Troubleshooting and measuring techniques

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Purpose

The purpose of this presentation is to provide **practical guidance on troubleshooting and measuring techniques** which help reducing the development **cost, time and resources**

The method consists in encouraging the audience to be actively involved and assisted to come up with the correct answers and draw the conclusion

Structure (each slide/subject)
Initial questions on subject (evaluate the answers)

List the answers received from the audience

Ask additional questions (to reveal the missing elements/items received from the audience)
Provide concrete examples to help the audience identify/structure the missing elements
The presenter will use the whiteboard to better define the elements in discussion.

Review the initial questions (after brainstorming)

Conclusion (for the particular subject in discussion)

Presentation Summary

WHAT IS A SIMPTOM / ROOT CAUSE / TROUBLESHOOTING?

What is a symptom in hardware electronics?
What is the root cause in hardware electronics?
How do we find the connection between the SIMPTOM and ROOT CAUSE?
What do we consider a satisfactory root cause when debugging hardware electronics?
What is a corrective action request and when do we need it?

WHAT IS A HARDWARE DEFECT?

How do you define a defect? What is a defect in the hardware layer?

WHAT CAUSES A DEFECT?

What causes a defect?
How can we classify the defects (by cause/source)?

How can we prevent the systematic defects?

How would you characterize a systematic defect?
What can we do to prevent a systematic defect?

Preventing device specific defects

How would you characterize a device/board specific defect?
What can we do to prevent a device specific defect?

Hardware Documentation

Why a project should be properly documented?
What is the purpose of documentation?
Who should have access to the documentation?
Are there any restrictions for sharing the documentation?

Hardware/Project Files

How can the project files be classified (taking in consideration the risk of counterfeiting)?
Why important is to keep the files safe and share only the necessary information within the team

Electrostatic Discharge prevention

What is an ESD event?
How can the ESD be prevented?
What can get damaged during an ESD event?
How can this slow down the design process?

Bring up the boards

What steps we should follow when bringing up the boards?
What are risks in bringing up phase?
What tools we need to use to properly bring up the boards in the safest/efficient manner?

Visual inspection during bring up

Why visual inspection is important?
What tools we can use to visually inspect the devices?
At what steps is the visual inspection recommended (taking in consideration the entire life of a product)

Passive component testing

What components are considered passive in electrical circuits?
What lab tools can be used to measure the parameters of the respective components?
What tricks can be used to measure the components in-circuit?

Short-circuit

What is a short-circuit?
What tools can we use to identify the location of a short circuit?

Open-circuit

What is an open-circuit?
How can we identify an open circuit?

Diode test

What is a junction?
Can we effectively determine if a component is electrically damaged using the junction test?
What happens inside a junction when is electrically defective/damaged?

Short-circuit on power rail

What symptoms indicate that we are dealing with a short on a power rail?
How do we narrow down the short to the component level?

Probing Digital Signals

What is the difference between an analog, digital signal and a power rail?
What is an ADC, DAC?
What do we consider an active low/high signal?

Repair station tools

What tools are used to rework the boards?

Instruments used for troubleshooting

What instruments are used for troubleshooting?

THANK YOU!
Useful resources

Legend