HP Pavilion Power 15 Laptop PC

** Model numbers: 15-cb000 – 15-cb099*

Maintenance and Service Guide

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Product notice

This guide describes features that are common to most models. Some features may not be available on your computer.

Not all features are available in all editions of Windows. This computer may require upgraded and/or separately purchased hardware, drivers, and/or software to take full advantage of Windows functionality. See http://www.microsoft.com for details.

Software terms

By installing, copying, downloading, or otherwise using any software product preinstalled on this computer, you agree to be bound by the terms of the HP End User License Agreement (EULA). If you do not accept these license terms, your sole remedy is to return the entire unused product (hardware and software) within 14 days for a refund subject to the refund policy of your place of purchase.

For any further information or to request a full refund of the computer, please contact your local point of sale (the seller).

Safety warning notice

⚠ **WARNING!** To reduce the possibility of heat-related injuries or of overheating the device, do not place the device directly on your lap or obstruct the device air vents. Use the device 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 contact the skin or a soft surface, such as pillows or rugs or clothing, during operation. The device and the AC adapter comply with the user-accessible surface temperature limits defined by the International Standard for Safety of Information Technology Equipment (IEC 60950-1).

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1 Product description

Category	Description	N17P-G0 graphics	R17M-P1-70 graphics
Product name	HP Pavilion Power 15 Laptop PC ** Model numbers: 15-cb000 – 15-cb099*	√	√
Processor	**7th generation Intel® Core™ processors**	√	√
	Intel Core i7-7700HQ (2.8-GHz, turbo up to 3.8 GHz, 2400-MHz/6-MB L3 cache, quad core)	√	√
	Intel Core i5-7300HQ (2.5-GHz, turbo up to 3.5 GHz, 2400-MHz/6-MB L3 cache, quad core)	√	√
Graphics	**Internal graphics**	√	√
	Intel HD Graphics 630	√	√
	Hybrid graphics	√	√
	Nvidia N17P-G0 (GeForce GTX 1050) with 4096 MB or 2048 GB of dedicated video memory	√	
	AMD R17M-P1-70 (Radeon RX 550) with 2048 MB of dedicated video memory		√
	Support HD Decode, DX12, and HDMI	√	√
	Supports Optimus	√	
	Support GPS (GPU Performance Scaling)	√	
Panel	**39.6-cm** (15.6-in), white light-emitting diode (WLED), UWVA, eDP, slim-flat (3.2 mm)	√	√
	Full high-definition (FHD), anti glare (1920×1080); typical brightness: 220 nits	√	√
	Full high-definition (FHD), BrightView (1920×1080); typical brightness: 220 nits	√	√
	Ultra high-definition (UHD), anti glare (3840×2160), eDP+NVSR; typical brightness: 300 nits	√	√
	Touch solution with flush glass, multitouch enabled	√	√
Memory	Two non-customer-accessible/upgradable memory module slots	√	√
	DDR4-2400 dual channel support	√	√
	Supports up to 16 GB of system RAM in the following configurations:	√	√
	• 16384-MB total system memory (8192×2)	√	√
	• 12288-MB total system memory (8192×1) + (4096×1)	√	√
	• 8192-MB total system memory (8192×1) or (4096×2)	√	√
	• 6144-MB total system memory (4096×1) + (2048×1)	√	√
	• 4096-MB total system memory (4096×1)	√	√

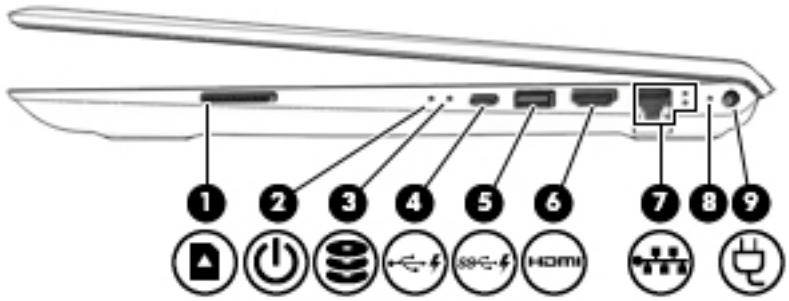
Category	Description	N17P-G0 graphics	R17M-P1-70 graphics
Hard drives	Supports **6.35-cm** (2.5-in) SATA hard drives in **9.5-mm** (.37-in) and **7.0-mm/7.2-mm** (.28-in) thicknesses	√	√
	Support for solid-state drive + hard drive	√	√
	Support for M.2 PCIe SSD	√	√
	Support for M.2 SATA SSD	√	√
	Accelerometer/hard drive protection support	√	√
	Single hard drive configurations:	√	√
	• 2-TB, 5400 rpm, 9.5 mm/7.2 mm	√	√
	• 1-TB, 7200 rpm, 9.5 mm	√	√
	PCIe NVMe TLC M.2 solid-state drive:	√	√
	• 256 GB	√	√
	Dual storage configurations:	√	√
	• 256 GB PCIe NVMe TLC M.2 SSD + 1 TB (7200 rpm) 9.5 mm	√	√
	• 128 GB SATA Value SSD + 1 TB (7200 rpm) 9.5 mm	√	√
	• 128 GB SATA Value SSD + 2 TB (5400 rpm) 9.5 mm/7.2 mm	√	√
	• 128 GB PCIe NVMe TLC M.2 SSD + 1 TB (7200 rpm) 9.5 mm	√	√
	• 128 GB PCIe NVMe TLC M.2 SSD + 2 TB (5400 rpm) 9.5 mm/7.2 mm	√	√
Camera/mic	**HP Wide Vision HD camera** - indicator LED, USB 2.0, HD BSI sensor, f2.0, WDR, 88° WFOV, 720p by 30 frames per second	√	√
	Dual array digital microphones with appropriate software - beam forming, echo cancellation, noise suppression	√	√
	HP Wide Vision FHD IR Camera, indicator LED & 2x IR LEDs, USB 2.0, FHD Hybrid BSI sensor, f2.2, WDR, 88° WFOV, 1080p by 30 frames per second	√	√
	Support Windows Hello	√	√
	Dual array digital microphones with appropriate software - beam forming, echo cancellation, noise suppression	√	√
	Support WDR (Wide Dynamic Range)	√	√
Audio	Supports HP Audio Boost	√	√
	Dual speakers	√	√
	Audio brand	√	√
	B&O Play	√	√
	Audio application name	√	√
	B&O Play Audio Control	√	√
Ethernet	Integrated 10/100/1000 network interface card (NIC)	√	√
Wireless Network	**Integrated wireless options with dual antennas (M.2/PCIe):**	√	√

Category	Description	N17P-G0 graphics	R17M-P1-70 graphics
	Compatible with Miracast-certified devices	√	√
	Support for the following WLAN formats:	√	√
	• Intel Dual Band Wireless-AC 7265 802.11AC 2x2 WiFi + Bluetooth 4.2 Combo Adapter (non-vPro)	√	√
External media card	**HP Multi-Format Digital Media Reader**	√	√
	Support SD/SDHC/SDXC	√	√
	Push-push insertion/removal	√	√
Internal Card Expansion	One M.2 slot for solid-state drive	√	√
	One M.2 slot for WLAN	√	√
Ports	Hot plug/unplug and auto detect for correct output to wide-aspect vs. standard aspect video (auto adjust panel resolution to fit embedded panel and external monitor connected)	√	√
	HDMI v2.0 supporting up to 4096×2160 @ 60Hz	√	√
	RJ-45 (Ethernet)	√	√
	USB 3.0 (3)	√	√
	USB 3.1 Gen1 Type-C port (support data transfer, DisplayPort 1.2 out up to 4096×2304 (60Hz), HP Sleep & Charge)	√	√
	AC Smart Pin adapter plug	√	√
	Headphone/line out and microphone/line in combo jack	√	√
Keyboard/ pointing devices	**Keyboard**	√	√
	Full-size backlit, 3-coat paint, island style keyboard with numeric keypad	√	√
	TouchPad	√	√
	Image sensor	√	√
	Multi-touch gestures enabled	√	√
	Taps enabled by default	√	√
	Supports Modern Trackpad Gestures	√	√
Power	**AC adapters**	√	√
	150 W	√	√
	Power cord	√	√
	1 meter premium power cord	√	√
	Battery	√	√
	4-cell, 70-Whr, 4550 mAh, polymer battery	√	√
Security	TPM 2.0	√	√
	Kensington Security Lock	√	√
Operating system	**Preinstalled**	√	√

Category	Description	N17P-G0 graphics	R17M-P1-70 graphics
	Windows 10	√	√
	Windows 10 Professional	√	√
	For Developed Market (ML):	√	√
	Windows 10 Home ML	√	√
	Windows 10 Home Plus ML	√	√
	For Emerging Market (EM/SL):	√	√
	Windows 10 Home EM/SL	√	√
	Windows 10 Home Plus EM/SL	√	√
	For China Market:	√	√
	CPPP Windows 10 Home High End China Language Edition	√	√
	CPPP Windows 10 Home China Language Edition	√	√
	For APJ SEAP Market (EM/SL):	√	√
	SEAP Windows 10 Home EM/SL	√	√
	SEAP Windows 10 Home High End Plus	√	√
	FreeDOS 2.0	√	√
Service	**End-user replaceable parts**	√	√
	AC adapter	√	√

2 Getting to know your computer

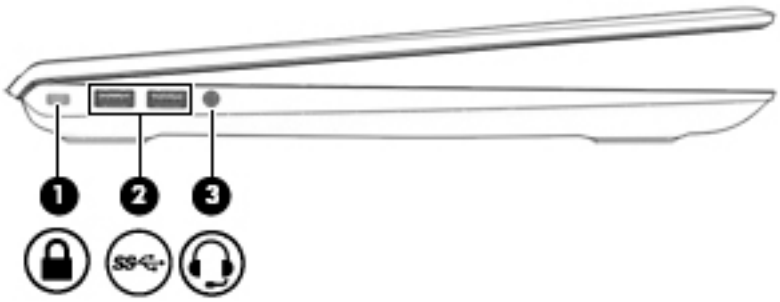
Right side



Component			Description
(1)		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.
(2)		Power light	• On: The computer is on. • Blinking: The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unneeded components. • Off: The computer is off or in Hibernation. Hibernation is a power-saving state that uses the least amount of power.
(3)		Drive light	• Blinking white: The hard drive is being accessed. • Amber: HP 3D DriveGuard has temporarily parked the hard drive.
(4)		USB Type-C port with HP Sleep and Charge	Connects a USB device that has a Type-C connector, provides high-speed data transfer, and even when the computer is off, charges products such as a cell phone, camera, activity tracker, or smartwatch (select devices only). – or – Connects to various USB, video, HDMI, and LAN devices. **NOTE:** Cables and/or adapters (purchased separately) may be required.

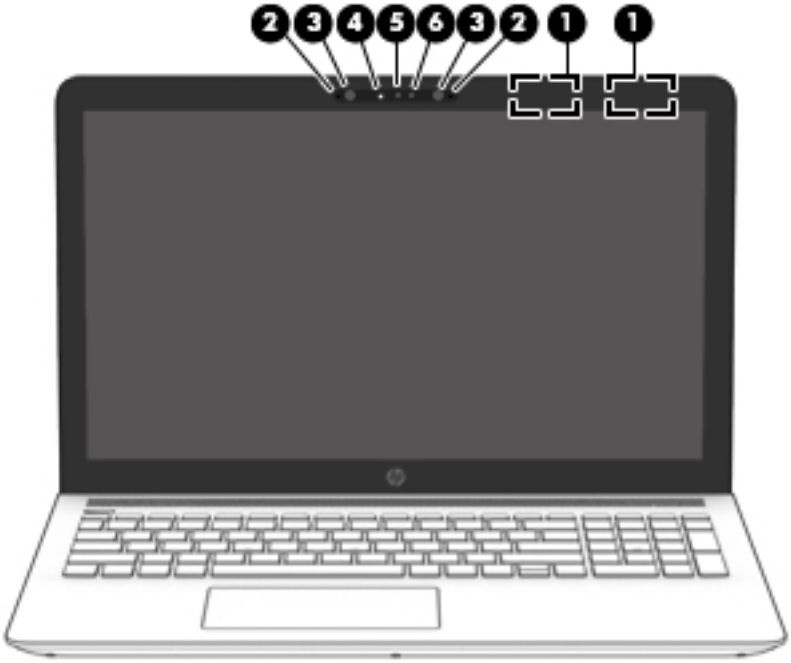
Component		Description
(5)	USB 3.x port with HP Sleep and Charge	Connects a USB device, provides high-speed data transfer, and even when the computer is off, charges products such as a cell phone, camera, activity tracker, or smartwatch (select devices only).
(6)	HDMI port	Connects an optional video 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.
(7)	RJ-45 (network) jack/status lights	Connects a network cable. • White: The network is connected. • Amber: Activity is occurring on the network.
(8)	AC adapter and battery light	• White: The AC adapter is connected and the battery is fully charged. • Blinking white: The AC adapter is disconnected and the battery has reached a low battery level.
(9)	Power connector	Connects an AC adapter.

Left side



Component			Description
(1)		Security cable slot	Attaches an optional security cable to the computer. **NOTE:** The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.
(2)		USB 3.x SuperSpeed ports (2)	Connect a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provides high-speed data transfer.
(3)		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 *Regulatory, Safety, and Environmental Notices*. To access this guide: ▲ Select the **Start** button, select **HP Help and Support**, and then select **HP Documentation**. **NOTE:** When a device is connected to the jack, the computer speakers are disabled.

Display



Component		Description
(1)	WLAN antennas*	Send and receive wireless signals to communicate with wireless local area networks (WLANs).
(2)	Internal microphones	Record sound.
(3)	Infrared camera lights (select products only)	On: The infrared camera is in use.
(4)	Camera light	On: The camera is in use.
(5)	Camera	Allows you to video chat, record video, and record still images.
(6)	Infrared camera (select products only)	Allows a facial recognition logon to Windows, instead of a password logon.

*The antennas are not visible from the outside of the computer, and antenna location varies. For optimal transmission, keep the areas immediately around the antennas free from obstructions.

For wireless regulatory notices, see the section of the *Regulatory, Safety, and Environmental Notices* that applies to your country or region.

To access this guide:

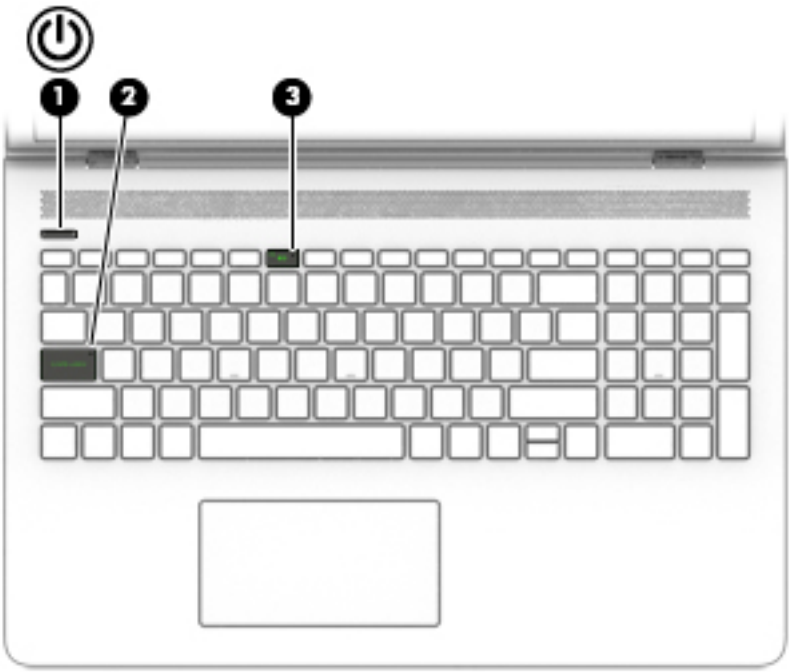
▲ Select the **Start** button, select **HP Help and Support**, and then select **HP Documentation**.

Keyboard area

TouchPad

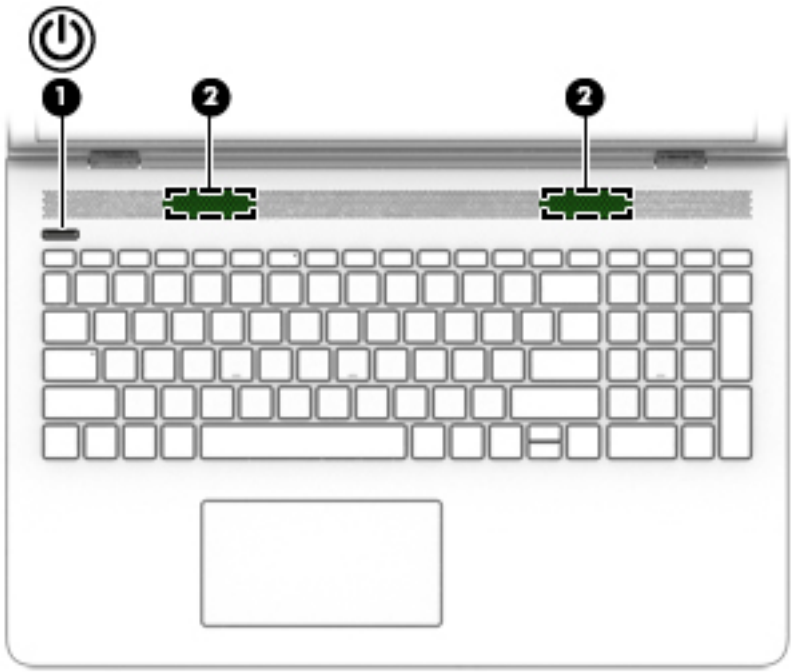
Component		Description
(1)	TouchPad zone	Reads your finger gestures to move the pointer or activate items on the screen.
(2)	Left TouchPad button	Functions like the left button on an external mouse.
(3)	Right TouchPad button	Functions like the right button on an external mouse.

Lights



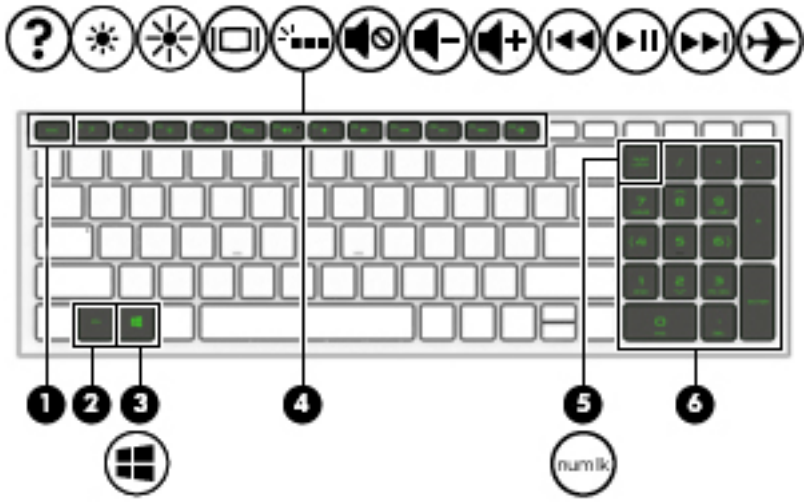
Component			Description
(1)		Power light	• On: The computer is on. • Blinking: The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unneeded components. • Off: The computer is off or in Hibernation. Hibernation is a power-saving state that uses the least amount of power.
(2)		Caps lock light	On: Caps lock is on, which switches the key input to all capital letters.
(3)		Mute light	• On: Computer sound is off. • Off: Computer sound is on.

Button and speakers



Component		Description
(1)	Power button	• When the computer is off, press the button 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. • When the computer is in Hibernation, press the button briefly to exit Hibernation. **CAUTION:** 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 5 seconds to turn off the computer. To learn more about your power settings, see your power options. ▲ Type `power` in the taskbar search box, and then select **Power & sleep settings**. – or – Right-click the **Start** button, and then select **Power Options**.
(2)	Speakers	Produce sound.

Special keys



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. **NOTE:** On select products, the f5 action key turns the keyboard backlight feature off or on.
(5)	Num Lk key	Alternates between the navigational and numeric functions on the integrated numeric keyboard.
(6)	Integrated numeric keypad	A separate keypad to the right of the alphabet keyboard. When num lk is pressed, the keypad can be used like an external numeric keypad.

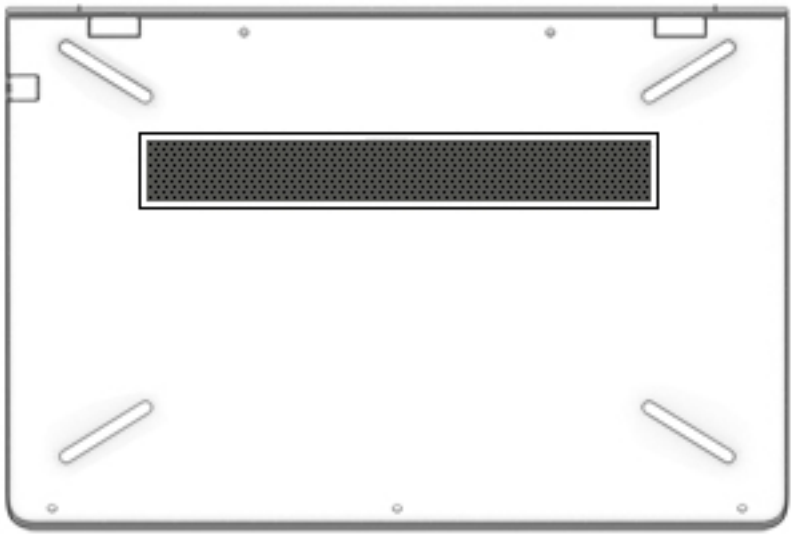
Action keys

An action key performs the function indicated by the icon on the key. To determine which keys are on your product, see Special keys on page 12.

▲ To use an action key, press and hold the key.

Icon	Description
	Opens the Get started app.
	Decreases the screen brightness incrementally as long as you hold down the key.
	Increases the screen brightness incrementally as long as you hold down the key.
	Switches the screen image between display devices connected to the system. For example, if a monitor is connected to the computer, repeatedly pressing this key alternates the screen image from the computer display to the monitor display to a simultaneous display on both the computer and the monitor.
	Turns the keyboard backlight off or on. **NOTE:** To conserve battery power, turn off this feature.
	Mutes or restores speaker sound.
	Decreases speaker volume incrementally while you hold down the key.
	Increases speaker volume incrementally while you hold down the key.
	Plays the previous track of an audio CD or the previous section of a DVD or a Blu-ray Disc (BD).
	Starts, pauses, or resumes playback of an audio CD, a DVD, or a BD.
	Plays the next track of an audio CD or the next section of a DVD or a BD.
	Turns the airplane mode and wireless feature on or off. **NOTE:** The airplane mode key is also referred to as the wireless button. **NOTE:** A wireless network must be set up before a wireless connection is possible.

Bottom



Component	Description
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.

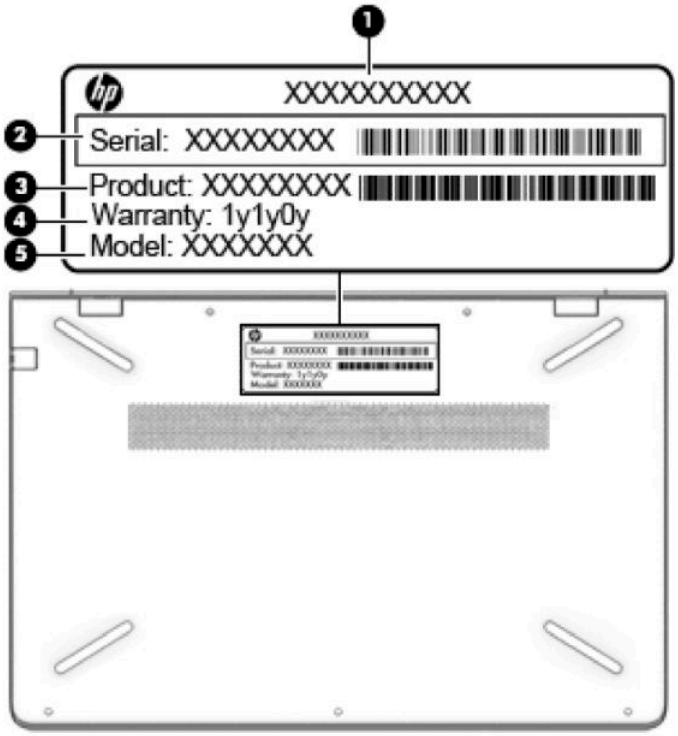
Labels

The labels affixed to the computer provide information you may need when you troubleshoot system problems or travel internationally with the computer.

IMPORTANT: Check the following locations for the labels described in this section: the bottom of the computer, inside the battery bay, under the service door, or on the back of the display.

- Service label—Provides important information to identify your computer. When contacting support, you will probably be asked for the serial number, and possibly for the product number or the model number. Locate these numbers before you contact support.

  Your service label will resemble one of the examples shown below. Refer to the illustration that most closely matches the service label on your computer.



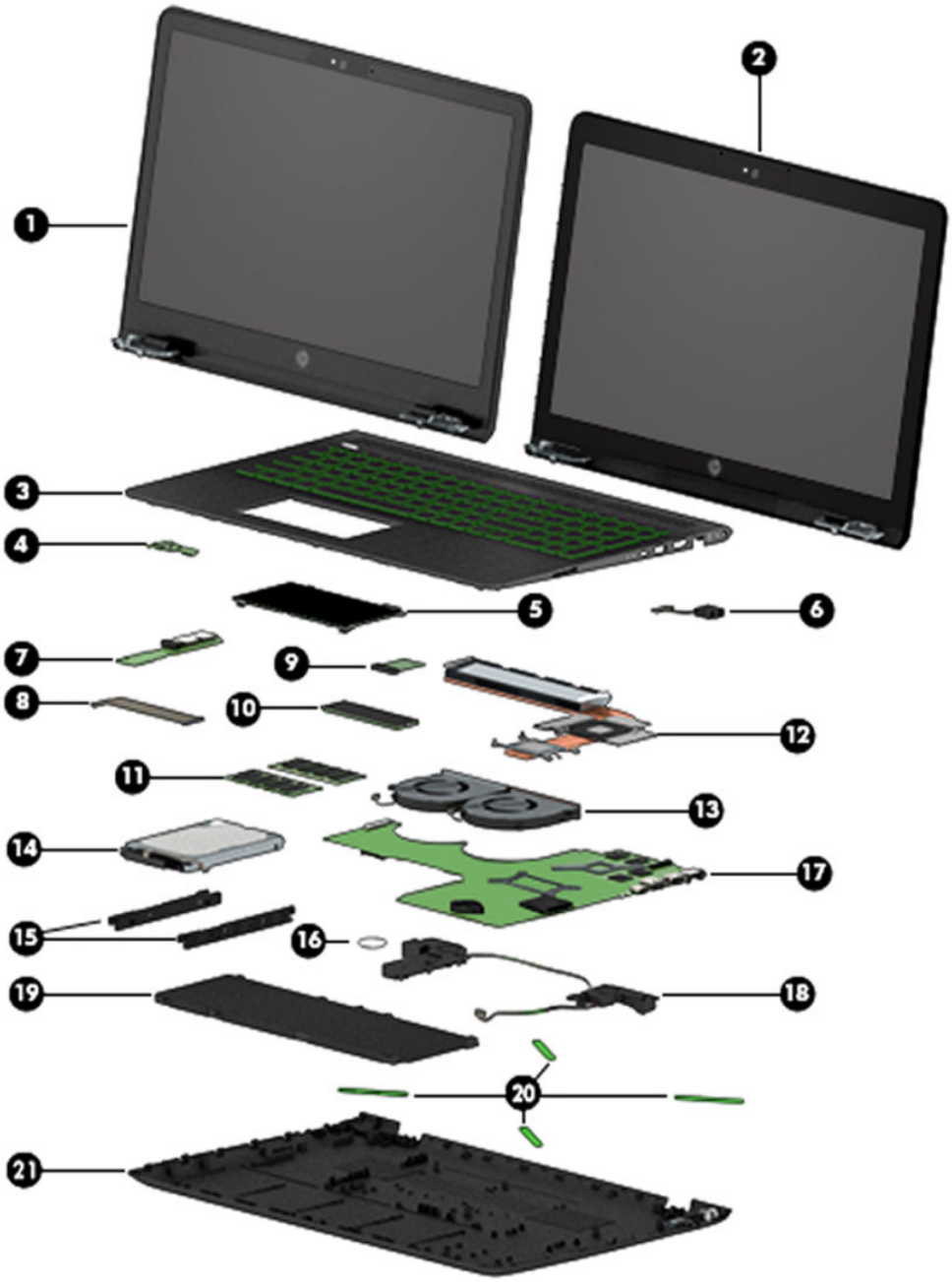
Component	
(1)	HP product name
(2)	Serial number
(3)	Product number
(4)	Warranty period
(5)	Model number (select products only)

- Regulatory label(s)—Provide(s) regulatory information about the computer.
- Wireless certification label(s)—Provide(s) information about optional wireless devices and the approval markings for the countries or regions in which the devices have been approved for use.

3 Illustrated parts catalog

Computer major components

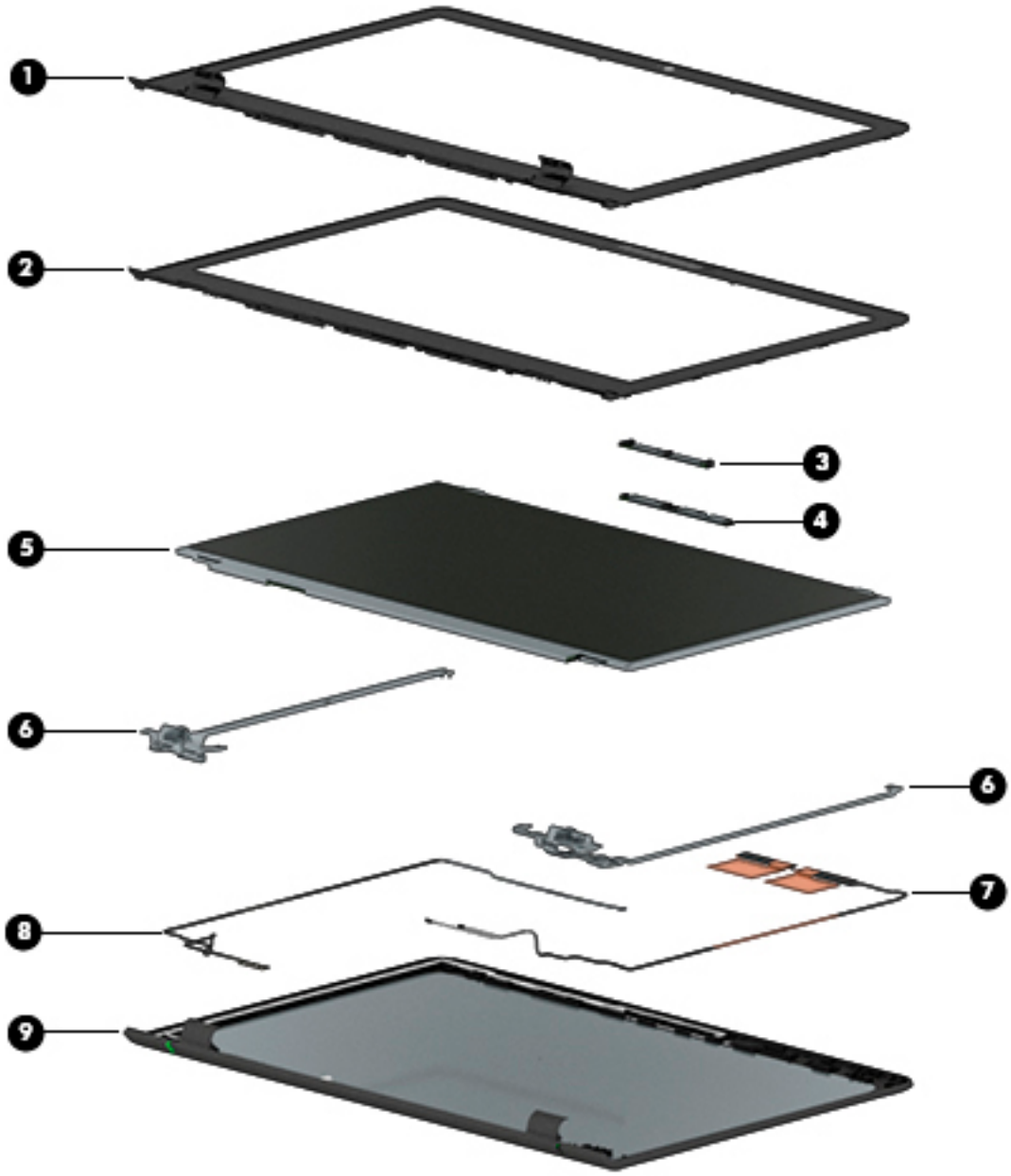
NOTE: HP continually improves and changes product parts. For complete and current information on supported parts for your computer, go to http://partsurfer.hp.com, select your country or region, and then follow the on-screen instructions.



Item	Component	Spare part number
	Display assembly (touch or non-touch) **NOTE:** For non-touch display assembly spare part information, see Display assembly subcomponents on page 20.	
(1)	Touch screen for use in black and green models	926881-001
	Touch screen for use in black and white models	928180-001
(2)	Non-touch screen	not spared
(3)	**Top cover/keyboard** **NOTE:** For a detailed list of keyboard country codes, see Top cover/keyboard on page 67.	
	For use in black and green models	926893-xxx
	For use in black and white models	926894-xxx
(4)	**Power button board** **NOTE:** The power button board cable is available using spare part number 926872-001.	
	For use in black and green models with AMD Radeon graphics	926885-001
	For use in black and white models with AMD Radeon graphics	926886-001
	For use in black and green models with Nvidia GeForce graphics	926887-001
	For use in black and white models with Nvidia GeForce graphics	926888-001
(5)	**TouchPad board** **NOTE:** The TouchPad cable is available using spare part number 926873-001.	926882-001
(6)	**Power connector cable**	926430-001
(7)	**USB board** **NOTE:** The USB board cable is available using spare part number 926871-001.	926883-001
	For use in models with AMD Radeon graphics	926883-001
	For use in models with Nvidia GeForce graphics	926884-001
(8)	**TouchPad bracket** (not illustrated)	926879-001
(9)	**WLAN module**	
	Intel Dual Band Wireless-AC 7265 802.11AC 2x2 WiFi + BT 4.2 Combo Adapter (non-vPro)	901229-855
(10)	**Solid-state drive**, M.2	
	256 GB, PCIe	847109-020
	128 GB, PCIe	912322-007
	128 GB, SATA-3	827560-052
(11)	**Memory module** (DDR4-2400)	
	8-GB	862398-855
	4 GB	862397-855
	2 GB	864271-855

Item	Component	Spare part number
(12)	**Heat sink assembly** (includes replacement thermal materials)	
	For use in models with AMD Radeon graphics	926876-001
	For use in models with Nvidia GeForce graphics	930615-001
(13)	**Fan**	926875-001
(14)	**Hard drive**, 2.5 inch (does not include bracket, connector board, or cable) **NOTE:** The hard drive cable is available using spare part number 926874-001.	
	2-TB, 5400-rpm	912487-855
	1-TB, 7200-rpm	766644-005
(15)	**Hard drive bracket**	926877-001
(16)	**RTC battery**	not spared
(17)	**System board** (includes replacement thermal materials) All system boards use the following part numbers: xxxxxx-001: Non-Windows operating systems xxxxxx-601: Windows 10 operating system	
	For use in models with Nvidia GeForce discrete graphics memory:	
	• Intel Core i7-7700HQ processor and 4 GB of discrete graphics memory	926305-xx1
	• Intel Core i7-7700HQ processor and 2 GB of discrete graphics memory	926304-xx1
	• Intel Core i5-7300HQ processor and 4 GB of discrete graphics memory	926307-xx1
	• Intel Core i5-7300HQ processor and 2 GB of discrete graphics memory	926306-xx1
	For use in models with AMD Radeon discrete graphics memory:	
	• Intel Core i7-7700HQ processor	926308-xx1
	• Intel Core i5-7300HQ processor	926309-xx1
(18)	**Speakers** (includes left and right speakers and cable)	926892-001
(19)	**Battery** (4 cell, 70 Wh, 4.55 Ah)	917724-855
(20)	**Rubber Kit**	
	For use in black and green models	926889-001
	For use in black and white models	926890-001
(21)	**Bottom cover**	
	For use in black and green models	926864-001
	For use in black and white models	926863-001

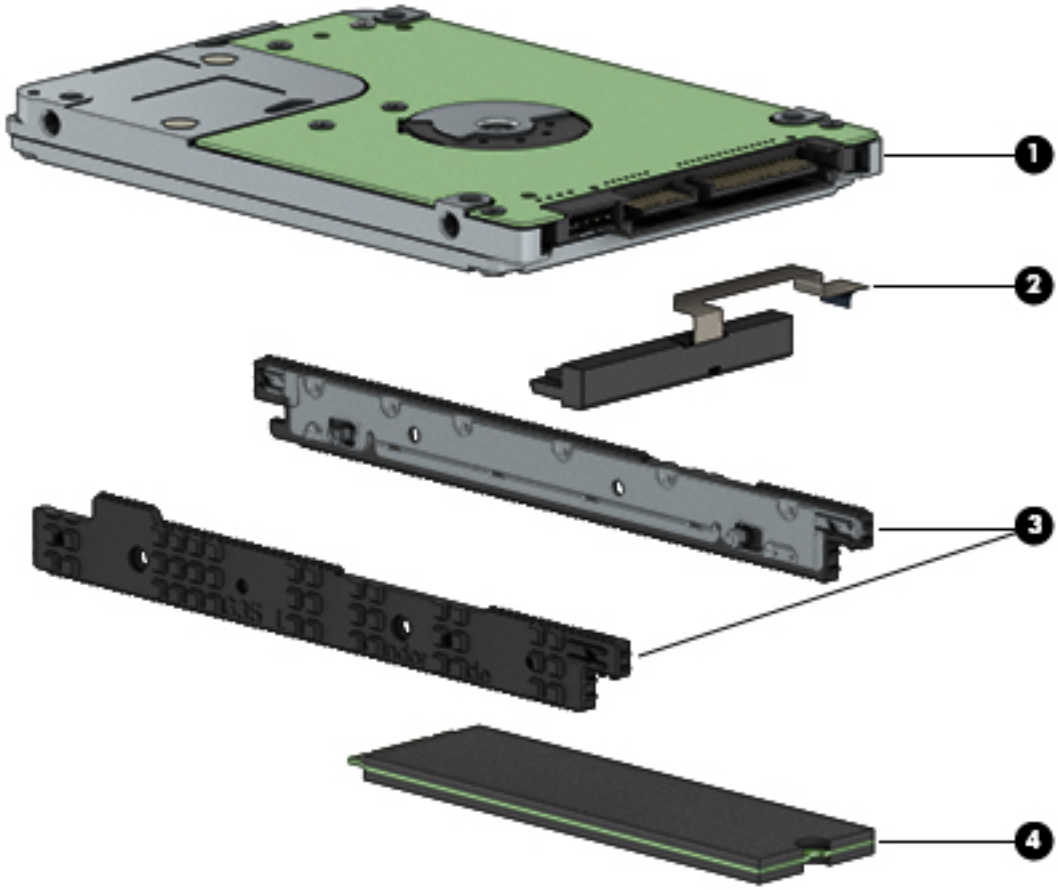
Display assembly subcomponents



Item	Component	Spare part number
	Display bezel **NOTE:** Foil piece for use with the bezel on models with UHD panels is available using spare part number 935520-001.	
(1)	For use in models with a standard HD camera	926865-001
(2)	For use in models with an IR camera	926866-001
	Camera/microphone module	
(3)	Standard HD camera	919573-006

Item	Component	Spare part number
(4)	IR camera	926727-001
(5)	**Raw display panel** (39.6-cm [15.6-in])	
	FHD	752920-017
	UHD	929115-001
(6)	**Hinge Kit** (left and right)	926880-001
(7)	**Antenna**, dual (includes wireless antenna cable and transceiver)	926860-001
(8)	**Display cable** (includes display panel cable and camera/microphone cable)	
	For use in models with an FHD display and standard HD camera	926867-001
	For use in models with an FHD display and IR camera	926869-001
	For use in models with an UHD display and standard HD camera	926868-001
	For use in models with an UHD display and IR camera	926870-001
(9)	**Display enclosure**:(includes wireless antennas)	
	For use in models with FHD displays:	
	• For use in black and green models	926861-001
	• For use in black and white models	926862-001
	For use in models with UHD displays: **NOTE:** Foil piece for use in the enclosure in models with UHD panels is available using spare part number 935521-001.	
	• For use in black and green models	935522-001
	• For use in black and white models	935523-001
	Hinge cover (not illustrated)	
	Left	928123-001
	Right	928122-001

Mass storage devices



Item	Component	Spare part number
(1)	**Hard drive**, SATA; does not include brackets, connector board, or cable):	
	2-TB, 5400-rpm	912487-855
	1-TB, 7200-rpm	766644-005
(2)	**Hard drive connector/cable**	926874-001
(3)	**Hard drive brackets**	926877-001
(4)	**Solid-state drive**, M.2	
	256 GB, PCIe	847109-020
	128 GB, PCIe	912322-007
	128 GB, SATA-3	827560-052
(*)	**External optical drive** (not illustrated)	747080-001

Miscellaneous parts

Component	Spare part number
HP Smart AC adapter, 150 W (4.5 mm, PFC, SMART, slim)	917649-850
Power cord:	
For use in Australia	920689-011
For use in Denmark	920689-007
For use in Europe	920689-005
For use in India	920689-016
For use in Israel	920689-008
For use in Japan	920689-017
For use in North America	920689-001
For use in the People's Republic of China	920689-014
For use in South Africa	920689-010
For use in South Korea	920689-013
For use in Switzerland	920689-009
For use in Taiwan	920689-015
For use in Thailand	920689-012
For use in the United Kingdom	920689-006
Screw Kit	926891-001
USB-C to USB-A adapter	833960-001
HP HDMI to VGA Adapter	701943-001

4 Removal and replacement procedures preliminary requirements

Tools required

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

- Flat-bladed screwdriver
- Magnetic screwdriver
- Phillips P0 and P1 screwdrivers

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

CAUTION: Using excessive force during disassembly and reassembly can damage plastic parts. Use care when handling the plastic parts. Apply pressure only at the points designated in the maintenance instructions.

Cables and connectors

CAUTION: 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.

Cables must be handled with extreme care to avoid damage. 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 in such a way that they cannot be caught or snagged by parts being removed or replaced. Handle flex cables with extreme care; these cables tear easily.

Drive handling

⚠ **CAUTION:** Drives are fragile components that must be handled 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.

Handle drives on surfaces covered with at least one inch of shock-proof foam.

Avoid dropping drives from any height onto any surface.

After removing a hard 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.”

Grounding guidelines

Electrostatic discharge damage

Electronic components are sensitive to electrostatic discharge (ESD). Circuitry design and structure determine the degree of sensitivity. Networks built into many integrated circuits provide some protection, but in many cases, ESD contains enough power to alter device parameters or melt silicon junctions.

A discharge of static electricity from a finger or other conductor can destroy static-sensitive devices or microcircuitry. Even if the spark is neither felt nor heard, damage may have occurred.

An electronic device exposed to ESD may not be affected at all and can work perfectly throughout a normal cycle. Or the device may function normally for a while, then degrade in the internal layers, reducing its life expectancy.

⚠ **CAUTION:** To prevent damage to the computer when you are removing or installing 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 in this section.

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.

The following table shows how humidity affects the electrostatic voltage levels generated by different activities.

⚠ **CAUTION:** A product can be degraded by as little as 700 V.

Typical electrostatic voltage levels			
	Relative humidity		
Event	**10%**	**40%**	**55%**
Walking across carpet	35,000 V	15,000 V	7,500 V
Walking across vinyl floor	12,000 V	5,000 V	3,000 V
Motions of bench worker	6,000 V	800 V	400 V
Removing DIPS from plastic tube	2,000 V	700 V	400 V
Removing DIPS from vinyl tray	11,500 V	4,000 V	2,000 V
Removing DIPS from Styrofoam	14,500 V	5,000 V	3,500 V
Removing bubble pack from PCB	26,500 V	20,000 V	7,000 V
Packing PCBs in foam-lined box	21,000 V	11,000 V	5,000 V

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 non-conductive 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.

Workstation guidelines

Follow these grounding workstation guidelines:

- Cover the workstation with approved static-shielding material.
- Use a wrist strap connected to a properly grounded work surface and use properly grounded tools and equipment.
- Use conductive field service tools, such as cutters, screwdrivers, and vacuums.
- When fixtures must directly contact dissipative surfaces, use fixtures made only of static-safe materials.
- Keep the work area free of nonconductive materials, such as ordinary plastic assembly aids and Styrofoam.
- Handle ESD-sensitive components, parts, and assemblies by the case or PCM laminate. Handle these items only at static-free workstations.
- Avoid contact with pins, leads, or circuitry.
- Turn off power and input signals before inserting or removing connectors or test equipment.

Equipment guidelines

Grounding equipment must include either a wrist strap or a foot strap at a grounded workstation.

- When seated, wear a wrist strap connected to a grounded system. Wrist straps are flexible straps with a minimum of one megohm ±10% resistance in the ground cords. To provide proper ground, wear a strap snugly against the skin at all times. On grounded mats with banana-plug connectors, use alligator clips to connect a wrist strap.
- When standing, use foot straps and a grounded floor mat. Foot straps (heel, toe, or 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 foot straps on both feet with a minimum of one megohm resistance between the operator and ground. To be effective, the conductive must be worn in contact with the skin.

The following grounding equipment is recommended to prevent electrostatic damage:

- Antistatic tape
- Antistatic smocks, aprons, and sleeve protectors
- Conductive bins and other assembly or soldering aids
- Nonconductive foam
- Conductive tabletop workstations with ground cords of one megohm resistance
- Static-dissipative tables or floor mats with hard ties to the ground
- Field service kits
- Static awareness labels
- Material-handling packages
- Nonconductive plastic bags, tubes, or boxes
- Metal tote boxes
- Electrostatic voltage levels and protective materials

The following table lists the shielding protection provided by antistatic bags and floor mats.

Material	Use	Voltage protection level
Antistatic plastics	Bags	1,500 V
Carbon-loaded plastic	Floor mats	7,500 V
Metallized laminate	Floor mats	5,000 V

5 Removal and replacement procedures for Authorized Service Provider parts

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

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

Component replacement procedures

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. See Labels on page 15 for details.

This chapter provides removal and replacement procedures for Authorized Service Provider only parts.

There are as many as 54 screws that must be removed, replaced, or loosened when servicing Authorized Service Provider only parts. Make special note of each screw size and location during removal and replacement.

Display subcomponents (bezel, panel, camera)

NOTE: Non-touch display assemblies are spared at the subcomponent level only.

Touch displays are spared only as entire hinge-ups.

This section illustrates how to remove the display bezel, display panel, and camera module for non-touch displays without removing the display from the computer. Display assembly on page 57 illustrates removing all non-touch display subcomponents.

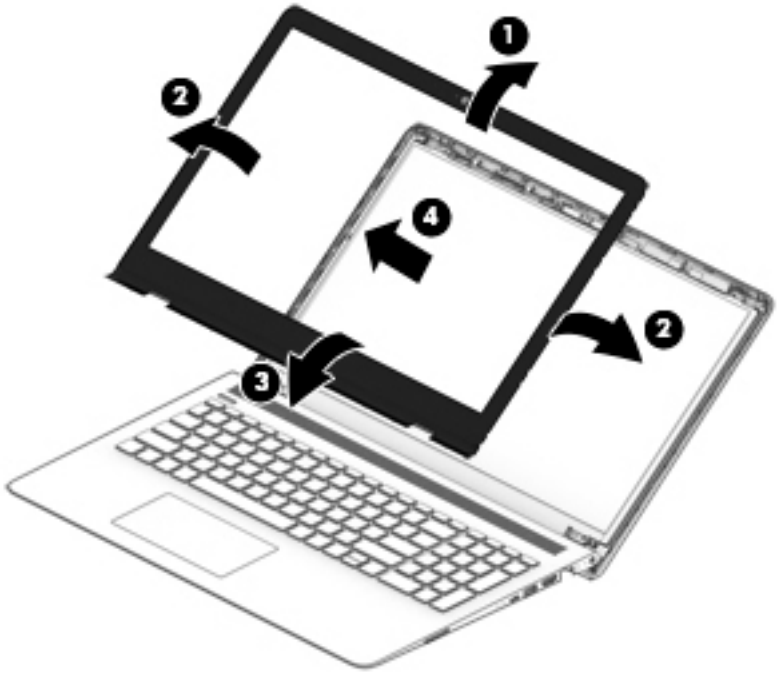
To remove non-touch display assembly subcomponents, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.

Remove the display assembly subcomponents:

1. Open the computer as far as it will open.
2. To remove the display bezel:
   a. Flex the inside of the top edge **(1)**, the left and right edges **(2)**, and the bottom edge **(3)** of the display bezel until the bezel disengages from the display enclosure.

b. Remove the display bezel **(4)**.



3. To remove the standard camera/microphone module:

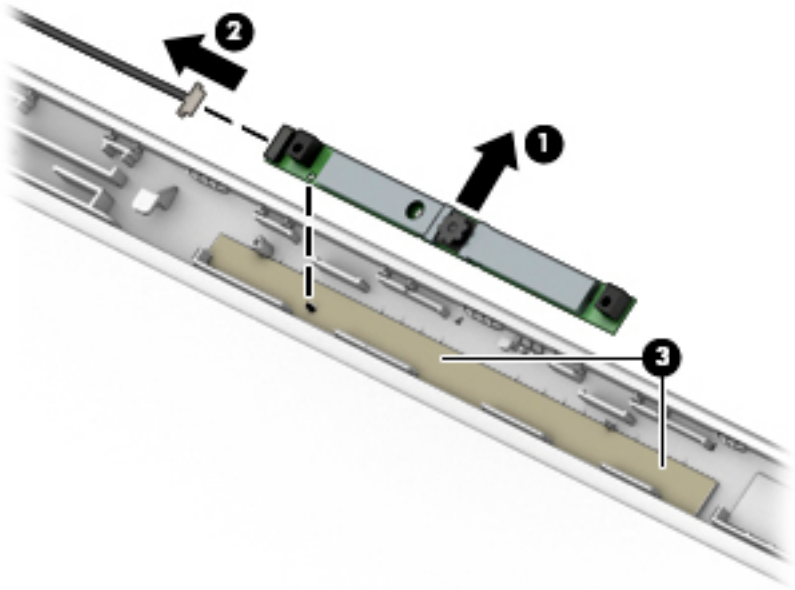
   Standard webcam

   a. Position the display assembly with the top edge toward you.

   b. Pry up to disengage the camera/microphone module from the adhesive that secures it to the display **(1)**.

   c. Disconnect the cable **(2)** from the module.

d. Remove the tape from the enclosure **(3)**. Replacement cameras come with tape already installed.



4. To remove the infrared (IR) camera/microphone module:

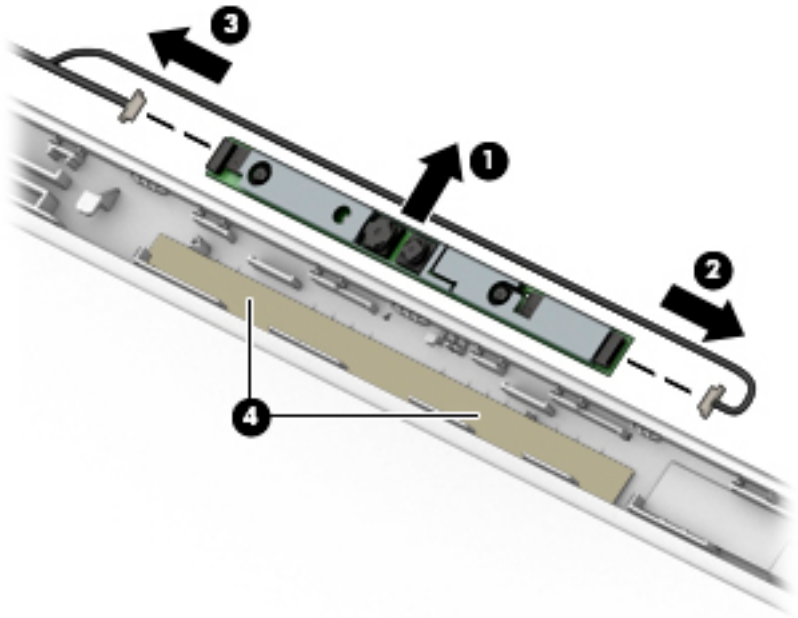
IR webcam

a. Position the display assembly with the top edge toward you.

b. Pry up to disengage the camera/microphone module from the adhesive that secures it to the display **(1)**.

c. Disconnect the cables from the right side of the camera **(2)** and the left side of the camera **(3)**.

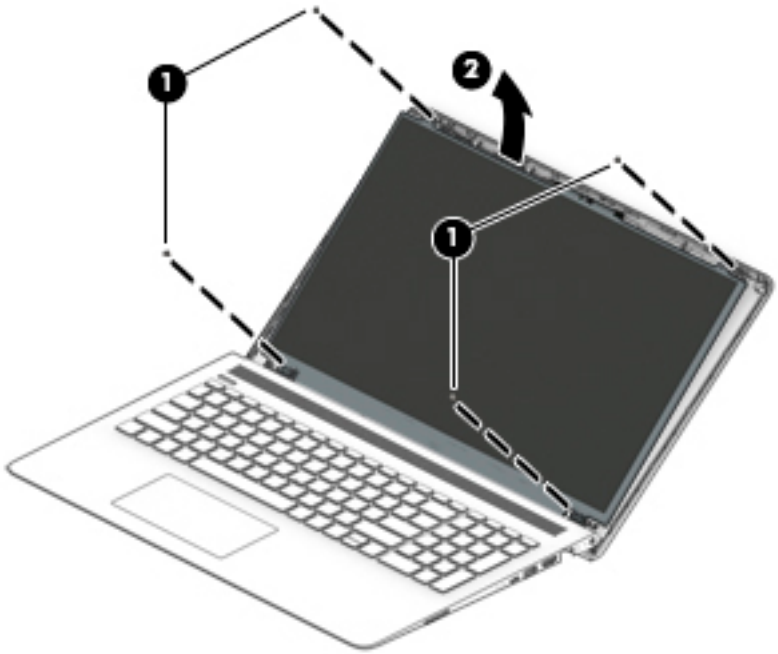
d. Remove the tape from the enclosure **(4)**. Replacement cameras come with tape already installed.



5. To remove the display panel:

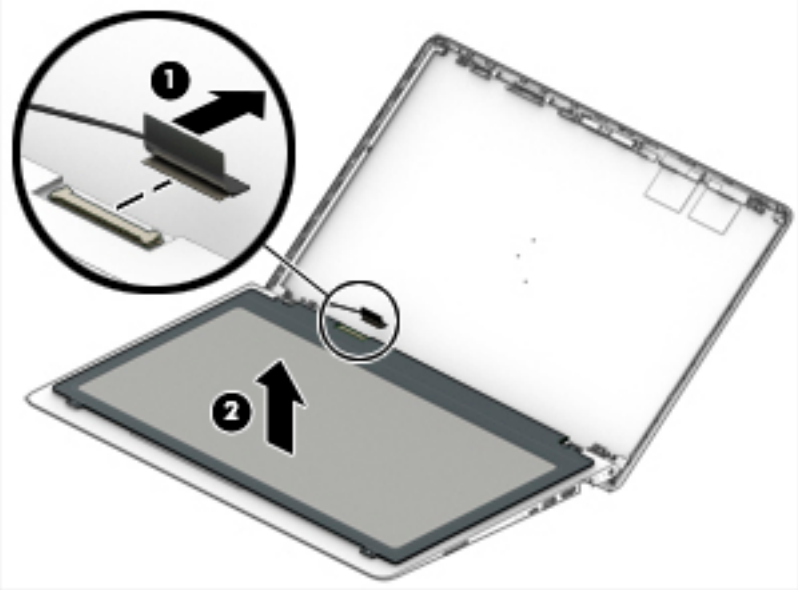
   a. Remove the four Phillips PM2.0×3.0 screws **(1)** that secure the display panel to the top of the enclosure.

   b. Rotate the display panel onto the keyboard **(2)** to gain access to the display cable connection on the back of the panel.



c. On the back of the display panel, release the adhesive strip that secures the display panel cable to the display panel, and then disconnect the cable **(1)**.

d. Remove the display panel from the display enclosure **(2)**.



Reverse this procedure to reassemble and install the display assembly components.

Rubber feet

Description	Spare part number
Rubber feet for use in black and green models	926889-001
Rubber feet for use in black and white models	926890-001

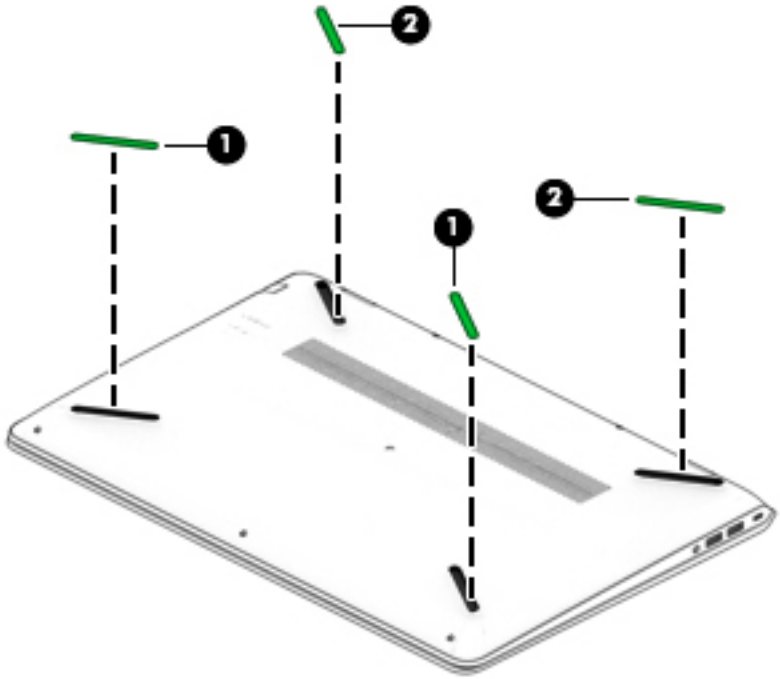
Before removing the rubber feet, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.

To remove the rubber feet:

▲ Peel the lower rubber feet **(1)** and upper rubber feet **(2)** from the bottom of the computer.

NOTE: The lower feet and upper feet are different sizes.



Reverse this procedure to install the rubber feet.

Bottom cover

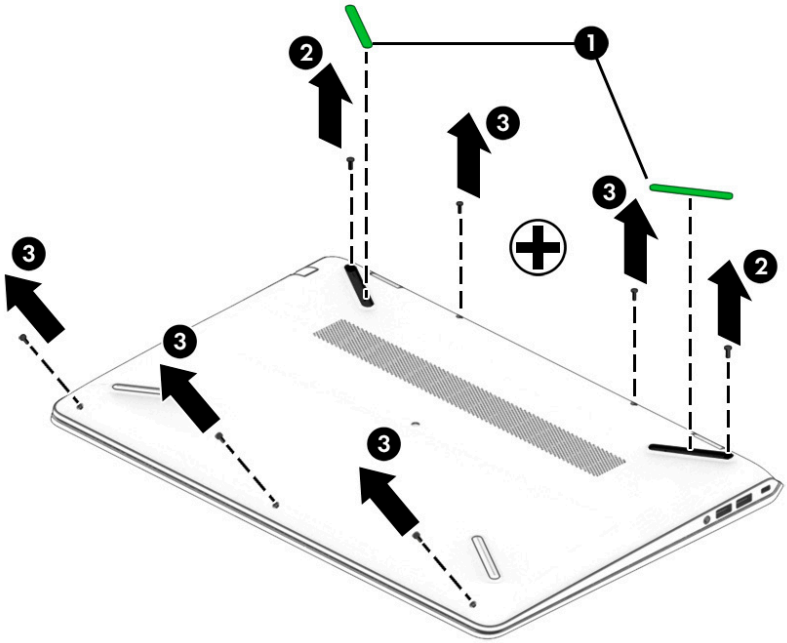
Description	Spare part number
Bottom cover for use in black and green models	926864-001
Bottom cover for use in black and white models	926863-001

Before removing the bottom cover, follow these steps:

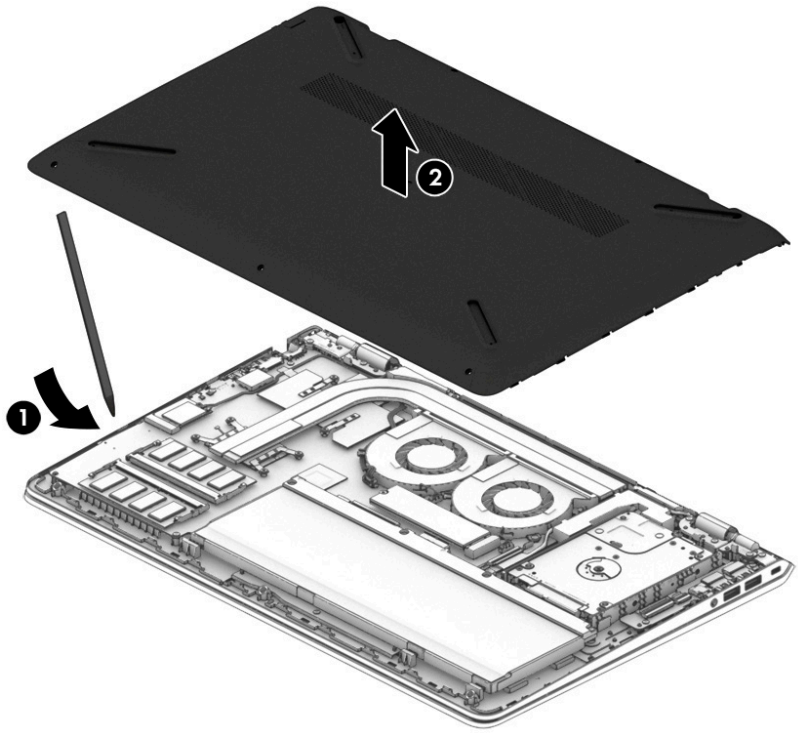
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the battery (see Battery on page 37).

To remove the bottom cover:

1. Position the computer upside down with the front toward you.
2. Remove the two upper rubber feet **(1)**.
3. Remove the two Phillips PM2.5×6.0 screws **(2)** under the two upper rubber feet that secure the bottom cover to the computer.
4. Remove the five Phillips PM2.0×6.0 screws **(3)** that secure the bottom cover to the computer.



5. Using a non-marking tool, start prying near a corner of the computer and work around to the back to separate the bottom cover from computer **(1)**, and then remove the bottom cover **(2)**.



Reverse this procedure to install the bottom cover.

Battery

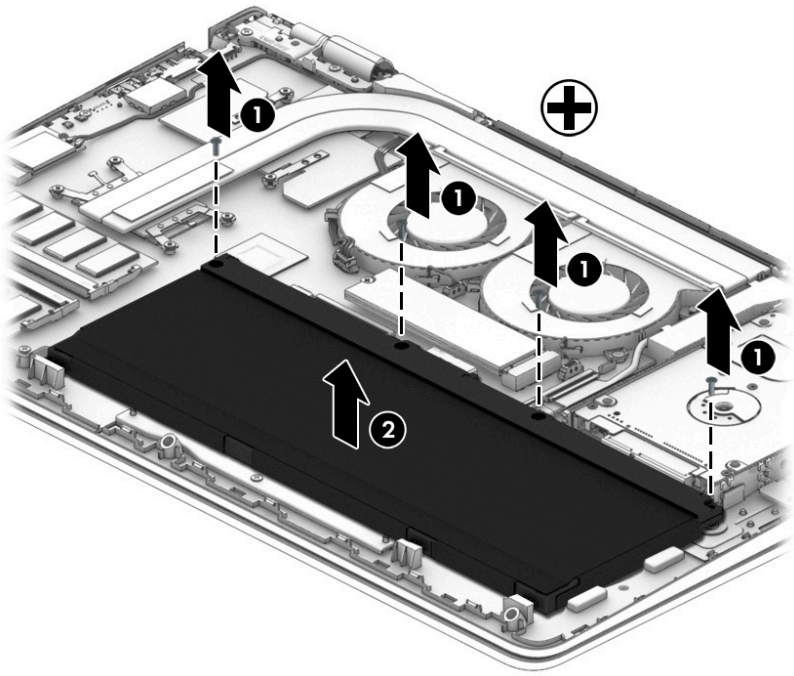
Description	Spare part number
Battery, 4 cell, 70 Wh, 4.55 Ah	917724-855

Before disassembling the computer, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).

To remove the battery:

1. Remove the four Phillips PM2.0×4.0 screws **(1)** that secure the battery to the computer.
2. Lift the battery **(2)** up and out of the computer.



Reverse this procedure to install the battery.

WLAN module

Description	Spare part number
Intel Dual Band Wireless-AC 7265 802.11AC 2x2 WiFi + BT 4.2 Combo Adapter (non-vPro)	901229-855

CAUTION: 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 support.

Before removing the WLAN module, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).

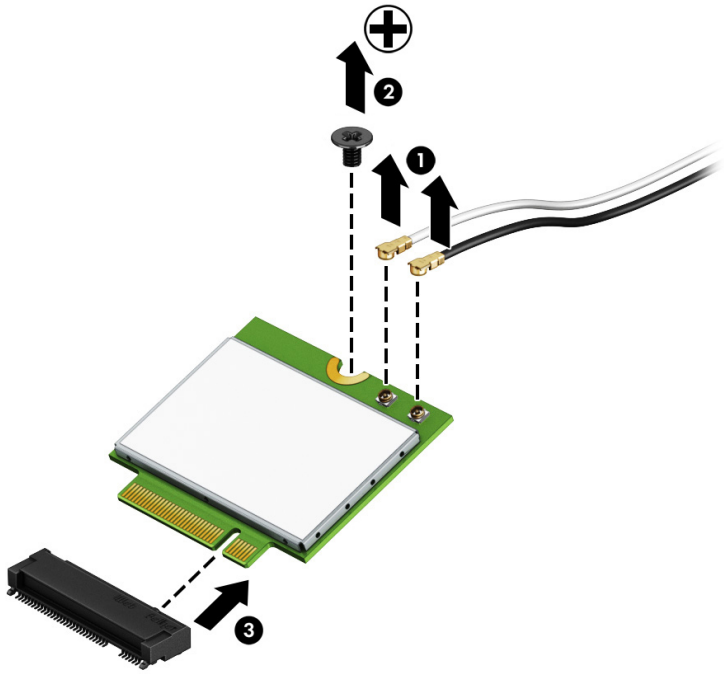
To remove the WLAN module:

1. Disconnect the WLAN antenna cables **(1)** from the terminals on the WLAN module.

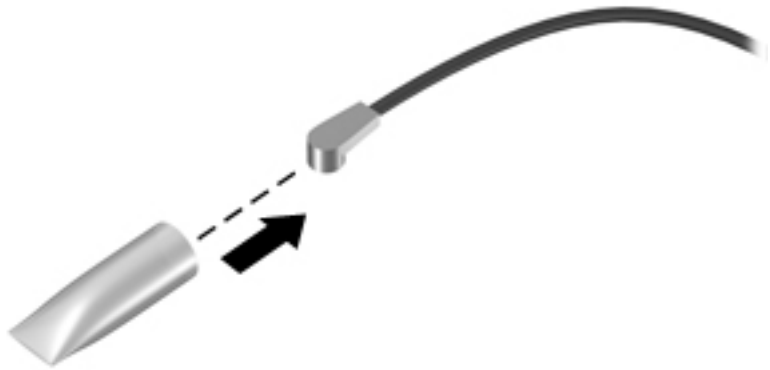
NOTE: The WLAN antenna cable labeled “1” connects to the WLAN module “Main” terminal labeled “1”. The WLAN antenna cable labeled “2” connects to the WLAN module “Aux” terminal labeled “2” (if applicable).

2. Remove the Phillips PM2.0×3.0 screw **(2)** that secures the WLAN module to the system board. (The WLAN module tilts up.)

3. Remove the WLAN module by pulling the module away from the slot at an angle **(3)**.



NOTE: If the WLAN antennas are not connected to the terminals on the WLAN module, the protective sleeves must be installed on the antenna connectors, as shown in the following illustration.



Reverse this procedure to install the WLAN module.

Memory module

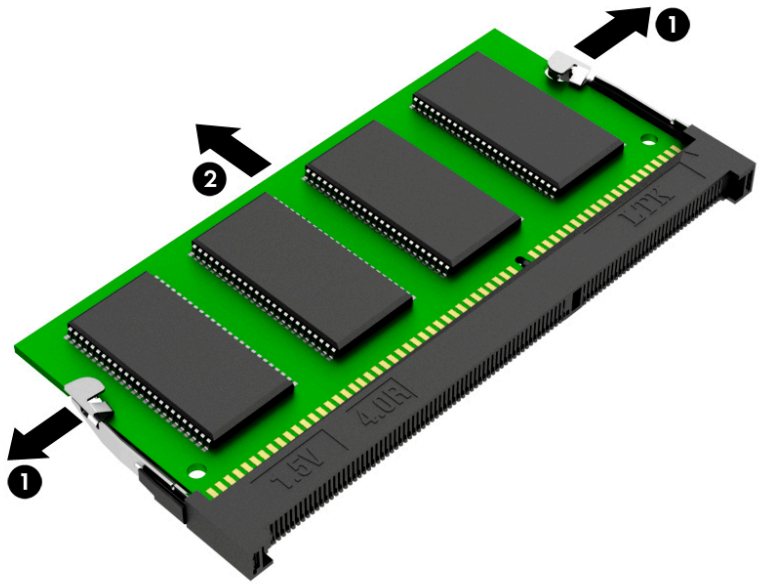
Description	Spare part number
Memory module (PC4-2400)	
8-GB	862398-855
4-GB	862397-855
2-GB	864271-855

Before removing a memory module, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).

To remove a memory module:

1. Spread the retaining tabs **(1)** on each side of the memory module slot to release the memory module. (The memory module tilts up.)
2. Remove the memory module **(2)** by pulling it away from the slot at an angle.



Reverse this procedure to install a memory module.

Hard drive

NOTE: The hard drive spare part kit does not include the hard drive bracket or cable.

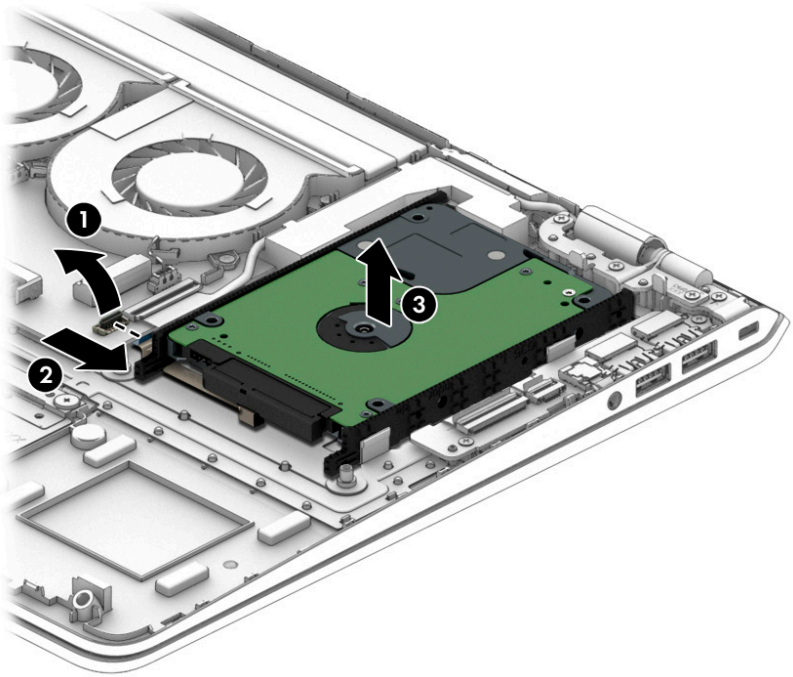
Description	Spare part number
Hard drives:	
2-TB, 5400-rpm	912487-855
1-TB, 5400-rpm	766644-005
Hard drive bracket	926877-001
Hard drive cable	926874-001

Before removing the hard drive, follow these steps:

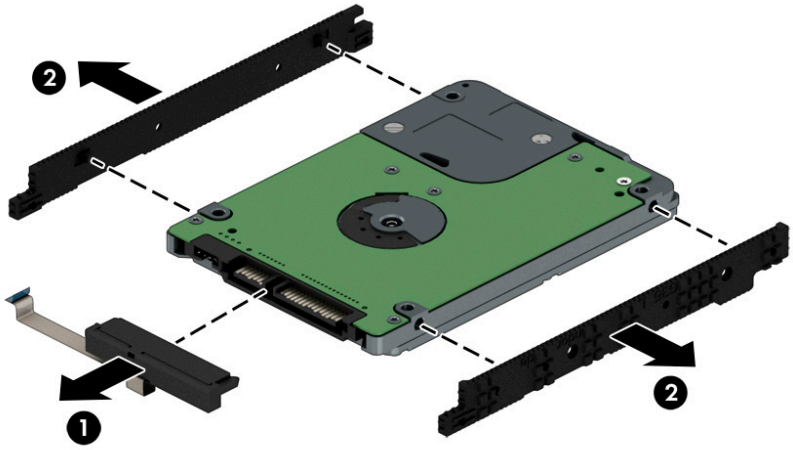
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).

To remove the hard drive:

1. Disconnect the hard drive connector cable from the system board **(1)**.
2. Use the tab on the bracket at the front of the hard drive to lift the drive **(2)**.
3. Remove the hard drive from the computer **(3)**.



4. To remove the hard drive bracket and connector, pull the connector away from the hard drive **(1)**.
5. Pull each bracket away from the sides of the hard drive **(2)**.



Reverse this procedure to reassemble and install the hard drive.

Solid-state drive (SSD)

Description	Spare part number
256 GB, PCIe	847109-020
128 GB, PCIe	912322-007
128 GB, SATA-3	827560-052

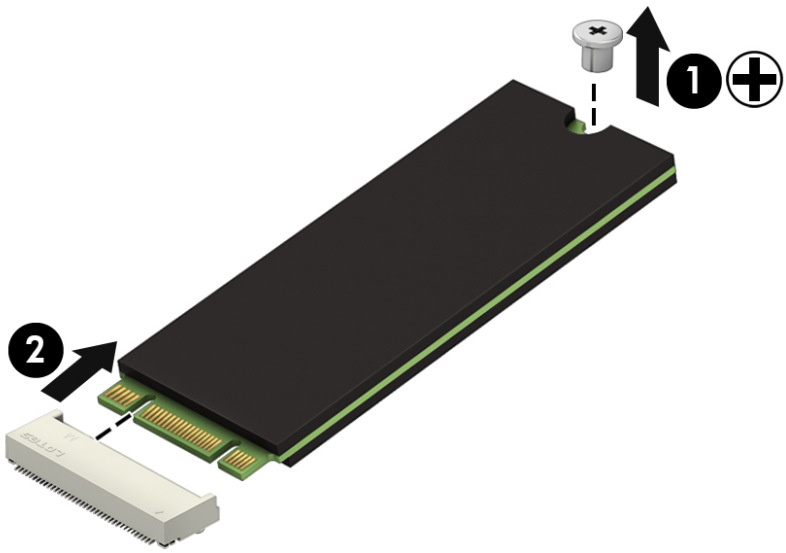
Before removing the solid-state drive, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).

Remove the solid-state drive:

1. Remove the Phillips PM2.0×2.0 screw **(1)** that secures the drive to the system board.
2. Remove the drive **(2)** by pulling it away from the connector.

NOTE: Solid-state drives are designed with notches to prevent incorrect insertion.



Reverse this procedure to reassemble and install the solid-state drive.

Fan assembly

Description	Spare part number
Fan assembly	926875-001

NOTE: To properly ventilate the computer, allow at least **7.6 cm** (3.0 in) of clearance on the left side of the computer. The computer uses an electric fan for ventilation. The fan is controlled by a temperature sensor and is designed to turn on automatically when high temperature conditions exist. These conditions are affected by high external temperatures, system power consumption, power management/battery conservation configurations, battery fast charging, and software requirements. Exhaust air is displaced through the ventilation grill located on the left side of the computer.

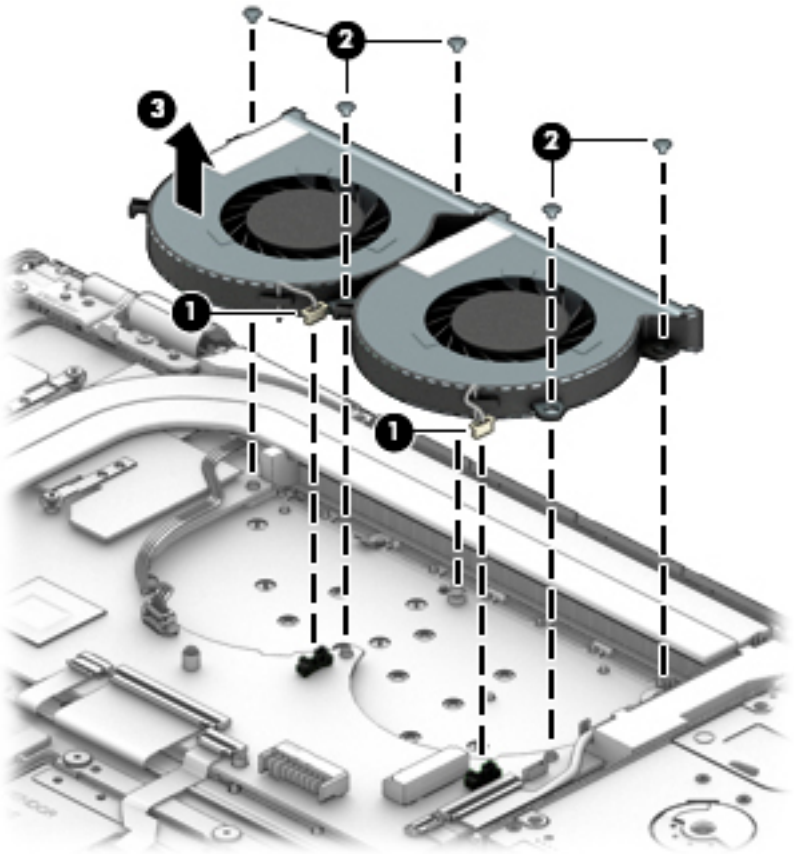
Before removing the fan assembly, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).

To remove the fan assembly:

1. Disconnect both fan cables from the system board **(1)**.
2. Remove the five Phillips PM2.0×4.0 screws **(2)** that secure the fan to the computer.

3. Remove the fan assembly from the computer **(3)**.



Reverse this procedure to install the fan assembly.

Heat sink

NOTE: The heat sink spare part kit includes replacement thermal materials.

Description	Spare part number
Heat sink for use in models with AMD Radeon graphics	926876-001
Heat sink for use in models with Nvidia GeForce graphics	930615-001

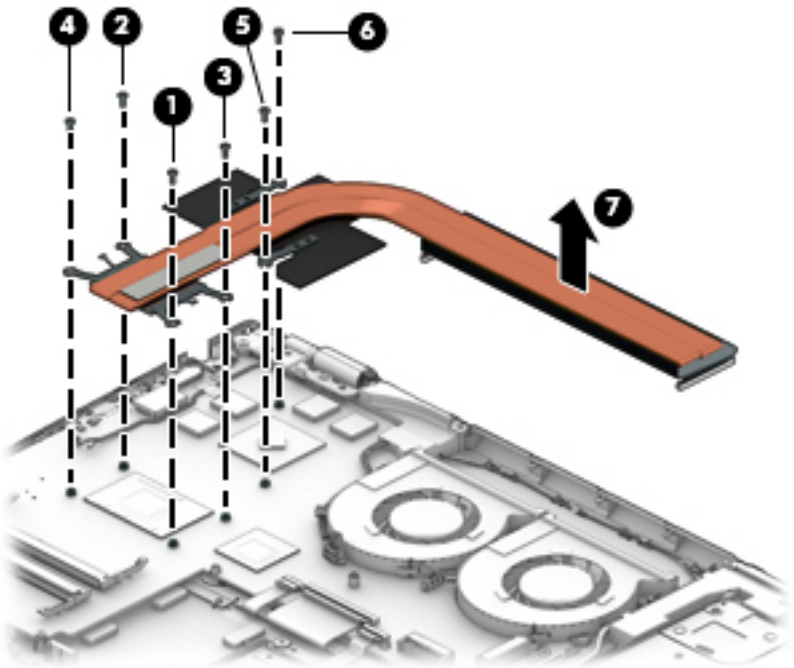
NOTE: To properly ventilate the computer, allow at least **7.6 cm** (3.0 in) of clearance on the left side of the computer. The computer uses an electric fan for ventilation. The fan is controlled by a temperature sensor and is designed to turn on automatically when high temperature conditions exist. These conditions are affected by high external temperatures, system power consumption, power management/battery conservation configurations, battery fast charging, and software requirements. Exhaust air is displaced through the ventilation grill located on the left side of the computer.

Before removing the heat sink, follow these steps:

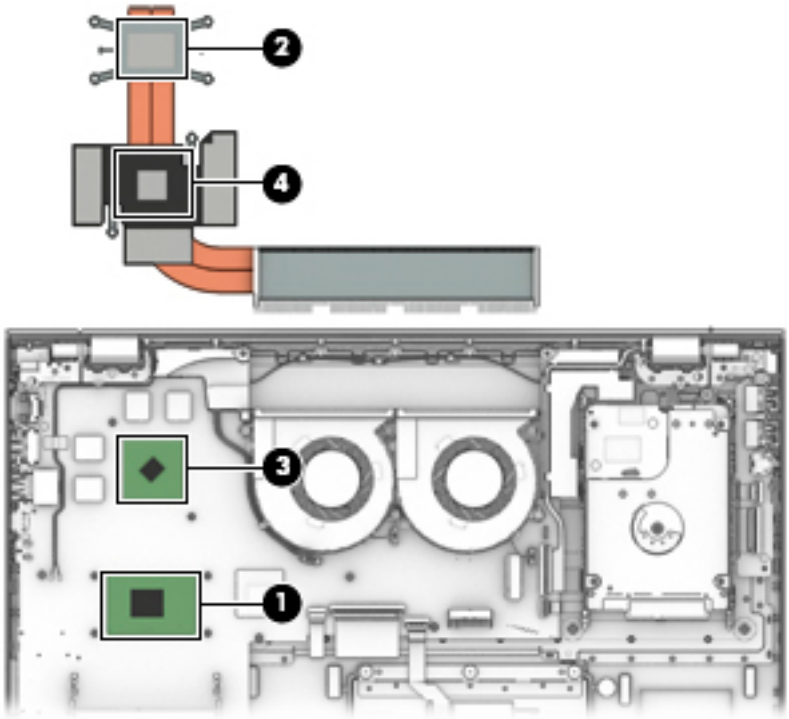
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).

To remove the heat sink:

1. In the order indicated on the heat sink, remove the screws **(1)** – **(6)** that secure the heat sink to the system board.
2. Remove the heat sink from the system board **(7)**.



- Thermal paste is used on the processor and associated heat sink area **(1)(2)**, as well as the graphics chip and associated heat sink area **(3)(4)**.



Reverse this procedure to reassemble and install the heat sink.

TouchPad board

Description	Spare part number
TouchPad board	926882-001
TouchPad bracket	926879-001
TouchPad board cable	926873-001

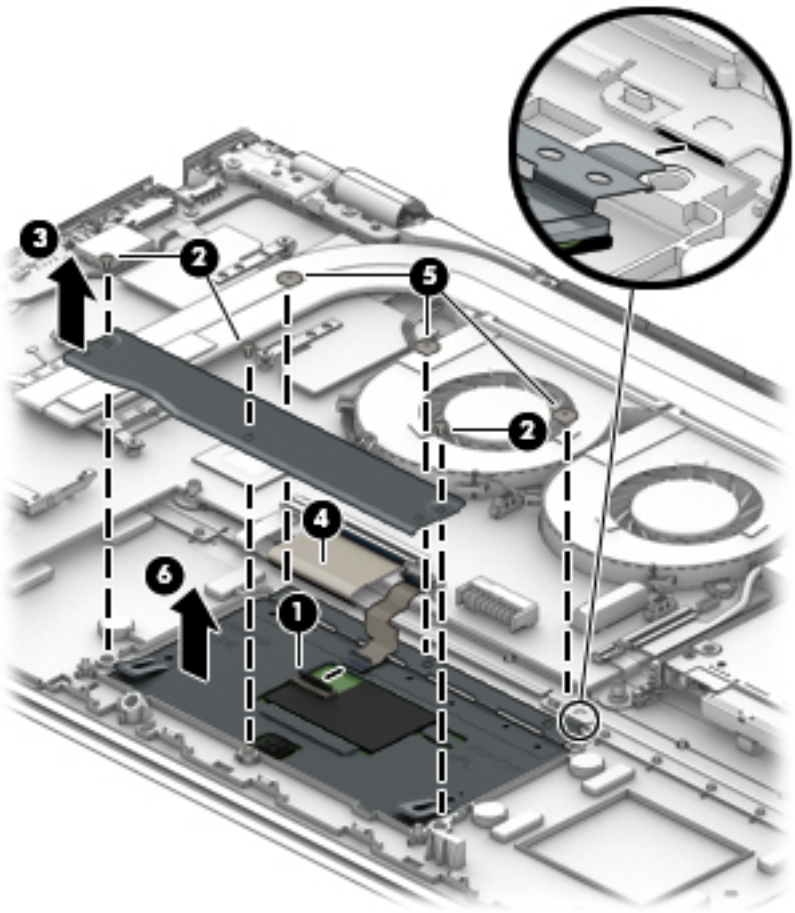
Before removing the TouchPad board, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).

To remove the TouchPad board:

1. Disconnect the cable from the TouchPad board **(1)**.
2. Using a Phillips P1 screwdriver, remove the three Phillips PM2.0×2.5 screws **(2)** that secure the bracket to the computer, and the lift the bracket from atop the TouchPad **(3)**.
3. Lift keyboard cable up to access screws underneath **(4)**.

4. Using a Phillips P0 screwdriver, remove the three Phillips broad head PM2.0×2.0 screws **(5)** that secure the TouchPad board to the computer, and the lift the board from the computer **(6)**.



Reverse this procedure to install the TouchPad board.

USB board

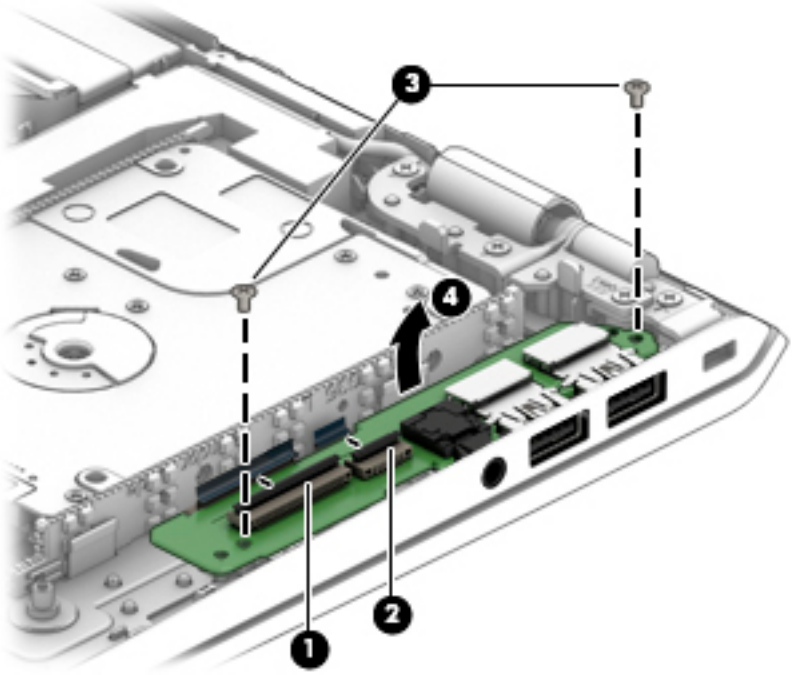
Description	Spare part number
USB board for use in models with AMD Radeon graphics	926883-001
USB board for use in models with Nvidia GeForce graphics	926884-001
USB board cable	926871-001

Before removing the USB board, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).

To remove the USB board:

1. Disconnect the larger **(1)** and smaller **(2)** cables from the USB board.
2. Remove the two Phillips PM2.0×4.0 screws **(3)** that secure the USB board to the computer.
3. Rotate the back of the board up and pull it away from the side of the computer to remove it **(4)**.



Reverse this procedure to install the USB board.

Power button board

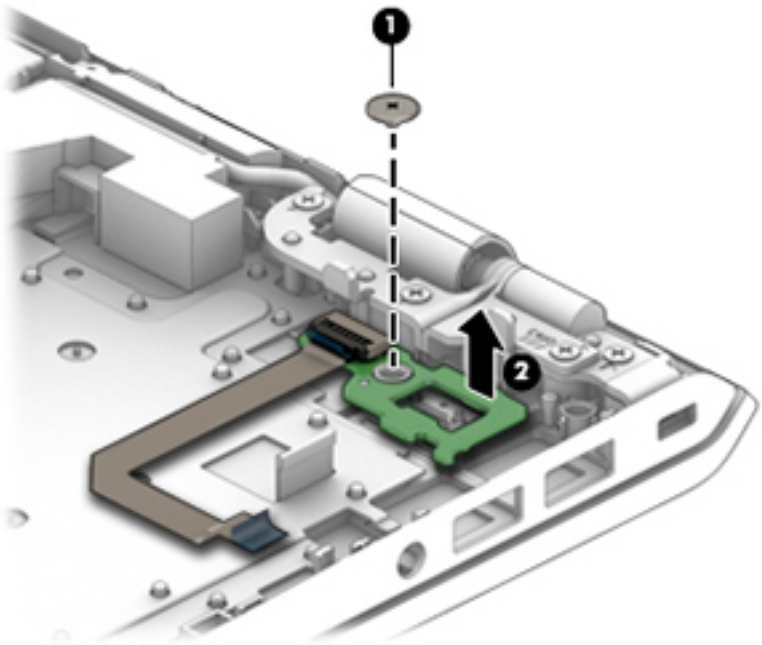
Description	Spare part number
Power button board for use in black and green models with AMD Radeon graphics	926885-001
Power button board for use in black and white models with AMD Radeon graphics	926886-001
Power button board for use in black and green models with Nvidia GeForce graphics	926887-001
Power button board for use in black and white models with Nvidia GeForce graphics	926888-001
Power button board cable	926872-001

Before removing the power button board, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).
6. Remove the USB board (see USB board on page 50).

To remove the power button board:

1. Using a Phillips P0 screwdriver, remove the Phillips broad head PM2.0×2.0 screw **(1)** that secures the power button board to the computer
2. Remove the power button board from the computer **(2)**.



Reverse this procedure to install the power button board and cable.

System board

NOTE: The system board spare part kit includes replacement thermal materials.

Description	Spare part number
System board (includes replacement thermal materials):	
All system boards use the following part numbers:	
xxxxxx-001: Non-Windows operating systems	
xxxxxx-601: Windows 10 operating system	
For use in models with Nvidia GeForce discrete graphics memory:	
• Intel Core i7-7700HQ processor and 4 GB of discrete graphics memory	926305-xx1
• Intel Core i7-7700HQ processor and 2 GB of discrete graphics memory	926304-xx1
• Intel Core i5-7300HQ processor and 4 GB of discrete graphics memory	926307-xx1
• Intel Core i5-7300HQ processor and 2 GB of discrete graphics memory	926306-xx1
For use in models with AMD Radeon discrete graphics memory:	
• Intel Core i7-7700HQ processor	926308-xx1
• Intel Core i5-7300HQ processor	926309-xx1

Before removing the system board, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).
6. Remove the WLAN module (see WLAN module on page 38).
7. Remove the memory module (see Memory module on page 40).
8. Remove the hard drive (see Hard drive on page 41).
9. Remove the solid-state drive (see Solid-state drive (SSD) on page 43).
10. Remove the fan assembly (see Fan assembly on page 44).

To remove the system board:

1. Position the computer upright, and then disconnect the following cables from the system board:

   (1): Display cable

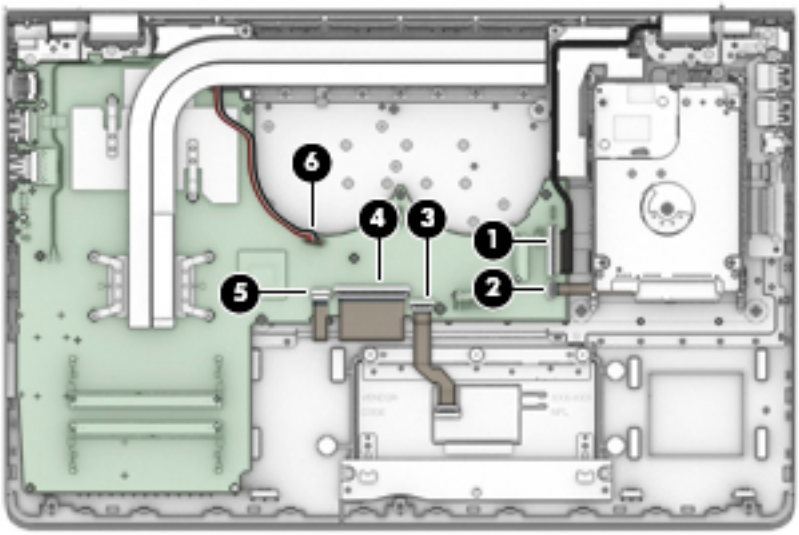
   (2): Hard drive connector cable

   (3): TouchPad cable

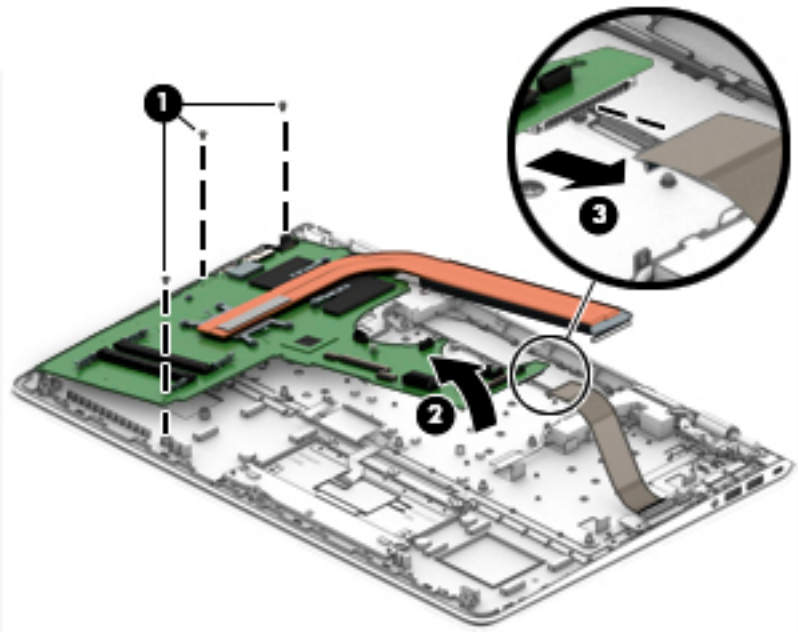
   (4): Keyboard cable

(5): Keyboard backlight cable

(6): Speaker cable

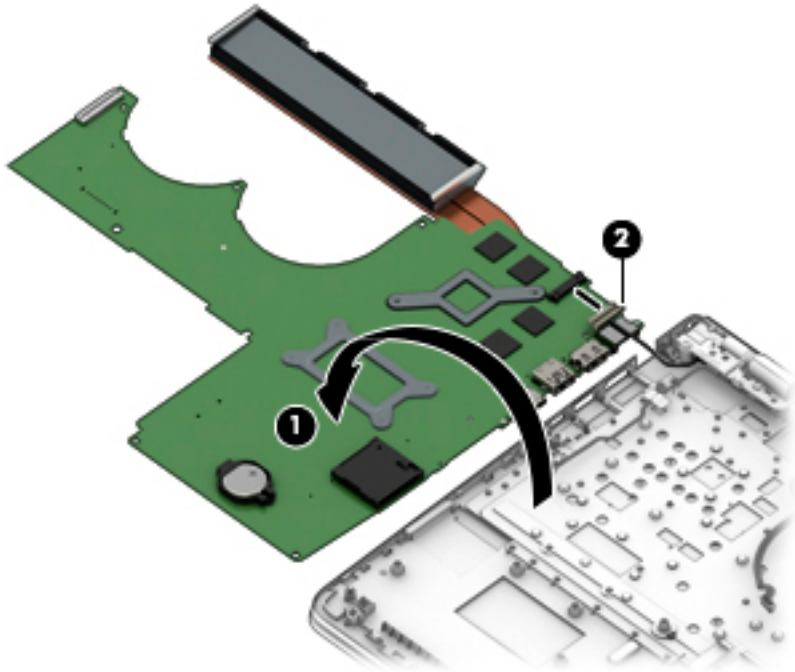


2. Remove the three Phillips PM2.0×4.0 screws **(1)** that secure the system board to the computer.
3. Rotate the side of the board upward **(2)**, and then disconnect the USB board cable from underneath the system board **(3)**.



4. Rotate the system board upside down to gain access to the cable connected to the bottom **(1)**

5. Disconnect the power connector cable from the system board **(2)**.



Reverse this procedure to install the system board.

RTC battery

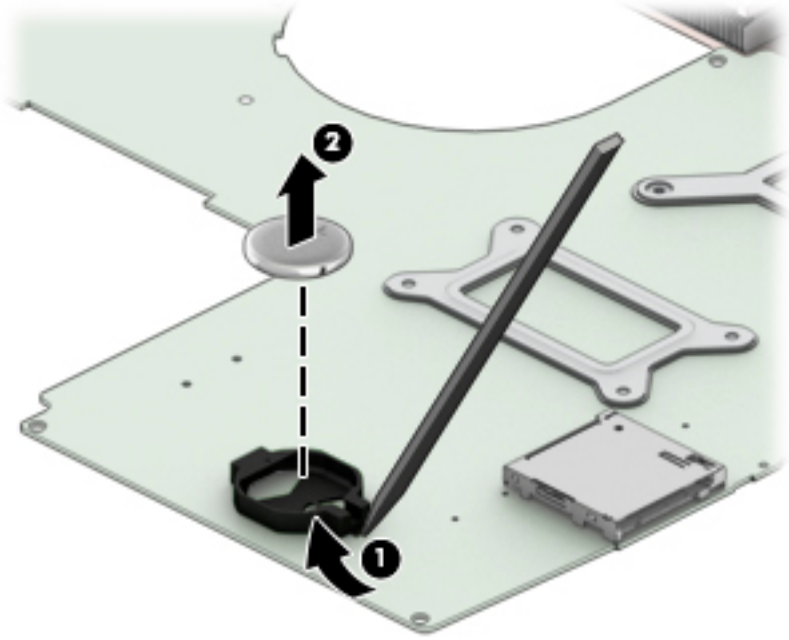
Description	Spare part number
RTC battery	not spared

Before removing the RTC battery, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).
6. Remove the WLAN module (see WLAN module on page 38).
7. Remove the memory module (see Memory module on page 40).
8. Remove the hard drive (see Hard drive on page 41).
9. Remove the solid-state drive (see Solid-state drive (SSD) on page 43).
10. Remove the fan assembly (see Fan assembly on page 44).
11. Remove the system board (see System board on page 52).

To remove the RTC battery:

▲ On the bottom of the system board, use a thin tool or screwdriver to disengage the battery from the socket **(1)**, and then remove the battery **(2)**.



Reverse this procedure to install the RTC battery.

Speakers

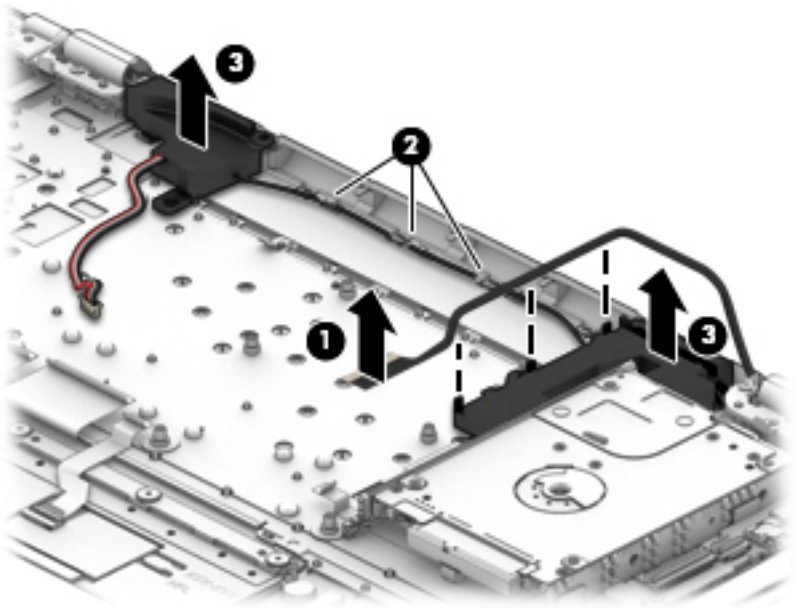
Description	Spare part number
Speakers (includes left and right speakers and cable)	926892-001

Before removing the speakers, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).
6. Remove the system board (see System board on page 52).

To remove the speakers:

1. Remove the display cable from the right speaker **(1)**.
2. Remove the cable from its routing path along the bottom of the computer **(2)**, and then remove the speakers from the computer **(3)**.



Reverse this procedure to install the speakers.

Display assembly

Description	Spare part number
Touch screen display for use in black and green models	926881-001
Touch screen display for use in black and white models	928180-001

This section describes removing the display assembly and disassembling display subcomponents. You must remove the display from the computer to disassemble display subcomponents.

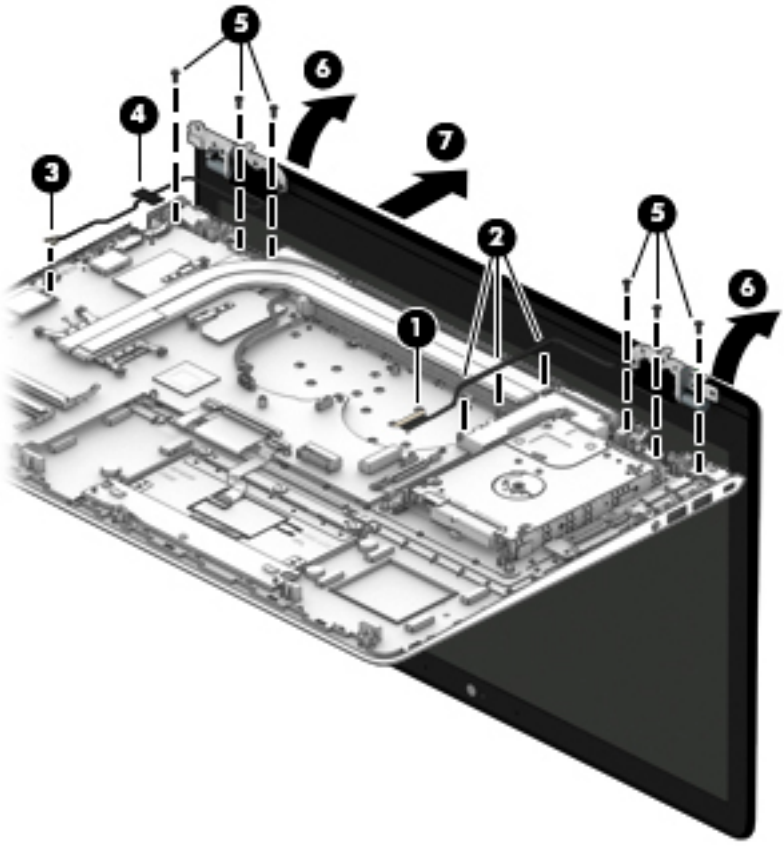
Before removing the display assembly, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).
6. Remove the fan assembly (see Fan assembly on page 44).

To remove the display assembly:

1. Disconnect the display panel cable from the system board **(1)**.
2. Remove the display cable from its routing path in the right speaker **(2)**.
3. Disconnect the wireless antennas from the WLAN module **(3)**.
4. Lift the tape and remove the antenna cables from their routing path in the computer **(4)**.
5. Remove the six Phillips PM2.5×7.0 screws **(5)** (three from each hinge) and one broadhead Phillips PM2.0×2.0 screw **(4)** (on the left hinge) that secures the display assembly to the computer.
6. Lift the display to bend the hinges upward **(6)**.

7. Separate the display from the computer **(7)**.



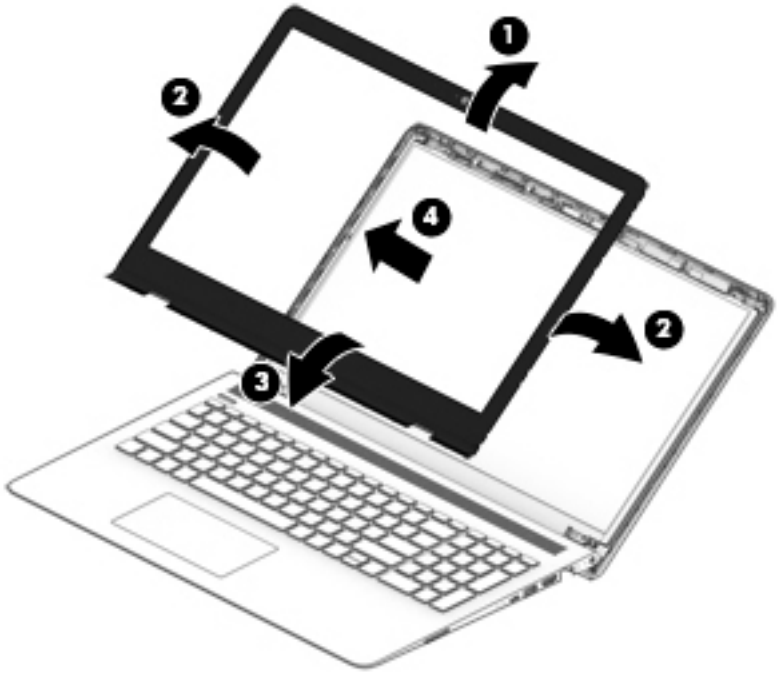
If it is necessary to replace any of the display assembly subcomponents:

1. To remove the display bezel:

   a. Flex the inside of the top edge **(1)**, the left and right edges **(2)**, and the bottom edge **(3)** of the display bezel until the bezel disengages from the display enclosure.

b. Remove the display bezel **(4)**.

NOTE: The display will not be connected to the computer as shown in the following image.



2. To remove the standard camera/microphone module:

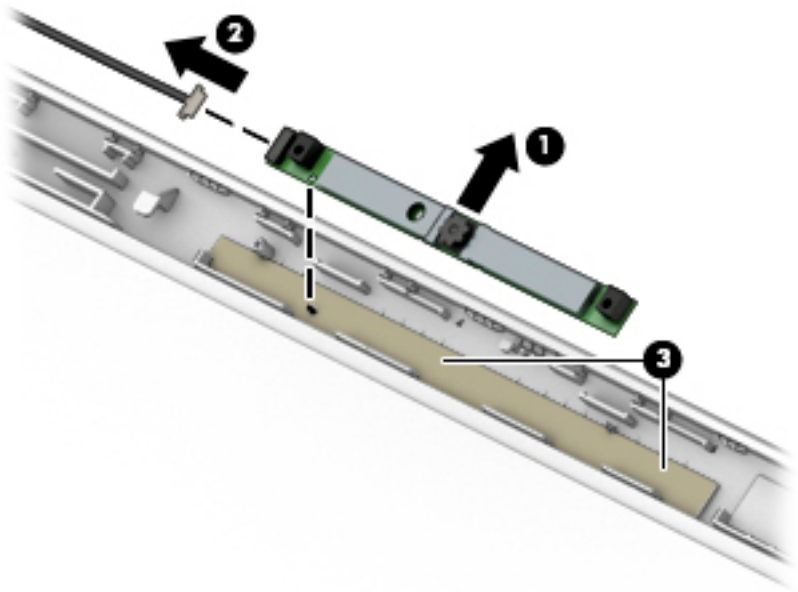
Standard webcam

a. Position the display assembly with the top edge toward you.

b. Pry up to disengage the camera/microphone module from the adhesive that secures it to the display **(1)**.

c. Disconnect the cable **(2)** from the module.

d. Remove the tape from the enclosure **(3)**. Replacement cameras come with tape already installed.



3. To remove the infrared (IR) camera/microphone module:

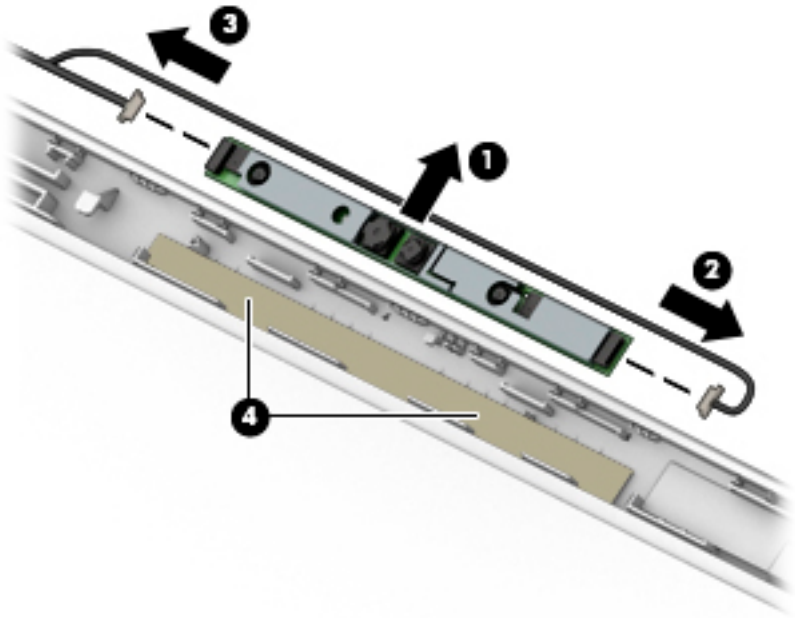
   IR webcam

   a. Position the display assembly with the top edge toward you.

   b. Pry up to disengage the camera/microphone module from the adhesive that secures it to the display **(1)**.

   c. Disconnect the cables from the right side of the camera **(2)** and the left side of the camera **(3)**.

d. Remove the tape from the enclosure **(4)**. Replacement cameras come with tape already installed.

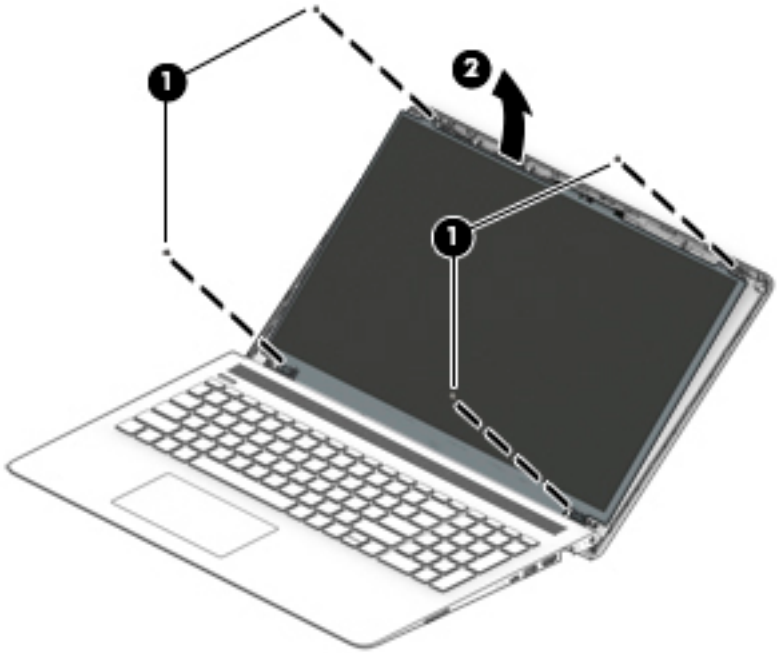


4. To remove the display panel:

   a. Remove the four Phillips PM2.0×3.0 screws **(1)** that secure the display panel to the enclosure.

   b. Rotate the display panel onto the keyboard **(2)** to gain access to the display cable connection on the back of the panel.

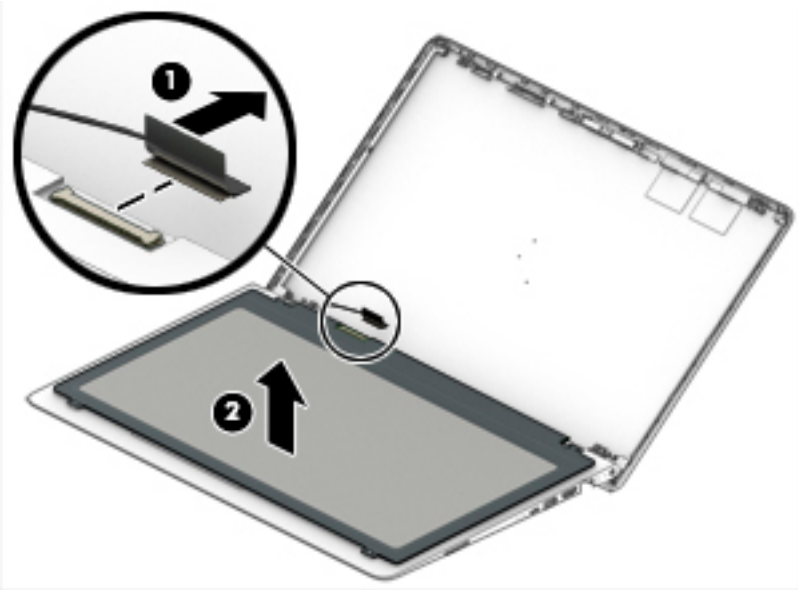
   NOTE: The display will not be connected to the computer as shown in the following image.



c. On the back of the display panel, release the adhesive strip that secures the display panel cable to the display panel, and then disconnect the cable **(1)**.

d. Remove the display panel from the computer **(2)**.

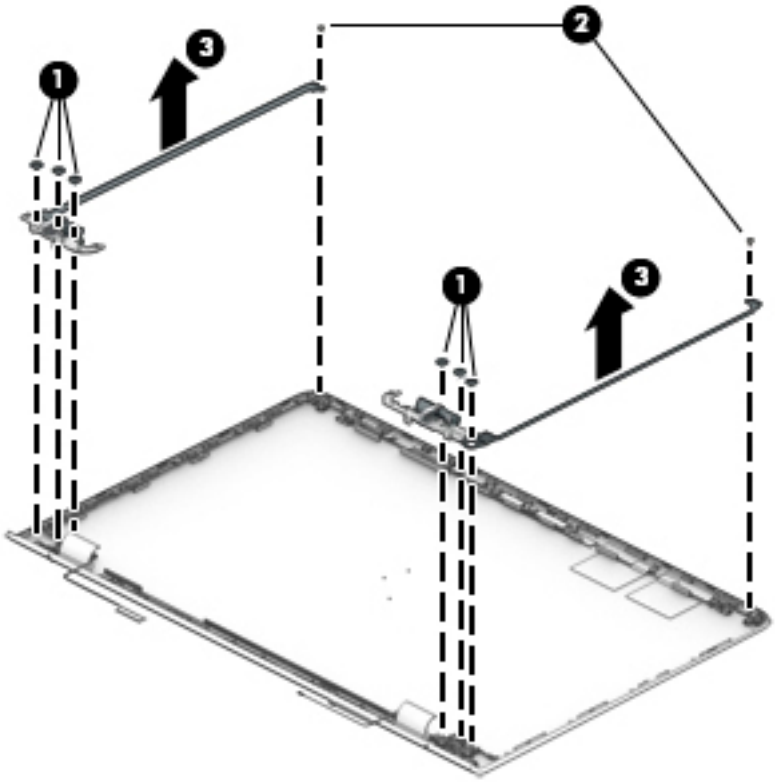
NOTE: The display will not be connected to the computer as shown in the following image.



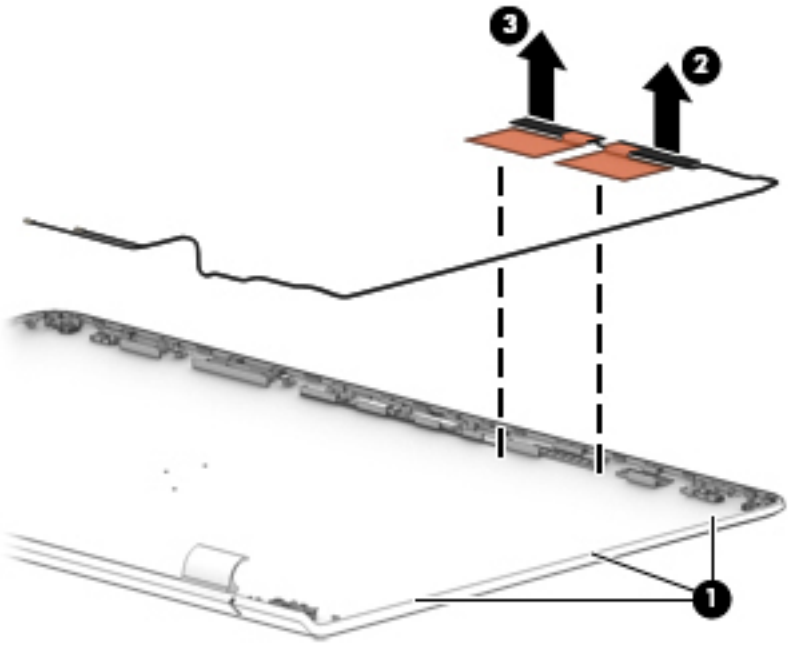
5. To remove the display hinges:

a. Remove the three Phillips broad head PM2.5×2.5 screws **(1)** and the Phillips PM2.5×3.0 screw **(2)** that secure each hinge to the display enclosure.

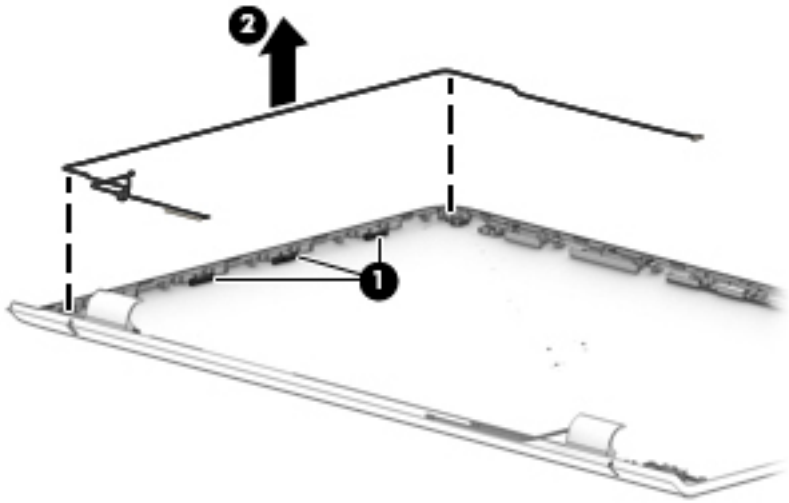
b. Remove the display hinges **(3)**.



6. To remove the wireless antennas an cables, release the cables from the clips built into the side of the display enclosure **(1)**, and then remove the antennas and cables **(2)(3)**.



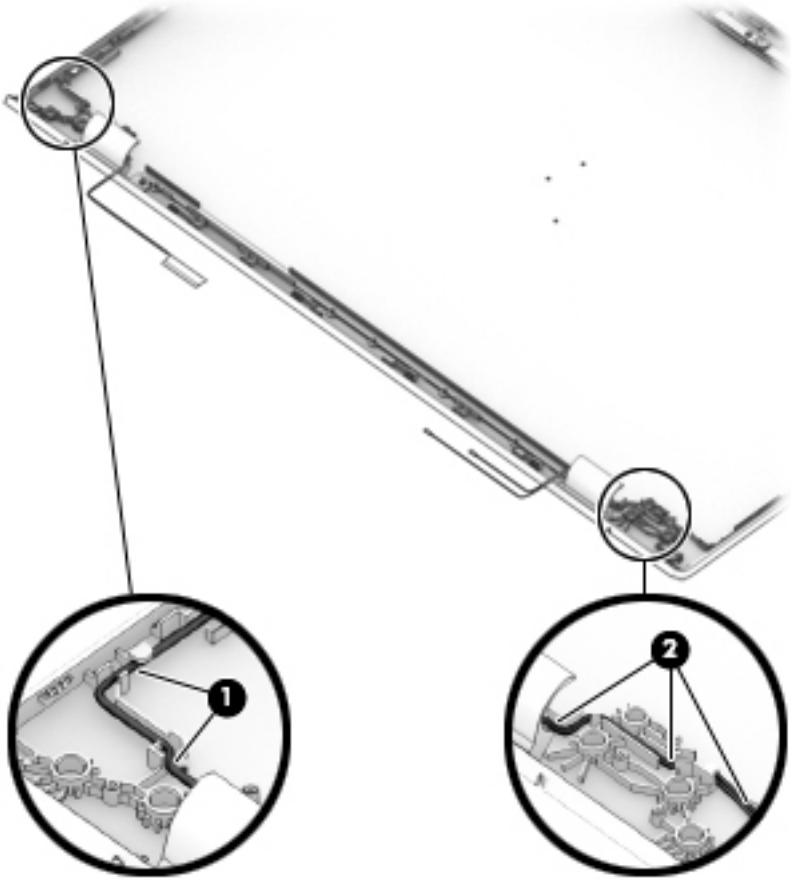
7. To remove the display/camera cable, remove the cable from the clips built into the side of the display enclosure **(1)**, and then remove the cable from the display enclosure **(2)**.



8. Use the following image to determine proper cable routing around the left hinge for the camera/display cable and the wireless antenna cables.

   (1): Display/camera cable routing path

   (2): Antenna cable routing path



9. If replacing the display enclosure, be sure that the subcomponents (including the camera/microphone module, the antenna receivers, and all associated cables and hardware) are transferred to the new enclosure.

Reverse this procedure to reassemble and install the display assembly.

Power connector cable

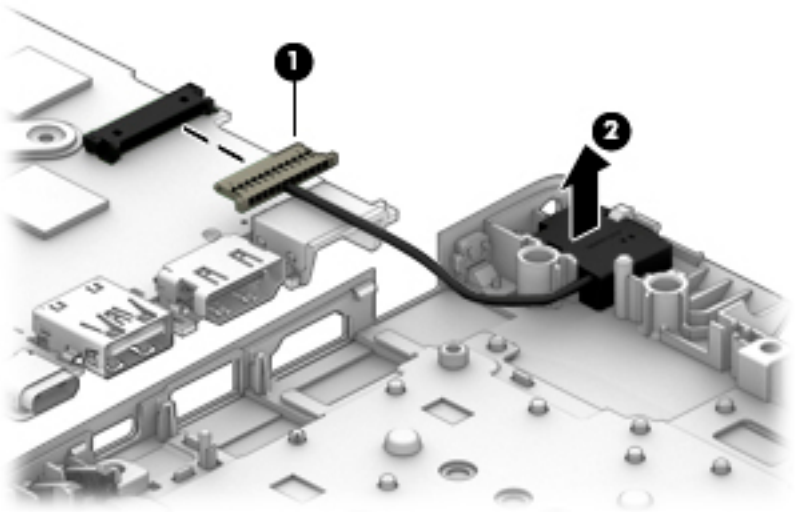
Description	Spare part number
Power connector cable	926430-001

Before removing the power connector cable, follow these steps:

1. 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.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see Bottom cover on page 35).
5. Remove the battery (see Battery on page 37).
6. Remove the display (see Display assembly on page 57).

To remove the power connector cable:

1. Disconnect the power connector cable from the system board **(1)**.
2. Remove the power connector cable **(2)**.



Reverse this procedure to install the power connector cable.

Top cover/keyboard

The top cover/keyboard spare part remains after all other spare parts have been removed.

The top cover/keyboard spare part kit includes the keyboard, keyboard cable and the keyboard backlight cable.

In this section, the first table provides the main spare part number for the keyboard. The second table provides the country codes.

NOTE: All top cover/keyboard spare part kits include TouchPad.

Description	Spare part number
Keyboard for use in black and green models	926893-xxx
Keyboard for use in black and white models	926894-xxx

For use in country or region	Spare part number	For use in country or region	Spare part number	For use in country or region	Spare part number
Belgium	-A41	Israel	-BB1	South Korea	-AD1
Bulgaria	-261	Italy	-061	Spain	-071
English/French Canada	-DB1	Japan	-291	Switzerland	-BG1
Czech Republic and Slovakia	-FL1	The Netherlands	-B31	Taiwan	-AB1
Denmark, Finland, and Norway	-DH1	Portugal	-131	Thailand	-281
France	-051	Romania	-271	Turkey	-141
Germany	-041	Russia	-251	United Kingdom	-031
Greece	-151	Saudi Arabia	-171	United States	-001
Hungary	-211	Slovenia	-BA1		

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)

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

▲ Turn on or restart the computer, quickly press esc, and then press f10.

Updating Setup Utility (BIOS)

Updated versions of Setup Utility (BIOS) may 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 –

     Click the question mark icon in the taskbar.
  2. Select **My PC**, and then select **Specifications**.
- Setup Utility (BIOS)
  1. Start Setup Utility (BIOS) (see Starting Setup Utility (BIOS) on page 69).
  2. Select **Main**, select **System Information**, and then make note of the BIOS version.
  3. Select **Exit**, select **No**, and then follow the on-screen instructions.

To check for later BIOS versions, see Downloading a BIOS update on page 70.

Downloading a BIOS update

CAUTION: 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.

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

   – or –

   Click the question mark icon in the taskbar.

2. Click **Updates**, and then click **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 may 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.

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. Click 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 Backing up, restoring, and recovering

This chapter provides information about the following processes. The information in the chapter is standard procedure for most products.

- Creating recovery media and backups
- Restoring and recovering your system

For additional information, refer to the HP Support Assistant app.

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

– or –

Select the question mark icon in the taskbar.

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.

Creating recovery media and backups

The following methods of creating recovery media and backups are available on select products only. Choose the available method according to your computer model.

- Use HP Recovery Manager to create HP Recovery media after you successfully set up the computer. This step creates a backup of the HP Recovery partition on the computer. The backup can be used to reinstall the original operating system in cases where the hard drive is corrupted or has been replaced. For information on creating recovery media, see Creating HP Recovery media (select products only) on page 71. For information on the recovery options that are available using the recovery media, see Using Windows tools on page 72.
- Use Windows tools to create system restore points and create backups of personal information.

  For more information, see Recovering using HP Recovery Manager on page 73.

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

Creating HP Recovery media (select products only)

If possible, check for the presence of the Recovery partition and the Windows partition. From the **Start** menu, select **File Explorer**, and then select **This PC**.

- If your computer does not list the Windows partition and the Recovery partition, you can obtain recovery media for your system from support. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information on the HP website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.

You can use Windows tools to create system restore points and create backups of personal information, see Using Windows tools on page 72.

- If your computer does list the Recovery partition and the Windows partition, you can use HP Recovery Manager to create recovery media after you successfully set up the computer. HP Recovery media can be used to perform system recovery if the hard drive becomes corrupted. System recovery reinstalls the original operating system and software programs that were installed at the factory and then configures the settings for the programs. HP Recovery media can also be used to customize the system or restore the factory image if you replace the hard drive.
  - Only one set of recovery media can be created. Handle these recovery tools carefully, and keep them in a safe place.
  - HP Recovery Manager examines the computer and determines the required storage capacity for the media that will be required.
  - To create recovery discs, your computer must have an optical drive with DVD writer capability, and you must use only high-quality blank DVD-R, DVD+R, DVD-R DL, or DVD+R DL discs. Do not use rewritable discs such as CD±RW, DVD±RW, double-layer DVD±RW, or BD-RE (rewritable Blu-ray) discs; they are not compatible with HP Recovery Manager software. Or, instead, you can use a high-quality blank USB flash drive.
  - If your computer does not include an integrated optical drive with DVD writer capability, but you would like to create DVD recovery media, you can use an external optical drive (purchased separately) to create recovery discs. If you use an external optical drive, it must be connected directly to a USB port on the computer; the drive cannot be connected to a USB port on an external device, such as a USB hub. If you cannot create DVD media yourself, you can obtain recovery discs for your computer from HP. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information on the HP website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.
  - Be sure that the computer is connected to AC power before you begin creating the recovery media.
  - The creation process can take an hour or more. Do not interrupt the creation process.
  - If necessary, you can exit the program before you have finished creating all of the recovery DVDs. HP Recovery Manager will finish burning the current DVD. The next time you start HP Recovery Manager, you will be prompted to continue.

To create HP Recovery media:

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

1. Type `recovery` in the taskbar search box, and then select **HP Recovery Manager**.
2. Select **Create recovery media**, and then follow the on-screen instructions.

If you ever need to recover the system, see Recovering using HP Recovery Manager on page 73.

Using Windows tools

You can create recovery media, system restore points, and backups of personal information using Windows tools.

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

For more information and steps, see the Get started app.

- Select the **Start** button, and then select the **Get started** app.

Restore and recovery

There are several options for recovering your system. Choose the method that best matches your situation and level of expertise:

IMPORTANT: Not all methods are available on all products.

- Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state. For more information see the Get started app.

  ▲ Select the **Start** button, and then select the **Get started** app.

- If you need to correct a problem with a preinstalled application or driver, use the Reinstall drivers and/or applications option (select products only) of HP Recovery Manager to reinstall the individual application or driver.

  ▲ Type `recovery` in the taskbar search box, select **HP Recovery Manager**, select **Reinstall drivers and/or applications**, and then follow the on-screen instructions.

- If you want to recover the Windows partition to original factory content, you can choose the System Recovery option from the HP Recovery partition (select products only) or use the HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 73. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 71.

- On select products, if you want to recover the computer's original factory partition and content, or if you have replaced the hard drive, you can use the Factory Reset option of HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 73.

- On select products, if you want to remove the Recovery partition to reclaim hard drive space, HP Recovery Manager offers the Remove Recovery Partition option.

  For more information, see Removing the HP Recovery partition (select products only) on page 76.

Recovering using HP Recovery Manager

HP Recovery Manager software allows you to recover the computer to its original factory state by using the HP Recovery media that you either created or that you obtained from HP, or by using the HP Recovery partition (select products only). If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 71.

What you need to know before you get started

- HP Recovery Manager recovers only software that was installed at the factory. For software not provided with this computer, you must either download the software from the manufacturer's website or reinstall the software from the media provided by the manufacturer.

  IMPORTANT: Recovery through HP Recovery Manager should be used as a final attempt to correct computer issues.

- HP Recovery media must be used if the computer hard drive fails. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 71.

- To use the Factory Reset option (select products only), you must use HP Recovery media. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 71.

- If your computer does not allow the creation of HP Recovery media or if the HP Recovery media does not work, you can obtain recovery media for your system from support. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information from the HP

website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.

IMPORTANT: HP Recovery Manager does not automatically provide backups of your personal data. Before beginning recovery, back up any personal data you want to retain.

Using HP Recovery media, you can choose from one of the following recovery options:

NOTE: Only the options available for your computer display when you start the recovery process.

- System Recovery—Reinstalls the original operating system, and then configures the settings for the programs that were installed at the factory.
- Factory Reset—Restores the computer to its original factory state by deleting all information from the hard drive and re-creating the partitions. Then it reinstalls the operating system and the software that was installed at the factory.

The HP Recovery partition (select products only) allows System Recovery only.

Using the HP Recovery partition (select products only)

The HP Recovery partition allows you to perform a system recovery without the need for recovery discs or a recovery USB flash drive. This type of recovery can be used only if the hard drive is still working.

To start HP Recovery Manager from the HP Recovery partition:

IMPORTANT: For a tablet with a detachable keyboard, connect the tablet to the keyboard base before beginning these steps (select products only).

1. Type `recovery` in the taskbar search box, select **Recovery Manager**, and then select **HP Recovery Environment**.

   – or –

   For computers or tablets with keyboards attached, press f11 while the computer boots, or press and hold f11 as you press the power button.

   For tablets without keyboards:

   - Turn on or restart the tablet, and then quickly hold down the volume up button; then select **f11**.

   – or –

   - Turn on or restart the tablet, and then quickly hold down the volume down button; then select **f11**.
2. Select **Troubleshoot** from the boot options menu.
3. Select **Recovery Manager**, and then follow the on-screen instructions.

Using HP Recovery media to recover

You can use HP Recovery media to recover the original system. This method can be used if your system does not have an HP Recovery partition or if the hard drive is not working properly.

1. If possible, back up all personal files.
2. Insert the HP Recovery media, and then restart the computer.

   NOTE: If the computer does not automatically restart in HP Recovery Manager, change the computer boot order. See Changing the computer boot order on page 75.
3. Follow the on-screen instructions.

Changing the computer boot order

If your computer does not restart in HP Recovery Manager, you can change the computer boot order, which is the order of devices listed in BIOS where the computer looks for startup information. You can change the selection to an optical drive or a USB flash drive.

To change the boot order:

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

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, and then quickly hold down the volume up button; then select **f9**.

     – or –

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

Removing the HP Recovery partition (select products only)

HP Recovery Manager software allows you to remove the HP Recovery partition to free up hard drive space.

IMPORTANT: After you remove the HP Recovery partition, you will not be able to perform System Recovery or create HP Recovery media from the HP Recovery partition. So before you remove the Recovery partition, create HP Recovery media; see Creating HP Recovery media (select products only) on page 71.

NOTE: The Remove Recovery Partition option is only available on products that support this function.

Follow these steps to remove the HP Recovery partition:

1. Type `recovery` in the taskbar search box, and then select **HP Recovery Manager**.
2. Select **Remove Recovery Partition**, and then follow the on-screen instructions.

8 Using HP PC Hardware Diagnostics (UEFI)

HP PC Hardware Diagnostics is a Unified Extensible Firmware Interface (UEFI) that allows you to run diagnostic tests to determine whether the computer hardware is functioning properly. The tool runs outside the operating system so that it can isolate hardware failures from issues that are caused by the operating system or other software components.

When HP PC Hardware Diagnostics (UEFI) detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. This ID code can then be provided to support to help determine how to correct the problem.

NOTE: To start diagnostics on a convertible computer, your computer must be in notebook mode and you must use the keyboard attached.

To start HP PC Hardware Diagnostics (UEFI), follow these steps:

1. Turn on or restart the computer, and quickly press esc.
2. Press f2.

   The BIOS searches three places for the diagnostic tools, in the following order:

   a. Connected USB drive

      NOTE: To download the HP PC Hardware Diagnostics (UEFI) tool to a USB drive, see Downloading HP PC Hardware Diagnostics (UEFI) to a USB device on page 77.

   b. Hard drive

   c. BIOS
3. When the diagnostic tool opens, select the type of diagnostic test you want to run, and then follow the on-screen instructions.

NOTE: If you need to stop a diagnostic test, press esc.

Downloading HP PC Hardware Diagnostics (UEFI) to a USB device

NOTE: The HP PC Hardware Diagnostics (UEFI) download instructions are provided in English only, and you must use a Windows computer to download and create the HP UEFI support environment because only .exe files are offered.

There are two options to download HP PC Hardware Diagnostics to a USB device.

Download the latest UEFI version

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.
2. In the HP PC Hardware Diagnostics section, select the **Download** link, and then select **Run**.

Download any version of UEFI for a specific product

1. Go to http://www.hp.com/support.
2. Select **Get software and drivers**.

3. Enter the product name or number.

   – or –

   Select **Identify now** to let HP automatically detect your product.

4. Select your computer, and then select your operating system.

5. In the **Diagnostic** section, follow the on-screen instructions to select and download the UEFI version you want.

Additional BIOS crisis recovery tool

HP provides a BIOS crisis recovery tool through the HP PC Hardware Diagnostics 3-in-1 USB key. This tool can be used by HP authorized service providers to recover systems that have failed due to a corrupted BIOS. For more information about using the 3-in-1 USB key for BIOS crisis recovery, go to http://www.hp.com/go/techcenter/pcdiags. Additional information is included in the web-based training offered by HP University. See the modules that cover HP PC Hardware Diagnostics (UEFI).

9 Specifications

Computer specifications

	Metric	U.S.
Dimensions (touch models)		
Depth	**252.2 mm**	9.93 in
Width	**378.0 mm**	14.88 in
Height	**24.1 mm**	0.95 in
Weight		
SSD, non-touch	**2121 g**	4.68 lb
SSD, touch	**2260 g**	4.98 lb
HDD, non-touch	**2213 g**	4.88 lb
HDD, touch	**2352 g**	5.19 lb
Input power		
Operating voltage and current	19.5 V dc @ 3.33 A – 65 W 19.5 V dc @ 2.31 A – 45 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

	Metric	U.S.
Active diagonal size	39.6-cm	15.6-in
Resolution	1920x1080 (FHD)	
	3840x2160 (UHD)	
Surface treatment	Anti glare	
	BrightView	
Brightness	220 nits (FHD)	
	300 nits (UHD)	
Viewing angle	UWVA	
Backlight	WLED	
Graphics adapter	eDP (FHD)	
	eDP+NVSR (UHD)	
Thickness	3.2 mm	

Hard drive specifications

	2-TB*	1-TB*
Dimensions		
Height	9.5 mm	9.5 mm
Length	100.4 mm	100.4 mm
Width	69.9 mm	69.9 mm
Weight	130.0 g	107.0 g
Interface type	SATA	SATA
Transfer rate		
Synchronous (maximum)	300 MB/sec	300 MB/sec
Security	ATA security	ATA security
Seek times (typical read, including setting)		
Single track	2.0 ms	2.0 ms
Average (read/write)	12 ms	12 ms
Maximum	22 ms	22 ms
Logical blocks	3,907,029,168	1,953,525,168
Disk rotational speed	5400 rpm	5400 rpm
Operating temperature	**0°C** to **60°C** (32°F to 140°F)	
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.		
NOTE: Certain restrictions and exclusions apply. Contact technical support for details.		

M.2 PCIe solid-state drive specifications

	128-GB*	256-GB*
Dimensions		
Height	1 mm	1 mm
Length	50.8 mm	50.8 mm
Width	28.9 mm	28.9 mm
Weight	< 10 g	< 10 g
Interface type	ATA-7	ATA-7
Transfer rate		
Sequential Read	Up to 3100 MB/s	Up to 2150 MB/s
Random Read	Up to 330 KIOPs	Up to 300 KIOPs
Sequential Write	Up to 700 MB/s	Up to 1260 MB/s
Random Write	Up to 170 KIOPs	Up to 100 KIOPs
Ready time, Maximum (to not busy)	1.0 s	1.0 s
Access times		
Logical	0.1	0.1
Operating temperature		
Operating	0° to 70°C (32°F to 158°F)	0° to 70°C (32°F to 158°F)
Non-operating	-40° to 85°C (-40°F to 185°F)	-40° to 80°C (-40°F to 176°F)
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.		
NOTE: Certain restrictions and exclusions apply. Contact technical support for details.		

M.2 SATA-3 solid-state drive specifications

	128-GB*
Dimensions	
Height	1 mm
Length	50.8 mm
Width	28.9 mm
Weight	< 10 g
Interface type	ATA-7
Transfer rate	
Sequential Read	Up to 520 MB/s
Random Read	Up to 60K IOPs
Sequential Write	Up to 160 MB/s
Random Write	Up to 34K IOPs
Ready time, Maximum (to not busy)	1.0 s
Access times	
Logical	0.1 ms
Total logical sectors	250,069,680
Operating temperature	
Operating	0° to 70°C (32°F to 158°F)
Non-operating	-40° to 95°C (-40°F to 203°F)
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.	
NOTE: Certain restrictions and exclusions apply. Contact technical support for details.	

10 Power cord set requirements

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

The 3-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 and regions must meet the requirements of the country or region where the computer is used.

Requirements for all countries

The following requirements are applicable to all countries and regions:

- The length of the power cord set must be at least **1.5 m** (5.0 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 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

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
Germany	VDE	1
India	ISI	1
Israel	SII	1
Italy	IMQ	1
Japan	JIS	3
The Netherlands	KEMA	1
New Zealand	SANZ	1
Norway	NEMKO	1
The 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
The United Kingdom	ASTA	1
The United States	UL	2

1. The flexible cord must be Type HO5VV-F, 3-conductor, 0.75mm^2 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, 3-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.

Country/region	Accredited agency	Applicable note number

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, 3-conductor, 0.75mm^2 or 1.25mm^2 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, 3-conductor, 0.75mm^2 conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the CCC certification mark.
5. The flexible cord must be Type H05VV-F 3X0.75mm^2 conductor size. KTL logo and individual approval number must be on each element. Corset approval number and logo must be printed on a flag label.
6. The flexible cord must be Type HVCTF 3X1.25mm^2 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 x 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 H05VV-F 3X0.75/1.00mm^2 conductor size, with plug BS 1363/A with BSI or ASTA marks.

11 Recycling

When a non-rechargeable 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 Web site at http://www.hp.com/recycle.

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