CERAMIC RESONATOR SURFACE MOUNT

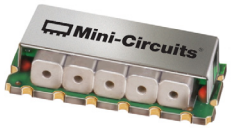
Band Pass Filter

CBP4-1600A+

50Ω 1590 to 1610 MHz

THE BIG DEAL

- Narrow Band Design with Fast Roll-off
- High Rejection, 70 dB Typ.
- Insertion Loss, 4.8 dB Typ.

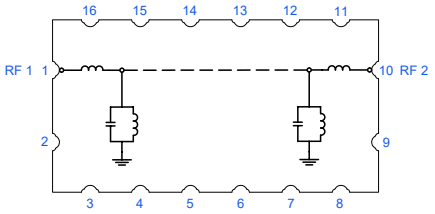


Generic photo used for illustration purposes only

APPLICATIONS

- Test and Measurement Systems
- Radionavigation-Satellite Services

FUNCTIONAL DIAGRAM



PRODUCT OVERVIEW

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

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

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Passband	Center Frequency	—	—	—	1600	—	MHz
	Insertion Loss	F1-F2	1590 - 1610	—	4.8	5.5	dB
	Return Loss	F1-F2	1590 - 1610	10	15	—	dB
Stopband, Lower	Rejection	DC-F3	DC - 1500	65	80	—	dB
		F3-F4	1500 - 1572	20	30	—	
Stopband, Upper	Rejection	F5-F6	1627 - 1680	20	30	—	dB
		F6-F7	1680 - 3000	55	70	—	
		F7-F8	3000 - 3800	—	50	—	

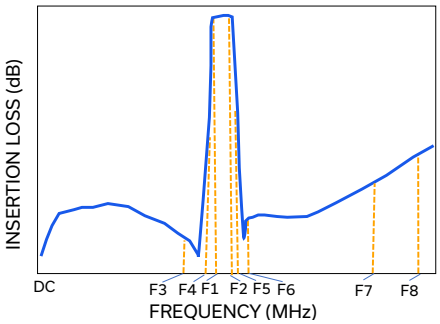
1. Tested in Evaluation Board P/N TB-CBP4-1600A+.
2. This component should not be used as a DC-block. In applications where DC voltage and/or current is present at either the input or output ports, external DC blocking capacitors are required.

ABSOLUTE MAXIMUM RATINGS[3]

Operating Temperature	-40°C to +85°C
Storage Temperature	-55°C to +100°C
Input Power[4]	4 W at +25°C

3. Permanent damage may occur if any of these limits are exceeded.
4. Power rating applies only to signals within the passband. Power rating above +25°C operating temperature decreases linearly to 1 W at +85°C.

TYPICAL FREQUENCY RESPONSE



REV. OR
ECO-028494
EDU5253
CBP4-1600A+
URJ
260210

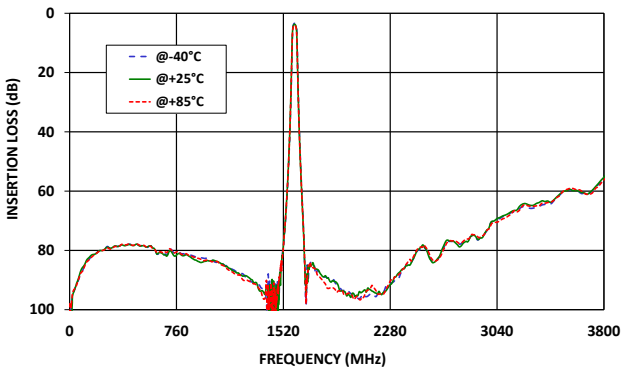
Band Pass Filter

CBP4-1600A+

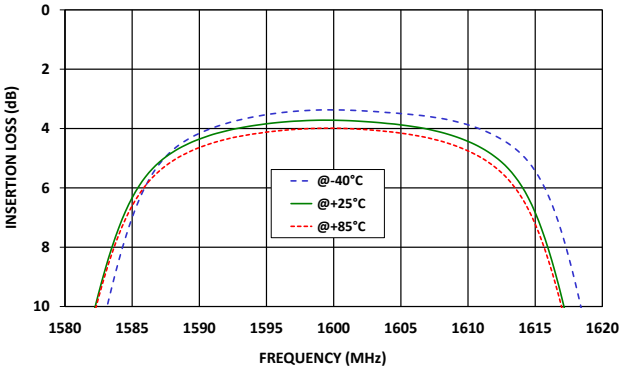
50Ω 1590 to 1610 MHz

TYPICAL PERFORMANCE GRAPHS

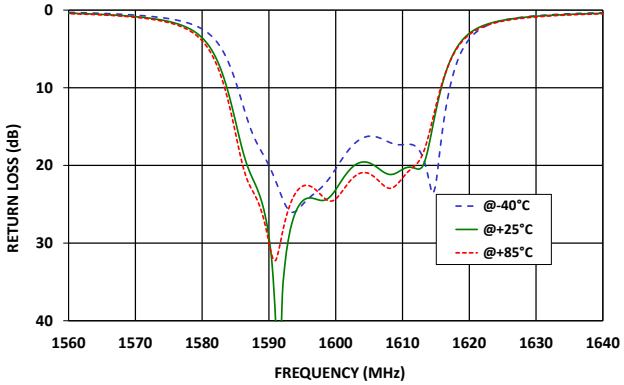
CBP4-1600A+
INSERTION LOSS



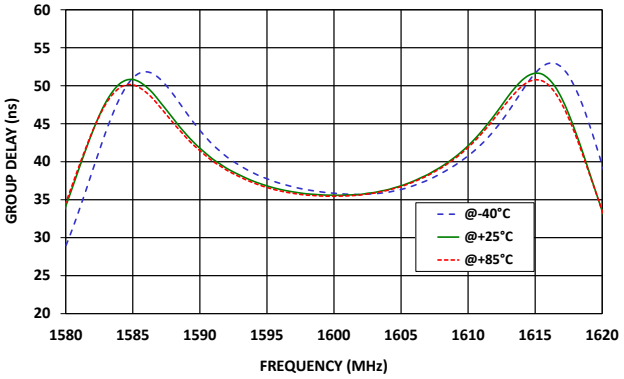
CBP4-1600A+
INSERTION LOSS (Zoomed)



CBP4-1600A+
RETURN LOSS (Zoomed)



CBP4-1600A+
GROUP DELAY



CERAMIC RESONATOR SURFACE MOUNT

Band Pass Filter

CBP4-1600A+

50Ω 1590 to 1610 MHz

FUNCTIONAL DIAGRAM

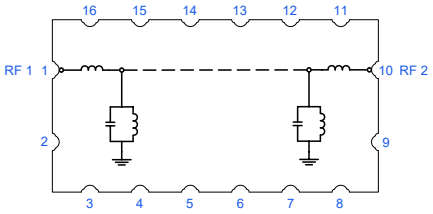
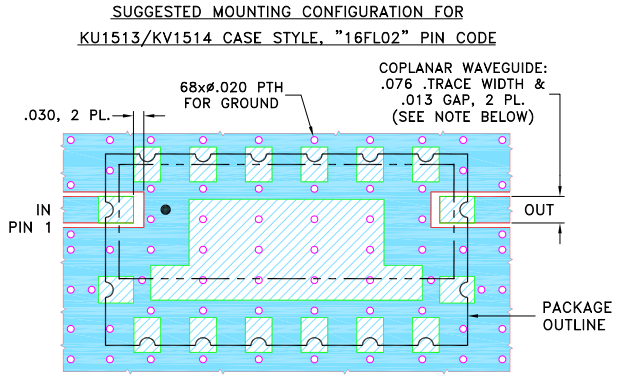


Figure 1. CBP4-1600A+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description
RF1	1	Connects to RF Input Port
RF2	10	Connects to RF Output Port
GROUND	2-9, 11-16	Connects to Ground on PCB, (See drawing PL-331)

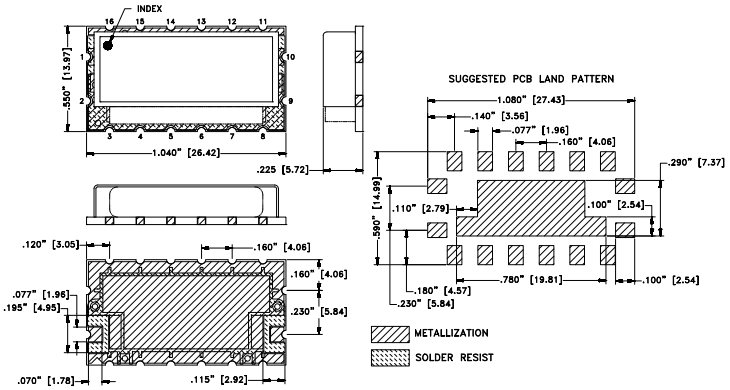
SUGGESTED PCB LAYOUT



NOTE: 1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .060"±.004"; 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

Figure 2. Suggested PCB Layout

CASE STYLE DRAWING



Weight: 4.8 gram
Dimensions are in inches (mm). Tolerances: 2Pl. ± .03; 3Pl. ± .015

PRODUCT MARKING*: CBP4-1600A

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

Band Pass Filter

CBP4-1600A+

50Ω 1590 to 1610 MHz

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD CLICK HERE

Performance Data & Graphs	Data Graphs S-Parameter (S2P Files) Data Set (.zip file) De-embedded to device pads
Case Style	KV1514 Lead Finish: Gold over Nickel Plate
RoHS/REACH Status	Compliant
Tape and Reel	F106
Suggested Layout for PCB Design	PL-331
Evaluation Board	TB-CBP4-1600A+ Gerber File
Environmental Rating	ENV54
MSL Level	MSL1

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 CBP4-1600A+

Typical Performance Data

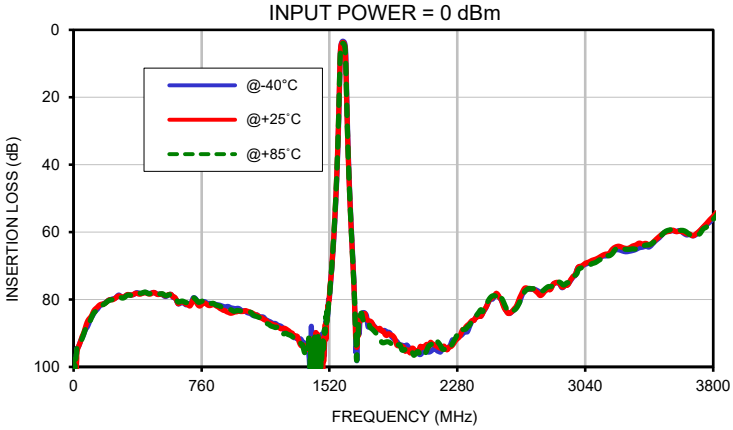
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
10	100.36	104.02	99.39	0.07	0.07	0.08	0.07	0.07	0.07
20	94.48	95.49	94.30	0.09	0.09	0.10	0.09	0.09	0.10
50	91.41	91.02	91.65	0.10	0.11	0.12	0.11	0.11	0.11
100	85.82	85.29	86.15	0.14	0.14	0.15	0.14	0.15	0.15
150	82.24	81.79	82.64	0.15	0.16	0.17	0.16	0.16	0.17
200	80.51	80.54	80.63	0.15	0.17	0.17	0.15	0.17	0.17
300	79.25	79.15	79.44	0.13	0.15	0.16	0.12	0.15	0.16
400	78.22	78.36	78.15	0.10	0.12	0.13	0.09	0.12	0.13
500	78.40	78.53	78.37	0.07	0.10	0.11	0.06	0.09	0.10
600	79.48	79.29	79.51	0.05	0.08	0.10	0.04	0.07	0.09
700	80.91	81.27	80.29	0.04	0.07	0.08	0.02	0.05	0.07
1000	83.34	83.57	83.52	0.01	0.03	0.05	0.03	0.02	0.04
1300	90.60	90.03	91.06	0.03	0.02	0.04	0.04	0.02	0.05
1500	86.28	91.80	84.84	0.00	0.06	0.10	0.02	0.08	0.12
1572	32.00	30.28	30.22	0.78	1.02	1.13	0.81	1.01	1.09
1575	26.79	24.87	24.81	1.10	1.46	1.61	1.15	1.44	1.54
1576	24.92	22.92	22.87	1.25	1.69	1.86	1.31	1.66	1.77
1580	16.66	14.53	14.54	2.44	3.57	3.95	2.65	3.56	3.76
1590	4.17	4.36	4.64	20.01	29.22	29.89	18.84	20.92	21.76
1593	3.71	3.98	4.26	25.80	29.13	25.46	20.22	22.31	21.69
1595	3.53	3.84	4.12	25.07	24.61	22.69	23.75	23.65	21.75
1600	3.37	3.72	3.99	20.43	23.11	24.32	24.60	25.20	25.43
1601	3.38	3.73	4.00	19.11	21.80	23.30	21.49	23.01	23.96
1603	3.43	3.79	4.06	17.05	19.89	21.31	18.34	20.71	21.69
1605	3.50	3.88	4.16	16.24	19.67	21.06	17.98	21.32	21.91
1610	3.87	4.43	4.76	17.33	20.52	21.62	33.67	24.77	24.04
1615	5.43	6.83	7.22	22.35	12.98	12.35	13.96	12.67	13.61
1620	13.47	16.06	16.24	3.73	3.00	3.16	3.36	3.07	3.38
1622	18.04	20.44	20.56	2.27	2.03	2.16	2.12	2.09	2.31
1627	28.33	30.18	30.22	1.02	1.05	1.15	0.99	1.08	1.21
1650	59.01	60.02	60.03	0.19	0.26	0.31	0.19	0.27	0.33
1680	93.96	90.05	97.39	0.04	0.11	0.15	0.05	0.12	0.17
1700	87.30	86.57	85.39	0.01	0.08	0.12	0.02	0.10	0.14
1800	88.64	88.86	90.19	0.03	0.03	0.07	0.01	0.06	0.10
2000	94.58	95.85	94.82	0.04	0.03	0.07	0.00	0.07	0.11
2050	96.16	95.26	95.58	0.03	0.03	0.07	0.01	0.07	0.12
2100	95.46	93.31	94.84	0.03	0.03	0.07	0.01	0.08	0.12
2150	94.62	93.70	91.79	0.03	0.03	0.07	0.01	0.08	0.12
2200	94.56	93.80	94.83	0.03	0.03	0.07	0.01	0.08	0.12
2250	92.02	93.63	93.13	0.03	0.03	0.07	0.02	0.09	0.13
2300	90.73	90.26	90.08	0.03	0.04	0.08	0.02	0.09	0.13
2350	88.29	87.21	87.74	0.03	0.04	0.07	0.02	0.09	0.13
2400	84.53	85.16	84.29	0.03	0.03	0.07	0.02	0.09	0.13
2450	82.43	82.30	81.67	0.03	0.04	0.07	0.02	0.09	0.13
2500	78.95	78.95	78.88	0.03	0.03	0.07	0.02	0.09	0.13
2550	81.19	81.46	80.27	0.03	0.03	0.07	0.03	0.09	0.13
2600	83.79	83.80	83.63	0.02	0.04	0.07	0.03	0.10	0.13
2650	80.68	79.51	80.80	0.03	0.03	0.07	0.03	0.09	0.13
2700	76.97	76.76	76.78	0.02	0.04	0.07	0.03	0.09	0.13
2750	77.23	77.74	76.97	0.02	0.03	0.07	0.02	0.09	0.13
2800	77.19	77.54	76.89	0.03	0.03	0.07	0.02	0.09	0.13
3000	70.41	70.29	71.05	0.03	0.03	0.06	0.01	0.08	0.12
3100	68.36	68.06	69.05	0.03	0.03	0.06	0.01	0.08	0.12
3200	65.91	65.13	66.41	0.03	0.03	0.06	0.00	0.08	0.11
3300	65.70	64.75	65.12	0.03	0.03	0.06	0.00	0.07	0.11
3400	64.23	63.34	63.86	0.03	0.03	0.06	0.01	0.07	0.11
3500	60.56	60.46	60.56	0.02	0.04	0.07	0.01	0.07	0.11
3600	59.55	59.74	59.48	0.03	0.04	0.07	0.02	0.06	0.11
3700	60.65	60.43	61.06	0.03	0.04	0.07	0.02	0.06	0.11
3800	55.90	55.34	56.22	0.03	0.05	0.08	0.02	0.06	0.11

Typical Performance Data

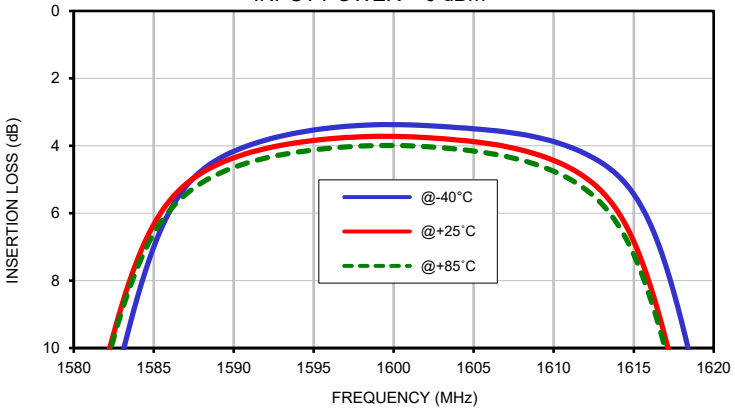
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-40°C	@+25°C	@+85°C
1590.0	44.13	41.78	41.46
1590.5	43.11	41.02	40.71
1591.0	42.17	40.29	40.01
1591.5	41.39	39.71	39.46
1592.0	40.65	39.13	38.88
1592.5	40.03	38.65	38.42
1593.0	39.48	38.22	37.98
1593.5	38.96	37.80	37.57
1594.0	38.51	37.43	37.22
1594.5	38.10	37.11	36.88
1595.0	37.76	36.82	36.61
1595.5	37.42	36.57	36.35
1596.0	37.14	36.35	36.15
1596.5	36.90	36.17	35.97
1597.0	36.67	36.01	35.82
1597.5	36.47	35.88	35.69
1598.0	36.30	35.76	35.60
1598.5	36.16	35.71	35.54
1599.0	36.03	35.64	35.49
1599.5	35.93	35.60	35.46
1600.0	35.85	35.59	35.47
1600.5	35.78	35.59	35.48
1601.0	35.72	35.61	35.50
1601.5	35.69	35.65	35.55
1602.0	35.68	35.70	35.62
1602.5	35.74	35.84	35.76
1603.0	35.77	35.94	35.86
1603.5	35.87	36.13	36.05
1604.0	35.97	36.31	36.23
1604.5	36.15	36.57	36.48
1605.0	36.34	36.83	36.72
1605.5	36.60	37.15	37.04
1606.0	36.89	37.50	37.39
1606.5	37.23	37.91	37.78
1607.0	37.57	38.32	38.19
1607.5	38.00	38.83	38.69
1608.0	38.47	39.34	39.18
1608.5	38.97	39.94	39.77
1609.0	39.51	40.58	40.40
1609.5	40.12	41.30	41.10
1610.0	40.77	42.10	41.87

Typical Performance Curves

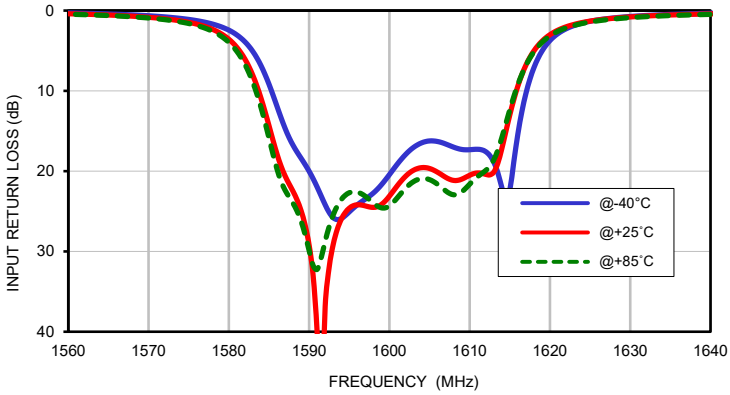
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



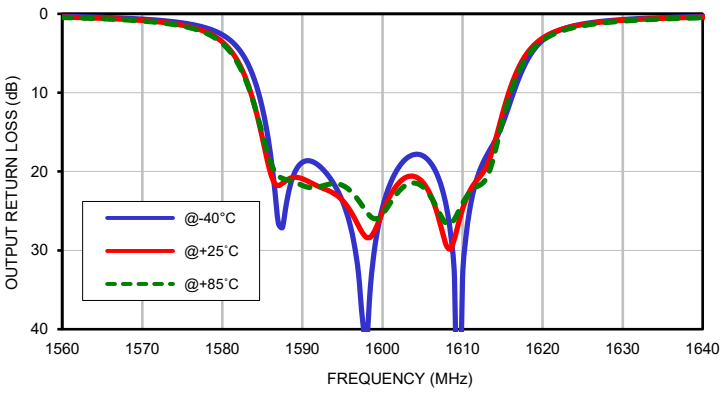
INSERTION LOSS vs. TEMPERATURE (Zoomed)
INPUT POWER = 0 dBm



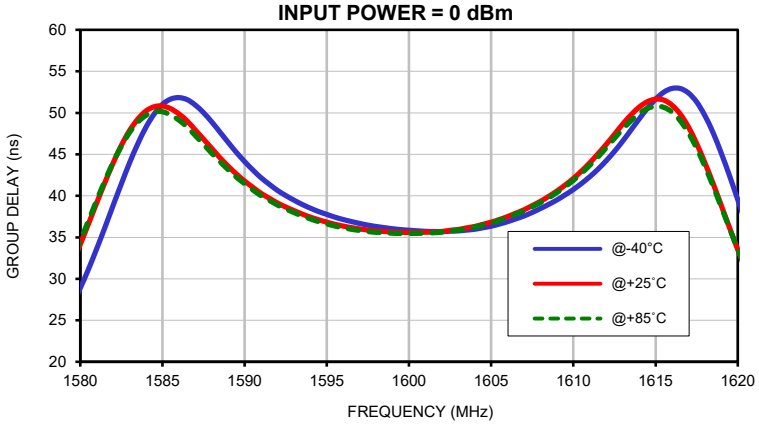
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



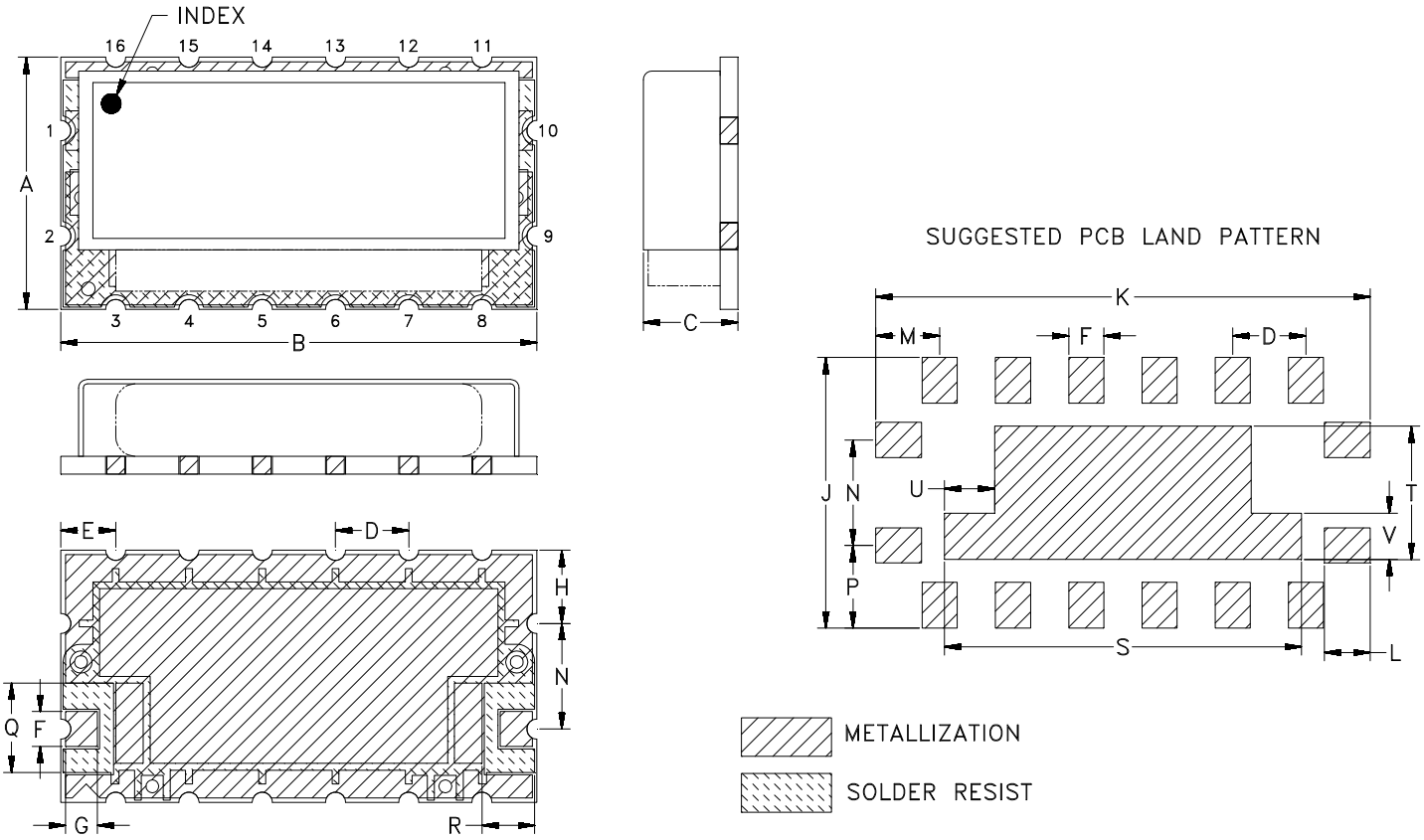
GROUP DELAY vs. TEMPERATURE
INPUT POWER = 0 dBm



Case Style KV

KV1514

Outline Dimensions



CASE#	A	B	C	D	E	F	G	H	J	K	L	M
KV1514	.550 (13.97)	1.040 (26.24)	.225 (5.72)	.160 (4.06)	.120 (3.05)	.077 (1.96)	.070 (1.78)	.160 (4.06)	.590 (14.99)	1.080 (27.43)	.100 (2.54)	.140 (3.56)

CASE#	N	P	Q	R	S	T	U	V	WT, GRAMS
KV1514	.230 (5.84)	.180 (4.57)	.195 (4.95)	.115 (2.92)	.780 (19.81)	.290 (7.37)	.110 (2.79)	.100 (2.54)	4.8

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

Notes:

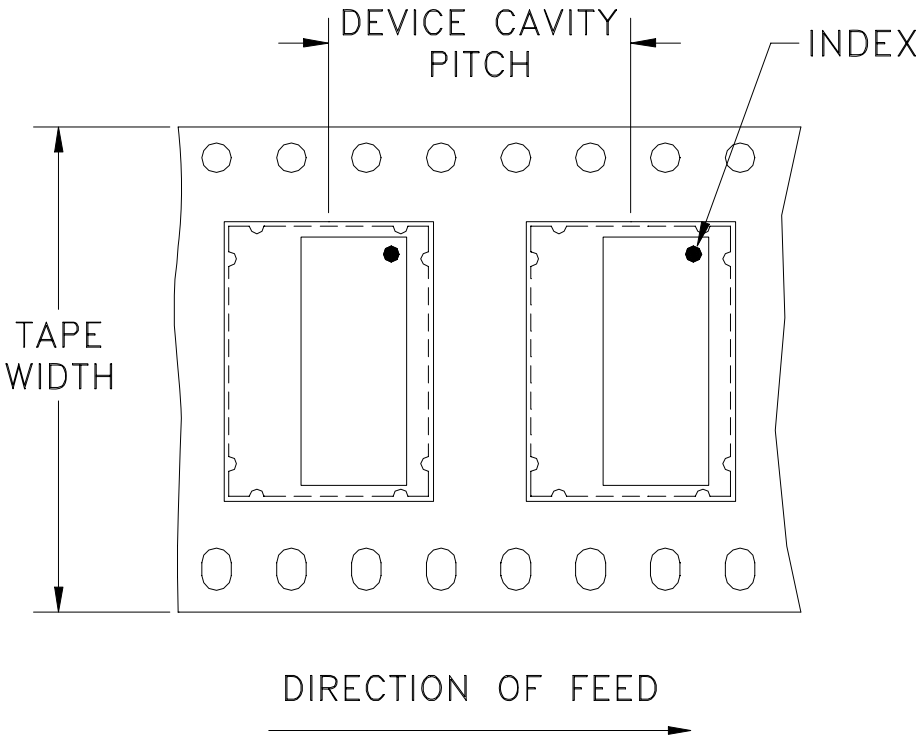
1. Case material: Nickel-Silver alloy.
2. Base: Printed wiring laminate.
3. Termination finish:

   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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Tape & Reel Packaging TR-F106

DEVICE ORIENTATION IN T&R



Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel
44	24	13	250

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

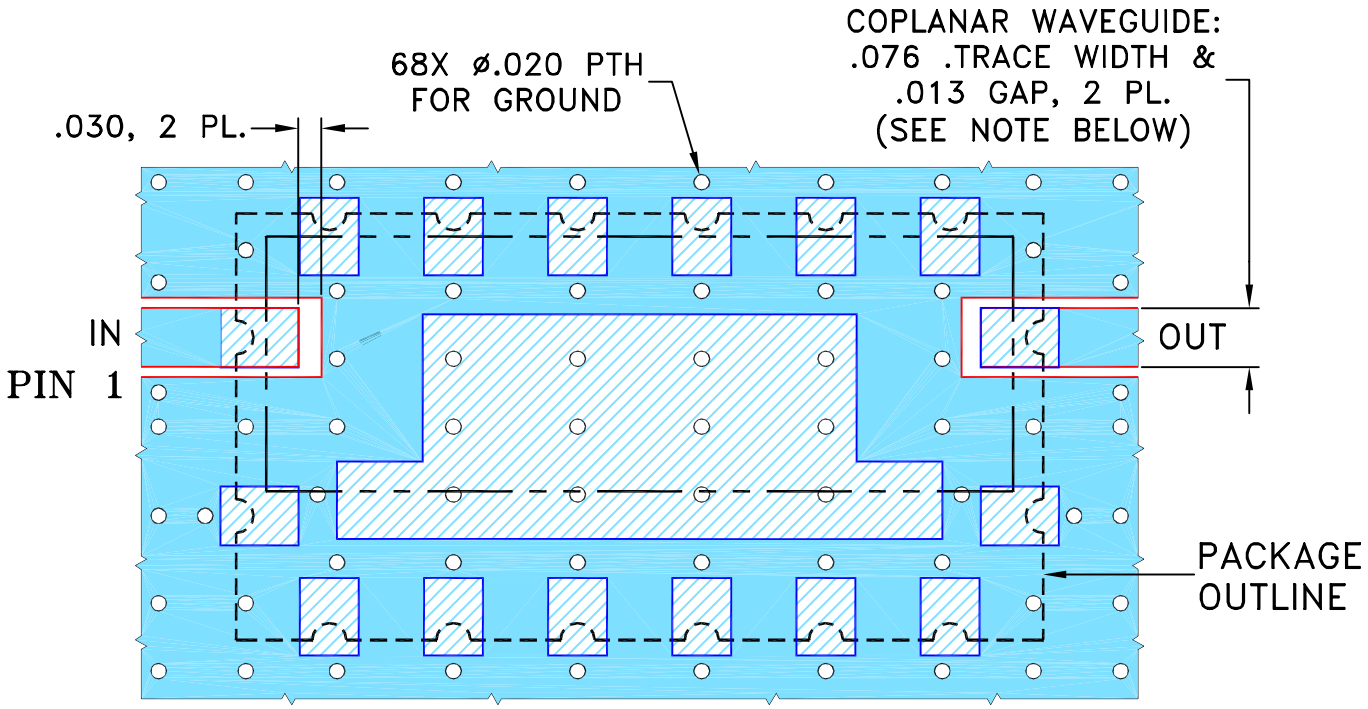
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THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M126876	NEW RELEASE	04/21/10	MMG	RD

SUGGESTED MOUNTING CONFIGURATION FOR KU1513/KV1514 CASE STYLE, "16FL02" PIN CODE



NOTE: 1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS .060" ± .004";
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	MMG	04/08/10
TOLERANCES ON:	CHECKED	IL	04/21/10
2 PL DECIMALS ±	APPROVED	RD	04/21/10
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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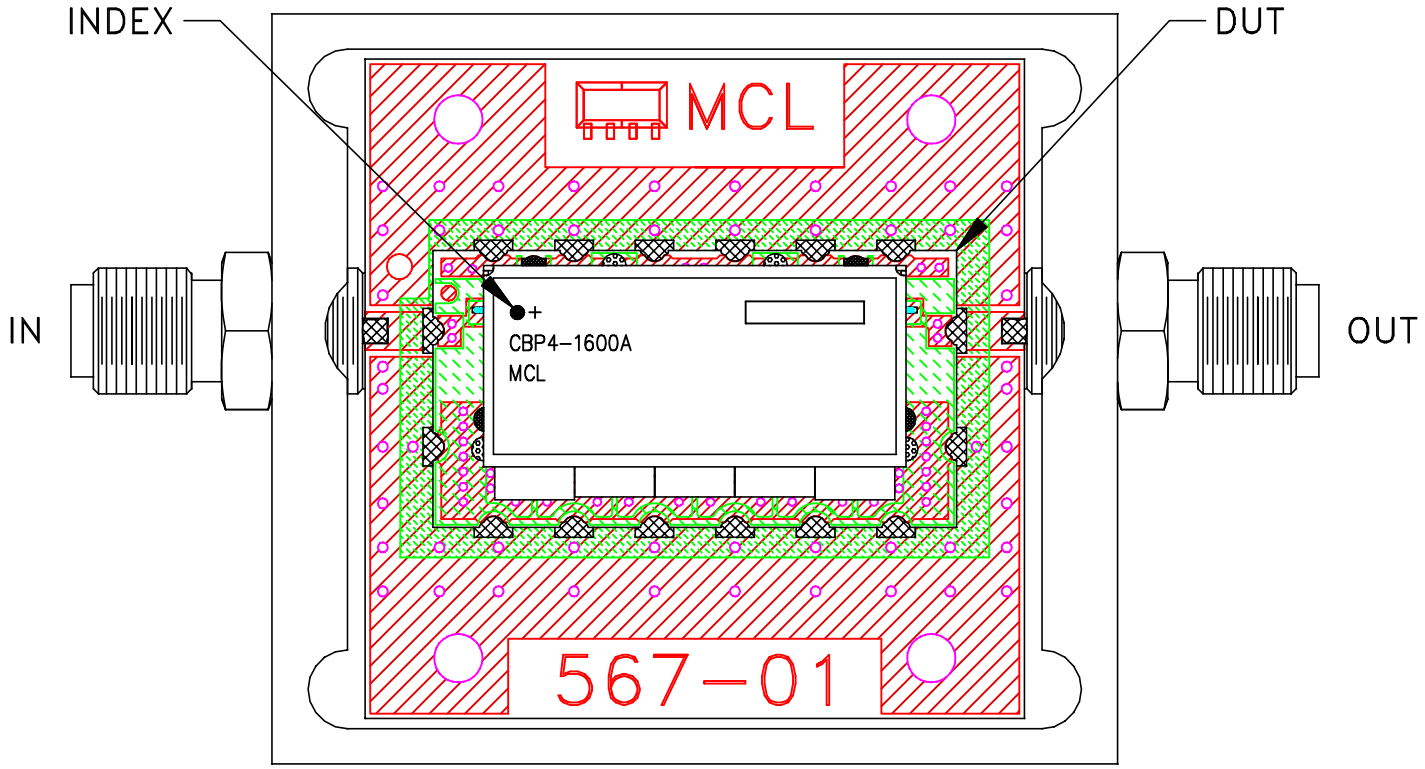
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, 16FL02, KU1513/KV1514, TB-578+

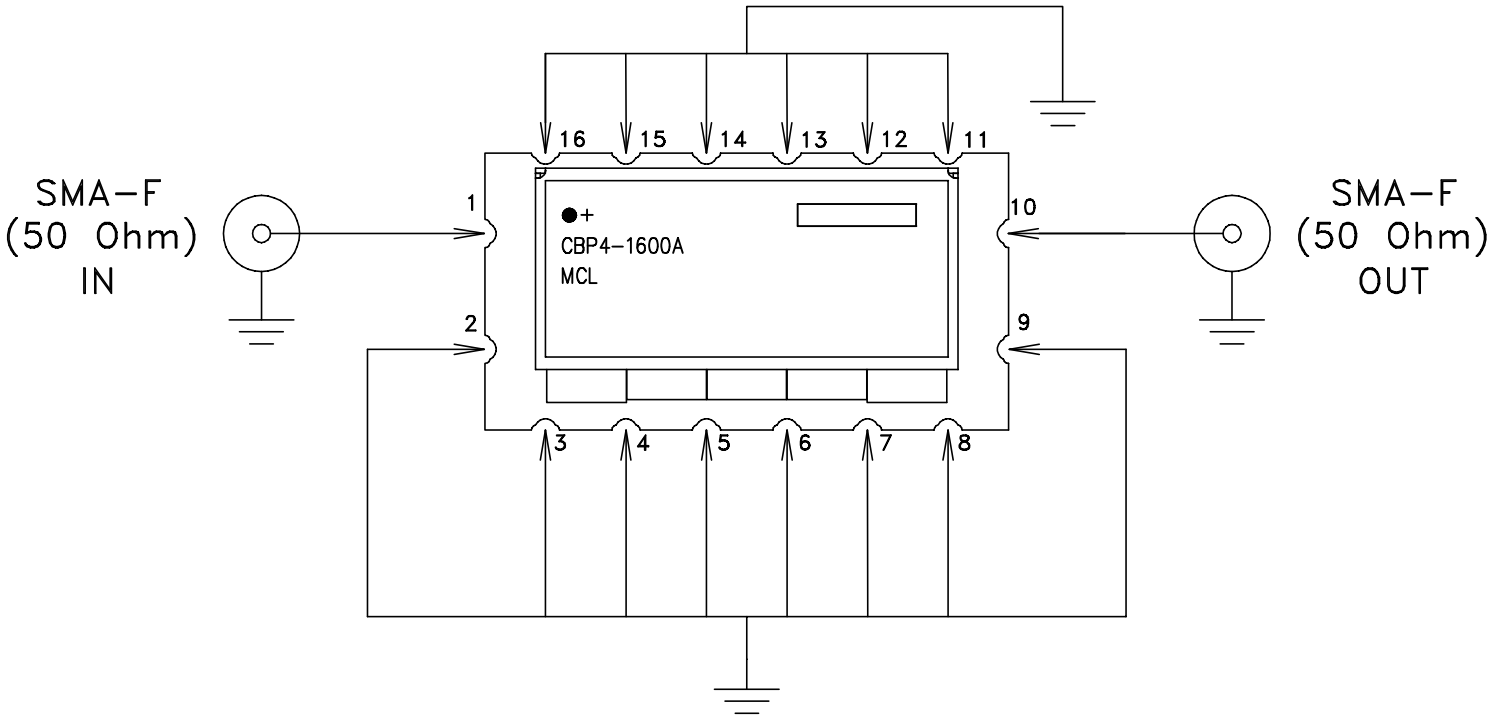
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-331	OR
FILE: 98PL331	SCALE: 4:1	SHEET: 1 OF 1	

Evaluation Board and Circuit

TB-CBP4-1600A+



Schematic diagram



Notes:

1. PCB Material: ROGERS (RO4350B) OR Equivalent, Dielectric Constant=3.48±.05
   Dielectric Thickness: .060±.004 inch
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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