HP mt31 Mobile Thin Client

Maintenance and Service Guide

Product notice

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

This computer may require upgraded and/ or separately purchased hardware and/or a DVD drive to install the Windows 7 software and take full advantage of Windows 7 functionality. See http://windows.microsoft.com/en-us/ windows7/get-know-windows-7 for details.

Software terms

Important Notice about Customer Self-Repair Parts

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

Safety warning notice

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

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1   Product description

Category	Description
Product Name	**HP mt31 Mobile Thin Client**
Processor	**Intel Celeron dual core processor** (2-MB L3 cache, 15 W)
	3867U, 1.8-GHz, 2-MB SmartCache, dual core, 12.5 W; Intel HD Graphics 610
Graphics	Supports HD decode, DX12, HDMI 1.4b, HDCP 2.2 via HDMI up to 4K@30Hz, DP support 4K@60Hz on 7th/8th Generation Celeron, i3, i5, and i7 processors
	Integrated UMA Graphics GT1 and GT2
	Integrated with shared video memory; dynamically allocated
Panel	**33.8 cm (13.3-inch), LED backlight, 16:9 aspect ratio, SVA, HD (1366×768), 220 nits, eDP, HD, slim (3.0 mm)**
	2 WLAN antennas, anti-glare (not available with camera)
	Camera, 2 WLAN antennas, anti-glare (only available with camera)
Memory	Two customer-accessible memory module slots supporting up to 8 GB of RAM
	Supports dual-channel memory
	PC4, 2133-MHz, DDR4 SODIMMs
	Supports the following configurations:
	● 8192 MB (4096 × 2; dual channel)
	● 4096 MB (4096 × 1)
Primary M.2 storage	**M.2 2280 SSD (NGFF)**
	● 128 GB, SATA, TLC
Audio/Visual	Audio controls
	Integrated mono microphone (non-camera models only)
	Integrated dual-array microphone (camera models only)
	Integrated camera (720p HD) (supports Wide Dynamic Range [WDR])
	Stereo speakers (2)
	Headphone/microphone combo jack
Ethernet	Realtek RTL8111HSH 10/100/1000
	S3/S5 wake on LAN (AC mode and battery mode)
Wireless	**Integrated WLAN options by way of wireless module** (select models only)
	WLAN antennas built into top of display assembly
	Supports HP Connection Optimizer with wi-fi load balancing
	Supports the following wireless adapters via minicard connector:

Category	Description
	● Intel Dual Band Wireless-AC 8265, 802.11ac, 2×2 Wi-Fi + Bluetooth 4.2 combination adapter (non-vPro)
External media card	**Digital Media Reader Slot**
	Supports SD, SDHC, SDXC
Ports (Input/output)	VGA (Dsub 15-pin) supporting:
	● 2048×1536 external resolution at 60-GHz
	● Hot plug/unplug and auto detect
	● HDMI 1.4b
	USB 3.0 + powered ports (left)
	USB 3.0 (right)
	USB Type-C (PD+DP, gen 1)
	Headphone/microphone combo jack
	RJ-45 (Ethernet, includes link and activity lights)
	Multi-pin AC port
Docking	Docking via USB Type-C
Keyboard/pointing devices	**Keyboard**
	HP Premium Keyboard
	TouchPad
	Full-sized, chiclet, spill-resistant keyboard (backlit or not backlit)
	TouchPad
	Windows 10 gestures
Power requirements	**Battery**
	3-cell prismatic, 48-Wh, long-life, Li-ion battery
	AC adapters
	45-W Smart AC adapter, right angle, 2-prong, 4.5 mm (Japan only)
	Power cords
	3-wire plug – 1.8 m
Security	Security lock
	Integrated fingerprint reader (select models only)
	TPM 2.0 SLB9670 (Infineon; soldered down)
	Hardware enforced firmware protection: HP Hardware Root of Trust
	ANSSI Certified Hardware Root of Trust: Yes
	Hardware enforced software protection: No
	Firmware based operating system recovery: No
Operating system	**Operating system version**

Category	Description
	Windows 10 IoT Enterprise 2019 LTSC 64
Serviceability	**End-user replaceable parts**
	AC adapter
	M.2 solid-state drive
	Memory module
	WLAN module
	Keyboard

2   External component identification

Right

Component		Description
(1)	USB Type-C power connector port, SuperSpeed port, and DisplayPort connector	Connects an AC adapter that has a USB Type-C connector, supplying power to the computer and, if needed, charging the computer battery. – and – Connects a USB device that has a Type-C connector, such as a cell phone, camera, activity tracker, or smartwatch, and provides high-speed data transfer. – and – Connects a display device that has a USB Type-C connector, providing DisplayPort output. **NOTE:** Cables and/or adapters (purchased separately) may be required.
(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)	HDMI port	Connects an optional video or audio device, such as a high-definition television, any compatible digital or audio component, or a high-speed High Definition Multimedia Interface (HDMI) device.
(4)	VGA port	Connects an external VGA monitor or projector.
(5)	RJ-45 (network) jack/status lights	Connects a network cable. ● Green (left): The network is connected. ● Amber (right): Activity is occurring on the network.
(6)	Battery light	When AC power is connected: ● White: The battery charge is greater than 90 percent. ● Amber: The battery charge is from 0 to 90 percent. ● Off: The battery is not charging. When AC power is disconnected (battery not charging): ● Blinking amber: The battery has reached a low battery level. When the battery has reached a critical battery level, the battery light begins blinking rapidly.

Component		Description
		● Off: The battery is not charging.
(7)	🔌 Power connector	Connects an AC adapter.

Left

Component		Description
(1)	🔒 Security cable slot	Attaches an optional security cable to the computer.
		NOTE: The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.
(2)	Vent	Enables airflow to cool internal components.
		NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(3)	ss←⁺● USB SuperSpeed powered port	Connects and supplies power to a USB device, such as a cell phone, camera, activity tracker, optical drive, or smartwatch, and provides high-speed data transfer.
(4)	🎧 Audio-out (headphone)/ Audio-in (microphone) combo jack	Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. Also connects an optional headset microphone. This jack does not support optional standalone microphones.
		WARNING! To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, refer to the *Regulatory, Safety, and Environmental Notices*.
		To access this guide:
		▲ Select the **Start** button, select **HP Help and Support**, and then select **HP Documentation**.
		NOTE: When a device is connected to the jack, the computer speakers are disabled.
(5)	SD Memory card reader	Reads optional memory cards that store, manage, share, or access information.
		To insert a card:
		1. Hold the card label-side up, with the connectors facing the computer.
		2. Insert the card into the memory card reader, and then press in on the card until it is firmly seated.
		To remove a card:

Component		Description
		▲ Press in on the card, and then remove it from the memory card reader.
(6)	⬤	Drive light	Blinking white: The hard drive is being accessed.

Display
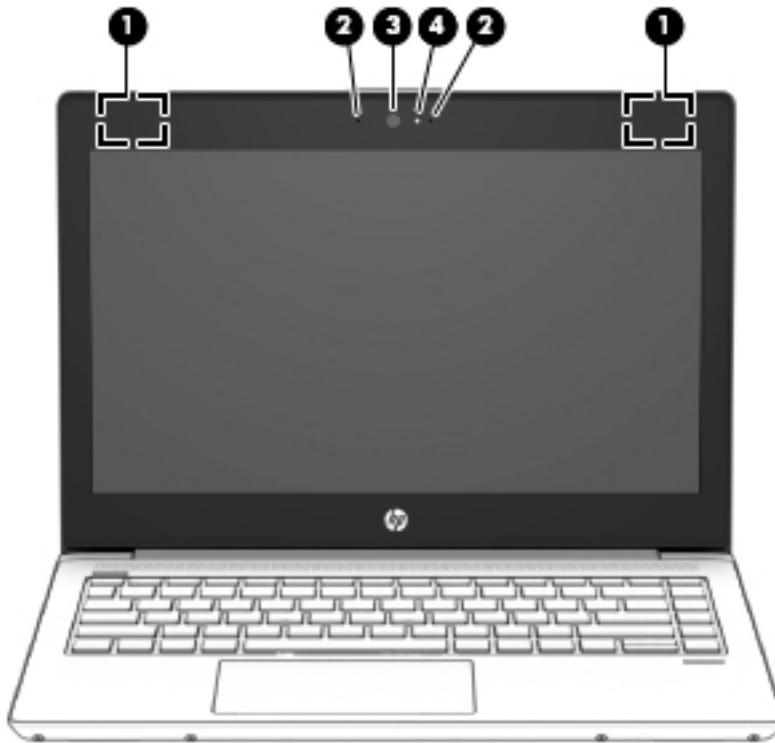
Component		Description
(1)	WLAN antennas* (select products only)	Send and receive wireless signals to communicate with wireless local area networks (WLANs).
(2)	Internal microphones (1 or 2 depending on model)	Record sound.
(3)	Camera (select products only)	Allows you to video chat, record video, and record still images.
		NOTE: Camera functions vary depending on the camera hardware and software installed on your product.
(4)	Camera light (select products only)	On: The camera is in use.

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

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

To access this guide:

▲ Select the **Start** button, select **HP Help and Support** tab, and then select **HP Documentation**.

Keyboard area

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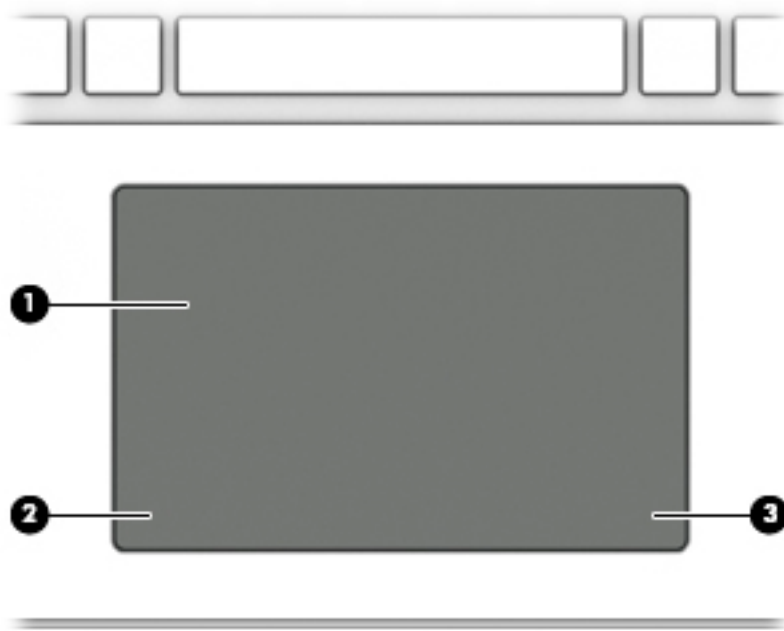
Component		Description
(1)	TouchPad zone	Reads your finger gestures to move the pointer or activate items on the screen.
(2)	Left TouchPad button	Functions like the left button on an external mouse.
(3)	Right TouchPad button	Functions like the right button on an external mouse.

Lights

Component		Description
(1)	Power light	● On: The computer is on.
		● Blinking: The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unneeded components.
		● Off: The computer is off.
(2)	Caps lock light	On: Caps lock is on, which switches the key input to all capital letters.
(3)	Fn lock light	On: The fn key is locked.
(4)	Mute light	● On: Computer sound is off.
		● Off: Computer sound is on.
(5)	Microphone mute light	● On: Microphone is off.
		● Off: Microphone is on.
(6)	Num lk light	On: Num lock is on.
(7)	Wireless light	On: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on.
		NOTE: On some models, the wireless light is amber when all wireless devices are off.

Button, speakers, and fingerprint reader

Component		Description
(1)	Power button	• When the computer is off, press the button to turn on the computer.
		• When the computer is on, press the button briefly to initiate Sleep .
		• When the computer is in the Sleep state, press the button briefly to exit Sleep (select products only).
		CAUTION: Pressing and holding down the power button results in the loss of unsaved information.
		If the computer has stopped responding and shutdown procedures are ineffective, press and hold the power button for at least 5 seconds to turn off the computer.
		To learn more about your power settings, see your power options.
		▲ Right-click the **Power meter** icon [icon] and then select **Power Options**.
(2)	Speakers (2)	Produce sound.
(3)	Fingerprint reader (select products only)	Allows a fingerprint logon to Windows, instead of a password logon.
		▲ To use the fingerprint reader, swipe the fingerprint reader until it reads your fingerprint.

Special keys

Component		Description
(1)	esc key	Displays system information when pressed in combination with the fn key.
(2)	fn key	Executes frequently used system functions when pressed in combination with another key. Such key combinations are called *hot keys*.
(3)	Windows key	Opens the **Start** menu.
		NOTE: Pressing the Windows key again will close the **Start** menu.
(4)	Action keys	Execute frequently used system functions.
		See Action keys on page 11.
(5)	Embedded numeric keypad	A numeric keypad superimposed over the keyboard alphabet keys. When num lk is pressed, the keypad can be used like an external numeric keypad. Each key on the keypad performs the function indicated by the icon in the upper-right corner of the key.
		NOTE: If the keypad function is active when the computer is turned off, that function is reinstated when the computer is turned back on.
(6)	Windows application key	Displays options for a selected object.
(7)	num lk key	Alternates between the navigational and numeric functions on the embedded numeric keypad.

Action keys

An action key performs the function indicated by the icon on the key. To determine which keys are on your product, see .

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

Icon	Description
⊏⊐⊏	Switches the screen image among display devices connected to the system. For example, if a monitor is connected to the computer, repeatedly pressing the key alternates the screen image from computer display to monitor display to simultaneous display on both the computer and monitor.
☀	Decreases the screen brightness incrementally as long as you hold down the key.
☀	Increases the screen brightness incrementally as long as you hold down the key.
⊿	Mutes or restores speaker sound.
◁›	Decreases speaker volume incrementally while you hold down the key.
◁)))	Increases speaker volume incrementally while you hold down the key.
⊿	Mutes the microphone.
▪▪▪	Turns the keyboard backlight off or on (select products only). **NOTE:** To conserve battery power, turn off this feature.
((ᵢ))	Turns the wireless feature on or off. **NOTE:** A wireless network must be set up before a wireless connection is possible.
☾	Initiates Sleep, which saves your information in system memory. The display and other system components turn off and power is conserved. To exit Sleep, briefly press the power button. **CAUTION:** To reduce the risk of information loss, save your work before initiating Sleep.

NOTE: The action key feature is enabled at the factory. You can disable this feature by pressing and holding the fn key and the left shift key. The fn lock light will turn on. After you have disabled the action key feature, you can still perform each function by pressing the fn key in combination with the appropriate action key.

Bottom

Component		Description
(1)	Service doors (2)	Provide access to the hard drive bay, the WLAN module slot, and the memory module slots.
		CAUTION: To prevent an unresponsive system, replace the wireless module only with a wireless module authorized for use in the computer by the governmental agency that regulates wireless devices in your country or region. If you replace the module and then receive a warning message, remove the module to restore computer functionality, and then contact support.
(2)	Vents (2)	Enable airflow to cool internal components.
		NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.

Locating system information

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

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

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

  Your service label will resemble one of the examples shown below. Refer to the illustration that most closely matches the service label on your computer.
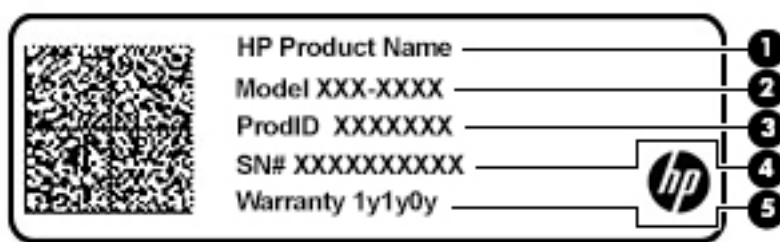
Component	
(1)	HP product name
(2)	Model number
(3)	Product ID
(4)	Serial number
(5)	Warranty period
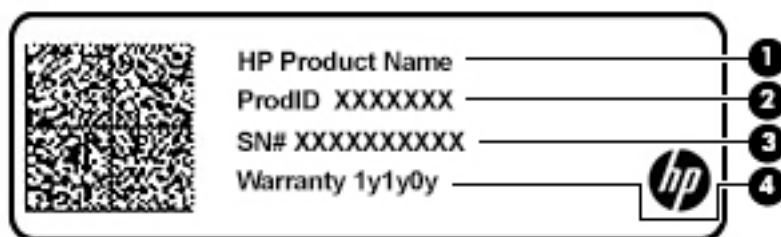
Component	
(1)	HP product name
(2)	Product ID

Component	
(3)	Serial number
(4)	Warranty period

- Regulatory label(s)—Provide(s) regulatory information about the computer.

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

3   Illustrated parts catalog

Computer major components
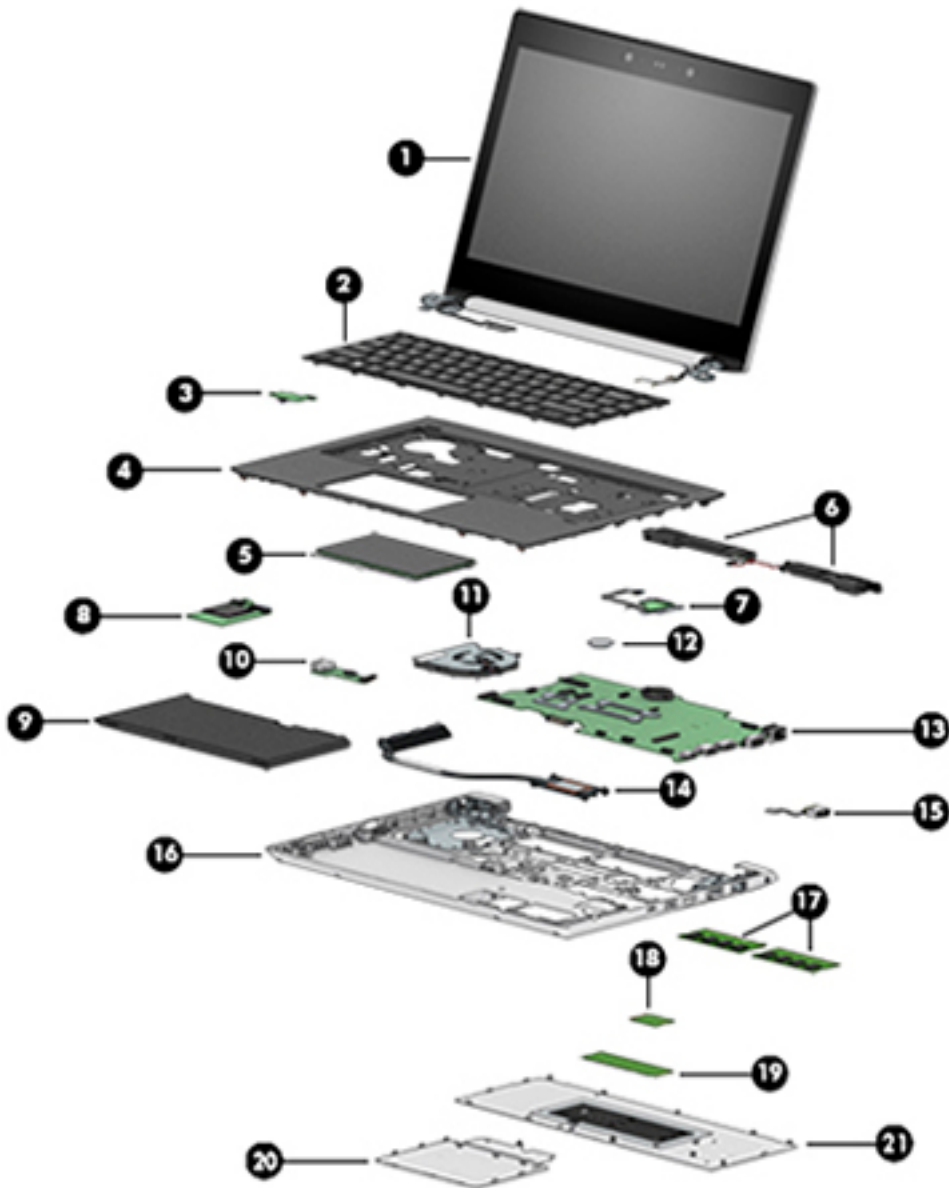
Item	Description	Spare part number
(1)	**Display panel assembly**	
(2)	**Keyboard** (includes cable)	
	NOTE: For a detailed list of keyboard country codes, see Keyboard on page 33.	
	No backlight	L01072-xxx
	Backlit	L01071-xxx
(3)	**Power button board**	L01044-001
(4)	**Top cover**	L01055-001
(5)	**TouchPad**	L01056-001
(6)	**Speaker assembly**	L01053-001
(7)	**Fingerprint reader assembly** (includes cable)	L01058-001
(8)	**Card reader board**	L01045-001
(9)	**Battery, Li-ion (4-cell, 48 WHr, 4.21 Ah)**	851610-855
(10)	**USB board**	L01043-001
(11)	**Fan**	L01054-001
(12)	**RTC battery**	746439-001
(13)	**System board** (includes replacement thermal material)	
	Intel Celeron 3867U processor	L68816-301
(14)	**Heat sink** (includes replacement thermal material)	L01052-001
(15)	**Power connector cable**	L01048-001
(16)	**Base enclosure**	L01057-001
(17)	**Memory modules** (DDR4-2666)	
	4-GB	L10598-850
(18)	**WLAN module**	
	Intel Dual Band Wireless-AC 8265, 802.11ac, 2×2 Wi-Fi + Bluetooth 4.2 combination adapter	851594-001
(19)	**M.2 solid-state drive**	
	128-GB, SATA-3	L44591-001
(20)	**Drive service door**	L01049-001
	NOTE: The drive service door is included in the Hard Drive Hardware Kit.	
(21)	**Main service door**	L01050-001
	NOTE: The main service door is included in the Plastics Kit.	

Display assembly subcomponents
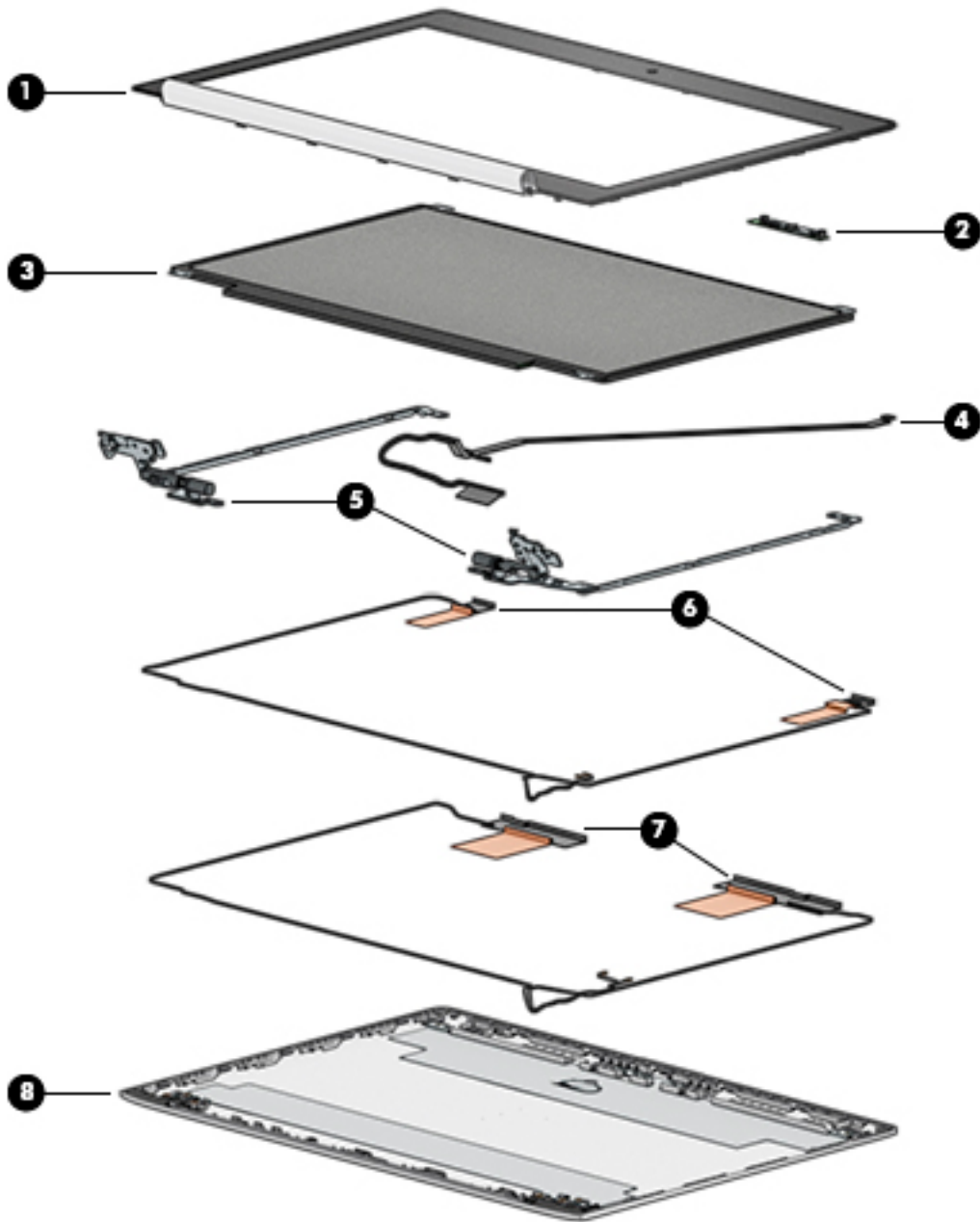
Item	Description	Spare part number
(1)	**Display bezel**	
	Models without a camera	L01061-001
	Models with a camera	L01060-001
(2)	**Camera module**	L01065-001
	Microphone board	L01046-001
(3)	**Display panel (raw)**	

Item	Description	Spare part number
	FHD	L44592-001
(4)	**Display/camera cable assembly**	L01062-001
(5)	**Hinge Kit** (includes left and right hinges)	L01064-001
(6)	**WLAN antennas**	L01946-001
(7)	**Display rear cover** (includes wireless antennas)	L01059-001

Cable Kit
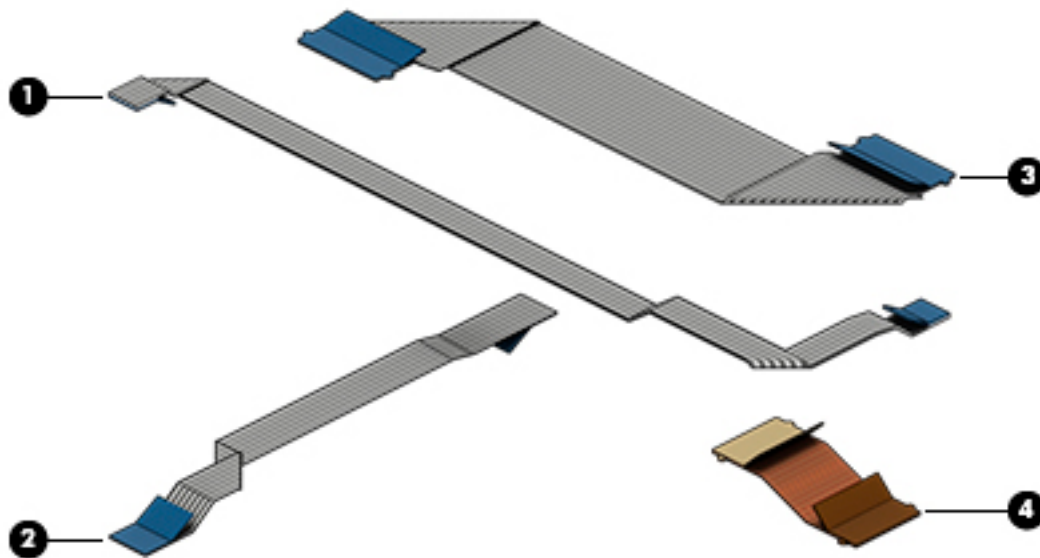
Item	Description	Spare part number
	Cable Kit	L01047-001
(1)	TouchPad cable	
(2)	Power button board cable	
(3)	Card reader board cable	
(4)	USB board cable	

Plastics Kit
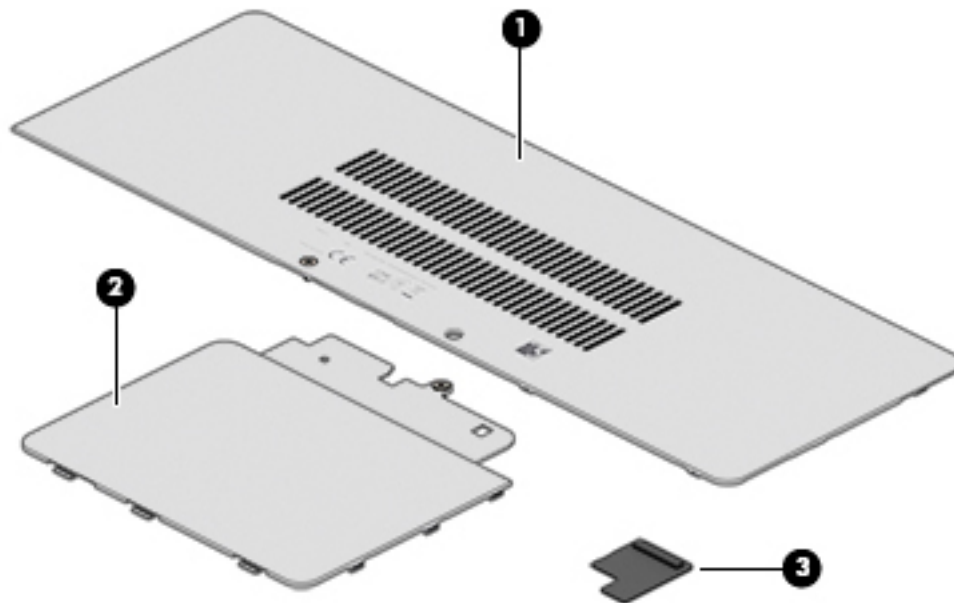
Item	Description	Spare part number
	Plastics Kit	L01050-001
(1)	Main service door	
(2)	Fingerprint reader insert (for use in models without a fingerprint reader)	
(3)	Fingerprint reader	

Bracket Kit
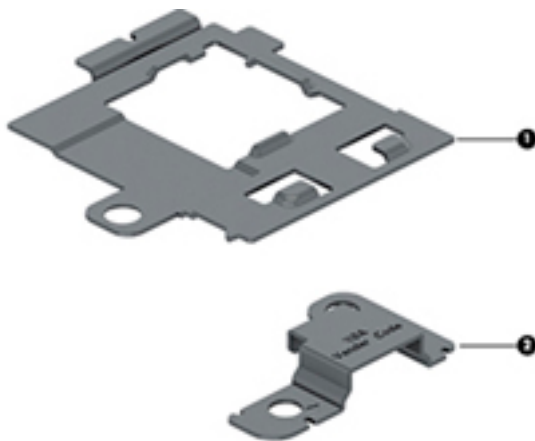
Item	Description	Spare part number
	Bracket Kit	L01051-001
(1)	Fingerprint reader bracket	
(2)	USB reader bracket	

Miscellaneous parts

Description	Spare part number
AC adapters, 45-W Smart AC power adapter, 4.5 mm barrel connector, 2 prong	742436-001
Power cord (3-pin, C7, black, 1.00-m), for use in Japan	931325-001
Screw kit	L01067-001
Mouse	
HP USB Laser Mouse	674318-001
HP Comfort Grip Wireless Mouse	691922-001
HP USB Travel Mouse	757770-001
Cases	
Top load case	679921-001
Messenger bag	679922-001
Backpack	679923-001
HP keyed cable lock	840158-001
HP Smart AC Adapter dongle, 7.4 mm	734734-001
HP Elite USB-C Docking Station	844550-001
HP USB-C Mini Dock	935327-001
HP USB Travel Dock	844551-001

4 Removal and replacement procedures preliminary requirements

Tools required

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

- Flat-bladed screwdriver
- Phillips P0 and P1 screwdrivers
- Torx T8 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

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

Cables and connectors

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

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

Drive handling

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

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

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

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

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

Avoid dropping drives from any height onto any surface.

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

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

Avoid exposing a drive to temperature extremes or liquids.

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

Electrostatic discharge damage

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

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

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

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

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

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

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

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

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

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

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

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

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

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

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

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

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

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

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

Workstation guidelines

Follow these grounding workstation guidelines:

- Cover the workstation with approved static-shielding material.

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

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

- When fixtures must directly contact dissipative surfaces, use fixtures made only of static-safe materials.

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

- Handle ESD-sensitive components, parts, and assemblies by the case or PCM laminate. Handle these items only at static-free workstations.

- Avoid contact with pins, leads, or circuitry.

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

Equipment guidelines

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

- When seated, wear a wrist strap connected to a grounded system. Wrist straps are flexible straps with a minimum of one megohm ±10% resistance in the ground cords. To provide proper ground, wear a strap snugly against the skin at all times. On grounded mats with banana-plug connectors, use alligator clips to connect a wrist strap.

- When standing, use foot straps and a grounded floor mat. Foot straps (heel, toe, or boot straps) can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use foot straps on both feet with a minimum of one megohm resistance between the operator and ground. To be effective, the conductive must be worn in contact with the skin.

The following grounding equipment is recommended to prevent electrostatic damage:

- Antistatic tape

- Antistatic smocks, aprons, and sleeve protectors

- Conductive bins and other assembly or soldering aids

- Nonconductive foam

- Conductive tabletop workstations with ground cords of one megohm resistance

- Static-dissipative tables or floor mats with hard ties to the ground

- Field service kits

- Static awareness labels

- Material-handling packages

- Nonconductive plastic bags, tubes, or boxes

- Metal tote boxes

- Electrostatic voltage levels and protective materials

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

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

5 Removal and replacement procedures for Customer Self-Repair parts

This chapter provides removal and replacement procedures for Customer Self-Repair parts.

NOTE: The Customer Self-Repair program is not available in all locations. Installing a part not supported by the Customer Self-Repair program may void your warranty. Check your warranty to determine if Customer Self-Repair is supported in your location.

Component replacement procedures

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

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

This chapter provides removal and replacement procedures for Customer Self-Repair parts.

There are as many as 13 screws that must be removed, replaced, or loosened when servicing Customer Self-Repair parts. Make special note of each screw size and location during removal and replacement.

Battery Safe mode

Before removing internal components, you must place the computer in "Battery Safe mode." This mode avoids short-circuits or system malfunction by removing power from internal components.

To place the computer in "Battery Safe mode," follow these steps:

1. With the computer turned off and AC adapter connected, press the following key and button combination: **Windows key + Backspace key + Power button**.

2. Turn the computer on to initiate "Battery Safe mode."

3. After the computer powers off, disconnect the AC adapter.

In "Battery Safe mode," the power button will not turn the computer on if the AC adapter is not connected.

To disengage "Battery Safe mode," plug in the AC adapter and press the power button.

Service doors

Description	Spare part number
Main service door (included in Plastics Kit)	L01050-001
Drive service door (included in Hard Drive Hardware Kit)	L01049-001

The bottom of the computer has two service doors. The hard drive service door only provides access to the hard drive. The main service door provides access to the memory modules, wireless modules, M.2 solid-state drive, and keyboard screws.

Before removing the service doors, follow these steps:

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

2. Place the computer in "Battery Safe mode" ().

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

Remove the service doors:

Main service door

1. Loosen the captive Phillips screw **(1)**.

2. Lift the bottom of the door upward **(2)**, and then remove the door from the computer **(3)**.

Drive service door

3. Loosen the captive Phillips screw **(1)**.

4.   Lift the bottom of the door upward **(2)**, and then remove the door from the computer **(3)**.
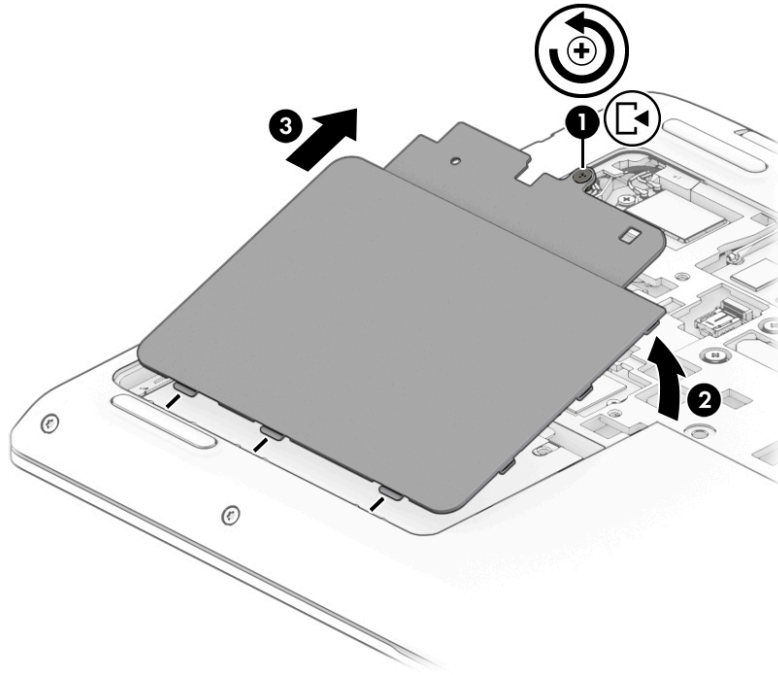
Reverse these procedures to install the service doors.

Memory modules

Description	Spare part number
4-GB (DDR4-2666)	L10598-850

Update BIOS before adding memory modules

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

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

To update BIOS:

1. Navigate to www.hp.com.

2. Move the cursor over **Support** to display the pull-down menu, and then click **Software & drivers**.

3. Type your product name, number, or serial number, and then click **Find**.

4. Click **BIOS**, and then click **Download**.

5. Follow the on-screen instructions.

Before removing the memory module, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the main service door (Service doors on page 26).

Remove the memory module:

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

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

📝 **NOTE:** Memory modules are designed with a notch to prevent incorrect insertion into the memory module slot.

Reverse this procedure to install a memory module.

WLAN/Bluetooth combo card

The computer uses a card that provides both WLAN and Bluetooth functionality.

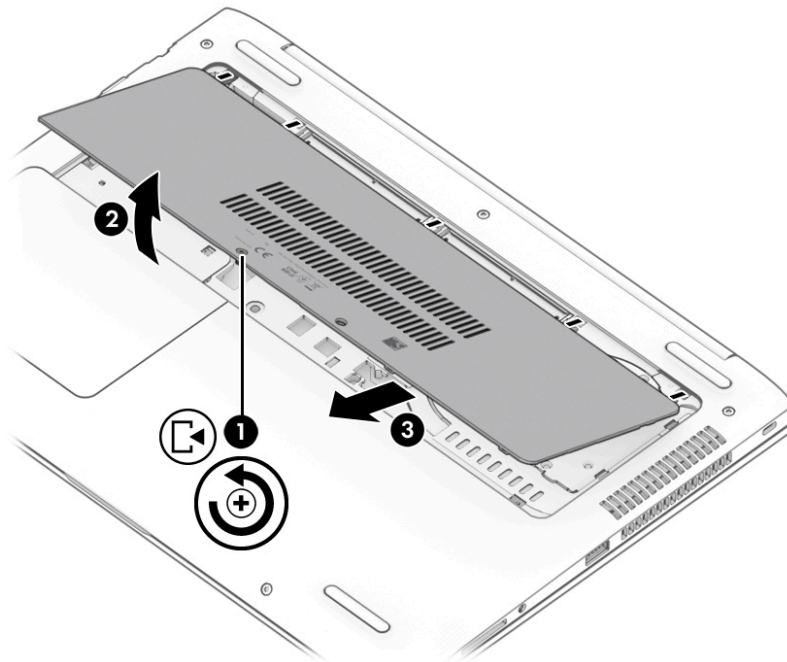| Description	Spare part number
Intel Dual Band Wireless-AC 8265, 802.11ac, 2×2 Wi-Fi + Bluetooth 4.2 combination adapter (non-vPro)	851594-001

Before removing the WLAN module, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the main service door (Service doors on page 26).

Remove the WLAN module:

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

📝 **NOTE:** The WLAN antenna cable labeled "1" connects to the WLAN module "Main" terminal labeled "1". The WLAN antenna cable labeled "2" connects to the WLAN module "Aux" terminal labeled "2". If the computer is equipped with an 802.11a/b/g/n WLAN module, the yellow WLAN antenna cable connects to the middle terminal on the WLAN module.

2. Remove the Phillips M2.0×4.0 screw **(2)** that secures the WLAN module to the computer. (The edge of the module opposite the slot rises away from the computer.)

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

📝 **NOTE:** WLAN modules are designed with a notch to prevent incorrect insertion.
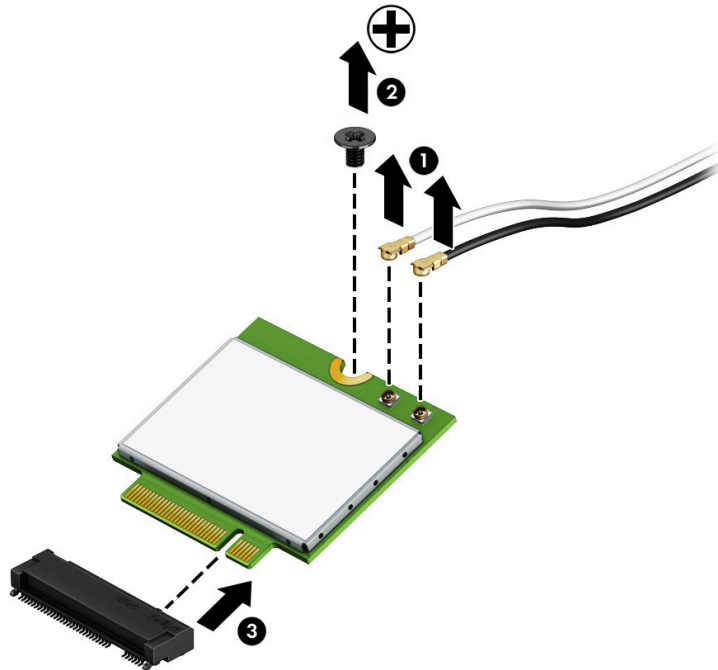
📝 **NOTE:** If the WLAN antennas are not connected to the terminals on the WLAN module, the protective sleeves must be installed on the antenna connectors, as shown in the following illustration.
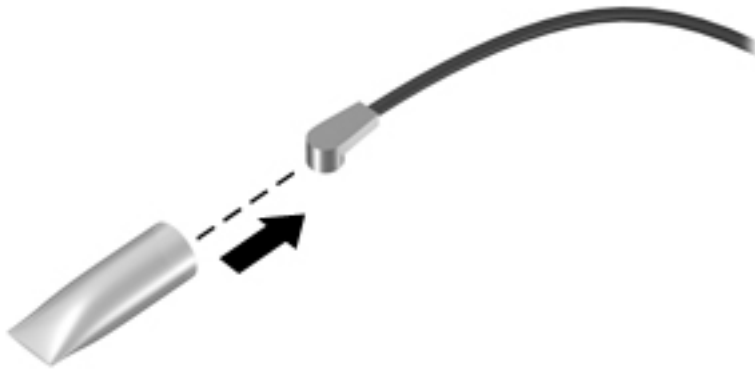
Reverse this procedure to install the WLAN module.

M.2 solid-state drive

Description	Spare part number
128-GB, SATA-3	L01067-001

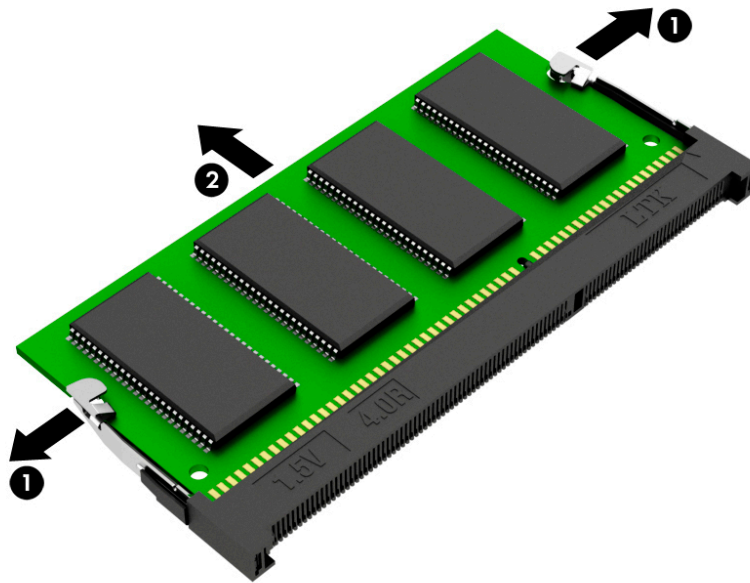Before removing the solid-state drive, follow these steps:

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

2. Place the computer in "Battery Safe mode" ().

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the main service door ().

6. Remove the drive service door ().

Remove the solid-state drive:

1. Remove the Phillips M2.0×4.0 screw **(1)** that secures the solid-state drive to the computer. (The edge of the module opposite the slot rises away from the computer.)

2. Remove the solid-state drive **(2)** by pulling the module away from the slot at an angle.
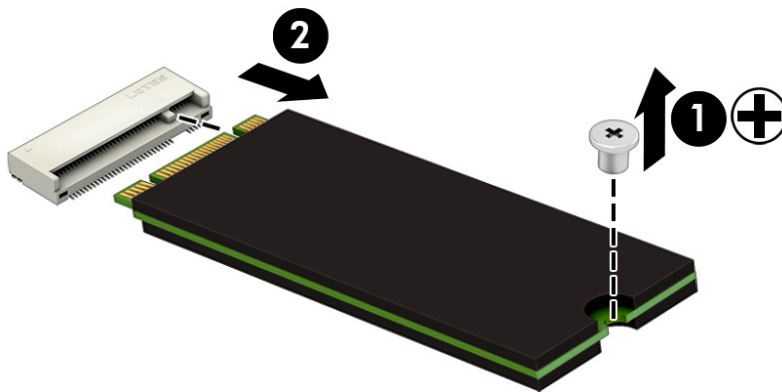
Reverse this procedure to install the solid-state drive.

Keyboard

Description	Spare part number
Keyboard, no backlight	L01072–001
Keyboard, backlit	L01071–001

Before removing the keyboard, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the main service door (Service doors on page 26).

Remove the keyboard:

1. Remove the 2 Phillips M2.5×5.0 screws that secure the keyboard to the computer **(1)**.

2. Insert a tool into the access hole next to the fan in the bottom of the computer and push to disengage the keyboard from the top cover **(2)**.
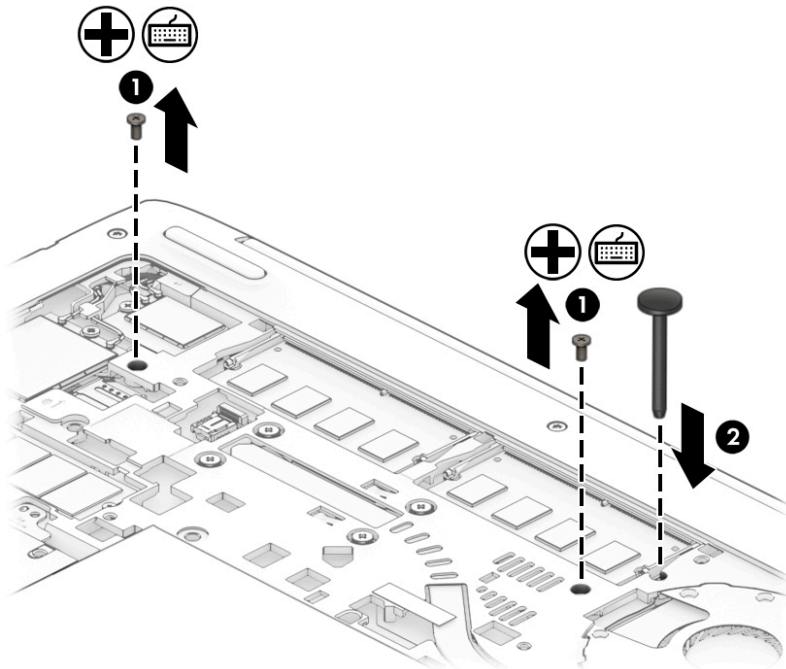
3. Lift the top of the keyboard upward, and then rotate the keyboard until it rests on the palm rest.

📝 **NOTE:** A cable (or cables) connect the bottom of the keyboard to the system board. Make sure not to prematurely pull the cables out of the system board connector(s).

4. If applicable, disconnect the backlight cable by lifting the ZIF connector latch **(1)**, and then disconnect the cable from the system board **(2)**.

5. Disconnect the keyboard cable by lifting the reverse ZIF connector latch **(3)**, and then disconnect the keyboard cable from the system board **(4)**.

6. Remove the keyboard **(5)**.
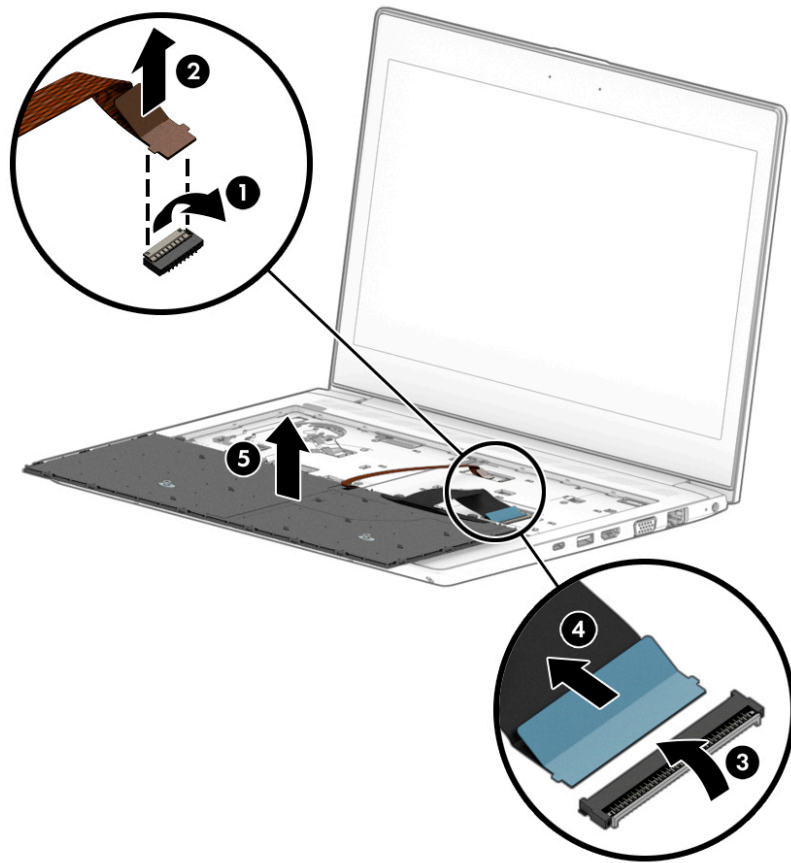
Reverse this procedure to install the keyboard.

6 Removal and replacement procedures for authorized service provider parts

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

Component replacement procedures

📝 **NOTE:** Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See Locating system information on page 13 for details.

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

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

There are as many as 48 screws that must be removed, replaced, or loosened when servicing Authorized Service Provider only parts. Make special note of each screw size and location during removal and replacement.

Top cover

Description	Spare part number
Top cover	L01055-001

Before removing the top cover, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the following components:

    a. Service doors (Service doors on page 26).

    b. Keyboard (Keyboard on page 33)

Remove the top cover:

1. Position the computer upside-down with the front toward you.

2. Remove the 8 Torx T8 2.5×6.0 screws **(1)** from around the edges of the computer.

3. Remove the Phillips broad head M2.0×2.0 screw **(2)** from the hard drive bay.
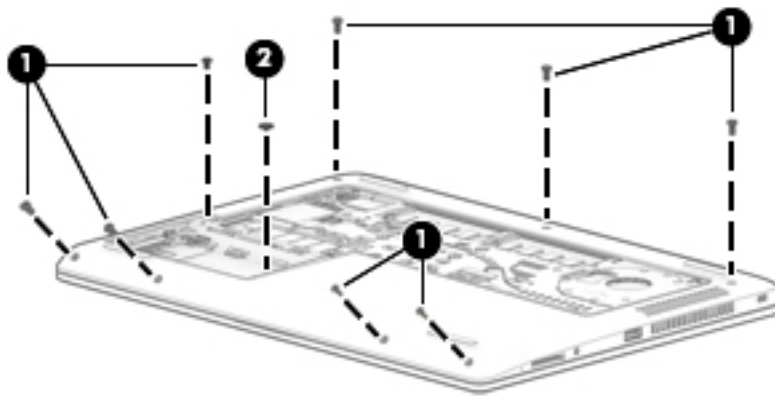
4. Position the computer upright and open it as far as possible.

5. Remove the 6 Torx T8 2.5×5.0 screws from under the keyboard.
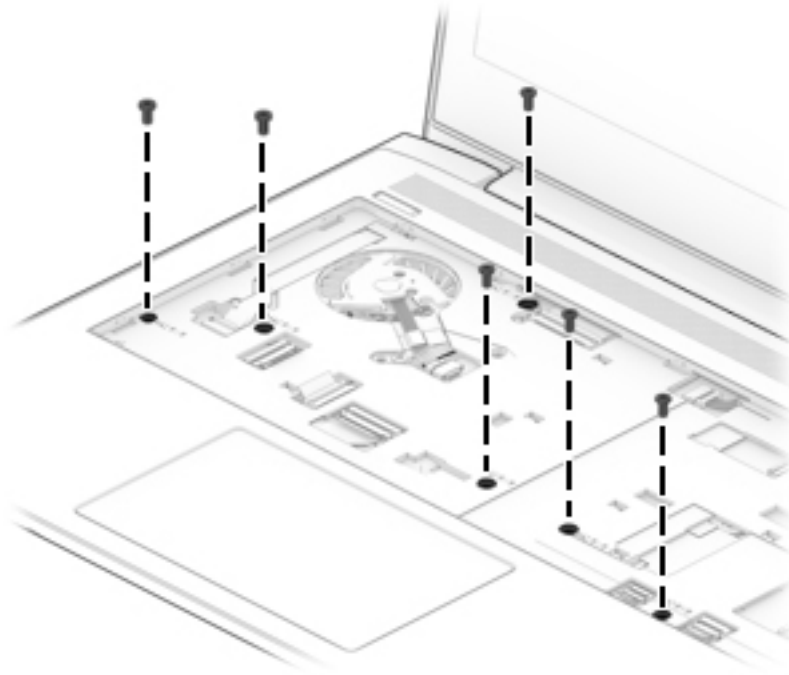
6. Disconnect the following cables from the system board:

(1) Power button board cable

(2) Speaker cable

(3) TouchPad board cable

(4) Fingerprint reader cable (select products only)
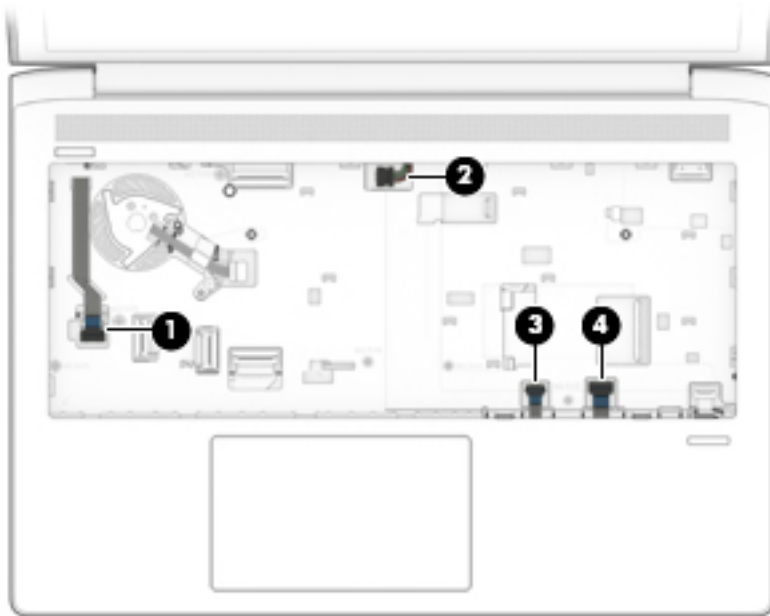
7. To remove the top cover, start prying upward on both sides of the TouchPad **(1)**, and then remove the top cover from the computer **(2)**.

📝 **NOTE:** The top cover may be secured very tightly to the computer.

💡 **TIP:** After disengaging the front of the top cover, the rear near the display may remain connected. If this is the case, lift up on the rear part of the top cover to remove.
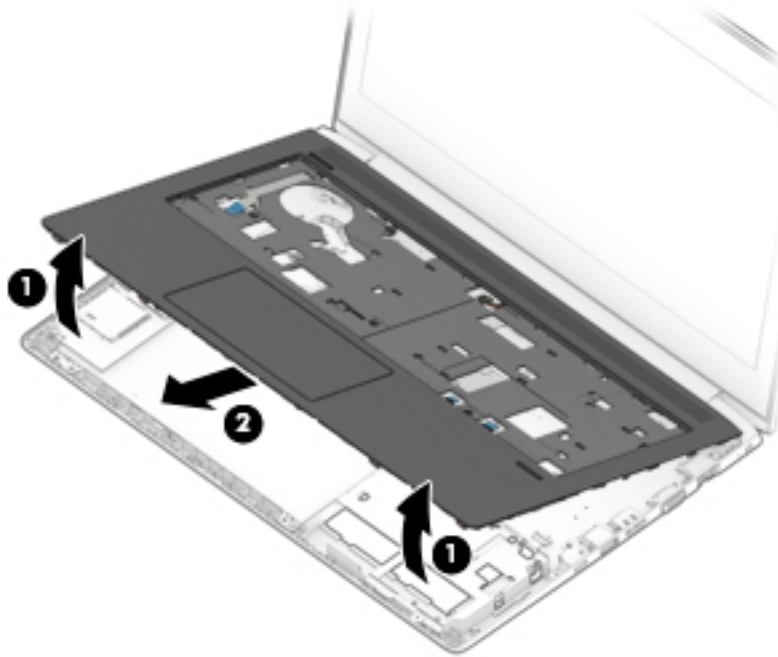
Reverse this procedure to install the top cover.

Fingerprint reader assembly

Description	Spare part number
Fingerprint reader assembly (includes cable)	L01058-001
Fingerprint reader bracket (included in Bracket Kit)	L01051-001
Fingerprint reader insert (included in Plastics Kit; for use in models without a fingerprint reader)	L01050-001

Before removing the fingerprint reader assembly, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the following components:

   a. Service doors (Service doors on page 26).

   b. Keyboard (Keyboard on page 33)

   c. Top cover (Top cover on page 37)

Remove the fingerprint reader assembly:

1. Position the top cover upside-down.

2. If necessary, lift the tape from atop the bracket **(1)**.

3. Slide the bracket toward the side of the top cover, and then lift it off the fingerprint reader board **(2)**.

   ☼ **TIP:** A tool may be required to push and disengage the bracket.

4. Lift the fingerprint reader cable **(3)** and board **(4)** to disengage the adhesive that secures them to the top cover, and then remove the board and cable assembly from the top cover.

Reverse this procedure to install the fingerprint reader assembly.

Power button board

Description	Spare part number
Power button board	L01044-001
Power button board cable (included in Cable Kit)	L01047-001

Before removing the power button board, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the following components:

   a. Service doors (Service doors on page 26)

   b. Keyboard (Keyboard on page 33)

   c. Top cover (Top cover on page 37)

Remove the power button board:

1. Position the top cover upside-down.

2. Disconnect the cable from the connector on the board **(1)**.

3. Remove the Phillips M2.0×3.0 screw **(2)** that secures the board to the top cover.

4. Lift the left side of the board **(3)**, and then pull the board to the left **(4)** to remove it from under the tab **(5)**.

5. If you need to replace the cable, note the cable routing path inside of the top cover.

Reverse this procedure to install the power button board.

Speaker assembly

Description	Spare part number
Speaker assembly	L01053-001

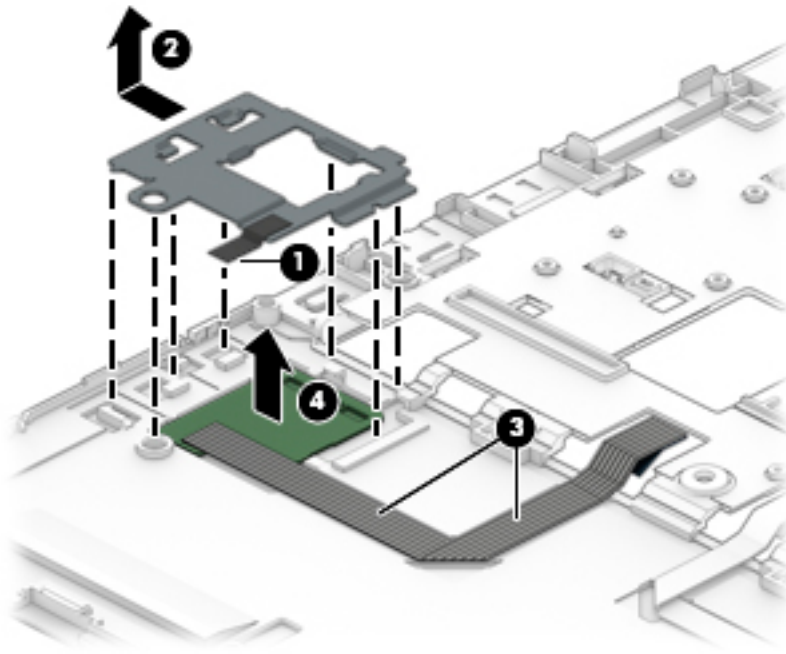Before removing the speaker assembly, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the following components:

    a. Service doors (Service doors on page 26).

    b. Keyboard (Keyboard on page 33)

    c. Top cover (Top cover on page 37)

Remove the speaker assembly:

1. Position the top cover upside-down.

2. Remove the 2 Phillips M2.0×6.0 screws **(1)** that secure the speaker assembly to the top cover.

3. Remove the cable from the clips in the top cover **(2)**.

4. Remove the speakers from the top cover **(3)**.

IMPORTANT: When removing the speakers, make sure the rubber feet **(4)** and rubber screw gaskets **(5)** remain attached to the speakers. These parts must be installed with the speakers.

Reverse this procedure to install the speaker assembly.

TouchPad assembly

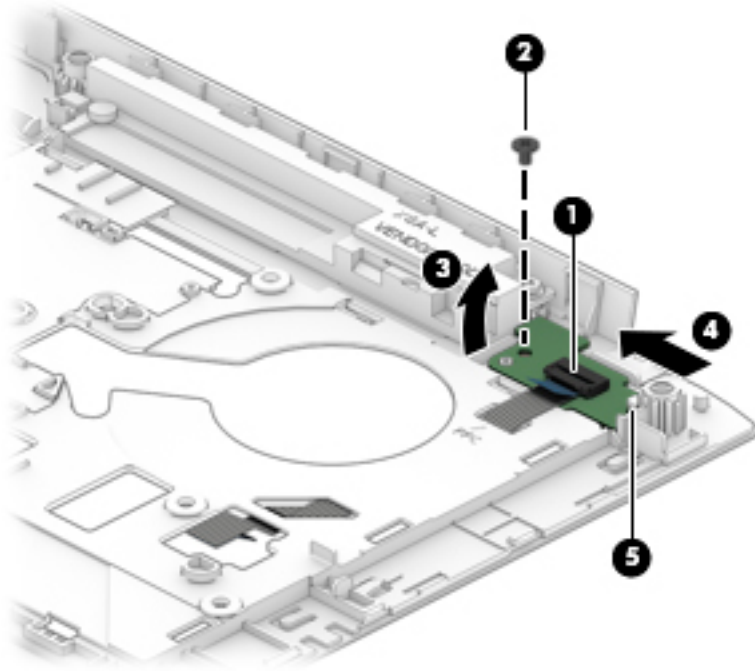| Description	Spare part number
TouchPad assembly	L01056-001
TouchPad assembly cable (included in Cable Kit)	L01047-001

Before removing the TouchPad assembly, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the following components:

    a. Service doors (Service doors on page 26).

    b. Keyboard (Keyboard on page 33)

    c. Top cover (Top cover on page 37)

Remove the TouchPad assembly:

1. Position the top cover upside-down.

2. Disconnect the cable from the ZIF connector on the TouchPad **(1)**.

3. Lift the cable to remove it from the adhesive that secures it to the top cover **(2)**.

4. Remove the 6 broad head Phillips M2.0×2.0 screws **(3)** that secure the TouchPad to the top cover.

5. Lift the TouchPad off the top cover **(4)**.

Reverse this procedure to install the TouchPad assembly.

Card reader board

Description	Spare part number
Card reader board assembly	L01045-001
Card reader board cable (included in Cable Kit)	L01047-001

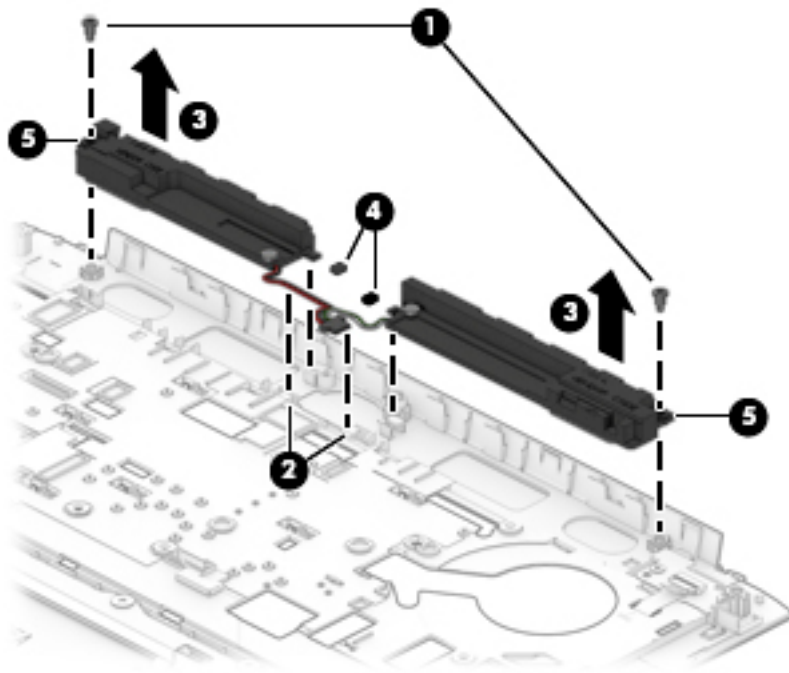Before removing the card reader board, follow these steps:

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

2. Place the computer in "Battery Safe mode" ().

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the following components:

    a. Service doors ()

    b. Keyboard ()

    c. Top cover ()

Remove the card reader board:

1. Position the computer upright on a flat surface and open the display as far as possible.

2. Disconnect the cable from the system board ZIF connector **(1)**.

3. Remove the 2 Torx T8 2.5×4.0 screws **(2)** that secure the board to the computer.

4. Lift the board out of the computer **(3)**.
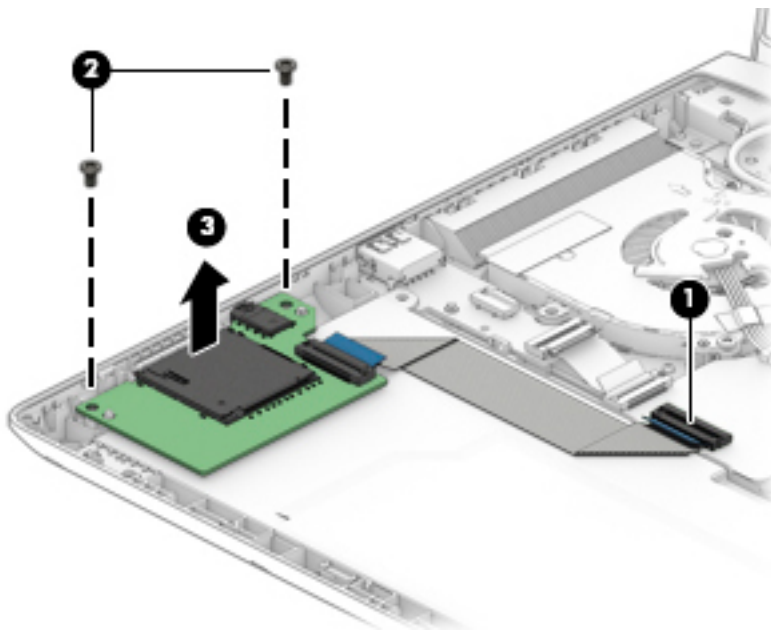
Reverse this procedure to install the card reader board.

Fan

Description	Spare part number
Fan	L01054-001

NOTE: To properly ventilate the computer, allow at least **7.6 cm** (3.0 in) of clearance on the sides of the computer. The computer uses an electric fan for ventilation. The fan is controlled by a temperature sensor and is designed to turn on automatically when high temperature conditions exist. These conditions are affected by high external temperatures, system power consumption, power management/battery conservation configurations, battery fast charging, and software requirements. Exhaust air is displaced through the ventilation grill.
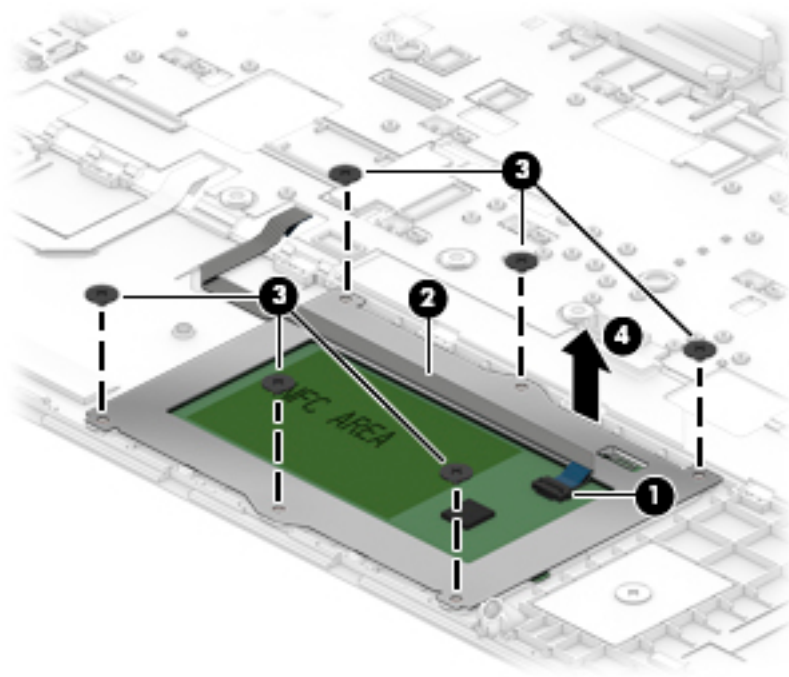
Before removing the fan, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet and then unplugging the AC adapter from the computer.

5. Remove the battery (Battery on page 52), and then remove the following components:

   a. Service doors (Service doors on page 26).

   b. Keyboard (Keyboard on page 33).

   c. Top cover (Top cover on page 37).

To remove the fan:

1. Position the computer upright on a flat surface and open the display as far as possible.

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

3. Remove the display cable from atop the screw **(2)**.

4. Lift the fan out of the computer **(3)**.

Reverse this procedure to install the fan.

RTC battery

Description	Spare part number
RTC battery	746439-001

Before removing the RTC battery, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the following components:

    a. Service doors (Service doors on page 26).

    b. Keyboard (Keyboard on page 33)

    c. Top cover (Top cover on page 37)

Remove the RTC battery:

1. Position the computer upright on a flat surface and open the display as far as possible.

2. Use a tool to pry the battery out of the socket.

Reverse this procedure to install the RTC battery.

Battery

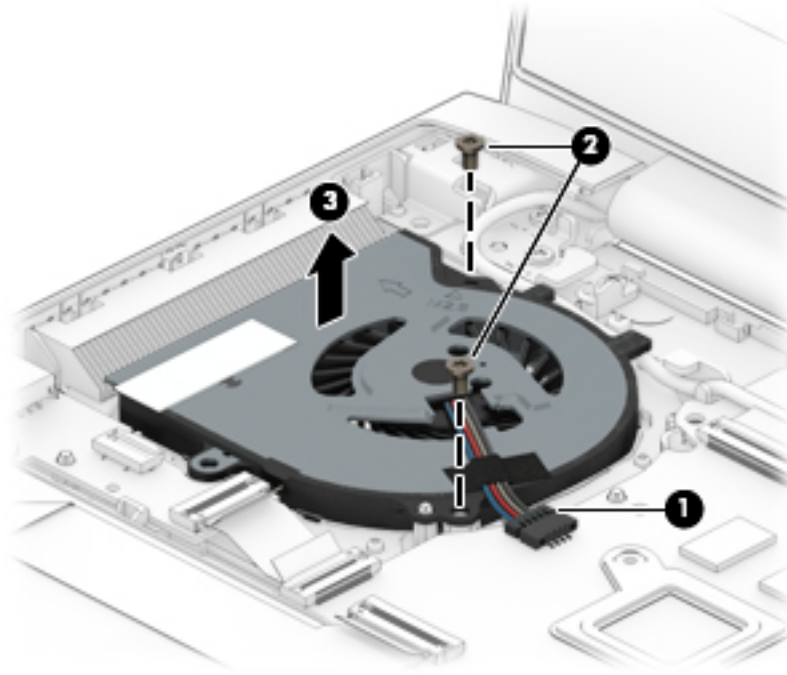| Description	Spare part number
Battery, 4-cell, 48 WHr, 4.21 Ah	851610-855

Before removing the battery, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the following components:

    a. Service doors (Service doors on page 26).

    b. Keyboard (Keyboard on page 33)

    c. Top cover (Top cover on page 37)

    d. Card reader board (Card reader board on page 48)

To remove the battery:

1. Position the computer upright on a flat surface and open the display as far as possible.

2. Remove the Torx T8 2.5×5.0 screw **(1)** that secures the battery to the computer.

3. Lift the battery out of the computer **(2)**.
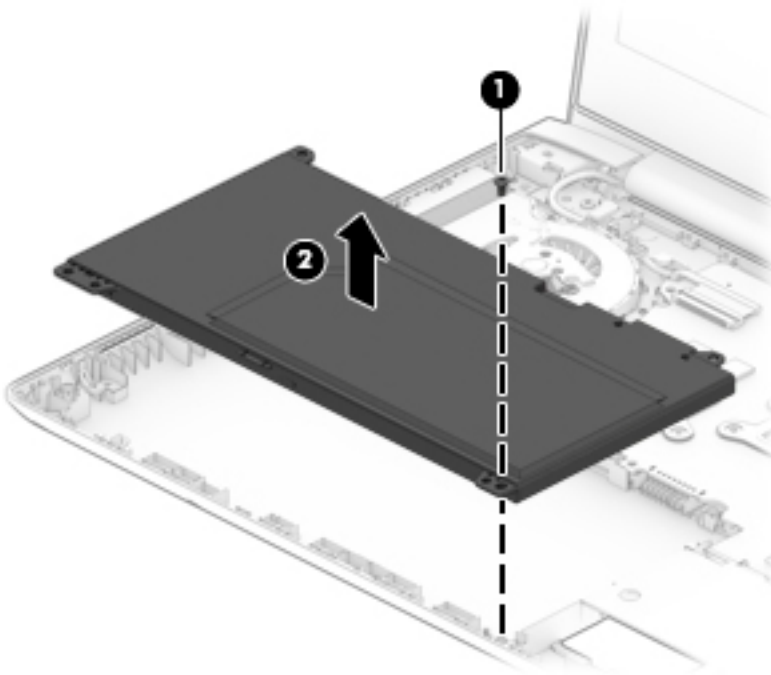
Reverse this procedure to install the battery.

USB board

Description	Spare part number
USB board	L01043–001
USB board cable (included in Cable Kit)	L01047–001

Before removing the USB board, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the following components:

   a. Service doors (Service doors on page 26).

   b. Keyboard (Keyboard on page 33)

   c. Top cover (Top cover on page 37)

   d. Card reader board (Card reader board on page 48)

   e. Battery (Battery on page 52)

Remove the USB board:

1. Position the computer upright on a flat surface and open the display as far as possible.

2. Disconnect the cable from the ZIF connector on the USB board **(1)**.

3. Use a tool to pry the side of the board near the fan upward **(2)**, and then pull the board away from the tab that secures it **(3)**.

4. Remove the USB board from the computer **(4)**.

Reverse this procedure to install the USB board.

System board

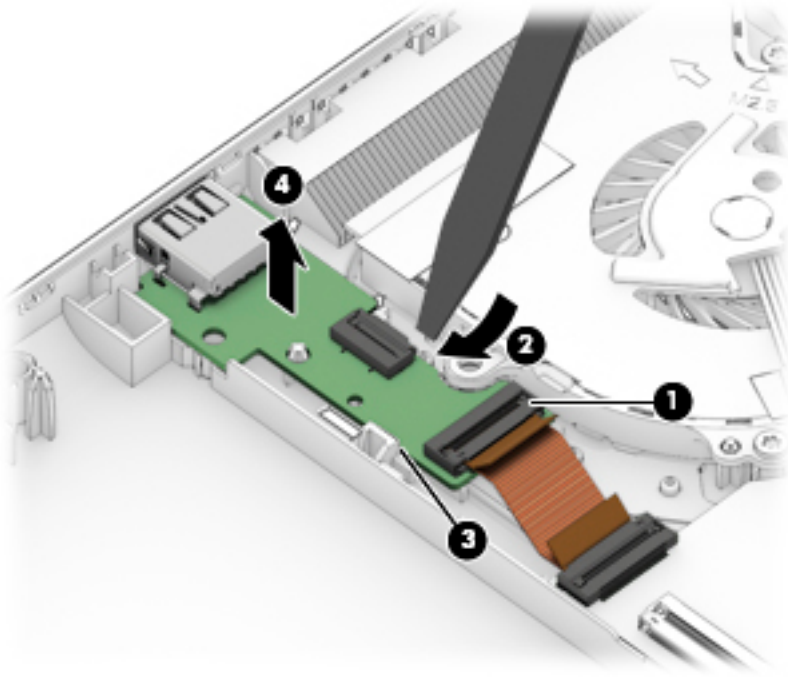| Description	Spare part number
System board with processor:	
<mark>Intel Celeron 3867U processor</mark>	<mark>L68816-301</mark>

Before removing the system board, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the following components:

   a. Service doors (Service doors on page 26).

   b. Keyboard (Keyboard on page 33)

   c. Top cover (Top cover on page 37)

   d. Card reader board (Card reader board on page 48)

   e. Battery (Battery on page 52)

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

- Memory modules (Memory modules on page 28)

- WLAN/Bluetooth module (WLAN/Bluetooth combo card on page 30)

- M.2 solid-state drive (M.2 solid-state drive on page 32)

Remove the system board:

1. Position the computer upright on a flat surface and open the display as far as possible.

2. Disconnect the following cables from the system board:

(1): Display cable

(2): Power connector cable

(3): Hard drive connector cable (ZIF)
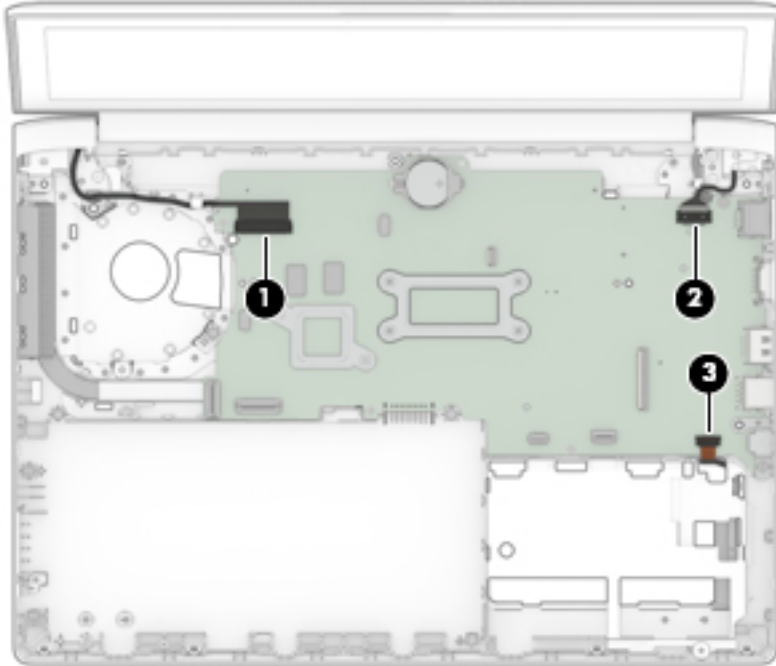
3. Remove the 2 Torx T8 2.5×4.0 screws **(1)** that secure the system board to the computer.

4. Lift the bracket from atop the USB–Type C port **(2)**.

   The USB bracket is available using spare part number L01051-001.

5. Rotate the left side of the system board upward **(3)**.

6. Pull the system board away from the connectors on the side of the chassis to remove it from the computer **(4)**.
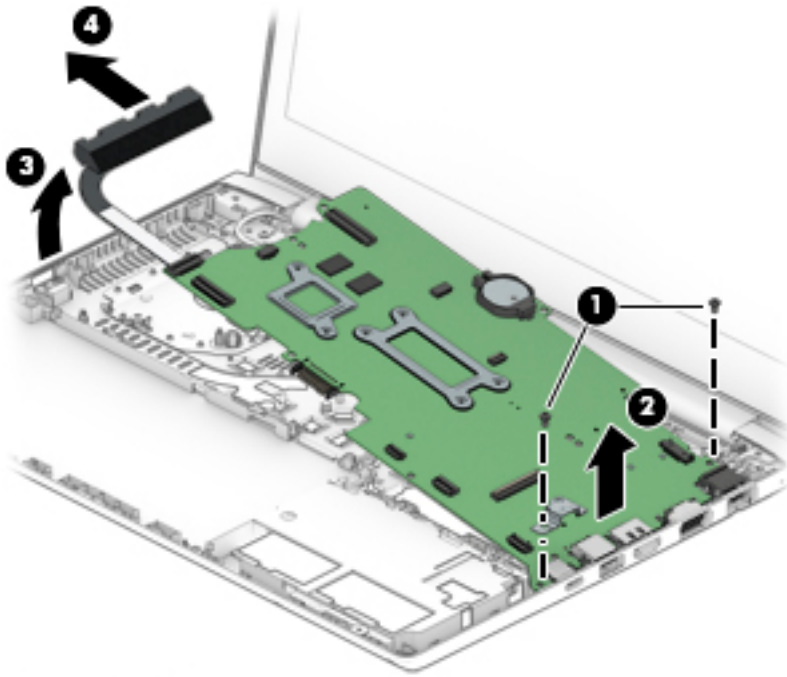
Reverse this procedure to install the system board.

Heat sink

All heat sink spare part kits include replacement thermal material.

Description	Spare part number
Heat sink	L01052-001

Before removing the heat sink, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the following components:

   a. Service doors (Service doors on page 26).

   b. Keyboard (Keyboard on page 33)

   c. Top cover (Top cover on page 37)

   d. Card reader board (Card reader board on page 48)

   e. Battery (Battery on page 52)

   f. System board (System board on page 55)

Remove the heat sink:

1. Position the system board upside-down.

2. In the order indicated on the heat sink, loosen the 4 captive Phillips screws **(1)** that secure the heat sink to the system board.

3. Lift the heat sink from the system board **(2)**.

> 📝 **NOTE:** Thoroughly clean thermal material from the surfaces of the system board component **(1)** and the heat sink **(2)** each time you remove the heat sink. All heat sink and processor spare part kits include thermal material.
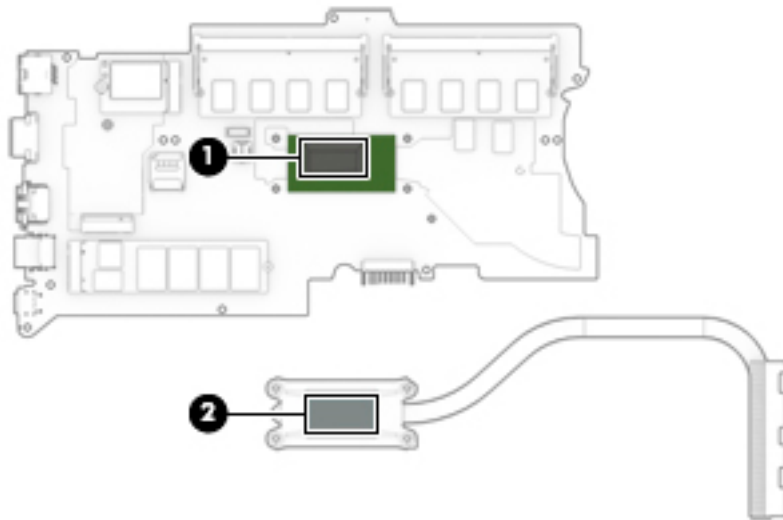
Reverse this procedure to install the heat sink.

Display assembly

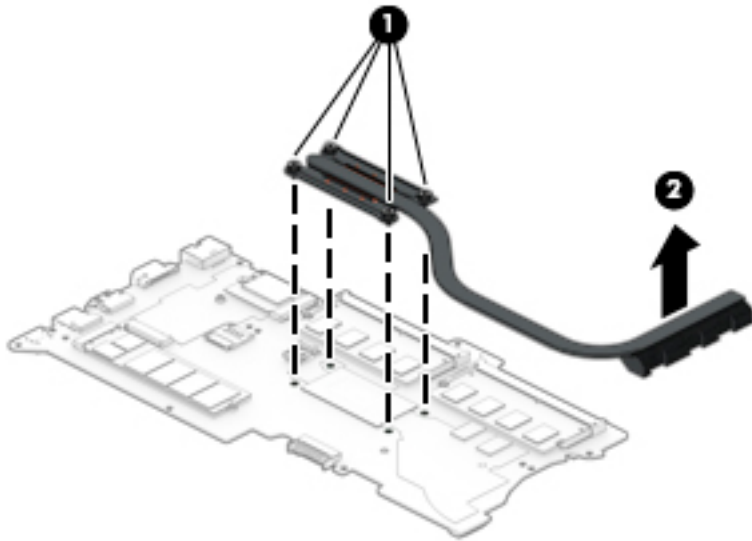| Description	Spare part number
Display panel	L44592-001

Before disassembling the display assembly, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the following components:

   a. Service doors (Service doors on page 26).

   b. Keyboard (Keyboard on page 33)

   c. Top cover (Top cover on page 37)

Disassemble the display assembly:

1. Position the computer upright on a flat surface and open the display as far as possible.

2. Flex the top **(1)** of the bezel, the inside edges of the left and right sides **(2)**, and then the right side of the bottom **(3)** and the left side of the bottom **(4)** of the bezel until it disengages from the display enclosure.

☼ **TIP:** The bottom, inside of the bezel is secured to the display enclosure with double-sided adhesive. When removing the bezel, be sure to remove the tape from the bezel so that it remains connected to the display.

3. Remove the display bezel **(5)**.
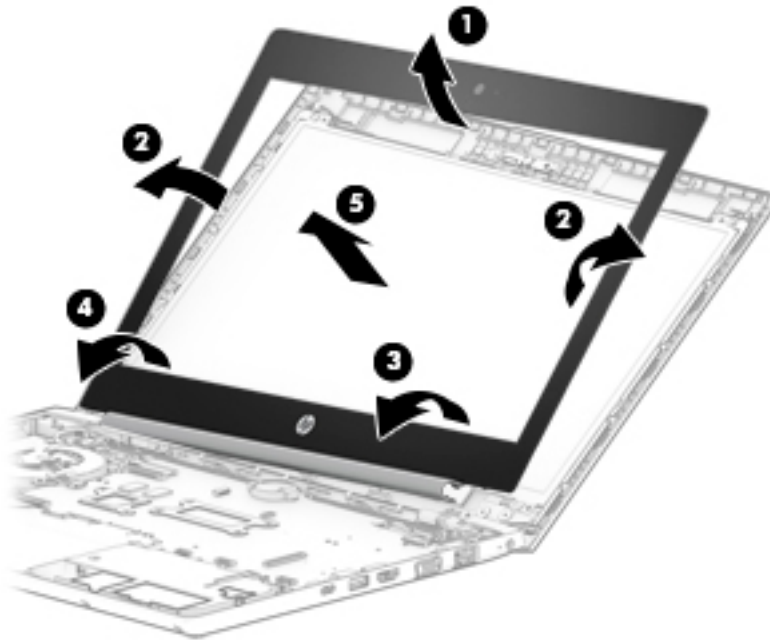
4. If it is necessary to remove or replace the display panel, remove the 4 Phillips M2.0×2.0 screws **(1)** that secure the display panel to the enclosure.

5. Rotate the display panel onto the keyboard **(2)** to gain access to the display cable connector on the back of the panel.
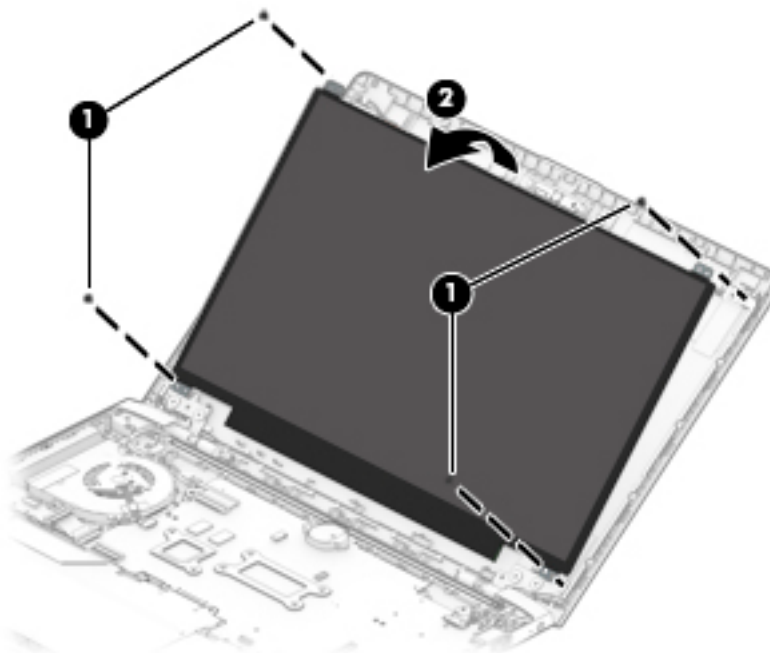
6. Lift the tape from atop the connector on the display panel **(1)**, lift the connector latch **(2)**, and then disconnect the cable from the panel **(3)**.

7. Remove the panel **(4)**.
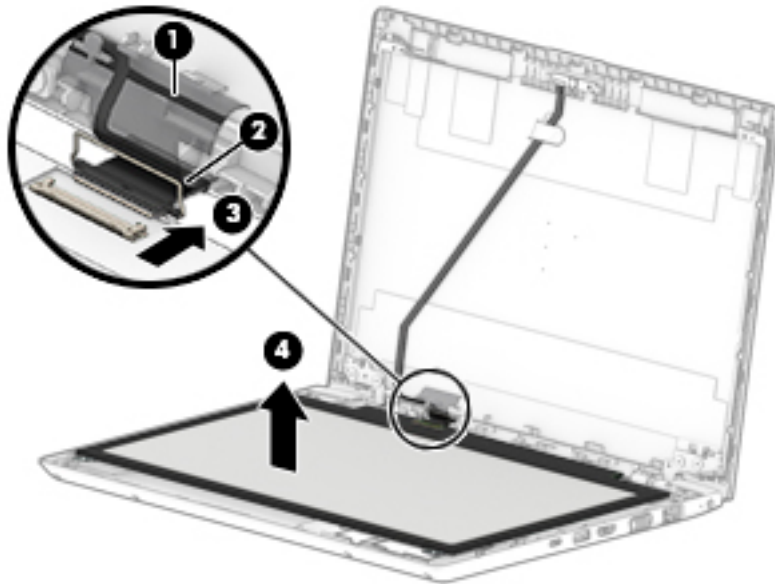
8. To remove the display enclosure, remove the 4 Phillips broad head M2.5×2.5 screws **(1)** from the bottom of the display hinges and the 2 Phillips M2.0×2.0 screws **(2)** from the inside of the display hinges.
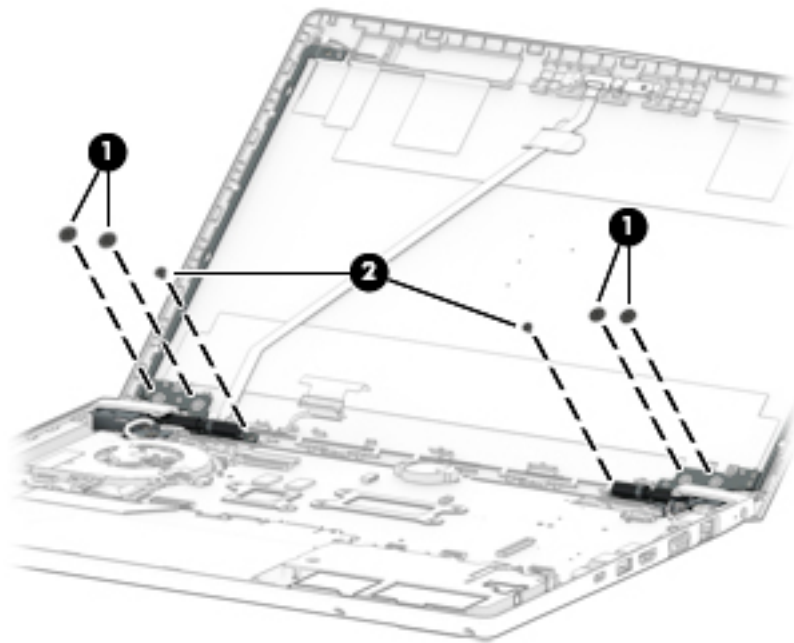
9. Separate the display enclosure from the hinges.
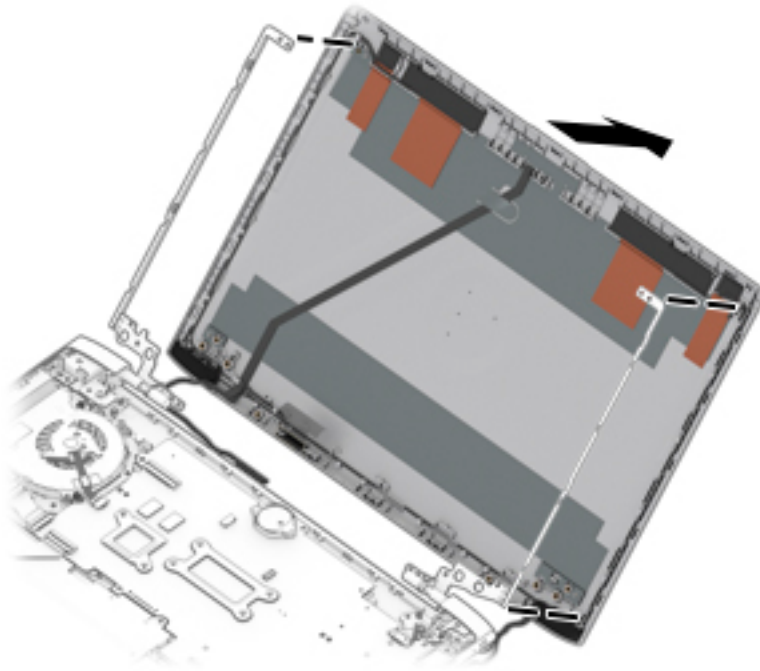
10. To remove the display hinges and brackets, remove the 4 Torx T8 2.5×4.0 screws **(1)** that secure the hinges to the computer, and then slide the hinges toward each other to remove them **(2)**.
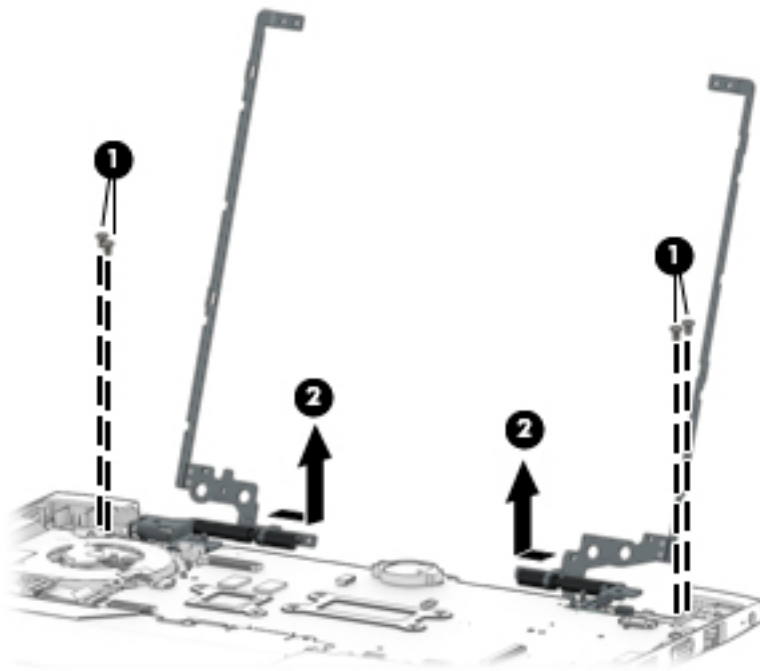
11. If it is necessary to replace the WWAN antennas, peel the antennas from the display enclosure **(1)**, remove the cables from the clips in the sides of the enclosure **(2)**, and then lift the cables and antennas from the enclosure **(3)**.
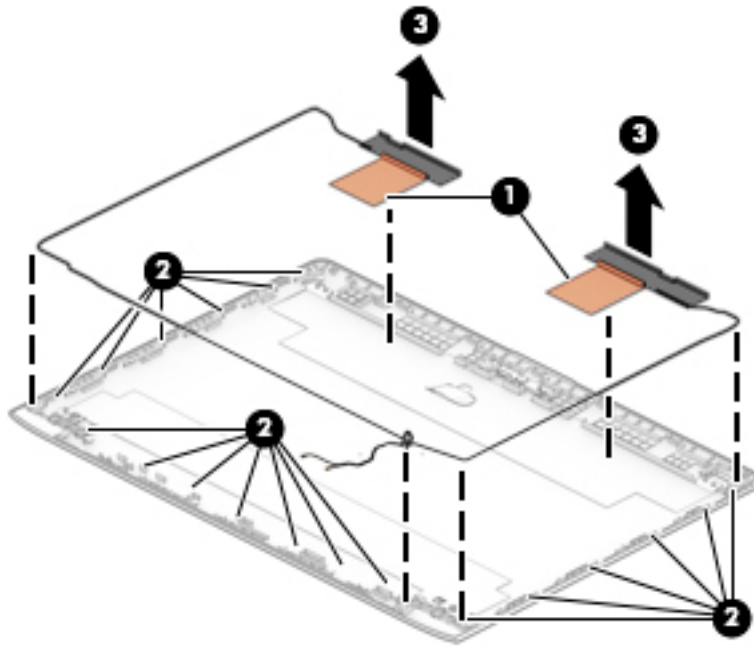
12. If it is necessary to replace the WLAN antennas, peel the antennas from the display enclosure **(1)**, remove the cables from the clips in the sides of the enclosure **(2)**, and then lift the cables and antennas from the enclosure **(3)**.
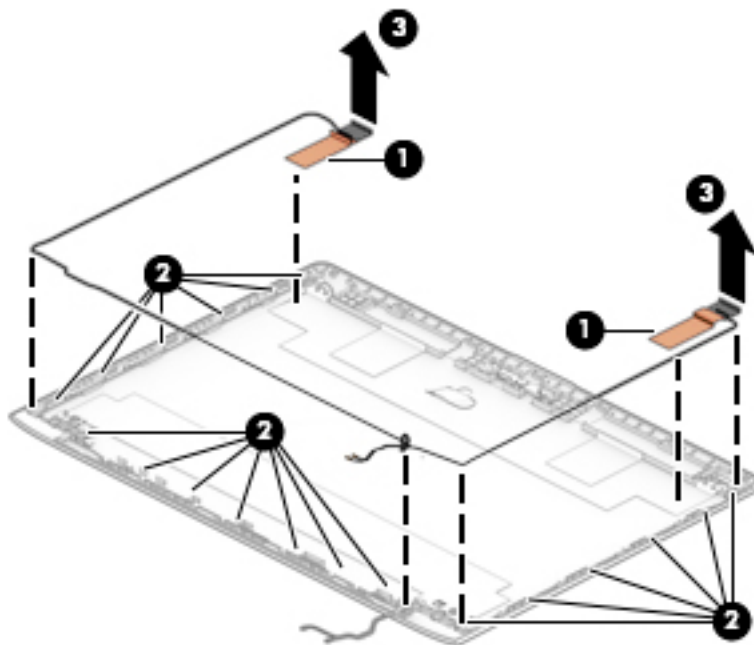
13. If it is necessary to remove or replace the IR camera, disconnect the cable from both sides of the camera **(1)**, and then peel the camera module up to remove it from the adhesive that secures it to the enclosure **(2)** .
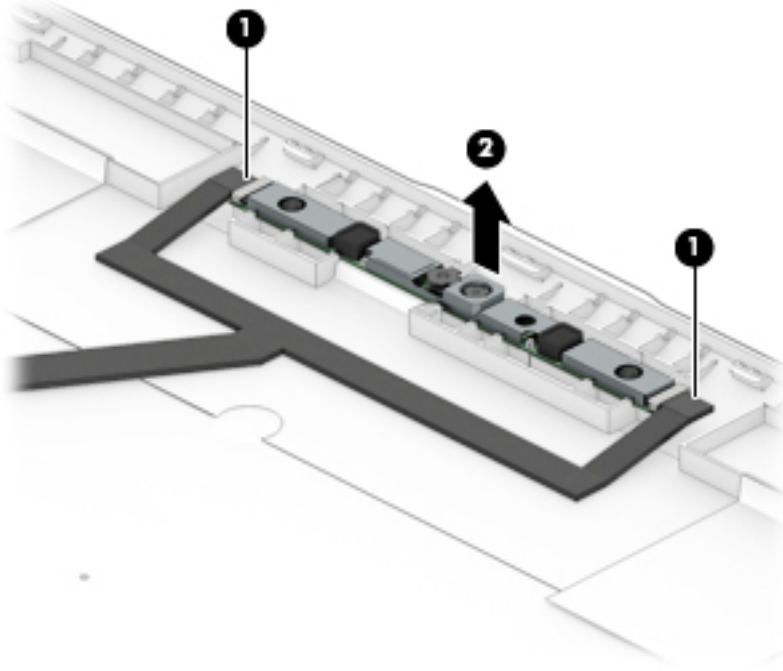
14. If it is necessary to remove or replace the HD camera, disconnect the cable from the camera **(1)**, and then peel the camera module up to remove it from the adhesive that secures it to the enclosure **(2)** .
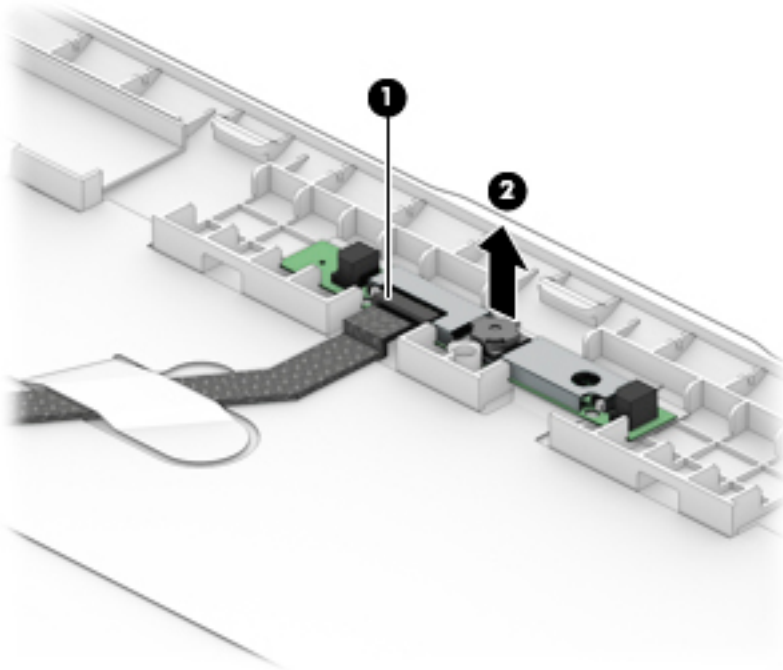
15. If it is necessary to remove or replace the IR display/camera cable, lift the cable from under the tab that secures it to the enclosure **(1)**, and then remove the cable from the display enclosure **(2)**.
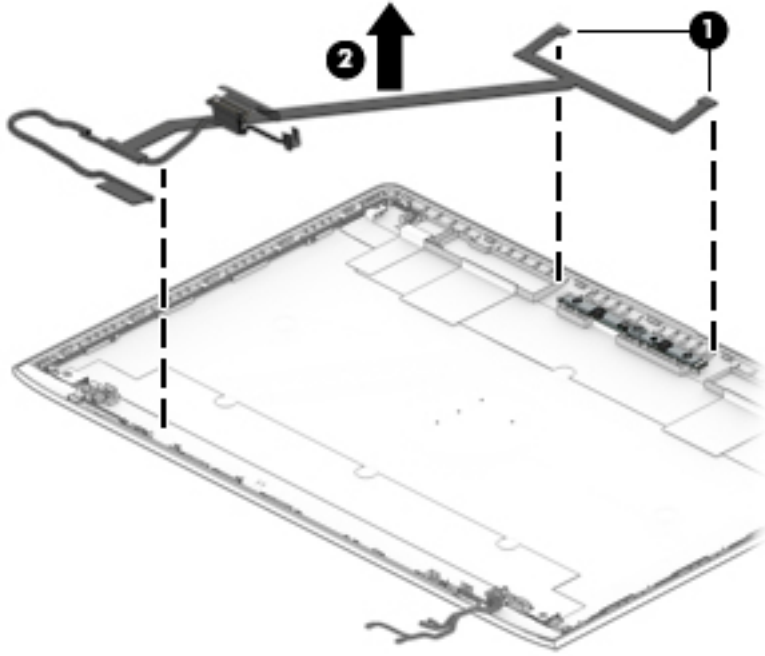
16. If it is necessary to remove or replace the HD display/camera cable, remove the cable from under the tab that secures it to the enclosure **(1)**, and then remove the cable from the display enclosure **(2)**.
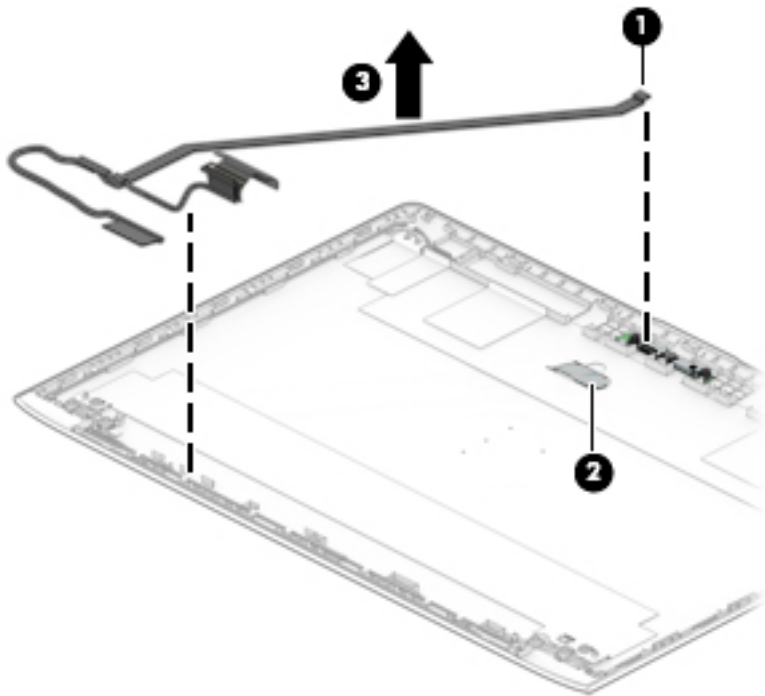
Reverse this procedure to reassemble the touch display assembly.

Power cable

Description	Spare part number
Power cable	L01048-001

Before removing the power cable, follow these steps:

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

2. Place the computer in "Battery Safe mode" (Battery Safe mode on page 25).

3. Disconnect all external devices connected to the computer.

4. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.

5. Remove the following components:

   a. Service door (Service doors on page 26).

   b. Keyboard (Keyboard on page 33)

   c. Top cover (Top cover on page 37)

   d. Card reader board (Card reader board on page 48)

   e. Battery (Battery on page 52)

   f. Display assembly right hinge Display assembly on page 60)

Remove the power cable:

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

2. Remove the power cable from the computer **(2)**.
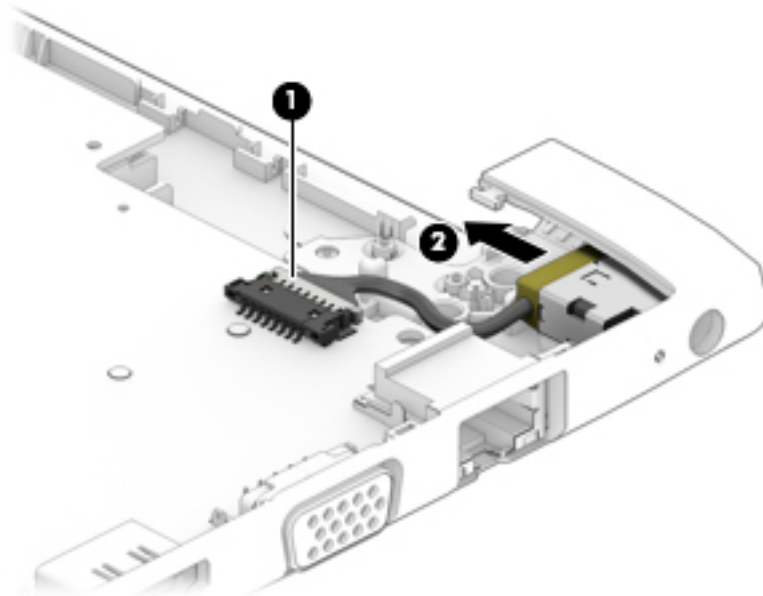
Reverse this procedure to install the power cable.

7 Computer Setup (BIOS), TPM, and HP Sure Start

Using Computer Setup

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

NOTE: Use extreme care when making changes in Computer Setup. Errors can prevent the computer from operating properly.

Starting Computer Setup

▲ Turn on or restart the computer, and when the HP logo appears, press f10 to enter Computer Setup.

Navigating and selecting in Computer Setup

- To select a menu or a menu item, use the tab key and the keyboard arrow keys and then press enter, or use a pointing device to select the item.

- To scroll up and down, select the up arrow or the down arrow in the upper-right corner of the screen, or use the up arrow key or the down arrow key on the keyboard.

- To close open dialog boxes and return to the main Computer Setup screen, press esc, and then follow the on-screen instructions.

To exit Computer Setup, choose one of the following methods:

- To exit Computer Setup menus without saving your changes, select **Main**, select **Ignore Changes and Exit**, and then select **Yes**.

  NOTE: If you are using arrow keys to highlight your choice, you must then press enter.

- To save your changes and exit Computer Setup menus, select **Main**, select **Save Changes and Exit**, and then select **Yes**.

  NOTE: If you are using arrow keys to highlight your choice, you must then press enter.

Your changes go into effect when the computer restarts.

Restoring factory settings in Computer Setup

NOTE: Restoring defaults will not change the hard drive mode.

To return all settings in Computer Setup to the values that were set at the factory, follow these steps:

1. Start Computer Setup. See .

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

   NOTE: If you are using arrow keys to highlight your choice, you must then press enter.

NOTE: On select products, the selections may display **Restore Defaults** instead of **Apply Factory Defaults and Exit**.

Your changes go into effect when the computer restarts.

NOTE: Your password settings and security settings are not changed when you restore the factory settings.

Updating the BIOS

Updated versions of the BIOS may be available on the HP website.

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

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

Determining the BIOS version

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

BIOS version information (also known as *ROM date* and *System BIOS*) can be accessed by pressing fn+esc (if you are already in Windows) or by using Computer Setup.

1. Start Computer Setup. See .

2. Select **Main**, and then select **System Information**.

3. To exit Computer Setup menus without saving your changes, select **Main**, select **Ignore Changes and Exit**, and then select **Yes**.

    NOTE: If you are using arrow keys to highlight your choice, you must then press enter.

To check for later BIOS versions, see .

Downloading a BIOS update

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

Do not disconnect power on the computer by unplugging the power cord from the AC outlet.

Do not shut down the computer or initiate Sleep.

Do not insert, remove, connect, or disconnect any device, cable, or cord.

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

    – or –

    Select the question mark icon in the taskbar.

2. Select **Updates**, and then select **Check for updates and messages**.

3. Follow the on-screen instructions.

4. At the download area, follow these steps:

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

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

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

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

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

1. Type file in the taskbar search box, and then select **File Explorer**.

2. Select your hard drive designation. The hard drive designation is typically Local Disk (C:).

3. Using the hard drive path you recorded earlier, open the folder that contains the update.

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

   The BIOS installation begins.

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

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

Changing the boot order using the f9 prompt

To dynamically choose a boot device for the current startup sequence, follow these steps:

1. Access the Boot Device Options menu:

   ● Turn on or restart the computer, and when the HP logo appears, press f9 to enter the Boot Device Options menu.

2. Select a boot device, press enter, and then follow the on-screen instructions.

TPM BIOS settings (select products only)

IMPORTANT: Before enabling Trusted Platform Module (TPM) functionality on this system, you must ensure that your intended use of TPM complies with relevant local laws, regulations and policies, and approvals or licenses must be obtained if applicable. For any compliance issues arising from your operation/usage of TPM which violates the above mentioned requirement, you shall bear all the liabilities wholly and solely. HP will not be responsible for any related liabilities.

TPM provides additional security for your computer. You can modify the TPM settings in Computer Setup (BIOS).

NOTE: If you change the TPM setting to Hidden, TPM is not visible in the operating system.

To access TPM settings in Computer Setup:

1. Start Computer Setup. See Starting Computer Setup on page 68.

2. Select **Security**, select **TPM Embedded Security**, and then follow the on-screen instructions.

Using HP Sure Start (select products only)

Select computer models are configured with HP Sure Start, a technology that monitors the computer's BIOS for attacks or corruption. If the BIOS becomes corrupted or is attacked, HP Sure Start automatically restores the BIOS to its previously safe state, without user intervention.

HP Sure Start is configured and already enabled so that most users can use the HP Sure Start default configuration. The default configuration can be customized by advanced users.

To access the latest documentation on HP Sure Start, go to http://www.hp.com/support. Select **Find your product**, and then follow the on-screen instructions.

8 Using HP ThinUpdate to restore the image

HP ThinUpdate software is installed on Thin Client computers (select products only) to provide backup and recovery. If it is not installed on your computer, you can download it from http://www.hp.com/support (search for the Thin Client model and click on the **Drivers & software** section of the support page for that model. For information on using this software, refer to the Manuals section).

NOTE: HP recommends periodically going to the website to check for application updates.

Use HP ThinUpdate software for the following processes:

- Creating recovery media and backups

- Restoring and recovering your system

- Installing and updating software

HP ThinUpdate allows you to download images and add-ons from HP, capture an HP thin client image, and create bootable USB flash drives for image deployment.

- The Image Downloads feature lets you download an image from HP to either local storage or a USB flash drive. The USB flash drive option creates a bootable USB flash drive that can be used to deploy the image to other thin clients.

- The Image Capture feature lets you capture an image from an HP thin client and save it to a USB flash drive, which can be used to deploy the image to other thin clients.

- The Add-on Downloads feature lets you download add-ons from HP to either local storage or a USB flash drive.

- The USB Drive Management feature lets you do the following:

  - Create a bootable USB flash drive from an image file on local storage

  - Copy an .ibr image file from a USB flash drive to local storage

  - Restore a USB flash drive layout

You can use a bootable USB flash drive created with HP ThinUpdate to deploy an HP thin client image to another HP thin client of the same model with the same operating system.

System requirements

To create a recovery device for the purpose of reflashing or restoring the software image on the flash, you will need the following:

- One or more HP thin clients.

- USB flash device in the following size or larger:

  - Windows 10 IoT (if using the USB format): 32 GB

NOTE: Optionally, you can use the tool on a Windows computer.

This restore method will not work with all USB flash devices. USB flash devices that do not show up as removable drive in Windows do not support this restore method. USB flash devices with multiple partitions generally do not support this restore method. The range of USB flash devices available on the market is constantly changing. Not all USB flash devices have been tested with the HP Thin Client Imaging Tool.

9 Device management

The thin client includes a license for HP Device Manager and has a Device Manager agent pre-installed. HP Device Manager is a thin client optimized management tool used to manage the full life cycle of HP thin clients to include Discover, Asset Management, Deployment and Configuration. For more information on HP Device Manager, please visit www.hp.com/go/hpdm.

If you wish to manage the thin client with other management tools such as Microsoft SCCM or LANDesk, go to www.hp.com/go/clientmanagement for more information.

10   Using HP PC Hardware Diagnostics

Using HP PC Hardware Diagnostics Windows (select products only)

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

If HP PC Hardware Diagnostics Windows is not installed on your computer, first you must download and install it. To download HP PC Hardware Diagnostics Windows, see Downloading HP PC Hardware Diagnostics Windows on page 74.

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

1. To access HP PC Hardware Diagnostics Windows from HP Help and Support:

    a. Select the **Start** button, and then select **HP Help and Support**.

    b. Right-click **HP PC Hardware Diagnostics Windows**, select **More**, and then select **Run as administrator**.

    – or –

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

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

        – or –

        Select the question mark icon in the taskbar.

    b. Select **Troubleshooting and fixes**.

    c. Select **Diagnostics**, and then select **HP PC Hardware Diagnostics Windows**.

2. When the tool opens, select the type of diagnostic test you want to run, and then follow the on-screen instructions.

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

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

Downloading HP PC Hardware Diagnostics Windows

-   The HP PC Hardware Diagnostics Windows download instructions are provided in English only.

-   You must use a Windows computer to download this tool because only .exe files are provided.

Downloading the latest HP PC Hardware Diagnostics Windows version

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

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.

2. In the **HP PC Hardware Diagnostics** section, select **Download**, and then select a location on your computer or a USB flash drive.

   The tool is downloaded to the selected location.

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

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

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

1. Go to http://www.hp.com/support.

2. Select **Get software and drivers**, select your type of product, and then enter the product name or number in the search box that is displayed.

3. In the **HP PC Hardware Diagnostics** section, select **Download**, and then select a location on your computer or a USB flash drive.

   The tool is downloaded to the selected location.

Installing HP PC Hardware Diagnostics Windows

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

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

Using HP PC Hardware Diagnostics UEFI

📝 **NOTE:** For Windows 10 S computers, you must use a Windows computer and a USB flash drive to download and create the HP UEFI support environment because only .exe files are provided. For more information, see Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive on page 76.

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

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

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

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

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

Starting HP PC Hardware Diagnostics UEFI

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

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

2. Press f2.

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

   a. Connected USB flash drive

      NOTE: To download the HP PC Hardware Diagnostics UEFI tool to a USB flash drive, see Downloading the latest HP PC Hardware Diagnostics UEFI version on page 76.

   b. Hard drive

   c. BIOS

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

Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive

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

- HP PC Hardware Diagnostics UEFI is not included in the preinstall image.

- HP PC Hardware Diagnostics UEFI is not included in the HP Tool partition.

- The hard drive is damaged.

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

Downloading the latest HP PC Hardware Diagnostics UEFI version

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

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.

2. In the **HP PC Hardware Diagnostics UEFI** section, select **Download UEFI Diagnostics**, and then select **Run**.

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

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

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

1. Go to http://www.hp.com/support.

2. Enter the product name or number, select your computer, and then select your operating system.

3. In the **Diagnostics** section, follow the on-screen instructions to select and download the specific UEFI Diagnostics version for your computer.

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

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

Downloading Remote HP PC Hardware Diagnostics UEFI

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

Downloading the latest Remote HP PC Hardware Diagnostics UEFI version

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

1. Go to http://www.hp.com/go/techcenter/pcdiags. The HP PC Diagnostics home page is displayed.

2. In the **HP PC Hardware Diagnostics UEFI** section, select **Download Remote Diagnostics**, and then select **Run**.

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

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

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

1. Go to http://www.hp.com/support.

2. Select **Get software and drivers**, select your type of product, enter the product name or number in the search box that is displayed, select your computer, and then select your operating system.

3. In the **Diagnostics** section, follow the on-screen instructions to select and download the **Remote UEFI** version for the product.

Customizing Remote HP PC Hardware Diagnostics UEFI settings

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

- Set a schedule for running diagnostics unattended. You can also start diagnostics immediately in interactive mode by selecting **Execute Remote HP PC Hardware Diagnostics**.

- Set the location for downloading the diagnostic tools. This feature provides access to the tools from the HP website or from a server that has been preconfigured for use. Your computer does not require the traditional local storage (such as a disk drive or USB flash drive) to run remote diagnostics.

- Set a location for storing the test results. You can also set the user name and password settings used for uploads.

- Display status information about the diagnostics run previously.

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

1. Turn on or restart the computer, and when the HP logo appears, press f10 to enter Computer Setup.

2. Select **Advanced**, and then select **Settings**.

3. Make your customization selections.

4. Select **Main**, and then **Save Changes and Exit** to save your settings.

Your changes take effect when the computer restarts.

11 Specifications

Computer specifications

	Metric	U.S.
Dimensions		
Depth	234.0 mm	9.21 in
Width	326.0 mm	12.83 in
Height (non-touch)	19.8 mm	0.78 in
Height (touch)	21.4 mm	0.84 in
Weight (1 DIMM, WLAN, webcam, no fingerprint reader, no WWAN)		
Non-touch, M.2 SSD	1.49 kg	3.28 lbs
Non-touch, hard drive	1.59 kg	3.50 lbs
Touch, M.2 SSD	1.75 kg	3.85 lbs
Touch, hard drive	1.85 kg	4.07 lbs
Input power		
Operating voltage	19.0 V dc @ 4.74 A – 90 W or 18.5 V dc @ 3.5 A - 65 W	
Operating current	4.74 A or 3.5 A	
Temperature		
Operating (not writing to optical disc)	0°C to 35°C	32°F to 95°F
Operating (writing to optical disc)	5°C to 35°C	41°F to 95°F
Nonoperating	-20°C to 60°C	-4°F to 140°F
Relative humidity		
Operating	10% to 90%	
Nonoperating	5% to 95%	
Maximum altitude (unpressurized)		
Operating (14.7 to 10.1 psia)	–15 m to 3,048 m	50 ft to 10,000 ft
Nonoperating (14.7 to 4.4 psia)	–15 m to 12,192 m	-50 ft to 40,000 ft
Shock		
Operating	125 g, 2 ms, half-sine	
Nonoperating	200 g, 2 ms, half-sine	
Random vibration		
Operating	0.75 g zero-to-peak, 10 Hz to 500 Hz, 0.25 oct/min sweep rate	

	Metric	U.S.
Nonoperating	1.50 g zero-to-peak, 10 Hz to 500 Hz, 0.5 oct/min sweep rate	

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

33.8-cm (13.3-in) display specifications

	Metric	U.S.
Active diagonal size	33.8-cm	13.3-in
Resolution	1366×768 (HD)	
Surface treatment	Anti-glare	
Brightness	220 nits (typical)	
Viewing angle	SVA (HD)	
Width	3.0 mm (HD)	
Backlight	WLED	

Solid-state drive specifications

	128-GB*	256-GB*	512-GB*
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
Transfer rate			
Sequential read	up to 2150 MB/sec	up to 2150 MB/sec	up to 2150 MB/sec
Random read	Up to 300,000 IOPs	Up to 300,000 IOPs	Up to 300,000 IOPs
Sequential write	up to 1260 MB/sec	up to 1550 MB/sec	up to 1550 MB/sec
Random write	Up to 100,000 IOPs	Up to 100,000 IOPs	Up to 100,000 IOPs
Interface type	SATA-3	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
Total logical sectors	234,441,648	468,883,296	1,000,215,216
Operating temperature		0°C to 70°C (32°F to 158°F)	

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

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

12 Power cord set requirements

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

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

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

Requirements for all countries and regions

The following requirements are applicable to all countries and regions:

- The length of the power cord set must be at least **1.5 m** (5.0 ft) and no more than **2.0 m** (6.5 ft).

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

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

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

Requirements for specific countries and regions

Country/region	Accredited agency	Applicable note number
Japan	JIS	1
The United States	UL	2

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

2. The flexible cord must be Type SVT/SJT or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V ac) or NEMA 6-15P (15 A, 250 V ac) configuration. CSA or C-UL mark. UL file number must be on each element.

13 Statement of memory volatility

The purpose of this chapter is to provide general information regarding nonvolatile memory in HP Business computers. This chapter also provides general instructions for restoring nonvolatile memory that can contain personal data after the system has been powered off and the hard drive has been removed.

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, assuming that no subsequent modifications have been made to the system and assuming that no applications, features, or functionality have been 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 will also remain in nonvolatile memory. Use the steps below 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

1. Follow steps (a) through (l) below 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, enter the password at the prompt.

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

      The computer will reboot.

   c. 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, enter 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 will reboot.

   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, enter 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**, then uncheck the checkbox for **DriveLock password on restart**. Select **OK** to proceed.

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

The computer will reboot.

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, enter 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) and/or fingerprint reader, 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:

📝 **IMPORTANT:** If you clear data using Secure Erase, it cannot be recovered.

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

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

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 input into this memory?	How is this memory write-protected?
HP Sure Start flash (select models only)	8 MBytes	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 models only) on page 88.	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 the Computer Setup (BIOS), or changing the Microsoft Windows date & time.	This memory is not write-protected.
Controller (NIC) EEPROM	64 KBytes (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 is required 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 non-functional.
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 MBytes	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 input using the Computer Setup (BIOS) or a custom utility.	**NOTE:** Writing data to this ROM in an inappropriate manner can render the computer non-functional. A utility is required for writing data to this memory and is available on the HP website; go to http://www.hp.com/support. Select **Find your**

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 input into this memory?	How is this memory write-protected?
						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 **Find your product**, and then follow the on-screen instructions.)	1.5 MBytes or 7 MBytes	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 is required for updating the firmware. Only firmware updates digitally signed by Intel can be applied using this utility.
Bluetooth flash (select products only)	2 Mbit	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 is required for writing data to this memory and is made available through newer versions of the driver whenever the flash requires an upgrade.
802.11 WLAN EEPROM	4 Kbit to 8 Kbit	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 is required 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.
Webcam (select products only)	64 Kbit	No	Yes	Stores webcam configuration and firmware.	Webcam memory is programmed using a utility from the device manufacturer that can be run from Windows.	A utility is required 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 KByte 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

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

   IMPORTANT: Restore defaults does not securely erase any data on your hard drive. See question and answer 6 for steps to securely erase data.

   Restore defaults 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 is a replacement for 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 run-time environment that supports a Graphic User Interface (GUI). In this environment, you can use either a pointing device (Touchscreen, 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 run-time 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 does the UEFI BIOS reside?**

   The UEFI BIOS resides on a flash memory chip. A utility is required 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/timing, voltage, and thermal information. This information is written by the module manufacturer and stored on an EEPROM. This EEPROM cannot be written to 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 data erased?**

📝 **IMPORTANT:** Resetting will result in the loss of information.

These steps will 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, simply disabling Secure Boot will not clear the keys. You must also select to clear the Custom Secure Boot Keys. Use the same Secure Boot access procedure you used to create the Custom Secure Boot Keys, but make the selection 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 models 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. The default configuration can be customized by advanced users.

To access the latest documentation on HP Sure Start, go to http://www.hp.com/support. Select **Find your product**, and then follow the on-screen instructions.

14 Recycling

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

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

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