

# INTERNATIONAL STANDARD



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



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2015 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

#### IEC Catalogue - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

#### IEC publications search - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 2 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### IEC Glossary - [www.iec.ch/glossary](http://www.iec.ch/glossary)

More than 60 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [csc@iec.ch](mailto:csc@iec.ch).

# INTERNATIONAL STANDARD



---

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

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 29.220; 33.120; 35.200

ISBN 978-2-8322-2844-9

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### UNIVERSAL SERIAL BUS INTERFACES FOR DATA AND POWER –

#### Part 1-1: Common components – USB Battery Charging Specification, Revision 1.2

#### FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization, comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with the conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, issue to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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.

The text of this standard is based on the following documents:

CDV	Report on voting
100/2330/CDV	100/2433/RVC

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.

A bilingual version of this publication may be issued at a later date.

**IMPORTANT** – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

## 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.

**ANY USB SPECIFICATIONS ARE PROVIDED TO YOU "AS IS," WITH NO WARRANTIES WHATSOEVER, INCLUDING ANY WARRANTY OF MERCHANTABILITY, NON-INFRINGEMENT, OR FITNESS FOR ANY PARTICULAR PURPOSE. THE USB IMPLEMENTERS FORUM AND THE AUTHORS OF ANY USB SPECIFICATIONS DISCLAIM ALL LIABILITY, INCLUDING LIABILITY FOR INFRINGEMENT OF ANY PROPRIETARY RIGHTS, RELATING TO USE OR IMPLEMENTATION OR INFORMATION IN THIS SPECIFICATION.**

**THE PROVISION OF ANY USB SPECIFICATIONS TO YOU DOES NOT PROVIDE YOU WITH ANY LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS.**

Entering into USB Adopters Agreements may, however, allow a signing company to participate in a reciprocal, royalty-free licensing arrangement for compliant products. For more information, please see:

<http://www.usb.org/developers/docs/>

[http://www.usb.org/developers/devclass\\_doc\\_#approved](http://www.usb.org/developers/devclass_doc_#approved)

IEC DOES NOT TAKE ANY POSITION AS TO WHETHER IT IS ADVISABLE FOR YOU TO ENTER INTO ANY USB ADOPTER AGREEMENTS OR TO PARTICIPATE IN THE USB IMPLEMENTERS FORUM.”

This series covers the Universal Serial 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.

## CONTENTS

FOREWORD.....	2
INTRODUCTION.....	4
1 Introduction .....	13
1.1 Scope .....	13
1.2 Background.....	13
1.3 Reference Documents.....	13
1.4 Definitions of Terms.....	14
1.4.1 Accessory Charger Adaptor .....	14
1.4.2 ACA-Dock.....	14
1.4.3 Attach versus Connect.....	14
1.4.4 Charging Downstream Port.....	14
1.4.5 Charging Port .....	14
1.4.6 Dead Battery Threshold .....	14
1.4.7 Dedicated Charging Port.....	15
1.4.8 Downstream Port.....	15
1.4.9 Micro ACA .....	15
1.4.10 Portable Device .....	15
1.4.11 Rated Current.....	15
1.4.12 Standard ACA.....	15
1.4.13 Standard Downstream Port.....	15
1.4.14 USB Charger .....	15
1.4.15 Weak Battery Threshold .....	15
1.5 Parameter Values .....	16
1.6 OTG Considerations .....	16
1.7 Super Speed Considerations .....	16
2 Dead Battery Provision .....	16
2.1 Background.....	16
2.2 DBP – Unconfigured Use.....	16
2.3 DBP – Configured Use .....	17
3 Charging Port Detection .....	18
3.1 Overview .....	18
3.2 Charger Detection Hardware.....	19
3.2.1 Overview .....	19
3.2.2 BUS Detect .....	20
3.2.3 Data Contact Detect .....	20
3.2.4 Primary Detection .....	23
3.2.5 Secondary Detection .....	30
3.2.6 ACA Detection.....	32
3.3 Charger Detection Algorithms .....	34
3.3.1 Weak Battery Algorithm .....	34
3.3.2 Good Battery Algorithm .....	35
3.4 Charger Detection Timing .....	36
3.4.1 Data Contact Detect Timing.....	36
3.4.2 Detection Timing, CDP .....	38
3.5 Ground Current and Noise Margins.....	40
4 Charging Port and Portable Device Requirements .....	40

4.1	Charging Port Requirements .....	40
4.1.1	Overshoot.....	40
4.1.2	Maximum Current .....	40
4.1.3	Detection Renegotiation .....	40
4.1.4	Shutdown Operation .....	41
4.1.5	Failure Voltage .....	41
4.1.6	Multiple Ports .....	41
4.2	Charging Downstream Port .....	41
4.2.1	Required Operating Range .....	41
4.2.2	Shutdown Operation .....	42
4.2.3	Undershoot.....	42
4.2.4	Detection Signaling.....	42
4.2.5	Connector.....	43
4.3	ACA-Dock .....	43
4.3.1	Required Operating Range .....	43
4.3.2	Undershoot.....	43
4.3.3	Detection Signaling.....	43
4.3.4	Connector.....	43
4.4	Dedicated Charging Port .....	43
4.4.1	Required Operating Range .....	43
4.4.2	Undershoot.....	44
4.4.3	Detection Signaling.....	44
4.4.4	Connector.....	44
4.5	Accessory Charger Adapter .....	45
4.5.1	Required Operating Range .....	45
4.5.2	Undershoot.....	45
4.5.3	Detection Signaling.....	45
4.5.4	Connector.....	45
4.6	Portable Device .....	45
4.6.1	Allowed Operating Range .....	45
4.6.2	Detection Signaling.....	46
4.6.3	Detection Renegotiation .....	46
4.6.4	Connector.....	47
5	Parameter Values .....	47
6	Accessory Charger Adapter .....	50
6.1	Introduction.....	50
6.2	Micro ACA .....	52
6.2.1	Micro ACA Ports .....	52
6.2.2	Micro ACA Connectivity Options .....	53
6.2.3	Micro ACA Architecture.....	53
6.2.4	Micro ACA Modes of Operation.....	54
6.2.5	Implications of not Supporting Micro ACA Detection .....	56
6.2.6	Micro ACA Requirements.....	56
6.2.7	Portable Device State Diagram .....	57
6.3	Standard ACA .....	59
6.3.1	Standard ACA Ports .....	59
6.3.2	Standard ACA Architecture .....	60
6.3.3	Standard ACA Modes of Operation .....	62
6.3.4	Implications of not Supporting Standard ACA Detection.....	62

6.3.5	Standard ACA Requirements .....	62
Figure 3-1	– System Overview .....	18
Figure 3-2	– Charger Detection Hardware .....	19
Figure 3-3	– Data Pin Offset .....	20
Figure 3-4	– Data Contact Detect, Not Attached.....	21
Figure 3-5	– Data Contact Detect, Standard Downstream Port .....	22
Figure 3-6	– Primary Detection, DCP .....	23
Figure 3-7	– Primary Detection, CDP .....	25
Figure 3-8	– Primary Detection, SDP .....	26
Figure 3-9	– Primary Detection, ACA-Dock .....	27
Figure 3-10	– Primary Detection, ACA .....	29
Figure 3-11	– Secondary Detection, DCP .....	30
Figure 3-12	– Secondary Detection, CDP.....	31
Figure 3-13	– ACA Detection .....	33
Figure 3-14	– Weak Battery Algorithm.....	34
Figure 3-15	– Good Battery Algorithm .....	35
Figure 3-16	– DCD Timing, Contact After Start.....	37
Figure 3-17	– DCD Timing, Contact Before Start.....	37
Figure 3-18	– DCD Timing, No Contact .....	38
Figure 3-19	– Detection Timing, CDP .....	39
Figure 4-1	– CDP Required Operating Range .....	42
Figure 4-2	– DCP Required Operating Range .....	44
Figure 4-3	– Portable Device Allowed Operating Range .....	46
Figure 6-1	– Accessory Charger Adapter .....	51
Figure 6-2	– Micro ACA Ports .....	52
Figure 6-3	– Micro ACA Architecture .....	54
Figure 6-4	– Portable Device State Diagram .....	58
Figure 6-5	– Standard ACA Ports .....	59
Figure 6-6	– Standard ACA Architecture .....	61
Table 5-1	– Voltages .....	47
Table 5-2	– Currents .....	48
Table 5-3	– Resistances .....	49
Table 5-4	– Capacitances .....	49
Table 5-5	– Times .....	50
Table 6-1	– Micro ACA Connectivity Options.....	53
Table 6-2	– Micro ACA Modes of Operation .....	55
Table 6-3	– Standard ACA Connectivity Options .....	60
Table 6-4	– Standard ACA Modes of Operation.....	62

**Battery Charging  
Specification  
(Including errata and ECNs through March 15, 2012)**

**Revision 1.2  
March 15, 2012**

**Copyright © 2012, USB Implementers Forum, Inc.  
All rights reserved.**

A LICENSE IS HEREBY GRANTED TO REPRODUCE THIS SPECIFICATION FOR INTERNAL USE ONLY. NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, IS GRANTED OR INTENDED HEREBY.

USB-IF AND THE AUTHORS OF THIS SPECIFICATION EXPRESSLY DISCLAIM ALL LIABILITY FOR INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS, RELATING TO IMPLEMENTATION OF INFORMATION IN THIS SPECIFICATION. USB-IF AND THE AUTHORS OF THIS SPECIFICATION ALSO DO NOT WARRANT OR REPRESENT THAT SUCH IMPLEMENTATION(S) WILL NOT INFRINGE THE INTELLECTUAL PROPERTY RIGHTS OF OTHERS.

THIS SPECIFICATION IS PROVIDED "AS IS" AND WITH NO WARRANTIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE. ALL WARRANTIES ARE EXPRESSLY DISCLAIMED. NO WARRANTY OF MERCHANTABILITY, NO WARRANTY OF NON-INFRINGEMENT, NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, AND NO WARRANTY ARISING OUT OF ANY PROPOSAL, SPECIFICATION, OR SAMPLE.

IN NO EVENT WILL USB-IF OR USB-IF MEMBERS BE LIABLE TO ANOTHER FOR THE COST OF PROCURING SUBSTITUTE GOODS OR SERVICES, LOST PROFITS, LOSS OF USE, LOSS OF DATA OR ANY INCIDENTAL, CONSEQUENTIAL, INDIRECT, OR SPECIAL DAMAGES, WHETHER UNDER CONTRACT, TORT, WARRANTY, OR OTHERWISE, ARISING IN ANY WAY OUT OF THE USE OF THIS SPECIFICATION, WHETHER OR NOT SUCH PARTY HAD ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

## Contributors

Mark Lai	Allion Test Labs
Sammy Mbanta	Astec Power
Abel Astley	Broadcom
Kenneth Ma	Broadcom
Shimon Elkayam	Broadcom
Gaurav Singh	Cypress
Dan Ellis	DisplayLink
Graham Connolly	Fairchild
Oscar Freitas	Fairchild
Joel Silverman	Kawasaki
Pat Crowe	MQP Electronics
Juha Heikkila	Nokia
Richard Petrie	Nokia
Sten Carlsen	Nokia
Jeroen Kleinpenning	NXP Semiconductors
Terry Remple, Chair	Qualcomm
Dave Haglan	SMSC
Mark Bohm	SMSC
Morgan Monks	SMSC
Tim Knowlton	SMSC
Morten Christiansen	ST Ericsson
Nicolas Florenchie	ST Ericsson
Shaun Reemeyer	ST Ericsson
George Paparrizos	Summit Microelectronics
Adam Burns	Synopsys
Wei Ming	Telecommunication Metrology Center of MII
Jean Picard	Texas Instruments
Ivo Huber	Texas Instruments
Pasi Palojarvi	Texas Instruments
Steven Tom	Texas Instruments
Ed Beeman	USB-IF
Mark Paxson	USB-IF

**Revision History**

Revision	Date	Author	Description
BC1.0	Mar 8, 2007	Terry Remple	First release
BC1.1	April 15, 2009	Terry Remple	Major updates to all sections. Added Data Contact Detect protocol, and Accessory Charger Adapter.
BC1.2	Oct 5, 2010	Terry Remple Adam Burns	<p>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.</p> <ol style="list-style-type: none"> <li>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.</li> <li>2. Increase minimum CDP current to 1.5A. Without change, PDs had to draw less than 500mA, to avoid CDP shutdown. Table 5-2.</li> <li>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.</li> <li>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.</li> <li>5. Require CDPs to support 1.5A during HS chirp and traffic. Affects CDP common mode range. Section 3.5.</li> <li>6. Reduce maximum PD current from 1.8A to 1.5A, to avoid shutdown when attached to CDP. Table 5-2.</li> <li>7. Rename Docking Station to ACA-Dock, to avoid confusion with other types of Docking Stations.</li> <li>8. Require ACA-Dock to differentiate itself from an ACA, by enabling VDM_SRC during no activity. Section 3.2.4.4.</li> <li>9. Allow CDP to leave VDM_SRC enabled while peripheral not connected. Section 3.2.4.2.</li> <li>10. Remove ICHG_SHTDWN. This was a recommended max output current for Charging Ports with VBUS grounded. BC1.1 Section 4.1.</li> <li>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.</li> <li>12. Make DCD current source optional for PDs. Section 3.2.3.</li> <li>13. Make DCD timeout required for PDs. Section 3.2.3.</li> <li>14. Make Secondary Detection optional for PDs. Section 4.6.2.</li> <li>15. Make Good Battery Algorithm required behavior for PDs. Section 3.2.4.</li> <li>16. Remove resistive detection. BC1.1 Section 3.9.</li> <li>17. Change PD Required Operating Range to include 4.5V at 500mA. Figure 4-3.</li> <li>18. Allow any downstream port to act as a DCP. Section 4.1.3.</li> <li>19. Require PDs to enable VDP_SRC or RDP_PU when charging from a DCP. Section 3.3.2.</li> </ol>

Revision	Date	Author	Description
			20. Allow chargers to renegotiate current with PD by dropping and reasserting VBUS. Section 4.1.3. 21. Require PDs to discharge their own VBUS input after VBUS drops to support charger port renegotiation request. Section 4.6.3. 22. Allow PDs to disconnect and repeat Charger Detection multiple times while attached, with specified timing. Section 4.6.3. 23. Reduce DCP input impedance between D+, D- to VBUS and ground from 1MΩ to 300kΩ. Section 4.4.3. 24. Require CDPs to recover after over-current condition. Section 4.2.2. 25. Allow greater DCP undershoot for large load current steps, to enable low quiescent current chargers required by Europe. Section 4.4.2. 26. Define ACAs and ACA-Docks as types of Charging Ports. Section 1.4.5. 27. Use session valid voltage range defined in EH and OTG Supplement rev 2.0. Section 3.2.2. 28. Only devices that can operate stand-alone from internal battery power are allowed to use the Dead Battery Provision. Section 2.2. 29. Allow compound PDs to draw ISUSP plus an responsible for protecting themselves against higher voltages on VBUS. BC1.1 Section 6.7. 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. 46. Change charger shutdown recovery time (TSHTDWN_REC) from 2 seconds to 2 minutes. Table 5-5. 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. 48. Remove statements regarding devices with multiple receptacles. Covered in Multiple Receptacle white paper at <a href="http://www.usb.org/developers/docs/">http://www.usb.org/developers/docs/</a> . 49. Improve readability by adding and updating drawings, re-structuring sections, and clarifying text.
BC 1.2 plus errata	Oct 12, 2011	Pat Crowe	Includes errata changes from Oct 12, 2011
BC 1.2 plus further errata	Mar 15, 2012	Pat Crowe	Includes errata changes from Mar 15, 2012: 1. Corrections to Micro ACA specification.

**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

## UNIVERSAL SERIAL BUS INTERFACES FOR DATA AND POWER –

### Part 1-1: Common components – USB Battery Charging Specification, Revision 1.2

## 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