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

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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>
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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.

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- withdrawn,
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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

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<th>Author</th>
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<td>BC1.0</td>
<td>Mar 8, 2007</td>
<td>Terry Remple</td>
<td>First release</td>
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<td>Terry Remple</td>
<td>Major updates to all sections. Added Data Contact Detect protocol, and Accessory Charger Adapter.</td>
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<td>Terry Remple, Adam Burns</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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<td></td>
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<td></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>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>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>
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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>10. Remove ICHG_SHTDWN. This was a recommended max output current for Charging Ports with VBUSB 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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Acronyms

ACA Accessory Charger Adapter
CDP Charging Downstream Port
DBP Dead Battery Provision
DCD Data Contact Detect
DCP Dedicated Charging Port
FS Full Speed
HS High-Speed
LS Low-Speed
OTG On-The-Go
PC Personal Computer
PD Portable Device
PHY Physical Layer Interface for High-Speed USB
PS2 Personal System 2
SDP Standard Downstream Port
SRP Session Request Protocol
TPL Targeted Peripheral List
USB Universal Serial Bus
USBCV USB Command Verifier
USB-IF USB Implementers Forum
VBUS Voltage 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 IDEV_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 IUNIT 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