Using DATA Files for IBIS-AMI Models

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Outline

This was originally presented in 2017 DesignCon IBIS Summit, and it is with updates.

- Motivation
- Platform/OS dependent DLL, SO
- Using DATA Files for AMI models
- The advantages using DATA Files for AMI models
- Test case for AMI models with DATA Files
- Summary

Special thanks to ANSYS for providing some images in this presentation

Motivation

When we make and use AMI models:

- Who makes AMI executable:
  - Did I write the code that is compatible with all platform/OSs and compilers?
- Who puts everything together into an IBIS file:
  - Did I mess up 64bits and 32bits dll/so files in the IBIS file?
- Who uses AMI models:
  - Why doesn’t this AMI model support my OS? Did I do anything wrong with them?

Motivation

- Of course, everyone will blame EDA vendors

Motivation

Can we make everyone a LITTLE happier?

Platform/OS/Compiler Dependent

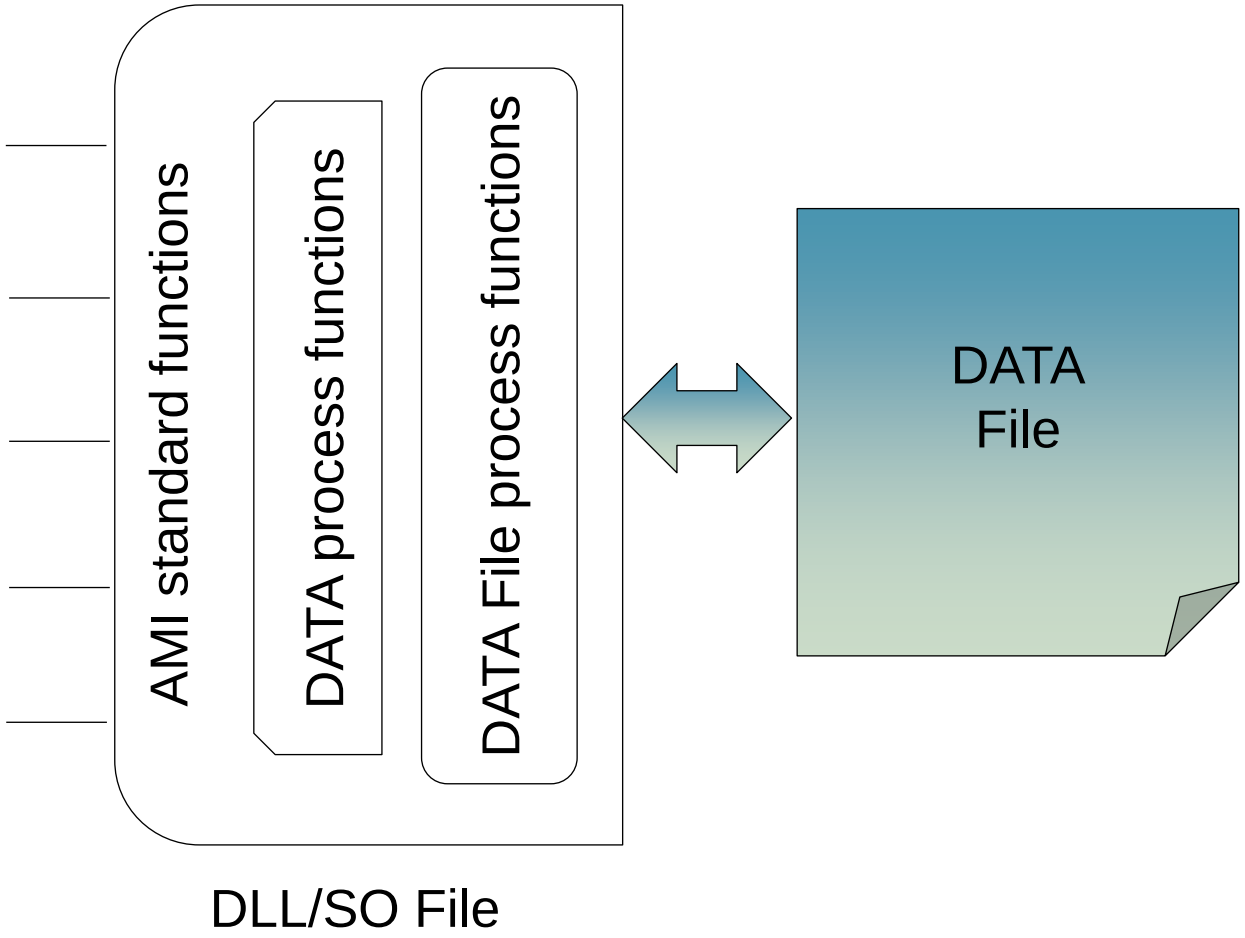
- We have so many platform/OS/Compilers to cover:
  - Windows, Linux, Unix, Mac OS, etc.
  - WinXP, Win8, Win10, Ubuntu, Debian, Fedora, CentOS, Red Hat, etc. Solaris, Solaris 10, HP-UX, OSx, etc.
  - Visual Studio 8 – 11, CC, gcc, etc.
- We also have 32 bit, 64 bit and maybe 128 bit in the future to cover.

This is not all!

Platform/OS/Compiler Dependent

- This makes Designers/Modelers have many headaches:
  - Can my programmed source code be compiled successfully in all platforms?
  - How do I compile and debug my code in all platforms and compilers?
  - Do I need to support all of them?

Using DATA Files for AMI models



Using DATA Files for AMI models

- In DLL/SO
  - AMI standard functions
    - AMI_Init(), AMI_GetWave(), AMI_Close(). Etc.
  - DATA process functions
    - Process the DATA for algorithms
    - Take inputs from AMI standard functions
    - Apply algorithms
    - Put results back to AMI standard functions
  - DATA File process functions
    - Read DATA File
    - Decryption (Optional)

Using DATA Files for AMI models

- In DATA File
  - Software code, and/or
  - Behavioral data, and/or
  - Parameters, or/and
  - Other data
  - Encrypted contents (Optional)

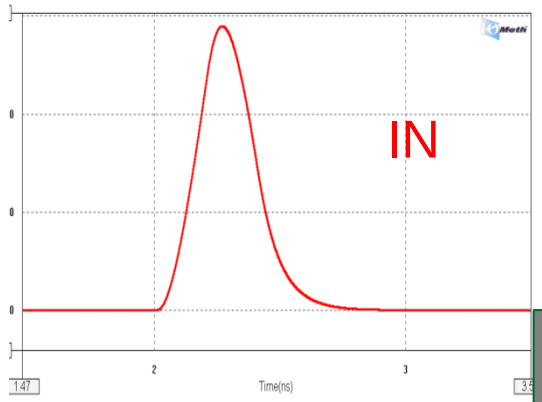
Using DATA Files for AMI models

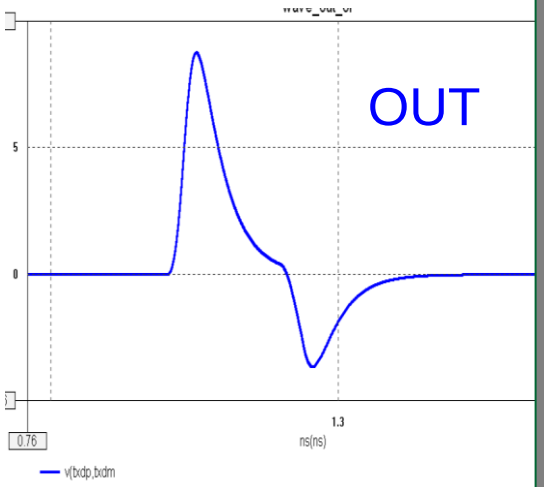
- The DLL/SO file
  - Could be made by professional software programmers for model vendors or EDA vendors
  - One time job! It can be used for many different DATA Files
- The DATA File
  - Can be created by Designers or Modelers
  - No compilation needed. Platform/OS/Compiler/Bits independent.

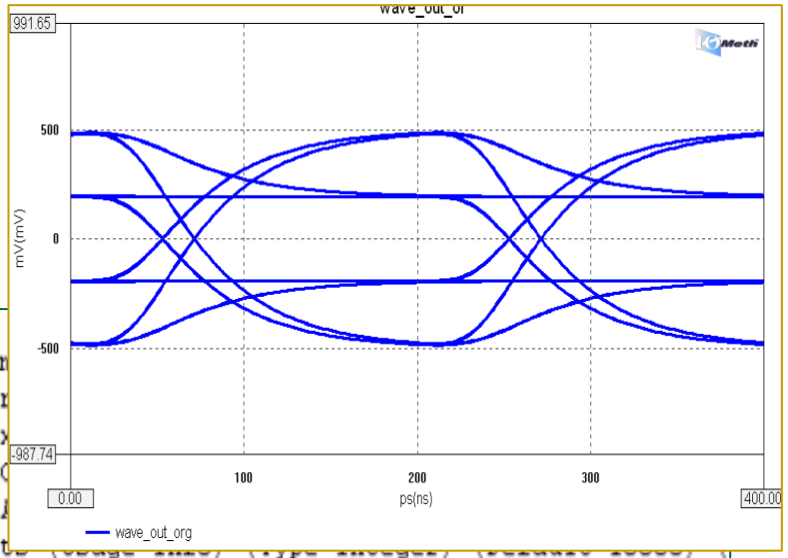
The advantages using DATA Files for AMI models

- DATA File is Platform/OS/Compiler/Bit INDEPENDENT
- Although we will still have to build Platform/OS/Compiler/Bit dependent DLL/SO files to fulfill current IBIS specification, they only need to be built ONCE for model vendor and/or EDA vendor since it can be used for different DATA Files
- The DATA File will be easier to build. And it can be used for different data types that the Model or EDA vendor defines
- The DATA can be securely encrypted with advanced encryption algorithms. It is even more secured than software executables.

Generic Test case for AMI models with DATA Files

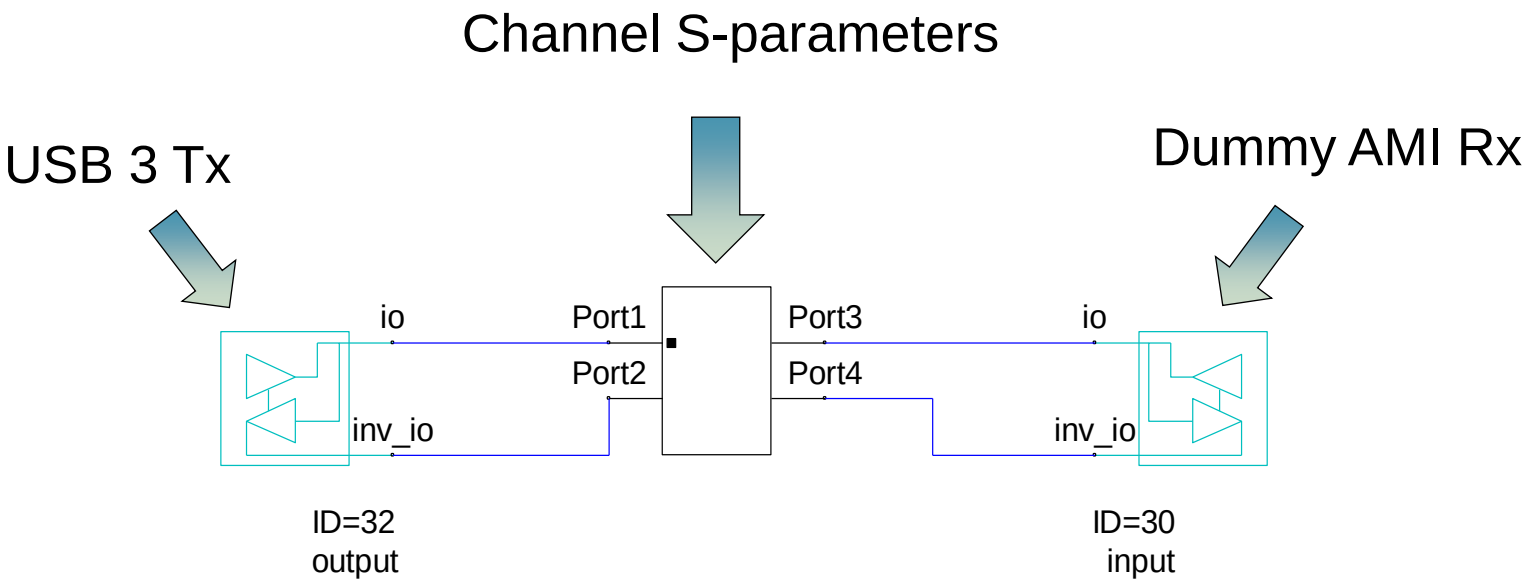




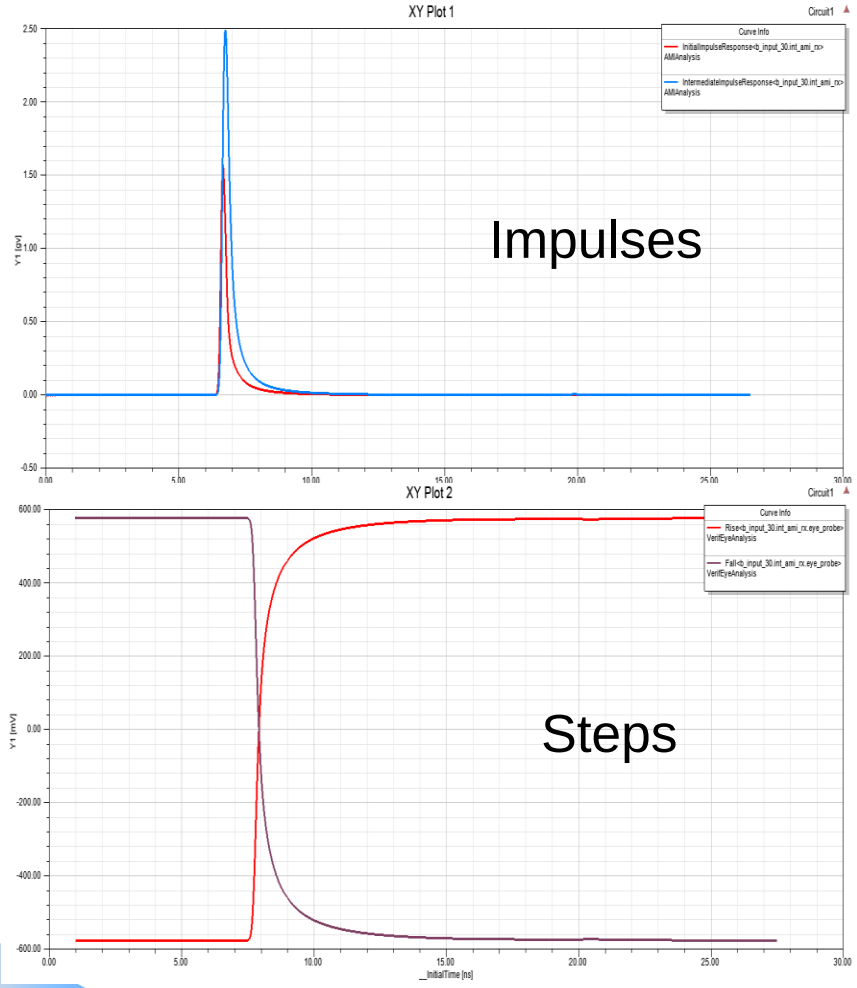


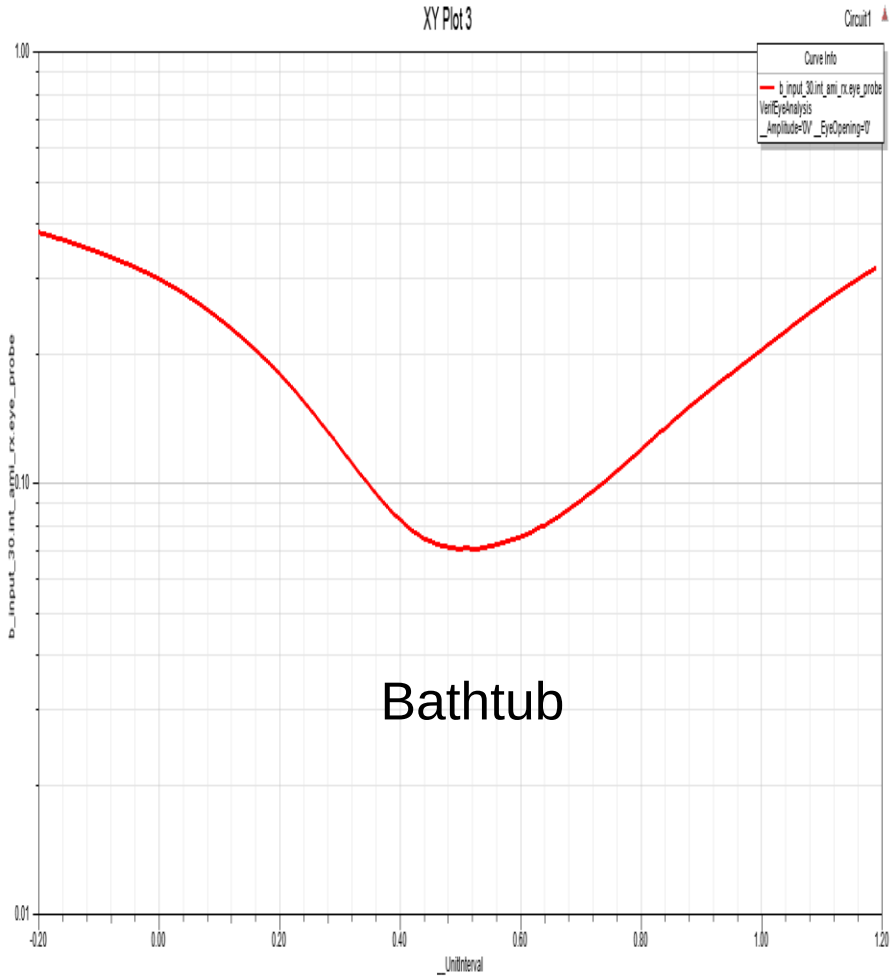

```
1  (TestEmphasis
2      (Reserved_Para
3          (Init_Retu
4          (GetWave_E
5          (Use_Init_
6          (Max_Init_
7          (Ignore_Bit
8      )
9      (Model_Specific
10         (DATA_File
11             (Usage In) (Type String)
12             (Format Value "/data/AMI_Test/AMI_SPICE_ENC.dat")
13             (Description "AMI DATA file for Spice preemphasis Tx)
14         )
15         (NumBitsToAvg (Usage In) (Type Integer) (Format Value 200)
16         (TargetV (Usage In) (Type Float) (Format Value 0.15) (Defa
17         (ThresholdV (Usage In) (Type Float) (Format Value 0.015) (
```

USB3 TX Test case for AMI models with DATA Files

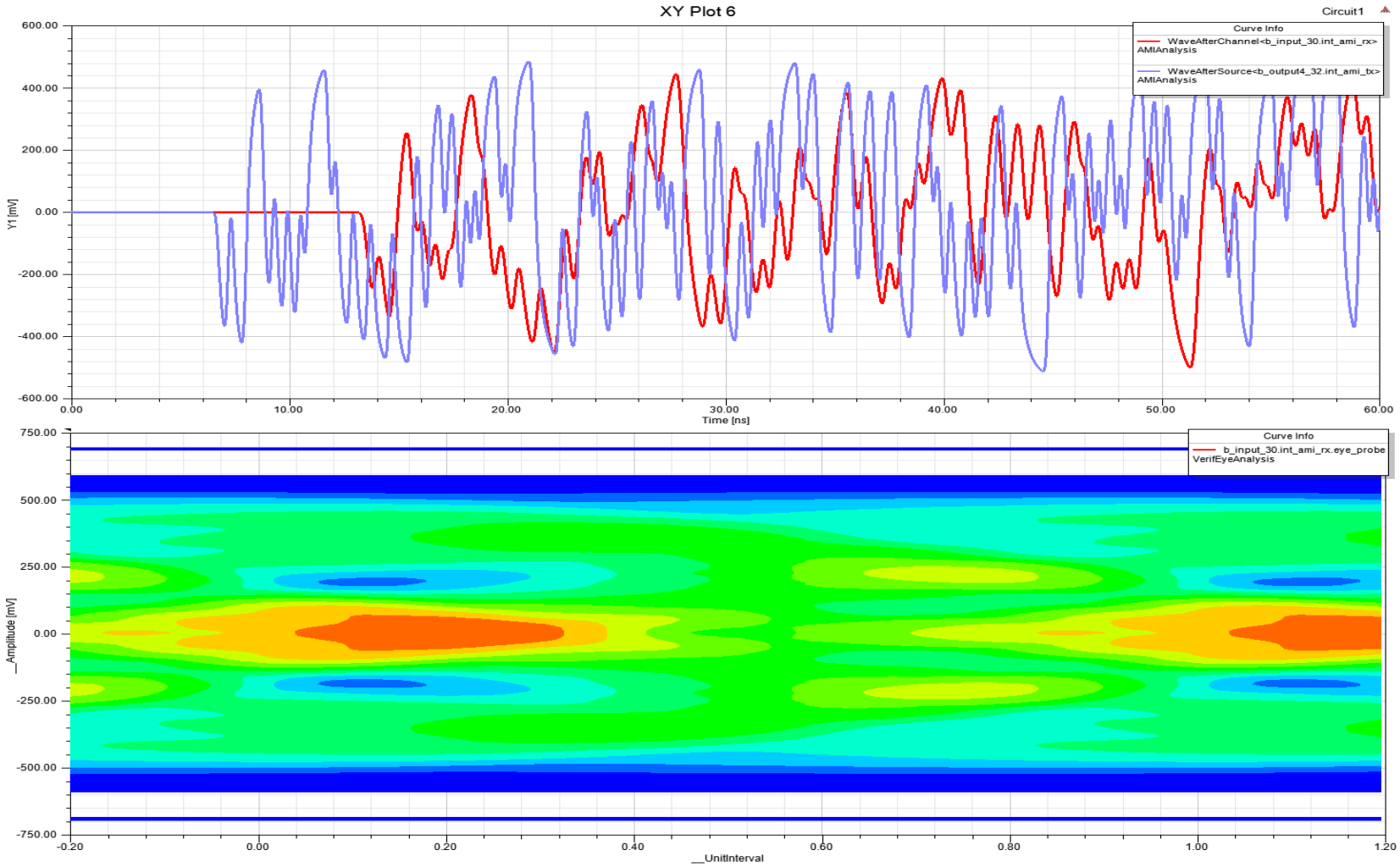


USB3 TX Test case for AMI models with DATA Files – AMP 105 No EQ Applied

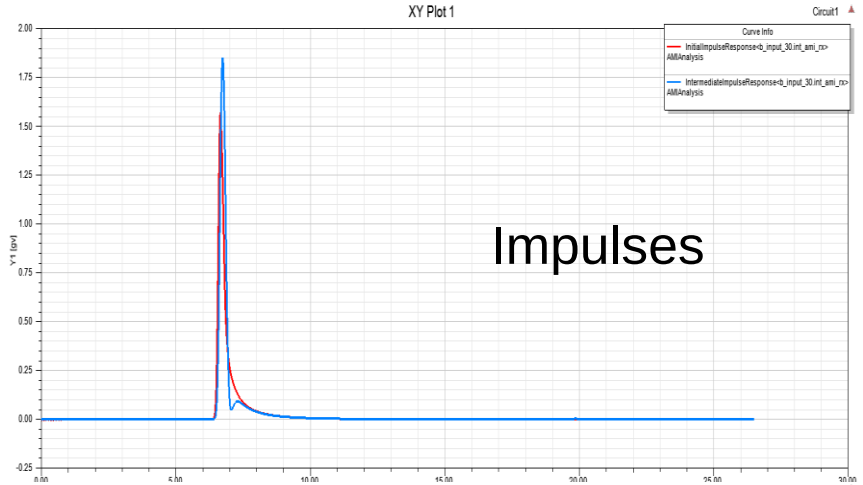


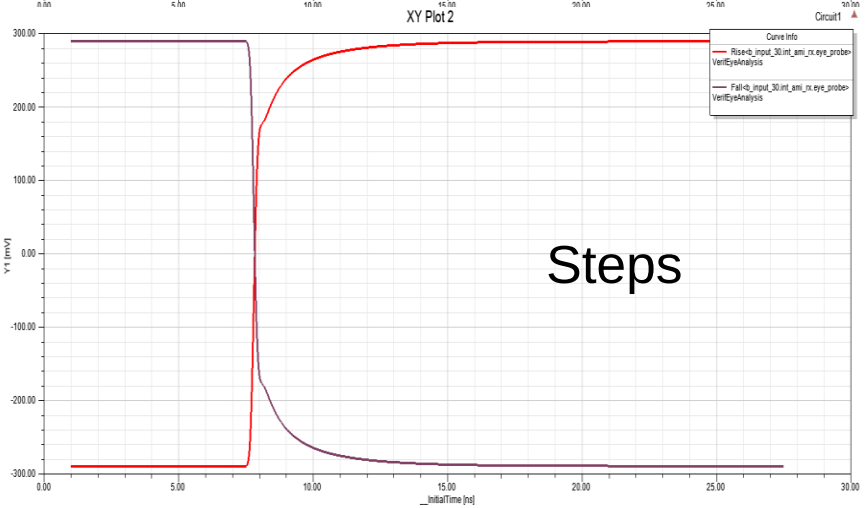


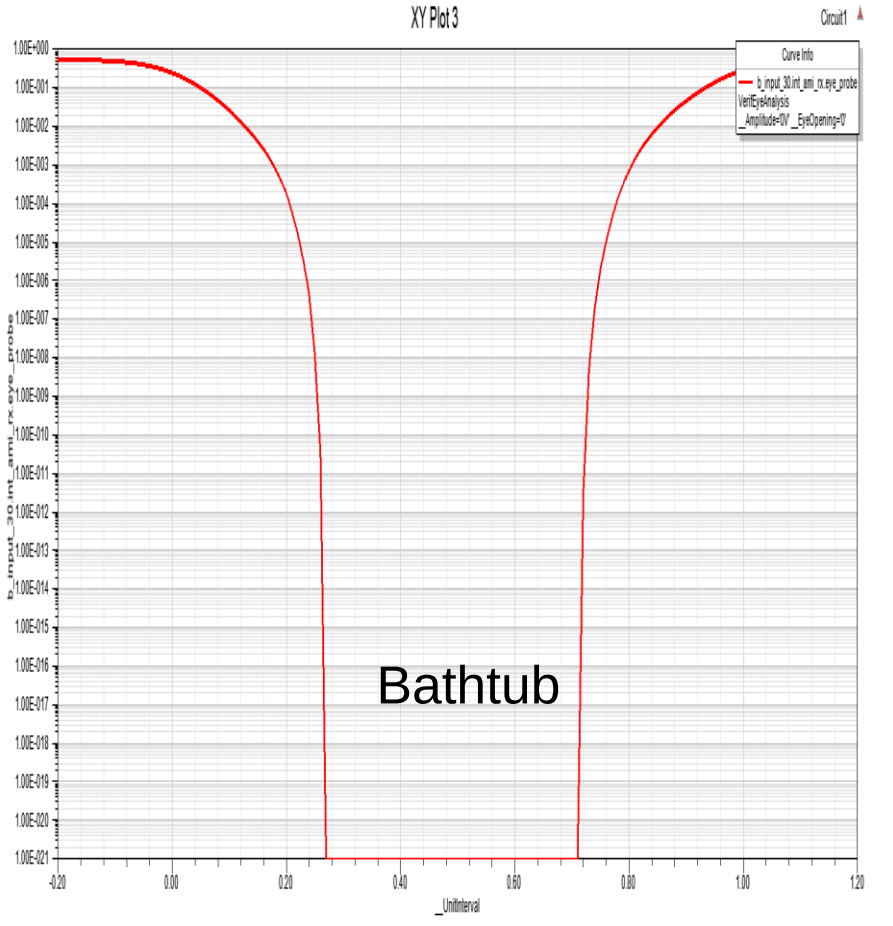
USB3 TX Test case for AMI models with DATA Files – AMP 105 No EQ Applied



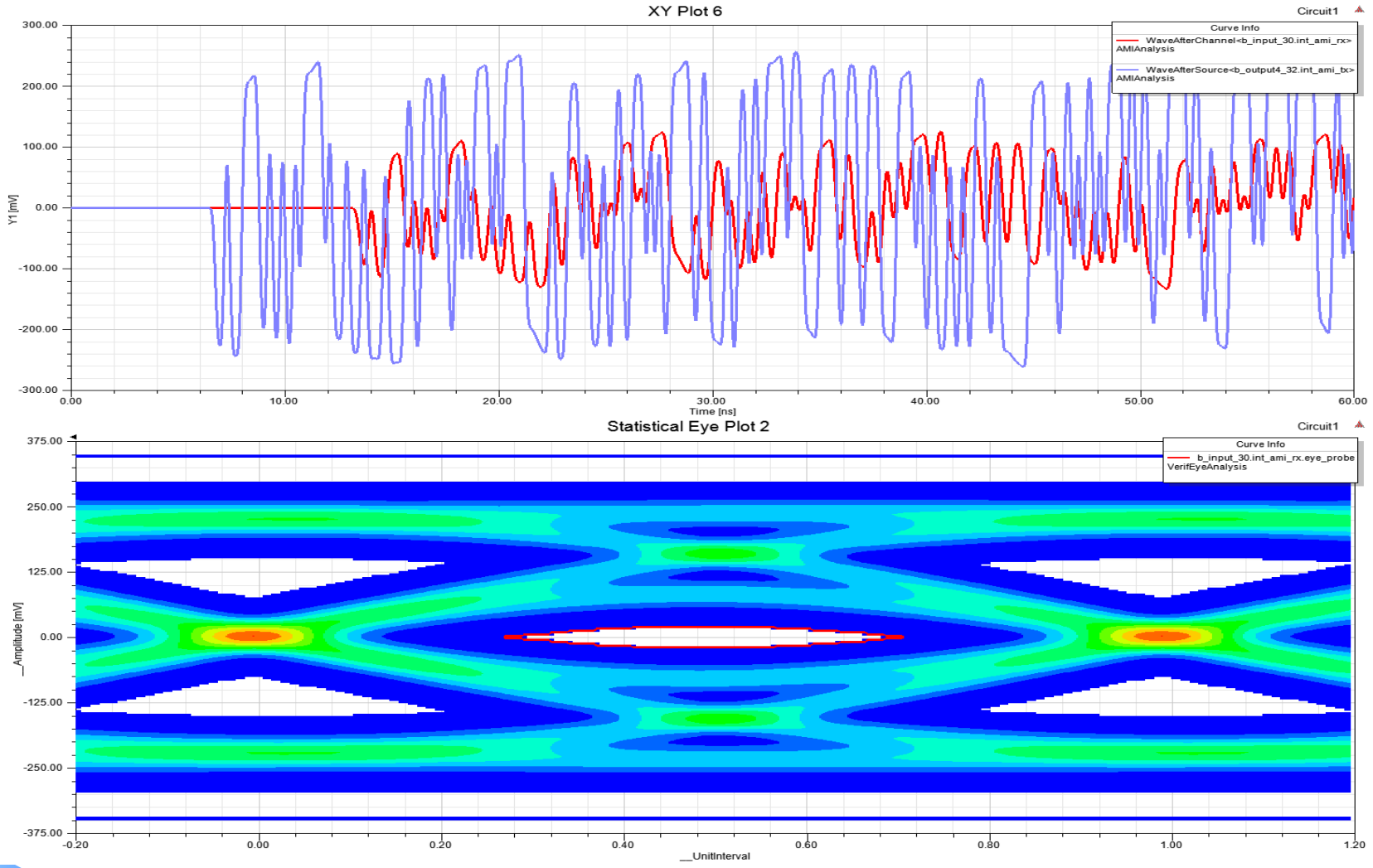
USB3 TX Test case for AMI models with DATA Files – AMP 105 EQ 30 Applied







USB3 TX Test case for AMI models with DATA Files – AMP 105 EQ 30 Applied



Summary

- This presentation introduces a DATA File method for IBIS AMI models
  - The DATA File is easier to be created by modeler
  - The DATA File can be very secure through advanced encryption technologies
  - The DLL/SO will only be made by software professional ONCE and used for different DATA files
- This method is currently supported by IBIS specification and works with multiple EDA AMI tools

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