IBIS Quality Checklist Rev. 2.0

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IBIS Quality Specification

- The purpose of IBIS Quality Specification is to provide a methodology for validating model data against the IBIS Specification and a means of objective measures of correlating model simulation results with measurements or other model simulations.
- By providing standards for validating, correlating, and replicating simulation results we seek to enhance the value of modeling and simulation.

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IBIS Quality Rev 1.0 (Basic Checks)

- IBIS Quality Rev 1.0 covers only the basic checks and do not address the newer features added later on IBIS Specification
  - IQ0 – Can be checked by IBISCHK, plus a few others
  - IQ1 – Correctness, completeness, and simulation checks
  - IQ2a – Simulation correlated
  - IQ2b – Bench measurement correlated
  - IQ3 – Simulation and measurement correlated

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IBIS Quality Rev 2.0 (Advanced Checks)

- IBIS Quality Rev 2.0 covers the items necessary to check the models based on latest IBIS specification and adds stringent requirements to achieve certain IQ levels
  - IQ0 - No IQ checking at all
  - IQ1 - Passes IBISCHK without Errors or unexplained Warnings
  - IQ2 - IQ1 + data for basic simulation checked
  - IQ3 - IQ2 + data for timing analysis checked
  - IQ4 - IQ3 + data for power analysis checked
  - IQ3M – IQ3 + correlated against hardware measurements
  - IQ3MS - IQ3 + correlated against measurements and simulation
  - IQ3GS - IQ3 + golden waveforms + correlated against simulation
  - IQ4X - IQ4, but exception(s) to check(s) commented in file

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IBIS Quality Checklist Rev. 2.0

- IBIS Quality Checklist provides a general guideline on validating the quality of the IBIS file
- Documents the results of the quality check based on the IBIS Quality Rev. 2.0 specification

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Using the IBIS Quality Checklist

- To use the IBIS Quality checklist one needs:
  - IBIS file to check
  - IBIS Quality Specification
  - IBIS Quality Checklist spreadsheet
  - Latest IBISCHK parser (currently IBISCHK 5.0.1)
  - IBIS File Viewer that displays I/V and V-T curves
- IBIS Quality Specification and Checklist can be downloaded from Quality subcommittee webpage
  - http://www.eda.org/pub/ibis/quality_wip/

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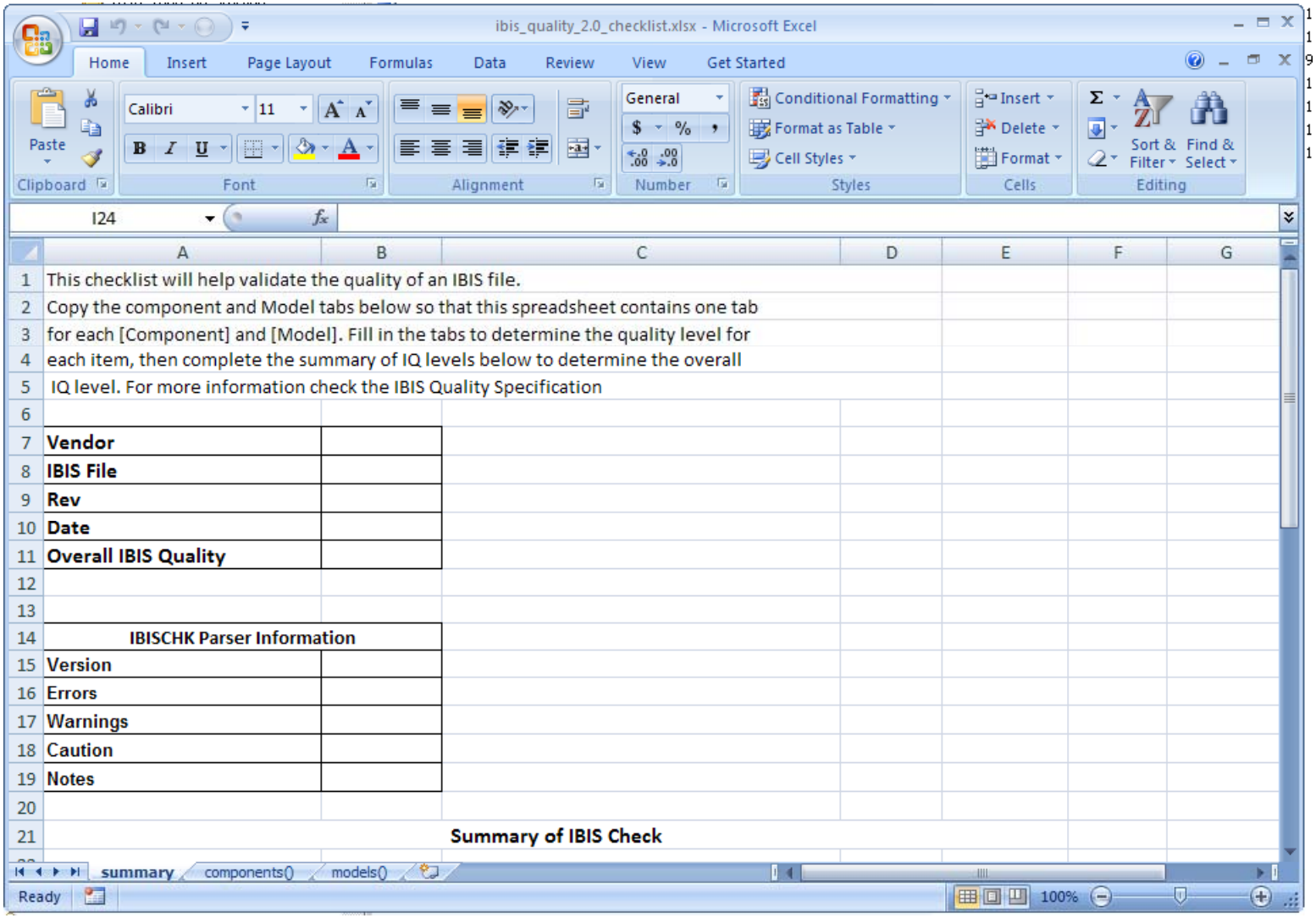
Start With Blank IQ checklist



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Fill in the IBIS File Information

This checklist will help validate the quality of an IBIS file.
Copy the component and Model tabs below so that this spreadsheet contains one tab for each [Component] and [Model]. Fill in the tabs to determine the quality level for each item, then complete the summary of IQ levels below to determine the overall IQ level. For more information check the IBIS Quality Specification

Vendor	**Micron**
IBIS File	**l63b_bd.ibs**
Rev	**2.1**
Date	**10/23/09**
Overall IBIS Quality	

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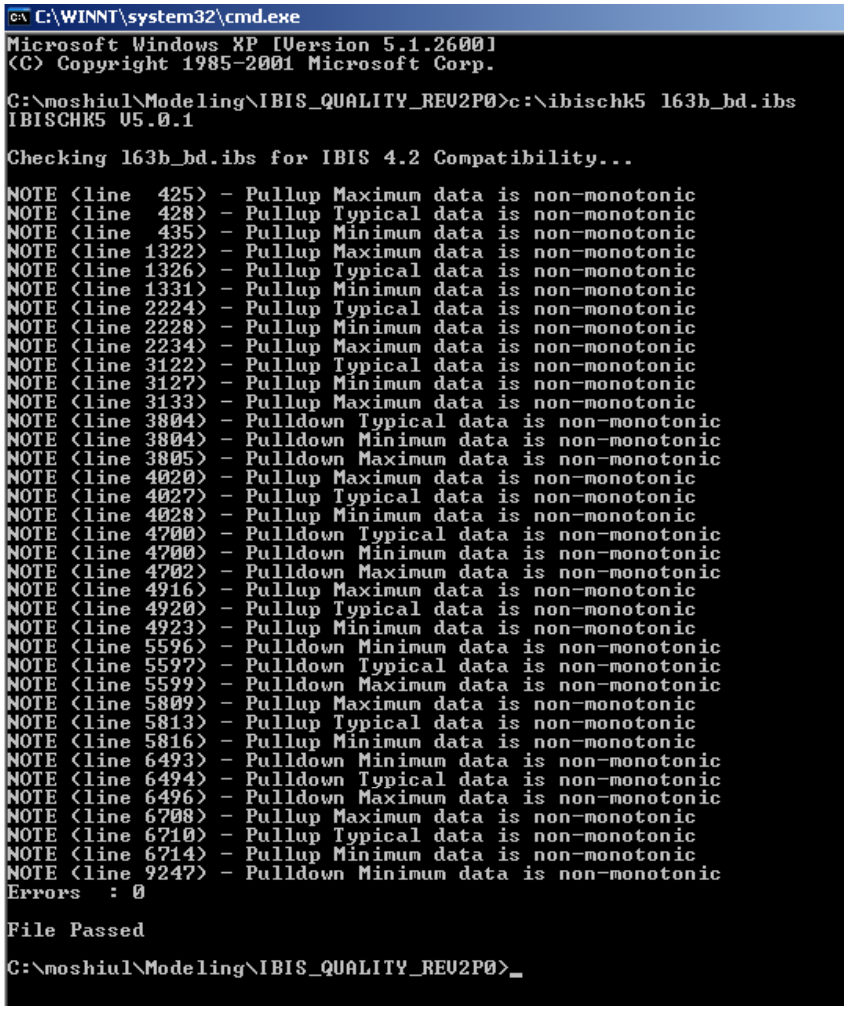
Run the IBISCHK Parser on the IBIS File



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Fill in the IBISCHK results in the IQ Spreadsheet

This checklist will help validate the quality of an IBIS file.
Copy the component and Model tabs below so that this spreadsheet contains one tab for each [Component] and [Model]. Fill in the tabs to determine the quality level for each item, then complete the summary of IQ levels below to determine the overall IQ level. For more information check the IBIS Quality Specification

Vendor	**Micron**
IBIS File	**l63b_bd.ibs**
Rev	**2.1**
Date	**10/23/09**
Overall IBIS Quality	

IBISCHK Parser Information	
Version	5.0.1
Errors	0
Warnings	0
Caution	0
Notes	37

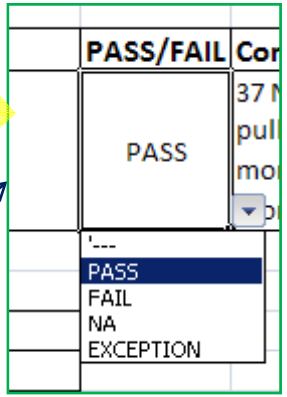
Summary of IBIS Check

File Header

In column **Pass/Fail** below mark each item PASS, FAIL, NA or EXCEPTION.
The IQ level is the highest level number for which all checks PASS.
The IQ level is FAIL if no level completely passes.
See IBIS Quality Specification for complete descriptions of the checks.

IQ Spec Reference	IQ LEVEL	Description	PASS/FAIL	Comments
2.1	LEVEL 1	IBIS file passes IBISCHK	PASS	37 Notes are generated due to pullup/pulldown data being non-monotonic. Combined V-I data is monotonic

Select the appropriate results from the drop-down menu



Add comments to explain errors, warnings, notes or caution messages generated from IBISCHK parser

Check IQ Specification paragraph 2.1 for details on the check

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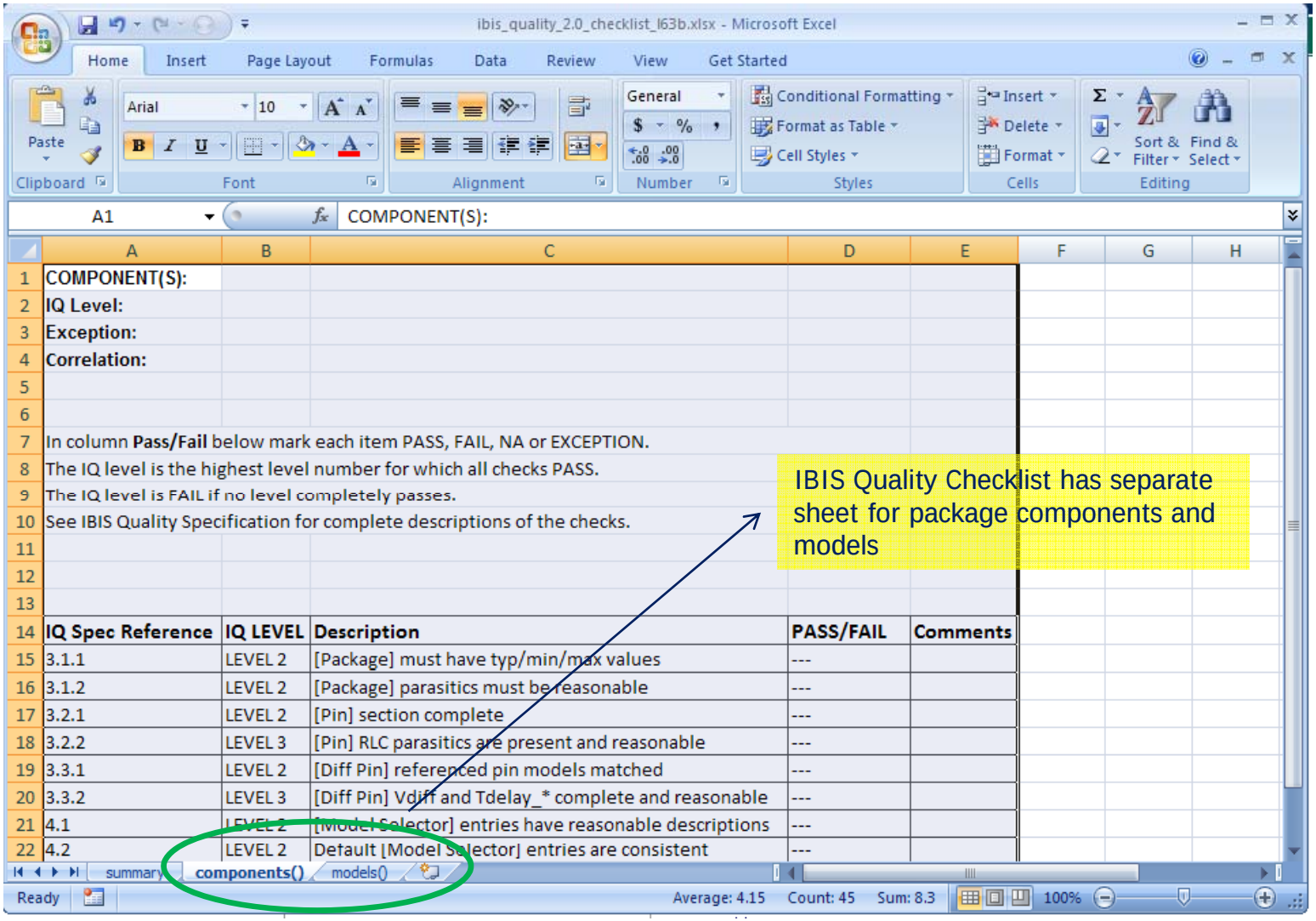
IBIS Components Check



	A	B	C	D	E
1	COMPONENT(S):				
2	IQ Level:				
3	Exception:				
4	Correlation:				
5					
6					
7	In column **Pass/Fail** below mark each item PASS, FAIL, NA or EXCEPTION.				
8	The IQ level is the highest level number for which all checks PASS.				
9	The IQ level is FAIL if no level completely passes.				
10	See IBIS Quality Specification for complete descriptions of the checks.				
11					
12					
13					
14	**IQ Spec Reference**	**IQ LEVEL**	**Description**	**PASS/FAIL**	**Comments**
15	3.1.1	LEVEL 2	[Package] must have typ/min/max values	---	
16	3.1.2	LEVEL 2	[Package] parasitics must be reasonable	---	
17	3.2.1	LEVEL 2	[Pin] section complete	---	
18	3.2.2	LEVEL 3	[Pin] RLC parasitics are present and reasonable	---	
19	3.3.1	LEVEL 2	[Diff Pin] referenced pin models matched	---	
20	3.3.2	LEVEL 3	[Diff Pin] Vdiff and Tdelay_* complete and reasonable	---	
21	4.1	LEVEL 2	[Model Selector] entries have reasonable descriptions	---	
22	4.2	LEVEL 2	Default [Model Selector] entries are consistent	---	

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IBIS Components Check

COMPONENT(S):	MT29F32G08MABL63B
IQ Level:	3
Exception:	
Correlation:	

In column **Pass/Fail** below mark each item PASS, FAIL, NA or EXCEPTION.
The IQ level is the highest level number for which all checks PASS.
The IQ level is FAIL if no level completely passes.
See IBIS Quality Specification for complete descriptions of the checks.

IQ Spec Reference	IQ LEVEL	Description	PASS/FAIL	Comments
3.1.1	LEVEL 2	[Package] must have typ/min/max values	PASS	Bare Die, RLC set to 0
3.1.2	LEVEL 2	[Package] parasitics must be reasonable	PASS	Bare Die, RLC set to 0
3.2.1	LEVEL 2	[Pin] section complete	PASS	
3.2.2	LEVEL 3	[Pin] RLC parasitics are present and reasonable	PASS	Bare Die, RLC set to 0
3.3.1	LEVEL 2	[Diff Pin] referenced pin models matched	NA	
3.3.2	LEVEL 3	[Diff Pin] Vdiff and Tdelay_* complete and reasonable	NA	
4.1	LEVEL 2	[Model Selector] entries have reasonable descriptions	PASS	
4.2	LEVEL 2	Default [Model Selector] entries are consistent	PASS	

Fill in the combined IQ Level

Fill in the information regarding the components. Multiple components can be added on the same sheet if the check results are similar

Select the appropriate results from the drop-down menu

Add comments to explain the result

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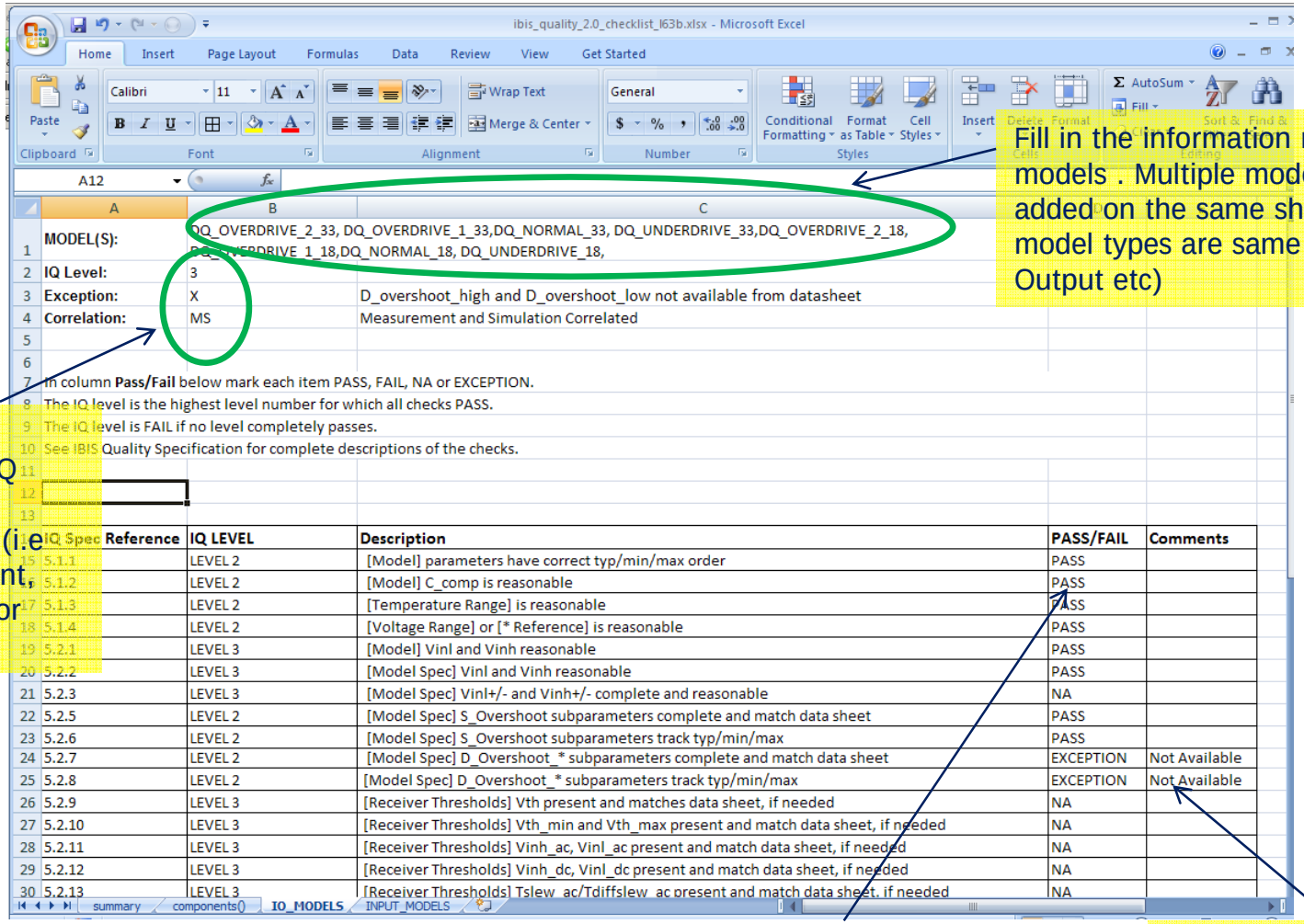
IBIS Models Check



IQ Spec Reference	IQ LEVEL	Description	PASS/FAIL	Comments
5.1.1	LEVEL 2	[Model] parameters have correct typ/min/max order	PASS	
5.1.2	LEVEL 2	[Model] C_comp is reasonable	PASS	
5.1.3	LEVEL 2	[Temperature Range] is reasonable	PASS	
5.1.4	LEVEL 2	[Voltage Range] or [* Reference] is reasonable	PASS	
5.2.1	LEVEL 3	[Model] Vinl and Vinh reasonable	PASS	
5.2.2	LEVEL 3	[Model Spec] Vinl and Vinh reasonable	PASS	
5.2.3	LEVEL 3	[Model Spec] Vinl+/- and Vinh+/- complete and reasonable	NA	
5.2.5	LEVEL 2	[Model Spec] S_Overshoot subparameters complete and match data sheet	PASS	
5.2.6	LEVEL 2	[Model Spec] S_Overshoot subparameters track typ/min/max	PASS	
5.2.7	LEVEL 2	[Model Spec] D_Overshoot_* subparameters complete and match data sheet	EXCEPTION	Not Available
5.2.8	LEVEL 2	[Model Spec] D_Overshoot_* subparameters track typ/min/max	EXCEPTION	Not Available
5.2.9	LEVEL 3	[Receiver Thresholds] Vth present and matches data sheet, if needed	NA	
5.2.10	LEVEL 3	[Receiver Thresholds] Vth_min and Vth_max present and match data sheet, if needed	NA	
5.2.11	LEVEL 3	[Receiver Thresholds] Vinh_ac, Vinl_ac present and match data sheet, if needed	NA	
5.2.12	LEVEL 3	[Receiver Thresholds] Vinh_dc, Vinl_dc present and match data sheet, if needed	NA	
5.2.13	LEVEL 3	[Receiver Thresholds] Tslew_ac/Tdiffslew_ac present and match data sheet, if needed	NA	

Fill in the information regarding the models . Multiple models can be added on the same sheet if the model types are same (I/O, Input, Output etc)

Fill in the combined IQ Level and Correlation (i.e Measurement, Simulation or both)

Select the appropriate results from the drop-down menu

Add comments to explain the result

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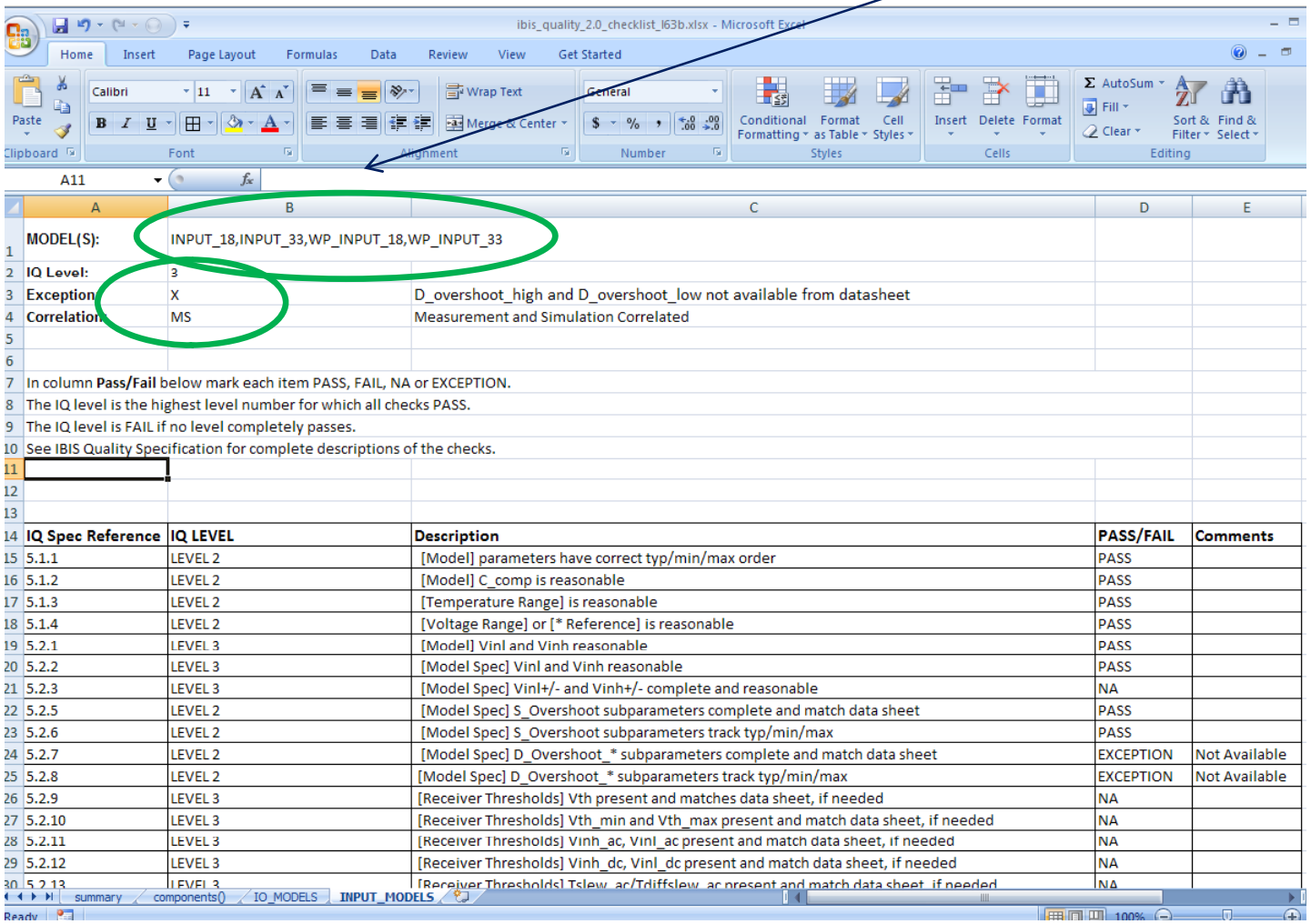
IBIS Models Check

Fill in the information for other types of models (ex. Input)



ibis_quality_2.0_checklist_l63b.xlsx - Microsoft Excel

	A	B	C	D	E
1	**MODEL(S):**	INPUT_18,INPUT_33,WP_INPUT_18,WP_INPUT_33			
2	**IQ Level:**	3			
3	**Exception**	X	D_overshoot_high and D_overshoot_low not available from datasheet		
4	**Correlation**	MS	Measurement and Simulation Correlated		
5					
6					
7	In column **Pass/Fail** below mark each item PASS, FAIL, NA or EXCEPTION.				
8	The IQ level is the highest level number for which all checks PASS.				
9	The IQ level is FAIL if no level completely passes.				
10	See IBIS Quality Specification for complete descriptions of the checks.				
11					
12					
13					
14	**IQ Spec Reference**	**IQ LEVEL**	**Description**	**PASS/FAIL**	**Comments**
15	5.1.1	LEVEL 2	[Model] parameters have correct typ/min/max order	PASS	
16	5.1.2	LEVEL 2	[Model] C_comp is reasonable	PASS	
17	5.1.3	LEVEL 2	[Temperature Range] is reasonable	PASS	
18	5.1.4	LEVEL 2	[Voltage Range] or [* Reference] is reasonable	PASS	
19	5.2.1	LEVEL 3	[Model] Vinl and Vinh reasonable	PASS	
20	5.2.2	LEVEL 3	[Model Spec] Vinl and Vinh reasonable	PASS	
21	5.2.3	LEVEL 3	[Model Spec] Vinl+/- and Vinh+/- complete and reasonable	NA	
22	5.2.5	LEVEL 2	[Model Spec] S_Overshoot subparameters complete and match data sheet	PASS	
23	5.2.6	LEVEL 2	[Model Spec] S_Overshoot subparameters track typ/min/max	PASS	
24	5.2.7	LEVEL 2	[Model Spec] D_Overshoot_* subparameters complete and match data sheet	EXCEPTION	Not Available
25	5.2.8	LEVEL 2	[Model Spec] D_Overshoot_* subparameters track typ/min/max	EXCEPTION	Not Available
26	5.2.9	LEVEL 3	[Receiver Thresholds] Vth present and matches data sheet, if needed	NA	
27	5.2.10	LEVEL 3	[Receiver Thresholds] Vth_min and Vth_max present and match data sheet, if needed	NA	
28	5.2.11	LEVEL 3	[Receiver Thresholds] Vinh_ac, Vinl_ac present and match data sheet, if needed	NA	
29	5.2.12	LEVEL 3	[Receiver Thresholds] Vinh_dc, Vinl_dc present and match data sheet, if needed	NA	
30	5.2.13	LEVEL 3	[Receiver Thresholds] Tslew_ac/Tdiffslew_ac present and match data sheet, if needed	NA	

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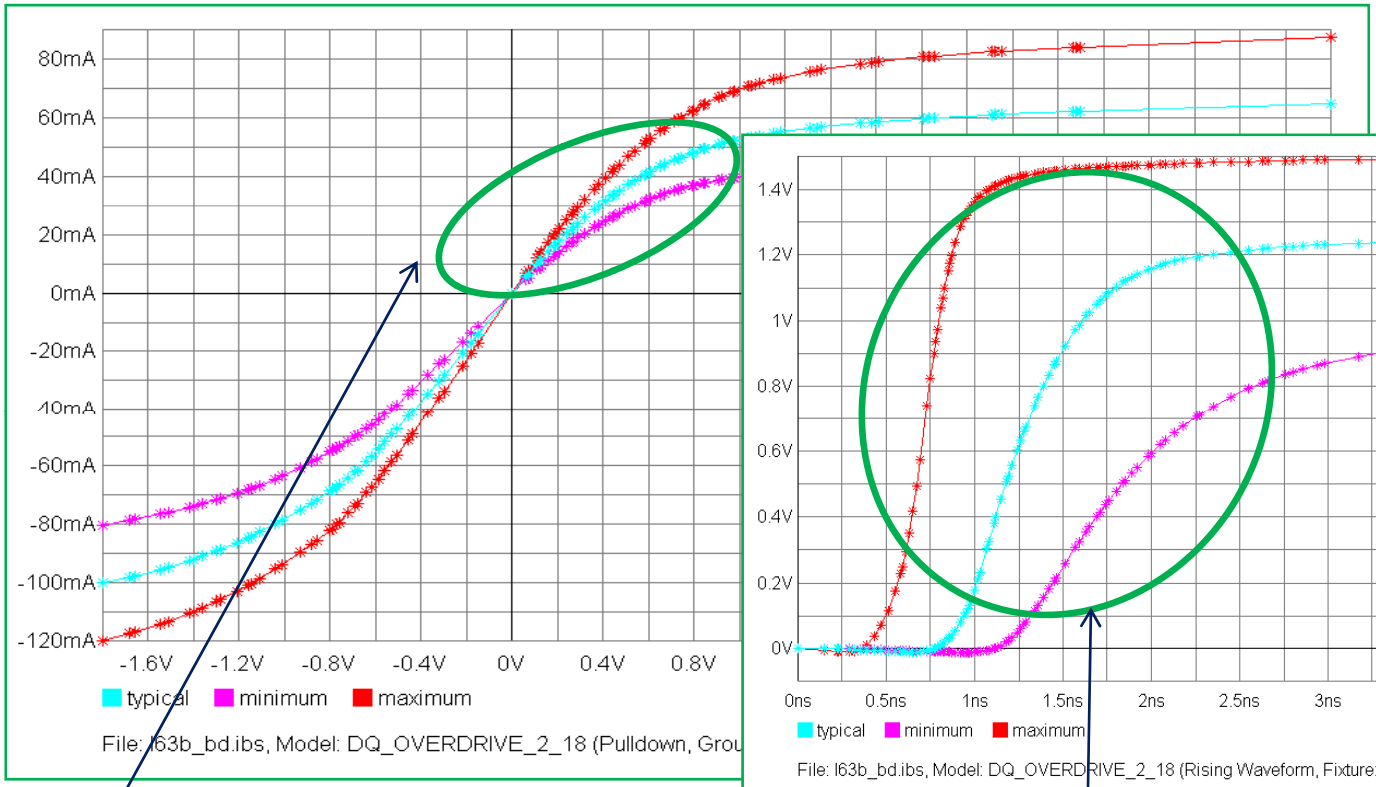
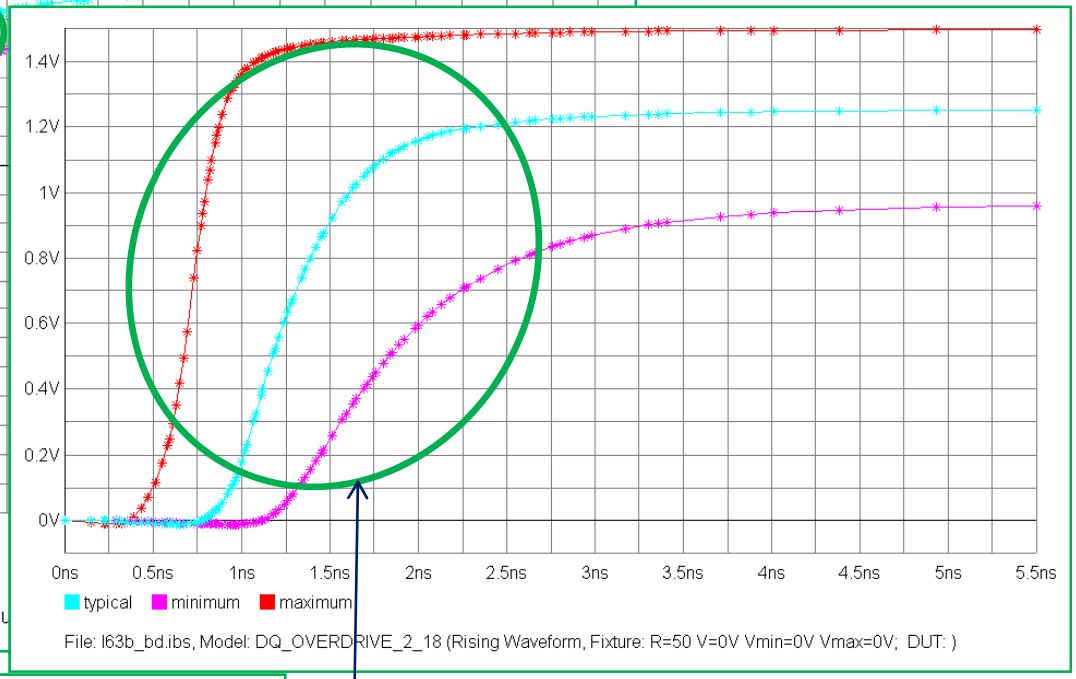
Some Checks Require a Curve Viewer





5.3.14. {LEVEL 2} Point distributions in I-V tables should be sufficient

We recommend a minimum of 10 data points at points of inflection in I-V tables to prevent interpolation issues in simulations.

5.4.2. {LEVEL 2} V-T tables have reasonable point distribution

V-T tables should be well behaved, with continuous second derivative. V-T point density should be sufficient in areas with non-zero second derivative. For example, a low to high state transition should have at least 10 points.

This check is easily accomplished by viewing the curves and checking visually.

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Summarize Model and Component IQ Checks in Summary Sheet

Components		
Component	**IQ LEVEL**	**Comments**
MT29F32G08MAEL63B	3	

Models		
Models	**IQ LEVEL**	**Comments**
DQ_OVERDRIVE_2_33	3XMS	Exception-Dynamic Overshoot parameter value not available from datasheet
DQ_OVERDRIVE_1_33	3XMS	Exception-Dynamic Overshoot parameter value not available from datasheet
DQ_NORMAL_33	3XMS	Exception-Dynamic Overshoot parameter value not available from datasheet
DQ_UNDERDRIVE_33	3XMS	Exception-Dynamic Overshoot parameter value not available from datasheet
DQ_OVERDRIVE_2_18	3XMS	Exception-Dynamic Overshoot parameter value not available from datasheet
DQ_OVERDRIVE_1_18	3XMS	Exception-Dynamic Overshoot parameter value not available from datasheet
DQ_NORMAL_18	3XMS	Exception-Dynamic Overshoot parameter value not available from datasheet

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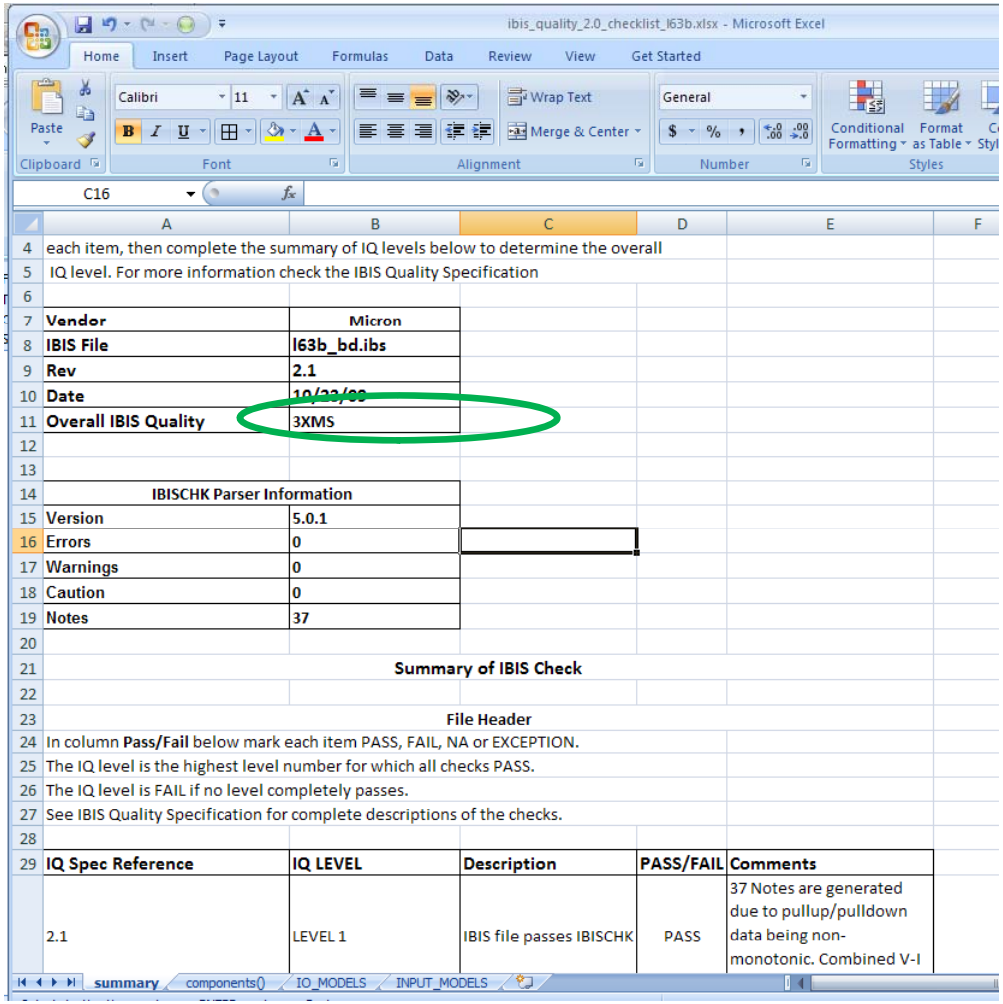
Summarize Overall IQ Checks in Summary Sheet



ibis_quality_2.0_checklist_I63b.xlsx - Microsoft Excel

Home | Insert | Page Layout | Formulas | Data | Review | View | Get Started

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each item, then complete the summary of IQ levels below to determine the overall
IQ level. For more information check the IBIS Quality Specification

Vendor	**Micron**
IBIS File	**I63b_bd.ibs**
Rev	**2.1**
Date	**10/22/09**
Overall IBIS Quality	**3XMS**

IBISCHK Parser Information	
Version	**5.0.1**
Errors	**0**
Warnings	**0**
Caution	**0**
Notes	**37**

Summary of IBIS Check

File Header

In column **Pass/Fail** below mark each item PASS, FAIL, NA or EXCEPTION.
The IQ level is the highest level number for which all checks PASS.
The IQ level is FAIL if no level completely passes.
See IBIS Quality Specification for complete descriptions of the checks.

IQ Spec Reference	IQ LEVEL	Description	PASS/FAIL	Comments
2.1	LEVEL 1	IBIS file passes IBISCHK	PASS	37 Notes are generated due to pullup/pulldown data being non-monotonic. Combined V-I

summary | components() | IO_MODELS | INPUT_MODELS

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Conclusions

- Summary sheet can be copied into the IBIS file or additional quality documents
- A detailed correlation report can be provided in addition to IQ checklist to verify “S” and “M” correlation designators in overall IQ levels
- IBIS models for modern technology are becoming more and more complex. IBIS Quality Specification and IQ checklist can help to verify the accuracy of the models for the SI engineers.

Start asking for models with IQ Checklist!!

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References

- IBIS Quality Specification
  - http://www.eda.org/ibis/quality_ver2.0/quality_ver2_0.pdf
- IBIS Quality Review
  - Mike LaBonte, Cisco Systems, DAC IBIS Summit, July 28, 2009
  - http://www.eda.org/pub/ibis/summits/jul09/labonte.pdf

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