CERAMIC

High Pass Filter

HFCV-145+

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

ELECTRICAL SPECIFICATIONS[1,2] 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

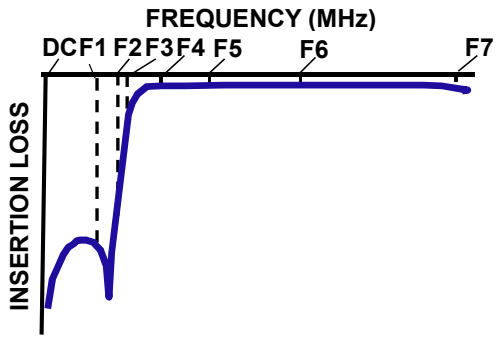
1 This component should not be employed as a DC-block. DC de-coupling capacitors are required in applications where DC voltage and/or current is present at either input or output ports. Please contact Mini-Circuits for further support.
2 Measured on Mini-Circuits Characterization Test Board TB-HFCV-145+
* Typically, a ±5% frequency deviation from the stated value may occur on a unit-to-unit basis.

MAXIMUM RATINGS

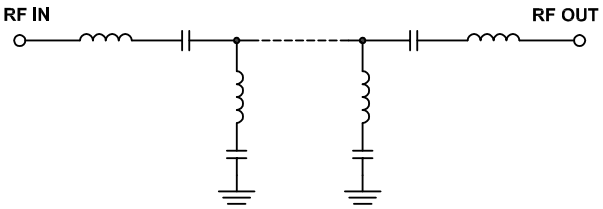
Parameter	Ratings
Operating temperature	-55°C to 125°C
Storage temperature	-55°C to 125°C
RF Power Input*	5W @25°C

*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



CERAMIC

High Pass Filter

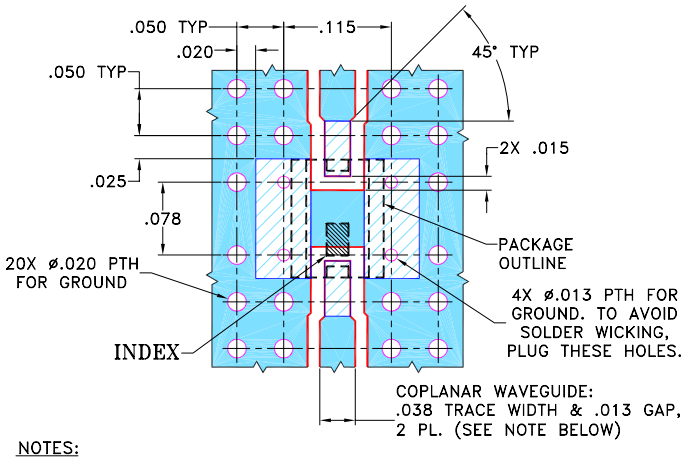
HFCV-145+

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)



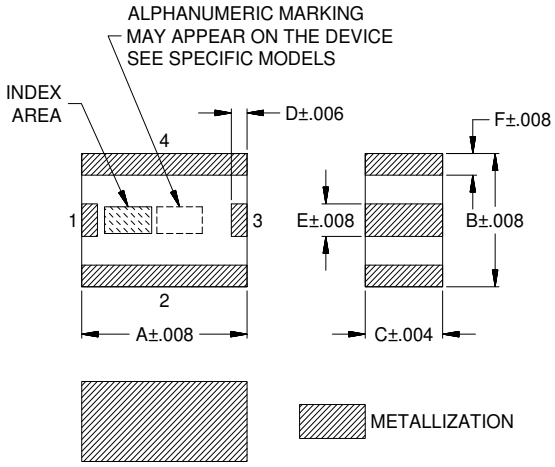
NOTES:

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

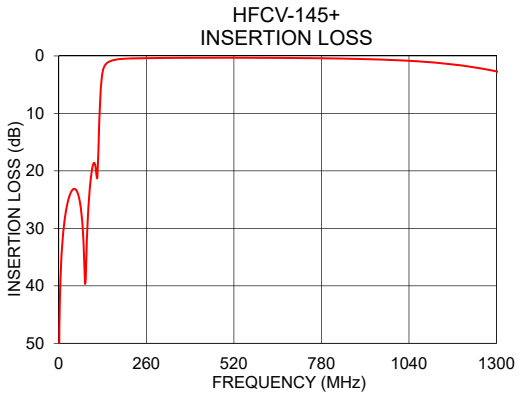
Note: Please refer to case style drawing for details

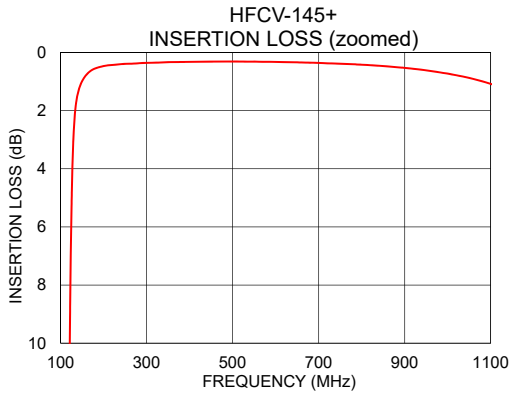
High Pass Filter

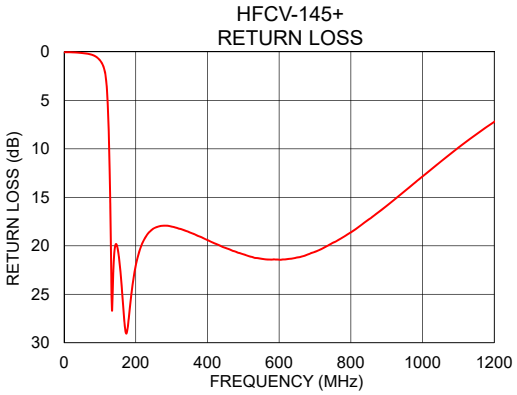
HFCV-145+

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

Ceramic High Pass Filter HFCV-145+

Typical Performance Data

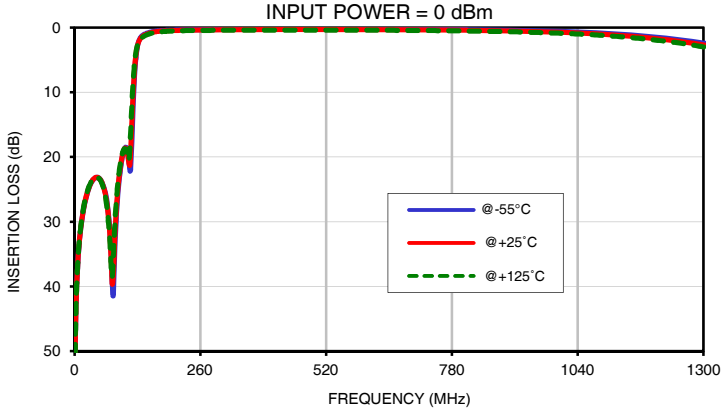
FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-55°C	@+25°C	@+125°C	@-55°C	@+25°C	@+125°C	@-55°C	@+25°C	@+125°C
10	33.19	33.08	32.91	0.03	0.03	0.04	0.03	0.03	0.04
12	31.66	31.55	31.39	0.03	0.04	0.04	0.03	0.04	0.04
14	30.40	30.29	30.13	0.04	0.04	0.04	0.04	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

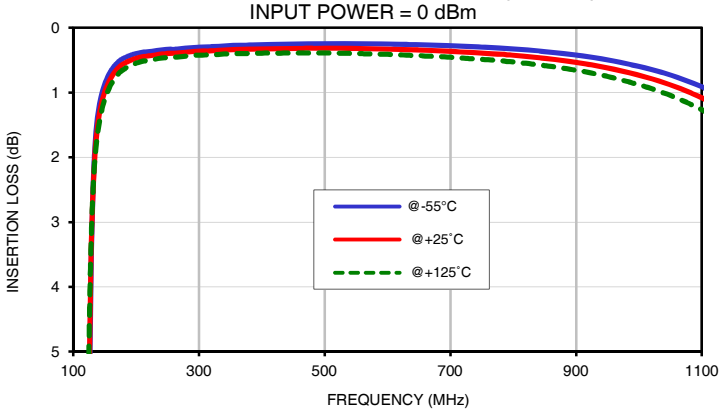
FREQ. (MHz)	GROUP DELAY (nsec)		
	@-55°C	@+25°C	@+125°C
140	8.02	7.41	6.77
155	4.27	4.11	3.92
180	2.42	2.37	2.31
200	1.71	1.68	1.65
220	1.45	1.43	1.42
240	1.19	1.18	1.17
260	1.01	1.01	1.00
280	0.89	0.88	0.88
300	0.79	0.79	0.79
320	0.72	0.72	0.72
340	0.66	0.66	0.66
360	0.61	0.61	0.61
380	0.58	0.58	0.58
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

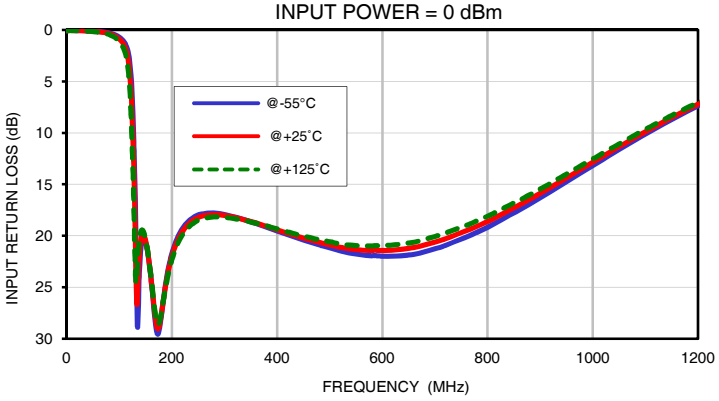
INSERTION LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



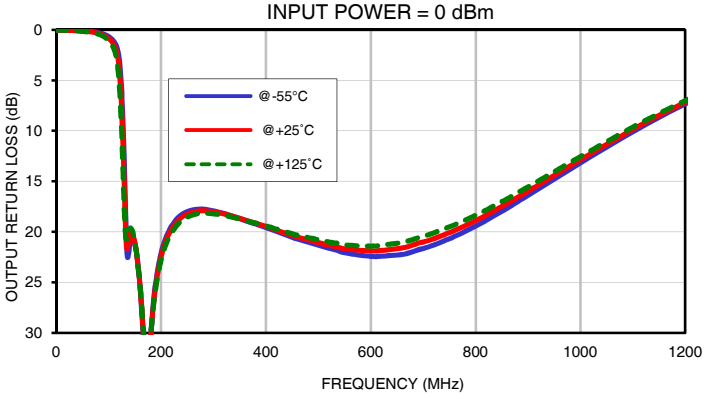
INSERTION LOSS vs. TEMPERATURE (Zoomed)
INPUT POWER = 0 dBm



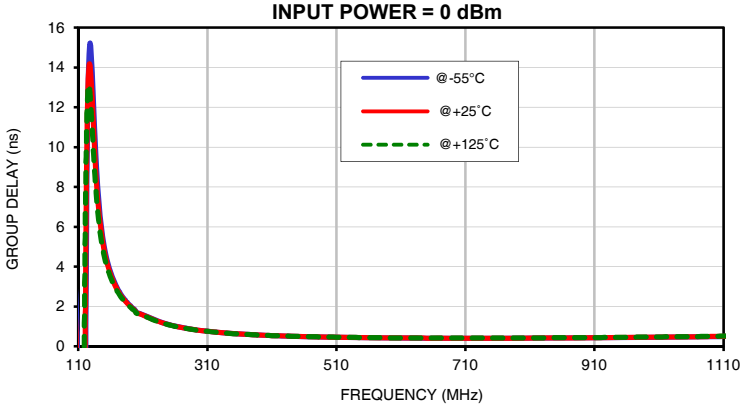
INPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS vs. TEMPERATURE
INPUT POWER = 0 dBm



GROUP DELAY vs. TEMPERATURE
INPUT POWER = 0 dBm

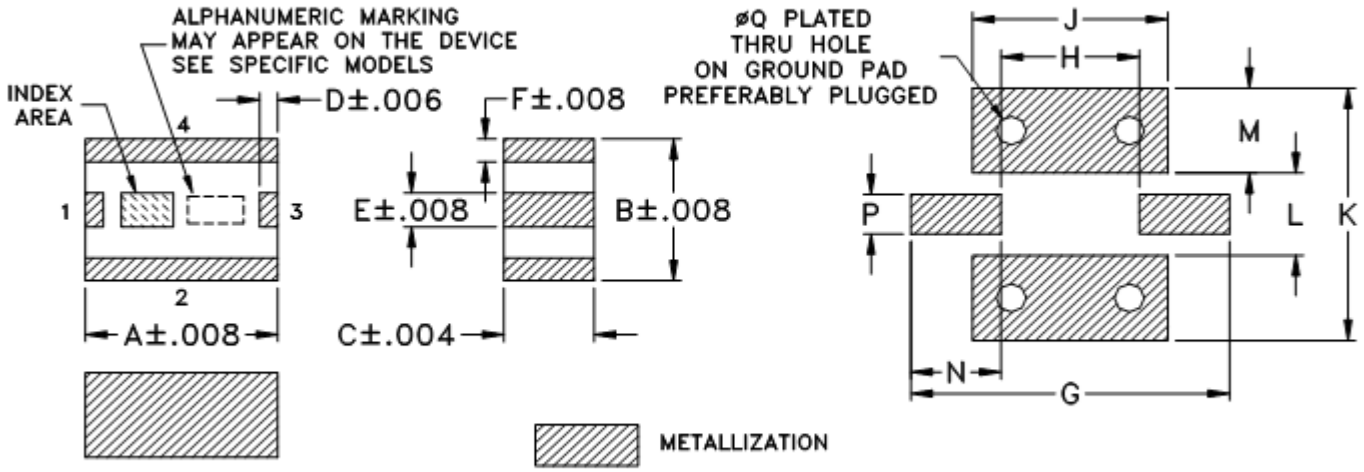


Case Style JV

Outline Dimensions

JV1210C

PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.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. ± .01; 3 Pl. ± .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.

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Tape & Reel Packaging TR-F74

DEVICE ORIENTATION IN T&R

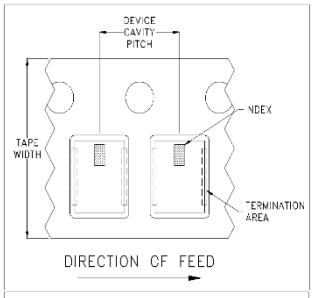


ILLUSTRATION 1

Applicable Case Styles
GE0805C-1
GE0805C-1AP
JV1210C-1
GU2939

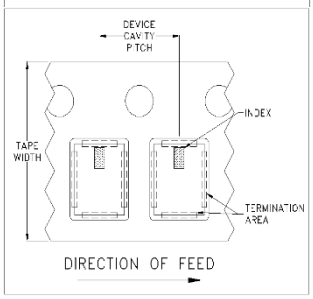


ILLUSTRATION 2

Applicable Case Styles
JV1210C
JV1210C-2
JV1210C-3
JV1210C-4
JV1210C-5
JV1210C-6
JV1210C-11

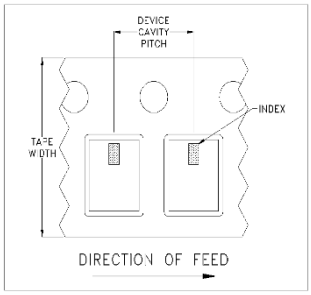


ILLUSTRATION 3

Applicable Case Styles
JC0603C-8
JC0603C-9
JV1210C-7
JV1210C-8
JV1210C-9
JV1210C-10
JV1210C-13
GE0805C-13
GE0805C-19
GE0805C-20

Tape Width, mm	Device Cavity Pitch, mm	Real Size, inches	Devices per Reel	
8	4	7	Small quantity standards **(see note)**	20
				50
				100
				200
				500
				1000
			Standard	2000
				4000

Note: Small reel availability varies by model. Refer to pricing and availability on individual model dashboard.

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

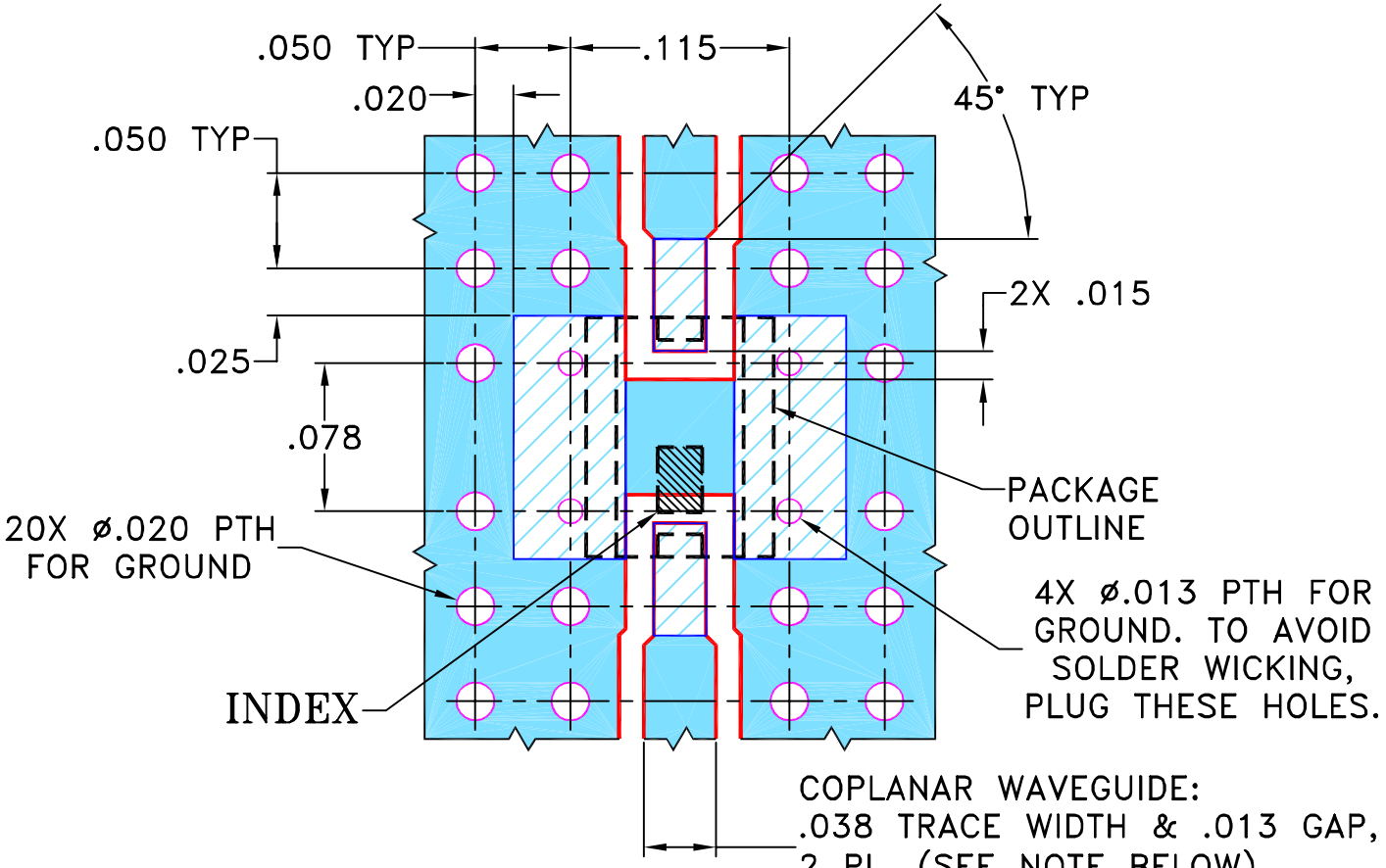
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THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	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 ±			

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

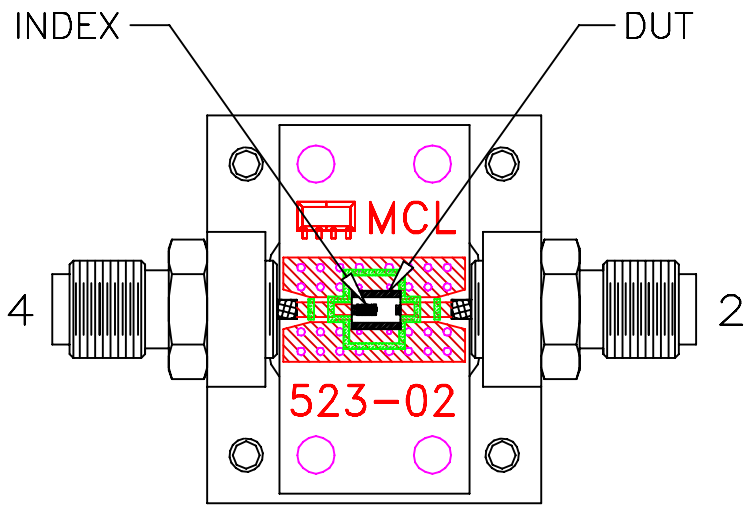
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

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

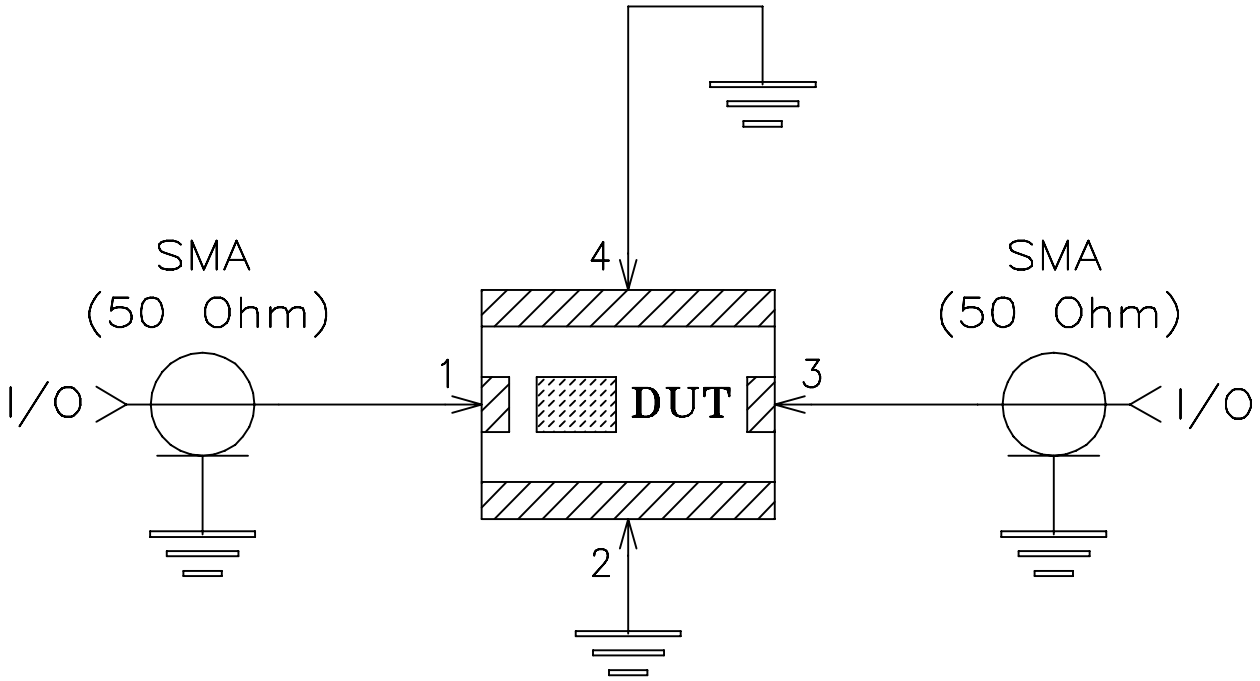
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-307	OR

FILE:	SCALE:	SHEET:
98PL307	10:1	1 OF 1

Evaluation Board and Circuit



TB-526+



Schematic Diagram

Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: RO4350 or equivalent,
   Dielectric Constant=3.5, Thickness=.020 inch.

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Environmental Specifications ENV06

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

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