Product notice

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

Not all features are available in all editions of Windows. This computer may require upgraded and/or separately purchased hardware, drivers and/or software to take full advantage of Windows functionality. Go to http://www.microsoft.com for details.

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 60950-1).
# Table of contents

1 Product description ................................................................................................................. 1

2 Getting to know your computer ............................................................................................. 5
   Right side .............................................................................................................................. 5
   Left side .............................................................................................................................. 6
   Display ................................................................................................................................. 7
   Keyboard area ...................................................................................................................... 8
   TouchPad .............................................................................................................................. 8
   Lights ................................................................................................................................... 9
   Speakers ............................................................................................................................... 10
   Special keys .......................................................................................................................... 11
   Action keys .......................................................................................................................... 12
   Bottom .................................................................................................................................. 13
   Labels ................................................................................................................................... 14

3 Illustrated parts catalog .......................................................................................................... 15
   Computer major components ............................................................................................... 15
   Cables ................................................................................................................................... 18
   Mass storage devices ........................................................................................................... 19
   Miscellaneous parts ............................................................................................................ 20

4 Removal and replacement preliminary requirements ............................................................ 21
   Tools required ...................................................................................................................... 21
   Service considerations ......................................................................................................... 21
   Plastic parts .......................................................................................................................... 21
   Cables and connectors ......................................................................................................... 21
   Drive handling ...................................................................................................................... 22
   Grounding guidelines .......................................................................................................... 23
   Electrostatic discharge damage ........................................................................................... 23
   Packaging and transporting guidelines ............................................................................... 24
   Workstation guidelines ........................................................................................................ 24

5 Removal and replacement procedures .................................................................................... 26
   Component replacement procedures .................................................................................... 26
   Bottom cover ........................................................................................................................ 27
   Battery .................................................................................................................................. 29
Solid-state drive ................................................................. 30
Optane memory module ........................................................ 31
WLAN module .................................................................... 32
Hard drive .......................................................................... 33
Memory module ................................................................... 36
Audio/power button board .................................................... 39
TouchPad ............................................................................ 40
Display assembly .................................................................. 42
Power connector cable .......................................................... 45
System board ....................................................................... 46
USB board ........................................................................... 49
Speakers ............................................................................. 50
Fan/heat sink assembly ............................................................ 51
Top cover with keyboard ......................................................... 55

6 Using Setup Utility (BIOS) .................................................................................. 56
Starting Setup Utility (BIOS) ......................................................... 56
Updating Setup Utility (BIOS) ....................................................... 56
Determining the BIOS version ..................................................... 56
Downloading a BIOS update ........................................................ 57

7 Using HP PC Hardware Diagnostics ...................................................................... 58
Using HP PC Hardware Diagnostics Windows ......................................... 58
Downloading HP PC Hardware Diagnostics Windows .................................... 58
  Downloading the latest HP PC Hardware Diagnostics Windows version ........... 59
  Installing HP PC Hardware Diagnostics Windows ........................................ 59
Using HP PC Hardware Diagnostics UEFI ............................................... 59
Starting HP PC Hardware Diagnostics UEFI ............................................. 60
  Installing HP PC Hardware Diagnostics UEFI to a USB flash drive ............. 60
  Downloading the latest HP PC Hardware Diagnostics UEFI version ............ 60
  Installing HP PC Hardware Diagnostics UEFI by product name or number 
    (select products only) ......................................................... 60
Using Remote HP PC Hardware Diagnostics UEFI settings (select products only) ..................................................... 61
  Installing Remote HP PC Hardware Diagnostics UEFI ................................ 61
  Downloading the latest Remote HP PC Hardware Diagnostics UEFI version .... 61
  Installing Remote HP PC Hardware Diagnostics UEFI by product name or number .................................................. 61
  Customizing Remote HP PC Hardware Diagnostics UEFI settings ................. 61
8 Backing up, restoring, and recovering ........................................................................................................... 63
   Using Windows tools ........................................................................................................................................... 63
   Creating HP Recovery media (select products only) ....................................................................................... 63
      Using HP Recovery Manager to create recovery media ........................................................................... 64
      Before you begin ........................................................................................................................................... 64
      Creating the recovery media ....................................................................................................................... 64
   Using the HP Cloud Recovery Download Tool to create recovery media ................................................. 65
   Restoring and recovery ..................................................................................................................................... 65
      Restoring, resetting, and refreshing using Windows tools ........................................................................... 65
      Restoring using HP Recovery Manager and the HP Recovery partition ...................................................... 65
      Recovering using HP Recovery Manager ................................................................................................... 65
      Recovering using the HP Recovery partition (select products only) .......................................................... 66
      Recovering using HP Recovery media ......................................................................................................... 66
      Changing the computer boot order ............................................................................................................... 67
      Removing the HP Recovery partition (select products only) ...................................................................... 67

9 Specifications ......................................................................................................................................................... 68

10 Power cord set requirements ........................................................................................................................... 69
   Requirements for all countries .......................................................................................................................... 69
   Requirements for specific countries and regions ........................................................................................... 69

11 Recycling ......................................................................................................................................................... 71

Index ...................................................................................................................................................................... 72
## 1 Product description

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>UMA</th>
<th>Discrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Name</td>
<td>HP Pavilion x360 15 Convertible PC Model: 15-crxxxx</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Processors</td>
<td>8th generation Intel® Core™ processors:</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>i7-8550U 1.80-GHz (SC turbo up to 4.00-GHz) quad core processor (8.0-MB L3 cache, 15 W)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>i5-8250U 1.60-GHz (SC turbo up to 3.40-GHz) quad core processor (6.0-MB L3 cache, 15 W)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>i3-8130U 2.20-GHz (SC turbo up to 3.40-GHz) dual core processor (4.0-MB L3 cache, 15 W)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7th generation Intel Pentium™ processor:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gold4415U 2.3-GHz dual core processor (2.0-MB L3 cache, 15 W)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Chipset</td>
<td>Integrated with soldered-on-circuit (SoC)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Graphics</td>
<td>Support for HD decode, DX12, and high-definition multimedia interface (HDMI)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Supports MR ready</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supports Optimus</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Supports GPS (GPU Performance Scaling)</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Internal graphics:</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Intel UHD Graphics 620</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Intel HD Graphics 620</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Hybrid graphics:</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AMD Radeon® 530 R17M-M1-70 (Meso Pro) with up to 4096-MB of discrete video memory</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AMD Radeon 530 R17M-M1-70 (Meso Pro) with up to 2048-MB of discrete video memory</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Panel</td>
<td>16:9 ultra wide aspect ratio, narrow bezel:</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>15.6-in, full high-definition (FHD)(1920×1080), white light-emitting (WLED), BrightView, slim/flat (3.0-mm), UWVA, eDP, 220 nits</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>15.6-in, high-definition (HD)(1366×768), WLED, anti glare, SVA, eDP, 220 nits</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Touch solution with flush glass, multi-touch enabled</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Supports Simultaneous Pen &amp; Touch</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Support for active stylus</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Memory</td>
<td>Two SODIMM memory module slots, non-customer-accessible/non-upgradable</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Supports up to 12-GB of system memory</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>DDR4-2400 dual channel support (DDR4-2666 downgrade to DDR4-2400)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>DDR4-2133 dual channel support (DDR4-2666/2400 downgrade to DDR4-2133)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Supports the following configurations:</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>UMA</td>
<td>Discrete</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----</td>
<td>----------</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td>Support for all 7.2 mm/9.5 mm, SATA, 2.5-inch:</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Support for solid-state drive + hard drive</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Support for M.2 SATA solid-state drive</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Single hard drive configurations:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-TB, 5400-rpm, 7.0 mm</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>500-GB, 5400-rpm, 7.0 mm</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Solid-state hard drive configuration:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-TB, 5400-rpm, 7.2 mm, solid-state hard drive with 8-GB NAND</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Dual storage configurations:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>128-GB, TLC, solid-state drive with 1-TB, 5400-rpm hard drive</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>128-GB, TLC, solid-state drive with 500-GB, 5400-rpm hard drive</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>16-GB, PCIe, 3x2, 3D Xpoint Optane solid-state drive with 1-TB, 5400-rpm hard drive</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>M.2, SATA-3, solid-state drive with Triple-Level Cell (TLC):</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>512-GB</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>256-GB</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Optical drive</td>
<td>HP external DVD±RW DL SuperMulti Drive</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Camera</td>
<td>HP Wide Vision FHD infrared camera with indicator light and 2 infrared lights, USB 2.0, FHD hybrid BSI sensor, f2.2, WDR, 88° wide field of vision, 1080p by 30 frames per second</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>1080p by 30 frames per second</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Support Windows Hello</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Dual array Digital Microphones w/ appropriate software - beam forming, echo cancellation, noise suppression</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>HP Wide Vision HD camera with indicator light, USB 2.0, HD BSI sensor, f2.0, WDR, 88° wide field of vision, 720p by 30 frames per second</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>720p by 30 frames per second</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Dual array Digital Microphones w/ appropriate software - beam forming, echo cancellation, noise suppression</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Audio</td>
<td>Audio brand: B&amp;O Play</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td>Audio control panel: B&amp;O Play Audio Control</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>
### Category Description

<table>
<thead>
<tr>
<th>Supports HP Audio Boost</th>
<th>UM</th>
<th>Discrete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dual speakers</td>
<td>UM</td>
<td>Discrete</td>
</tr>
</tbody>
</table>

#### Wireless

**Integrated wireless options (M.2/PCIe):**

- Intel Dual band wireless-AC 3168 802.11AC 1x1 WiFi + Bluetooth 4.2 Combo Adaptor (non-vPro) | UM | Discrete |
- Realtek RTL8821CE 802.11 ac 1x1 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported) with single antenna | UM | Discrete |
- Intel Dual Band Wireless-AC 7265 802.11 AC 2x2 WiFi + Bluetooth 4.2 Combo Adaptor (non-vPro) | UM | Discrete |
- Realtek RTL8822BE 802.11 ac 2x2 WiFi + Bluetooth 4.2 Combo Adapter | UM | Discrete |

Compatible with Miracast-certified devices | UM | Discrete |
WiFi SAR enabled in BIOS (Intel WLAN only) | UM | Discrete |

#### External media cards

**HP Multi-Format Digital Media Card Reader** | UM | Discrete |

Supports SD/SDHC/SDXC | UM | Discrete |
Push-push insertion/removal | UM | Discrete |

#### Internal card expansion

One M.2 slot for SSD | UM | Discrete |
One M.2 slot for WLAN | UM | Discrete |

#### Ports

AC Smart Pin adapter plug | UM | Discrete |
Audio-out (headphone)/audio-in (microphone) combo jack | UM | Discrete |
HDMI v1.4 supporting up to 1920×1080 @ 60Hz | UM | Discrete |
Hot plug/unplug and auto detect for correct output to wide-aspect vs standard aspect video (auto adjust panel resolution to fit embedded panel and external monitor connected) | UM | Discrete |
USB 3.0 ports (2, left side) | UM | Discrete |
USB Type-C port; USB 3.1 Gen 1 (right side); supports data transfer | UM | Discrete |

#### Keyboard/TouchPad

**Keyboard:**

Full-sized, textured, island-style keyboard | UM | Discrete |
Full-sized, three-coat, backlit, island-style keyboard | UM | Discrete |

**TouchPad:**

Image sensor | UM | Discrete |
MultiTouch gestures enabled | UM | Discrete |
Support for Modern TrackPad gestures | UM | Discrete |
Taps enabled as default | UM | Discrete |

#### Power requirements

**Battery:**

3-cell, 48-WHr, 4.2 Ah, Primus Prismatic battery | UM | Discrete |
Supports battery fast charge | UM | Discrete |

**AC adapter:** | UM | Discrete |
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>UMA</th>
<th>Discrete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>65-W HP Smart AC adapter (EM) with power cord</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>65-W HP Smart AC adapter with power cord</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>65-W HP Smart AC adapter (Argentina specific) with power cord</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45-W HP Smart AC adapter with power cord</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45-W HP Smart AC adapter (Argentina specific) with power cord</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Power cord:</strong></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>1.0 m conventional power cord with a C5 connector</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>1.0 m conventional power cord with a C5 connector + Japan plug adapter</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Security</td>
<td>Kensington Security Lock</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Support for Trusted Platform Module (TPM) 2.0</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>U2F (Universal 2nd Factor Authentication)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Operating system</td>
<td>FreeDOS 2.0</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td><strong>Preinstalled:</strong></td>
<td>✓</td>
<td>✓</td>
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<tr>
<td></td>
<td>Windows 10</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td></td>
<td>Windows 10 Professional</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td><strong>For Developed Markets (ML):</strong></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Windows 10 Home ML</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Windows 10 Home Plus ML</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td><strong>For Emerging Markets (EM/SL):</strong></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Windows 10 Home EM/SL</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Windows 10 Home Plus EM/SL</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td><strong>For China Market:</strong></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>CPPPP Windows 10 Home High End China Language Edition</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>CPPPP Windows 10 Home China Language Edition</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td><strong>For India Market:</strong></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Windows 10 Home Plus EM/SL IPPP</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Windows 10 Home EM/SL IPPP</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Serviceability</td>
<td><strong>End user replaceable part:</strong> AC adapter</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
2  Getting to know your computer

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

Right side

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Drive light</td>
<td>- Blinking white: The hard drive is being accessed.</td>
</tr>
<tr>
<td></td>
<td>- Amber: HP 3D DriveGuard has temporarily parked the hard drive.</td>
</tr>
<tr>
<td>(2) Volume button</td>
<td>Controls speaker volume on the computer.</td>
</tr>
<tr>
<td>(3) Memory card reader</td>
<td>Reads optional memory cards that enable you to store, manage, share, or access information.</td>
</tr>
<tr>
<td></td>
<td>To insert a card:</td>
</tr>
<tr>
<td></td>
<td>1. Hold the card label-side up, with connectors facing the computer.</td>
</tr>
<tr>
<td></td>
<td>2. Insert the card into the memory card reader, and then press in on the card until it is firmly seated.</td>
</tr>
<tr>
<td></td>
<td>To remove a card:</td>
</tr>
<tr>
<td></td>
<td>▲ Press in on the card, and then remove it from the memory card reader.</td>
</tr>
<tr>
<td>(4) USB Type-C port</td>
<td>Connects a USB device, such as a cell phone, camera, activity tracker, or smartwatch, and provides data transfer.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> Cables and/or adapters (purchased separately) may be required.</td>
</tr>
<tr>
<td>(5) HDMI port</td>
<td>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.</td>
</tr>
<tr>
<td>(6) AC adapter and battery light</td>
<td>- White: The AC adapter is connected and the battery is fully charged.</td>
</tr>
<tr>
<td></td>
<td>- Blinking white: The AC adapter is disconnected and the battery has reached a low battery level.</td>
</tr>
<tr>
<td></td>
<td>- Amber: The AC adapter is connected and the battery is charging.</td>
</tr>
<tr>
<td></td>
<td>- Off: The battery is not charging.</td>
</tr>
<tr>
<td>(7) Power connector</td>
<td>Connects an AC adapter.</td>
</tr>
</tbody>
</table>
Component | Description
--- | ---
(1) USB SuperSpeed ports (2) | Connect USB devices, such as a cell phone, camera, activity tracker, or smartwatch, and provide high-speed data transfer.
(2) Vent | Enables airflow to cool internal components.
| NOTE: The computer fan starts up automatically to cool internal components and prevent overheating. It is normal for the internal fan to cycle on and off during routine operation.
(3) Power button | • When the computer is off, press the button to turn on the computer.
• When the computer is on, press the button briefly to initiate Sleep.
• When the computer is in the Sleep state, press the button briefly to exit Sleep.
• When the computer is in Hibernation, press the button briefly to exit Hibernation.
| CAUTION: Pressing and holding down the power button results in the loss of unsaved information.
If the computer has stopped responding and shutdown procedures are ineffective, press and hold the power button down for at least 5 seconds to turn off the computer.
To learn more about your power settings, see your power options:
▲ Right-click the Power icon and then select Power Options.
(4) Power light | • On: The computer is on.
• Blinking: The computer is in the Sleep state, a power-saving state. The computer shuts off power to the display and other unneeded components.
• Off: The computer is off or in Hibernation. Hibernation is a power-saving state that uses the least amount of power.
(5) Audio-out (headphone)/Audio-in (microphone) combo jack | Connects optional powered stereo speakers, headphones, earbuds, a headset, or a television audio cable. Also connects an optional headset microphone. This jack does not support optional standalone microphones.
| WARNING! To reduce the risk of personal injury, adjust the volume before putting on headphones, earbuds, or a headset. For additional safety information, refer to the Regulatory, Safety, and Environmental Notices.
To access this guide:
▲ Select the Start button, select HP Help and Support, and then select HP Documentation.
### Component

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(6) Security cable slot</td>
<td>Attaches an optional security cable to the computer. <strong>NOTE:</strong> The security cable is designed to act as a deterrent, but it may not prevent the computer from being mishandled or stolen.</td>
</tr>
</tbody>
</table>

### Display

1. **WLAN antennas**
   - Send and receive wireless signals to communicate with wireless local area networks (WLANs).

2. **Internal microphones**
   - Record sound.

3. **Camera light(s)**
   - On: One or more cameras are in use.

4. **Camera(s)**
   - Allow(s) you to video chat, record video, and record still images. Some cameras also allow a facial recognition logon to Windows, instead of a password logon. **NOTE:** Camera functions vary depending on the camera hardware and software installed on your product.

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

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

To access this guide:

1. Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.
   - or –
   - Click the question mark icon in the taskbar.

2. Select **My PC**, select the **Specifications** tab, and then select **User Guides**.
## Keyboard area

### TouchPad

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) TouchPad zone</td>
<td>Reads your finger gestures to move the pointer or activate items on the screen.</td>
</tr>
<tr>
<td>(2) Left TouchPad button</td>
<td>Functions like the left button on an external mouse.</td>
</tr>
<tr>
<td>(3) Right TouchPad button</td>
<td>Functions like the right button on an external mouse.</td>
</tr>
</tbody>
</table>
## Lights

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Caps lock light</td>
<td>On: Caps lock is on, which switches the key input to all capital letters.</td>
</tr>
</tbody>
</table>
| (2) Mute light | - On: Computer sound is off.  
- Off: Computer sound is on. |
## Speakers

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speakers (2)</td>
<td>Produce sound.</td>
</tr>
</tbody>
</table>
## Special keys

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) esc key</td>
<td>Displays system information when pressed in combination with the fn key.</td>
</tr>
<tr>
<td>(2) fn key</td>
<td>Executes specific functions when pressed in combination with another key.</td>
</tr>
<tr>
<td>(3) Windows key</td>
<td>Opens the Start menu.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> Pressing the Windows key again will close the Start menu.</td>
</tr>
<tr>
<td>(4) Action keys</td>
<td>Execute frequently used system functions.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> On select products, the f5 action key turns the keyboard backlight feature off or on.</td>
</tr>
<tr>
<td>(5) num lock key</td>
<td>Alternates between the navigational and numeric functions on the integrated numeric keypad.</td>
</tr>
<tr>
<td>(6) Integrated numeric keypad</td>
<td>A separate keypad to the right of the alphabet keyboard. When num lock is pressed, the keypad can be used like an external numeric keypad.</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> If the keypad function is active when the computer is turned off, that function is reinstated when the computer is turned back on.</td>
</tr>
</tbody>
</table>
# Action keys

An action key performs the function indicated by the icon on the key. To determine which keys are on your product, see [Special keys on page 11](#).

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

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Helps prevent side-angle viewing from onlookers. If needed, decrease or increase brightness for well-lit or darker environments. Press the key again to turn off the privacy screen.</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Decreases the screen brightness incrementally as long as you hold down the key.</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Increases the screen brightness incrementally as long as you hold down the key.</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Opens the “How to get help in Windows 10” webpage.</td>
</tr>
<tr>
<td><img src="image" alt="Icon" /></td>
<td>Switches the screen image between display devices connected to the system. For example, if a monitor is connected to the computer, repeatedly pressing this key alternates the screen image from the computer display to the monitor display to a simultaneous display on both the computer and the monitor.</td>
</tr>
</tbody>
</table>
| ![Icon](image) | Turns the keyboard backlight off or on (select products only).  
  **NOTE:** To conserve battery power, turn off this feature. |
| ![Icon](image) | Plays the previous track of an audio CD or the previous section of a DVD or a Blu-ray Disc (BD). |
| ![Icon](image) | Starts, pauses, or resumes playback of an audio CD, a DVD, or a BD. |
| ![Icon](image) | Plays the next track of an audio CD or the next section of a DVD or a BD. |
| ![Icon](image) | Stops audio or video playback of a CD, a DVD, or a BD. |
| ![Icon](image) | Decreases speaker volume incrementally while you hold down the key. |
| ![Icon](image) | Increases speaker volume incrementally while you hold down the key. |
| ![Icon](image) | Mutes or restores speaker sound. |
| ![Icon](image) | Turns the wireless feature on or off. |
NOTE: A wireless network must be set up before a wireless connection is possible.

Turns the airplane mode and wireless feature on or off.

NOTE: The airplane mode key is also referred to as the wireless button.

NOTE: A wireless network must be set up before a wireless connection is possible.

### Bottom

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vent</td>
<td>Enable airflow to cool internal components.</td>
</tr>
</tbody>
</table>

**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.
Labels

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

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

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

![Labels](image)

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Product name</td>
</tr>
<tr>
<td>(2)</td>
<td>Model number</td>
</tr>
<tr>
<td>(3)</td>
<td>Product ID</td>
</tr>
<tr>
<td>(4)</td>
<td>Serial number</td>
</tr>
<tr>
<td>(5)</td>
<td>Warranty period</td>
</tr>
</tbody>
</table>

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

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.

Computer major components
<table>
<thead>
<tr>
<th>Item</th>
<th>Component</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td><strong>Display assembly, touch screen</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>IMPORTANT:</strong> The display assembly is spared only as an entire hinge-up. Display subcomponents are not spared.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FHD panel, IR camera, direct bonded, natural silver</td>
<td>L20822-001</td>
</tr>
<tr>
<td></td>
<td>FHD panel, IR camera, direct bonded, pale gold</td>
<td>L20823-001</td>
</tr>
<tr>
<td></td>
<td>FHD panel, HD camera, direct bonded, natural silver</td>
<td>L20824-001</td>
</tr>
<tr>
<td></td>
<td>FHD panel, HD camera, direct bonded, pale gold</td>
<td>L20825-001</td>
</tr>
<tr>
<td></td>
<td>HD panel, HD camera, air bonded, natural silver</td>
<td>L20826-001</td>
</tr>
<tr>
<td></td>
<td>HD panel, HD camera, air bonded, pale gold</td>
<td>L20827-001</td>
</tr>
<tr>
<td>(2)</td>
<td><strong>Top cover with keyboard</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> For a list of keyboard country codes, see Top cover with keyboard on page 55.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No backlight, natural silver</td>
<td>L20848-xx1</td>
</tr>
<tr>
<td></td>
<td>Backlit, natural silver</td>
<td>L20849-xx1</td>
</tr>
<tr>
<td></td>
<td>No backlight, pale gold</td>
<td>L20850-xx1</td>
</tr>
<tr>
<td></td>
<td>Backlit, pale gold</td>
<td>L20851-xx1</td>
</tr>
<tr>
<td>(3)</td>
<td><strong>TouchPad</strong> (includes Mylar and bracket rubber)</td>
<td>L20830-001</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> The TouchPad cable is available using spare part number L20813-001.</td>
<td></td>
</tr>
<tr>
<td>(4)</td>
<td><strong>TouchPad bracket</strong></td>
<td>L20820-001</td>
</tr>
<tr>
<td>(5)</td>
<td><strong>Hard drive cable</strong></td>
<td>L20815-001</td>
</tr>
<tr>
<td>(6)</td>
<td><strong>Hard drive</strong> (7 mm):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-TB, 5400-rpm, SATA, 8-GB hybrid hard drive</td>
<td>924036-855</td>
</tr>
<tr>
<td></td>
<td>1-TB, 5400-rpm, SATA hard drive</td>
<td>762990-005</td>
</tr>
<tr>
<td></td>
<td>500-GB, 5400-rpm, SATA hard drive</td>
<td>778186-005</td>
</tr>
<tr>
<td>(7)</td>
<td><strong>Hard drive foil</strong></td>
<td>L25138-001</td>
</tr>
<tr>
<td>(8)</td>
<td><strong>Hard drive rubber gasket</strong></td>
<td>L20832-001</td>
</tr>
<tr>
<td>(9)</td>
<td><strong>Battery</strong> (3-cell, 48-WHr, 4.2-AHr, Li-ion)</td>
<td>L09280-855</td>
</tr>
<tr>
<td>(10)</td>
<td><strong>USB board</strong></td>
<td>L20829-001</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> The USB board cable is available using spare part number L20816-001.</td>
<td></td>
</tr>
<tr>
<td>(11)</td>
<td><strong>Audio/power button board</strong></td>
<td>L20828-001</td>
</tr>
<tr>
<td></td>
<td><strong>NOTE:</strong> The audio/power button board cable is available using spare part number L20814-001.</td>
<td></td>
</tr>
<tr>
<td>(12)</td>
<td><strong>System board</strong> (includes processor and replacement thermal material):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All system boards use the following part numbers:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>xxxxxxx-001: Non-Windows operating systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>xxxxxxx-601: Windows operating system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Models with discrete graphics:</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Component</td>
<td>Spare part number</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
<td>------------------</td>
</tr>
<tr>
<td>1</td>
<td>Equipped with an Intel Core i7-8550U processor and 4 GB of discrete graphics memory</td>
<td>L20842-xx1</td>
</tr>
<tr>
<td>2</td>
<td>Equipped with an Intel Core i5-8250U processor and 2 GB of discrete graphics memory</td>
<td>L20841-xx1</td>
</tr>
<tr>
<td>3</td>
<td>Models with UMA graphics:</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Equipped with an Intel Core i7-8550U processor</td>
<td>L28780-xx1</td>
</tr>
<tr>
<td>5</td>
<td>Equipped with an Intel Core i5-8250U processor and an HD camera</td>
<td>L20844-xx1</td>
</tr>
<tr>
<td>6</td>
<td>Equipped with an Intel Core i5-8250U processor and an IR camera</td>
<td>L20846-xx1</td>
</tr>
<tr>
<td>7</td>
<td>Equipped with an Intel Core i3-8130U processor</td>
<td>L20847-xx1</td>
</tr>
<tr>
<td>8</td>
<td>Equipped with an Intel Pentium 4415U processor</td>
<td>L20845-xx1</td>
</tr>
<tr>
<td></td>
<td><strong>Fan/heat sink assembly</strong> (includes fan cable and replacement thermal material):</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>For use in models equipped with a discrete graphics memory subsystem</td>
<td>L20819-001</td>
</tr>
<tr>
<td>10</td>
<td>For use in models equipped with a UMA graphics subsystem</td>
<td>L20818-001</td>
</tr>
<tr>
<td>11</td>
<td>Thermal pad for use in models with discrete graphics (not illustrated)</td>
<td>L21302-001</td>
</tr>
<tr>
<td>12</td>
<td><strong>Memory modules</strong> (DDR4-2400):</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>8-MB (2666 MHz)</td>
<td>937236-855</td>
</tr>
<tr>
<td>14</td>
<td>4-MB (2666 MHz)</td>
<td>L10598-855</td>
</tr>
<tr>
<td>15</td>
<td>2-MB (2400 MHz)</td>
<td>864271-855</td>
</tr>
<tr>
<td>16</td>
<td><strong>Memory cover</strong></td>
<td>L20821-001</td>
</tr>
<tr>
<td>17</td>
<td><strong>WLAN module:</strong></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Intel Dual Band Wireless-AC 7265 802.11 AC 2×2 WiFi + Bluetooth 4.2 Combo Adapter (non-vPro)</td>
<td>901229-855</td>
</tr>
<tr>
<td>19</td>
<td>Intel Dual Band Wireless-AC 3168 802.11AC 1×1 WiFi + Bluetooth 4.2 Combo Adapter (non-vPro)</td>
<td>863934-855</td>
</tr>
<tr>
<td>20</td>
<td>Realtek RTL8822BE 802.11 ac 2x2 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)</td>
<td>924813-855</td>
</tr>
<tr>
<td>21</td>
<td>Realtek RTL8821CE 802.11 ac 1x1 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)</td>
<td>L17365-005</td>
</tr>
<tr>
<td>22</td>
<td><strong>Solid-state drive</strong> (M.2; includes foil)</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>512-GB, PCIe, NVMe</td>
<td>L20840-001</td>
</tr>
<tr>
<td>24</td>
<td>256-GB, 2280, PCIe, NVMe</td>
<td>L20839-001</td>
</tr>
<tr>
<td>25</td>
<td>256-GB, SATA-3, TLC</td>
<td>L20838-001</td>
</tr>
<tr>
<td>26</td>
<td>128-GB, SATA-3, TLC</td>
<td>L20837-001</td>
</tr>
<tr>
<td>27</td>
<td><strong>Optane memory module</strong> (16-GB; not illustrated)</td>
<td>L20836-001</td>
</tr>
<tr>
<td>28</td>
<td><strong>Solid-State Drive Rubber Kit</strong> (not illustrated)</td>
<td>L20833-001</td>
</tr>
<tr>
<td>29</td>
<td><strong>Power connector cable</strong></td>
<td>L20817-001</td>
</tr>
<tr>
<td>30</td>
<td><strong>Speakers</strong> (include cable)</td>
<td>L20835-001</td>
</tr>
<tr>
<td>31</td>
<td><strong>Rubber Kit</strong> (includes rubber feet and Mylar screw cover)</td>
<td>L20831-001</td>
</tr>
<tr>
<td>32</td>
<td><strong>Base enclosure</strong></td>
<td>L20812-001</td>
</tr>
</tbody>
</table>
# Cables

<table>
<thead>
<tr>
<th>Item</th>
<th>Component</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>USB board cable</td>
<td>L20816-001</td>
</tr>
<tr>
<td>(2)</td>
<td>TouchPad module cable</td>
<td>L20813-001</td>
</tr>
<tr>
<td>(3)</td>
<td>Hard drive cable</td>
<td>L20815-001</td>
</tr>
<tr>
<td>(4)</td>
<td>Audio/power button board cable</td>
<td>L20814-001</td>
</tr>
</tbody>
</table>
# Mass storage devices

<table>
<thead>
<tr>
<th>Item</th>
<th>Component</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Hard drive</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-TB, 5400-rpm, SATA, 8-GB hybrid hard drive</td>
<td>924036-855</td>
</tr>
<tr>
<td></td>
<td>1-TB, 5400-rpm, SATA hard drive</td>
<td>762990-005</td>
</tr>
<tr>
<td></td>
<td>500-GB, 5400-rpm, SATA hard drive</td>
<td>778186-005</td>
</tr>
<tr>
<td>(2)</td>
<td>Hard drive rubber sleeve</td>
<td>L20832-001</td>
</tr>
<tr>
<td>(3)</td>
<td>Hard drive cable</td>
<td>L20815-001</td>
</tr>
<tr>
<td>(4)</td>
<td>Hard drive foil</td>
<td>L25138-001</td>
</tr>
<tr>
<td>(5)</td>
<td>Solid-state drives (M.2; includes foil)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>512-GB, PCIe, NVMe</td>
<td>L20840-001</td>
</tr>
<tr>
<td></td>
<td>256-GB, 2280, PCIe, NVMe</td>
<td>L20839-001</td>
</tr>
<tr>
<td></td>
<td>256-GB, SATA-3, TLC</td>
<td>L20838-001</td>
</tr>
<tr>
<td></td>
<td>128-GB, SATA-3, TLC</td>
<td>L20837-001</td>
</tr>
<tr>
<td></td>
<td><strong>Optane memory module</strong> (16-GB)</td>
<td>L20836-001</td>
</tr>
</tbody>
</table>
## Miscellaneous parts

<table>
<thead>
<tr>
<th>Component</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AC adapter:</strong></td>
<td></td>
</tr>
<tr>
<td>65-W HP Smart AC adapter (non-PFC, EM, RC, 4.5-mm)</td>
<td>913691-850</td>
</tr>
<tr>
<td>65-W AC adapter (non-PFC, 5-3P, 4.5-mm)</td>
<td>710412-001</td>
</tr>
<tr>
<td>65-W AC adapter (non-PFC, 4.5-mm, for use in Argentina)</td>
<td>710340-850</td>
</tr>
<tr>
<td>45-W HP Smart AC adapter (non-PFC, RC, 4.5-mm, non-slim)</td>
<td>741553-850</td>
</tr>
<tr>
<td>45-W AC adapter (non-PFC, 4.5-mm, for use in Argentina)</td>
<td>741553-852</td>
</tr>
<tr>
<td><strong>HP HDMI-to-VGA adapter</strong></td>
<td>701943-001</td>
</tr>
<tr>
<td><strong>HP external DVD±RW DL SuperMulti Drive</strong></td>
<td>747080-001</td>
</tr>
<tr>
<td><strong>HP USB-to-Gigabit RJ45 adapter</strong></td>
<td>829941-001</td>
</tr>
<tr>
<td><strong>HP USB–C-to-USB–A dongle</strong></td>
<td>833960-001</td>
</tr>
<tr>
<td><strong>Power cord</strong> (C5 connector, 1.00-m):</td>
<td></td>
</tr>
<tr>
<td>For use in Argentina</td>
<td>L19357-001</td>
</tr>
<tr>
<td>For use in Australia</td>
<td>L19358-001</td>
</tr>
<tr>
<td>For use in Denmark</td>
<td>L19360-001</td>
</tr>
<tr>
<td>For use in Europe</td>
<td>L19361-001</td>
</tr>
<tr>
<td>For use in India</td>
<td>L19363-001</td>
</tr>
<tr>
<td>For use in Israel</td>
<td>L19362-001</td>
</tr>
<tr>
<td>For use in Italy</td>
<td>L19364-001</td>
</tr>
<tr>
<td>For use in North America</td>
<td>L19367-001</td>
</tr>
<tr>
<td>For use in the People's Republic of China</td>
<td>L19368-001</td>
</tr>
<tr>
<td>For use in South Africa</td>
<td>L19369-001</td>
</tr>
<tr>
<td>For use in Switzerland</td>
<td>L19370-001</td>
</tr>
<tr>
<td>For use in Thailand</td>
<td>L19371-001</td>
</tr>
<tr>
<td>For use in the United Kingdom and Singapore</td>
<td>L19373-001</td>
</tr>
<tr>
<td><strong>Rubber Kit</strong> (includes rubber feet and Mylar screw cover)</td>
<td>L20831-001</td>
</tr>
<tr>
<td><strong>Screw Kit</strong></td>
<td>L20834-001</td>
</tr>
<tr>
<td><strong>Pen tip</strong></td>
<td>L04536-001</td>
</tr>
<tr>
<td><strong>Stylus</strong> (active pen in Pike silver finish)</td>
<td>910942-001</td>
</tr>
</tbody>
</table>
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 and P1 screw drivers
- Non-marking pry tool

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.

<table>
<thead>
<tr>
<th>Event</th>
<th>Relative humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event</td>
<td>10%</td>
</tr>
<tr>
<td>Walking across carpet</td>
<td>35,000 V</td>
</tr>
<tr>
<td>Walking across vinyl floor</td>
<td>12,000 V</td>
</tr>
<tr>
<td>Motions of bench worker</td>
<td>6,000 V</td>
</tr>
<tr>
<td>Removing DIPS from plastic tube</td>
<td>2,000 V</td>
</tr>
<tr>
<td>Removing DIPS from vinyl tray</td>
<td>11,500 V</td>
</tr>
<tr>
<td>Removing DIPS from Styrofoam</td>
<td>14,500 V</td>
</tr>
<tr>
<td>Removing bubble pack from PCB</td>
<td>26,500 V</td>
</tr>
<tr>
<td>Packing PCBs in foam-lined box</td>
<td>21,000 V</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Material</th>
<th>Use</th>
<th>Voltage protection level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antistatic plastics</td>
<td>Bags</td>
<td>1,500 V</td>
</tr>
<tr>
<td>Carbon-loaded plastic</td>
<td>Floor mats</td>
<td>7,500 V</td>
</tr>
<tr>
<td>Metallized laminate</td>
<td>Floor mats</td>
<td>5,000 V</td>
</tr>
</tbody>
</table>
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 [Labels on page 14](#) 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](http://partsurfer.hp.com), select your country or region, and then follow the on-screen instructions.

There are as many as 46 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.
### Bottom cover

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom cover</td>
<td>L09577-001</td>
</tr>
<tr>
<td>Rubber Kit (includes rubber feet and Mylar screw cover)</td>
<td>L20831-001</td>
</tr>
</tbody>
</table>

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. Remove the two rubber feet near the vent (1).
2. Remove the two Phillips M2.0×6.0 screws (P1 driver) (2) from under the feet.
3. Remove the Mylar screw cover (3).
4. Loosen the four Phillips M2.0×4.0 screws (P0 driver) (4) that secure the cover to the computer.
5. Using a plastic tool, starting near a hinge under the display, pry the bottom cover up to remove it (2).
Battery

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-cell, 48-WHr, 4.2-AHr, Li-ion battery</td>
<td>L09280-855</td>
</tr>
</tbody>
</table>

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 27).

Remove the battery:

1. Remove the seven Phillips M2.0×5.0 screws (1) that secure the battery to the computer.
2. Lift the battery on the connector side, and then remove it from the computer (2).

Reverse this procedure to install the battery.
Solid-state drive

**IMPORTANT:** The solid-state drive is installed into the M.2 connector that is used by the Optane memory module. You cannot install both a solid-state drive and a Optane memory module in the computer at the same time.

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>512-GB, PCIe, NVMe</td>
<td>L20840-001</td>
</tr>
<tr>
<td>256-GB, 2280, PCIe, NVMe</td>
<td>L20839-001</td>
</tr>
<tr>
<td>256-GB, SATA-3, TLC</td>
<td>L20838-001</td>
</tr>
<tr>
<td>128-GB, SATA-3, TLC</td>
<td>L20837-001</td>
</tr>
</tbody>
</table>

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

1. Shut down the computer.
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 27**).
5. Remove the battery (see **Battery on page 29**).

Remove the solid-state drive:

▲ Remove the Phillips M2.0×3.0 screw (1), and then pull the solid-state drive module from the socket (2).

Reverse this procedure to install the solid-state drive.
Optane memory module

**IMPORTANT:** The Optane memory module is installed into the M.2 connector that is used by M.2 solid-state drives. You cannot install both an Optane memory module and a solid-state drive in the computer at the same time.

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optane memory module, 16 GB</td>
<td>L20836-001</td>
</tr>
</tbody>
</table>

Before removing the Optane memory module, follow these steps:

1. Shut down the computer.
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 27](#)).
5. Remove the battery (see [Battery on page 29](#)).

Remove the Optane memory module:

▲ Remove the Phillips M2.0×3.0 screw (1), and then pull the solid-state drive module from the socket (2).

Reverse this procedure to install the Optane memory module.
WLAN module

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel Dual Band Wireless-AC 7265 802.11 AC 2×2 WiFi + Bluetooth 4.2 Combo Adapter (non-vPro)</td>
<td>901229-855</td>
</tr>
<tr>
<td>Intel Dual Band Wireless-AC 3168 802.11AC 1×1 WiFi + Bluetooth 4.2 Combo Adapter (non-vPro)</td>
<td>863934-855</td>
</tr>
<tr>
<td>Realtek RTL8822BE 802.11 ac 2x2 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)</td>
<td>924813-855</td>
</tr>
<tr>
<td>Realtek RTL8821CE 802.11 ac 1x1 WiFi + Bluetooth 4.2 Combo Adapter (MU-MIMO supported)</td>
<td>L17365-005</td>
</tr>
</tbody>
</table>

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

Before removing the WLAN module, follow these steps:

1. Turn off the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. Disconnect the power from the computer by first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see **Bottom cover on page 27**).
5. Remove the battery (see **Battery on page 29**).

Remove the WLAN module:

1. Disconnect the antenna cable from the module (1).
2. Remove the Phillips M2.0×3.0 screw (2), and then pull the module out of the socket (3).

Reverse this procedure to install the WLAN module.
Hard drive

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-TB, 5400-rpm, SATA, 8-GB hybrid hard drive</td>
<td>924036-855</td>
</tr>
<tr>
<td>1-TB, 5400-rpm, SATA hard drive</td>
<td>762990-005</td>
</tr>
<tr>
<td>500-GB, 5400-rpm, SATA hard drive</td>
<td>778186-005</td>
</tr>
<tr>
<td>Hard drive rubber sleeve</td>
<td>L20832-001</td>
</tr>
<tr>
<td>Hard drive foil</td>
<td>L25138-001</td>
</tr>
<tr>
<td>Hard drive cable</td>
<td>L20815-001</td>
</tr>
</tbody>
</table>

Before removing the hard drive, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. 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 27).
5. Remove the battery (see Battery on page 29).

Remove the hard drive:

1. Release the ZIF connector (1), and then disconnect the hard drive cable from the system board (2).
2. Remove the hard drive from the computer (3).
3. If it is necessary to remove the hard drive from the rubber sleeve, pull the sides of rubber bracket away from the hard drive, and then remove the bracket from the hard drive (1).

4. Disconnect the cable from the hard drive (2).
5. If it is necessary to remove the foil from the hard drive, pull up on the sides of the foil (1), lift the foil at the front of the drive (2), and then remove the foil from the drive (3).

Reverse this procedure to reassemble and install the hard drive.
Memory module

**NOTE:** The memory module spare part kit does not include the memory cover. The memory cover is available using spare part number L20821-001.

**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.

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-MB, DDR4-2666, 1.2-V</td>
<td>937236-855</td>
</tr>
<tr>
<td>4-MB, DDR4-2666, 1.2-V</td>
<td>L10598-855</td>
</tr>
<tr>
<td>2-MB, DDR4-2133, 1.2-V</td>
<td>864271-855</td>
</tr>
</tbody>
</table>

**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:

2. Click Support, and then click Software & Drivers.
3. Personal Computing
4. In the Enter your HP product name, product number or serial number box, type the computer model information, and then click Find.
5. (If necessary) Click the link for the computer model.
6. Click the BIOS link.
7. Click the Download button, and then follow the on-screen instructions.

Before removing the memory 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 first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 27).
5. Remove the battery (see Battery on page 29).

Remove the memory module:

1. Squeeze the sides of the memory cover (1), and then lift the cover off the system board (2).

The memory cover is available using spare part number L20821-001.
2. 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.)

3. 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.

Reverse this procedure to install a memory module.

Seven small clips and four holes on the system board hold the memory cover in place. When replacing the memory cover, be sure to align the cover with these components.
**Audio/power button board**

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio/power button board</td>
<td>L20828-001</td>
</tr>
<tr>
<td>Audio/power button board cable</td>
<td>L20814-001</td>
</tr>
</tbody>
</table>

Before removing the audio/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 27).
5. Remove the battery (see Battery on page 29).

Remove the audio/power button board:

1. Disconnect the cable from the system board ZIF connector (1).
2. Remove the two Phillips M2.0×2.0 screws (2) that secure the board to the computer.
3. Rotate the rear of the board up, and then lift it out of the computer (3).

Reverse this procedure to install the audio/power button board.
## TouchPad

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>TouchPad (includes Mylar and bracket rubber)</td>
<td>L20830-001</td>
</tr>
<tr>
<td>TouchPad bracket</td>
<td>L20820-001</td>
</tr>
<tr>
<td>TouchPad cable</td>
<td>L20813-001</td>
</tr>
</tbody>
</table>

Before removing the TouchPad, 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 27).
5. Remove the battery (see Battery on page 29).

Remove the TouchPad:

1. Disconnect the TouchPad cable from the system board ZIF connector (1).
2. Remove the three Phillips M2.0×3.0 screws (2) that secure the TouchPad bracket to the computer.
3. Remove the bracket (3).
4. Remove the three Phillips M2.0×2.0 screws (4) that secure the TouchPad to the computer.
5. Remove the TouchPad (S).

Reverse this procedure to install the TouchPad.
Display assembly

NOTE: The display assembly is spared only as an entire hinge-up. Display subcomponents are not spared.

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display assembly, FHD panel, IR camera, direct bonded, natural silver</td>
<td>L20822-001</td>
</tr>
<tr>
<td>Display assembly, FHD panel, IR camera, direct bonded, pale gold</td>
<td>L20823-001</td>
</tr>
<tr>
<td>Display assembly, FHD panel, HD camera, direct bonded, natural silver</td>
<td>L20824-001</td>
</tr>
<tr>
<td>Display assembly, FHD panel, HD camera, direct bonded, pale gold</td>
<td>L20825-001</td>
</tr>
<tr>
<td>Display assembly, HD panel, HD camera, air bonded, natural silver</td>
<td>L20826-001</td>
</tr>
<tr>
<td>Display assembly, HD panel, HD camera, air bonded, pale gold</td>
<td>L20827-001</td>
</tr>
</tbody>
</table>

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 27).
5. Remove the battery (see Battery on page 29).

Remove the display assembly:

1. Disconnect the antenna cables from WLAN module (1).
2. Disconnect the camera (CCD) cable from the system board ZIF connector (2).
3. Disconnect the display cable from the system board ZIF connector (3).
4. Remove the camera cable and antenna cable from the clips in the left speaker (4).
5. Remove the display cable from the clips in the right speaker (5).

6. Open display to approximately 270 degrees (1).

7. Remove the six Phillips PM2.5×4.0 screws (2) that secure the display assembly to the computer.
8. With display open about 270 degrees (1), pull the display away to separate it from the computer (2).

Reverse this procedure to install the display assembly.
Power connector cable

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power connector cable</td>
<td>L20817-001</td>
</tr>
</tbody>
</table>

Before removing the power connector cable, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. 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 27).
5. Remove the battery (see Battery on page 29).
6. Remove the display (see Display assembly on page 42).

Remove the power connector cable:

1. Disconnect the power connector cable from the system board (1).
2. Remove the power connector cable from the computer (2).

Reverse this procedure to install the power connector cable.
**System board**

**NOTE:** All system board spare part kits include a processor and replacement thermal material.

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>System board for use in models with discrete graphics:</td>
<td></td>
</tr>
<tr>
<td>● Equipped with an Intel Core i7-8550U processor and 4 GB of discrete graphics memory</td>
<td>L20842-xx1</td>
</tr>
<tr>
<td>● Equipped with an Intel Core i5-8250U processor and 2 GB of discrete graphics memory</td>
<td>L20841-xx1</td>
</tr>
<tr>
<td>System board for use in models with UMA graphics:</td>
<td></td>
</tr>
<tr>
<td>● Equipped with an Intel Core i7-8550U processor</td>
<td>L28780-xx1</td>
</tr>
<tr>
<td>● Equipped with an Intel Core i5-8250U processor and an HD camera</td>
<td>L20844-xx1</td>
</tr>
<tr>
<td>● Equipped with an Intel Core i5-8250U processor and an IR camera</td>
<td>L20846-xx1</td>
</tr>
<tr>
<td>● Equipped with an Intel Core i3-8130U processor</td>
<td></td>
</tr>
<tr>
<td>● Equipped with an Intel Pentium 4415U processor</td>
<td></td>
</tr>
</tbody>
</table>

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 27).
5. Remove the battery (see Battery on page 29).

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

- WLAN module (see WLAN module on page 32)
- Solid-state drive (see Solid-state drive on page 30) or Optane memory module (see Optane memory module on page 31)
- Fan/heat sink assembly (see Fan/heat sink assembly on page 51)
- Memory modules (see Memory module on page 36)

Remove the system board:

1. Disconnect the following cables from the system board:

   (1): Audio/power button board cable
   (2): TouchPad cable
   (3): Keyboard cable
   (4): Backlight cable
   (5): Hard drive cable
2. Remove the two Phillips M2.0×4.0 screws (1) that secure the system board to the computer.
3. Remove the four Phillips M2.0×3.0 screws (2) that secure the system board to the computer.
4. Remove the two Phillips M2.0×3.0 screw (3) that secure the USB board to the computer.

5. Lift the system board until it rests at an angle (1).
6. Remove the system board by pulling it away from and out of the computer (2).

Reverse this procedure to install the system board.
USB board

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB board</td>
<td>L20829-001</td>
</tr>
<tr>
<td>USB board cable</td>
<td>L20816-001</td>
</tr>
</tbody>
</table>

Before removing the USB board, follow these steps:

1. Shut down the computer. If you are unsure whether the computer is off or in Hibernation, turn the computer on, and then shut it down through the operating system.
2. 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 27).
5. Remove the battery (see Battery on page 29).
6. Remove the system board (see System board on page 46).

Remove the USB board:

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

Reverse this procedure to install the USB board.
Speakers

### Description

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speakers (include cable)</td>
<td>L20835-001</td>
</tr>
</tbody>
</table>

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 first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see [Bottom cover on page 27](#)).
5. Remove the battery (see [Battery on page 29](#)).
6. Remove the system board (see [System board on page 46](#)).

Remove the speakers:

1. Remove the antenna cable and CCD cable from the clips in the left speaker (1).
2. Remove the display cable from the clips in the right speaker (2).
3. Remove the two Phillips M2.0×6.0 screws (3) that secure the speakers to the computer.
4. Remove the speakers (4).

Reverse this procedure to install the speakers.
**Fan/heat sink assembly**

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan/heat sink for use in models equipped with a discrete graphics memory subsystem</td>
<td>L20819-001</td>
</tr>
<tr>
<td>Thermal pad for use in models with discrete graphics</td>
<td>L21302-001</td>
</tr>
<tr>
<td>Fan/heat sink for use in models equipped with a UMA graphics subsystem</td>
<td>L20818-001</td>
</tr>
</tbody>
</table>

Before removing the fan/heat sink 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 first unplugging the power cord from the AC outlet, and then unplugging the AC adapter from the computer.
3. Disconnect all external devices from the computer.
4. Remove the bottom cover (see Bottom cover on page 27).
5. Remove the battery (see Battery on page 29).

Remove the fan/heat sink assembly:

1. **Discrete models:**
   - Disconnect the fan cable from the system board (1).
2. In the order shown, loosen the six Phillips captive screws (2)-(7) that secure the fan/heat sink assembly to the system board.
3. Pull the heat sink off the thermal pad (8).
4. Remove the fan/heat sink assembly (9).

5. Thoroughly clean the thermal material from the surfaces of the fan/heat sink assembly and the system board components each time the fan/heat sink assembly is removed. Replacement thermal material is included with the fan/heat sink assembly and system board spare part kits.

Thermal paste is used on the processor (1) and the heat sink section (2) that services it. Thermal paste is also used on the VGA component (3) and the heat sink section (4) that services it.
6. **UMA models:**
   Disconnect the fan cable from the system board (1).

7. In the order shown, loosen the four Phillips captive screws (2)-(5) that secure the fan/heat sink assembly to the system board.

8. Pull the heat sink off the thermal pad (6).

9. Remove the fan/heat sink assembly (7).
10. Thoroughly clean the thermal material from the surfaces of the fan/heat sink assembly and the system board components each time the fan/heat sink assembly is removed. Replacement thermal material is included with the fan/heat sink assembly and system board spare part kits.

Thermal paste is used on the processor (1) and the heat sink section (2) that services it.

Reverse this procedure to install the fan/heat sink assembly.
**Top cover with keyboard**

The top cover with keyboard remains after removing all other spared parts from the computer.

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

<table>
<thead>
<tr>
<th>Description</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keyboard, no backlight, natural silver</td>
<td>L20848-xx1</td>
</tr>
<tr>
<td>Keyboard, backlit, natural silver</td>
<td>L20849-xx1</td>
</tr>
<tr>
<td>Keyboard, no backlight, pale gold</td>
<td>L20850-xx1</td>
</tr>
<tr>
<td>Keyboard, backlit, pale gold</td>
<td>L20851-xx1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>For use in country or region</th>
<th>Spare part number</th>
<th>For use in country or region</th>
<th>Spare part number</th>
<th>For use in country or region</th>
<th>Spare part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belgium</td>
<td>-A41</td>
<td>Hungary</td>
<td>-211</td>
<td>Saudi Arabia</td>
<td>-171</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>-261</td>
<td>Israel</td>
<td>-BB1</td>
<td>Slovenia</td>
<td>-BA1</td>
</tr>
<tr>
<td>Canada</td>
<td>-DB1</td>
<td>Italy</td>
<td>-061</td>
<td>Spain</td>
<td>-071</td>
</tr>
<tr>
<td>Czech Republic and Slovakia</td>
<td>-FL1</td>
<td>Latin America</td>
<td>-161</td>
<td>Switzerland</td>
<td>-BG1</td>
</tr>
<tr>
<td>Denmark, Finland, and Norway</td>
<td>-DH1</td>
<td>The Netherlands</td>
<td>-B31</td>
<td>Turkey</td>
<td>-141</td>
</tr>
<tr>
<td>France</td>
<td>-051</td>
<td>Portugal</td>
<td>-131</td>
<td>United Kingdom</td>
<td>-031</td>
</tr>
<tr>
<td>Germany</td>
<td>-041</td>
<td>Romania</td>
<td>-271</td>
<td>United States</td>
<td>-001</td>
</tr>
<tr>
<td>Greece</td>
<td>-151</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6 Using Setup Utility (BIOS)

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

NOTE: To start Setup Utility on convertible computers, your computer must be in notebook mode and you must use the keyboard attached to your notebook.

Starting Setup Utility (BIOS)

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

▲ Turn on or restart the computer, quickly press esc, and then press f10.

Updating Setup Utility (BIOS)

Updated versions of Setup Utility (BIOS) may be available on the HP website.

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

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

Determining the BIOS version

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

To reveal the BIOS version information (also known as ROM date and System BIOS), use one of these options.

● HP Support Assistant
  1. Type support in the taskbar search box, and then select the HP Support Assistant app.
  
  – or –
  Click the question mark icon in the taskbar.
  
  2. Select My PC, and then select Specifications.

● Setup Utility (BIOS)
  2. Select Main, select System Information, and then make note of the BIOS version.
  3. Select Exit, select No, and then follow the on-screen instructions.

To check for later BIOS versions, see Downloading a BIOS update on page 57.
Downloading a BIOS update

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

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

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

1. Type `support` in the taskbar search box, and then select the **HP Support Assistant** app.
   - or –
   Click the question mark icon in the taskbar.
2. Click **Updates**, and then click **Check for updates and messages**.
3. Follow the on-screen instructions.
4. At the download area, follow these steps:
   a. Identify the most recent BIOS update and compare it to the BIOS version currently installed on your computer. If the update is more recent than your BIOS version, make a note of the date, name, or other identifier. You may need this information to locate the update later, after it has been downloaded to your hard drive.
   b. Follow the on-screen instructions to download your selection to the hard drive.
      Make a note of the path to the location on your hard drive where the BIOS update is downloaded. You will need to access this path when you are ready to install the update.

   BIOS installation procedures vary. Follow any instructions that appear on the screen after the download is complete. If no instructions appear, follow these steps:
   1. Type `file` in the taskbar search box, and then select **File Explorer**.
   2. Click your hard drive designation. The hard drive designation is typically Local Disk (C:).
   3. Using the hard drive path you recorded earlier, open the folder that contains the update.
   4. Double-click the file that has an .exe extension (for example, `filename.exe`).
      The BIOS installation begins.
   5. Complete the installation by following the on-screen instructions.

💡 **NOTE:** After a message on the screen reports a successful installation, you can delete the downloaded file from your hard drive.
Using HP PC Hardware Diagnostics Windows

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

If HP PC Hardware Diagnostics Windows is not installed on your computer, first you must download and install it. To download HP PC Hardware Diagnostics Windows, see Downloading HP PC Hardware Diagnostics Windows on page 58.

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

1. To access HP PC Hardware Diagnostics Windows from HP Help and Support:
   a. Select the Start button, and then select HP Help and Support.
   b. Right-click HP PC Hardware Diagnostics Windows, select More, and then select Run as administrator.

   – or –

   To access HP PC Hardware Diagnostics Windows from HP Support Assistant:
   a. Type support in the taskbar search box, and then select the HP Support Assistant app.
      – or –
      Select the question mark icon in the taskbar.
   b. Select Troubleshooting and fixes.
   c. Select Diagnostics, and then select HP PC Hardware Diagnostics Windows.

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

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

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

Downloading HP PC Hardware Diagnostics Windows

- The HP PC Hardware Diagnostics Windows download instructions are provided in English only.
- You must use a Windows computer to download this tool because only .exe files are provided.
**Downloading the latest HP PC Hardware Diagnostics Windows version**

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

2. In the **HP PC Hardware Diagnostics** section, select **Download**, and then select the installation location:
   - To run the tool on your computer, download it to the computer desktop.
   - or –
   - To run the tool from a USB flash drive, download it to a USB flash drive.
3. Select **Run**.

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

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

To download HP PC Hardware Diagnostics Windows by product name or number (select products only), follow these steps:

2. Select **Get software and drivers**, and then enter the product name or number.
3. In the **HP PC Hardware Diagnostics** section, select **Download**, and then select the installation location:
   - To run the tool on your computer, download it to the computer desktop.
   - or –
   - To run the tool from a USB flash drive, download it to a USB flash drive.
4. Select **Run**.

**Installing HP PC Hardware Diagnostics Windows**

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

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

**Using HP PC Hardware Diagnostics UEFI**

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

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

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

**NOTE:** To start diagnostics on a convertible computer, your computer must be in notebook mode, and you must use the attached keyboard.
Starting HP PC Hardware Diagnostics UEFI

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

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

2. Press `f2`.

   The BIOS searches three places for the diagnostic tools, in the following order:
   a. Connected USB flash drive
   
   **NOTE:** To download the HP PC Hardware Diagnostics UEFI tool to a USB flash drive, see Downloading the latest HP PC Hardware Diagnostics UEFI version on page 60.
   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.

Downloading HP PC Hardware Diagnostics UEFI to a USB flash drive

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

- HP PC Hardware Diagnostics UEFI is not included in the preinstall image.
- HP PC Hardware Diagnostics UEFI is not included in the HP Tool partition.
- The hard drive is damaged.

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

Downloading the latest HP PC Hardware Diagnostics UEFI version

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


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

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

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

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


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

3. In the Diagnostics section, follow the on-screen instructions to select and download the specific UEFI Diagnostics version for your computer.
Using Remote HP PC Hardware Diagnostics UEFI settings (select products only)

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

### Downloading Remote HP PC Hardware Diagnostics UEFI

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

#### Downloading the latest Remote HP PC Hardware Diagnostics UEFI version

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

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

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

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

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

2. Select **Get software and drivers**, enter the product name or number, select your computer, and then select your operating system.
3. In the **Diagnostics** section, follow the on-screen instructions to select and download the **Remote UEFI** version for the product.

### Customizing Remote HP PC Hardware Diagnostics UEFI settings

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

- Set a schedule for running diagnostics unattended. You can also start diagnostics immediately in interactive mode by selecting **Execute Remote HP PC Hardware Diagnostics**.
- Set the location for downloading the diagnostic tools. This feature provides access to the tools from the HP website or from a server that has been preconfigured for use. Your computer does not require the traditional local storage (such as a disk drive or USB flash drive) to run remote diagnostics.
- Set a location for storing the test results. You can also set the user name and password settings used for uploads.
- Display status information about the diagnostics run previously.

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

1. Turn on or restart the computer, and when the HP logo appears, press **f10** to enter Computer Setup.
2. Select **Advanced**, and then select **Settings**.
3. Make your customization selections.

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

Your changes take effect when the computer restarts.
8 Backing up, restoring, and recovering

This chapter provides information about the following processes, which are standard procedure for most products:

- **Backing up your personal information**—You can use Windows tools to back up your personal information (see Using Windows tools on page 63).

- **Creating a restore point**—You can use Windows tools to create a restore point (see Using Windows tools on page 63).

- **Creating recovery media (select products only)**—You can use HP Recovery Manager or HP Cloud Recovery Download Tool (select products only) to create recovery media (see Creating HP Recovery media (select products only) on page 63).

- **Restoring and recovery**—Windows offers several options for restoring from backup, refreshing the computer, and resetting the computer to its original state (see Using Windows tools on page 63).

- **Removing the Recovery Partition**—To remove the Recovery partition to reclaim hard drive space (select products only), select the Remove Recovery Partition option of HP Recovery Manager. For more information, see Removing the HP Recovery partition (select products only) on page 67.

**Using Windows tools**

**IMPORTANT:** Windows is the only option that allows you to back up your personal information. Schedule regular backups to avoid information loss.

You can use Windows tools to back up personal information and create system restore points and recovery media, allowing you to restore from backup, refresh the computer, and reset the computer to its original state.

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

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

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

**NOTE:** You must be connected to the Internet to access the Get Help app.

**Creating HP Recovery media (select products only)**

After you have successfully set up the computer, use HP Recovery Manager to create a backup of the HP Recovery partition on the computer. This backup is called HP Recovery media. In cases where the hard drive is corrupted or has been replaced, the HP Recovery media can be used to reinstall the original operating system.

To check for the presence of the Recovery partition in addition to the Windows partition, right-click the **Start** button, select **File Explorer**, and then select **This PC**.

**NOTE:** If your computer does not list the Recovery partition in addition to the Windows partition, contact support to obtain recovery discs. Go to http://www.hp.com/support, select your country or region, and then follow the on-screen instructions.
On select products, you can use the HP Cloud Recovery Download Tool to create HP Recovery media on a bootable USB flash drive. For more information, see Using the HP Cloud Recovery Download Tool to create recovery media on page 65.

Using HP Recovery Manager to create recovery media

**NOTE:** If you cannot create recovery media yourself, contact support to obtain recovery discs. Go to http://www.hp.com/support, select your country or region, and then follow the on-screen instructions.

Before you begin

Before you begin, note the following:

- Only one set of recovery media can be created. Handle these recovery tools carefully, and keep them in a safe place.
- HP Recovery Manager examines the computer and determines the required media storage capacity.
- To create recovery media, use one of the following options:

  **NOTE:** If the computer does not have a recovery partition, HP Recovery Manager displays the Windows Create a Recovery Drive feature. Follow the on-screen instructions to create a recovery image on a blank USB flash drive or hard drive.

  - If your computer has an optical drive with DVD writer capability, be sure to use only high-quality blank DVD-R, DVD+R, DVD-R DL, or DVD+R DL discs. Do not use rewritable discs such as CD±RW, DVD±RW, double-layer DVD±RW, or BD-RE (rewritable Blu-ray) discs, which are not compatible with HP Recovery Manager software.
  
  - If your computer does not include an integrated optical drive with DVD writer capability, you can use an external optical drive (purchased separately) to create recovery discs, as described above. If an external optical drive is used, you must connect it directly to a USB port on the computer. It cannot be connected to a USB port on an external device, such as a USB hub.
  
  - To create a recovery flash drive, use a high-quality blank USB flash drive.

- Be sure that the computer is connected to AC power before you begin creating the recovery media.
- The creation process can take an hour or more. Do not interrupt this process.
- If necessary, you can exit the program before you have finished creating all of the recovery media. HP Recovery Manager will finish the current DVD or flash drive. The next time you start HP Recovery Manager, you will be prompted to continue.

Creating the recovery media

To create HP Recovery media using HP Recovery Manager:

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

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

If you need to recover the system, see Recovering using HP Recovery Manager on page 65.
Using the HP Cloud Recovery Download Tool to create recovery media

To create HP Recovery media using the HP Cloud Recovery Download Tool:

2. Select Software and Drivers, and then follow the on-screen instructions.

Restoring and recovery

Restoring and recovery can be performed using one or more of the following options: Windows tools, HP Recovery Manager, or the HP Recovery partition.

IMPORTANT: Not all methods are available on all products.

Restoring, resetting, and refreshing using Windows tools

Windows offers several options for restoring, resetting, and refreshing the computer. For details, see Using Windows tools on page 63.

Restoring using HP Recovery Manager and the HP Recovery partition

You can use HP Recovery Manager and the HP Recovery partition (select products only) to restore the computer to the original factory state:

- **Resolving problems with preinstalled applications or drivers**—To correct a problem with a preinstalled application or driver:
  1. Type recovery in the taskbar search box, and then select HP Recovery Manager.
  2. Select Reinstall drivers and/or applications, and then follow the on-screen instructions.

- **Using System Recovery**—To recover the Windows partition to original factory content, select the System Recovery option from the HP Recovery partition (select products only) or use the HP Recovery media. For more information, see Recovering using HP Recovery Manager on page 65. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 63.

- **Using Factory Reset** (select products only)—Restores the computer to its original factory state by deleting all information from the hard drive and recreating the partitions and then reinstalling the operating system and the software that was installed at the factory (select products only). To use the Factory Reset option, you must use HP Recovery media. If you have not already created recovery media, see Creating HP Recovery media (select products only) on page 63.

  NOTE: If you have replaced the hard drive in the computer, you can use the Factory Reset option to install the operating system and the software that was installed at the factory.

Recovering using HP Recovery Manager

You can use HP Recovery Manager software to recover the computer to its original factory state by using the HP Recovery media that you either created or that you obtained from HP, or by using the HP Recovery partition (select products only).

If you have not already created HP Recovery media, see Creating HP Recovery media (select products only) on page 63.

IMPORTANT: HP Recovery Manager does not automatically provide backups of your personal data. Before beginning recovery, back up any personal data that you want to retain. See Using Windows tools on page 63.
**IMPORTANT:** Recovery through HP Recovery Manager should be used as a final attempt to correct computer issues.

**NOTE:** When you start the recovery process, only the options available for your computer are displayed.

Before you begin, note the following:

- HP Recovery Manager recovers only software that was installed at the factory. For software not provided with this computer, you must either download the software from the manufacturer's website or reinstall the software from the media provided by the manufacturer.
- If the computer hard drive fails, HP Recovery media must be used. This media is created using HP Recovery Manager. See Creating HP Recovery media (select products only) on page 63.
- If your computer does not allow the creation of HP Recovery media or if the HP Recovery media does not work, contact support to obtain recovery media. Go to [http://www.hp.com/support](http://www.hp.com/support), select your country or region, and then follow the on-screen instructions.

### Recovering using the HP Recovery partition (select products only)

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

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

To start HP Recovery Manager from the HP Recovery partition:

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

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

   - or –

   For computers or tablets with keyboards attached:

   ▲ Press `f11` while the computer boots, or press and hold `f11` as you press the power button.

   For tablets without keyboards:

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

2. Select Troubleshoot from the boot options menu.

3. Select Recovery Manager, and then follow the on-screen instructions.

**NOTE:** If your computer does not automatically restart in HP Recovery Manager, change the computer boot order, and then follow the on-screen instructions. See Changing the computer boot order on page 67.

### Recovering using HP Recovery media

If your computer does not have an HP Recovery partition or if the hard drive is not working properly, you can use HP Recovery media to recover the original operating system and software programs that were installed at the factory.

▲ Insert the HP Recovery media, and then restart the computer.
**NOTE:** If your computer does not automatically restart in HP Recovery Manager, change the computer boot order, and then follow the on-screen instructions. See Changing the computer boot order on page 67.

### Changing the computer boot order

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

To change the boot order:

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

1. Insert the HP Recovery media.
2. Access the system **Startup** menu.
   
   For computers or tablets with keyboards attached:
   
   ▲ Turn on or restart the computer or tablet, quickly press `esc`, and then press `f9` for boot options.
   
   For tablets without keyboards:
   
   ▲ Turn on or restart the tablet, quickly hold down the volume up button, and then select `f9`.
   
   – or –
   
   Turn on or restart the tablet, quickly hold down the volume down button, and then select `f9`.
   
3. Select the optical drive or USB flash drive from which you want to boot, and then follow the on-screen instructions.

### Removing the HP Recovery partition (select products only)

HP Recovery Manager software allows you to remove the HP Recovery partition (select products only) to free up hard drive space.

**IMPORTANT:** After you remove the HP Recovery partition, you will not be able to perform System Recovery or create HP Recovery media. Before removing the Recovery partition, create HP Recovery media. See Creating HP Recovery media (select products only) on page 63.

Follow these steps to remove the HP Recovery partition:

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

<table>
<thead>
<tr>
<th>Metric</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Computer dimensions</strong></td>
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<tr>
<td><strong>Width</strong></td>
<td>358.1 mm</td>
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<tr>
<td><strong>Depth</strong></td>
<td>243 mm</td>
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<tr>
<td><strong>Height</strong></td>
<td></td>
</tr>
<tr>
<td>HD display</td>
<td>20.7 mm</td>
</tr>
<tr>
<td>FHD display</td>
<td>19.9 mm</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
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<tr>
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</tr>
<tr>
<td>FHD display; SSD models</td>
<td>1994 g</td>
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<td>2081 g</td>
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<tr>
<td>FHD display; HDD models</td>
<td>2088 g</td>
</tr>
</tbody>
</table>

### 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.
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

<table>
<thead>
<tr>
<th>Country/region</th>
<th>Accredited agency</th>
<th>Applicable note number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>EANSW</td>
<td>1</td>
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<tr>
<td>Austria</td>
<td>OVE</td>
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<tr>
<td>Denmark</td>
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<td>The People's Republic of China</td>
<td>COC</td>
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<td>Applicable note number</td>
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<td>The United Kingdom</td>
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<td>1</td>
</tr>
<tr>
<td>The United States</td>
<td>UL</td>
<td>2</td>
</tr>
</tbody>
</table>

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

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

A
AC adapter and battery light, identifying 5
AC adapter, spare part numbers 20
action keys
  airplane mode 13
  help 12
  identifying 11, 12
  keyboard backlight 12
  mute 12
  next track 12
  pause 12
  play 12
  privacy screen 12
  screen brightness 12
  speaker volume 12
  stop 12
  switch screen image 12
  using 12
  wireless 12
airplane mode key 13
audio
  adjusting volume 12
audio, product description 2
audio-out (headphone)/audio-in (microphone) combo jack, identifying 6
audio/power button board
  removal 39
  spare part number 16, 39
B
backup, creating 63
backups 63
base enclosure, spare part numbers 17
battery
  removal 29
  spare part number 16, 29
BIOS
  determining version 56
  downloading an update 57
  starting the Setup Utility 56
  updating 56
Bluetooth label 14
boot order, changing 67
bottom cover
  removal 27
  spare part number 27
buttons
  left TouchPad 8
  power 6
  right TouchPad 8
  volume 5
cables 18
cables, service considerations 21
camera
  identifying 7
  camera lights, identifying 7
  camera, product description 2
  caps lock light, identifying 9
  chipset, product description 1
  components
    bottom 13
    display 7
    left side 6
    right side 5
  computer major components 15
  connector, power 5
  connectors, service considerations 21
display assembly
  removal 42
  spare part numbers 42
display panel, product description 1
drive light, identifying 5
drives 19
  precautions 22
  preventing damage 22
electrostatic discharge 23
equipment guidelines 25
esc key, identifying 11
fan/heat sink assembly
  removal 51
  spare part numbers 17, 51
fn key, identifying 11
Get Help in Windows 10 action key 12
graphics, product description 1
grounding guidelines 23
  equipment 25
  grounding 23
  packaging 24
  transporting 24
  workstation 24
hard drive
  product description 2
  removal 33
  spare part numbers 16, 33
hard drive cable
  spare part number 33
hard drive foil
  removal 35
  spare part number 33
hard drive rubber sleeve
  removal 34
  spare part number 33
HDMI port
  identifying 5
HDMI-to-VGA adapter, spare part number 20
HP PC Hardware Diagnostics UEFI
  downloading 60
  starting 60
  using 59
HP PC Hardware Diagnostics Windows
  downloading 58
  installing 59
  using 58
HP Recovery Manager
   correcting boot problems 67
   starting 66
HP Recovery media
   recovery 66
   using 64
HP Recovery partition
   recovery 66
   removing 67

I
   integrated numeric keypad,
      identifying 11
   internal microphones, identifying 7

J
   jacks
      audio-out (headphone)/audio-in
         (microphone) 6

K
   keyboard
      removal 16, 55
      spare part number 16, 55
   keyboard backlight action key 12
   keyboard, product description 3
   keys
      action 11
      airplane mode 13
      esc 11
      fn 11
      Windows 11

L
   labels
      Bluetooth 14
      regulatory 14
      serial number 14
      service 14
      wireless certification 14
   lights
      AC adapter and battery light 5
      caps lock 9
      drive 5
      mute 9
      power 6

M
   mass storage devices 19
   memory card reader, identifying 5
   memory card, identifying 5
   memory cover
      removal 36
      spare part number 17, 36
   memory module
      product description 1
      removal 36
      spare part numbers 17, 36
   memory module bracket
      spare part number 36
   microphone
      product description 2
      minimized image recovery 66
   minimized image, creating 65
   model name 1
   mute light, identifying 9
   mute volume action key 12

N
   next track action key 12

O
   operating system, product
      description 4
   Optane memory module
      removal 31
      spare part number 31
      spare part numbers 31
   optical drive
      product description 2
      optical drive, spare part number 20
   original system recovery 65

P
   packaging guidelines 24
   pause action key 12
   plastic parts, service
      considerations 21
   play action key 12
   ports
      HDMI 5
      product description 3
      USB SuperSpeed 6
      USB Type-C 5
   power button, identifying 6
   power connector cable
      removal 45
      spare part number 17, 45
   power connector, identifying 5
   power cord
      set requirements 69
   power lights, identifying 6
   power requirements, product
      description 3
   privacy screen action key 12
   privacy screen action key,
      identifying 12
   processor, product description 1
   product description
      audio 2
      camera 2
      chipset 1
      display panel 1
      external media cards 3
      graphics 1
      hard drive 2
      internal card expansion 3
      keyboard 3
      memory module 1
      microphone 2
      operating system 4
      optical drive 2
      ports 3
      power requirements 3
      processors 1
      product name 1
      security 4
      serviceability 4
      solid-state drive 2
      storage 2
      TouchPad 3
      wireless 3
      product name 1
      product name and number,
         computer 14

R
   recovery 63
   discs 64, 66
   HP Recovery Manager 65
   HP Recovery partition 65
   media 66
   starting 66
   supported discs 64
   system 65
   USB flash drive 66
   using HP Recovery media 64
   recovery media
      creating using HP Cloud Recovery
         Download Tool 65
creating using HP Recovery Manager 64
creating using Windows tools 63
discs 64
HP Recovery partition 63
USB flash drive 64
using 64
recovery partition, removing 67
regulatory information
  regulatory label 14
  wireless certification labels 14
Remote HP PC Hardware Diagnostics
UEFI settings
  customizing 61
  using 61
removal/replacement procedures 26
restoring 63
Rubber Kit, spare part number 17, 20, 27
S
screen brightness action keys 12
Screw Kit, spare part number 20
security cable slot, identifying 7
security, product description 4
serial number, computer 14
service considerations
  cables 21
  connectors 21
  plastic parts 21
  service labels, locating 14
  serviceability, product description 4
slots
  memory card reader 5
  solid-state drive
    product description 2
    removal 30
    spare part numbers 17, 30
Solid-State Drive Rubber Kit, spare part number 17
speaker volume action keys 12
speakers
  identifying 10
  removal 50
  spare part number 17, 50
special keys, using 11
stop action key 12
storage, product description 2
stylus, spare part number 20
supported discs, recovery 64
switch screen image action key 12
system board
  removal 46
  spare part numbers 16, 46
system recovery 65
system restore point, creating 63
T
tools required 21
top cover
  removal 16, 55
  spare part number 16, 55
TouchPad
  buttons 8
  removal 40
  spare part number 16, 40
TouchPad bracket
  spare part number 16, 40
TouchPad cable
  spare part number 16, 40
TouchPad zone, identifying 8
TouchPad, product description 3
transporting guidelines 24
traveling with the computer 14
U
USB board
  removal 49
  spare part number 16, 49
USB SuperSpeed port, identifying 6
USB Type-C port, identifying 5
USB-to-Gigabit RJ45 adapter, spare part number 20
USB–C-to-USB–A dongle, spare part number 20
V
vents, identifying 6, 13
volume
  adjusting 12
  mute 12
  volume button, identifying 5
W
Windows
  backup 63
  recovery media 63
  system restore point 63
Windows key, identifying 11
Windows tools, using 63
wireless action key 12
wireless certification label 14
wireless, product description 3
WLAN antennas, identifying 7
WLAN device 14
WLAN label 14
WLAN module
  removal 32
  spare part numbers 17, 32
workstation guidelines 24