



## Critical level of water film formation under transient condensing condition leading to PCBA failures

Conseil-Gudla, Helene; Ambat, Rajan

*Publication date:*  
2021

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

[Link back to DTU Orbit](#)

*Citation (APA):*  
Conseil-Gudla, H., & Ambat, R. (2021). *Critical level of water film formation under transient condensing condition leading to PCBA failures*. 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.



---

## Critical level of water film formation under transient condensing condition leading to PCBA failures

**Helene CONSEIL-GUDLA<sup>1</sup>, Rajan AMBAT<sup>1</sup>**

<sup>1</sup> *Celcorr, Technical University of Denmark, Denmark*

Electronics industry increases packing density on printed circuit board assembly surfaces together with device miniaturization. Exposure to harsh climatic conditions introduces a number of serious humidity-related reliability issues, and the water film forming on the PCBA surface is found to be the critical factor determining the reliability of the electronics. The thickness of the water layer is dependent of the PCBA surface and its architecture, the presence of hygroscopic residues, the humidity level in the environments, and the temperature fluctuations.

The water film build-up on the PCBA surface is the key factor determining the electronics reliability, such as leak current and electrochemical migration (ECM); therefore, it is important to correlate the water layer thickness and the electrochemical response to understand the critical level of water film build up.

This study aims to provide quantifiable physical values for assessing and predicting the reliability of electronics, through accurate condensation experimental set-up. Water layer thickness has been determined under dynamic and equilibrium conditions, with and without the presence of weak organic acid on the PCBA surface, and are correlated to impedance and leak current data measured on surface insulated resistance (SIR) pattern. The leak current data can be correlated to failure occurrence.

Keywords: Condensation, conductivity, contamination, humidity, impedance, leak current, reliability, thickness, water film