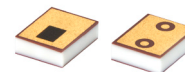


**THE BIG DEAL**

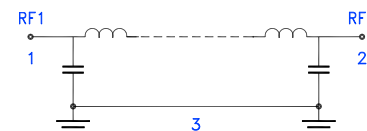
- Low Insertion Loss, 1.3 dB Typ.
- Passband Return Loss, 19 dB Typ.
- Stopband Rejection, 83 dB Typ.
- 1008 Surface Mount Footprint
- Power Handling: 10 W



Generic photo used for illustration purposes only

APPLICATIONS

- Harmonic Rejection and Spurious Cleanup
- Radar, EW, and ECM Defense Systems
- UHF Transmitters / Receivers
- Test and Measurement Equipment

FUNCTIONAL DIAGRAM**PRODUCT OVERVIEW**

Mini-Circuits' LFHK-1200+ is a miniature low temperature co-fired ceramic (LTCC) low pass filter with a DC to 1200 MHz passband supporting a variety of applications. This model provides 1.3 dB typical insertion loss over a wide band due to its rugged monolithic construction. Housed in a small 1008 ceramic form factor the filter is ideal for dense signal chain PCB layouts where it complements MMIC size and performance. The LTCC fabrication process assures minimal RF performance variation while delivering a product that is well suited for environmental extremes of high humidity and temperature.

KEY FEATURES

Features	Advantages
Ultra-Wide Stopband	The LTCC lowpass filter provides a very good stopband rejection up to 40 GHz, suitable for wide band applications.
LTCC Construction	Provides repeatable performance in a rugged, ceramic package well suited for tough environments such as high humidity and temperature extremes.
Small Size, 1008	Saves space in dense circuit board layouts and minimizes the effects of parasitics.
Rugged Power Handling, 10 Watts	Handles up to 10 Watts in a small 1008 package.



LTCC SURFACE MOUNT

Low Pass Filter

LFHK-1200+

50Ω

DC to 1200 MHz

ELECTRICAL SPECIFICATIONS^{1,2,3} AT +25°C

Parameter		F#	Frequency (MHz)	Min.	Typ.	Max.	Units
Pass Band	Insertion Loss	DC-F1	DC - 1200	—	1.3	1.9	dB
	Freq. Cut-Off ⁴	Fc	1460	—	3	—	dB
	Return Loss	DC-F1	DC - 1200	10	19	—	dB
Stop Band	Rejection	F2-F3	1850 - 2900	20	31	—	dB
		F3-F4	2900 - 8000	65	83	—	
		F4-F5	8000 - 15000	40	50	—	
		F5-F6	15000 - 40000	—	28	—	

1. Tested on Evaluation Board P/N TB-LFHK-1200+ with connectors and feedline de-embedded with thru-line compensation.

2. This filter is bi-directional, RF1 and RF2 ports may be interchanged.

3. In applications where DC voltage and/or current is present at either the input or output ports, external DC blocking capacitors are required.

4. Typical variation ±5%.

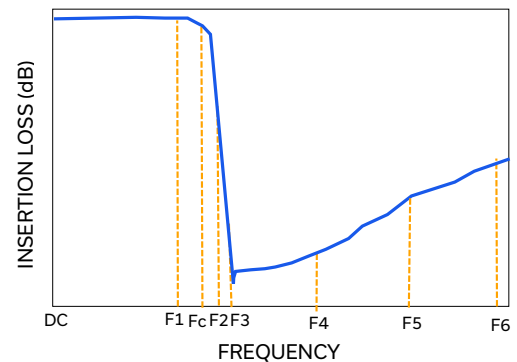
ABSOLUTE MAXIMUM RATINGS⁵

Parameter	Ratings
Operating Temperature	-55°C to +125°C
Storage Temperature	-55°C to +125°C
Input Power ⁶	10 W @ +25°C

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

6. Power rating applies only to signals within the passband. Power rating above +25°C operating temperature decreases linearly to 1.5 W at +125°C.

TYPICAL FREQUENCY RESPONSE AT +25°C





LTCC SURFACE MOUNT

Low Pass Filter

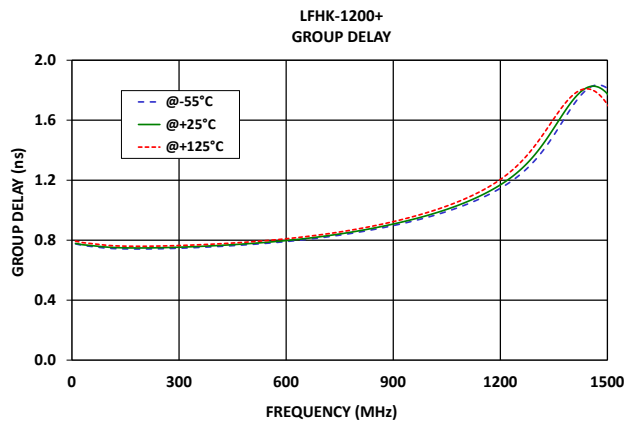
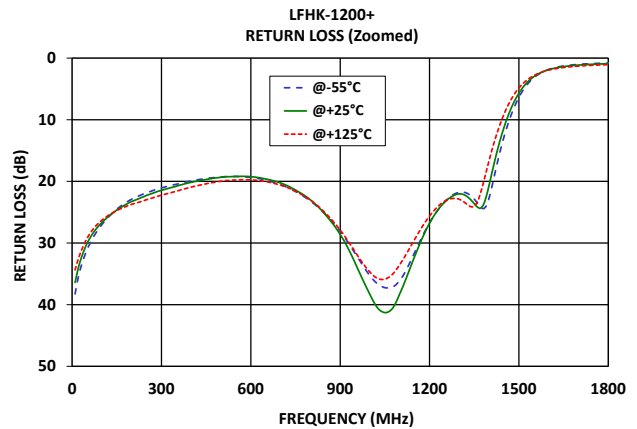
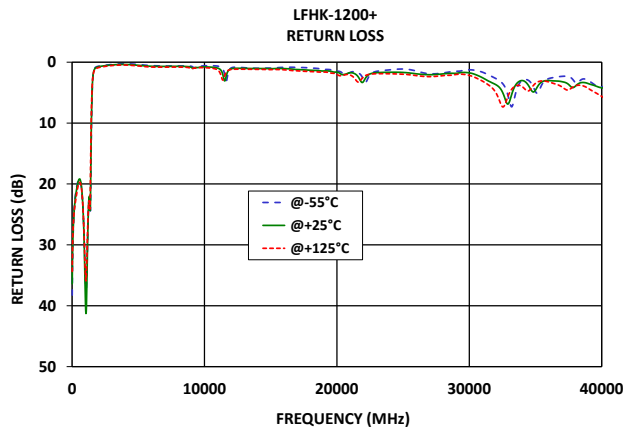
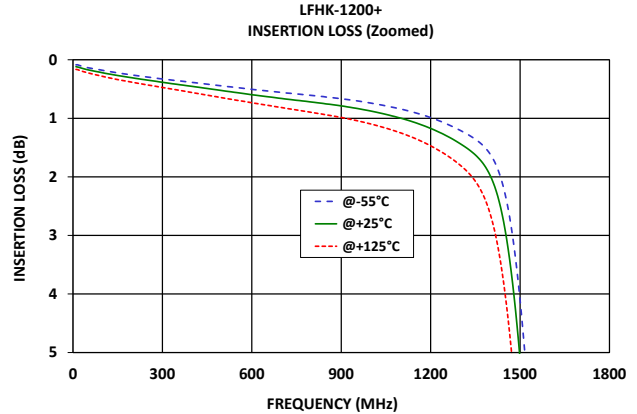
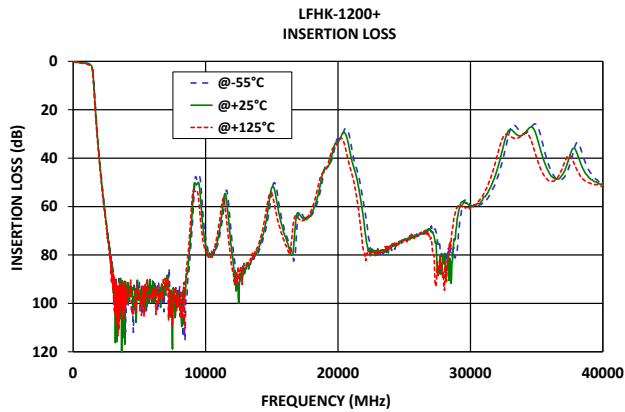
LFHK-1200+

Mini-Circuits

50 Ω

DC to 1200 MHz

TYPICAL PERFORMANCE GRAPHS





LTCC SURFACE MOUNT

Low Pass Filter

LFHK-1200+

50Ω

DC to 1200 MHz

FUNCTIONAL DIAGRAM

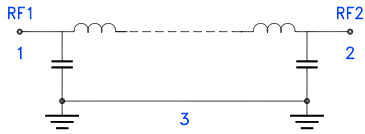
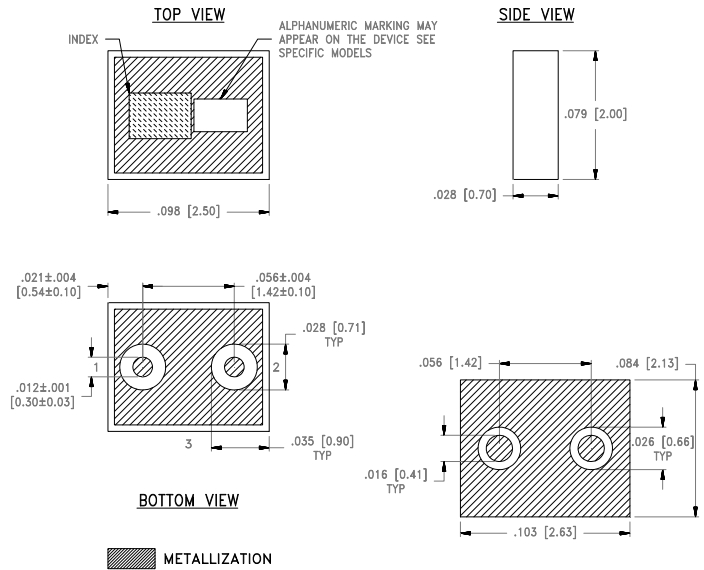


Figure 1. LFHK-1200+ Functional Diagram

PAD DESCRIPTION

Function	Pad Number	Description
RF1 ²	1	Connects to RF Input Port
RF2 ²	2	Connects to RF Output Port
GROUND	3	Connects to Ground on PCB, (See drawing PL-798)
NC	-	No connection, not used internally. See drawing PL-798 for connection to PCB

CASE STYLE DRAWING



Weight: .019 grams.

Dimensions are in inches (mm).

Tolerances: 2Pl. ± .01; 3Pl. ± .005

PRODUCT MARKING*: U5

*Marking may contain other features or characters for internal lot control.



Mini-Circuits

LTCC SURFACE MOUNT

Low Pass Filter

LFHK-1200+

50Ω

DC to 1200 MHz

SUGGESTED PCB LAYOUT (PL-798)

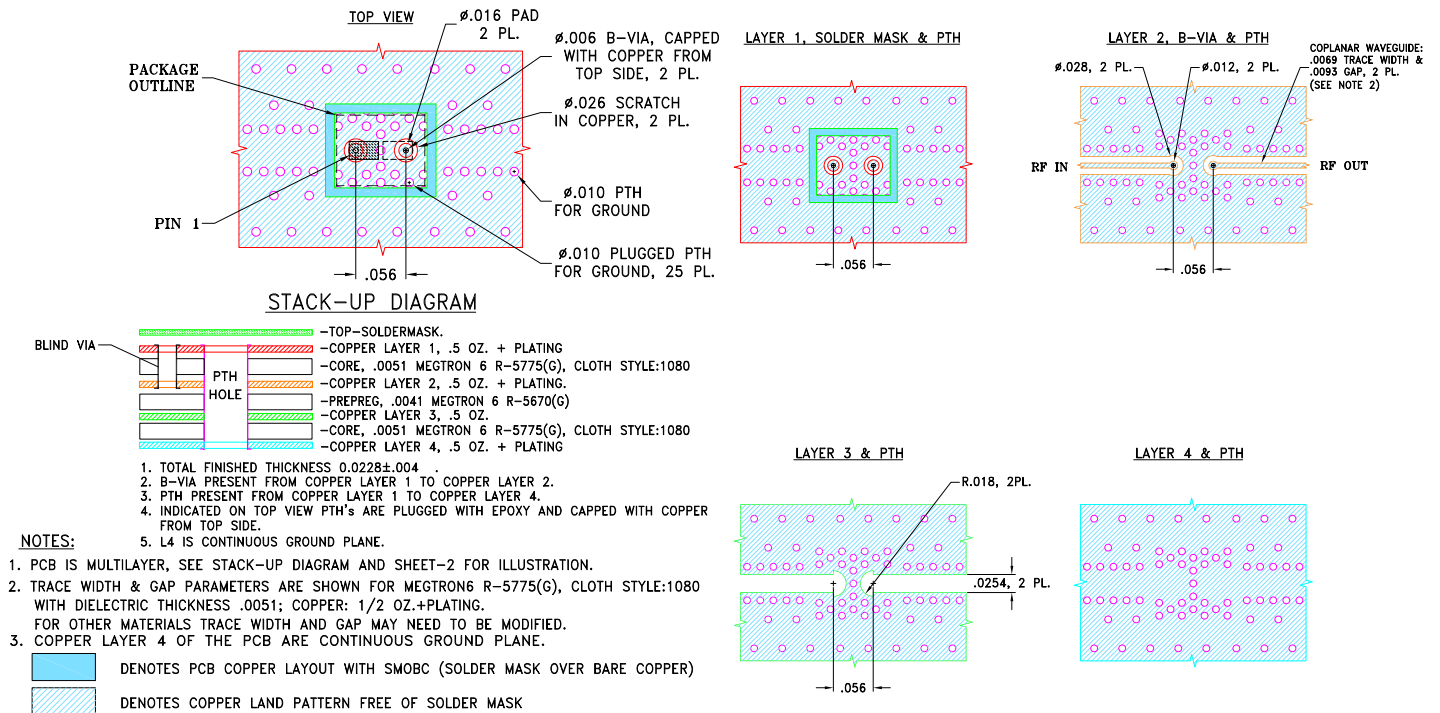


Figure 2. Suggested PCB Layout PL-798

NOTES

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' applicable established test performance criteria and measurement instructions.
- 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





Mini-Circuits

LTCC SURFACE MOUNT

Low Pass Filter

LFHK-1200+

50Ω

DC to 1200 MHz

ADDITIONAL DETAILED INFORMATION IS AVAILABLE ON OUR DASHBOARD.

[CLICK HERE](#)

Performance Data and Graphs	Data Graphs S-Parameter (S2P Files) Data Set (.zip file) De-embedded to device pads
Case Style	NL1008C-9 Lead Finish: Gold over Electroless Nickel
RoHS Status	Compliant
Tape and Reel	TR-F75
Suggested Layout for PCB Design	PL-798
Evaluation Board	TB-LFHK-1200+
	Gerber File
Environmental Rating	ENV06T10

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-Circuits' 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



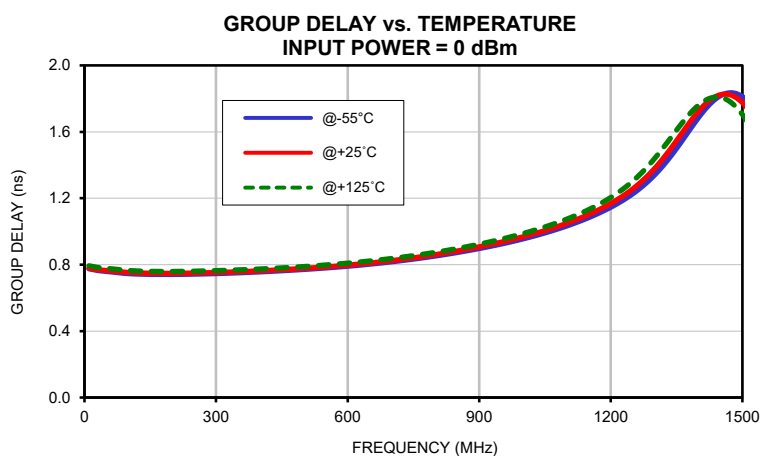
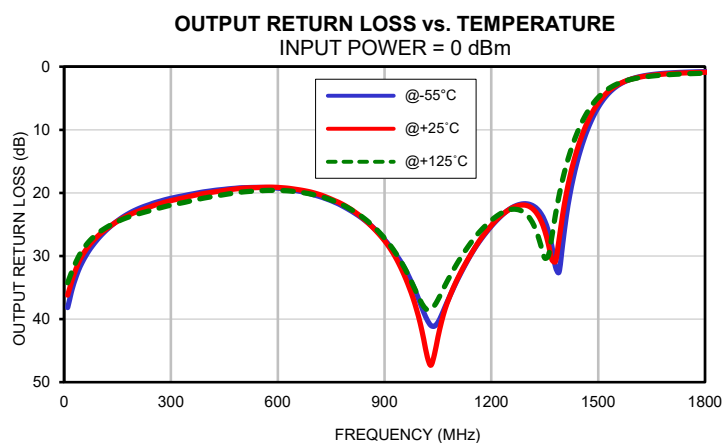
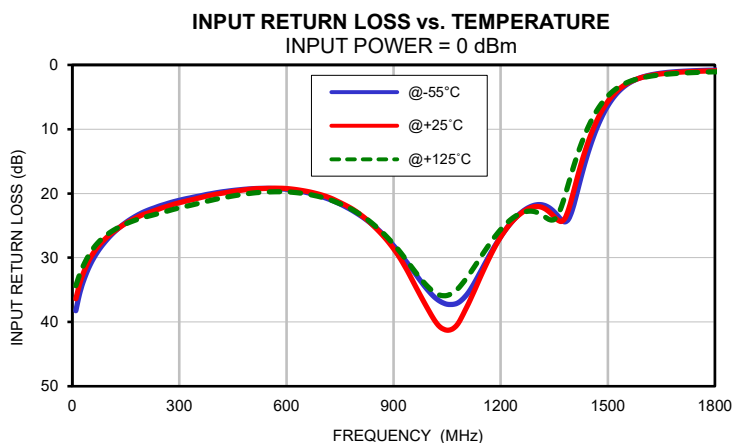
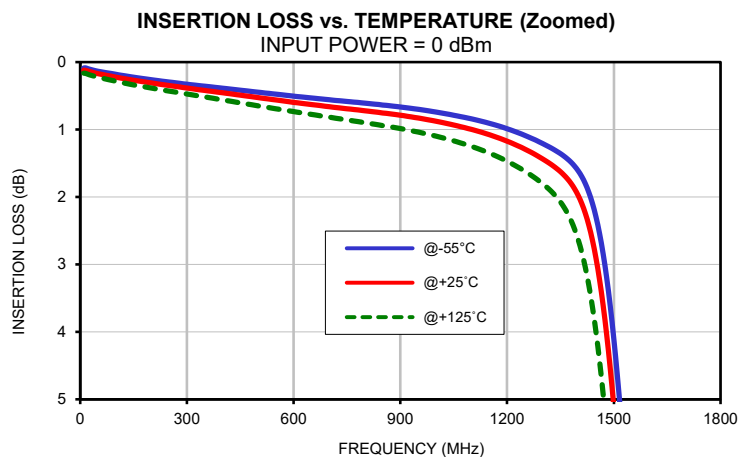
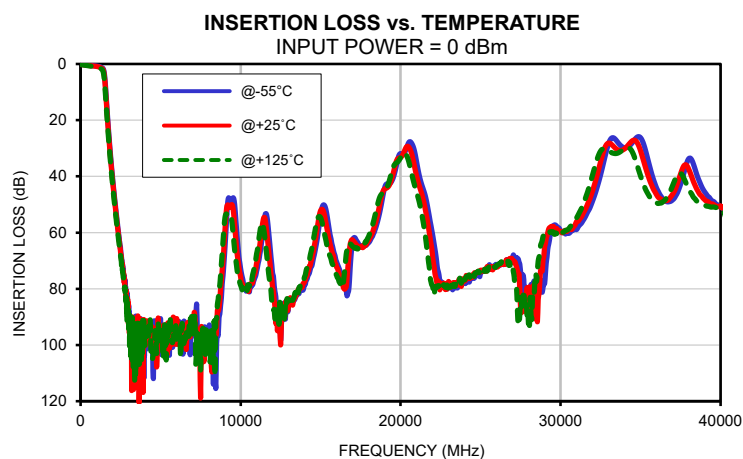
Typical Performance Data

FREQ.	INSERTION LOSS			INPUT RETURN LOSS			OUTPUT RETURN LOSS		
(MHz)	(dB)			(dB)			(dB)		
	@-55°C	@+25°C	@+125°C	@-55°C	@+25°C	@+125°C	@-55°C	@+25°C	@+125°C
10	0.09	0.12	0.16	38.25	36.40	34.36	38.18	36.21	34.25
50	0.14	0.17	0.22	31.11	30.09	29.26	31.09	30.01	29.19
100	0.18	0.22	0.28	27.01	26.67	26.30	26.97	26.57	26.17
200	0.26	0.31	0.39	22.89	23.26	23.72	22.73	23.08	23.48
500	0.45	0.53	0.65	19.28	19.33	19.97	19.19	19.27	19.87
1000	0.74	0.88	1.10	35.30	38.37	34.72	37.47	40.63	37.02
1200	0.99	1.17	1.47	26.73	26.77	25.61	25.28	25.15	24.34
1460	2.54	3.23	4.44	11.16	9.82	8.00	11.50	10.07	8.17
1850	31.07	32.19	33.71	0.75	0.85	1.01	0.73	0.83	0.98
2900	83.91	84.71	91.68	0.40	0.47	0.58	0.39	0.47	0.57
3800	96.69	93.02	106.46	0.27	0.37	0.47	0.29	0.40	0.49
4000	99.89	93.86	98.63	0.26	0.37	0.47	0.29	0.41	0.50
4800	93.57	99.22	95.23	0.34	0.47	0.58	0.37	0.52	0.61
5000	90.89	98.06	97.38	0.38	0.51	0.62	0.40	0.55	0.64
5800	95.24	90.07	96.54	0.53	0.65	0.77	0.53	0.65	0.75
6000	94.58	90.72	97.83	0.56	0.67	0.79	0.55	0.66	0.76
6500	96.35	99.18	96.11	0.60	0.70	0.81	0.58	0.67	0.77
7000	96.49	90.03	96.09	0.62	0.69	0.81	0.60	0.67	0.77
7500	101.46	118.88	109.12	0.62	0.68	0.80	0.62	0.68	0.78
8000	96.69	95.71	97.27	0.61	0.68	0.80	0.63	0.70	0.80
8400	107.46	93.98	110.92	0.61	0.69	0.82	0.64	0.72	0.83
9000	67.37	61.34	55.82	0.67	0.85	1.07	0.70	0.86	1.05
9300	48.20	51.03	53.37	0.84	0.88	0.97	0.82	0.89	0.97
10000	72.79	75.71	78.72	0.59	0.78	0.90	0.59	0.78	0.89
10500	79.63	80.98	79.30	0.58	0.82	0.98	0.57	0.82	0.97
11000	73.72	70.78	67.53	0.65	0.97	1.29	0.68	1.02	1.38
11200	67.71	64.47	59.98	0.77	1.22	1.90	0.89	1.43	2.27
12000	74.55	79.50	84.78	0.97	1.10	1.21	0.87	1.09	1.21
12500	98.51	100.00	90.26	0.83	1.00	1.15	0.85	1.04	1.18
13000	85.54	85.78	83.97	0.90	1.01	1.15	0.94	1.07	1.19
13500	82.27	81.30	80.83	0.97	1.03	1.16	1.00	1.08	1.19
14000	78.41	77.49	75.69	1.00	1.04	1.18	1.02	1.07	1.18
14500	70.65	67.74	63.96	0.99	1.04	1.19	0.99	1.05	1.18
15000	53.77	52.19	54.68	0.97	1.07	1.22	0.98	1.06	1.21
15500	57.53	61.75	66.83	0.90	1.03	1.20	0.91	1.04	1.21
16000	70.43	72.28	75.23	0.85	1.05	1.25	0.86	1.07	1.27
17000	63.14	62.66	64.91	0.88	1.21	1.42	0.89	1.25	1.46
18000	63.58	62.81	61.40	0.94	1.32	1.54	0.97	1.36	1.56
19000	44.12	44.52	45.37	1.18	1.44	1.62	1.18	1.42	1.60
20000	31.89	33.26	33.30	1.50	1.63	2.00	1.66	1.74	2.14
21000	34.86	39.90	45.64	1.69	1.73	2.10	2.04	2.34	3.18
23000	78.96	77.39	78.09	1.50	1.72	1.89	1.38	1.67	1.86
25000	74.03	73.37	73.89	1.12	1.69	1.98	1.17	1.69	1.98
26000	72.01	72.14	71.55	1.47	1.91	2.21	1.51	1.90	2.18
27000	69.12	70.40	72.63	1.90	2.06	2.37	1.87	2.07	2.39
28000	81.73	83.60	93.94	1.78	1.92	2.21	1.81	1.99	2.28
29000	78.20	65.08	60.24	1.49	1.83	2.02	1.54	1.86	2.16
30000	59.27	59.64	60.69	1.25	1.76	2.17	1.34	1.92	2.33
31000	58.93	56.04	54.77	1.65	2.56	3.12	1.70	2.57	3.16
32000	48.71	45.12	39.44	2.68	3.69	4.98	2.76	3.62	5.03
33000	28.31	28.16	30.87	6.13	6.66	5.19	7.34	6.10	5.00
34000	29.80	30.18	30.08	2.99	3.02	4.02	3.21	3.65	5.11
35000	26.26	30.94	39.87	4.83	4.58	3.47	5.56	4.35	3.71
35500	34.98	40.26	46.62	3.61	3.21	3.07	3.26	3.35	3.46
36000	44.18	46.55	49.43	2.70	3.02	3.24	2.60	3.22	3.62
36500	48.65	48.69	48.54	2.47	3.08	3.58	2.37	3.19	3.83
37000	48.37	46.35	43.29	2.33	3.20	4.07	2.27	3.21	4.16
38000	33.78	37.34	44.35	3.32	3.96	3.88	3.66	3.85	3.85
39000	45.48	48.26	50.19	3.02	3.53	4.33	3.11	3.44	4.28
40000	50.94	50.48	51.49	4.05	4.21	5.62	3.75	4.41	5.91

Typical Performance Data

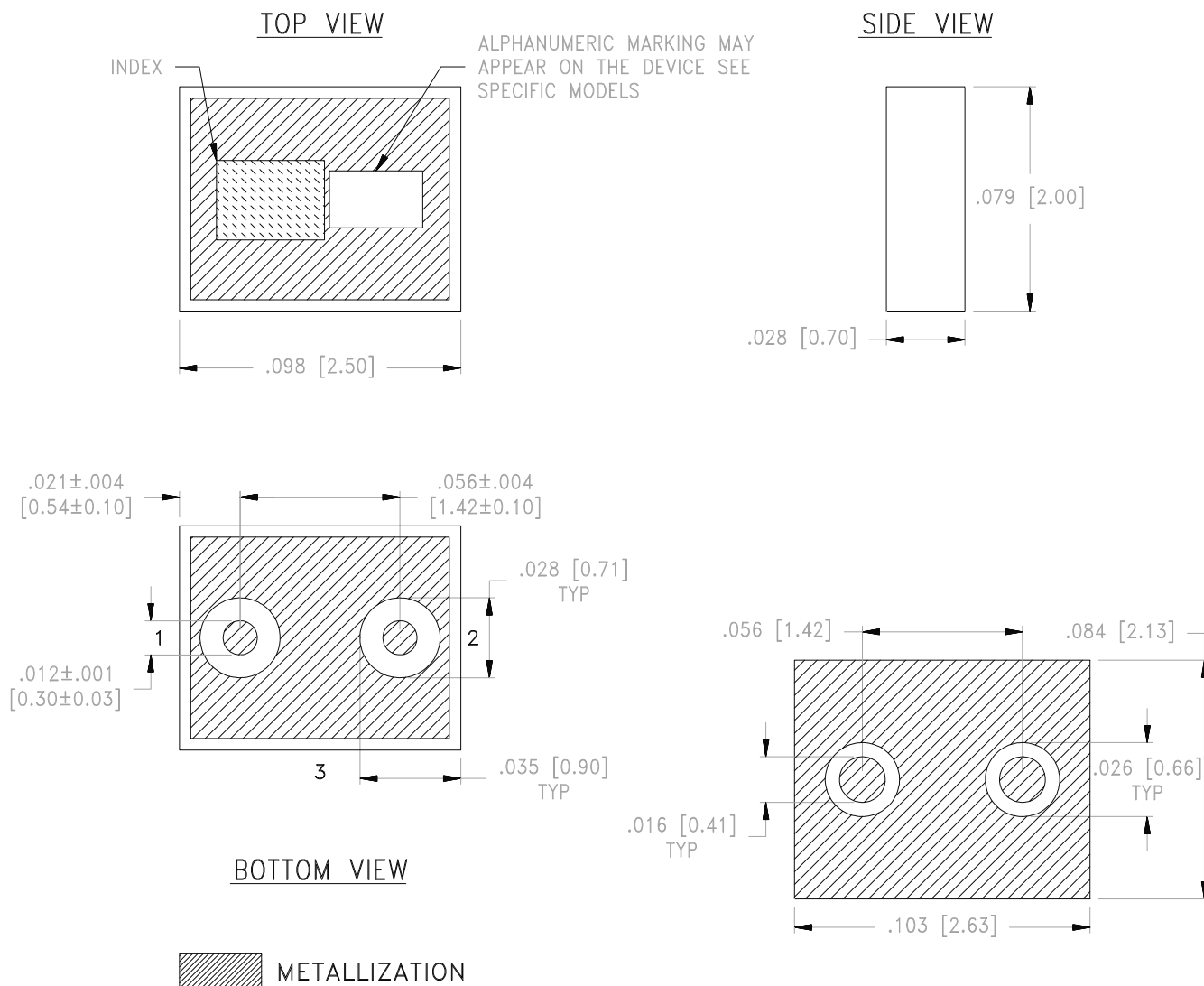
FREQ.	GROUP DELAY		
(MHz)	(nsec)		
	@-55°C	@+25°C	@+125°C
10	0.78	0.78	0.79
25	0.77	0.77	0.79
50	0.76	0.76	0.78
100	0.75	0.75	0.77
120	0.74	0.75	0.76
140	0.74	0.75	0.76
160	0.74	0.75	0.76
180	0.74	0.75	0.76
200	0.74	0.75	0.76
250	0.74	0.75	0.76
280	0.74	0.75	0.76
300	0.75	0.75	0.76
350	0.75	0.76	0.77
380	0.75	0.76	0.77
400	0.76	0.76	0.77
420	0.76	0.77	0.78
450	0.76	0.77	0.78
480	0.77	0.77	0.79
500	0.77	0.78	0.79
540	0.78	0.78	0.80
580	0.79	0.79	0.80
600	0.79	0.80	0.81
650	0.80	0.81	0.82
680	0.81	0.82	0.83
700	0.82	0.82	0.84
750	0.83	0.84	0.85
780	0.84	0.85	0.87
800	0.85	0.86	0.87
850	0.87	0.88	0.90
900	0.90	0.91	0.92
910	0.90	0.91	0.93
930	0.91	0.92	0.94
950	0.92	0.94	0.95
1000	0.96	0.97	0.99
1100	1.03	1.05	1.07
1200	1.15	1.17	1.20

Typical Performance Curves



Outline Dimensions

NL1008C-9



SUGGESTED LAYOUT FOR PCB LAND PATTERN
PATTERN TO BE WITHIN ±.002

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

Notes:

1. Open style, Ceramic base.
2. Termination finish: **as shown below or indicated on Data sheet.**
For RoHS Case Styles: Gold plate over nickel plate. All models, (+) suffix.
3. Weight: .019 grams.
4. Pad tolerance is non-cumulative.

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The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RFIIF MICROWAVE COMPONENTS

DEVICE ORIENTATION IN T&R

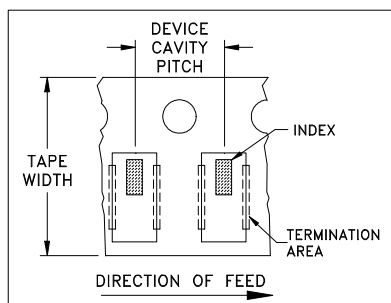


ILLUSTRATION 1

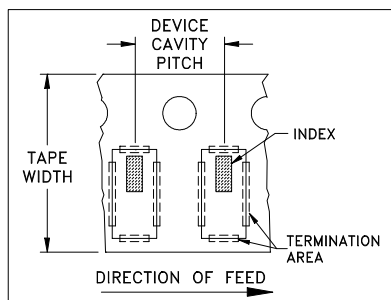


ILLUSTRATION 2

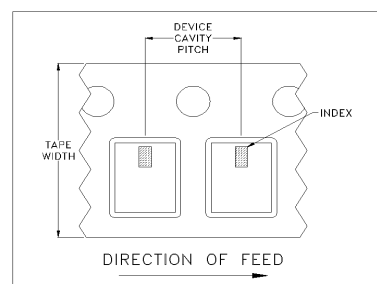


ILLUSTRATION 3

Applicable Case Styles

FV1206-1
FV1206-3

Applicable Case Styles

FV1206-4
FV1206-5
FV1206-6
FV1206-7
FV1206-9

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



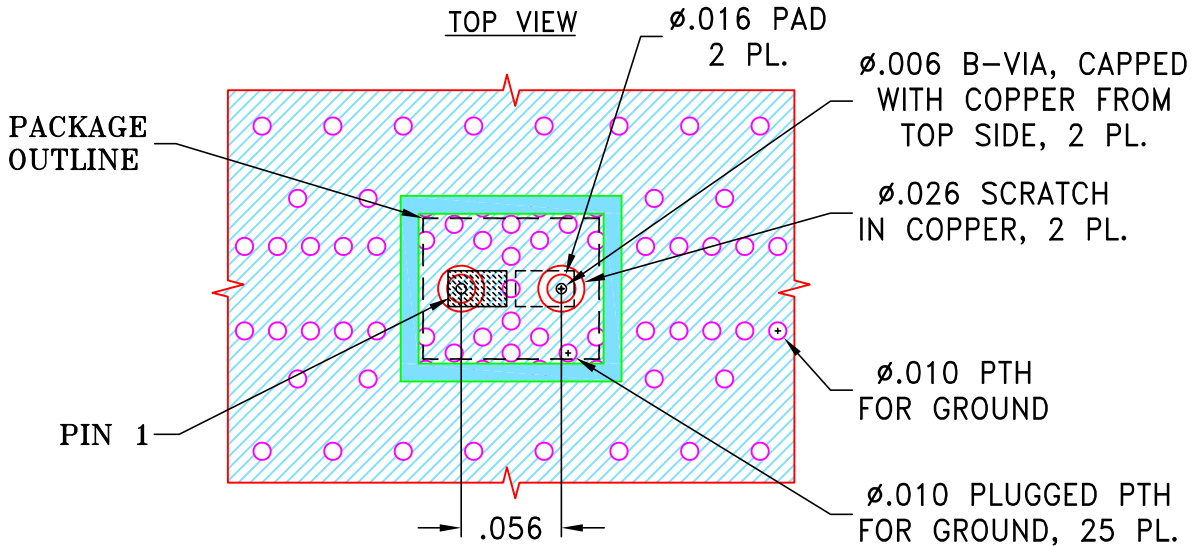
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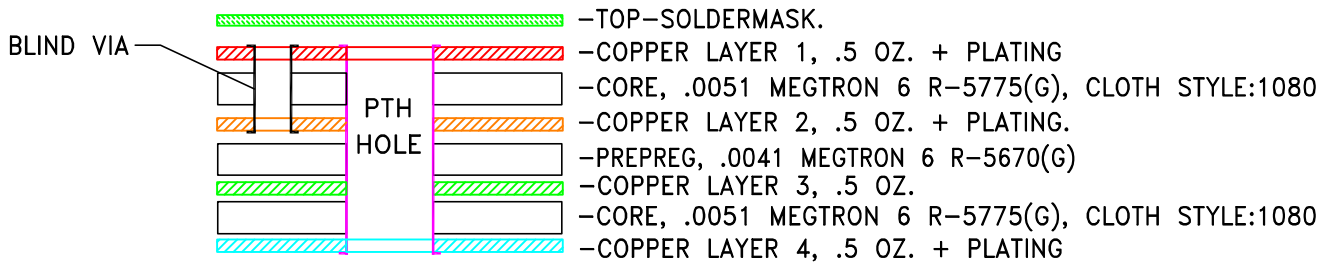
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THIRD ANGLE PROJECTION		REVISIONS					
		REV	ECN No.	DESCRIPTION	DATE	DR	AUTH
		OR	ECO-023057	NEW RELEASE	SEP 24	AGS	GT
		OR1	NPO-004738	ADDED NL1008C-10 CASE STYLE	OCT 24	AGS	GT
		OR2	ECO-023820	NOTES & TOLERANCES UPDATED	NOV 24	AGS	GT

SUGGESTED MOUNTING CONFIGURATION FOR
NL1008C-9,NL1008C-10 CASE STYLE



STACK-UP DIAGRAM



1. TOTAL FINISHED THICKNESS 0.0228±.004
2. B-VIA PRESENT FROM COPPER LAYER 1 TO COPPER LAYER 2.
3. PTH PRESENT FROM COPPER LAYER 1 TO COPPER LAYER 4.
4. INDICATED ON TOP VIEW PTH's ARE PLUGGED WITH EPOXY AND CAPPED WITH COPPER FROM TOP SIDE.
5. L4 IS CONTINUOUS GROUND PLANE.

NOTES:

1. DIMENSIONS ARE IN INCHES ; [CD] DENOTES CRITICAL DIMENSIONS.
2. PCB IS MULTILAYER, SEE STACK-UP DIAGRAM AND SHEET-2 FOR ILLUSTRATION.
3. TRACE WIDTH & GAP PARAMETERS ARE SHOWN FOR MEGTRON 6 R-5775(G), CLOTH STYLE:1080 WITH DIELECTRIC THICKNESS .0051; COPPER: 1/2 OZ.+PLATING.
FOR OTHER MATERIALS TRACE WIDTH AND GAP MAY NEED TO BE MODIFIED.
4. COPPER LAYER 4 OF THE PCB ARE CONTINUOUS GROUND PLANE.



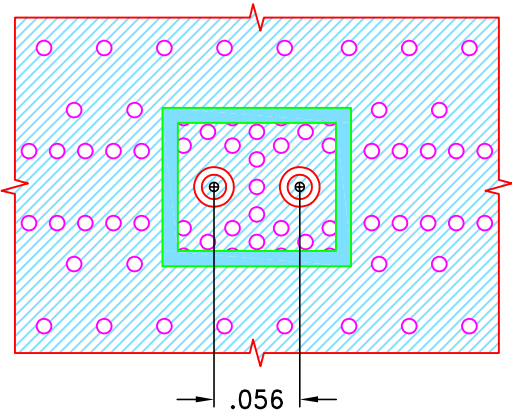
DENOTES PCB COPPER LAYOUT WITH SMOBC (SOLDER MASK OVER BARE COPPER)



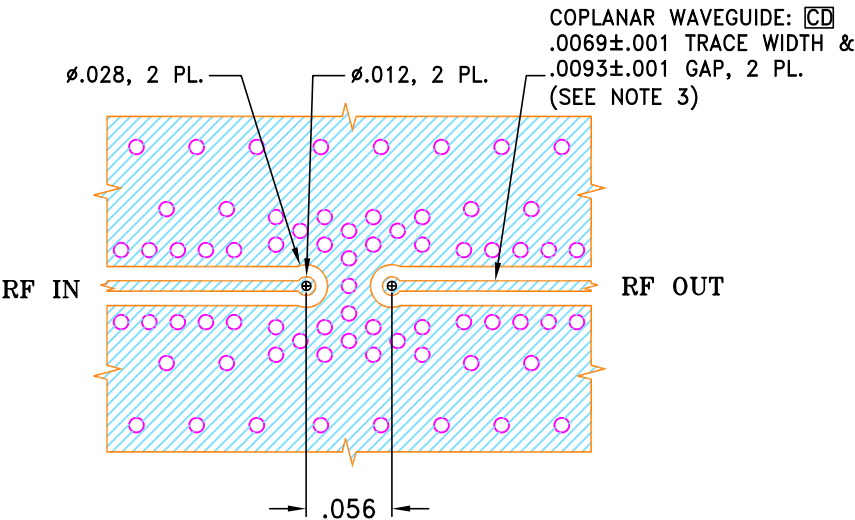
DENOTES COPPER LAND PATTERN FREE OF SOLDER MASK

UNLESS OTHERWISE SPECIFIED		INITIALS	DATE	 Mini-Circuits® 13 Neptune Avenue Brooklyn NY 11235			
DIMENSIONS ARE IN INCHES TOLERANCES ON: 2 PL DECIMALS ± 3 PL DECIMALS ± .002 ANGLES ± FRACTIONS ±	DRAWN	AGS	14 SEP 24				
	CHECKED	MD	16 SEP 24				
	APPROVED	GTP	17 SEP 24				
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ASHEETA1.DWG REV:A DATE:01/12/95				FILE: 98-PL-798	SCALE: 9:1	SHEET: 1 OF 2	

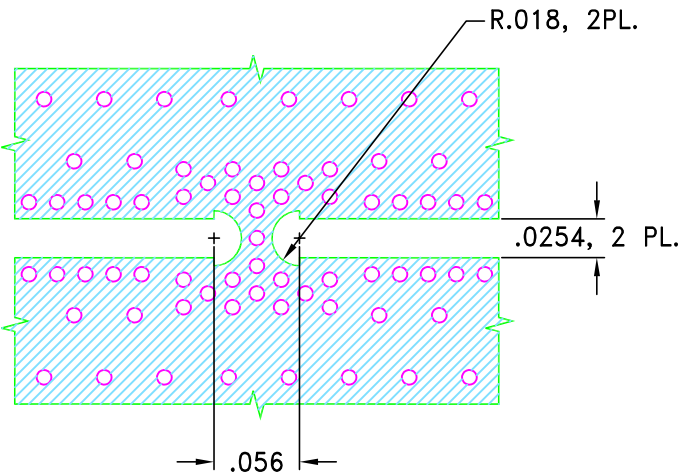
LAYER 1, SOLDER MASK & PTH



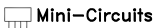
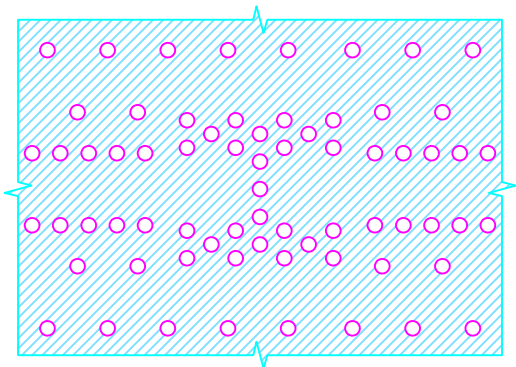
LAYER 2, B-VIA & PTH



LAYER 3 & PTH



LAYER 4 & PTH



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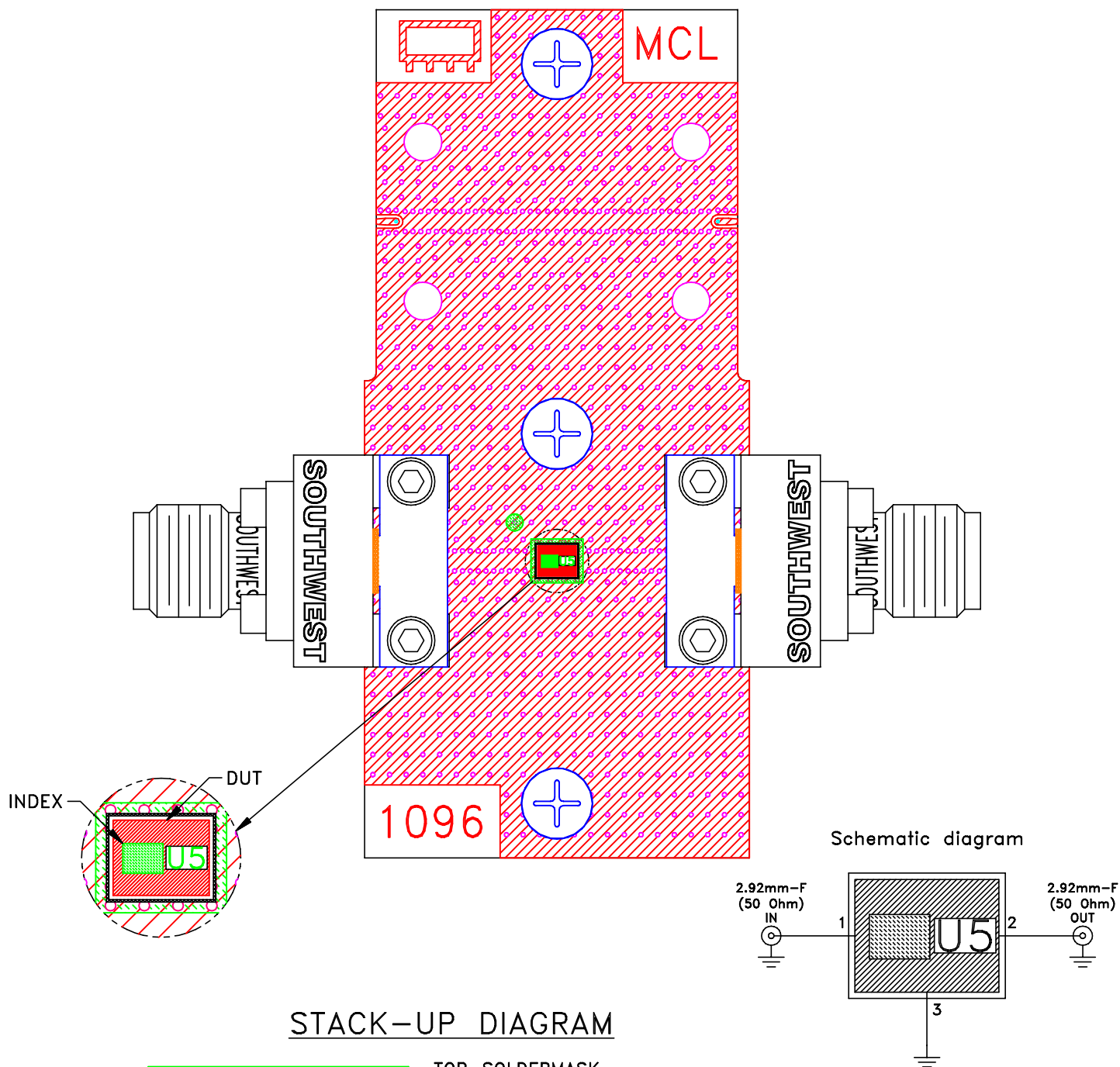
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ALL DIMENSIONS ARE IN INCHES EXCEPT OTHERWISE SPECIFIED

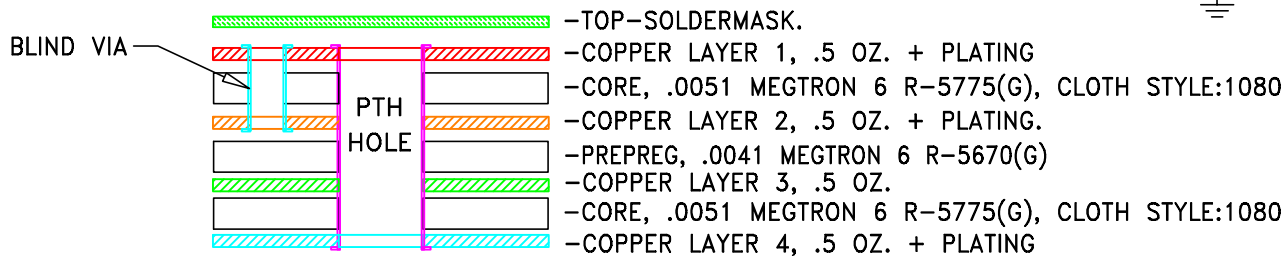
SIZE	CODE IDENT	DRAWING NO:	REV:
A	15542	98-PL-798	OR2
FILE:	98-PL-798	SCALE: 7.7:1	SHEET: 2 OF 2

Evaluation Board and Circuit

TB-LFHK-1200+



STACK-UP DIAGRAM



Notes:

1. PCB Material: MEGTRON-6 R5775(G) OR Equivalent, Dielectric Constant=3.6
2. Total finished thickness: .023 inch
3. 50 Ohm 2.92mm Female End Launch Connector.

 **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 245° - 250°C peak	J-STD-020C, Table 4-1, 4-2 and 5-2, Figure 5-1
Solderability	10X Magnification	J-STD-002, Test B,B1, 95% Coverage
Thermal Shock	-55° to +125°C, 15 min dwell,250 cycles	MIL-STD-202, Method 107
Bend Test	1mm, deflection for 5 seconds Span of bending: 2.75"	--
High Temp Storage	125°C to 1000 Hrs	---