HP ENVY Notebook PC (model numbers used: 13-d000 through 13-d099)

Maintenance and Service Guide

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Product notice

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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 of Windows 10. This computer may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows 10 functionality. See http://www.microsoft.com for details.

The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

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Important Notice about Customer Self-Repair Parts

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

Safety warning notice

⚠ **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).

Table of contents

1 Product description 1

2 External component identification 3

Locating hardware 3

Locating software 3

Display 4

Buttons, speakers, and fingerprint reader 5

Keys 6

Lights 7

TouchPad 8

Left side 9

Right side 10

Bottom 11

3 Illustrated parts catalog 12

Service tag 12

Computer major components 14

Display assembly subcomponents 18

Miscellaneous parts 19

4 Removal and replacement procedures preliminary requirements 20

Tools required 20

Service considerations 20

Plastic parts 20

Cables and connectors 21

Drive handling 21

Grounding guidelines 22

Electrostatic discharge damage 22

Packaging and transporting guidelines 23

Workstation guidelines 23

Equipment guidelines 24

5 Removal and replacement procedures 25

Component replacement procedures 25

Bottom cover 25

Battery 27

Solid-state drive 28
WLAN module 30
Speakers 32
Fingerprint reader board 33
TouchPad board 34
Power connector cable 35
Fan 36
Security cable slot bracket 37
System board 38
Heat sink 42
RTC battery 44
Display assembly 45

6 Using Setup Utility (BIOS) 53
Starting Setup Utility (BIOS) 53
Updating Setup Utility (BIOS) 53
Determining the BIOS version 53
Downloading a BIOS update 54
Synchronizing a tablet and keyboard (select products only) 55

7 Using HP PC Hardware Diagnostics (UEFI) 56
Downloading HP PC Hardware Diagnostics (UEFI) to a USB device 56

8 Specifications 58
Computer specifications 58

9 Backing up, restoring, and recovering 59
Creating recovery media and backups 59
Creating HP Recovery media (select products only) 59
Using Windows tools 60
Restore and recovery 61
Recovering using HP Recovery Manager 61
What you need to know before you get started 61
Using the HP Recovery partition (select products only) 62
Using HP Recovery media to recover 62
Changing the computer boot order 63
Removing the HP Recovery partition (select products only) 64

10 Power cord set requirements 65
Requirements for all countries 65

Requirements for specific countries and regions 65

11 Recycling 67

Index 68

1 Product description

Category	Description
Product Name	HP ENVY Notebook PC (model numbers used: 13-d000 through 13-d099)
Processors	• Intel® Core™ i7-6500U 2.50-GHz (SC turbo up to 3.10-GHz) processor (1600-MHz FSB, 4.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]) • Intel Core i5-6200U 2.30-GHz (SC turbo up to 2.80-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]) • Intel Core i3-6100U 2.30-GHz processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W])
Chipset	Integrated soldered-on-circuit (SOC)
Graphics	Intel HD Graphics 520 Support for HD Decode, DX12, and high-definition multimedia interface (HDMI)
Panel	13.3-in, RGBW quad high-definition+ (QHD+), white light-emitting diode (WLED), BrightView (3200×1800), ultraslim-flat (2.6-mm), UWVA display panel; eDP; typical brightness: 300 nits 13.3-in, full high-definition (FHD), WLED, AntiGlare (1920×1080), ultraslim-flat (2.6-mm), UWVA display panel; eDP; typical brightness: 300 nits
Memory	Support for LPDDR3-1600 dual channel, onboard memory Support for 8192-MB maximum system RAM in the following configurations: • 8192-MB (16-GB, 256-MB × 16 × 4 × 4 pieces) • 4096-MB (8-GB, 128-MB × 32 × 2 × 4 pieces)
Solid-state drive	Support for M2 Serial ATA storage Support for the following solid-state drive configurations: • 512-MB, M2, SATA-3, supporting triple level cell (TLC) • 256-MB, M2, SATA-3, supporting TLC • 128-MB, M2, SATA-3, supporting TLC • 128-MB, M2.2280, SATA-3
Audio and video	HP TrueVision HD webcam: fixed (no tilt) with activity light, 1280×720 by 30 frames per second Integrated dual-array digital microphones with appropriate beam-forming, echo-cancellation, noise-reduction software Bang & Olufsen dual speakers (2) with subwoofer
Ethernet	Integrated 10/100/1000 network interface card (NIC)
Wireless	Integrated wireless local area network (WLAN) options by way of wireless module Support for the following WLAN modules: • Broadcom BCM943142 802.11 bgn 1×1 Wi-Fi + Bluetooth 4.0 M.2 Combo Adapter • Intel Dual Band Wireless-AC 7265 802.11 ac 2×2 WiFi + Bluetooth 4.0 Combo Adapter
	Two WLAN antennas built into display assembly

Category	Description
	Support for Intel WiDi
	Compatible with Miracast-certified devices
External media cards	HP 2-in-1 multiformat Digital Media Reader Slot with push-push technology. Reads data from and writes data to digital memory cards such as Secure Digital (SD).
Ports	• HP Smart Plug AC adapter (4.5-mm barrel) • Headphone/microphone combo • HDMI v.1.4, supporting up to 1920×1080 at 60 Hz • RJ45 • USB 3.0 • USB 2.0
Keyboard/pointing devices	Full-size, backlit, island-style keyboard TouchPad requirements: • ClickPad with image sensor • MultiTouch gestures enabled • Support for modern TrackPad gestures • Taps enables as default
Power requirements	Support for 65-W HP Smart AC adapter (non-PFC, EM, 3-wire, 4.5-mm) and 45-W HP Smart AC adapter (non-PFC, RC, 3-wire, 4.5-mm) 1.0-meter (3.2-feet) power cord
	Support for 6-cell, 44-Wh, 1.98-Ah, Li-ion battery
Security	• Support for security cable lock • Support for Trusted Platfom Module (TPM) 2.0 • Fingerprint reader with HP Simple Pass software support
Operating system	**Preinstalled:** • Windows 10 • Windows 10 Emerging Markets Single Language High-End • Windows 10 Multilanguage High-End • Windows 10 Professional • FreeDos 2.0
Serviceability	**End user replaceable part:** AC adapter

2 External component identification

Locating hardware

To find out what hardware is installed on your computer:

- Type `device manager` in the taskbar search box, and then select the **Device Manager** app.

  A list displays all the devices installed on your computer.

For information about system hardware components and the system BIOS version number, press fn+esc (select products only).

Locating software

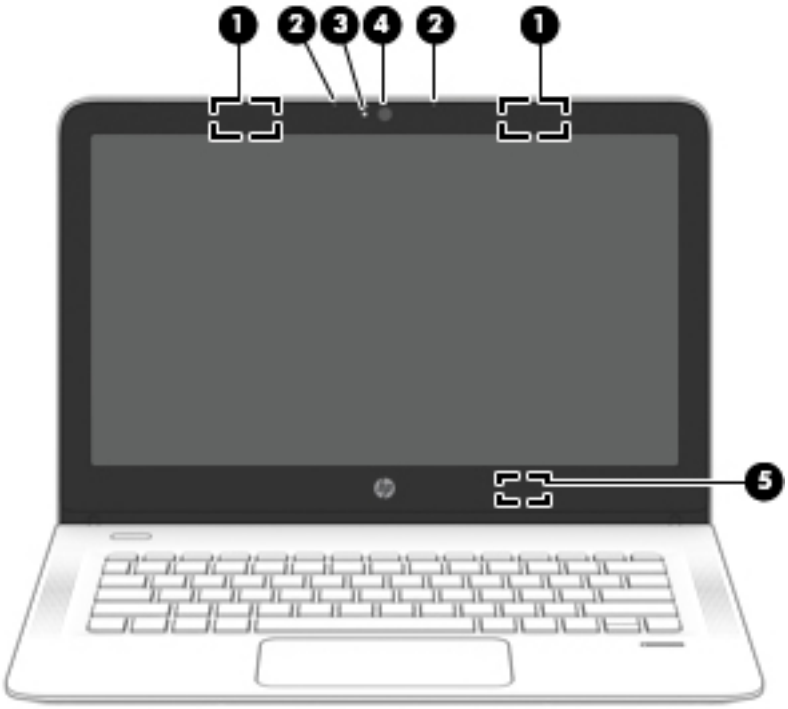
To find out what software is installed on your computer:

- Select the **Start** button, and then select **All apps**.

  – or –

  Right-click the **Start** button, and then select **Programs and Features**.

Display



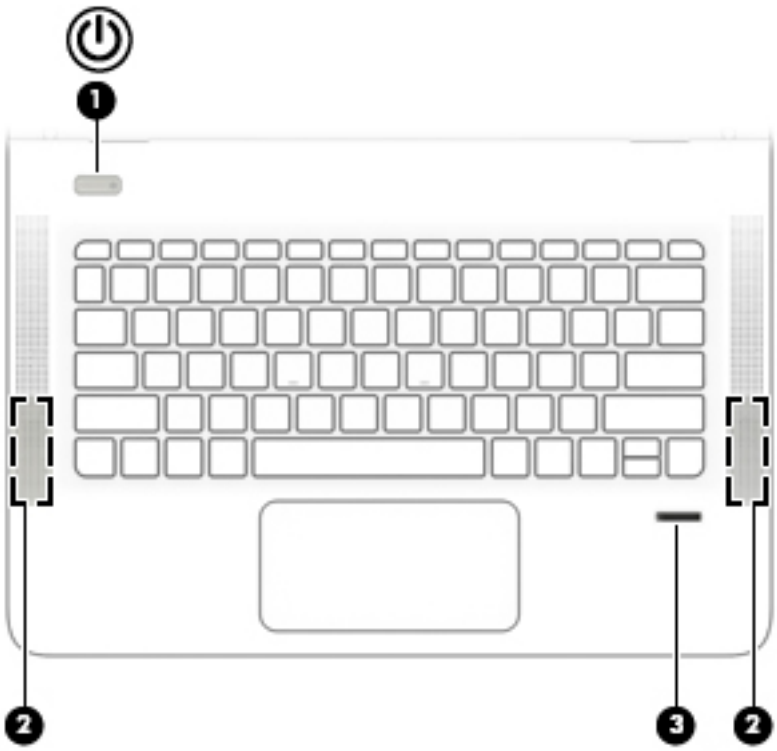
Item	Component	Description
(1)	WLAN antennas (2)*	Send and receive wireless signals to communicate with WLANs.
(2)	Internal microphones (2)	Record sound.
(3)	Webcam light	On: The webcam is in use.
(4)	Webcam	Records video and captures photographs. Some products allow you to video conference and chat online using streaming video. To use a webcam (integrated camera): ▲ Type `camera` in the taskbar search box, and then select **Camera**.
(5)	Internal display switch	Turns off the display and initiates Sleep if the display is closed while the power is on. **NOTE:** The internal display switch is not visible from the outside of the computer.

*The antennas are not visible on the outside of the computer. For optimal transmission, keep the areas immediately around the antennas free from obstructions. To see wireless regulatory notices, see the section of the *Regulatory, Safety, and Environmental Notices* that applies to your country or region.

To access this guide, select the **Start** button, select **All apps**, select **HP Help and Support**, and then select **HP Documentation**.

Buttons, speakers, and fingerprint reader

NOTE: Your computer may look slightly different from the illustration in this section.

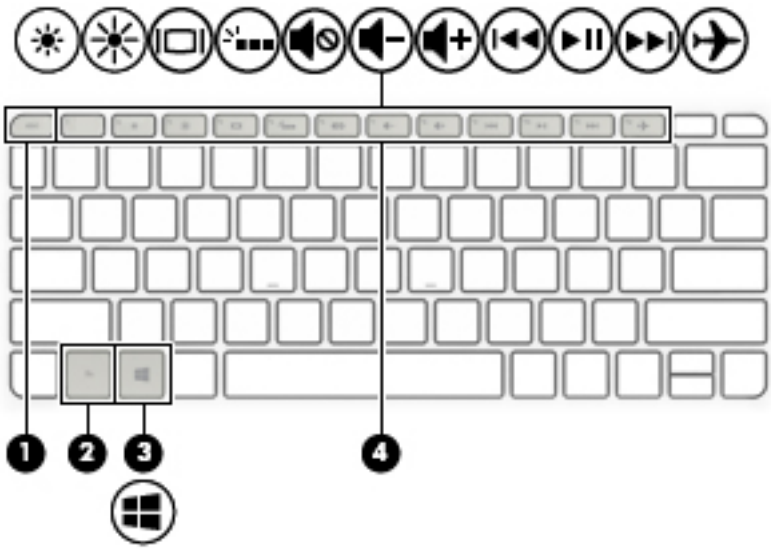


Item	Component	Description
(1)	Power button	• When the computer is off, press the button to turn on the computer. • When the computer is on, press the button briefly to initiate Sleep. • When the computer is in the Sleep state, press the button briefly to exit Sleep. • When the computer is in Hibernation, press the button briefly to exit Hibernation. **CAUTION:** Pressing and holding down the power button results in the loss of unsaved information. 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. To learn more about your power settings, see your power options. ▲ Type `power` in the taskbar search box, and then select **Power and sleep settings**. – or – Right-click the **Start** button, and then select **Power Options**.

Item	Component	Description
(2)	Speakers	Produce sound.
(3)	Fingerprint reader	Allows a fingerprint logon to Windows, instead of a password logon.

Keys

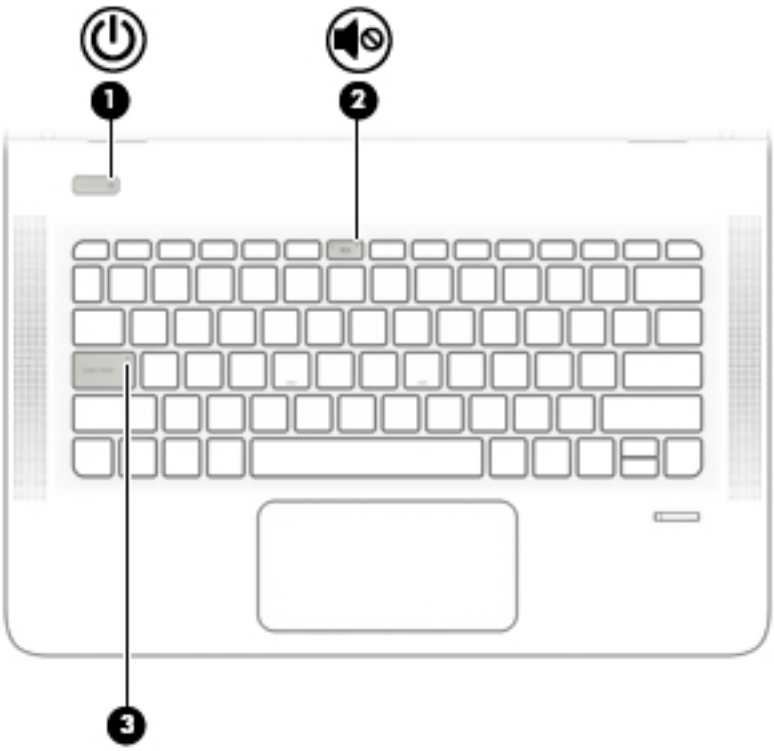
NOTE: Your computer may look slightly different from the illustration in this section.



Item	Component	Description
(1)	esc key	Displays system information when pressed in combination with the fn key.
(2)	fn key	Executes frequently used system functions when pressed in combination with the esc key, action keys, or the spacebar.
(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 backlight keyboard feature off or on.

Lights

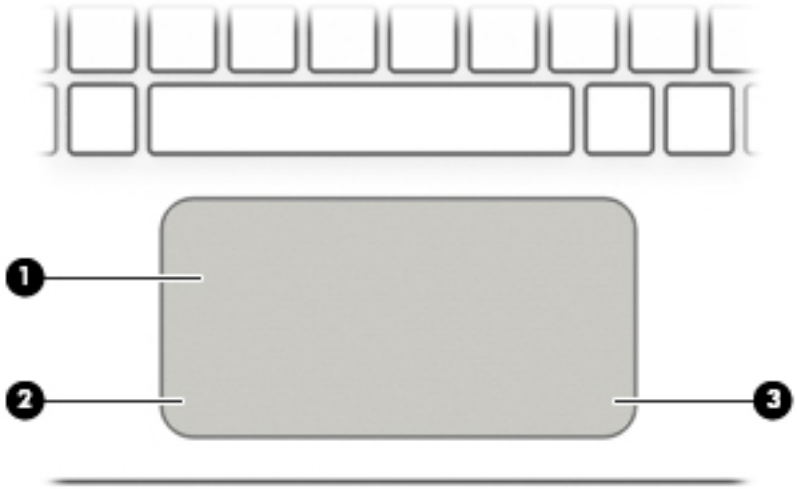
NOTE: Your computer may look slightly different from the illustration in this section.



Item	Component	Description
(1)	Power light	• 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)	Mute light	• Amber: Computer sound is off. • Off: Computer sound is on.
(3)	Caps lock light	On: Caps lock is on, which switches the key input to all capital letters.

TouchPad

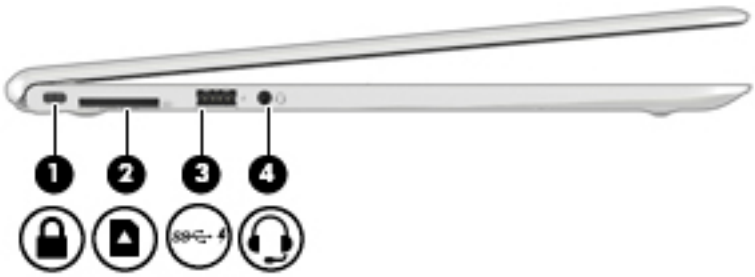
NOTE: Your computer may look slightly different from the illustration in this section.



Item	Component	Description
(1)	TouchPad zone	Reads 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.

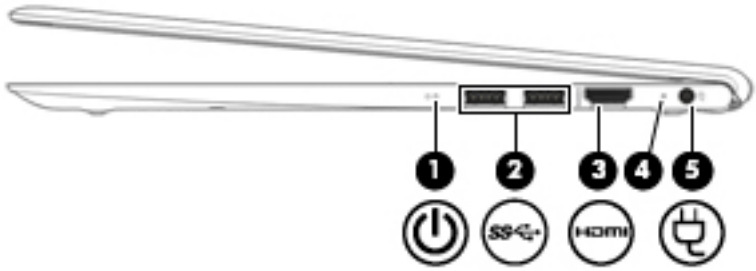
Left side

NOTE: Your computer may look slightly different from the illustration in this section.



Item	Component	Description
(1)	Security cable slot	Attaches an optional security cable to the computer. **NOTE:** The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.
(2)	Memory card reader	Reads optional memory cards that enable you to store, manage, share, or access information. To insert a card: 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. To remove a card: ▲ Press in on the card, and then remove it from the memory card reader.
(3)	USB 3.0 charging (powered) port	Connects an optional USB device, such as a keyboard, mouse, external drive, printer, scanner or USB hub. Standard USB ports will not charge all USB devices or will charge using a low current. Some USB devices require power and require you to use a power port. **NOTE:** USB charging ports can also charge select models of cell phones and MP3 players, even when the computer is off.
(4)	Audio-out (headphone)/audio-in (microphone) combo jack	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 microphone-only devices. **NOTE:** When a device is connected to the jack, the computer speakers are disabled. **WARNING!** To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, refer to the *Regulatory, Safety, and Environmental Notices*. To access this guide, select the **Start** button, select **All apps**, select **HP Help and Support**, and then select **HP Documentation**.

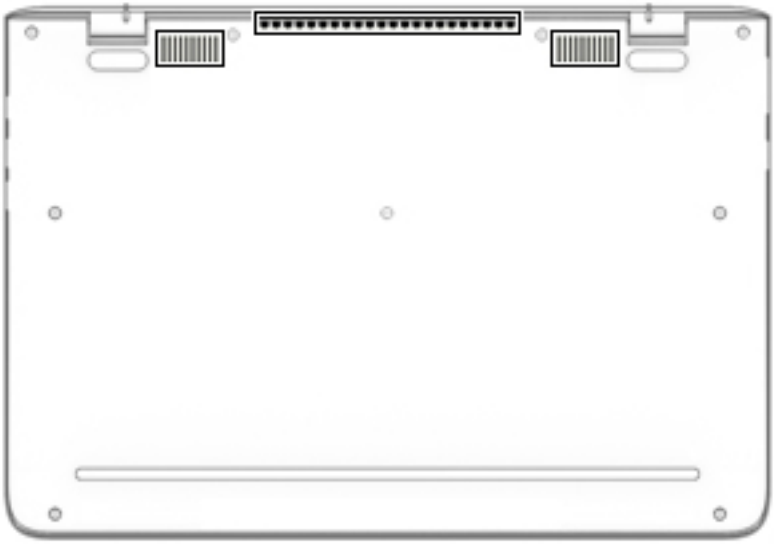
Right side



Item	Component	Description
(1)	Power light	• 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. • The computer is off or in Hibernation. Hibernation is a power-saving state that uses the least amount of power.
(2)	USB 3.0 ports	Connect an optional USB device, such as a keyboard, mouse, external drive, printer, scanner or USB hub.
(3)	HDMI port	Connects an optional video or audio device, such as a high-definition television, any compatible digital or audio component, or a high-speed High-Definition Multimedia Interface (HDMI) device.
(4)	AC adapter light	• 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.
(5)	Power connector	Connects an AC adapter.

Bottom

NOTE: Your computer may look slightly different from the illustration in this section.

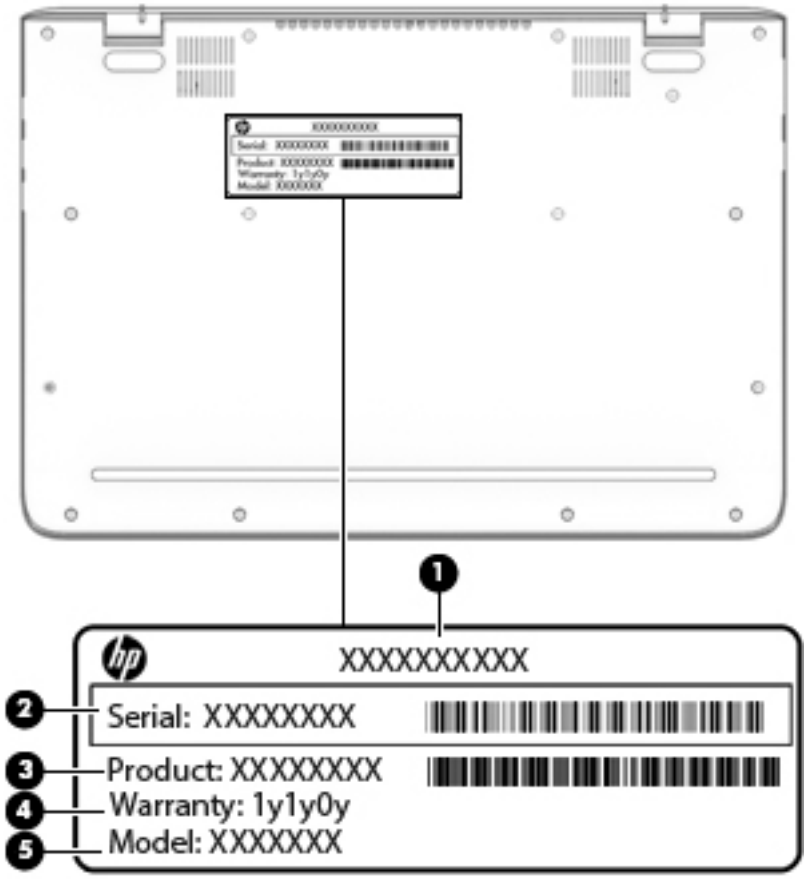


Component	Description
Vents (2)	Enable airflow to cool internal components. **NOTE:** The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.

3 Illustrated parts catalog

Service tag

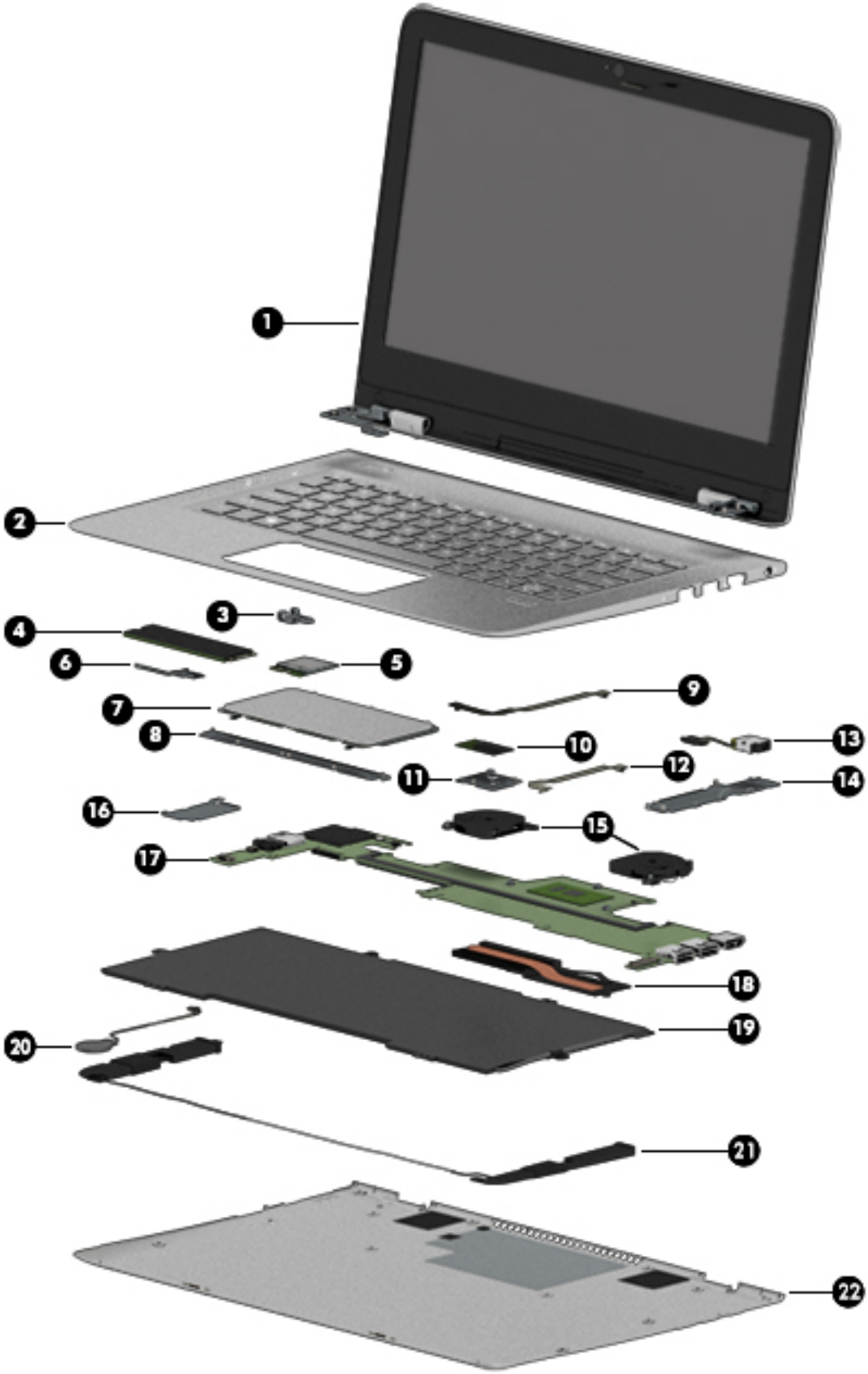
When ordering parts or requesting information, provide the computer serial number and model number provided on the service tag.



Item	Description	Function
(1)	Product name	This is the product name affixed to the front of the computer.
(2)	Serial number (s/n)	This is an alphanumeric identifier that is unique to each product.
(3)	Part number/Product number (p/n)	This number provides specific information about the product's hardware components. The part number helps a service technician to determine what components and parts are needed.

Item	Description	Function
(4)	Warranty period	This number describes the duration of the warranty period for the computer.
(5)	Model description	This is the alphanumeric identifier used to locate documents, drivers, and support for the computer.

Computer major components

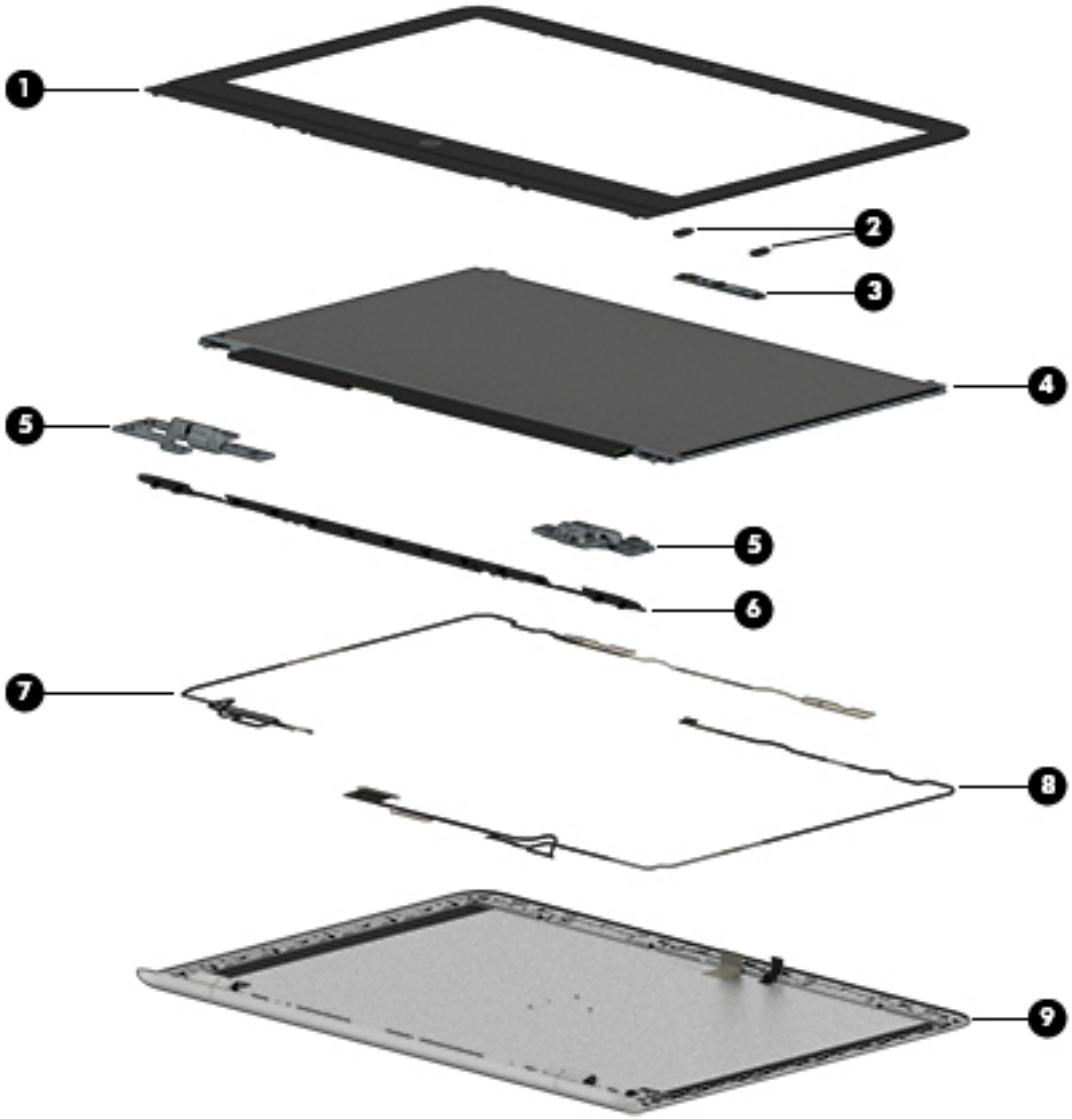


Item	Component	Spare part number
(1)	**Display assembly**: The display assembly is spared at the subcomponent level only. For more display assembly spare part information, see Display assembly subcomponents on page 18.	
(2)	**Keyboard/top cover** (in natural silver finish; includes backlight, backlight cable, and keyboard cable):	
	For use in Belgium	829305-A41
	For use in Canada	829305-DB1
	For use in the Czech Republic and Slovakia	829305-FL1
	For use in Denmark, Finland, and Norway	829305-DH1
	For use in France	829305-051
	For use in Germany	829305-041
	For use in Greece	829305-151
	For use in Italy	829305-061
	For use in Japan	829305-291
	For use in Latin America	829305-161
	For use in the Netherlands	829305-B31
	For use in Portugal	829305-131
	For use in Russia	829305-251
	For use in Saudi Arabia	829305-171
	For use in South Korea	829305-AD1
	For use in Spain	829305-071
	For use in Switzerland	829305-BG1
	For use in Taiwan	829305-AB1
	For use in Thailand	829305-281
	For use in Turkey	829305-141
	For use in the United Kingdom and Singapore	829305-031
	For use in the United States	829305-001
(3)	**Security cable slot bracket**	829298-001
(4)	**Solid-state drive:**	
	512-MB, M2, SATA-3, supporting TLC	814224-001
	256-MB, M2, SATA-3, supporting TLC	812708-001
	128-MB, M2, SATA-3, supporting TLC	820547-001
	128-MB, M2.2280, SATA-3	829985-001
	Solid-state drive Hardware Kit (includes solid-state drive/WLAN module bracket)	829300-001
(5)	**WLAN module:**	
	Broadcom BCM943142 802.11 bgn 1×1 Wi-Fi + Bluetooth 4.0 M.2 Combo Adapter	792608-005

Item	Component	Spare part number
	Intel Dual Band Wireless-AC 7265 802.11 ac 2×2 WiFi + Bluetooth 4.0 Combo Adapter	793840-005
(6)	**Solid-state drive/WLAN module bracket** (included in the Solid-state drive Hardware Kit, spare part number 829300-001)	
(7)	**TouchPad board** **NOTE:** The TouchPad board spare part kit does not include the TouchPad board bracket or the TouchPad board cable. The TouchPad board bracket is available using spare part number 829301-001. The TouchPad board cable is available using spare part number 829294-001.	833590-001
(8)	**TouchPad board bracket**	829301-001
(9)	**TouchPad board cable**	829294-001
(10)	**Fingerprint reader board** **NOTE:** The fingerprint reader board spare part kit does not include the fingerprint reader board bracket or the fingerprint reader board cable. The fingerprint reader board bracket is available using spare part number 829302-001. The fingerprint reader board cable is available using spare part number 829295-001.	826257-001
(11)	**Fingerprint reader board bracket**	829302-001
(12)	**Fingerprint reader board cable**	829295-001
(13)	**Power connector cable**	838841-001
(14)	**Right I/O bracket**	829299-001
(15)	**Fans** (2, include cables)	829296-001
(16)	**Left I/O bracket**	829299-001
(17)	**System board** (includes processor and replacement thermal material):	
	Equipped with an Intel Core i7-6500U 2.50-GHz (SC turbo up to 3.10-GHz) processor (1600-MHz FSB, 4.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 8.0-GB of system memory, and the Windows 10 Professional operating system	829286-601
	Equipped with an Intel Core i7-6500U 2.50-GHz (SC turbo up to 3.10-GHz) processor (1600-MHz FSB, 4.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 8.0-GB of system memory and a non-Windows operating system	829286-001
	Equipped with an Intel Core i5-6200U 2.30-GHz (SC turbo up to 2.80-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 8.0-GB of system memory, and the Windows 10 Professional operating system	829285-601
	Equipped with an Intel Core i5-6200U 2.30-GHz (SC turbo up to 2.80-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 8.0-GB of system memory and a non-Windows operating system	829285-001
	Equipped with an Intel Core i5-6200U 2.30-GHz (SC turbo up to 2.80-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 4.0-GB of system memory, and the Windows 10 Professional operating system	829284-601
	Equipped with an Intel Core i5-6200U 2.30-GHz (SC turbo up to 2.80-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 4.0-GB of system memory and a non-Windows operating system	829284-001
	Equipped with an Intel Core i3-6100U 2.30-GHz processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 4.0-GB of system memory, and the Windows 10 Professional operating system	829283-601

Item	Component	Spare part number
	Equipped with an Intel Core i3-6100U 2.30-GHz processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 4.0-GB of system memory and a non-Windows operating system	829283-001
(18)	**Heat sink** (includes replacement thermal material)	829314-001
(19)	**3-cell, 45-Wh, 3.83-Ah, Li-ion battery** (includes cable)	816238-850
(20)	**RTC battery** (includes cable and double-sided adhesive)	829306-001
(21)	**Speaker Kit** (includes left and right speakers and cables)	829309-001
(22)	**Bottom cover** (includes two rear rubber feet, one front rubber foot, speaker grilles, shielding, and retention brackets)	829289-001
	Rubber Kit (not illustrated, includes front rubber foot pad and rear rubber feet)	829307-001

Display assembly subcomponents



Item	Component	Spare part number
(1)	**Display bezel**	833480-001
(2)	**Display bezel screw covers** (2)	833481-001
(3)	**Webcam/microphone module** (includes two microphone rubber isolators and double-sided adhesive)	833512-001
(4)	**Display panel:**	
	13.3-in, RGBW QHD+, WLED, BrightView (3200×1800), ultraslim-flat (2.6-mm), UWVA display panel	815165-001
	13.3-in, FHD, WLED, AntiGlare (1920×1080), ultraslim-flat (2.6-mm), UWVA display panel	830567-001
(5)	**Display hinges** (2, includes left and right display hinges)	829303-001
(6)	**Display hinge strip**	829304-001

Item	Component	Spare part number
(7)	**WLAN antenna** (includes left and right WLAN cables and transceivers)	829287-001
(8)	**Display panel cable** (includes webcam/microphone module cable):	
	For use only on computer models equipped with a QHD+ display assembly	833483-001
	For use only on computer models equipped with an FHD display assembly	833482-001
(9)	**Display back cover**	829288-001

Miscellaneous parts

Component	Spare part number
AC adapter:	
65-W, HP Smart, AC adapter (non-PFC, EM, 3-wire, 4.5-mm)	714635-850
45-W, HP Smart, AC adapter (non-PFC, RC, 3-wire, 4.5-mm)	741553-850
HP USB external DVD-RW Drive	747080-011
HP HDMI-to-VGA adapter	701943-011
HP RJ45-to-USB adapter dongle	539614-011
Power cord (3-pin, black, 1.00-m):	
For use in Australia	755530-011
For use in Denmark	755530-081
For use in Europe	755530-021
For use in India	755530-D61
For use in Italy	755530-061
For use in Japan	755530-291
For use in North America	755530-001
For use in the People's Republic of China	755530-AA1
For use in South Korea	755530-AD1
For use in Switzerland	755530-111
For use in Taiwan	755530-AB1
For use in Thailand	755530-201
For use in the United Kingdom and Singapore	755530-031
Screw Kit	829308-001

4 Removal and replacement procedures preliminary requirements

Tools required

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

- Case utility tool or similar plastic, flat-tipped tool
- 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.

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

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

Avoid dropping drives from any height onto any surface.

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

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

Avoid exposing a drive to temperature extremes or liquids.

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

Grounding guidelines

Electrostatic discharge damage

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

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

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

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

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

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

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

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

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

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

Typical electrostatic voltage levels

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

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

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

Workstation guidelines

Follow these grounding workstation guidelines:

- Cover the workstation with approved static-shielding material.
- Use a wrist strap connected to a properly grounded work surface and use properly grounded tools and equipment.
- Use conductive field service tools, such as cutters, 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 ±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.

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

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.

Component replacement procedures

NOTE: Details about the computer, including model, serial number, product key, and length of warranty, are on the service tag one the bottom of the computer. See Bottom on page 11 for details.

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

Bottom cover

Description	Spare part number
Bottom cover (includes two rear rubber feet, one front rubber foot, speaker grilles, shielding, and retention brackets)	829289-001

Before disassembling the computer, follow these steps:

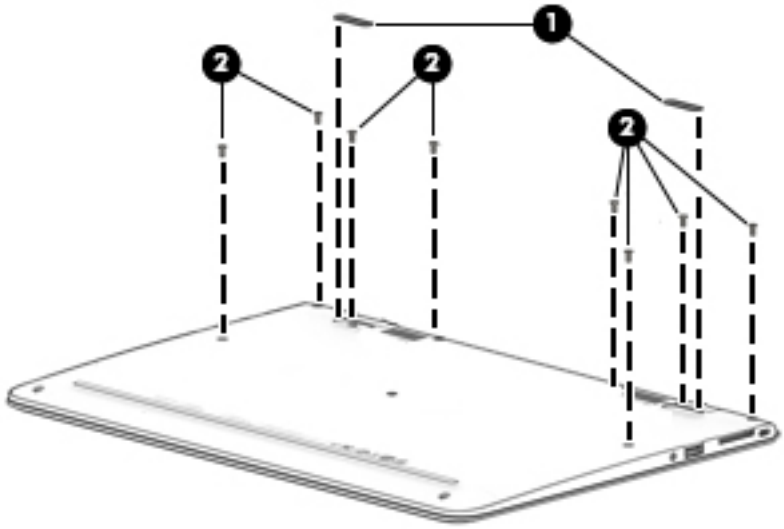
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.

Remove the bottom cover:

1. Remove the bottom cover rear rubber feet **(1)**.

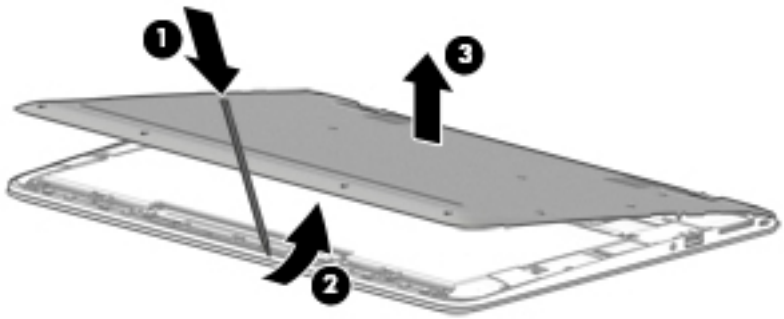
   The bottom cover rear rubber feet are available using spare part number 829307-001.

2. Remove the eight Phillips PM2.5×5.5 screws **(2)** that secure the bottom cover to the computer.



3. Remove the three Phillips PM2.5×3.4 screws that secure the bottom cover to the computer.

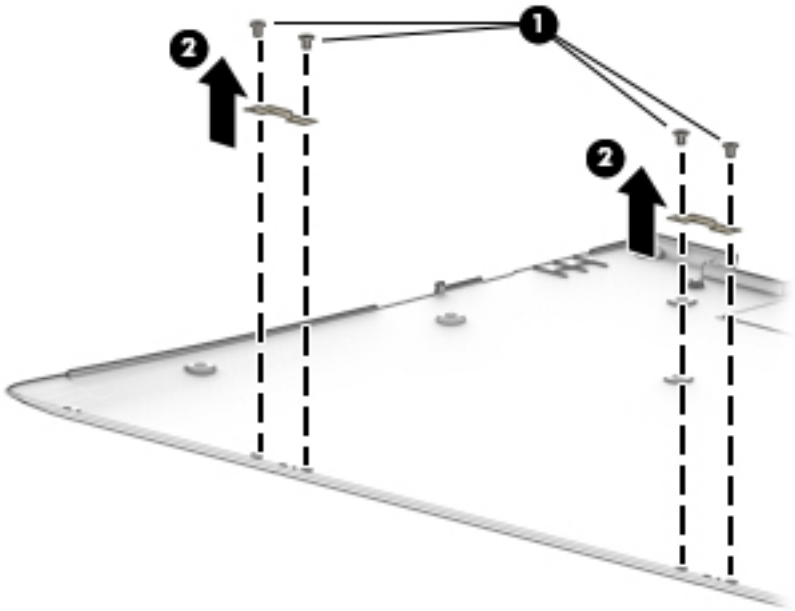
4. Insert a case utility tool **(1)** or similar plastic, flat-tipped tool between the front edge of the bottom cover and keyboard/top cover.
5. Separate the front edge **(2)** of the bottom cover from keyboard/top cover.
6. Remove the bottom cover **(3)**.



NOTE: If it is necessary to replace the bottom cover, be sure to remove the bottom cover retention brackets from the defective bottom cover and install them on the replacement bottom cover.

To remove the bottom cover retention brackets:

1. Remove the four Phillips PM2.0×2.3 screws **(1)** that secure the bottom cover retention brackets to the bottom cover.
2. Remove the bottom cover retention brackets **(2)**.



Reverse this procedure to install the bottom cover.

Battery

Description	Spare part number
3-cell, 45-Wh, 3.83-Ah, Li-ion battery	816238-850

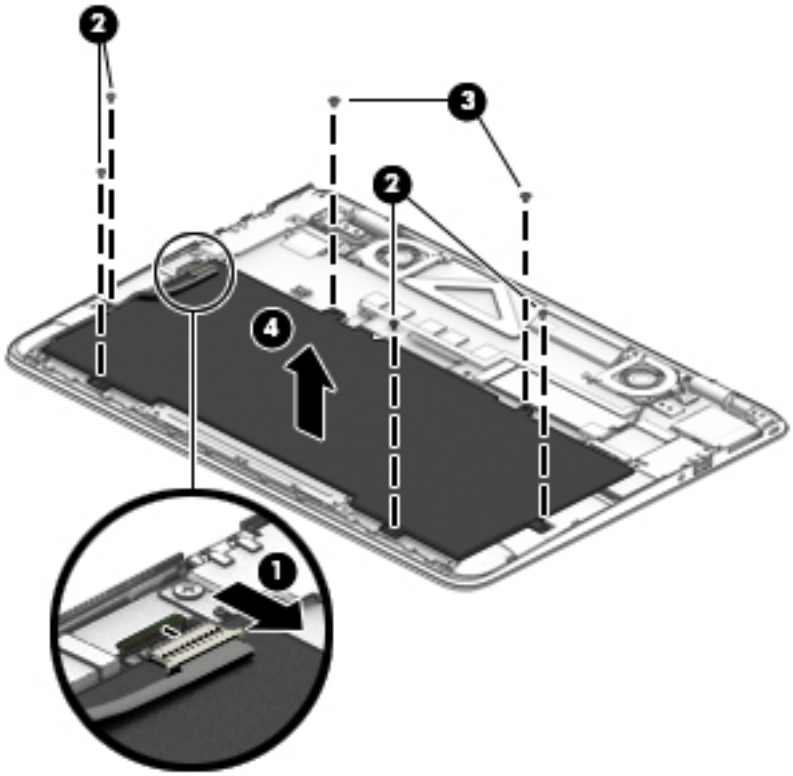
Before removing the battery, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 25).

Remove the battery:

1. Disconnect the battery cable **(1)** from the system board.
2. Remove the four Phillips PM2.5×4.4 screws **(2)** that secure the battery to the keyboard/top cover.
3. Remove the two Phillips PM2.5×2.6 broad head screws **(3)** that secure the battery to the keyboard/top cover.

4. Remove the battery **(4)**.



Reverse this procedure to install the battery.

Solid-state drive

Description	Spare part number
512-MB, M2, SATA-3, supporting TLC	814224-001
256-MB, M2, SATA-3, supporting TLC	812708-001
128-MB, M2, SATA-3, supporting TLC	820547-001
128-MB, PM2.2280, SATA-3	829985-001
Solid-state Drive Hardware Kit	829300-001

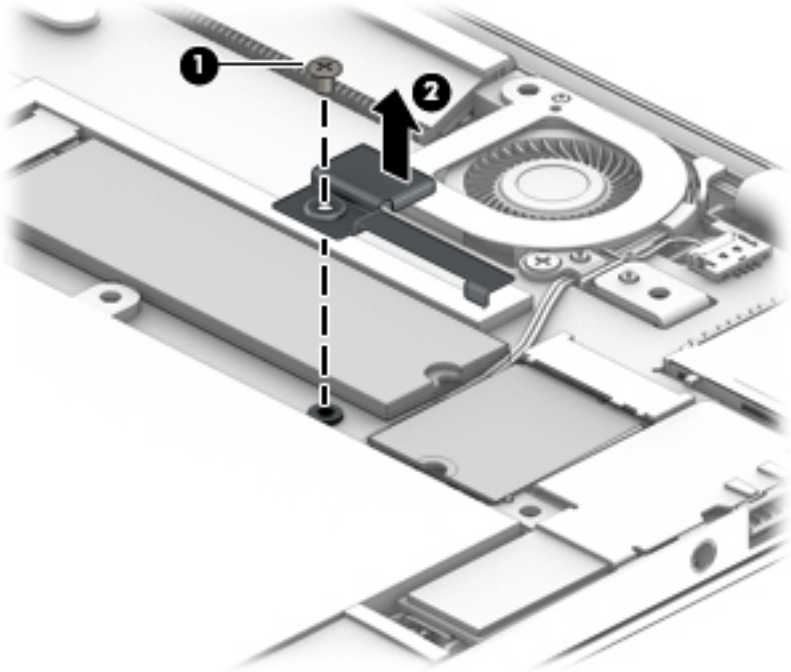
Before removing the solid-state drive, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 25).
5. Disconnect the battery cable from the system board (see Battery on page 27).

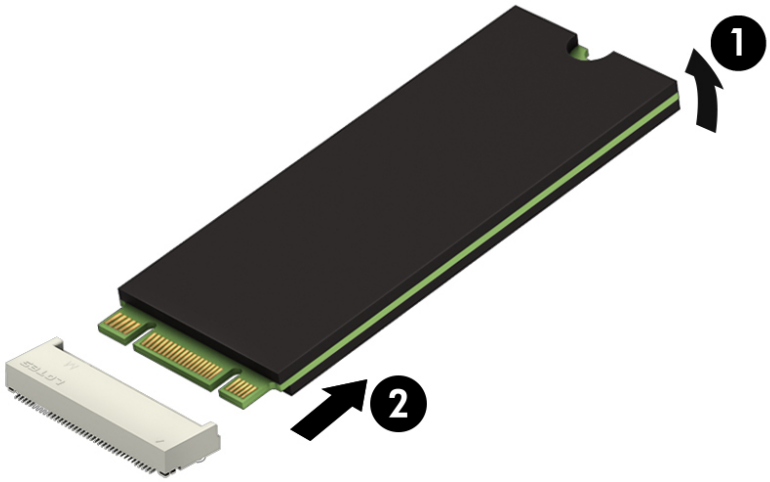
Remove the solid-state drive:

1. Remove the Phillips PM2.0×2.6 broad head screw **(1)** that secures the solid-state drive/WLAN module bracket to the keyboard/top cover.
2. Remove the solid-state drive/WLAN module bracket **(2)**.

   The solid-state drive/WLAN module bracket is included in the Solid-state Drive Hardware Kit, spare part number 829300-001.



3. Lift the edge of the solid-state drive **(1)** opposite of the slot until it rests at an angle.
4. Remove the solid-state drive **(2)** by pulling the drive away from the slot at an angle.



Reverse this procedure to install the solid-state drive.

WLAN module

Description	Spare part number
Intel Dual Band Wireless-AC 7265 802.11 ac 2×2 WiFi + Bluetooth 4.0 Combo Adapter	793840-005
Broadcom BCM943142 802.11 bgn 1×1 Wi-Fi + Bluetooth 4.0 M.2 Combo Adapter	792608-005

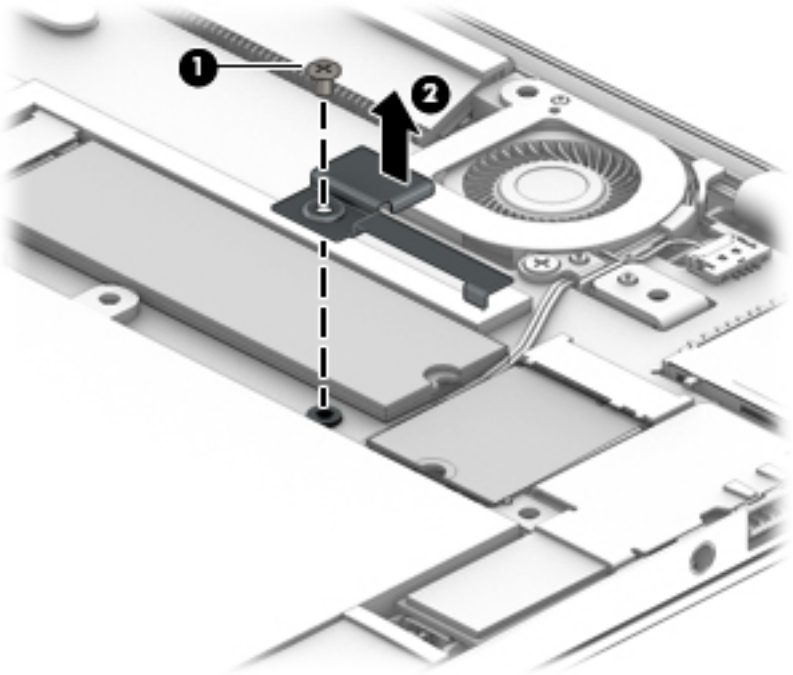
⚠ **CAUTION:** To prevent an unresponsive system, replace the wireless module only with a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you replace the module and then receive a warning message, remove the module 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 unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 25).
5. Disconnect the battery cable from the system board (see Battery on page 27).

Remove the WLAN module:

1. Remove the Phillips PM2.0×2.6 broad head screw **(1)** that secures the solid-state drive/WLAN module bracket to the keyboard/top cover.
2. Remove the solid-state drive/WLAN module bracket **(2)**.

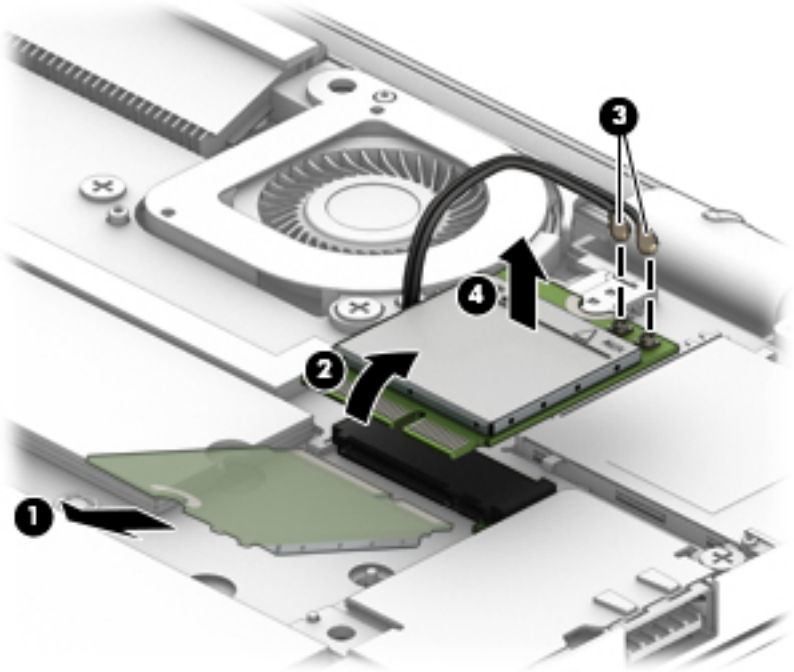


3. Release the WLAN module **(1)** by pulling the module away from the slot at an angle.
4. Flip the WLAN module **(2)** up and over until it rests upside down on the system board.

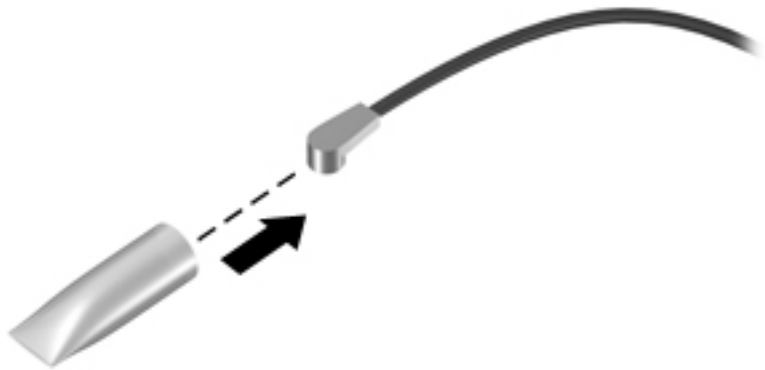
5. Disconnect the WLAN antenna cables **(3)** from the WLAN module terminals.

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.

6. Remove the WLAN module **(4)**.



NOTE: If the WLAN antennas are not connected to the WLAN module, the protective sleeve should be installed on the antenna connectors, as shown in the following illustration.



Reverse this procedure to install the WLAN module.

Speakers

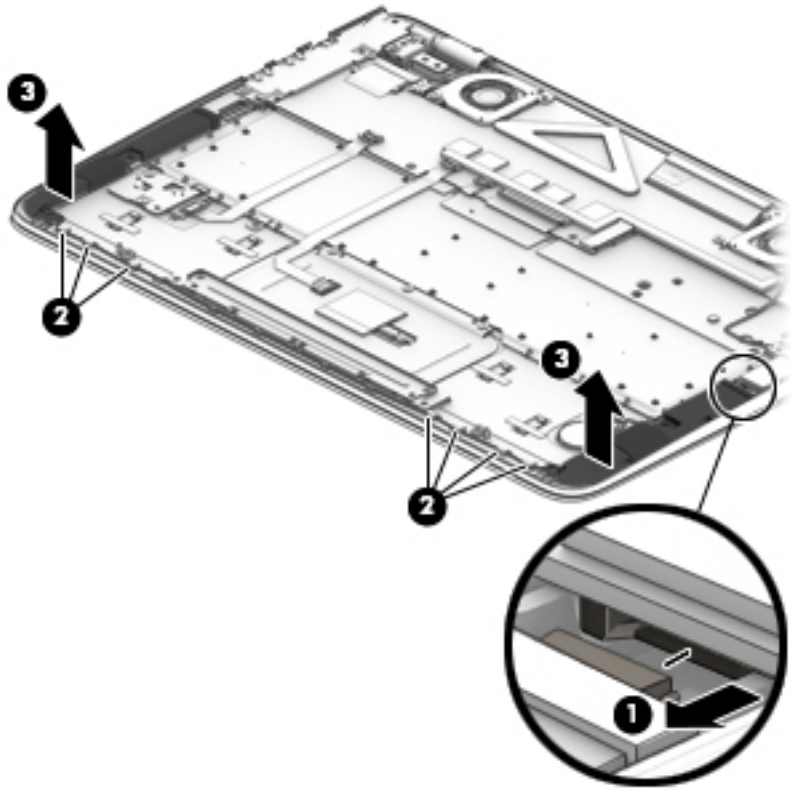
Description	Spare part number
Speaker Kit (includes left and right speakers and cables)	829309-001

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 unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 25).
5. Remove the battery (see Battery on page 27).

Remove the speakers:

1. Disconnect the speaker cable **(1)** from the system board.
2. Release the speaker cables from the retention clips **(2)** and channels built into the keyboard/top cover.
3. Remove the speakers **(3)** and cables.



Reverse this procedure to install the speakers.

Fingerprint reader board

Description	Spare part number
Fingerprint reader board	826257-001
NOTE: The fingerprint board spare part kit does not include the fingerprint reader board bracket or the fingerprint reader board cable. The fingerprint reader board bracket is available using spare part number 829302-001. The fingerprint reader board cable is available using spare part number 829295-001.	

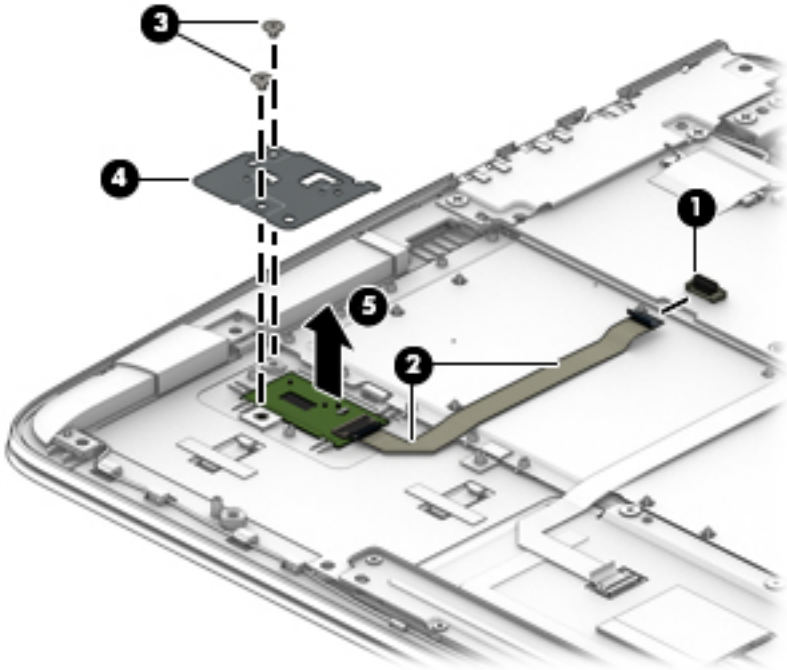
Before removing the fingerprint reader board, follow these steps:

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 unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 25).
5. Remove the battery (see Battery on page 27).

Remove the fingerprint reader board:

1. Release the zero insertion force (ZIF) connector **(1)** to which the fingerprint reader board cable is attached, and then disconnect the fingerprint reader board cable from the system board.
2. Detach the fingerprint reader board cable **(2)** from the keyboard/top cover. (The fingerprint reader board cable is attached to the keyboard/top cover with double-sided adhesive.)
3. Remove the two Phillips PM2.0×2.5 screws **(3)** that secure the fingerprint reader board and fingerprint reader board bracket to the keyboard/top cover.
4. Remove the fingerprint reader board bracket **(4)**.

5. Remove the fingerprint reader board **(5)**.



Reverse this procedure to install the fingerprint reader board.

TouchPad board

Description	Spare part number
TouchPad board	833590-001
NOTE: The TouchPad board spare part kit does not include the TouchPad board bracket or the TouchPad board cable. The TouchPad board bracket is available using spare part number 829301-001. The TouchPad board cable is available using spare part number 829294-001.	

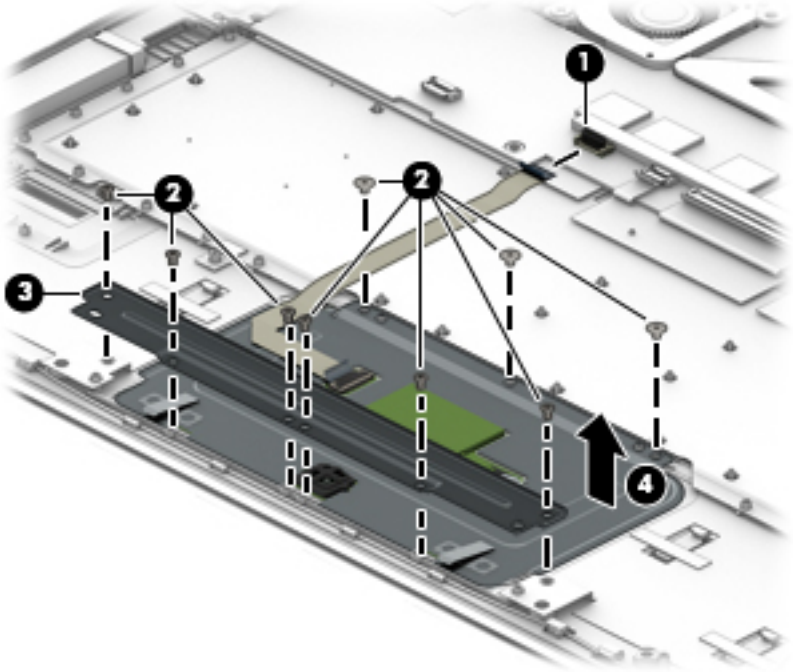
Before removing the TouchPad board, follow these steps:

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 unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 25).
5. Remove the battery (see Battery on page 27).

Remove the TouchPad board:

1. Release the ZIF connector **(1)** to which the TouchPad board cable is attached, and then disconnect the TouchPad board cable from the system board.
2. Remove the nine Phillips PM2.0×2.5 screws **(2)** that secure the TouchPad board and TouchPad board bracket to the keyboard/top cover.
3. Remove the TouchPad board bracket **(3)**.

4. Remove the TouchPad board **(4)**.



Reverse this procedure to install the TouchPad board.

Power connector cable

Description	Spare part number
Power connector cable	838841-001

Before removing the power connector cable, follow these steps:

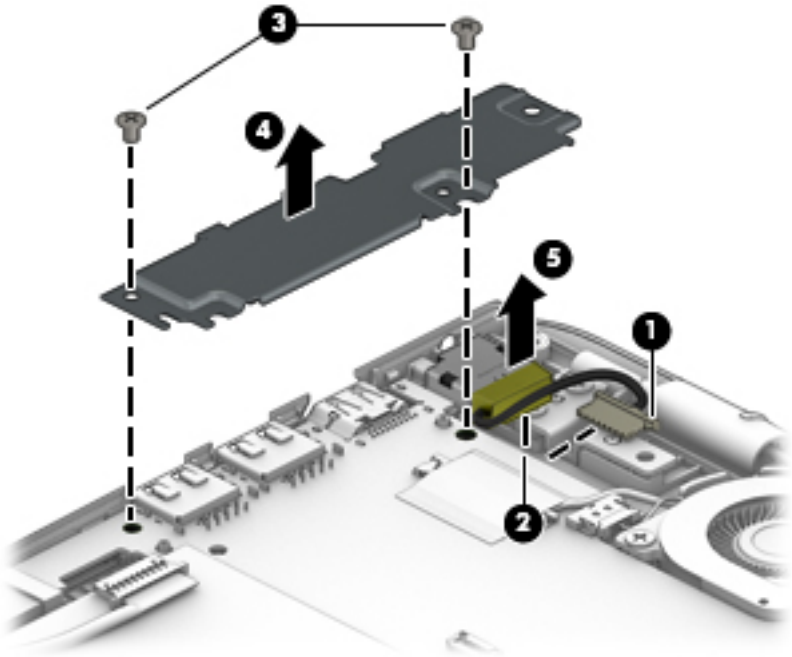
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 25).
5. Disconnect the battery cable from the system board (see Battery on page 27).

Remove the power connector cable:

1. Disconnect the power connector cable **(1)** from the system board.
2. Release the power connector cable **(2)** from the routing channel built into the system board.
3. Remove the two Phillips PM2.0×4.4 screws **(3)** that secure the power connector cable and power connector cable bracket to the keyboard/top cover.
4. Remove the right I/O bracket **(4)**.

   The right I/O bracket is available using spare part number 829299-001.

5. Remove the power connector cable **(5)**.



Reverse this procedure to install the power connector cable.

Fan

Description	Spare part number
Fans (2, include cable)	829296-001

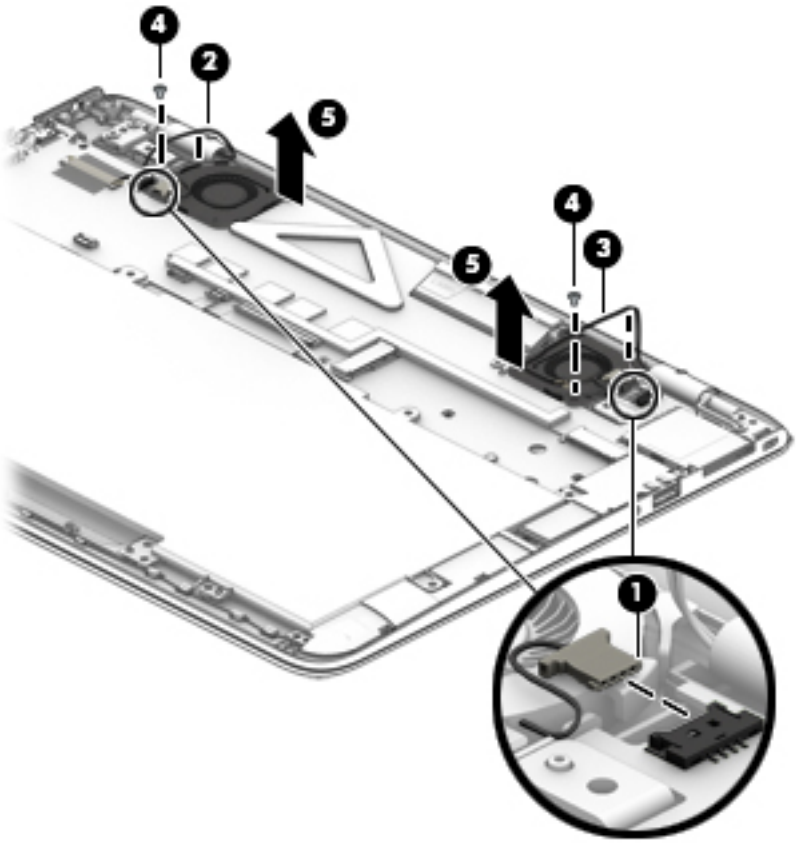
Before removing the fans, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 25).
5. Disconnect the battery cable from the system board (see Battery on page 27).

Remove the fans:

1. Disconnect the fan cables **(1)** from the system board.
2. Release the display panel cable from the routing clips built into the left fan **(2)**.
3. Release the wireless antenna cable from the routing clips built into the right fan **(3)**.
4. Remove the two Phillips PM2.5×4.4 screws **(4)** that secure the fans to the keyboard/top cover.

5. Remove the fans **(5)**.



6. Remove the fans.

Reverse this procedure to install the fans.

Security cable slot bracket

Description	Spare part number
Security cable slot bracket	829298-001

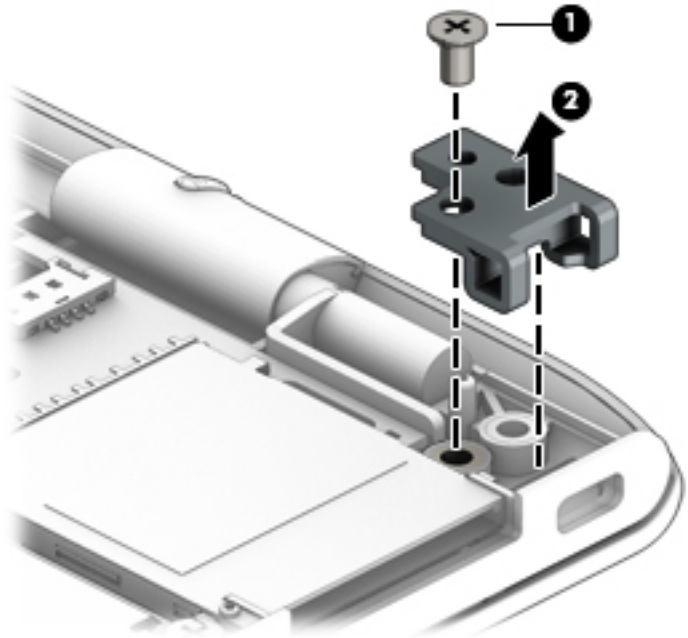
Before removing the security cable slot bracket, follow these steps:

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 unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 25).
5. Disconnect the battery cable from the system board (see Battery on page 27).

Remove the security cable slot bracket:

1. Remove the Phillips PM2.5×4.4 screw **(1)** that secures the security cable slot bracket to the keyboard/top cover.

2. Remove the security cable slot bracket **(2)**.



Reverse this procedure to install the security cable slot bracket.

System board

Description	Spare part number
Equipped with an Intel Core i7-6500U 2.50-GHz (SC turbo up to 3.10-GHz) processor (1600-MHz FSB, 4.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 8.0-GB of system memory, and the Windows 10 Professional operating system	829286-601
Equipped with an Intel Core i7-6500U 2.50-GHz (SC turbo up to 3.10-GHz) processor (1600-MHz FSB, 4.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 8.0-GB of system memory and a non-Windows operating system	829286-001
Equipped with an Intel Core i5-6200U 2.30-GHz (SC turbo up to 2.80-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 8.0-GB of system memory, and the Windows 10 Professional operating system	829285-601
Equipped with an Intel Core i5-6200U 2.30-GHz (SC turbo up to 2.80-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 8.0-GB of system memory and a non-Windows operating system	829285-001
Equipped with an Intel Core i5-6200U 2.30-GHz (SC turbo up to 2.80-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 4.0-GB of system memory, and the Windows 10 Professional operating system	829284-601
Equipped with an Intel Core i5-6200U 2.30-GHz (SC turbo up to 2.80-GHz) processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 4.0-GB of system memory and a non-Windows operating system	829284-001
Equipped with an Intel Core i3-6100U 2.30-GHz processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 4.0-GB of system memory, and the Windows 10 Professional operating system	829283-601
Equipped with an Intel Core i3-6100U 2.30-GHz processor (1600-MHz FSB, 3.0-MB L3 cache, dual core, 15-W [dynamic PL1 to 8.5-W]), 4.0-GB of system memory and a non-Windows operating system	829283-001

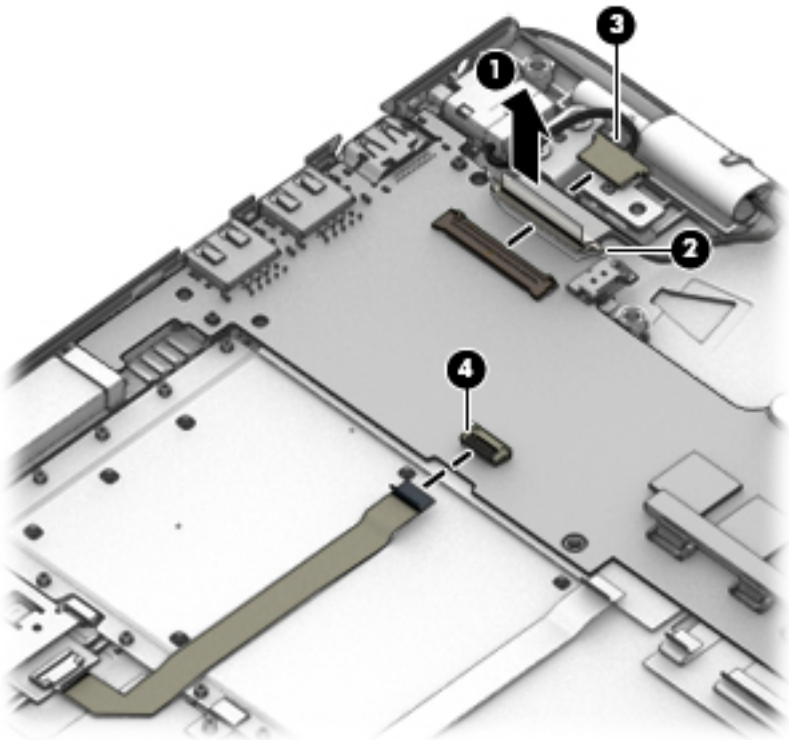
Before removing the system board, follow these steps:

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 unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 25), and then remove the following components:
   a. Battery (see Battery on page 27)
   b. Solid-state drive (see Solid-state drive on page 28)
   c. WLAN module (see WLAN module on page 30)
   d. Power connector bracket (see Power connector cable on page 35)
   e. Fans (see Fan on page 36)

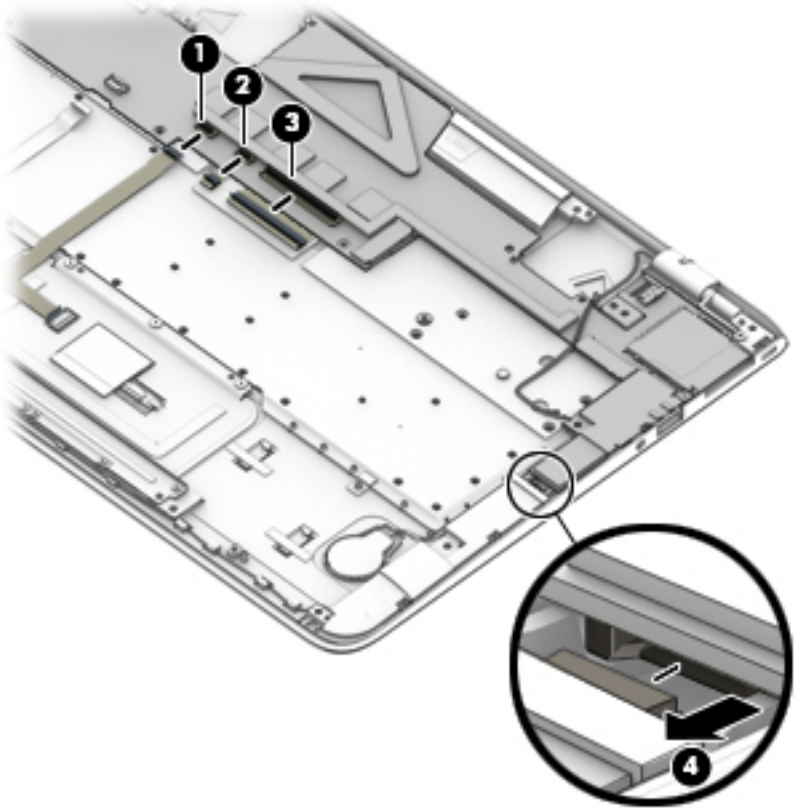
NOTE: When replacing the system board, be sure that the heat sink is removed from the defective system board and installed on the replacement system board. See see Heat sink on page 42 for heat sink removal and replacement instructions.

Remove the system board:

1. Release the adhesive support strip **(1)** that secures the display panel cable to the system board.
2. Disconnect the display panel cable **(2)** from the system board.
3. Disconnect the power connector cable **(3)** from the system board.
4. Release the ZIF connector **(4)** to which the fingerprint reader board cable is attached, and then disconnect the fingerprint reader board cable from the system board.



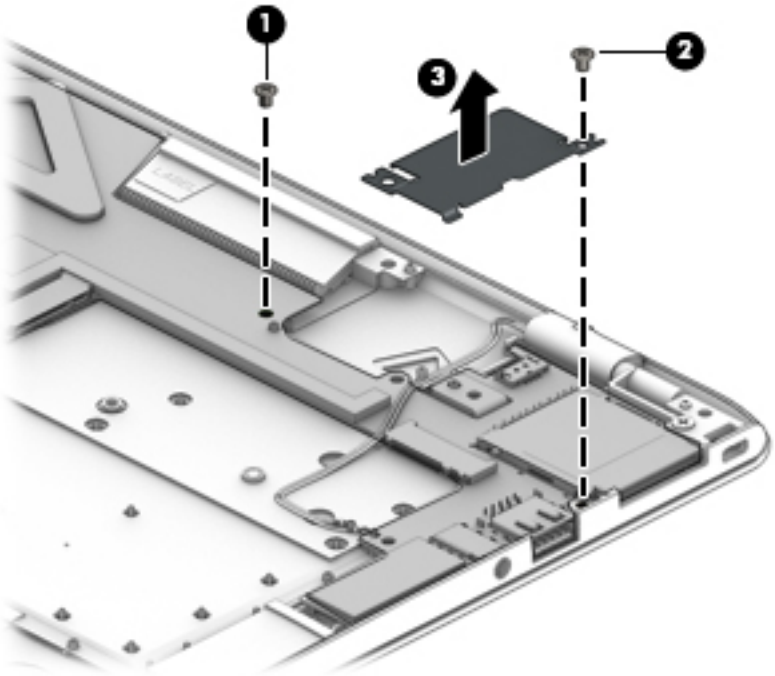
5. Release the ZIF connector **(1)** to which the TouchPad board cable is attached, and then disconnect the TouchPad board cable from the system board.
6. Release the ZIF connector **(2)** to which the keyboard backlight cable is attached, and then disconnect the keyboard backlight board cable from the system board.
7. Release the ZIF connector **(3)** to which the keyboard cable is attached, and then disconnect the keyboard cable from the system board.
8. Disconnect the speaker cable **(4)** from the system board.



9. Remove the Phillips PM2.5×3.4 screw **(1)** that secures the system board to the keyboard/top cover.
10. Remove the Phillips PM2.5×4.4 screw **(2)** that secures the system board and the left I/O bracket to the keyboard/top cover.

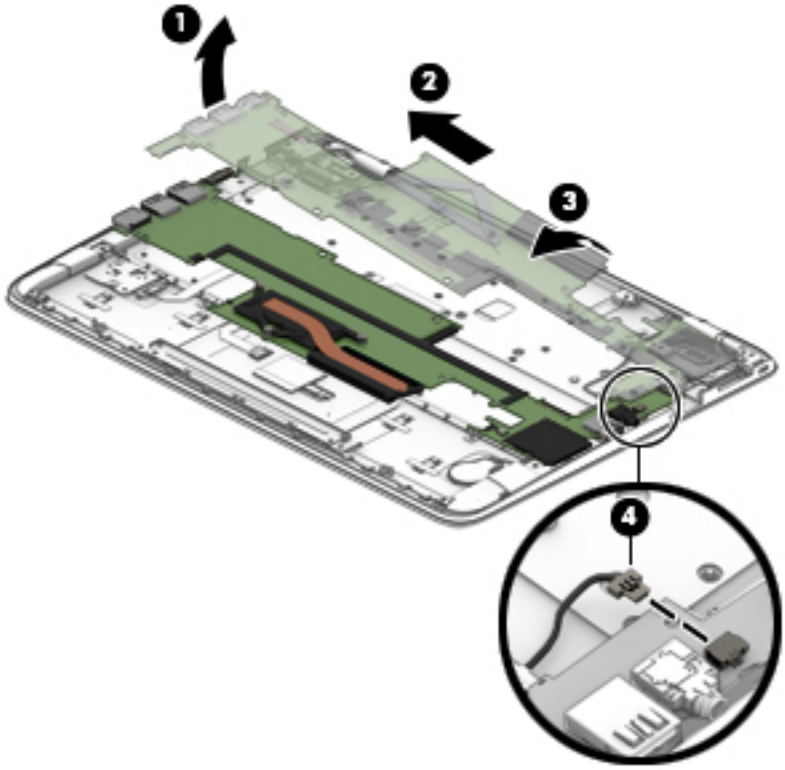
11. Remove the left I/O bracket **(3)**.

    The left I/O bracket is available using spare part number 829299-001.



12. Lift the left side of the system board **(1)** until it rests at an angle.
13. Slide the system board **(2)** up and to the left at an angle until the connectors on the right side of the system board are clear of the openings on the right side of the keyboard/top cover.
14. Swing the rear edge of the system board **(3)** up and forward until the system board rests upside down on the keyboard/top cover.

15. Disconnect the RTC battery cable **(4)** from the system board.



16. Remove the system board.

Reverse this procedure to install the system board.

Heat sink

Description	Spare part number
Heat sink (includes replacement thermal material)	829314-001

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 unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 25), and then remove the following components:
   a. Battery (see Battery on page 27)
   b. Solid-state drive (see Solid-state drive on page 28)
   c. WLAN module (see WLAN module on page 30)
   d. Power connector bracket (see Power connector cable on page 35)

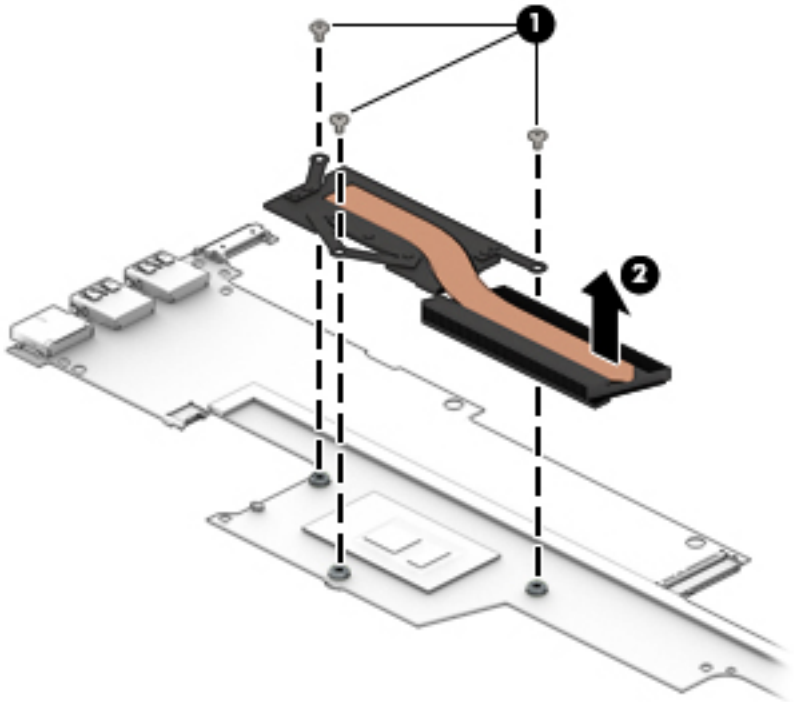
e. Fans (see Fan on page 36)

f. System board (see System board on page 38)

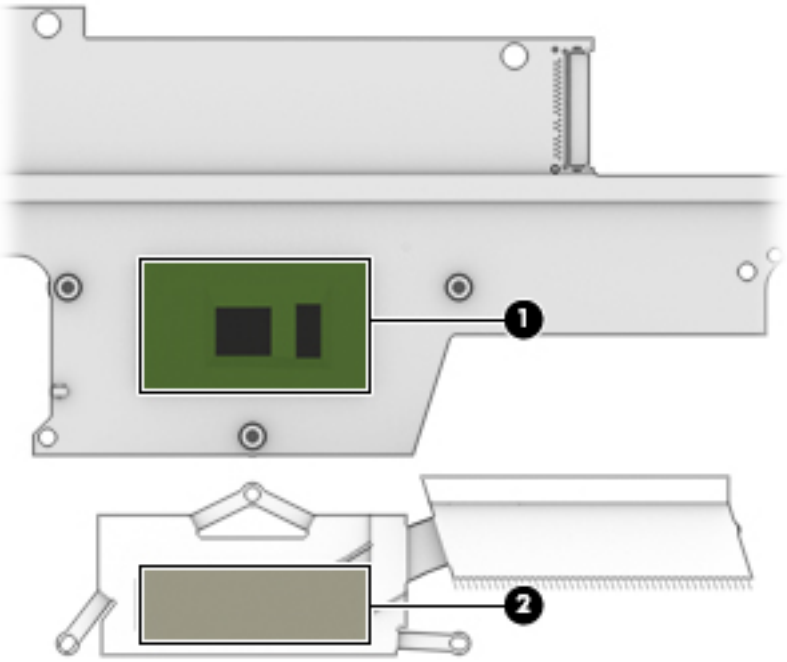
Remove the heat sink:

1. Following the 1, 2, 3 sequence stamped into the heat sink, remove the three Phillips PM2.0×2.4 screws **(1)** that secure the heat sink to the system board.
2. Remove the heat sink **(2)**.

NOTE: Due to the adhesive quality of the thermal material located between the heat sink and the system board components, it may be necessary to move the heat sink from side to side to detach it.



NOTE: The thermal material must be thoroughly cleaned from the surfaces of the heat sink and the system board each time the heat sink is removed. Replacement thermal material is included with the heat sink and system board spare part kits. Thermal paste is used on the system board **(1)** and the section of the heat sink **(2)** that services it.



Reverse this procedure to install the heat sink.

RTC battery

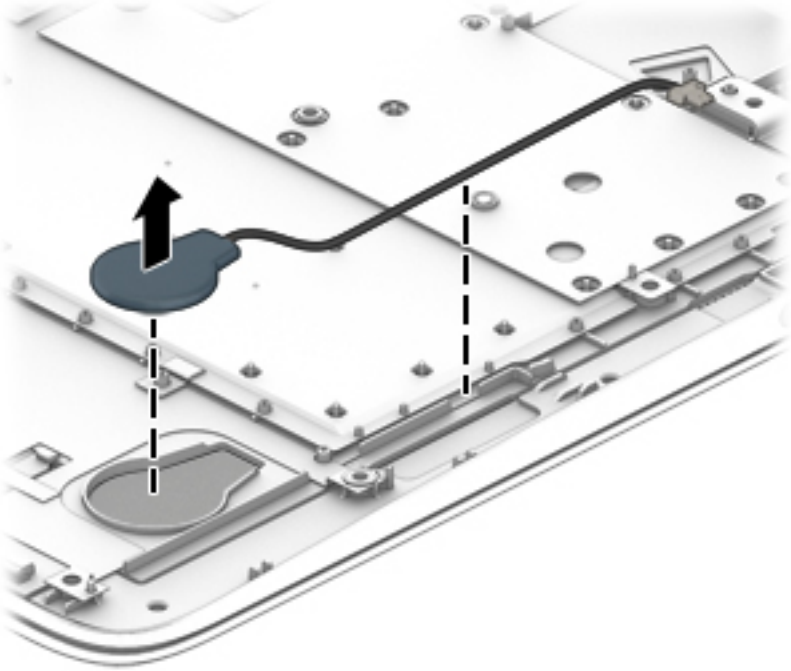
Description	Spare part number
RTC battery (includes cable and double-sided adhesive)	829306-001

Before removing the RTC battery, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 25), and then remove the following components:
   a. Battery (see Battery on page 27)
   b. Solid-state drive (see Solid-state drive on page 28)
   c. WLAN module (see WLAN module on page 30)
   d. Power connector bracket (see Power connector cable on page 35)
   e. Fans (see Fan on page 36)
   f. System board (see System board on page 38)

Remove the RTC battery:

▲ Detach the RTC battery from the keyboard/top cover. (The RTC battery is attached to the keyboard/top cover with double-sided adhesive.)



Reverse this procedure to install the RTC battery.

Display assembly

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

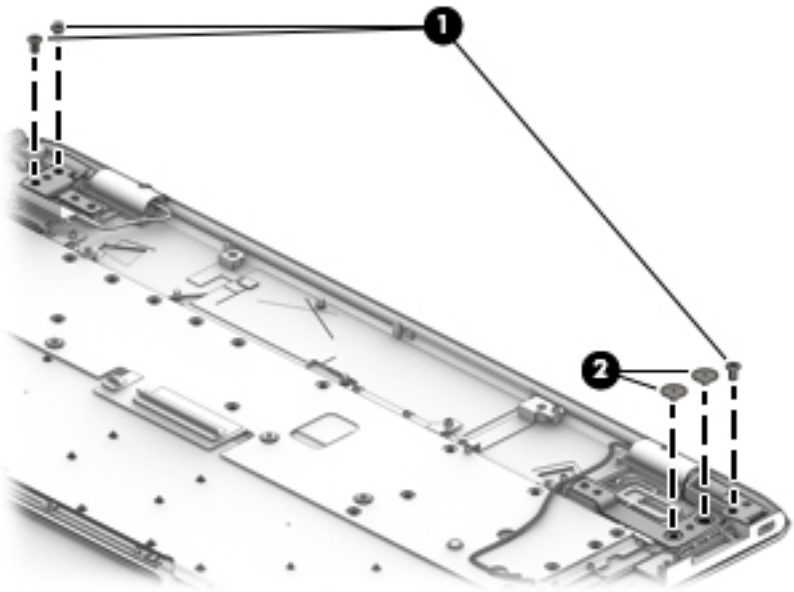
Before removing the display assembly, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 25), and then remove the following components:
   a. Battery (see Battery on page 27)
   b. Solid-state drive (see Solid-state drive on page 28)
   c. WLAN module (see WLAN module on page 30)
   d. Power connector bracket (see Power connector cable on page 35)
   e. Fans (see Fan on page 36)
   f. System board (see System board on page 38)

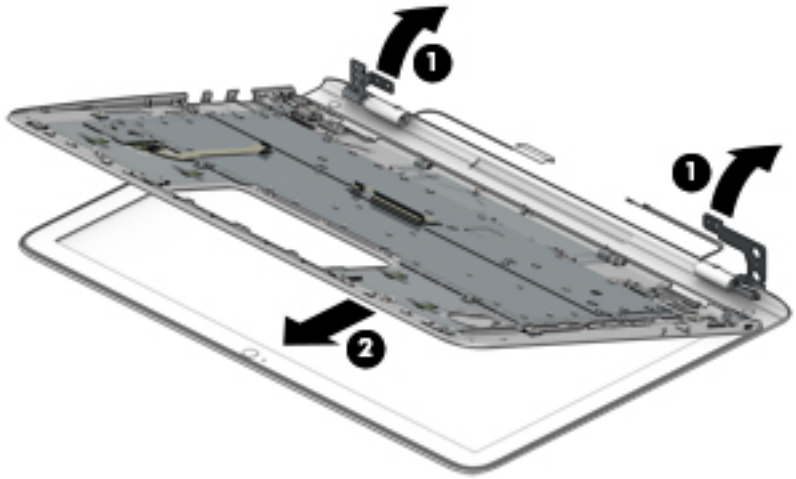
Remove the display assembly:

1. Remove the three Phillips PM2.5×4.4 screws **(1)** that secure the display assembly to the keyboard/top cover.

2. Remove the two Phillips PM2.5×2.9 broad head screws **(2)** that secure the display assembly to the keyboard/top cover.



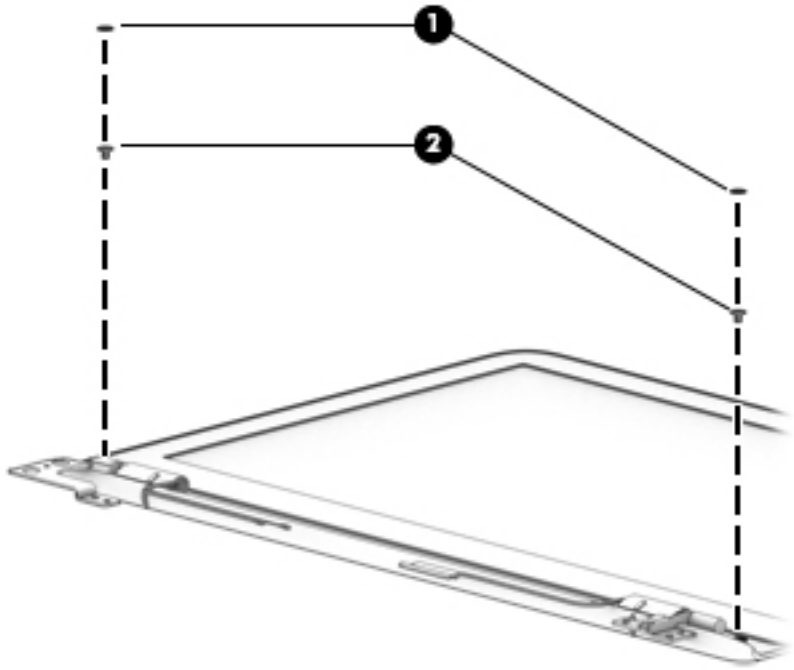
3. Swing the display hinges **(1)** up and back as far as they will go.
4. Slide the keyboard/top cover **(2)** away from the display assembly.



5. If it is necessary to replace the display bezel or any of the display assembly subcomponents:
   a. Remove the two display bezel screw covers **(1)**.

      The display bezel screw covers are available using spare part number 833481-001.

b. Remove the two Phillips PM2.5×3.4 screws **(2)** that secure the display bezel to the display assembly.

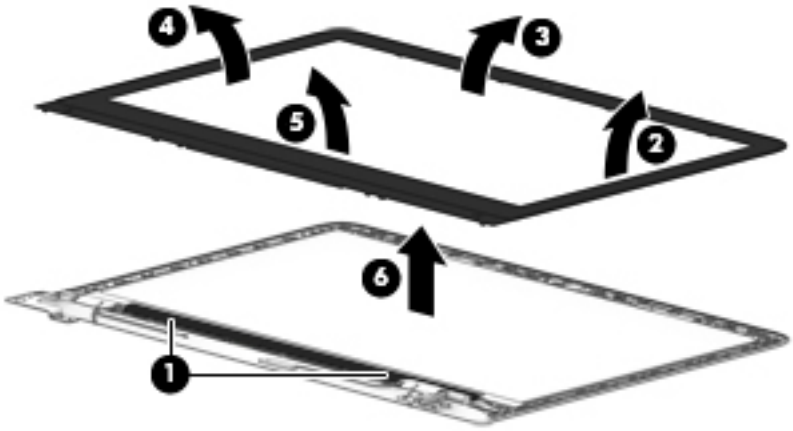


CAUTION: When releasing the bottom edge of the display bezel, make note of the location and the strength of the adhesive strip **(1)** on the of the bezel. This adhesive strip is important to the fit of the display bezel. If this caution is not followed, the display bezel can be damaged.

c. Flex the inside edges of the right edge **(2)**, the top edge **(3)**, the left edge **(4)**, and the bottom edge **(5)** of the display bezel until the bezel disengages from the display back cover.

d. Remove the display bezel **(6)**.

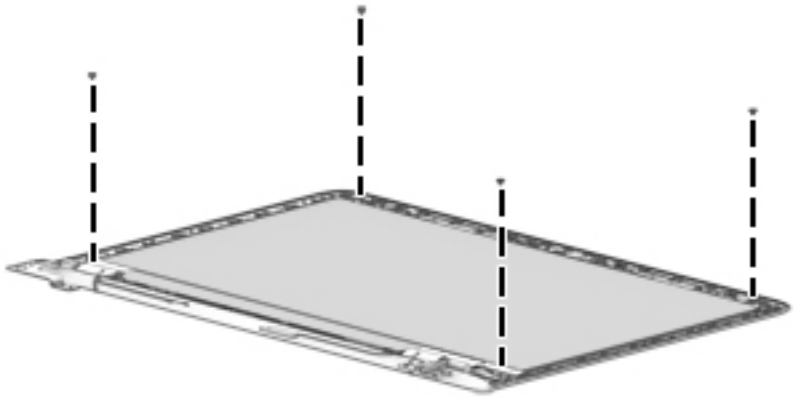
The display bezel is available using spare part number 833480-001.



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

a. Remove the display bezel.

b. Remove the four Phillips PM2.0×2.3 screws that secure the display panel to the display back cover.

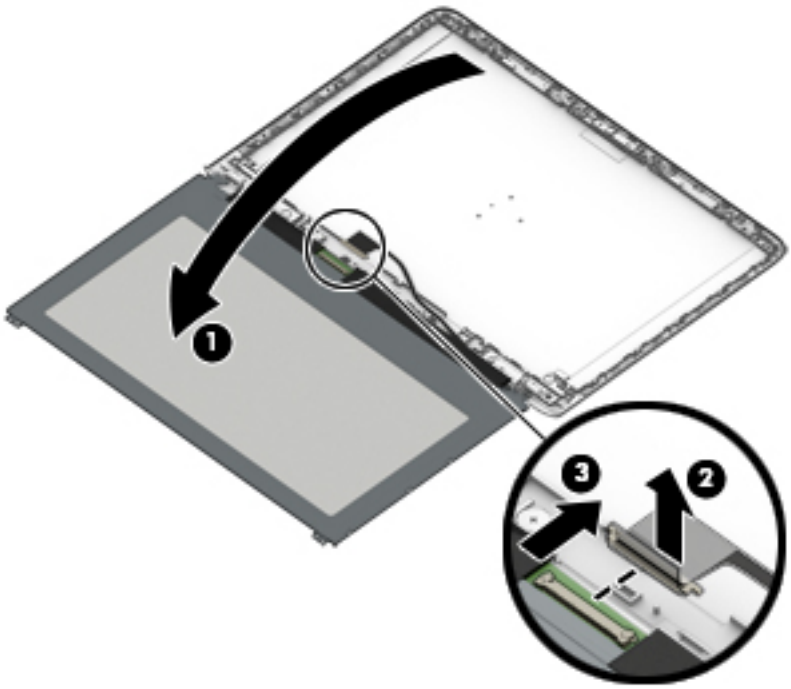


⚠ **CAUTION:** Before turning the display panel upside down, make sure the work surface is clear of tools, screws, and any other foreign objects. Failure to follow this caution can result in damage to the display panel.

c. Lift the top edge of the display panel **(1)** and swing it up and forward until it rests upside down in front of the display back cover.

d. Release the adhesive strip **(2)** that secures the display panel cable connector to the display panel.

e. Disconnect the display panel cable **(3)** from the display panel.



f. Remove the display panel.

The display panel is available using spare part numbers 815165-001 (13.3-in, QHD+, BrightView, UWVA) and 830567-001 (13.3-in, FHD, AntiGlare UWVA, WLED).

7. If it is necessary to replace the webcam/microphone module:

a. Remove the display bezel.

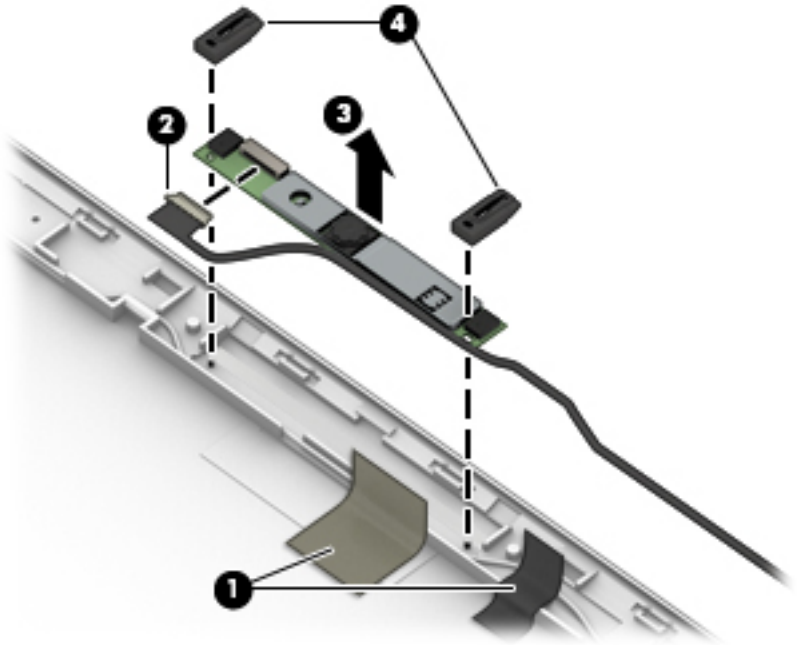
b. Remove the display panel.

c. Release the two pieces of grounding tape **(1)** the secure the webcam/microphone module cable to the display back cover.

d. Disconnect the webcam/microphone module cable **(2)** from the webcam/microphone module.

e. Detach the webcam/microphone module **(3)** from the display back cover. (The webcam/microphone module is attached to the display back cover with double-sided adhesive.)

NOTE: When releasing the webcam/microphone module, make sure the microphone rubber isolators **(4)** do not get lost. These isolators are important to the microphone performance.



f. Remove the webcam/microphone module.

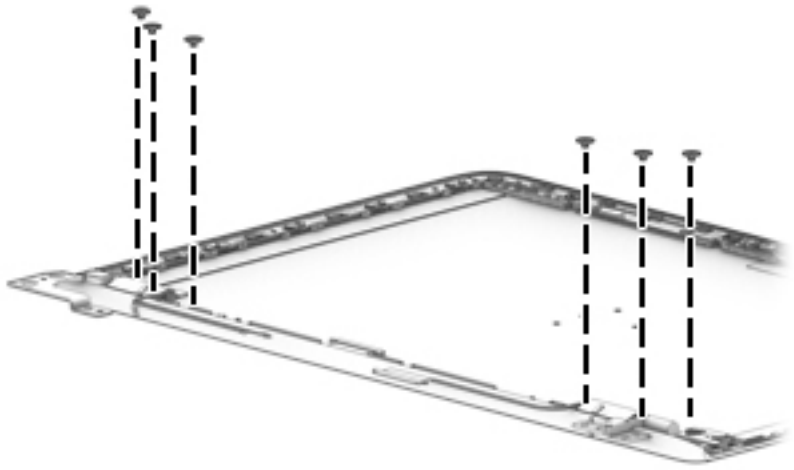
The webcam/microphone module is available using spare part number 833512-001.

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

a. Remove the display bezel.

b. Remove the display panel.

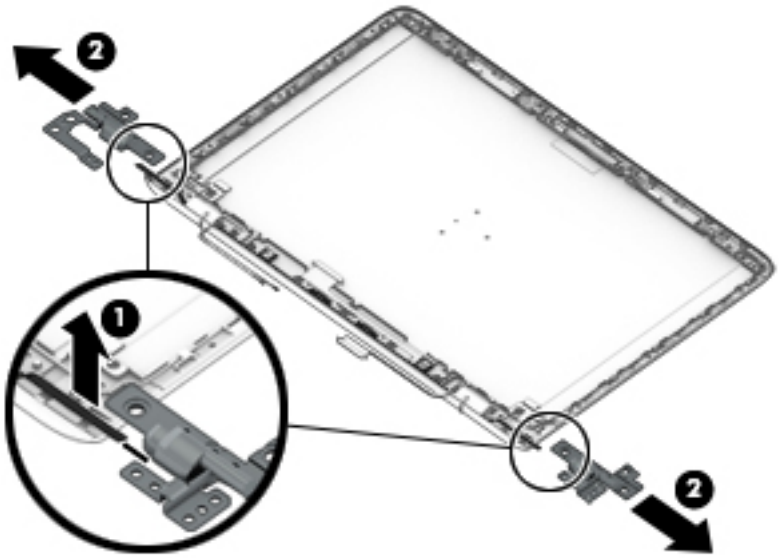
c. Remove the six Phillips PM2.5×2.7 broad head screws that secure the display hinges to the display back cover.



d. Release the outside tips of the display hinge cover **(1)** from the slots built into the display hinges.

e. Remove the display hinges **(2)**.

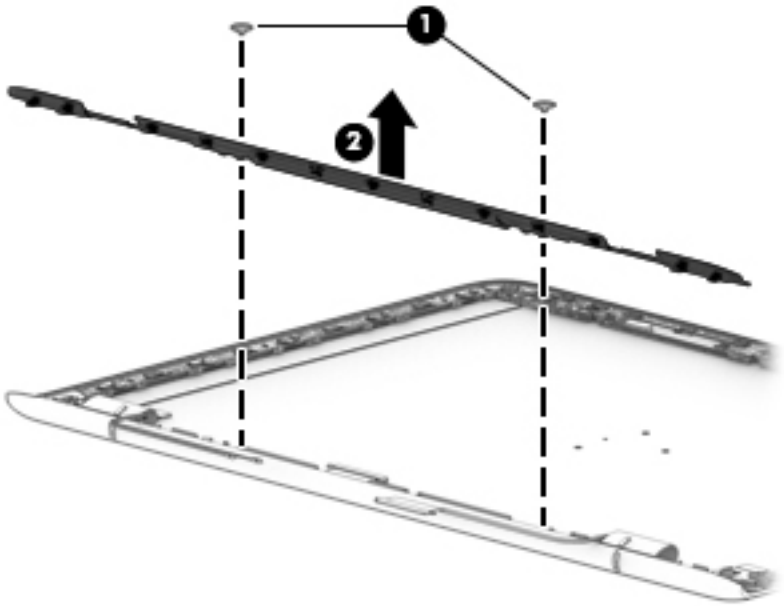
The display hinges are available using spare part number 829303-001.



f. If it is necessary to replace the hinge strip, remove the two Phillips PM2.0×2.4 screws **(1)** that secure the hinge strip to the display back cover.

g. Remove the hinge strip **(2)**.

The hinge strip is available using spare part number 829304-001.



9. If it is necessary to replace the WLAN antenna cables and transceivers:

a. Remove the display bezel.

b. Remove the display panel.

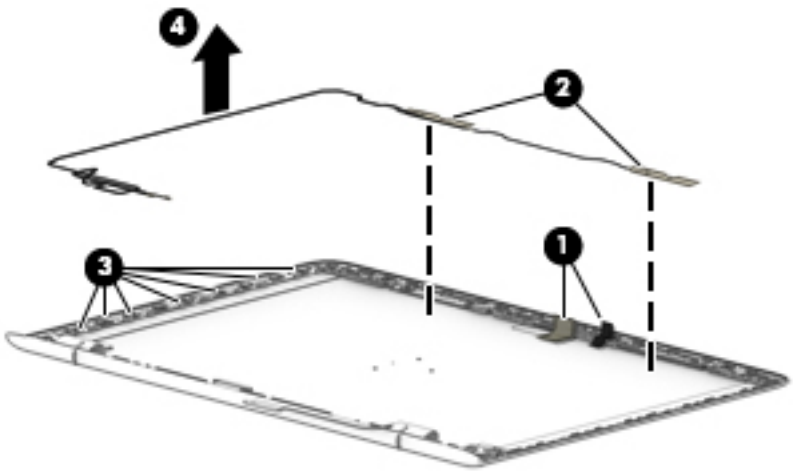
c. Release the two pieces of grounding tape **(1)** the secure the webcam/microphone module cable to the display back cover.

d. Detach the WLAN antenna transceivers **(2)** from the display back cover. (The WLAN antenna transceivers are attached to the display back cover with double-sided adhesive.)

e. Release the WLAN antenna cables from the clips **(3)** and routing channel built into the left edge of the display back cover.

f. Remove the WLAN antenna cables and transceivers **(4)**.

The WLAN antenna cables and transceivers are available using spare part number 829287-001.



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

    a. Remove the display bezel.

    b. Remove the display panel.

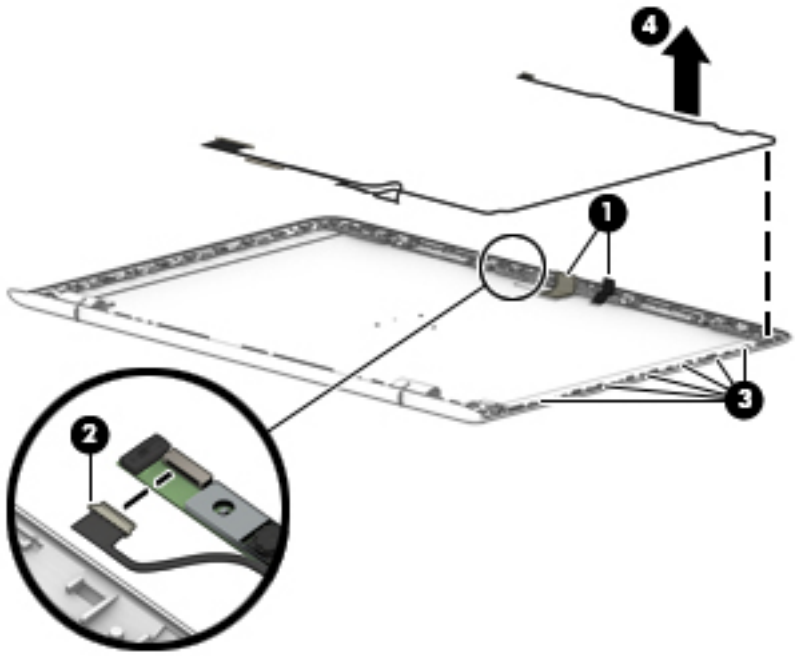
    c. Release the two pieces of grounding tape **(1)** the secure the webcam/microphone module cable to the display back cover.

    d. Disconnect the display panel cable **(2)** from the webcam/microphone module.

    e. Release the display panel cable from the retention clips **(3)** and routing channel built into the right side of the display back cover.

    f. Remove the display panel cable **(4)**.

    The display panel cable is available using spare part numbers 833483-001 (for use only on computer models equipped with a QHD+ display assembly) and 833482-001 (for use only on computer models equipped with an FHD display assembly).



Reverse this procedure to reassemble and install the display assembly.

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. The on-screen keyboard, which displays in tablet mode, cannot access Setup Utility.

Starting Setup Utility (BIOS)

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

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. The on-screen keyboard, which displays in tablet mode, cannot access Setup Utility.

- Computers or tablets with keyboards:
  - ▲ Turn on or restart the computer, quickly press esc, and then press f10.
- Tablets without keyboards:
  1. Turn on or restart the tablet, and then quickly hold down the volume down button.

     - or -

     Turn on or restart the tablet, and then quickly hold down the Windows button.
  2. Tap **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*):

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

   – or –

Click the question mark icon in the taskbar.

2. Select **My PC**, and then select **Specifications**.

– or –

▲ Use Setup Utility (BIOS).

To use Setup Utility (BIOS):

1. Start Setup Utility (BIOS) (see Starting Setup Utility (BIOS) on page 53).
2. Select **Main**, select System Information, and then make note of the BIOS version.
3. Select **Exit**, select **No**, and then follow the on-screen instructions.

To check for later BIOS versions, see Downloading a BIOS update on page 54.

Downloading a BIOS update

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

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

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

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

   – or –

   Click the question mark icon in the taskbar.

2. Click **Updates**, and then click **Check for updates and messages**.
3. Follow the on-screen instructions.
4. At the download area, follow these steps:

   a. Identify the most recent BIOS update and compare it to the BIOS version currently installed on your computer. If the update is more recent than your BIOS version, make a note of the date, name, or other identifier. You may need this information to locate the update later, after it has been downloaded to your hard drive.

   b. Follow the on-screen instructions to download your selection to the hard drive.

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

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

1. Type `file` in the taskbar search box, and then select **File Explorer**.
2. Click your hard drive designation. The hard drive designation is typically Local Disk (C:).
3. Using the hard drive path you recorded earlier, open the folder that contains the update.

4. Double-click the file that has an .exe extension (for example, *filename*.exe).

   The BIOS installation begins.

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

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

Synchronizing a tablet and keyboard (select products only)

For a tablet with a detachable keyboard, when you attach the tablet to the keyboard and restart the computer, Setup Utility (BIOS) checks to see if the Embedded Controller firmware on the keyboard needs to be synchronized. If so, synchronization begins. If the synchronization is interrupted, a notification screen displays for 10 seconds before the tablet restarts and attempts to synchronize again.

NOTE: The Embedded Controller firmware will synchronize ONLY if the tablet or keyboard battery is more than 50% charged, or if your tablet is connected to AC power.

7 Using HP PC Hardware Diagnostics (UEFI)

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

NOTE: To start BIOS on a convertible computer, your computer must be in notebook mode and you must use the keyboard attached to your tablet. The on-screen keyboard, which displays in tablet mode, cannot access BIOS.

To start HP PC Hardware Diagnostics UEFI:

1. Start BIOS:
   - Computers or tablets with keyboards:
     - Turn on or restart the computer, quickly press esc.
   - Tablets without keyboards:
     - Turn on or restart the tablet, and then quickly hold down the volume down button.

       - or -

       Turn on or restart the tablet, and then quickly hold down the Windows button.
2. Press or tap f2.

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

   a. Connected USB drive

   NOTE: To download the HP PC Hardware Diagnostics (UEFI) tool to a USB drive, see Downloading HP PC Hardware Diagnostics (UEFI) to a USB device on page 56.

   b. Hard drive

   c. BIOS
3. When the diagnostic tool opens, select the type of diagnostic test you want to run, and then follow the on-screen instructions. On a tablet, press the volume down button to stop a diagnostic test.

NOTE: If you need to stop a diagnostic test on computers or tablets with a keyboard, press esc.

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

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

Download the latest UEFI version:

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

Download any version of UEFI for a specific product:

1. Go to http://www.hp.com/support, and then select your country. The HP Support page is displayed.
2. Click **Drivers & Downloads**.
3. In the text box, enter the product name, and then click **Go**.

   – or –

   Click **Find Now** to let HP automatically detect your product.
4. Select your computer, and then select your operating system.
5. In the **Diagnostic** section, follow the on-screen instructions to select and download the UEFI version you want.

8 Specifications

Computer specifications

The computer operates on DC power, which can be supplied by an AC or a DC power source. The AC power source must be rated at 100–240 V, 50–60 Hz. Although the computer can be powered from a standalone DC power source, it should be powered only with an AC adapter or a DC power source that is supplied and approved by HP for use with this computer.

	Metric	U.S.
Dimensions		
Width	**32.7 cm**	12.85 in
Depth	**22.6 cm**	8.89 in
Height	**1.3 cm**	0.51 in
Weight	**1.4 kg**	3.01 lbs
Input power		
Operating voltage and current	19.5 V dc @ 2.31 A – 45 W 19.5 V dc @ 3.33 A – 65 W 19.5 V dc @ 4.62 A – 90 W 19.5 V dc @ 6.15 A – 120 W 19.5 V dc @ 7.69 A – 150 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.

9 Backing up, restoring, and recovering

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

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

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

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

– or –

Click the question mark icon in the taskbar.

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

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

Creating recovery media and backups

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

- Use HP Recovery Manager to create HP Recovery media after you successfully set up the computer. This step creates a backup of the HP Recovery partition on the computer. The backup can be used to reinstall the original operating system in cases where the hard drive is corrupted or has been replaced. For information on creating recovery media, see Creating HP Recovery media (select products only) on page 59. For information on the recovery options that are available using the recovery media, see Using Windows tools on page 60.
- Use Windows tools to create system restore points and create backups of personal information.

  For more information, see Recovering using HP Recovery Manager on page 61.

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

Creating HP Recovery media (select products only)

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

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

You can use Windows tools to create system restore points and create backups of personal information, see Using Windows tools on page 60.

- If your computer does list the Recovery partition and the Windows partition, you can use HP Recovery Manager to create recovery media after you successfully set up the computer. HP Recovery media can be used to perform system recovery if the hard drive becomes corrupted. System recovery reinstalls the original operating system and software programs that were installed at the factory and then configures the settings for the programs. HP Recovery media can also be used to customize the system or restore the factory image if you replace the hard drive.
  - Only one set of recovery media can be created. Handle these recovery tools carefully, and keep them in a safe place.
  - HP Recovery Manager examines the computer and determines the required storage capacity for the media that will be required.
  - To create recovery discs, your computer must have an optical drive with DVD writer capability, and you must use only high-quality blank DVD-R, DVD+R, DVD-R DL, or DVD+R DL discs. Do not use rewritable discs such as CD±RW, DVD±RW, double-layer DVD±RW, or BD-RE (rewritable Blu-ray) discs; they are not compatible with HP Recovery Manager software. Or, instead, you can use a high-quality blank USB flash drive.
  - If your computer does not include an integrated optical drive with DVD writer capability, but you would like to create DVD recovery media, you can use an external optical drive (purchased separately) to create recovery discs. If you use an external optical drive, it must be connected directly to a USB port on the computer; the drive cannot be connected to a USB port on an external device, such as a USB hub. If you cannot create DVD media yourself, you can obtain recovery discs for your computer from HP. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information on the HP website. Go to http://www.hp.com/support, select your country or region, and follow the on-screen instructions.
  - Be sure that the computer is connected to AC power before you begin creating the recovery media.
  - The creation process can take an hour or more. Do not interrupt the creation process.
  - If necessary, you can exit the program before you have finished creating all of the recovery DVDs. HP Recovery Manager will finish burning the current DVD. The next time you start HP Recovery Manager, you will be prompted to continue.

To create HP Recovery media:

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

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

If you ever need to recover the system, see Recovering using HP Recovery Manager on page 61.

Using Windows tools

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

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

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

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

Restore and recovery

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

IMPORTANT: Not all methods are available on all products.

- Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state. For more information see the Get started app.

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

- If you need to correct a problem with a preinstalled application or driver, use the Reinstall drivers and/or applications option (select products only) of HP Recovery Manager to reinstall the individual application or driver.

  ▲ Type `recovery` in the taskbar search box, select **HP Recovery Manager**, select **Reinstall drivers and/or applications**, and then follow the on-screen instructions.

- If you want to recover the Windows partition to original factory content, you can choose the System Recovery option from the HP Recovery partition (select products only) or use the HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 61. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 59.

- On select products, if you want to recover the computer's original factory partition and content, or if you have replaced the hard drive, you can use the Factory Reset option of HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 61.

- On select products, if you want to remove the recovery partition to reclaim hard drive space, HP Recovery Manager offers the Remove Recovery Partition option.

  For more information, see Removing the HP Recovery partition (select products only) on page 64.

Recovering using HP Recovery Manager

HP Recovery Manager software allows you to recover the computer to its original factory state by using the HP Recovery media that you either created or that you obtained from HP, or by using the HP Recovery partition (select products only). If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 59.

What you need to know before you get started

- HP Recovery Manager recovers only software that was installed at the factory. For software not provided with this computer, you must either download the software from the manufacturer's website or reinstall the software from the media provided by the manufacturer.

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

- HP Recovery media must be used if the computer hard drive fails. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 59.

- To use the Factory Reset option (select products only), you must use HP Recovery media. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 59.

- If your computer does not allow the creation of HP Recovery media or if the HP Recovery media does not work, you can obtain recovery media for your system from support. See the *Worldwide Telephone Numbers* booklet included with the computer. You can also find contact information from the HP

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

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

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

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

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

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

Using the HP Recovery partition (select products only)

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

To start HP Recovery Manager from the HP Recovery partition:

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

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

   - or-

   For computers or tablets with keyboards attached, press f11 while the computer boots, or press and hold f11 as you press the power button.

   For tablets without keyboards:

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

   - or -

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

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

Using HP Recovery media to recover

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

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

   NOTE: If the computer does not automatically restart in HP Recovery Manager, change the computer boot order. See Changing the computer boot order on page 63.

3. Follow the on-screen instructions.

Changing the computer boot order

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

To change the boot order:

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

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

   For computers or tablets with keyboards attached:

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

   For tablets without keyboards:

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

   - or -

   Turn on or restart the tablet, and then quickly hold down the Windows button; then select **f9**.
3. Select the optical drive or USB flash drive from which you want to boot.
4. Follow the on-screen instructions.

Removing the HP Recovery partition (select products only)

HP Recovery Manager software allows you to remove the HP Recovery partition to free up hard drive space.

IMPORTANT: After you remove the HP Recovery partition, you will not be able to perform System Recovery or create HP recovery media from the HP Recovery partition. So before you remove the Recovery partition, create HP Recovery media; see Creating HP Recovery media (select products only) on page 59.

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

Follow these steps to remove the HP Recovery partition:

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

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 **1.0 m** (3.2 ft) and no more than **1.8 m** (6 ft).
- All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country or region where the power cord set will be used.
- The power cord sets must have a minimum current capacity of 10 amps and a nominal voltage rating of 125 or 250 V AC, as required by the power system of each country or region.
- The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with the appliance inlet on the back of the computer.

Requirements for specific countries and regions

Country/region	Accredited agency	Applicable note number
Australia	EANSW	1
Austria	OVE	1
Belgium	CEBC	1
Canada	CSA	2
Denmark	DEMKO	1
Finland	FIMKO	1
France	UTE	1
Germany	VDE	1
Italy	IMQ	1
Japan	METI	3
The Netherlands	KEMA	1
Norway	NEMKO	1
The People's Republic of China	COC	5
South Korea	EK	4

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

1. The flexible cord must be Type HO5VV-F, 3-conductor, 1.0-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.
2. The flexible cord must be Type SPT-3 or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V) or NEMA 6-15P (15 A, 250 V) configuration.
3. The appliance coupler, flexible cord, and wall plug must bear a “T” mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCT or VCTF, 3-conductor, 1.00-mm² conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V) configuration.
4. The flexible cord must be Type RVV, 3-conductor, 0.75-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.
5. The flexible cord must be Type VCTF, 3-conductor, 0.75-mm² 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.

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 light 10
AC adapter, spare part numbers 19
action keys 6
antenna
  location 4
  removal 51
  spare part number 19, 51
audio, product description 1
audio-in jack 9
audio-out jack 9

B

backups 59
battery
  removal 27
  spare part number 17, 27
BIOS
  determining version 53
  downloading an update 54
  starting the Setup Utility 53
  updating 53
boot order
  changing 63
bottom components 11
bottom cover
  removal 25
  spare part number 17, 25
button components 5
buttons
  power 5
  TouchPad 8

C

caps lock light 7
chipset, product description 1
components
  bottom 11
  buttons 5
  display 4
  fingerprint reader 5
  keys 6
  left-side 9
  lights 7
  right-side 10
  speakers 5
  TouchPad 8
computer
  major components 14
  specifications 58

D

display assembly
  removal 45
  spare part number 45
  subcomponents 18
display back cover, spare part number 19
display bezel
  removal 46
  spare part number 18, 47
display bezel screw covers
  removal 46
  spare part number 18, 46
display components 4
display panel
  removal 47
  spare part numbers 18, 48
display panel cable
  removal 52
  spare part numbers 19, 52
display panel, product description 1
display switch 4
DVD-RW Drive, spare part number 19

E

esc key 6
Ethernet, product description 1

F

fan
  removal 36
  spare part number 16, 36
feet
  removal 25
  spare part number 17, 25
fingerprint reader 6
fingerprint reader board
  removal 33
  spare part number 16, 33
fingerprint reader board bracket
  removal 33
  spare part number 16, 33
fingerprint reader board cable, spare part number 16, 33
fingerprint reader components 5
fn key 6

G

graphics, product description 1

H

HDMI port 10
HDMI-to-VGA adapter, spare part number 19
headphone jack 9
heat sink
  removal 42
  spare part number 17, 42
hinge
  removal 49
  spare part number 18, 50
hinge strip
  removal 49
  spare part number 18, 51
HP PC Hardware Diagnostics (UEFI)
  using 56
HP Recovery Manager
  correcting boot problems 63
  starting 62
HP Recovery media
  creating 59
  recovery 62
HP Recovery partition
  recovery 62
  removing 64

I

I/O bracket
  removal 35, 40
  spare part number 16, 35, 41

J

jacks
- audio-in 9
- audio-out 9
- headphone 9
- microphone 9

K

key components 6
keyboard, product description 2
keyboard/top cover, spare part numbers 15
keys
- action 6
- esc 6
- fn 6
- Windows 6

L

left side components 9
light components 7
lights
- AC adapter 10
- caps lock 7
- mute 7
- power 7, 10
- webcam 4

M

memory card reader 9
memory module, product description 1
microphone
- location 4
- product description 1

microphone jack 9
minimized image recovery 62
minimized image, creating 61
miscellaneous part 19
model name 1
mute light 7

O

operating system, product description 2
optical drive, spare part number 19
original system recovery 61

P

pointing device, product description 2
ports
- HDMI 10
- product description 2
- USB 3.0 9, 10

power button 5
power connector 10
power connector cable
- removal 35
- spare part number 16, 35

power cord
- set requirements 65
- spare part numbers 19

power light 7, 10
power requirements, product description 2
processor, product description 1
product description
- audio 1
- chipset 1
- display panel 1
- Ethernet 1
- external media cards 2
- graphics 1
- keyboard 2
- memory module 1
- microphone 1
- operating system 2
- pointing device 2
- ports 2
- power requirements 2
- processors 1
- product name 1
- security 2
- serviceability 2
- solid-state drive 1
- video 1
- wireless 1

product name 1

R

recover
- options 61

recovery
- discs 60, 62
- HP Recovery Manager 61
- media 62
- starting 62
- supported discs 60
- system 61
- USB flash drive 62
- using HP Recovery media 60

recovery media
- creating 59
- creating using HP Recovery Manager 60

recovery partition
- removing 64

removal/replacement
- procedures 25

right-side components 10
RJ45-to-USB adapter, spare part number 19
RTC battery
- removal 44
- spare part number 17, 44

Rubber Kit, spare part number 17

S

Screw Kit, spare part number 19
security cable slot 9
security cable slot bracket
- removal 37
- spare part number 15, 37

security, product description 2
service tag 12
serviceability, product description 2
solid-state drive
- product description 1
- removal 28
- spare part numbers 15, 28

Solid-state Drive Hardware Kit, spare part number 15, 28
solid-state drive/WLAN module bracket
- removal 29
- spare part number 16, 29

speaker components 5
Speaker Kit, spare part number 17, 32
speakers
- location 6
- removal 32
- spare part number 17, 32

specifications 58
supported discs, recovery 60
system board
- removal 38
- spare part numbers 16, 38

system recovery 61

system restore point
creating 60
system restore point, creating 59

T

TouchPad board
removal 34
spare part number 16, 34
TouchPad board bracket
removal 34
spare part number 16, 34
TouchPad board cable, spare part number 16, 34
TouchPad button 8
TouchPad components 8
TouchPad zone 8

U

USB 3.0 port 9, 10

V

vents 11
video, product description 1

W

webcam 4
webcam light 4
webcam/microphone module
removal 48
spare part number 18, 49
Windows
system restore point 59, 60
Windows key 6
Windows tools
using 60
wireless antenna
location 4
removal 51
spare part number 19, 51
wireless, product description 1
WLAN antenna
location 4
removal 51
spare part number 19, 51
WLAN module
removal 30
spare part numbers 15, 30