



Maintenance and Service Guide

HP EliteBook x360 830 G6 Notebook PC

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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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Important Notice about Customer Self-Repair Parts

 **CAUTION:** The computer includes Customer Self-Repair parts and parts that should be accessed only by an authorized service provider. See Chapter 5, "Removal and replacement procedures for Customer Self-Repair parts," for details. Accessing parts described in Chapter 6, "Removal and replacement procedures for Authorized Service Provider only parts," can damage the computer or void your warranty.

Safety warning notice


 **CAUTION:** 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 applicable safety standards.

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1 Product description

Table 1-1 Product components and their descriptions

Category	Description
Product Name	HP EliteBook x360 830 G6 Notebook PC
Processor	<ul style="list-style-type: none">• Intel™ Core® i7-8565U (1.8 GHz, turbo up to 4.6 GHz, 8 MB SmartCache, quad core, 15 W)• Intel Core i7-8650U (1.9 GHz, turbo up to 4.2 GHz, 8 MB SmartCache, quad core, 15 W)• Intel Core i5-8365U (1.6 GHz, turbo up to 4.1 GHz, 6 MB SmartCache, quad core, 15 W)• Intel Core i5-8265U (1.6 GHz, turbo up to 3.9 GHz, 6 MB SmartCache, quad core, 15 W)• Intel Core i3-8145U (2.1 GHz, turbo up to 3.9 GHz, 4 MB SmartCache, dual core, 15 W)
Graphics	<p>Integrated UMA graphics: Intel UHD Graphics 620</p> <p>Supports HD decode, DX12, HDMI 1.4, and HDCP 2.2 via DisplayPort™ up to 4K @ 60 Hz and via HDMI up to 4K @ 30 Hz</p> <p>Supports 2 external monitors when on the HP Elite 90W Thunderbolt 3 Dock; Max resolution = 2.5K @ 60 Hz (DisplayPort 1) and 2.5K @ 60 Hz (DisplayPort 2) or 4K @ 60 Hz (one DisplayPort) and 4K @ 60 Hz (Type-C output port using a Type C-to-DP adapter)</p> <p>Supports 2 external monitors when on the HP Thunderbolt Dock 120W G2; Max resolution = 2.5K @ 60 Hz (DisplayPort 1) and 2.5K @ 60 Hz (DisplayPort 2) or 4K @ 60 Hz (one DisplayPort) and 4K @ 60 Hz (Type-C output port using a Type C-to-DP adapter)</p>
Display panel	<p>33.8-cm (13.3 in.), FHD (1920 × 1080), UWVA, touch screen, narrow bezel</p> <ul style="list-style-type: none">• AntiGlare, 1000 nits, 72% CG, eDP + PSR, ultra slim, ambient light sensor, HD + IR camera, for WWAN• BrightView, 1000 nits, 72% CG, eDP + PSR, ultra slim, ambient light sensor, HD + IR camera, for WWAN• BrightView, 1000 nits, 72% CG, eDP + PSR, ultra slim, ambient light sensor, HD + IR camera, for WWAN• BrightView, 1000 nits, 72% CG, eDP + PSR, ultra slim, ambient light sensor, HD + IR camera• AntiGlare, 400 nits, 72% CG, eDP + PSR, ultra slim, ambient light sensor, HD + IR camera, for WWAN• BrightView, 400 nits, 72% CG, eDP + PSR, ultra slim, ambient light sensor, HD + IR camera, for WWAN• BrightView, 400 nits, 72% CG, eDP + PSR, ultra slim, ambient light sensor, HD + IR camera• BrightView, 250 nits, 45% CG, eDP, slim, HD camera, for WWAN• BrightView, 250 nits, 45% CG, eDP, slim, HD camera• BrightView, 220 nits, 45% CG, eDP, slim, HD camera, for WWAN• BrightView, 220 nits, 45% CG, eDP, slim, HD camera
Memory	<p>Two SODIMM slots, accessible/upgradeable</p> <p>DDR4-2400 dual channel support (quad core processors)</p> <p>DDR4-2133 dual channel support (dual core processors)</p> <p>Supports up to 32 GB maximum system memory in the following configurations:</p> <ul style="list-style-type: none">• 32 GB (16 GB × 2)• 24 GB (16 GB + 8 GB)

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

Category	Description
Memory <i>(continued)</i>	<ul style="list-style-type: none"> • 20 GB (16 GB + 4 GB) • 16 GB (16 GB × 1 or 8 GB × 2) • 12 GB (8 GB + 4 GB) • 8 GB (8 GB × 1 or 4 GB × 2) • 4 GB (4 GB × 1)
Operating system recovery (OSR) storage	32 GB eMMC
Storage	<p>M.2 2280 solid-state drive next generation form-factor (NGFF)</p> <ul style="list-style-type: none"> • 2 TB, PCIe, NVMe, TLC • 1 TB, PCIe, NVMe, TLC • 512 GB, PCIe, NVMe, TLC • 512 GB, PCIe, NVMe • 512 GB, PCIe, NVMe, TLC, self-encrypting drive (SED), Opal 2 • 512 GB, M.2, SATA-3, TLC, FIPS • 512 GB, PCIe, NVMe, 32 GB 3D Xpoint • 256 GB, PCIe, NVMe, TLC • 256 GB, PCIe, NVMe • 256 GB, SATA-3, TLC, Opal 2 • 128 GB, PCIe, NVMe, TLC
Audio	<p>HP Bang and Olufsen Audio</p> <p>Multi array including world-facing third microphone</p> <p>Dual speakers</p>
Video	<p>Camera, HD RGB 720p</p> <p>Camera, HD RGB 720p + IR</p> <p>Supports Wide Dynamic Range (WDR)</p>
Wireless networking	<p>WLAN options with dual antennas (M.2 2230 socket PCIe/USB) (select products only)</p> <ul style="list-style-type: none"> • Intel Wi-Fi 6 AX200 ax 2×2 + Bluetooth® 5 MU-MIMO M.2 2230 vPro 160-MHz PCI-e + USB WW with 2 antennas • Intel Wi-Fi 6 AX200 ax 2×2 + Bluetooth 5 MU-MIMO M.2 2230 non-vPro 160-MHz PCI-e + USB WW with 2 antennas • Intel 9560 ac 2×2 + Bluetooth 5 MU-MIMO M.2 2230 non-vPro 160-MHz MIPI + BRI WW • Intel 9560 ac 2×2 + Bluetooth 5 MU-MIMO M.2 2230 vPro 160-MHz MIPI + BRI WW <p>WLAN antennas (2) configured at top of display panel</p> <p>Support for HP LAN-Wireless Protection (WLAN/LAN/WWAN switching)</p> <p>Support for HP Connection Optimizer</p> <p>Support for Miracast-certified devices</p> <p>Support for S3/S4 wake on wireless LAN</p>

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

Category	Description
Wireless networking (continued)	<p>Support for Dynamic BIOS SAR</p> <p>Support for Turbo Lite Wi-Fi</p> <p>Near-Field Communication (NFC) (select products only)</p> <p>NXP NPC300 Near Field Communication Module</p> <p>NFC antenna configured on computer</p> <p>WWAN options with dual antennas (select products only)</p> <ul style="list-style-type: none"> Integrated WWAN options (M.2 30 × 42 socket USB2): Intel XMM™ 7262 LTE-Advanced (CAT 6) Integrated WWAN options (M.2 30 × 42 socket PCIe): Intel XMM 7360 LTE-Advanced (CAT 9) Integrated WWAN options (M.2 30 × 42 socket PCIe): Intel XMM 7560 LTE-Advanced Pro (CAT 16) <p>SIM (4FF/nano SIM) user accessible on side of unit</p> <p>WWAN modules compatible with programmable removable eSIM</p> <p>WWAN antennas (2) (world wide 5 band, configured at top of display panel on WWAN models)</p> <p>Supports WWAN after market option</p>
Ports	<ul style="list-style-type: none"> USB Type-C ports (Thunderbolt) (2) USB 3.1 Gen 1 Type A ports, 1 charging (2) Headphone/microphone combo jack High-definition multimedia interface (HDMI) v 1.4b External Nano (4FF) SIM slot for WWAN
Keyboard/pointing devices	<p>Keyboard:</p> <ul style="list-style-type: none"> HP Collaboration Keyboard Backlit, spill-resistant with drain, HP Dura Keys Backlit, spill-resistant with drain, HP Dura Keys, privacy <p>TouchPad requirements</p> <ul style="list-style-type: none"> Glass TouchPad Microsoft Precision Touchpad Default Gestures support Firmware PTP with filter driver No hybrid mode support
Power requirements	<p>Battery:</p> <p>4-cell, 53 Whr, HP Long Life lithium polymer soft-pack battery</p> <p>HP Fast Charge Technology (50% in 30 minutes with 65 W AC adapter)</p> <p>AC adapter:</p> <ul style="list-style-type: none"> 65 W HP Smart AC adapter, 4.5 mm, right angle 65 W HP Smart AC adapter, 4.5 mm, right angle – Argentina 65 W HP Smart AC adapter, 4.5 mm, right angle – EM 65 W HP Smart AC adapter, USB Type-C, straight 45 W HP Smart AC adapter, 4.5 mm, right angle

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

Category	Description
Power requirements <i>(continued)</i>	<ul style="list-style-type: none"> • 45 W HP Smart AC adapter, 4.5 mm, right angle – Argentina • 45 W HP Smart AC adapter, 4.5 mm, right angle – 2-prong (Japan only) • 45 W HP Smart AC adapter, USB Type-C, straight <p>Power cord:</p> <ul style="list-style-type: none"> • 3-wire plug, 1.0 m, conventional power cord (C5) • 3-wire plug, 1.8 m, conventional power cord (C5) • 2-wire plug, 1.0 m, conventional power cord (C7) • Duckhead power cord (C5NS), 1.0 m • Duckhead power cord (C5NS), 1.8 m • Duckhead adapter (C5NS)
Security	<p>Trusted Platform Module (TPM) 2.0, Infineon, soldered down</p> <p>Fingerprint sensor (select products only)</p> <p>Security lock</p> <p>Touch fingerprint sensor (landed, touch with 8 × 8 sensor) (select products only)</p> <p>Preboot Authentication (password, smart card)</p> <p>Smart Card Reader (active) (select products only)</p> <p>Hardware-enforced firmware protection: HP Hardware Root of Trust + Sure Start Gen 4</p>
Operating system1	<p>Operating system version: Windows® 10 RS5</p> <p>Preinstalled:</p> <ul style="list-style-type: none"> • Windows 10 Home 64-bit • Windows 10 Home 64-bit Advanced • Windows 10 Home 64-bit Advanced Single Language • Windows 10 Home 64-bit Chinese Market CPPP • Windows 10 Home 64-bit High-end Chinese Market CPPP • Windows 10 Home 64-bit Plus • Windows 10 Home 64-bit Plus Single Language • Windows 10 Home 64-bit Plus Single Language APAC EM PPP • Windows 10 Home 64-bit Plus Single Language India Market PPP • Windows 10 Home 64-bit Plus Single Language Indonesia Market PPP • Windows 10 Home 64-bit Single Language • Windows 10 Home 64-bit Single Language APAC EM PPP • Windows 10 Home 64-bit Single Language India Market PPP • Windows 10 Home 64-bit Single Language Indonesia Market PPP • Windows 10 Home 64-bit StF MSNA for Higher Education Strategic • Windows 10 Professional 64-bit • Windows 10 Professional 64-bit Chinese Market

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

Category	Description
Operating system	<ul style="list-style-type: none">• Windows 10 Professional 64-bit StF MSNA Plus• Windows 10 Professional 64-bit StF MSNA Standard• Windows 10 Professional 64-bit StF MSNA Strategic• FreeDOS 3.0 <p>Restore media:</p> <ul style="list-style-type: none">• Windows 10 Driver DVD• Windows 10 Driver USB• Windows 10 Professional 64-bit Operating System DVD• Windows 10 Professional 64-bit Operating System USB <p>Certified: Certified Microsoft WHQL</p> <p>Web-only support:</p> <p>Windows 10 Enterprise 64-bit</p> <p>Windows 10 Professional 64-bit CBB 1803</p>
Serviceability	End-user replaceable part: AC adapter

2 Components

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

Right

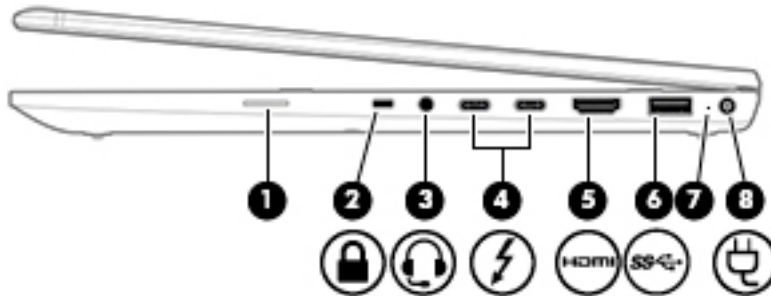


Table 2-1 Right-side components and their descriptions







Component	Description
(1)	SIM card slot (select products only) Supports a wireless subscriber identity module (SIM) card.
(2) 	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.
(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: ▲ Type HP Documentation in the taskbar search box, and then select HP Documentation . NOTE: When a device is connected to the jack, the computer speakers are disabled.
(4) 	USB Type-C Thunderbolt ports with HP Sleep and Charge (2) Even when the computer is off, connect and charge most USB devices that have a Type-C connector, such as a cell phone, camera, activity tracker, or smartwatch, and provide high-speed data transfer. – and – Connect a display device that has a USB Type-C connector, providing DisplayPort output. NOTE: Your computer may also support a Thunderbolt docking station. NOTE: Cables and/or adapters (purchased separately) may be required.

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

Component	Description
(5)  HDMI port	Connects an optional video or audio device, such as a high-definition television, any compatible digital or audio component, or a high-speed High Definition Multimedia Interface (HDMI) device.
(6)  USB SuperSpeed port	Connects a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provides high-speed data transfer.
(7) Battery light	<p>When AC power is connected:</p> <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.
(8)  Power connector	Connects an AC adapter.

Left

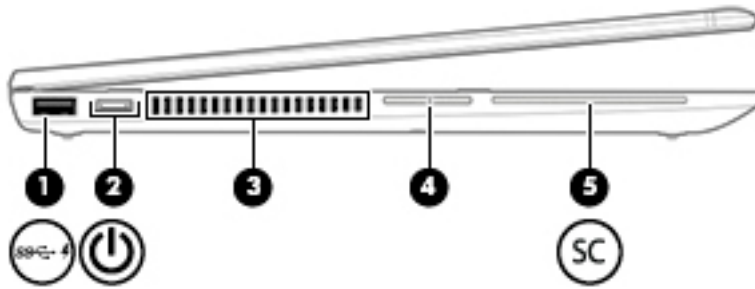







Table 2-2 Left-side components and their descriptions

Component	Description
(1)  USB SuperSpeed port with HP Sleep and Charge	Connects a USB device, provides high-speed data transfer, and even when the computer is off, charges most products such as a cell phone, camera, activity tracker, or smartwatch.
(2)  Power button and power light	<p>Power button:</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> <hr/> <p>Power light:</p> <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.
(3) Vent	Enables airflow to cool internal components.
(4) Volume button	Controls speaker volume on the computer.
(5)  Smart card reader	Supports optional smart cards.

Display

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

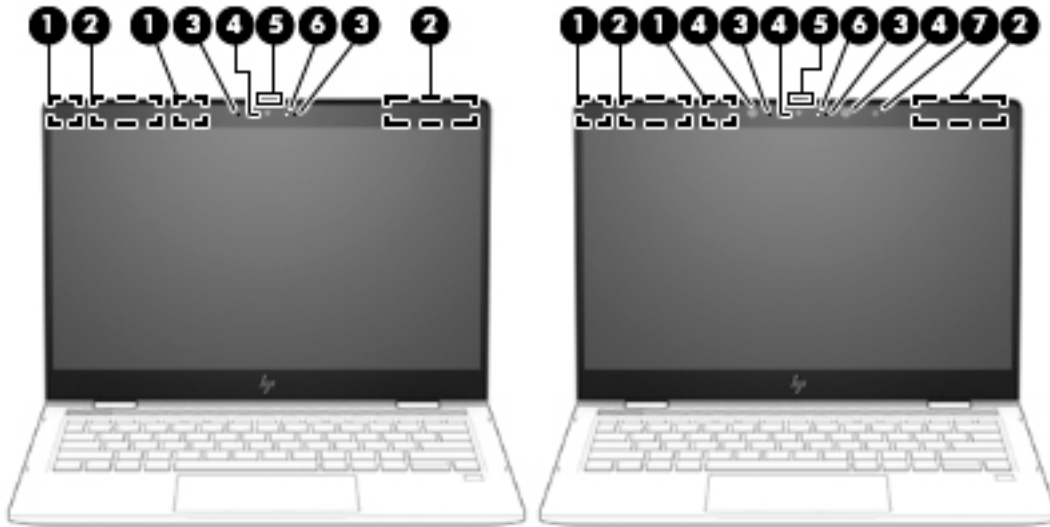


Table 2-3 Display components and their descriptions

Component	Description
(1) WLAN antennas* (select products only)	Send and receive wireless signals to communicate with wireless local area networks (WLANs).
(2) WWAN antennas* (select products only)	Send and receive wireless signals to communicate with wireless wide area networks (WWANs).
(3) Internal microphones	Record sound.
(4) Camera(s)	Allow(s) 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.
(5) Camera privacy cover	When closed, the camera privacy cover conceals the camera. To reveal the camera for use, slide the cover to the left. To conceal the camera, slide the cover to the right.
(6) Camera light(s)	On: One or more cameras are in use.
(7) Ambient light sensor (select products only)	Adjusts the brightness of the display, depending on the ambient light.

*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:

Table 2-3 Display components and their descriptions (continued)

Component	Description
▲	Type HP Documentation in the taskbar search box, and then select HP Documentation .

Keyboard area

TouchPad

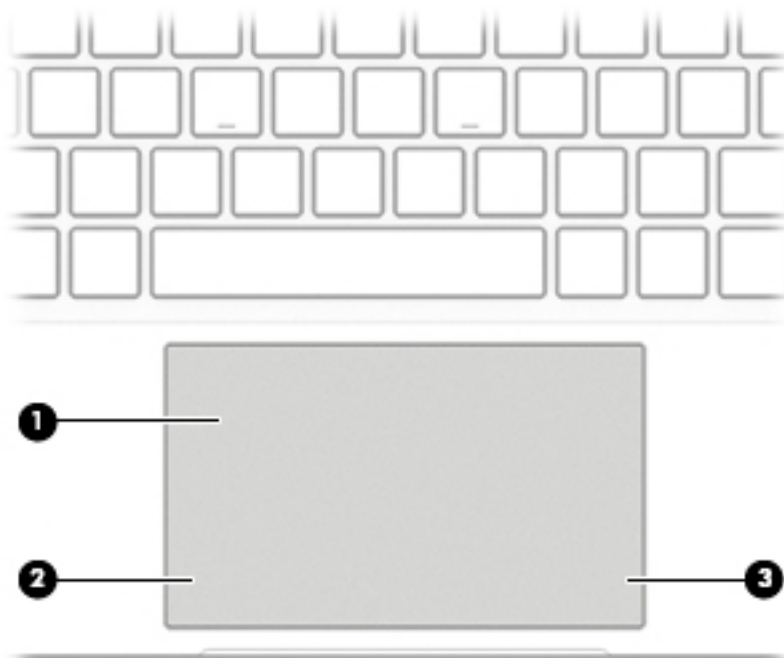


Table 2-4 TouchPad components and their descriptions

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

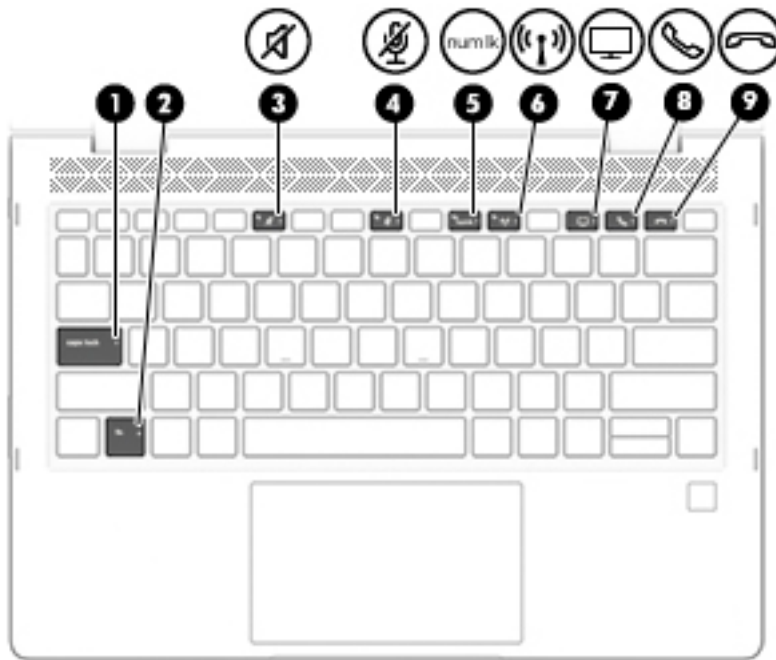









Table 2-5 Lights and their descriptions

Component	Description
(1) Caps lock light	On: Caps lock is on, which switches the key input to all capital letters.
(2) Fn lock light	On: The fn key is locked. For more information, see [Xref Error! Target does not exist.] .
(3)  Mute light	<ul style="list-style-type: none"> On: Computer sound is off. Off: Computer sound is on.
(4)  Microphone mute light	<ul style="list-style-type: none"> On: Microphone is off. Off: Microphone is on.
(5)  Num Lk light	On: Num lock is on.
(6)  Wireless light	<p>On: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on.</p> <p>NOTE: On some models, the wireless light is amber when all wireless devices are off.</p>
(7)  Sharing or presenting light	On: Sharing is on.
(8)  Call answer light	On: Call answer is on.
(9)  Call end light	On: Call end is on.

Speakers and fingerprint sensor

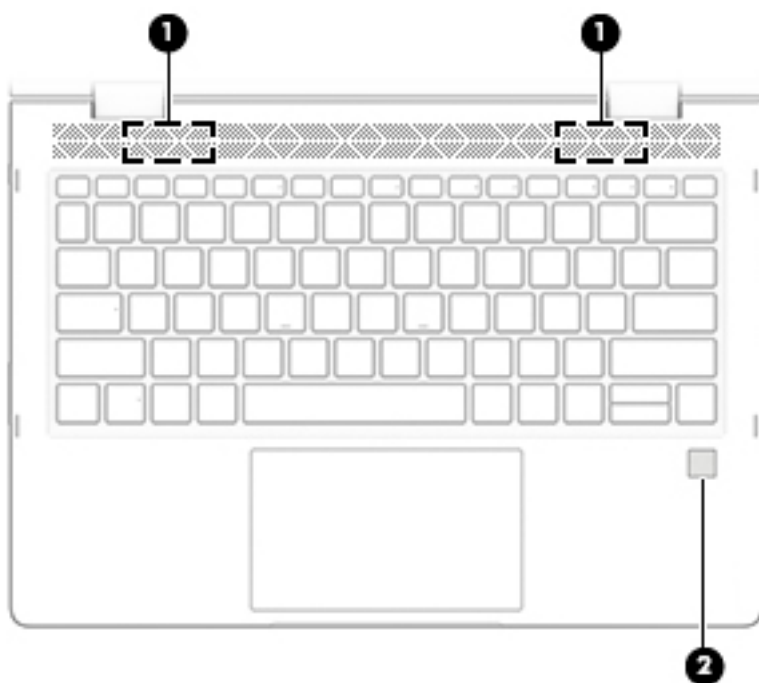


Table 2-6 Speakers and fingerprint sensor and their descriptions

Component	Description
(1) Speakers	Produce sound.
(2) Fingerprint sensor (select products only)	Allows a fingerprint logon to Windows, instead of a password logon. <ul style="list-style-type: none">▲ To use the fingerprint sensor, place your finger on the fingerprint sensor until it reads your fingerprint. <p>IMPORTANT: To prevent fingerprint logon issues, make sure when you register your fingerprint that all sides of your finger are registered by the fingerprint sensor.</p>

Special keys

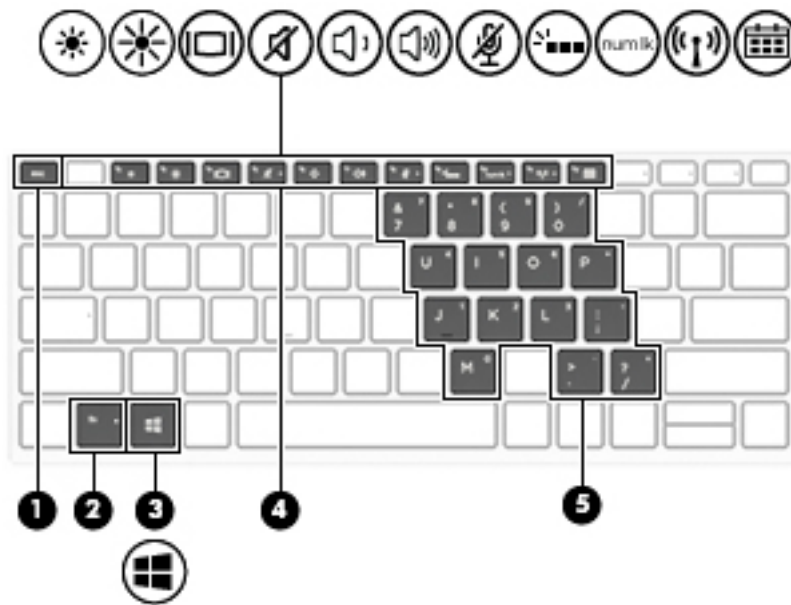



Table 2-7 Special keys and their descriptions

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.
(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.

Bottom

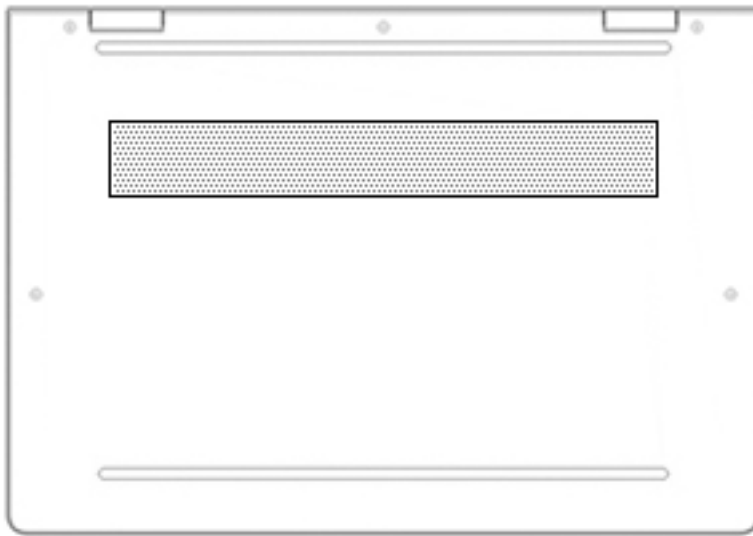



Table 2-8 Bottom components and their descriptions

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

Top

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

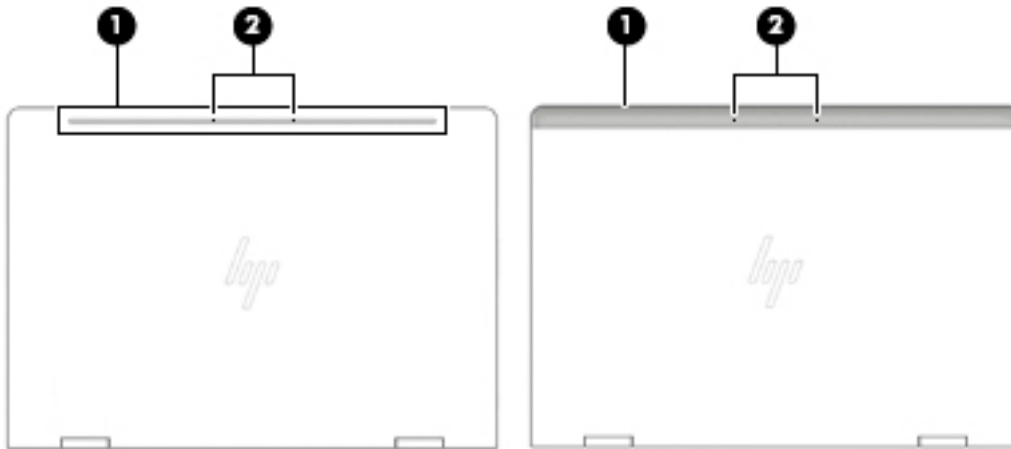


Table 2-9 Top components and their descriptions

Component	Description
(1)	WLAN antennas Send and receive wireless signals to communicate with WLANs.
	WWAN antennas (select products only) Send and receive wireless signals to communicate with WWANs.
(2)	Internal microphones Record 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.

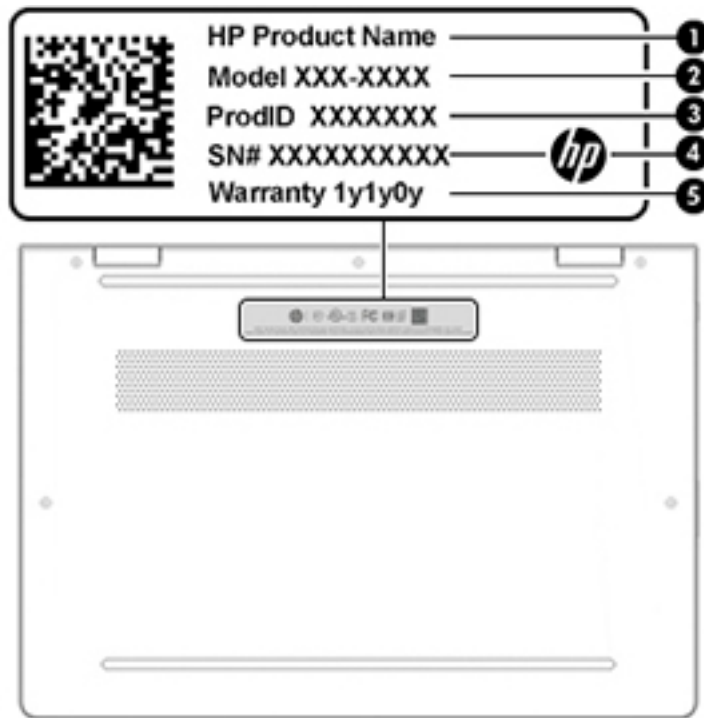


Table 2-10 Identifying the service label

Component
(1) HP product name
(2) Model number
(3) Product ID
(4) Serial number
(5) 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.

Inserting a SIM card (select products only)

CAUTION: Inserting a SIM card of the wrong size could damage the SIM card or cause the SIM card to become stuck in the slot. The use of SIM card adapters is not recommended. To prevent damage to the SIM card or the connectors, use minimal force when inserting or removing a SIM card.

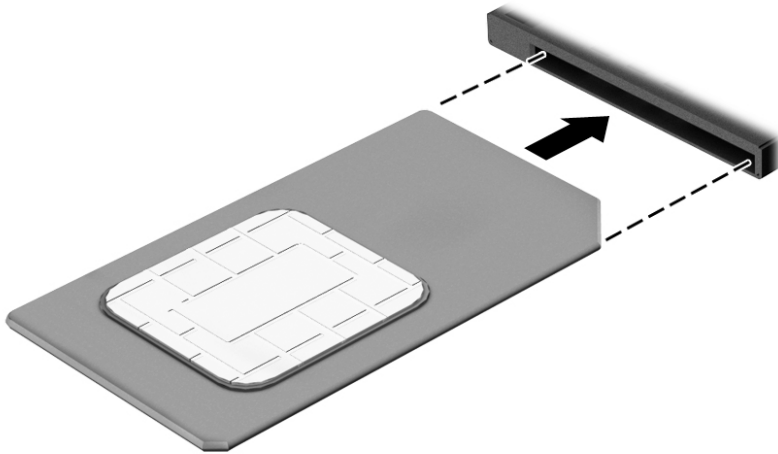
NOTE: Before purchasing a SIM card, follow these instructions to determine the correct SIM card size for your computer:

1. Go to <http://www.hp.com/support>, and then search for your computer by product name or number.
2. Select **Product Information**.
3. Refer to the listed options to determine which card to purchase.

To insert a SIM card, follow these steps:

1. Turn off the computer by using the Shut down command.
2. Insert the SIM card into the SIM card slot, and then press in on the SIM card until it is firmly seated.


NOTE: The SIM card in your computer may look slightly different from the illustration in this section.




To remove a SIM card, press in on the SIM card, and then remove it from the slot.

3 Illustrated parts catalog

Computer major components

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

 **NOTE:** Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See [Labels on page 17](#) for details.

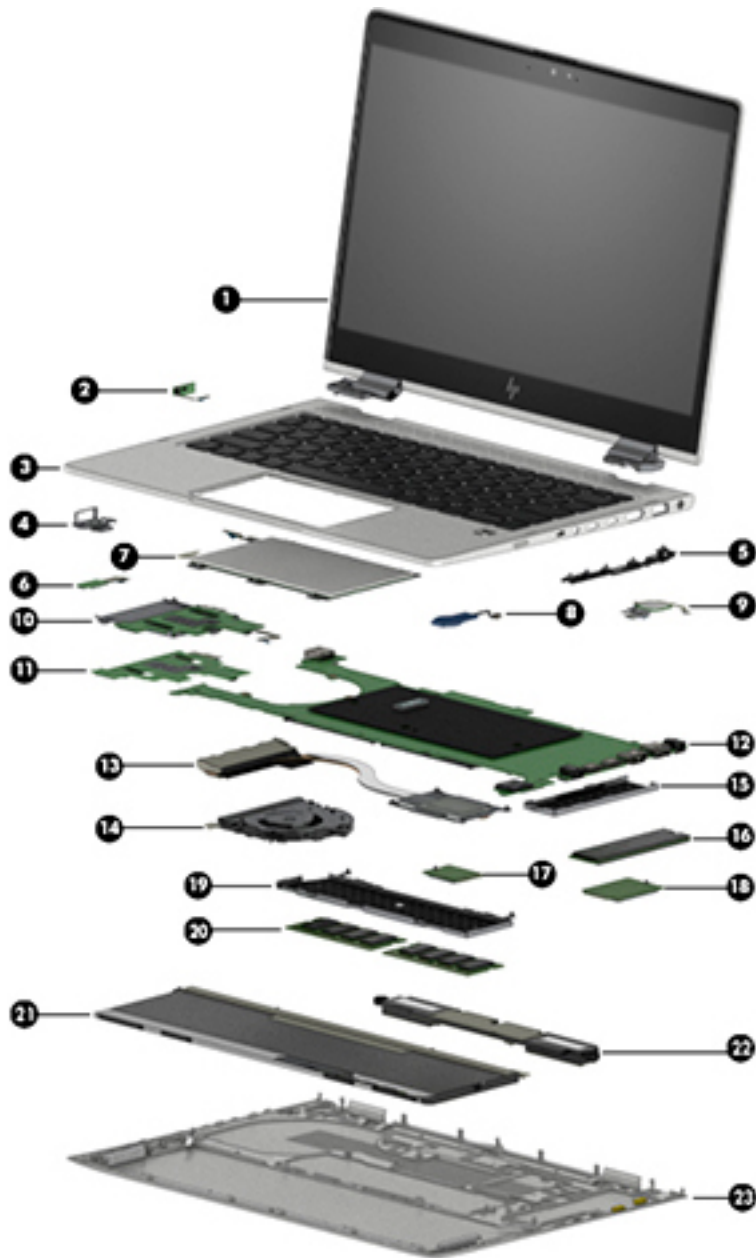


Table 3-1 Computer major component part numbers and their descriptions

Item	Component	Spare part number
(1)	13.0-in., FHD, UWVA, TouchScreen display assembly:	
	AntiGlare, privacy filter, 1000 nits, equipped with webcam/microphone module and WLAN and WWAN antenna	L56441-001
	BrightView, privacy filter, 1000 nits, equipped with webcam/microphone module and WLAN and WWAN antenna	L56439-001
	BrightView, privacy filter, 1000 nits, equipped with webcam/microphone module and WLAN antenna	L56440-001
	AntiGlare, 400 nits, equipped with webcam/microphone module and WLAN and WWAN antenna	L56438-001
	400 nits, equipped with webcam/microphone module and WLAN and WWAN antenna	L56437-001
	400 nits, equipped with webcam/microphone module and WLAN antenna	L56436-001
	AntiGlare, 250 nits, equipped with HD webcam/microphone module and WLAN and WWAN antenna	L65321-001
	AntiGlare, 250 nits, equipped with HD webcam/microphone module and WLAN antenna	L65320-001
	AntiGlare, 220 nits, equipped with webcam/microphone module and WLAN and WWAN antenna	L56435-001
	AntiGlare, 220 nits, equipped with webcam/microphone module and WLAN antenna	L56434-001
(2)	Power button board (includes holder and cable)	L56451-001
(3)	Keyboard/top cover with backlight (includes backlight cable and keyboard cable):	
	For use in Belgium	L56442-A41
	For use in Brazil	L56442-201
	For use in Bulgaria	L56442-261
	For use in Canada	L56442-DB1
	For use in the Czech Republic and Slovakia	L56442-FL1
	For use in Denmark	L56442-081
	For use in Denmark and Finland	L56442-DH1
	For use in France	L56442-051
	For use in Germany	L56442-041
	For use in Greece	L56442-151
	For use in Hungary	L56442-211
	For use in Iceland	L56442-DD1
	For use in India	L56442-D61
	For use in Israel	L56442-BB1
	For use in Italy	L56442-061
	For use in Japan	L56442-291
	For use in Latin America	L56442-161

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

Item	Component	Spare part number
	For use in the Netherlands	L56442-B31
	For use in North Africa	L56442-FP1
	For use in Norway	L56442-091
	For use in Portugal	L56442-131
	For use in Romania	L56442-271
	For use in Russia	L56442-251
	For use in Saudi Arabia	L56442-171
	For use in Slovenia	L56442-BA1
	For use in South Korea	L56442-AD1
	For use in Spain	L56442-071
	For use in Sweden and Finland	L56442-B71
	For use in Switzerland	L56442-BG1
	For use in Taiwan	L56442-AB1
	For use in Thailand	L56442-281
	For use in Turkey	L56442-141
	For use in Turkey F	L56442-541
	For use in the United Kingdom	L56442-031
	For use in the United States	L56442-001
	Keyboard/top cover with privacy filter (includes keyboard cable):	
	For use in Belgium	L56443-A41
	For use in Brazil	L56443-201
	For use in Bulgaria	L56443-261
	For use in Canada	L56443-DB1
	For use in the Czech Republic and Slovakia	L56443-FL1
	For use in Denmark	L56443-081
	For use in Denmark and Finland	L56443-DH1
	For use in France	L56443-051
	For use in Germany	L56443-041
	For use in Greece	L56443-151
	For use in Hungary	L56443-211
	For use in Iceland	L56443-DD1
	For use in India	L56443-D61
	For use in Israel	L56443-BB1

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

Item	Component	Spare part number
	For use in Italy	L56443-061
	For use in Japan	L56443-291
	For use in Latin America	L56443-161
	For use in the Netherlands	L56443-B31
	For use in North Africa	L56443-FP1
	For use in Norway	L56443-091
	For use in Portugal	L56443-131
	For use in Romania	L56443-271
	For use in Russia	L56443-251
	For use in Saudi Arabia	L56443-171
	For use in Slovenia	L56443-BA1
	For use in South Korea	L56443-AD1
	For use in Spain	L56443-071
	For use in Sweden and Finland	L56443-B71
	For use in Switzerland	L56443-BG1
	For use in Taiwan	L56443-AB1
	For use in Thailand	L56443-281
	For use in Turkey	L56443-141
	For use in Turkey F	L56443-541
	For use in the United Kingdom	L56443-031
	For use in the United States	L56443-001
(4)	USB port bracket (included in the Bracket Kit, spare part number L56447-001)	
(5)	I/O port bracket (included in Plastics Kit, spare part number L56454-001)	
(6)	NFC module (includes cables)	L56453-001
(7)	TouchPad (includes TouchPad cable):	
	For use only on computer models equipped with NFC capability (includes NFC antenna)	L56457-001
	For use only on computer models not equipped with NFC capability	L56458-001
(8)	RTC battery	not spared
(9)	Fingerprint sensor board (includes cable and gasket)	L56446-001
(10)	Card reader board (includes cable)	L56452-001
(11)	NFC interface board (includes cable)	L59058-001
(12)	System board (includes processor, a graphics subsystem with UMA memory, and replacement thermal material):	
	Equipped with an Intel Core i7-8565U processor and the Windows 10 operating system	L65059-601

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

Item	Component	Spare part number
	Equipped with an Intel Core i7-8565U processor and a non-Windows 10 operating system	L65059-001
	Equipped with an Intel Core i7-8650U processor and the Windows 10 operating system	L64979-601
	Equipped with an Intel Core i7-8650U processor and a non-Windows 10 operating system	L64979-001
	Equipped with an Intel Core i7-8650U processor, on storage recovery (OSR), and the Windows 10 operating system	L64980-601
	Equipped with an Intel Core i7-8650U processor, on storage recovery (OSR), and a non-Windows 10 operating system	L64980-001
	Equipped with an Intel Core i5-8365U processor and the Windows 10 operating system	L64981-601
	Equipped with an Intel Core i5-8365U processor and a non-Windows 10 operating system	L64981-001
	Equipped with an Intel Core i5-8265U processor and the Windows 10 operating system	L64982-601
	Equipped with an Intel Core i5-8265U processor and a non-Windows 10 operating system	L64982-001
	Equipped with an Intel Core i3-8145U processor and the Windows 10 operating system	L64983-601
	Equipped with an Intel Core i3-8145U processor and a non-Windows 10 operating system	L64983-001
(13)	Heat sink (includes replacement thermal material)	L56445-001
(14)	Fan	L56444-001
(15)	Solid-state drive shield (included in the Bracket Kit, spare part number L56447-001)	
(16)	Solid-state drive (M.2):	
	2 TB, PCIe, NVMe, TLC	L60460-001
	1 TB, PCIe, NVMe, TLC	L60457-001
	512 GB, PCIe, NVMe, TLC	L60463-001
	512 GB, PCIe, NVMe	L64978-001
	512 GB, PCIe, NVMe, TLC, self-encrypting drive (SED), Opal 2	L60462-001
	512 GB, M.2, SATA-3, TLC, FIPS	L60461-001
	512 GB, PCIe, NVMe, 32 GB 3D Xpoint	L65322-001
	256 GB, PCIe, NVMe, TLC	L60458-001
	256 GB, PCIe, NVMe	L60459-001
	256 GB, SATA-3, TLC, Opal 2	L60464-001
	128 GB, SATA-3, TLC	L60456-001
(17)	WLAN module:	
	Intel Wi-Fi 6 AX200 ax 2x2 + Bluetooth 5 MU-MIMO M.2 2230 vPro 160-MHz PCI-e + USB WW with 2 antennas	L35284-005
	Intel Wi-Fi 6 AX200 ax 2x2 + Bluetooth 5 MU-MIMO M.2 2230 non-vPro 160-MHz PCI-e + USB WW with 2 antennas	L35282-005
	Intel 9560 ac 2x2 + Bluetooth 5 MU-MIMO M.2 2230 non-vPro 160-MHz MIPI + BRI WW	L22634-005
	Intel 9560 ac 2x2 + Bluetooth 5 MU-MIMO M.2 2230 vPro 160-MHz MIPI + BRI WW	L28418-005

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

Item	Component	Spare part number
(18)	WWAN module:	
	Intel XMM 7360 LTE-Advanced (Cat 9)	L15398-002
	Intel XMM 7560 LTE-Advanced Pro (Cat 16)	L27188-002
	Intel XMM 7262 LTE-Advanced (Cat 6)	L35286-002
(19)	Memory module shield (included in the Bracket Kit, L56447-001)	
(20)	Memory module (DDR4-2666, 1.2-V):	
	16 GB	937438-852
	8 GB	937236-852
	4 GB	L10598-852
(21)	Battery (4-cell, 53-Whr, 3.45-Ahr, includes cable)	L34449-002
(22)	Speakers (includes cable)	L56456-001
(23)	Bottom cover:	
	For use only on computer models with WWAN capability	L56449-001
	For use only on computer models without WWAN capability	L56448-001

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, RC, 4.5 mm)	913691-850
65 W AC adapter (non-PFC, S-3P, 4.5 mm)	710412-001
65 W AC adapter, USB Type-C, (non-PFC, 1.8-m)	L32392-001
45 W HP Smart AC adapter (non-PFC, RC, 2P, 4.5 mm)	742436-001
45 W HP Smart AC adapter (non-PFC, RC, non-slim, 4.5 mm)	741727-001
45 W AC adapter, USB Type-C, (non-PFC, wall mount, 1.8 m)	L32390-001
Duck head adapter (premium, black, C5NS, with sticker)	
For use in Australia	L50818-004
For use in North America	L50818-002
For use in the People's Republic of China	L50818-005
For use in South Korea	L50818-001
For use in the United Kingdom	L50818-003
Power cord (C5 connector, 1.8 m, conventional):	
For use in Argentina	L19357-002

Table 3-2 Miscellaneous parts and their descriptions (continued)

Component	Spare part number
For use in Australia	L19358-002
For use in Brazil	L19359-002
For use in Denmark	L19360-002
For use in Europe	L19361-002
For use in India	L19363-002
For use in Israel	L19362-002
For use in Italy	L19364-002
For use in Japan	L19365-002
For use in North America	L19367-002
For use in the People's Republic of China	L19368-002
For use in South Africa	L19369-002
For use in South Korea	L19366-002
For use in Switzerland	L19370-002
For use in Taiwan	L19372-002
For use in Thailand	L19371-002
For use in the United Kingdom	L19373-002
Power cord (C5 connector, 1.8 m, premium, with FDH sticker):	
For use in Australia	L45264-001
For use in Brazil	L48055-001
For use in Denmark	L50729-001
For use in Europe	L45265-001
For use in Israel	L45266-001
For use in Italy	L45267-001
For use in Japan	L45268-001
For use in North America	L45269-001
For use in the People's Republic of China	L45270-001
For use in South Africa	L45271-001
For use in Switzerland	L45272-001
For use in Taiwan	L45274-001
For use in Thailand	L45273-001
For use in the United Kingdom	L45275-001
Screw Kit	L56455-001

Cable Kit

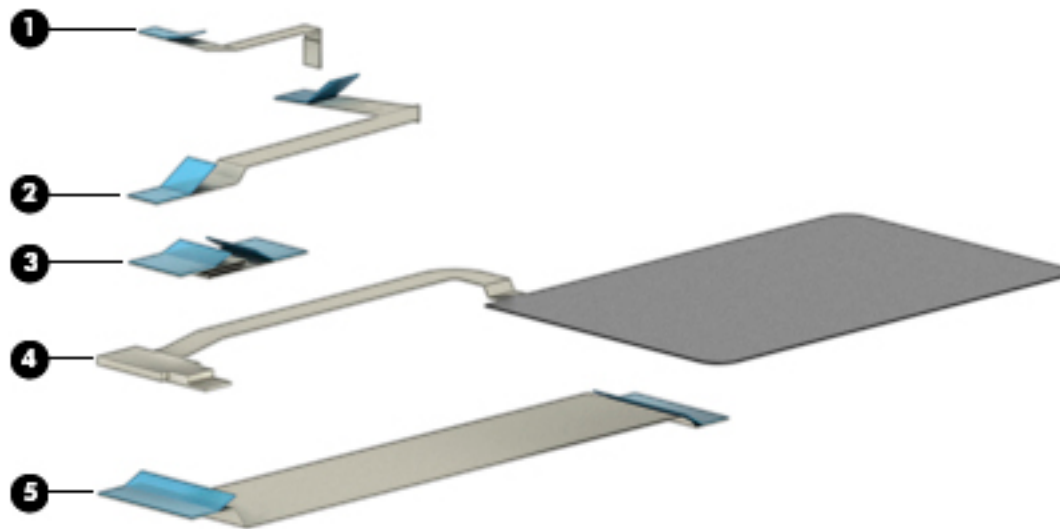


Table 3-3 Cable Kit part number, components, and their descriptions

Item	Component	Spare part number
	Cable Kit , includes the following cables:	L56450-001
(1)	Power button board cable	
(2)	TouchPad cable	
(3)	NFC module cable	
(4)	NFC antenna cable	
(5)	Card reader cable	

Plastics Kit

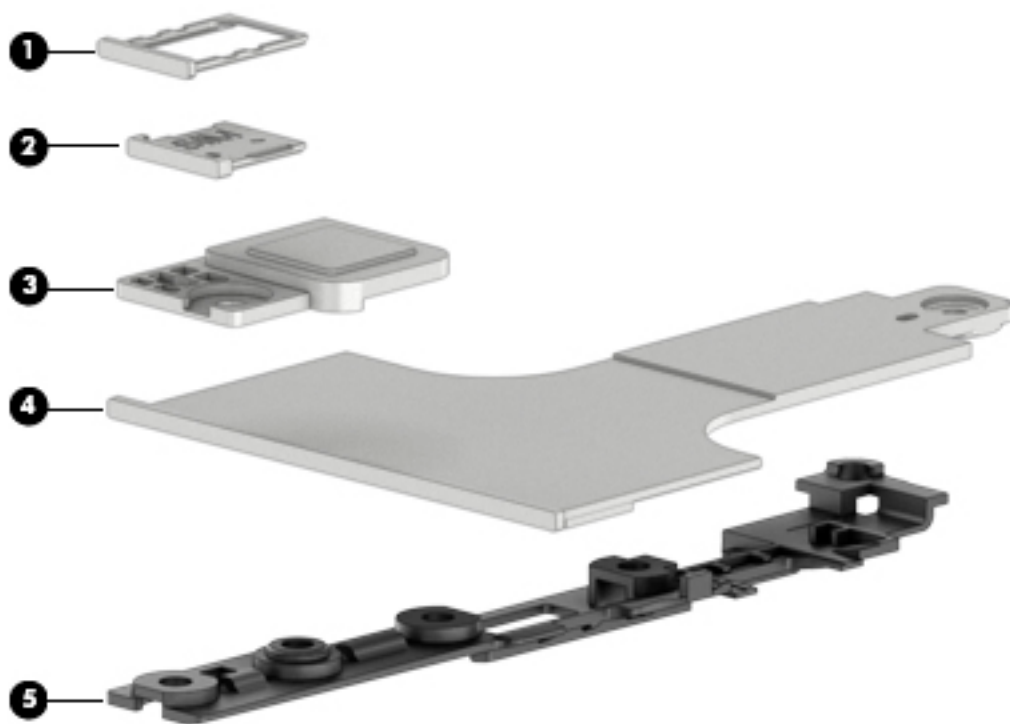


Table 3-4 Plastics Kit part number, components, and their descriptions

Item	Component	Spare part number
	Plastics Kit , includes the following parts:	L56454-001
(1)	SIM tray	
(2)	SIM insert	
(3)	Fingerprint sensor insert	
(4)	Smart card reader insert	
(5)	I/O bracket	

Bracket Kit

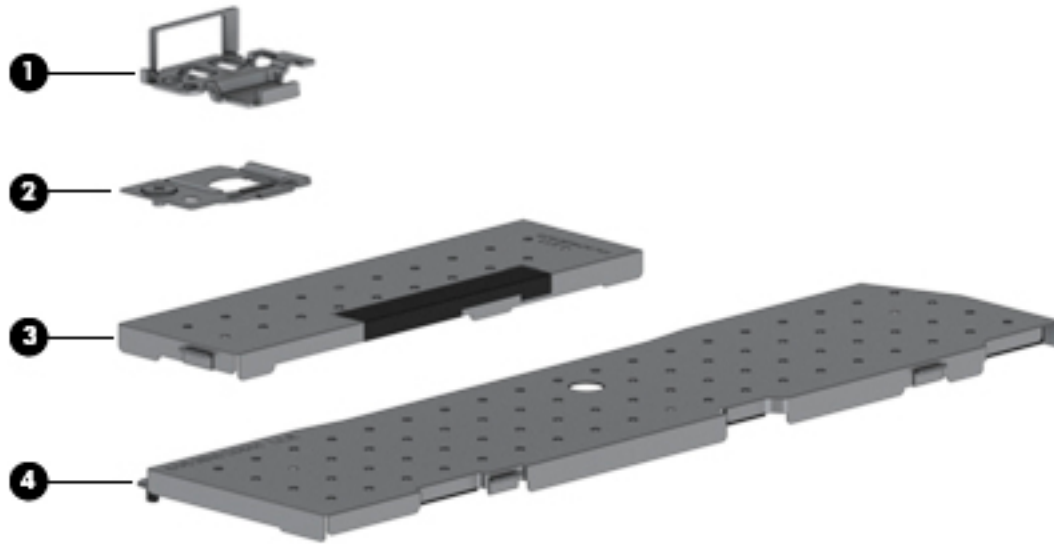


Table 3-5 Bracket Kit part number, components, and their descriptions

Item	Component	Spare part number
	Bracket Kit , includes the following parts:	L56447-001
(1)	USB bracket	
(2)	Fingerprint sensor bracket	
(3)	Solid-state drive EMI shield	
(4)	Memory module EMI shield	

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 screwdriver
- Phillips P1 screwdriver
- Phillips P0 screwdriver
- Torx T5 screwdriver

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


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

Cables and connectors

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

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

 **IMPORTANT:** 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 Customer Self-Repair parts

 **IMPORTANT:** The Customer Self-Repair program is not available in all locations. Installing a part not supported by the Customer Self-Repair program may void your warranty. Check your warranty to determine if Customer Self-Repair is supported in your location.

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

Component replacement procedures

 **NOTE:** Please read and follow the procedures described here to access and replace Customer Self-Repair parts successfully.

 **NOTE:** Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See [Labels on page 17](#) for details.

This chapter provides removal and replacement procedures for Customer Self-Repair parts.

There are as many as 10 screws that must be removed, replaced, or loosened when servicing Customer Self-Repair parts. 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 29](#) for initial safety procedures.

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

Bottom cover

Table 5-1 Bottom cover descriptions and part numbers

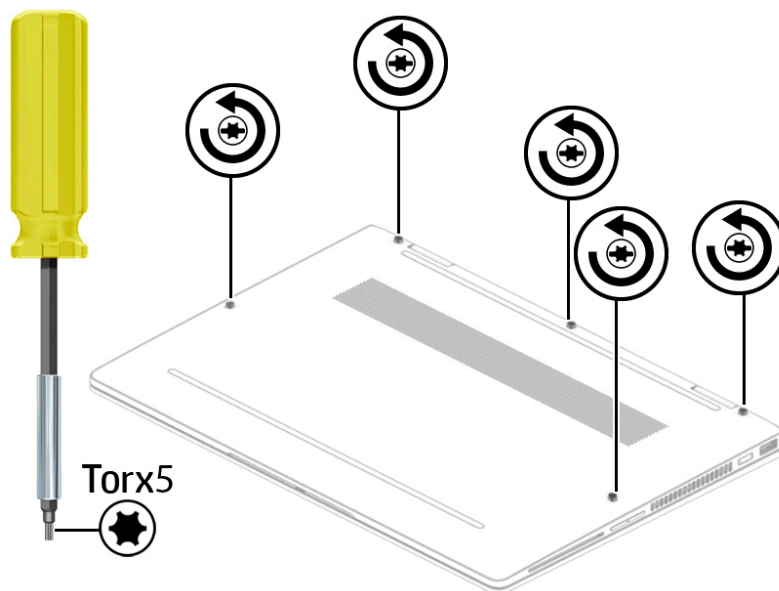
Description	Spare part number
For use only on computer models with WWAN capability	L56449-001
For use only on computer models without WWAN capability	L56448-001

Before removing the bottom cover, follow this step:

- ▲ Prepare the computer for disassembly ([Preparation for disassembly on page 34](#)).

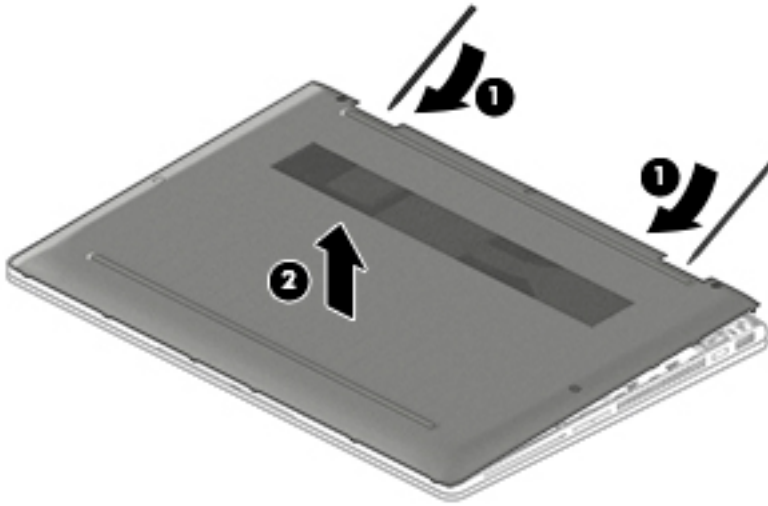
Remove the bottom cover:

1. Loosen the five captive Torx T5 screws that secure the bottom cover to the computer.



2. Insert a non-marking, non-conductive tool at the hinges and separate the bottom cover from the computer (1).

3. Rotate the top (hinge side) of the cover up, and then lift it off the computer (2).



Reverse this procedure to install the bottom cover.

Battery

Table 5-2 Battery description and part number

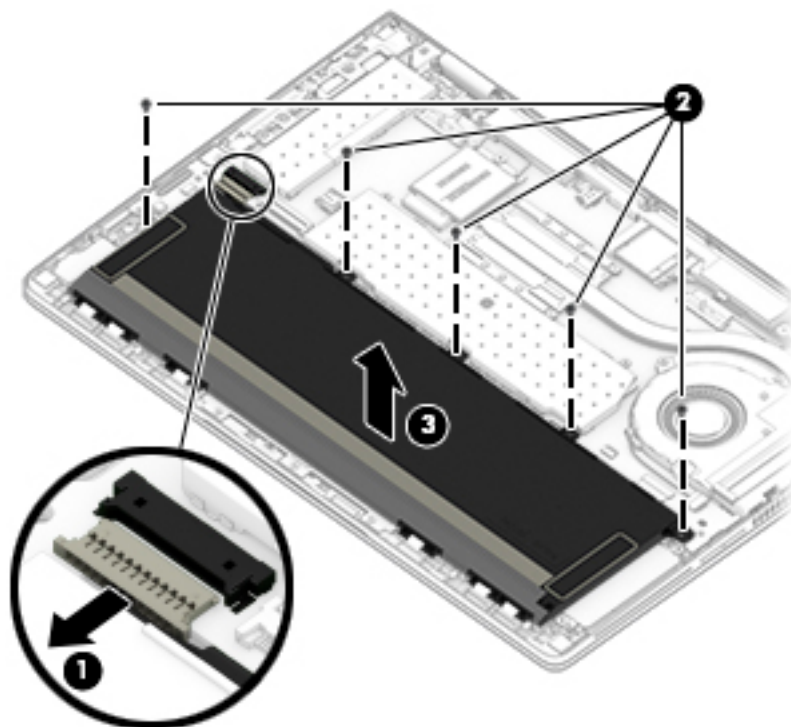
Description	Spare part number
Battery (4-cell, 53-Whr, 3.45-Ahr, includes cable)	L34449-002

Before removing the battery, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 34](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).

Remove the battery:

1. Disconnect the battery cable from the system board (1).
2. Remove the five Phillips M2.0 × 3.5 screws (2) that secure the battery to the computer.
3. Remove the battery from the computer (3).




Reverse this procedure to install the battery.

WLAN module

Table 5-3 WLAN module descriptions and part numbers

Description	Spare part number
Intel Wi-Fi 6 AX200 ax 2×2 + Bluetooth 5 MU-MIMO M.2 2230 vPro 160-MHz PCI-e + USB WW with 2 antennas	L35284-005
Intel Wi-Fi 6 AX200 ax 2×2 + Bluetooth 5 MU-MIMO M.2 2230 non-vPro 160-MHz PCI-e + USB WW with 2 antennas	L35282-005
Intel 9560 ac 2×2 + Bluetooth 5 MU-MIMO M.2 2230 non-vPro 160-MHz MIPI + BRI WW	L22634-005
Intel 9560 ac 2×2 + Bluetooth 5 MU-MIMO M.2 2230 vPro 160-MHz MIPI + BRI WW	L28418-005

 **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 34](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Remove the battery (see [Battery on page 37](#)).

Remove the WLAN module:

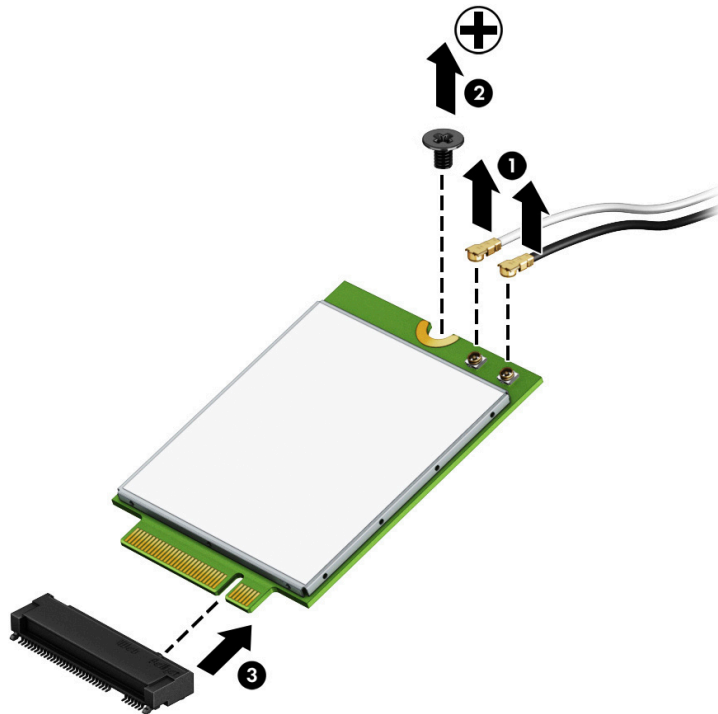
1. Disconnect the WLAN antenna cables **(1)** from the terminals on the WLAN module.




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

2. Remove the Phillips M2.0 × 2.5 screw **(2)** that secures the WLAN module to the bottom cover. (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 WLAN antenna is not connected to the terminal on the WLAN module, a protective sleeve must be installed on the antenna connector, as shown in the following illustration.



Reverse this procedure to install the WLAN module.

WWAN module

The WLAN module and WWAN module are not interchangeable.

The WWAN module is available on select models only.

Table 5-4 WWAN module descriptions and part numbers

Description	Spare part number
Intel XMM 7360 LTE-Advanced (Cat 9)	L15398-002
Intel XMM 7560 LTE-Advanced Pro (Cat 16)	L27188-002
Intel XMM 7262 LTE-Advanced (Cat 6)	L35286-002

Before removing the WLAN module, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 34](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Remove the battery (see [Battery on page 37](#)).

Remove the WWAN module:


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

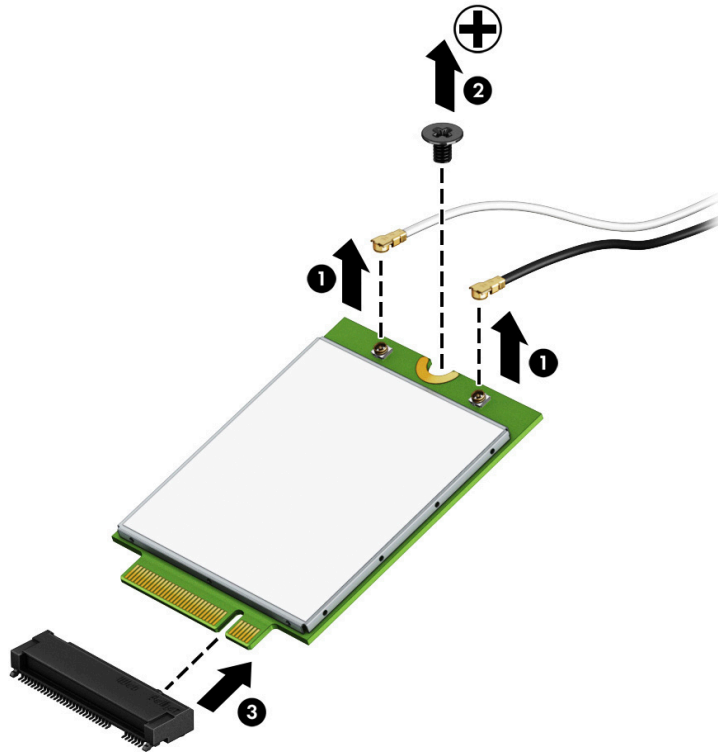



NOTE: The red WWAN antenna cable is connected to the WWAN module 'Main' terminal. The blue WWAN antenna cable is connected to the WWAN module 'Aux' terminal.

2. Remove the Phillips M2.0 × 2.0 screw **(2)** that secures the WWAN module to the computer. (The edge of the module opposite the slot rises away from the computer.)

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

 **NOTE:** WWAN modules are designed with a notch to prevent incorrect insertion.



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



Reverse this procedure to install the WWAN module.

Solid-state drive

Table 5-5 Solid-state drive descriptions and part numbers

Description	Spare part number
2 TB, PCIe, NVMe, TLC	L60460-001
1 TB, PCIe, NVMe, TLC	L60457-001
512 GB, PCIe, NVMe, TLC	L60463-001
512 GB, PCIe, NVMe	L64978-001
512 GB, PCIe, NVMe, TLC, self-encrypting drive (SED), Opal 2	L60462-001
512 GB, SATA-3, TLC, FIPS 140-2	L60461-001
512 GB, PCIe, NVMe, 32 GB 3D Xpoint	L65322-001
256 GB, PCIe, NVMe, TLC	L60458-001
256 GB, PCIe, NVMe, value	L60459-001
256 GB, SATA-3, TLC, Opal 2	L60464-001
128 GB, SATA-3, TLC	L60456-001
Solid-state drive shield (included in the Bracket Kit, spare part number L56447-001)	

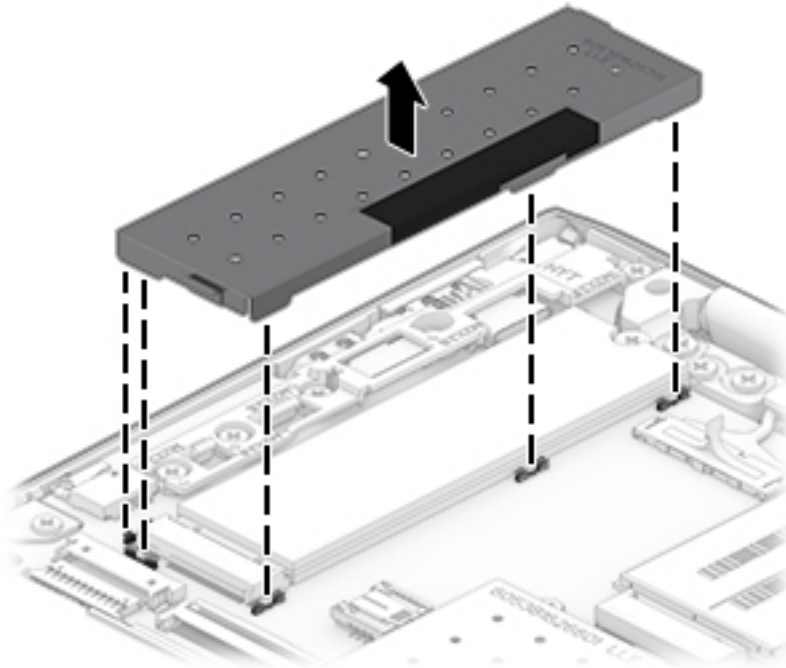
Before removing the solid-state drive, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 34](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Remove the battery (see [Battery on page 37](#)).

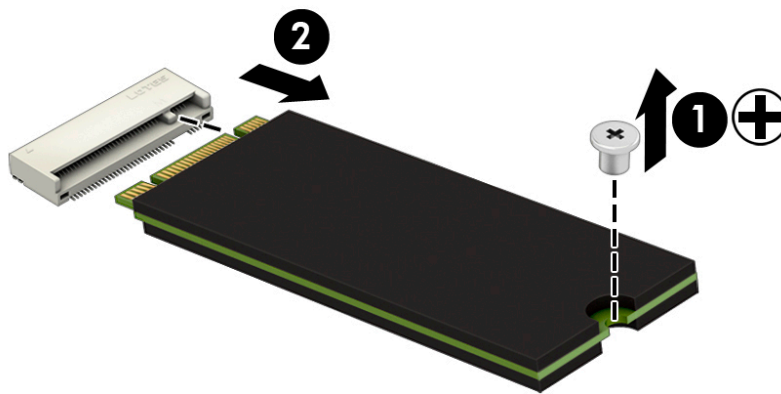
Remove the solid-state drive:

1. Remove the solid-state drive shield.

 **TIP:** Clips on the system board secure the solid-state drive shield. When installing the shield, be sure to insert the shield into the clips.



2. Remove the Phillips M2.0 × 2.0 screw (1), and then pull the solid-state drive module from the socket (2).



Reverse this procedure to install the solid-state drive.

Memory module

Table 5-6 Memory descriptions and part numbers


Description	Spare part number
16 GB memory module (DDR4-2666, 1.2-V)	937438-852
8 GB memory module (DDR4-2666, 1.2-V)	937236-852
4 GB memory module (DDR4-2666, 1.2-V)	L10598-852
Memory module shield (included in the Bracket Kit, spare part number L56447-001)	

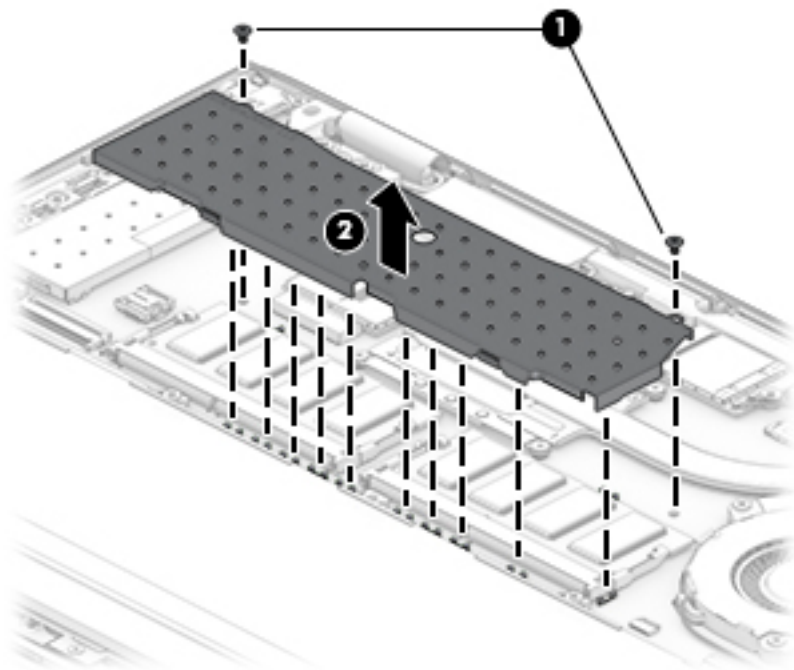
Before removing the memory modules, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 34](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Remove the battery (see [Battery on page 37](#)).

Remove the memory modules:


1. Remove the two Phillips M2.0 × 3.0 screws (1) that secure the memory module shield to the system board.
2. Remove the memory module shield (2).

 **TIP:** Clips on the system board secure the bottom edge of the memory module shield. When installing the shield, be sure to insert the bottom edge of the shield into the clips.

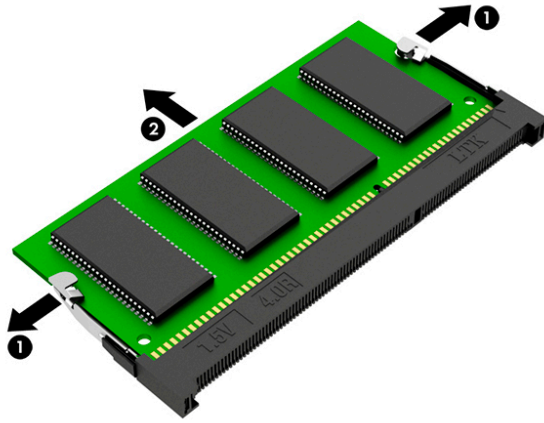


3. Spread the two retention clips outward (1) until the memory module tilts up at a 45-degree angle.


4. Grasp the edge of the memory module (2), and then gently pull the module out of the slot. Use the same procedure to remove both memory modules.

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

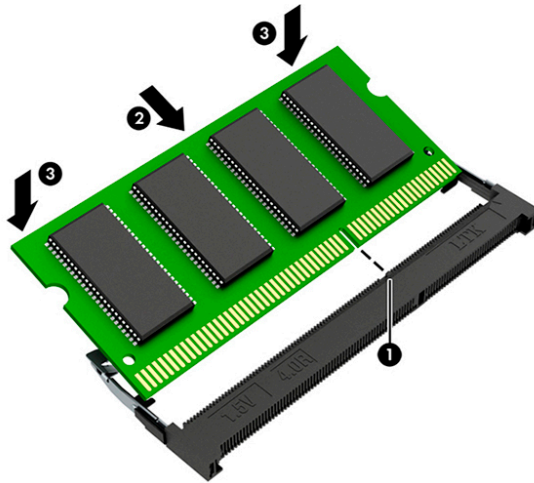
To protect a memory module after removal, place it in an electrostatic-safe container.



Install the memory modules:


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


1. Align the notched edge of the memory module with the tab in the memory module slot (1).
2. Press the module into the slot until seated (2).
3. Gently press down on the module edges until the side retention clips snap into place (3).



4. Replace the memory module shield.

6 Removal and replacement procedures for authorized service provider parts

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

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

Component replacement procedures

There are as many as 42 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 29](#) 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.

Display assembly

Table 6-1 Display assembly descriptions and part numbers

Description	Spare part number
13.0-in., AntiGlare, FHD, UWVA, 1000 nits, TouchScreen display assembly equipped with webcam/microphone module, privacy filter, and WLAN and WWAN antenna	L56441-001
13.0-in., BrightView, FHD, UWVA, 1000 nits, TouchScreen display assembly equipped with webcam/microphone module, privacy filter, and WLAN and WWAN antenna	L56439-001
13.0-in., BrightView, FHD, UWVA, 1000 nits, TouchScreen display assembly equipped with webcam/microphone module, privacy filter, and WLAN antenna	L56440-001
13.0-in., AntiGlare, FHD, UWVA, 400 nits, TouchScreen display assembly equipped with webcam/microphone module and WLAN and WWAN antenna	L56438-001
13.0-in., FHD, UWVA, 400 nits, TouchScreen display assembly equipped with webcam/microphone module and WLAN and WWAN antenna	L56437-001
13.0-in., FHD, UWVA, 400 nits, TouchScreen display assembly equipped with webcam/microphone module and WLAN antenna	L56436-001
13.0-in., FHD, UWVA, AntiGlare, 250 nits, TouchScreen display assembly equipped with HD webcam/microphone module and WLAN and WWAN antenna	L65321-001
13.0-in., FHD, UWVA, AntiGlare, 250 nits, TouchScreen display assembly equipped with HD webcam/microphone module and WLAN antenna	L65320-001
13.0-in., FHD, UWVA, AntiGlare, 220 nits, TouchScreen display assembly equipped with webcam/microphone module and WLAN and WWAN antenna	L56435-001
13.0-in., FHD, UWVA, AntiGlare, 220 nits, TouchScreen display assembly equipped with webcam/microphone module and WLAN antenna	L56434-001

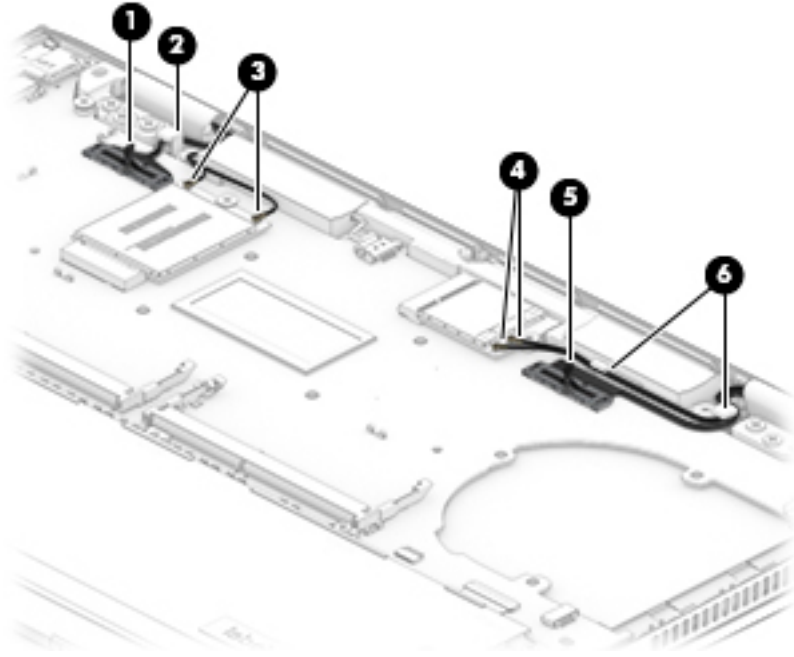
Before removing the display assembly, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 46](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Disconnect the battery (see [Battery on page 37](#)).

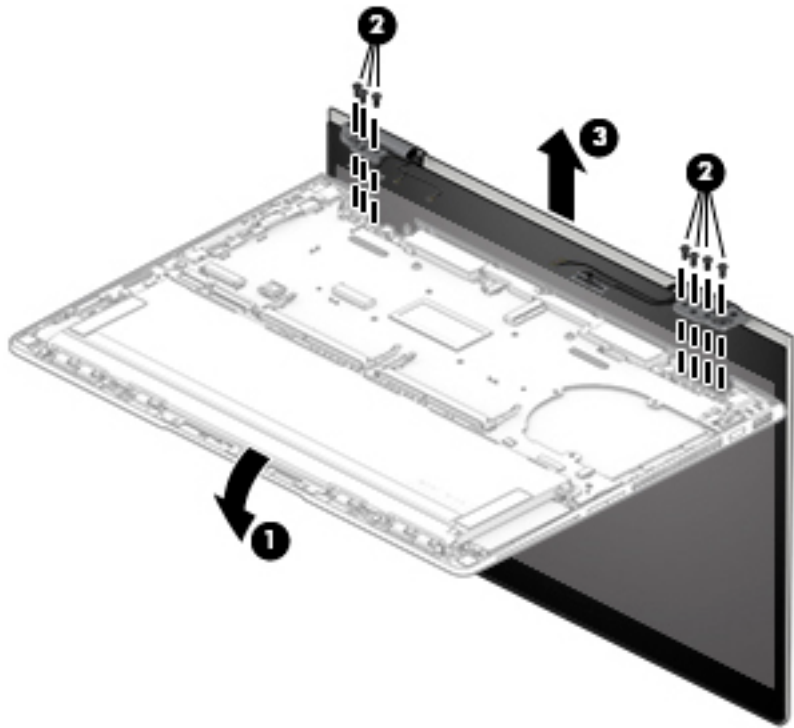
Remove the display assembly:

1. Disconnect the webcam cable from the system board **(1)**, and then remove the cable from the clip **(2)**.
2. Disconnect the WWAN antenna cables from the WWAN module **(3)**.
3. Disconnect the WLAN antenna cables from the WLAN module **(4)**.

4. Disconnect the display cable from the system board (5), and then remove the cable from the clips (6).



5. Open the display to open the hinges (1).
6. Remove the seven Phillips M2.5 × 5.0 screws (2) that secure the display hinges to the computer.
7. Separate the display from the computer by pulling the display up and away from the computer (3).



Reverse this procedure to install the display assembly.

RTC battery

Table 6-2 RTC battery description and part number

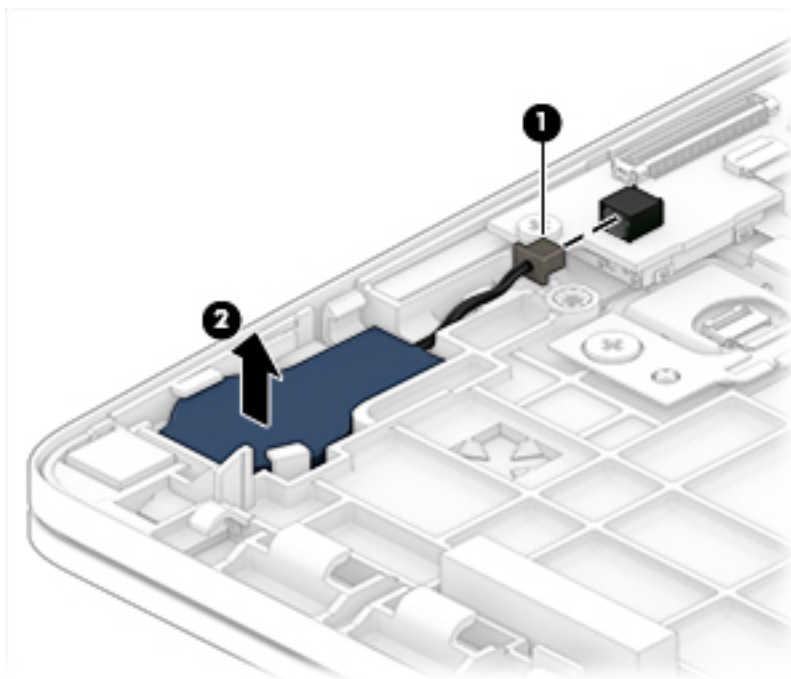
Description	Spare part number
RTC battery	not spared

Before removing the RTC battery, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 46](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Remove the battery (see [Battery on page 37](#)).

Remove the RTC battery:

1. Disconnect the battery cable from the system board (1).
2. Lift the battery out of the computer (2). The battery is secured with adhesive.



Reverse this procedure to install the RTC battery

NFC module

Table 6-3 NFC module description and part number

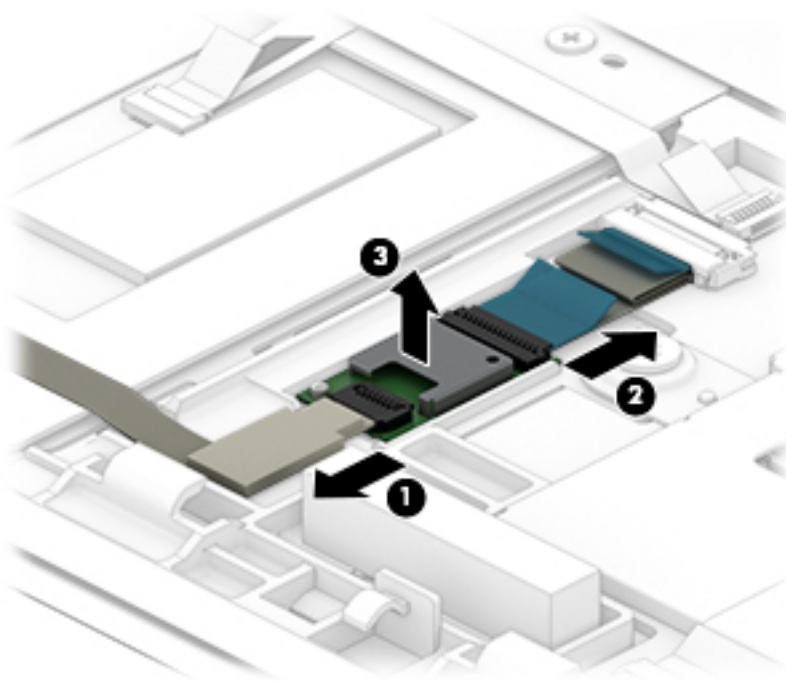
Description	Spare part number
NFC module (includes cables)	L56453-001

Before removing the NFC module, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 46](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Remove the battery (see [Battery on page 37](#)).

Remove the NFC module:

1. Disconnect the TouchPad cable from the ZIF connector on the NFC module **(1)**.
2. Disconnect the card reader board cable from the ZIF connector on the NFC module **(2)**.
3. Remove the NFC module from the computer **(3)**.



Reverse this procedure to install the NFC module.

TouchPad

Table 6-4 TouchPad descriptions and part numbers


Description	Spare part number
TouchPad for use only on computer models with NFC capability (includes TouchPad cable and NFC antenna)	L56457-001
TouchPad for use only on computer models without NFC capability (includes TouchPad cable)	L56458-001

Before removing the TouchPad, follow these steps:

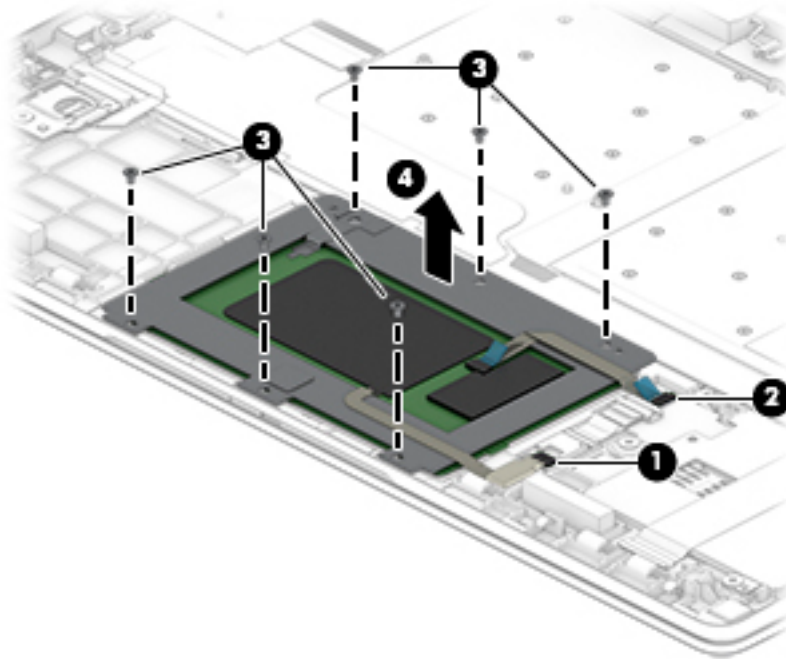
1. Prepare the computer for disassembly ([Preparation for disassembly on page 46](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Remove the battery (see [Battery on page 37](#)).

Remove the TouchPad:

1. (NFC models only) Disconnect the NFC antenna cable from the ZIF connector on the NFC board **(1)**.
The NFC antenna is spared with the TouchPad on models that offer NFC.
2. Disconnect the TouchPad cable from the ZIF connector on the card reader board **(2)**.
3. Remove the six Phillips M1.6 × 2.5 screws **(3)** that secure the TouchPad to the computer.

 **TIP:** Removing these screws requires a Phillips P0 driver.

4. Remove the TouchPad from the computer **(4)**.



Reverse this procedure to install the TouchPad.

Card reader board

Table 6-5 Card reader board description and part number

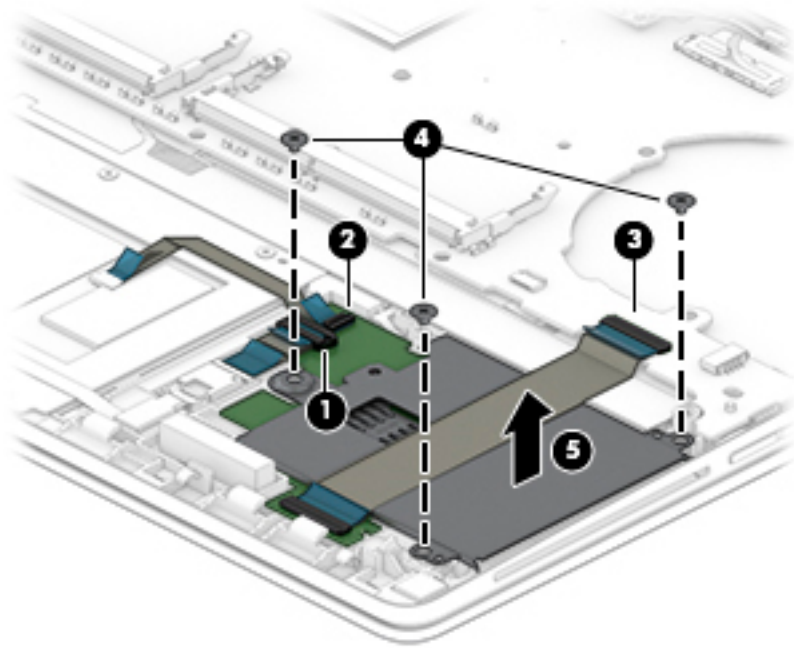
Description	Spare part number
Card reader board (includes cable)	L56452-001

Before removing the card reader board, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 46](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Remove the battery (see [Battery on page 37](#)).

Remove the card reader board:

1. (NFC models only) Disconnect the NFC board cable from the card reader board (1).
2. Disconnect the TouchPad cable from the card reader board (2).
3. Disconnect the card reader board cable from the system board (3).
4. Remove the three Phillips M2.0 × 2.0 screws (4) that secures the board to the computer.
5. Remove the card reader board from the computer (5).



Reverse this procedure to install the card reader board.

NFC interface board

Table 6-6 NFC interface board description and part number

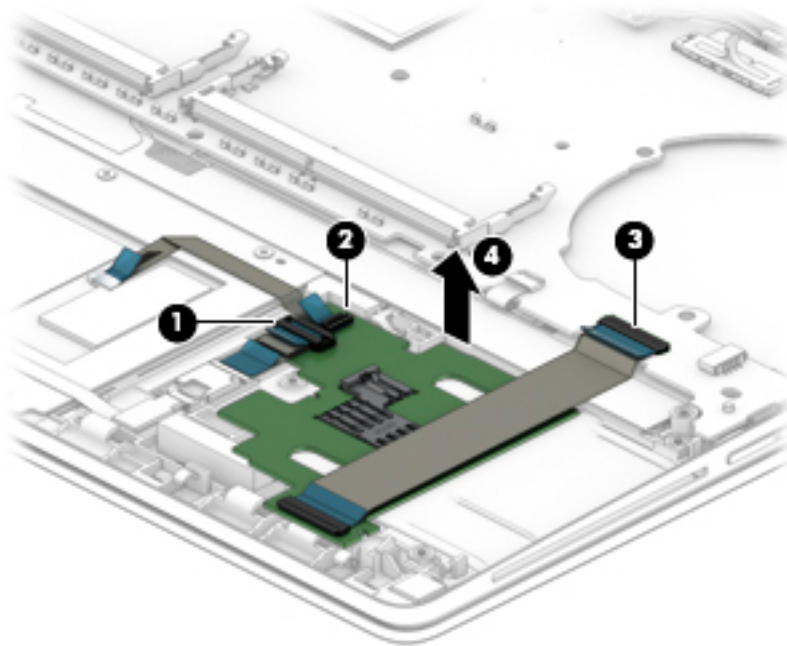
Description	Spare part number
NFC interface board	L59058-001
Card reader insert (for use on computer models without a card reader, available in the Plastics Kit, spare part number L56454-001)	

Before removing the NFC interface board, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 46](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Remove the battery (see [Battery on page 37](#)).

Remove the NFC interface board:

1. Disconnect the NFC board cable from the NFC interface board **(1)**.
2. Disconnect the TouchPad cable from the NFC interface board **(2)**.
3. Disconnect the NFC interface board cable from the system board **(3)**.
4. Remove the NFC interface board from the computer **(4)**.



Reverse this procedure to install the NFC interface board.


Fan

Table 6-7 Fan description and part number

Description	Spare part number
Fan	L56444-001

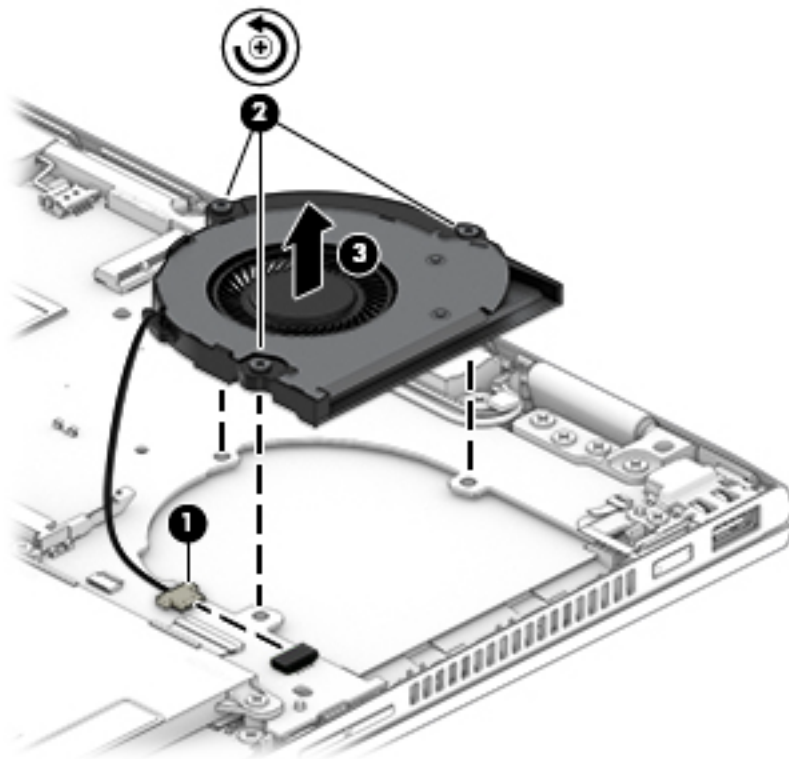
Before removing the fan, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 46](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Disconnect the battery (see [Battery on page 37](#)).

 **TIP:** You do not have to remove the fan to remove the system board. You can remove the fan with the system board still installed.

Remove the fan:

1. Disconnect the fan cable from the system board (1).
2. Remove the three Phillips M2.5 × 3.5 screws (2) that secure the fan to the computer.
3. Remove the fan from the computer (3).



Reverse this procedure to install the fan.


Heat sink

Table 6-8 Heat sink description and part number

Description	Spare part number
Heat sink (includes replacement thermal material)	L56445-001

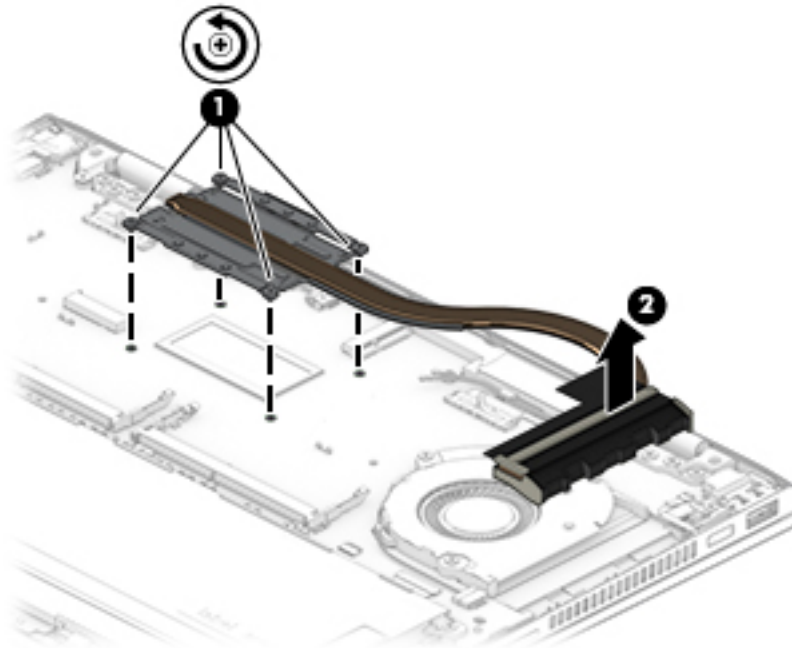
Before removing the heat sink, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 46](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Disconnect the battery (see [Battery on page 37](#)).

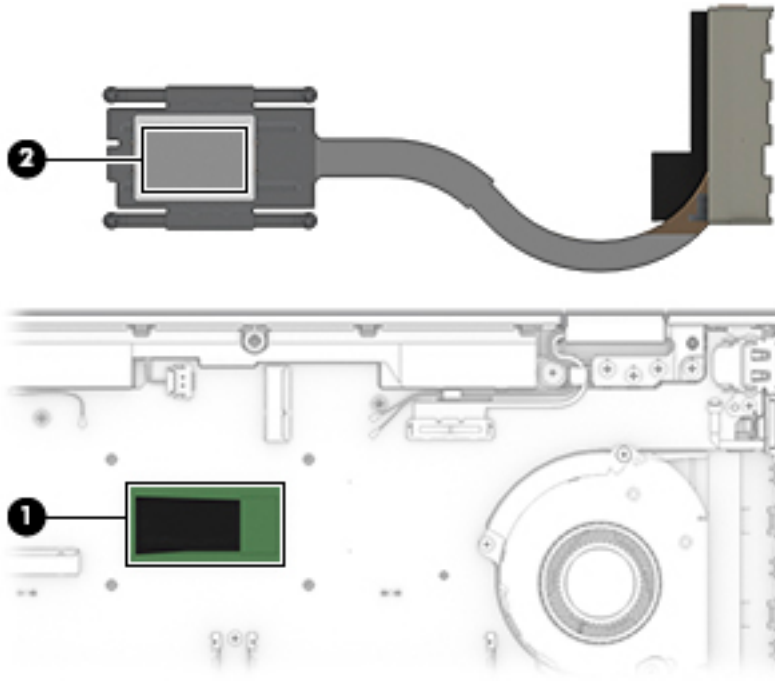
 **TIP:** You do not have to remove the heat sink to remove the system board. You can remove the heat sink with the system board still installed.

Remove the heat sink:

1. Loosen the four captive Phillips screws (1) that secure the heat sink to the system board.
2. Remove the heat sink (2).



3. Clean and reapply thermal material to the surfaces of the system board component (1) and the heat sink (2) each time the heat sink is removed.



Reverse this procedure to install the heat sink.

System board

All system board spare part kits include the processor, a graphics subsystem with UMA memory, and replacement thermal material.

Table 6-9 System board descriptions and part numbers

Description	Spare part number
Equipped with an Intel Core i7-8650U processor and the Windows 10 operating system	L64979-601
Equipped with an Intel Core i7-8650U processor and a non-Windows 10 operating system	L64979-001
Equipped with an Intel Core i7-8650U processor, on storage recovery (OSR), and the Windows 10 operating system	L64980-601
Equipped with an Intel Core i7-8650U processor, on storage recovery (OSR), and a non-Windows 10 operating system	L64980-001
Equipped with an Intel Core i7-8565U processor and the Windows 10 operating system	L65059-601
Equipped with an Intel Core i7-8565U processor and a non-Windows 10 operating system	L65059-001
Equipped with an Intel Core i5-8365U processor and the Windows 10 operating system	L64981-601
Equipped with an Intel Core i5-8365U processor and a non-Windows 10 operating system	L64981-001
Equipped with an Intel Core i5-8265U processor and the Windows 10 operating system	L64982-601
Equipped with an Intel Core i5-8265U processor and a non-Windows 10 operating system	L64982-001
Equipped with an Intel Core i3-8145U processor and the Windows 10 operating system	L64983-601
Equipped with an Intel Core i3-8145U processor and a non-Windows 10 operating system	L64983-001

Before removing the system board, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 46](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Remove the battery (see [Battery on page 37](#)).
4. Remove the memory module EMI cover (see [Memory module on page 44](#)).

When replacing the system board, be sure to remove the following components (as applicable) from the defective system board and install them on the replacement system board:

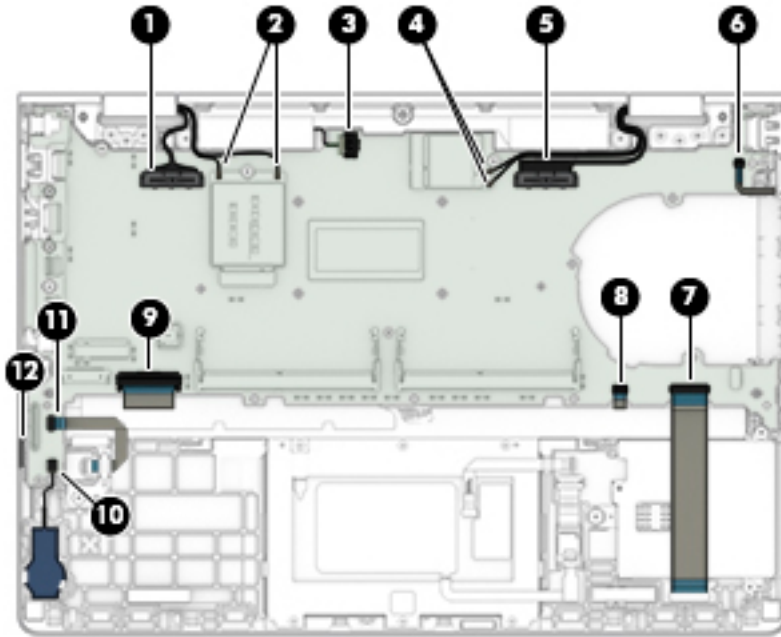
- Memory modules (see [Memory module on page 44](#))
- WLAN module (see [WLAN module on page 38](#))
- WWAN module (see [WWAN module on page 40](#))
- Solid-state drive (see [Solid-state drive on page 42](#))
- Heat sink (see [Heat sink on page 55](#))
- Fan (see [Fan on page 54](#))

Remove the system board:

1. Disconnect the following cables and the SIM card holder from the system board:
 - (1) Webcam cable

- (2) WLAN module antenna cables
- (3) Speaker cable
- (4) WWAN module antenna cables
- (5) Display cable
- (6) Power button board cable
- (7) Card reader board cable (ZIF)
- (8) Keyboard backlight cable (ZIF)
- (9) Keyboard cable (ZIF)
- (10) RTC battery cable
- (11) Fingerprint board cable (ZIF)
- (12) Remove the SIM card holder for the slot

The SIM card holder is available in the Plastics Kit using spare part number L56454-001.

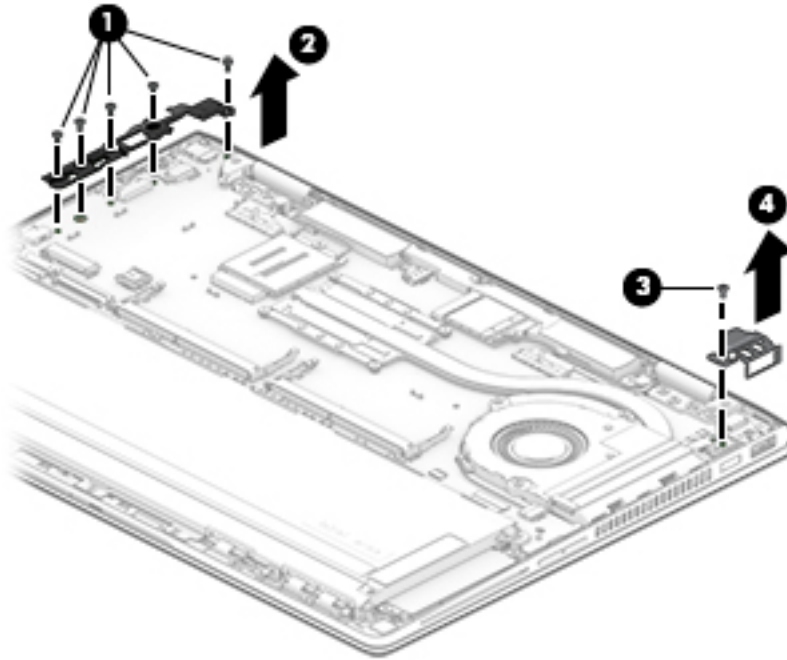


2. Remove the five Phillips M2.0 × 3.5 screws (1) that secure the plastic I/O bracket to the computer, and then remove the bracket (2).

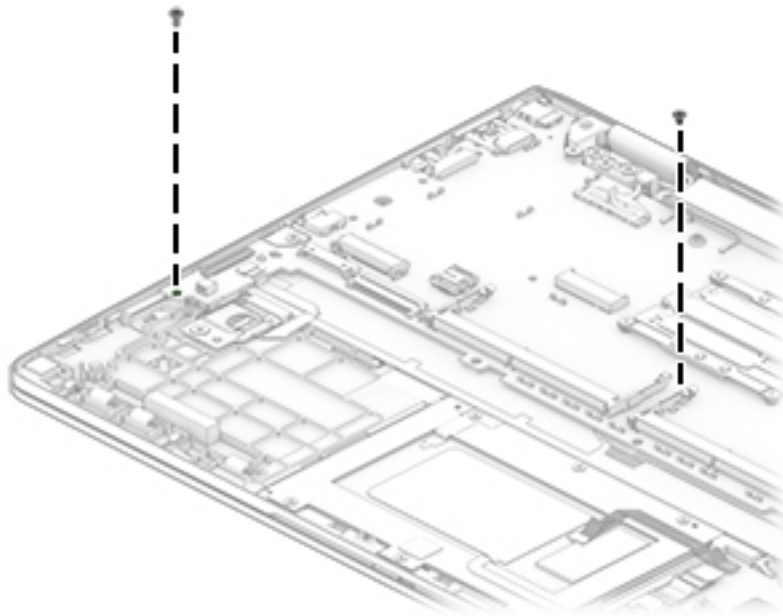
The plastic I/O bracket is available in the Plastics Kit using spare part number L56454-001.

3. Remove the Phillips M2.0 × 3.5 screw that secures the metal USB bracket to the computer (3), and then remove the bracket (4).

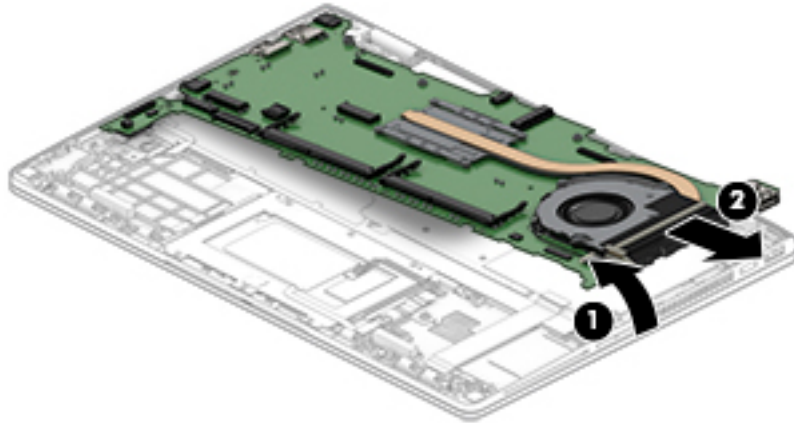
The USB bracket is available in the Bracket Kit using spare part number L56447-001.



4. Remove the two Phillips M2.0 × 2.5 screws that secure the system board to the computer.



5. Lift the right side of the system board (1), and then pull the system board to the right to remove it from the computer (2).



Reverse this procedure to install the system board.

Speakers

Table 6-10 Speaker description and part number

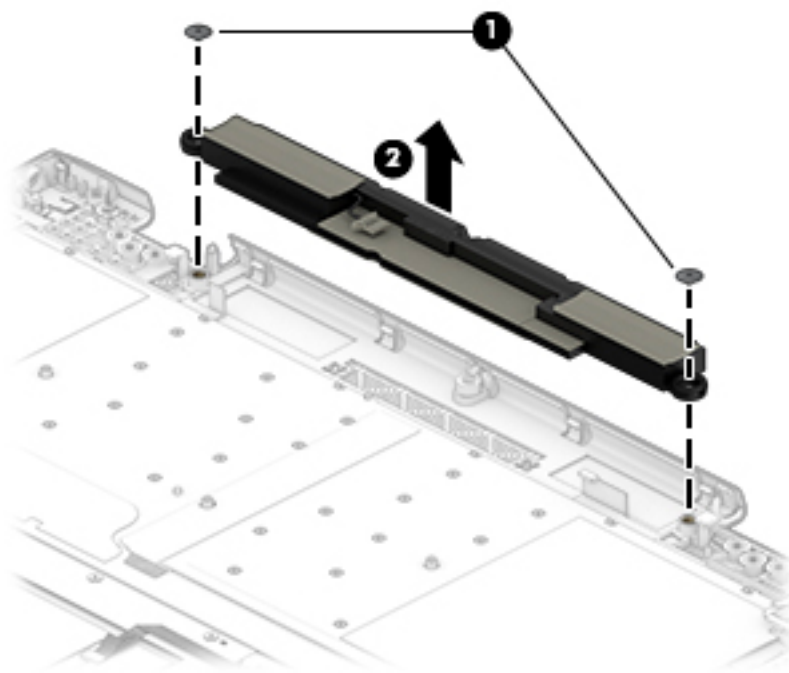
Description	Spare part number
Speakers (includes cable)	L56456-001

Before removing the speakers, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 46](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Remove the battery (see [Battery on page 37](#)).
4. Remove the system board (see [System board on page 57](#)).

Remove the speakers:

1. Remove the two Phillips M2.0 × 2.0 screws (1) that secure the speakers to the computer.
2. Remove the speakers from the computer (2).



Reverse this procedure to install the speakers.

Fingerprint sensor board

Table 6-11 Fingerprint sensor board and insert descriptions and part numbers

Description	Spare part number
Fingerprint sensor board (includes cable and gasket)	L56446-001
Fingerprint sensor insert (for use on computer models without a fingerprint sensor, available in the Plastics Kit, spare part number L56454-001)	

Before removing the fingerprint sensor board, follow these steps:

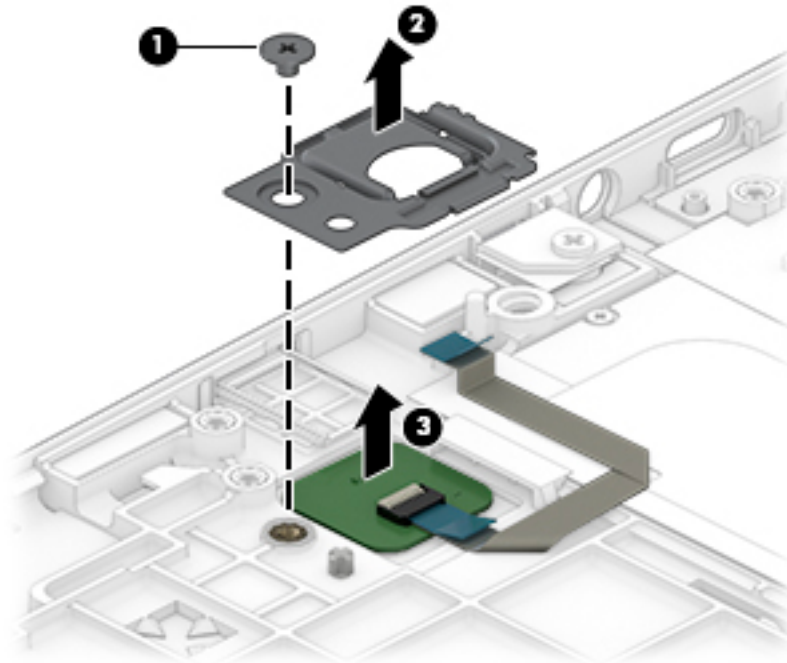
1. Prepare the computer for disassembly ([Preparation for disassembly on page 46](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Remove the battery (see [Battery on page 37](#)).
4. Remove the system board (see [System board on page 57](#)).

Remove the fingerprint sensor board:

1. Remove the Phillips M2.0 × 2.0 screw (1) that secures the fingerprint sensor board bracket to the computer.
2. Remove the bracket from the computer (2).

The fingerprint sensor bracket is available in the Bracket Kit using spare part number L56447-001.

3. Remove the fingerprint sensor board from the computer (3).



Reverse this procedure to install the fingerprint sensor board.

Power button board

Table 6-12 Power button board description and part number

Description	Spare part number
Power button board (includes holder and cable)	L56451-001

Before removing the power button board, follow these steps:

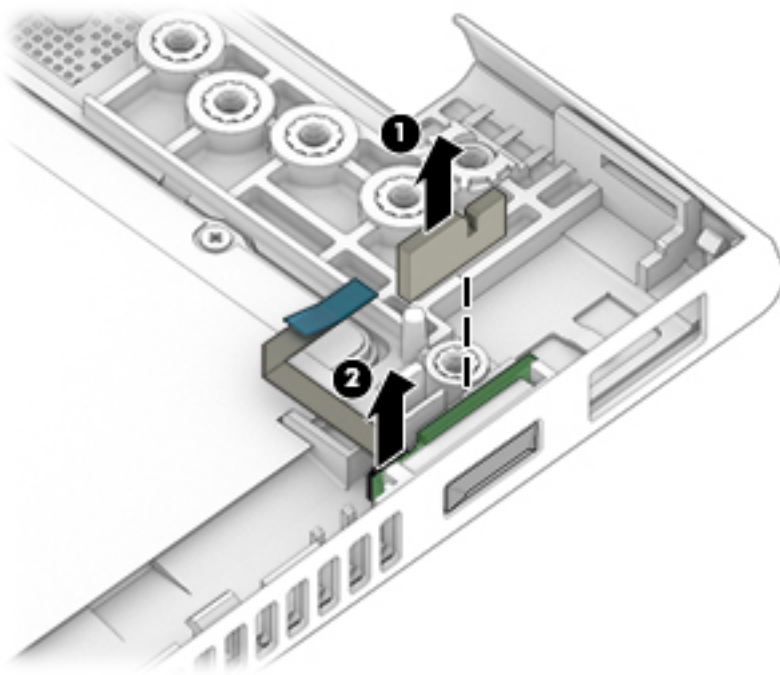
1. Prepare the computer for disassembly ([Preparation for disassembly on page 46](#)).
2. Remove the bottom cover (see [Bottom cover on page 35](#)).
3. Remove the battery (see [Battery on page 37](#)).
4. Remove the system board (see [System board on page 57](#)).

Remove the power button board:

1. Lift the power button board holder straight up and out of the computer (1).

 **TIP:** Be sure to note the orientation of the power button board holder so you can replace it correctly when installing the power button board.

2. Lift the power button board and cable straight up and out of the computer (2).



Reverse this procedure to install the power button board.

Keyboard/top cover

The keyboard/top cover remains after removing all other spare parts from the computer.

Table 6-13 Keyboard/top cover with backlight description and spare part numbers

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
Keyboard/top cover with backlight (includes backlight cable and keyboard cable):		Iceland	L56442-DD1	Saudi Arabia	L56442-171
Belgium	L56442-A41	India	L56442-D61	Slovenia	L56442-BA1
Brazil	L56442-201	Israel	L56442-BB1	South Korea	L56442-AD1
Bulgaria	L56442-261	Italy	L56442-061	Spain	L56442-071
Canada	L56442-DB1	Japan	L56442-291	Sweden and Finland	L56442-B71
The Czech Republic and Slovakia	L56442-FL1	Latin America	L56442-161	Switzerland	L56442-BG1
Denmark	L56442-081	The Netherlands	L56442-B31	Taiwan	L56442-AB1
Denmark and Finland	L56442-DH1	North Africa	L56442-FP1	Thailand	L56442-281
France	L56442-051	Norway	L56442-091	Turkey	L56442-141
Germany	L56442-041	Portugal	L56442-131	Turkey F	L56442-541
Greece	L56442-151	Romania	L56442-271	The United Kingdom	L56442-031
Hungary	L56442-211	Russia	L56442-251	The United States	L56442-001

Table 6-14 Keyboard/top cover with privacy filter description and spare part numbers

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
Keyboard/top cover with backlight (includes and keyboard cable):		Iceland	L56443-DD1	Saudi Arabia	L56443-171
Belgium	L56443-A41	India	L56443-D61	Slovenia	L56443-BA1
Brazil	L56443-201	Israel	L56443-BB1	South Korea	L56443-AD1
Bulgaria	L56443-261	Italy	L56443-061	Spain	L56443-071
Canada	L56443-DB1	Japan	L56443-291	Sweden and Finland	L56443-B71
The Czech Republic and Slovakia	L56443-FL1	Latin America	L56443-161	Switzerland	L56443-BG1
Denmark	L56443-081	The Netherlands	L56443-B31	Taiwan	L56443-AB1
Denmark and Finland	L56443-DH1	North Africa	L56443-FP1	Thailand	L56443-281
France	L56443-051	Norway	L56443-091	Turkey	L56443-141
Germany	L56443-041	Portugal	L56443-131	Turkey F	L56443-541

Table 6-14 Keyboard/top cover with privacy filter description and spare part numbers (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
Greece	L56443-151	Romania	L56443-271	The United Kingdom	L56443-031
Hungary	L56443-211	Russia	L56443-251	The United States	L56443-001

7 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 66](#).
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 66](#).
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 67](#).

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 66](#).
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.

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 70](#).

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 –
- a. 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 72](#).

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 72](#).


- 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 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 75](#)).
- **Creating a restore point**—You can use Windows tools to create a restore point (see [Using Windows tools on page 75](#)).
- **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 75](#)).
- **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 75](#)).

 **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.

To download the tool:

- ▲ Go to the Microsoft Store and search for HP Cloud Recovery.

For details, go to <http://www.hp.com/support>, search for HP Cloud Recovery, and then select "HP PCs – Using the Cloud Recovery Tool (Windows 10, 7)."



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 75](#).

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 75](#).



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.

10 Specifications

Table 10-1 Computer specifications

	Metric	U.S.
Computer dimensions		
Width	306.7 mm	12.07 in
Depth	215.2 mm	8.47 in
Height (anti glare models)	17.8 mm	0.70 in
Height (non-anti glare models)	16.9 mm	0.66 in
Weight	1350.0 g	2.97 lbs
Input power	Rating	
Operating voltage and current	19.5 V dc @ 2.31 A – 45 W	
	19.5 V dc @ 3.33 A – 65 W	
Temperature		
Operating	5°C to 35°C	41°F to 95°F
Nonoperating	-20°C to 60°C	-4°F to 140°F
Relative humidity (noncondensing)		
Operating	10% to 90%	
Nonoperating	5% to 95%	
Maximum altitude (unpressurized)		
Operating	-15 m to 3,048 m	-50 ft to 10,000 ft
Nonoperating	-15 m to 12,192 m	-50 ft to 40,000 ft
NOTE: Applicable product safety standards specify thermal limits for plastic surfaces. The device operates well within this range of temperatures.		

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 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 quickly press **esc**.

 **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 reader, 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 quickly press **esc**.
- 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.

– or –

- Clear the contents of the drive using the following Disk Sanitizer commands steps:



IMPORTANT: If you clear data using Disk Sanitizer, it cannot be recovered.



NOTE: The amount of time it takes for Disk Sanitizer to run can take several hours. Plug the computer into an AC outlet before starting.

- a. Turn on or restart the computer, and then quickly press **esc**.
- b. Select the **Security** menu and scroll down to the **Utilities** menu.
- c. Select **Hard Drive Utilities**.
- d. Under **Utilities**, select **Disk Sanitizer**, select the hard drive storing the data you want to clear, and then follow the on-screen instructions to continue.

Nonvolatile memory usage

Table 12-1 Troubleshooting steps for 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 MB	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 86 .	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 Computer Setup (BIOS), or by changing the Microsoft® Windows date & time.	This memory is not write-protected.
Controller (NIC) EEPROM	64 KB (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 must be used 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 MB	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 must be used for writing data to this memory and is available on the HP website; go to http://www.hp.com/support . Select Find your

Table 12-1 Troubleshooting steps for 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 MB or 7 MB	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.	product , and then follow the on-screen instructions.
Bluetooth flash (select products only)	2 Mb	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 must be used 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 Kb to 8 Kb	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 must be used 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.
Webcam (select products only)	64 Kb	No	Yes	Stores webcam configuration and firmware.	Webcam memory is programmed using a utility from the device manufacturer that can be run from Windows.	A utility must be used 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 reader (select products only)	512 KB flash	Yes	Yes	Stores fingerprint templates.	Fingerprint reader 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 quickly press `esc`.
- 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 must be used 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 quickly press **esc**.
- 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 quickly press **esc**.
- 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.

13 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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