SURFACE MOUNT

Bi-Directional Coupler

RBDC9-182-75R+

75Ω 5 to 1800 MHz 9 dB Coupling

KEY FEATURES

- Low Mainline Loss, 1.8 dB Typ. at 1800 MHz
- Good Return Loss, 23 dB Typ. at Input
- Excellent Isolation between In-CPLR 38 dB Typ. in the Range 50 - 684 MHz
- Supports DOCSIS® 4.0 Systems

Generic photo used for illustration purposes only

APPLICATIONS

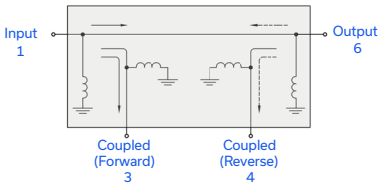
- DOCSIS® 4.0
- Cable TV

PRODUCT OVERVIEW

Mini-Circuits' RBDC9-182-75R+ 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.

FUNCTIONAL DIAGRAM

BI-DIRECTIONAL COUPLER*



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

ELECTRICAL SPECIFICATIONS AT +25°C

Parameter	Frequency (MHz)	Min.	Typ.	Max.	Units
Frequency Range		5		1800	MHz
Insertion Loss (Input-Output)	5 - 50	—	1.5	1.9	dB
	50 - 684	—	1.35	1.7	
	684 - 1218	—	1.6	1.9	
	1218 - 1800	—	1.8	2.3	
Insertion Loss (CPLF-CPLR)	5 - 684	—	2.0	2.7	dB
	684 - 1218	—	2.9	—	
	1218 - 1800	—	4.5	—	
Coupling, Nominal	5 - 684	—	9.5±0.8	—	dB
	684 - 1800	—	9.5±1.0	—	
Coupling Flatness (±)	5 - 684	—	0.15	0.7	dB
	684 - 1800	—	0.8	1.5	
Isolation (Input-CPLR)	5 - 50	32	40	—	dB
	50 - 684	30	38	—	
	684 - 1800	16	25	—	
Isolation (Output-CPLF)	5 - 684	18	23	—	dB
Return Loss (Input)	5 - 684	17	23	—	dB
	684 - 1218	16	20	—	
	1218 - 1800	16.5	22	—	
Return Loss (Output)	5 - 50	14	18	—	dB
	50 - 1218	16.5	22	—	
	1218 - 1800	16	21	—	
Return Loss (Coupling)	5 - 684	—	18	—	dB
	684 - 1800	—	10	—	

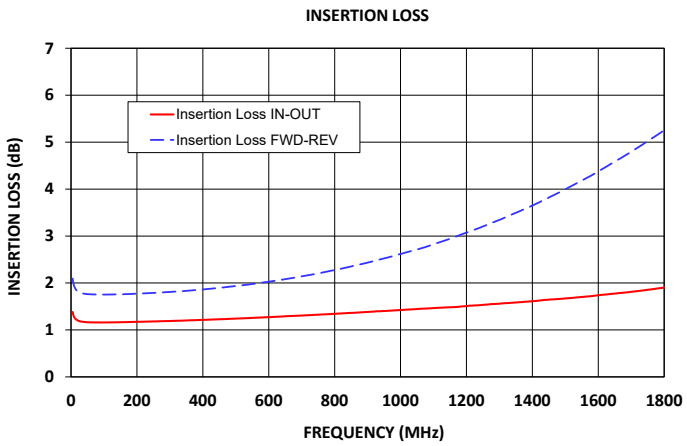
ABSOLUTE MAXIMUM RATINGS[1]

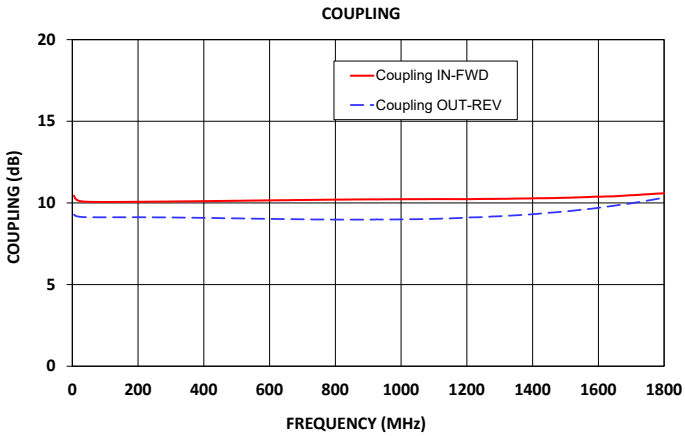
Operating Case Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C
Input Power[2]	2 W

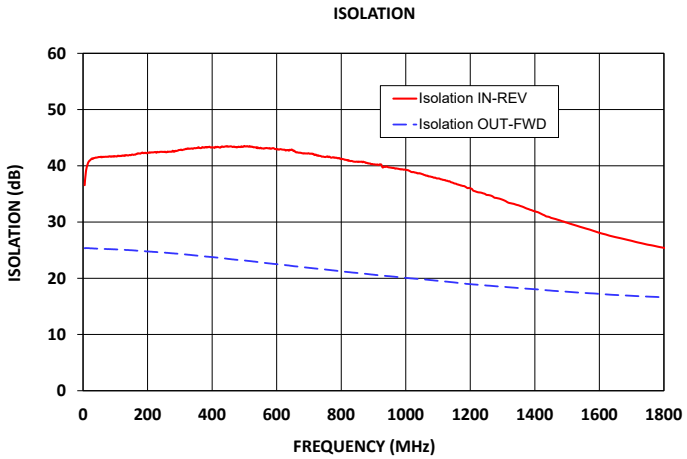
1. Permanent damage may occur if any of these limits are exceeded.
2. Derate linearly to 0.1W at 85°C ambient.

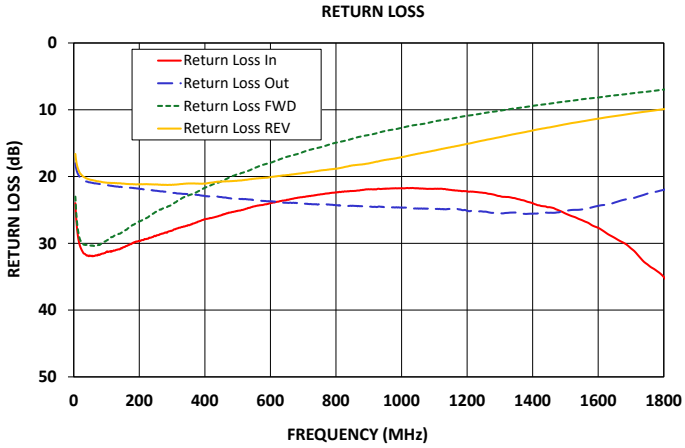
REV.OR
ECO-030214
RBDC9-182-75R+
EDU5335
MCINU
260624

TYPICAL PERFORMANCE GRAPHS AT +25°C









SURFACE MOUNT

Bi-Directional Coupler RBDC9-182-75R+

75Ω 5 to 1800 MHz 9 dB Coupling

FUNCTIONAL DIAGRAM

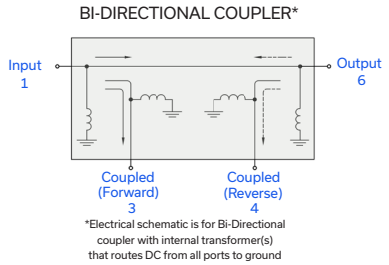
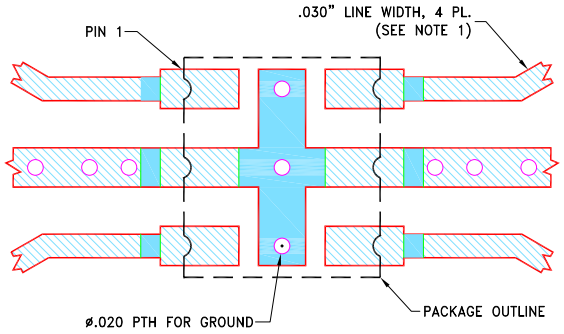


Figure 1. RBDC9-182-75R+ Functional Diagram

PAD DESCRIPTION/CONFIGURATION

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

SUGGESTED PCB LAYOUT (PL-795)



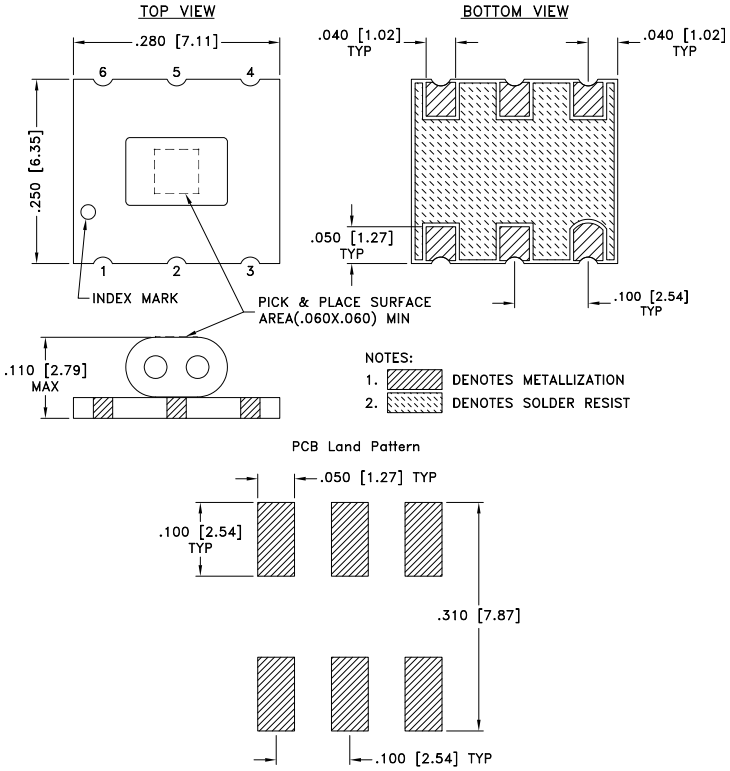
NOTES:
1. LINE WIDTH IS SHOWN FOR ROGERS RO4350B, DIELECTRIC THICKNESS: .030±.002";
COPPER: 1/2 Oz EACH SIDE. FOR OTHER MATERIALS LINE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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



WEIGHT: .361 grams

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

PRODUCT MARKING*: N/A

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

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 Lead Finish: Gold over Nickel Plate
RoHS Status	Compliant
Tape and Reel	F34
Suggested Layout for PCB Design	PL-795
Evaluation Board	TB-RBDC918275R+
	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-Circuits' applicable established test performance criteria and measurement instructions.

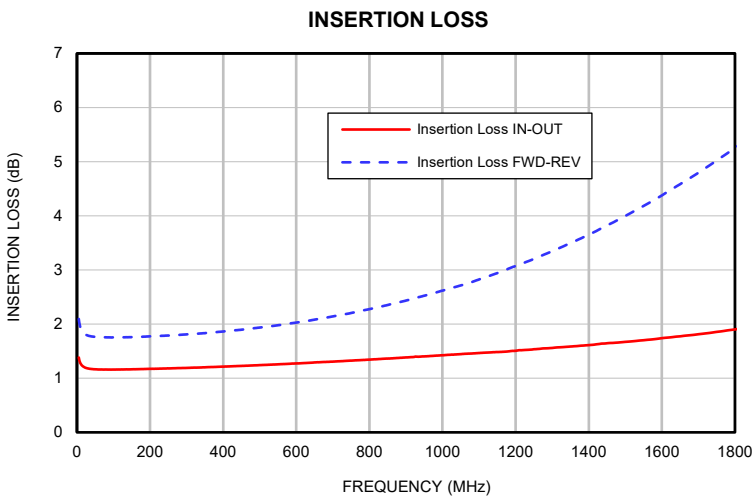
C. The parts covered by this specification document are subject to Mini-Circuits' standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html

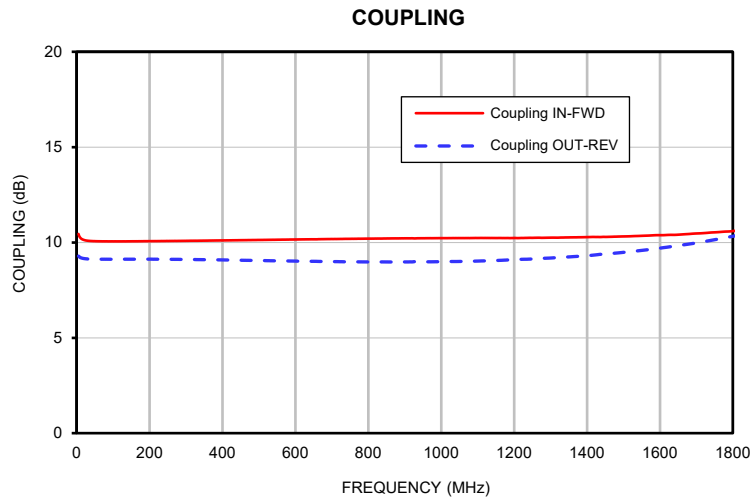
Typical Performance Data

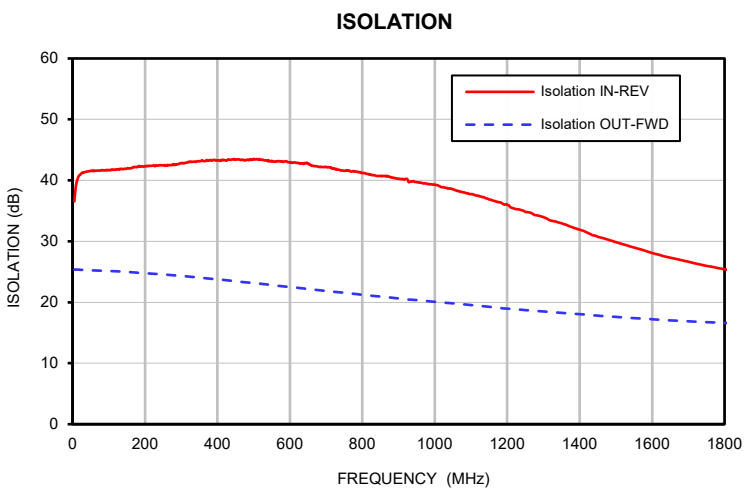
FREQUENCY	Insertion Loss[1] (dB)		Coupling (dB)		Isolation (dB)		RETURN LOSS (dB)			
(MHz)	IN-OUT	FWD-REV	IN-FWD	OUT-REV	IN-REV	OUT-FWD	IN	OUT	CPL	REV
5	1.38	2.09	10.45	9.29	36.55	25.36	23.98	18.01	23.01	16.62
7	1.32	2.00	10.33	9.25	37.96	25.36	25.84	18.66	24.90	17.47
10	1.27	1.93	10.25	9.21	39.35	25.37	27.73	19.27	26.82	18.30
16	1.22	1.85	10.16	9.17	40.59	25.36	29.80	19.90	28.85	19.19
20	1.20	1.82	10.13	9.16	40.93	25.34	30.52	20.15	29.53	19.54
50	1.16	1.76	10.07	9.12	41.56	25.25	31.85	20.87	30.32	20.49
100	1.16	1.75	10.06	9.12	41.69	25.14	31.30	21.28	29.59	20.91
120	1.16	1.76	10.06	9.12	41.69	25.14	31.30	21.28	29.59	20.91
150	1.16	1.76	10.06	9.12	41.95	24.99	30.61	21.58	28.31	21.07
200	1.17	1.77	10.07	9.12	42.33	24.77	29.70	21.83	26.71	21.17
250	1.18	1.79	10.08	9.12	42.46	24.56	28.94	22.13	25.30	21.17
300	1.19	1.81	10.09	9.11	42.82	24.33	28.09	22.44	24.14	21.23
350	1.20	1.83	10.10	9.10	43.15	24.07	27.39	22.62	22.87	21.06
400	1.21	1.86	10.11	9.08	43.31	23.88	26.77	22.76	22.25	21.05
450	1.23	1.90	10.12	9.07	43.39	23.44	25.78	23.06	20.72	20.76
500	1.24	1.94	10.13	9.05	43.54	23.16	25.13	23.36	19.65	20.61
550	1.26	1.98	10.15	9.04	43.22	22.82	24.47	23.51	18.78	20.34
600	1.27	2.03	10.16	9.02	42.91	22.51	24.01	23.69	17.93	20.09
684	1.30	2.12	10.18	9.00	42.17	21.96	23.15	23.98	16.61	19.57
700	1.31	2.14	10.18	9.18	40.23	25.36	29.30	19.73	28.35	18.97
750	1.32	2.20	10.19	8.99	41.57	21.56	22.71	24.16	15.64	19.10
800	1.34	2.28	10.20	8.98	41.18	21.23	22.37	24.29	14.93	18.84
850	1.36	2.35	10.21	8.98	40.72	20.94	22.16	24.37	14.34	18.34
900	1.38	2.43	10.22	8.98	40.25	20.63	21.91	24.51	13.78	18.03
950	1.40	2.52	10.22	8.99	39.72	20.36	21.84	24.59	13.17	17.51
1000	1.42	2.62	10.23	8.99	39.28	20.07	21.76	24.64	12.71	17.10
1050	1.45	2.71	10.23	9.01	38.55	19.83	21.78	24.77	12.29	16.66
1100	1.46	2.82	10.23	9.02	37.75	19.54	21.82	24.82	11.75	16.12
1150	1.48	2.94	10.23	9.05	36.94	19.27	21.99	24.87	11.37	15.63
1200	1.51	3.07	10.23	9.03	37.49	19.44	21.83	24.87	11.59	15.92
1225	1.52	3.14	10.24	9.12	35.28	18.84	22.31	25.18	10.73	14.85
1300	1.56	3.34	10.25	9.18	33.97	18.50	22.93	25.49	10.14	14.10
1400	1.61	3.65	10.28	9.31	31.90	18.05	23.99	25.57	9.41	13.10
1450	1.65	3.82	10.29	9.40	30.75	17.81	24.58	25.43	9.10	12.65
1500	1.67	4.00	10.32	9.48	29.88	17.60	25.53	25.16	10.79	14.95
1550	1.70	4.18	10.35	9.58	28.99	17.40	26.52	24.93	8.43	11.75
1600	1.74	4.38	10.38	9.70	28.08	17.22	27.68	24.39	8.16	11.34
1650	1.77	4.58	10.41	9.83	27.31	17.03	29.17	23.90	7.84	10.95
1700	1.81	4.79	10.47	9.98	26.66	16.88	30.76	23.27	7.56	10.59
1800	1.90	5.25	10.60	10.33	25.41	16.62	35.05	21.99	6.98	9.91

[1]Mainline loss includes coupling loss.

Typical Performance Curves

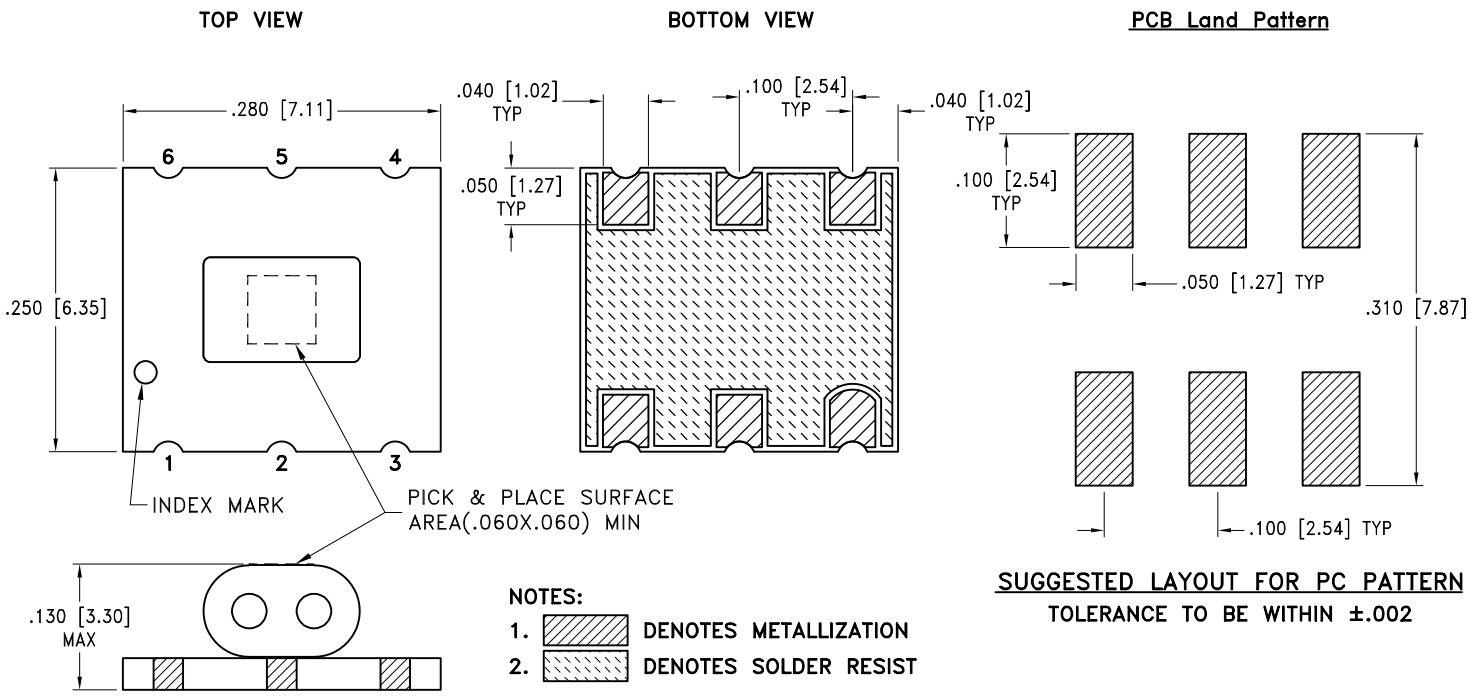






Case Style TT

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.

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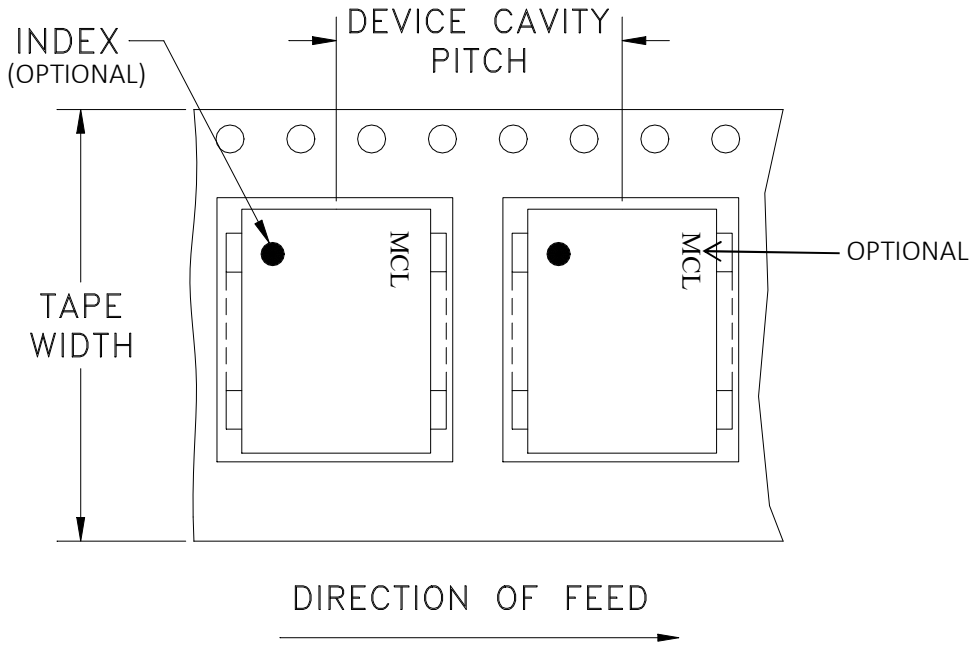
RF/IF MICROWAVE COMPONENTS

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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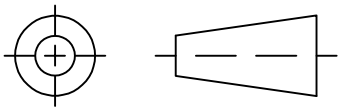
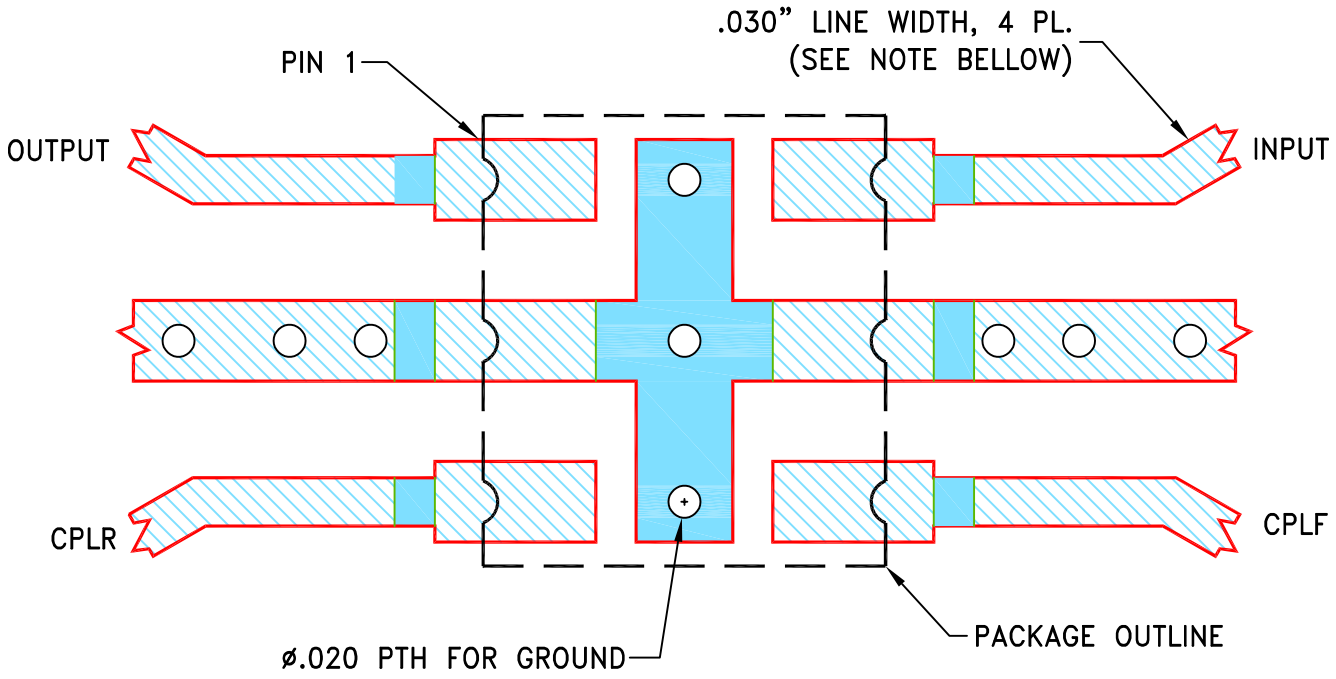
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	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 ±			

Mini-Circuits®

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:	SCALE:	SHEET:
98PL795	8:1	1 OF 1

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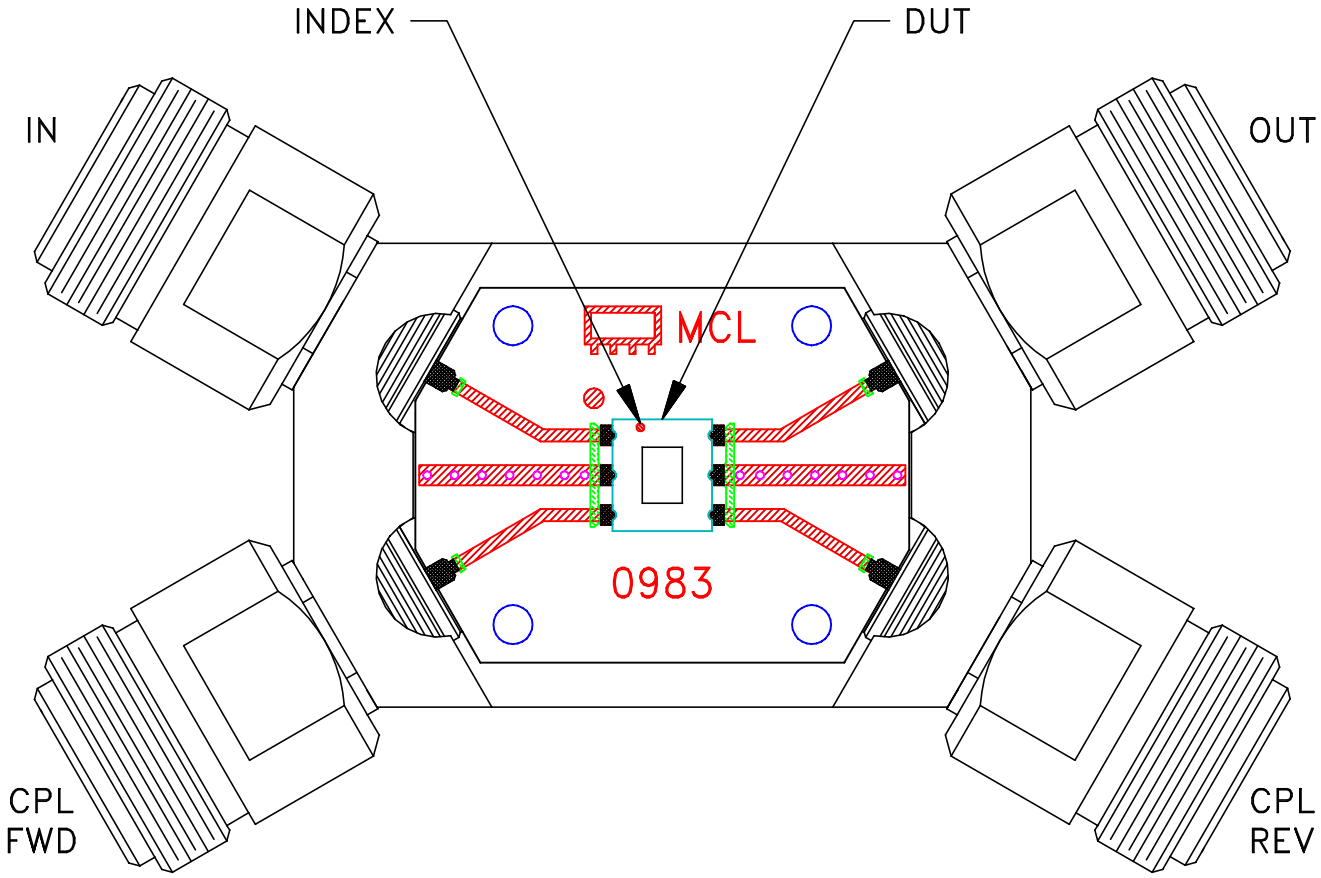
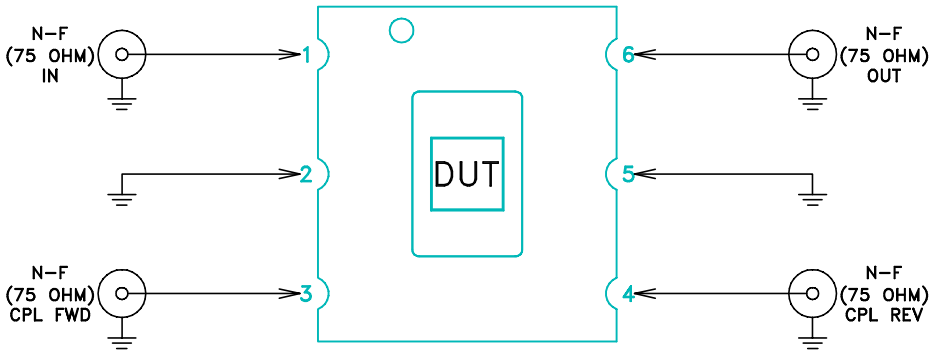
ASHEETA1.DWG REV:A DATE:01/12/95

Evaluation Board and Circuit

TB-RBDC918275R+



Schematic Diagram



Notes:

1. PCB Material: ROGERS (RO4350B) OR Equivalent, Dielectric Constant=3.48
   Thickness=.030±.002 inch
2. 75 Ohm N Female Connector.

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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

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