



# HP Pavilion 15 Laptop PC

## Maintenance and Service Guide

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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 of Windows. This computer may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows functionality. Go to <http://www.microsoft.com> for details.

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

## 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).

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# Table of contents

<b>1 Product description .....</b>	<b>1</b>
<b>2 Getting to know your computer .....</b>	<b>6</b>
Right side .....	6
Left side .....	7
Display .....	8
Keyboard area .....	9
TouchPad .....	9
Lights .....	10
Button, vent, and speakers .....	11
Special keys .....	12
Action keys .....	13
Bottom .....	14
Labels .....	15
<b>3 Illustrated parts catalog .....</b>	<b>16</b>
Computer components .....	16
Display assembly components .....	19
Mass storage devices .....	21
Miscellaneous parts .....	22
<b>4 Removal and replacement preliminary requirements .....</b>	<b>23</b>
Tools required .....	23
Service considerations .....	23
Plastic parts .....	23
Cables and connectors .....	24
Drive handling .....	24
Grounding guidelines .....	25
Electrostatic discharge damage .....	25
Packaging and transporting guidelines .....	26
Workstation guidelines .....	26
<b>5 Removal and replacement procedures for Customer Self-Repair parts .....</b>	<b>28</b>
Component replacement procedures .....	28
Optical drive .....	28

<b>6 Removal and replacement procedures for Authorized Service Provider parts .....</b>	<b>31</b>
Component replacement procedures .....	31
Bottom cover .....	31
RJ-45 cover .....	33
Battery .....	34
Display assembly .....	35
Hard drive .....	44
WLAN module .....	46
Solid-state drive .....	48
Memory module .....	50
Card reader board .....	52
TouchPad .....	53
Fan .....	55
Heat sink .....	56
System board .....	59
Speakers .....	62
Lock bracket .....	63
Power connector cable .....	64
Top cover with keyboard .....	65
<b>7 Using Setup Utility (BIOS) .....</b>	<b>66</b>
Starting Setup Utility (BIOS) .....	66
Updating Setup Utility (BIOS) .....	66
Determining the BIOS version .....	66
Downloading a BIOS update .....	67
<b>8 Using HP PC Hardware Diagnostics .....</b>	<b>68</b>
Using HP PC Hardware Diagnostics Windows (select products only) .....	68
Downloading HP PC Hardware Diagnostics Windows .....	68
Downloading the latest HP PC Hardware Diagnostics Windows version .....	69
Downloading HP Hardware Diagnostics Windows by product name or number (select products only) .....	69
Installing HP PC Hardware Diagnostics Windows .....	69
Using HP PC Hardware Diagnostics UEFI .....	69
Starting HP PC Hardware Diagnostics UEFI .....	70
Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive .....	70
Downloading the latest HP PC Hardware Diagnostics UEFI version .....	70
Downloading HP PC Hardware Diagnostics UEFI by product name or number (select products only) .....	70
Using Remote HP PC Hardware Diagnostics UEFI settings (select products only) .....	71
Downloading Remote HP PC Hardware Diagnostics UEFI .....	71

Downloading the latest Remote HP PC Hardware Diagnostics UEFI version .....	71
Downloading Remote HP PC Hardware Diagnostics UEFI by product name or number .....	71
Customizing Remote HP PC Hardware Diagnostics UEFI settings .....	71
<b>9 Backing up, restoring, and recovering .....</b>	<b>73</b>
Using Windows tools .....	73
Creating HP Recovery media (select products only) .....	73
Using HP Recovery Manager to create recovery media .....	74
Before you begin .....	74
Creating the recovery media .....	74
Using the HP Cloud Recovery Download Tool to create recovery media .....	75
Restoring and recovery .....	75
Restoring, resetting, and refreshing using Windows tools .....	75
Restoring using HP Recovery Manager and the HP Recovery partition .....	75
Recovering using HP Recovery Manager .....	75
Recovering using the HP Recovery partition (select products only) .....	76
Recovering using HP Recovery media .....	76
Changing the computer boot order .....	77
Removing the HP Recovery partition (select products only) .....	77
<b>10 Specifications .....</b>	<b>78</b>
<b>11 Power cord set requirements .....</b>	<b>79</b>
Requirements for all countries .....	79
Requirements for specific countries and regions .....	79
<b>12 Recycling .....</b>	<b>81</b>
<b>Index .....</b>	<b>82</b>



# 1 Product description

Category	Description	UMA	Discrete
<b>Product Name</b>	HP Pavilion 15 Laptop PC	✓	✓
	<i>* Model numbers: 15-cu0000 – 15-cu0999</i>	✓	✓
	<i>* Model numbers: 15-cu1000 – 15-cu1999</i>	✓	✓
<b>Processors</b>	<b>8th generation Intel® Core™ processors:</b>	✓	✓
	i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad-core processor (8.0-MB L3 cache, 2400-MHz FSB, 15 W)		✓
	i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad-core processor (6.0-MB L3 cache, 2400-MHz FSB, 15 W)	✓	✓
	i3-8145U 2.10-GHz (SC turbo up to 3.90-GHz) dual-core processor (4.0-MB L3 cache, 2400-MHz FSB, 15 W)	✓	
	i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (8.0-MB L3 cache, 2400-MHz FSB, 15 W)	✓	✓
	i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 2400-MHz FSB, 15 W)	✓	✓
	i3-8130U 2.20-GHz (SC turbo up to 3.40-GHz) dual core processor (4.0-MB L3 cache, 2400-MHz FSB, 15 W)	✓	
<b>Chipset</b>	Integrated with soldered-on-circuit (SoC)	✓	✓
<b>Graphics</b>	Support for HD decode, DX12, and high-definition multimedia interface (HDMI)	✓	✓
	<b>Internal graphics:</b>	✓	✓
	Intel UHD Graphics 620	✓	
	Intel HD Graphics 620	✓	
	<b>Hybrid graphics:</b>		✓
	AMD Radeon® 530 with up to 4096-MB of discrete video memory		✓
	AMD Radeon 530 with up to 2048-MB of discrete video memory		✓
<b>Panel</b>	<b>15.6-in, white light-emitting (WLED), slim, eDP, 16:9 aspect ratio:</b>	✓	✓
	HD (1366×768), BrightView, SVA, 220 nits	✓	✓
	HD (1366×768), BrightView, SVA, 200 nits, Touch-on Panel (TOP)	✓	✓
	Full high-definition (FHD) (1920×1080), BrightView, UWVA, 220 nits	✓	✓
	FHD (1920×1080), anti glare, SVA, 220 nits	✓	✓
	FHD (1920×1080), BrightView, UWVA, 220 nits, Touch-on Panel (TOP)	✓	✓
	Touch solution with bezel, multi-touch enabled	✓	✓
<b>Memory</b>	Two SODIMM memory module slots, non-customer-accessible/non-upgradable	✓	✓
	Supports up to 16-GB of system memory	✓	✓

Category	Description	UMA	Discrete
	DDR4-2400 dual channel support (DDR4-2666 bridge to DDR4-2400)	√	√
	DDR4-2133 dual channel support (DDR4-2666 bridge to DDR4-2400, and DDR4-2400 downgrade to DDR4-2133)	√	√
	Supports the following configurations:	√	√
	• 16384 MB (8192 MB × 2)	√	√
	• 12288 MB (8192 MB × 1 + 4096 × 1)	√	√
	• 8192 MB (8192 MB × 1 or 4096 MB × 2)	√	√
	• 6144 MB (4096 MB × 1 + 2048 MB × 1)	√	√
	• 4096 MB (4096 MB × 1)	√	√
<b>Storage</b>	<b>Support for all 7.2 mm/9.5 mm, SATA, 2.5-inch hard drives:</b>	√	√
	Support for solid-state drive + hard drive	√	√
	Support for M.2 SATA/PCIe solid-state drive	√	√
	Accelerometer/Hard drive protection support (select models only)	√	√
	<b>Single hard drive configurations:</b>	√	√
	2-TB, 5400-rpm, 9.5 mm/7.2 mm	√	√
	1-TB, 5400-rpm, 9.5 mm/7.2 mm	√	√
	<b>Solid-state hard drive configuration:</b>	√	√
	1-TB, 5400-rpm, 9.5 mm/7.2 mm, solid-state hard drive with 8-GB NAND	√	√
	<b>Dual storage configurations:</b>	√	√
	256-GB, PCIe, value, solid-state drive + 1-TB, 5400-rpm 9.5 mm/7.2 mm hard drive	√	√
	256-GB, SATA, TLC, solid-state drive + 1-TB, 5400-rpm 9.5 mm/7.2 mm hard drive	√	√
	128-GB, SATA, TLC, solid-state drive + 1-TB, 5400-rpm 9.5 mm/7.2 mm hard drive	√	√
	<b>M.2 SATA-3, TLC, solid-state drive:</b>	√	√
	256-GB	√	√
	<b>M.2, PCIe, NVMe, value, solid-state drive:</b>	√	√
	256-GB	√	√
	<b>Intel Optane (3D Xpoint) Solution, PCIe, Gen3x2, M.2, solid-state drive:</b>	√	√
	16 GB (Optane memory module) + 1 TB, 5400 rpm, 9.5mm/7.2mm hard drive	√	√
<b>Optical drive</b>	9.0 mm tray load, SATA, fixed (not modular)	√	√
	DVD+/-RW Double-Layer Writer	√	√
<b>Camera</b>	<b>HP Wide Vision FHD infrared camera</b> with indicator light and 2 infrared lights, USB 2.0, FHD hybrid BSI sensor, f2.2, WDR, 88° wide field of vision	√	√
	1080p by 30 frames per second	√	√
	Supports Windows Hello	√	√

Category	Description	UMA	Discrete
	Dual array Digital Microphones with appropriate software - beam forming, echo cancellation, noise suppression	✓	✓
	<b>HP Wide Vision HD camera</b> with indicator light, USB 2.0, HD BSI sensor, f2.0, WDR, 88° wide field of vision	✓	✓
	720p by 30 frames per second	✓	✓
	Dual array Digital Microphones w/ appropriate software - beam forming, echo cancellation, noise suppression	✓	✓
<b>Audio</b>	<b>Audio brand:</b> B&O Play	✓	✓
	<b>Audio control panel:</b> B&O Play Audio Control	✓	✓
	Supports HP Audio Boost	✓	✓
	Dual speakers	✓	✓
<b>Wireless</b>	Compatible with Miracast-certified devices	✓	✓
	Turbo WLAN SVTP	✓	✓
	<b>Integrated wireless options with dual antennas (M.2/PCIe):</b>	✓	✓
	Intel Dual Band 9560 802.11 ac 2×2 MU-MIMO + Bluetooth 5 (non-vPro)	✓	✓
	Intel Dual band wireless-AC 3168 802.11AC 1×1 WiFi + Bluetooth 4.2 Combo Adaptor (non-vPro)	✓	✓
	Intel Dual Band Wireless-AC 7265 802.11 AC 2×2 WiFi + Bluetooth 4.2 Combo Adapter (non-vPro)	✓	✓
	Realtek RTL8822BE 802.11 ac 2×2 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	✓	✓
	<b>Integrated wireless options with single antenna (M.2/PCIe):</b>	✓	✓
	Realtek RTL8821CE 802.11 ac 1×1 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	✓	✓
	Intel Wireless-AC 9461 802.11AC 1×1 WiFi + BT 5.0 (non-vPro) (MU-MIMO supported)	✓	✓
<b>External media cards</b>	<b>HP Multi-Format Digital Media Card Reader</b>	✓	✓
	Supports SD/SDHC/SDXC	✓	✓
	Push-push insertion/removal	✓	✓
<b>Internal card expansion</b>	One M.2 slot for solid-state drive	✓	✓
	One M.2 slot for WLAN	✓	✓
<b>Ports</b>	AC Smart Pin adapter plug	✓	✓
	Audio-out (headphone)/audio-in (microphone) combo jack	✓	✓
	HDMI v1.4 supporting up to 1920×1080 @ 60Hz	✓	✓
	RJ-45/Ethernet	✓	✓
	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)	✓	✓
	USB 3.0 ports (2, left side)	✓	✓
	USB Type-C port; USB 3.1 Gen 1 (left side); supports data transfer	✓	✓
<b>Keyboard/ TouchPad</b>	<b>Keyboard:</b>	✓	✓
	Full-sized, two coat paint, island-style keyboard with numeric keypad	✓	✓

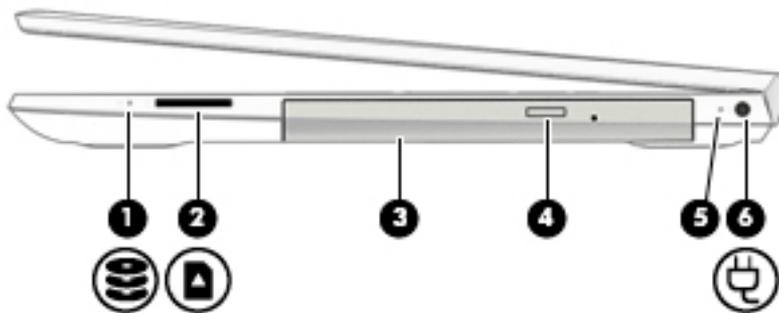
Category	Description	UMA	Discrete
	Full-sized, three-coat paint, backlit, island-style keyboard with numeric keypad	√	√
	<b>TouchPad:</b>	√	√
	Image sensor	√	√
	MultiTouch gestures enabled	√	√
	Support for Modern TrackPad gestures	√	√
	Taps enabled as default	√	√
<b>Power requirements</b>	<b>Battery:</b>	√	√
	3-cell, 41-WHr, 3549 mAh, prismatic/polymer battery	√	√
	Supports battery fast charge	√	√
	<b>AC adapter:</b>	√	√
	65-W HP Smart AC adapter (EM) with power cord	√	√
	65-W HP Smart AC adapter with power cord		√
	45-W HP Smart AC adapter with power cord	√	
	<b>Power cord:</b>	√	√
	1.0 m conventional power cord with a C5 connector	√	√
	1.0 m conventional power cord with a C5 connector + Japan plug adapter	√	√
<b>Security</b>	Kensington Nano Security Slot	√	√
	Support for Trusted Platform Module (TPM) 2.0	√	√
<b>Operating system</b>	FreeDOS 2.0	√	√
	<b>Preinstalled:</b>	√	√
	Windows 10	√	√
	Windows 10 Professional	√	√
	<b>For Developed Markets (ML):</b>	√	√
	Windows 10 Home ML	√	√
	Windows 10 Home Plus ML	√	√
	<b>For Emerging Markets (EM/SL):</b>	√	√
	Windows 10 Home EM/SL	√	√
	Windows 10 Home Plus EM/SL	√	√
	Windows 10 Home Value NB EM/SL	√	
	Windows 10 Home Value NB Select Geo EM/SL	√	
	<b>For China Market:</b>	√	√
	CPPP Windows 10 Home High End China Language Edition	√	√
	CPPP Windows 10 Home China Language Edition	√	√
	<b>For India Market:</b>	√	√

Category	Description	UMA	Discrete
	Windows 10 Home Plus EM/SL IPPP	√	√
	Windows 10 Home EM/SL IPPP	√	√
	<b>For Indonesia Market:</b>		
	Windows 10 Home Entry EM/SL Indonesia PPP	√	√
	Windows 10 Home Plus EM/SL Indonesia PPP	√	√
	<b>For APAC EM Partner Program:</b>		
	Windows 10 Home Entry EM/SL APAC PPP	√	√
	Windows 10 Home Plus EM/SL APAC PPP	√	√
<b>Serviceability</b>	<b>End user replaceable parts:</b>	√	√
	AC adapter	√	√
	Optical drive	√	√

## 2 Getting to know your computer

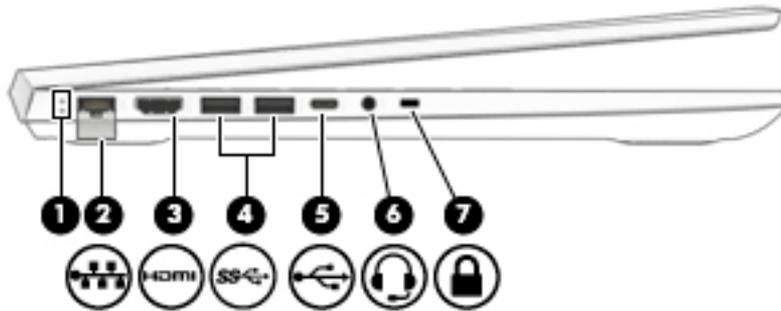
Your computer features top-rated components. This chapter provides details about your components, where they are located, and how they work.

### Right side



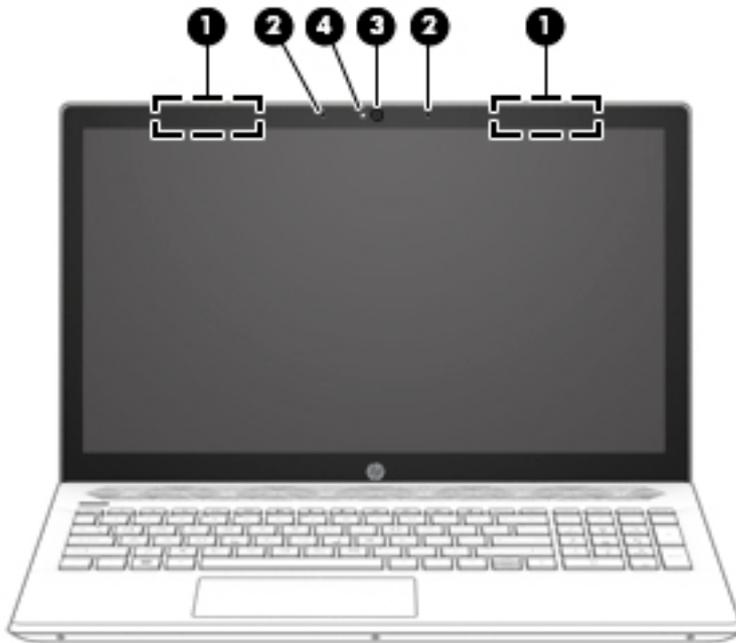
Component	Description
(1)  Drive light	<ul style="list-style-type: none"><li>• Blinking white: The hard drive is being accessed.</li><li>• Amber: HP 3D DriveGuard (select products only) has temporarily parked the hard drive.</li></ul>
(2)  Memory card reader	<p>Reads optional memory cards that enable you to store, manage, share, or access information.</p> <p>To insert a card:</p> <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> <p>To remove a card:</p> <ul style="list-style-type: none"><li>▲ Press in on the card, and then remove it from the memory card reader.</li></ul>
(3) Optical drive	Depending on your computer model, reads an optical disc or reads and writes to an optical disc.
(4) Optical drive eject button	Releases the optical drive disc tray.
(5) AC adapter and battery light	<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>
(6)  Power connector	Connects an AC adapter.

## Left side



Component	Description
(1)	<p>RJ-45 (network) status lights</p> <ul style="list-style-type: none"> <li>White: The network is connected.</li> <li>Amber: Activity is occurring on the network.</li> </ul>
(2)	<p>RJ-45 (network) jack</p> <p>Connects a network cable.</p>
(3)	<p>HDMI port</p> <p>Connects an optional video or audio device, such as a high-definition television, any compatible digital or audio component, or a high-speed High-Definition Multimedia Interface (HDMI) device.</p>
(4)	<p>USB SuperSpeed ports (2)</p> <p>Connect a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provide high-speed data transfer.</p>
(5)	<p>USB Type-C port</p> <p>Connects a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provides data transfer.</p> <p><b>NOTE:</b> Cables and/or adapters (purchased separately) may be required.</p>
(6)	<p>Audio-out (headphone)/Audio-in (microphone) combo jack</p> <p>Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. Also connects an optional headset microphone. This jack does not support optional standalone microphones.</p> <p><b>WARNING!</b> To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, see the <i>Regulatory, Safety, and Environmental Notices</i>.</p> <p>To access this guide:</p> <ul style="list-style-type: none"> <li>Select the <b>Start</b> button, select <b>HP Help and Support</b>, and then select <b>HP Documentation</b>.</li> </ul> <p><b>NOTE:</b> When a device is connected to the jack, the computer speakers are disabled.</p>
(7)	<p>Security cable slot</p> <p>Attaches an optional security cable to the computer.</p> <p><b>NOTE:</b> The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.</p>

# Display



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) Internal microphones (2)	Record sound.
(3) Camera(s)	Allow(s) you to video chat, record video, and record still images. Some cameras also allow a facial recognition logon to Windows, instead of a password logon. <b>NOTE:</b> Camera functions vary depending on the camera hardware and software installed on your product.
(4) Camera light	On: One or more cameras are in use.

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

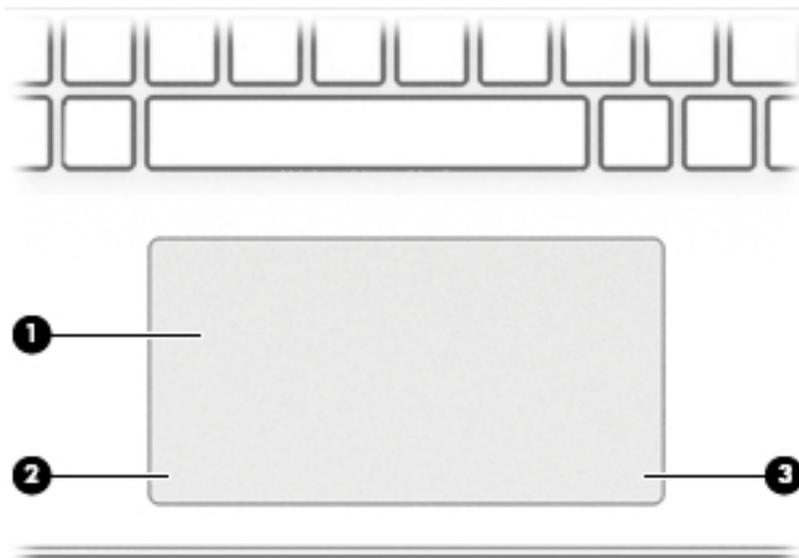
For wireless regulatory notices, see the section of the *Regulatory, Safety, and Environmental Notices* that applies to your country or region.

To access this guide:

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

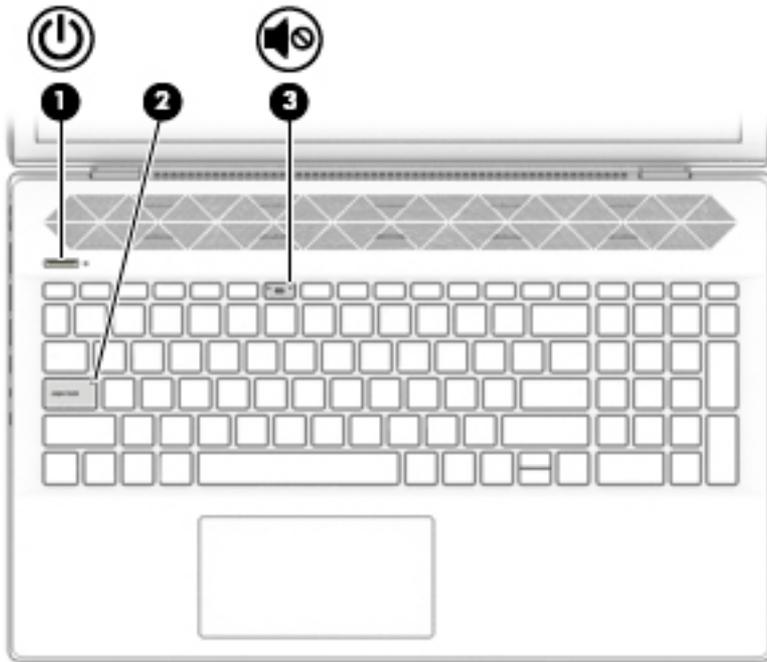
# Keyboard area

## TouchPad



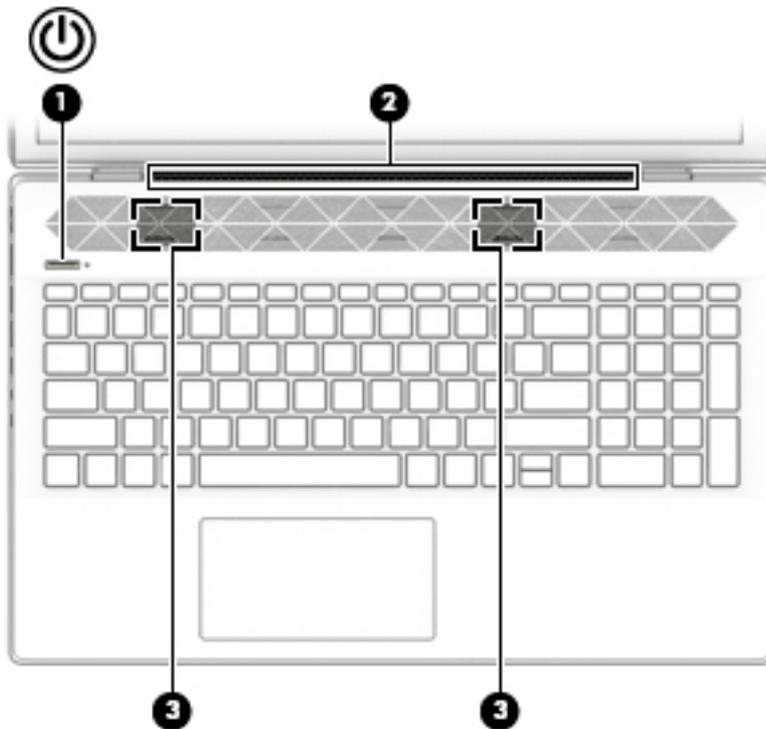
Component		Description
(1)	TouchPad zone	Reads your finger gestures to move the pointer or activate items on the screen.
(2)	Left control zone	Textured area that allows you to perform additional gestures.
(3)	Right control zone	Textured area that allows you to perform additional gestures.

## Lights



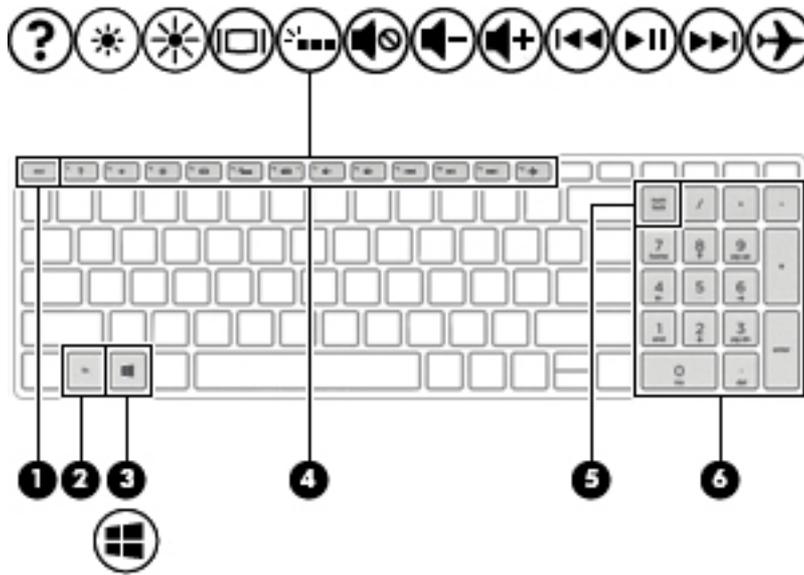
Component	Description
(1)  Power light	<ul style="list-style-type: none"><li>• On: The computer is on.</li><li>• Blinking: The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unneeded components.</li><li>• Off: The computer is off or in Hibernation. Hibernation is a power-saving state that uses the least amount of power.</li></ul>
(2) Caps lock light	On: Caps lock is on, which switches the key input to all capital letters.
(3)  Mute light	<ul style="list-style-type: none"><li>• On: Computer sound is off.</li><li>• Off: Computer sound is on.</li></ul>

## Button, vent, and speakers



Component	Description
<b>(1)</b>  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> <p>▲ Right-click the <b>Power</b> icon , and then select <b>Power Options</b>.</p>
<b>(2)</b> Vent	<p>Enables airflow to cool internal components.</p> <p><b>NOTE:</b> The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.</p>
<b>(3)</b> Speakers (2)	Produce sound.

## Special keys



Component	Description
(1) <code>esc</code> key	Displays system information when pressed in combination with the <code>fn</code> key.
(2) <code>fn</code> key	Executes specific functions when pressed in combination with another key.
(3)  Windows key	Opens the Start menu. <b>NOTE:</b> Pressing the Windows key again will close the Start menu.
(4) Action keys	Execute frequently used system functions. <b>NOTE:</b> On select products, the <code>f5</code> action key turns the keyboard backlight feature off or on.
(5) <code>num lock</code> 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 <code>num lock</code> 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.

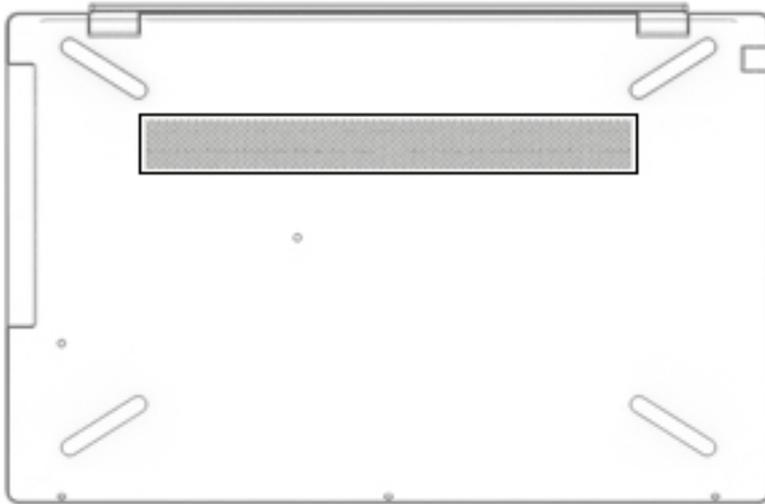
## Action keys

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 12](#).

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

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. 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



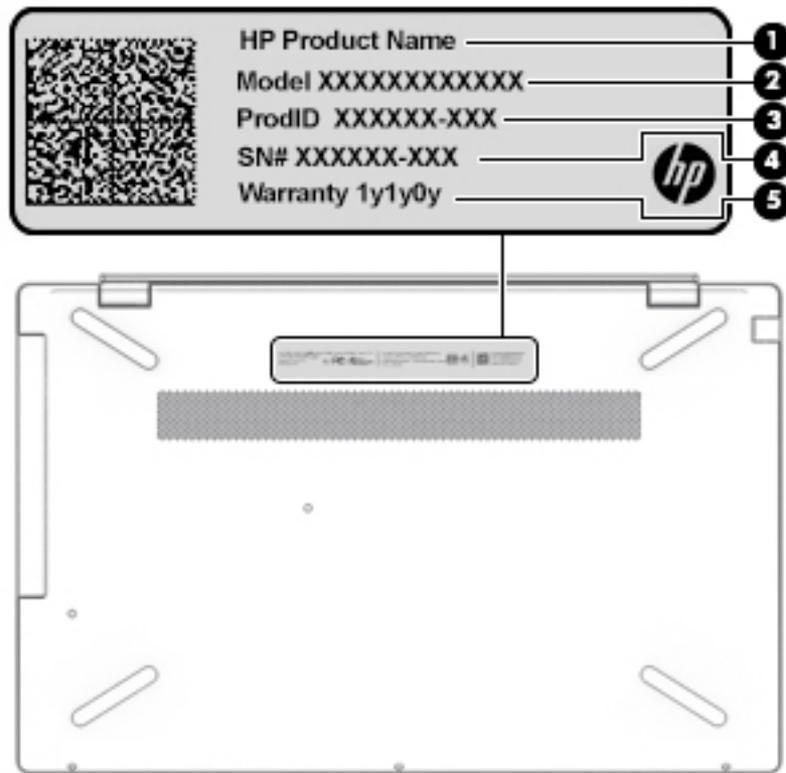
Component	Description
Vent	Enables airflow to cool internal components. <b>NOTE:</b> The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.

# 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.



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### Component

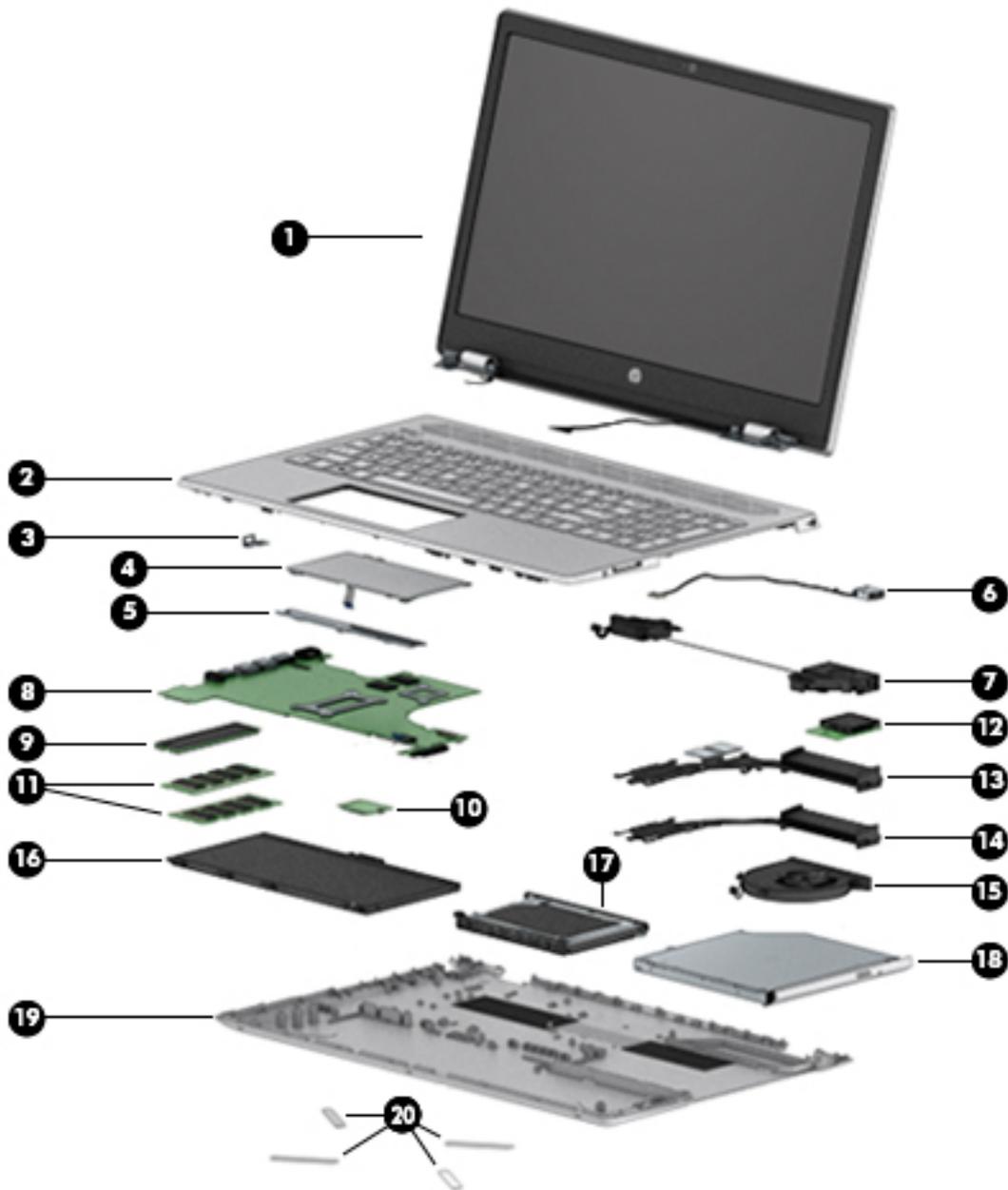
- 
- |     |                 |
|-----|-----------------|
| (1) | HP product name |
| (2) | Model number    |
| (3) | Product ID      |
| (4) | Serial number   |
| (5) | Warranty period |
- 

- 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

 **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.

## Computer components

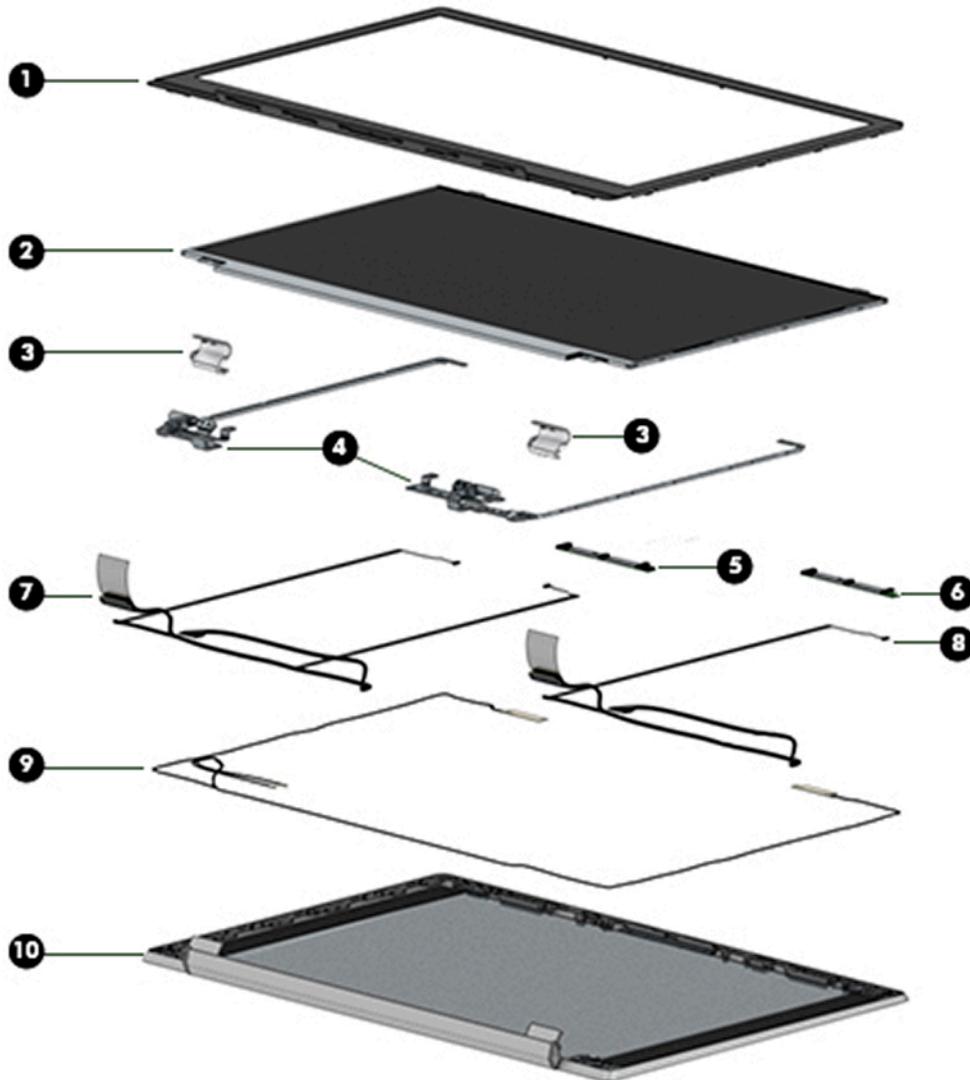


Item	Component	Spare part number
(1)	<b>Display assembly:</b> The display assembly is spared at the subcomponent level only. For more display assembly spare part information, see <a href="#">Display assembly components on page 19</a> .	
(2)	<b>Top cover with backlit keyboard in natural silver finish</b>	
	For use in Canada	L24925-DB1
	For use in Japan	L24925-291
	For use in South Korea	L24925-AD1
	For use in Taiwan	L24925-AB1
	For use in Thailand	L24925-281
	For use in the United States	L24925-001
	<b>Top cover with non-backlit keyboard in natural silver finish:</b>	
	For use in Canada	L24926-DB1
	For use in Japan	L24926-291
	For use in South Korea	L24926-AD1
	For use in Taiwan	L24926-AB1
	For use in Thailand	L24926-281
	For use in the United States	L24926-001
(3)	<b>Lock bracket</b>	L24943-001
(4)	<b>TouchPad</b>	L24934-001
	<b>NOTE:</b> The TouchPad cable is available using spare part number L24932-001.	
(5)	<b>TouchPad bracket</b>	L24931-001
(6)	<b>Power connector cable</b>	810327-006
(7)	<b>Speakers</b> (include cables)	L24941-001
(8)	<b>System board</b> (includes processor and replacement thermal material):	
	For use in models with discrete graphics equipped with the following processors:	
	<ul style="list-style-type: none"> <li>Intel Core i7-8565U processor and 4 GB of discrete graphics memory</li> </ul>	L36252-xx1
	<ul style="list-style-type: none"> <li>Intel Core i5-8265U processor and 2 GB of discrete graphics memory</li> </ul>	L36251-xx1
	<ul style="list-style-type: none"> <li>Intel Core i7-8550U processor and 4 GB of discrete graphics memory</li> </ul>	L22879-xx1
	<ul style="list-style-type: none"> <li>Intel Core i7-8550U processor and 2 GB of discrete graphics memory</li> </ul>	L22878-xx1
	<ul style="list-style-type: none"> <li>Intel Core i5-8250U processor and 4 GB of discrete graphics memory</li> </ul>	L22875-xx1
	<ul style="list-style-type: none"> <li>Intel Core i5-8250U processor and 2 GB of discrete graphics memory</li> </ul>	L22874-xx1
	For use in models with UMA graphics equipped with the following processors:	
	<ul style="list-style-type: none"> <li>Intel Core i5-8265U processor</li> </ul>	L36254-xx1
	<ul style="list-style-type: none"> <li>Intel Core i3-8145U processor</li> </ul>	L36253-xx1
	<ul style="list-style-type: none"> <li>Intel Core i5-8250U processor</li> </ul>	L22881-xx1
	<ul style="list-style-type: none"> <li>Intel Core i3-8130U processor</li> </ul>	L22880-xx1

Item	Component	Spare part number
<b>(9)</b>	<b>Solid-state drive (2280 M.2):</b>	
	256-GB, SATA-3, TLC	L25202-001
	256-GB, PCIe, TLC	L25205-001
	128-GB, SATA-3, TLC	L25204-001
	16-GB, PCIe (Optane memory module)	L25203-001
<b>(10)</b>	<b>WLAN module:</b>	
	Intel Wireless-AC 9560 802.11 ac 2×2 WiFi + Bluetooth 5 (non-vPro)	L22634-005
	Intel Wireless-AC 9461 802.11 ac 1×1 WiFi + Bluetooth 5.0 (non-vPro)	L25889-005
	Intel Dual Band Wireless-AC 7265 802.11 ac 2×2 WiFi + Bluetooth 4.2 Combo Adapter (non-vPro)	901229-855
	Intel Dual Band Wireless-AC 3168 802.11 ac 1×1 WiFi + Bluetooth 4.2 Combo Adapter (non-vPro)	863934-855
	Realtek RTL8822BE 802.11 ac 2x2 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	924813-855
	Realtek RTL8821CE 802.11 ac 1x1 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	L17365-005
<b>(11)</b>	<b>Memory modules (2, DDR4-2400, 1.2-V):</b>	
	8-MB	862398-855
	4-MB	862397-855
	2-MB	864271-855
<b>(12)</b>	<b>Card reader board</b>	L24929-001
	<b>NOTE:</b> The card reader cable is available using spare part number L24930-001.	
	<b>Heat sink (includes replacement thermal material):</b>	
<b>(13)</b>	For use only on computer models equipped with a graphics subsystem with discrete memory	L24940-001
<b>(14)</b>	For use only on computer models equipped with a graphics subsystem with UMA memory	L24939-001
<b>(15)</b>	<b>Fan (includes cable)</b>	L24935-001
<b>(16)</b>	<b>Battery (3-cell, 41-WHr, 3.6-AHr, Li-ion)</b>	L11119-855
<b>(17)</b>	<b>Hard drive (does not include hard drive bracket or hard drive cable):</b>	
	2-TB, 5400-rpm, SATA, 7.0-mm hard drive	912487-855
	1-TB, 5400-rpm, SATA, 7.0-mm, Hybrid 8.0-GB hard drive	924036-855
	1-TB, 5400-rpm, SATA, 7.0-mm hard drive	762990-005
	<b>NOTE:</b> The hard drive spare part kit does not include the hard drive bracket or the hard drive cable. The hard drive bracket is available using spare part number L24924-001. The hard drive cable is available using spare part number L24923-001	
<b>(18)</b>	<b>DVD±RW DL SuperMulti Drive (does not include optical drive bezel or optical drive bracket)</b>	L25293-001
	<b>NOTE:</b> The optical drive spare part kit does not include the optical drive bezel or the optical drive bracket. The optical drive bezel is available using spare part number L24952-001. The optical drive bracket is available using spare part number L24953-001	
<b>(19)</b>	<b>Bottom cover</b>	
	For use in natural silver models	L24918-001

Item	Component	Spare part number
	For use in pale gold models	L24917-001
<b>(20)</b>	<b>Rubber Foot Kit</b> (not illustrated, includes Mylar screw cover)	L24922-001

## Display assembly components

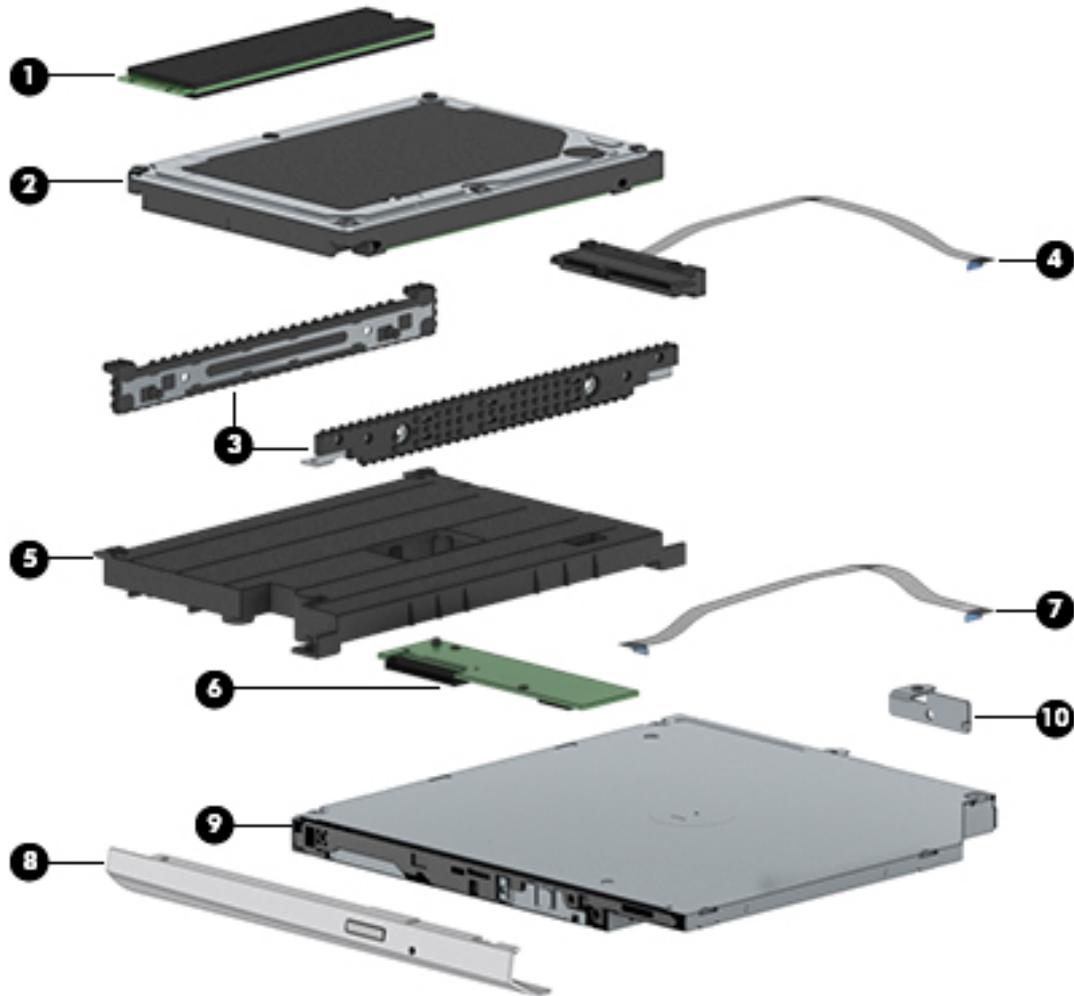


Item	Component	Spare part number
<b>(1)</b>	<b>Display bezel:</b>	
	For use on computer models equipped with a FHD infrared camera	L24909-001
	For use on computer models equipped with a FHD infrared camera and a narrow bezel	L25125-001
	For use on computer models equipped with an HD non-infrared camera	L24908-001
	For use on computer models equipped with an HD non-infrared camera and a narrow bezel	L25124-001

<b>Item</b>	<b>Component</b>	<b>Spare part number</b>
<b>(2)</b>	<b>Display panel:</b>	
	FHD, anti glare, SVA, non-touch	L25206-001
	FHD, anti glare, UWVA, non-touch	L25207-001
	FHD, BrightView, UWVA, non-touch	L25208-001
	FHD, BrightView, UWVA, touch screen	L25209-001
	HD, anti glare, non-touch	L25210-001
	HD, BrightView, non-touch	L25211-001
	HD, BrightView, touch screen	L25212-001
	<b>Display panel conductive tape</b> (not illustrated)	L29768-001
<b>(3)</b>	<b>Hinge covers</b>	L24920-001
<b>(4)</b>	<b>Hinges</b> (include left and right display hinges):	
	For use in models without a narrow bezel	L24916-001
	For use in models with a narrow bezel	L25132-001
<b>(5)</b>	<b>IR camera/microphone module</b>	L28105-001
<b>(6)</b>	<b>HD camera/microphone module</b>	L28106-001
	<b>Display panel cable</b> (includes the camera/microphone module cable)	
<b>(7)</b>	IR camera	
	<ul style="list-style-type: none"> <li>• FHD panel, touch screen</li> </ul>	L24945-001
	<ul style="list-style-type: none"> <li>• HD panel, touch screen</li> </ul>	L24947-001
	<ul style="list-style-type: none"> <li>• Non-touch panel, IR camera</li> </ul>	L24949-001
<b>(8)</b>	HD camera	
	<ul style="list-style-type: none"> <li>• FHD panel, touch screen</li> </ul>	L24944-001
	<ul style="list-style-type: none"> <li>• HD panel, touch screen</li> </ul>	L24946-001
	<ul style="list-style-type: none"> <li>• Non-touch panel</li> </ul>	L24948-001
<b>(9)</b>	<b>Wireless Antenna Kit</b> (includes left and right wireless antenna cables and transceivers):	L24942-001
<b>(10)</b>	<b>Display back cover</b> (includes left and right wireless antenna cables and transceivers and rubber padding and shielding):	
	In pale gold finish	L24910-001
	In ceramic white finish	L24911-001
	In sapphire blue finish	L24913-001
	In velvet burgundy finish	L24914-001
	In mineral silver finish	L24915-001
	In pale gold finish	L25126-001
	In ceramic white finish, narrow bezel	L25127-001
	In sapphire blue finish, narrow bezel	L25129-001

Item	Component	Spare part number
	In velvet burgundy finish, narrow bezel	L25130-001
	In mineral silver finish, narrow bezel	L25131-001

## Mass storage devices



Item	Component	Spare part number
<b>(1)</b>	<b>Solid-state drives (M.2)</b>	
	256-GB, SATA-3, TLC	L25202-001
	256-GB, PCIe, TLC	L25205-001
	128-GB, SATA-3, TLC	L25204-001
	16-GB, PCIe (Optane memory module)	L25203-001
<b>(2)</b>	<b>Hard drives (do not include hard drive cable or brackets)</b>	
	2-TB, 5400-rpm, SATA, 7.0-mm hard drive	912487-855

Item	Component	Spare part number
	1-TB, 5400-rpm, SATA, 7.0-mm, Hybrid 8.0-GB hard drive	924036-855
	1-TB, 5400-rpm, SATA, 7.0-mm hard drive	762990-005
<b>(3)</b>	<b>Hard drive brackets</b>	L24924-001
<b>(4)</b>	<b>Hard drive cable</b>	L24923-001
<b>(5)</b>	<b>Solid-state drive carrier</b>	L24936-001
<b>(6)</b>	<b>Solid-state drive board</b>	L24937-001
<b>(7)</b>	<b>Solid-state drive cable</b>	L24938-001
<b>(8)</b>	<b>Optical drive bezel</b>	L24952-001
<b>(9)</b>	<b>DVD±RW DL SuperMulti Drive</b> (does not include optical drive bezel or bracket)	L25293-001
<b>(10)</b>	<b>Optical drive bracket</b>	L24953-001

## Miscellaneous parts

Component	Spare part number
<b>AC adapter:</b>	
65-W HP Smart AC adapter (non-PFC, EM, RC, 4.5-mm)	913691-850
65-W AC adapter (non-PFC, S-3P, 4.5-mm)	710412-001
45-W HP Smart AC adapter (non-PFC, RC, 4.5-mm, non-slim)	741727-001
<b>HP HDMI-to-VGA adapter</b>	701943-001
<b>HP USB-C to USB-A dongle</b>	914936-001
<b>Power cord</b> (C5 connector, 1.0 m):	
For use in Australia	L19358-001
For use in Europe	L19361-001
For use in India	L19363-001
For use in Japan	L19365-001
For use in North America	L19367-001
For use in the People's Republic of China	L19368-001
For use in South Korea	L19366-001
For use in Taiwan	L19372-001
For use in Thailand	L19371-001
For use in the United Kingdom	L19373-001
<b>Power adapter, C5, for use in Japan</b>	226768-001
<b>Rubber Foot Kit</b> (includes bottom cover rear feet)	L24922-001
<b>Screw Kit</b>	L24950-001

---

## 4 Removal and replacement preliminary requirements

### Tools required

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

- Flat-bladed screw driver
- Magnetic screw driver
- Phillips P0 screw driver

### Service considerations

The following sections include some of the considerations that you must keep in mind during disassembly and assembly procedures.

---

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

---

### Plastic parts

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

---

## Cables and connectors

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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 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 a diskette drive or optical drive, be sure that a diskette or 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 drive, place it in a static-proof bag.

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

Avoid exposing a drive to temperature extremes or liquids.

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

---

# Grounding guidelines

## Electrostatic discharge damage

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

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

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

**⚠ CAUTION:** To prevent damage to the computer when you are removing or installing internal components, observe these precautions:

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

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

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

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

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

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

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

## Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

- To avoid hand contact, transport products in static-safe tubes, bags, or boxes.
- Protect ESD-sensitive parts and assemblies with conductive or approved containers or packaging.
- Keep ESD-sensitive parts in their containers until the parts arrive at static-free workstations.
- Place items on a grounded surface before removing items from their containers.
- Always be properly grounded when touching a component or assembly.
- Store reusable ESD-sensitive parts from assemblies in protective packaging or 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.

## 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.

## Equipment guidelines

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

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

The following grounding equipment is recommended to prevent electrostatic damage:

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

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

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

# 5 Removal and replacement procedures for 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.

## Component replacement procedures

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

 **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.

## Optical drive

Description	Spare part number
DVD±RW DL SuperMulti Drive (does not include optical drive bezel or optical drive bracket)	L25293-001

**NOTE:** The optical drive spare part kit does not include the optical drive bezel or the optical drive bracket. The optical drive bezel is available using spare part number L24952-001. The optical drive bracket is available using spare part number L24953-001

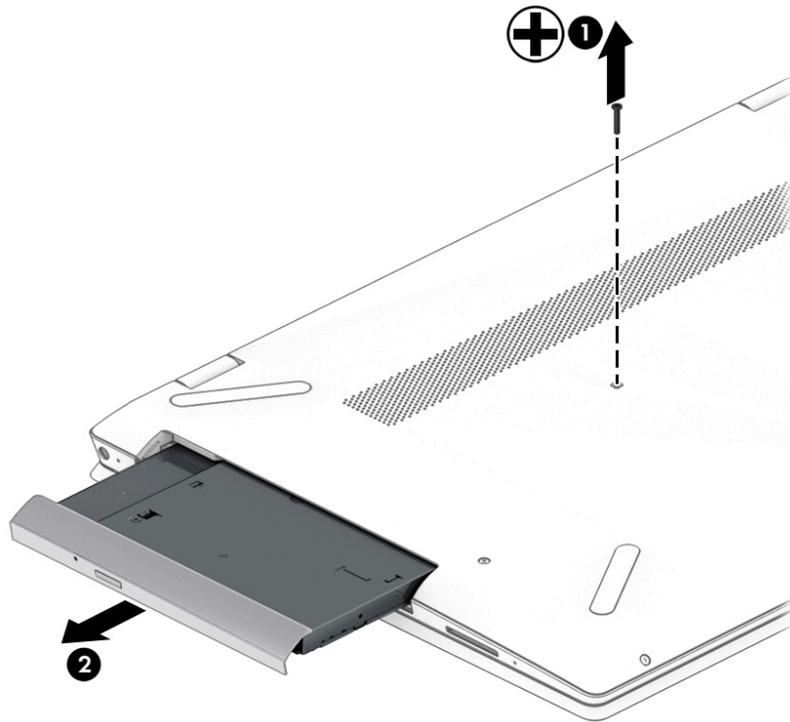
Before disassembling the computer, follow these steps:

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

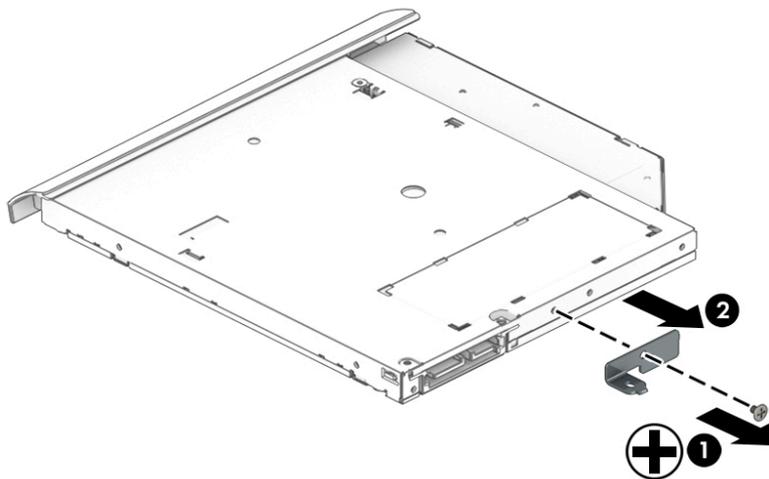
Remove the optical drive:

1. Position the computer upside down on a flat surface.
2. Position the computer with the front toward you.
3. Remove the Phillips M2.0×11.0 screw **(1)** that secures the optical drive to the computer.

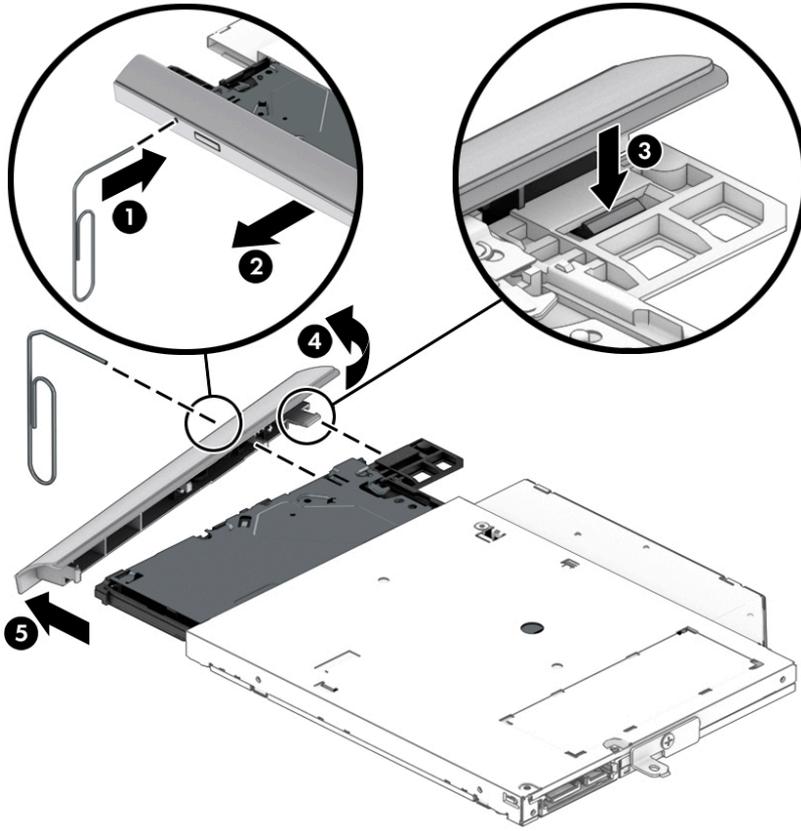
4. Slide the optical drive out of the computer (2).



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



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



Reverse this procedure to assemble and install the optical drive.

# 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.

**CAUTION:** Only HP authorized service providers should perform the removal and replacement procedures described here. Accessing the internal part could damage the computer or void the warranty.

## Component replacement procedures

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

 **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.

There are as many as 54 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

Description	Spare part number
Bottom cover	L24918-001

Before removing the bottom cover, follow these steps:

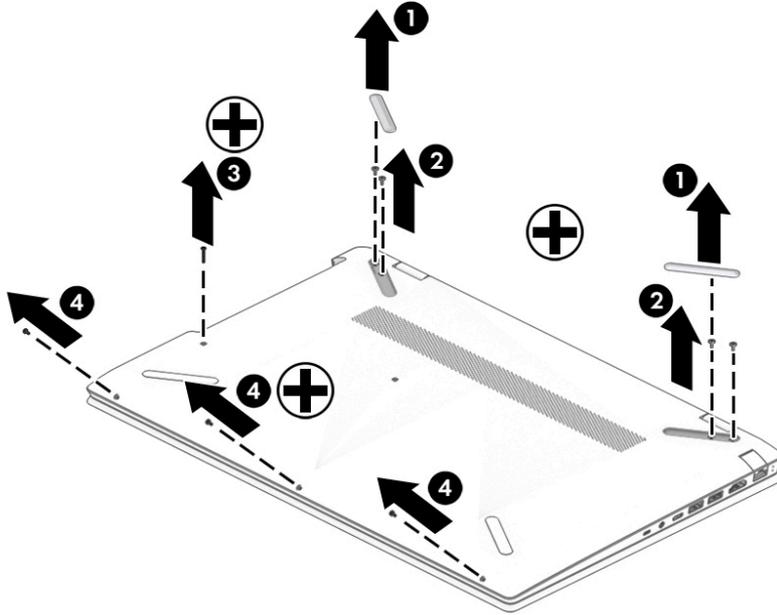
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)).

Remove the bottom cover:

1. Remove the two rubber feet **(1)**.

The rubber feet are available using spare part number L24922-001.

2. Remove the following screws that secure the bottom cover to the computer:
  - (2) Two Phillips M2.5×6.0 screws under the rubber feet
  - (3) One Phillips M2.0×11.0 screw in the middle of the bottom cover
  - (4) Three Phillips M2.0×4.0 screws along the front edge on the bottom cover



3. Starting under the hinges, use a thin plastic tool to pry the bottom cover off the computer (1).
4. Remove the bottom cover (2).



Reverse this procedure to install the bottom cover.

## RJ-45 cover

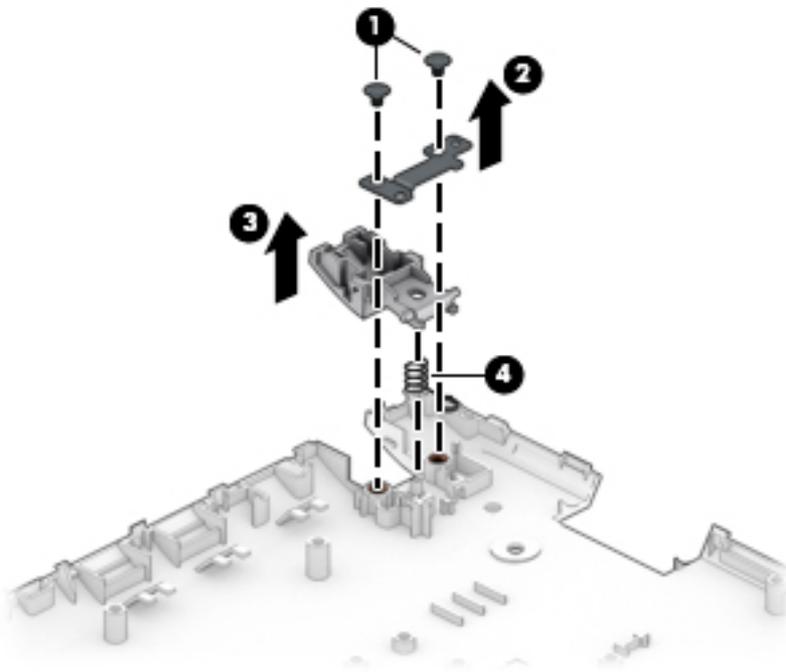
Description	Spare part number
RJ-45 cover	not spared

Before removing the RJ-45 cover, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)).
5. Remove the bottom cover (see [Bottom cover on page 31](#)).

Remove the RJ-45 cover:

1. Position the bottom cover upside down.
2. Remove the two Phillips M2.0×2.0 screws **(1)** that secure the RJ-45 cover to the bottom cover.
3. Lift the bracket from on top of the RJ-45 cover **(2)**.
4. Lift up on the RJ-45 cover, and remove it from bottom cover **(3)**.
5. Remove the spring from the bottom cover **(4)**.



Reverse this procedure to install the RJ-45 cover.

## Battery

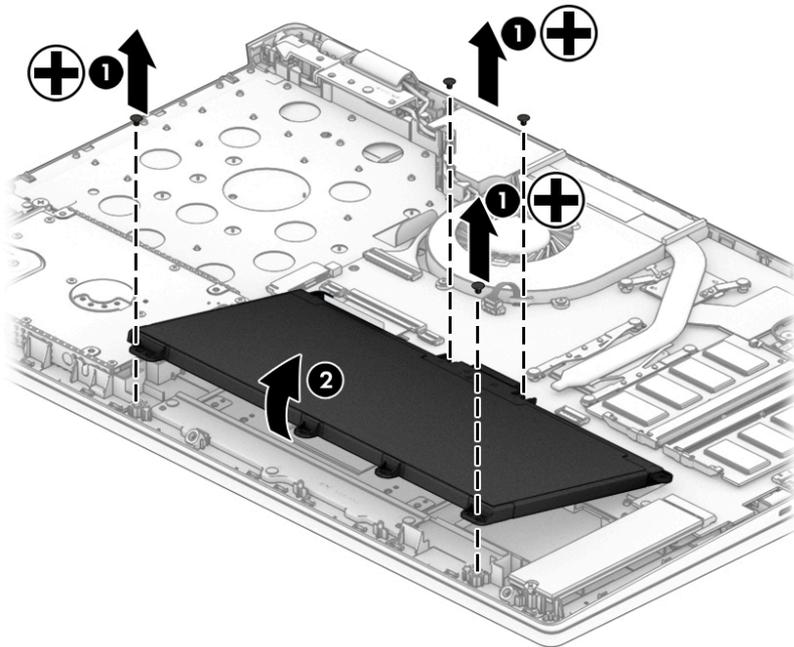
Description	Spare part number
3-cell, 41-WHr, 3.6-AHr, Li-ion battery	L11119-855

Before removing the battery, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)).
5. Remove the bottom cover (see [Bottom cover on page 31](#)).

Remove the battery:

1. Remove the four Phillips M2.0×4.0 screws (1) that secure the battery to the computer.
2. Remove the battery from the computer (2).



Reverse this procedure to install the battery.

## Display assembly



**NOTE:** The display assembly is spared at the subcomponent level. For display assembly spare part information, see the individual removal subsections.

---

Before removing the display assembly, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)).
5. Remove the bottom cover (see [Bottom cover on page 31](#)).
6. Remove the battery (see [Battery on page 34](#)).

Remove the display assembly:

1. Disconnect the display cable from the system board ZIF connector **(1)**.
2. Disconnect the WLAN antenna cables **(2)** from the terminals on the WLAN module.

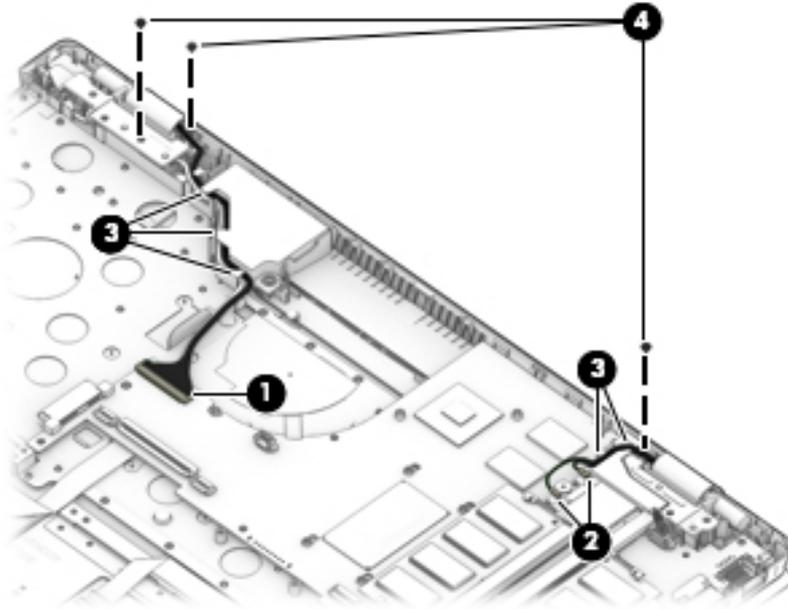


**NOTE:** The WLAN antenna cable labeled "1/MAIN" connects to the WLAN module "Main" terminal. The WLAN antenna cable labeled "2/AUX" connects to the WLAN module "Aux" terminal.

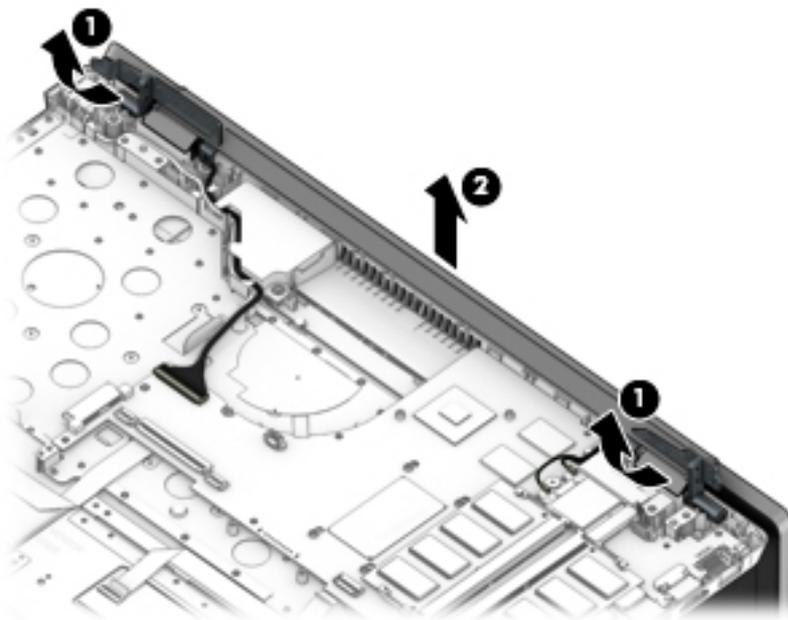
---

3. Release the display panel from the retention clips **(3)** and routing channel built into the left speaker.
4. Release the WLAN antenna cables from the retention clips **(3)** and routing channel built into the right speaker.

5. Remove the three Phillips M2.5×6.0 screws (4) that secure the display assembly to the computer.



6. Rotate the hinges upward (1).
7. Separate the display from the computer (2).

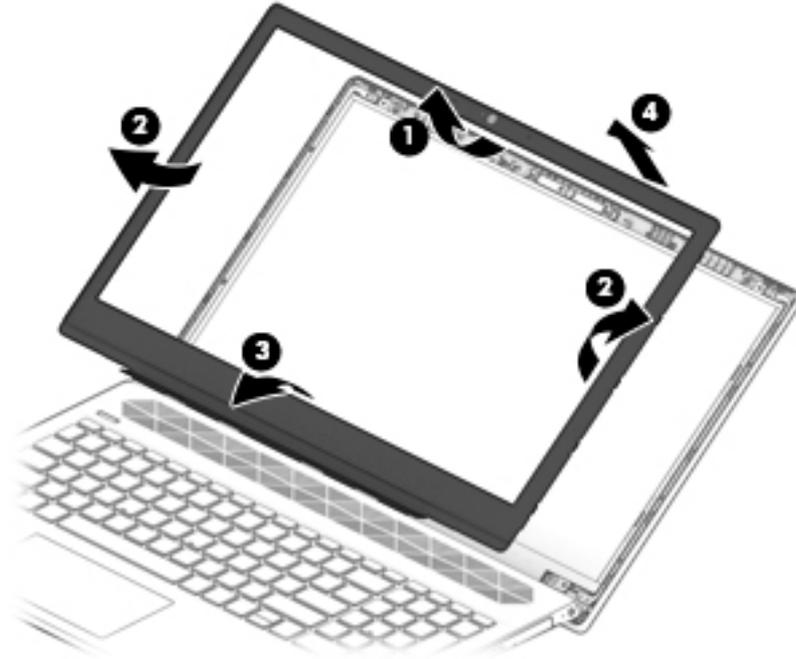


8. If it is necessary to replace the display bezel or any of the display assembly subcomponents:
  - a. Release the top edge of the display bezel (1) from the display assembly.
  - b. Release the left and right edges of the display bezel (2) from the display assembly.

- c. Release the bottom edge of the display bezel **(3)** from the display assembly.
- d. Remove the display bezel **(4)** from the display assembly.

The display bezel is available using the following spare part numbers:

- L24909-001 - FHD infrared camera
- L25125-001 - FHD infrared camera, models with a narrow bezel
- L24908-001 - HD non-infrared camera
- L25124-001 - HD non-infrared camera, models with a narrow bezel



9. If it is necessary to replace the camera/microphone module:
  - a. Disconnect the cable **(1)** from the camera/microphone module.

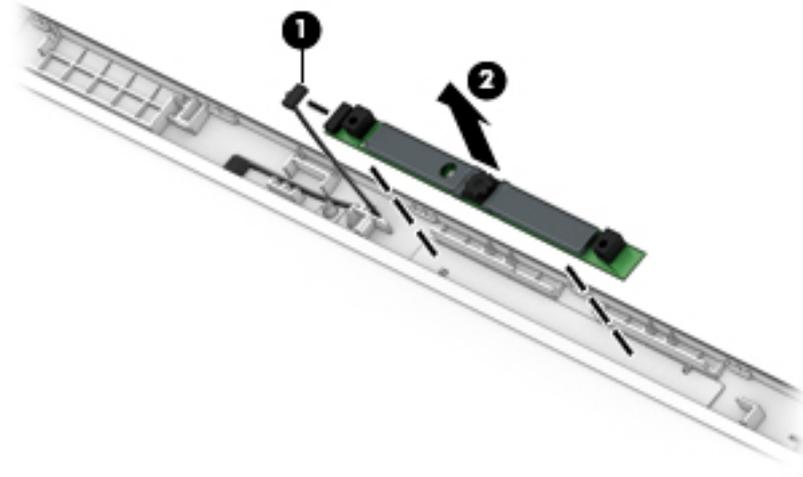


**NOTE:** Cables connect to both sides of IR cameras. A single cable connects to only one side of HD cameras.

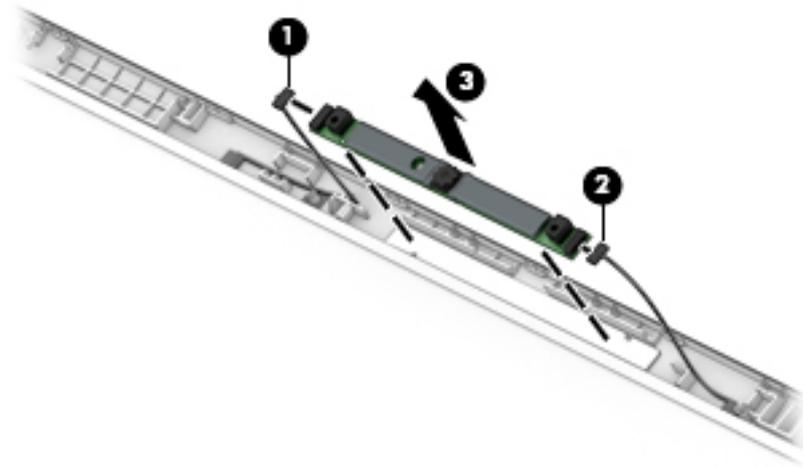
- b.** Detach the camera/microphone module **(2)** from the display back cover. (The module is attached with double-sided adhesive.)

The camera/microphone module is available using spare part numbers L28105-001 for FHD infrared camera/microphone modules and L28106-001 for HD non-infrared camera/microphone modules.

**Models with an HD camera**



**Models with an IR camera**

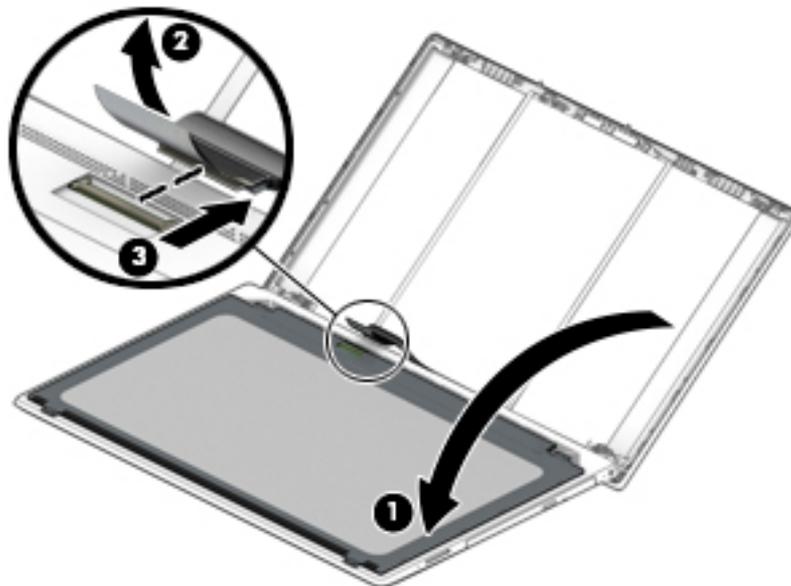


- 10.** If it is necessary to replace the display panel:

- a.** Remove the four Phillips M2.0×3.0 screws that secure the display panel to the display back cover.



- b. Swing the top edge of the display panel **(1)** up and forward until the panel rests upside down on the keyboard.
- c. Release the adhesive support strip **(2)** that secures the display panel cable connector to the display panel.
- d. Disconnect the display panel cable **(3)** from the display panel.



- e. Remove the display panel.

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

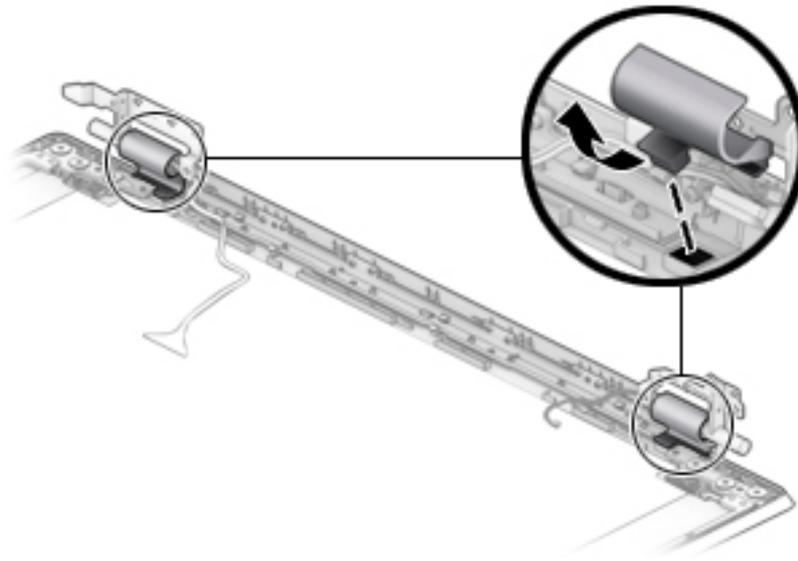
- L25206-001 – FHD, anti glare, SVA, non-touch
- L25207-001 – FHD, anti glare, UWVA, non-touch

- L25208-001 – FHD, BrightView, UWVA, non-touch
- L25209-001 – FHD, BrightView, UWVA, touch screen
- L25210-001 – FHD, anti glare, SVA, non-touch
- L25211-001 – FHD, BrightView, SVA, non-touch
- L25212-001 – FHD, BrightView, SVA, touch screen

Display panel conductive tape is available using spare part number L29768-001.

11. Pull up on the side of the hinge cover to remove it.

Hinge covers are available using spare part number L24920-001.

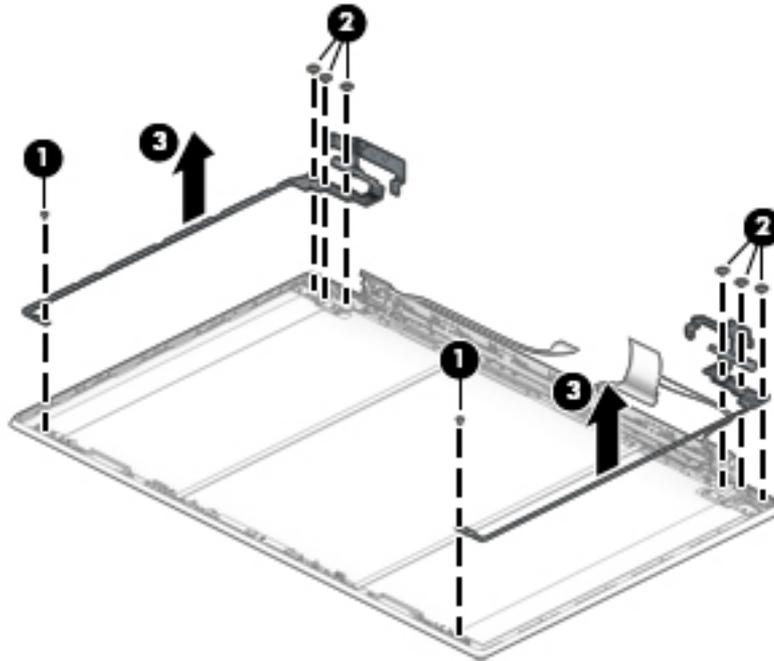


12. If it is necessary to replace the display hinges:

- a. Remove the two Phillips M2.0×2.5 screws **(1)** from the top of the hinges.
- b. Remove the six Phillips M2.0×3.0 broad head screws **(2)** from the bottom of the hinges.

- c. Remove the display hinges (3).

The display hinges are available using spare part number L24916-001 for models with a standard bezel or L25132-001 for models with a narrow bezel.



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

- a. Disconnect the cable from the camera module (1).



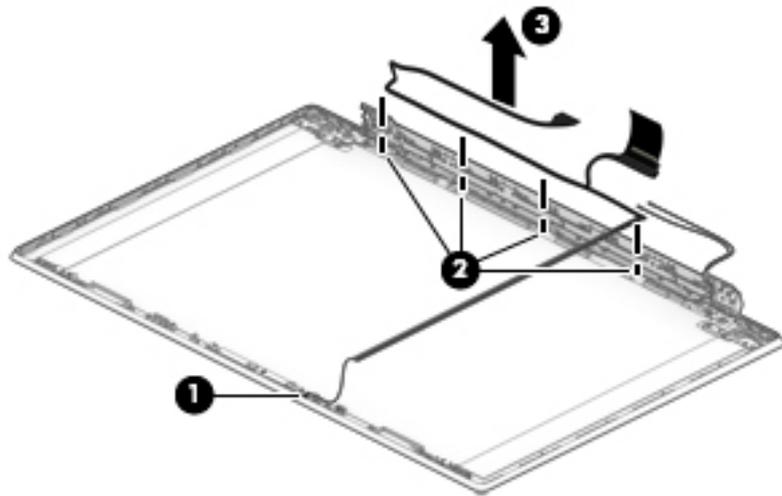
**NOTE:** Cables connect to both sides of IR cameras. A single cable connects to only one side of HD cameras.

- b. Release the cable from the retention clips (2) and routing channel built into the bottom edge of the display back cover.
- c. Remove the display panel cable (3).

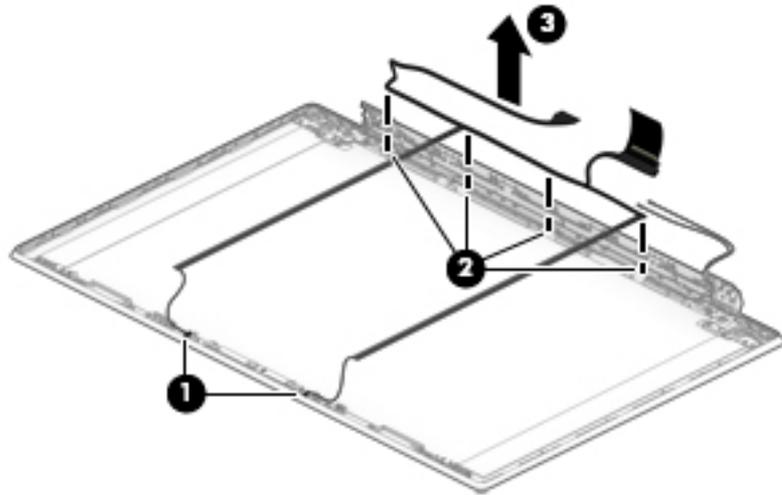
The display panel cable is available using the following spare part numbers:

- L24944-001 – FHD, touch display assembly and an HD non-infrared camera
- L24945-001 – FHD, touch display assembly and an FHD infrared camera
- L24946-001 – HD, touch display assembly and an HD non-infrared camera
- L24947-001 – HD, touch display assembly and an FHD infrared camera
- L24948-001 – Non-touch display assembly and an HD non-infrared camera
- L24949-001 – Non-touch display assembly and an FHD infrared camera

**Models with an HD camera**



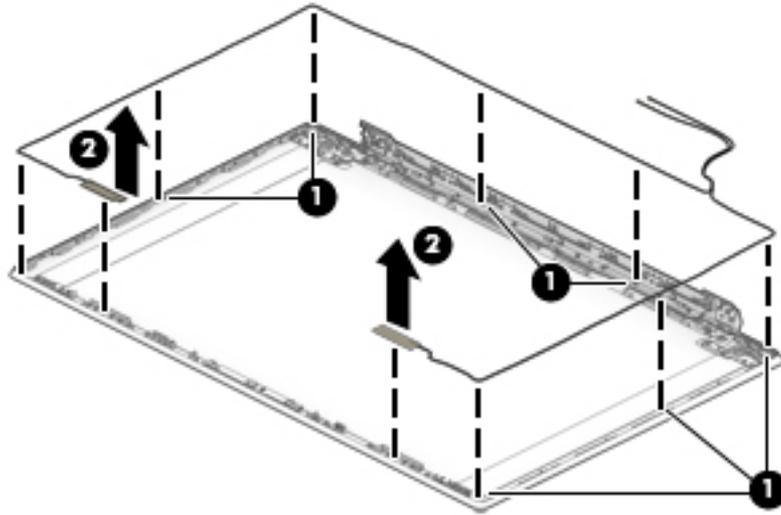
**Models with an IR camera**



14. If it is necessary to replace the wireless antenna cables and transceivers:
  - a. Release the wireless antenna cables from the retention clips **(1)** and routing channels built into the sides of the display back cover.

- b. Detach the wireless antenna transceivers (2) from the display back cover, and then remove the antennas from the display back cover. (The wireless antenna transceivers are attached to the display back cover with double-sided adhesive.)

The wireless antenna cables and transceivers are available using spare part number L24942-001.



Reverse this procedure to reassemble and install the display assembly.

## Hard drive



**NOTE:** The hard drive spare part kit does not include the hard drive bracket or the hard drive cable. The hard drive bracket is available using spare part number L24924-001. The hard drive cable is available using spare part number L24923-001

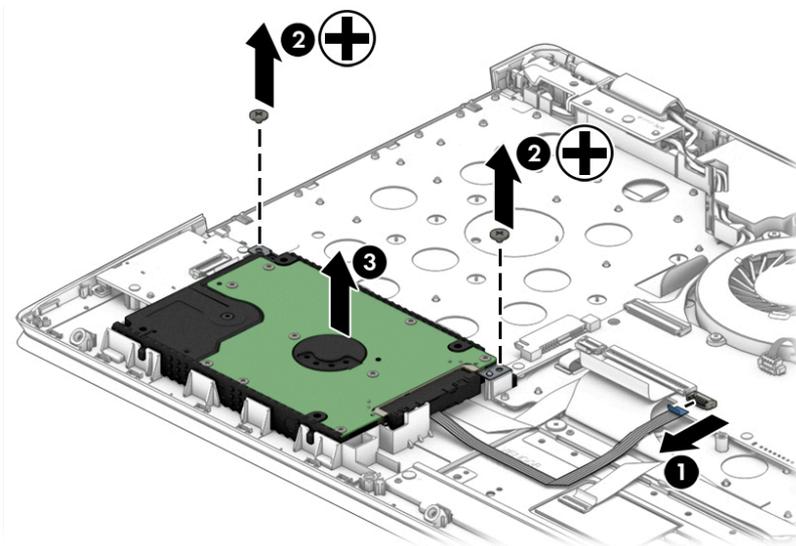
Description	Spare part number
2-TB, 5400-rpm, SATA, 7.0-mm hard drive	912487-855
1-TB, 5400-rpm, SATA, 7.0-mm, Hybrid 8.0-GB hard drive	924036-855
1-TB, 5400-rpm, SATA, 7.0-mm hard drive	762990-005

Before removing the hard drive, follow these steps:

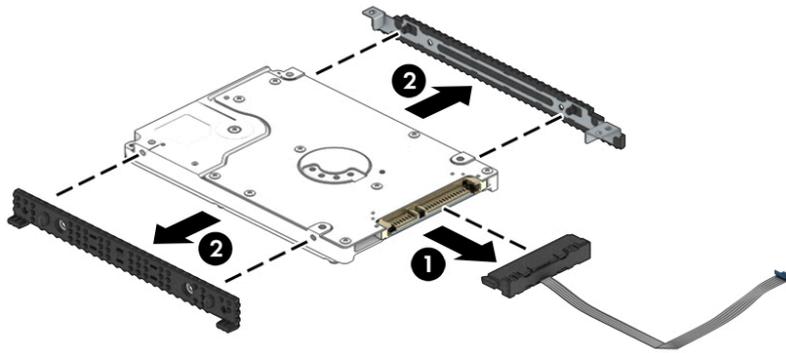
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)).
5. Remove the bottom cover (see [Bottom cover on page 31](#)).
6. Remove the battery (see [Battery on page 34](#)).

Remove the hard drive:

1. Disconnect the hard drive cable from the ZIF connector on the system board **(1)**.
2. Remove the two Phillips M2.0×4.0 screws **(2)** that secure the hard drive to the computer.
3. Lift the hard drive out of the computer **(3)**.



4. If it is necessary to disassemble the hard drive, disconnect the hard drive cable **(1)** and pull the rubber brackets away from each side of the hard drive **(2)**.



Reverse this procedure to reassemble and install the hard drive.

## WLAN module

Description	Spare part number
Intel Wireless-AC 9560 802.11 ac 2×2 WiFi + Bluetooth 5 (non-vPro)	L22634-005
Intel Wireless-AC 9461 802.11 ac 1×1 WiFi + Bluetooth 5.0 (non-vPro)	L25889-005
Intel Dual Band Wireless-AC 7265 802.11 AC 2×2 WiFi + Bluetooth 4.2 Combo Adapter (non-vPro)	901229-855
Intel Dual Band Wireless-AC 3168 802.11AC 1×1 WiFi + Bluetooth 4.2 Combo Adapter (non-vPro)	863934-855
Realtek RTL8822BE 802.11 ac 2x2 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	924813-855
Realtek RTL8821CE 802.11 ac 1x1 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	L17365-005

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

Before removing the WLAN module, follow these steps:

1. 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 first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)).
5. Remove the bottom cover (see [Bottom cover on page 31](#)).
6. Remove the battery (see [Battery on page 34](#)).

Remove the WLAN module:

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

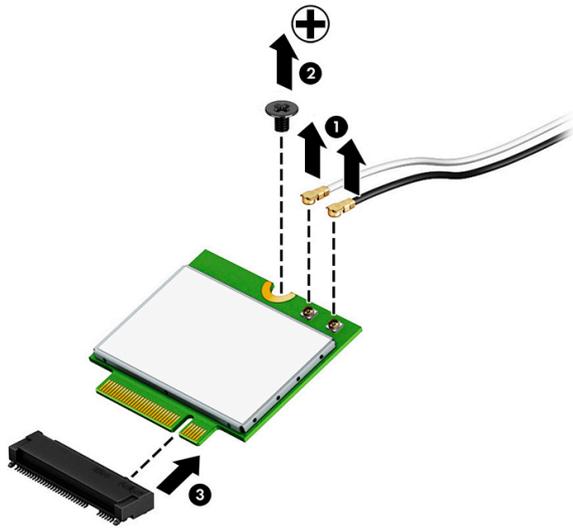


**NOTE:** The WLAN antenna cable labeled "1/MAIN" connects to the WLAN module "Main" terminal. The WLAN antenna cable labeled "2/AUX" connects to the WLAN module "Aux" terminal.

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

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

 **NOTE:** The WLAN module is designed with a notch to prevent incorrect insertion.



Reverse this procedure to install the WLAN module.

## Solid-state drive

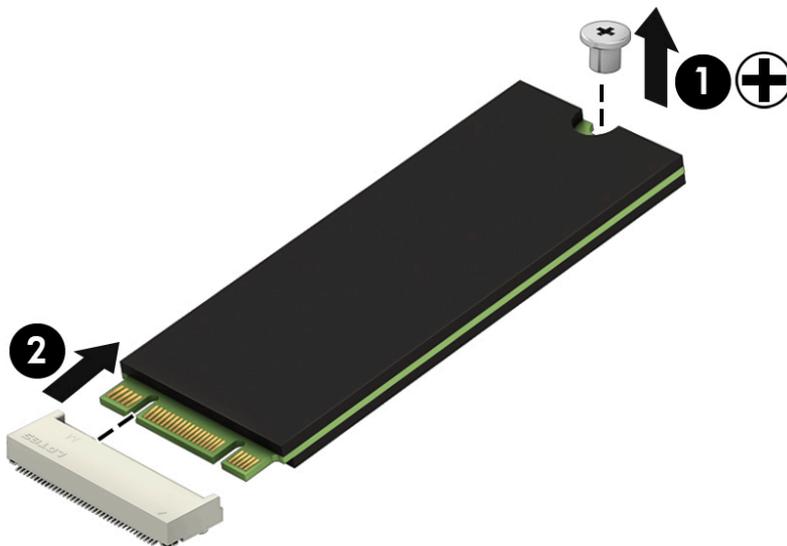
Description	Spare part number
256-GB, SATA-3, TLC	L25202-001
256-GB, PCIe, TLC	L25205-001
128-GB, SATA-3, TLC	L25204-001
16-GB, PCIe (Optane memory module)	L25203-001
Solid-state drive carrier	L24936-001
Solid-state drive board	L24937-001
Solid-state drive cable	L24938-001

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

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)).
5. Remove the bottom cover (see [Bottom cover on page 31](#)).
6. Remove the battery (see [Battery on page 34](#)).

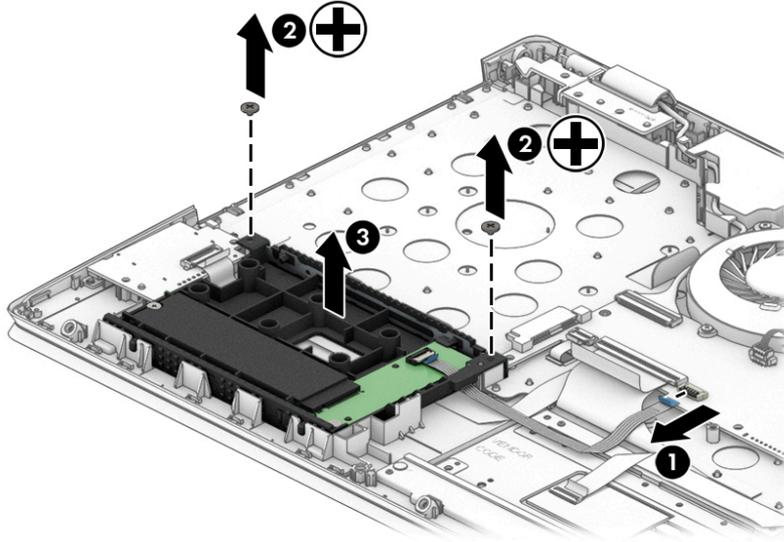
Remove the solid-state drive module from the carrier:

1. Remove the Phillips M2.0×3.0 screw (1) that secures the drive to the carrier.
2. Remove the drive (2) by pulling it away from the connector.

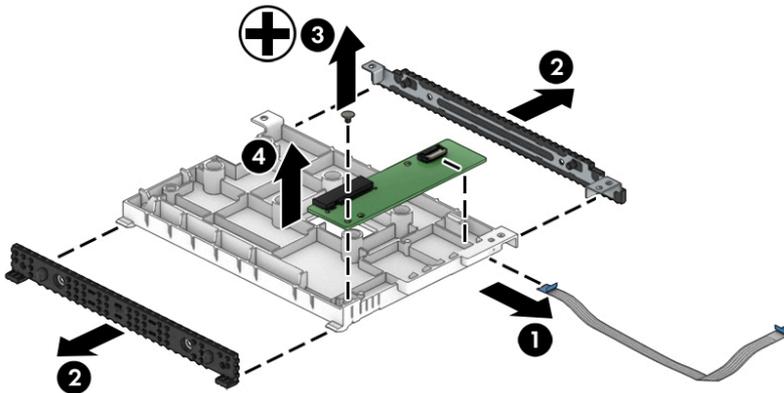


If it is necessary, remove the carrier from the computer and disassemble:

1. Disconnect the solid-state drive board cable from the system board ZIF connector **(1)**.
2. Remove the two Phillips M2.0×3.0 screws **(2)** that secure the carrier to the computer.
3. Remove the carrier from the computer **(3)**.



4. Disconnect the cable from the ZIF connector on the solid-state drive board **(1)**.
5. Pull the brackets away from the sides of the carrier **(2)**.
6. Remove the Phillips M2.0×3.0 screw **(3)** that secures the board to the carrier.
7. Remove the board from the carrier **(4)**.



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

## Memory module

 **NOTE:** Primary and expansion memory is installed in a side-by-side configuration in the bottom of the computer. If only one memory module is installed, it must be installed in the socket labeled 1.

Description	Spare part number
8-MB, DDR4-2400, 1.2-V	862398-855
4-MB, DDR4-2400, 1.2-V	862397-855
2-MB, DDR4-2400, 1.2-V	864271-855

### Update BIOS before adding memory modules

Before adding new memory, make sure you update the computer to the latest BIOS.

 **CAUTION:** Failure to update the computer to the latest BIOS prior to installing new memory may result in various system problems.

To update BIOS:

1. Navigate to [www.hp.com](http://www.hp.com).
2. Click **Support**, and then click **Software & Drivers**.
3. **Personal Computing**
4. In the **Enter your HP product name, product number or serial number** box, type the computer model information, and then click **Find**.
5. (If necessary) Click the link for the computer model.
6. Click the **BIOS** link.
7. Click the **Download** button, and then follow the on-screen instructions.

Before removing the memory module, follow these steps:

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 first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)).
5. Remove the bottom cover (see [Bottom cover on page 31](#)).
6. Remove the battery (see [Battery on page 34](#)).

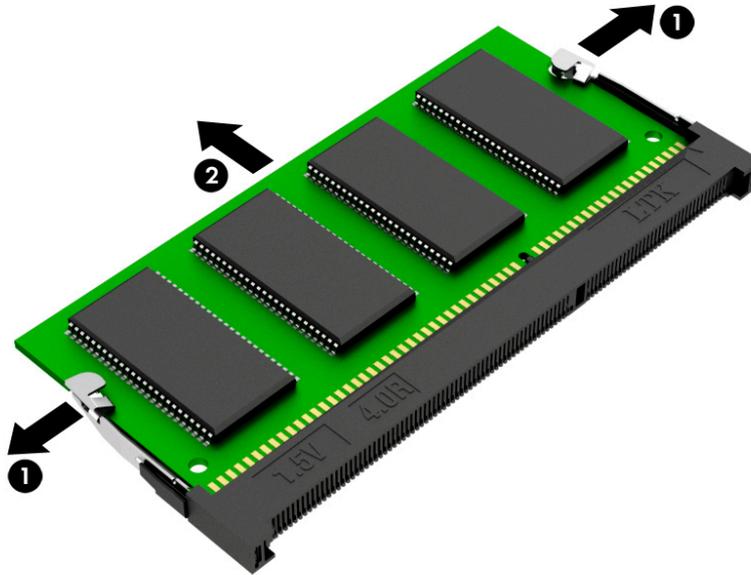
Remove the memory module:

1. Spread the retaining tabs **(1)** on each side of the memory module slot to release the memory module. (The edge of the module opposite the slot rises away from the computer.)

2. Remove the memory module (**2**) by pulling the module away from the slot at an angle.

**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.

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



To protect a memory module after removal, place it in an electrostatic-safe container.  
Reverse this procedure to install a memory module.

## Card reader board

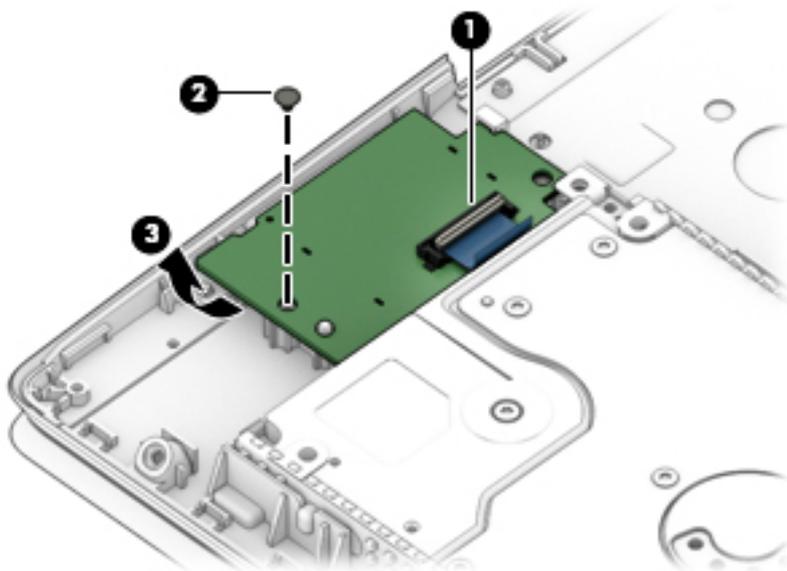
Description	Spare part number
Card reader board	L24929-001
Card reader board cable	L24930-001

Before removing the card reader board, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)).
5. Remove the bottom cover (see [Bottom cover on page 31](#)).
6. Remove the battery (see [Battery on page 34](#)).

Remove the card reader board:

1. Disconnect the cable from the ZIF connector on the card reader board **(1)**.
2. Remove the Phillips M2.0×2.5 screw **(2)** that secures the board to the computer.
3. Remove the board from the computer **(3)**.



Reverse this procedure to install the card reader board.

## TouchPad

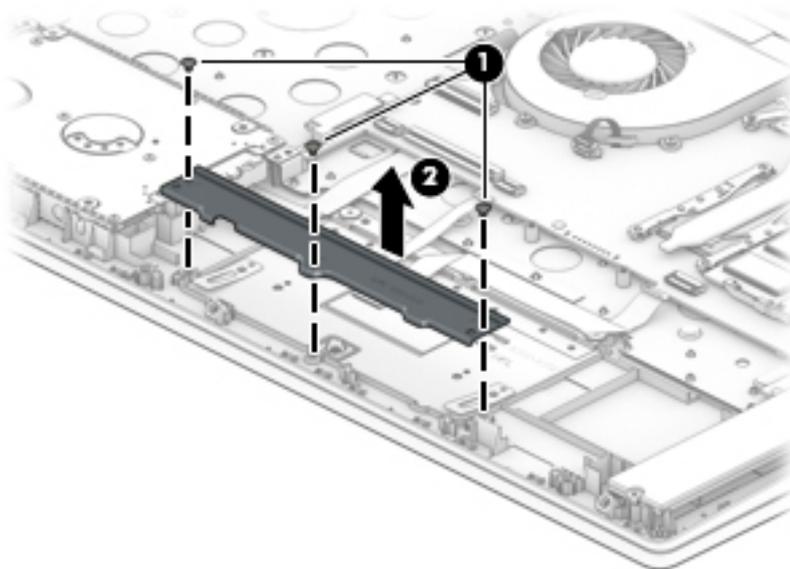
Description	Spare part number
TouchPad	L24934-001
TouchPad cable	L24932-001
TouchPad bracket	L24931-001

Before removing the TouchPad, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)).
5. Remove the bottom cover (see [Bottom cover on page 31](#)).
6. Remove the battery (see [Battery on page 34](#)).

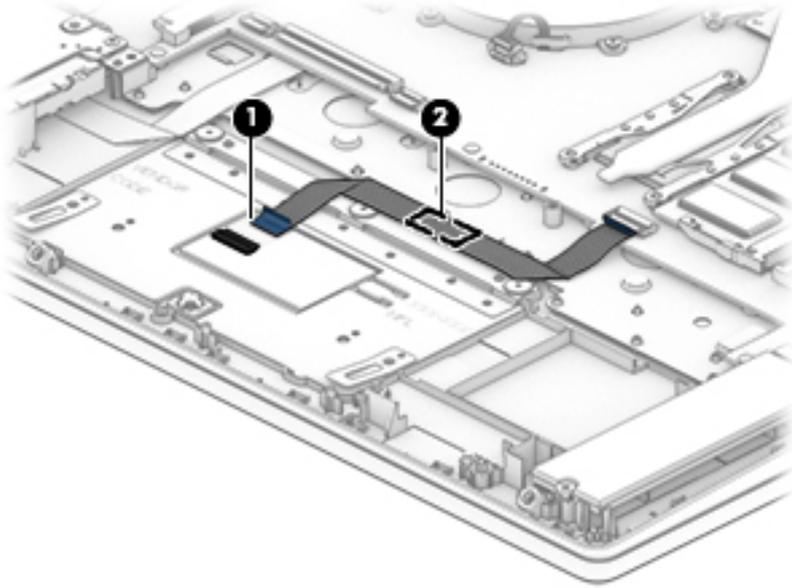
Remove the TouchPad:

1. Remove the three Phillips M2.0×2.5 screws **(1)** that secure the TouchPad bracket to the computer.
2. Remove the bracket **(2)**.

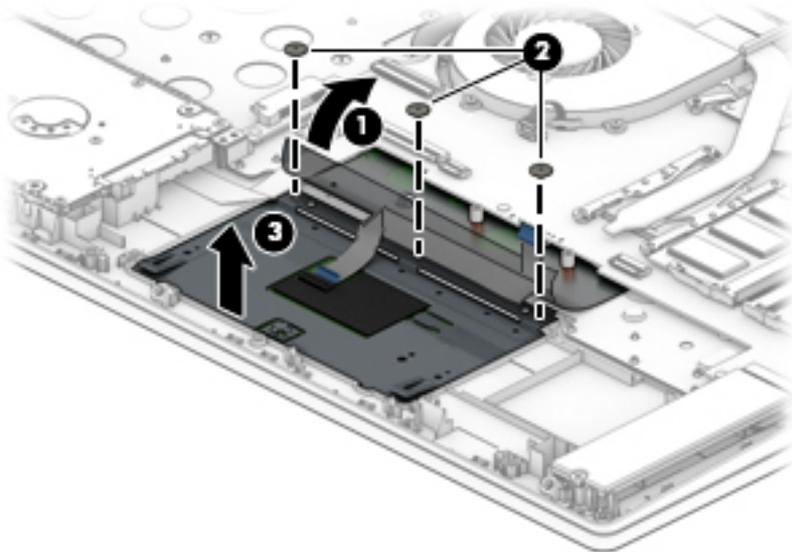


3. Disconnect the cable from the ZIF connector on the TouchPad **(1)**.

4. Lift to disengage the cable from the adhesive that secures it to the TouchPad **(2)**.



5. Lift the clear plastic from on top of the screws **(1)**.
6. Remove the three Phillips M2.0×2.0 broad head screws **(2)** that secure the TouchPad to the computer.
7. Remove the TouchPad from the computer **(3)**.



Reverse this procedure to install the TouchPad.

## Fan

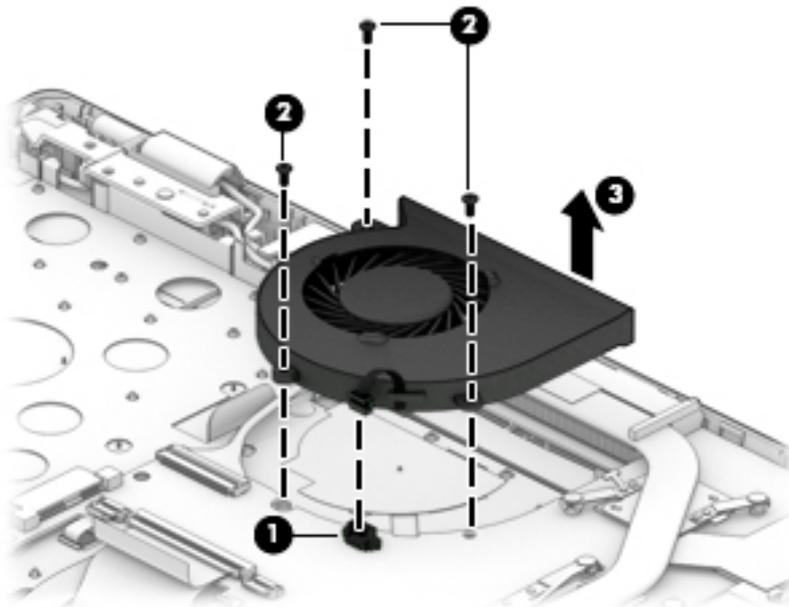
Description	Spare part number
Fan (includes cable)	L24935-001

Before removing the fan, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)).
5. Remove the bottom cover (see [Bottom cover on page 31](#)).
6. Remove the battery (see [Battery on page 34](#)).

Remove the fan:

1. Disconnect the fan cable (1) from the system board.
2. Remove the three Phillips M2.0×4.0 screws (2) that secure the fan to the computer.
3. Remove the fan from the computer (3).



Reverse this procedure to install the fan.

## Heat sink



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

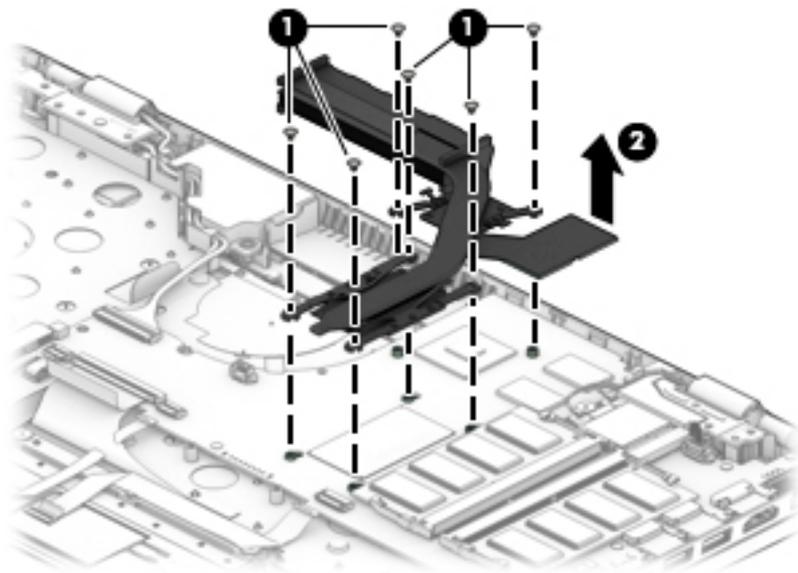
Description	Spare part number
Heat sink for use only on computer models equipped with a graphics subsystem with discrete memory	L24940-001
Heat sink for use only on computer models equipped with a graphics subsystem with UMA memory	L24939-001

Before removing the heat sink, follow these steps:

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 first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)).
5. Remove the bottom cover (see [Bottom cover on page 31](#)).
6. Remove the battery (see [Battery on page 34](#)).

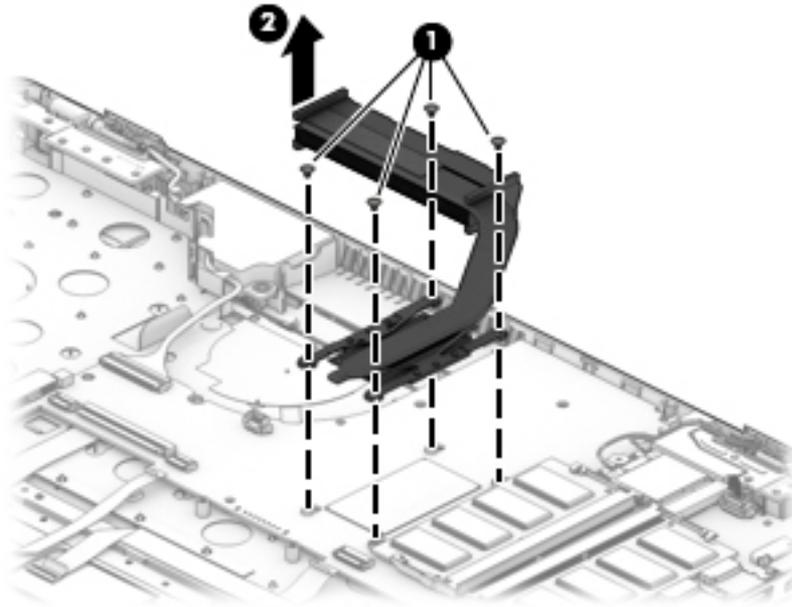
Remove the heat sink:

1. **Discrete graphics:** In the order indicated on the heat sink, remove the six Phillips M2.0×2.5 screws **(1)** that secure the heat sink to the system board.
2. Remove the heat sink **(2)**.



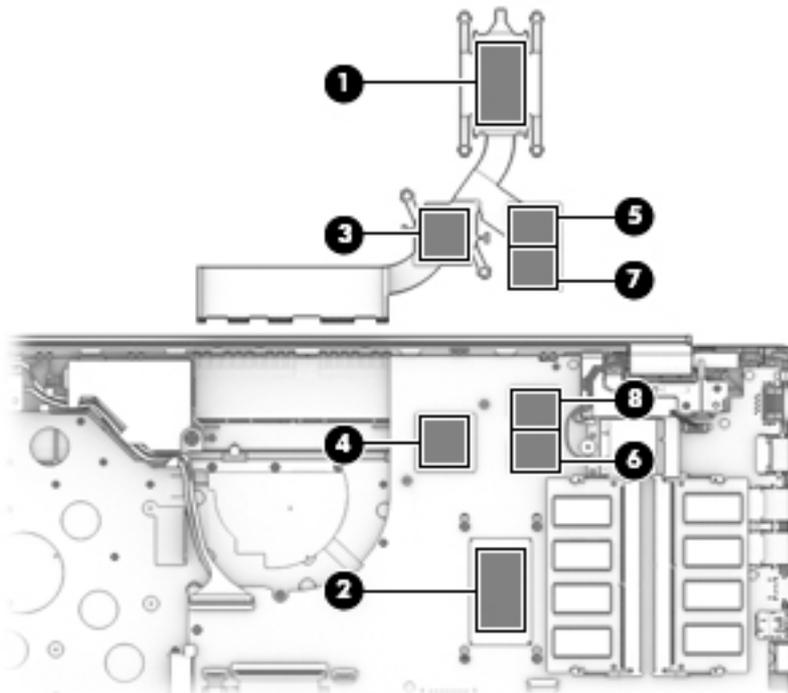
3. **UMA graphics:** In the order indicated on the heat sink, remove the four Phillips M2.0×2.5 screws **(1)** that secure the heat sink to the system board.

4. Remove the heat sink (2).

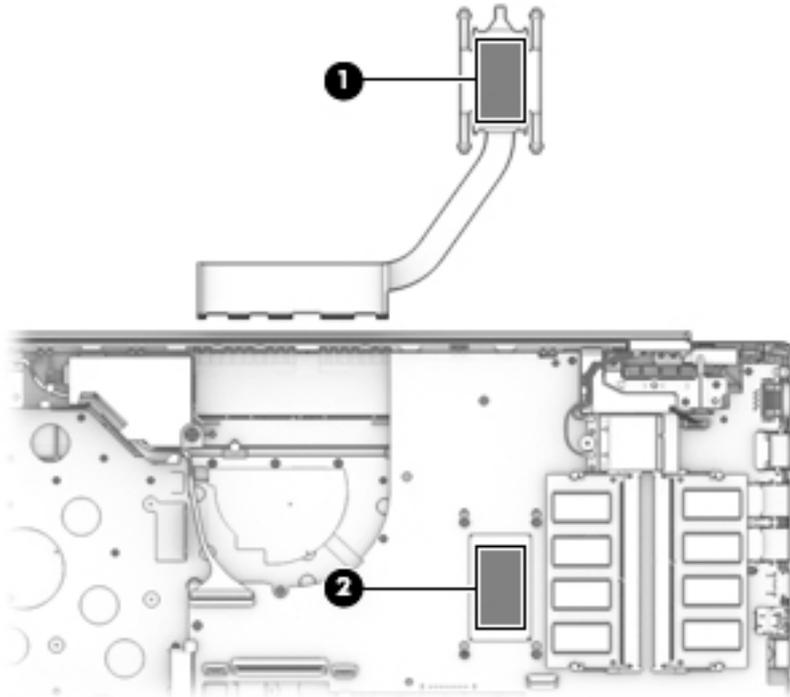


 **NOTE:** The thermal material must be thoroughly cleaned from the surfaces of the heat sink and the system board components each time the heat sink is removed. Replacement thermal material is included with the heat sink and system board spare part kits.

**Discrete memory:** Thermal paste is used on the heat sink (1), (3) and associated system board components (2), (4). Thermal pads are used on the heat sink (5), (7) and associated system board components (6), (8).



**UMA memory:** Thermal paste is used on the heat sink (1) and the processor (2).



Reverse this procedure to install the heat sink.

## System board



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

Description	Spare part number
<b>System board or use in models with discrete graphics equipped with the following processors:</b>	
Intel Core i7-8565U processor and 4 GB of discrete graphics memory	L36252-xx1
Intel Core i5-8265U processor and 2 GB of discrete graphics memory	L36251-xx1
Intel Core i7-8550U processor and 4 GB of discrete graphics memory	L22879-xx1
Intel Core i7-8550U processor and 2 GB of discrete graphics memory	L22878-xx1
Intel Core i5-8250U processor and 4 GB of discrete graphics memory	L22875-xx1
Intel Core i5-8250U processor and 2 GB of discrete graphics memory	L22874-xx1
<b>System board for use in models with UMA graphics equipped with the following processors:</b>	
Intel Core i5-8265U processor	L36254-xx1
Intel Core i3-8145U processor	L36253-xx1
Intel Core i5-8250U processor	L22881-xx1
Intel Core i3-8130U processor	L22880-xx1

Before removing the system board, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)), and then remove the following components:
  - a. Bottom cover (see [Bottom cover on page 31](#))
  - b. Battery (see [Battery on page 34](#))
  - c. Hard drive (see [Hard drive on page 44](#))
  - d. Fan (see [Fan on page 55](#))

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

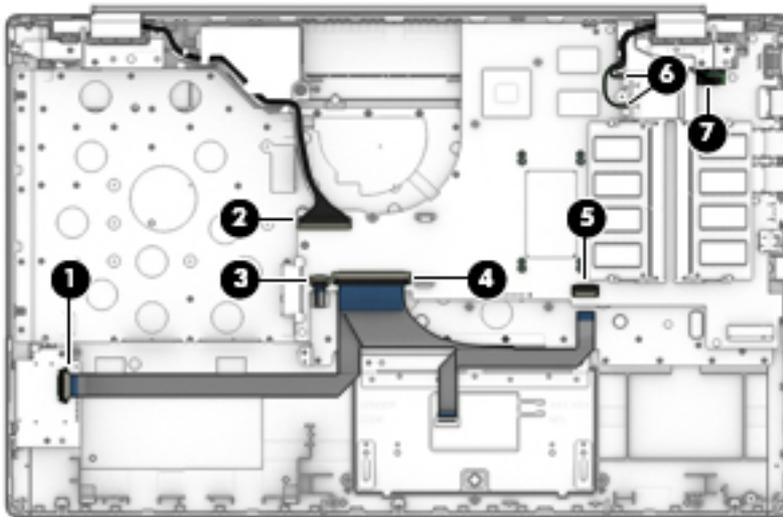
- WLAN module (see [WLAN module on page 46](#))
- Solid-state drive (see [Solid-state drive on page 48](#))
- Memory modules (see [Memory module on page 50](#))
- Heat sink (see [Heat sink on page 56](#))

Remove the system board:

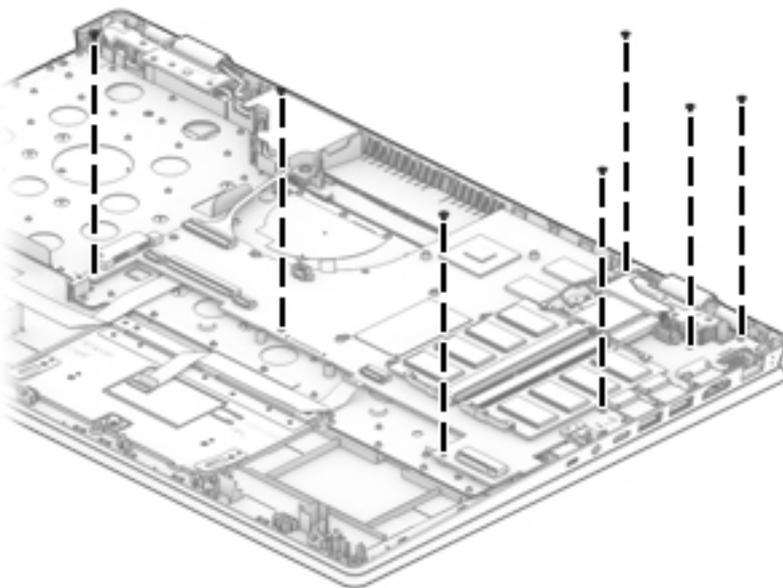
1. Disconnect the following cables:
  - (1) Card reader board cable (from the card reader board)
  - (2) Display cable
  - (3) Backlight cable
  - (4) Keyboard cable
  - (5) TouchPad cable
  - (6) WLAN antenna cables

 **NOTE:** The #1/white WLAN antenna cable connects to the WLAN module "#1/Main" terminal. The #2/black WLAN antenna cable connects to the WLAN module "#2/Aux" terminal.

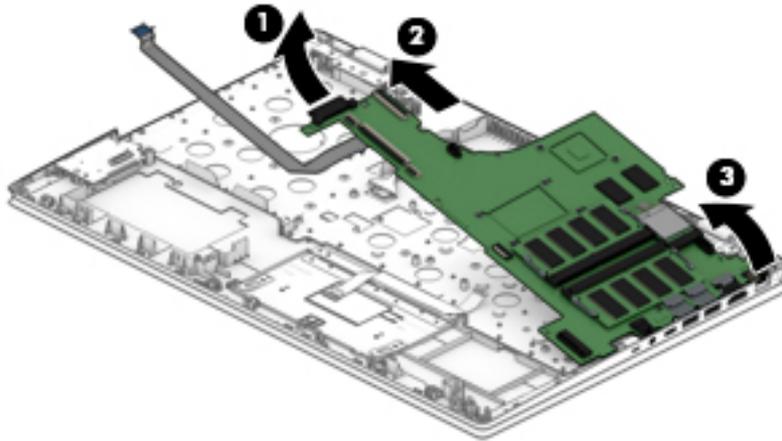
- (7) Speaker cable



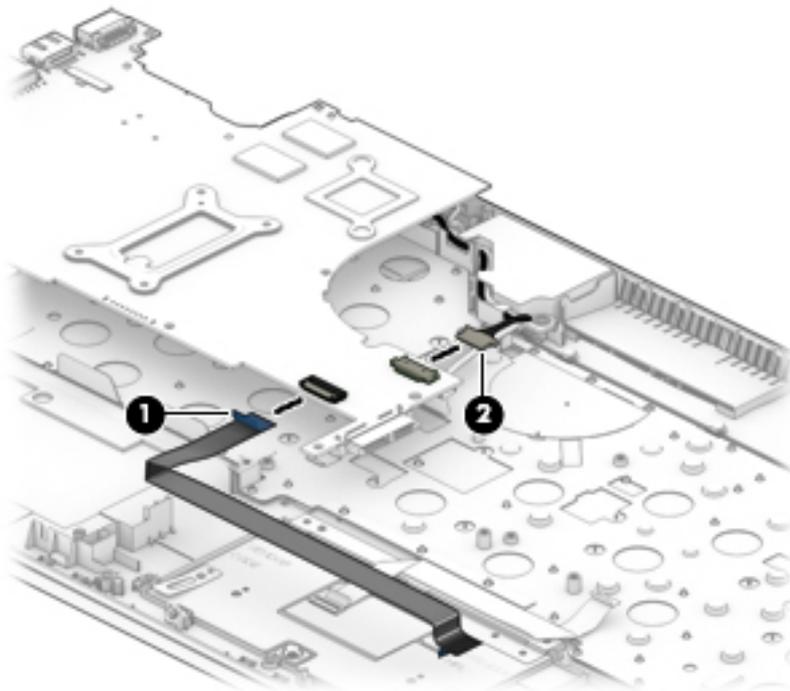
2. Remove the seven Phillips M2.0×4.0 screws that secure the system board to the computer.



3. Lift the left side of the system board **(1)** until it rests at an angle.
4. Remove the system board **(2)** by pulling it up and to the left at an angle.
5. Rotate the system board upside down to access the cables underneath **(3)**.



6. Disconnect the card reader cable **(1)** and power connector cable **(2)** from the bottom of the system board.



Reverse this procedure to install the system board.

## Speakers

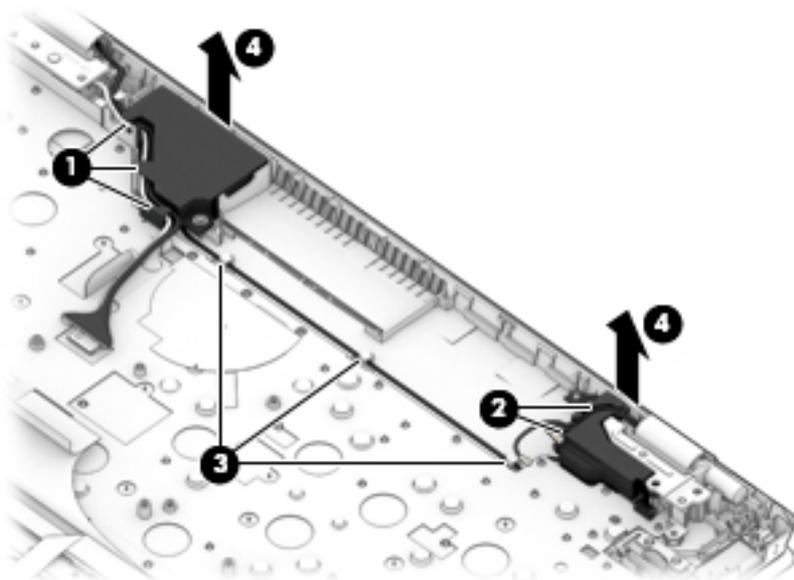
Description	Spare part number
Speakers (include cables)	L24941-001

Before removing the speakers, follow these steps:

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 first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)), and then remove the following components:
  - a. Bottom cover (see [Bottom cover on page 31](#))
  - b. Battery (see [Battery on page 34](#))
  - c. Hard drive (see [Hard drive on page 44](#))
  - d. Fan (see [Fan on page 55](#))
  - e. System board (see [System board on page 59](#))

Remove the speakers:

1. Remove the screw in the left display hinge, and then rotate the hinge upward (see [Display assembly on page 35](#)).
2. Release the cable from the retention clips and routing channel built into the left speaker **(1)**.
3. Release the cable from the retention clips and routing channel built into the right speaker **(2)**.
4. Release the speaker cable from the retention clips and routing channel built into the computer **(3)**.
5. Remove the speakers **(4)**.



Reverse this procedure to install the speakers.

## Lock bracket

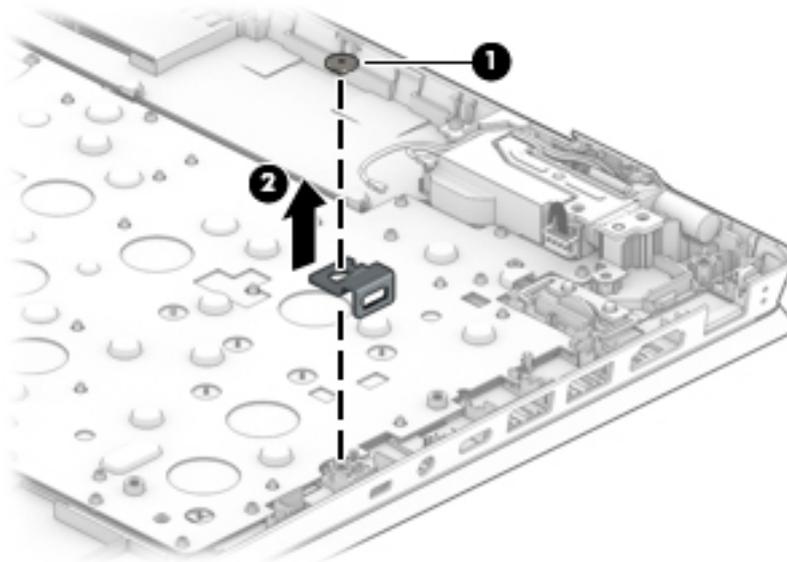
Description	Spare part number
Lock bracket	L24941-001

Before removing the lock bracket, follow these steps:

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 first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)), and then remove the following components:
  - a. Bottom cover (see [Bottom cover on page 31](#))
  - b. Battery (see [Battery on page 34](#))
  - c. Hard drive (see [Hard drive on page 44](#))
  - d. Fan (see [Fan on page 55](#))
  - e. System board (see [System board on page 59](#))

Remove the lock bracket:

1. Remove the Phillips M2.0×2.0 broad head screw (1) that secures the lock bracket to the computer.
2. Remove the lock bracket from the computer (2).



Reverse this procedure to install the lock bracket.

## Power connector cable

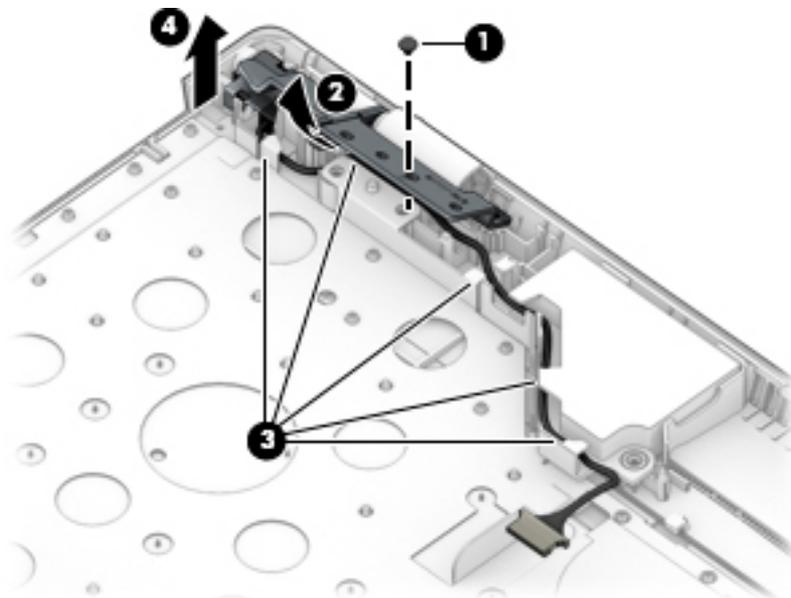
Description	Spare part number
Power connector cable	810327-006

Before removing the power connector cable, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the optical drive (see [Optical drive on page 28](#)), and then remove the following components:
  - a. Bottom cover (see [Bottom cover on page 31](#))
  - b. Battery (see [Battery on page 34](#))
  - c. Hard drive (see [Hard drive on page 44](#))
  - d. Fan (see [Fan on page 55](#))
  - e. System board (see [System board on page 59](#))

Remove the power connector cable:

1. Remove the Phillips M2.5×6.0 screw **(1)** from the left display hinge.
2. Rotate the left display hinge upward **(2)**.
3. Release the power connector cable from the retention clips and routing channel built into the computer and speaker **(3)**.
4. Remove the power connector cable from the computer **(4)**.



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.

Description	Spare part number
Keyboard, no backlight, natural silver	L24926-xx1
Keyboard, backlit, natural silver	L24925-xx1

For use in country or region	Spare part number
Canada	-DB1
India	-002
Japan	-291
South Korea	-AD1
Taiwan	-AB1
Thailand	-281
United States	-001

---

## 7 Using Setup Utility (BIOS)

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

---

 **NOTE:** To start Setup Utility on convertible computers, your computer must be in notebook mode and you must use the keyboard attached to your notebook.

---

### Starting Setup Utility (BIOS)

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

---

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

### Updating Setup Utility (BIOS)

Updated versions of Setup Utility (BIOS) may be available on the HP website.

Most BIOS updates on the HP website are packaged in compressed files called *SoftPaqs*.

Some download packages contain a file named `Readme.txt`, which contains information regarding installing and troubleshooting the file.

### Determining the BIOS version

To decide whether you need to update Setup Utility (BIOS), first determine the BIOS version on your computer.

To reveal the BIOS version information (also known as *ROM date* and *System BIOS*), use one of these options.

- HP Support Assistant
  1. Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.  
– or –  
Select the question mark icon in the taskbar.
  2. Select **My notebook**, and then select **Specifications**.
- Setup Utility (BIOS)
  1. Start Setup Utility (BIOS) (see [Starting Setup Utility \(BIOS\) on page 66](#)).
  2. Select **Main**, and then make note of the BIOS version.
  3. Select **Exit**, select one of the options, and then follow the on-screen instructions.

To check for later BIOS versions, see [Downloading a BIOS update on page 67](#).

## Downloading a BIOS update

---

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

- Do not disconnect power from the computer by unplugging the power cord from the AC outlet.
- Do not shut down the computer or initiate Sleep.
- Do not insert, remove, connect, or disconnect any device, cable, or cord.

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

---

1. Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.  
– or –  
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. If the update is more recent than your BIOS version, make a note of the date, name, or other identifier. You may need this information to locate the update later, after it has been downloaded to your hard drive.
  - b. Follow the on-screen instructions to download your selection to the hard drive.  
  
Make a note of the path to the location on your hard drive where the BIOS update is downloaded. You will need to access this path when you are ready to install the update.

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

1. Type `file` in the taskbar search box, and then select **File Explorer**.
2. 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.

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# 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 68](#).

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**.

---

3. When HP PC Hardware Diagnostics Windows detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. For assistance in correcting the problem, contact support, and then provide the Failure ID code.

## 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. In the **HP PC Hardware Diagnostics** section, select **Download**, and then select a location on your computer or a USB flash drive.

The tool is downloaded to the selected location.

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

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

---

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 **HP PC Hardware Diagnostics** section, select **Download**, and then select a location on your computer or a 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 70](#).

---

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 UEFI detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. For assistance in correcting the problem, 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



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**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 70](#).

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- b. Hard drive

- c. BIOS

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

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

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

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



---

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

---

## 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. In the **HP PC Hardware Diagnostics UEFI** section, select **Download UEFI Diagnostics**, and then select **Run**.

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



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

---

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 on 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. In the **HP PC Hardware Diagnostics UEFI** section, 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 73](#)).
- **Creating a restore point**—You can use Windows tools to create a restore point (see [Using Windows tools on page 73](#)).
- **Creating recovery media** (select products only)—You can use HP Recovery Manager or HP Cloud Recovery Download Tool (select products only) to create recovery media (see [Creating HP Recovery media \(select products only\) on page 73](#)).
- **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 73](#)).
- **Removing the Recovery Partition**—To remove the Recovery partition to reclaim hard drive space (select products only), select the **Remove Recovery Partition** option of HP Recovery Manager. For more information, see [Removing the HP Recovery partition \(select products only\) on page 77](#).

## 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, allowing you to restore from backup, refresh the computer, and reset the computer to its original state.

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

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

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

---

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

---

## Creating HP Recovery media (select products only)

After you have successfully set up the computer, use HP Recovery Manager to create a backup of the HP Recovery partition on the computer. This backup is called HP Recovery media. In cases where the hard drive is corrupted or has been replaced, the HP Recovery media can be used to reinstall the original operating system.

To check for the presence of the Recovery partition in addition to the Windows partition, right-click the **Start** button, select **File Explorer**, and then select **This PC**.

---

 **NOTE:** If your computer does not list the Recovery partition in addition to the Windows partition, 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.

---

On select products, you can use the HP Cloud Recovery Download Tool to create HP Recovery media on a bootable USB flash drive. For more information, see [Using the HP Cloud Recovery Download Tool to create recovery media on page 75](#).

## Using HP Recovery Manager to create recovery media



**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.

### Before you begin

Before you begin, note the following:

- Only one set of recovery media can be created. Handle these recovery tools carefully, and keep them in a safe place.
- HP Recovery Manager examines the computer and determines the required media storage capacity.
- To create recovery media, use one of the following options:



**NOTE:** If the computer does not have a recovery partition, HP Recovery Manager displays the Windows Create a Recovery Drive feature. Follow the on-screen instructions to create a recovery image on a blank USB flash drive or hard drive.

- If your computer has an optical drive with DVD writer capability, be sure to use only high-quality blank DVD-R, DVD+R, DVD-R DL, or DVD+R DL discs. Do not use rewritable discs such as CD±RW, DVD±RW, double-layer DVD±RW, or BD-RE (rewritable Blu-ray) discs, which are not compatible with HP Recovery Manager software.
- If your computer does not include an integrated optical drive with DVD writer capability, you can use an external optical drive (purchased separately) to create recovery discs, as described above. If an external optical drive is used, you must connect it directly to a USB port on the computer. It cannot be connected to a USB port on an external device, such as a USB hub.
- To create a recovery flash drive, use a high-quality blank USB flash drive.
- Be sure that the computer is connected to AC power before you begin creating the recovery media.
- The creation process can take an hour or more. Do not interrupt this process.
- If necessary, you can exit the program before you have finished creating all of the recovery media. HP Recovery Manager will finish the current DVD or flash drive. The next time you start HP Recovery Manager, you will be prompted to continue.

### Creating the recovery media

To create HP Recovery media using HP Recovery Manager:



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

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

If you need to recover the system, see [Recovering using HP Recovery Manager on page 75](#).

## Using the HP Cloud Recovery Download Tool to create recovery media

To create HP Recovery media using the HP Cloud Recovery Download Tool:

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

## Restoring and recovery

Restoring and recovery can be performed using one or more of the following options: Windows tools, HP Recovery Manager, or the HP Recovery partition.

---

 **IMPORTANT:** Not all methods are available on all products.

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### 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 73](#).

### Restoring using HP Recovery Manager and the HP Recovery partition

You can use HP Recovery Manager and the HP Recovery partition (select products only) to restore the computer to the original factory state:

- **Resolving problems with preinstalled applications or drivers**—To correct a problem with a preinstalled application or driver:
  1. Type `recovery` in the taskbar search box, and then select **HP Recovery Manager**.
  2. Select **Reinstall drivers and/or applications**, and then follow the on-screen instructions.
- **Using System Recovery**—To recover the Windows partition to original factory content, select the **System Recovery** option from the HP Recovery partition (select products only) or use the HP Recovery media. For more information, see [Recovering using HP Recovery Manager on page 75](#). If you have not already created recovery media, see [Creating HP Recovery media \(select products only\) on page 73](#).
- **Using Factory Reset** (select products only)—Restores the computer to its original factory state by deleting all information from the hard drive and recreating the partitions and then reinstalling the operating system and the software that was installed at the factory (select products only). To use the **Factory Reset** option, you must use HP Recovery media. If you have not already created recovery media, see [Creating HP Recovery media \(select products only\) on page 73](#).

---

 **NOTE:** If you have replaced the hard drive in the computer, you can use the Factory Reset option to install the operating system and the software that was installed at the factory.

---

### Recovering using HP Recovery Manager

You can use HP Recovery Manager software to recover the computer to its original factory state by using the HP Recovery media that you either created or that you obtained from HP, or by using the HP Recovery partition (select products only).

If you have not already created HP Recovery media, see [Creating HP Recovery media \(select products only\) on page 73](#).

---

 **IMPORTANT:** HP Recovery Manager does not automatically provide backups of your personal data. Before beginning recovery, back up any personal data that you want to retain. See [Using Windows tools on page 73](#).

---

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

 **NOTE:** When you start the recovery process, only the options available for your computer are displayed.

---

Before you begin, note the following:

- HP Recovery Manager recovers only software that was installed at the factory. For software not provided with this computer, you must either download the software from the manufacturer's website or reinstall the software from the media provided by the manufacturer.
- If the computer hard drive fails, HP Recovery media must be used. This media is created using HP Recovery Manager. See [Creating HP Recovery media \(select products only\) on page 73](#).
- If your computer does not allow the creation of HP Recovery media or if the HP Recovery media does not work, contact support to obtain recovery media. Go to <http://www.hp.com/support>, select your country or region, and then follow the on-screen instructions.

## Recovering using the HP Recovery partition (select products only)

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

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

To start HP Recovery Manager from the HP Recovery partition:

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

---

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

– or –

For computers or tablets with keyboards attached:

- ▲ Press **f11** while the computer boots, or press and hold **f11** as you press the power button.

For tablets without keyboards:

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

2. Select **Troubleshoot** from the boot options menu.
3. Select **Recovery Manager**, and then follow the on-screen instructions.

 **NOTE:** If your computer does not automatically restart in HP Recovery Manager, change the computer boot order, and then follow the on-screen instructions. See [Changing the computer boot order on page 77](#).

---

## Recovering using HP Recovery media

If your computer does not have an HP Recovery partition or if the hard drive is not working properly, you can use HP Recovery media to recover the original operating system and software programs that were installed at the factory.

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

---

 **NOTE:** If your computer does not automatically restart in HP Recovery Manager, change the computer boot order, and then follow the on-screen instructions. See [Changing the computer boot order on page 77](#).

---

## Changing the computer boot order

If your computer does not restart in HP Recovery Manager, 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.

## Removing the HP Recovery partition (select products only)

HP Recovery Manager software allows you to remove the HP Recovery partition (select products only) to free up hard drive space.

---

 **IMPORTANT:** After you remove the HP Recovery partition, you will not be able to perform System Recovery or create HP Recovery media. Before removing the Recovery partition, create HP Recovery media. See [Creating HP Recovery media \(select products only\) on page 73](#).

---

Follow these steps to remove the HP Recovery partition:

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

# 10 Specifications

	Metric	U.S.
<b>Computer dimensions</b>		
<b>Width</b>	<b>376 mm</b>	14.80 in
<b>Depth</b>	<b>248 mm</b>	9.76 in
<b>Height</b>	<b>22.5 mm</b>	0.89 in
<b>Weight</b>		
Solid-state drive models	<b>1865 g</b>	4.11 lbs
Hard drive models	<b>2047 g</b>	4.51 lbs
Solid-state drive with optical drive models	<b>2015 g</b>	4.44 lbs
Hard drive with optical drive models	<b>2129 g</b>	4.69 lbs
<b>Temperature</b>		
Operating	<b>5°C to 35°C</b>	41°F to 95°F
Nonoperating	<b>-20°C to 60°C</b>	-4°F to 140°F
<b>Relative humidity</b> (noncondensing)		
Operating	10% to 90%	
Nonoperating	5% to 95%	
<b>Maximum altitude</b> (unpressurized)		
Operating	<b>-15 m to 3,048 m</b>	-50 ft to 10,000 ft
Nonoperating	<b>-15 m to 12,192 m</b>	-50 ft to 40,000 ft
<b>NOTE:</b> Applicable product safety standards specify thermal limits for plastic surfaces. The device operates well within this range of temperatures.		

# 11 Power cord set requirements

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

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

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

## Requirements for all countries

The following requirements are applicable to all countries and regions:

- The length of the power cord set must be at least 1.0 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 amps 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 all countries 113

## Requirements for specific countries and regions

Country/region	Accredited agency	Applicable note number
Australia	EANSW	1
Austria	OVE	1
Belgium	CEBC	1
Canada	CSA	2
Denmark	DEMKO	1
Finland	FIMKO	1
France	UTE	1
Germany	VDE	1
Italy	IMQ	1
Japan	METI	3
The Netherlands	KEMA	1
Norway	NEMKO	1
The People's Republic of China	COC	5

Country/region	Accredited agency	Applicable note number
South Korea	EK	4
Sweden	CEMKO	1
Switzerland	SEV	1
Taiwan	BSMI	4
The United Kingdom	BSI	1
The United States	UL	2

1. The flexible cord must be Type H05VV-F, 3-conductor, 1.0-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.
2. The flexible cord must be Type SPT-3 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) or NEMA 6-15P (15 A, 250 V) configuration.
3. The appliance coupler, flexible cord, and wall plug must bear a “T” mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCT or VCTF, 3-conductor, 1.00-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) configuration.
4. The flexible cord must be Type RVV, 3-conductor, 0.75-mm<sup>2</sup> conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.
5. The flexible cord must be Type VCTF, 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.

---

## 12 Recycling

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

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

# Index

- A**
  - AC adapter and battery light, identifying 6
  - AC adapter, spare part numbers 22
  - action keys
    - airplane mode 13
    - help 13
    - identifying 12, 13
    - keyboard backlight 13
    - mute 13
    - next track 13
    - pause 13
    - play 13
    - screen brightness 13
    - speaker volume 13
    - switch screen image 13
    - using 13
  - airplane mode key 13
  - antenna
    - removal 42
    - spare part number 20, 43
  - audio
    - adjusting volume 13
  - audio, product description 3
  - audio-out (headphone)/audio-in (microphone) combo jack, identifying 7
- B**
  - backup, creating 73
  - backups 73
  - battery
    - removal 34
    - spare part number 18, 34
  - bezel
    - removal 36
    - spare part numbers 19, 37
  - BIOS
    - determining version 66
    - downloading an update 67
    - starting the Setup Utility 66
    - updating 66
  - Bluetooth label 15
  - boot order, changing 77
  - bottom components 14
  - bottom cover
    - removal 31
    - spare part number 18, 31
  - buttons
    - optical drive eject 6
    - power 11
- C**
  - cables, service considerations 24
  - camera
    - identifying 8
  - camera light, identifying 8
  - camera, product description 2
  - camera/microphone module
    - spare part numbers 20, 38
  - caps lock light, identifying 10
  - card reader board
    - removal 52
    - spare part number 18, 52
  - card reader board cable
    - spare part number 52
  - chipset, product description 1
  - components
    - bottom 14
    - display 8
    - keyboard area 9
    - left side 7
    - right side 6
  - computer components 16
  - connector, power 6
  - connectors, service considerations 24
  - control zone 9
- D**
  - display assembly
    - components 19
    - removal 35
    - spare part numbers 35
  - display back cover, spare part numbers 20
  - display components 8
  - display panel
    - removal 38
    - spare part numbers 20, 39
  - display panel cable
    - removal 41
    - spare part numbers 20, 41
  - display panel conductive tape
    - spare part number 20
  - display panel, product description 1
  - drive light, identifying 6
  - drives 21
    - precautions 24
    - preventing damage 24
- E**
  - electrostatic discharge 25
  - equipment guidelines 27
  - esc key, identifying 12
- F**
  - fan
    - removal 55
    - spare part number 18, 55
  - fn key, identifying 12
- G**
  - Get Help in Windows 10 action key 13
  - graphics, product description 1
  - grounding guidelines 25
  - guidelines
    - equipment 27
    - grounding 25
    - packaging 26
    - transporting 26
    - workstation 26
- H**
  - hard drive
    - product description 2
    - removal 44
    - spare part numbers 18, 44
  - hard drive bracket
    - removal 45
    - spare part number 18, 44
  - hard drive cable
    - removal 45
    - spare part number 18, 44

- HDMI port
  - identifying 7
- HDMI-to-VGA adapter, spare part
  - number 22
- heat sink
  - removal 56
  - spare part numbers 18, 56
- hinge
  - removal 40
  - spare part number 20, 41
- hinge covers
  - spare part number 20
- HP PC Hardware Diagnostics UEFI
  - downloading 70
  - starting 70
  - using 69
- HP PC Hardware Diagnostics Windows
  - downloading 68
  - installing 69
  - using 68
- HP Recovery Manager
  - correcting boot problems 77
  - starting 76
- HP Recovery media
  - recovery 76
  - using 74
- HP Recovery partition
  - recovery 76
  - removing 77

**I**

- integrated numeric keypad,
  - identifying 12
- internal microphones, identifying 8

**J**

- jacks
  - audio-out (headphone)/audio-in (microphone) 7
  - network 7
  - RJ-45 (network) 7

**K**

- keyboard
  - removal 65
  - spare part number 65
- keyboard backlight action key 13
- keyboard, product description 3
- keyboard/top cover
  - spare part numbers 17
- keypad, integrated numeric 12

- keys
  - action 12
  - airplane mode 13
  - esc 12
  - fn 12
  - num lock 12
  - Windows 12

**L**

- labels
  - Bluetooth 15
  - regulatory 15
  - serial number 15
  - service 15
  - wireless certification 15
  - WLAN 15
- left control zone, identifying 9
- left side components 7
- lights
  - AC adapter and battery 6
  - camera 8
  - caps lock 10
  - drive 6
  - mute 10
  - power 10
  - RJ-45 (network) status 7
- lock bracket
  - removal 63
  - spare part number 17, 63

**M**

- mass storage devices 21
- memory module
  - product description 1
  - removal 50
  - spare part numbers 18, 50
- microphone
  - product description 2, 3
- MicroSD memory card reader,
  - identifying 6
- minimized image recovery 76
- minimized image, creating 75
- model name 1
- mute light, identifying 10
- mute volume action key 13

**N**

- network jack, identifying 7
- next track action key 13

**O**

- operating system, product
  - description 4
- optical drive
  - product description 2
  - removal 28
  - spare part number 18, 22, 28
- optical drive bezel, spare part
  - number 18, 28
- optical drive bracket, spare part
  - number 18, 28
- optical drive eject button,
  - identifying 6
- optical drive, identifying 6
- original system recovery 75

**P**

- packaging guidelines 26
- pause action key 13
- plastic parts, service
  - considerations 23
- play action key 13
- ports
  - HDMI 7
  - product description 3
  - USB SuperSpeed 7
  - USB Type-C 7
- power button, identifying 11
- power connector
  - identifying 6
- power connector cable
  - removal 64
  - spare part number 17, 64
- power cord
  - set requirements 79
  - spare part numbers 22
- power lights, identifying 10
- power requirements, product
  - description 4
- processor, product description 1
- product description
  - audio 3
  - camera 2
  - chipset 1
  - display panel 1
  - external media cards 3
  - graphics 1
  - hard drive 2
  - internal card expansion 3
  - keyboard 3

- memory module 1
- microphone 3
- operating system 4
- optical drive 2
- ports 3
- power requirements 4
- processors 1
- product name 1
- security 4
- serviceability 5
- solid-state drive 2
- storage 2
- TouchPad 3
- wireless 3
- product name 1
- product name and number, computer 15
- R**
- recovery 73
  - discs 74, 76
  - HP Recovery Manager 75
  - HP Recovery partition 75
  - media 76
  - starting 76
  - supported discs 74
  - system 75
  - USB flash drive 76
  - using HP Recovery media 74
- recovery media
  - creating using HP Cloud Recovery Download Tool 75
  - creating using HP Recovery Manager 74
  - creating using Windows tools 73
  - discs 74
  - HP Recovery partition 73
  - USB flash drive 74
  - using 74
- recovery partition, removing 77
- regulatory information
  - regulatory label 15
  - wireless certification labels 15
- Remote HP PC Hardware Diagnostics
  - UEFI settings
    - customizing 71
    - using 71
- removal/replacement
  - procedures 28, 31
- restoring 73
- right control zone, identifying 9
- right side components 6
- RJ-45 (network) jack, identifying 7
- RJ-45 (network) status lights, identifying 7
- RJ-45 cover
  - removal 33
  - spare part number 33
- rubber feet
  - removal 31
  - spare part number 31
- Rubber Foot Kit, spare part number 19, 22
- S**
- screen brightness action keys 13
- Screw Kit, spare part number 22
- security cable slot, identifying 7
- security, product description 4
- serial number, computer 15
- service considerations
  - cables 24
  - connectors 24
  - plastic parts 23
- service labels, locating 15
- serviceability, product description 5
- slots
  - memory card reader 6
  - security cable 7
- solid-state drive
  - product description 2
  - removal 48
  - spare part numbers 18, 48
- speaker volume action keys 13
- speakers
  - identifying 11
  - removal 62
  - spare part number 17, 62
- special keys, using 12
- storage, product description 2
- supported discs, recovery 74
- switch screen image action key 13
- system board
  - removal 59
  - spare part numbers 17, 59
- system recovery 75
- system restore point, creating 73
- T**
- tools required 23
- top cover
  - removal 65
  - spare part number 65
- TouchPad
  - removal 53
  - spare part number 17, 53
- TouchPad bracket
  - removal 53
  - spare part number 17, 53
- TouchPad cable
  - spare part number 17, 18, 53
- TouchPad zone, identifying 9
- TouchPad, product description 3
- transporting guidelines 26
- traveling with the computer 15
- U**
- USB SuperSpeed port, identifying 7
- USB Type-C port, identifying 7
- USB-C to USB-A dongle, spare part number 22
- V**
- vents, identifying 11, 14
- volume
  - adjusting 13
  - mute 13
- W**
- webcam/microphone module
  - removal 37
- webcam/microphone module cable
  - spare part numbers 20
- Windows
  - backup 73
  - recovery media 73
  - system restore point 73
- Windows key, identifying 12
- Windows tools, using 73
- wireless antenna
  - removal 42
  - spare part number 20, 43
- wireless certification label 15
- wireless, product description 3
- WLAN antenna
  - removal 42
  - spare part number 20, 43
- WLAN antennas, identifying 8
- WLAN device 15
- WLAN label 15

WLAN module  
  removal 46  
  spare part numbers 18, 46  
workstation guidelines 26