

Connection standard USB Type-C™ & USB 5/10/20 Gbps

Content

1. The form factor USB Type-C™
2. What is USB 20 Gbps?
3. Overview USB specifications + interfaces
4. The duo USB 20 Gbps and USB Type-C™
5. The DP Alt Mode of USB Type-C™
6. Delock product examples

The USB Type-C™ form factor

The USB Type-C™ male with its characteristic elliptic shape is already widespread used in the area of mobile devices. The user friendly 24 pin male enables the simultaneously transfer of current, data, video and audio signals in high quality.



Male and female of the both-sided usable USB Type-C™ form factor

Specifications & advantages of USB Type-C™

Protocol diversity

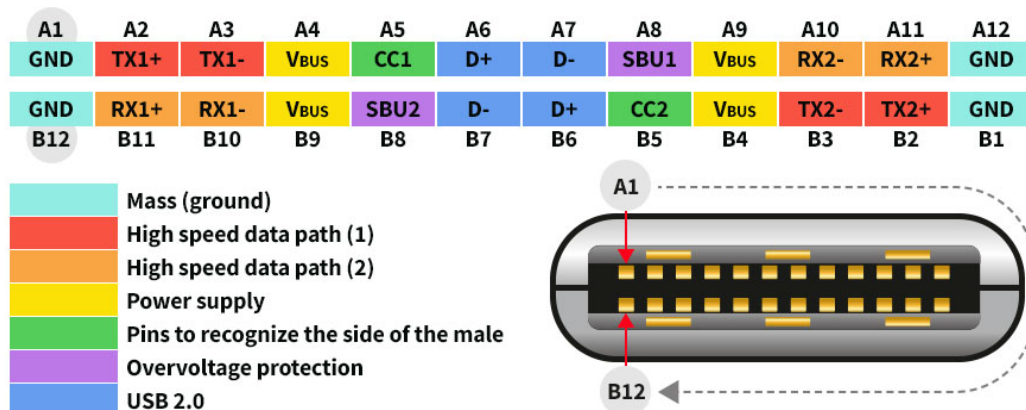
Beside the USB variants 1 to 3.2, also DisplayPort™, PCI Express, Thunderbolt™, HDMI or MHL signals are compatible. Via a USB Type-C™ connection, the transfer of audio and video data is even possible parallel to the USB data and USB charging current. With appropriate converters, also a VGA monitor can be connected.

Supports 20 Gbps data transfer rate

USB Type-A males are constructed in a way to reach maximum 10 Gbps using these, which corresponds to the specification USB 10 Gbps. The maximum 20 Gbps of the new USB 20 Gbps protocol need the USB Type-C™ interface. - For the USB versions and data rates in an overview, see the [table below](#).

User-friendliness

The USB Type-C™ male is twisting-safe constructed. It cannot be plugged into the female the wrong way round and it is therefore not necessary to distinguish between "top" and "bottom". Also with the cable USB Type-C™ to USB Type-C™ you do not have to pay attention to "start" or "end": It does not matter which end of the cable is connected to the host, which is connected to the device, since both connection ends are equivalent in their functionality.



The USB Type-C™ pin assignment shows the mirrored functions of the two pin lines and so the both-sided usability

Durability

The USB Type-C™ male is much more robust than its predecessor. According to the USB Implementers Forum (USB-IF) the male is designed in a way that it withstands 10,000 mating cycles. That means, in terms of figure, a Smartphone could be charged once a day for 329

months (= plug in / pull out again), for example. Compared to these 10,000, for the USB 5 Gbps Type-A male a lifespan of up to 5,000 mating cycles is stated.

Slim and resistant design

The USB Type-C™ connector has a slim design similar to the Micro USB connector, but is robust enough to be completely suitable for use with laptops, tablets or other mobile devices. The USB Type-C™ male with its small measurements of only 8.4 x 2.6 mm is ideally suitable for slim smartphones as well as desktop PCs and entertainment electronics devices.

Compatibility

With USB Type-C™ connectors, connections can also be made to different USB devices (= non USB Type-C™ devices) by using adapters or cables. In this way, pre-existing hardware or peripheral devices can still be used.

Universal

Thanks to their functionalities, the USB Type-C™ interface will gain more and more importance. So already today and also in future at an increasing rate, fewer power adapters for connected devices are and will be needed. For example a laptop can be connected to a docking station that supplies the laptop and other devices with power.

Improved EMC

USB Type-C™ can reduce malfunctions of involved devices because the electromagnetic compability has been upgraded.

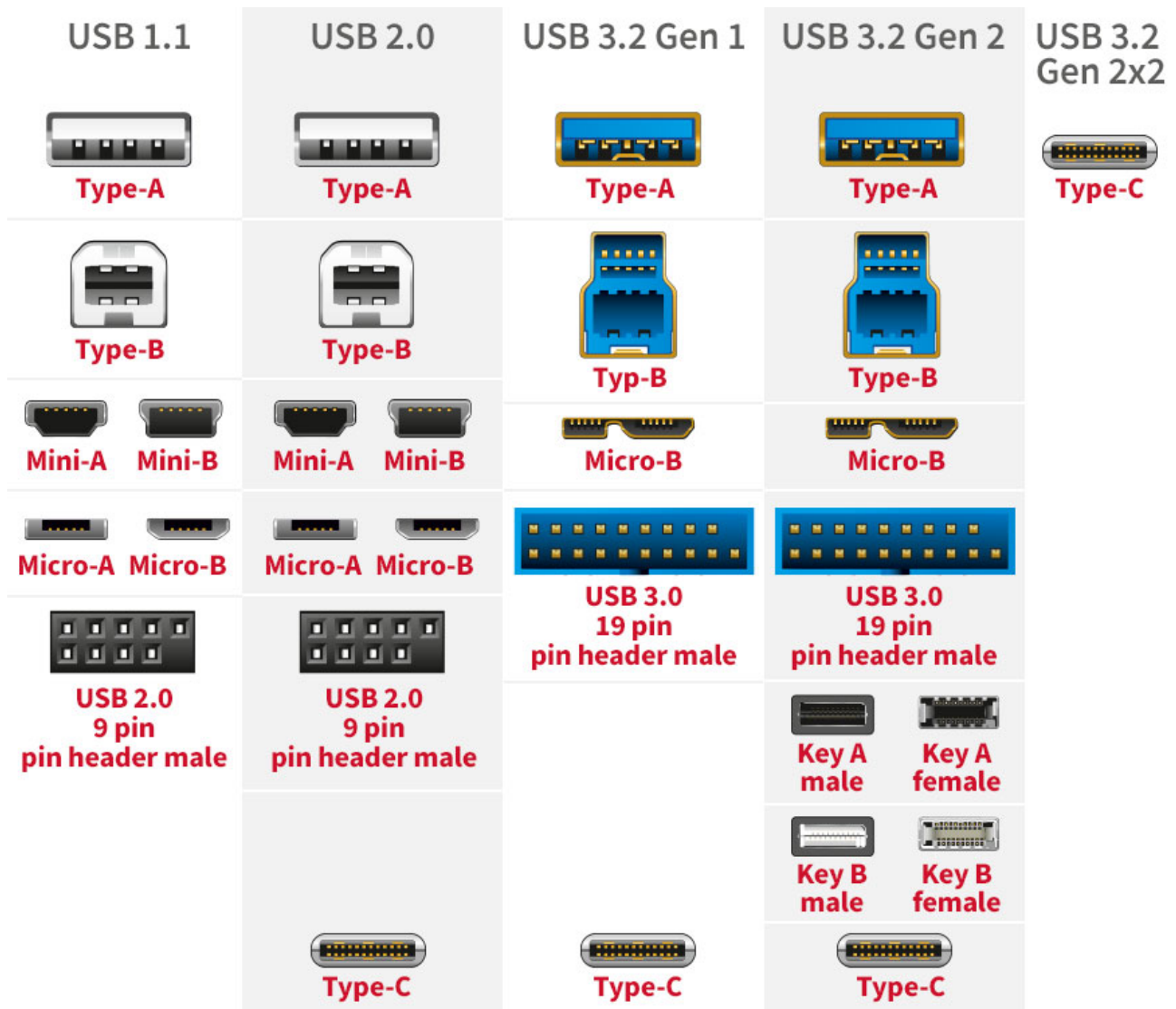
USB 20 Gbps – What is it?

The USB 20 Gbps specification has, compared to its predecessor USB 10 Gbps, a doubled maximum possible data transfer rate of 20 Gbps. In the following, it is about the standard USB 20 Gbps in connection with the USB Type-C™ form factor, so firstly an overview of the USB specifications with the old and the new names may be helpful.

ATTENTION: The USB Implementers Forum (USB-IF) decided on 2 September 2022 new designations for the different versions of the USB standards. The reason given was the previous confusing naming schemes. The new syntax follows the system **"USB X Gbps"** whereas **X** stands for the maximum data transfer rate each.

Old specification	Old marketing-name	New (marketing-) name	Max. data transfer rate
USB 1.1	Full-Speed 12 Mbps	-	12 Mbps
USB 2.0	Hi-Speed 480 Mbps	-	480 Mbps
USB 3.2 Gen 1	SuperSpeed USB 5 Gbps	USB 5 Gbps	5 Gbps
USB 3.2 Gen 2	SuperSpeed USB 10 Gbps	USB 10 Gbps	10 Gbps
USB 3.2 Gen 2x2	SuperSpeed USB 20 Gbps	USB 20 Gbps	20 Gbps
USB4 20 Gbps	-	USB 20 Gbps	20 Gbps
USB4 40 Gbps	-	USB 40 Gbps	40 Gbps
USB4 Gen 3x2	-	USB 40 Gbps	40 Gbps
USB4 Version 2.0	-	USB 80 Gbps	80 Gbps

USB specifications and interfaces at a glance



USB 20 Gbps plus USB Type-C™ = The super-fast duo

Data transfer performance

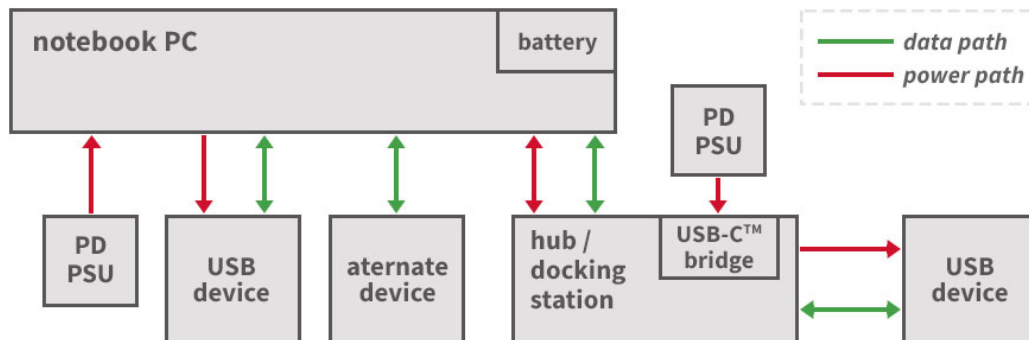
The predecessor of USB 20 Gbps is USB 10 Gbps. Through this predecessor protocol, data rates of up to 10 Gbps can be reached. The subsequent, faster transmission mode is the USB 20 Gbps protocol. With it, you can achieve a data rate of up to 20 Gbps.

The USB Type-C™ male can be used for all USB connections, even for older USB devices and cables. To reach the highest possible data rate of 20 Gbps, please note that both connected devices must support the USB 20 Gbps protocol. But older cables which support „only“ USB 10 Gbps can be used also for applications with 20 Gbps.

USB Power Delivery & charging function

Since USB 10 Gbps, the power supply specification called USB Power Delivery (shortened: USB PD) is supported. Thereby a maximum power consumption of 5 A and 20 V (100 watt) is possible. The power supply works in both directions.

How does it work? Power supply unit and end device negotiate the combination of voltage and current intensity and so the performance, that means they create a profile. The PSU offers the available combinations and the end device chooses an appropriate profile out of these. USB PD detects and takes notice of the charging direction of the devices connected to each other.

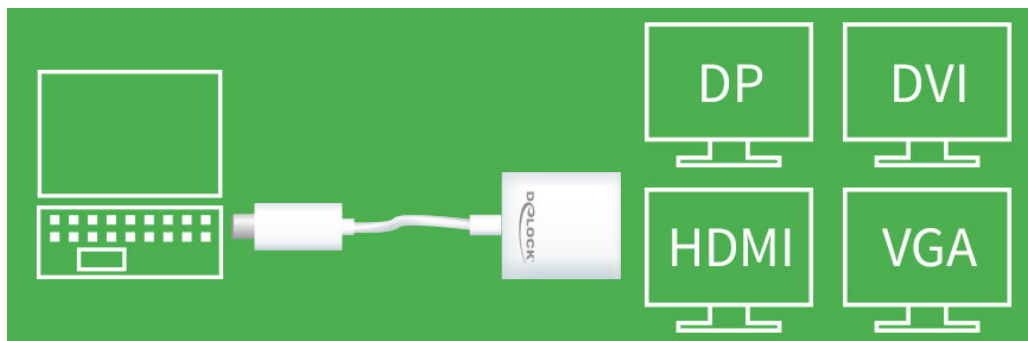


The topology of USB PD

Thanks to USB Type-C™ and USB PD, not only smartphones or tablets can be charged, but also larger or powerful devices such as monitors or laptops can be supplied with power. The prerequisite is USB PD support, for the device on the one hand and the cable on the other. For example, a monitor with USB Type-C™ connection and USB PD support which is connected to a power supply can charge a laptop while simultaneously transmitting signals from the laptop to the monitor.

The USB Type-C™ DisplayPort Alternate Mode

In addition to the USB data line, the USB Type-C™ connector of the laptop and other devices has another function. This function is called DisplayPort Alternate Mode (DP Alt Mode). It allows to connect a monitor adapter to the appropriate USB Type-C™ port of a device. In case this port supports the DP Alt Mode, the signal can be transmitted to the monitor via the adapter or cable.



Monitor diversity thanks to DP Alt Mode

If the device supports DP Alt Mode, appropriate USB Type-C™ to DisplayPort™, HDMI, DVI or VGA adapters can be used in order to connect corresponding monitors.

The relationship between USB Type-C™ and Thunderbolt™ 3

Basic idea of the USB Type-C™ interface is to transfer various kinds of data or signals via a single cable. The initially in 2009 by Intel and Apple introduced standard Thunderbolt™ was following the same purpose. Since middle of 2015, Thunderbolt™ 3 has also been using the USB Type-C™ connector, which can be used on both sides. Thunderbolt™ 3 is using the same male and female connector like USB Type-C™ and supports all USB Type-C™ functions. In addition, the Thunderbolt™ 3 controller has a USB 3.2 controller integrated.

Product examples by Delock



Item 85291

Cable USB Type-C™ male to HDMI male (DP Alt Mode)

■ Connectors

- 1 x USB Type-C™ male >
- 1 x HDMI-A 19 pin male

- High Speed HDMI with Ethernet (HEC) specification
- Resolution up to 3840 x 2160 @ 60 Hz (depending on monitor / system)
- Supports 3D Displays & HDCP 1.4 / 2.2
- Gold-plated connectors
- Length: ca. 2 m (without connectors)

Also available with following lengths

- [Item 85290](#) ca. 1 m
- [Item 85292](#) ca. 3 m



Item 85255

Cable USB Type-C™ male to DisplayPort™ male (DP Alt Mode)

■ Connectors

1 x USB Type-C™ male >

1 x DisplayPort™ 20 pin male

■ DisplayPort™ 1.2 specification

■ Resolution up to 3840 x 2160 @ 60 Hz (depending on monitor / system)

■ Supports 3D Displays & HDCP 1.4 / 2.2

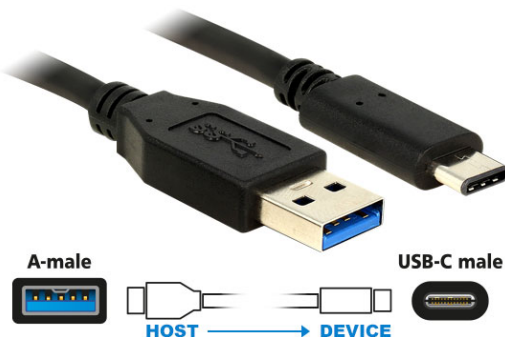
■ Gold-plated connectors

■ Length: ca. 1 m (without connectors)

Also available with following lengths

→ [Item 85256](#) ca. 2 m

→ [Item 85257](#) ca. 3 m



Item 83870

Cable USB 3.2 Gen 2 Type-A male to USB Type-C™ male

■ Connectors

SuperSpeed USB 10 Gbps Type-A male >

SuperSpeed USB 10 Gbps USB Type-C™ male

■ Host = USB Typ A; Device = USB Type-C™

■ Data transfer rate up to 10 Gbps

■ Cable gauge:

30 AWG data line

22 AWG power line

■ Cable diameter: ca. 4.5 mm

■ Length: ca. 1 m (incl. connectors)

Also available with the length

→ [Item 83869](#) ca. 0.5 m



Item 84845

Cable Thunderbolt™ 3 (20 Gbps) USB Type-C™ male to male passive

■ Connectors

- 1 x Thunderbolt™ 3 USB Type-C™ 24 pin male >
- 1 x Thunderbolt™ 3 USB Type-C™ 24 pin male

■ Data transfer rates

- Thunderbolt™ 3 up to 20 Gbps
- DisplayPort™ 1.2a up to 21.6 Gbps
- SuperSpeed USB up to 10 Gbps
- Thunderbolt™ Networking up to 10 Gbps (Peer-To-Peer)

Peer)

■ Supports PCI Express 3.0 protocol (4 lanes)

■ Supports Displayport 1.2a protocol (8 lanes, HBR2 and MST)

■ Cascadable up to 6 Thunderbolt™ devices (Daisy Chain)

■ Cable gauge:

32 + 34 AWG data line

24 + 34 AWG power line

■ Gold-plated connectors

■ Threefold shielded cable

■ Cable diameter: ca. 4.4 mm

■ Length: ca. 1 m (without connectors)

Also available with

→ [Item 84844](#) ca. 0.5 m • 5 A • 40 Gbps

→ [Item 84846](#) ca. 1.5 m • 5 A • 20 Gbps

→ [Item 84847](#) ca. 2 m • 3 A • 20 Gbps



Item 62904

Adapter USB Type-C™ to 1 x Serial DB9 RS-232 + Adapter DB25

■ Connectors

Cable:

1 x USB Type-C™ male >

1 x Serial RS-232 DB9 male with screws

Adapter:

1 x Serial RS-232 DB9 female with nuts >

1 x Serial RS-232 DB25 male with screws

■ Cable length: ca. 1.8 m (incl. connectors)

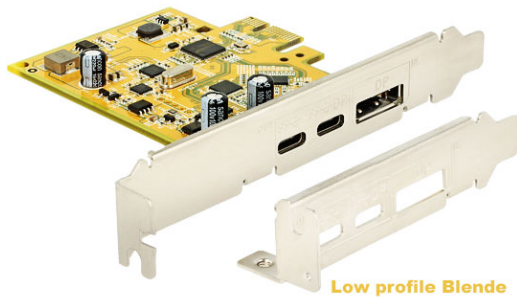


Item 65842

Audio Adapter USB Type-C™ male to stereo jack female

■ Connectors

- 1 x USB Type-C™ male >
- 1 x 3.5 mm 4 pin stereo jack female
- USB 2.0 and USB Audio Device Class 1.0 specification
- Gold-plated connectors
- Cable diameter: ca. 2 mm
- Cable length: ca. 14 cm (incl. connectors)



Item 89582

PCI Express Card to 1 x external USB Type-C™ 3.1 female + 1 x external USB Type-C™ 3.1 (DP Alt Mode) female

■ Connectors

- external:
 - 1 x SuperSpeed USB 10 Gbps USB Type-C™ female
 - 1 x SuperSpeed USB 10 Gbps USB Type-C™ female (DP Alt Mode capable)
 - 1 x DisplayPort™ 20 Pin female (for DP Alt Mode function)
- internal:
 - 1 x PCI Express x1, V3.0
 - DisplayPort™ 1.2 specification
 - Data transfer rate up to USB 10 Gbps
 - Resolution up to 3840 x 2160 @ 60 Hz (depending on monitor / system)
 - Power supply via PCI Express interface
 - Supports eXtensible Host Controller Interface (xHCI) specification 1.1

➔ Application example



Item 87298

USB Type-C™ 3.1 Docking Station

■ Connectors

Front side:

- 1 x Gigabit LAN 10/100/1000 Mbps RJ45 jack
- 1 x mini Displayport 20 pin female
- 1 x VGA 15 pin female
- 1 x USB Type-C™ female (power supply)

Back side:

- 3 x USB 3.0 Type-A female
 - 1 x Headset 3.5 mm 4 pin jack
 - 1 x SD / SDHC / SDXC / MMC slot
 - 1 x Micro SD / SDHC / SDXC slot
 - 1 x USB Type-C™ male
- Extended and mirror (HDMI and DisplayPort)
 - Resolution up to 2560 x 1440 @ 60 Hz oder 3840 x 2160 @ 30 Hz (depending on monitor / system)
 - VGA resolution up to 1920 x 1080 @ 60 Hz
 - Cable length: ca. 18 cm (incl. connectors)
 - Dimensions (LxWxH): ca. 13.7 x 7.5 x 1.7 cm



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