



# INTERNATIONAL STANDARD



---

**Universal serial bus interfaces for data and power –  
Part 2-3: Universal Serial Bus Cables and Connectors Class Document  
Revision 2.0**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 29.220; 33.120; 35.200

ISBN 978-2-8322-2847-0

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

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

### Part 2-3: Universal Serial Bus Cables and Connectors Class Document Revision 2.0

#### 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 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, access 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 62680-2-3 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 62680-4 published in 2013. This edition constitutes a technical revision.

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

CDV	Report on voting
100/2333/CDV	100/2436/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.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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\\_docs#approved](http://www.usb.org/developers/devclass_docs#approved)

IEC DOES NOT TAKE ANY POSITION AS TO WHETHER IT IS ADVISABLE FOR YOU TO ENTER INTO ANY USB ADOPTERS 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 Rev. 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 developed by the USB-IF.

## CONTENTS

FOREWORD .....	2
INTRODUCTION .....	4
1 Introduction .....	11
1.1 Purpose .....	11
1.2 Scope .....	11
1.3 Related Documents .....	11
1.4 Terms and Abbreviations .....	12
2 Management Overview .....	13
3 USB Electrical, Mechanical and Environmental Compliance Standards .....	13
4 Acceptance Criteria, Test Methods and Test Procedures .....	17
4.1 Integrators List (IL) .....	17
4.2 USB Logo Usage .....	17
4.3 Compliance Test Report .....	17
4.4 Connector and Cable Assembly Physical Certification .....	17
4.5 General Information .....	18
4.5.1 Mated Pairs .....	18
4.5.2 Before Testing .....	18
4.5.3 Test Sequences .....	18
4.6 Sample Selection .....	18
4.7 USB Compliance Testing Interval .....	18
4.8 Primary Qualification Approval Testing .....	19
4.9 Sustaining Qualification Approval Testing .....	19
4.10 Compliance Test Sequences .....	19
4.10.1 Inspection EIA 364-18 .....	19
4.10.2 Test Group ‘1’ .....	21
4.10.3 Test Group ‘2’ .....	22
4.10.4 Test Group ‘3’ .....	23
4.10.5 Test Group ‘4’ .....	24
4.10.6 Test Group ‘5’ .....	25
4.10.7 Test Group ‘6’ .....	25
4.10.8 Test Group ‘7’ .....	26
4.10.9 Test Group ‘8’ .....	27
5 Certification Acceptance and Submission .....	27
5.1 Compliance Test Report .....	28
5.2 Listing, Authorization and Notification .....	28
5.2.1 Listing .....	28
5.2.2 Authorization to use Certified USB Logo .....	28
5.2.3 Notification .....	28
Appendices .....	29
Figure 4-1 – Typical Contact Resistance Measurement .....	22
Table 3-1 – Electrical, Mechanical and Environmental Compliance Standards .....	14
Table 4-1 – Test Conditions .....	18
Table 4-2 – Performance Levels .....	18

Table 4-3 – Primary Qualification Approval Testing .....	19
Table 4-4 – Test Group '1' Durability, Vibration, Shock, Cable Retention and Mating/Un-mating Force.....	21
Table 4-5 – Group '2' Temperature Life .....	22
Table 4-6 – Test Group '3' Mixed Flowing Gas .....	23
Table 4-7 – Test Group '4' Insulation Resistance, Dielectric Withstanding Voltage, Thermal Shock & Humidity Temperature Cycling.....	24
Table 4-8 – Test Group '5' Solderability .....	25
Table 4-9 – Test Group '6' High Frequency Testing.....	25
Table 4-10 – Test Group '7' Critical Dimensions.....	26
Table 4-11 – Test Group '8' Cable.....	27

## Universal Serial Bus Cables and Connectors Specification

Revision 2.0  
August, 2007

### Revision History

Revision	Date	Filename	Comment
2.0 RC 6	August 10, 2007	CabConnRC6_Aug10.doc	Added Go/No-go & latch measurement for Micro series Added Drain wire inspection process Added pin contact visual inspection Added clarifying text to 4-axis test description
2.0 RC5	June 5, 2007	CabConn20RC5_June5	Removed Shielding Effectiveness Replace Rotational Continuity with 4-Axis continuity Other miscellaneous minor changes
2.0 RC4	May, 2007	CabConn20RC4_May07	Cable Construction inspection added
2.0	April 4, 2007	CabConn20	Removed Shielding Effectiveness, Added power line resistance test Added cable rotation test
2.0	February 14, 2007	CabConn Rev 2.0	Edits from Tsuyoshi YAMANE of Matsushita
2.0	February 13, 2007	CabConn Rev 2.0	Edited by Jim Koser new chart from Hirose
2.0	February 7, 2007	CabConn Rev 2.0	Edited draft
2.02RC2	February 6, 2007	CabConnRC2_02-06-07	Work group editorials
2.01RC2	December 6, 2006	CabConnRC2_12-06-06	Work group editorials
2.0RC2	July 11, 2006	CabConnRC2_7-11-06	Added durability requirements for Ruggedized Standard "A" receptacle and durability requirements for Micro series
2.0RC2	June 7, 2006	CabConnRC2_6-7-06	Added new critical dimensions drawings for standard "A" and "B" plugs and receptacles and changed the criteria for "mini" products to the use of go – no go gages in Appendix B
2.0RC2	March 24, 2006	CabConnRC2_3-23-06.doc	Added new IP agreement
2.0RC2	December 03, 2003	CabConnRC2.doc	Final edit during USB DWG meeting in Austin prior to posting the document to Web site
2.0RC1	October 29, 2002	CabConnRC1.doc	Adjust formatting in technical edit pass
2.0RC	August 13, 2002		Rewrite of test program to reflect current practice and general updates to reflect changes in the USB Specification.
1.1	September 1, 1999		Editorial Update for improved use. Add Appendices 'A' and 'B.'
1.0	May 22, 1999		Accepted unanimously by USB-IF DWG after 30-day posting without negative comment.
1.0RC	March 27, 1999		Release for industry comment

Revision	Date	Filename	Comment
0.9a	January 19, 1999		Moved to Revision 0.9 by consensus of the Cable & Connector Work Group. Pending final editorial cleanup RRs to be voted on at a special Cable & Connector Work Group meeting February 21, 1999.
0.9RC	December 18, 1998		Moves Document to 0.9RC by consensus of the Cable & Connector Group to Version 0.9 without Appendices Drawings and Lab Listings. Special dispensation by the DWG to move to Revision 1.0 for use at the January 1999 Plug Fest.
0.8	October 20, 1998		Release for industry comment

### INTELLECTUAL PROPERTY DISCLAIMER

THIS SPECIFICATION IS PROVIDED TO YOU "AS IS" WITH NO WARRANTIES WHATSOEVER, INCLUDING ANY WARRANTY OF MERCHANTABILITY, NON-INFRINGEMENT, OR FITNESS FOR ANY PARTICULAR PURPOSE. THE AUTHORS OF THIS SPECIFICATION DISCLAIM ALL LIABILITY, INCLUDING LIABILITY FOR INFRINGEMENT OF ANY PROPRIETARY RIGHTS, RELATING TO USE OR IMPLEMENTATION OF INFORMATION IN THIS SPECIFICATION. THE PROVISION OF THIS SPECIFICATION TO YOU DOES NOT PROVIDE YOU WITH ANY LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE, TO ANY INTELLECTUAL PROPERTY RIGHTS.

All product names are trademarks, registered trademarks, or service marks of their respective owners.

**USB Cables and Connectors Class Document**  
**© Copyright 2007 USB Implementers Forum**  
**All rights reserved.**



## Contributors

Name	Company	E-mail Address
James R. Koser	Foxconn Electronics – CCWG Chair	jim.koser@foxconn.com
Tsuneki Watanabe	Foxconn Electronics	t.watanabe@foxconn.com
Jim Zhao	Foxconn Electronics	Jim.zhao@foxconn.com
George G. Olear II	Contech Research – Co-Editor	ggo@contechresearch.com
Jaremy Flake	ATL Technology – CCWG Scribe	jaremyf@atlconnect.com
Glen Chandler	Acon	glenc@acon.com
George Yee	Acon	George.Yee@acon.com
Roy Ting	ELKA International Ltd.	roy@elka.com.tw
Sophia Liu	ETC (Electronic Test Center, Taiwan)	scl@etc.org.tw
Bill Northey	FCI	William.northey@fciconnect.com
Jack Lu	Foxlink International, Inc.	Jack_lu@foxlink.com
Wen Yang	Foxlink International, Inc.	wen@foxlink.com
Yasuhiro Ishii	Fujikura Ltd	Yishii@fujikura.co.jp
Shigreu Ashida	Fujikura Ltd	Ashidas@fujikura.co.jp
Marksuk Piyavit	Fujikura Ltd	MPiyavit @fujikura.com
Hikomichi Kato	Fujikura Ltd	pakl@fujikura.com
Sathid Inthon	Fujikura Ltd	isathid @fujikura.com
Makoto Kikuchi	Fujikura Ltd	mkikuchi@fujikura.co.jp
Hiroshi Nakazawa	Hirose Electric Co. Ltd Hiroshi	Nakazawa@hirose.co.jp
Yousuke Takeuchi	Hirose Electric Co. Ltd	Yousuke_Takeuchi@hirose.co.jp
Shinya Tono	Hirose Electric Co. Ltd	Shinya_tohno@hirose.co.jp
Karl Kwiat	Hirose Electric Co. Ltd	kkwiat@hirose.com
Kazunori Ichikawa	Hirose Electric Co. Ltd	Kazunori_Ichikawa@hirose.co.jp
Toshi Sasaki	Honda Connectors	t.sasaki@honda-connectors.co.jp
Jim Eilers	Hosiden	eilersjm@hoaco.com
Tsuyoshi Kitagawa	Hosiden	kitagawat@hoaco.com
David Suryoutomo	Japan Aviation Electronics, Inc	suryoutomod@jae.com
Ron Muir	Japan Aviation Electronics, Inc	muirr@jae.com
Kazuhiro Saito	Japan Aviation Electronics, Inc	saitouk@jae.co.jp
Takahiro Deguchi	JST Mfg. Co. Ltd	tdeguchi@jst-mfg.com
Yasuhira Miya	JST Mfg. Co. Ltd	ymiya@jst-mfg.com
Yoichi Nakazawa	JST Mfg. Co. Ltd	ynakazawa@jst-mfg.com
Hironori Handa	JST Mfg. Co. Ltd	hhanda@jst-mfg.com
Vincent Chen	Longwell	vince@longwell.com
Ron Ward	Matsushita Electronics	rward@us.pewg.panasonic.com
Hitoshi Kawamura	Mitsumi	h_kawamura@sales.mitsumi.co.jp
Atsushi Nishio	Mitsumi	a_nishio@eeb.mitsumi.co.jp
Yasuhiko Shinohara	Mitsumi	y_shinohara@eeb.mitsumi.co.jp
Scott Sommers	Molex	Scott.sommers@molex.com
E. Mark Rodda	Motorola PCS	markrodde@motorola.com
Sheldon Singleton	National Technical Systems	sheldons@ntscorp.com
Sam Liu	Newnex	saml@newnex.com
Jan Fahllund	Nokia Corporation	Jan.h.fahllund@nokia.com

<b>Name</b>	<b>Company</b>	<b>E-mail Address</b>
Kai Silvennoine	Nokia Corporation	Kai.silvennoine@nokia.com
Richard Petrie	Nokia Corporation	Richard.petrie@nokia.com
Jussi Takaneva	Nokia Corporation	Jussi.Takaneva@nokia.com
Panu Ylihaavisto	Nokia Corporation	Panu.Ylihaavisto@nokia.com
Arthur Zarnowitz	Palm	arthur.zarnowitz@palm.com
Dave Peters	Palm	dave.peters@palm.com
Tetsuji Kawaguchi	Panasonic (Matsushita)	t.Kawaguchi@us.pewg.panasonic.com
Satoshi Yamamoto	Panasonic (Matsushita)	koteyamd@sei.mew.co.jp
Tsuyoshi Yamane	Panasonic (Matsushita)	Yamane.tsuyoshi@mail.mew.co.jp
Naoyuki Ono	SMK	Naoyuki@smk.co.jp
Eric Yagi	SMK	s-yagi@smkusa.com
Scott Shuey	Tyco Electronics.	scott.shuey@tycoelectronics.com
Masaru Ueno	Tyco Electronics	Ueno.masaru@tycoelectronics.com
Mark Paxson	USB-IF.	mpaxson@vtm-inc.com
Ed Beeman	2010 Tech for USB-IF	ed.beeman@2010tech.com

## UNIVERSAL SERIAL BUS INTERFACES FOR DATA AND POWER –

### Part 2-3: Universal Serial Bus Cables and Connectors Class Document Revision 2.0

## 1 Introduction

### 1.1 Purpose

This document describes the mechanical, electrical, environmental, design and performance criteria and voluntary supplier compliance requirements for USB connectors, cable and fabricated cable assemblies. In addition, this document provides detailed requirements for the design, approval and implementation of application specific USB connectors and fabricated cable assemblies.

### 1.2 Scope

The information provided in this document serves as a guideline for design, development and voluntary compliance testing of USB connectors and fabricated cables assemblies, as well as defining mechanical, electrical, environmental and performance characteristics. As such, it defines how USB connectors, cable and fabricated cables assemblies are to be implemented and how manufacturers and/or fabricators will interact with the voluntary compliance requirements.

### 1.3 Related Documents

American Society for Testing and Materials

ASTM-D-4565 *Standard Test Methods for Physical and Environmental Performance Properties of Insulations and Jackets for Telecommunications Wire and Cable.* This specification is available through the World Wide Web site <http://www.astm.org/>

ASTM-D-4566 *Standard Test Methods for Electrical Performance Properties of Insulations and Jackets for Telecommunications Wire and Cable.* This specification is available through the World Wide Web site <http://www.astm.org/>

ANSI/EIA 364-C *Electrical Connector/Socket Test Procedures Including Environmental Classifications*, approved 1994. Available in hard copy – reference search site <http://www.nssn.org/information.html>

Underwriters Laboratories

UL STD-94 *Test procedures used to classify polymeric materials 94HB, 94V-1, 94V-2, 94-5VA, 94-5VB, 94VTM-0, 94VTM-1, 94VTM-2, 94HBF, 94HF-1, and 94HF-2.* This specification is available through the World Wide Web site <http://www.comm-2000.com/>

UL Subject-444 *Type CMP (plenum cable), Type CMR (riser cable), Type CM (commercial cable), and Type CMX (cable for restricted use.* This specification is available through the World Wide Web site <http://www.comm-2000.com/>

[USB2.0] *Universal Serial Bus Specification*, revision 2.0 (also referred to as the *USB Specification*). This specification is available on the World Wide Web site <http://www.usb.org>.

USB On-The-Go *On-The-Go Supplement to the USB 2.0 Specification* (also referred to as the *USB On-The-Go Specification*). This specification is available on the World Wide Web site <http://www.usb.org>.