

SURFACE MOUNT 

# Directional Coupler

**RDC-10-182-75X+**

75Ω 10 dB 5 to 1800 MHz

## THE BIG DEAL

- Low Mainline Loss, 1.7 dB Typ.
- Good Return Loss, 18 dB
- Excellent Coupling Flatness,  $\pm 0.2$  dB
- Supports DOCSIS® 3.1/4.0 Systems

*Generic photo used for illustration purposes only*

CASE STYLE: TT2315

## APPLICATIONS

- DOCSIS 3.1/4.0
- Cable TV

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

## PRODUCT OVERVIEW

Mini-Circuits' RDC-10-182-75X+ surface-mount directional coupler provides 10 dB coupling with excellent flatness, low mainline loss, high directivity, and good return loss for 75Ω applications from 5 to 1800 MHz, supporting a variety of broadband applications including DOCSIS 3.1/4.0 systems and equipment. This model features core and wire construction with wrap-around terminations for good solderability and easy visual inspection.

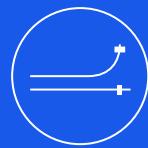
## KEY FEATURES

Feature	Advantages
Broadband, 5 to 1800 MHz	Supports bandwidth requirements for DOCSIS 3.1/4.0 systems and equipment.
Low Mainline Loss, 1.7 dB	Provides excellent through-path signal transmission and maintains low heat dissipation, avoiding the need for special heat sinking methods.
Power Handling, Up to 1 W	Usable in systems with a variety of signal power requirements.
Excellent Return Loss, 18 dB Typ.	Provides excellent matching for 75Ω systems.
Top Hat® Feature	Improves speed and accuracy of pick and place assembly.

REV. B  
ECO-012267  
RDC-10-182-75X+  
MCL NY  
260121

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PAGE 1 OF 4



**SURFACE MOUNT** top hat®

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## ELECTRICAL SPECIFICATIONS AT +25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		5		1800	MHz
Mainline Loss <sup>1</sup>	5-1250 1250-1800		1.3 1.9	1.8 2.8	dB
Nominal Coupling	5-1800		10±0.5		dB
Coupling Flatness(±)	5-1800		± 0.1	± 0.5	dB
Directivity	5-870 870-1250 1250-1800	15 14 10	20 20 15		dB
Return Loss (Input)	5-1800		18		dB
Return Loss (Output)	5-1800		20		dB
Return Loss (Coupled)	5-1800		18		dB
Input Power	5-1800			1.0	W

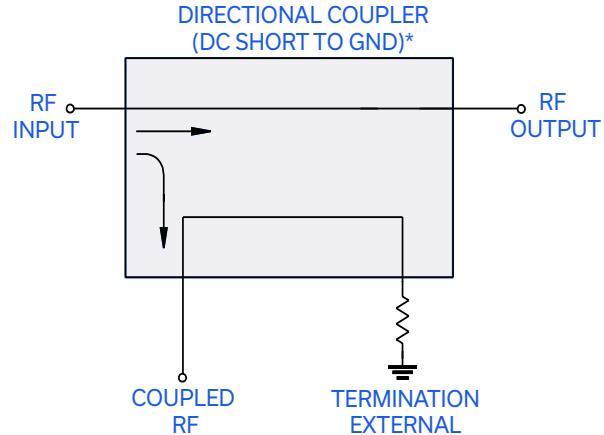
1. Mainline loss includes theoretical power loss at coupled port.

## ABSOLUTE MAXIMUM RATINGS

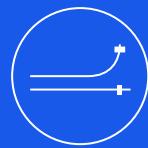
Parameter	Ratings
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C

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

## ELECTRICAL SCHEMATIC



\*Electrical schematic is for Directional coupler with internal transformer(s) and external termination



SURFACE MOUNT 

# Directional Coupler

**RDC-10-182-75X+**

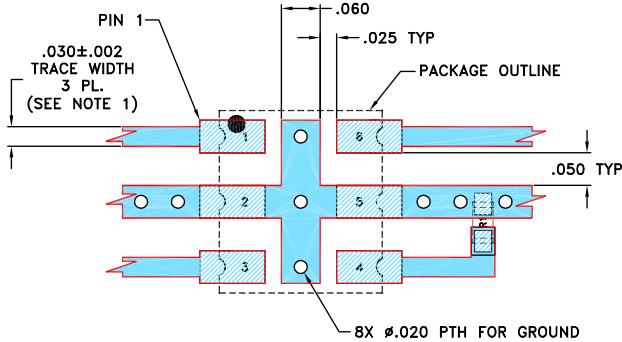
75Ω 10 dB 5 to 1800 MHz

## PIN CONNECTIONS

Function	Pad Number
INPUT	1
OUTPUT	6
COUPLED	3
GROUND	2
75Ω TERM EXTERNAL	4
No Internal Connection (Grounding Recommended)	5

## PRODUCT MARKING: US

### DEMO BOARD MCL P/N: TB-RDC1018275X+ SUGGESTED PCB LAYOUT (PL-452)



#### NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS  $.030 \pm .002$ ; COPPER: 1/2 OZ. EACH SIDE.  
FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.

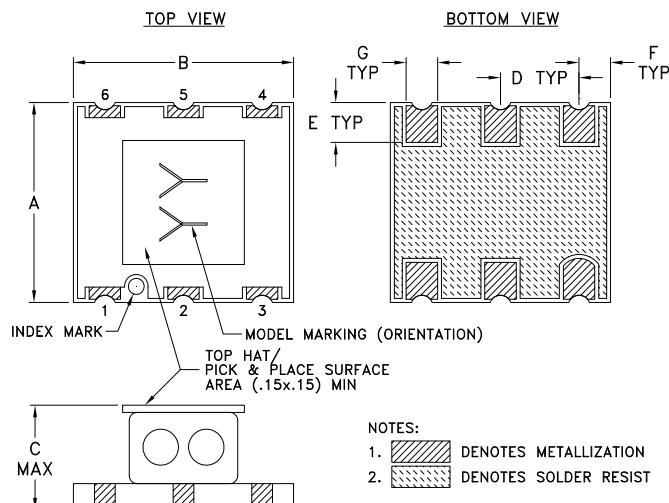
2. 0603 SIZE CHIP RESISTOR FOOT PRINT SHOWN FOR REFERENCE,  
FOR RESISTOR VALUE REFER TO TB-917+.

3. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

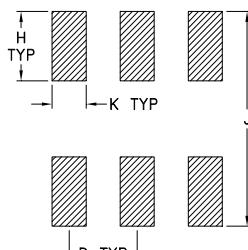
 DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK  
OVER BARE COPPER)

 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

## OUTLINE DRAWING



## PCB Land Pattern



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

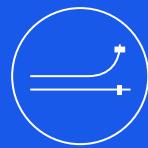
## OUTLINE DIMENSIONS (Inches mm)

A	B	C	D	E	F	G	H	J	K
.250	.280	.140	.100	.050	.040	.040	.100	.310	.050

6.35 7.11 3.56 2.54 1.27 1.02 1.02 2.54 7.87 1.27

Weight: 0.35 grams

## TAPE & REEL INFORMATION: F34



SURFACE MOUNT



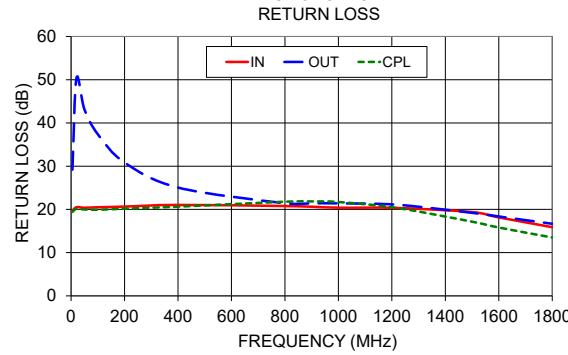
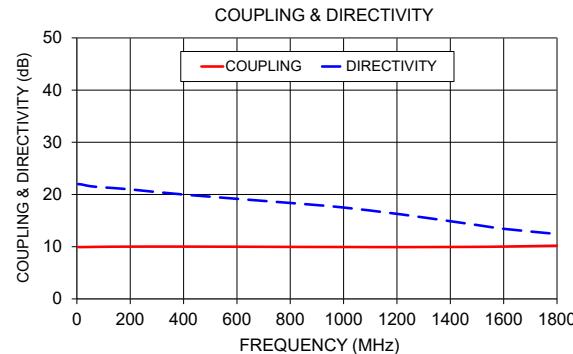
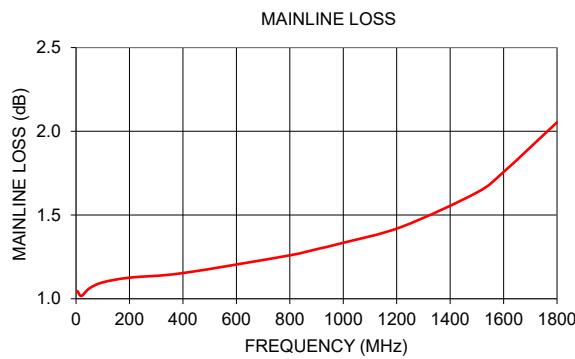
## Directional Coupler

RDC-10-182-75X+

75Ω 10 dB 5 to 1800 MHz

## TYPICAL PERFORMANCE DATA

Frequency (MHz)	Mainline Loss (dB) In-Out	Coupling (dB) In-Cpl	Directivity (dB)	Return Loss (dB)		
				In	Out	Cpl
5	1.05	9.94	21.99	19.68	29.18	19.42
20	1.02	9.92	21.90	20.50	50.34	20.13
50	1.06	9.95	21.59	20.39	43.13	19.99
100	1.10	9.98	21.36	20.49	37.38	19.91
200	1.13	10.02	20.98	20.65	30.84	20.17
400	1.15	10.02	19.99	21.04	25.05	20.63
800	1.26	9.96	18.38	20.78	21.42	21.79
900	1.30	9.95	17.97	20.62	21.41	21.85
1000	1.33	9.94	17.50	20.39	21.40	21.71
1218	1.43	9.92	16.18	20.34	21.08	20.35
1500	1.63	9.97	14.15	19.39	19.20	17.16
1600	1.76	10.03	13.43	18.15	18.36	15.81
1800	2.05	10.19	12.43	15.89	16.67	13.50



## NOTES

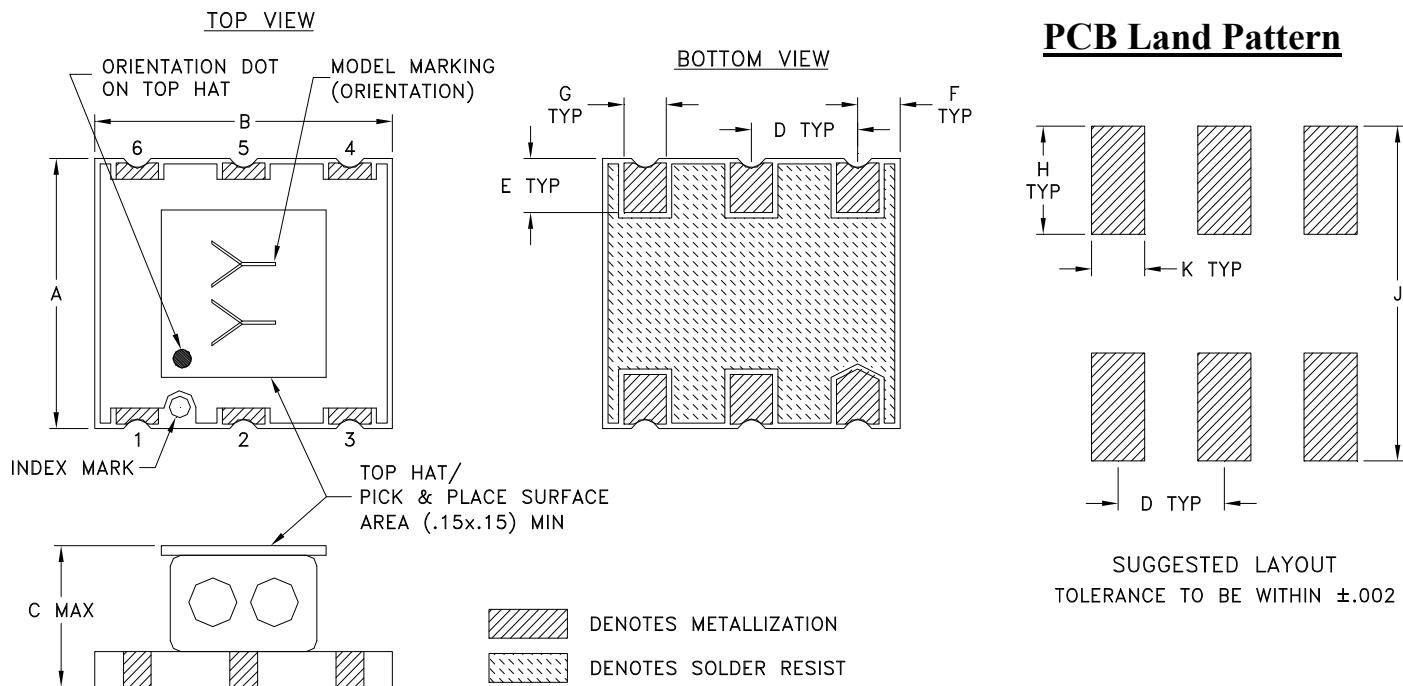
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# Case Style

TT

TT2315

## Outline Dimensions



CASE #	A		B	C	D	E	F	G	H	J	K	WT. GRAMS
TT2315	.250 (6.35)		.280 (7.11)	.140 (3.56)	.100 (2.54)	.050 (1.27)	.040 (1.02)	.040 (1.02)	.100 (2.54)	.310 (7.87)	.050 (1.27)	.35

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

### Notes:

1. Open style, Base material: Printed wiring laminate.
2. Termination finish: 3-5  $\mu$  inch (.08-.13 microns) Gold over 120-240  $\mu$  inch (3.05-6.10 microns) Nickel plate. All models, (+) suffix.
3. Top-Hat total thickness: .013 inches MAX.
4. Orientation Dot on Top Hat & PCB corresponds to Pin #1.

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ISO 9001 ISO 14001 CERTIFIED

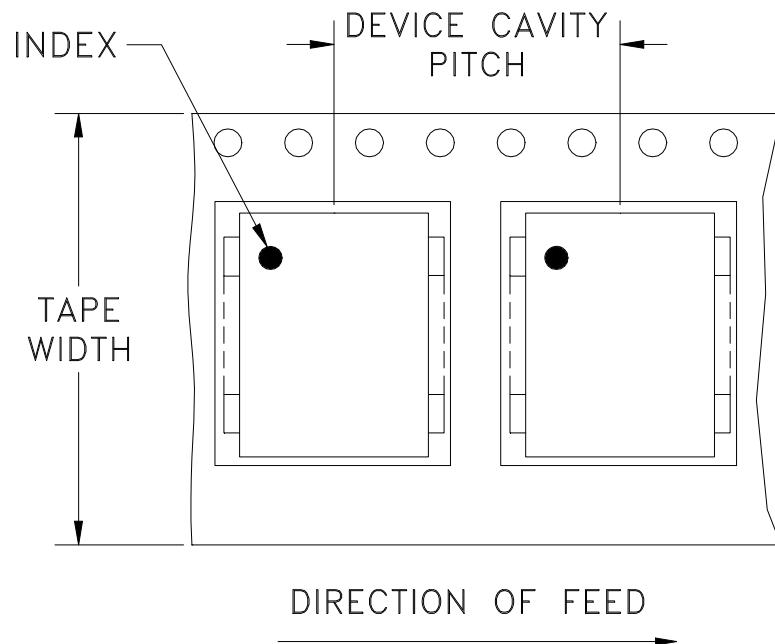
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site

 The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

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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.

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



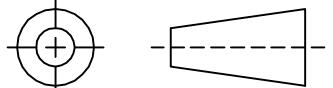
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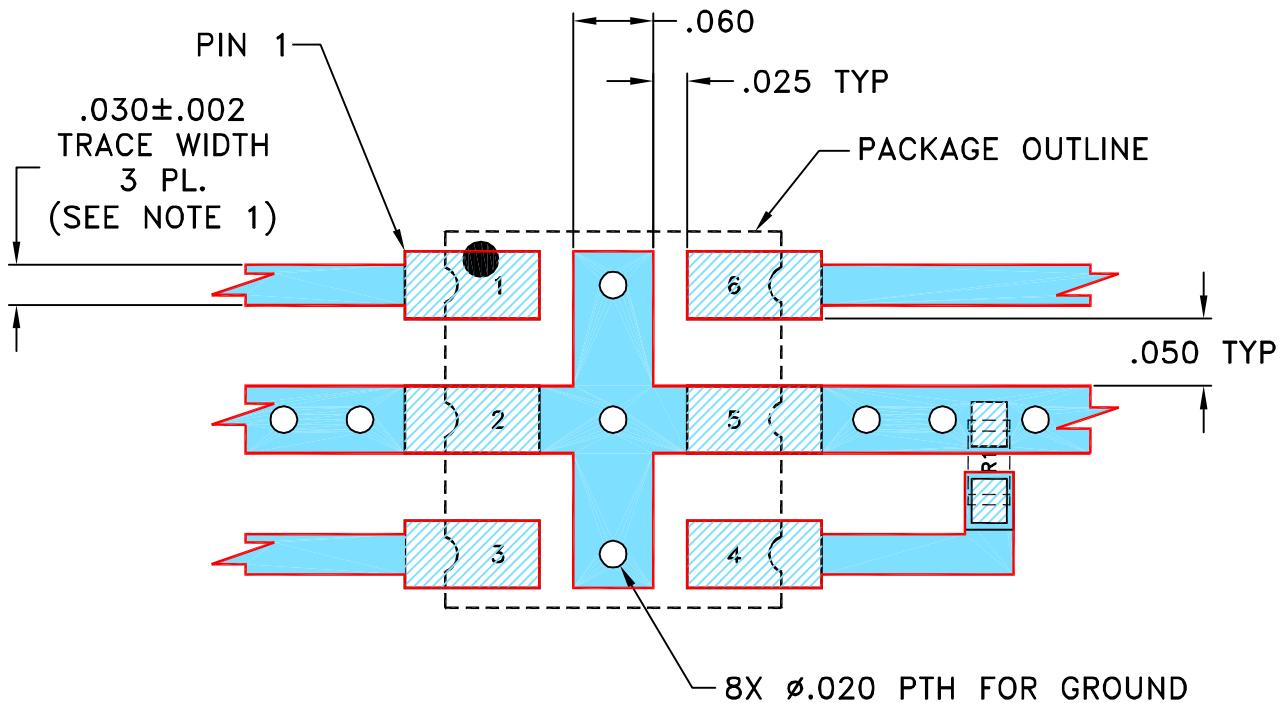
## THIRD ANGLE PROJECTION



## REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M158078	NEW RELEASE	09/16/16	CA	IL

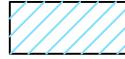
SUGGESTED MOUNTING CONFIGURATION  
FOR TT2315 CASE STYLE, "06DC03" PIN CODE

NOTES:

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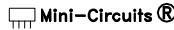


DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)



DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS		DATE
DIMENSIONS ARE IN INCHES		DRAWN	CA	09/15/16
TOLERANCES ON:		CHECKED	IL	09/16/16
2 PL DECIMALS $\pm$		APPROVED	YL	09/16/16
3 PL DECIMALS $\pm$ .005				
ANGLES $\pm$				
FRACTIONS $\pm$				



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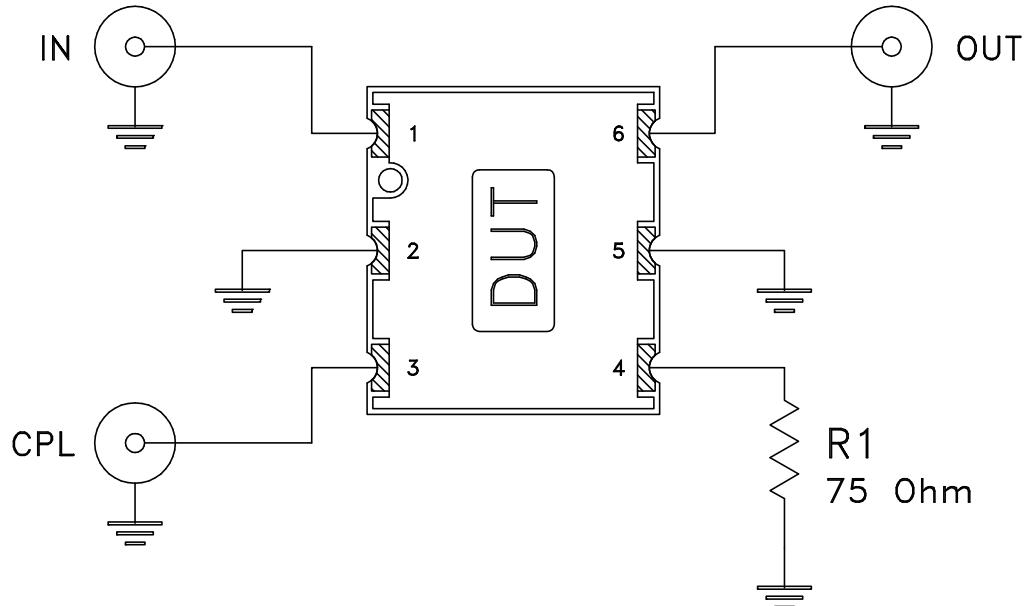
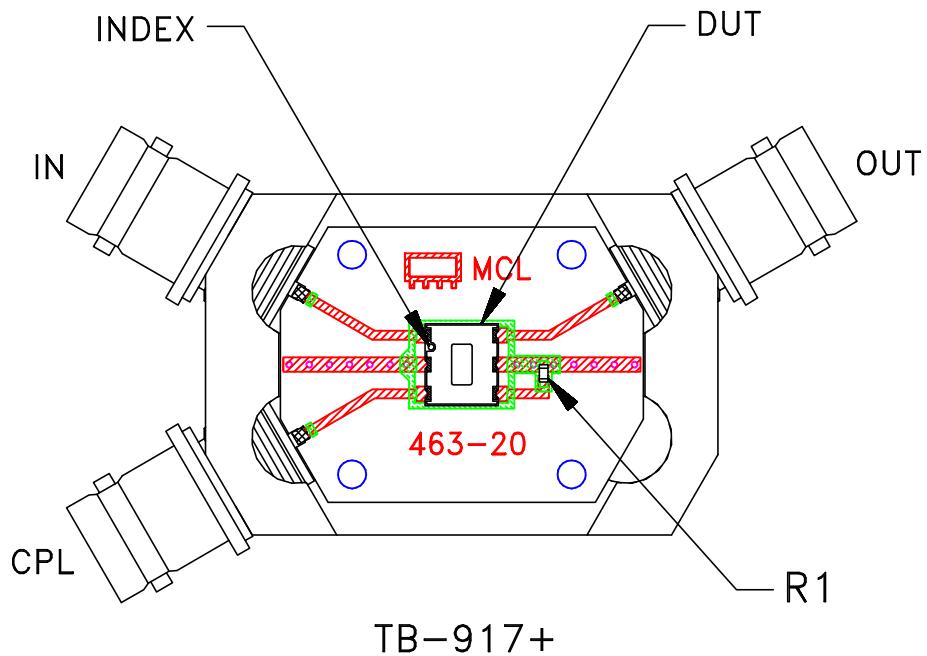
ASHEET1.DWG REV:A DATE:01/12/95

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

PL, 06DC03, TT2315, TB-917+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-452	OR
FILE: 98PL452	SCALE: 7:1	SHEET: 1	OF 1

# Evaluation Board and Circuit



Schematic Diagram

Notes:

1. 75 Ohm BNC connectors.
2. PCB Material: 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 + propylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215