IBIS DNA:
Decoding The Quality Gene

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IBIS Summit DesignCon 2009
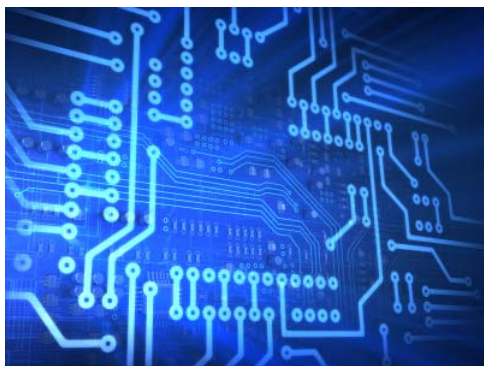
Santa Clara, CA

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About SCG

Consulting

www.siconsultant.com

Software

www.sharksim.com

Education

www.xrosstalkmag.com

Reference

- "IBIS Quality Report: A Report On The State of IBIS Simulation Models for Signal Integrity Analysis" published by SGC

- Go to www.sharksim.com and request a copy of the whitepaper

How It All Started

Generate IBIS Models

Validate IBIS Models

Fix and Update IBIS Models

Run SI Sims

Do Timing Analysis

Feed the cat

Pay the bills

It goes on and on

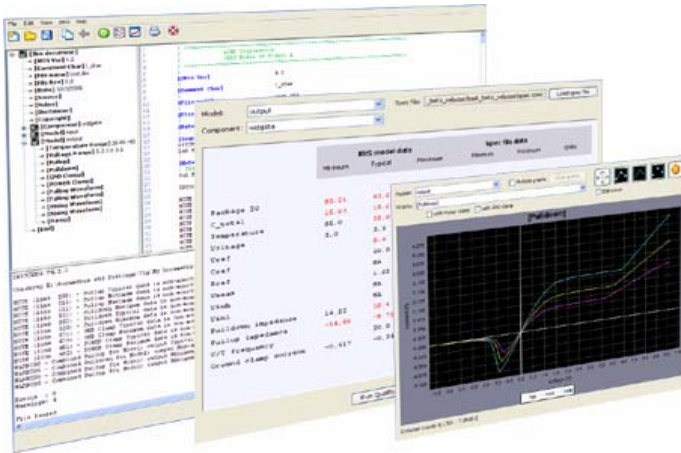This is me. I have a lot of Signal Integrity work to do.

Where It Was Going

Spending a lot of time fixing and updating IBIS models

Using different tools, scripts, books, duct tape …

Why don't I just make my own tool to make my life easier?

And So I Did

Built IBIS Modeling software tool

Called it SharkSim

Started using it, seemed good, start licensing to clients, and life is good …

But Then I Hit A Wall

What issues are IBIS users facing?

Are there still quality issues with models?

How do I figure this out?

Than An Idea = This Presentation

Review a bunch of models and see what the issues are

Talk to IBIS model users and see what their issues are

Engineers Love Data

IBIS Model Quality Review
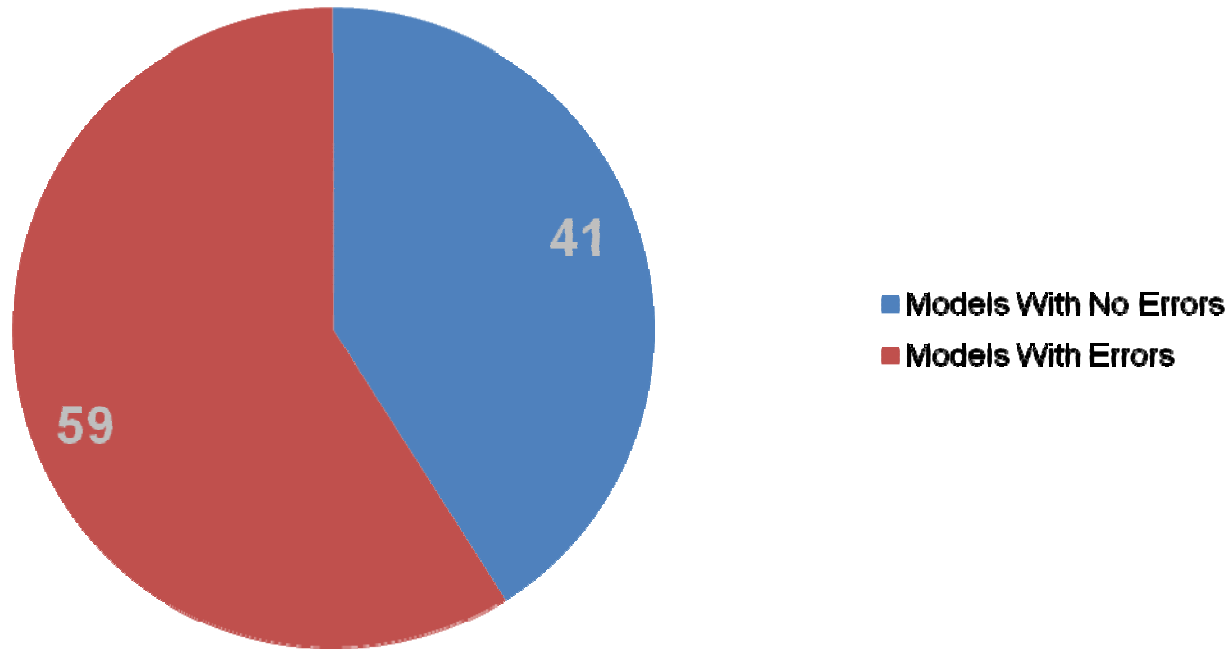
Reviewed 32 Models

Used IBIS Parser 4.2.2

Categorized Warnings/Errors

* Flagged any warning/error that would not make an IBIS model suitable for Signal Integrity analysis
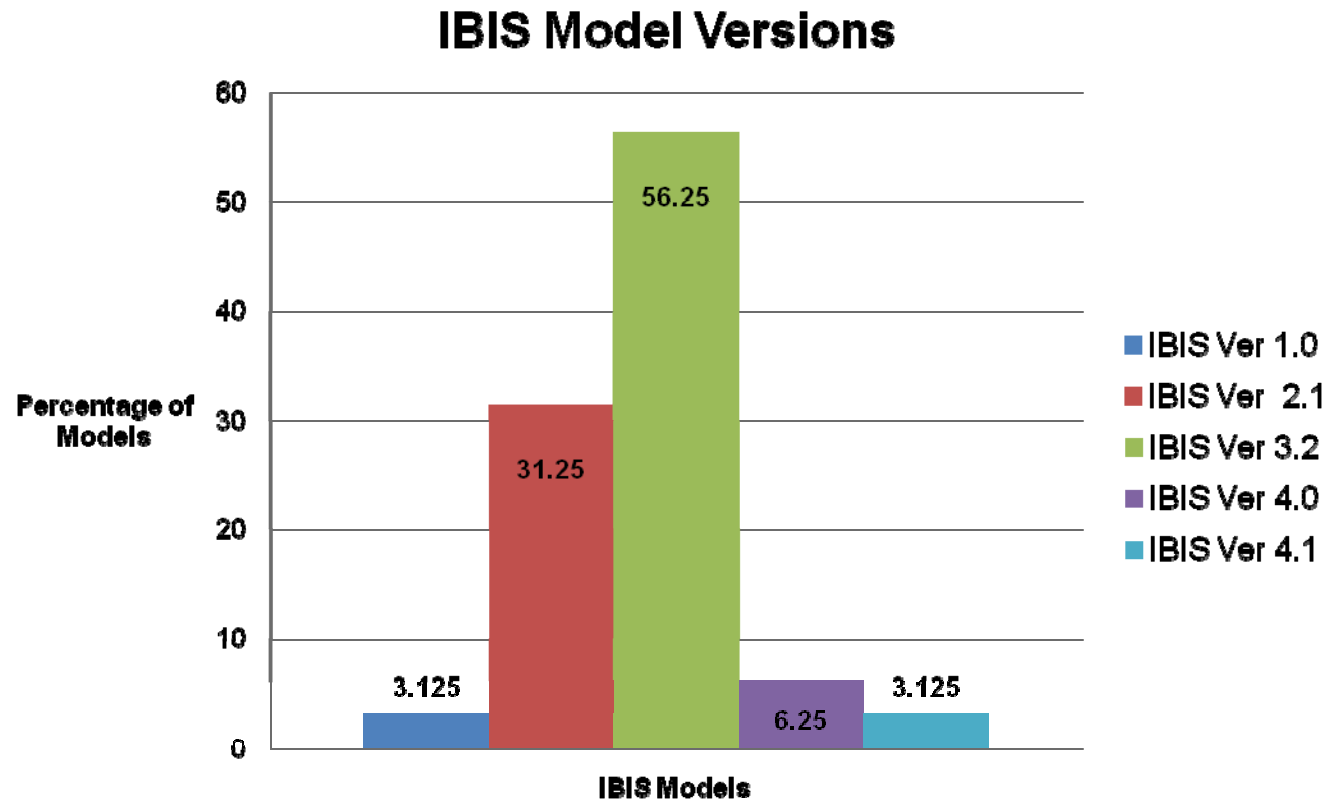
What Is A Quality Model

A quality model would be an IBIS model that has no errors or warnings that would stop an engineer from immediately running simulations.
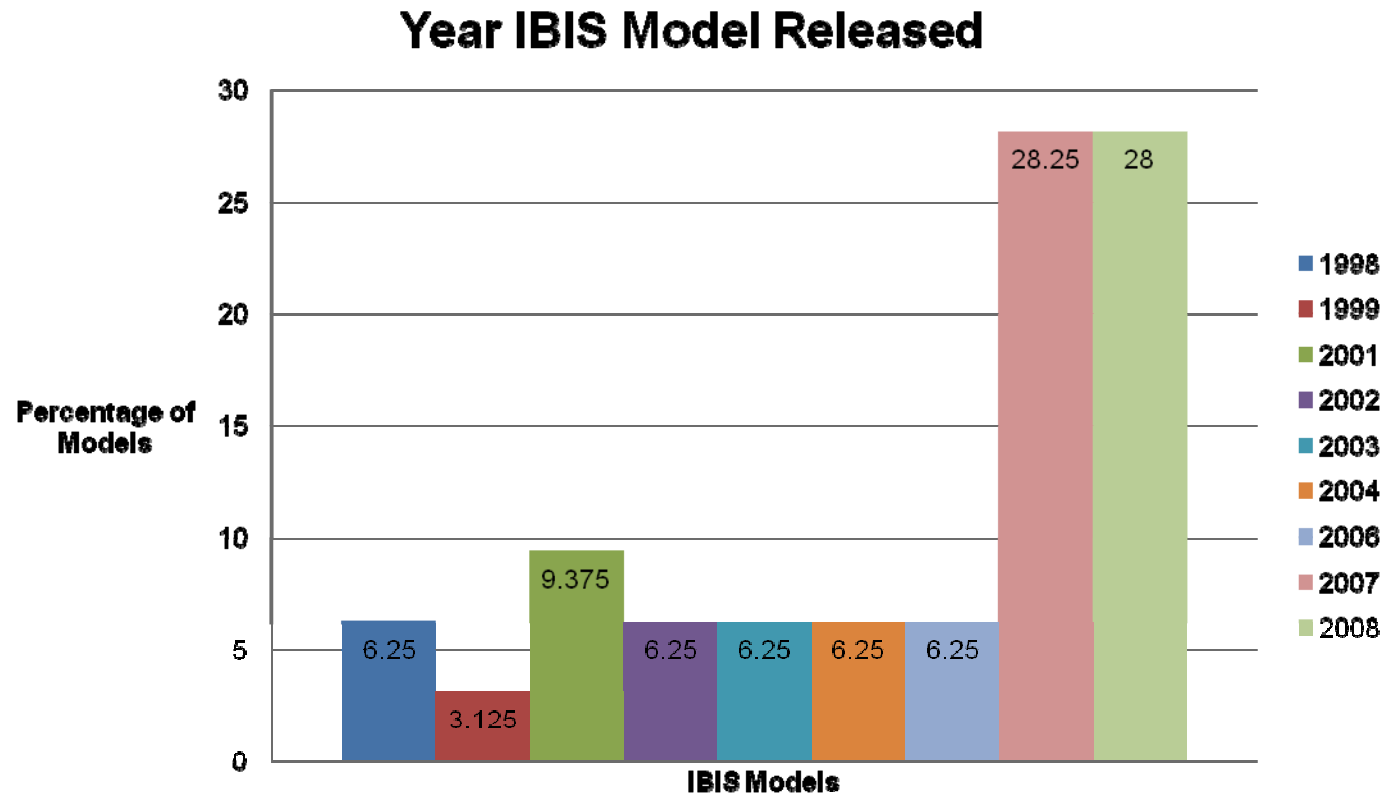
IBIS Model Quality Review

41 — Models With No Errors

59 — Models With Errors

IBIS Model Quality Review Results

59% of IBIS Simulation Models Unsuitable for Signal Integrity Analysis

IBIS Model Versions of Reviewed Models
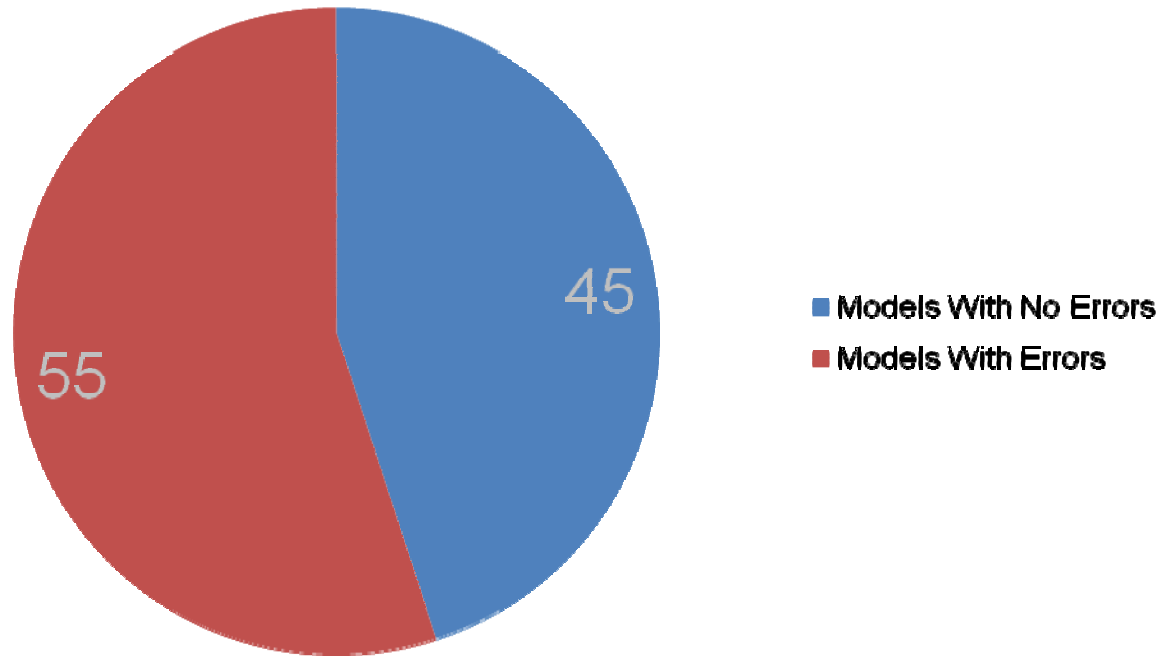
Almost 70% of Models Ver 3.2 or Later

But less than 10% of Models Ver 4.0 or Later

Year IBIS Model Released

Almost 70% of IBIS Models Reviewed Released in Last 3 Years

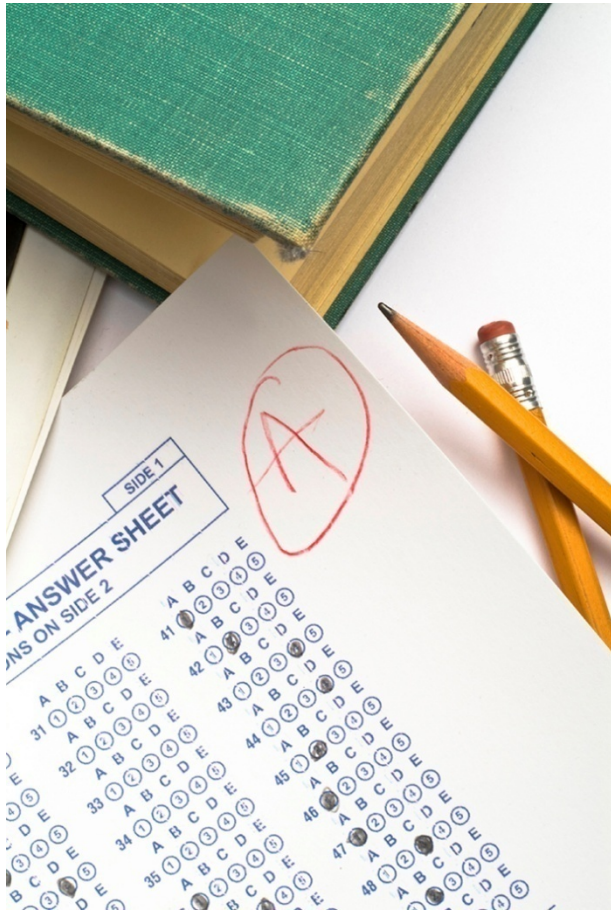**IBIS Model Quality Review (2006 - 2008)**

45 — Models With No Errors
55 — Models With Errors

IBIS Model Quality Review (Last 3 Years)

Still 55% of IBIS Models Not Suitable for Signal Integrity Analysis

IBIS Quality Error	Percentage of Occurrences
Incorrect Filename	25
Missing Timing Load	34
Incorrect Receiver Threshold	9
Clamp Curve Doesn't Reach Zero	25
AC/DC Mismatch Error < 10%	13
Combined Data Non-Monotonic	22
Extreme Current In Clamp Curve	6
Unreferenced Model	6
Exceeds Line Character Limit	3
Series Mosfet Decreasing Current	3
IV Curve Can't Drive Load	3
Incorrect Ramp Data	3

IBIS Quality Error Occurrences

#1 Offender -> Missing Timing Load (Vref, Cref, Rref, Vmeas)

What Did We Find Out

1. Over 50% of IBIS Models Not Suitable for Signal Integrity Analysis
2. Newer IBIS version models not abundant
3. Still Need Improvement

But We Can Fix These Errors

Most of These Quality Issues Can Be Fixed

Some Easier Than Others

Read the Report for Full Details

Because There's Still A Problem

Going Beyond The Parser

Quality Control Does Not Stop With the IBIS Parser

Parser Does Not Check For A Lot Of Things

Parser Does Not VALIDATE that IBIS Parameters Are Correct

IBIS Model Quality Review 2.0

Took 45% of IBIS Models With No Errors and Ran Through Next Level Of Quality Checking

Picked 5 Parameters To Compare Against Data Sheet:
1. Only Typical Data
2. Not Enough Data Points
3. Inadequate Voltage Sweep
4. Incorrect Timing Load
5. Invalid C_Comp

And The Results

22% of IBIS Models Passed

Second Level of Quality Checking

So What Do The Users Think

Informal Survey of 22 IBIS Model Users

Asked A Bunch Of Questions

Came Up With Some Conclusions

0 to 25% Have Errors ->   **23%**

25 to 50% Have Errors ->   **23%**

50 to 75% Have Errors ->   **45%**

75 to 100% Have Errors ->   **9%**

Question 1

What percentages of IBIS models have an error or warning that makes it unsuitable for simulation?

No ->   **13%**

IQ Checklist ->   **13%**

Internal ->   **65%**

Measurement ->   **9%**

Question 2

Do you use a formal IBIS quality checking procedure?

43% of Respondents said Yes IBIS Models Matter

Question 3

Does the availability of quality IBIS models influence your company's purchase decisions of components in any way?

24

23% of Respondents said Vendors

Are Doing A Good Job

Question 4

Do you feel that the silicon vendors are doing a good job of delivering quality IBIS models?

Wisdom Of Crowds

Users Told Us A Few Things

They Know IBIS Model Quality Is Less Than 50%

They Are Basing Business And Design Decisions on IBIS Models

Not Happy With Quality of Models

A Process Flow Is Needed
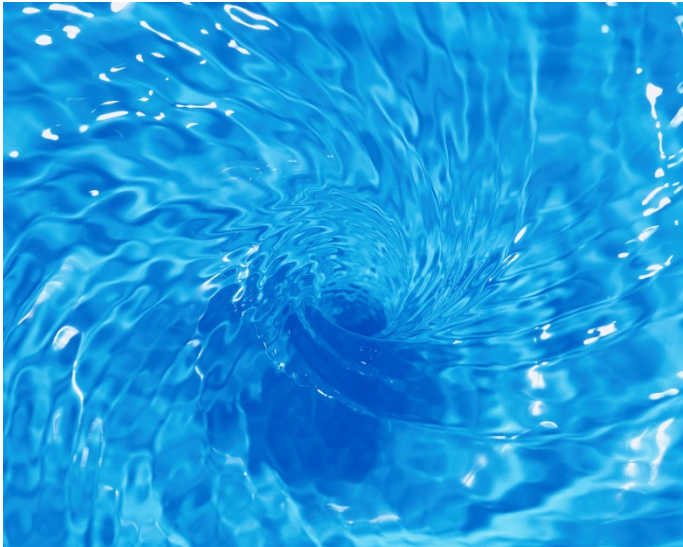
Generate

Validate

Correlate

Process Flow: Generate

Automate the Process of SPICE to IBIS

Extract C_Comp

Get the Test Data

Why Test Data Is Important
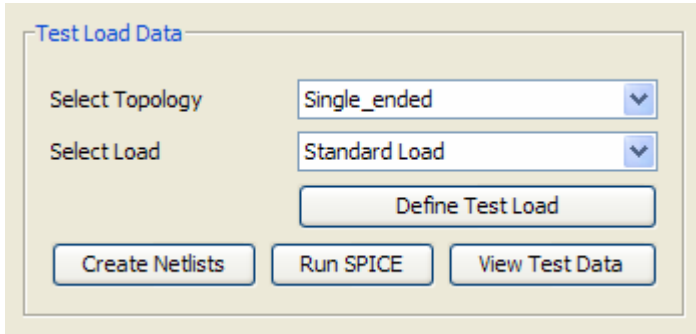
1. Correlate IBIS Model Before Released
2. Correlation Data Automatically Given To Customer
3. Customer Sees Your Correlation, Has the Correlation Data
4. You're Done!

Process Flow: Validate
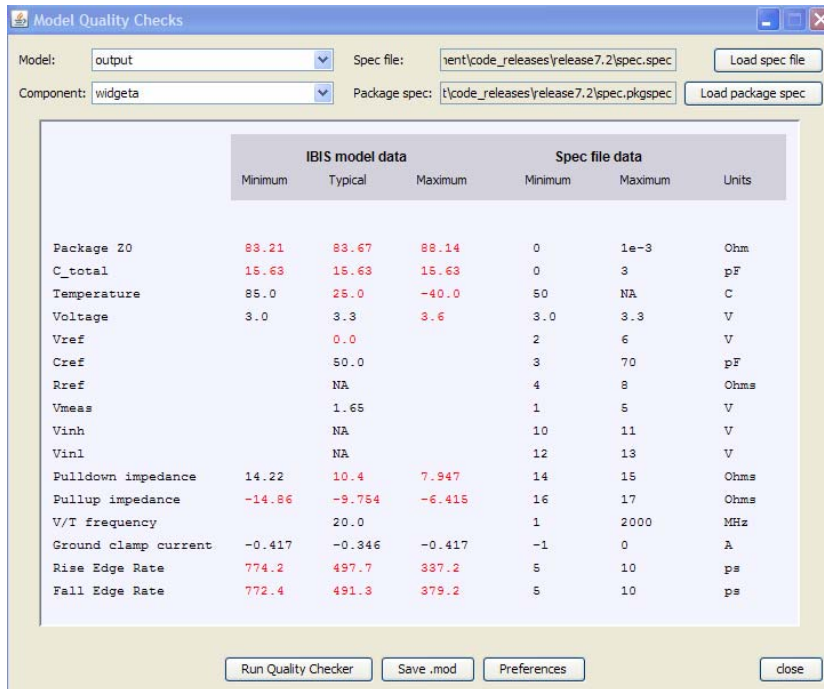
Run The Parser

Graph The Data

Check The Syntax

Going Beyond The Parser
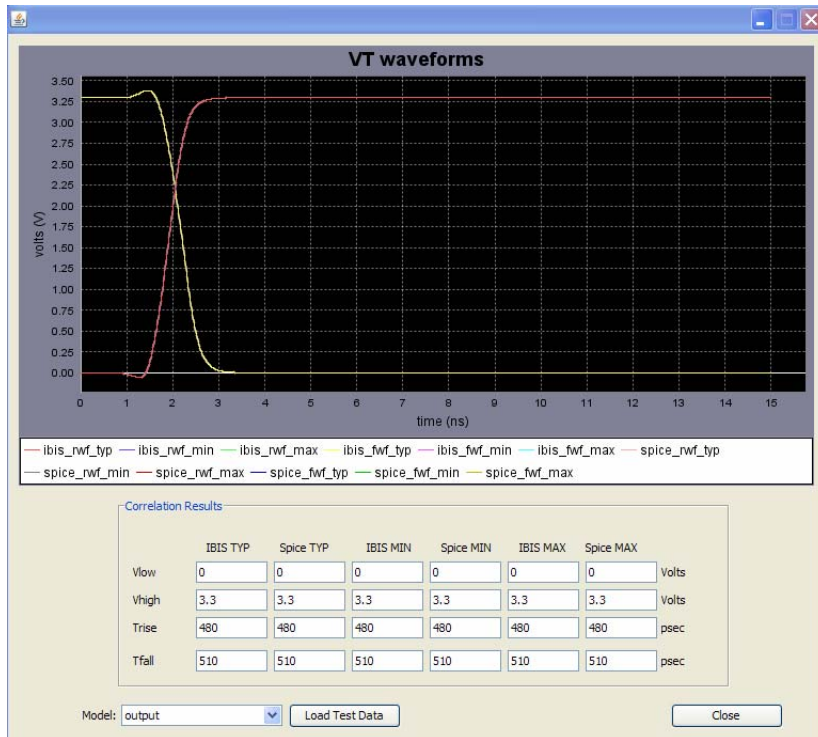

Validate Against Datasheet

Check That Values Are There And Are Correct

Check Package Pin Out

Look For Over Clocking

Get The Output Impedance

Process Flow: Correlation

Always Simulate Buffer Into Standard and System Loads

Use Test Data For Automatic Correlation of Different Loads

Both Vendor and Customer Can Use This Flow

We Can Do This

Still Quality Issues With IBIS

Models Today > **50%**

Users Not Happy **77%**

Vendors AND Users Together With Right Flow Can Help Each Other Solve the Problem

Thanks For Your Time

Questions?

Comments?