



Maintenance and Service Guide

HP ProBook x360 11 G3 Education Edition

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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 or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. Go to <http://www.microsoft.com> for details.

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For any further information or to request a full refund of the price of the computer, please contact your 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

Table 1-1 Product components and their descriptions

Category	Description
Product Name	HP ProBook x360 11 G3 Education Edition
Processors	Intel® Pentium® Silver N5000 1.10 GHz (turbo up to 2.70 GHz) quad core processor, 2400 MHz FSB, 4 MB L2 cache, 6 W (Intel UHD Graphics 605) Intel Celeron® N4100 1.10 GHz (turbo up to 2.40 GHz) quad core processor, 2400 MHz FSB, 4 MB L2 cache, 6 W (Intel UHD Graphics 600) Intel Celeron N4000 1.10 GHz (turbo up to 2.60 GHz) dual core processor, 2400 MHz FSB, 4 MB L2 cache, 6 W (Intel UHD Graphics 600)
Graphics	Intel universal memory architecture (UMA) Intel UHD Graphics 605 (N5000 processor) Intel UHD Graphics 600 (N4100, N4000 processors) Support for DirectX 12
Panel	29.46 cm (11.6-in), high-definition (HD) (1366 × 768), light-emitting diode (LED), EDP, slim, 220 nits Touch display, SVA, with HD camera Touch display UWVA, with HD camera Non-touch display, SVA, with HD camera
Memory module	Support for up to 8-GB, DDR4-2400, on-board system memory in the following configurations: <ul style="list-style-type: none">• 8192-MB• 4096-MB
Storage	eMMC configuration 64 GB Solid-state drive (M.2; not available on computer models equipped with eMMC storage) 256 GB, SATA-3, TLC 128 GB, SATA-3, TLC
Audio and video	Front-facing camera: 1 MP HD @ 1280 × 720p Second camera: 5 MP full high-definition (FHD) @ 2560 × 1920p (select models) Integrated dual digital microphones HP HD audio Dual speakers Realtek ALC3247
Ethernet	Realtek GBE Ethernet (Non-SAH, QFN32)

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

Category	Description
	Support S3/S4/S5 wake on LAN with embedded NIC
	Support S3/S4/S5 wake on LAN (via out of band): HP USB-C Universal Dock
	Support S0/S3/S4/S5 MAPT (via out of band): HP USB-C Universal Dock
Wireless	Integrated WLAN options with dual antennas (M.2 2230 socket PCIe/USB)
	<ul style="list-style-type: none"> Intel Wireless-AC 9260 802.11ac 2 × 2 WiFi + Bluetooth® 5.0 Realtek RTL8822BE 802.11ac 2 × 2 Wi-Fi + Bluetooth 4.2 Combo Adapter
	Bluetooth 1.2 supported
	Static WIFI BIOS SAR support for Intel Wireless-AC 9260
	Wireless antennas configured at bottom of display
	Support for Miracast
	Support for WoWLAN S3/S4 (AC only)
	Support for HP LAN wireless protection (WLAN/LAN switching)
	Support for HP Connection Optimizer with data analytics
External media cards	Micro-Secure Digital (SD®) media reader slot
	Support for micro SD/SDHC/SDXC up to UHS-104
	Push-push insertion/removal
Internal card expansion	One M.2 slot for WLAN
Ports	Headphone/microphone combo jack
	AC Smart Pin adapter plug
	HDMI v1.4b supporting up to 3840 × 2160 @ 30-Hz
	*auto adjust panel resolution to fit embedded panel and external monitor connected
	USB 3.1 Gen 1 port with Type-A connector (2)
	USB 3.1 port with Type-C connector
Sensors	Combination chip, including:
	Accelerometer
	Magnetometer
	Gyro
Keyboard	Keyboard
	Full-sized, chiclet-style keyboard
	Pick-resistant
	Spill resistant
	TouchPad requirements
	Multitouch gestures enabled

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

Category	Description
	Support for Windows® 10 trackpad gestures
	Taps enabled as default
	Default on 2-finger scroll, pinch
Pen input	Wacom AES pen with loop (select models; touch screen only)
	Support for passive pen
Power requirements	Battery
	3 cell, 48 WHr, long-life lithium polymer soft pack battery
	AC adapter
	65 W HP Smart AC adapter (non-PFC, EM, 4.5-mm)
	45 W HP Smart AC adapter (non-PFC, 4.5-mm)
	45 W USB Type-C straight, nPFC
	Power cord
	1 m convention power cord
Security	Kensington Nano Security Slot
Operating system	Preinstalled
	Windows® 10 Home 64
	Windows 10 Home 64 Single Language
	Windows 10 Home 64 Chinese Market CPPP
	Windows 10 Home 64 Single Language APAC EM PPP
	Windows 10 Home 64 Single Language India Market PPP
	Windows 10 Home 64 Single Language Indonesia Market PPP
	Windows 10 Home 64 StF MSNA for Higher Education
	Windows 10 Home 64 StF MSNA for Higher Education Strategic
	Windows 10 Pro 64
	Windows 10 Pro 64 Chinese Market
	Windows 10 Pro 64 StF MSNA
	Windows 10 Pro 64 StF MSNA Emerging Markets
	Windows 10 Pro 64 StF MSNA Standard
	Windows 10 Pro 64 StF MSNA Strategic
	Windows 10 Pro 64 Value Notebook
	Windows 10 Pro 64 Value Notebook Chinese Market
	Windows 10 Pro S 64
	Windows 10 Pro S 64 Value

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

Category	Description
	Restore media–DRDVD
	Windows 10 Driver DVD
	Restore media–OSDVD
	Windows 10 S
	Web support OS
	Windows 10 Enterprise 64
	Win 10 Pro 64 CBB 1803
	Certified
	Microsoft WHQL
Serviceability	End user replaceable part
	AC adapter
	Pen

2 Components

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

Right

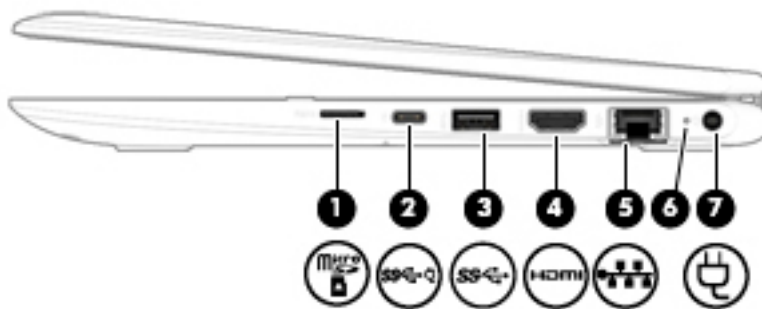


Table 2-1 Right-side components and their descriptions







Component	Description
(1)  MicroSD memory card reader	<p>Reads optional memory cards that store, manage, share, or access information.</p> <p>To insert a card:</p> <ol style="list-style-type: none"> 1. Hold the card label-side up, with the 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. <p>To remove a card:</p> <ul style="list-style-type: none"> ▲ Press in on the card, and then remove it from the memory card reader.
(2)  USB Type-C port	<p>Connects a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provides data transfer.</p> <p>NOTE: Cables and/or adapters (purchased separately) may be required.</p>
(3)  USB SuperSpeed port	<p>Connects a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provides high-speed data transfer.</p>
(4)  HDMI port	<p>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.</p>
(5)  RJ-45 (network) jack/status lights	<p>Connects a network cable.</p> <ul style="list-style-type: none"> • Green (left): The network is connected. • Amber (right): Activity is occurring on the network.
(6) Battery light	<p>When AC power is connected:</p>

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

Component	Description
	<ul style="list-style-type: none"> • White: The battery charge is greater than 90 percent. • Amber: The battery charge is from 0 to 90 percent. • Off: The battery is not charging. <p>When AC power is disconnected (battery not charging):</p> <ul style="list-style-type: none"> • Blinking amber: The battery has reached a low battery level. When the battery has reached a critical battery level, the battery light begins blinking rapidly. • Off: The battery is not charging.
(7)  Power connector	Connects an AC adapter.

Left

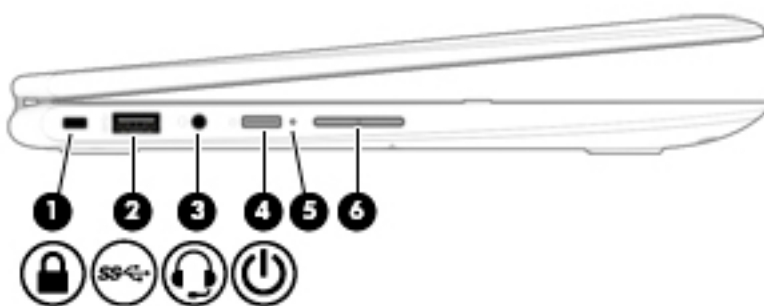


Table 2-2 Left-side components and their descriptions






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 SuperSpeed port	Connects 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, refer to the <i>Regulatory, Safety, and Environmental Notices</i> . To access this guide: ▲ Select the Start button, select HP Help and Support , and then select HP Documentation .

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

Component	Description
(4)  Power button	<p>NOTE: When a device is connected to the jack, the computer speakers are disabled.</p> <ul style="list-style-type: none">• 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 (select products only).• When the computer is in Hibernation, press the button briefly to exit Hibernation. <p>CAUTION: Pressing and holding down the power button results in the loss of unsaved information.</p> <p>If the computer has stopped responding and shutdown procedures are ineffective, press and hold the power button for at least 5 seconds to turn off the computer.</p> <p>To learn more about your power settings, see your power options.</p> <p>▲ Right-click the Power meter icon  and then select Power Options.</p>
(5) Power light	<ul style="list-style-type: none">• 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.
(6) Volume button	Controls speaker volume on the computer.

*The antennas are not visible from the outside of the computer. 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**.

Display



Table 2-3 Display components and their descriptions

Component	Description
(1) WLAN antennas*	Send and receive wireless signals to communicate with wireless local area networks (WLANs).
(2) Internal microphones	Record sound.
(3) Camera light	On: The camera is in use.
(4) Camera	Allows you to video chat, record video, and record still images. Some cameras also allow a facial recognition logon to Windows, instead of a password logon. NOTE: Camera functions vary depending on the camera hardware and software installed on your product.

*The antennas are not visible from the outside of the computer. 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

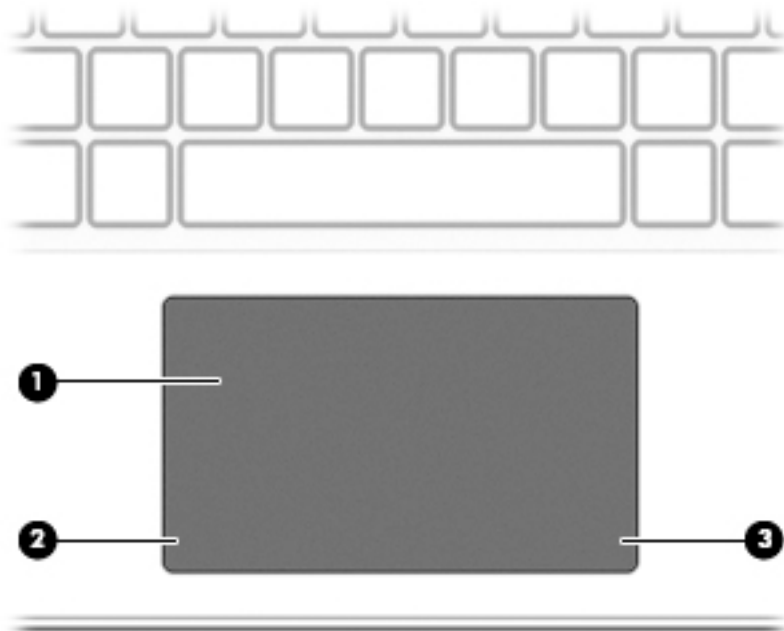


Table 2-4 TouchPad components and their descriptions

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

Lights

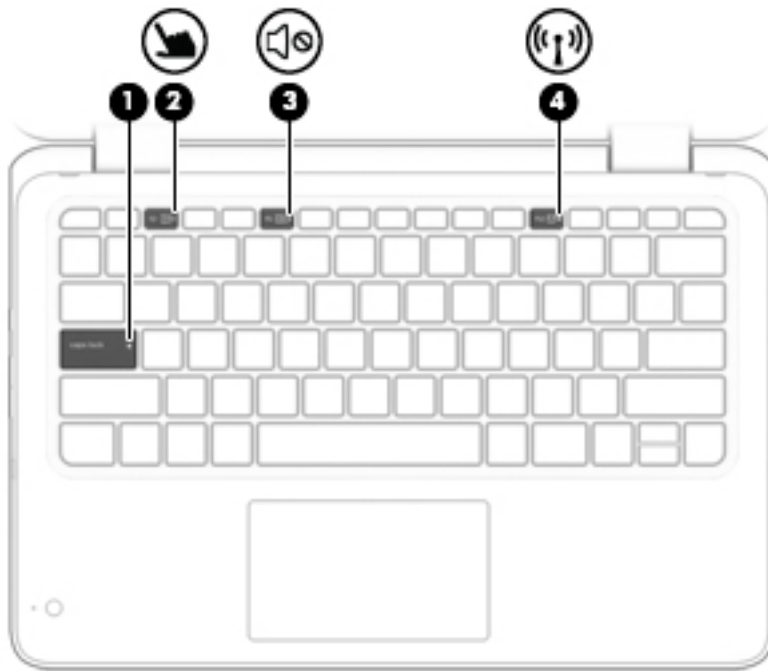



Table 2-5 Lights and their descriptions

Component	Description
(1) Caps lock light	On: Caps lock is on, which switches the key input to all capital letters.
(2) TouchPad light	<ul style="list-style-type: none">• On: The TouchPad is off.• Off: The TouchPad is on.
(3) Mute light	<ul style="list-style-type: none">• On: Computer sound is off.• Off: Computer sound is on.
(4)  Wireless light	On: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on. NOTE: On some models, the wireless light is amber when all wireless devices are off.

Keyboard webcam

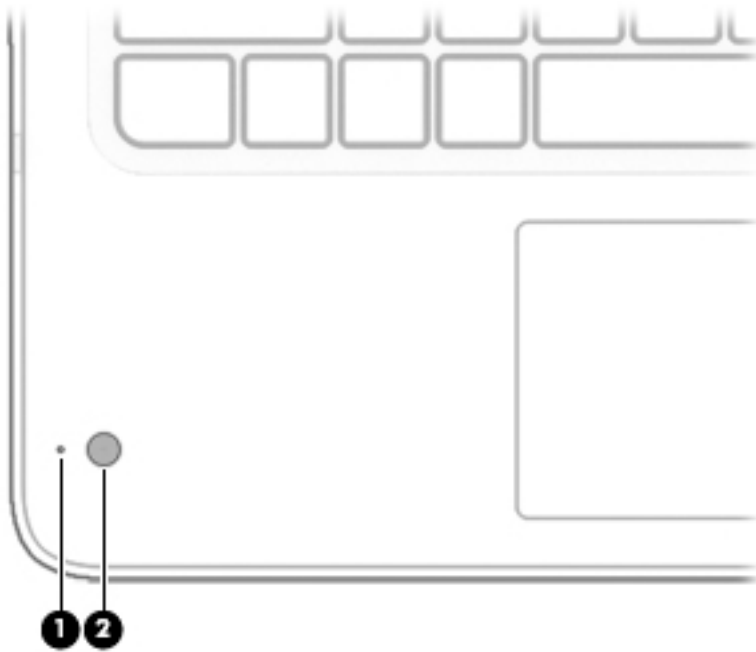


Table 2-6 Keyboard webcam components and their descriptions

Component	Description
(1) Camera light	On: The camera is in use.
(2) Camera	Allows you to video chat, record video, and record still images. Some cameras also allow a facial recognition logon to Windows, instead of a password logon. NOTE: Camera functions vary depending on the camera hardware and software installed on your product.

Special keys

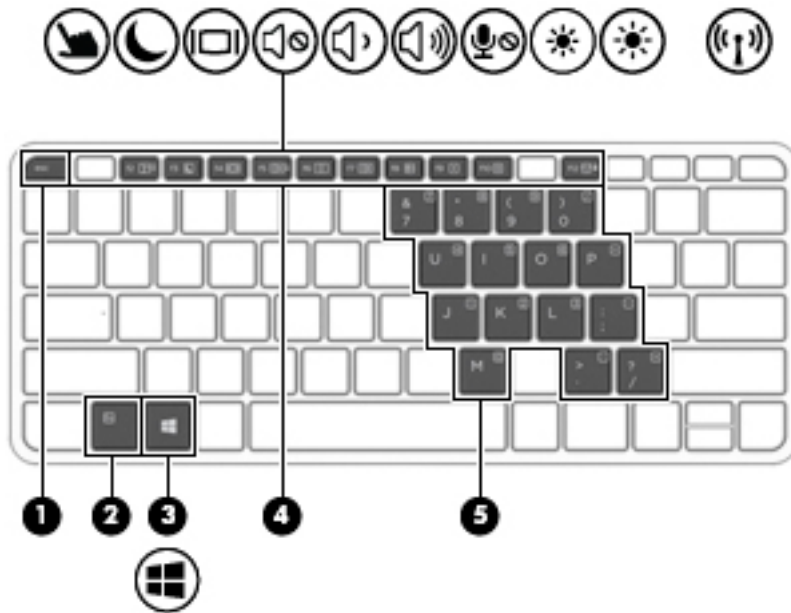



Table 2-7 Special keys and their descriptions











Component	Description
(1) <code>esc</code> key	Displays system information when pressed in combination with the <code>fn</code> key.
(2) <code>fn</code> key	Executes frequently used system functions when pressed in combination with another key. Such key combinations are called <i>hot keys</i> .
(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. See Action keys on page 13 .
(5) Embedded numeric keypad	A numeric keypad superimposed over the keyboard alphabet keys. When <code>fn+num lk</code> is pressed, the keypad can be used like an external numeric keypad. Each key on the keypad performs the function indicated by the icon in the upper-right corner of the key. NOTE: If the keypad function is active when the computer is turned off, that function is reinstated when the computer is turned back on.


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.

Table 2-8 Action keys and their descriptions

Icon	Description
	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.
	Decreases speaker volume incrementally while you hold down the key.
	Increases speaker volume incrementally while you hold down the key.
	Mutes the microphone.
	Mutes or restores speaker sound.
	Turns the wireless feature on or off. NOTE: A wireless network must be set up before a wireless connection is possible.
	Turns the TouchPad on and off.
	Switches the screen image among display devices connected to the system. For example, if a monitor is connected to the computer, repeatedly pressing the key alternates the screen image from computer display to monitor display to simultaneous display on both the computer and the monitor.
	Initiates Sleep, which saves your information in system memory. The display and other system components turn off and power is conserved. To exit Sleep, briefly press the power button. CAUTION: To reduce the risk of information loss, save your work before initiating Sleep.

 **NOTE:** The action key feature is enabled at the factory. You can disable this feature by pressing and holding the **fn** key and the left **shift** key. The **fn** lock light will turn on. After you have disabled the action key feature, you can still perform each function by pressing the **fn** key in combination with the appropriate action key.

Bottom

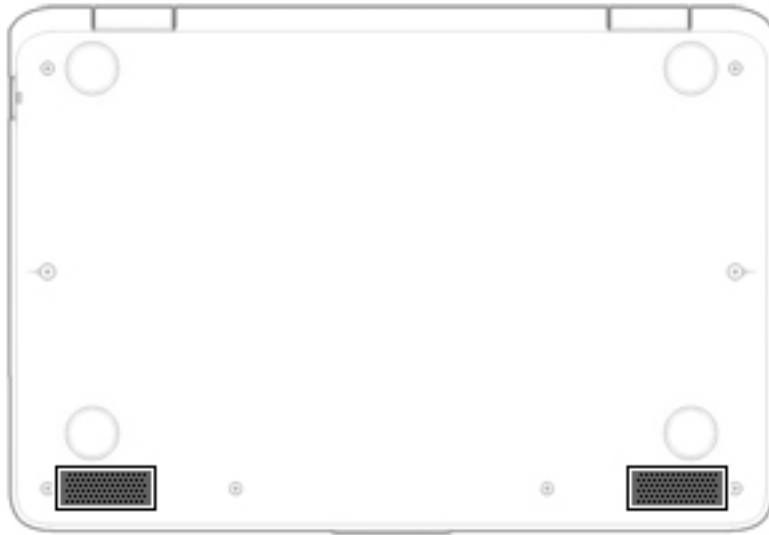


Table 2-9 Bottom components and their descriptions

Component	Description
Speakers (2)	Produce sound.

Labels

The labels affixed to the computer provide information you may need when you troubleshoot system problems or travel internationally with the computer. Labels may be in paper form or imprinted on the product.

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, on the back of the display, or on the bottom of a tablet kickstand.

- Service label—Provides important information to identify your computer. When contacting support, you may be asked for the serial number, the product number, or the model number. Locate this information before you contact support.

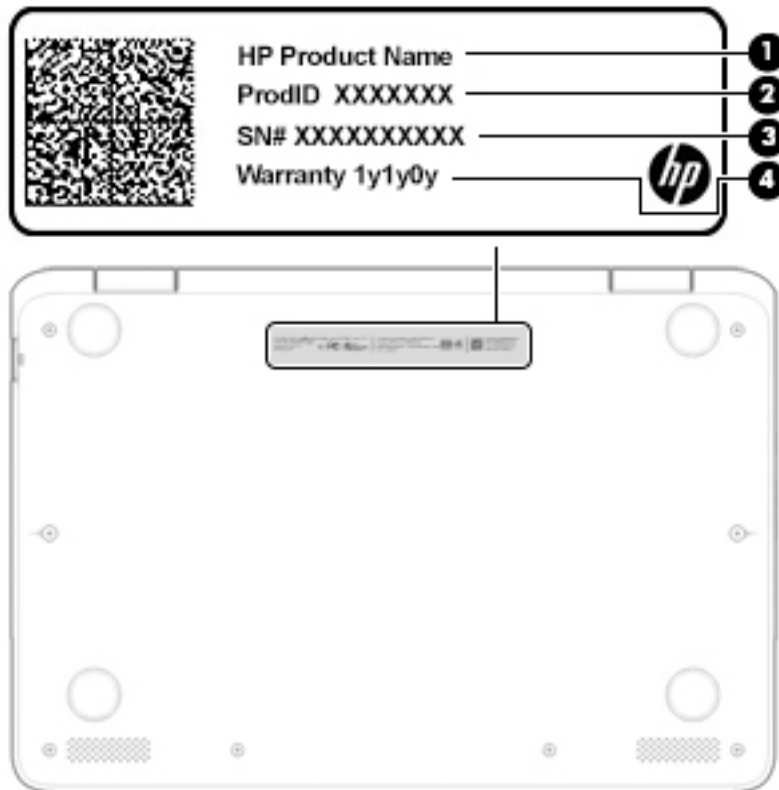


Table 2-10 Service label components

Component
(1) HP product name
(2) Product ID
(3) Serial number
(4) Warranty period

- 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

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

Computer major components

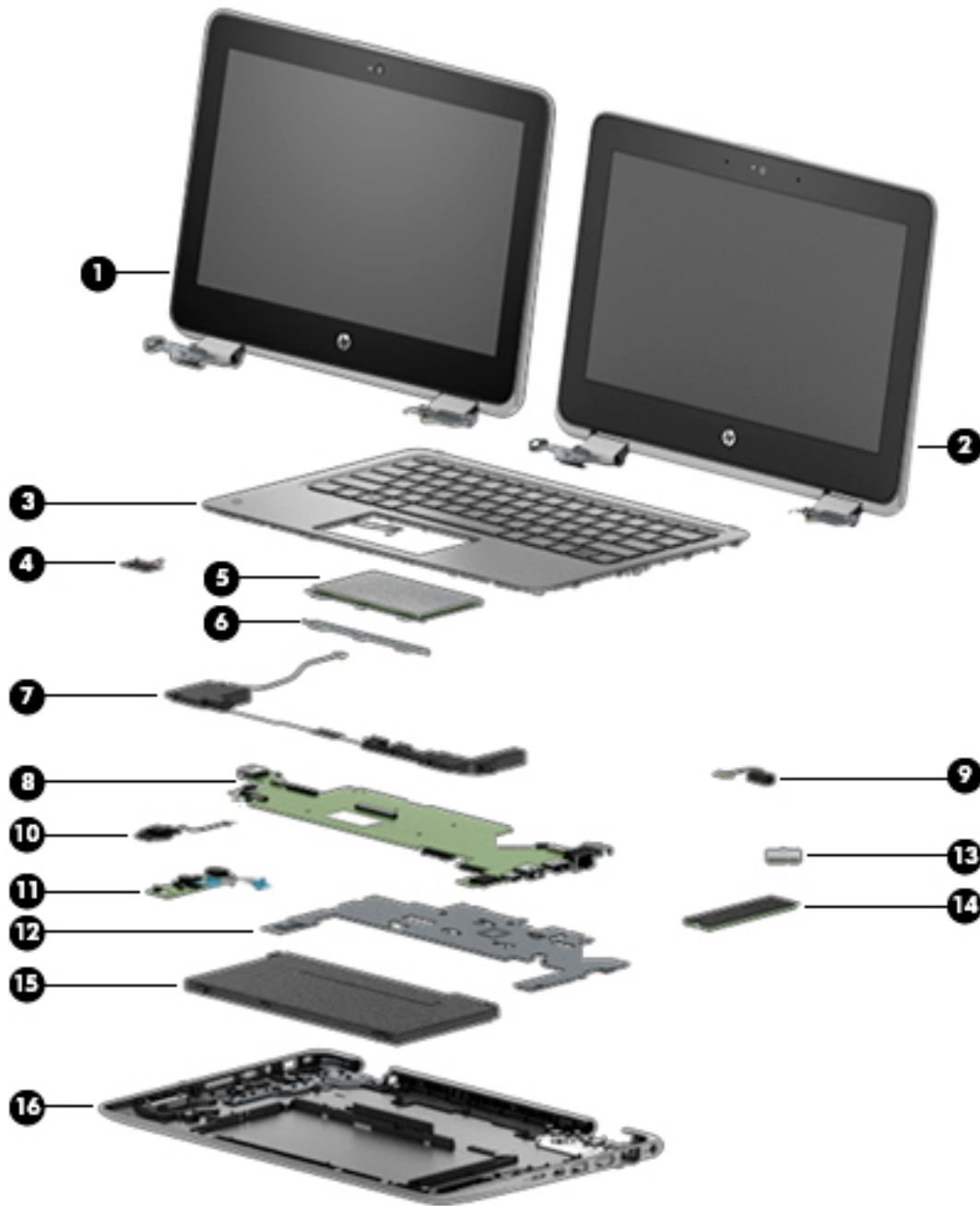


Table 3-1 Computer major components and their descriptions

Item	Component	Spare part number
(1)	Display assembly, touch NOTE: The touch display is spared only as an entire assembly.	
	For use in blue models:	
	• Touch, SVA	L47209-001
	• Touch, UWVA	L47210-001
	For use in grey models:	
	• Touch, SVA	L43785-001
	• Touch, UWVA	L43786-001
(2)	Display assembly, non-touch NOTE: The non-touch display is spared only at the subcomponent level. For more non-touch display assembly spare part information, see Display assembly subcomponents on page 19 .	not spared
(3)	Keyboard/top cover (includes keyboard cable, top cover shielding, and magnets): NOTE: For a detailed list of keyboard country codes, see Keyboard/top cover on page 26 .	
	Models without a second webcam	L47577-xx1
	Models with a second webcam	L47578-xx1
(4)	Second webcam	L43799-001
(5)	TouchPad (does not include cable or bracket)	L43778-001
(6)	TouchPad bracket (included in the Bracket Kit)	L43792-001
(7)	Speakers (left and right; includes cables)	L43779-001
(8)	System board (includes processor, graphics subsystem with UMA memory, and replacement thermal material): All system boards use the following part numbers: xxxxxx-001: Non-Windows operating system xxxxxx-601: Windows 10 operating system	
	Equipped with an Intel Pentium N5000 processor and 8 GB of system memory	L43775-xx1
	Equipped with an Intel Pentium N5000 processor and 4 GB of system memory	L43774-xx1
	Equipped with an Intel Celeron N4100 processor and 4 GB of system memory	L43773-xx1
	Equipped with an Intel Celeron N4100 processor, 4 GB of system memory, and 64 GB of eMMC memory	L43772-xx1
	Equipped with an Intel Celeron N4000 processor and 4 GB of system memory	L43771-xx1
	Equipped with an Intel Celeron N4000 processor, 4 GB of system memory, and 64 GB of eMMC memory	L43770-xx1
(9)	RTC battery (includes cable)	L43797-001
(10)	Webcam transfer board (includes cable)	L43800-001
(11)	Audio board (includes rubber and cable)	L43777-001
(12)	Heat sink (includes replacement thermal material)	L43776-001

Table 3-1 Computer major components and their descriptions (continued)

Item	Component	Spare part number
(13)	WLAN module	
	Intel Wireless-AC 9260 802.11ac 2 × 2 WiFi + Bluetooth 5.0	L16647-005
	Realtek RTL8822BE 802.11ac 2 × 2 Wi-Fi + Bluetooth 4.2 Combo Adapter	L51005-005
(14)	Solid-state drive:	
	256-GB, M.2, SATA-3 solid-state drive	L43788-001
	128-GB, M.2, SATA-3 solid-state drive	L43787-001
(15)	Battery	L12791-855
(16)	Bottom cover	
	Grey	L43780-001
	Blue	L43781-001

Miscellaneous parts

Table 3-2 Miscellaneous parts and their descriptions

Component	Spare part number
AC adapter:	
65-W HP Smart AC adapter (non-PFC, EM, 4.5-mm)	913691-850
45-W HP Smart AC adapter (non-PFC, RC, 4.5-mm, for use in Argentina)	741553-852
45-W USB Type-C adapter (nPFC, 3 pin)	934739-850
45-W HP Smart AC adapter (non-PFC, RC, 4.5-mm)	741727-001
Misc Kit (includes bezel adhesive)	L43802-001
Screw Kit	L43782-001
AES active pen	L43795-001
Pen holder	L43796-001

Display assembly subcomponents

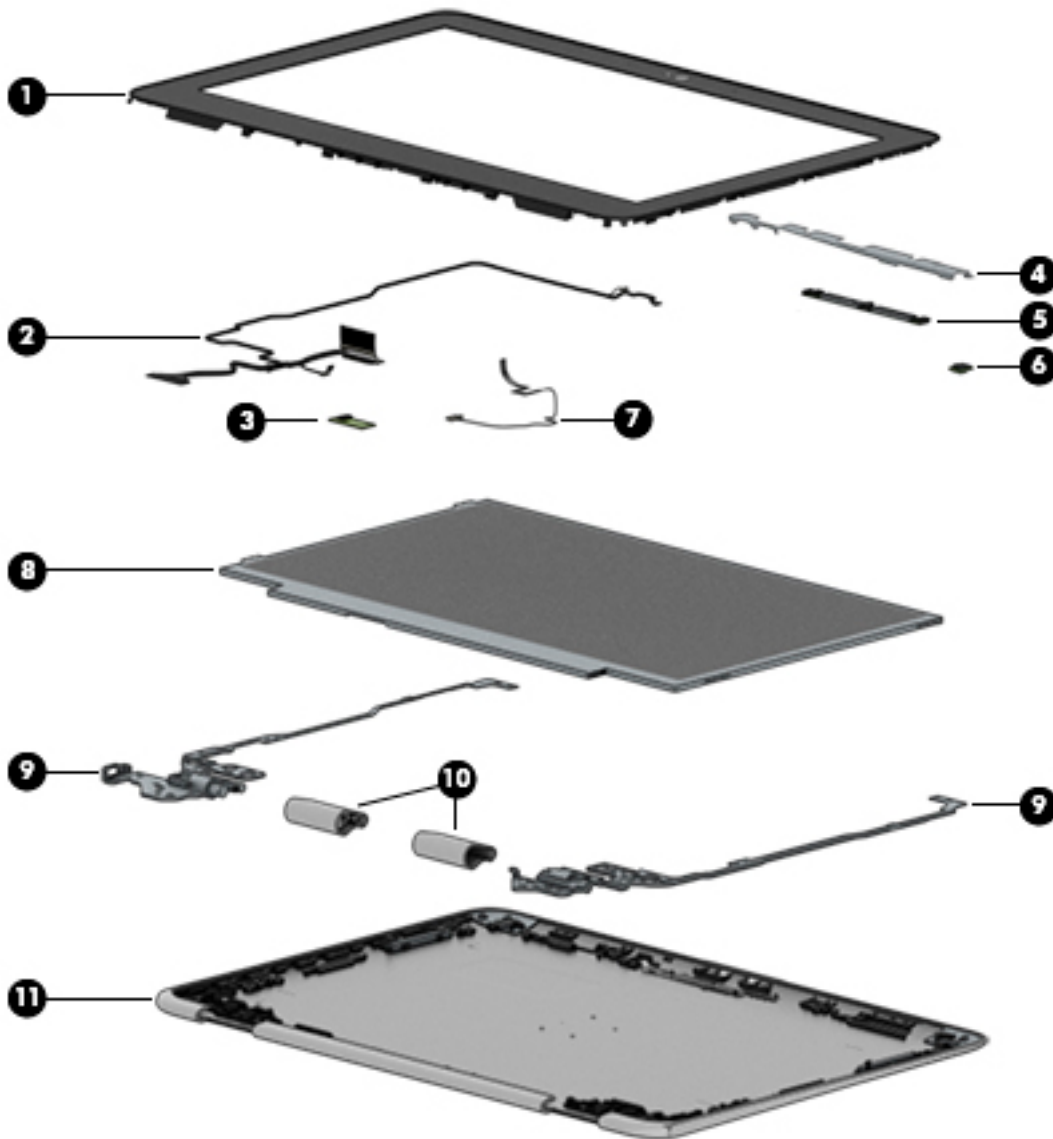


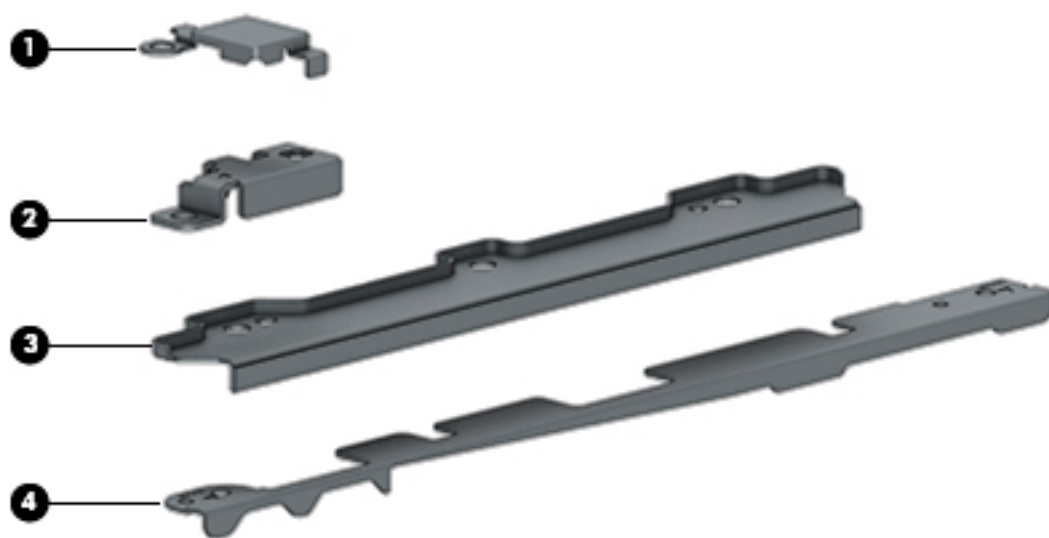
Table 3-3 Display components and their descriptions

Item	Component	Spare part number
(1)	Display bezel	L43791-001
(2)	Webcam/microphone module cable (available in the Cable Kit, spare part number L43783-001; includes LED board cable) Display bezel adhesive (not illustrated, included in the Miscellaneous Kit, spare part number L43802-001)	
(3)	G-sensor module	L43794-001
(4)	Display support bracket (included in Bracket Kit)	L43792-001
(5)	Webcam/microphone module (includes double-sided adhesive):	L43801-001
(6)	LED board	L50719-001
(7)	Display panel cable (available in the Cable Kit, spare part number L43783-001)	

Table 3-3 Display components and their descriptions (continued)

Item	Component	Spare part number
(8)	Raw display panel	L43784-001
(9)	Display hinges (left and right)	L43793-001
(10)	Display hinge covers (left and right, blue and grey; included in Display Hinge Kit, spare part number L43793-001)	
(11)	Display back cover (includes wireless antennas)	
	Grey	L43789-001
	Blue	L43790-001

Bracket Kit

**Table 3-4 Bracket Kit components and their descriptions**

Item	Component	Spare part number
	Bracket Kit , includes the following parts:	L43792-001
(1)	USB Type-C bracket	
(2)	Power connector (DC-in) bracket	
(3)	TouchPad bracket	
(4)	Webcam bracket	

4 Removal and replacement procedures preliminary requirements


Tools required

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

- Non-marking, non-conductive pry tool
- Magnetic 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.

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.

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

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

Avoid dropping drives from any height onto any surface.

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

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

Avoid exposing a drive to temperature extremes or liquids.

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

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, screw drivers, 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.

Electrostatic discharge information

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

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



IMPORTANT: To prevent damage to the device when you 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.

Generating static electricity

Note the following:

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

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

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

Electronic components are then multi-packaged inside plastic tubes, trays, or Styrofoam.



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

Preventing electrostatic damage to equipment

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

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

- Avoid contact with pins, leads, or circuitry.
- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

Personal grounding methods and equipment

Use the following equipment to prevent static electricity damage to electronic components:

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

Table 4-2 Static shielding protection levels

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

Grounding the work area

To prevent static damage at the work area, use the following precautions:

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

Recommended materials and equipment

Materials and equipment that are recommended for use in preventing static electricity include:

- Antistatic tape
- Antistatic smocks, aprons, or sleeve protectors
- Conductive bins and other assembly or soldering aids
- Conductive foam
- Conductive tabletop workstations with ground cord of one-megohm \pm 10% resistance
- Static-dissipative table or floor mats with hard tie to ground


- Field service kits
- Static awareness labels
- Wrist straps and footwear straps providing one-megohm +/- 10% resistance
- Material handling packages
- Conductive plastic bags
- Conductive plastic tubes
- Conductive tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes

Packaging and transporting guidelines


Follow these grounding guidelines when packaging and transporting equipment:

- To avoid hand contact, transport products in static-safe tubes, bags, or boxes.
- Protect ESD-sensitive parts and assemblies with conductive or approved containers or packaging.
- Keep ESD-sensitive parts in their containers until the parts arrive at static-free workstations.
- Place items on a grounded surface before removing items from their containers.
- Always be properly grounded when touching a component or assembly.
- Store reusable ESD-sensitive parts from assemblies in protective packaging or nonconductive foam.
- Use transporters and conveyors made of antistatic belts and roller bushings. Be sure that mechanized equipment used for moving materials is wired to ground and that proper materials are selected to avoid static charging. When grounding is not possible, use an ionizer to dissipate electric charges.

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.

Component replacement procedures

 **NOTE:** Details about the computer, including model, serial number, product key, and length of warranty, are on the service tag on the bottom of the computer. See [Labels on page 15](#) for details.

This chapter provides removal and replacement procedures.

There are as many as 68 screws that must be removed, replaced, and/or loosened when servicing the computer. Make special note of each screw size and location during removal and replacement.

Preparation for disassembly

See [Removal and replacement procedures preliminary requirements on page 21](#) for initial safety procedures.

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

Keyboard/top cover

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

Table 5-1 Spare part description and number

Description	Spare part number
Keyboard/top cover, models without a second webcam	L47577-xx1
Keyboard/top cover, models with a second webcam	L47578-xx1

Table 5-2 Keyboard country codes


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	Hungary	-211	Saudi Arabia	-171
Brazil	-201	Iceland	-DD1	Slovenia	-BA1
Bulgaria	-261	India	-D61	South Korea	-AD1
Chile	-161	Israel	-BB1	Spain	-071

Table 5-2 Keyboard country codes (continued)

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
Czech Republic/Slovakia	-FL1	Italy	-061	Sweden/Finland	-B71
Denmark	-081	The Netherlands	-DH1	Switzerland	-BG1
Europe	-B31	Northern Africa	-FP1	Taiwan	-AB1
French Canada	-DB1	Norway	-091	Thailand	-281
France	-051	Portugal	-131	Turkey	-141
Germany	-041	Romania	-271	United Kingdom	-031
Greece	-151	Russia	-251	United States	-001

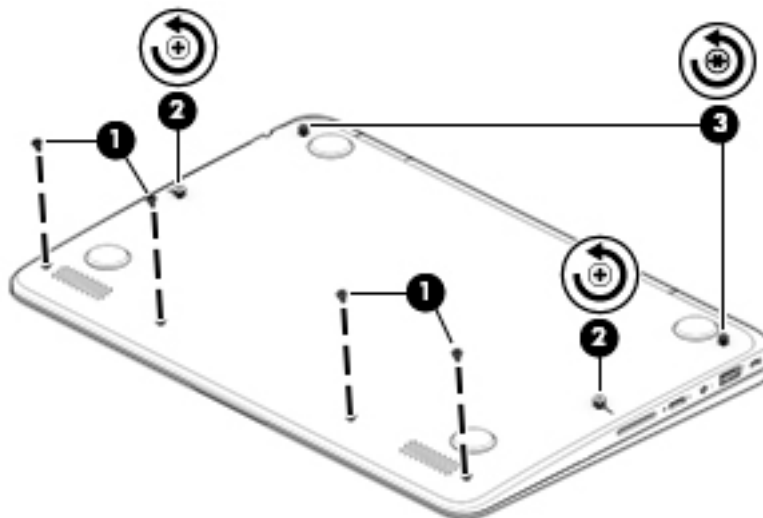
Before disassembling the computer, follow these steps:

- ▲ Prepare the computer for disassembly ([Preparation for disassembly on page 26](#)).

 **NOTE:** When replacing the keyboard/top cover, be sure that the TouchPad (see [TouchPad on page 29](#)), the second webcam, and webcam transfer board (see [Second webcam and webcam transfer board on page 31](#)) are removed from the defective keyboard/top cover and installed on the replacement keyboard/top cover.

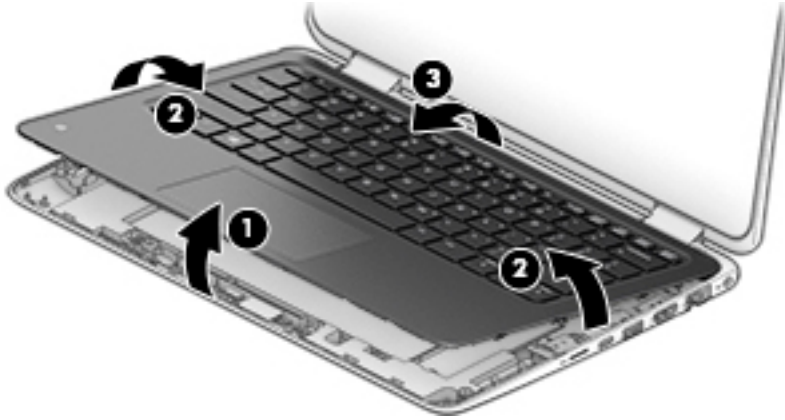
Remove the keyboard/top cover:

1. Turn the computer upside down with the front toward you.
2. Remove the four T8 Torx M2.5 × 4.1 screws **(1)** that secure the bottom cover to the computer.
3. Loosen the two captive Phillips P1 screws **(2)** that secure the bottom cover to the computer.
4. Loosen the two captive Torx T8 screws **(3)** that secure the bottom cover to the computer.




5. Open the computer.
6. Starting near the TouchPad **(1)**, flex to disengage the top cover from the bottom cover.

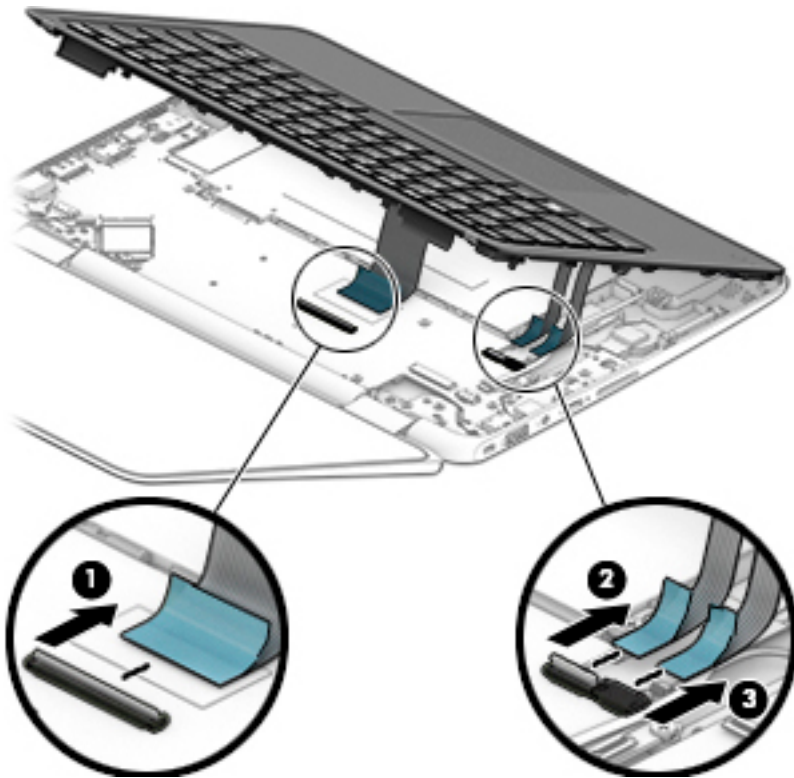
7. Loosen the sides (2) and top (3) to completely disengage the top cover from the bottom cover.



8. Lift the front edge of the keyboard/top cover up and back until the webcam module cable, TouchPad cable, and keyboard cable connectors are accessible.

 **IMPORTANT:** The top cover is connected to the system board by three cables. Do not lift the top cover so much as to inadvertently disconnect the cables, as doing so could damage the cables and/or connectors.

9. Disconnect the keyboard cable from the zero insertion force (ZIF) connector on the system board (1).
10. Disconnect the TouchPad cable from the ZIF connector on the system board (2).
11. Disconnect the webcam cable from the ZIF connector on the system board (3).
12. Remove the keyboard/top cover.



Reverse this procedure to install the keyboard/top cover.

TouchPad



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

Table 5-3 Spare part description and number

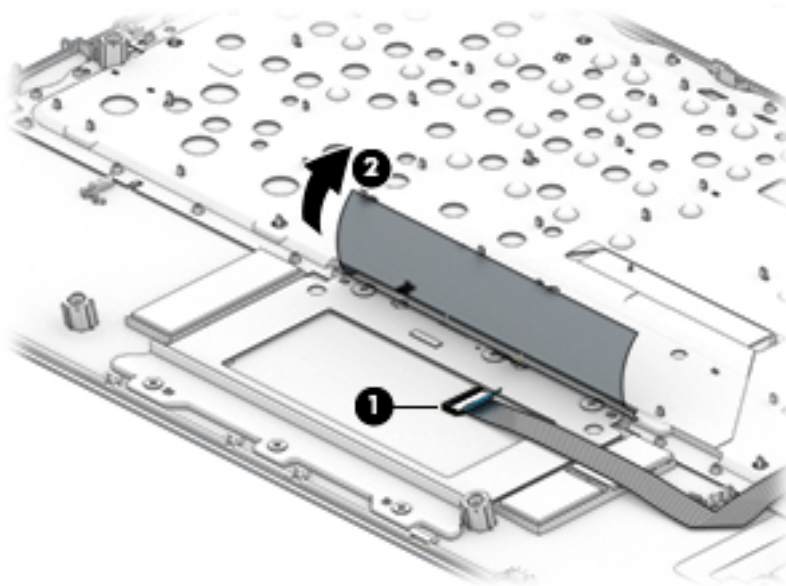
Description	Spare part number
TouchPad (does not include cable or bracket)	L43778-001
TouchPad cable (included in Cable Kit)	L43783-001
TouchPad bracket (included in Bracket Kit)	L43792-001

Before removing the TouchPad, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 26](#)).
2. Remove the keyboard/top cover (see [Keyboard/top cover on page 26](#)).

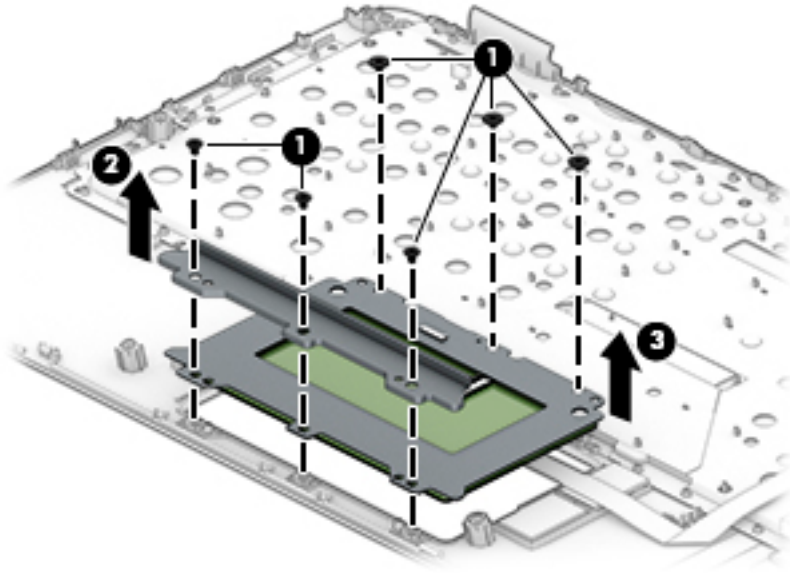
Remove the TouchPad:

1. Position the keyboard/top cover upside down with the front edge toward you.
2. Disconnect the cable from the ZIF connector on the TouchPad **(1)**.
3. Lift the clear tape from the top of the TouchPad **(2)**.



4. Remove the six Phillips M2.0 × 2.3 screws **(1)** that secure the TouchPad and TouchPad bracket to the keyboard/top cover.
5. Remove the TouchPad bracket **(2)**.

6. Remove the TouchPad (3).



Reverse this procedure to install the TouchPad.

Second webcam and webcam transfer board

Table 5-4 Spare part description and number

Description	Spare part number
Second webcam	L43799-001
Webcam transfer board (includes cable)	L43800-001
Webcam bracket (included in Bracket Kit)	L43792-001
Webcam transfer board cable (included in Cable Kit)	L43783-001

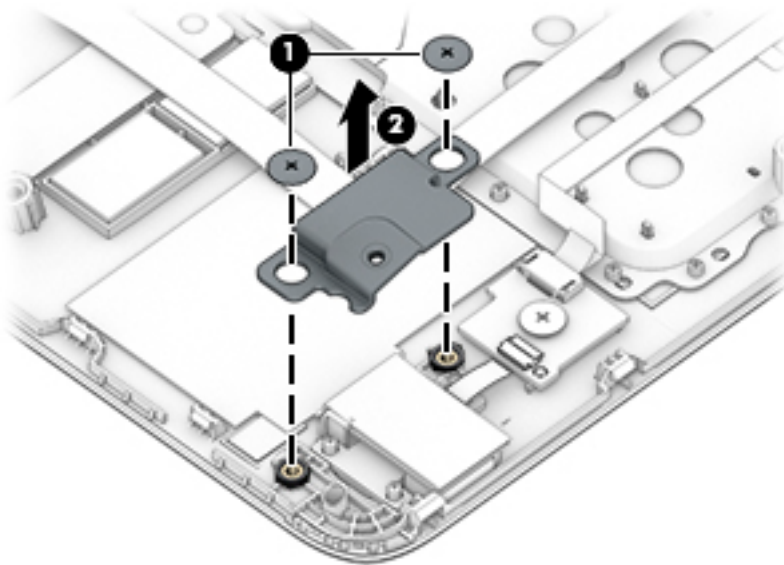
Before removing the second webcam, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 26](#)).
2. Remove the keyboard/top cover (see [Keyboard/top cover on page 26](#)).

Remove the second webcam:

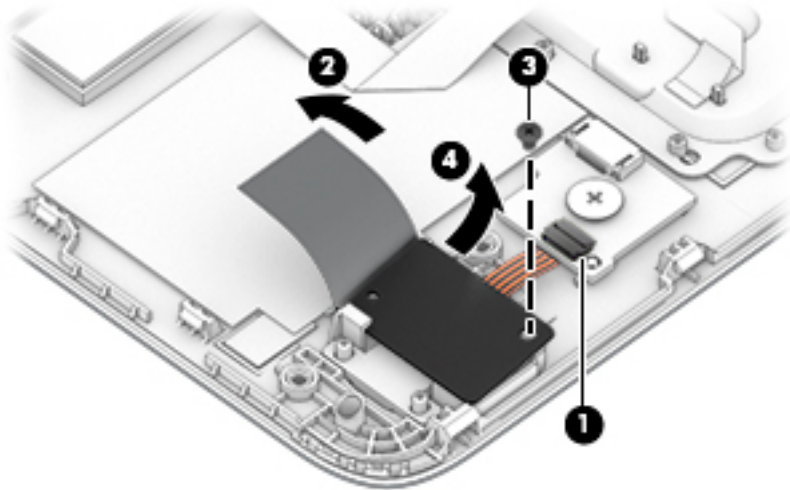
1. Turn the keyboard/top cover upside down with the front edge toward you.
2. Remove the two Phillips M2.0 × 2.0 broad head screws **(1)** that secure the webcam bracket to the keyboard/top cover.
3. Remove the bracket **(2)**.

The second webcam bracket is included in the Bracket Kit, spare part number L43792-001.

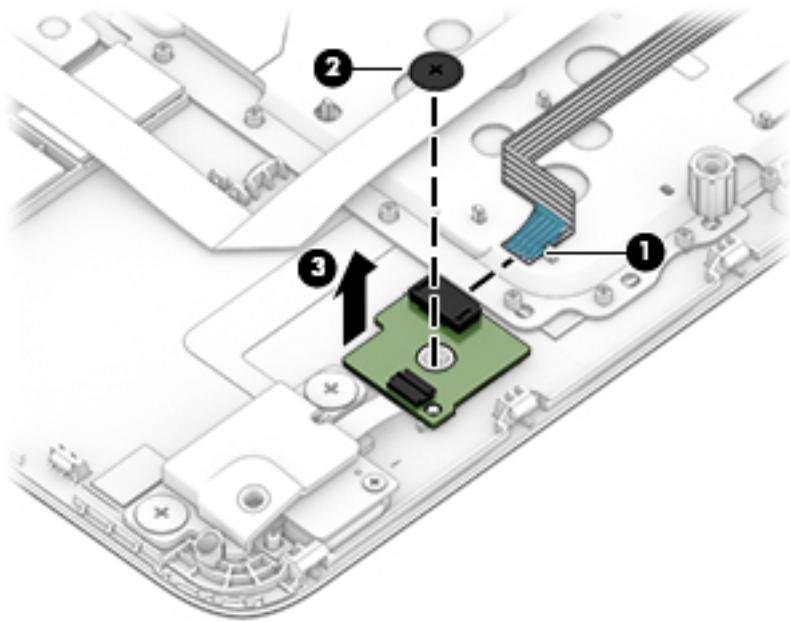


4. Disconnect the cable from the ZIF connector on the webcam transfer board **(1)**.
5. Lift the foil from on top of the webcam **(2)**.
6. Remove the Phillips M1.6 × 2.0 screw (P0 driver) **(3)** that secures the second webcam to the keyboard/top cover.

7. Remove the second webcam from the top cover (4).



8. If it is necessary to remove the webcam transfer board, disconnect the cable from the webcam transfer board (1), remove the Phillips M2.0 × 2.0 screw (2), and then remove the board from the top cover (3).



Reverse these procedures to install the second webcam and webcam transfer board.

Battery

Table 5-5 Spare part description and number

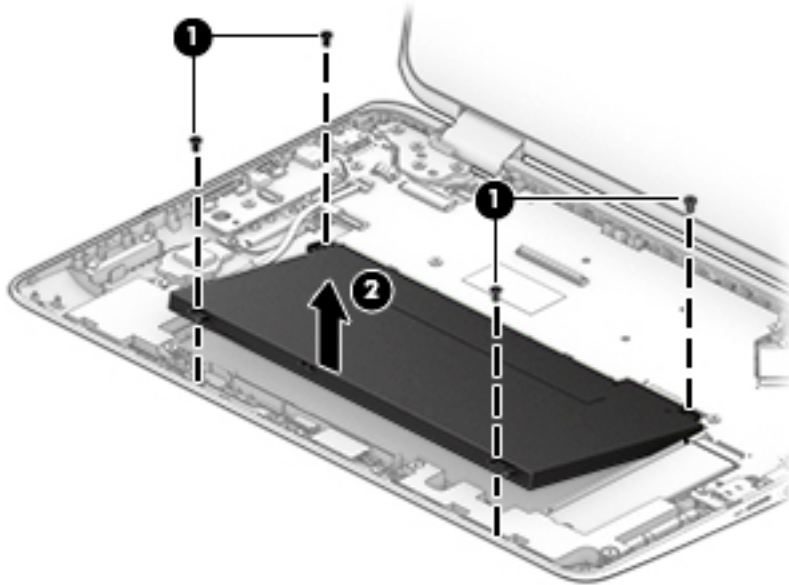
Description	Spare part number
Battery (3-cell, 48-WHr, 4.21-AHr)	L12791-855

Before removing the battery, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 26](#)).
2. Remove the keyboard/top cover (see [Keyboard/top cover on page 26](#)).

Remove the battery:

1. Remove the four Phillips M2.5 × 4.0 screws (1) that secure the battery to the bottom cover.
2. Lift the bottom of the battery, and then pull it away to disconnect it from the system board (2).



Reverse this procedure to install the battery.

Solid-state drive

Table 5-6 Spare part description and number

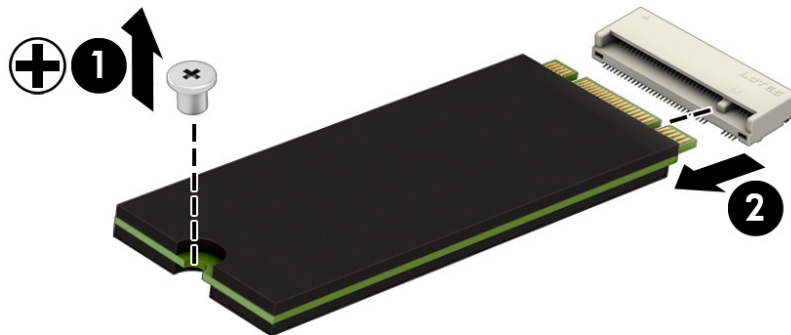
Description	Spare part number
256-GB, M.2, SATA-3 solid-state drive	L43788-001
128-GB, M.2, SATA-3 solid-state drive	L43787-001

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

1. Prepare the computer for disassembly ([Preparation for disassembly on page 26](#)).
2. Remove the keyboard/top cover (see [Keyboard/top cover on page 26](#)).
3. Remove the battery (see [Battery on page 33](#)).

Remove the solid-state drive:

1. Remove the Phillips M2.0 × 2.5 screw **(1)** that secures the solid-state drive to the bottom cover. (The solid-state drive tilts up.)
2. Remove the solid-state drive **(2)** by pulling the drive away from the slot at an angle.




Reverse this procedure to install the solid-state drive.

WLAN module

Table 5-7 Spare part description and number

Description	Spare part number
Intel Wireless-AC 9260 802.11ac 2 × 2 WiFi + Bluetooth 5.0	L16647-005
Realtek RTL8822BE 802.11ac 2 × 2 Wi-Fi + Bluetooth 4.2 Combo Adapter	L51005-005

 **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 technical support.

Before removing the WLAN module, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 26](#)).
2. Remove the keyboard/top cover (see [Keyboard/top cover on page 26](#)).
3. Remove the battery (see [Battery on page 33](#)).

Remove the WLAN module:

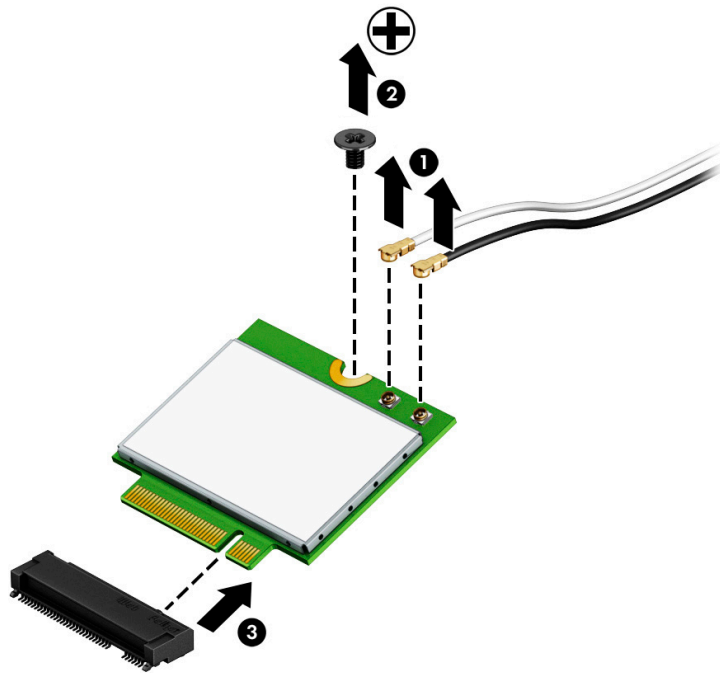
1. Disconnect the wireless antenna cables **(1)** from the terminals on the WLAN module.



NOTE: The wireless antenna cable labeled “1/MAIN” connects to the WLAN module “Main” terminal. The wireless antenna cable labeled “2/AUX” connects to the WLAN module “Aux” terminal.

2. Remove the Phillips M2.0 × 2.5 screw **(2)** that secures the WLAN module to the computer. (The WLAN module tilts up.)

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

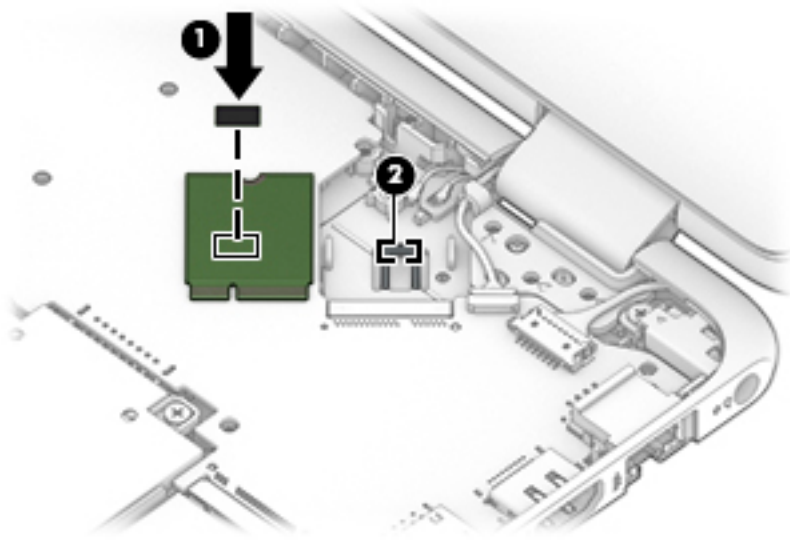


NOTE: If the wireless antenna cables are not connected to the WLAN module terminal, the protective sleeves should be installed on the antenna connectors, as shown in the following illustration.



Reverse this procedure to install the WLAN module.

IMPORTANT: If installing a Realtek RTL8822BE 802.11ac 2 × 2 Wi-Fi + Bluetooth 4.2 Combo Adapter, install a gasket to the module **(1)**. This gasket sits between the WLAN module and the bracket **(2)** on the computer.



RTC battery

Table 5-8 Spare part description and number

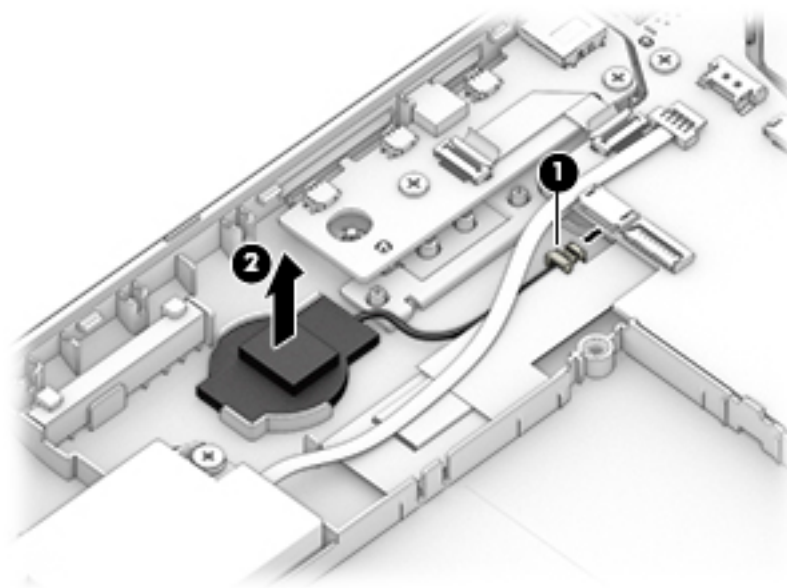
Description	Spare part number
RTC battery (includes cable)	L43797-001

Before removing the RTC battery, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 26](#)).
2. Remove the keyboard/top cover (see [Keyboard/top cover on page 26](#)).
3. Remove the battery (see [Battery on page 33](#)).

Remove the RTC battery:

1. Disconnect the RTC battery cable **(1)** from the system board.
2. Detach the RTC battery **(2)** from the bottom cover and remove it. (The RTC battery is secured to the bottom cover with double-sided adhesive.)



Reverse this procedure to install the RTC battery.

Speakers

Table 5-9 Spare part description and number


Description	Spare part number
Speakers (left and right; includes cables)	L43779-001

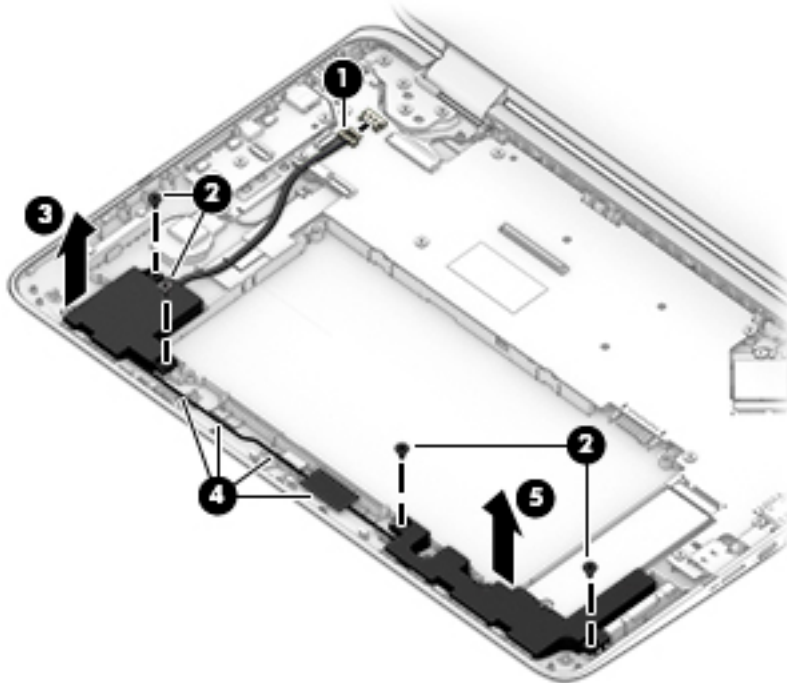
Before removing the speakers, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 26](#)).
2. Remove the keyboard/top cover (see [Keyboard/top cover on page 26](#)).
3. Remove the battery (see [Battery on page 33](#)).

Remove the speakers:

1. Disconnect the speaker cable **(1)** from the system board.
2. Remove the four Phillips M2.0 × 5.0 shoulder screws **(2)** that secure the speakers to the bottom cover.
3. Lift the left speaker **(3)**.
4. Release the speaker cable from the routing channel **(4)** and retention clips built into the bottom cover.
5. Remove the right speaker **(5)**.

 **NOTE:** When removing the speakers, make note of the location of the four rubber isolators around the screws **(2)**. Failure to properly install or damage to these isolators can result in degraded speaker performance.



Reverse this procedure to install the speakers.

Audio board

Table 5-10 Spare part description and number

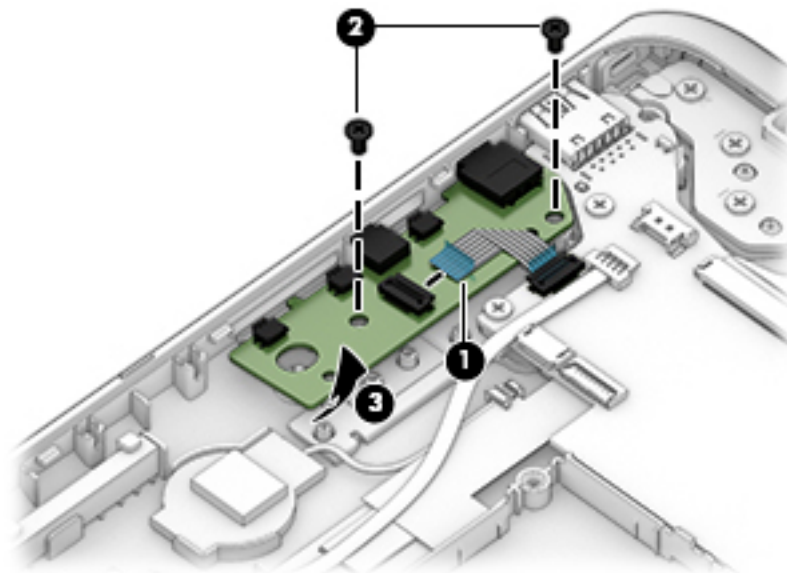
Description	Spare part number
Audio board (includes rubber and cable)	L43777-001
Audio board cable (included in Cable Kit)	L43783-001

Before removing the audio board, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 26](#)).
2. Remove the keyboard/top cover (see [Keyboard/top cover on page 26](#)).
3. Remove the battery (see [Battery on page 33](#)).

Remove the audio board:

1. Disconnect the cable from the ZIF connector on the audio board (**1**).
2. Remove the two Phillips M2.5 × 4.0 screws (**2**) that secure the board to the bottom cover.
3. Release the audio board by lifting the right side until it rests at an angle, and then pull the board away from the side and out of the computer (**3**).



Reverse this procedure to install the audio board.

Power connector cable (DC-in)

Table 5-11 Spare part description and number

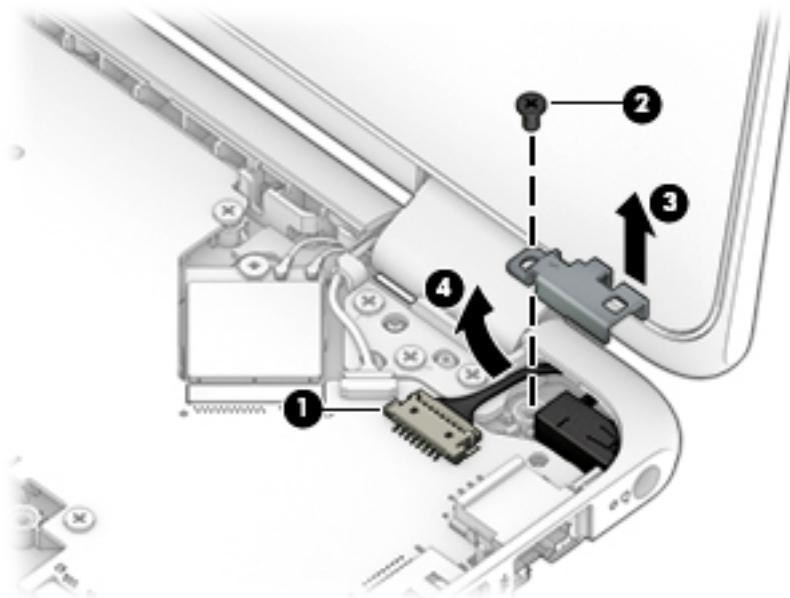
Description	Spare part number
Power connector cable (included in Cable Kit)	L43783-001
Power connector cable bracket (included in Bracket Kit)	L43792-001

Before removing the power connector cable, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 26](#)).
2. Remove the keyboard/top cover (see [Keyboard/top cover on page 26](#)).
3. Remove the battery (see [Battery on page 33](#)).

Remove the power connector cable:

1. Disconnect the power connector cable from the system board (**1**).
2. Remove the Phillips M2.5 × 4.0 screw (**2**) that secures the power connector cable to the bottom cover.
3. Lift the bracket off the connector (**3**).
4. Use the cable to pull the connector out of the computer (**4**).



Reverse this procedure to install the power connector cable.

System board



NOTE: The system board spare part kit includes the processor, integrated system memory, a graphics subsystem with UMA memory, and replacement thermal material.

All system boards use the following part numbers:

xxxxxx-001: Non-Windows operating system

xxxxxx-601: Windows 10 operating system

Table 5-12 Spare part description and number

Description	Spare part number
System board equipped with an Intel Pentium N5000 processor and 8 GB of system memory	L43775-xx1
System board equipped with an Intel Pentium N5000 processor and 4 GB of system memory	L43774-xx1
System board equipped with an Intel Celeron N4100 processor and 4 GB of system memory	L43773-xx1
System board equipped with an Intel Celeron N4100 processor, 4 GB of system memory, and 64 GB of eMMC memory	L43772-xx1
System board equipped with an Intel Celeron N4000 processor and 4 GB of system memory	L43771-xx1
System board equipped with an Intel Celeron N4000 processor, 4 GB of system memory, and 64 GB of eMMC memory	L43770-xx1

Before removing the system board, follow these steps:

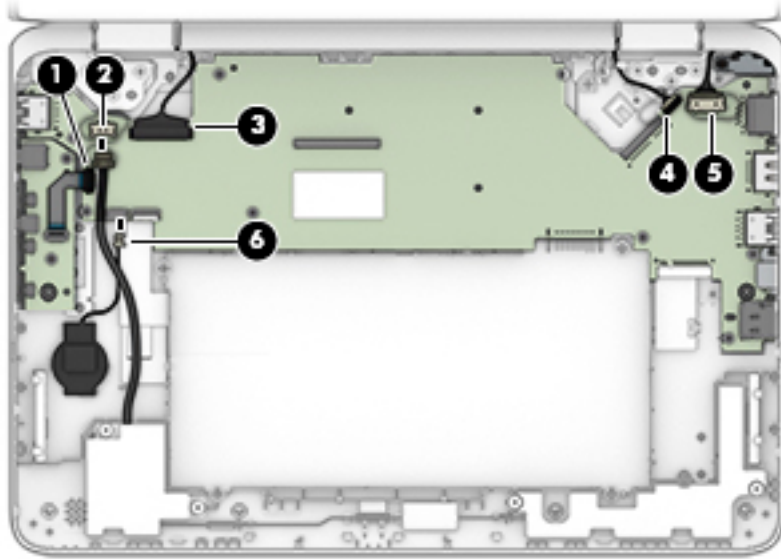
1. Prepare the computer for disassembly ([Preparation for disassembly on page 26](#)).
2. Remove the keyboard/top cover (see [Keyboard/top cover on page 26](#)), and then remove the following components:
 - a. Battery (see [Battery on page 33](#))
 - b. Solid-state drive (see [Solid-state drive on page 34](#))
 - c. WLAN module (see [WLAN module on page 35](#))



NOTE: When replacing the system board, be sure that the heat sink (see [Heat sink on page 45](#)) is removed from the defective system board and installed on the replacement system board.

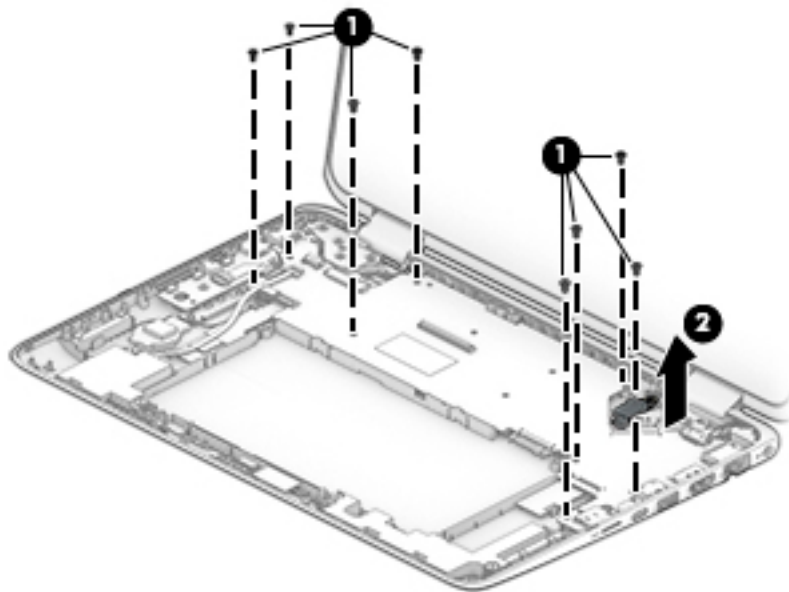
Remove the system board:

1. Disconnect the following cables from the system board:
 - (1) Audio board ZIF connector cable
 - (2) Speaker cable
 - (3) Display panel ZIF connector cable
 - (4) Display touch cable (only on computer models equipped with a touch display assembly)
 - (5) Power connector cable
 - (6) RTC battery cable



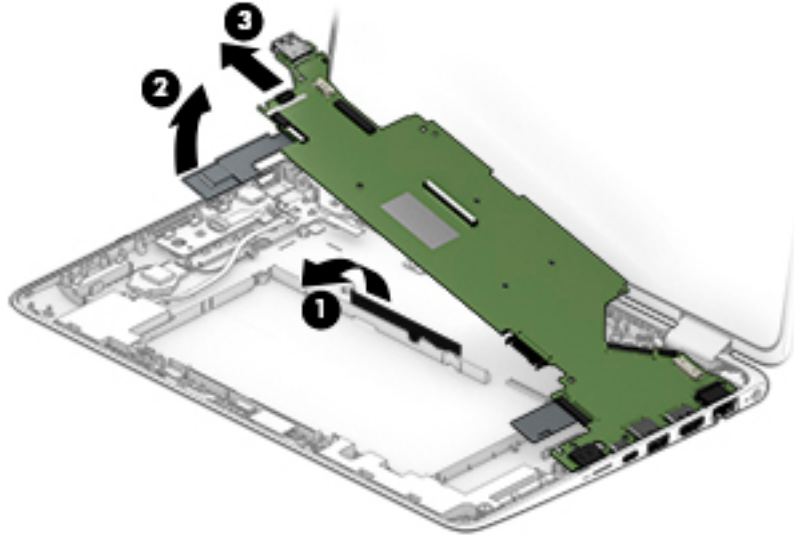
2. Remove the eight Phillips M2.5 × 4.0 screws **(1)** that secure the system board to the bottom cover.
3. Remove the USB bracket from the system board **(2)**.

The USB bracket is available in the Bracket Kit using spare part number L43792-001.



4. Lift the Mylar tape from the edge of the system board **(1)**.
5. Lift the left side of the system board **(2)** until it rests at an angle.

6. Remove the system board (3) by sliding it up and to the left at an angle.



Reverse this procedure to install the system board.

Heat sink

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

Table 5-13 Spare part description and number

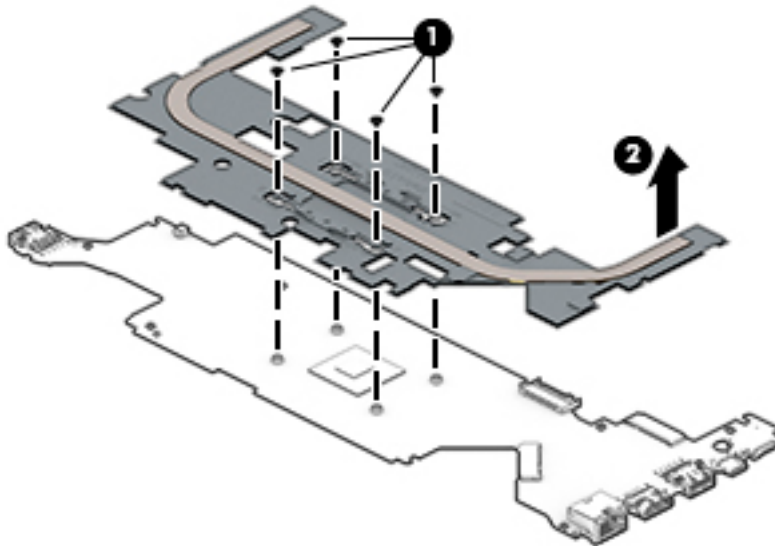
Description	Spare part number
Heat sink (includes replacement thermal material)	L43776-001


Before removing the heat sink, follow these steps:

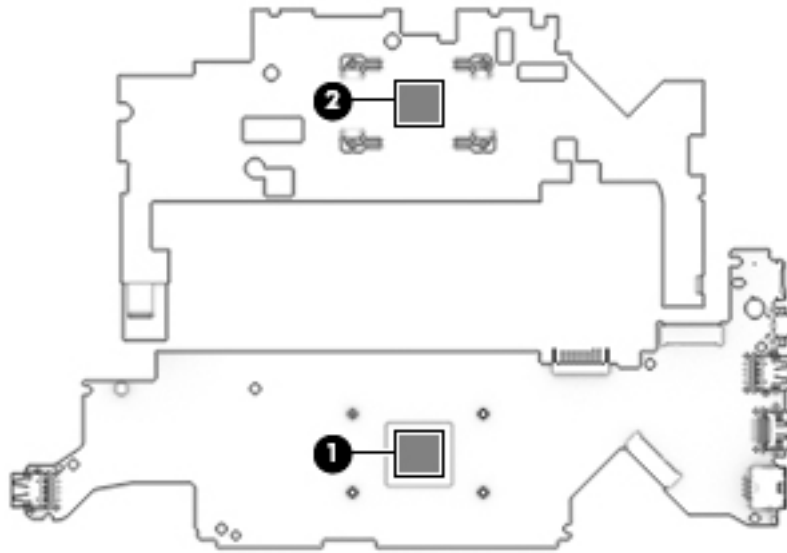
1. Prepare the computer for disassembly ([Preparation for disassembly on page 26](#)).
2. Remove the keyboard/top cover (see [Keyboard/top cover on page 26](#)), and then remove the following components:
 - a. Battery (see [Battery on page 33](#))
 - b. Solid-state drive (see [Solid-state drive on page 34](#))
 - c. WLAN module (see [WLAN module on page 35](#))
 - d. System board (see [System board on page 42](#))

Remove the heat sink:

1. Turn the system board upside down with the rear toward you.
2. Remove the four Phillips M2.0 × 3.0 screws **(1)** that secure the heat sink to the system board.
3. Remove the heat sink from the system board **(2)**.



 **NOTE:** The thermal material must be thoroughly cleaned from the surfaces of the heat sink and the system board each time the heat sink is removed. Thermal paste is used on the processor **(1)** and the heat sink section **(2)** that services it.



Reverse this procedure to install the heat sink.

Display assembly



 **NOTE:** The touch display is spared only as an entire assembly. The non-touch display is spared only at the subcomponent level. For non-touch display assembly spare part information, see the individual removal subsections.

Table 5-14 Spare part description and number

Description	Spare part number
Touch display assembly, SVA, for use in blue models	L47209-001
Touch display assembly, UWVA, for use in blue models	L47210-001
Touch display assembly, SVA, for use in grey models	L43785-001
Touch display assembly, UWVA, for use in grey models	L43786-001

Before removing the display assembly, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 26](#)).
2. Remove the keyboard/top cover (see [Keyboard/top cover on page 26](#)).
3. Remove the battery (see [Battery on page 33](#)).

 **TIP:** Touch display assemblies and non-touch display assemblies use the same removal procedure.

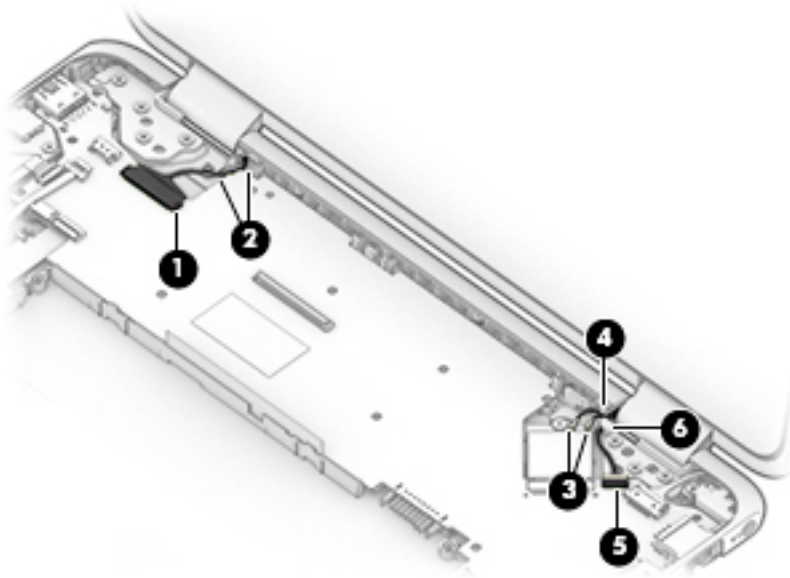
Remove the display assembly:

1. Disconnect the display cable from the ZIF connector on the system board **(1)**.
2. Release the display panel cable **(2)** from the retention clip built into the bottom cover.
3. Disconnect the wireless antenna cables **(3)** from the terminals on the WLAN module.

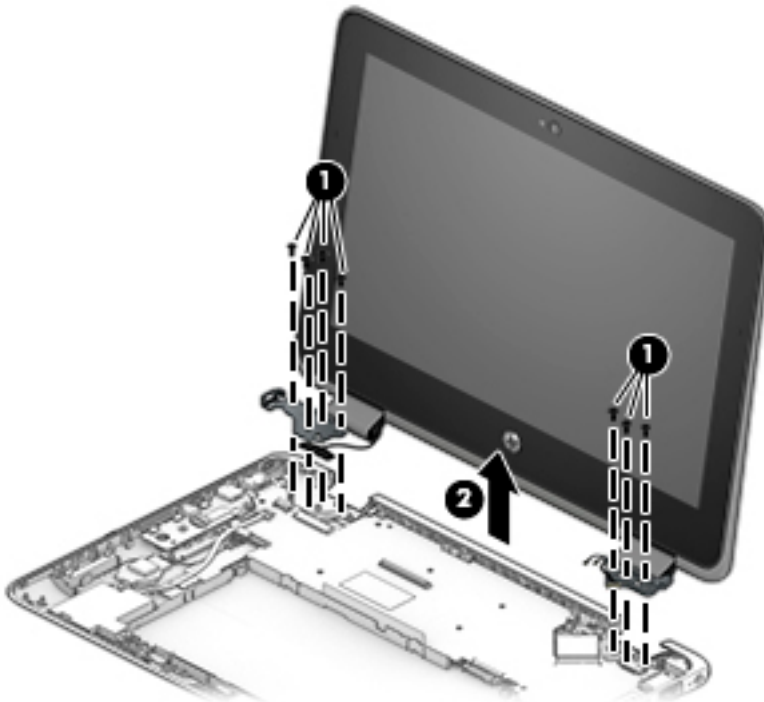
 **NOTE:** The wireless antenna cable labeled “1/MAIN” connects to the WLAN module “Main” terminal. The wireless antenna cable labeled “2/AUX” connects to the WLAN module “Aux” terminal.

4. Release the wireless antenna cables **(4)** from the retention clip built into the bottom cover.
5. Disconnect the display touch cable **(5)** from the system board (only on computer models equipped with a touch display assembly).

6. Release the display touch cable (only on computer models equipped with a touch display assembly) from the retention clip **(6)** built into the bottom cover.



7. Remove the seven Phillips M2.5 × 5.0 screws that secure the display assembly to the bottom cover.
8. Separate the display assembly from the bottom cover **(2)**.

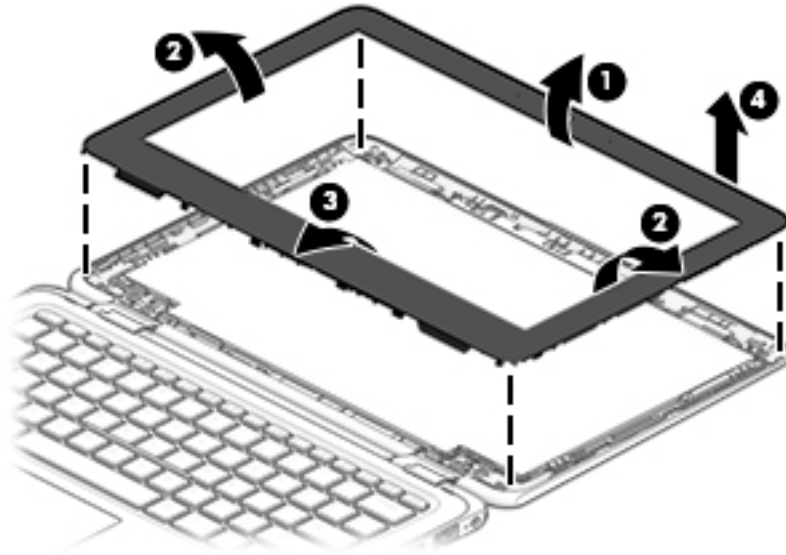


9. If it is necessary to replace the display bezel or any of the display assembly subcomponents:
 - a. Flex the inside edges of the top edge **(1)**, left and right edges **(2)**, and bottom edge **(3)** of the display bezel until the bezel disengages from the display back cover.

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

The display bezel is available using spare part number L43791-001.

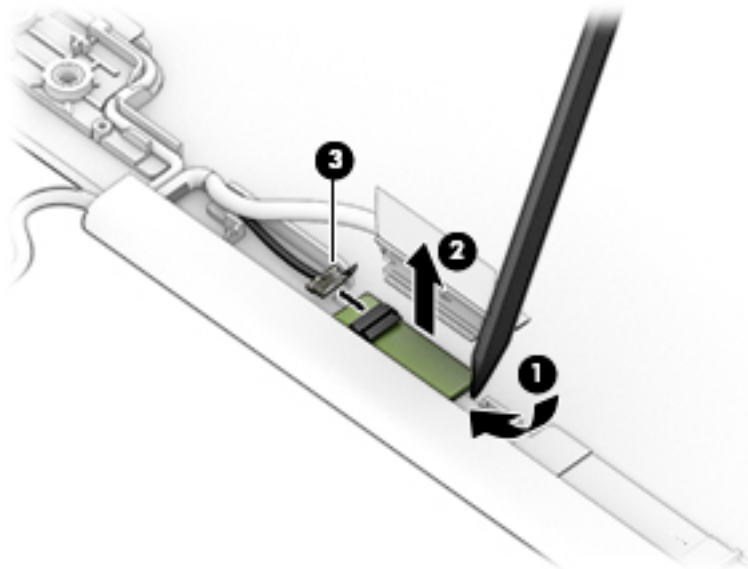
Display bezel adhesive is included in the Miscellaneous Kit, spare part number L43802-001.



- 10. If it is necessary to replace the G-sensor module from the bottom of the display assembly:

- a. Use a tool **(1)** to detach the G-sensor module from the display back cover **(2)**. The G-sensor module is secured to the display back cover with double-sided adhesive.
- b. Disconnect the cable from the G-sensor module **(3)**.

The G-sensor module is available using spare part number L43794-001.

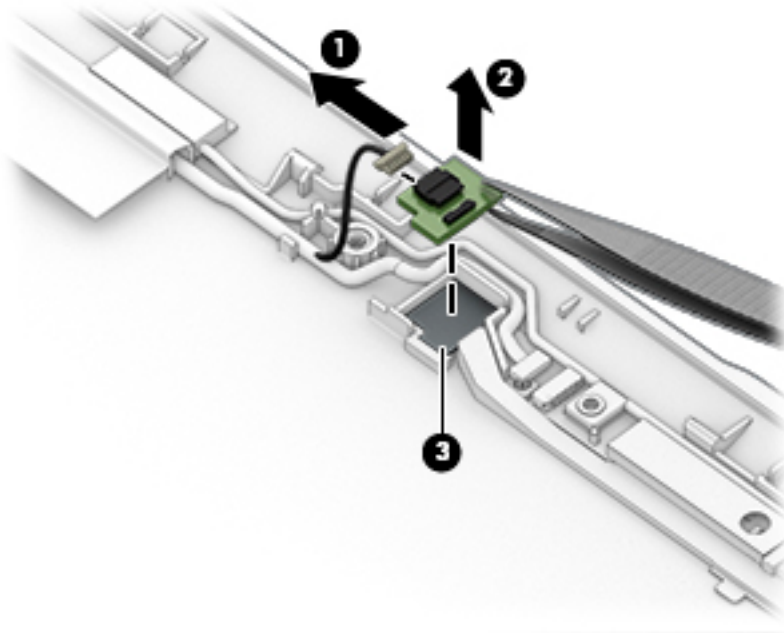


- 11. If it is necessary to replace the LED board from the top of the display assembly:

- a. Disconnect the cable **(1)** from the LED board.
- b. Detach the LED board **(2)** from the display back cover. (The LED board is secured to the display back cover with double-sided adhesive.)

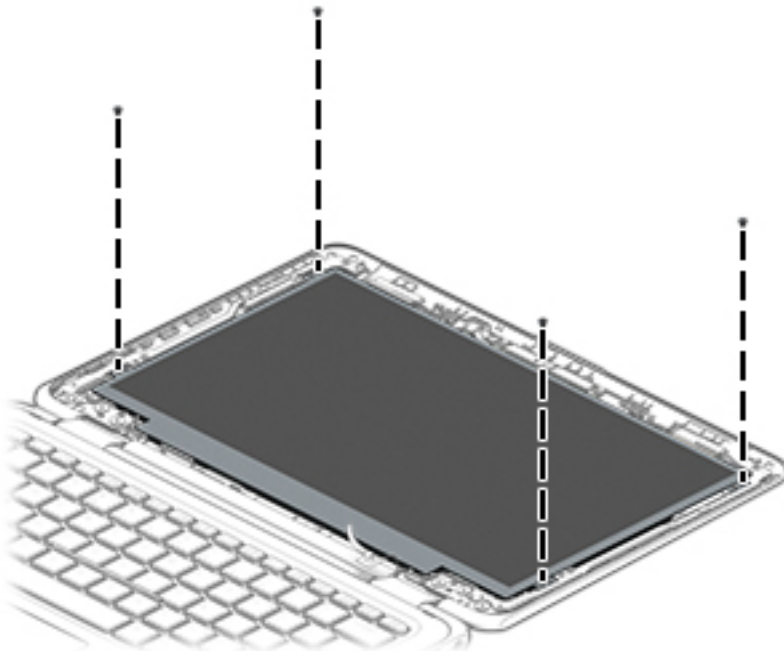
- c. Note the location of the foil below the board **(3)**. Make sure this foil is correctly installed before installing the LED board. The foil prevents light leakage.

The LED board is available using spare part number L50719-001.



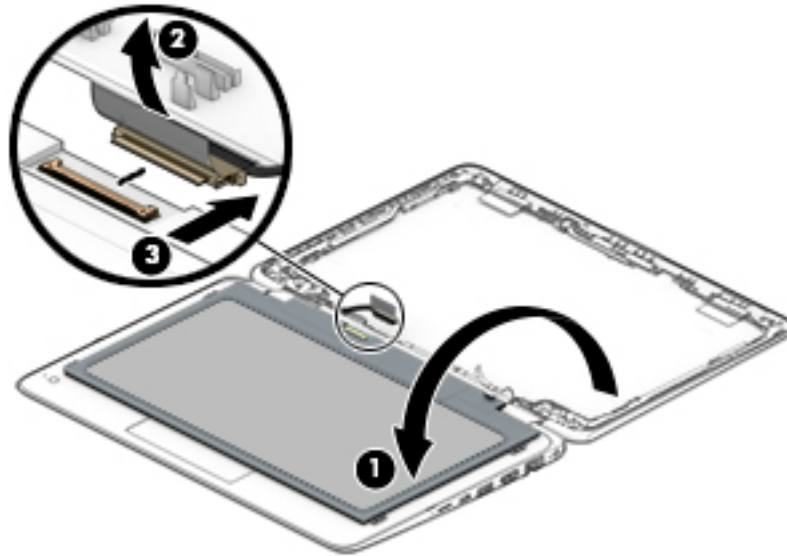
- 12. If it is necessary to replace the display panel:

- a. Remove the four Phillips M2.0×2.5 screws that secure the display panel to the display back cover.



- b. Lift the top edge of the display panel **(1)** and swing it up and forward until it rests upside down on the keyboard.
- c. Release the adhesive strip **(2)** that secures the display panel cable connector to the display panel.

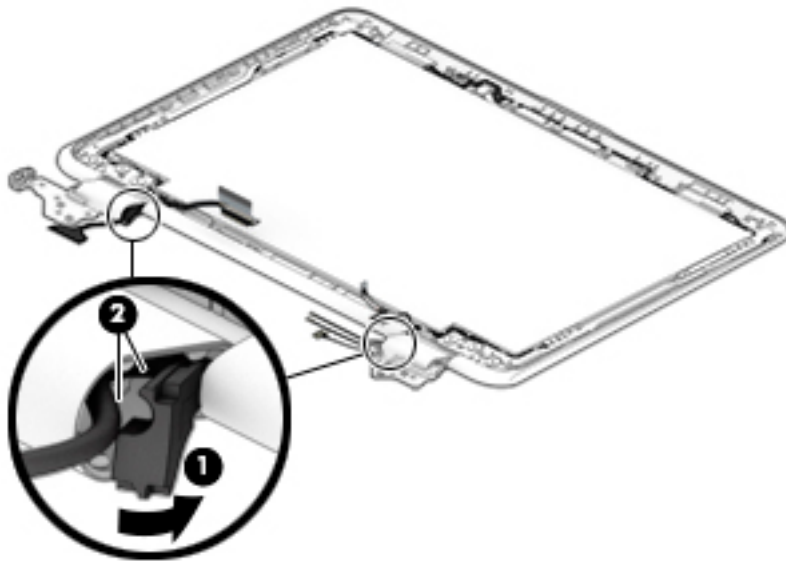
- d. Disconnect the display panel cable (3) from the display panel.



- e. Remove the display panel.

The display panel is available using spare part number L43784-001.

13. Release the rubber cable guides from inside of the hinges by pulling the guide (1) away from the cables (2). The display panel cable routes through the left display hinge. The antenna and touch board cables (touch models only) route through the right hinge.

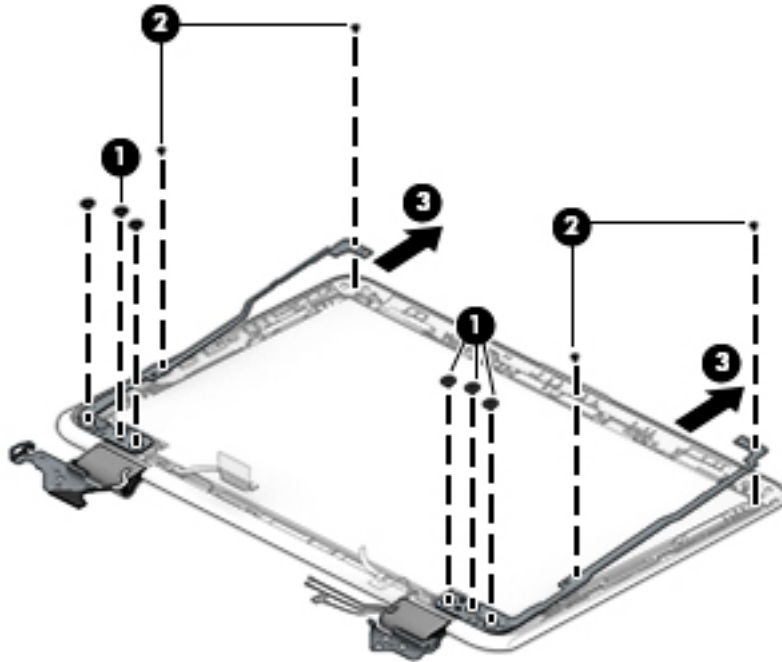


14. If it is necessary to replace the display hinges or hinge covers:

- a. Remove the six Phillips M2.5 × 5.0 screws (1) that secure the display hinges to the display back cover.
- b. Remove the four Phillips M2.0 × 3.0 screws (2) that secure the display hinges to the display back cover.

- c. Remove the display hinges (3).

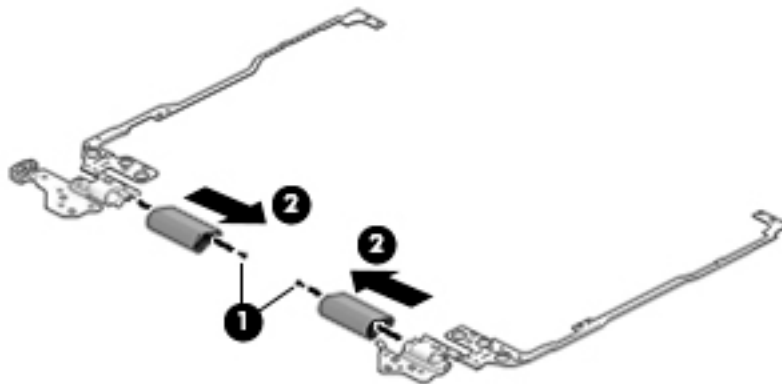
The display hinges are available in the Display Hinge Kit using spare part number L43793-001. The kit includes left and right hinges, blue and grey hinge covers, and rubber cable guides.



- d. Remove the Phillips M1.6 × 3.0 screws (P0 driver) (1) that secure the hinge covers to the display hinges.

- e. Remove the display hinge covers (2).

The display hinge covers are included in the Display Hinge Kit using spare part number L43793-001. The kit includes both blue and grey hinge covers.

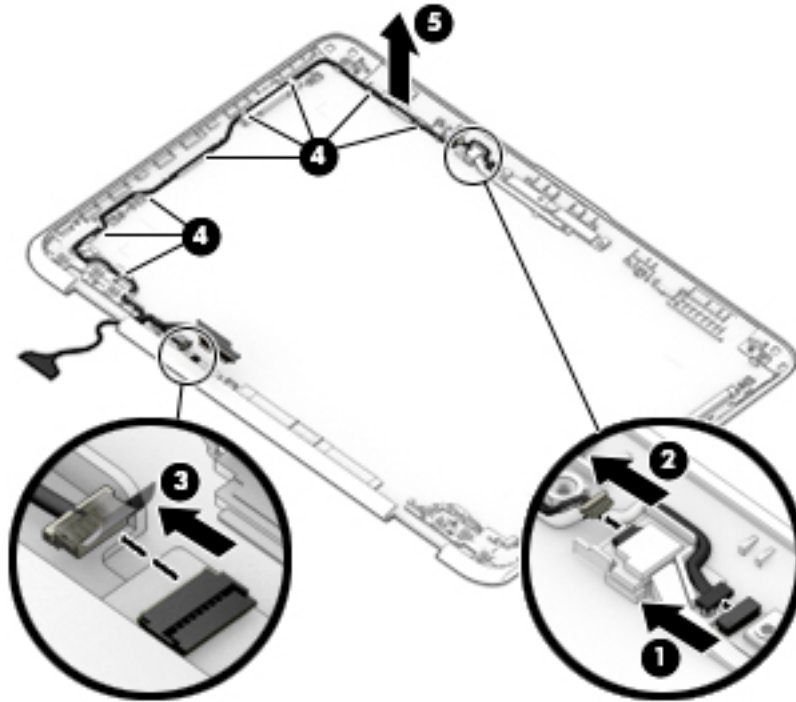


15. If it is necessary to replace the display panel cable:

- a. Disconnect the display cable from the webcam module (1) and the LED board (2) at the top of the display.
- b. Disconnect the cable from the G-sensor board at the bottom of the display (3).

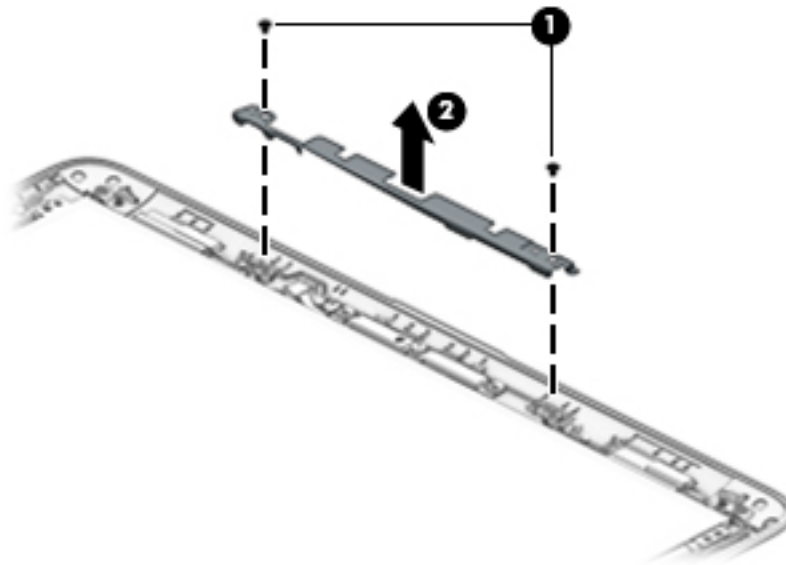
- c. Remove the cable from the clips in the bottom left, left side, and top left of the display back cover **(4)** and then remove the display cable from the display back cover **(5)**.

The display panel cable is included in the Cable Kit, spare part number L43783-001.



- 16. If it is necessary to replace the webcam/microphone module:

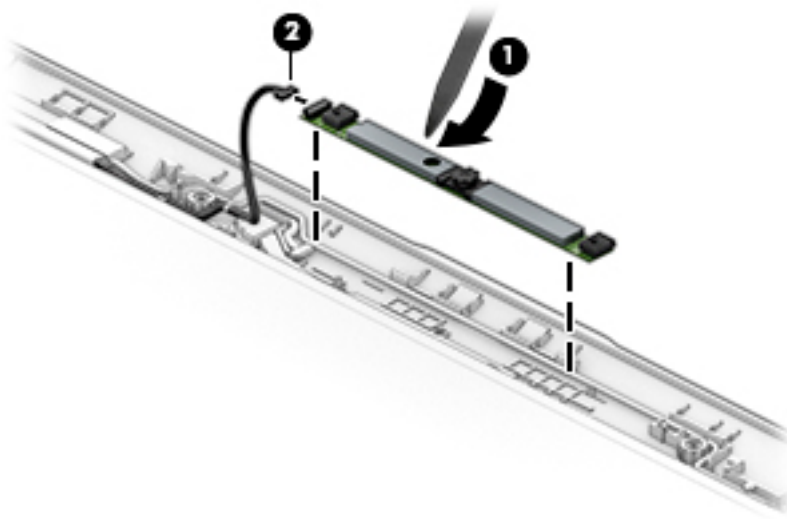
- a. Remove the two Phillips 2.0 × 3.0 screws **(1)** that secure the support bracket to the display back cover, and then remove the bracket from the display **(2)**.



- b. Detach the webcam/microphone module **(1)** from the display back cover. (The module is attached to the display back cover with double-sided adhesive.)

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

The webcam/microphone module is available using spare part number L43801-001.



Reverse this procedure to reassemble and install the display assembly.

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

Using Computer Setup

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

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

Starting Computer Setup


- ▲ Turn on or restart the computer, and when the HP logo appears, press **f10** to enter Computer Setup.

Navigating and selecting in Computer Setup


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

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

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

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

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

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

Your changes go into effect when the computer restarts.


Restoring factory settings in Computer Setup

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

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

1. Start Computer Setup. See [Starting Computer Setup on page 55](#).
2. Select **Main**, select **Apply Factory Defaults and Exit**, and then select **Yes**.

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

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

Your changes go into effect when the computer restarts.

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

Updating the BIOS

Updated versions of the BIOS 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 Computer Setup (BIOS), first determine the BIOS version on your computer.


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

1. Start Computer Setup. See [Starting Computer Setup on page 55](#).
2. Select **Main**, and then select **System Information**.
3. To exit Computer Setup menus without saving your changes, select **Main**, select **Ignore Changes and Exit**, and then select **Yes**.

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

To check for later BIOS versions, see [Downloading a BIOS update on page 56](#).

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 on the computer by unplugging the power cord from the AC outlet.


Do not shut down the computer or initiate Sleep.

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

1. Type `support` in the taskbar search box, and then select the HP Support Assistant app.
– or –
Select the question mark icon in the taskbar.
2. Select **Updates**, and then select **Check for updates and messages**.
3. Follow the on-screen instructions.
4. At the download area, follow these steps:

- a. Identify the most recent BIOS update and compare it to the BIOS version currently installed on your computer. Make a note of the date, name, or other identifier. You 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.


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

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

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

The BIOS installation begins.

5. Complete the installation by following the on-screen instructions.


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

Changing the boot order using the f9 prompt

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

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

TPM BIOS settings (select products only)

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

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

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

To access TPM settings in Computer Setup:

1. Start Computer Setup. See [Starting Computer Setup on page 55](#).
2. Select **Security**, select **TPM Embedded Security**, and then follow the on-screen instructions.

Using HP Sure Start (select products only)

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


HP Sure Start is configured and already enabled so that most users can use the HP Sure Start default configuration. The default configuration can be customized by advanced users.

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

7 Backing up, restoring, and recovering

This chapter provides information about the following processes, which are standard procedure for most products:


- **Backing up your personal information**—You can use Windows tools to back up your personal information (see [Using Windows tools on page 59](#)).
- **Creating a restore point**—You can use Windows tools to create a restore point (see [Using Windows tools on page 59](#)).
- **Creating recovery media** (select products only)—You can use the HP Cloud Recovery Download Tool (select products only) to create recovery media (see [Using the HP Cloud Recovery Download Tool to create recovery media \(select products only\) on page 59](#)).
- **Restoring and recovery**—Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state (see [Using Windows tools on page 59](#)).

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

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

Backing up information and creating recovery media

Using Windows tools


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

You can use Windows tools to back up personal information and create system restore points and recovery media.

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

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

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

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

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

You can use the HP Cloud Recovery Download Tool to create HP Recovery media on a bootable USB flash drive, as follows:

1. Go to <http://www.hp.com/support>.
2. Select **Software and Drivers**, and then follow the on-screen instructions.



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

Restoring and recovery

Restoring, resetting, and refreshing using Windows tools

Windows offers several options for restoring, resetting, and refreshing the computer. For details, see [Using Windows tools on page 59](#).

Recovering using HP Recovery media

HP Recovery media is used to recover the original operating system and software programs that were installed at the factory. On select products, it can be created on a bootable USB flash drive using the HP Cloud Recovery Download Tool. For details, see [Using the HP Cloud Recovery Download Tool to create recovery media \(select products only\) on page 59](#).



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

To recover your system:

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

Changing the computer boot order

If your computer does not restart using the HP Recovery media, you can change the computer boot order. This 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, depending on the location of your HP Recovery media.

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

– or –

Turn on or restart the tablet, quickly hold down the volume down button, and then select **f9**.

3. Select the optical drive or USB flash drive from which you want to boot, and then follow the on-screen instructions.

8 Using HP PC Hardware Diagnostics

Using HP PC Hardware Diagnostics Windows (select products only)

HP PC Hardware Diagnostics Windows is a Windows-based utility that allows you to run diagnostic tests to determine whether the computer hardware is functioning properly. The tool runs within the Windows operating system in order to diagnose hardware failures.

If HP PC Hardware Diagnostics Windows is not installed on your computer, first you must download and install it. To download HP PC Hardware Diagnostics Windows, see [Downloading HP PC Hardware Diagnostics Windows on page 61](#).

After HP PC Hardware Diagnostics Windows is installed, follow these steps to access it from HP Help and Support or HP Support Assistant.

1. To access HP PC Hardware Diagnostics Windows from HP Help and Support:
 - a. Select the **Start** button, and then select **HP Help and Support**.
 - b. Right-click **HP PC Hardware Diagnostics Windows**, select **More**, and then select **Run as administrator**.

– or –

To access HP PC Hardware Diagnostics Windows from HP Support Assistant:

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

– or –

Select the question mark icon in the taskbar.
 - b. Select **Troubleshooting and fixes**.
 - c. Select **Diagnostics**, and then select **HP PC Hardware Diagnostics Windows**.
2. When the 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 at any time, select **Cancel**.

When HP PC Hardware Diagnostics Windows detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. The screen displays one of the following options:

- A Failure ID link is displayed. Select the link and follow the on-screen instructions.
- A Quick Response (QR) code is displayed. With a mobile device, scan the code and then follow the on-screen instructions.
- Instructions for calling support are displayed. Follow those instructions.

Downloading HP PC Hardware Diagnostics Windows

- The HP PC Hardware Diagnostics Windows download instructions are provided in English only.
- You must use a Windows computer to download this tool because only .exe files are provided.


Downloading the latest HP PC Hardware Diagnostics Windows version

To download HP PC Hardware Diagnostics Windows, follow these steps:

1. Go to <http://www.hp.com/go/techcenter/pcdiags>. The HP PC Diagnostics home page is displayed.
2. Select **Download HP Diagnostics Windows**, and then select a location on your computer or a USB flash drive.

The tool is downloaded to the selected location.

Downloading HP Hardware Diagnostics Windows by product name or number (select products only)

 **NOTE:** For some products, it may be necessary to download the software to a USB flash drive by using the product name or number.

To download HP PC Hardware Diagnostics Windows by product name or number, follow these steps:

1. Go to <http://www.hp.com/support>.
2. Select **Get software and drivers**, select your type of product, and then enter the product name or number in the search box that is displayed.
3. In the **Diagnostics** section, select **Download**, and then follow the on-screen instructions to select the specific Windows diagnostics version to be downloaded to your computer or USB flash drive.


The tool is downloaded to the selected location.

Installing HP PC Hardware Diagnostics Windows

To install HP PC Hardware Diagnostics Windows, follow these steps:

- ▲ Navigate to the folder on your computer or the USB flash drive where the .exe file was downloaded, double-click the .exe file, and then follow the on-screen instructions.

Using HP PC Hardware Diagnostics UEFI

 **NOTE:** For Windows 10 S computers, you must use a Windows computer and a USB flash drive to download and create the HP UEFI support environment because only .exe files are provided. For more information, see [Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive on page 63](#).

HP PC Hardware Diagnostics UEFI (Unified Extensible Firmware Interface) 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.


If your PC will not boot into Windows, you can use HP PC Hardware Diagnostics UEFI to diagnose hardware issues.

When HP PC Hardware Diagnostics Windows detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. For assistance in solving the problem:

- ▲ Select **Get Support**, and then use a mobile device to scan the QR code that displays on the next screen. The HP Customer Support - Service Center page displays, with your Failure ID and product number automatically filled in. Follow the on-screen instructions.

– or –

Contact support, and provide the Failure ID code.

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

 **NOTE:** If you need to stop a diagnostic test, press [esc](#).

Starting HP PC Hardware Diagnostics UEFI

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 flash drive

 **NOTE:** To download the HP PC Hardware Diagnostics UEFI tool to a USB flash drive, see [Downloading the latest HP PC Hardware Diagnostics UEFI version on page 63](#).

- b. Hard drive


- c. BIOS

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

Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive

Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive can be useful in the following situations:

- HP PC Hardware Diagnostics UEFI is not included in the preinstall image.
- HP PC Hardware Diagnostics UEFI is not included in the HP Tool partition.
- The hard drive is damaged.


 **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 provided.

Downloading the latest HP PC Hardware Diagnostics UEFI version

To download the latest HP PC Hardware Diagnostics UEFI version to a USB flash drive:

1. Go to <http://www.hp.com/go/techcenter/pcdiags>. The HP PC Diagnostics home page is displayed.
2. Select **Download HP Diagnostics UEFI**, and then select **Run**.

Downloading HP PC Hardware Diagnostics UEFI by product name or number (select products only)

 **NOTE:** For some products, it may be necessary to download the software to a USB flash drive by using the product name or number.

To download HP PC Hardware Diagnostics UEFI by product name or number (select products only) to a USB flash drive:

1. Go to <http://www.hp.com/support>.
2. Enter the product name or number, select your computer, and then select your operating system.
3. In the **Diagnostics** section, follow the on-screen instructions to select and download the specific UEFI Diagnostics version for your computer.

Using Remote HP PC Hardware Diagnostics UEFI settings (select products only)

Remote HP PC Hardware Diagnostics UEFI is a firmware (BIOS) feature that downloads HP PC Hardware Diagnostics UEFI to your computer. It can then execute the diagnostics on your computer, and it may upload results to a preconfigured server. For more information about Remote HP PC Hardware Diagnostics UEFI, go to <http://www.hp.com/go/techcenter/pcdiags>, and then select **Find out more**.

Downloading Remote HP PC Hardware Diagnostics UEFI



NOTE: HP Remote PC Hardware Diagnostics UEFI is also available as a Softpaq that can be downloaded to a server.

Downloading the latest Remote HP PC Hardware Diagnostics UEFI version

To download the latest Remote HP PC Hardware Diagnostics UEFI version, follow these steps:

1. Go to <http://www.hp.com/go/techcenter/pcdiags>. The HP PC Diagnostics home page is displayed.
2. Select **Download Remote Diagnostics**, and then select **Run**.

Downloading Remote HP PC Hardware Diagnostics UEFI by product name or number



NOTE: For some products, it may be necessary to download the software by using the product name or number.

To download HP Remote PC Hardware Diagnostics UEFI by product name or number, follow these steps:

1. Go to <http://www.hp.com/support>.
2. Select **Get software and drivers**, select your type of product, enter the product name or number in the search box that is displayed, select your computer, and then select your operating system.
3. In the **Diagnostics** section, follow the on-screen instructions to select and download the **Remote UEFI** version for the product.

Customizing Remote HP PC Hardware Diagnostics UEFI settings

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

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

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

1. Turn on or restart the computer, and when the HP logo appears, press **f10** to enter Computer Setup.
2. Select **Advanced**, and then select **Settings**.
3. Make your customization selections.
4. Select **Main**, and then **Save Changes and Exit** to save your settings.

Your changes take effect when the computer restarts.

9 Specifications

Computer specifications

The power information in this section may be helpful if you plan to travel internationally with the computer.

The computer operates on DC power, which can be supplied by an AC or a DC power source. The AC power source must be rated at 100–240 V, 50–60 Hz. Although the computer can be powered from a standalone DC power source, it should be powered only with an AC adapter or a DC power source that is supplied and approved by HP for use with this computer.

The computer can operate on DC power within the following specifications. Operating voltage and current varies by platform. The voltage and current for your computer is located on the regulatory label.

Table 9-1 Computer specifications


	Metric	U.S.
Dimensions		
Depth	20.1 cm	8.1 in
Width	30.0 cm	11.8 in
Height	2.0 cm	0.8 in
Weight (non-touch display)	1.35 kg	2.98 lbs
Weight (touch display)	1.44 kg	3.18 lbs
Input power		
Operating voltage and current	5 V dc @ 2 A / 12 V dc @ 3 A / 15 V dc @ 3 A – 45 W USB-C 19.5 V dc @ 2.31 A – 45 W 19.5 V dc @ 3.33 A – 65 W	
NOTE: This product is designed for IT power systems in Norway with phase-to-phase voltage not exceeding 240 V rms.		
Temperature		
Operating	5°C to 35°C	41°F to 95°F
Non-operating	-20°C to 60°C	-4°F to 140°F
Relative humidity (non-condensing)		
Operating	10% to 90%	
Non-operating	5% to 95%	
Maximum altitude (unpressurized)		
Operating	-15 m to 3,048 m	-50 ft to 10,000 ft
Non-operating	-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.		

10 Statement of memory volatility

The purpose of this chapter is to provide general information regarding nonvolatile memory in HP Business computers. This chapter also provides general instructions for restoring nonvolatile memory that can contain personal data after the system has been powered off and the hard drive has been removed.


HP Business computer products that use Intel®-based or AMD®-based system boards contain volatile DDR memory. The amount of nonvolatile memory present in the system depends upon the system configuration. Intel-based and AMD-based system boards contain nonvolatile memory subcomponents as originally shipped from HP, assuming that no subsequent modifications have been made to the system and assuming that no applications, features, or functionality have been added to or installed on the system.


Following system shutdown and removal of all power sources from an HP Business computer system, personal data can remain on volatile system memory (DIMMs) for a finite period of time and will also remain in nonvolatile memory. Use the steps below to remove personal data from the computer, including the nonvolatile memory found in Intel-based and AMD-based system boards.


 **NOTE:** If your tablet has a keyboard base, connect to the keyboard base before beginning steps in this chapter.

Current BIOS steps

1. Follow steps (a) through (l) below to restore the nonvolatile memory that can contain personal data. Restoring or reprogramming nonvolatile memory that does not store personal data is neither necessary nor recommended.
 - a. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.

 **NOTE:** If the system has a BIOS administrator password, enter the password at the prompt.
 - b. Select **Main**, select **Apply Factory Defaults and Exit**, and then select **Yes** to load defaults.
The computer will reboot.
 - c. During the reboot, press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.

 **NOTE:** If the system has a BIOS administrator password, enter the password at the prompt.
 - d. Select the **Security** menu, select **Restore Security Settings to Factory Defaults**, and then select **Yes** to restore security level defaults.
The computer will reboot.
 - e. During the reboot, press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.

 **NOTE:** If the system has a BIOS administrator password, enter the password at the prompt.
 - f. If an asset or ownership tag is set, select the **Security** menu and scroll down to the **Utilities** menu. Select **System IDs**, and then select **Asset Tracking Number**. Clear the tag, and then make the selection to return to the prior menu.

- g. If a DriveLock password is set, select the **Security** menu, and scroll down to **Hard Drive Utilities** under the **Utilities** menu. Select **Hard Drive Utilities**, select **DriveLock**, then uncheck the checkbox for **DriveLock password on restart**. Select **OK** to proceed.
- h. Select the **Main** menu, and then select **Reset BIOS Security to factory default**. Click **Yes** at the warning message.
The computer will reboot.
- i. During the reboot, press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.



NOTE: If the system has a BIOS administrator password, enter the password at the prompt.

- j. Select the **Main** menu, select **Apply Factory Defaults and Exit**, select **Yes** to save changes and exit, and then select **Shutdown**.
 - k. Reboot the system. If the system has a Trusted Platform Module (TPM) and/or fingerprint sensor, one or two prompts will appear—one to clear the TPM and the other to Reset Fingerprint Sensor; press or tap **F1** to accept or **F2** to reject.
 - l. Remove all power and system batteries for at least 24 hours.
2. Complete one of the following:
- Remove and retain the storage drive.
 - or –
 - Clear the drive contents by using a third party utility designed to erase data from an SSD.
 - or –
 - Clear the contents of the drive by using the following BIOS Setup Secure Erase command option steps:



IMPORTANT: If you clear data using Secure Erase, it cannot be recovered.

- a. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
- b. Select the **Security** menu and scroll down to the **Utilities** menu.
- c. Select **Hard Drive Utilities**.
- d. Under **Utilities**, select **Secure Erase**, select the hard drive storing the data you want to clear, and then follow the on-screen instructions to continue.

Nonvolatile memory usage

Table 10-1 Nonvolatile memory usage

Nonvolatile Memory Type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data input into this memory?	How is this memory write-protected?
HP Sure Start flash (select models only)	8 MBytes	No	Yes	Provides protected backup of critical System BIOS code, EC firmware, and critical computer configuration data for select platforms that support HP Sure Start. For more information, see Using HP Sure Start (select models only) on page 72.	Data cannot be written to this device via the host processor. The content is managed solely by the HP Sure Start Embedded Controller.	This memory is protected by the HP Sure Start Embedded Controller.
Real Time Clock (RTC) battery backed-up CMOS configuration memory	256 Bytes	No	Yes	Stores system date and time and noncritical data.	RTC battery backed-up CMOS is programmed using the Computer Setup (BIOS), or changing the Microsoft Windows date & time.	This memory is not write-protected.
Controller (NIC) EEPROM	64 KBytes (not customer accessible)	No	Yes	Stores NIC configuration and NIC firmware.	NIC EEPROM is programmed using a utility from the NIC vendor that can be run from DOS.	A utility is required to write data to this memory and is available from the NIC vendor. Writing data to this ROM in an inappropriate manner will render the NIC non-functional.
DIMM Serial Presence Detect (SPD) configuration data	256 Bytes per memory module, 128 Bytes programmable (not customer accessible)	No	Yes	Stores memory module information.	DIMM SPD is programmed by the memory vendor.	Data cannot be written to this memory when the module is installed in a computer. The specific write-protection method varies by memory vendor.
System BIOS	9 MBytes	Yes	Yes	Stores system BIOS code and computer configuration data.	System BIOS code is programmed at the factory. Code is updated when the system BIOS is updated. Configuration data and settings are input using the Computer Setup (BIOS) or a custom utility.	NOTE: Writing data to this ROM in an inappropriate manner can render the computer non-functional. A utility is required for writing data to this memory and is available on the HP website; go to http://www.hp.com/

Table 10-1 Nonvolatile memory usage (continued)

Nonvolatile Memory Type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data input into this memory?	How is this memory write-protected?
Intel Management Engine Firmware (present only in select Elite or Z models. For more information, go to http://www.hp.com/support . Select Find your product , and then follow the on-screen instructions.)	1.5 MBytes or 7 MBytes	Yes	Yes	Stores Management Engine Code, Settings, Provisioning Data and iAMT third-party data store.	Management Engine Code is programmed at the factory. Code is updated via Intel secure firmware update utility. Unique Provisioning Data can be entered at the factory or by an administrator using the Management Engine (MEBx) setup utility. The third party data store contents can be populated by a remote management console or local applications that have been registered by an administrator to have access to the space.	support . Select Find your product , and then follow the on-screen instructions. The Intel chipset is configured to enforce hardware protection to block all direct read/write access to this area. An Intel utility is required for updating the firmware. Only firmware updates digitally signed by Intel can be applied using this utility.
Bluetooth flash (select products only)	2 Mbit	No	Yes	Stores Bluetooth configuration and firmware.	Bluetooth flash is programmed at the factory. Tools for writing data to this memory are not publicly available but can be obtained from the silicon vendor.	A utility is required for writing data to this memory and is made available through newer versions of the driver whenever the flash requires an upgrade.
802.11 WLAN EEPROM	4 Kbit to 8 Kbit	No	Yes	Stores configuration and calibration data.	802.11 WLAN EEPROM is programmed at the factory. Tools for writing data to this memory are not made public.	A utility is required for writing data to this memory and is typically not made available to the public unless a firmware upgrade is necessary to address a unique issue.
Camera (select products only)	64 Kbit	No	Yes	Stores camera configuration and firmware.	Camera memory is programmed using a utility from the device manufacturer that can be run from Windows.	A utility is required for writing data to this memory and is typically not made available to the public unless a firmware upgrade is necessary to address a unique issue.
Fingerprint sensor (select products only)	512 KByte flash	Yes	Yes	Stores fingerprint templates.	Fingerprint sensor memory is programmed by user enrollment in HP ProtectTools Security Manager.	Only a digitally signed application can make the call to write to the flash.

Questions and answers

1. How can the BIOS settings be restored (returned to factory settings)?



IMPORTANT: Restore defaults does not securely erase any data on your hard drive. See question and answer 6 for steps to securely erase data.

Restore defaults does not reset the Custom Secure Boot keys. See question and answer 7 for information about resetting the keys.

- a. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
- b. Select **Main**, and then select **Apply Factory Defaults and Exit**.
- c. Follow the on-screen instructions.
- d. Select **Main**, select **Save Changes and Exit**, and then follow the on-screen instructions.

2. What is a UEFI BIOS, and how is it different from a legacy BIOS?

The Unified Extensible Firmware Interface (UEFI) BIOS is an industry-standard software interface between the platform firmware and an operating system (OS). It is a replacement for the older BIOS architecture, but supports much of the legacy BIOS functionality.

Like the legacy BIOS, the UEFI BIOS provides an interface to display the system information and configuration settings and to change the configuration of your computer before an OS is loaded. BIOS provides a secure run-time environment that supports a Graphic User Interface (GUI). In this environment, you can use either a pointing device (Touchscreen, TouchPad, pointing stick, or USB mouse) or the keyboard to navigate and make menu and configuration selections. The UEFI BIOS also contains basic system diagnostics.

The UEFI BIOS provides functionality beyond that of the legacy BIOS. In addition, the UEFI BIOS works to initialize the computer’s hardware before loading and executing the OS; the run-time environment allows the loading and execution of software programs from storage devices to provide more functionality, such as advanced hardware diagnostics (with the ability to display more detailed system information) and advanced firmware management and recovery software.

HP has provided options in Computer Setup (BIOS) to allow you to run in legacy BIOS, if required by the operating system. Examples of this requirement would be if you upgrade or downgrade the OS.

3. Where does the UEFI BIOS reside?

The UEFI BIOS resides on a flash memory chip. A utility is required to write to the chip.

4. What kind of configuration data is stored on the DIMM Serial Presence Detect (SPD) memory module? How would this data be written?

The DIMM SPD memory contains information about the memory module, such as size, serial number, data width, speed/timing, voltage, and thermal information. This information is written by the module manufacturer and stored on an EEPROM. This EEPROM cannot be written to when the memory module is installed in a computer. Third-party tools do exist that can write to the EEPROM when the memory module is not installed in a computer. Various third-party tools are available to read SPD memory.

5. What is meant by “Restore the nonvolatile memory found in Intel-based system boards”?

This message relates to clearing the Real Time Clock (RTC) CMOS memory that contains computer configuration data.

6. How can the BIOS security be reset to factory defaults and data erased?

 **IMPORTANT:** Resetting will result in the loss of information.

These steps will not reset Custom Secure Boot Keys. See question and answer 7 for information about resetting the keys.

- a. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
- b. Select **Main**, and then select **Reset Security to Factory Defaults**.
- c. Follow the on-screen instructions.
- d. Select **Main**, select **Save Changes and Exit**, and then follow the on-screen instructions.

7. How can the Custom Secure Boot Keys be reset?

Secure Boot is a feature to ensure that only authenticated code can start on a platform. If you enabled Secure Boot and created Custom Secure Boot Keys, simply disabling Secure Boot will not clear the keys. You must also select to clear the Custom Secure Boot Keys. Use the same Secure Boot access procedure you used to create the Custom Secure Boot Keys, but make the selection to clear or delete all Secure Boot Keys.

- a. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
- b. Select the **Security** menu, select **Secure Boot Configuration**, and then follow the on-screen instructions.
- c. At the **Secure Boot Configuration** window, select **Secure Boot**, select **Clear Secure Boot Keys**, and then follow the on-screen instructions to continue.

Using HP Sure Start (select models only)

Select computer models are configured with HP Sure Start, a technology that continuously monitors your computer's BIOS for attacks or corruption. If the BIOS becomes corrupted or is attacked, HP Sure Start restores the BIOS to its previously safe state, without user intervention. Those select computer models ship with HP Sure Start configured and enabled. HP Sure Start is configured and already enabled so that most users can use the HP Sure Start default configuration. The default configuration can be customized by advanced users.

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

11 Power cord set requirements

The wide-range input feature of the computer permits it to operate from any line voltage from 100 to 120 V ac, or from 220 to 240 V 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 or regions must meet the requirements of the country and 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 **1.0 m** (3.3 ft) and no more than **2.0 m** (6.5 ft).
- All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country or region where the power cord set will be used.
- The power cord sets must have a minimum current capacity of 10 A and a nominal voltage rating of 125 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

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

Country/region	Accredited agency	Applicable note number
Argentina	IRAM	1
Australia	SAA	1
Austria	OVE	1
Belgium	CEBEC	1
Brazil	ABNT	1
Canada	CSA	2
Chile	IMQ	1
Denmark	DEMKO	1
Finland	FIMKO	1
France	UTE	1
Germany	VDE	1
India	BIS	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 H05VV-F, 3-conductor, 0.75 mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.

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

Country/region	Accredited agency	Applicable note number
		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.
		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, 0.75 mm ² or 1.25 mm 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, 0.75 mm 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 3-conductor, 0.75 mm 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 3-conductor, 1.25 mm 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-conductor, 18 AWG, with plug NEMA 5-15P (15 A, 125 V ac), with UL and CSA or C-UL marks. For 240 V ac, the flexible cord must be Type H05VV-F 3-conductor, 0.75 mm ² or 1.00 mm ² conductor size, with plug BS 1363/A with BSI or ASTA marks.

12 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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