IBIS Quality 3.0 checklist spreadsheet

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IBIS Quality Specification

- The purpose of the 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

IBIS Quality Version 1.0 (Basic Checks)

- IBIS Quality version 1.0 covers only the basic checks and does not address the newer features added later in the 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

IBIS Quality Version 2.0 (Advanced Checks)

- IBIS Quality version 2.0 covers the items necessary to check the models based on the 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 declared but not defined
  - Extension M – correlated against hardware measurements
  - Extension S – correlated against simulation
  - Extension G – golden waveforms included
  - Extension X – exception(s) to check(s) commented in file

IBIS Quality Version 2.0 (Advanced Checks)

- IBIS Quality version 2.0 covers the items necessary to check the models based on the 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-aware analysis checked**

  modifiers (additional slide)
  - Extension M – correlated against hardware measurements
  - Extension S – correlated against simulation
  - Extension G – golden waveforms included
  - Extension X – exception(s) to check(s) commented in file

Quality Level Modifiers

- A quality level might have one or more letters after the number
- Any combination of letter extensions can be added after the quality level number, such as, IQ3MS

- X – Exceptions
- S – Simulation Correlated
- M – Measurement Correlated
- G – Contains Golden Waveforms

IBIS Quality Checklist version 3.0

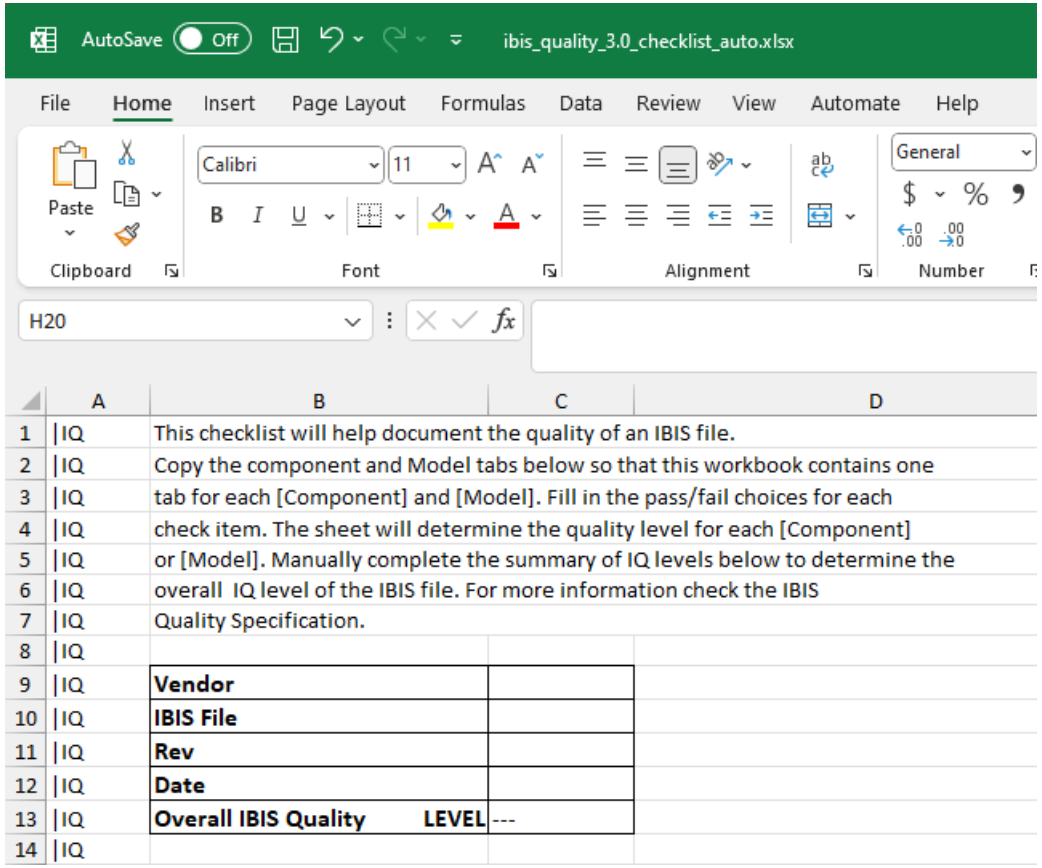
- Is a spreadsheet file
- Filename - ibis_quality_3.0_checklist_auto.xlsx
- Provides a general guideline on validating the quality of the IBIS file
- Documents the results of the quality check based on the IBIS Quality specification version 3.0

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
  - IBIS File Viewer that displays I-V and V-T curves (helpful)
- IBIS Quality Specification and Checklist can be downloaded from the Quality subcommittee webpage

https://ibis.org/quality_ver3.0/

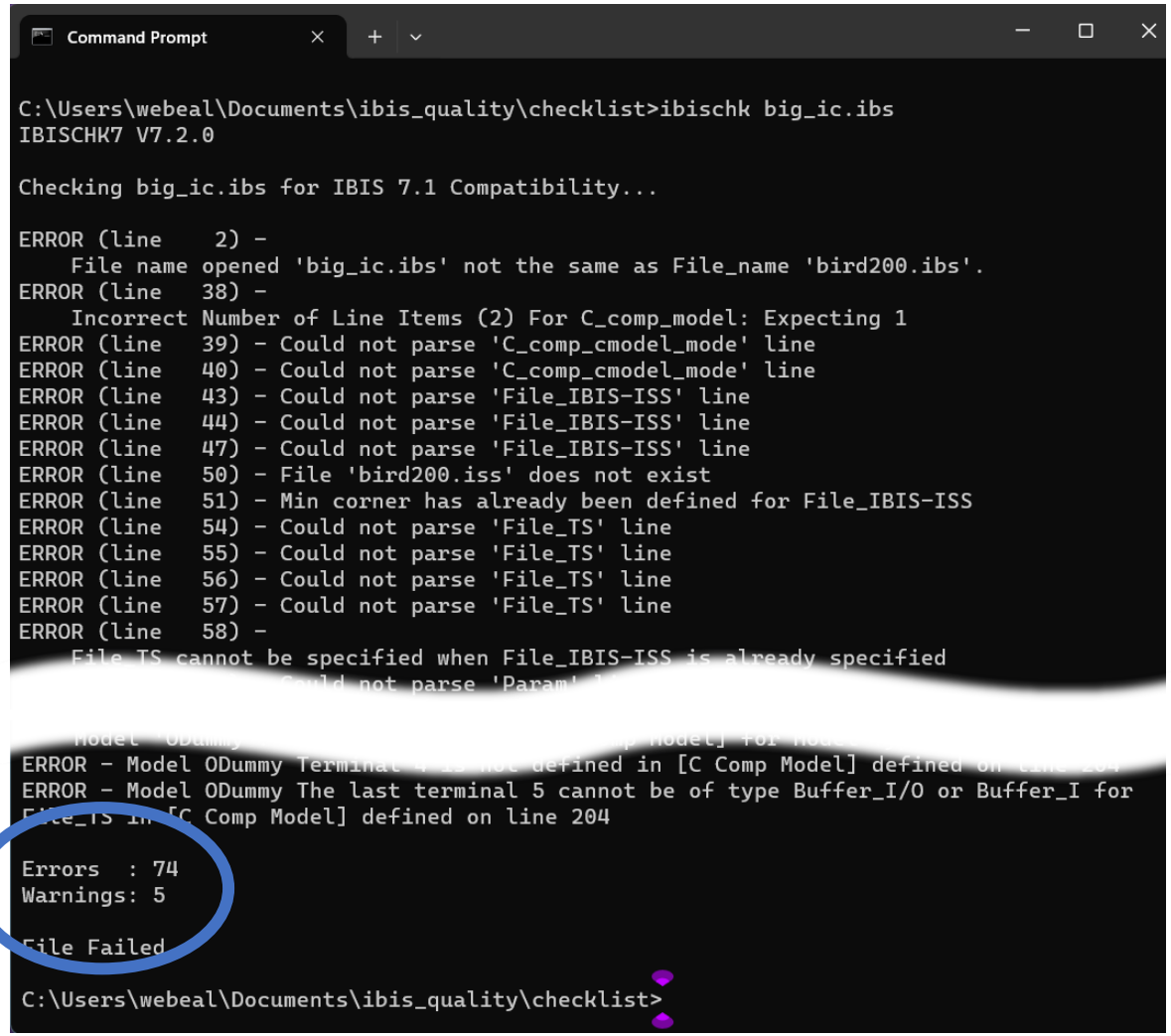
Start With Blank IQ checklist



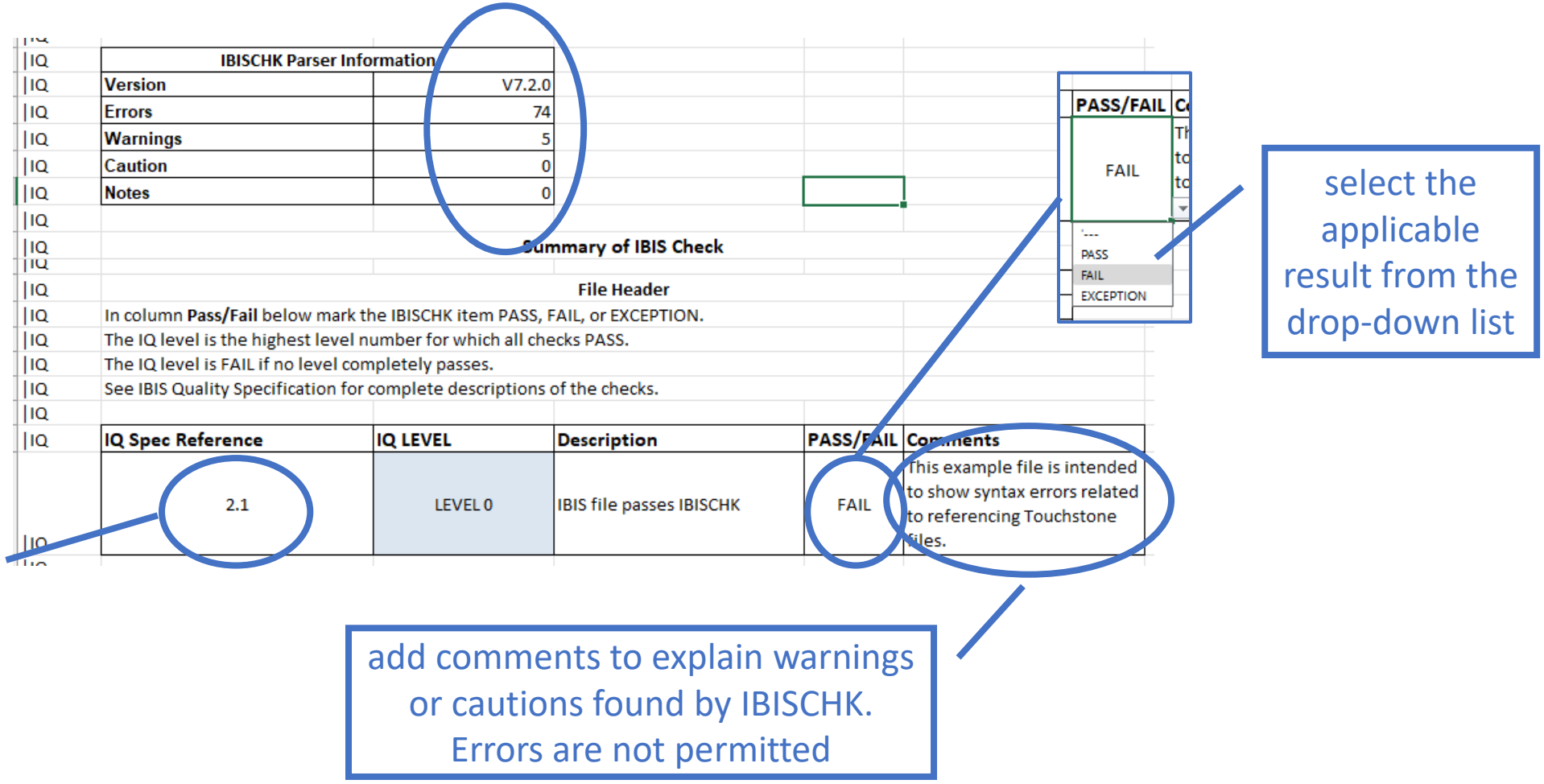
	A	B	C	D
1	IQ	This checklist will help document the quality of an IBIS file.		
2	IQ	Copy the component and Model tabs below so that this workbook contains one		
3	IQ	tab for each [Component] and [Model]. Fill in the pass/fail choices for each		
4	IQ	check item. The sheet will determine the quality level for each [Component]		
5	IQ	or [Model]. Manually complete the summary of IQ levels below to determine the		
6	IQ	overall IQ level of the IBIS file. For more information check the IBIS		
7	IQ	Quality Specification.		
8	IQ			
9	IQ	**Vendor**		
10	IQ	**IBIS File**		
11	IQ	**Rev**		
12	IQ	**Date**		
13	IQ	**Overall IBIS Quality LEVEL**	---	
14	IQ			

Fill in the IBIS File Information

Run the IBISCHK Parser on the IBIS File



Fill in the IBISCHK results in the IQ Spreadsheet



IBISCHK Parser Information	
Version	V7.2.0
Errors	74
Warnings	5
Caution	0
Notes	0

Summary of IBIS Check

File Header

In column **Pass/Fail** below mark the IBISCHK item PASS, FAIL, 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 0	IBIS file passes IBISCHK	FAIL	This example file is intended to show syntax errors related to referencing Touchstone files.

PASS/FAIL

FAIL

PASS
FAIL
EXCEPTION

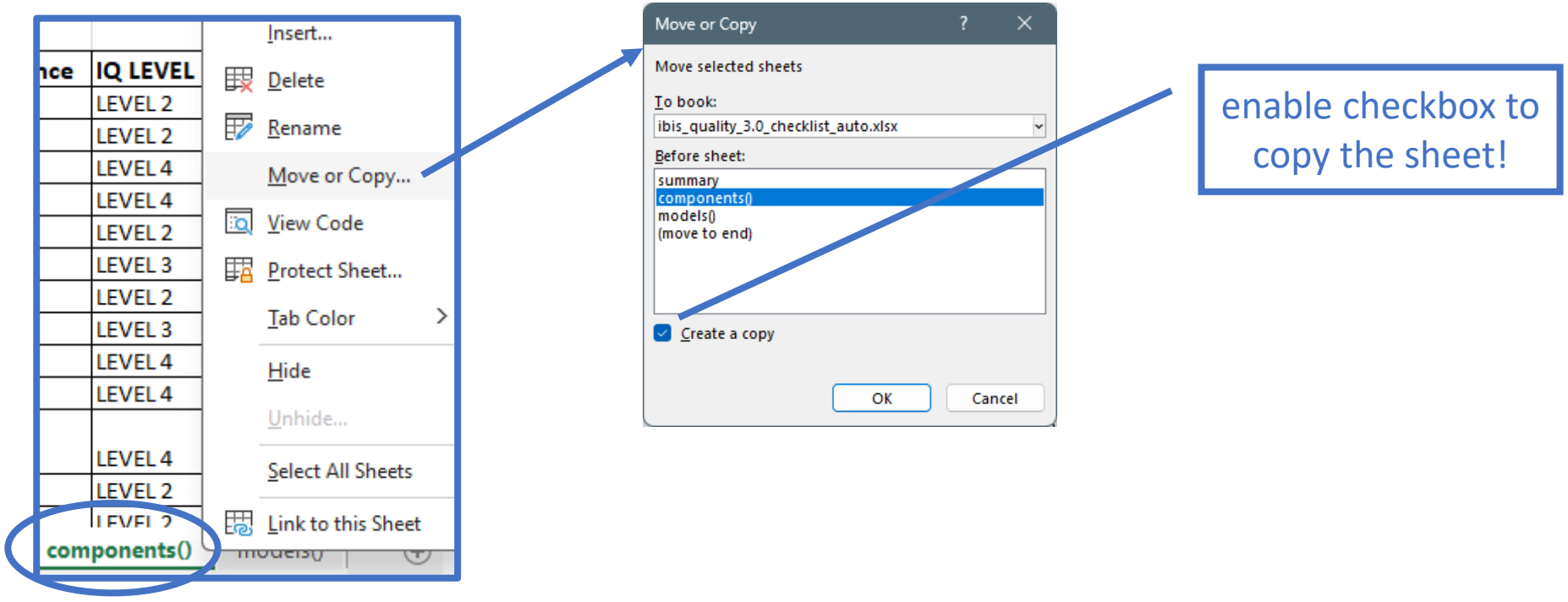
refer to section 2.1 of the IBIS Quality specification

select the applicable result from the drop-down list

add comments to explain warnings or cautions found by IBISCHK. Errors are not permitted

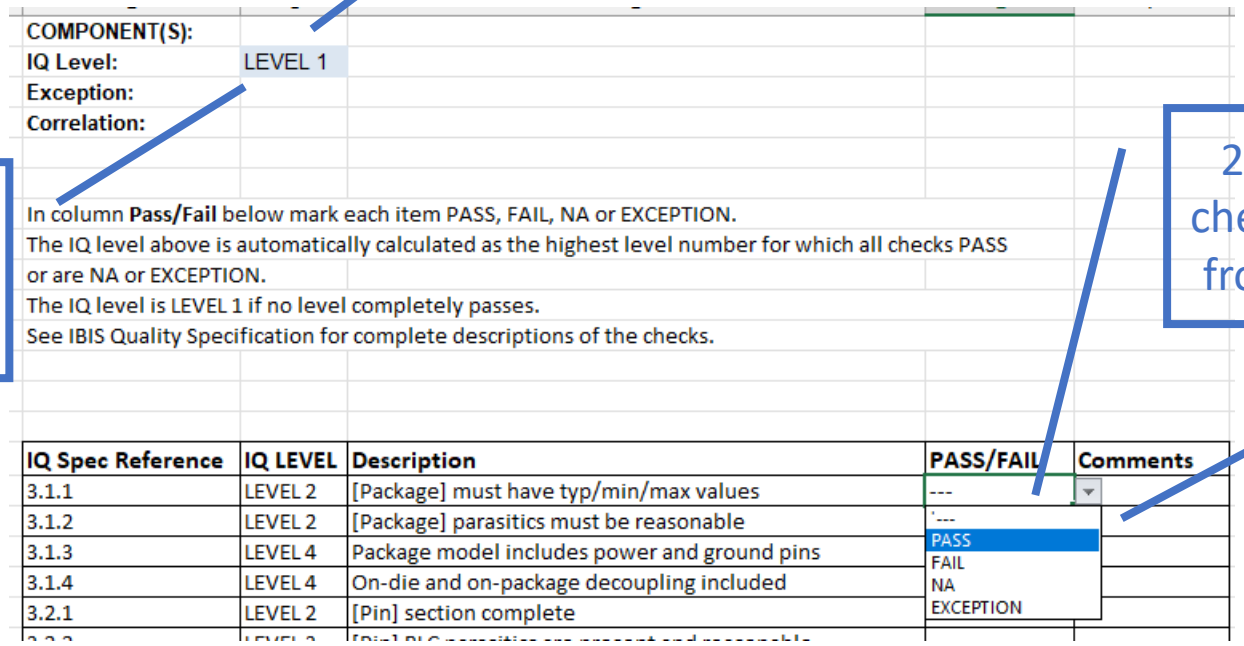
IBIS Components Sheets

Make a copy of the components() sheet for each [Component] in the file being checked



[Component] Checks

1. fill in the component label



COMPONENT(S):	
IQ Level:	LEVEL 1
Exception:	
Correlation:	

In column **Pass/Fail** below mark each item PASS, FAIL, NA or EXCEPTION.
The IQ level above is automatically calculated as the highest level number for which all checks PASS or are NA or EXCEPTION.
The IQ level is LEVEL 1 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	---	
3.1.2	LEVEL 2	[Package] parasitics must be reasonable	---	
3.1.3	LEVEL 4	Package model includes power and ground pins	PASS	
3.1.4	LEVEL 4	On-die and on-package decoupling included	FAIL	
3.2.1	LEVEL 2	[Pin] section complete	NA	
			EXCEPTION	

2. for each item in the checklist select the result from the drop-down list

3. add comments as appropriate

4. the IQ Level is calculated automatically from the PASS/FAIL column data

[Model Selector] Checks

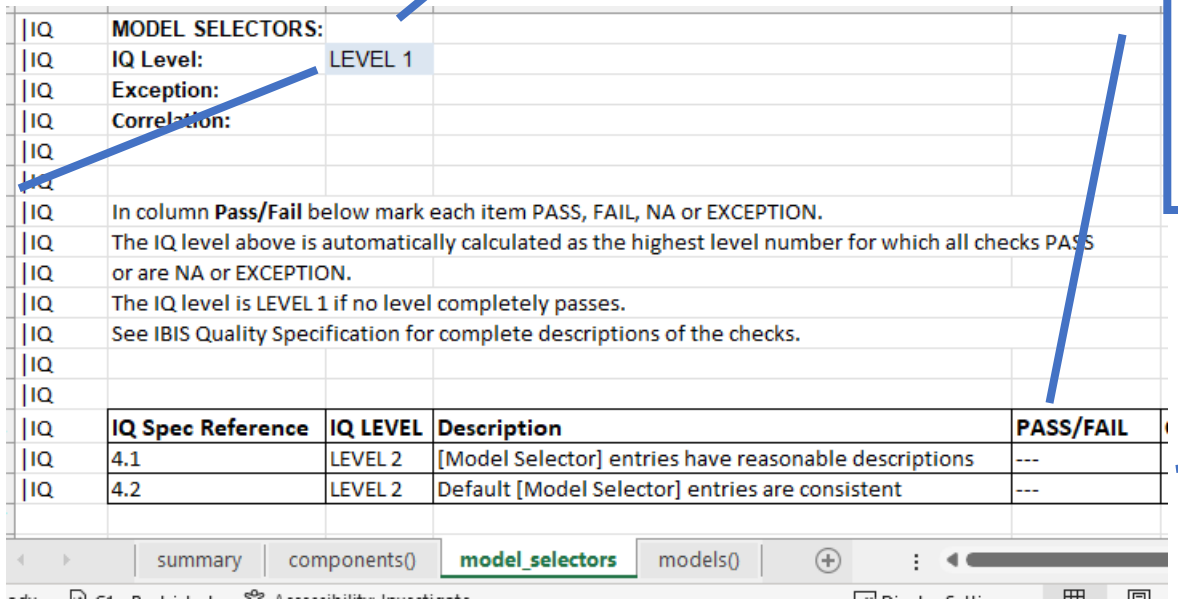
no need to copy the model_selector sheet

1. fill in the list of model selector labels

2. for each item in the checklist select the result from the drop-down list

3. add comments as appropriate

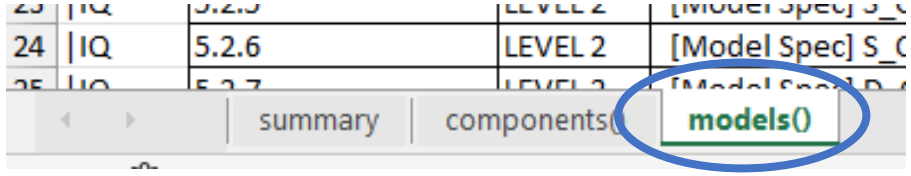
4. the IQ Level is calculated automatically from the PASS/FAIL column data



IQ	**MODEL SELECTORS:**			
IQ	**IQ Level:**	LEVEL 1		
IQ	**Exception:**			
IQ	**Correlation:**			
IQ				
IQ				
IQ	In column **Pass/Fail** below mark each item PASS, FAIL, NA or EXCEPTION.			
IQ	The IQ level above is automatically calculated as the highest level number for which all checks PASS			
IQ	or are NA or EXCEPTION.			
IQ	The IQ level is LEVEL 1 if no level completely passes.			
IQ	See IBIS Quality Specification for complete descriptions of the checks.			
IQ				
IQ				
IQ	**IQ Spec Reference**	**IQ LEVEL**	**Description**	**PASS/FAIL**
IQ	4.1	LEVEL 2	[Model Selector] entries have reasonable descriptions	---
IQ	4.2	LEVEL 2	Default [Model Selector] entries are consistent	---

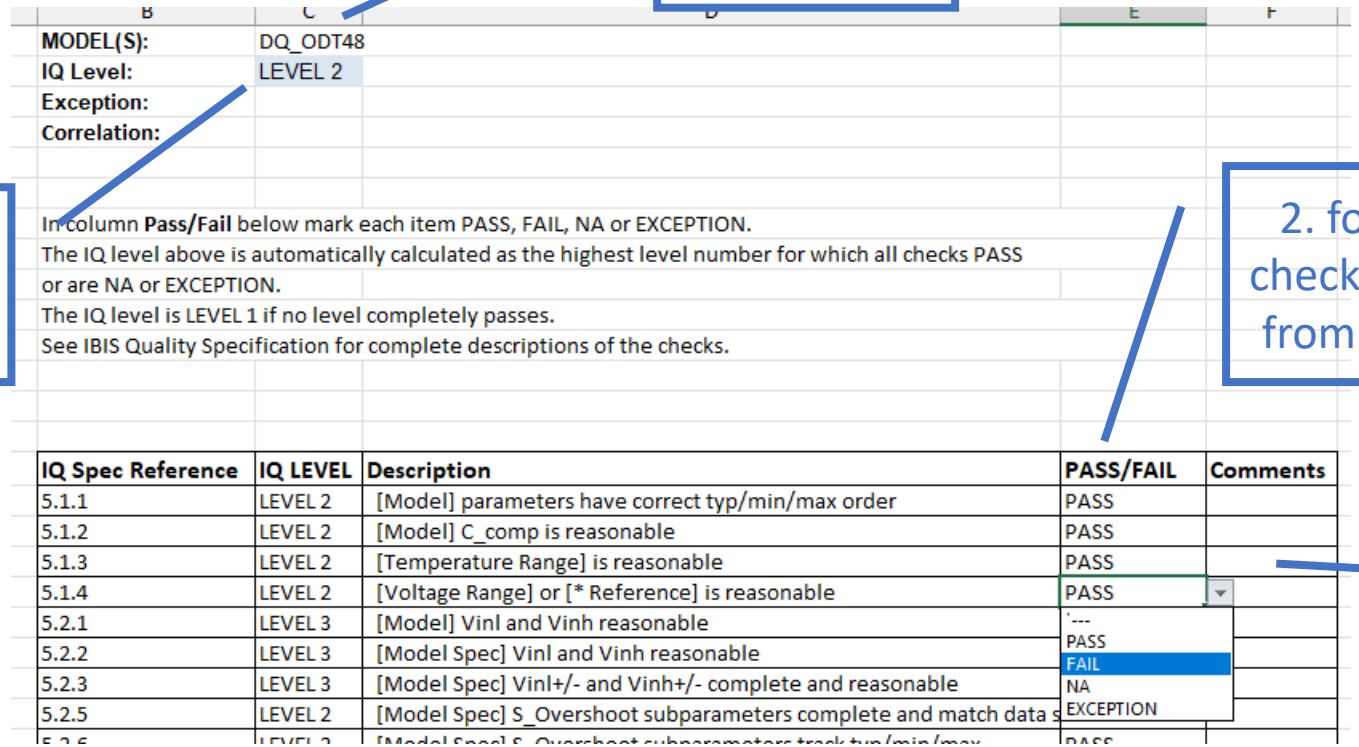
IBIS Models Sheets

Make a copy of the models() sheet for each [Model] in the file being checked



[Model] Checks

1. fill in the model label



MODEL(S):	DQ_ODT48
IQ Level:	LEVEL 2
Exception:	
Correlation:	

In column **Pass/Fail** below mark each item PASS, FAIL, NA or EXCEPTION.
The IQ level above is automatically calculated as the highest level number for which all checks PASS or are NA or EXCEPTION.
The IQ level is LEVEL 1 if no level completely passes.
See IBIS Quality Specification for complete descriptions of the checks.

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		
5.2.2	LEVEL 3	[Model Spec] Vinl and Vinh reasonable		
5.2.3	LEVEL 3	[Model Spec] Vinl+/- and Vinh+/- complete and reasonable		
5.2.5	LEVEL 2	[Model Spec] S_Overshoot subparameters complete and match data s		

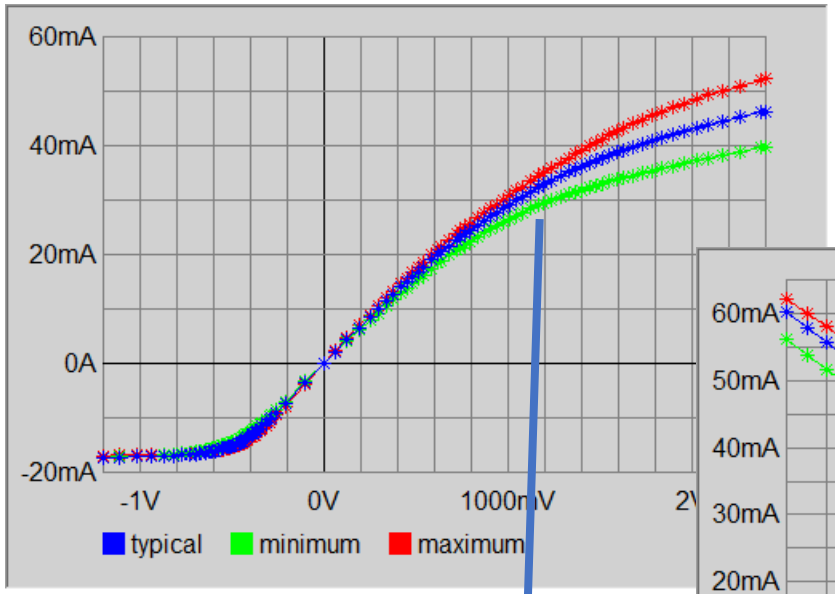
'---
PASS
FAIL
NA
EXCEPTION

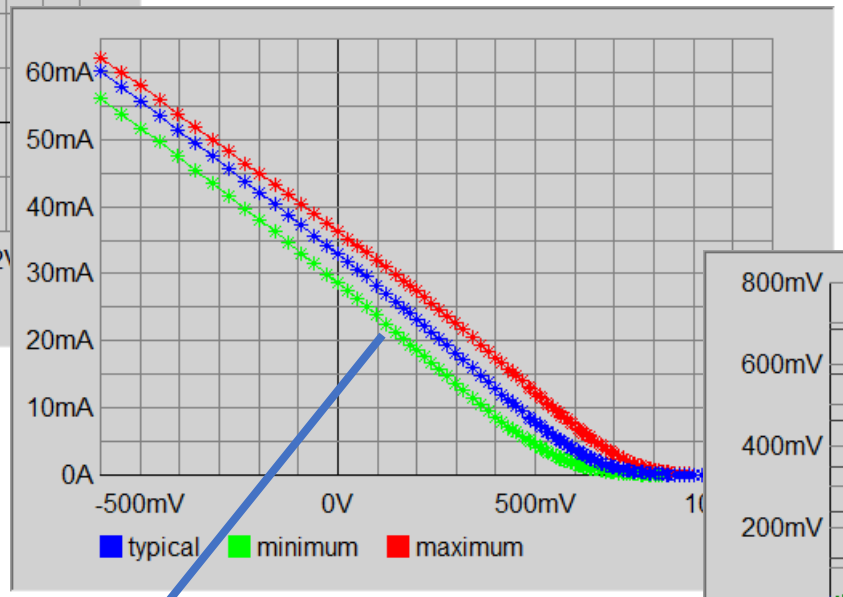
2. for each item in the checklist select the result from the drop-down list

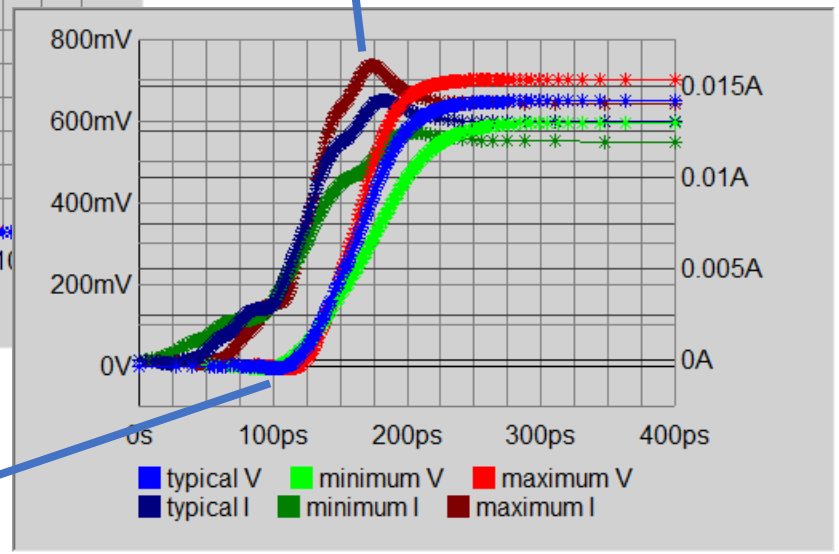
3. add comments as appropriate

4. the IQ Level is calculated automatically from the PASS/FAIL column data

Some Checks Require a Curve Viewer







5.8.3 {LEVEL 4} [Composite Current] waveforms must be time-aligned with corresponding V-T waveforms

Most SI tools that use IBIS models have a way to view the tables as curves

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

5.7.3 {LEVEL 4} ISSO tables have sufficient point distribution

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

Summarize Model and Component IQ Checks in Summary Sheet

1. copy the component and model names into the summary list adding or deleting rows as needed

File Header

In column **Pass/Fail** below mark the IBISCHK item PASS, FAIL, or EXCEPTION.
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See IBIS Quality Specification for complete descriptions of the checks.

IQ Spec Reference	IQ LEVEL	Description	PASS/FAIL	Comments
3.0	LEVEL 1	IBIS file passes IBISCHK	PASS	

Components

Component	IQ LEVEL	Comments
Component1	---	
Component2	---	
Component3	---	

Models

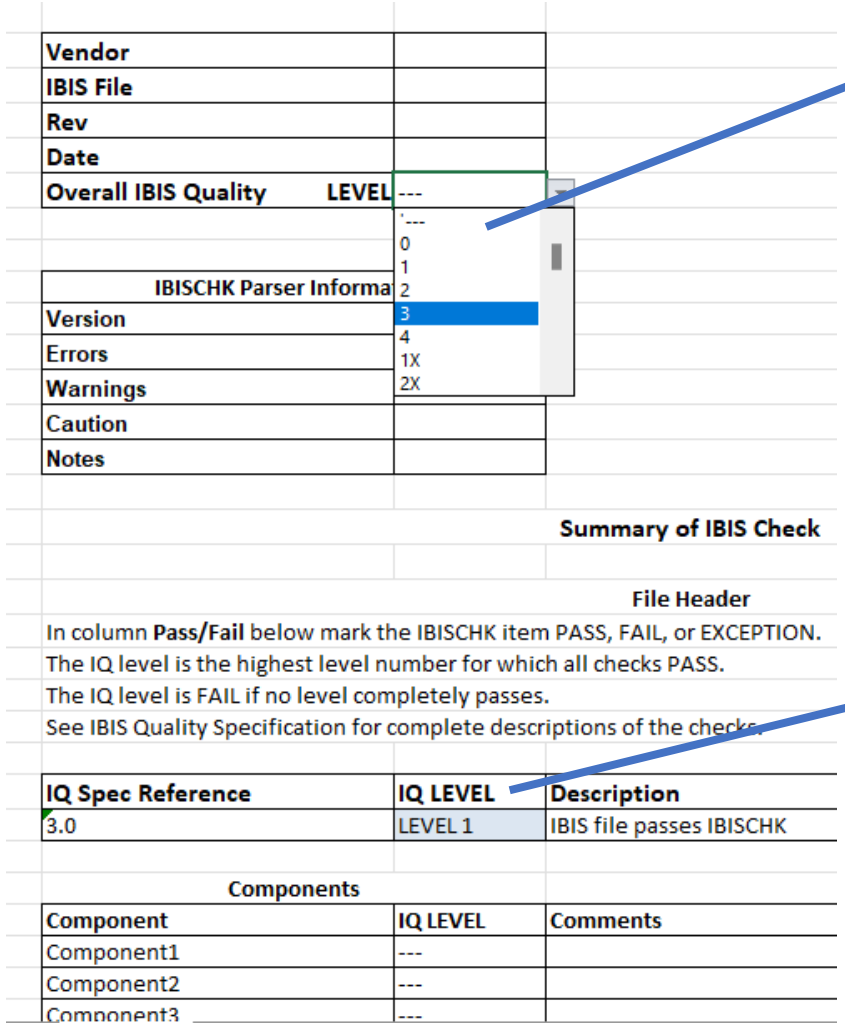
Models	IQ LEVEL	Comments
Model1	---	
Model2	---	
Model3	---	

summary | components() | models()

2. for each component and model, copy the IQ LEVEL from the sheet and select the level from the drop-down list

automating this step requires a script macro in Excel which might present a security risk

Summarize Overall IQ Checks in Summary Sheet



Vendor	
IBIS File	
Rev	
Date	
Overall IBIS Quality LEVEL	---

0
1
2
3
4
1X
2X

IBISCHK Parser Informa	
Version	
Errors	
Warnings	
Caution	
Notes	

Summary of IBIS Check

File Header

In column **Pass/Fail** below mark the IBISCHK item PASS, FAIL, or EXCEPTION.
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IQ Spec Reference	IQ LEVEL	Description
3.0	LEVEL 1	IBIS file passes IBISCHK

Components

Component	IQ LEVEL	Comments
Component1	---	
Component2	---	
Component3	---	

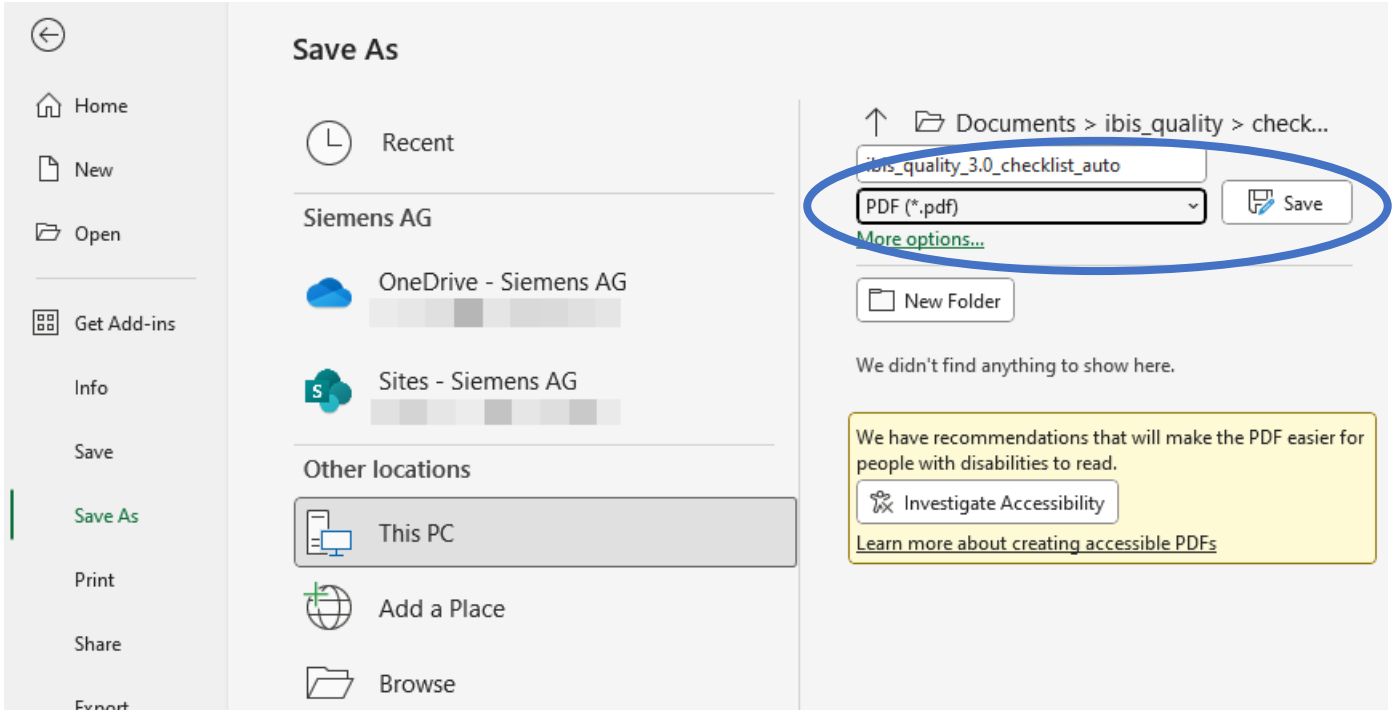
select the overall file IQ Level with applied modifiers

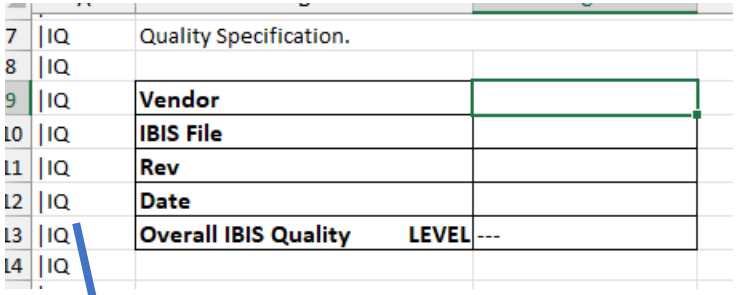
this step is not automated since modifiers cannot be determined programmatically

the file IQ Level is the lowest level found in this column of the summary

Report

- Save as PDF
- Copy checklist result into the IBIS file





all lines in the checklist sheets begin with "|IQ" so you can cut and paste the text into the IBIS file

Conclusions

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

Keep asking for models with an IQ Checklist!