CERAMIC

High Pass Filter

HFCQ-2902+

50Ω 29 to 39 GHz

THE BIG DEAL

- Standard small 1008 (2.5mm x 2.0mm) case style
- Low Insertion Loss – Passband 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 web site for RoHS Compliance methodologies and qualifications

APPLICATIONS

- Test and Measurement

PRODUCT OVERVIEW

The HFCQ-2902+ LTCC High 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 29.0 – 39.0 GHz is as low as 1.5 dB, with typical stopband rejections at 25 dB up to 21.9 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
NPO-002619
HFCQ-2902+
CGD/CP/AM
032125

ELECTRICAL SPECIFICATIONS[1] AT 25°C

Parameter		F#	Frequency (GHz)	Min.	Typ.	Max.	Units
Stop Band	Insertion Loss	DC-F1	0.1 – 15	30	40	—	dB
		F1-F2	15 – 21.9	18	25	—	dB
Pass Band	Insertion Loss	F3-F4	29 – 39	—	1.5	2.75	dB
	Return Loss	F3-F4	29 - 39	—	13	—	

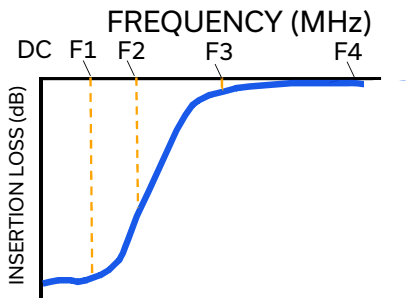
1. Measured on Mini-Circuits Test Board TB-HFCQ-2902C+ with connectors and feedlines de-embedded.

MAXIMUM RATINGS

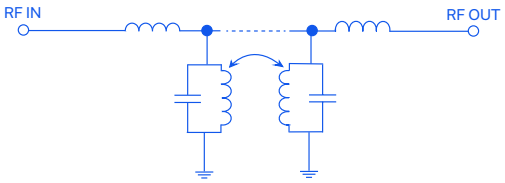
Parameter	Ratings
Operating temperature	-55°C to +125°C
Storage temperature	-55°C to +125°C
RF Power Input	1W

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

TYPICAL FREQUENCY RESPONSE



FUNCTIONAL SCHEMATIC



CERAMIC

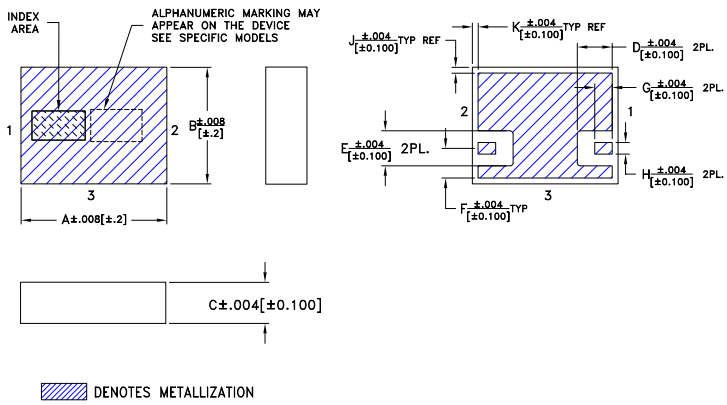
High Pass Filter

HFCQ-2902+

PAD CONNECTIONS

INPUT	1
OUTPUT	2
GROUND	3

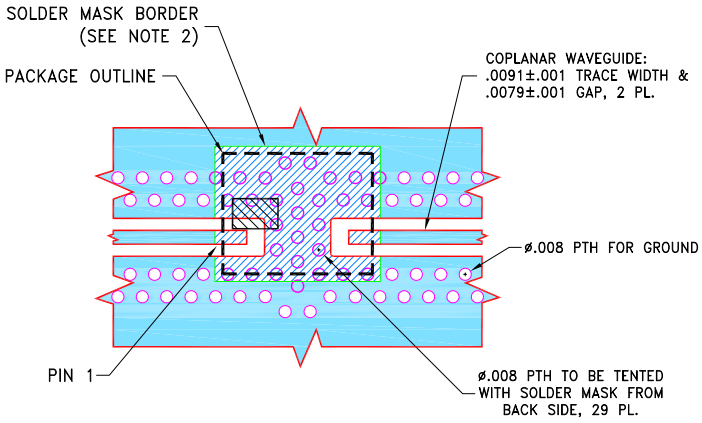
OUTLINE DRAWING



PRODUCT MARKING: UP

DEMO BOARD MCL P/N: TB-HFCQ-2902C+

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 DIMENSIONS (Inches / mm)

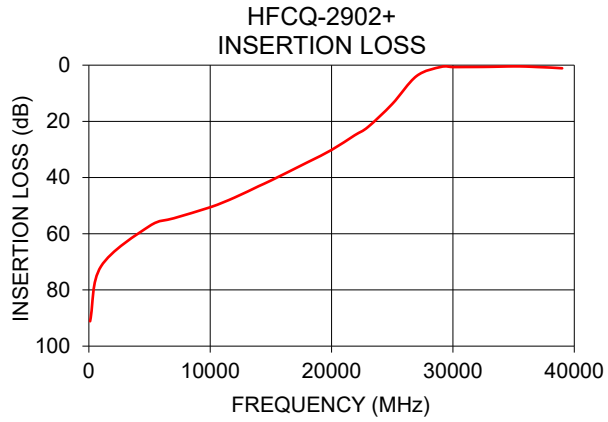
A	B	C	D	E	F	G	H	J	K	wt
.098	.079	.028	.024	.024	.020	.012	.008	.004	.004	grams
2.49	2.01	0.71	0.6	0.6	0.51	0.3	0.2	0.1	0.1	.019

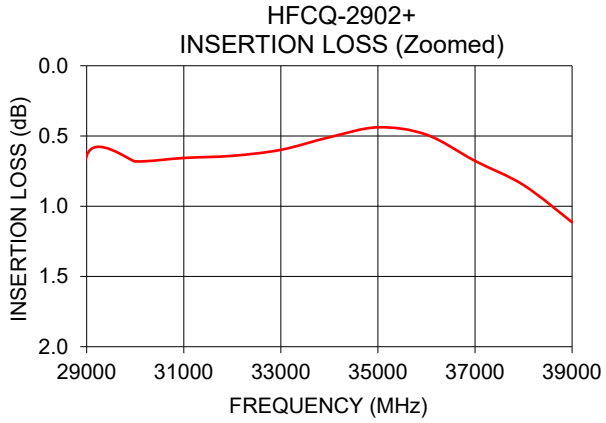
High Pass Filter

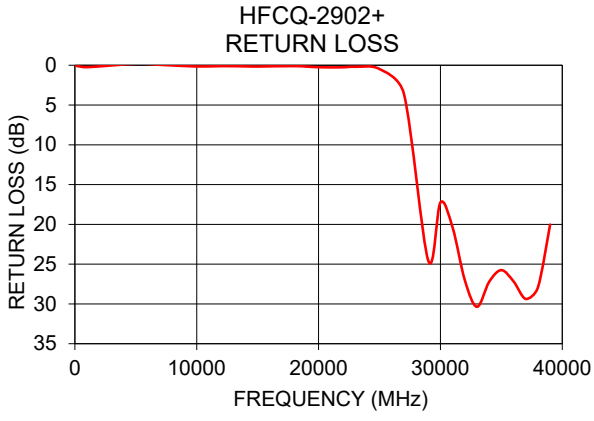
HFCQ-2902+

TYPICAL PERFORMANCE DATA AT 25°C

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
100	91.15	0.07
1000	71.61	0.24
10000	50.57	0.15
15000	41.06	0.16
20000	30.17	0.25
21900	24.96	0.26
25000	13.82	0.47
29000	0.64	24.55
30000	0.68	17.25
36000	0.49	27.16
38000	0.85	27.93
39000	1.11	20.03







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

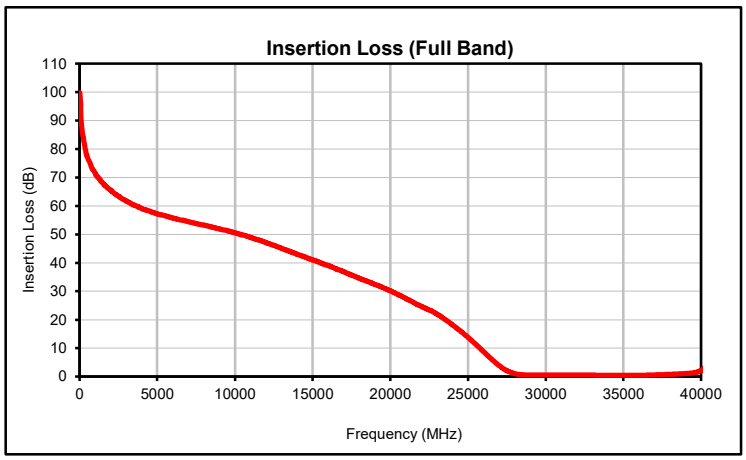
Ceramic Bandpass Filter HFCQ-2902+

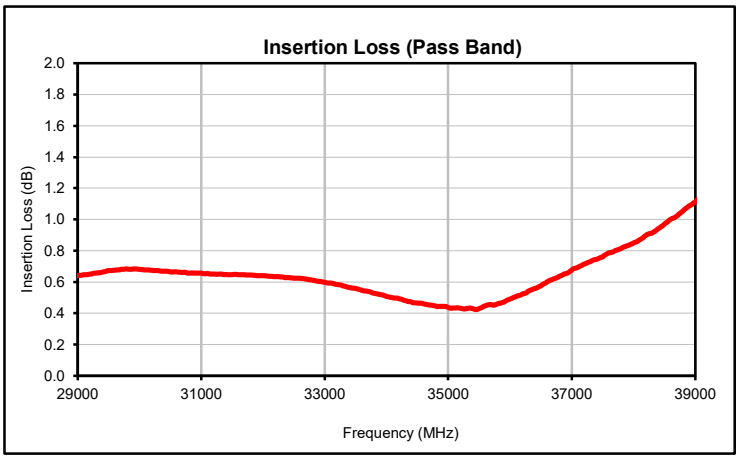
Typical Performance Data

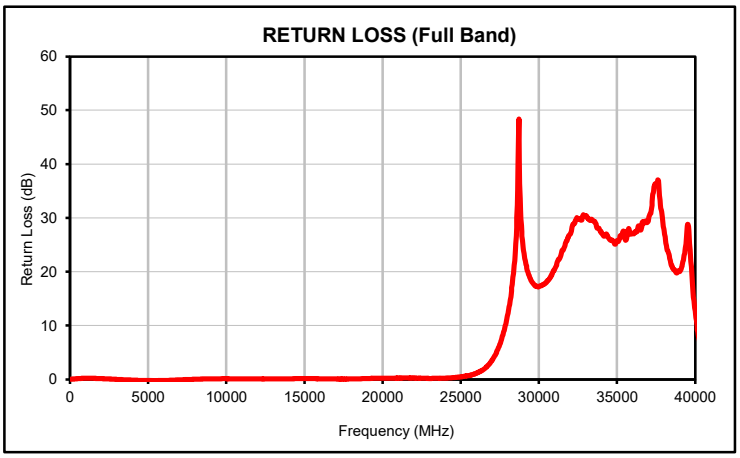
FREQUENCY (MHz)	INSERTION LOSS (dB)	RETURN LOSS (dB)
100	91.15	0.07
500	77.18	0.16
1000	71.61	0.24
2000	65.59	0.17
3000	61.75	0.04
4000	59.13	0.09
5000	57.25	0.18
6000	55.80	0.16
7000	54.49	0.05
8000	53.24	0.06
9000	51.96	0.13
10000	50.57	0.15
11000	48.97	0.13
12000	47.13	0.11
13000	45.12	0.11
14000	43.05	0.14
15000	41.06	0.16
16000	39.03	0.15
17000	36.85	0.10
18000	34.61	0.10
19000	32.46	0.19
20000	30.17	0.25
21000	27.50	0.28
22000	24.69	0.27
23000	22.01	0.20
24000	18.22	0.26
25000	13.82	0.47
26000	8.79	1.15
27000	3.89	3.56
28000	1.08	11.94
29000	0.64	24.55
29500	0.67	18.37
30000	0.68	17.25
30500	0.67	18.14
31000	0.66	20.40
31500	0.65	23.98
32000	0.64	27.00
32500	0.63	29.80
33000	0.60	30.36
33500	0.56	29.42
34000	0.51	27.22
34500	0.47	26.18
35000	0.44	25.75
35500	0.43	26.43
36000	0.49	27.16
36500	0.58	27.78
37000	0.68	29.37
37500	0.76	36.40
38000	0.85	27.93
38500	0.97	21.13
39000	1.11	20.03

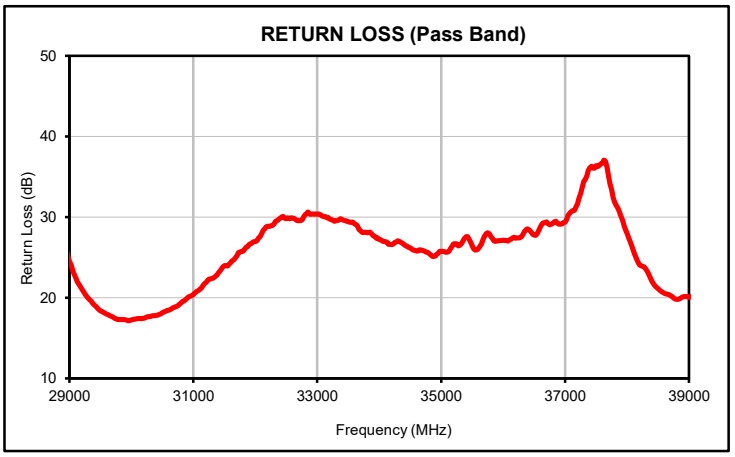
Ceramic Bandpass Filter HFCQ-2902+

Typical Performance Curves





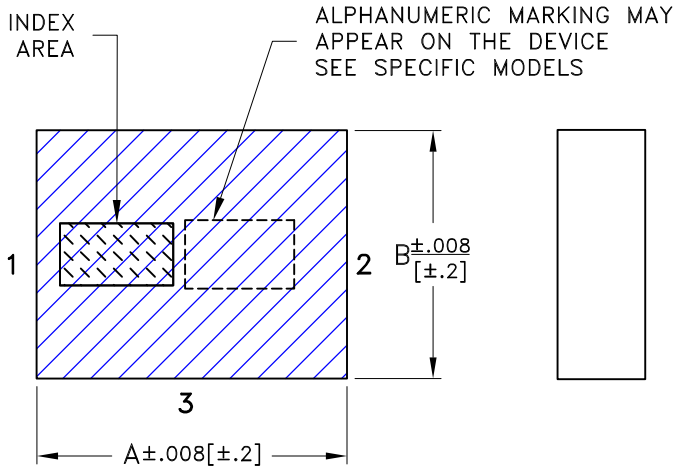


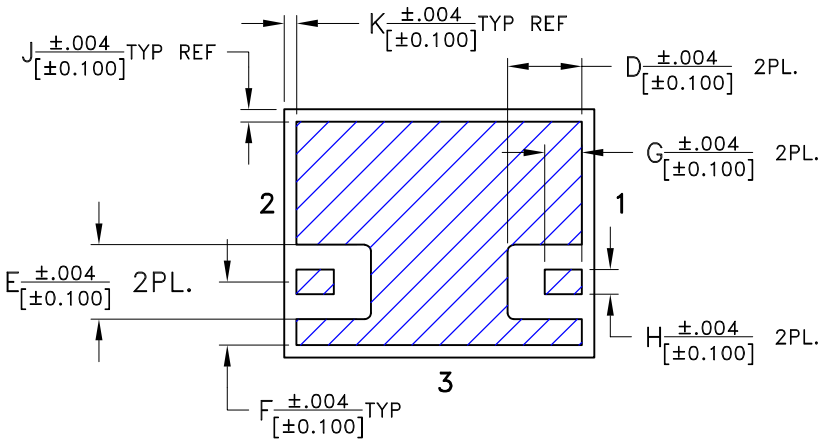


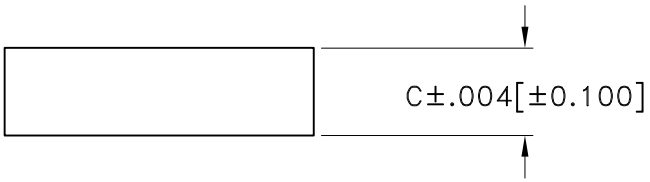
Case Style NL

Outline Dimensions

NL1008C-6

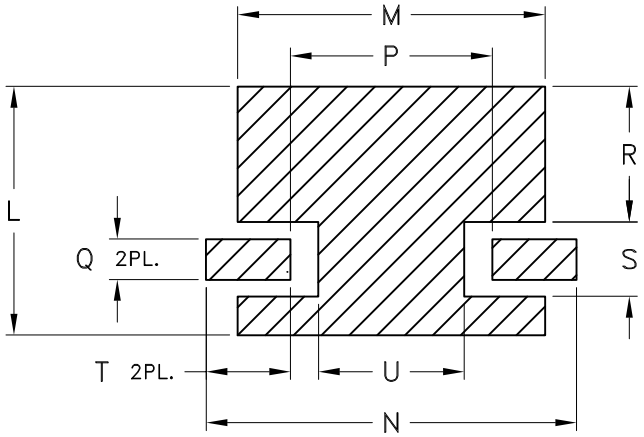






DENOTES METALLIZATION

PCB Land Pattern



Suggested Layout,
Tolerance to be within ±.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.±.01; 3 Pl. ±.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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RF/IF MICROWAVE COMPONENTS

Tape & Reel Packaging TR-F75

DEVICE ORIENTATION IN T&R

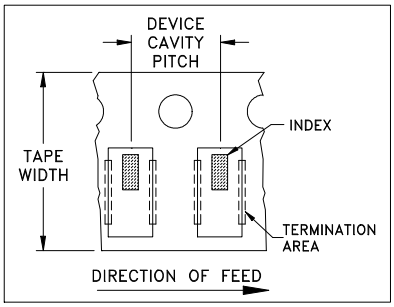

ILLUSTRATION 1

Applicable Case Styles
FV1206-1
FV1206-3

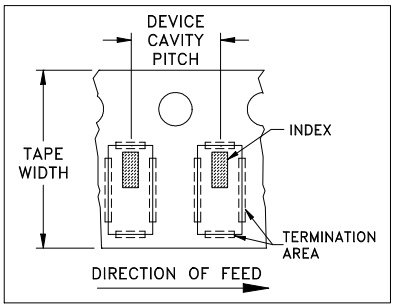

ILLUSTRATION 2

Applicable Case Styles
FV1206-4
FV1206-5
FV1206-6
FV1206-7
FV1206-9

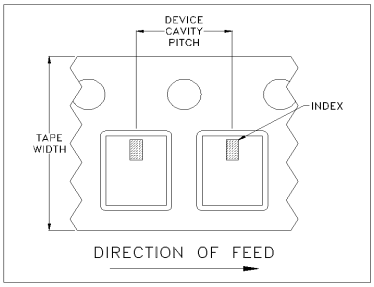

ILLUSTRATION 3

Applicable Case Styles
FV1206-11
FV1206-12
GE0805C-18
NL1008C-6
NL1008C-7
NL1008C-9
NL1008C-10
NL1008C-12

Tape Width, mm	Device Cavity Pitch, mm	Reel Size, inches	Devices per Reel	
8	4	7	Small quantity standards (see note)	20
				50
				100
				200
				500
				1000
			Standard	3000

Note: Please consult individual model data sheet to determine device per reel availability.

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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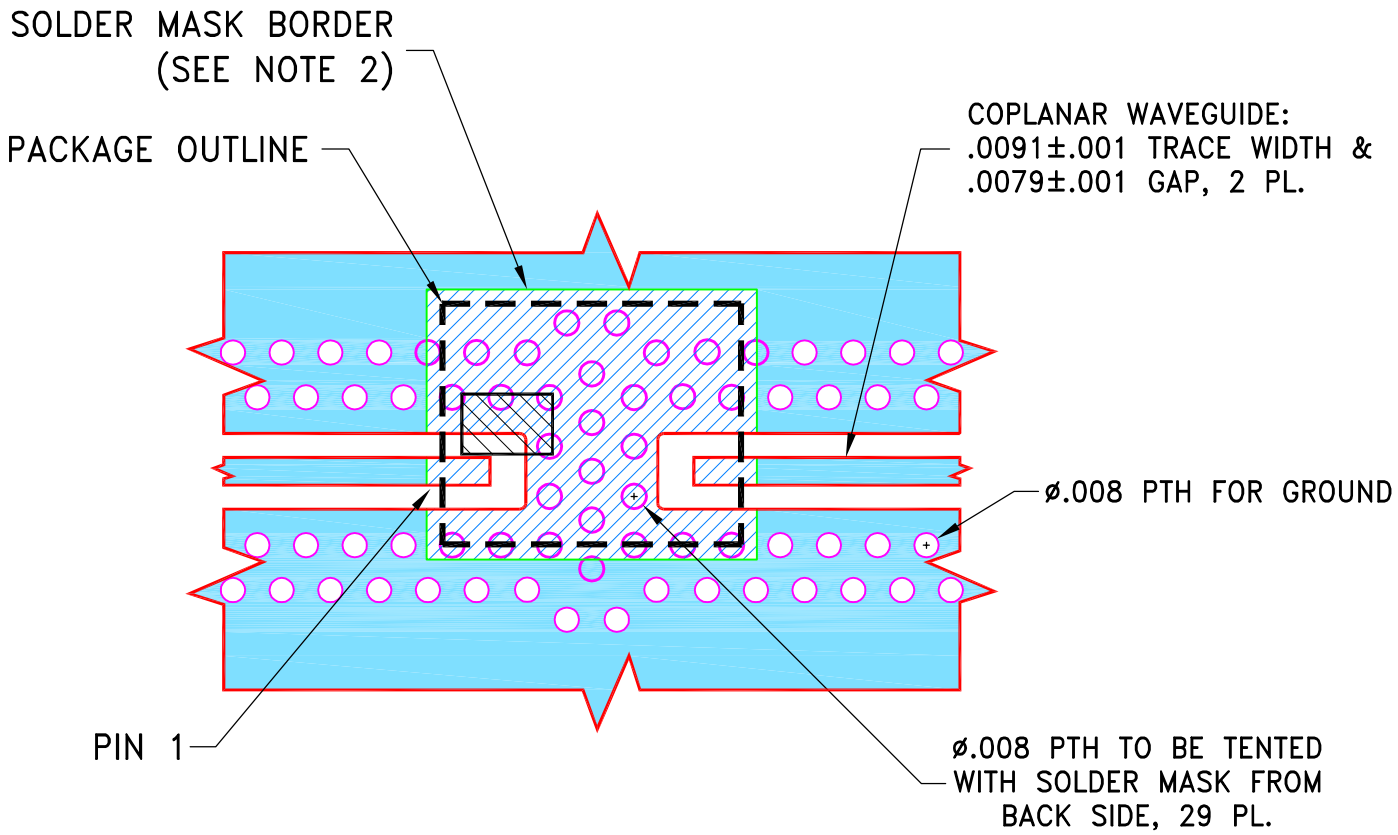
THIRD ANGLE PROJECTION

REVISIONS					
REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
0R	ECO-007756	NEW RELEASE	05/12/21	ITG	IL

SUGGESTED MOUNTING CONFIGURATION FOR NL1008C-6 CASE STYLE



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.

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 ±			

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

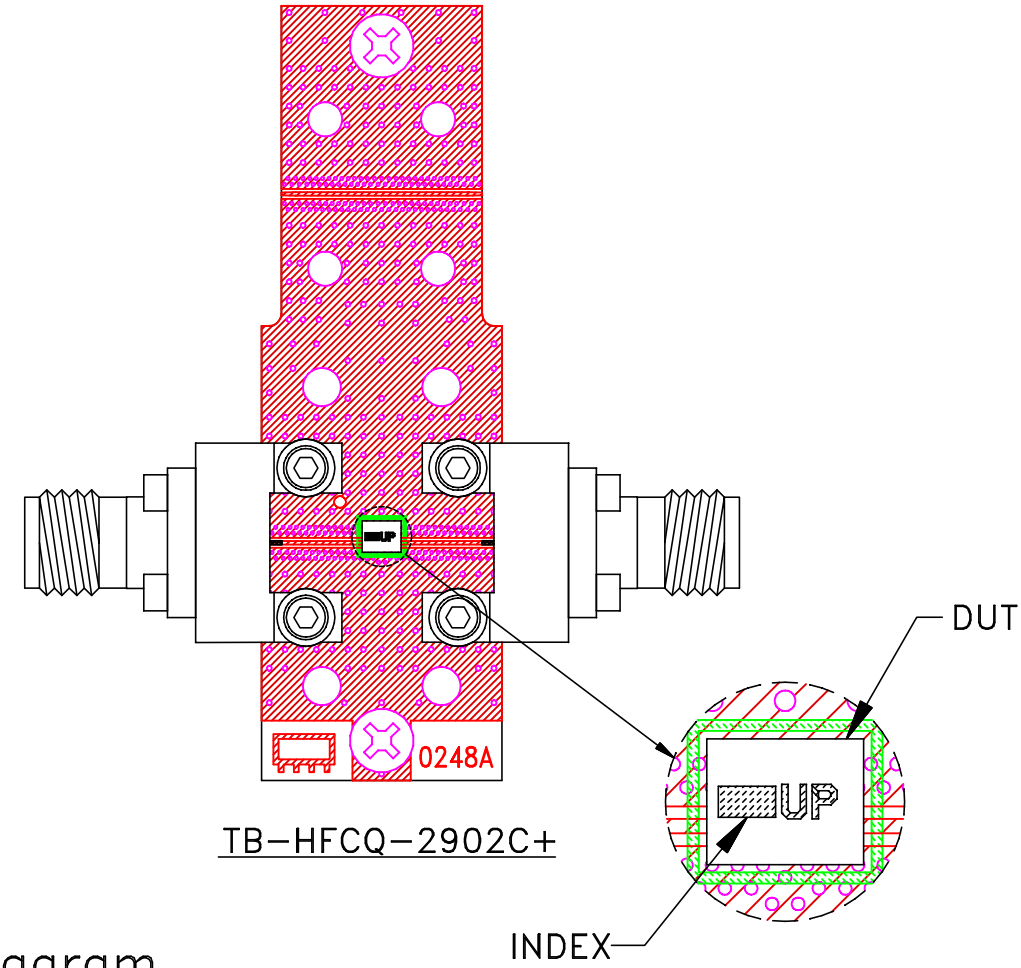
Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235

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

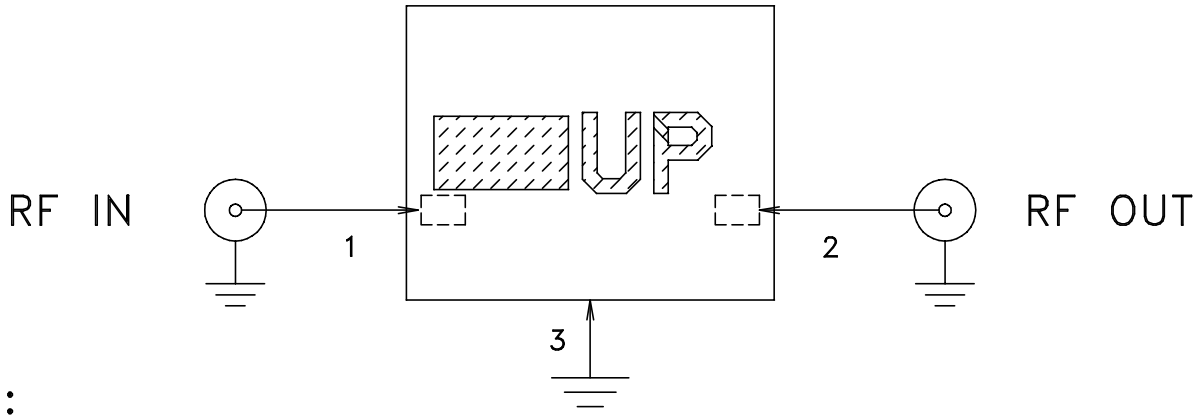
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-707	0R

FILE:	SCALE:	SHEET:
98PL707	15:1	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.

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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	

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