



## Maintenance and Service Guide

HP 340 G5 Notebook PC  
HP 348 G5 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.

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## Safety warning notice

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

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# 1 Product description

Category	Description
<b>Product Name</b>	<b>HP 340 G5 Notebook PC</b> <b>HP 348 G5 Notebook PC</b>
<b>Processor</b>	<b>8th-generation Intel® Core™ processors</b>  i7-8565U 1.80-GHz (SC turbo up to 4.60 GHz) quad-core processor (8.0 MB L3 cache, 2400 MHz FSB, 15 W; Intel UHD Graphics 620)  i5-8265U 1.60 GHz (SC turbo up to 3.90 GHz) quad core processor (6.0 MB L3 cache, 2400 MHz FSB, 15 W; Intel UHD Graphics 620)  i3-8145U 2.10 GHz (SC turbo up to 3.90 GHz) dual core processor (4 MB L3 cache, 2400 MHz FSB, 15 W; Intel UHD Graphics 620)  <b>7th generation Intel Core processors</b>  i3-7020U 2.40 GHz dual core processor (3.0 MB L3 cache, 2133 MHz FSB, 15 W; Intel HD Graphics 620)
<b>Graphics</b>	Supports HD decode, DX12, and HDMI  <b>Internal graphics</b>  Intel UHD Graphics 620 (8th generation Intel processors)  Intel HD Graphics 620 (7th generation Intel processors)  Supports MR graphics (requires Core i7/Core i5 processors, at least 8 GB system memory, > 10 GB free hard drive space, Windows® Display Driver Model 2.2)  <b>External graphics</b>  AMD Radeon™ 530 with 2 GB of dedicated video memory
<b>Panel</b>	<b>35.6 cm (14.0 in), WLED, anti glare, eDP, 45% CG, slim-flat (3.0 mm), 16:9 ultra wide aspect ratio, narrow bezel, non-touch</b>  High definition (HD) (1366 × 768), SVA, 220 nits, 1 or 2 WLAN antennas  Full high-definition (FHD) (1920 × 1080), UWVA, 250 nits, 1 or 2 WLAN antennas
<b>Memory</b>	<b>Two memory module slots</b>  Memory is customer accessible/non-upgradeable  DDR4-2666 bridge to DDR4-2400 dual channel support (i7-8565U, i5-8265U, i3-8145U processors)  DDR4-2400 bridge to DDR4-2133 dual channel support (i3-7020U processor)  Supports up to 32 GB of system RAM in the following configurations: <ul style="list-style-type: none"><li>• 32 GB (16 GB × 2) (dual channel)</li><li>• 16 GB (16 GB × 1)</li><li>• 8 GB (8 GB × 1)</li><li>• 4 GB (4 GB × 1)</li></ul>

Category	Description
<b>Primary storage</b>	<b>Single hard drive configurations, 6.35 cm (2.5 in) SATA hard drives</b>
	1 TB, 5400 rpm
	500 GB, 7200 rpm
	<b>M.2 2280 solid-state drives (NGFF)</b>
	512 GB, PCIe, NVMe, value
	256 GB, PCIe, NVMe, TLC
	256 GB, PCIe, NVMe, value
	256 GB, SATA-3, TLC (for use only in Brazil)
128 GB, SATA-3, TLC	
<b>Cache memory</b>	Intel Optane 16 GB memory cache (not available in models with SSD primary storage)
<b>Camera</b>	<b>HP TrueVision HD Camera</b> – indicator LED, USB 2.0, HD BSI sensor, f2.0, WDR (select models only)
	720p by 30 frames per second
	Dual array microphone
<b>Audio</b>	Stereo speakers (2)
<b>RJ-45 (network) jack</b>	Realtek RTL8111HSH-CG Gigabit Ethernet controller
	S3/S4/S5 wake on LAN (both AC power and battery modes)
	BIOS Support RTXMAC for MAPT via in band
<b>Wireless networking</b>	Compatible with Miracast-certified devices
	HP Connection Optimizer with data analytics
	<b>Integrated wireless options with single antenna (M.2)</b>
	Intel® Wireless-AC 9560 802.11ac 2 × 2 Wi-Fi + Bluetooth® 5
	Realtek RTL8821CE 802.11ac 1 × 1 Wi-Fi + Bluetooth 4.2 (MU-MIMO supported)
Realtek RTL8723DE 802.11bgn 1 × 1 Wi-Fi + Bluetooth 4.2	
<b>Media card reader</b>	Supports microSD™/SDHC™/SDXC™
	Push-pull insertion/removal
<b>Internal card expansion</b>	One M.2 slot for solid-state drive/Optane memory module
	One M.2 slot for WLAN
<b>Ports</b>	Hot plug/unplug and auto detect for correct output to wide-aspect vs. standard aspect video (auto adjust panel resolution to fit embedded panel and external monitor connected)
	HDMI v1.4 supporting: up to 1920 × 1080 @ 60 Hz
	USB Type-C 3.1 Gen 1 port (left side)
	(2) USB Type-A 3.1 Gen 1 ports (right side)
	RJ-45 (network)
	Audio-out (headphone)/audio-in (microphone) combo jack
	AC Smart Pin adapter plug

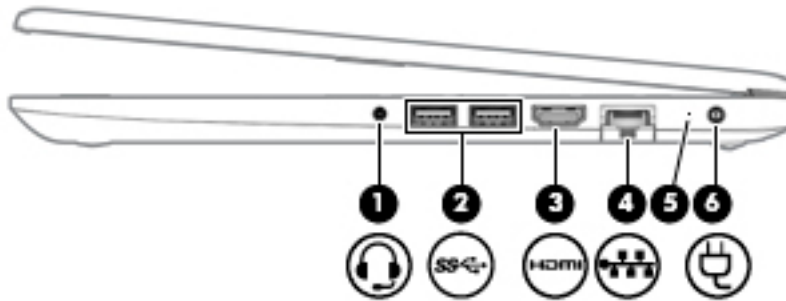
<b>Category</b>	<b>Description</b>
<b>Keyboard/pointing devices</b>	<b>Keyboard</b>
	Full-size, spill-resistant, textured, island-style keyboard
	No numeric keypad
	<b>Touchpad</b>
	Multitouch gestures enabled
	Taps enabled by default
<b>Power requirements</b>	<b>Battery</b>
	3-cell, 41 Wh, prismatic/polymer, long-life
	Supports battery fast charge, 90 mins/90% charge or 45 mins/50% charge
	<b>AC adapter, standard barrel</b>
	65 W Smart, nPFC, right angle, 4.5 mm (models with discrete graphics)
	65 W Smart, nPFC, 4.5 mm, EM (only for Asia, People's Republic of China, and India)
	45 W Smart, nPFC, right angle, 4.5 mm (models with UMA graphics)
	<b>Power cord (C5)</b>
	3-wire plug (with ground pin), 1.8 m
	3-wire plug (with ground pin), 1.0 m
<b>Security</b>	Mini Security Slot
	Supports firmware-based Trusted Platform Module (fTPM) 2.0
<b>Operating system</b>	FreeDOS 2.0
	Windows 10 Home 64
	Windows 10 Home 64 Single Language
	Windows 10 Home 64 Single Language APAC EM PPP
	Windows 10 Home 64 Single Language India Market PPP
	Windows 10 Home 64 Single Language Indonesia Market PPP
	Windows 10 Home 64 Advanced
	Windows 10 Home 64 Advanced Single Language
	Windows 10 Home 64 Chinese Market CPPP
	Windows 10 Home 64 High-end Chinese Market CPPP
	Windows 10 Home 64 Plus
	Windows 10 Home 64 Plus Single Language
	Windows 10 Home 64 Plus Single Language APAC EM PPP
	Windows 10 Home 64 Plus Single Language India Market PPP
	Windows 10 Home 64 Plus Single Language Indonesia Market PPP
	Windows 10 Pro 64

<b>Category</b>	<b>Description</b>
	Windows 10 Pro 64 Chinese Market
	Windows 10 Pro 64 StF MSNA Plus
	Windows 10 Pro 64 StF MSNA Standard
	Windows 10 Pro 64 StF MSNA Stragetic
	<b>Restore media</b>
	SSRD (System Recovery Disc)
	<b>Web-only support</b>
	Windows 10 Enterprise
	<b>Tested and documented</b>
	Windows 10 Enterprise 64 LTSC 1809
<b>Serviceability</b>	<b>End user replaceable part</b>
	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



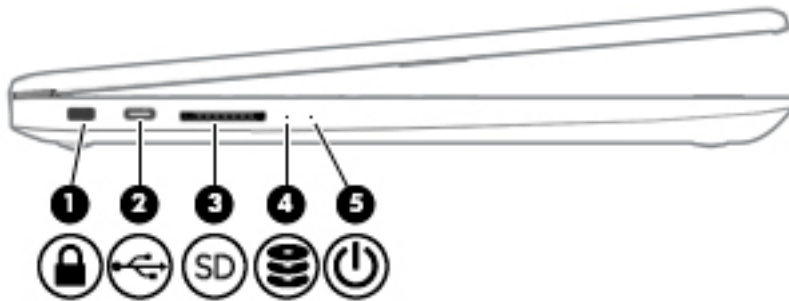
**Table 2-1 Right-side components and their descriptions**

Component	Description
(1) 	<p>Audio-out (headphone)/ Audio-in (microphone) combo jack</p> <p>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.</p> <p><b>WARNING!</b> To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, see the <i>Regulatory, Safety, and Environmental Notices</i>.</p> <p>To access this guide:</p> <ul style="list-style-type: none"> <li>▲ Select the <b>Start</b> button, select <b>HP Help and Support</b>, and then select <b>HP Documentation</b>.</li> </ul> <p><b>NOTE:</b> When a device is connected to the jack, the computer speakers are disabled.</p>
(2) 	<p>USB SuperSpeed ports (2)</p> <p>Connect a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provide high-speed data transfer.</p>
(3) 	<p>HDMI port</p> <p>Connects an optional video or audio device, such as a high-definition television, any compatible digital or audio component, or a high-speed High Definition Multimedia Interface (HDMI) device.</p>
(4) 	<p>RJ-45 (network) jack/ status lights</p> <p>Connects a network cable.</p> <ul style="list-style-type: none"> <li>• White (left): The network is connected.</li> <li>• Amber (right): Activity is occurring on the network.</li> </ul>
(5)	<p>Battery light</p> <p>When AC power is connected:</p> <ul style="list-style-type: none"> <li>• White: The battery charge is greater than 90 percent.</li> <li>• Amber: The battery charge is from 0 to 90 percent.</li> <li>• Off: The battery is not charging.</li> </ul> <p>When AC power is disconnected (battery not charging):</p>





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

Component	Description
	<ul style="list-style-type: none"> <li>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.</li> <li>Off: The battery is not charging.</li> </ul>
(6) 	<p>Power connector</p> <p>Connects an AC adapter.</p>

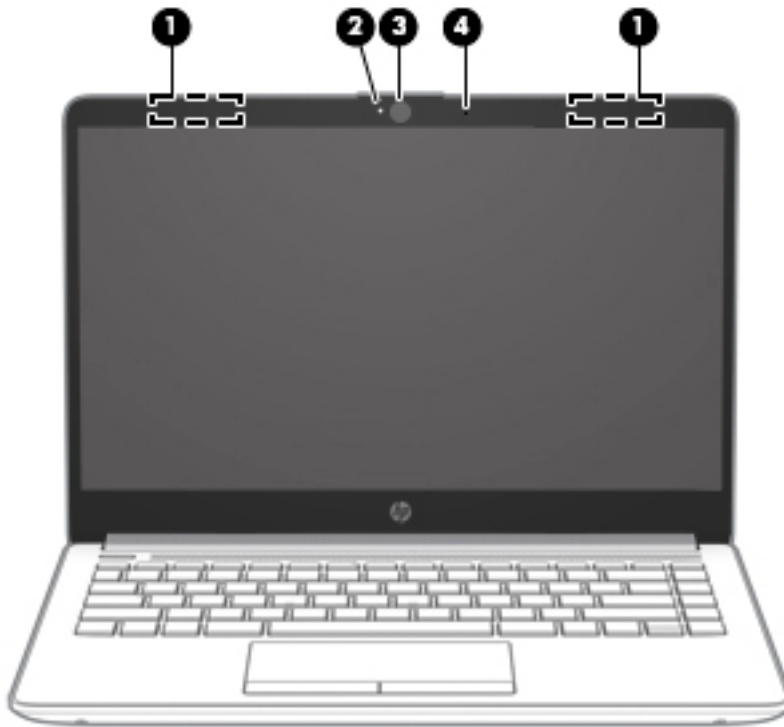
## Left



**Table 2-2 Left-side components and their descriptions**

Component	Description
(1)	<p>Security cable slot</p> <p>Attaches an optional security cable to the computer.</p> <p><b>NOTE:</b> The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.</p>
(2) 	<p>USB Type-C port</p> <p>Connects a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provides data transfer.</p> <p><b>NOTE:</b> Cables and/or adapters (purchased separately) may be required.</p>
(3) 	<p>Memory card reader</p> <p>Reads optional memory cards that store, manage, share, or access information.</p> <p>To insert a card:</p> <ol style="list-style-type: none"> <li>Hold the card label-side up, with the connectors facing the computer.</li> <li>Insert the card into the memory card reader, and then press in on the card until it is firmly seated.</li> </ol> <p>To remove a card:</p> <ol style="list-style-type: none"> <li>Press in on the card, and then remove it from the memory card reader.</li> </ol>
(4) 	<p>Drive light (select products only)</p> <ul style="list-style-type: none"> <li>Blinking white: The hard drive is being accessed.</li> </ul>
(5) 	<p>Power light</p> <ul style="list-style-type: none"> <li>On: The computer is on.</li> <li>Blinking: The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unneeded components.</li> <li>Off: The computer is off or in Hibernation. Hibernation is a power-saving state that uses the least amount of power.</li> </ul>

# Display



**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) Internal microphones	Record sound.
(3) Camera light (select products only)	On: The camera is in use.
(4) Camera (select products only)	Allows you to video chat, record video, and record still images.. Some cameras also allow a facial recognition logon to Windows, instead of a password logon. <b>NOTE:</b> Camera functions vary depending on the camera hardware and software installed on your product.

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

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

To access this guide:

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

# Keyboard area

## Touchpad

### Touchpad settings

To adjust touchpad settings and gestures, or to turn off the touchpad:

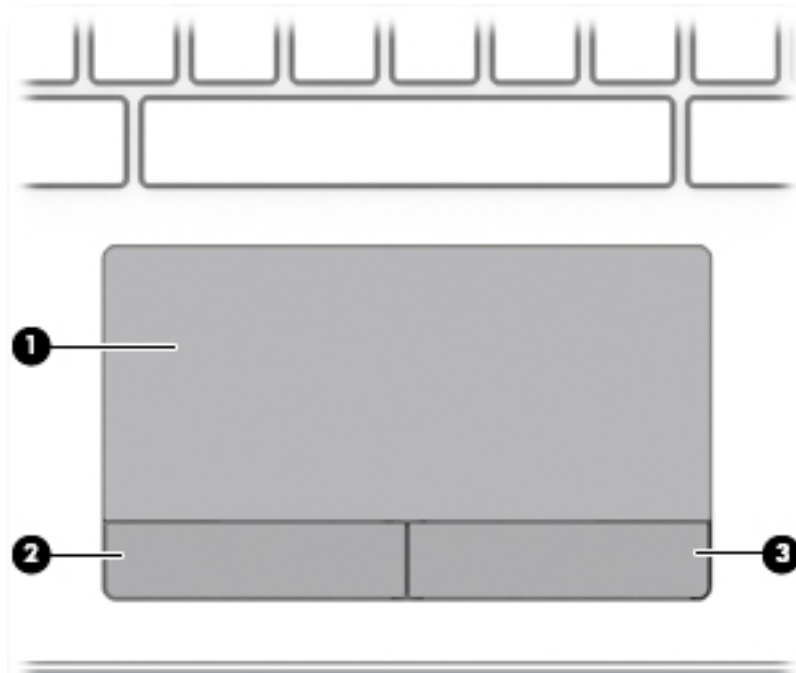
1. Type `touchpad settings` in the taskbar search box, and then press [enter](#).
2. Choose a setting.

To turn on the touchpad:

1. Type `touchpad settings` in the taskbar search box, and then press [enter](#).
2. Using an external mouse, click the **Touchpad** button.

– or –

- ▲ Press the [Tab](#) key repeatedly until the pointer rests on the **Touchpad** button. Then press the [spacebar](#) to select the button.

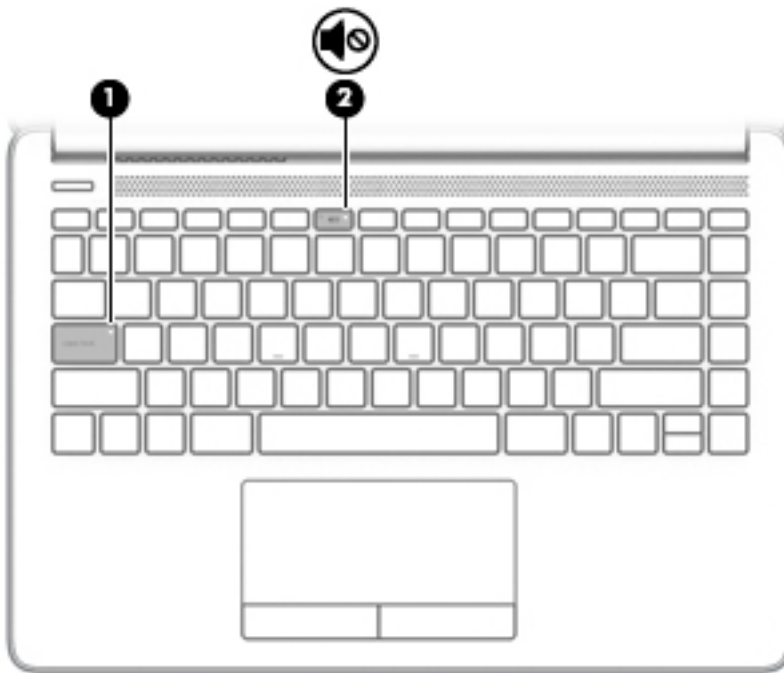


**Table 2-4** Touchpad components and their descriptions


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.



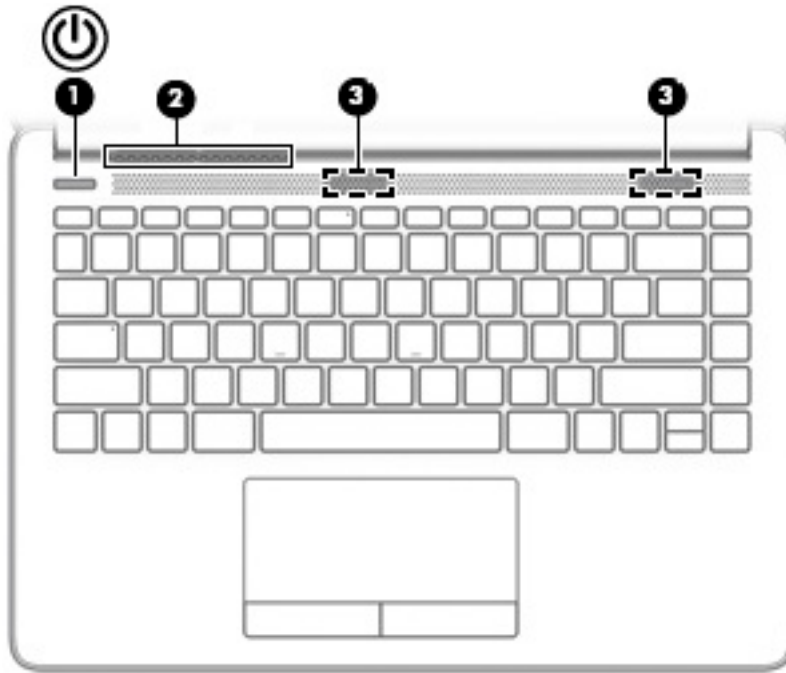
## Lights





**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)  Mute light	<ul style="list-style-type: none"><li>• On: Computer sound is off.</li><li>• Off: Computer sound is on.</li></ul>

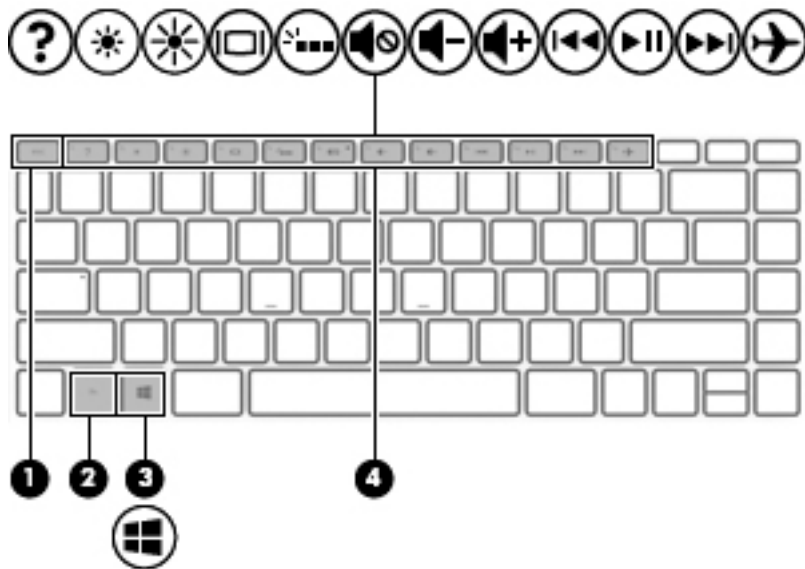
## Button, vent, and speakers




**Table 2-6** Button, vent, and speakers and their descriptions

Component	Description
(1)  Power button	<ul style="list-style-type: none"> <li>• When the computer is off, press the button to turn on the computer.</li> <li>• When the computer is on, press the button briefly to initiate Sleep.</li> <li>• When the computer is in the Sleep state, press the button briefly to exit Sleep (select products only).</li> <li>• When the computer is in Hibernation, press the button briefly to exit Hibernation.</li> </ul> <p><b>IMPORTANT:</b> 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 <b>Power meter</b> icon  and then select <b>Power Options</b>.</p>
(2) Vent	<p>Enables airflow to cool internal components.</p> <p><b>NOTE:</b> 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.</p>
(3) Speakers (2)	Produce sound.

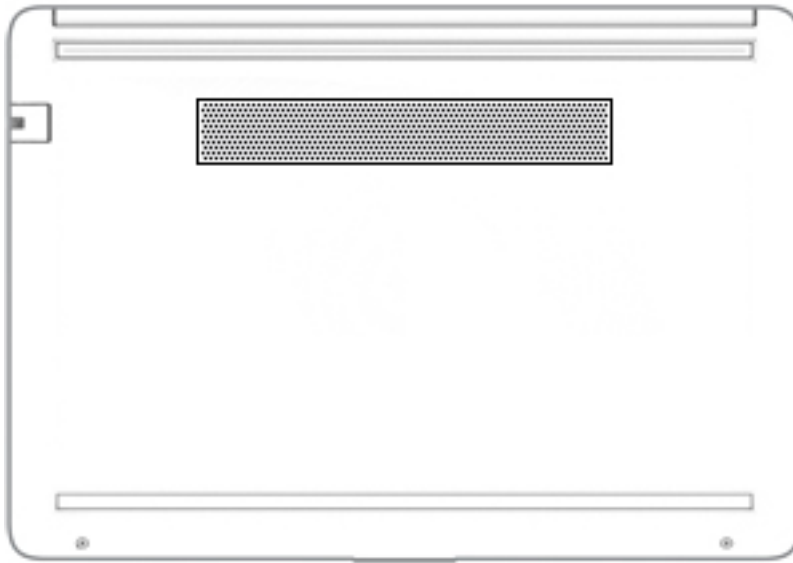
## Special keys



**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. <b>NOTE:</b> Pressing the Windows key again will close the Start menu.
(4) Action keys	Execute frequently used system functions.

## Bottom




**Table 2-8** Bottom components and their descriptions

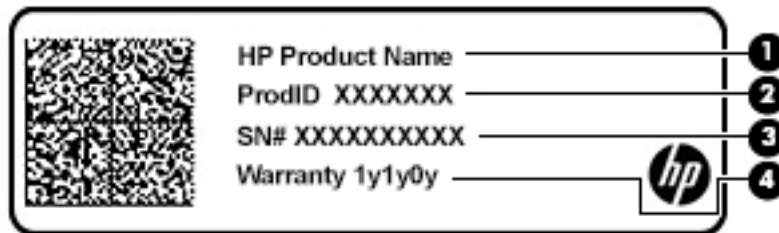
Component	Description
Vent	Enables airflow to cool internal components. <b>NOTE:</b> The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.

# Labels

The labels affixed to the computer provide information you may need when you troubleshoot system problems or travel internationally with the computer. 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 2-9** Service label components

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

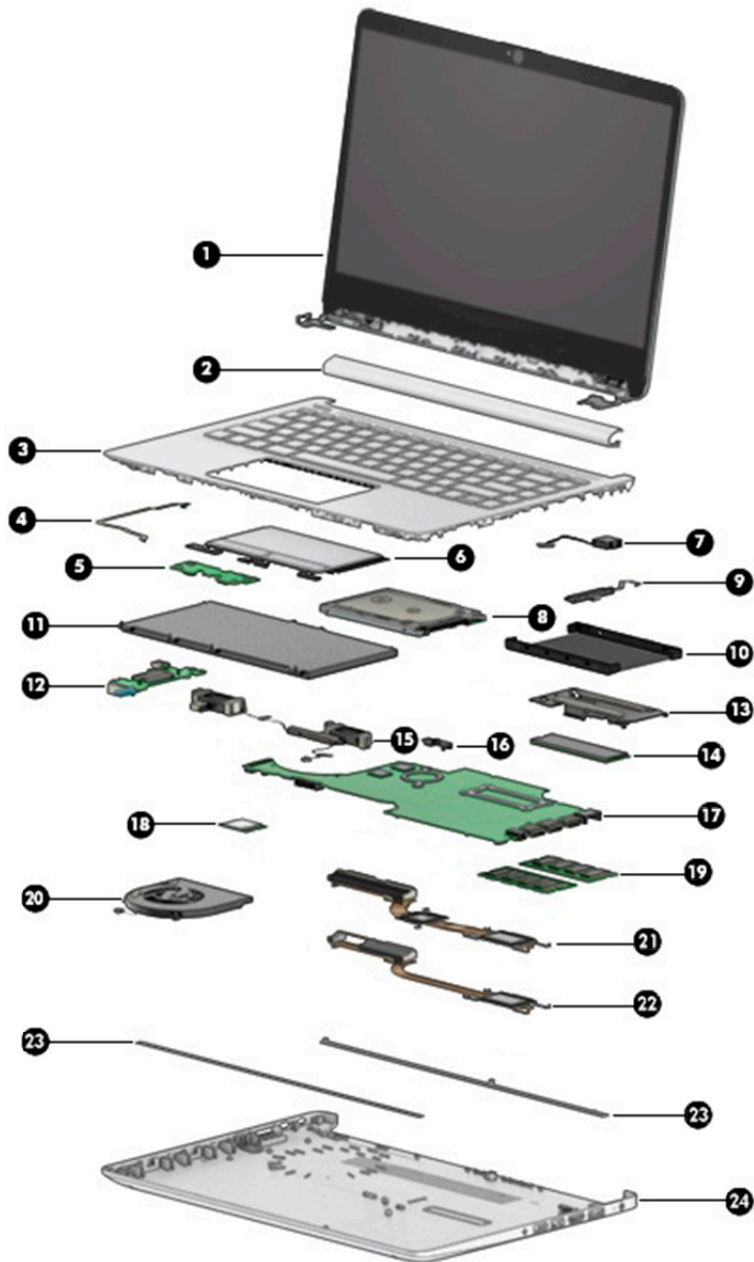
- Regulatory label(s)—Provide(s) regulatory information about the computer.
- Wireless certification label(s)—Provide(s) information about optional wireless devices and the approval markings for the countries or regions in which the devices have been approved for use.



# 3 Illustrated parts catalog

## 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.



**Table 3-1 Computer major components and their descriptions**

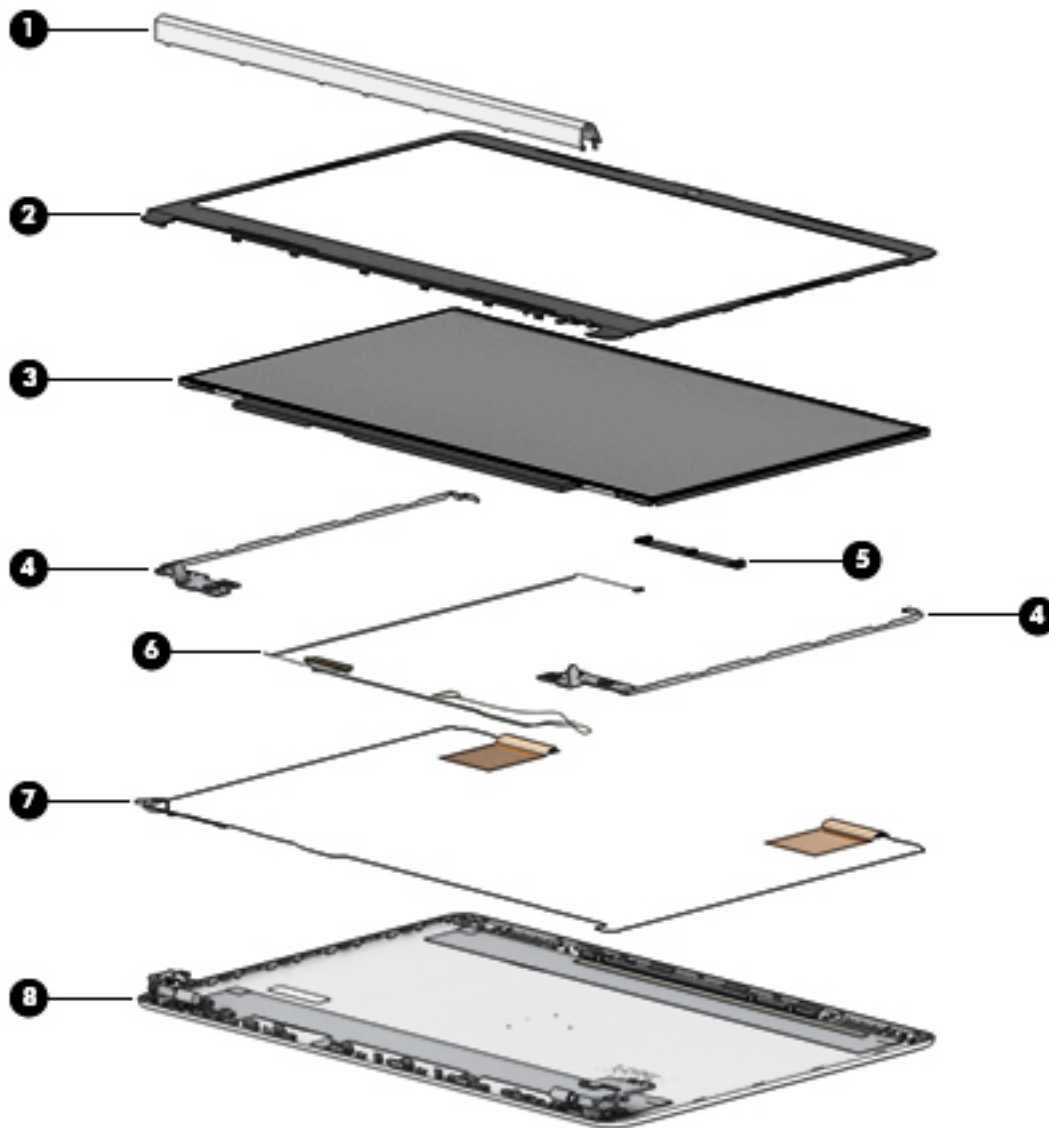
Item	Component	Spare part number
(1)	<b>Display assembly</b> <b>NOTE:</b> Displays are only spared at the subcomponent level. For display assembly spare part information, see <a href="#">Display assembly subcomponents on page 18</a> .	
(2)	<b>Hinge cover</b>	
	Stone silver	L58454-001
	Pike silver	L58455-001
(3)	<b>Top cover/keyboard</b> (includes touchpad and touchpad top protective tape; does not include touchpad board or touchpad click board) <b>NOTE:</b> For a detailed list of keyboard country codes, see <a href="#">Top cover/keyboard on page 56</a> .	
	Pike silver, not backlit	L57400-xx1
	Stone silver, not backlit	L57402-xx1
(4)	<b>Touchpad board cable</b>	L23184-001
(5)	<b>Touchpad board</b>	L24484-001
(6)	<b>Touchpad click board</b> <b>NOTE:</b> The touchpad click board cable is available as spare part number L24485-001.	L24486-001
(7)	<b>Power connector</b>	L23188-001
(8)	<b>Hard drive</b> (does not include bracket)	
	1-TB, 5400-rpm, 7 mm	762990-005
	500-GB, 7200-rpm, 7 mm	703267-005
(9)	<b>Hard drive cable</b>	L23187-001
(10)	<b>Hard drive bracket</b>	L24490-001
(11)	<b>Battery</b> , 3 cell, 41 Wh, prismatic/polymer	L11119-855
(12)	<b>USB board</b>	L24483-001
	<b>USB board cable</b> (not illustrated)	L23186-001
(13)	<b>Solid-state drive board</b>	L24487-001
	<b>Solid-state drive bracket</b> (not illustrated)	L24488-001
(14)	<b>Solid-state drive</b>	
	PCIe:	
	• 512 GB	L25984-001
	• 256 GB	L25983-001
	SATA-3, TLC:	
	• 256 GB	L56986-001
	• 128 GB	L25981-001
	<b>Optane memory module</b> (16 GB)	L34406-001



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

Item	Component	Spare part number
(15)	<b>Speakers</b>	L24489-001
(16)	<b>System board hook</b>	L23206-001
(17)	<b>System board</b> (includes replacement thermal materials)  All system boards use the following part numbers:  xxxxxx-001: non-Windows operating system  xxxxxx-601: Windows operating system  For use in models with discrete graphics:  <ul style="list-style-type: none"> <li>Intel Core i7-8565U processor and 2 GB of dedicated video memory</li> <li>Intel Core i5-8265U processor and 2 GB of dedicated video memory</li> <li>Intel Core i3-8145U processor and 2 GB of dedicated video memory</li> <li>Intel Core i3-7020U processor and 2 GB of dedicated video memory</li> </ul> For use in models with UMA graphics:  <ul style="list-style-type: none"> <li>Intel Core i7-8565U processor</li> <li>Intel Core i5-8265U processor</li> <li>Intel Core i3-8145U processor</li> <li>Intel Core i3-7020U processor</li> </ul>	L62278-xxx  L64984-xxx  L56988-xxx  L62276-xxx        L56990-xxx  L62279-xxx  L56989-xxx  L62277-xxx
(18)	<b>WLAN module</b>  Realtek RTL8821CE 802.11ac 1 × 1 Wi-Fi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)  Realtek RTL8723DE 802.11bgn 1 × 1 Wi-Fi + Bluetooth 4.2 Combo Adapter  Intel Dual Band Wireless-AC 9461 802.11ac 1 × 1 Wi-Fi + Bluetooth 5 Combo Adapter (non-vPro) (MU-MIMO supported)	L17365-005  L21480-005  L25889-005
(19)	<b>Memory module</b>  4 GB  8 GB  16 GB	L10598-855  937236-855  937438-855
(20)	<b>Fan</b>	L23189-001
(21)	<b>Heat sink assembly, discrete</b> (includes replacement thermal materials)	L23192-001
(22)	<b>Heat sink assembly, UMA</b> (includes replacement thermal materials)	L23191-001
(23)	<b>Rubber Feet</b> (includes front and rear feet)  Natural silver  Stone silver	L24482-001  L56985-001
(24)	<b>Bottom cover</b>  Pike silver  Stone silver	L56976-001  L56977-001

## Display assembly subcomponents



**Table 3-2** Display components and their descriptions

Item	Component	Spare part number
<b>(1)</b>	<b>Hinge cover</b>	
	Stone silver	L58454-001
	Pike silver	L58455-001
<b>(2)</b>	<b>Display bezel</b>	
	For use in models with a webcam	L56981-001
	For use in models without a webcam	L56980-001
<b>(3)</b>	<b>Raw display panel</b>	
	FHD, UWVA	L56982-001

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

Item	Component	Spare part number
	HD, SVA	L56983-001
<b>(4)</b>	<b>Hinges</b> (left and right)	L24470-001
<b>(5)</b>	<b>Webcam/microphone module</b>	L56987-001
	<b>Microphone module</b>	L56984-001
<b>(6)</b>	<b>Display cable</b>	
	HD display	L24492-001
	FHD display	L24493-001
<b>(7)</b>	<b>Antennas</b>	
	Dual	L24640-001
	Single	L29012-001
<b>(8)</b>	<b>Display enclosure</b>	
	Pike silver	L56978-001
	Stone silver	L56979-001

## Miscellaneous parts

**Table 3-3 Miscellaneous parts and their descriptions**

Component	Spare part number
<b>Adhesive tape kit</b>	L24491-001
<b>HP Smart AC adapter</b>	
45 W, RC 4.5 mm, NPFC, non-slim	741727-001
65 W, NPFC, S-3P 4.5 mm	710412-001
65 W, NPFC, RC 4.5 mm, EM	913691-850
<b>Power cord</b> (3-pin, black, 1.0-m) for use in:	
For use in Brazil	L19359-001
For use in Europe	L19361-001
For use in India	L19363-001
For use in North America	L19367-001
For use in the People's Republic of China	L19368-001
For use in Thailand	L19371-001
For use in Taiwan	L19372-001
For use in the United Kingdom	L19373-001
<b>Power cord</b> (3-pin, black, 1.8-m) for use in:	

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

<b>Component</b>	<b>Spare part number</b>
For use in the United Kingdom and Singapore	L19373-002
<b>Screw Kit</b>	L58135-001

---

# 4 Removal and replacement procedures preliminary requirements

## Tools required


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

- Flat-bladed screwdriver
- Non-marking, non-conductive prying tool
- Magnetic Phillips P1 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


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

---

## Cables and connectors

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 **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) might not appear to be affected at all and can work perfectly throughout a normal cycle. The device might function normally for a while, but it has been degraded in the internal layers, reducing its life expectancy.

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



**IMPORTANT:** To prevent damage to the device when you 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

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

**Table 4-2 Static shielding protection levels**

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

## Grounding the work area

To prevent static damage at the work area, 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

HP recommends the following materials and equipment to prevent static electricity:

- Antistatic tape
- Antistatic smocks, aprons, or sleeve protectors
- Conductive bins and other assembly or soldering aids
- Conductive foam
- Conductive tabletop workstations with ground cord of  $1\text{ M}\Omega \pm 10\%$  resistance
- Static-dissipative table or floor mats with hard tie to ground



- Field service kits
- Static awareness labels
- Wrist straps and footwear straps providing  $1\text{ M}\Omega \pm 10\%$  resistance
- Material handling packages
- Conductive plastic bags
- Conductive plastic tubes
- Conductive tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes


## Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

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




# 5 Removal and replacement procedures for authorized service provider parts

 **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

 **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.

There are as many as 58 screws that must be removed, replaced, or loosened when servicing Authorized Service Provider only parts. Make special note of each screw size and location during removal and replacement.

## Preparation for disassembly

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

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

## Computer feet

**Table 5-1 Computer feet description and part number**

Description	Spare part number
Computer feet, natural silver	L24482-001
Computer feet, stone silver	L56985-001

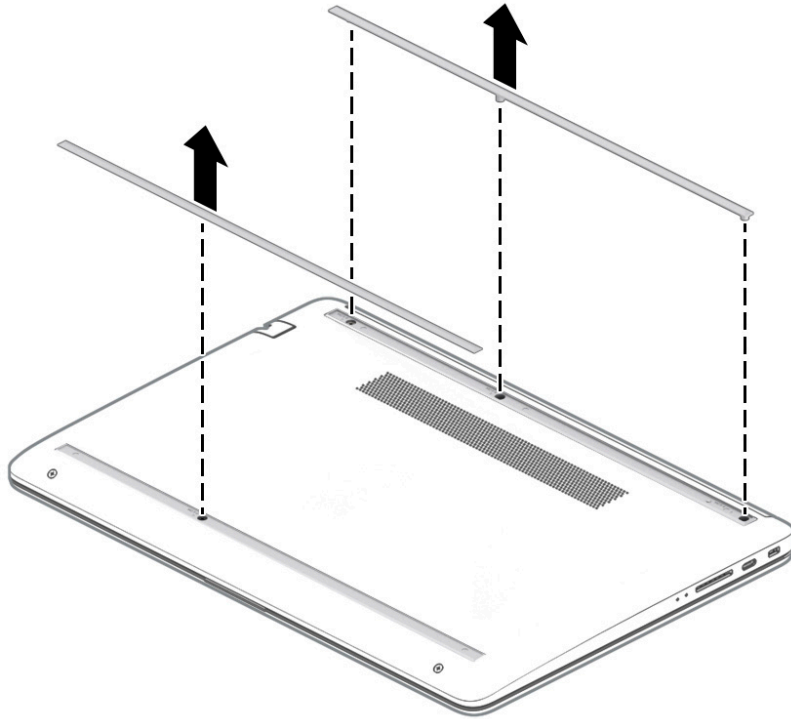
Before removing the computer feet, follow these steps:

- ▲ Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).

Remove the computer feet:

1. Close the computer and position it upside down, with the front toward you.
2. Insert a tool with no sharp edges between the base enclosure and one end of the rubber feet.

3. Pull up the rubber feet lightly and quickly.



To install the rubber feet, refit them on the adhesive backing.



**NOTE:** The bottoms of the computer feet are ribbed. These ribs are designed to fit only one way in the grooves that are in the enclosure. Make sure the feet are positioned in those grooves when reinstalling the feet.

## Bottom cover

**Table 5-2 Bottom cover descriptions and part numbers**

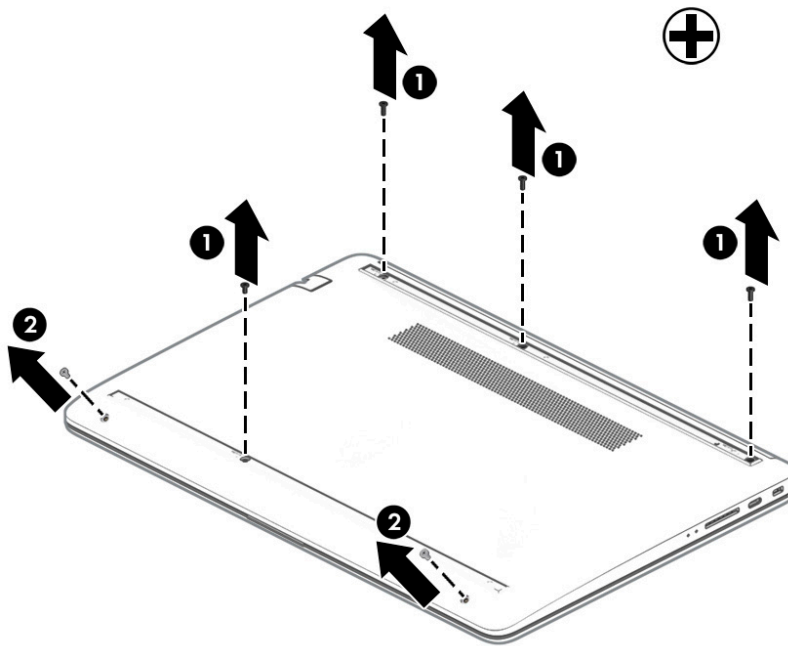
Description	Spare part number
Bottom cover, pike silver	L56976-001
Bottom cover, stone silver	L56977-001

Before removing the bottom cover, follow these steps:

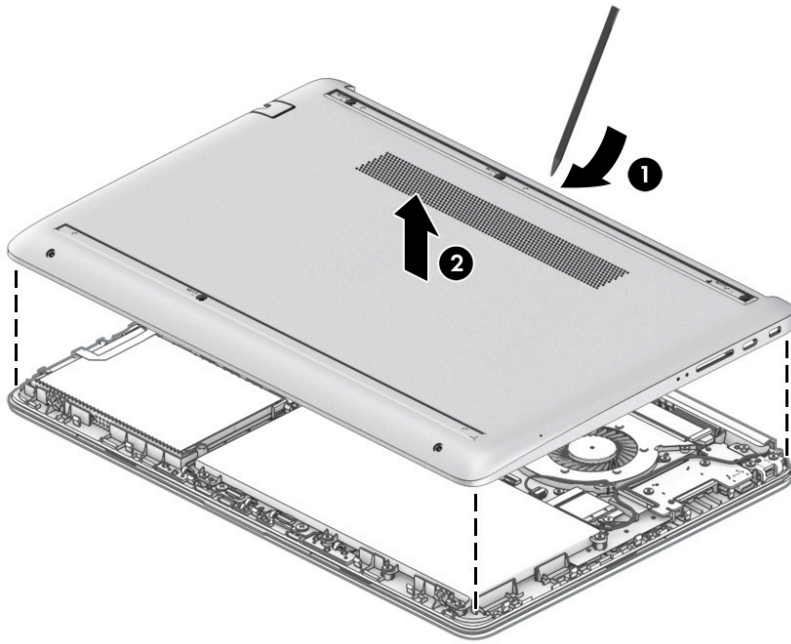
1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).

To remove the bottom cover:

1. Remove the four Phillips M2.5 × 6.0 screws **(1)** from under the feet, and then two Phillips M2.5 × 4.0 screws **(2)** from the front part of the bottom cover.



2. Use a thin plastic tool **(1)** to release the back cover. Work your way around prying to disengage the bottom cover from the computer, and then remove the cover **(2)**.



Reverse this procedure to install the bottom cover.

## Battery

**Table 5-3 Battery and system board hook descriptions and part numbers**

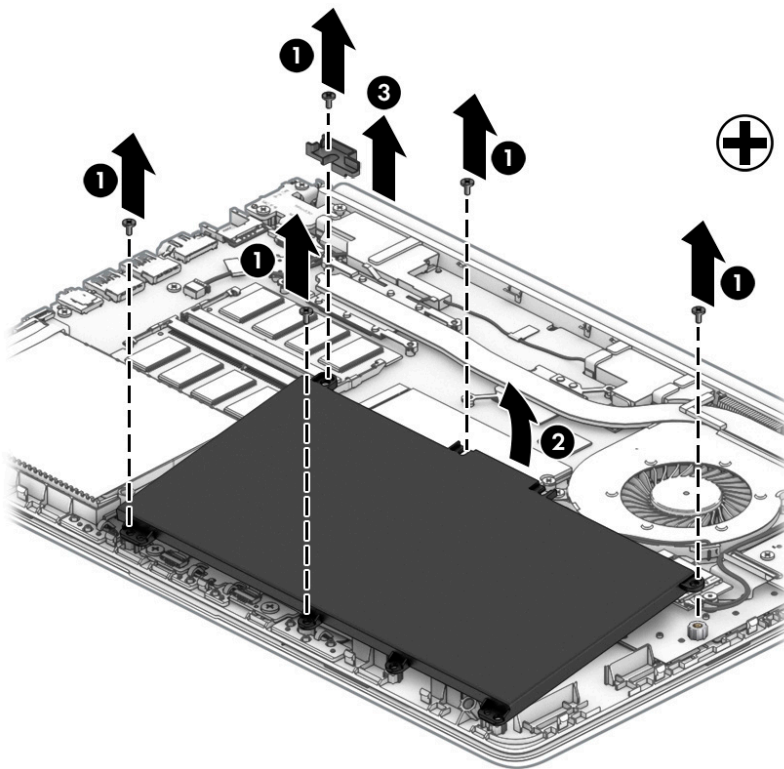
Description	Spare part number
Battery	L11119-855
System board hook	L23206-001

Before removing the battery and system board hook, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).

To remove the battery and system board hook:

1. Remove the five screws (1) securing the battery.
2. Lift the top of the battery (2), and then remove the system board hook (3).



Reverse this procedure to install the battery.

## Hard drive



**NOTE:** The hard drive spare part kit does not include the hard drive cover.

**Table 5-4 Hard drive descriptions and part numbers**

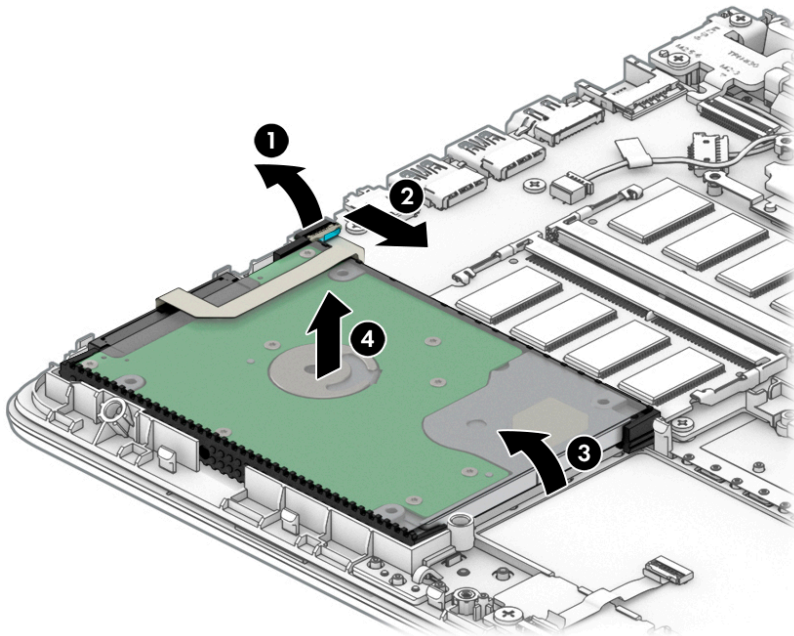
Description	Spare part number
Hard drive, 1 TB, 5400 rpm, 7 mm	762990-005
Hard drive, 500 GB, 7200 rpm, 7 mm	703267-005
Hard drive cable	L23187-001
Hard drive bracket	L24490-001

Before removing the hard drive, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).
4. Remove the battery (see [Battery on page 31](#)).

To remove the hard drive:

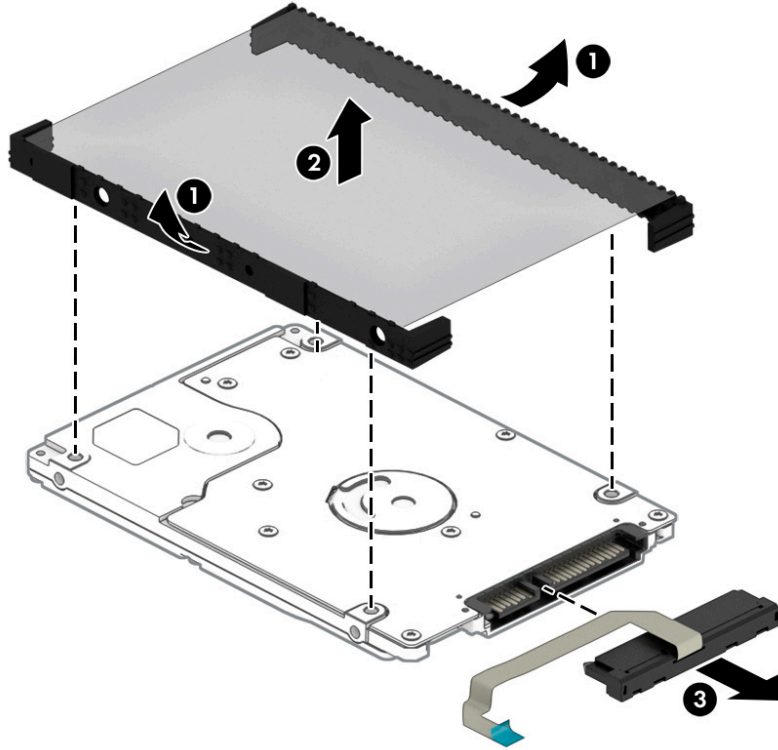
1. Open the system board ZIF connector **(1)**, and then disconnect the cable **(2)**.
2. Lift the front of the hard drive **(3)**, and then remove it **(4)** from the computer.



3. To remove the hard drive bracket and connector cable, pull the sides up and away from the hard drive **(1)**, and then remove the bracket from the hard drive **(2)**.



4. Pull the connector away from the hard drive (3).



Reverse this procedure to reassemble and install the hard drive.

## WLAN module

**Table 5-5 WLAN module descriptions and part numbers**

Description	Spare part number
Realtek RTL8821CE 802.11ac 1 × 1 Wi-Fi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	L17365-005
Realtek RTL8723DE 802.11bgn 1 × 1 Wi-Fi + Bluetooth 4.2 Combo Adapter	L21480-005
Intel Dual Band Wireless-AC 9461 802.11ac 1 × 1 Wi-Fi + Bluetooth 5 Combo Adapter (non-vPro) (MU-MIMO supported)	L25889-005



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

Before removing the WLAN module, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).
4. Remove the battery (see [Battery on page 31](#)).

To remove the WLAN module:

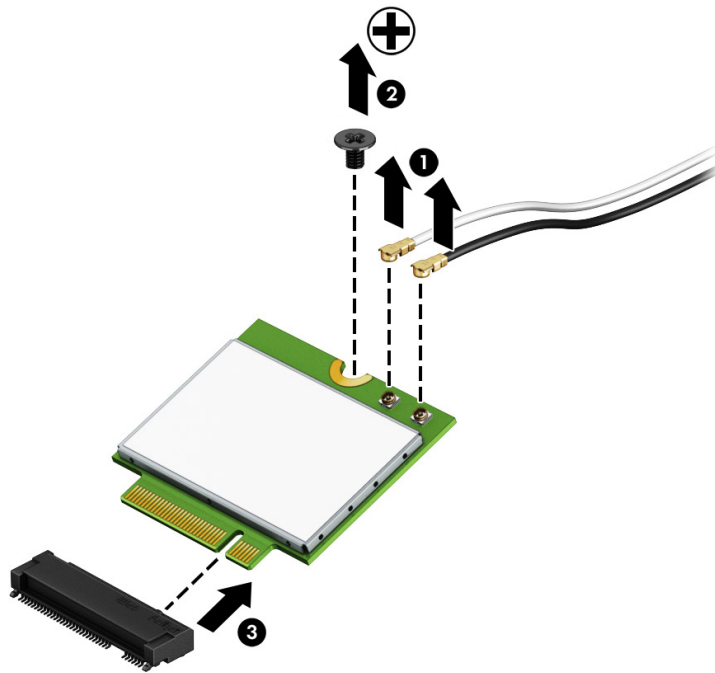
1. Disconnect the WLAN antenna cables **(1)** from the terminals on the WLAN module.




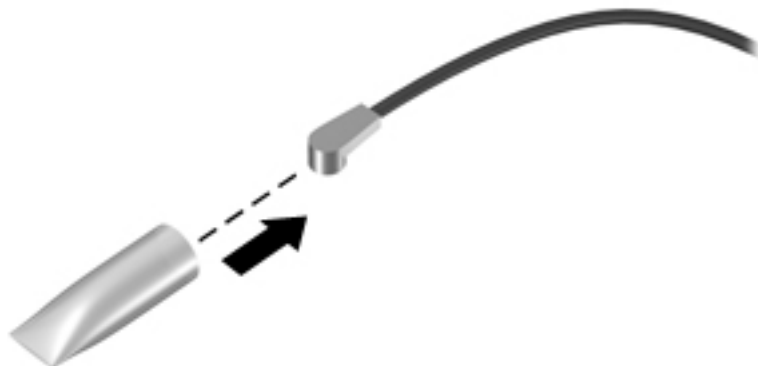
**NOTE:** The #1 WLAN antenna cable is connected to the WLAN module Main terminal. The #2 WLAN antenna cable is connected to the WLAN module Aux terminal.

2. Remove the Phillips M2.0 × 3.0 screw **(2)** that secures the WLAN module to the system board. (The WLAN module tilts up.)

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



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



Reverse this procedure to install the WLAN module.

## Memory module

**Table 5-6** Memory module descriptions and part numbers

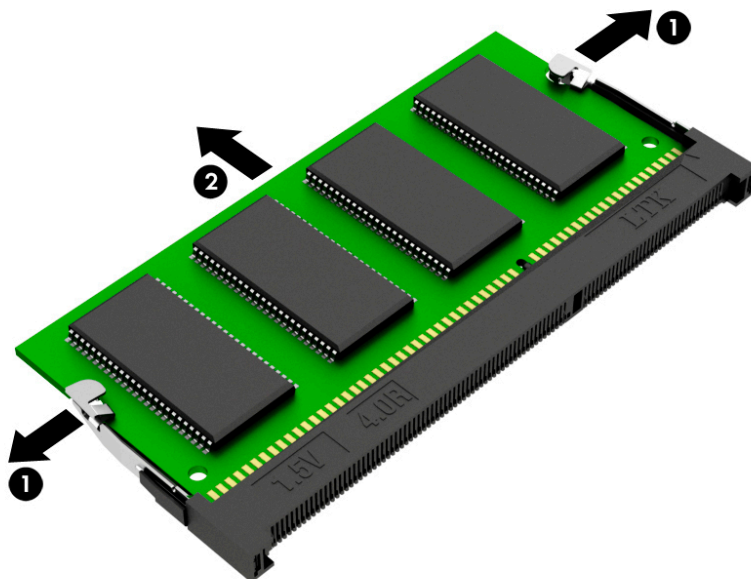
Description	Spare part number
4 GB memory module (SODIMM)	L10598-855
8 GB memory module (SODIMM)	937236-855
16 GB memory module (SODIMM)	937438-855

Before removing a memory module, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).
4. Remove the battery (see [Battery on page 31](#)).

To remove a memory module:

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



Reverse this procedure to install a memory module.

## Solid-state drive

**Table 5-7 Solid-state drive descriptions and part numbers**


Description	Spare part number
Solid-state drive, 512 GB, PCIe	L25984-001
Solid-state drive, 256 GB, PCIe	L25983-001
Solid-state drive, 256 GB, SATA-3	L56986-001
Solid-state drive, 128 GB, SATA-3	L25981-001
Optane memory module, 16 GB	L34406-001
Solid-state drive bracket	L24488-001
Solid-state drive board	L24487-001

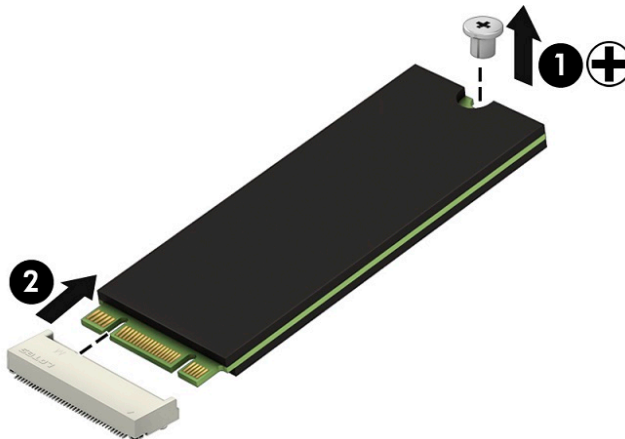
Before removing the solid-state drive, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).
4. Remove the battery (see [Battery on page 31](#)).

Remove the solid-state drive:

1. Remove the Phillips M2.0 × 2.0 screw **(1)** that secures the drive to the system board.
2. Remove the drive **(2)** by pulling it away from the connector.

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



Reverse this procedure to install the solid-state drive.

## Speakers

**Table 5-8 Speaker description and part number**

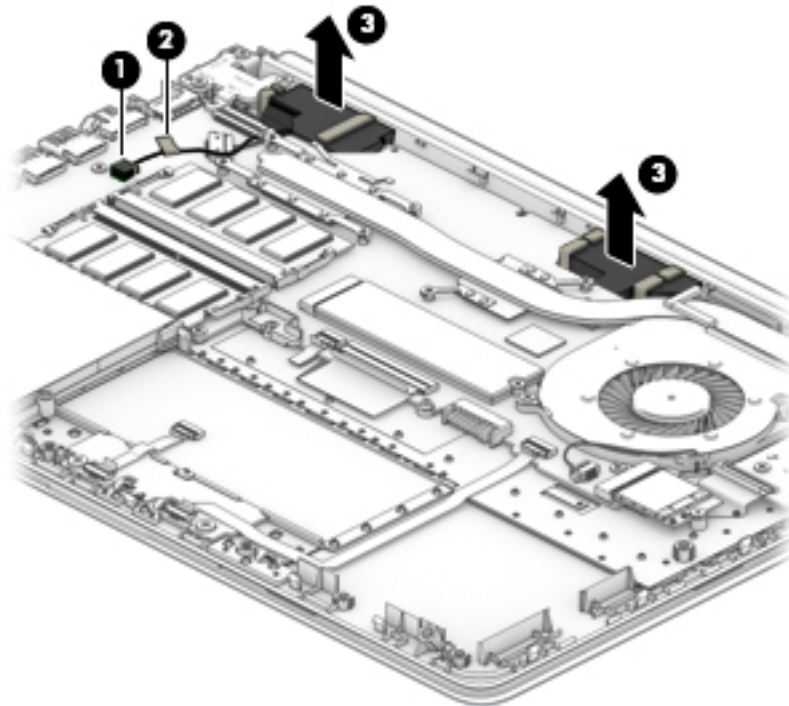
Description	Spare part number
Speakers (includes left and right speakers and cable)	926558-001

Before removing the speakers, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).
4. Remove the battery (see [Battery on page 31](#)).

To remove the speakers:

1. Disconnect the speaker cable from the system board **(1)**.
2. Remove the tape **(2)** securing the cable.
3. Lift the speakers out of the computer **(3)**.



Reverse this procedure to install the speakers.

## Power connector

**Table 5-9 Power connector description and part number**

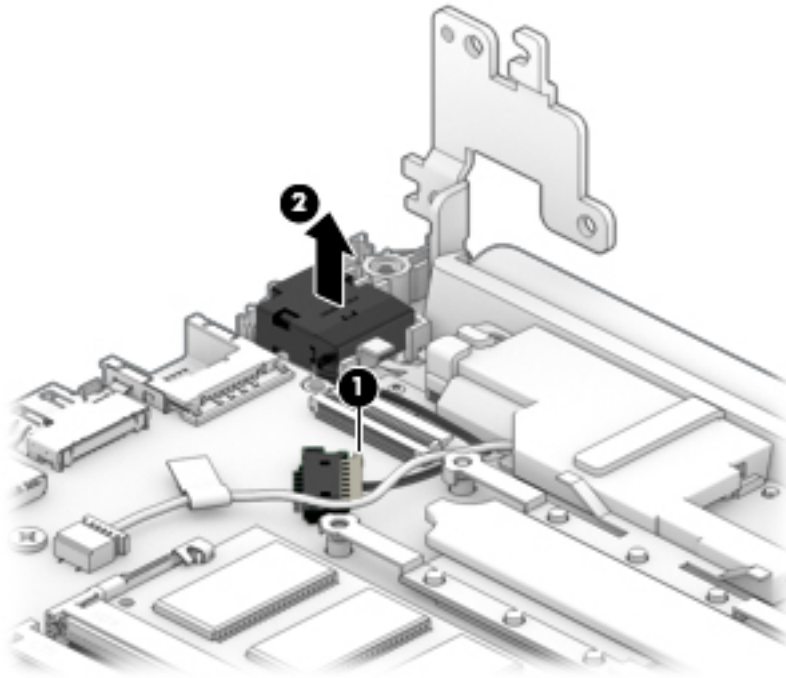
Description	Spare part number
Power connector	L23188-001

Before removing the power connector cable, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).
4. Remove the battery (see [Battery on page 31](#)).
5. Remove the right hinge screw and lift the right hinge (see [Display assembly on page 49](#)).

To remove the power connector:

1. Disconnect the power connector cable **(1)** from the system board.
2. Lift the power connector **(2)** to remove it.



Reverse this procedure to install the power connector.

## Touchpad click board

**Table 5-10 Touchpad click board and cables descriptions and part numbers**


Description	Spare part number
Touchpad click board	L24486-001
Touchpad board cable	L23184-001
Touchpad click board cable	L24485-001

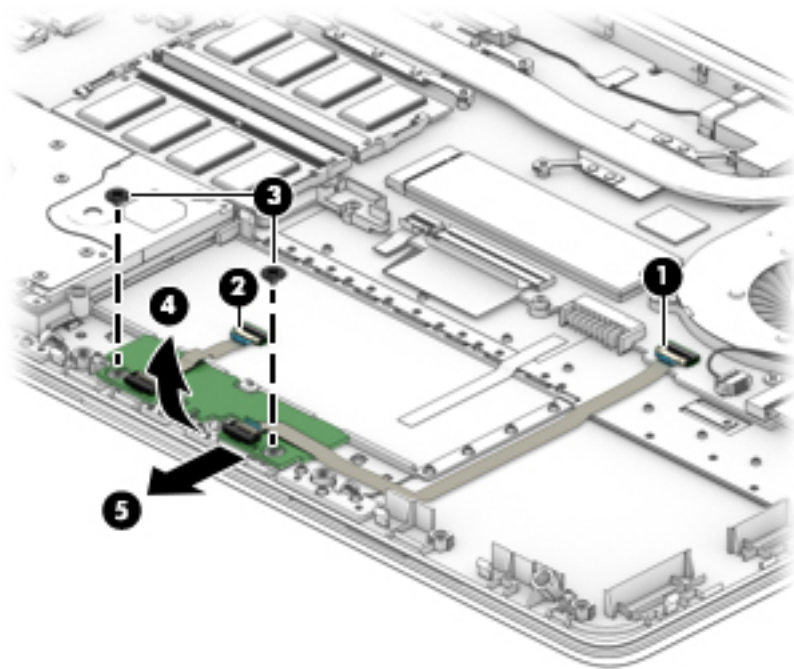
Before removing the touchpad click board, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).
4. Remove the battery (see [Battery on page 31](#)).

To remove the touchpad click board:

1. Disconnect the touchpad cable **(1)** from the system board ZIF connector, and then disconnect from the touchpad click board cable **(2)** from the touchpad ZIF connector.
2. Remove the two Phillips M2.0 × 2.0 screws **(3)** that secure the touchpad click board to the computer.
3. Lift the board **(4)**, and then slide it outward from under the clips that hold it on place **(5)**.

 **TIP:** The edge of the board sits under clips. Be sure to slide the board out from under the clips to prevent damage to the board or clips.



Reverse this procedure to install the touchpad click board.



# Touchpad

**Table 5-11 Touchpad description and part number**

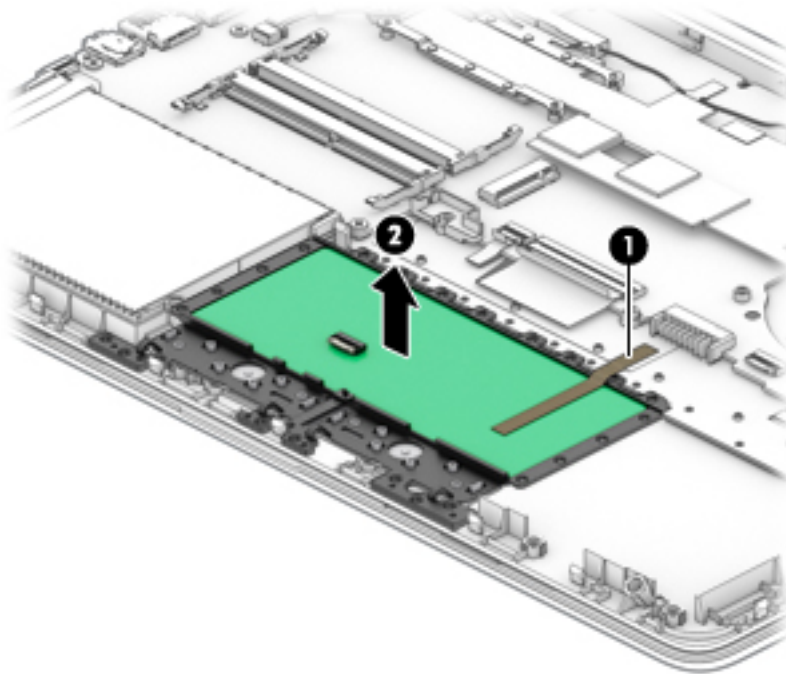
Description	Spare part number
Touchpad	L24484-001

Before removing the touchpad, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).
4. Remove the battery (see [Battery on page 31](#)).
5. Remove the touchpad click board (see [Touchpad click board on page 40](#)).

To remove the touchpad:

1. Peel the conductive tape off the keyboard **(1)**.
2. Lift the touchpad to remove it from the computer **(2)**.



Reverse this procedure to install the touchpad click board.

## USB board

**Table 5-12 USB board and cable descriptions and part numbers**

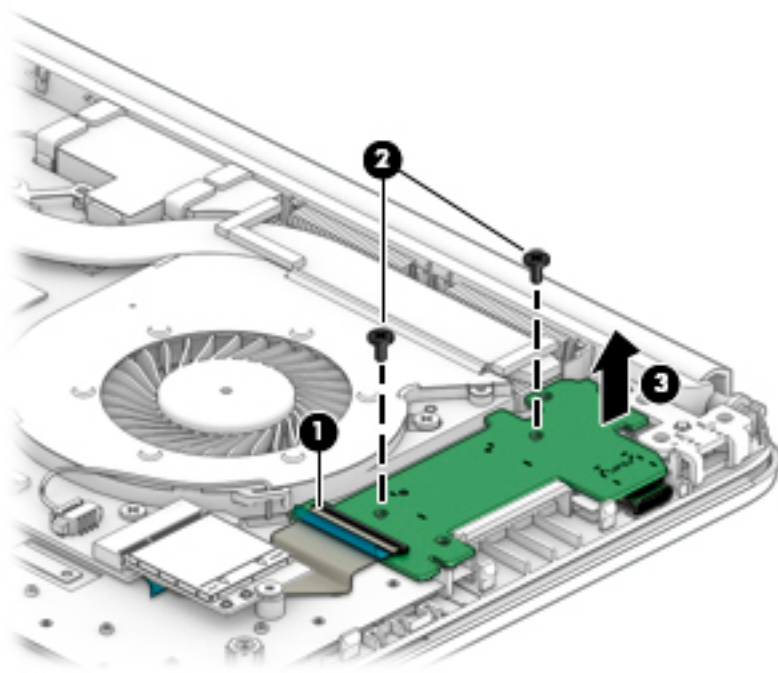
Description	Spare part number
USB board	L24483-001
USB board cable	L23186-001

Before removing the USB board, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).
4. Remove the battery (see [Battery on page 31](#)).

To remove the USB board:

1. Disconnect the cable from the ZIF connector on the USB board **(1)**
2. Remove the two Phillips M2.0 × 3.0 screws **(2)** that secure the USB board to the computer.
3. Remove the USB board from the computer **(3)**.



Reverse this procedure to install the USB board.

# Fan

**Table 5-13 Fan and fan insert descriptions and part numbers**

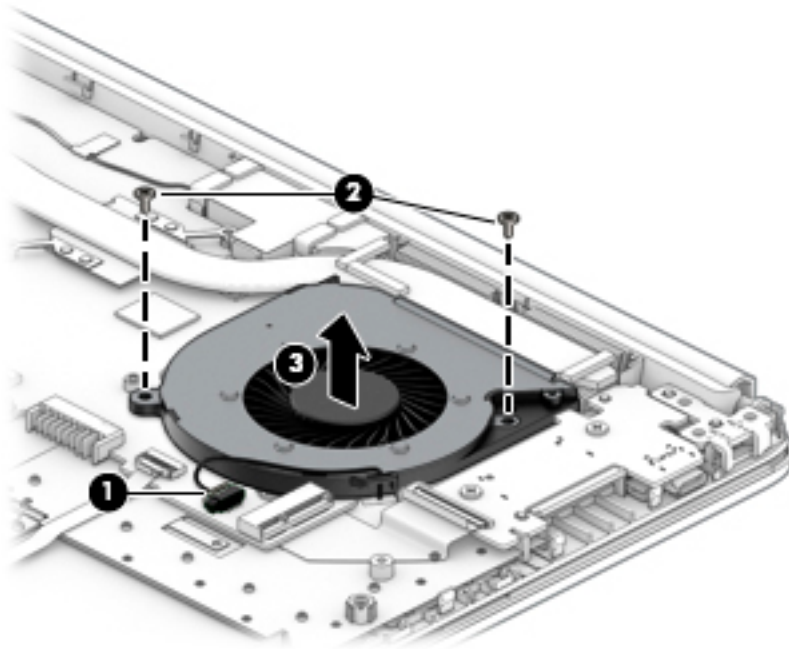
Description	Spare part number
Fan	L23189-001

Before removing the fan, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).
4. Remove the battery (see [Battery on page 31](#)).

To remove the fan:

1. Disconnect the fan cable from the system board **(1)**.
2. Remove the two Phillips M2.5 × 5.0 screws **(2)** that secure the fan to the computer.
3. Lift the fan out of the computer **(3)**.



Reverse this procedure to install the fan.

## System board



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

**Table 5-14 System board descriptions and part numbers**

Description	Spare part number
System board (includes replacement thermal materials):	
All system boards use the following part numbers:	
xxxxxx-001: Non-Windows operating system	
xxxxxx-601: Windows operating system	
For use in models with discrete graphics:	
<ul style="list-style-type: none"><li>Intel Core i7-8565U processor and 2 GB of dedicated video memory</li></ul>	L62278-xxx
<ul style="list-style-type: none"><li>Intel Core i5-8265U processor and 2 GB of dedicated video memory</li></ul>	L64984-xxx
<ul style="list-style-type: none"><li>Intel Core i3-8145U processor and 2 GB of dedicated video memory</li></ul>	L56988-xxx
<ul style="list-style-type: none"><li>Intel Core i3-7020U processor and 2 GB of dedicated video memory</li></ul>	L62276-xxx
For use in models with UMA graphics:	
<ul style="list-style-type: none"><li>Intel Core i7-8565U processor</li></ul>	L56990-xxx
<ul style="list-style-type: none"><li>Intel Core i5-8265U processor</li></ul>	L62279-xxx
<ul style="list-style-type: none"><li>Intel Core i3-8145U processor</li></ul>	L56989-xxx
<ul style="list-style-type: none"><li>Intel Core i3-7020U processor</li></ul>	L62277-xxx

Before removing the system board, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).
4. Remove the battery (see [Battery on page 31](#)).
5. Remove the fan (see [Fan on page 43](#)).



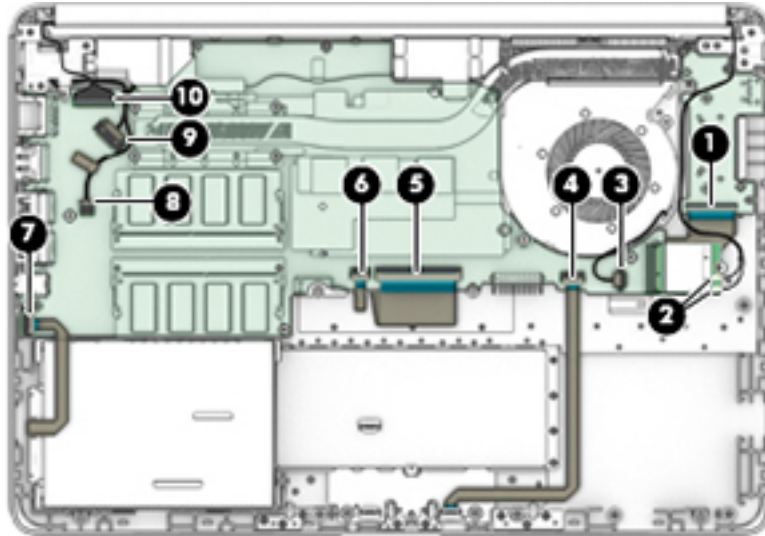
**NOTE:** When replacing the system board, be sure that the following components are removed from the defective system board and installed on the replacement system board:

- WLAN module (see [WLAN module on page 34](#))
- Memory modules (see [Memory module on page 36](#))
- Solid-state drive (if installed) (see [Solid-state drive on page 37](#))
- Heat sink assembly (see [Heat sink assembly on page 46](#))

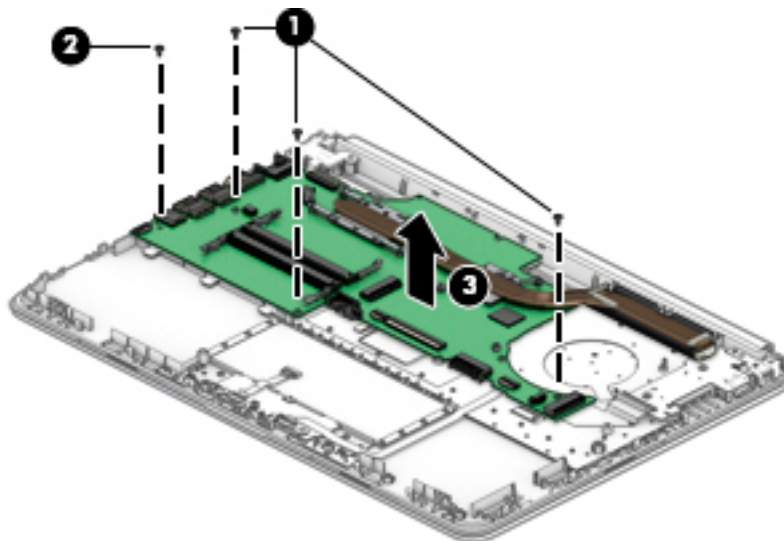
To remove the system board:

1. Position the computer upright, and then disconnect the following cables from the system board:
  - (1) USB board cable
  - (2) WLAN antenna cables

- (3) Fan cable
- (4) Touchpad button board cable
- (5) Keyboard cable
- (6) Backlight cable
- (7) Hard drive cable
- (8) Speaker cable
- (9) Power connector cable
- (10) Display cable



2. Remove the three silver Phillips M2.0 × 2.0 screws **(1)** that secure the system board to the computer.
3. Remove the black Phillips broadhead M2.0 × 3.0 screw **(2)** that secures the system board to the computer.
4. Lift the system board out of the computer **(3)**.



Reverse this procedure to install the system board.

## Heat sink assembly



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

**Table 5-15 Heat sink descriptions and part numbers**

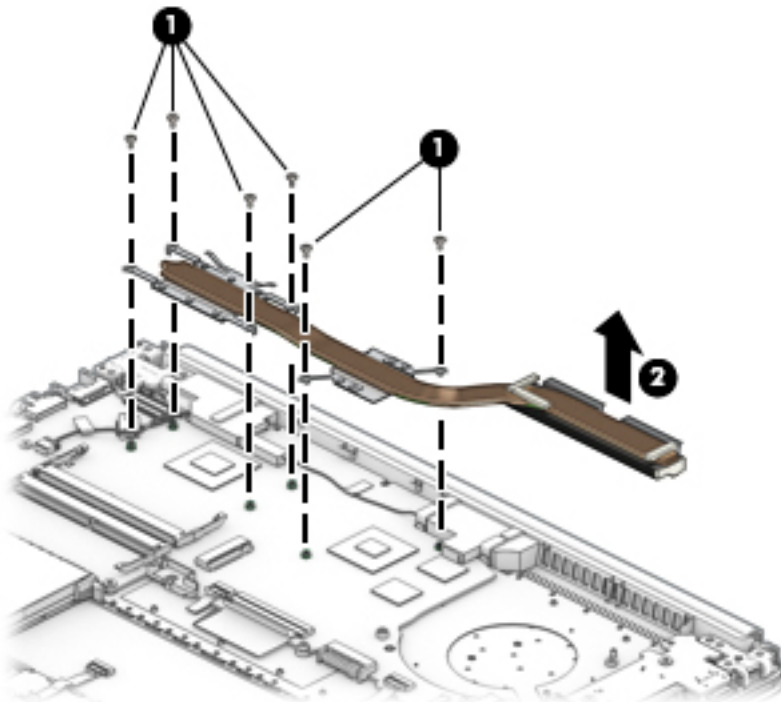
Description	Spare part number
Heat sink assembly, discrete (includes replacement thermal materials)	L23192-001
Heat sink assembly, UMA (includes replacement thermal materials)	L23191-001

Before removing the heat sink assembly, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).
4. Remove the battery (see [Battery on page 31](#)).

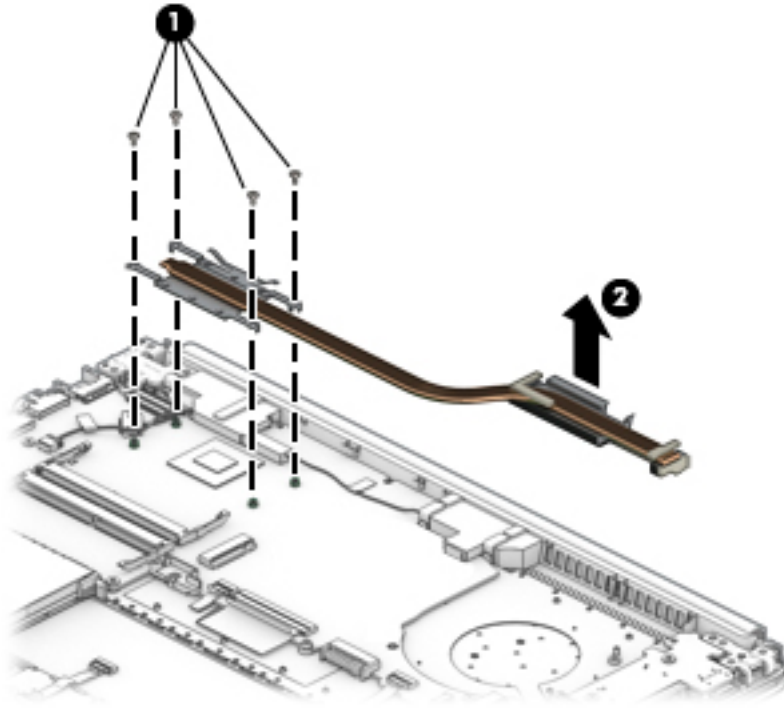
To remove the heat sink assembly:


1. If you have a model with discrete graphics:
  - a. In the order indicated on the heat sink, remove the six Phillips M2.0 × 4.0 screws **(1)** that secure the heat sink to the system board.
  - b. Remove the heat sink **(2)** from the system board.



2. If you have a model with UMA graphics:
  - a. In the order indicated on the heat sink, remove the four Phillips M2.0 × 4.0 screws **(1)** that secure the heat sink to the system board.

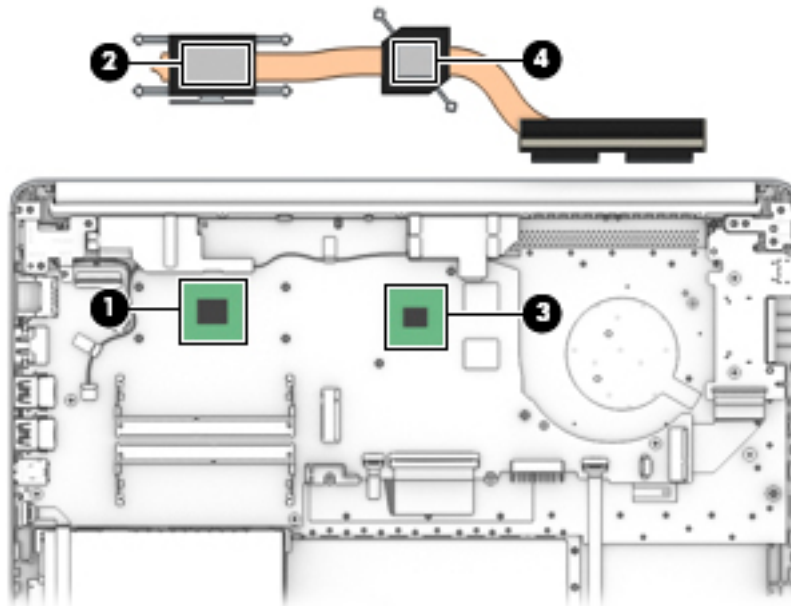
- b. Remove the heat sink (2) from the system board.



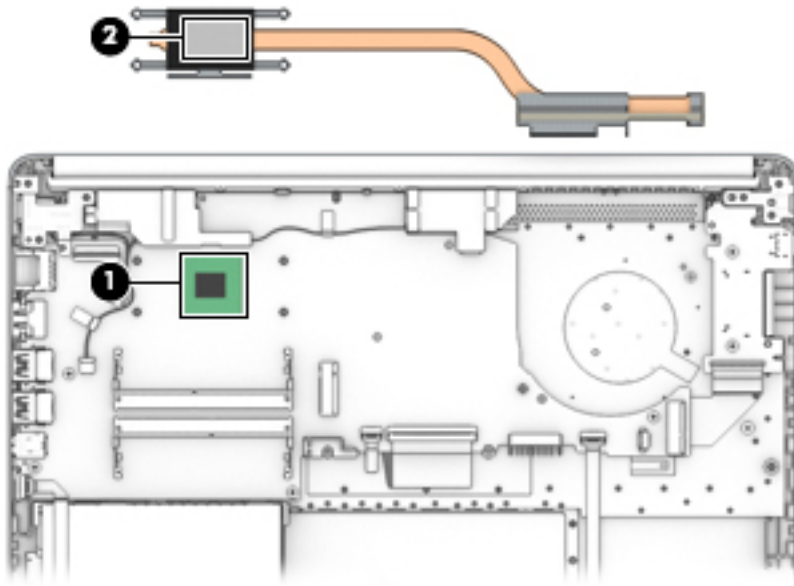
 **NOTE:** Thoroughly clean the thermal material from the surfaces of the heat sink and the system board components each time the heat sink is removed. Replacement thermal material is included with the heat sink, processor, and system board spare part kits.

The following illustrations show replacement thermal material locations.

- **Discrete graphics:** Thermal paste is used on the heat sink (2) (4) and associated system board components (1) (3).



- **UMA graphics:** Thermal paste is used on the heat sink **(2)** and associated system board component **(1)**.



Reverse this procedure to reassemble and install the heat sink assembly.



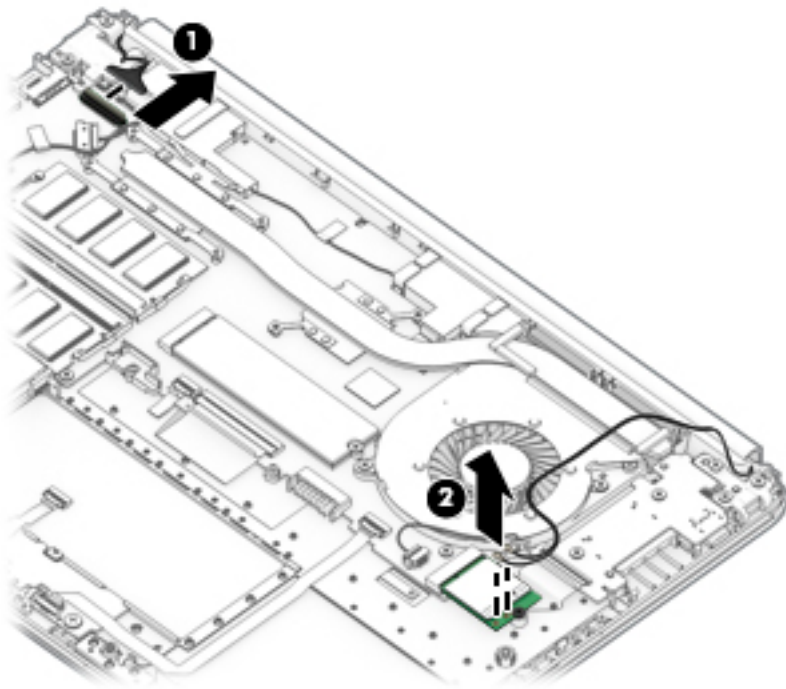
## Display assembly

Before removing the display assembly, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 27](#)).
2. Remove the rubber feet (see [Computer feet on page 27](#)).
3. Remove the bottom cover (see [Bottom cover on page 29](#)).
4. Remove the battery (see [Battery on page 31](#)).

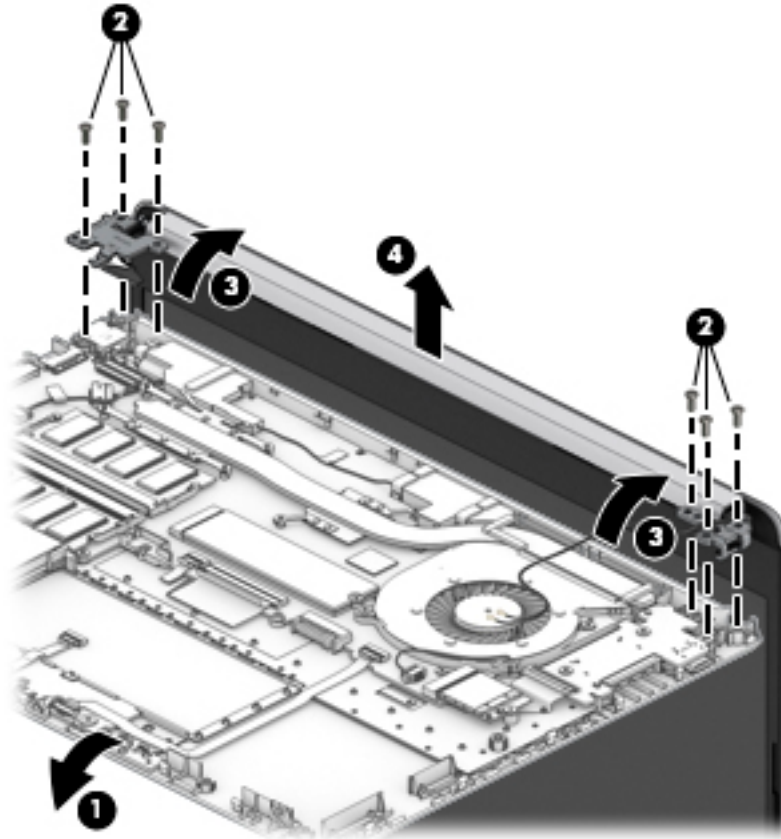
To remove the display assembly:

1. Disconnect the display cable from the system board **(1)**.
2. Disconnect the wireless antenna cables from the WLAN module **(2)**.



3. Position the computer so it is open with the display hanging off the table **(1)**.
4. Remove the six Phillips M2.5 × 6.0 screws **(2)** from the display hinges.

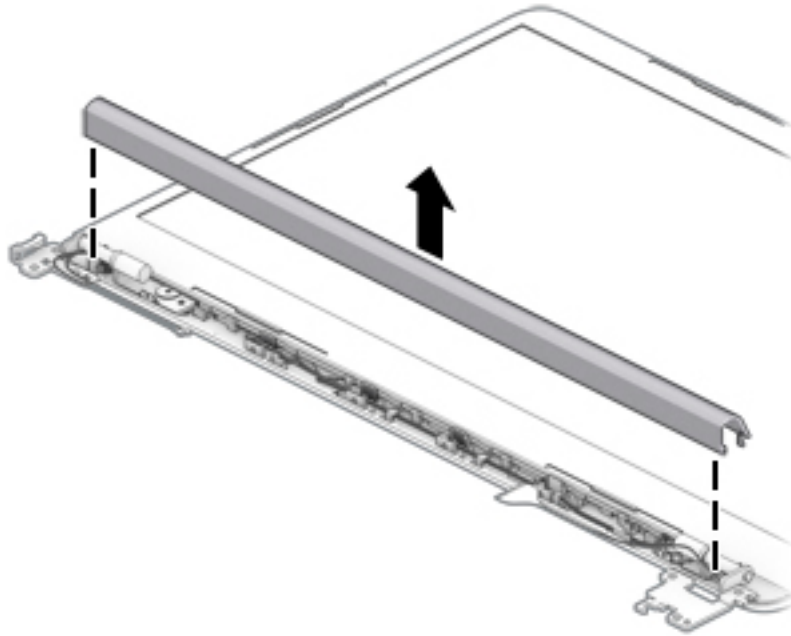
5. Rotate the hinges upward to an angle **(3)**, and then remove the display **(4)**.



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

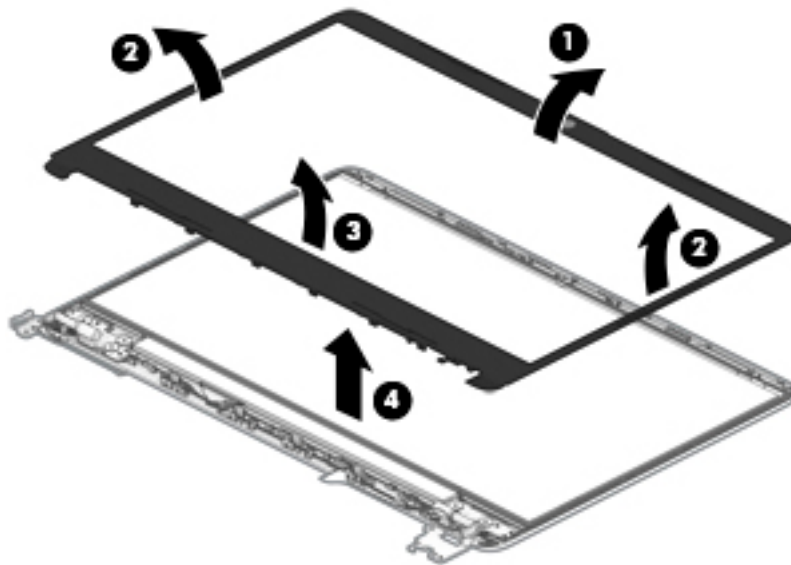
1. Lift the hinge cap to remove it from display.

The hinge cap is available as spare part numbers L58455-001 for pike silver models and L58454-001 for stone silver models.



2. Flex the inside of the top edge **(1)**, left and right sides **(2)**, and the inside of the bottom edge **(3)** of the display bezel until the bezel disengages from the display enclosure.
3. Remove the display bezel **(4)**.

The display bezel is available as spare part numbers L56980-001 for models without a webcam and L56981-001 for models with a webcam.

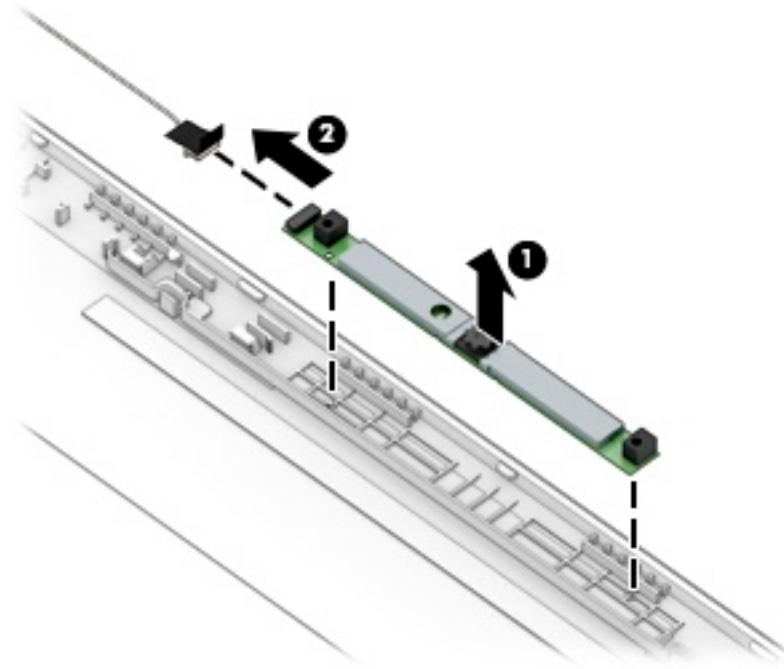


4. To remove the webcam/microphone module:
  - a. Position the display assembly with the top edge toward you.
  - b. Lift the webcam module to disengage the adhesive that secures the module to the display **(1)**.

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

The webcam module is available as spare part number L56987-001.

The microphone module is available as spare part number L56984-001.



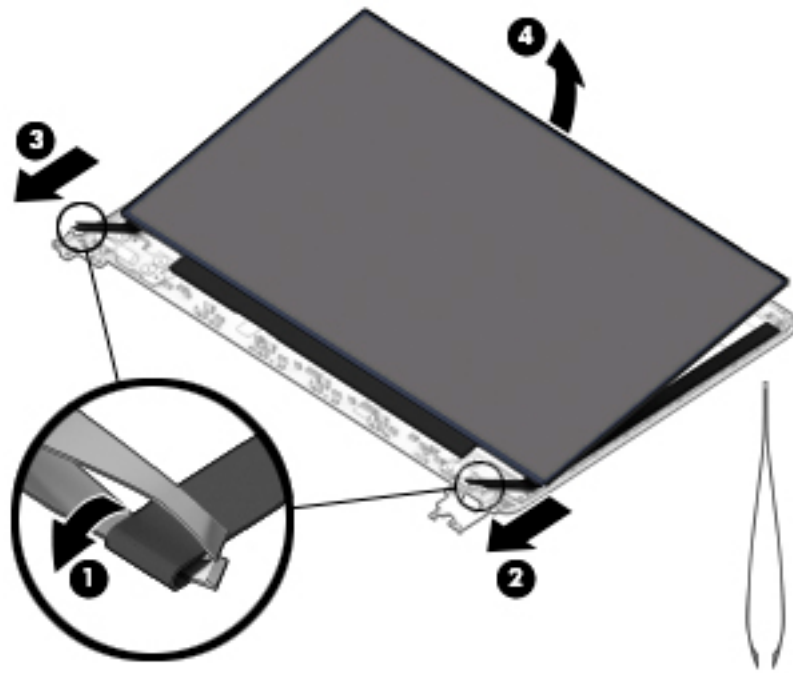
- 5. To remove the display panel:

- a. Use a tweezer to grasp the adhesive tape **(1)** near the bottom corners of the display panel. Pull the tape out from under the right **(2)** and left **(3)** corners of the display panel until it is completely removed. Lift the top of the panel **(4)**.

---

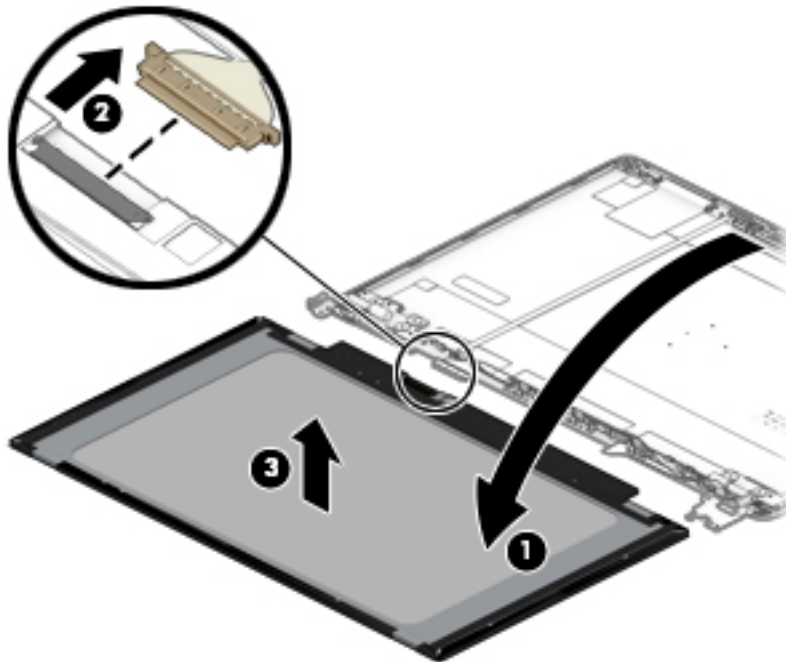
 **TIP:** You must pull the tape several times to remove it.

---



- b. Rotate the display panel onto the keyboard **(1)** to gain access to the display cable connection on the back of the panel.
- c. On the back of the display panel, release the adhesive strip that secures the display panel cable to the display panel, and then disconnect the cable **(2)**.
- d. Remove the display panel from the display enclosure **(3)**.

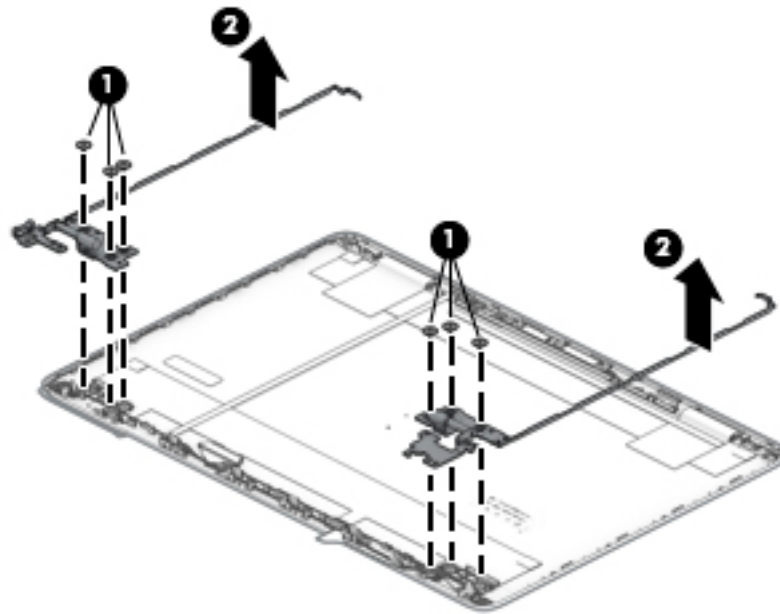
The display panel is available as spare part numbers L56982-001 for FHD UWVA panels and L56983-001 for HD SVA panels.



6. To remove the display hinges:

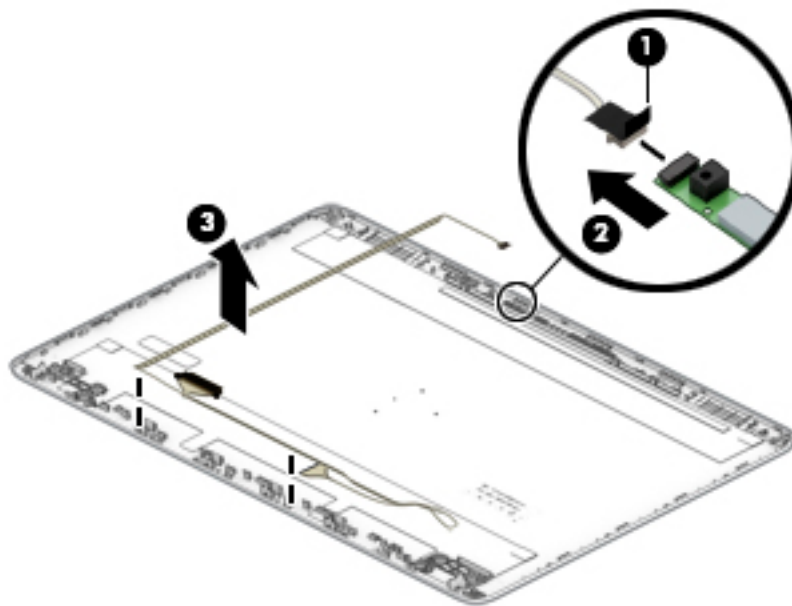
- a. Remove the three Phillips M2.5 × 2.5 screws **(1)** from the bottom of each hinge.
- b. Remove the display hinges from the enclosure **(2)**.

The display hinges are available as spare part number L24470-001.




7. To remove the display/webcam cable, lift the tape from atop the connector on the webcam module **(1)**, and then disconnect the cable from the webcam module **(2)**. Lift the cable from the display enclosure to disengage the adhesive that secures it **(3)**.

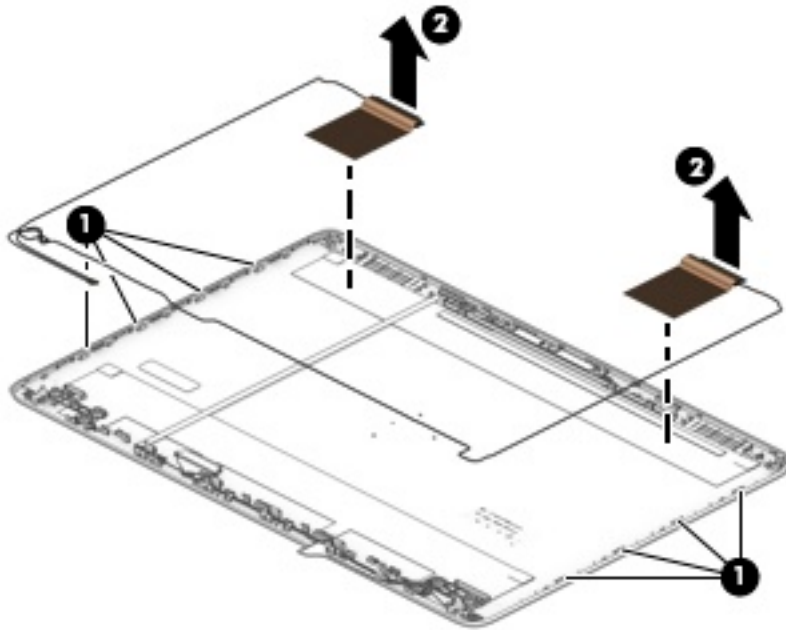
The display/webcam cable is available as spare part number L24492-001 for models with HD panels and L24493-001 for models with FHD panels.



8. To remove the wireless antennas and cables, release the wireless antenna cables from the clips **(1)** built into the side of the display enclosure, and then peel the antennas of the display enclosure **(2)** to remove the antennas and cables.

 **NOTE:** Number of antennas and transceivers may vary.

The antenna cables are available as spare part number L24640-001 for models with dual antennas and L29012-001 for models with a single antenna.



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

The display enclosure is available as spare part number L56978-001 for pike silver models and L56979-001 for stone silver models.

Reverse this procedure to reassemble and install the display assembly.

## Top cover/keyboard

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

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

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

**Table 5-16 Top cover/keyboard descriptions and part numbers**

Description	Spare part number
Pike silver, not backlit	L57400-xx1
Stone silver, not backlit	L57402-xx1

**Table 5-17 Keyboard country codes**

For use in country or region	Spare part number	For use in country or region	Spare part number
Brazil	-201	Taiwan	-AB1
India	-D61	Thailand	-281
Latin America	-161	United States	-001



---

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

## Using Computer Setup

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

---

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

---

## Starting Computer Setup

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

## Navigating and selecting in Computer Setup

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

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

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

---

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

---

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

---

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

---

Your changes go into effect when the computer restarts.

## Restoring factory settings in Computer Setup

---

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

---


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

1. Start Computer Setup. See [Starting Computer Setup on page 57](#).
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 57](#).
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 58](#).

## 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)

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 **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 57](#).
2. Select **Security**, select **TPM Embedded Security**, and then follow the on-screen instructions.

## Using HP Sure Start (select products only)

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

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

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


---

# 7 Backing up, restoring, and recovering

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

- **Backing up your personal information**—You can use Windows tools to back up your personal information (see [Using Windows tools on page 61](#)).
- **Creating a restore point**—You can use Windows tools to create a restore point (see [Using Windows tools on page 61](#)).
- **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 61](#)).
- **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 61](#)).

---

 **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

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 **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 61](#).

### 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 61](#).



---

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

---

To recover your system:

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

### Changing the computer boot order

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

To change the boot order:



---

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

---

1. Insert the HP Recovery media.
2. Access the system **Startup** menu.

For computers or tablets with keyboards attached:

- ▲ Turn on or restart the computer or tablet, quickly press **esc**, and then press **f9** for boot options.

For tablets without keyboards:

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

– or –

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

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

# 8 Using HP PC Hardware Diagnostics

## Using HP PC Hardware Diagnostics Windows (select products only)

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

If HP PC Hardware Diagnostics Windows is not installed on your computer, first you must download and install it. To download HP PC Hardware Diagnostics Windows, see [Downloading HP PC Hardware Diagnostics Windows on page 63](#).

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. Select **HP PC Hardware Diagnostics Windows**.

– or –

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

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

– or –

Select the question mark icon in the taskbar.

- b. Select **Troubleshooting and fixes**.
- c. Select **Diagnostics**, and then select **HP PC Hardware Diagnostics Windows**.

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



**NOTE:** If you need to stop a diagnostic test at any time, select **Cancel**.

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

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

## Downloading HP PC Hardware Diagnostics Windows

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

## Downloading the latest HP PC Hardware Diagnostics Windows version

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

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

The tool is downloaded to the selected location.

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

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

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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

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 **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 65](#).

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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.



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 **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](#).

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## 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 65](#).

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- 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.


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## 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.

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

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

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

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

### Downloading Remote HP PC Hardware Diagnostics UEFI



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

### Downloading the latest Remote HP PC Hardware Diagnostics UEFI version

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

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

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



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

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

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

## Customizing Remote HP PC Hardware Diagnostics UEFI settings

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

- Set a schedule for running diagnostics unattended. You can also start diagnostics immediately in interactive mode by selecting **Execute Remote HP PC Hardware Diagnostics**.
- Set the location for downloading the diagnostic tools. This feature provides access to the tools from the HP website or from a server that has been preconfigured for use. Your computer does not require the traditional local storage (such as a disk drive or USB flash drive) to run remote diagnostics.

- Set a location for storing the test results. You can also set the user name and password settings used for uploads.
- Display status information about the diagnostics run previously.

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

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

Your changes take effect when the computer restarts.



# 9 Specifications

## Computer specifications

**Table 9-1 Computer specifications**

	<b>Metric</b>	<b>U.S.</b>
<b>Dimensions</b>		
Depth	<b>324.0 mm</b>	12.76 in
Width	<b>225.9 mm</b>	8.9 in
Height (rear)	<b>19.9 mm</b>	0.78 in
<b>Weight</b>	<b>1480 g</b>	3.26 lb
<b>Input power</b>		
Operating voltage and current	19.5 V dc @ 2.31 A – 45 W 19.5 V dc @ 3.33 A – 65 W	
<b>Temperature</b>		
Operating	<b>5°C to 35°C</b>	41°F to 95°F
Nonoperating	<b>-20°C to 60°C</b>	-4°F to 140°F
<b>Relative humidity</b> (noncondensing)		
Operating	10% to 90%	
Nonoperating	5% to 95%	
<b>Maximum altitude</b> (unpressurized)		
Operating	<b>-15 m to 3,048 m</b>	-50 ft to 10,000 ft
Nonoperating	<b>-15 m to 12,192 m</b>	-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.

## 35.6 cm (14.0 in) display specifications

**Table 9-2 Display specifications**

	<b>Metric</b>	<b>U.S.</b>
Active diagonal size	35.6 cm	14.0 in
Thickness	3.0 mm 3.0 mm 3.0 mm 3.0 mm	0.118 inch
Resolution	1920 × 1080 (FHD panel) 1366 × 768 (HD panel)	
Surface treatment	Anti glare	
Brightness	220 nits (HD panel) 250 nits (FHD panel)	
Viewing angle	SVA (HD panel) UWVA (FHD panel)	
Backlight	WLED	
Graphics adapter	eDP	

# Hard drive specifications

**Table 9-3** Hard drive specifications

	1-TB*	500-GB*
<b>Dimensions</b>		
Height	7.2 mm or 9.5 mm	7.2 mm
Length	100.4 mm	100.6 mm
Width	69.9 mm	70.1 mm
Weight	115.0 g	92.0 g
<b>Interface type</b>	SATA	SATA
<b>Transfer rate</b>		
Synchronous (maximum)	300 MB/sec	300 MB/sec
Security	ATA security	ATA security
<b>Seek times</b> (typical read, including setting)		
Single track	1.4 ms	3 ms
Average (read/write)	10 ms	13 ms
Maximum	12 ms	24 ms
<b>Logical blocks</b>	1,938,921,461	1,048,576,000
<b>Disk rotational speed</b>	5400 rpm	5400 rpm
<b>Operating temperature</b>	0°C to 60°C (32°F to 140°F)	
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.		
<b>NOTE:</b> Certain restrictions and exclusions apply. Contact technical support for details.		

## PCIe solid-state drive specifications

	256-GB*	512-GB*
<b>Dimensions</b>		
Height	1 mm	1 mm
Length	50.8 mm	50.8 mm
Width	28.9 mm	28.9 mm
Weight	< 10 g	< 10 g
<b>Interface type</b>		
	ATA-7	ATA-7
<b>Transfer rate</b>		
Sequential Read	Up to 2150 MB/s	Up to 2150 MB/s
Random Read	Up to 300,000 IOPs	Up to 300,000 IOPs
Sequential Write	Up to 1260 MB/s	Up to 1550 MB/s
Random Write	Up to 100,000 IOPs	Up to 100,000 IOPs
<b>Ready time, Maximum (to not busy)</b>		
	1.0 s	1.0 s
<b>Access times</b>		
Logical	0.1	0.1
<b>Total logical sectors</b>		
	500,118,192	1,000,215,216
<b>Operating temperature</b>		
Operating	0° to 70°C (32°F to 158°F)	0° to 70°C (32°F to 158°F)
Non-operating	-40° to 80°C (-40°F to 176°F)	-40° to 85°C (-40°F to 185°F)
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.		
<b>NOTE:</b> Certain restrictions and exclusions apply. Contact technical support for details.		



# SATA solid-state drive specifications

**Table 9-4 Solid-state drive specifications**

	128-GB*	256-GB*
<b>Dimensions</b>		
Height	1 mm	1 mm
Length	50.8 mm	50.8 mm
Width	28.9 mm	28.9 mm
Weight	< 10 g	< 10 g
<b>Interface type</b>	SATA-3 (6 Gbps)	SATA-3 (6 Gbps)
<b>Transfer rate</b>		
Sequential Read	Up to 520 MB/s	Up to 540 MB/s
Random Read	Up to 60K IOPs	Up to 85K IOPs
Sequential Write	Up to 160 MB/s	Up to 280 MB/s
Random Write	Up to 34K IOPs	Up to 67K IOPs
<b>Ready time, maximum</b>	1.0 s	1.0 s
<b>Access times</b>		
Logical	0.1 ms	0.1
<b>Total logical sectors</b>	250,069,680	500,118,192
<b>Operating temperature</b>		
Operating	0° to 70°C (32°F to 158°F)	0° to 70°C (32°F to 158°F)
Non-operating	-40° to 95°C (-40°F to 203°F)	-55° to 90°C (-67°F to 194°F)
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.		
<b>NOTE:</b> Certain restrictions and exclusions apply. Contact technical support for details.		



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# 10 Power cord set requirements

The wide-range input feature of the computer permits it to operate from any line voltage from 100 to 120 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 10-1 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 mm<sup>2</sup> 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 10-1 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 <sup>2</sup> or 1.25 mm <sup>2</sup> 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 <sup>2</sup> 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 <sup>2</sup> 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 <sup>2</sup> 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 <sup>2</sup> or 1.00 mm <sup>2</sup> conductor size, with plug BS 1363/A with BSI or ASTA marks.




# 11 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.

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

---


## Current BIOS steps

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


---

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

---

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

---

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

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



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

- j. Select the **Main** menu, select **Apply Factory Defaults and Exit**, select **Yes** to save changes and exit, and then select **Shutdown**.
  - k. Reboot the system. If the system has a Trusted Platform Module (TPM) and/or fingerprint 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 press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
  - b. Select the **Security** menu and scroll down to the **Utilities** menu.
  - c. Select **Hard Drive Utilities**.
  - d. Under **Utilities**, select **Secure Erase**, select the hard drive storing the data you want to clear, and then follow the on-screen instructions to continue.
- 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 press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
- b. Select the **Security** menu and scroll down to the **Utilities** menu.



- c. Select **Hard Drive Utilities**.
- d. Under **Utilities**, select **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 11-1** 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 <a href="#">Using HP Sure Start (select models only)</a> on page 85.	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.

**Table 11-1 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?
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.	<b>NOTE:</b> 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 <a href="http://www.hp.com/support">http://www.hp.com/support</a> . Select <b>Find your product</b> , and then follow the on-screen instructions.
Intel Management Engine Firmware (present only in select Elite or Z models. For more information, go to <a href="http://www.hp.com/support">http://www.hp.com/support</a> . Select <b>Find your product</b> , 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.	The Intel chipset is configured to enforce hardware protection to block all direct read/write access to this area. An Intel utility must be used for updating the firmware. Only firmware updates digitally signed by Intel can be applied using this utility.
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

**Table 11-1 Troubleshooting steps for nonvolatile memory usage (continued)**

<b>Nonvolatile memory type</b>	<b>Amount (Size)</b>	<b>Does this memory store customer data?</b>	<b>Does this memory retain data when power is removed?</b>	<b>What is the purpose of this memory?</b>	<b>How is data input into this memory?</b>	<b>How is this memory write-protected?</b>
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.	upgrade is necessary to address a unique issue. Only a digitally signed application can make the call to write to the flash.

## Questions and answers

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



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

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

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

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

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

Like the legacy BIOS, the UEFI BIOS provides an interface to display the system information and configuration settings and to change the configuration of your computer before an OS is loaded. BIOS provides a secure run-time environment that supports a Graphic User Interface (GUI). In this environment, you can use either a pointing device (touch screen, 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 press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
- b. Select **Main**, and then select **Reset Security to Factory Defaults**.
- c. Follow the on-screen instructions.
- d. Select **Main**, select **Save Changes and Exit**, and then follow the on-screen instructions.

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

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

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

## Using HP Sure Start (select models only)

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

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



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## 12 Recycling

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

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





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