



## OMEN by HP Laptop PC

Maintenance and Service Guide  
**IMPORTANT!** This document is intended for  
HP authorized service providers only.

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#### Product notice

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

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

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## Safety warning notice

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 **WARNING!** To reduce the possibility of heat-related injuries or of overheating the device, do not place the device directly on your lap or obstruct the device air vents. Use the device only on a hard, flat surface. Do not allow another hard surface, such as an adjoining optional printer, or a soft surface, such as pillows or rugs or clothing, to block airflow. Also, do not allow the AC adapter to contact the skin or a soft surface, such as pillows or rugs or clothing, during operation. The device and the AC adapter comply with the user-accessible surface temperature limits defined by the International Standard for Safety of Information Technology Equipment (IEC 60950-1).

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## Processor information



**IMPORTANT:** This version of Windows running with the processor or chipsets used in this system has limited support from Microsoft. For more information about Microsoft's support, please see Microsoft's Support Lifecycle FAQ at <https://support.microsoft.com/lifecycle>.

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# 1 Product description

Category	Description
Product Name	OMEN by HP Laptop PC
Processors	<b>6th generation Intel® Core™ i7 Processor</b> Intel Core i7-6700 HQ (2.6 GHz, turbo up to 3.5 GHz), 2133 MHz/6 MB L3, Quad, TDP 45 W, cTDP 35 W <b>6th generation Intel Core i5 Processor</b> Intel Core i5-6300 HQ (2.3 GHz, turbo up to 3.2 GHz), 2133 MHz/6 MB L3, Quad, TDP 45 W, cTDP 35 W <b>6th generation Intel Core i3 Processor</b> Intel Core i3-6100H (2.7 GHz, turbo up to 2.7 GHz), 2133 MHz/3 MB L3, Dual, TDP 35 W (not available for products with Hybrid Green), for use with NVIDIA® N16 P-GT (GeForce® GTX 950 M) only
Chipset	Intel HM170
Graphics	<b>Internal graphics:</b> Intel HD Graphics 530 <b>Hybrid graphics:</b> NVIDIA N16 P-GT (GeForce GTX 950 M) with up to 2048 MB of dedicated video memory (128 Mx32 GDDR5 x 4 PCs) (not available for products with Hybrid Green) NVIDIA N16 P-GX (GeForce GTX 960 M) with up to 2048 MB of dedicated video memory (128 Mx32 GDDR5 x 4 PCs) (not available to Core-i3) NVIDIA N16 P-GX (GeForce GTX 960 M) with up to 4096 MB of dedicated video memory (256 Mx32 GDDR5 x 4 PCs) (not available to Core-i3) (not available for products with Hybrid Green) NVIDIA N16 E-GR (GeForce GTX 965M) with up to 4096 MB of dedicated video memory (256 Mx32 GDDR5 x 4 PCs) (not available to Core-i3) Support HD Decode, DX12, and HDMI Support Optimus Support GPS (GPU Performance Scaling)
Panel	<b>16:9 Ultra Wide Aspect Ratio</b> 15.6" FHD WLED AntiGlare (1920x1080) slim-flat (3.2 mm) UWVA, eDP, typical brightness 220 nits 15.6" FHD WLED AntiGlare (1920x1080) slim-flat (3.2 mm) UWVA, eDP, typical brightness 250 nits, bridged to 220 nits FHD panel 15.6" UHD Pentile WLED AntiGlare (3840x2160) uslim-flat (2.6 mm) UWVA, eDP+PSR, typical brightness 300 nits
Color	<b>Back cover:</b> <ul style="list-style-type: none"><li>Shadow Mesh, Pattern: Shadow Mesh</li><li>Twinkle Black</li></ul> <b>Top cover with keyboard:</b> <ul style="list-style-type: none"><li>Black, Pattern: Shadow Mesh + Dragon Red</li><li>Ash Silver background + Hybrid Green pattern gradient, Pattern: Hexagon</li></ul>

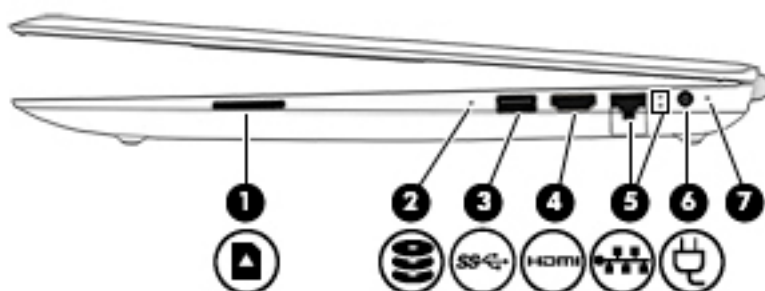
Category	Description
	<b>Base enclosure:</b> <ul style="list-style-type: none"> <li>Twinkle Black for products with Dragon Red</li> <li>Twinkle Black with Hybrid Green feet for products with Hybrid Green</li> </ul>
<b>Memory</b>	<b>Two SODIMM slots - customer non-accessible/non-upgradeable</b> DDR4-2133 Dual Channel Support (DDR4-2400 bridge to DDR4-2133) <b>Supports up to 16 GB max system memory</b> 4096 MB (4096 MB x 1) 6144 MB (2048 MB x 1 + 4096MB x 1), no support for 32-bit OS 8192 MB (4096 MB x 2), no support for 32-bit OS 8192 MB (8192 MB x 1), no support for 32-bit OS 12288 MB (8192 MB +4096 MB), no support for 32-bit OS and Win7 Home Basic 16384 MB (8192 MB x 2), no support for 32-bit OS and Win7 Home Basic
<b>Hard drive</b>	<b>Supports all 7 mm/9.5 mm, SATA 2.5" hard drives</b> HP 3D DriveGuard <b>Single hard drive configurations</b> 1 TB (7200) 9.5 mm 2 TB (5400) 9.5 mm <b>PCIe NVMe TLC M.2 SSD</b> 256 GB 512 GB <b>Hard drive +SSD configurations</b> 1 TB (7200) 9.5 mm hard drive + 256 GB PCIe NVMe TLC M.2 SSD 1 TB (7200) 9.5 mm hard drive + 128 GB M.2 SATA-3 SSD (Value) 2 TB (5400) 9.5 mm hard drive + 128 GB M.2 SATA-3 SSD (Value)
<b>Optical drive</b> (External USB)	<b>9.5 mm tray load - SATA - External USB ODD (Aluminum material)</b> DVD+/-RW Double-Layer SuperMulti
<b>Camera and Microphone</b>	<b>HP TrueVision HD:</b> HP Wide Vision HD Camera - indicator LED, USB 2.0, BSI sensor, f2.0, 88° WFOV 720p by 30 frames per second Dual array Digital Microphones with appropriate software - beam forming, echo cancellation, noise suppression <b>Intel RealSense 3D Camera:</b> (not available for products with Hybrid Green) Intel RealSense 3D camera - indicator LED, USB 3.0, 85° WFOV 1080p by 30 frames per second, 4x depth resolution Support Windows Hello Dual array Digital Microphones with appropriate software Enable HP Noise Cancellation






Category	Description
	Support HP Audio Boost
<b>Audio</b>	Bang and Olufsen Dual Speakers
<b>Ethernet</b>	Integrated 10/100/1000 NIC
<b>Wireless</b>	<b>Integrated Wireless options with dual antennas (M.2/PCIe):</b> Intel Dual Band Wireless-AC 7265 802.11 ac 2x2 WiFi + BT 4.2 Combo Adapter (non vPRO) Intel WiDi support (select products only) Compatible with Miracast-certified devices
<b>External media cards</b>	<b>HP Multi-Format Digital Media Card Reader</b> Support SD/SDHC/SDXC Push-Push Insertion/Removal
<b>Internal card expansion</b>	One M.2 slot for WLAN One M.2 slot for SSD
<b>Ports</b>	Hot Plug / Unplug and auto detect for correct output to wide-aspect vs. standard aspect video (auto adjust panel resolution to fit embedded panel and external monitor connected) Headphone / Microphone Combo Jack HDMI v2.0 supporting: up to 4096x2160 @ 60Hz Connect HDMI 2.0 to dGPU <b>USB 2.0 Ports on Unit:</b> 1 (left side) <b>USB 3.0 Ports on Unit:</b> 2 (1 on the left side ; 1 on the right side) RJ-45 / Ethernet AC Smart Pin adapter plug
<b>Keyboard/pointing devices</b>	Full Size Backlit 3 Coat paint island-style keyboard with numeric key pad Dragon Red Full Size Backlit 3 Coat paint island-style keyboard with numeric key pad Hybrid Green <b>TouchPad Requirements:</b> Clickpad with image sensor Multitouch gestures enabled Support Modern Trackpad Gestures Taps enabled as default
<b>Power requirements</b>	<b>Batteries:</b> 3 cell prismatic battery - 61.5 Whr (5360 mAh) Battery life enhancement Supports battery fast charge; when the battery charge remaining is between zero and 90%, the battery will charge to 90% of full capacity in no more than 90 minutes <b>AC Adapters:</b>

Category	Description
	<ul style="list-style-type: none"> <li>120 W</li> <li>150 W, for use with products with NVIDIA N16 E-GR only</li> <li>1 M length power cord</li> </ul>
<b>Mechanical Requirements</b>	<b>Chassis Buttons</b> Power LED indicators
<b>Security</b>	TPM 2.0 Kensington Security Lock
<b>Operating system</b>	<b>Preinstalled:</b> Windows 10 Windows 10 Pro <b>For Developed Market (ML):</b> Windows 10 Home ML Windows 10 Home High End ML (for use with Intel Core i7-6700 HQ with > 4 GB, or, any processor with ≥1080p screen and ≥ 8GB) <b>For Emerging Market (EM/SL):</b> Windows 10 Home EM/SL Windows 10 Home High End EM/SL (for use with Intel Core i7-6700 HQ with > 4 GB, or, any processor with ≥1080p screen and ≥ 8GB) CPPP Windows 10 Home China Language Edition CPPP Windows 10 Home High End China Language Edition (for use with Intel Core i7-6700 HQ with > 4 GB, or, any processor with ≥1080p screen and ≥ 8GB) SEAP Windows 10 Home Single Language Edition (select products only) SEAP Windows 10 Home High End (select products only)
<b>Serviceability</b>	<b>End user replaceable parts:</b> AC adapter

## 2 External component identification

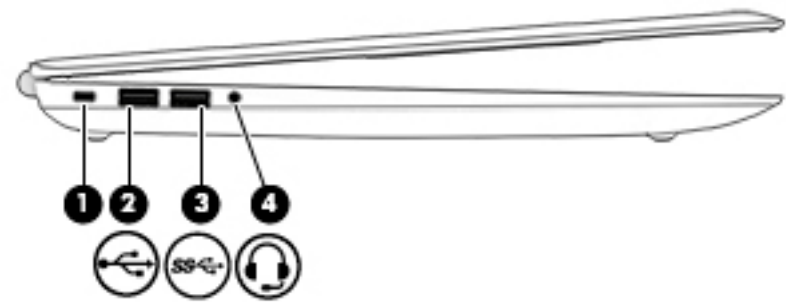
### Right side







		Description
(1)		<p>Memory card reader</p> <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>
(2)		<p>Drive light (select products only)</p> <ul style="list-style-type: none"> <li>• Blinking white: The hard drive is being accessed.</li> <li>• Amber: HP 3D DriveGuard has temporarily parked the hard drive (select products only).</li> </ul>
(3)		<p>USB 3.0 port</p> <p>Connects an optional USB device, such as a keyboard, mouse, external drive, printer, scanner, or USB hub.</p>
(4)		<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>
(5)		<p>RJ-45 (network) jack/status lights</p> <p>Connects a network cable.</p> <ul style="list-style-type: none"> <li>• White: The network is connected.</li> <li>• Amber: Activity is occurring on the network.</li> </ul>
(6)		<p>Power connector</p> <p>Connects an AC adapter.</p>
(7)		<p>AC adapter and battery light</p> <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> </ul>

Description	
	<ul style="list-style-type: none"> <li>Amber: The AC adapter is connected and the battery is charging.</li> <li>Off: The battery is not charging.</li> </ul>


## Left side

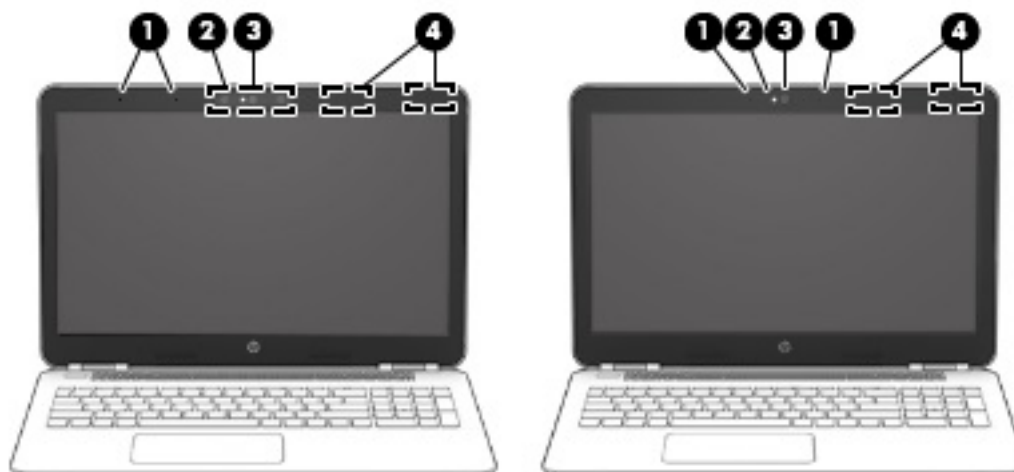


		Description
(1)		<p>Security cable slot</p> <p>Attaches an optional security cable to the computer.</p> <p><b>NOTE:</b> The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.</p>
(2)		<p>USB 2.0 port</p> <p>Connects an optional USB device, such as a keyboard, mouse, external drive, printer, scanner, or USB hub.</p>
(3)		<p>USB 3.0 port</p> <p>Connects an optional USB device, such as a keyboard, mouse, external drive, printer, scanner, or USB hub.</p>
(4)		<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, refer to 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>All apps</b> (required on some products), select <b>HP Help and Support</b>, and then select <b>HP Documentation</b>.</li> </ul> <p><b>NOTE:</b> When a device is connected to the jack, the computer speakers are disabled.</p>



# Display

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



Component		Description
(1)	Internal microphones	Record sound.
(2)	Camera light	On: The camera is in use.
(3)	Camera	<p>Allows you to video chat, record video, or record still images. Some also provide HD (high-definition) or 3D capability, apps for gaming, or facial recognition software like Windows Hello.</p> <p>To use your camera:</p> <ul style="list-style-type: none"><li>Type <b>camera</b> in the taskbar search box, and then select <b>Camera</b>.</li><li>On select products, type <b>Intel RealSense</b> in the taskbar search box to explore additional features, demos, and apps.</li></ul>
(4)	WLAN antennas*	Send and receive wireless signals to communicate with wireless local area networks (WLANs).

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

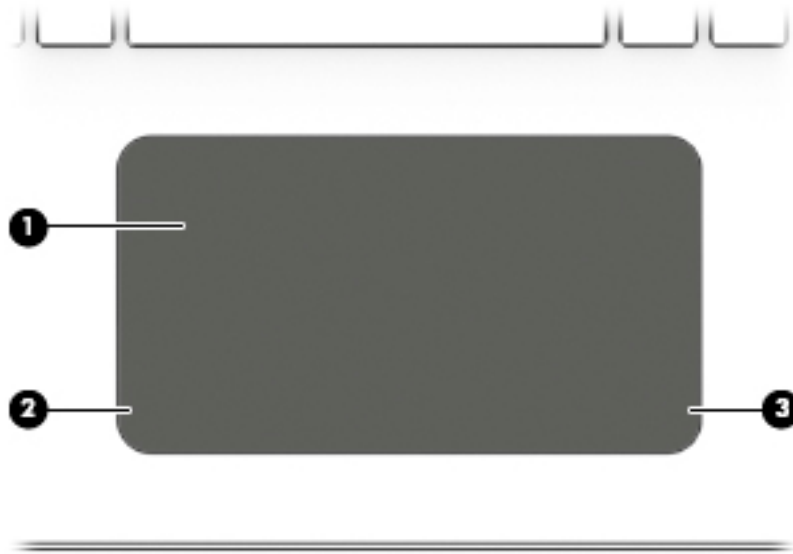
For wireless regulatory notices, see the section of the *Regulatory, Safety, and Environmental Notices* that applies to your country or region.

To access this guide:

- ▲ Select the **Start** button, select **All apps** (required on some products), select **HP Help and Support**, and then select **HP Documentation**.

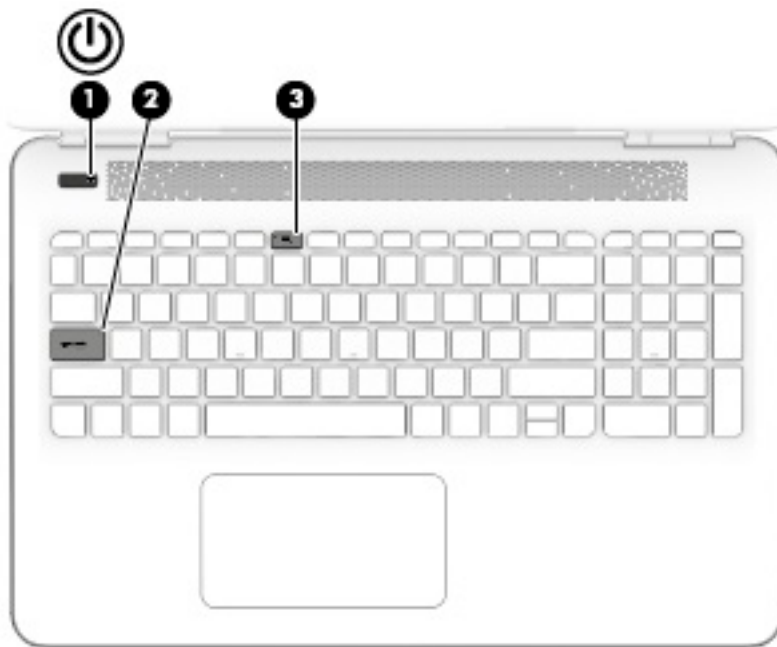
# Top



## TouchPad



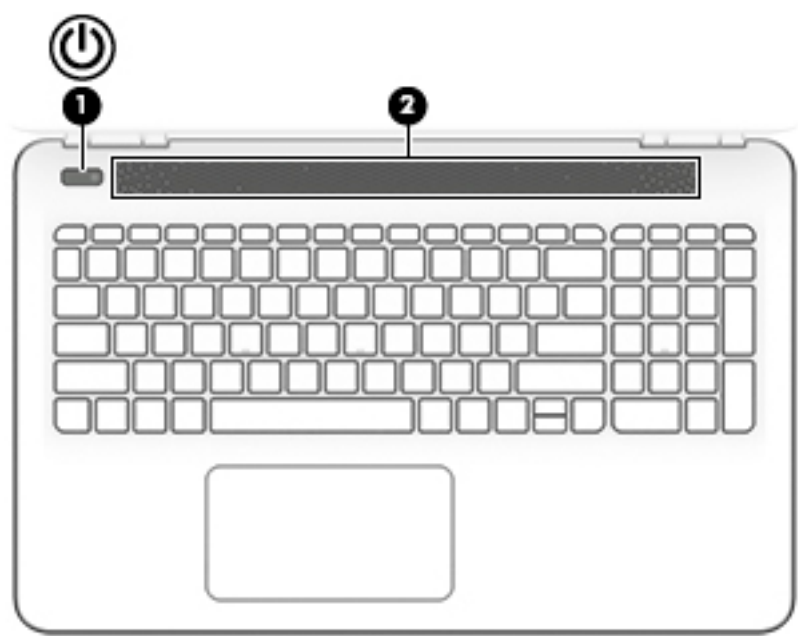
Component		Description
(1)	TouchPad zone	Reads your finger gestures to move the pointer or activate items on the screen.
(2)	Left TouchPad button	Functions like the left button on an external mouse.
(3)	Right TouchPad button	Functions like the right button on an external mouse.


## Lights



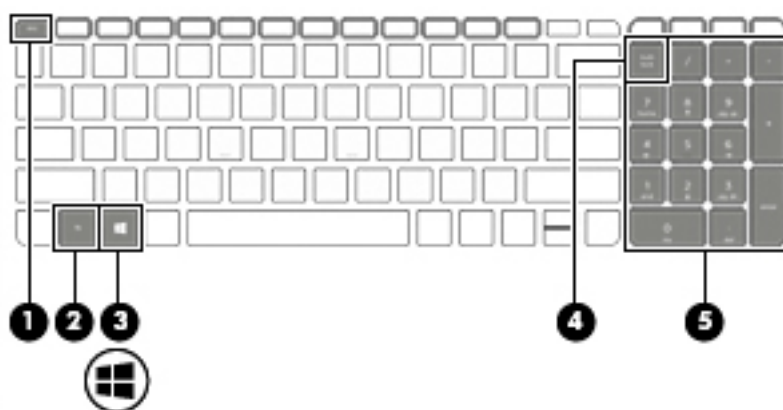
Component		Description
(1)	 Power light	<ul style="list-style-type: none"><li>On: The computer is on.</li><li>Blinking: The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unneeded components.</li><li>Off: The computer is off or in Hibernation. 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>Amber: Computer sound is off.</li><li>Off: Computer sound is on.</li></ul>


Button and speakers



Component		Description
(1)	 Power button	<ul style="list-style-type: none"><li>• When the computer is off, press the button to turn on the computer.</li><li>• When the computer is on, press the button briefly to initiate Sleep.</li><li>• When the computer is in the Sleep state, press the button briefly to exit Sleep.</li><li>• When the computer is in Hibernation, press the button briefly to exit Hibernation.</li></ul> <p><b>CAUTION:</b> Pressing and holding down the power button results in the loss of unsaved information.</p> <p>If the computer has stopped responding and shutdown procedures are ineffective, press and hold the power button down for at least 5 seconds to turn off the computer.</p> <p>To learn more about your power settings, see your power options.</p> <p>▲ Type <code>power</code> in the taskbar search box, and then select <b>Power and sleep settings</b>.</p> <p>– or –</p> <p>Right-click the <b>Start</b> button, and then select <b>Power Options</b>.</p>
(2)	Speakers	Produce sound.





## Keys










Component		Description
(1)	<a href="#">esc</a> key	Displays system information when pressed in combination with the <a href="#">fn</a> key.
(2)	<a href="#">fn</a> key	Executes frequently used system functions when pressed in combination with the <a href="#">esc</a> key, action keys, or the <a href="#">spacebar</a> .
(3)	 Windows key	Opens the <b>Start</b> menu. <b>NOTE:</b> Pressing the Windows key again will close the <b>Start</b> menu.
(4)	<a href="#">num lock</a> key	Alternates between the navigational and numeric functions on the integrated numeric keypad.
(5)	Integrated numeric keypad	When <a href="#">num lock</a> is on, the keypad can be used like an external numeric keypad.

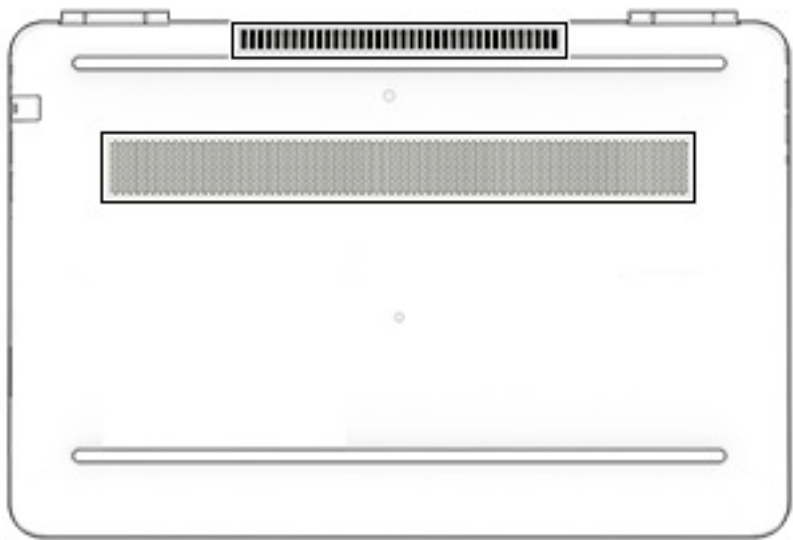
## Using the action keys

- An action key performs an assigned function.
- The icon on each action key illustrates the function for that key.
- To use an action key, press and hold the key.

Icon	Description
	Decreases the screen brightness incrementally as long as you hold down the key.
	Increases the screen brightness incrementally as long as you hold down the key.
	Switches the screen image between display devices connected to the system. For example, if a monitor is connected to the computer, repeatedly pressing this key alternates the screen image from the computer display to the monitor display to a simultaneous display on both the computer and the monitor.
	Turns the keyboard backlight off or on. <b>NOTE:</b> To conserve battery power, turn off this feature.

Icon	Description
	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.
	<p>Turns the airplane mode and wireless feature on or off.</p> <p><b>NOTE:</b> The airplane mode key is also referred to as the wireless button.</p> <p><b>NOTE:</b> A wireless network must be set up before a wireless connection is possible.</p>

# Bottom



Description	
Vents (2)	<p>Enable 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>

# Rear



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.



**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, or on the back of the display.

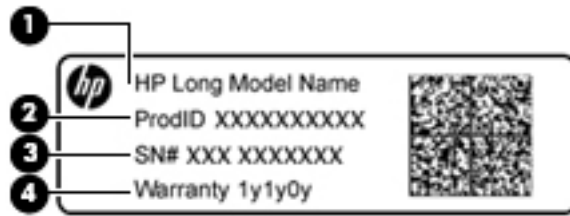
- Service label—Provides important information to identify your computer. When contacting support, you will probably be asked for the serial number, and possibly for the product number or the model number. Locate these numbers before you contact support.

Your service label will resemble one of the examples shown below. Refer to the illustration that most closely matches the service label on your computer.



Component	
(1)	Serial number
(2)	Product number
(3)	Warranty period
(4)	Model number (select products only)





Component
(1) Model name (select products only)
(2) Product number
(3) Serial number
(4) Warranty period

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

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## 3 Illustrated parts catalog

### Computer major components

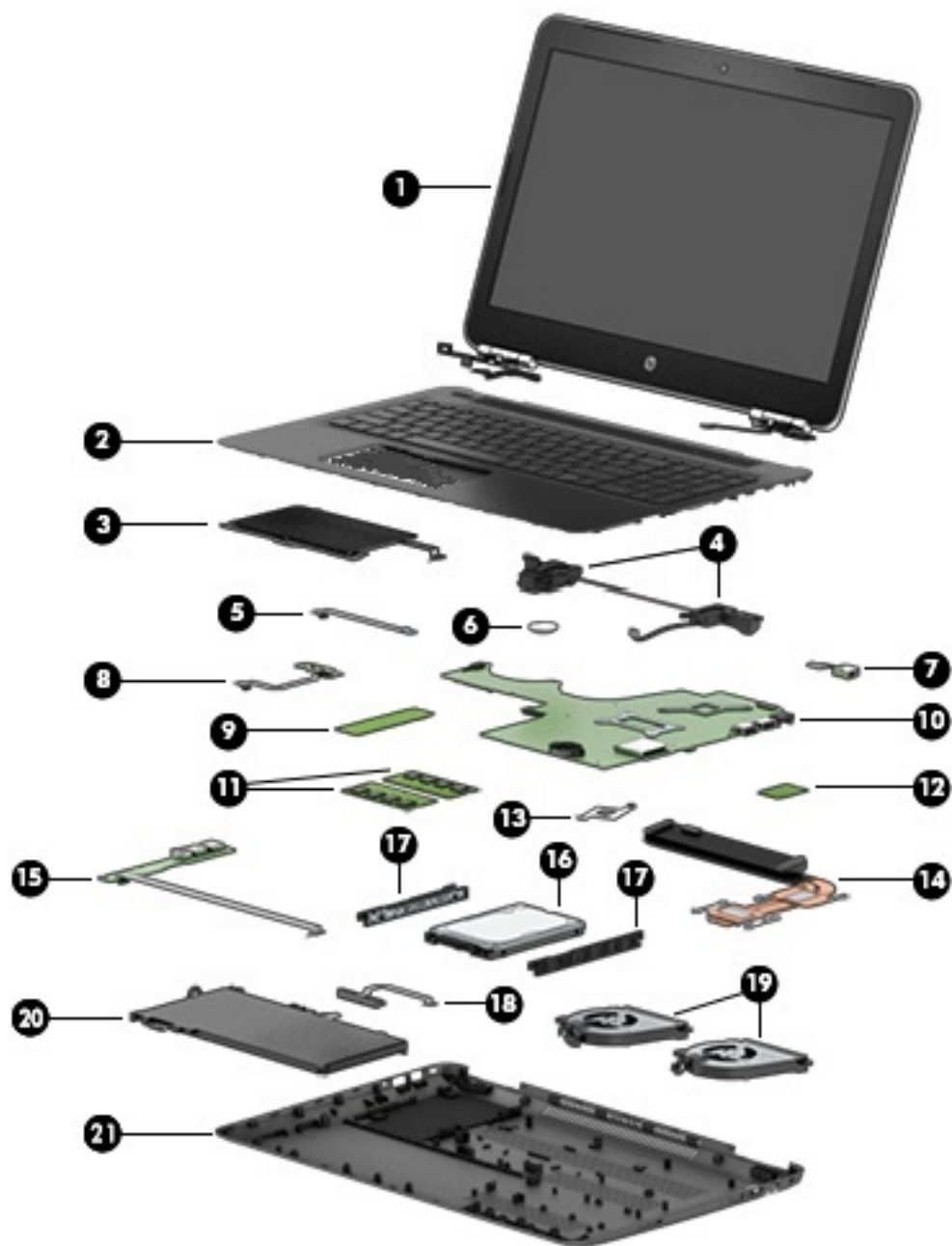


**NOTE:** HP continually improves and changes product parts. For complete and current information on supported parts for your computer, go to <http://partsurfer.hp.com>, select your country or region, and then follow the on-screen instructions.



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

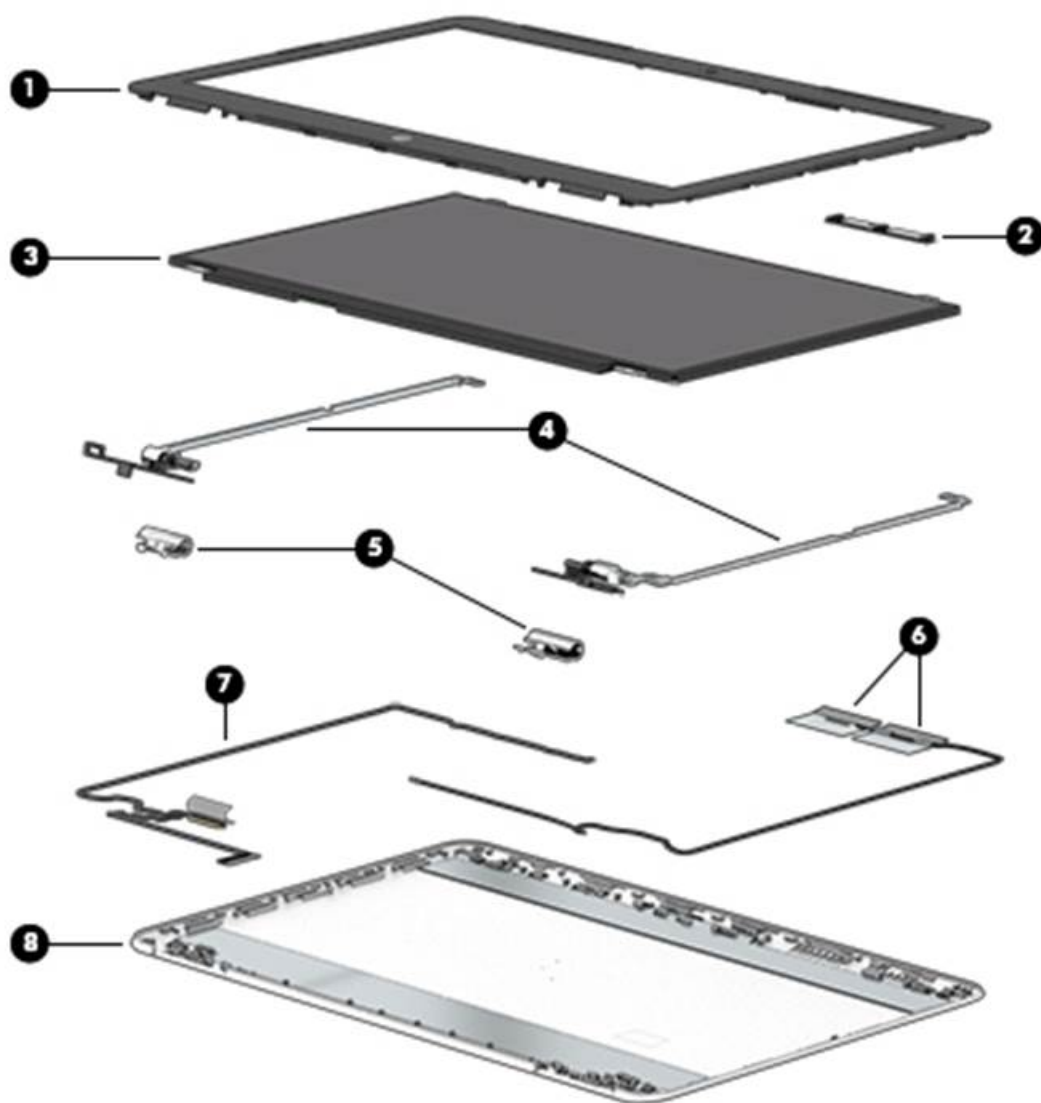
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Item	Component	Spare part number
(1)	Display panel (see <a href="#">Display assembly on page 32</a> )	
(2)	Top cover with TouchPad and keyboard (see <a href="#">TouchPad on page 52</a> for a detailed list of country codes)	
(3)	TouchPad board	860364-001
	TouchPad cable	858967-001
(4)	Speaker Kit	858976-001
(5)	USB board cable	856729-001
(6)	RTC battery	741976-001

Item	Component	Spare part number
(7)	<b>Power connector</b> (includes cable)	858021-001
(8)	<b>Power button board</b>	858974-001
	<b>Power button board cable</b>	858966-001
(9)	<b>Solid-state drive</b>	
	Generic SSD 128 GB 2280 M2 SATA-3 Value TL	827560-027
	Generic SSD 256 GB 2280 M2 PCIe 3x4SS NVMeTLC TL	847109-008
	Generic SSD 512 GB 2280 M2PCIe 3x4SS NVMeTLC TL	847110-007
(10)	<b>System board</b> (see <a href="#">System board on page 47</a> )	
(11)	<b>Memory</b>	
	4 GB 2133 MHz 1.2v DDR4 shared	820569-005
	8 GB 2133 MHz 1.2v DDR4 shared	820570-005
	2 GB 2133 MHz 1.2v DDR4 shared	851379-005
(12)	<b>WLAN module</b> , Intel Dual Band Wireless-AC 7265	793840-005
(13)	<b>Heat sink for products with discrete graphics</b>	856668-001
(14)	<b>Heat sink for CPU and graphics</b>	725625-001
(15)	<b>USB board</b>	858975-001
(16)	<b>Hard drive</b>	
	1 TB 7200 RPM SATA RAW 9.5mm	766644-005
	2 TB 5400 RPM SATA RAW 9.5 mm	801808-005
	Hard drive cable	858969-001
(17)	<b>Hard drive brackets</b>	not spared
(18)	<b>Battery cable</b>	858968-001
(19)	<b>Fan</b> , the same spare part number can be used to replace either the right fan or the left fan	858970-001
(20)	<b>Battery</b>	849910-850
(21)	<b>Base enclosure</b>	
	Twinkle Black for Shadow Mesh finish	858965-001
	Twinkle Black with Hybrid Green feet	905114-001

## Display assembly subcomponents



Item	Component	Spare part number
(1)	<b>Bezel</b>	
	For products with an HD camera	856725-001
	For products with a 3D camera	856726-001
(2)	<b>Camera</b>	
	Intel RealSense 3D camera 1p NM U3 1080p	781624-005
	HP Wide Vision HD camera 1p DM U2 Mjpeg 720p VDH SF HD	846006-003
	3D camera cable	859445-001
(3)	<b>Raw panel</b>	
	15.6" generic panel, FHD AG UWVA 220 eDP, Slim KR	752920-014

Item	Component	Spare part number
	15.6" generic panel, UHD AG UWVA300 eDPU Slim PSRKR	842484-004
(4)	<b>Hinge assembly</b>	856741-001
(5)	<b>Hinge cap assembly</b>	859737-001
(6)	<b>WLAN antenna</b>	856923-001
(7)	<b>Display cable</b>	
	Full high-definition display cable for products with an HD camera	856733-001
	Full high-definition display cable for products with a 3D camera	856734-001
	High-definition display cable for products with an HD camera	856735-001
	High-definition display cable for products with a 3D camera	856736-001
(8)	<b>Back cover</b>	
	In Hybrid Green finish, with antenna	905115-001
	In Shadow Mesh finish, with antenna, for products with an HD camera	856715-001
	In Shadow Mesh finish, with antenna, for products with a 3D camera	856718-001

## Miscellaneous parts

Component	Spare part number
<b>AC adapter</b> 120 W adapter PFC S-3P, slim, 4.5 mm	710415-001
<b>AC adapter</b> 150 W adapter PFC smart, slim, 4.5 mm (for use with products with NVIDIA N16 E-GR only)	776620-001
<b>HP HDMI to VGA adapter</b>	701943-001
<b>Microphone board</b>	857471-001
<b>HP USB External DVD/RW Drive</b>	747080-001
<b>Power cord</b>	
For use in Australia	213356-008
For use in Denmark	213353-008
For use in Europe	213350-009
For use in India	404827-003
For use in Israel	398063-003
For use in Italy	213352-008
For use in Japan	349756-002
For use in Korea	267836-008
For use in North America	213349-009
For use in the People's Republic of China	286497-008
For use in South Africa	361240-002

<b>Component</b>	<b>Spare part number</b>
For use in Switzerland	213354-008
For use in Taiwan	393313-003
For use in Thailand	285096-006
For use in the United Kingdom	213351-008
<b>Screw Kit</b>	856752-001

---

## 4 Removal and replacement procedures preliminary requirements

### Tools required

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

- Flat-bladed screwdriver
- Magnetic screwdriver
- Phillips P0 and P1 screwdrivers

### Service considerations

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



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

---

### Plastic parts




**CAUTION:** Using excessive force during disassembly and reassembly can damage plastic parts. Use care when handling the plastic

---




## Cables and connectors

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

---

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

## Drive handling

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

---

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

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

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

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

Avoid dropping drives from any height onto any surface.

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

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

Avoid exposing a drive to temperature extremes or liquids.

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

---

# 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 plastic foam	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, screwdrivers, 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 plastic foam.
- 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 equipment 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 tabletop 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 authorized service provider parts

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

**CAUTION:** This computer does not have user-replaceable parts. 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 14](#) for details.

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

There are as many as 61 screws that must be removed, replaced, and/or loosened when servicing the parts described in this chapter. Make special note of each screw size and location during removal and replacement.

### Base enclosure

Description	Spare part number
Twinkle Black for Shadow Mesh finish	858965-001
Twinkle Black with Hybrid Green feet	905114-001

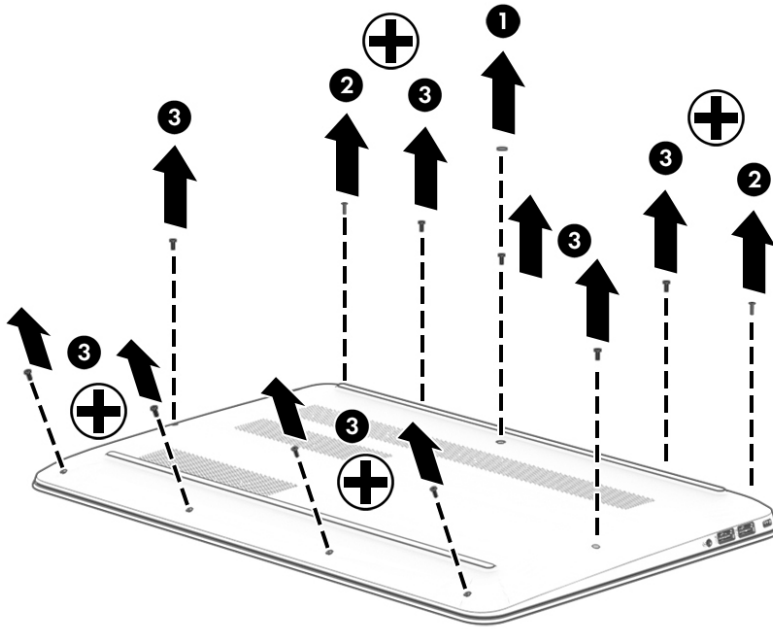
Before disassembling the computer, follow these steps:


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 unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.

Remove the base enclosure:

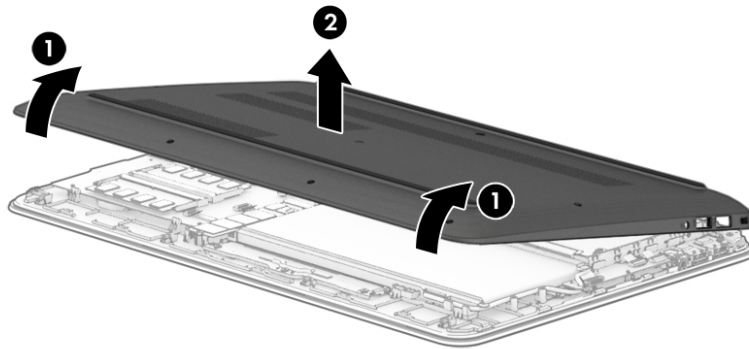
1. Position the computer upside down on a flat surface.

2. Remove the plastic plug and screw (1), and then remove the 2 Phillips M2x5.0 screws (2) and the 8 M2.5x6.0 screws (3).



 **NOTE:** There are three internal clips by the battery area. Carefully disengage those clips as you are removing the base enclosure.



3. Slide a nylon flake tool around the edge of the base enclosure to loosen it, taking care not to damage the internal clips. Lift the front edge (1) to access the internal clips in the battery area.
4. Remove the base enclosure (2).



## Battery

Description	Spare part number
Battery 3C 61WH 5.37Ah LI TE03061XL-PR	849910-850
Battery cable	858968-001

Remove the battery:

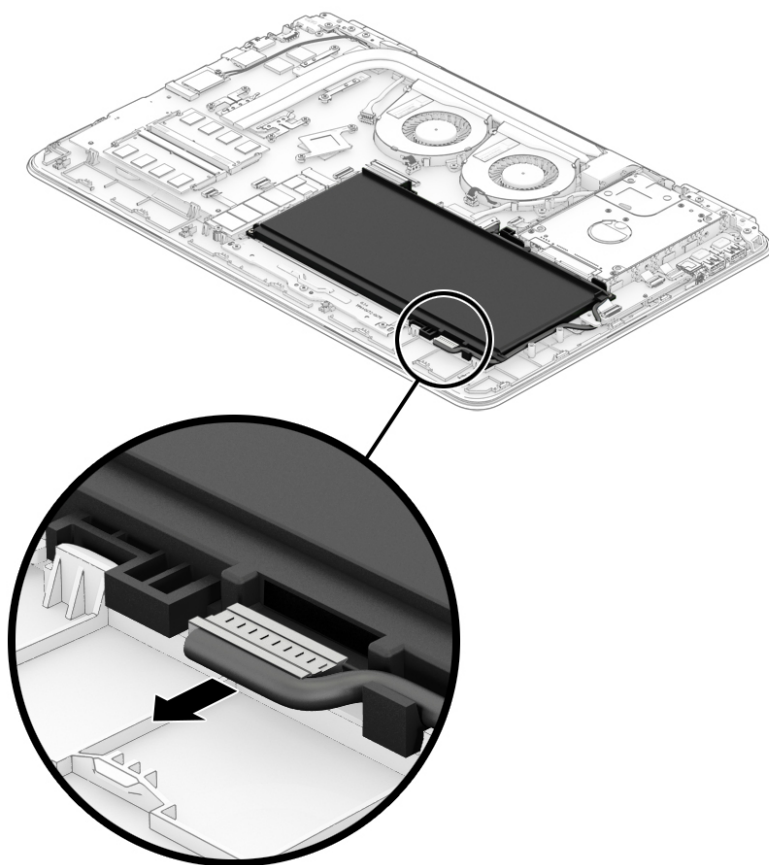
-  **WARNING!** To reduce potential safety issues, use only the user-replaceable battery provided with the computer, a replacement battery provided by HP, or a compatible battery purchased from HP.
-  **CAUTION:** Removing a user-replaceable battery that is the sole power source for the computer can cause loss of information. To prevent loss of information, save your work or shut down the computer through Windows before removing the battery.

Before removing the battery, follow these steps:

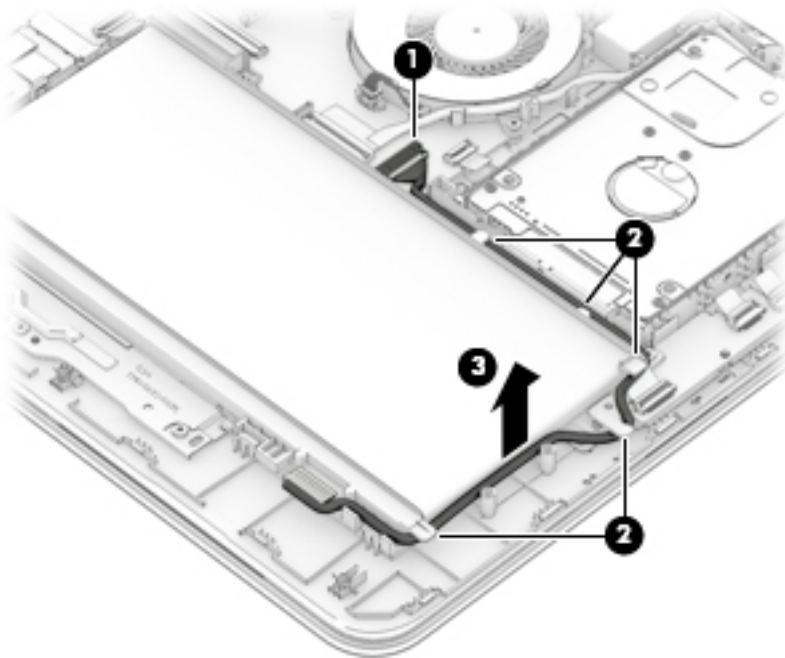
1. Shut down the computer.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the base enclosure (see [Base enclosure on page 27](#)).

Remove the battery:

1. Disconnect the battery cable from the battery.

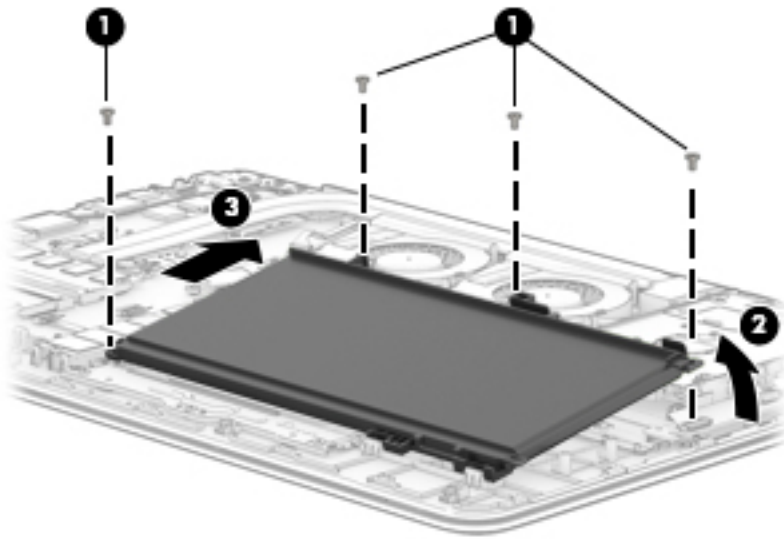


2. Disconnect the battery cable from the system board **(1)**, release the battery cable from the routing channels **(2)**, and then lift the battery cable to remove it **(3)**.





3. Remove 4 Phillips 2x5 screws **(1)**, lift the battery **(2)**, and then slide the battery **(3)** to remove it from the computer.



To insert the battery, reverse the removal procedures.

## Display assembly



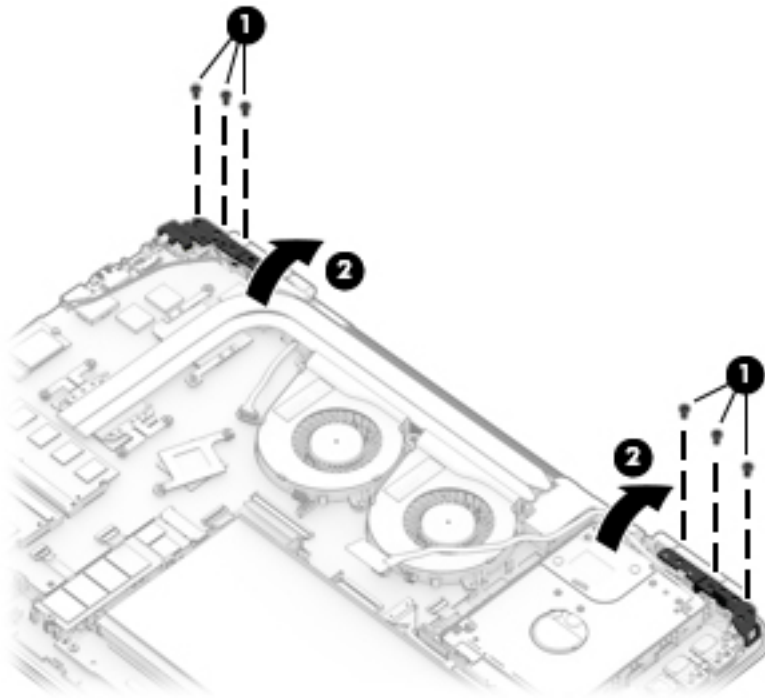
**IMPORTANT:** Make special note of each screw and screw lock size and location during removal and replacement.

Before removing the display assembly, follow these steps:

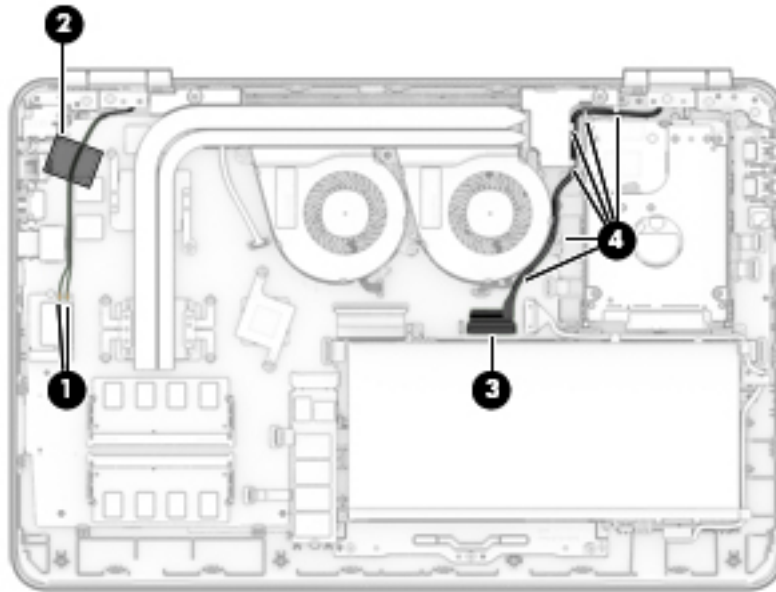
1. Shut down the computer.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the base enclosure (see [Base enclosure on page 27](#)).
5. Disconnect the battery (see [Battery on page 29](#)).

Remove the display assembly:

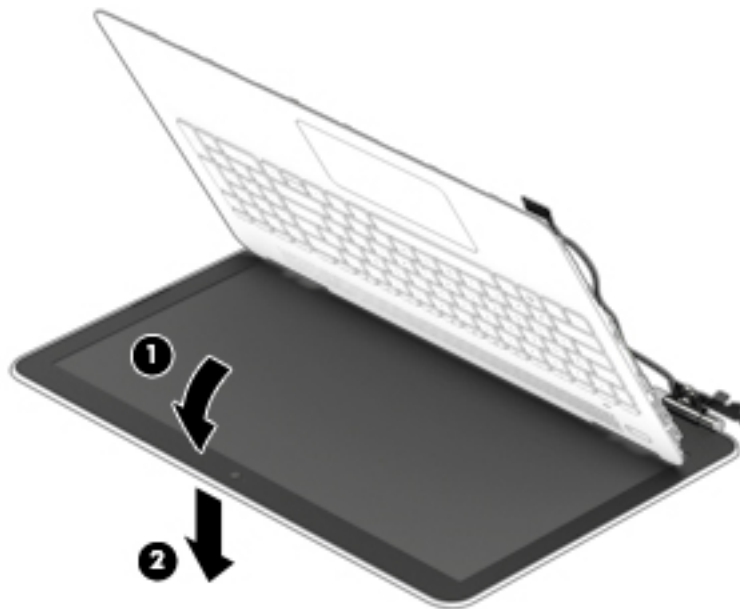
1. Remove 3 Phillips 2.5x6.0 screws from the left hinge and 3 Phillips 2.5x6.0 screws from the right hinge bracket **(1)**, and then lift the hinge brackets **(2)** to remove them .



2. Disconnect the WLAN antenna cable **(1)**, and remove the tape **(2)** holding it in place, disconnect the display cable **(3)**, and then release the cable from the routing channels **(4)**.



3. Rotate the display assembly **(1)**, and then remove the display assembly **(2)** from the base enclosure.



 **NOTE:** For display panel and display component removal procedures, see [Display panel on page 54](#).

Reverse this procedure to install the display assembly.

## Hard drive

Description	Spare part number
<b>Hard drive</b>	
1 TB 7200 RPM SATA RAW 9.5mm	766644-005
2 TB 5400 RPM SATA RAW 9.5 mm	801808-005
Hard drive cable	858969-001



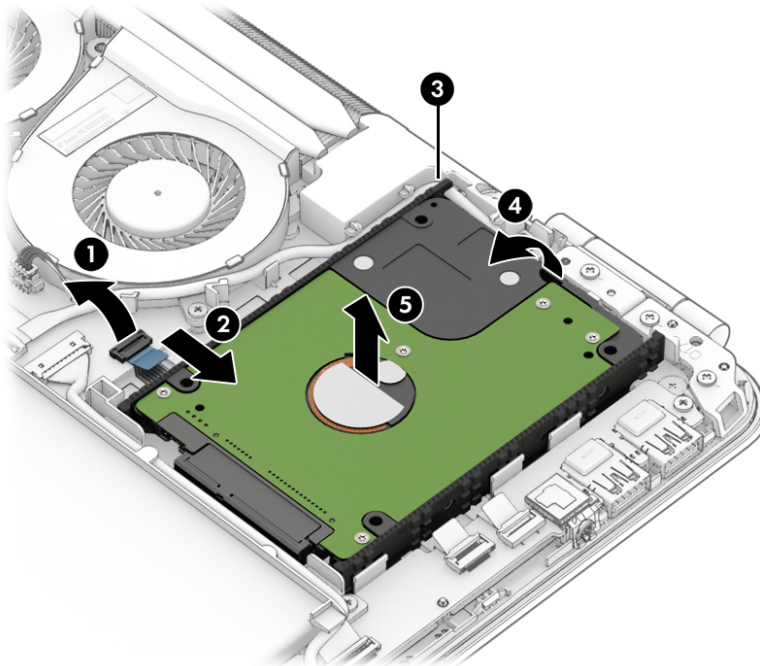
**IMPORTANT:** Make special note of each screw and screw lock size and location during removal and replacement.

Before removing the hard drive, follow these steps:

1. Shut down the computer.
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 base enclosure (see [Base enclosure on page 27](#)).
5. Disconnect the battery (see [Battery on page 29](#)).

Remove the hard drive:

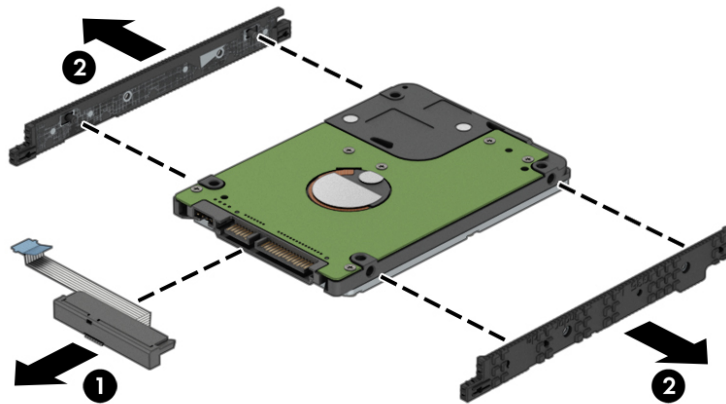
1. Disconnect the hard drive cable (1), slide the hard drive horizontally (2), and then loosen the side brackets (3).
2. Lift the right side of the hard drive (4), and then remove the hard drive (5).



Reverse this procedure to install the hard drive.

If it is necessary to disassemble the hard drive, follow these steps:

- ▲ Remove the hard drive connector **(1)**, and then remove the side brackets **(2)**.



Reverse this procedure to reassemble the hard drive.

## SSD (M.2)

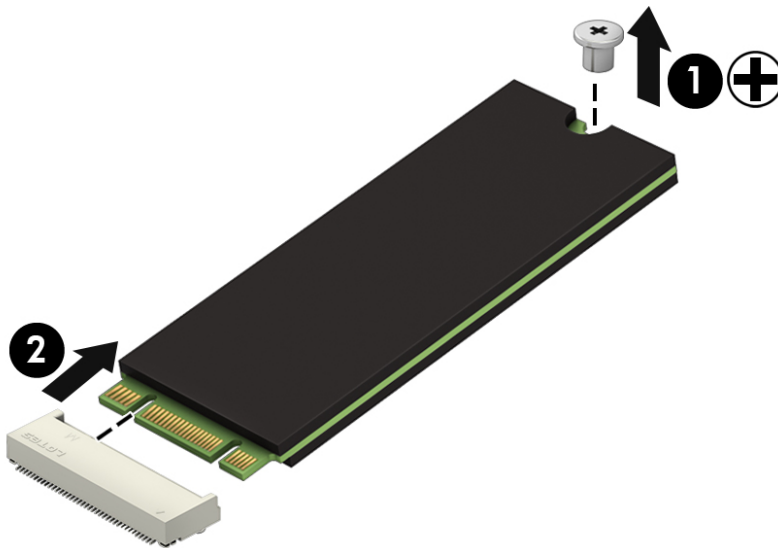
Description	Spare part number
Generic SSD 128 GB 2280 M2 SATA-3 Value TL	827560-027
Generic SSD 256 GB 2280 M2 PCIe 3x4SS NVMeTLC TL	847109-008
Generic SSD 512 GB 2280 M2PCIe3x4SS NVMeTLC TL	847110-007

Before removing the SSD, 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 unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the base enclosure (see [Base enclosure on page 27](#)).
5. Disconnect the battery (see [Battery on page 29](#)).

Remove the SSD:

1. Remove the Phillips M2.0 x 2.5 screw **(1)** that secures the SSD to the system board.
2. Remove the SSD **(2)** by pulling the drive away from the slot at an angle.



Reverse this procedure to install the SSD.

## Memory

Description	Spare part number
<b>Memory</b>	
4 GB 2133 MHz 1.2v DDR4 shared	820569-005
8 GB 2133 MHz 1.2v DDR4 shared	820570-005
2 GB 2133 MHz 1.2v DDR4 shared	851379-005



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

Before removing the memory, follow these steps:

### 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 <http://www.hp.com>.
2. Select **Support > Support & drivers**.
3. In the **Enter my HP model number** box, type the computer model information, and then select **Find my product**.  
-or-  
Select **Identify now**.
4. Select the link for the computer model.
5. Select the language and the operating system.
6. Under the downloads heading, select the **BIOS** link.
7. Select the link for the most recent BIOS.
8. Select the **Download** button, and then follow the on-screen instructions.
1. Shut down the computer.
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 base enclosure (see [Base enclosure on page 27](#)).
5. Disconnect the battery (see [Battery on page 29](#)).

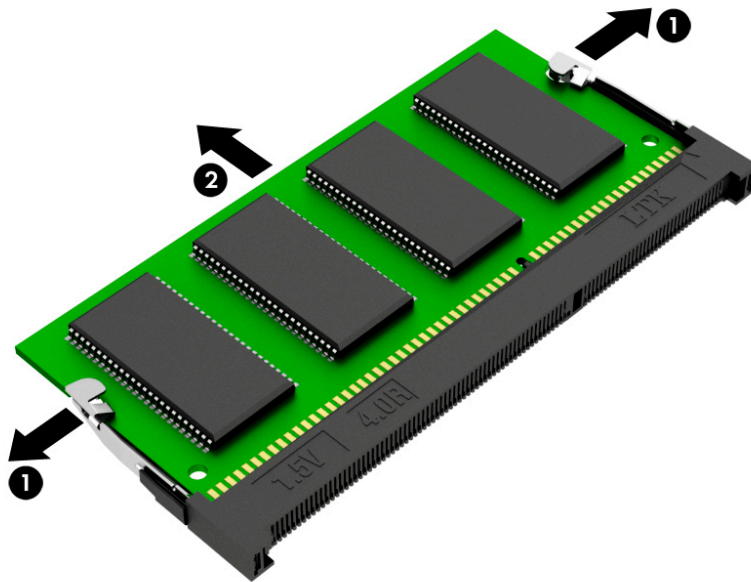
If you are replacing a memory module, remove the existing memory module:

1. Lift the clear film covering the memory module.
2. Pull away the retention clips **(1)** on each side of the memory module.  
The memory module tilts up.
3. Grasp the edge of the memory module **(2)**, and then gently pull the memory module out of the memory module slot.

---

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

---




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



## WLAN module

Description	Spare part number
WLAN module, Intel Dual Band Wireless-AC 7265	793840-005

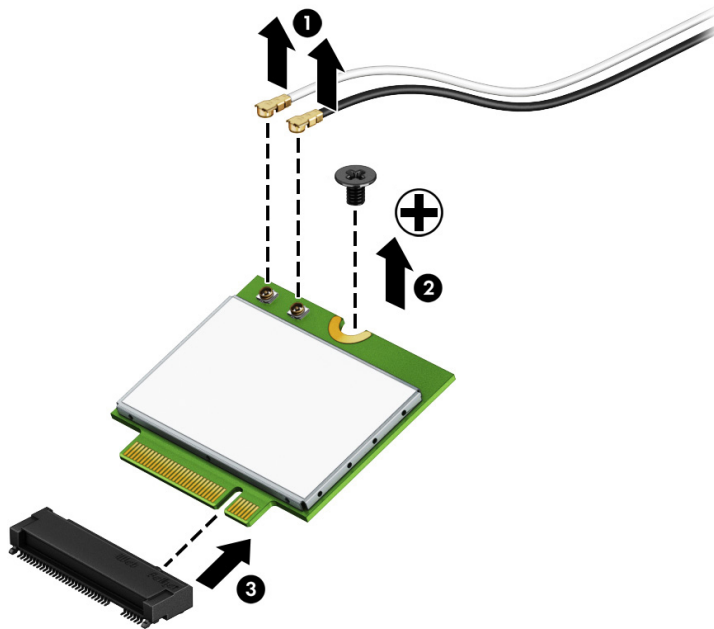
 **IMPORTANT:** Make special note of each screw and screw lock size and location during removal and replacement.

Before removing the WLAN module, follow these steps:

1. Shut down the computer.
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 base enclosure (see [Base enclosure on page 27](#)).
5. Disconnect the battery (see [Battery on page 29](#)).

Remove the WLAN module:

1. Carefully disconnect 2 antenna cables (1).
2. Remove 1 Phillips 2.0x2.5 screw (2), and then remove the WLAN module (3).



Reverse this procedure to install the WLAN module.

## USB board

Description	Spare part number
USB board	858975-001
USB board cable	856729-001



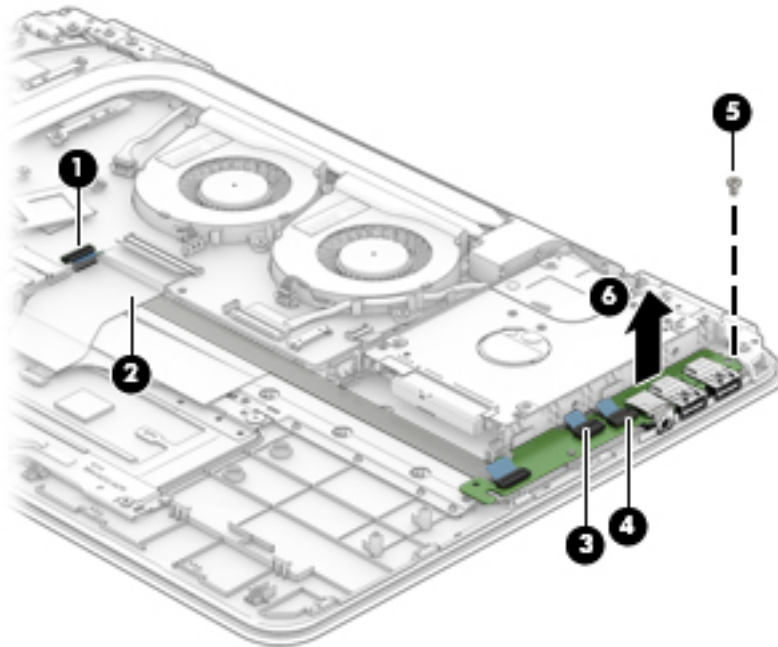
**IMPORTANT:** Make special note of each screw and screw lock size and location during removal and replacement.

Before removing the USB board, follow these steps:

1. Shut down the computer.
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 base enclosure (see [Base enclosure on page 27](#)).
5. Disconnect the battery (see [Battery on page 29](#)).

Remove the USB board:


- ▲ Disconnect the zero-insertion force (ZIF) connector **(1)**, remove the USB board cable **(2)**, disconnect 2 zero-insertion force (ZIF) connectors **(3)** and **(4)**, remove 1 Phillips screw **(5)**, and then lift the USB board to remove it **(6)**.



Reverse this procedure to install the USB board.

## Power button board

Description	Spare part number
Power button board	858974-001
Power button board cable	858966-001

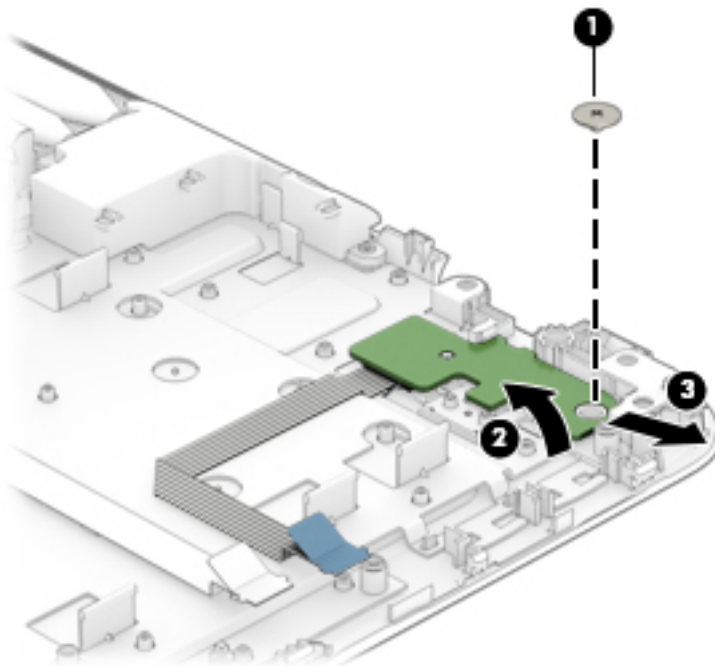
 **IMPORTANT:** Make special note of each screw and screw lock size and location during removal and replacement.

Before removing the power button board, follow these steps:

1. Shut down the computer.
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 base enclosure (see [Base enclosure on page 27](#)).
5. Disconnect the battery (see [Battery on page 29](#)), and then remove the following components:
  - a. Display assembly (see [Display assembly on page 32](#)).
  - b. Hard drive (see [Hard drive on page 34](#)).
  - c. USB board (see [USB board on page 40](#)).

Remove the power button board:

1. Remove the Phillips screw (1) securing the power button board.
2. Lift the power button board (2) at an angle, and then remove the board (3).



Reverse this procedure to install the power button board.

## Fans

Description	Spare part number
Fan, the same spare part number can be used to replace either the right fan or the left fan	858970-001



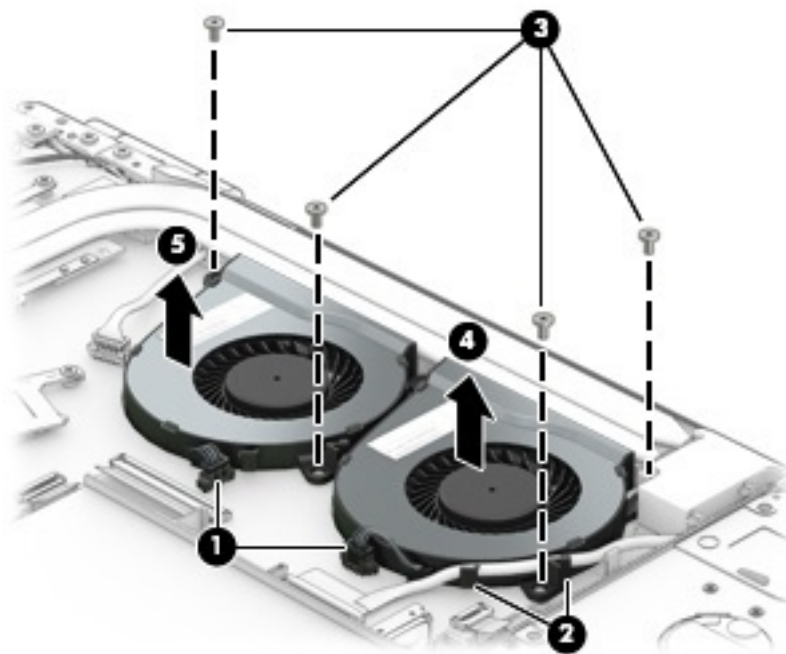
**IMPORTANT:** Make special note of each screw and screw lock size and location during removal and replacement.

Before removing the fan, follow these steps:

1. Shut down the computer.
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 base enclosure (see [Base enclosure on page 27](#)).
5. Disconnect the battery (see [Battery on page 29](#)).

Remove the fans:

1. Disconnect the fan cables (1), and then release the cable from the threading channels (2).
2. Remove the 4 Phillips 2x5 screws (3) from the fans, lift and remove the right fan (4), and then lift and remove the left fan (5).



Reverse this procedure to install the fans.

## Heat sink for discrete graphics memory

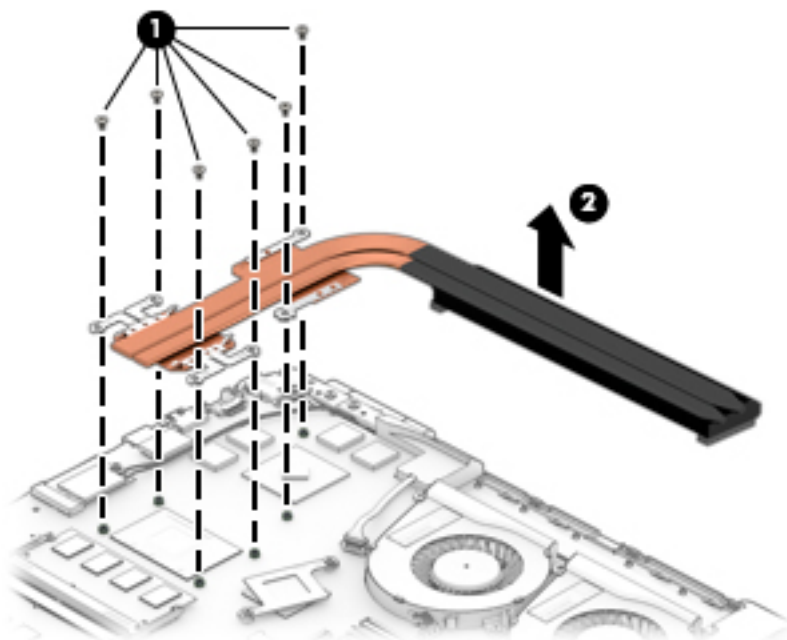
Description	Spare part number
Heat sink for discrete graphics memory	856668-001

Before removing the heat sink for discrete graphics memory, 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 unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the base enclosure (see [Base enclosure on page 27](#)).
5. Disconnect the battery (see [Battery on page 29](#)).

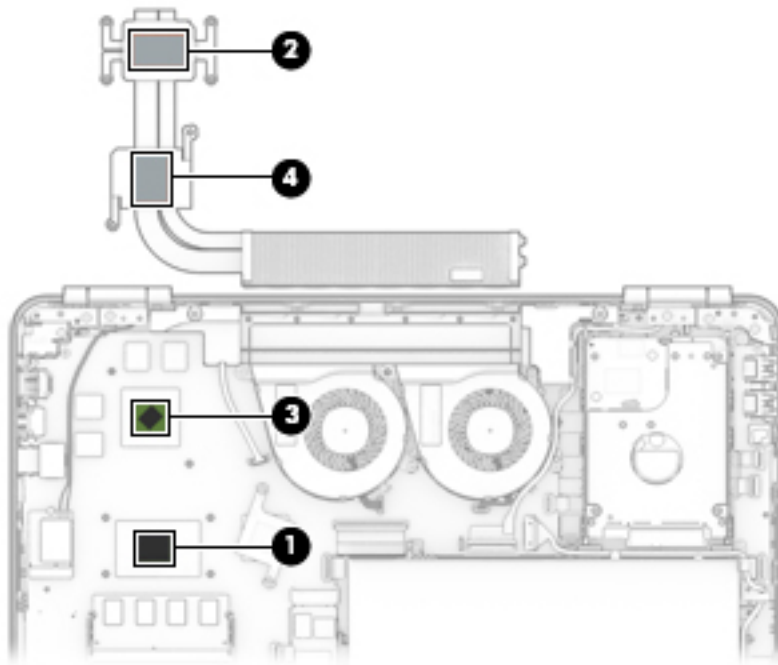
Remove the heat sink for discrete graphics memory:

1. Remove the 6 Phillips M2.0 screws **(1)** securing the heat sink.
2. Carefully lift the heat sink **(2)** to remove it from the system board.



3. The following illustration shows the replacement thermal material locations. 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.

Thermal paste is used on the system board components **(1), (3)** and on the heat sink areas **(2), (4)** that service them.



Reverse this procedure to install the heat sink for discrete graphics memory.

## Heat sink for CPU and graphics

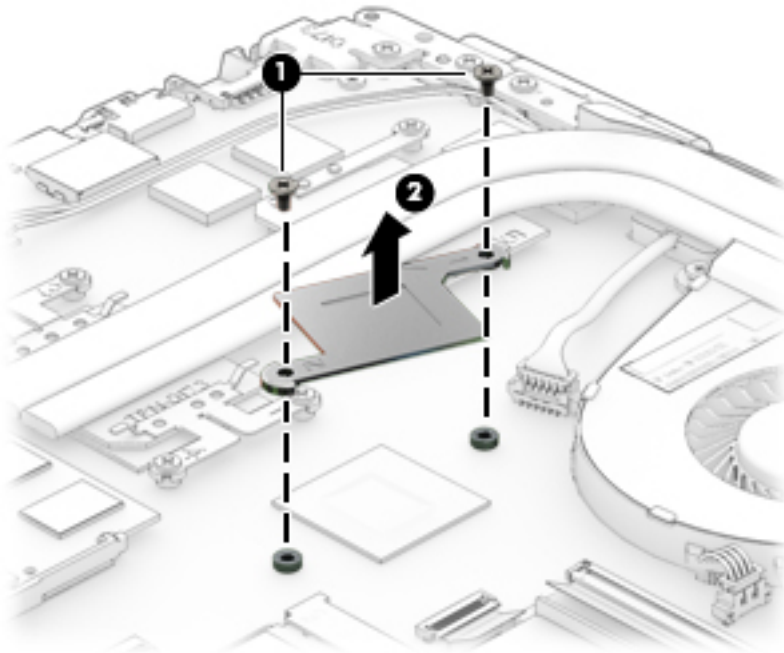
Description	Spare part number
Heat sink for CPU and graphics	725625-001

Before removing the heat sink for CPU and graphics, 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 unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the base enclosure (see [Base enclosure on page 27](#)).
5. Disconnect the battery (see [Battery on page 29](#)).

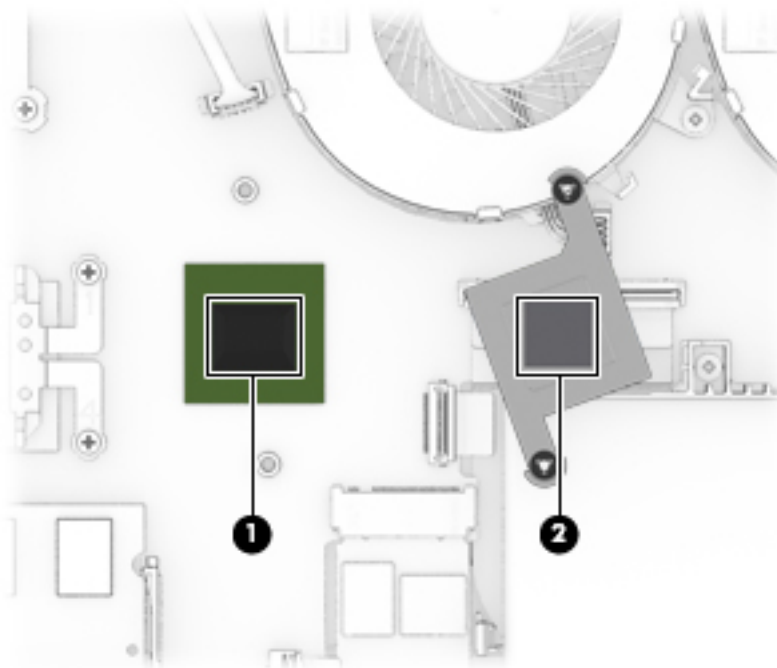
Remove the heat sink for CPU and graphics:

1. Remove the 2 Phillips screws **(1)**, and then remove the heat sink **(2)** from the system board.



2. The following illustration shows the replacement thermal material locations. 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.


Thermal paste is used on the system board components **(1)** and on the heat sink areas **(2)** that service them.



Reverse this procedure to install the heat sink for CPU and graphics.

## Speakers

Description	Spare part number
<b>Speaker Kit</b> , includes the cable	858976-001

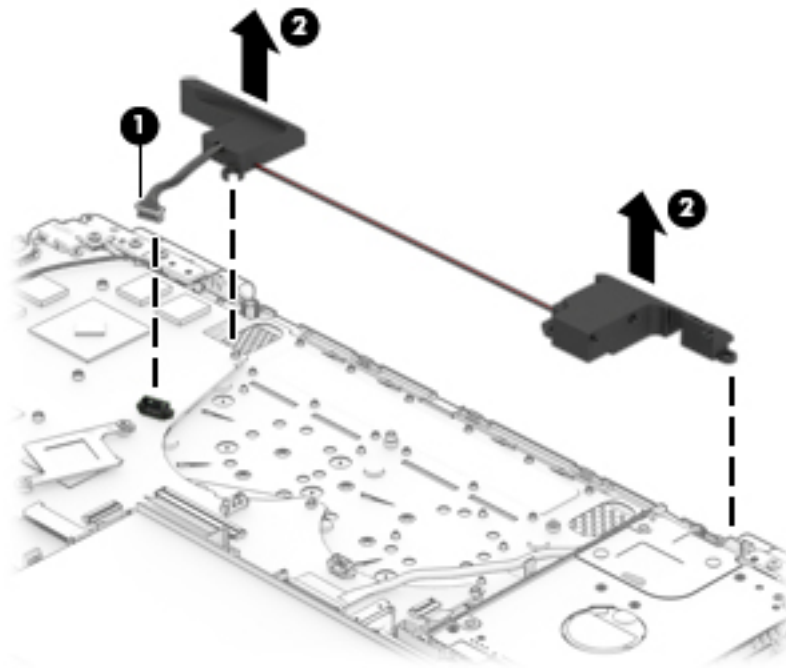
 **IMPORTANT:** Make special note of each screw and screw lock size and location during removal and replacement.

Before removing the speakers, follow these steps:

1. Shut down the computer.
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 base enclosure (see [Base enclosure on page 27](#)).
5. Disconnect the battery (see [Battery on page 29](#)), and then remove the following components:
  - a. Fans (see [Fans on page 42](#)).
  - b. Heatsink (see [Heat sink for discrete graphics memory on page 43](#)).

Remove the speakers:

1. Disconnect the right speaker cable (1).
2. Lift the left speaker and the right speaker, and then remove them (2).



Reverse this procedure to install the speakers.



## System board

Description	Spare part number
<b>System board</b>	
Intel i7-6700HQ system board, 950M, 2 GB, with a Windows operating system	856673-601
Intel 2GB i5-6300HQ system board, 950M, 2 GB, with a Windows operating system	856674-601
Intel i3-6100H system board, 950M, 2 GB, with a Windows operating system	856675-601
Intel i7-6700HQ system board, 960M, 2 GB, with a Windows operating system	856676-601
Intel i5-6300HQ system board, 960M, 2 GB, with a Windows operating system	856677-601
Intel i7-6700HQ system board, 960M, 2 GB, with a Windows operating system	856678-601
Intel i5-6300HQ system board, 960M, 2 GB, with a Windows operating system	856679-601
Intel i7-6700HQ system board, 965M, 4 GB, with a Windows operating system	859750-601
Intel i5-6300HQ system board, 965M, 4 GB, with a Windows operating system	859751-601



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

Before removing the system board, follow these steps:

1. Shut down the computer.
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 base enclosure (see [Base enclosure on page 27](#)).
5. Remove the battery (see [Battery on page 29](#)), and then remove the following components:
  - a. Hard drive (see [Hard drive on page 34](#)).
  - b. SSD (see [SSD \(M.2\) on page 36](#)).
  - c. Fans (see [Fans on page 42](#)).



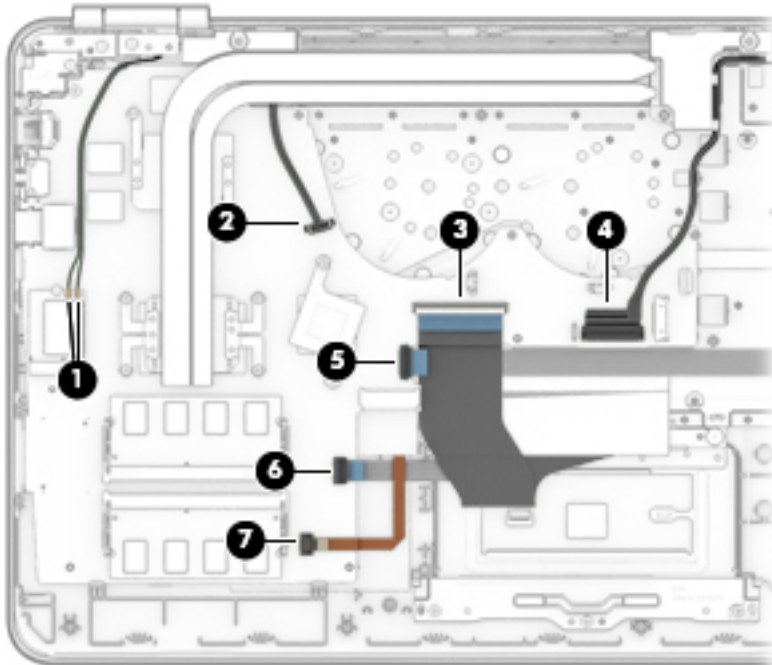
**NOTE:** When replacing the system board, be sure that the following components are removed from the defective system board and installed on the replacement system board:

- Heat sink for discrete graphics (see [Heat sink for discrete graphics memory on page 43](#)).
- Heat sink for CPU and graphics (see [Heat sink for CPU and graphics on page 44](#)).
- WLAN module (see [WLAN module on page 39](#))
- Memory module (see [Memory on page 37](#))
- RTC battery (see [RTC battery on page 49](#))

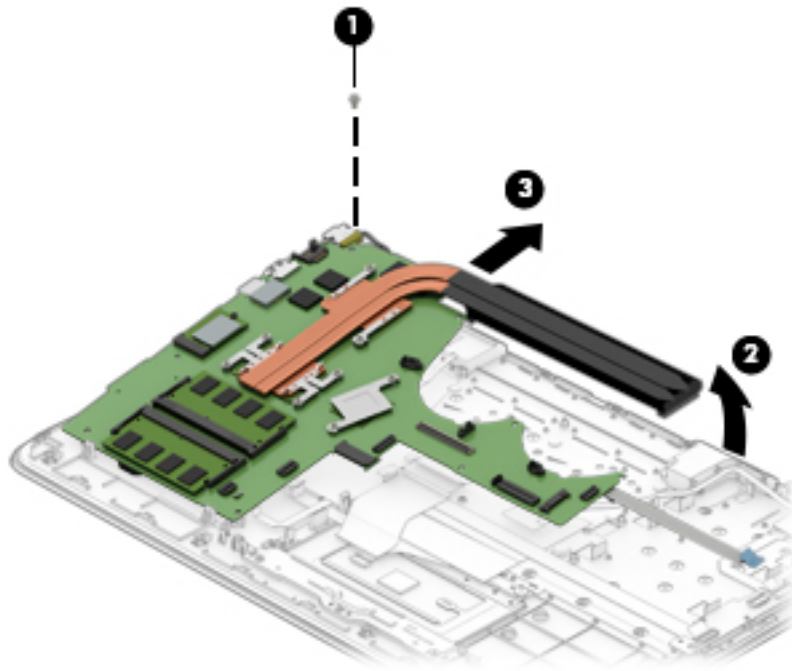
Remove the system board:

1. Disconnect the following cables and zero-insertion force (ZIF) connectors from the system board:

- Wireless antenna cable **(1)**
- Speaker cable **(2)**
- Keyboard cable **(3)**
- Display cable **(4)**
- USB board cable **(5)**
- TouchPad cable **(6)**
- Memory cable **(7)**




2. Remove 1 Phillips 2x5 screw (1), lift the system board (2), and then remove it (3).



Reverse this procedure to install the system board.

## RTC battery

Description	Spare part number
RTC battery	741976-001

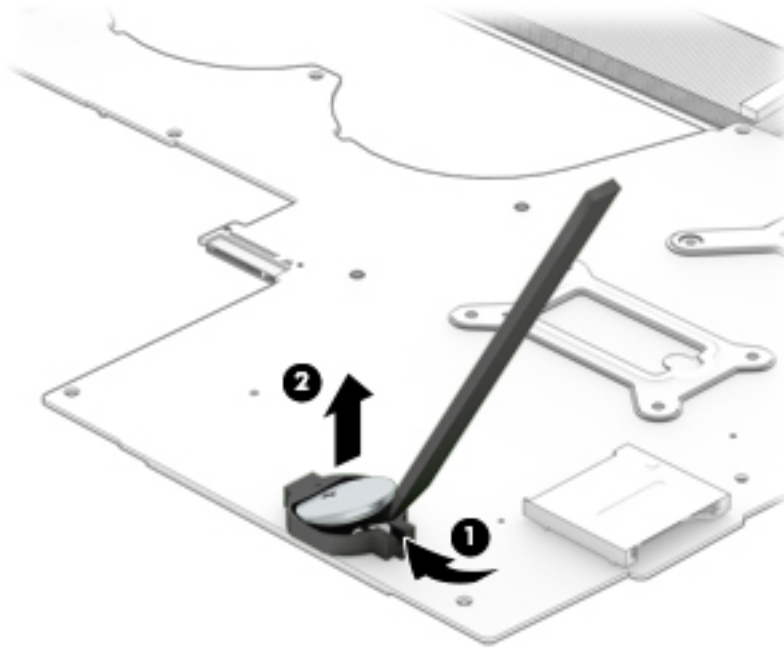
 **IMPORTANT:** Make special note of each screw and screw lock size and location during removal and replacement.

Before removing the RTC battery, follow these steps:

1. Shut down the computer.
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 base enclosure (see [Base enclosure on page 27](#)).
5. Remove the battery (see [Battery on page 29](#)), and then remove the following components:
  - a. Hard drive (see [Hard drive on page 34](#)).
  - b. SSD (see [SSD \(M.2\) on page 36](#)).
  - c. Fans (see [Fans on page 42](#)).
  - d. System board (see [System board on page 47](#)).

Remove the RTC battery:


1. Carefully place the system board face down.
2. Insert a thin plastic tool (1) to lift the RTC battery, and then remove the battery (2).



Reverse this procedure to install the RTC battery.

## Power connector

Description	Spare part number
<b>Power connector</b> (includes cable)	858021-001

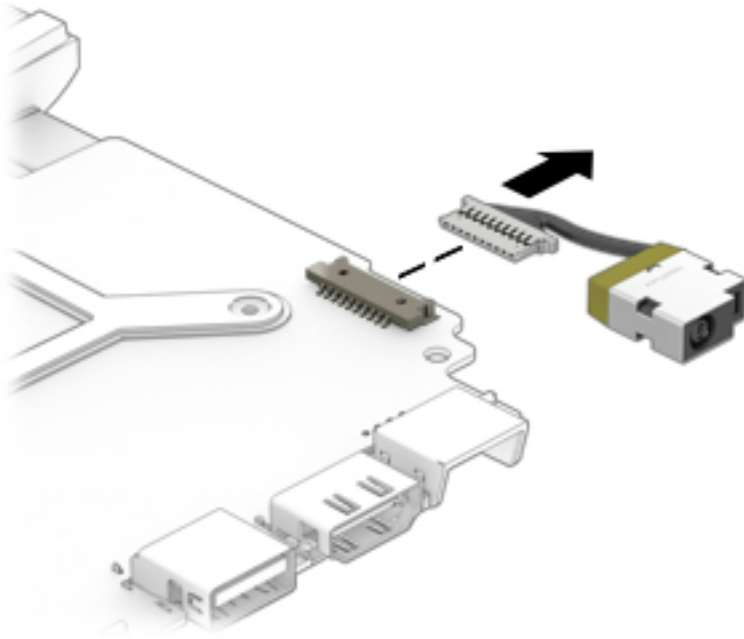
 **IMPORTANT:** Make special note of each screw and screw lock size and location during removal and replacement.

Before removing the power connector, follow these steps:

1. Shut down the computer.
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 base enclosure (see [Base enclosure on page 27](#)).
5. Remove the battery (see [Battery on page 29](#)), and then remove the following components:
  - a. Hard drive (see [Hard drive on page 34](#)).
  - b. SSD (see [SSD \(M.2\) on page 36](#)).
  - c. Fans (see [Fans on page 42](#)).
  - d. System board (see [System board on page 47](#)).

Remove the power connector:

1. Carefully place the system board face down.
2. Disconnect the connector cable, and then remove the power connector.



Reverse this procedure to install the power connector.

## TouchPad

Description	Spare part number
TouchPad board	
• Shadow Mesh	860364-001
• Hybrid Green	860330-001
TouchPad cable	858967-001
Top cover with TouchPad in Black with Hybrid Green, and Backlit Keyboard for use in Mainland China	859735-AB1
Top cover with TouchPad in Black with Shadow Mesh, and Backlit Keyboard in Dragon Red	859735-XXX

For use in country or region	Spare part number	For use in country or region	Spare part number	For use in country or region	Spare part number
Belgium	-A41	Israel	-BB1	Slovenia	-BA1
Bulgaria	-261	Italy	-061	Spain	-071
Canada	-DB1	Japan	-291	Switzerland	-BG1
Czech Republic and Slovakia	-FL1	Korea	-AD1		
Denmark, Norway, Finland, and Sweden	-DH1	Latin America	-161	Thailand	-281
France	-051	The Netherlands	-B31	Turkey	-141
Germany	-041	Portugal	-131	United Kingdom	-031
Greece	-151	Romania	-271	United States	-001
Hungary	-211	Russia	-251		
India	-002	Saudi Arabia	-171		



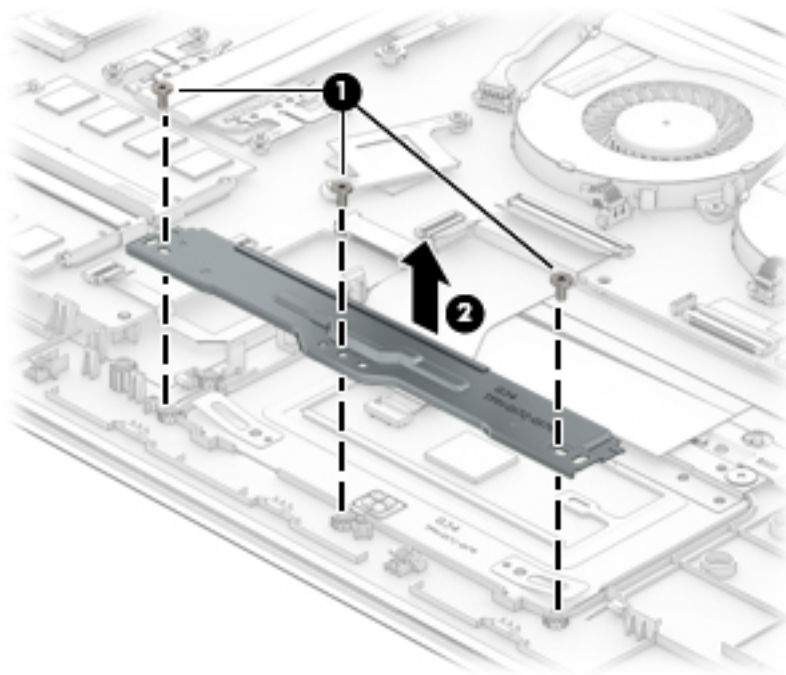
**IMPORTANT:** Make special note of each screw and screw lock size and location during removal and replacement.

Before removing the TouchPad, follow these steps:

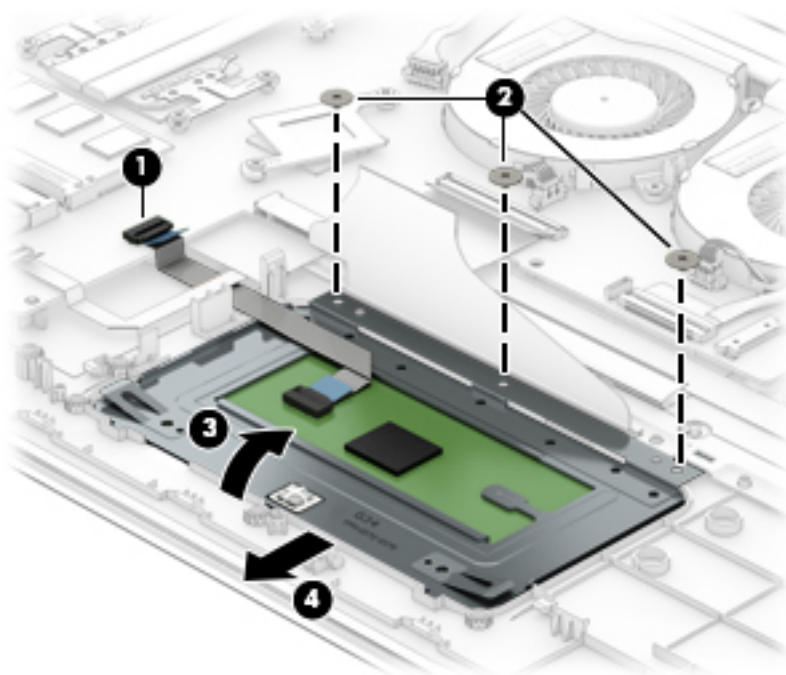
1. Shut down the computer.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the base enclosure (see [Base enclosure on page 27](#)).
5. Remove the battery (see [Battery on page 29](#)).

Remove the TouchPad:

1. Remove the 3 Phillips 2.0x2.0 screws **(1)**, and then lift the TouchPad bracket **(2)** to remove it.



2. Disconnect the TouchPad cable (1).
3. Remove the 3 Phillips 2.0x2.5 screws (2).
4. Lift the front of the TouchPad (3), and then slide the TouchPad (4) forward to remove it.



Reverse this procedure to install the TouchPad.

## Display panel

Description	Spare part number
<b>Bezel</b>	
For products with an HD camera	856725-001
For products with a 3D camera	856726-001
<b>Display panel</b>	
15.6" FHD AG UWVA 220 eDP, Slim KR	752920-014
15.6" UHD AG UWVA300 eDPU Slim PSRKR	842484-004
<b>Hinge assembly</b>	856741-001
<b>Hinge cap assembly</b>	859737-001
<b>Display cable</b>	
Full high-definition display cable for products with an HD camera	856733-001
Full high-definition display cable for products with a 3D camera	856734-001
High-definition display cable for products with an HD camera	856735-001
High-definition display cable for products with a 3D camera	856736-001
<b>WLAN antenna cable</b>	856923-001
<b>Back cover</b>	
In Hybrid Green finish, with antenna	905115-001
In Shadow Mesh finish, with antenna, for products with HD camera	856715-001
In Shadow Mesh finish, with antenna, for products with 3D camera	856718-001



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

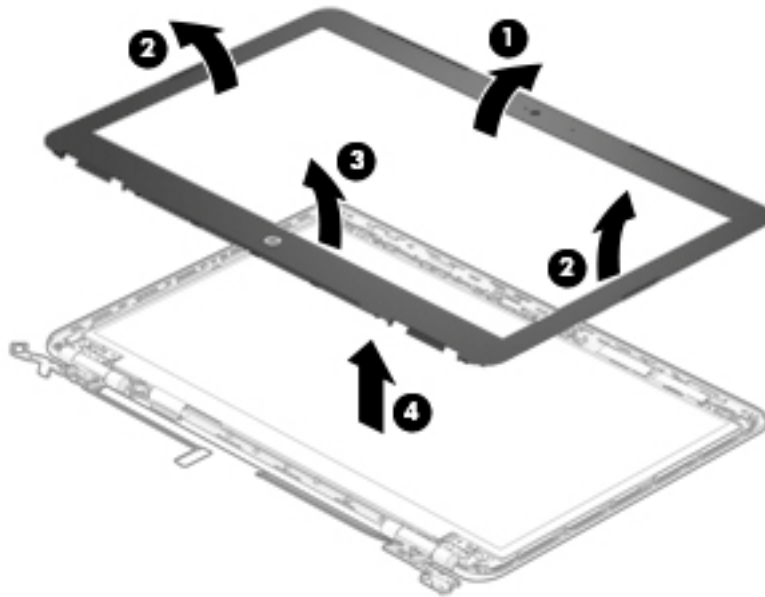
Before removing the display assembly, follow these steps:

1. Shut down the computer.
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 base enclosure (see [Base enclosure on page 27](#)).
5. Disconnect the battery (see [Battery on page 29](#)), and then remove the following components:
  - ▲ Display assembly (see [Display assembly on page 32](#)).

Remove the display panel:

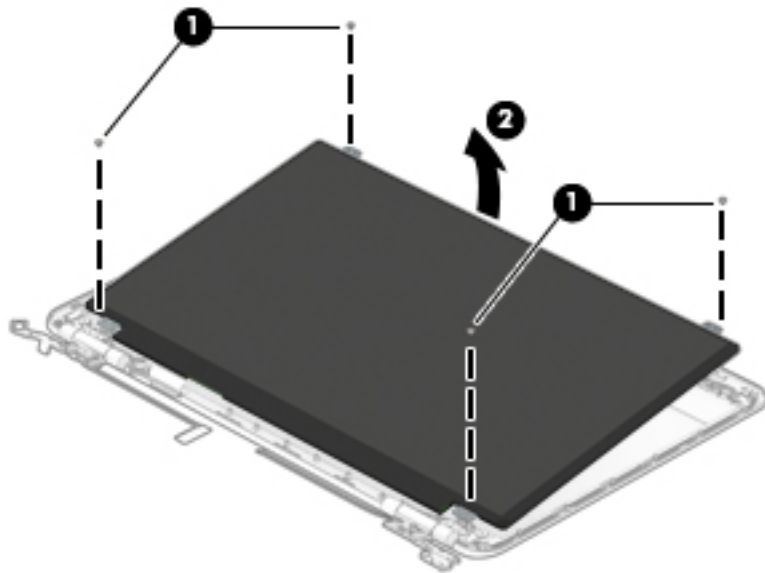
1. Use a thin plastic tool to disengage the bezel starting on the top edge **(1)**. Continue on the left and right edges **(2)** and then bottom edge **(3)**, and then lift the display bezel **(4)** to remove it.



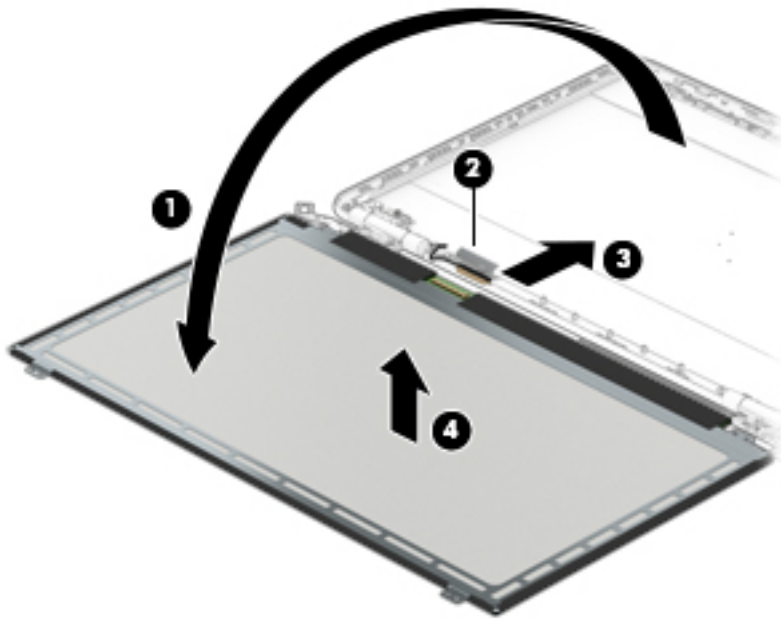


**NOTE:** The camera and microphone board can be removed after removing the display bezel and before removing the display panel. See [Camera on page 59](#).

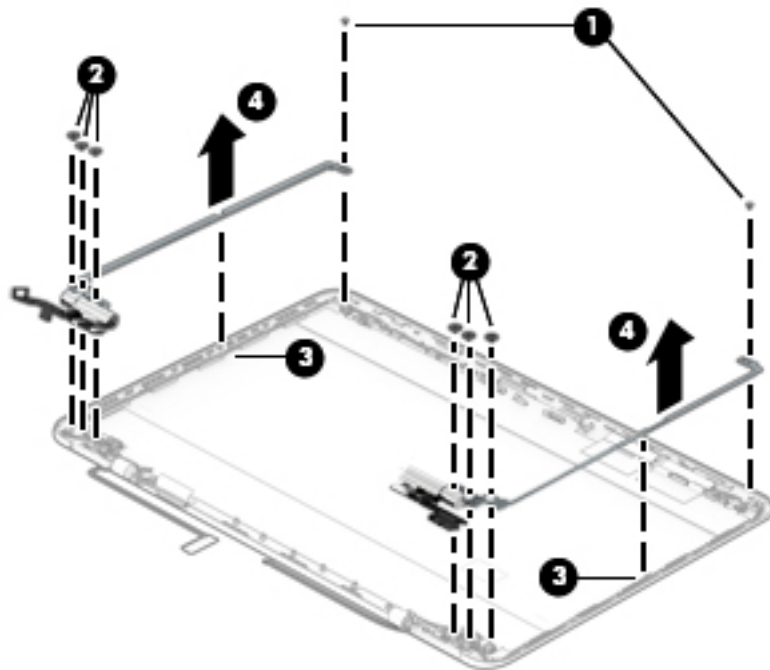
2. If it is necessary to replace the display panel, remove 4 Phillips 2.0x2.5 screws from the display panel (1), and then lift the display panel (2) to remove it.



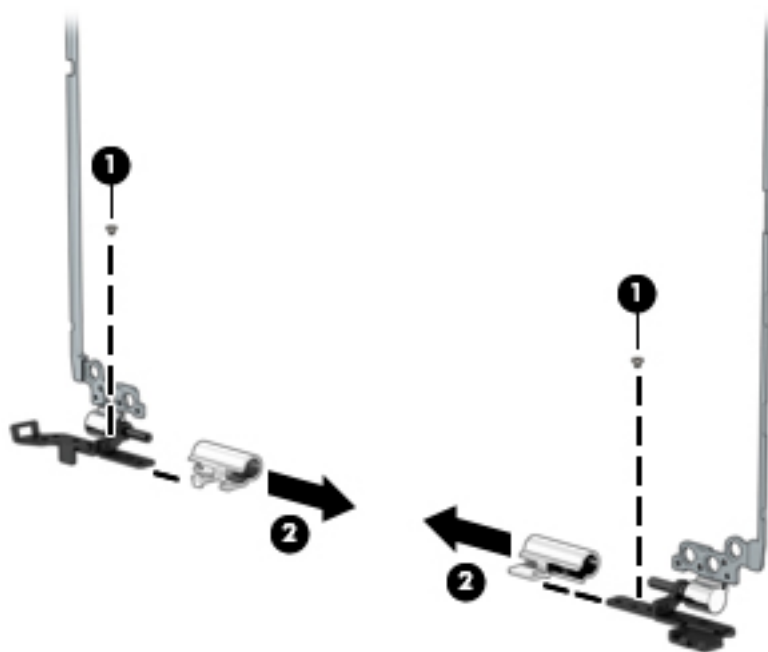
3. Rotate the display panel (1), disconnect the display cable (2) from the display panel (3), and then lift the display panel (4) to remove it.



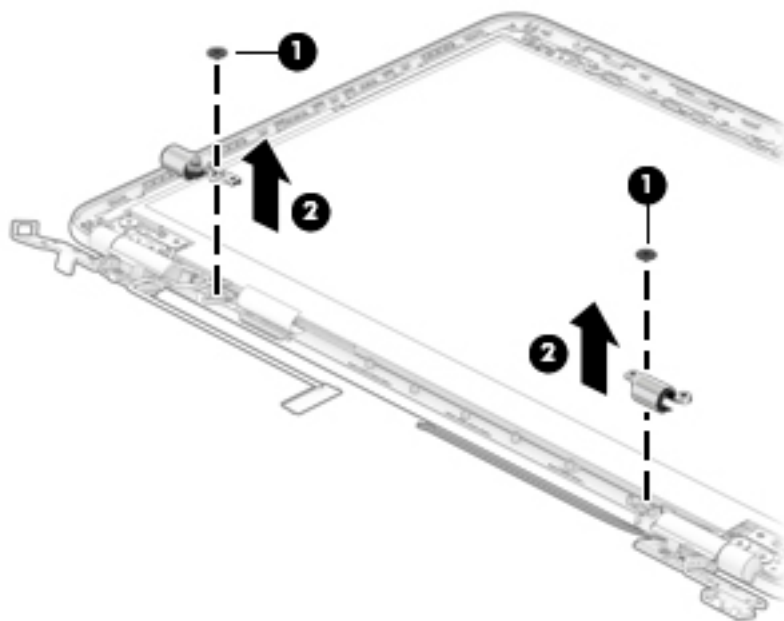
4. If it is necessary to replace the hinge brackets, remove the Phillips 2.5x6.0 screw from the top of each hinge bracket (1) and the 3 Phillips 2.5x6.0 screws from each hinge (2), remove the hinge brackets from the back cover (3), and then lift the hinge brackets (4) to remove them.



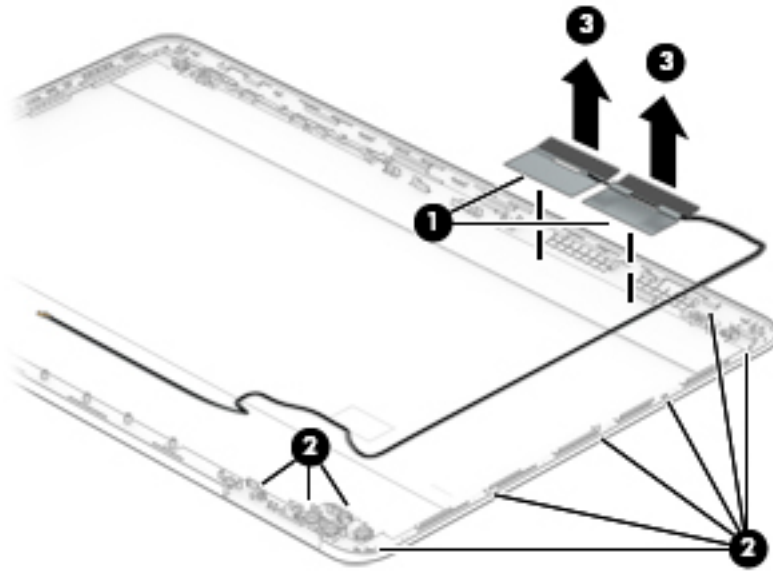
5. Remove the Phillips 2.0x2.0 screw from each hinge bracket **(1)**, and then separate the hinge caps **(2)** from the hinge brackets.



6. Remove the Phillips 2.0x2.0 screw from each hinge **(1)**, and then lift the hinges **(2)** to remove them.



7. If it is necessary to replace the WLAN antennas, remove the WLAN antennas **(1)** from the back cover , release the WLAN cable from the routing channels **(2)**, and then lift the antennas and cable to remove them **(3)**.



Reverse this procedure to install the display assembly and components.

## Camera

Description	Spare part number
<b>Camera</b>	
Intel RealSense 3D camera 1p NM U3 1080p	781624-005
HP Wide Vision HD camera 1p DM U2 Mjpeg 720p VDH SF	846006-003
3D camera cable	859445-001
<b>Microphone board</b> (no support for products with AMD hybrid graphics)	857471-001



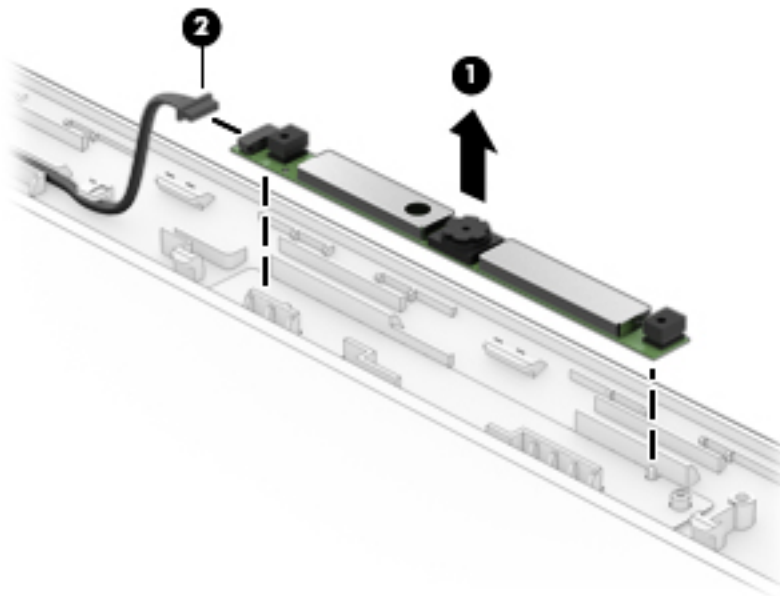
**IMPORTANT:** Make special note of each screw and screw lock size and location during removal and replacement.

Before removing the camera, follow these steps:

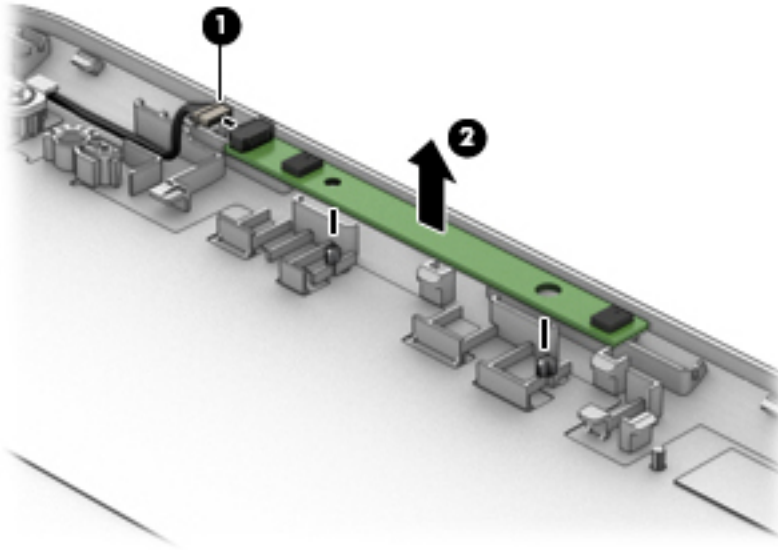
1. Shut down the computer.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.
4. Remove the base enclosure (see [Base enclosure on page 27](#)).
5. Disconnect the battery (see [Battery on page 29](#)), and then remove the following components:
  - a. Display assembly (see [Display assembly on page 32](#)).
  - b. Display bezel (see [Display panel on page 54](#)).

Remove the camera:

1. If it is necessary to replace to remove the camera board, lift the camera board **(1)**, and then disconnect the camera cable **(2)** from the camera board.



2. If it is necessary to replace the microphone board (select products only), disconnect the cable **(1)**, and then lift the microphone board **(2)** to remove it.



Reverse this procedure to install the camera.

---

## 6 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)



**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 –  
Click the question mark icon in the taskbar.
  2. Select **My PC**, and then select **Specifications**.
- Setup Utility (BIOS)
  1. Start Setup Utility (BIOS) (see [Starting Setup Utility \(BIOS\) on page 61](#)).
  2. Select **Main**, select **System Information**, and then make note of the BIOS version.
  3. Select **Exit**, select **No**, and then follow the on-screen instructions.

To check for later BIOS versions, see [Downloading a BIOS update on page 62](#).

## 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 –  
Click the question mark icon in the taskbar.
2. Click **Updates**, and then click **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. Click 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.




## 7 Using HP PC Hardware Diagnostics (UEFI)

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

When HP PC Hardware Diagnostics (UEFI) detects a failure that requires hardware replacement, a 24-digit Failure ID code is generated. This ID code can then be provided to support to help determine how to correct the problem.

---

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

---

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 drive



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

---

- b. Hard drive
- c. BIOS

3. When the diagnostic 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, press **esc**.

---

## Downloading HP PC Hardware Diagnostics (UEFI) to a USB device

---

 **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 offered.

---

There are two options to download HP PC Hardware Diagnostics to a USB device.

### Download the latest UEFI version

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 the **Download** link, and then select **Run**.

### Download any version of UEFI for a specific product

1. Go to <http://www.hp.com/support>.
2. Select **Get software and drivers**.

3. Enter the product name or number.

– or –

Select **Identify now** to let HP automatically detect your product.

4. Select your computer, and then select your operating system.
5. In the **Diagnostic** section, follow the on-screen instructions to select and download the UEFI version you want.

## 8 Backing up, restoring, and recovering

This chapter provides information about the following processes. The information in the chapter is standard procedure for most products.


- Creating recovery media and backups
- Restoring and recovering your system

For additional information, refer to the HP support assistant app.

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

– or –

Click the question mark icon in the taskbar.

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

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

### Creating recovery media and backups

The following methods of creating recovery media and backups are available on select products only. Choose the available method according to your computer model.

- Use HP Recovery Manager to create HP Recovery media after you successfully set up the computer. This step creates a backup of the HP Recovery partition on the computer. The backup can be used to reinstall the original operating system in cases where the hard drive is corrupted or has been replaced. For information on creating recovery media, see [Creating HP Recovery media \(select products only\) on page 65](#). For information on the recovery options that are available using the recovery media, see [Using Windows tools on page 66](#).
- Use Windows tools to create system restore points and create backups of personal information.

For more information, see [Recovering using HP Recovery Manager on page 67](#).

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

### Creating HP Recovery media (select products only)

If possible, check for the presence of the Recovery partition and the Windows partition. From the **Start** menu, select **File Explorer**, and then select **This PC**.

- If your computer does not list the Windows partition and the Recovery partition, you can obtain recovery media for your system from support. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information on the HP website. Go to <http://www.hp.com/support>, select your country or region, and follow the on-screen instructions.

You can use Windows tools to create system restore points and create backups of personal information, see [Using Windows tools on page 66](#).

- If your computer does list the Recovery partition and the Windows partition, you can use HP Recovery Manager to create recovery media after you successfully set up the computer. HP Recovery media can be used to perform system recovery if the hard drive becomes corrupted. System recovery reinstalls the original operating system and software programs that were installed at the factory and then configures the settings for the programs. HP Recovery media can also be used to customize the system or restore the factory image if you replace the hard drive.
  - 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 storage capacity for the media that will be required.
  - To create recovery discs, your computer must have an optical drive with DVD writer capability, and you must 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; they are not compatible with HP Recovery Manager software. Or, instead, you can use a high-quality blank USB flash drive.
  - If your computer does not include an integrated optical drive with DVD writer capability, but you would like to create DVD recovery media, you can use an external optical drive (purchased separately) to create recovery discs. If you use an external optical drive, it must be connected directly to a USB port on the computer; the drive cannot be connected to a USB port on an external device, such as a USB hub. If you cannot create DVD media yourself, you can obtain recovery discs for your computer from HP. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information on the HP website. Go to <http://www.hp.com/support>, select your country or region, and follow the on-screen instructions.
  - 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 the creation process.
  - If necessary, you can exit the program before you have finished creating all of the recovery DVDs. HP Recovery Manager will finish burning the current DVD. The next time you start HP Recovery Manager, you will be prompted to continue.

To create HP Recovery media:



**IMPORTANT:** For a tablet with a detachable keyboard, connect the keyboard to the keyboard dock 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 ever need to recover the system, see [Recovering using HP Recovery Manager on page 67](#).

## Using Windows tools

You can create recovery media, system restore points, and backups of personal information using Windows tools.



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

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

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

# Restore and recovery

There are several options for recovering your system. Choose the method that best matches your situation and level of expertise:



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

- Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state. For more information see the Get started app.
  - ▲ Select the **Start** button, and then select the **Get started** app.
- If you need to correct a problem with a preinstalled application or driver, use the Reinstall drivers and/or applications option (select products only) of HP Recovery Manager to reinstall the individual application or driver.
  - ▲ Type `recovery` in the taskbar search box, select **HP Recovery Manager**, select **Reinstall drivers and/or applications**, and then follow the on-screen instructions.
- If you want to recover the Windows partition to original factory content, you can choose 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 67](#). If you have not already created recovery media, see [Creating HP Recovery media \(select products only\) on page 65](#).
- On select products, if you want to recover the computer's original factory partition and content, or if you have replaced the hard drive, you can use the Factory Reset option of HP Recovery media. For more information, see [Recovering using HP Recovery Manager on page 67](#).
- On select products, if you want to remove the recovery partition to reclaim hard drive space, HP Recovery Manager offers the Remove Recovery Partition option.

For more information, see [Removing the HP Recovery partition \(select products only\) on page 70](#).

## Recovering using HP Recovery Manager

HP Recovery Manager software allows you 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 recovery media, see [Creating HP Recovery media \(select products only\) on page 65](#).

### What you need to know before you get started

- 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.



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

- HP Recovery media must be used if the computer hard drive fails. If you have not already created recovery media, see [Creating HP Recovery media \(select products only\) on page 65](#).
- To use the Factory Reset option (select products only), you must use HP Recovery media. If you have not already created recovery media, see [Creating HP Recovery media \(select products only\) on page 65](#).
- If your computer does not allow the creation of HP Recovery media or if the HP Recovery media does not work, you can obtain recovery media for your system from support. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information from the HP

website. Go to <http://www.hp.com/support>, select your country or region, and follow the on-screen instructions.



**IMPORTANT:** HP Recovery Manager does not automatically provide backups of your personal data. Before beginning recovery, back up any personal data you want to retain.

Using HP Recovery media, you can choose from one of the following recovery options:



**NOTE:** Only the options available for your computer display when you start the recovery process.

- **System Recovery**—Reinstalls the original operating system, and then configures the settings for the programs that were installed at the factory.
- **Factory Reset**—Restores the computer to its original factory state by deleting all information from the hard drive and re-creating the partitions. Then it reinstalls the operating system and the software that was installed at the factory.

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

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

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

To start HP Recovery Manager from the HP Recovery partition:



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

1. Type `recovery` in the taskbar search box, select **Recovery Manager**, and then select **HP 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, and then quickly hold down the volume down button; then select **f11**.

- or -

Turn on or restart the tablet, and then quickly hold down the Windows button; then select **f11**.

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

## Using HP Recovery media to recover

You can use HP Recovery media to recover the original system. This method can be used if your system does not have an HP Recovery partition or if the hard drive is not working properly.

1. If possible, back up all personal files.
2. Insert the HP Recovery media, and then restart the computer.



**NOTE:** If the computer does not automatically restart in HP Recovery Manager, change the computer boot order. See [Changing the computer boot order on page 69](#).

3. Follow the on-screen instructions.

## Changing the computer boot order

If your computer does not restart in HP Recovery Manager, you can change the computer boot order, which 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.

To change the boot order:



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

---

1. Insert the HP Recovery media.
2. Access BIOS:

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, and then quickly hold down the volume down button; then select **f9**.  
- or -

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

3. Select the optical drive or USB flash drive from which you want to boot.
4. 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 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 from the HP Recovery partition. So before you remove the Recovery partition, create HP Recovery media; see [Creating HP Recovery media \(select products only\) on page 65](#).



**NOTE:** The Remove Recovery Partition option is only available on products that support this function.

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.



# 9 Specifications

## Computer specifications

	Metric	U.S.
<b>Dimensions</b>		
Width	<b>382.4 mm</b>	15.06 in
Depth	<b>252.5 mm</b>	9.94 in
Height (front to back)	<b>24.5 mm</b>	.96 in
<b>Weight</b>		
Products with hard drive	<b>2200.5 g</b>	4.85 lb
Products with SSD	<b>2095.4 g</b>	4.62 lb
<b>Input power</b>		
Operating voltage and current	19.5 V dc @ 6.15 A – 120 W	
	19.5 V dc @ 7.70 A – 150 W	
<b>Temperature</b>		
Operating	<b>5°C to 35°C</b>	41°F to 95°F
Nonoperating	<b>-20°C to 60°C</b>	-4°F to 140°F
<b>Relative humidity</b> (noncondensing)		
Operating	10% to 90%	
Nonoperating	5% to 95%	
<b>Maximum altitude</b> (unpressurized)		
Operating	<b>-15 m to 3,048 m</b>	-50 ft to 10,000 ft
Nonoperating	<b>-15 m to 12,192 m</b>	-50 ft to 40,000 ft
<b>NOTE:</b> Applicable product safety standards specify thermal limits for plastic surfaces. The device operates well within this range of temperatures.		

## 39.62 cm (15.6 in) display specifications

	Metric	U.S.
Dimensions		
Height	20.77 cm	8.175 in
Width	37.78 cm	14.875 in
Diagonal	39.62 cm	15.6 in
Number of colors	Up to 16.8 million	
Contrast ratio	500:1 (typical)	
Brightness	220, 250, or 300 nits	
Pixel resolution		
Pitch	0.252mm x 0.252mm	
Format	1920x1080 or 3840x2160	
Configuration	RGB vertical stripe	
Backlight	LED	
Character display	80 × 25	
Total power consumption	2.0 W	
Viewing angle	±65° horizontal, ±50° vertical (typical)	

## Hard drive specifications

	1 TB*	2TB*
<b>Dimensions</b>		
Height	9.5 mm	9.5 mm
Width	69.85 mm	69.85 mm
Weight	102 g max	130 g max
Interface type	SATA 3.0	SATA 3.0
Transfer rate	600 MB/sec	600 MB/sec
Security	ATA-8 security	ATA-8 security
<b>Seek times</b> (typical read, including setting)		
Single track	2 ms	2 ms
Average	13.0 ms	12.0 ms
Maximum	15.0 ms	22.0 ms
Logical blocks	1,953,525,168	3,907,029,168
Disk rotational speed	5400 rpm	5400 rpm
Operating temperature	0°C to 60°C (0°F to 140°F)	0°C to 60°C (0°F to 140°F)

1 TB*	2TB*
*Size refers to hard drive storage capacity. Actual accessible capacity is less. Actual drive specifications may differ slightly.	
<b>NOTE:</b> Certain restrictions and exclusions apply. Contact support for details.	

---

# 10 Power cord set requirements

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

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

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

## Requirements for all countries

The following requirements are applicable to all countries and regions:

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

## Requirements for specific countries and regions

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

1. The flexible cord must be Type H05VV-F, 3-conductor, 0.75 mm<sup>2</sup> conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.
2. The flexible cord must be Type SVT/SJT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V ac) or NEMA 6-15P (15 A, 250 V ac) configuration. CSA or C-UL mark. UL file number must be on each element.

Country/region	Accredited agency	Applicable note number
		<p>3. The appliance coupler, flexible cord, and wall plug must bear a “T” mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCTF, 3-conductor, 0.75 mm<sup>2</sup> or 1.25 mm<sup>2</sup> conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V ac) configuration.</p> <p>4. The flexible cord must be Type RVV, 3-conductor, 0.75 mm<sup>2</sup> conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the CCC certification mark.</p> <p>5. The flexible cord must be Type H05VV-F 3-conductor, 0.75 mm<sup>2</sup> conductor size. KTL logo and individual approval number must be on each element. Corset approval number and logo must be printed on a flag label.</p> <p>6. The flexible cord must be Type HVCTF 3-conductor, 1.25 mm<sup>2</sup> conductor size. Power cord set fittings (appliance coupler, cable, and wall plug) must bear the BSMI certification mark.</p> <p>7. For 127 V ac, the flexible cord must be Type SVT or SJT 3-conductor, 18 AWG, with plug NEMA 5-15P (15 A, 125 V ac), with UL and CSA or C-UL marks. For 240 V ac, the flexible cord must be Type H05VV-F 3-conductor, 0.75 mm<sup>2</sup> or 1.00 mm<sup>2</sup> conductor size, with plug BS 1363/A with BSI or ASTA marks.</p>

---

# 11 Recycling

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

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

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