

HP USB Type-C™

Features, power options, and accessories



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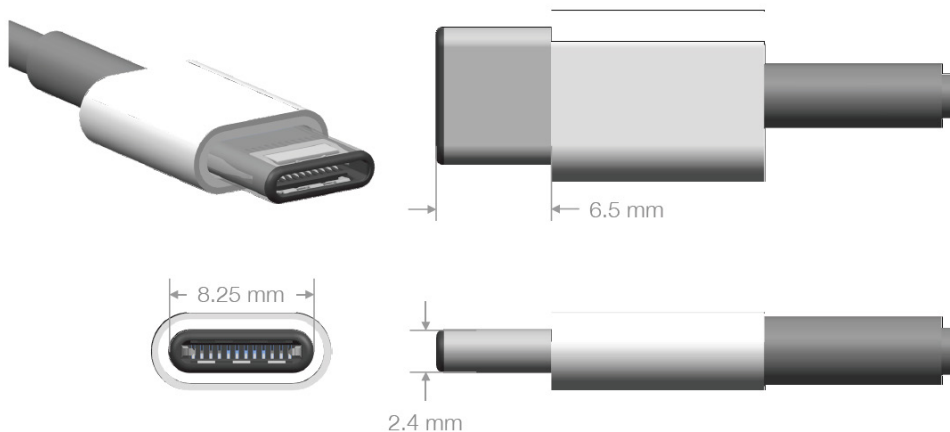
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The purpose of this document is to provide a brief overview of USB Type-C™ and define the available features, accessories, and power options.

What is USB Type-C™?

USB Type-C™ is a small, reversible USB connector with 4x high speed lanes (24 pin). USB Type-C™ can deliver data (including Thunderbolt™ 3), audio, and video, as well as provide charging power to many devices (USB Power Delivery).

Figure. USB Type-C™ Plug



USB Type-C™ video modes (alternate mode): USB Type-C™ ports support adapters that can output different types of video, such as HDMI, VGA, and DisplayPort™, all from one USB Type-C™ port on your computer or device.

USB Type-C™ power delivery (USB PD): USB Type-C™ power delivery is bi-directional, so a device can either send or receive power. This power can be transferred at the same time the device is transmitting data across the connection.

Thunderbolt™ 3: The Thunderbolt™ 3 controller has bandwidth up to 40 Gbit/s (5 GB/s) and can drive two external 4K displays at 60 Hz. It supports PCIe 3.0, HDMI 2.0, DisplayPort™ 1.2, and allows backwards compatibility with the first two Thunderbolt™ versions by the use of adapters or transitional cables.

Power delivery implementation on HP ZBooks, commercial notebooks, and adapters

USB Type-C™ power delivery allows HP computers to deliver a higher current output at different output voltages. The power delivery output and voltage will vary based on the capabilities of the computer or device.

Hosts or computers

- HP ZBooks and commercial notebooks deliver 5V of output voltage. Some computers support delivering a maximum current of 1.5A or 3A, but do not support 5A. Refer to the **HP Computers - USB Type-C™ Features** table for more details on power delivery.
- The USB Type-C™ output power can be adjusted based on system power conditions. For example, an HP Elitebook or HP ZBook provides power at 5V@3A. But, the computer can change the output power to 5V@1.5A or 5V@900mA depending on the load that the system exerts on the AC Adapter to prevent overdrawing current.
- Some HP commercial notebooks can also withdraw power from an external device (i.e., an AC Adapter) through the USB Type-C™ Port. Refer to the **HP computers - USB Type-C™ features** table for more details.

Accessories

- Current HP USB Type-C™ AC adapters are designed to support an output voltage of 5V@3A for 15W adapters and 15V@3A for 45W adapters.
- HP AC adapters do not support variable voltage output.
- Any dongle, adapter, or accessory that supports HP USB Type-C™ AC adapters will allow or reject power output based on the computer’s capabilities.

NOTE: For optimal compatibility and performance, HP recommends using an HP branded USB Type-C™ power adapter and cable.

Features and compatibility for USB Type-C™ hosts and accessories

HP computers - USB Type-C™ features

The table below shows the USB Type-C™ capabilities and features of HP computers.

USB Type-C™ feature	Summary of feature	ZBook G3-Mobile Workstations	HP Elite x2 1012 G1 Tablet/ HP EliteBook Folio G1	HP Pro Tablet 608 G1	600 G2/700 G3/ 800 G3/1030 G1/1040 G3 series Notebooks	Desktop 800 Series DM & AiO	Desktop PCIe Card for 6/7/8 TWR, MT, SFF
USB	USB 3.0/3.1	USB 3.1 G2	USB 3.1 G2	USB 3.1 G1	USB 3.1 G1	USB 3.1 G1	USB 3.1 G1
Thunderbolt™	Thunderbolt™ 3	Yes	Yes	No	No	No	No
DP	Alternative Mode Support for Display Port	x2 & x4	x2 & x4	x2 & x4	No	No	No
Power delivery output	Provide power for accessories	3A (15W)	1.5A/3A (7.5W/15W)	1.5A (7.5W)	3A (15W)	3A (15W)	3A (15W)
Input power	AC Power/ System Charging	No	36W	15W	No	No	No

USB Type-C™ compatible HP accessories

The tables below showcase a list of key USB Type-C™ accessories and a brief description of the features available.

Dongles	Description/features	Power role(s)	Equipment description
HP USB-C™ to USB 3 Adapter	HP USB-C™ to USB 3.0 Adapter with Type-A receptacle	Consumer	Convert the notebook or tablet’s USB-C™ port to USB 3.0 with the HP USB-C™ to USB 3.0 Adapter
HP USB-C™ to VGA Display Adapter	VGA	Consumer	Alternative mode is DisplayPort™
HP USB-C™ to HDMI Display Adapter	HDMI	Consumer	Alternative mode is DisplayPort™
HP USB-C™ to Ethernet/USB3/ USB-C Adapter	HP USB Type-C™ (male) to RJ45 (female), USB3 (female) and USB-C™ (female)	Consumer	Combinational dongle
HP USB-C™ to HDMI/ VGA/ USB-C™ Adapter	USB Type-C™ (male) to HDMI (female), VGA (female), USB Type-C™ (female) adapter	Consumer	Dongle
HP USB-C™ to US 3.0 mm and 4.5 mm Adapter	USB Type-C™ to 4.5 mm and 3.0 mm Combo DC Jacks	Supplier	Charges computer using the HP Smart AC Adapter (18 to 65W)

USB Type-C™ compatible HP docks

Docks	Description/features	Power role(s)	Equipment description
HP ZBook Thunderbolt™ 3 Dock	USB Type-C™ Thunderbolt™ 3 Dock with (4) USB 3.0, (2) DP, (1) VGA, (1) RJ45, (1) audio, and (1) USB-Type C™ port; the dock is also capable of charging compatible computers.	Consumer	Thunderbolt™ 3 enabled docking station for ZBook Mobile Workstations; the docking station uses a combo AC + USB Type-C™ combo cable to connect to the computer; Charging is only through the AC adapter.
HP Elite Thunderbolt™ 3 Dock	USB Type-C™ Thunderbolt™ 3 Dock with (4) USB 3.0, (2) DP, (1) VGA, (1) RJ45, (1) audio, and (1) USB-Type C™ port; the dock is also capable of charging compatible computers.	Supplier	Thunderbolt™ 3 enabled docking station for HP Elite x2 1012 G1 Tablet and HP EliteBook Folio G1
HP Elite USB-C™ Docking Station	USB Type-C™ Dock with (4) USB 3.0, (1) DP, (1) HDMI, (1) RJ45, (1) Audio, and (1) USB Type-C™ port; capable of charging compatible computers.	Supplier	USB-C™ Docking Station for HP Elite x2 1012 and HP EliteBook Folio G.

For more information about the HP ZBook Thunderbolt™ Dock or HP Elite Thunderbolt™ 3 Dock, please refer to the HP technical white paper: [HP Elite Dock with Thunderbolt 3 & HP ZBook Dock with Thunderbolt 3](#).

HP Notifications: USB Type-C™ messaging

Below is a list of USB Type-C™ messages/notifications that might appear on the computer display, depending on the scenarios described.

Scenario	Message	Cause
Power Adapter accepted: Matches capabilities to charge while in sleep states	Title: USB Type-C™ Connector Text: "For full performance, connect a higher capacity power adapter."	A power adapter that is too small to operate the system while the device is powered on; the adapter could be used to charge while the system is in sleep mode or when powered off.
Power adapter rejected: Upstream power flow is not supported	Title: USB Type-C™ Connector Text: "Charging system via adapter plugged into the USB port is not supported."	Plugging in an adapter that requests power that is not supported (Cypress controller).
Connected device requests more power than can be supplied	Title: USB Type-C™ Connector Text: "USB device requesting more power than system can provide." <i>Display system charging capability</i>	Plugging a device that requires more power than can be provided by the system.
Balance downstream power for charging from Multiple USB ports	Title: USB Type-C™ Connector Text: "Charging from multiple USB ports may have limited support."	Plugging in an adapter to both a USB Type-A port and a USB Type-C™ port (or into 2 USB Type-C™ ports) and the system is not capable of charging both at full capacity while system is running.
The attached dock cable is inadequate to handle the needed power load	Title: USB Connector Text: "For full performance, connect higher capacity USB cable to dock." <i>Display capabilities of the cable</i>	When a dock is connected to a system using a cable that is inadequate to power the system and charge the battery simultaneously.
Power adapter rejected: Provider and consumer mismatch	Title: USB Connector Text: "The power adapter is not compatible with this system."	Inserting an adapter that is not compatible with the HP system (i.e., from a third-party vendor that is not supported).
The Cable Connecting the PCIe expansion card to the system board is unplugged	Title: USB Type-C™ Connector Text: "Device mode is not supported. Check cable or system capabilities."	Either the device does not support alternate modes, or doesn't support a particular alternate mode, or the inserted cable is not supported.
Using a non-HP Adapter	Title: USB Type-C™ Connector Text: "HP recommends using an HP power source."	A non-HP adapter is plugged into the USB port. Optimal performance is not guaranteed with non-HP adapters.

Scenario	Message	Cause
Using a small adapter	Title: USB Type-C™ Connector Text: "The attached power source cannot fully power the system but can supplement battery power. For full performance, use a higher capacity power source."	The use of an adapter that is too small to power the system. Adapters that are too small will only be used to supplement the battery and extend battery life.
Port over current situation	Title: USB Type-C™ connector Text: "The connected device exceeded the power limit of the USB-C™ port."	The connected device pulls too much current from the port causing the Power Delivery controller to issue an over current error to the Embedded Controller (EC).
Port over voltage situation	Title: USB Type-C™ connector Text: "The USB-C™ port is not working. The connected device caused a power surge. Please disconnect."	If the power source provides high voltage to the USB-C™ port, the PD controller will issue an "over voltage failure" message which is shown in the message section.
Unsupported expansion module	Title: USB Type-C™ connector Text: "The system does not support one of the connected expansion modules."	When a non-genuine HP expansion module is detected in the system, the "Unsupported expansion module" message will display.
Too many expansion modules	Title: USB Type-C™ connector Text: "The system configuration exceeds the number of supported expansion modules."	When the number of expansion modules exceeds the acceptable amount of system connections, the SIO/BIOS will issue the "Too many expansion modules" message.
Thunderbolt module is not at the top of the stack	Title: USB Type-C™ connector Text: "The Thunderbolt™ module must be attached directly below the system module."	If more than one Thunderbolt expansion module is in the module stack, the "Thunderbolt module is not at the top of the stack" message will display; only one module is permitted, and it should be at the top of the stack.

Frequently asked questions

What is USB Type-C™?

USB Type-C™ is a smaller, reversible USB connector with 4x high speed lanes (24 pin). USB Type-C™ can deliver data (including Thunderbolt™ 3), audio, and video, as well as provide charging power to many devices (USB Power Delivery).

Is USB Type-C™ backwards compatible?

Yes, USB Type-C™ is backwards compatible. You can plug any USB 3.0 device into a USB Type-C™ port using a USB Type-C™ (male) to Type-A (female) adapter.

What is USB Type-C™ power delivery?

USB Type-C™ power delivery is bi-directional, so a device can either send or receive power. This power can be transferred at the same time the device is transmitting data across the connection.

Does USB Type-C™ support video modes (alternate modes)?

USB Type-C™ ports support adapters that can output different types of video, such as HDMI, VGA, and DisplayPort™, all from one USB Type-C™ port on a computer or device.

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