SURFACE MOUNT

Bi-Directional Coupler

ADCB-20-82+

50Ω 20dB Coupling 1 to 800 MHz

THE BIG DEAL

- Very Flat Coupling, 0.2 dB
- Very Low Loss, 0.3 dB
- Small Size
- Aqueous washable
- Protected by US Patents, 6,133,525 & 6,140,887

Generic photo used for illustration purposes only

CASE STYLE: CD636

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

APPLICATIONS

- Cable TV
- Communications

PRODUCT OVERVIEW

ADCB-20-82+ is a surface mount, bi-directional coupler, operating over a wide frequency range, 1-800 MHz housed in a small case measuring 0.31" x 0.27" x 0.16" (7.9 mm x 6.9 mm x 4.1 mm). It uses square cores and a unique patented1 circuit design to achieve very flat coupling making it ideal for use in wideband applications.

KEY FEATURES

Feature	Advantages
Wide Bandwidth: 1-800 MHz	Ideal for use in CATV and instrumentation applications.
Very Flat Coupling: ±0.2 dB	Coupled port output is flat over frequency range eliminating need for compensation circuits.
Very Low Loss: 0.3 dB typ.	When used at the output of the amplifiers, low loss minimizes the gain reduction and temperature rise of surrounding components, thus preserving performance and improving reliability.
Bi-Directional	ADCB has two coupled ports; one to sample power traveling from in-out port & the other for sampling power traveling from out to In-Port. Ideal for use in instrumentation applications for measuring ratio of the two powers (return loss).
High Directivity: 16-24 dB typ. to 400 MHz 15-24 dB typ. to 800 MHz	Minimizes the undesired power entering the coupled ports due to imperfect source and load impedances resulting in improved system performance.
Excellent Return Loss: 20-40 dB typ. to 400 MHz	Excellent Return loss of ADCB minimizes interaction effects with adjacent circuits and resulting gain ripple.

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50Ω 20dB Coupling 1 to 800 MHz

ELECTRICAL SPECIFICATIONS[1] AT 25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Units
Frequency Range		1		800	MHz
Mainline Loss[2] (above theoretical 0.05 dB)	1	—	0.2	0.4	dB
	400	—	0.3	0.6	
	800	—	0.6	0.9	
Coupling	1-800		20.2		dB
	1	19.5	20.2	20.9	
	400	19.5	20.4	21.6	
	800	18.5	20.2	21.8	
Coupling Flatness(±)	1-400	—	0.2	0.6	dB
	400-800	—	0.2	0.7	
Directivity	1	15	20	—	dB
	400	14	24.4	—	
	800	10	15	—	
Return Loss (Input)	1	21	28	—	dB
	400	15	21	—	
	800	11	16	—	
Return Loss (Output)	1	21	27	—	dB
	400	15	22	—	
	800	11	17	—	
Return Loss (Coupled)	1	18	24	—	dB
	400	14	19	—	
	800	11	15	—	
Input Power[3]	1-10	—	—	0.5	W
	10-800	—	—	1.0	

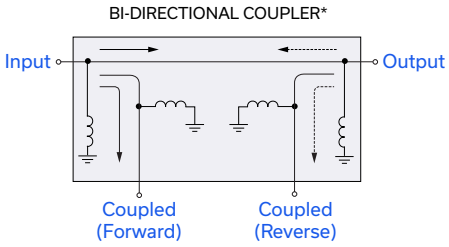
1. Measured on Evaluation board TB-ADCB-20-82+
2. Mainline loss includes theoretical power loss at coupled port.
3. Over -40 to 85 deg C

MAXIMUM RATINGS

Parameter	Ratings
Operating temperature	-40°C to 85°C
Storage temperature	-55°C to 100°C

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

ELECTRICAL SCHEMATIC



*Electrical schematic is for Bi-Directional coupler with internal transformer(s) that routes DC from all ports to ground

SURFACE MOUNT

Bi-Directional Coupler

ADCB-20-82+

50Ω 20dB Coupling 1 to 800 MHz

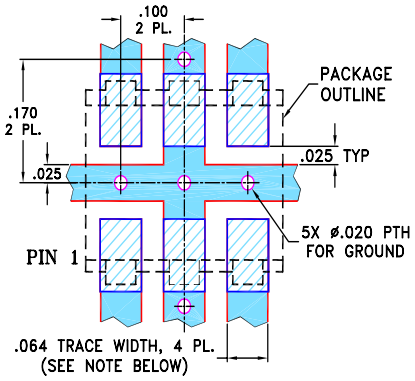
PIN CONNECTIONS

RF INPUT	1
RF OUTPUT	6
COUPLED (FORWARD) RF	3
COUPLED (REVERSE) RF	4
GROUND	2, 5

*PRODUCT MARKING: ADCB-20-82

*Marking may contain other features or characters for internal lot

EVALUATION BOARD MCL P/N: TB-ADCB-20-82+
SUGGESTED PCB LAYOUT (PL-097)

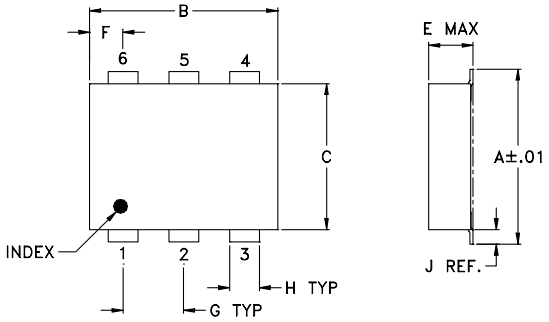


NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

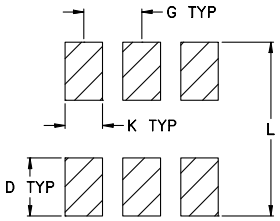
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

OUTLINE DRAWING



PBC Land Pattern



Suggested Layout,

OUTLINE DIMENSIONS (Inches / 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

TAPE & REEL INFORMATION: F34

SURFACE MOUNT

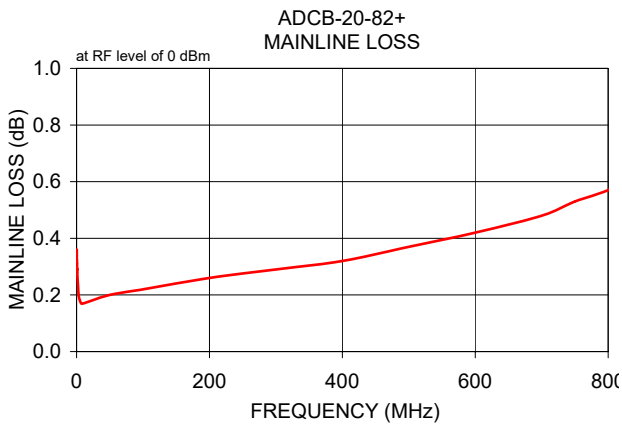
Bi-Directional Coupler

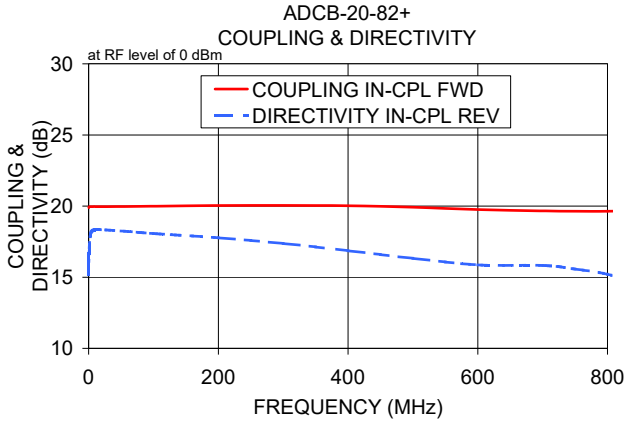
ADCB-20-82+

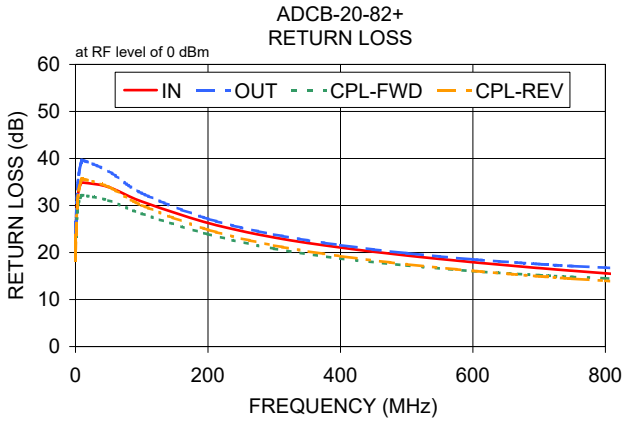
50Ω 20dB Coupling 1 to 800 MHz

TYPICAL PERFORMANCE DATA

Frequency (MHz)	Mainline Loss (dB)	Coupling (dB)		Directivity (dB)		Return Loss (dB)			
	In-Out	In-Cpl Fwd	Out-Cpl Rev	Out-Cpl Fwd	In-Cpl Rev	In	Out	Cpl Fwd	Cpl Rev
1.00	0.28	19.95	20.51	23.31	17.11	26.99	27.95	24.36	25.10
5.00	0.18	19.96	20.26	22.64	18.23	33.33	36.56	30.77	33.21
7.00	0.17	19.96	20.24	22.53	18.31	34.26	38.32	31.63	34.62
10.00	0.17	19.96	20.24	22.52	18.36	34.90	39.65	32.20	35.65
50.00	0.20	19.97	20.27	22.96	18.25	33.92	37.31	31.06	33.96
100.00	0.22	19.99	20.32	23.46	18.07	30.86	32.63	28.26	30.05
500.00	0.37	19.92	20.90	33.83	16.33	19.37	19.85	17.25	17.50
600.00	0.42	19.76	20.95	24.49	15.87	17.94	18.54	16.02	16.09
700.00	0.48	19.66	20.81	19.60	15.83	16.69	17.53	15.18	14.93
800.00	0.57	19.64	20.63	15.95	15.21	15.57	16.79	14.51	13.99







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

Bi-Directional Coupler ADCB-20-82+

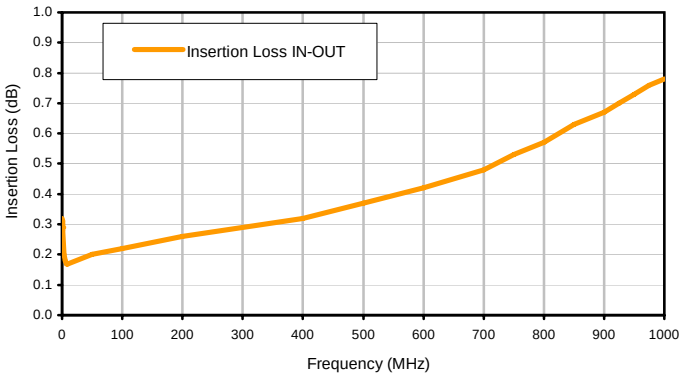
Typical Performance Data

FREQ. (MHz)	INSERTION LOSS (dB)	COUPLING (dB)		DIRECTIVITY (dB)		RETURN LOSS (dB)			
	IN-OUT	IN-FWD	OUT-REV	IN-REV	OUT-FWD	IN	OUT	FWD	REV
0.5	0.32	19.94	20.59	16.26	21.65	23.66	24.04	21.17	21.51
0.6	0.31	19.94	20.57	16.56	22.44	24.63	25.15	22.08	22.51
0.7	0.30	19.95	20.55	16.70	22.69	25.41	26.03	22.81	23.30
0.8	0.29	19.95	20.53	16.88	22.97	26.02	26.77	23.41	23.98
0.9	0.29	19.95	20.51	17.04	23.15	26.55	27.40	23.91	24.56
1.0	0.28	19.95	20.51	17.11	23.31	26.99	27.95	24.36	25.10
3.0	0.20	19.96	20.32	18.05	22.76	31.53	33.76	28.96	30.66
5.0	0.18	19.96	20.26	18.23	22.64	33.33	36.56	30.77	33.21
7.0	0.17	19.96	20.24	18.31	22.53	34.26	38.32	31.63	34.62
9.0	0.17	19.97	20.23	18.31	22.51	34.79	39.26	32.06	35.43
10.0	0.17	19.96	20.24	18.36	22.52	34.90	39.65	32.20	35.65
50.0	0.20	19.97	20.27	18.25	22.96	33.92	37.31	31.06	33.96
100.0	0.22	19.99	20.32	18.07	23.46	30.86	32.63	28.26	30.05
200.0	0.26	20.04	20.44	17.77	24.59	26.30	27.16	23.89	24.84
300.0	0.29	20.05	20.60	17.37	27.22	23.20	23.83	20.81	21.49
400.0	0.32	20.02	20.76	16.86	32.20	21.06	21.55	18.72	19.23
500.0	0.37	19.92	20.90	16.33	33.83	19.37	19.85	17.25	17.50
600.0	0.42	19.76	20.95	15.87	24.49	17.94	18.54	16.02	16.09
700.0	0.48	19.66	20.81	15.83	19.60	16.69	17.53	15.18	14.93
750.0	0.53	19.64	20.73	15.58	17.60	16.13	17.12	14.80	14.41
800.0	0.57	19.64	20.63	15.21	15.95	15.57	16.79	14.51	13.99
850.0	0.63	19.70	20.54	14.56	14.55	15.02	16.48	14.15	13.54
900.0	0.67	19.79	20.48	13.88	13.41	14.50	16.19	13.93	13.18
925.0	0.70	19.86	20.46	13.52	12.96	14.25	16.06	13.73	13.00
950.0	0.73	19.94	20.44	13.11	12.60	14.00	15.91	13.48	12.81
975.0	0.76	20.03	20.43	12.74	12.32	13.76	15.77	13.28	12.66
1000.0	0.78	20.11	20.42	12.43	12.06	13.54	15.61	13.11	12.51

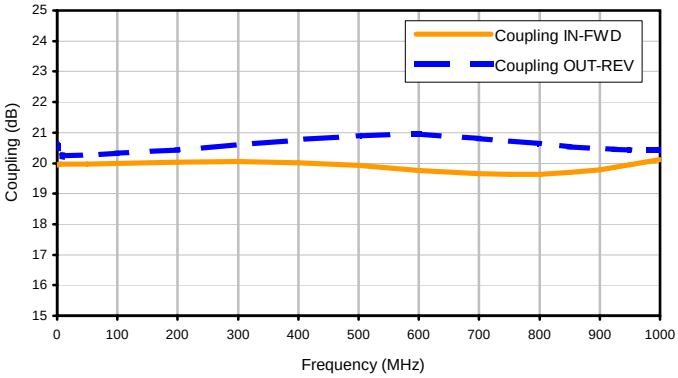
Bi-Directional Coupler ADCB-20-82+

Typical Performance Curves

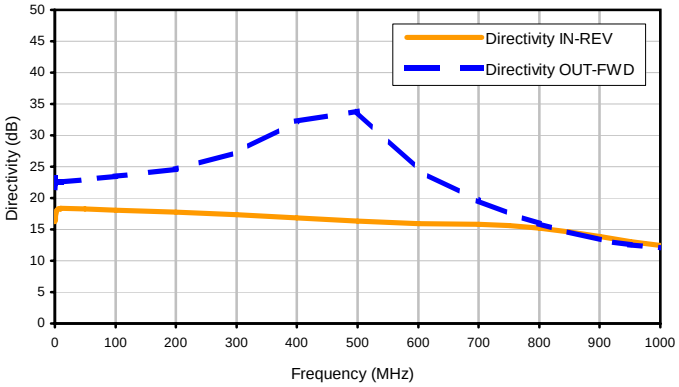
Insertion Loss



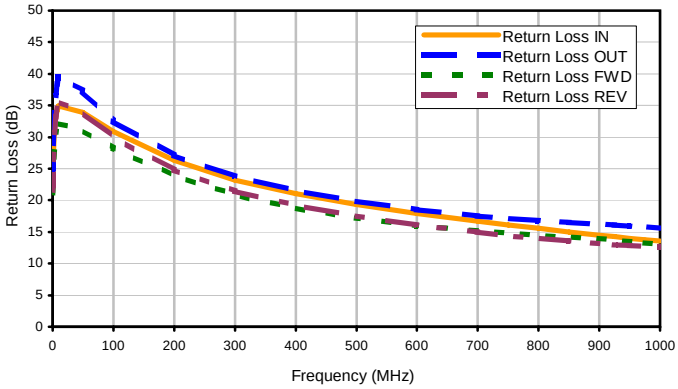
Coupling



Directivity



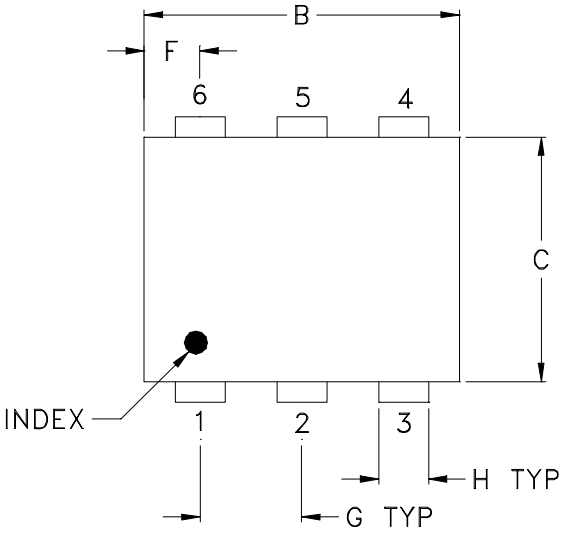
Return Loss

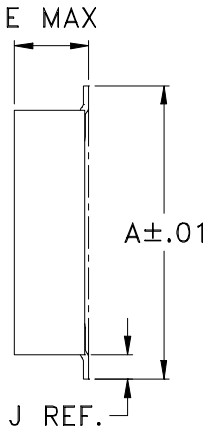


Case Style CD

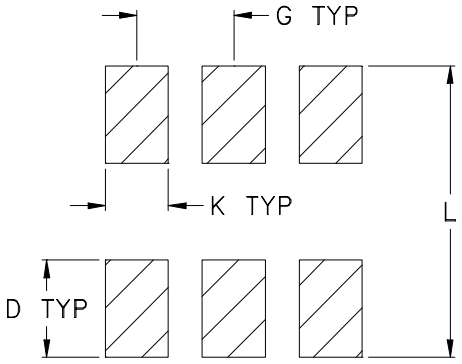
CD541
CD542
CD636
CD637

Outline Dimensions





PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.002

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

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

Notes:

1. Case material: Plastic.
2. 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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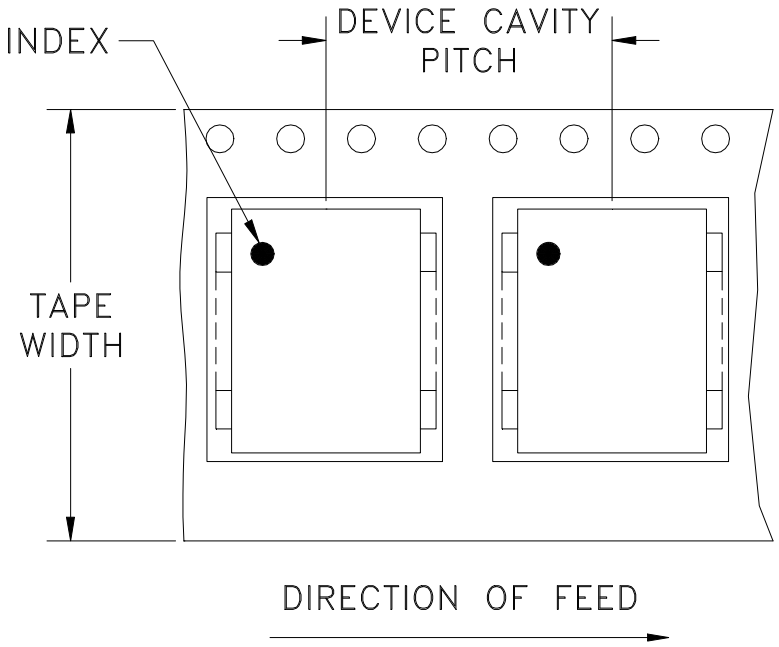
Tape & Reel Packaging TR-F34

DEVICE ORIENTATION IN T&R



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.

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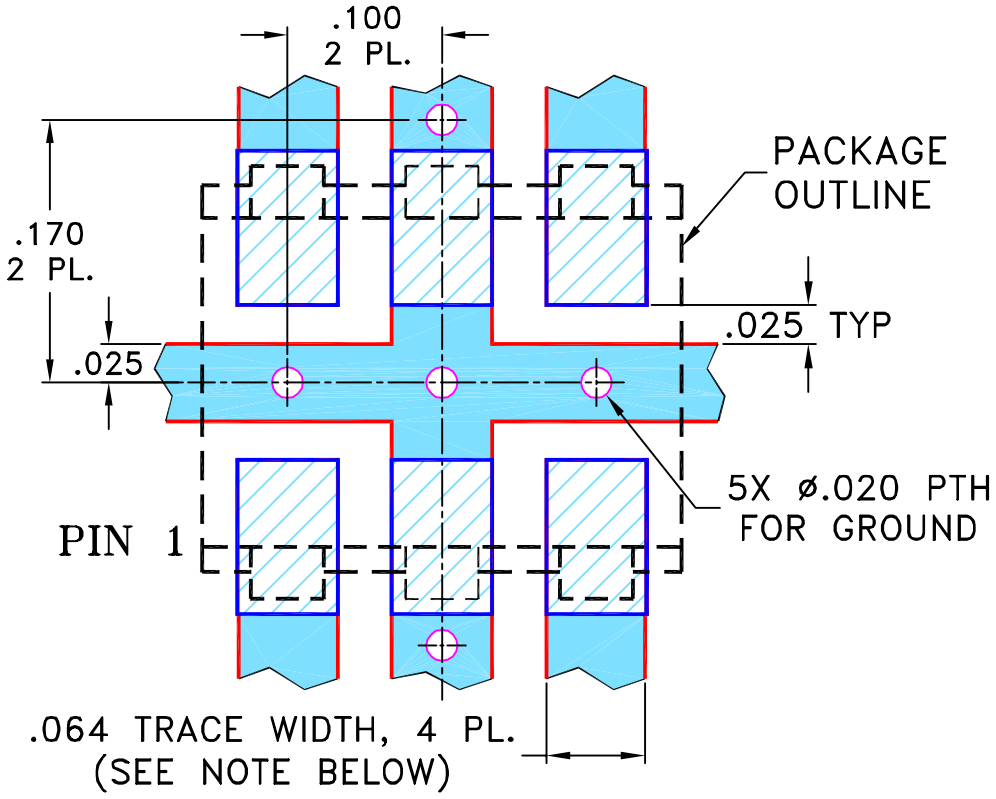
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M82476	NEW RELEASE	11/26/02	MMG	HY
A	M102713	ADDED "ay", "ls" PIN CONNECTIONS,	01/17/06	MMG	IL
		CD636/637 CASE STYLES & "...WITH SMOBC"			

SUGGESTED MOUNTING CONFIGURATION FOR BH292, CD636/CD637 CASE STYLES, "ay", "jg", "ls" PIN CONNECTIONS



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		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	MMG	10/30/02
TOLERANCES ON:	CHECKED	AV	11/26/02
2 PL DECIMALS ±	APPROVED	HY	11/26/02
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

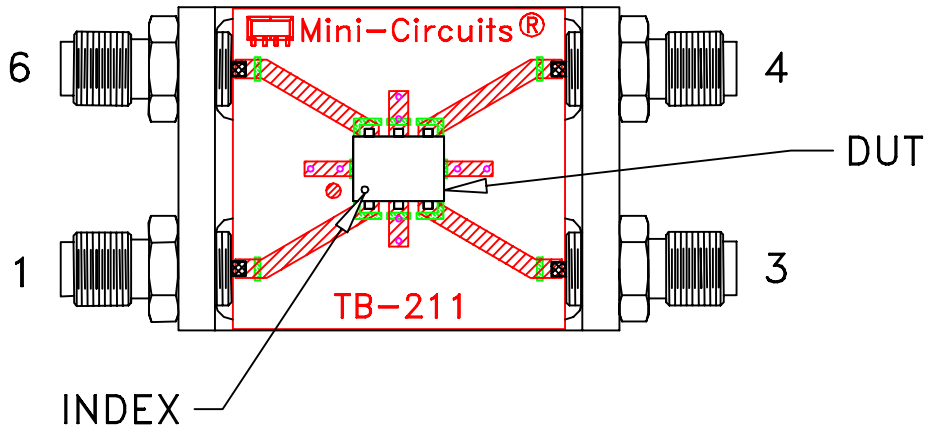
PL, ay/jg/lb, BH292, CD636/637, ADPQ/AMT/JPS, TB-211

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-097	A

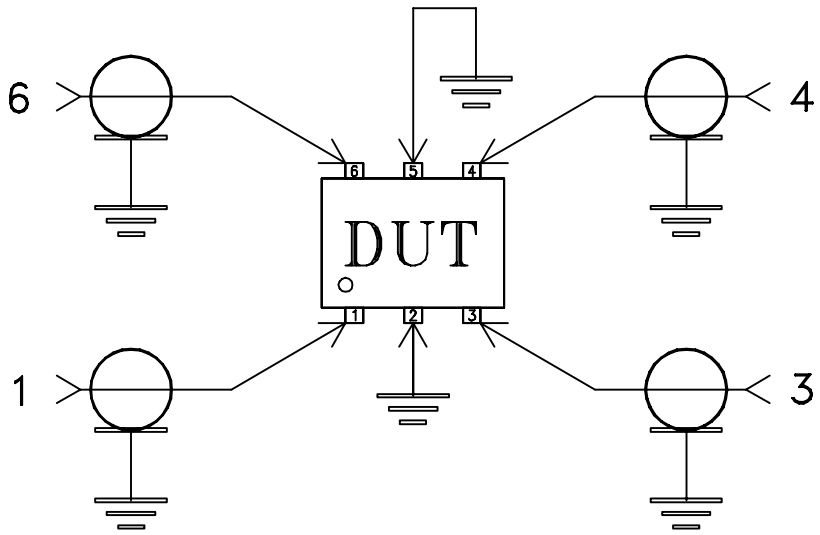
FILE:	SCALE:	SHEET:
98PL097	8:1	1 OF 1

Evaluation Board and Circuit

For Pin Connections refer to Data Sheet of the DUT



TB-211



Schematic Diagram

Notes:

1. SMA Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

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Environmental Specifications ENV02

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	-20° 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