



# Maintenance and Service Guide

## SUMMARY

This guide provides information about spare parts, removal and replacement of parts, security, backing up, and more.

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First Edition: May 2022

Document Part Number: N10622-001

### 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 is automatically updated, which is always enabled. High-speed internet and Microsoft account required. ISP fees may apply and additional requirements may apply over time for updates. See <http://www.windows.com>. **If your product ships with Windows in S Mode:** Windows in S Mode works exclusively with apps from the Microsoft Store within Windows. Certain default settings, features, and apps cannot be changed. Some accessories and apps that are compatible with Windows may not work (including some antivirus, PDF writers, driver utilities, and accessibility apps), and performance may vary, even if you switch out of S Mode. If you switch to Windows, you cannot switch back to S Mode. Learn more at [Windows.com/SmodeFAQ](http://Windows.com/SmodeFAQ).

To access the latest user guides, go to <http://www.hp.com/support>, and follow the instructions to find your product. Then select **Manuals**.

### Software terms


By installing, copying, downloading, or otherwise using any software product preinstalled on this computer, you agree to be bound by the terms of the HP End User License Agreement (EULA). If you do not accept these license terms, your sole remedy is to return the entire unused product (hardware and software) within 14 days for a full refund subject to the refund policy of your seller.

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

## Safety warning notice

Reduce the possibility of heat-related injuries or of overheating the computer by following the practices described.

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 **WARNING!** To reduce the possibility of heat-related injuries or of overheating the computer, do not place the computer directly on your lap or obstruct the computer air vents. Use the computer 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 come into contact with the skin or a soft surface, such as pillows or rugs or clothing, during operation. The computer and the AC adapter comply with the user-accessible surface temperature limits defined by applicable safety standards.

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# Table of contents

<b>1 Product description.....</b>	<b>1</b>
<b>2 Components .....</b>	<b>3</b>
Right.....	3
Left.....	4
Display .....	5
Low blue light mode (select products only) .....	6
Keyboard area .....	6
Touchpad .....	6
Speakers and fingerprint reader .....	7
Special keys .....	8
Bottom .....	9
Labels.....	10
<b>3 Illustrated parts catalog .....</b>	<b>12</b>
Computer major components.....	12
Miscellaneous parts.....	15
<b>4 Removal and replacement procedures preliminary requirements .....</b>	<b>17</b>
Tools required .....	17
Service considerations.....	17
Plastic parts .....	17
Cables and connectors.....	17
Drive handling.....	17
Electrostatic discharge information.....	18
Generating static electricity .....	18
Preventing electrostatic damage to equipment .....	19
Personal grounding methods and equipment .....	19
Grounding the work area .....	20
Recommended materials and equipment.....	20
Cleaning your computer .....	21
Enabling HP Easy Clean (select products only) .....	21
Removing dirt and debris from your computer.....	21
Cleaning your computer with a disinfectant .....	22
Caring for wood veneer (select products only) .....	23
Packaging and transporting guidelines .....	23
Accessing support information .....	23
<b>5 Removal and replacement procedures for authorized service provider parts.....</b>	<b>26</b>
Component replacement procedures.....	26



Preparation for disassembly .....	26
Bottom cover .....	26
Battery .....	27
Touchpad .....	29
WWAN module .....	30
Solid-state drive .....	32
Speakers .....	34
Wireless charging module .....	35
Fingerprint reader.....	36
Fans.....	37
Heat sink assembly.....	38
System board.....	39
Lock bracket.....	42
Keyboard.....	43
Display assembly .....	45
Top cover.....	46
<b>6 Backing up, resetting, and recovering .....</b>	<b>48</b>
Backing up .....	48
Resetting.....	48
Recovering .....	48
Installing the Chromebook Recovery Utility .....	49
Creating recovery media.....	49
Recovering the Chrome operating system.....	49
Setting up your computer after a reset or recovery .....	50
Erasing and reformatting the recovery media.....	50
<b>7 Specifications .....</b>	<b>51</b>
Computer specifications .....	51
Display specifications .....	51
Solid-state drive specifications .....	52
<b>8 Statement of memory volatility .....</b>	<b>53</b>
Current BIOS steps.....	53
Nonvolatile memory usage .....	55
Questions and answers .....	57
Using HP Sure Start (select products only) .....	59
<b>9 Power cord set requirements .....</b>	<b>60</b>
Requirements for all countries.....	60
Requirements for specific countries and regions .....	60
<b>10 Recycling .....</b>	<b>62</b>
<b>Index .....</b>	<b>63</b>

# 1 Product description

This table provides detailed product information.

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

Category	Description
<b>Product Name</b>	<b>HP Elite Dragonfly 13.5 inch Chromebook</b>
<b>Processor</b>	Intel® Core™ i7-1265U processor (1.8 GHz [max turbo frequency 4.8 GHz], 10 cores, 12 MB Intel Smart Cache) Intel Core i7-1255U processor (1.7 GHz [max turbo frequency 4.7 GHz], 10 cores, 12 MB Intel Smart Cache) Intel Core i5-1245U processor (1.2 GHz [max turbo frequency 4.4 GHz], 10 cores, 12 MB Intel Smart Cache) Intel Core i5-1235U processor (1.3 GHz [max turbo frequency 4.4 GHz], 10 cores, 12 MB Intel Smart Cache) Intel Core i3-1215U processor (1.2 GHz [max turbo frequency 4.4 GHz], 6 cores, 10 MB Intel Smart Cache)
<b>Graphics controller</b>	Intel® Iris® Xe Graphics Intel UHD Graphics
<b>Display</b>	<b>34.3 cm (13.5 in), liquid crystal display (LCD), white light-emitting diode (WLED), ultrawide viewing angle (UWVA)</b>  Widescreen ultra extended graphics array (WUXGA+) (1920 × 1280), BrightView, 100% sRGB, eDP 1.4 + panel self-refresh (PSR) 2, 400 nits  WUXGA+, antiglare, 100% sRGB, eDP 1.4 + PSR2, 400 nits  WUXGA+, HP SureView Reflect+, 100% sRGB, eDP 1.3 + PSR, antiglare, 1000 nits, privacy screen  2K (2256 × 1504), 100% sRGB, eDP 1.4 + PSR2, BrightView, 400 nits
<b>Memory</b>	Onboard (nonaccessible) memory supporting up to 32 GB of RAM  LPDDR4x-4266  Supports the following configurations: <ul style="list-style-type: none"><li>• 32 GB</li><li>• 16 GB</li><li>• 8 GB</li></ul>
<b>Primary storage</b>	<b>M.2 solid-state drive (PCIe, non-volatile memory express (NVMe))</b>  512 GB, PCIe 2280  256 GB, PCIe 2230  128 GB, PCIe 2230
<b>Audio</b>	Bang and Olufsen  Quad speakers with discrete smart amp  Noise reduction
<b>Video</b>	5 MP integrated camera  Dual-edge microphone

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

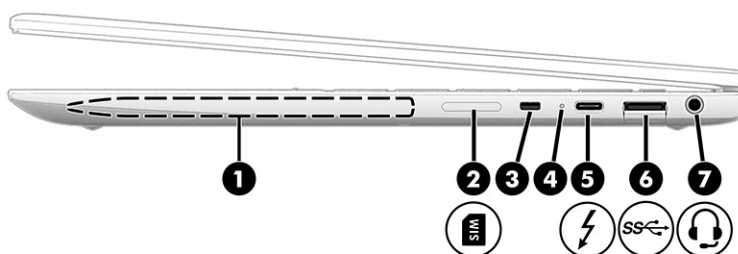
Category	Description
Wireless	<b>Wireless Local Area Network (WLAN)</b>
	<ul style="list-style-type: none"> <li>Intel AX211 Wi-Fi® 6E Bluetooth® 5.2 WLAN</li> <li>Intel AX211 Wi-Fi 6E Bluetooth® 5.2 vPro WLAN</li> </ul>
	Support for Chromecast
	WiFi SAR enabled in BIOS
	<b>Wireless Wide Area Network (WWAN)</b> (select products only)
	Intel 5000 5G Solution WWAN
	Intel XMM 7360 LTE-Advanced WWAN (Cat 9)
Ports	Audio-out (headphone)/audio-in (microphone) combo jack
	USB 3.2 Gen 2 Type-A port
	(2) USB Type-C® Thunderbolt™ ports
	HDMI In port
Digital pen	HP Wireless Charging USI Pen (select products only)
Keyboard/pointing devices	<b>Keyboard</b>
	Full size, island style, backlit keyboard with haptic touchpad
	Full size, island style, backlit keyboard with haptic touchpad, privacy
Power requirements	<b>Battery</b>
	4 cell, 50 Whr
	Long life
	Fast charge
	<b>HP Smart AC adapter</b> (non-power correction factor [nPFC], straight, 1.8 m [6 ft] USB Type-C)
	65 W, slim
	65 W, standard
	45 W, standard
	<b>Power cord</b>
	C5, 1.0 m (3.3 ft)
Security	Fingerprint touch sensor
	Privacy screen
	Nano lock slot
Operating system	Chrome™
	Chrome with Chrome Education Upgrade (sold separately)
	Chrome with Chrome Enterprise Upgrade (sold separately)
Serviceability	AC adapter

## 2 Components

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

### Right

Use the illustration and table to identify the components on the right side of the computer.



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




Component		Description
(1)	Magnetic pen attachment area	Holds an optional pen. Place the pen tip facing down for optimal magnetic attachment. The pen charges wirelessly when attached to this area.
(2)	SIM card tray (select products only)	Supports a wireless subscriber identity module (SIM) card.
(3)	Security cable slot	Attaches an optional security cable to the computer.
(4)	AC adapter and battery light	<ul style="list-style-type: none"><li>White: The AC adapter is connected and the battery is fully charged.</li><li>Amber: The AC adapter is connected and the battery is charging.</li><li>Blinking amber: The battery has an error.</li><li>Off: The battery is not charging.</li></ul>
(5)	 USB Type-C® power connector and Thunderbolt™ port	Connects an AC adapter that has a USB Type-C Thunderbolt connector, supplying power to the computer and, if needed, charging the computer battery. Also connects a USB device, provides data transfer, and charges small devices.
(6)	 USB SuperSpeed port	Connects a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provides high-speed data transfer.

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

Component	Description
(7)  Audio-out (headphone)/audio-in (microphone) combo jack	<p>Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. Also connects an optional headset microphone. This jack does not support optional standalone microphones.</p> <p><b>WARNING!</b> To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, see the <i>Regulatory, Safety, and Environmental Notices</i>.</p> <p><b>NOTE:</b> When a device is connected to the jack, the computer speakers are disabled.</p>

Left

Use the illustration and table to identify the components on the left side of the computer.

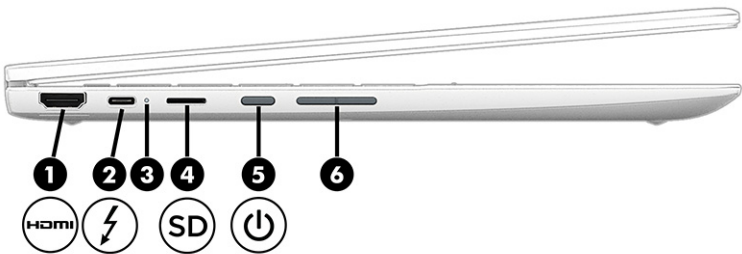



Table 2-2 Left-side components and their descriptions

Component	Description
(1) HDMI port	Connects an optional video or audio device, such as a high definition television, any compatible digital or audio component, or a high-speed High Definition Multimedia Interface (HDMI) device.
(2) USB Type-C® power connector and Thunderbolt port	Connects an AC adapter that has a USB Type-C Thunderbolt connector, supplying power to the computer and, if needed, charging the computer battery. Also connects a USB device, provides data transfer, and charges small devices.
(3) AC adapter and battery light	<ul style="list-style-type: none"><li>• White: The AC adapter is connected and the battery is fully charged.</li><li>• Amber: The AC adapter is connected and the battery is charging.</li><li>• Blinking amber: The battery has an error.</li><li>• Off: The battery is not charging.</li></ul>
(4) microSD™ memory card reader	Reads optional memory cards that store, manage, share, or access information.

Table 2-2 Left-side components and their descriptions (continued)

Component		Description
(5)	 Power button	<ul style="list-style-type: none"><li>When the computer is off, press the button briefly to turn on the computer.</li><li>When the computer is on, press the button briefly to initiate Sleep.</li><li>When the computer is in the Sleep state, press the button briefly to exit Sleep (select products only).</li><li>When the computer is in Hibernation, press the button briefly to exit Hibernation.</li></ul> <p><b>IMPORTANT:</b> Pressing and holding down the power button results in the loss of unsaved information.</p> <p>If the computer has stopped responding and shutdown procedures are ineffective, press and hold the power button for at least 10 seconds to turn off the computer.</p>
(6)	Volume button	Controls speaker volume on the computer.

## Display

Use the illustration and table to identify the components on the display.

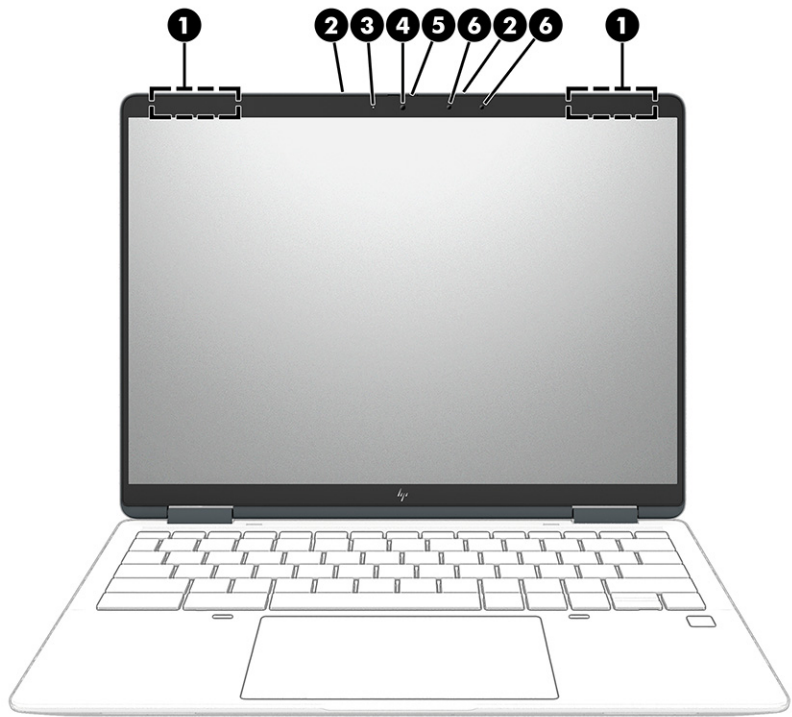


Table 2-3 Display components and their descriptions


Component		Description
(1)	WLAN antennas*	Send and receive wireless signals to communicate with wireless local area networks (WLANs).

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

Component		Description
(2)	Internal microphones	Record sound.
(3)	Camera light	On (white): The camera is in use.
		Off: The camera is turned off by the software.
(4)	Camera	Allows you to video chat, record video, and record still images.  <b>NOTE:</b> Camera functions vary depending on the camera hardware and software installed on your product.
(5)	Camera privacy cover	By default, the camera lens is uncovered, but you can slide the camera privacy cover to block the camera's view. To use the camera, slide the camera privacy cover in the opposite direction to reveal the lens.
		<b>NOTE:</b> If you have both front-facing and rear-facing cameras, when one camera lens is revealed and ready to use, the other is concealed.
(6)	Ambient light sensors	Detects ambient light and allows the device to adjust the screen brightness.
*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 <i>Regulatory, Safety, and Environmental Notices</i> that applies to your country or region.		

## Low blue light mode (select products only)

Your computer display is shipped from the factory in low blue light mode for improved eye comfort and safety. Also, blue light mode automatically adjusts blue light emissions when you are using the computer at night or for reading.

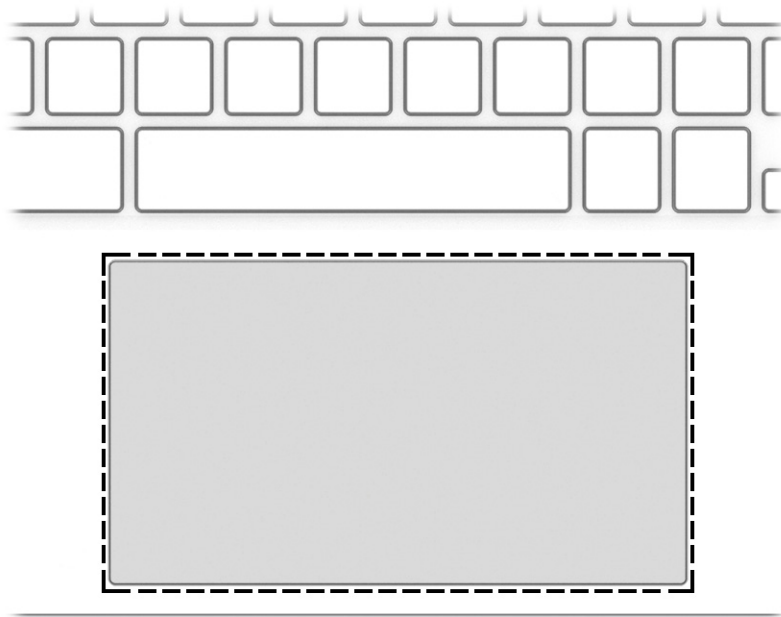
 **WARNING!** To reduce the risk of serious injury, read the *Safety & Comfort Guide*. It describes proper workstation setup and proper posture, health, and work habits for computer users. The *Safety & Comfort Guide* also provides important electrical and mechanical safety information. The *Safety & Comfort Guide* is available on the web at <http://www.hp.com/ergo>.

## Keyboard area

Keyboards can vary by language.

## Touchpad

The touchpad settings and components are described here.



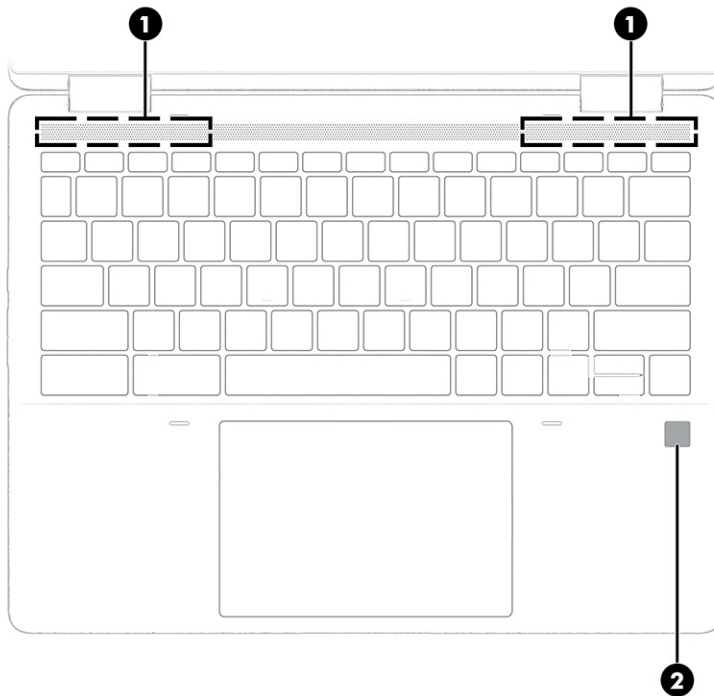
**Table 2-4** Touchpad component and description

Component	Description
Touchpad zone	Reads your finger gestures to move the pointer or activate items on the screen.

## Speakers and fingerprint reader

Speakers are located on the right and left of the keyboard. Fingerprint readers can be located on the touchpad, on a side panel of the computer, or on the top cover below the keyboard.



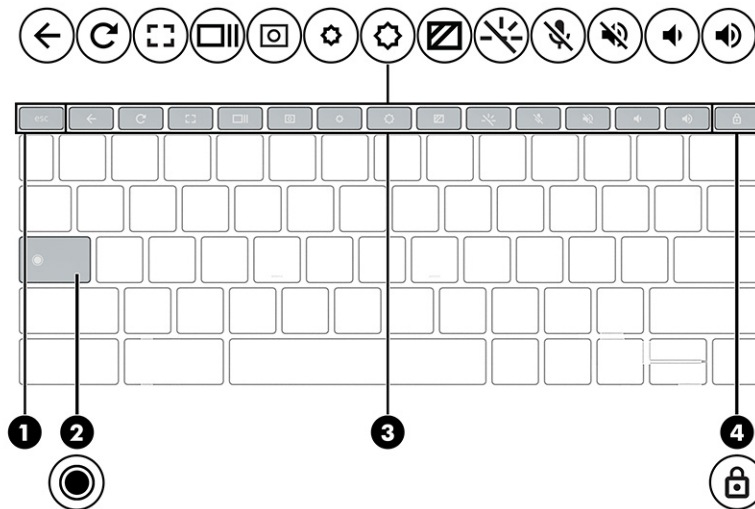


**Table 2-5** Speakers and fingerprint reader and their descriptions

Component		Description
(1)	Speakers	Produce sound.
(2)	Fingerprint reader	<p>The fingerprint reader allows you to unlock the computer screen or to resume computer operations. The reader does not function as a login device.</p> <ul style="list-style-type: none"> <li>■ Swipe down across the fingerprint reader.</li> </ul>

## Special keys

Use the illustration and table to locate the special keys.

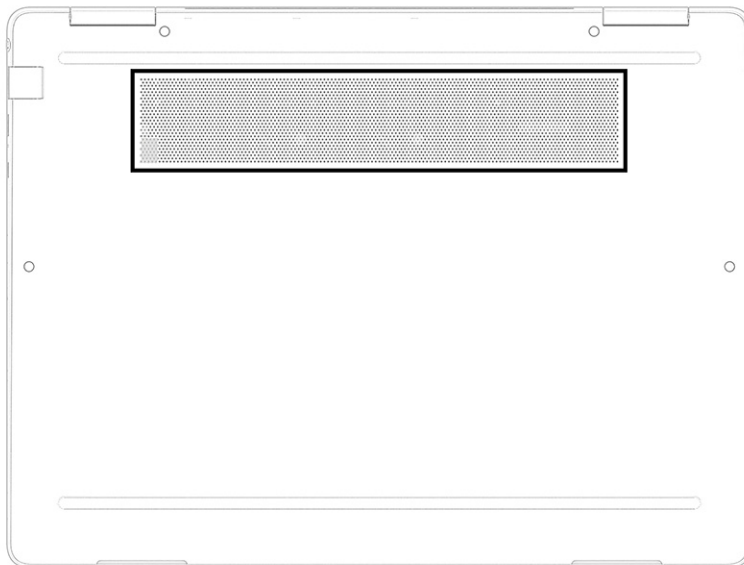


**Table 2-6** Special keys and their descriptions

Component	Description
(1) <a href="#">esc</a> key	Activates certain computer functions when pressed in combination with other keys, such as <a href="#">tab</a> or <a href="#">shift</a> .
(2) Search key	Press to search your apps and the web from your apps list.
(3) Action keys	Execute frequently used system functions.
(4) Keyboard lock key	Press to lock or unlock your keyboard.

## Bottom

Use the illustration and table to identify the bottom component.




**Table 2-7 Bottom component and description**

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

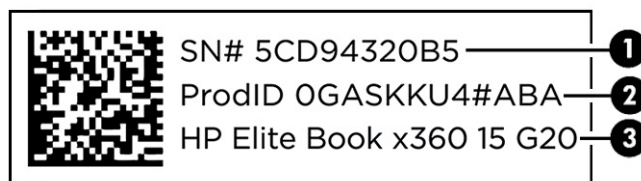
## Labels

The labels affixed to the computer provide information you might need when you troubleshoot system problems or travel internationally with the computer. Labels might be in paper form or imprinted on the product.

 **IMPORTANT:** Check the following locations for the labels described in this section: the bottom of the computer, inside the battery bay, under the service door, on the back of the display, or on the bottom of a tablet kickstand.

- **Service label**—Provides important information to identify your computer. When contacting support, you might be asked for the serial number, the product number, or the model number. Locate this information before you contact support.

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



**Table 2-8 Service label components**

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

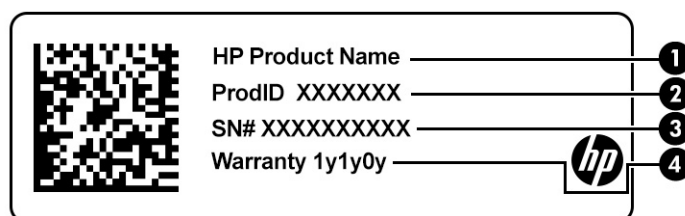


Table 2-9 Service label components

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

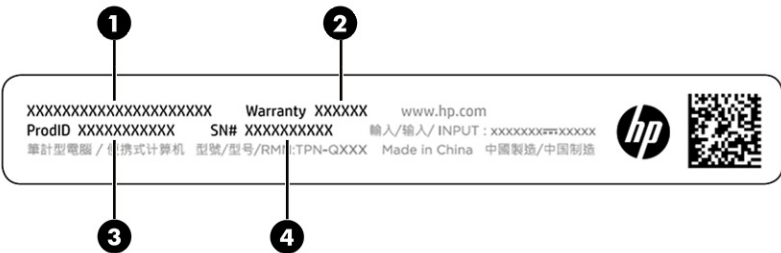


Table 2-10 Service label components

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

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


## 3 Illustrated parts catalog

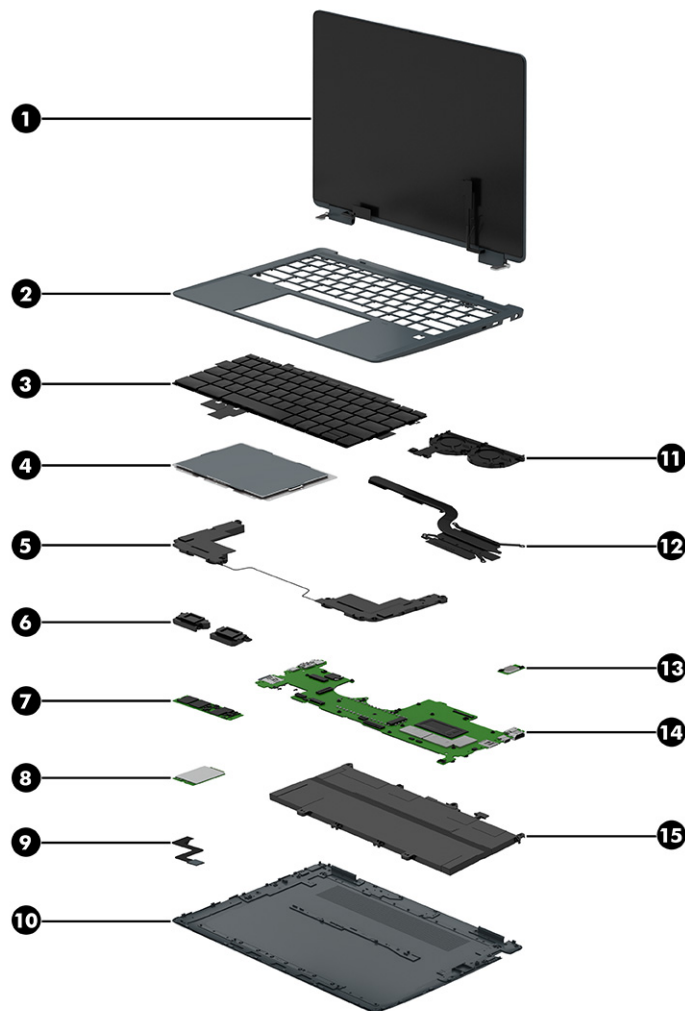
Use this chapter to determine the spare parts that are available for the computer.

### Computer major components

To identify the computer major components, use this illustration and table.

 **NOTE:** HP continually improves and changes product parts. For complete and current information about 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.



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

Item	Component	Spare part number
(1)	<b>Display assembly</b>	
	<b>NOTE:</b> Display assemblies are available only as entire hinge-ups.	
	Models with WWAN:	
	• QHD, antiglare, 400 nits	N13419-001
	• WUXGA, antiglare, 400 nits	N13420-001
	• WUXGA, antiglare, 1000 nits, privacy	N13421-001
	• WUXGA, BrightView, 400 nits	N13422-001
	Models without WWAN:	
	• QHD, antiglare, 400 nits	N19301-001
	• WUXGA, antiglare, 400 nits	N19302-001
	• WUXGA, antiglare, privacy, 1000 nits	N19303-001
	• WUXGA, BrightView, 400 nits	N19304-001
(2)	<b>Top cover</b> (does not include keyboard)	
	Models with WWAN	N13442-001
	Models without WWAN	N13441-001
	Models with WWAN, Japan	N19300-001
	Models without WWAN, Japan	N19299-001
(3)	<b>Keyboard</b>	
	<b>NOTE:</b> Keyboard brackets are available as spare part number N18723-001. The keyboard support kit is available as spare part number N18724-001.	
	<b>NOTE:</b> For a detailed list of country codes, see <a href="#">Keyboard on page 43</a> .	
	Nonprivacy	N18720-xxx
	Privacy	N18721-xxx
(4)	<b>Touchpad</b>	N13440-001
	<b>NOTE:</b> The touchpad cable is available in the cable kit as spare part number N13425-001.	
(5)	<b>Bottom speakers</b> (left and right)	
	Models without WWAN	N13433-001
	Models with 5G WWAN	N13434-001
	Models with LTE WWAN	N13435-001
(6)	<b>Top speakers</b> (left and right)	N13436-001
(7)	<b>Solid-state drive</b>	
	<b>NOTE:</b> The solid-state drive cover is available in the bracket kit as spare part number N13424-001.	
	512 GB	N13460-001
	256 GB	N13459-001

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

Item	Component	Spare part number
	128 GB	N13458-001
<b>(8)</b>	<b>WWAN module</b>	
	Intel 5000 5G Solution WWAN	N13456-001
	Bracket	N13438-001
	Intel XMM 7360 LTE-Advanced WWAN (Cat 9)	N13457-001
	Bracket	N13439-001
<b>(9)</b>	<b>Fingerprint reader module</b>	N13453-001
	<b>NOTE:</b> The fingerprint reader bracket is available in the bracket kit as spare part number N13424-001.	
<b>(10)</b>	<b>Bottom cover</b>	
	Models with WWAN	N13430-001
	Models without WWAN	N13429-001
<b>(11)</b>	<b>Fans (left and right)</b>	N13432-001
<b>(12)</b>	<b>Heat sink assembly</b>	N13431-001
<b>(13)</b>	<b>Wireless charging module</b>	N13452-001
	<b>NOTE:</b> The wireless charging module cable is available in the cable kit as spare part number N13425-001.	
<b>(14)</b>	<b>System board</b>	
	<b>NOTE:</b> The system board repair kit is available as spare part number N19902-888.	
	Intel Core i7-1265U processor and 32 GB of system memory	N13417-001
	Intel Core i7-1265U processor and 16 GB of system memory	N13416-001
	Intel Core i7-1265U processor and 8 GB of system memory (WWAN models)	N13418-001
	Intel Core i7-1255U processor and 16 GB of system memory	N13415-001
	Intel Core i5-1245U processor and 16 GB of system memory	N13412-001
	Intel Core i5-1245U processor and 8 GB of system memory	N13413-001
	Intel Core i5-1245U processor and 8 GB of system memory (WWAN models)	N13414-001
	Intel Core i5-1235U processor and 8 GB of system memory	N13411-001
	Intel Core i3-1215U processor and 8 GB of system memory	N13409-001
	Intel Core i3-1215U processor and 8 GB of system memory (WWAN models)	N13410-001
<b>(15)</b>	<b>Battery (4 cell, 50 Whr)</b>	L93559-005
	<b>USB door</b> (not illustrated)	N19631-001
	<b>WWAN antennas</b> (not illustrated)	N19903-001

## Miscellaneous parts

To identify the miscellaneous parts, use this table.

**Table 3-2 Miscellaneous part descriptions and part numbers**

Component	Spare part number
<b>AC adapter</b> (nPFC, 1.8 m [6 ft], USB Type-C)	
65 W	L67440-001
65 W, slim	L04650-850
45 W	L43407-001
45 W, wall mount	L32390-001
<b>Wireless pen</b>	N22208-001
<b>SIM card tray</b>	N13437-001
<b>USB-C-to-VGA adapter</b>	831751-001
<b>USB-C-to-DisplayPort adapter</b>	831753-001
<b>USB-C-to-RJ-45 (network) adapter</b>	M95985-001
<b>USB-C-to-HDMI 2.0 adapter</b>	935325-001
<b>HDMI-to-VDA adapter</b>	701943-001
<b>HDMI-to-DVI adapter</b>	749038-001
<b>USB 3.0-to-gigabit adapter</b>	914031-001
<b>USB-C-to-RJ-45 adapter</b>	918779-001
<b>System board repair kit</b>	N19902-888
<b>Bracket kit</b> (includes left and right brackets, solid-state drive cover, WWAN brackets, and fingerprint reader bracket)	N13424-001
<b>Miscellaneous parts kit</b> (includes fan connector Mylar, WLAN Mylar, left and right connector Mylar, solid-state drive absorber, touchpad Mylar, keyboard acetic tape, blue LCD deco cap, system board Mylar, top vent)	N13423-001
<b>Screw kit</b>	N13428-001
<b>HP bluetooth travel mouse</b>	L62043-001
<b>HP USB mouse</b>	L95713-001
<b>HP 14.1 business slim top load case</b>	L05333-001
<b>HP Business 14.1 laptop bag</b>	M55007-001
<b>Duckhead adapter</b> (for use in Japan)	L33157-001
<b>Power cord</b> (C5, conventional, 1.0 m [3.3 ft])	
Argentina	L19357-001
Australia	L19358-001
Brazil	L19359-001
Denmark	L19360-001
Europe (Austria, Belgium, Finland, France, Germany, the Netherlands, Norway, and Sweden)	L19361-001



**Table 3-2 Miscellaneous part descriptions and part numbers (continued)**

<b>Component</b>	<b>Spare part number</b>
India	L19363-001
Israel	L19362-001
Italy	L19364-001
Japan	L19365-001
North America	L19367-001
People's Republic of China	L19368-001
South Africa	L19369-001
South Korea	L19366-001
Switzerland	L19370-001
Taiwan	L19372-001
Thailand	L19371-001
Thailand (ADP + cord)	M85418-001
The United Kingdom	L19373-001
<b>Power cord (C5, conventional, 1.8 m [6.0 ft])</b>	
North America	L19367-002
<b>Power cord (C5, premium, duckhead, 1.0 m [3.3 ft])</b>	
Argentina	L36815-001
Australia	L36816-001
Europe (Austria, Belgium, Finland, France, Germany, the Netherlands, Norway, and Sweden)	L36818-001
India	L36820-001
Israel	L36819-001
Italy	L44788-001
North America	L36822-001
People's Republic of China	L36823-001
South Africa	L36824-001
Switzerland	L36825-001
Taiwan	L36827-001
Thailand	L36826-001
United Kingdom	L36828-001
<b>Duckhead power cord (C5NS)</b>	
South Korea	L50818-001
North America	L50818-002

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## 4 Removal and replacement procedures preliminary requirements

Use this information to properly prepare to disassemble and reassemble the computer.

### Tools required

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

- Nonconductive, nonmarking pry tool
- Magnetic Phillips P1 screwdriver
- Tweezers

### 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

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

### Cables and connectors

Handle cables with extreme care to avoid damage.



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

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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 so that they cannot be caught or snagged as you remove or replace parts. Handle flex cables with extreme care; these cables tear easily.

### Drive handling

Note the following guidelines when handling drives.



**IMPORTANT:** Drives are fragile components. Handle them 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 2.54 cm (1 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.”
- 

## Electrostatic discharge information

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

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



**IMPORTANT:** To prevent damage to the device when you remove or install 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 [Personal grounding methods and equipment on page 19](#).
  - Avoid touching pins, leads, and circuitry. Handle electronic components as little as possible.
  - If you remove a component, place it in an electrostatic-safe container.
- 

## Generating static electricity

Follow these static electricity guidelines:

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

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

Event	Relative humidity		
	55%	40%	10%
Walking across carpet	7,500 V	15,000 V	35,000 V
Walking across vinyl floor	3,000 V	5,000 V	12,000 V
Motions of bench worker	400 V	800 V	6,000 V
Removing DIPs (dual in-line packages) from plastic tube	400 V	700 V	2,000 V
Removing DIPs from vinyl tray	2,000 V	4,000 V	11,500 V
Removing DIPs from polystyrene foam	3,500 V	5,000 V	14,500 V
Removing bubble pack from PCB (printed circuit board)	7,000 V	20,000 V	26,500 V
Packing PCBs in foam-lined box	5,000 V	11,000 V	21,000 V
Multiple electric components can be packaged together in plastic tubes, trays, or polystyrene foam.			



**NOTE:** As little as 700 V of static electricity can degrade a product.

## Preventing electrostatic damage to equipment

Many electronic components are sensitive to ESD. Circuitry design and structure determine the degree of sensitivity.

The following packaging and grounding precautions are necessary to prevent static electricity damage to electronic components:

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

## Personal grounding methods and equipment

Using certain equipment can prevent static electricity damage to electronic components.

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

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

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

## Grounding the work area

To prevent static damage at the work area, follow these precautions:

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

## Recommended materials and equipment

HP recommends certain materials and equipment to prevent static electricity:

- Antistatic tape
- Antistatic smocks, aprons, or sleeve protectors
- Conductive bins and other assembly or soldering aids
- Conductive foam
- Conductive tabletop workstations with ground cord of  $1\text{ M}\Omega \pm 10\%$  resistance
- Static-dissipative table or floor mats with hard tie to ground
- Field service kits
- Static awareness labels
- Wrist straps and footwear straps providing  $1\text{ M}\Omega \pm 10\%$  resistance
- Material handling packages

- Conductive plastic bags
- Conductive plastic tubes
- Conductive tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes

## Cleaning your computer

Cleaning your computer regularly removes dirt and debris so that your device continues to operate at its best. Use the following information to safely clean the external surfaces of your computer.

### Enabling HP Easy Clean (select products only)

HP Easy Clean helps you to avoid accidental input while you clean the computer surfaces. This software disables devices such as the keyboard, touch screen, and touchpad for a preset amount of time so that you can clean all computer surfaces.

1. Start HP Easy Clean in one of the following ways:
  - Select the **Start** menu, and then select **HP Easy Clean**.  
– or –
  - Select the **HP Easy Clean** icon in the taskbar.  
– or –
  - Select **Start**, and then select the **HP Easy Clean** tile.
2. Now that your device is disabled for a short period, see [Removing dirt and debris from your computer on page 21](#) for the recommended steps to clean the high-touch, external surfaces on your computer. After you remove the dirt and debris, you can also clean the surfaces with a disinfectant. See [Cleaning your computer with a disinfectant on page 22](#) for guidelines to help prevent the spread of harmful bacteria and viruses.


### Removing dirt and debris from your computer

Here are the recommended steps to clean dirt and debris from your computer.

For computers with wood veneer, see [Caring for wood veneer \(select products only\) on page 23](#).

1. Wear disposable gloves made of latex (or nitrile gloves, if you are latex-sensitive) when cleaning the surfaces.
2. Turn off your device and unplug the power cord and other connected external devices. Remove any installed batteries from items such as wireless keyboards.

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 **CAUTION:** To prevent electric shock or damage to components, never clean a product while it is turned on or plugged in.

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3. Moisten a microfiber cloth with water. The cloth should be moist, but not dripping wet.



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**IMPORTANT:** To avoid damaging the surface, avoid abrasive cloths, towels, and paper towels.

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4. Wipe the exterior of the product gently with the moistened cloth.



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**IMPORTANT:** Keep liquids away from the product. Avoid getting moisture in any openings. If liquid makes its way inside your HP product, it can cause damage to the product. Do not spray liquids directly on the product. Do not use aerosol sprays, solvents, abrasives, or cleaners containing hydrogen peroxide or bleach that might damage the finish.

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5. Start with the display (if applicable). Wipe carefully in one direction, and move from the top of the display to the bottom. Finish with any flexible cables, like power cord, keyboard cable, and USB cables.
6. Be sure that surfaces have completely air-dried before turning the device on after cleaning.
7. Discard the gloves after each cleaning. Clean your hands immediately after you remove the gloves.

See [Cleaning your computer with a disinfectant on page 22](#) for recommended steps to clean the high-touch, external surfaces on your computer to help prevent the spread of harmful bacteria and viruses.

## Cleaning your computer with a disinfectant

The World Health Organization (WHO) recommends cleaning surfaces, followed by disinfection, as a best practice for preventing the spread of viral respiratory illnesses and harmful bacteria.

After cleaning the external surfaces of your computer using the steps in [Removing dirt and debris from your computer on page 21](#), [Caring for wood veneer \(select products only\) on page 23](#), or both, you might also choose to clean the surfaces with a disinfectant. A disinfectant that is within HP's cleaning guidelines is an alcohol solution consisting of 70% isopropyl alcohol and 30% water. This solution is also known as rubbing alcohol and is sold in most stores.

Follow these steps when disinfecting high-touch, external surfaces on your computer:

1. Wear disposable gloves made of latex (or nitrile gloves, if you are latex-sensitive) when cleaning the surfaces.
2. Turn off your device and unplug the power cord and other connected external devices. Remove any installed batteries from items such as wireless keyboards.



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**CAUTION:** To prevent electric shock or damage to components, never clean a product while it is turned on or plugged in.

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3. Moisten a microfiber cloth with a mixture of 70% isopropyl alcohol and 30% water. The cloth should be moist, but not dripping wet.



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**CAUTION:** Do not use any of the following chemicals or any solutions that contain them, including spray-based surface cleaners: bleach, peroxides (including hydrogen peroxide), acetone, ammonia, ethyl alcohol, methylene chloride, or any petroleum-based materials, such as gasoline, paint thinner, benzene, or toluene.

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**IMPORTANT:** To avoid damaging the surface, avoid abrasive cloths, towels, and paper towels.

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4. Wipe the exterior of the product gently with the moistened cloth.



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**IMPORTANT:** Keep liquids away from the product. Avoid getting moisture in any openings. If liquid makes its way inside your HP product, it can cause damage to the product. Do not spray liquids directly

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on the product. Do not use aerosol sprays, solvents, abrasives, or cleaners containing hydrogen peroxide or bleach that might damage the finish.

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5. Start with the display (if applicable). Wipe carefully in one direction, and move from the top of the display to the bottom. Finish with any flexible cables, like power cord, keyboard cable, and USB cables.
6. Be sure that surfaces have completely air-dried before turning the device on after cleaning.
7. Discard the gloves after each cleaning. Clean your hands immediately after you remove the gloves.

## Caring for wood veneer (select products only)

Your product might feature high-quality wood veneer. As with all natural wood products, proper care is important for best results over the life of the product. Because of the nature of natural wood, you might see unique variations in the grain pattern or subtle variations in color, which are normal.

- Clean the wood with a dry, static-free microfiber cloth or chamois.
- Avoid cleaning products containing substances such as ammonia, methylene chloride, acetone, turpentine, or other petroleum-based solvents.
- Do not expose the wood to sun or moisture for long periods of time.
- If the wood becomes wet, dry it by dabbing with an absorbent, lint-free cloth.
- Avoid contact with any substance that might dye or discolor the wood.
- Avoid contact with sharp objects or rough surfaces that might scratch the wood.

See [Removing dirt and debris from your computer on page 21](#) for the recommended steps to clean the high-touch, external surfaces on your computer. After you remove the dirt and debris, you can also clean the surfaces with a disinfectant. See [Cleaning your computer with a disinfectant on page 22](#) for sanitizing guidelines to help prevent the spread of harmful bacteria and viruses.

## 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.

## Accessing support information

To find the HP support that you need, use this information.



**Table 4-3 Support information locations**


Service consideration	Path to access information
Records of reported failure incidents stored on the computer	<p><b>Windows:</b></p> <p>Pre-operating system failures are logged in the BIOS Event Log. To view the BIOS Event Log:</p> <ol style="list-style-type: none"> <li>1. Press the power button.</li> <li>2. Immediately and repeatedly press <b>esc</b> when the power button light turns white. <p><b>NOTE:</b> If you do not press <b>esc</b> at the appropriate time, you must restart the computer and again repeatedly press <b>esc</b> when the power button light turns white to access the utility.</p> </li> <li>3. Press <b>f10</b> to enter the BIOS setup.</li> <li>4. (On commercial products) Under the <b>Main</b> tab, select <b>BIOS event log</b>, and then select <b>View BIOS Event Log</b>.</li> </ol> <p>- or -</p> <p>(On consumer products) Under the <b>Main</b> tab, select <b>System Log</b>.</p> <p>Post-operating system failures are logged in the Event Viewer.</p> <ol style="list-style-type: none"> <li>1. Turn on the computer and allow the operating system to open.</li> <li>2. Select the search icon  in the taskbar.</li> <li>3. Type <code>Event Viewer</code>, and then press <b>enter</b>.</li> <li>4. Select the log from the left panel. Details display in the right panel.</li> </ol> <p><b>Chrome:</b></p> <ol style="list-style-type: none"> <li>1. Go to <a href="https://support.google.com/chrome">support.google.com/chrome</a>.</li> <li>2. Search <code>collect Chrome device logs</code>.</li> </ol>
Technical bulletins	<p>To locate technical bulletins:</p> <ol style="list-style-type: none"> <li>1. Go to <a href="https://www.hp.com">www.hp.com</a>.</li> <li>2. Place the cursor over <b>Problem solving</b> to display more options.</li> <li>3. Select <b>Support &amp; Troubleshooting</b>.</li> <li>4. Type the serial number, product number, or product name to go to the product support page.</li> <li>5. Select <b>Advisories</b> to view technical bulletins.</li> </ol>
Repair professionals	<p>To locate repair professionals:</p> <ol style="list-style-type: none"> <li>1. Go to <a href="https://www.hp.com">www.hp.com</a>.</li> <li>2. Place the cursor over <b>Support resources</b> to display more options.</li> <li>3. Select <b>Authorized service providers</b>.</li> </ol>


**Table 4-3** Support information locations (continued)

Service consideration	Path to access information
Component and diagnosis information, failure detection, and required action	<p>To locate diagnosis information and actions:</p> <ol style="list-style-type: none"><li>1. Go to <a href="http://www.hp.com/go/techcenter/pcdiags">http://www.hp.com/go/techcenter/pcdiags</a>.</li><li>2. Select <b>Get Support</b>.</li><li>3. Near the bottom of the window, select <b>Notebook PCs</b>, and then select your location.</li></ol>

## 5 Removal and replacement procedures for authorized service provider parts

This chapter provides removal and replacement procedures for authorized service provider parts.

 **IMPORTANT:** Only an authorized service provider should access the components described in this chapter. Accessing these parts can damage the computer or void the warranty.

 **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.

### Component replacement procedures

To remove and replace computer components, use the procedures described in this section.

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

Make special note of each screw size and location during removal and replacement.

### Preparation for disassembly

To remove and replace computer components, use these procedures:

For initial safety procedures, see [Removal and replacement procedures preliminary requirements on page 17](#).

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

### Bottom cover

To remove the bottom cover, use this procedure and illustration.

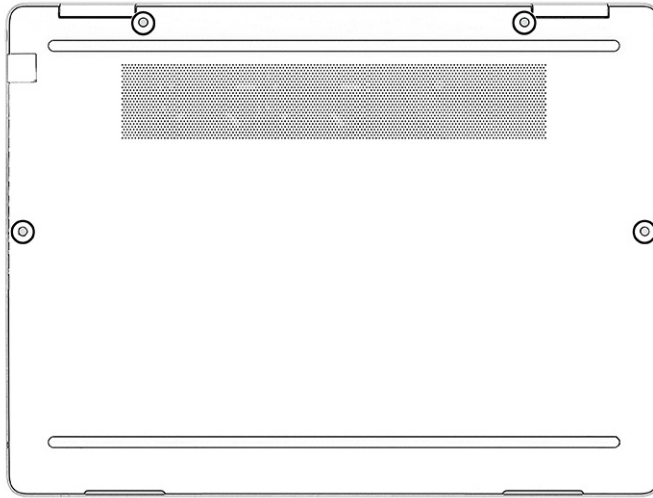
**Table 5-1** Bottom cover description and part number

Description	Spare part number
Bottom cover for use in models with WWAN	N13430-001
Bottom cover for use in models without WWAN	N13429-001

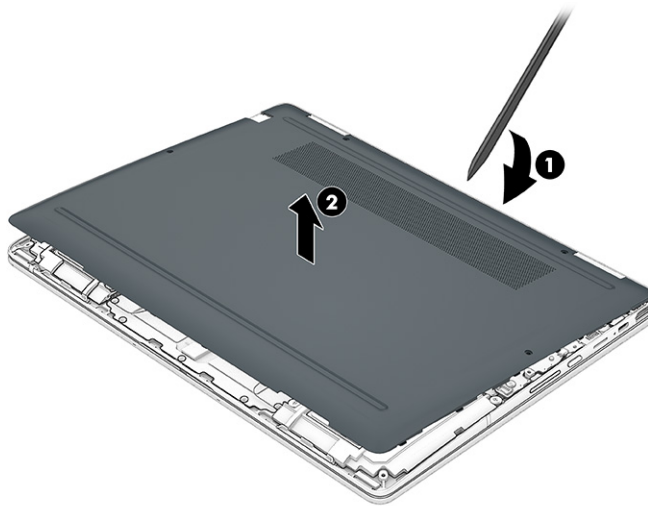
Before removing the bottom cover, prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).

Remove the bottom cover:

1. Close the computer and rest it upside down on a flat work surface with the front toward you.
2. Remove the four Phillips M2.0 × 3.5 screws that secure the bottom cover to the computer.



3. Insert a thin, plastic tool in the seam between the bottom cover and top cover of the computer between the hinges to release the cover (1).
4. Remove the bottom cover (2).




To replace the bottom cover, reverse the removal procedures.

## Battery

To remove the battery, use this procedure and illustration.

**Table 5-2 Battery description and part number**


Description	Spare part number
Battery (4 cell, 50 Whr)	L93559-005


 **WARNING!** To avoid personal injury and damage to the product:

- Do *not* puncture, twist, or crack the battery.
- Do *not* cause an external puncture or rupture to the battery, which can cause a short inside the battery, which can result in battery thermal runaway.
- Do *not* handle or touch the battery enclosure with sharp objects such as tweezers or pliers, which might puncture the battery.
- Do *not* compress or squeeze the battery case with tools or heavy objects stacked on top of the case. These actions can apply undue force on the battery.
- Do *not* touch the connectors with any metallic surface or object, such as metal tools, screws, or coins, which can cause shorting across the connectors.

Before removing the battery, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).
2. Remove the bottom cover (see [Bottom cover on page 26](#)).

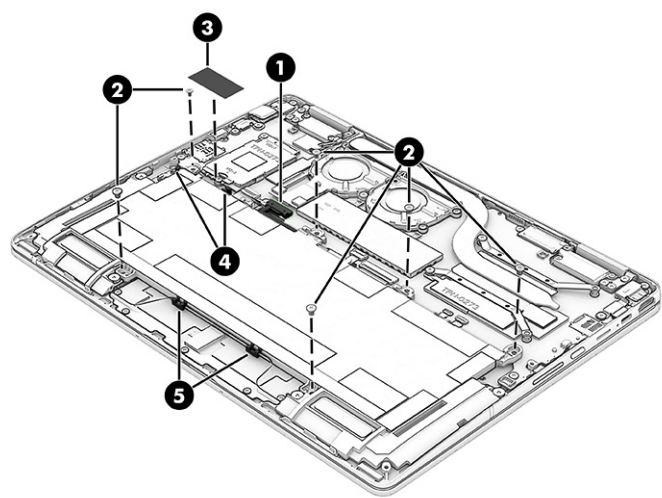
 **WARNING!** To reduce potential safety issues, use only the user-replaceable battery provided with the computer, a replacement battery provided by HP, or a compatible battery purchased from HP.

 **IMPORTANT:** Removing a 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 you remove the battery.

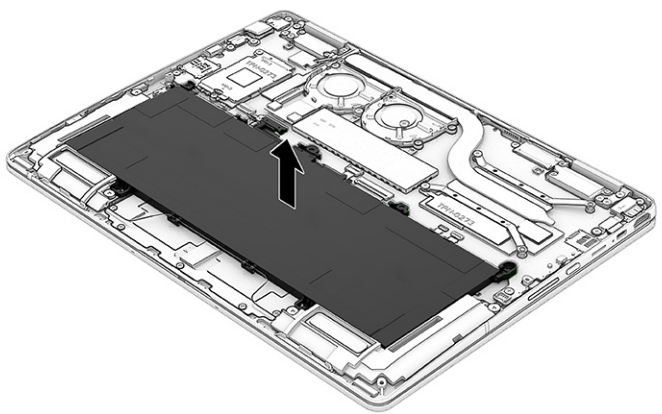
Remove the battery:

1. Disconnect the battery cable **(1)** from the system board.
2. Remove the six Phillips M2.0 × 3.0 screws **(2)** that secure the battery to the computer.
3. (WWAN models only) Remove the tape that secures the WWAN antenna cables to the battery **(3)**, and then remove the WWAN antenna cables from the clips along the top of the battery **(4)**.

4. Remove the speaker cable from the clips along the bottom of the battery (5).



5. Remove the battery from the computer.



To install the battery, reverse the removal procedures.

## Touchpad

To remove the touchpad, use this procedure and illustration.

**Table 5-3** Touchpad description and part number

Description	Spare part number
Touchpad	N13440-001
Touchpad cable (available in the Cable Kit)	N13425-001

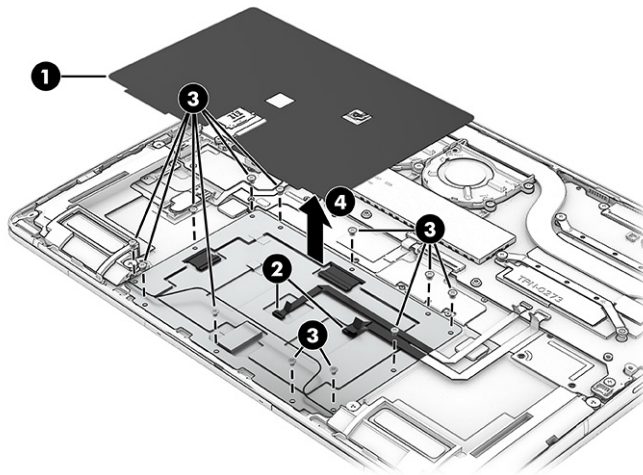
Before removing the touchpad, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).
2. Remove the bottom cover (see [Bottom cover on page 26](#)).

3. Remove the battery (see [Battery on page 27](#)).

Remove the touchpad:

1. Remove the protective Mylar from the top of the touchpad (1).
2. Disconnect the two cables from the ZIF connectors on the touchpad cable (2), and then peel the cables off the touchpad. The cables are secured to the touchpad with adhesive.
3. Remove the 12 Phillips M2.0 × 2.0 screws (3) that secure the touchpad to the computer.
4. Lift the touchpad straight up to remove it (4).



To install the touchpad, reverse this procedure.

## WWAN module

To remove the WWAN module, use this procedure and illustration.

**Table 5-4 WWAN module descriptions and part numbers**

Description	Spare part number
Intel 5000 5G Solution WWAN	N13456-001
Bracket	N13438-001
Intel XMM 7360 LTE-Advanced WWAN (Cat 9)	N13457-001
Bracket	N13439-001



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


Before removing the WWAN module, follow these steps:

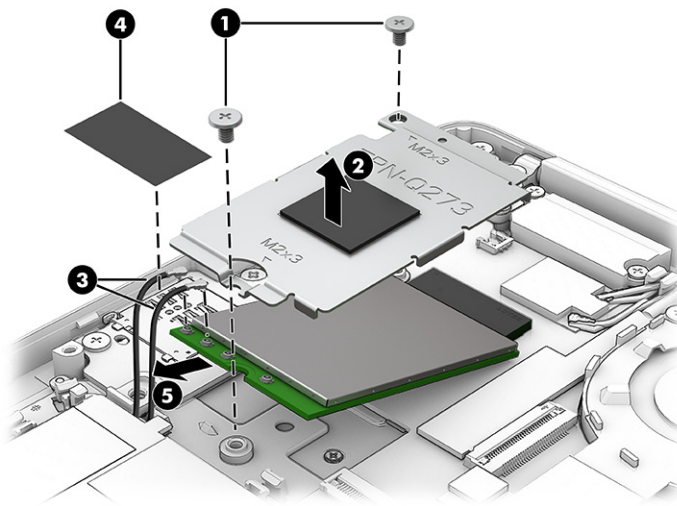
1. Prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).

2. Remove the bottom cover (see [Bottom cover on page 26](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 27](#)).

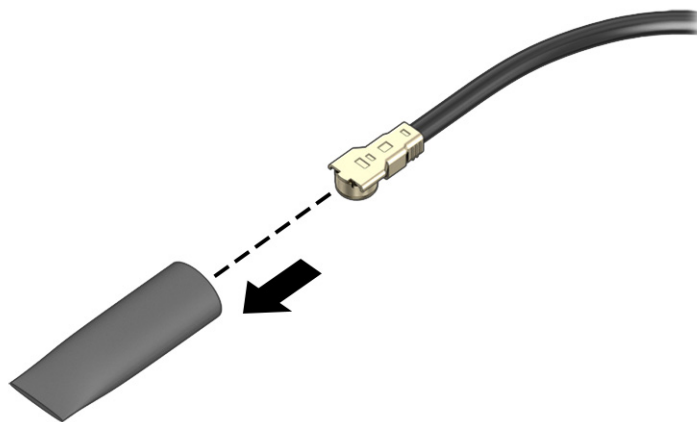
Remove the WWAN module:

1. Remove the two Phillips M2.0 × 2.5 screws (1) from the WWAN bracket, and then remove the bracket (2).
2. Carefully disconnect the antenna cables from the WWAN module (3).
3. Remove the tape that secures the WWAN antenna cable to the battery (4).
4. Pull the module out of the socket (5).

 **NOTE:** Be sure to match the number on the antenna cable with the number next to the connector on the module.



5. If the WWAN antenna is not connected to the terminal on the WWAN module, install a protective sleeve on the antenna connector, as shown in the following illustration.





To install the WWAN module, reverse this procedure.

## Solid-state drive

To remove the M.2 solid-state drive, use this procedure and illustration.

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

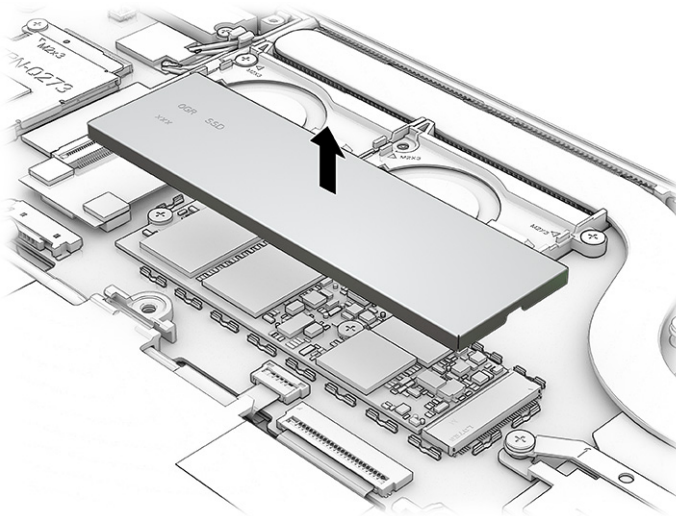
Description	Spare part number
512 GB	N13460-001
256 GB	N13459-001
128 GB	N13458-001

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

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).
2. Remove the bottom cover (see [Bottom cover on page 26](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 27](#)).

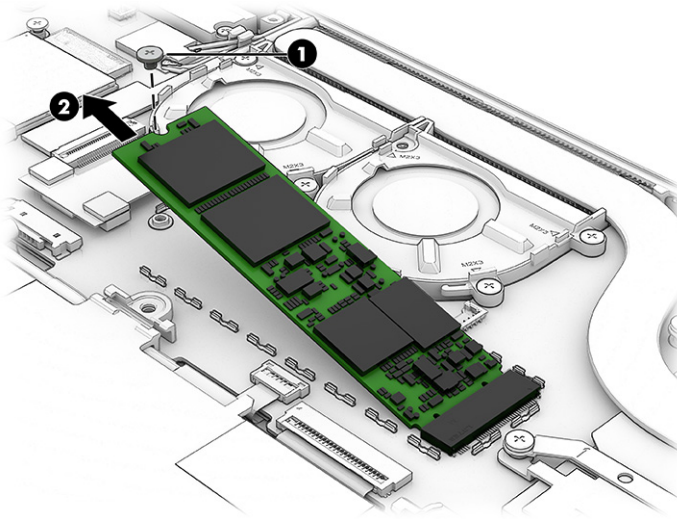
Remove the solid-state drive:

1. Lift the cover off the top of the drive.

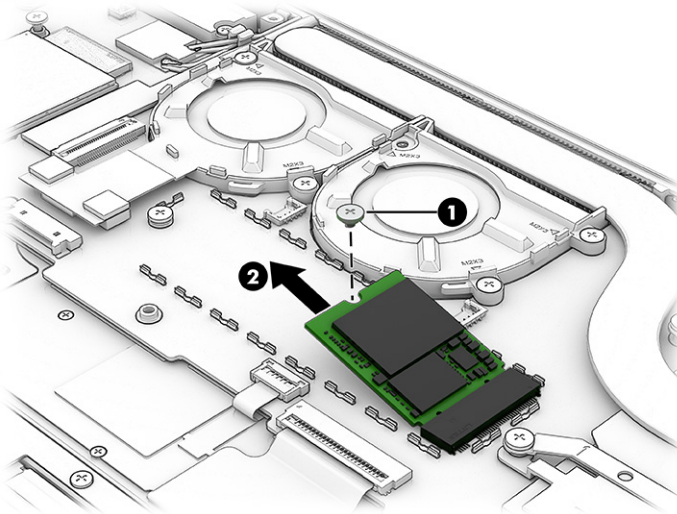


2. Remove the Phillips M2.0 × 2.0 screw (2280) or Phillips M1.6 × 1.3 screw (2230) that secures the drive (1).
3. Pull the drive away from the socket to remove it (2).

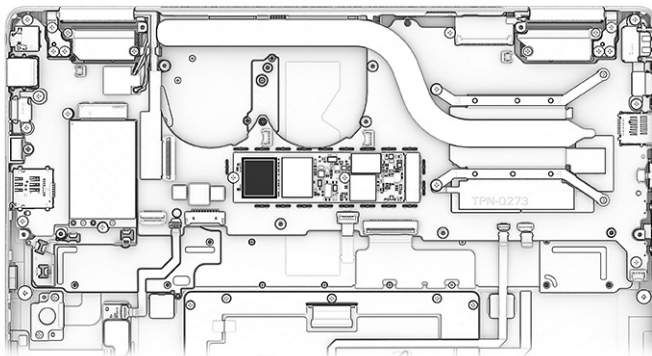
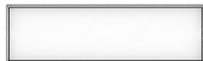
M.2 2280 drive



M.2 2230 drive



4. When installing a drive, be sure a thermal pad is installed on the drive.



To install the solid-state drive, reverse the removal procedures.



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

## Speakers

To remove the speakers, use this procedure and illustration.

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

Description	Spare part number
Top speakers (left and right)	N13436-001
Bottom speakers (left and right), models without WWAN	N13433-001
Bottom speakers (left and right), models with 5G WWAN	N13434-001
Bottom speakers (left and right), models with LTE WWAN	N13435-001

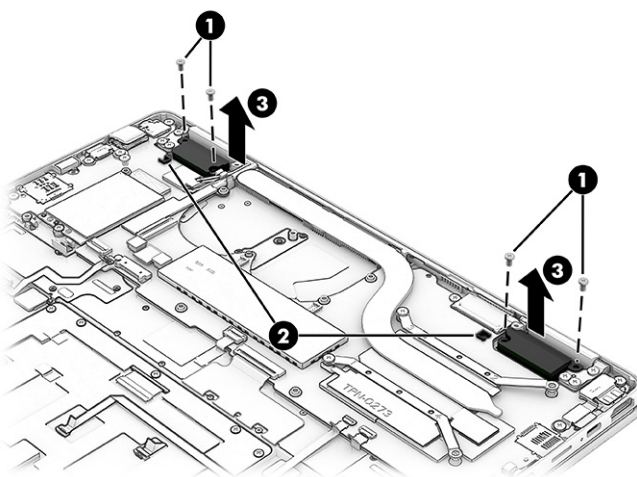
Before removing the speakers, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).
2. Remove the bottom cover (see [Bottom cover on page 26](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 27](#)).

Remove the speakers:

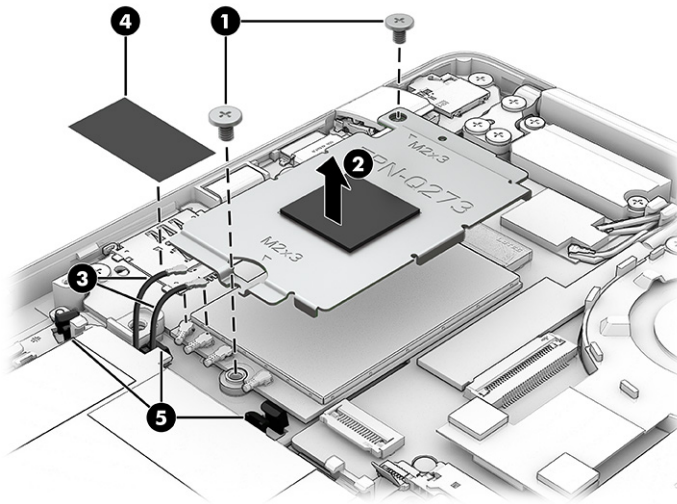
### Top speakers

1. Remove the two broadhead Phillips M2.0 × 2.0 screws (1) that secure each speaker to the computer.
2. Disconnect the speaker cables from the system board (2).
3. Remove the speakers from the computer (3).

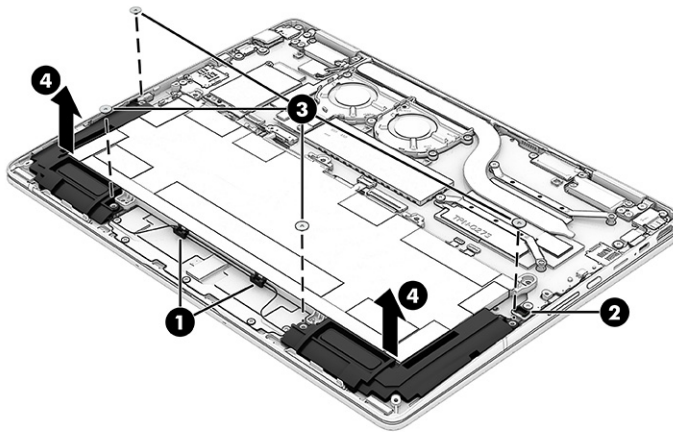


### Bottom speakers

1. (WWAN models) Remove the two Phillips M2.0 × 2.5 screws (1) from the WWAN bracket, and then remove the bracket (2). Carefully disconnect the antenna cables from the WWAN module (3). Remove the tape that secures the WWAN antenna cable to the battery (4), and then remove the cables from the clips along the top of the battery and above the right speaker (5).



2. Remove the speaker cables from the clips along the bottom of the battery (1).
3. Disconnect the speaker cable from the system board (2).
4. Remove the two Phillips M2.0 × 2.0 screws (3) from each speaker.
5. Remove the speakers from the computer (4).



To install the speakers, reverse this procedure.

## Wireless charging module

To remove the wireless charging module, use this procedure and illustration.

**Table 5-7 Wireless charging module description and part number**

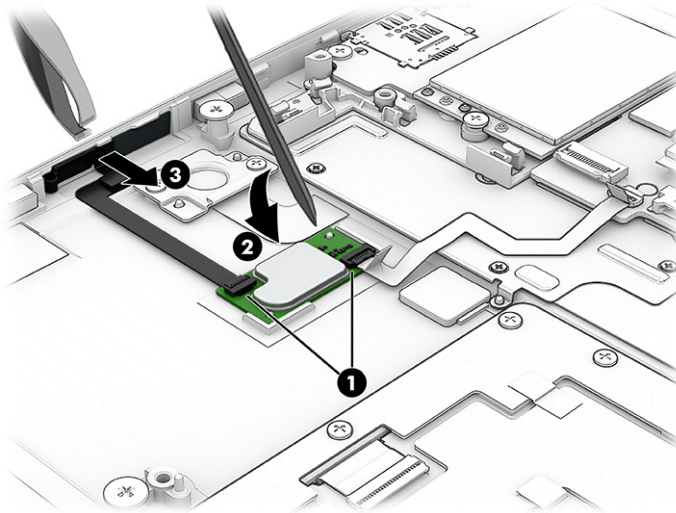
Description	Spare part number
Wireless charging module	N13452-001
Wireless charging module cable	N13425-001

Before removing the wireless charging module, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).
2. Remove the bottom cover (see [Bottom cover on page 26](#)).
3. Remove the battery (see [Battery on page 27](#)).
4. Remove the right speaker (see [Speakers on page 34](#)).

Remove the wireless charging module:

1. Disconnect the two cables from the ZIF connectors on the wireless charging module (1).
2. Use a tool to release the module from the computer (2). The module is secured with adhesive.
3. Use tweezers to pull the cable with the wireless charger antenna off the side of the computer (3).



To install the wireless charging module, reverse this procedure.

## Fingerprint reader

To remove the fingerprint reader, use this procedure and illustration.

**Table 5-8 Fingerprint reader description and part number**

Description	Spare part number
Fingerprint reader	N13453-001

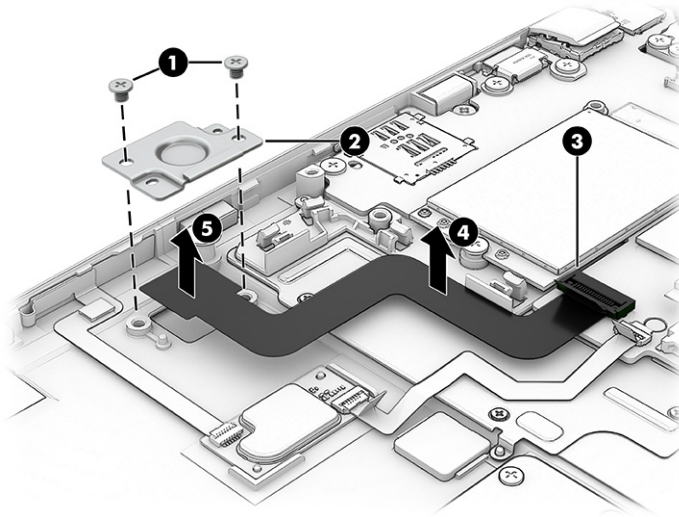
Before removing the fingerprint reader board, follow these steps:



1. Prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).
2. Remove the bottom cover (see [Bottom cover on page 26](#)).
3. Remove the battery (see [Battery on page 27](#)).
4. Remove the right speaker (see [Speakers on page 34](#)).

Remove the fingerprint reader:

1. Remove the two Phillips M2.0 × 2.0 screws (1) from the bracket, and then remove the bracket (2).
2. Disconnect the cable from the ZIF connector on the system board (3).
3. Release the cable from the computer (4). The cable is secured with adhesive.
4. Remove the fingerprint reader and cable from the computer (5).



To install the fingerprint reader, reverse this procedure.

## Fans

To remove the fans, use this procedure and illustration.

**Table 5-9 Fans description and part number**

Description	Spare part number
Fans (left and right)	N13432-001

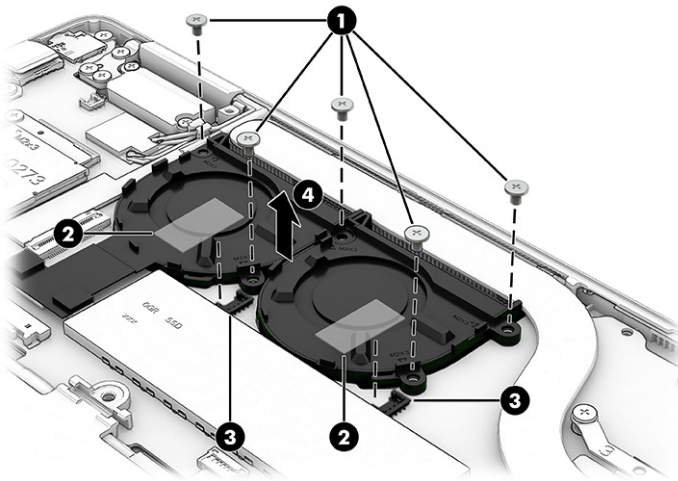
Before removing the fans, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).
2. Remove the bottom cover (see [Bottom cover on page 26](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 27](#)).

Remove the fans:

1. Remove the five Phillips M2.0 × 3.0 screws (1) that secure the fans to the computer.

2. Remove the protective Mylar (2), and then disconnect the fan cables from the system board (3).
3. Remove the fans from the computer (4).



To install the fans, reverse this procedure.

## Heat sink assembly

To remove the heat sink assembly, use this procedure and illustration.

**Table 5-10** Heat sink description and part number

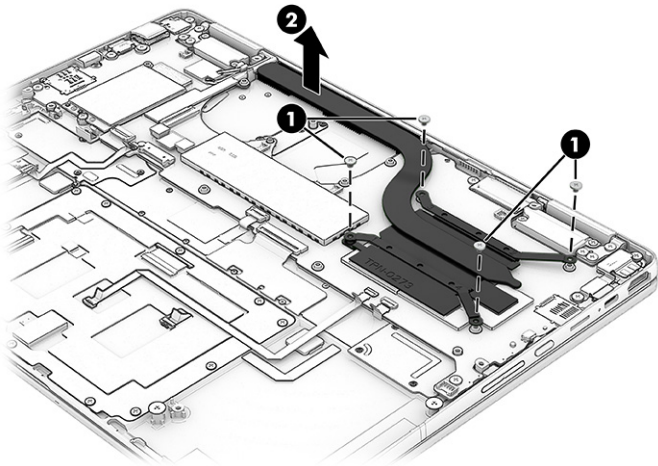
Description	Spare part number
Heat sink assembly	N13431-001

Before removing the heat sink assembly, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).
2. Remove the bottom cover (see [Bottom cover on page 26](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 27](#)).

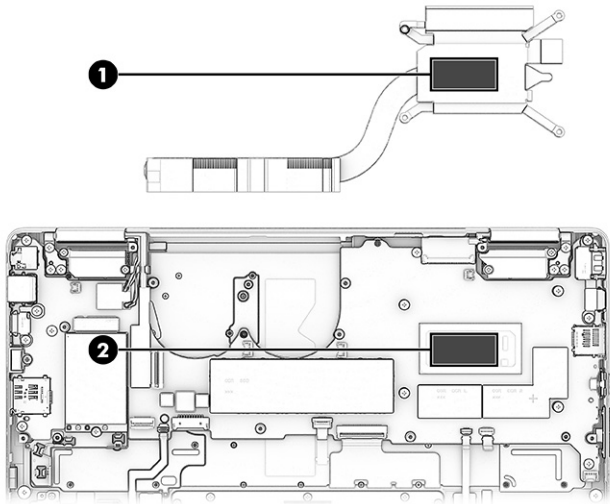
Remove the heat sink assembly:

1. Remove the four Phillips M2.0 × 3.5 screws (1) that secure the heat sink to the computer, and then remove the heat sink (2).



2. Thoroughly clean the thermal material from the surfaces of the heat sink and the system board components each time the heat sink is removed. Replacement thermal material is included with the heat sink and system board spare part kits. The following illustration shows the replacement thermal material locations.

Thermal material is used on the heat sink (1) and associated system board component (2).



To install the heat sink, reverse this procedure.

## System board

To remove the system board, use these procedures and illustrations.

**Table 5-11** System board descriptions and part numbers

Description	Spare part number
Intel Core i7-1265U processor and 32 GB of system memory	N13417-001



**Table 5-11 System board descriptions and part numbers (continued)**

Description	Spare part number
Intel Core i7-1265U processor and 16 GB of system memory	N13416-001
Intel Core i7-1265U processor and 8 GB of system memory (WWAN models)	N13418-001
Intel Core i7-1255U processor and 16 GB of system memory	N13415-001
Intel Core i5-1245U processor and 16 GB of system memory	N13412-001
Intel Core i5-1245U processor and 8 GB of system memory	N13413-001
Intel Core i5-1245U processor and 8 GB of system memory (WWAN models)	N13414-001
Intel Core i5-1235U processor and 8 GB of system memory	N13411-001
Intel Core i3-1215U processor and 8 GB of system memory	N13409-001
Intel Core i3-1215U processor and 8 GB of system memory (WWAN models)	N13410-001
System board repair kit	N19902-888
USB door	N19631-001

Before removing the system board, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).
2. Remove the bottom cover (see [Bottom cover on page 26](#)).
3. Remove the battery (see [Battery on page 27](#)).
4. Remove the WWAN module (see [WWAN module on page 30](#)).
5. Remove the fans (see [Fans on page 37](#)).
6. Remove the heat sink (see [Heat sink assembly on page 38](#)).

Remove the system board:

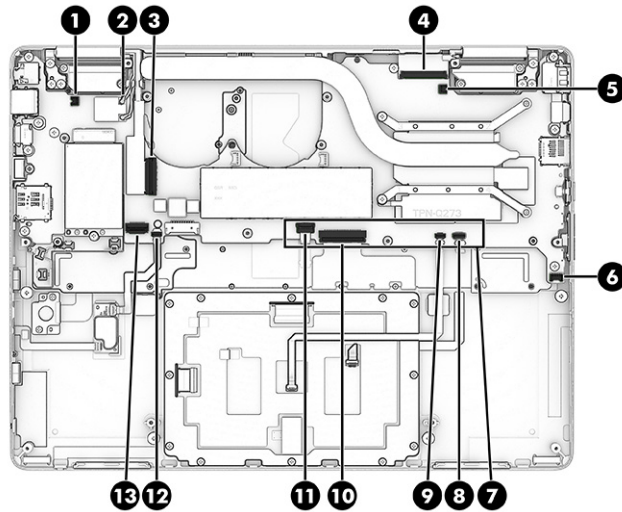
1. Disconnect the following cables from the system board:
  - Top speaker cable (1)
  - Wireless antenna cables (2) from the WLAN module (Mylar covers the connectors)
  - Camera cable (ZIF) (3)
  - Display cable (4)
  - Top left speaker cable (5)
  - Bottom left speaker cable (6)



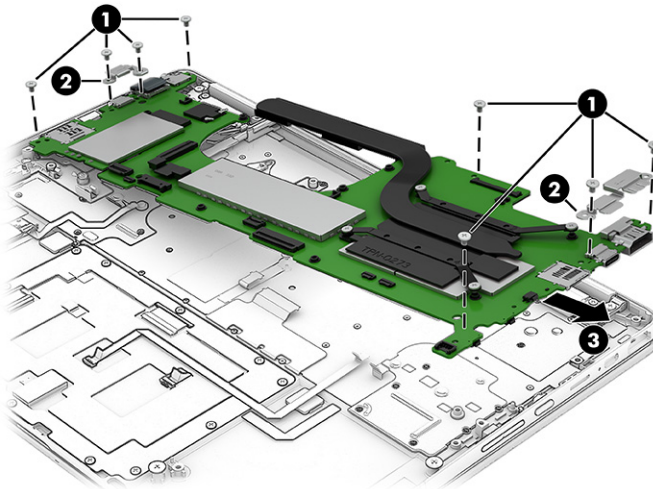
**NOTE:** Remove the protective tape that covers the four connectors shown by callout (7). Be sure to replace this tape after reconnecting these cables.

- Touchpad cable (ZIF) (8)
- Touchpad cable (ZIF) (9)

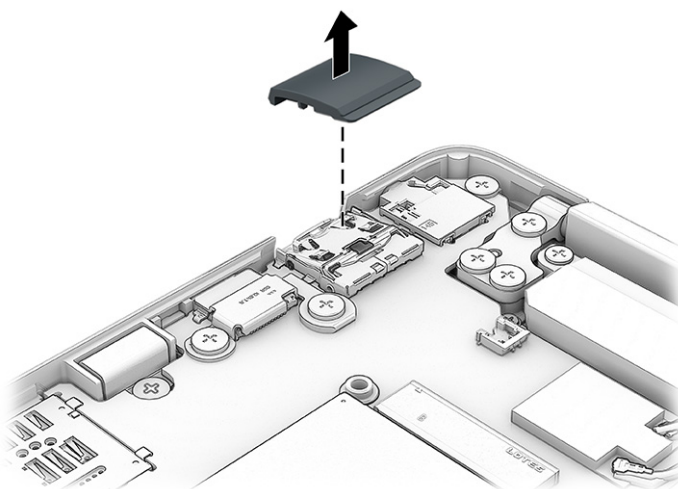
- Keyboard cable (ZIF) (10)
- Keyboard backlight cable (ZIF) (11)
- Wireless charging module cable (ZIF) (12)
- Fingerprint reader cable (ZIF) (13)



2. Remove the eight Phillips M2.0 × 3.5 screws (1) that secure the system board to the computer.
3. Remove the USB bracket from each side of the system board (2).
4. Lift the right edge of the system board, and then pull the board up and to the right to remove it from the computer (3).



5. If you need to remove the USB door, push the door away from system board to remove it.



To install the system board, reverse this procedure.

## Lock bracket

To remove the lock bracket, use this procedure and illustration.

**Table 5-12** Lock bracket description and part number

Description	Spare part number
Lock bracket	not available as a spare part

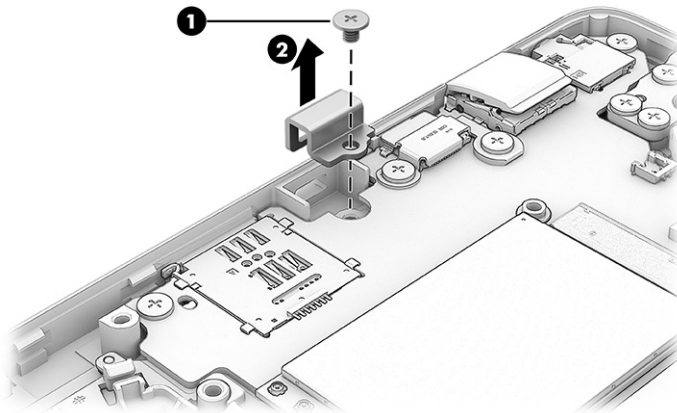
Before removing the lock bracket, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).
2. Remove the bottom cover (see [Bottom cover on page 26](#)).
3. Remove the battery (see [Battery on page 27](#)).
4. Remove the fans (see [Fans on page 37](#)).
5. Remove the system board (see [System board on page 39](#)).

Remove the lock bracket:

1. Remove the Phillips M2.0 × 3.5 screw **(1)** that secures the bracket to the computer.

2. Remove the lock bracket (2).



To install the lock bracket, reverse this procedure.

## Keyboard

To remove the keyboard, use this procedure and illustration. In this section, the first table provides the main spare part number for the top cover with keyboard. The second table provides the country codes.

**Table 5-13 Keyboard description and part number**

Description	Spare part number
Keyboard, nonprivacy	N18720-xxx
Keyboard, privacy	N18721-xxx
Keyboard bracket kit	N18723-001
Keyboard support kit	N18724-001

**Table 5-14 Spare part country codes**

For use in country or region	Spare part number	For use in country or region	Spare part number	For use in country or region	Spare part number
Belgium	-A41	Hungary	-211	Saudi Arabia	-171
Brazil	-201	Iceland	-DD1	Slovenia	-BA1
Bulgaria	-261	India	-D61	South Korea	-AD1
Chile	-161	Israel	-BB1	Spain	-071
Czech Republic/Slovakia	-FL1	Italy	-061	Switzerland	-BG1
Denmark	-081	Japan	-291	Taiwan	-AB1
Denmark, Finland, and Norway	-DH1	The Netherlands	-B31	Thailand	-281
French Canada	-DB1	Northern Africa	-FP1	Turkey	-141
Finland/Sweden	-B71	Norway	-091	Turkey-F	-541

**Table 5-14 Spare part country codes (continued)**

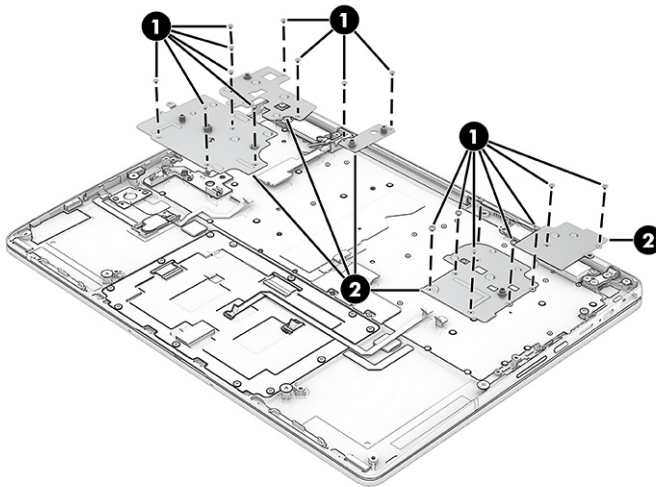
For use in country or region	Spare part number	For use in country or region	Spare part number	For use in country or region	Spare part number
France	-051	Portugal	-131	Ukraine	-BD1
Germany	-041	Romania	-271	United Kingdom	-031
Greece	-151	Russia	-251	United States	-001

Before removing the keyboard, follow these steps:

1. Prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).
2. Remove the bottom cover (see [Bottom cover on page 26](#)).
3. Remove the battery (see [Battery on page 27](#)).
4. Remove the fans (see [Fans on page 37](#)).
5. Remove the system board (see [System board on page 39](#)).

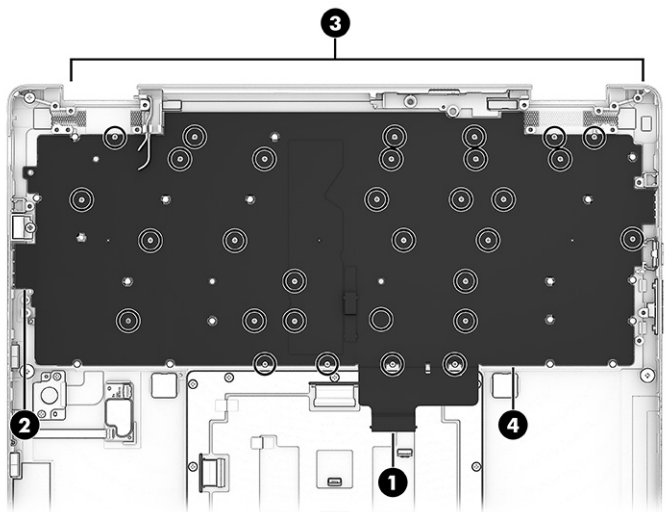
Remove the keyboard:

1. Remove the 17 Phillips M2.0 × 3.0 screws (1) from the five brackets that secure the keyboard.
2. Remove the brackets (2).



3. Peel the keyboard cable off the keyboard (1).
4. Peel the backlight cable Mylar off the keyboard (2).
5. Remove the 31 screws that secure the keyboard (3).

6. Remove the keyboard (4).



To install the keyboard, reverse this procedure.

Display assembly

To remove the display assembly, use these procedures and illustrations. Display assemblies are available only as entire hinge-ups.

Table 5-15 Display assembly descriptions and part numbers

Description	Spare part number
<b>Display panel for use in models with WWAN</b>	
QHD, 400 nits	N13419-001
WUXGA, antiglare, 400 nits	N13420-001
WUXGA, antiglare, 1000 nits, privacy	N13421-001
WUXGA, BrightView, 400 nits	N13422-001
<b>Display panel for use in models without WWAN</b>	
QHD, antiglare, 400 nits	N19301-001
WUXGA, antiglare, 400 nits	N19302-001
WUXGA, antiglare, privacy, 1000 nits	N19303-001
WUXGA, BrightView, 400 nits	N19304-001

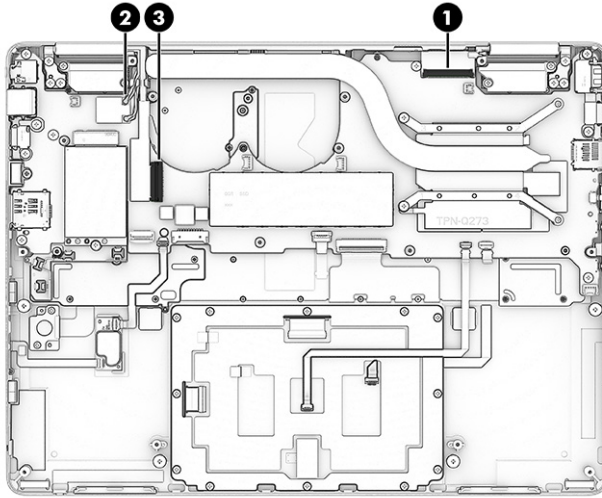
Full hinge-up displays are not available as spare parts. Spare parts for displays are available only at the subcomponent level.

Before removing the display panel, follow these steps:

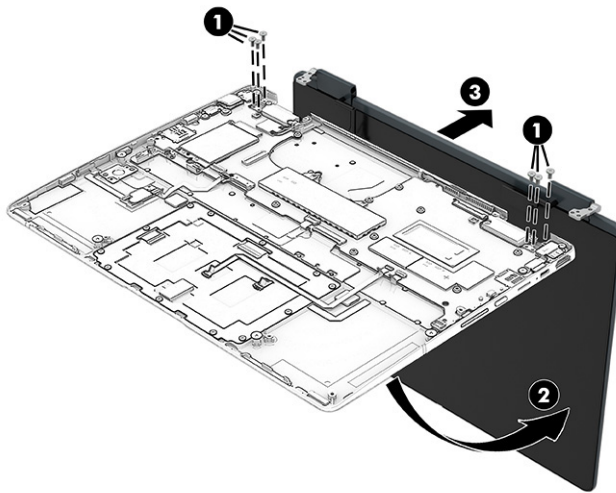
1. Prepare the computer for disassembly (see [Preparation for disassembly on page 26](#)).
2. Remove the bottom cover (see [Bottom cover on page 26](#)).
3. Disconnect the battery cable from the system board (see [Battery on page 27](#)).

Remove the display assembly:

1. Disconnect the display cable (1) from the ZIF connector on the system board.
2. Disconnect the wireless antenna cables (2) from the WLAN module.
3. Disconnect the camera cable (3) from the ZIF connector on the system board.



4. Remove the six Phillips M2.0 × 5.0 screws (1) that secure the display assembly to the computer.
5. Open the display to rotate the hinges (2).
6. Separate the display from the computer (3).



To install the display assembly, reverse this procedure.

## Top cover

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

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

Description	Spare part number
Top cover, models with WWAN	N13442-001
Top cover, models without WWAN	N13441-001
Top cover, models with WWAN, Japan	N19300-001
Top cover, models without WWAN, Japan	N19299-001



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## 6 Backing up, resetting, and recovering

This chapter provides information about the standard procedures of backing up your personal data, resetting your computer to original factory conditions, and recovering your operating system with the Chromebook Recovery Utility.

### Backing up

You can back up your data to an optional USB flash drive or SD memory card or through Google Drive™.

For detailed information about creating a backup, go to <http://www.support.google.com>.

### Resetting

A factory reset erases the information on your computer hard drive, including files in the Downloads folder. Before you reset, back up your files to an optional USB flash drive, to an SD memory card, or through Google Drive. The factory reset will not delete your files at these locations.

You might want to reset your computer in the following circumstances:

- You see the message "Reset this Chrome device."
- You are having problems with your user profile or settings.
- You restarted your computer, and it still doesn't work properly.
- You want to change the owner of your computer.

To reset your computer:

1. Under the **Settings** menu, select **Advanced**.
2. In the **Powerwash** section, select **Powerwash**.
3. Select **Restart**.
4. In the window that appears, select **Powerwash**, and then select **Continue**.
5. Follow the on-screen instructions to reset your computer, and sign in with your Google Account.




**NOTE:** The account you sign in with after you reset your computer is recognized as the owner account.


6. After you complete the reset, you can set up your computer and check to see whether the problem is fixed.

### Recovering

When your Chrome OS™ doesn't work properly, you can perform a recovery. A recovery reinstalls the operating system, software programs, and original factory settings. It deletes locally saved files and saved networks for all accounts. A system recovery does not affect Google Accounts and data synced to Google Drive.

---

 **IMPORTANT:** Recovery permanently erases everything on your computer hard drive, including your downloaded files. If possible, back up your files before you recover your computer.

 **NOTE:** For more information about performing a system recovery on your computer, go to <http://www.support.google.com>.

---

Before you begin the recovery process, you need the following prerequisites:

- A USB flash drive or SD memory card with a capacity of 4 GB or greater. All data is erased from this storage device when the recovery media is created, so back up all files from the device before you begin.
- A computer with internet access. You must also have administrative rights to the computer.
- Computer AC adapter. The computer must be plugged into AC power during recovery.
- The “Chrome OS is missing or damaged” screen displaying on your computer. If this message is not already displayed:
  - Turn on the computer, press and hold the **esc+f3** keys, and then press the power button. The computer restarts, and the screen shows the “Chrome OS is missing or damaged” screen.

## Installing the Chromebook Recovery Utility

The Chromebook™ Recovery Utility recovers the original operating system and software programs that were installed at the factory. You can install this utility from the Chrome Web Store on any computer.

To install the Chromebook Recovery Utility:

- Open the Chrome Web Store, search for `chrome recovery`, select **Chromebook Recovery Utility** from the Apps list, and follow the on-screen instructions.

## Creating recovery media

You can use recovery media to recover the original operating system and software programs that were installed at the factory.

To create recovery media:

1. Turn on a computer that has internet access.


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 **NOTE:** You must have administrative rights to the computer.

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2. Select the **Launcher** icon, and then select **All Apps**.
3. In the Apps window, select **Recovery**, and then select **Get started**.
4. Follow the on-screen instructions to create the recovery media.

---

 **NOTE:** All data and partitions on your recovery media will be deleted. Do not remove the USB flash drive or SD memory card until the process is complete.

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## Recovering the Chrome operating system

Use these instructions to recover the Chrome operating system on your computer using the recovery media that you created.

1. Disconnect any external devices connected to your computer, plug in the power cord, and then turn on the computer.
2. To enter recovery mode, press and hold **esc+f3**, and then press the power button. When the “Chrome OS is missing or damaged” screen appears, insert the recovery media into your computer. The recovery process begins immediately.
3. Wait while Chrome verifies the integrity of the recovery media.



**NOTE:** If you need to cancel the recovery during the verification process, press and hold the power button until the computer turns off. Do not disrupt the system recovery process after the verification step is complete.



**NOTE:** If an error message is displayed, you might need to run the Chrome Recovery Utility again or use a different USB flash drive or SD memory card.

4. When the “System Recovery is complete” message appears, remove the recovery media.  
The computer restarts with Chrome OS reinstalled.

## Setting up your computer after a reset or recovery

After a reset or recovery is complete, perform the initial setup process.

For details about setting up the computer, go to <http://www.support.google.com>.

## Erasing and reformatting the recovery media

When you create recovery media, the USB flash drive or SD memory card is formatted as a recovery tool. After recovery, you must erase the recovery media to reuse your storage device. Follow these steps to use the Chromebook Recovery Utility to erase the recovery media.

1. Select the **Launcher** icon, and then select **All Apps**.
2. In the apps window, select **Recovery**.
3. Select the **Settings** icon, and then select **Erase recovery media**.
4. Select the USB flash drive or SD memory card that you inserted, select **Continue**, and then select **Erase now**.
5. After the recovery media is erased, select **Done** to close the Chromebook Recovery Utility, and then remove the USB flash drive or SD memory card.

The media is ready to be formatted using a formatting tool provided by your operating system.

# 7 Specifications

This chapter provides specifications for your computer system.

## Computer specifications

This section provides specifications for your computer. When you travel with your computer, the computer dimensions and weights, as well as input power ratings and operating specifications, provide helpful information.

**Table 7-1 Computer specifications**

	Metric	U.S.
<b>Dimensions</b>		
Width	249.5 mm	9.82 in
Depth	221.9 mm	8.73 in
Height	16.6 mm	0.65 in
<b>Weight</b>	1270.1 g	2.8 lb
<b>Input power</b>		
Operating voltage and current	5 V dc @ 3 A – 65 W	
	9 V dc @ 3 A – 65 W	
	12 V dc @ 5 A – 65 W	
	15 V dc @ 4.33 A – 65 W	
	20 V dc @ 3.25 A – 65 W	
<b>Temperature</b>		
Operating	5°C to 35°C	41°F to 95°F
Nonoperating	–20°C to 60°C	–4°F to 140°F
<b>Relative humidity</b> (noncondensing)		
Operating	10% to 90%	
Nonoperating	5% to 95%	
<b>Maximum altitude</b> (unpressurized)		
Operating	–15 m to 3,048 m	–50 ft to 10,000 ft
Nonoperating	–15 m to 12,192 m	–50 ft to 40,000 ft
<b>NOTE:</b> Applicable product safety standards specify thermal limits for plastic surfaces. The device operates well within this range of temperatures.		

## Display specifications

This section provides specifications for your display.

**Table 7-2 Display specifications**

	<b>Metric</b>	<b>U.S.</b>
Active diagonal size	<b>34.3 cm</b>	13.5 in
Resolution	1920 × 1280 (WUXGA+) 2256 × 1504 (2K)	
Surface treatment	BrightView Antiglare	
Brightness	1000 nits (privacy) 400 nits	
Viewing angle	UWVA	
Backlight	WLED	
Display panel interface	eDP	

## Solid-state drive specifications

This section provides specifications for your solid-state drives.

**Table 7-3 Solid-state drive specifications**

	256 GB*	512 GB*	1 TB*
Dimensions			
Height	1.0 mm	1.0 mm	1.0 mm
Length	50.8 mm	50.8 mm	50.8 mm
Width	28.9 mm	28.9 mm	28.9 mm
Weight	< 10 g	< 10 g	< 10 g
Interface type			
Ready time, maximum (to not busy)	1.0 ms	< 1.0 ms	1.0 ms
Access times, logical	0.1 ms	0.1 ms	0.1 ms
Transfer rate			
Sequential read	up to 2150 MBps	up to 2150 MBps	up to 2150 MBps
Random read	Up to 300,000 IOPs	Up to 300,000 IOPs	Up to 300,000 IOPs
Sequential write	up to 1550 MBps	up to 1550 MBps	up to 1550 MBps
Random write	Up to 100,000 IOPs	Up to 100,000 IOPs	Up to 100,000 IOPs
Total logical sectors	468,883,296	1,000,215,216	1,500,336,388
Operating temperature	0°C to 70°C (32°F to 158°F)		
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less. Actual drive specifications may differ slightly.			
NOTE: Certain restrictions and exclusions apply. Contact support for details.			

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## 8 Statement of memory volatility

For general information regarding nonvolatile memory in HP business computers, and to restore nonvolatile memory that can contain personal data after the system has been turned off and the hard drive has been removed, use these instructions.

HP business computer products that use Intel®-based or AMD®-based system boards contain volatile DDR memory. The amount of nonvolatile memory present in the system depends upon the system configuration. Intel-based and AMD-based system boards contain nonvolatile memory subcomponents as originally shipped from HP, with the following assumptions:

- No subsequent modifications were made to the system.
- No applications, features, or functionality were added to or installed on the system.

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



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

---

### Current BIOS steps

Use these instructions to restore nonvolatile memory.

1. Follow these steps to restore the nonvolatile memory that can contain personal data. Restoring or reprogramming nonvolatile memory that does not store personal data is neither necessary nor recommended.
    - a. Turn on or restart the computer, and then quickly press **esc**.
- 
- b. Select **Main**, select **Apply Factory Defaults and Exit**, and then select **Yes** to load defaults. The computer restarts.
  - c. During the restart, press **esc** while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.
- 
- d. Select the **Security** menu, select **Restore Security Settings to Factory Defaults**, and then select **Yes** to restore security level defaults. The computer reboots.
  - e. During the reboot, press **esc** while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.



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

---

- f. If an asset or ownership tag is set, select the **Security** menu and scroll down to the **Utilities** menu. Select **System IDs**, and then select **Asset Tracking Number**. Clear the tag, and then make the selection to return to the prior menu.
- g. If a DriveLock password is set, select the **Security** menu, and scroll down to **Hard Drive Utilities** under the **Utilities** menu. Select **Hard Drive Utilities**, select **DriveLock**, and then clear the check box for **DriveLock password on restart**. Select **OK** to proceed.
- h. Select the **Main** menu, and then select **Reset BIOS Security to factory default**. Select **Yes** at the warning message. The computer reboots.
- i. During the reboot, press **esc** while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.




---

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

---

- j. Select the **Main** menu, select **Apply Factory Defaults and Exit**, select **Yes** to save changes and exit, and then select **Shutdown**.
  - k. Reboot the system. If the system has a Trusted Platform Module (TPM), fingerprint reader, or both, one or two prompts will appear—one to clear the TPM and the other to Reset Fingerprint Sensor. Press or tap **f1** to accept or **f2** to reject.
  - l. Remove all power and system batteries for at least 24 hours.
2. Complete one of the following:
- Remove and retain the storage drive.  
– or –
  - Clear the drive contents by using a third-party utility designed to erase data from an SSD.  
– or –
  - Clear the contents of the drive by using the following BIOS Setup Secure Erase command option steps:





---

**NOTE:** If you clear data using Secure Erase, you cannot recover it.

---

- a. Turn on or restart the computer, and then quickly press **esc**.
- b. Select the **Security** menu and scroll down to the **esc** menu.
- c. Select **Hard Drive Utilities**.
- d. Under **Utilities**, select **Secure Erase**, select the hard drive storing the data you want to clear, and then follow the on-screen instructions to continue.  
– or –  
Clear the contents of the drive using the following Disk Sanitizer commands steps:
  - i. Turn on or restart the computer, and then quickly press **esc**.
  - ii. Select the **Security** menu and scroll down to the **Utilities** menu.
  - iii. Select **Hard Drive Utilities**.

- iv. Under **Utilities**, select **Disk Sanitizer**, select the hard drive with the data that you want to clear, and then follow the on-screen instructions to continue.

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

## Nonvolatile memory usage

Use this table to troubleshoot nonvolatile memory usage.

**Table 8-1** Troubleshooting steps for nonvolatile memory usage

Nonvolatile memory type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data entered into this memory?	How is this memory write-protected?
HP Sure Start flash (select models only)	8 MB	No	Yes	Provides protected backup of critical System BIOS code, EC firmware, and critical computer configuration data for select platforms that support HP Sure Start.  For more information, see <a href="#">Using HP Sure Start (select models only)</a> HP Sure Start on page 59.	Data cannot be written to this device via the host processor. The content is managed solely by the HP Sure Start Embedded Controller.	This memory is protected by the HP Sure Start Embedded Controller.
Real Time Clock (RTC) battery backed-up CMOS configuration memory	256 bytes	No	Yes	Stores system date and time and noncritical data.	RTC battery backed-up CMOS is programmed using Computer Setup (BIOS), or by changing the Windows date & time.	This memory is not write-protected.
Controller (NIC) EEPROM	64 KB (not customer accessible)	No	Yes	Stores NIC configuration and NIC firmware.	NIC EEPROM is programmed using a utility from the NIC vendor that can be run from DOS.	A utility must be used to write data to this memory and is available from the NIC vendor. Writing data to this ROM in an inappropriate manner will render the NIC nonfunctional.



**Table 8-1 Troubleshooting steps for nonvolatile memory usage (continued)**

Nonvolatile memory type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data entered into this memory?	How is this memory write-protected?
DIMM Serial Presence Detect (SPD) configuration data	256 bytes per memory module, 128 bytes programmable (not customer accessible)	No	Yes	Stores memory module information.	DIMM SPD is programmed by the memory vendor.	Data cannot be written to this memory when the module is installed in a computer. The specific write-protection method varies by memory vendor.
System BIOS	9 MB	Yes	Yes	Stores system BIOS code and computer configuration data.	System BIOS code is programmed at the factory. Code is updated when the system BIOS is updated. Configuration data and settings are entered using the Computer Setup (BIOS) or a custom utility.	<p><b>NOTE:</b> Writing data to this ROM in an inappropriate manner can render the computer nonfunctional.</p> <p>A utility must be used for writing data to this memory and is available on the HP website; go to <a href="http://www.hp.com/support">http://www.hp.com/support</a>. Select <b>Find your product</b>, and then follow the on-screen instructions.</p>
Intel Management Engine Firmware (present only in select Elite or Z models. For more information, go to <a href="http://www.hp.com/support">http://www.hp.com/support</a> . Select <b>Identify your product for manuals and specific product information</b> , and then follow the on-screen instructions.)	1.5 MB or 7 MB	Yes	Yes	Stores Management Engine Code, Settings, Provisioning Data and iAMT third-party data store.	Management Engine Code is programmed at the factory. Code is updated via Intel secure firmware update utility. Unique Provisioning Data can be entered at the factory or by an administrator using the Management Engine (MEBx) setup utility. The third-party data store contents can be populated by a remote management console or local applications that have been registered by an administrator to have access to the space.	The Intel chipset is configured to enforce hardware protection to block all direct read-write access to this area. An Intel utility must be used for updating the firmware. Only firmware updates digitally signed by Intel can be applied using this utility.
Bluetooth flash (select products only)	2 megabits	No	Yes	Stores Bluetooth configuration and firmware.	Bluetooth flash is programmed at the factory. Tools for writing data to this memory are not publicly available but can be obtained from the silicon vendor.	A utility must be used for writing data to this memory and is made available through newer versions of the driver whenever the flash requires an upgrade.

**Table 8-1** Troubleshooting steps for nonvolatile memory usage (continued)

Nonvolatile memory type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data entered into this memory?	How is this memory write-protected?
802.11 WLAN EEPROM	4 kilobits to 8 kilobits	No	Yes	Stores configuration and calibration data.	802.11 WLAN EEPROM is programmed at the factory. Tools for writing data to this memory are not made public.	A utility must be used for writing data to this memory and is typically not made available to the public unless a firmware upgrade is necessary to address a unique issue.
Camera (select products only)	64 kilobits	No	Yes	Stores camera configuration and firmware.	Camera memory is programmed using a utility from the device manufacturer that can be run from Windows.	A utility must be used for writing data to this memory and is typically not made available to the public unless a firmware upgrade is necessary to address a unique issue.
Fingerprint reader (select products only)	512 KB flash	Yes	Yes	Stores fingerprint templates.	Fingerprint reader memory is programmed by user enrollment in HP ProtectTools Security Manager.	Only a digitally signed application can make the call to write to the flash.

## Questions and answers

Use this section to answer your questions about nonvolatile memory.

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



**IMPORTANT:** The restore defaults feature does not securely erase any information on your hard drive. See question and answer 6 for steps to securely erase information.

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

- Turn on or restart the computer, and then quickly press **esc**.
- Select **Main**, and then select **Apply Factory Defaults and Exit**.
- Follow the on-screen instructions.
- Select **Main**, select **Save Changes and Exit**, and then follow the on-screen instructions.

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

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

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

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

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

**3. Where is the UEFI BIOS located?**

The UEFI BIOS is located on a flash memory chip. You must use a utility to write to the chip.

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


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

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

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

**6. How can the BIOS security be reset to factory defaults and erase the data?**

---

 **IMPORTANT:** Resetting results in the loss of information.

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

---

- a. Turn on or restart the computer, and then quickly press **esc**.
- b. Select **Main**, and then select **Reset Security to Factory Defaults**.
- c. Follow the on-screen instructions.
- d. Select **Main**, select **Save Changes and Exit**, and then follow the on-screen instructions.

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

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

- a. Turn on or restart the computer, and then quickly press **esc**.

- b. Select the **Security** menu, select **Secure Boot Configuration**, and then follow the on-screen instructions.
- c. At the **Secure Boot Configuration** window, select **Secure Boot**, select **Clear Secure Boot Keys**, and then follow the on-screen instructions to continue.

## Using HP Sure Start (select products only)

Select computer models are configured with HP Sure Start, a technology that continuously monitors your computer's BIOS for attacks or corruption.

If the BIOS becomes corrupted or is attacked, HP Sure Start restores the BIOS to its previously safe state, without user intervention. Those select computer models ship with HP Sure Start configured and enabled. HP Sure Start is configured and already enabled so that most users can use the HP Sure Start default configuration. Advanced users can customize the default configuration.

To access the latest documentation on HP Sure Start, go to <http://www.hp.com/support>.

## 9 Power cord set requirements

This chapter provides power cord requirements for countries and regions.

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

The three-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

These power cord 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 V ac 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

To determine power cord requirements for specific countries and regions, use this table.

**Table 9-1** Power cord requirements for specific countries and regions

Country/region	Accredited agency	Applicable note number
Argentina	IRAM	1
Australia	SAA	1
Austria	OVE	1
Belgium	CEBEC	1
Brazil	ABNT	1
Canada	CSA	2
Chile	IMQ	1
Denmark	DEMKO	1
Finland	FIMKO	1
France	UTE	1
Germany	VDE	1

**Table 9-1 Power cord requirements for specific countries and regions (continued)**

Country/region	Accredited agency	Applicable note number
India	BIS	1
Israel	SII	1
Italy	IMQ	1
Japan	JIS	3
Netherlands	KEMA	1
New Zealand	SANZ	1
Norway	NEMKO	1
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
United Kingdom	ASTA	1
United States	UL	2

1. The flexible cord must be Type H05VV-F, three-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, three-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V ac) or NEMA 6-15P (15 A, 250 V ac) configuration. CSA or C-UL mark. UL file number must be on each element.
3. The appliance coupler, flexible cord, and wall plug must bear a T mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCTF, three-conductor, 0.75 mm<sup>2</sup> or 1.25 mm<sup>2</sup> conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V ac) configuration.
4. The flexible cord must be Type RVV, three-conductor, 0.75 mm<sup>2</sup> conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the CCC certification mark.
5. The flexible cord must be Type H05VV-F three-conductor, 0.75 mm<sup>2</sup> conductor size. KTL logo and individual approval number must be on each element. Approval number and logo must be printed on a flag label.
6. The flexible cord must be Type HVCTF three-conductor, 1.25 mm<sup>2</sup> conductor size. Power cord set fittings (appliance coupler, cable, and wall plug) must bear the BSMI certification mark.
7. For 127 V ac, the flexible cord must be Type SVT or SJT 3-conductor, 18 AWG, with plug NEMA 5-15P (15 A, 125 V ac), with UL and CSA or C-UL marks. For 240 V ac, the flexible cord must be Type H05VV-F three-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.

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## 10 Recycling

When a nonrechargeable 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 website at <http://www.hp.com/recycle>.

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# Index

## A

AC adapter light 3  
AC adapter, spare part number 15  
action keys  
    identifying 8  
audio-in (microphone) jack,  
    identifying 4  
audio-out (headphone) jack,  
    identifying 4  
audio, product description 1

## B

backing up 48  
battery  
    illustrated 14  
    light 3  
    spare part number 14  
Bluetooth label 10  
bottom cover  
    illustrated 14  
    removal 26  
    spare part number 26  
    spare part numbers 14  
button  
    camera privacy 5

## C

camera 6  
    identifying 6  
camera light, identifying 6  
camera privacy cover, identifying 6  
caring for your computer 21  
cautions  
    electrostatic discharge 17, 18  
Chromebook Recovery Utility,  
    installing 49  
cleaning your computer 21  
    caring for wood veneer 23  
    disinfecting 22  
    HP Easy Clean 21  
    removing dirt and debris 21  
components  
    bottom 9  
    display 5  
    keyboard area 6  
    left side 4  
    right side 3

computer major components 12  
computer specifications 51  
covers  
    camera privacy 6

## D

digital pen  
    product description 2  
display  
    specifications 51  
display panel  
    product description 1

## E

electrostatic discharge (ESD) 17,  
    18  
    preventing damage 17-19  
esc key, identifying 8

## F

fans  
    removal 37  
    spare part number 37  
fingerprint reader  
    removal 36  
    spare part numbers 36  
fingerprint reader module  
    illustrated 14  
    spare part number 14  
fingerprint reader, identifying 7

## G

graphics controller, product  
    description 1  
grounding methods 17-19  
guidelines  
    packaging 17, 23  
    transporting 17, 23  
    workstation 17

## H

hard drive  
    product description 1  
    specifications 51  
HDMI port, identifying 4  
headphone (audio-out) jack 4

heat sink assembly  
    illustrated 14  
    removal 38  
    spare part number 38  
    spare part numbers 14  
HP Sure Start 53, 59

## I

illustrated parts catalog 12  
internal microphones, identifying 6

## J

jacks  
    audio-in (microphone) 4  
    audio-out (headphone) 4

## K

keyboard  
    illustrated 13  
    product description 2  
    removal 43  
    spare part number 43  
    spare part numbers 13  
keys  
    esc 8

## L

labels  
    Bluetooth 10  
    regulatory 10  
    serial number 10  
    service 10  
    wireless certification 10  
    WLAN 10  
lights  
    AC adapter and battery 3  
    camera 6  
lock bracket  
    removal 42  
    spare part number 42  
low blue light mode 6

## M

magnetic pen attachment area,  
    identifying 3



- memory
  - nonvolatile 53
  - volatile 53
- memory module
  - product description 1
- microphone
  - product description 1
- microphone (audio-in) jack,
  - identifying 4
- model name 1

## N

- nonvolatile memory 53

## O

- operating system, product
  - description 2

## P

- packaging guidelines 17, 23
- pointing device, product
  - description 2
- ports
  - HDMI 4
  - product description 2
  - USB SuperSpeed 3
  - USB SuperSpeed port,
    - identifying 3
  - USB Type-C power connector 3
- power button, identifying 5
- power cord
  - requirements for all
    - countries 60
  - requirements for specific
    - countries and regions 60
  - set requirements 60
- power requirements, product
  - description 2
- primary storage
  - product description 1
- processor
  - product description 1
- processor, product description 1
- product description
  - audio 1
  - digital pen 2
  - display panel 1
  - graphics controller 1
  - hard drive 1
  - keyboard 2
  - memory module 1
  - microphone 1
  - operating system 2

- pointing device 2
- ports 2
- power requirements 2
- primary storage 1
- product name 1
- security 2
- serviceability 2
- solid-state drive 1
- video 1
- wireless 2
- product name 1
- product name and number,
  - computer 10

## R

- recovery media
  - creating 49
  - erase 50
- recovery, performing 48
- regulatory information
  - regulatory label 10
  - wireless certification labels 10
- removal and replacement
  - procedures 26
  - solid-state drive 32
- removing personal data from
  - volatile system memory 53
- resetting 48

## S

- search key, identifying 8
- Security cable slot 3
- security, product description 2
- serial number, computer 10
- service labels, locating 10
- serviceability, product
  - description 2
- SIM card tray, identifying 3
- slots
  - security cable 3
- solid-state drive
  - illustrated 13
  - product description 1
  - removal and replacement 32
  - spare part numbers 13
  - specifications 52
- speaker
  - removal 34
  - spare part number 34
- speakers, identifying 7
- specifications
  - computer 51
  - display 51
  - hard drive 51

- solid-state drive 52
- static electricity 17, 18
- support information 23
- system board
  - illustrated 14
  - removal 39
  - spare part numbers 14, 39
- system memory, removing personal
  - data from volatile 53
- system recovery
  - Chrome operating system 49
  - Chromebook Recovery
    - Utility 49
  - recovery media 49

## T

- top cover
  - spare part numbers 46
- top speakers
  - illustrated 13
  - spare part number 13
- touchpad
  - illustrated 13
  - removal 29
  - spare part numbers 13, 29
- touchpad zone, identifying 6
- transporting guidelines 17, 23
- traveling with the computer 10

## U

- USB Type-C power connector and
  - Thunderbolt port, identifying 3

## V

- vent, identifying 10
- video, product description 1
- Volume button, identifying 5

## W

- wireless certification label 10
- wireless charging module
  - illustrated 14
  - removal 35
  - spare part number 14, 35
- wireless, product description 2
- WLAN antennas, identifying 5
- WLAN device 10
- WLAN label 10
- workstation guidelines 17
- WWAN antennas
  - spare part number 14
- WWAN module
  - removal 30

