HP Chromebook (model numbers 14-ak000 through 14-ak099)
HP Chromebook 14 G4

Maintenance and Service Guide
IMPORTANT! This document is intended for HP authorized service providers only.

First Edition: September 2015

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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.

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).

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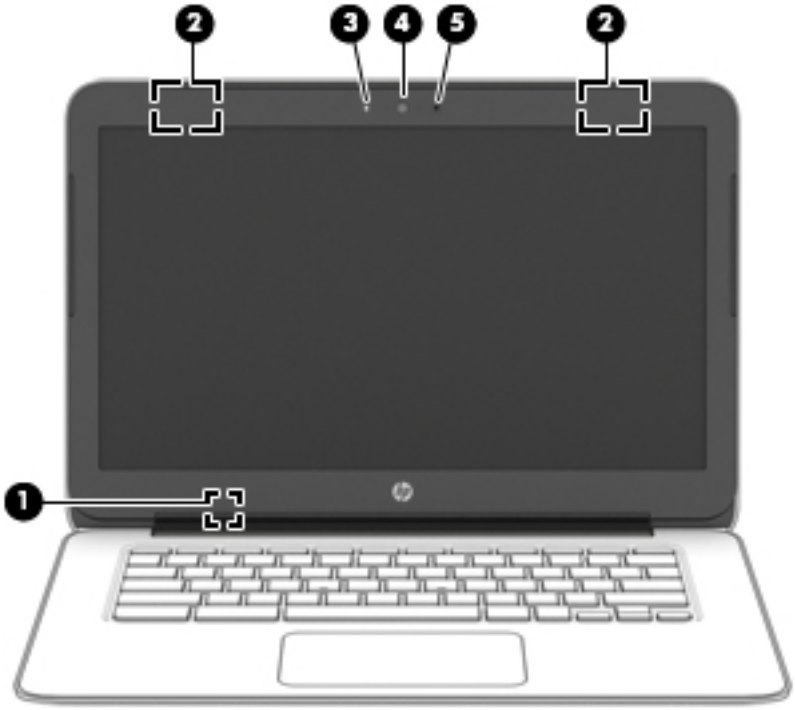
1 Product description

Category	Description
Product Name	HP Chromebook (model numbers 14-ak000 through 14-ak099) HP Chromebook 14 G4
Processor	Intel Celeron N2940 (1.83GHz, turbo up to 2.25GHz), 1333MHz/1MB L2, Quad SDP4.5W, BGA Intel Celeron N2840 (2.16GHz, turbo up to 2.58GHz), 1333MHz/1MB L2, Dual SDP4.5W, BGA
Chipset	Integrated SoC processor controller hub (PCH) for use on all computer models
Graphics	**Internal Graphics**: Intel HD graphics Support for HD decode, DX11, and HDMI
Panel	**Non-touch** 14.0-in, high-definition (HD), WLED, anti-glare (1366×768), flat (3.6 mm), SVA, 220 nits typical brightness 14.0-in full high-definition (FHD), WLED, anti-glare (1920x1080), slim (3.0 mm), UWVA, 220 nits, eDP, 220 nits typical brightness * FHD panel requires N2940 processor and 4G memory.
Memory	**Onboard system memory** Supports up to 4096-MB maximum on-board system memory DDR3L-1600 single channel support (DDR3L-1600 downgrade to DDR3L-1333) (for 2 GB memory) DDR3L-1600 dual channel support (DDR3L-1600 downgrade to DDR3L-1333) (for 4 GB memory)
Storage	Supports 16- and 32-GB embedded MultiMedia Controller (eMMC)
Audio and video	HP TrueVision HD slim webcam, 1280×720 by 30 frames per second; fixed (no tilt), with activity LED Single digital microphone with appropriate echo-cancellation, noise-suppression software Two speakers HD audio
Wireless	**Integrated wireless local area network (WLAN) options with dual antennas** Intel Dual Band Wireless-AC 7260 802.11 ac 2x2 WiFi + BT 4.0 Combo Adapter Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n 2x2 WiFi + BT 4.0 combo
External media cards	**HP Multi-Format Digital Media Card Reader** Supports micro SD/SDHC/SDXC up to UHS-I Push-Push Insertion/Removal
Ports	AC Smart Pin adapter plug (4.5 mm barrel) Headphone/microphone combo jack HDMI v1.4b supporting up to 1920×1080 @ 60Hz USB 3.0 port (1)

Category	Description
	USB 2.0 ports (2)
Keyboard/pointing devices	Full-sized, textured, island-style, Google keyboard (black) for use only on HP Chromebook 14 G4
	Full-sized, textured, island-style, Google keyboard (white) for use only on HP Chromebook 14
	Touchpad requirements:
	Multitouch gestures enabled
	Taps enabled as default
Power requirements	**Battery**
	Support for a 3-cell, 37-WHr battery
	AC adapters
	65-W, EM (for India and the People's Republic of China)
	45-W AC adapter (not for India or the People's Republic of China)
	1.0 meter power cord
Operating system	**Preinstalled:** Google Chrome operating system
Serviceability	**End user replaceable part:** AC adapter

2 External component identification

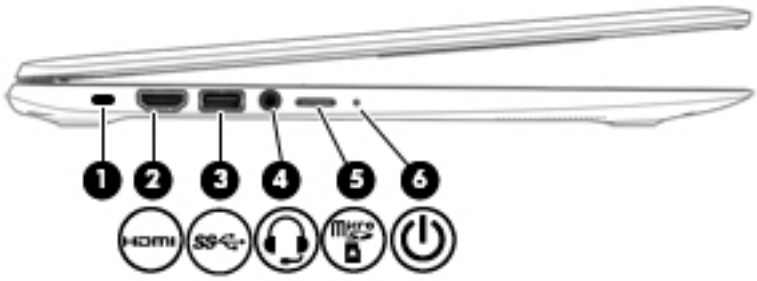
Display



Component		Description
(1)	Internal display switch	Turns off the display and initiates Sleep if the display is closed while the power is on. **NOTE:** The internal display switch is not visible from the outside of the computer.
(2)	WLAN antennas*	Send and receive wireless signals to communicate with wireless local area networks (WLANs). **NOTE:** The position of the WLAN antennas may differ, depending on model.
(3)	Internal microphone	Records sound.
(4)	Webcam	Records video, captures still photographs, and allows video conferences and online chat by means of streaming video.
(5)	Webcam light	On: The webcam is in use.

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

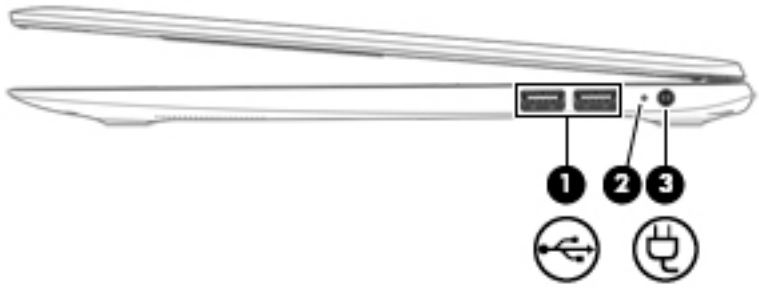
Left side



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)	HDMI	HDMI port	Connects an optional video or audio device, such as a high-definition television, any compatible digital or audio component, or a high-speed High-Definition Multimedia Interface (HDMI) device.
(3)	SS	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 cell phones and MP3 players, even when the computer is off.
(4)		Audio-out (headphone)/Audio-in (microphone) jack	Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. Also connects an optional headset microphone. This jack does not support optional microphone-only devices. **WARNING!** To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. **NOTE:** When a device is connected to the jack, the computer speakers are disabled. **NOTE:** Be sure that the device cable has 4-conductor connector that supports both audio-out (headphone) and audio-in (microphone).
(5)		Micro memory card reader	Reads optional memory cards that store, manage, share, or access information. To insert a card: ▲ Hold the card label-side up, with connectors facing the slot, insert the card into the slot, and then push in on the card until it is firmly seated. To remove a card: ▲ Press in on the card it until it pops out.
(6)		Power light	• White: Computer is on. • Blinking white: Computer is in Sleep mode.

Component	Description
	• Off: The computer is off.

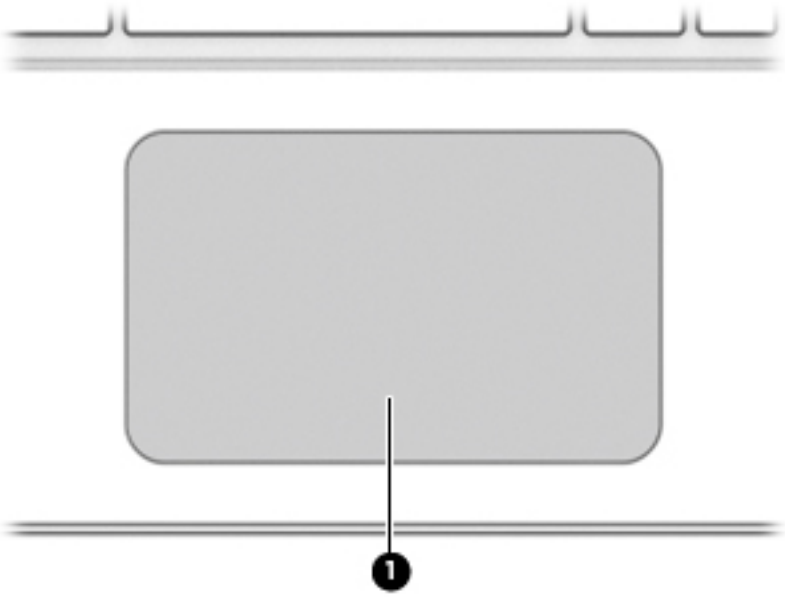
Right side



Component		Description
(1)	USB 2.0 ports	Connect optional USB devices, such as a keyboard, mouse, external drive, printer, scanner or USB hub.
(2)	AC adapter light	• White: The AC adapter is connected and the battery is charged. • Amber: The AC adapter is connected and the battery is charging. • Off: The computer is using battery power.
(3)	Power connector	Connects an AC adapter.

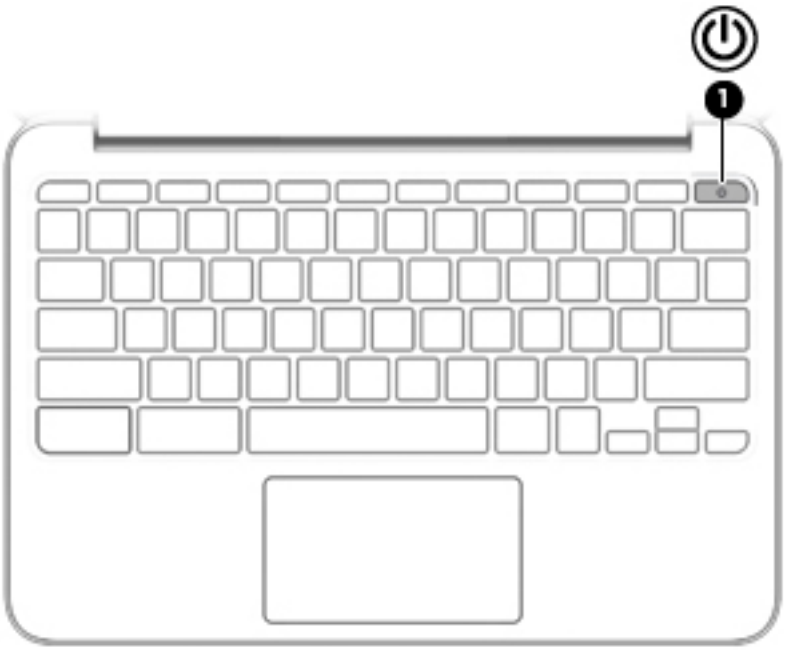
Top

TouchPad



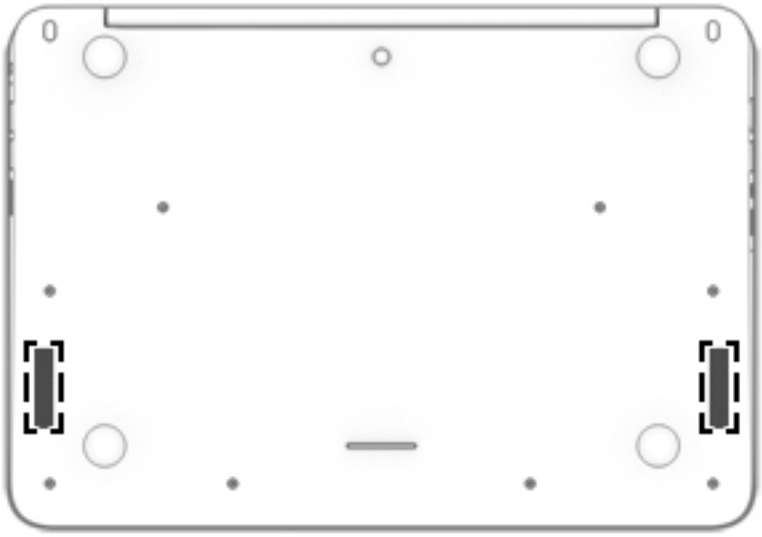
Component		Description
(1)	TouchPad zone	Moves the on-screen pointer and selects or activates items on the screen.

Buttons



Component		Description
(1)	Power button	• When the computer is off, press the button to turn on the computer. • When the computer is in the Sleep state, press the button briefly to exit Sleep. • When the computer is on and you want to lock the screen, press the power button until you see the sign-in screen appear. Pressing the power button during screen-lock mode turns off the computer. • When the computer is on and you want to turn it off, press and hold the power

Bottom



Component		Description
(1)	Speakers (2)	Produce sound.

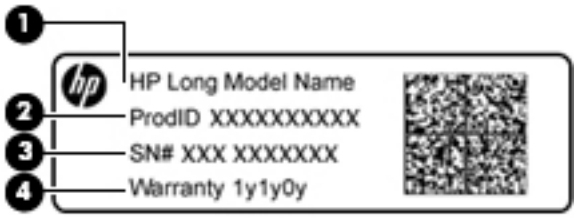
Labels

The labels affixed to the computer provide information you may need when you troubleshoot system problems or travel internationally with the computer.

IMPORTANT: All labels described in this section will be affixed to the bottom of the computer.

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

- Service label—Provides important information, including the following:



Component	
(1)	Model name (select products only)
(2)	Product number
(3)	Serial number
(4)	Warranty period

Have this information available when you contact support.

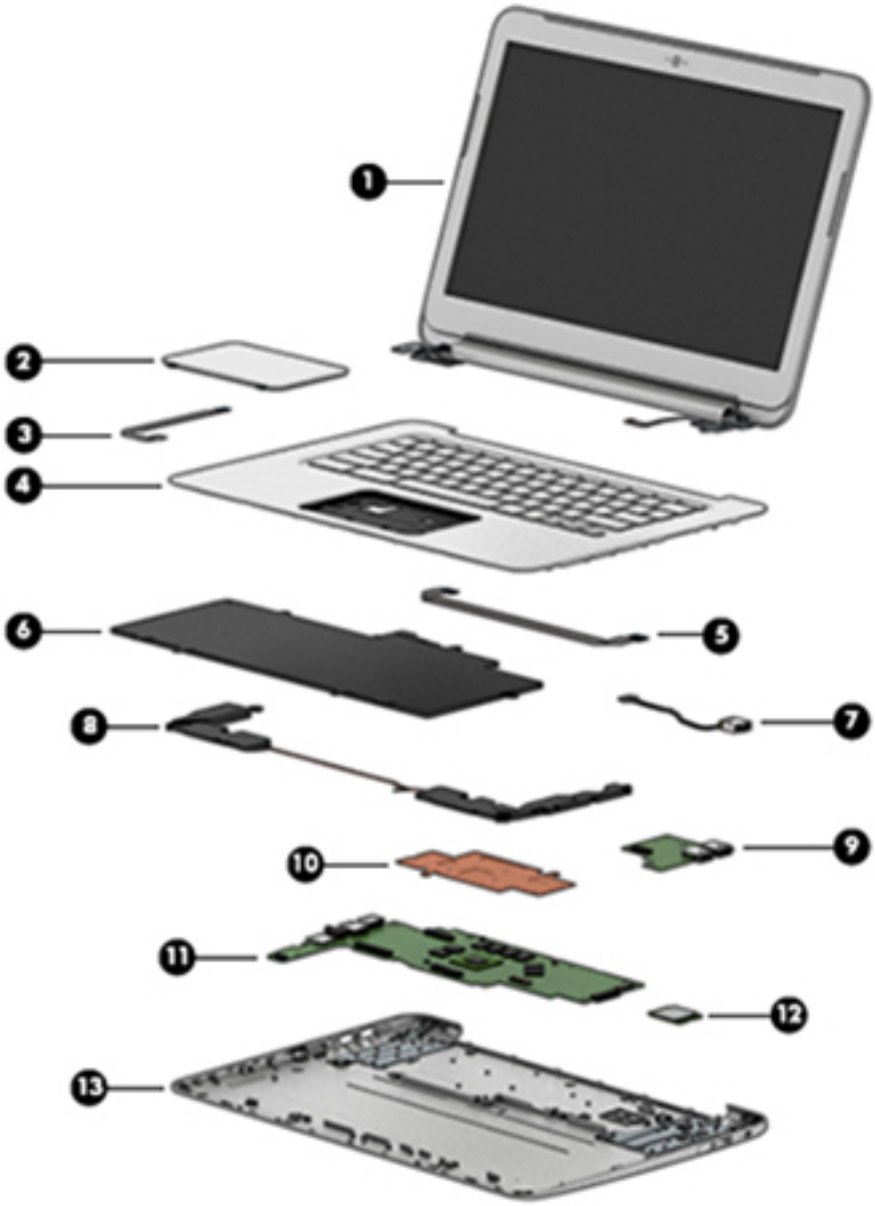
- Regulatory label—Provides regulatory information about the computer.
- Wireless certification label or labels—Provide information about optional wireless devices and the approval markings of some of the countries or regions in which the devices have been approved for use. If your computer model includes one or more wireless devices, one or more certification labels are included with your computer. You may need this information when traveling internationally.

3 Illustrated parts catalog

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

NOTE: Details about your computer, including model, serial number, product key, and length of warranty, are on the service tag at the bottom of your computer. See Labels on page 9 for details.

Computer major components

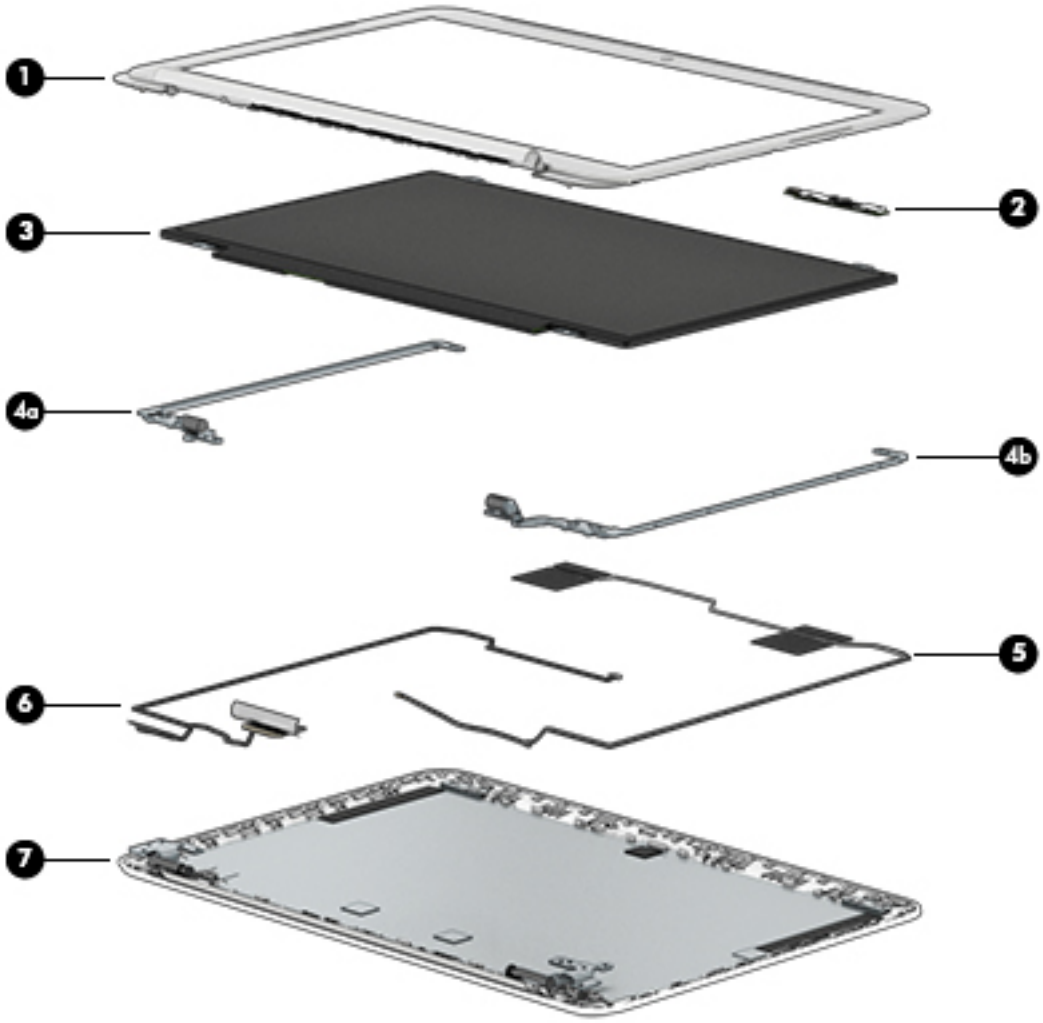


Item	Component	Spare part number
(1)	**Display assembly**: The display assembly is spared at the subcomponent level only. For display assembly spare part information, see Display assembly subcomponents on page 14.	
(2)	**TouchPad** (includes gasket)	
	For use in HP Chromebook 14 G4 models	830874-001
	For use in silver HP Chromebook models	830874-001
	For use in blue HP Chromebook models	835047-001
	For use in purple HP Chromebook models	835048-001
(3)	**Touchpad cable**	830870-001
(4)	**Keyboard/top cover** (includes keyboard cable):	
	HP Chromebook 14 G4 models in silver finish:	
	• For use in Belgium	834913-A41
	• For use in Canada	834913-DB1
	• For use in the Czech Republic and Slovakia	834913-FL1
	• For use in Denmark, Finland, and Norway	834913-DH1
	• For use in France	834913-051
	• For use in Germany	834913-041
	• For use in India	834913-D61
	• For use in Israel	834913-BB1
	• For use in Italy	834913-061
	• For use in Japan	834913-291
	• For use in Latin America	834913-161
	• For use in the Netherlands	834913-B31
	• For use in Russia	834913-251
	• For use in Saudi Arabia	834913-171
	• For use in Spain	834913-071
	• For use in Switzerland	834913-BG1
	• For use in Taiwan	834913-AB1
	• For use in Thailand	834913-281
	• For use in the United Kingdom and Singapore	834913-031
	• For use in the United States	834913-001
	HP Chromebook models with silver finish:	
	• For use in Belgium	830878-A41
	• For use in Canada	830878-DB1
	• For use in Denmark, Finland, and Norway	830878-DH1

Item	Component	Spare part number
	• For use in France	830878-051
	• For use in Germany	830878-041
	• For use in Italy	830878-061
	• For use in the Netherlands	830878-B31
	• For use in Russia	830878-251
	• For use in Spain	830878-071
	• For use in Switzerland	830878-BG1
	• For use in the United Kingdom and Singapore	830878-031
	• For use in the United States for use only on HP Chromebook 14 PC	830878-001
	HP Chromebook models with blue finish:	
	• For use in Belgium	830879-A41
	• For use in Canada	830879-DB1
	• For use in Denmark, Finland, and Norway	830879-DH1
	• For use in France	830879-051
	• For use in Germany	830879-041
	• For use in Italy	830879-061
	• For use in the Netherlands	830879-B31
	• For use in Russia	830879-251
	• For use in Spain	830879-071
	• For use in Switzerland	830879-BG1
	• For use in the United Kingdom and Singapore	830879-031
	• For use in the United States	830879-001
	HP Chromebook models with purple finish:	
	• For use in Belgium	830880-A41
	• For use in Canada	830880-DB1
	• For use in Denmark, Finland, and Norway	830880-DH1
	• For use in France	830880-051
	• For use in Germany	830880-041
	• For use in Italy	830880-061
	• For use in the Netherlands	830880-B31
	• For use in Russia	830880-251
	• For use in Spain	830880-071
	• For use in Switzerland	830880-BG1
	• For use in the United Kingdom and Singapore	830880-031

Item	Component	Spare part number
	• For use in the United States	830880-001
(5)	**USB cable**	830869-001
(6)	**Battery** (3-cell, 37-WHr, 3.28-AHr, Li-ion)	816609-005
(7)	**Power connector cable**	841638-001
(8)	**Speakers** (includes left and right speakers and cables)	787723-001
(9)	**USB board** (includes cable and double-sided adhesive):	830873-001
(10)	**Heat sink** (includes alcohol pad, thermal tape, and thermal grease)	830871-001
(11)	**System board** (includes alcohol pad, thermal tape, and thermal grease)	
	For use in all models:	
	• System board equipped with a Intel Celeron N2940 processor, 4.0-GB of system memory, and 16-GB of eMMC primary storage	830019-001
	• System board equipped with a Intel Celeron N2840 processor, 4.0-GB of system memory, and 16-GB of eMMC primary storage	830018-001
	• System board equipped with a Intel Celeron N2840 processor, 2.0-GB of system memory, and 16-GB of eMMC primary storage	830017-001
	For use in HP Chromebook 14 G4 models:	
	• System board equipped with a Intel Celeron N2940 processor, 4.0-GB of system memory, and 32-GB of eMMC primary storage	839038-001
	• System board equipped with a Intel Celeron N2940 processor, 2.0-GB of system memory, and 32-GB of eMMC primary storage	839037-001
	• System board equipped with a Intel Celeron N2940 processor, 2.0-GB of system memory, and 16-GB of eMMC primary storage	839036-001
	• System board equipped with a Intel Celeron N2840 processor, 4.0-GB of system memory, and 32-GB of eMMC primary storage	839035-001
	• System board equipped with a Intel Celeron N2840 processor, 2.0-GB of system memory, and 32-GB of eMMC primary storage	839034-001
(12)	**WLAN module:**	
	Intel Dual Band Wireless-AC 7260 802.11 ac 2x2 WiFi + BT 4.0 Combo Adapter	784645-005
	Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n 2x2 WiFi + BT 4.0 combo adaptor	784647-005
(13)	**Base enclosure:**	
	For use in HP Chromebook models:	
	• Silver	830862-001
	• Blue	830863-001
	• Purple	830864-001
	For use in HP Chromebook 14 G4 models:	
	• Silver	834906-001

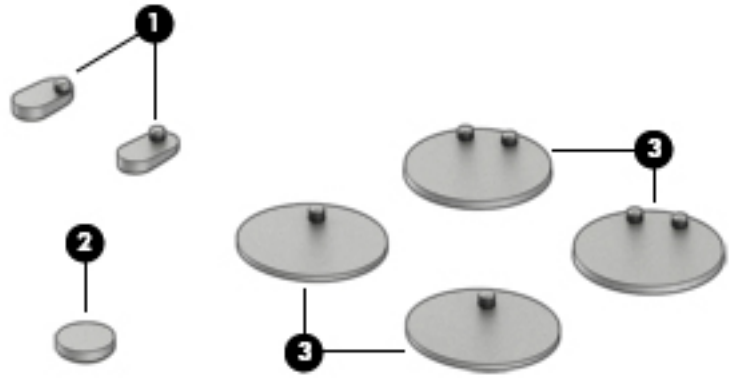
Display assembly subcomponents



Item	Description	Spare part number
(1)	**Display bezel** (includes Mylar)	
	For use in HP Chromebook 14 G4 models:	
	• Silver	834907-001
	For use in HP Chromebook models:	
	• Silver	830865-001
	• Blue	830866-001
	• Purple	830867-001
(2)	**Webcam/microphone module** (includes bezel Mylar)	
	For use in HP Chromebook 14 G4 models	834912-001
	For use in HP Chromebook models	830877-001
(3)	**Display panel (raw)** (includes bezel Mylar)	

Item	Description	Spare part number
	For use in models with HD displays	830015-001
	For use in models with FHD displays	830016-001
	Display Hinge Kit for in HP Chromebook 14 G4 models	834909-001
	Display Hinge Kit for in HP Chromebook models	830872-001
(4a)	Left hinge	
(4b)	Right hinge	
(5)	**Antenna cable** (includes bezel Mylar)	
	For use in HP Chromebook 14 G4 models	834904-001
	For use in HP Chromebook models	830858-001
(6)	**Display panel cable** (includes bezel Mylar)	
	For use in HP Chromebook 14 G4 models with HD displays	834908-001
	For use in HP Chromebook 14 G4 models with FHD displays	841682-001
	For use in HP Chromebook models with HD displays	830868-001
	For use in HP Chromebook models with FHD displays	841536-001
(7)	**Display rear cover** (includes bezel Mylar)	
	For use in HP Chomebook 14 G4 models:	
	• Silver	834905-001
	For use in HP Chomebook models:	
	• Silver	830859-001
	• Blue	830860-001
	• Purple	830861-001

Rubber Kit



Item	Description	Spare part number
	Rubber Kit for use in HP Chromebook 14 G4 models	834911-001
	Rubber Kit for use in HP Chromebook models	830875-001
(1)	Oval foot/screw covers	
(2)	Small foot/screw cover	
(3)	Large foot/screw cover	

Miscellaneous parts

Component	Spare part number
AC adapter	
65-W HP Smart AC adapter (non-PFC, EM, 4.5-mm) for use on all computer models	714657-001
45-W HP Smart AC adapter (non-PFC, RC, 4.5-mm) for use on all computer models	741727-001
Power cord (3-pin, 1.0-meter, black):	
For use in Australia for use on all computer models	755530-011
For use in Denmark for use on all computer models	755530-081
For use in Europe for use on all computer models	755530-021
For use in India for use on all computer models	755530-D61
For use in North America for use on all computer models	755530-001
For use in Switzerland for use on all computer models	755530-111
For use in the United Kingdom and Singapore for use on all computer models	755530-031
Rubber Kit (not illustrated, includes rubber feet/screw covers)	
For use in Chromebook 14 G4 models:	834911-001
For use in Chromebook models:	830875-001

Component	Spare part number
Screw Kit	830876-001
HP HDMI to VGA Adapter	701943-001
RJ-45 to USB adapter	539614-001

4 Removal and replacement preliminary requirements

Tools required

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

- Flat-bladed screw driver
- Magnetic screw driver
- Phillips P0 screw driver

Service considerations

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

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

Plastic parts

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

Cables and connectors

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

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

Drive handling

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

Before removing or inserting a 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.

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

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

Avoid exposing a drive to temperature extremes or liquids.

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

Grounding guidelines

Electrostatic discharge damage

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

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

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

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

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

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

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

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

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

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

Typical electrostatic voltage levels

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

Packaging and transporting guidelines

Follow these grounding guidelines when packaging and transporting equipment:

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

Workstation guidelines

Follow these grounding workstation guidelines:

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

Equipment guidelines

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

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

The following grounding equipment is recommended to prevent electrostatic damage:

- Antistatic tape
- Antistatic smocks, aprons, and sleeve protectors
- Conductive bins and other assembly or soldering aids
- Nonconductive foam
- Conductive computerop 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 Authorized Service Provider 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.

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.

Component replacement procedures

There are as many as 48 screws that must be removed, replaced, and/or loosened when servicing the computer. Make special note of each screw size and location during removal and replacement.

Keyboard/top cover

NOTE: The keyboard/top cover spare part kit includes the keyboard cable.

Description	Spare part number	Description	Spare part number
Keyboard/top cover in silver finish for use only on HP Chromebook 14 G4 models:			
For use in Belgium	834913-A41	For use in Latin America	834913-161
For use in Canada	834913-DB1	For use in the Netherlands	834913-B31
For use in the Czech Republic and Slovakia	834913-FL1	For use in Russia	834913-251
For use in Denmark, Finland, and Norway	834913-DH1	For use in Saudi Arabia	834913-171
For use in France	834913-051	For use in Spain	834913-071
For use in Germany	834913-041	For use in Switzerland	834913-BG1
For use in India	834913-D61	For use in Taiwan	834913-AB1
For use in Israel	834913-BB1	For use in Thailand	834913-281
For use in Italy	834913-061	For use in the United Kingdom and Singapore	834913-031
For use in Japan	834913-291	For use in the United States	834913-001
Keyboard/top cover in silver finish for use only on HP Chromebook models:			
For use in Belgium	830878-A41	For use in the Netherlands	830878-B31
For use in Canada	830878-DB1	For use in Russia	830878-251
For use in Denmark, Finland, and Norway	830878-DH1	For use in Spain	830878-071
For use in France	830878-051	For use in Switzerland	830878-BG1

Description	Spare part number	Description	Spare part number
For use in Germany	830878-041	For use in the United Kingdom and Singapore	830878-031
For use in Italy	830878-061	For use in the United States	830878-001
Keyboard/top cover in blue finish for use only on HP Chromebook models:			
For use in Belgium	830879-A41	For use in the Netherlands	830879-B31
For use in Canada	830879-DB1	For use in Russia	830879-251
For use in Denmark, Finland, and Norway	830879-DH1	For use in Spain	830879-071
For use in France	830879-051	For use in Switzerland	830879-BG1
For use in Germany	830879-041	For use in the United Kingdom and Singapore	830879-031
For use in Italy	830879-061	For use in the United States	830879-001
Keyboard/top cover in purple finish for use only on HP Chromebook models:			
For use in Belgium	830880-A41	For use in the Netherlands	830880-B31
For use in Canada	830880-DB1	For use in Russia	830880-251
For use in Denmark, Finland, and Norway	830880-DH1	For use in Spain	830880-071
For use in France	830880-051	For use in Switzerland	830880-BG1
For use in Germany	830880-041	For use in the United Kingdom and Singapore	830880-031
For use in Italy	830880-061	For use in the United States	830880-001

Before removing the disassembling the computer, follow these steps:

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

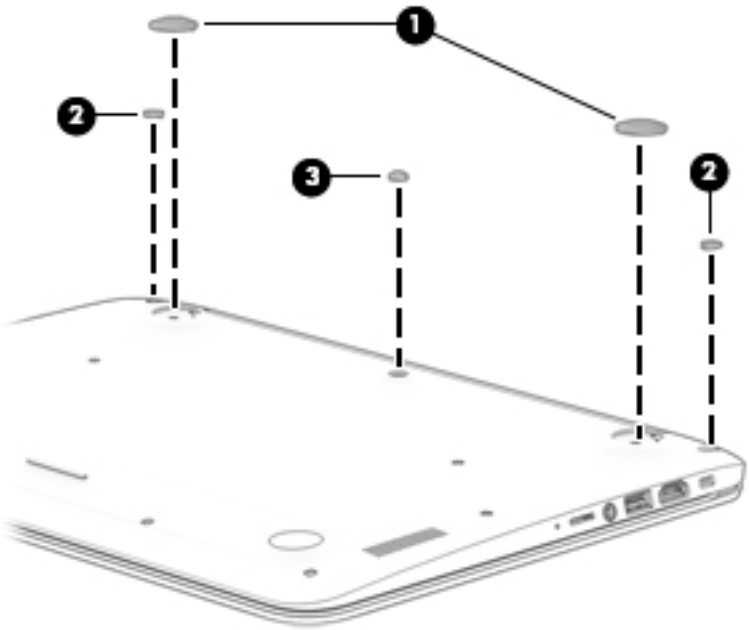
NOTE: When replacing the keyboard/top cover, be sure that the heat sink (see Heat sink on page 33) and TouchPad (see TouchPad on page 27) are removed from the defective keyboard/top cover and installed on the replacement keyboard/top cover.

Remove the keyboard/top cover:

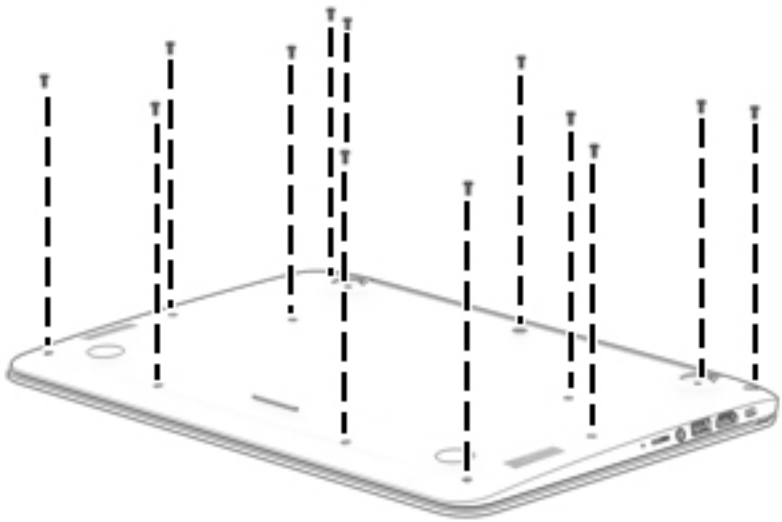
1. Close the computer.
2. Position the computer upside down with the front toward you.
3. Remove the two larger rubber feet/screw covers **(1)**.
4. Remove the two oval rubber feet/screw covers **(2).**

5. Remove the middle smaller rubber foot/screw cover **(3).**

NOTE: The feet/screw covers are included in the Rubber Kit, spare part number 834911-001 for use only on HP Chromebook 14 G4 models and 830875-001 for use only on HP Chromebook models.

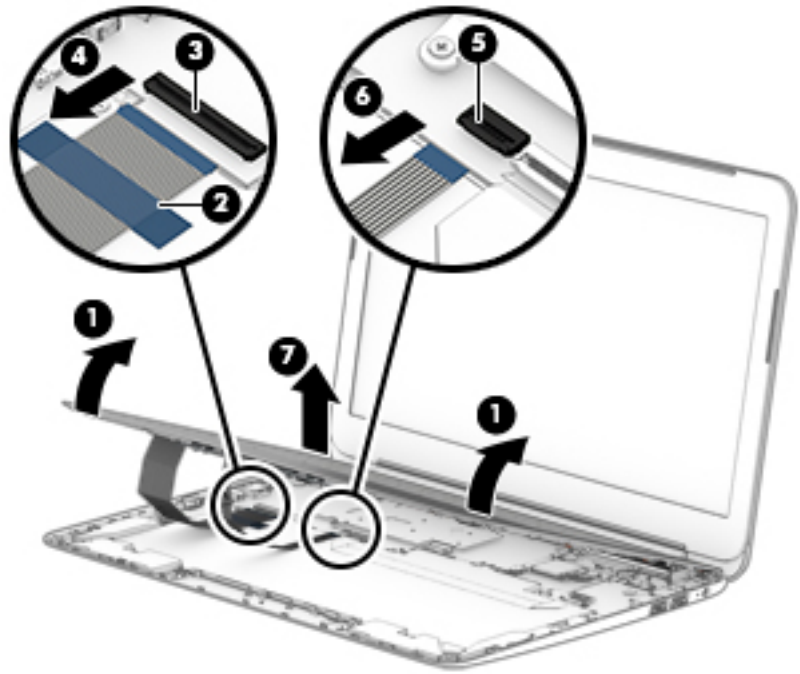


6. Remove the 13 Phillips PM2.0×5.0 screws that secure the keyboard/top cover to the base enclosure.



7. Turn the computer right side up with the front toward you.
8. Open the computer as far as it will open.
9. Lift the front edge **(1)** of the keyboard/top cover until it separates from the front edge of the base enclosure.
10. Lift the tape **(2)** that secures the keyboard cable.

11. Release the zero insertion force (ZIF) connector **(3)** to which the keyboard cable is attached, and then disconnect the keyboard cable **(4)** from the system board.
12. Release the ZIF connector **(5)** to which the TouchPad cable is attached, and then disconnect the TouchPad cable **(6)** from the system board.
13. Remove keyboard/top cover **(7)** by sliding it forward.



Reverse this procedure to install the keyboard/top cover.

TouchPad

Description	Spare part number
TouchPad for use in HP Chromebook 14 G4 models (includes gasket)	830874-001
TouchPad for use in silver HP Chromebook models (includes gasket)	830874-001
TouchPad for use in blue HP Chromebook models (includes gasket)	835047-001
TouchPad for use in purple HP Chromebook models (includes gasket)	835048-001
Touchpad cable	830870-001

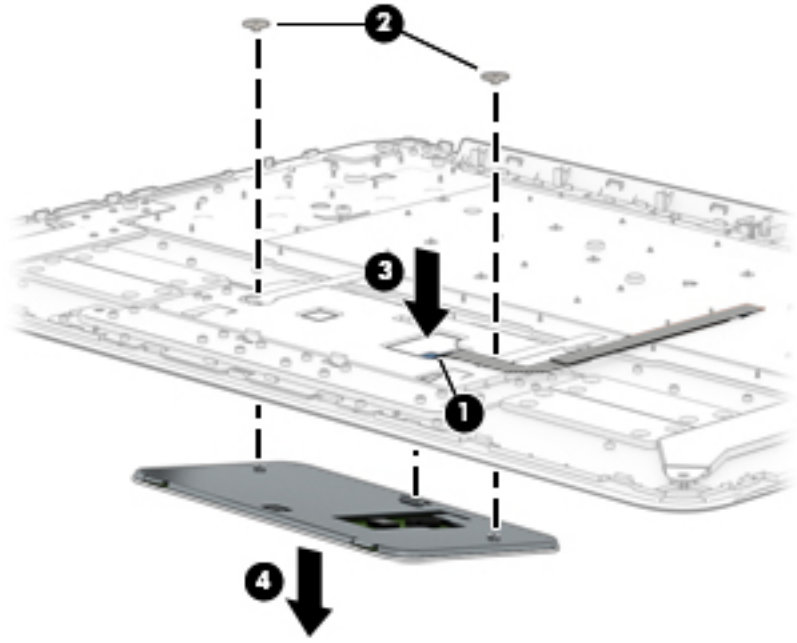
Before removing the TouchPad, follow these steps:

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 keyboard/top cover (see Keyboard/top cover on page 23).

Remove the TouchPad button board:

1. Position the keyboard/top cover upside down with the front toward you.
2. Detach the TouchPad cable **(1)** from the keyboard/top cover. (The TouchPad cable is attached to the keyboard/top cover with double-sided adhesive.)
3. Remove the two Phillips PM2.0×2.0 broad head screws **(2)** that secure the TouchPad to the keyboard/top cover.
4. Release the TouchPad **(3)** by pressing it through the opening in the keyboard/top cover.

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



Reverse this procedure to install the TouchPad.

Power connector cable

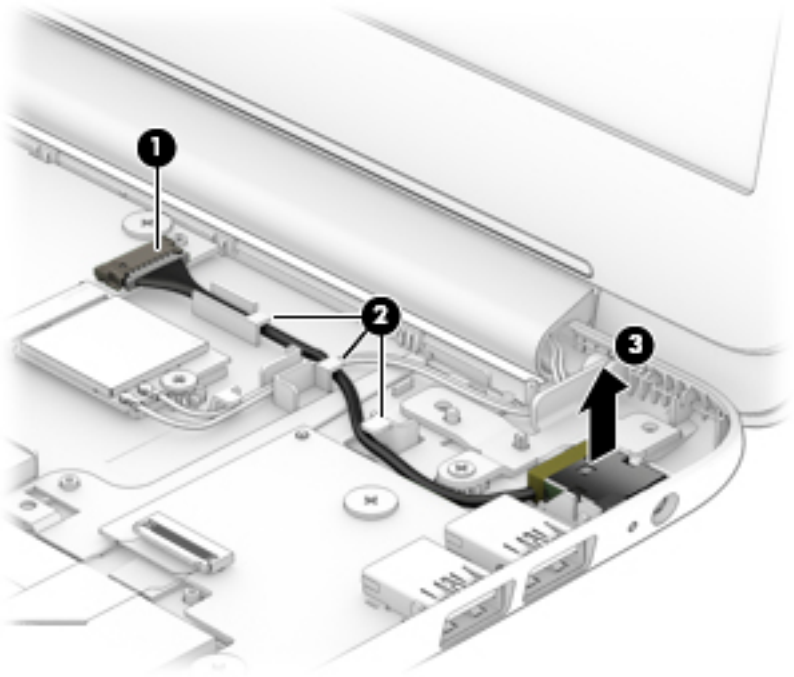
Description	Spare part number
Power connector cable	841638-001

Before removing the power connector cable, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the keyboard/top cover (see Keyboard/top cover on page 23).
5. Disconnect the battery cable from the system board (see Battery on page 42).

Remove the power connector cable:

1. Disconnect the cable **(1)** from the system board.
2. Release the cable from the routing clips **(2)** built into the base enclosure.
3. Remove the power connector cable **(3)**.



Reverse this procedure to install the power connector cable.

USB board

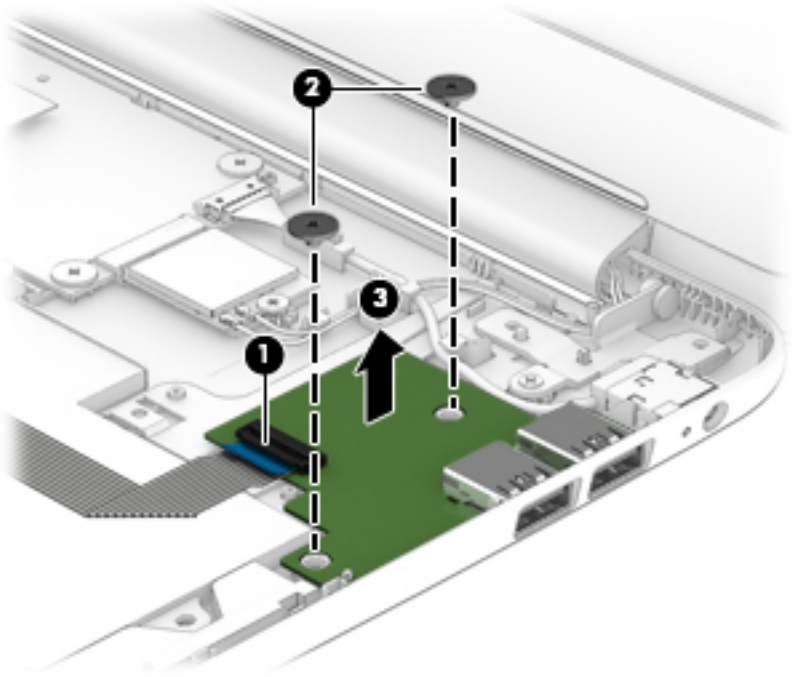
Description	Spare part number
USB board	830873-001
USB board cable	830869-001

Before removing the USB board, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the keyboard/top cover (see Keyboard/top cover on page 23).
5. Disconnect the battery cable from the system board (see Battery on page 42).

Remove the USB board:

1. Release the ZIF connector **(1)** to which the USB board ribbon cable is attached, and then disconnect the cable from the USB board.
2. Remove the two Phillips PM2.0×2.0 broad head screws **(2)** that secure the USB board to the base enclosure.
3. Remove the USB board **(3)**.



Reverse this procedure to install the USB board.

WLAN/Bluetooth combo card

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

Description	Spare part number
Intel Dual Band Wireless-AC 7260 802.11 ac 2x2 WiFi + BT 4.0 Combo Adapter	784645-005
Intel Dual Band Wireless-N 7260AN 802.11 a/b/g/n 2x2 WiFi + BT 4.0 combo adaptor	784647-005

Before removing the WLAN module, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the keyboard/top cover (see Keyboard/top cover on page 23).
5. Disconnect the battery cable from the system board (see Battery on page 42).

Remove the WLAN module:

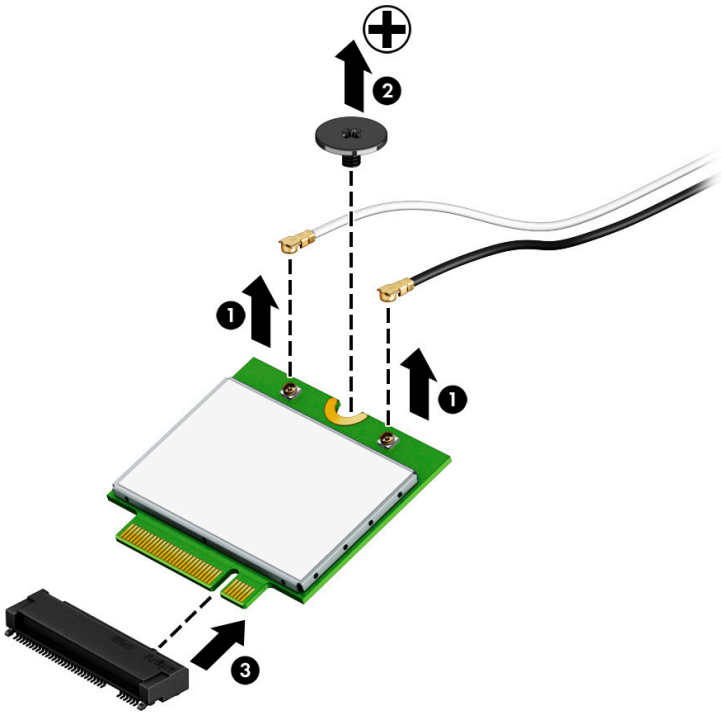
1. Disconnect the WLAN antenna cables **(1)** from the terminals on the WLAN module.

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

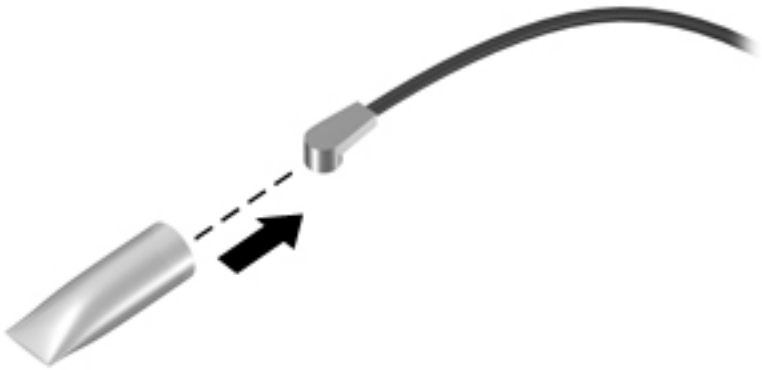
2. Remove the Phillips PM2.0×4.0 screw **(2)** that secures the WLAN module to the computer. (The edge of the module opposite the slot rises away from the computer.)

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

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



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



Reverse this procedure to install the WLAN module.

Heat sink

Description	Spare part number
Heat sink (includes alcohol pad, thermal tape, and thermal grease)	830871-001

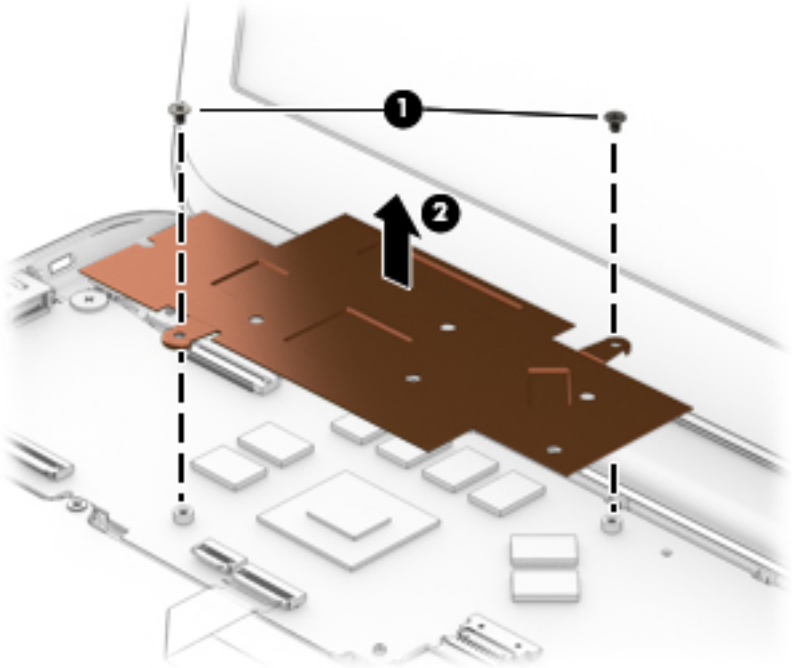
Before removing the heat sink, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the keyboard/top cover (see Keyboard/top cover on page 23).
5. Disconnect the battery cable from the system board (see Battery on page 42).

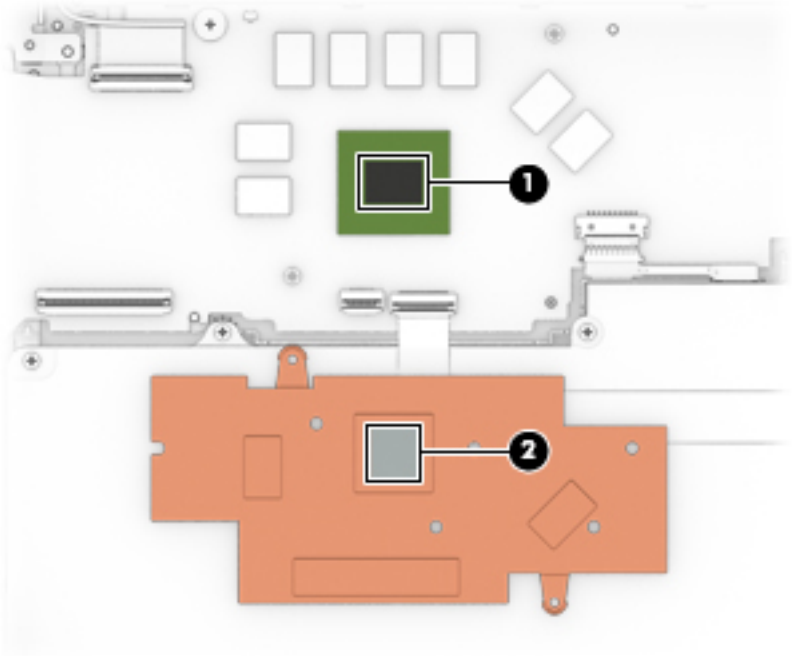
Remove the heat sink:

1. Remove the two Phillips PM2.0×2.0 screws **(1)** that secure the heat sink to the system board.

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



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



Reverse this procedure to install the heat sink.

Display assembly

Before removing the display assembly, follow these steps:

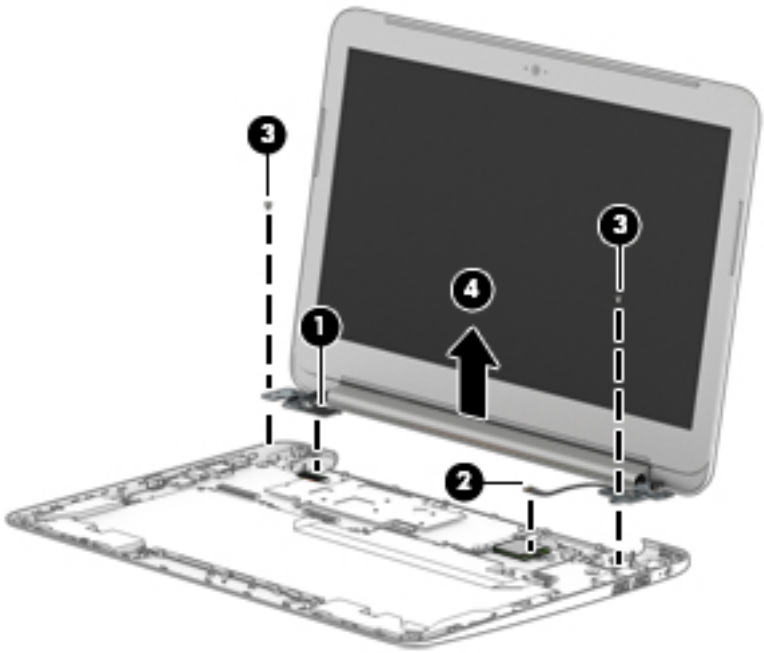
1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the keyboard/top cover (see Keyboard/top cover on page 23).
5. Disconnect the battery cable from the system board (see Battery on page 42).

Remove the display assembly:

1. Release the ZIF connector **(1)** to which the display panel cable is attached, and then disconnect the display panel cable from the system board.
2. Disconnect the wireless antenna cables **(2)** from the WLAN terminals on the system board and WLAN terminals on the WLAN module.

NOTE: The white WLAN antenna cable labeled “1/Main” connects to the system board “Main” terminal. The black WLAN antenna cable labeled “2/Aux” connects to the system board “Aux” terminal.

3. Remove the two Phillips 2.0×4.0 screws **(3)** that secure the display assembly to the base enclosure.
4. Remove the display assembly **(4)**.



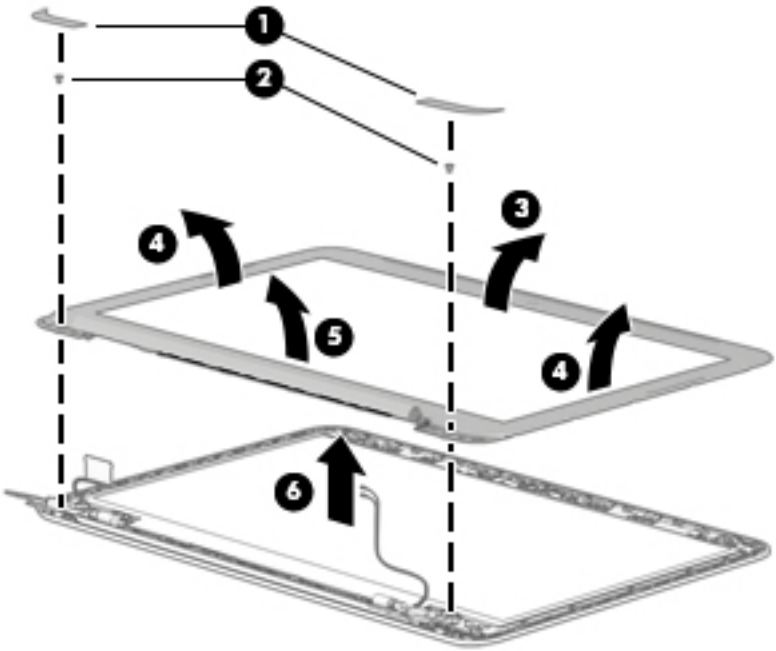
5. If it is necessary to replace the display enclosure or any of the display assembly subcomponents:
   a. Remove the two display bezel screw covers **(1)**.
   b. Remove the two Phillips PM2.0×2.0 broad head screws **(2)** that secure the display enclosure to the display panel assembly.

c. Using a flat plastic tool, separate the top edge of the display bezel from the enclosure **(3)**, then the left and right sides **(4)**, and then the bottom **(5)**. Remove the bezel from the display enclosure **(6)**.

NOTE: When lifting the bezel, make sure the mylar between the bezel and panel does not pull free from the panel.

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

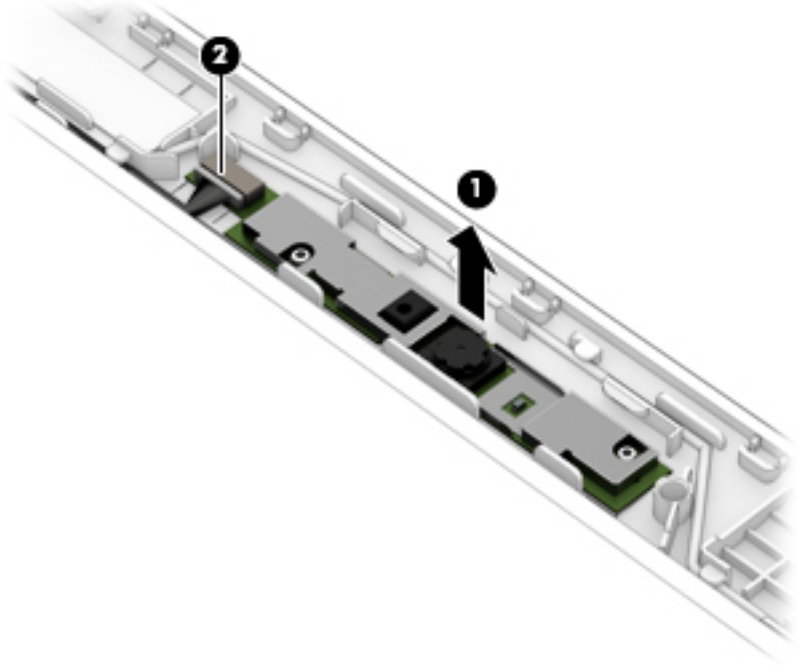
- 834907-001—For use on HP Chromebook 14 G4 models
- 830865-001—For use on silver HP Chromebook models
- 830866-001—For use on blue HP Chromebook models
- 830867-001—For use on purple HP Chromebook models



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

a. Detach the webcam/microphone module **(1)** from the display enclosure. (The webcam/microphone module is attached to the display enclosure with double-sided adhesive at two locations.)

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



c. Remove the webcam/microphone module.

The webcam/microphone module is available using spare part number 834912-001 for use on HP Chromebook 14 G4 models or 830877-001 for use on HP Chromebook models.

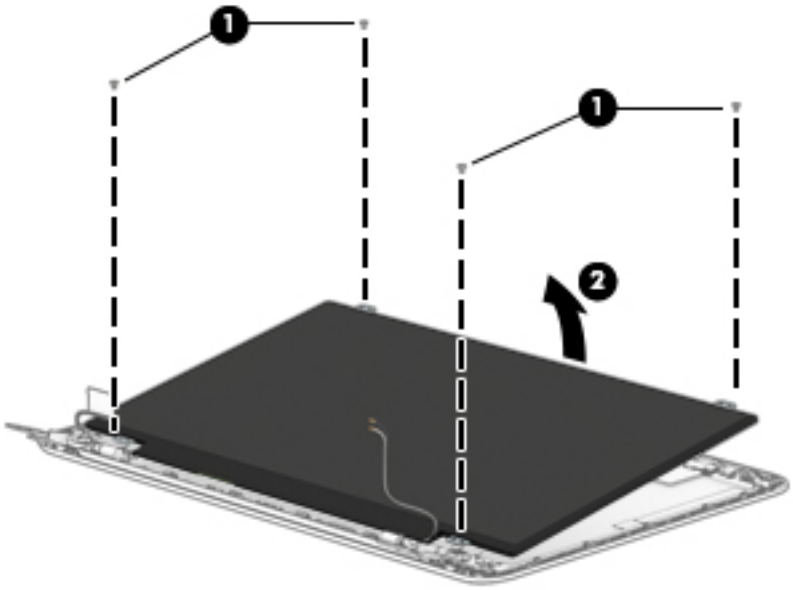
7. If it is necessary to replace the display panel:

a. Remove the four Phillips PM2.0×3.0 screws **(1)** that secure the display panel to the display enclosure.

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

b. Lift the top edge of the display panel **(2)** and swing it up and forward until it rests upside down in front of the display enclosure.

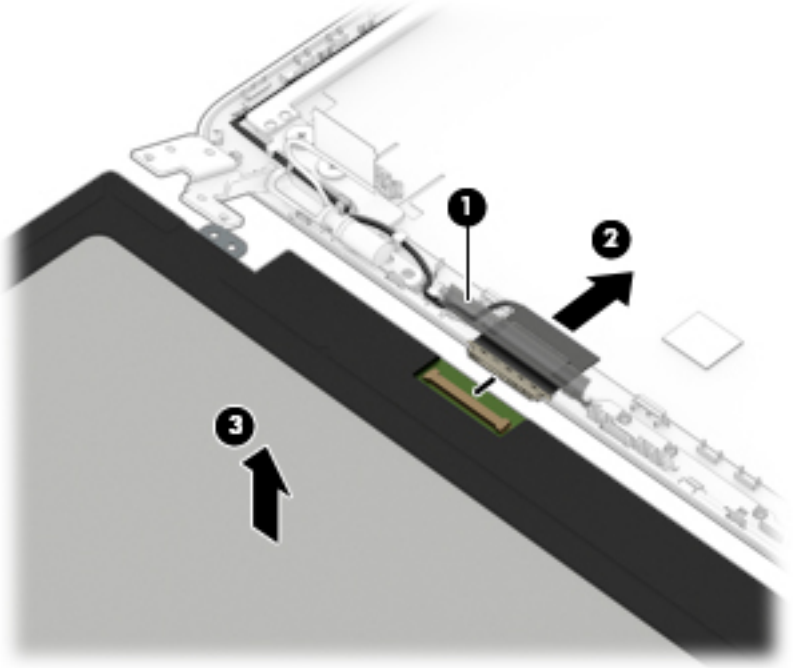
The raw display panel is available using spare part number 830015-001 for HD displays and 830016-001 for FHD displays.



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

d. Disconnect the display panel cable **(2)** from the display panel.

e. Remove the display panel **(3)**.



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

a. Remove the following screws that secure the display hinges and display hinge support brackets to the display enclosure:

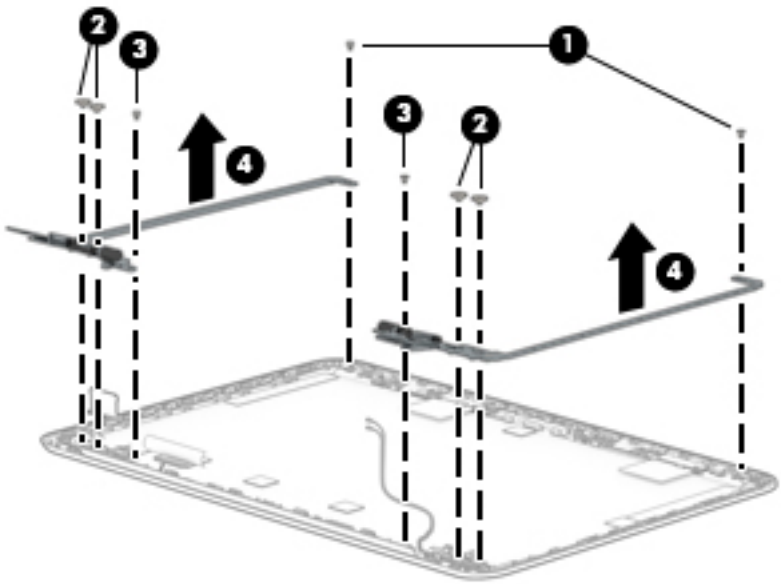
(1) Two Phillips PM2.0×3.0 screws that secure the display hinge brackets

(2) Four Phillips PM2.5×3.0 broad head screws that secure the display hinges

(3) Two Phillips PM2.0×2.0 screws that secure the display hinges

b. Remove the display hinges **(4)**.

The display hinges are included in the Display Hinge Kit, spare part number 834909-001 for use on HP Chromebook 14 G4 models or 830872-001 on HP Chromebook models.



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

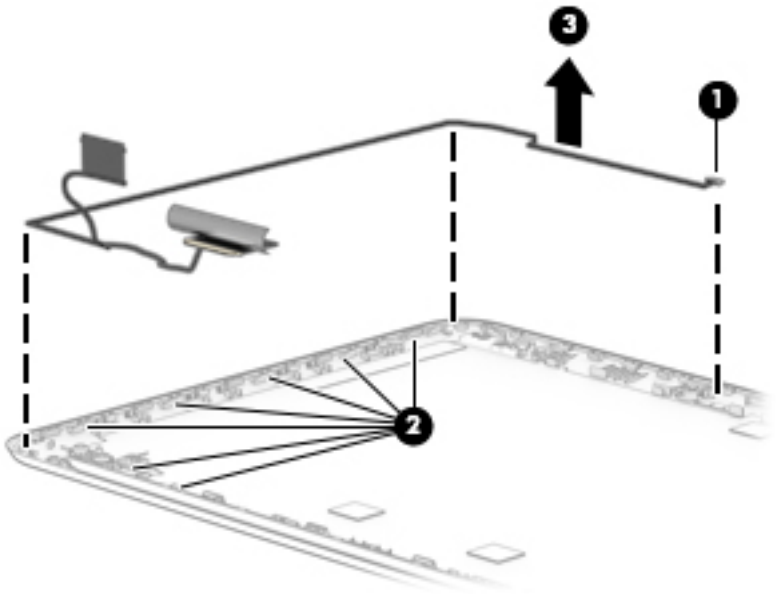
a. Disconnect the display panel cable from the webcam/microphone module **(1)**.

b. Release the display panel cable from the retention clips **(2)** and channel built into the top, left, and bottom edges of the display enclosure.

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

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

- 834908-001–For use on HP Chromebook 14 G4 models with HD displays
- 841682-001–For use on silver HP Chromebook models with FHD displays
- 830868-001–For use on blue HP Chromebook models with HD displays
- 841536-001–For use on purple HP Chromebook models with FHD displays



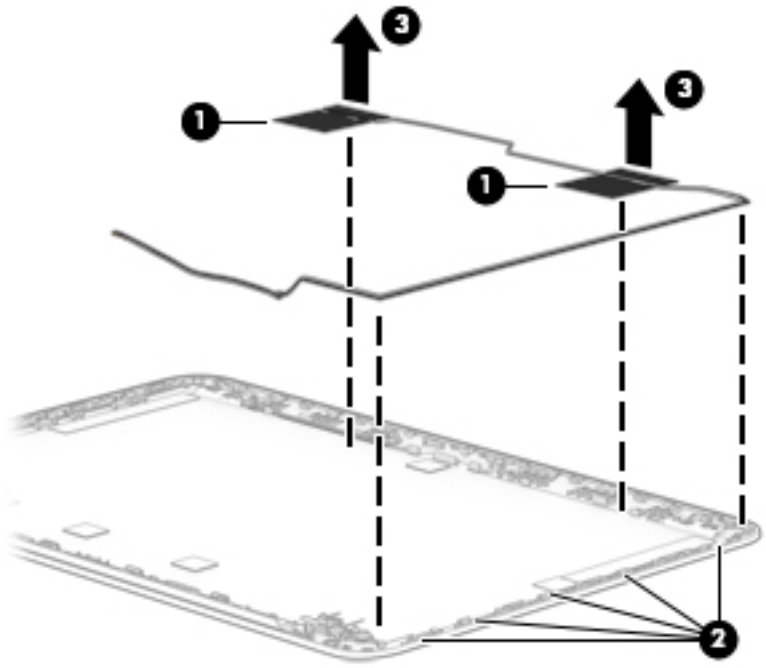
10. If it is necessary to replace the antenna cable:

    a. Peel to remove the transceivers from the top of the display enclosure **(1)**.

    b. Release the cable from the retention clips **(2)** and channel built into the side of the display enclosure.

    c. Remove the antenna cable **(3)**.

    The antenna cable is available using spare part number 834904-001 for HP Chromebook 14 G4 models and 830858-001 for HP Chromebook models.



The display rear cover is available using the following spare part numbers:

- 834905-001—For use on HP Chromebook 14 G4 models
- 830859-001—For use on silver HP Chromebook models
- 830860-001—For use on blue HP Chromebook models
- 830861-001—For use on purple HP Chromebook models

Reverse this procedure to reassemble and install the display assembly.

Battery

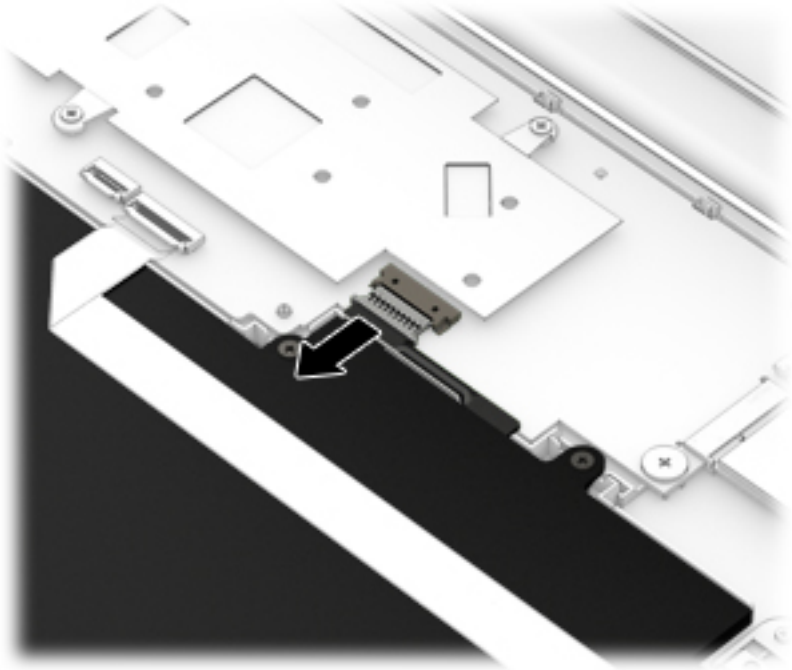
Description	Spare part number
Battery, 3-cell, 37-WHr, 3.28-AHr, Li-ion	816609-005

Before removing the battery, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the keyboard/top cover (see Keyboard/top cover on page 23).

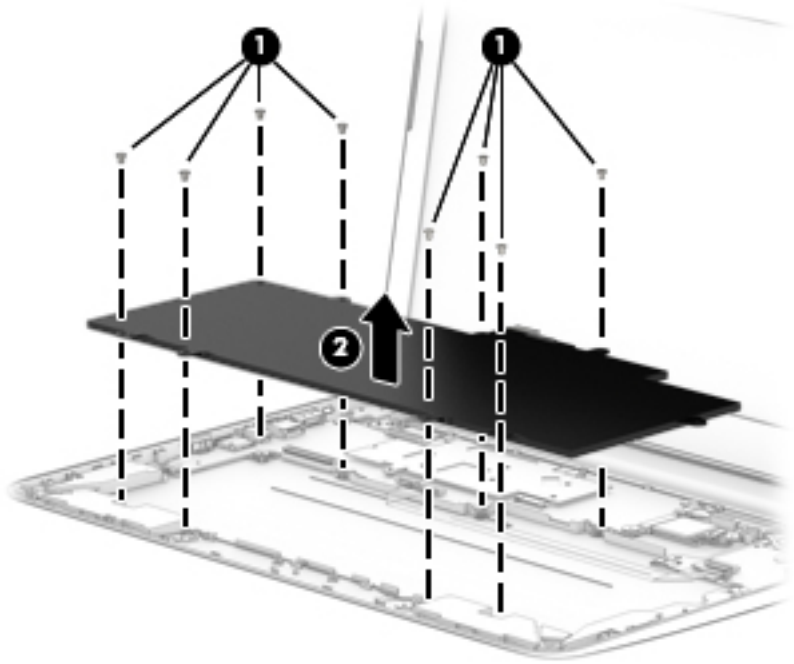
Remove the battery:

1. Disconnect the battery cable from the system board.



2. Remove the eight Phillips PM2.0×3.0 screws **(1)** that secure the battery to the base enclosure.

3. Lift the battery from the computer **(2)**.



Reverse this procedure to install the battery.

Speakers

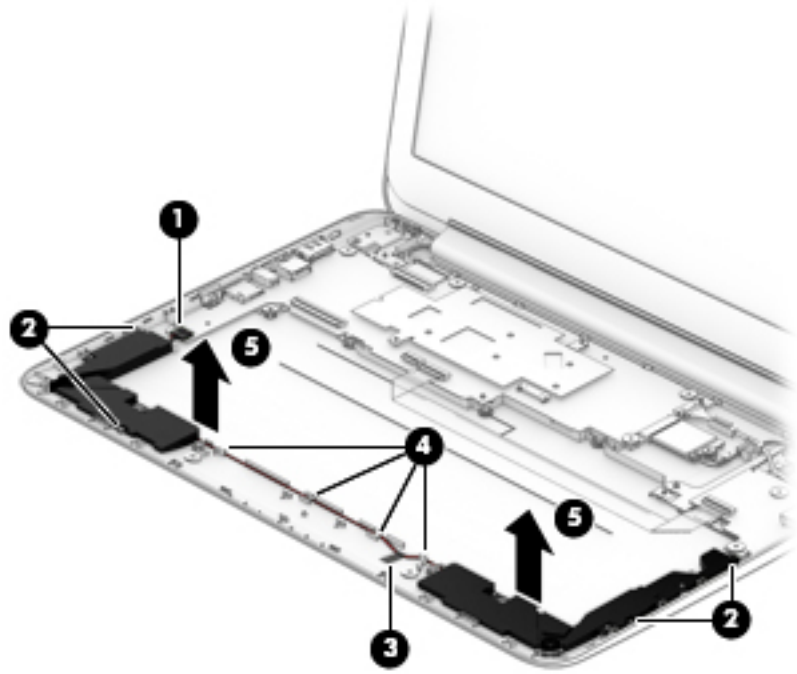
Description	Spare part number
Speakers (include left and right speakers and cables)	787723-001

Before removing the speakers, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the keyboard/top cover (see Keyboard/top cover on page 23).
5. Remove the battery (see Battery on page 42).

Remove the speakers:

1. Disconnect the speaker cable **(1)** from the system board.
2. Disengage each speaker from the computer by using a tool to pry up near the tabs of each speaker **(2)**.
3. Remove the tape **(3)**, and then release the speaker cables from the routing clips **(4)** and channels built into the base enclosure.
4. Remove the speakers **(5)**.



Reverse this procedure to install the speakers.

System board

Description	Spare part number
System board for use in all models (includes alcohol pad, thermal tape, and thermal grease):	
Equipped with a Intel Celeron N2940 processor, 4.0-GB of system memory, and 16-GB of eMMC primary storage	830019-001
Equipped with a Intel Celeron N2840 processor, 4.0-GB of system memory, and 16-GB of eMMC primary storage	830018-001
Equipped with a Intel Celeron N2840 processor, 2.0-GB of system memory, and 16-GB of eMMC primary storage	830017-001
System board for use in HP Chromebook 14 G4 models (includes alcohol pad, thermal tape, and thermal grease):	
Equipped with a Intel Celeron N2940 processor, 4.0-GB of system memory, and 32-GB of eMMC primary storage	839038-001
Equipped with a Intel Celeron N2940 processor, 2.0-GB of system memory, and 32-GB of eMMC primary storage	839037-001
Equipped with a Intel Celeron N2940 processor, 2.0-GB of system memory, and 16-GB of eMMC primary storage	839036-001
Equipped with a Intel Celeron N2840 processor, 4.0-GB of system memory, and 32-GB of eMMC primary storage	839035-001
Equipped with a Intel Celeron N2840 processor, 2.0-GB of system memory, and 32-GB of eMMC primary storage	839034-001

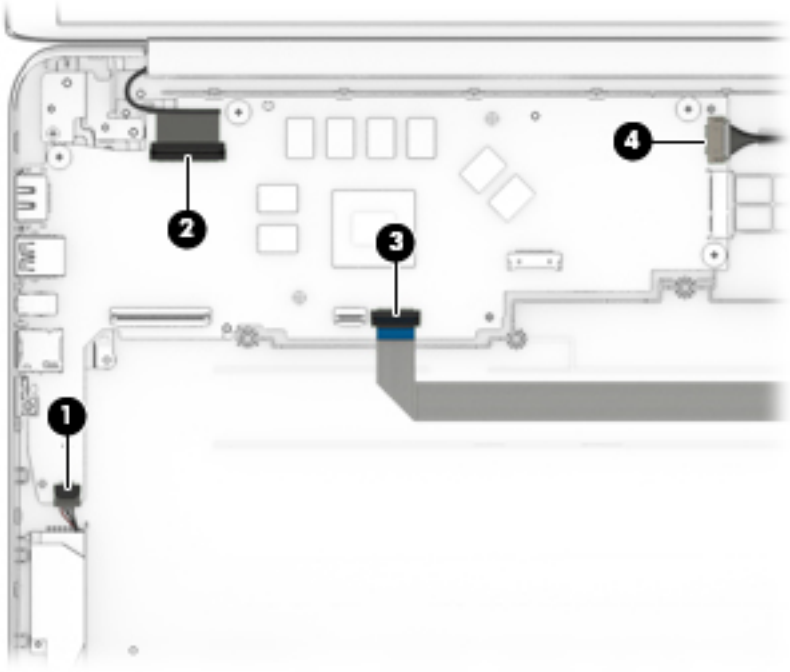
Before removing the system board, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by unplugging the power cord from the computer.
3. Disconnect all external devices from the computer.
4. Remove the keyboard/top cover (see Keyboard/top cover on page 23).
5. Remove the battery (see Battery on page 42).

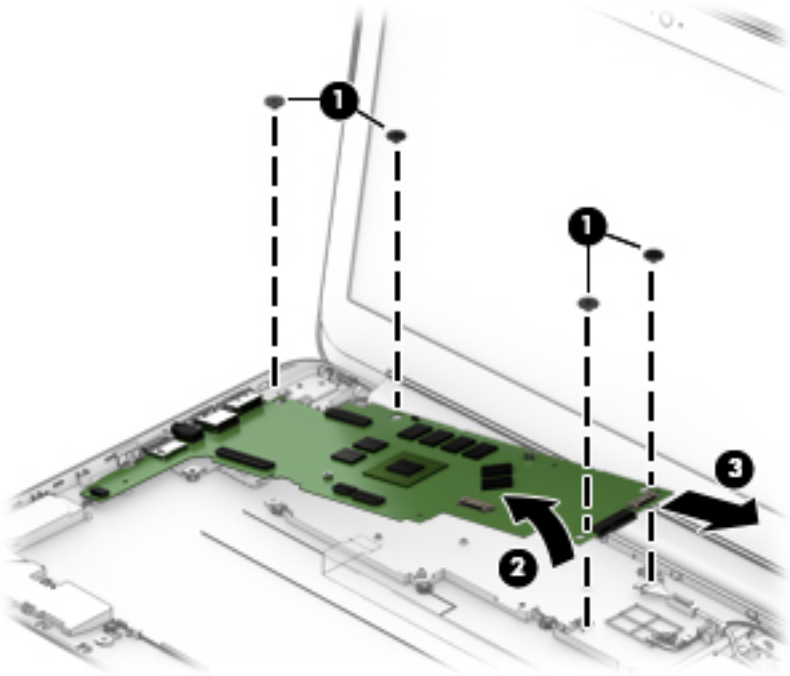
Remove the system board:

1. Disconnect the speaker cable **(1)** from the system board.
2. Release the ZIF connector **(2)** to which the display panel cable is attached, and then disconnect the display panel cable from the system board.
3. Release the ZIF connector **(3)** to which the connector board cable is attached, and then disconnect the connector board cable from the system board.

4. Disconnect the power connector cable **(4)** from the system board.



5. Remove the four Phillips PM2.0×2.0 screws **(1)** that secure the system board to the base enclosure.
6. Lift the right side of the system board **(2)** until it rests at an angle.
7. Remove the system board **(3)** by sliding it up and to the right at an angle.



Reverse this procedure to install the system board.

6 Specifications

	Metric	U.S.
Computer dimensions		
Width	**34.4 cm**	13.5 in
Depth	**24.0 cm**	9.5 in
Height	**1.8 cm**	0.7 in
Weight	**1.7 kg**	3.8 lbs
Operating voltage and current:	19.5V dc @ 2.31 A – 45 W 19.5V 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 device operating voltage and current can be found on the system regulatory label.		
Temperature		
Operating	**5°C to 35°C**	41°F to 95°F
Nonoperating	**-20°C to 60°C**	-4°F to 140°F
Relative humidity (noncondensing)		
Operating	10% to 90%	
Nonoperating	5% to 95%	
Maximum altitude (unpressurized)		
Operating	**-15 m to 3,048 m**	-50 ft to 10,000 ft
Nonoperating	**-15 m to 12,192 m**	-50 ft to 40,000 ft
NOTE: Applicable product safety standards specify thermal limits for plastic surfaces. The device operates well within this range of temperatures.		

7 Using HP PC Hardware Diagnostics (UEFI)

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

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

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

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 48.

   b. Hard drive

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

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 a USB device.

Download the latest UEFI version

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

Download any version of UEFI for a specific product

1. Go to http://www.hp.com/support, and then select your country. The HP Support page is displayed.
2. Click **Drivers & Downloads**.

3. 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.

8 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 all countries 113

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

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

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

9 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.

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

Current BIOS steps

1. Follow steps (a) through (l) below to restore the nonvolatile memory that can contain personal data. Restoring or reprogramming nonvolatile memory that does not store personal data is neither necessary nor recommended.

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

   IMPORTANT: If the **Main** menu displays **Restore Defaults** instead of **Apply Factory Defaults and Exit**, go to Legacy BIOS Steps on page 53.

   NOTE: If the system has a BIOS administrator password, enter the password at the prompt.

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

   The computer will reboot.

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

   NOTE: If the system has a BIOS administrator password, enter the password at the prompt.

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

   The computer will reboot.

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

   NOTE: If the system has a BIOS administrator password, enter the password at the prompt.

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

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

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

   The computer will reboot.

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

NOTE: If the system has a BIOS administrator password, enter the password at the prompt.

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

k. Reboot the system. If the system has a Trusted Platform Module (TPM) and/or fingerprint reader, one or two prompts will appear—one to clear the TPM and the other to Reset Fingerprint Sensor; press or tap F1 to accept or F2 to reject.

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

2. Complete one of the following:

   - Remove and retain the storage drive.

   – or –

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

   – or –

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

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

a. Turn on or restart the computer, and then 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.

Legacy BIOS Steps

Use the steps for older versions of BIOS.

NOTE: If you already completed the steps in Current BIOS steps on page 52, skip this section.

1. Follow steps (a) through (i) 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.

NOTE: If you have not already done so, access the BIOS menu.

   - 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.

a. Select **Main**, select **Restore Defaults**, and then select **Yes** to load defaults.

b. Select the **Security** menu, select **Restore Security Level Defaults**, and then select **Yes** to restore security level defaults.

c. 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.

d. 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 uncheck the checkbox for **DriveLock password on restart**. Select **OK** to proceed.

e. 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.

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

g. Select the **Main** menu, select **Save Changes and Exit**, select **Yes** to save changes and exit, and then select **Shutdown**.

h. 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.

i. 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 59.	Data cannot be written to this device via the host processor. The content is managed solely by the HP Sure Start Embedded Controller.	This memory is protected by the HP Sure Start Embedded Controller.
Real Time Clock (RTC) battery backed-up CMOS configuration memory	256 Bytes	No	Yes	Stores system date and time and noncritical data.	RTC battery backed-up CMOS is programmed using the Computer Setup (BIOS), or changing the Microsoft Windows date & time.	This memory is not write-protected.
Controller (NIC) EEPROM	64 KBytes (not customer accessible)	No	Yes	Stores NIC configuration and NIC firmware.	NIC EEPROM is programmed using a utility from the NIC vendor that can be run from DOS.	A utility is required to write data to this memory and is available from the NIC vendor. Writing data to this ROM in an inappropriate manner will render the NIC non-functional.
DIMM Serial Presence Detect (SPD) configuration data	256 Bytes per memory module, 128 Bytes programmable (not customer accessible)	No	Yes	Stores memory module information.	DIMM SPD is programmed by the memory vendor.	Data cannot be written to this memory when the module is installed in a 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?
						Downloads, and then follow the on-screen instructions.
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.	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 typically 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 typically 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.

10 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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