

## 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

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

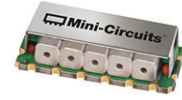
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# Surface Mount Bandpass Filter

## CBP-1023A+

50Ω 1005 to 1041 MHz



Generic photo used for illustration purposes only  
CASE STYLE: KV1514

### Features

- Fast roll-off
- Low passband IL
- Miniature shielded package

### Applications

- Aviation / Aeronautical
- Test and measurement

### Electrical Specifications at 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Center Frequency	-	-	1023	-	MHz	
	Insertion Loss	F1-F2	1005-1041	-	2.5	3.0	dB
	VSWR	F1-F2	1005-1041	-	1.7	2.3	:1
Stop Band, Lower	Insertion Loss	DC-F3	DC-970	20.0	30.0	-	dB
	VSWR	DC-F3	DC-970	-	20.0	-	:1
Stop Band, Upper	Insertion Loss	F4-F5	1075-2400	20.0	30.0	-	dB
	VSWR	F4-F5	1075-2400	-	20.0	-	:1

### Maximum Ratings

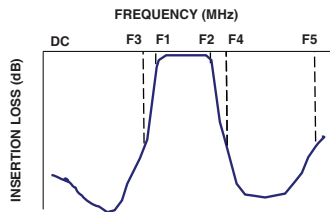
Operating Temperature	-40°C to 85°C
Storage Temperature	-55°C to 100°C
RF Power Input	10 W max.

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

### Functional Schematic



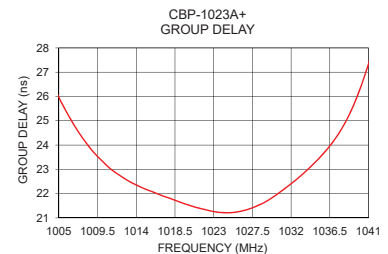
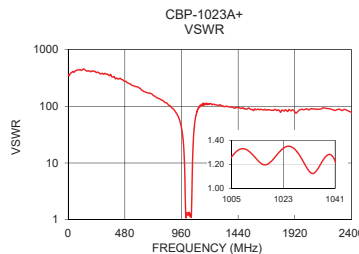
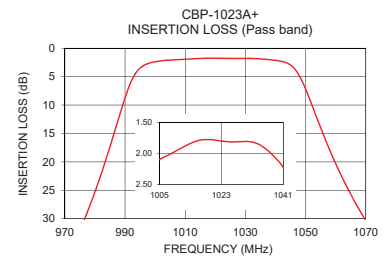
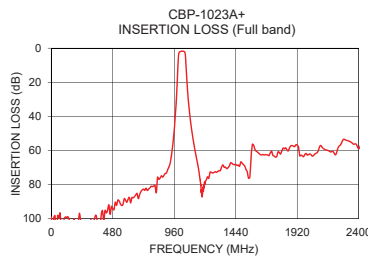
### Typical Frequency Response



### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	VSWR (:1)	Frequency (MHz)	Group Delay (nsec)
1	99.03	358.09	1005	25.96
100	100.44	444.75	1008	24.17
500	90.34	262.28	1010	23.35
900	73.10	85.22	1012	22.77
970	38.08	30.70	1014	22.36
976	30.83	23.24	1016	22.06
983	20.64	13.65	1018	21.79
989	10.38	5.32	1020	21.54
992	5.91	2.58	1022	21.34
1005	2.10	1.26	1023	21.26
1023	1.80	1.33	1026	21.26
1041	2.22	1.23	1028	21.49
1053	11.27	8.86	1030	21.88
1060	20.34	23.80	1032	22.41
1070	30.38	46.02	1034	23.02
1075	34.46	56.23	1036	23.75
1100	49.82	88.92	1037	24.19
1500	68.33	90.36	1038	24.74
2000	62.69	87.22	1040	26.29
2400	58.96	78.38	1041	27.34

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



### Notes

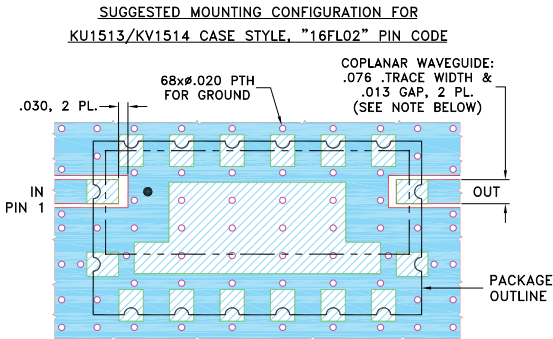
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## Pad Connections

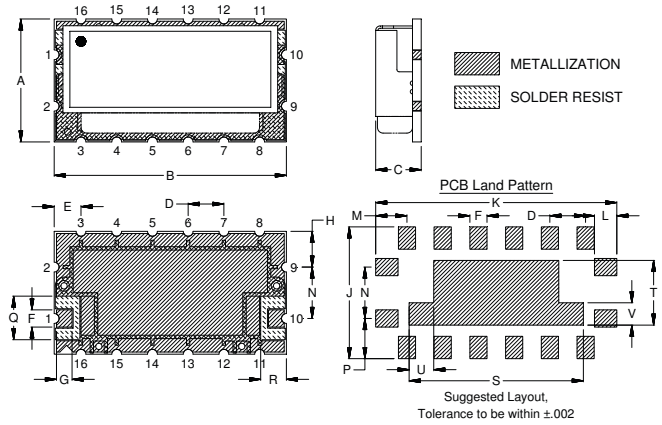
INPUT	1
OUTPUT	10
GROUND	2,3,4,5,6,7,8,9,11,12,13,14,15,16

**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)

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

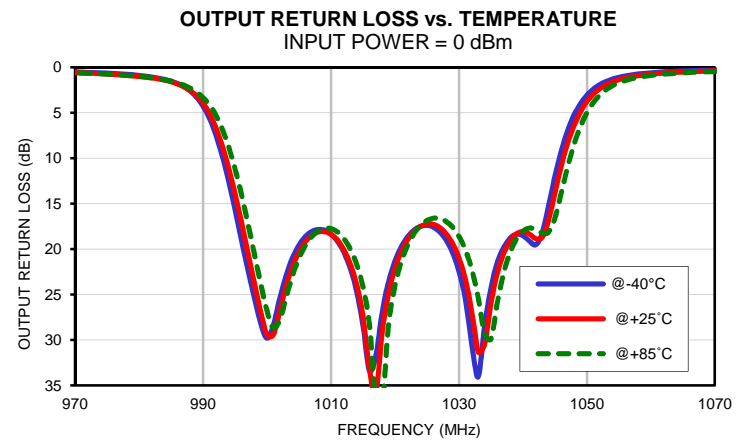
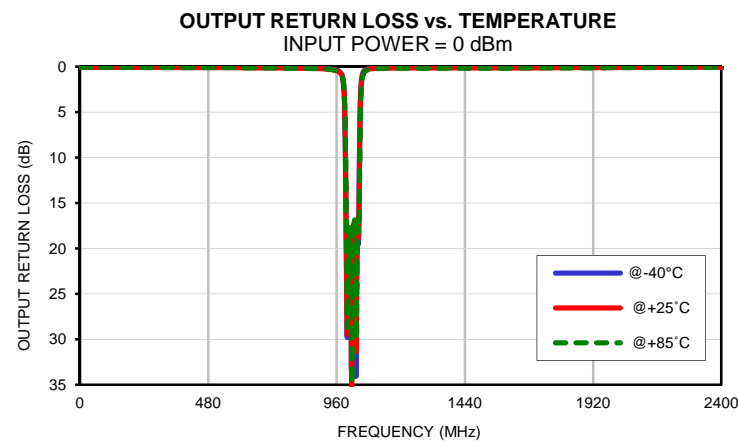
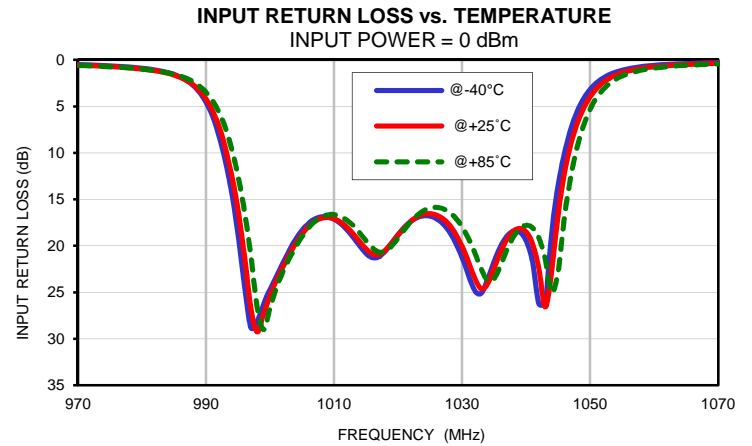
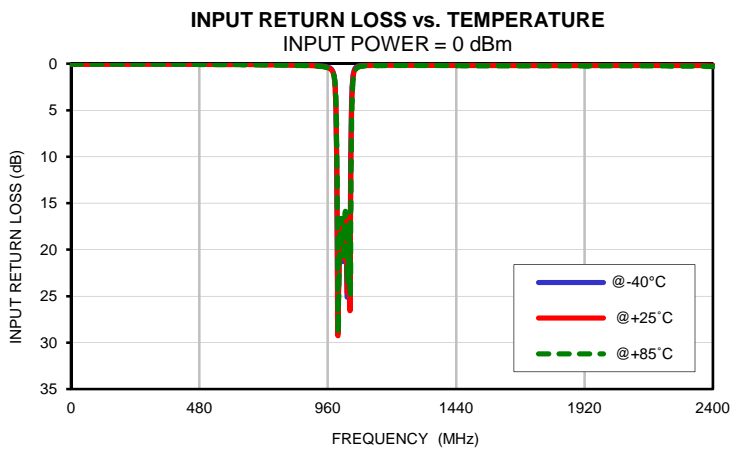
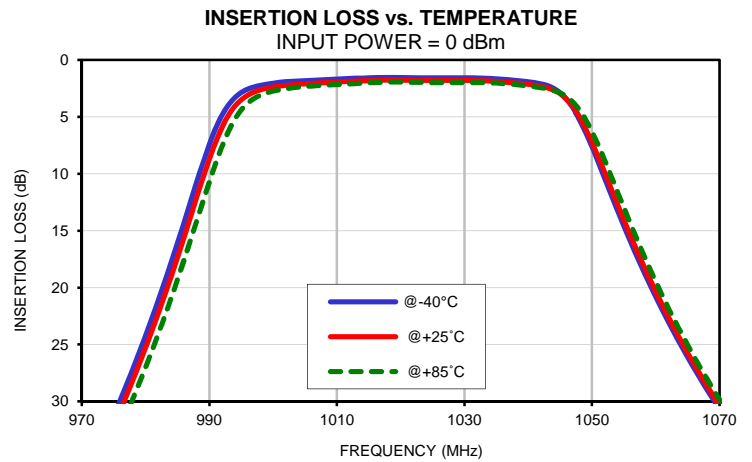
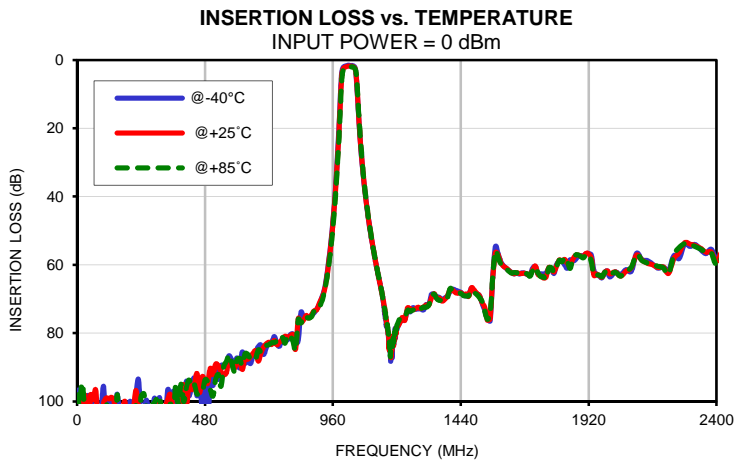
FREQ.  (MHz)	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
	(dB)			(dB)			(dB)		
	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C	@-40°C	@+25°C	@+85°C
1	104.63	99.03	101.11	0.05	0.05	0.05	0.05	0.05	0.05
10	102.92	109.45	101.09	0.05	0.05	0.05	0.05	0.05	0.05
50	99.85	98.17	107.91	0.04	0.04	0.04	0.05	0.05	0.06
100	95.92	100.44	105.12	0.04	0.04	0.04	0.06	0.06	0.06
500	91.91	90.34	96.60	0.04	0.07	0.07	0.07	0.09	0.10
750	83.13	83.43	82.37	0.09	0.12	0.14	0.09	0.13	0.14
900	72.82	73.10	73.25	0.16	0.20	0.22	0.16	0.21	0.22
950	55.33	55.85	56.93	0.28	0.34	0.36	0.28	0.34	0.36
960	47.36	47.99	49.15	0.35	0.42	0.44	0.35	0.42	0.44
970	37.28	38.08	39.43	0.49	0.57	0.59	0.50	0.57	0.60
975	31.22	32.12	33.63	0.63	0.71	0.73	0.63	0.72	0.74
976	29.90	30.83	32.37	0.67	0.75	0.76	0.67	0.75	0.77
980	24.22	25.27	26.98	0.89	0.97	0.97	0.88	0.97	0.98
982	21.11	22.23	24.04	1.07	1.16	1.14	1.05	1.14	1.14
983	19.48	20.64	22.50	1.19	1.27	1.24	1.17	1.26	1.24
985	16.07	17.32	19.29	1.56	1.62	1.53	1.51	1.58	1.52
990	7.43	8.72	10.72	4.54	4.18	3.46	4.24	3.94	3.32
995	2.87	3.49	4.39	18.70	16.16	12.46	15.65	13.91	11.14
1000	2.04	2.39	2.75	24.72	25.33	26.71	29.80	29.42	26.80
1005	1.82	2.10	2.34	18.32	18.73	18.99	19.57	20.32	21.01
1010	1.70	1.95	2.17	17.13	17.09	16.64	18.35	18.37	17.75
1020	1.55	1.78	1.95	18.78	18.85	19.14	21.34	22.17	24.06
1023	1.57	1.80	1.97	16.97	16.88	16.71	17.89	18.05	18.27
1030	1.57	1.81	1.99	21.25	20.06	17.94	22.44	20.98	18.60
1041	1.99	2.22	2.36	21.67	19.75	18.05	19.11	18.33	17.69
1045	2.89	2.97	2.90	13.52	16.53	22.80	11.97	13.83	16.57
1050	7.63	7.20	6.29	3.17	3.94	5.32	3.04	3.75	4.98
1055	14.55	14.02	12.97	1.10	1.37	1.73	1.08	1.34	1.68
1060	20.78	20.34	19.46	0.58	0.73	0.88	0.58	0.73	0.87
1065	26.10	25.73	25.03	0.39	0.49	0.58	0.39	0.50	0.59
1070	30.69	30.38	29.81	0.29	0.38	0.44	0.29	0.38	0.44
1075	34.72	34.46	34.00	0.23	0.31	0.36	0.23	0.31	0.36
1100	49.97	49.82	49.66	0.14	0.20	0.23	0.12	0.19	0.22
1150	71.20	70.88	71.16	0.10	0.16	0.18	0.08	0.14	0.16
1200	79.01	78.42	77.89	0.11	0.16	0.18	0.08	0.13	0.15
1250	73.78	72.86	73.60	0.12	0.16	0.19	0.08	0.13	0.15
1300	73.21	72.29	72.38	0.12	0.17	0.20	0.08	0.13	0.15
1350	69.33	69.80	69.90	0.13	0.18	0.20	0.08	0.13	0.15
1400	67.81	67.23	66.95	0.13	0.18	0.20	0.08	0.13	0.15
1450	68.68	68.74	69.02	0.14	0.18	0.21	0.08	0.13	0.15
1500	68.36	68.33	68.67	0.15	0.19	0.21	0.08	0.13	0.15
1550	76.39	75.76	74.60	0.15	0.20	0.22	0.08	0.13	0.15
1600	60.32	60.40	60.48	0.15	0.20	0.22	0.07	0.13	0.15
1650	62.37	62.32	62.33	0.16	0.20	0.22	0.07	0.12	0.14
1700	62.95	62.93	63.34	0.15	0.20	0.22	0.06	0.12	0.14
1750	62.75	63.85	63.46	0.15	0.20	0.22	0.06	0.11	0.13
1800	59.82	60.25	60.41	0.18	0.22	0.25	0.06	0.11	0.13
1850	58.57	60.24	61.05	0.16	0.21	0.23	0.06	0.11	0.13
1900	57.46	57.72	57.95	0.15	0.20	0.23	0.04	0.10	0.12
1950	62.79	62.71	62.97	0.17	0.21	0.24	0.04	0.09	0.12
2000	63.55	62.69	62.79	0.15	0.20	0.23	0.03	0.08	0.10
2040	62.84	63.30	63.30	0.15	0.20	0.23	0.02	0.08	0.10
2100	56.62	57.12	56.95	0.15	0.19	0.23	0.01	0.07	0.09
2160	59.77	59.98	60.00	0.14	0.18	0.23	0.01	0.05	0.08
2200	60.65	60.60	60.86	0.13	0.19	0.23	0.01	0.05	0.07
2260	58.11	56.42	54.96	0.14	0.21	0.25	0.01	0.05	0.07
2300	54.60	53.92	53.87	0.12	0.20	0.25	0.03	0.04	0.06
2320	54.06	54.37	54.68	0.13	0.21	0.26	0.04	0.03	0.05
2340	55.49	55.12	55.37	0.12	0.20	0.26	0.04	0.03	0.06
2400	58.27	58.96	60.15	0.13	0.22	0.31	0.06	0.01	0.05



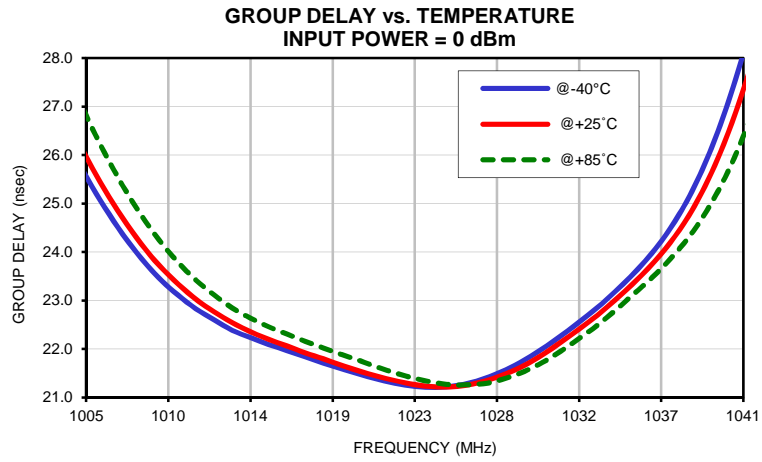
## Typical Performance Data

FREQ.  (MHz)	GROUP DELAY		
	(nsec)		
	@-40°C	@+25°C	@+85°C
1005	25.55	25.96	26.81
1006	24.93	25.29	26.05
1007	24.36	24.69	25.37
1008	23.88	24.17	24.77
1009	23.45	23.72	24.24
1010	23.12	23.35	23.80
1011	22.83	23.02	23.42
1012	22.60	22.77	23.11
1013	22.39	22.54	22.85
1014	22.23	22.36	22.63
1015	22.09	22.19	22.46
1016	21.97	22.06	22.30
1017	21.84	21.92	22.16
1018	21.71	21.79	22.02
1019	21.59	21.66	21.88
1020	21.47	21.54	21.76
1021	21.37	21.43	21.62
1022	21.29	21.34	21.50
1023	21.23	21.26	21.39
1024	21.20	21.22	21.31
1025	21.23	21.22	21.26
1026	21.30	21.26	21.26
1027	21.41	21.35	21.30
1028	21.57	21.49	21.40
1029	21.77	21.66	21.54
1030	22.00	21.88	21.72
1031	22.27	22.14	21.95
1032	22.55	22.41	22.22
1033	22.85	22.69	22.49
1034	23.19	23.02	22.80
1035	23.56	23.36	23.13
1036	23.98	23.75	23.47
1037	24.49	24.19	23.86
1038	25.11	24.74	24.30
1039	25.91	25.43	24.85
1040	26.90	26.29	25.54
1041	28.08	27.34	26.38

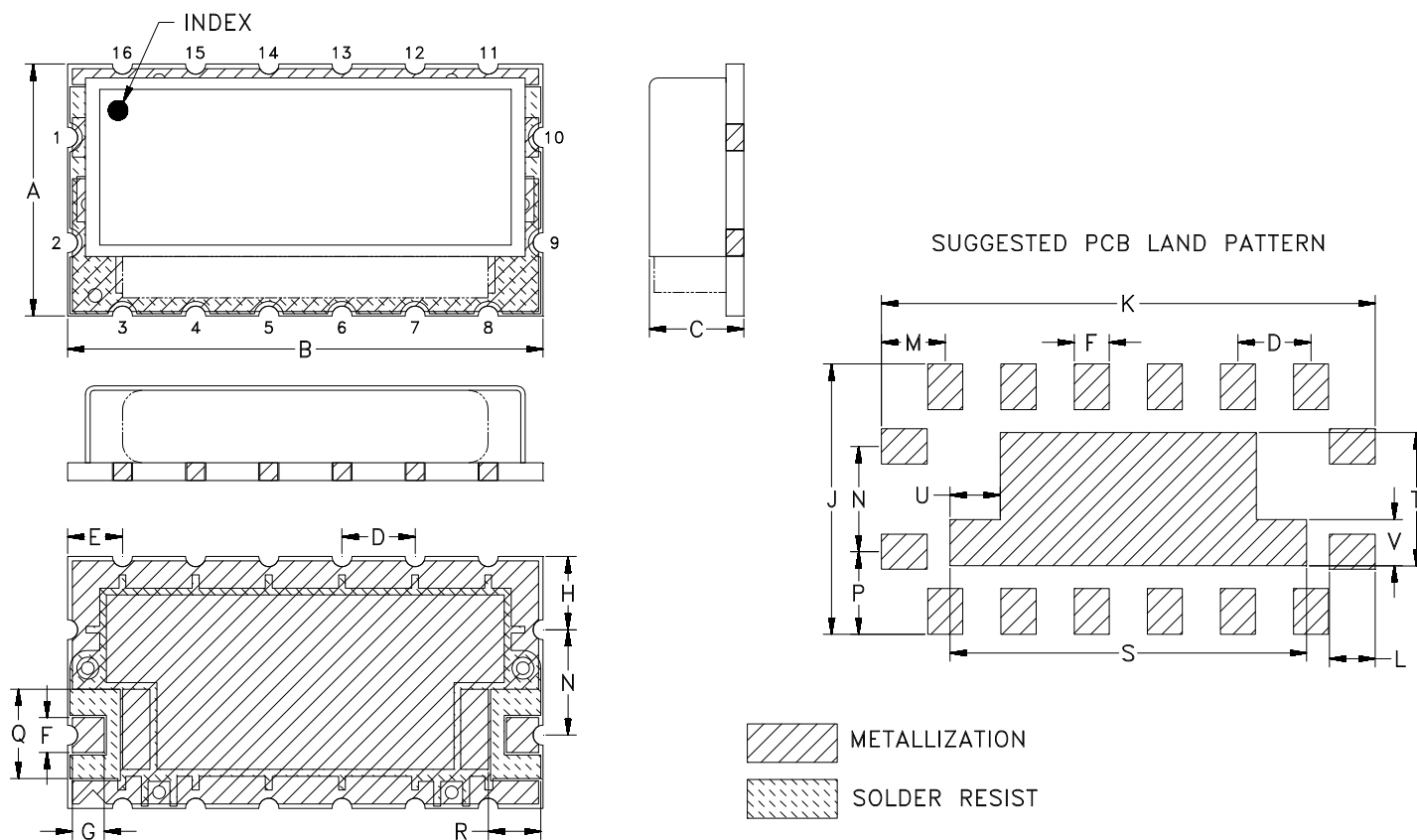
## Typical Performance Curves



## Typical Performance Curves



### 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:

- Case material: Nickel-Silver alloy.
- Base: Printed wiring laminate.
- 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.

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

ALL NEW  
minicircuits.com

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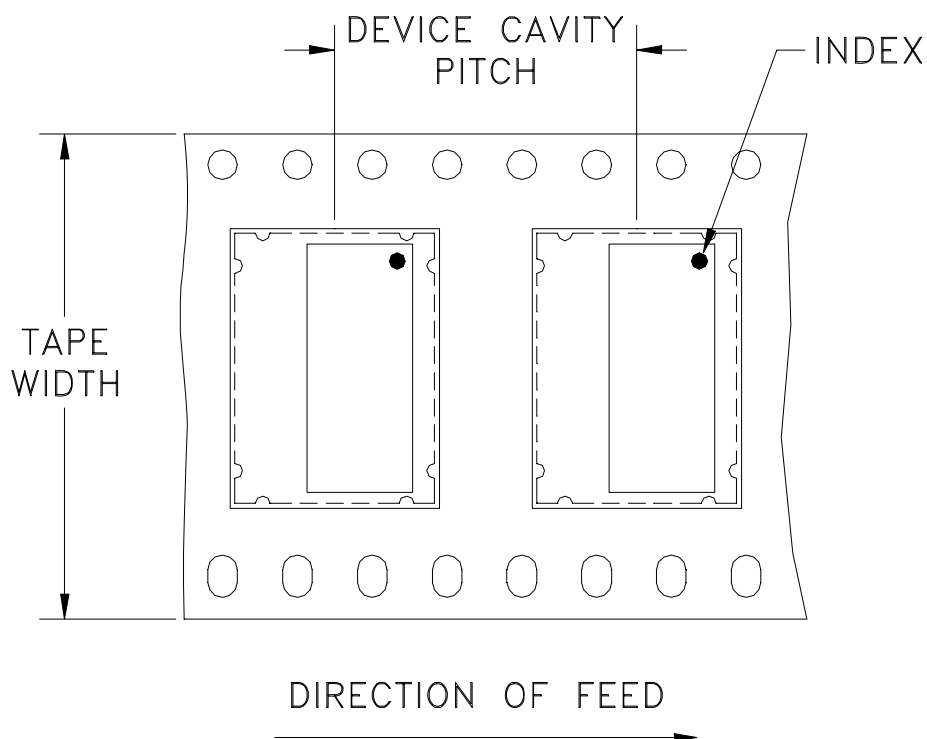
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

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)

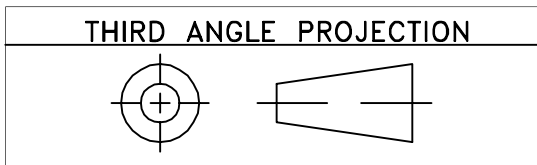


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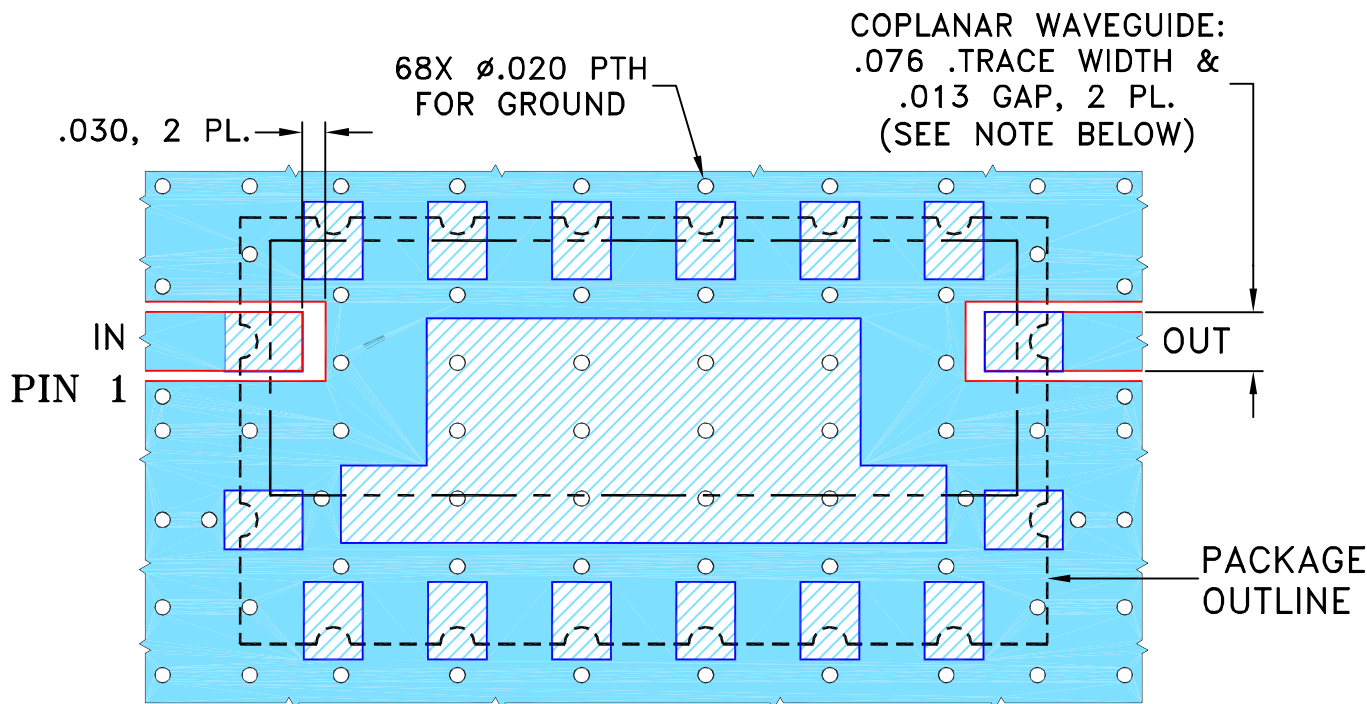
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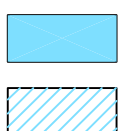


REVISIONS					
REV OR	ECN No.	DESCRIPTION	DATE	DR	AUTH
	M126876	NEW RELEASE	04/21/10	MMG	RD

**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.



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

HATCHED 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



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Brooklyn NY 11235

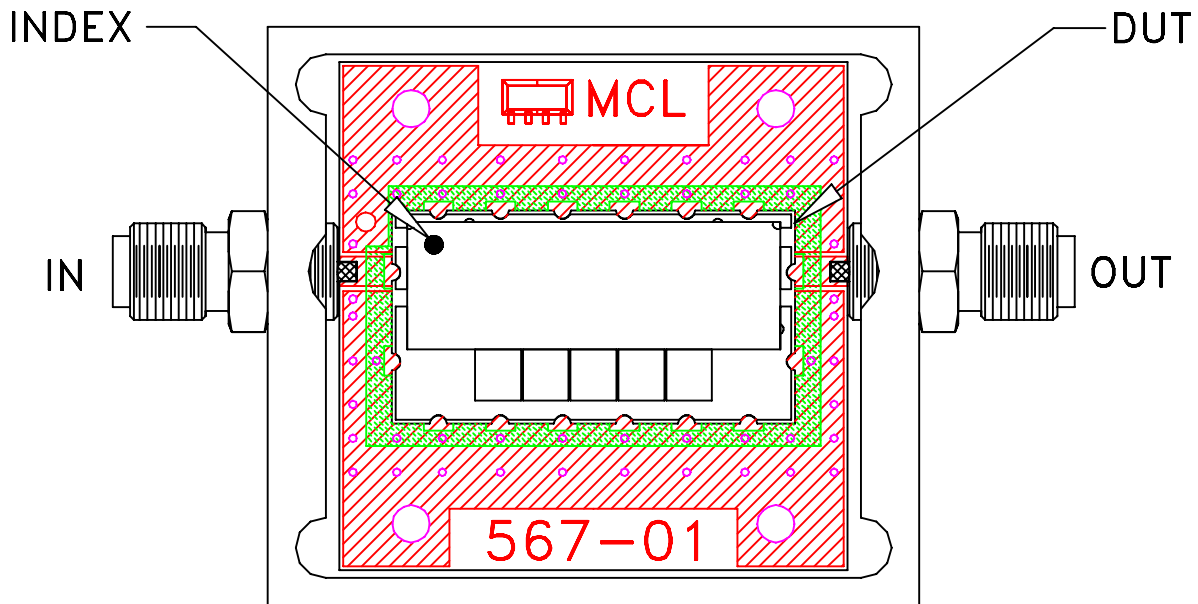
PL, 16FL02, KU1513/KV1514, TB-578+

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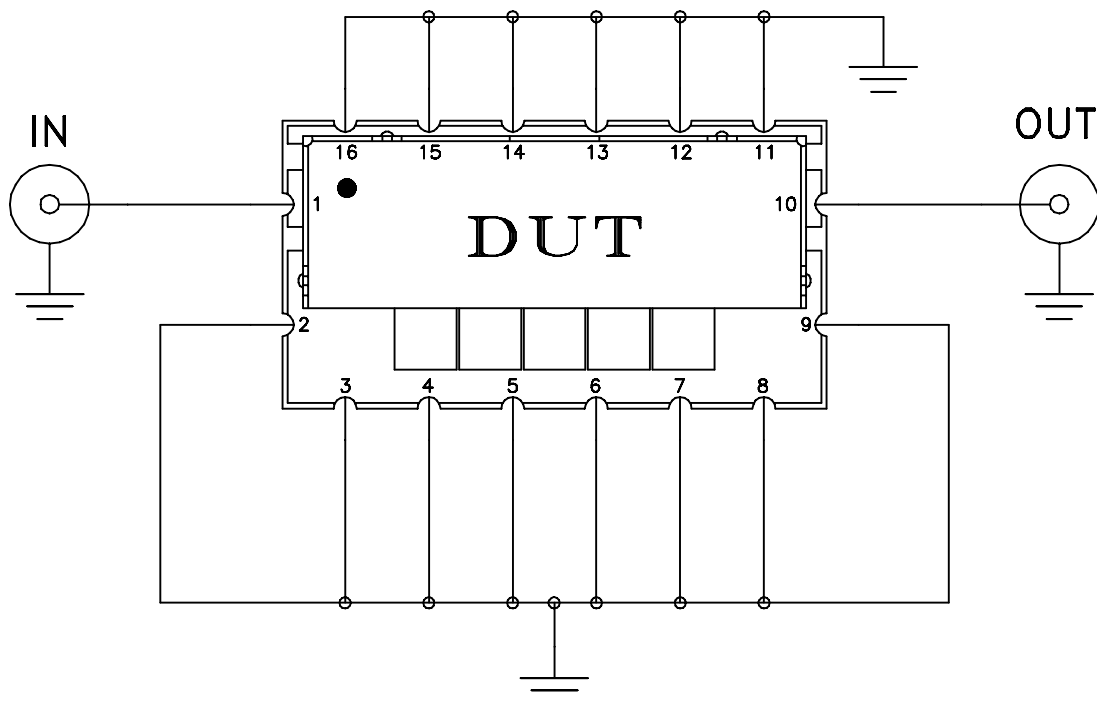
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SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-331	OR
FILE:	98PL331	SCALE: 4:1	SHEET: 1 OF 1

# Evaluation Board and Circuit




TB-578+



Schematic Diagram

## Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: R04350 or equivalent,  
Dielectric Constant=3.5, Thickness=.060 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