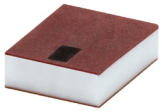
Ceramic

Low Pass Filter

LFCV-1652+

50Ω DC to 16500 MHz



Generic photo used for illustration purposes only
CASE STYLE: JV1210C-7

The Big Deal

- Good rejection, 35 dB typical
- Rugged, ceramic construction
- Small size, 0.126" x 0.098" x 0.039" (1210)
- Good power handling, 3.2W

Product Overview

Mini-Circuits' LFCV-1652+ is an LTCC low pass filter with a passband from DC to 16500 MHz, supporting a variety of applications. This model provides 1.3 dB typical passband insertion loss and provides a very good stopband rejection due to strategically constructed layout with minimal interaction between components. It handles up to 3.2W RF input power and provides a wide operating temperature range from -55 to +125°C. Housed in a small 1210 ceramic form factor, the filter is ideal for dense PCB layouts and with minimal performance variation due to parasitics.

Key Features

Feature	Advantages
Ultra-wide stopband	The LTCC lowpass filter provides a very good stopband rejection until 40 GHz suitable for high end applications.
LTCC Construction	Provides repeatable performance in a rugged, ceramic package well suited for tough environments such as high humidity and temperature extremes.
Small size (0.126" x 0.098" x 0.039")	Saves space in dense circuit board layouts and minimizes the effects of parasitics.
Good power handling, 3.2W	Supports a wide range of system power requirements.

Ceramic

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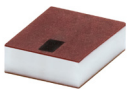


Generic photo used for illustration purposes only

CASE STYLE: JV1210C-7

+RoHS Compliant

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

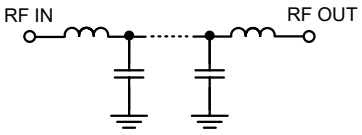
Features

- Low loss, 1.3 dB typical
- Good rejection 35 dB typical
- Good power handling, 3.2W
- Small size 1210 (0.126" x 0.098" x 0.039")
- Temperature stable
- LTCC construction

Applications

- Military radar applications
- Test and measurement
- Telecommunications & broadband wireless applications

Functional Schematic



Electrical Specifications[1,2] at 25°C

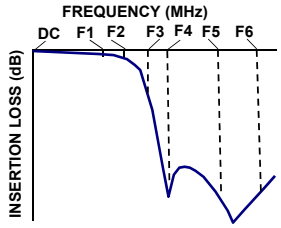
Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Pass Band	Insertion Loss	DC-F1	DC - 16500	—	1.3	1.9	dB
	Frequncy Cut-off	F2*	18400	—	3.0	—	dB
	Return Loss	DC-F1	DC - 16500	—	13	—	dB
Stop Band	Rejection Loss	F3-F4	22500 - 25000	20	35	—	dB
		F4-F5	25000 - 26500	25	35	—	dB
		F5-F6	26500 - 40000	—	30	—	dB

1 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 alternatives if DC pass from IN-OUT is required.
2 Measured on Mini-Circuits Characterization Test Board TB-LFCV-1652+
* Typically, a ±5% frequency deviation from the stated value may occur on a unit-to-unit basis.

Maximum Ratings	
Operating Temperature	-55°C to 125°C
Storage Temperature	-55°C to 125°C
RF Power Input*	3.2W max.@25°C

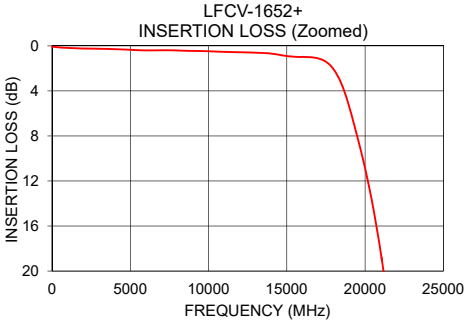
*Passband rating, derate linearly to 1.6W at 125°C ambient
Permanent damage may occur if any of these limits are exceeded.

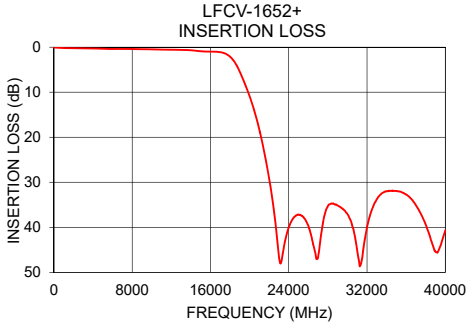
Typical Frequency Response

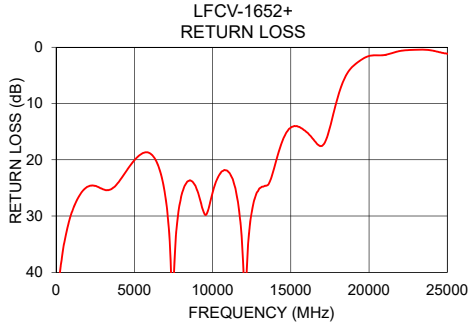


Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
10	0.08	49.48
100	0.08	45.28
300	0.12	38.68
400	0.13	36.78
500	0.14	34.99
1000	0.18	29.34
5000	0.35	20.10
10000	0.48	25.87
16500	1.00	16.59
18400	3.08	5.75
20000	10.87	1.55
21500	23.31	1.02
22500	36.52	0.51
24000	40.02	0.58
25000	37.18	1.15
26000	39.60	1.08
26500	43.91	0.82
30000	37.06	0.55
32000	39.90	1.00
40000	40.69	1.60







Notes

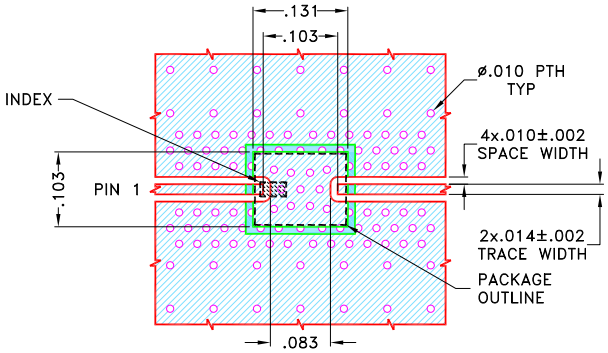
A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's 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

Pad Connections

INPUT	1
OUTPUT	2
GROUND	3

Product Marking: MZ

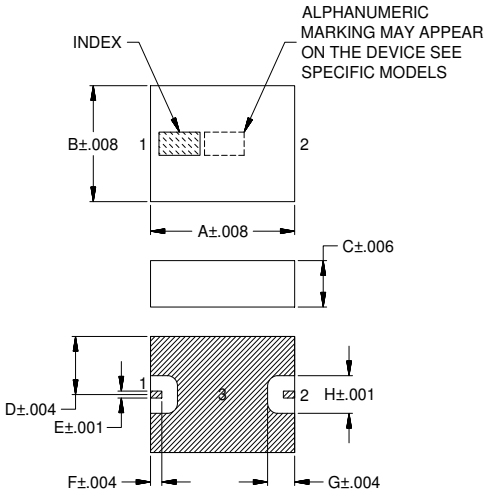
Demo Board MCL P/N: TB-LFCV-1652+
Suggested PCB Layout (PL-679)



NOTES:
1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4835 Lo Pro) WITH DIELECTRIC THICKNESS .0073±.0007. 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 PATTERN WITH SMOBC (SOLDER MASK OVER BARE COPPER)
DENOTES PCB COPPER PATTERN FREE OF SOLDERMASK

Outline Drawing



Outline Dimensions (inch / mm)

A	B	C	D	E
.126	**.098**	**.037**	**.049**	**.006**
3.20	2.50	0.95	1.25	0.15

F	G	H	Wt.
.010	**.024**	**.032**	grams
0.25	0.60	0.81	0.03

Note: Please refer to case style drawing for details

Ceramic Low Pass Filter LFCV-1652+

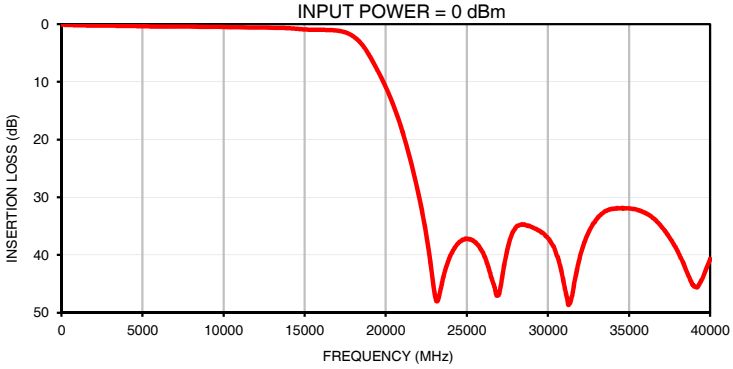
Typical Performance Data

FREQ. (MHz)	Insertion Loss (dB)	Input Return Loss (dB)	Output Return Loss (dB)
10	0.08	49.48	45.86
50	0.08	48.51	46.61
100	0.08	45.28	45.24
500	0.14	34.99	34.83
1000	0.18	29.34	29.17
2000	0.23	24.80	24.90
2500	0.25	24.64	24.82
3000	0.26	25.25	25.14
4000	0.29	23.96	23.61
5000	0.35	20.10	19.51
6000	0.40	18.86	18.55
6500	0.40	20.87	20.68
7000	0.39	26.88	26.61
7500	0.39	42.81	42.12
8000	0.41	26.45	26.80
9000	0.45	25.33	26.43
10000	0.48	25.87	24.99
10500	0.51	22.42	20.97
11000	0.53	22.12	20.33
11500	0.55	25.66	22.50
11700	0.56	29.20	24.29
12000	0.56	41.63	27.27
12400	0.58	31.21	27.47
12500	0.58	29.34	26.88
13000	0.61	25.08	26.24
13600	0.64	24.23	33.73
15000	0.90	14.28	14.53
16500	1.00	16.59	18.36
17000	1.11	17.53	19.24
18000	2.10	8.91	9.29
18400	3.08	5.75	6.18
19000	5.47	3.30	3.34
19500	8.03	2.24	2.41
20000	10.87	1.55	1.93
20600	15.00	1.45	1.44
21000	18.35	1.38	1.27
21500	23.31	1.02	1.07
22000	29.20	0.66	0.86
22500	36.52	0.51	0.75
23000	46.48	0.45	0.83
23500	44.40	0.43	1.03
24000	40.02	0.58	1.22
24500	37.87	0.89	1.38
25000	37.18	1.15	1.54
25500	37.75	1.18	1.68
26000	39.60	1.08	1.88
26500	43.91	0.82	2.52
27000	46.65	2.18	3.62
27500	38.98	1.81	4.98
28000	35.26	1.25	3.41
28500	34.73	0.82	1.92
30000	37.06	0.55	1.69
31000	45.17	0.84	2.25
32000	39.90	1.00	1.62
33000	33.79	0.88	0.86
34000	32.02	0.73	0.87
35000	31.94	0.87	1.58
37000	35.08	1.62	1.93
39000	45.43	0.89	1.91
40000	40.69	1.60	1.54

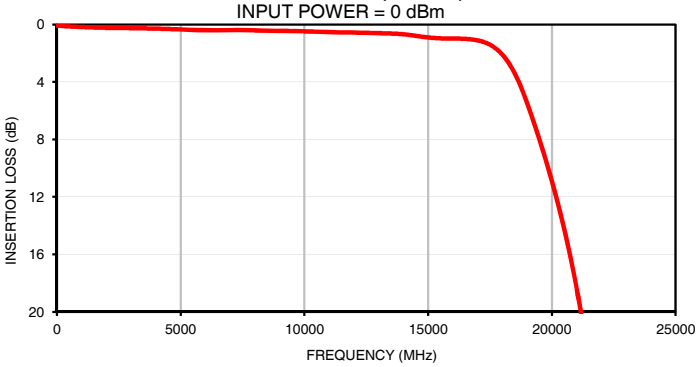
FREQ. (MHz)	Group Delay (ns)
10	0.21
50	0.04
100	0.04
300	0.04
500	0.04
600	0.04
800	0.04
1000	0.04
1200	0.04
1400	0.04
1600	0.04
1800	0.04
2000	0.04
2200	0.04
2400	0.04
2600	0.04
2800	0.04
3000	0.04
3200	0.04
3400	0.04
3600	0.04
3800	0.04
4000	0.04
4200	0.04
4400	0.04
4600	0.04
4800	0.04
5000	0.04
5200	0.04
5400	0.04
5600	0.04
5800	0.04
6000	0.04
6200	0.04
6400	0.04
6600	0.04
6800	0.04
7000	0.05
7200	0.05
7400	0.05
7600	0.05
7800	0.05
8000	0.05
8200	0.05
8400	0.05
8600	0.05
8800	0.05
9000	0.05
9200	0.05
9400	0.05
9600	0.05
9800	0.05
10000	0.05
10200	0.05
11000	0.05
11500	0.05
12000	0.05
14000	0.06
15000	0.07
16500	0.09

Typical Performance Curves

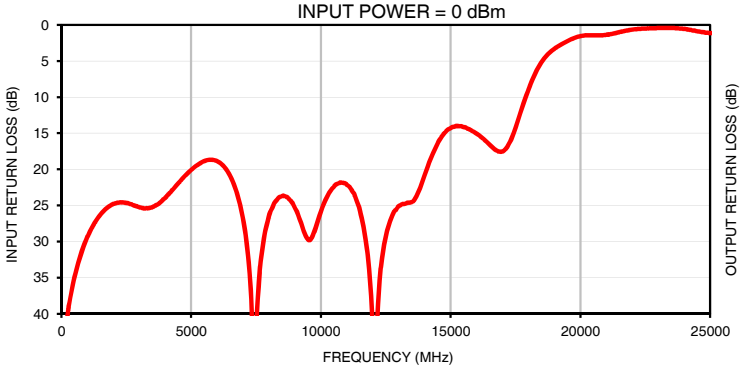
INSERTION LOSS
INPUT POWER = 0 dBm



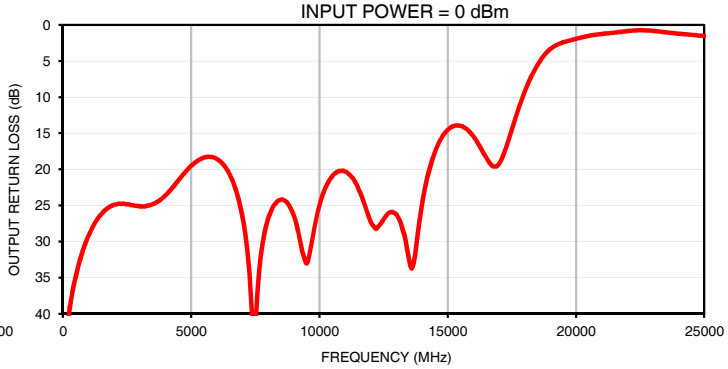
INSERTION LOSS (zoomed)
INPUT POWER = 0 dBm



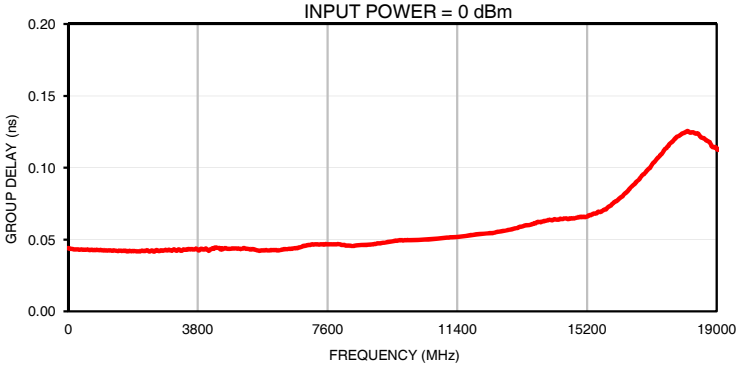
INPUT RETURN LOSS
INPUT POWER = 0 dBm



OUTPUT RETURN LOSS
INPUT POWER = 0 dBm

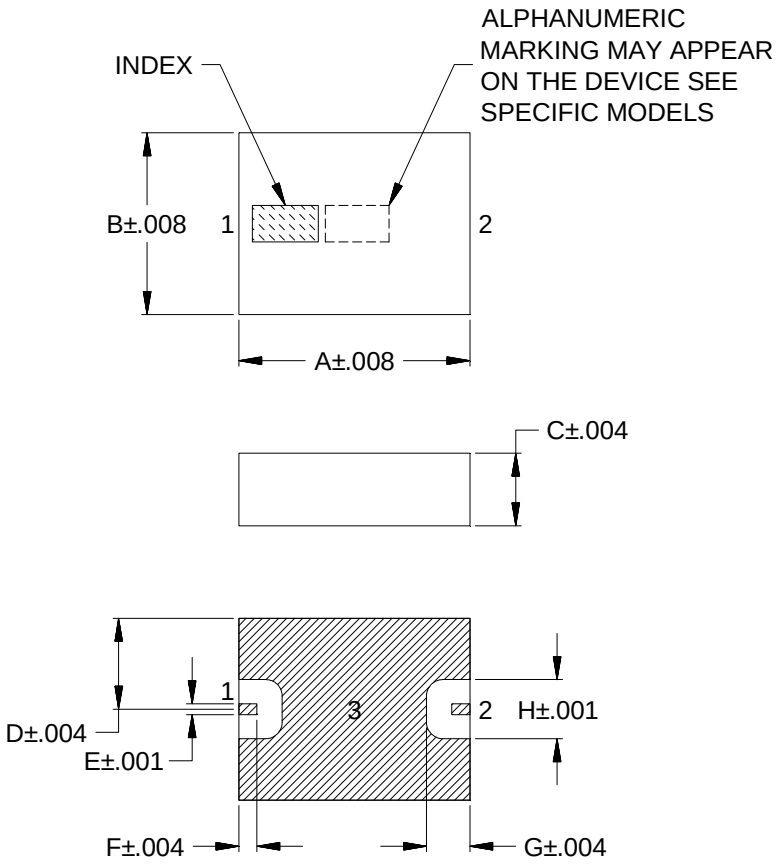


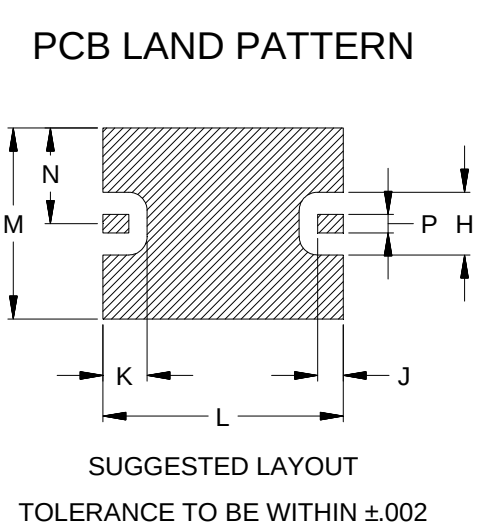
GROUP DELAY
INPUT POWER = 0 dBm



Case Style JV

Outline Dimensions JV1210C-7





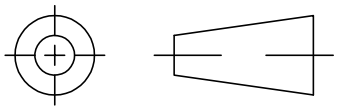
CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	P	WT.GRAM
JV1210C-7	.126 (3.20)	.098 (2.50)	.039 (1.00)	.049 (1.25)	.006 (0.15)	.010 (0.25)	.024 (0.60)	.032 (0.81)	.014 (0.36)	.024 (0.61)	.131 (3.33)	.103 (2.63)	.052 (1.31)	.010 (0.25)	0.03

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

Notes:

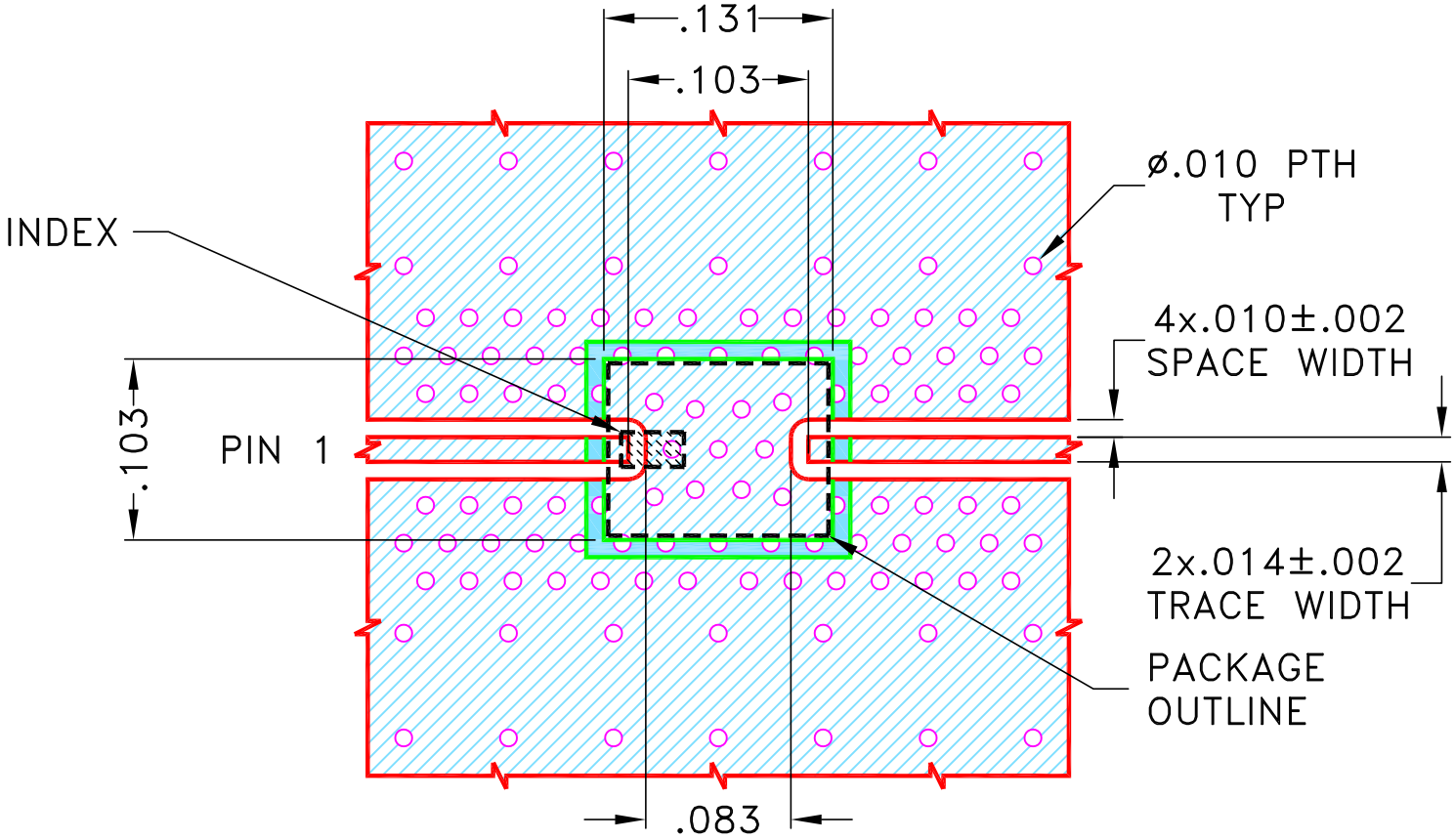
1. Open style, Ceramic base.
2. Termination finish: **as shown below or indicated on Data Sheet.**
   For RoHS Case Styles: Gold plate over Nickel plate. All models, (+) suffix.
3. Pad tolerance is non-cumulative. Minimum spacing between each pad is .004.

THIRD ANGLE PROJECTION



REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-003129	NEW RELEASE	JUL 20	DDR	VC
OR1	ECO-019409	JV1210C-13 ADDED	OCT 23	AGS	VC

SUGGESTED MOUNTING CONFIGURATION FOR JV1210C-7, JV1210C-13 CASE STYLE



NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4835 Lo Pro) WITH DIELECTRIC THICKNESS .0073±.0007. 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 PATTERN WITH SMOBC (SOLDER MASK OVER BARE COPPER)

DENOTES PCB COPPER PATTERN FREE OF SOLDERMASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN	DDR	02 JUL 20
TOLERANCES ON:	CHECKED	RV	02 JUL 20
2 PL DECIMALS ±	APPROVED	RKS	02 JUL 20
3 PL DECIMALS ± .005"			
ANGLES ±			
FRACTIONS ±			

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

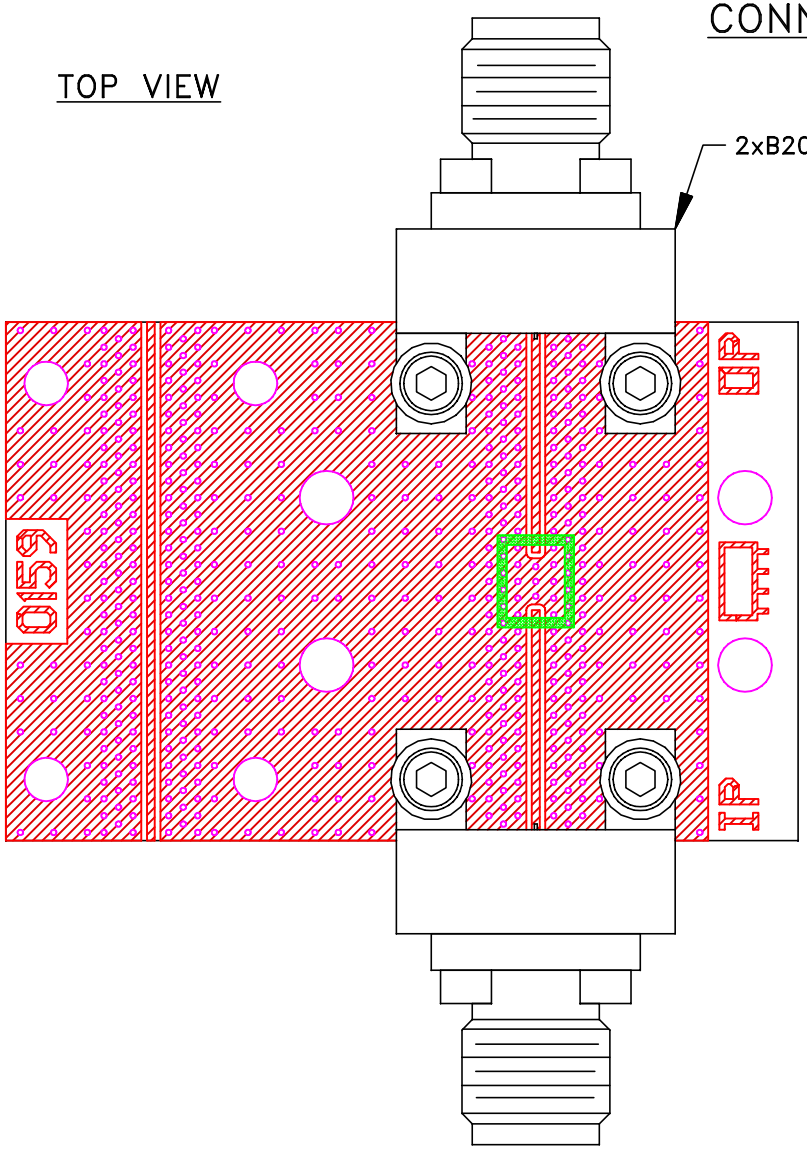
Mini-Circuits®
13 Neptune Avenue
Brooklyn NY 11235

PL, JV1210C-7, JV1210C-13, TB-LFCV-X+

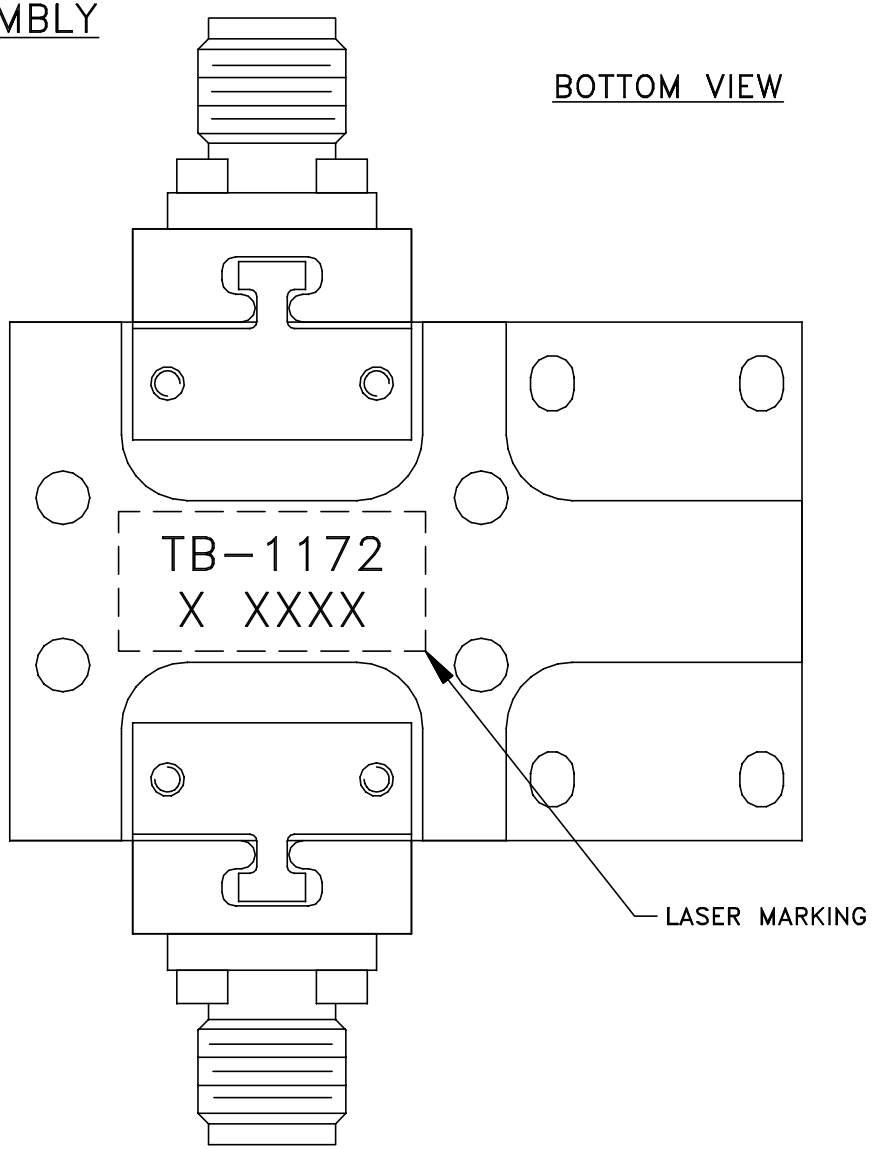
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-679	OR1
FILE: 98PL679		SCALE: 9:1	SHEET: 1 OF 1

CONNECTOR ASSEMBLY

TOP VIEW



BOTTOM VIEW



BSHEETA2.DWG REV:A DATE: 01/12/94

ALL DIMENSIONS ARE IN INCHES EXCEPT OTHERWISE SPECIFIED

SIZE	CODE IDENT	DRAWING NO:	REV:
B	15542	TB-1172-20	OR

FILE:	SCALE:	SHEET:
WTB-1172	4:1	2 OF 2

Mini-Circuits

Environmental Specifications ENV126

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, 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