SURFACE MOUNT

Bi-Directional Coupler

RBDC9-182-75+

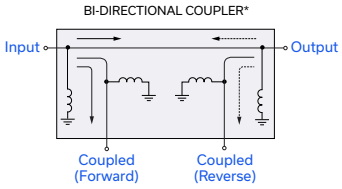
75Ω 5 to 1800 MHz 9 dB 1 Watt

KEY FEATURES

- Low Mainline Loss, 1.7 dB typ at 1800 MHz
- Good Return Loss, 20 dB typ at Input.
- Excellent Isolation between In-CPLR 40 dB typ in the range 100-700 MHz.
- Supports DOCSIS® 4.0 Systems

Generic photo used for illustration purposes only

ELECTRICAL SCHEMATIC



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

APPLICATIONS

- DOCSIS® 4.0
- CABLE TV

PRODUCT OVERVIEW

Mini-Circuits' RBDC9-182-75+ surface-mount bi-directional coupler provides 9 dB coupling with low mainline loss, high isolation between In-CPLR ports, and good return loss for 75 ohms applications from 5 to 1800 MHz, supporting a variety of broadband applications including DOCSIS® 4.0 systems and equipment. This model features core and wire construction is good for solderability and easy visual inspection.

ELECTRICAL SPECIFICATIONS AT +25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Frequency Range	-	5	-	1800	MHz
Mainline Loss[1]	5 684 1218 1800	- - - -	1.3 1.3 1.5 1.7	1.5 1.6 1.8 2.2	dB
Coupling Nominal (In – CPLF) Coupling Nominal (Out – CPLR)	5 – 1800 5 - 1800	- -	10±0.5 9 ±0.5	- -	dB
Coupling Flatness (±) (In – CPLF) Coupling Flatness (±) (Out – CPLR)	5 – 1800 5 - 1800	- -	0.5 0.8	0.9 1.3	dB
Isolation (In – CPLR)	5 – 100 100 – 700 700 - 1800	35 30 17	40 35 22		dB
Return Loss (Input)	5 – 1218 1218 - 1800	- -	22 20		dB
Return Loss (Output)	5 - 1800	-	18		dB
Return Loss (Coupled)	5 - 1800	-	14		dB

1. Mainline Loss includes coupling loss.

ABSOLUTE MAXIMUM RATINGS[2]

Operating Case Temperature	-40 °C to +85 °C
Storage Temperature	-55 °C to +100 °C
Input Power	1 W

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

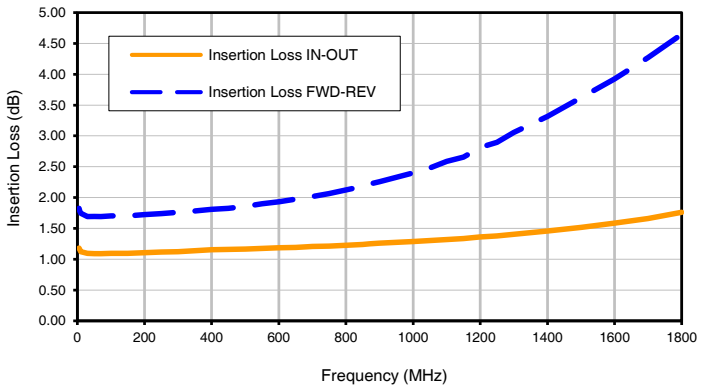
REV. OR
NPO-004674
RBDC9-182-75+
MCL NY
240917

Bi-Directional Coupler RBDC9-182-75+

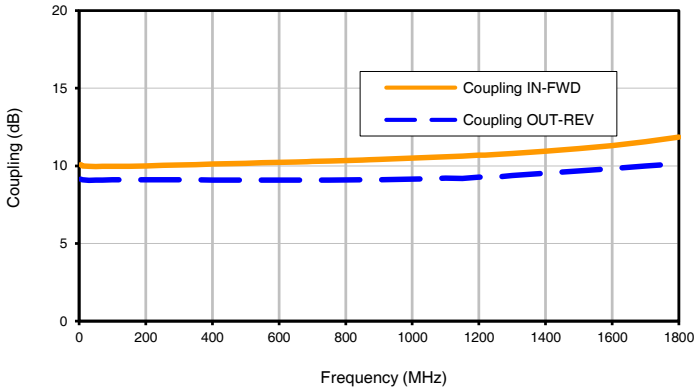
75Ω 5 to 1800 MHz 9 dB 1 Watt

TYPICAL PERFORMANCE GRAPHS

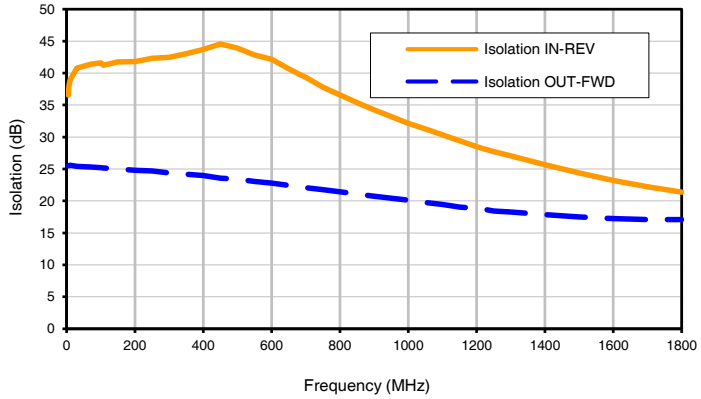
Insertion Loss



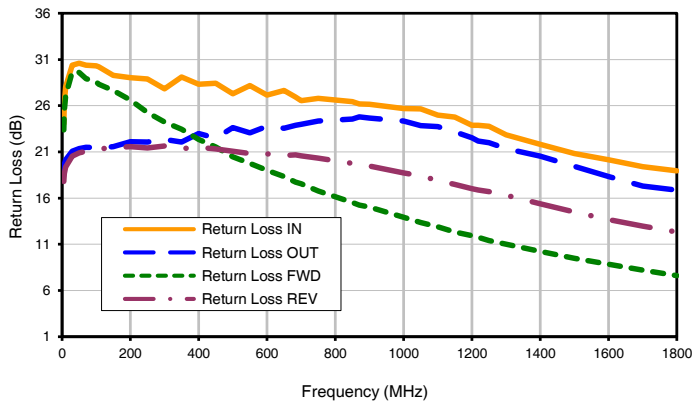
Coupling



Isolation



Return Loss



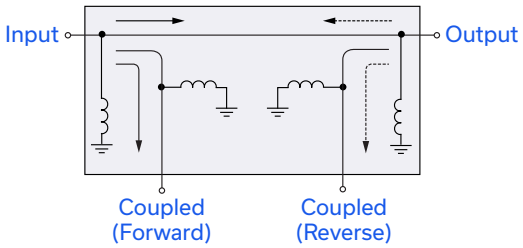
SURFACE MOUNT

Bi-Directional Coupler RBDC9-182-75+

75Ω 5 to 1800 MHz 9 dB 1 Watt

ELECTRICAL SCHEMATIC

BI-DIRECTIONAL COUPLER*



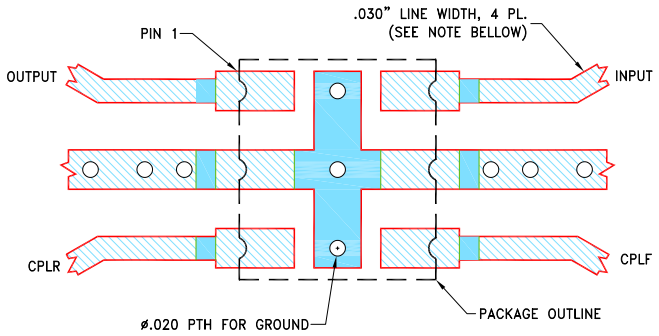
*Electrical schematic is for Bi-Directional coupler with internal transformer(s) that routes DC from all ports to ground

Figure 1. RBDC9-182-75+ Electrical Schematic

PAD DESCRIPTION/CONFIGURATION

Function	Pad Number	Description
Input	6	Connects to RF Input Port
Output	1	Connects to RF Output Port
CPL F	4	Connects to Coupled Ports
CPL R	3	
Ground	2;5	Connects to Ground

SUGGESTED PCB LAYOUT (PL-795)



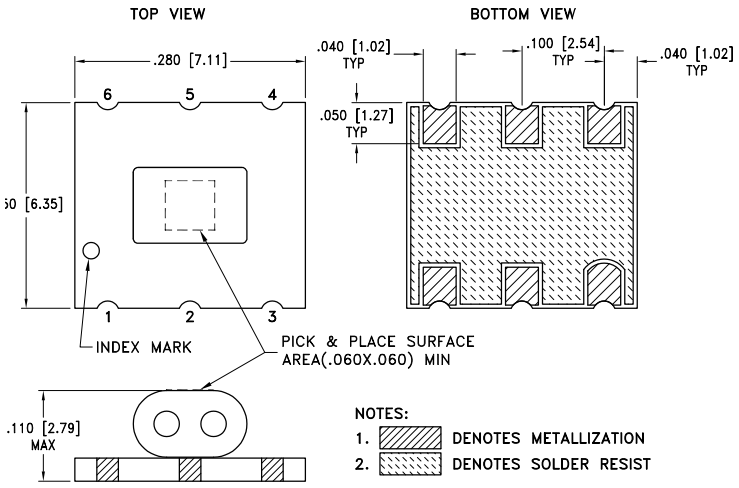
NOTES:
1. LINE WIDTH IS SHOWN FOR ROGERS RO4350B, DIELECTRIC THICKNESS: .030±.002"; COPPER: 1/2 Oz EACH SIDE. FOR OTHER MATERIALS LINE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

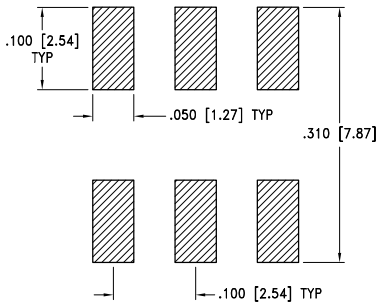
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

Figure 2. Suggested PCB Layout PL-795

CASE STYLE DRAWING



PCB Land Pattern



SUGGESTED LAYOUT FOR PC PATTERN
TOLERANCE TO BE WITHIN ±.002

Weight: .361 grams
Dimensions are in inches [mm]. Tolerances: 2 Pl.±.01; 3 Pl. ±.005 Inch

PRODUCT MARKING*: N/A

*Marking may contain other features or characters for internal lot control.

SURFACE MOUNT

Bi-Directional Coupler RBDC9-182-75+

75Ω 5 to 1800 MHz 9 dB 1 Watt

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD. CLICK HERE

Performance Data & Graphs	Data Graphs S-Parameter (S4P Files) Data Set (.zip file) De-embedded to device pads
Case Style	TT1491-8
RoHS Status	Compliant
Tape and Reel	F2
Suggested Layout for PCB Design	PL-795
Evaluation Board	TB-RBDC918275+ Gerber File
Environmental Rating	ENV02T1

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 RBDC9-182-75+

Typical Performance Data

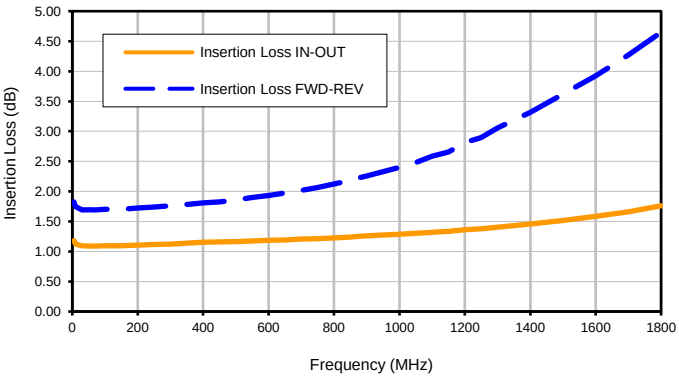
FREQ. (MHz)	INSERTION LOSS[1] (dB)		COUPLING (dB)		ISOLATION (dB)		RETURN LOSS (dB)			
	IN-OUT	FWD-REV	IN-FWD	OUT-REV	IN-REV	OUT-FWD	IN	OUT	FWD	REV
5	1.18	1.82	10.08	9.15	36.58	25.54	24.06	19.10	23.38	17.79
7	1.15	1.78	10.05	9.13	38.03	25.54	26.29	19.66	25.46	18.64
10	1.12	1.74	10.00	9.11	38.87	25.59	28.04	20.15	27.08	19.36
30	1.09	1.69	9.97	9.07	40.79	25.43	30.37	21.07	29.65	20.54
50	1.09	1.69	9.95	9.08	41.07	25.34	30.59	21.35	29.60	20.90
70	1.09	1.69	9.96	9.08	41.41	25.29	30.38	21.50	28.91	21.08
100	1.10	1.70	9.97	9.09	41.61	25.20	30.32	21.47	28.55	21.26
108	1.10	1.70	9.97	9.09	41.26	25.13	30.20	21.41	28.33	21.31
150	1.09	1.70	9.98	9.09	41.73	24.99	29.28	21.58	27.63	21.46
200	1.11	1.72	10.00	9.10	41.82	24.80	29.04	22.10	26.62	21.55
250	1.12	1.74	10.02	9.10	42.32	24.69	28.88	22.07	25.25	21.42
300	1.12	1.76	10.06	9.10	42.46	24.40	27.81	22.35	24.22	21.64
350	1.14	1.78	10.08	9.10	43.03	24.16	29.10	22.08	23.44	21.34
400	1.15	1.81	10.12	9.09	43.69	23.99	28.31	22.97	22.36	21.51
450	1.16	1.83	10.13	9.08	44.56	23.57	28.43	22.50	21.52	21.33
500	1.16	1.86	10.17	9.08	43.90	23.43	27.27	23.62	20.46	21.07
550	1.17	1.90	10.20	9.09	42.84	23.04	28.18	23.05	19.77	20.82
600	1.18	1.93	10.21	9.08	42.18	22.77	27.13	23.76	19.00	20.78
650	1.19	1.97	10.24	9.08	40.65	22.46	27.65	23.56	18.33	20.61
684	1.20	2.01	10.27	9.08	39.73	22.15	26.93	23.89	17.75	20.67
700	1.21	2.02	10.28	9.08	39.31	22.06	26.54	23.99	17.54	20.56
750	1.21	2.07	10.31	9.09	37.81	21.75	26.79	24.34	16.75	20.32
850	1.24	2.18	10.37	9.10	35.37	21.09	26.43	24.57	15.51	19.77
870	1.25	2.22	10.40	9.12	34.90	20.96	26.19	24.79	15.25	19.72
900	1.26	2.26	10.41	9.11	34.23	20.74	26.14	24.67	15.03	19.46
1000	1.29	2.40	10.49	9.14	32.15	20.10	25.70	24.34	13.92	18.72
1050	1.30	2.48	10.54	9.16	31.29	19.74	25.66	23.84	13.36	18.39
1100	1.32	2.59	10.57	9.20	30.34	19.43	24.98	23.74	12.89	17.91
1150	1.33	2.66	10.62	9.19	29.44	19.06	24.78	23.16	12.31	17.49
1200	1.36	2.81	10.68	9.27	28.49	18.85	23.88	22.51	11.93	17.02
1218	1.37	2.84	10.70	9.27	28.21	18.72	23.88	22.15	11.77	16.87
1250	1.38	2.89	10.74	9.28	27.74	18.43	23.77	22.00	11.42	16.70
1300	1.41	3.06	10.80	9.39	27.05	18.29	22.85	21.35	11.03	16.31
1400	1.46	3.32	10.94	9.53	25.65	17.88	21.81	20.53	10.22	15.40
1500	1.52	3.62	11.11	9.67	24.39	17.50	20.81	19.43	9.50	14.51
1600	1.59	3.92	11.31	9.82	23.22	17.23	20.14	18.32	8.85	13.68
1700	1.66	4.27	11.56	10.00	22.25	17.09	19.40	17.30	8.22	12.98
1800	1.76	4.65	11.85	10.14	21.38	17.09	18.95	16.86	7.61	12.33

[1] Does not include coupling loss

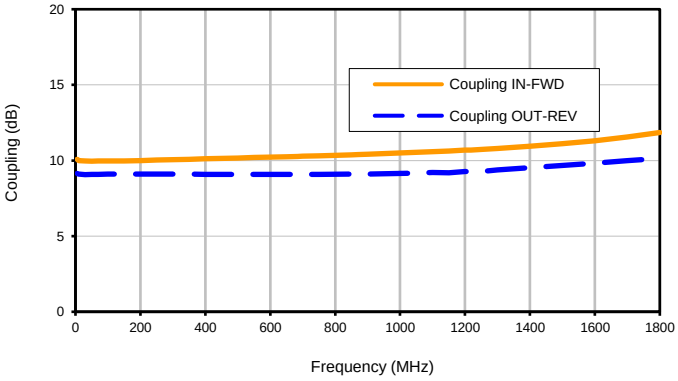
Bi-Directional Coupler RBDC9-182-75+

Typical Performance Curves

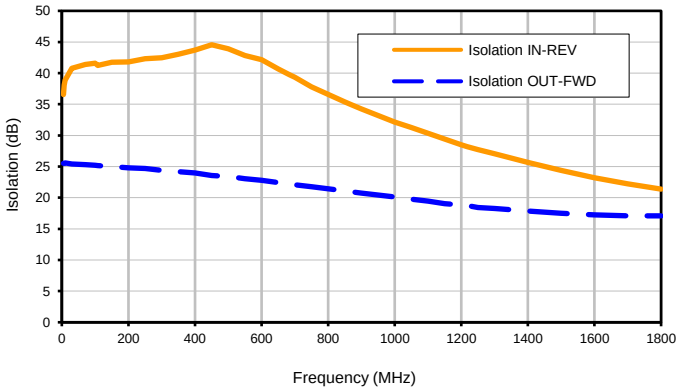
Insertion Loss



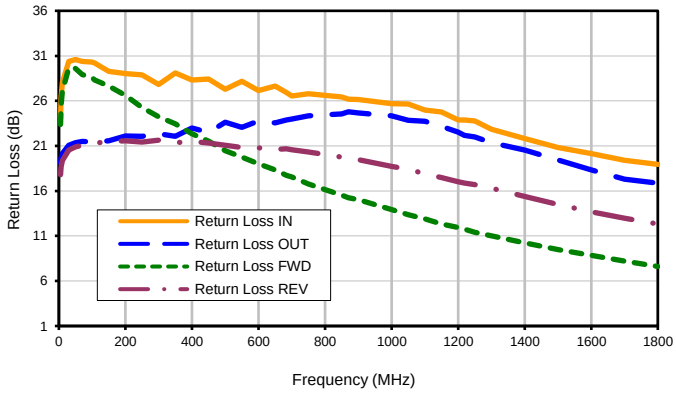
Coupling



Isolation



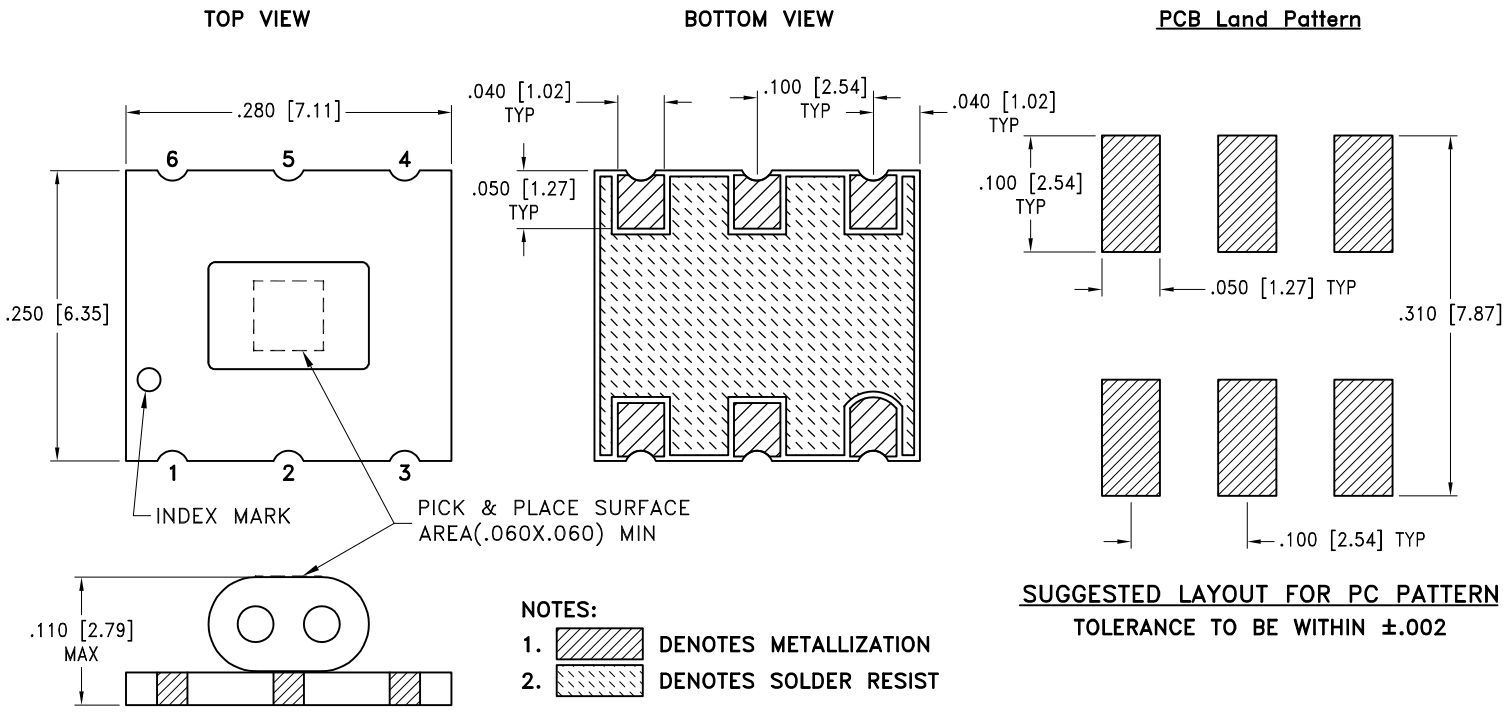
Return Loss



Case Style TT

Outline Dimensions

TT1491-8



Weight: .361 grams

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

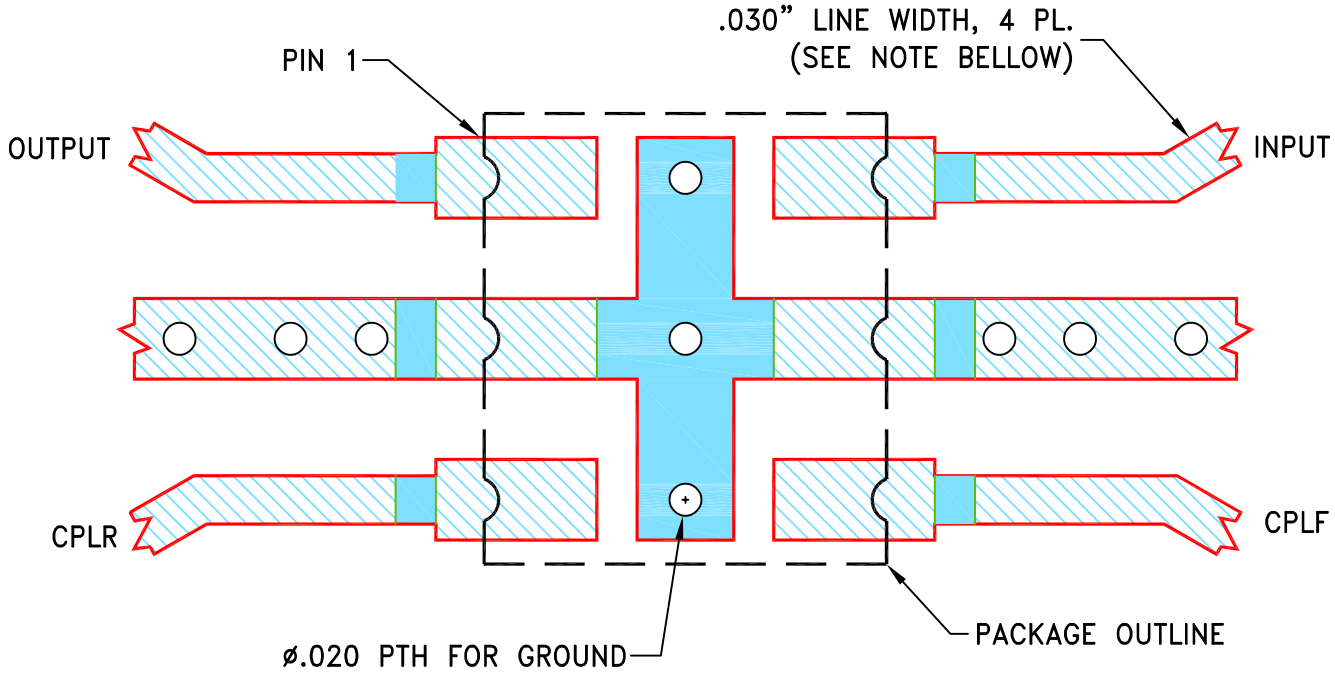
Notes:

1. Open style, Base material: Printed wiring laminate.
2. Termination finish: 3-5 µ inch (.08-.13 microns) Gold over 120-240 µ inch (3.05-6.10 microns) Nickel plate All models, (+) suffix.

THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-023000	NEW RELEASE	09/16/24	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR TT1491-8 CASE STYLE



NOTES:

1. LINE WIDTH IS SHOWN FOR ROGERS RO4350B, DIELECTRIC THICKNESS: .030±.002"; COPPER: 1/2 Oz EACH SIDE. FOR OTHER MATERIALS LINE 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	ITG	09/10/24
TOLERANCES ON:	CHECKED	GF	09/10/24
2 PL DECIMALS ±	APPROVED	IL	09/10/24
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

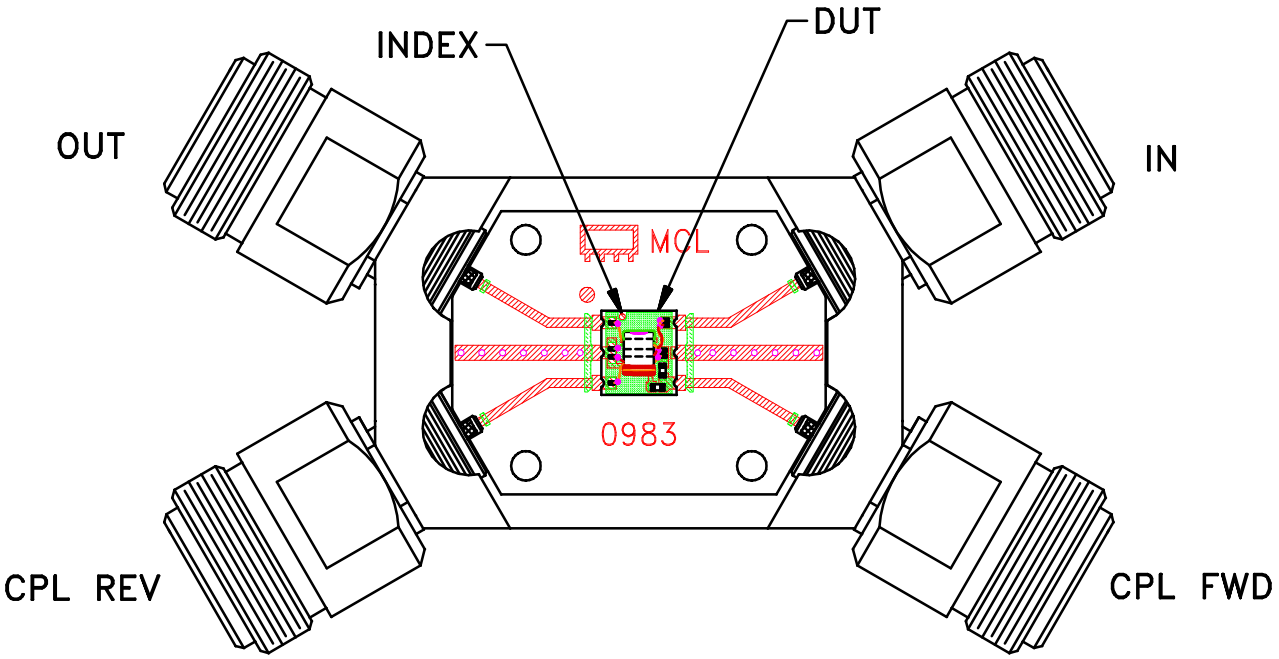
ASHEETA1.DWG REV:A DATE:01/12/95

Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

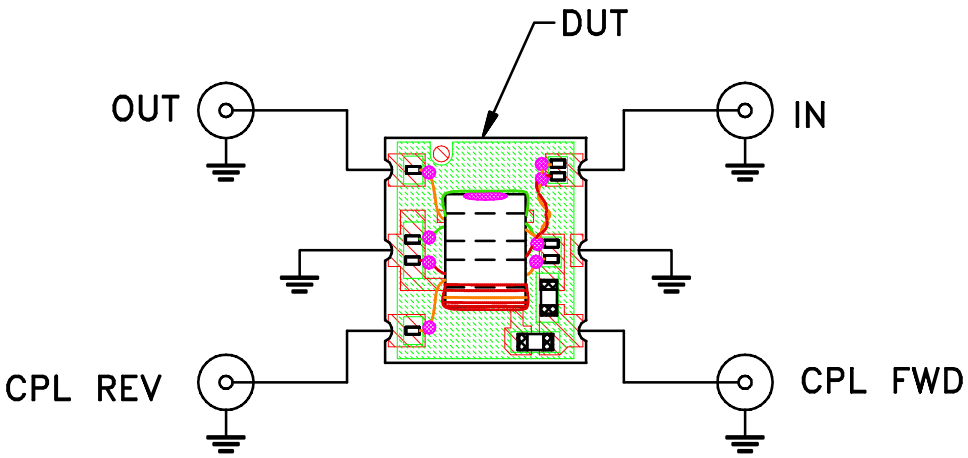
PL, TT1491-8, TB-RBDC918275X+

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-795	OR
FILE: 98PL795	SCALE: 8:1	SHEET: 1 OF 1	

Evaluation Board and Circuit



TB-RBDC918275+



Schematic Diagram

Notes:

1. 75 Ohm N-TYPE Female connectors.
2. PCB Material: ROGERS RO4350B or equivalent, Dielectric Constant=.030±.002, Thickness=.030 inch.

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