

## **Title: Maximum Vbus Voltage.**

### **Applied to: Revision 2.0, Including Errata through 27-July-2012 (Version 1.1a)**

#### **Brief description of the functional changes:**

The OTG & EH specification requires B-devices to operate at up to 6V. This is greater than the 5.50V which USB 2.0 and USB 3.1 are being changed to require. This places an additional requirement over and above the base specification which some manufacturers find to be onerous. B-devices, according to the specification, need to be tolerant of power supply transients up to 6V but there is no supply defined which outputs a steady 6V. The changes in this ECN reduce the required operating range of a B-device to 4-5.50V and add a requirement for toleration of transients.

#### **Benefits as a result of the changes:**

Lower requirement on manufacturers implementing the OTG and EH supplement.

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

Any system which meets the requirement to operate at 6V will be able to meet this less stringent requirement as well.

#### **An analysis of the hardware implications:**

Reduces requirements on HW to support operation at a steady 6V and replaces this with a requirement to tolerate transients.

#### **An analysis of the software implications:**

None known.

#### **An analysis of the compliance testing implications:**

Compliance plan and test scripts will need to be re-issued to change the operating voltage tests. There is no plan to add additional testing for a 6V transient.

## Actual Change

### (a). From Text/Table:

#### 4.3.2 VBUS Input Voltage

A B-device (OTG or SRP-capable peripheral-only) shall be able to operate at a voltage of VB\_VBUS. Standard peripherals which wish to operate correctly with Targeted Hosts should also comply with this requirement. See also [USBBattery1.2] for requirements on peripheral operating voltages with a charger or ACA.

### To Text/Table:

#### 4.3.2 VBUS Input Voltage

A B-device (OTG or SRP-capable peripheral-only) shall be able to operate at a voltage of VB\_VBUS **and shall be able to tolerate transients in the range VA\_VBUS\_TRANS\_LO**. Standard peripherals which wish to operate correctly with Targeted Hosts should also comply with this requirement. See also [USBBattery1.2] for requirements on peripheral operating voltages with a charger or ACA.

**(b). From Text/Table:****Table 4-1: Electrical Characteristics**

Parameter	Symbol	Conditions	Min <sup>5</sup>	Max <sup>5</sup>	Units	Ref
<b>VBUS Voltage:</b>						
VBUS Average Voltage (low power) <sup>6</sup>	VA_VBUS_AVG_LO	IA_VBUS_RATED ≤ 100 mA	4.4	5.25	V	4.2.1
VBUS Average Voltage (high power) <sup>6</sup>	VA_VBUS_AVG_HI	100mA < IA_VBUS_RATED	4.75	5.25	V	4.2.1
VBUS transient voltage (low power)	VA_VBUS_TRNS_LO	IA_VBUS_RATED ≤ 100 mA	4.1	6.0	V	4.2.1, 4.3.3
VBUS transient voltage (high power)	VA_VBUS_TRNS_HI	100mA < IA_VBUS_RATED	4.4	6.0	V	4.2.1, 4.3.3
B-device operating voltage	VB_VBUS		4.0	6.0	V	4.3.2
OTG device or EH Leakage Voltage	VOTG_VBUS_LKG			0.7	V	4.1.1
ADP discharge voltage	VADP_DSCHG			0.15	V	5.4.2
VBUS noise requirement for ADP	VADP_NOISE	+ve or -ve peak voltage		10	mV	5.4.2
<b>VBUS Current:</b>						
A-device Output Current <sup>7</sup>	IA_VBUS_OUT		8 <sup>8</sup>	5000	mA	4.2.1
B-device (OTG or SRP-capable peripheral-only) Unconfigured Average Current <sup>6</sup>	IB_UNCFG	0 V ≤ VBUS ≤ VA_VBUS_AVG_LO max or VA_VBUS_AVG_HI max		2.5	mA	4.3.1
VBUS leakage source current	IVBUS_LKG_SRC	VBUS held at ground		70	μA	4.1.1
ADP source current <sup>9</sup>	IADP_SRC		1.1	1.65	mA	5.4.2

## To Text/Table:

**Table 4-1: Electrical Characteristics**

Parameter	Symbol	Conditions	Min <sup>5</sup>	Max <sup>5</sup>	Units	Ref
<b>VBUS Voltage:</b>						
VBUS Average Voltage (low power) <sup>6</sup>	VA_VBUS_AVG_LO	IA_VBUS_RATED ≤ 100 mA	4.4	5.50	V	4.2.1
VBUS Average Voltage (high power) <sup>6</sup>	VA_VBUS_AVG_HI	100mA < IA_VBUS_RATED	4.75	5.50	V	4.2.1
VBUS transient voltage (low power)	VA_VBUS_TRNS_LO	IA_VBUS_RATED ≤ 100 mA	4.1	5.50	V	4.2.1, 4.3.3
VBUS transient voltage (high power)	VA_VBUS_TRNS_HI	100mA < IA_VBUS_RATED	4.4	5.50	V	4.2.1, 4.3.3
B-device operating voltage	VB_VBUS		4.0	5.50	V	4.3.2
OTG device or EH Leakage Voltage	VOTG_VBUS_LKG			0.7	V	4.1.1
ADP discharge voltage	VADP_DSCHG			0.15	V	5.4.2
VBUS noise requirement for ADP	VADP_NOISE	+ve or -ve peak voltage		10	mV	5.4.2
<b>VBUS Current:</b>						
A-device Output Current <sup>7</sup>	IA_VBUS_OUT		8 <sup>8</sup>	5000	mA	4.2.1
B-device (OTG or SRP-capable peripheral-only) Unconfigured Average Current <sup>6</sup>	IB_UNCFG	0 V ≤ VBUS ≤ VA_VBUS_AVG_LO max or VA_VBUS_AVG_HI max		2.5	mA	4.3.1
VBUS leakage source current	IVBUS_LKG_SRC	VBUS held at ground		70	μA	4.1.1
ADP source current <sup>9</sup>	IADP_SRC		1.1	1.65	mA	5.4.2