Looking to the Future for DFT and Analogue Test

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Automotive Test
Existing Challenges

Historically Low Volume, High Reliability

More extensive and exhaustive testing

• Very long test times
• Limited resources needed extensively around the device
  – Potentially compromising loadboard design
• Long time to market

Expensive RMA process – 2 man years at ams AG

• Extensive failures analysis
• 8D reports
Consumer Test
Existing Challenges

High Volume

Bare bones testing, system tests

• Short test times
• Complicated multi-site boards, high parallelism
  – Long down times due to setup issues during production
• Fast time to market

Non-existent RMA flow

• Generally only receive RMA during cost negotiations
Automotive test
Future Challenges

A move to higher supply voltages, more complex test boards

- Fewer resources available, and lower accuracy
- Requires more resource sharing

Higher volume

An even greater focus on product quality and reliability

- As devices get larger and more complex, more defects missed by test
Consumer
Future Challenges

Our current high-volume consumer customers requesting more automotive-style product qualifications

More precision
  • Less chance for parallelism, which increases cost

More RMA received – More than 2 man years?

Even higher volume
  • Need more parallelism
Automotive and Consumer
Future Challenges

• Automotive and consumer requirements will merge and a single standard will be adopted for all semiconductor segments

• Larger ASICS, smaller geometries, more defects per sq. mm
  – More focus on defect-based testing, since spec testing simply doesn’t find all defects.

• We will need more design tools to calculate analogue test coverage to show where test coverage is missing
Automotive and Consumer
Future Challenges

• We need to focus more on automated analogue DFT to allow muxing signals on-chip, to single points on loadboards
  – To aid test board reliability, device debug, automated test generation
  – Access to nodes we simply don’t have access to today
Measurement System Analysis V4 spec change

• Automotive industry has seen a requirement to change the MSA spec due to very tight requirements becoming unrealistic
  – Means? No need for such accuracies and test repeatability to pass requirements → use \( Cp(\text{observed}) \) rather than \( Cp \)
  – Possibly built-in test measurement accuracy can be relaxed

• Applicable to Consumer parts for high volumes, not just Automotive!
New Release Criteria
IEEE 1687 Standard

- A new approach to scan access based on IEEE 1149.1 and 1500
  - Allows faster, simpler access to IP blocks (“instruments”) via scan
- Intended to also allow test access to the IP blocks in the field
- Tools currently available from some EDA vendors
Analogue Defect Simulation

- No commercially available tools
- Published papers proposed many different techniques over last 30 years, with no really usable result
- With larger ASICS and more defects in the analogue circuitry, it becomes much more critical to finding reliability-related defects
- Analogue Defect Simulation shows where coverage is lacking and hence where more test access is needed

Ad hoc working group

- A group of motivated people from industry working together to find common ground in mixed-signal DFT and test generation
- Work on-going to develop standard way to describe Analogue Test Bus and ADC/DAC serial access using 1687 syntax, to allow automation
- Focused on Defect-Oriented Test (DOT), rather than spec testing
  - This simplifies the problem for an Analogue BIST approach

Thank you

Please visit our website www.ams.com