



HP mt42 Mobile Thin Client

Maintenance and Service Guide

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Product notice

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

Software terms

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

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

Important Notice about Customer Self-Repair parts

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

Safety warning notice

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

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1 Product description

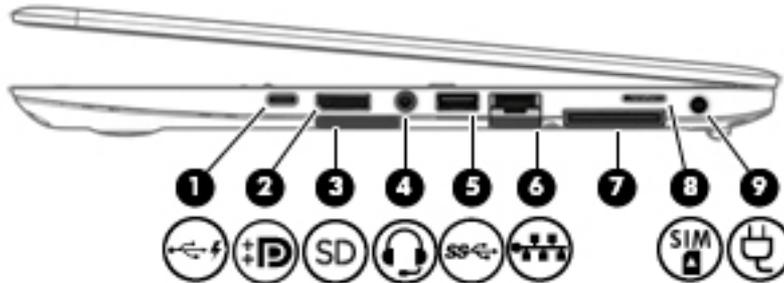
Category	Description
Product Name	HP mt42 Mobile Thin Client
Processors	AMD® Carrizo processor: A8 Pro-8600B 1.6 GHz (max turbo frequency 3 GHz), DDR3-2133, 2 MB L2 Cache, 15 W) with Radeon RX graphics
Graphics	Internal graphics: AMD UMA graphics (with shared video memory) Up to three independent displays supported with docking solution
Panel	35.6-cm (14.0-in), eDP 1.2 slim, full high-definition (FHD), AntiGlare (AG), SVA (1920 x 1080) display
Memory	Two customer accessible memory module slots DDR3L-12800 (1600 MHz) dual channel support Supports up to 4 GB of system RAM (4096 MB (4096 MB×1)) with the WES7 operating system Supports up to 8 GB of system RAM (4096 MB (4096 MB×2)) with the Windows 10 IoT operating system
Primary storage	M.2 (NGFF) 2242 solid-state drive M.2 (2242) 32 GB SATA-3
Audio and video	Conexant smart amplifier and ambient noise suppression Dual-array microphone Premium stereo speakers Webcam (720p)
Ethernet	Broadcom 5762 10/100/1000 Ethernet NIC with DASH Support S3/S4/S5 Wake-on-LAN
Wireless	WLAN Integrated wireless local area network (WLAN) options by way of wireless module Two WLAN antennas built into display assembly Supports disabled Bluetooth Intel Pro Wireless Display (WiDi Pro) Compatible with Miracast-certified devices Supports the following WLAN modules: <ul style="list-style-type: none">• Broadcom 43228 dual-band 802.11abgn 2x2 Wi-Fi Adapter + BT 4.0 combo adapter• Intel 7265 802.11 AC 2x2 WiFi + BT 4.2 Combo Adapter (non-vPro) WWAN Integrated wireless wide area network (WWAN) options by way of wireless module Two WWAN antennas built into display assembly

Category	Description
	<p>Supports the following WWAN module:</p> <ul style="list-style-type: none"> • Huawei MU736 HSPA+ with GPS M.2 (NGFF) • HP lt4120 LTE/EVDO/HSPA+ SnapdragonT X5 LTE Mobile Broadband Module
External media cards	<p>Micro SIM card reader</p> <p>Memory card reader (SD, SDHC, SDXC)</p>
Ports	<p>VGA (Dsub 15 pin) supporting 1920x1200 external resolution @ 75Hz; hot plug/unplug and auto detect</p> <p>USB 3.0 charging port</p> <p>USB 3.0 port</p> <p>USB Type-C port</p> <p>DisplayPort</p> <p>RJ-45</p> <p>Docking connector</p> <p>Audio-out (headphone)/audio-in (microphone) combo jack</p> <p>AC port</p>
Keyboard/pointing devices	<p>Keyboard:</p> <p>Dual point</p> <p>Spill resistant with drain</p> <hr/> <p>TouchPad:</p> <p>Gestures enabled by default: two-finger scrolling, two-finger pinch-zoom</p> <p>Taps enabled by default</p> <p>On/off button</p> <p>Supports 2-way scroll w/ legend</p> <p>Mylar</p>
Power requirements	<p>AC adapter:</p> <p>65 W HP Smart AC adapter</p> <p>45 W HP Smart AC adapter</p> <p>45 W, 2-prong AC adapter</p> <p>Power cord:</p> <p>2-wire cord, 1.0 m</p> <p>3-wire cord, 1.0 m (with ground pin)</p> <p>3-wire cord, 1.8 m (with ground pin)</p>
Security	<p>Security lock</p> <p>Supports Trusted Platform Module (TPM) 1.2 or 2.0 (Infineon, soldered down)</p> <p>Integrated Smart Card reader (active)</p> <p>Preboot authentication (password, smart card)</p>
Operating system	Preinstalled:

Category	Description
	Windows Embedded Standard 7E (32-bit)
	Windows 10 IoT Enterprise 2015 LTSB for Retail and Thin Clients
	Web-only support
	Windows Embedded Standard 7E (32-bit)
Serviceability	End user replaceable parts:
	AC adapter
	Battery
	M.2 SSD
	Memory module
	WLAN
	WWAN
	Keyboard

2 External component identification

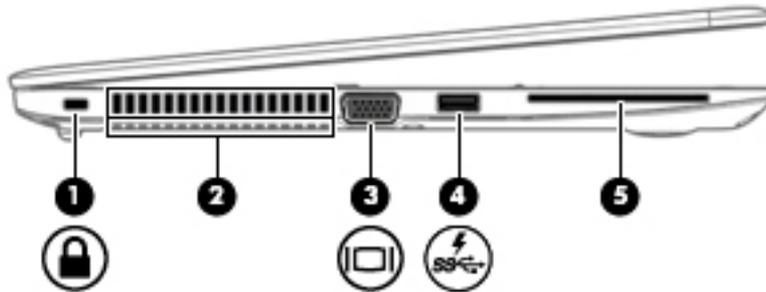
Right



Component	Description
(1)  USB Type-C (charging) port	<p>Connects any USB device with a Type-C connector.</p> <p>NOTE: USB Type-C ports charge products such as cell phones, laptops, tablets, and MP3 players, even when the computer is off. Also, some USB Type-C ports connect DisplayPort, VGA, HDMI and other video devices to provide video output.</p> <p>NOTE: Adapters (purchased separately) may be required.</p>
(2)  Dual-Mode DisplayPort	Connects an optional digital display device, such as a high-performance monitor or projector.
(3)  Memory card reader	Reads optional memory cards that store, manage, share, or access information.
(4)  Audio-out (headphone)/Audio-in (microphone) jack	<p>Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. Also connects an optional headset microphone. This jack does not support optional microphone-only devices.</p> <p>WARNING! To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, see the <i>Regulatory, Safety, and Environmental Notices</i>. To access the user guides, select Start > HP > HP Documentation.</p> <p>NOTE: When a device is connected to the jack, the computer speakers are disabled.</p> <p>NOTE: Be sure that the device cable has a 4-conductor connector that supports both audio-out (headphone) and audio-in (microphone).</p>
(5)  USB 3.0 port	Connects an optional USB device, such as a keyboard, mouse, external drive, printer, scanner or USB hub.
(6)  RJ-45 (network) jack	Connects a network cable.
(7) Docking connector	Connects an optional docking device.

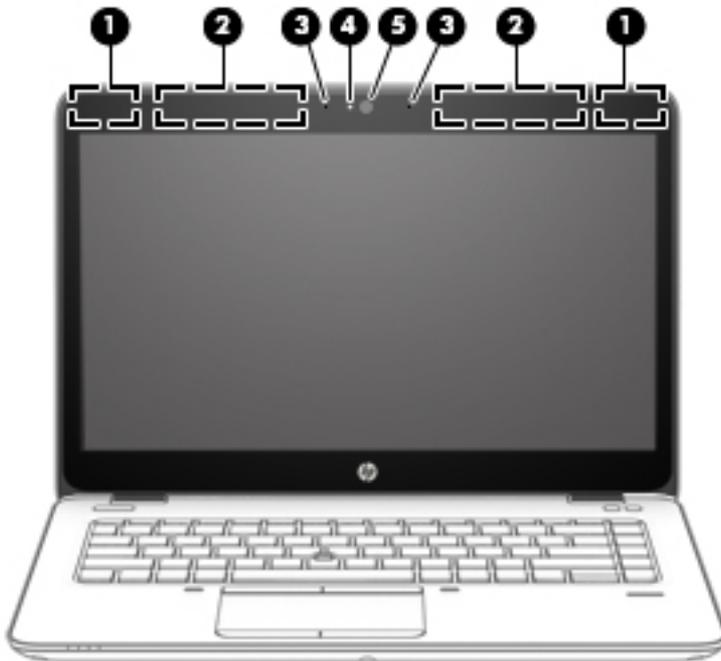
Component	Description
(8)  SIM slot	Supports a wireless subscriber identity module (SIM) card.
(9)  Power connector	Connects an AC adapter.

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) Vents (2)	Enable airflow to cool internal components. NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(3)  External monitor port	Connects an external VGA monitor or projector.
(4)  USB 3.0 charging (powered) port	Connects an optional USB device, such as a keyboard, mouse, external drive, printer, scanner or USB hub. Standard USB ports will not charge all USB devices or will charge using a low current. Some USB devices require power and require you to use a powered port. NOTE: USB charging ports can also charge select models of cell phones and MP3 players, even when the computer is off.
(5) Smart card reader	Supports optional smart cards.

Display

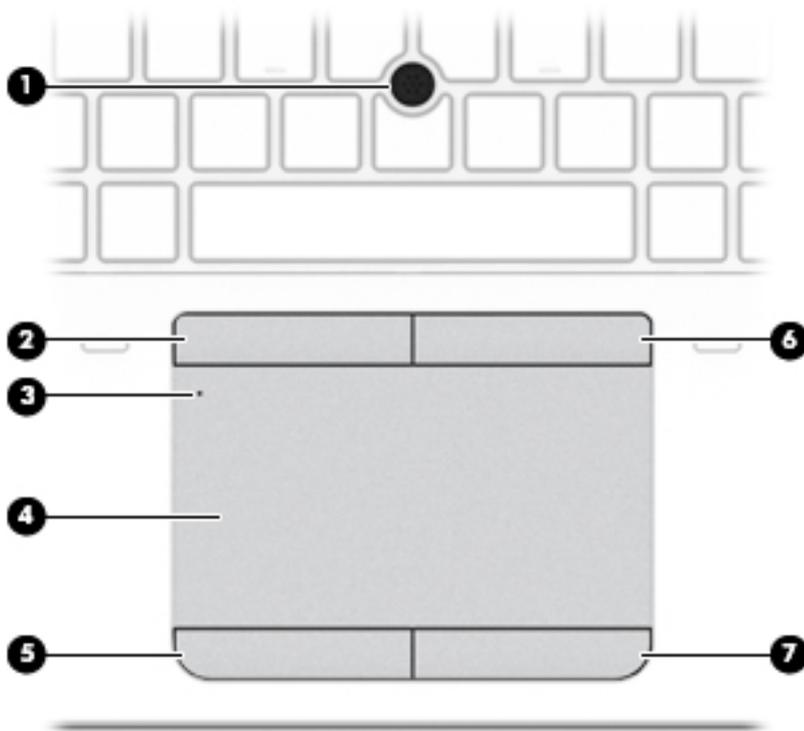


Component	Description
(1) WLAN antennas (2)*	Send and receive wireless signals to communicate with wireless local area networks (WLAN).
(2) WWAN antennas (2)*	Send and receive wireless signals to communicate with wireless wide area networks (WWAN).
(3) Internal microphones	Record sound.
(4) Webcam light	On: The webcam is in use.
(5) Webcam	Records video and captures photographs. Some models allow you to video conference and chat online using streaming video.

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

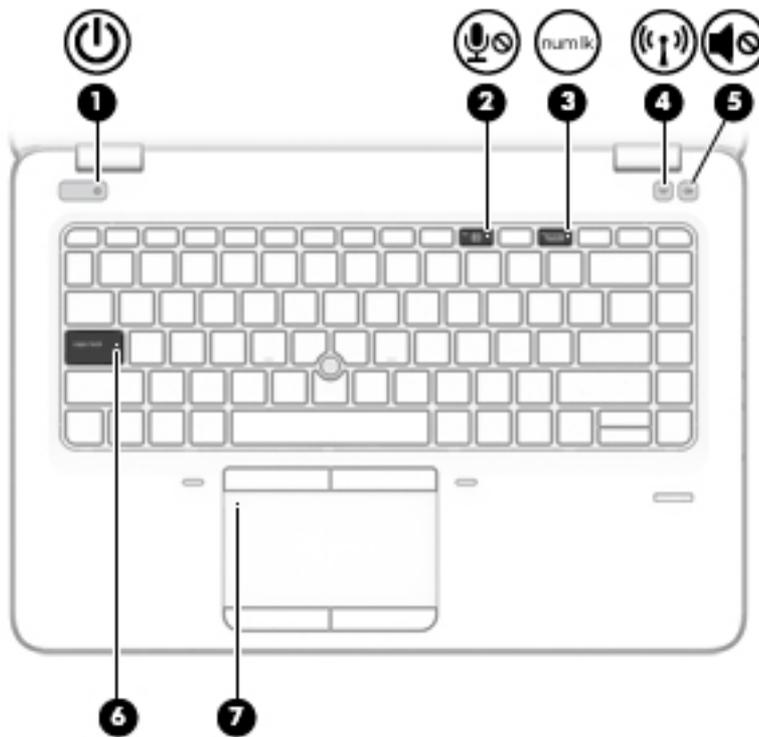
Top

TouchPad



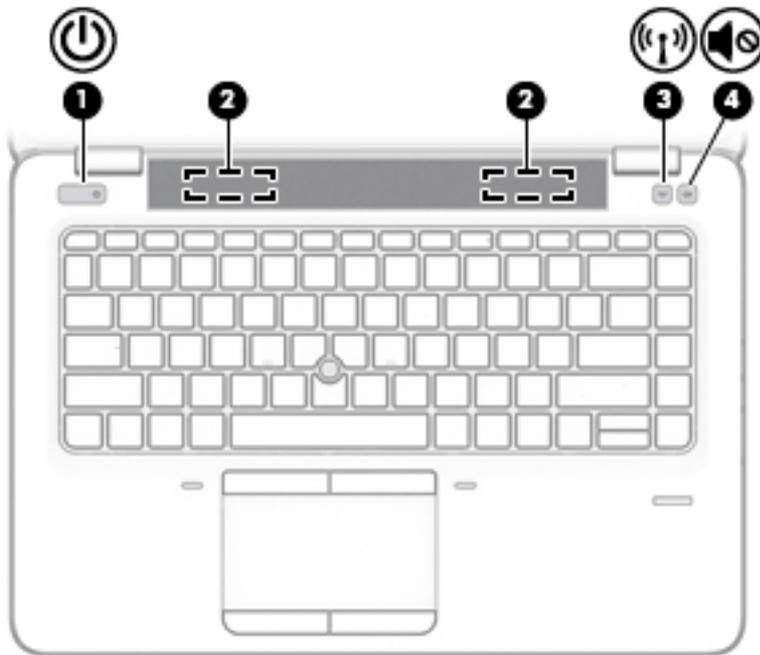
Component		Description
(1)	Pointing stick (select models only)	Moves the pointer and selects or activates items on the screen.
(2)	Left pointing stick button (select models only)	Functions like the left button on an external mouse.
(3)	TouchPad on/off button	Turns the TouchPad on and off.
(4)	TouchPad zone	Moves the pointer and selects or activates items on the screen. NOTE: The TouchPad also supports edge-swipe gestures. For more information, see Edge swipes (select models only) on page 34.
(5)	Left TouchPad button	Functions like the left button on an external mouse.
(6)	Right pointing stick button (select models only)	Functions like the right button on an external mouse.
(7)	Right TouchPad button	Functions like the right button on an external mouse.

Lights



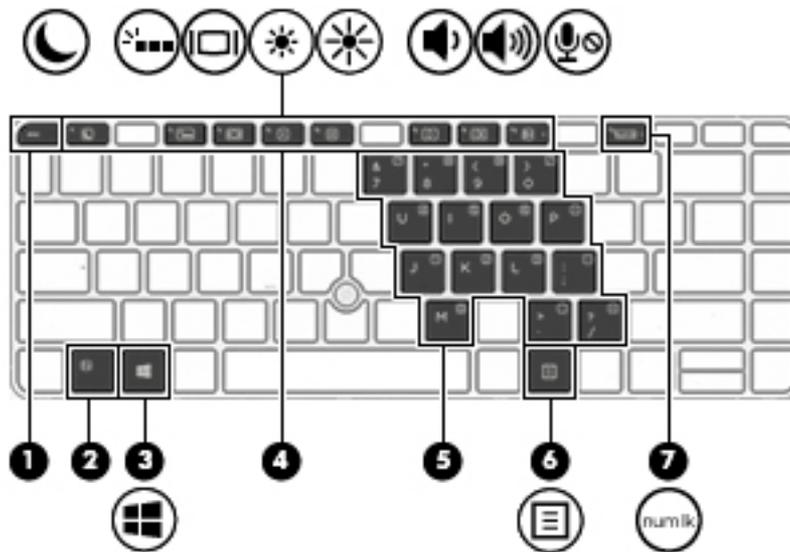
Component	Description
(1)  Power light	<ul style="list-style-type: none"> On: The computer is on. Blinking: The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unneeded components. Off: The computer is off.
(2)  Microphone mute light	<ul style="list-style-type: none"> Amber: microphone sound is off. Off: microphone sound is on.
(3) num lk Num lock light	On: Num lock is on.
(4)  Wireless light	<p>On: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on.</p> <p>NOTE: On some models, the wireless light is amber when all wireless devices are off.</p>
(5)  Mute light	<ul style="list-style-type: none"> Amber: Computer sound is off. Off: Computer sound is on.
(6) Caps lock light	On: Caps lock is on, which switches the keys to all capital letters.
(7) TouchPad light	<ul style="list-style-type: none"> On: The TouchPad is off. Off: The TouchPad is on.

Buttons and speakers

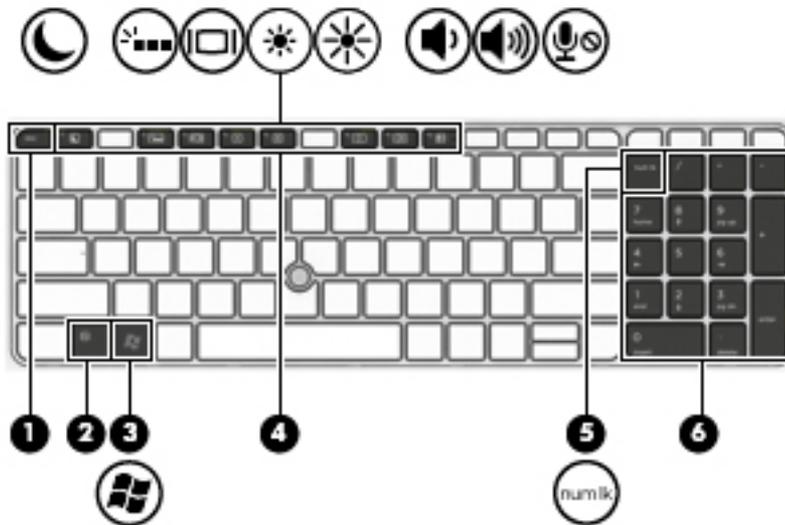


Component	Description
(1)  Power button	<ul style="list-style-type: none">• When the computer is off, press the button to turn on the computer.• When the computer is on, press the button briefly to initiate Sleep.• When the computer is in the Sleep state, press the button briefly to exit Sleep. <p>CAUTION: Pressing and holding down the power button will result in the loss of unsaved information.</p> <p>If the computer has stopped responding and Windows® shutdown procedures are ineffective, press and hold the power button for at least 15 seconds to turn off the computer.</p> <p>To learn more about your power settings:</p> <p>WES7: Select Start > Control Panel > System and Security > Power Options.</p> <p>Windows 10 IoT: Right-click Start, select Control Panel, and then select Power Options.</p>
(2) Speakers (2)	Produce sound.
(3)  Wireless button	Turns the wireless feature on or off but does not establish a wireless connection.
(4)  Volume mute button	Mutes and restores speaker sound.

Keys

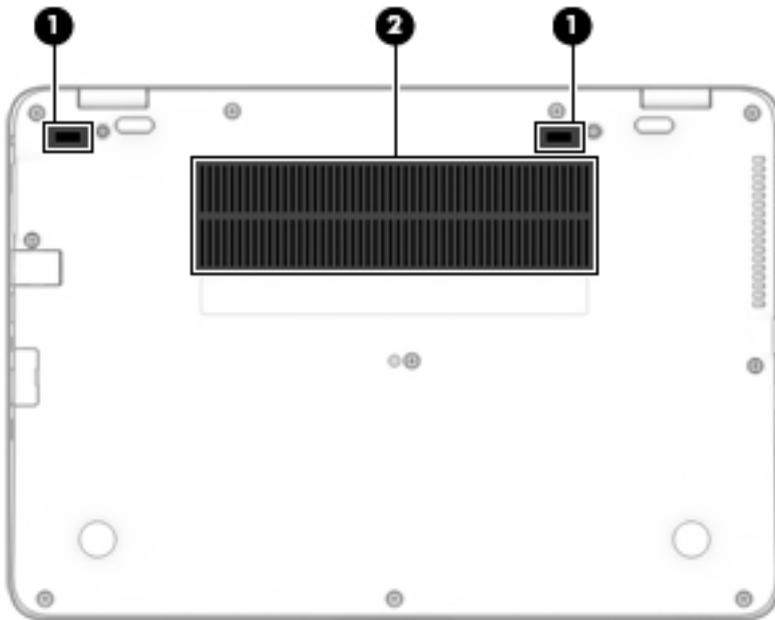


Component	Description
(1)  <code>esc</code> key	Displays system information when pressed in combination with the <code>fn</code> key.
(2) <code>fn</code> key	Executes frequently used system functions when pressed in combination with a function key, the <code>num lk</code> key, the <code>esc</code> key, or the <code>b</code> key.
(3)  Windows button	Displays the Windows Start menu.
(4) Function keys	Execute frequently used system functions when pressed in combination with the <code>fn</code> key.
(5) Embedded numeric keypad	When the keypad is turned on, it 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.
(6)  Windows applications key	Displays a shortcut menu for items beneath the cursor.
(7) <code>num lk</code> key	Turns the embedded numeric keypad on and off when pressed in combination with the <code>fn</code> key.



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 a function key, the num lk key, the esc key, or the b key.
(3)  Windows button	Displays the Windows Start menu.
(4) Function keys	Execute frequently used system functions when pressed in combination with the fn key.
(5) num lk key	Alternates between the navigational and numeric functions on the integrated numeric keypad.
(6) Integrated numeric keypad	When num lk has been enabled, it can be used like an external numeric keypad.

Bottom



Component		Description
(1)	Docking connectors (2)	Connect an optional docking device.
(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.

Front



Component	Description
(1) 	<p>Wireless light</p> <p>On: An integrated wireless device, such as a wireless local area network (WLAN) device and/or a Bluetooth® device, is on.</p> <p>NOTE: On some models, the wireless light is amber when all wireless devices are off.</p>
(2) 	<p>Power light</p> <ul style="list-style-type: none">On: The computer is on.Blinking: The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unneeded components.Off: The computer is off.
(3) 	<p>Battery light</p> <p>When AC power is connected:</p> <ul style="list-style-type: none">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. <p>When AC power is disconnected (battery not charging):</p> <ul style="list-style-type: none">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.Off: The battery is not charging.
(4) 	<p>Drive light</p> <p>Blinking white: The hard drive is being accessed.</p>

Locating system information

Important system information is located on the bottom edge of the tablet or on the keyboard base. You may need the information when travelling internationally or when you contact support:

(1): Serial number

(2): Product number

(3): Model number

(4): Warranty period

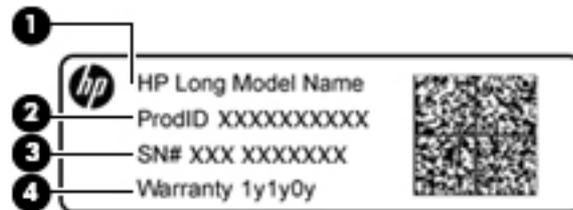
 **IMPORTANT:** Check the following locations for the labels described in this section: the bottom of the computer, inside the battery bay, under the service door, or on the back of the display.

- Service label—Provides important information to identify your computer. When contacting support, you will probably be asked for the serial number, and possibly for the product number or the model number. Locate these numbers 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)	Serial number
(2)	Product number
(3)	Warranty period
(4)	Model number (select products only)



Component	
(1)	Model name (select products only)
(2)	Product number
(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.

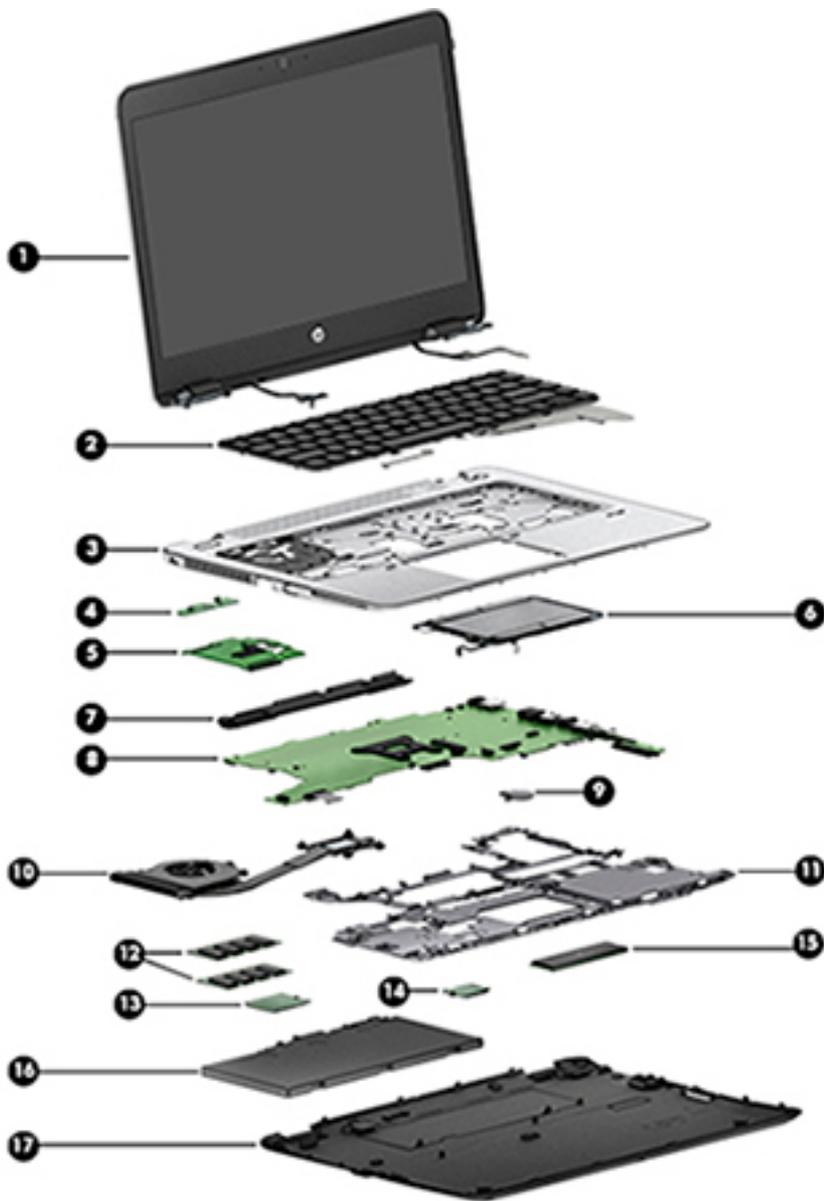
Using Windows, briefly press the **fn+esc** key combination to display the System Information screen, which provides the product name and serial number of your computer, as well as information about the memory, processor, BIOS, and keyboard.

3 Illustrated parts catalog

Computer major components

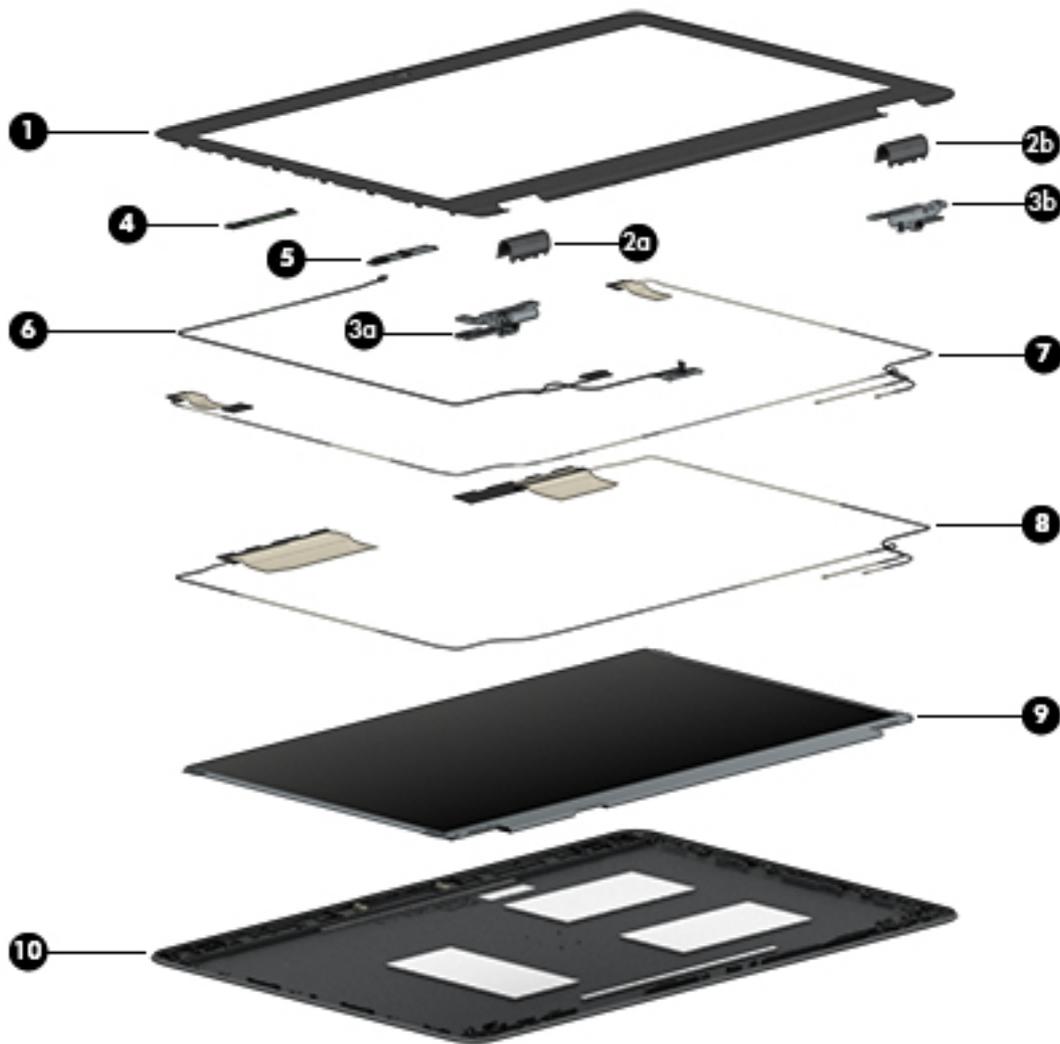
 **NOTE:** HP continually improves and changes product parts. For complete and current information on supported parts for your computer, go to <http://partsurfer.hp.com>, select your country or region, and then follow the on-screen instructions.

 **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.



Item	Component	Spare part number
(1)	Display assembly: Non-touch display assemblies are spared at the subcomponent level only. For more non-touch display assembly spare part information, see Display assembly subcomponents on page 17 .	
(2)	Keyboard	836634-xx1
(3)	Top cover	821173-001
(4)	Power button board	821169-001
(5)	USB/audio board (includes cable)	837846-001
(6)	TouchPad	821171-001
(7)	Speakers (includes cable)	821170-001
(8)	System board (includes processor and replacement thermal material)	
	For use in models with the Windows IoT operating system	827570-301
	For use in models with Windows Embedded Standard (WES) 7E operating system	827570-001
(9)	RTC battery	665733-001
(10)	Heat sink/fan assembly	821163-001
(11)	Internal base plate	not spared
(12)	Memory module	
	4-GB (PC3L-12800, 1600-MHz, DDR3L)	691740-001
(13)	WWAN module	
	HP lt4120 LTE/EVDO/HSPA+ SnapdragonT X5 LTE Mobile Broadband Module	800870-001
	Huawei MU736 HSPA+ with GPS M.2 (NGFF)	822828-001
(14)	WLAN/Bluetooth combo card	
	Intel 7265 802.11 AC 2x2 WiFi + BT 4.2 Combo Adapter (non-vPro)	793840-001
	Broadcom 43228 dual-band 802.11abgn 2x2 Wi-Fi Adapter + BT 4.0 combo adapter (not available in Indonesia)	797884-001
	Broadcom 43228 dual-band 802.11abgn 2x2 Wi-Fi Adapter + BT 4.0 combo adapter (Indonesia only)	812132-001
(15)	Solid-state drive (SSD), 2242.M2	
	128 GB	854106-001
	32 GB	827578-001
(16)	Battery	800513-001
(17)	Bottom cover	821162-001

Display assembly subcomponents



Item	Component	Spare part number
(1)	Bezel	821160-001
	Hinge kit	821166-001
(2)	Left hinge cover (a) and right hinge cover (b) (spared with hinges)	
(3)	Left hinge (a) and right hinge (b)	
(4)	Microphone module	821168-001
(5)	Webcam module (includes microphone)	821676-001
(6)	Display/webcam cable	821174-001
(7)	WLAN antenna (spared with back cover)	
(8)	WWAN antenna (spared with back cover)	
(9)	Raw panel	823951-001
(10)	Back cover (includes antennas)	821161-001

Plastics Kit



Item	Component	Spare part number
	Plastics Kit	821175-001
(1)	Fingerprint reader blank	
(2)	SD card blank	

Miscellaneous parts

Component	Spare part number
AC adapter:	
45 W HP Smart AC adapter, nPFC, slim	741727-001
45 W HP Smart AC adapter, nPFC, 2P	742436-001
65 W HP Smart AC adapter, nPFC, emerging markets	714657-001
65 W HP Smart AC adapter, nPFC, S-3P	710412-001
65 W HP Smart AC adapter, nPFC	693711-001
HP Mobile Connect	714749-001
HP DisplayPort to HDMI cable	749288-001
HP Essential Top Load Case	679921-001
HP Professional Slim Top Load Case	703888-001
Cable lock docking station	575921-001
HP USB Laser Mouse	674318-001
HP USB Travel Mouse	757770-001
Power cord (3-pin, C5, black, 1.83-m), for use in:	
Argentina	401300-001
Australia	213356-001

Component	Spare part number
Denmark	213353-001
Europe (Austria, Belgium, Finland, France, Germany, the Netherlands, Norway and Sweden)	213350-001
India	404827-001
Israel	398063-001
Italy	213352-001
Japan	349756-001
North America	213349-001
People's Republic of China	286497-001
South Korea	267836-001
Switzerland	213354-001
Taiwan	393313-001
Thailand	285096-001
United Kingdom and Singapore	213351-001
Power cord (3-pin, C5, black, 1.00-m), for use in:	
Argentina	401300-007
Australia	213356-008
Brazil	438722-004
Denmark	213353-008
Europe (Austria, Belgium, Finland, France, Germany, the Netherlands, Norway and Sweden)	213350-009
India	404827-003
Israel	398063-003
Italy	213352-008
Japan	349756-002
North America	213349-009
People's Republic of China	286497-008
South Africa	361240-002
South Korea	267836-008
Switzerland	213354-008
Taiwan	393313-003
Thailand	285096-006
United Kingdom and Singapore	213351-008
Power cord (C7, 1.00-m), for use in Japan	190548-003
Power cord (C7, 1.80-m), for use in Japan	589211-002
Screw kit	840070-001

4 Removal and replacement procedures preliminary requirements

Tools required

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

- Phillips P0 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 a diskette drive or optical drive, be sure that a diskette or disc is not in the drive and be sure that the optical drive tray is closed.

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

Avoid dropping drives from any height onto any surface.

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

Avoid exposing a drive to temperature extremes or liquids.

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

Grounding guidelines

Electrostatic discharge damage

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

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

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

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

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

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

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

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

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

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

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

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

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

Workstation guidelines

Follow these grounding workstation guidelines:

- Cover the workstation with approved static-shielding material.
- Use a wrist strap connected to a properly grounded work surface and use properly grounded tools and equipment.
- Use conductive field service tools, such as cutters, screwdrivers, and vacuums.
- When fixtures must directly contact dissipative surfaces, use fixtures made only of static safe materials.
- Keep the work area free of nonconductive materials, such as ordinary plastic assembly aids and Styrofoam.
- Handle ESD-sensitive components, parts, and assemblies by the case or PCM laminate. Handle these items only at static-free workstations.
- Avoid contact with pins, leads, or circuitry.
- Turn off power and input signals before inserting or removing connectors or test equipment.

Equipment guidelines

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

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

The following grounding equipment is recommended to prevent electrostatic damage:

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

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

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 [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.

There are as many as 22 screws that must be removed, replaced, and/or loosened when servicing Customer Self-Repair parts. Make special note of each screw size and location during removal and replacement.

Bottom cover

Description	Spare part number
Bottom cover	821162-001

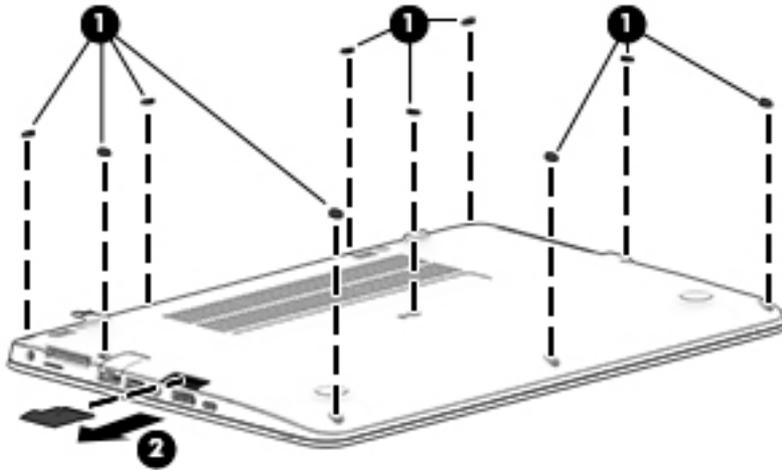
Before removing the bottom cover, follow these steps:

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

Remove the bottom cover:

1. Turn the computer upside down on a flat surface.

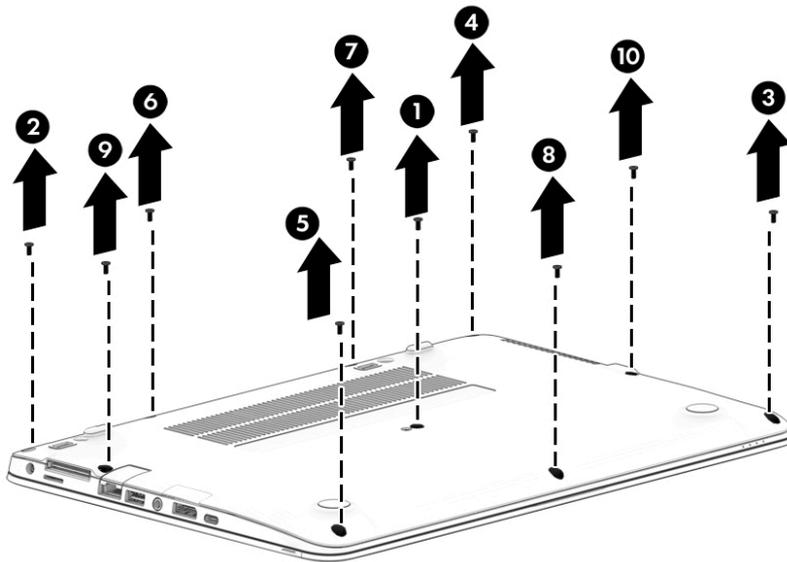
2. Remove the 10 rubber plugs (1) and the SD card blank (2) from the bottom cover.



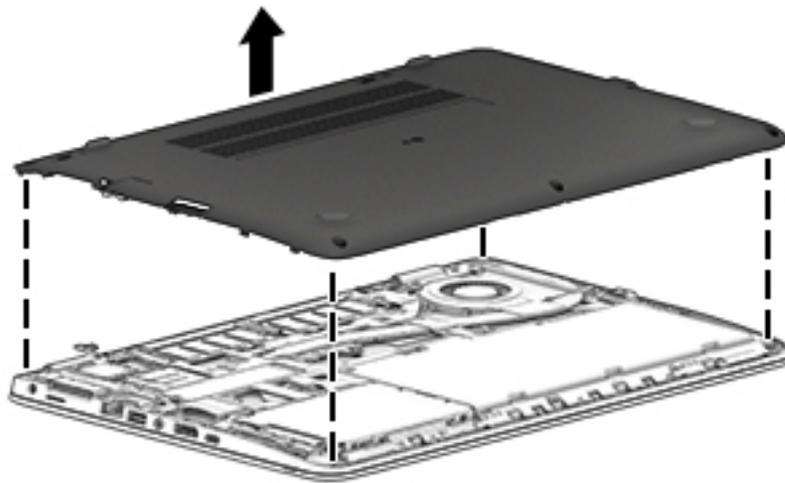
3. In the order indicated in the following image, remove the 10 Phillips PM2.5×5.0 screws that secure the bottom cover to the computer.



IMPORTANT: To make sure the bottom cover installs properly, be sure to remove and replace the screws in the order shown in the following image.



4. Pry up on the top (near the display hinge) of the bottom cover to disengage it from the computer.



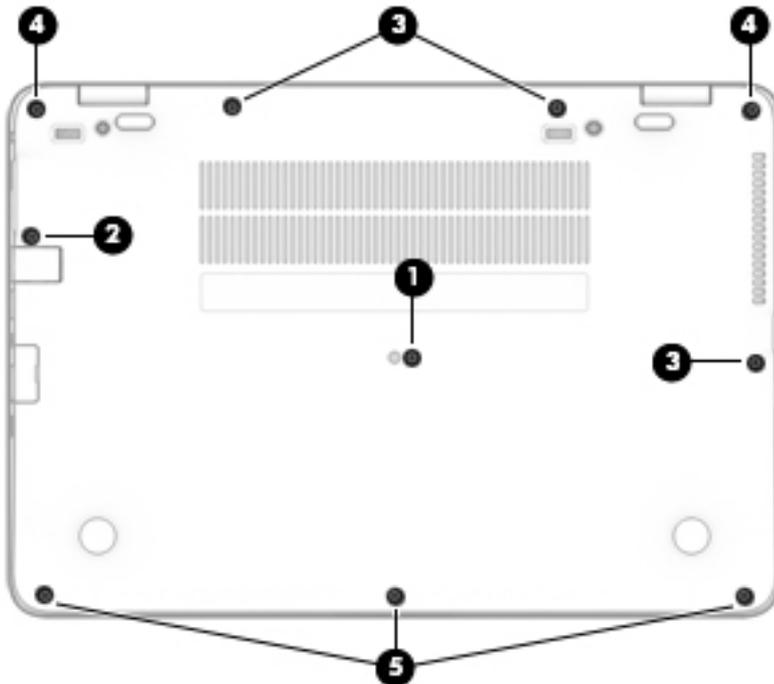
Reverse the removal procedures to install the bottom cover.

 **NOTE:** There are five different sizes of rubber plugs. Be sure that you reinstall them over the correct screws.

The rubber-plug sizes are as follows.



The rubber-plug locations are as follows.



Battery

Description	Spare part number
3-cell, 46 WHr, 4.08 Ah Li-ion battery	800513-001

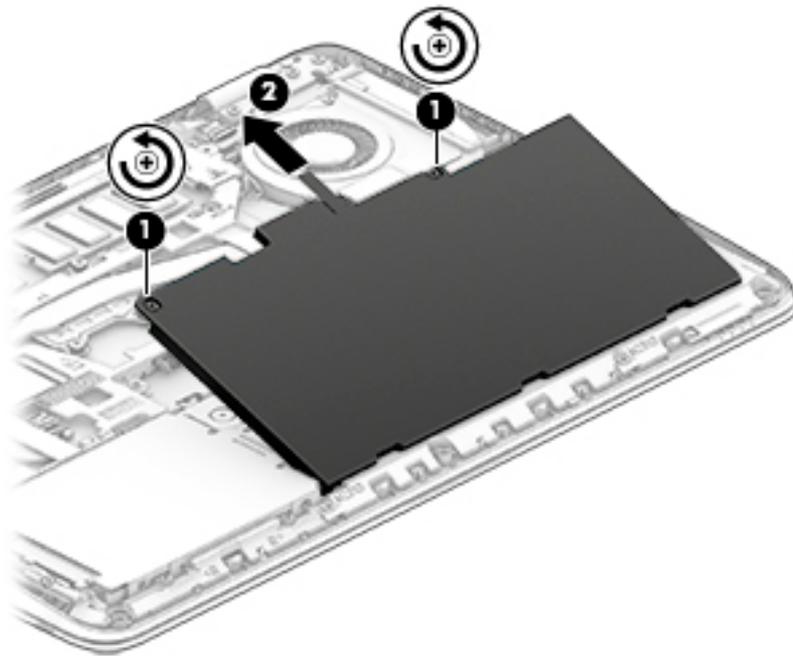
Before removing the battery, follow these steps:

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

To remove the battery:

⚠ CAUTION: Removing a battery that is the sole power source for the computer can cause loss of information. To prevent loss of information, save your work and shut down the computer through Windows before removing the battery.

- ▲ Loosen the two captive screws **(1)** and remove the battery from the computer **(2)**.



Reverse the removal procedures to install the battery.

SSD

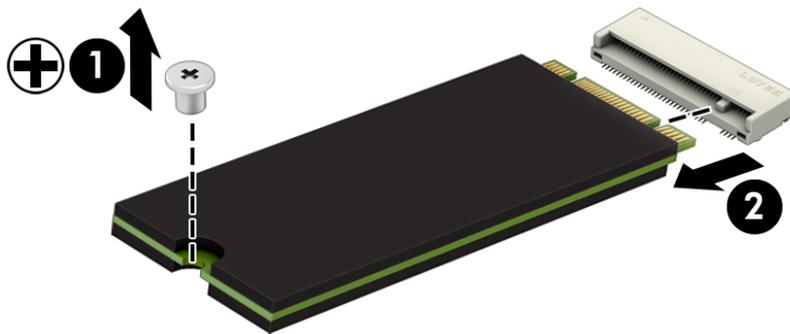
Description	Spare part number
Solid-state drive, 2242.M2	
128 GB	854106-001
32 GB	827578-001

Before removing the SSD, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 25](#)).
5. Disconnect the battery (see [Battery on page 28](#)).

Remove the SSD:

1. Remove the Phillips PM2.0×3.0 screw **(1)** that secures the drive to the system board.



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

 **NOTE:** SSD drives are designed with notches to prevent incorrect insertion.

Reverse this procedure to reassemble and install the SSD drive.

Memory modules

 **NOTE:** Primary and expansion memory is installed in a side-by-side configuration in the bottom of the computer.

If only one memory module is installed, it must be installed in the socket labeled 1.

Description	Spare part number
4-GB (PC3L-12800, 1600-MHz, DDR3L)	691740-001

Update BIOS before adding memory modules

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

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

To update BIOS:

1. Navigate to www.hp.com.
2. Click **Support & Drivers > Drivers & Software**.
3. In the **Enter a product name/number** box, type the computer model information, and then click **Search**.
4. Click the link for the computer model.
5. Select the operating system, and then click **Next**.
6. Under **Step 2: Select a Download**, click the **BIOS** link.
7. Click the link for the most recent BIOS.
8. Click the **Download** button, and then 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. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 25](#)).
5. Remove the battery (see [Battery on page 28](#)).

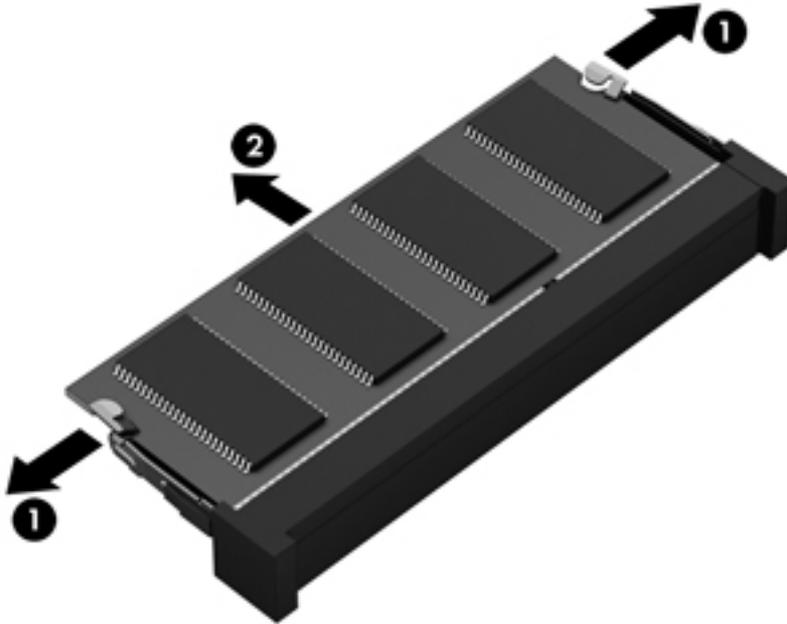
Remove the memory module:

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.

 **NOTE:** The computer uses two memory sockets. The socket labeled 2 houses the expansion memory module and the socket labeled 1 houses the primary memory module. The removal procedure is the same for both memory sockets.



Reverse this procedure to install a memory module.

WLAN/Bluetooth combo card

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

The WLAN module and WWAN module are not interchangeable.

Description	Spare part number
Intel 7265 802.11 AC 2x2 WiFi + BT 4.2 Combo Adapter (non-vPro)	793840-001
Broadcom 43228 dual-band 802.11abgn 2x2 Wi-Fi Adapter + BT 4.0 combo adapter (not available in Indonesia)	797884-001
Broadcom 43228 dual-band 802.11abgn 2x2 Wi-Fi Adapter + BT 4.0 combo adapter (Indonesia only)	812132-001

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. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 25](#)).
5. Remove the battery (see [Battery on page 28](#)).

Remove the WLAN module:

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

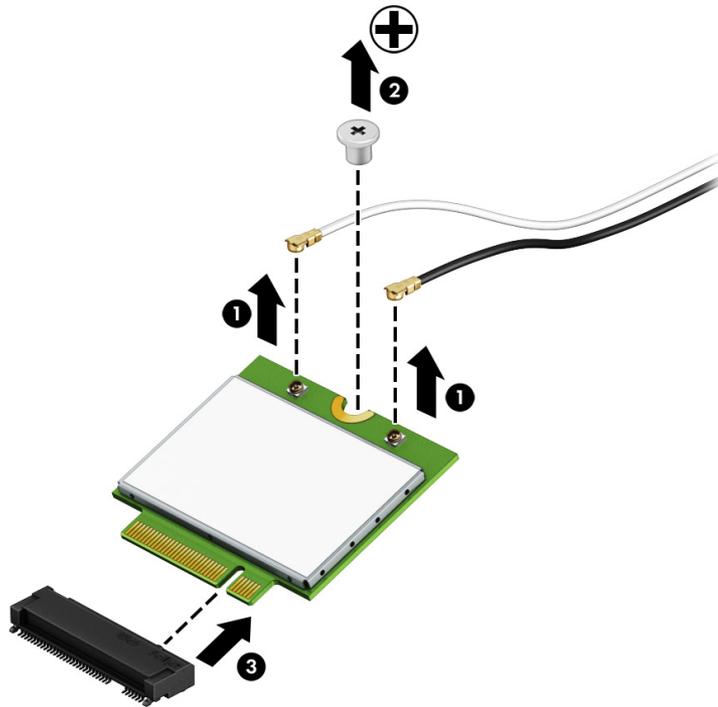


NOTE: The WLAN antenna cable labeled “1” connects to the WLAN module “Main” terminal labeled “1”. The WLAN antenna cable labeled “2” connects to the WLAN module “Aux” terminal labeled “2”. If the computer is equipped with an 802.11a/b/g/n WLAN module, the yellow WLAN antenna cable connects to the middle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

2. Remove the one Phillips PM2.5×3.0 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 by pulling the module away from the slot at an angle (3).

 **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.

WWAN module

The WLAN module and WWAN module are not interchangeable.

The WWAN module is available on select models only.

Description	Spare part number
HP It4120 LTE/EVDO/HSPA+ SnapdragonT X5 LTE Mobile Broadband Module	800870-001
Huawei MU736 HSPA+ with GPS M.2 (NGFF)	822828-001

Before removing the WWAN module, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 25](#)).
5. Remove the battery (see [Battery on page 28](#)).

Remove the WWAN module:

1. Position the computer upside-down.
2. Disconnect the WWAN antenna cables **(1)** from the terminals on the WWAN module.

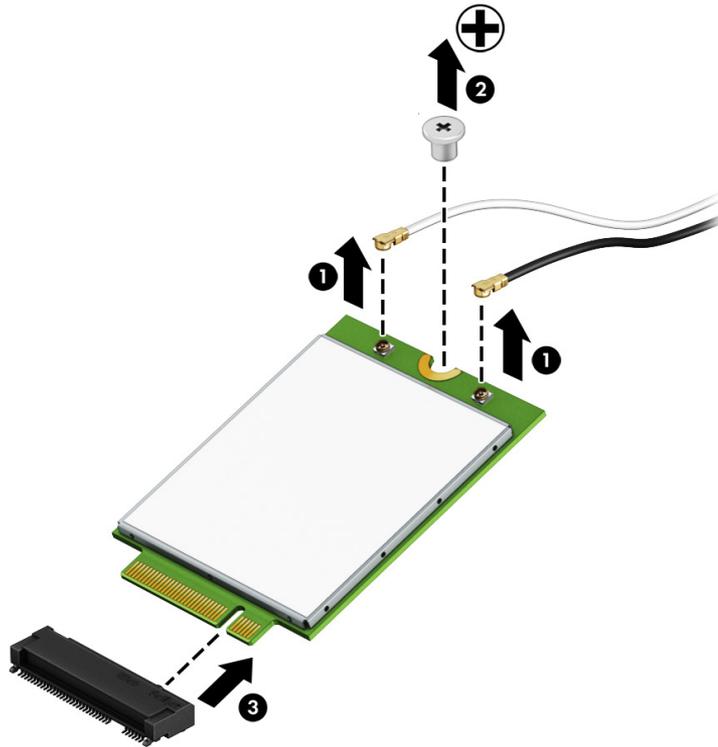


NOTE: The red WWAN antenna cable is connected to the WWAN module “Main” terminal. The blue WWAN antenna cable is connected to the WWAN module “Aux” terminal.

3. Remove the one Phillips PM2.5×3.0 screws **(2)** that secure the WWAN module to the computer. (The edge of the module opposite the slot rises away from the computer.)

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

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



 **NOTE:** If the WWAN antennas are not connected to the terminals on the WWAN module, the protective sleeves must be installed on the antenna connectors, as shown in the following illustration.



Reverse this procedure to install the WWAN module.

Keyboard

In this section, the first table provides the main spare part number for the keyboards. The second table provides the country codes.

Description	Spare part number
Keyboard	836634-xx1

For use in country or region	Spare part number	For use in country or region	Spare part number	For use in country or region	Spare part number
Belgium	-A41	India	-D61	Saudi Arabia	-171
Brazil	-201	Israel	-BB1	Slovenia	-BA1
Bulgaria	-261	Italy	-061	South Korea	-AD1
Canada	-DB1	Japan	-291	Spain	-071
Czech Republic and Slovakia	-FL1	Latin America	-161	Sweden and Finland	-B71
Denmark	-081	The Netherlands	-B31	Switzerland	-BG1
France	-051	Northern Africa	-FP1	Taiwan	-AB1
Germany	-041	Norway	-091	Thailand	-281
Greece	-151	Portugal	-131	Turkey	-141
Hungary	-211	Romania	-271	United Kingdom	-031
Iceland	-DD1	Russia	-251	United States	-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. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 25](#)).
5. Remove the battery (see [Battery on page 28](#)).

Remove the keyboard:

1. Remove the 2 Phillips PM2.5×5.0 screws that secure the keyboard to the computer **(1)**.

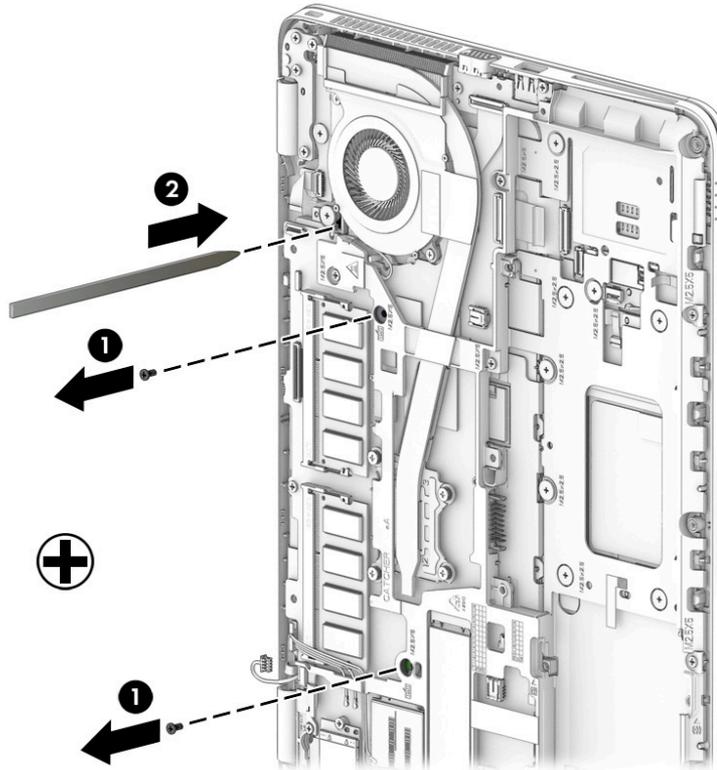


NOTE: The screws are labeled with a keyboard symbol.

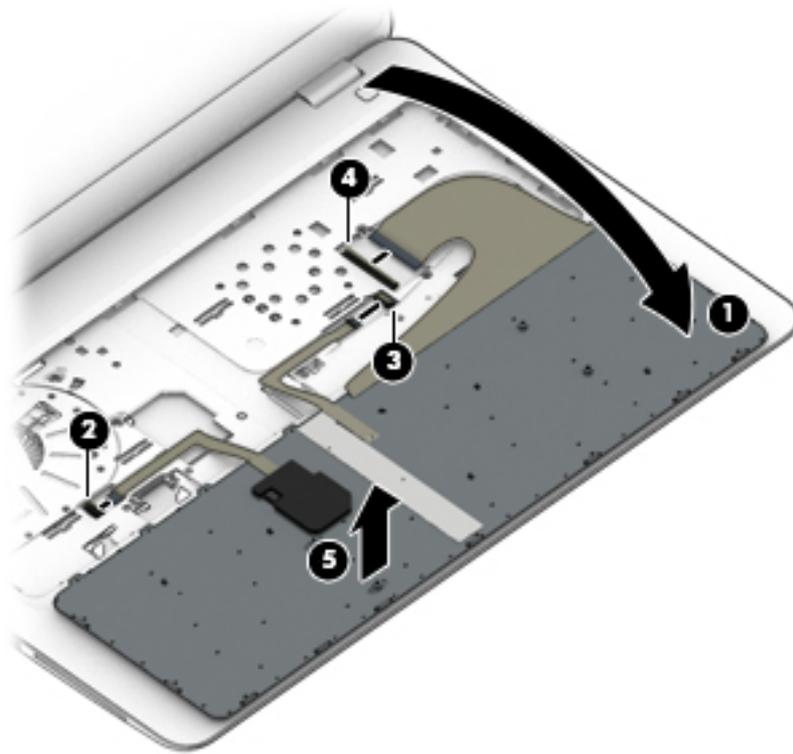
2. Position the computer upright with the front toward you.
3. Open the computer as far as possible.

4. Insert a screwdriver or similar thin tool into the hole beside the heat sink/fan assembly, and then press on the back of the keyboard until it disengages from the computer (2).

 **NOTE:** Cables connect the bottom of the keyboard to the system board. Make sure not to prematurely pull the keyboard cables out of the system board connectors.



5. Rotate the top of the keyboard upward, and then place the keyboard on the palm rest **(1)**. Remove the keyboard backlight cable **(2)**, pointing stick cable **(3)**, and keyboard cable **(4)**.



6. Remove the keyboard **(5)**.

Reverse this procedure to install the keyboard.

6 Removal and replacement procedures for Authorized Service Provider parts

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

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

CAUTION: This computer does not have user-replaceable parts. Only HP authorized service providers should perform the removal and replacement procedures described here. Accessing the internal part could damage the computer or void the warranty.

Component replacement procedures

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

There are as many as 45 screws that must be removed, replaced, and/or loosened when servicing Authorized Service Provider only parts. Make special note of each screw size and location during removal and replacement.

RTC battery

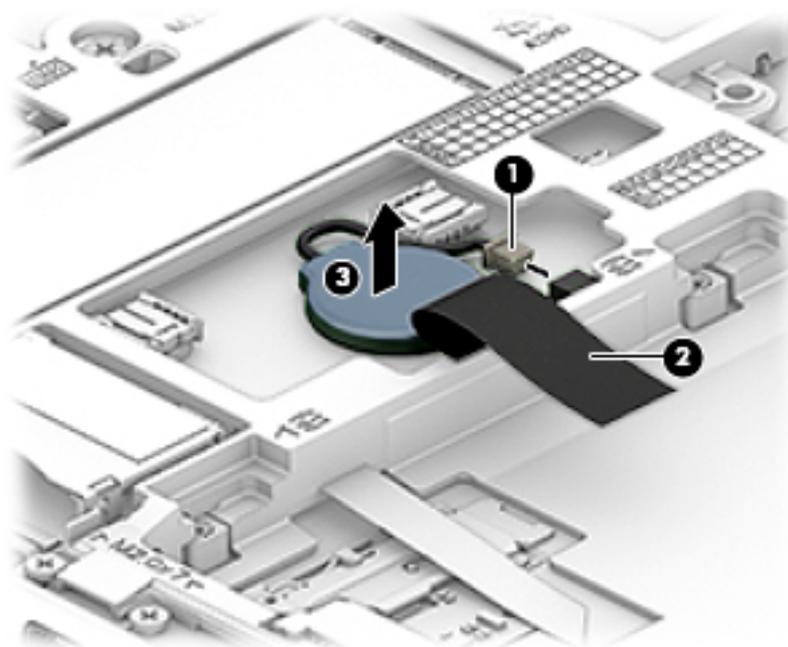
Description	Spare part number
RTC battery	665733-001

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. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 25](#)).
5. Remove the battery (see [Battery on page 28](#)).

Remove the RTC battery:

1. Remove the RTC battery cable from the system board **(1)**.
2. Lift the mylar cover **(2)**.
3. Using a flat tool, pry the battery out of the socket **(3)**.



Reverse this procedure to install the RTC battery.

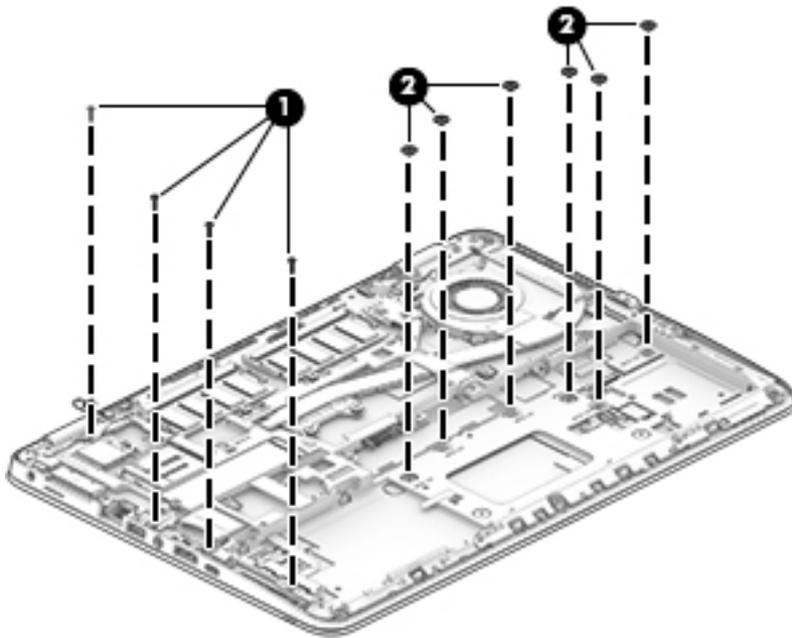
Internal base plate

Before removing the internal base plate, follow these steps:

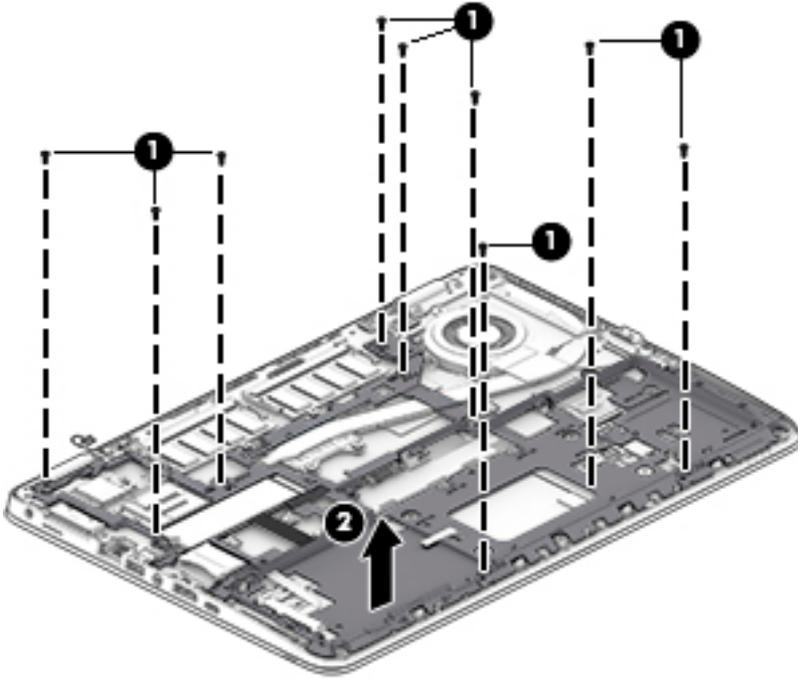
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 25](#)).
5. Remove the battery (see [Battery on page 28](#)).

Remove the internal base plate:

1. Remove 4 Phillips PM2.0x7.0 screws **(1)** and 6 PM2.5x2.5 screws **(2)**.



2. Remove 9 Phillips PM2.5x5.0 screws (1), and then remove the base plate from the computer (2).



Reverse this procedure to install the internal base plate.

Heat sink/fan assembly

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

Description	Spare part number
Heat sink/thermal module with fans	821163-001

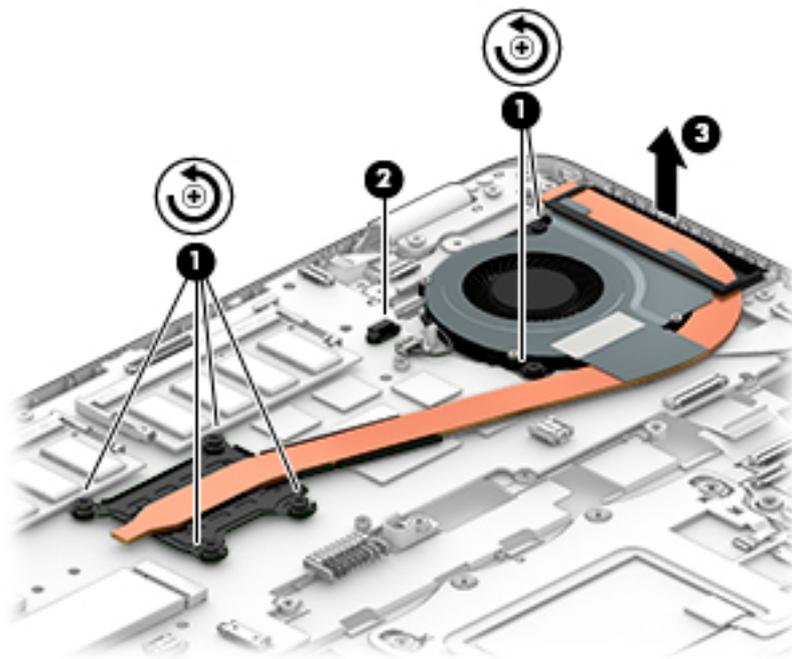
Before removing the heat sink/fan assembly, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Bottom cover (see [Bottom cover on page 25](#)).
5. Remove the battery (see [Battery on page 28](#)).
6. Remove the internal base plate (see [Internal base plate on page 41](#)).

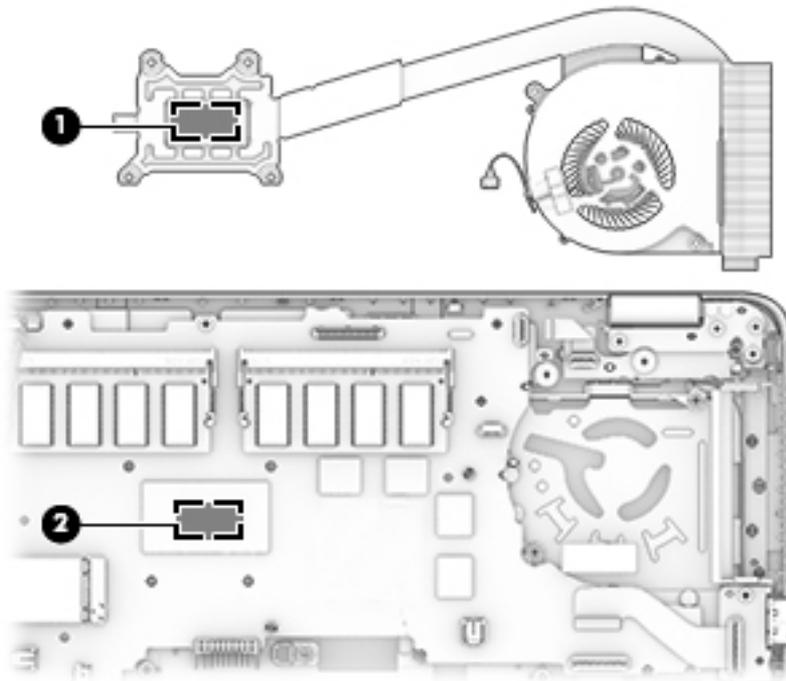
Remove the heat sink/fan assembly:

- ▲ Loosen the six captive screws on the fan and heat sink following the sequence stamped on the heat sink **(1)**, disconnect the fan cable **(2)**, and then remove the heat sink/fan assembly from the system board **(3)**.

 **CAUTION:** Take extreme care when removing the heat sink and fan assembly. The heatpipes between the fans are very fragile and can be easily damaged and bent during removal.



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



Reverse this procedure to install the heat sink/fan assembly.

Power button board

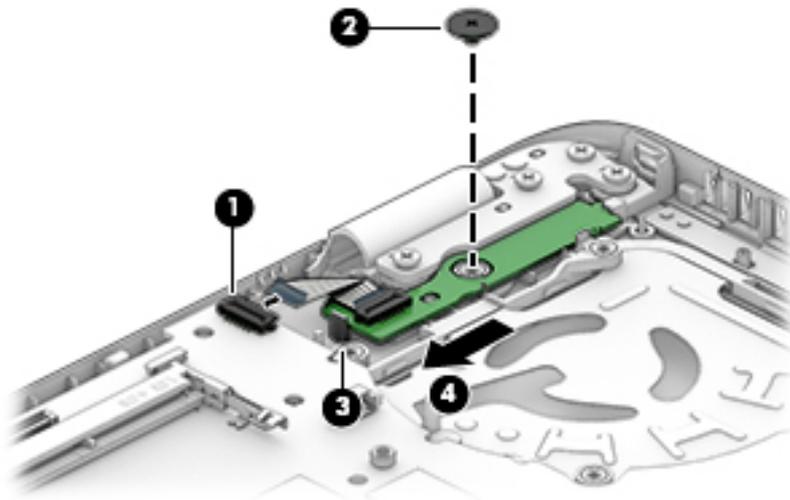
Description	Spare part number
Power button board assembly	821169-001

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. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 25](#)).
5. Remove the battery (see [Battery on page 28](#)).
6. Remove the following components:
 - a. Keyboard (see [Keyboard on page 36](#))
 - b. Internal base plate ([Internal base plate on page 41](#))

Remove the power button board:

1. Disconnect the cable from the system board **(1)**.
2. Remove the Phillips PM2.5×2.5 screw **(2)** that secures the power button board to the top cover.
3. Push the lever left **(3)**.
4. Slide the power button board left from beneath the hinge **(4)**.



Reverse this procedure to install the power button board.

Touchpad button board

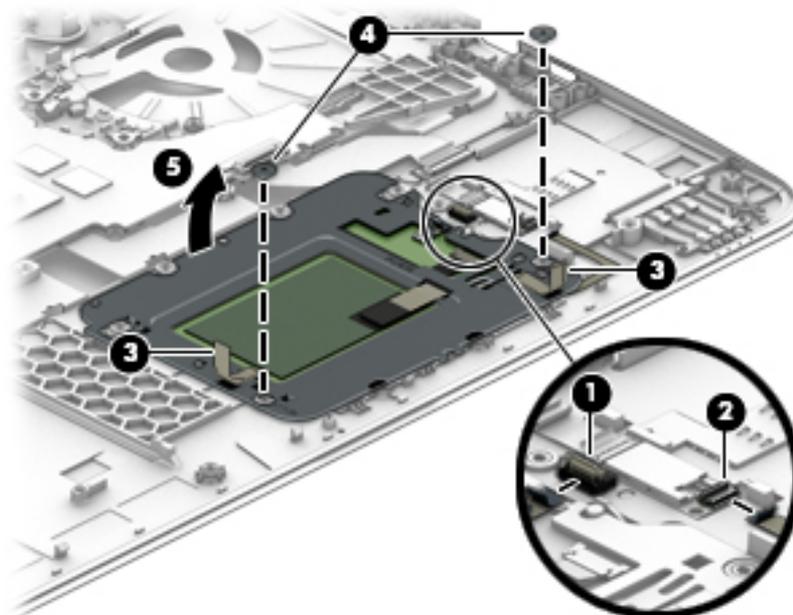
Description	Spare part number
Touchpad button board	821171-001

Before removing the touchpad 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. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 25](#)).
5. Remove the battery (see [Battery on page 28](#)).
6. Remove the following components:
 - a. Keyboard (see [Keyboard on page 36](#))
 - b. Internal base plate ([Internal base plate on page 41](#))

Remove the touchpad button board:

1. Disconnect the cable from the touchpad to the smart card reader board **(1)**, and then disconnect the NFC antenna from the NFC module **(2)**.
2. Lift the tape **(3)**, and then remove the 2 Phillips PM2.5x2.5 screws **(4)** that secure the touchpad button board to the top cover.
3. Lift the top of the touchpad button board up, and then pull it forward to remove it from the slot **(5)**.



Reverse this procedure to install the touchpad board.

USB/audio board

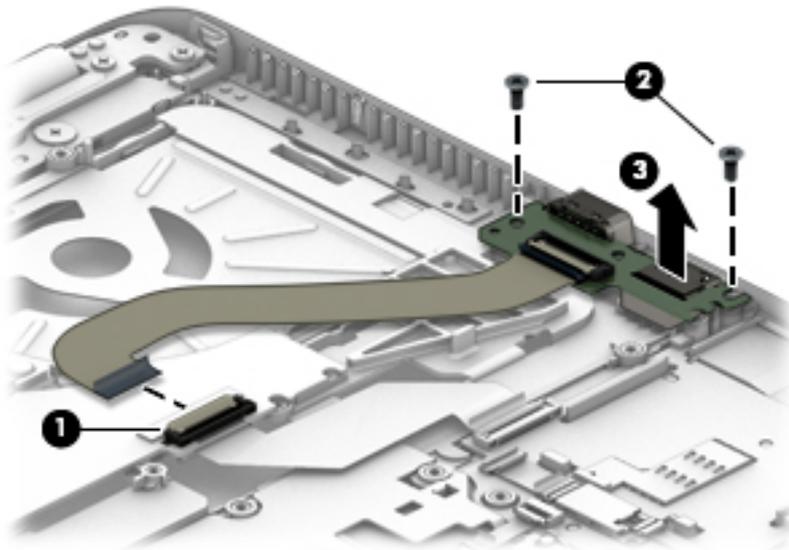
Description	Spare part number
USB/audio board	837846-001

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

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 25](#)).
5. Remove the battery (see [Battery on page 28](#)).
6. Remove the following components:
 - a. Keyboard (see [Keyboard on page 36](#))
 - b. Internal base plate ([Internal base plate on page 41](#))

Remove the USB/audio board:

1. Disconnect the cable from the board **(1)**.
2. Remove the 2 Phillips PM2.5×5.0 screws **(2)** that secure the USB/audio board to the computer.
3. Lift the board off the top cover **(3)**.



Reverse this procedure to install the USB/audio board.

System board



NOTE: All system board spare part kits include replacement thermal material.

Description	Spare part number
System board with an AMD A8 Pro-8600B processor for use in models with the Windows IoT operating system	827570-301
System board with an AMD A8 Pro-8600B processor for use in models with the Windows Embedded Standard (WES) 7E operating system	827570-001

Before removing the system board, follow these steps:

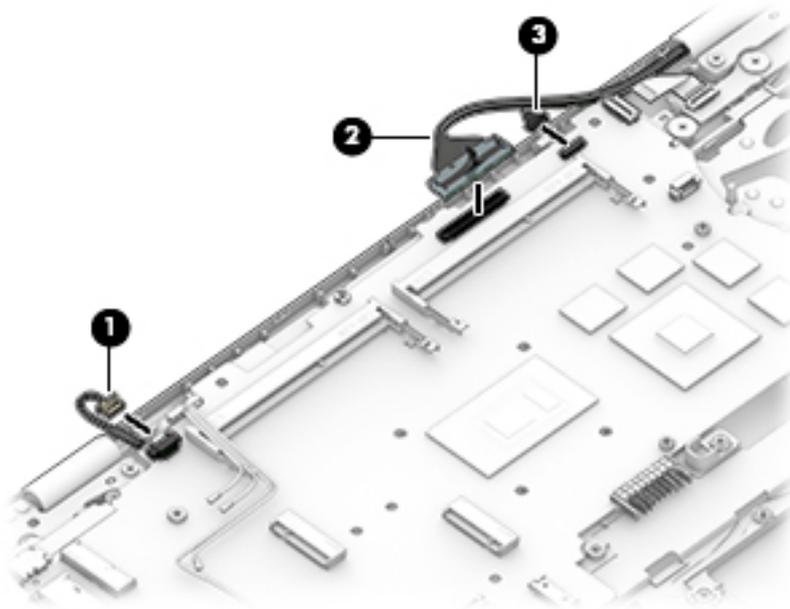
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 25](#)).
5. Remove the battery (see [Battery on page 28](#)).
6. Remove the following components:
 - a. Keyboard (see [Keyboard on page 36](#))
 - b. Internal base plate (see [Internal base plate on page 41](#))
 - c. Power button board (see [Power button board on page 45](#))
 - d. USB/audio board (see [USB/audio board on page 47](#))

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

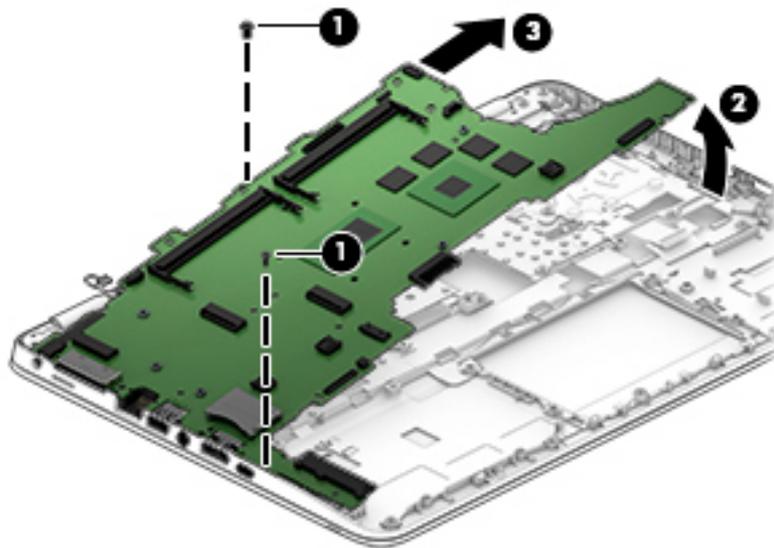
- Memory modules (see [Memory modules on page 30](#))
- WLAN/Bluetooth module (see [WLAN/Bluetooth combo card on page 32](#))
- WWAN module (see [WWAN module on page 34](#))
- SSD (see [SSD on page 29](#))
- Heat sink/ fan assembly (see [Heat sink/fan assembly on page 43](#))

Remove the system board:

1. Disconnect the following cables from the system board:
 - (1) Speaker cable
 - (2) Display cable
 - (3) Webcam cable (select products only)



2. Remove the 2 Phillips PM2.5×5.0 screws **(1)** that secure the system board to the computer.
3. Lift the right side of the system board up at an angle **(2)**.
4. Pull the system board up and toward the right to remove it from the computer **(3)**.



Reverse this procedure to install the system board.

Speaker assembly

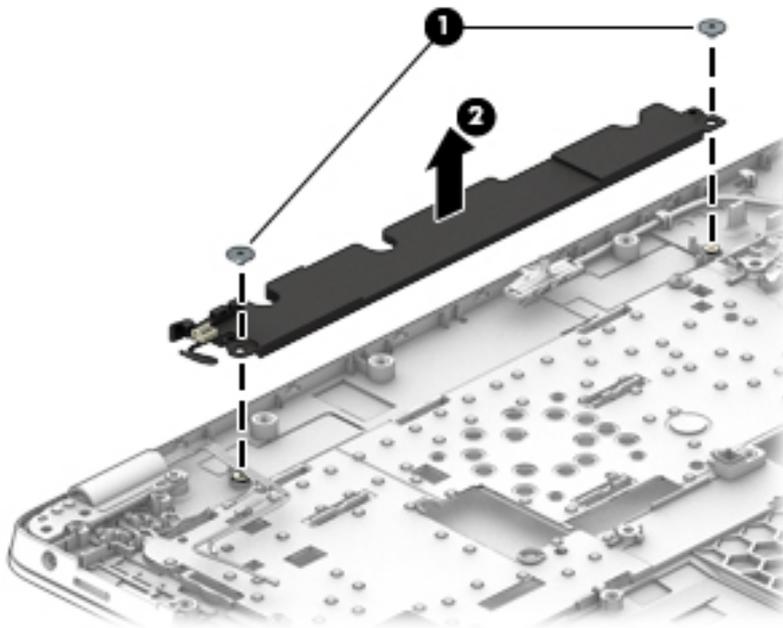
Description	Spare part number
Speaker assembly (includes cable)	821170-001

Before removing the speaker assembly, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 25](#)).
5. Remove the battery (see [Battery on page 28](#)).
6. Remove the keyboard (see [Keyboard on page 36](#)).
7. Remove the heat sink/fan assembly (see [Heat sink/fan assembly on page 43](#)).
8. Remove the system board (see [System board on page 48](#)).

Remove the speaker assembly:

1. Remove the two Phillips PM2.5x2.5 screws that secure the speakers to the computer **(1)**.
2. Remove the speaker **(2)** from the computer.



Reverse this procedure to install the speakers.

Display assembly

Before removing the display assembly, follow these steps:

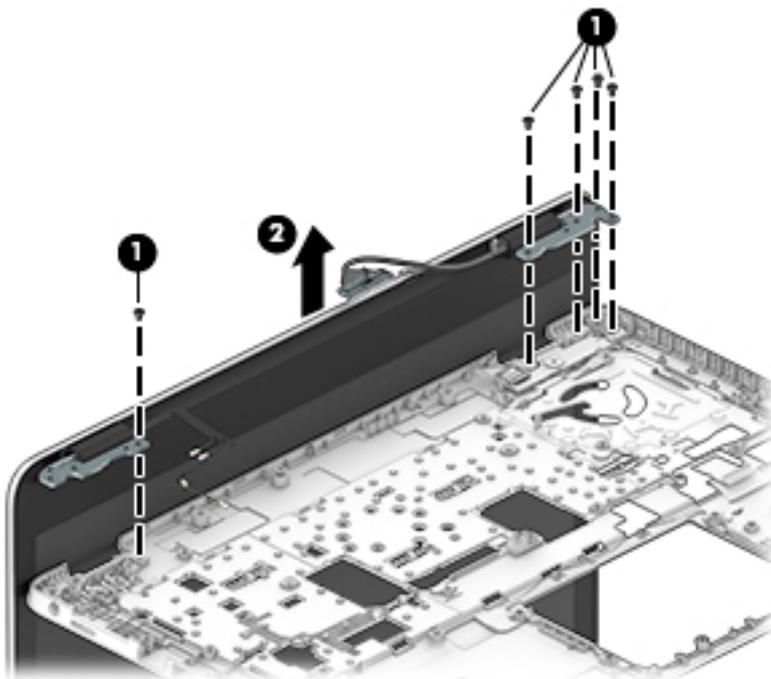
1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove the bottom cover (see [Bottom cover on page 25](#)).
5. Remove the battery (see [Battery on page 28](#)).
6. Remove the following components:
 - a. WLAN module (see [WLAN/Bluetooth combo card on page 32](#))
 - b. WWAN module (see [WWAN module on page 34](#))

Remove the display assembly:

1. Position the computer upside down.
2. Disconnect the display cable from the system board.
3. Remove the WLAN antennas and WWAN antennas (if equipped) from the routing path along the base of the computer.
4. Remove the 5 Phillips PM2.5×5.0 screws **(1)** from the display hinges.
5. Lift the display assembly straight up and remove it **(2)**.

CAUTION: When installing the display assembly, be sure that the wireless antenna cables are routed and arranged properly.

Failure to properly route the antennas can result in degradation of the computer's wireless performance.

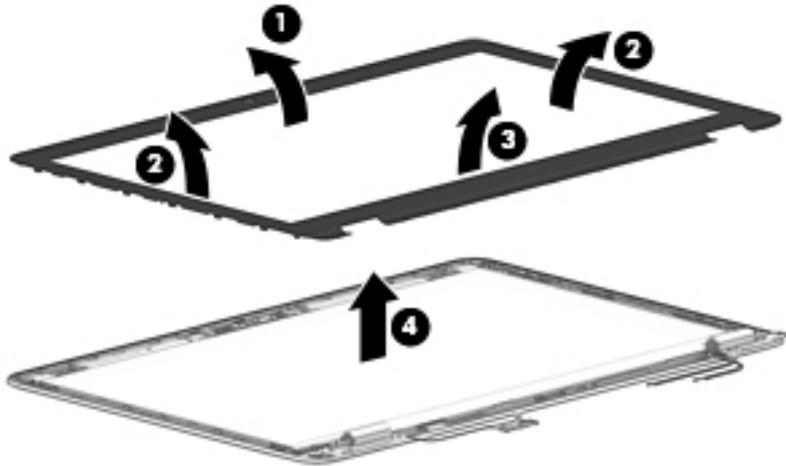


6. If you need to remove the display bezel, flex the top **(1)** of the bezel, the inside edges of the left and right sides **(2)**, and then the bottom **(3)** of the bezel until it disengages from the display enclosure.

 **NOTE:** Make sure the hinges are not bent (see hinge position in following image) when you remove the bezel.

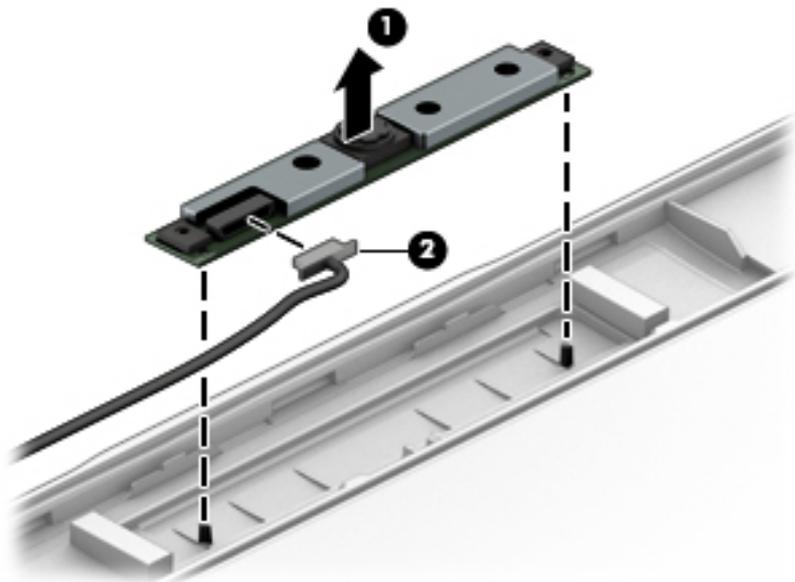
7. Remove the display bezel **(4)**.

The display bezel is available using spare part number 821160-001.



8. If it is necessary to replace the webcam or microphone module, gently pull the module away from the double-sided tape on the display enclosure **(1)**, and then disconnect the cable from the module **(2)**.

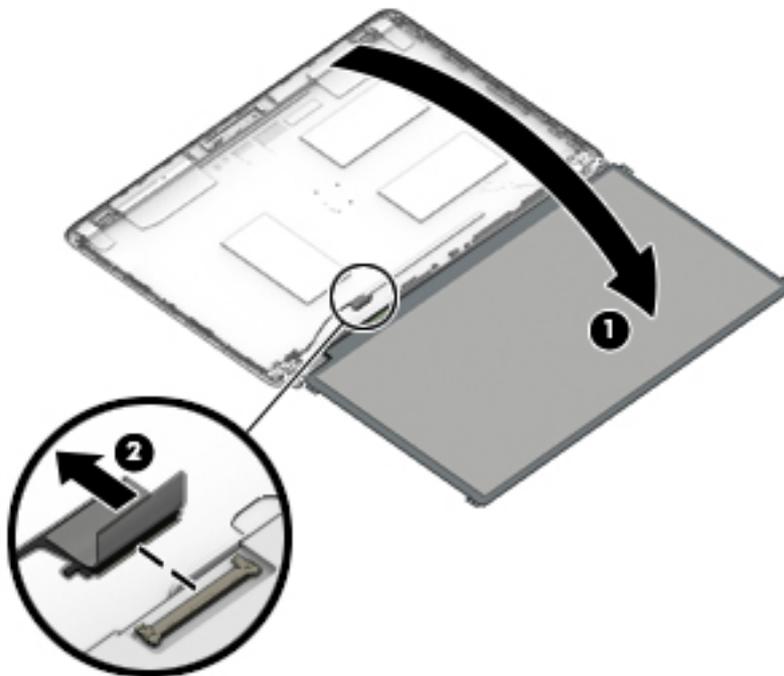
The webcam module is available using spare part number 821676-001. The microphone module is available using spare part number 821168-001.



9. If it is necessary to remove the display panel from the enclosure, remove the 4 Phillips PM2.0×3.0 screws that secure the panel to the display enclosure, and then lift the top of the panel upward.
- The raw display panel is available using spare part number 823951-001.



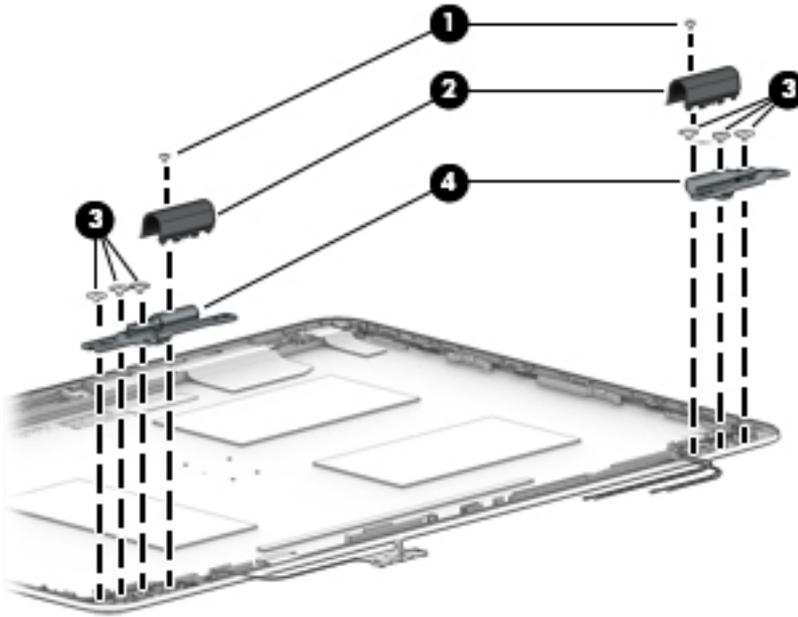
10. Rotate the display panel all the way over (1), disconnect the display cable from the rear of the panel (2), and then remove the display panel from the enclosure.



11. If it is necessary to replace the display hinges, remove the 1 Phillips PM2.0×3.0 screw (1) that secure the hinge covers to the display enclosure, and then remove the hinge covers (2).

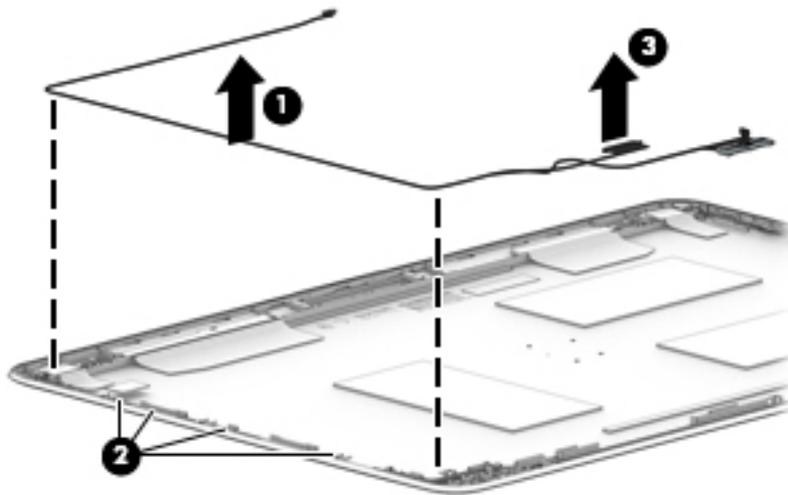
12. Remove the 6 Phillips PM2.5x2.5 screws that secure the hinges to the display enclosure (3), and then remove the display hinges from the display enclosure (4).

Display hinges are available in the Display Hinge Kit using spare part number 821166-001.



13. If it is necessary to replace the display/webcam cable, lift the display/webcam cable assembly (1) from the routing (2) and disconnect the cable if needed (3).

The display cable is available in the Cable Kit using spare part number 821174-001.



Reverse this procedure to reassemble and install the display assembly.

Top cover

Description	Spare part number
Top cover	821173-001

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. Disconnect all external devices connected to the computer.
3. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
4. Remove all other components.

Reverse this procedure to install the top cover.

7 Computer Setup (BIOS) and MultiBoot

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

 **NOTE:** An external keyboard or mouse connected to a USB port can be used with Computer Setup only if USB legacy support is enabled.

To start Computer Setup, follow these steps:

1. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press **f10** to enter Computer Setup.

Navigating and selecting in Computer Setup

To navigate and select in Computer Setup, follow these steps:

1. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.

 **NOTE:** You can use either a pointing device (TouchPad, pointing stick, or USB mouse) or the keyboard to navigate and make selections in Computer Setup.

2. Press **f10** to enter 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 menus, choose one of the following methods:

- To exit Computer Setup menus without saving your changes:
Click the **Exit** icon in the lower-right corner of the screen and then follow the on-screen instructions.
– or –
Use the arrow keys to select **Main**, select **Ignore Changes and Exit**, and then press **enter**.
- To save your changes and exit Computer Setup menus:

Click the **Save** icon in the lower-right corner of the screen and then follow the on-screen instructions.

– or –

Use the arrow keys to select **Main**, select **Save Changes and Exit**, and 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. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press **f10** to enter Computer Setup.
3. Use a pointing device or the arrow keys to select **Main** and then select **Restore Defaults**.
4. Follow the on-screen instructions.
5. To save your changes and exit, click the **Save** icon in the lower-right corner of the screen and then follow the on-screen instructions.

– or –

Use the arrow keys to select **Main**, select **Save Changes and Exit**, and then press **enter**.

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.

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

Determining the BIOS version

To determine whether available BIOS updates contain later BIOS versions than those currently installed on the computer, you need to know the version of the system BIOS currently installed.

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

1. Start Computer Setup.
2. Use a pointing device or the arrow keys to select **Main** and then select **System Information**.
3. To exit Computer Setup without saving your changes, click the **Exit** icon in the lower-right corner of the screen and then follow the on-screen instructions.

– or –

Use the arrow keys to select **Main**, select **Ignore Changes and Exit**, and then press **enter**.

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. To access HP Support, go to <http://www.hp.com/support>, and select your country. Select **Drivers & Downloads**, and then follow the on-screen instructions to access BIOS downloads.
2. At the BIOS 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.

If the update is more recent than your BIOS, 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 revealed on the screen after the download is complete. If no instructions are revealed, follow these steps:

1. Select **Start** and then select **Computer**.
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 on your hard drive 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.

Using MultiBoot

About the boot device order

As the computer starts, the system attempts to boot from enabled devices. The MultiBoot utility, which is enabled at the factory, controls the order in which the system selects a boot device. Boot devices can include optical drives, diskette drives, a network interface card (NIC), hard drives, and USB devices. Boot devices contain bootable media or files that the computer needs to start and operate properly.



NOTE: Some boot devices must be enabled in Computer Setup before they can be included in the boot order.

You can change the order in which the computer searches for a boot device by changing the boot order in Computer Setup. You can also press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen, and then press **f9**. Pressing **f9** displays a menu that shows the current boot devices and allows you to select a boot device. Or, you can use MultiBoot Express to set the computer to prompt you for a boot location each time the computer turns on or restarts.

Choosing MultiBoot preferences

You can use MultiBoot in the following ways:

- To set a new boot order that the computer uses each time it is turned on, by changing the boot order in Computer Setup.
- To dynamically choose the boot device, by pressing **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen, and then pressing **f9** to enter the Boot Device Options menu.
- To use MultiBoot Express to set variable boot orders. This feature prompts you for a boot device each time the computer is turned on or restarted.

Setting a new boot order in Computer Setup

To start Computer Setup and set a boot device order that the computer uses each time it is turned on or restarted, follow these steps:

1. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press **f10** to enter Computer Setup.
3. Use a pointing device or the arrow keys to select the **Legacy Boot Order** list, and then press **enter**.
4. To move the device up in the boot order, use a pointing device to select the up arrow or press the **+** key.
– or –
To move the device down in the boot order, use a pointing device to select the down arrow or press the **-** key.
5. To save your changes and exit Computer Setup, click the **Save** icon in the lower-left corner of the screen and then follow the on-screen instructions.
– or –
Use the arrow keys to select **Main**, select **Save Changes and Exit**, and then press **enter**.

Dynamically choosing a boot device using the f9 prompt

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

1. Open the Select Boot Device menu by turning on or restarting the computer, and then pressing **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press **f9**.
3. Use a pointing device or the arrow keys to select a boot device, then press **enter**.

Setting a MultiBoot Express prompt

To start Computer Setup and set the computer to display the MultiBoot startup location menu each time the computer is started or restarted, follow these steps:

1. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
2. Press **f10** to enter Computer Setup.
3. Use a pointing device or the arrow keys to select **System Configuration**, select **Boot Options**, and then press **enter**.
4. In the **MultiBoot Express Popup Delay (Sec)** field, enter the length of time in seconds that you want the computer to display the startup location menu before it defaults to the current MultiBoot setting. (When 0 is selected, the Express Boot startup location menu is not displayed.)
5. To save your changes and exit Computer Setup, click the **Save** icon in the lower-left corner of the screen and then follow the on-screen instructions.

– or –

Use the arrow keys to select **Main**, select **Save Changes and Exit**, and then press **enter**.

Your changes go into effect when the computer restarts.

Entering MultiBoot Express preferences

When the Express Boot menu is displayed during startup, you have the following choices:

- To specify a boot device from the Express Boot menu, select your preference within the allotted time, and then press **enter**.
- To prevent the computer from defaulting to the current MultiBoot setting, press any key before the allotted time expires. The computer will not start until you select a boot device and press **enter**.
- To allow the computer to start according to the current MultiBoot settings, wait for the allotted time to expire.

Using HP Sure Start (select models only)

Select computer models are configured with HP Sure Start, a technology that continuously 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>, and select your country. Select **Drivers & Downloads**, and then follow the on-screen instructions.

8 Using HP PC Hardware Diagnostics (UEFI)

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

When HP PC Hardware Diagnostics (UEFI) detects a failure that requires hardware replacement, a 24-digit Failure ID is generated. This ID can then be provided to support to help determine how to correct the problem.

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 drive



NOTE: To download the HP PC Hardware Diagnostics (UEFI) tool to a USB drive, see [Downloading HP PC Hardware Diagnostics \(UEFI\) to a USB device on page 61](#).

- b. Hard drive (not applicable)
- c. BIOS

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



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

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



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 offered.

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

Download the latest UEFI version

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

Download any version of UEFI for a specific product

1. Go to <http://www.hp.com/support>, and then select your country. The HP Support page is displayed.
2. Click **Drivers & Downloads**.
3. Use the categories listed to find your product.

– or –

Click **Find Now** to let HP automatically detect your product.

4. Select your computer, and then select your operating system.
5. In the **Diagnostic** section, follow the on-screen instructions to select and download the UEFI version you want.

9 Device management

The HP mt42 Mobile Thin Client includes a license for HP Device Manager and has a Device Manager agent pre-installed. HP Device Manager is an optimized management tool used to manage the full life cycle of HP products 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 HP mt42 Mobile Thin Client with other management tools such as Microsoft SCCM or LANDesk, go to www.hp.com/go/clientmanagement for more information.

10 Diagnostics and troubleshooting

Lights

Light	Status
Power Light Off	When the unit is plugged into the wall socket and the power light is off, the unit is powered off. However, the network can trigger a Wake On LAN event in order to perform management functions.
Power Light On	Displays during boot sequence and while the unit is on. During boot sequence, hardware initialization is processed and startup tests are performed on the following: <ul style="list-style-type: none">• Processor initialization• Memory detection and initialization• Video detection and initialization <p>NOTE: If one of the tests fails, the unit will simply stop, but the light will stay on. If the video test fails, the unit beeps. There are no messages sent to video for any of these failed tests.</p> <p>NOTE: After the video is initialized, anything that fails will have an error message.</p>
NOTE: RJ-45 Lights – Blinking green indicates network activity, and amber indicates a 100MB speed connection.	
IDE Light is Off	When the unit is powered on and the flash activity light is off, then there is no access to the system flash.
IDE Light blinks white	Indicates the system is accessing the internal IDE flash.

Wake-on LAN

Wake-on LAN (WOL) allows a computer to be turned on or resumed from sleep or hibernation state by a network message. You can enable or disable WOL in Computer Setup using the **S5 Maximum Power Savings** setting.

To enable or disable WOL:

1. Turn on or restart the computer.
2. Press either **Esc** or **F10** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.



NOTE: If you do not press **Esc** or **F10** at the appropriate time, you must restart the computer and again press **Esc** or **F10** when the monitor light turns green to access the utility.

3. If you pressed **Esc**, press **F10** to enter Computer Setup.
4. Navigate to **Advanced > Built-in Device Options**.
5. Under **Wake-on LAN**, select the appropriate WOL setting.
6. Press **F10** to accept any changes.
7. Select **Main > Save Changes and Exit**.

Power-on sequence

At power-on, the flash boot block code initializes the hardware to a known state, then performs basic power-on diagnostic tests to determine the integrity of the hardware. Initialization performs the following functions:

1. Initializes CPU and memory controller.
2. Initializes and configures all PCI devices.
3. Initializes VGA software.
4. Initializes the video to a known state.
5. Initializes USB devices to a known state.
6. Performs power-on diagnostics. For more information, see “Power-On Diagnostic Tests”.
7. The unit boots the operating system.

Power-on diagnostic tests

The Power-on diagnostics performs basic integrity tests of the hardware to determine its functionality and configuration. If a diagnostic test fails during hardware initialization the unit simply stops. There are no messages sent to video.



NOTE: You may try to restart the unit and run through the diagnostic tests a second time to confirm the first shutdown.

The following table lists the tests that are performed on the unit.

Test	Description
Boot Block Checksum	Tests boot block code for proper checksum value
DRAM	Simple write/read pattern test of the first 640k of memory
Serial Port	Tests the serial port using simple port verification test to determine if ports are present
Timer	Tests timer interrupt by using polling method
RTC CMOS battery	Tests integrity of RTC CMOS battery
NAND flash device	Tests for proper NAND flash device ID present

Troubleshooting

Basic troubleshooting

If the computer is experiencing operating problems or will not power on, review the following items.

Issue	Procedures
The computer unit is experiencing operating problems.	Ensure that the following connectors are securely plugged into the computer: Power connector, keyboard, mouse, network RJ-45 connector, monitor
The computer does not power on.	<ol style="list-style-type: none">1. Verify that the power supply is good by installing it on a known working unit and testing it. If the power supply does not work on the test unit, replace the power supply.

Issue	Procedures
The computer powers on and displays a splash screen, but does not connect to the server.	<ol style="list-style-type: none"> 2. If the unit does not work properly with the replaced power supply, have the unit serviced. <ol style="list-style-type: none"> 1. Verify that the network is operating and the network cable is working properly. 2. Verify that the unit is communicating with the server by having the System Administrator ping the unit from the server: <ul style="list-style-type: none"> — If the computer pings back, then the signal was accepted and the unit is working. This indicates a configuration issue. — If the computer does not ping back and the computer does not connect to the server, re-image the unit.
No link or activity on the network RJ-45 lights or the lights do not illuminate blinking green after powering on the computer. (The network lights are located inside the RJ-45 connector on the top, rear panel of the computer. Indicator lights are visible when the connector is installed.)	<ol style="list-style-type: none"> 1. Verify that the network is not down. 2. Make sure the RJ-45 cable is good by installing the RJ-45 cable onto a known working device—if a network signal is detected then the cable is good. 3. Verify the power supply is good by replacing the power cable to the unit with a known working power supply cable and testing it. 4. If network lights still do not light and you know the power supply is good, then re-image the unit. 5. If network lights still do not light, run the IP configuration procedure. 6. If network lights still do not light, have the unit serviced.
A newly connected unknown USB peripheral does not respond or USB peripherals connected prior to the newly connected USB peripheral will not complete their device actions.	An unknown USB peripheral may be connected and disconnected to a running platform as long as you do not reboot the system. If problems occur, disconnect the unknown USB peripheral and reboot the platform.

Configuring a PXE server

 **NOTE:** All PXE software is supported by authorized service providers on a warranty or service contract basis. Customers that call the HP Customer Service Center with PXE issues and questions should be referred to their PXE provider for assistance.

Additionally, refer to the following:

– For Windows 2008 R2: <http://technet.microsoft.com/en-us/library/7d837d88-6d8e-420c-b68f-a5b4baeb5248.aspx>

– For Windows 2012: <http://technet.microsoft.com/en-us/library/jj648426.aspx>

The services listed below must be running, and they may be running on different servers:

1. Domain Name Service (DNS)
2. Remote Installation Services (RIS)

 **NOTE:** Active Directory DHCP is not required, but is recommended.

11 Using HP ThinUpdate to restore the image

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.

HP ThinUpdate is preinstalled on some HP thin clients, and it is also available as an add-on at <http://www.hp.com/support> (search for the thin client model and see the **Drivers & software** section of the support page for that model).

- 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:
 - ThinPro: 8 GB
 - 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.

12 Adding an image restore tool

1. Ensure that the boot order is set to use the **Network** as the first boot device.
2. Ensure that IBR.exe (Image Restore) and Flash.dd are stored in the same directory on the server. (e.g., `c:\program files\altiris\express\deployment server\images`)
3. From the Altiris Deployment Server Console, click **File > New > Job** .
4. Enter a unique name for the job that you will use to deploy the original computer image.
5. Click the name of the new job.
6. Near the upper-right side of the screen, click **Add**.
7. Select **Run Script** from the menu.
8. Type [full path]`images\ibr\exe-y\images\flash.xx hd0`
9. Under **In which OS would you like to run this script?** Click **DOS**.
10. Click **Finish**.
11. You can now drag and drop the job onto the appropriate machine(s) or schedule it to run later, depending on your needs. Refer to the documentation for Altiris Deployment Solution (<http://www.altiris.com/support/documentation>) for more detailed information.

13 Power cord set requirements

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

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

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

Requirements for all countries

The following requirements are applicable to all countries and regions:

- The length of the power cord set must be at least **1.0 m** (3.3 ft) and no more than **2.0 m** (6.5 ft).
- All power cord sets must be approved by an acceptable accredited agency responsible for evaluation in the country or region where the power cord set will be used.
- The power cord sets must have a minimum current capacity of 10 amps and a nominal voltage rating of 125 or 250 V AC, as required by the power system of each country or region.
- The appliance coupler must meet the mechanical configuration of an EN 60 320/IEC 320 Standard Sheet C13 connector for mating with the appliance inlet on the back of the computer.

Requirements for specific countries and regions

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

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

1. The flexible cord must be Type H05VV-F, 3-conductor, 1.0-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.
2. The flexible cord must be Type SPT-3 or equivalent, No. 18 AWG, 3-conductor. The wall plug must be a two-pole grounding type with a NEMA 5-15P (15 A, 125 V) or NEMA 6-15P (15 A, 250 V) configuration.
3. The appliance coupler, flexible cord, and wall plug must bear a “T” mark and registration number in accordance with the Japanese Dentori Law. The flexible cord must be Type VCT or VCTF, 3-conductor, 1.00-mm² conductor size. The wall plug must be a two-pole grounding type with a Japanese Industrial Standard C8303 (7 A, 125 V) configuration.
4. The flexible cord must be Type RVV, 3-conductor, 0.75-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.
5. The flexible cord must be Type VCTF, 3-conductor, 0.75-mm² conductor size. Power cord set fittings (appliance coupler and wall plug) must bear the certification mark of the agency responsible for evaluation in the country or region where it will be used.

14 Statement of memory volatility

The purpose of this chapter is to provide general information regarding nonvolatile memory in HP Business PCs. 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 PC 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 PC 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 PC, including the nonvolatile memory found in Intel-based and AMD-based system boards.

1. Follow steps (a) through (j) 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 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.
 - b. Select **Main**, select **Restore Defaults**, and then select **Yes** to load defaults.
 - c. Select the **Security** menu, select **Restore Security Level Defaults**, and then select **Yes** to restore security level defaults.
 - d. 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.
 - e. If a DriveLock password is set, select the **Security** menu, and scroll down to **Hard Drive Tools** under the **Utilities** menu. Select **Hard Drive Tools**, select **DriveLock**, then clear the check box for **DriveLock password on restart**. Select **OK** to proceed.
 - f. If an Automatic DriveLock password is set, select the **Security** menu, scroll down to **Hard Drive Tools** under the **Utilities** menu. Select **Hard Drive Tools**, scroll down to **Automatic DriveLock**, then select the desired hard drive and disable protection. At the automatic drive lock warning screen, select **Yes** to continue. Repeat this procedure if more than one hard drive has an Automatic DriveLock password.
 - g. Select the **Main** menu, and then select **Reset BIOS Security to factory default**. Click **Yes** at the warning message.
 - h. Select the **Main** menu, select **Save Changes and Exit**, select **Yes** to save changes and exit, and then select **Shutdown**.

- i. 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.
 - j. 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 press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
 - b. Select the **Security** menu and scroll down to the **Utilities** menu.
 - c. Select **Hard Drive Tools**.
 - d. Under **Utilities**, select **Secure Erase**, select the hard drive storing the data you want to clear, and then follow the on-screen instructions to continue.
- or –
- Clear the contents of the drive by using the following Disk Sanitizer command steps:



IMPORTANT: If you clear data using Disk Sanitizer, it cannot be recovered.



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

- a. Turn on or restart the computer, and then press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
- b. Select the **Security** menu and scroll down to the **Utilities** menu.
- c. Select **Hard Drive Tools**.
- d. Under **Utilities**, select **Disk Sanitizer**, 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)	2 MBytes	No	Yes	Provides protected backup of critical System BIOS code, EC firmware, and critical PC configuration data for select platforms that support HP Sure Start. For more information, see Using HP Sure Start (select models only) on page 76.	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 and 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 PC. The specific write-protection method varies by memory vendor.
System BIOS	4 MBytes to 5 MBytes	Yes	Yes	Stores system BIOS code and PC 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 PC 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 , and select your country. Select Drivers &

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?
Intel Management Engine Firmware (present in only specific ZBook and EliteBook models. For more information, go to http://www.hp.com/support , and select your country. Select Drivers & Downloads , and then follow the on-screen instructions.)	1.5 MBytes or 5 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.	Downloads , and then follow the on-screen instructions. 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	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 usually not made available to the public unless a firmware upgrade is necessary to address a unique issue.
Web camera	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 usually not made available to the public unless a firmware upgrade is necessary to address a unique issue.
Fingerprint reader	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 press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
- b. Select **Main**, and then select **Restore defaults**.
- 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 PC. Third-party tools do exist that can write to the EEPROM when the memory module is not installed in a PC. 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 PC 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 press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
- b. Select **Main**, and then select **Reset BIOS Security to Factory Default**.
- 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 press **esc** while the “Press the ESC key for Startup Menu” message is displayed at the bottom of the screen.
- 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>, and select your country. Select **Drivers & Downloads**, and then follow the on-screen instructions.

15 Specifications

Input power

The power information in this section may be helpful if you plan to travel internationally with the computer.

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

The computer can operate on DC power within the following specifications.

Input Power	Rating
Operating voltage and current	19.5 V dc @ 2.31 A – 45 W
	19.5 V dc @ 3.33 A – 65 W

 **NOTE:** This product is designed for IT power systems in Norway with phase-to-phase voltage not exceeding 240 V rms.

 **NOTE:** The computer operating voltage and current can be found on the system regulatory label.

Operating environment

Factor	Metric	U.S.
Temperature		
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 (noncondensing)		
Operating	10% to 90%	10% to 90%
Nonoperating	5% to 95%	5% to 95%
Maximum altitude (unpressurized)		
Operating	-15 m to 3,048 m	-50 ft to 10,000 ft
Nonoperating	-15 m to 12,192 m	-50 ft to 40,000 ft

16 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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