

# Ceramic High Pass Filter

## HFCW-7500+

50Ω      8200 to 21000 MHz

### The Big Deal

- Very good rejection, 44 dB typical
- Small size 0603 (0.063" X 0.032" X 0.024")
- Good Power handling, 2.5W
- Ceramic construction



Generic photo used for illustration purposes only  
CASE STYLE: JC0603C

### Product Overview

HFCW-7500+ is a high pass filter with passband from 8200 MHz to 21000 MHz supporting a variety of applications. This model provides good insertion loss over a wide band due to strategically constructed layout. Housed in a tiny 0603 ceramic form factor with wraparound terminations, the filter is ideal for dense PCB layouts with minimal performance variation due to parasitics.

### Key Features

Feature	Advantages
Small size, 0603 (0.063" X 0.032" X 0.024")	Accommodates tight space requirements for dense PCB layouts.
Wrap around termination	Provides excellent solderability and easy visual inspection capability.
LTCC construction	Provides a rugged package that is well suited for tough environments including high humidity and high temperature extremes.
Ultra-wide pass band	This filter has a very wide passband from 8.2 GHz to 21 GHz.

#### 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)



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CASE STYLE: JC0603C

**+RoHS Compliant**

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

### Features

- Very good rejection, 44 dB typ.
- Small size 0603 (0.063" X 0.032" X 0.024")
- Temperature stable
- LTCC construction

### Applications

- Test and measurements
- Military applications
- Telecommunications and broadband wireless systems

### Functional Schematic



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

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Unit
Stop Band	Rejection Loss	DC-F1	DC - 4000	38	44	-	dB
		F1-F2	4000 - 6000	25	34	-	dB
	Freq. Cut-Off	F3*	7600	-	3.0	-	dB
Pass Band	Insertion Loss	F4-F5	8200 - 9500	-	1.8	-	dB
		F5-F6	9500 - 15000	-	0.8	1.5	dB
	Return Loss	F6-F7	15000 - 21000	-	1.0	-	dB
		F4-F6	8200 - 15000	-	10	-	dB
		F6-F7	15000 - 21000	-	7	-	dB

<sup>1</sup> This component is not intended to act as a DC block. Please consult with Mini-Circuits for further details

<sup>2</sup> Measured on Mini-Circuits Characterization Test Board TB-HFCW-7500+

\* Typically, a ±5% frequency deviation from the stated value may occur on a unit-to-unit basis.

### Maximum Ratings

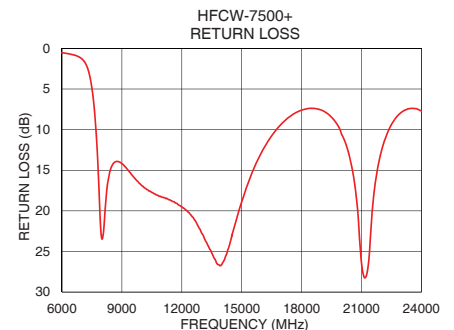
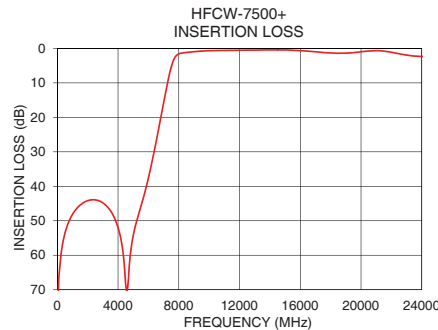
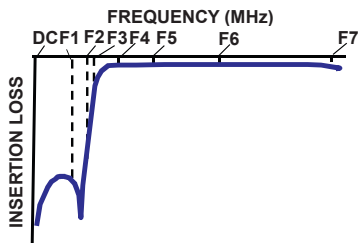
Operating Temperature	-55°C to 125°C
Storage Temperature	-55°C to 125°C
RF Power Input*	2.5W @ 25°C

\* Passband rating, derate linearly to 0.7W at 125°C ambient  
Permanent damage may occur if any of these limits are exceeded.

### Typical Performance Data at 25°C

Frequency (MHz)	Insertion Loss (dB)	Return Loss (dB)
10	72.74	0.09
100	66.69	0.11
500	53.69	0.16
2000	44.17	0.16
4000	51.93	0.17
6000	37.61	0.54
6360	30.31	0.68
6800	20.49	0.98
7240	10.43	2.17
7500	5.43	4.90
7600	4.02	6.97
7700	2.98	9.96
8200	1.34	18.61
9500	0.77	15.59
11000	0.57	18.30
13000	0.49	22.76
15000	0.45	18.90
16000	0.63	12.77
18000	1.33	7.60
21000	0.65	26.47

### Typical Frequency Response



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[www.minicircuits.com](http://www.minicircuits.com) P.O. Box 350166, Brooklyn, NY 11235-0003 (718) 934-4500 sales@minicircuits.com

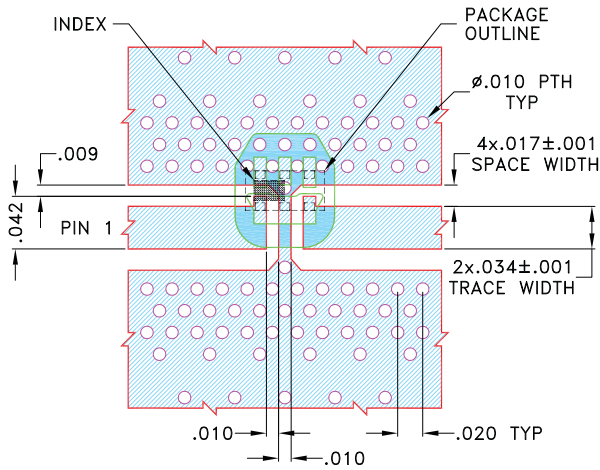
REV. OR  
ECO-009063  
HFCW-7500+  
EDU3856  
URJ  
210804  
Page 2 of 3

## Pad Connections

INPUT	1
OUTPUT	3
GROUND	2,4,5,6

Product Marking: R

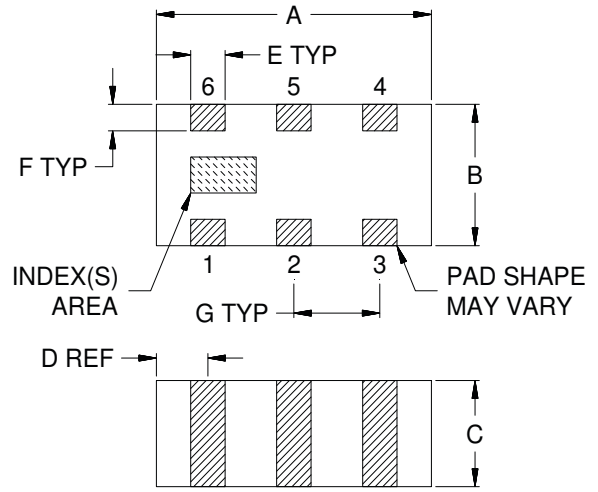
Demo Board MCL P/N: TB-HFCW-7500+  
Suggested PCB Layout (PL-703)



### NOTES:

- COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (RO4350B) WITH DIELECTRIC THICKNESS .0200±.0015. COPPER: 1/2 Oz. EACH SIDE. FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
  - 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)

A	B	C	D	E	F	G	Wt.
.063	.032	.024	.012	.008	.006	.020	grams
1.60	0.80	0.60	0.30	0.20	0.15	0.50	.005

Note: Please refer to case style drawing for details.

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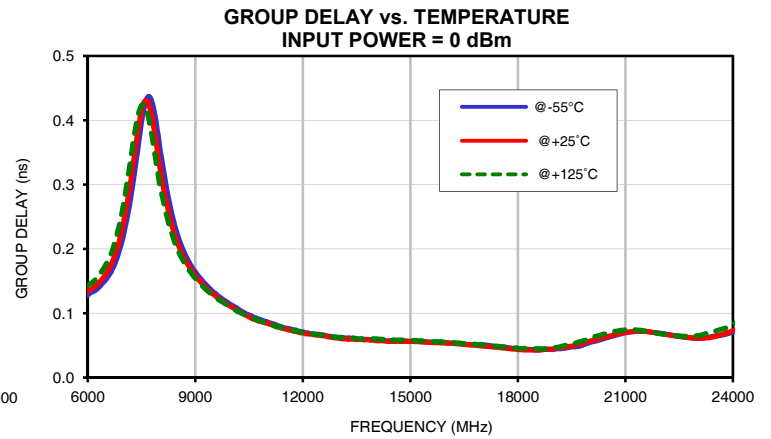
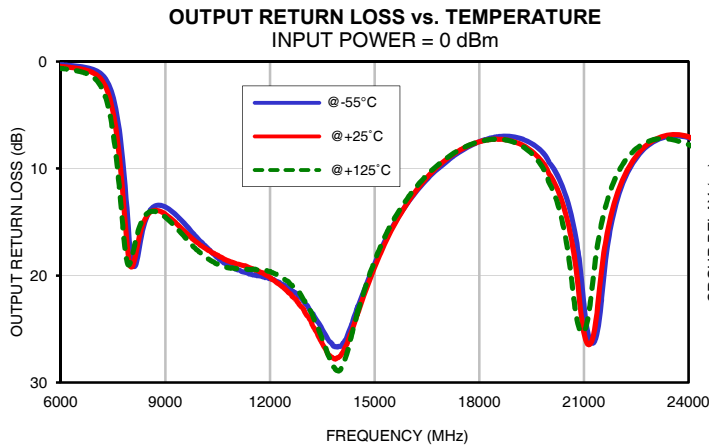
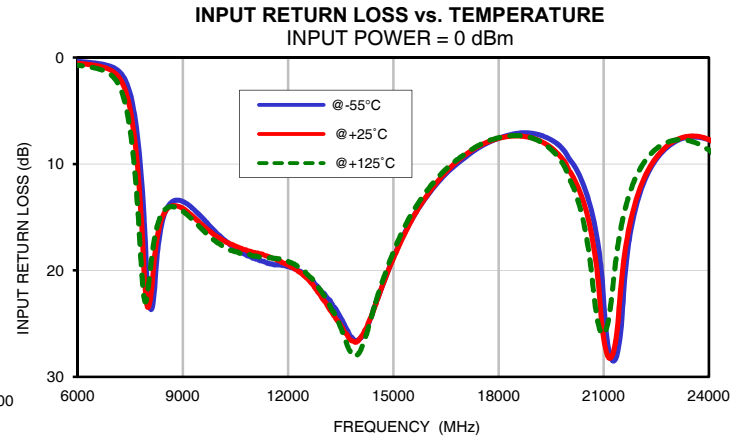
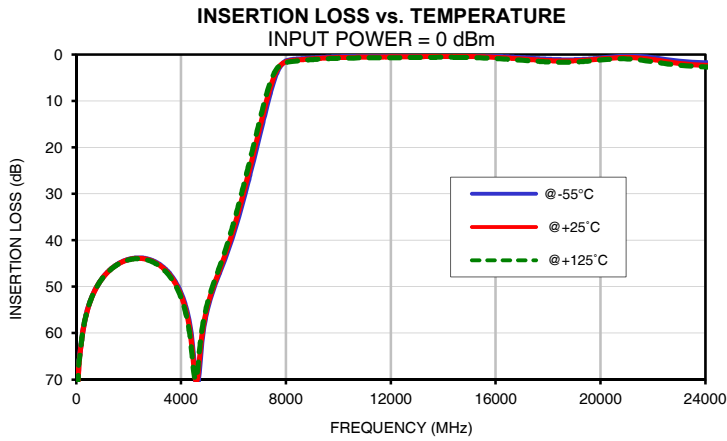
## Typical Performance Data

FREQ. (MHz)	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
	(dB)			(dB)			(dB)		
	@-55°C	@+25°C	@+125°C	@-55°C	@+25°C	@+125°C	@-55°C	@+25°C	@+125°C
10	68.39	72.74	69.55	0.07	0.09	0.09	0.07	0.08	0.10
30	69.01	72.22	70.24	0.07	0.09	0.10	0.07	0.09	0.11
50	69.47	71.71	70.37	0.08	0.09	0.10	0.07	0.09	0.12
100	65.96	66.69	66.04	0.09	0.11	0.13	0.08	0.11	0.14
200	61.79	61.83	61.80	0.10	0.13	0.15	0.09	0.12	0.16
300	58.04	58.06	58.02	0.11	0.14	0.17	0.10	0.13	0.18
500	53.66	53.69	53.68	0.12	0.16	0.20	0.11	0.15	0.20
700	50.89	50.92	50.93	0.12	0.17	0.21	0.12	0.16	0.22
1000	48.14	48.16	48.18	0.13	0.18	0.22	0.12	0.17	0.23
1200	46.85	46.87	46.90	0.12	0.18	0.22	0.12	0.17	0.23
1400	45.86	45.88	45.91	0.12	0.18	0.22	0.11	0.17	0.23
1600	45.09	45.11	45.14	0.11	0.17	0.22	0.11	0.16	0.23
1800	44.52	44.55	44.59	0.10	0.16	0.22	0.10	0.16	0.22
2000	44.13	44.17	44.22	0.09	0.16	0.21	0.09	0.15	0.22
2200	43.90	43.95	44.01	0.08	0.15	0.21	0.08	0.15	0.22
2400	43.82	43.90	43.97	0.07	0.14	0.20	0.07	0.14	0.21
2600	43.91	44.01	44.10	0.06	0.14	0.20	0.07	0.14	0.21
2800	44.17	44.29	44.42	0.06	0.14	0.20	0.06	0.13	0.21
3000	44.63	44.79	44.92	0.05	0.14	0.21	0.05	0.13	0.21
3200	45.29	45.49	45.65	0.05	0.14	0.21	0.05	0.13	0.21
3400	46.23	46.46	46.68	0.05	0.14	0.22	0.04	0.13	0.22
3600	47.47	47.75	48.02	0.05	0.15	0.23	0.04	0.13	0.23
3800	49.14	49.50	49.86	0.05	0.16	0.25	0.04	0.14	0.24
4000	51.44	51.93	52.39	0.06	0.17	0.27	0.05	0.15	0.26
4200	54.81	55.49	56.24	0.07	0.19	0.29	0.06	0.17	0.28
4400	60.76	62.09	63.68	0.09	0.21	0.32	0.07	0.18	0.30
4600	70.94	70.25	69.25	0.11	0.24	0.35	0.09	0.20	0.33
4800	61.54	60.25	59.10	0.14	0.27	0.39	0.11	0.23	0.36
5000	54.92	54.31	53.65	0.17	0.30	0.43	0.13	0.26	0.39
5200	51.03	50.55	49.95	0.20	0.34	0.48	0.16	0.29	0.44
5500	46.50	45.94	45.21	0.25	0.40	0.56	0.21	0.35	0.51
6000	38.61	37.61	36.35	0.37	0.54	0.73	0.31	0.47	0.65
6360	31.60	30.31	28.76	0.47	0.68	0.90	0.41	0.59	0.81
6800	21.94	20.49	18.77	0.70	0.98	1.32	0.62	0.89	1.22
7240	11.81	10.43	8.97	1.51	2.17	3.07	1.42	2.04	2.91
7500	6.38	5.43	4.60	3.43	4.90	6.89	3.28	4.67	6.55
7600	4.70	4.02	3.50	4.96	6.97	9.63	4.74	6.63	9.06
7700	3.38	2.98	2.74	7.22	9.96	13.48	6.87	9.36	12.32
8200	1.13	1.34	1.53	21.41	18.61	16.86	18.42	17.25	16.12
8600	0.94	1.12	1.30	13.87	14.08	14.05	13.77	14.01	14.00
8800	0.86	1.03	1.20	13.42	13.93	14.08	13.43	13.94	14.12
9000	0.78	0.95	1.11	13.53	14.18	14.45	13.60	14.26	14.55
9200	0.71	0.87	1.03	13.95	14.66	15.00	14.04	14.78	15.16
9500	0.61	0.77	0.93	14.88	15.59	15.99	14.96	15.71	16.18
9800	0.52	0.70	0.85	15.92	16.40	16.91	16.07	16.61	17.28
10000	0.48	0.66	0.81	16.62	16.91	17.44	16.78	17.15	17.86
10200	0.45	0.63	0.79	17.17	17.27	17.83	17.40	17.58	18.37
10400	0.44	0.62	0.77	17.72	17.57	18.14	18.03	17.93	18.77
10600	0.41	0.61	0.76	18.19	17.87	18.37	18.60	18.28	19.07
10800	0.40	0.59	0.74	18.53	18.08	18.49	19.04	18.64	19.26
11000	0.38	0.57	0.73	18.85	18.30	18.66	19.36	18.85	19.36
12000	0.34	0.53	0.70	19.64	19.51	19.14	20.30	20.17	19.62
13000	0.30	0.49	0.65	22.13	22.76	22.25	22.57	23.40	22.40
14000	0.24	0.43	0.60	26.58	26.62	27.87	26.63	27.57	28.85
15000	0.25	0.45	0.66	18.84	18.90	18.29	18.92	19.25	18.66
16000	0.40	0.63	0.88	12.86	12.77	12.35	13.00	12.94	12.54
17000	0.69	0.97	1.24	9.54	9.27	9.17	9.55	9.29	9.21
18000	1.05	1.33	1.61	7.59	7.60	7.54	7.51	7.51	7.50
19000	1.16	1.36	1.64	7.14	7.61	7.62	7.06	7.50	7.55
21000	0.37	0.65	0.96	23.06	26.47	25.97	22.67	25.31	25.23

## Typical Performance Data

FREQ.  (MHz)	GROUP DELAY		
	(nsec)		
	@-55°C	@+25°C	@+125°C
8200	0.29	0.27	0.25
8400	0.24	0.23	0.21
8600	0.21	0.20	0.19
8800	0.18	0.17	0.17
9000	0.16	0.16	0.15
9200	0.15	0.15	0.14
9500	0.13	0.13	0.13
9800	0.12	0.12	0.12
10000	0.11	0.11	0.11
10300	0.10	0.10	0.10
10600	0.09	0.09	0.09
10900	0.09	0.09	0.09
11200	0.08	0.08	0.08
11500	0.08	0.08	0.08
11800	0.07	0.07	0.07
12100	0.07	0.07	0.07
12400	0.07	0.07	0.07
12700	0.06	0.06	0.06
13000	0.06	0.06	0.06
13300	0.06	0.06	0.06
13600	0.06	0.06	0.06
13900	0.06	0.06	0.06
14200	0.06	0.06	0.06
14500	0.06	0.06	0.06
14800	0.06	0.06	0.06
15000	0.06	0.06	0.06
15300	0.06	0.06	0.06
15600	0.06	0.05	0.06
15900	0.05	0.05	0.06
16200	0.05	0.05	0.05
16500	0.05	0.05	0.05
16800	0.05	0.05	0.05
17100	0.05	0.05	0.05
17400	0.05	0.05	0.05
17700	0.05	0.05	0.05
18000	0.05	0.04	0.05
18500	0.04	0.04	0.04
19000	0.04	0.04	0.05
20000	0.05	0.06	0.06
21000	0.07	0.07	0.07

## Typical Performance Curves





# Tape & Reel Packaging TR-F114

## DEVICE ORIENTATION IN T&R



ILLUSTRATION 1

Applicable Case Styles	
GE0805C	JC0603C
GE0805C-1	JC0603C-4
GE0805C-1AP	JC0603C-6
GE0805C-7	
GE0805C-9	
GE0805C-10	
GE0805C-11	
GE0805C-12	



ILLUSTRATION 2

Applicable Case Styles	
GE0805C-2	JC0603C-1
GE0805C-3	JC0603C-2
GE0805C-4	JC0603C-3
GE0805C-5	JC0603C-5
GE0805C-6	JC0603C-7
GE0805C-8	
GE0805C-15	

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
			Standard	1000
			Standard	4000

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.

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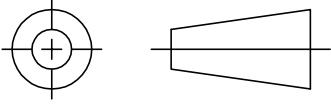
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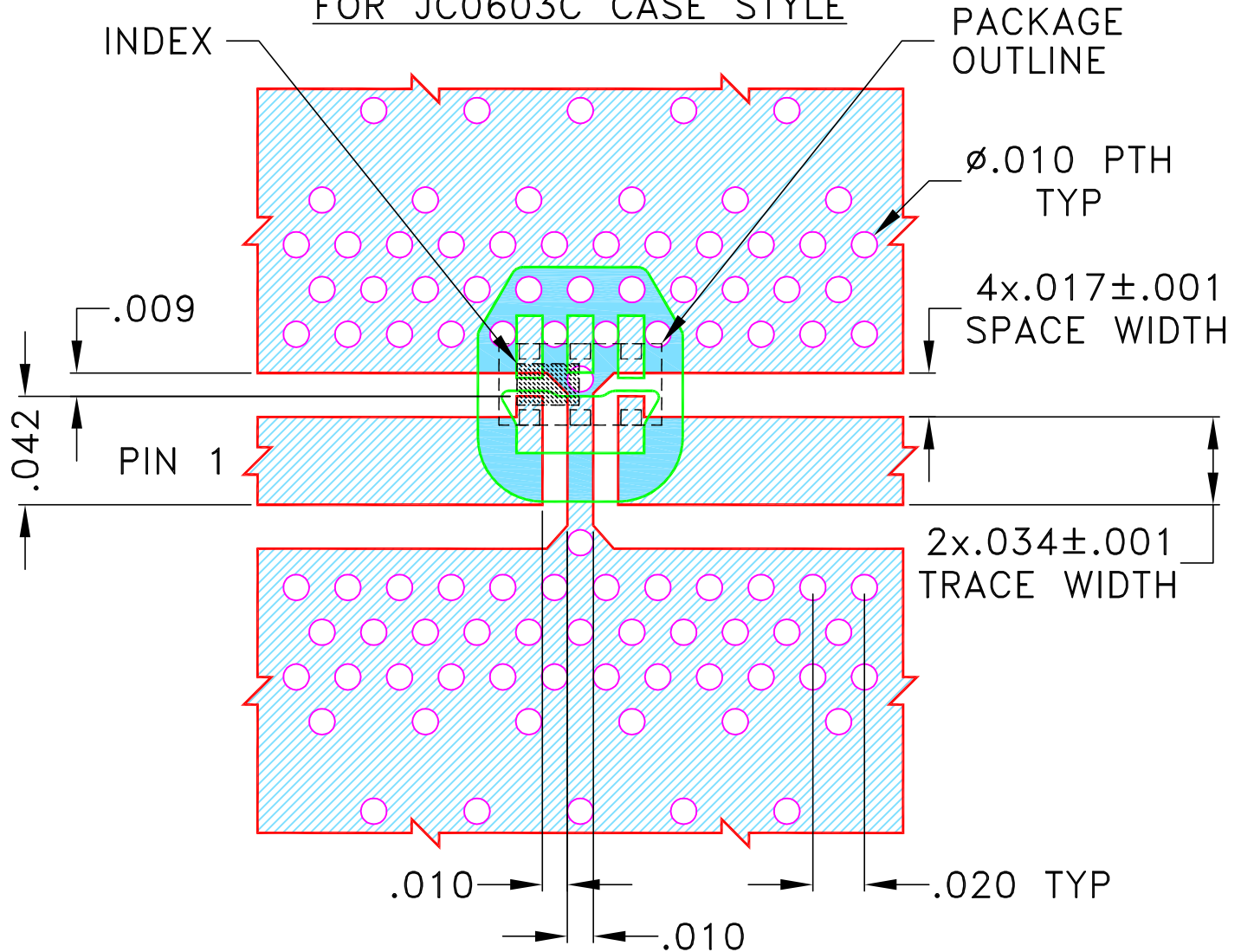
THIRD ANGLE PROJECTION



REVISIONS



REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
OR	ECO-006344	NEW RELEASE	FEB 21	DDR	VC

SUGGESTED MOUNTING CONFIGURATION  
FOR JC0603C CASE STYLE



NOTES:

1. COPLANAR WAVEGUIDE PARAMETERS ARE SHOWN FOR ROGERS (R04350B) WITH DIELECTRIC THICKNESS  $.0200 \pm .0015$ . 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	17 FEB 21
TOLERANCES ON:	CHECKED: RV	17 FEB 21
2 PL DECIMALS ±	APPROVED: RKS	17 FEB 21
3 PL DECIMALS ± .005		
ANGLES ±		
FRACTIONS ±		

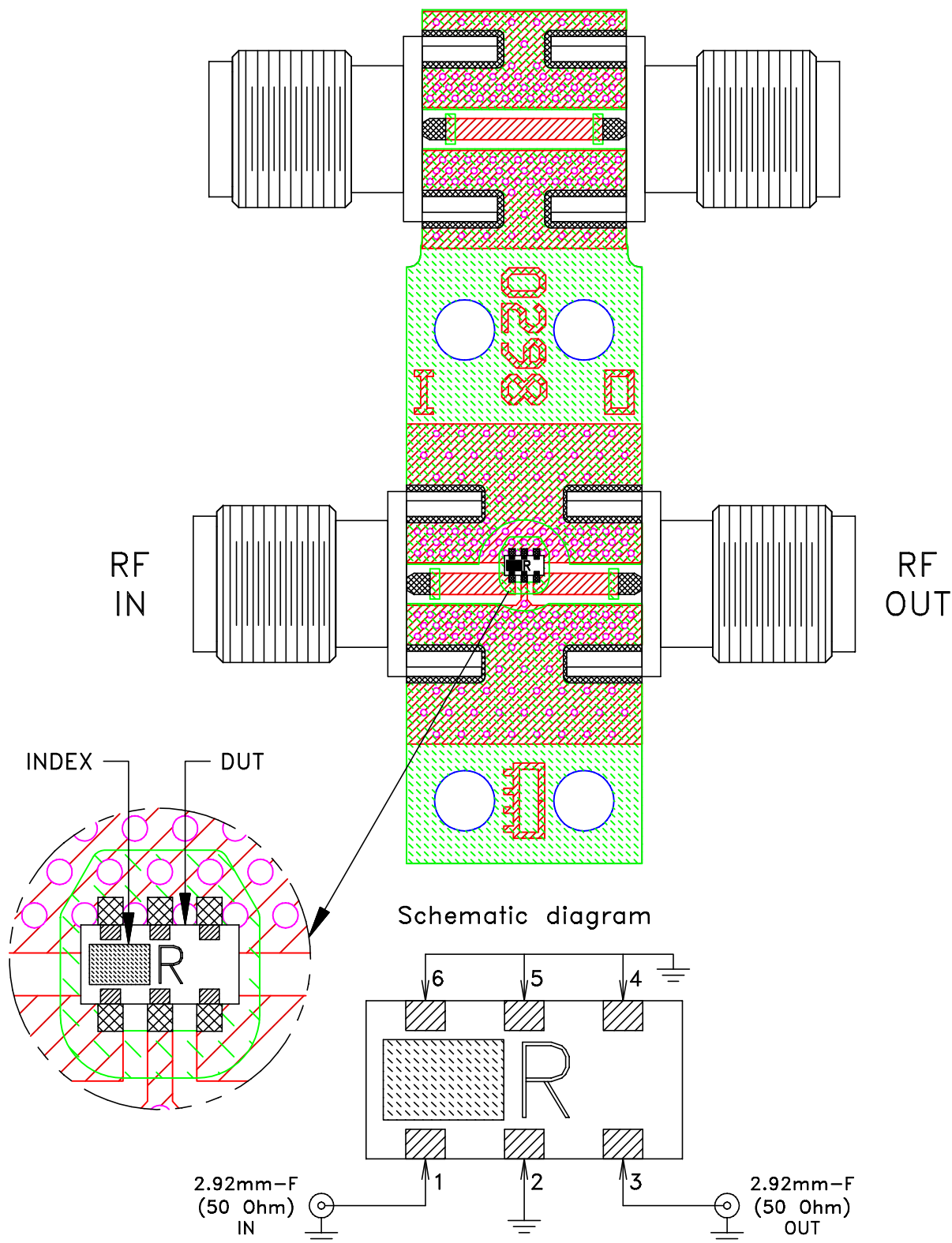
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PL DWG, JC0603C C.S, 50 OHM, HFCW

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SIZE: A	CODE IDENT: 15542	DRAWING NO: 98-PL-703	REV: OR
FILE: 98PL703	SCALE: 15:1	SHEET: 1 OF 1	
ASHEETA1.DWG REV:A DATE:01/12/95			


# Evaluation Board and Circuit

TB-HFCW-7500+



## Notes:

1. PCB Material: ROGERS (R04350B) OR Equivalent, Dielectric Constant= $3.48 \pm 0.05$   
Dielectric Thickness:  $.020 \pm 0.0015$
2. 50 Ohm 2.92mm Female Connectors.
3. Connectors on the test board shall not be subjected to temperature greater than 200°C to avoid permanent damage to the connectors.

 **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 100°C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-55° to 100° 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 Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak	J-STD-020, 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