IBIS Quality Review

A status review of the IBIS Quality specification

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IBIS Quality Task Group

- **Web:**

- **Email list:**
  - [http://www.freelists.org/list/ibis-quality](http://www.freelists.org/list/ibis-quality)
  - Or send email
  - To: ibis-quality-request@freelists.org
  - Subject: subscribe

- **Meetings:**
  - Tuesdays from 11:00am to 12:00pm Eastern Time

- **Questions? Mike LaBonte milabont@cisco.com**
Brief History

- 2002 March - Barry Katz started IBIS-Quality
- 2004 November - IQ 1.0 specification completed
- 2005 August - Parser bug 90 submitted and approved
- 2006 March - Parser bug 94 submitted and approved
- 2006 April - Book “Semiconductor Modeling” discusses IQ (Roy Leventhal, Lynne Green)
- 2006 August - IQ 1.1 specification initiated
- 2009 August - IQ 1.1 renamed IQ 2.0
- 2009 October - IQ 2.0 approval expected
Specification Version 1.0

- IBIS Quality Levels
  - 0  Can be checked by IBISCHK, plus a few others
  - 1  Correctness, completeness, and simulation checks
  - 2a Simulation correlated
  - 2b Bench measurement correlated
  - 3  Simulation and measurement correlated
Issues with IQ Version 1.0

- Passing IQ Level 0 does not sound like much of an accomplishment
  - Is a non-compliant file level -1?
- There should be a strict level for “Passes IBISCHK”
- No other IQ check should duplicate IBISCHK
- Can’t have a correlated model without full IQ check
- Some checks are weak (“should” vs. “must”)
- Feedback from JEITA
Specification Version 2.0

- IBIS Quality Levels
  - IQ0  Not Checked
  - IQ1  Passes IBISCHK
  - IQ2  Suitable for Waveform Simulation
  - IQ3  Suitable for Timing Analysis
  - IQ4  Suitable for Power Analysis * (defined, but no checks)

- Special Designators
  - S    Simulation correlated
  - M    Measurement correlated
  - X    Exceptions
  - G    Has Golden Waveforms
2.1 {LEVEL 1} IBIS file passes IBISCHK

Checking a123_test.ibs for IBIS 4.1 Compatibility...

ERROR (line 446) - [Receiver Thresholds] should be specified immediately after all the subparameters of a model and before the other keywords of a model except [Model Spec]
ERROR - Model DQ_FULL Receiver Thresholds: Tslew_ac must be specified for single ended receivers
WARNING - Model DQ_HALF Pullup Typical data is non-monotonic
WARNING - Model DQ_HALF Pulldown Minimum data is non-monotonic
WARNING - Model DQ_HALF Pullup Minimum data is non-monotonic
WARNING - Model DQ_HALF Pullup Maximum data is non-monotonic
WARNING - Model DQ_FULL Pullup Typical data is non-monotonic

Errors : 2
Warnings: 5

File Failed
Example LEVEL 2 Checks (Waveforms)

5.3.7. {LEVEL 2} Combined I-V tables are monotonic
5.3.8. {LEVEL 2} [Pulldown] I-V tables pass through zero/zero
5.3.9. {LEVEL 2} [Pullup] I-V tables pass through zero/zero
5.3.10. {LEVEL 2} No leakage current in clamp tables
5.3.11. {LEVEL 2} I-V behavior not double-counted
Example LEVEL 3 Checks (Timing)

3.2.2. {LEVEL 3} [Pin] RLC parasitics are present and reasonable
3.3.1. {LEVEL 3} [Diff Pin] Vdiff and Tdelay_* complete and reasonable
5.2.1. {LEVEL 3} [Model] Vinl and Vinh reasonable
5.2.2. {LEVEL 3} [Model Spec] Vinl and Vinh reasonable
Level 4 (Power) Checks for future releases

- A [Pin Mapping] Complete and Correct check was proposed
- Power analysis really needs new features:
  - BIRD95 - Power Integrity Analysis using IBIS
  - BIRD98 - Gate Modulation Effect (table format)
- IBIS 5.0 adoption still in progress
  - IBIS 5.1 may be submitted for EIA/ANSI standardization
  - IBISCHK 5.0 parser released October 2009
  - Have not yet seen IBIS 5.0 power keywords in IBIS files
- Level 4 checks are planned for future IQ 2.x
Notes on IQ Version 2.0

- “Possible Errors” section removed
  - Some items made into regular checks
- “Correlation” section minimized
  - Refers to IBIS Accuracy Handbook for details
- IC vendor push-back on overshoot parameters
  - Not many IBIS files have this
  - Buffer developers simply do not measure it
  - Difference between functional and destruction limits
  - BIRD103 D_overshoot parameters may work better
IQ Version 2.0 Status

- 44 draft revisions posted
- In review phase for IBIS Open Forum acceptance vote
  - Review phase in 3 consecutive Open Forum meetings.
  - Acceptance vote scheduled for October 30, 2009.
After Version 2.0

- File parser bug reports
- Update the IBIS Accuracy Handbook
  - Emphasis on feature-selective correlation
- Begin drafting IQ 2.x
  - Level 4 power analysis checks
Regular 2009 IQ Meeting Participants

- Cisco Systems
- Ericsson
- Huawei Technologies
- Micron Technology *
- Nokia Siemens Networks
- Texas Instruments *
- Teraspeed Consulting Group *
- Xilinx *

* IBIS model makers
Future IQ expectations

- IQ adoption by IC vendors
- Adoption by library flow in system companies
- IBIS modeling tools implementing the IQ checks