USB 3.1 ENGINEERING CHANGE NOTICE

Title: USB 3.1 VBUS Max Limit
Applied to: USB_3_1r1.0_07_31_2013

Brief description of the functional changes:

Update the USB3.1 specification to align with the expanded VBUS voltage definition in the USB-IF Type-C specification which defines VBUS as having a Max supply voltage of 5.50 V DC.

The Type-C cable and connector definition specifies a minimal current carrying capacity of 3A. This increased capacity creates a situation where losses in cables, connectors, PCB traces and power supply components will result in the VBUS level available at the consumer end of the cable that is below the minimum acceptable level for operation. As a result, in order to have an implementable Type-C specification it is necessary to boost the upper limit for VBUS at the supply side to 5.5V DC from the present spec value of 5.25 V DC.

Benefits as a result of the changes:

OEM's can design products that support the higher power levels of the Type-C connector and provide VBUS levels at or above 5.25V to ensure that the VBUS voltage that is available at the far-side connection is within a suitable working range for USB products, and is also at a high enough level to charge batteries in as short a time interval as possible to ensure customer satisfaction.

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

The impact is difficult to assess as there is a wide range of component vendors supporting USB, and also a wide variation of design methodologies by OEM's.

There are certainly going to be a subset of existing USB products that may be sensitive to operation at VBUS levels of up to 5.5V. The sensitivity will be mitigated in many cases by cable losses, so the devices themselves may never experience the 5.5V condition. In the cases where there is a direct attach, then connector losses are minimized and an increased potential will exist for a device that is not tolerant of 5.5V operation to experience overstress.

The overstress results will be device specific and is impossible to outline in this ECN but is not expected to result in a safety situation of any kind.

An analysis of the hardware implications:

New designs adhering to this ECN will need to consider the new 5.5V VBUS max level during the component selection process.

An analysis of the software implications:

There are no known software implications.

An analysis of the compliance testing implications:

Compliance will need to make the small modifications necessary to accommodate the new upper limit.

Actual Change

(a). Section 11.4.2 Steady State Voltage Drop Budget

From Text:

The nominal 5 V ± 5% source (host or hub) is 4.75 V to 5.25 V

To Text:

The nominal 5 V - 5% +10% source (host or hub) is 4.75 V to 5.50 V

(b) Section 11.4.5 VBUS Electical Characteristics.
Table 11-2, Supply Voltage: Port (downstream connector) VBUS, Max.

From Text:

Change From: 5.25V

Table 11-2. DC Electrical Characteristics

Parameter	Symbol	Conditions	Min.	Max.	Units
Supply Voltage:					
Port (downstream connector)	VBUS		4.45	5.25	V
Port (upstream connector)	VBUS		4.0		V
Supply Current:					
High-power Hub Port (out)	ICCPRT		900		mA
Low-power Hub Port (out)	ICCUPT		150		mA
High-power Peripheral Device (in)	ICCHPF			900	mA
Low-power Peripheral Device (in)	ICCLPF			150	mA
Unconfigured Device (in)	ICCINIT			150	mA
Suspended High-power Device	ICCS			2.5	mA

To Text:

Change To: 5.50 V

Table 11-2. DC Electrical Characteristics

Parameter	Symbol	Conditions	Min.	Max.	Units
Supply Voltage:					
Port (downstream connector)	VBUS		4.45	5.50	V
Port (upstream connector)	VBUS		4.0		V
Supply Current:					
High-power Hub Port (out)	ICCPRT		900		mA
Low-power Hub Port (out)	ICCUPT		150		mA
High-power Peripheral Device (in)	ICCHPF			900	mA
Low-power Peripheral Device (in)	ICCLPF			150	mA
Unconfigured Device (in)	ICCINIT			150	mA
Suspended High-power Device	ICCS			2.5	mA