Universal serial bus interfaces for data and power - Part 1-3: Common components - USB Type-C® Cable and Connector Specification

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 62680-1-3:2022 sisaldab Euroopa standardi EN IEC 62680-1-3:2022 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 62680-1-3:2022 consists of the English text of the European standard EN IEC 62680-1-3:2022.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
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ICS 11.040.40

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62680-1-3

October 2022

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Supersedes EN IEC 62680-1-3:2021

English Version

Universal serial bus interfaces for data and power - Part 1-3: Common components - USB Type-C(r) cable and connector specification (IEC 62680-1-3:2022)

Interfaces de bus universel en série pour les données et l'alimentation électrique - Partie 1-3: Composants communs - Spécification des câbles et connecteurs USB Type-C(r) (IEC 62680-1-3:2022)

Schnittstellen des Universellen Seriellen Busses für Daten und Energie - Teil 1-3: Gemeinsame Bauteile - Festlegung für USB-Typ-C(r)-Kabel und -Steckverbinder (IEC 62680-1-3:2022)

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Ref. No. EN IEC 62680-1-3:2022 E

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The text of document 100/3715/CDV, future edition 5 of IEC 62680-1-3, prepared by IEC/TC 100 "Audio, video and multimedia systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62680-1-3:2022.

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•	latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop) 2023-07-10
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IEC 62680-1-3

Edition 5.0 2022-09

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Universal serial bus interfaces for data and power – Part 1-3: Common components – USB Type-C® Cable and Connector Specification

Interfaces de bus universel en série pour les données et l'alimentation électrique – Partie 1-3: Composants communs – Spécification des câbles et connecteurs USB Type-C®

IEC 62680-1-3:2022-09(en-fr)

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INTERNATIONAL STANDARD

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Interfaces de bus universel en série pour les données et l'alimentation électrique – Partie 1-3: Composants communs – Spécification des câbles et connecteurs USB Type-C®

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Part 1-3: Common components – USB Type-C® Cable and Connector Specification

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

Draft	Report on voting
100/3715/CDV	100/3762/RVC

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

A list of all 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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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.

This standard is the USB-IF publication Universal Serial Bus Type-C Cable and Connector Specification Revision 2.0.

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Pre-Release Draft Industry Reviewing Companies That Provided Feedback

Aces	JST Mfg. Co., Ltd.	Pericom
Fairchild Semiconductor	Korea Electric Terminal	Semtech Corporation
Fujitsu Ltd.	Marvell Semiconductor	Silicon Image
Industrial Technology Research Institute (ITRI)	Motorola Mobility LLC	SMK Corporation
Joinsoon Electronics Mfg. Co. Ltd.	PalCONN/PalNova (Palpilot International Corp.)	Toshiba Corporation

Revision History

Revision	Date	Description
1.0	August 11, 2014	Initial Release
1.1	April 3, 2015	Reprint release including incorporation of all approved ECNs as of the revision date plus editorial clean-up.
1.2	March 25, 2016	Reprint release including incorporation of all approved ECNs as of the revision date plus editorial clean-up.
1.3	July 14, 2017	Reprint release including incorporation of all approved ECNs as of the revision date plus editorial clean-up.
1.4	March 29, 2019	Reprint release including incorporation of all approved ECNs as of the revision date plus editorial clean-up.
2.0	August 2019	New release primarily for enabling *USB4* over USB Type-C connectors and cables. Also includes incorporation of all approved ECNs as of the revision date plus editorial clean-up.
2.1	May 2021	New release primarily for enabling Extended Power Range (EPR) and defining EPR cables aligning with *USB Power Delivery* Specification R3.1 V1.0. Also includes incorporation of all approved ECNs as the revision date plus editorial clean-up.

1 Introduction

With the continued success of the USB interface, there exists a need to adapt USB technology to serve newer computing platforms and devices as they trend toward smaller, thinner and lighter form-factors. Many of these newer platforms and devices are reaching a point where existing USB receptacles and plugs are inhibiting innovation, especially given the relatively large size and internal volume constraints of the Standard-A and Standard-B versions of USB connectors. Additionally, as platform usage models have evolved, usability and robustness requirements have advanced and the existing set of USB connectors were not originally designed for some of these newer requirements. This specification is to establish a new USB connector ecosystem that addresses the evolving needs of platforms and devices while retaining all of the functional benefits of USB that form the basis for this most popular of computing device interconnects.

1.1 Purpose

This specification defines the USB Type-C® receptacles, plug and cables.

The USB Type-C Cable and Connector Specification is guided by the following principles:

- Enable new and exciting host and device form-factors where size, industrial design and style are important parameters
- Work seamlessly with existing USB host and device silicon solutions
- Enhance ease of use for connecting USB devices with a focus on minimizing user confusion for plug and cable orientation

The USB Type-C Cable and Connector Specification defines a new receptacle, plug, cable and detection mechanisms that are compatible with existing USB interface electrical and functional specifications. This specification covers the following aspects that are needed to produce and use this new USB cable/connector solution in newer platforms and devices, and that interoperate with existing platforms and devices:

- USB Type-C receptacles, including electro-mechanical definition and performance requirements
- USB Type-C plugs and cable assemblies, including electro-mechanical definition and performance requirements
- USB Type-C to legacy cable assemblies and adapters
- USB Type-C-based device detection and interface configuration, including support for legacy connections
- USB Power Delivery optimized for the USB Type-C connector

The USB Type-C Cable and Connector Specification defines a standardized mechanism that supports Alternate Modes, such as repurposing the connector for docking-specific applications.

1.2 Scope

This specification is intended as a supplement to the existing *USB 2.0*, *USB 3.2*, *USB4™* and *USB Power Delivery* specifications. It addresses only the elements required to implement and support the USB Type-C receptacles, plugs and cables.

Normative information is provided to allow interoperability of components designed to this specification. Informative information, when provided, may illustrate possible design implementations.

1.3 Related Documents

USB 2.0	*Universal Serial Bus Revision 2.0 Specification* This includes the entire document release package.

USB 3.2	*Universal Serial Bus Revision 3.2 Specification* This includes the entire document release package. *USB 3.1 Legacy Cable and Connector Specification, Revision 1.0*
USB4	*USB4™ Specification, Version 1.0, August 2019* *(including posted errata and ECNs)*
TBT3	Chapter 13 of *USB4 Specification, Version 1.0, August 2019*
USB PD	*USB Power Delivery Specification, Revision 2.0, Version 1.3, January 12, 2017* *USB Power Delivery Specification, Revision 3.1, Version 1.0, May 2021* *(including posted errata and ECNs)*
USB BB	*USB Billboard Device Class Specification, Revision 1.2.2, January 29, 2021*
USB BC	*Battery Charging Specification, Revision 1.2 (including errata and ECNs through March 15, 2012), March 15, 2012*
DP AM	*DisplayPort™ Alt Mode on USB Type-C Standard, Version 2.0, 12 March 2020*

All USB-specific documents are available for download at http://www.usb.org/documents. The DisplayPort Alt Mode specification is available from VESA (http://www.vesa.org).

1.4 Conventions

1.4.1 Precedence

If there is a conflict between text, figures, and tables, the precedence shall be tables, figures, and then text.

1.4.2 Keywords

The following keywords differentiate between the levels of requirements and options.

1.4.2.1 Informative

Informative is a keyword that describes information with this specification that intends to discuss and clarify requirements and features as opposed to mandating them.

1.4.2.2 May

May is a keyword that indicates a choice with no implied preference.

1.4.2.3 N/A

N/A is a keyword that indicates that a field or value is not applicable and has no defined value and shall not be checked or used by the recipient.

1.4.2.4 Normative

Normative is a keyword that describes features that are mandated by this specification.

1.4.2.5 Optional

Optional is a keyword that describes features not mandated by this specification. However, if an optional feature is implemented, the feature shall be implemented as defined by this specification (optional normative).

1.4.2.6 Reserved

Reserved is a keyword indicating reserved bits, bytes, words, fields, and code values that are set-aside for future standardization. Their use and interpretation may be specified by future extensions to this specification and, unless otherwise stated, shall not be utilized or adapted by vendor implementation. A reserved bit, byte, word, or field shall be set to zero by the sender and shall be ignored by the receiver. Reserved field values shall not be sent by the sender and, if received, shall be ignored by the receiver.

1.4.2.7 Shall

Shall is a keyword indicating a mandatory (normative) requirement. Designers are mandated to implement all such requirements to ensure interoperability with other compliant Devices.

1.4.2.8 Should

Should is a keyword indicating flexibility of choice with a preferred alternative. Equivalent to the phrase “it is recommended that”.

1.4.3 Numbering

Numbers that are immediately followed by a lowercase “b” (e.g., 01b) are binary values. Numbers that are immediately followed by an uppercase “B” are byte values. Numbers that are immediately followed by a lowercase “h” (e.g., 3Ah) are hexadecimal values. Numbers not immediately followed by either a “b”, “B”, or “h” are decimal values.

1.5 Terms and Abbreviations

Term	Description
Accessory Mode	A reconfiguration of the connector based on the presence of Rd/Rd or Ra/Ra on CC1/CC2, respectively.
Active cable	Active cables are USB Full-Featured Type-C Cables that incorporate repeaters in the *USB 3.2* data path. All active cables, regardless of length, are expected to comply with this specification, the *USB 3.2* Appendix E, and the *USB 3.2* active cable CTS. Active cables may incorporate repeaters in both ends of the cable, one end, or anywhere in the cable.
Alternate Mode	Operation defined by a vendor or standards organization that is associated with a SVID assigned by the USB-IF. Entry and exit into and from an Alternate Mode is controlled by the *USB PD* Structured VDM Enter Mode and Exit Mode commands.
Alternate Mode Adapter (AMA)	A *USB PD* Device which supports Alternate Modes and acts as a UFP.
Audio Adapter Accessory Mode	The Accessory Mode defined by the presence of Ra/Ra on CC1/CC2, respectively. See Appendix A.
BMC	Biphase Mark Coding used for *USB PD* communication over the CC wire.
Cable Port Partner	The USB Type-C DRP, Source, or Sink connected to the cable plug.
Captive cable	A cable that is terminated on one end with a USB Type-C plug and has a vendor-specific connect means (hardwired or custom detachable) on the opposite end.
CC	Configuration Channel (CC) used in the discovery, configuration and management of connections across a USB Type-C cable.
Charge-Through VPD (CTVPD)	A VCONN-Powered USB Device that has the mechanism to pass power and CC communication from one port to the other without any reregulation.
Configuration Lane	The USB 3.2 Configuration Lane is used to establish and manage dual-lane SuperSpeed USB operation. The Configuration Lane is specifically the SuperSpeed USB TX1/RX1 differential signal set in the cable/plug.
Debug Accessory Mode (DAM)	The Accessory Mode defined by the presence of Rd/Rd or Rp/Rp on CC1/CC2, respectively. See Appendix B.