

# USB 3.1 & USB Type-C™ - The new connection standard

## What is USB Type-C™?

In August 2014, USB 3.1 was published by the USB Implementers Forum (USB IF) as an **interface for data and power supply**. One of its innovations is the **USB Type-C™ plug**. The novel **elliptic shape of this 24 Pin plug** characterize it and makes it easy to differentiate from other USB plugs. USB 3.1 is said to be the **future-proof interface for every application** whereby it would fulfill its partial name "universal" much more than every other USB version before.



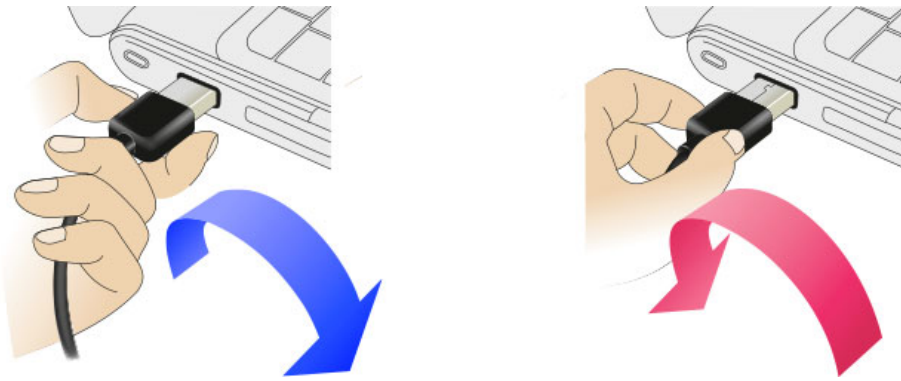
USB Type-C™ at a Delock product | USB Type-C™ plug and jack in schematic front view

## USB 3.1 = flexible, fast & strong

Most important improvements of this specification are **1** the double-sided usability of plug and cable, **2** the doubled data transfer rate and **3** the increased capability for power supply and charging functionality, for details see below.

### 1 Comfortably flexible application

The USB Type-C™ plug is **double-sided usable**, so it can be plugged into the jack in both directions - that means a convenient novelty in comparison to older USB connectors. With USB Type-C™ it doesn't matter any longer where "top" or "bottom" are, because the **plug fits into the port independently of its rotation direction**. Also with a USB Type-C™ to USB Type-C™ cable, there is no difference between "start" or "end". Which cable end has to be connected to the host and which to the device doesn't matter, because **both cable connectors are equally functional**.



USB Type-C™ plug offers double-sided usability

## 2 Higher speed

The data transfer protocol of the earlier predecessor USB 3.0 is now called SuperSpeed USB 3.1 Gen 1. With this protocol data rates of up to 5 Gbps are possible. The **fastest transfer mode is the protocol SuperSpeed USB 10 Gbps (USB 3.1 Gen 2). It enables data rates of up to 10 Gbps.**

The USB Type-C™ plug can be used for all USB connections, so also for older USB devices and cables. To achieve the highest possible data rate of 10 Gbps, it is important that both of the connected devices, as well as the used cable, do support the protocol USB 3.1 Gen 2. Only in this case the data transfer can work at this rate.

## 3 Power supply & the specification Power Delivery

USB 3.1 supports **USB Power Delivery 2.0** (shortened: **USB PD**) that specifies the power supply. Thereby a maximum power consumption of **5 A and 20 V (100 watt)** is possible. Power supply works **in both directions**.

Via USB it is not only possible to charge Smartphones or Tablet PCs. Thanks to USB Type-C™ and USB PD it is also possible to **supply power to bigger or high-performance devices** like e.g. **displays or laptops**. Precondition is the USB PD support of the devices on the one hand and of the cable on the other hand. In this way, for example, a display with USB Type-C™ connector and USB PD support that is connected to a power adapter can charge a laptop while **signals can simultaneously be transferred from the laptop to the display**.

By the way: The designation USB Type-C™ within the name of a device or product does not in every case guarantee that this device is equipped with USB 3.1 Gen 2 or USB PD. It is advisably to read the product specifications thoroughly.

## More features & advantages

### ✓ Upgraded functions

The **protocol diversity** the USB Type-C plug can deal with has been significantly extended. Beside USB 2.0 / USB 3.1 Gen 1 / USB 3.1 Gen 2, **also DisplayPort™, PCI Express, Thunderbolt™, HDMI or MHL signals are compatible** now. Via an USB Type-C connection™

the transfer of audio and video signals even **parallel to the USB data stream and charging current** is possible. Furthermore, a VGA display can be connected with an appropriate converter.

### ✓ Increased durability

Not only because of the abovementioned both-sided usability, the USB Type-C™ plug is **much more robust** than its predecessor. According to the USB IF the plug is designed in a way that it withstands **10.000 mating cycles**. That means in absolute terms 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 3.0 type-A plug 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 in **laptops, tablets** or other mobile devices. The USB Type-C™ jack 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 - using adapters or cables - **connections** can also be made to different USB devices, that means **to Non-USB-Type-C™ devices**. In this way, pre-existing hardware or peripheral devices can still be used.

### ✓ Saving resources

As a consequence of its 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

Not least, USB Type-C™ **can reduce malfunctions of involved devices** because the electromagnetic compability has been upgraded.

## THE USB SPECIFICATION

Data transfer rate	Designation / protocol
Low-Speed 1.5 Mbps	USB 1.1
Full-Speed 12 Mbps	USB 2.0
Hi-Speed 480 Mbps	USB 2.0

SuperSpeed 5 Gbps

SuperSpeed USB (USB 3.1 Gen 1) \*

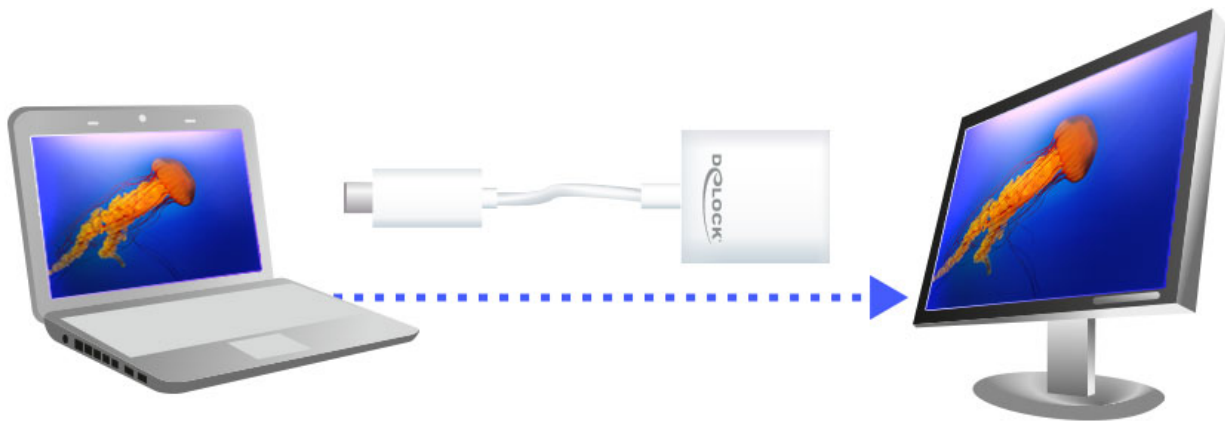
SuperSpeed 10 Gbps

SuperSpeed USB 10 Gbps (USB 3.1 Gen 2)

\* former designation: USB 3.0

## The DP Alt Mode of the USB Type-C™ connector

The USB Type-C™ connector of the MacBook and Chromebook has, additionally to the USB data line, another function. This function is called **DP Alt Mode**. It allows to connect a display adapter to the appropriate USB Type-C™ port of a MacBook or Chromebook. In case this port supports the DP Alt Mode, the **signal can be transmitted to the display via the adapter or cable**. Provided the DP Alt Mode support is given, appropriate **USB Type-C™ to DisplayPort™, HDMI, DVI oder VGA** adapters can be used in order to connect corresponding monitors.



Flexibility within the display diversity thanks to DP Alt Mode

## 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. From the middle of 2015, **Thunderbolt™ 3 makes also use of the both-sided applicable USB Type-C™ plug**. Thunderbolt™ 3 is using the same female jack like USB Type-C™ and **supports all USB Type-C™ functions**. In addition, the Thunderbolt™ 3 controller has a USB 3.1 controller integrated.

## Delock USB 3.1 / USB Type-C™ product examples



→ Item 85291

## Cable USB Type-C™ plug > HDMI plug (DP Alt Mode)

- **Connectors:**
  - 1 x USB Type-C™ plug >
  - 1 x HDMI-A 19 pin plug
- High Speed HDMI with Ethernet (HEC) specification
- Signal direction: USB Type-C™ input > HDMI output
- Resolution up to 3840 x 2160 @ 60 Hz (depending on monitor / system)
- Transfer of audio and video signals
- Supports 3D displays
- Supports HDCP 1.4 and 2.2
- Gold-plated connectors
- Length: ca. 2 m (without connectors)

Also available in cable lengths

→ [Item 85290](#) ca. 1 m

→ [Item 85292](#) ca. 3 m



→ Item 85255

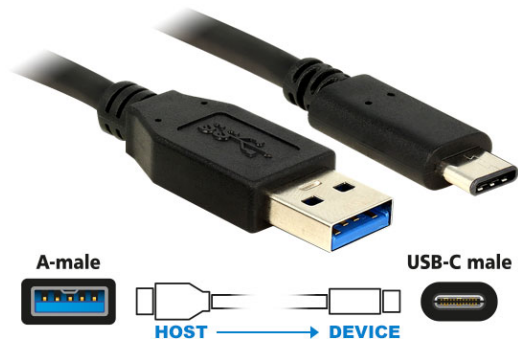
## Cable USB Type-C™ male > DisplayPort™ male (DP Alt Mode)

- **Connectors:**
  - 1 x USB Type-C™ male >
  - 1 x DisplayPort™ 20 Pin male
- DisplayPort™ 1.2 specification
- Chipset: Cypress
- Signal direction: USB Type-C™ input > DisplayPort™ output
- Resolution up to 3840 x 2160 @ 60 Hz (depending on monitor / system)
- Transfer of audio and video signals
- Supports 3D displays
- Supports HDCP 1.4
- Gold-plated connectors
- Length: ca. 1 m (without connectors)

Also available in cable lengths

→ [Item 85256](#) ca. 2 m

→ [Item 85257](#) ca. 3 m



→ Item 83870

## Cable SuperSpeed USB 10 Gbps (USB 3.1 Gen 2) Type-A male > USB Type-C™ male

- **Connectors:**
  - SuperSpeed USB 10 Gbps (USB 3.1 Gen 2) Type-A male > SuperSpeed USB 10 Gbps (USB 3.1 Gen 2) USB Type-C™ male
- Host = USB Type-A; Device = USB Type-C™
- Data transfer rate up to SuperSpeed USB 10 Gbps
- Cable gauge:
  - 30 AWG data line
  - 22 AWG power line
- Resistor: 56 kΩ
- Cable diameter: ca. 4.5 mm
- Length: ca. 1 m (incl. Anschlüsse)

Also available in cable length

→ Item 83869 ca. 0,5 m



→ Item 84845

## Cable Thunderbolt™ 3 (20 Gbps) USB Type-C™ male > male passive • 1 m • 5 A

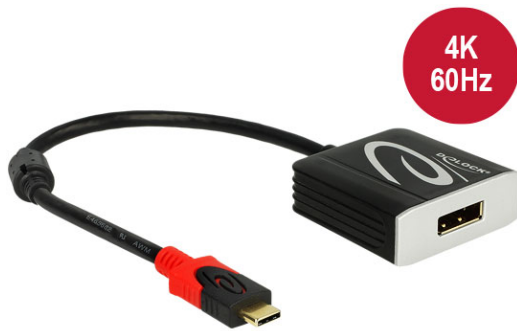
- **Connectors:**
  - 1 x Thunderbolt™ 3 USB Type-C™ 24 pin male >
  - 1 x Thunderbolt™ 3 USB Type-C™ 24 pin male
- Chipset: Cypress E-Marker
- **Data transfer rates**
  - Thunderbolt™ 3 up to 20 Gbps
  - DisplayPort™ 1.2a up to 21.6 Gbps
  - SuperSpeed USB up to 10 Gbps
  - Thunderbolt™ Networking up to 10 Gbps (Peer-To-Peer)
- 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
- Triple shielded cable
- Cable diameter: ca. 4.4 mm
- Length: ca. 1.0 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. 2.0 m • 3 A • 20 Gbps



→ [Item 62727](#)

### Adapter USB Type-C™ male > DisplayPort™ female (DP Alt Mode)

- **Connectors:**
  - USB Type-C™ male >
  - DisplayPort™ 20 pin female
- Chipset: ST 042K46
- DisplayPort™ 1.2 specification
- Resolution up to 4096 x 2160 @ 60 Hz (depending on monitor / system)
- Transfer of audio and video signals
- Gold-plated connectors
- 1 x ferrite core
- Cable length: ca. 20 cm (without connectors)

#### Similar items

→ [Item 62726](#) Adapter USB Type-C™ male > **VGA female** (DP Alt Mode)

→ [Item 62728](#) Adapter USB Type-C™ male > **DVI female** (DP Alt Mode)

→ [Item 62729](#) Adapter USB Type-C™ male > **HDMI female** (DP Alt Mode)



→ [Item 62904](#)

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

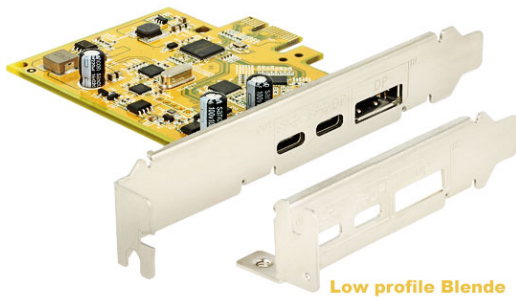
- **Connectors:**
  - Cable**
    - 1 x USB Type-C™ male >
    - 1 x serial RS-232 DB9 male with screws
  - Adapter**
    - 1 x serial RS-232 DB9 female with nuts >
    - 1 x serial RS-232 DB25 male with screws
- Chipset: FTDI FT232RL
- Data transfer rate up to 1 Mbps
- FIFO: 512 byte
- Cable length: ca. 1.8 m (incl. connectors)



→ Item 65842

## Audio Adapter USB Type-C™ male > Stereo Jack female

- **Connectors**
  - 1 x USB Type-C™ male >
  - 1 x 3.5 mm 4 pin stereo jack female
- Chipset: Cmedia CM119B
- 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 > 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 3.1 Gen 2) USB Type-C™ female
    - 1 x SuperSpeed USB 10 Gbps (USB 3.1 Gen 2) 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
- Chipset: Asmedia ASM1142
- DisplayPort™ 1.2 specification
- Data transfer rate up to SuperSpeed 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

➔ [Show application example](#)





→ Item 87298

## USB Type-C™ 3.1 Docking Station

### ■ Connectors:

#### Front site

- 1 x Gigabit LAN 10/100/1000 Mbps RJ45 female
- 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

- HDMI and DisplayPort™ ports support: extended and mirrored, resolution up to 2560 x 1440 @ 60 Hz or 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



→ Item 62901

## External USB 3.1 Gen 1 Hub USB Type-C™ > 3 x USB Type-A + 2 Slot SD Card Reader

### ■ Connectors:

- 1 x SuperSpeed USB (USB 3.1 Gen 1) USB Type-C™ male >
- 3 x SuperSpeed USB (USB 3.1 Gen 1) Type-A female
- 1 x SD slot
- 1 x Micro SD slot
- 1 x 5 V DC jack

### ■ Chipsets

Hub: Genesys Logic GL3520

Card Reader: Genesys Logic GL3224

- Data transfer rate up to SuperSpeed USB 5 Gbps
- Card Reader supports following memory cards:

#### 1. Slot Secure Digital

SD, SD3.0 UHS-I, SD High Capacity (SDHC), SD Ultra, SDHC Ultra, SDXC, MMC-I, MMC-II, MMC 4.0, Mini SD, Mini SDHC, MMCmobile, RS-MMC, RS-MMC 4.0

#### 2. Slot micro Secure Digital

MicroSD, Micro SDHC, Micro SDHC Ultra, T-Flash, MMCmicro

- 1 x ferrite core

- USB cable directly on the hub (length ca. 15 cm)
- Dimensions (LxWxH): ca. 9 x 4 x 1.3 cm



→ Item 42586

## 2.5" External Enclosure SATA HDD > SuperSpeed USB 10 Gbps (USB 3.1 Gen 2)

### ■ Connectors:

#### external

1 x SuperSpeed USB 10 Gbps (USB 3.1 Gen 2) USB Type-C™ female

#### internal

1 x SATA 6 Gbps 22 pin

- Chipset: Asmedia ASM1351
- Data transfer rates up to SuperSpeed USB 10 Gbps
- Suitable for 2.5" SATA HDDs / SSDs:
  - HDD height up to 9.5 mm
  - SATA HDD / SSD up to 6 Gbps
  - HDDs / SSDs up to 3 TB
  - Supports 5 V HDD / SSD
- LED indicator for power and access
- Dimensions (LxWxH): ca. 13.2 x 8 x 1.3 cm



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