



Solder mask surface properties and related PCBA failure due to build-up of water layer

Lakkaraju, Anish Rao; Conseil-Gudla, Helene; Steiner, Frantisek; Ambat, Rajan

Publication date:
2021

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Lakkaraju, A. R., Conseil-Gudla, H., Steiner, F., & Ambat, R. (2021). *Solder mask surface properties and related PCBA failure due to build-up of water layer*. Abstract from EUROCORR 2021, Budapest, Hungary.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.



Solder mask surface properties and related PCBA failure due to build-up of water layer

Anish Rao LAKKARAJU¹, Helene CONSEIL-GUDLA¹, Frantisek STEINER², Rajan AMBAT¹

¹ *Celcorr, Technical University of Denmark, Denmark*

² *University of West Bohemia, Czech Republic*

The electronics industry adopts an increased device miniaturization, and devices are expected to perform optimally in a multitude of climatic conditions worldwide, which adds to the list of possible failure modes. Changing temperature and humidity are a major driving force for failure, supported by device design elements and surface morphology.

Surface properties of the circuit board comprise the surface roughness of the laminate and the chemical coatings like solder masks etc., which are often overlooked.

Simulated high-humidity conditions at room temperature and Peltier cooling have been combined to induce condensation and resultant water layer build up on test PCBs with different solder masks.

The surface water layer formation on test specimens has been monitored using both qualitative (Digital Microscope) and quantitative (Impedance measurement) methods, in order to create a correlation to measured surface roughness parameters, solder mask surface morphology and chemical properties.

The results give an insight into the bridging of condensed water droplets on the solder mask surface, which can be confirmed by changes in measured impedance. Average Time-To-Failure of the specimens has also been recorded. Ultimately, a unified picture of the effect of surface parameters such as roughness values on potential PCBA failure has been created. Selection of the appropriate surface roughness parameter can be used to rank and potentially predict solder mask contribution to PCBA failures.

Keywords: Humidity, Impedance, Printed circuit board laminate, Solder Mask, Surface roughness, Temperature, Water layer formation