DRAFT TANZANIA STANDARD

(Draft for comments only)

Universal serial bus interfaces for data and power - Part 1-1: Common components - USB Battery Charging Specification, Revision 1.2

TANZANIA BUREAU OF STANDARDS
1 National Foreword

This draft Tanzania Standard is being prepared by the Telecommunications and Information Technology Technical Committee, under the supervision of the Electrotechnical divisional standards committee (EDC)

This draft Tanzania Standard is an adoption of the International Standard IEC 62680-1-1:2015 Universal serial bus interfaces for data and power - Part 1-1: Common components - USB Battery Charging Specification, Revision 1.2, Which has been prepared by the International Electrotechnical Commission.

2 Terminology and conventions

Some terminologies and certain conventions are not identical with those used in Tanzania standards; attention is drawn especially to the following: -

1) The comma has been used as a decimal marker for metric dimensions. In Tanzania Standards, it is current practice to use “full point” on the baseline as the decimal marker.

2) Where the words “International Standard(s)” appear, referring to this standard they should read “Tanzania Standard(s)".
Universal serial bus interfaces for data and power –
Part 1-1: Common components – USB Battery Charging Specification,
Revision 1.2
INTERNATIONAL ELECTROTECHNICAL COMMISSION

UNIVERSAL SERIAL BUS INTERFACES
FOR DATA AND POWER –
Part 1-1: Common components –
USB Battery Charging Specification, Revision 1.2

FOREWORD

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International Standard IEC 62680-1-1 has been prepared by technical area 14: Interfaces and methods of measurement for personal computing equipment, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

The text of this standard is based on documents prepared by the USB Implementers Forum (USB-IF). The structure and editorial rules used in this publication reflect the practice of the organization which submitted it.

This first edition cancels and replaces IEC 62680-3 published in 2013. This edition constitutes a technical revision.
The text of this standard is based on the following documents:

<table>
<thead>
<tr>
<th>CDV</th>
<th>Report on voting</th>
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<tbody>
<tr>
<td>100/2330/CDV</td>
<td>100/2433/RVC</td>
</tr>
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</table>

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

A list of all the parts in the IEC 62680 series, published under the general title *Universal serial bus interfaces for data and power* can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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**INTRODUCTION**

The IEC 62680 series is based on a series of specifications that were originally developed by the USB Implementers Forum (USB-IF). These specifications were submitted to the IEC under the auspices of a special agreement between the IEC and the USB-IF.

The USB Implementers Forum, Inc.(USB-IF) is a non-profit corporation founded by the group of companies that developed the Universal Serial Bus specification. The USB-IF was formed to provide a support organization and forum for the advancement and adoption of Universal Serial Bus technology. The Forum facilitates the development of high-quality compatible USB peripherals (devices), and promotes the benefits of USB and the quality of products that have passed compliance testing.

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This series covers the Universal Series Bus interfaces for data and power and consists of the following parts:

IEC 62680-1 -1, Universal Serial Bus interfaces for data and power – Part 1-1: Common components – USB Battery Charging Specification, Revision 1.2

IEC 62680 -2-1, Universal Serial Bus interfaces for data and power – Part 2-1: Universal Serial Bus Specification, Revision 2.0

IEC 62680-2 -2, Universal Serial Bus interfaces for data and power – Part 2-2: USB Micro-USB Cables and Connectors Specification, Revision 1.01

IEC 62680 -2-3, Universal Serial Bus interfaces for data and power – Part 2-3: Universal Serial Bus Cables and Connectors Class Document Revision 2.0

This part of the IEC 62680 series consists of several distinct parts:

• the main body of the text, which consists of the original specification and all ECN and Errata developed by the USB-IF.
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## Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Author</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC1.0</td>
<td>Mar 8, 2007</td>
<td>Terry Remple</td>
<td>First release</td>
</tr>
<tr>
<td>BC1.1</td>
<td>April 15, 2009</td>
<td>Terry Remple</td>
<td>Major updates to all sections. Added Data Contact Detect protocol, and Accessory Charger Adapter.</td>
</tr>
<tr>
<td>BC1.2</td>
<td>Oct 5, 2010</td>
<td>Terry Remple</td>
<td>Following items indicate changes from BC1.1 to BC1.2. References below to Section, Figures and Tables refer to BC1.2, unless BC1.1 is specifically indicated.</td>
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<tr>
<td></td>
<td></td>
<td>Adam Burns</td>
<td>1. Allow DCPs to output more than 1.5A. Allows Portable Devices (PDs) with switch mode chargers to draw more power. Section 4.4.1.</td>
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<td></td>
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<td>2. Increase minimum CDP current to 1.5A. Without change, PDs had to draw less than 500mA, to avoid CDP shutdown. Table 5-2.</td>
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<td>3. Indicate that ICDP max and IDCP max limits of 5A come from USB 2.0, and are safety limits. Table 5-2 note 1.</td>
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<td>4. Allow PDs to draw up to 1.5A during HS chirp and traffic. Remove previous limits of 560mA and 900mA which was based on HS common mode ranges. Section 3.5.</td>
</tr>
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<td>5. Require CDPs to support 1.5A during HS chirp and traffic. Affects CDP common mode range. Section 3.5.</td>
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<td>6. Reduce maximum PD current from 1.8A to 1.5A, to avoid shutdown when attached to CDP. Table 5-2.</td>
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<td>7. Rename Docking Station to ACA-Dock, to avoid confusion with other types of Docking Stations.</td>
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<td>8. Require ACA-Dock to differentiate itself from an ACA, by enabling VDM_SRC during no activity. Section 3.2.4.4.</td>
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<td>9. Allow CDP to leave VDM_SRC enabled while peripheral not connected. Section 3.2.4.2.</td>
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<td>10. Remove ICHG_SHTDWN. This was a recommended max output current for Charging Ports with VBUS grounded. BC1.1 Section 4.1.</td>
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<td>11. Require VDP_SRC to not pull D+ below 2.2V when D+ is being pulled to VDP_UP through RDP_UP. Require VDM_SRC to not pull D- below 2.2V when D- is being pulled high. Required for ACA-Dock support. Table 5-1 notes 1 and 2.</td>
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<td>12. Make DCD current source optional for PDs. Section 3.2.3.</td>
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<td>13. Make DCD timeout required for PDs. Section 3.2.3.</td>
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<td>15. Make Good Battery Algorithm required behavior for PDs. Section 3.2.4.</td>
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<td>16. Remove resistive detection. BC1.1 Section 3.9.</td>
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<td>17. Change PD Required Operating Range to include 4.5V at 500mA. Figure 4-3.</td>
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<td>18. Allow any downstream port to act as a DCP. Section 4.1.3.</td>
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<td>19. Require PDs to enable VDP_SRC or RDP_PU when charging from a DCP. Section 3.3.2.</td>
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<td>20. Allow chargers to renegotiate current with PD by dropping and reasserting VBUS. Section 4.1.3.</td>
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<td>21. Require PDs to discharge their own VBUS input after VBUS drops to support charger port renegotiation request. Section 4.6.3.</td>
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<td>22. Allow PDs to disconnect and repeat Charger Detection multiple times while attached, with specified timing. Section 4.6.3.</td>
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<td>23. Reduce DCP input impedance between D+, D- to VBUS and ground from 1MΩ to 300kΩ. Section 4.4.3.</td>
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<td>24. Require CDPs to recover after over-current condition. Section 4.2.2.</td>
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<td>25. Allow greater DCP undershoot for large load current steps, to enable low quiescent current chargers required by Europe, Section 4.4.2.</td>
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<td>26. Define ACAs and ACA-Docks as types of Charging Ports. Section 1.4.5.</td>
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<td>27. Use session valid voltage range defined in EH and OTG Supplement rev 2.0. Section 3.2.2.</td>
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<td>28. Only devices that can operate stand-alone from internal battery power are allowed to use the Dead Battery Provision. Section 2.2.</td>
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<td>29. Allow compound PDs to draw ISUSP plus an responsible for protecting themselves against higher voltages on VBUS. BC1.1 Section 6.7.</td>
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<td>45. Require ACAs to continue providing power to OTG device from Charging Port, even if ground offsets or USB reset cause D- to go below VDAT_REF. Section 6.2.6.</td>
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<td>46. Change charger shutdown recovery time (TSHTDWN_REC) from 2 seconds to 2 minutes. Table 5-5.</td>
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<td>47. Indicate that ACA-Dock is required to pull D+ to VDP_UP with RDP_UP when VBUS is asserted. Section 3.2.4.4.</td>
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<td>49. Improve readability by adding and updating drawings, re-structuring sections, and clarifying text.</td>
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<td></td>
<td>Mar 15, 2012</td>
<td>Pat Crowe</td>
<td>Includes errata changes from Mar 15, 2012:</td>
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<tr>
<td>BC 1.2: plus further errata</td>
<td>Mar 15, 2012</td>
<td>Pat Crowe</td>
<td>Includes errata changes from Mar 15, 2012:</td>
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</table>
Acronyms

ACAAccessory Charger Adapter
CDPCharging Downstream Port
DBPDead Battery Provision
DCDData Contact Detect
DCPDedicated Charging Port
FSFull Speed
HSHigh-Speed
LSLow-Speed
OTGOn-The-Go
PCPersonal Computer
PDPortable Device
PHYPysical Layer Interface for High-Speed USB
PS2Personal System 2
SDPStandard Downstream Port
SRPSession Request Protocol
TPLTargeted Peripheral List
USBU universal Serial Bus
USBCVUSB Command Verifier
USB-IFUSB Implementers Forum
VBUSVoltage line of the USB interface
1 Introduction

1.1 Scope

The Battery Charging Working Group is chartered with creating specifications that define limits as well as detection, control and reporting mechanisms to permit devices to draw current in excess of the USB 2.0 specification for charging and/or powering up from dedicated chargers, hosts, hubs and charging downstream ports. These mechanisms are backward compatible with USB 2.0 compliant hosts and peripherals.

1.2 Background

The USB ports on personal computers are convenient places for Portable Devices (PDs) to draw current for charging their batteries. This convenience has led to the creation of USB Chargers that simply expose a USB standard-A receptacle. This allows PDs to use the same USB cable to charge from either a PC or from a USB Charger.

If a PD is attached to a USB host or hub, then the USB 2.0 specification requires that after connecting, a PD must draw less than:

- 2.5 mA average if the bus is suspended
- 100 mA if bus is not suspended and not configured
- 500 mA if bus is not suspended and configured for 500 mA

If a PD is attached to a Charging Port, (i.e. CDP, DCP, ACA-Dock or ACA), then it is allowed to draw \( I_{DEV\_CHG} \) without having to be configured or follow the rules of suspend.

In order for a PD to determine how much current it is allowed to draw from an upstream USB port, there need to be mechanisms that allow the PD to distinguish between a Standard Downstream Port and a Charging Port. This specification defines just such mechanisms.

Since PDs can be attached to USB chargers from various manufacturers, it is important that all provide an acceptable user experience. This specification defines the requirements for a compliant USB charger, which is referred to in this spec as a USB Charger.

If a PD has a Dead or Weak Battery, then the Connect Timing Engineering Change Notice (ECN) issued by the USB-IF on the USB 2.0 spec allows that device to draw up to \( I_{UNIT} \) while attached but not connected. The conditions associated with this ECN are contained in Section 2 of this specification, and are referred to as the Dead Battery Provision (DBP).

1.3 Reference Documents

The following specifications contain information relevant to the Battery Charging Specification.

- OTG and Embedded Host Supplement, Revision 2.0
- USB 2.0 Specification
- USB 3.0 Specification