



Maintenance and Service Guide

SUMMARY

This guide provides information about spare parts, removal and replacement of parts, security, backing up, and more.

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First Edition: April 2021

Document Part Number: M38059-001

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Safety warning notice

Reduce the possibility of heat-related injuries or of overheating the computer by following the practices described.

 **WARNING!** To reduce the possibility of heat-related injuries or of overheating the computer, do not place the computer directly on your lap or obstruct the computer air vents. Use the computer only on a hard, flat surface. Do not allow another hard surface, such as an adjoining optional printer, or a soft surface, such as pillows or rugs or clothing, to block airflow. Also, do not allow the AC adapter to come into contact with the skin or a soft surface, such as pillows or rugs or clothing, during operation. The computer and the AC adapter comply with the user-accessible surface temperature limits defined by applicable safety standards.

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1 Product description

This table provides detailed product information.

Table 1-1 Product components and their descriptions

Category	Description
Product Name	HP ENVY x360 15 Convertible PC Model number: 15m-es0xxx CTO model number: 15m-es0xxx
Processors	Intel® Core™ i7-1165G7 2.8 GHz processor (quad core, 12 MB L3 cache, 3200 MHz front side bus (FSB), 28 W) Intel Core i5-1135G7 2.40 GHz processor (quad core, 8 MB L3 cache, 3200 MHz FSB, 28 W)
Chipset	Intel integrated soldered-on-circuit (SoC)
Digital pen	HP Pen in natural silver finish with cable (Zenovo)
Display	39.6 cm (15.6 in), ultra high-definition (UHD) (3840 × 2160), BrightView, organic light-emitting diode (OLED), UWVA, DCI-P3, 100% CG, eDP+PSR, bent touchscreen display panel with narrow bezel; typical brightness: 400 nits 39.6 cm (15.6 in), liquid crystal display (LCD), full high-definition (FHD) (1920 × 1080), antiglare, white light-emitting diode (WLED), UWVA, sRGB, 100% CG, eDP 1.4+PSR2, bent low power touchscreen display panel with narrow bezel; typical brightness: 400 nits 39.6 cm (15.6 in), LCD, FHD (1920 × 1080), antiglare, WLED, UWVA, 45% CG, eDP 1.2 without PSR, bent touchscreen display panel with narrow bezel; typical brightness: 250 nits
Fingerprint reader	Secure Payment fingerprint reader integrated into computer keyboard
Graphics card	Intel Iris® Xe
Graphics controller	NVIDIA® GeForce® MX450 (N18S-G5) with up to 2 GB of dedicated graphics memory (256 MB × 32, GDDR6 × 2 pieces), 25 W) graphics controller
Memory	Upgradeable system memory supporting up to 16 GB 16 GB (2 × 8 GB) 12 GB (1 × 8 GB + 1 × 4 GB) 8 GB (2 × 4 GB) Support for 3200 DDR4 1.2 V SODIMM system memory DDR4-3200 dual-channel support
Media card reader	microSD™ media reader slot Supports microSD, SDHC™, SDXC™ Push-push insertion/removal
Networking	Intel Wi-Fi 6 AX201 ax 2×2 + Bluetooth® 5.0 MU-MIMO M.22230 non-vPro® 160 MHz MIPI+BR1 WW with 2 antennas

Table 1-1 Product components and their descriptions (continued)

Category	Description
Storage	Support for the following solid-state drives: • 1 TB, M.2 2280, peripheral component interconnect express (PCIe), nonvolatile memory express (NVMe), value solid-state drive • 512 GB, M.2 2280, PCIe, NVMe, value solid-state drive • 256 GB, M.2 2280, PCIe, NVMe, value solid-state drive • 512 GB, M.2 2280, PCIe + 32 GB, 3D Xpoint solid-state drive
Audio and video	• Integrated dual BANG and OLUFSEN speakers • HP support for Far Field Cortana • Support for Alexa • Support for HP Audio Boost 2.0 • Support for Speaker Swap • Support for XiaoWei Integrated Wide Vision HD camera with shutter door: USB 2.0 Indicator LED, HD BSI sensor, f2.0, 88° wide field of vision 720p by 30 frames per second Dual-array microphone with appropriate beam-forming, echo-cancellation, noise-suppression software
Ports	• Audio-out (headphone)/audio-in (microphone) combo jack • HDMI port • Power connector • USB SuperSpeed port • USB SuperSpeed port with HP Sleep and Charge • USB Type-C® power connector and SuperSpeed port • USB Type-C power connector and Thunderbolt™ port with HP Sleep and Charge
Keyboard/pointing devices	Keyboard: Integrated, backlit, island-style, standard, notebook keyboard with touchpad with image sensor in natural silver finish Touchpad: Touchpad with image sensor Multitouch gestures enabled Precision touchpad support Support for Modern Trackpad Gestures Taps enabled as default

Table 1-1 Product components and their descriptions (continued)

Category	Description
Power requirements	Battery: 3 cell, 51 WHr, HP Long Life
	Support for the following AC adapters:
	90 W HP Smart Adapter (PFC, standard barrel, 4.5 mm, right angle, 1.8 m [6.0 ft]) 65 W AC adapter (non-PFC, slim, USB Type-C, straight, 1.8 m [6.0 ft]) 65 W AC adapter (non-PFC, slim, black barrel, straight, 4.5 mm, for use in Argentina and Latin America)
	Power cord: C5, 1.0 m (3.3 ft), premium power cord with sticker
Security	- Microphone mute button - Privacy camera shutter door - Trusted Platform Module TPM 2.0 - Firmware
Sensors	- Accelerometer (2) - Gyroscope / E-compass / Accelerometer + Magnetometer - Infrared thermal sensor - Sensor hub
Operating system	- Windows® 10 Home 64-bit Advanced - Windows 10 Home 64-bit Advanced Single Language - Windows 10 Home 64-bit High-End Chinese Market CPPP - Windows 10 Home 64-bit Plus - Windows 10 Home 64-bit Plus Single Language - Windows 10 Home 64-bit Plus Single Language Africa Market PPP - Windows 10 Home 64-bit Single Language - Windows 10 Home 64-bit Single Language Africa Market PPP - Windows 10 Home 64-bit
Serviceability	End user replaceable part: AC adapter

2 Components

Your computer features top-rated components. This chapter provides details about your components, where they are located, and how they work.

Right side

Identify the components on the right side of the computer.

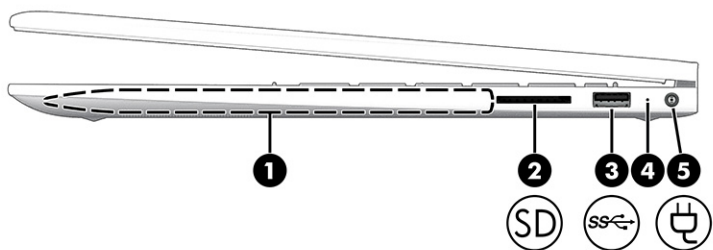


Table 2-1 Right-side components and their descriptions

Component		Description
(1)	Magnetic pen attachment area	Holds an optional pen.
(2)	SD Memory card reader	Reads optional memory cards that enable you to store, manage, share, or access information. To insert a card: 1. Hold the card label-side up, with connectors facing the computer. 2. Insert the card into the memory card reader, and then press in on the card until it is firmly seated. To remove a card: ■ Press in on the card, and then remove it from the memory card reader.
(3)	SS USB SuperSpeed port	Connects a USB device, provides high-speed data transfer, and (for select products) charges small devices (such as a smartphone) when the computer is on or in Sleep mode. NOTE: Use a standard USB Type-A charging cable or cable adapter (purchased separately) when charging a small external device.

Table 2-1 Right-side components and their descriptions (continued)

Component	Description
(4)  AC adapter and battery light	• White: The AC adapter is connected and the battery is fully charged. • Blinking amber: The AC adapter is disconnected and the battery has reached a low battery level. • Amber: The AC adapter is connected and the battery is charging. • Off: The battery is not charging. NOTE: If you connect both the USB Type-C and the barrel AC adapters to your computer at the same time, only one AC adapter and battery light turns on. The light next to the USB Type-C power connector turns on when the Type-C adapter power rating is more than the barrel adapter rating. The light next to the barrel power connector turns on when the barrel AC adapter power rating is the same or greater than the Type-C adapter rating.
(5)  Power connector	Connects an AC adapter. NOTE: Some computers might ship with two separate AC adapters and power cords. Be sure to match the connector end of the power cord to the corresponding USB Type-C or barrel power connector of your computer.

Left side

Identify the components on the left side of the computer.



NOTE: Refer to the illustration that most closely matches your computer.

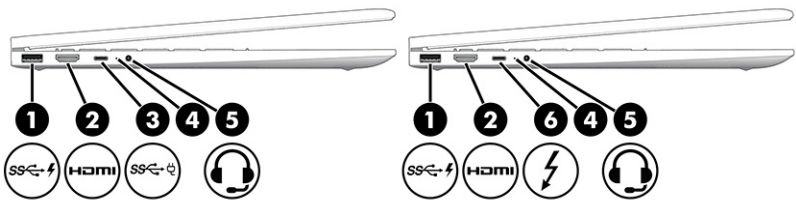


Table 2-2 Left-side components and their descriptions

Component	Description
(1)  USB SuperSpeed port with HP Sleep and Charge	Connects a USB device, provides high-speed data transfer, and charges small devices (such as a smartphone), even when the computer is off. NOTE: Use a standard USB Type-A charging cable or cable adapter (purchased separately) when charging a small external device.
(2)  HDMI port	Connects an optional video or audio device, such as a high-definition television, any compatible digital or audio component, or a high-speed High-Definition Multimedia Interface (HDMI) device.

Table 2-2 Left-side components and their descriptions (continued)

Component	Description
(3)  USB Type-C power connector and SuperSpeed port with HP Sleep and Charge	Connects an AC adapter that has a USB Type-C connector, supplying power to the computer and, if needed, charging the computer battery. - and - Connects a USB device, provides high-speed data transfer, and charges small devices (such as a smartphone), even when the computer is off. NOTE: Use a standard USB Type-C charging cable or cable adapter (purchased separately) when charging a small external device. - and - Connects a display device that has a USB Type-C connector, providing DisplayPort™ output. NOTE: Some computers might ship with two separate AC adapters and power cords. Be sure to match the connector end of the power cord to the corresponding USB Type-C or barrel power connector of your computer.
(4) AC adapter and battery light	• White: The AC adapter is connected and the battery is fully charged. • Blinking amber: The AC adapter is disconnected and the battery has reached a low battery level. • Amber: The AC adapter is connected and the battery is charging. • Off: The battery is not charging. NOTE: If you connect both the USB Type-C and the barrel AC adapters to your computer at the same time, only one AC adapter and battery light turns on. The light next to the USB Type-C power connector turns on when the Type-C adapter power rating is more than the barrel adapter rating. The light next to the barrel power connector turns on when the barrel AC adapter power rating is the same or greater than the Type-C adapter rating.
(5)  Audio-out (headphone)/Audio-in (microphone) combo jack	Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. Also connects an optional headset microphone. This jack does not support optional standalone microphones. WARNING! To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, see the <i>Regulatory, Safety, and Environmental Notices</i>. To access this guide: ■ Type HP Documentation in the taskbar search box, and then select HP Documentation. NOTE: When a device is connected to the jack, the computer speakers are disabled.

Table 2-2 Left-side components and their descriptions (continued)

Component	Description
(6)  USB Type-C power connector and Thunderbolt port with HP Sleep and Charge	Connects an AC adapter that has a USB Type-C connector, supplying power to the computer and, if needed, charging the computer battery. - and - Connects a USB device, provides high-speed data transfer, and charges small devices (such as a smartphone), even when the computer is off. NOTE: Use a standard USB Type-C charging cable or cable adapter (purchased separately) when charging a small external device. - and - Connects a display device that has a USB Type-C connector, providing DisplayPort output. NOTE: Your computer might also support a Thunderbolt docking station. NOTE: Some computers might ship with two separate AC adapters and power cords. Be sure to match the connector end of the power cord to the corresponding USB Type-C or barrel power connector of your computer.

Rear

Identify the rear component.



Table 2-3 Rear component and its description

Component	Description
Vents	Enable airflow to cool internal components. NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.

Touchpad components

Identify the touchpad components.

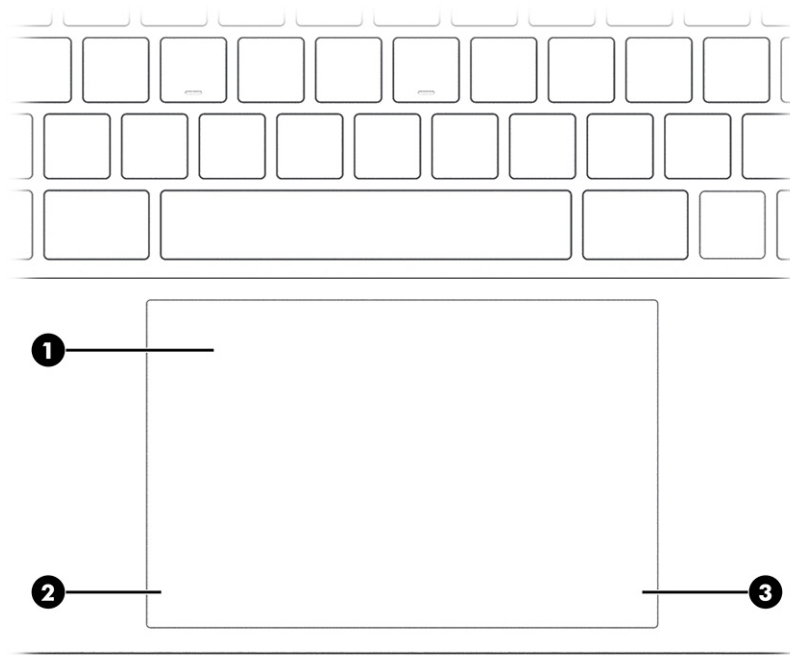


Table 2-4 Touchpad components and their descriptions

Component		Description
(1)	Touchpad zone	Reads your finger gestures to move the pointer or activate items on the screen.
(2)	Left touchpad button	Functions like the left button on an external mouse.
(3)	Right touchpad button	Functions like the right button on an external mouse.

Lights

Identify the lights on the computer.

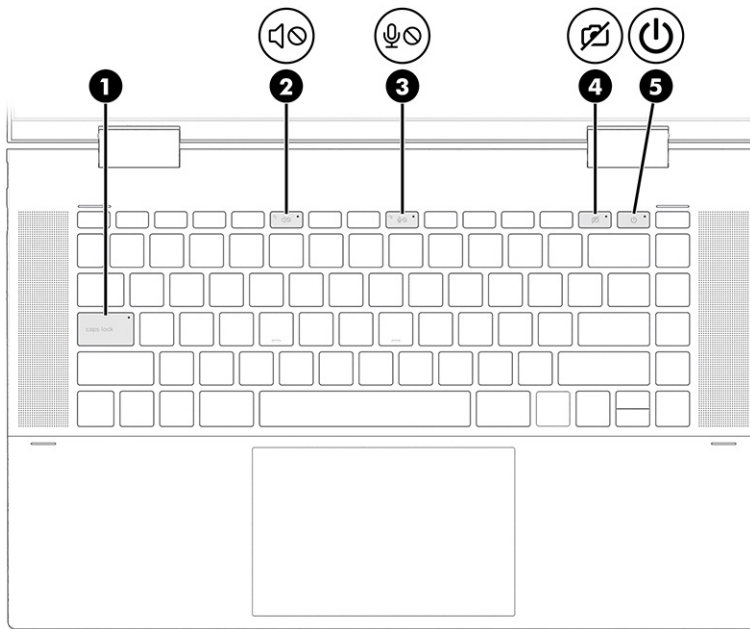


Table 2-5 Lights and their descriptions

Component		Description
(1)	Caps lock light	On: Caps lock is on, which switches the key input to all capital letters.
(2)	 Mute light	- On: Computer sound is off. - Off: Computer sound is on.
(3)	 Microphone mute light	- On: Microphone is off. - Off: Microphone is on.
(4)	 Camera privacy light	- On: The camera is off. - Off: The camera is on.
(5)	 Power light	- On: The computer is on. - Blinking (select products only): The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unnecessary components. - Off: Depending on your computer model, the computer is off, in Hibernation, or in Sleep. Hibernation is the power-saving state that uses the least amount of power.

Special keys

Identify the special keys.

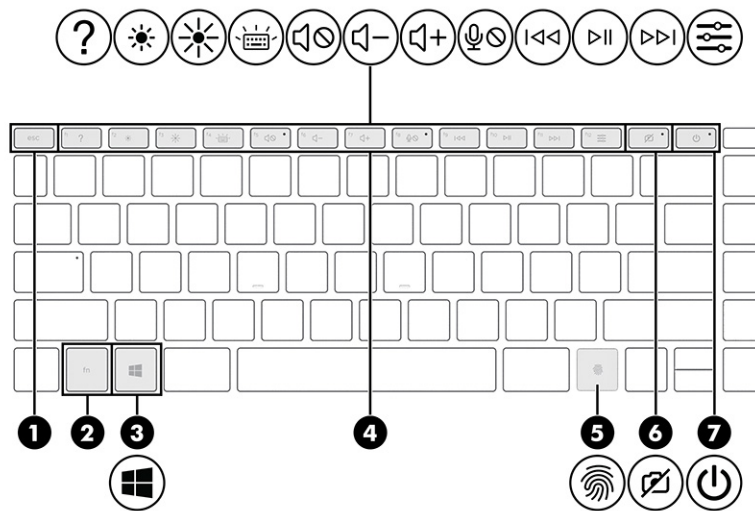


Table 2-6 Special keys and their descriptions

Component		Description
(1)	esc key	Displays system information when pressed in combination with the fn key.
(2)	fn key	Executes specific functions when pressed in combination with another key.
(3)	 Windows key	Opens the Start menu. NOTE: Pressing the Windows key again will close the Start menu.
(4)	Action keys	Execute frequently used system functions as defined by the icon symbols on f1 through f12 function keys.
(5)	 Fingerprint reader	Allows a fingerprint logon to Windows, instead of a password logon. ■ Touch your finger to the fingerprint reader. IMPORTANT: To prevent fingerprint logon issues, make sure when you register your fingerprint that all sides of your finger are registered by the fingerprint reader.
(6)	 Camera privacy key	Turns the camera off and on.

Table 2-6 Special keys and their descriptions (continued)

Component		Description
(7)	 Power button	- When the computer is off, press the button briefly to turn on the computer. - When the computer is on, press the button briefly to initiate Sleep. - When the computer is in the Sleep state, press the button briefly to exit Sleep (select products only). - When the computer is in Hibernation, press the button briefly to exit Hibernation. IMPORTANT: Pressing and holding down the power button results in the loss of unsaved information. If the computer has stopped responding and shutdown procedures are ineffective, press and hold the power button down for at least 10 seconds to turn off the computer. To learn more about your power settings, see your power options: - Right-click the Power icon , and then select Power Options.

Bottom

Identify the bottom components.

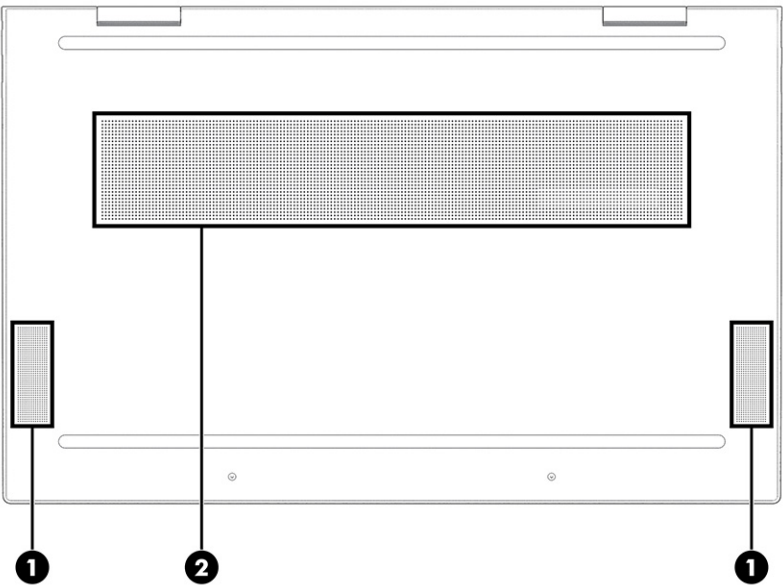


Table 2-7 Bottom components and their descriptions

Component		Description
(1)	Speakers (2)	Produce sound.

Table 2-7 Bottom components and their descriptions (continued)

Component		Description
(2)	Vent	Enables airflow to cool internal components. NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.

3 Illustrated parts catalog

Use this table to determine the spare parts that are available for the computer.

Computer major components

To identify the computer major components, use this illustration and table.

 **NOTE:** HP continually improves and changes product parts. For complete and current information about supported parts for your computer, go to <http://partsurfer.hp.com>, select your country or region, and then follow the on-screen instructions.

 **NOTE:** Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer.

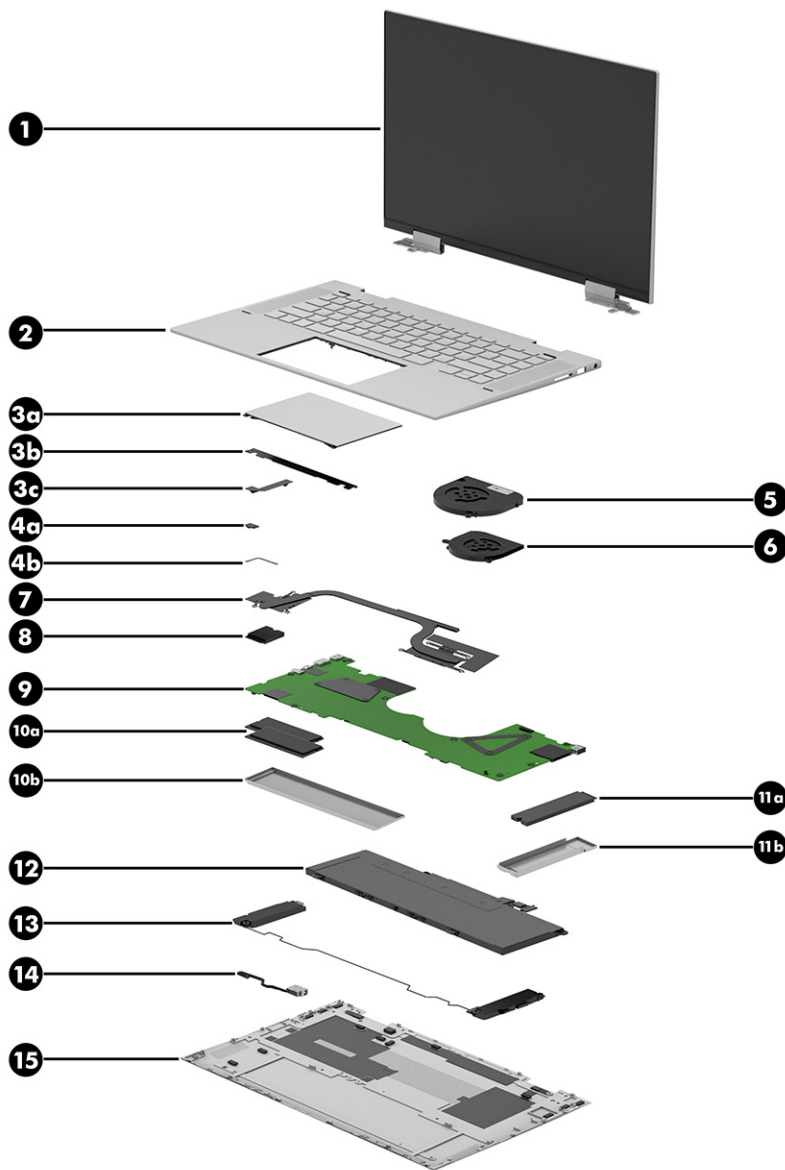


Table 3-1 Computer major component descriptions and part numbers

Item	Component	Spare part number
(1)	Display assembly	
	NOTE: Display spare parts are available as subcomponents, not as whole units. Display subcomponent spare parts are available. For spare part information, see Display assembly subcomponents on page 16 .	
(2)	Top cover/keyboard with backlight (includes backlight cable and keyboard cable):	
	For use in Belgium	M45474-A41
	For use in Canada	M45474-DB1
	For use in the Czech Republic and Slovakia	M45474-FL1
	For use in Denmark, Finland, and Norway	M45474-DH1
	For use in France	M45474-051

Table 3-1 Computer major component descriptions and part numbers (continued)

Item	Component	Spare part number
	For use in Germany	M45474-041
	For use in Hungary	M45474-211
	For use in Italy	M45474-061
	For use in Latin America	M45474-161
	For use in the Netherlands	M45474-B31
	For use in Portugal	M45474-131
	For use in Russia	M45474-251
	For use in Saudi Arabia	M45474-171
	For use in Spain	M45474-071
	For use in Switzerland	M45474-BG1
	For use in Turkey	M45474-141
	For use in Ukraine	M45474-BD1
	For use in the United Kingdom	M45474-031
	For use in the United States	M45474-001
(3a)	Touchpad	M45451-001
	NOTE: The touchpad spare part kit does not include the touchpad bracket or touchpad cable. The touchpad bracket is not available as a spare part component. The touchpad cable is available using spare part number M45458-001.	
(3b)	Touchpad bracket (not available as a spare part component)	
(3c)	Touchpad cable (includes double-sided adhesive)	M45458-001
(4a)	Infrared sensor board	M45450-001
	NOTE: The infrared sensor board spare part kit does not include the infrared sensor board cable. The infrared sensor board cable is available using spare part number M45459-001.	
(4b)	Infrared sensor board cable (includes double-sided adhesive)	M45459-001
(5)	Processor fan (includes cable)	M45465-001
(6)	Graphics fan (includes cable)	M45466-001
(7)	Heat sink (includes replacement thermal material):	
	For use only on computer models equipped a graphics subsystem with discrete memory	M45464-001
	For use only on computer models equipped a graphics subsystem with universal memory architecture (UMA) memory	M45463-001
	Thermal Pad Kit (not illustrated)	M45484-001
(8)	Intel Wi-Fi 6 AX201 ax 2x2 + Bluetooth 5.0 MU-MIMO M.22230 non-vPro 160 MHz MIPI+BR1 WW WLAN module with 2 antennas	L92724-005
(9)	System board (includes replacement thermal material and the Windows 10 operating system)	
	Equipped with an Intel i7-1165G7 processor, an MX450 graphics subsystem with 2 GB of discrete memory, for use only on computer models equipped with an OLED display assembly	M45471-601

Table 3-1 Computer major component descriptions and part numbers (continued)

Item	Component	Spare part number
	Equipped with an Intel i7-1165G7 processor, an MX450 graphics subsystem with 2 GB of discrete memory, for use only on computer models equipped with a non-OLED display assembly	M45470-601
	Equipped with an Intel i7-1165G7 processor and a graphics subsystem with UMA memory	M45472-601
	Equipped with an Intel i5-1135G7 processor and a graphics subsystem with UMA memory	M45473-601
(10a)	Memory module:	
	8 GB, 3200 MHz, 1.2.v DDR4	L46598-005
	4 GB, 3200 MHz, 1.2.v DDR4	L83673-005
(10b)	Memory module shield (not available as a spare part component)	
(11a)	Solid-state drive (M.2 2280, PCIe-NVMe):	
	1 TB value solid-state drive	L85370-005
	512 GB value solid-state drive	L85364-005
	256 GB value solid-state drive	L85354-005
	512 GB, M.2 2280, PCIe + 32 GB, 3D Xpoint solid-state drive	L85366-005
	Solid-State Drive Thermal Pad Kit	M46333-001
(11b)	Solid-state drive shield (not available as a spare part component)	
(12)	Battery (3 cell, 51 Whr, 4.45 Ahr, Li, includes cable)	L77034-005
(13)	Speakers (include left and right speakers and cables and four rubber isolators)	M45468-001
(14)	Power connector cable	M45461-001
(15)	Bottom cover:	
	For use only on computer models equipped a graphics subsystem with discrete memory	M47050-001
	For use only on computer models equipped a graphics subsystem with UMA memory	M45456-001
	Rubber Feet Kit (not illustrated, includes front and rear rubber feet strips)	M45467-001

Display assembly subcomponents

To identify the display assembly subcomponents, use this illustration and table.

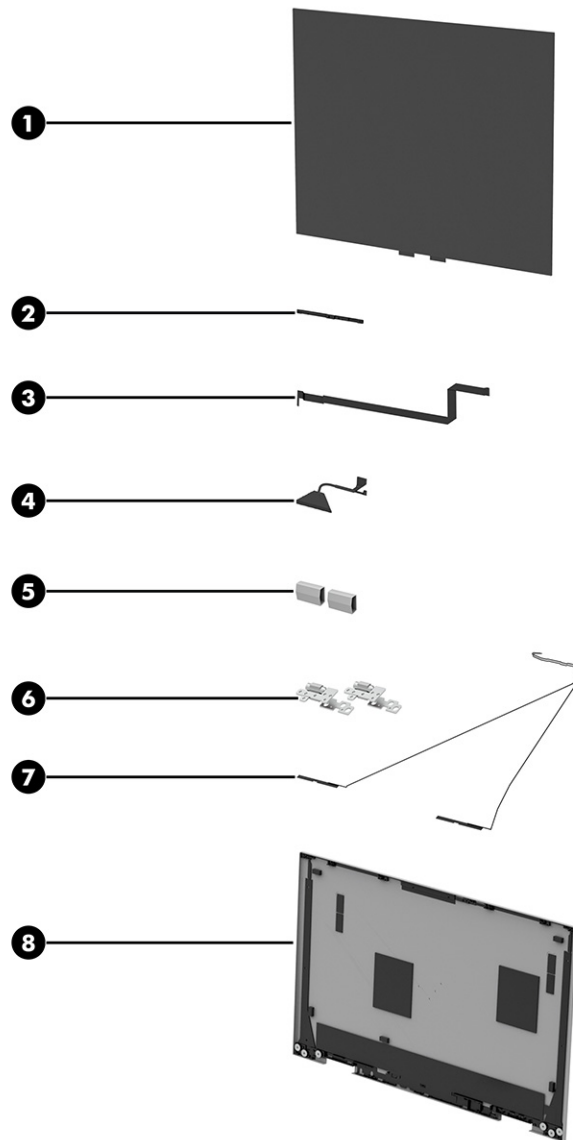


Table 3-2 Display component descriptions and part numbers

Item	Component	Spare part number
(1)	Display panel assembly:	
	NOTE: Display adhesive is available using spare part number M45797-001.	
	39.6 cm (15.6 in), UHD (3840 × 2160), BrightView, OLED, UWVA, touchscreen display panel assembly	M45454-001
	39.6 cm (15.6 in), LCD, FHD (1920 × 1080), antiglare, WLED, UWVA, low power touchscreen display panel assembly	M45453-001
	39.6 cm (15.6 in), LCD, FHD (1920 × 1080), antiglare, WLED, UWVA, touchscreen display panel assembly	M45452-001

Table 3-2 Display component descriptions and part numbers (continued)

Item	Component	Spare part number
(2)	Webcam/microphone module (includes double-sided adhesive) NOTE: The webcam/microphone module spare part kit does not include the webcam/microphone module cable. The webcam/microphone module cable is available using spare part number M45457-001.	M45455-001
(3)	Webcam/microphone module cable	M45457-001
(4)	Display panel cable	M45460-001
(5)	Display hinge covers (2, includes left and right hinge covers)	M45448-001
(6)	Display hinges (2, includes left and right hinges)	M45449-001
(7)	Wireless antenna (includes left and right wireless antenna cables and transceivers and double-sided adhesive)	M45446-001
(8)	Display back cover (includes wireless antenna) NOTE: Display panel adhesive is available using spare part number M45797-001.	M45447-001

Miscellaneous parts

To identify the miscellaneous parts, use this table.

Table 3-3 Miscellaneous part descriptions and part numbers

Component	Spare part number
AC adapter:	
90 W HP Smart Adapter (PFC, RA, 4.5 mm, 1.8 m [6.0 ft])	937532-850
65 W AC adapter (non-PFC, slim USB Type-C, straight, 1.8 m [6.0 ft])	L04650-850
65 W AC adapter (non-PFC, slim, 4.5 mm, 1.8 m [6.0 ft])	L24008-001
Adapter:	
HP HDMI-to-VGA adapter	701943-001
HP USB Type-C-to-HDMI 2.0 adapter	935325-001
HP USB Type-C-to-VGA adapter	831751-001
HP USB-to-Gigabit RJ-45 adapter	829941-001
HP USB Type-C-to-USB Type-A cable adapter	833960-001
HP USB External DVDRW Drive	747080-001
Hub:	
HP Elite USB Type-C multiport hub	L39572-001
HP USB Type-C-to-multiport hub	919666-001
HP USB Type-C-to-USB Type-A hub	916838-001
Pen (Zenovo, natural silver finish, with cord)	L95614-001
Power cord (C5, 1.0 m [3.3 ft], prime with sticker)	

Table 3-3 Miscellaneous part descriptions and part numbers (continued)

Component	Spare part number
For use in Argentina	L30811-001
For use in Denmark	L22322-001
For use in Europe	L22321-001
For use in Italy	L30813-001
For use in North America	L22319-001
For use in the People's Republic of China	L21930-001
For use in South Africa	L22325-001
For use in Switzerland	L22324-001
For use in the United Kingdom	L22320-001
Screw Kit	M45469-001

4 Removal and replacement procedures preliminary requirements

Use this information to properly prepare to disassemble and reassemble the computer.

Tools required

You need the following tools to complete the removal and replacement procedures:

- Forceps or tweezers
- Keyboard removal tool
- Magnetic Phillips P0 screwdriver
- Nonconductive, nonmarking pry tool
- Suction cups

Service considerations

The following sections include some of the considerations that you must keep in mind during disassembly and assembly procedures.

 **NOTE:** As you remove each subassembly from the computer, place the subassembly (and all accompanying screws) away from the work area to prevent damage.

Plastic parts

Using excessive force during disassembly and reassembly can damage plastic parts.

Cables and connectors

Handle cables with extreme care to avoid damage.

 **IMPORTANT:** When servicing the computer, be sure that cables are placed in their proper locations during the reassembly process. Improper cable placement can damage the computer.

Apply only the tension required to unseat or seat the cables during removal and insertion. Handle cables by the connector whenever possible. In all cases, avoid bending, twisting, or tearing cables. Be sure that cables are routed so that they cannot be caught or snagged as you remove or replace parts. Handle flex cables with extreme care; these cables tear easily.

Drive handling

Note the following guidelines when handling drives.

 **IMPORTANT:** Drives are fragile components. Handle them with care. To prevent damage to the computer, damage to a drive, or loss of information, observe these precautions:

Before removing or inserting a hard drive, shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.

Before handling a drive, be sure that you are discharged of static electricity. While handling a drive, avoid touching the connector.

Before removing an optical drive, be sure that a disc is not in the drive, and be sure that the optical drive tray is closed.

Handle drives on surfaces covered with at least 2.54 cm (1 inch) of shock-proof foam.

Avoid dropping drives from any height onto any surface.

After removing a hard drive or an optical drive, place it in a static-proof bag.

Avoid exposing an internal hard drive to products that have magnetic fields, such as monitors or speakers.

Avoid exposing a drive to temperature extremes or liquids.

If a drive must be mailed, place the drive in a bubble pack mailer or other suitable form of protective packaging, and label the package "FRAGILE."

Electrostatic discharge information

A sudden discharge of static electricity from your finger or other conductor can destroy static-sensitive devices or microcircuitry. Often the spark is neither felt nor heard, but damage occurs. An electronic device exposed to electrostatic discharge (ESD) might not appear to be affected at all and can work perfectly throughout a normal cycle. The device might function normally for a while, but it has been degraded in the internal layers, reducing its life expectancy.

Networks built into many integrated circuits provide some protection, but in many cases, the discharge contains enough power to alter device parameters or melt silicon junctions.

 **IMPORTANT:** To prevent damage to the device when you remove or install internal components, observe these precautions:

Keep components in their electrostatic-safe containers until you are ready to install them.

Before touching an electronic component, discharge static electricity by using the guidelines described [Personal grounding methods and equipment on page 22](#).

Avoid touching pins, leads, and circuitry. Handle electronic components as little as possible.

If you remove a component, place it in an electrostatic-safe container.

Generating static electricity

Follow these static electricity guidelines.

- Different activities generate different amounts of static electricity.
- Static electricity increases as humidity decreases.

Table 4-1 Static electricity occurrence based on activity and humidity

Event	Relative humidity		
	55%	40%	10%
Walking across carpet	7,500 V	15,000 V	35,000 V
Walking across vinyl floor	3,000 V	5,000 V	12,000 V
Motions of bench worker	400 V	800 V	6,000 V
Removing DIPs (dual in-line packages) from plastic tube	400 V	700 V	2,000 V
Removing DIPs from vinyl tray	2,000 V	4,000 V	11,500 V
Removing DIPs from polystyrene foam	3,500 V	5,000 V	14,500 V
Removing bubble pack from PCB (printed circuit board)	7,000 V	20,000 V	26,500 V
Packing PCBs in foam-lined box	5,000 V	11,000 V	21,000 V
Multiple electric components can be packaged together in plastic tubes, trays, or polystyrene foam.			



NOTE: As little as 700 V can degrade a product.

Preventing electrostatic damage to equipment

Many electronic components are sensitive to ESD. Circuitry design and structure determine the degree of sensitivity. The following packaging and grounding precautions are necessary to prevent static electricity damage to electronic components.

- To avoid hand contact, transport products in static-safe containers such as tubes, bags, or boxes.
- Protect all electrostatic parts and assemblies with conductive or approved containers or packaging.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.
- Place items on a grounded surface before removing them from their container.
- Always be properly grounded when touching a sensitive component or assembly.
- Avoid contact with pins, leads, or circuitry.
- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

Personal grounding methods and equipment

Using certain equipment can prevent static electricity damage to electronic components.

- **Wrist straps** are flexible straps with a maximum of $1\text{ M}\Omega \pm 10\%$ resistance in the ground cords. To provide proper ground, a strap must be worn snug against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.
- **Heel straps/Toe straps/Boot straps** can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use them on both feet with a maximum of $1\text{ M}\Omega \pm 10\%$ resistance between the operator and ground.

Table 4-2 Static shielding protection levels

Static shielding protection levels	
Method	Voltage
Antistatic plastic	1,500
Carbon-loaded plastic	7,500
Metallized laminate	15,000

Grounding the work area

To prevent static damage at the work area, follow these precautions.

- Cover the work surface with approved static-dissipative material.
- Use a wrist strap connected to a properly grounded work surface and use properly grounded tools and equipment.
- Use static-dissipative mats, foot straps, or air ionizers to give added protection.
- Handle electrostatic sensitive components, parts, and assemblies by the case or PCB laminate. Handle them only at static-free work areas.
- Turn off power and input signals before inserting and removing connectors or test equipment.
- Use fixtures made of static-safe materials when fixtures must directly contact dissipative surfaces.
- Keep the work area free of nonconductive materials, such as ordinary plastic assembly aids and polystyrene foam.
- Use conductive field service tools, such as cutters, screwdrivers, and vacuums.
- Avoid contact with pins, leads, or circuitry.

Recommended materials and equipment

HP recommends certain materials and equipment to prevent static electricity.

- Antistatic tape
- Antistatic smocks, aprons, or sleeve protectors
- Conductive bins and other assembly or soldering aids
- Conductive foam
- Conductive tabletop workstations with ground cord of $1\text{ M}\Omega \pm 10\%$ resistance
- Static-dissipative table or floor mats with hard tie to ground
- Field service kits
- Static awareness labels
- Wrist straps and footwear straps providing $1\text{ M}\Omega \pm 10\%$ resistance
- Material handling packages

- Conductive plastic bags
- Conductive plastic tubes
- Conductive tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes

Cleaning your computer

Cleaning your computer regularly removes dirt and debris so that your device continues to operate at its best. Use the following information to safely clean the external surfaces of your computer.

Enabling HP Easy Clean (select products only)

HP Easy Clean helps you to avoid accidental input while you clean the computer surfaces. This software disables devices such as the keyboard, touch screen, and touchpad for a preset amount of time so that you can clean all computer surfaces.

1. Start HP Easy Clean in one of the following ways:
 - Select the **Start** menu, and then select **HP Easy Clean**.
 - or -
 - Select the **HP Easy Clean** icon in the taskbar.
 - or -
 - Select **Start**, and then select the **HP Easy Clean** tile.
2. Now that your device is disabled for a short period, see [Removing dirt and debris from your computer on page 24](#) for the recommended steps to clean the high-touch, external surfaces on your computer. After you remove the dirt and debris, you can also clean the surfaces with a disinfectant. See [Cleaning your computer with a disinfectant on page 25](#) for guidelines to help prevent the spread of harmful bacteria and viruses.

Removing dirt and debris from your computer

Here are the recommended steps to clean dirt and debris from your computer.

For computers with wood veneer, see [Caring for wood veneer \(select products only\) on page 26](#).

1. Wear disposable gloves made of latex (or nitrile gloves, if you are latex-sensitive) when cleaning the surfaces.
2. Turn off your device and unplug the power cord and other connected external devices. Remove any installed batteries from items such as wireless keyboards.

 **CAUTION:** To prevent electric shock or damage to components, never clean a product while it is turned on or plugged in.

3. Moisten a microfiber cloth with water. The cloth should be moist, but not dripping wet.

 **IMPORTANT:** To avoid damaging the surface, avoid abrasive cloths, towels, and paper towels.

4. Wipe the exterior of the product gently with the moistened cloth.

 **IMPORTANT:** Keep liquids away from the product. Avoid getting moisture in any openings. If liquid makes its way inside your HP product, it can cause damage to the product. Do not spray liquids directly on the product. Do not use aerosol sprays, solvents, abrasives, or cleaners containing hydrogen peroxide or bleach that might damage the finish.

5. Start with the display (if applicable). Wipe carefully in one direction, and move from the top of the display to the bottom. Finish with any flexible cables, like power cord, keyboard cable, and USB cables.
6. Be sure that surfaces have completely air-dried before turning the device on after cleaning.
7. Discard the gloves after each cleaning. Clean your hands immediately after you remove the gloves.

See [Cleaning your computer with a disinfectant on page 25](#) for recommended steps to clean the high-touch, external surfaces on your computer to help prevent the spread of harmful bacteria and viruses.

Cleaning your computer with a disinfectant

The World Health Organization (WHO) recommends cleaning surfaces, followed by disinfection, as a best practice for preventing the spread of viral respiratory illnesses and harmful bacteria.

After cleaning the external surfaces of your computer using the steps in [Removing dirt and debris from your computer on page 24](#), [Caring for wood veneer \(select products only\) on page 26](#), or both, you might also choose to clean the surfaces with a disinfectant. A disinfectant that is within HP's cleaning guidelines is an alcohol solution consisting of 70% isopropyl alcohol and 30% water. This solution is also known as rubbing alcohol and is sold in most stores.

Follow these steps when disinfecting high-touch, external surfaces on your computer:

1. Wear disposable gloves made of latex (or nitrile gloves, if you are latex-sensitive) when cleaning the surfaces.
2. Turn off your device and unplug the power cord and other connected external devices. Remove any installed batteries from items such as wireless keyboards.

 **CAUTION:** To prevent electric shock or damage to components, never clean a product while it is turned on or plugged in.

3. Moisten a microfiber cloth with a mixture of 70% isopropyl alcohol and 30% water. The cloth should be moist, but not dripping wet.

 **CAUTION:** Do not use any of the following chemicals or any solutions that contain them, including spray-based surface cleaners: bleach, peroxides (including hydrogen peroxide), acetone, ammonia, ethyl alcohol, methylene chloride, or any petroleum-based materials, such as gasoline, paint thinner, benzene, or toluene.

 **IMPORTANT:** To avoid damaging the surface, avoid abrasive cloths, towels, and paper towels.

4. Wipe the exterior of the product gently with the moistened cloth.



IMPORTANT: Keep liquids away from the product. Avoid getting moisture in any openings. If liquid makes its way inside your HP product, it can cause damage to the product. Do not spray liquids directly on the product. Do not use aerosol sprays, solvents, abrasives, or cleaners containing hydrogen peroxide or bleach that might damage the finish.

5. Start with the display (if applicable). Wipe carefully in one direction, and move from the top of the display to the bottom. Finish with any flexible cables, like power cord, keyboard cable, and USB cables.
6. Be sure that surfaces have completely air-dried before turning the device on after cleaning.
7. Discard the gloves after each cleaning. Clean your hands immediately after you remove the gloves.

Caring for wood veneer (select products only)

Your product might feature high-quality wood veneer. As with all natural wood products, proper care is important for best results over the life of the product. Because of the nature of natural wood, you might see unique variations in the grain pattern or subtle variations in color, which are normal.

- Clean the wood with a dry, static-free microfiber cloth or chamois.
- Avoid cleaning products containing substances such as ammonia, methylene chloride, acetone, turpentine, or other petroleum-based solvents.
- Do not expose the wood to sun or moisture for long periods of time.
- If the wood becomes wet, dry it by dabbing with an absorbent, lint-free cloth.
- Avoid contact with any substance that might dye or discolor the wood.
- Avoid contact with sharp objects or rough surfaces that might scratch the wood.

See [Removing dirt and debris from your computer on page 24](#) for the recommended steps to clean the high-touch, external surfaces on your computer. After you remove the dirt and debris, you can also clean the surfaces with a disinfectant. See [Cleaning your computer with a disinfectant on page 25](#) for sanitizing guidelines to help prevent the spread of harmful bacteria and viruses.

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment.

- To avoid hand contact, transport products in static-safe tubes, bags, or boxes.
- Protect ESD-sensitive parts and assemblies with conductive or approved containers or packaging.
- Keep ESD-sensitive parts in their containers until the parts arrive at static-free workstations.
- Place items on a grounded surface before removing items from their containers.
- Always be properly grounded when touching a component or assembly.
- Store reusable ESD-sensitive parts from assemblies in protective packaging or nonconductive foam.

- Use transporters and conveyors made of antistatic belts and roller bushings. Be sure that mechanized equipment used for moving materials is wired to ground and that proper materials are selected to avoid static charging. When grounding is not possible, use an ionizer to dissipate electric charges.

Accessing support information

Use this information to find the HP support that you need.

Table 4-3 Support information locations

Service consideration	Path to access information
Records of reported failure incidents stored on the computer	Windows: Pre-operating system failures are logged in the BIOS Event Log. To view the BIOS Event Log: 1. Press the power button. 2. Immediately and repeatedly press esc when the power button light turns white. NOTE: If you do not press esc at the appropriate time, you must restart the computer and again repeatedly press esc when the power button light turns white to access the utility. 3. Press f10 to enter the BIOS setup. 4. (On commercial products) Under the Main tab, select BIOS event log, and then select View BIOS Event Log. - or - (On consumer products) Under the Main tab, select System Log. Post operating system failures are logged in the Event Viewer. 1. Turn on the computer and allow the operating system to open. 2. Click the search icon  in the taskbar. 3. Type <code>Event Viewer</code>, and then press enter. 4. Select the log from the left panel. Details display in the right panel. Chrome: 1. Go to support.google.com/chrome. 2. Search <code>collect Chrome device logs</code>.
Technical bulletins	To locate technical bulletins: 1. Go to www.hp.com. 2. Place the cursor over Problem solving to display more options. 3. Select Support & Troubleshooting. 4. Type the serial number, product number, or product name to go to the product support page. 5. Select Advisories to view technical bulletins.

Table 4-3 Support information locations (continued)

Service consideration	Path to access information
Repair professionals	To locate repair professionals: 1. Go to www.hp.com. 2. Place the cursor over Support resources to display more options. 3. Select Authorized service providers.
Component and diagnosis information, failure detection, and required action	To locate diagnosis information and actions: 1. Go to http://www.hp.com/go/techcenter/pcdiags. 2. Select Get Support. 3. Near the bottom of the window, select Notebook PCs, and then select your location.

5 Removal and replacement procedures for authorized service provider parts

This chapter provides removal and replacement procedures for authorized service provider parts.

 **IMPORTANT:** Components described in this chapter should be accessed only by an authorized service provider. Accessing these parts can damage the computer or void the warranty.

 **NOTE:** Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer.

Component replacement procedures

To remove and replace computer components, use these procedures.

 **NOTE:** HP continually improves and changes product parts. For complete and current information about supported parts for your computer, go to <http://partsurfer.hp.com>, select your country or region, and then follow the on-screen instructions.

You must remove, replace, or loosen as many as 57 screws when you service the parts described in this chapter. Make special note of each screw size and location during removal and replacement.

Preparation for disassembly

To remove and replace computer components, use these procedures.

See [Removal and replacement procedures preliminary requirements on page 20](#) for initial safety procedures.

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.

Bottom cover

To remove the bottom cover, use this procedure and illustration.

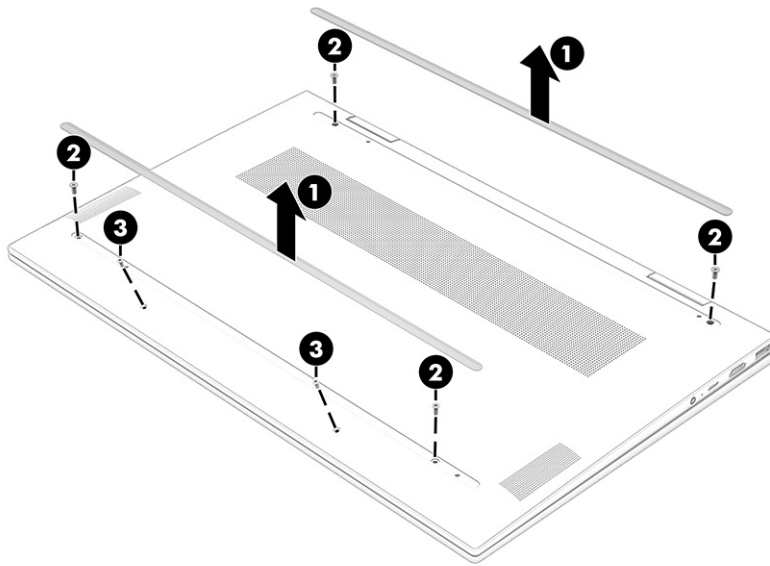
Table 5-1 Bottom cover description and part numbers

Description	Spare part number
For use only on computer models equipped a graphics subsystem with discrete memory	M47050-001
For use only on computer models equipped a graphics subsystem with UMA memory	M45456-001

Before removing the bottom cover, prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).

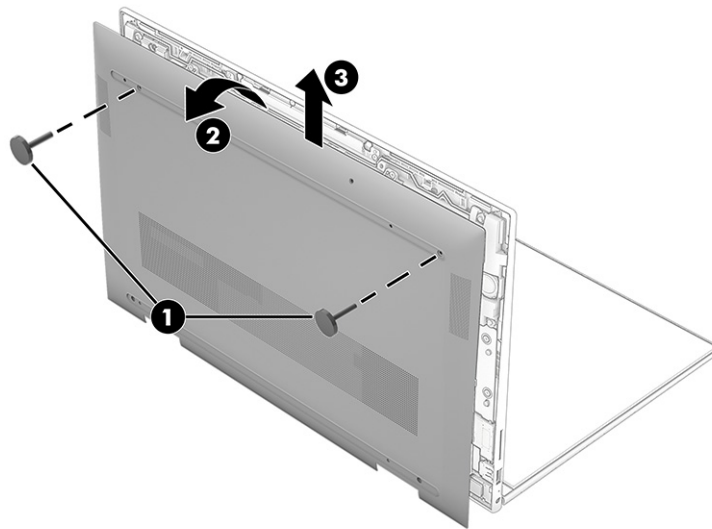
Remove the bottom cover:

1. Close the computer and turn it upside down with the front toward you.
2. Remove the front and rear rubber foot strips **(1)**.
The rubber foot strips are available in the Rubber Kit, spare part number M45467-001.
3. Remove the four Phillips M2.0 × 5.2 screws **(2)** that secure the bottom cover to the computer.
4. Remove the two Torx5 M2.0 × 4.3 screws **(3)** that secure the bottom cover to the computer.



5. Open the computer and rest it on its display back cover with the bottom toward you.
6. Insert a keyboard removal tool **(1)** into the bottom cover front screw holes and press until the bottom cover front edge **(2)** disengages from the base enclosure.

7. Remove the bottom cover (3).



Reverse this procedure to install the bottom cover.

Battery

To remove the touchpad cable, use this procedure and illustration.

Table 5-2 Battery description and part number

Description	Spare part number
Battery (3 cell, 51 Whr, 4.45 AHr, Li, includes cable)	L77034-005

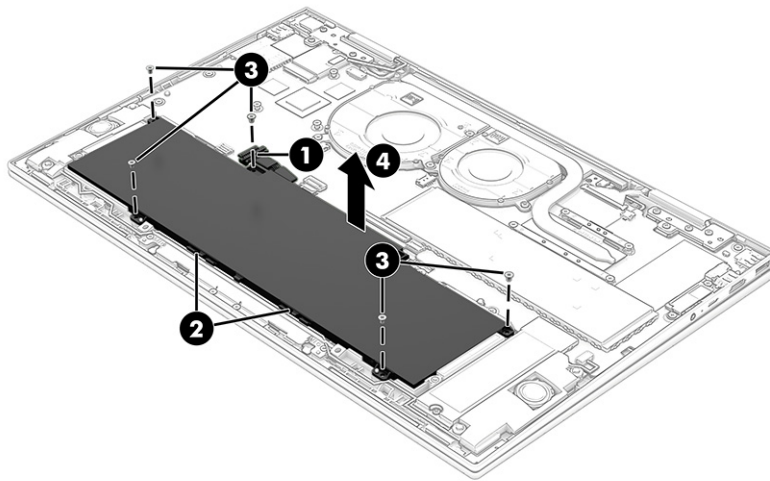
Before removing the battery, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).

Remove the battery:

1. Disconnect the battery cable (1) from the system board.
2. Release the speaker cable from the retention clips (2) built into the front edge of the battery.
3. Remove the five Phillips M2.0 × 3.2 screws (2) that secure the battery to the computer.

4. Remove the battery (4).



Reverse this procedure to install the battery.

Speakers

To remove the speakers, use this procedure and illustration.

Table 5-3 Speaker description and part number

Description	Spare part number
Speakers (include left and right speakers and cables and four rubber isolators)	M45468-001

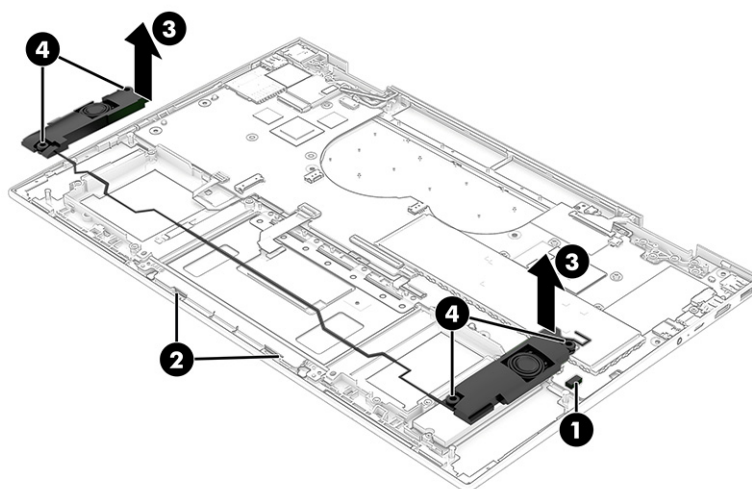
Before removing the speakers, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 31](#)).

Remove the speakers:

1. Disconnect the speaker cable (1) from the system board.
2. Release the speaker cable from the retention clips (2) built into the front edge of the top cover/ keyboard.
3. Remove the speakers (3).

When removing the speakers, make note of the location of the four rubber isolator locations (4). The absence of or damage to these isolators can result in degraded speaker performance.



Reverse this procedure to install the speakers.

Solid-state drive

To remove the solid-state drive, use this procedure and illustration.

Table 5-4 Solid-state drive description and part numbers

Description	Spare part number
M.2 2280, PCIe-NVMe:	
1 TB value solid-state drive	L85370-005
512 GB value solid-state drive	L85364-005
256 GB value solid-state drive	L85354-005
512 GB, M.2 2280, PCIe + 32 GB, 3D Xpoint solid-state drive	L85366-005

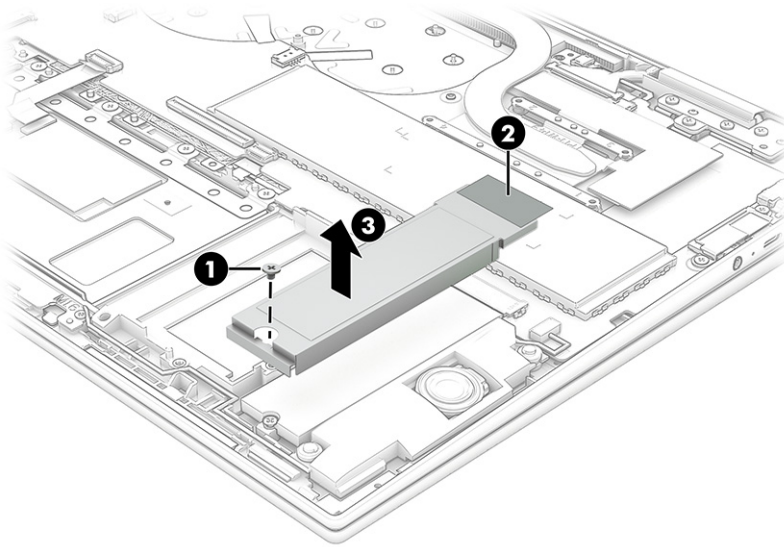
Before removing the solid-state drive, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 31](#)).

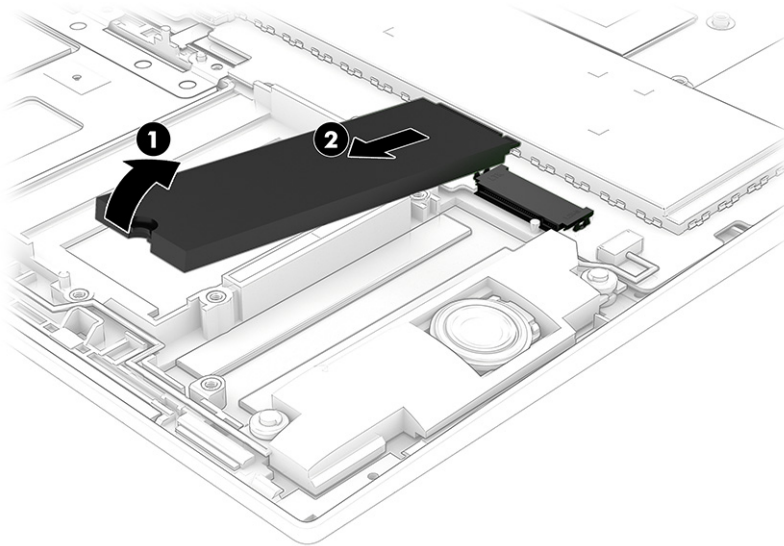
Remove the solid-state drive:

1. Remove the Phillips M2.0 × 2.9 screw (1) that secures the solid-state drive shield to the computer.
2. Detach the grounding tape (2) that secures the solid-state drive shield to the memory module shield.
3. Remove the solid-state drive shield (3).

The solid-state drive shield is not available as a spare part component.

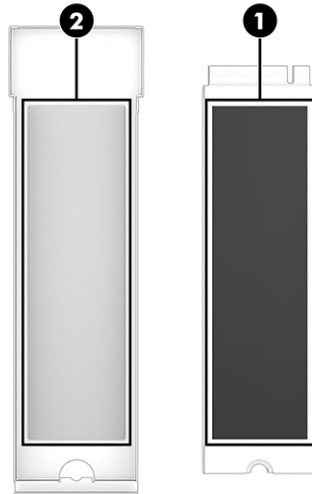


4. Lift the front edge of the solid-state drive (1) until it rests at an angle.
5. Remove the solid-state drive (2) by sliding it away from the slot at an angle.



6. Inspect, and if necessary, thoroughly clean the thermal pad from the surfaces of the solid-state drive and the shield each time you remove the solid-state drive shield. Replacement thermal material is included with the solid-state drive spare part kit. The following illustration shows the replacement thermal pad locations.

A thermal pad is used on the solid-state drive (1) and on the solid-state drive shield (2). Replacement thermal pads are also available in the Solid-State Drive Thermal Pad Kit, spare part number M46333-001.



Reverse this procedure to install the solid-state drive.

Memory module

To remove the memory module, use this procedure and illustrations.

Table 5-5 Memory module descriptions and part numbers

Description	Spare part number
8 GB, 3200 MHz, 1.2 V DDR4	L46598-005
4 GB, 3200 MHz, 1.2 V DDR4	L83673-005

Before removing the memory module, follow these steps:

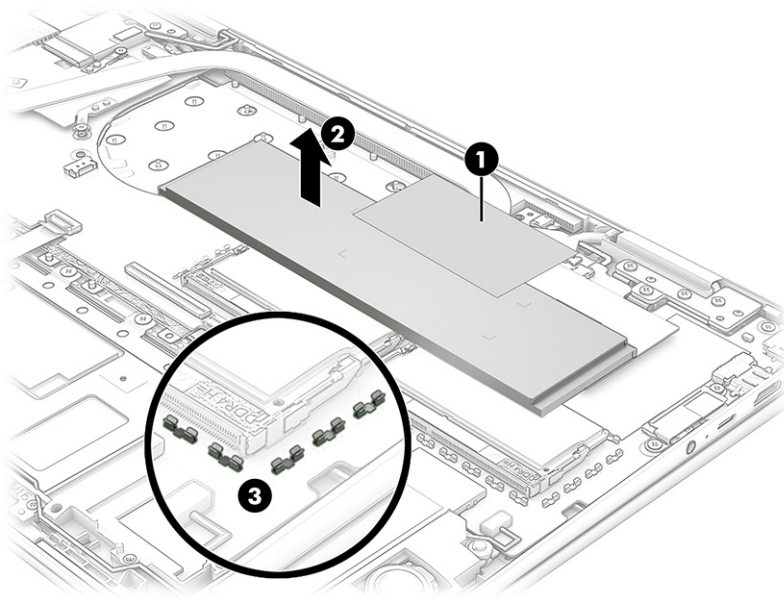
1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 31](#)).

Remove the memory module:

1. Detach the grounding tape **(1)** that secures the memory module shield to the heat sink.
2. Remove the memory module shield **(2)**.

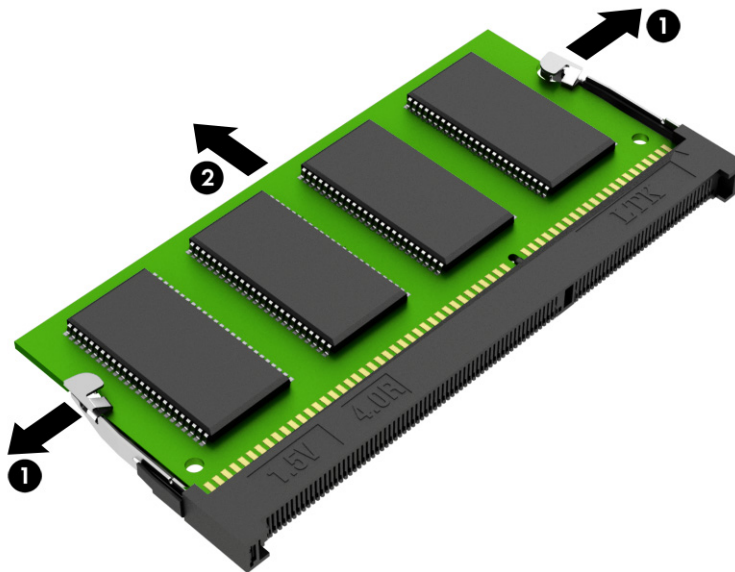
 **NOTE:** When installing the memory module shield, be sure that the edges of the shield fit securely into the clips **(3)** built onto the system board.

The memory module shield is not available as a spare part component.



3. Spread the two retention clips outward (1) until the memory module tilts up at a 45° angle, and then remove the module (2). Use the same procedure to remove all memory modules.

 **IMPORTANT:** To prevent damage to the memory module, hold the memory module by the edges only. Do not touch the components on the memory module.



To protect a memory module after removal, place it in an electrostatic-safe container.

Reverse this procedure to install the memory module.

WLAN module

To remove the WLAN module, use this procedure and illustration.

Table 5-6 WLAN module descriptions and part numbers

Description	Spare part number
Intel Wi-Fi 6 AX201 ax 2×2 + Bluetooth 5.0 MU-MIMO M.22230 non-vPro 160MHz MIPI+BRI WW WLAN module with 2 antennas	L92724-005

 **IMPORTANT:** To prevent an unresponsive system, replace the wireless module only with a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you replace the module and then receive a warning message, remove the module to restore device functionality, and then contact technical support.

Before removing the WLAN module, follow these steps:

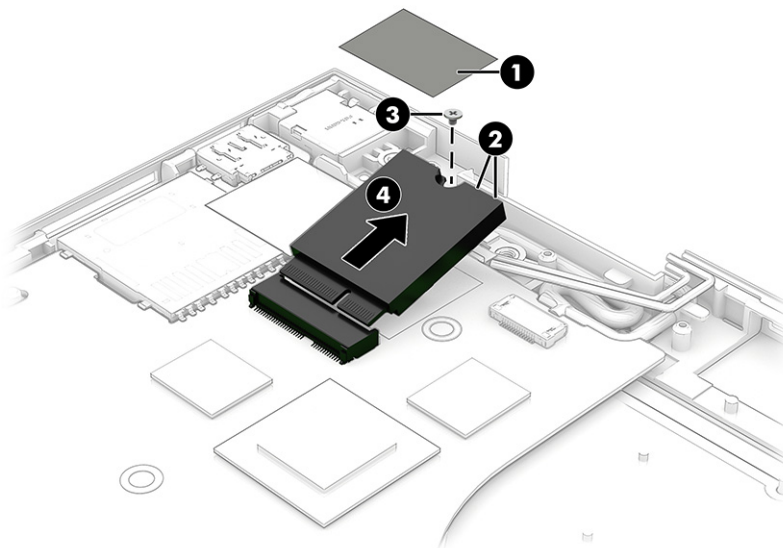
1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 31](#)).

Remove the WLAN module:

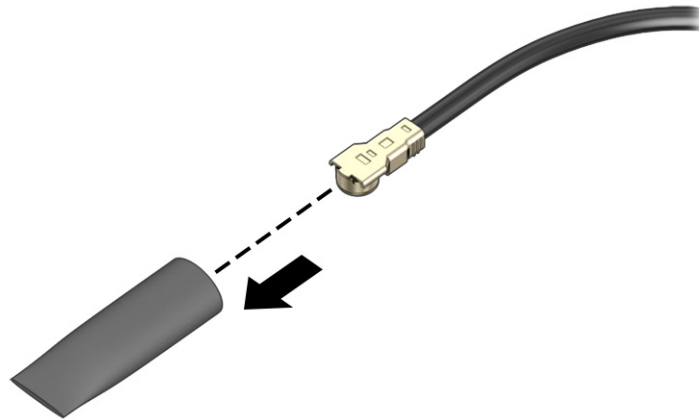
1. Remove the shield (1) that secures the wireless antenna cables to the WLAN module.
2. Carefully disconnect the wireless antenna cables (2) from the WLAN module.

 **NOTE:** Computer models have either one or two WLAN antennas. On models with two antennas, the #1 white WLAN antenna cable connects to the WLAN module #1 Main terminal. The #2 black WLAN antenna cable connects to the WLAN module #1 Aux terminal.

3. Remove the Phillips M2.0 × 2.3 (3) that secures the WLAN module to the system board.
4. Remove the WLAN module (4) by sliding it away from the slot at an angle.



5. If the WLAN antenna is not connected to the terminal on the WLAN module, install a protective sleeve on the antenna connector, as shown in the following illustration.



Reverse this procedure to install the WLAN module.

Infrared sensor board cable

To remove the infrared sensor board cable, use this procedure and illustration.

 **NOTE:** The infrared sensor board cable is available using spare part number M45459-001.

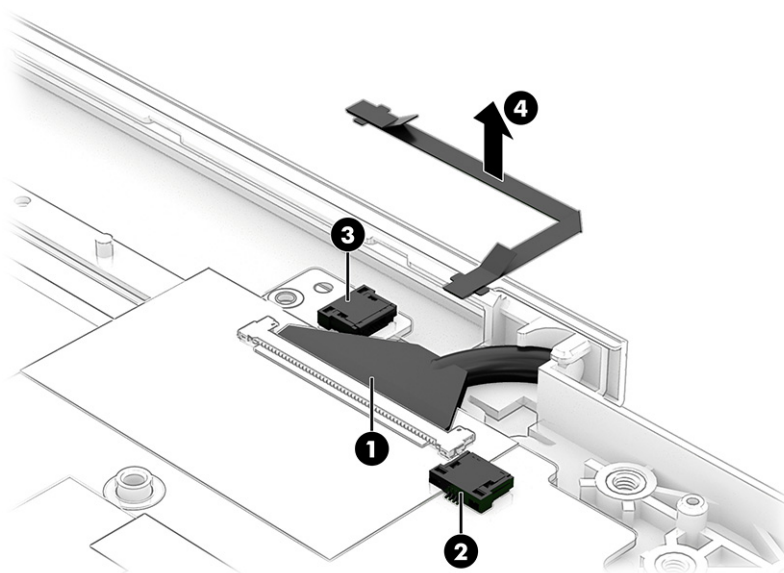
Before removing the infrared sensor board cable, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 31](#)).

Remove the infrared sensor board cable:

1. Disconnect the display panel cable **(1)** from the system board.
2. Release the zero insertion force (ZIF) connector **(2)** to which the infrared sensor board cable is connected, and then disconnect the infrared sensor board cable from the system board.
3. Release the ZIF connector **(3)** to which the infrared sensor board cable is connected, and then disconnect the infrared sensor board cable from the infrared sensor board.

4. Remove the infrared sensor board cable (4).



Reverse this procedure to install the infrared sensor board cable.

Infrared sensor board

To remove the infrared sensor board, use this procedure and illustration.

Table 5-7 Infrared sensor board description and part number

Description	Spare part number
Infrared sensor board	M45450-001

NOTE: The infrared sensor board spare part kit does not include the infrared sensor board cable. The infrared sensor board cable is available using spare part number M45459-001.

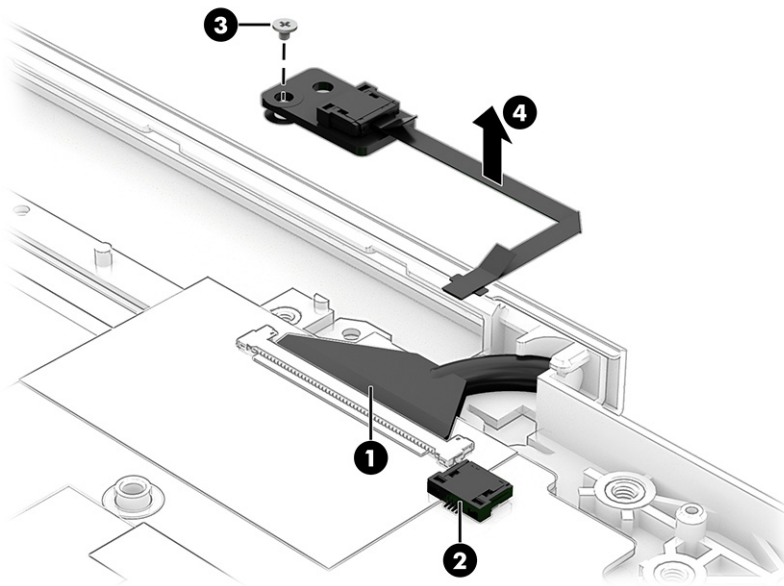
Before removing the infrared sensor board, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 31](#)).

Remove the infrared sensor board:

1. Disconnect the display panel cable (1) from the system board.
2. Release the ZIF connector (2) to which the infrared sensor board cable is connected, and then disconnect the infrared sensor board cable from the system board.
3. Remove the Phillips M2.0 × 3.2 screw (3) that secures the infrared sensor board to the computer.

4. Remove the infrared sensor board (4) and cable.



Reverse this procedure to install the infrared sensor board.

Processor fan

To remove the processor fan, use these procedures and illustrations.

Table 5-8 Fan description and part number

Description	Spare part number
Fan (includes cable)	M45465-001

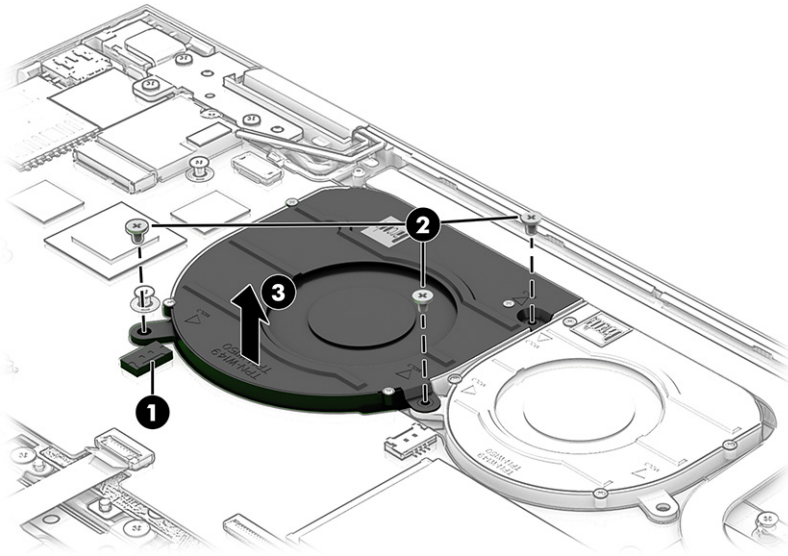
Before removing the processor fan, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 31](#)).

Remove the processor fan:

1. Disconnect the processor fan cable (1) from the system board.
2. Remove the three Phillips M2.0 × 3.7 screws (2) that secure the processor fan to the computer.

3. Remove the processor fan (3).



Reverse this procedure to install the processor fan.

Graphics fan

To remove the graphics fan, use these procedures and illustrations.

Table 5-9 Graphics fan description and part number

Description	Spare part number
Graphics fan (includes cable)	M45466-001

NOTE: The graphics fan is used only on computer models equipped with a graphics subsystem with discrete memory.

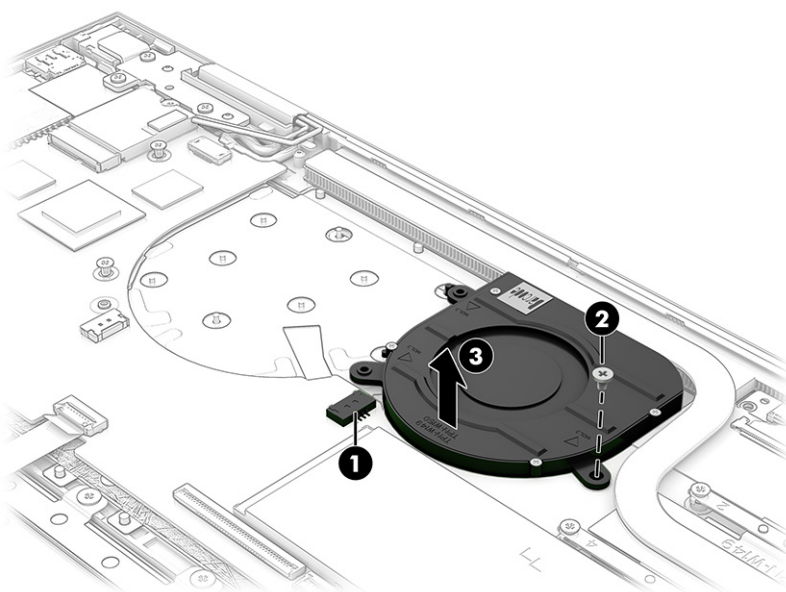
Before removing the graphics fan, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 31](#)).
4. Remove the processor fan (see [Processor fan on page 40](#)).

Remove the graphics fan:

1. Disconnect the graphics fan cable (1) from the system board.
2. Remove the Phillips M2.0 × 3.7 screw (2) that secures the graphics fan to the computer.

3. Remove the graphics fan (3).



Reverse this procedure to install the graphics fan.

Heat sink

To remove the heat sink, use these procedures and illustrations.

Table 5-10 Heat sink descriptions and part numbers

Description	Spare part number
The heat sink spare part kit includes replacement thermal material.	
For use only on computer models equipped a graphics subsystem with discrete memory	M45464-001
For use only on computer models equipped a graphics subsystem with UMA memory	M45463-001

Before removing the heat sink, follow these steps:

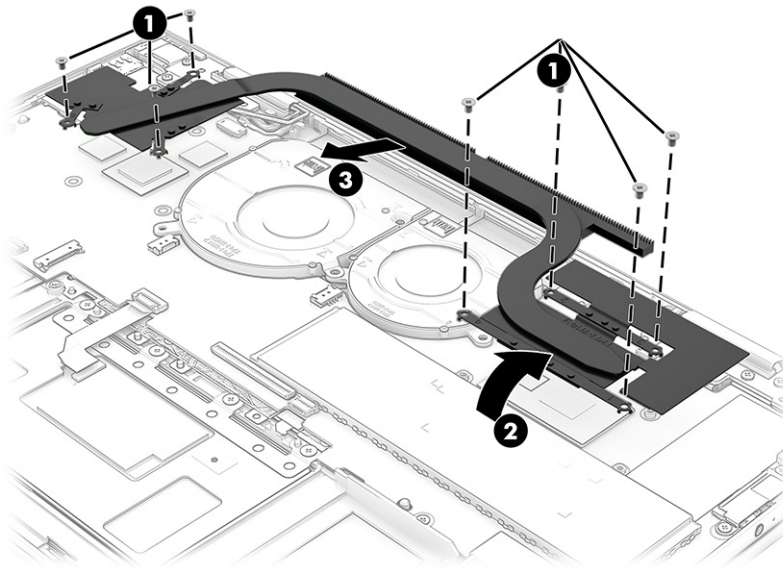
1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 31](#)).

Remove the heat sink:

1. In the order indicated on the heat sink, remove the seven Phillips M2.0 × 3.2 screws (1) that secure the heat sink to the system board.

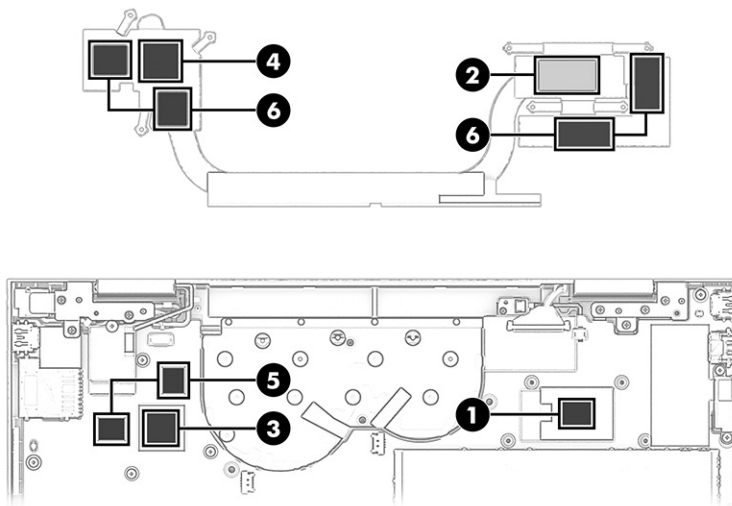
The number of screws securing the heat sink to the computer varies. Computer models equipped with a graphics subsystem with discrete memory have seven screws. Computer models equipped with a graphics subsystem with UMA memory have four screws.
2. In the order indicated on the heat sink, remove the four Phillips M2.0 × 3.2 screws (1) that secure the heat sink to the system board.

3. Swing the front edge of the heat sink **(2)** up until it rests at an angle.
4. Slide the heat sink **(3)** up and forward at an angle and remove it.

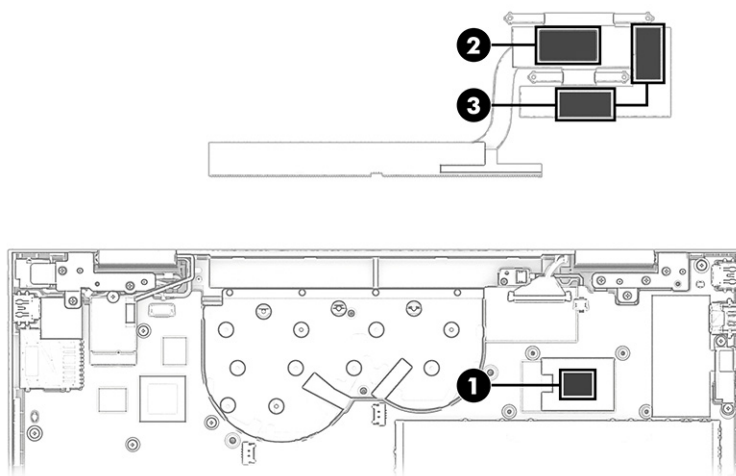


NOTE: Inspect, and if necessary, thoroughly clean the thermal material from the surfaces of the heat sink and the system board components each time you remove the heat sink. Replacement thermal material is included with the heat sink and system board spare part kits. Replacement thermal material is also available in the Thermal Material Kit, spare part number M45484-001.

The following illustration shows the replacement thermal material locations for a computer model equipped with a graphics subsystem with discrete memory. Thermal paste is used on the processor **(1)** and the heat sink area **(2)** that services it. Thermal pads are used on the other system board components **(3)** and **(5)** and the heat sink areas **(4)** and **(6)** that service them.



The following illustration shows the replacement thermal material locations for a computer model equipped with a graphics subsystem with UMA memory. Thermal paste is used on the processor **(1)** and the heat sink area **(2)** that services it.



Reverse this procedure to install the heat sink.

System board

To remove the system board, use these procedures and illustrations.

Table 5-11 System board descriptions and part numbers

Description	Spare part number
System board (includes replacement thermal material and the Windows 10 operating system):	
Equipped with an Intel i7-1165G7 processor, an MX450 graphics subsystem with 2 GB of discrete memory, for use only on computer models equipped with an OLED display assembly	M45471-601
Equipped with an Intel i7-1165G7 processor, an MX450 graphics subsystem with 2 GB of discrete memory, for use only on computer models equipped with a non-OLED display assembly	M45470-601
Equipped with an Intel i7-1165G7 processor and a graphics subsystem with UMA memory	M45472-601
Equipped with an Intel i5-1135G7 processor and a graphics subsystem with UMA memory	M45473-601

Before removing the system board, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 31](#)).
4. Remove the solid-state drive (see [Solid-state drive on page 33](#)).
5. Remove the processor fan (see [Processor fan on page 40](#)).
6. Remove the graphics fan (see [Graphics fan on page 41](#)).
7. Remove the heat sink (see [Heat sink on page 42](#)).

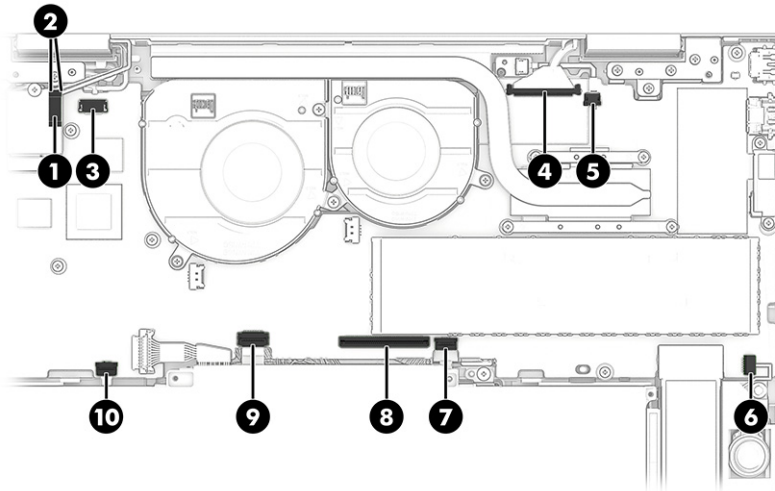
When replacing the system board, be sure to remove the memory modules (see [Memory module on page 35](#)) from the defective system board and install them on the replacement system board.

Remove the system board:

1. Remove the shield (1) that secures the wireless antenna cables to the WLAN module.
2. Carefully disconnect the wireless antenna cables (2) from the WLAN module.

 **NOTE:** Computer models have either one or two WLAN antennas. On models with two antennas, the #1 white WLAN antenna cable connects to the WLAN module #1 Main terminal. The #2 black WLAN antenna cable connects to the WLAN module #1 Aux terminal.

3. Release the ZIF connector (3) to which the webcam/microphone module cable is connected, and then disconnect the webcam/microphone module cable from the system board.
4. Disconnect the display panel cable (4) from the system board.
5. Release the ZIF connector (5) to which the sensor board cable is connected, and then disconnect the sensor board cable from the system board.
6. Disconnect the speaker cable (6) from the system board.
7. Release the ZIF connector (7) to which the backlight cable is connected, and then disconnect the backlight cable from the system board.
8. Release the ZIF connector (8) to which the keyboard cable is connected, and then disconnect the keyboard cable from the system board.
9. Release the ZIF connector (9) to which the touchpad cable is connected, and then disconnect the touchpad cable from the system board.
10. Release the ZIF connector (10) to which the fingerprint reader board cable is connected, and then disconnect the fingerprint reader board cable from the system board.

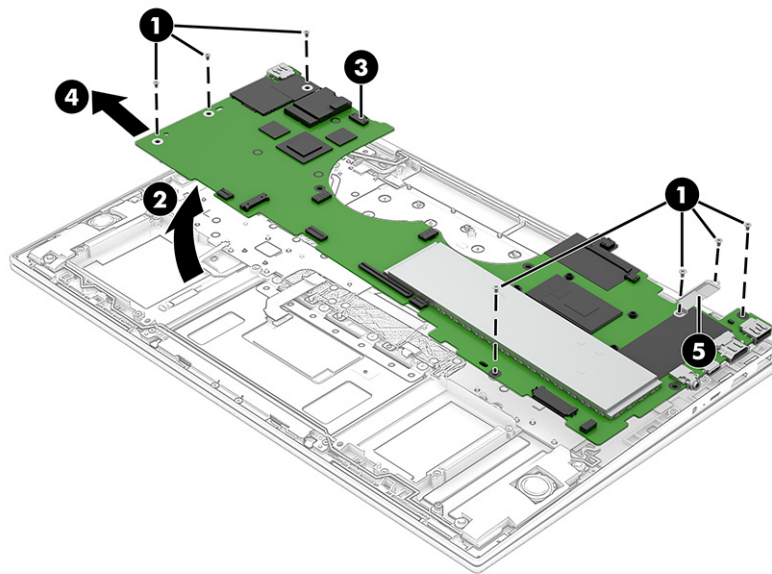


11. Remove the seven Phillips M2.0 × 3.2 screws (1) that secure the system board to the computer.
12. Lift the left side of the system board (2) as far as the power connector cable allows.
13. Disconnect the power connector cable (3) from the system board.

14. Remove the system board (4) by sliding it up and to the left at an angle.



NOTE: When removing the system board, make note of the location of the I/O bracket (5). The I/O bracket is not available as a spare part component.



Reverse this procedure to install the system board.

39.6 cm (15.6 in) display assembly

To remove and disassemble the display assembly, use these procedures and illustrations.

Full hinge-up displays are not available as spare parts. Spare parts for displays are available only at the subcomponent level.



NOTE: After replacing the display panel assembly, it is necessary to update the firmware. Refer to Service Advisory c06220255 for details on downloading and installing the Touch Panel Firmware.



NOTE: After replacing the display panel assembly, it is necessary to reload the calibration data. Refer to Service Advisory c06640672 for details on reloading the HP Display Control Panel Color Calibration Data Reload Process.

Before removing the display panel, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 31](#)).

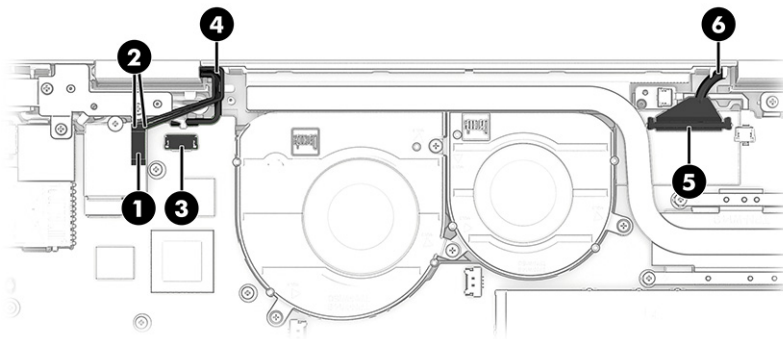
Remove the display assembly:

1. Remove the shield (1) that secures the wireless antenna cables to the WLAN module.

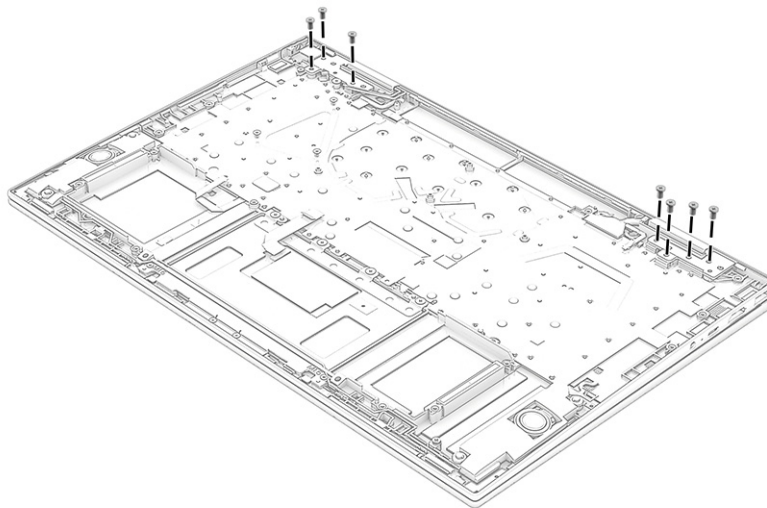
2. Carefully disconnect the wireless antenna cables (2) from the WLAN module.

 **NOTE:** Computer models have either one or two WLAN antennas. On models with two antennas, the #1 white WLAN antenna cable connects to the WLAN module #1 Main terminal. The #2 black WLAN antenna cable connects to the WLAN module #1 Aux terminal.

3. Release the ZIF connector (3) to which the webcam/microphone module cable is connected, and then disconnect the webcam/microphone module cable from the system board.
4. Release the wireless antenna cables and the webcam/microphone module cable from the retention clip (4) built into the top cover/keyboard.
5. Disconnect the display panel cable (5) from the system board.
6. Release the display panel cable from the retention clip (6) built into the top cover/keyboard.

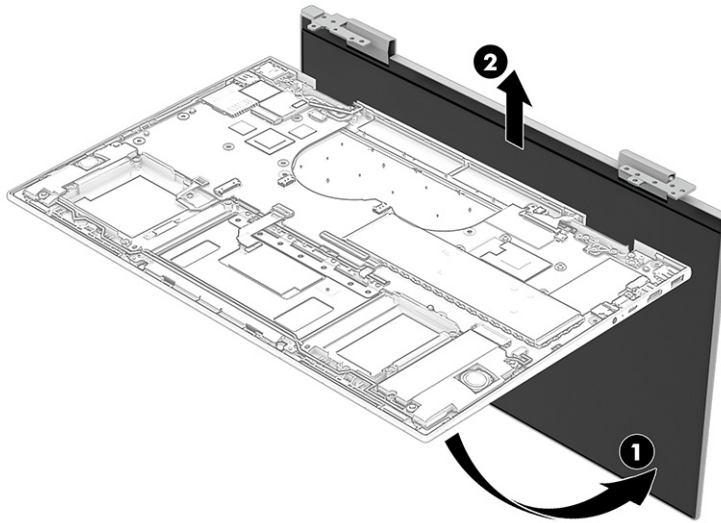


7. Remove the seven Phillips M2.5 × 4.9 screws that secure the display assembly to the top cover/keyboard.



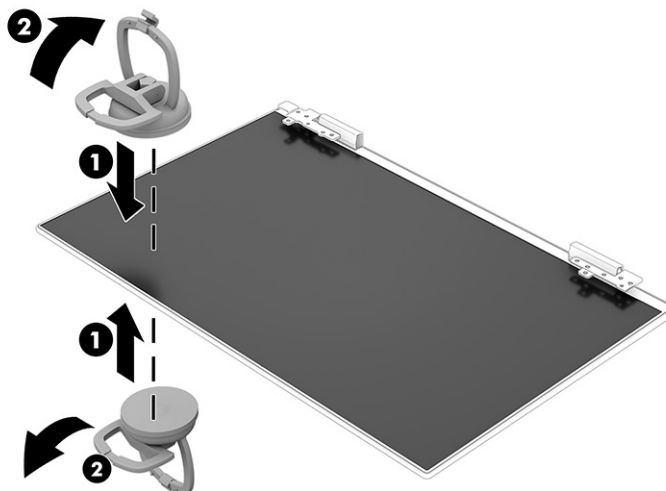
8. Swing the top edge of the display assembly (1) away from the top cover/keyboard.

9. Separate the display assembly (2) from the top cover/keyboard.



10. If it is necessary to replace the display panel assembly or any of the internal display components, follow these steps:

- a. Position the display assembly with the panel facing up.
- b. Disengage the hooks built into the top edge of the display back cover from the display assembly.
- c. Attach two suction cups (1) to the display assembly as shown in the following illustration.
- d. Secure the suction cups to the display assembly by swinging the handles (2) into position.

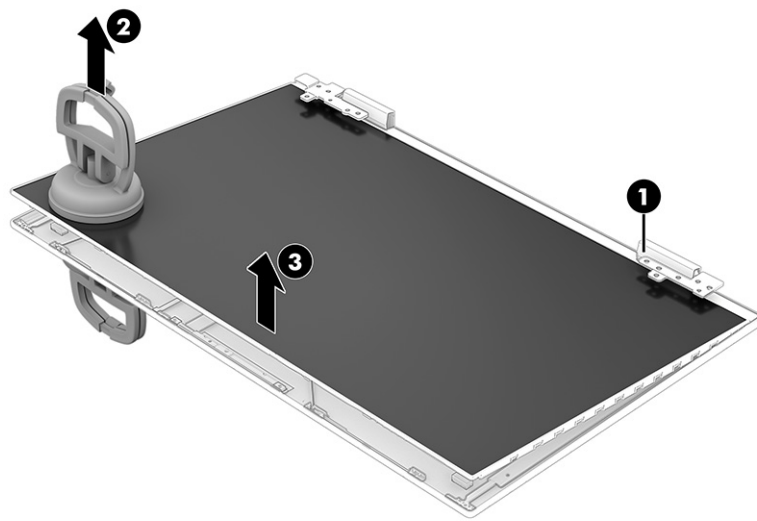


- e. Release the display panel cable from the display left hinge area (1).

- f. Use the suction cups **(2)** to release the top edge of the display panel assembly from the display back cover.
- g. Remove the display panel assembly **(3)**.

The display panel assembly is available using the following spare part numbers:

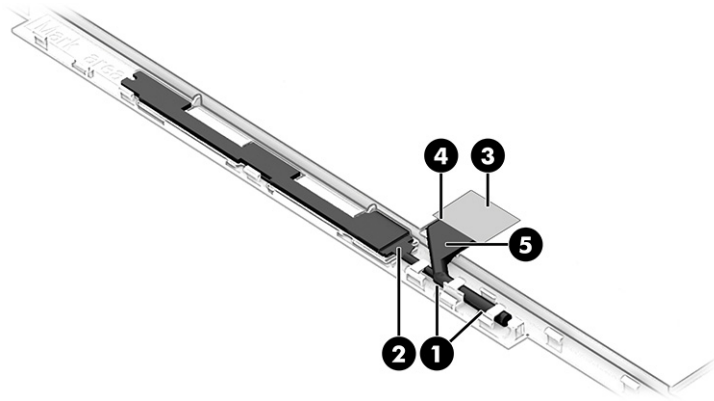
- M45454-001: 39.6 cm (15.6 in), UHD (3840 × 2160), BrightView, OLED, UWVA, touchscreen display panel assembly
- M45453-001: 39.6 cm (15.6 in), LCD, FHD (1920 × 1080), antiglare, WLED, UWVA, low power touchscreen display panel assembly
- M45452-001: 39.6 cm (15.6 in), LCD, FHD (1920 × 1080), antiglare, WLED, UWVA, touchscreen display panel assembly



11. If it is necessary to replace the display panel cable, follow these steps:

- a. Remove the display panel assembly.
- b. Release the display panel cable from the retention clips **(1)** built into the bottom edge of the display back cover.
- c. Disconnect the display panel cable **(2)** from the touch control board.
- d. Detach the grounding tape **(3)** that secures the display panel cable to the display panel assembly.
- e. Release the retention bar **(4)** that secures the display panel cable to the display panel assembly.
- f. Disconnect the display panel cable **(5)** from the display panel assembly.

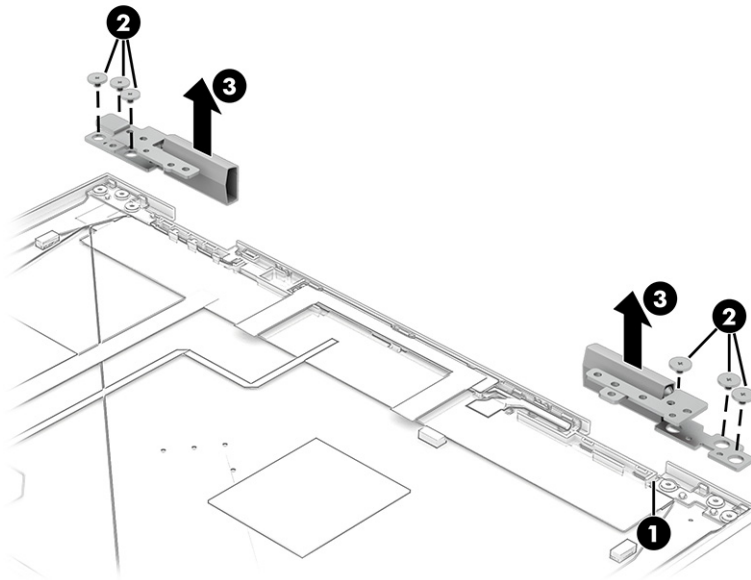
The display panel cable is available using spare part number M45460-001.



12. If it is necessary to replace the display hinges, follow these steps:

- a. Remove the display panel assembly.
- b. Release the display panel cable from the display left hinge area (1).
- c. Remove the six Phillips M2.5 × 3.6 broad head screws (2) that secure the hinges to the display back cover.
- d. Remove the hinges (3).

The hinges are available using spare part number M45449-001.

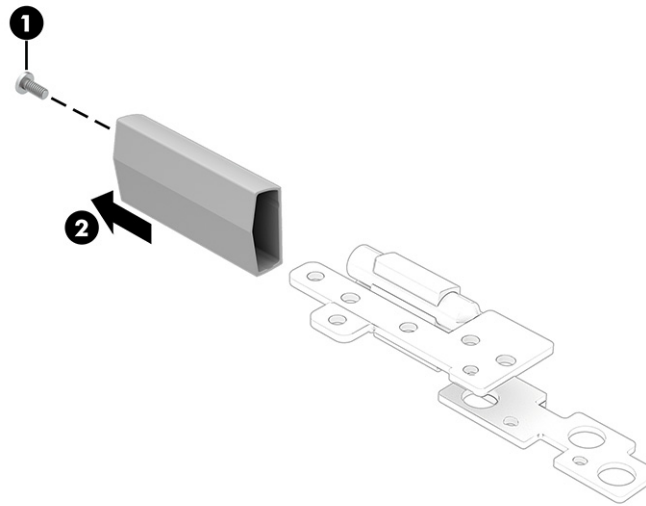


13. If it is necessary to replace the display hinge covers, follow these steps:

- a. Remove the display panel assembly.
- b. Remove the display hinges.
- c. Remove the Phillips M2.0 × 3.2 screw (1) that secures the hinge cover to the hinge.

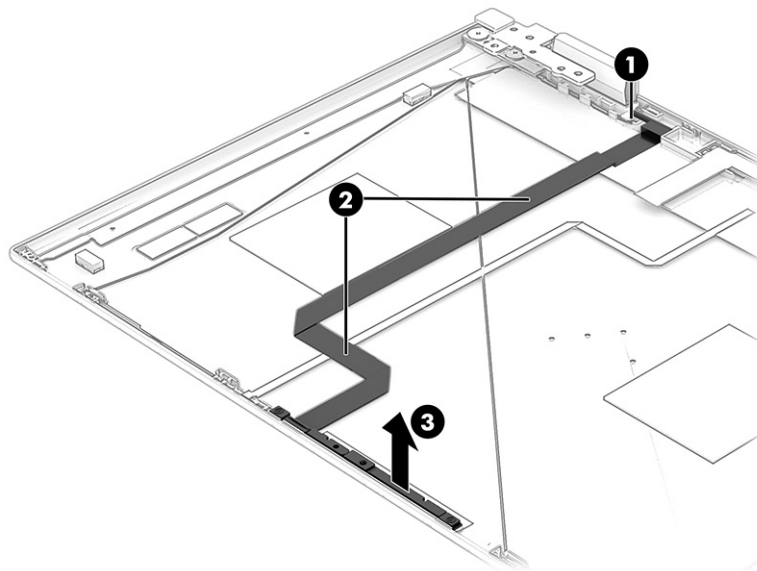
- d. Remove the hinge cover (2).

The hinge covers are available using spare part number M45448-001.



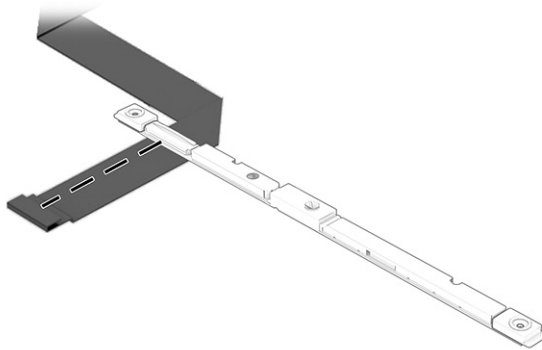
- 14. If it is necessary to replace the webcam/microphone module, follow these steps:

- a. Remove the display panel assembly.
- b. Release the webcam/microphone module cable from the retention clip (1) and routing channel built into the bottom edge of the display back cover.
- c. Detach the webcam/microphone module cable (2) from the display back cover. (The webcam/microphone module cable is attached to the display back cover with double-sided adhesive.)
- d. Detach the webcam/microphone module (3) from the display back cover. (The webcam/microphone module is attached to the display back cover with double-sided adhesive.)



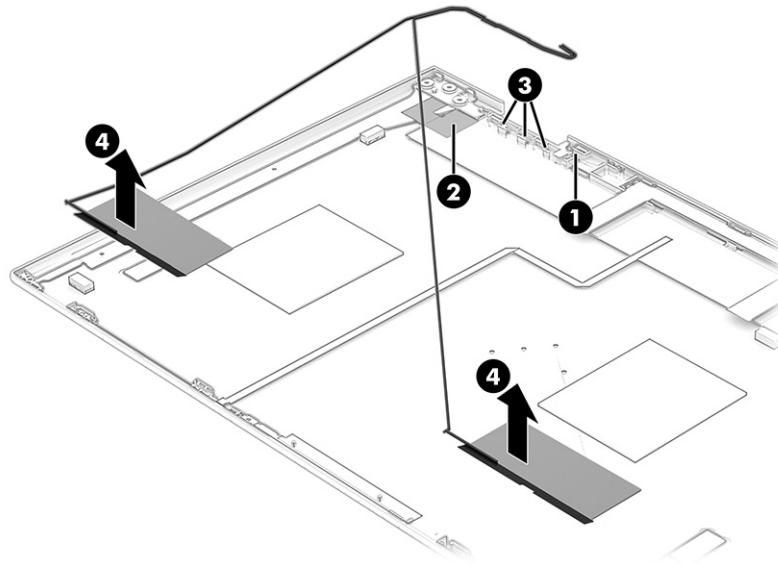
- e. If it is necessary to replace the webcam/microphone module cable, release the ZIF connector to which the webcam/microphone module cable is connected, and then disconnect the webcam/microphone module cable from the webcam/microphone module.

The webcam/microphone module is available using spare part number M45455-001. The webcam/microphone module cable is available using spare part number M45457-001.



- 15. If it is necessary to replace the wireless antenna, follow these steps:
 - a. Remove the display panel assembly.
 - b. Remove the display right hinge.
 - c. Remove the webcam/microphone module and cable.
 - d. Release the wireless antenna cable from the retention clip **(1)** built into the bottom edge of the display back cover.
 - e. Detach the grounding foil **(2)** that secures the wireless antenna cable to the display back cover.
 - f. Release the wireless antenna cable from the routing channel **(3)** built into the bottom edge of the display back cover.

- g. Detach the wireless antenna transceivers (4) from the display back cover. (The wireless antenna transceivers are attached to the display back cover with double-sided adhesive.)



- h. Remove the wireless antennas.

The wireless antennas are available using spare part number M45446-001.

Reverse this procedure to reassemble and replace the display assembly.

Power connector cable

To remove the power connector cable, use these procedures and illustrations.

Table 5-12 Power connector cable description and part number

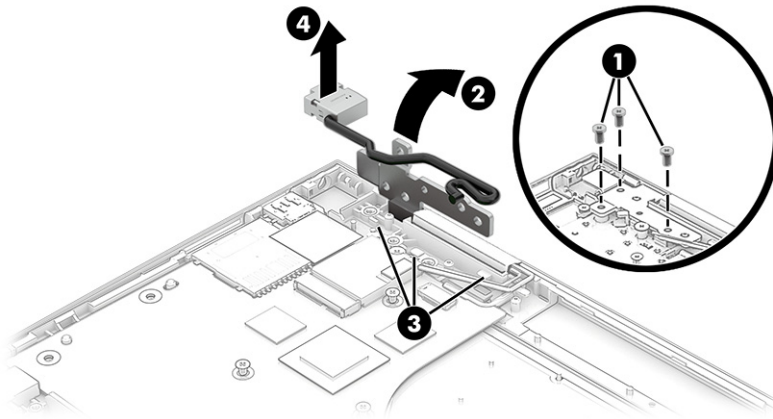
Description	Spare part number
Power connector cable	M45461-001

Before removing the power connector cable, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 31](#)).
4. Remove the solid-state drive (see [Solid-state drive on page 33](#)).
5. Remove the processor fan (see [Processor fan on page 40](#)).
6. Remove the graphics fan (see [Graphics fan on page 41](#)).
7. Remove the heat sink (see [Heat sink on page 42](#)).
8. Remove the system board (see [System board on page 44](#)).

Remove the power connector cable:

1. Remove the three Phillips M2.5 × 4.9 screws (1) that secure the display right hinge to the computer.
2. Swing the display right hinge (2) up and away from the computer.
3. Release the power connector cable from the retention clips (3) and routing channel built into the top cover/keyboard.
4. Remove the power connector cable (4).



Reverse this procedure to install the power connector cable.

Touchpad cable

To remove the touchpad cable, use this procedure and illustration.



NOTE: The touchpad cable is available using spare part number M45458-001.

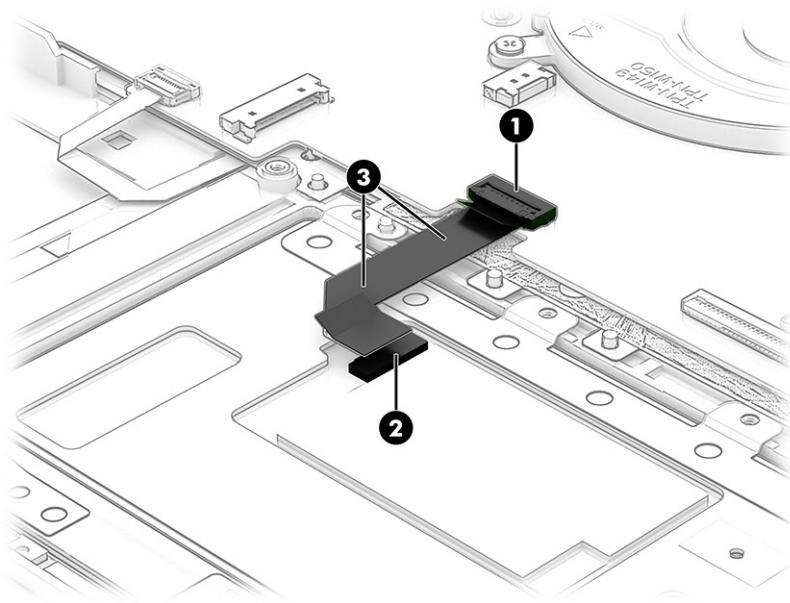
Before removing the touchpad cable, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Remove the battery (see [Battery on page 31](#)).

Remove the touchpad cable:

1. Release the ZIF connector (1) to which the touchpad cable is connected, and then disconnect the touchpad cable from the system board.
2. Release the ZIF connector (2) to which the touchpad cable is connected, and then disconnect the touchpad cable from the touchpad.

3. Detach the touchpad cable (3) from the top cover/keyboard. (The touchpad cable is attached to the top cover/keyboard with double-sided adhesive.)



4. Remove the touchpad cable (4).

Reverse this procedure to install the touchpad cable

Touchpad

To remove the touchpad, use this procedure and illustration.

Table 5-13 Touchpad description and part numbers

Description	Spare part number
Touchpad	M45451-001

NOTE: The touchpad spare part kit does not include the touchpad bracket or touchpad cable. The touchpad bracket is not available as a spare part component. The touchpad cable is available using spare part number M45458-001.

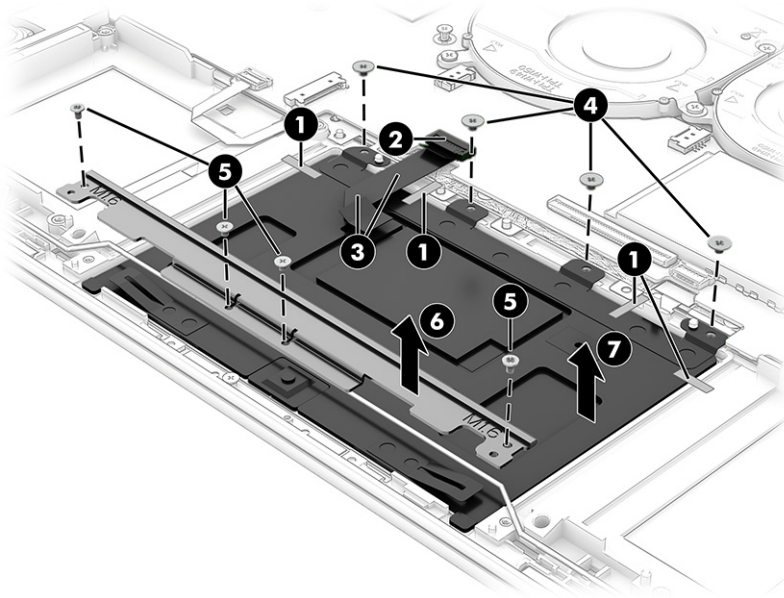
Before removing the touchpad, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 29](#)).
2. Remove the bottom cover (see [Bottom cover on page 29](#)).
3. Remove the battery (see [Battery on page 31](#)).

Remove the touchpad:

1. Position the top cover/keyboard upside down with the front toward you.
2. Detach the strips of grounding tape (1) that secure the touchpad to the computer.
3. Release the ZIF connector (2) to which the touchpad cable is connected, and then disconnect the touchpad cable from the system board.

4. Detach the touchpad cable (3) from the top cover/keyboard. (The touchpad cable is attached to the top cover/keyboard with double-sided adhesive.)
 5. Remove the four Phillips M2.0 × 2.2 broad head screws (4) that secure the touchpad to the computer.
 6. Remove the four Phillips M1.6 × 2.8 screws (5) that secure the touchpad bracket and touchpad to the computer.
 7. Remove the touchpad bracket (6).
- The touchpad bracket is not available as a spare part component.
8. Remove the touchpad (7).



Reverse this procedure to install the touchpad.

6 Using Setup Utility (BIOS)

Setup Utility, or Basic Input/Output System (BIOS), controls communication between all the input and output devices on the system (such as disk drives, display, keyboard, mouse, and printer). Setup Utility (BIOS) includes settings for the types of devices installed, the startup sequence of the computer, and the amount of system and extended memory.



NOTE: To start Setup Utility on convertible computers, your computer must be in notebook mode and you must use the keyboard attached to your notebook.

Starting Setup Utility (BIOS)

You have several ways to access the Setup Utility (BIOS).



IMPORTANT: Use extreme care when making changes in Setup Utility (BIOS). Errors can prevent the computer from operating properly.

- Turn on or restart the computer and quickly press **f10**.

– or –

Turn on or restart the computer, quickly press **esc**, and then press **f10** when the Start menu is displayed.

Updating Setup Utility (BIOS)

Updated versions of Setup Utility (BIOS) might be available on the HP website. Most BIOS updates on the HP website are packaged in compressed files called *SoftPaqs*. Some download packages contain a file named *Readme.txt*, which contains information regarding installing and troubleshooting the file.

Determining the BIOS version

To decide whether you need to update Setup Utility (BIOS), first determine the BIOS version on your computer.

To reveal the BIOS version information (also known as *ROM date* and *System BIOS*), use one of these options.

- HP Support Assistant

1. Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.

– or –

Select the question mark icon in the taskbar.

2. Select **My notebook**, and then select **Specifications**.

- Setup Utility (BIOS)

1. Start Setup Utility (BIOS) (see [Starting Setup Utility \(BIOS\) on page 57](#)).

2. Select **Main**, and then make note of the BIOS version.
 3. Select **Exit**, select one of the options, and then follow the on-screen instructions.
- In Windows, press **ctrl+alt+s**.

To check for later BIOS versions, see [Preparing for a BIOS update on page 58](#).

Preparing for a BIOS update

Be sure to follow all prerequisites before downloading and installing a BIOS update.



IMPORTANT: To reduce the risk of damage to the computer or an unsuccessful installation, download and install a BIOS update only when the computer is connected to reliable external power using the AC adapter. Do not download or install a BIOS update while the computer is running on battery power, docked in an optional docking device, or connected to an optional power source. During the download and installation, follow these instructions:

- Do not disconnect power from the computer by unplugging the power cord from the AC outlet.
- Do not shut down the computer or initiate Sleep.
- Do not insert, remove, connect, or disconnect any device, cable, or cord.



NOTE: If your computer is connected to a network, consult the network administrator before installing any software updates, especially system BIOS updates.

Downloading a BIOS update

After you review the prerequisites, you can check for and download BIOS updates.

1. Type **support** in the taskbar search box, and then select the **HP Support Assistant** app.
– or –
Select the question mark icon in the taskbar.
2. Select **Updates**, and then select **Check for updates and messages**.
3. Follow the on-screen instructions.
4. At the download area, follow these steps:
 - a. Identify the most recent BIOS update and compare it to the BIOS version currently installed on your computer. If the update is more recent than your BIOS version, make a note of the date, name, or other identifier. You might need this information to locate the update later, after it has been downloaded to your hard drive.
 - b. Follow the on-screen instructions to download your selection to the hard drive.

Make a note of the path to the location on your hard drive where the BIOS update is downloaded. You will need to access this path when you are ready to install the update.

Installing a BIOS update

BIOS installation procedures vary. Follow any instructions that appear on the screen after the download is complete. If no instructions appear, follow these steps.

1. Type **file** in the taskbar search box, and then select **File Explorer**.
2. Select your hard drive designation. The hard drive designation is typically Local Disk (C:).

3. Using the hard drive path you recorded earlier, open the folder that contains the update.
4. Double-click the file that has an .exe extension (for example, *filename.exe*).
The BIOS installation begins.
5. Complete the installation by following the on-screen instructions.



NOTE: After a message on the screen reports a successful installation, you can delete the downloaded file from your hard drive.

7 Computer Setup (BIOS), TPM, and HP Sure Start

HP provides several tools to help set up and protect your computer.

Using Computer Setup

Computer Setup, or Basic Input/Output System (BIOS), controls communication between all the input and output devices on the system (such as hard drives, display, keyboard, mouse, and printer). Computer Setup includes settings for types of devices installed, the startup sequence of the computer, and amount of system and extended memory.



NOTE: Use extreme care when making changes in Computer Setup. Errors can prevent the computer from operating properly.

To start Computer Setup, turn on or restart the computer, and when the HP logo appears, press **f10** to enter Computer Setup.

Navigating and selecting in Computer Setup

You can navigate and select in Computer Setup using one or more methods.

- To select a menu or a menu item, use the **tab** key and the keyboard arrow keys and then press **enter**, or use a pointing device to select the item.
- To scroll up and down, select the up arrow or the down arrow in the upper-right corner of the screen, or use the up arrow key or the down arrow key on the keyboard.
- To close open dialog boxes and return to the main Computer Setup screen, press **esc**, and then follow the on-screen instructions.

To exit Computer Setup, choose one of the following methods:

- To exit Computer Setup menus without saving your changes, select **Main**, select **Ignore Changes and Exit**, and then select **Yes**.



NOTE: If you are using arrow keys to highlight your choice, you must then press **enter**.

- To save your changes and exit Computer Setup menus, select **Main**, select **Save Changes and Exit**, and then select **Yes**.



NOTE: If you are using arrow keys to highlight your choice, you must then press **enter**.

Your changes go into effect when the computer restarts.

Restoring factory settings in Computer Setup

To return all settings in Computer Setup to the values that were set at the factory, follow these steps.



NOTE: Restoring defaults will not change the hard drive mode.

1. Start Computer Setup. See [Using Computer Setup on page 60](#).
2. Select **Main**, select **Apply Factory Defaults and Exit**, and then select **Yes**.

 **NOTE:** If you are using arrow keys to highlight your choice, you must then press **enter**.

 **NOTE:** On select products, the selections might display **Restore Defaults** instead of **Apply Factory Defaults and Exit**.

Your changes go into effect when the computer restarts.

 **NOTE:** Your password settings and security settings are not changed when you restore the factory settings.

Updating the BIOS

Updated versions of the BIOS might be available on the HP website. Most BIOS updates on the HP website are packaged in compressed files called *SoftPaqs*.

Some download packages contain a file named Readme.txt, which contains information regarding installing and troubleshooting the file.

Determining the BIOS version

To decide whether you need to update Computer Setup (BIOS), first determine the BIOS version on your computer.

You can access BIOS version information (also known as *ROM date* and *System BIOS*) by pressing **fn+esc** (if you are already in Windows) or by using Computer Setup.

1. Start Computer Setup. See [Using Computer Setup on page 60](#).
2. Select **Main**, and then select **System Information**.
3. To exit Computer Setup menus without saving your changes, select **Main**, select **Ignore Changes and Exit**, and then select **Yes**.

 **NOTE:** If you are using arrow keys to highlight your choice, you must then press **enter**.

To check for later BIOS versions, see [Preparing for a BIOS update on page 61](#).

Preparing for a BIOS update

Be sure to follow all prerequisites before downloading and installing a BIOS update.

 **IMPORTANT:** To reduce the risk of damage to the computer or an unsuccessful installation, download and install a BIOS update only when the computer is connected to reliable external power using the AC adapter. Do not download or install a BIOS update while the computer is running on battery power, docked in an optional docking device, or connected to an optional power source. During the download and installation, follow these instructions:

Do not disconnect power on the computer by unplugging the power cord from the AC outlet.

Do not shut down the computer or initiate Sleep.

Do not insert, remove, connect, or disconnect any device, cable, or cord.

Downloading a BIOS update

After you review the prerequisites, you can check for and download BIOS updates.

1. Type `support` in the taskbar search box, and then select the HP Support Assistant app.
– or –
Select the question mark icon in the taskbar.
2. Select **Updates**, and then select **Check for updates and messages**.
3. Follow the on-screen instructions.
4. At the download area, follow these steps:
 - a. Identify the most recent BIOS update and compare it to the BIOS version currently installed on your computer. Make a note of the date, name, or other identifier. You might need this information to locate the update later, after it has been downloaded to your hard drive.
 - b. Follow the on-screen instructions to download your selection to the hard drive.

Make a note of the path to the location on your hard drive where the BIOS update is downloaded. You will need to access this path when you are ready to install the update.



NOTE: If you connect your computer to a network, consult the network administrator before installing any software updates, especially system BIOS updates.

Installing a BIOS update

BIOS installation procedures vary. Follow any instructions that are displayed on the screen after the download is complete. If no instructions are displayed, follow these steps.

1. Type `file` in the taskbar search box, and then select **File Explorer**.
2. Select your hard drive designation. The hard drive designation is typically Local Disk (C:).
3. Using the hard drive path you recorded earlier, open the folder that contains the update.
4. Double-click the file that has an .exe extension (for example, *filename.exe*).

The BIOS installation begins.
5. Complete the installation by following the on-screen instructions.



NOTE: After a message on the screen reports a successful installation, you can delete the downloaded file from your hard drive.

Changing the boot order using the f9 prompt

To dynamically choose a boot device for the current startup sequence, follow these steps.

1. Access the Boot Device Options menu:
 - Turn on or restart the computer, and when the HP logo appears, press **f9** to enter the Boot Device Options menu.
2. Select a boot device, press **enter**, and then follow the on-screen instructions.

TPM BIOS settings (select products only)

TPM provides additional security for your computer. You can modify the TPM settings in Computer Setup (BIOS).

 **IMPORTANT:** Before enabling Trusted Platform Module (TPM) functionality on this system, you must ensure that your intended use of TPM complies with relevant local laws, regulations and policies, and approvals or licenses must be obtained if applicable. For any compliance issues arising from your operation or usage of TPM that violates the previously mentioned requirement, you shall bear all the liabilities wholly and solely. HP will not be responsible for any related liabilities.

 **NOTE:** If you change the TPM setting to Hidden, TPM is not visible in the operating system.

To access TPM settings in Computer Setup:

1. Start Computer Setup. See [Using Computer Setup on page 60](#).
2. Select **Security**, select **TPM Embedded Security**, and then follow the on-screen instructions.

Using HP Sure Start (select products only)

Select computer models are configured with HP Sure Start, a technology that monitors the computer's BIOS for attacks or corruption. If the BIOS becomes corrupted or is attacked, HP Sure Start automatically restores the BIOS to its previously safe state, without user intervention.

HP Sure Start is configured and already enabled so that most users can use the HP Sure Start default configuration. Advanced users can customize the default configuration.

To access the latest documentation on HP Sure Start, go to <http://www.hp.com/support>. Select **Find your product**, and then follow the on-screen instructions.

8 Backing up, restoring, and recovering

You can use Windows tools or HP software to back up your information, create a restore point, reset your computer, create recovery media, or restore your computer to its factory state. Performing these standard procedures can return your computer to a working state faster.

 **IMPORTANT:** If you will be performing recovery procedures on a tablet, the tablet battery must be at least 70% charged before you start the recovery process.

 **IMPORTANT:** For a tablet with a detachable keyboard, connect the tablet to the keyboard base before beginning any recovery process.

Backing up information and creating recovery media

These methods of creating recovery media and backups are available on select products only.

Using Windows tools for backing up

HP recommends that you back up your information immediately after initial setup. You can do this task either using Windows Backup locally with an external USB drive or using online tools.

 **IMPORTANT:** Windows is the only option that allows you to back up your personal information. Schedule regular backups to avoid information loss.

 **NOTE:** If computer storage is 32 GB or less, Microsoft® System Restore is disabled by default.

Using the HP Cloud Recovery Download Tool to create recovery media (select products only)

You can use the HP Cloud Recovery Download Tool to create HP Recovery media on a bootable USB flash drive.

For details:

- Go to <http://www.hp.com/support>, search for HP Cloud Recovery, and then select the result that matches the type of computer that you have.

 **NOTE:** If you cannot create recovery media yourself, contact support to obtain recovery discs. Go to <http://www.hp.com/support>, select your country or region, and then follow the on-screen instructions.

 **IMPORTANT:** HP recommends that you follow the [Restoring and recovery methods on page 65](#) to restore your computer before you obtain and use the HP recovery discs. Using a recent backup can return your machine to a working state sooner than using the HP recovery discs. After the system is restored, reinstalling all the operating system software released since your initial purchase can be a lengthy process.

Restoring and recovering your system

You have several tools available to recover your system both within and outside of Windows if the desktop cannot load.

HP recommends that you attempt to restore your system using the [Restoring and recovery methods on page 65](#).

Creating a system restore

System Restore is available in Windows. The System Restore software can automatically or manually create restore points, or snapshots, of the system files and settings on the computer at a particular point.

When you use System Restore, it returns your computer to its state at the time you made the restore point. Your personal files and documents should not be affected.

Restoring and recovery methods

After you run the first method, test to see whether the issue still exists before you proceed to the next method, which might now be unnecessary.

1. Run a Microsoft System Restore.
2. Run Reset this PC.



NOTE: The options **Remove everything** and then **Fully clean the drive** can take several hours to complete and leave no information on your computer. It is the safest way to reset your computer before you recycle it.

3. Recover using HP Recovery media. For more information, see [Recovering using HP Recovery media on page 65](#).

For more information about the first two methods, see the Get Help app:

Select the **Start** button, select the **Get Help** app, and then enter the task you want to perform.



NOTE: You must be connected to the internet to access the Get Help app.

Recovering using HP Recovery media

You can use HP Recovery media to recover the original operating system and software programs that were installed at the factory. On select products, it can be created on a bootable USB flash drive using the HP Cloud Recovery Download Tool.

For details, see [Using the HP Cloud Recovery Download Tool to create recovery media \(select products only\) on page 64](#).



NOTE: If you cannot create recovery media yourself, contact support to obtain recovery discs. Go to <http://www.hp.com/support>, select your country or region, and then follow the on-screen instructions.

To recover your system:

- Insert the HP Recovery media, and then restart the computer.



NOTE: HP recommends that you follow the [Restoring and recovery methods on page 65](#) to restore your computer before you obtain and use the HP recovery discs. Using a recent backup can return your

machine to a working state sooner than using the HP recovery discs. After the system is restored, reinstalling all the operating system software released since your initial purchase can be a lengthy process.

Changing the computer boot order

If your computer does not restart using the HP Recovery media, you can change the computer boot order, the order of devices listed in BIOS for startup information. You can select an optical drive or a USB flash drive, depending on the location of your HP Recovery media.



IMPORTANT: For a tablet with a detachable keyboard, connect the tablet to the keyboard base before beginning these steps.

To change the boot order:

1. Insert the HP Recovery media.
2. Access the system **Startup** menu.
 - For computers or tablets with keyboards attached, turn on or restart the computer or tablet, quickly press **esc**, and then press **f9** for boot options.
 - For tablets without keyboards, turn on or restart the tablet, quickly press and hold the volume up button, and then select **f9**.

– or –

Turn on or restart the tablet, quickly press and hold the volume down button, and then select **f9**.
3. Select the optical drive or USB flash drive from which you want to boot, and then follow the on-screen instructions.

Using HP Sure Recover (select products only)

Select computer models are configured with HP Sure Recover, a PC operating system (OS) recovery solution built into the hardware and software. HP Sure Recover can fully restore the HP OS image without installed recovery software.

Using HP Sure Recover, an administrator or user can restore the system and install:

- Latest version of the operating system
- Platform-specific device drivers
- Software applications, in the case of a custom image

To access the latest documentation for HP Sure Recover, go to <http://www.hp.com/support>. Follow the on-screen instructions to find your product and locate your documentation.

9 Using HP PC Hardware Diagnostics

You can use the HP PC Hardware Diagnostics utility to determine whether your computer hardware is running properly. The three versions are HP PC Hardware Diagnostics Windows, HP PC Hardware Diagnostics UEFI (Unified Extensible Firmware Interface), and (for select products only) Remote HP PC Hardware Diagnostics UEFI, a firmware feature.

Downloading the HP PC Hardware Diagnostics Windows from the Microsoft Store

You can download the HP PC Hardware Diagnostics Windows from the Microsoft Store.

1. Select the Microsoft Store app on your desktop or enter `Microsoft Store` in the taskbar search box.
2. Enter `HP PC Hardware Diagnostics Windows` in the **Microsoft Store** search box.
3. Follow the on-screen directions.

The tool downloads to the selected location.

Customizing Remote HP PC Hardware Diagnostics UEFI settings

Using the Remote HP PC Hardware Diagnostics setting in Computer Setup (BIOS), you can perform several customizations.

- Set a schedule for running diagnostics unattended. You can also start diagnostics immediately in interactive mode by selecting **Execute Remote HP PC Hardware Diagnostics**.
- Set the location for downloading the diagnostic tools. This feature provides access to the tools from the HP website or from a server that has been preconfigured for use. Your computer does not require the traditional local storage (such as a hard drive or USB flash drive) to run remote diagnostics.
- Set a location for storing the test results. You can also set the user name and password that you use for uploads.
- Display status information about the diagnostics run previously.

To customize Remote HP PC Hardware Diagnostics UEFI settings, follow these steps:

1. Turn on or restart the computer, and when the HP logo appears, press **F10** to enter Computer Setup.
2. Select **Advanced**, and then select **Settings**.
3. Make your customization selections.
4. Select **Main**, and then **Save Changes and Exit** to save your settings.

Your changes take effect when the computer restarts.

10 Specifications

This chapter provides specifications for your computer.

Computer specifications

This section provides specifications for your computer. When you travel with your computer, the computer dimensions and weights, as well as input power ratings and operating specifications, provide helpful information.

Table 10-1 Computer specifications

	Metric	U.S.
Dimensions		
Width	359.0 mm	14.1 in
Depth	228.2 mm	8.9 in
Height (front to back)	18.4 mm	0.7 in
Weight		
	1.9 kg	4.1 lb
Input power		
Operating voltage and current	19.5 V dc @ 2.31 A – 45 W	
	19.5 V dc @ 3.33 A – 65 W	
	19.5 V dc @ 4.62 A – 90 W	
	19.5 V dc @ 7.70 A – 150 W	
	19.5 V dc @ 10.3 A – 200 W	
Temperature		
Operating	5°C to 35°C	41°F to 95°F
Nonoperating	-20°C to 60°C	-4°F to 140°F
Relative humidity (noncondensing)		
Operating	10% to 90%	
Nonoperating	5% to 95%	
Maximum altitude (unpressurized)		
Operating	-15 m to 3,048 m	-50 ft to 10,000 ft
Nonoperating	-15 m to 12,192 m	-50 ft to 40,000 ft
NOTE: Applicable product safety standards specify thermal limits for plastic surfaces. The device operates well within this range of temperatures.		

39.6 cm (15.6 in) display specifications

This section provides specifications for your display.

Table 10-2 Display specifications

	Metric	U.S.
Active diagonal size	39.6 cm	15.6 in
Resolution	3840 × 2160 (UHD panel) 1920 × 1080 (FHD panel)	
Surface treatment	BrightView (UHD panel) Antiglare (FHD panel)	
Brightness	400 nits and 250 nits (FHD panel, 100% NTSC and 45% NTSC panels)	
Viewing angle	UWVA	
Backlight	AMOLED WLED	
Display panel interface	eDP+PSR eDP 1.4+PSR2 eDP 1.2 without PSR	

Solid-state drive specifications

This section provides specifications for your solid-state drives.

Table 10-3 Solid-state drive specifications

	256 GB*	512 GB*	1 TB*
Dimensions			
Height	1.0 mm	1.0 mm	1.0 mm
Length	50.8 mm	50.8 mm	50.8 mm
Width	28.9 mm	28.9 mm	28.9 mm
Weight	< 10 g	< 10 g	< 10 g
Interface type			
Ready time, maximum (to not busy)	1.0 ms	< 1.0 ms	1.0 ms
Access times, logical	0.1 ms	0.1 ms	0.1 ms
Transfer rate			
Sequential read	up to 2150 MB/s	up to 2150 MB/s	up to 2150 MB/s
Random read	Up to 300,000 IOPs	Up to 300,000 IOPs	Up to 300,000 IOPs
Sequential write	up to 1550 MB/s	up to 1550 MB/s	up to 1550 MB/s
Random write	Up to 100,000 IOPs	Up to 100,000 IOPs	Up to 100,000 IOPs
Total logical sectors	468,883,296	1,000,215,216	1,500,336,388
Operating temperature	0°C to 70°C (32°F to 158°F)		

Table 10-3 Solid-state drive specifications (continued)

	256 GB*	512 GB*	1 TB*
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less. Actual drive specifications may differ slightly.			
NOTE: Certain restrictions and exclusions apply. Contact support for details.			

Solid-state drive specifications (SATA-3)

This section provides specifications for your solid-state drive.

Table 10-4 Solid-state drive specifications

	256 GB*
Dimensions	
Height	1.35 mm
Weight	< 10 g
Interface type	
Ready time, maximum (to not busy)	1.0 ms
Access times, logical	0.1 ms
Transfer rate	
	up to 540 MB/s
Total logical sectors	
	234,441,648
Operating temperature	
	0°C to 70°C (32°F to 158°F)
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less. Actual drive specifications may differ slightly.	
NOTE: Certain restrictions and exclusions apply. Contact support for details.	

11 Power cord set requirements

This chapter provides power cord requirements for countries and regions.

The wide-range input feature of the computer permits it to operate from any line voltage from 100 V ac to 120 V ac, or from 220 V ac to 240 V ac.

The three-conductor power cord set included with the computer meets the requirements for use in the country or region where the equipment is purchased.

Power cord sets for use in other countries or regions must meet the requirements of the country and region where the computer is used.

Requirements for all countries

These power cord requirements are applicable to all countries and regions.

- The length of the power cord set must be at least **1.0 m** (3.3 ft) and no more than **2.0 m** (6.5 ft).
- All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country or region where the power cord set will be used.
- The power cord sets must have a minimum current capacity of 10 A and a nominal voltage rating of 125 V ac or 250 V ac, as required by the power system of each country or region.
- The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with the appliance inlet on the back of the computer.

Requirements for specific countries and regions

To determine power cord requirements for specific countries and regions, use this table.

Table 11-1 Power cord requirements for specific countries and regions

Country/region	Accredited agency	Applicable note number
Argentina	IRAM	1
Australia	SAA	1
Austria	OVE	1
Belgium	CEBEC	1
Brazil	ABNT	1
Canada	CSA	2
Chile	IMQ	1
Denmark	DEMKO	1
Finland	FIMKO	1
France	UTE	1

Table 11-1 Power cord requirements for specific countries and regions (continued)

Country/region	Accredited agency	Applicable note number
Germany	VDE	1
India	BIS	1
Israel	SII	1
Italy	IMQ	1
Japan	JIS	3
Netherlands	KEMA	1
New Zealand	SANZ	1
Norway	NEMKO	1
People's Republic of China	CCC	4
Saudi Arabia	SASO	7
Singapore	PSB	1
South Africa	SABS	1
South Korea	KTL	5
Sweden	SEMKO	1
Switzerland	SEV	1
Taiwan	BSMI	6
Thailand	TISI	1
United Kingdom	ASTA	1
United States	UL	2

1. The flexible cord must be Type HO5VV-F, three-conductor, 0.75 mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.
2. The flexible cord must be Type SVT/SJT or equivalent, No. 18 AWG, three-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V ac) or NEMA 6-15P (15 A, 250 V ac) configuration. CSA or C-UL mark. UL file number must be on each element.
3. The appliance coupler, flexible cord, and wall plug must bear a T mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCTF, three-conductor, 0.75 mm² or 1.25 mm² conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V ac) configuration.
4. The flexible cord must be Type RVV, three-conductor, 0.75 mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the CCC certification mark.
5. The flexible cord must be Type HO5VV-F three-conductor, 0.75 mm² conductor size. KTL logo and individual approval number must be on each element. Approval number and logo must be printed on a flag label.
6. The flexible cord must be Type HVCTF three-conductor, 1.25 mm² conductor size. Power cord set fittings (appliance coupler, cable, and wall plug) must bear the BSMI certification mark.
7. For 127 V ac, the flexible cord must be Type SVT or SJT 3-conductor, 18 AWG, with plug NEMA 5-15P (15 A, 125 V ac), with UL and CSA or C-UL marks. For 240 V ac, the flexible cord must be Type HO5VV-F three-conductor, 0.75 mm² or 1.00 mm² conductor size, with plug BS 1363/A with BSI or ASTA marks.

12 Recycling

When a nonrechargeable or rechargeable battery has reached the end of its useful life, do not dispose of the battery in general household waste. Follow the local laws and regulations in your area for battery disposal.

HP encourages customers to recycle used electronic hardware, HP original print cartridges, and rechargeable batteries. For more information about recycling programs, see the HP website at <http://www.hp.com/recycle>.

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