



CERAMIC

# Bandpass Filter

## BFCQ-2702+

Mini-Circuits

50Ω 22 to 31 GHz

### THE BIG DEAL

- Standard small 1008 (2.5mm x 2.0mm) case style
- Low Insertion Loss – Mid band 1.5 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-2702+ 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 22.0 – 31.0 GHz is as low as 1.5 dB, with typical stopband rejections at 43 dB up to 48 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-2702+  
CGD/CP/AM  
221026





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

Parameter	F#	Frequency (GHz)	Min.	Typ.	Max.	Units
Passband	Center Frequency	—	—	26.1	—	GHz
	Insertion Loss	F1-F2	22 - 31	1.5	2.75	dB
	Return Loss	F1-F2	22 - 31	11	—	dB
Stop Band, Lower	Insertion Loss	DC-F3	0.1 - 14	32	42	dB
		14 - 17.1	20	27		
Stop Band, Upper	Insertion Loss	F4-F5	35.7 - 38	20	43	dB
		38 - 48	33	43		

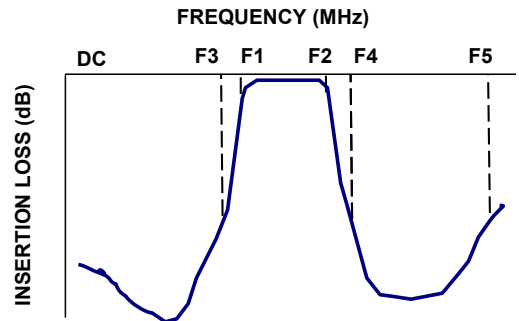
1. Measured on Mini-Circuits Test Board TB-BFCQ-2702C+ with connectors and feedlines de-embedded.

### MAXIMUM RATINGS

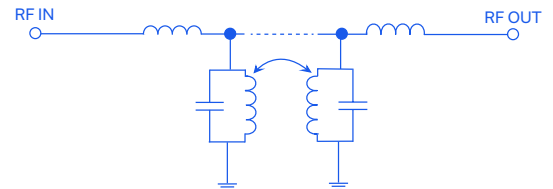
Parameter	Ratings
Operating temperature	-55°C to +125°C
Storage temperature	-55°C to +125°C
RF Power Input	1W

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

### TYPICAL FREQUENCY RESPONSE



### FUNCTIONAL SCHEMATIC





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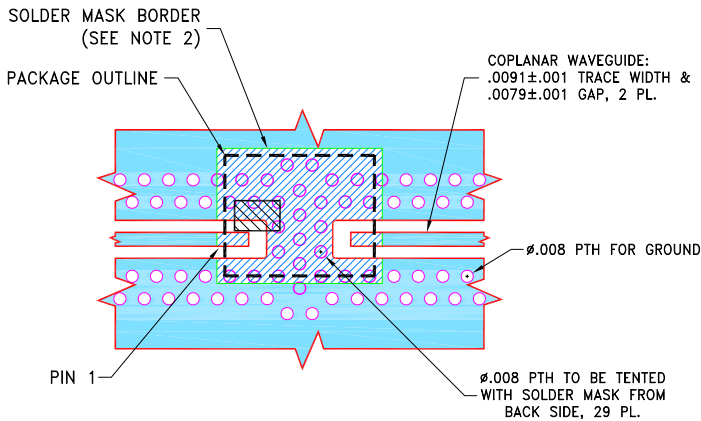
50Ω 22 to 31 GHz

### PAD CONNECTIONS

INPUT	1
OUTPUT	2
GROUND	3

PRODUCT MARKING: UN

### DEMO BOARD MCL P/N: TB-BFCQ-2702C+ SUGGESTED PCB LAYOUT (PL-707)

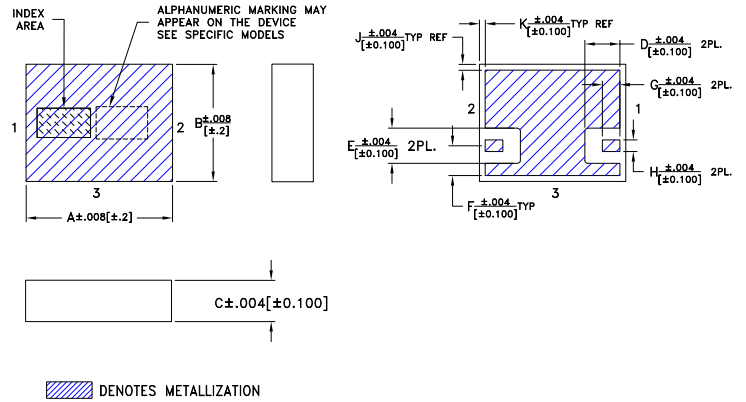


#### NOTES:

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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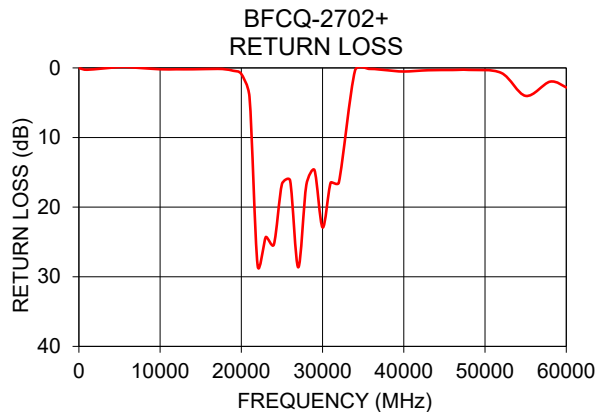
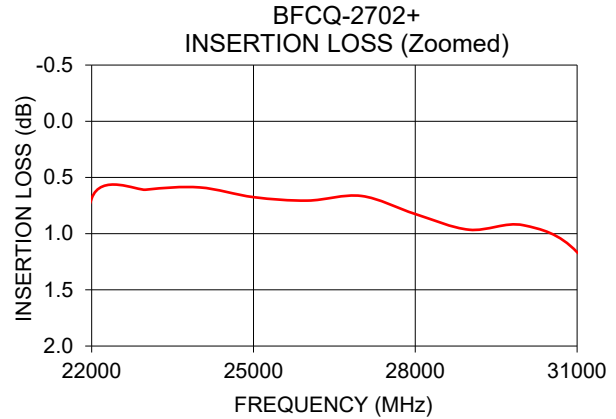
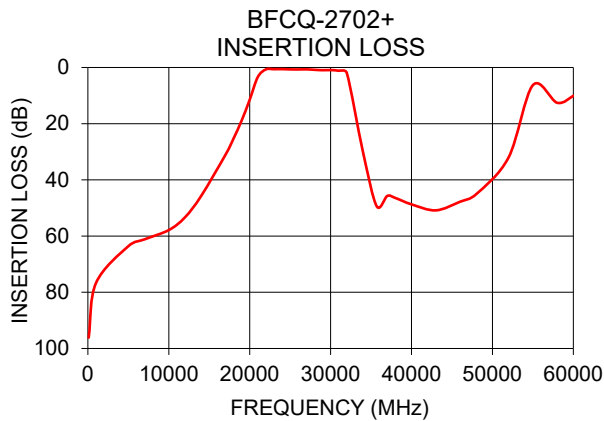
## BFCQ-2702+

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50Ω 22 to 31 GHz

### TYPICAL PERFORMANCE DATA AT 25°C

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
100	96.13	0.06
1000	76.71	0.26
5000	63.60	-0.11
10000	57.87	0.20
14000	45.73	0.20
17100	30.59	0.14
22000	0.69	28.36
26000	0.71	16.17
28000	0.83	16.80
31000	1.17	16.47
32000	1.93	16.47
35700	49.40	0.14
37000	45.72	0.23
38000	46.43	0.34
40000	48.71	0.52
46000	47.77	0.30
48000	45.07	0.29



#### NOTES

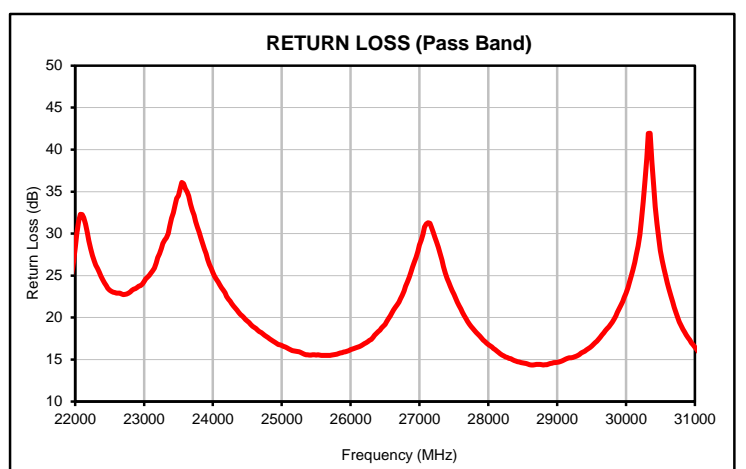
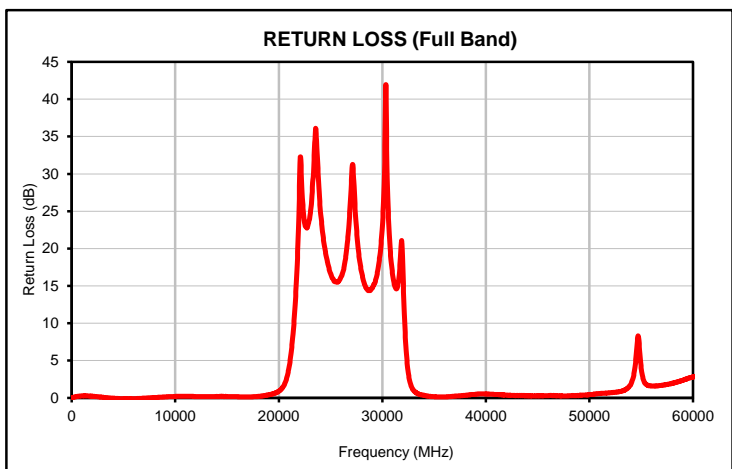
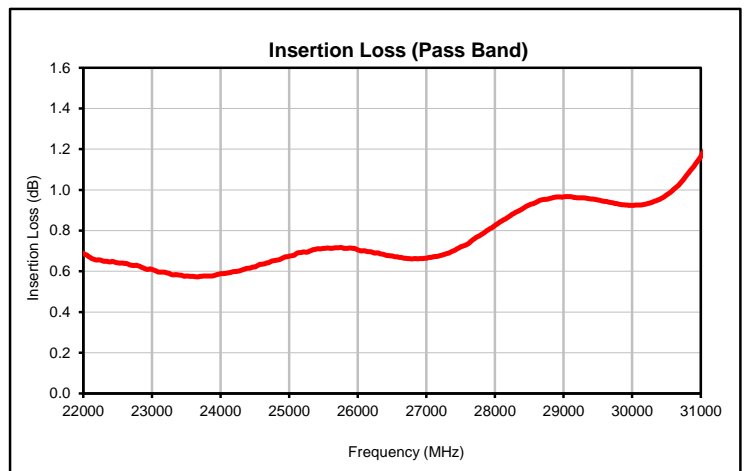
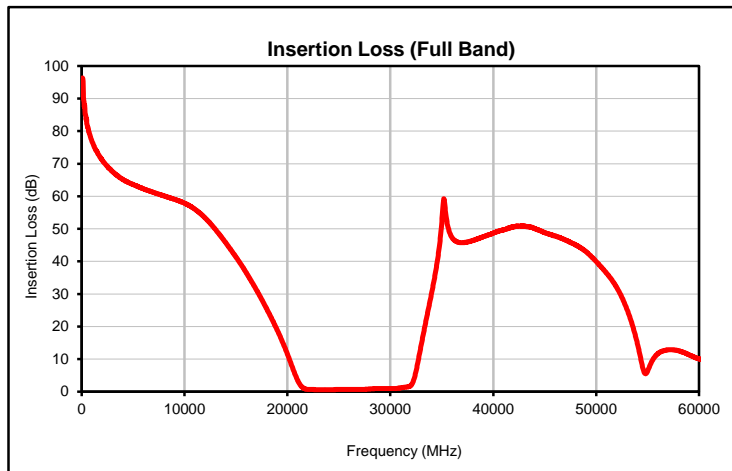
- A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
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*Typical Performance Data*

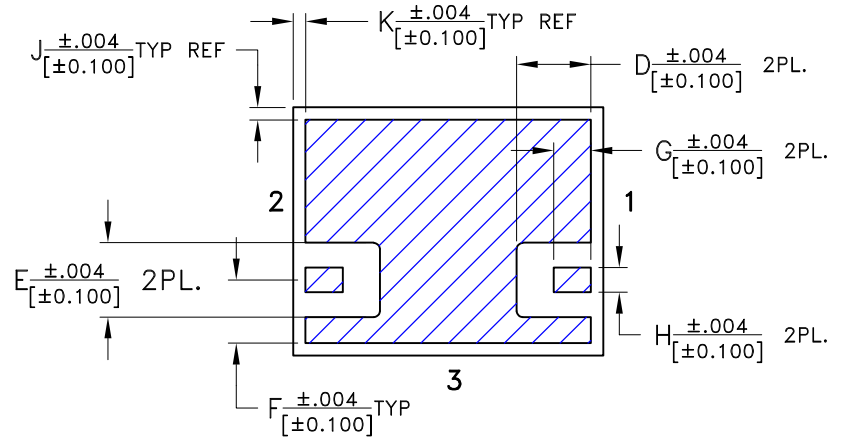
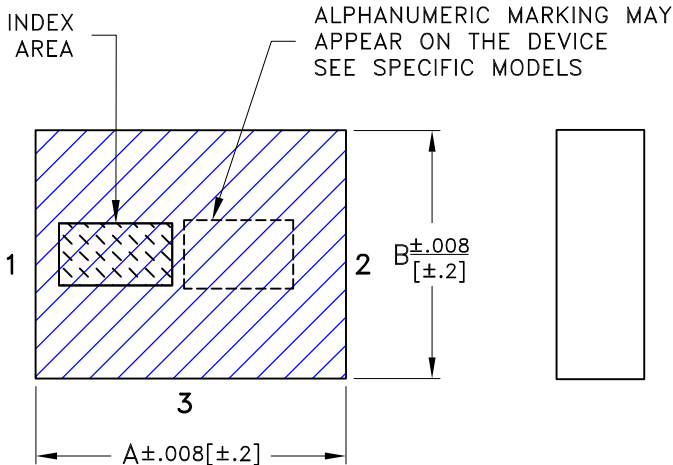
FREQUENCY (MHz)	INSERTION LOSS (dB)	RETURN LOSS (dB)
100	96.13	0.06
1000	76.71	0.26
5000	63.60	0.11
7000	61.17	0.03
10000	57.87	0.20
12000	53.33	0.20
14000	45.73	0.20
17100	30.59	0.14
18000	25.31	0.20
19000	18.92	0.41
20000	11.48	0.88
21000	3.40	4.15
22000	0.69	28.36
23000	0.61	24.31
24000	0.59	25.37
25000	0.68	16.67
26000	0.71	16.17
27000	0.66	28.65
28000	0.83	16.80
29000	0.97	14.67
30000	0.92	22.92
31000	1.17	16.47
32000	1.93	16.47
34000	30.08	0.35
35700	49.40	0.14
37000	45.72	0.23
38000	46.43	0.34
40000	48.71	0.52
43000	50.85	0.34
46000	47.77	0.30
48000	45.07	0.29
52000	31.99	0.72
55000	6.29	4.02
58000	12.56	1.97
60000	10.07	2.81

## Typical Performance Curves



## Outline Dimensions

NL1008C-6



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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ISO 9001 ISO 14001 CERTIFIED

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

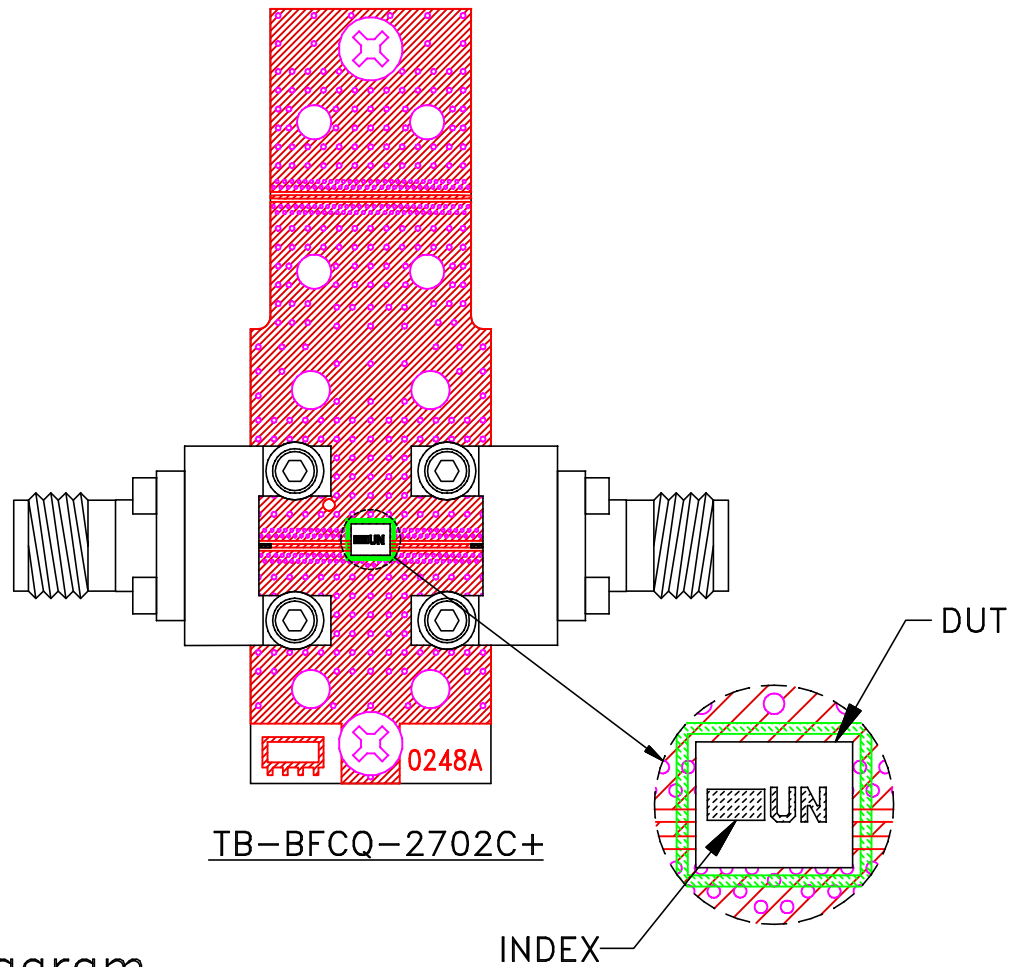
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



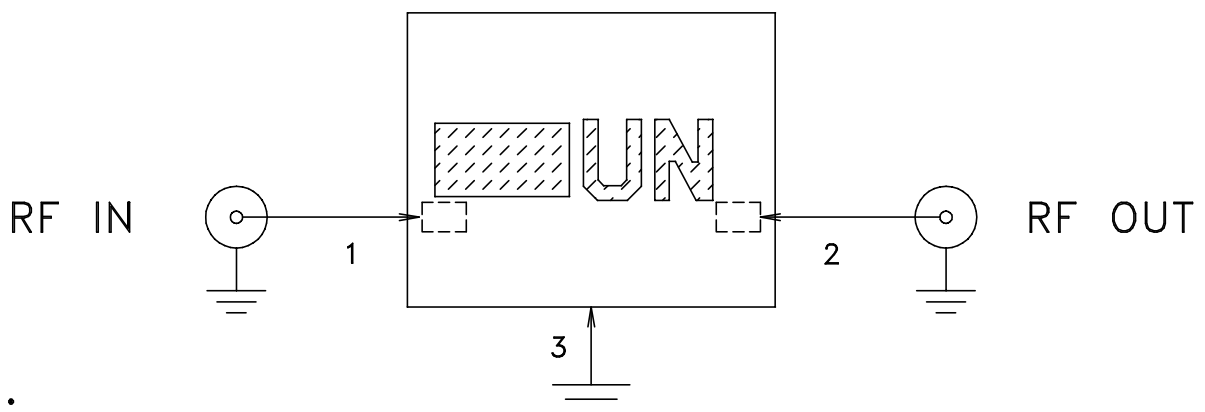
The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: [www.minicircuits.com](http://www.minicircuits.com)

RF/IF MICROWAVE COMPONENTS

# 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.

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## 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	