USB 3.1 ENGINEERING CHANGE NOTICE FORM

Title: Rx High Z Value
Applied to: USB3.1

Brief description of the functional changes:
This proposal is to reduce the min HiZ requirement on the RX pins from 25Kohms to 10Kohms.

Benefits as a result of the changes
Allows continued integration of USB on contemporary manufacturing processes, and implementation of Type-C on older generations.

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:
None.

An analysis of the hardware implications:
The current RX HiZ spec poses an unnecessarily high requirement which becomes more and more challenging to hit on each subsequent CMOS manufacturing generation. The introduction of the DP transmitter on the RX pins for Type-C make it almost impossible to meet for Type-C products on 22nm or better. Since devices are ultimately looking for the presence of a 50 Ohm pulldown, a 10Kohm output impedance is easily distinguishable and there is no need to require higher.

An analysis of the software implications:
none

An analysis of the compliance testing implications:
none

USB 3.1 ENGINEERING CHANGE NOTICE FORM

Actual Change

Section 6.3.3

From Text:

Table 6-21. Receiver 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	UI does not account for SSC caused variations.
R_{RX-DC}	Receiver DC common mode impedance	18 (min) 30 (max)	18 (min) 30 (max)	Ω	DC impedance limits are needed to guarantee Receiver detect. Measured with respect to ground over a voltage of 500 mV maximum.
$R_{RX-DIFF-DC}$	DC differential impedance	72 (min) 120 (max)	72 (min) 120 (max)	Ω	
$Z_{RX-HIGH-IMP-LF}$ [1]	**LF CM Input Imedance for 0 ≤ ΔV ≤ 500mV during Reset or Power Down**	25k (min)	25k (min)	Ω	**Rx LF CM impedance with the Rx terminations not powered. Defined at the far end of the ac cap as the Min(Delta_V/Delta_I) upon application of a positive step of any size up to +500mV from steady-state.** [2]
$V_{RX-LFPS-DET-DIFFp-p}$	LFPS Detect Threshold	100 (min) 300 (max)	100 (min) 300 (max)	mV	Below the minimum is noise. Must wake up above the maximum.

Note

1. **Impedance is only specified for ΔV > 0. ΔV < 0 is not specified and could be as low as 0Ω.**
2. **Steady-state is defined as no movement on TX or RX nodes and zero current through the AC cap.**

To Text:

6.8.3 Receiver Electrical Parameters

Normative specifications are to be measured at the connector. Peak (p) and peak- peak (p-p) are defined in Section 6.6.2.

Table 6-21. Receiver 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	UI does not account for SSC caused variations.
R_{RX-DC}	Receiver DC common mode impedance	18 (min) 30 (max)	18 (min) 30 (max)	Ω	DC impedance limits are needed to guarantee Receiver detect. Measured with respect to ground over a voltage of 500 mV maximum.
$R_{RX-DIFF-DC}$	DC differential impedance	72 (min) 120 (max)	72 (min) 120 (max)	Ω	
$Z_{RX-HIGH-IMP-DC-POS}$ [1]	**LF CM Input Imedance for 0 ≤ ΔV ≤ 500mV during Reset or Power Down**	10K (min)	10K (min)	Ω	**Rx LF CM impedance with the Rx terminations not powered. Defined at the far end of the ac cap as the Min(Delta_V/Delta_I) upon application of a positive step of any size up to +500mV from steady-state.** [2]
$V_{RX-LFPS-DET-DIFFp-p}$	LFPS Detect Threshold	100 (min) 300 (max)	100 (min) 300 (max)	mV	Below the minimum is noise. Must wake up above the maximum.

Note

1. **Impedance is only specified for ΔV > 0. ΔV < 0 is not specified and could be as low as 0Ω.**
2. **Steady-state is defined as no movement on TX or RX nodes and zero current through the AC cap.**