

Introduction

This document contains a list of frequently asked questions (FAQ) on USB, USB Type-C®, and Power Delivery.

1 FAQ on USB, type-C, and Power Delivery

1.1 Does PD charging damage the battery?

As long as the battery management is compatible with fast charging, there is no risk. However, each battery has a specific lifespan defined in its datasheet. A battery managed according to its characteristics with a PD controller or interfaced with a type-C port protection (such as [TCPP](#)) keep the battery safe.

1.2 Is PD charging safe for a laptop or phone?

A PD charger using a type-C port protection (such as [TCPP](#)) can work with all products because by default, the charger starts in 5 V mode and then negotiate through CC lines to define the optimum charge mode. If no negotiation is possible, the charger remains in 5 V.

1.3 Which is a better PD or USB Type-C?

These are 3 different topics:

- USB is the data transfer protocol
- While the C or type-C defines connector and cable shapes
- PD stands for power delivery and defines the power charging protocol:
 - Up to 15 W (5 V - 3 A) corresponds to legacy
 - Up to 100 W (20 V - 5 A) is SPR mode
 - The latest version is EPR mode with a maximum capability of 240 W (48 V - 5 A).

1.4 Can I use a PD charger with any phone?

A PD charger using a type-C port protection, such as [TCPP](#), can work with all products because by default, the charger starts in 5 V mode and negotiate through CC lines to define the optimum charging mode. If no negotiation is possible, the charger remains in 5 V mode.

1.5 How do I disable USB Type-C PD?

There is no need to disable USB Type-C PD as the charge is automatically adapted to the sink and source devices.

1.6 Does Apple use USB PD?

European regulation has adopted the USB Type-C connector to charge various products including the mobile phones. All phone manufacturers move to USB Type-C PD to be able to sell phones in Europe.

1.7 Is USB Type-C PD only for power?

A USB Type-C connector embeds traditional D+/D- (USB2), Rx/Tx for USB3.x or USB4, CC lines for charge mode control, SBU lines for optional functions, and of course, GND, and Vbus.

USB Type-C PD combines power and data.

1.8 How many amps can a USB Type-C PD handle?

There are 3 modes:

- Up to 15 W (5 V - 3 A) corresponds to legacy
- Up to 100 W (20 V - 5 A) is SPR mode
- The latest version is EPR mode with a max capability of 240 W (48 V - 5 A).
There are intermediate voltages defined in the power delivery standard.

1.9 Is USB Type-C PD the same as thunderbolt?

Thunderbolt is a communication protocol developed by Intel and Apple. Thunderbolt 3 is based on a USB Type-C connector, but its power capability is limited to 15 W, which is the same as the USB Type-C legacy.

1.10 Can I use a PD charger for a laptop?

A PD charger with a type-C port protection can work with all products because by default, the charger starts in 5 V mode and negotiate through CC lines to define the optimum charging mode. If no negotiation is possible, the charger stays in 5 V. Many laptops are already using PD.

1.11 Does the iPhone support PD charging?

As European regulations have adopted the USB Type-C connector to charge various products, including mobile phones, it becomes the standardized cable for all phones in Europe.

1.12 Does USB PD require a specific cable?

A specific cable must be used to deliver more than 3 A or more than 20 V.

1.13 Does USB Type-C prevent over charging?

USB Type-C PD standard requires the source to monitor the supply current to avoid over charging. This can be done with a type-C port protection including over voltage and ESD protection such as [TCPP](#).

1.14 What is the new USB Type-C rule?

This is a complex question knowing the USB is a communication protocol. The C corresponds to the connector type and PD is the charging mode.

1.15 How much time can a USB Type-C port can be used?

This only depends on the battery's lifespan.

1.16 Why not use USB Type-C for everything?

This is a question of time!

1.17 How do I secure my USB Type-C connector?

If secure means safe, the design of USB Type-C imposes having some protections, such as overcurrent, overvoltage, and ESD protection, to avoid damages. Integrated circuits, such as the [TCPP series](#), have been designed to consider these kinds of surges.

1.18 How do I know if my USB Type-C cable is safe / Are all USB Type-C cables safe to use?

This is a good question, as it is possible to find very cheap cables on the internet with a limited lifetime duration. A damaged cable can lead to non-recoverable failure on the application (PC, mobile phone, etc.). It is important to have a [type-C port protection](#) inside the application to manage the right voltage and current, and to protect against overcurrent, overvoltage, or short-circuits between CC or SBU lines to Vbus due to their adjacent pin position in the type-C connector.

1.19 What is the difference between USB Type-C and USB Type-C PD?

The difference between USB Type-C and USB Type-C PD is the power capability, as C corresponds to the connector and the cable types and there is no visible difference.

USB Type-C by default corresponds to legacy (5 V – 3 A = 15 W), while PD can reach up to 100 W in SPR mode (20 V – 5 A) and 240 W in EPR mode (48 V – 5 A). Source and sink applications negotiate together to choose the optimum voltage, so the user does not really need to care if the applications are PD compatible or not. The key point for the user point of view is the charging time.

1.20 How do I know if my charger is PD?

All cables support PD but with a limitation as to deliver more than 20 V or more than 3 A specific cables are required.

1.21 What is the difference between a PD charger and a normal charger?

The difference is the power capability. However, the USB Type-C PD charger is backward compatible with an old USB working at 5 V.

1.22 What voltage is USB Type-C PD charging?

USB Type-C voltages are:

- 5 V (legacy)
- 9, 15 and 20 V (SPR)
- 28, 36 and 48 V (EPR)

1.23 Can USB Type-C PD be connected to a monitor?

As long as there is a USB Type-C connector, it is possible to connect all kinds of applications.

1.24 Are all USB Type-C PD cables the same?

No, specific cables must be used to deliver more than 3 A or more than 20 V.

1.25 Can USB Type-C PD transfer data?

USB Type-C PD is used to transfer data and / or to charge equipment.

1.26 Is PD the same as USB Type-C?

There are three different topics:

- USB is the data transfer protocol
- C is the cable and connector shape
- PD is power delivery, which defines power capabilities:
 - PD has 3 different modes:
 - Legacy, which is up to 15 W (5 V - 3 A)
 - SPR, which is up to 100 W (20 V - 5 A)
 - EPR, which has a maximum capability of 240 W (48 V – 5 A).

1.27 What is the maximum voltage for USB?

USB Type-C voltages are:

- 5 V (legacy)
- 9, 15 and 20 V (SPR) with power delivery
- 28, 36 and 48 V (EPR) with power delivery.

1.28 What is the maximum current in USB PD 5 V?

The maximum current in USB PD 5 V is 3 A.

1.29 What voltage is the USB PD?

USB Type-C voltages are:

- 5 V (legacy)
- 9, 15 and 20 V (SPR) with power delivery
- 28, 36 and 48 V (EPR) with power delivery.

1.30 How many watts is the USB3.1 power output?

There are three different topics:

- USB is the data transfer protocol
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1.31 Do all USB Type-C cables support PD?

Yes but with a limitation. For more than 3 A or more than 20 V a specific cable must be used.

1.32 Is PD the same as a type-C?

There are three different topics:

- USB is the data transfer protocol
- C is cable and connector shapes
- PD is power delivery, which defines power capabilities:
 - Legacy, which is up to 15 W (5 V - 3 A)
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1.33 What cables support PD?

All cables support PD but with a limitation as to deliver more than 20 V or more than 3 A specific cables are required.

1.34 How many volts is the USB Type-C PD?

Power Delivery voltages are:

- 5 V (legacy)
- 9, 15 and 20 V (SPR) with power delivery
- 28, 36 and 48 V (EPR) with power delivery.

1.35 Is USB PD bidirectional?

There are three kinds of configuration: Sink and source are unidirectional, DRP is bidirectional, and a typical bidirectional application is the power bank. The cable is always bidirectional.

1.36 What damages a USB Type-C port?

If the devices are not correctly designed, for instance, without type-C port protection and if there is a short-circuit between the CC or SBU line and Vbus, the device can be damaged.

1.37 How long can USB Type-C last?

This is only depending on the battery life duration.

1.38 Does USB Type-C prevent overcharging?

USB Type-C PD standard requires the source to monitor the supply current to avoid over charging. This can be done with a type-C port protection including over voltage, over current and other protections such as [TCPP](#).

1.39 Are USB Type-C ports easily damaged?

If the devices are correctly designed with a type C port protection, there is neither risk of over current, nor over voltage nor ESD, nor short-circuit: the port is robust.

1.40 How do you deal with moisture in a USB port?

Moisture can be detected by the latest [type-C](#) port protection associated to the microcontroller.

1.41 Is USB Type-C only for charging?

There are 3 different topics:

- USB is the data transfer protocol
- PD is power delivery, which defines power capabilities.
- C is the cable and connector shapes.

PD has 3 different modes:

- Legacy, which is up to 15 W (5 V - 3 A)
- SPR, which is up to 100 W (20 V - 5 A)
- EPR, which has a maximum capability of 240 W (48 V - 5 A).

1.42 How does USB Type-C charging work?

The protocol is quite complex. It results of a discussion between sink and source devices.

To make things easy for the users circuit such as [TCPP](#) automatically manage Power Delivery to be 100 % compliant with the standard.

1.43 What is the power limit of USB Type-C?

There are 3 modes:

- Up to 15 W (5 V - 3 A), it corresponds to legacy
- Up to 100 W (20 V - 5 A) it is SPR
- The latest version is EPR with a max capability of 240 W (48 V - 5 A).

1.44 How long does USB Type-C take to charge?

This is depending on the power capability of both systems (sink and source) and on the battery size.

1.45 How does USB Type-C know which direction to charge?

At the plug-in, both systems communicate and select the right direction and the suitable power.

1.46 How to correctly design a PD device?

It is required to consider the negotiation between the sink and source devices, to consider the possible short circuits between pins, and to pay attention to ESD surges and other issues. ST has developed the right devices ([TCPP](#) series) and the right software for [STM32](#), associated with [evaluation boards](#), to secure your design.

Our software expansion for [STM32CubeMX](#) can configure your application without writing any code.

Revision history

Table 1. Document revision history

Date	Revision	Changes
09-Apr-2024	1	Initial release.

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