

Cascade Radar RF Board – Antenna Etching

1 Summary

This document is a supplement meant to aid PCB fabricators working with the Cascade Radar RF (TI PROC054, MMW_CAS_RF_EVM).

This document emphasizes critical regions of the PCB artwork where achieving best possible etching accuracy (as close to design dimensions as possible) is a critical fabrication requirement for achieving functional operation of the mmWave antenna structures.

2 Table of Contents

1	SUMMARY	1
2	TABLE OF CONTENTS	1
3	GLOSSARY	2
4	ANTENNA ETCHING CRITICAL REGIONS	3
5	ANTENNA ETCHING CRITICAL DIMENSIONS	6
6	REVISION HISTORY	8

3 Glossary

TBD

Preliminary

4 Antenna Etching Critical Regions

This section calls out the critical RF structure regions.

This PCB has multiple etched antenna arrays on the metal layer 1 (top) which require high etching tolerance to achieve expected RF performance.

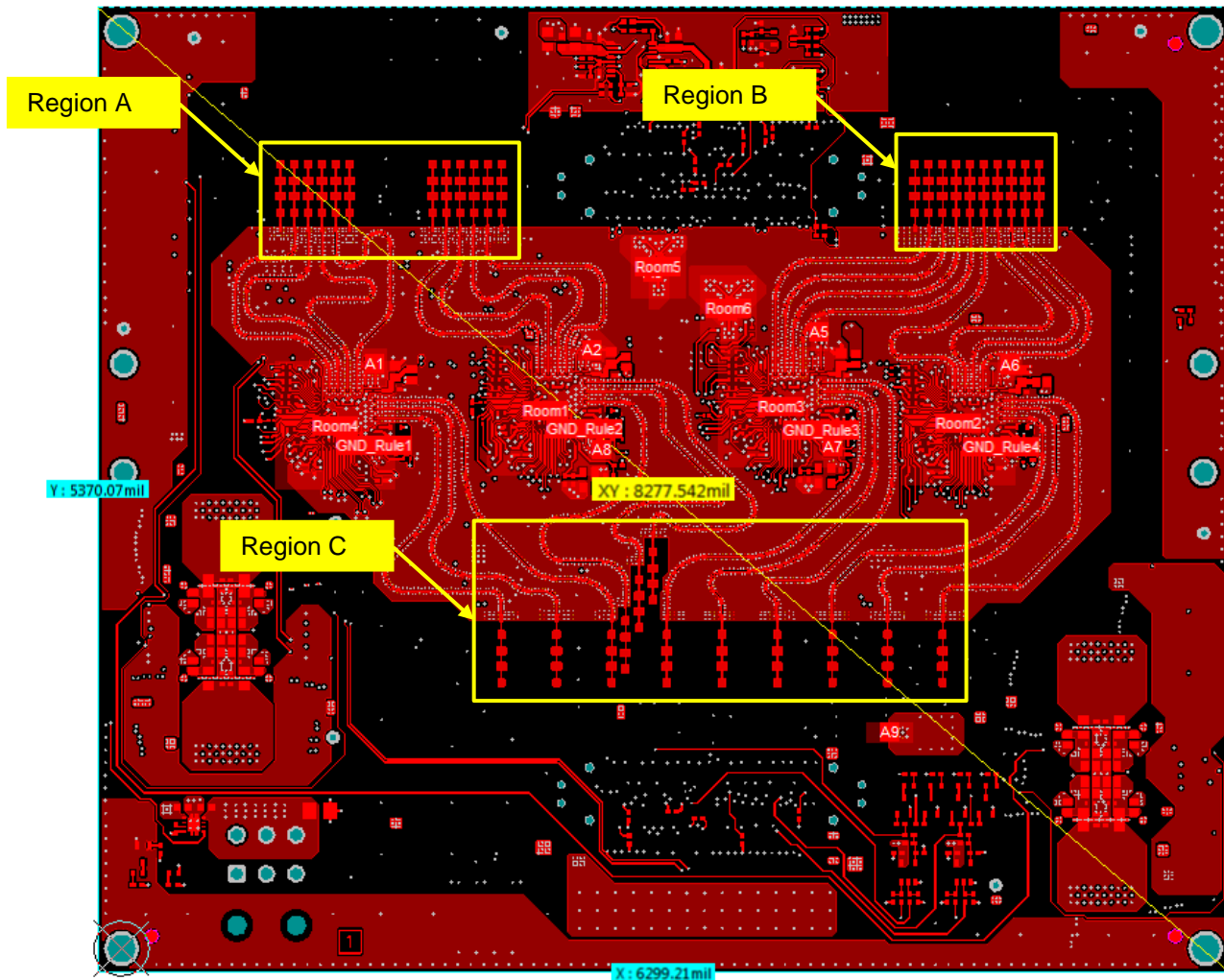


Figure 1 - Antenna Etching Critical Areas

Excerpted from Cascade RF Revision, Metal Layer 1 (top), C Altium Database (SVN revision 579)

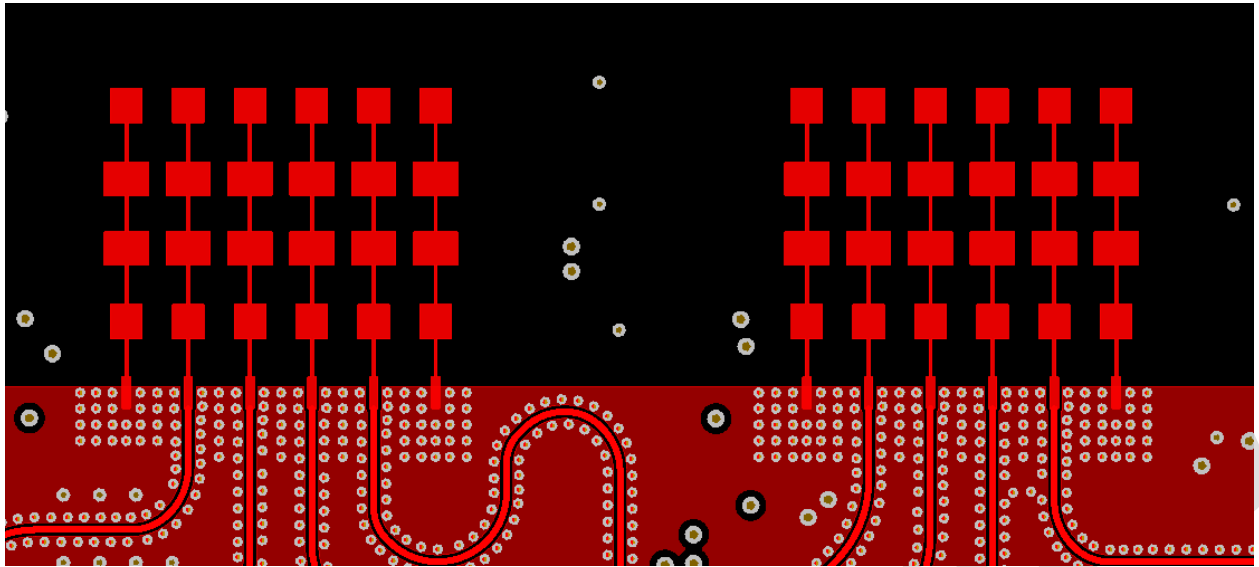


Figure 2 - Antenna Etching Critical Area – Region A

Excerpted from Cascade RF Revision, Metal Layer 1 (top), C Altium Database (SVN revision 579)

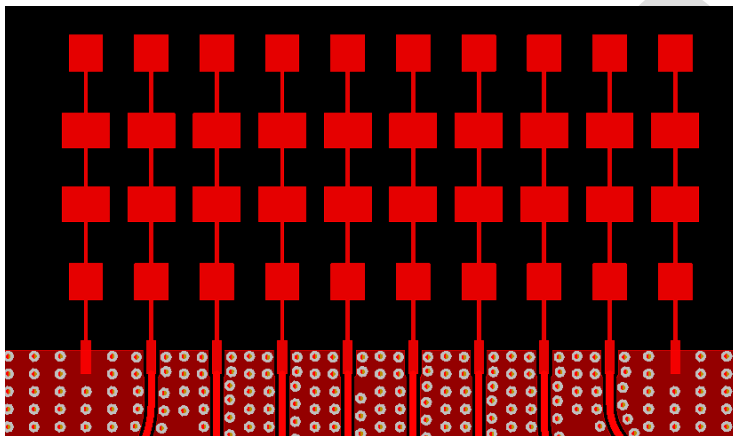


Figure 3 - Antenna Etching Critical Areas – Region B

Excerpted from Cascade RF Revision, Metal Layer 1 (top), C Altium Database (SVN revision 579)

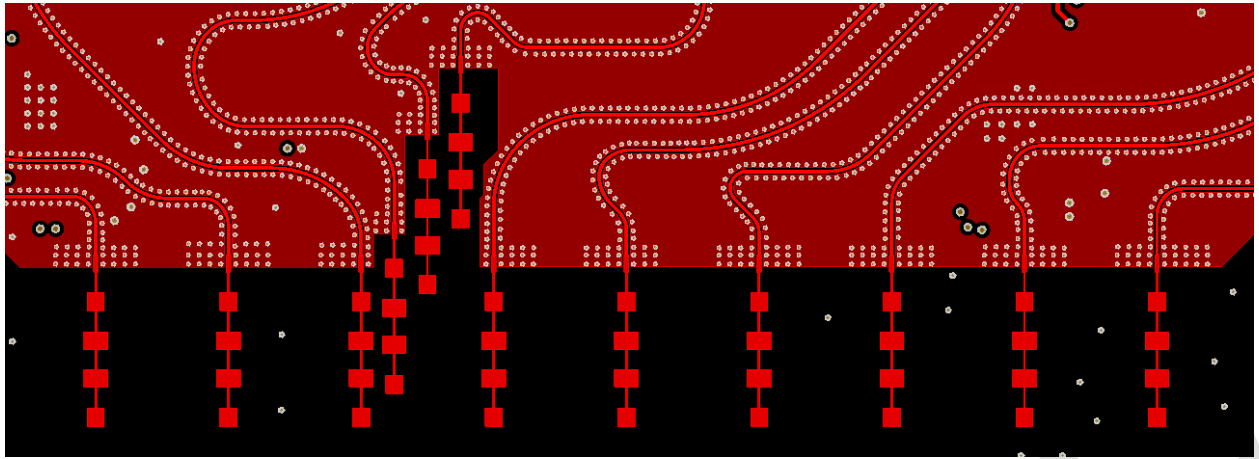


Figure 4 - Antenna Etching Critical Areas – Region C

Excerpted from Cascade RF Revision, Metal Layer 1 (top), C Altium Database (SVN revision 579)



Figure 5 - Antenna Etching Critical Areas – Single Antenna Element

Excerpted from Cascade RF Revision, Metal Layer 1 (top), C Altium Database (SVN revision 579)

5 Antenna Etching Critical Dimensions

This section defines critical antenna etching dimensions for the regions identified in the previous section.

In all chemical etching processes, the “top” of the copper structure will be over-etched relative to the bottom of the structure, resulting in a non-uniform trace width or side-wall profile to the copper shapes.

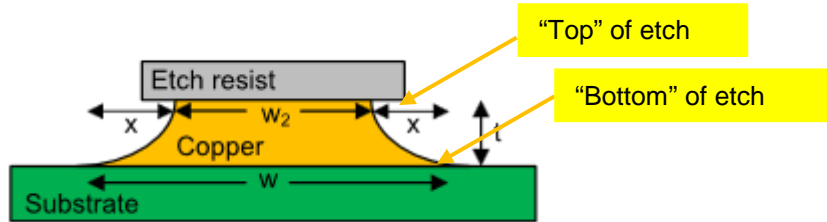


Figure 6 – Example of typical side-wall, etching profile seen in all PCB chemical etching processes

For the antenna structures called out here, for best performance, the target design dimensions must be the achieved as close as possible on the “top” of the resulting etched copper shapes. The etching process must be adjusted to meet the design dimensions on the “top” of the resulting copper shapes.

Tolerance of all etching must stay within +/- 20um.

Each of these dimensions shall be verified by the fabricator post-fabrication to ensure that all critical dimensions are achieved prior to the PCB being accepted for assembly and test. Each critical region is composed of an array of etched antenna elements. Each etched antenna element are themselves composed of rectangular patches and small width traces of varying dimension.

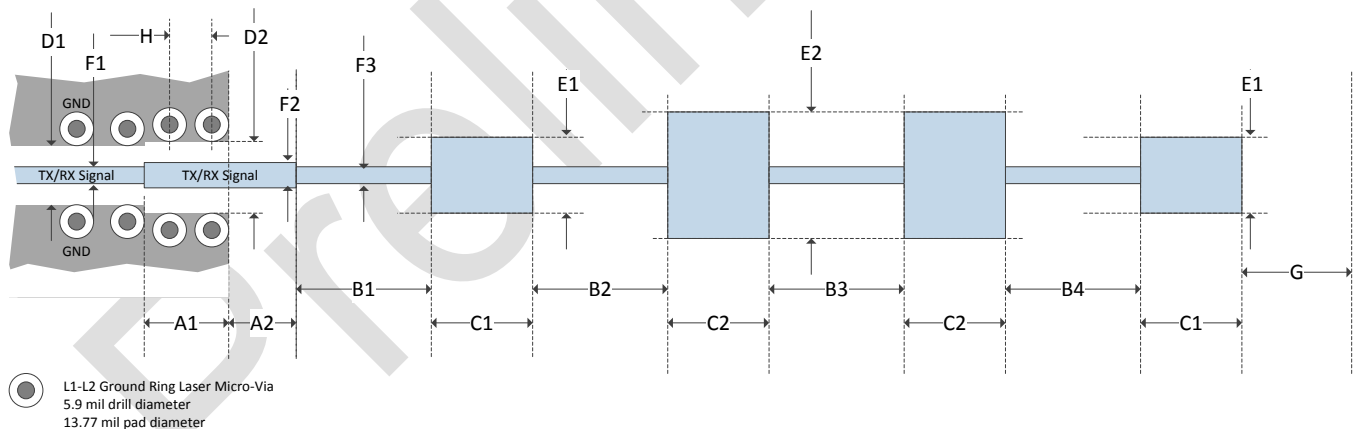


Figure 7 - Single Antenna Element Dimensions

Table 1 - Single Antenna Element Dimensions – Reference Associated Artwork For All Design Dimensions. Extracted dimensions provided here for reference only.

Measurement	Value	Unit
A1	27.568	mil
A2	11.802	mil

B1	47.24	mil
B2	49.21	mil
B3	45.27	mil
B4	49.21	mil
C1	42.52	mil
C2	40.95	mil
D1	16.722	mil
D2	20.002	mil
E1	39.38	mil
E2	55.12	mil
F1	8.4	mil
F2	10.62	mil
F3	3.94	mil
G	78.7402	mil
H	20.67	mil

Table 1, Note 1 - Dimension G denotes the minimum distance the edge of the patch elements shall come to the edge of the continuous ground reference plane. This may be the edge of the PCB (as in the case of the BoosterPack EVM) or an internal edge.

Table 1, Note 2 - Dimension H denotes the minimum ground stitch via center-to-center distance.

6 Revision History

Rev 1 - 2018/08/29, R. Rosales (rosales.r@ti.com)

- Initial revision

Preliminary