

# Ceramic Bandpass Filter

## BFCW-252+

50Ω 2400 to 2500 MHz

### The Big Deal

- Very good rejection, 30 dB typical
- Rugged, ceramic construction
- Tiny size, 0.063" x 0.032" x 0.024" (0603)



CASE STYLE: JC0603C-1

### Product Overview

Mini-Circuits' BFCW-252+ is a LTCC band pass filter with a passband from 2400 to 2500 MHz, supporting a variety of applications. This model provides 3.0 dB typical passband insertion loss and provides a very good stopband rejection due to strategically constructed layout with minimal interaction between components. It provides a wide operating temperature range from -55 to +125°C. Housed in a tiny 0603 ceramic form factor with wrap-around terminations, 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 band pass filter provides a very good stopband rejection 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.
Tiny size (0.063 x 0.032 x 0.024")	Saves space in dense circuit board layouts and minimizes the effects of parasitics.
Wrap-around terminations	Provides excellent solderability and easy visual inspection

#### 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)



# Ceramic Bandpass Filter

50Ω 2400 to 2500 MHz

## BFCW-252+



Generic photo used for illustration purposes only

CASE STYLE: JC0603C-1

### Features

- High Rejection
- Miniature size 0603
- Low cost
- Aqueous washable

### Applications

- ISM Band
- WLAN
- Bluetooth
- Zigbee

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

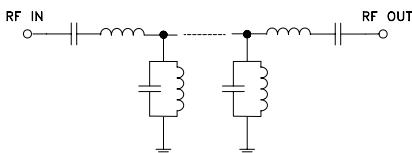
### Electrical Specifications<sup>1,2</sup> at 25°C

Parameter	F#	Frequency (MHz)	Min.	Typ.	Max.	Unit	
Pass Band	Center Frequency	—	—	2450	—	dB	
	Insertion Loss	F1-F2	2400 - 2500	—	3.0	4.0	dB
	Return Loss	F1-F2	2400 - 2500	—	11	—	dB
Stop Band, Lower	Insertion Loss	DC-F3	10 - 1860	20	25	—	dB
Stop Band, Upper	Insertion Loss	F4-F5	3200 - 8000	20	30	—	dB

1. Tested on Evaluation Board TB-BFCW-252+

2. This filter is not intended for use as a DC Blocking circuit element. In Application where DC Voltage is present at either input or output ports, blocking capacitors are required at the corresponding RF ports.

### Functional Schematic



### Maximum Ratings

Operating Temperature	-55°C to 125°C
Storage Temperature <sup>3</sup>	-55°C to 125°C
RF Power Input <sup>4</sup>	0.5W at 25°C

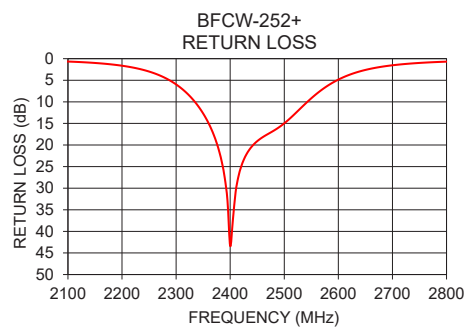
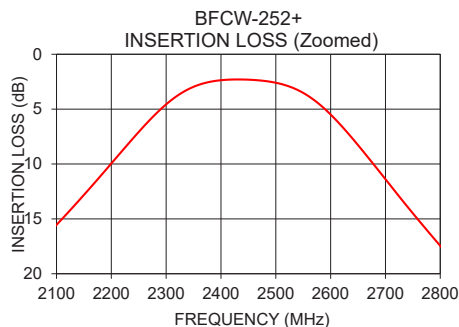
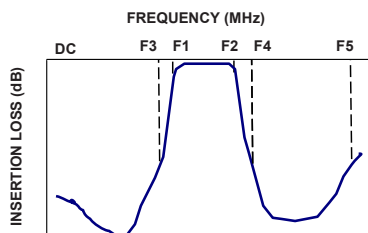
3. Refer to product storage temperature after installation  
Suggestion for T&R unused product storage condition:  
+5 ~ +35 °C, Humidity 45-75%RH, 12 month Max.

4. Derate linearly to 0.1W at 125°C.  
Permanent damage may occur if any of these limits exceeded.

### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
10	79.20	0.05
100	61.12	0.05
500	47.82	0.07
1000	45.17	0.09
1500	46.81	0.13
1860	26.82	0.22
2000	20.51	0.37
2400	2.37	43.37
2450	2.32	19.11
2500	2.60	14.98
3000	29.06	0.27
3200	44.65	0.15
4000	32.25	0.04
4500	31.25	0.07
5000	31.87	0.14
5500	33.81	0.21
6000	36.37	0.30
6500	45.69	0.34
7000	43.88	0.34
8000	50.56	0.35

### Typical Frequency Response



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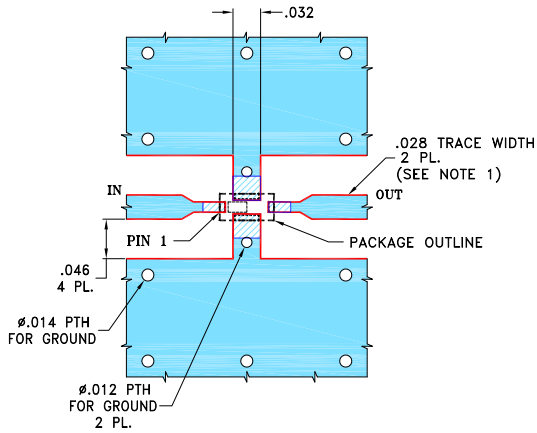


## Pad Connections

INPUT	1
OUTPUT	3
GROUND	2,4

## Product Marking: N/A

**Evaluation Board MCL P/N: TB-BFCW-252+**  
**Suggested PCB Layout (PL-563)**

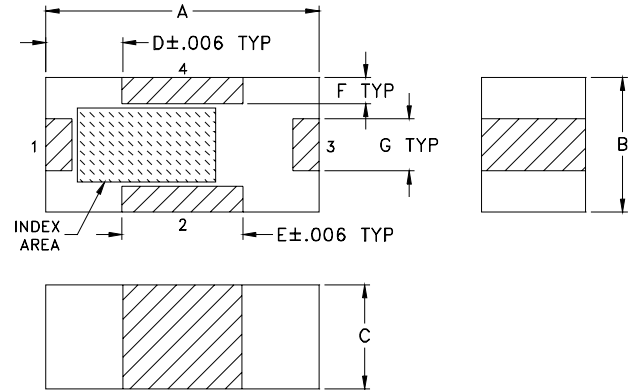


### NOTES:

- TRACE WIDTH IS SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS .016±.0015. COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
- 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/mm)

A	B	C	D	E	F	G	wt
.063	.031	.024	.018	.028	.006	.012	grams
1.60	0.79	0.61	0.46	0.71	0.15	0.30	0.005

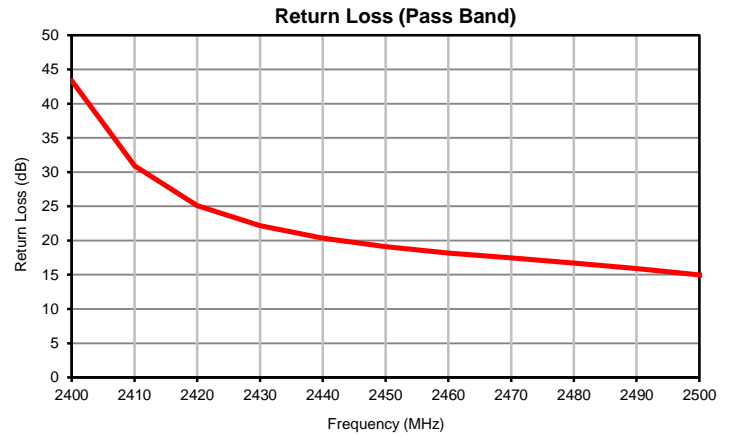
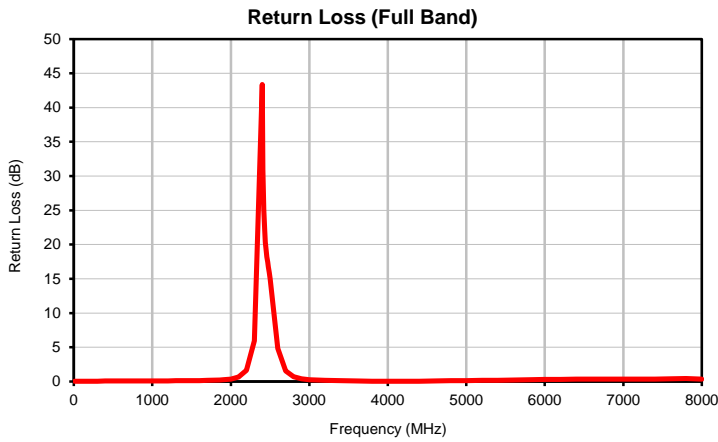
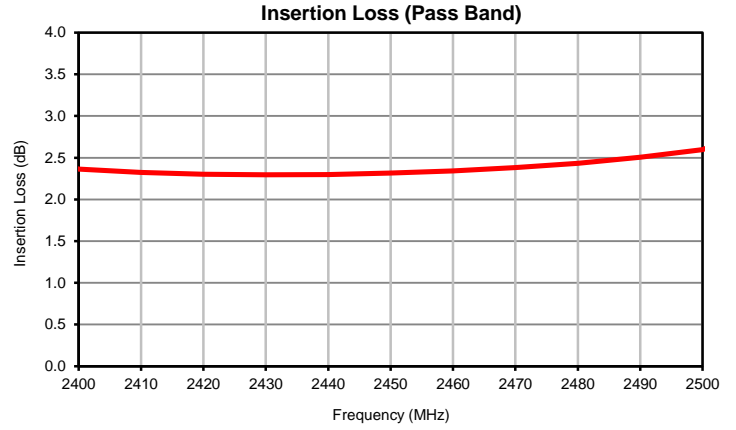
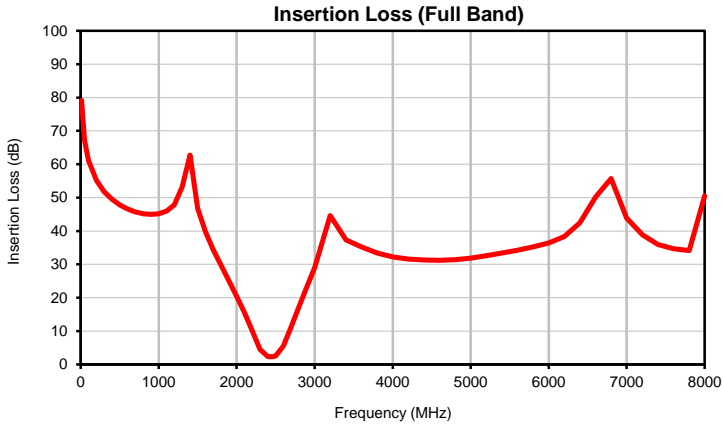
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## Typical Performance Data

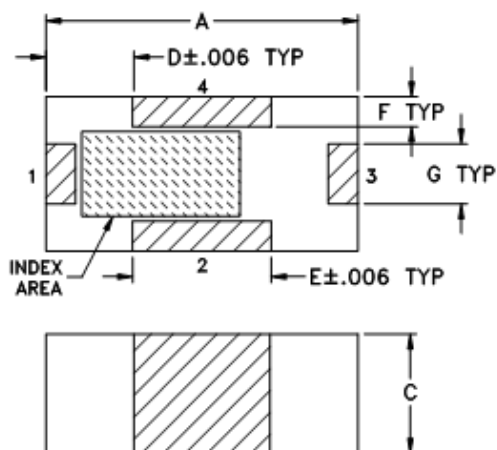
FREQUENCY (MHz)	INSERTION LOSS (dB)	RETURN LOSS (dB)
10	79.20	0.05
50	67.11	0.05
100	61.12	0.05
200	55.17	0.06
300	51.80	0.06
400	49.55	0.07
500	47.82	0.07
600	46.60	0.07
700	45.72	0.08
800	45.16	0.08
900	44.96	0.08
1000	45.17	0.09
1100	45.99	0.09
1200	47.82	0.11
1300	53.17	0.11
1400	62.74	0.12
1500	46.81	0.13
1600	39.67	0.14
1700	34.26	0.16
1860	26.82	0.22
1900	25.06	0.25
2000	20.51	0.37
2100	15.55	0.67
2200	9.95	1.64
2300	4.56	5.96
2400	2.37	43.37
2410	2.33	30.91
2420	2.30	25.12
2430	2.30	22.16
2440	2.30	20.35
2450	2.32	19.11
2460	2.34	18.19
2470	2.38	17.44
2480	2.43	16.71
2490	2.50	15.91
2500	2.60	14.98
2600	5.49	4.85
2700	11.38	1.53
2800	17.46	0.69
2900	23.17	0.40
3000	29.06	0.27
3200	44.65	0.15
3400	37.31	0.11
3600	35.19	0.08
3800	33.40	0.05
4000	32.25	0.04
4200	31.60	0.04
4400	31.32	0.06
4600	31.23	0.08
4800	31.40	0.11
5000	31.87	0.14
5200	32.57	0.16
5400	33.41	0.19
5600	34.23	0.23
5800	35.23	0.27
6000	36.37	0.30
6200	38.30	0.32
6400	42.47	0.34
6600	50.18	0.34
6800	55.77	0.34
7000	43.88	0.34
7200	38.84	0.34
7400	35.98	0.35
7600	34.72	0.38
7800	34.15	0.43
8000	50.56	0.35

## Typical Performance Curves

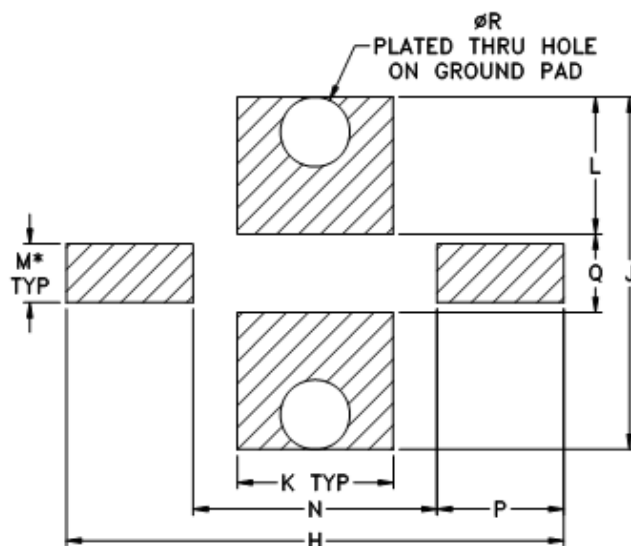


## Outline Dimensions

JC0603C-1



## PCB Land Pattern



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

CASE #	A	B	C	D	E	F	G	H	J	K	L
JC0603C-1	.063 (1.60)	.031 (0.80)	.024 (0.60)	.018 (0.45)	.028 (0.70)	.006 (0.15)	.012 (0.30)	.100 (2.54)	.071 (1.80)	.032 (0.80)	.028 (0.70)

CASE #	M*	N	P	Q	R	WT. GRAMS
JC0603C-1	.012 (0.30)	.049 (1.24)	.026 (0.65)	.016 (0.40)	.014 (0.35)	.005

Dimensions are in inches (mm). Tolerances: 3 Pl.  $\pm .004$

### Notes:

1. Open style, ceramic base.
2. Termination finish:  
For RoHS Case Styles: Tin plate over Nickel plate. All models, (+) suffix.
- 3.\* - Line width should be designed to match 50 OHMS characteristic impedance, depending on PCB material & thickness.



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



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RF/MICROWAVE COMPONENTS

# Tape & Reel Packaging TR-F74

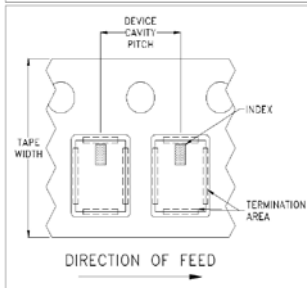
## DEVICE ORIENTATION IN T&R



**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  
 JV1210C-7  
 JV1210C-8  
 JV1210C-9  
 JV1210C-10  
 JV1210C-13  
 GE0805C-13

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
			Standard	1000
				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.

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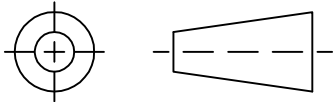
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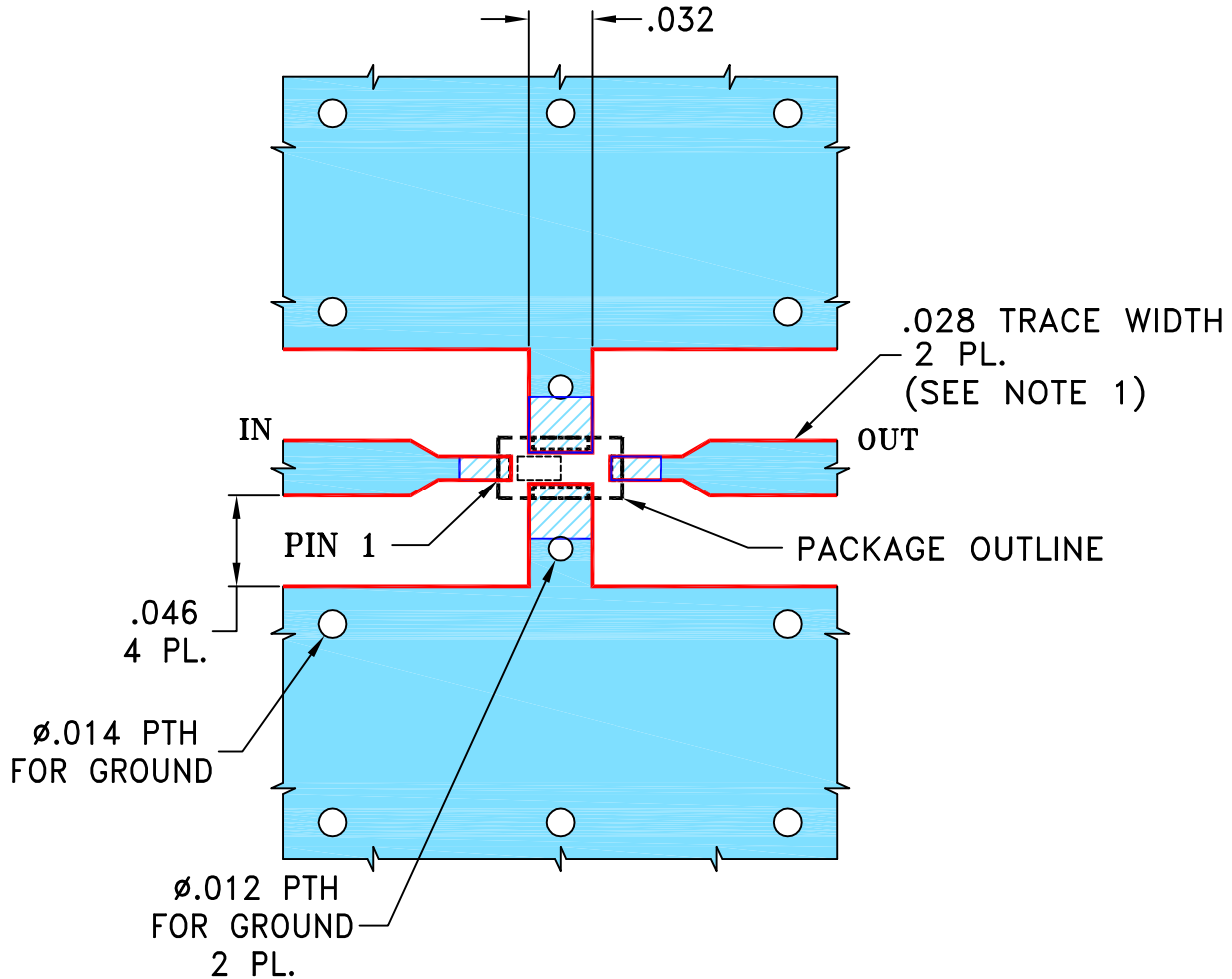
THIRD ANGLE PROJECTION



REVISIONS

REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	M168200	NEW RELEASE	05/31/18	NP	SL

**SUGGESTED MOUNTING CONFIGURATION  
FOR JC0603C-1 CASE STYLE, "04FL01" PIN CODE**



**NOTES:**

- TRACE WIDTH IS SHOWN FOR FR4, GRADE IT-180TC (ITEQ CORP.) WITH DIELECTRIC THICKNESS  $.016 \pm .0015$ . COPPER: 1/2 OZ. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH & GAP MAY NEED TO BE MODIFIED.
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DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER).  
 DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DRAWN	NP	05/30/18
CHECKED	GF	05/30/18
APPROVED	SL	05/31/18

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Brooklyn NY 11235

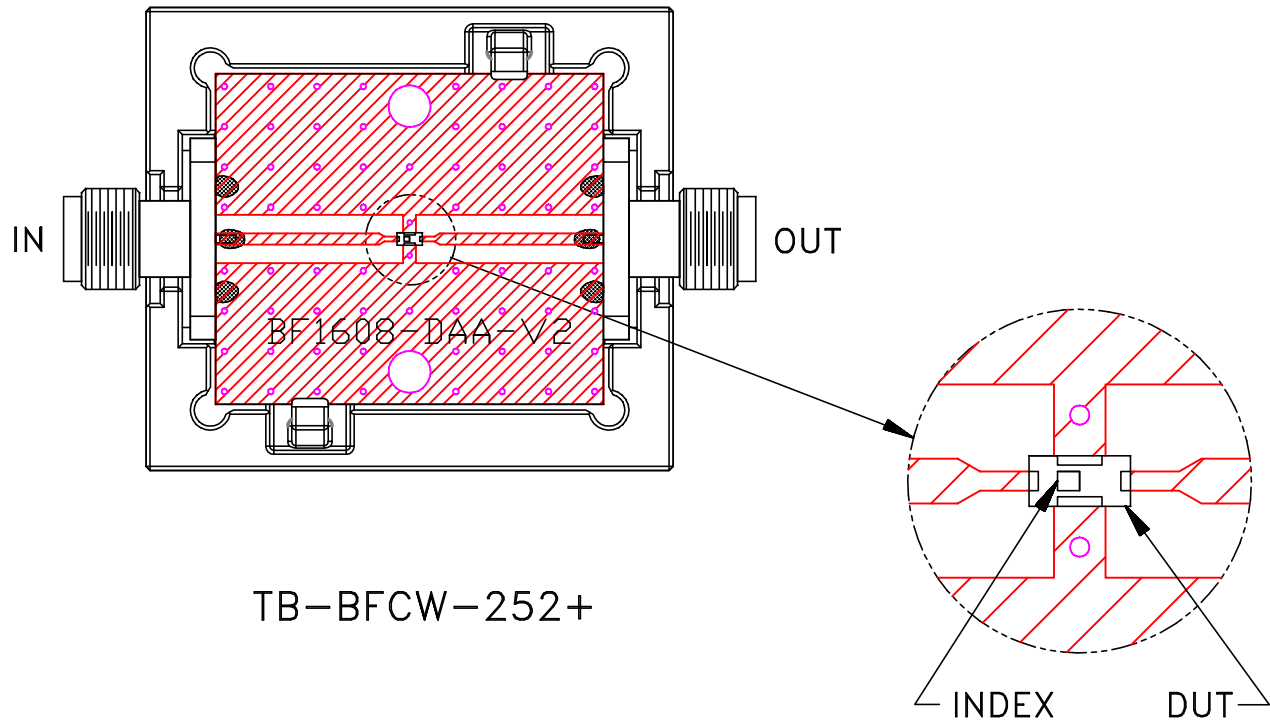
**PL, 04FL01, JC0603C-1, TB-1023+**

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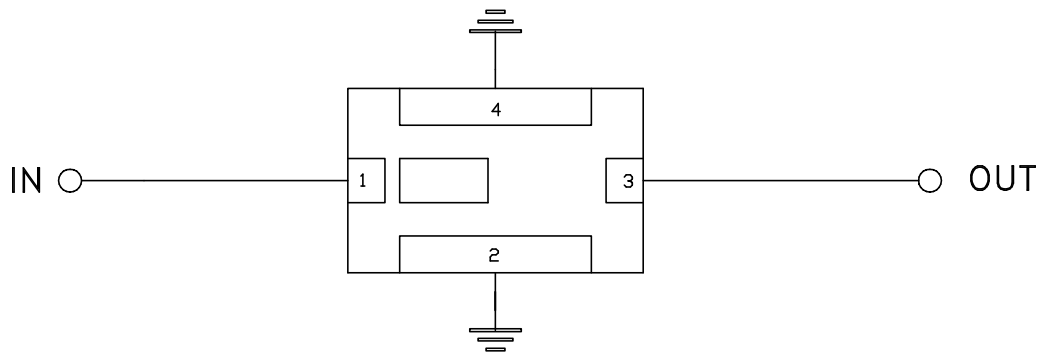
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# Evaluation Board and Circuit




TB-BFCW-252+



Schematic Diagram

## Notes:

1. 50 Ohm SMA Female connectors.
2. PCB Material: FR4 or equivalent,  
Dielectric Constant=4.5, Thickness=.016 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 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: 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