Way-90° Power Splitter/Combiner

ADQ-90+

Typical Performance Data

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

FREQ. (MHz)	TOTAL LOSS ¹			AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB) 1-2	VSWR		
	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

REV. X2

ADQ-90+

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Page 1 of 3



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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			AMP. UNBAL. (dB)	PHASE UNBAL. From 90° (deg.)	ISOLATION (dB) 1-2	VSWR		
	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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Page 2 of 3



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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		
	S-1	S-2	AVG.				S	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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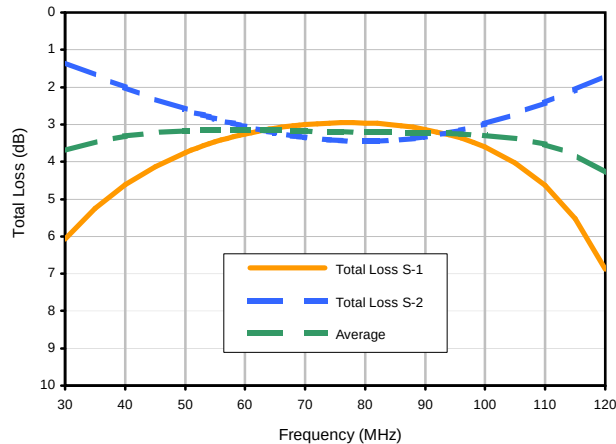
REV. X2
ADQ-90+
100623
Page 3 of 3

2 Way-90° Power Splitter/Combiner

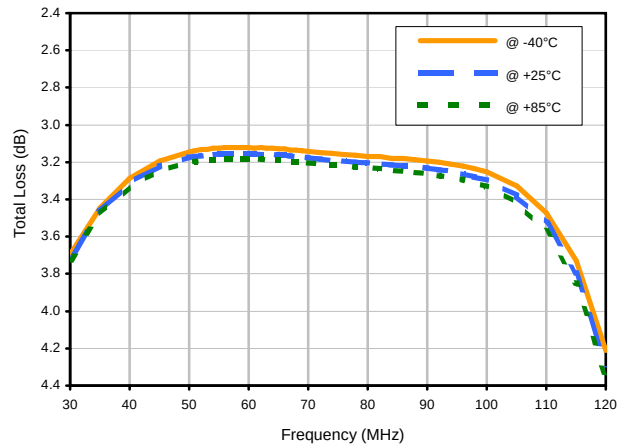
ADQ-90+

Typical Performance Curves

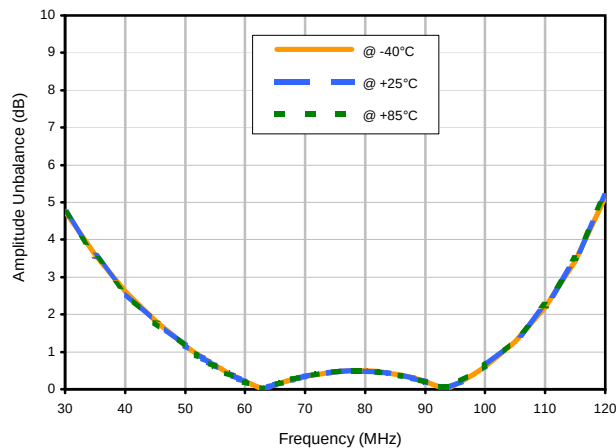
Total Loss



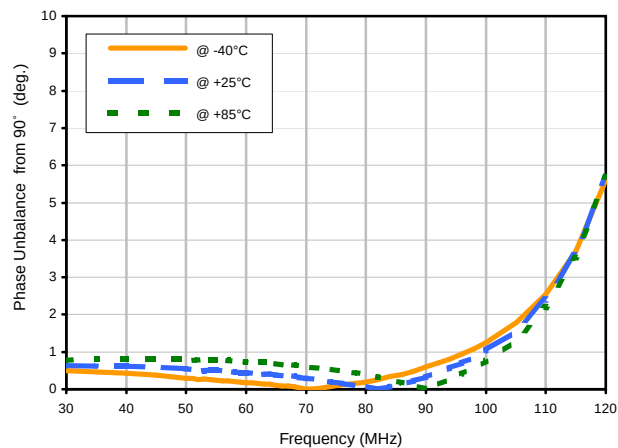
Average Total Loss vs. TEMPERATURE



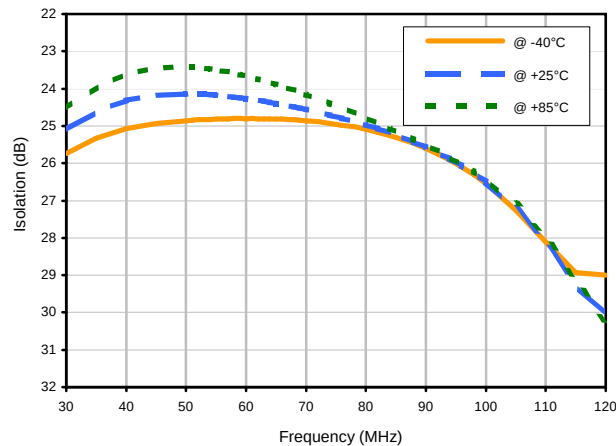
Amplitude Unbalance vs. TEMPERATURE



Phase Unbalance vs. TEMPERATURE



Isolation 1-2 vs. TEMPERATURE



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Page 1 of 2



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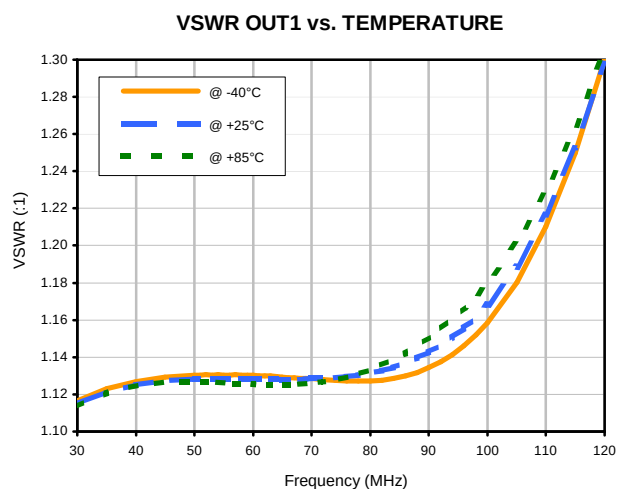
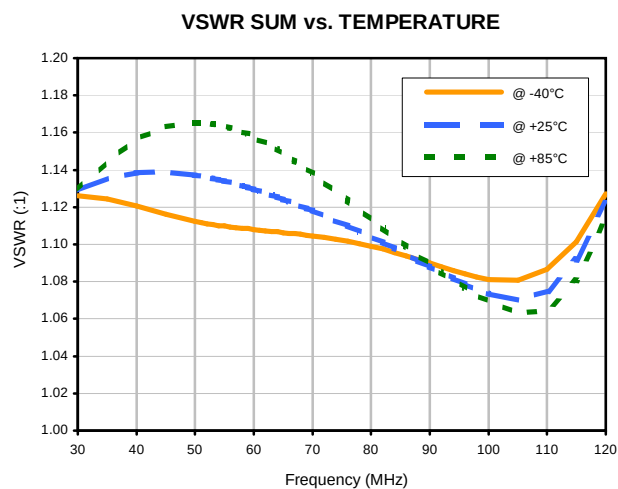
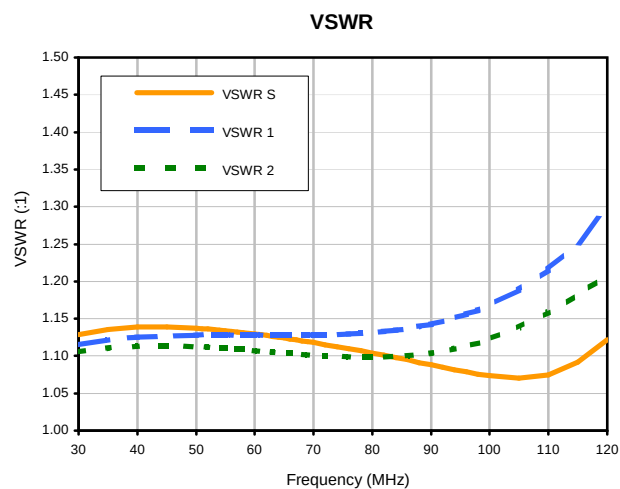
The Design Engineers Search Engine finds the model you need, Instantly • For detailed performance specs & shopping online see

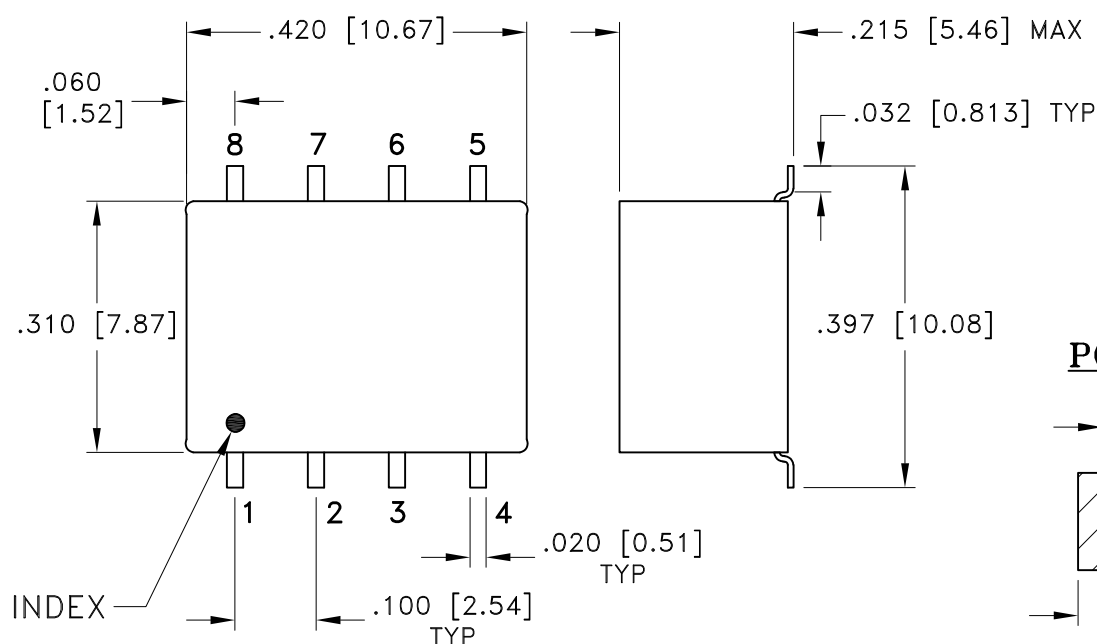


2 Way-90° Power Splitter/Combiner

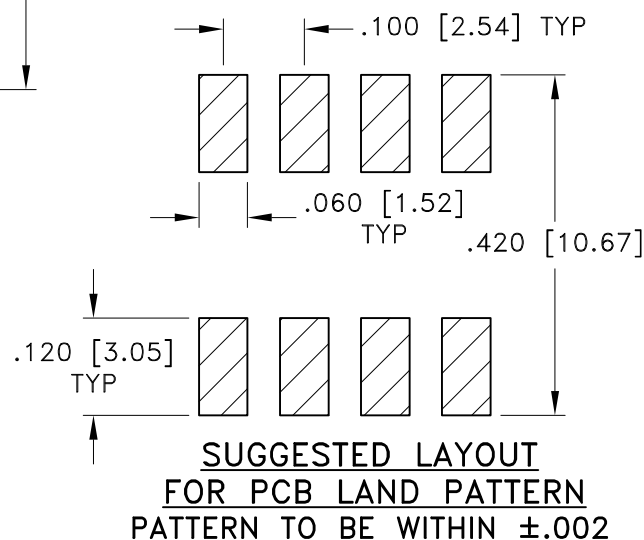
ADQ-90+

Typical Performance Curves





PCB Land Pattern



METALLIZATION

Weight: .40 gram

Dimensions are in inches [mm]. Tolerances: 2 Pl. ±.01; 3 Pl. ±.005 Inch

Notes:

1. Case material: Plastic.
2. Termination finish:
Tin plate over Nickel plate.



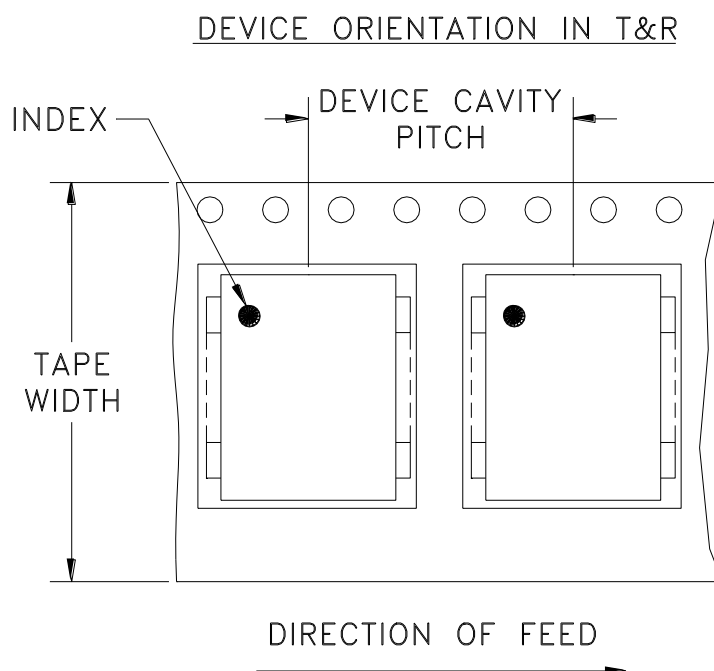
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RF/IF MICROWAVE COMPONENTS

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.

Go to: www.minicircuits.com/pages/pdfs/tape.pdf

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



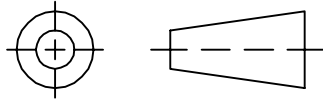
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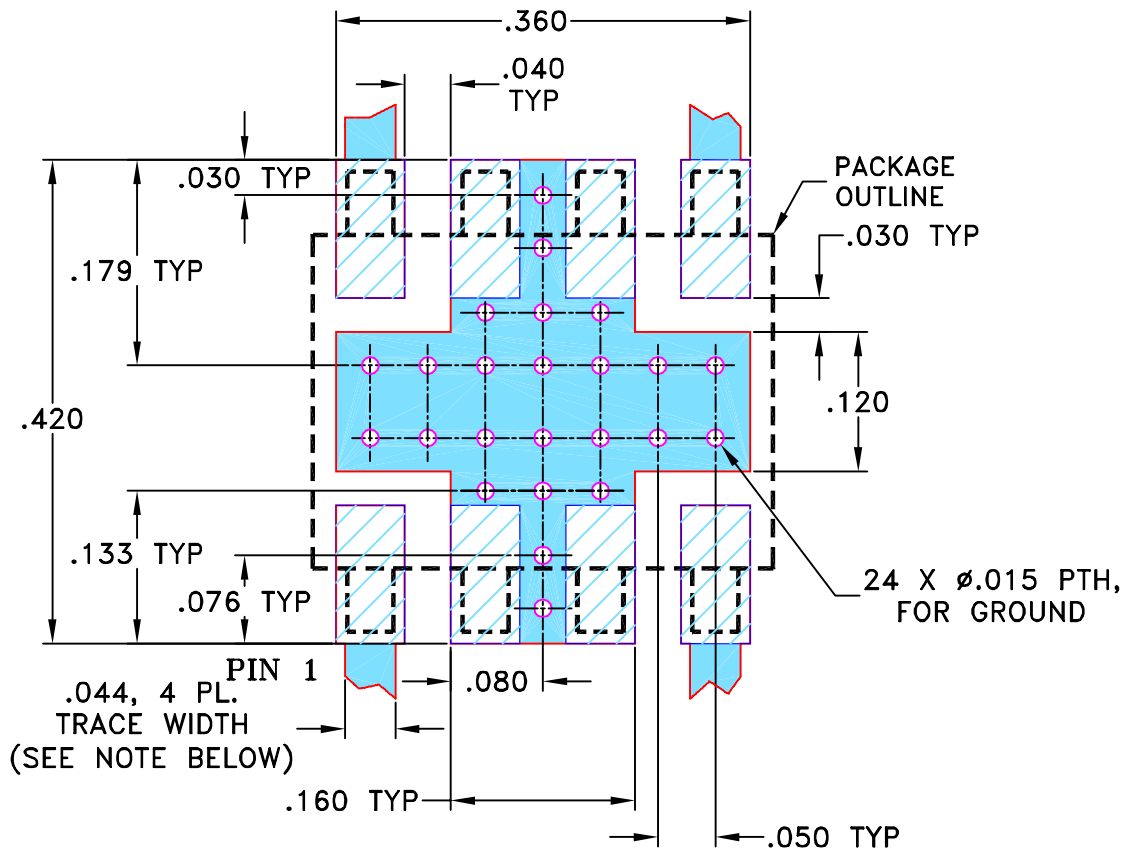
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M82272	NEW RELEASE	08/06/02	GF	DJ
A	M102713	UPDATED NOTES, ADDED "...WITH SMOBC"	01/16/06	GT	IL

SUGGESTED MOUNTING CONFIGURATION FOR CJ725 CASE STYLE, "ma", "nf" PIN CONNECTIONS



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B 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

GF

07/18/02

TOLERANCES ON:

CHECKED

HY

08/01/02

2 PL DECIMALS $\pm$

APPROVED

DJ

08/06/02

3 PL DECIMALS $\pm$.005ANGLES $\pm$ FRACTIONS $\pm$
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ASHEETA1.DWG REV:A DATE:01/12/95



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Brooklyn NY 11235

PL, ma/nf, CJ725, AD3PS/ADQ, TB-83

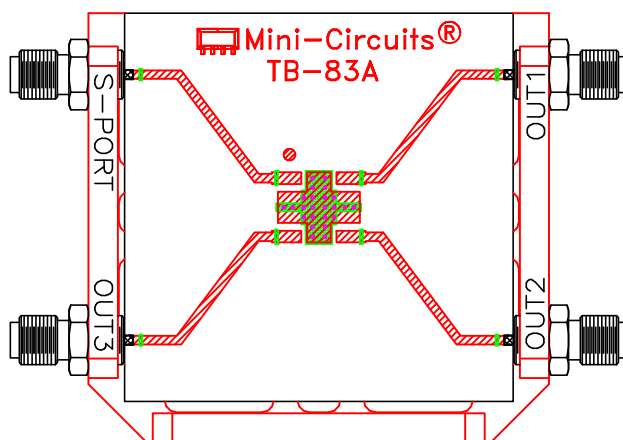
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A

FILE: 98PL063

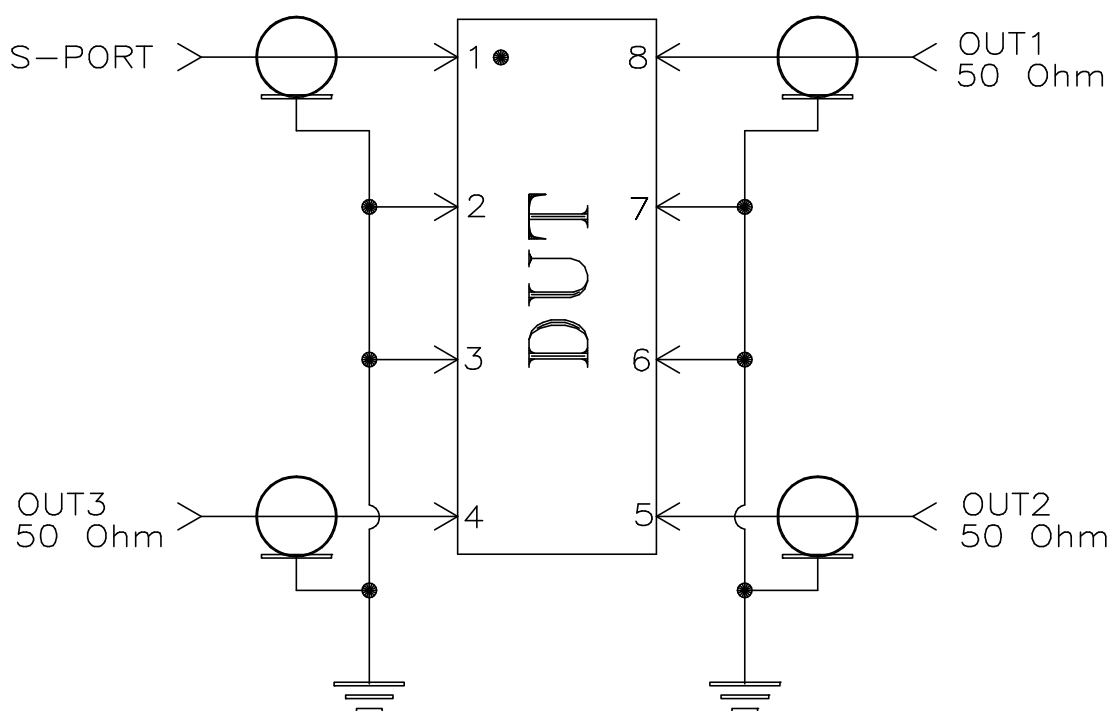
SCALE: 6:1

SHEET: 1 OF 1

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