



Maintenance and Service Guide

HP Pavilion 14 Laptop PC
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Product notice

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

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

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

Table of contents

1 Product description	1
2 Exterior components	9
Right side	10
Left side	12
Display	13
Keyboard area	15
TouchPad	15
Lights	16
Button, speakers, and vent	17
Special keys	18
Action keys	19
Bottom	20
Labels	21
3 Illustrated parts catalog	23
Computer components	23
Display assembly components	42
Miscellaneous parts	44
4 Removal and replacement procedures preliminary requirements	47
Tools required	47
Service considerations	47
Plastic parts	47
Cables and connectors	48
Drive handling	48
Grounding guidelines	48
Electrostatic discharge damage	48
Packaging and transporting guidelines	49
Workstation guidelines	49
5 Removal and replacement procedures for Authorized Service Provider parts	51
Component replacement procedures	51
Bottom cover	51
Battery	53
Display assembly	54

Hard drive	63
WLAN module	66
Solid-state drive	68
Optane memory module (select products only)	69
Memory module	71
Card reader board	73
TouchPad	74
Lock bracket	76
USB/audio board	77
Fingerprint reader	78
Fan	79
Heat sink	81
System board	83
Speakers	89
Power connector cable	90
Keyboard/top cover	92

6 Using Setup Utility (BIOS) 95

Starting Setup Utility (BIOS)	95
Updating Setup Utility (BIOS)	95
Determining the BIOS version	95
Downloading a BIOS update	96

7 Backing up, restoring, and recovering 97

Using Windows tools for backing up, restoring, and recovering your computer	97
Creating backups	97
Restoring and recovering	97
Creating HP Recovery media (select products only)	98
Using HP Recovery Manager to create recovery media	98
Before you begin	98
Creating the recovery media	99
Using the HP Cloud Recovery Download Tool to create recovery media	99
Restoring and recovery	99
Restoring, resetting, and refreshing using Windows tools	99
Restoring using HP Recovery Manager and the HP Recovery partition	99
Recovering using HP Recovery Manager	100
Recovering using the HP Recovery partition (select products only)	100
Recovering using HP Recovery media	101
Changing the computer boot order	101
Removing the HP Recovery partition (select products only)	101

8 Using HP PC Hardware Diagnostics	103
Using HP PC Hardware Diagnostics Windows (select products only)	103
Downloading HP PC Hardware Diagnostics Windows	103
Downloading the latest HP PC Hardware Diagnostics Windows version	103
Downloading HP Hardware Diagnostics Windows by product name or number (select products only)	104
Installing HP PC Hardware Diagnostics Windows	104
Using HP PC Hardware Diagnostics UEFI	104
Starting HP PC Hardware Diagnostics UEFI	104
Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive	105
Downloading the latest HP PC Hardware Diagnostics UEFI version	105
Downloading HP PC Hardware Diagnostics UEFI by product name or number (select products only)	105
Using Remote HP PC Hardware Diagnostics UEFI settings (select products only)	105
Downloading Remote HP PC Hardware Diagnostics UEFI	106
Downloading the latest Remote HP PC Hardware Diagnostics UEFI version	106
Downloading Remote HP PC Hardware Diagnostics UEFI by product name or number	106
Customizing Remote HP PC Hardware Diagnostics UEFI settings	106
 9 Specifications	 107
Computer specifications	107
35.6-cm (14.0-in) display specifications	108
Hard drive specifications	108
M.2 solid-state drive specifications	110
 10 Power cord set requirements	 111
Requirements for all countries	111
Requirements for specific countries and regions	112
 11 Recycling	 115
 Index	 117

1 Product description

Table 1-1 Product components and descriptions

Category	Description	Computer models 14-ce2000 through 14-ce2999	Computer models 14-ce1000 through 14-ce1999	Computer models 14-ce0000 through 14-ce0999
Product Name	<ul style="list-style-type: none"> HP Pavilion 14 Laptop PC (model numbers 14-ce2000 through 14-ce2999) 	√		
	<ul style="list-style-type: none"> HP Pavilion 14 Laptop PC (model numbers 14-ce1000 through 14-ce1999) 		√	
	<ul style="list-style-type: none"> HP Pavilion 14 Laptop PC (model numbers 14-ce0000 through 14-ce0999) 			√
Processors	<ul style="list-style-type: none"> Intel™ Core® i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W) 	√	√	
	<ul style="list-style-type: none"> Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W) 		√	√
	<ul style="list-style-type: none"> Intel Core i7-7500U 2.70-GHz (SC turbo up to 3.50-GHz) dual core processor (4.0-MB L3 cache, 15 W) 		√	√
	<ul style="list-style-type: none"> Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W) 	√	√	
	<ul style="list-style-type: none"> Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W) 		√	√
	<ul style="list-style-type: none"> Intel Core i3-8145U 2.10-GHz (SC turbo up to 3.90-GHz) dual core processor (4.0-MB L3 cache, 15 W) 	√	√	
	<ul style="list-style-type: none"> Intel Core i3-8130U 2.20-GHz (SC turbo up to 3.40-GHz) dual core processor (4.0-MB L3 cache, 15 W) 		√	√
	<ul style="list-style-type: none"> Intel Pentium® 4415U 2.3-GHz dual core processor (2.0-MB L3 cache, 15 W) 	√	√	√
	Chipset	Intel integrated with soldered-on-circuit (SoC)	√	√
Graphics	Hybrid graphics:			
	<ul style="list-style-type: none"> NVIDIA GeForce MX250 with up to 4096-MB of discrete video memory 	√		
	<ul style="list-style-type: none"> NVIDIA GeForce MX250 with up to 2048-MB of discrete video memory 	√		
	<ul style="list-style-type: none"> NVIDIA GeForce MX150 with up to 4096-MB of discrete video memory 			√

Table 1-1 Product components and descriptions (continued)

Category	Description	Computer models 14-ce2000 through 14-ce2999	Computer models 14-ce1000 through 14-ce1999	Computer models 14-ce0000 through 14-ce0999	
Graphics <i>(continued)</i>	<ul style="list-style-type: none"> NVIDIA GeForce MX150 with up to 2048-MB of discrete video memory 		√	√	
	<ul style="list-style-type: none"> NVIDIA GeForce MX130 with up to 4096-MB of discrete video memory 			√	
	<ul style="list-style-type: none"> NVIDIA GeForce MX130 with up to 2048-MB of discrete video memory 	√	√		
	Internal universal memory architecture (UMA) graphics:				
	<ul style="list-style-type: none"> Intel UHD Graphics 620 	√	√	√	
	<ul style="list-style-type: none"> Intel HD Graphics 620 			√	
	<ul style="list-style-type: none"> Intel HD Graphics 610 			√	
	Support for HD decode, DX12, and high-definition multimedia interface (HDMI)	√	√	√	
	Supports Optimus	√	√	√	
	Supports FPS (GPU Performance Scaling)	√	√	√	
Panel	<ul style="list-style-type: none"> 14.0-in, full high-definition (FHD), AntiGlare, UWVA (1920×1080), white light-emitting (WLED), eDP, slim-flat (3.0 mm), 400 nits, 16:9 ultra wide aspect ratio, with narrow bezel 	√			
	<ul style="list-style-type: none"> 14.0-in, FHD, AntiGlare, UWVA (1920×1080), WLED, eDP, slim-flat (3.0 mm), 250 nits, 16:9 ultra wide aspect ratio, with narrow bezel 	√			
	<ul style="list-style-type: none"> 14.0-in, FHD, BrightView, UWVA (1920×1080), WLED, eDP, slim-flat (3.0 mm), 250 nits, 16:9 ultra wide aspect ratio, with narrow bezel 	√			
	<ul style="list-style-type: none"> 14.0-in, HD, AntiGlare, SVA (1366×768), WLED, eDP, slim-flat (3.6 mm), 250 nits, 16:9 ultra wide aspect ratio, with narrow bezel 	√			
	<ul style="list-style-type: none"> 14.0-in, FHD, AntiGlare, UWVA (1920×1080), WLED, eDP, slim-flat (3.0 mm), 220 nits, 16:9 ultra wide aspect ratio, with narrow bezel 	√	√	√	
	<ul style="list-style-type: none"> 14.0-in, FHD, AntiGlare, UWVA (1920×1080), WLED, eDP, slim-flat (3.0 mm), 220 nits, 16:9 ultra wide aspect ratio, with narrow bezel 		√	√	
	<ul style="list-style-type: none"> 14.0-in, FHD, AntiGlare, SVA (1920×1080), WLED, eDP, slim-flat (3.0 mm), 220 nits, 16:9 ultra wide aspect ratio, with narrow bezel 	√			
	<ul style="list-style-type: none"> 14.0-in, HD, AntiGlare, SVA (1366×768), WLED, eDP, slim-flat (3.6 mm), 220 nits, 16:9 ultra wide aspect ratio, with narrow bezel 	√	√	√	

Table 1-1 Product components and descriptions (continued)

Category	Description	Computer models 14-ce2000 through 14-ce2999	Computer models 14-ce1000 through 14-ce1999	Computer models 14-ce0000 through 14-ce0999
Panel <i>(continued)</i>	<ul style="list-style-type: none"> 16:9 ultra wide aspect ratio, with narrow bezel 	√	√	√
	<ul style="list-style-type: none"> 14.0-in, HD, BrightView, SVA (1366×768), WLED, eDP, slim-flat (3.6 mm), 220 nits, 16:9 ultra wide aspect ratio, with narrow bezel 	√	√	√
Memory	One SODIMM memory module slot, non-customer-accessible/non-upgradable	√	√	√
	Supports up to 16-GB of system memory	√	√	√
	DDR4-2133 single channel support (DDR4-2666 bridged to DDR4-2400, DDR4-2400 downgraded to DDR4-2133)	√	√	√
	Supports the following configurations:	√	√	√
	<ul style="list-style-type: none"> 16384 MB (16384 MB × 1) 8192 MB (8192 MB × 1) 4096 MB (4096 MB × 1) 			
Storage	Support for all 7.2 mm/9.5 mm, SATA, 2.5-inch hard drives:	√	√	√
	<ul style="list-style-type: none"> Accelerometer/Hard drive protection 	√	√	√
	<ul style="list-style-type: none"> M.2 SATA/PCIe solid-state drive 	√	√	√
	<ul style="list-style-type: none"> Solid-state drive + hard drive 	√	√	√
	Single hard drive configurations: 1 TB, 5400 rpm, 7.2 mm and 500 GB, 5400 rpm, 7.0 mm	√	√	√
	Dual storage configurations:			
	<ul style="list-style-type: none"> 256-GB, PCIe, solid-state drive + 1-TB hard drive 	√	√	√
	<ul style="list-style-type: none"> 256-GB, SATA, solid-state drive with TLC + 1-TB hard drive 	√	√	√
	<ul style="list-style-type: none"> 128-GB, SATA, solid-state drive with TLC + 1-TB hard drive 	√	√	√
	<ul style="list-style-type: none"> 128-GB, SATA, solid-state drive with TLC + 500-GB hard drive 	√	√	√
	M.2 SATA-3, solid-state drive with TLC: 256 GB and 128 GB	√	√	√
M.2, PCIe, NVMe, solid-state drive: 512 GB and 256 GB	√	√	√	
Intel Optane (3D Xpoint) Solution, PCIe, Gen3×2, M.2, solid-state drive: 16 GB (Optane memory module) + 1 TB, 5400 rpm, 7.2 mm hard drive	√	√	√	
Optical drive	DVD+/-RW DL SuperMulti, 9.0-mm tray load, SATA, fixed (not modular)	√	√	√

Table 1-1 Product components and descriptions (continued)

Category	Description	Computer models 14-ce2000 through 14-ce2999	Computer models 14-ce1000 through 14-ce1999	Computer models 14-ce0000 through 14-ce0999
Audio and video	Audio brand: B&O Play	√	√	√
	Audio control panel: B&O Play Audio Control	√	√	√
	Supports HP Audio Boost	√	√	√
	Dual speakers	√	√	√
Camera				
	HP Wide Vision FHD infrared camera with indicator light and 2 infrared lights, USB 2.0, FHD hybrid BSI sensor, f2.2, WDR, 88° wide field of vision, 1080p by 30 frames per second	√	√	√
	HP Wide Vision HD camera with indicator light, USB 2.0, HD BSI sensor, f2.0, WDR, 88° wide field of vision, 720p by 30 frames per second	√	√	√
	Supports Windows Hello	√	√	√
	Microphones: Dual-array digital microphones with appropriate beam-forming, echo-cancellation, noise-suppression software	√	√	√
Ethernet	Integrated 10/100/1000 network interface card (NIC)	√	√	√
Wireless	Integrated wireless options with dual antennas (M.2/PCIe):			
	<ul style="list-style-type: none"> Realtek RTL8822BE 802.11 ac 2×2 Wi-Fi + Bluetooth® 4.2 Combo Adapter (MU-MIMO-supported) 	√	√	√
	<ul style="list-style-type: none"> Intel Dual Band Wireless ac 3168 802.11 ac 1×1 Wi-Fi + Bluetooth 4.2 Combo Adapter (non-vPro) 		√	√
	<ul style="list-style-type: none"> Intel Dual Band Wireless ac 7265 802.11 ac 2×2 Wi-Fi + Bluetooth 4.2 Combo Adapter (non-vPro) 		√	√
	Integrated wireless options with single antenna (M.2/PCIe):			
	<ul style="list-style-type: none"> Realtek RTL8723DE 802.11 bgn 1×1 Wi-Fi + Bluetooth 4.2 Combo Adapter 	√	√	√
	<ul style="list-style-type: none"> Realtek RTL8821CE 802.11 ac 1×1 Wi-Fi + Bluetooth 4.2 Combo Adapter (MU-MIMO-supported) 	√	√	√
	<ul style="list-style-type: none"> Intel Wireless ac 9560 2×2 MU-MIMO + Bluetooth 5.0 M.2 non-vPro MIPI+BRI WW 	√	√	
	<ul style="list-style-type: none"> Intel Wireless ac 9461 NGW 1×1 M.2 NV + Bluetooth 5.0 	√	√	
	External media cards	HP Multi-Format Digital Media Card Reader	√	√
Supports SD/SDHC/SDXC		√	√	√

Table 1-1 Product components and descriptions (continued)

Category	Description	Computer models 14-ce2000 through 14-ce2999	Computer models 14-ce1000 through 14-ce1999	Computer models 14-ce0000 through 14-ce0999
External media cards <i>(continued)</i>	Push-push insertion/removal	√	√	√
Internal card expansion	One M.2 slot for solid-state drive	√	√	√
	One M.2 slot for WLAN module	√	√	√
Ports	AC Smart Pin adapter plug	√	√	√
	Audio-out (headphone)/audio-in (microphone) combo jack	√	√	√
	HDMI v1.4 supporting up to 1920×1080 @ 60Hz	√	√	√
	RJ-45 network jack	√	√	√
	Hot plug/unplug and auto detect for correct output to wide-aspect vs standard aspect video (auto adjust panel resolution to fit embedded panel and external monitor connected)	√	√	√
	USB 3.1 ports (2, left side)	√		
	USB 3.0 ports (2, left side)		√	√
	USB Type-C port; USB 3.1 Gen 1 (right side); supports data transfer	√	√	√
Keyboard/pointing devices	Keyboard: Full-sized, two-coat paint and three-coat paint, island-style keyboard	√	√	√
	TouchPad:			
	• Image sensor	√	√	√
	• MultiTouch gestures enabled	√	√	√
	• Support for Modern TrackPad gestures	√	√	√
	• Taps enabled as default	√	√	√
Power requirements	Battery:			
	• 3-cell, 41-WHr, 3.6-AHr, Li-ion battery	√	√	√
	• Supports battery life enhancement	√	√	√
	• Supports battery fast charge	√	√	√
	AC adapter:			
	• 65-W HP Smart AC adapter (EM) with power cord	√	√	√
	• 65-W HP Smart AC adapter with power cord	√	√	√
	• 45-W HP Smart AC adapter with power cord	√	√	√

Table 1-1 Product components and descriptions (continued)

Category	Description	Computer models 14-ce2000 through 14-ce2999	Computer models 14-ce1000 through 14-ce1999	Computer models 14-ce0000 through 14-ce0999
Power requirements <i>(continued)</i>	Power cord: 1.0 m conventional power cord with a C5 connector	√	√	√
Security	<ul style="list-style-type: none"> • Kensington Nano Security Lock 	√	√	√
	<ul style="list-style-type: none"> • Support for Trusted Platform Module (TPM) 2.0 	√	√	√
	<ul style="list-style-type: none"> • Fingerprint reader 	√	√	√
Sensor	Accelerometer	√	√	√
Operating system	Windows 10 Home 64-bit	√	√	√
	Windows 10 Home 64-bit Chinese Market CPP	√	√	√
	Windows 10 Home 64-bit High-end Chinese Market CPP	√	√	√
	Windows 10 Home 64-bit Plus	√	√	√
	Windows 10 Home 64-bit Plus QVC	√		√
	Windows 10 Home 64-bit Plus Single Language	√	√	√
	Windows 10 Home 64-bit Plus Single Language Africa Market PPP	√	√	√
	Windows 10 Home 64-bit Plus Single Language APAC EM PPP	√	√	√
	Windows 10 Home 64-bit Plus Single Language India Market PPP	√	√	√
	Windows 10 Home 64-bit Plus Single Language Indonesia Market PPP	√	√	√
	Windows 10 Home 64-bit Plus Web/Kiosk		√	√
	Windows 10 Home 64-bit QVC	√		√
	Windows 10 Home 64-bit Single Language	√	√	√
	Windows 10 Home 64-bit Single Language Africa Market PPP	√	√	√
	Windows 10 Home 64-bit Single Language APAC EM PPP	√	√	√
	Windows 10 Home 64-bit Single Language India Market PPP	√	√	√
	Windows 10 Home 64-bit Single Language Indonesia Market PPP	√	√	√
	Windows 10 Home 64-bit Single Language Value Africa Market PPP	√		√
	Windows 10 Home 64-bit Single Language Value APAC EM PPP			√


Table 1-1 Product components and descriptions (continued)

Category	Description	Computer models 14-ce2000 through 14-ce2999	Computer models 14-ce1000 through 14-ce1999	Computer models 14-ce0000 through 14-ce0999
Operating system <i>(continued)</i>	Windows 10 Home 64-bit Single Language Value India Market PPP			√
	Windows 10 Home 64-bit Single Language Value Indonesia Market PPP			√
	Windows 10 Home 64-bit Value Notebook Single Language			√
	Windows 10 Home 64-bit Value Notebook Single Language SEAP			√
	Windows 10 Home 64-bit Value Notebook Single Language select Geo			√
	Windows 10 Home 64-bit Value Single Language			√
	Windows 10 Home 64-bit Web/Kiosk	√	√	√
	Windows 10 Home S 64-bit Value	√		√
	Windows 10 Professional 64-bit	√	√	√
	Windows 10 Professional 64-bit Chinese Market	√	√	√
	Windows 10 Professional 64-bit QVC	√		√
	Windows 10 Professional 64-bit StF MSNA Standard	√	√	√
	FreeDOS 2.0	√	√	√
Serviceability	End user replaceable parts: AC adapter	√	√	√

2 Exterior components

The computer features top-rated components. This chapter provides details about the components, their location, and how they work.

Right side

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

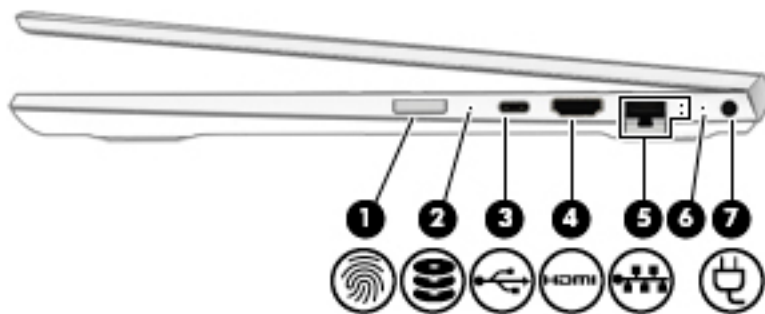








Table 2-1 Right-side components and descriptions

Component	Description
(1)  Fingerprint reader (select products only)	<p>Allows a fingerprint logon to Windows, instead of a password logon.</p> <ul style="list-style-type: none"> ▲ To use the fingerprint reader, swipe your finger across the reader.
(2)  Drive light	<ul style="list-style-type: none"> ● Blinking white: The hard drive is being accessed. ● Amber: HP 3D DriveGuard has temporarily parked the hard drive.
(3)  USB Type-C port	<p>Connects a USB device such as a cell phone, camera, activity tracker, or smartwatch, and provides data transfer.</p> <p>NOTE: Cables and/or adapters (purchased separately) may be required.</p>
(4)  HDMI port	<p>Connects an optional video or audio device, such as a high-definition television, any compatible digital or audio component, or a high-speed High-Definition Multimedia Interface (HDMI) device.</p>
(5)  RJ-45 (network) jack/status lights	<p>Connects a network cable.</p> <ul style="list-style-type: none"> ● White: The network is connected. ● Amber: Activity is occurring on the network.
(6) AC adapter and battery light	<ul style="list-style-type: none"> ● White: The AC adapter is connected and the battery is fully charged. ● Blinking white: The AC adapter is disconnected and the battery has reached a low battery level. ● Amber: The AC adapter is connected and the battery is charging. ● Off: The battery is not charging.
(7)  Power connector	<p>Connects an AC adapter.</p>

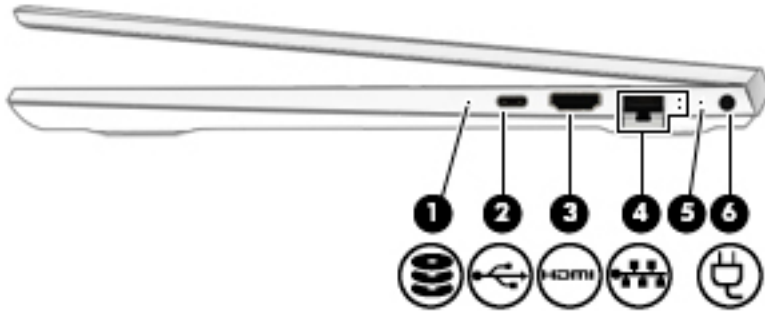







Table 2-2 Right-side components and descriptions (continued)

Component	Description
(1)  Drive light	<ul style="list-style-type: none"> Blinking white: The hard drive is being accessed. Amber: HP 3D DriveGuard has temporarily parked the hard drive.
(2)  USB Type-C port	<p>Connects a USB device such as a cell phone, camera, activity tracker, or smartwatch and provides data transfer.</p> <p>NOTE: Cables and/or adapters (purchased separately) may be required.</p>
(3)  HDMI port	<p>Connects an optional video or audio device, such as a high-definition television, any compatible digital or audio component, or a high-speed High-Definition Multimedia Interface (HDMI) device.</p>
(4)  RJ-45 (network) jack/status lights	<p>Connects a network cable.</p> <ul style="list-style-type: none"> White: The network is connected. Amber: Activity is occurring on the network.
(5) AC adapter and battery light	<ul style="list-style-type: none"> White: The AC adapter is connected and the battery is fully charged. Blinking white: The AC adapter is disconnected and the battery has reached a low battery level.
(6)  Power connector	<p>Connects an AC adapter.</p>

Left side

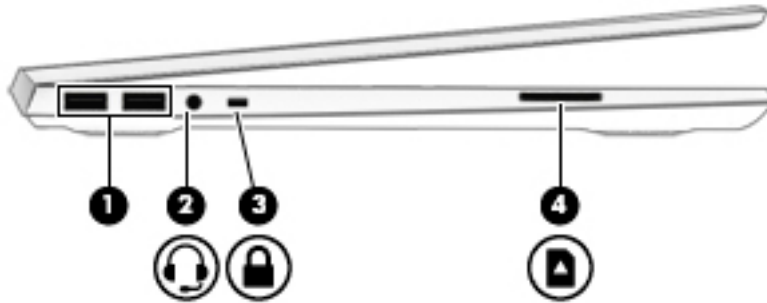






Table 2-3 Left-side components and descriptions

Component	Description
(1)	<p>USB SuperSpeed ports (2)</p> <p>Connect a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provide high-speed data transfer.</p>
(2)	<p> Audio-out (headphone)/Audio-in (microphone) combo jack</p> <p>Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. Also connects an optional headset microphone. This jack does not support optional standalone microphones.</p> <p>WARNING! To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, see the <i>Regulatory, Safety, and Environmental Notices</i>.</p> <p>To access this guide:</p> <ul style="list-style-type: none"> ▲ Select the Start button, select HP Help and Support, and then select HP Documentation. <p>NOTE: When a device is connected to the jack, the computer speakers are disabled.</p>
(3)	<p> Security cable slot</p> <p>Attaches an optional security cable to the computer.</p> <p>NOTE: The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.</p>
(4)	<p> Memory card reader</p> <p>Reads optional memory cards that enable you to store, manage, share, or access information.</p> <p>To insert a card:</p> <ol style="list-style-type: none"> 1. Hold the card label-side up, with connectors facing the computer. 2. Insert the card into the memory card reader, and then press in on the card until it is firmly seated. <p>To remove a card:</p> <ul style="list-style-type: none"> ▲ Press in on the card, and then remove it from the memory card reader.

Display

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

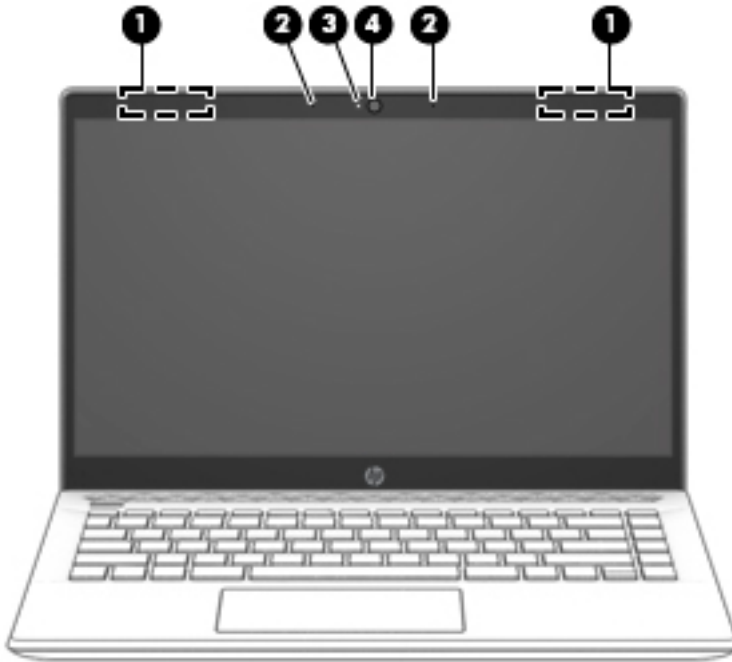


Table 2-4 Display components and descriptions

Component	Description
(1) WLAN antennas (1 or 2, depending on computer)*	Send and receive wireless signals to communicate with wireless local area networks (WLANs). NOTE: If your computer has a single antenna, it is located on the left side.
(2) Internal microphones (2)	Record sound.
(3) Camera light	On: The camera is in use.
(4) Camera(s)	Allows you to video chat, record video, and record still images. Some cameras also allow a facial recognition logon to Windows, instead of a password logon. NOTE: Camera functions vary depending on the camera hardware and software installed on your product.

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

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

To access this guide:

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

– or –

Click the question mark icon in the taskbar.

2. Select **My notebook**, select the **Specifications** tab, and then select **User Guides**.

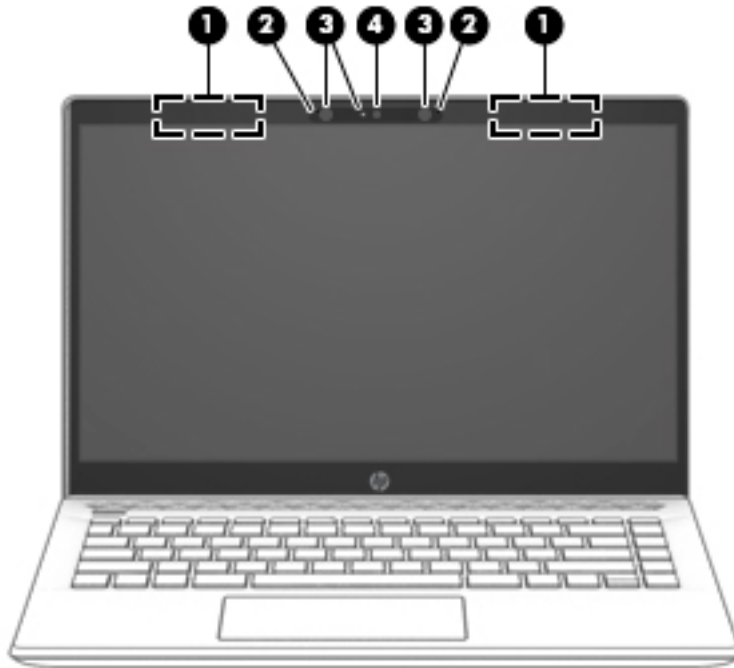


Table 2-5 Display components and descriptions (continued)

Component	Description
(1) WLAN antennas (1 or 2 depending on computer)*	Send and receive wireless signals to communicate with wireless local area networks (WLANs). NOTE: If your computer has a single antenna, it is located on the left side.
(2) Internal microphones	Record sound.
(3) Camera light(s)	On: One or more cameras are in use.
(4) Camera(s)	Allows you to video chat, record video, and record still images. Some cameras also allow a facial recognition logon to Windows, instead of a password logon. NOTE: Camera functions vary depending on the camera hardware and software installed on your product.

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

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

To access this guide:

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

Keyboard area

TouchPad

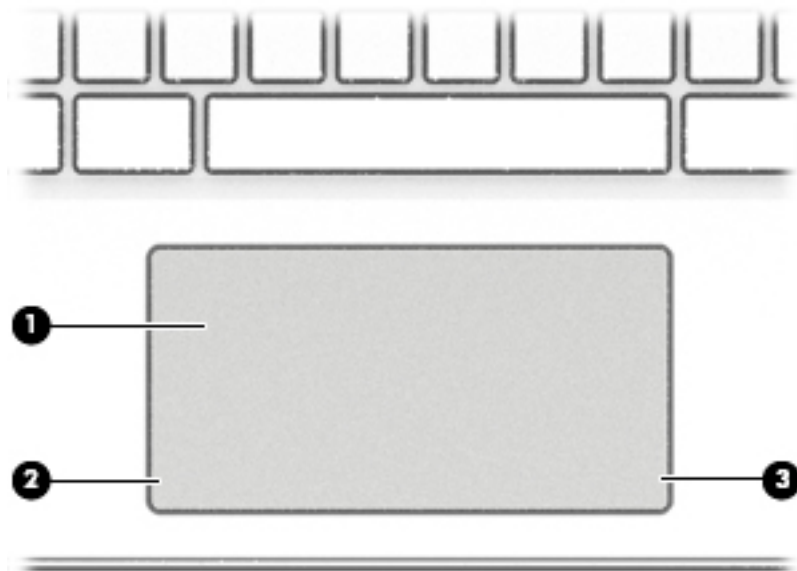


Table 2-6 TouchPad components and descriptions

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

Lights

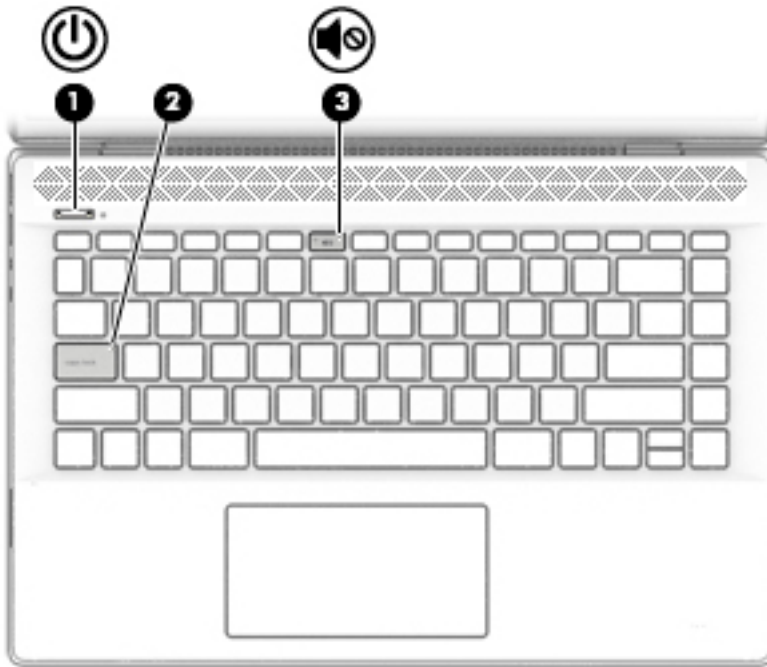




Table 2-7 Light components and descriptions

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

Button, speakers, and vent

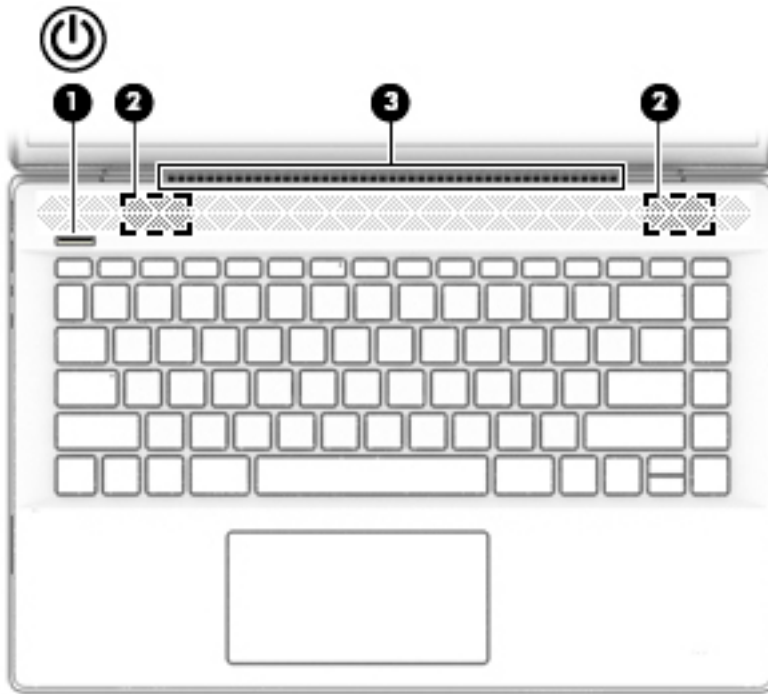



Table 2-8 Button, speaker, and vent components and descriptions

Component	Description
(1)  Power button	<ul style="list-style-type: none"> • When the computer is off, press the button to turn on the computer. • When the computer is on, press the button briefly to initiate Sleep. • When the computer is in the Sleep state, press the button briefly to exit Sleep. • When the computer is in Hibernation, press the button briefly to exit Hibernation. <p>CAUTION: Pressing and holding down the power button results in the loss of unsaved information.</p> <p>If the computer has stopped responding and shutdown procedures are ineffective, press and hold the power button down for at least 5 seconds to turn off the computer.</p> <p>To learn more about your power settings and power options:</p> <ul style="list-style-type: none"> ▲ Right-click the Power icon, and then select Power Options.
(2) Speakers	Produce sound.
(3) Vent	<p>Enables airflow to cool internal components.</p> <p>NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.</p>

Special keys

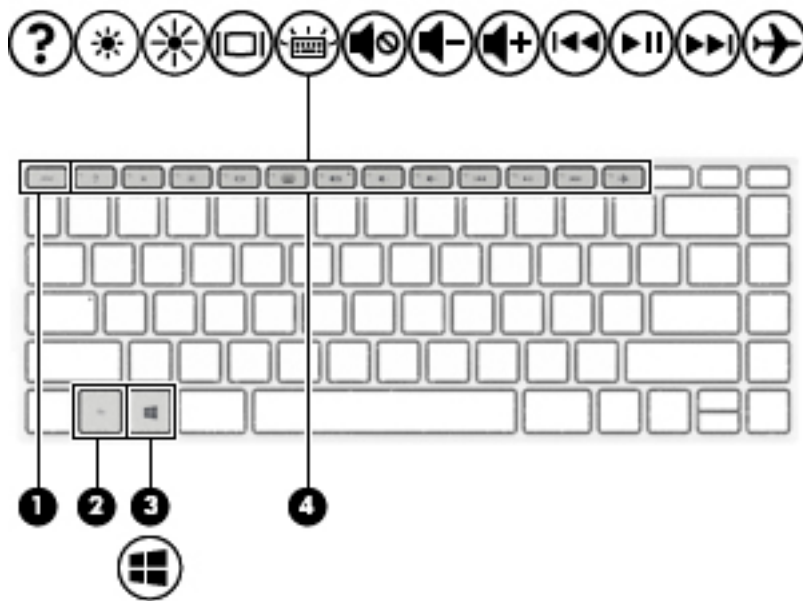



Table 2-9 Special key components and descriptions













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

Action keys

An action key performs the function indicated by the icon on the key. To determine which keys are on your product, see [Special keys on page 18](#).

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

Table 2-10 Special key components and descriptions

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

Bottom

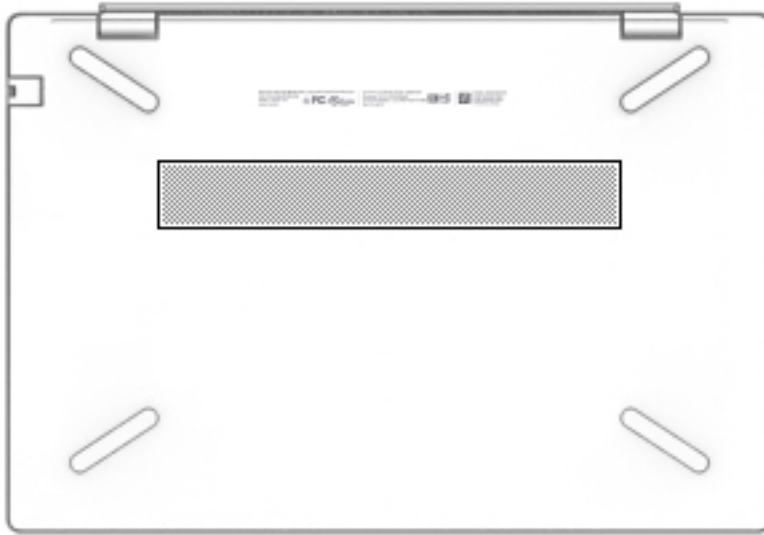


Table 2-11 Bottom component and description

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

Labels

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

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

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

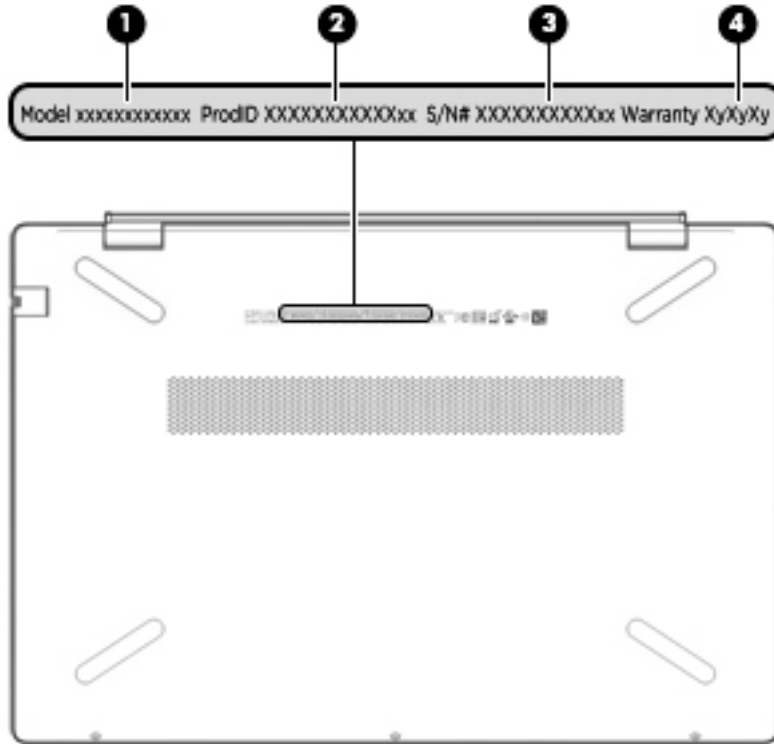



Table 2-12 Label components

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

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

3 Illustrated parts catalog

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

Computer components

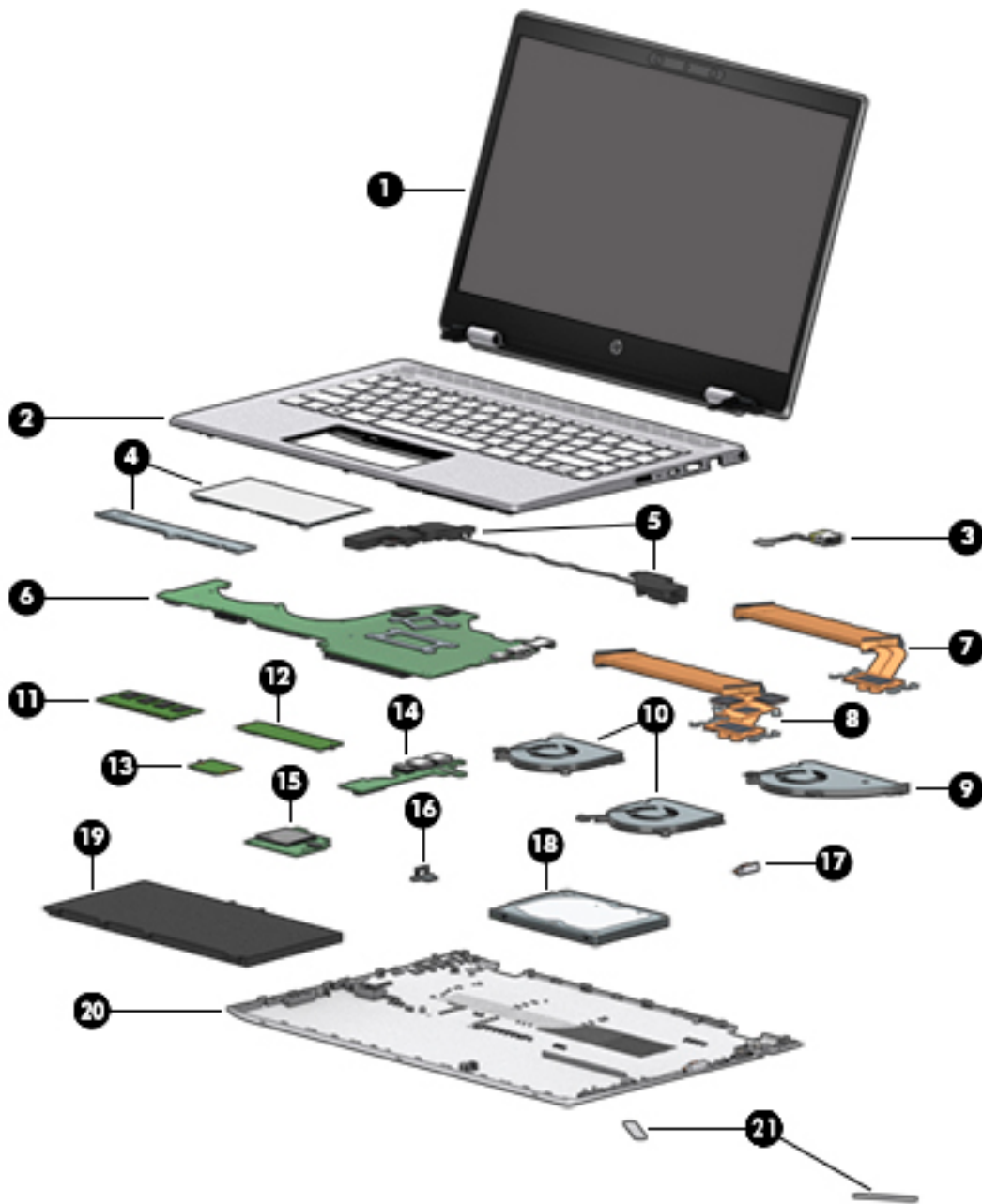


Table 3-1 Computer components and descriptions

Item	Component	Spare part number
(1)	Display assembly: The display assembly is spared at the subcomponent level only. For more display assembly spare part information, see Display assembly components on page 42 .	
(2)	Keyboard/top cover:	
	In luminous green finish, equipped with backlight and fingerprint reader (includes backlight cable, fingerprint reader cable, keyboard cable):	
	For use in Belgium	L51758-A41
	For use in Bulgaria	L51758-261
	For use in Canada	L51758-DB1
	For use in the Czech Republic and Slovakia	L51758-FL1
	For use in Denmark, Finland, and Norway	L51758-DH1
	For use in France	L51758-051
	For use in Germany	L51758-041
	For use in Greece	L51758-151
	For use in Hungary	L51758-211
	For use in Israel	L51758-BB1
	For use in Italy	L51758-061
	For use in Latin America	L51758-161
	For use in the Netherlands	L51758-B31
	For use in Portugal	L51758-131
	For use in Romania	L51758-271
	For use in Russia	L51758-251
	For use in Saudi Arabia	L51758-171
	For use in Slovenia	L51758-BA1
	For use in Spain	L51758-071
	For use in Switzerland	L51758-BG1
	For use in Taiwan	L51758-AB1
	For use in Thailand	L51758-281
	For use in Turkey	L51758-141
	For use in the United Kingdom	L51758-031
	For use in the United States	L51758-001
	For use in Uruguay	L51758-BD1
	In luminous green finish, equipped with backlight (includes backlight cable and keyboard cable):	
	For use in Belgium	L51756-A41
	For use in Bulgaria	L51756-261

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	For use in Canada	L51756-DB1
	For use in the Czech Republic and Slovakia	L51756-FL1
	For use in Denmark, Finland, and Norway	L51756-DH1
	For use in France	L51756-051
	For use in Germany	L51756-041
	For use in Greece	L51756-151
	For use in Hungary	L51756-211
	For use in Israel	L51756-BB1
	For use in Italy	L51756-061
	For use in Latin America	L51756-161
	For use in the Netherlands	L51756-B31
	For use in Portugal	L51756-131
	For use in Romania	L51756-271
	For use in Russia	L51756-251
	For use in Saudi Arabia	L51756-171
	For use in Slovenia	L51756-BA1
	For use in Spain	L51756-071
	For use in Switzerland	L51756-BG1
	For use in Taiwan	L51756-AB1
	For use in Thailand	L51756-281
	For use in Turkey	L51756-141
	For use in the United Kingdom	L51756-031
	For use in the United States	L51756-001
	For use in Uruguay	L51756-BD1
	In luminous green finish, equipped with fingerprint reader (includes fingerprint reader cable and keyboard cable):	
	For use in Belgium	L51757-A41
	For use in Bulgaria	L51757-261
	For use in Canada	L51757-DB1
	For use in the Czech Republic and Slovakia	L51757-FL1
	For use in Denmark, Finland, and Norway	L51757-DH1
	For use in France	L51757-051
	For use in Germany	L51757-041
	For use in Greece	L51757-151

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	For use in Hungary	L51757-211
	For use in Israel	L51757-BB1
	For use in Italy	L51757-061
	For use in Latin America	L51757-161
	For use in the Netherlands	L51757-B31
	For use in Portugal	L51757-131
	For use in Romania	L51757-271
	For use in Russia	L51757-251
	For use in Saudi Arabia	L51757-171
	For use in Slovenia	L51757-BA1
	For use in Spain	L51757-071
	For use in Switzerland	L51757-BG1
	For use in Taiwan	L51757-AB1
	For use in Thailand	L51757-281
	For use in Turkey	L51757-141
	For use in the United Kingdom	L51757-031
	For use in the United States	L51757-001
	For use in Uruguay	L51757-BD1
	In luminous green finish (includes keyboard cable):	
	For use in Belgium	L51755-A41
	For use in Bulgaria	L51755-261
	For use in Canada	L51755-DB1
	For use in the Czech Republic and Slovakia	L51755-FL1
	For use in Denmark, Finland, and Norway	L51755-DH1
	For use in France	L51755-051
	For use in Germany	L51755-041
	For use in Greece	L51755-151
	For use in Hungary	L51755-211
	For use in Israel	L51755-BB1
	For use in Italy	L51755-061
	For use in Latin America	L51755-161
	For use in the Netherlands	L51755-B31
	For use in Portugal	L51755-131

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	For use in Romania	L51755-271
	For use in Russia	L51755-251
	For use in Saudi Arabia	L51755-171
	For use in Slovenia	L51755-BA1
	For use in Spain	L51755-071
	For use in Switzerland	L51755-BG1
	For use in Taiwan	L51755-AB1
	For use in Thailand	L51755-281
	For use in Turkey	L51755-141
	For use in the United Kingdom	L51755-031
	For use in the United States	L51755-001
	For use in Uruguay	L51755-BD1
	In natural silver finish, equipped with backlight and fingerprint reader (includes backlight cable, fingerprint reader cable, keyboard cable):	
	For use in Belgium	L19195-A41
	For use in Bulgaria	L19195-261
	For use in Canada	L19195-DB1
	For use in the Czech Republic and Slovakia	L19195-FL1
	For use in Denmark, Finland, and Norway	L19195-DH1
	For use in France	L19195-051
	For use in Germany	L19195-041
	For use in Greece	L19195-151
	For use in Hungary	L19195-211
	For use in Israel	L19195-BB1
	For use in Italy	L19195-061
	For use in Latin America	L19195-161
	For use in the Netherlands	L19195-B31
	For use in Portugal	L19195-131
	For use in Romania	L19195-271
	For use in Russia	L19195-251
	For use in Saudi Arabia	L19195-171
	For use in Slovenia	L19195-BA1
	For use in Spain	L19195-071
	For use in Switzerland	L19195-BG1

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	For use in Taiwan	L19195-AB1
	For use in Thailand	L19195-281
	For use in Turkey	L19195-141
	For use in the United Kingdom	L19195-031
	For use in the United States	L19195-001
	For use in Uruguay	L19195-BD1
	In natural silver, equipped with backlight (includes backlight cable and keyboard cable):	
	For use in Belgium	L19191-A41
	For use in Bulgaria	L19191-261
	For use in Canada	L19191-DB1
	For use in the Czech Republic and Slovakia	L19191-FL1
	For use in Denmark, Finland, and Norway	L19191-DH1
	For use in France	L19191-051
	For use in Germany	L19191-041
	For use in Greece	L19191-151
	For use in Hungary	L19191-211
	For use in Israel	L19191-BB1
	For use in Italy	L19191-061
	For use in Latin America	L19191-161
	For use in the Netherlands	L19191-B31
	For use in Portugal	L19191-131
	For use in Romania	L19191-271
	For use in Russia	L19191-251
	For use in Saudi Arabia	L19191-171
	For use in Slovenia	L19191-BA1
	For use in Spain	L19191-071
	For use in Switzerland	L19191-BG1
	For use in Taiwan	L19191-AB1
	For use in Thailand	L19191-281
	For use in Turkey	L19191-141
	For use in the United Kingdom	L19191-031
	For use in the United States	L19191-001
	For use in Uruguay	L19191-BD1

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	In natural silver finish, equipped with fingerprint reader (includes fingerprint reader cable and keyboard cable):	
	For use in Belgium	L19194-A41
	For use in Bulgaria	L19194-261
	For use in Canada	L19194-DB1
	For use in the Czech Republic and Slovakia	L19194-FL1
	For use in Denmark, Finland, and Norway	L19194-DH1
	For use in France	L19194-051
	For use in Germany	L19194-041
	For use in Greece	L19194-151
	For use in Hungary	L19194-211
	For use in Israel	L19194-BB1
	For use in Italy	L19194-061
	For use in Latin America	L19194-161
	For use in the Netherlands	L19194-B31
	For use in Portugal	L19194-131
	For use in Romania	L19194-271
	For use in Russia	L19194-251
	For use in Saudi Arabia	L19194-171
	For use in Slovenia	L19194-BA1
	For use in Spain	L19194-071
	For use in Switzerland	L19194-BG1
	For use in Taiwan	L19194-AB1
	For use in Thailand	L19194-281
	For use in Turkey	L19194-141
	For use in the United Kingdom	L19194-031
	For use in the United States	L19194-001
	For use in Uruguay	L19194-BD1
	In natural silver finish (includes keyboard cable):	
	For use in Belgium	L19190-A41
	For use in Bulgaria	L19190-261
	For use in Canada	L19190-DB1
	For use in the Czech Republic and Slovakia	L19190-FL1
	For use in Denmark, Finland, and Norway	L19190-DH1

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	For use in France	L19190-051
	For use in Germany	L19190-041
	For use in Greece	L19190-151
	For use in Hungary	L19190-211
	For use in Israel	L19190-BB1
	For use in Italy	L19190-061
	For use in Latin America	L19190-161
	For use in the Netherlands	L19190-B31
	For use in Portugal	L19190-131
	For use in Romania	L19190-271
	For use in Russia	L19190-251
	For use in Saudi Arabia	L19190-171
	For use in Slovenia	L19190-BA1
	For use in Spain	L19190-071
	For use in Switzerland	L19190-BG1
	For use in Taiwan	L19190-AB1
	For use in Thailand	L19190-281
	For use in Turkey	L19190-141
	For use in the United Kingdom	L19190-031
	For use in the United States	L19190-001
	For use in Uruguay	L19190-BD1
	In plum mauve finish, equipped with backlight and fingerprint reader (includes backlight cable, fingerprint reader cable, keyboard cable):	
	For use in Belgium	L51754-A41
	For use in Bulgaria	L51754-261
	For use in Canada	L51754-DB1
	For use in the Czech Republic and Slovakia	L51754-FL1
	For use in Denmark, Finland, and Norway	L51754-DH1
	For use in France	L51754-051
	For use in Germany	L51754-041
	For use in Greece	L51754-151
	For use in Hungary	L51754-211
	For use in Israel	L51754-BB1
	For use in Italy	L51754-061

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	For use in Latin America	L51754-161
	For use in the Netherlands	L51754-B31
	For use in Portugal	L51754-131
	For use in Romania	L51754-271
	For use in Russia	L51754-251
	For use in Saudi Arabia	L51754-171
	For use in Slovenia	L51754-BA1
	For use in Spain	L51754-071
	For use in Switzerland	L51754-BG1
	For use in Taiwan	L51754-AB1
	For use in Thailand	L51754-281
	For use in Turkey	L51754-141
	For use in the United Kingdom	L51754-031
	For use in the United States	L51754-001
	For use in Uruguay	L51754-BD1
	In plum mauve finish, equipped with backlight (includes backlight cable and keyboard cable):	
	For use in Belgium	L51752-A41
	For use in Bulgaria	L51752-261
	For use in Canada	L51752-DB1
	For use in the Czech Republic and Slovakia	L51752-FL1
	For use in Denmark, Finland, and Norway	L51752-DH1
	For use in France	L51752-051
	For use in Germany	L51752-041
	For use in Greece	L51752-151
	For use in Hungary	L51752-211
	For use in Israel	L51752-BB1
	For use in Italy	L51752-061
	For use in Latin America	L51752-161
	For use in the Netherlands	L51752-B31
	For use in Portugal	L51752-131
	For use in Romania	L51752-271
	For use in Russia	L51752-251
	For use in Saudi Arabia	L51752-171

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	For use in Slovenia	L51752-BA1
	For use in Spain	L51752-071
	For use in Switzerland	L51752-BG1
	For use in Taiwan	L51752-AB1
	For use in Thailand	L51752-281
	For use in Turkey	L51752-141
	For use in the United Kingdom	L51752-031
	For use in the United States	L51752-001
	For use in Uruguay	L51752-BD1
	In plum mauve finish, equipped with fingerprint reader (includes fingerprint reader cable and keyboard cable):	
	For use in Belgium	L51753-A41
	For use in Bulgaria	L51753-261
	For use in Canada	L51753-DB1
	For use in the Czech Republic and Slovakia	L51753-FL1
	For use in Denmark, Finland, and Norway	L51753-DH1
	For use in France	L51753-051
	For use in Germany	L51753-041
	For use in Greece	L51753-151
	For use in Hungary	L51753-211
	For use in Israel	L51753-BB1
	For use in Italy	L51753-061
	For use in Latin America	L51753-161
	For use in the Netherlands	L51753-B31
	For use in Portugal	L51753-131
	For use in Romania	L51753-271
	For use in Russia	L51753-251
	For use in Saudi Arabia	L51753-171
	For use in Slovenia	L51753-BA1
	For use in Spain	L51753-071
	For use in Switzerland	L51753-BG1
	For use in Taiwan	L51753-AB1
	For use in Thailand	L51753-281
	For use in Turkey	L51753-141

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	For use in the United Kingdom	L51753-031
	For use in the United States	L51753-001
	For use in Uruguay	L51753-BD1
	In plum mauve finish (includes keyboard cable):	
	For use in Belgium	L51751-A41
	For use in Bulgaria	L51751-261
	For use in Canada	L51751-DB1
	For use in the Czech Republic and Slovakia	L51751-FL1
	For use in Denmark, Finland, and Norway	L51751-DH1
	For use in France	L51751-051
	For use in Germany	L51751-041
	For use in Greece	L51751-151
	For use in Hungary	L51751-211
	For use in Israel	L51751-BB1
	For use in Italy	L51751-061
	For use in Latin America	L51751-161
	For use in the Netherlands	L51751-B31
	For use in Portugal	L51751-131
	For use in Romania	L51751-271
	For use in Russia	L51751-251
	For use in Saudi Arabia	L51751-171
	For use in Slovenia	L51751-BA1
	For use in Spain	L51751-071
	For use in Switzerland	L51751-BG1
	For use in Taiwan	L51751-AB1
	For use in Thailand	L51751-281
	For use in Turkey	L51751-141
	For use in the United Kingdom	L51751-031
	For use in the United States	L51751-001
	For use in Uruguay	L51751-BD1
	In rose gold finish, equipped with backlight and fingerprint reader (includes backlight cable, fingerprint reader cable, keyboard cable):	
	For use in Belgium	L19197-A41
	For use in Bulgaria	L19197-261

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	For use in Canada	L19197-DB1
	For use in the Czech Republic and Slovakia	L19197-FL1
	For use in Denmark, Finland, and Norway	L19197-DH1
	For use in France	L19197-051
	For use in Germany	L19197-041
	For use in Greece	L19197-151
	For use in Hungary	L19197-211
	For use in Israel	L19197-BB1
	For use in Italy	L19197-061
	For use in Latin America	L19197-161
	For use in the Netherlands	L19197-B31
	For use in Portugal	L19197-131
	For use in Romania	L19197-271
	For use in Russia	L19197-251
	For use in Saudi Arabia	L19197-171
	For use in Slovenia	L19197-BA1
	For use in Spain	L19197-071
	For use in Switzerland	L19197-BG1
	For use in Taiwan	L19197-AB1
	For use in Thailand	L19197-281
	For use in Turkey	L19197-141
	For use in the United Kingdom	L19197-031
	For use in the United States	L19197-001
	For use in Uruguay	L19197-BD1
	In rose gold finish, equipped with backlight (includes backlight cable and keyboard cable):	
	For use in Belgium	L19193-A41
	For use in Bulgaria	L19193-261
	For use in Canada	L19193-DB1
	For use in the Czech Republic and Slovakia	L19193-FL1
	For use in Denmark, Finland, and Norway	L19193-DH1
	For use in France	L19193-051
	For use in Germany	L19193-041
	For use in Greece	L19193-151

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	For use in Hungary	L19193-211
	For use in Israel	L19193-BB1
	For use in Italy	L19193-061
	For use in Latin America	L19193-161
	For use in the Netherlands	L19193-B31
	For use in Portugal	L19193-131
	For use in Romania	L19193-271
	For use in Russia	L19193-251
	For use in Saudi Arabia	L19193-171
	For use in Slovenia	L19193-BA1
	For use in Spain	L19193-071
	For use in Switzerland	L19193-BG1
	For use in Taiwan	L19193-AB1
	For use in Thailand	L19193-281
	For use in Turkey	L19193-141
	For use in the United Kingdom	L19193-031
	For use in the United States	L19193-001
	For use in Uruguay	L19193-BD1
	In rose gold finish, equipped with fingerprint reader (includes fingerprint reader cable and keyboard cable):	
	For use in Belgium	L19196-A41
	For use in Bulgaria	L19196-261
	For use in Canada	L19196-DB1
	For use in the Czech Republic and Slovakia	L19196-FL1
	For use in Denmark, Finland, and Norway	L19196-DH1
	For use in France	L19196-051
	For use in Germany	L19196-041
	For use in Greece	L19196-151
	For use in Hungary	L19196-211
	For use in Israel	L19196-BB1
	For use in Italy	L19196-061
	For use in Latin America	L19196-161
	For use in the Netherlands	L19196-B31
	For use in Portugal	L19196-131

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	For use in Romania	L19196-271
	For use in Russia	L19196-251
	For use in Saudi Arabia	L19196-171
	For use in Slovenia	L19196-BA1
	For use in Spain	L19196-071
	For use in Switzerland	L19196-BG1
	For use in Taiwan	L19196-AB1
	For use in Thailand	L19196-281
	For use in Turkey	L19196-141
	For use in the United Kingdom	L19196-031
	For use in the United States	L19196-001
	For use in Uruguay	L19196-BD1
	In rose gold finish (includes keyboard cable):	
	For use in Belgium	L19192-A41
	For use in Bulgaria	L19192-261
	For use in Canada	L19192-DB1
	For use in the Czech Republic and Slovakia	L19192-FL1
	For use in Denmark, Finland, and Norway	L19192-DH1
	For use in France	L19192-051
	For use in Germany	L19192-041
	For use in Greece	L19192-151
	For use in Hungary	L19192-211
	For use in Israel	L19192-BB1
	For use in Italy	L19192-061
	For use in Latin America	L19192-161
	For use in the Netherlands	L19192-B31
	For use in Portugal	L19192-131
	For use in Romania	L19192-271
	For use in Russia	L19192-251
	For use in Saudi Arabia	L19192-171
	For use in Slovenia	L19192-BA1
	For use in Spain	L19192-071
	For use in Switzerland	L19192-BG1

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	For use in Taiwan	L19192-AB1
	For use in Thailand	L19192-281
	For use in Turkey	L19192-141
	For use in the United Kingdom	L19192-031
	For use in the United States	L19192-001
	For use in Uruguay	L19192-BD1
(3)	Power connector cable	L19162-001
(4)	TouchPad (includes bracket, does not include cable. The TouchPad cable is available using spare part number L19167-001.)	
	In luminous green finish	L51746-001
	In natural silver finish	L19166-001
	In plum mauve finish	L51745-001
	In rose gold finish	L19166-001
(5)	Speakers (include cables)	L19161-001
(6)	System board (includes processor and replacement thermal material):	
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX250 graphics subsystem with 4-GB of memory, and the Windows 10 operating system 	L51763-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX250 graphics subsystem with 4-GB of memory, and a non-Windows 10 operating system 	L51763-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX250 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L51762-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX250 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L51762-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L36234-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L36234-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX130 graphics subsystem with 2-GB of memory, and the Windows 10 operating system 	L51760-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX130 graphics subsystem with 2-GB of memory, and a non-Windows 10 operating system 	L51760-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX150 graphics subsystem with 4-GB of memory, and the Windows 10 operating system 	L18499-601

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX150 graphics subsystem with 4-GB of memory, and a non-Windows 10 operating system 	L18499-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L18496-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L18496-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX130 graphics subsystem with 2-GB of memory, and the Windows 10 operating system 	L18497-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX130 graphics subsystem with 2-GB of memory, and a non-Windows 10 operating system 	L18497-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-7500U 2.70-GHz (SC turbo up to 3.50-GHz) dual core processor (4.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, and the Windows 10 operating system 	L18493-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-7500U 2.70-GHz (SC turbo up to 3.50-GHz) dual core processor (4.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, and a non-Windows 10 operating system 	L18493-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX250 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L51761-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX250 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L51761-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L36326-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L36326-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX150 graphics subsystem with 2-GB of memory, and the Windows 10 operating system 	L36325-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX150 graphics subsystem with 2-GB of memory, and a non-Windows 10 operating system 	L36325-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, and the Windows 10 operating system 	L51759-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, and a non-Windows 10 operating system 	L51759-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L18495-601

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L18495-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L18494-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L18494-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 4-GB of memory, and the Windows 10 operating system 	L18498-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 4-GB of memory, and a non-Windows 10 operating system 	L18498-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, and the Windows 10 operating system 	L18492-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2GB of memory, and a non-Windows 10 operating system 	L18492-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), a UMA graphics subsystem, and the Windows 10 operating system 	L18501-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), a UMA graphics subsystem, and a non-Windows 10 operating system 	L18501-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), a UMA graphics subsystem, a fingerprint reader, and the Windows 10 operating system 	L51764-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), a UMA graphics subsystem, a fingerprint reader, and a non-Windows 10 operating system 	L51764-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), a UMA graphics subsystem, and the Windows 10 operating system 	L36238-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), a UMA graphics subsystem, and a non-Windows 10 operating system 	L36238-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), a UMA graphics subsystem, and the Windows 10 operating system 	L18500-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), a UMA graphics subsystem, and a non-Windows 10 operating system 	L18500-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i3-8145U 2.10-GHz (SC turbo up to 3.90-GHz) dual core processor (4.0-MB L3 cache, 15 W), a UMA graphics subsystem, and the Windows 10 operating system 	L36237-601

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	<ul style="list-style-type: none"> Equipped with an Intel Core i3-8145U 2.10-GHz (SC turbo up to 3.90-GHz) dual core processor (4.0-MB L3 cache, 15 W), a UMA graphics subsystem, and a non-Windows 10 operating system 	L36237-001
	<ul style="list-style-type: none"> Equipped with an Intel Core i3-8130U 2.20-GHz (SC turbo up to 3.40-GHz) dual core processor (4.0-MB L3 cache, 15 W), a UMA graphics subsystem, and the Windows 10 operating system 	L18503-601
	<ul style="list-style-type: none"> Equipped with an Intel Core i3-8130U 2.20-GHz (SC turbo up to 3.40-GHz) dual core processor (4.0-MB L3 cache, 15 W), a UMA graphics subsystem, and a non-Windows 10 operating system 	L18503-001
	<ul style="list-style-type: none"> Equipped with an Intel Pentium 4415U 2.3-GHz dual core processor (2.0-MB L3 cache, 15 W), a UMA graphics subsystem, and the Windows 10 operating system 	L18502-601
	<ul style="list-style-type: none"> Equipped with an Intel Pentium 4415U 2.3-GHz dual core processor (2.0-MB L3 cache, 15 W), a UMA graphics subsystem, and a non-Windows 10 operating system 	L18502-001
	Heat sink (includes replacement thermal material):	
(7)	For use only on computer models equipped with a graphics subsystem with UMA memory and 7th generation Intel Core processors	L19157-001
(7)	For use only on computer models equipped with a graphics subsystem with UMA memory and 8th generation Intel Core processors	L19158-001
(8)	For use only on computer models equipped with a graphics subsystem with discrete memory	L19156-001
	Fan (includes cable):	
(9)	For use only on computer models equipped with a graphics subsystem with UMA memory	L19160-001
(10)	For use only on computer models equipped with a graphics subsystem with discrete memory	L19159-001
(11)	Memory modules (DDR4-2400, 1.2-V):	
	16-MB	865396-855
	8-MB	862398-855
	4-MB	862397-855
(12)	Solid-state drive:	
	512-GB, 2280, PCIe, NVMe solid-state drive	L18510-001
	256-GB, M.2 2280, SATA-3, solid-state drive with TLC	L18508-001
	256-GB, 2280, PCIe, NVMe solid-state drive	L18509-001
	128-GB, M.2 2280, SATA-3, solid-state drive with TLC	L18507-001
	Optane memory module , 2280, PCIe, NVMe, 16-GB	L18506-001
(13)	WLAN module:	
	Intel Dual Band Wireless ac 7265 802.11 AC 2×2 Wi-Fi + Bluetooth 4.2 Combo Adapter (non-vPro)	901229-855
	Intel Dual Band Wireless ac3168 802.11 ac 1×1 Wi-Fi + Bluetooth 4.2 Combo Adapter (non-vPro)	863934-855
	Realtek RTL8723DE 802.11 bgn 1×1 Wi-Fi + Bluetooth 4.2 Combo Adapter	L21480-005

Table 3-1 Computer components and descriptions (continued)

Item	Component	Spare part number
	Realtek RTL8822BE 802.11 ac 2x2 Wi-Fi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	924813-855
	Realtek RTL8821CE 802.11 ac 1x1 Wi-Fi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	L17365-005
	Intel Wireless ac 9461 NGW 1x1 M.2 NV + Bluetooth 5.0	L25889-005
	Intel Wireless ac 9560 2x2 MU-MIMO + Bluetooth 5.0 M.2 non-vPro MIPI+BRI WW	L22634-005
(14)	USB/audio board (does not include USB/audio board cable. The USB/audio board cable is available using spare part number L19153-001.)	L19152-001
(15)	Card reader board (does not include card reader board cable. The card reader board cable is available using spare part number L19155-001.)	L19154-001
(16)	Lock bracket	L19470-001
(17)	Fingerprint reader (includes bracket)	
	In luminous green finish	L51744-001
	In natural silver finish	L19163-001
	In plum mauve finish	L51743-001
	In rose gold finish	L19164-001
(18)	Hard drive (does not include hard drive bracket or hard drive cable):	
	1-TB, 5400-rpm, SATA, 7.0 mm	762990-005
	500-GB, 5400-rpm, SATA, 7.0 mm	778186-005
	NOTE: The hard drive bracket is available using spare part number L19469-001. The hard drive cable is available using spare part number L19172-001	
(19)	Battery (3-cell, 41-WHr, 3.6-AHr, Li-ion)	L11119-855
(20)	Bottom cover:	
	In luminous green finish	L51742-001
	In natural silver finish	L19168-001
	In plum mauve finish	L51741-001
	In rose gold finish	L19169-001
(21)	Rubber Foot Kit (not illustrated, includes Mylar screw cover):	
	In luminous green finish	L51750-001
	In natural silver finish	L19170-001
	In plum mauve finish	L51749-001
	In rose gold finish	L19171-001

Display assembly components

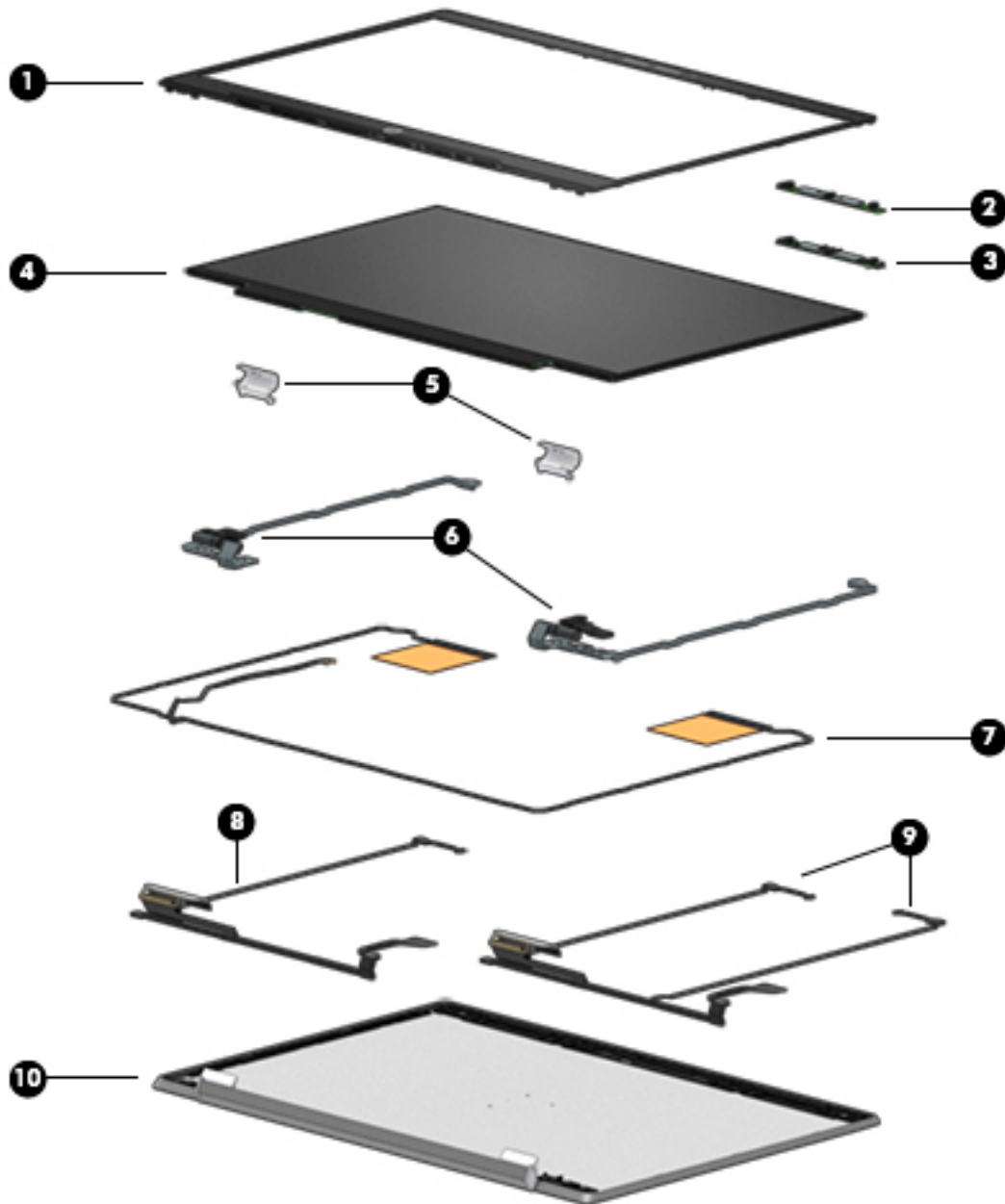


Table 3-2 Display assembly components and descriptions

Item	Component	Spare part number
(1)	Display bezel:	
	For use only on computer models equipped with an FHD infrared camera	L19182-001
	For use only on computer models equipped with an HD non-infrared camera	L19181-001
	Camera/microphone module:	
(2)	For use only on computer models equipped with an FHD infrared camera	L18504-001

Table 3-2 Display assembly components and descriptions (continued)

Item	Component	Spare part number
(3)	For use only on computer models equipped with an HD non-infrared camera/microphone module	L18505-001
(4)	Display panel:	
	14.0-in, FHD, AntiGlare, UWVA, 400 nits	L51765-001
	14.0-in, FHD, AntiGlare, UWVA, 250 nits	L51766-001
	14.0-in, FHD, AntiGlare, UWVA, 220 nits	L19198-001
	14.0-in, FHD, BrightView, UWVA, 250 nits	L51767-001
	14.0-in, FHD, BrightView, UWVA, 220 nits	L19199-001
	14.0-in, FHD, AntiGlare, SVA, 220 nits	L54655-001
	14.0-in, HD, AntiGlare, SVA, 220 nits	L19200-001
	14.0-in, HD, BrightView, SVA, 220 nits	L19201-001
(5)	Hinge covers (2):	
	In luminous green finish	L51748-001
	In natural silver finish	L19183-001
	In plum mauve finish	L51747-001
	In rose gold finish	L19184-001
(6)	Hinges (include left and right display hinges)	L19185-001
(7)	Wireless antennas (includes auxiliary and main antenna cables and transceivers)	L19179-001
	Display panel cable (includes the camera/microphone module cable)	
(8)	For use only with the HD non-infrared camera/microphone module	L19187-001
(9)	For use only with the FHD infrared camera/microphone module	L19188-001
(10)	Display back cover (includes left and right wireless antenna cables and transceivers, rubber padding, and shielding):	
	In ceramic white finish	L19173-001
	In ceramic white finish with natural silver logo	L51738-001
	In mineral silver finish	L19174-001
	In misty mauve finish	L51739-001
	In pale gold finish	L19175-001
	In sapphire blue finish	L19177-001
	In tranquil pink finish	L19176-001
	In velvet burgundy finish	L19178-001
	In warm gold finish	L51740-001
	Display adhesive (secures display panel to display back cover; not illustrated)	L28524-001
	Display panel conductive tape (not illustrated)	L29768-001

Miscellaneous parts

Table 3-3 Miscellaneous parts components and descriptions

Component	Spare part number
AC adapter:	
65-W HP Smart AC adapter (non-PFC, RC, EM, 4.5-mm, for use in all countries and regions except Argentina)	913691-850
65-W HP Smart AC adapter (non-PFC, RC, 4.5-mm, for use in Argentina)	710340-850
65-W AC adapter (non-PFC, S-3P, 4.5-mm)	710412-001
65-W AC adapter (non-PFC, RC, EM, 4.5-mm)	913691-850
45-W HP Smart AC adapter (non-PFC, RC, 4.5-mm)	741727-001
45-W HP Smart AC adapter (non-PFC, 4.5-mm, for use in Argentina)	741553-852
HP External USB optical drive	747080-001
HP HDMI-to-VGA adapter	701943-001
USB-C to USB-A adapter	833960-001
Power cord (C5 connector, 1.0 m):	
For use in Argentina	L19357-001
For use in Australia	L19358-001
For use in Brazil	L19359-001
For use in Denmark	L19360-001
For use in Europe	L19361-001
For use in India	L19363-001
For use in Israel	L19362-001
For use in Italy	L19364-001
For use in North America	L19367-001
For use in the People's Republic of China	L19368-001
For use in South Africa	L19369-001
For use in Switzerland	L19370-001
For use in Taiwan	L19372-001
For use in Thailand	L19371-001
For use in the United Kingdom	L19373-001
Rubber Foot Kit (includes bottom cover rear feet):	
In luminous green finish	L51750-001
In natural silver finish	L19170-001
In plum mauve finish	L51749-001

Table 3-3 Miscellaneous parts components and descriptions (continued)

Component	Spare part number
In rose gold finish	L19171-001
Screw Kit	L19189-001

4 Removal and replacement procedures preliminary requirements


Tools required

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


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

Service considerations

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

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

Plastic parts

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

Cables and connectors

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

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

Drive handling

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

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

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

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

Avoid dropping drives from any height onto any surface.

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

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

Avoid exposing a drive to temperature extremes or liquids.

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

Grounding guidelines

Electrostatic discharge damage

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

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

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

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

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

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

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

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

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


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

Table 4-1 Typical electrostatic voltage levels

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

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

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

Workstation guidelines

Follow these grounding workstation guidelines:

- Cover the workstation with approved static-shielding material.
- Use a wrist strap connected to a properly grounded work surface and use properly grounded tools and equipment.
- Use conductive field service tools, such as cutters, screwdrivers, and vacuums.
- When fixtures must directly contact dissipative surfaces, use fixtures made only of static-safe materials.
- Keep the work area free of nonconductive materials, such as ordinary plastic assembly aids and Styrofoam.

- Handle ESD-sensitive components, parts, and assemblies by the case or PCM laminate. Handle these items only at static-free workstations.
- Avoid contact with pins, leads, or circuitry.
- Turn off power and input signals before inserting or removing connectors or test equipment.

Equipment guidelines

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

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

The following grounding equipment is recommended to prevent electrostatic damage:

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


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

Table 4-2 Shielding protection provided by antistatic bags and floor mats

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


5 Removal and replacement procedures for Authorized Service Provider parts


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

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

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

Component replacement procedures

 **NOTE:** Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See [Labels on page 21](#) for details.

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

There are as many as 54 screws that must be removed, replaced, and/or loosened when servicing Authorized Service Provider only parts. Make special note of each screw size and location during removal and replacement.

Bottom cover

Table 5-1 Bottom cover description and spare part number information

Description	Spare part number
In luminous green finish	L51750-001
In natural silver finish	L19170-001
In plum mauve finish	L51749-001
In rose gold finish	L19171-001

Before removing the bottom cover, follow these steps:

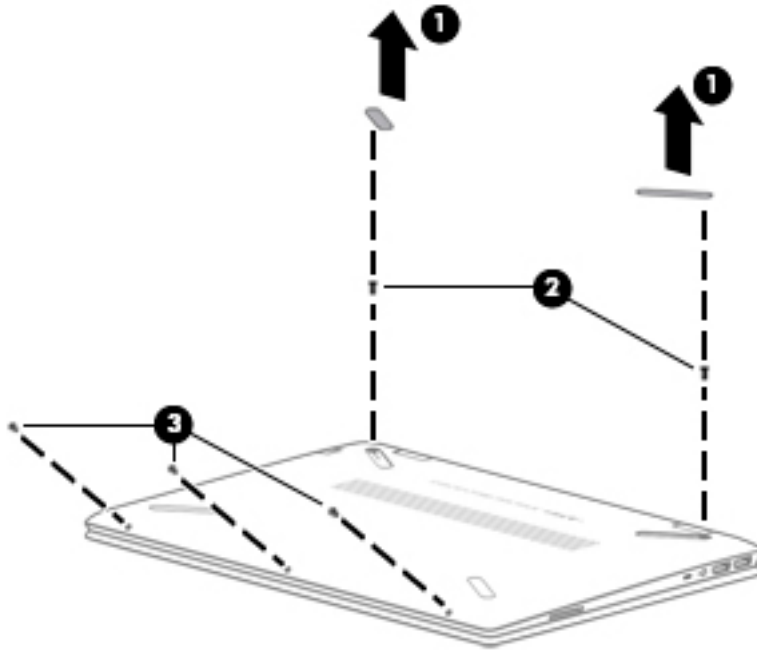
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord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

Remove the bottom cover:

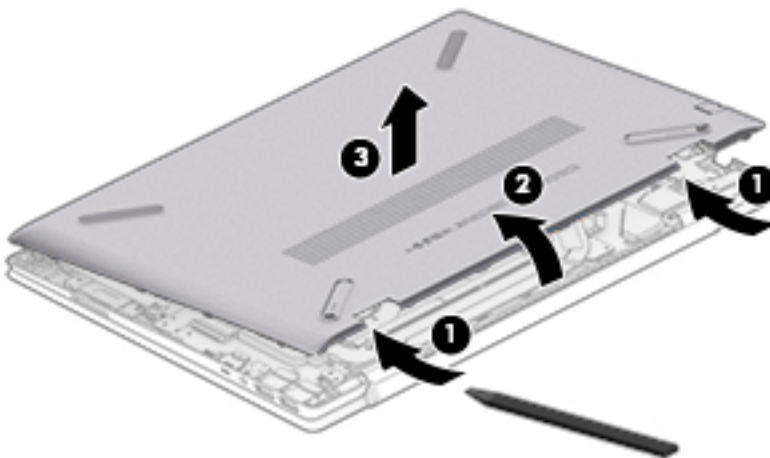
1. Remove the two rubber feet **(1)**.

The rubber feet are available in the Rubber Foot Kits, using the following spare part numbers:

- L51750-001 – For use only on computer models in luminous green finish
 - L19170-001 – For use only on computer models in natural silver finish
 - L51749-001 – For use only on computer models in plum mauve finish
 - L19171-001 – For use only on computer models in rose gold finish
2. Remove the two Phillips M2.5×5.0 screws (P1 driver) under the rubber feet.
 3. Remove the three Phillips M2.0×4.0 screws (P0 driver) along the front edge on the bottom cover



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



Reverse this procedure to install the bottom cover.

Battery

Table 5-2 Battery description and spare part number information

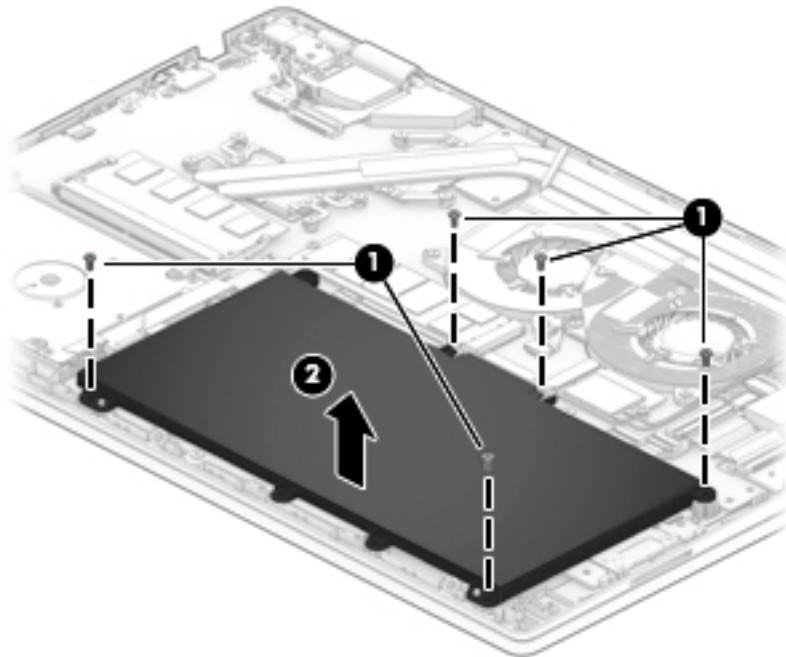
Description	Spare part number
3-cell, 41-WHr, 3.6-AHr, Li-ion battery	L11119-855

Before removing the battery, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 51](#)).


Remove the battery:

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



Reverse this procedure to install the battery.

Display assembly


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

Before removing the display assembly, follow these steps:

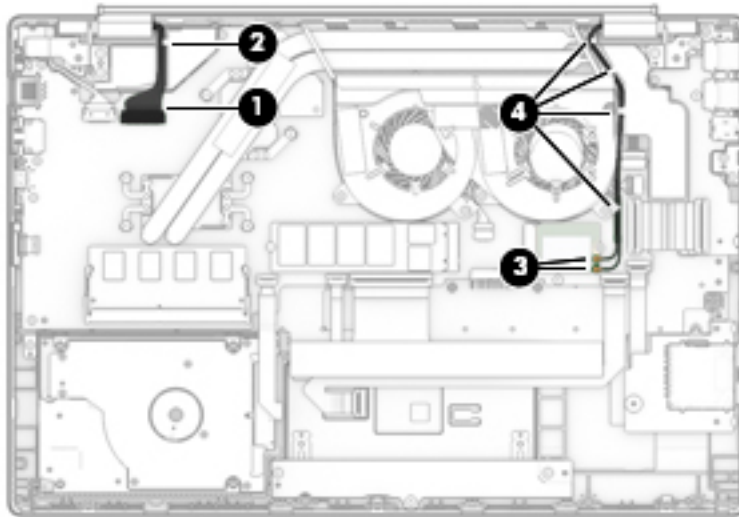
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 51](#)).
5. Remove the battery (see [Battery on page 53](#)).

Remove the display assembly:

1. Disconnect the display cable from the system board ZIF connector **(1)**.
2. Release the display panel from the retention clips **(2)** and routing channel built into the left speaker.
3. Disconnect the WLAN antenna cables **(3)** from the terminals on the WLAN module.

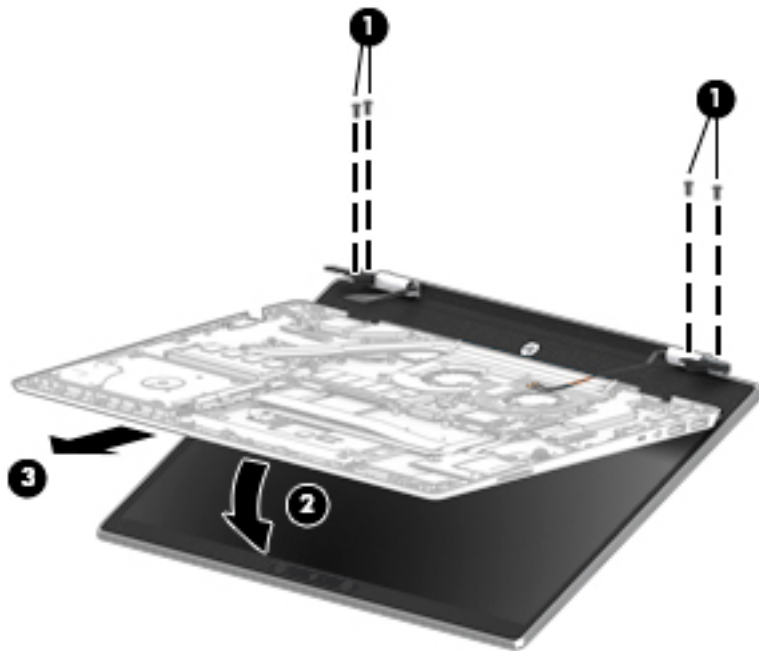
 **NOTE:** The WLAN antenna cable labeled "1/MAIN" connects to the WLAN module "Main" terminal. The WLAN antenna cable labeled "2/AUX" connects to the WLAN module "Aux" terminal.

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



5. Remove the four Phillips M2.5×6.0 screws **(1)** that secure the display assembly to the computer.
6. Rotate the display downward to separate it from the hinges **(2)**.

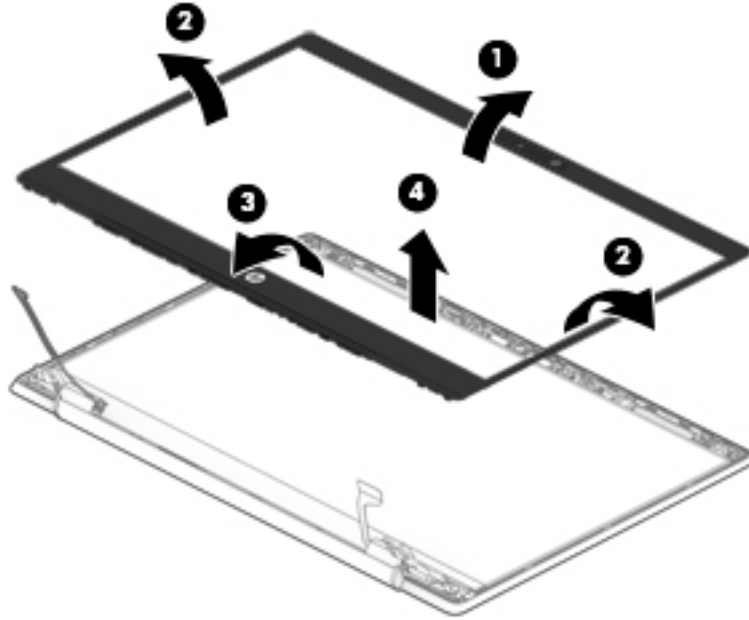
7. Separate the display from the computer (3).




8. If it is necessary to replace the display bezel or any of the display assembly subcomponents:
- Release the top edge of the display bezel (1) from the display assembly.
 - Release the left and right edges of the display bezel (2) from the display assembly.
 - Release the bottom edge of the display bezel (3) from the display assembly.

- d. Remove the display bezel (4) from the display assembly.

The display bezel is available spare part numbers L19182-001 (for use only on computer models equipped with an FHD infrared camera) and L19181-001 (for use only on computer models equipped with an HD non-infrared camera).



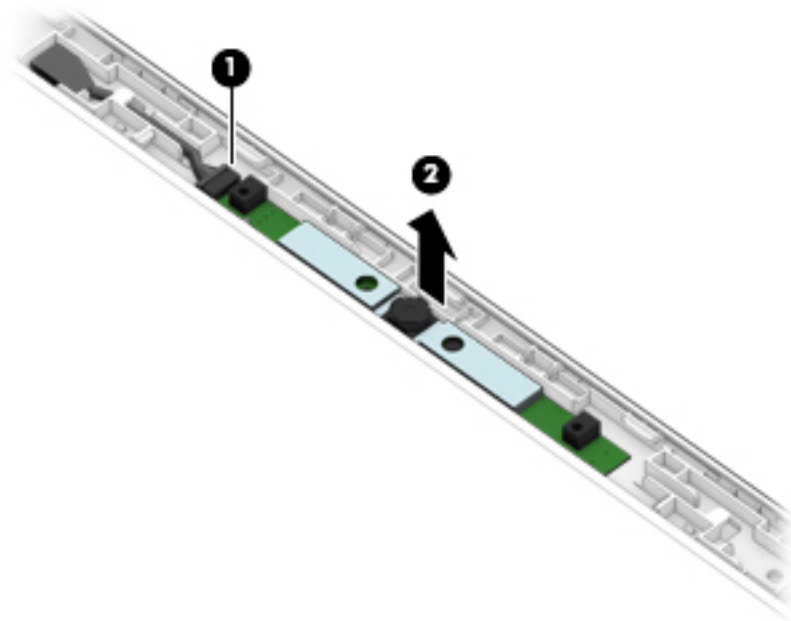
9. If it is necessary to replace the camera/microphone module:
 - a. Disconnect the cable (1) from the camera/microphone module.

 **NOTE:** Cables connect to both sides of the FHD infrared camera. A single cable connects to only one side of the HD camera.

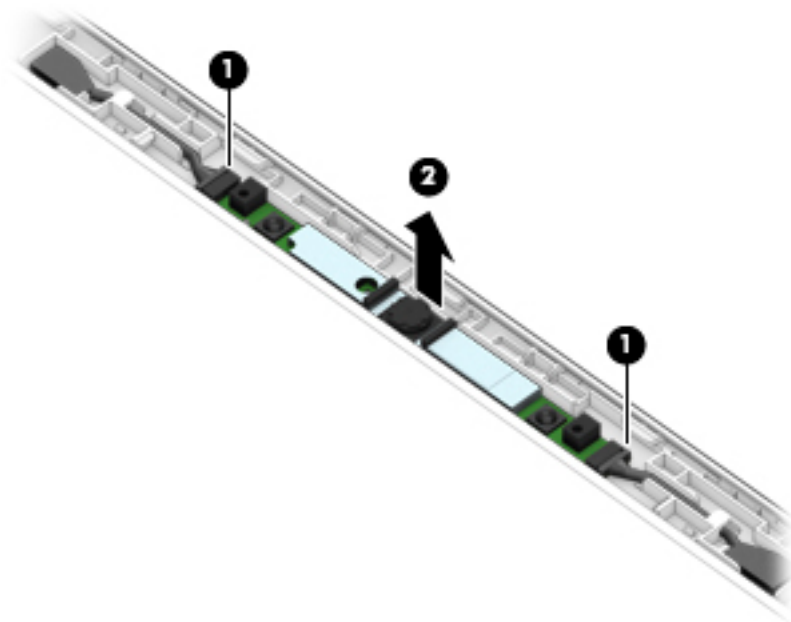
- b. Detach the camera/microphone module (2) from the display back cover. (The module is attached with double-sided adhesive.)

The camera/microphone module is available using spare part numbers L18504-001 (for use only on computer models equipped with an FHD infrared camera) L18505-001 (for use only on computer models equipped with an HD non-infrared camera/microphone module).

Models with an HD camera



Models with an IR camera

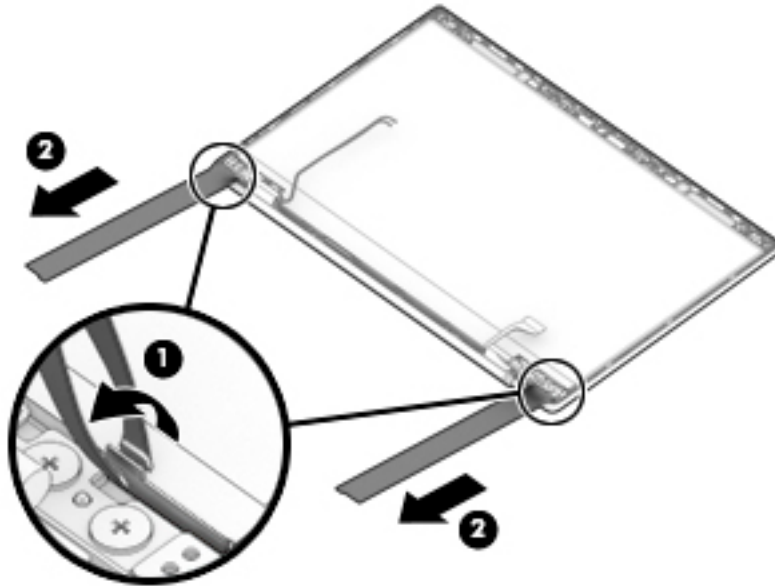


10. If it is necessary to replace the display panel:

- a. The panel is secured to the display enclosure with long strips of tape. Use a tweezer to grasp the tape just above each hinge (1).
- b. Pull the tape out from behind the panel (2).

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

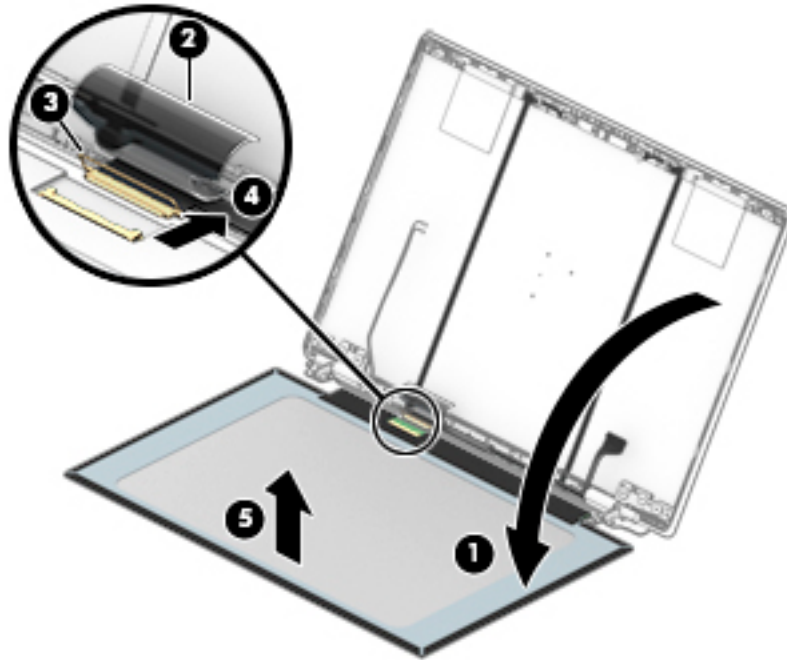
Display adhesive is available using spare part number L28524-001.



- c. Swing the top edge of the display panel (1) forward until the panel rests upside down on the keyboard.
- d. Release the adhesive support strip (2) that secures the display panel cable connector to the display panel.
- e. Press the release lever on the side of the connector (3).
- f. Disconnect the display panel cable (4) from the display panel.

- g. Remove display panel (5) from the display enclosure.

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

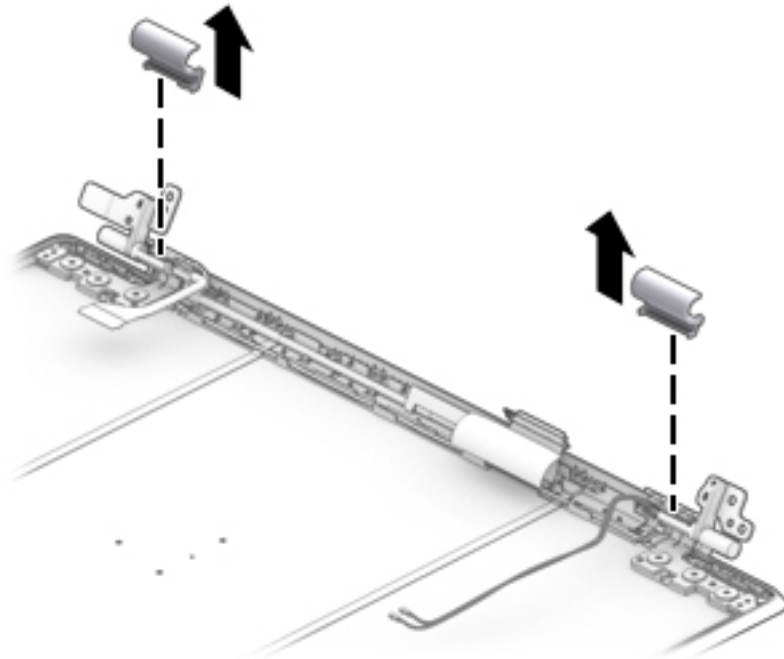


- h. Remove the display panel.

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

- L51765-001 – 14.0-in, FHD, AntiGlare, UWVA, 400 nits
- L51766-001 – 14.0-in, FHD, AntiGlare, UWVA, 250 nits
- L19198-001 – 14.0-in, FHD, AntiGlare, UWVA, 220 nits
- L51767-001 – 14.0-in, FHD, BrightView, UWVA, 250 nits
- L19199-001 – 14.0-in, FHD, BrightView, UWVA, 220 nits
- L54655-001 – 14.0-in, FHD, AntiGlare, SVA, 220 nits
- L19200-001 – 14.0-in, HD, AntiGlare, SVA, 220 nits
- L19201-001 – 14.0-in, HD, BrightView, SVA, 220 nits

11. If it is necessary to replace the hinge covers, pull up on the side of the hinge covers to remove them.



Hinge covers are available using the following spare part numbers:

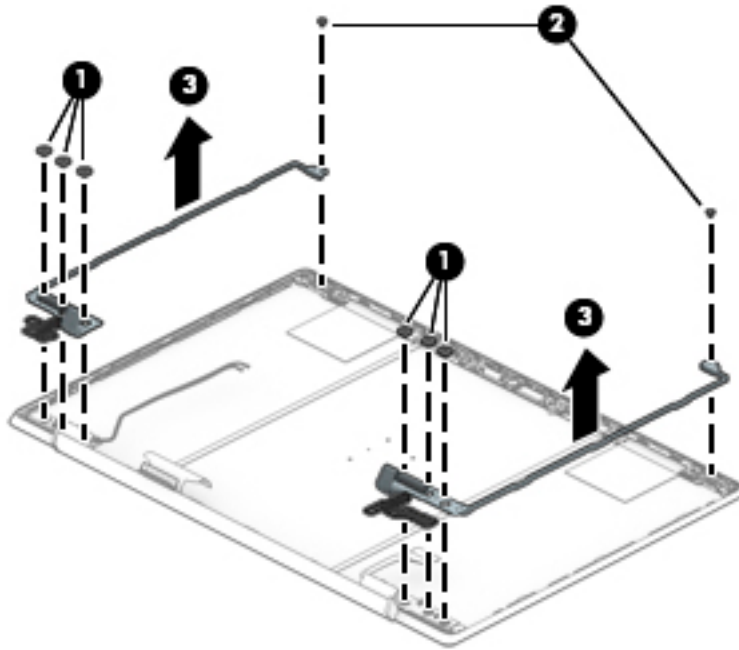
- L51748-001 – For use only on computer models in luminous green finish
- L19183-001 – For use only on computer models in natural silver finish
- L51747-001 – For use only on computer models in plum mauve finish
- L19184-001 – For use only on computer models in rose gold finish

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

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

- c. Remove the display hinges (3).

The display hinges are available using spare part number L19185-001.



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

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



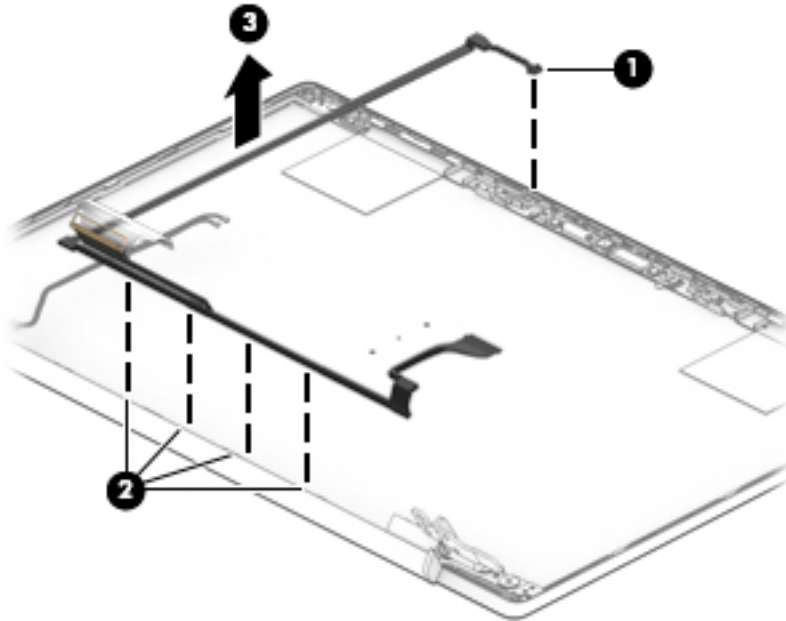
NOTE: Cables connect to both sides of IR cameras. A single cable connects to only one side of HD cameras.

- b. Release the cable from the retention clips (2) and routing channel built into the bottom edge of the display enclosure.

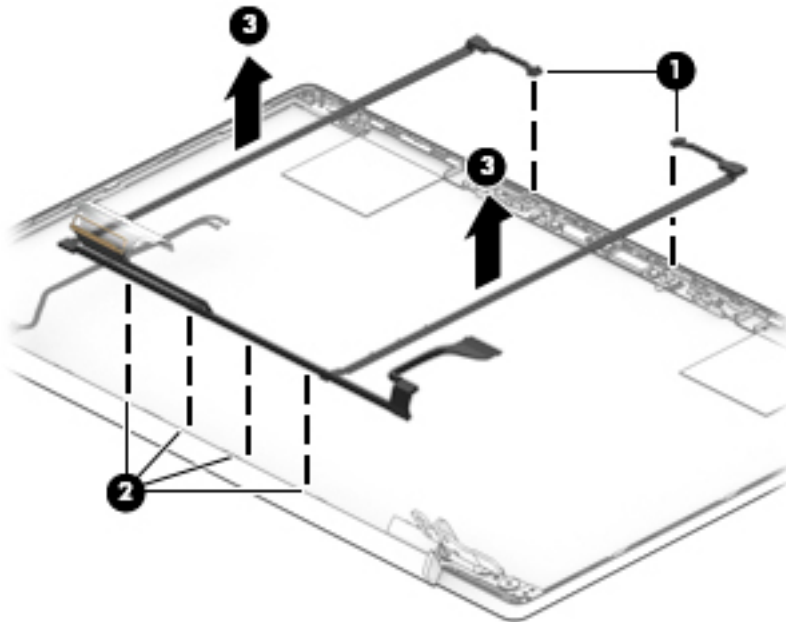
- c. Remove the display panel cable (3).

The display panel cable is available using spare part numbers L19188-001 (for use only with the FHD infrared camera/microphone module) and L19187-001 (for use only with the HD non-infrared camera/microphone module).

Models with an HD camera



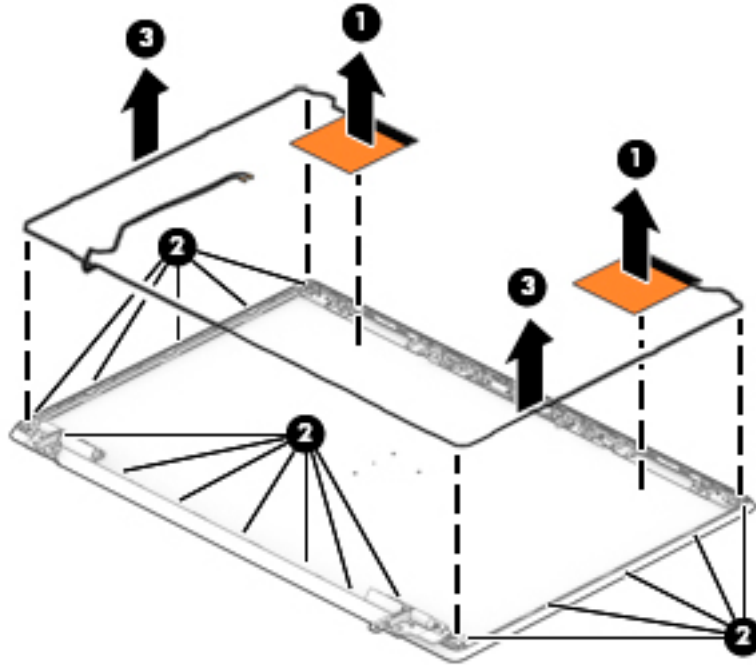
Models with an IR camera



14. If it is necessary to replace the wireless antenna cables and transceivers:

- Detach the wireless antenna transceivers (1) from the display enclosure. (The wireless antenna transceivers are attached to the enclosure with double-sided adhesive.)
- Release the wireless antenna cables from the retention clips and routing channels built into the sides of the display enclosure (2).
- Remove the antennas from the display enclosure (3).

The wireless antenna cables and transceivers are available using spare part number L19179-001.



Reverse this procedure to reassemble and install the display assembly.

Hard drive

NOTE: The hard drive spare part kit does not include the hard drive bracket or the hard drive cable. The hard drive bracket is available using spare part number L19469-001. The hard drive cable is available using spare part number L19172-001

Table 5-3 Hard drive description and spare part number information

Description	Spare part number
1-TB, 5400-rpm, SATA, 7.0 mm	762990-005
500-GB, 5400-rpm, SATA, 7.0 mm	778186-005

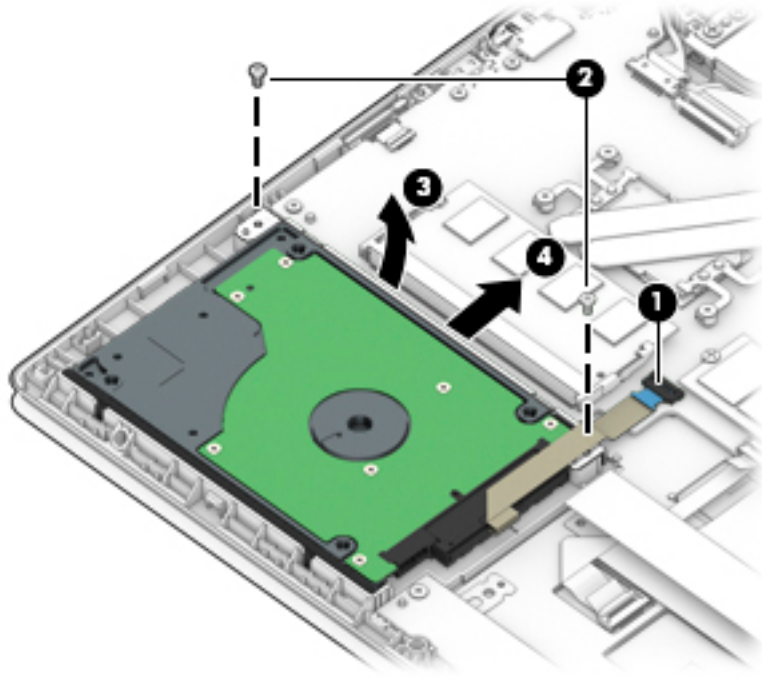
Before removing the hard drive, follow these steps:

- 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.
- Disconnect all external devices connected to the computer.
- Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

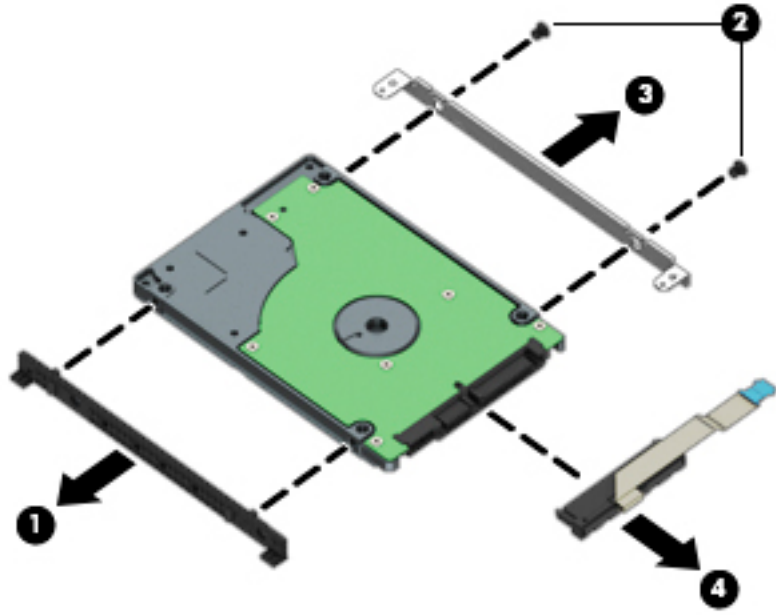
4. Remove the bottom cover (see [Bottom cover on page 51](#)).
5. Remove the battery (see [Battery on page 53](#)).

Remove the hard drive:

1. Disconnect the hard drive cable from the ZIF connector on the system board (1).
2. Remove the two Phillips M2.0×4.0 screws (2) that secure the hard drive to the computer.
3. Rotate the inside of the hard drive upward (3), and then lift the hard drive out of the computer (4).



4. If it is necessary to disassemble the hard drive:
 - a. Pull the rubber bracket away from hard drive (1).
 - b. Remove the two Phillips M2.0×4.0 screws (2) from the metal bracket.
 - c. Remove the metal bracket (3).
 - d. Disconnect the connector from the rear of the drive (4).




Reverse this procedure to reassemble and install the hard drive.

WLAN module

Table 5-4 WLAN module description and spare part number information

Description	Spare part number
Intel Dual Band Wireless ac 7265 802.11 AC 2×2 Wi-Fi + Bluetooth 4.2 Combo Adapter (non-vPro)	901229-855
Intel Dual Band Wireless ac 3168 802.11 ac 1×1 Wi-Fi + Bluetooth 4.2 Combo Adapter (non-vPro)	863934-855
Realtek RTL8723DE 802.11 bgn 1x1 Wi-Fi + Bluetooth 4.2 Combo Adapter	L21480-001
Realtek RTL8822BE 802.11 ac 2×2 Wi-Fi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	924813-855
Realtek RTL8821CE 802.11 ac 1×1 Wi-Fi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)	L17365-005
Intel Wireless 9461 ac 1×1 MU-MIMO + Bluetooth 5.0 M.2 non-vPro MIPI+BRI WW with 1 antenna	L25889-005
Intel Wireless 9560 ac 2×2 MU-MIMO + Bluetooth 5.0 M.2 non-vPro MIPI+BRI WW with 2 antennas	L22634-005


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

Before removing the WLAN module, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 51](#)).
5. Remove the battery (see [Battery on page 53](#)).


Remove the WLAN module:

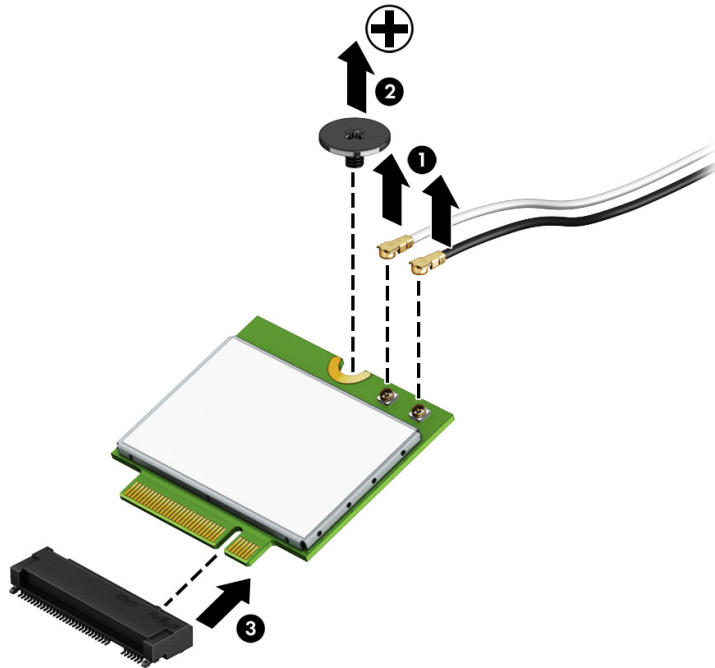
1. Disconnect the WLAN antenna cables **(1)** from the terminals on the WLAN module.

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

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

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

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



Reverse this procedure to install the WLAN module.

Solid-state drive

Table 5-5 Solid-state module description and spare part number information

Description	Spare part number
512-GB, 2280, PCIe, NVMe solid-state drive	L18510-001
256-GB, M.2 2280, SATA-3, solid-state drive with TLC	L18508-001
256-GB, 2280, PCIe, NVMe solid-state drive	L18509-001
128-GB, M.2 2280, SATA-3, solid-state drive with TLC	L18507-001
Solid-state drive carrier	L24936-001
Solid-state drive board	L24937-001
Solid-state drive cable	L24938-001



IMPORTANT: An M.2 solid-state drive is installed into the M.2 connector that is used by an Optane memory module. You cannot install both a solid-state drive and an Optane memory module in the computer at the same time.

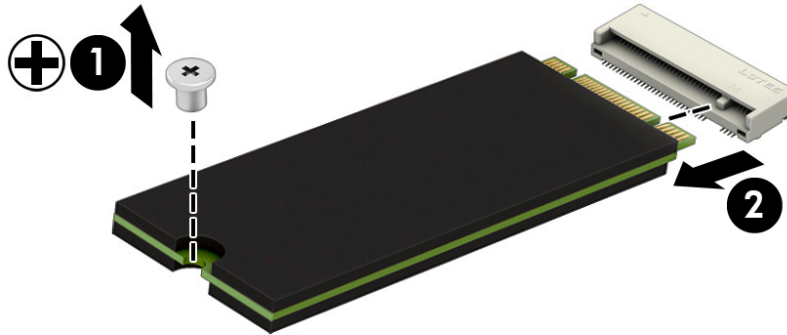
Before removing the solid-state drive, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 51](#)).
5. Remove the battery (see [Battery on page 53](#)).

Remove the solid-state drive:

1. Remove the Phillips M2.0×3.0 screw **(1)** that secures the drive to the carrier.

2. Remove the drive (2) by pulling it away from the connector.



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

Optane memory module (select products only)

IMPORTANT: The Optane memory module is installed into the M.2 connector that is used by M.2 solid-state drives. You cannot install both an Optane memory module and a solid-state drive in the computer.

Table 5-6 Optane memory module description and spare part number information

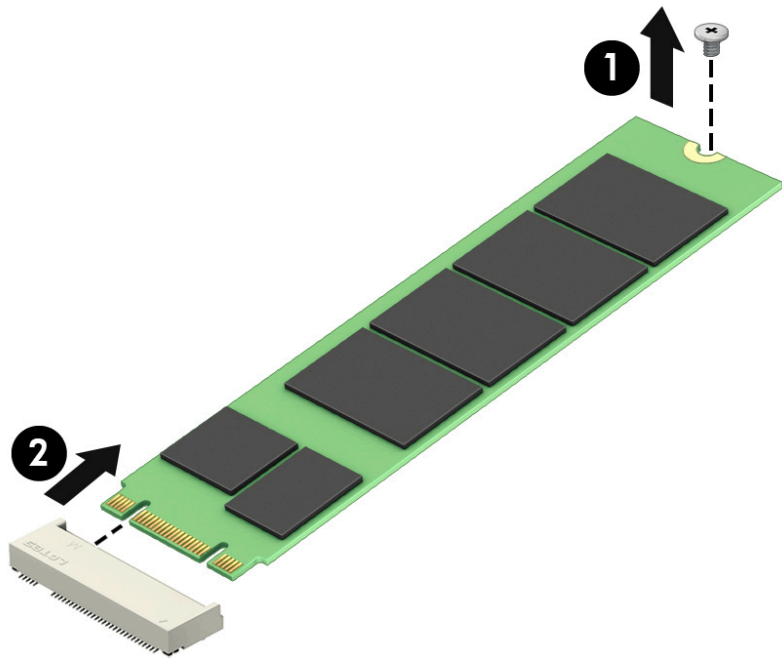
Description	Spare part number
Optane memory module, 16 GB	L18506-001

Before removing the Optane memory module, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 51](#)).
5. Remove the battery (see [Battery on page 53](#)).

Remove the Optane memory module:

- ▲ Remove the Phillips M2.0×3.0 screw (1), and then pull the Optane memory module from the socket (2).



Reverse this procedure to install the Optane memory module.

Memory module

Table 5-7 Memory module description and spare part number information

Description	Spare part number
16-MB, DDR4-2400, 1.2-V	865396-855
8-MB, DDR4-2400, 1.2-V	862398-855
4-MB, DDR4-2400, 1.2-V	862397-855

Update BIOS before adding memory modules

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

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

To update BIOS:

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

Before removing the memory module, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 51](#)).
5. Remove the battery (see [Battery on page 53](#)).

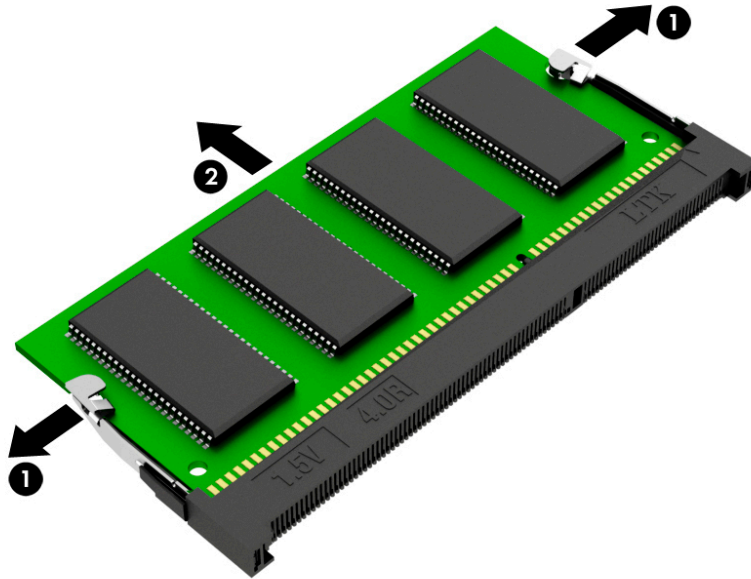
Remove the memory module:

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

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

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

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



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

Reverse this procedure to install a memory module.

Card reader board



NOTE: The card reader board spare part kit does not include the card reader board cable. The card reader board cable is available using spare part number L19155-001.

Table 5-8 Card reader board description and spare part number information

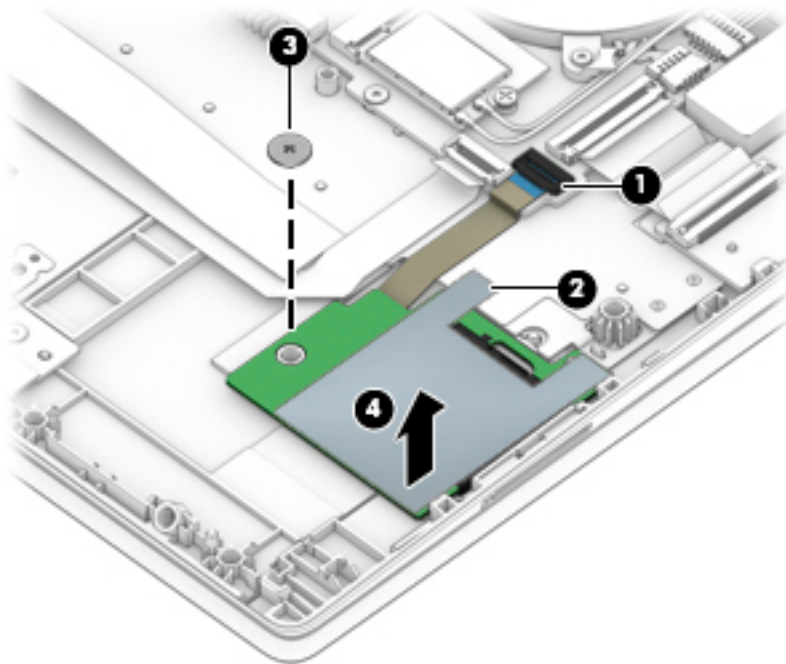
Description	Spare part number
Card reader board	L19154-001

Before removing the card reader board, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 51](#)).
5. Remove the battery (see [Battery on page 53](#)).

Remove the card reader board:

1. Disconnect the cable from the ZIF connector on the system board (1).
2. Release the silver tab securing the card reader board (2).
3. Remove the Phillips M2.0×2.0 screw (P0 driver) (3) that secures the board to the computer.
4. Remove the board from the computer (4).



Reverse this procedure to install the card reader board.

TouchPad

 **NOTE:** The TouchPad spare part kit includes the TouchPad bracket, but does not include the TouchPad cable. The TouchPad cable is available using spare part number L19167-001.

Table 5-9 TouchPad description and spare part number information

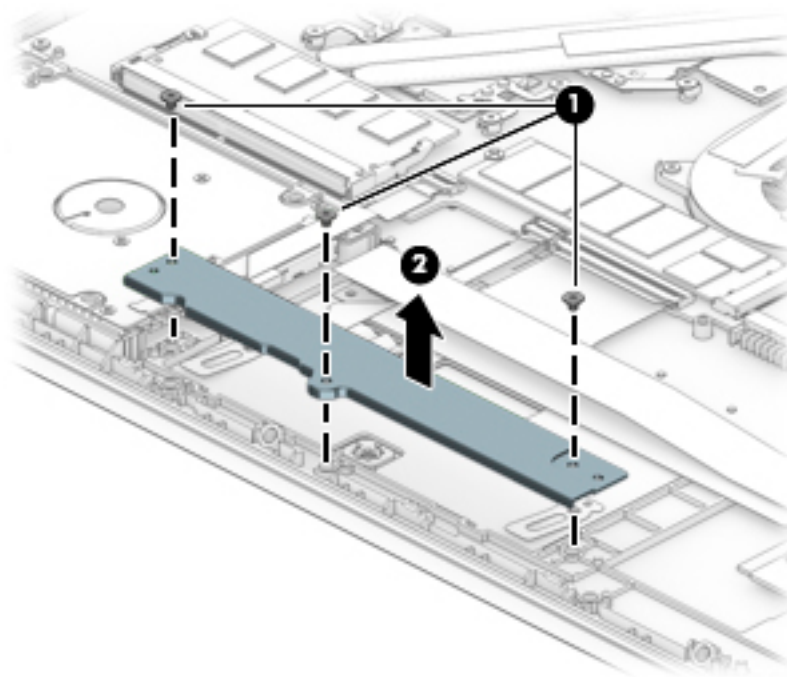
Description	Spare part number
In luminous green finish	L51746-001
In natural silver finish	L19166-001
In plum mauve finish	L51745-001
In rose gold finish	L19166-001

Before removing the TouchPad, follow these steps:

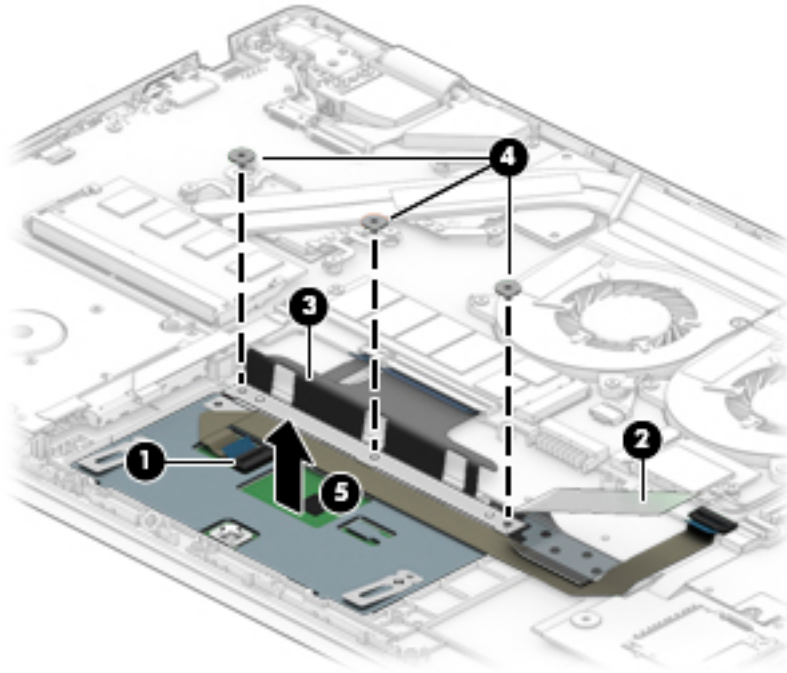
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 51](#)).
5. Remove the battery (see [Battery on page 53](#)).

Remove the TouchPad:

1. Remove the three Phillips M2.0×2.0 screws (1) that secure the TouchPad bracket to the computer.
2. Remove the bracket (2).



3. Disconnect the cable from the ZIF connector on the TouchPad (1).
4. Lift the keyboard cable to provide access to the screws(2).
5. Lift the clear plastic covering the top of the screws (3).
6. Remove the three Phillips M2.0×2.0 broad head screws (4) that secure the TouchPad to the computer.
7. Remove the TouchPad from the computer (5).



Reverse this procedure to install the TouchPad.

Lock bracket

Table 5-10 Lock bracket description and spare part number information

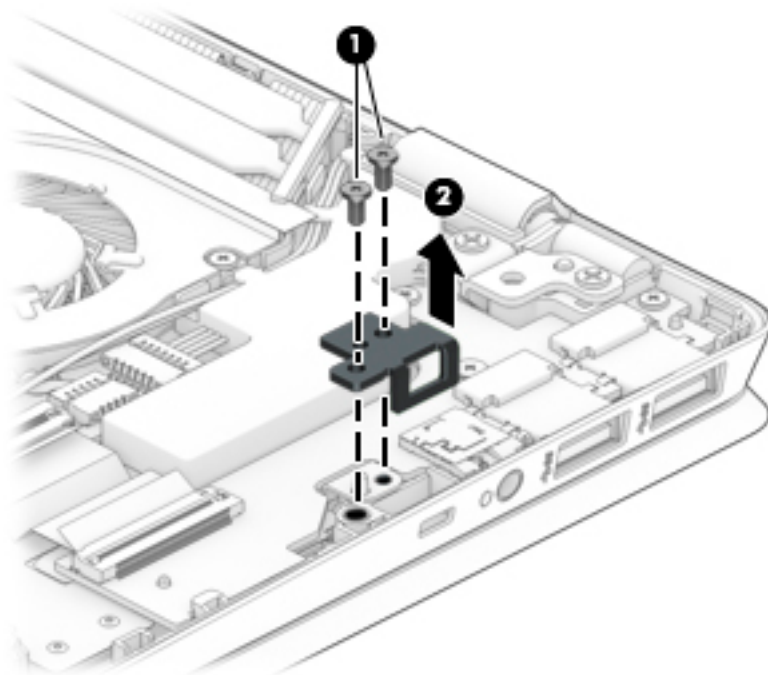
Description	Spare part number
Lock bracket	L19470-001

Before removing the lock bracket, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 51](#)).
5. Remove the battery (see [Battery on page 53](#)).

Remove the lock bracket:

1. Remove the two Phillips M2.0×4.0 screws (1) that secure the lock bracket to the computer.
2. Remove the lock bracket from the computer (2).



Reverse this procedure to install the lock bracket.

USB/audio board


 **NOTE:** The USB/audio board spare part kit does not include the USB/audio board cable. The USB/audio board cable is available using spare part number L19153-001.

Table 5-11 USB/audio board description and spare part number information

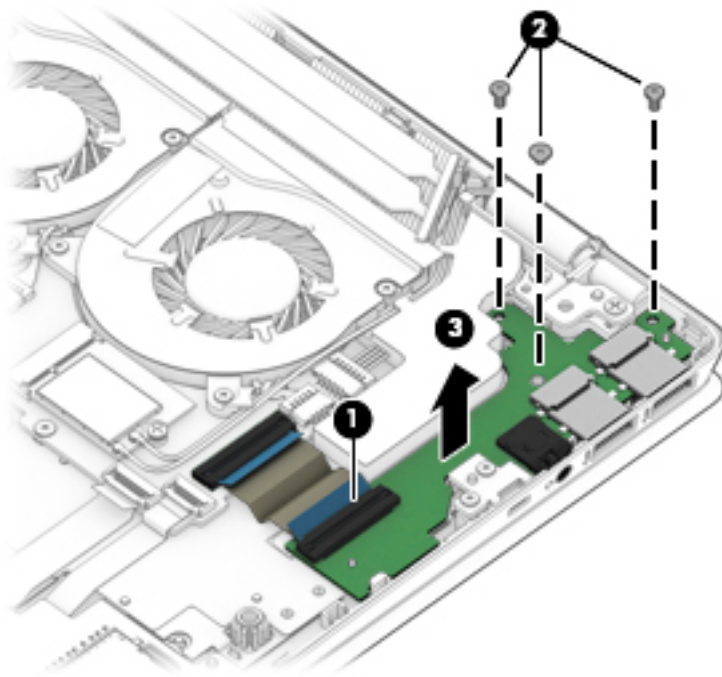
Description	Spare part number
USB/audio board	L19152-001

Before removing the USB/audio board, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 51](#)).
5. Remove the battery (see [Battery on page 53](#)).

Remove the USB/audio board:

1. Disconnect the cable from the ZIF connector on the USB/audio board (1).
2. Remove the three Phillips M2.0×4.0 screws (2) that secure the board to the computer.
3. Remove the board from the computer (3).



Reverse this procedure to install the USB/audio board.

Fingerprint reader

Table 5-12 Fingerprint reader description and spare part number information

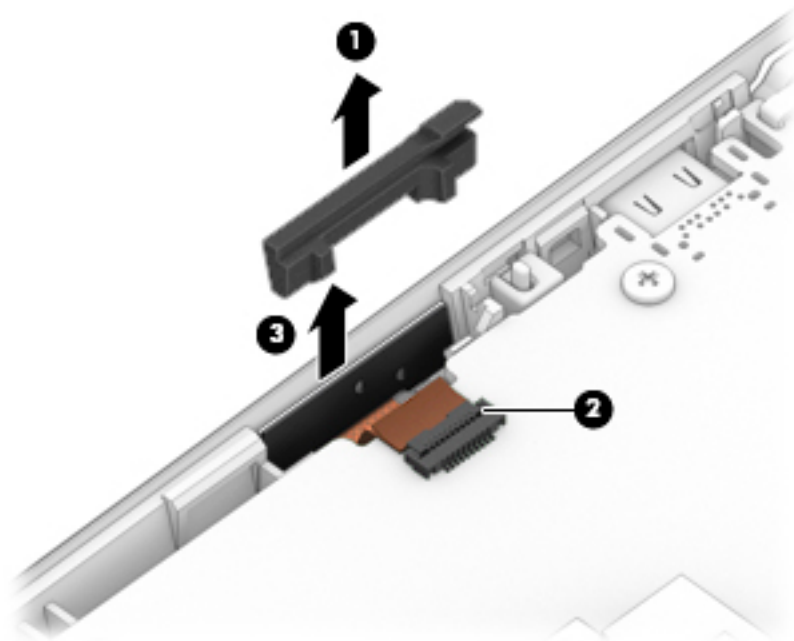
Description	Spare part number
In luminous green finish	L51744-001
In natural silver finish	L19163-001
In plum mauve finish	L51743-001
In rose gold finish	L19164-001

Before removing the fingerprint reader, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 51](#)).
5. Remove the battery (see [Battery on page 53](#)).

Remove the fingerprint reader:

1. Lift the plastic bracket out of the computer (1).
2. Disconnect the cable from the system board ZIF connector (2).
3. Remove the fingerprint reader module and cable from the computer (3).



Reverse this procedure to install the fingerprint reader.

Fan

Table 5-13 Fan description and spare part number information

Description	Spare part number
Fan for use only on computer models equipped with a graphics subsystem with discrete memory	L19159-001
Fan for use only on computer models equipped with a graphics subsystem with UMA memory	L19160-001

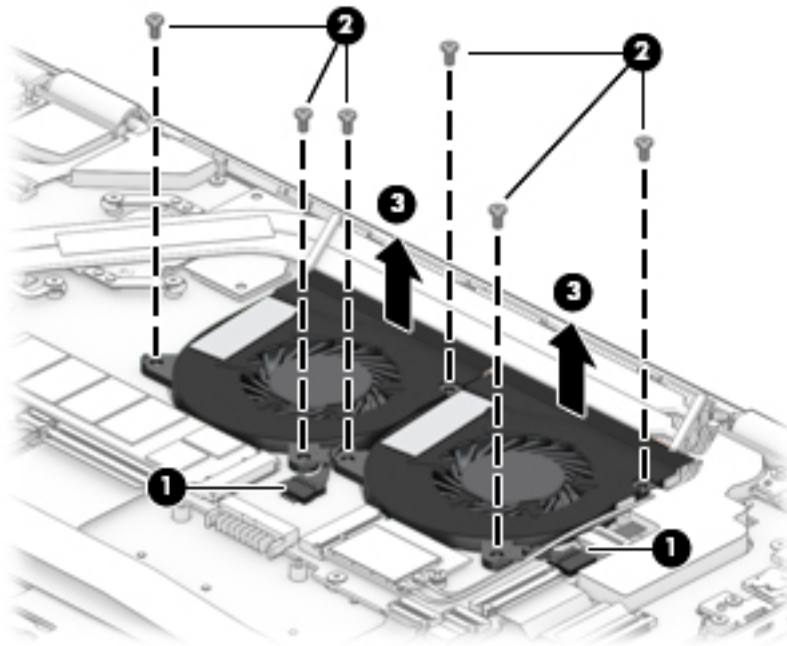
Before removing the fan, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 51](#)).
5. Remove the battery (see [Battery on page 53](#)).

Remove the fan:

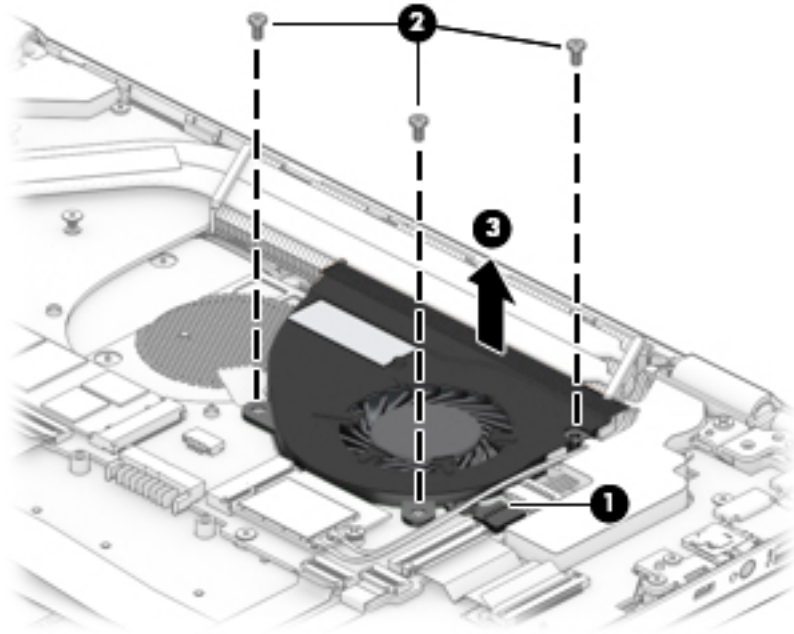
Discrete graphics models:

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



UMA graphics models:

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



Reverse these procedures to install the fan.

Heat sink

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

Table 5-14 Heat sink description and spare part number information

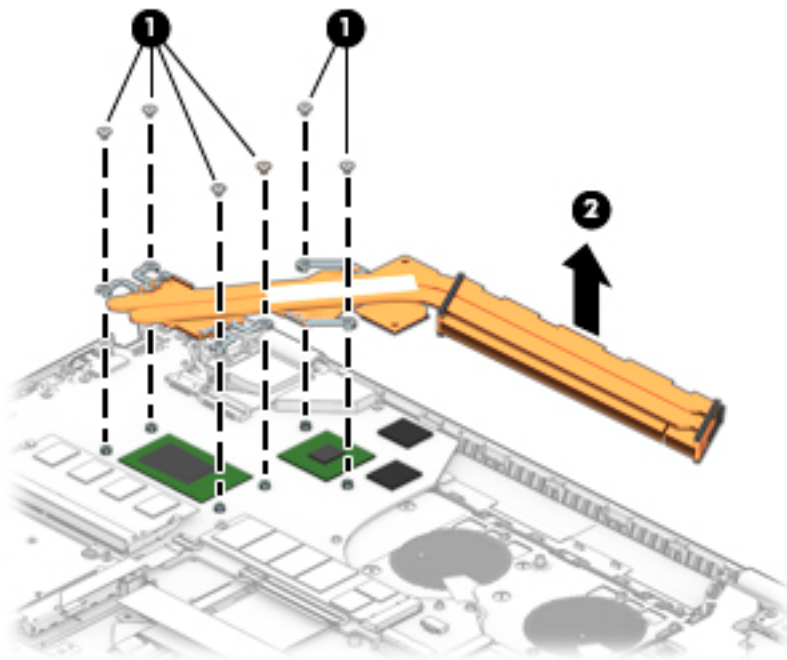
Description	Spare part number
Heat sink for use only on computer models equipped with a graphics subsystem with discrete memory	L19156-001
Heat sink for use only on computer models equipped with a graphics subsystem with UMA memory and 7th generation Intel Core processors	L19157-001
Heat sink for use only on computer models equipped with a graphics subsystem with UMA memory and 8th generation Intel Core processors	L19158-001

Before removing the heat sink, follow these steps:

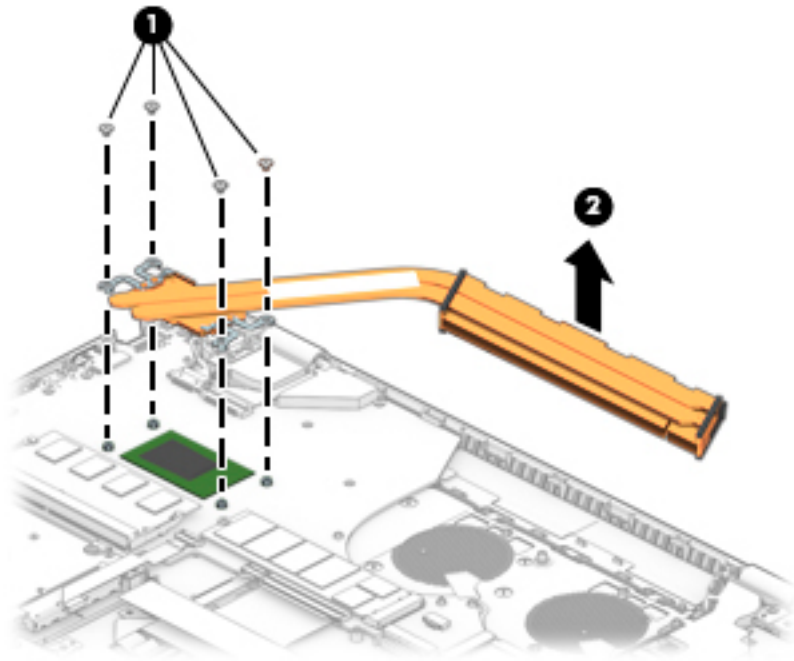
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 51](#)).
5. Remove the battery (see [Battery on page 53](#)).


Remove the heat sink:

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

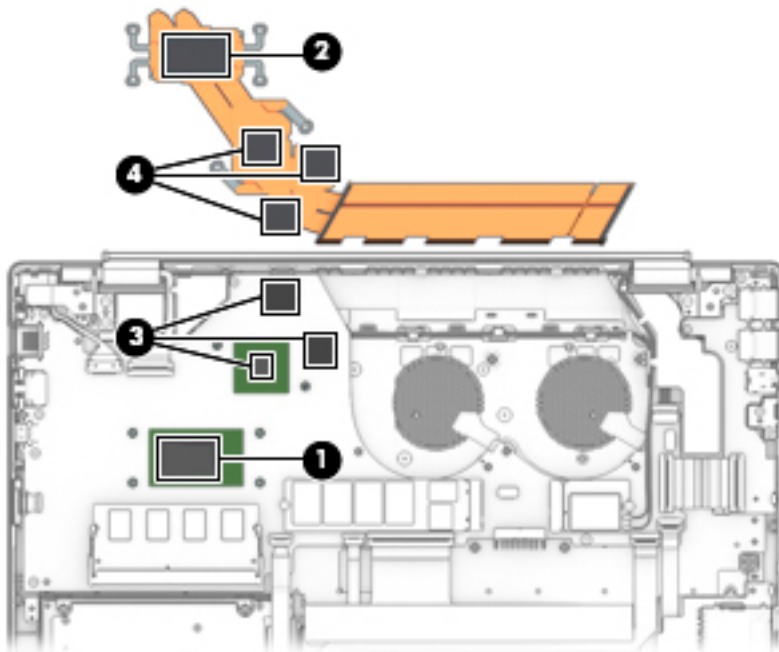


3. **UMA graphics:** In the order indicated on the heat sink, remove the four Phillips M2.0×2.5 screws (1) that secure the heat sink to the system board.
4. Remove the heat sink (2).

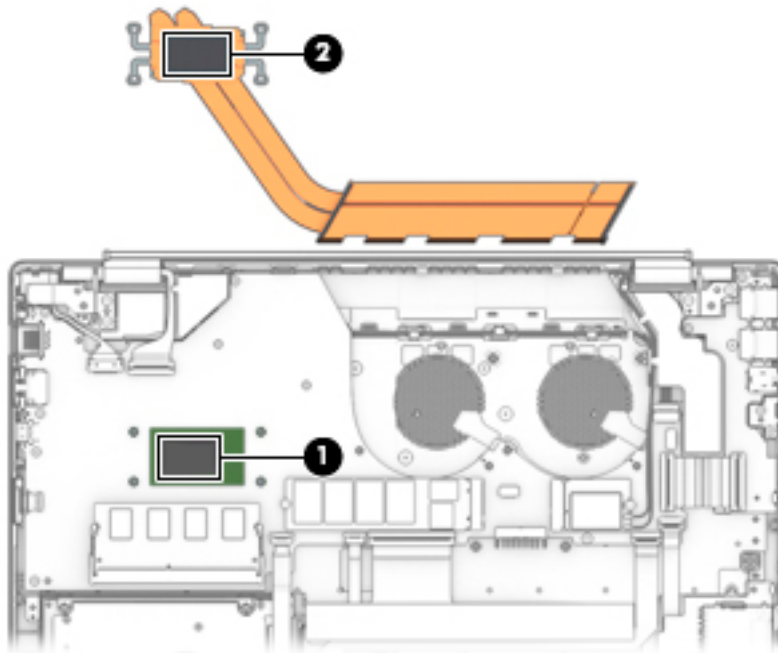


 **NOTE:** The thermal material must be thoroughly cleaned from the surfaces of the heat sink and the system board components each time the heat sink is removed. Replacement thermal material is included with the heat sink and system board spare part kits.

Discrete graphics: Thermal pads and thermal paste are used on the system board components (1), (3) and the heat sink (2), (4).



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



Reverse this procedure to install the heat sink.

System board

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

Table 5-15 System board description and spare part number information

Description	Spare part number
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX250 graphics subsystem with 4-GB of memory, and the Windows 10 operating system 	L51763-601
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX250 graphics subsystem with 4-GB of memory, and a non-Windows 10 operating system 	L51763-001
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX250 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L51762-601
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX250 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L51762-001
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L36234-601
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L36234-001
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.60-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX130 graphics subsystem with 2-GB of memory, and the Windows 10 operating system 	L51760-601

Table 5-15 System board description and spare part number information (continued)

Description	Spare part number
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8565U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX130 graphics subsystem with 2-GB of memory, and a non-Windows 10 operating system 	L51760-001
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX150 graphics subsystem with 4-GB of memory, and the Windows 10 operating system 	L18499-601
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX150 graphics subsystem with 4-GB of memory, and a non-Windows 10 operating system 	L18499-001
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L18496-601
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L18496-001
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX130 graphics subsystem with 2-GB of memory, and the Windows 10 operating system 	L18497-601
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), an MX130 graphics subsystem with 2-GB of memory, and a non-Windows 10 operating system 	L18497-001
<ul style="list-style-type: none"> Equipped with an Intel Core i7-7500U 2.70-GHz (SC turbo up to 3.50-GHz) dual core processor (4.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, and the Windows 10 operating system 	L18493-601
<ul style="list-style-type: none"> Equipped with an Intel Core i7-7500U 2.70-GHz (SC turbo up to 3.50-GHz) dual core processor (4.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, and a non-Windows 10 operating system 	L18493-001
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX250 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L51761-601
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX250 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L51761-001
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L36326-601
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L36326-001
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX150 graphics subsystem with 2-GB of memory, and the Windows 10 operating system 	L36325-601
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX150 graphics subsystem with 2-GB of memory, and a non-Windows 10 operating system 	L36325-001
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, and the Windows 10 operating system 	L51759-601

Table 5-15 System board description and spare part number information (continued)

Description	Spare part number
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, and a non-Windows 10 operating system 	L51759-001
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L18495-601
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX150 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L18495-001
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, a fingerprint reader, and the Windows 10 operating system 	L18494-601
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, a fingerprint reader, and a non-Windows 10 operating system 	L18494-001
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 4-GB of memory, and the Windows 10 operating system 	L18498-601
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 4-GB of memory, and a non-Windows 10 operating system 	L18498-001
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2-GB of memory, and the Windows 10 operating system 	L18492-601
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), an MX130 graphics subsystem with 2GB of memory, and a non-Windows 10 operating system 	L18492-001
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), a UMA graphics subsystem, and the Windows 10 operating system 	L18501-601
<ul style="list-style-type: none"> Equipped with an Intel Core i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (2400-MHz, 8.0 MB L3 cache, 15-W), a UMA graphics subsystem, and a non-Windows 10 operating system 	L18501-001
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), a UMA graphics subsystem, a fingerprint reader, and the Windows 10 operating system 	L51764-601
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), a UMA graphics subsystem, a fingerprint reader, and a non-Windows 10 operating system 	L51764-001
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), a UMA graphics subsystem, and the Windows 10 operating system 	L36238-601
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8265U 1.60-GHz (SC turbo up to 3.90-GHz) quad core processor (6.0-MB L3 cache, 15 W), a UMA graphics subsystem, and a non-Windows 10 operating system 	L36238-001
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), a UMA graphics subsystem, and the Windows 10 operating system 	L18500-601
<ul style="list-style-type: none"> Equipped with an Intel Core i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W), a UMA graphics subsystem, and a non-Windows 10 operating system 	L18500-001

Table 5-15 System board description and spare part number information (continued)

Description	Spare part number
<ul style="list-style-type: none">Equipped with an Intel Core i3-8145U 2.10-GHz (SC turbo up to 3.90-GHz) dual core processor (4.0-MB L3 cache, 15 W), a UMA graphics subsystem, and the Windows 10 operating system	L36237-601
<ul style="list-style-type: none">Equipped with an Intel Core i3-8145U 2.10-GHz (SC turbo up to 3.90-GHz) dual core processor (4.0-MB L3 cache, 15 W), a UMA graphics subsystem, and a non-Windows 10 operating system	L36237-001
<ul style="list-style-type: none">Equipped with an Intel Core i3-8130U 2.20-GHz (SC turbo up to 3.40-GHz) dual core processor (4.0-MB L3 cache, 15 W), a UMA graphics subsystem, and the Windows 10 operating system	L18503-601
<ul style="list-style-type: none">Equipped with an Intel Core i3-8130U 2.20-GHz (SC turbo up to 3.40-GHz) dual core processor (4.0-MB L3 cache, 15 W), a UMA graphics subsystem, and a non-Windows 10 operating system	L18503-001
<ul style="list-style-type: none">Equipped with an Intel Pentium 4415U 2.3-GHz dual core processor (2.0-MB L3 cache, 15 W), a UMA graphics subsystem, and the Windows 10 operating system	L18502-601
<ul style="list-style-type: none">Equipped with an Intel Pentium 4415U 2.3-GHz dual core processor (2.0-MB L3 cache, 15 W), a UMA graphics subsystem, and a non-Windows 10 operating system	L18502-001

Before removing the system board, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the following components:
 - a. Bottom cover (see [Bottom cover on page 51](#))
 - b. Battery (see [Battery on page 53](#))
 - c. Hard drive (see [Hard drive on page 63](#))
 - d. Fan (see [Fan on page 79](#))

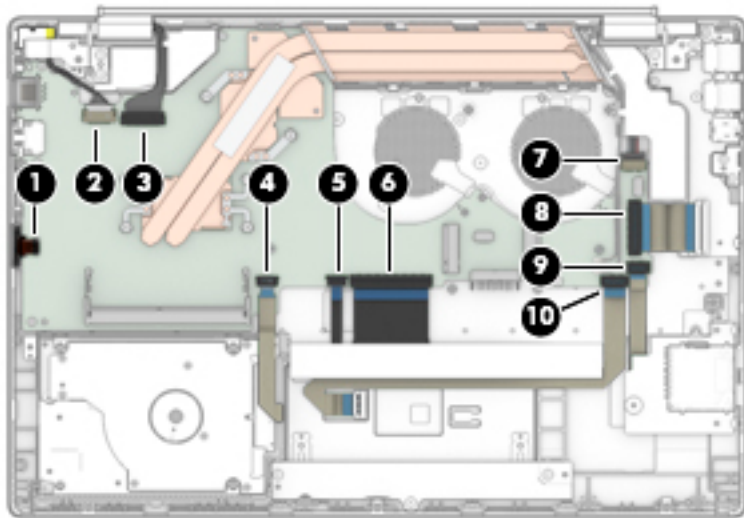
When replacing the system board, be sure to remove the following components from the defective system board and install them on the replacement system board:

- WLAN module (see [WLAN module on page 66](#))
- Solid-state drive (see [Solid-state drive on page 68](#)) or Optane memory module (see [Optane memory module \(select products only\) on page 69](#))
- Memory modules (see [Memory module on page 71](#))
- Heat sink (see [Heat sink on page 81](#))

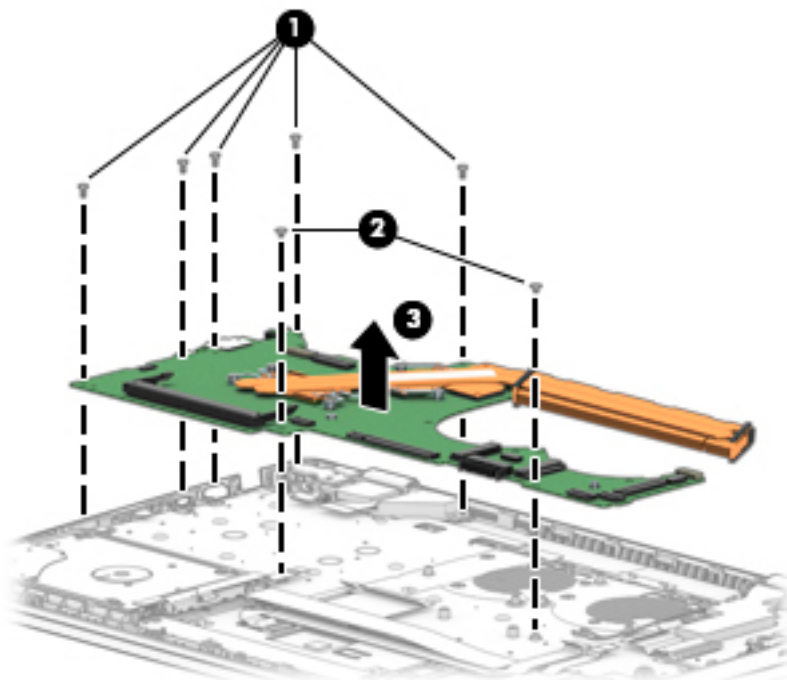
Remove the system board:

1. Disconnect the following cables:
 - (1) Fingerprint reader cable
 - (2) Power connector cable
 - (3) Display cable
 - (4) Hard drive cable

- (5) Backlight cable
- (6) Keyboard cable
- (7) Speaker cable
- (8) USB board cable
- (9) Card reader cable
- (10) TouchPad cable



- 2. Remove the five Phillips M2.0×4.0 screws (1) that secure the system board to the computer.
- 3. Remove the two Phillips M2.0×2.5 screws (2) that secure the system board to the computer.
- 4. Lift the system board out of the computer (3).



Reverse this procedure to install the system board.

Speakers

Table 5-16 Speakers description and spare part number information

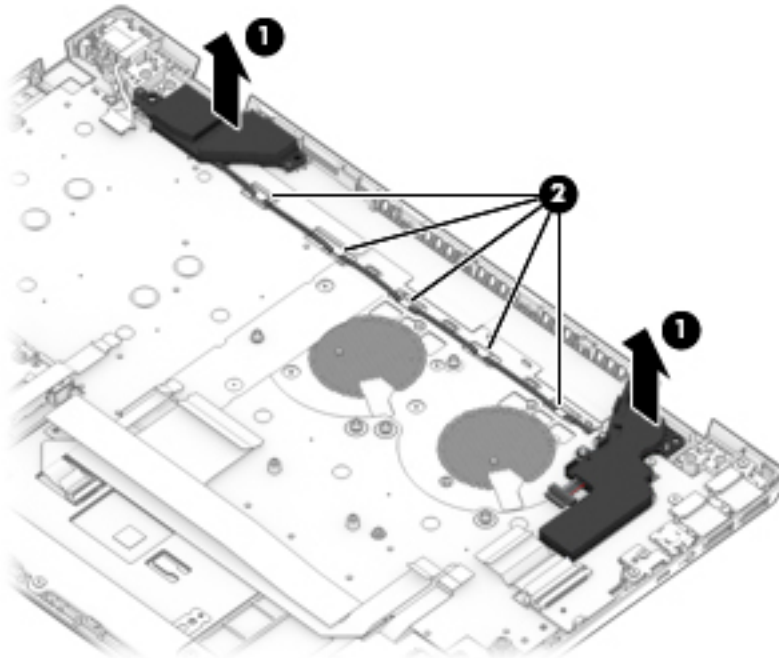
Description	Spare part number
Speakers (include cables)	L19161-001

Before removing the speakers, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the following components:
 - a. Bottom cover (see [Bottom cover on page 51](#))
 - b. Battery (see [Battery on page 53](#))
 - c. Hard drive (see [Hard drive on page 63](#))
 - d. Fan (see [Fan on page 79](#))
 - e. System board (see [System board on page 83](#))

Remove the speakers:

1. Lift the speakers (1).
2. Release the cable from the retention clips and routing channel built into the computer (2).



Reverse this procedure to install the speakers.

Power connector cable

Table 5-17 Power connector cable description and spare part number information

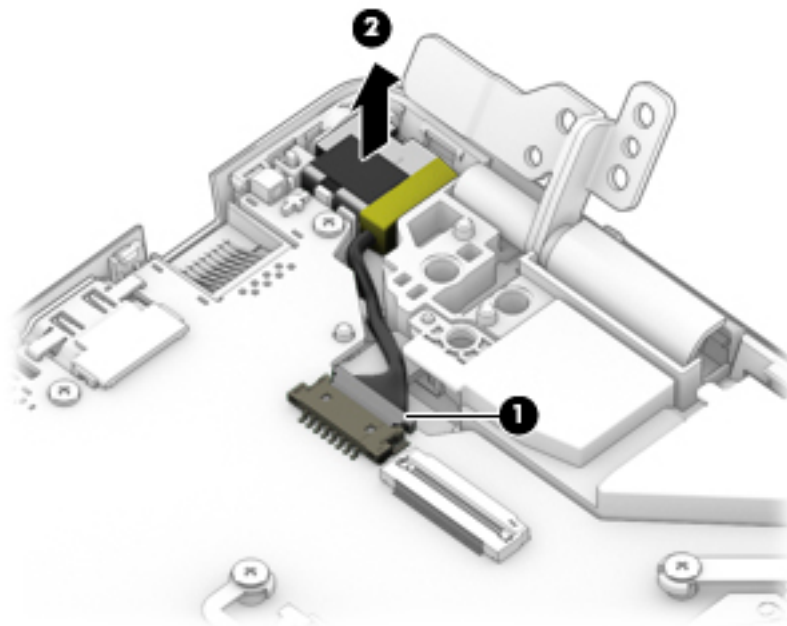
Description	Spare part number
Power connector cable	L19162-001

Before removing the power connector cable, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the following components:
 - a. Bottom cover (see [Bottom cover on page 51](#))
 - b. Battery (see [Battery on page 53](#))
 - c. Hard drive (see [Hard drive on page 63](#))
 - d. Fan (see [Fan on page 79](#))
 - e. System board (see [System board on page 83](#))

Remove the power connector cable:

1. If necessary, rotate the left display hinge upward.
2. Disconnect the power connector cable from the system board (1).
3. Remove the cable from the computer (2).



Reverse this procedure to install the power connector cable.

Keyboard/top cover

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

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

Table 5-18 Keyboard/top cover description and spare part number information


Description	Spare part number
In luminous green finish, equipped with backlight and fingerprint reader (includes backlight cable, fingerprint reader cable, keyboard cable)	L51758-xx1
In luminous green finish, equipped with backlight (includes backlight cable and keyboard cable)	L51756-xx1
In luminous green finish, equipped with fingerprint reader (includes fingerprint reader cable and keyboard cable)	L51757-xx1
In luminous green finish (includes keyboard cable)	L51755-xx1
In natural silver finish, equipped with backlight and fingerprint reader (includes backlight cable, fingerprint reader cable, keyboard cable)	L19195-xx1
In natural silver finish, equipped with backlight (includes backlight cable and keyboard cable)	L19191-xx1
In natural silver finish, equipped with fingerprint reader (includes fingerprint reader cable and keyboard cable)	L19194-xx1
In natural silver finish (includes keyboard cable)	L19190-xx1
In plum mauve finish, equipped with backlight and fingerprint reader (includes backlight cable, fingerprint reader cable, keyboard cable)	L51754-xx1
In plum mauve finish, equipped with backlight (includes backlight cable and keyboard cable)	L51752-xx1
In plum mauve finish, equipped with fingerprint reader (includes fingerprint reader cable and keyboard cable)	L51753-xx1
In plum mauve finish (includes keyboard cable)	L51751-xx1
In rose gold finish, equipped with backlight and fingerprint reader (includes backlight cable, fingerprint reader cable, keyboard cable)	L19197-xx1
In rose gold finish, equipped with backlight (includes backlight cable and keyboard cable)	L19193-xx1
In rose gold finish, equipped with fingerprint reader (includes fingerprint reader cable and keyboard cable)	L19196-xx1
In rose gold finish (includes keyboard cable)	L19192-xx1

For use in country or region	Spare part number	For use in country or region	Spare part number	For use in country or region	Spare part number
Belgium	-A41	Israel	-BB1	Spain	-071
Bulgaria	-261	Italy	-061	Switzerland	-BG1
Canada	-DB1	Latin America	-161	Taiwan	-AB1
Czech Republic and Slovakia	-FL1	The Netherlands	-B31	Thailand	-281
Denmark, Finland, and Norway	-DH1	Portugal	-131	Turkey	-141
France	-051	Romania	-271	United Kingdom	-031

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
Germany	-041	Russia	-251	United States	-001
Greece	-151	Saudi Arabia	-171	Uruguay	-BD1
Hungary	-211	Slovenia	-BA1		

6 Using Setup Utility (BIOS)

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

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

Starting Setup Utility (BIOS)

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

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

Updating Setup Utility (BIOS)

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

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

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

Determining the BIOS version


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

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


- HP Support Assistant
 1. Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.
– or –
Select the question mark icon in the taskbar.
 2. Select **My notebook**, and then select **Specifications**.
- Setup Utility (BIOS)
 1. Start Setup Utility (BIOS) (see [Starting Setup Utility \(BIOS\) on page 95](#)).
 2. Select **Main**, and then make note of the BIOS version.
 3. Select **Exit**, select one of the options, and then follow the on-screen instructions.

To check for later BIOS versions, see [Downloading a BIOS update on page 96](#).

Downloading a BIOS update

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

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

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

1. Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.
– or –
Select the question mark icon in the taskbar.
2. Select **Updates**, and then select **Check for updates and messages**.
3. Follow the on-screen instructions.
4. At the download area, follow these steps:
 - a. Identify the most recent BIOS update and compare it to the BIOS version currently installed on your computer. If the update is more recent than your BIOS version, make a note of the date, name, or other identifier. You may need this information to locate the update later, after it has been downloaded to your hard drive.
 - b. Follow the on-screen instructions to download your selection to the hard drive.

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

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

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

The BIOS installation begins.
5. Complete the installation by following the on-screen instructions.

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

7 Backing up, restoring, and recovering

This chapter provides information about creating backups and restoring and recovering your system.


Windows provides tools to back up your personal information, restore your computer from a backup, and recover the computer to its original state. See [Using Windows tools for backing up, restoring, and recovering your computer on page 97](#).

In addition to the Windows tools, depending on the operating system preinstalled on your computer, your computer may also include tools provided by HP for additional functionality.

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

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

Using Windows tools for backing up, restoring, and recovering your computer

 **IMPORTANT:** Windows is the only option that allows you to back up your personal information. Schedule regular backups to avoid information loss.

You can use Windows tools to back up personal information and create system restore points and recovery media, allowing you to restore from backup, refresh the computer, and reset the computer to its original state.

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

Creating backups

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

To create a backup:

1. Select **Start**, select **Settings**, and then select **Update & Security**.
2. Select **Backup**, and then follow the on-screen instructions.

Restoring and recovering

Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state.


To restore your system:

1. Select **Start**, select **Settings**, and then select **Update & Security**.
2. Select **Recovery**, and then follow the on-screen instructions.

Creating HP Recovery media (select products only)


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

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

 **NOTE:** If your computer does not list the Recovery partition in addition to the Windows partition, contact support to obtain recovery discs. Go to <http://www.hp.com/support>, select your country or region, and then follow the on-screen instructions.

On select products, you can use the HP Cloud Recovery Download Tool to create HP Recovery media on a bootable USB flash drive. For more information, see [Using the HP Cloud Recovery Download Tool to create recovery media on page 99](#).


Using HP Recovery Manager to create recovery media

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

Before you begin

Before you begin, note the following:


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

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

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

Creating the recovery media

To create HP Recovery media using HP Recovery Manager:

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

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

If you need to recover the system, see [Recovering using HP Recovery Manager on page 100](#).

Using the HP Cloud Recovery Download Tool to create recovery media

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

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

Restoring and recovery

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

 **IMPORTANT:** HP Recovery Manager and the HP Recovery partition are not available for Windows 10 S products.

Restoring, resetting, and refreshing using Windows tools

Windows offers several options for restoring, resetting, and refreshing the computer. For details, see [Using Windows tools for backing up, restoring, and recovering your computer on page 97](#).

Restoring using HP Recovery Manager and the HP Recovery partition

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


- **Resolving problems with preinstalled applications or drivers**—To correct a problem with a preinstalled application or driver:
 1. Type `recovery` in the taskbar search box, and then select **HP Recovery Manager**.
 2. Select **Reinstall drivers and/or applications**, and then follow the on-screen instructions.
- **Using System Recovery**—To recover the Windows partition to original factory content, select the **System Recovery** option from the HP Recovery partition (select products only) or use the HP Recovery media. For more information, see [Recovering using HP Recovery Manager on page 100](#). If you have not already created recovery media, see [Creating HP Recovery media \(select products only\) on page 98](#).
- **Using Factory Reset** (select products only)—Restores the computer to its original factory state by deleting all information from the hard drive and recreating the partitions and then reinstalling the operating system and the software that was installed at the factory (select products only). To use the **Factory Reset** option, you must use HP Recovery media. If you have not already created recovery media, see [Creating HP Recovery media \(select products only\) on page 98](#).

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


Recovering using HP Recovery Manager

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

If you have not already created HP Recovery media, see [Creating HP Recovery media \(select products only\) on page 98](#).

 **IMPORTANT:** HP Recovery Manager does not automatically provide backups of your personal data. Before beginning recovery, back up any personal data that you want to retain. See [Using Windows tools for backing up, restoring, and recovering your computer on page 97](#).

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

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

Before you begin, note the following:


- HP Recovery Manager recovers only software that was installed at the factory. For software not provided with this computer, you must either download the software from the manufacturer's website or reinstall the software from the media provided by the manufacturer.
- If the computer hard drive fails, HP Recovery media must be used. This media is created using HP Recovery Manager. See [Creating HP Recovery media \(select products only\) on page 98](#).
- If your computer does not allow the creation of HP Recovery media or if the HP Recovery media does not work, contact support to obtain recovery media. Go to <http://www.hp.com/support>, select your country or region, and then follow the on-screen instructions.

Recovering using the HP Recovery partition (select products only)

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

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

To start HP Recovery Manager from the HP Recovery partition:

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

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

– or –


For computers or tablets with keyboards attached:

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

For tablets without keyboards:

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


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

 **NOTE:** If your computer does not automatically restart in HP Recovery Manager, change the computer boot order, and then follow the on-screen instructions. See [Changing the computer boot order on page 101](#).

Recovering using HP Recovery media

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


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

 **NOTE:** If your computer does not automatically restart in HP Recovery Manager, change the computer boot order, and then follow the on-screen instructions. See [Changing the computer boot order on page 101](#).

Changing the computer boot order

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

To change the boot order:

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

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

For computers or tablets with keyboards attached:

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

For tablets without keyboards:

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


– or –

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

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

Removing the HP Recovery partition (select products only)

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

 **IMPORTANT:** After you remove the HP Recovery partition, you will not be able to perform System Recovery or create HP Recovery media. Before removing the Recovery partition, create HP Recovery media. See [Creating HP Recovery media \(select products only\) on page 98](#).

Follow these steps to remove the HP Recovery partition:

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

8 Using HP PC Hardware Diagnostics

Using HP PC Hardware Diagnostics Windows (select products only)

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

If HP PC Hardware Diagnostics Windows is not installed on your computer, first you must download and install it. To download HP PC Hardware Diagnostics Windows, see [Downloading HP PC Hardware Diagnostics Windows on page 103](#).

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

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

– or –

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

- a. Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.
 - or –
Select the question mark icon in the taskbar.
 - b. Select **Troubleshooting and fixes**.
 - c. Select **Diagnostics**, and then select **HP PC Hardware Diagnostics Windows**.
2. When the tool opens, select the type of diagnostic test you want to run, and then follow the on-screen instructions.



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

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

Downloading HP PC Hardware Diagnostics Windows

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


Downloading the latest HP PC Hardware Diagnostics Windows version

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

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

The tool is downloaded to the selected location.

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

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

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

1. Go to <http://www.hp.com/support>.
2. Select **Get software and drivers**, select your type of product, and then enter the product name or number in the search box that is displayed.
3. In the **HP PC Hardware Diagnostics** section, select **Download**, and then select a location on your computer or a USB flash drive.


The tool is downloaded to the selected location.

Installing HP PC Hardware Diagnostics Windows

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

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

Using HP PC Hardware Diagnostics UEFI

 **NOTE:** For Windows 10 S computers, you must use a Windows computer and a USB flash drive to download and create the HP UEFI support environment because only .exe files are provided. For more information, see [Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive on page 105](#).

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

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

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

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

 **NOTE:** If you need to stop a diagnostic test, press `esc`.

Starting HP PC Hardware Diagnostics UEFI

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

1. Turn on or restart the computer, and quickly press `esc`.
2. Press `f2`.

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

- a. Connected USB flash drive


 **NOTE:** To download the HP PC Hardware Diagnostics UEFI tool to a USB flash drive, see [Downloading the latest HP PC Hardware Diagnostics UEFI version on page 105](#).

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

Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive

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

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


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

Downloading the latest HP PC Hardware Diagnostics UEFI version

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

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

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

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

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

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

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

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

Downloading Remote HP PC Hardware Diagnostics UEFI



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

Downloading the latest Remote HP PC Hardware Diagnostics UEFI version

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

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

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



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

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

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

Customizing Remote HP PC Hardware Diagnostics UEFI settings

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

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

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

1. Turn on or restart the computer, and when the HP logo appears, press **F10** to enter Computer Setup.
2. Select **Advanced**, and then select **Settings**.
3. Make your customization selections.
4. Select **Main**, and then **Save Changes and Exit** to save your settings.

Your changes take effect when the computer restarts.

9 Specifications

Computer specifications

Table 9-1 Computer specifications

	Metric	U.S.
Dimensions		
Depth	225.5 mm	8.88 in
Width	326.8 mm	12.87 in
Height	17.9 mm	0.71 in
Weight		
With solid-state drive	1599 g	3.53 lb
With hard drive	1694 g	3.73 lb
With solid-state drive and hard drive	1705 g	3.76 lb
Input power		
Operating voltage and current	19.5 V dc @ 3.33 A – 65 W 19.5 V dc @ 2.31 A – 45 W	
Temperature		
Operating	5°C to 35°C	41°F to 95°F
Nonoperating	-20°C to 60°C	-4°F to 140°F
Relative humidity (noncondensing)		
Operating	10% to 90%	
Nonoperating	5% to 95%	
Maximum altitude (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
NOTE: Applicable product safety standards specify thermal limits for plastic surfaces. The device operates well within this range of temperatures.		

35.6-cm (14.0-in) display specifications

Table 9-2 Display specifications

	Metric	U.S.
Active diagonal size	35.6-cm	14.0-in
Resolution	1366x768 (HD) 1920x1080 (FHD)	
Surface treatment	BrightView Anti glare	
Brightness	220 nits	
Backlight	WLED	
Graphics adapter	eDP	
Thickness	3.6 mm (HD panels) 3.0 mm (FHD panels)	

Hard drive specifications

Table 9-3 Hard drive specifications

	1-TB*	500-GB*
Dimensions		
Height	7.2 mm	7.0 mm
Length	100.4 mm	100.6 mm
Width	69.9 mm	70.1 mm
Weight	107.0 g	92.0 g
Interface type	SATA	SATA
Transfer rate		
Synchronous (maximum)	300 MB/sec	300 MB/sec
Security	ATA security	ATA security
Seek times (typical read, including setting)		
Single track	2.0 ms	3 ms
Average (read/write)	12 ms	13 ms
Maximum	22 ms	24 ms
Logical blocks	1,953,525,168	1,048,576,000
Disk rotational speed	5400 rpm	5400 rpm
Operating temperature	0°C to 60°C (32°F to 140°F)	

Table 9-3 Hard drive specifications (continued)

	1-TB*	500-GB*
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.		
NOTE: Certain restrictions and exclusions apply. Contact technical support for details.		

M.2 solid-state drive specifications

Table 9-4 Solid-state drive specifications

	128-GB*	256-GB*	512-GB*
Dimensions			
Height	1 mm	1 mm	1 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	SATA-3 (6 Gbps)	SATA-3 (6 Gbps)	SATA-3 (6 Gbps)
Transfer rate			
Sequential Read	Up to 520 MB/s	Up to 540 MB/s	Up to 530 MB/s
Random Read	Up to 60K IOPs	Up to 85K IOPs	Up to 97K IOPs
Sequential Write	Up to 160 MB/s	Up to 280 MB/s	Up to 515 MB/s
Random Write	Up to 34K IOPs	Up to 67K IOPs	Up to 88K IOPs
Ready time, Maximum (to not busy)	1.0 s	1.0 s	1.0 s
Access times			
Logical	0.1 ms	0.1	0.1
Total logical sectors	250,069,680	500,118,192	1,000,215,216
Operating temperature			
Operating	0° to 70°C (32°F to 158°F)	0° to 70°C (32°F to 158°F)	0° to 70°C (32°F to 158°F)
Non-operating	-40° to 95°C (-40°F to 203°F)	-55° to 90°C (-67°F to 194°F)	-40° to 85°C (-40°F to 185°F)
*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.			
NOTE: Certain restrictions and exclusions apply. Contact technical support for details.			

10 Power cord set requirements

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

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

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

Requirements for all countries

The following requirements are applicable to all countries and regions:

- The length of the power cord set must be at least **1.5 m** (5.0 ft) and no more than **2.0 m** (6.5 ft).
- All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country or region where the power cord set will be used.
- The power cord sets must have a minimum current capacity of 10 A and a nominal voltage rating of 125 or 250 V ac, as required by the power system of each country or region.
- The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with the appliance inlet on the back of the computer.

Requirements for specific countries and regions

Table 10-1 Power cord requirements for specific countries and regions

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

1. The flexible cord must be Type H05VV-F, 3-conductor, 0.75mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.

Table 10-1 Power cord requirements for specific countries and regions (continued)

Country/region	Accredited agency	Applicable note number
		2. The flexible cord must be Type SVT/SJT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V ac) or NEMA 6-15P (15 A, 250 V ac) configuration. CSA or C-UL mark. UL file number must be on each element.
		3. The appliance coupler, flexible cord, and wall plug must bear a “T” mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCTF, 3-conductor, 0.75mm ² or 1.25mm ² conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V ac) configuration.
		4. The flexible cord must be Type RVV, 3-conductor, 0.75mm ² 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 3X0.75mm ² conductor size. KTL logo and individual approval number must be on each element. Corset approval number and logo must be printed on a flag label.
		6. The flexible cord must be Type HVCTF 3X1.25mm ² 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 x 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 3X0.75/1.00mm ² conductor size, with plug BS 1363/A with BSI or ASTA marks.

11 Recycling

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

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

Index

A

- AC adapter and battery light 10, 11
- AC adapter, spare part numbers 44
- action keys
 - identifying 18
 - using 19
- airplane mode key 19
- antenna
 - removal 62
 - spare part number 43, 63
- audio, product description 4
- audio-out (headphone)/audio-in (microphone) combo jack, identifying 12

B

- backups 97
- battery
 - removal 53
 - spare part number 41, 53
- bezel
 - removal 55
 - spare part numbers 42, 56
- BIOS
 - determining version 95
 - downloading an update 96
 - starting the Setup Utility 95
 - updating 95
- Bluetooth label 21
- boot order, changing 101
- bottom cover
 - removal 51
 - spare part numbers 41, 51
- buttons
 - left TouchPad 15
 - power 17
 - right TouchPad 15

C

- cables, service considerations 48
- camera lights, identifying 13, 14
- camera(s)
 - identifying 13, 14
- camera/microphone module
 - spare part numbers 42, 57

- caps lock light, identifying 16
- card reader board
 - removal 73
 - spare part number 41, 73
- card reader board cable
 - removal 73
 - spare part number 41, 73
- chipset, product description 1
- components
 - bottom 20
 - display 13
 - keyboard area 15
 - left side 12
 - right side 10
- computer components 23
- computer specifications 107
- connector, power 10, 11
- connectors, service considerations 48

D

- display assembly
 - components 42
 - removal 54
 - spare part numbers 54
- display back cover, spare part numbers 43
- display panel
 - product description 2, 3
 - removal 57
 - spare part numbers 43, 59
- display panel cable
 - removal 61
 - spare part numbers 43, 62
- display specifications 108
- drive light 10, 11

E

- electrostatic discharge 48
- equipment guidelines 50
- esc key, identifying 18
- Ethernet, product description 4

F

- fan
 - removal 79
 - spare part number 79
 - spare part numbers 40
- fingerprint reader
 - removal 78
 - spare part numbers 41, 78
- fingerprint reader, identifying 10
- fn key, identifying 18

G

- graphics, product description 1, 2
- grounding guidelines 48
- guidelines
 - equipment 50
 - grounding 48
 - packaging 49
 - transporting 49
 - workstation 49

H

- hard drive
 - precautions 48
 - product description 3
 - removal 63
 - spare part numbers 41, 63
 - specifications 108
- hard drive bracket
 - removal 64
 - spare part number 41, 63
- hard drive cable
 - removal 64
 - spare part number 41, 63
- HDMI port 10, 11
- HDMI-to-VGA adapter, spare part number 44
- heat sink
 - removal 81
 - spare part numbers 40, 81
- hinge
 - removal 60
 - spare part number 43, 61

- hinge cover
 - removal 59
 - spare part numbers 60
- hinge covers
 - spare part numbers 43
- HP PC Hardware Diagnostics UEFI
 - downloading 105
 - starting 104
 - using 104
- HP PC Hardware Diagnostics Windows
 - downloading 103
 - installing 104
 - using 103
- HP Recovery Manager
 - correcting boot problems 101
 - starting 100
- HP Recovery media
 - recovery 101
 - using 98
- HP Recovery partition
 - recovery 100
 - removing 101
- I**
- internal microphones, identifying 13, 14
- J**
- jacks
 - RJ-45 (network) 10, 11
- K**
- keyboard
 - product description 5
- keyboard/top cover
 - removal 92
 - spare part numbers 24, 92
- keys
 - action 18
 - airplane mode 19
 - esc 18
 - fn 18
 - Windows 18
- L**
- labels
 - Bluetooth 21
 - regulatory 21
 - serial number 21
 - service 21
- wireless certification 21
- WLAN 21
- lights
 - AC adapter and battery 10, 11
 - caps lock 16
 - drive 10, 11
 - mute 16
 - power 16
- lock bracket
 - removal 76
 - spare part number 41, 76
- M**
- M.2 solid-state drive
 - specifications 110
- mass storage devices
 - precautions 48
- memory card reader, identifying 12
- memory card, identifying 12
- memory module
 - product description 3
 - removal 71
 - spare part numbers 40, 71
- microphone
 - product description 4
- minimized image recovery 100
- minimized image, creating 100
- model name 1
- mute light, identifying 16
- O**
- operating system, product description 6, 7
- Optane memory module
 - removal 69
 - spare part number 69
 - spare part numbers 69
- optical drive
 - product description 3
- original system recovery 100
- P**
- packaging guidelines 49
- plastic parts, service considerations 47
- pointing device, product description 5
- ports
 - HDMI 10, 11
 - product description 5
- USB SuperSpeed 12
- USB Type-C 10, 11
- power button, identifying 17
- power connector cable
 - removal 90
 - spare part number 37, 90
- power connector, identifying 10, 11
- power cord
 - requirements for all countries 111
 - requirements for specific countries and regions 112
 - set requirements 111
 - spare part numbers 44
- power lights, identifying 16
- power requirements, product description 5, 6
- processor
 - product description 1
- product description
 - audio 4
 - chipset 1
 - display panel 2, 3
 - Ethernet 4
 - external media cards 4, 5
 - graphics 1, 2
 - hard drive 3
 - internal card expansion 5
 - keyboard 5
 - memory module 3
 - microphone 4
 - operating system 6, 7
 - optical drive 3
 - pointing device 5
 - ports 5
 - power requirements 5, 6
 - processors 1
 - product name 1
 - security 6
 - sensor 6
 - serviceability 7
 - solid-state drive 3
 - storage 3
 - video 4
 - wireless 4
- product name 1
- product name and number, computer 21

R

recovery

- discs 98, 101
- HP Recovery Manager 100
- HP Recovery partition 99
- media 101
- starting 100
- supported discs 98
- system 100
- USB flash drive 101
- using HP Recovery media 99

recovery media

- creating using HP Cloud Recovery Download Tool 99
- creating using HP Recovery Manager 99
- creating using Windows tools 97
- discs 99
- HP Recovery partition 98
- USB flash drive 99
- using 98

recovery partition, removing 101

regulatory information

- regulatory label 21
- wireless certification labels 21

Remote HP PC Hardware Diagnostics

- UEFI settings
- customizing 106
- using 105

removal/replacement

- preliminaries 47
- procedures 51

RJ-45 (network) jack/status lights, identifying 10, 11

rubber feet

- removal 51
- spare part number 51

Rubber Foot Kit, spare part number 44

Rubber Foot Kit, spare part numbers 41

S

Screw Kit, spare part number 45

security cable slot, identifying 12

security, product description 6

sensor

- product description 6
- sensor, product description 6
- serial number, computer 21

service considerations

- cables 48
- connectors 48
- plastic parts 47

service labels, locating 21

serviceability, product description 7

slots

- memory card reader 12
- security cable 12

solid-state drive

- product description 3
- removal 68
- spare part numbers 40, 68

speakers

- identifying 17
- removal 89
- spare part number 37, 89

specifications

- computer 107
- display 108
- hard drive 108
- M.2 solid-state drive 110

storage

- product description 3

supported discs, recovery 98

system board

- removal 83
- spare part numbers 37, 83

system recovery 100

system restore point, creating 97

T

tools required 47

TouchPad

- buttons 15
- removal 74
- spare part numbers 37, 74

TouchPad bracket

- removal 74

TouchPad cable

- removal 74
- spare part number 37, 74

TouchPad zone, identifying 15

transporting guidelines 49

traveling with the computer 21

U

USB SuperSpeed ports, identifying 12

USB Type-C port 11

USB Type-C port, identifying 10

USB/audio board

- removal 77
- spare part number 41, 77

USB/audio board cable

- removal 77
- spare part number 41, 77

V

vents, identifying 17, 20

video, product description 4

W

webcam/microphone module

- removal 56

webcam/microphone module cable

- spare part numbers 43

Windows

- system restore point 97

Windows key, identifying 18

wireless antenna

- removal 62
- spare part number 43, 63

wireless certification label 21

wireless, product description 4

WLAN antenna

- removal 62
- spare part number 43, 63

WLAN antennas, identifying 13, 14

WLAN device 21

WLAN label 21

WLAN module

- removal 66
- spare part numbers 40, 66

workstation guidelines 49

