

# Power Splitter/Combiner

## ADP-2-9+

2 Way-0° 50Ω 200 to 900 MHz

### Maximum Ratings

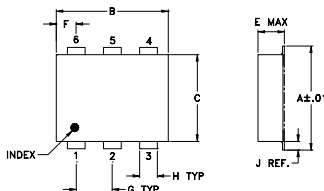
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
Power Input (as a splitter)	0.5W max.
Internal Dissipation	0.125W max.

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

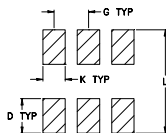
### Pin Connections

SUM PORT	1
PORT 1	3
PORT 2	4
GROUND	6
Externally connect together & isolate	2,5

### Outline Drawing



### PCB Land Pattern

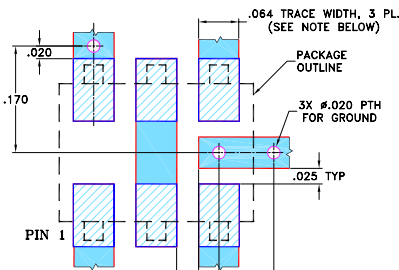


Suggested Layout, Tolerance to be within ±.002

### Outline Dimensions (inch/mm)

A	B	C	D	E	F	G		
.272	.310	.220	.100	.162	.055	.100		
6.91	7.87	5.59	2.54	4.11	1.40	2.54		
H	J	K	L				wt	
.030	.026	.065	.300				grams	
0.76	0.66	1.65	7.62				0.25	

### Demo Board MCL P/N: TB-208 Suggested PCB Layout (PL-116)



NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .030" ± .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

### 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.  
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### Features

- low insertion loss, 0.4 dB typ.
- excellent amplitude unbalance, 0.05 dB typ.
- very good phase unbalance, 0.3 deg. typ.
- aqueous washable
- protected under U.S. Patent 6,133,525

### Applications

- VHF/UHF receivers/transmitters
- cellular



Generic photo used for illustration purposes only

CASE STYLE: CD636

+RoHS Compliant

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

Available Tape and Reel at no extra cost

Reel Size	Devices/Reel
7"	20, 50, 100, 200
13"	500, 1000

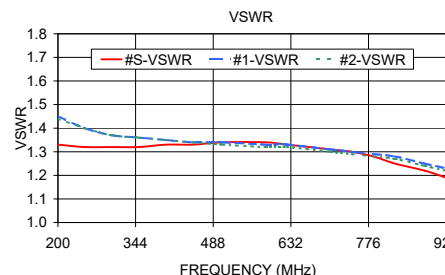
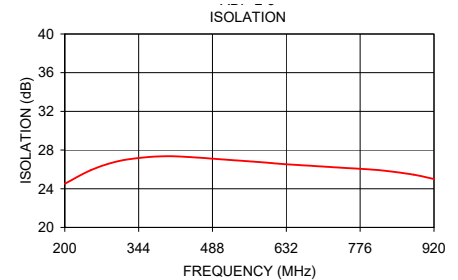
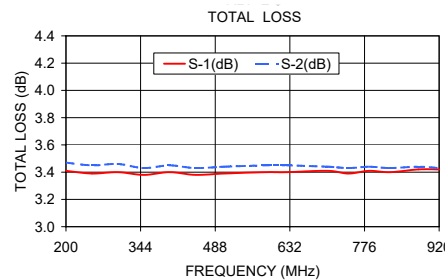
### Electrical Specifications

FREQ. RANGE (MHz)	ISOLATION (dB)		INSERTION LOSS (dB) ABOVE 3.0 dB		PHASE UNBALANCE (Degrees)	AMPLITUDE UNBALANCE (dB)
	Typ.	Min.	Typ.	Max.	Max.	Max.
$f_L - f_U$						
200-900	27	20	0.4	0.8	2.0	0.3

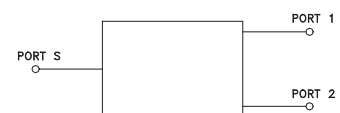
### Typical Performance Data

Frequency (MHz)	Total Loss <sup>1</sup> (dB)		Amplitude Unbalance (dB)	Isolation (dB)	Phase Unbalance (deg.)	VSWR S	VSWR 1	VSWR 2
	S-1	S-2						
200.00	3.41	3.47	0.06	24.51	0.17	1.33	1.45	1.44
250.00	3.39	3.45	0.06	25.90	0.15	1.32	1.40	1.40
300.00	3.40	3.46	0.06	26.80	0.16	1.32	1.37	1.37
350.00	3.38	3.43	0.06	27.21	0.17	1.32	1.36	1.36
400.00	3.40	3.45	0.06	27.36	0.16	1.33	1.35	1.35
450.00	3.38	3.43	0.05	27.25	0.17	1.33	1.34	1.34
505.00	3.39	3.44	0.05	27.04	0.18	1.34	1.34	1.33
585.00	3.40	3.45	0.05	26.73	0.23	1.34	1.33	1.32
625.00	3.40	3.45	0.05	26.56	0.20	1.33	1.33	1.32
705.00	3.41	3.44	0.03	26.29	0.24	1.31	1.31	1.30
745.00	3.39	3.43	0.04	26.15	0.23	1.30	1.30	1.29
785.00	3.41	3.44	0.03	26.03	0.23	1.28	1.29	1.28
825.00	3.40	3.43	0.03	25.85	0.26	1.25	1.28	1.27
880.00	3.42	3.44	0.02	25.46	0.22	1.22	1.25	1.24
920.00	3.42	3.43	0.01	25.01	0.21	1.19	1.23	1.22

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



### electrical schematic



# 2 Way-0° Power Splitter/Combiner

# ADP-2-9+

## Typical Performance Data

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

FREQ. (MHz)	TOTAL LOSS <sup>1</sup> (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. (deg.)	ISOLATION (dB)	VSWR (:1)		
	S-1	S-2				S	1	2
50	3.76	3.86	0.10	0.15	16.36	1.90	2.52	2.56
100	3.48	3.56	0.08	0.03	20.63	1.45	1.72	1.74
150	3.43	3.51	0.08	0.07	23.40	1.35	1.50	1.52
200	3.41	3.48	0.07	0.13	25.36	1.31	1.40	1.42
225	3.40	3.48	0.08	0.15	26.23	1.30	1.38	1.40
250	3.40	3.47	0.07	0.20	26.96	1.29	1.35	1.37
275	3.40	3.47	0.07	0.20	27.55	1.29	1.34	1.36
300	3.39	3.47	0.08	0.24	28.05	1.29	1.32	1.35
325	3.40	3.47	0.07	0.26	28.58	1.29	1.31	1.33
350	3.39	3.47	0.08	0.28	29.01	1.29	1.30	1.33
375	3.39	3.46	0.07	0.29	29.40	1.29	1.30	1.32
400	3.39	3.46	0.07	0.31	29.68	1.29	1.29	1.31
425	3.40	3.46	0.06	0.31	29.91	1.29	1.29	1.31
450	3.40	3.46	0.06	0.33	30.03	1.29	1.28	1.31
475	3.40	3.46	0.06	0.33	30.21	1.29	1.28	1.30
500	3.41	3.46	0.05	0.34	30.32	1.29	1.27	1.30
525	3.41	3.46	0.05	0.36	30.51	1.29	1.27	1.29
550	3.41	3.46	0.05	0.36	30.60	1.29	1.27	1.29
575	3.42	3.46	0.04	0.38	30.78	1.28	1.26	1.29
600	3.42	3.46	0.04	0.36	30.95	1.28	1.26	1.29
625	3.43	3.46	0.03	0.36	31.24	1.28	1.26	1.28
650	3.43	3.46	0.03	0.39	31.56	1.27	1.25	1.28
675	3.44	3.46	0.02	0.40	31.93	1.27	1.25	1.28
700	3.44	3.46	0.02	0.36	32.32	1.26	1.25	1.27
725	3.45	3.46	0.01	0.40	32.85	1.25	1.24	1.27
750	3.45	3.46	0.01	0.39	33.56	1.24	1.24	1.26
775	3.46	3.45	0.01	0.39	34.51	1.23	1.23	1.26
800	3.46	3.46	0.01	0.38	35.70	1.22	1.22	1.25
825	3.47	3.46	0.01	0.36	37.14	1.21	1.22	1.24
850	3.48	3.46	0.02	0.35	38.88	1.19	1.21	1.24
875	3.49	3.46	0.03	0.34	40.70	1.17	1.20	1.23
900	3.50	3.45	0.05	0.32	41.21	1.15	1.20	1.22
1000	3.55	3.46	0.09	0.25	31.44	1.05	1.16	1.18
1100	3.66	3.51	0.15	0.08	23.94	1.11	1.14	1.14
1200	3.92	3.69	0.23	0.10	18.51	1.40	1.20	1.17
1300	4.54	4.19	0.35	0.45	14.15	1.98	1.38	1.34
1400	5.92	5.39	0.54	0.88	10.76	3.23	1.72	1.65

<sup>1</sup>Total Loss = Insertion Loss + 3dB Splitter Loss

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# 2 Way-0° Power Splitter/Combiner

# ADP-2-9+

## Typical Performance Data

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

FREQ. (MHz)	TOTAL LOSS <sup>1</sup> (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. (deg.)	ISOLATION (dB)	VSWR (:1)		
	S-1	S-2				S	1	2
50	3.77	3.87	0.10	0.16	16.24	1.89	2.53	2.57
100	3.51	3.59	0.08	0.05	20.71	1.49	1.76	1.78
150	3.44	3.51	0.07	0.08	23.17	1.38	1.54	1.56
200	3.39	3.47	0.08	0.15	25.20	1.32	1.42	1.44
225	3.39	3.47	0.08	0.16	26.32	1.32	1.40	1.42
250	3.38	3.46	0.08	0.22	27.19	1.33	1.38	1.41
275	3.39	3.46	0.07	0.22	27.60	1.33	1.37	1.40
300	3.38	3.45	0.07	0.24	27.82	1.33	1.36	1.38
325	3.38	3.45	0.07	0.27	28.17	1.32	1.35	1.37
350	3.37	3.44	0.07	0.31	28.53	1.32	1.33	1.35
375	3.37	3.44	0.07	0.32	28.86	1.32	1.32	1.35
400	3.37	3.44	0.07	0.34	29.02	1.32	1.32	1.35
425	3.37	3.44	0.07	0.34	29.10	1.32	1.31	1.34
450	3.37	3.44	0.07	0.31	29.14	1.32	1.31	1.34
475	3.37	3.43	0.06	0.32	29.29	1.32	1.30	1.33
500	3.37	3.43	0.06	0.32	29.38	1.32	1.30	1.32
525	3.37	3.42	0.05	0.35	29.50	1.31	1.30	1.32
550	3.37	3.42	0.05	0.36	29.55	1.31	1.29	1.31
575	3.37	3.42	0.05	0.37	29.74	1.30	1.28	1.31
600	3.37	3.42	0.05	0.36	30.07	1.29	1.28	1.30
625	3.37	3.41	0.04	0.35	30.49	1.28	1.27	1.29
650	3.37	3.41	0.04	0.37	30.85	1.28	1.27	1.29
675	3.38	3.41	0.03	0.41	31.09	1.28	1.27	1.28
700	3.38	3.40	0.02	0.36	31.40	1.27	1.26	1.28
725	3.39	3.40	0.01	0.41	31.88	1.26	1.25	1.28
750	3.38	3.39	0.01	0.40	32.64	1.25	1.24	1.27
775	3.39	3.39	0.00	0.39	33.63	1.23	1.23	1.26
800	3.39	3.39	0.00	0.40	34.82	1.22	1.23	1.25
825	3.39	3.39	0.00	0.37	36.09	1.21	1.22	1.25
850	3.40	3.38	0.02	0.37	37.39	1.20	1.22	1.24
875	3.41	3.38	0.03	0.36	38.75	1.18	1.22	1.24
900	3.42	3.38	0.04	0.33	39.43	1.16	1.21	1.23
1000	3.46	3.38	0.08	0.24	31.56	1.06	1.17	1.19
1100	3.56	3.42	0.14	0.07	23.98	1.11	1.15	1.15
1200	3.81	3.60	0.22	0.10	18.53	1.41	1.21	1.18
1300	4.40	4.06	0.34	0.42	14.17	1.99	1.39	1.34
1400	5.72	5.21	0.51	0.86	10.76	3.25	1.73	1.66

<sup>1</sup>Total Loss = Insertion Loss + 3dB Splitter Loss

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# 2 Way-0° Power Splitter/Combiner

# ADP-2-9+

## Typical Performance Data

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

FREQ. (MHz)	TOTAL LOSS <sup>1</sup> (dB)		AMP. UNBAL. (dB)	PHASE UNBAL. (deg.)	ISOLATION (dB)	VSWR (:1)		
	S-1	S-2				S	1	2
50	3.76	3.85	0.09	0.15	16.53	1.92	2.53	2.56
100	3.46	3.54	0.08	0.02	20.48	1.42	1.69	1.71
150	3.42	3.49	0.07	0.08	23.47	1.31	1.47	1.49
200	3.41	3.48	0.07	0.14	25.49	1.30	1.39	1.41
225	3.41	3.48	0.07	0.18	26.09	1.29	1.37	1.38
250	3.39	3.46	0.07	0.26	26.63	1.27	1.33	1.35
275	3.39	3.46	0.07	0.23	27.23	1.26	1.31	1.33
300	3.38	3.45	0.07	0.29	27.95	1.25	1.29	1.31
325	3.39	3.46	0.07	0.31	28.73	1.25	1.28	1.30
350	3.39	3.45	0.06	0.33	29.37	1.26	1.27	1.29
375	3.39	3.45	0.06	0.32	29.83	1.26	1.27	1.29
400	3.39	3.46	0.07	0.39	30.23	1.26	1.27	1.29
425	3.40	3.46	0.06	0.38	30.61	1.26	1.26	1.28
450	3.40	3.45	0.05	0.39	30.91	1.26	1.25	1.28
475	3.40	3.46	0.06	0.40	31.24	1.26	1.25	1.27
500	3.41	3.46	0.05	0.41	31.47	1.26	1.25	1.27
525	3.41	3.46	0.05	0.42	31.78	1.26	1.25	1.27
550	3.42	3.46	0.04	0.46	31.94	1.26	1.24	1.27
575	3.43	3.47	0.04	0.46	32.13	1.26	1.24	1.27
600	3.44	3.47	0.03	0.46	32.25	1.26	1.24	1.27
625	3.45	3.48	0.03	0.47	32.46	1.26	1.24	1.27
650	3.45	3.48	0.03	0.49	32.69	1.26	1.24	1.27
675	3.46	3.48	0.02	0.49	33.07	1.26	1.24	1.26
700	3.46	3.48	0.02	0.46	33.61	1.25	1.23	1.26
725	3.47	3.48	0.01	0.49	34.27	1.24	1.23	1.26
750	3.48	3.48	0.00	0.50	34.99	1.24	1.23	1.25
775	3.49	3.49	0.00	0.48	35.83	1.23	1.23	1.25
800	3.50	3.49	0.01	0.49	37.00	1.23	1.22	1.25
825	3.51	3.49	0.02	0.49	38.75	1.21	1.22	1.24
850	3.51	3.49	0.02	0.46	41.24	1.20	1.21	1.24
875	3.52	3.49	0.03	0.47	44.80	1.18	1.20	1.23
900	3.54	3.49	0.05	0.44	46.45	1.16	1.20	1.22
1000	3.59	3.50	0.09	0.39	32.02	1.06	1.17	1.18
1100	3.71	3.55	0.16	0.23	24.20	1.09	1.14	1.14
1200	3.97	3.74	0.23	0.04	18.65	1.37	1.19	1.16
1300	4.62	4.26	0.36	0.33	14.16	1.96	1.37	1.33
1400	6.08	5.54	0.54	0.78	10.75	3.23	1.73	1.66

<sup>1</sup>Total Loss = Insertion Loss + 3dB Splitter Loss

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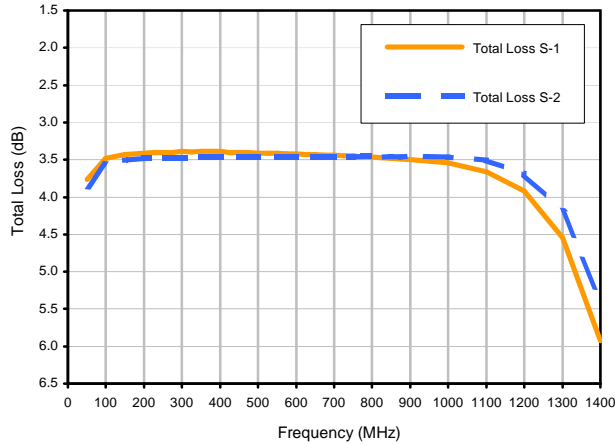


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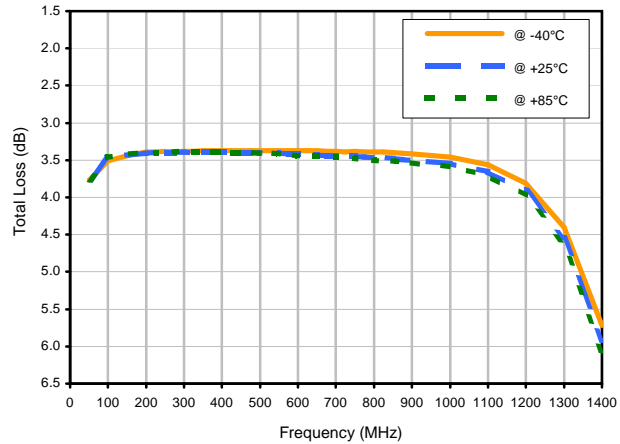


## Typical Performance Curves

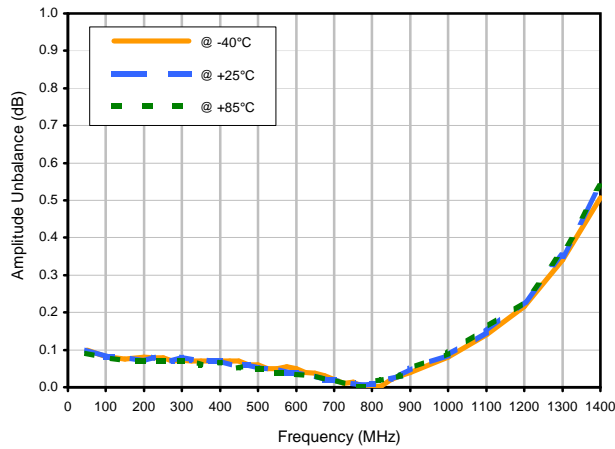
**Total Loss**



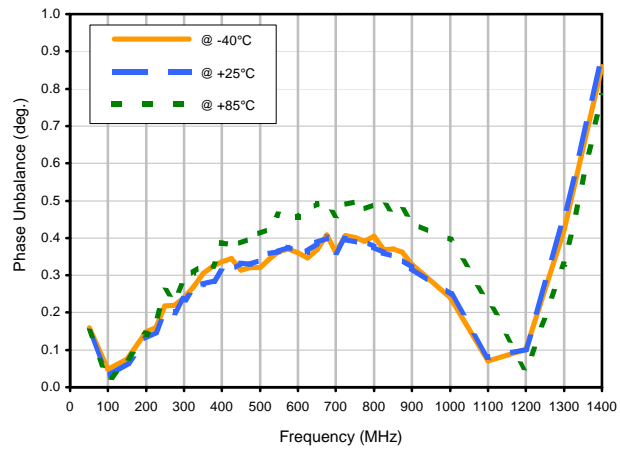
**Total Loss S-1 vs. TEMPERATURE**



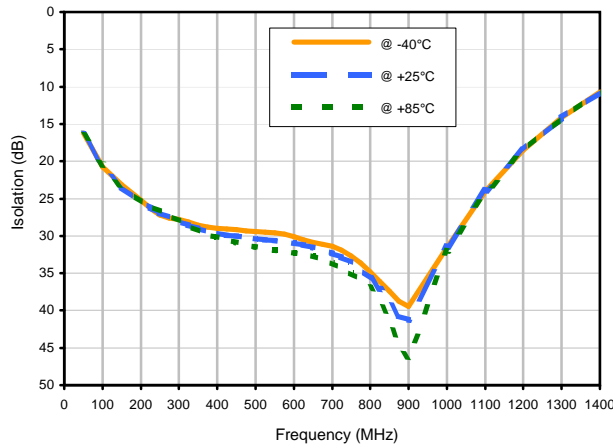
**Amplitude Unbalance vs. TEMPERATURE**



**Phase Unbalance vs. TEMPERATURE**

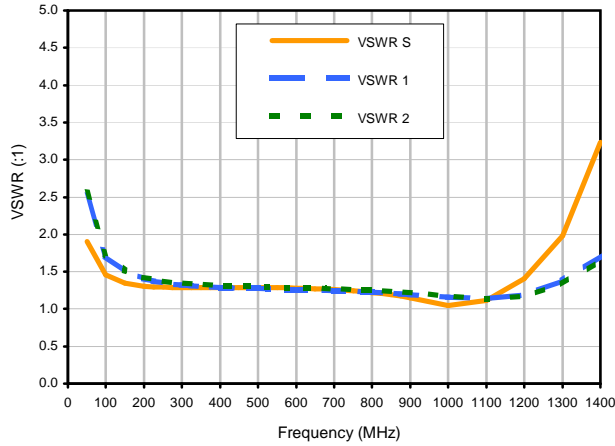


**Isolation 1-2 vs. TEMPERATURE**

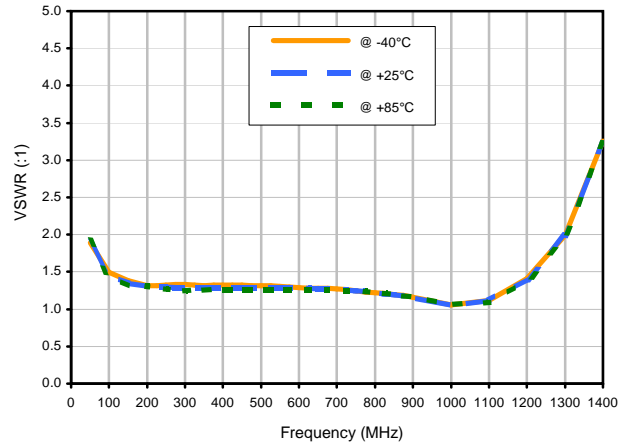


## Typical Performance Curves

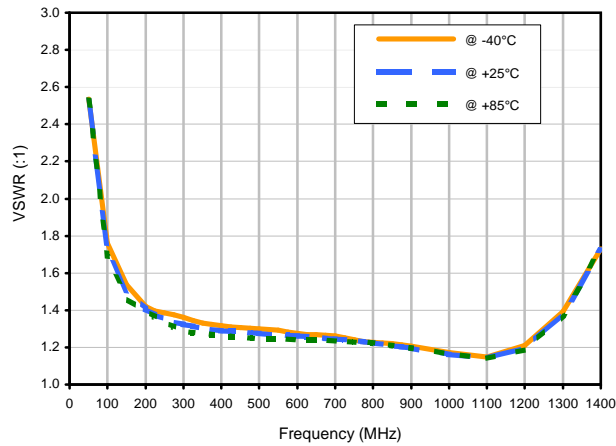
VSWR



VSWR SUM vs. TEMPERATURE



VSWR OUT1 vs. TEMPERATURE

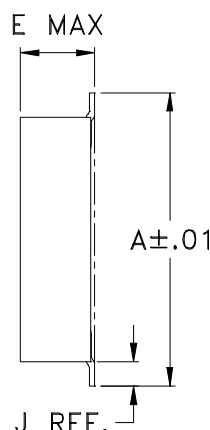
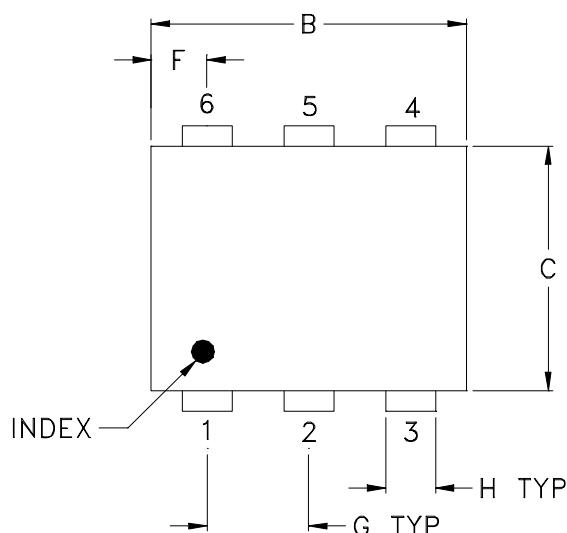


# Case Style

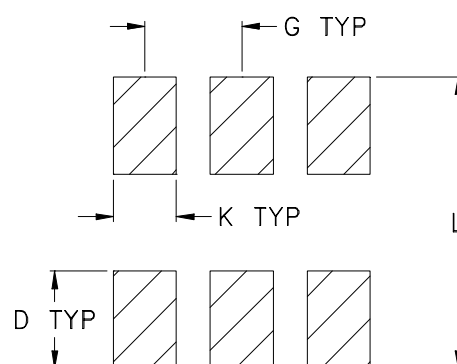
# CD

CD541  
CD542  
CD636  
CD637

## Outline Dimensions



## PCB Land Pattern



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

CASE#	A	B	C	D	E	F	G	H	J	K	L	WT, GRAM
CD541					.082 (2.08)							.15
CD542	.272 (6.91)	.310 (7.87)	.220 (5.58)	.100 (2.54)	.112 (2.84)	.055 (1.40)	.100 (2.54)	.030 (0.76)	.026 (0.66)	.065 (1.65)	.300 (7.62)	.20
CD636					.162 (4.11)							.25
CD637					.206 (5.23)							.40

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

### Notes:

- Case material: Plastic.
- Termination finish:
  - For RoHS Case Styles: Tin plate over 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-F34



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel see note	
16	12	7	Small quantity standard (see note)	20
				50
				100
				200
		13	Standard	500
				1000

Note: Availability of small reel quantity 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.

Go to: [www.minicircuits.com/pages/pdfs/tape.pdf](http://www.minicircuits.com/pages/pdfs/tape.pdf)



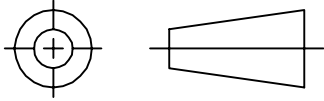
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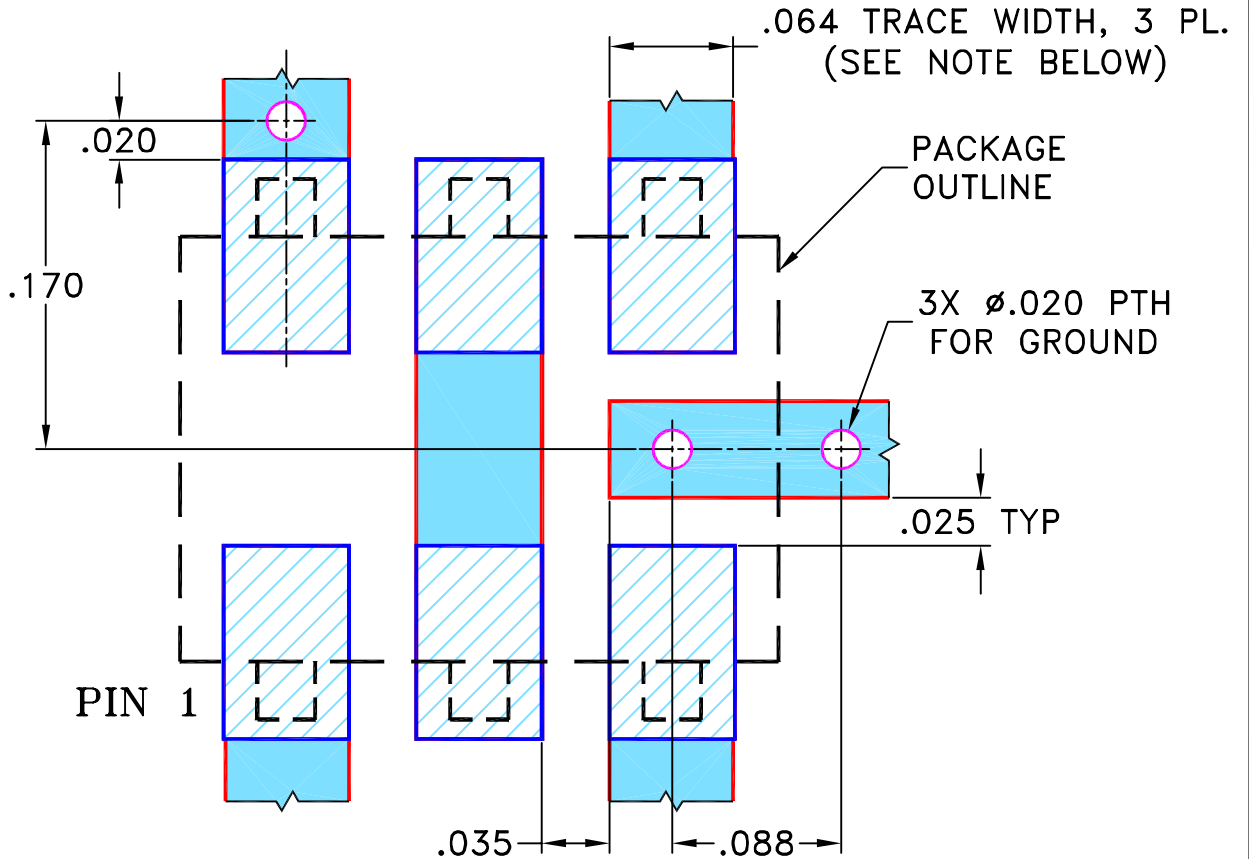
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M82448	NEW RELEASE	12/06/02	MMG	HY
A	M102713	ADDED "...WITH SMOBC"	01/17/06	MMG	IL

SUGGESTED MOUNTING CONFIGURATION  
FOR CD636 CASE STYLE, "mp" PIN CONNECTION



- NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .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

DIMENSIONS ARE IN INCHES  
TOLERANCES ON:  
2 PL DECIMALS ±  
3 PL DECIMALS ± .005  
ANGLES ±  
FRACTIONS ±

	INITIALS	DATE
DRAWN	MMG	11/19/02
CHECKED	AV	12/05/02
APPROVED	HY	12/06/02



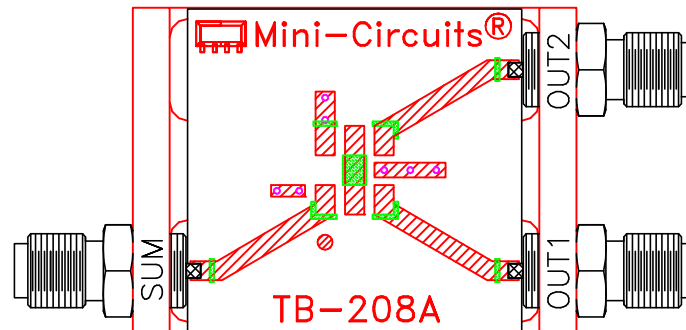
**Mini-Circuits®** 13 Neptune Avenue  
Brooklyn NY 11235

PL, mp, CD636, ADP, TB-208

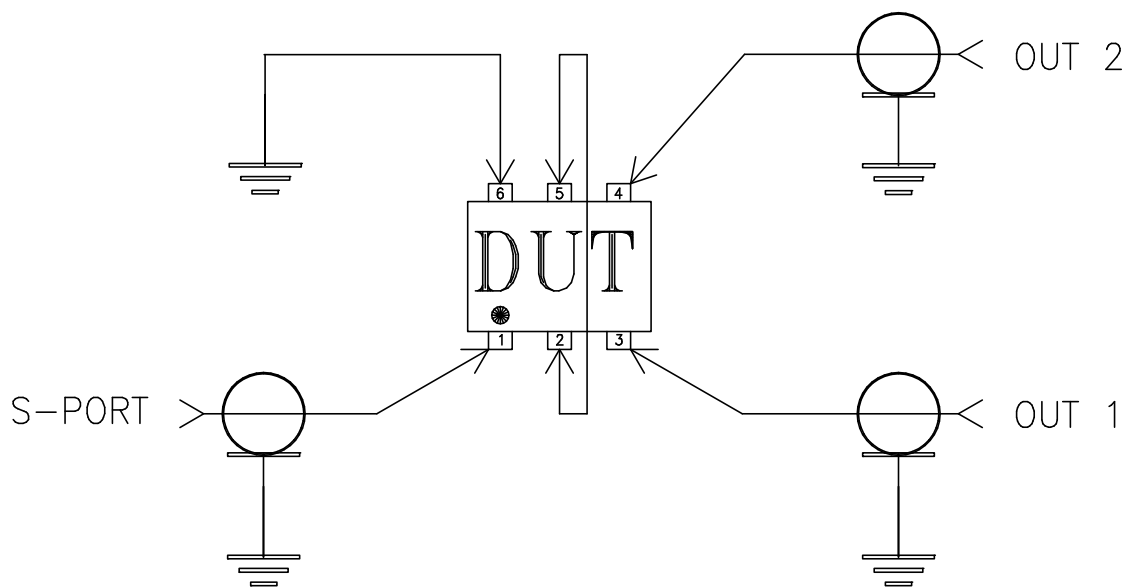
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SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-116	REV: A
FILE: 98PL116	SCALE: 10:1	SHEET: 1 OF 1	

# Evaluation Board and Circuit




TB-208



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