

USB ENGINEERING CHANGE NOTICE

Title: Device Capacitance

Applies to: Universal Serial Bus Specification, Revision 2.0

Summary of ECN

This ECN ensures that all USB peripherals have a detectable change in capacitance on VBus when they are attached. This ensures that OTG devices and Embedded Hosts can detect attachment of peripherals in the absence of VBus.

In addition the ECN clarifies an inconsistency in the USB 2.0 specification.

Reasons for ECN

OTG devices and Embedded Hosts are becoming more prevalent in the eco-system and it would improve the interoperability and end user ease of use if OTG devices and hosts can properly detect the attachment of devices when VBus is turned-off (typically to conserve power).

Impact on Existing Peripherals and Systems:

It is estimated that around 10% of USB devices going into compliance have less than 1 μ F capacitance on VBUS as measured by the inrush test. All of these are self-powered devices.

With the increased uptake of USB charging and a desire to be detectable via the Attach Detection Protocol (ADP), it is anticipated that the number of USB devices with less than 1 μ F capacitance will reduce.

Hardware Implications:

A small number of USB devices will need to add a 1 μ F capacitance to their VBUS line in order to be detectable via ADP. The majority of USB devices already have a capacitance larger than 1 μ F on VBUS.

Software Implications:

Large improvement in usability since USB device attachment/detachment can now be detected reliably.

Compliance Testing Implications:

Method of testing this is inrush. The compliance tests will need to be verified to ensure that the limits on the test are still correct.

Specification Changes

The last sentence in Section 7.2.4.2 to be modified from:

“A minimum of 1.0uF is recommended for bypass across Vbus.”

To the following text:

“A USB device is required to expose a capacitance on the VBUS pin of its connector of CRPB. This capacitance shall be greater than CRPB min for voltages on the VBUS pin from 0V to 5.25V, regardless of whether the USB device is powered or unpowered.”

Table 7-7 entry for CRPB to be modified as follows:

| | | | | | |
|---|------|--|-----|------|----|
| Upstream Facing Port Bypass Capacitance | CRPB | VBUS to GND across the whole VBUS voltage range (0 - 5.25V) ; Note 9, Section 7.2.4.1 | 1.0 | 10.0 | μF |
|---|------|--|-----|------|----|