Cost Savings and Risk Avoidance Using Automated Design Analysis™

The depth and complexity of the electronics supply chain has resulted in a design process that distributes the decisions affecting product reliability across many companies and stakeholders. Coordinating these decisions to maximize reliability while protecting supplier intellectual property requires a new communication paradigm. Sherlock provides an ideal platform for this communication, standardizing the language of environmental requirements down the supply chain while flowing reliability assurance up.

Requirements Communication

Sherlock's Environment Tool is an effective means to communicate your expectations to suppliers. The tool combines tabular values with graphic representations to provide a high level of detail with an intuitive interface.

Test Environment

Whether requiring standard based test or moving beyond to custom testing, Sherlock allows you to provide suppliers with a clear plan.

Use Environment

The flexibility of Sherlock allows for easy communication of the use environment to the supplier, providing the ability for suppliers to design for durability under conditions seen in the field and not just to pass qualification tests.

Reliability Communication

In today's competitive supply chain, supplier reliability communication is limited by concerns of IP protection often revealing weaknesses only late in the development process during testing, or worse: in the hands of users. Sherlock's selective automated PDF reports provide design reliability assurance and minimize late program surprises.

Pre-Layout

Using the environment information provided by the customer, designers can assess board harmonic response, large component placement limitations, laminate selection and support strategies, providing layout teams with unprecedented insight into the reliability impacts of their design decision.

Design Release

Evaluating the design using Sherlock before releasing to prototype provides reliability assurance up the supply chain, demonstrating that the product will not only pass test but will meet lifetime requirements in the use environment.

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Business Case

Using and specifying Sherlock Automated Design Analysis™ into the supply chain helps bring projects in on time and under budget while reducing overall risk.

Schedule Risk

Sherlock users have reported an improvement in their ability to pass qualification testing the first time from 80% to 100%.   Identifying and correcting reliability risks during the initial design phase of product development saves months in additional design cycle time.


Budget Risk

Additional design and qualification test cycles can cost from $250,000 into the millions of dollars based on
troubleshooting, design modification, experimentation,
and revenue and market loss due to launch delays.

User Satisfaction

Past performance is a key differentiator in contract award and customer loyalty. Reliability assurance activities at the supplier reduces field performance risk and protects the product reputation in the market place.

Secondary Benefits

Greater insight into specific failure mechanisms provides ability to proactively schedule maintenance and replacement activities, moving from corrective to preventative maintenance. Strategies that employ time
to failure predictions can nearly eliminate unplanned downtime and customer-visible field failures. Proactive repair strategies can increase customer satisfaction while enabling more creative and potentially lucrative warranty, performance and maintenance contract options.

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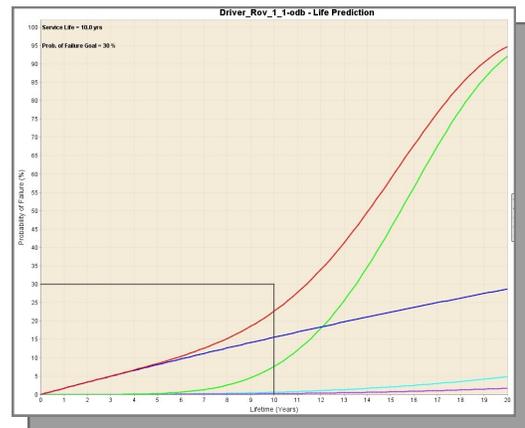
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Suggested Requirement Examples

Example 1:

For each PCBA, SUPPLIER shall perform a reliability prediction using Sherlock Automated Design Analysis™ physics-based modeling software. A report will be provided that clearly indicates the life cycle environments simulated are those provided by CUSTOMER. SUPPLIER shall provide an unaltered Sherlock generated PDF report to include component level Pareto risk and time-to-failure tables and life curves that are a summation of the following common electronic module failure mechanisms:

- Thermal Cycling Induced Component Attachment Fatigue
- Vibration Induced Component Attachment Fatigue
- Shock Induced Component Attachment Fracture
- Circuit Board Plated Through Hole Via Fatigue

A reliability projection of at least _____% shall be required over a useful life of -_____ years.

Example 2:

For each PCBA, SUPPLIER shall provide the time to failure of each solder joint and plated through hole using a physics of failure reliability prediction tool, such as Sherlock Automated Design Analysis or equivalent. Alternatively acceptable is the use of Finite Element Analysis tools in combination with physics of failure based time-to-failure and reliability risk calculations. At a minimum the following failure mechanisms will be considered:

- Thermal Cycling Induced Component Attachment Fatigue
- Vibration Induced Component Attachment Fatigue
- Shock Induced Component Attachment Fracture
- Circuit Board Plated Through Hole Via Fatigue

A reliability projection of at least _____% shall be required over a useful life of -_____ years.

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Suggested Requirement Examples

Example 3:

SUPPLIER shall perform a physics of failure based analysis using Sherlock Automated Design Analysis™ software or equivalent tool. If equivalent tool, SUPPLIER shall provide documents that validate the accuracy of the tool to the satisfaction of CUSTOMER.

The analysis shall consist of solder fatigue due to thermal cycling, plated through via fatigue due to thermal cycling, solder or lead fatigue due to vibration, and solder cracking/lead fracture/pad cratering due to mechanical shock.

In the case of thermal cycling, the SUPPLIER shall include thermal analysis or thermal measurements that accurately identifies the case temperature of every part when the product is powered and in operation. If there are multiple power states, SUPPLIER shall take this into consideration in their physics of failure based analysis.

Design for Test Environment

The analysis shall assess the ability of the design to service environmental test conditions specified by Customer. The probability of failure at the end of testing shall be less than 1%.

Design for Use Environment

SUPPLIER shall use environmental conditions provided by CUSTOMER. Through the physics of failure analysis, SUPPLIER shall demonstrate that the probability of failure will be less than __% after ___ years in the field.

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