

IBIS Quality Review

**A status review of the IBIS Quality
specification**

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(Previously presented in China, November 4, 2009)

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IBIS Quality Task Group

- **Web:**
 - http://www.vhdl.org/pub/ibis/quality_wip
- **Email list:**
 - <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

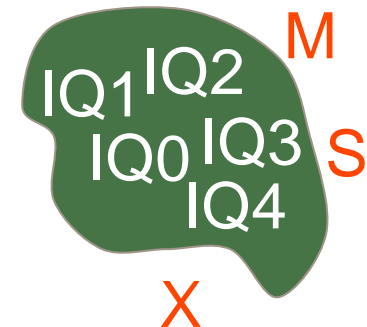
Specification Version 2.0

■ 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



The Only LEVEL 1 Check (IBISCHK)

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 I-V
- 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



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