



# Maintenance and Service Guide

HP 250 G7 Notebook PC

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### **Product notice**

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

Not all features are available in all editions or versions of Windows. Systems may require upgraded and/or separately purchased hardware, drivers, software or BIOS update to take full advantage of Windows functionality. Windows 10 is automatically updated, which is always enabled. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.microsoft.com>.

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

## Important Notice about Customer Self-Repair Parts

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

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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 the International Standard for Safety of Information Technology Equipment (IEC 60950-1).

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# 1 Product description

**Table 1-1 Product components and their descriptions**

Category	Description
<b>Product Name</b>	<b>HP 250 G7 Notebook PC</b>
<b>Processor</b>	<p><b>8th-generation Intel® Core™ processors</b></p> <p>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)</p> <p>i5-8265U 1.60 GHz (SC turbo up to 4.10 GHz) quad-core processor (6.0 MB L3 cache, 2400 MHz FSB, 15 W)</p> <p><b>7th-generation Intel Core processors</b></p> <p>i3-7020U 2.30 GHz dual core processor (3.0 MB L3 cache, 2133 MHz FSB, 15 W)</p> <p><b>Intel Pentium® and Celeron® processors</b></p> <p>Intel Pentium Silver N5000 1.10 GHz (SC turbo up to 2.70 GHz) quad core processor (4.0 MB L3 cache, 2400 MHz FSB, 6 W)</p> <p>Intel Pentium Gold 4417U 2.30 GHz dual core processor (2.0 MB L3 cache, 2133 MHz FSB, 15 W)</p> <p>Intel Celeron N4000 1.10 GHz (SC turbo up to 2.60 GHz) dual core processor (2.0 MB L3 cache, 2400 MHz FSB, 6 W)</p> <p>Intel Celeron N3060 1.60 GHz (SC turbo up to 2.48 GHz) dual core processor (2.0 MB L2 cache, 1333 MHz FSB, 6 W)</p>
<b>Graphics</b>	<p>Supports HD decode, DX12, HDMI</p> <p><b>Internal graphics</b></p> <p>Intel UHD Graphics 620 (i7-8565U, i5-8265U processors, i3 7020U)</p> <p>Intel UHD Graphics 605 (Pentium N5000 processor)</p> <p>Intel UHD Graphics 600 (Celeron N4000 processor)</p> <p>Intel HD Graphics 610 (Pentium Gold 4417U processor)</p> <p>Intel HD Graphics 400 (Celeron N3060 processor)</p> <p><b>Hybrid graphics (Intel Core processors)</b></p> <p>GeForce MX110 with up to 4 GB of dedicated video memory</p>
<b>Panel</b>	<p><b>39.6-cm (15.6-in), WLED, SVA, eDP, anti glare, slim-flat (3.2 mm), 220 nits</b></p> <p>High definition (HD) (1366 × 768)</p> <p>Full high-definition (FHD) (1920 × 1080)</p>
<b>Memory</b>	<p><b>Two memory module slots (Intel Core processors)</b></p> <p>Memory is non-customer accessible/non-upgradeable OR accessible/upgradeable</p> <p>DDR4-2400 dual channel support (i7-8565U, i5-8265U processors)</p> <p>DDR4-2133 dual channel support (i3-7020U, 4417U processors)</p> <p>Supports up to 8 GB of system RAM in the following configurations:</p>

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

Category	Description
	<ul style="list-style-type: none"> <li>8192 MB (8192 MB × 1 + 4096 × 2)</li> <li>4096 MB (4096 MB × 1 or 2048 × 2)</li> </ul>
	<b>One memory module slot</b> (Intel Pentium and Celeron processors)
	Memory is non-customer accessible/non-upgradeable
	DDR4-2400 single channel support (Celeron N4000, N5000 processors)
	DDR3L-1600 single channel support (N3060 processor)
	Supports up to 8 GB of system RAM in the following configurations:
	<ul style="list-style-type: none"> <li>8192 MB (8192 MB × 1)</li> <li>4096 MB (4096 MB × 1)</li> </ul>
<b>Primary storage</b>	<b>Single hard drive configurations, 6.35 cm (2.5-in), 7.0 mm/7.2 mm/9.5 mm SATA hard drives</b>
	1 TB, 5400 rpm, 9.5 mm
	1 TB, 5400 rpm, 7.2 mm
	500 GB, 7200 rpm, 7.0 mm
	500 GB, 5400 rpm, 7.0 mm
	<b>M.2, SATA-3, solid-state drives</b>
	256 GB, TLC
	128 GB, TLC
	<b>PCIe, NVMe, M.2 solid-state drives</b>
	512 GB
	256 GB
	<b>Dual storage configurations</b> (Intel Core processors):
	128 GB, SATA-3, TLC, solid-state drive + 1 TB, 5400 rpm hard drive
	<b>Optane configuration</b> (Intel Core processors):
	16 GB, PCIe, Optane solid-state drive + 1 TB, 5400 rpm hard drive
<b>Optical drive</b>	9.0 mm tray load
	DVD+/-RW Double-Layer Writer
<b>Camera</b>	<b>HP TrueVision HD Camera</b> - indicator LED, USB2.0, HD BSI sensor, f2.0
	720p by 30 frames per second
	Single digital microphone
	<b>HP Webcam</b> - VGA camera, indicator LED, USB 2.0, f2.4
	640 × 480 by 30 frames per second
	Single digital microphone
<b>Audio</b>	<b>Audio Control Panel:</b> HP Audio Control

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

<b>Category</b>	<b>Description</b>
	Dual speakers
<b>Ethernet</b>	Ethernet Integrated 10/100/1000 NIC
<b>Wireless networking</b>	<b>Integrated Wireless options with dual antennas (M.2/PCIe):</b>
	Realtek RTL8822BE 802.11ac 2 × 2 WiFi + Bluetooth® 4.2 Combo Adapter (MU-MIMO supported)
	<b>Integrated Wireless options with single antenna (M.2/PCIe):</b>
	Realtek RTL8821CE 802.11ac 1 × 1 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)
<b>External media cards</b>	<b>HP Multi-Format Digital Media Card Reader</b>
	Supports SD/SDHC/SDXC
	Push-pull insertion/removal
<b>Internal card expansion</b>	One M.2 slot for solid-state drive
	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 @ 60Hz
	USB 2.0 port (right side)
	(2) USB 3.1 Gen 1 Type-A ports (left side)
	RJ-45/Ethernet
	Audio-out (headphone)/audio-in (microphone) combo jack
	AC Smart Pin adapter plug
<b>Keyboard/pointing devices</b>	<b>Keyboard</b>
	Full-size, textured, island-style keyboard with numeric keypad (jet black and ash silver)
	<b>TouchPad</b>
	Multitouch gestures enabled
	Support Modern Trackpad Gestures
	Taps enabled by default
<b>Power requirements</b>	<b>Battery</b>
	3-cell battery, 41 Whr, long-life
	Supports battery fast charge
	<b>AC adapter, barrel type</b>
	65 W Smart, nPFC, right angle, 4.5 mm (models with discrete graphics)
	65 W Smart, nPFC, 4.5 mm, EM
	45 W Smart, nPFC, right angle, 4.5 mm (models with UMA graphics)
	<b>Power cord (C5)</b>
	1 m, conventional

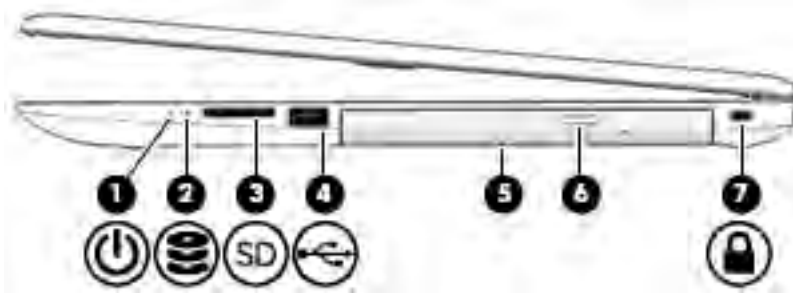
**Table 1-1 Product components and their descriptions (continued)**

<b>Category</b>	<b>Description</b>
<b>Security</b>	Kensington Mini Security Lock
	Supports firmware-based Trusted Platform Module (fTPM) 2.0
<b>Operating system</b>	FreeDOS 2.0
	Windows® 10 Home 64
	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 Africa Market PPP
	Windows 10 Home 64 Plus Single Language India Market PPP
	Windows 10 Home 64 Plus Single Language Indonesia Market PPP
	Windows 10 Home 64 Single Language
	Windows 10 Home 64 Single Language Africa Market PPP
	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 Value Notebook Single Language (Intel Pentium and Celeron processors only)
	Windows 10 Home 64 Value Notebook Single Language SEAP (Intel Pentium and Celeron processors only)
	Windows 10 Home 64 Value Notebook Single Language select GEO (Intel Pentium and Celeron processors only)
	Windows 10 Pro 64
	Windows 10 Pro 64 StF MSNA Emerging Market
	Windows 10 Pro 64 StF MSNA Standard
Windows 10 Pro 64 StF MSNA Strategic	
<b>Serviceability</b>	<b>End user replaceable parts:</b>
	AC adapter
	Optical drive






## 2 Getting to know your computer

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

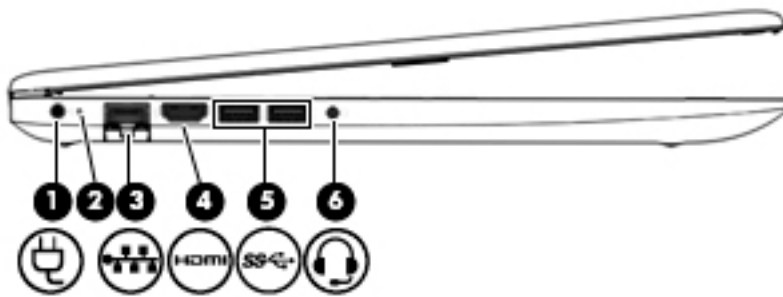
### Right side









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

Component	Description
(1)  Power light	<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>
(2)  Drive light	<ul style="list-style-type: none"><li>• Blinking white: The hard drive is being accessed.</li></ul>
(3)  Memory card reader	Reads optional memory cards that enable you to store, manage, share, or access information. To insert a card: <ol style="list-style-type: none"><li>1. Hold the card label-side up, with connectors facing the computer.</li><li>2. Insert the card into the memory card reader, and then press in on the card until it is firmly seated.</li></ol> To remove a card: <ul style="list-style-type: none"><li>▲ Pull to remove the card from the memory card reader.</li></ul>
(4)  USB port	Connects a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provides data transfer.
(5) Optical drive	Depending on your computer model, reads an optical disc or reads and writes to an optical disc.
(6) Optical drive eject button	Releases the optical drive disc tray.
(7)  Security cable slot	Attaches an optional security cable to the computer. <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.

## Left side



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

Component	Description
(1) 	Connects an AC adapter.
(2) 	<ul style="list-style-type: none"> <li>White: The AC adapter is connected and the battery is fully charged.</li> <li>Blinking white: The AC adapter is disconnected and the battery has reached a low battery level.</li> <li>Amber: The AC adapter is connected and the battery is charging.</li> <li>Off: The battery is not charging.</li> </ul>
(3) 	Connects a network cable. <ul style="list-style-type: none"> <li>White: The network is connected.</li> <li>Amber: Activity is occurring on the network.</li> </ul>
(4) 	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.
(5) 	Connect a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provide high-speed data transfer.
(6) 	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><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> To access this guide: <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>

# Display



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

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

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

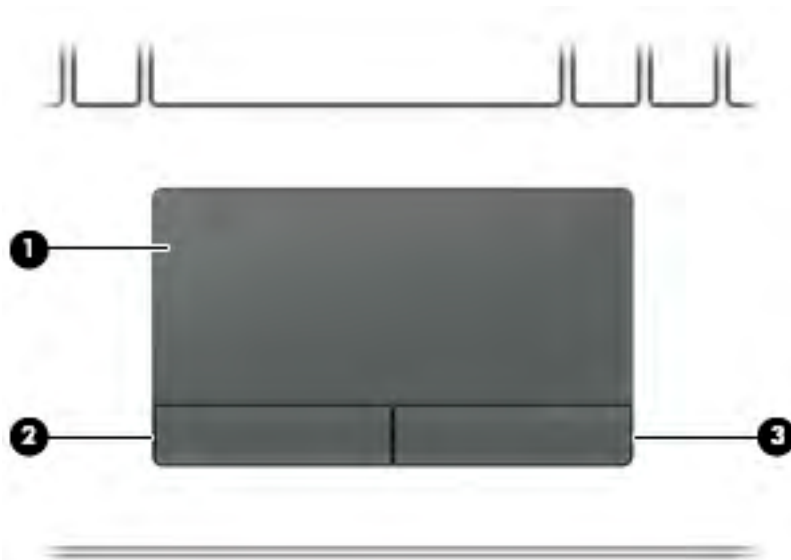
For wireless regulatory notices, see the section of the *Regulatory, Safety, and Environmental Notices* that applies to your country or region.

To access this guide:

1. Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.  
– or –  
Click the question mark icon in the taskbar.
2. Select **My PC**, select the **Specifications** tab, and then select **User Guides**.

# Keyboard area

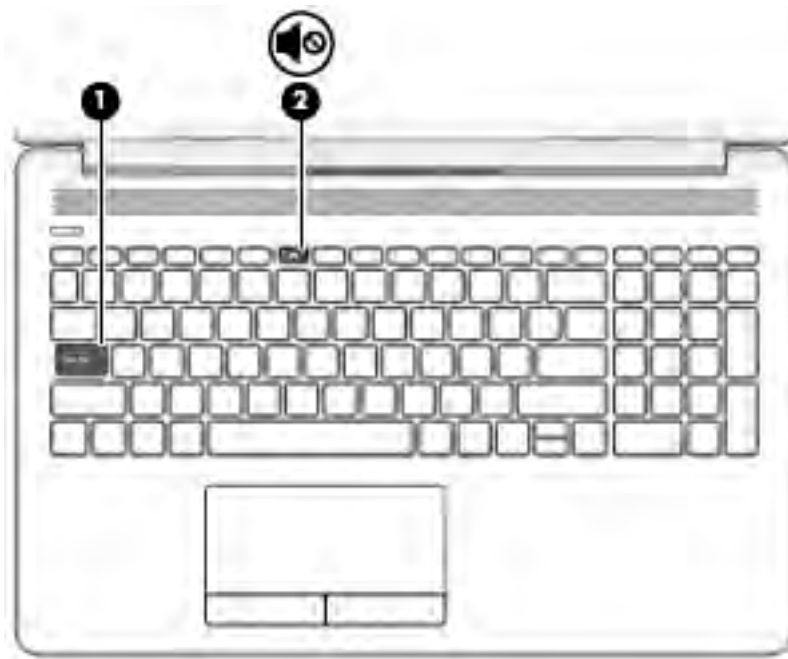
## TouchPad




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

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

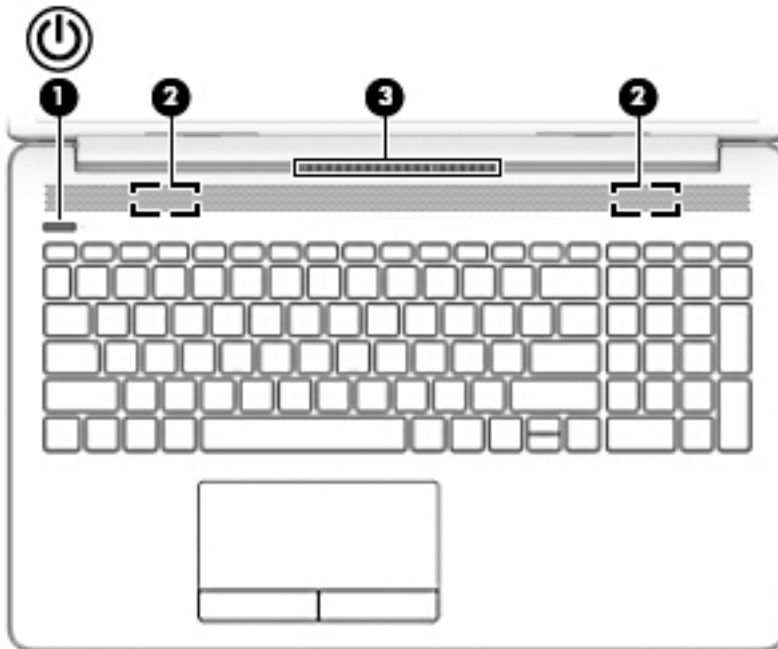
## Lights





**Table 2-5** Lights and their descriptions

Component	Description
(1) Caps lock light	On: Caps lock is on, which switches the key input to all capital letters.
(2)  Mute light	<ul style="list-style-type: none"><li>• On: Computer sound is off.</li><li>• Off: Computer sound is on.</li></ul>

## Button and speakers

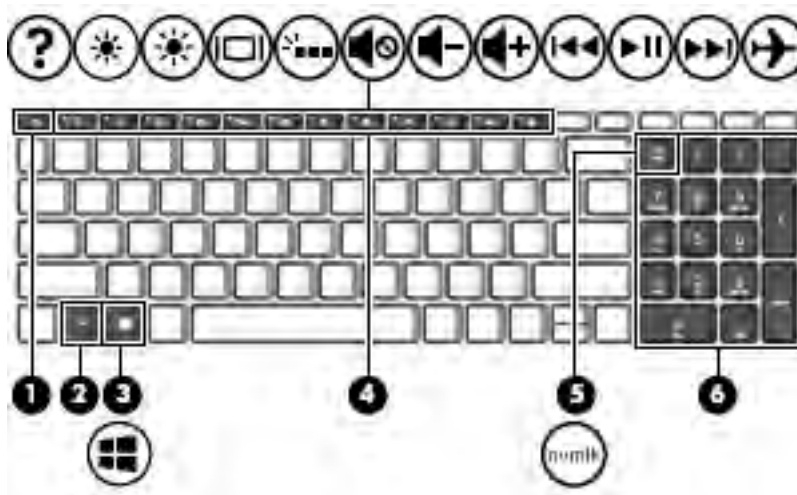


**Table 2-6** Button and speakers and their descriptions


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.</li> <li>• When the computer is in Hibernation, press the button briefly to exit Hibernation.</li> </ul> <p><b>CAUTION:</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 down for at least 5 seconds to turn off the computer.</p> <p>To learn more about your power settings, see your power options:</p> <ul style="list-style-type: none"> <li>▲ Right-click the <b>Power</b> icon , and then select <b>Power Options</b>.</li> </ul>
(2) Speakers (2)	Produce sound.
(3) Vent	Enables airflow to cool internal components.

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

## Special keys



**Table 2-7** Special keys and their descriptions













Component	Description
(1) <span style="color: #0070C0;">esc</span> key	Displays system information when pressed in combination with the <span style="color: #0070C0;">fn</span> key.
(2) <span style="color: #0070C0;">fn</span> key	Executes specific functions when pressed in combination with another key.
(3)  Windows key	Opens the <b>Start</b> menu. <b>NOTE:</b> Pressing the Windows key again will close the <b>Start</b> menu.
(4) Action keys	Execute frequently used system functions. <b>NOTE:</b> On select products, the <span style="color: #0070C0;">f5</span> action key turns the keyboard backlight feature off or on.
(5) <span style="color: #0070C0;">num lock</span> key	Alternates between the navigational and numeric functions on the integrated numeric keypad.
(6) Integrated numeric keypad	A separate keypad to the right of the alphabet keyboard. When <span style="color: #0070C0;">num lock</span> is pressed, the keypad can be used like an external numeric keypad. <b>NOTE:</b> If the keypad function is active when the computer is turned off, that function is reinstated when the computer is turned back on.

## Action keys

An action key performs the function indicated by the icon on the key. To determine which keys are on your product, see [Special keys on page 11](#).

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

**Table 2-8 Action keys and their descriptions**

Icon	Description
	Opens the “How to get help in Windows 10” webpage.
	Decreases the screen brightness incrementally as long as you hold down the key.
	Increases the screen brightness incrementally as long as you hold down the key.
	Switches the screen image between display devices connected to the system. For example, if a monitor is connected to the computer, repeatedly pressing this key alternates the screen image from the computer display to the monitor display to a simultaneous display on both the computer and the monitor.
	Turns the keyboard backlight off or on. <b>NOTE:</b> To conserve battery power, turn off this feature.
	Mutes or restores speaker sound.
	Decreases speaker volume incrementally while you hold down the key.
	Increases speaker volume incrementally while you hold down the key.
	Plays the previous track of an audio CD or the previous section of a DVD or a Blu-ray Disc (BD).
	Starts, pauses, or resumes playback of an audio CD, a DVD, or a BD.
	Plays the next track of an audio CD or the next section of a DVD or a BD.
	Turns the airplane mode and wireless feature on or off. <b>NOTE:</b> The airplane mode key is also referred to as the wireless button. <b>NOTE:</b> A wireless network must be set up before a wireless connection is possible.

## Bottom



**Table 2-9** 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 2-10** Service label components


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

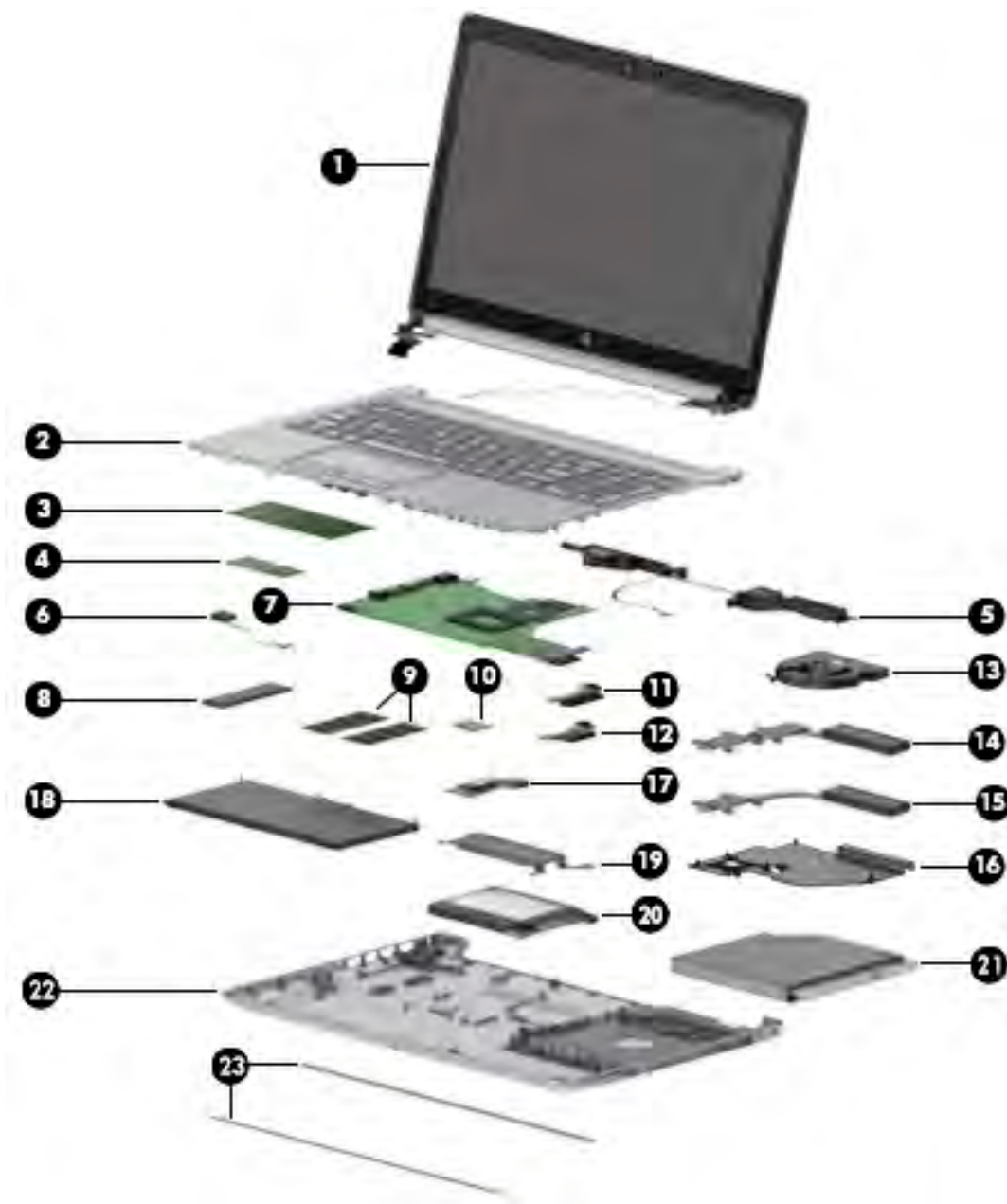
- Regulatory label(s)—Provide(s) regulatory information about the computer.
- Wireless certification label(s)—Provide(s) information about optional wireless devices and the approval markings for the countries or regions in which the devices have been approved for use.

# 3 Illustrated parts catalog

## Computer major components

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

 **NOTE:** Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See [Labels on page 14](#) for details.



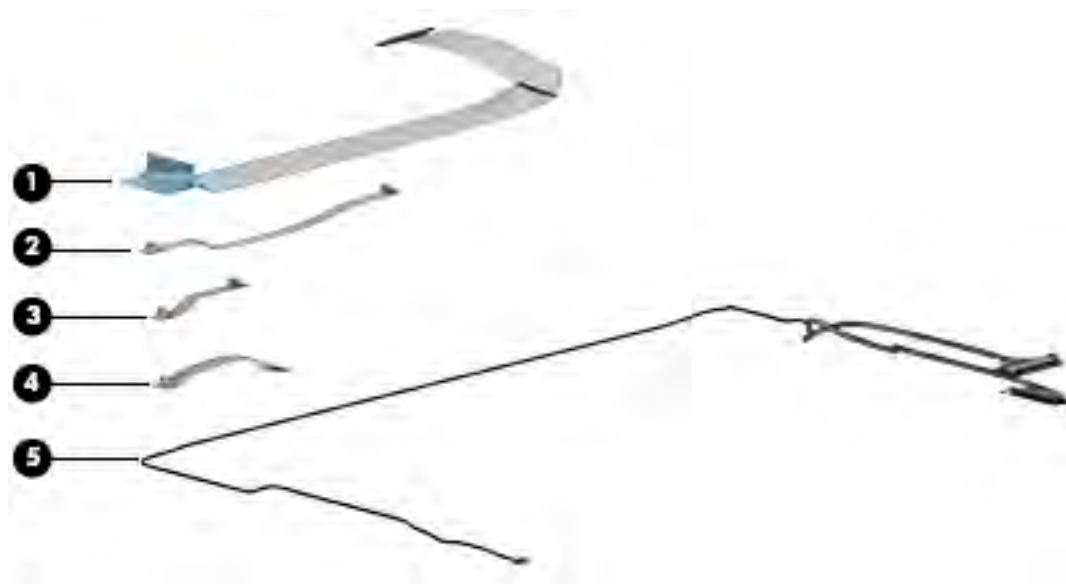
**Table 3-1 Computer major components and their descriptions**

Item	Component	Spare part number
(1)	<b>Display</b> <b>NOTE:</b> Displays are not spared as whole units. Display subcomponent spare parts are available. For spare part information, see <a href="#">Display assembly subcomponents on page 19</a> .	Not spared
(2)	<b>Top cover/keyboard</b> <b>NOTE:</b> For a detailed list of keyboard country codes, see <a href="#">Top cover with keyboard on page 68</a> .	
	Keyboard, jet black	L50000-xx1
	Keyboard, silver	L50001-xx1
(3)	<b>TouchPad module</b>	L20449-001
(4)	<b>TouchPad button board</b>	not spared
(5)	<b>Speakers</b> (includes cable)	L20453-001
(6)	<b>Power connector cable (DC-in)</b>	L20475-001
(7)	<b>System board</b> <b>NOTE:</b> All system board spare part kits include replacement thermal material. All system boards use the following part numbers: xxxxxx-001: Non-Windows operating systems xxxxxx-601: Windows operating system  For use in models with discrete graphics memory:	
	<ul style="list-style-type: none"> <li>Intel Core i5-8265U processor with 2 GB of discrete graphics memory</li> </ul>	L49981-xx1
	<ul style="list-style-type: none"> <li>Intel Core i3-7020U processor with 2 GB of discrete graphics memory</li> </ul>	L49980-xx1
	For use in models with UMA graphics memory:	
	<ul style="list-style-type: none"> <li>Intel Core i7-8565U processor</li> </ul>	L49976-xx1
	<ul style="list-style-type: none"> <li>Intel Core i5-8265U processor</li> </ul>	L49975-xx1
	<ul style="list-style-type: none"> <li>Intel Core i3-7020U processor</li> </ul>	L49974-xx1
	<ul style="list-style-type: none"> <li>Intel Pentium N5000 processor</li> </ul>	L49979-xx1
	<ul style="list-style-type: none"> <li>Intel Pentium 4417U processor</li> </ul>	L53961-xx1
	<ul style="list-style-type: none"> <li>Intel Celeron N4000 processor</li> </ul>	L49978-xx1
	<ul style="list-style-type: none"> <li>Intel Celeron N3060 processor</li> </ul>	L49977-xx1
(8)	<b>Solid-state drive</b> <b>NOTE:</b> For spare part information, see <a href="#">Mass storage devices on page 21</a> .	
(9)	<b>Memory modules</b> (2400 MHz DDR4)	
	8 GB	937236-855
	4 GB	L10598-855
(10)	<b>WLAN module</b>	
	Realtek RTL8821CE 802.11ac 1 × 1 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	L17365-005

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

Item	Component	Spare part number
	Realtek RTL8822BE 802.11ac 2 × 2 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	924813-855
<b>(11)</b>	<b>Hard drive connector board</b>	L20454-001
<b>(12)</b>	<b>Solid-state drive connector board</b>	L20457-001
<b>(13)</b>	<b>Fan</b>	
	Fan for use in models with discrete graphics	L20473-001
	Fan for use in models with UMA graphics	L20474-001
	<b>Heat sink</b>	
<b>(14)</b>	Heat sink for use in models with i7-8565U, i5-8265U, i3-7020U processors and integrated discrete graphics memory	L20469-001
	Heat sink for use in models with i7-8565U, i5-8265U processors and discrete graphics memory	L36498-001
	Heat sink for use in models with an Intel Pentium or Celeron processor and discrete graphics	L20471-001
<b>(15)</b>	Heat sink for use in models with i7-8565U, i5-8265U, i3-7020U processors and UMA graphics memory	L20470-001
<b>(16)</b>	Heat sink for use in fanless models with an Intel Pentium or Celeron processor and UMA graphics	L20472-001
<b>(17)</b>	<b>USB/card reader board</b>	L20448-001
	The USB/card reader board cable is available using spare part number L20452-001.	
<b>(18)</b>	<b>Battery</b> (3-cell, 48 Whr)	L11119-855
<b>(19)</b>	<b>Solid-state drive bracket</b>	L20458-001
<b>(20)</b>	<b>Hard drive</b>	
	<b>NOTE:</b> For spare part information, see <a href="#">Mass storage devices on page 21</a> .	
<b>(21)</b>	<b>DVD+/-RW Double-Layer Writer</b>	L50002-001
<b>(22)</b>	<b>Bottom cover</b>	
	For use in models with an optical drive	
	• Asteroid silver	L49982-001
	• Dark ash silver	L49983-001
	For use in models without an optical drive	
	• Asteroid silver	L49984-001
	• Dark ash silver	L49985-001
<b>(23)</b>	<b>Rubber feet</b>	not spared

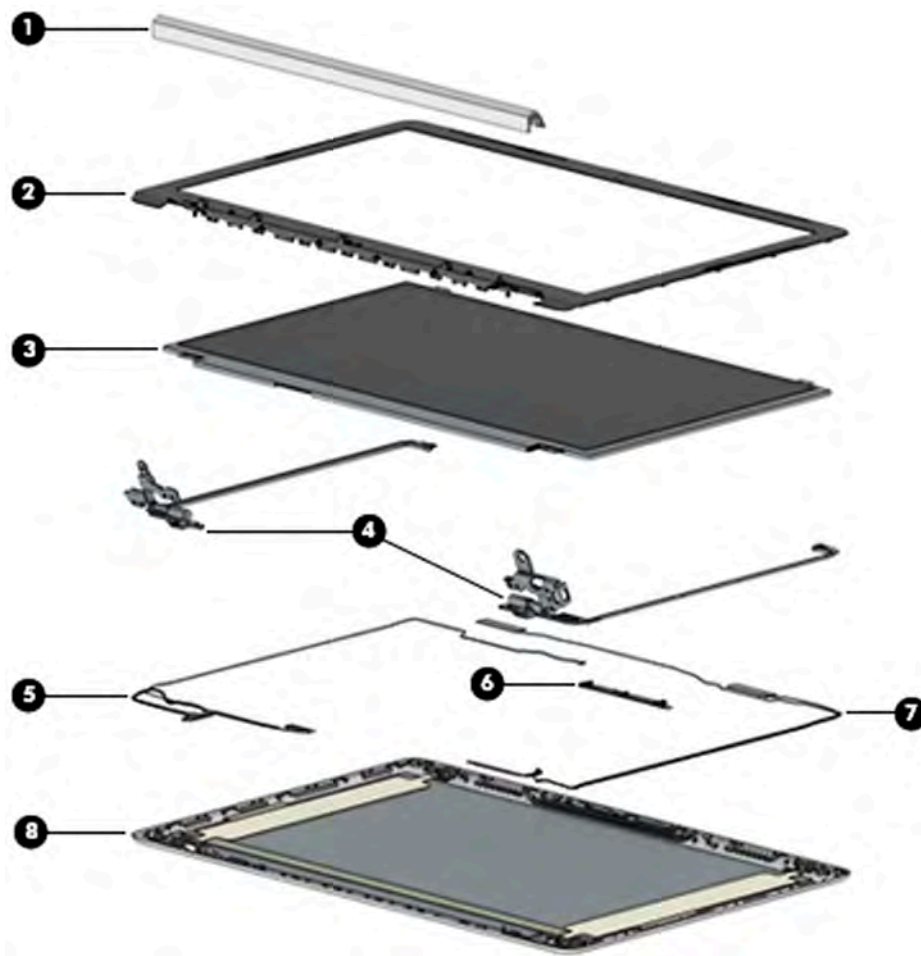
# Cables



**Table 3-2 Cables and their descriptions**

Item	Component	Spare part number
(1)	<b>USB/card reader board cable</b>	L20452-001
(2)	<b>TouchPad button board cable</b>	L20451-001
(3)	<b>TouchPad cable</b>	L20450-001
(4)	<b>Hard drive/solid-state drive cable</b>	L20456-001
(5)	<b>Display cable</b>	
	Display cable, non-touch, HD	L20443-001
	Display cable, non-touch, FHD	L23064-001
	Display cable, touch, HD	L20442-001

## Display assembly subcomponents



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

Item	Component	Spare part number
(1)	<b>Hinge cover</b>	
	Asteroid silver	L49990-001
	Dark ash silver	L49991-001
(2)	<b>Display bezel</b>	L20421-001
(3)	<b>Display panel</b>	
	HD	L49998-001
	FHD	L49999-001
	<b>Miscellaneous Display Kit</b> (includes gaskets [4] and rubber corner positioning tools [4]; not illustrated)	L23065-001
	<b>Display panel stretchable adhesive tape</b> (not illustrated)	L29080-001
(4)	<b>Hinge Kit</b> (includes left and right hinges)	L20420-001
(5)	<b>Display cable</b>	
	Non-touch, HD	L20443-001

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

Item	Component	Spare part number
	Non-touch, FHD	L23064-001
	Touch, HD	L20442-001
<b>(6)</b>	<b>Camera module</b>	
	HD camera	L20447-001
	VGA camera	L20446-001
<b>(7)</b>	<b>WLAN antenna cable</b>	
	Single antenna	L20445-001
	Single antennas, narrow bezel	L23060-001
	Dual antennas	L20444-001
	Dual antennas, narrow bezel	L23059-001
<b>(8)</b>	<b>Back cover</b>	
	Asteroid silver	L49986-001
	Dark ash silver	L49987-001

## Miscellaneous parts

**Table 3-4 Miscellaneous parts and their descriptions**

Component	Spare part number
<b>AC adapter</b>	
65 W AC adapter, nPFC, 4.5 mm	710412-001
65 W AC adapter, nPFC, SMART, RC, 4.5 mm, EM	913691-850
45 W AC adapter, nPFC, SMART, RC, 4.5 mm, non-slim	741727-001
<b>Power cord, C5, conventional, 1.0 m</b>	
For use in Argentina	920688-003
For use in Austria	L19358-001
For use in Denmark	920688-007
For use in Europe	L19361-001
For use in India	L19363-001
For use in Israel	920688-008
For use in Italy	L19364-001
For use in Japan	920688-017
For use in the People's Republic of China	920688-014
For use in South Africa	920688-010
For use in South Korea	920688-013

**Table 3-4 Miscellaneous parts and their descriptions (continued)**

Component	Spare part number
For use in Switzerland	L19370-001
For use in Taiwan	920688-015
For use in Thailand	920688-012
For use in the United Kingdom	L19373-001
<b>Power adapter</b> (for use in Japan)	226768-001
<b>Screw Kit</b>	L20476-001

## Mass storage devices

**Table 3-5 Mass storage devices and their descriptions**

Item	Component	Spare part number
(1)	<b>DVD+/-RW Double-Layer Writer</b>	L50002-001
(2)	<b>Optical drive bezel</b>	
	Asteroid silver	L49988-001
	Dark ash silver	L49989-001
(3)	<b>Optical drive bracket</b>	L20459-001
(4)	<b>Hard drive, 7 mm</b>	
	1 TB, 5400 rpm, 7.2 mm	L30422-005
	500 GB, 7200 rpm, 7 mm	703267-005
	500 GB, 5400 rpm, 7 mm	778186-005

**Table 3-5 Mass storage devices and their descriptions (continued)**

<b>Item</b>	<b>Component</b>	<b>Spare part number</b>
<b>(5)</b>	<b>Hard drive bracket</b>	L20455-001
<b>(6)</b>	<b>Hard drive connector board</b>	L20454-001
<b>(7)</b>	<b>Hard drive/solid-state drive cable</b>	L20456-001
<b>(8)</b>	<b>Solid-state drive bracket</b>	L20458-001
<b>(9)</b>	<b>Solid-state drive connector board</b>	L20457-001
<b>(10)</b>	<b>Solid-state drive (M.2)</b>	
	512 GB, PCIe, NVMe	L49997-001
	256 GB, PCIe, NVMe	L49996-001
	256 GB, SATA-3, TLC	L49995-001
	128 GB, SATA-3, TLC	L49994-001

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## 4 Removal and replacement procedures preliminary requirements

### Tools required


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

- Non-conductive, non-marking plastic 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.

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

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### Plastic parts


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

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### Cables and connectors

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

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Cables must be handled with extreme care to avoid damage. Apply only the tension required to unseat or seat the cables during removal and insertion. Handle cables by the connector whenever possible. In all cases, avoid bending, twisting, or tearing cables. Be sure that cables are routed in such a way that they cannot be caught or snagged by parts being removed or replaced. Handle flex cables with extreme care; these cables tear easily.

## Drive handling

**⚠ CAUTION:** Drives are fragile components that must be handled with care. To prevent damage to the computer, damage to a drive, or loss of information, observe these precautions:

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

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

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

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

Avoid dropping drives from any height onto any surface.

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

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

Avoid exposing a drive to temperature extremes or liquids.

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

## Workstation guidelines

Follow these grounding workstation guidelines:

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

## Electrostatic discharge information

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

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



**IMPORTANT:** To prevent damage to the device when you are removing or installing internal components, observe these precautions:

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

Before touching an electronic component, discharge static electricity by using the guidelines described in this section.

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

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

## Generating static electricity

Note the following:

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

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

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

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



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

## Preventing electrostatic damage to equipment

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

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

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

## Personal grounding methods and equipment

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

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

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

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

## Grounding the work area

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

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

## Recommended materials and equipment

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

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

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

## Packaging and transporting guidelines


Follow these grounding guidelines when packaging and transporting equipment:

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

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# 5 Removal and replacement procedures for Customer Self-Repair parts

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

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

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## Component replacement procedures

 **NOTE:** Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See [Labels on page 14](#) for details.

 **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.

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## Preparation for disassembly

See [Removal and replacement procedures preliminary requirements on page 23](#) 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

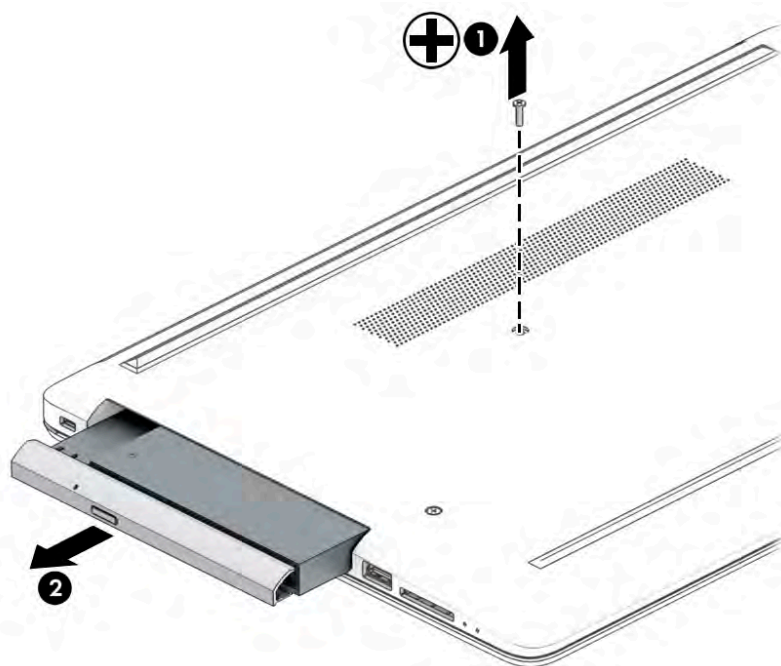
## Optical drive

**Table 5-1 Spare part description and number**

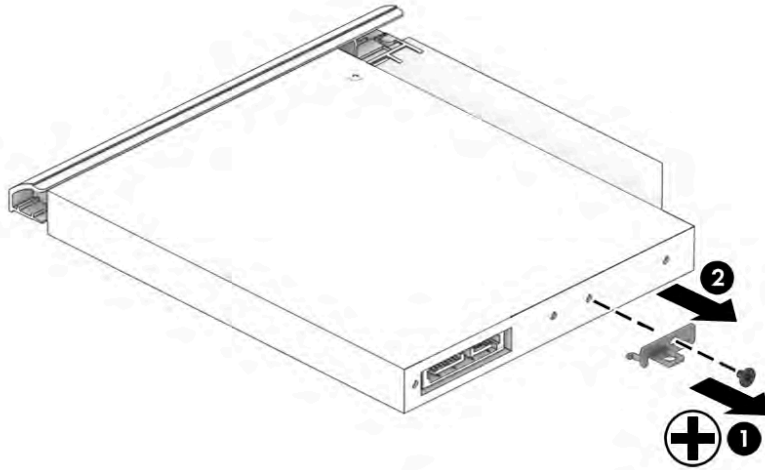
Description	Spare part number
DVD+/-RW Double-Layer Writer	L50002-001
Optical drive bracket	L20459-001
Optical drive bezel - asteroid silver	L49988-001
Optical drive bezel - dark ash silver	L49989-001

Remove the optical drive:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the Phillips M2.5 × 9.0 screw (1) that secures the drive to the computer.
3. Slide the optical drive out of the computer (2).



4. If it is necessary to remove the bracket from the rear of the optical drive, remove the Phillips M2.0 × 3.0 screw **(1)**, and then remove the bracket from the drive **(2)**.



5. If it is necessary to remove the bezel from the front of the optical drive:
  - a. Insert a paper clip into the release hole on the front of the bezel **(1)**. The left side of the bezel rotates outward **(2)**.
  - b. Press the tab to release the bezel from the drive **(3)**.
  - c. Rotate the side of the bezel **(4)**, and then remove it **(5)**.




Reverse this procedure to reassemble and install the optical drive.

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## 6 Removal and replacement procedures for Authorized Service Provider parts

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

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

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### Component replacement procedures

 **NOTE:** Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See [Labels on page 14](#) for details.

 **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.

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There are as many as 46 screws that must be removed, replaced, and/or loosened when servicing Authorized Service Provider only parts. Make special note of each screw size and location during removal and replacement.

## Bottom cover

**Table 6-1 Spare part description and number**

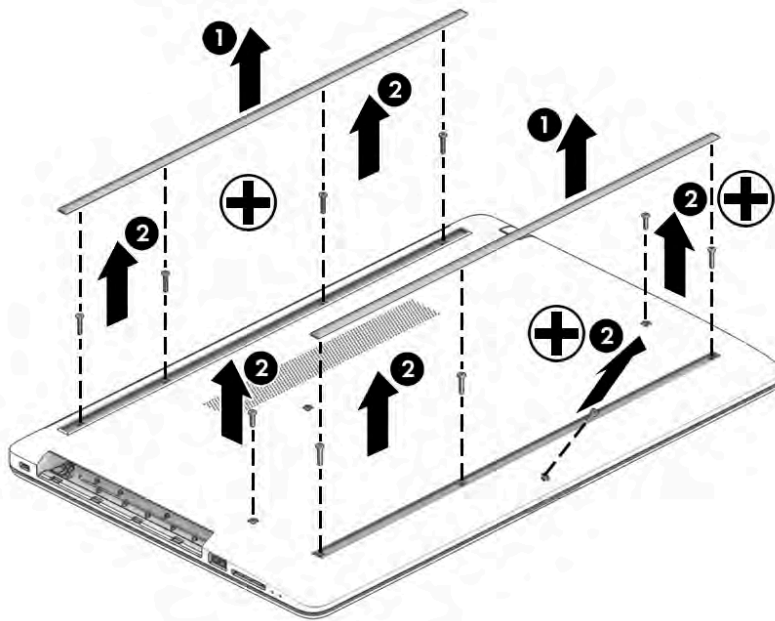
Description	Spare part number
Bottom cover for use in models with an optical drive	
<ul style="list-style-type: none"><li>Asteroid silver</li></ul>	L49982-001
<ul style="list-style-type: none"><li>Dark ash silver</li></ul>	L49983-001
Bottom cover for use in models without an optical drive	
<ul style="list-style-type: none"><li>Asteroid silver</li></ul>	L49984-001
<ul style="list-style-type: none"><li>Dark ash silver</li></ul>	L49985-001

Before removing the bottom cover, follow these steps:

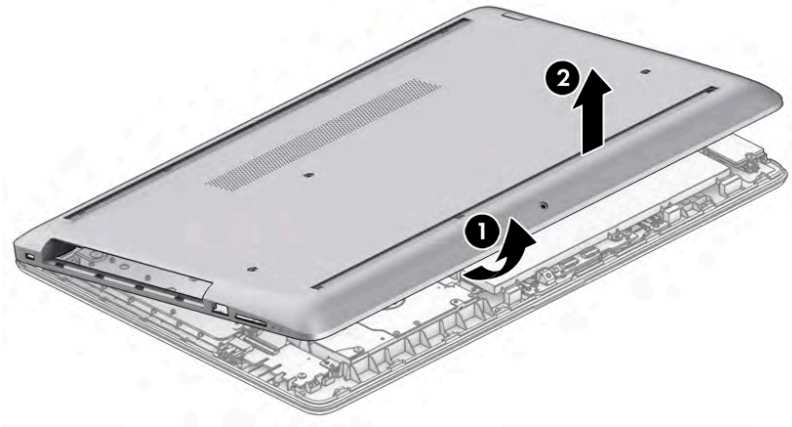
1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).

Remove the bottom cover:

1. Peel the rubber feet off the bottom of the computer (**1**).
2. Remove the 10 Phillips M2.5 × 9.0 screws (**2**) that secure the bottom cover to the computer.



3. Starting near the middle, bottom of the bottom cover **(1)**, pry the cover up to remove it **(2)**.



Reverse this procedure to install the bottom cover.

## Battery

**Table 6-2 Spare part description and number**

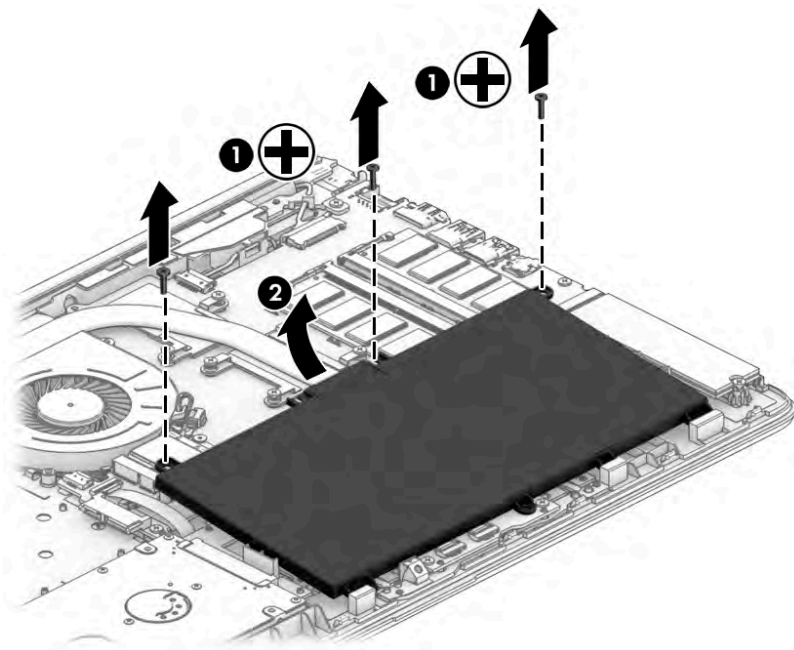
Description	Spare part number
Battery (3-cell, 41 Wh, 3.6 Ah)	L11119-855

Before removing the battery, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).

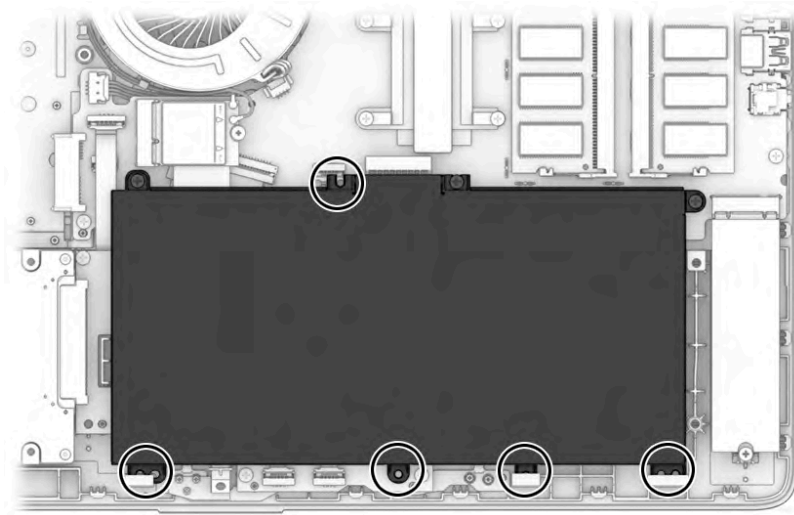
Remove the battery:

1. Remove the three Phillips M2.0 × 8.0 screws **(1)** that secure the battery to the computer.
2. Remove the battery from the computer **(2)**.



Reverse this procedure to install the battery.

When installing the battery, be sure to install screws in the proper locations. The following image shows the locations around the battery that have holes but do NOT require screws.



## Memory

**Table 6-3 Spare part description and number**

Description	Spare part number
Memory module, 8 GB	937236-855
Memory module, 4 GB	L10598-855

Before removing the memory modules, follow these steps:

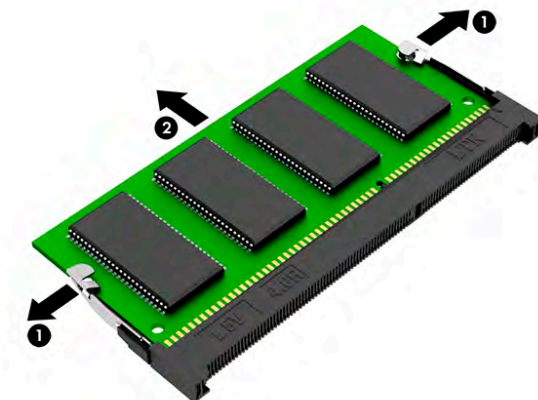
1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).

Remove the memory modules:

1. Spread the two retention clips outward (**1**) until the memory module tilts up at a 45-degree angle.
2. Grasp the edge of the memory module (**2**), and then gently pull the module out of the slot. Use the same procedure to remove both memory modules.

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

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

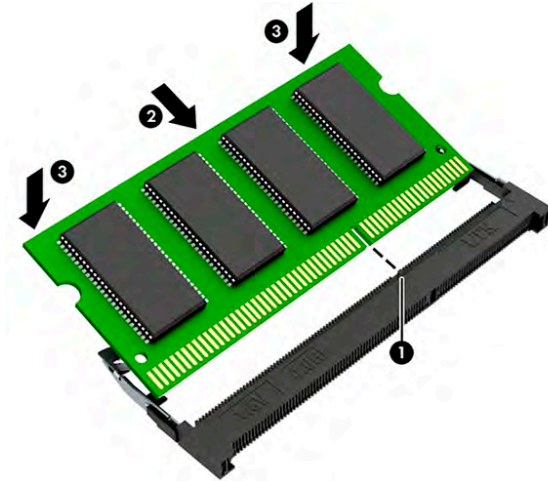


Install the memory modules:

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

1. Align the notched edge of the memory module with the tab in the memory module slot (**1**).
2. Press the module into the slot until seated (**2**).

3. Gently press down on the module edges until the side retention clips snap into place **(3)**.



## Hard drive

**Table 6-4 Spare part description and number**

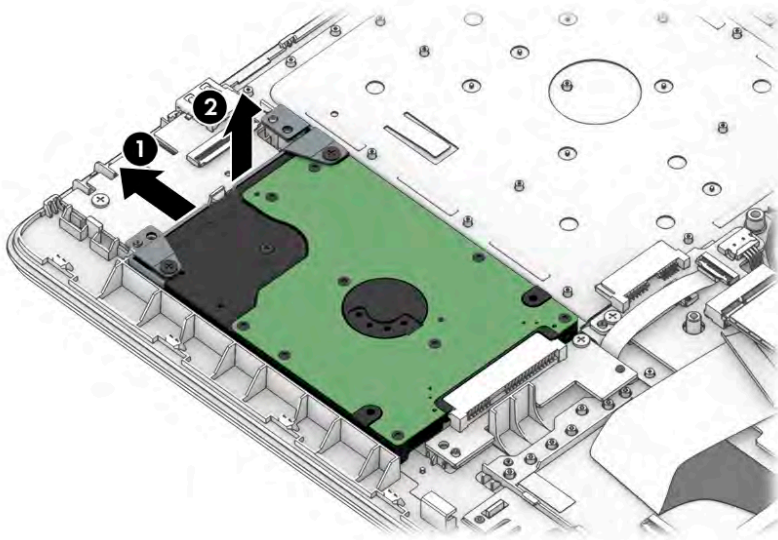
Description	Spare part number
Hard drive, 1 TB, 5400 rpm, 7.2 mm	L30422-005
Hard drive, 500 GB, 7200 rpm, 7 mm	703267-005
Hard drive, 500 GB, 5400 rpm, 7 mm	778186-005
Hard drive bracket	L20455-001

Before removing the hard drive, follow these steps:

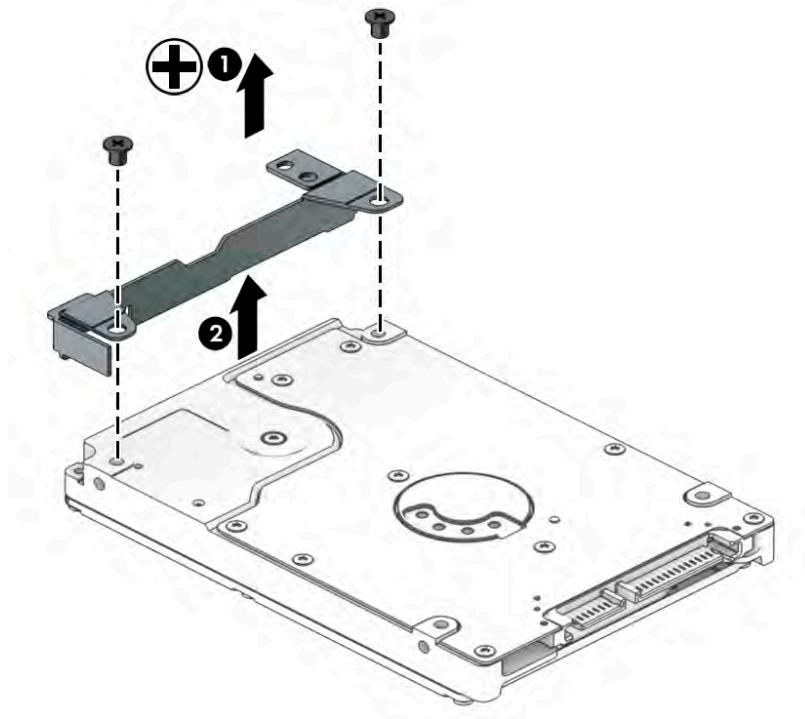
1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).

Remove the hard drive:

1. Slide the hard drive away from the connector **(1)**, and then lift the hard drive out of the computer **(2)**.



2. If it is necessary to disassemble the hard drive, remove the two Phillips M3.0 × 3.0 screws **(1)**, and then lift the bracket off the drive **(2)**.



Reverse this procedure to reassemble and install the hard drive.

## Solid-state drive

**Table 6-5 Spare part description and number**

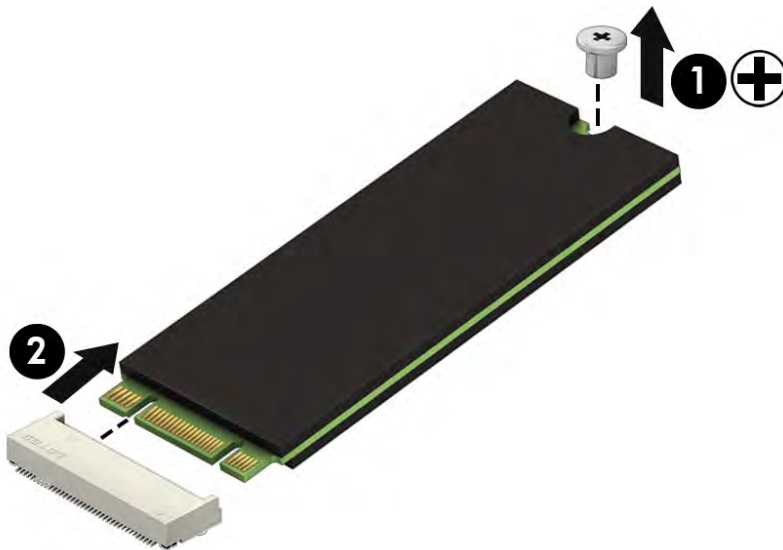
Description	Spare part number
512 GB, PCIe, NVMe	L49997-001
256 GB, PCIe, NVMe	L49996-001
256 GB, SATA-3, TLC	L49995-001
128 GB, SATA-3, TLC	L49994-001

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

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).

Remove the solid-state drive:

- ▲ Remove the Phillips M2.0 × 3.0 screw **(1)**, and then pull the solid-state drive module from the socket **(2)**.



Reverse this procedure to install the solid-state drive.

## Solid-state drive bracket and connector board

**Table 6-6 Spare part description and number**

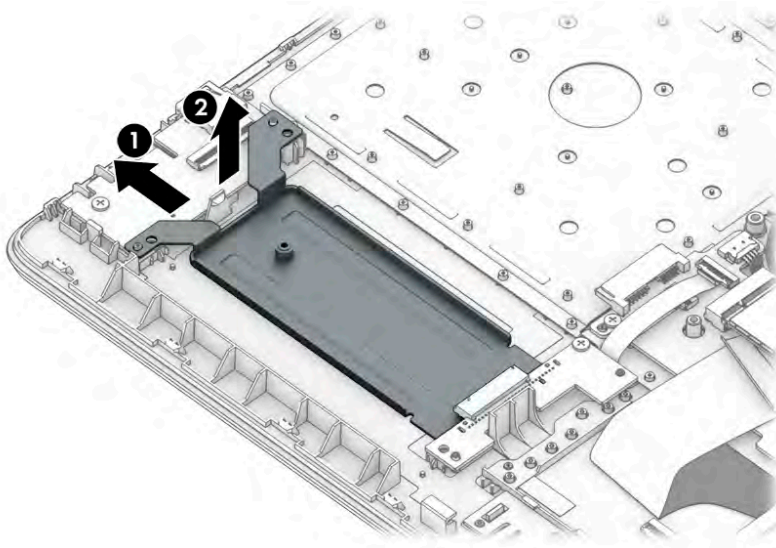
Description	Spare part number
Solid-state drive bracket	L20458-001
Solid-state drive connector board	L22542-001
Solid-state drive cable	L20456-001

Before removing the solid-state drive bracket and connector board, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).
5. Remove the solid-state drive (see [Solid-state drive on page 40](#)).

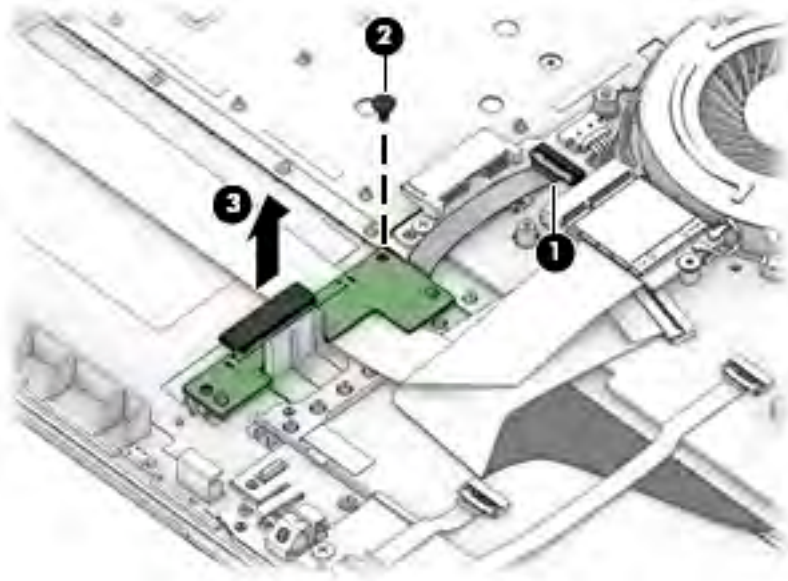
Remove the solid-state drive bracket and connector board:

1. Slide the bracket toward the side of the computer **(1)**, and then lift the bracket out of the computer **(2)**.



2. Disconnect the solid-state connector board cable from the system board ZIF connector **(1)**.
3. Remove the Phillips M2.0 × 3.0 screw **(2)** that secures the board to the computer.

4. Remove the connector board from the computer **(3)**.



Reverse this procedure to install the solid-state drive bracket and connector board.

## WLAN module

**Table 6-7 Spare part description and number**

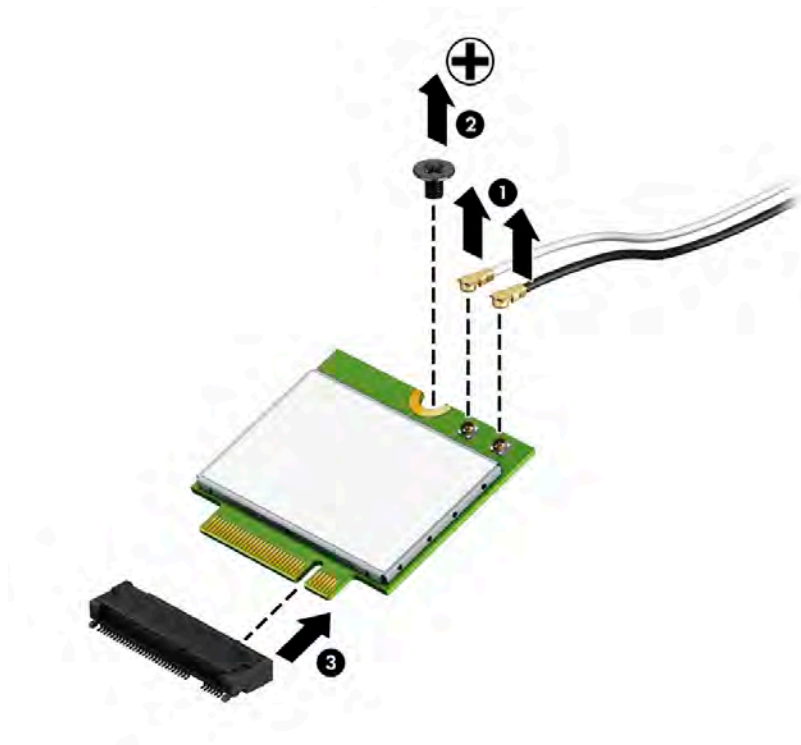
Description	Spare part number
Realtek RTL8822BE 802.11ac 2 × 2 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	924813-855
Realtek RTL8821CE 802.11ac 1 × 1 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	L17365-005

Before removing the WLAN module, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).

Remove the WLAN module:

1. Disconnect the two antenna cables from the module **(1)**.
2. Remove the Phillips M2.0 × 3.0 screw **(2)**, and then pull the module out of the socket **(3)**.



Reverse this procedure to install the WLAN module.

## Hard drive connector board

**Table 6-8 Spare part description and number**

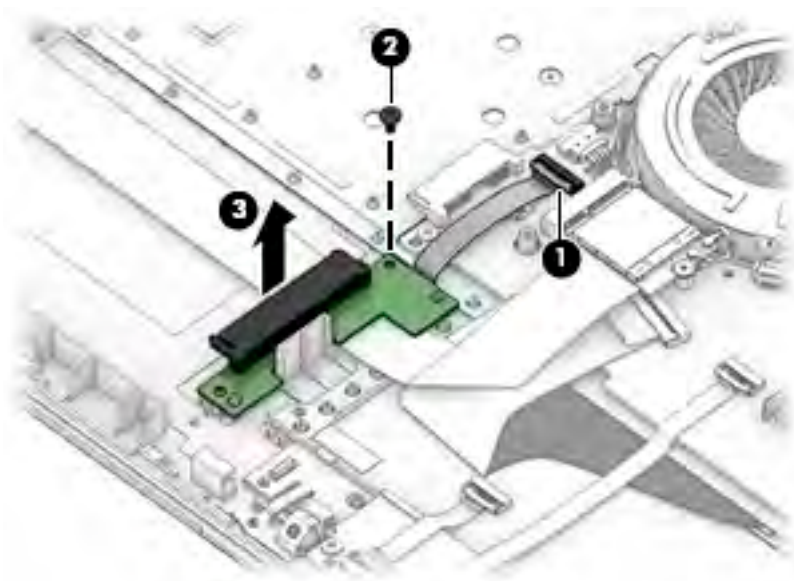
Description	Spare part number
Hard drive connector board	L20454-001

Before removing the hard drive connector board, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).
5. Remove the hard drive (see [Hard drive on page 38](#)).

Remove the hard drive connector:

1. Disconnect the cable from the system board ZIF connector **(1)**.
2. Remove the Phillips M2.0 × 3.0 screw **(2)** that secures the board to the computer.
3. Remove the board from the computer **(3)**.



Reverse this procedure to install the hard drive connector board.

## USB/card reader board

**Table 6-9 Spare part description and number**

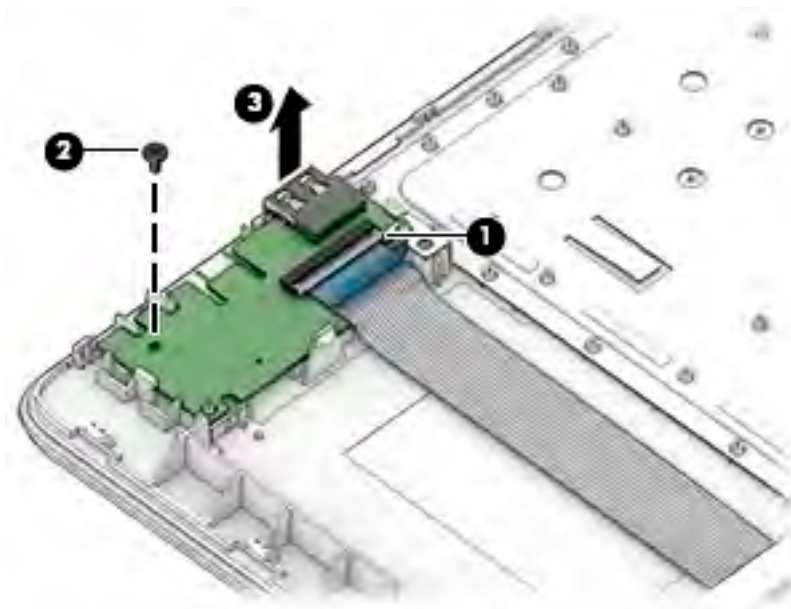
Description	Spare part number
USB/card reader board	L20448-001
USB/card reader board cable	L20452-001

Before removing the USB/card reader board, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).

Remove the USB/card reader board:

1. Disconnect the cable from the ZIF connector on the USB board **(1)**.
2. Remove the Phillips M2.0 × 3.0 screw **(2)**, and then remove the board from the computer **(3)**.



Reverse this procedure to replace the USB/card reader board.

## TouchPad button board

**Table 6-10 Spare part description and number**

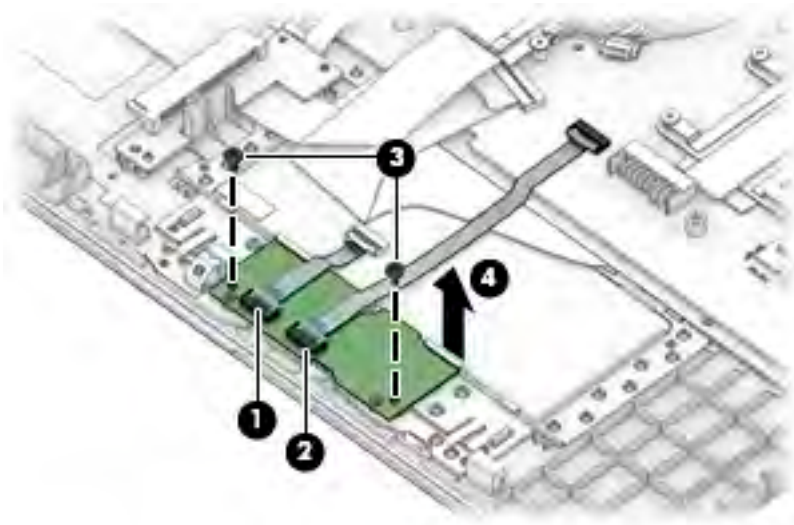
Description	Spare part number
TouchPad button board	not spared
TouchPad button board cable	L20451-001

Before removing the TouchPad button board, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).

Remove the TouchPad button board:

1. Disconnect the system board cable from the ZIF connector on the TouchPad button board **(1)**.
2. Disconnect the TouchPad cable from the ZIF connector on the TouchPad button board **(2)**.
3. Remove the two Phillips M2.0 × 3.0 screws **(3)** that secure the board to the computer.
4. Remove the TouchPad button board from the computer **(4)**.



Reverse this procedure to install the TouchPad button board.

## TouchPad module

**Table 6-11 Spare part description and number**

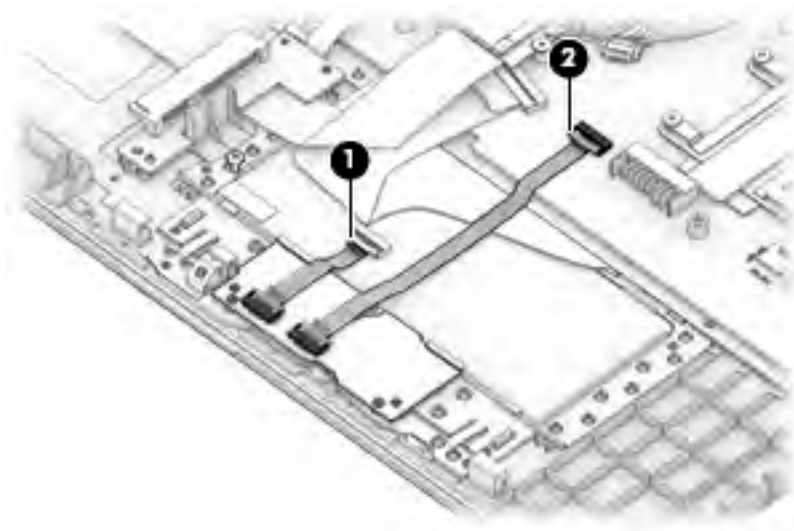
Description	Spare part number
TouchPad module	L20449-001
TouchPad module cable	L20450-001

Before removing the TouchPad module, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).

To remove the TouchPad module:

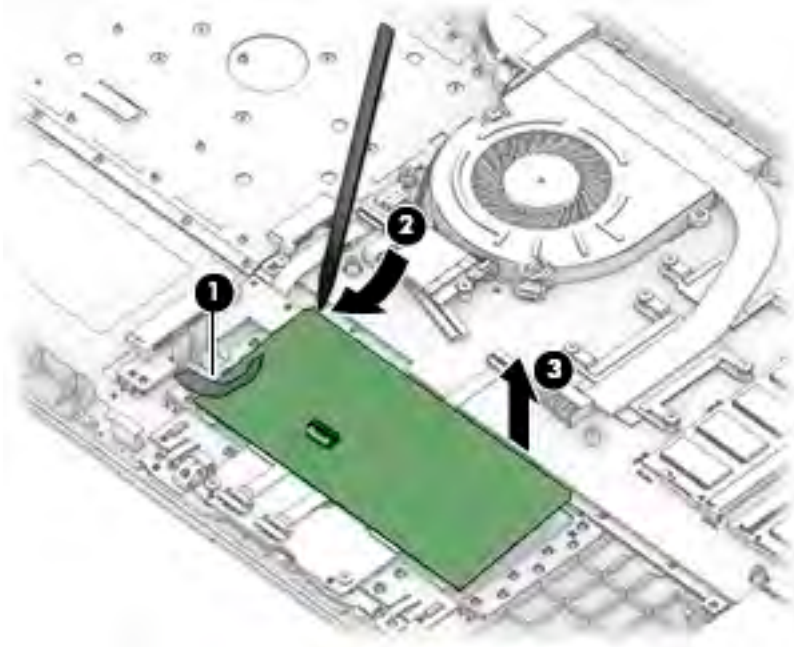
1. Disconnect the TouchPad cable from the ZIF connector on the TouchPad **(1)** and the TouchPad button board cable from the ZIF connector on the system board **(2)**.



2. Peel the tape off the TouchPad **(1)**.
3. Starting in the corner, use a plastic, non-marking tool to pry up the TouchPad module to disengage the adhesive that secures it to the top cover **(2)**

4. Working around each edge, pry the TouchPad module loose, and then remove it from the computer **(3)**.

 **NOTE:** The TouchPad module may be very tight and difficult to remove.



Reverse this procedure to install the TouchPad module.

# Fan

**Table 6-12 Spare part description and number**

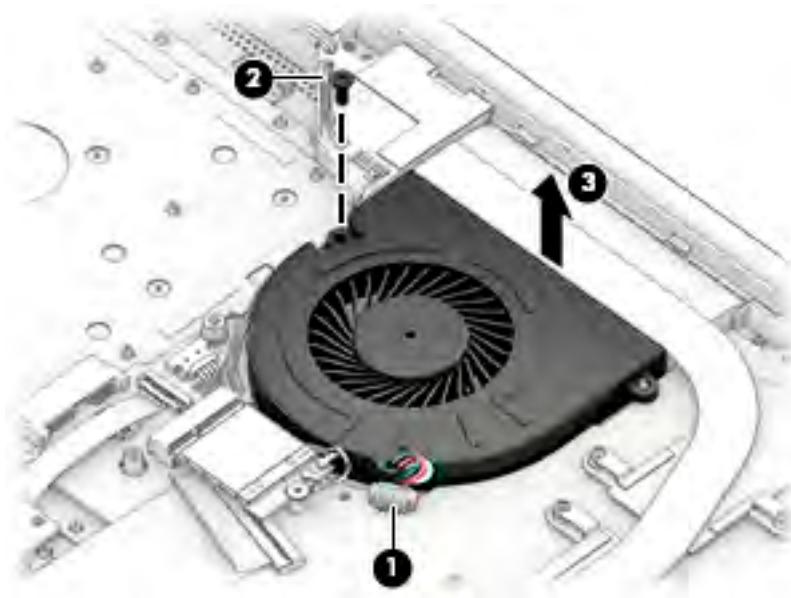
Description	Spare part number
Fan for use in models with discrete graphics	L20473-001
Fan for use in models with UMA graphics	L20474-001

Before removing the fan, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).

Remove the fan:

1. Disconnect the fan cable from the system board **(1)**.
2. Remove the Phillips M2.5 × 6.0 screw **(2)** that secures the fan to the computer.
3. Lift the fan from the computer **(3)**.



Reverse this procedure to install the fan.

## Heat sink assembly

**Table 6-13 Spare part description and number**

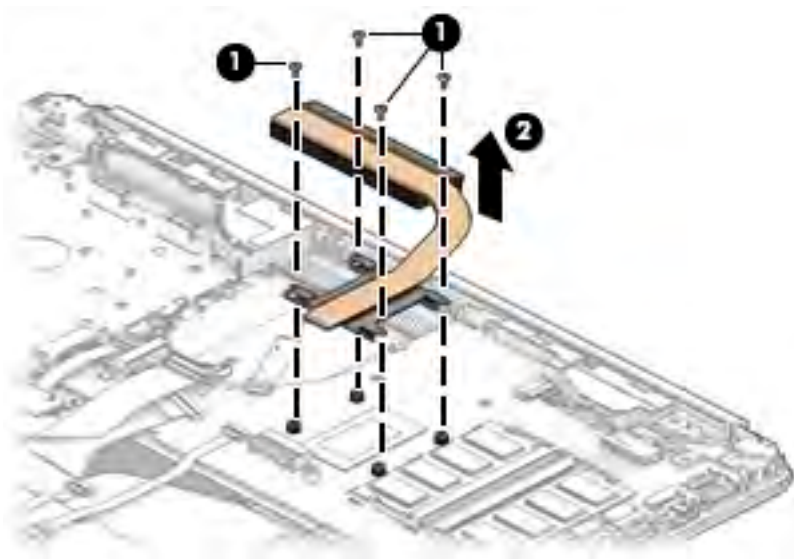
Description	Spare part number
Heat sink for use in models with i7-8565U, i5-8265U, i3-7020U processors and integrated discrete graphics memory	L20469-001
Heat sink for use in models with i7-8565U, i5-8265U, i3-7020U processors and UMA graphics memory	L20470-001
Heat plate for use in fanless models with UMA graphics memory and an Intel Pentium or Celeron processor	L20472-001
Heat sink for use in models with an Intel Pentium or Celeron processor and discrete graphics memory	L20471-001
Heat sink for use in models with i7-8565U, i5-8265U processors and discrete graphics memory	L36498-001

Before removing the heat sink, follow these steps:

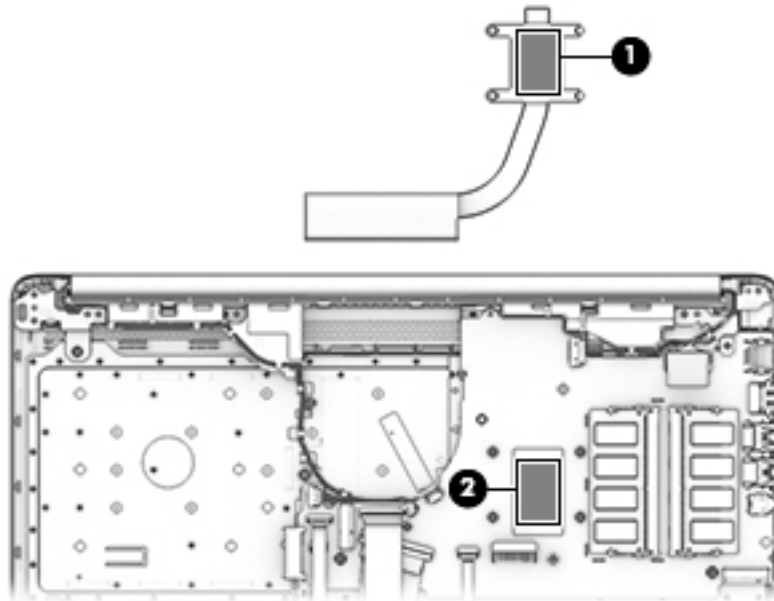
1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).

To remove the heat sink assembly from products with integrated UMA graphics:

1. In the order indicated on the heat sink assembly, remove the four Phillips M2.0 × 3.0 screws **(1)** that secure the heat sink to the computer.
2. Lift the heat sink assembly from the computer **(2)**.

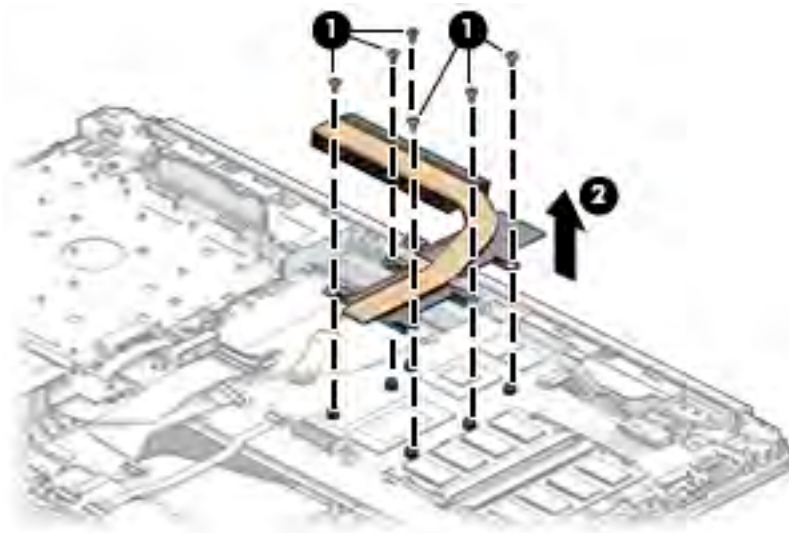


3. Thoroughly clean the thermal material from the surface of the heat sink **(1)** and its associated system board component **(2)** each time the heat sink is removed. Replacement thermal material is included with the heat sink and system board spare part kits.

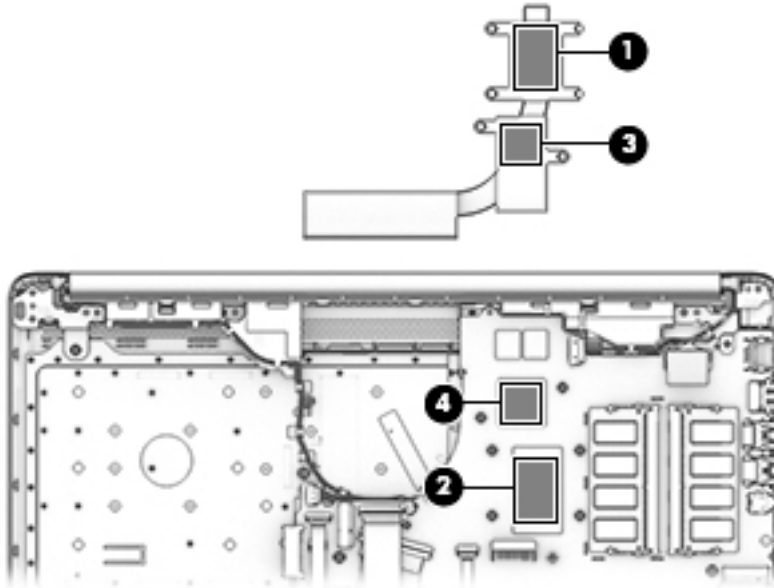


To remove the heat sink assembly from products with discrete graphics:

1. In the order indicated on the heat sink assembly, remove the six Phillips M2.0 × 3.0 screws **(1)** that secure the heat sink to the computer.
2. Lift the heat sink assembly from the computer **(2)**.

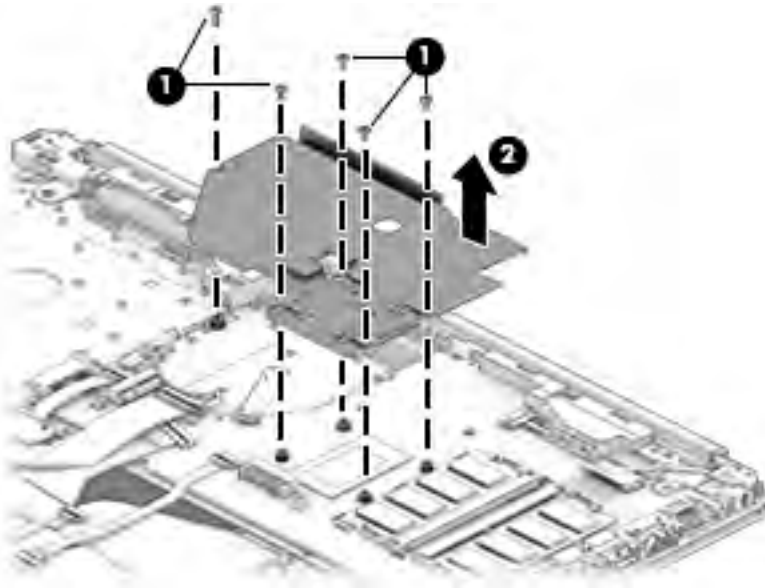


3. Thoroughly clean the thermal material from the surfaces of the heat sink **(1)(3)** and associated system board components **(2)(4)** each time the heat sink is removed. Replacement thermal material is included with the heat sink and system board spare part kits.

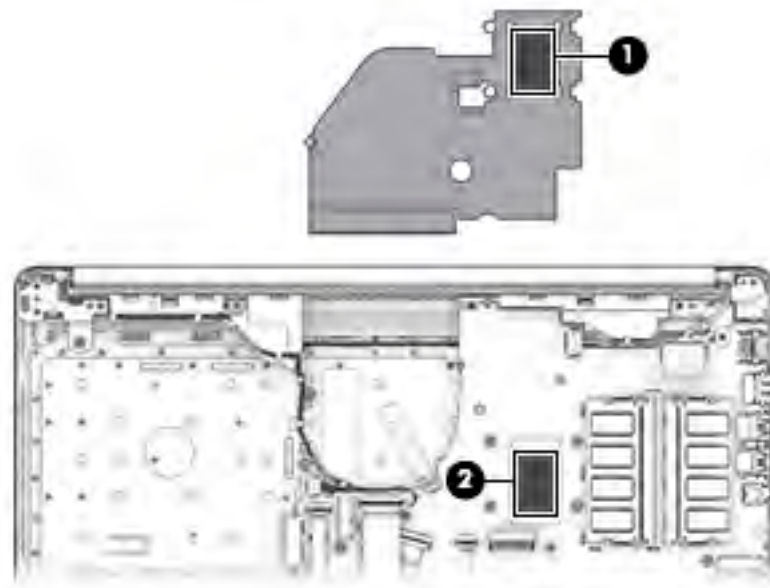


To remove the heat plate from fanless models:

1. In the order indicated on the heat plate, remove the five Phillips M2.0 × 3.0 screws **(1)** that secure the heat plate to the computer.
2. Lift the heat plate from the computer **(2)**.



3. Thoroughly clean the thermal material from the surface of the heat plate **(1)** and associated system board component **(2)** each time the heat plate is removed. Replacement thermal material is included with the heat plate and system board spare part kits.



Reverse this procedure to install the heat plate or heat sink assembly.

## Display assembly

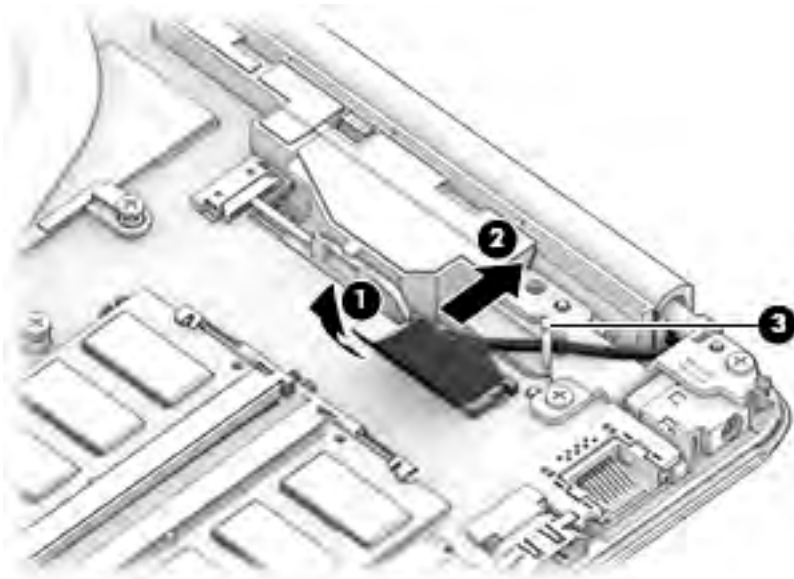
Full hinge-up displays are not spared. Displays are spared only at the subcomponent level.

Before removing the display panel, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).

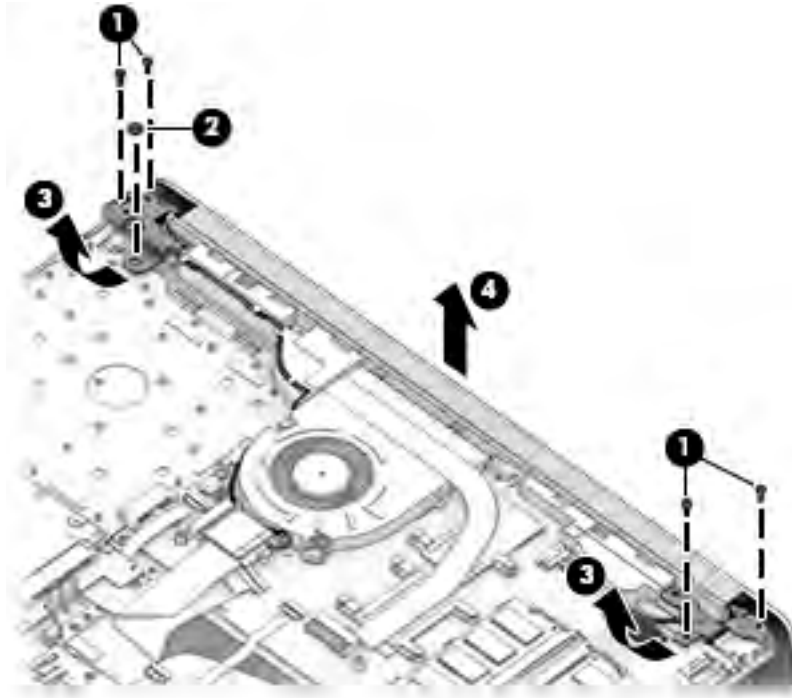
Remove the display assembly:

1. Lift the tape from the display connector on the system board **(1)**.
2. Disconnect the cable from the connector **(2)**.
3. Remove the cable from the clip **(3)**.



4. Remove the four Phillips M2.5 × 6.0 screws **(1)** from the display hinges.
5. Remove the Phillips broad head M2.0 × 2.0 screw **(2)** from the right display hinge.
6. Rotate the hinges upward **(3)**.

7. Separate the display from the computer (4).



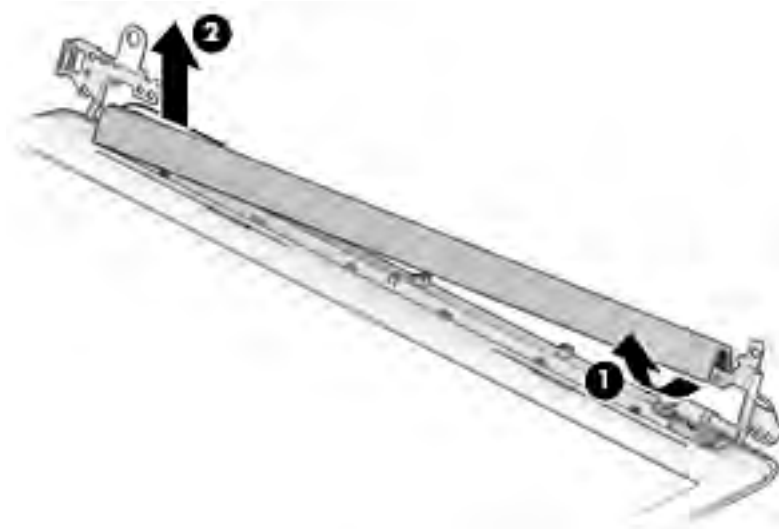
Remove the display assembly subcomponents:

1. To remove the hinge cover, pull upward near the hinge to disengage it from the display enclosure (1), and then remove the hinge cover from the display enclosure (2).

Hinge covers are available using the following spare part numbers:

L49990-001: Asteroid silver

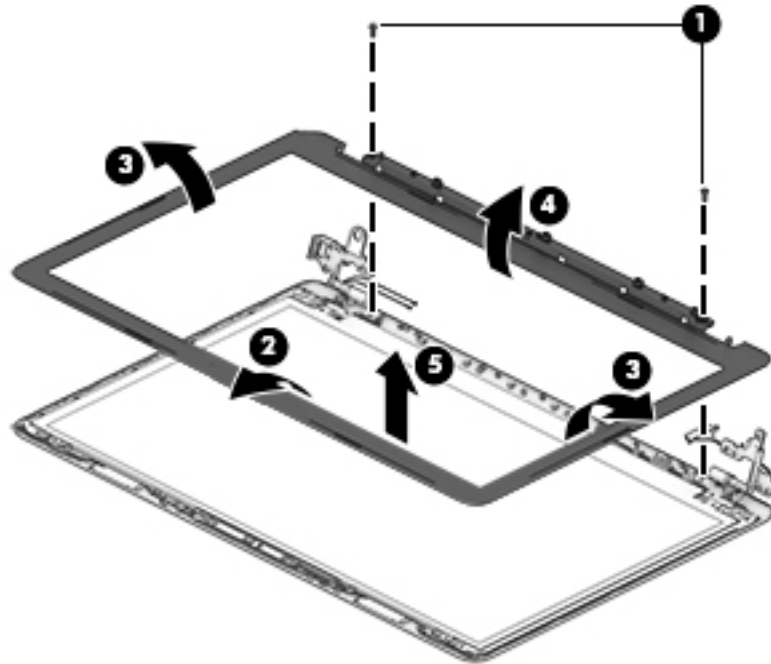
L49991-001: Dark ash silver



When replacing the hinge cover, make sure the hinges rotate downward as far as they can go. Align the cover, and then start from above and rotate the cover downward onto the hinges. Make sure the clips snap into place along the bottom of the display cover.

2. If it is necessary to replace the display bezel:
  - a. Remove the two Phillips M2.0 × 3.0 screws (1), flex the top (2) of the bezel, the inside edges of the left and right sides (3), and then the bottom (4) of the bezel until it disengages from the display enclosure.
  - b. Remove the bezel (5).

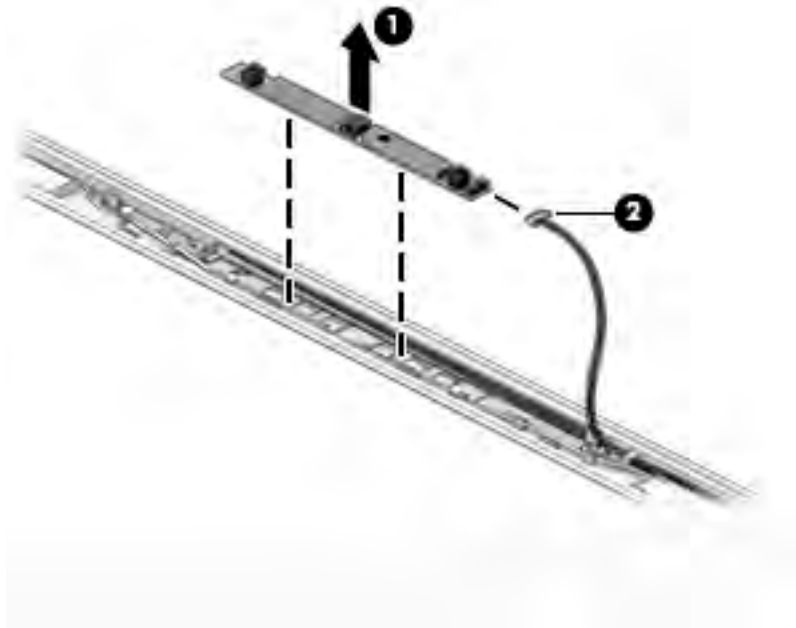
The display bezel is available using spare part number L20421-001.




3. If it is necessary to replace the camera/microphone module:
  - a. Detach the module (1) from the display back cover. (The module is attached with double-sided adhesive.)

- b. Disconnect the cable (2) from the camera/microphone module.

The HD camera module is available using spare part number L20447-001. The VGA camera module is available using spare part number L20446-001.

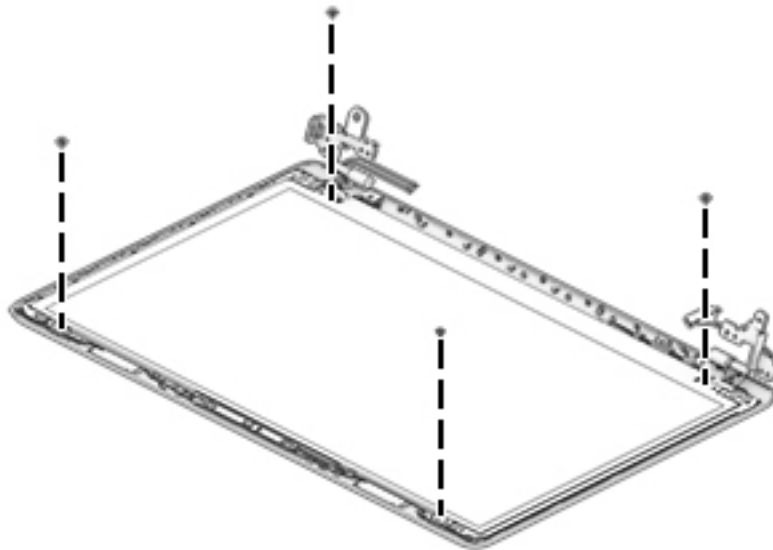


4. If it is necessary to replace the display panel:

 **IMPORTANT:** HD panels are secured to the display enclosure with screws. FHD panels are secured with tape.


- a. **HD panels:**

Remove the four Phillips M2.0 × 3.0 screws that secure the panel to the display enclosure.



**FHD panels:**

- b. Pull the tape out from behind the left and right sides of the panel.

 **NOTE:** You have to pull on the tape multiple times before it is completely removed.

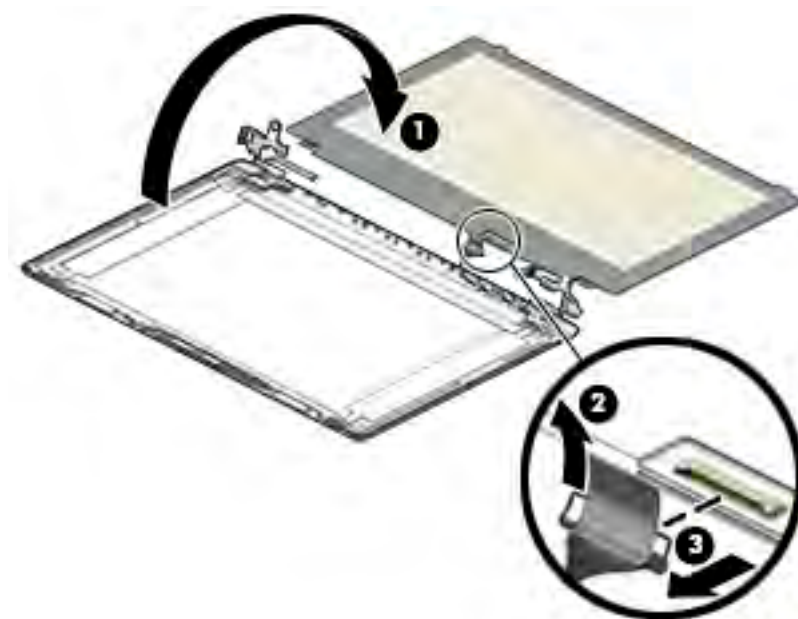
Display panel stretchable adhesive tape is available using spare part number L29080-001.



- c. **HD and FHD panels:**

Swing the top edge of the display panel forward and position it upside down next to the display enclosure **(1)**.

- d. Release the adhesive support strip **(2)** that secures the display panel cable connector to the display panel.
- e. Disconnect the display panel cable **(3)** from the display panel.



- f. Remove the display panel.

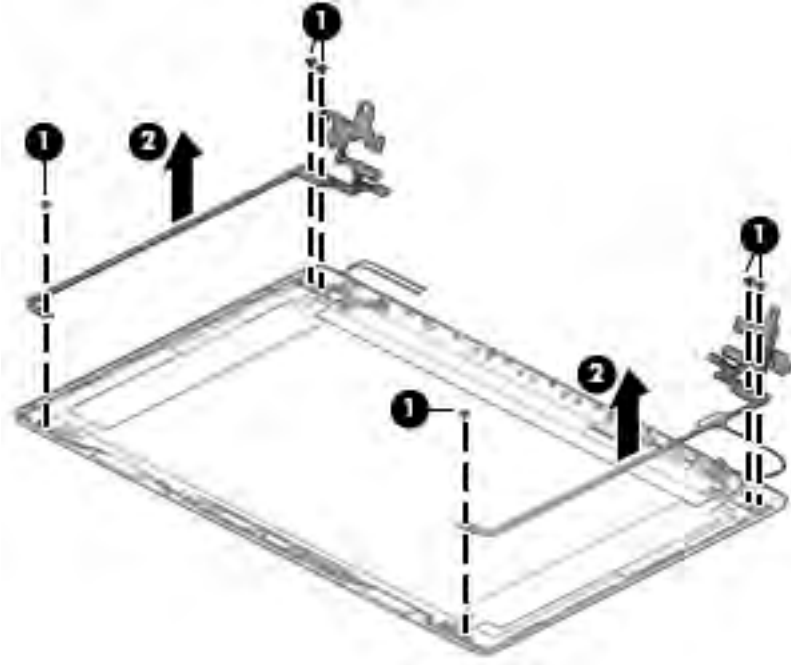
Raw display panels are available using the following spare part numbers:

L49998-001: HD

L49999-001: FHD

5. If it is necessary to replace the display hinges:
  - a. Remove the three Phillips M2.5 × 2.5 screws **(1)** from each hinge.
  - b. Remove the display hinges **(2)**.

The display hinges are available using spare part number L20420-001.



6. If it is necessary to replace the display panel cable:
  - a. Release the cable from the retention clips and routing channel built into the bottom edge and side of the display enclosure **(1)**.

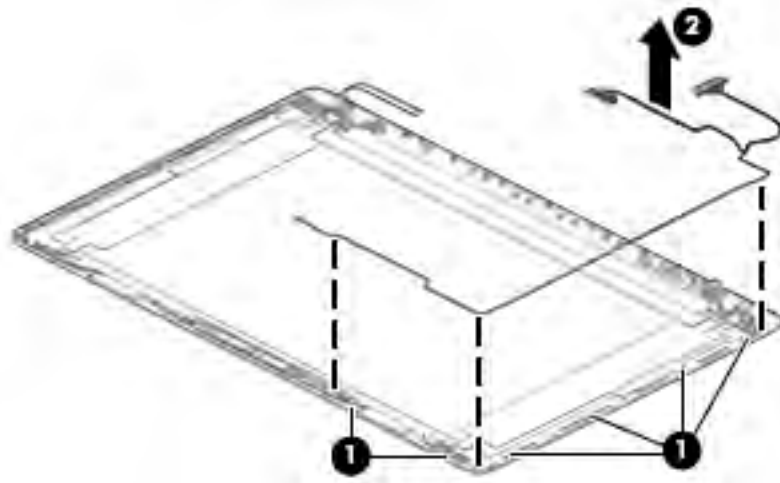
- b.** Remove the display panel cable **(2)**.

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

L20443-001: HD, non-touch display

L23064-001: FHD, non-touch display

L20442-001: HD, touch display



- 7.** If it is necessary to replace the wireless antenna cables and transceivers:

- a.** Remove the antennas from the top of the display enclosure **(1)**.

- b. Release the wireless antenna cables from the retention clips and routing channel built into the sides of the display enclosure (2).

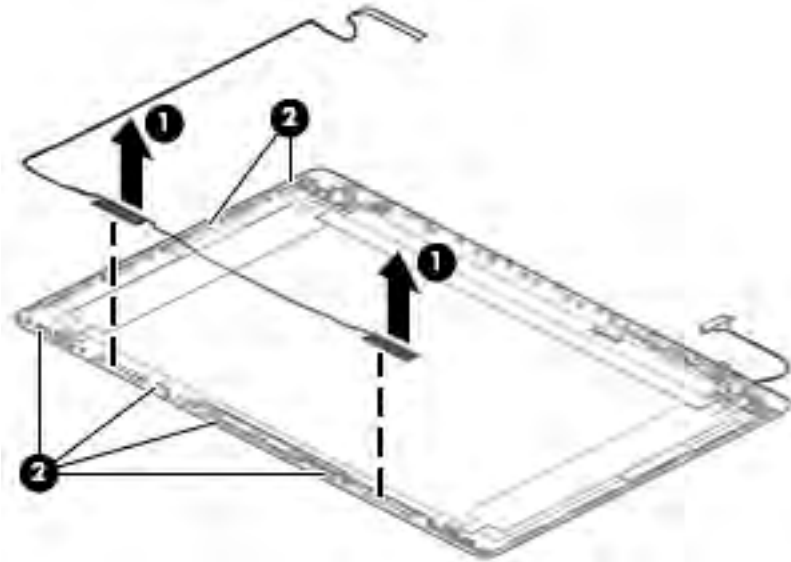
Antennas are available using the following spare part numbers:

L20445-001: Single antenna models

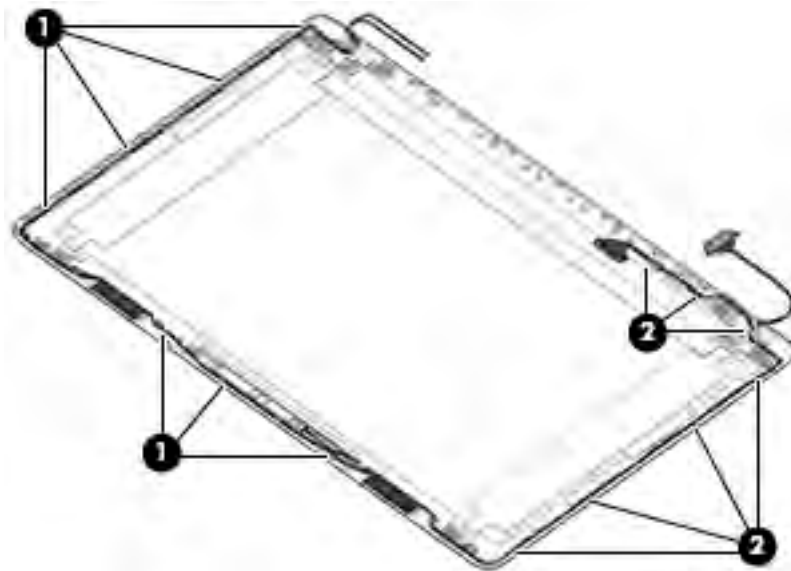
L23060-001: Single antenna, narrow bezel models

L20444-001: Dual antenna models

L23059-001: Dual antenna, narrow bezel models



Use the following image to determine proper cable routing in the display of the antenna cable (1) and display cable (2).



The display rear cover is available using the following spare part numbers:

L49986-001: Asteroid silver

L49987-001: Dark ash silver

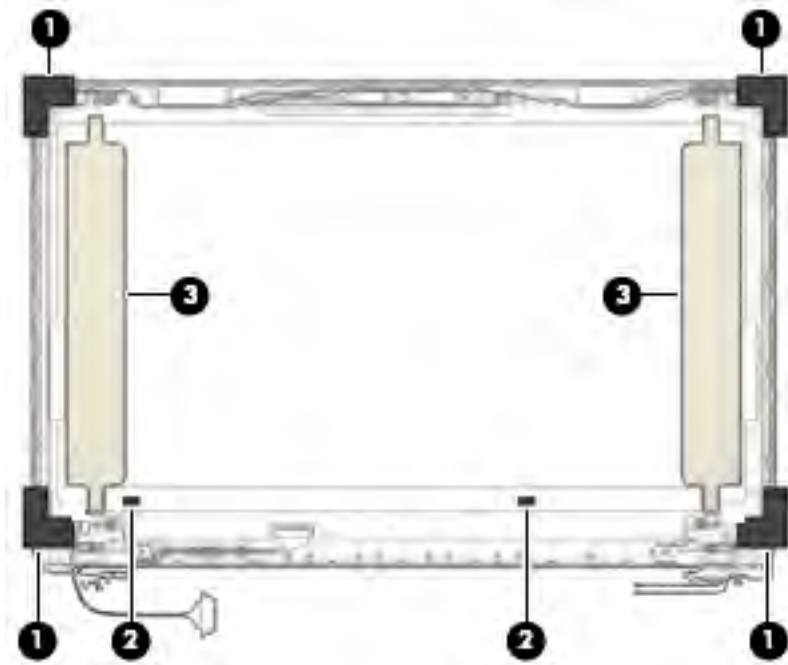
Reverse these procedures to reassemble and install the display assembly components.

When reassembling an FHD display assembly, be sure to install the following parts into the display enclosure from the Display Miscellaneous Kit, spare part number L23065-001 and display panel stretchable adhesive tape, spare part number L29080-001.

**(1):** Four positioning corner pieces

**(2):** Two gaskets

**(3):** Display panel stretchable adhesive tape



## System board

 **NOTE:** All system board spare part kits include replacement thermal material.

All system boards use the following part numbers:

xxxxxx-001: Non-Windows operating systems

xxxxxx-601: Windows operating system

**Table 6-14 Spare part description and number**

Description	Spare part number
System board for use in models with discrete graphics memory:	
<ul style="list-style-type: none"><li>Intel Core i5-8265U processor with 2 GB of discrete graphics memory</li></ul>	L49981-xx1
<ul style="list-style-type: none"><li>Intel Core i3-7020U processor with 2 GB of discrete graphics memory</li></ul>	L49980-xx1
System board for use in models with UMA graphics memory:	
<ul style="list-style-type: none"><li>Intel Core i7-8565U processor</li></ul>	L49976-xx1
<ul style="list-style-type: none"><li>Intel Core i5-8265U processor</li></ul>	L49975-xx1
<ul style="list-style-type: none"><li>Intel Core i3-7020U processor</li></ul>	L49974-xx1
<ul style="list-style-type: none"><li>Intel Pentium N5000 processor</li></ul>	L49979-xx1
<ul style="list-style-type: none"><li>Intel Pentium 4417U processor</li></ul>	L53961-xx1
<ul style="list-style-type: none"><li>Intel Celeron N4000 processor</li></ul>	L49978-xx1
<ul style="list-style-type: none"><li>Intel Celeron N3060 processor</li></ul>	L49977-xx1

Before removing the system board, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the following components:
  - a. Optical drive (see [Optical drive on page 29](#))
  - b. Bottom cover (see [Bottom cover on page 32](#))
  - c. Battery (see [Battery on page 34](#))
  - d. Display (see [Display assembly on page 54](#))

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

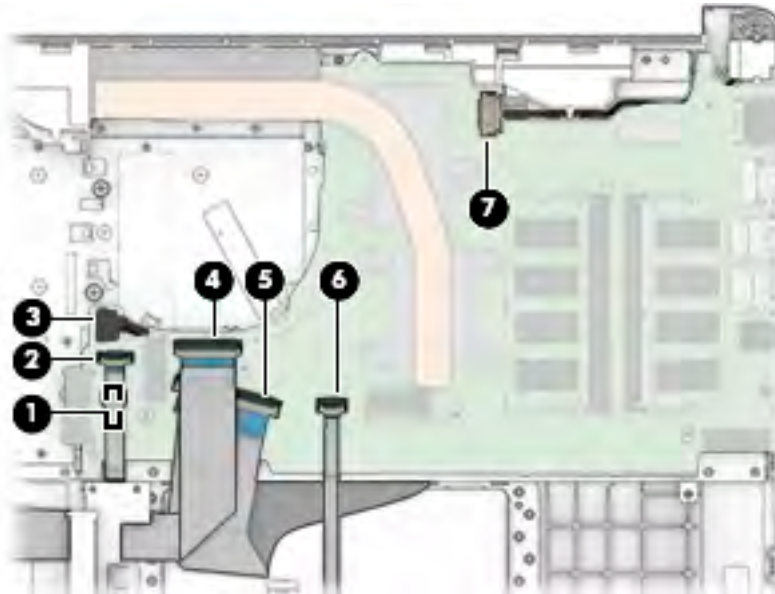
- WLAN module (see [WLAN module on page 43](#))
- Memory modules (see [Memory on page 36](#))
- Heat sink (see [Heat sink assembly on page 50](#))

Remove the system board:

 **IMPORTANT:** Make special note of each screw size and location during removal and replacement

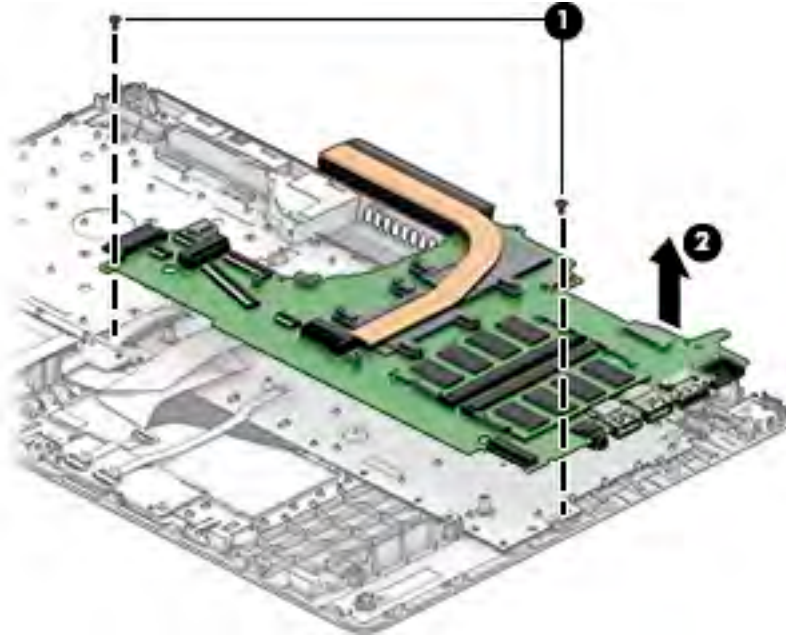
1. Disconnect the following cables from the system board:

- (1): Keyboard backlight cable
- (2): Hard drive connector cable
- (3): Speaker cable
- (4): USB/card reader board cable
- (5): Keyboard cable
- (6): TouchPad button board cable
- (7): Power connector cable



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

3. Lift the left side of the system board, and then remove the system board from the computer (2).



Reverse this procedure to install the system board.

## Speakers

**Table 6-15 Spare part description and number**

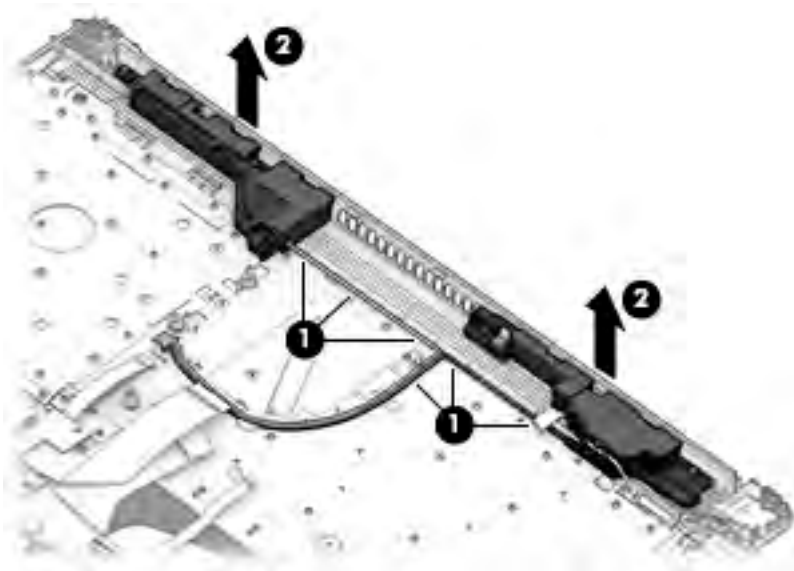
Description	Spare part number
Speaker Kit	L20453-001

Before removing the speakers, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).
5. Remove the display (see [Display assembly on page 54](#)).

Remove the speakers:

1. Remove the speaker cable from the clips built into the computer **(1)**.
2. Remove the speakers from the computer **(2)**.



Reverse this procedure to install the speakers.

## Power connector cable (DC-in)

**Table 6-16 Spare part description and number**

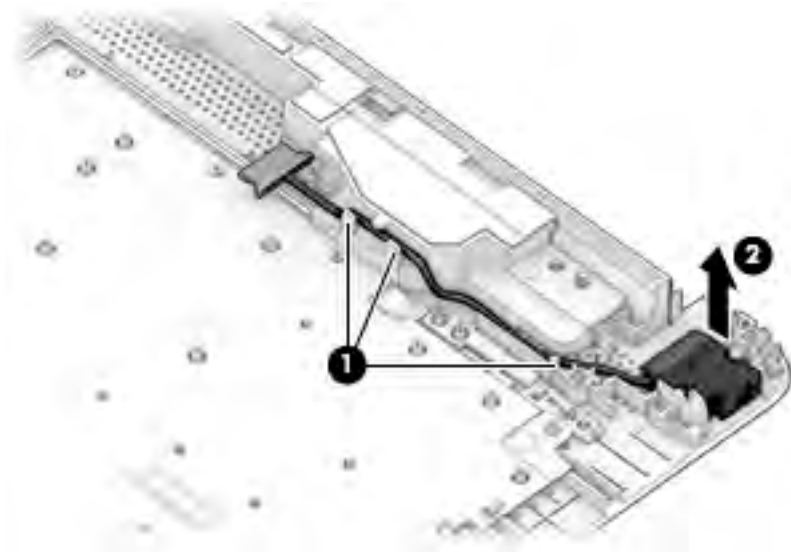
Description	Spare part number
Power connector cable	L20475-001

Before removing the power connector cable, follow these steps:

1. Prepare the computer for disassembly ([Preparation for disassembly on page 28](#)).
2. Remove the optical drive (see [Optical drive on page 29](#)).
3. Remove the bottom cover (see [Bottom cover on page 32](#)).
4. Remove the battery (see [Battery on page 34](#)).
5. Remove the system board (see [System board on page 63](#)).
6. Remove the display (see [Display assembly on page 54](#)).

Remove the power connector cable:

1. Remove the cable from the clips built into the computer (**1**).
2. Remove the power connector cable from the computer (**2**).



Reverse this procedure to install the power connector cable.

## Top cover with keyboard

The top cover with keyboard remains after removing all other spared parts from the computer.

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

**Table 6-17 Spare part description and number**

Description	Spare part number
Keyboard, jet black	L50000-xx1
Keyboard, no backlight, silver	L50001-xx1

**Table 6-18 Spare part description and number**

For use in country or region	Spare part number	For use in country or region	Spare part number	For use in country or region	Spare part number
Belgium	-A41	Hungary	-211	Slovenia	-BA1
Bulgaria	-261	India	-D61	South Korea	-AD1
Chile	-161	Israel	-BB1	Spain	-071
Czech Republic/Slovakia	-FL1	Italy	-061	Switzerland	-BG1
Denmark, Finland, and Norway	-DH1	Japan	-291	Taiwan	-AB1
French Arabia	-DE1	The Netherlands	-B31	Thailand	-281
French Canada	-DB1	Portugal	-131	Turkey	-141
France	-051	Russia	-251	United Kingdom	-031
Germany	-041	Saudi Arabia	-171	United States	-001
Greece	-151				

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

## Using Computer Setup

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

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

## Starting Computer Setup

- ▲ Turn on or restart the computer, and when the HP logo appears, press **F10** to enter Computer Setup.

## Navigating and selecting in Computer Setup

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

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

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

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

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

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

Your changes go into effect when the computer restarts.


## Restoring factory settings in Computer Setup

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

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

1. Start Computer Setup. See [Starting Computer Setup on page 69](#).
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 69](#).
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 70](#).

## Downloading a BIOS update

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

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

Do not shut down the computer or initiate Sleep.

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


---

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

- a. Identify the most recent BIOS update and compare it to the BIOS version currently installed on your computer. Make a note of the date, name, or other identifier. You may need this information to locate the update later, after it has been downloaded to your hard drive.
- b. Follow the on-screen instructions to download your selection to the hard drive.

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

---

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

---


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

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

The BIOS installation begins.

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

---

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

---


## Changing the boot order using the f9 prompt

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

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

## TPM BIOS settings (select products only)

---

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

---

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

---

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

---

To access TPM settings in Computer Setup:

1. Start Computer Setup. See [Starting Computer Setup on page 69](#).
2. Select **Security**, select **TPM Embedded Security**, and then follow the on-screen instructions.

## Using HP Sure Start (select products only)

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

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

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

# 8 Using HP PC Hardware Diagnostics

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

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

If HP PC Hardware Diagnostics Windows is not installed on your computer, first you must download and install it. To download HP PC Hardware Diagnostics Windows, see [Downloading HP PC Hardware Diagnostics Windows on page 73](#).

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

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

– or –

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

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

– or –

Select the question mark icon in the taskbar.
  - b. Select **Troubleshooting and fixes**.
  - c. Select **Diagnostics**, and then select **HP PC Hardware Diagnostics Windows**.
2. When the tool opens, select the type of diagnostic test you want to run, and then follow the on-screen instructions.



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

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

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

## Downloading HP PC Hardware Diagnostics Windows

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

## Downloading the latest HP PC Hardware Diagnostics Windows version

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

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

The tool is downloaded to the selected location.

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

---

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

---

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

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

The tool is downloaded to the selected location.


## Installing HP PC Hardware Diagnostics Windows

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

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

## Using HP PC Hardware Diagnostics UEFI

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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 75](#).

---

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

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


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

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

– or –

Contact support, and provide the Failure ID code.

---

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

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

---

## Starting HP PC Hardware Diagnostics UEFI

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

1. Turn on or restart the computer, and quickly press [esc](#).
2. Press [f2](#).

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

- a. Connected USB flash drive

 **NOTE:** To download the HP PC Hardware Diagnostics UEFI tool to a USB flash drive, see [Downloading the latest HP PC Hardware Diagnostics UEFI version on page 75](#).

---

- b. Hard drive


- c. BIOS

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

## Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive

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

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

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

---

## Downloading the latest HP PC Hardware Diagnostics UEFI version

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

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

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

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

---

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

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

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

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

### Downloading Remote HP PC Hardware Diagnostics UEFI



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

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

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

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

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



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

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

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

## Customizing Remote HP PC Hardware Diagnostics UEFI settings

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

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

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

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

Your changes take effect when the computer restarts.


---

# 9 Backing up, restoring, and recovering

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

- **Backing up your personal information**—You can use Windows tools to back up your personal information (see [Using Windows tools on page 78](#)).
- **Creating a restore point**—You can use Windows tools to create a restore point (see [Using Windows tools on page 78](#)).
- **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 78](#)).
- **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 78](#)).

---

 **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, as follows:

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



---

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

---

## Restoring and recovery

### Restoring, resetting, and refreshing using Windows tools

Windows offers several options for restoring, resetting, and refreshing the computer. For details, see [Using Windows tools on page 78](#).

### 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 78](#).



---

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

---

To recover your system:

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

### Changing the computer boot order

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

To change the boot order:



---

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

---

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

For computers or tablets with keyboards attached:

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

For tablets without keyboards:

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

– or –

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

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

# 10 Specifications

## Computer specifications

**Table 10-1 Computer specifications**

	<b>Metric</b>	<b>U.S.</b>
<b>Dimensions</b>		
Length	246.0 mm	10.72 in
Width	376.0 mm	16.33 in
Height	22.5 mm	0.97 in
<b>Weight (lowest configuration)</b>		
SSD, Pentium or Celeron processors, UMA graphics	1771.5 g	3.91 lbs
SSD, 7th/8th generation Core processors, UMA graphics	1829.5 g	4.03 lbs
SSD, discrete graphics	1855.5 g	4.09 lbs
HDD and ODD, Pentium or Celeron processors, UMA graphics	2004.7 g	4.42 lbs
HDD and ODD, 7th/8th generation Core processors, UMA graphics	2062.7 g	4.55 lbs
HDD and ODD, discrete graphics	2088.7 g	4.60 lbs
<b>Input power</b>		
Operating voltage	19.0 V dc @ 4.74 A – 90 W or 18.5 V dc @ 3.5 A - 65 W or 45 W	
Operating current	4.74 A or 3.5 A	
<b>Temperature</b>		
Operating (not writing to optical disc)	0°C to 35°C	32°F to 95°F
Operating (writing to optical disc)	5°C to 35°C	41°F to 95°F
Nonoperating	-20°C to 60°C	-4°F to 140°F
<b>Relative humidity</b>		
Operating	10% to 90%	
Nonoperating	5% to 95%	
<b>NOTE:</b> Applicable product safety standards specify thermal limits for plastic surfaces. The computer operates well within this range of temperatures.		

## 39.6-cm (15.6-in) display specifications

**Table 10-2 Display specifications**

	<b>Metric</b>	<b>U.S.</b>
Active diagonal size	39.6-cm	15.6-in
Resolution	FHD: 1920 × 1080 HD: 1366 × 768	
Surface treatment	Anti-glare BrightView	
Brightness	220 nits 200 nits (BrightView, HD, Touch-on Panel)	
Viewing angle	SVA UWVA (FHD, anti glare panel)	
Backlight	WLED	
Aspect ratio	16:10 ultra wide	
Display panel interface	eDP	
Width	Slim-flat, 3.2 mm	

## M.2 SATA solid-state drive specifications

**Table 10-3 Solid-state drive specifications**

	<b>128-GB*</b>	<b>256-GB*</b>
<b>Height</b>	1.35 mm	1.35 mm
<b>Weight</b>	< 10 g	< 10 g
<b>Form factor</b>	M.2 2280-D2-B-M	M.2 2280-D2-B-M
<b>Transfer rate</b>	up to 540 MB/sec	up to 540 MB/sec
<b>Interface type</b>	SATA-3	SATA-3
Ready time, maximum (to not busy)	1.0 ms	< 1.0 ms
Access times, logical	0.1 ms	0.1 ms
<b>Total logical sectors</b>	234,441,648	468,883,296
<b>Operating temperature</b>	0°C to 70°C (32°F to 158°F)	
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less. Actual drive specifications may differ slightly.		
<b>NOTE:</b> Certain restrictions and exclusions apply. Contact technical support for details.		

## M.2 PCIe solid-state drive specifications

**Table 10-4 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 ms	0.1 ms
<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.		

## Hard drive specifications

**Table 10-5 Hard drive specifications**

	2-TB*	1-TB*	500-GB*
<b>Dimensions</b>			
Height	7.2 mm or 9.5 mm	7.2 mm or 9.5 mm	7.0 mm
Length	100.4 mm	100.4 mm	100.6 mm
Width	69.9 mm	69.9 mm	70.1 mm
Weight	130.0 g	107.0 g	92.0 g
<b>Interface type</b>	SATA	SATA	SATA
<b>Transfer rate</b>			
Synchronous (maximum)	300 MB/sec	300 MB/sec	300 MB/sec
Security	ATA security	ATA security	ATA security
<b>Seek times</b> (typical read, including setting)			
Single track	2.0 ms	2.0 ms	3 ms
Average (read/write)	12 ms	12 ms	13 ms
Maximum	22 ms	22 ms	24 ms
<b>Logical blocks</b>	3,907,029,168	1,953,525,168	1,048,576,000
<b>Disk rotational speed</b>	5400 rpm	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.			

---

# 11 Power cord set requirements

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

The 3-conductor power cord set included with the computer meets the requirements for use in the country or region where the equipment is purchased.

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

## Requirements for all countries

The following requirements are applicable to all countries and regions:

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

# Requirements for specific countries and regions

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

Country/region	Accredited agency	Applicable note number
Argentina	IRAM	1
Australia	SAA	1
Austria	OVE	1
Belgium	CEBEC	1
Brazil	ABNT	1
Canada	CSA	2
Chile	IMQ	1
Denmark	DEMKO	1
Finland	FIMKO	1
France	UTE	1
Germany	VDE	1
India	BIS	1
Israel	SII	1
Italy	IMQ	1
Japan	JIS	3
The Netherlands	KEMA	1
New Zealand	SANZ	1
Norway	NEMKO	1
The People's Republic of China	CCC	4
Saudi Arabia	SASO	7
Singapore	PSB	1
South Africa	SABS	1
South Korea	KTL	5
Sweden	SEMKO	1
Switzerland	SEV	1
Taiwan	BSMI	6
Thailand	TISI	1
The United Kingdom	ASTA	1
The United States	UL	2

1. The flexible cord must be Type H05VV-F, 3-conductor, 0.75 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 11-1 Power cord requirements for specific countries and regions (continued)**

Country/region	Accredited agency	Applicable note number
		<b>2.</b> 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.
		<b>3.</b> 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.
		<b>4.</b> 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.
		<b>5.</b> 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.
		<b>6.</b> 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.
		<b>7.</b> 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.

## 12 Statement of memory volatility

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

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

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



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

### Current BIOS steps

1. Follow steps (a) through (l) below to restore the nonvolatile memory that can contain personal data. Restoring or reprogramming nonvolatile memory that does not store personal data is neither necessary nor recommended.
  - a. Turn on or restart the computer, and then 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 12-1 Nonvolatile memory usage**

Nonvolatile Memory Type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data input into this memory?	How is this memory write-protected?
HP Sure Start flash (select models only)	8 MBytes	No	Yes	Provides protected backup of critical System BIOS code, EC firmware, and critical computer configuration data for select platforms that support HP Sure Start.  For more information, see <a href="#">Using HP Sure Start (select models only) on page 93</a> .	Data cannot be written to this device via the host processor. The content is managed solely by the HP Sure Start Embedded Controller.	This memory is protected by the HP Sure Start Embedded Controller.
Real Time Clock (RTC) battery backed-up CMOS configuration memory	256 Bytes	No	Yes	Stores system date and time and noncritical data.	RTC battery backed-up CMOS is programmed using the Computer Setup (BIOS), or changing the Microsoft® Windows date & time.	This memory is not write-protected.
Controller (NIC) EEPROM	64 KBytes (not customer accessible)	No	Yes	Stores NIC configuration and NIC firmware.	NIC EEPROM is programmed using a utility from the NIC vendor that can be run from DOS.	A utility is required to write data to this memory and is available from the NIC vendor. Writing data to this ROM in an inappropriate manner will render the NIC non-functional.
DIMM Serial Presence Detect (SPD) configuration data	256 Bytes per memory module, 128 Bytes programmable (not customer accessible)	No	Yes	Stores memory module information.	DIMM SPD is programmed by the memory vendor.	Data cannot be written to this memory when the module is installed in a computer. The specific write-protection method varies by memory vendor.
System BIOS	9 MBytes	Yes	Yes	Stores system BIOS code and computer configuration data.	System BIOS code is programmed at the factory. Code is updated when the system BIOS is updated. Configuration data and settings are input using the Computer Setup (BIOS) or a custom utility.	<b>NOTE:</b> Writing data to this ROM in an inappropriate manner can render the computer non-functional.  A utility is required for writing data to this memory and is available on the HP website; go to <a href="http://www.hp.com/">http://www.hp.com/</a>

**Table 12-1 Nonvolatile memory usage (continued)**

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

## Questions and answers

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



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

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

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

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

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

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

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

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

### 3. Where does the UEFI BIOS reside?

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

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

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

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

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

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

---

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

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

---

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

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

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

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

## Using HP Sure Start (select models only)

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

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

---

# 13 Recycling

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

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

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