

# USB 3.1 ENGINEERING CHANGE NOTICE FORM

**Title: Gen 1 AC Coupling**  
**Applied to: USB3.1**

<b>Brief description of the functional changes:</b>
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Make the AC coupling cap specs for SuperSpeed Gen 1 consistent with those for SuperSpeed Gen 2.
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<b>Benefits as a result of the changes:</b>
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The change will eliminate confusion around the AC coupling requirements for SuperSpeed Gen 2 designs. As the spec is currently written, a Gen 2 capable design that uses a 220nF AC cap will violate the spec when connected to a Gen 1 link partner.
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<b>An assessment of the impact to the existing revision and systems that currently conform to the USB specification:</b>
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No impact.
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<b>An analysis of the hardware implications:</b>
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No impact.
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<b>An analysis of the software implications:</b>
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No impact.
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<b>An analysis of the compliance testing implications:</b>
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No impact.
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## Actual Change

### Section 6.7.1, Table 6-17, page 6-30

**Table Error! No text of specified style in document.-1. Transmitter Normative Electrical Parameters**

Symbol	Parameter	Gen 1 (5.0 GT/s)	Gen 2 (10 GT/s)	Units	Comments
UI	Unit Interval	199.94 (min) 200.06 (max)	99.97 (min) 100.03 (max)	ps	The specified UI is equivalent to a tolerance of $\pm 300$ ppm for each device. Period does not account for SSC induced variations.
$V_{TX-DIFF-PP}$	Differential p-p Tx voltage swing	0.8 (min) 1.2 (max)	0.8 (min) 1.2 (max)	V	Nominal is 1 V p-p
$V_{TX-DIFF-PP-LOW}$	Low-Power Differential p-p Tx voltage swing	0.4 (min) 1.2 (max)	0.4 (min) 1.2 (max)	V	Refer to Section <b>Error! Reference source not found..</b> There is no de-emphasis requirement in this mode. De-emphasis is implementation specific for this mode.
$V_{TX-DE-RATIO}$	Tx de-emphasis	3.0 (min) 4.0 (max)	Not applicable	dB	Nominal is 3.5 dB for Gen 1 operation. Gen 2 transmitter equalization recommendations are described in section <b>Error! Reference source not found..</b>
$R_{TX-DIFF-DC}$	DC differential impedance	72 (min) 120 (max)	72 (min) 120 (max)	$\Omega$	
$V_{TX-RCV-DETECT}$	The amount of voltage change allowed during Receiver Detection	0.6 (max)	0.6 (max)	V	Detect voltage transition should be an increase in voltage on the pin looking at the detect signal to avoid a high impedance requirement when an "off" receiver's input goes below ground.
$C_{AC-COUPLING}$	AC Coupling Capacitor	75 (min) 200 (max)	75 (min) 265 (max)	nF	All Transmitters shall be AC coupled. The AC coupling is required either within the media or within the transmitting component itself.
$t_{CDR\_SLEW\_MAX}$	Maximum slew rate	10	Not applicable	ms/s	See the jitter white paper for details on this measurement. This is a df/ft specification; refer to Section <b>Error! Reference source not found.</b> for details.
$SSC_{df/dt}$	SSC df/dt	Not applicable	1250 (max)	ppm/ $\mu$ s	See note 1.

**Notes:**

1. Measured over a 0.5 $\mu$ s interval using CP10. The measurements shall be low pass filtered using a filter with 3 dB cutoff frequency that is 60 times the modulation rate. The filter stopband rejection shall be greater or equal to a second order low-pass of 20 dB per decade. Evaluation of the maximum df/dt is achieved by inspection of the low-pass filtered waveform.

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To Text:

## Section 6.7.1, Table 6-17, page 6-30

**Table Error! No text of specified style in document.-2. Transmitter Normative Electrical Parameters**

Symbol	Parameter	Gen 1 (5.0 GT/s)	Gen 2 (10 GT/s)	Units	Comments
UI	Unit Interval	199.94 (min) 200.06 (max)	99.97 (min) 100.03 (max)	ps	The specified UI is equivalent to a tolerance of $\pm 300$ ppm for each device. Period does not account for SSC induced variations.
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1. Measured over a 0.5 $\mu$ s interval using CP10. The measurements shall be low pass filtered using a filter with 3 dB cutoff frequency that is 60 times the modulation rate. The filter stopband rejection shall be greater or equal to a second order low-pass of 20 dB per decade. Evaluation of the maximum df/dt is achieved by inspection of the low-pass filtered waveform.