CERAMIC RESONATOR SURFACE MOUNT

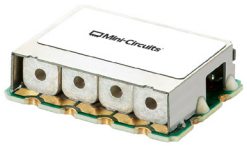
Bandpass Filter

CBP4-A3R5G+

50Ω 3450 to 3550 MHz

KEY FEATURES

- Good Insertion Loss, 1.6 dB Typ.
- Excellent Rejection, 65 dB Typ.
- Miniature Shielded Package

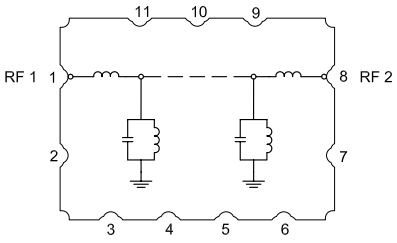


Generic photo used for illustration purposes only

APPLICATIONS

- Wireless Communication
- Satellite Communication
- Radar Systems
- Industrial, Scientific and Medical (ISM) Applications
- Radio Astronomy

FUNCTIONAL DIAGRAM



PRODUCT OVERVIEW

All our coaxial-ceramic resonator filters are built with rugged contruction, qualified to withstand multiple demanding reflow cycles. Excellent repeatability across units is achieved through precise tunning and process control.

ELECTRICAL SPECIFICATIONS[1,2,3] AT +25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Passband	Center Frequency	—	—	—	3500	—	MHz
	Insertion Loss	F1-F2	3450 - 3550	—	1.6	2.2	dB
	Return Loss	F1-F2	3450 - 3550	10	15	—	dB
Stopband, Lower	Rejection	DC-F3	DC - 3000	58	65	—	dB
		F3-F4	3000 - 3330	20	30	—	
Stopband, Upper	Rejection	F5-F6	3660 - 4050	20	28	—	dB
		F6-F7	4050 - 5500	30	40	—	

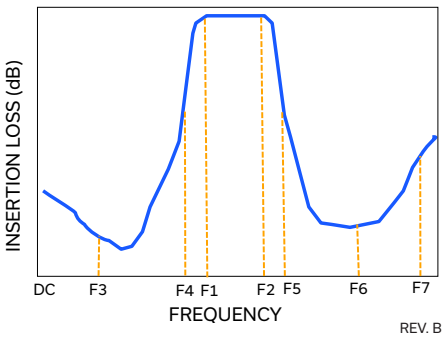
1. Tested in Evaluation Board P/N TB-CBP4-A3R5G+.
2. This filter is bi-directional RF1 and RF2 ports may be interchanged, see S-Parameters for actual performance.
3. This component should not be used as a DC-block. In applications where DC voltage and/or current is present at either the input or output ports, external DC blocking capacitors are required.

ABSOLUTE MAXIMUM RATINGS[4]

Parameter	Ratings
Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C
Input Power[5]	8 W at 25°C

4. Permanent damage may occur if any of these limits are exceeded.
5. Power rating applies only to signals within the passband. Power rating above +25°C operating temperature decreases linearly to 2 W at +85°C.

TYPICAL FREQUENCY RESPONSE AT +25°C



REV. B
ECO-028461
EDU4940
CBP4-A3R5G+
URJ
260206

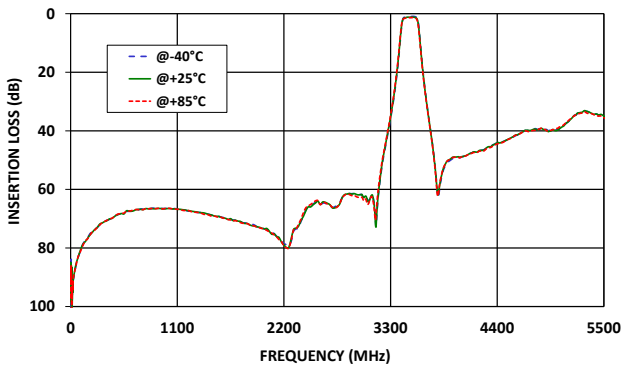
Bandpass Filter

CBP4-A3R5G+

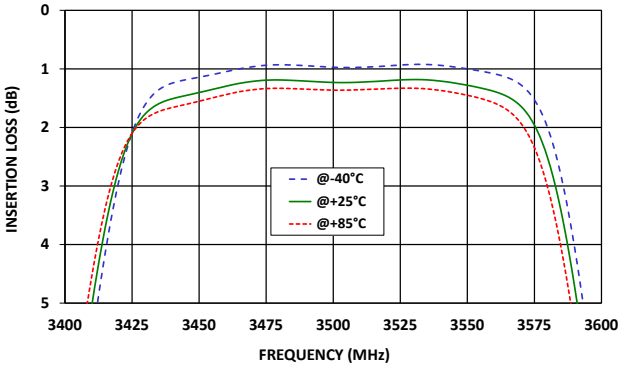
50Ω 3450 to 3550 MHz

TYPICAL PERFORMANCE GRAPHS

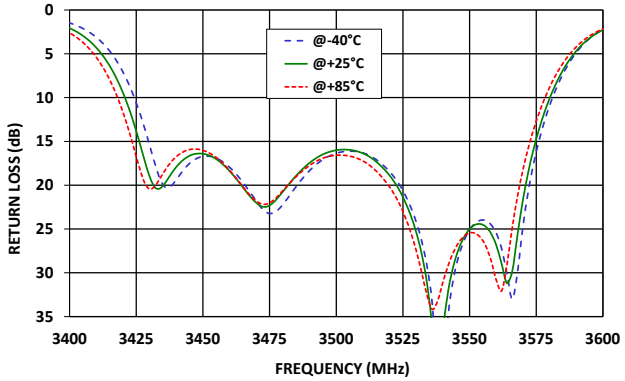
CBP4-A3R5G+
INSERTION LOSS



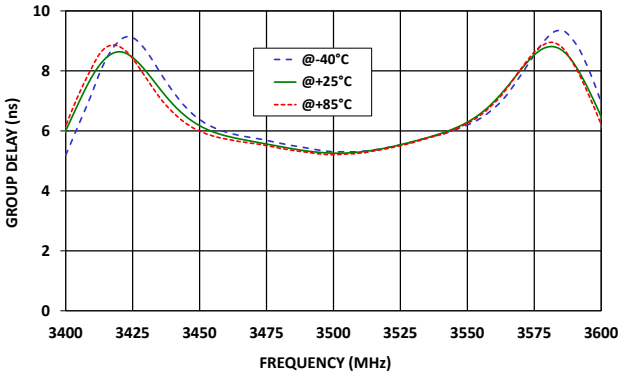
CBP4-A3R5G+
INSERTION LOSS (Zoomed)



CBP4-A3R5G+
RETURN LOSS (Zoomed)



CBP4-A3R5G+
GROUP DELAY



CERAMIC RESONATOR SURFACE MOUNT

Bandpass Filter

CBP4-A3R5G+

50Ω 3450 to 3550 MHz

FUNCTIONAL DIAGRAM

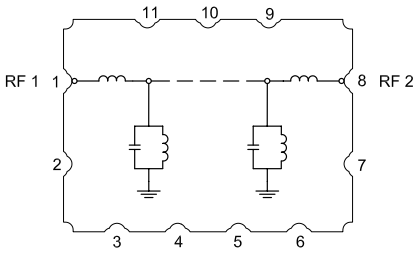
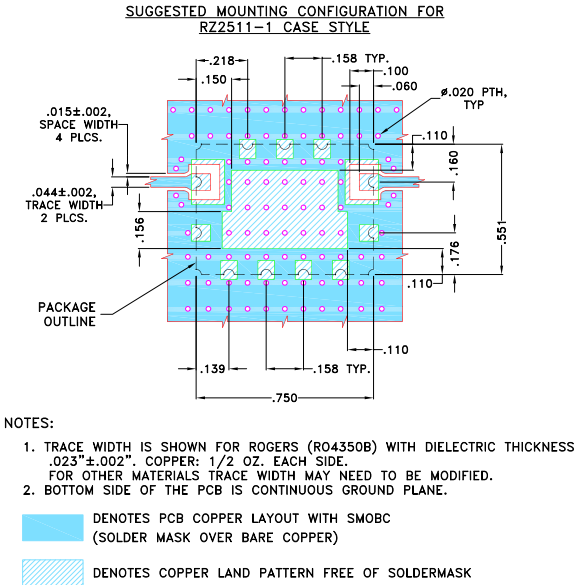


Figure 1. CBP4-A3R5G+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description
RF1[2]	1	Connects to RF Input Port
RF2[2]	8	Connects to RF Output Port
GROUND	2-7, 9-11	Connects to Ground on PCB, (See drawing PL-709)
NC	-	No connection, not used internally. See drawing PL-709 for connection to PCB

SUGGESTED PCB LAYOUT (PL-709)



NOTES:

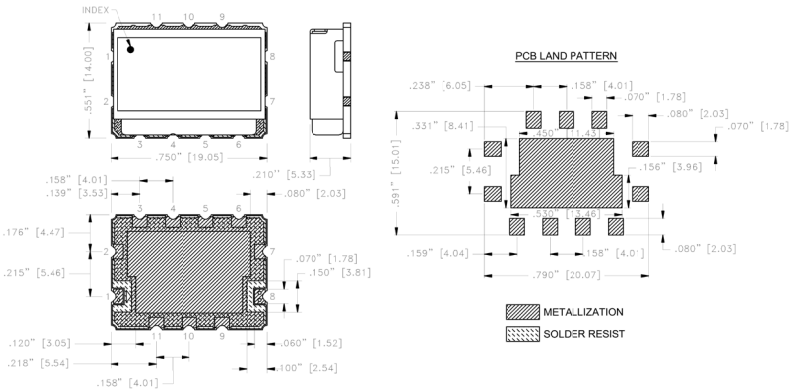
1. TRACE WIDTH IS SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .023"±.002". COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH MAY NEED TO BE MODIFIED.
2. BOTTOM SIDE OF THE PCB IS CONTINUOUS GROUND PLANE.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDERMASK

Figure 2. Suggested PCB Layout PL-709

CASE STYLE DRAWING



Weight: 2.4 gram

Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015

PRODUCT MARKING*: CBP4-A3R5G

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

Bandpass Filter

CBP4-A3R5G+

50Ω 3450 to 3550 MHz

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD. CLICK HERE

Performance Data and Graphs	Data Graphs S-Parameter (S2P Files) Data Set (.zip file) De-embedded to device pads
Case Style	RZ2511-1 Lead Finish: Electroless Nickel Immersion Gold
RoHS Status	Compliant
Tape and Reel	F122
Suggested Layout for PCB Design	PL-709
Evaluation Board	TB-CBP4-A3R5G+
	Gerber File
Environmental Rating	ENV54

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

Surface Mount Bandpass Filter CBP4-A3R5G+

Typical Performance Data

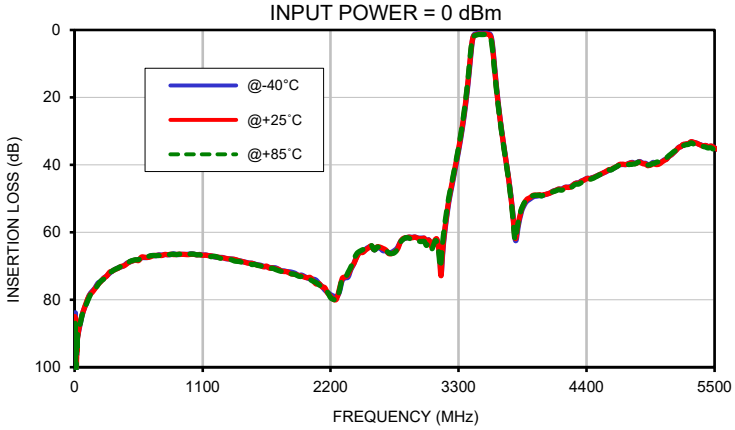
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1	86.43	90.56	97.02	0.01	0.01	0.00	0.02	0.02	0.02
3	94.79	92.90	88.58	0.01	0.01	0.01	0.03	0.02	0.02
7	100.68	85.99	87.67	0.01	0.01	0.00	0.03	0.02	0.02
10	103.09	99.04	105.58	0.01	0.01	0.00	0.03	0.03	0.02
25	91.21	91.40	90.70	0.01	0.00	0.01	0.04	0.02	0.01
50	86.88	86.35	86.87	0.00	0.01	0.03	0.03	0.01	0.00
75	83.35	83.39	83.18	0.00	0.02	0.04	0.02	0.01	0.01
100	81.26	80.85	81.32	0.01	0.02	0.05	0.02	0.00	0.02
300	72.14	71.84	72.15	0.02	0.04	0.07	0.00	0.03	0.06
500	68.41	68.48	68.34	0.01	0.04	0.06	0.01	0.02	0.05
1000	66.38	66.54	66.46	0.07	0.03	0.00	0.09	0.03	0.00
1200	67.30	67.19	67.09	0.10	0.04	0.01	0.11	0.04	0.00
1500	69.12	69.19	69.25	0.10	0.04	0.00	0.11	0.04	0.02
2000	73.52	73.47	73.58	0.06	0.02	0.05	0.06	0.02	0.07
2500	65.05	65.27	64.50	0.04	0.04	0.08	0.01	0.07	0.12
2600	64.72	64.29	64.39	0.04	0.04	0.08	0.01	0.07	0.12
2700	66.20	66.31	66.13	0.04	0.04	0.08	0.02	0.06	0.12
2800	62.83	62.85	62.90	0.05	0.04	0.08	0.02	0.07	0.14
3000	61.72	61.77	62.67	0.05	0.04	0.09	0.03	0.08	0.15
3325	30.75	30.11	29.56	0.09	0.21	0.29	0.12	0.27	0.39
3330	29.65	29.00	28.43	0.11	0.23	0.31	0.13	0.28	0.41
3366	20.54	19.78	19.10	0.28	0.45	0.59	0.33	0.54	0.71
3418	3.37	3.08	2.86	5.99	8.06	10.00	6.44	8.67	10.74
3450	1.14	1.40	1.55	16.71	16.41	16.02	17.46	17.07	16.81
3460	1.05	1.30	1.44	17.96	18.38	18.30	18.93	19.81	20.09
3480	0.93	1.19	1.33	22.19	20.73	20.61	28.86	25.56	25.31
3490	0.95	1.21	1.35	18.34	17.45	17.74	19.72	18.76	19.16
3500	0.97	1.23	1.36	16.36	16.01	16.58	16.78	16.50	17.23
3510	0.97	1.23	1.36	16.32	16.36	17.24	16.34	16.48	17.54
3520	0.95	1.20	1.34	18.44	18.89	20.21	17.88	18.43	20.02
3530	0.92	1.18	1.33	24.21	25.39	27.48	21.90	23.07	25.74
3540	0.94	1.21	1.37	43.80	36.40	31.06	26.86	27.70	29.10
3550	1.00	1.28	1.45	25.09	24.99	25.44	23.85	24.14	25.14
3660	27.18	27.49	27.87	0.18	0.30	0.36	0.21	0.36	0.45
4000	49.04	48.85	49.06	0.04	0.08	0.16	0.01	0.15	0.26
4050	48.76	48.75	48.81	0.04	0.08	0.16	0.01	0.14	0.25
4100	48.04	48.08	48.14	0.03	0.09	0.17	0.01	0.14	0.26
4150	47.34	47.28	47.47	0.02	0.11	0.19	0.01	0.14	0.26
4200	46.92	47.09	47.28	0.02	0.10	0.19	0.02	0.14	0.26
4250	46.55	46.68	47.01	0.00	0.12	0.21	0.02	0.14	0.26
4300	45.56	45.56	45.84	0.02	0.15	0.25	0.02	0.13	0.26
4350	44.88	45.02	45.34	0.02	0.15	0.25	0.02	0.14	0.26
4400	44.06	44.11	44.42	0.04	0.17	0.27	0.02	0.14	0.28
4450	43.77	43.86	44.05	0.07	0.21	0.30	0.02	0.14	0.27
4500	43.09	43.09	43.16	0.08	0.22	0.32	0.02	0.14	0.27
4550	42.30	42.24	42.37	0.09	0.23	0.33	0.01	0.16	0.29
4600	41.52	41.38	41.53	0.12	0.26	0.36	0.01	0.16	0.30
4650	40.69	40.62	40.67	0.14	0.29	0.40	0.00	0.17	0.30
4700	39.91	39.83	40.04	0.17	0.32	0.44	0.03	0.20	0.33
4750	39.82	39.79	40.03	0.18	0.34	0.46	0.04	0.21	0.34
4800	39.32	39.50	39.75	0.20	0.36	0.48	0.06	0.23	0.36
4850	39.05	39.20	39.13	0.20	0.37	0.49	0.07	0.24	0.37
4900	39.53	39.66	39.71	0.20	0.37	0.50	0.07	0.24	0.38
4950	39.81	40.13	39.92	0.19	0.38	0.51	0.08	0.25	0.38
5000	39.66	39.92	39.21	0.19	0.38	0.52	0.08	0.25	0.39
5100	37.79	37.76	37.50	0.19	0.39	0.54	0.11	0.28	0.42
5200	34.65	34.70	34.86	0.21	0.41	0.55	0.16	0.34	0.48
5300	33.22	33.11	33.47	0.24	0.44	0.58	0.23	0.42	0.54
5400	34.37	34.36	34.50	0.21	0.40	0.53	0.21	0.39	0.52
5500	34.97	34.98	35.53	0.17	0.35	0.48	0.20	0.37	0.49

Typical Performance Data

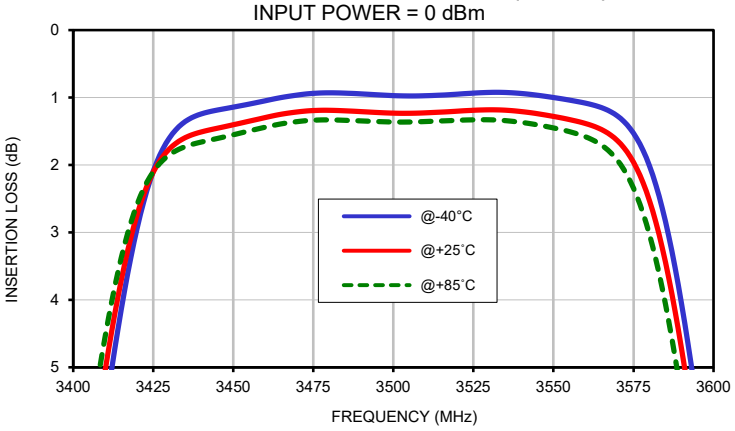
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
3450	6.38	6.17	5.99
3452	6.26	6.08	5.92
3456	6.08	5.93	5.80
3458	6.01	5.88	5.76
3460	5.96	5.83	5.72
3462	5.91	5.79	5.69
3464	5.86	5.75	5.66
3468	5.80	5.68	5.61
3470	5.76	5.64	5.58
3480	5.59	5.48	5.42
3486	5.49	5.38	5.33
3488	5.46	5.35	5.31
3500	5.30	5.26	5.20
3502	5.30	5.25	5.21
3504	5.30	5.26	5.22
3508	5.30	5.28	5.24
3510	5.32	5.30	5.26
3514	5.35	5.34	5.32
3518	5.40	5.40	5.38
3520	5.44	5.44	5.41
3524	5.51	5.52	5.48
3526	5.55	5.56	5.52
3528	5.59	5.60	5.57
3530	5.64	5.65	5.62
3534	5.74	5.75	5.72
3536	5.79	5.80	5.78
3540	5.88	5.91	5.87
3544	5.99	6.04	6.00
3550	6.19	6.29	6.25

Typical Performance Curves

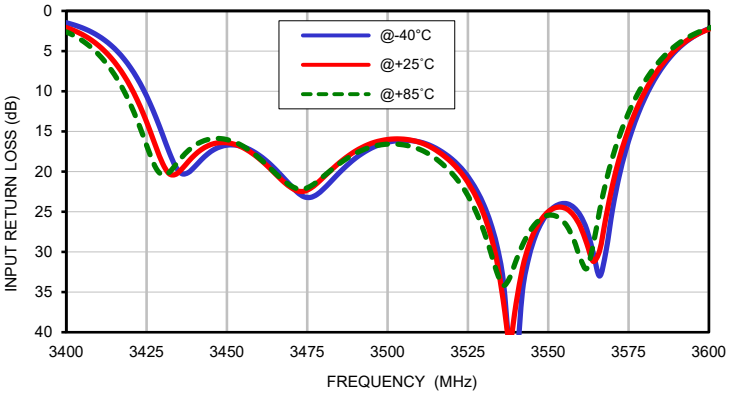
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



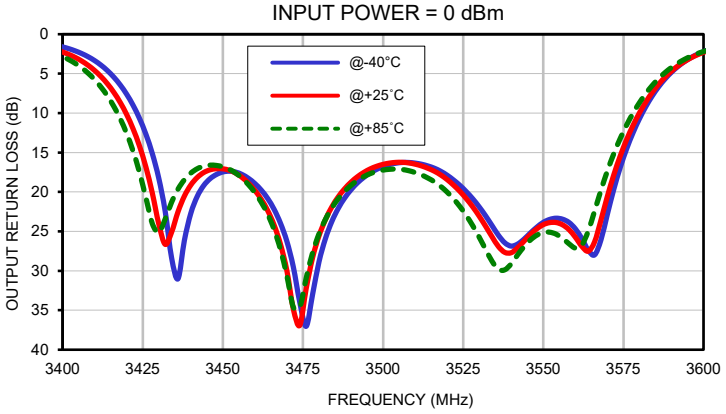
INSERTION LOSS vs. TEMPERATURE (Zoomed)
INPUT POWER = 0 dBm



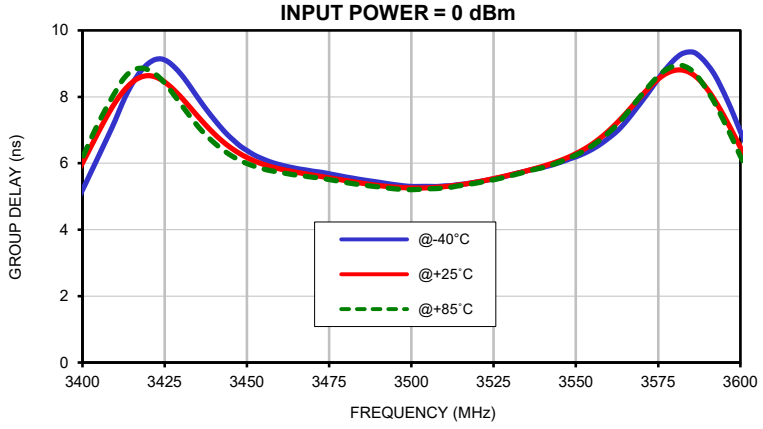
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



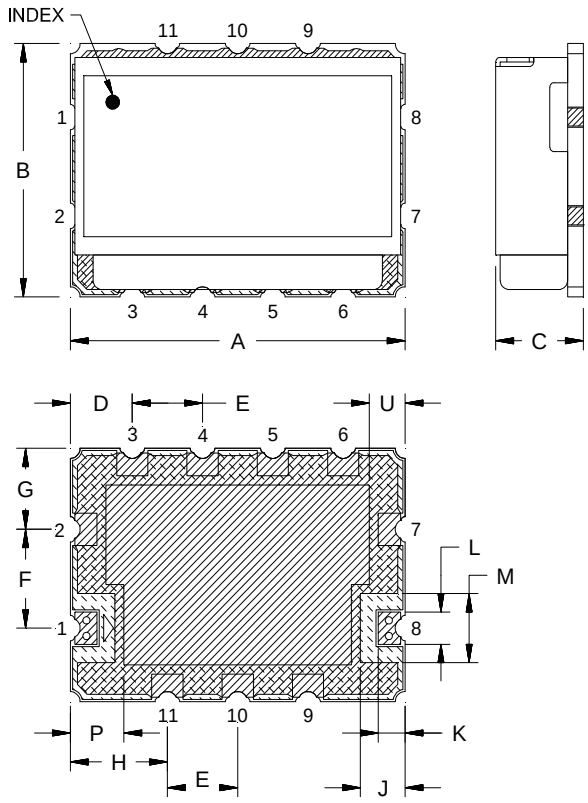
GROUP DELAY vs. TEMPERATURE
INPUT POWER = 0 dBm

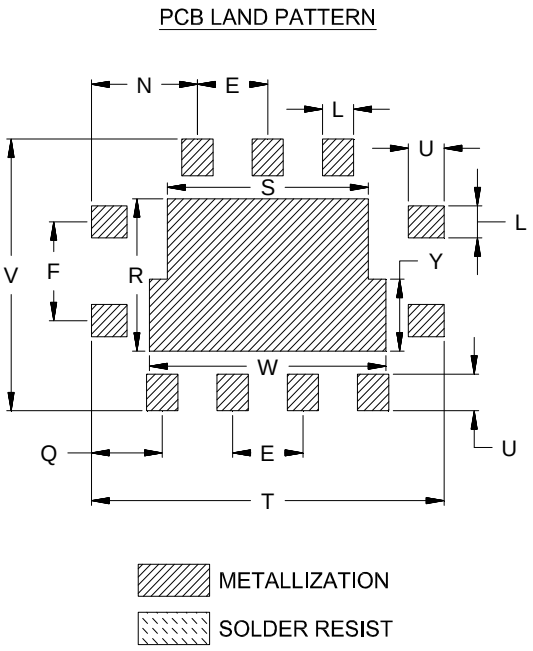


Case Style RZ

Outline Dimensions

RZ2511-1





CASE#	A	B	C	D	E	F	G	H	J	K	L	M
RZ2511-1	.750 (19.05)	.551 (14.00)	.210 (5.33)	.139 (3.53)	.158 (4.01)	.215 (5.46)	.176 (4.47)	.218 (5.54)	.100 (2.54)	.060 (1.52)	.070 (1.78)	.150 (3.81)

CASE#	N	P	Q	R	S	T	U	V	W	Y	WT.GRAMS
RZ2511-1	.238 (6.05)	.120 (3.05)	.159 (4.04)	.331 (8.41)	.450 (11.43)	.790 (20.07)	.080 (2.03)	.591 (15.01)	.530 (13.46)	.156 (3.96)	2.4

Dimensions are in inches (mm). Tolerances: 2PL. ± .03; 3PL. ± .015

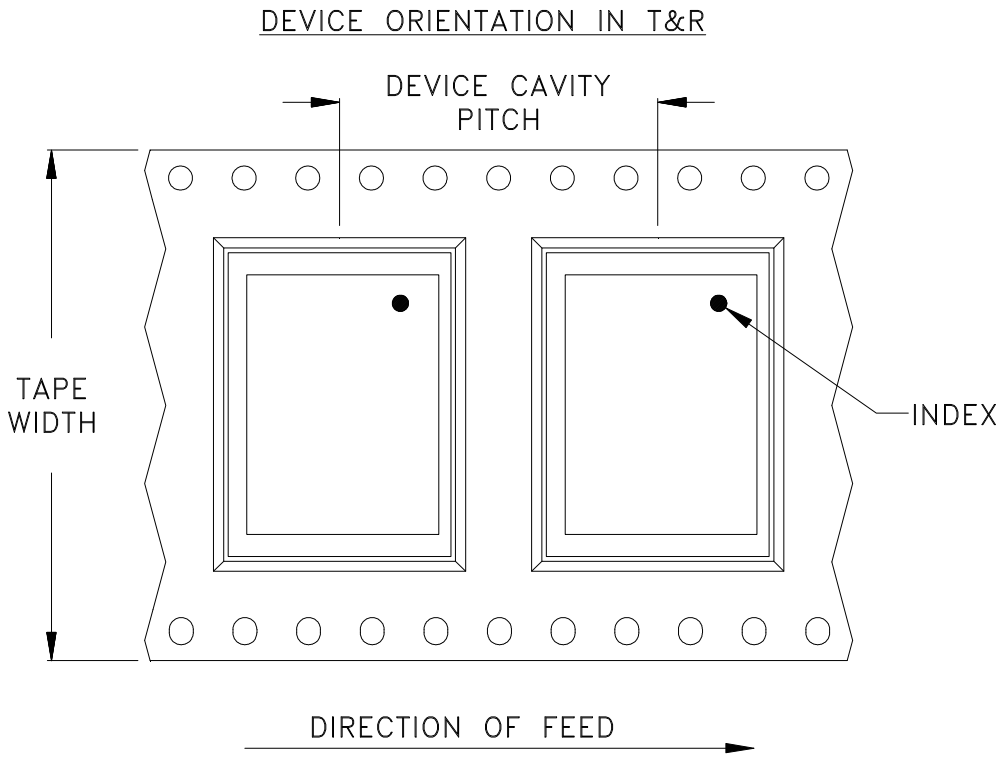
Notes:

1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:
   For RoHS Case Styles: 2-5 µ inch (.05-.13 microns) Gold over 120-240 µ inch (3.05-6.10 microns) Nickel plate.
   All models, (+) suffix.

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The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com
RF/IF MICROWAVE COMPONENTS

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Tape & Reel Packaging TR-F122



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
32	20	13	500

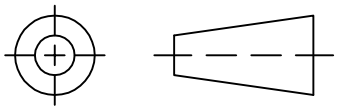
Mini-Circuits carrier tape materials provide protection from ESD (Electro-Static Discharge) during handling and transportation. Tapes are static dissipative and comply with industry standards EIA-481/EIA-541.

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

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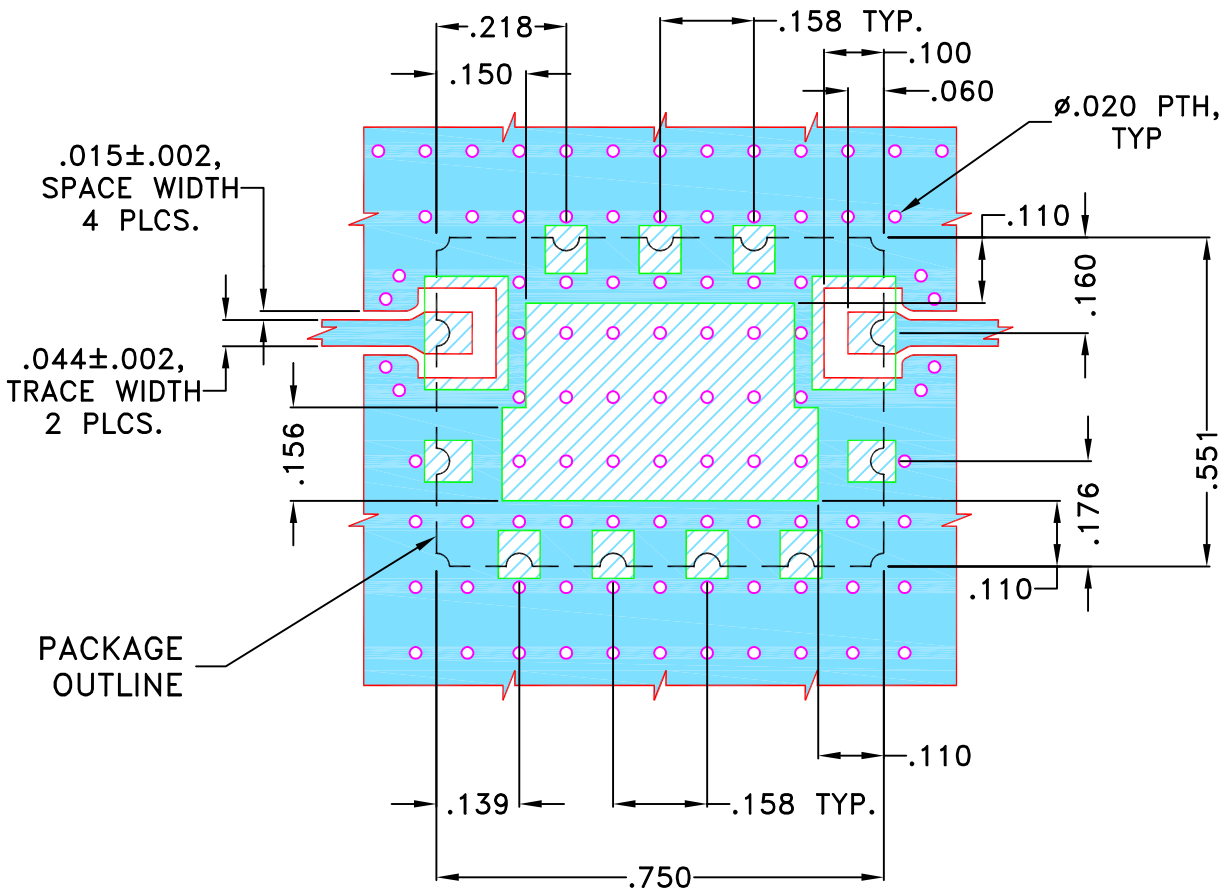
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THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	NPO-000556	NEW RELEASE	FEB 23	DDR	VC

SUGGESTED MOUNTING CONFIGURATION FOR RZ2511-1 CASE STYLE



NOTES:

1. TRACE WIDTH IS SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .023"±.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 SOLDERMASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	DDR	10 FEB 23
TOLERANCES ON:	CHECKED	CSS	10 FEB 23
2 PL DECIMALS ±	APPROVED	KN	10 FEB 23
3 PL DECIMALS ± .005"			
ANGLES ±			
FRACTIONS ±			

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

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Brooklyn NY 11235

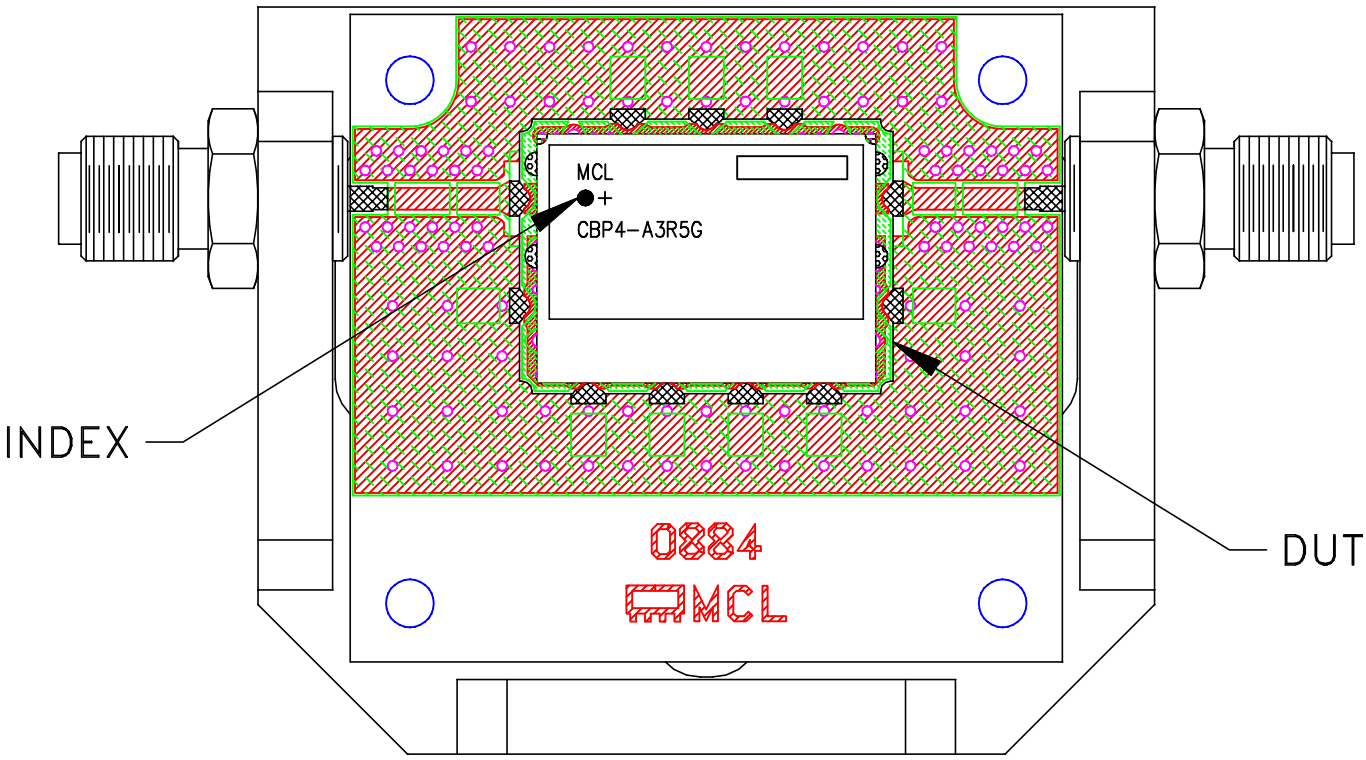
PL DWG RZ2511-1 C.S 50 OHM CBP4

SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-709	OR

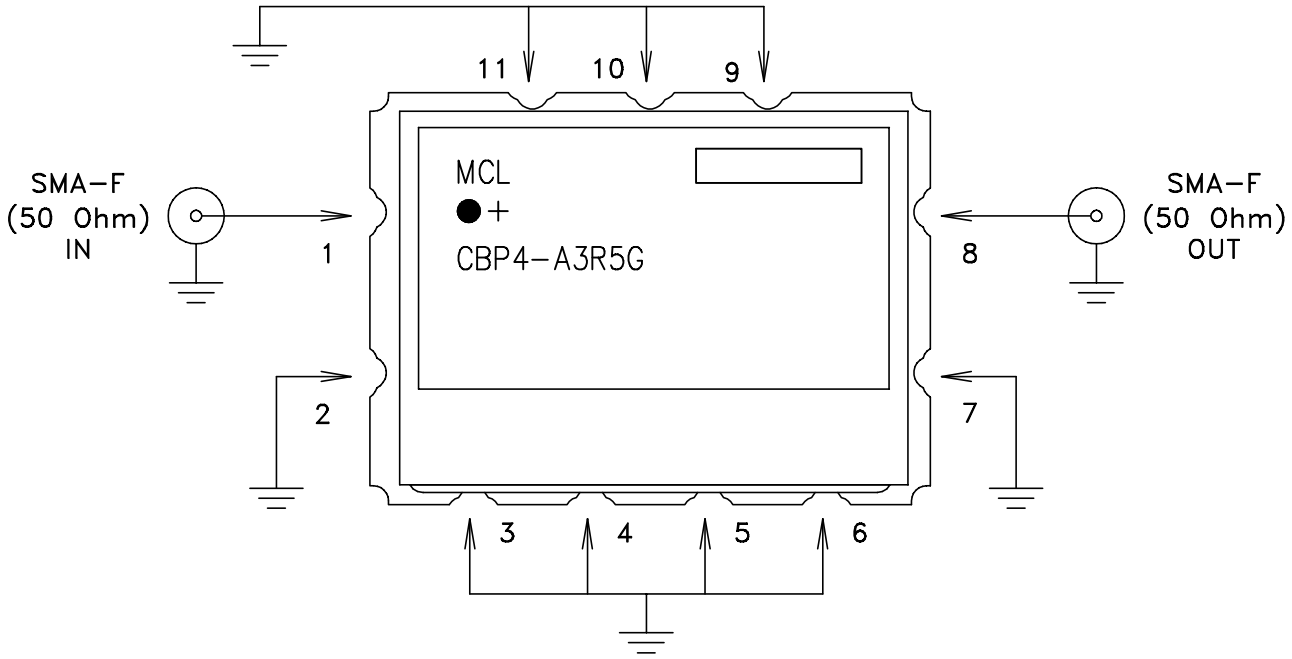
FILE:	SCALE:	SHEET:
98-PL-709	3:1	1 OF 1

Evaluation Board and Circuit

TB-CBP4-A3R5G+



Schematic diagram



Notes:

1. PCB Material: ROGERS (RO4350B) OR Equivalent, Dielectric Constant=3.48±.05
Dielectric Thickness: .023±.002
2. 50 Ohm SMA Female Connectors.

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Environmental Specifications ENV54

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, 96 hours, 40°C	MIL-STD-202, Method 103B, Condition B, Except 50°C
Thermal Shock	-55° to 100°C, 100 cycles	MIL-STD-202, Method 107, Condition A-3, except +100°C
Solder Reflow Heat	Sn-Pb Eutectic Process: 225°C peak Pb-Free Process, 245°C peak	J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Para 4.2.5, Test S, 95% Coverage
Vibration (High Frequency)	20g peak, 10-2000 Hz, 4 times in each of three axes (total 12)	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

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