Proposed Draft

Serial ATA International Organization

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Title : Mathematical CIC for Gen3i

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Document History

Version	Date	Comments
0	8 March 2010	Initial release.
1	17 March 2010	

1 Introduction

1.1 Problem Statement

The mathematical Compliance Interconnect Channel is allowed to be used for Gen3i.

1.2 Solution Summary

Reference the appropriate footnote in the specification to Gen3i as well as Gen1x and Gen2x.

1.3 Background (optional)

Gen3i parameters are measured with no cable and with a reference cable called the Compliance Interconnect Channel. When a physical realization of the Compliance Interconnect Channel is used the test setup cabling becomes more complex and errors from the physical realization affect reproducibility of test results. Many test equipment vendors have implemented mathematical equivalents of the Compliance Interconnect Channel that avoid these limitations. The intent upon release of the Gen3i specification was to allow a mathematical Compliance Interconnect Channel. But the relevant footnote only referenced Gen1x/2x and not Gen3i. This was a minor oversight.

2 Technical Specification Changes

Editors Note: look carefully at item 3 below and find the footnote 2 referenced there now.

7.2.7 Compliance Interconnect Channels (Gen1x, Gen2x, Gen3i)

Compliance Interconnect Channels are defined as a set of calibrated physical test circuits applied to the Transmitter mated connector, intended to be representative of the highest-loss interconnects.

The Compliance Interconnect Channel (CIC) is used to verify that the signal electrical characteristics at the Transmitter mated connector are sufficient to ensure compliance to the input electrical specifications for Gen1x, Gen2x and Gen3i receivers as delivered through worst-case media. The magnitude of this worst-case loss as a function of frequency is defined mathematically as a Transmitter Compliance Transfer Function (TCTF). There is a Gen3i TCTF, Gen2x TCTF and a Gen1x TCTF. Any linear, passive, differential two-port (e.g., a SATA cable) with loss greater than the TCTF at all frequencies and which meets the ISI loss constraint (defined below) is defined to be a CIC. (See also section **Error! Reference source not found.**.)

A combination of a zero-length test load (i.e., the Laboratory Load) plus the applicable CIC (Gen1x/Gen2x/Gen3i) is used for the specification of the host-controller or device transmitter characteristics.

A Gen1x/Gen2x/Gen3i transmitter signal is specified by:

1. Meeting all parameters in **Error! Reference source not found.**[1] for Gen1x, Gen2x or Gen3i when transmitting into a Laboratory Load.
2. Meeting **Error! Reference source not found.** input swing (V_{diffTX}) and jitter (TJ after CIC and DJ after CIC) requirements for Gen1x or Gen2x when transmitting through the appropriate Gen1x or Gen2x CIC into a Laboratory Load while using the same transmitter settings (emphasis, amplitude, etc.) as in the first test.[2] (see sections **Error! Reference source not found.** and **Error! Reference source not found.**)
3. Meeting **Error! Reference source not found.** input swing (VdiffTx) and total jitter (TJ after CIC) requirements for Gen3i when transmitting through the appropriate Gen3i CIC into a Laboratory Load while using the same transmitter settings (emphasis, amplitude, etc.) as in the first test.[2]

The transmission magnitude response, $|S_{21}|$, of the Gen3i TCTF satisfies the following two inequalities[3]:

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[1] Note that the Transmitter Compliance Specifications are defined and measured into a Laboratory Load. Received signal attenuation or amplification due to actual receiver terminator tolerance as well as additional received signal ISI due to the actual receiver return loss may further degrade the actual receiver's input signal. Transmitter Compliance Specifications are expected to be only slightly tighter than Receiver Specifications.

[2] While not permitted in this specification, this second requirement can be approximated by *mathematically* processing through a TCTF the signal captured by the HBWS using only the Laboratory Load in the first requirement.

[3] Please note that "e" in the first expression is the base of the natural logarithms, approximately 2.71828. Hence, the first factor, $20 \log_{10}(e)$, evaluates to approximately 8.6859. This value is the conversion factor from nepers (defined as the natural logarithm of a power ratio) to decibels.