

USB Type-C ENGINEERING CHANGE NOTICE

Title: Legacy Cable Rp Tolerance

Applied to: USB Type-C Specification Release 1.0, August 11, 2014

Brief description of the functional changes:

Require a tolerance of +/- 5% for Rp when used in the USB Type-C plug on a USB Type-C to USB 3.1 Standard-A Cable Assembly, USB Type-C to USB 2.0 Standard-A Cable Assembly and USB Type-C to USB 2.0 Micro-B Receptacle Adapter Assembly. Require minimum impedance to GND on VBus on DFPs and DRPs when unattached.

Benefits as a result of the changes:

An interoperability issue is avoided, whereby a UFP may fail to detect a connected legacy DFP. A second interoperability is avoided whereby a DFP may mis-detect a connected USB Type-C to USB A cable.

An assessment of the impact to the existing revision and systems that currently conform to the USB specification:

Currently, the spec requires a tolerance of +/- 20% on Rp. The value of 56k Ohms is required when connected to a power rail in the range 4.75V – 5.5V, and this is specified in Table 4-10. The specifications for the above mentioned legacy cable assemblies all require a Rp pull-up on CC to VBus, and refer to Table 4-10 for the value of Rp. No allowance is made in table 4-10 for the possible IR drop in the cable assembly, which can result in a VBus being in the range 4V – 5.5V. The result can be that, with a lower value for VBus, a 56K +20% resistor will result in a voltage at the UFP that falls outside the range specified in Table 4-22. A 5% tolerance brings the detect voltage back into the desired range, even with Vbus at 4V.

If a DFP or DRP is attached to a legacy adapter cable, which is not connected at the far end, it may mis-detect the Rp as a pull-down to GND, depending on the impedance to GND on VBus when VBus is not being sourced. Requiring a minimum impedance avoids this issue.

An analysis of the hardware implications:

Different spec resistor in the Type-C connector of the relevant legacy adapter cables Possible hardware change to DFPs and DRPs.

An analysis of the software implications:

None

An analysis of the compliance testing implications:

None

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Actual Change

(a). Section 4.4.2, Page 103

Add Text to end of section:

A DRP or DFP or UFP with Accessory Support implementing an Rp pull-up as its method of connection detection shall provide an impedance between VBus and GND on its receptacle pins as specified in Table 4-x when not sourcing power on VBus (i.e. when in states Unattached.DFP or Unattached.Accessory).

Table 4-x VBus Leakage

	Minimum	Maximum	Notes
VBus Leakage Impedance	72.4k Ω		Leakage between VBus pins and GND pins on receptacle when VBus is not being Sourced

(b). Section 4.11.1, Table 4-10, Page 149

From Text:

(Row Default USB Power, column Resistor pull-up to 4.75 – 5.5V)

56 k Ω \pm 20%

To Text:

(Row Default USB Power, column Resistor pull-up to 4.75 – 5.5V)

56 k Ω \pm 20% (Note 1)

(Under table)

Notes:

1. For Rp when implemented in the USB Type-C plug on a USB Type-C to USB 3.1 Standard-A Cable Assembly, a USB Type-C to USB 2.0 Standard-A Cable Assembly, a USB Type-C to USB 2.0 Micro-B Receptacle Adapter Assembly or a USB Type-C captive cable connected to a USB host, a value of 56 k Ω \pm 5% shall be used, in order to provide tolerance to IR drop on VBus and GND in the cable assembly.