Maintenance and Service Guide

SUMMARY

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

Legal information

Product notice

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

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

Software terms

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

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

Safety warning notice

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

⚠ **WARNING!** To reduce the possibility of heat-related injuries or of overheating the computer, do not place the computer directly on your lap or obstruct the computer air vents. Use the computer only on a hard, flat surface. Do not allow another hard surface, such as an adjoining optional printer, or a soft surface, such as pillows or rugs or clothing, to block airflow. Also, do not allow the AC adapter to come into contact with the skin or a soft surface, such as pillows or rugs or clothing, during operation. The computer and the AC adapter comply with the user-accessible surface temperature limits defined by applicable safety standards.

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1 Product description

This table provides detailed product information.

Table 1-1 Product components and their descriptions

Category	Description
Product Name	HP Elite c640 14 inch G3 Chromebook™
Processors	Intel® Core™ processors
	Intel Core i7-1265U (1.8 GHz [max turbo frequency 4.8 GHz], 10 cores, 12 MB Intel Smart Cache)
	Intel Core i7-1255U (1.7 GHz [max turbo frequency 4.7 GHz], 10 cores, 12 MB Intel Smart Cache)
	Intel Core i5-1245U (1.6 GHz [max turbo frequency 4.4 GHz], 10 cores, 12 MB Intel Smart Cache)
	Intel Core i5-1235U (1.3 GHz [max turbo frequency 4.4 GHz], 10 cores, 12 MB Intel Smart Cache)
	Intel Core i3-1215U (1.2 GHz [max turbo frequency 4.4 GHz], 10 MB cache, 6 cores)
	Intel Pentium® Gold 8505 (1.2 GHz [max turbo frequency 4.4 GHz], 8 MB cache, 5 cores)
	Intel Celeron® 7305 (1.1 GHz base frequency, 8 MB cache, 5 cores)
Graphics	Internal graphics
	Intel® Iris® Xe
Display	14.0 in (35.6 cm), white light-emitting diode (WLED), antiglare
	Full high definition (FHD) (1920 × 1080), ultra wide viewing angle (UWVA), 45% NTSC, embedded DisplayPort™ (eDP) 1.2 without panel self-refresh (PSR), 250 nits
	FHD, UWVA, 45% NTSC, eDP 1.2 without PSR, 250 nits, WWAN
	FHD, UWVA, 45% NTSC, eDP 1.2 without PSR, 250 nits, touch-on panel (TOP)
	FHD, UWVA, 45% NTSC, eDP 1.2 without PSR, 250 nits, no WWAN
	FHD, UWVA, 100% sRGB, eDP 1.3 + PSR, 400 nits
	FHD, UWVA, 100% sRGB, eDP 1.3 + PSR, low blue light, 1000 nits, privacy panel, HP Eye Ease certification
	High definition (HD) (1366 × 768), standard viewing angle (SVA), 45% NTSC, eDP 1.2 without PSR, 250 nits
Memory	Integrated, not customer accessible or upgradeable supporting up to 32 GB of RAM
	LPDDR4-4266 dual-channel support
	Supports the following configurations:
	● 32 GB
	● 16 GB

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

Category	Description
Primary storage	**PCIe, Non-Volatile Memory express (NVMe), M.2 solid-state drives** (select models only)
	512 GB, M2, 2280
	256 GB, M2, 2230
	128 GB, M2, 2230
	embedded MultiMedia Controller (eMMC) 5.0 (select models only)
	64 GB
Audio and video	B&O Play
	Dual speakers
	5 MP camera, narrow field-of-view (NFOV), USB2
	Dual-array digital microphone with appropriate software: beam forming, echo cancellation, noise suppression
Wireless	**Wireless Local Area Network (WLAN)**
	Intel AX211 Wi-Fi® 6E Bluetooth® 5.2 WLAN
	Intel AX211 Wi-Fi 6E Bluetooth 5.2 vPro™ WLAN
	Wireless Wide Area Network (WWAN) (select products only)
	Intel® XMM™ 7360 LTE-Advanced (Cat 9)
Media card reader	Supports microSD™, SDHC™, SDXC™
Ports	HDMI v2.0
	USB Type-C®
	USB 3.2 Gen 1 Type-A (2)
Keyboard/pointing devices	**Keyboard** (island style, spill resistant)
	3-coat paint, backlit
	3-coat paint, backlit, WWAN models
	3-coat paint, backlit, privacy
	3-coat paint, backlit, privacy, WWAN models
	Textured
Power requirements	**Battery**
	3 cell, 58 Whr, polymer, HP Long Life
	HP Fast Charge Technology
	Smart AC adapters (USB Type-C, non power factor correction (nPFC), straight, 1.8 m [6 ft])
	65 W
	45 W
	Power cord
	C5, conventional, 1 m (3.3 ft)

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

Category	Description
Security	Integrated fingerprint touch sensor (select products only)
	Kensington nano security lock
	Active SmartCard (select products only)
Operating system	Chrome™
	Chrome with Chrome Education Upgrade
	Chrome with Chrome Enterprise Upgrade
Serviceability	**End user replaceable parts**
	AC adapter

2 Components

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

Right

Use the illustration and table to identify the components on the right side of the computer.
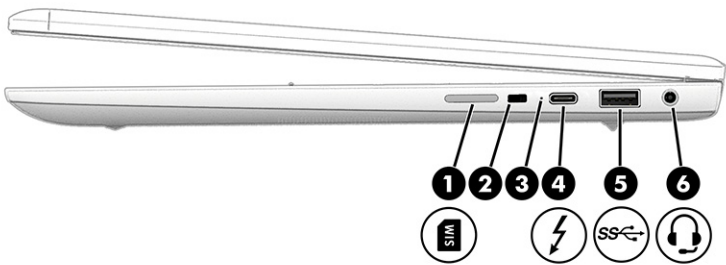
Table 2-1 Right-side components and their descriptions

Component		Description
(1)	SIM card tray (select products only)	Supports a wireless subscriber identity module (SIM) card.
(2)	Security cable slot	Attaches an optional security cable to the computer.
(3)	AC adapter and battery light	- White: The AC adapter is connected and the battery is fully charged. - Amber: The AC adapter is connected and the battery is charging. - Blinking amber: The battery has an error. - Off: The battery is not charging.
(4)	USB Type-C® power connector and Thunderbolt™ port	Connects an AC adapter that has a USB Type-C Thunderbolt connector, supplying power to the computer and, if needed, charging the computer battery. Also connects a USB device, provides data transfer, and charges small devices.
(5)	USB SuperSpeed port	Connects a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provides high-speed data transfer.
(6)	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 standalone microphones.

Left

Use the illustration and table to identify the components on the left side of the computer.
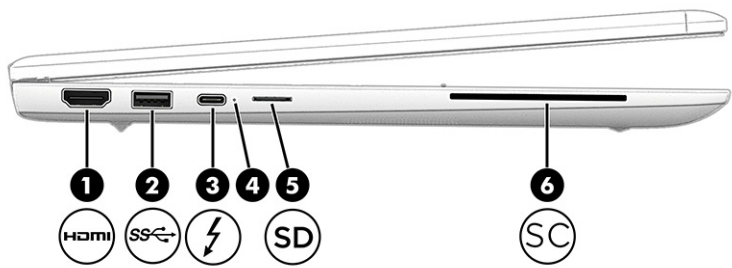
Table 2-2 Left-side components and their descriptions

Component		Description
(1)	HDMI port	Connects an optional video or audio device, such as a high-definition television, any compatible digital or audio component, or a high-speed High Definition Multimedia Interface (HDMI) device.
(2)	USB SuperSpeed port	Connects a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provides high-speed data transfer.
(3)	USB Type-C power connector and Thunderbolt port	Connects an AC adapter that has a USB Type-C Thunderbolt connector, supplying power to the computer and, if needed, charging the computer battery. Also connects a USB device, provides data transfer, and charges small devices.
(4)	AC adapter and battery light	● White: The AC adapter is connected and the battery is fully charged. ● Amber: The AC adapter is connected and the battery is charging. ● Blinking amber: The battery has an error. ● Off: The battery is not charging.
(5)	microSD™ memory card reader	Reads optional memory cards that store, manage, share, or access information.
(6)	Smart card reader (select products only)	Supports optional smart cards.

Display

Use the illustration and table to identify the components on the display.
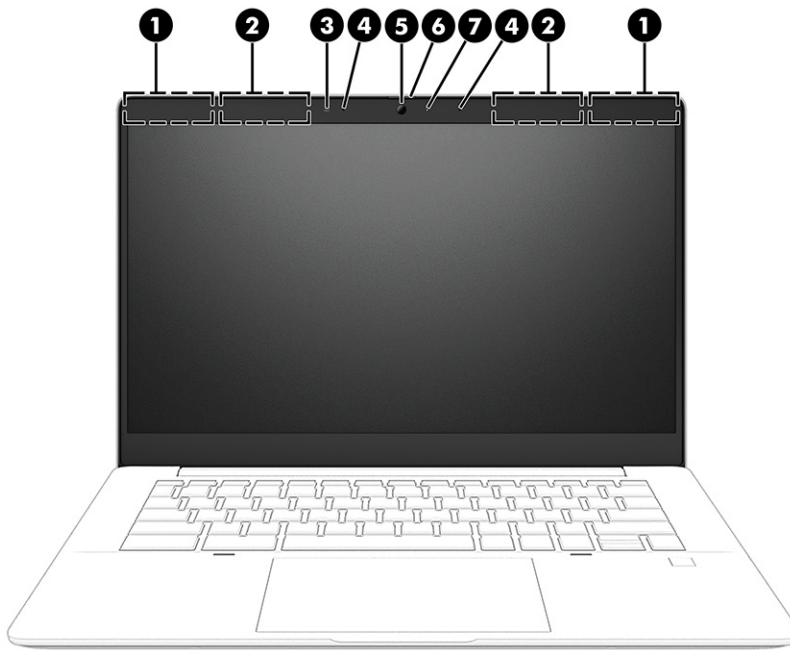
Table 2-3 Display components and their descriptions

Component		Description
(1)	WWAN antennas* (select products only	Send and receive wireless signals to communicate with wireless wide area networks (WWANs).
(2)	WLAN antennas*	Send and receive wireless signals to communicate with wireless local area networks (WLANs).
(3)	Ambient light sensor (select products only)	Detects ambient light and allows the device to adjust the screen brightness.
(4)	Internal microphones	Record sound.
(5)	Camera	Allows you to video chat, record video, and record still images. **NOTE:** Camera functions vary depending on the camera hardware and software installed on your product.
(6)	Camera privacy cover	By default, the camera lens is uncovered, but you can slide the camera privacy cover to block the camera's view. To use the camera, slide the camera privacy cover in the opposite direction to reveal the lens.
(7)	Camera light	● On (white): The camera is in use. ● Off: The camera is turned off.

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

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

Keyboard area

Keyboards can vary by language.

Touchpad

The touchpad settings and components are described here.
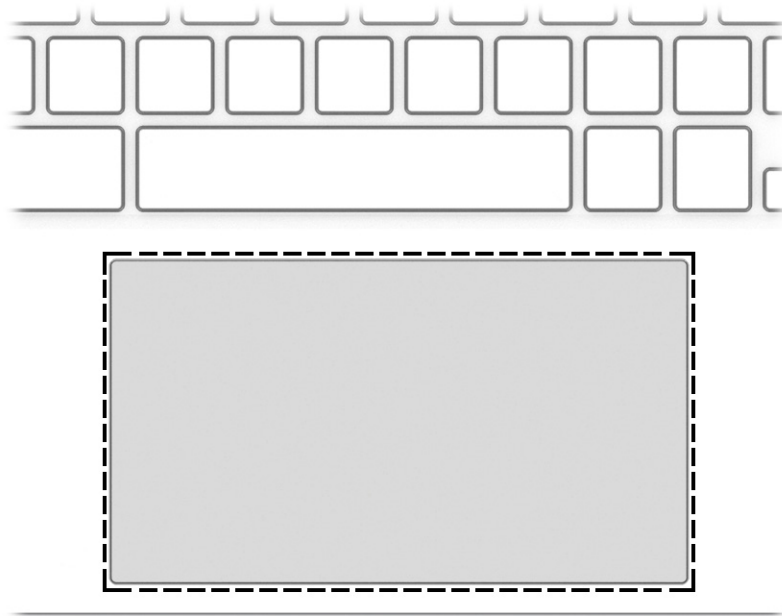
Table 2-4 Touchpad component and description

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

Power key and fingerprint reader

The power key is located at the top of the keyboard. Fingerprint readers can be located on the touchpad, on a side panel of the computer, or on the top cover below the keyboard.
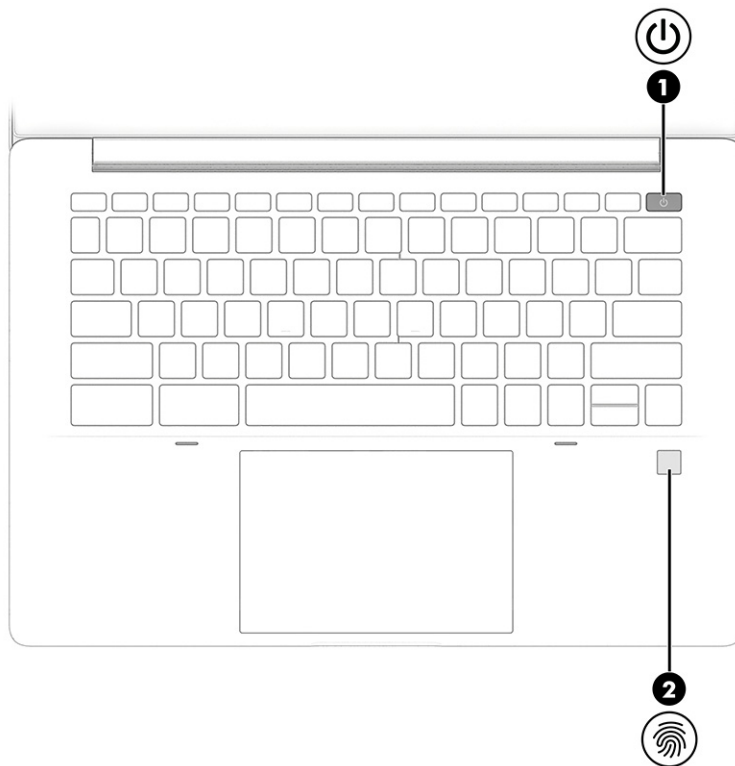
Table 2-5 Power key and fingerprint reader and their descriptions

Component		Description
(1)	Power key	• When the computer is off, press the key briefly to turn on the computer. • When the computer is on, press and hold the key for 10 seconds to turn off the computer. IMPORTANT: Pressing and holding down the power key results in the loss of unsaved information. If the computer has stopped responding and shutdown procedures are ineffective, press and hold the power key for at least 10 seconds to turn off the computer.
(2)	Fingerprint reader (select products only)	The fingerprint reader allows you to unlock the computer screen or to resume computer operations. The reader does not function as a login device. ▪ Touch your finger to the fingerprint reader.

Special keys

Use the illustration and table to locate the special keys.
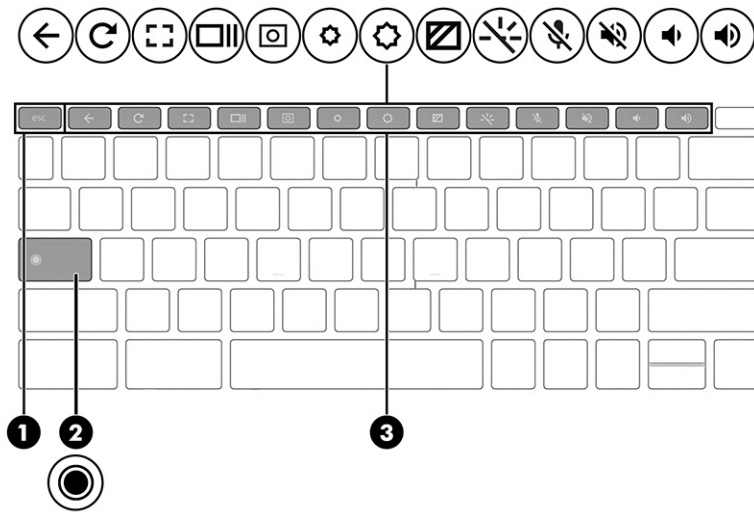
Table 2-6 Special keys and their descriptions

Component		Description
(1)	esc key	Activates certain computer functions when pressed in combination with other keys, such as tab or shift.
(2)	Search key	
(3)	Action keys	Execute frequently used system functions.

Bottom

Use the illustration and table to identify the bottom components.
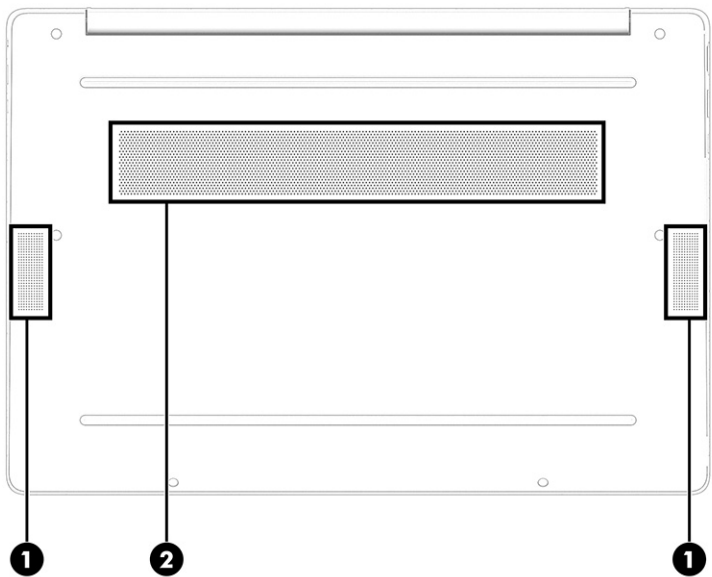
Table 2-7 Bottom components and their descriptions

	Components	Description
(1)	Speakers	Produce sound.
(2)	Vent	Enables airflow to cool internal components. **NOTE:** The computer fan starts automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.

Labels

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

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

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

  Your service label will resemble one of the following examples. Refer to the illustration that most closely matches the service label on your computer.
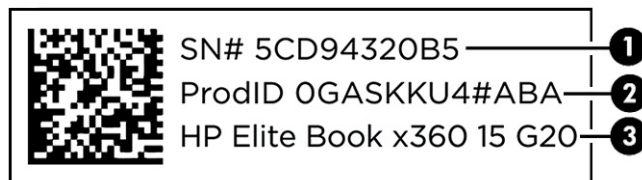
Table 2-8 Service label components

Component	
(1)	Serial number
(2)	Product ID
(3)	HP product name
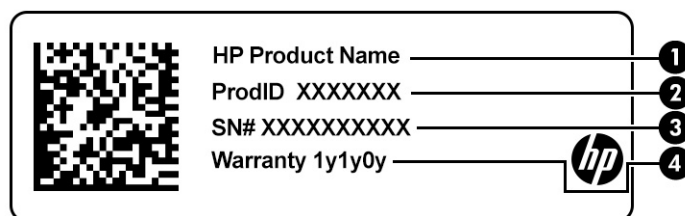
Table 2-9 Service label components

Component	
(1)	HP product name
(2)	Product ID
(3)	Serial number
(4)	Warranty period
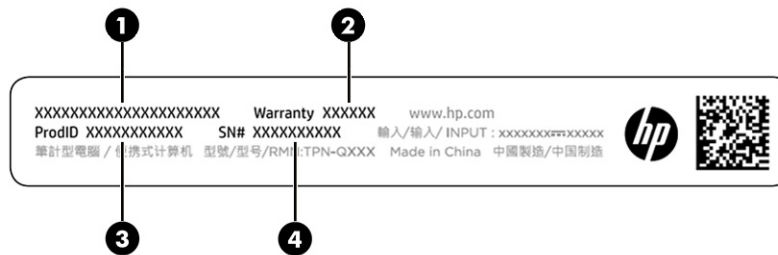
Table 2-10 Service label components

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

● Regulatory labels—Provide regulatory information about the computer.

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

3 Illustrated parts catalog

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

Computer major components

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

Table 3-1 Computer major component descriptions and part numbers

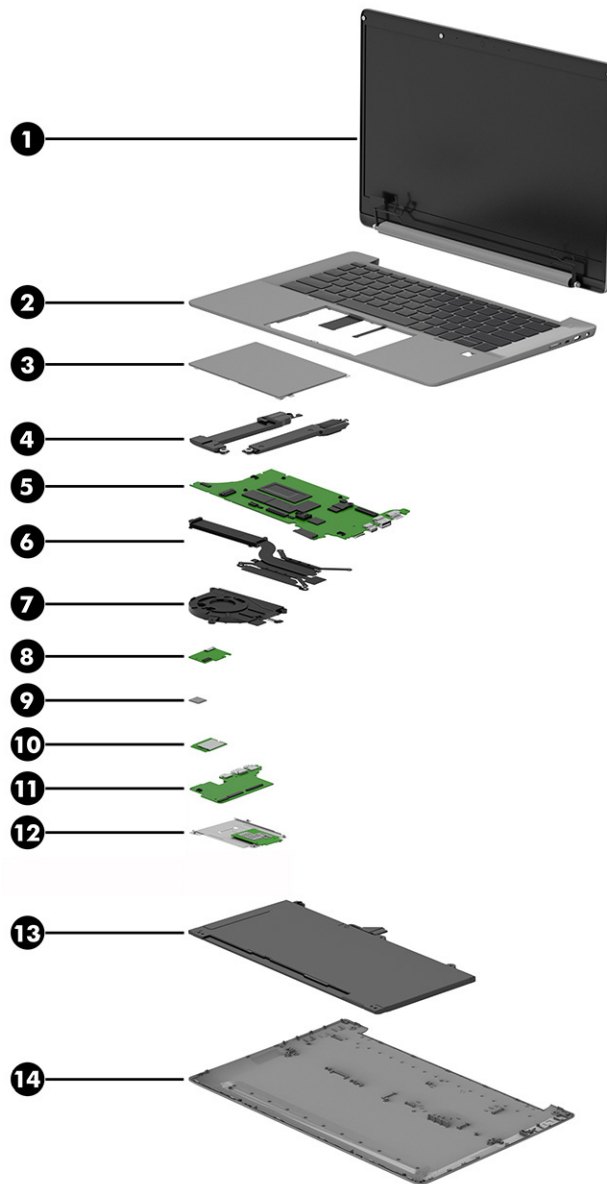| Item	Component	Spare part number
(1)	**Display assembly** **NOTE:** Display assemblies are offered as spare parts only at a subcomponent level. For more information, see Display assembly subcomponents on page 14.	not available as a spare part
(2)	**Top cover with keyboard** For a detailed list of country codes, see Top cover with keyboard on page 56.	
	Backlit, WWAN models	N14926-xxx
	Backlit, privacy, WWAN models	N14927-xxx
	Backlit, models without WWAN	N14928-xxx
	Backlit, privacy, models without WWAN	N14929-xxx
	Not backlit, models without WWAN	N14930-xxx
(3)	**Touchpad** (includes bracket) **NOTE:** The touchpad cable with Mylar is available using spare part number N14811-001.	N13682-001
(4)	**Speakers** (left and right)	N12919-001
(5)	**System board** (includes processor) **NOTE:** The system board repair kit is available as spare part number N19985-888. The system board bracket is available in the Bracket Kit as spare part number N12921-001.	
	For use in models without WWAN:	
	● Intel Core i7-1265U processor and 16 GB of system memory	N13676-001
	● Intel Core i5-1245U processor and 16 GB of system memory	N13674-001
	● Intel Core i5-1245U processor and 8 GB of system memory	N13675-001
	● Intel Core i5-1235U processor and 8 GB of system memory and 64 GB of eMMC storage	N13672-001
	● Intel Core i5-1235U processor and 8 GB of system memory	N13673-001
	● Intel Core i3-1215U processor and 8 GB of system memory and 64 GB of eMMC storage	N13670-001
	● Intel Core i3-1215U processor and 8 GB of system memory	N13671-001
	● Intel Pentium Gold 8505 processor and 8 GB of system memory and 64 GB of eMMC storage	N13677-001
	● Intel Celeron 7305 processor and 8 GB of system memory and 64 GB of eMMC storage	N13669-001
	For use in models with WWAN:	
	● Intel Core i7-1265U processor and 16 GB of system memory	N20844-001
	● Intel Core i5-1245U processor and 16 GB of system memory	N20842-001
	● Intel Core i5-1245U processor and 8 GB of system memory	N20843-001
	● Intel Core i5-1235U processor and 8 GB of system memory	N20841-001
	● Intel Core i3-1215U processor and 8 GB of system memory	N20840-001
	● Intel Pentium Gold 8505 processor and 8 GB of system memory and 64 GB of eMMC storage	N20845-001
	● Intel Celeron 7305 processor and 8 GB of system memory and 64 GB of eMMC storage	N20839-001

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

Item	Component	Spare part number
(6)	**Heat sink**	N13683-001
(7)	**Fan**	N12918-001
(8)	**Fingerprint reader board**	N12915-001
(9)	**Fingerprint reader**	N14814-001
	NOTE: The fingerprint reader cable is available using spare part number N13936-001.	
	The fingerprint reader bracket is available in the Bracket Kit as spare part number N12921-001.	
(10)	**WWAN module** (Intel XMM 7360 LTE-Advanced [Cat 9])	N13692-001
	NOTE: The WWAN bracket is available in the Bracket Kit as spare part number N12921-001.	
(11)	**USB board**	
	NOTE: The USB board cable is available using spare part number N13680-001 for models with WWAN and N13681-001 for models with WLAN.	
	USB board brackets are available in the Bracket Kit as spare part number N12921-001.	
	For use in models with WWAN	N13678-001
	For use in models with WLAN	N13679-001
(12)	**Smart card reader**	N12914-001
	NOTE: The smart card reader cable is available using spare part number N13936-001.	
	The smart card reader bracket is available in the Bracket Kit as spare part number N12921-001.	
(13)	**Battery** (3 cell, 58 Whr)	M12585-005
	NOTE: The battery bracket is available in the Bracket Kit as spare part number N12921-001.	
(14)	**Bottom cover**	
	For use in models with WWAN	N12890-001
	For use in models with WLAN	N12891-001
	Solid-state drive (PCIe) (not illustrated)	
	NOTE: The solid-state drive bracket is available in the Bracket Kit as spare part number N12921-001.	
	512 GB	N13691-001
	256 GB	N13690-001
	128 GB	N13689-001

Display assembly subcomponents

To identify the display assembly subcomponents, use this illustration and table.
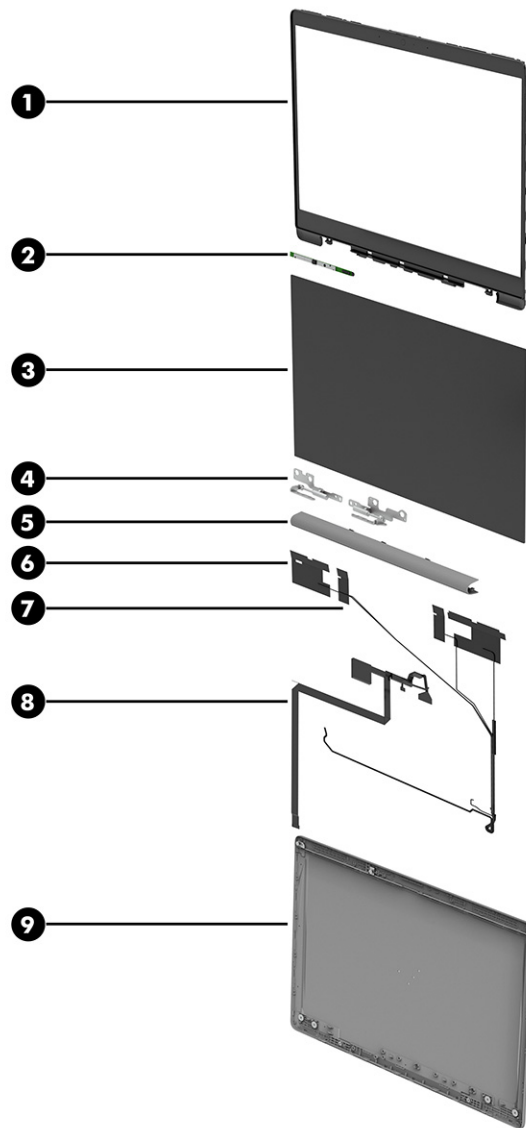
Table 3-2 Display component descriptions and part numbers

Item	Component	Spare part number
(1)	**Display bezel**	
	For use in privacy models	N12924-001
	For use in nonprivacy models	N12925-001
(2)	**Camera module**	N12929-001
(3)	**Display panel** (includes panel adhesive)	
	NOTE: The panel tape kit is available as spare part number N13937-001.	
	FHD, 250 nits, touch-on panel (TOP)	N13684-001
	FHD, 250 nits	N13685-001
	FHD, 250 nits, WWAN	N22122-001
	FHD, 400 nits	N13686-001

Table 3-2 Display component descriptions and part numbers (continued)

Item	Component	Spare part number
	FHD, 1000 nits, privacy	N13688-001
	HD, 250 nits	N13687-001
(4)	**Hinges** (includes left and right display hinges)	N12927-001
(5)	**Hinge cover**	N12928-001
(6)	**WWAN antenna kit**	N12922-001
(7)	**WLAN antenna kit**	N12923-001
(8)	**Display panel cable**	N12926-001
(9)	**Display back cover**	
	For use in models without WWAN:	
	● For use with 250 nit displays	N12902-001
	● For use with privacy displays	N12904-001
	● For use with 400 nit displays	N12903-001
	For use in models with WWAN:	
	● For use with 250 nit displays	N12905-001
	● For use with 400 nit displays	N12906-001
	● For use with privacy displays	N12907-001
	Ambient light sensor (includes cable)	N13938-001

Miscellaneous parts

To identify the miscellaneous parts, use this table.

Table 3-3 Miscellaneous part descriptions and part numbers

Component	Spare part number
AC adapters (USB Type-C AC adapter (nPFC, 3 pin, 1.8 m [6 ft])	
45 W	L43407-001
65 W	L67440-001
SIM card tray	N12920-001
Screw Kit	N12930-001
Bracket Kit (includes brackets for SmartCard, fingerprint reader, left and right cables, battery, WLAN module, WWAN module, solid-state drive, display panel, system board, USB I/O)	N12921-001
Miscellaneous Parts Kit (includes thermal pad, smart card reader insert, fingerprint reader insert, and various absorbers with Mylar)	N14812-001
System Board Repair Kit	N14813-888
Display Panel Adhesive Kit	N13937-001
Adapters	

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

Component	Spare part number
HDMI-to-VGA	701943-001
HDMI-to-DVI	749038-001
USB-C-to-VGA	831751-001
USB-C-to-HDMI 2.0	935325-001
USB-C-to-DisplayPort	831753-001
USB-C-to-USB 3.0	814618-001
USB-C-to-RJ-45	M95985-001
USB-C-to-RJ-45, FD	918779-001
USB 3.0-to-gigabit, FD	914031-001
HP USB Type-C-to-USB Type-A hub	916838-001
HP USB-C travel hub	L72056-001
HP 14.1 business, slim, top load case	L05333-001
HP Prelude Pro 15.6 backpack	M03617-001
HP Prelude Pro 15.6 top load case	M03618-001
HP business 14.1 laptop bag	M55007-001
HP bluetooth travel mouse	L62043-001
HP USB mouse	L95713-001
HP nano lock	918431-001
HP Sure Key cable lock	L65088-001
Power cords (C5, conventional, 1.0 m [3.3 ft])	
Argentina	L19357-001
Australia	L19358-001
Denmark	L19360-001
Europe (Austria, Belgium, Finland, France, Germany, the Netherlands, Norway, and Sweden)	L19361-001
Europe (bundle)	N16170-001
India	L19363-001
Israel	L19362-001
Italy	L19364-001
Japan	L19365-001
North America	L19367-001
People's Republic of China	L19368-001
South Africa	L19369-001
South Korea	L19366-001
Switzerland	L19370-001

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

Component	Spare part number
Taiwan	L19372-001
Thailand	L19371-001
Thailand (bundle)	M85418-001
United Kingdom	L19373-001
Power cord (C5, premium, 1.0 m [3.3 ft])	
Europe (Austria, Belgium, Finland, France, Germany, the Netherlands, Norway, and Sweden)	L22321-001

4 Removal and replacement procedures preliminary requirements

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

Tools required

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

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

Service considerations

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

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

Plastic parts

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

Cables and connectors

Handle cables with extreme care to avoid damage.

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

Apply only the tension required to unseat or seat the cables during removal and insertion. Handle cables by the connector whenever possible. In all cases, avoid bending, twisting, or tearing cables. Be sure that cables are routed so that they cannot be caught or snagged as you remove or replace parts. Handle flex cables with extreme care; these cables tear easily.

Drive handling

Note the following guidelines when handling drives.

> **IMPORTANT:** Drives are fragile components. Handle them with care. To prevent damage to the computer, damage to a drive, or loss of information, observe these precautions:

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

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

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

- Handle drives on surfaces covered with at least 2.54 cm (1 inch) of shock-proof foam.

- Avoid dropping drives from any height onto any surface.

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

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

- Avoid exposing a drive to temperature extremes or liquids.

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

Electrostatic discharge information

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

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

IMPORTANT: To prevent damage to the device when you remove or install internal components, observe these precautions:

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

- Before touching an electronic component, discharge static electricity by using the guidelines described in Personal grounding methods and equipment on page 21.

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

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

Generating static electricity

Follow these static electricity guidelines:

- Different activities generate different amounts of static electricity.

- Static electricity increases as humidity decreases.

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

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

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

Preventing electrostatic damage to equipment

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

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

- To avoid hand contact, transport products in static-safe containers such as tubes, bags, or boxes.

- Protect all electrostatic parts and assemblies with conductive or approved containers or packaging.

- Keep electrostatic-sensitive parts in their containers until they arrive at static-free stations.

- Place items on a grounded surface before removing them from their container.

- Always be properly grounded when touching a sensitive component or assembly.

- Avoid contact with pins, leads, or circuitry.

- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

Personal grounding methods and equipment

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

- **Wrist straps** are flexible straps with a maximum of 1 MΩ ±10% resistance in the ground cords. To provide proper ground, a strap must be worn snug against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.

- You can use **heel straps, toe straps, and boot straps** at standing workstations. These straps are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use them on both feet with a maximum of 1 MΩ ±10% resistance between the operator and ground.

Table 4-2 Static shielding protection levels

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

Grounding the work area

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

- Cover the work surface with approved static-dissipative material.

- Use a wrist strap connected to a properly grounded work surface and use properly grounded tools and equipment.

- Use static-dissipative mats, foot straps, or air ionizers to give added protection.

- Handle electrostatic sensitive components, parts, and assemblies by the case or PCB laminate. Handle them only at static-free work areas.

- Turn off power and input signals before inserting and removing connectors or test equipment.

- Use fixtures made of static-safe materials when fixtures must directly contact dissipative surfaces.

- Keep the work area free of nonconductive materials, such as ordinary plastic assembly aids and polystyrene foam.

- Use conductive field service tools, such as cutters, screwdrivers, and vacuums.

- Avoid contact with pins, leads, or circuitry.

Recommended materials and equipment

HP recommends certain materials and equipment to prevent static electricity:

- Antistatic tape

- Antistatic smocks, aprons, or sleeve protectors

- Conductive bins and other assembly or soldering aids

- Conductive foam

- Conductive tabletop workstations with ground cord of 1 MΩ ±10% resistance

- Static-dissipative table or floor mats with hard tie to ground

- Field service kits

- Static awareness labels

- Wrist straps and footwear straps providing 1 MΩ ±10% resistance

- Material handling packages

- Conductive plastic bags

- Conductive plastic tubes

- Conductive tote boxes

- Opaque shielding bags

- Transparent metallized shielding bags

- Transparent shielding tubes

Cleaning your computer

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

Enabling HP Easy Clean (select products only)

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

1. Start HP Easy Clean in one of the following ways:

   - Select the **Start** menu, and then select **HP Easy Clean**.

     – or –

   - Select the **HP Easy Clean** icon in the taskbar.

     – or –

   - Select **Start**, and then select the **HP Easy Clean** tile.

2. Now that your device is disabled for a short period, see for the recommended steps to clean the high-touch, external surfaces on your computer. After you remove the dirt and debris, you can also clean the surfaces with a disinfectant. See for guidelines to help prevent the spread of harmful bacteria and viruses.

Removing dirt and debris from your computer

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

For computers with wood veneer, see .

1. Wear disposable gloves made of latex (or nitrile gloves, if you are latex-sensitive) when cleaning the surfaces.

2. Turn off your device and unplug the power cord and other connected external devices. Remove any installed batteries from items such as wireless keyboards.

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

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

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

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

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

5. Start with the display (if applicable). Wipe carefully in one direction, and move from the top of the display to the bottom. Finish with any flexible cables, like power cord, keyboard cable, and USB cables.

6. Be sure that surfaces have completely air-dried before turning the device on after cleaning.

7. Discard the gloves after each cleaning. Clean your hands immediately after you remove the gloves.

See for recommended steps to clean the high-touch, external surfaces on your computer to help prevent the spread of harmful bacteria and viruses.

Cleaning your computer with a disinfectant

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

After cleaning the external surfaces of your computer using the steps in , , or both, you might also choose to clean the surfaces with a disinfectant. A disinfectant that is within HP's cleaning guidelines is an alcohol solution consisting of 70% isopropyl alcohol and 30% water. This solution is also known as rubbing alcohol and is sold in most stores.

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

1. Wear disposable gloves made of latex (or nitrile gloves, if you are latex-sensitive) when cleaning the surfaces.

2. Turn off your device and unplug the power cord and other connected external devices. Remove any installed batteries from items such as wireless keyboards.

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

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

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

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

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

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

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

5. Start with the display (if applicable). Wipe carefully in one direction, and move from the top of the display to the bottom. Finish with any flexible cables, like power cord, keyboard cable, and USB cables.

6. Be sure that surfaces have completely air-dried before turning the device on after cleaning.

7. Discard the gloves after each cleaning. Clean your hands immediately after you remove the gloves.

Caring for wood veneer (select products only)

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

- Clean the wood with a dry, static-free microfiber cloth or chamois.

- Avoid cleaning products containing substances such as ammonia, methylene chloride, acetone, turpentine, or other petroleum-based solvents.

- Do not expose the wood to sun or moisture for long periods of time.

- If the wood becomes wet, dry it by dabbing with an absorbent, lint-free cloth.

- Avoid contact with any substance that might dye or discolor the wood.

- Avoid contact with sharp objects or rough surfaces that might scratch the wood.

See Removing dirt and debris from your computer on page 23 for the recommended steps to clean the high-touch, external surfaces on your computer. After you remove the dirt and debris, you can also clean the surfaces with a disinfectant. See Cleaning your computer with a disinfectant on page 24 for sanitizing guidelines to help prevent the spread of harmful bacteria and viruses.

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

- To avoid hand contact, transport products in static-safe tubes, bags, or boxes.

- Protect ESD-sensitive parts and assemblies with conductive or approved containers or packaging.

- Keep ESD-sensitive parts in their containers until the parts arrive at static-free workstations.

- Place items on a grounded surface before removing items from their containers.

- Always be properly grounded when touching a component or assembly.

- Store reusable ESD-sensitive parts from assemblies in protective packaging or nonconductive foam.

- Use transporters and conveyors made of antistatic belts and roller bushings. Be sure that mechanized equipment used for moving materials is wired to ground and that proper materials are selected to avoid static charging. When grounding is not possible, use an ionizer to dissipate electric charges.

Accessing support information

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

Table 4-3 Support information locations

Service consideration	Path to access information

Records of reported failure incidents stored on the computer	**Windows:**
	
	Pre-operating system failures are logged in the BIOS Event Log. To view the BIOS Event Log:
	
	1. Press the power button.
	
	2. Immediately and repeatedly press esc when the power button light turns white.
	
	    NOTE: If you do not press esc at the appropriate time, you must restart the computer and again repeatedly press esc when the power button light turns white to access the utility.
	
	3. Press f10 to enter the BIOS setup.
	
	4. (On commercial products) Under the **Main** tab, select **BIOS event log**, and then select **View BIOS Event Log**.
	
	    - or -
	
	    (On consumer products) Under the **Main** tab, select **System Log**.
	
	Post-operating system failures are logged in the Event Viewer.
	
	1. Turn on the computer and allow the operating system to open.
	
	2. Select the search icon 🔍 in the taskbar.
	
	3. Type `Event Viewer`, and then press enter.
	
	4. Select the log from the left panel. Details display in the right panel.
	
	Chrome:
	
	1. Go to support.google.com/chrome.
	
	2. Search `collect Chrome device logs`.

Technical bulletins	To locate technical bulletins: **1.** Go to www.hp.com. **2.** Place the cursor over **Problem solving** to display more options. **3.** Select **Support & Troubleshooting**. **4.** Type the serial number, product number, or product name to go to the product support page. **5.** Select **Advisories** to view technical bulletins.
Repair professionals	To locate repair professionals: **1.** Go to www.hp.com. **2.** Place the cursor over **Support resources** to display more options. **3.** Select **Authorized service providers**.

Table 4-3 Support information locations (continued)

Service consideration	Path to access information
Component and diagnosis information, failure detection, and required action	To locate diagnosis information and actions: **1.** Go to http://www.hp.com/go/techcenter/pcdiags. **2.** Select **Get Support**. **3.** Near the bottom of the window, select **Notebook PCs**, and then select your location.

5 Removal and replacement procedures for authorized service provider parts

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

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

NOTE: Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer.

Component replacement procedures

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

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

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

Preparation for disassembly

To remove and replace computer components, use these procedures:

For initial safety procedures, see Removal and replacement procedures preliminary requirements on page 19.

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.

2. Disconnect the power from the computer by unplugging the power cord from the computer.

3. Disconnect all external devices from the computer.

Bottom cover

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

Table 5-1 Bottom cover description and part number

| Description	Spare part number
Bottom cover for use in models with WWAN	N12890-001
Bottom cover for use in models with WLAN	N12891-001

Before removing the bottom cover, prepare the computer for disassembly (see Preparation for disassembly on page 28).
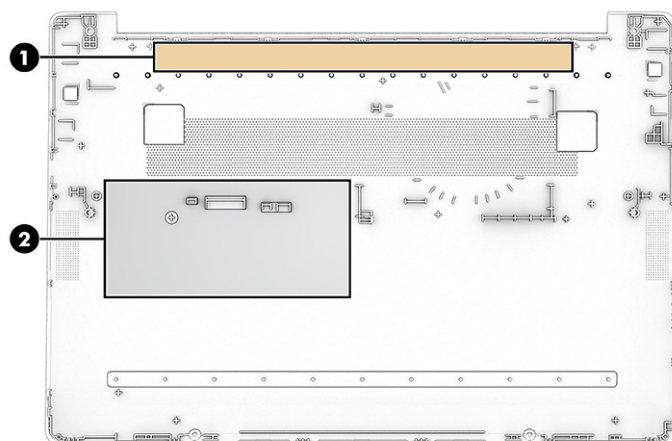
Remove the bottom cover:

1. Remove the four Phillips M2.5 × 6.0 screws **(1)** from the top and the two Phillips M2.0 × 4.0 screws **(2)** from the bottom of the bottom cover.
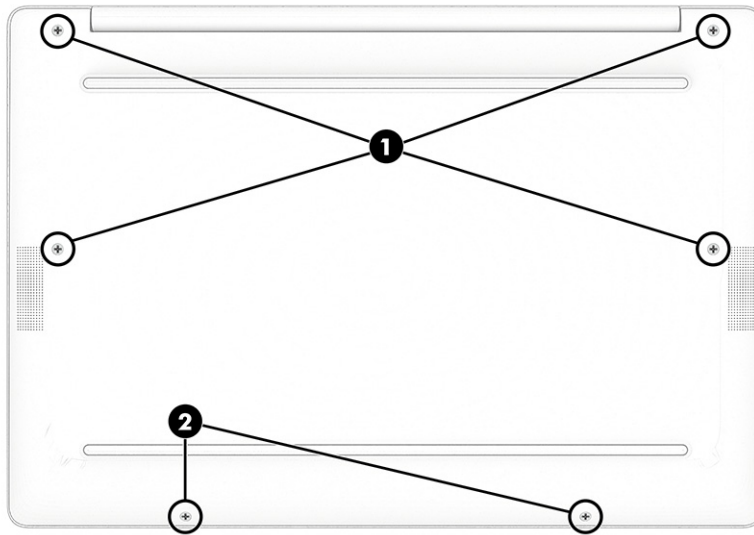
2. Open the display to 90° **(1)**.

3. While holding the bottom edge of the computer, place your thumbs on the top cover, below the keyboard and to the left and right of the touchpad **(2)**, and then press and pull up to release the bottom cover.

4. Close the computer and place it upside down **(3)**.

5. Pull the bottom cover off the computer by pulling up at the seam between the hinges **(4)**.
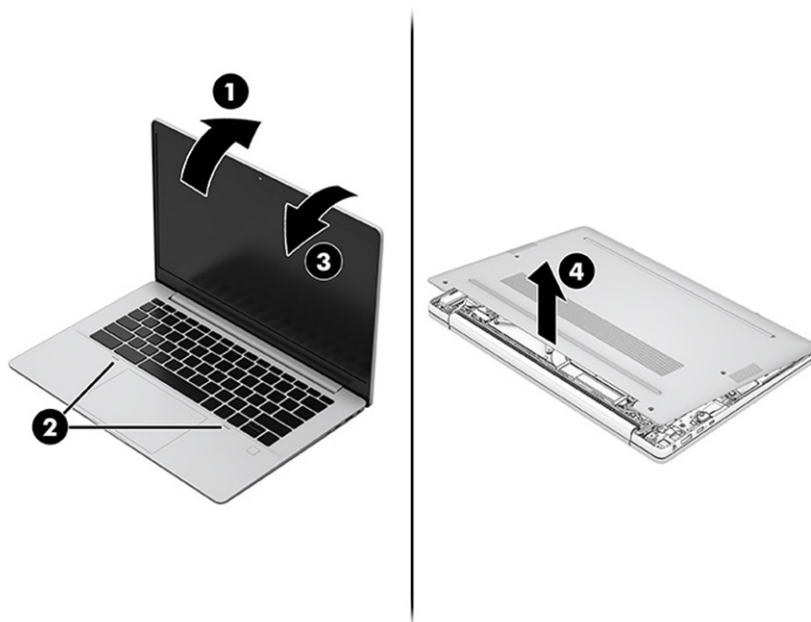
6.   When replacing the bottom cover, make sure the gold metal strip **(1)** and silver rectangular foil **(2)** are installed and intact.

To replace the bottom cover, reverse the removal procedures.

Battery

To remove the battery, use this procedure and illustration.

Table 5-2 Battery description and part number

Description	Spare part number
3 cell, 58 Whr, Li-ion battery	M12585-005
Battery bracket (available in the Bracket Kit)	N12921-001

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

● Do *not* puncture, twist, or crack the battery.

● Do *not* cause an external puncture or rupture to the battery. Punctures can cause a short inside the battery, which can result in battery thermal runaway.

● Do *not* handle or touch the battery enclosure with sharp objects such as tweezers or pliers, which might puncture the battery.

● Do *not* compress or squeeze the battery case with tools or heavy objects stacked on top of the case. These actions can apply undue force to the battery.

● Do *not* touch the connectors with any metallic surface or object, such as metal tools, screws, or coins, which can cause shorting across the connectors.

Before removing the battery, follow these steps:

1.   Prepare the computer for disassembly (see).

2.   Remove the bottom cover (see).

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

IMPORTANT: Removing a battery that is the sole power source for the computer can cause loss of information. To prevent loss of information, save your work or shut down the computer through Windows before you remove the battery.

Remove the battery:

1. Disconnect the battery cable from the system board **(1)**.

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

3. Remove the battery from the computer **(3)**.

NOTE: Computer component appearance might vary.
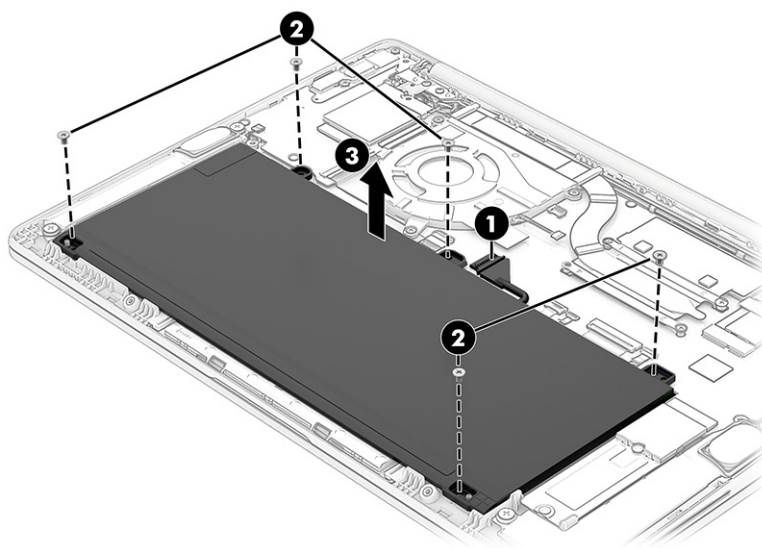
To install the battery, reverse the removal procedures.

Solid-state drive

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

Table 5-3 Solid-state drive descriptions and part numbers

Description	Spare part number
512 GB	N13691-001
256 GB	N13690-001
128 GB	N13689-001
Solid-state drive bracket (available in the Bracket Kit)	N12921-001

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

1. Prepare the computer for disassembly (see).

2. Remove the bottom cover (see).

3. Disconnect the battery cable from the system board (see).

Remove an M.2 2230 solid-state drive:

1. Peel the vinyl cover off the drive **(1)**.

2. Remove the Phillips M2.0 × 2.0 screw **(2)** that secures the drive.

3. Pull the drive out of the socket **(3)**.

📝 **NOTE:** Computer component appearance might vary.

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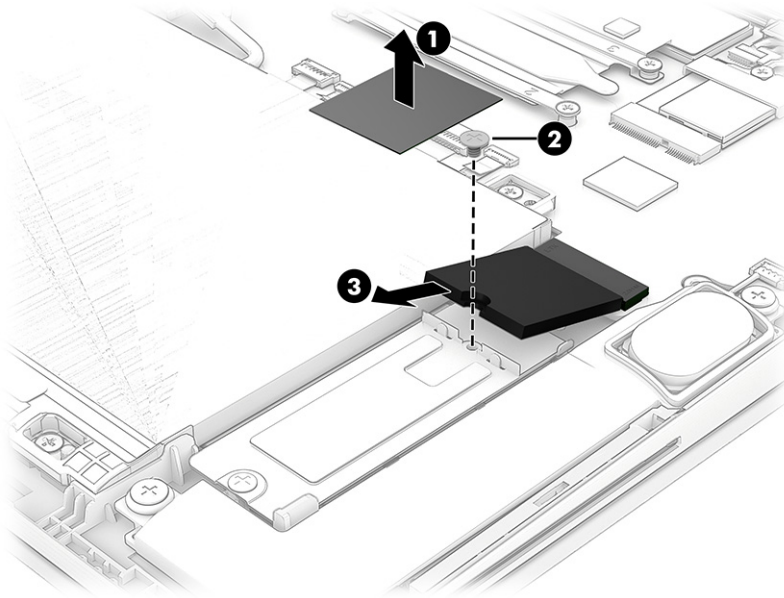
4. To replace an M.2 2230 drive with a M.2 2280 drive, remove the adapter bracket by removing the Phillips M2.0 × 2.0 screw **(1)** that secures the adapter bracket, and then removing the bracket **(2)**. Install the new drive.
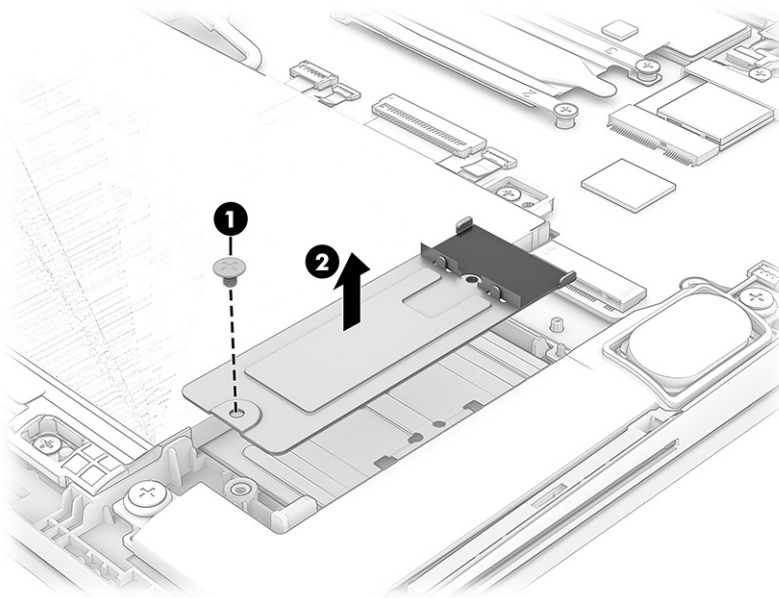
5. To replace an M.2 2280 drive with a M.2 2230 drive, install the adapter bracket by inserting the bracket into the solid-state drive bay **(1)**, and then installing the screw **(2)**. Install the new drive.
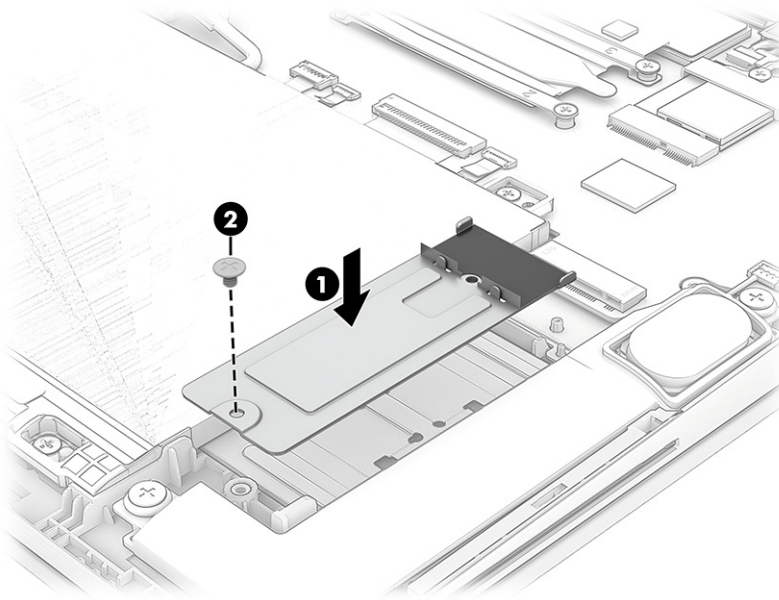
6. When installing a solid-state drive, be sure a thermal pad is installed on the drive. On M.2 2230 drives, install a thermal pad as shown by callout **(1)**. On M.2 2280 drives, install a thermal pad as shown by callout **(2)**.
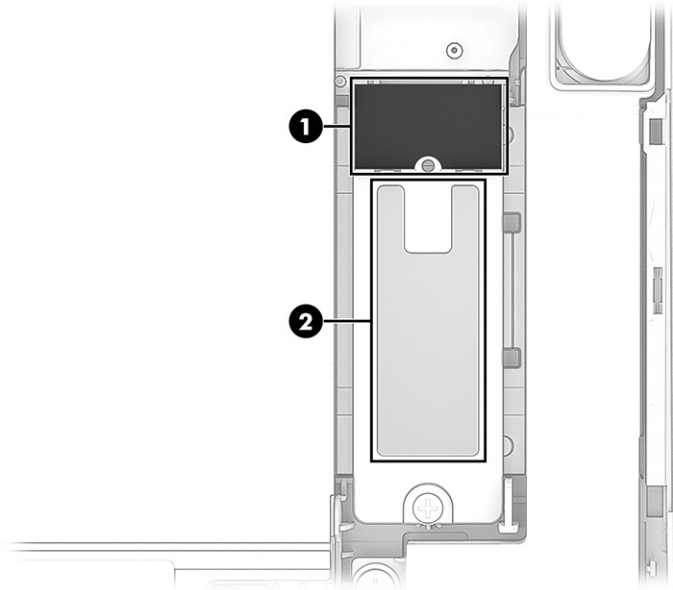
To install the solid-state drive, reverse the removal procedures.

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

WWAN module

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

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

Description	Spare part number
Intel XMM 7360 LTE-Advanced [Cat 9]	N13692-001

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

Before removing the WWAN module, follow these steps:

1. Prepare the computer for disassembly (see).

2. Remove the bottom cover (see).

3. Disconnect the battery cable from the system board (see).

Remove the WWAN module:

1. Remove the Phillips M2.0 × 2.5 screw **(1)**, and then remove the bracket from the module **(2)**.

2. Carefully disconnect the antenna cables from the module **(3)**.

3. Pull the module out of the socket to remove it **(4)**.

📝 **NOTE:** When you look at the antenna terminals from the top of the module, the white WWAN antenna cable connects to the terminal to the left of the black WWAN antenna cables.

📝 **NOTE:** Computer component appearance might vary.
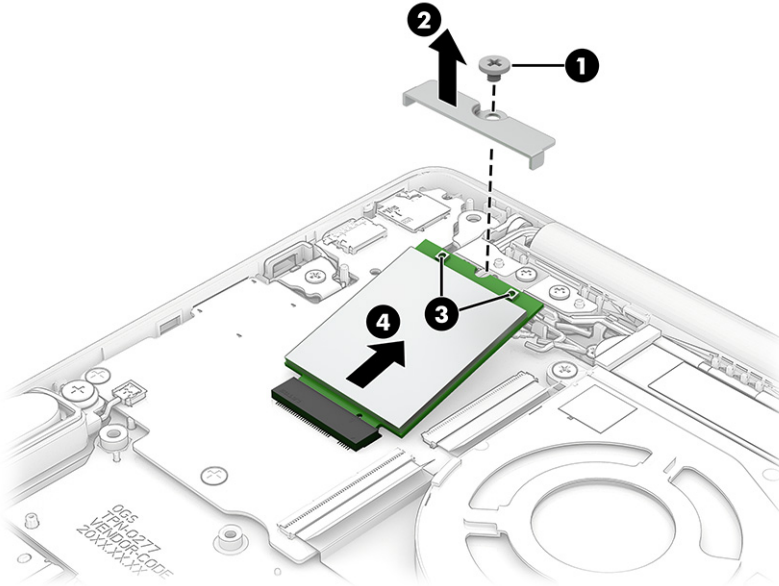
4. If the WWAN antenna is not connected to the terminal on the WWAN module, you must install a protective sleeve on the antenna connector, as shown in the following illustration.
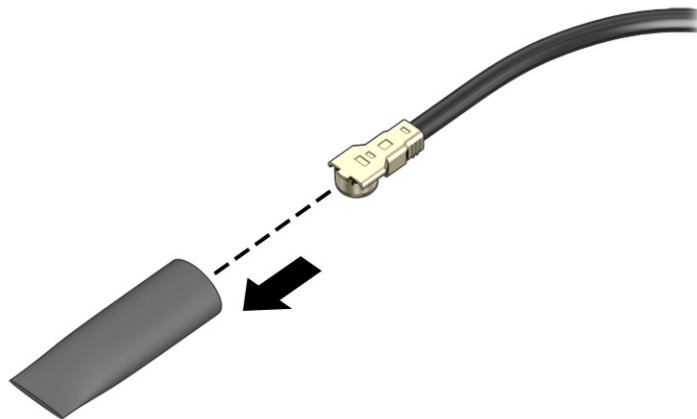
To install the WWAN module, reverse this procedure.

Speakers

To remove the speakers, use this procedure and illustration.

Table 5-5 Speaker description and part number

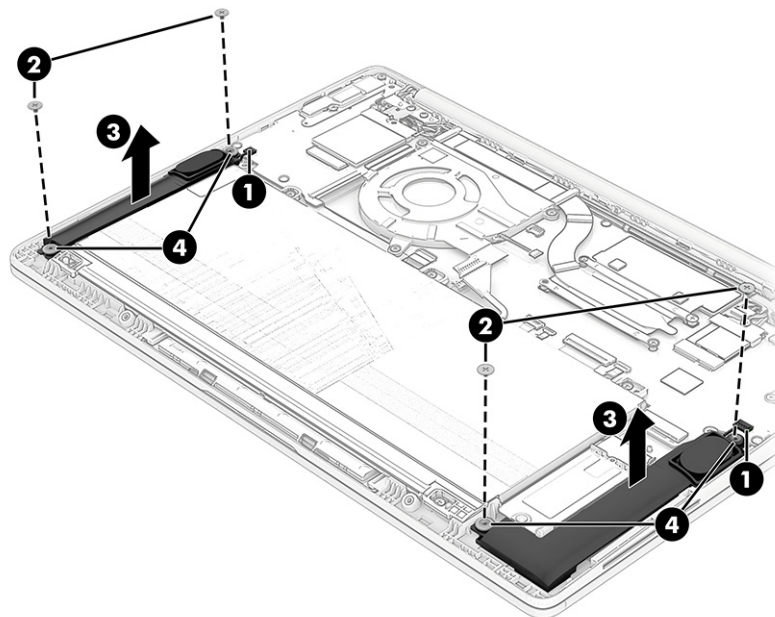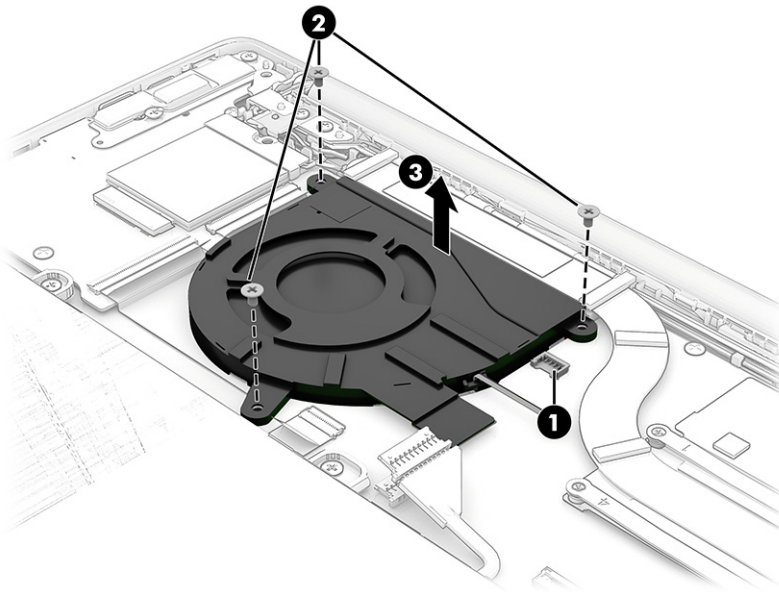| Description	Spare part number
Speaker Kit	N12919-001

Before removing the speakers, follow these steps:

1. Prepare the computer for disassembly (see Preparation for disassembly on page 28).

2. Remove the bottom cover (see Bottom cover on page 28).

3. Disconnect the battery cable from the system board (see Battery on page 30).

Remove the speakers:

1. Disconnect the speaker cables from the system board **(1)**.

2. Remove the two Phillips M2.0 × 5.0 screws from each speaker **(2)**.

3. Remove the speakers from the computer **(3)**.

📝 **NOTE:** When installing the speakers, be sure that the rubber washers **(4)** are installed with each screw.

📝 **NOTE:** Computer component appearance might vary.

To install the speakers, reverse this procedure.

Fan

To remove the fan, use this procedure and illustration.

Table 5-6 Fan description and part number

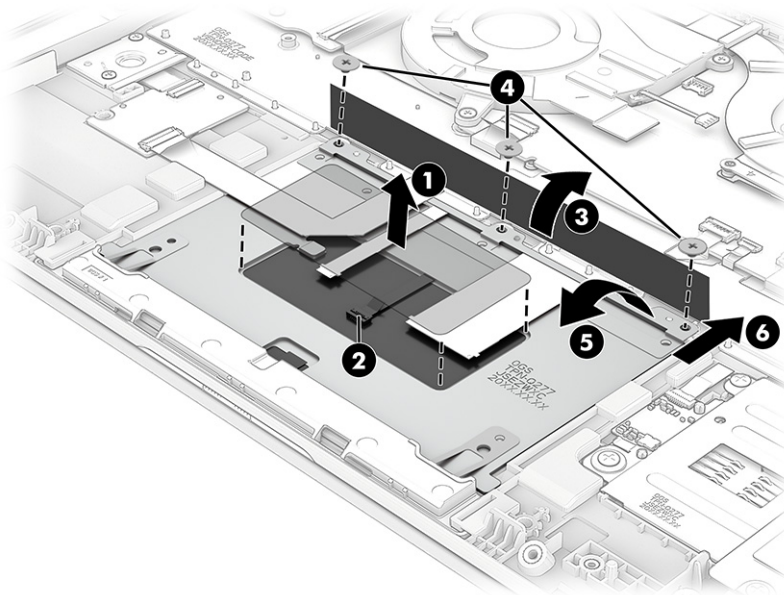| Description	Spare part number
Fan	N12918-001

Before removing the fan, follow these steps:

1. Prepare the computer for disassembly (see Preparation for disassembly on page 28).

2. Remove the bottom cover (see Bottom cover on page 28).

3. Disconnect the battery cable from the system board (see Battery on page 30).

Remove the fan:

1. Disconnect the fan cable from the system board **(1)**.

2. Remove the three Phillips M2.0 × 3.0 screws **(2)** that secure the fan to the computer.

3. Remove the fan from the computer **(3)**.

📝 **NOTE:** Computer component appearance might vary.

To install the fan, reverse this procedure.

Touchpad

To remove the touchpad, use this procedure and illustration.

Table 5-7 Touchpad description and part number

Description	Spare part number
Touchpad (includes bracket)	N13682-001
Touchpad cable with Mylar	N14811-001

Before removing the touchpad, follow these steps:

1. Prepare the computer for disassembly (see Preparation for disassembly on page 28).

2. Remove the bottom cover (see Bottom cover on page 28).

3. Remove the battery (see Battery on page 30).

Remove the touchpad:

1. Remove the clear plastic that covers the touchpad **(1)**.

2. Disconnect the touchpad cable from the ZIF connector on the touchpad **(2)**.

3. Lift the Mylar that covers the screws on the top of the touchpad **(3)**.

4. Remove the three Phillips M2.0 × 2.0 screws **(4)** from the touchpad.

5. Lift the top of the touchpad up **(5)**, and then pull it away from the bottom of the computer to remove it **(6)**.

📝 NOTE: Computer component appearance might vary.

To install the touchpad, reverse this procedure.

USB board

USB boards differ, depending on whether the computer offers WWAN. To remove the USB board, use these procedures and illustrations.

Table 5-8 USB board description and part number

Description	Spare part number
USB board for use in models with WWAN	N13678-001
USB board for use in models with WLAN	N13679-001
USB board cable for use in models with WWAN	N13680-001

Table 5-8 USB board description and part number (continued)

Description	Spare part number
USB board cable for use in models with WLAN	N13681-001
USB board bracket (available in the Bracket Kit)	N12921-001

Before removing the USB board, follow these steps:

1. Prepare the computer for disassembly (see Preparation for disassembly on page 28).

2. Remove the bottom cover (see Bottom cover on page 28).

3. Disconnect the battery cable from the system board (see Battery on page 30).

Remove the USB board:

📝 **NOTE:** The illustrations in this section show models that offer WWAN. Models with only WLAN do not have a WWAN module on the USB board or a SIM card.

1. If installed, remove the silver tape that covers the USB bracket **(1)**.

2. Remove the two Phillips M2.0 × 3.0 screws **(2)** that secure the bracket, and then remove the bracket **(3)**.
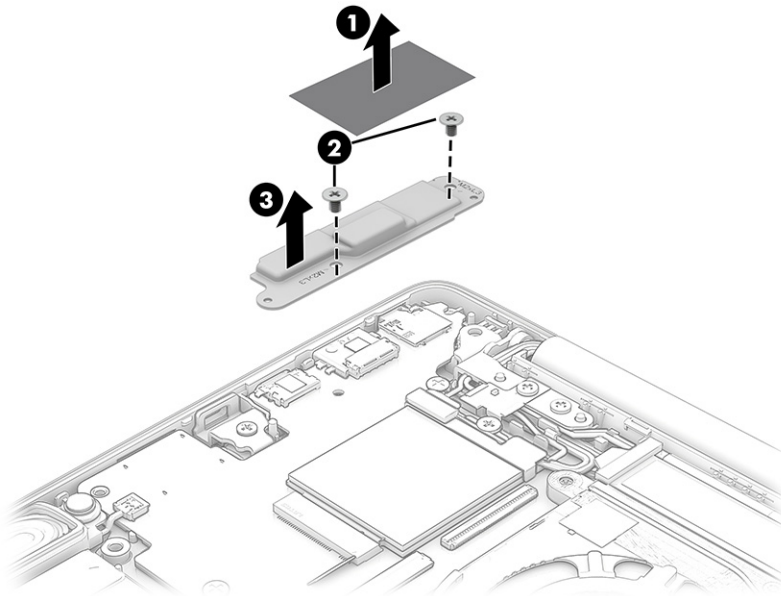
3. (WWAN models only) Remove the SIM card from the slot on the side of the computer **(1)**.

4. Remove the Phillips M2.0 × 2.5 screw **(2)** that secures the metal clip, and then remove the clip **(3)**.
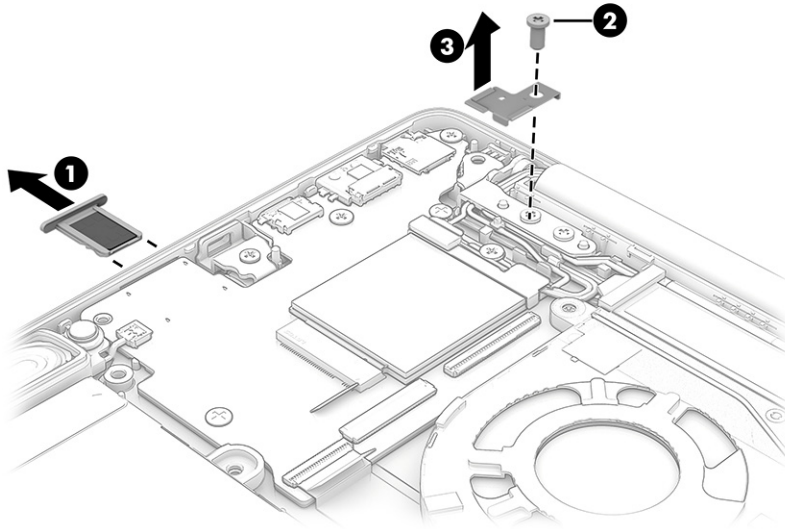
5. Lift the clear plastic so you can access the connectors and screws on the USB board **(1)**.

6. Disconnect the right speaker cable from the board **(2)**.

7. Disconnect the cables from the reverse ZIF connectors on the board **(3)**.

8. Remove the three Phillips M2.0 × 2.5 screws **(4)** that secure the board.

9. Remove the board from the computer **(5)**.
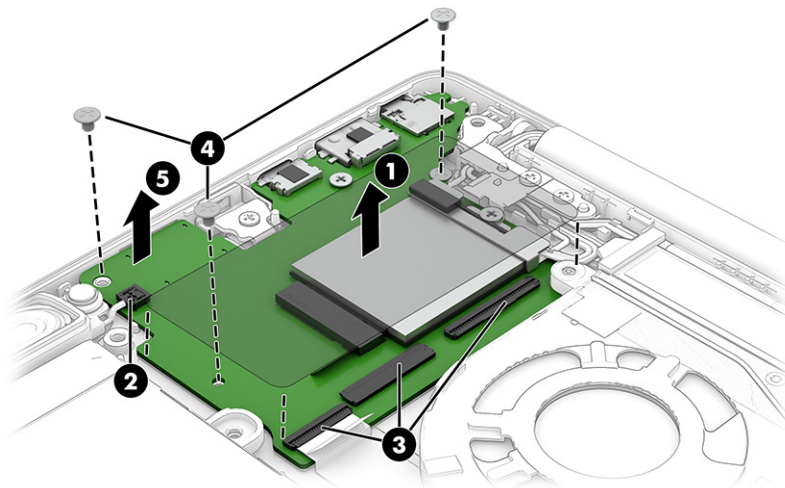
To install the USB board, reverse this procedure.

Lock bracket

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

Table 5-9 Lock bracket description and part number

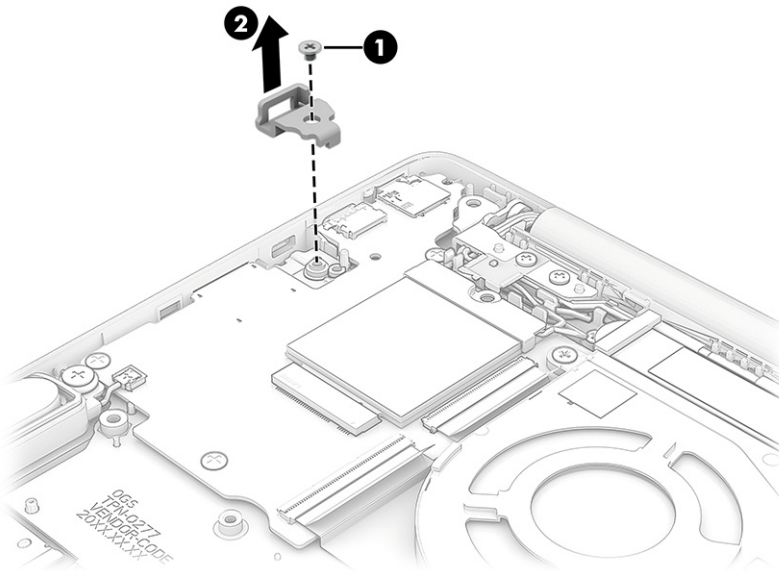| Description	Spare part number
Lock bracket (available in the Bracket Kit)	N12921-001

Before removing the lock bracket, follow these steps:

1. Prepare the computer for disassembly (see Preparation for disassembly on page 28).

2. Remove the bottom cover (see Bottom cover on page 28).

3. Disconnect the battery cable from the system board (see Battery on page 30).

4. Remove the USB board bracket (see USB board on page 38).

Remove the lock bracket:

1. Remove the Phillips M2.0 × 2.5 screw **(1)** that secures the bracket to the computer.

2. Remove the lock bracket from the computer **(2)**.

NOTE: Computer component appearance might vary.

To install the lock bracket, reverse this procedure.

Card reader

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

Table 5-10 Card reader description and part number

Description	Spare part number
Card reader	N12914-001
Card reader cable	N13936-001
Card reader bracket (available in the Bracket Kit)	N12921-001
Card reader insert (available in the Miscellaneous Parts Kit	N14812-001

Before removing the card reader, follow these steps:

1. Prepare the computer for disassembly (Preparation for disassembly on page 28).

2. Remove the bottom cover (see Bottom cover on page 28).

3. Remove the battery (see Battery on page 30).

Remove the card reader:

1. Disconnect the cable from the ZIF connector on the card reader board **(1)**.

2. Remove the four Phillips M2.0 × 3.0 screws **(2)** that secure the card reader bracket to the computer.

3. Remove the bracket from the computer **(3)**.

> **NOTE:**   Computer component appearance might vary.
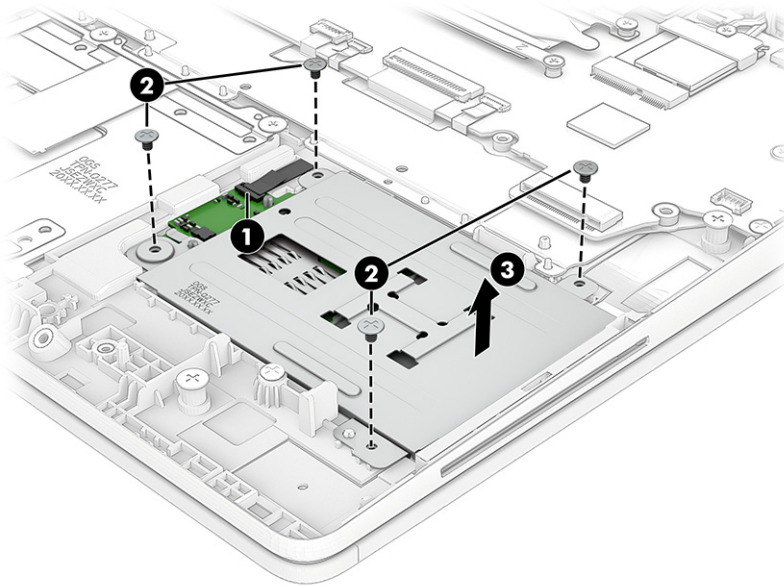
4. Insert a tool under the card reader near the touchpad **(1)**, and then lift to release the card reader from the computer **(2)**.
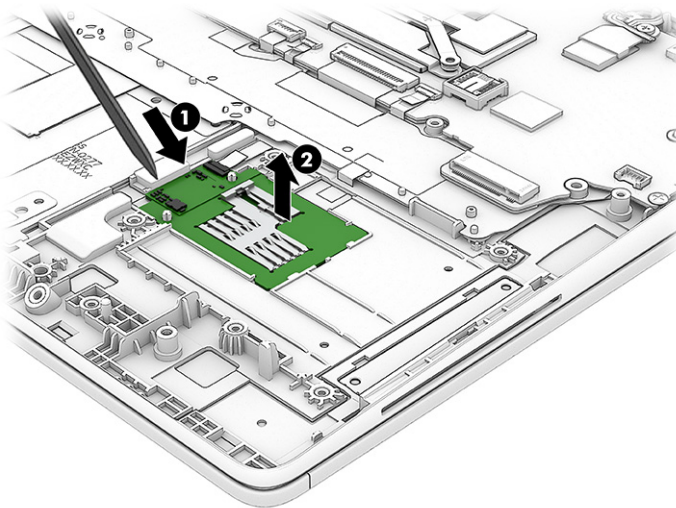
To install the card reader, reverse this procedure.

Fingerprint reader and board

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

Table 5-11 Fingerprint reader and board description and part number

Description	Spare part number
Fingerprint reader	N14814-001
Fingerprint reader board	N12915-001
Fingerprint reader cable	N13936-001
Fingerprint reader bracket (available in the Bracket Kit)	N12921-001
Fingerprint reader insert (available in the Miscellaneous Parts Kit	N14812-001

Before removing the fingerprint reader and board, follow these steps:

1. Prepare the computer for disassembly (see Preparation for disassembly on page 28).

2. Remove the bottom cover (see Bottom cover on page 28).

3. Remove the battery (see Battery on page 30).

Remove the fingerprint reader and board:

1. Disconnect the cable from the ZIF connector on the right side of the fingerprint reader board **(1)**.

2. Disconnect the cable from the ZIF connector on the left side of the board **(2)**.

3. Remove the board from the computer **(3)**.

> **NOTE:** Computer component appearance might vary.
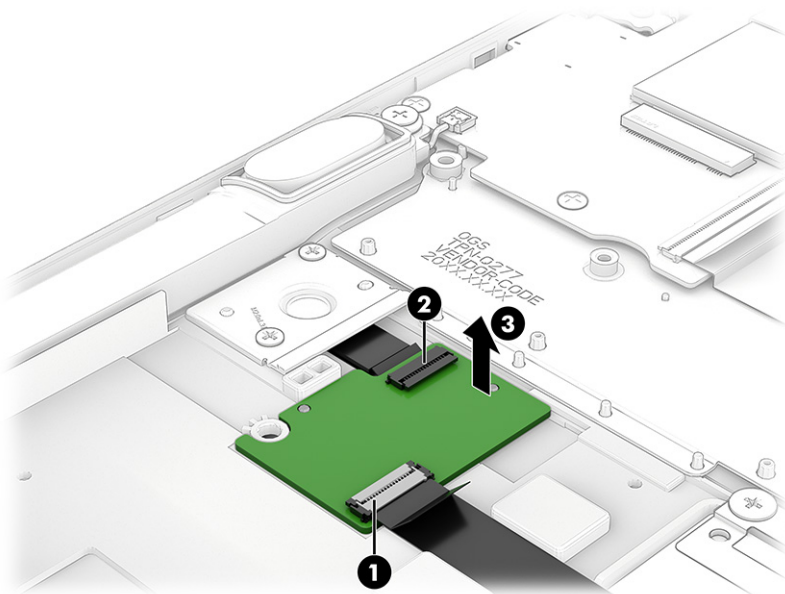
4. Disconnect the cable from the ZIF connector on the fingerprint reader board **(1)**.

5. Remove the two Phillips M2.0 × 2.0 screws **(2)** that secure the fingerprint reader bracket to the computer, and then remove the bracket **(3)**.

6. Remove the fingerprint reader from the computer **(4)**.
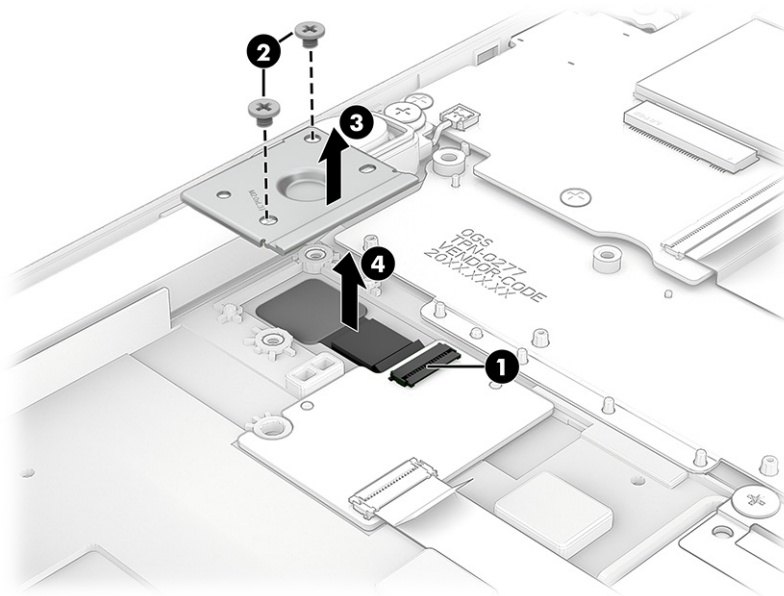
To install the fingerprint reader, reverse this procedure.

Heat sink

To remove the heat sink, use these procedures and illustrations.

Table 5-12 Heat sink descriptions and part numbers

| Description	Spare part number
Heat sink	N13683-001

Before removing the heat sink, follow these steps:

1. Prepare the computer for disassembly (see Preparation for disassembly on page 28).

2. Remove the bottom cover (see Bottom cover on page 28).

3. Remove the battery (see Battery on page 30).
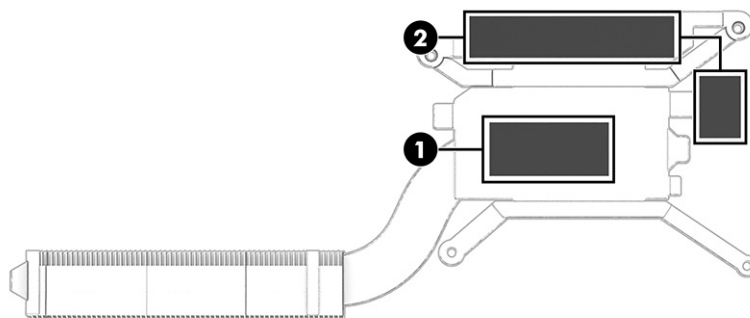
Remove the heat sink:

1. In the order indicated on the heat sink, remove the four Phillips M2.0 × 3.0 screws **(1)** that secure the heat sink to the system board.

2. Remove the heat sink **(2)**.

📝 **NOTE:**   Computer component appearance might vary.
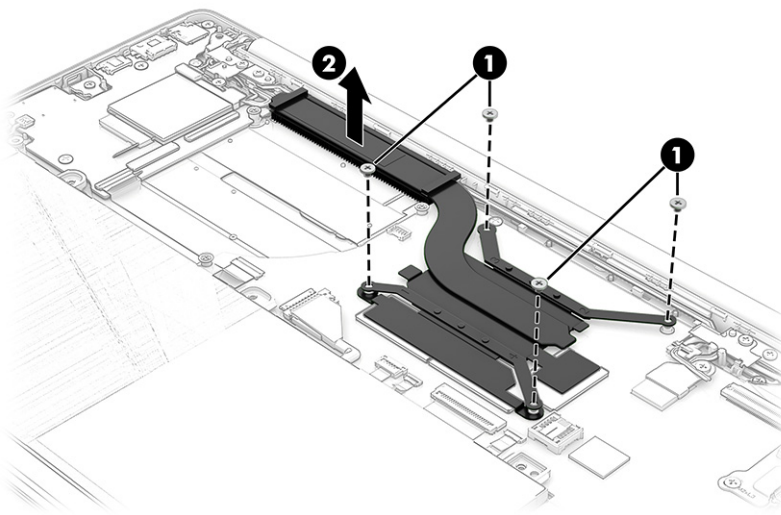
3. Thoroughly clean the thermal material from the surfaces of the heat sink and the system board components each time the heat sink is removed. Replacement thermal material is included with the heat sink and system board spare part kits.

Thermal paste **(1)** and thermal pads **(2)** are used on the heat sink.

To install the heat sink, reverse this procedure.

System board

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

Table 5-13 System board descriptions and part numbers

Description	Spare part number
System board (includes processor)	
NOTE: The system board repair kit is available as spare part number N14813-888.	
The system board bracket is available in the Bracket Kit as spare part number N12921-001.	
For use in models without WWAN:	

Description	Spare part number
● Intel Core i7-1265U processor and 16 GB of system memory	N13676-001
● Intel Core i5-1245U processor and 16 GB of system memory	N13674-001
● Intel Core i5-1245U processor and 8 GB of system memory	N13675-001
● Intel Core i5-1235U processor and 8 GB of system memory and 64 GB of eMMC storage	N13672-001
● Intel Core i5-1235U processor and 8 GB of system memory	N13673-001
● Intel Core i3-1215U processor and 8 GB of system memory and 64 GB of eMMC storage	N13670-001
● Intel Core i3-1215U processor and 8 GB of system memory	N13671-001
● Intel Pentium Gold 8505 processor and 8 GB of system memory and 64 GB of eMMC storage	N13677-001
● Intel Celeron 7305 processor and 8 GB of system memory and 64 GB of eMMC storage	N13669-001
For use in models with WWAN:	
● Intel Core i7-1265U processor and 16 GB of system memory	N20844-001
● Intel Core i5-1245U processor and 16 GB of system memory	N20842-001
● Intel Core i5-1245U processor and 8 GB of system memory	N20843-001
● Intel Core i5-1235U processor and 8 GB of system memory	N20841-001
● Intel Core i3-1215U processor and 8 GB of system memory	N20840-001
● Intel Pentium Gold 8505 processor and 8 GB of system memory and 64 GB of eMMC storage	N20845-001
● Intel Celeron 7305 processor and 8 GB of system memory and 64 GB of eMMC storage	N20839-001

Before removing the system board, follow these steps:

1. Prepare the computer for disassembly (see Preparation for disassembly on page 28).

2. Remove the bottom cover (see Bottom cover on page 28).

3. Remove the battery (see Battery on page 30).

4. Remove the fan (see Fan on page 36).

When you replace the system board, be sure to remove the following components (as applicable) from the defective system board and install them on the replacement system board:

● Solid-state drive (see Solid-state drive on page 31).

● Heat sink (see Heat sink on page 44).

Remove the system board:

1. Disconnect the following components and cables from the system board:

   ● WLAN module screw and bracket **(1)**

   ● Antenna cables from the WLAN module **(2)**

   ● Camera cable (ZIF) **(3)**

- Display cable (ZIF) **(4)**

- Left speaker cable **(5)**

- Card reader cable **(6)**

- Keyboard cable (ZIF) **(7)**

- Touchpad cable (ZIF) **(8)**

- Keyboard backlight cable (ZIF) **(9)** (select products only)

- Fingerprint reader cable (ZIF) **(10)** (select products only)

- USB cables (ZIF) from the USB board **(11)**

- Antenna cables from the WWAN module **(12)** (select products only)

📝 **NOTE:** System board and component appearance might vary.
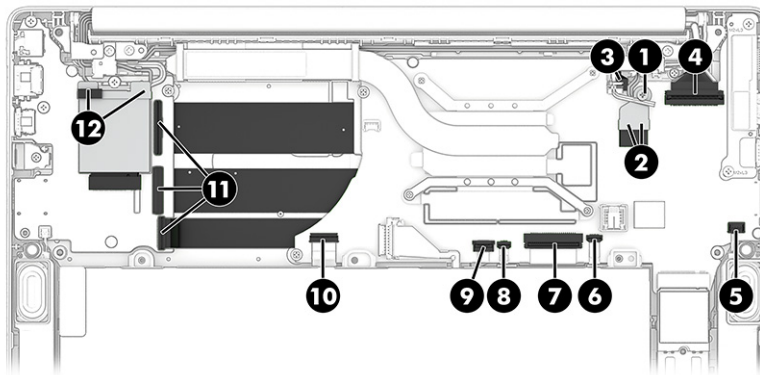
2. Remove the two Phillips M2.0 × 3.0 screws **(1)** from the bracket, and then remove the bracket **(2)**.

3. Remove the Mylar that covers the Phillips M2.0 × 2.5 screw at the top of the system board, and then remove the screw **(3)**.

4. Remove the two remaining Phillips M2.0 × 2.5 screws **(4)** that secure the system board to the computer.

5. Under the system board, release the USB cables from the computer chassis **(5)**.

6. Lift the left side of system board **(6)**, and then pull the system board left and away from the connectors to remove it from the computer **(7)**.

📝 **NOTE:** Models with WWAN shown.
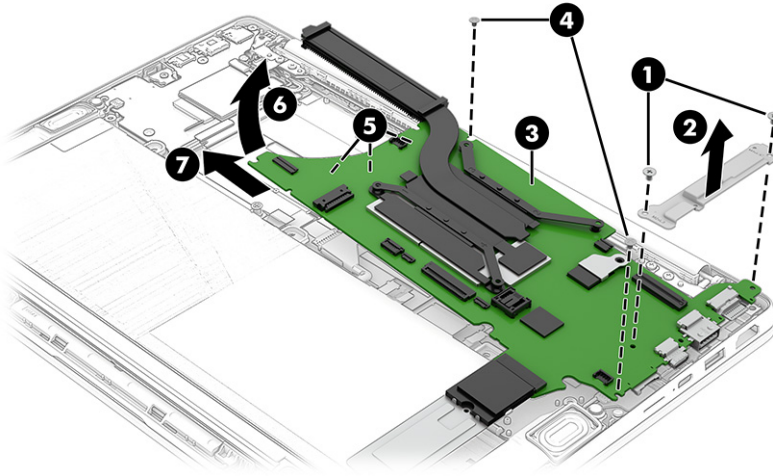
7. To disconnect the USB cables from the system board, turn the board upside down, remove the Mylar from the cables, and then disconnect the cables shown in the following illustration.
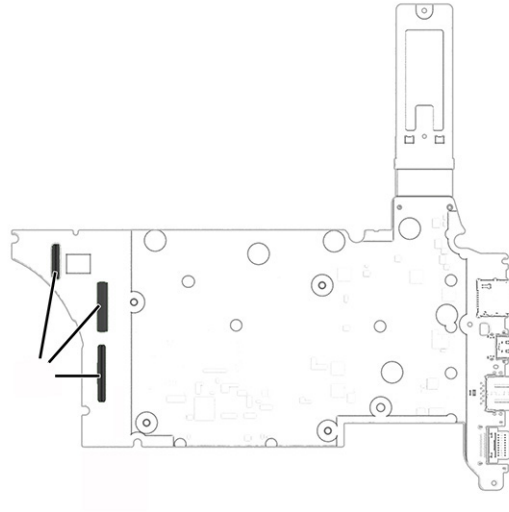
To install the system board, reverse this procedure.

Display assembly

To remove and disassemble the display assembly, use these procedures and illustrations.

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

Before removing the display panel, follow these steps:

1. Prepare the computer for disassembly (see).

2. Remove the bottom cover (see).

3. Remove the battery (see).

4. Remove the heat sink (see Heat sink on page 44).

Remove the display assembly:

1. (Models with WWAN) Disconnect the WWAN antenna cables **(1)** from the terminals on the WWAN module.

2. Remove the Phillips M2.0 × 2.0 screw **(2)** from the WLAN bracket, and then remove the bracket.

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

4. Remove the antenna cables **(4)** from the routing along the top of the computer.

5. Disconnect the camera cable from the connector on the system board **(5)**.

6. Disconnect the display cable from the ZIF connector on the system board **(6)**.

NOTE: Computer component appearance might vary.
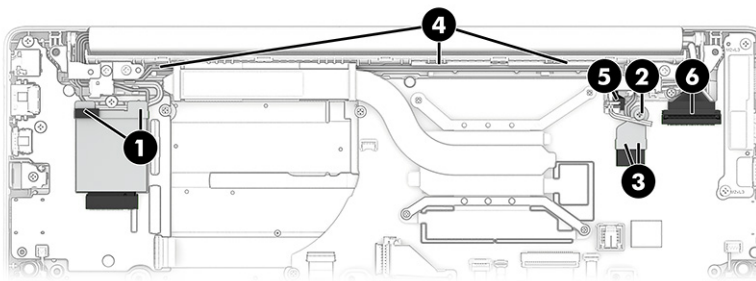
7. Remove the four Phillips M2.5 × 4.5 screws **(1)** that secure the display assembly to the computer.

8. Remove the clip from the left hinge **(2)**.

9. Remove the clip from the right hinge **(3)**.

10. Open the display to 90° to open the hinges **(4)**.

11. Separate the display from the computer **(5)**.
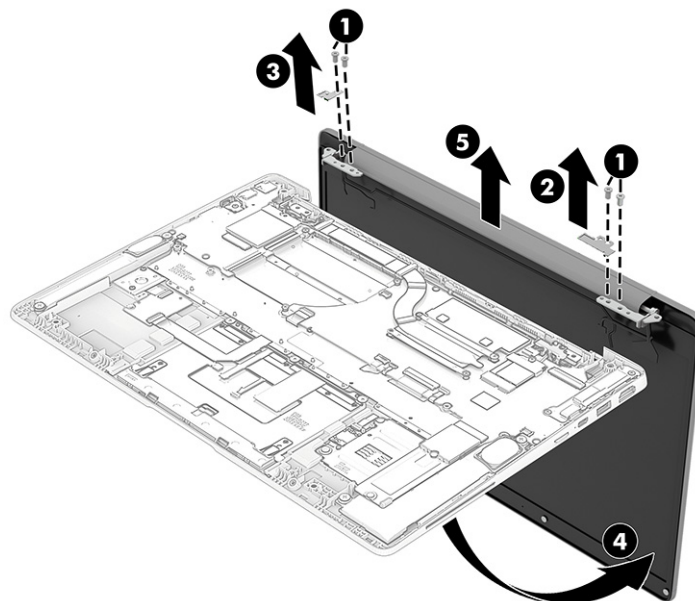
12. To remove the display bezel:

   a. Release the top edge of the display bezel **(1)** from the display assembly.

   b. Release the left and right edges of the display bezel **(2)** from the display assembly.

   c. Release the bottom edge of the display bezel **(3)** from the display assembly.

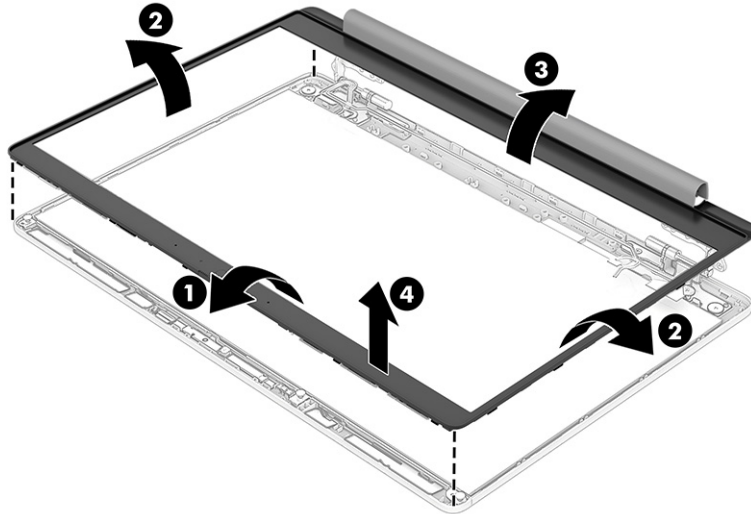   d. Remove the display bezel **(4)** from the display assembly.

   📝 **NOTE:** All four sides of the bezel are secured with adhesive. The top and bottom also have hooks to secure the bezel.

   Display adhesive is available in the Adhesive Kit as spare part number M17753-001.

   The bezel is available as the following spare part numbers:
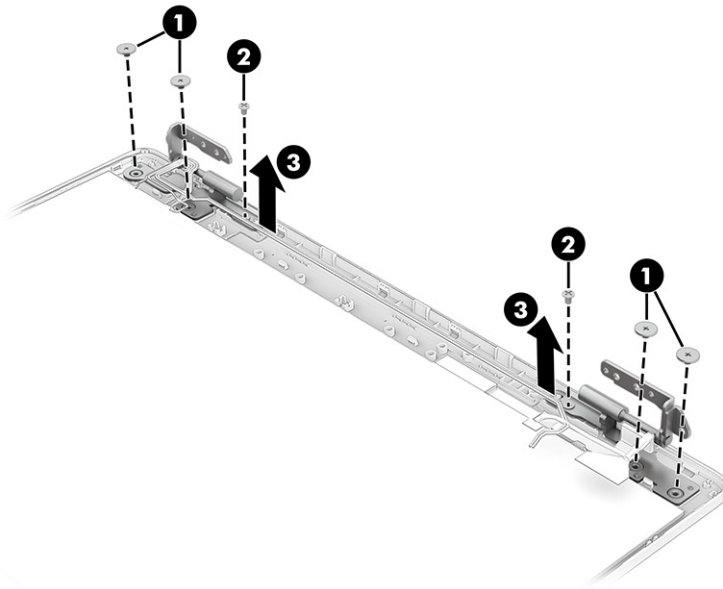
   N12924-001: Privacy models

   N12925-001: Nonprivacy models

13. To remove the hinges from the display rear cover:

   a. Remove the two Phillips M2.5 × 2.5 broadhead screws **(1)** and the Phillips 2.5 × 3.0 screw **(2)** from each hinge.

   b. Remove the hinges from the display back cover **(3)**.

   The display hinges are available as spare part number N12927-001.

14. To remove the display panel:

    a. The display panel is secured to the display enclosure with tape that is installed under the left and right sides of the panel. To remove the panel, use tweezers to grasp the end of the tape **(1)**. While turning the tweezers, wrap the tape around the tweezers **(2)** as you continue to pull the tape out from behind the display panel **(3)**. You must pull the tape multiple times before it is completely removed.

    b. Rotate the display panel over and place it next to the display enclosure **(4)**.

    📝 **NOTE:** Pull the tape out slowly and evenly to prevent it from breaking prematurely.

    Display adhesive is available as spare part number N10449-001.

    Display panels are available as the following spare part numbers:

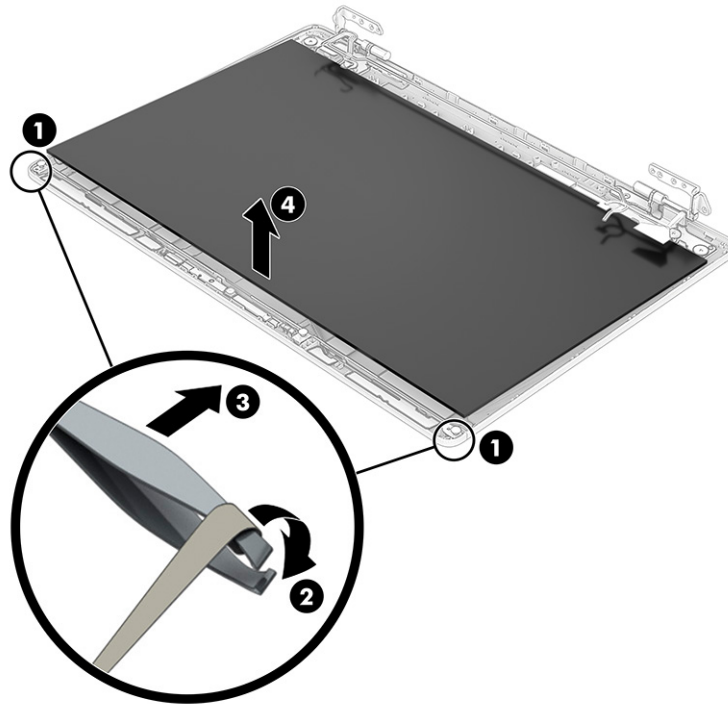   N13684-001: FHD, 250 nits, touch-on panel (TOP)

    N13685-001: FHD, 250 nits

    N22122-001: FHD, 250 nits, WWAN
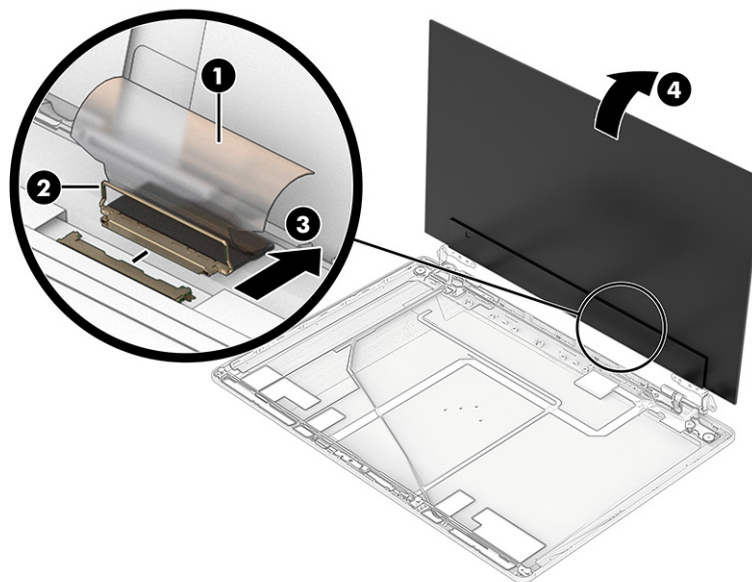
    N13686-001: FHD, 400 nits

   N13688-001: FHD, 1000 nits, privacy

    N13687-001: HD, 250 nits

c. Release the adhesive support strip **(1)** that secures the display panel cable connector to the display panel.

d. Lift the retainer latch from the connector **(2)**.

e. Disconnect the cable **(3)** from the display panel, and remove the panel **(4)**.

The display cable is available as spare part number N12926-001.

f. Remove the Mylar strips from each side of the inside of the display back cover. The replacement spare part includes these strips.
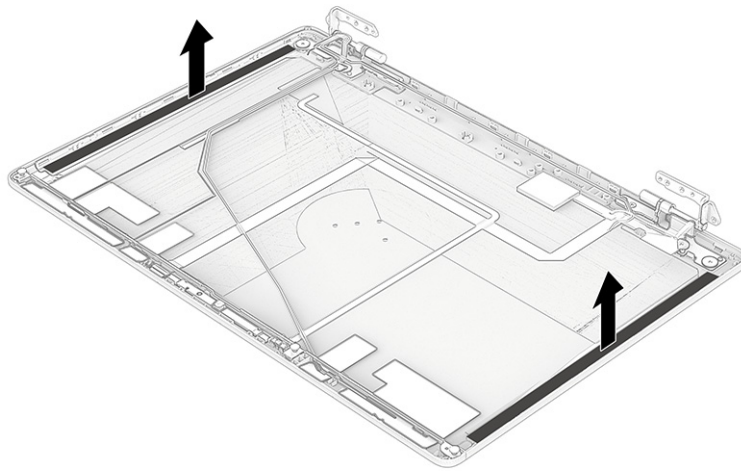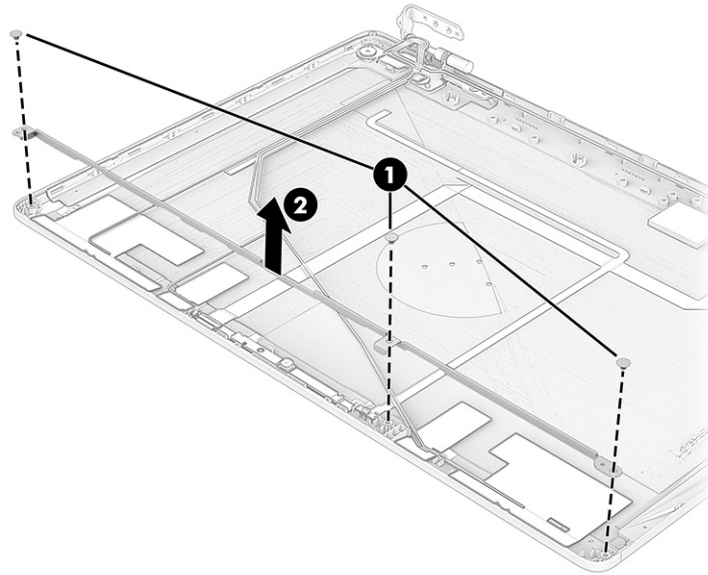

g. When installing a display panel, be sure to install the Mylar and the adhesive strips along the right and left sides of the inside of the display back cover as shown in the following illustration.
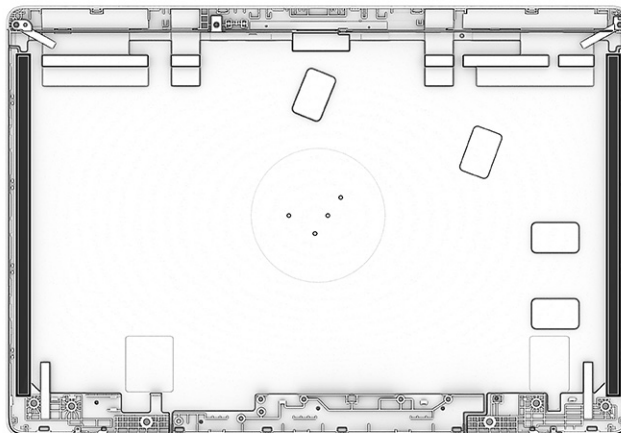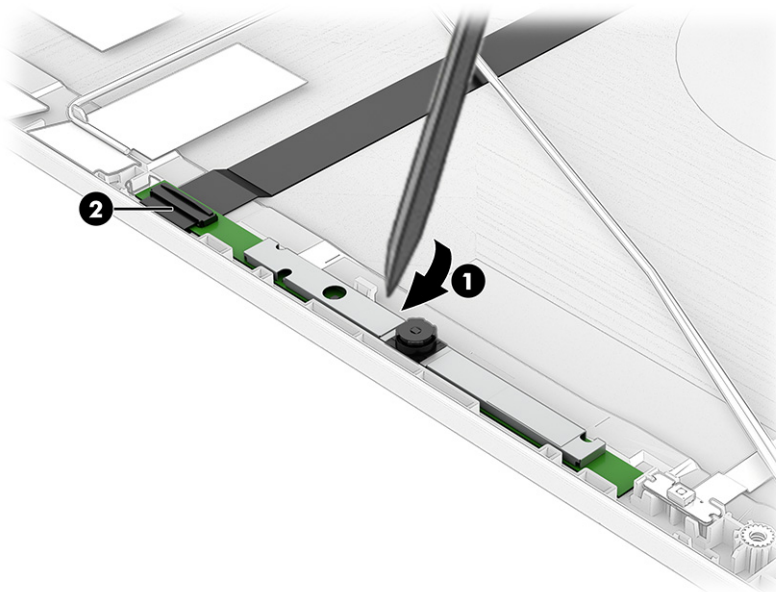

15. To remove the camera module:

a. Remove the three Phillips M2.0 × 2.0 screws **(1)** from the top bracket, and then remove the bracket from the display back cover **(2)**.


b. Use a tool to detach the camera module **(1)** from the display back cover. (The module is attached with double-sided adhesive.) Note that the camera routes under the camera so you must remove the camera before you can disconnect the cable.

c. Disconnect the cable from the module **(2)**. Note that the camera routes under the camera.

The camera module is available as spare part number N12929-001.

16. To remove the camera cable, peel the cable off the inside of the display back cover.

The camera cable is available as spare part number N10434-001.
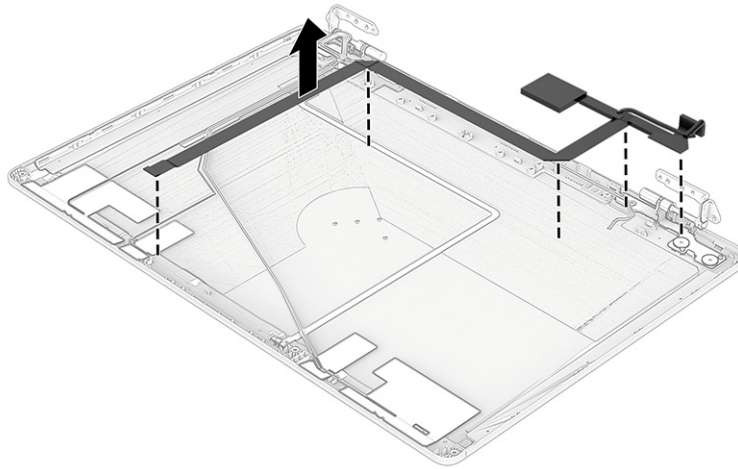
17. To remove the WWAN antennas and cables, release the cables from the retention clips on the inside of the display back cover **(1)**, peel the wireless antennas **(2)** off the display back cover, and then remove them **(3)**.

The WWAN cables and antennas are available as spare part number N12922-001.
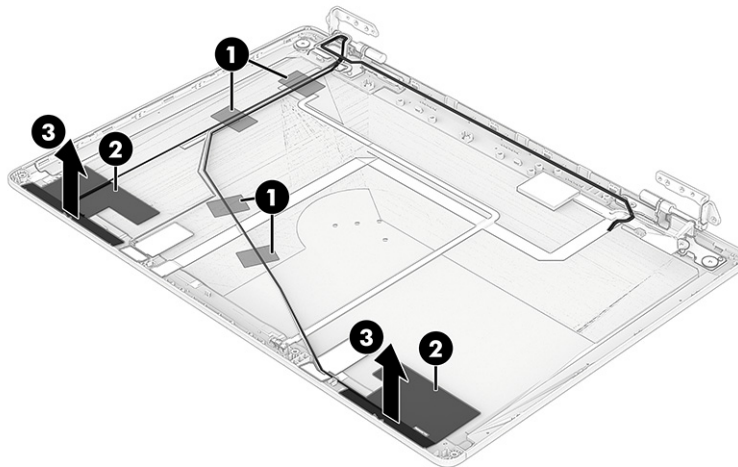
18. To remove the WLAN antennas and cables, release the cables from the retention clips on the inside of the display back cover **(1)**, peel the wireless antennas **(2)** off the display back cover, and then remove them **(3)**.

The WLAN cables and antennas are available as spare part number N12923-001.
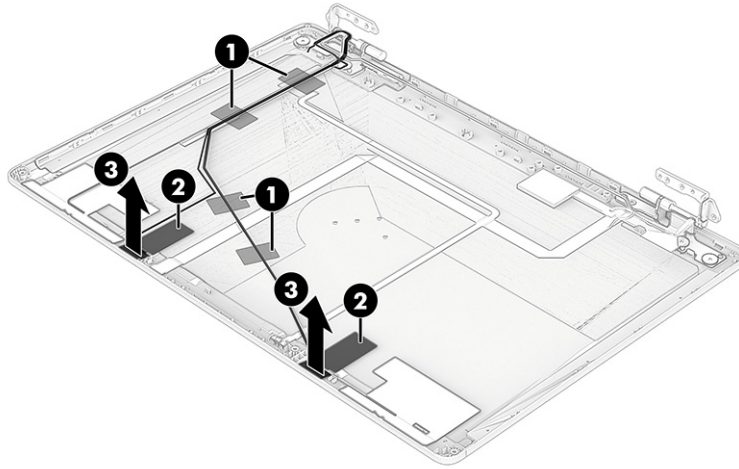
Display back covers are available as the following spare part numbers:

N12902-001: Models without WWAN and a 250 nit panel

N12903-001: Models without WWAN and a 400 nit panel

N12904-001: Models without WWAN and a privacy panel

N12905-001: Models with WWAN and a 250 nit panel

N12906-001: Models with WWAN and a 400 nit panel

N12907-001: Models with WWAN and a privacy panel

To reassemble and replace the display assembly, reverse these procedures.

Top cover with keyboard

The top cover with keyboard remains after removing all other spare parts from the computer. The first table provides the main spare part number for the top cover with keyboards. The second table provides the keyboard country codes.

Table 5-14 Top cover with keyboard descriptions and part numbers

Description	Spare part number
Top cover with keyboard, backlit, WWAN models	N14926-xxx
Top cover with keyboard, backlit, privacy, WWAN models	N14927-xxx
Top cover with keyboard, backlit, models without WWAN	N14928-xxx
Top cover with keyboard, backlit, privacy, models without WWAN	N14929-xxx
Top cover with keyboard, not backlit, models without WWAN	N14930-xxx

Table 5-15 Spare part country codes

For use in country or region	Spare part number	For use in country or region	Spare part number	For use in country or region	Spare part number
Belgium	-A41	Iceland	-DD1	Solvenia	-BA1
Brazil	-201	India	-D61	South Korea	-AD1

Table 5-15 Spare part country codes (continued)

For use in country or region	Spare part number	For use in country or region	Spare part number	For use in country or region	Spare part number
Bulgaria	–261	Israel	–BB1	Spain	–071
Chile	–161	Italy	–061	Switzerland	–BG1
Czech Republic/Slovakia	–FL1	Japan	–291	Taiwan	–AB1
Denmark, Finland, and Norway	–DH1	The Netherlands	–B31	Thailand	–281
French Canada	–DB1	Northern Africa	–FP1	Turkey	–141
France	–051	Portugal	–131	Ukraine	–BD1
Germany	–041	Romania	–271	United Kingdom	–031
Greece	–151	Russia	–251	United States	–001
Hungary	–211	Saudi Arabia	–171		

6 Backing up, resetting, and recovering

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

Backing up

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

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

Resetting

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

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

- You see the message "Reset this Chrome device."

- You are having problems with your user profile or settings.

- You restarted your computer, and it still doesn't work properly.

- You want to change the owner of your computer.

To reset your computer:

1. Under the **Settings** menu, select **Advanced**.

2. In the **Powerwash** section, select **Powerwash**.

3. Select **Restart**.

4. In the window that appears, select **Powerwash**, and then select **Continue**.

5. Follow the on-screen instructions to reset your computer, and sign in with your Google Account.

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

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

Recovering

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

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

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

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

- A USB flash drive or SD memory card with a capacity of 4 GB or greater. All data is erased from this storage device when the recovery media is created, so back up all files from the device before you begin.

- A computer with internet access. You must also have administrative rights to the computer.

- Computer AC adapter. The computer must be plugged into AC power during recovery.

- The "Chrome OS is missing or damaged" screen displaying on your computer. If this message is not already displayed:

  - Turn on the computer, press and hold the esc+f3 keys, and then press the power button. The computer restarts, and the screen shows the "Chrome OS is missing or damaged" screen.

Installing the Chromebook Recovery Utility

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

To install the Chromebook Recovery Utility:

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

Creating recovery media

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

To create recovery media:

1. Turn on a computer that has internet access.

   NOTE: You must have administrative rights to the computer.

2. Select the **Launcher** icon, and then select **All Apps**.

3. In the Apps window, select **Recovery**, and then select **Get started**.

4. Follow the on-screen instructions to create the recovery media.

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

Recovering the Chrome operating system

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

1. Disconnect any external devices connected to your computer, plug in the power cord, and then turn on the computer.

2. To enter recovery mode, press and hold esc+f3, and then press the power button. When the "Chrome OS is missing or damaged" screen appears, insert the recovery media into your computer. The recovery process begins immediately.

3. Wait while Chrome verifies the integrity of the recovery media.

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

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

4. When the "System Recovery is complete" message appears, remove the recovery media.

   The computer restarts with Chrome OS reinstalled.

Setting up your computer after a reset or recovery

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

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

Erasing and reformatting the recovery media

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

1. Select the **Launcher** icon, and then select **All Apps**.

2. In the apps window, select **Recovery**.

3. Select the **Settings** icon, and then select **Erase recovery media**.

4. Select the USB flash drive or SD memory card that you inserted, select **Continue**, and then select **Erase now**.

5. After the recovery media is erased, select **Done** to close the Chromebook Recovery Utility, and then remove the USB flash drive or SD memory card.

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

7 Specifications

This chapter provides specifications for your computer system.

Computer specifications

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

Table 7-1 Computer specifications

	Metric	U.S.
Dimensions		
Width	**323.0 mm**	12.7 in
Depth	**221.0 mm**	8.70 in
Height	**19.9 mm**	0.78 in
Weight	**1540 g**	3.40 lb
Input power		
Operating voltage and current	19.5 V dc @ 3.33 A – 65 W	
	19.5 V dc @ 2.31 A – 45 W	
Temperature		
Operating	**5°C to 35°C**	41°F to 95°F
Nonoperating	**−20°C to 60°C**	−4°F to 140°F
Relative humidity (noncondensing)		
Operating	10% to 90%	
Nonoperating	5% to 95%	
Maximum altitude (unpressurized)		
Operating	**−15 m to 3,048 m**	−50 ft to 10,000 ft
Nonoperating	**−15 m to 12,192 m**	−50 ft to 40,000 ft

NOTE: Applicable product safety standards specify thermal limits for plastic surfaces. The device operates well within this range of temperatures.

35.6 cm (14.0 in) display specifications

This section provides specifications for your display.

Table 7-2 Display specifications

	Metric	U.S.
Active diagonal size	**35.6 cm**	14.0 in
Resolution	1920 × 1080 (FHD)	
	1366 × 768 (HD)	
Surface treatment	Antiglare	
Brightness	1000 nits (privacy)	
	400 nits (100% sRGB)	
	250 nits	
Viewing angle	UWVA (FHD)	
	SVA (HD)	
Backlight	WLED	
Display panel interface	eDP	

Solid-state drive specifications

This section provides specifications for your solid-state drives.

Table 7-3 Solid-state drive specifications

	256 GB*	512 GB*	1 TB*
Dimensions			
Height	1.0 mm	1.0 mm	1.0 mm
Length	50.8 mm	50.8 mm	50.8 mm
Width	28.9 mm	28.9 mm	28.9 mm
Weight	< 10 g	< 10 g	< 10 g
Interface type	PCIe	PCIe	PCIe
Ready time, maximum (to not busy)	1.0 ms	< 1.0 ms	1.0 ms
Access times, logical	0.1 ms	0.1 ms	0.1 ms
Transfer rate			
Sequential read	up to 2150 MBps	up to 2150 MBps	up to 2150 MBps
Random read	Up to 300,000 IOPs	Up to 300,000 IOPs	Up to 300,000 IOPs
Sequential write	up to 1550 MBps	up to 1550 MBps	up to 1550 MBps
Random write	Up to 100,000 IOPs	Up to 100,000 IOPs	Up to 100,000 IOPs
Total logical sectors	468,883,296	1,000,215,216	1,500,336,388
Operating temperature	**0°C to 70°C** (32°F to 158°F)		

*1 GB = 1 billion bytes when referring to hard drive storage capacity. Actual accessible capacity is less.
Actual drive specifications may differ slightly.

Table 7-3 Solid-state drive specifications (continued)

	256 GB*	512 GB*	1 TB*

NOTE: Certain restrictions and exclusions apply. Contact support for details.

8 Statement of memory volatility

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

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

- No subsequent modifications were made to the system.

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

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

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

Current BIOS steps

Use these instructions to restore nonvolatile memory.

1. Follow these steps to restore the nonvolatile memory that can contain personal data. Restoring or reprogramming nonvolatile memory that does not store personal data is neither necessary nor recommended.

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

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

    b. Select **Main**, select **Apply Factory Defaults and Exit**, and then select **Yes** to load defaults. The computer restarts.

    c. During the restart, press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

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

    d. Select the **Security** menu, select **Restore Security Settings to Factory Defaults**, and then select **Yes** to restore security level defaults. The computer reboots.

    e. During the reboot, press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

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

f. If an asset or ownership tag is set, select the **Security** menu and scroll down to the **Utilities** menu. Select **System IDs**, and then select **Asset Tracking Number**. Clear the tag, and then make the selection to return to the prior menu.

g. If a DriveLock password is set, select the **Security** menu, and scroll down to **Hard Drive Utilities** under the **Utilities** menu. Select **Hard Drive Utilities**, select **DriveLock**, and then clear the check box for **DriveLock password on restart**. Select **OK** to proceed.

h. Select the **Main** menu, and then select **Reset BIOS Security to factory default**. Select **Yes** at the warning message. The computer reboots.

i. During the reboot, press esc while the "Press the ESC key for Startup Menu" message is displayed at the bottom of the screen.

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

j. Select the **Main** menu, select **Apply Factory Defaults and Exit**, select **Yes** to save changes and exit, and then select **Shutdown**.

k. Reboot the system. If the system has a Trusted Platform Module (TPM), fingerprint reader, or both, one or two prompts will appear—one to clear the TPM and the other to Reset Fingerprint Sensor. Press or tap f1 to accept or f2 to reject.

l. Remove all power and system batteries for at least 24 hours.

2. Complete one of the following:

- Remove and retain the storage drive.

  – or –

- Clear the drive contents by using a third-party utility designed to erase data from an SSD.

  – or –

- Clear the contents of the drive by using the following BIOS Setup Secure Erase command option steps:

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

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

b. Select the **Security** menu and scroll down to the esc menu.

c. Select **Hard Drive Utilities**.

d. Under **Utilities**, select **Secure Erase**, select the hard drive storing the data you want to clear, and then follow the on-screen instructions to continue.

– or –

Clear the contents of the drive using the following Disk Sanitizer commands steps:

i. Turn on or restart the computer, and then quickly press esc.

ii. Select the **Security** menu and scroll down to the **Utilities** menu.

iii. Select **Hard Drive Utilities**.

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

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

Nonvolatile memory usage

Use this table to troubleshoot nonvolatile memory usage.

Table 8-1 Troubleshooting steps for nonvolatile memory usage

Nonvolatile memory type	Amount (Size)	Does this memory store customer data?	Does this memory retain data when power is removed?	What is the purpose of this memory?	How is data entered into this memory?	How is this memory write-protected?
HP Sure Start flash (select models only)	8 MB	No	Yes	Provides protected backup of critical System BIOS code, EC firmware, and critical computer configuration data for select platforms that support HP Sure Start. For more information, see Using HP Sure Start (select products only) on page 70.	Data cannot be written to this device via the host processor. The content is managed solely by the HP Sure Start Embedded Controller.	This memory is protected by the HP Sure Start Embedded Controller.
Real Time Clock (RTC) battery backed-up CMOS configuration memory	256 bytes	No	Yes	Stores system date and time and noncritical data.	RTC battery backed-up CMOS is programmed using Computer Setup (BIOS), or by changing the Windows date & time.	This memory is not write-protected.
Controller (NIC) EEPROM	64 KB (not customer accessible)	No	Yes	Stores NIC configuration and NIC firmware.	NIC EEPROM is programmed using a utility from the NIC vendor that can be run from DOS.	A utility must be used to write data to this memory and is available from the NIC vendor. Writing data to this ROM in an inappropriate manner will render the NIC nonfunctional.

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

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

Questions and answers

Use this section to answer your questions about nonvolatile memory.

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

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

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

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

   b.   Select **Main**, and then select **Apply Factory Defaults and Exit**.

   c.   Follow the on-screen instructions.

   d.   Select **Main**, select **Save Changes and Exit**, and then follow the on-screen instructions.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

   b.   Select **Main**, and then select **Reset Security to Factory Defaults**.

   c.   Follow the on-screen instructions.

   d.   Select **Main**, select **Save Changes and Exit**, and then follow the on-screen instructions.

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

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

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

b. Select the **Security** menu, select **Secure Boot Configuration**, and then follow the on-screen instructions.

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

Using HP Sure Start (select products only)

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

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

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

9 Power cord set requirements

This chapter provides power cord requirements for countries and regions.

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

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

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

Requirements for all countries

These power cord requirements are applicable to all countries and regions.

- The length of the power cord set must be at least **1.0 m** (3.3 ft) and no more than **2.0 m** (6.5 ft).

- All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country or region where the power cord set will be used.

- The power cord sets must have a minimum current capacity of 10 A and a nominal voltage rating of 125 V ac or 250 V ac, as required by the power system of each country or region.

- The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with the appliance inlet on the back of the computer.

Requirements for specific countries and regions

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

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

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

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

Country/region	Accredited agency	Applicable note number
India	BIS	1
Israel	SII	1
Italy	IMQ	1
Japan	JIS	3
Netherlands	KEMA	1
New Zealand	SANZ	1
Norway	NEMKO	1
People's Republic of China	CCC	4
Saudi Arabia	SASO	7
Singapore	PSB	1
South Africa	SABS	1
South Korea	KTL	5
Sweden	SEMKO	1
Switzerland	SEV	1
Taiwan	BSMI	6
Thailand	TISI	1
United Kingdom	ASTA	1
United States	UL	2

1. The flexible cord must be Type H05VV-F, three-conductor, 0.75 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 SVT/SJT or equivalent, No. 18 AWG, three-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V ac) or NEMA 6-15P (15 A, 250 V ac) configuration. CSA or C-UL mark. UL file number must be on each element.

3. The appliance coupler, flexible cord, and wall plug must bear a T mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCTF, three-conductor, 0.75 mm² or 1.25 mm² conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V ac) configuration.

4. The flexible cord must be Type RVV, three-conductor, 0.75 mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the CCC certification mark.

5. The flexible cord must be Type H05VV-F three-conductor, 0.75 mm² conductor size. KTL logo and individual approval number must be on each element. Approval number and logo must be printed on a flag label.

6. The flexible cord must be Type HVCTF three-conductor, 1.25 mm² conductor size. Power cord set fittings (appliance coupler, cable, and wall plug) must bear the BSMI certification mark.

7. For 127 V ac, the flexible cord must be Type SVT or SJT 3-conductor, 18 AWG, with plug NEMA 5-15P (15 A, 125 V ac), with UL and CSA or C-UL marks. For 240 V ac, the flexible cord must be Type H05VV-F three-conductor, 0.75 mm² or 1.00 mm² conductor size, with plug BS 1363/A with BSI or ASTA marks.

10 Recycling

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

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

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