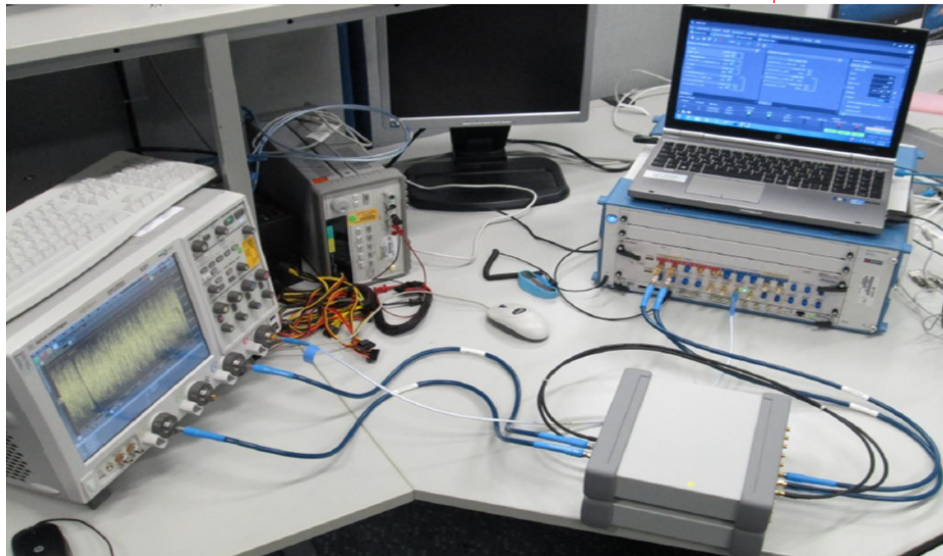


Keysight Technologies

W2353EP/ET

USB Compliance Test Bench

Data Sheet



Introduction

The W2353EP/ET USB Compliance Test Bench helps solve the problem of simulation-measurement correlation. In the past, the pre-manufacture design could be simulated and tested using compliance tools from an EDA vendor. And the post-manufacture prototype could be bench tested using compliance tools from test and measurement instrument vendors. However, because of subtle differences between the two vendors independent approaches to compliance, it was almost impossible to correlate the two. This opened the possibility of the pre-manufacture design passing and the post-manufacture prototype failing, necessitating a time-consuming and expensive design spin.

In contrast, USB Compliance Test Bench leverages the exact same industry-leading Compliance App used on Keysight Infiniium oscilloscopes. It mimics a real hardware test bench, and, using a scripting technology called "Waveform Bridge," emits the same waveforms that the Infiniium app receives when you are testing in your lab. Thus, the exact same tests – no ifs, ands, or buts -- are applied to both the pre-manufacture simulated design and the actual post-manufacture prototype.

Benefits Across The Development Process

Run a sign-off compliance test on the simulated test bench waveforms before committing to fabrication. Run the exact same tests on the simulated testbench that will be run on the oscilloscope in the test lab when prototypes come back from fab.

- SerDes chip I/O designer at an IC company may swap out the simulated testbench’s generic Tx/Rx models with the actual Tx/Rx model in AMI format.
 - Model an LTI Tx with an impulse-only AMI model and a non-linear or time-varying Rx with a so-called getwave-only model
 - In bit-by-bit mode, ADS Channel Simulator runs so-called dual-mode models, selecting the getwave part, as specified in the IBIS standard, version 5.1 and above.
- PCB and package designers at an OEM or IC company may swap out parts of the simulated testbench’s generic channel cascade with the post-layout EM-based model of actual package or PCB.

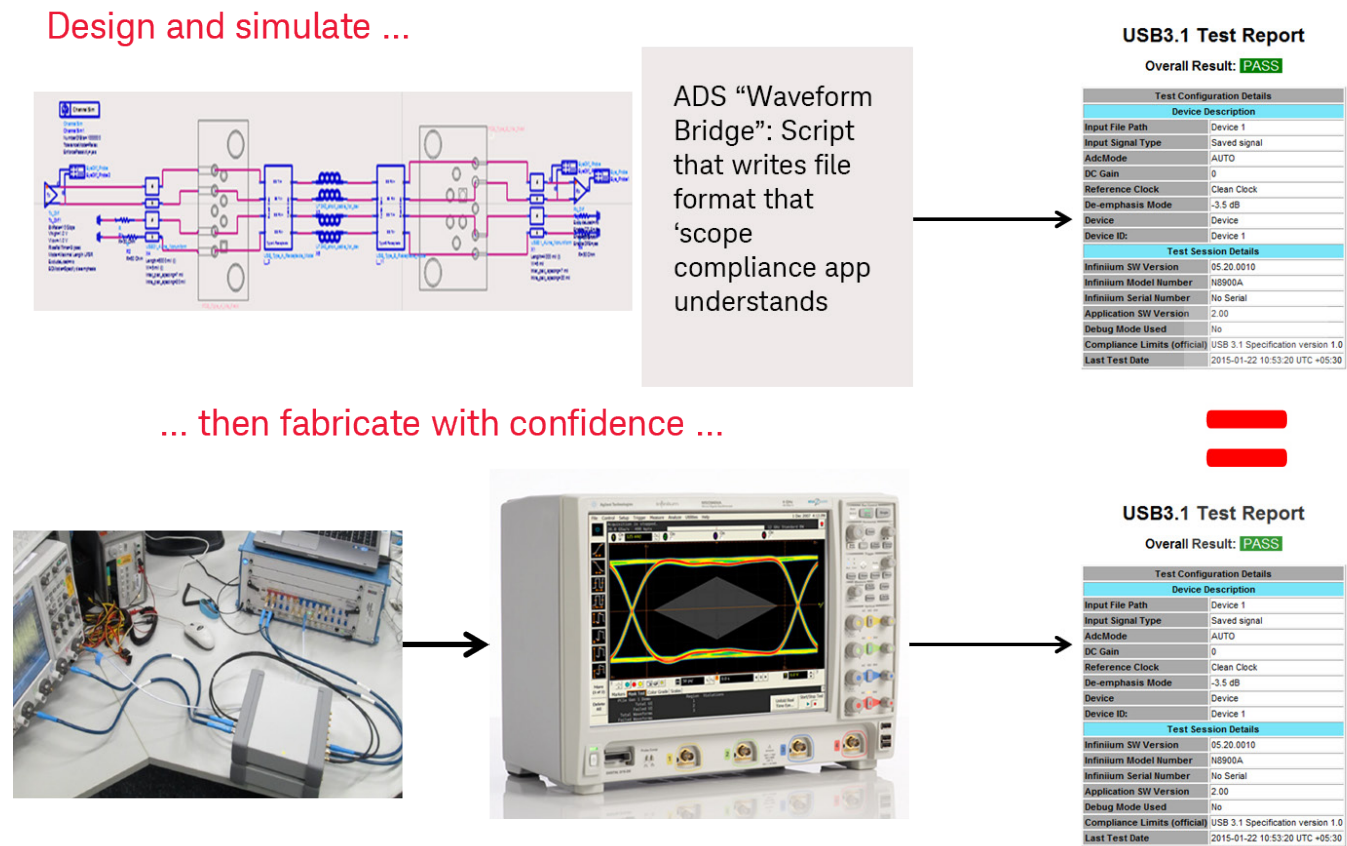


Figure 1. Engineers can apply the same set of compliance tests and receive the exact same compliance report on the simulated design as they will use on the fabricated prototype.

Simulated Test Bench

The simulated test bench is composed of subcircuits, namely a USB transmitter, a channel, and a USB receiver. The circuit runs under the pre-requisite ADS Channel Simulator in bit-by-bit mode for time domain waveforms. The generic chip I/Os are represented by specially created IBIS AMI models, but you can swap out one or both of these with IBIS AMI models that are more specific to your design, such as those from an IC vendor that represent a specific IC I/O. Likewise, any or all parts of the generic channel model cascade (consisting of the transmitter package, circuit boards, connectors, receiver package) can be replaced with pre- or post-layout models. For example, an electromagnetic (EM) field solver can be used to create an S-parameter model of one of more lanes on the post-layout motherboard.

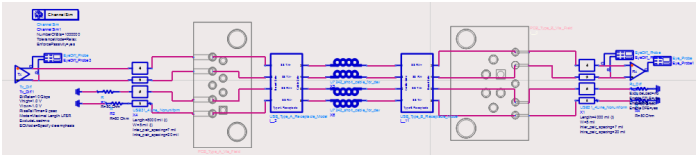
Waveform Bridge Script

Once the simulated testbench has been adopted to reflect your pre-manufacture design, the Channel simulation runs writing the appropriate waveforms to the dataset. The Waveform Bridge script is a post-processing step that takes waveforms in the data set and writes them to a file that the Infiniium Compliance Test Application can parse.

Use with U7243B-1TP USB Compliance Test Application

The file that the Waveform Bridge writes can be read into the U7243B-1TP USB Compliance Test Application for Infiniium 9000 and 90000 Series Oscilloscopes. This application is now available with an offline/remote mode, meaning that it can run not only on live data from an oscilloscope, but now also using stored (“offline”) data. In addition, you can now run the application in “remote” mode meaning that it can run on any Windows PC (including the one you run Advanced Design System (ADS) on), not just the PC embedded in the oscilloscope. In this way you can be assured that the tests you run on the pre-manufacture design simulation will be identical to the ones you will run when the prototype is subsequently manufactured.

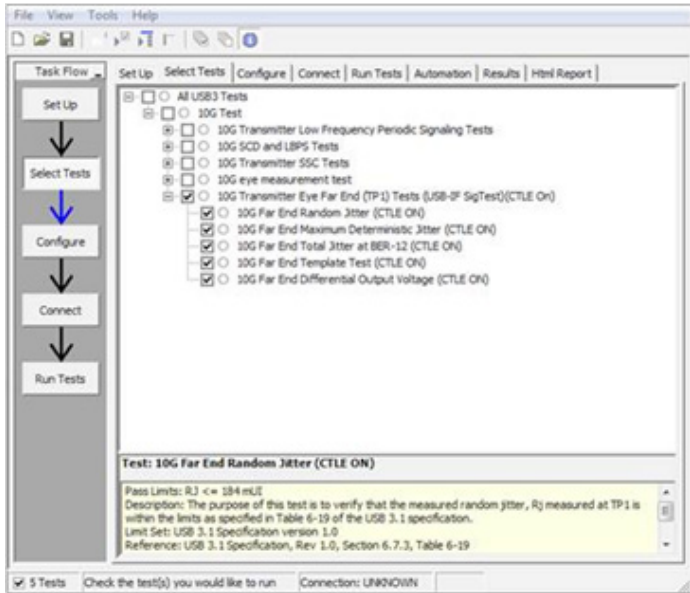
Step 1.
Set up simulation using W2353EP/ET USB Compliance Test Bench



Step 2.
ADS simulation of DQS and DQ waveforms run in the Infiniium Offline Display



Step 3.
Define set of compliance tests to run on simulated or “stored data”



Step 4.
Generate the same report on your simulated data as you generate on your prototype

USB3.1 Test Report

Overall Result: **PASS**

Test Configuration Details	
Device Description	
Input File Path	Device 1
Input Signal Type	Saved signal
AdcMode	AUTO
DC Gain	0
Reference Clock	Clean Clock
De-emphasis Mode	-3.5 dB
Device	Device
Device ID:	Device 1
Test Session Details	
Infiniium SW Version	05.20.0010
Infiniium Model Number	N8900A
Infiniium Serial Number	No Serial
Application SW Version	2.00
Debug Mode Used	No
Compliance Limits (official)	USB 3.1 Specification version 1.0
Last Test Date	2015-01-22 10:53:20 UTC +05:30

Typical Configuration

- W2210BP/BT ADS Core+Transient Convolution
- W2353EP/ET USB Compliance Test Bench
- N8900A-001 Infiniium Offline
- N8900A-002 DSA Package (EZJIT Plus and SDA)
- U7243B-1TP USB Compliance Transportable License



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