



SURFACE MOUNT

Power Splitter/Combiner

ADQ-180+

Mini-Circuits

2 Way-90° 50Ω 120 to 180 MHz

FEATURES

- Excellent Amplitude Unbalance, 0.6 dB Typ. and Phase Unbalance, 0.7 Deg. Typ.
- Very Low Insertion Loss, 0.2 dB Typ.
- Small Size
- 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 TV

ELECTRICAL SPECIFICATIONS

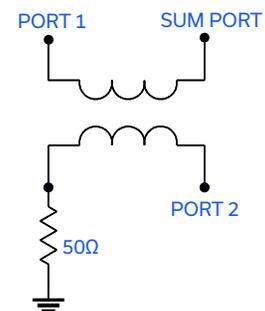
Parameter	Frequency (MHz)	Electrical Specifications			Unit
		Min.	Typ.	Max.	
Frequency Range		120		180	MHz
Insertion Loss Avg. of Coupled Outputs above 3 dB	120-180		0.2	0.7	dB
Isolation	120-180	20	35		dB
Phase Unbalance	120-180			6	Degree
Amplitude Unbalance	120-180			1.5	dB

ABSOLUTE MAXIMUM RATINGS

Parameter	Ratings
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C
Power Input (as a Splitter)	1 W Max.

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

ELECTRICAL SCHEMATIC



REV. E
ECO-019621
ADQ-180+
MCL NY
251031





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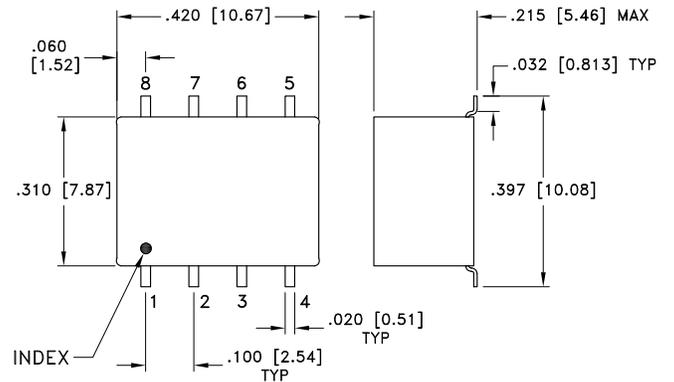
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PIN CONNECTIONS

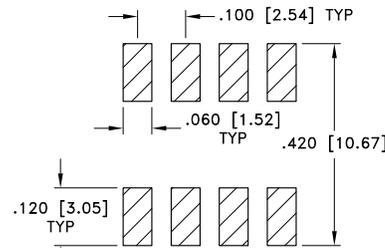
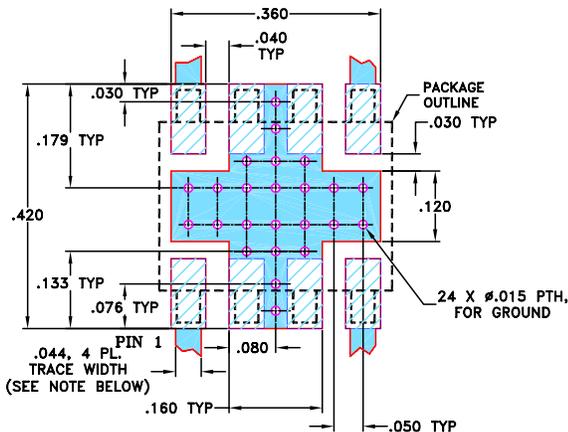
SUM PORT	1
PORT 1 (+90°)	8
PORT 2 (0°)	4
GROUND	2,3,6,7
50Ω TERM EXTERNAL	5

OUTLINE DRAWING



PRODUCT MARKING: ADQ-180+

DEMO BOARD MCL P/N: TB-ADQ-180+
SUGGESTED PCB LAYOUT (PL-063)



SUGGESTED LAYOUT FOR PCB LAND PATTERN
PATTERN TO BE WITHIN ±.002



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

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

- 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

TAPE & REEL INFORMATION: F10



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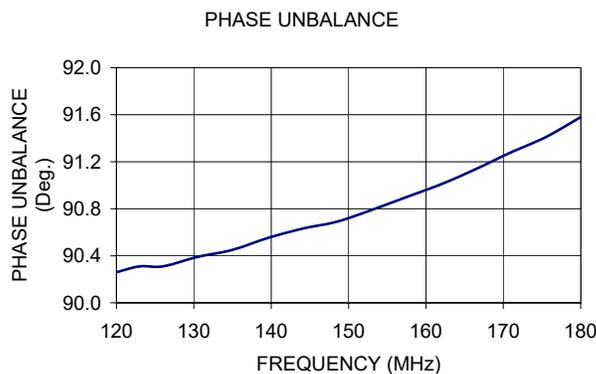
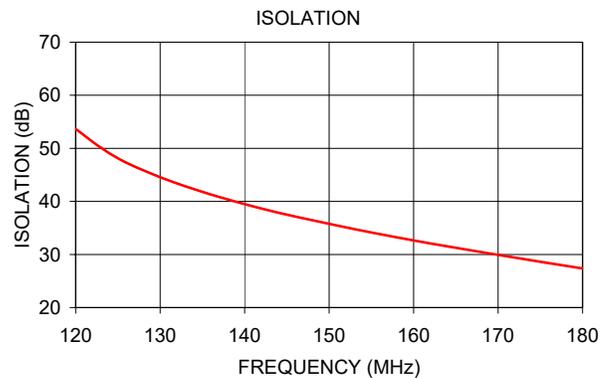
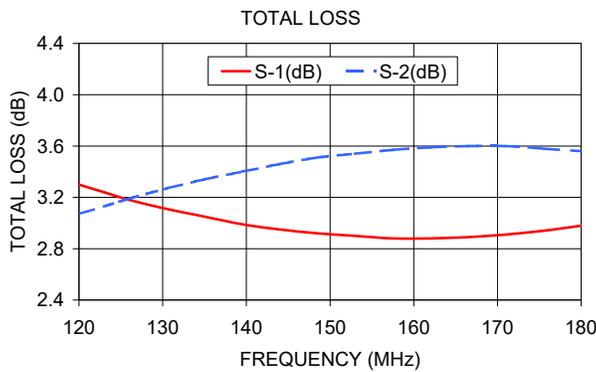
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2 Way-90° 50Ω 120 to 180 MHz

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
120.0	3.30	3.07	0.23	53.66	90.26	1.04	1.03	1.05
123.0	3.24	3.13	0.11	50.12	90.31	1.04	1.03	1.05
126.0	3.18	3.19	0.01	47.30	90.31	1.04	1.03	1.05
130.5	3.11	3.27	0.16	44.27	90.39	1.03	1.03	1.05
135.0	3.05	3.34	0.30	41.81	90.45	1.03	1.03	1.06
139.5	2.99	3.40	0.41	39.71	90.55	1.03	1.03	1.06
144.0	2.95	3.46	0.51	37.87	90.63	1.03	1.03	1.06
148.5	2.92	3.51	0.59	36.28	90.69	1.03	1.03	1.06
153.0	2.90	3.54	0.65	34.78	90.79	1.03	1.03	1.06
157.5	2.88	3.57	0.69	33.39	90.90	1.03	1.03	1.06
162.0	2.88	3.59	0.71	32.08	91.01	1.04	1.04	1.07
166.5	2.89	3.60	0.71	30.85	91.14	1.04	1.04	1.07
171.0	2.91	3.60	0.69	29.66	91.28	1.05	1.05	1.08
175.5	2.94	3.58	0.64	28.50	91.41	1.05	1.06	1.08
180.0	2.98	3.56	0.57	27.36	91.58	1.06	1.06	1.09

1. Total Loss = Insertion Loss + 3 dB 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-180+

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
60	6.36	1.29	3.82	5.07	0.41	40.55	1.02	1.03	1.03
65	5.89	1.45	3.67	4.45	0.39	39.98	1.02	1.03	1.03
70	5.49	1.61	3.55	3.88	0.38	39.50	1.02	1.03	1.03
75	5.13	1.77	3.45	3.36	0.34	39.15	1.02	1.02	1.03
80	4.81	1.93	3.37	2.88	0.32	38.79	1.02	1.02	1.03
85	4.53	2.08	3.31	2.45	0.30	38.48	1.02	1.02	1.03
90	4.29	2.23	3.26	2.05	0.28	38.26	1.02	1.02	1.03
95	4.07	2.38	3.22	1.69	0.23	38.08	1.02	1.02	1.03
100	3.87	2.52	3.20	1.35	0.22	37.88	1.02	1.02	1.02
105	3.70	2.66	3.18	1.04	0.19	37.65	1.02	1.02	1.02
110	3.55	2.79	3.17	0.76	0.15	37.46	1.02	1.02	1.02
115	3.42	2.91	3.16	0.51	0.14	37.34	1.02	1.02	1.02
120	3.30	3.02	3.16	0.28	0.11	37.20	1.02	1.02	1.02
125	3.20	3.12	3.16	0.08	0.07	37.10	1.02	1.02	1.02
130	3.11	3.22	3.16	0.11	0.04	37.10	1.02	1.02	1.02
135	3.03	3.31	3.17	0.27	0.00	37.15	1.02	1.02	1.02
140	2.97	3.39	3.18	0.42	0.04	37.21	1.02	1.02	1.02
145	2.92	3.45	3.18	0.53	0.09	37.24	1.02	1.02	1.02
150	2.87	3.51	3.19	0.64	0.13	37.15	1.02	1.02	1.01
155	2.84	3.56	3.20	0.71	0.16	37.04	1.02	1.03	1.01
160	2.82	3.59	3.21	0.77	0.18	36.84	1.02	1.03	1.01
165	2.81	3.62	3.21	0.81	0.26	36.64	1.02	1.03	1.01
170	2.81	3.63	3.22	0.82	0.28	36.31	1.02	1.03	1.01
175	2.82	3.64	3.23	0.82	0.32	35.92	1.03	1.04	1.02
180	2.84	3.63	3.23	0.79	0.37	35.44	1.03	1.04	1.02
185	2.87	3.61	3.24	0.73	0.45	34.76	1.03	1.05	1.02
190	2.92	3.57	3.24	0.65	0.52	33.96	1.04	1.05	1.02
195	2.98	3.52	3.25	0.54	0.59	33.04	1.04	1.06	1.03
200	3.05	3.45	3.25	0.40	0.68	32.00	1.05	1.07	1.03
205	3.15	3.38	3.26	0.23	0.75	30.85	1.06	1.08	1.04
210	3.26	3.29	3.27	0.03	0.91	29.67	1.07	1.09	1.05
215	3.40	3.19	3.29	0.21	1.04	28.45	1.08	1.11	1.06
220	3.57	3.07	3.32	0.50	1.19	27.19	1.10	1.12	1.07
225	3.77	2.94	3.35	0.83	1.38	25.92	1.11	1.14	1.09
230	4.01	2.80	3.40	1.21	1.62	24.62	1.13	1.17	1.11
235	4.30	2.64	3.47	1.65	1.94	23.32	1.16	1.19	1.13
240	4.65	2.48	3.56	2.17	2.34	22.00	1.19	1.22	1.16
245	5.08	2.31	3.69	2.77	2.91	20.69	1.22	1.26	1.19
250	5.62	2.14	3.88	3.48	3.67	19.39	1.26	1.31	1.23

¹Total Loss = Insertion Loss + 3dB Splitter Loss

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2 Way-90° Power Splitter/Combiner

ADQ-180+

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
60	6.43	1.22	3.82	5.21	0.01	36.96	1.05	1.04	1.07
65	5.96	1.38	3.67	4.58	0.07	36.45	1.06	1.04	1.07
70	5.54	1.54	3.54	4.01	0.10	36.04	1.06	1.04	1.07
75	5.18	1.69	3.44	3.49	0.13	35.76	1.06	1.04	1.07
80	4.86	1.85	3.35	3.01	0.15	35.53	1.06	1.04	1.07
85	4.57	2.00	3.29	2.57	0.22	35.40	1.06	1.04	1.06
90	4.32	2.15	3.23	2.18	0.26	35.34	1.06	1.04	1.06
95	4.10	2.29	3.19	1.81	0.31	35.40	1.05	1.04	1.05
100	3.90	2.43	3.16	1.47	0.34	35.49	1.05	1.04	1.05
105	3.72	2.56	3.14	1.16	0.40	35.63	1.04	1.04	1.04
110	3.56	2.69	3.13	0.87	0.45	35.88	1.04	1.04	1.04
115	3.43	2.81	3.12	0.62	0.48	36.25	1.03	1.04	1.03
120	3.30	2.92	3.11	0.39	0.54	36.68	1.03	1.04	1.03
125	3.20	3.02	3.11	0.18	0.59	37.16	1.02	1.04	1.03
130	3.11	3.12	3.11	0.01	0.66	37.75	1.02	1.04	1.03
135	3.03	3.20	3.12	0.17	0.70	38.45	1.02	1.04	1.03
140	2.96	3.28	3.12	0.32	0.77	39.21	1.02	1.04	1.03
145	2.90	3.35	3.12	0.44	0.84	40.03	1.02	1.04	1.03
150	2.86	3.41	3.13	0.55	0.87	40.71	1.03	1.04	1.03
155	2.83	3.45	3.14	0.62	0.90	41.46	1.03	1.04	1.03
160	2.80	3.49	3.15	0.69	0.96	42.01	1.03	1.04	1.03
165	2.78	3.52	3.15	0.73	1.04	42.56	1.04	1.05	1.03
170	2.78	3.53	3.15	0.75	1.09	42.74	1.04	1.05	1.03
175	2.79	3.54	3.16	0.75	1.13	42.63	1.04	1.05	1.03
180	2.81	3.53	3.17	0.72	1.20	42.12	1.04	1.05	1.03
185	2.84	3.51	3.17	0.67	1.27	40.91	1.05	1.05	1.03
190	2.88	3.47	3.18	0.59	1.36	39.32	1.05	1.05	1.03
195	2.93	3.43	3.18	0.49	1.43	37.55	1.05	1.06	1.02
200	3.00	3.36	3.18	0.36	1.52	35.65	1.05	1.06	1.03
205	3.08	3.28	3.18	0.20	1.60	33.76	1.05	1.07	1.03
210	3.19	3.20	3.19	0.00	1.76	31.93	1.06	1.08	1.04
215	3.33	3.09	3.21	0.23	1.85	30.18	1.07	1.09	1.06
220	3.49	2.98	3.23	0.51	2.01	28.48	1.08	1.10	1.08
225	3.68	2.85	3.26	0.83	2.20	26.87	1.10	1.12	1.10
230	3.91	2.71	3.31	1.20	2.42	25.28	1.12	1.14	1.12
235	4.18	2.55	3.37	1.63	2.72	23.74	1.15	1.17	1.14
240	4.52	2.39	3.46	2.14	3.09	22.24	1.18	1.20	1.17
245	4.94	2.22	3.58	2.72	3.60	20.78	1.21	1.24	1.21
250	5.45	2.05	3.75	3.40	4.29	19.36	1.26	1.29	1.24

¹Total Loss = Insertion Loss + 3dB Splitter Loss

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ADQ-180+

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	AVG.				S	1	2
60	6.41	1.28	3.85	5.13	0.66	39.93	1.01	1.03	1.02
65	5.94	1.44	3.69	4.50	0.64	39.90	1.02	1.03	1.02
70	5.54	1.60	3.57	3.93	0.65	39.95	1.02	1.03	1.02
75	5.18	1.77	3.47	3.41	0.67	40.19	1.02	1.03	1.02
80	4.86	1.92	3.39	2.94	0.68	40.37	1.02	1.03	1.02
85	4.58	2.08	3.33	2.50	0.69	40.55	1.01	1.03	1.02
90	4.33	2.23	3.28	2.11	0.66	40.75	1.01	1.03	1.02
95	4.11	2.37	3.24	1.74	0.67	40.88	1.01	1.03	1.02
100	3.92	2.51	3.21	1.40	0.67	40.93	1.01	1.03	1.02
105	3.74	2.65	3.20	1.09	0.66	40.83	1.02	1.03	1.02
110	3.59	2.78	3.19	0.82	0.65	40.73	1.02	1.02	1.02
115	3.46	2.90	3.18	0.56	0.68	40.61	1.02	1.02	1.02
120	3.34	3.01	3.18	0.33	0.66	40.46	1.03	1.02	1.02
125	3.24	3.12	3.18	0.13	0.66	40.20	1.03	1.02	1.03
130	3.15	3.21	3.18	0.06	0.66	39.95	1.03	1.02	1.02
135	3.07	3.30	3.19	0.22	0.64	39.74	1.03	1.02	1.02
140	3.01	3.38	3.19	0.36	0.62	39.49	1.03	1.02	1.02
145	2.96	3.44	3.20	0.48	0.59	39.18	1.03	1.02	1.02
150	2.92	3.50	3.21	0.58	0.58	38.75	1.03	1.02	1.01
155	2.89	3.55	3.22	0.66	0.59	38.36	1.03	1.03	1.01
160	2.87	3.59	3.23	0.72	0.58	37.91	1.03	1.03	1.01
165	2.85	3.61	3.23	0.76	0.54	37.45	1.03	1.03	1.02
170	2.85	3.62	3.24	0.77	0.51	36.90	1.03	1.04	1.02
175	2.87	3.62	3.24	0.76	0.52	36.29	1.03	1.04	1.03
180	2.89	3.62	3.25	0.72	0.46	35.56	1.03	1.05	1.03
185	2.93	3.60	3.26	0.67	0.41	34.66	1.04	1.06	1.04
190	2.97	3.56	3.27	0.59	0.35	33.65	1.04	1.07	1.05
195	3.04	3.51	3.27	0.48	0.29	32.57	1.05	1.07	1.05
200	3.11	3.45	3.28	0.34	0.22	31.40	1.06	1.09	1.06
205	3.21	3.37	3.29	0.17	0.14	30.20	1.07	1.10	1.06
210	3.33	3.29	3.31	0.04	0.00	29.00	1.08	1.11	1.07
215	3.47	3.19	3.33	0.28	0.08	27.79	1.10	1.13	1.08
220	3.64	3.07	3.36	0.57	0.25	26.57	1.11	1.15	1.09
225	3.85	2.95	3.40	0.90	0.42	25.38	1.13	1.17	1.10
230	4.10	2.81	3.45	1.29	0.69	24.15	1.15	1.19	1.11
235	4.40	2.65	3.52	1.74	1.02	22.91	1.18	1.22	1.13
240	4.76	2.49	3.62	2.27	1.44	21.65	1.20	1.25	1.15
245	5.20	2.32	3.76	2.88	2.04	20.38	1.23	1.29	1.18
250	5.76	2.16	3.96	3.60	2.90	19.12	1.27	1.33	1.21

¹Total Loss = Insertion Loss + 3dB Splitter Loss

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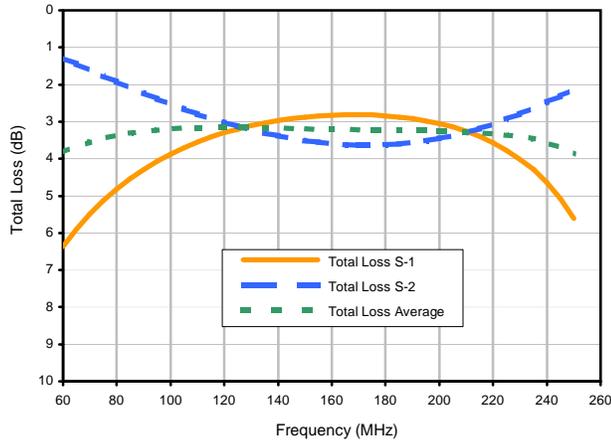


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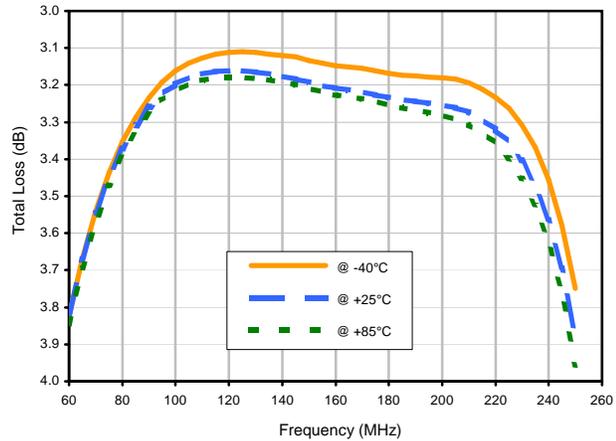


Typical Performance Curves

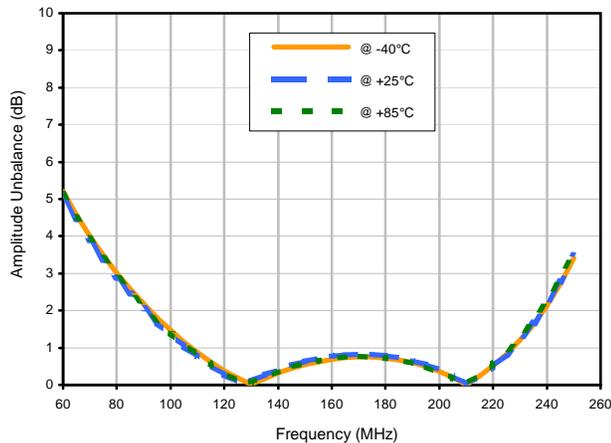
Total Loss



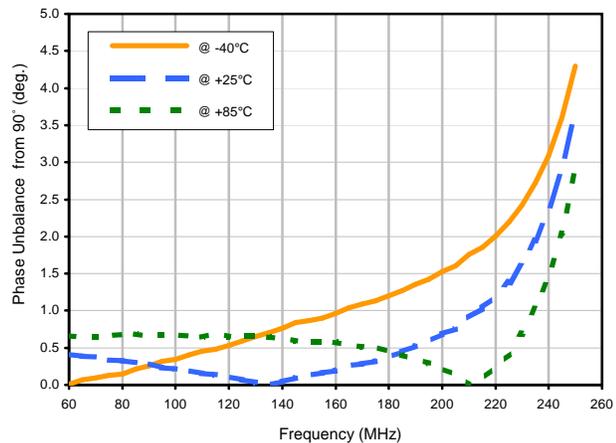
Average Total Loss vs. TEMPERATURE



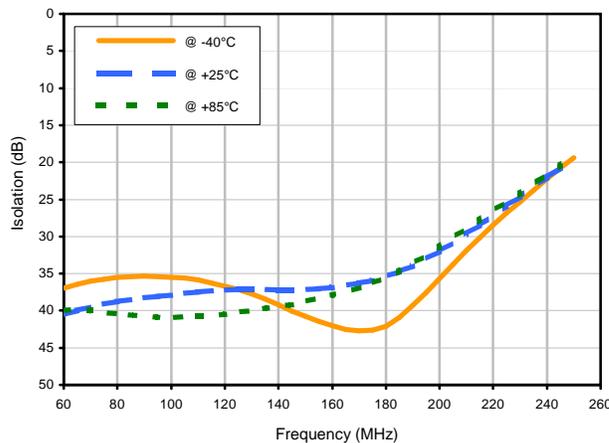
Amplitude Unbalance vs. TEMPERATURE



Phase Unbalance vs. TEMPERATURE

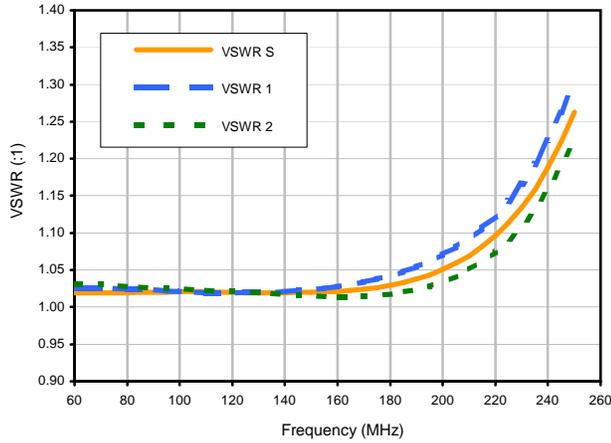


Isolation 1-2 vs. TEMPERATURE

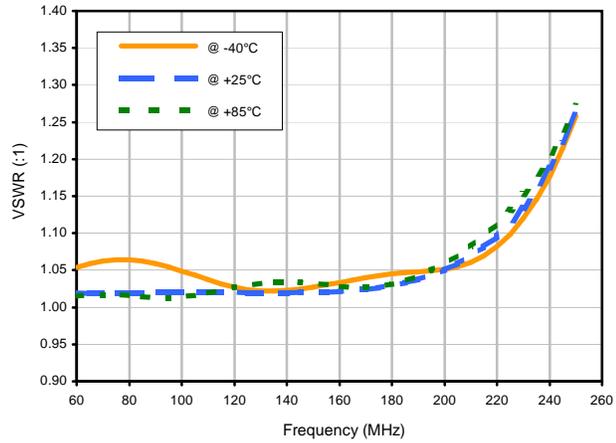


Typical Performance Curves

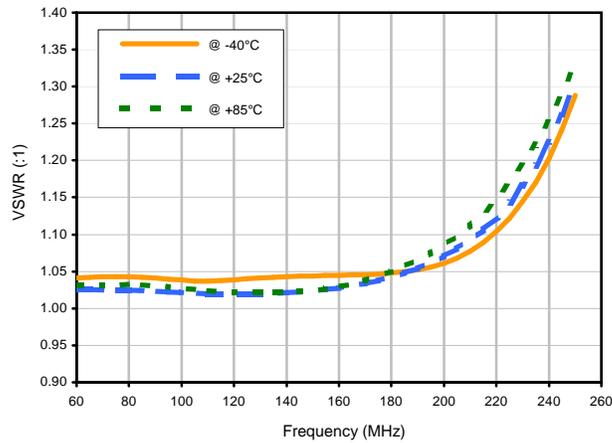
VSWR



VSWR SUM vs. TEMPERATURE



VSWR OUT1 vs. TEMPERATURE

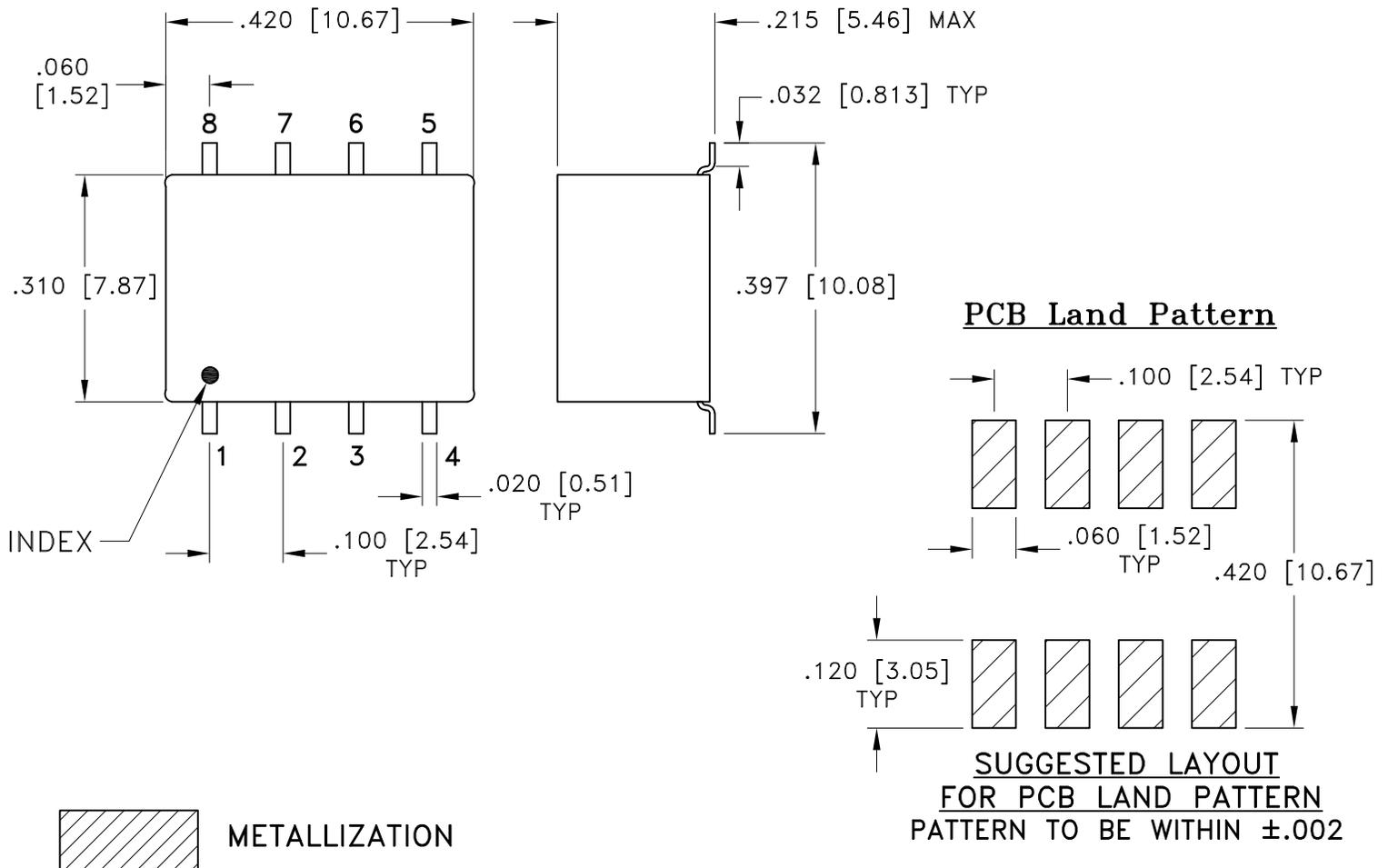


Case Style

CJ

Outline Dimensions

CJ725



Weight: .40 gram

Dimensions are in inches [mm]. Tolerances: 2 Pl. ± 0.01 ; 3 Pl. ± 0.005 Inch

Notes:

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

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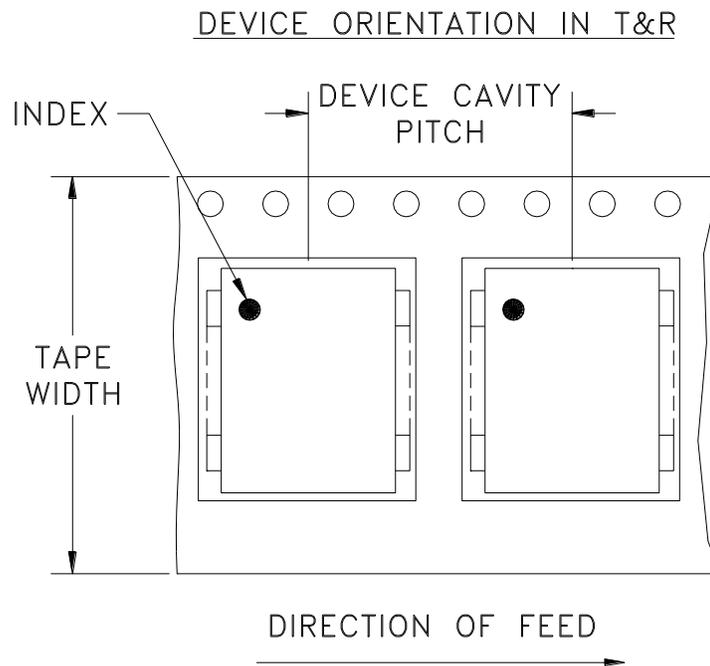
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Tape & Reel Packaging TR-F10



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

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.



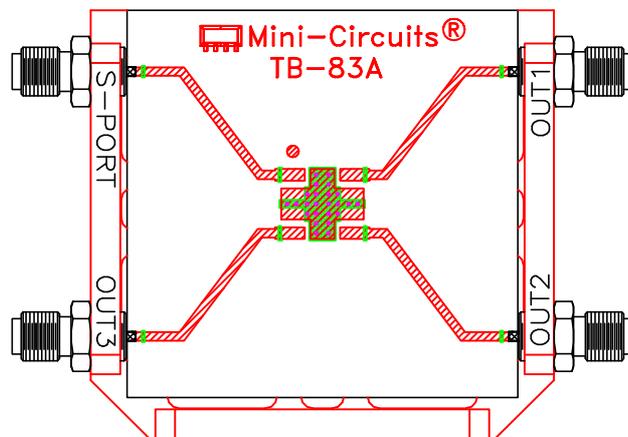
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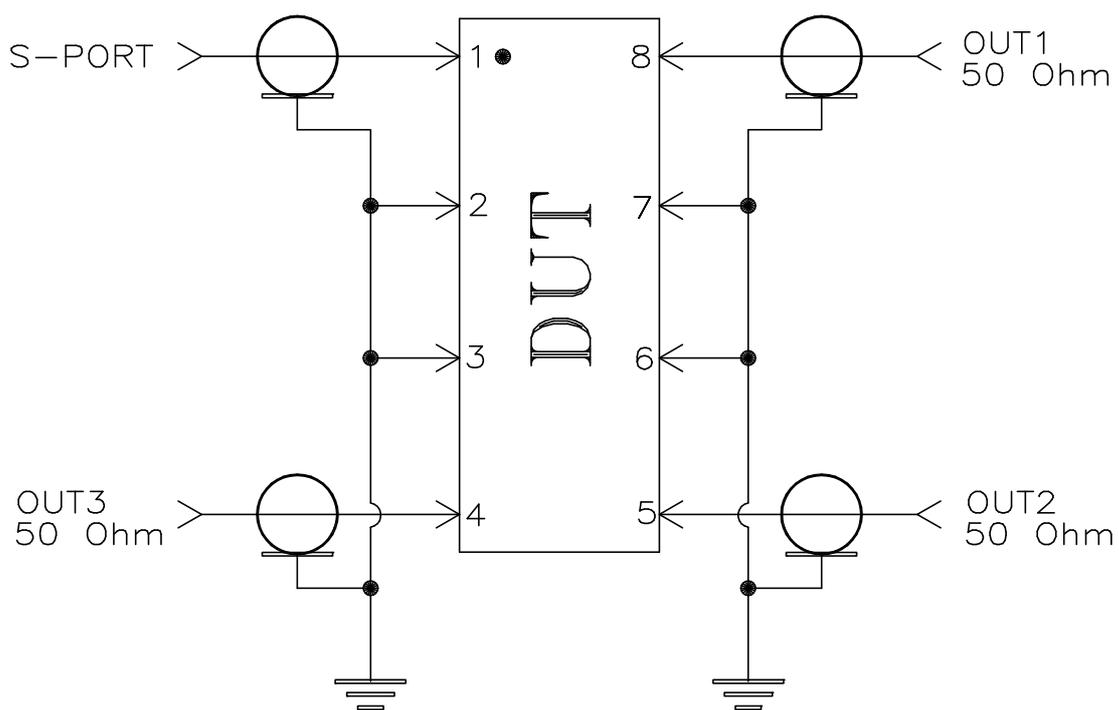
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Evaluation Board and Circuit



TB-83



Schematic Diagram

Notes:

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

 **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