

## Surface Mount

# Coaxial-Ceramic Resonator Filters and Multiplexers

50Ω DC to 6 GHz

## The Big Deal

- Low insertion loss with excellent power handling
- Passbands up to 6 GHz
- Fractional bandwidth from <1 to 25%
- Low profile designs with min. height of 0.120"
- Excellent temperature stability
- Rugged construction to handle demanding environmental conditions



## Product Overview

Mini-Circuits' *Coaxial-Ceramic Resonator filters* offer low insertion loss in very small form factors, using ceramic material with high dielectric constant and superior Q factor. Bandpass and bandstop filters, diplexer and multiplexer designs can be constructed using this technology. Low insertion loss combined with excellent power handling makes these filters well suited for transmitter and receiver signal chains. Advanced filter design and construction can achieve stopband width greater than 3x the center frequency as high as 20 GHz.

All our coaxial-ceramic resonator filters are built with rugged construction, qualified to withstand multiple demanding reflow cycles. Custom integrated assembly with LNA in greatly simplifying system integration. They can be realized in small form factors with high-quality, precise machining for applications where size is critical. Excellent repeatability across units is achieved through precise tuning and process control.

## Key Features

Feature	Advantages
Low insertion loss	Low signal loss results in better SNR in signal chain
Fast roll-off	Higher selectivity results in better adjacent channel rejection and dynamic range
Wide stop band	Wide spur-free stopband results in better receiver sensitivity
Excellent power handling	Well suited for transmitter applications
Rugged Construction	These filter assemblies have been qualified over a wide range of thermal, mechanical and environmental conditions including withstanding the stress of extensive solder reflow cycles
Small Size	Very well suited for high performance applications where size is a constraint.
Temperature stability	Very minimal change in electrical performance across temperature makes these filters suitable for a wide range of operating conditions.

### Notes

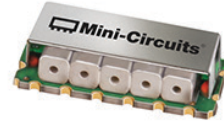
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# Surface Mount Bandpass Filter

## CBP-1414A+

50Ω 1402 to 1426 MHz



Generic photo used for illustration purposes only  
CASE STYLE: KV1514

### Features

- Fast roll-off
- Low passband IL
- Good VSWR 1.5:1 typical
- Miniature shielded package

### Applications

- Test and measurement
- Radio Astronomy
- Space research

### Electrical Specifications <sup>(1)</sup> at 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Center Frequency	-	-	1414	-	MHz	
	Insertion Loss	F1-F2	1402 - 1426	-	2.2	2.8	dB
	VSWR	F1-F2	1402 - 1426	-	1.5	2.1	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC - 1310	30	50	-	dB
		F3-F4	1310-1352	20	30	-	dB
Stop Band, Upper	Insertion Loss	F5-F6	1480 - 1500	20	30	-	dB
		F6-F7	1500 - 3000	35	45	-	dB

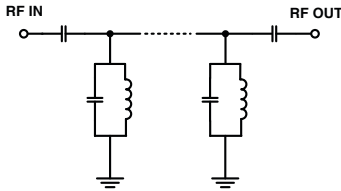
(1) Measured on Mini-Circuits Characterization Test Board TB-578+.

### Maximum Ratings

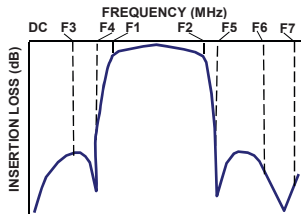
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	4 W Max.

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

### Functional Schematic



### Typical Frequency Response

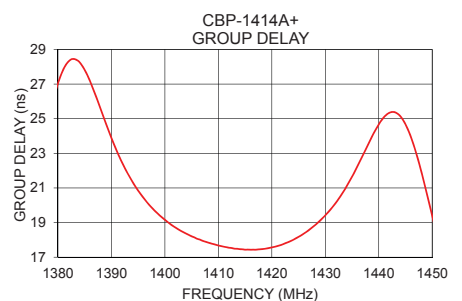
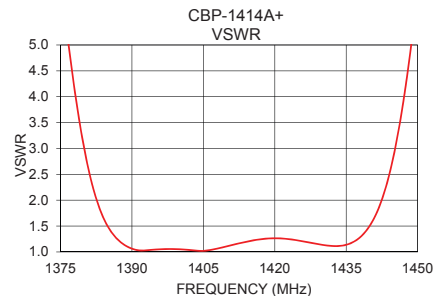
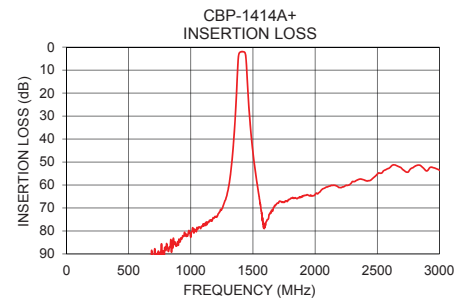
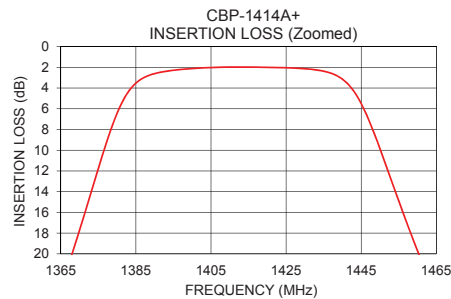


### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (ns)
1	96.11	350.79	1400	19.15
10	103.51	419.09	1402	18.71
100	104.83	828.51	1404	18.36
1000	82.71	247.81	1405	18.20
1310	59.11	63.13	1406	18.07
1352	35.44	26.61	1407	17.95
1358	30.23	21.38	1408	17.85
1368	20.01	12.44	1409	17.76
1380	6.43	2.99	1410	17.67
1402	2.07	1.04	1411	17.61
1410	1.98	1.11	1412	17.55
1414	1.98	1.20	1413	17.49
1420	2.00	1.26	1414	17.46
1426	2.05	1.20	1415	17.43
1440	3.14	1.51	1416	17.43
1462	21.51	18.91	1417	17.43
1480	34.88	41.80	1420	17.56
1500	45.75	67.48	1422	17.74
2500	55.31	76.89	1424	18.00
3000	53.50	45.74	1426	18.37

### +RoHS Compliant

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



### Notes

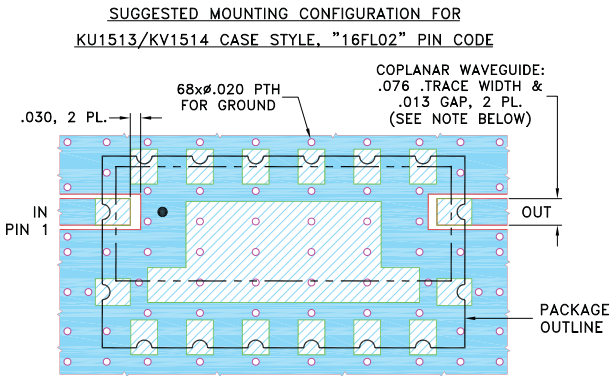
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## Pad Connections

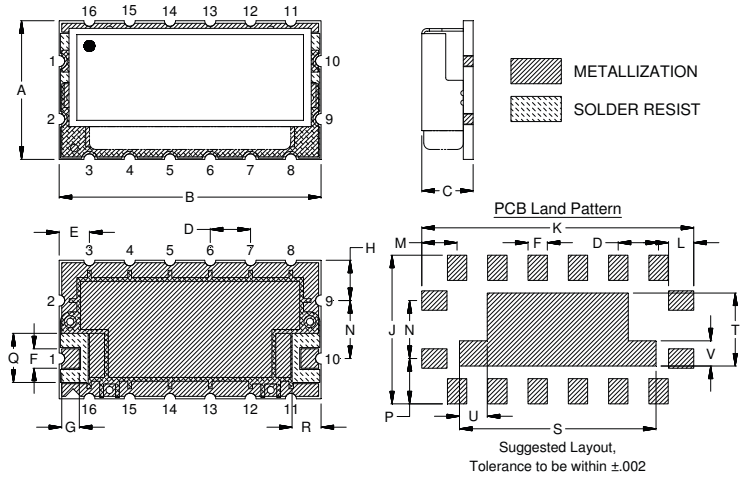
INPUT	1
OUTPUT	10
GROUND	2,3,4,5,6,7,8,9,11,12,13,14,15,16

## Demo Board MCL P/N: TB-578+ Suggested PCB Layout (PL-331)



- 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

## Outline Drawing



## Outline Dimensions ( inch ) mm

A	B	C	D	E	F	G	H	J	K	L
.550	1.040	.225	.160	.120	.077	.070	.160	.590	1.080	.100
13.97	26.24	5.72	4.06	3.05	1.96	1.78	4.06	14.99	27.43	2.54
M	N	P	Q	R	S	T	U	V	Wt.	
.140	.230	.180	.195	.115	.780	.290	.110	.100	grams	
3.56	5.84	4.57	4.95	2.92	19.81	7.37	2.79	2.54	4.8	

Note: Please refer to case style drawing for details

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Typical Performance Data

FREQ.  (MHz)	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1	97.02	98.14	96.34	0.05	0.04	0.05	0.05	0.05	0.05
5	121.20	121.74	95.17	0.04	0.04	0.04	0.04	0.04	0.04
25	109.21	97.38	105.28	0.03	0.03	0.03	0.03	0.03	0.03
50	104.11	99.89	106.93	0.02	0.02	0.03	0.03	0.02	0.02
100	106.17	100.02	99.68	0.01	0.02	0.02	0.01	0.02	0.02
250	106.82	104.84	99.19	0.01	0.00	0.01	0.01	0.00	0.01
500	96.69	91.73	97.17	0.01	0.01	0.02	0.01	0.01	0.03
750	93.43	88.72	91.77	0.00	0.03	0.05	0.00	0.03	0.05
1000	80.20	80.19	80.28	0.02	0.06	0.08	0.04	0.07	0.10
1100	79.68	80.99	80.48	0.03	0.08	0.10	0.06	0.09	0.12
1200	72.36	72.15	72.14	0.07	0.11	0.14	0.10	0.13	0.17
1300	63.02	60.52	62.75	0.17	0.23	0.27	0.22	0.26	0.31
1310	58.19	58.66	58.31	0.20	0.26	0.30	0.26	0.30	0.35
1340	44.36	44.31	44.31	0.36	0.45	0.51	0.44	0.51	0.59
1352	35.65	35.57	35.61	0.51	0.63	0.72	0.62	0.72	0.83
1358	30.43	30.34	30.43	0.65	0.79	0.89	0.77	0.91	1.04
1368	20.16	20.12	20.36	1.14	1.36	1.52	1.32	1.55	1.74
1375	11.75	11.85	12.30	2.34	2.70	2.90	2.61	2.99	3.21
1380	6.17	6.47	7.04	5.44	5.90	5.91	5.80	6.29	6.27
1385	3.13	3.50	3.96	13.82	14.04	13.13	14.26	14.31	13.17
1390	2.26	2.57	2.89	31.88	30.44	25.40	29.63	26.74	22.73
1395	1.97	2.25	2.51	35.37	33.34	30.82	35.03	31.53	27.99
1402	1.77	2.04	2.27	32.98	35.05	38.23	29.67	28.35	27.52
1405	1.73	1.99	2.22	38.68	41.05	34.69	30.21	27.88	26.10
1410	1.68	1.94	2.17	28.94	25.64	22.99	26.90	23.78	21.53
1414	1.68	1.94	2.17	22.84	20.85	19.13	22.45	20.37	18.68
1420	1.70	1.97	2.20	19.74	18.52	17.41	19.65	18.38	17.28
1425	1.75	2.01	2.23	20.60	19.81	19.09	20.56	19.65	18.96
1426	1.76	2.02	2.24	21.09	20.41	19.80	21.07	20.23	19.64
1430	1.83	2.10	2.31	23.45	23.54	23.89	23.88	23.55	23.74
1435	2.06	2.34	2.54	21.86	23.50	27.72	22.66	24.61	29.67
1440	2.83	3.11	3.21	12.73	13.72	16.04	12.69	13.72	15.96
1452	11.57	11.83	11.62	1.93	2.21	2.54	1.89	2.16	2.48
1462	21.24	21.48	21.35	0.73	0.90	1.04	0.72	0.88	1.02
1480	34.65	34.87	34.81	0.29	0.40	0.48	0.30	0.40	0.48
1500	45.53	45.72	45.70	0.16	0.24	0.30	0.18	0.25	0.32
1520	53.93	54.08	54.12	0.11	0.17	0.23	0.13	0.19	0.25
1600	76.10	79.38	77.12	0.06	0.11	0.15	0.08	0.13	0.17
1650	72.86	73.60	73.27	0.05	0.10	0.14	0.09	0.13	0.17
1700	67.04	67.47	67.61	0.05	0.10	0.14	0.10	0.13	0.17
1750	66.46	67.07	66.72	0.05	0.10	0.14	0.10	0.13	0.17
1800	68.93	69.93	69.44	0.06	0.10	0.14	0.10	0.13	0.17
1850	65.98	63.73	65.85	0.06	0.12	0.15	0.11	0.14	0.18
1900	61.98	62.72	62.64	0.07	0.11	0.15	0.11	0.14	0.18
1950	64.48	64.73	64.09	0.07	0.11	0.15	0.12	0.14	0.19
2000	70.46	64.00	71.56	0.07	0.13	0.16	0.12	0.15	0.19
2050	61.38	59.62	61.12	0.08	0.13	0.17	0.14	0.16	0.20
2100	61.37	61.02	60.61	0.08	0.13	0.17	0.14	0.16	0.20
2150	60.71	60.19	60.40	0.08	0.13	0.17	0.14	0.16	0.21
2200	58.19	57.75	57.90	0.09	0.14	0.18	0.16	0.18	0.22
2250	60.28	60.46	60.44	0.10	0.15	0.19	0.15	0.18	0.22
2300	59.65	60.30	59.73	0.10	0.16	0.20	0.15	0.18	0.23
2350	57.14	58.04	57.31	0.11	0.16	0.21	0.16	0.19	0.24
2400	58.11	59.02	59.72	0.12	0.17	0.22	0.16	0.20	0.25
2450	60.52	61.42	62.41	0.13	0.19	0.23	0.17	0.22	0.26
2500	54.59	53.24	53.91	0.13	0.20	0.24	0.18	0.23	0.28
2550	57.13	57.04	57.51	0.14	0.21	0.26	0.18	0.23	0.29
2600	56.63	49.68	53.97	0.16	0.25	0.29	0.20	0.28	0.32
2700	52.21	51.84	51.74	0.17	0.24	0.30	0.21	0.28	0.35
3000	55.36	57.54	55.76	0.25	0.34	0.44	0.27	0.37	0.47

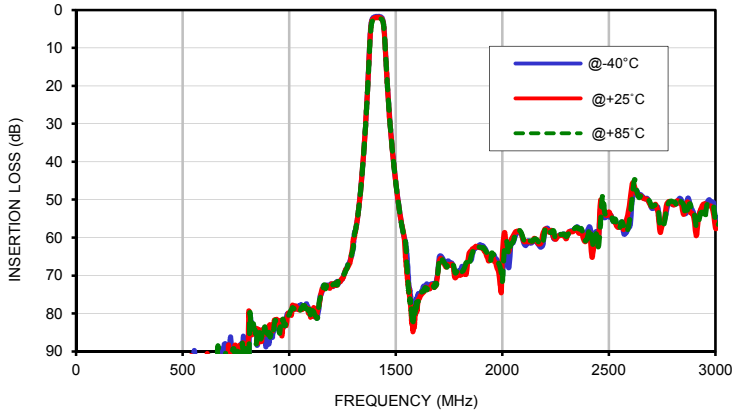


## Typical Performance Data

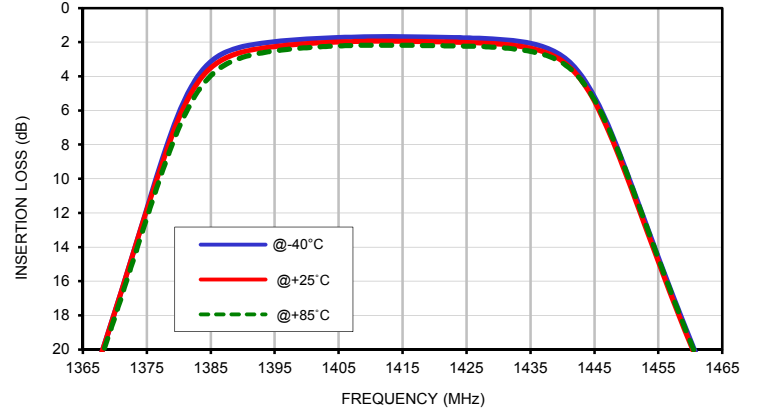
FREQ.  (MHz)	GROUP DELAY		
	(nsec)		
	@-40°C	@+25°C	@+85°C
1402.0	18.80	18.75	18.76
1402.5	18.70	18.65	18.66
1403.0	18.60	18.55	18.56
1403.5	18.53	18.48	18.48
1404.0	18.44	18.40	18.40
1404.5	18.37	18.32	18.31
1405.0	18.29	18.23	18.23
1405.5	18.22	18.18	18.16
1406.0	18.15	18.11	18.08
1406.5	18.10	18.05	18.03
1407.0	18.03	17.99	17.95
1407.5	17.99	17.94	17.90
1408.0	17.93	17.88	17.85
1408.5	17.89	17.84	17.80
1409.0	17.84	17.79	17.75
1409.5	17.80	17.74	17.69
1410.0	17.76	17.71	17.65
1410.5	17.73	17.68	17.61
1411.0	17.69	17.63	17.56
1411.5	17.66	17.60	17.53
1412.0	17.63	17.57	17.49
1412.5	17.62	17.56	17.47
1413.0	17.59	17.52	17.43
1413.5	17.58	17.51	17.42
1414.0	17.55	17.49	17.39
1414.5	17.55	17.48	17.38
1415.0	17.53	17.47	17.35
1415.5	17.54	17.47	17.36
1416.0	17.53	17.45	17.34
1416.5	17.53	17.46	17.34
1417.0	17.53	17.46	17.34
1417.5	17.54	17.47	17.35
1418.0	17.56	17.48	17.37
1418.5	17.57	17.50	17.38
1419.0	17.59	17.52	17.40
1419.5	17.62	17.55	17.43
1420.0	17.65	17.58	17.46
1420.5	17.68	17.62	17.50
1421.0	17.72	17.66	17.54
1425.0	18.24	18.19	18.05
1426.0	18.43	18.38	18.24

## Typical Performance Curves

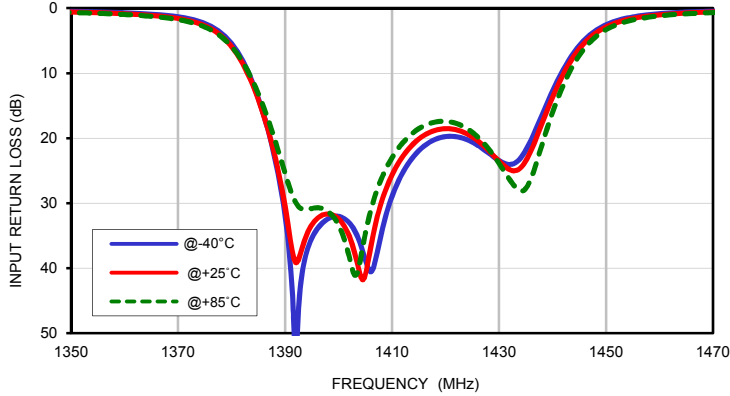
**INSERTION LOSS vs. TEMPERATURE**  
INPUT POWER = 0 dBm



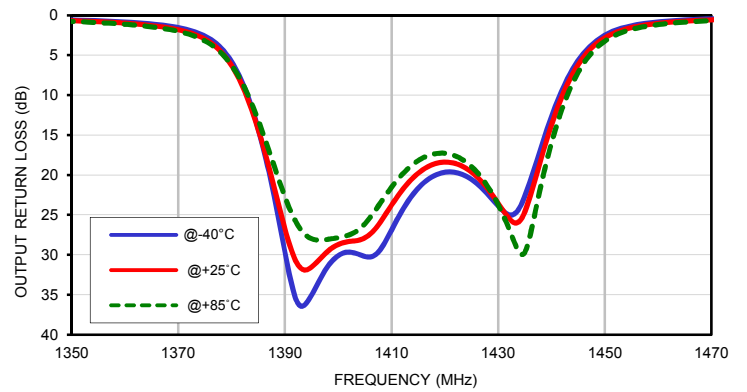
**INSERTION LOSS vs. TEMPERATURE (Zoomed)**  
INPUT POWER = 0 dBm



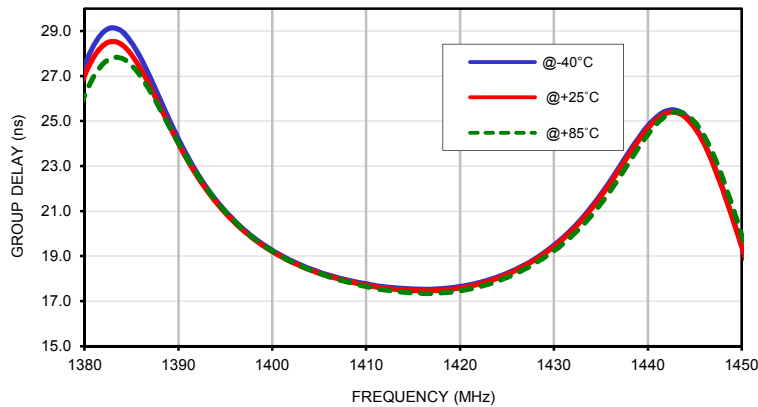
**INPUT RETURN LOSS vs. TEMPERATURE**  
INPUT POWER = 0 dBm



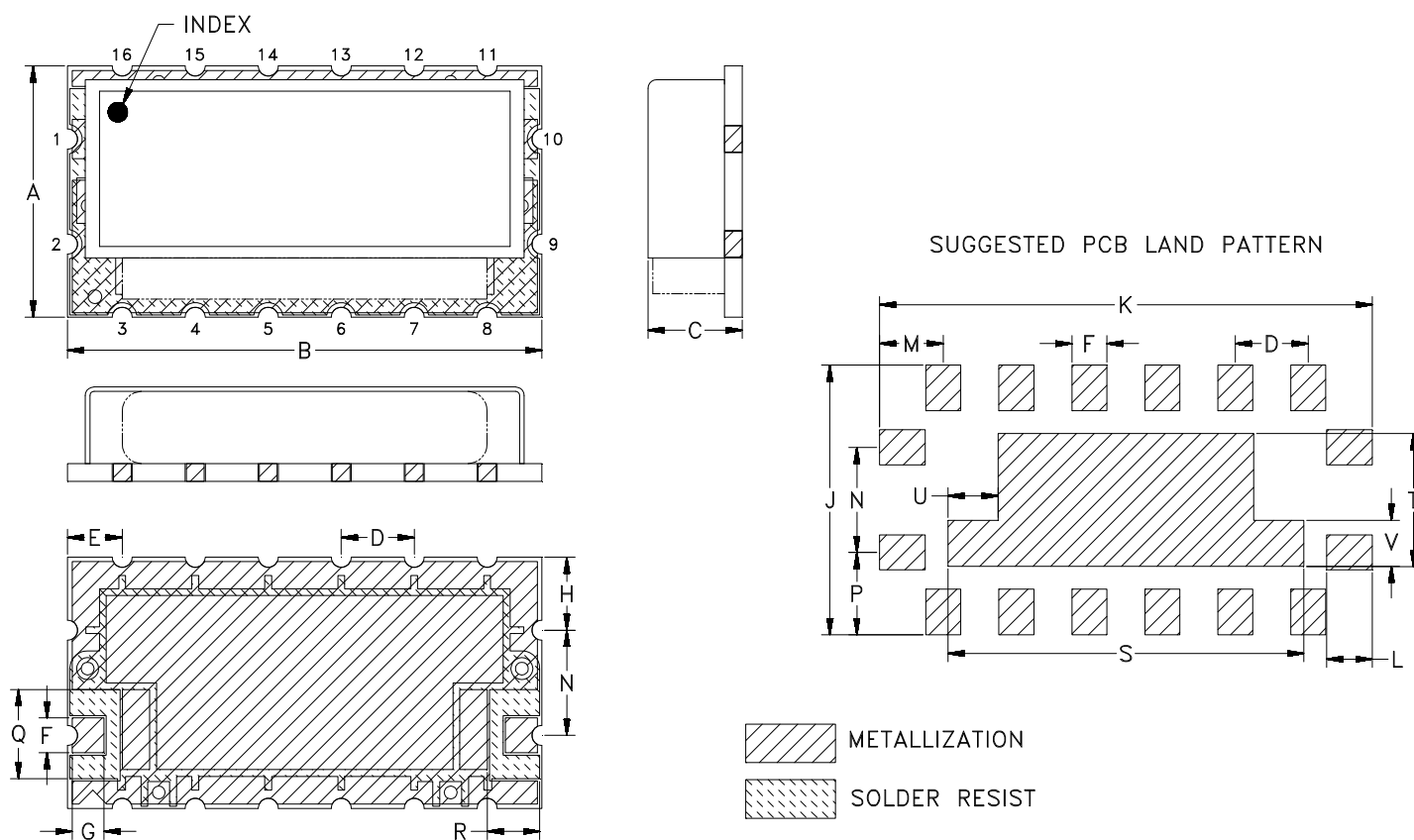
**OUTPUT RETURN LOSS vs. TEMPERATURE**  
INPUT POWER = 0 dBm



**GROUP DELAY vs. TEMPERATURE**  
INPUT POWER = 0 dBm



### 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.  $\pm .03$ ; 3PL.  $\pm .015$

#### Notes:

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

**Mini-Circuits®**  
ISO 9001 ISO 14001 CERTIFIED

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minicircuits.com

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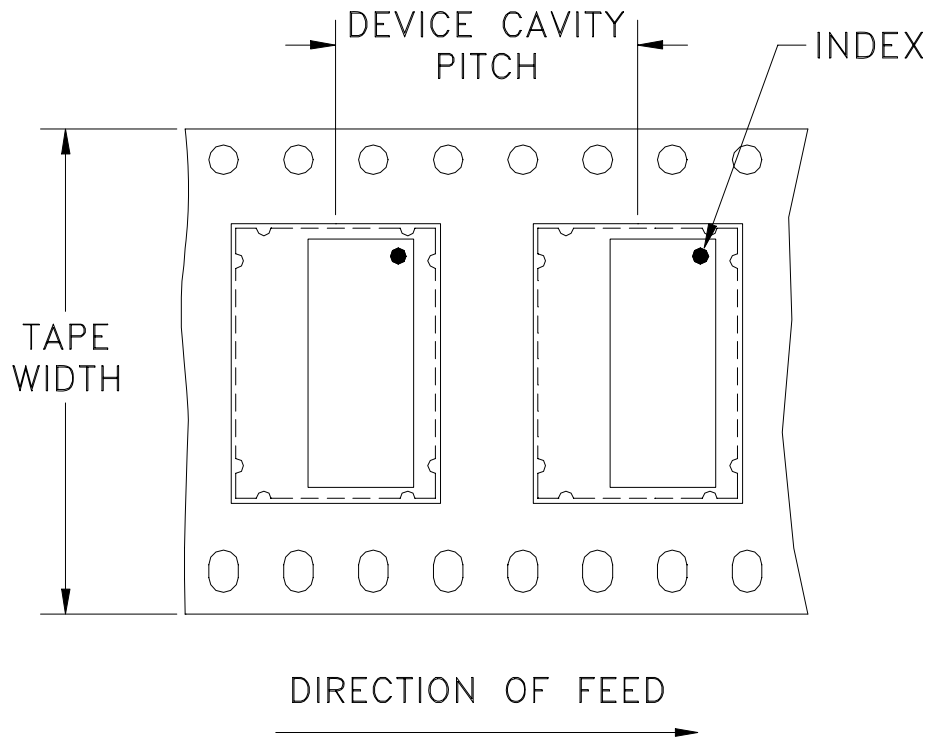
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS



# 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](http://www.minicircuits.com/pages/pdfs/tape.pdf)

 **Mini-Circuits**<sup>®</sup>

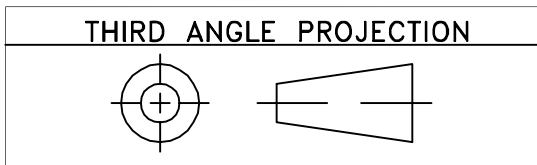
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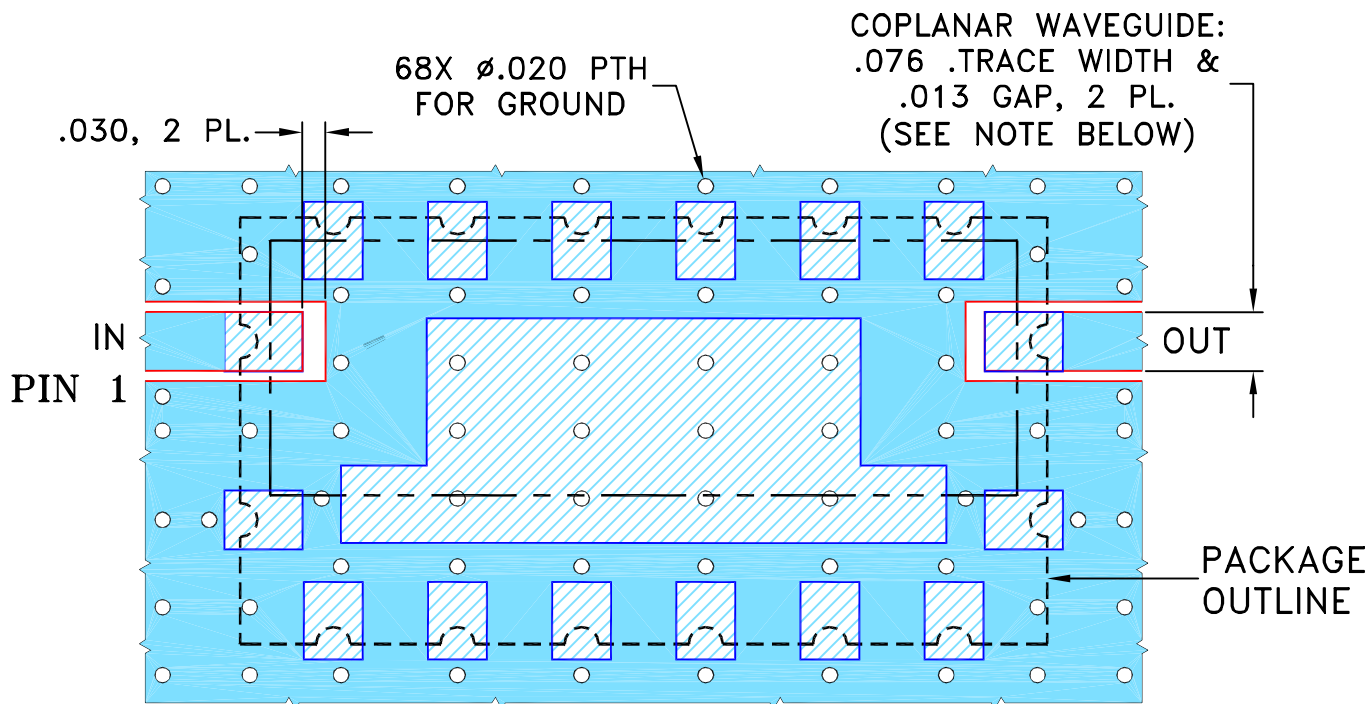
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REVISIONS					
REV OR	ECN No.	DESCRIPTION	DATE	DR	AUTH
	M126876	NEW RELEASE	04/21/10	MMG	RD

**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 TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .005 ANGLES ± FRACTIONS ±	DRAWN	MMG 04/08/10
	CHECKED	IL 04/21/10
	APPROVED	RD 04/21/10

**Mini-Circuits®** 13 Neptune Avenue  
 Brooklyn NY 11235

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

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



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