Surface Mount

Directional Coupler

ADC-17-122-75+

75Ω 17dB 5 to 1250 MHz

The Big Deal

- Covers DOCSIS® 3.1 Bandwidth Requirements
- Low mainline loss, 0.8 dB
- Excellent coupling flatness, ±0.4 dB up to 1000 MHz
- Good VSWR: 1.15:1

CASE STYLE: CD542

Product Overview

Mini-Circuits' ADC-17-122-75+ is a 75Ω surface-mount directional coupler providing 17 dB coupling from 5 to 1250 MHz, supporting bandwidth requirements for DOCSIS 3.1 systems and equipment. This model, provides excellent coupling flatness, low mainline loss, good VSWR and RF input power handling up to 1W. The unit comes housed in a miniature 6-lead plastic package (0.27 x 0.31 x 0.11"), saving space in dense PCB layouts.

Key Features

Feature	Advantages
Wideband, 5 to 1250 MHz	The ADC-17-122-75+ supports a variety of 75Ω applications, including DOCSIS 3.1 compliant systems.
Good coupling flatness, ±0.4 dB up to 1000 MHz	Provides consistent coupling performance across frequency.
High power handling, 1W	Usable in systems with a wide range of high-power requirements.
Low mainline loss, 0.8 dB	Provides excellent through-path signal power transmission.
Small size, 0.27 x 0.31 x 0.11"	Provides high power capability while saving space in systems with tight layouts.

Surface Mount

Directional Coupler

ADC-17-122-75+

75Ω 17dB 5 to 1250 MHz

Generic photo used for illustration purposes only

CASE STYLE: CD542

+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

Features

- wideband, 5-1250 MHz
- low mainline loss, 0.8 dB typ.
- good VSWR, 1.15:1 typ.
- excellent coupling flatness, ±0.4 dB typ. up to 1000 MHz
- aqueous washable
- protected by U.S Patents 6,133,525 & 6,140,887

Applications

- cable tv
- cellular
- DOCSIS 3.1 system
- VHF/UHF

Electrical Specifications at 25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		5		1250	MHz
Mainline Loss[1]	5 - 1000 1000 - 1250	— —	0.8 1.0	1.2 1.4	dB
Coupling	5 - 1250	—	17±0.5	—	dB
Coupling Flatness (±)	5 - 1000 5 - 1250	—	0.4 0.6	0.9 1.0	dB
Isolation	5 - 50 50 - 870 870 - 1250	30 22 20	48 30 25	— — —	dB
Return Loss (Input)	5 - 1250	18	23	—	dB
Return Loss (Output)	5 - 1250	19	25	—	dB
Return Loss (Coupling)	5 - 1250	18	22	—	dB
Input Power	5 - 1250	—	—	1.0	W

1. Mainline loss includes theoretical power loss at coupled port.

Maximum Ratings

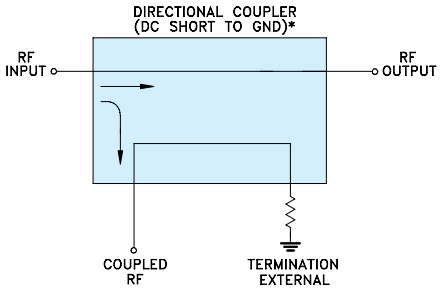
Parameter	Ratings
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C

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

Pin Connections

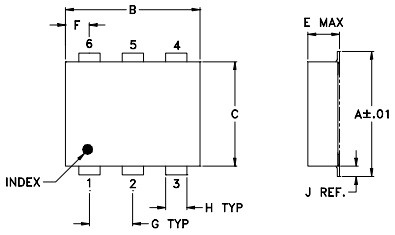
Function	Pin Number
INPUT	1
OUTPUT	6
COUPLED	3
GROUND	2
75Ω TERM EXTERNAL	4
ISOLATE (DO NOT USE)	5

Electrical Schematic

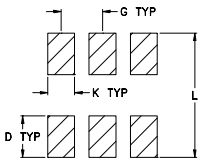


* ELECTRICAL SCHEMATIC IS FOR DIRECTIONAL COUPLER WITH INTERNAL TRANSFORMER(S) AND EXTERNAL TERMINATION.

Outline Drawing



PCB Land Pattern



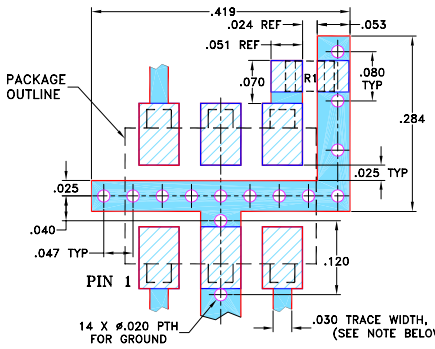
Suggested Layout,
Tolerance to be within ±.002

Outline Dimensions (inch / mm)

A	B	C	D	E	F	G
.272	.310	.220	.100	.112	.055	.100
6.91	7.87	5.59	2.54	2.84	1.40	2.54

H	J	K	L	wt
.030	.026	.065	.300	grams
0.76	0.66	1.65	7.62	0.20

Demo Board MCL P/N: TB-08
Suggested PCB Layout (PL-042)



RESISTOR R1: 75 Ohm, 0805 SIZE.

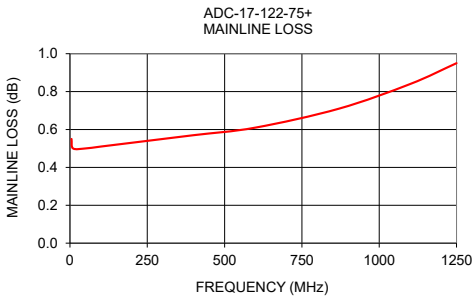
NOTES: 1. TRACE WIDTH IS SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .030" ± .002"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

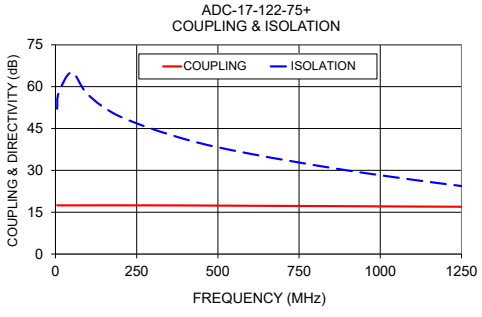
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)

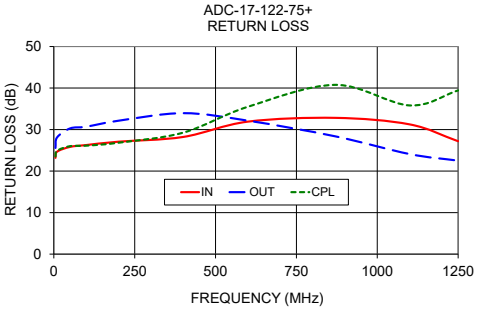
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

Typical Performance Data

Frequency (MHz)	Mainline Loss (dB) In-Out	Coupling (dB) In-Cpl	Isolation (dB)	Return Loss (dB) In	Return Loss (dB) Out	Return Loss (dB) Cpl
5	0.55	17.51	52.07	23.18	25.57	23.52
10	0.50	17.45	57.83	24.67	28.11	24.90
50	0.50	17.45	65.11	25.82	30.27	26.00
100	0.51	17.46	57.14	26.27	30.69	26.12
200	0.53	17.47	49.22	27.08	32.13	26.83
400	0.57	17.42	41.13	28.22	33.95	29.26
600	0.61	17.31	35.93	31.91	32.14	35.49
870	0.71	17.17	30.50	32.82	28.37	40.77
1100	0.84	17.04	26.64	31.25	24.10	35.81
1250	0.95	16.96	24.39	27.19	22.51	39.42







Additional 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/MCLStore/terms.jsp

Directional Coupler ADC-17-122-75+

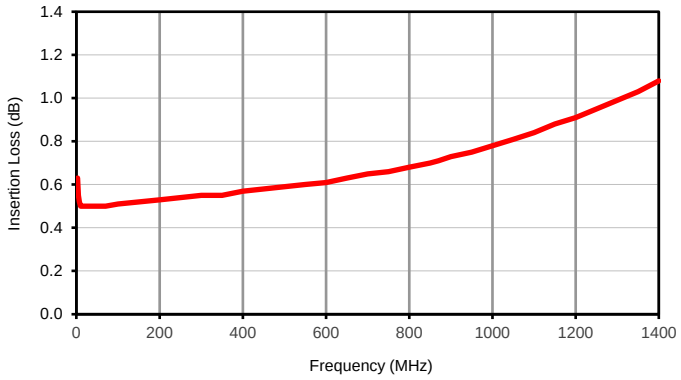
Typical Performance Data

FREQUENCY (MHz)	INSERTION LOSS (dB)	COUPLING (dB)	ISOLATION (dB)	RETURN LOSS (dB)		
				IN	OUT	CPL
3	0.63	17.62	47.84	21.37	23.08	21.79
5	0.55	17.51	52.07	23.18	25.57	23.52
7	0.52	17.47	55.13	24.04	26.94	24.28
9	0.51	17.46	57.62	24.54	27.75	24.73
10	0.50	17.45	57.83	24.67	28.11	24.90
50	0.50	17.45	65.11	25.82	30.27	26.00
70	0.50	17.45	60.44	26.01	30.49	26.10
100	0.51	17.46	57.14	26.27	30.69	26.12
200	0.53	17.47	49.22	27.08	32.13	26.83
300	0.55	17.46	44.62	27.68	32.98	27.87
350	0.55	17.44	42.78	28.11	32.80	28.46
400	0.57	17.42	41.13	28.22	33.95	29.26
450	0.58	17.40	39.79	29.03	32.88	30.51
500	0.59	17.38	38.42	29.50	33.22	31.53
550	0.60	17.35	37.09	30.28	33.06	33.19
600	0.61	17.31	35.93	31.91	32.14	35.49
650	0.63	17.29	34.77	32.92	32.93	37.50
700	0.65	17.26	33.76	35.03	31.45	41.84
750	0.66	17.23	32.80	34.67	30.33	43.27
800	0.68	17.21	31.81	34.74	30.32	43.82
850	0.70	17.18	30.85	32.99	28.36	43.32
870	0.71	17.17	30.50	32.82	28.37	40.77
900	0.73	17.16	29.99	32.79	28.80	38.45
950	0.75	17.13	29.10	32.19	26.78	39.31
1000	0.78	17.10	28.22	32.16	26.41	36.68
1050	0.81	17.07	27.42	32.09	25.36	37.44
1100	0.84	17.04	26.64	31.25	24.10	35.81
1150	0.88	17.01	25.86	30.55	23.95	36.54
1200	0.91	16.99	25.12	28.82	22.50	39.31
1250	0.95	16.96	24.39	27.19	22.51	39.42
1300	0.99	16.94	23.69	25.46	21.45	44.77
1350	1.03	16.90	22.98	23.84	21.20	42.15
1400	1.08	16.87	22.32	22.53	20.80	41.68

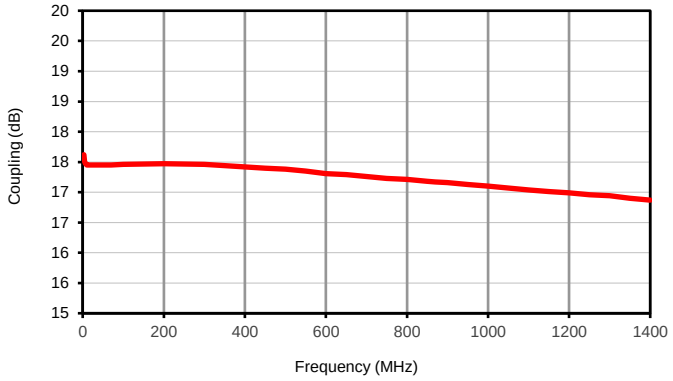
Directional Coupler ADC-17-122-75+

Typical Performance Curves

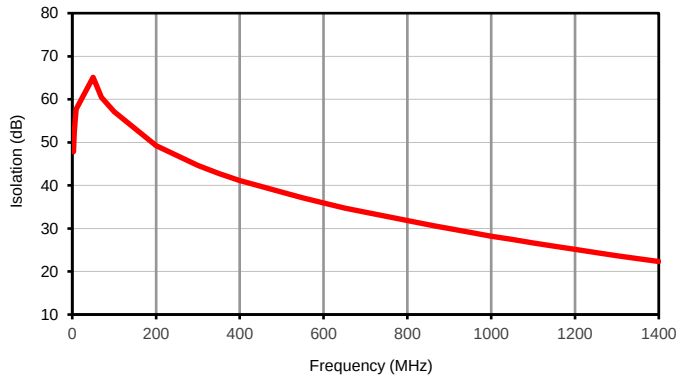
Insertion Loss



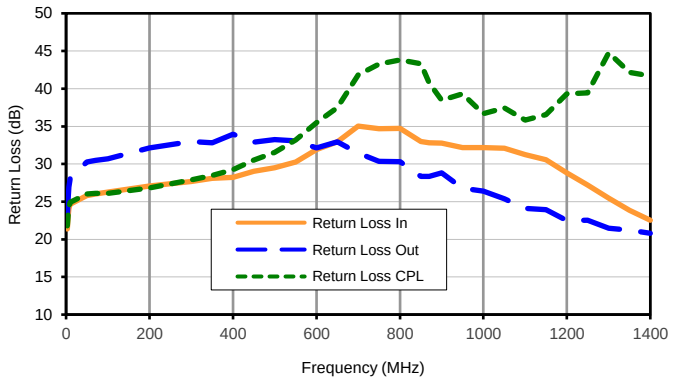
Coupling



Isolation



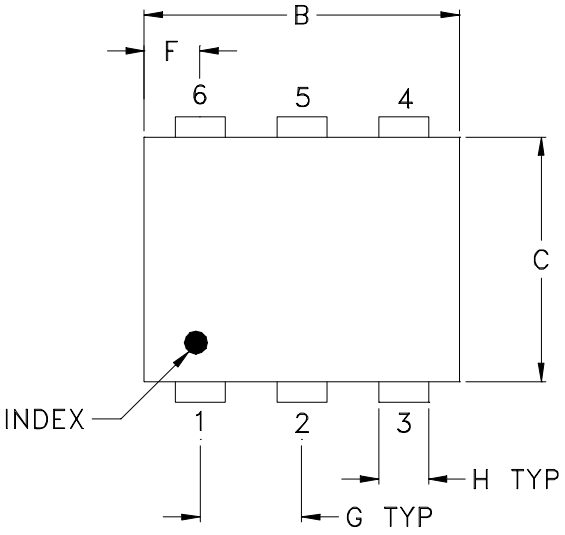
Return Loss

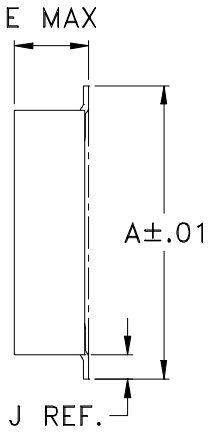


Case Style CD

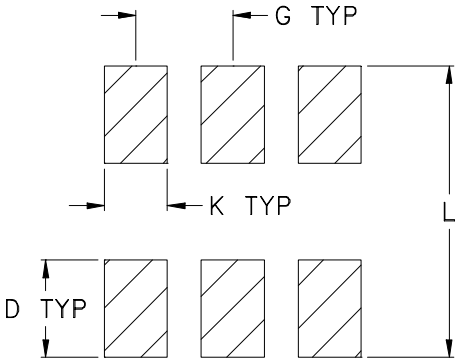
CD541
CD542
CD636
CD637

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:

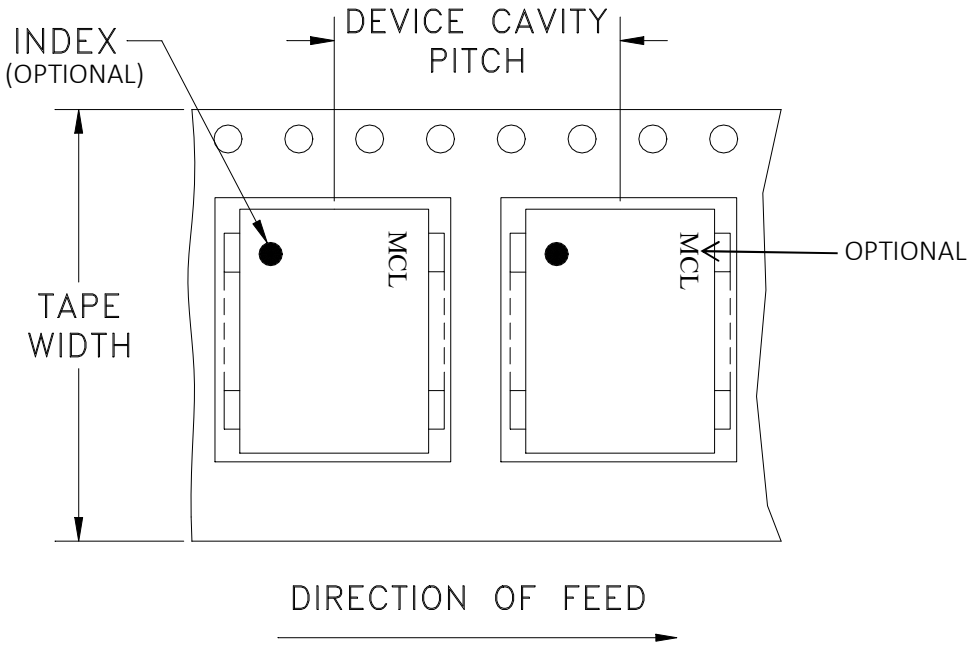
1. Case material: Plastic.
2. Termination finish:
   For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
   For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

This document and its contents are the property of Mini-Circuits

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.

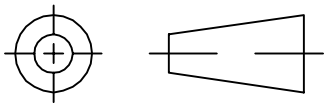
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-832600 • Fax 44-1252-837010
Mini-Circuits ISO 9001 & ISO 14001 Certified

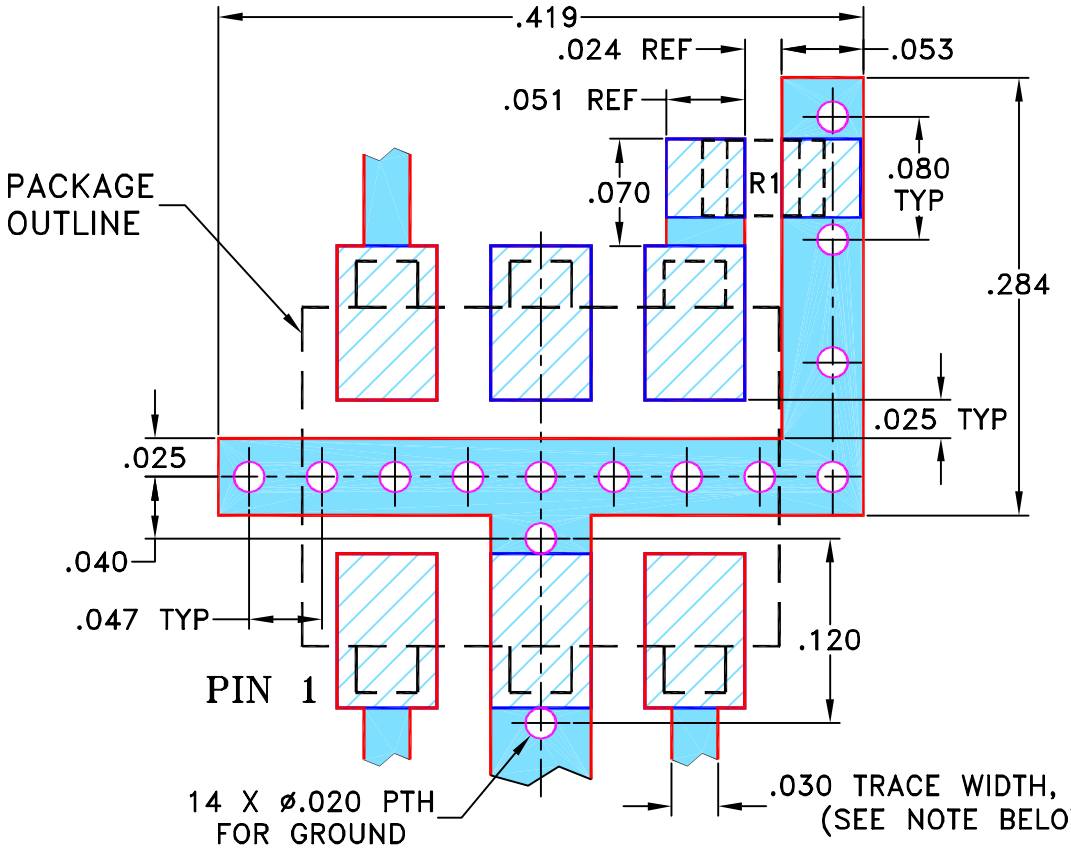
This document and its contents are the property of Mini-Circuits.

THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M81068	NEW RELEASE	07/22/02	GF	LC
A	M102713	ADDED NOTE 2 & "...WITH SMOBC"	01/17/06	MMG	IL

SUGGESTED MOUNTING CONFIGURATION FOR CD542 CASE STYLE, "kd" PIN CONNECTION



RESISTOR R1: 75 Ohm, 0805 SIZE.

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	GF	06/21/02
TOLERANCES ON:	CHECKED	IL	07/22/02
2 PL DECIMALS ±	APPROVED	LC	07/22/02
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS. EXCEPT FOR USE EXPRESSLY GRANTED, IN WRITING, TO ITS VENDORS, VENDEE AND THE UNITED STATES GOVERNMENT, MINI-CIRCUITS RESERVES ALL PROPRIETARY DESIGN, USE , MANUFACTURING AND REPRODUCTION RIGHTS THERETO. THESE CONTENTS SHALL NOT BE USED, DUPLICATED OR DISCLOSED TO ANY OUTSIDE PARTY, IN WHOLE OR IN PART, WITHOUT WRITTEN PERMISSION OF MINI-CIRCUITS.

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

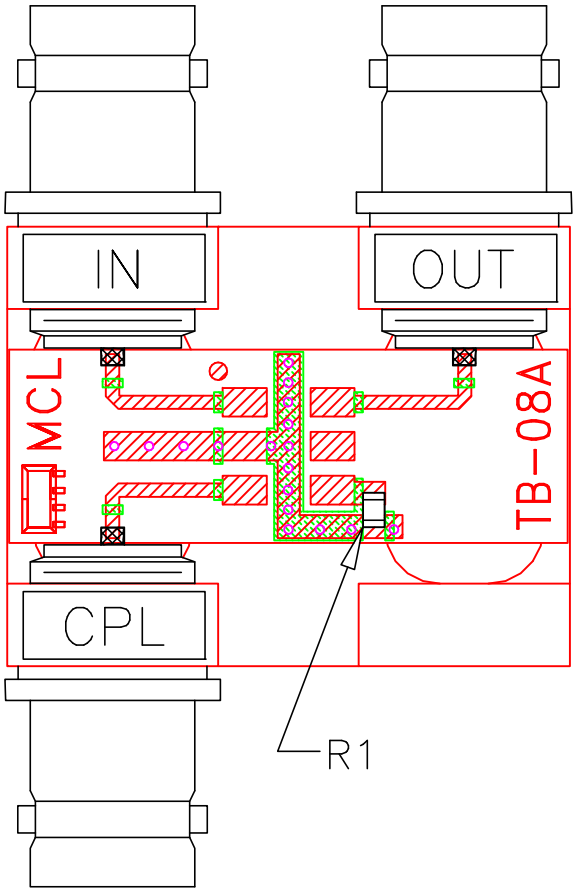
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, kd, 75, CD542, ADC, TB-08

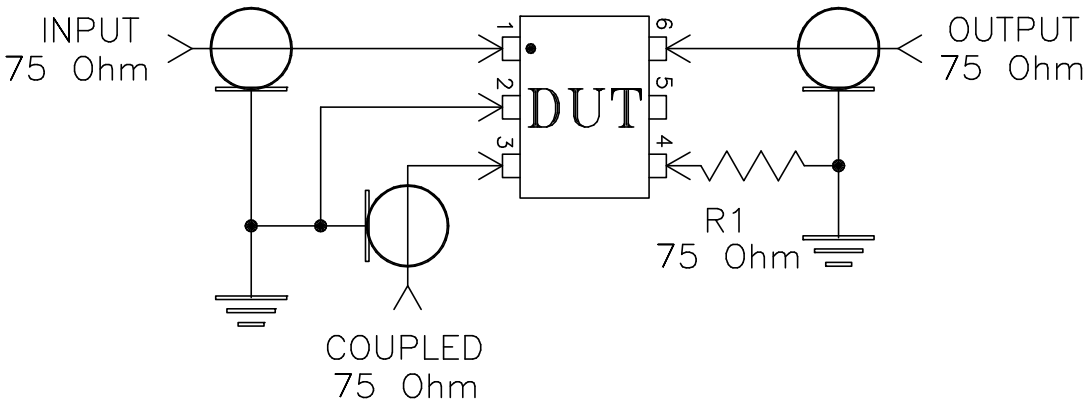
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-042	A

FILE:	SCALE:	SHEET:
98PL042	8:1	1 OF 1

Evaluation Board and Circuit



TB-08



Schematic Diagram

Notes:

1. 75 Ohm BNC Female connectors.
2. PCB Material: Rogers RO4350 or equivalent, Dielectric Constant=3.5, Thickness=.030 inch.

Mini-Circuits®

THIS DOCUMENT AND ITS CONTENTS ARE THE PROPERTY OF MINI-CIRCUITS.

Mini-Circuits

Environmental Specifications ENV02T1

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

This document and its contents are the property of Mini-Circuits.