



SURFACE MOUNT

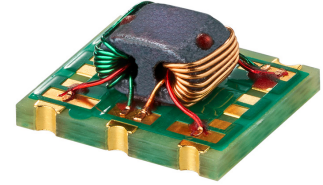
Bi-Directional Coupler

RDC-20-52-10W+

50Ω 20dB 30 to 520 MHz 10 Watt

THE BIG DEAL

- Wideband 30 to 520 MHz
- Low Mainline Loss, 0.3 dB typ. at 520 MHz
- Flat Coupling, ±0.5 dB
- Good Return Loss, 22 dB typ.



Generic photo used for illustration purposes only

CASE STYLE: TT1491-7

+RoHS Compliant

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

APPLICATIONS

- VHF/UHF
- Cable TV
- Defense / Military
- Military / Radio Application

PRODUCT OVERVIEW

Mini-Circuits' RDC-20-52-10W+ surface-mount directional coupler provides 20 dB coupling with high directivity, low mainline loss, and good return loss for 50Ω applications from 30 to 520 MHz, supporting a variety of broadband applications including VHF/UHF, cellular and more. This model features core and wire construction with wrap-around terminations for good solderability and easy visual inspection.

KEY FEATURES

Feature	Advantages
Broadband, 30 to 520 MHz	Supports bandwidth requirements.
Low Mainline Loss, 0.3 dB at 520 MHz	Provides excellent through-path signal transmission and maintains low heat dissipation, avoiding the need for special heat sinking methods.
Power Handling, up to 10 W	Usable in systems with a variety of signal power requirements.
Good Return Loss, 22 dB typ.	Provides excellent matching for 50Ω systems.

REV. A
ECO-021586
RDC-20-52-10W+
MCL NY
240430





SURFACE MOUNT

Bi-Directional Coupler

RDC-20-52-10W+

50Ω 20dB 30 to 520 MHz 10 Watt

ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		30		520	MHz
Mainline Loss ¹	30-520	–	0.3	0.4	dB
Nominal Coupling	30-520	–	19.0 ± 0.5	–	dB
Coupling Flatness(±)	30-520	–	0.3	0.5	dB
Directivity	30-520	14	20	–	dB
Return Loss (Input)	30-520	18	28	–	dB
Return Loss (Output)	30-520	18	28	–	dB
Return Loss (Coupled)	30-520	18	28	–	dB
Input Power	30-520	–	–	10	W

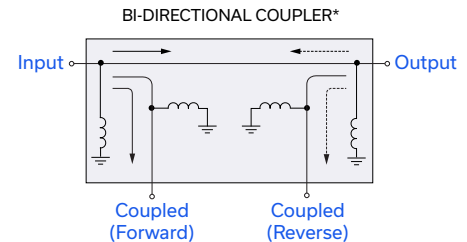
1. Mainline loss includes theoretical power loss at coupled port.

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 Bi-Directional coupler with internal transformer(s) that routes DC from all ports to ground



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Bi-Directional Coupler

RDC-20-52-10W+

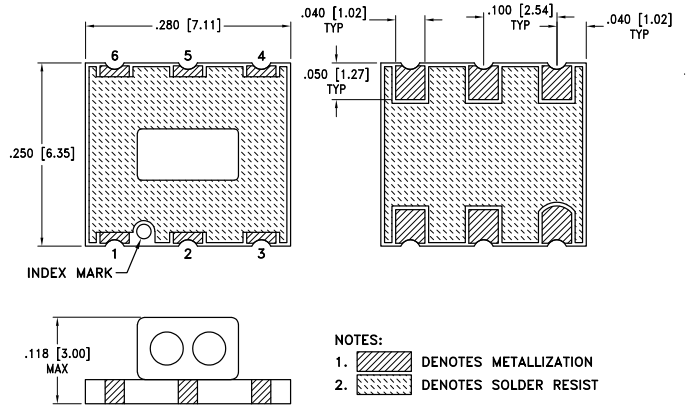


50Ω 20dB 30 to 520 MHz 10 Watt

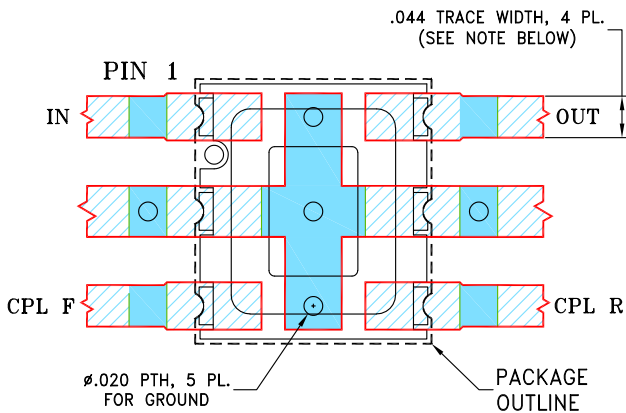
PAD CONNECTIONS

Function	Pad Number
INPUT	1
OUTPUT	6
COUPLED (Fwd)	3
GROUND	2
COUPLED (Rev)	4
ISOLATE (DO NOT USE)	5

OUTLINE DRAWING



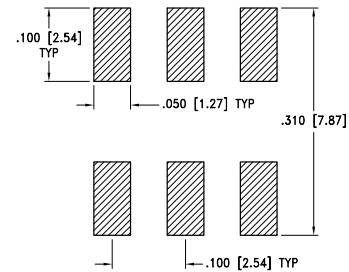
DEMO BOARD MCL P/N: TB-RDC205210W+ SUGGESTED PCB LAYOUT (PL-759)



NOTES:

- TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
- 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



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

OUTLINE DIMENSIONS (Inches mm)

A	B	C	D	E	F	G	H	J	K
.250	.280	0.118	.100	.050	.040	.040	.100	.310	.050
6.35	7.11	3.00	2.54	1.27	1.02	1.02	2.54	7.87	1.27

Weight: 0.35 grams

TAPE & REEL INFORMATION: F2





SURFACE MOUNT

Bi-Directional Coupler

RDC-20-52-10W+

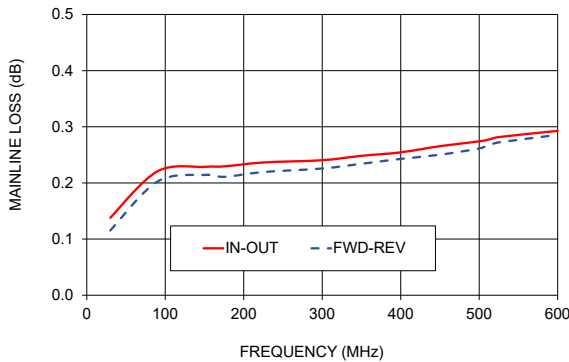
Mini-Circuits

50Ω 20dB 30 to 520 MHz 10 Watt

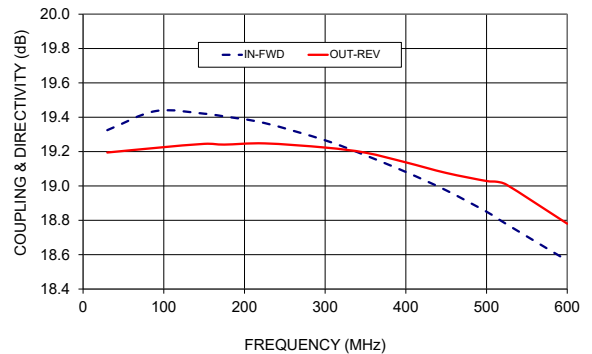
TYPICAL PERFORMANCE DATA

Frequency (Mhz)	Insertion Loss (Db)		Coupling (Db)		Directivity (Db)		Return Loss (Db)			
	In-Out	Fwd-Rev	In-Fwd	Out-Rev	In-Fwd	Out-Rev	In	Out	Fwd	Rev
30	0.14	0.12	19.32	19.19	41.64	39.17	27.24	27.59	26.80	27.28
90	0.22	0.20	19.44	19.22	33.77	39.32	31.80	34.16	31.06	33.23
150	0.23	0.21	19.42	19.25	27.83	32.03	32.71	35.14	31.77	34.41
175	0.23	0.21	19.40	19.24	26.96	30.36	32.88	34.94	31.79	33.82
225	0.24	0.22	19.37	19.25	24.70	27.35	32.89	34.19	31.27	33.21
300	0.24	0.23	19.27	19.22	21.99	24.13	33.43	33.47	30.73	31.75
350	0.25	0.23	19.18	19.19	20.69	22.30	33.25	33.31	30.42	31.20
400	0.25	0.24	19.08	19.14	19.49	20.73	33.54	32.84	30.01	30.54
450	0.27	0.25	18.97	19.08	18.37	19.36	33.58	32.76	29.59	29.66
500	0.27	0.26	18.85	19.03	17.61	18.12	33.19	32.50	29.14	29.33
512	0.28	0.27	18.82	19.02	17.43	17.80	33.13	32.41	28.96	29.17
525	0.28	0.27	18.78	19.01	17.16	17.41	33.17	32.14	28.70	28.91
600	0.29	0.29	18.57	18.78	15.87	15.84	33.27	31.29	28.01	27.56

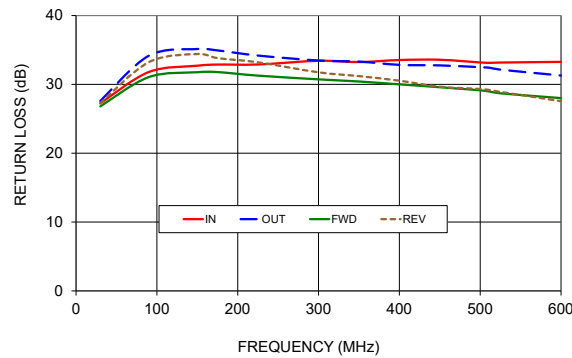
MAINLINE LOSS



COUPLING & DIRECTIVITY



RETURN LOSS



- 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.
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Bi-Directional Coupler

RDC-20-52-10W+

Typical Performance Data

FREQ. (MHz)	INSERTION LOSS ⁽¹⁾		COUPLING		DIRECTIVITY		RETURN LOSS			
	(dB)		(dB)		(dB)		(dB)			
	IN-OUT	FWD-REV	IN-FWD	OUT-REV	IN-REV	OUT-FWD	IN	OUT	FWD	REV
10	0.17	0.15	19.40	19.20	42.84	23.80	16.74	16.84	16.50	16.62
30	0.14	0.12	19.32	19.19	58.37	41.64	27.24	27.59	26.80	27.28
50	0.19	0.17	19.40	19.21	79.64	42.74	30.30	31.99	29.99	31.60
70	0.21	0.19	19.43	19.22	62.31	36.61	31.26	33.43	30.51	33.13
90	0.22	0.20	19.44	19.22	58.55	33.77	31.80	34.16	31.06	33.23
100	0.22	0.21	19.44	19.23	58.77	32.43	32.16	34.12	31.27	32.64
125	0.22	0.21	19.43	19.24	54.77	30.43	32.30	34.64	30.79	34.42
150	0.23	0.21	19.42	19.25	51.27	27.83	32.71	35.14	31.77	34.41
175	0.23	0.21	19.40	19.24	49.60	26.96	32.88	34.94	31.79	33.82
200	0.23	0.21	19.39	19.25	48.07	25.82	32.79	34.55	31.41	33.71
225	0.24	0.22	19.37	19.25	46.60	24.70	32.89	34.19	31.27	33.21
250	0.24	0.22	19.33	19.24	45.41	23.79	32.91	33.84	31.19	32.63
275	0.24	0.23	19.30	19.24	44.32	22.83	33.20	33.69	30.92	32.08
300	0.24	0.23	19.27	19.22	43.35	21.99	33.43	33.47	30.73	31.75
325	0.24	0.23	19.23	19.21	42.44	21.34	33.40	33.43	30.62	31.40
350	0.25	0.23	19.18	19.19	41.49	20.69	33.25	33.31	30.42	31.20
375	0.25	0.24	19.13	19.17	40.68	20.08	33.43	33.14	30.23	30.97
400	0.25	0.24	19.08	19.14	39.87	19.49	33.54	32.84	30.01	30.54
425	0.26	0.25	19.03	19.10	39.15	18.89	33.67	32.66	29.72	30.07
450	0.27	0.25	18.97	19.08	38.43	18.37	33.58	32.76	29.59	29.66
475	0.27	0.26	18.91	19.05	37.78	17.92	33.39	32.64	29.35	29.56
500	0.27	0.26	18.85	19.03	37.15	17.61	33.19	32.50	29.14	29.33
512	0.28	0.27	18.82	19.02	36.83	17.43	33.13	32.41	28.96	29.17
525	0.28	0.27	18.78	19.01	36.42	17.16	33.17	32.14	28.70	28.91
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600	0.29	0.29	18.57	18.78	34.62	15.87	33.27	31.29	28.01	27.56
650	0.31	0.30	18.43	18.65	33.71	15.26	33.43	31.21	27.53	27.03

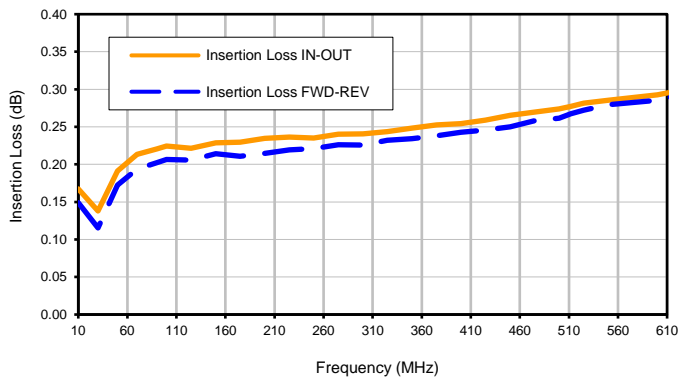
⁽¹⁾ Does not include coupling loss

Bi-Directional Coupler

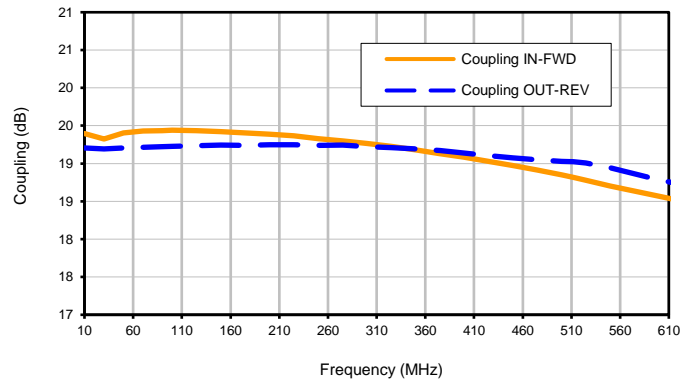
Typical Performance Curves

RDC-20-52-10W+

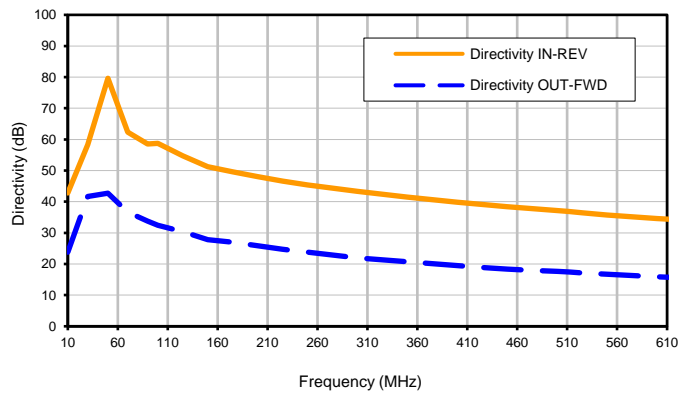
Insertion Loss



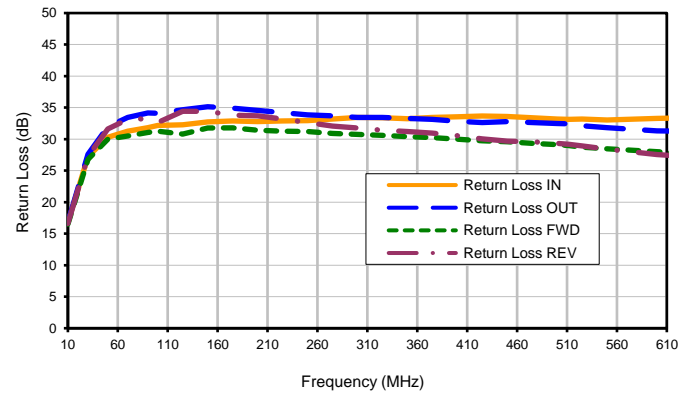
Coupling

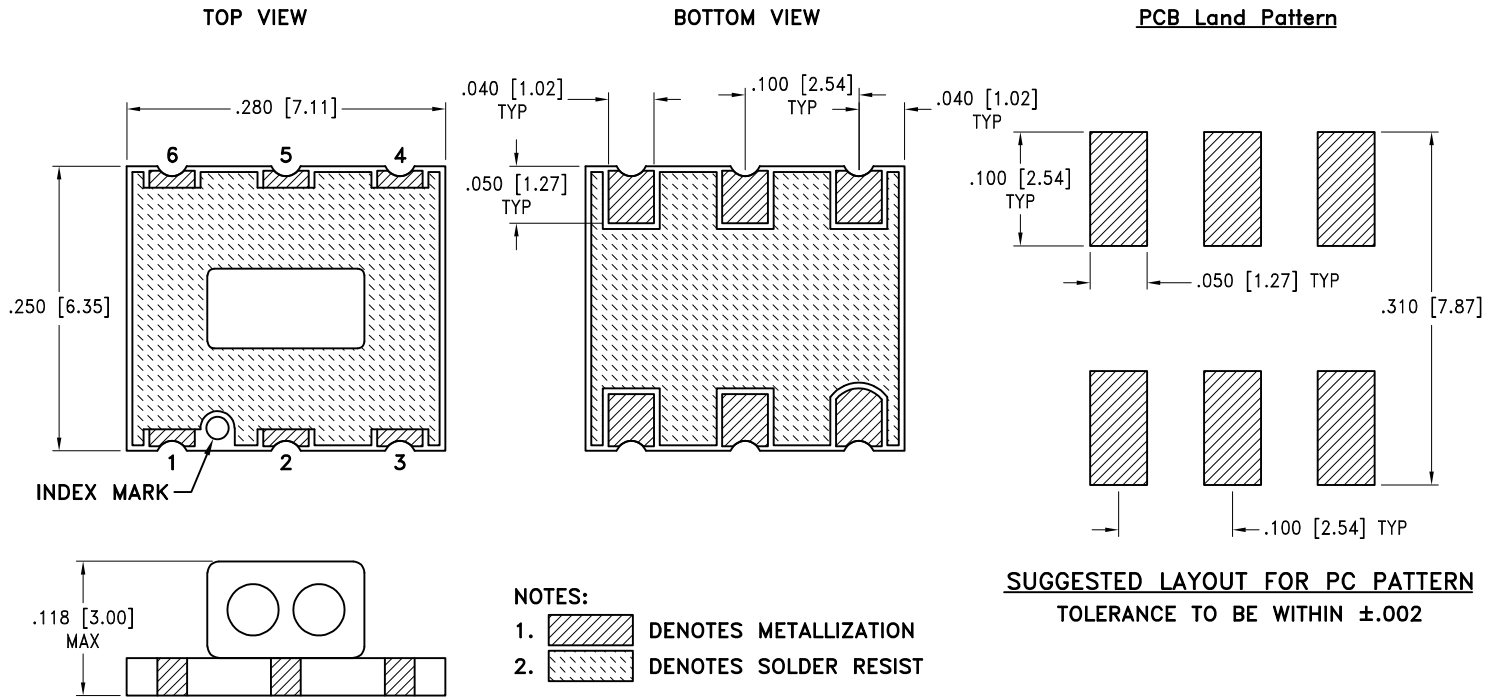


Directivity



Return Loss





Weight: .361 grams

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



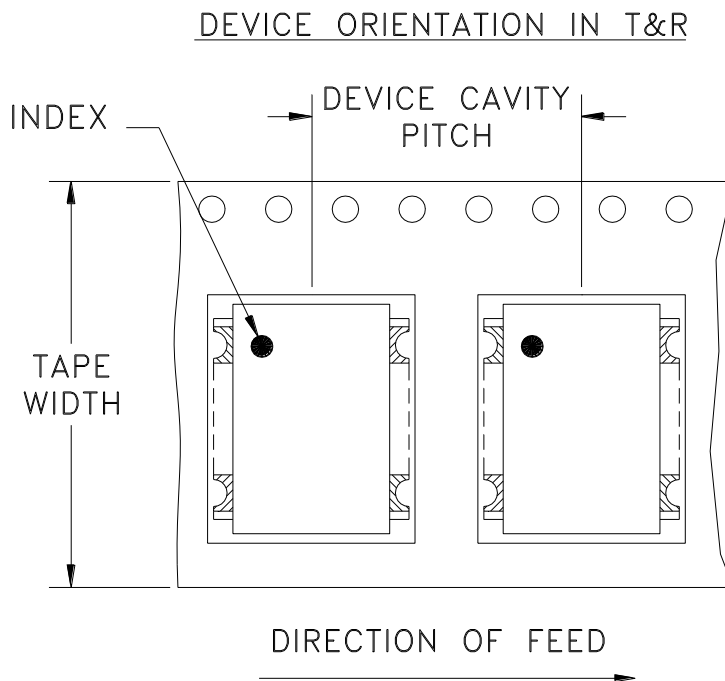
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F2



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel See note
16	12	7	10
			20
			50
			100
			200
		13	500

Note: Please consult individual model data sheet to determine device per reel availability

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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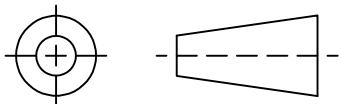
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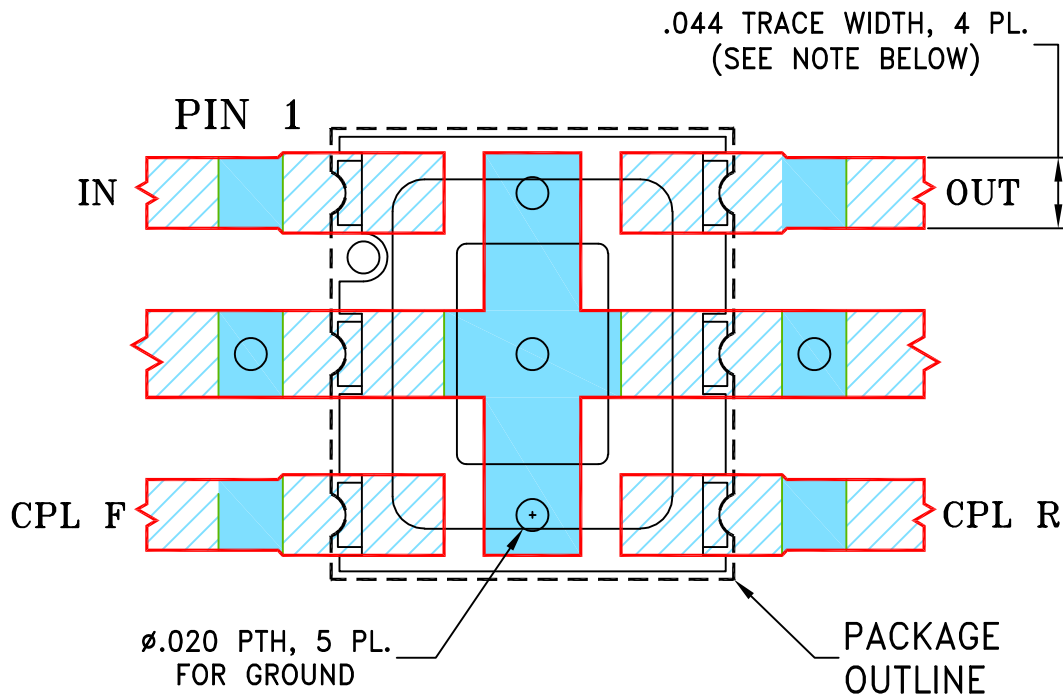
THIRD ANGLE PROJECTION



REVISIONS

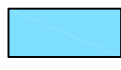
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-018890	NEW RELEASE	08/15/23	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR
TT1491-7 CASE STYLE

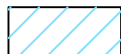


NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS R04350B WITH DIELECTRIC THICKNESS .020". 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	ITG	08/15/23
TOLERANCES ON:	CHECKED	GF	08/15/23
2 PL DECIMALS ±	APPROVED	IL	08/15/23
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			



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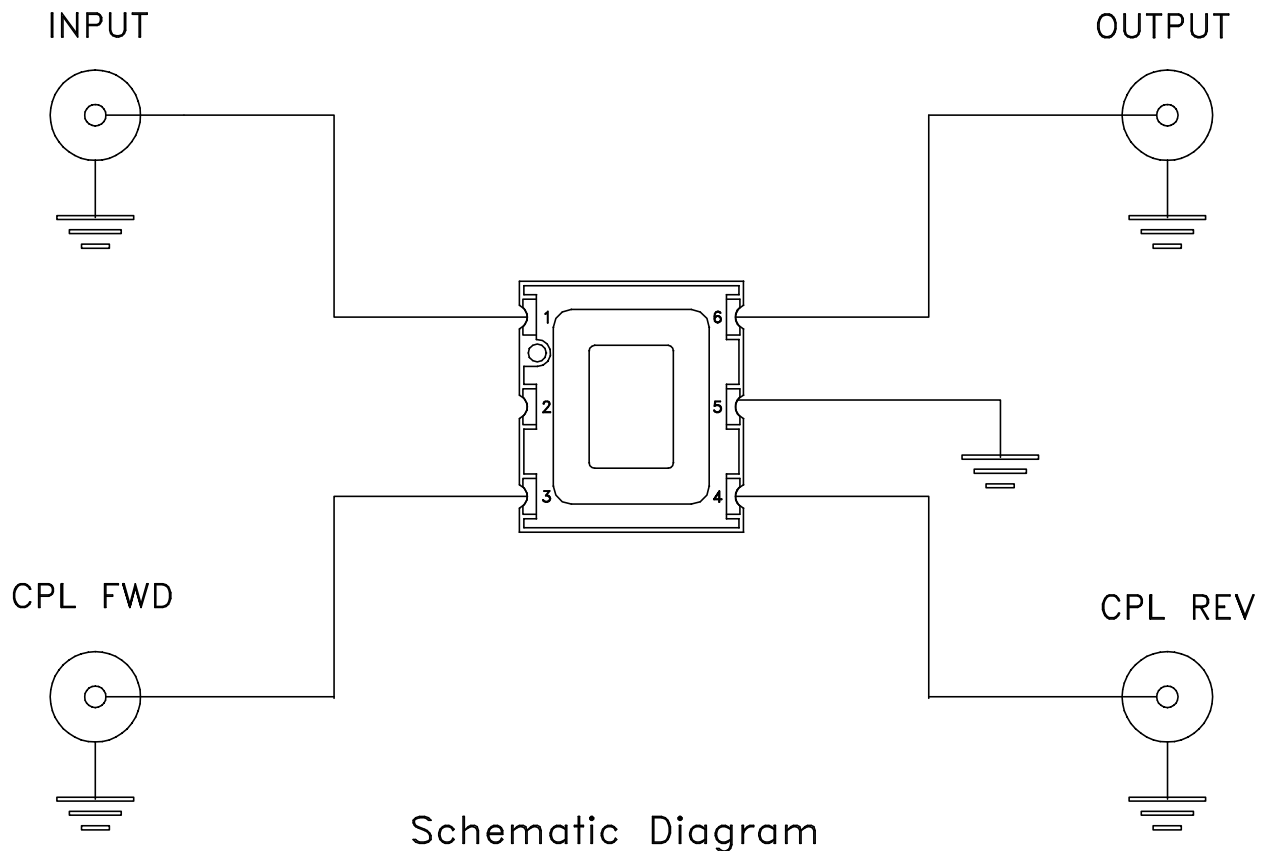
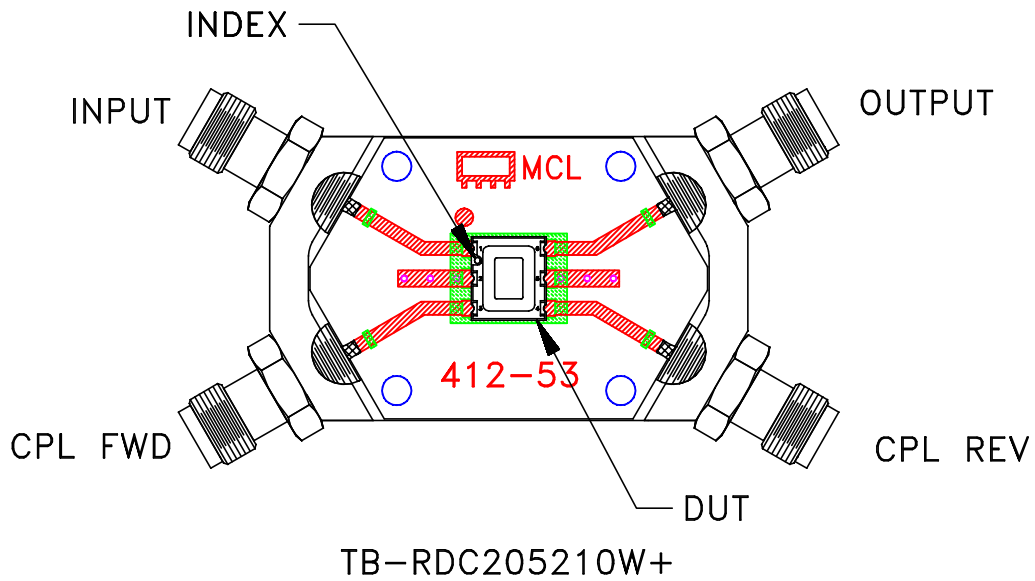
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Brooklyn NY 11235

PL, TT1491-7, TB-RDC205210W+

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SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-759	OR
FILE:	98PL759	SCALE: 8:1	SHEET: 1 OF 1

Evaluation Board and Circuit



Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 or equivalent,
Dielectric Constant=3.5, Thickness=.020 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 + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C	MIL-STD-202, Method 215