LTCC SMT

High Pass Filter

HFCV-2002+

50Ω 19.6 to 47 GHz

THE BIG DEAL

- Pass Band, 19.6 to 47 GHz
- Low Insertion Loss, Typ. 1.6 dB
- Return Loss, Typ. 10 dB
- Stop Band Rejection, Typ. 21 dB
- Power Handling, 1W



Generic photo used for illustration purposes only

CASE STYLE: JV1210C-13

+RoHS Compliant
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

APPLICATIONS

- Test & Measurement Equipment
- 5G mmWave Radio Systems
- Satellite Communications
- ISM Applications

PRODUCT OVERVIEW

The HFCV-2002+ is a miniature low temperature co-fired ceramic (LTCC) high pass filter with a 19.6 to 47 GHz passband supporting a variety of applications. This model provides 1.6 dB typical insertion loss over a wide band due to its rugged monolithic construction. Housed in a tiny 1210 ceramic form factor, the filter is ideal for dense signal chain PCB layouts where it complements MMIC size and performance. The LTCC fabrication process assures minimal RF performance variation while delivering a product that is well suited for environmental extremes of high humidity and temperature.

KEY FEATURES

Feature	Advantages
Passband	More than an octave bandwidth for wideband applications
Cost effective	LTCC is a scalable technology that is cost effective due to ease of production in high quantities.
Small size 1210	Allows for high layout density of circuit boards, while minimizing effects of parasites.
Surface Mountable	Suitable for very high volume automated assembly process.

REV. OR
ECO-015970
HFCV-2002+
ATHARVA/CP/AM
221222

LTCC SMT

High Pass Filter

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50Ω 19.6 to 47 GHz

ELECTRICAL SPECIFICATIONS [1,2] AT 25°C

Parameter		F#	Frequency (GHz)	Min.	Typ.	Max.	Units
Stop Band	Insertion Loss	DC-F1	0.1 - 8	—	21.9	—	dB
		F1-F2	8.1 - 15	—	17.8	—	
Pass Band	Insertion Loss	F3-F4	19.6 - 26.5	—	1.0	1.7	dB
		F4-F5	26.6 - 38	—	1.6	2.4	
		F5-F6	38.1 - 47	—	2.2	3.8	
	Return Loss	F3-F4	19.6 - 26.5	—	15.1	—	dB
		F4-F5	26.6 - 38	—	10.7	—	
		F5-F6	38.1 - 47	—	15	—	

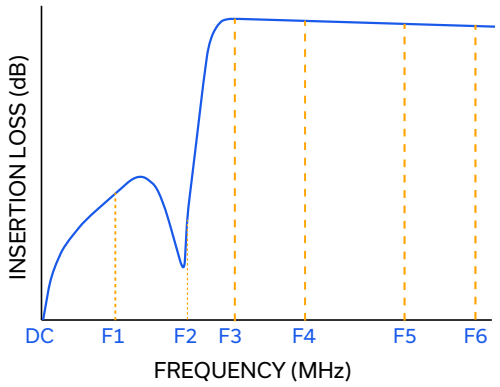
1. Measured on Mini-Circuits Test Board TB-HFCV-2002C+ with connectors and feedlines effects de-embedded using 2X Thru IEEE P370 method.
2. This component is not intended to act as a DC block. Please consult with Mini-Circuits for further details.
   DC blocking capacitors are required in applications where DC voltage and/or current is present at either input or output ports.

ABSOLUTE MAXIMUM RATINGS

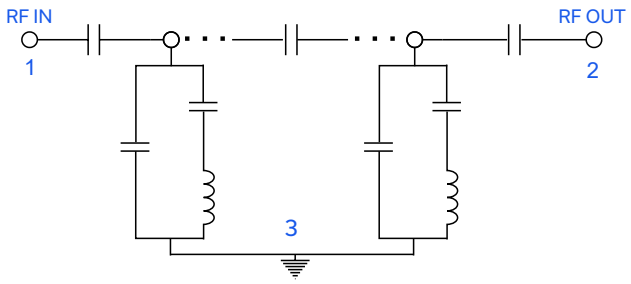
Parameter	Ratings
Operating Temperature	-55°C to +125°C
Storage Temperature	-55°C to +125°C
RF Power Input	1W max.

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

TYPICAL FREQUENCY RESPONSE



FUNCTIONAL SCHEMATIC



LTCC SMT

High Pass Filter

HFCV-2002+

50Ω 19.6 to 47 GHz

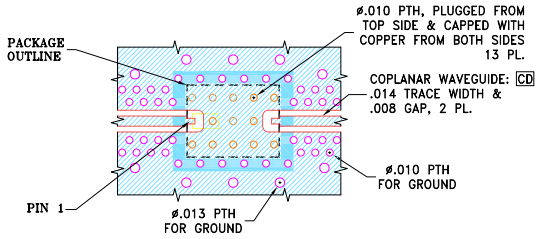
PIN CONNECTIONS

RF IN	1
RF OUT	2
GROUND	3

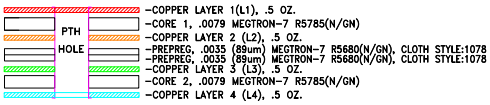
PRODUCT MARKING: VJ

EVALUATION BOARD MCL P/N: TB-HFCV-2002C+

SUGGESTED PCB LAYOUT (PL-743)



STACK-UP DIAGRAM



1. TOTAL FINISHED THICKNESS 0.026 ± 10%.
2. PTH PRESENT FROM COPPER LAYER 1 TO COPPER LAYER 4.
3. INDICATED ON TOP VIEW PTH's ARE PLUGGED WITH EPOXY AND CAPPED WITH COPPER FROM TOP SIDE.
4. L2, L3 AND L4 ARE CONTINUOUS GROUND PLANES.

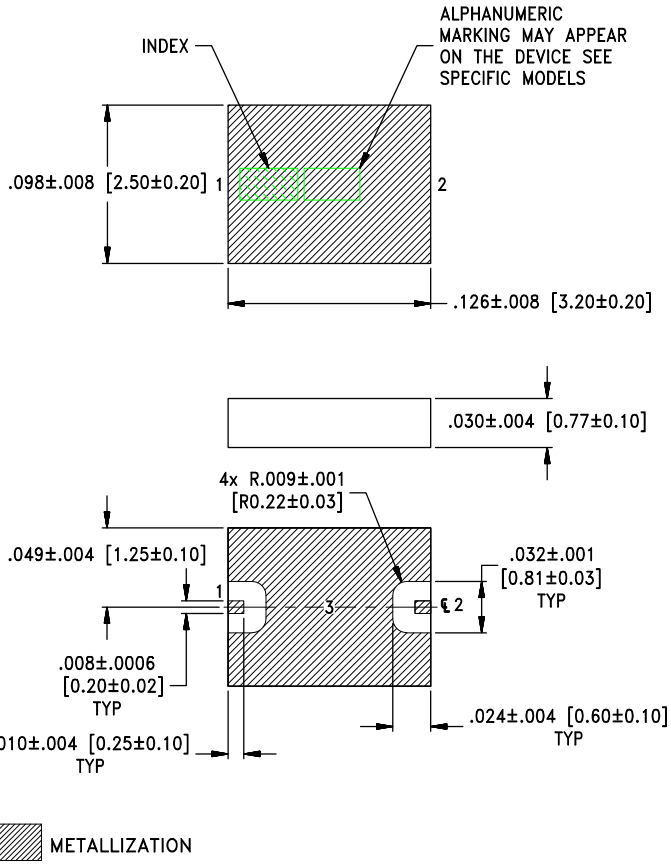
NOTES:

1. PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
2. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR MEGTRON-7 R-5785(N/GN), WITH DIELECTRIC THICKNESS .0079; COPPER: 1/2 OZ. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.

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

DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

OUTLINE DRAWING



Weight: .024 grams

Dimensions are in inches [mm]. Tolerances:2 Pl.±.010; 3 Pl. ±.005

TAPE & REEL INFORMATION: F74

LTCC SMT

High Pass Filter

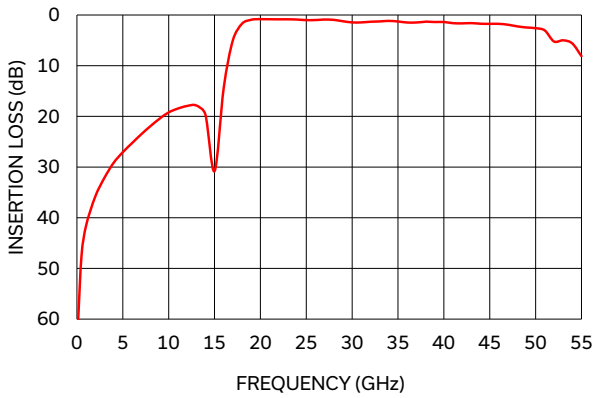
HFCV-2002+

50Ω 19.6 to 47 GHz

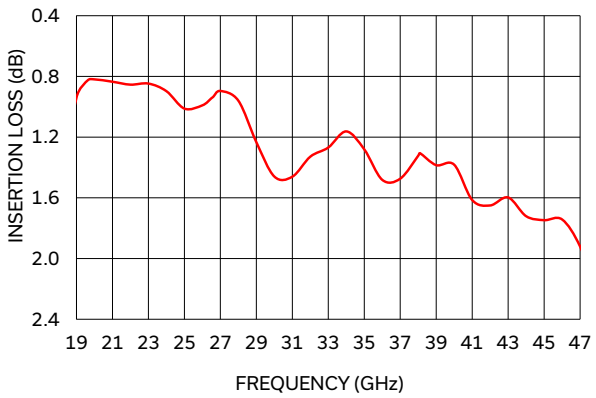
TYPICAL PERFORMANCE DATA AT 25°C

Frequency (GHz)	Insertion Loss (dB)	Return Loss (dB)
0.10	61.44	0.07
0.5	47.51	0.12
1.0	41.55	0.07
5.0	27.07	0.07
6.0	25.29	0.12
7.0	23.55	0.13
8.0	21.95	0.14
9.0	20.48	0.12
10	19.21	0.12
15	30.81	0.43
20	0.82	19.41
25	1.01	23.08
30	1.46	12.18
40	1.38	18.94
55	8.12	9.66

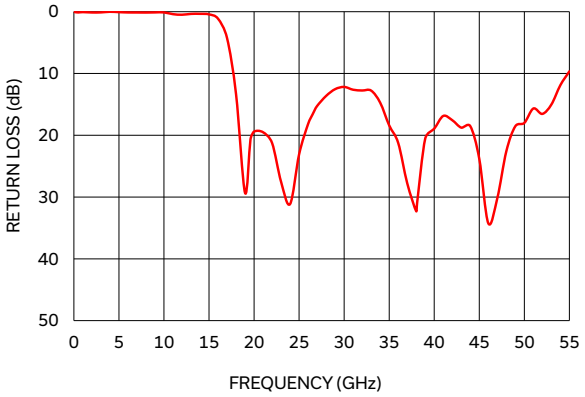
HFCV-2002+
INSERTION LOSS



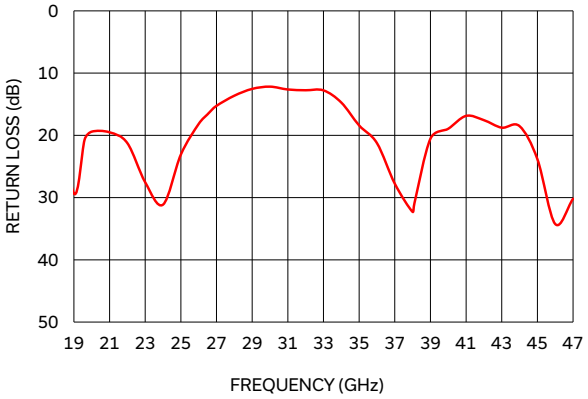
HFCV-2002+
INSERTION LOSS (Passband)



HFCV-2002+
RETURN LOSS



HFCV-2002+
RETURN LOSS (Passband)



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/terms/viewterm.html

Ceramic Bandpass Filter HFCV-2002+

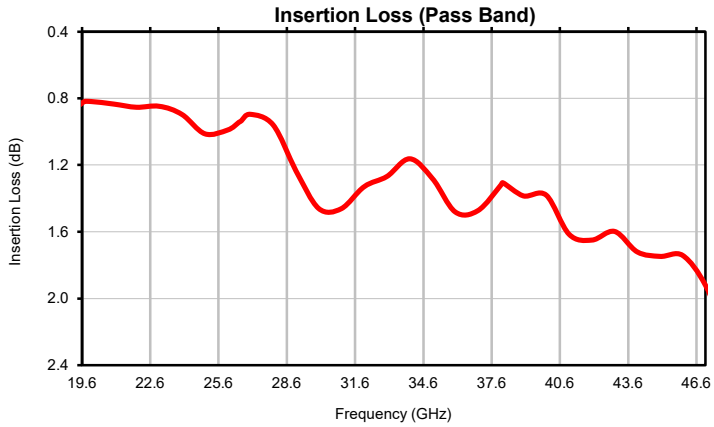
Typical Performance Data

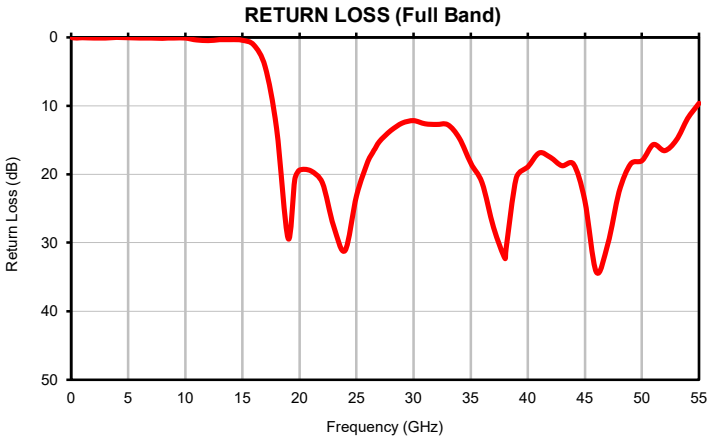
FREQUENCY (GHz)	INSERTION LOSS (dB)	RETURN LOSS (dB)
0.1	61.44	0.07
0.5	47.51	0.12
1.0	41.55	0.07
2.0	35.81	0.13
3.0	32.12	0.11
4.0	29.17	0.01
5.0	27.07	0.07
6.0	25.29	0.12
7.0	23.55	0.13
8.0	21.95	0.14
9.0	20.48	0.12
10.0	19.21	0.12
11.0	18.46	0.40
12.0	17.95	0.49
13.0	17.85	0.36
14.0	19.61	0.34
15.0	30.81	0.43
16.0	14.40	1.13
17.0	4.98	4.26
18.0	1.71	13.35
19.0	0.94	29.34
19.6	0.83	20.70
20.0	0.82	19.41
21.0	0.84	19.51
22.0	0.85	21.25
23.0	0.85	27.54
24.0	0.90	31.13
25.0	1.01	23.08
26.0	0.99	18.16
26.5	0.94	16.61
26.6	0.93	16.31
27.0	0.90	15.26
28.0	0.96	13.63
29.0	1.23	12.54
30.0	1.46	12.18
31.0	1.46	12.63
32.0	1.33	12.75
33.0	1.27	12.77
34.0	1.16	14.73
35.0	1.28	18.41
36.0	1.48	21.25
37.0	1.47	27.76
38.0	1.32	32.30
38.1	1.31	30.93
39.0	1.38	20.54
40.0	1.38	18.94
41.0	1.61	16.87
42.0	1.65	17.56
43.0	1.60	18.76
44.0	1.72	18.52
45.0	1.75	23.83
46.0	1.74	34.25
47.0	1.92	30.19
48.0	2.24	22.59
49.0	2.46	18.54
50.0	2.60	18.00
51.0	3.04	15.67
52.0	5.22	16.54
53.0	4.99	15.03
54.0	5.61	11.89
55.0	8.12	9.66

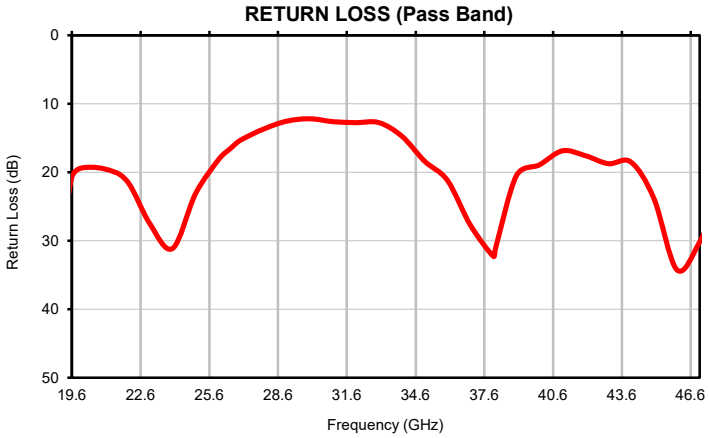
Ceramic Bandpass Filter HFCV-2002+

Typical Performance Curves





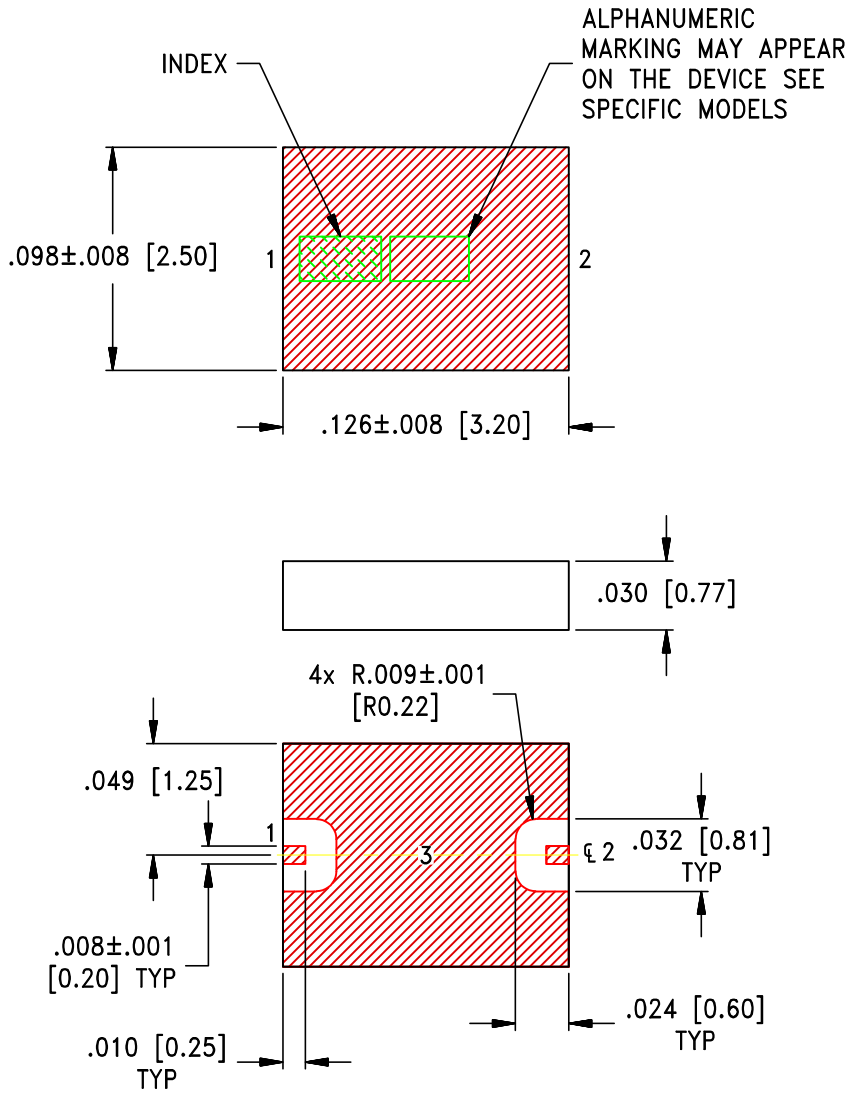




Case Style JV

Outline Dimensions

JV1210C-13



Weight: .024 grams

Dimensions are in inches [mm]. Tolerances: 3 Pl. ±.005 Inches

Notes:

1. Open style, Ceramic base.
2. Termination finish: **as shown below or indicated on Data Sheet**.
   For RoHS Case Styles: Gold plate over Nickel plate. All models, (+) suffix.
3. Primary dimensions are in Inches[millimeters]. Inch equivalents are calculated and subject to roundoff errors.

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RF/IF MICROWAVE COMPONENTS

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Tape & Reel Packaging TR-F74

DEVICE ORIENTATION IN T&R

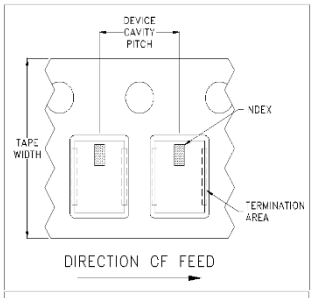


ILLUSTRATION 1

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

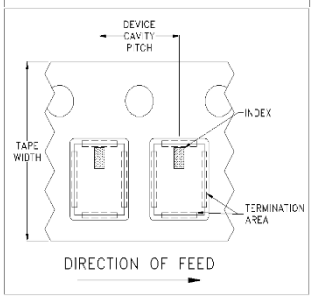


ILLUSTRATION 2

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

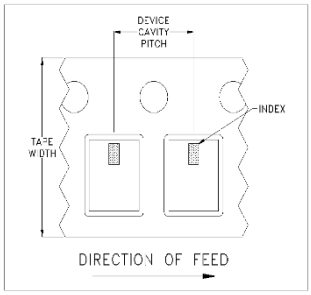


ILLUSTRATION 3

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

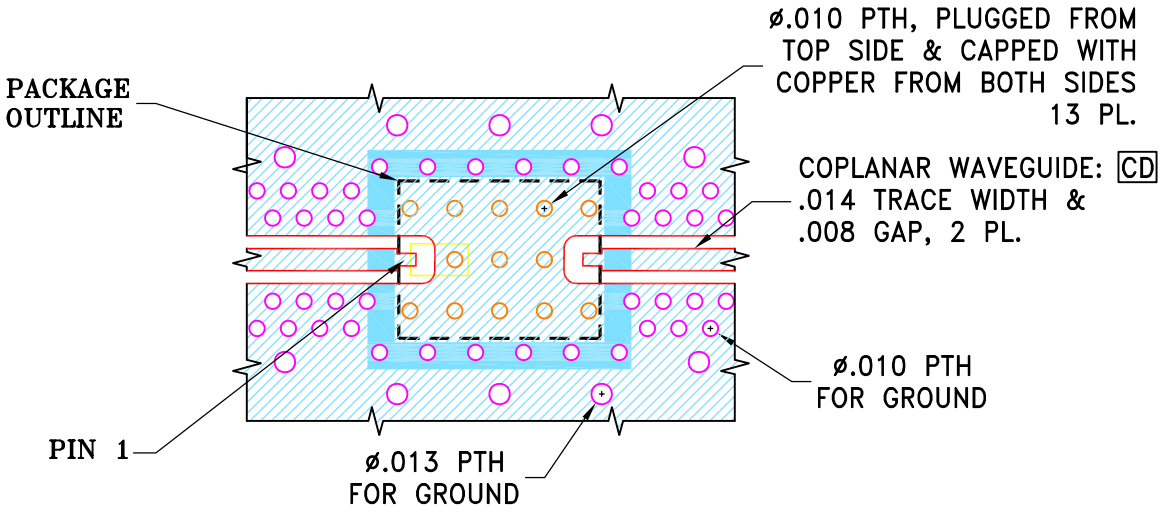
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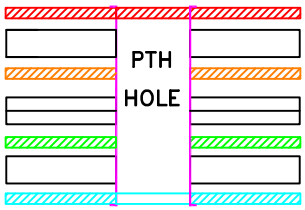
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-015970	NEW RELEASE	12/06/22	GF	IL

SUGGESTED MOUNTING CONFIGURATION FOR JV1210C-13 CASE STYLE



STACK-UP DIAGRAM



-COPPER LAYER 1(L1), .5 OZ.
-CORE 1, .0079 MEGTRON-7 R5785(N/GN)
-COPPER LAYER 2 (L2), .5 OZ.
-PREPREG, .0035 (89um) MEGTRON-7 R5680(N/GN), CLOTH STYLE:1078
-PREPREG, .0035 (89um) MEGTRON-7 R5680(N/GN), CLOTH STYLE:1078
-COPPER LAYER 3 (L3), .5 OZ.
-CORE 2, .0079 MEGTRON-7 R5785(N/GN)
-COPPER LAYER 4 (L4), .5 OZ.

1. TOTAL FINISHED THICKNESS 0.026 ± 10%. Ⓢ
2. PTH PRESENT FROM COPPER LAYER 1 TO COPPER LAYER 4.
3. INDICATED ON TOP VIEW PTH's ARE PLUGGED WITH EPOXY AND CAPPED WITH COPPER FROM TOP SIDE.
4. L2, L3 AND L4 ARE CONTINUOUS GROUND PLANES.

NOTES:

1. PCB IS MULTILAYER PCB, SEE STACK-UP DIAGRAM.
2. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR MEGTRON-7 R-5785(N/GN), WITH DIELECTRIC THICKNESS .0079; COPPER: 1/2 OZ. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.

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	GF	12/06/22
TOLERANCES ON:	CHECKED	IL	12/06/22
2 PL DECIMALS ±	APPROVED	IL	12/06/22
3 PL DECIMALS ± .005			
ANGLES ±			
FRACTIONS ±			

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

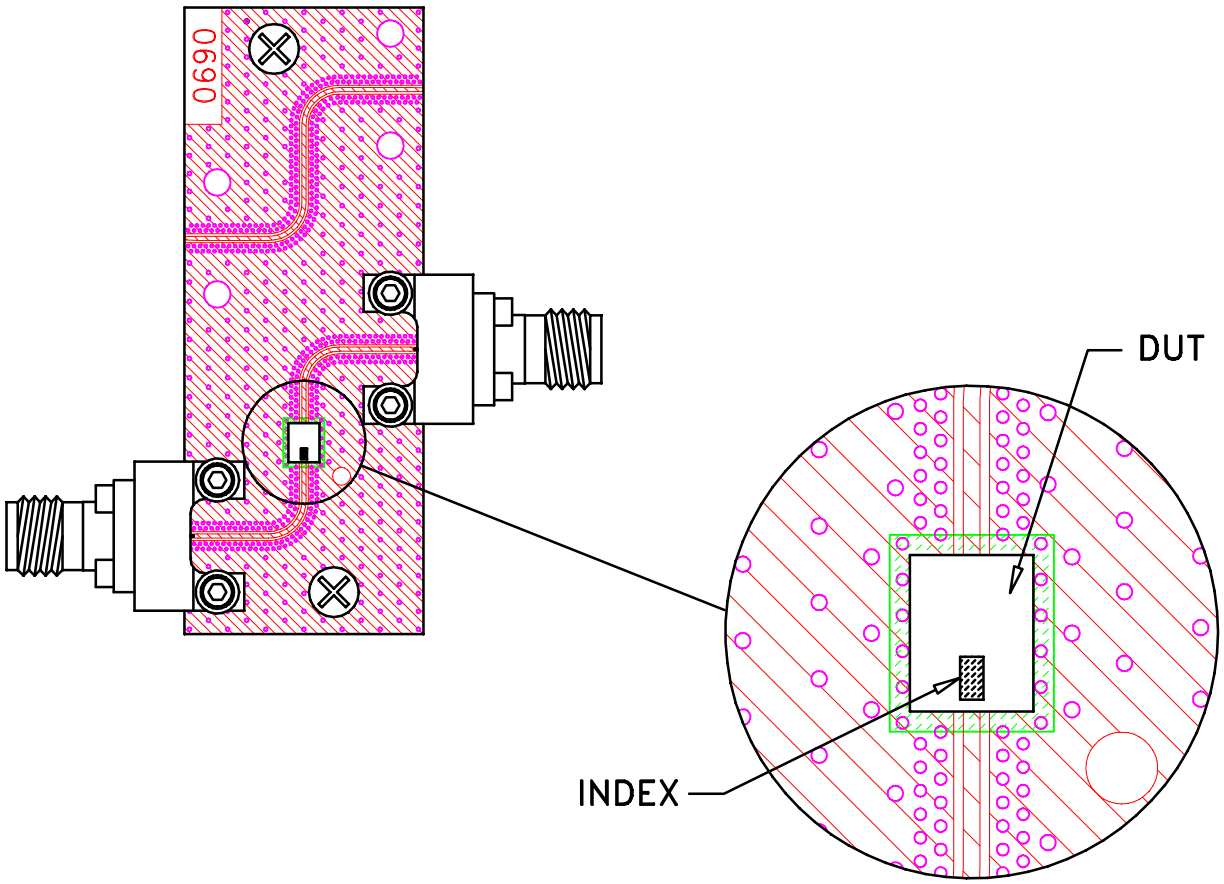
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

PL, JV1210C-13, TB-HFCV-2002+

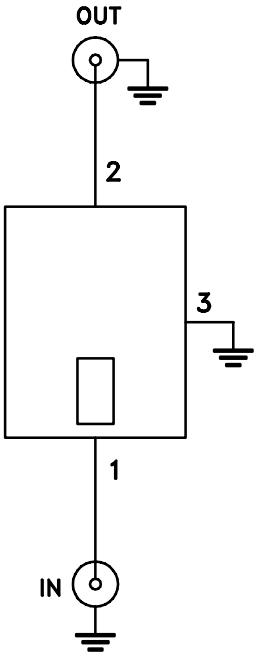
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-743	OR

FILE:	SCALE:	SHEET:
98PL743	8:1	1 OF 1

Evaluation Board and Circuit



TB-HFCV-2002C+



Schematic Diagram

1. 50 Ohm 1.85 End Launch Female connectors.
2. PCB Material: Megtron 7(N) or equivalent, Dielectric Constant=3.4, Thickness=.0079 inch.

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Mini-Circuits

Environmental Specifications ENV06T10

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 125° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 125° 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 Eutectic Process 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020C, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Test B,B1, 95% Coverage
Thermal Shock	-55° to +125°C, 15 min dwell,250 cycles	MIL-STD-202, Method 107
Bend Test	1mm, deflection for 5 seconds Span of bending: 2.75"	--
High Temp Storage	125°C to 1000 Hrs	---

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