



CERAMIC

# Bandpass Filter

## BFCQ-4302+

50Ω 36.5 to 50 GHz

### THE BIG DEAL

- Standard small 1008 (2.5mm x 2.0mm) case style
- Low Insertion Loss – Mid band 2.0 dB typical
- Shielded construction preventing filter from de-tuning
- Reduced footprint area by employing LGA (land grid array)
- Surface mountable pick and place standard case style
- Patent pending



Generic photo used for illustration purposes only

CASE STYLE: NL1008C-6

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

### APPLICATIONS

- Test and Measurement

### PRODUCT OVERVIEW

The BFCQ-4302+ LTCC Band Pass Filter achieves a miniature size and high repeatability of performance by utilizing a proprietary LTCC material system and distributed filter topology. The typical passband loss at 36.5 – 50.0 GHz is as low as 2.0 dB, with typical stopband rejections at 30 dB up to 59 GHz and 16 dB up to 67 GHz. This model handles up to 1W RF input power, and provides a wide operating temperature range from -55 to +125°C. Utilizing a proprietary LTCC material system and a distributed filter topology, this filter is able to achieve repeatable performance on a lot-to-lot basis.

### KEY FEATURES

Feature	Advantages
Cost effective	LTCC is scalable technology that is cost effective due to ease of production in high quantities.
Small size (2.5mm x 2.0mm)	Allows for high layout density of circuit boards, while minimizing effects of parasitics.
Surface Mountable	Suitable for very high volume automated assembly process.

REV. OR  
 ECO-012336  
 BFCQ-4302+  
 CGD/CP/AM  
 221026





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Mini-Circuits

50Ω 36.5 to 50 GHz

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

Parameter	F#	Frequency (GHz)	Min.	Typ.	Max.	Units	
Center Frequency	—	—	—	42.7	—	GHz	
Passband	Insertion Loss	F1-F2	36.5 - 50	—	2.0	3.0	dB
	Return Loss	F1-F2	36.5 - 50	—	10	—	dB
Stop Band, Lower	Insertion Loss	DC-F3	0.1 - 18	30	40	—	dB
		18 - 27	20	26	—	dB	
Stop Band, Upper	Insertion Loss	F4-F5	57.3 - 59	15	30	—	dB
		59 - 67	10	16	—	dB	

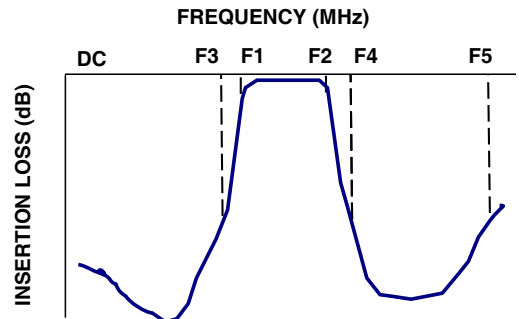
1. Measured on Mini-Circuits Test Board TB-BFCQ-4302C+ with connectors and feedlines de-embedded.

### MAXIMUM RATINGS

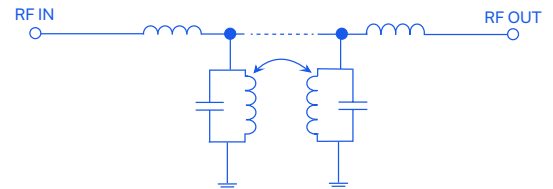
Parameter	Ratings
Operating temperature	-55°C to +125°C
Storage temperature	-55°C to +125°C
RF Power Input	1W

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

### TYPICAL FREQUENCY RESPONSE



### FUNCTIONAL SCHEMATIC





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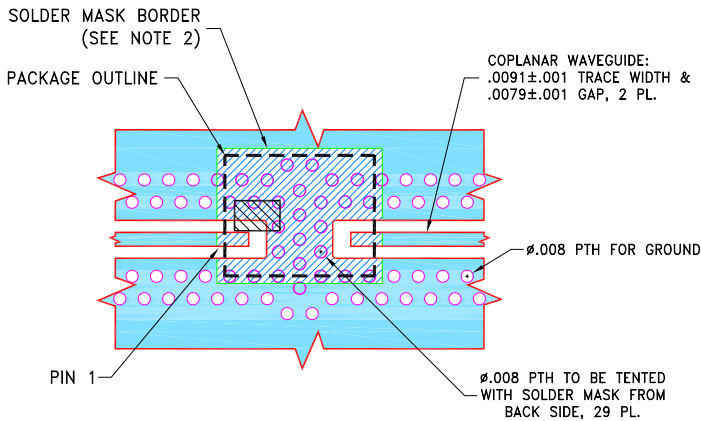
50Ω 36.5 to 50 GHz

### PAD CONNECTIONS

INPUT	1
OUTPUT	2
GROUND	3

### PRODUCT MARKING: UR

### DEMO BOARD MCL P/N: TB-BFCQ-4302C+ SUGGESTED PCB LAYOUT (PL-707)

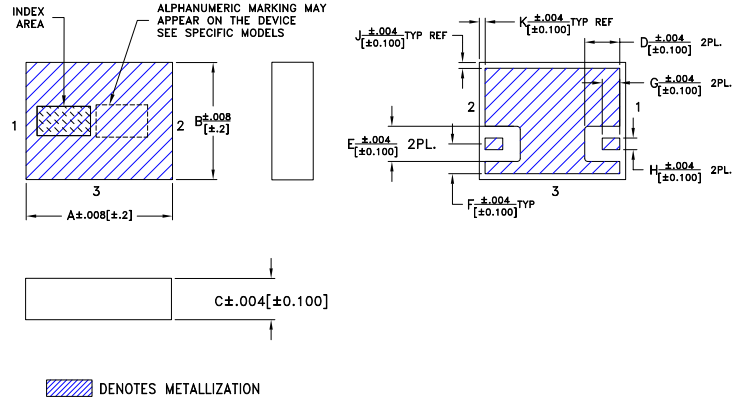


#### NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR MEGTRON-7 R5785(N); DIELECTRIC THICKNESS: .0049±.001; CLOTH STYLE: 2116; COPPER: HVLP/HVLP. FOR OTHER MATERIALS LINE WIDTH & GAP MAY NEED TO BE MODIFIED.
2. SOLDER MASK OPENING FOR COMPONENT SOLDERING HAS BEEN INCREASED AGAINST PCB LAND PATTERN RECOMMENDATIONS PER NL1008C-6 AND CAN BE DEVIATED FROM THIS DRAWING TO COMPLY WITH CUSTOMERS' DESIGN RULES.
3. 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	G	H	J	K	wt
.098	.079	.028	.024	.024	.020	.012	.008	.004	.004	grams
2.49	2.01	0.71	0.6	0.6	0.51	0.3	0.2	0.1	0.1	.019

### TAPE & REEL INFORMATION: F75



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# Bandpass Filter

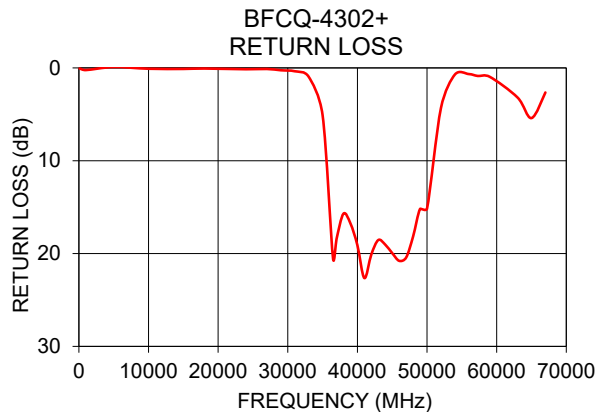
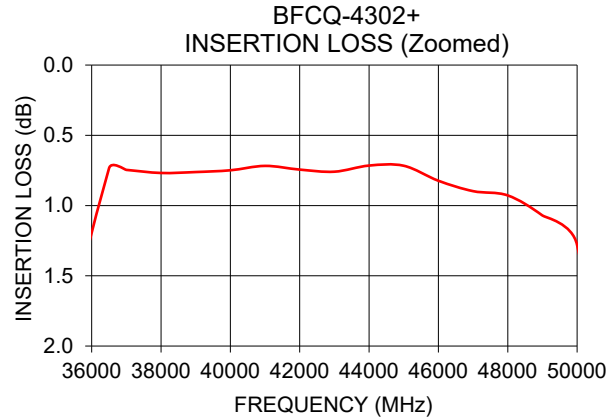
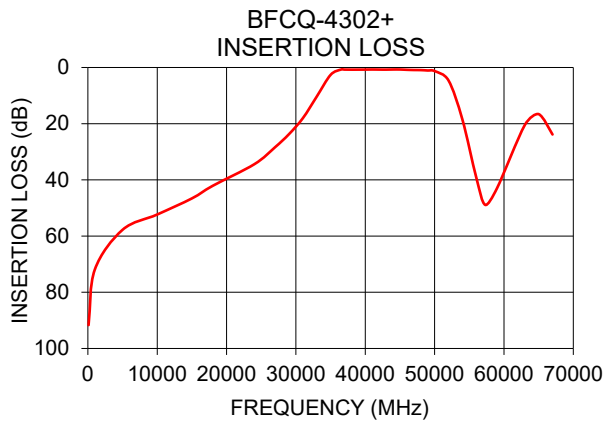
## BFCQ-4302+

Mini-Circuits

50Ω 36.5 to 50 GHz

### TYPICAL PERFORMANCE DATA AT 25°C

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
100	91.68	0.06
1000	71.93	0.23
5000	57.77	-0.09
10000	52.33	0.09
15000	46.60	0.11
18000	42.11	0.07
24000	34.43	0.14
27000	28.36	0.11
31000	18.05	0.36
35000	2.63	5.09
36500	0.74	20.53
40000	0.75	19.11
44000	0.72	19.04
50000	1.28	15.16
57300	48.90	0.87
59000	42.96	0.95
67000	23.84	2.65



#### NOTES

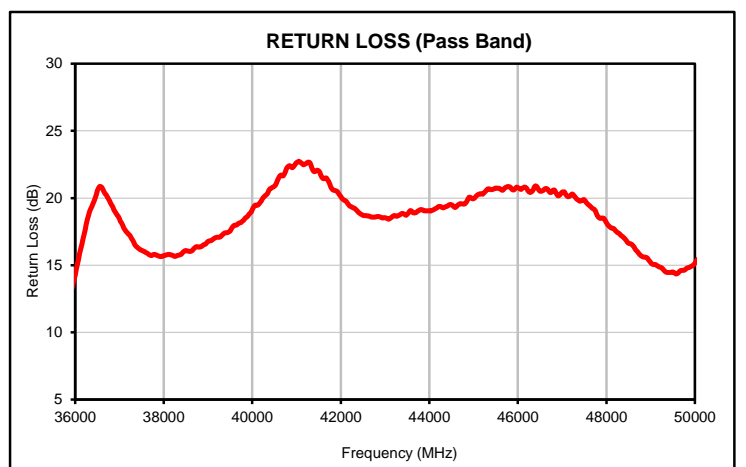
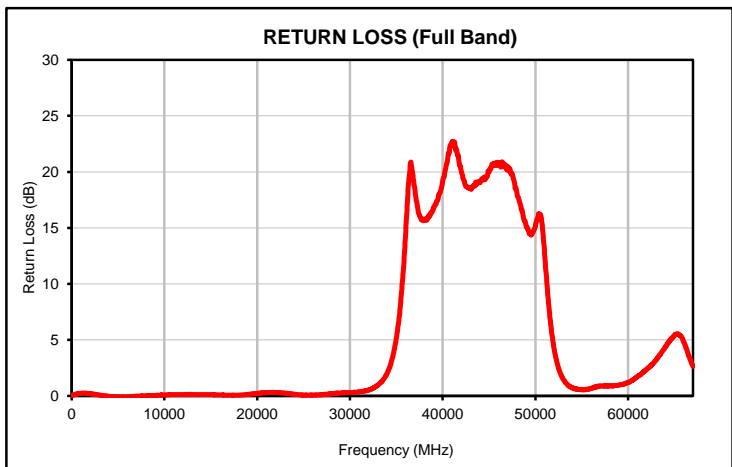
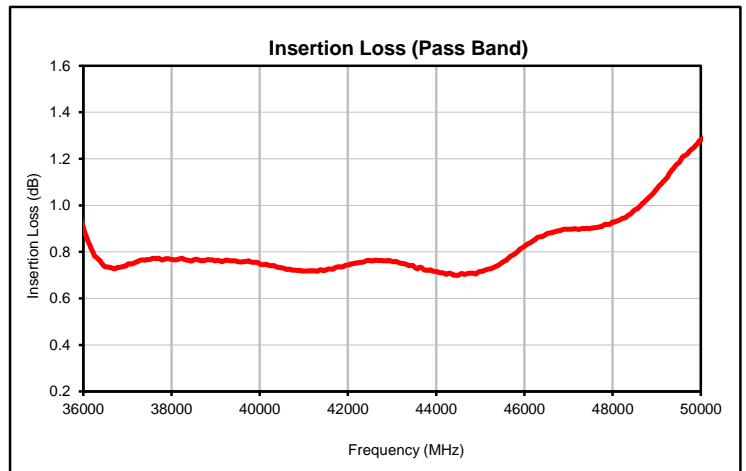
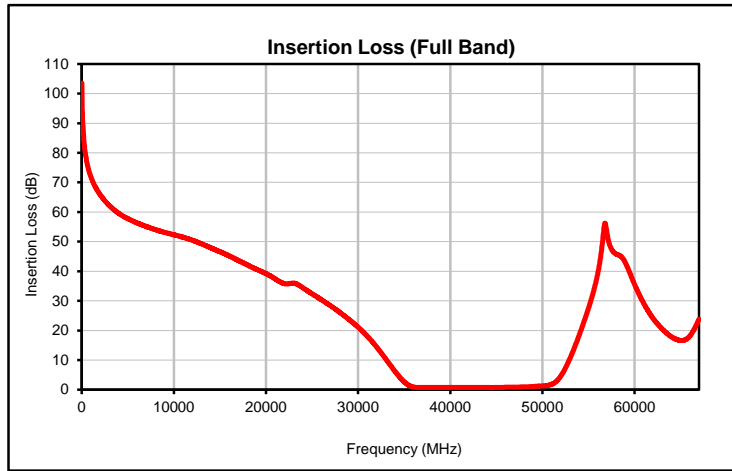
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- B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
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*Typical Performance Data*

FREQUENCY (MHz)	INSERTION LOSS (dB)	RETURN LOSS (dB)
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29000	23.73	0.25
31000	18.05	0.36
33000	10.36	0.95
35000	2.63	5.09
36500	0.74	20.53
37000	0.75	18.45
38000	0.77	15.70
39000	0.76	16.76
40000	0.75	19.11
41000	0.72	22.64
42000	0.74	20.10
43000	0.76	18.54
44000	0.72	19.04
45000	0.72	19.95
46000	0.82	20.78
47000	0.90	20.43
48000	0.93	18.16
49000	1.07	15.19
50000	1.28	15.16
52000	4.60	4.32
54000	18.45	0.72
56000	39.08	0.66
57300	48.90	0.87
59000	42.96	0.95
63000	20.51	3.19
65000	16.60	5.41
67000	23.84	2.65

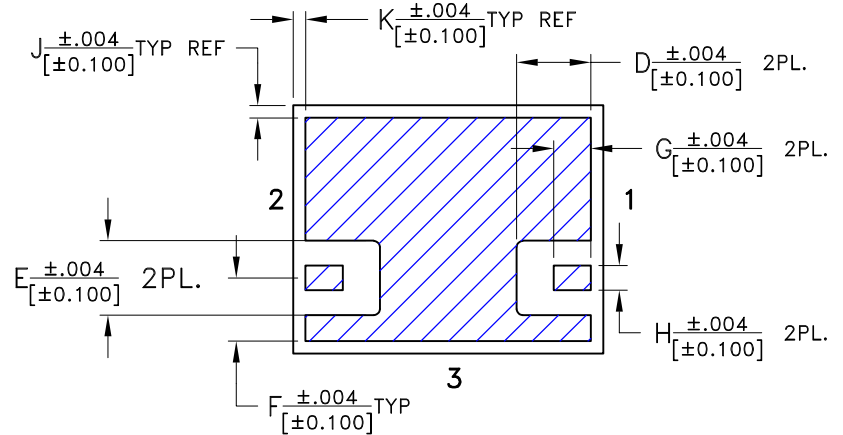
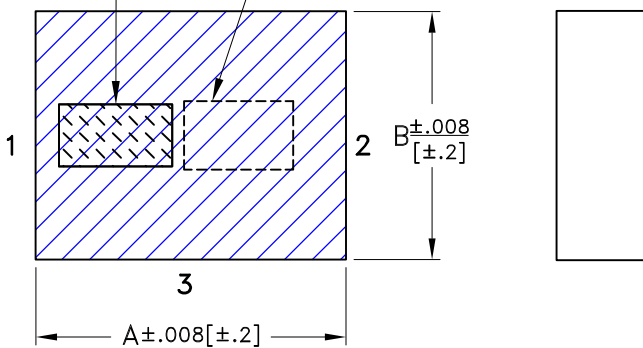
## Typical Performance Curves



## Outline Dimensions

NL1008C-6

INDEX AREA  
ALPHANUMERIC MARKING MAY APPEAR ON THE DEVICE SEE SPECIFIC MODELS



DENOTES METALLIZATION

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

CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N
NL1008C-6	.098 (2.50)	.079 (2.00)	.028 (.705)	.024 (.60)	.024 (.60)	.020 (.51)	.012 (.30)	.008 (.20)	.004 (.10)	.004 (.10)	.079 (2.0)	.098 (2.5)	.118 (3.0)
CASE #	P	Q	R	S	T	U	WT, GRAM						
NL1008C-6	.064 (1.63)	.013 (.3)	.043 (1.09)	.024 (.60)	.027 (.7)	.046 (1.2)	.019						

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

### Notes:

1. Open style, ceramic base.
2. Termination finish:  
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.
4. Line width should be designed to match 50Ω characteristic depending on PCB material and thickness.

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ALL NEW  
 [minicircuits.com](http://minicircuits.com)

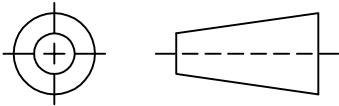
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



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RF/IF MICROWAVE COMPONENTS

THIRD ANGLE PROJECTION



REVISIONS

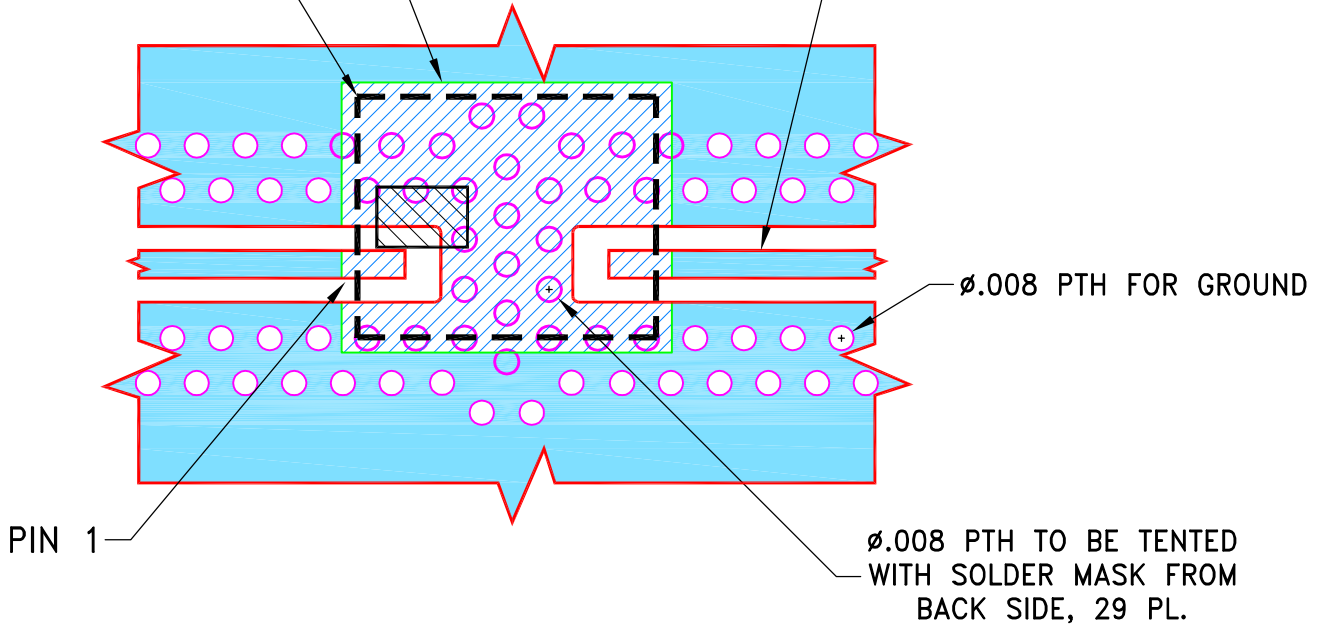
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-007756	NEW RELEASE	05/12/21	ITG	IL

SUGGESTED MOUNTING CONFIGURATION  
FOR NL1008C-6 CASE STYLE

SOLDER MASK BORDER  
(SEE NOTE 2)

PACKAGE OUTLINE

COPLANAR WAVEGUIDE:  
.0091±.001 TRACE WIDTH &  
.0079±.001 GAP, 2 PL.

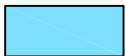


Ø.008 PTH FOR GROUND

Ø.008 PTH TO BE TENTED  
WITH SOLDER MASK FROM  
BACK SIDE, 29 PL.

NOTES:

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



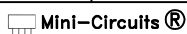
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK.

UNLESS OTHERWISE SPECIFIED	INITIALS	DATE
DIMENSIONS ARE IN INCHES	DRAWN ITG	05/12/21
TOLERANCES ON:	CHECKED GF	05/12/21
2 PL DECIMALS ±	APPROVED IL	05/12/21
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		



**Mini-Circuits®** 13 Neptune Avenue  
Brooklyn NY 11235

PL, NL1008C-6, TB-BFCQ-XXXX+

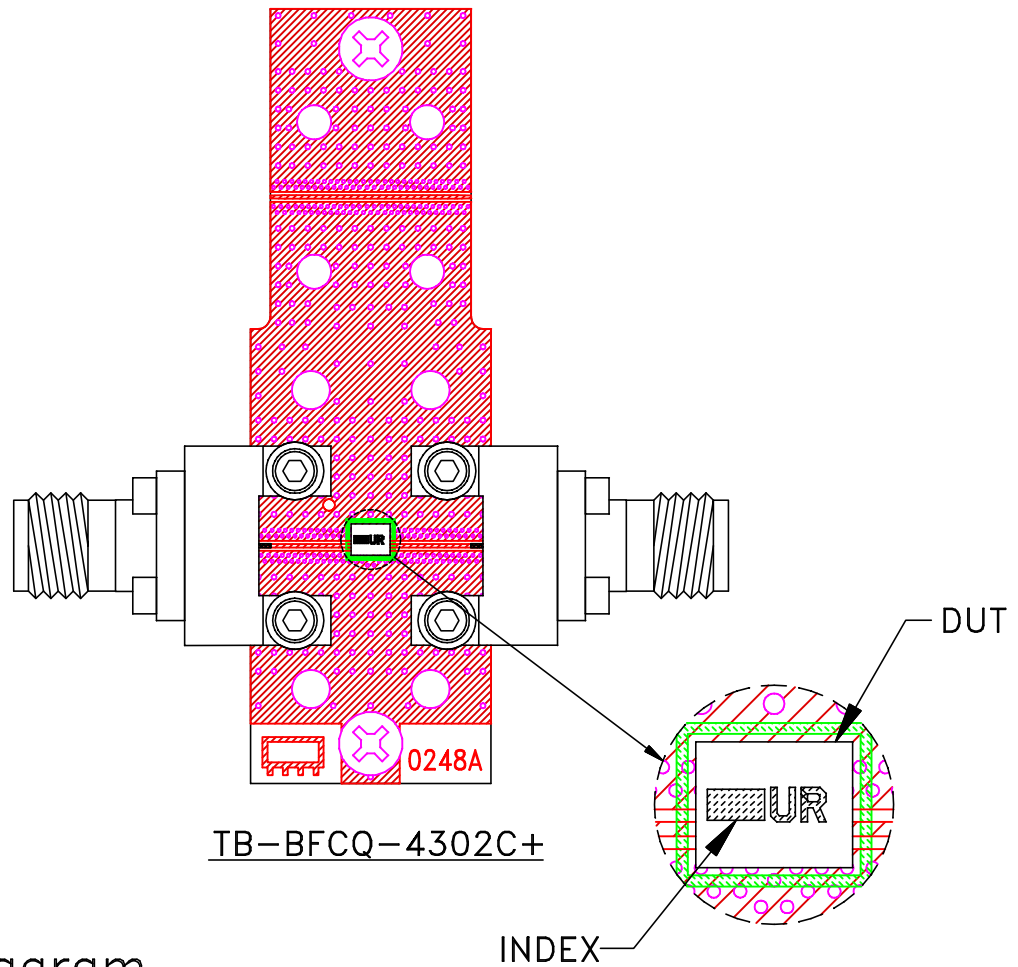


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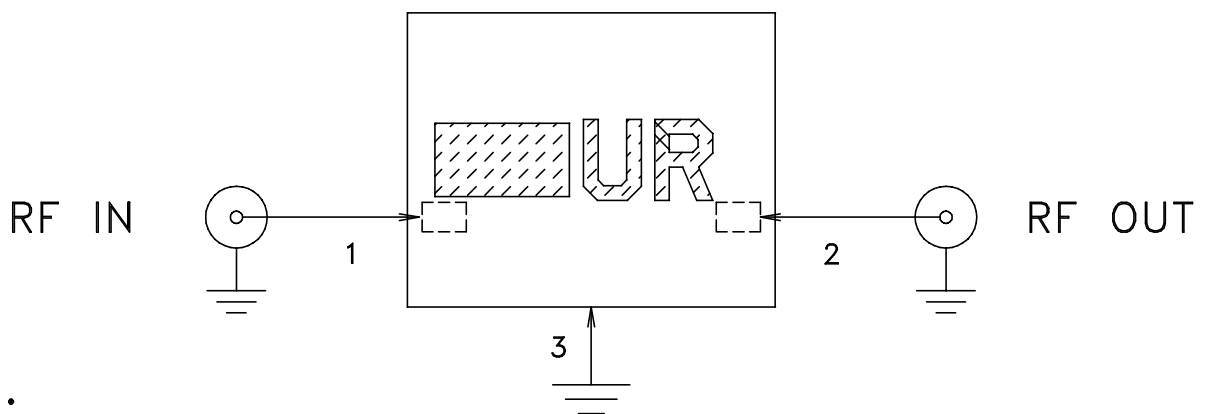
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-707	OR
FILE:	98PL707	SCALE: 15:1	SHEET: 1 OF 1



# Evaluation Board and Circuit



Schematic diagram



## Notes:

1. 50 Ohm 1.85 Female connectors.
2. PCB Material: Megtron 7(N) or equivalent,  
Dielectric Constant=3.4, Thickness=.005 inch.

 Mini-Circuits®



## Environmental Specifications ENV06T8

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
Thermal Cycling	-55 to 125°C, 100 cycles, Dwell Time 15 minutes.	MIL-STD-202, Method 107, Condition A-3
Mechanical Shock	50g, 11ms half-sine, 18 shocks applied each to 3 axes	MIL-STD-202 Method 213, Condition A
Vibration	10-2000Hz sine, 20g, 12 cycles applied each to 3 axes	MIL-STD-202, Method 204, Condition D
Constant Acceleration	30Kg, Y1 Direction	MIL-STD-883, Method 2001, Condition E
Humidity	85°C, 90-95% Relative Humidity, 250hours	
Solderability	10X / 30X Magnification	J-STD-002C Test S, J-STD-002C Test S1
High Temp Storage	125°C, 250 hours	