



Using the IBIS Quality Checklist

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IBIS Open Forum Summit

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IBIS Quality Subcommittee

- **IQ Purpose:**
 - Model Makers:** produce IBIS files that users trust
 - Model Users:** receive IBIS file that work
- **IBIS Quality Specification**
http://www.sissoft.com/ibis-quality/docs/IQ_specification.txt
- **IBIS Quality Checklist**
http://www.sissoft.com/ibis-quality/docs/IQ_checklist.xls
 - The specification is needed to understand checklist items.

Overview of using the IQ Checklist

- **What you need:**
 - An IBIS file
 - The IQ Checklist spreadsheet (copy)
 - The IQ Specification
 - Ibischk3 or ibischk4 program
 - An IBIS file viewer that display I/V and V/T curves

Start with a blank IQ Checklist spreadsheet

	A	B	C	D	E	F	G
1	IIQ	IBIS Quality Checklist					
2	IIQ						
3	IIQ						
4	IIQ	This checklist will help validate the quality of an IBIS file. Copy the Comp and Model					
5	IIQ	tabs below so that this spreadsheet contains one tab for each [Component] and					
6	IIQ	[Model]. Fill in the tabs to determine the quality level for each item, then complete					
7	IIQ	the summary of IQ levels below to determine the overall IQ level.					
8	IIQ	More information: http://www.sissoft.com/ibis-quality/docs/IQ_specification.txt					
9	IIQ						
10	IIQ	FILE:					
11	IIQ	SOURCE:					
12	IIQ	CHECKER:					
13	IIQ	DATE:					
14	IIQ						
15	IIQ		Name	IQ Level			
16	IIQ	Overall IQ Level					
17	IIQ	File Header					
18	IIQ	Comp					
19	IIQ	Model					
20	IIQ	Model					
21	IIQ						
22	IIQ		IBISCHK Information				
23	IIQ	IBISCHK VERSION:					
24	IIQ	ERRORS:					
25	IIQ	WARNINGS:					
26	IIQ						
27	IIQ	File Header:					
28	IIQ	In column B below mark each item PASS, FAIL, or N/A. The IQ level is the highest					
29	IIQ	level number for which all checks PASS. The IQ level is FAIL if no level completely					
30	IIQ	passes. See IQ_specification.txt for complete descriptions of the checks.					
31	IIQ						
32	IIQ	2.1	LEVEL 0	File passes IBISCHK			
33	IIQ	2.2	LEVEL 0	Latest [IBIS ver] used			
34	IIQ	2.3	LEVEL 0	Do not use [Comment Char]			
35	IIQ	2.4	LEVEL 0	[File Name] is correct			
36	IIQ	2.5	LEVEL 0	[File Rev] is correct			
37	IIQ	2.6	LEVEL 0	[Date] is correct			
38	IIQ	2.7	LEVEL 0	[Source] is complete			
39	IIQ	2.8	LEVEL 0	[Notes] is complete			
40	IIQ	2.9	OPTIONAL	[Disclaimer] and [Copyright]			
41	IIQ						
42							
		Summary	Comp NAME1	Model NAME1	Model NAME2		

Fill in basic information

	A	B	C	D	E	F
1	Q	IBIS Quality Checklist				
2	Q					
3	Q					
4	Q	This checklist will help validate the quality of an IBIS file. Copy the Comp and Model				
5	Q	tabs below so that this spreadsheet contains one tab for each [Component] and				
6	Q	[Model]. Fill in the tabs to determine the quality level for each item, then complete				
7	Q	the summary of IQ levels below to determine the overall IQ level.				
8	Q	More information: http://www.silicon.com/ibis-quality/docs/IQ_specification.txt				
9	Q					
10	Q	FILE:	iqsample.ibs			
11	Q	SOURCE:	ACME website			
12	Q	CHECKER:	Wile E. Coyote			
13	Q	DATE:	21-Sep-04			
14	Q					
15	Q		Name		IQ Level	
16	Q	Overall IQ Level				
17	Q	File Header				
18	Q	Comp				

Run IBISCHK on the IBIS file

```
[IBIS Ver]      4.0  
[File Name]     iqsampl.e.ibs  
[File Path]     4.0
```

- Use the latest IBISCHK
- Change [IBIS ver] in the file to match the IBISCHK used

```
$ ibischk4 iqsampl.e.ibs  
IBISCHK4 V4.0.2
```

```
Checking iqsampl.e.ibs for IBIS 4.0 Compatibility...
```

```
Errors      : 0
```

```
File Passed
```

Enter the ibischk results

22	IIQ		IBISCHK Information				
23	IIQ	IBISCHK VERSION:	V4.0.2				
24	IIQ	ERRORS:	0				
25	IIQ	WARNINGS:	0				
26	IIQ						
27	IIQ	File Header:					
28	IIQ	In column B below mark each item PASS, FAIL, or N/A. The IQ level is the highest level number for which all checks PASS. The IQ level is FAIL if no level completely passes. See IQ_specification.txt for complete descriptions of the checks.					
29	IIQ						
30	IIQ						
31							
32	IIQ	PASS	2.1	LEVEL 0	File passes IBISCHK		
33	IIQ	PASS	2.2	LEVEL 0	Latest [IBIS ver] used		
34	IIQ		2.3	LEVEL 0	Do not use [Comment Char]		

Use the IQ Specification as a reference

2.0 General Header Section Requirements

=====

Requirements for the header section of the IBIS file, from the beginning of the file to the line before the first [Component] keyword.

2.1 {LEVEL 0} Header passes IBISCHK

It is expected that semiconductor vendors pass the IBIS models they create through IBISCHK for testing purposes. A Quality Level 0 model must EITHER have no errors or warnings when passed through IBISCHK -OR- "acceptable" warnings must be identified in the IBIS file itself, under the [Notes] section below. The number of warnings expected, along with the reason why they should be considered acceptable must be identified. A Level 0 Model must NOT produce ANY errors when run through IBISCHK.

Summary:

- The is goal zero errors and zero warnings
- In some cases zero warnings not possible.
- Document known cases of acceptable warnings.
- Document version of IBISCHK

2.2 {LEVEL 0} Latest [IBIS ver] used

The highest IBIS version for which a parser is available should be used (presently 3.2, soon to be 4.0). Even if only IBIS 2.1 features are used in the model, the [IBIS Ver] value should be set to at least 3.2,

Check each IBIS file header item

```
[IBIS Ver]      4.0
[File Name]    iqsampl.ibs
[File Rev]     1.0
[Date]         09/21/2004

[Source]       State secret, can't reveal that.

[Notes]        This IBIS file was created to provide an instructive
                sample for learning to use the IBIS Quality Checklist.

[Copyright]     Unauthorized reproduction and/or distribution is strictly
                prohibited by no one.
```

[Disclaimer]

[Component]

[Manufacturer]

27	IIQ	File Header:					
28	IIQ	In column B below mark each item PASS, FAIL, or N/A. The IQ level is the highest					
29	IIQ	level number for which all checks PASS. The IQ level is FAIL if no level completely					
30	IIQ	passes. See IQ_specification.txt for complete descriptions of the checks.					
31							
32	IIQ	PASS	2.1	LEVEL 0	File passes IBSCHK		
33	IIQ	PASS	2.2	LEVEL 0	Latest [IBIS ver] used		
34	IIQ	PASS	2.3	LEVEL 0	Do not use [Comment Char]		
35	IIQ	PASS	2.4	LEVEL 0	[File Name] is correct		
36	IIQ	PASS	2.5	LEVEL 0	[File Rev] is correct		
37	IIQ	PASS	2.6	LEVEL 0	[Date] is correct		
38	IIQ	PASS	2.7	LEVEL 0	[Source] is complete		
39	IIQ	PASS	2.8	LEVEL 0	[Notes] is complete		
40	IIQ	PASS	2.9	OPTIONAL	[Disclaimer] and [Copyright]		
41	IIQ						

IQ Checklist has multiple sheets

Microsoft Excel - IQ_checklist.xls

File Edit View Insert Format Tools Data Window Help

Type a question for help

Reply with Changes... End Review...

4.3.3 LEVEL 1 I-V table

4.3.4 LEVEL 1 [Pullup]

4.3.5 LEVEL 1 [Pulldown]

4.3.6 LEVEL 1 [Power]

4.3.7 LEVEL 1 [GND C]

4.3.8 LEVEL 1 I-V table

Comp IQ_SAMPLE / Model SAMPLE_OUT / Model SAMPLE_IN

14 IIQ

15 IIQ

16 Overall IQ Level

17 IIQ File Header

18 IIQ Comp

19 IIQ Model

20 IIQ Model

21 IIQ

22 IIQ IBISCHK Information

23 IIQ IBISCHK VERSION:

24 IIQ ERRORS:

25 IIQ WARNINGS:

26 IIQ

27 IIQ File Header:

28 IIQ In column B below mark each item PASS, FAIL, or N/A. The IQ level is the highest

29 IIQ level number for which all checks PASS. The IQ level is FAIL if no level completely

30 IIQ passes. See IQ_specification.txt for complete descriptions of the checks.

31 IIQ

32 IIQ 2.2 LEVEL 0 Latest [IBIS ver] used

33 IIQ 2.3 LEVEL 0 Do not use [Comment Char]

34 IIQ 2.4 LEVEL 0 [File Name] is correct

35 IIQ 2.5 LEVEL 0 [File Rev] is correct

36 IIQ 2.6 LEVEL 0 [Date] is correct

37 IIQ 2.7 LEVEL 0 [Source] is complete

38 IIQ 2.8 LEVEL 0 [Notes] is complete

39 IIQ 2.9 OPTIONAL [Disclaimer] and [Copyright]

40 IIQ

41 IIQ

42 IIQ

43 IIQ

Summary / Comp NAME1 / Model NAME1 / Model NAME2 /

Ready

- Sheet for each Component and Model
- Copy and rename as needed

Check the [Component]s

- Fill in the name
- Use N/A for irrelevant items

[Component] IQ_SAMPLE
 [Manufacturer] ACME Inc.
 [Package]

R_pkg
 L_pkg
 C_pkg

[Pin] signal

1 CLK
 2 OE
 3 GND
 4 1YP
 5 1YN
 6 VDD
 7 1YP
 8 1YN

	typ	min	max
1	IIQ	COMPONENT:	IQ_SAMPLE
2	IIQ	IQ Level:	
3	IIQ		
4	IIQ	In column B below mark each item PASS, FAIL, or N/A. The IQ level is FAIL if no level completely passes. See IQ_specification.txt for complete descriptions of the	
5	IIQ	The IQ level is FAIL if no level completely passes. See IQ_specification.txt for complete descriptions of the	
6	IIQ	PASS	3.1.1 LEVEL 0 [Package] must have typical values
7	IIQ	PASS	3.1.2 LEVEL 0 [Package] Parasitics must be reasonable
8	IIQ	N/A	3.1.3 LEVEL 0 [Define Package Model] present if [Package Model] is
9	IIQ	PASS	3.1.4 LEVEL 1 [Package] parasitics are validated against data sheet
10	IIQ	PASS	3.2.1 LEVEL 0 [Pin] section complete
11	IIQ	PASS	3.2.2 LEVEL 0 [Pin] model names not too long
12	IIQ	PASS	3.2.3 LEVEL 0 [Pin] models present in file
13	IIQ	N/A	3.2.4 OPTIONAL [Pin] RLC complete
14	IIQ	N/A	3.2.5 LEVEL 1 [Pin] RLC parasitics are validated against data sheet
15	IIQ	N/A	3.3.1 LEVEL 0 [Diff Pin] referenced pins exist
16	IIQ	N/A	3.3.2 LEVEL 0 [Diff Pin] Vdiff and Tskew complete and reasonable
17	IIQ	N/A	3.3.3 LEVEL 1 [Diff Pin] Vdiff and Tskew correct
18	IIQ	N/A	3.3.4 LEVEL 1 [Diff Pin] referenced pin models matched
19	IIQ	N/A	3.4.1 LEVEL 0 [Model Selector] referenced [Model]s exist
20	IIQ	N/A	3.4.2 LEVEL 1 [Model Selector] first [Model] is default
21	IIQ	PASS	5.8 LEVEL 1 Models correspond to data sheet
22	IIQ	PASS	5.12 LEVEL 1 All pins consistent with data sheet
23	IIQ		

Common errors

5.8 {LEVEL 1} Models correspond to data sheet

In the ibis-model file there are some models missing, which should be there corresponding to the data sheet.

e.g. different driver strength, inputs with internal pullup either put them in a model selector and if there doesn't exist all models, please note in ibisfile with NC ! No-model

Example: [Pin] must not use the same Model for two pins if their electrical performance differs

5.12 {LEVEL 1} All pins consistent with data sheet

All pins must be listed. Pin names must match data sheet and/or appropriate design files. (Be careful of consistency of pins names A01 vs A1 and how tools will interpret this data).

Example: [Pin] must not have pin name "A02" if the datasheet has "A2"

Check the [Model]s

```
[Model]
Model_type
Polarity
Enable
|
Vmeas = 1.5V
Cref = 5pF
Rref = 500
Vref = 0
```

C_comp

[Voltage range
[Temperature ra

[Pullup]

SAMPLE_OUT
3-state
Non-Inverting
Active-High

	A	B	C	D	E
1	IIQ	MODEL:	SAMPLE_OUT		
2	IIQ	IQ Level:			
3	IIQ				
4	IIQ	In column B below mark each item PASS, FAIL, or N/A. The IQ			
5	IIQ	The IQ level is FAIL if no level completely passes. See IQ_specification.txt for complete descriptions of			
6	IIQ	PASS	4.1.1	LEVEL 0	[Model] parameters have correct typ/min/max order
7	IIQ	PASS	4.1.2	LEVEL 0	[Model] Model_type
8	IIQ	PASS	4.1.3	LEVEL 0	[Model] C_comp is reasonable
9	IIQ		4.1.4	LEVEL 1	[Model] C_comp is correct
10	IIQ		4.1.5	LEVEL 2a	[Model] C_comp SPICE correlation
11	IIQ		4.1.6	LEVEL 2b	[Model] C_comp laboratory correlation
12	IIQ	PASS	4.1.7	LEVEL 1	[Temperature Range] is reasonable
13	IIQ	PASS	4.1.8	LEVEL 1	[Voltage Range] or [* Reference] is complete
14	IIQ	N/A	4.1.9	LEVEL 1	[Pullup Reference] is reasonable
15	IIQ	N/A	4.1.10	LEVEL 1	[Pulldown Reference] is reasonable
16	IIQ	N/A	4.1.11	LEVEL 1	[POWER Clamp Reference] is reasonable
17	IIQ	N/A	4.1.12	LEVEL 1	[GND Clamp Reference] is reasonable
18	IIQ	N/A	4.1.13	LEVEL 1	[Model] timing test load subparameters complete
19	IIQ	N/A	4.2.1	LEVEL 0	[Model] Vinl and Vinh complete
20	IIQ	N/A	4.2.2	LEVEL 1	[Model] Vinl and Vinh correct
21	IIQ	N/A	4.2.3	LEVEL 1	[Model] Vinl and Vinh enclose Vmeas
22	IIQ	PASS	4.2.4	LEVEL 1	[Model] Vmeas matches data sheet
23	IIQ	N/A	4.2.5	LEVEL 1	[Model Spec] Vinl and Vinh complete
24	IIQ	N/A	4.2.6	LEVEL 0	[Model Spec] Vinl and Vinh correct

- **Fill in the name**
- **Use N/A for irrelevant items**
eg. Vinyl and Vinh for an Output

About IQ levels

7	IIQ	PASS	4.1.2	LEVEL 0	[Model] Model type
8	IIQ	PASS	4.1.3	LEVEL 0	[Model] C_comp is reasonable
9	IIQ		4.1.4	LEVEL 1	[Model] C_comp is correct
10	IIQ		4.1.5	LEVEL 2a	[Model] C_comp SPICE correlation
11	IIQ		4.1.6	LEVEL 2b	[Model] C_comp laboratory correlation
12	IIQ	PASS	4.1.7	LEVEL 1	[Temperature Range] is reasonable

- **PASSes LEVEL 0 check for reasonable C_comp**
- **Correctness not checked by any means**
- **Summary LEVEL is highest *checked* LEVEL**
- **This is a LEVEL 0 model (at best)**

Summarize IQ level on each sheet

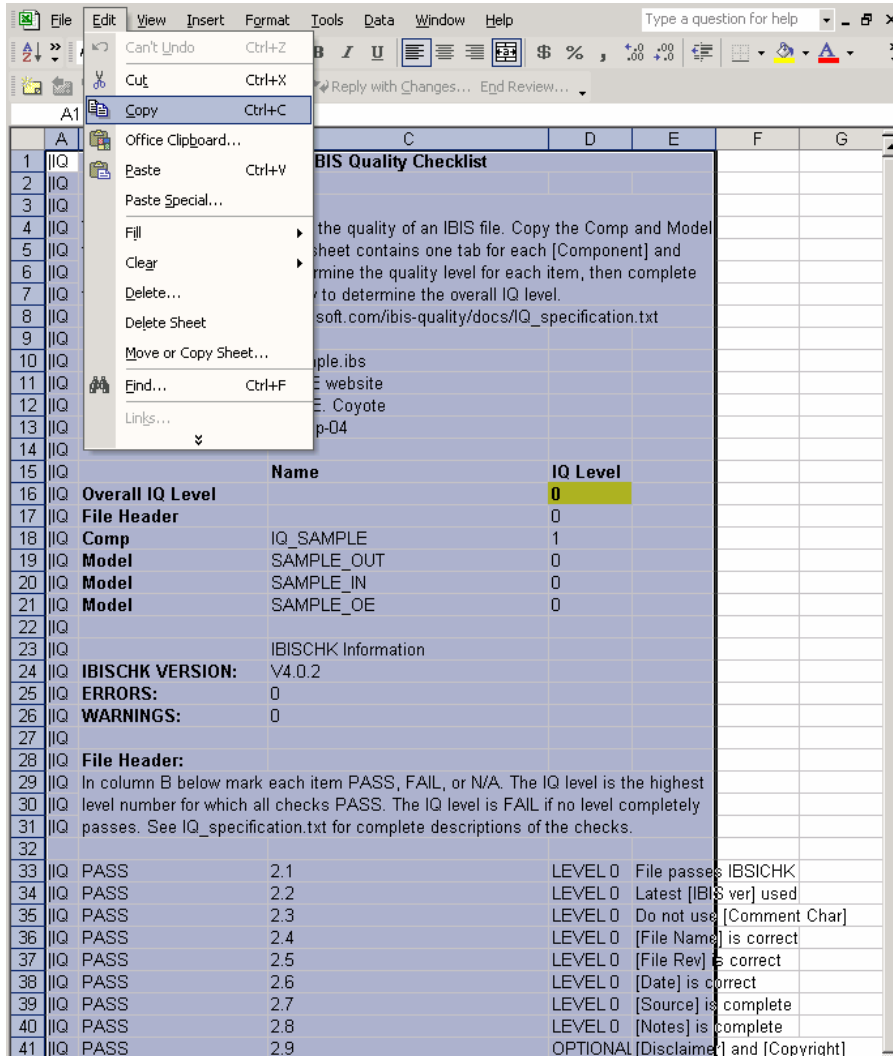
	A	B	C	D
1	IIQ	COMPONENT:	IQ_SAMPLE	
2	IIQ	IQ Level:	1	
	A	B	C	D
1	IIQ	MODEL:	SAMPLE_OUT	
2	IIQ	IQ Level:	0	
	A	B	C	D
1	IIQ	MODEL:	SAMPLE_IN	
2	IIQ	IQ Level:	0	
	A	B	C	D
1	IIQ	MODEL:	SAMPLE_OE	
2	IIQ	IQ Level:	0	
3	IIQ			

... and again on the Summary sheet

- Determine overall IQ level

	A	B	C	D
1	IIQ	IBIS Quality Checklist		
2	IIQ			
3	IIQ			
4	IIQ	This checklist will help validate the quality of an IBIS file. Copy the Comp a		
5	IIQ	tabs below so that this spreadsheet contains one tab for each [Component		
6	IIQ	[Model]. Fill in the tabs to determine the quality level for each item, then co		
7	IIQ	the summary of IQ levels below to determine the overall IQ level.		
8	IIQ	More information: http://www.sissoft.com/ibis-quality/docs/IQ_specification.t		
9	IIQ			
10	IIQ	FILE:	iqsample.ibs	
11	IIQ	SOURCE:	ACME website	
12	IIQ	CHECKER:	Wile E. Coyote	
13	IIQ	DATE:	21-Sep-04	
14	IIQ			
15	IIQ			
16	IIQ	Overall IQ Level		0
17	IIQ	File Header		0
18	IIQ	Comp	IQ_SAMPLE	1
19	IIQ	Model	SAMPLE_OUT	0
20	IIQ	Model	SAMPLE_IN	0
21	IIQ	Model	SAMPLE_OE	0
22	IIQ			
23	IIQ		IBISCHK Information	
24	IIQ	IBISCHK VERSION:	V4.0.2	
25	IIQ	ERRORS:	0	
26	IIQ	WARNINGS:	0	

Copy spreadsheet contents



- Select all IIQ lines
- Make sure every copied line has the IIQ
- Use clipboard Copy

15	IIQ		Name
16	IIQ	ov	
17	IIQ	File	
18	IIQ	Co	
19	IIQ	Model	SAMPL
20	IIQ	Model	SAMPL
21		Model	SAMPL
22	IIQ		
23	IIQ		IBISCHK
24	IIQ	IBISCHK VERSION:	V4.0.2
25	IIQ	ERRORS:	0
26	IIQ	WARNINGS:	0
27	IIQ		

Missing
IIQ !!!

Paste into the IBIS file

```
[IBIS Ver]      4.0
[File Name]    iqsample.ibs
[File Rev]    1.0
[Date]        09/21/2004

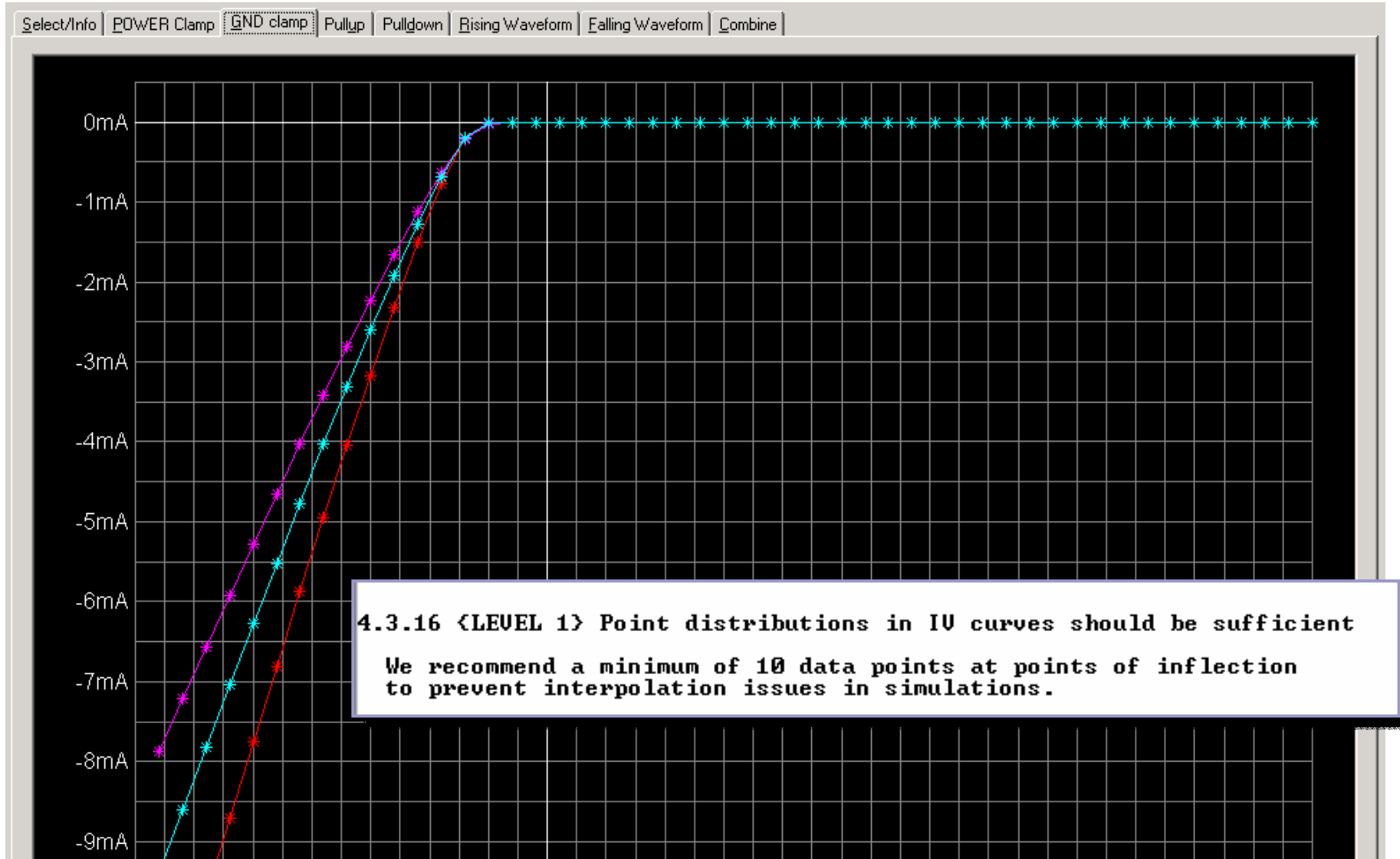
[Source]       State secret, can't reveal that.

[Notes]       This IBIS file was created to provide an in
               sample for learning to use the IBIS Quality

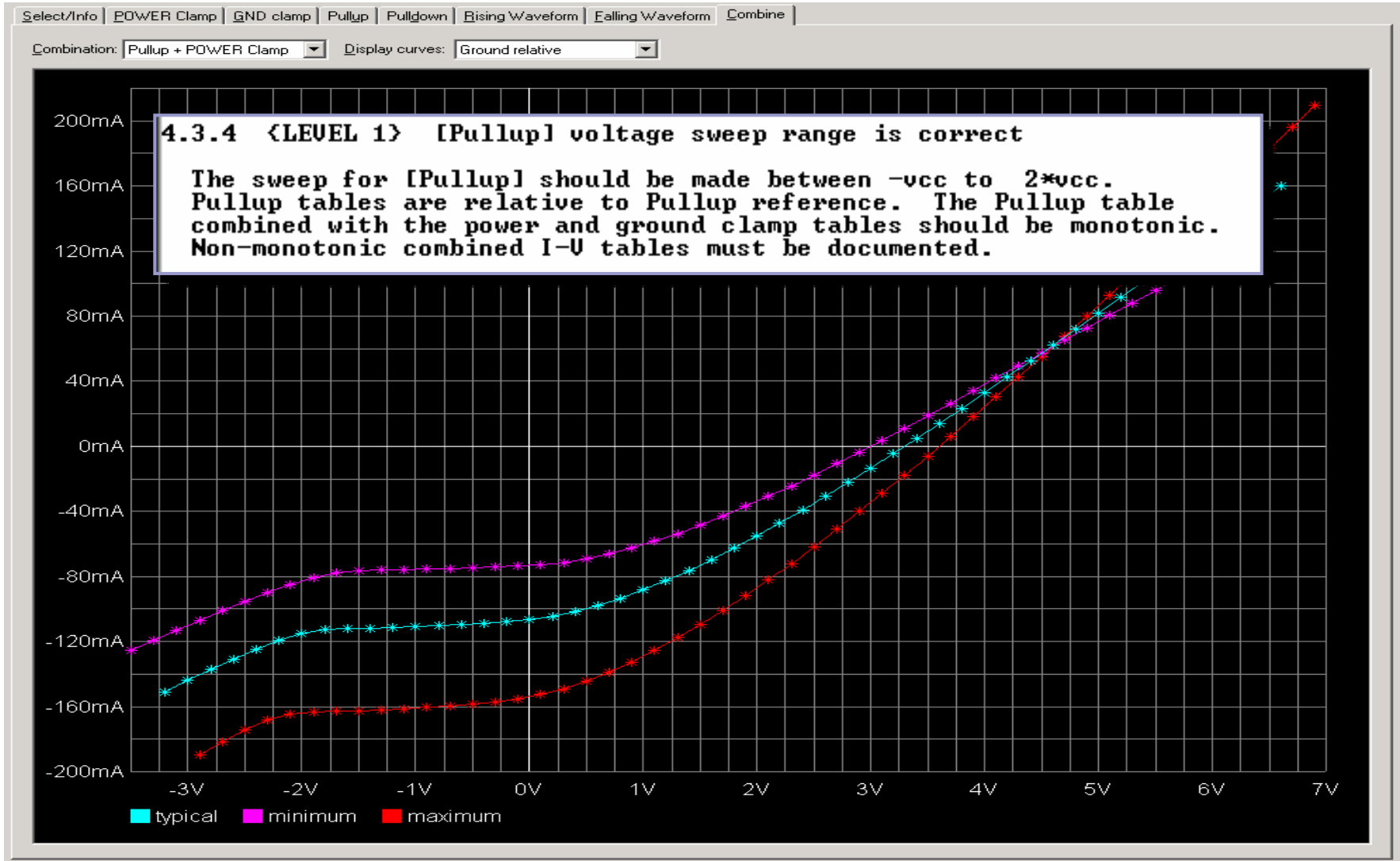
IQ    IBIS Quality Checklist
IQ
IQ    This checklist will help validate the quality of an
IQ    Copy the Comp and Model tabs below so that this spr
IQ    contains one tab for each [Component] and [Model].
IQ    tabs to determine the quality level for each item,
IQ    the summary of IQ levels below to determine the ove
IQ
IQ    More information:
IQ    http://www.sissoft.com/ibis-quality/docs/IQ\_specific
IQ
IQ    FILE:      iqsample.ibs
IQ    SOURCE:    ACME website
IQ    CHECKER:   Wile E. Coyote
IQ    DATE:      21-Sep-04
IQ
IQ              Name      IQ Level
IQ    Overall IQ Level      0
IQ    File Header           0
IQ    Comp      IQ_SAMPLE    1
IQ    Model     SAMPLE_OUT    0
IQ    Model     SAMPLE_IN     0
IQ    Model     SAMPLE_OE     0
IQ
```

- After [Notes] is a good location
- IBISCHK the file again, to guard against tabs and lines exceeding 80 characters

Some checks require a curve viewer



Some checks require combined I/V tables



We need your feedback !

- **Get the IQ Checklist Kit and try it yourself:**
http://www.sisoft.com/ibis-quality/docs/IQ_checklist_kit.zip
- **Let us know what needs to change**
- **Send checked IBIS files back to the vendor**
- **How can we get a checker program written?**

Ask your vendors to send you IBIS files with IQ!