

USB4 1.0 ENGINEERING CHANGE NOTICE FORM

Title: TBT3 SSC Allow USB4 SSC

Applied to: USB4 Specification Version 1.0

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| Brief description of the functional changes: |
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| Allows TBT3 systems to transmit USB4 SSC range at TBT3 frequencies. |
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| Benefits as a result of the changes: |
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| Allows TBT3 and USB4 transmitters to use the same SSC. |
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| An assessment of the impact to the existing revision and systems that currently conform to the USB specification: |
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| None. Interoperability with all TBT3 released silicon has been tested. |
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| An analysis of the hardware implications: |
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| None |
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| An analysis of the software implications: |
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| None |
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| An analysis of the compliance testing implications: |
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| The compliance specification will need to be updated. |
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Actual Change Requested

(a). Section 13.1, page 487

From Text:

When TBT3 Mode is established, an Adapter shall run at a TBT3-Compatible speed.

A Router Assembly shall support TBT3-Compatible Gen 2 Speed (10.3125Gbps). A Router Assembly may also optionally support TBT3-Compatible Gen 3 Speed (20.625Gbps).

A Router Assembly shall meet the specifications described in chapter 3, except for the following set of parameters that shall be used instead of the values specified in chapter 3:

Table 13-1. Thunderbolt 3 Parameters

| Parameter Name | Min | Max | Units |
|----------------------|---------|---------|-------|
| SSC_DOWN_SPREAD_RATE | 35 | 37 | KHz |
| SSC_PHASE_DEVIATION | -- | 18.5 | ns |
| UI (Gen 2 Speed) | 96.9406 | 96.9988 | ps |
| UI (Gen 3 Speed) | 48.4703 | 48.4994 | ps |

The transmit average UI (measured over windows at the size of one SSC cycle) shall be at the range of 97.1348ps to 97.2420ps.

The receiver shall tolerate input signals with maximum SSC down spreading of 5800ppm.

Additional receiver “Case 2a” test setup shall be supported, addressing optical interconnects with limiting modules. Case 2a setup is identical to Case 2 setup described in section 3.5.2, except that the passive cable is replaced with worst-case limiting optical cable (corresponding to the USB Type-C Specification). A receiver shall operate at BER of 1E-12 or lower with neither Forward Error Correction nor Pre-Coding applied when a stressed signal is driven at its input.

To Text:

When TBT3 Mode is established, an Adapter shall run at a TBT3-Compatible speed.

A Router Assembly shall support TBT3-Compatible Gen 2 Speed (10.3125Gbps). A Router Assembly may also optionally support TBT3-Compatible Gen 3 Speed (20.625Gbps).

A Router Assembly may transmit with either USB4 SSC or TBT3 SSC. A Router Assembly receiver must tolerate both USB4 SSC and TBT3 SSC.

A Router Assembly shall meet the specifications described in chapter 3, except for the following set of parameters that shall be used instead of the values specified in chapter 3:

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Table 13-1. Thunderbolt 3 Parameters

| Parameter Name | Min | Max | Units |
|-------------------------------------|------------------|-----------|------------|
| <u>USB4_SSC_DOWN_SPREAD_RATE_TX</u> | <u>Table 3-3</u> | | <u>KHz</u> |
| <u>USB4_SSC_PHASE_DEVIATION_TX</u> | <u>Table 3-3</u> | | <u>ns</u> |
| <u>TBT3_SSC_DOWN_SPREAD_RATE_TX</u> | 35 | 37 | KHz |
| <u>TBT3_SSC_PHASE_DEVIATION_TX</u> | -- | 18.5 | ns |
| <u>SSC_DOWN_SPREAD_RATE_RX</u> | <u>30</u> | <u>37</u> | <u>KHz</u> |
| <u>SSC_PHASE_DEVIATION_RX</u> | <u>2.5</u> | <u>22</u> | <u>ns</u> |
| UI (Gen 2 Speed) | 96.9406 | 96.9988 | ps |
| UI (Gen 3 Speed) | 48.4703 | 48.4994 | ps |

The transmit average UI (measured over windows at the size of one SSC cycle) shall be at the range of 97.1348ps to 97.2420ps.

The receiver shall tolerate input signals with maximum SSC down spreading of 5800ppm.

Additional receiver “Case 2a” test setup shall be supported, addressing optical interconnects with limiting modules. Case 2a setup is identical to Case 2 setup described in section 3.5.2, except that the passive cable is replaced with worst-case limiting optical cable (corresponding to the USB Type-C Specification). A receiver shall operate at BER of 1E-12 or lower with neither Forward Error Correction nor Pre-Coding applied when a stressed signal is driven at its input.