USB 3.1 ENGINEERING CHANGE NOTICE FORM

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

Brief description of the functional changes:
The current RX HiZ spec has confusing language and unnecessary impositions leaving too much open to interpretation which could lead to interoperability issues. This ECR suggests a change in language which focuses on ensuring proper receive detect operation.

Benefits as a result of the changes
The changes will help ensure all devices are detected properly.

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:
none

An analysis of the software implications:
none

An analysis of the compliance testing implications:
none

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Actual Change

Section 6.3.3

From 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]	DC Input CM Input Impedance for V>0 during Reset or power down	25k (min)	25k (min)	Ω	Rx DC CM impedance with the Rx terminations not powered, measured over the range 0 – 500 mV with respect to ground.
$V_{RX-LFPS-DET-DIFFp-p}$	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. Only DC Input CM Input Impedance for V >0 is specified. DC Input CM Input Impedance for V <0 is not guaranteed and could be as low as 0 Ω.

To Text:

Table Error! No text of specified style in document.**-1. 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	

Symbol	Parameter	Gen 1 (5.0 GT/s)	Gen 2 (10 GT/s)	Units	Comments
$Z_{RX-HIGH-IMP-DC-POS}$[1]	DC Input CM Input Impedance for V>0 during Reset or power down	25k (min)	25k (min)	Ω	Rx low frequency CM impedance with the Rx terminations not powered, Defined at the transmitter side of the AC cap as min(delta_V/delta_I) upon application of a positive Tx step of any size up to +500mV from steady state.
$V_{RX-LFPS-DET-DIFFp-p}$	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 at 0Ω.
2. Steady-state is defined as no change voltage on Tx or Rx nodes and zero current flow through the AC cap.