

Reliability Simulation of On-Board Charger PCB

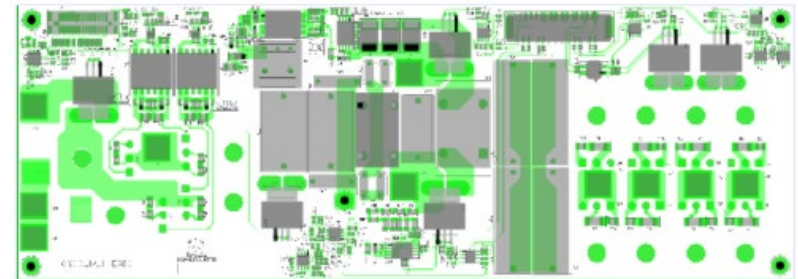
BACKGROUND AND CHALLENGE

Increase in electrification has raised the demand for evaluating the service life of PCBs. So, the customer needed extensive simulation capabilities to -

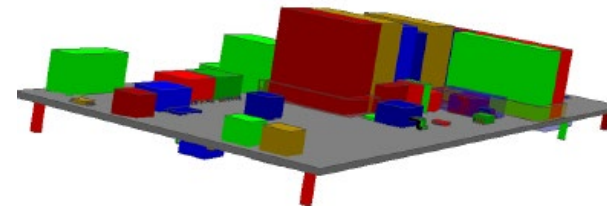
- Conduct extensive tests to study the reliability of a PCB design
- Analyze the PCB's design failure effects on the following loading conditions – thermal cycling, thermal shock, vibration and mechanical shock
- Meet all industry and customer standards related to loading, environment, and reliability

SCOPE OF WORK

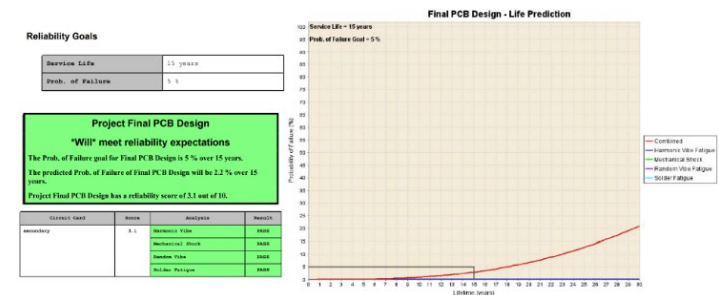
- Modeling, simulation and analysis of the PCB design to understand its behavior to all the mentioned loading conditions
- Identification of vulnerable components and PCB design attributes that contribute to failure
- Optimization of PCB design to meet the loading, environmental, and reliability requirements



Typical PCB Layout



3D CAD Model of PCB



Simulation Results: Probability of Failure Vs Lifetime

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SOLUTION

TATA ELXSI developed a PCB Design Reliability Validation Solution to –

- Predict the failure behavior of the PCB and components, which enabled easy optimization of the design
- Modify the design to provide additional mountings, mount point standoffs, increase the package pad dimensions, and add potting material to the critical large parts
- Ensure the modifications survived the maximum possible thermal cycling, thermal shock, vibration, and mechanical shock loads.

TOOLS USED

- Reliability – ANSYS Sherlock
- Thermal – ANSYS Icepak, Siemens Flowtherm

REGULATORY STANDARDS

- Thermal PCB: JEDEC
- Reliability PCB: IPC

IMPACT

- Optimized PCB design, which meets all the reliability requirements per the established standards
- Saved time and cost through simulation

