

Influence of package choice on your system reliability, Nick Renaud-Bezot, Serma Technologies

Abstract

Serma Technologies has developed a four-step method to assess the risk caused by product unreliability in any industry. This method is based on an introductory step and four activities related to system reliability:

- Introduction – Mission Profile Analysis
- Step 1 – Technology Risk Analysis
- Step 2 – Investigation Tests: Robustness
- Step 3 – Investigation Tests: Reliability
- Step 4 – Assembly Process Evaluation
-

The **Mission Profile** will be analysed to identify the main stresses that the system will have to endure. The objective is to represent, if possible in a quantified way, the main parameters: temperature, thermal cycling, on/off cycles, power use, humidity, pollutants, mechanical stress... These stresses will influence or accelerate the defects on the product and thus need to be known to be taken into consideration during development.

The **Technology Risk Analysis** consists in studying the different technologies used in the system (components, consumables, PCB...) in order to identify for each of them the risks toward:

- Failure mechanisms (knowledge of reliability issues with the selected technology, limit on life duration)
- Design (derating, layout...)
- Use (influence of the mission profile stresses on the failure mechanisms for this component)
- Process (reliability degradation caused by the chosen assembly process)
-

The **Robustness Tests** will be used during development to identify margins or weaknesses of the system. They will bring the system outside the specification boundaries using a step stressing method. Potential defects will then be analysed to identify if corrective actions are required to improve the quality and reliability results.

The **Reliability Tests** will be used to assess potential weaknesses (usual), life duration (less usual) and failure rate (rare because needing many parts) of the system. For a single stress (temperature for example) the principle is to increase the stress in order to decrease the correspondent test duration.

Finally, the **Process Evaluation** will verify that all the previous activities performed to improve the reliability will not be endangered by too low a manufacturing quality.

The presentation will highlight the main items of these different tools used for reliability and will present some specific cases of packaging influence encountered by Serma Technologies during the implementation of this method (delamination, BGAs, power components,...).