



CERAMIC

# High Pass Filter

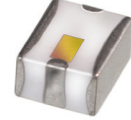
## HFCV-145+

Mini-Circuits

50Ω 140 to 1150 MHz

### THE BIG DEAL

- Low loss, 1 dB typ.
- Return loss, 11 dB typ.
- Stop Band Rejection, 23 dB typ.
- High power handling, 5W
- Small size 3.2mm x 2.5mm



Generic photo used for illustration purposes only

CASE STYLE: JV1210C

#### +RoHS Compliant

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

### APPLICATIONS

- Sub-harmonic rejection and DC blocking
- Transmitters/Receivers
- Lab use

### PRODUCT OVERVIEW

New High Pass Filter HFCV-145+ is an LTCC based 7 section design, that extends the lower frequency cutoff range of the existing HFCN series to 145 MHz. Systems that previously relied on active or lumped element filtering to support these lower frequencies can save power and system complexity by integrating the HFCV-145+ into new designs. These filters are offered in a EIA 1210 package size and have a typical stop band rejection of 23 dB.

### KEY FEATURES

Feature	Advantages
Small Size (3.2mm x 2.5mm)	Available in the size of typical resistors or capacitors (EIA 1210), the ultra small HFCV series integrates up to 7 low pass sections in a simple SMT chip form factor.
High Power Handling	The HFCV series can withstand up to 5W CW signal without damage making this filter ideal for use in medium power to transmit paths.
Temperature Stability	Over a 180°C operating temperature range (-55°C to +125°C), the HFCV series ceramic filters typically exhibit less than 0.2 dB pass band insertion loss variation.
High Rejection	Achieving 23dB rejection @ 80 MHz; the HFCV-145+ provides a versatile high pass configuration for many up converter applications.

REV. D  
ECO-015193  
HFCV-145+  
EDU4323  
URJ  
220913





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# High Pass Filter

## HFCV-145+

### ELECTRICAL SPECIFICATIONS<sup>1,2</sup> AT 25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Stopband	Rejection Loss	DC-F1	DC - 80	20	23	—	dB
		F1-F2	80 - 115	13	18	—	dB
	Freq. Cut-Off	F3*	130	—	3	—	dB
Passband	Insertion Loss	F4-F5	140 - 155	—	1.5	3	dB
		F5-F6	155 - 1050	—	1.0	1.5	dB
		F6-F7	1050 - 1150	—	1.4	3	dB
	Return Loss	F4-F5	140 - 155	—	19	—	dB
		F5-F6	155 - 1050	—	11	—	dB
		F6-F7	1050 - 1150	—	8	—	dB

1 This component should not be employed as a DC-block. DC de-coupling capacitors are required in applications where DC voltage and/or current is present at either input or output ports. Please contact Mini-Circuits for further support.

2 Measured on Mini-Circuits Characterization Test Board TB-HFCV-145+

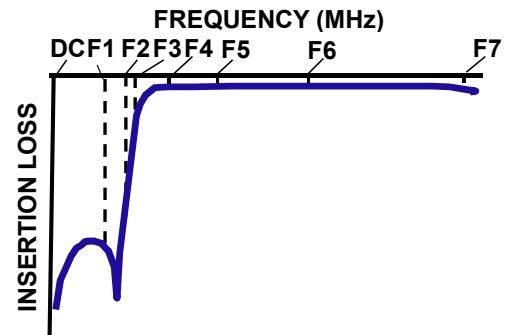
\* Typically, a ±5% frequency deviation from the stated value may occur on a unit-to-unit basis.

### MAXIMUM RATINGS

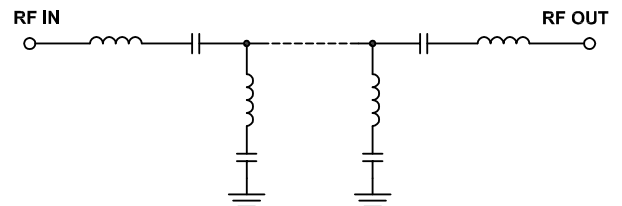
Parameter	Ratings
Operating temperature	-55°C to 125°C
Storage temperature	-55°C to 125°C
RF Power Input*	5W @25°C

\*Passband rating, derate linearly to 0.8W at 125°C ambient  
Permanent damage may occur if any of these limits are exceeded.

### TYPICAL FREQUENCY RESPONSE



### FUNCTIONAL SCHEMATIC



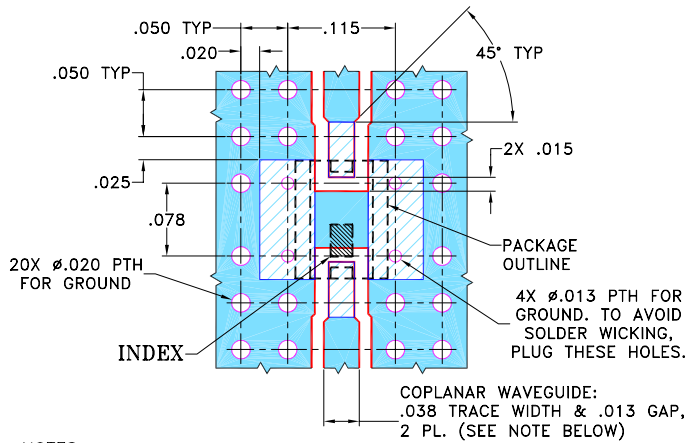


### PAD CONNECTIONS

INPUT	1
OUTPUT	3
GROUND	2,4

PRODUCT MARKING: UZ

DEMO BOARD MCL P/N: TB-HFCV-145+  
SUGGESTED PCB LAYOUT (PL-307)

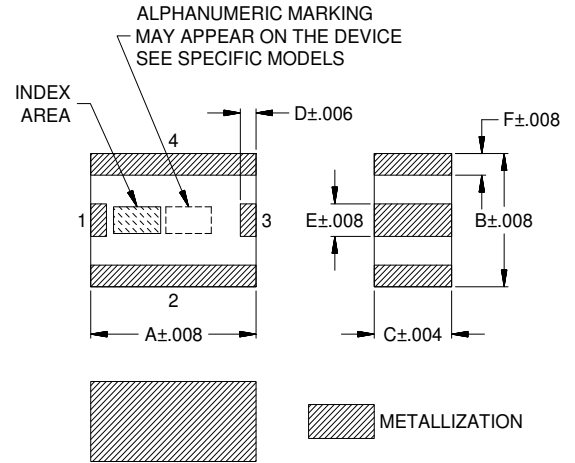


**NOTES:**

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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 (Inches/mm)

A	B	C	D	E	F	Wt.
.126	.098	.059	.012	.024	.016	grams
3.2	2.5	1.5	.3	.6	.4	.03

Note: Please refer to case style drawing for details



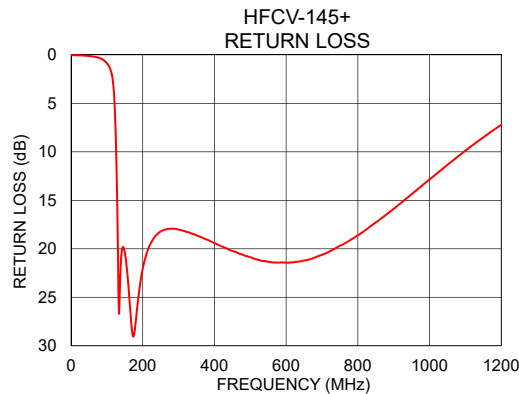
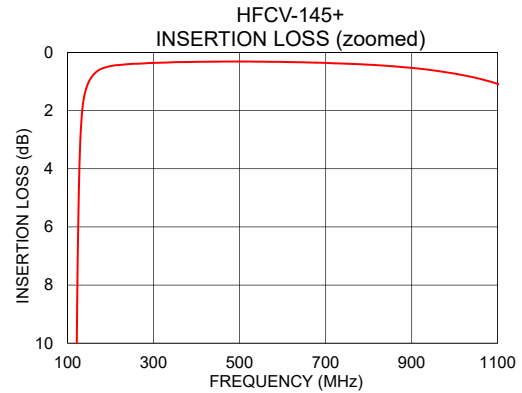
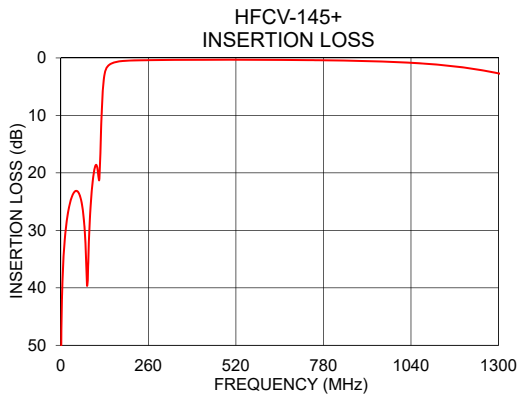
CERAMIC

# High Pass Filter

# HFCV-145+

### TYPICAL PERFORMANCE DATA AT 25°C

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
10	33.08	0.03
20	27.48	0.05
30	24.69	0.06
50	23.23	0.12
80	38.88	0.33
84	31.31	0.39
115	20.75	2.24
130	2.87	18.07
140	1.41	20.85
145	1.16	19.82
155	0.86	21.75
300	0.36	18.02
500	0.31	20.87
1050	0.88	11.34
1150	1.35	8.50



#### 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-Circuit's 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/MCLStore/terms.jsp](http://www.minicircuits.com/MCLStore/terms.jsp)



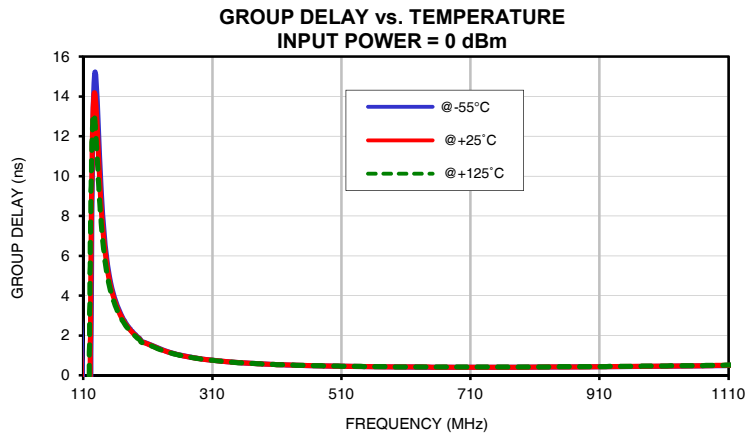
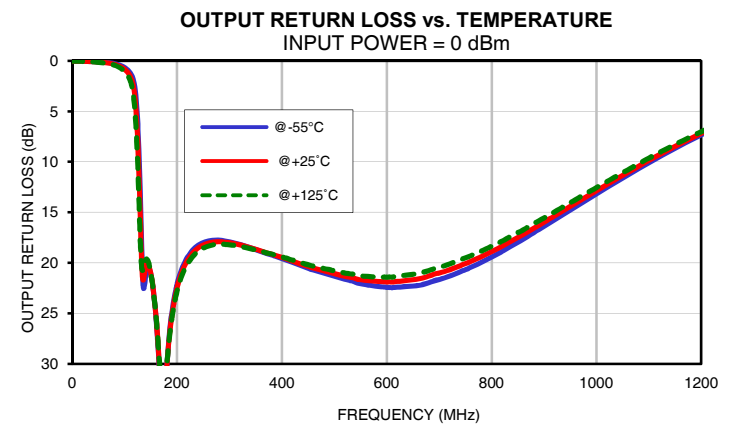
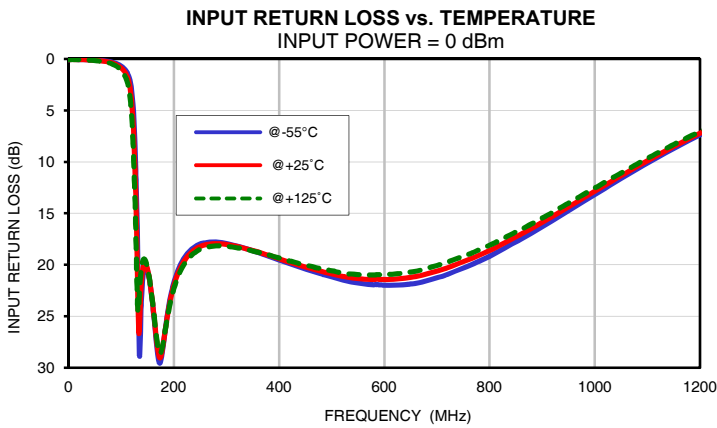
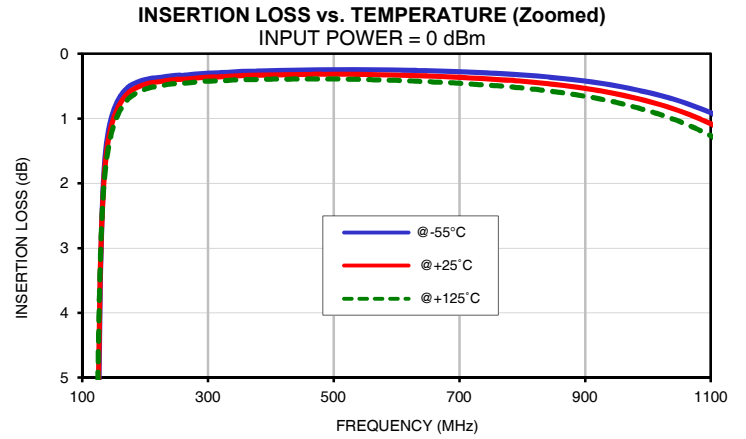
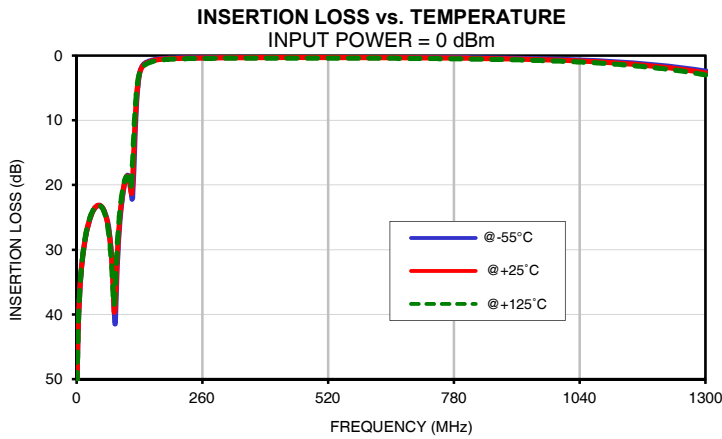
## Typical Performance Data

FREQ.  (MHz)	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
	(dB)			(dB)			(dB)		
	@-55°C	@+25°C	@+125°C	@-55°C	@+25°C	@+125°C	@-55°C	@+25°C	@+125°C
10	33.19	33.08	32.91	0.03	0.03	0.04	0.03	0.03	0.04
12	31.66	31.55	31.39	0.03	0.04	0.04	0.03	0.04	0.04
14	30.40	30.29	30.13	0.04	0.04	0.04	0.04	0.04	0.04
16	29.32	29.21	29.05	0.04	0.04	0.04	0.04	0.04	0.05
18	28.39	28.29	28.14	0.04	0.04	0.05	0.04	0.04	0.05
20	27.58	27.48	27.33	0.04	0.05	0.05	0.04	0.05	0.05
22	26.87	26.77	26.63	0.04	0.05	0.05	0.04	0.05	0.06
24	26.24	26.15	26.01	0.04	0.05	0.06	0.04	0.05	0.06
26	25.69	25.60	25.47	0.05	0.05	0.06	0.05	0.06	0.06
28	25.20	25.11	24.99	0.05	0.05	0.07	0.05	0.06	0.07
30	24.77	24.69	24.58	0.05	0.06	0.07	0.05	0.06	0.07
32	24.40	24.32	24.22	0.05	0.06	0.08	0.06	0.07	0.08
34	24.08	24.00	23.91	0.06	0.07	0.08	0.06	0.07	0.08
36	23.80	23.74	23.66	0.06	0.07	0.09	0.06	0.08	0.09
38	23.58	23.52	23.45	0.07	0.08	0.10	0.07	0.08	0.10
40	23.40	23.35	23.29	0.07	0.09	0.10	0.07	0.09	0.11
42	23.27	23.23	23.18	0.08	0.09	0.11	0.08	0.09	0.11
44	23.18	23.15	23.12	0.08	0.10	0.12	0.08	0.10	0.12
46	23.14	23.13	23.11	0.09	0.10	0.13	0.09	0.11	0.13
48	23.15	23.15	23.16	0.09	0.11	0.14	0.09	0.11	0.14
50	23.22	23.23	23.26	0.09	0.12	0.14	0.10	0.12	0.15
54	23.51	23.57	23.64	0.11	0.13	0.16	0.11	0.13	0.17
60	24.49	24.63	24.82	0.13	0.16	0.20	0.13	0.16	0.20
64	25.63	25.86	26.18	0.14	0.18	0.23	0.14	0.18	0.23
70	28.60	29.09	29.74	0.18	0.22	0.28	0.17	0.22	0.29
74	32.28	33.10	34.15	0.20	0.26	0.33	0.20	0.26	0.33
80	41.40	38.88	35.99	0.26	0.33	0.42	0.25	0.33	0.42
84	32.92	31.31	29.61	0.31	0.39	0.50	0.30	0.39	0.50
115	22.20	20.75	17.98	1.71	2.24	3.00	1.63	2.14	2.87
120	14.27	12.01	9.88	3.00	4.04	5.55	2.84	3.83	5.24
130	2.93	2.87	2.81	14.83	18.07	21.63	13.49	15.86	18.13
140	1.27	1.41	1.54	22.10	20.85	19.82	21.30	20.44	19.69
150	0.87	0.99	1.11	20.50	20.37	20.28	21.15	21.06	21.02
155	0.75	0.86	0.98	21.82	21.75	21.74	22.89	22.85	22.88
170	0.54	0.63	0.73	28.92	28.41	28.00	34.89	33.53	32.52
200	0.40	0.47	0.55	21.76	22.04	22.34	22.10	22.43	22.77
240	0.34	0.40	0.47	18.26	18.51	18.82	18.26	18.52	18.85
280	0.31	0.38	0.44	17.79	17.93	18.16	17.74	17.89	18.13
320	0.29	0.35	0.42	18.19	18.23	18.35	18.17	18.21	18.35
360	0.27	0.33	0.40	18.79	18.75	18.77	18.85	18.80	18.84
400	0.26	0.32	0.39	19.52	19.41	19.34	19.56	19.46	19.40
440	0.25	0.32	0.39	20.24	20.07	19.91	20.34	20.19	20.04
480	0.25	0.32	0.39	20.86	20.62	20.36	21.01	20.78	20.55
520	0.24	0.32	0.39	21.46	21.12	20.78	21.63	21.33	21.00
560	0.25	0.32	0.40	21.85	21.39	20.99	22.15	21.72	21.33
600	0.25	0.33	0.41	21.98	21.43	20.96	22.43	21.89	21.42
640	0.26	0.34	0.43	21.92	21.29	20.78	22.34	21.73	21.19
680	0.27	0.36	0.45	21.56	20.89	20.36	21.97	21.31	20.76
720	0.29	0.37	0.47	20.93	20.29	19.74	21.31	20.68	20.10
760	0.30	0.40	0.49	20.12	19.51	18.98	20.44	19.85	19.29
800	0.33	0.42	0.53	19.16	18.61	18.09	19.42	18.89	18.35
840	0.35	0.46	0.57	18.04	17.55	17.07	18.24	17.76	17.27
880	0.40	0.51	0.62	16.91	16.45	16.02	17.01	16.58	16.14
920	0.45	0.56	0.69	15.68	15.28	14.88	15.74	15.35	14.95
960	0.51	0.64	0.77	14.42	14.06	13.71	14.44	14.09	13.74
1000	0.59	0.73	0.88	13.16	12.84	12.53	13.16	12.86	12.55
1020	0.64	0.78	0.94	12.55	12.25	11.95	12.53	12.25	11.95
1050	0.73	0.88	1.04	11.61	11.34	11.07	11.60	11.34	11.07
1100	0.91	1.08	1.27	10.09	9.87	9.64	10.07	9.85	9.63
1150	1.16	1.35	1.56	8.68	8.50	8.30	8.65	8.47	8.27

## Typical Performance Data

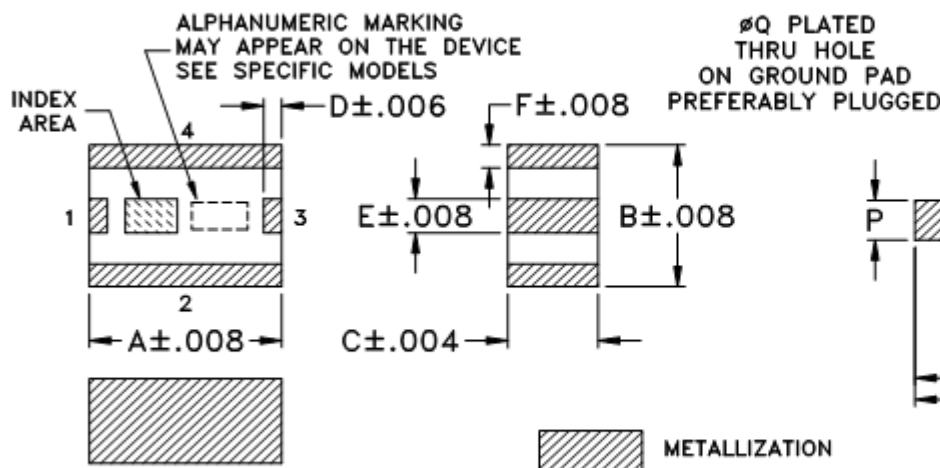
FREQ.  (MHz)	GROUP DELAY		
	(nsec)		
	@-55°C	@+25°C	@+125°C
140	8.02	7.41	6.77
155	4.27	4.11	3.92
180	2.42	2.37	2.31
200	1.71	1.68	1.65
220	1.45	1.43	1.42
240	1.19	1.18	1.17
260	1.01	1.01	1.00
280	0.89	0.88	0.88
300	0.79	0.79	0.79
320	0.72	0.72	0.72
340	0.66	0.66	0.66
360	0.61	0.61	0.61
380	0.58	0.58	0.58
400	0.55	0.55	0.55
420	0.52	0.52	0.53
440	0.50	0.50	0.51
460	0.48	0.49	0.49
480	0.47	0.47	0.48
500	0.46	0.46	0.46
520	0.45	0.45	0.45
540	0.44	0.44	0.44
560	0.43	0.43	0.44
580	0.42	0.43	0.43
600	0.42	0.42	0.42
620	0.41	0.42	0.42
640	0.41	0.41	0.42
660	0.41	0.41	0.42
680	0.41	0.41	0.41
700	0.40	0.41	0.41
720	0.40	0.41	0.41
740	0.41	0.41	0.42
760	0.40	0.41	0.41
780	0.40	0.41	0.42
800	0.41	0.41	0.42
820	0.41	0.42	0.42
850	0.41	0.42	0.43
900	0.42	0.43	0.44
950	0.44	0.44	0.45
1050	0.47	0.48	0.48
1150	0.51	0.51	0.52

## Typical Performance Curves

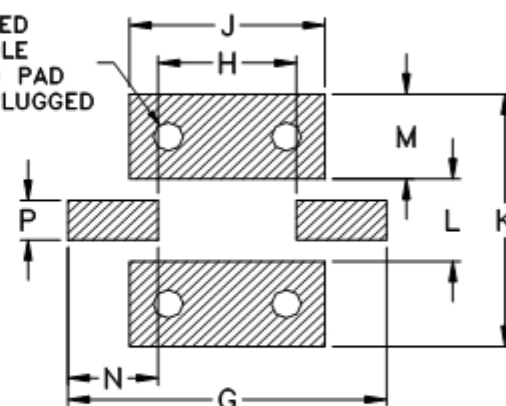


## Outline Dimensions

JV1210C



## PCB Land Pattern



Suggested Layout,  
Tolerance to be within  $\pm.002$

CASE #	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	WT. GRAM
JV1210C	.126 (3.2)	.098 (2.5)	.059 (1.5)	.012 (.3)	.024 (.6)	.016 (.4)	.209 (5.3)	.091 (2.3)	.128 (3.25)	.175 (4.45)	.057 (1.45)	.059 (1.5)	.059 (1.5)	.028 (.7)	.020 (.5)	.03

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

### Notes:

1. Open style, ceramic base.
2. Termination finish: **as shown below or indicated on Data Sheet.**  
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.  
For RoHS-5 Case Styles: Tin-Lead plate. All models, no (+) suffix.
3. Pad tolerance is non-cumulative. Minimum spacing between each pad is .004.



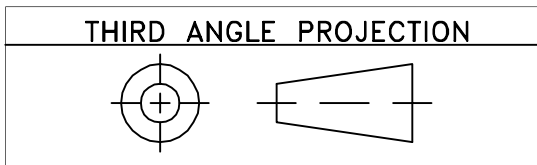
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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

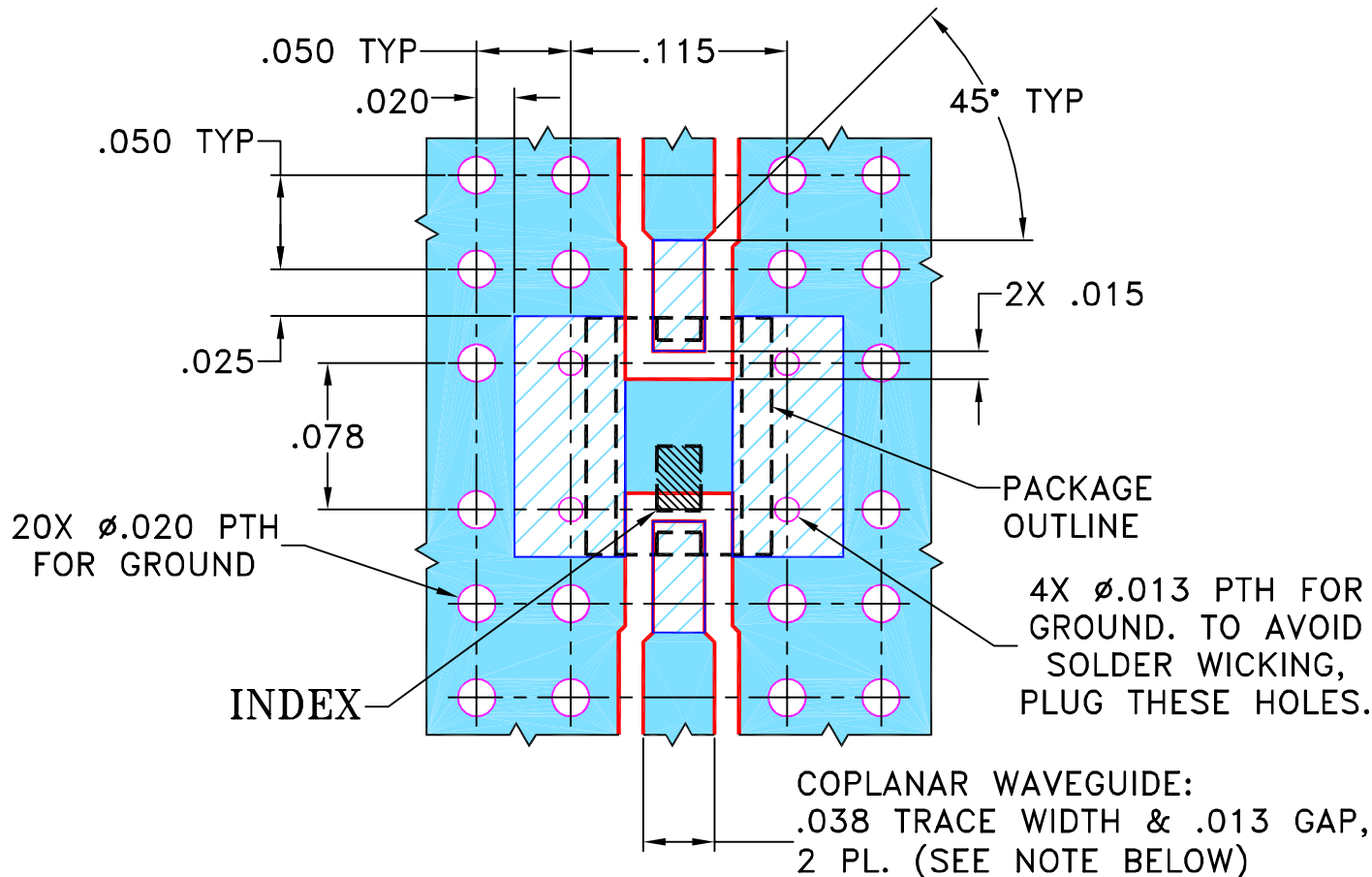
RF/IF MICROWAVE COMPONENTS





REVISIONS					
REV OR	ECN No.	DESCRIPTION	DATE	DR	AUTH
	M123026	NEW RELEASE	06/08/09	PW	ABD

**SUGGESTED MOUNTING CONFIGURATION  
FOR JV1210C CASE STYLE, "04FL01" PIN CONNECTIONS**



**NOTES:**

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS RO4350B WITH DIELECTRIC THICKNESS 0.020" ± 0.0015"; COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP 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 PW	05/27/09
TOLERANCES ON:	CHECKED IL	06/04/09
2 PL DECIMALS ±	APPROVED ABD	06/08/09
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		



**Mini-Circuits®**

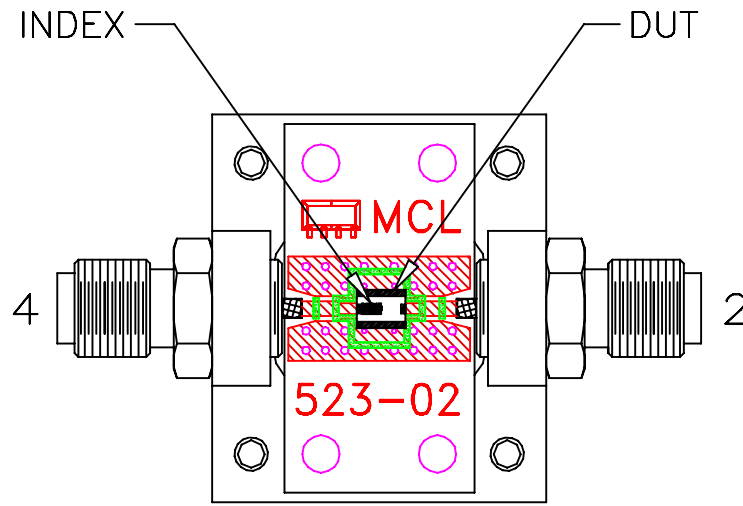
13 Neptune Avenue  
Brooklyn NY 11235

**PL, 04FL01, JV1210C, LFCF, TB-526+**

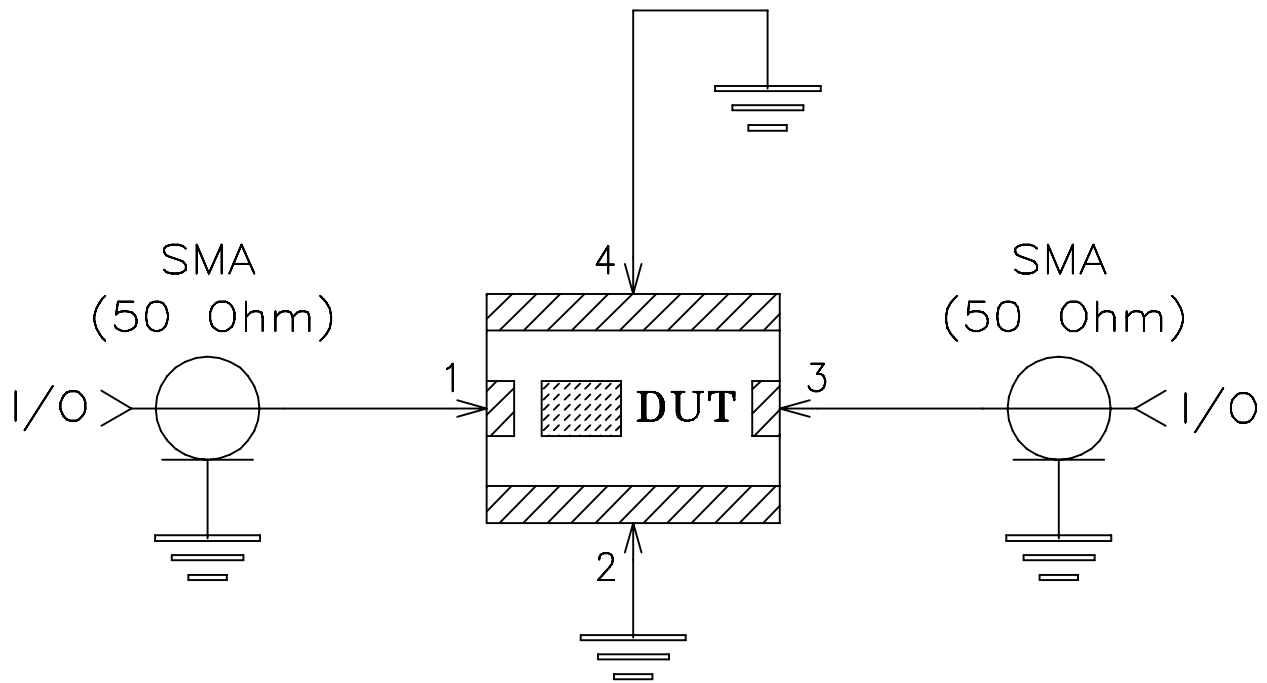
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SIZE A	CODE IDENT 15542	DRAWING NO: 98-PL-307	REV: OR
FILE: 98PL307	SCALE: 10:1	SHEET: 1 OF 1	

# Evaluation Board and Circuit




TB-526+



Schematic Diagram

## 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	-55° to 100°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
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, Para 4.2.5, Test S, 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