

**Proposed
Draft**

**Serial ATA
International Organization**

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Title : Tx AC Common Mode Voltage Procedural
Simplification**

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Document History

Version	Date	Comments
0	12-Nov-2012	Initial release. A further simplification of ECN056.
1	14-Nov-2012	Changed "third harmonic" to "fundamental", two places. Changed wording to use HBWS, exclusinvely.
2	14-Nov-2012	Fixed typo in last sentence.
3	14-Nov-2012	Restructured the editing changes and colors to conform to the style spec and for clarity to all readers. Changed the typo in last sentence of 7.4.21 and 7.4.22 to remove 'and' and add a comma, for better sentence structure.
4	19-Dec-2012	Member review

1 Introduction

1.1 Problem Statement

In the SATA Logo activities, a recommendation has been proposed to reduce the number of tests. The following proposal will change the Tx AC Common Mode Voltage testing required for Gen1, Gen 2 and Gen3 to simplify the procedure during Logo testing.

An earlier change, ECN056, attempted to improve the Gen3 procedure. After discussion in the SATA PHY Working Group, and further discussion with the SATA Logo Working Group, it was determined that the Tx AC Common Mode Voltage test could be further simplified without unintended consequences to existing devices and to further improve chances of test approval without jeopardizing interoperability in existing systems.

1.2 Solution Summary

Discussion with the Logo committee determined that particular bandwidth filtering, during testing, could be used across all generations of SATA testing, without changing the success of system level interoperability. This change is being proposed to simplify the testing and move SATA forward with reduced complexity.

The basic idea is to change the filter for this test to used a range of frequency from 200 MHz to the fundamental frequency of the bit rate ($f_{\text{baud}}/2$). All data currently archived within the efforts of the Logo Interoperability Workshops indicates this change will not affect existing products, and furthermore, will 'ease' the requirement for certain products which have proven to have difficulty with this test but have also proven that their interoperability in system has not been degraded.

Additionally, when Gen3 testing was created, the HFTP pattern was added to further refine the higher frequencies of the data that might cause additional AC Common mode excursions. This has proven useful so this pattern will be maintained for the Gen3 test only.

The 7.4.21 text has been changed to match the 7.4.22 text. The 7.4.22 text used herein has been taken from ECN056, which is being added to the current SATA spec, revision 3.1. The exception is the HFTP pattern being removed for the 7.4.21 text, as legacy devices have not been tested with this pattern, but have been proven to remain interoperable.

The text from 7.4.22, stating that this test is only performed during data transfers ("...during a data transfer only, not involving OOB transmissions"), has also been added to 7.4.21, to match the wording between 7.4.21 and 7.4.22. This was an oversight in ECN056.

2 Technical Specification Changes

The following additions are based on the content of Serial ATA Revision 3.1, 18-July-2011. Proposed additions to SATA 3.1 text are marked in blue underline. Proposed deletions to SATA 3.1 text are marked in ~~red-strikeout~~. Black text is the original SATA 3.1 text, except section 7.4.22, which was added or altered with ECN056. Section headers correspond to the section in SATA 3.1 into which the proposed text is to be inserted.

7.4.21 TX AC Common Mode Voltage (Gen2i, Gen2m, ~~Gen2u~~)

This parameter is a measure of common mode noise other than the CM spikes during transitions due to TX+/TX- mismatch and skews, which are limited by the rise/fall mismatch and other requirements. Measurement of this parameter is achieved by transmitting through a mated connector into a Lab-Load such as shown in Figure 163. The transmitter shall use an MFTP (mid-frequency test pattern) during a data transfer only, not involving OOB transmissions. The measurement ~~instrument may~~ shall be done with a HBWS ~~or other instrument with having a measurement analog~~ bandwidth of at least $3 * \text{bitrate} / 2$ limited on the low end at 200 MHz and on the high end at $\text{bitrate} / 2$ (fundamental), using first order filtering.

Separate channels shall be used for TX+ and TX-, and with the common mode ~~is being~~ (TX+ + TX-) / 2. This~~The~~ raw common mode ~~shall be~~ filtered with a first order filter having a cutoff equal to the $\text{bitrate} / 2$ to remove the noise contribution from the edge mismatches. The peak-to-peak voltage of the filter output is the AC Common Mode Voltage, and shall remain below the specified limit.

7.4.22 TX AC Common Mode Voltage (Gen1u, Gen2u, Gen3i, Gen3u)

This parameter is a measure of common mode noise other than the CM spikes during transitions due to TX+/TX- mismatch and skews, which are limited by the rise/fall mismatch and other requirements. Measurement of this parameter is achieved by transmitting through a mated connector into a Lab-Load such as shown in Figure 163. The transmitter shall use an MFTP (mid-frequency test pattern) and an HFTP (high frequency test pattern) during a data transfer only, not involving OOB transmissions. The measurement ~~shall be done with instrument may be~~ a HBWS having a measurement bandwidth limited on the low end at 200 MHz and on the high end at $\text{bitrate} / 2$ (fundamental), using first order filtering, or other instrument. The measurement bandwidth shall be limited on the low end at 200 MHz and on the high end at $3 * \text{bitrate} / 2$ (third harmonic), using first order filters. Separate channels shall be used for TX+ and TX-, and with the common mode ~~is being~~ (TX+ + TX-) / 2. The raw common mode is filtered to remove the noise contribution from the edge mismatches. The peak-to-peak voltage of the filter output is the AC Common Mode Voltage, and shall remain below the specified limit.