

Dell Precision 3541

Service Manual

Notes, cautions, and warnings

 **NOTE:** A NOTE indicates important information that helps you make better use of your product.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.

Chapter 1: Working on your computer	7
Safety instructions.....	7
Before working inside your computer.....	7
Safety precautions.....	8
Electrostatic discharge—ESD protection.....	8
ESD Field Service kit	9
Transporting sensitive components.....	10
After working inside your computer.....	10
Chapter 2: Technology and components	11
DDR4.....	11
USB features.....	12
USB Type-C.....	14
HDMI 1.4.....	15
USB features.....	16
Power button LED behavior.....	18
Chapter 3: Major components of your system	20
Chapter 4: Disassembly and reassembly	22
Base cover.....	22
Removing the base cover.....	22
Installing the base cover.....	24
Battery.....	26
Rechargeable Li-ion battery precautions.....	26
Removing the battery.....	26
Installing the battery.....	27
Memory module.....	28
Removing the memory modules.....	28
Installing the memory modules.....	29
WLAN card.....	30
Removing the WLAN card.....	30
Installing the WLAN card.....	31
WWAN card.....	32
Removing the WWAN.....	32
Installing the WWAN.....	33
Hard-drive assembly.....	34
Removing the Hard drive.....	34
Installing the Hard drive.....	35
Coin-cell battery.....	36
Removing the Coin-cell.....	36
Installing the Coin-cell.....	37
DC-in port.....	38
Removing the DC-in.....	38

Installing the DC-in.....	39
Solid-state drive.....	40
Removing the SSD.....	40
Installing the SSD.....	41
Inner frame.....	42
Removing the inner frame.....	42
Installing the inner frame.....	44
Touchpad buttons.....	46
Touchpad buttons.....	46
SmartCard reader.....	48
Removing the smart card reader board.....	48
Installing the smart card reader board.....	49
Touchpad buttons.....	51
Removing the touchpad buttons.....	51
Installing the touchpad buttons.....	52
LED board.....	53
Removing the LED board.....	53
Installing the LED board.....	54
Speakers.....	55
Removing the speakers.....	55
Installing the speakers.....	56
Heatsink assembly-Discrete.....	58
Removing the heatsink assembly-discrete.....	58
Installing the heatsink assembly-discrete.....	59
Heatsink assembly-UMA.....	62
Removing the heatsink assembly-UMA.....	62
Installing the heatsink assembly-UMA.....	63
System board.....	66
Removing the system board.....	66
Installing the system board.....	68
Keyboard assembly.....	70
Removing the Keyboard.....	70
Installing the Keyboard.....	71
Keyboard bracket.....	72
Removing the keyboard bracket.....	72
Installing the keyboard bracket.....	73
Power button.....	75
Removing the power button with fingerprint reader.....	75
Installing the power button with fingerprint.....	75
Display assembly.....	76
Removing the display assembly.....	76
Installing the display assembly.....	80
Display bezel.....	83
Removing the display bezel.....	83
Installing the display bezel.....	84
Hinge caps.....	85
Removing the hinge caps.....	85
Installing the hinge caps.....	86
Display panel.....	87
Removing the display panel.....	87

Installing the display panel.....	90
Palmrest assembly.....	92
Removing the palm-rest and keyboard assembly.....	92
Installing the palm-rest and keyboard assembly.....	93
Chapter 5: BIOS Setup.....	95
Boot menu.....	95
BIOS overview.....	95
Boot Sequence.....	96
Entering BIOS Setup.....	96
Navigation keys.....	96
F12 One Time Boot menu.....	97
System setup options.....	97
General options.....	97
System information.....	98
Video.....	99
Security.....	99
Secure boot.....	101
Intel Software Guard Extensions.....	101
Performance.....	102
Power management.....	102
POST behavior.....	103
Manageability.....	104
Virtualization support.....	104
Wireless.....	105
Maintenance screen.....	105
System logs.....	105
Updating the BIOS.....	105
Updating the BIOS in Windows.....	105
Updating the BIOS in Linux and Ubuntu.....	106
Updating the BIOS using the USB drive in Windows.....	106
Updating the BIOS from the F12 One-Time boot menu.....	106
System and setup password.....	107
Assigning a system setup password.....	107
Deleting or changing an existing system setup password.....	108
Clearing BIOS (System Setup) and System passwords.....	108
Chapter 6: Troubleshooting.....	109
Handling swollen rechargeable Li-ion batteries.....	109
Dell SupportAssist Pre-boot System Performance Check diagnostics.....	110
Running the SupportAssist Pre-Boot System Performance Check.....	110
Built-in self-test (BIST).....	110
M-BIST.....	110
LCD Power rail test (L-BIST).....	111
LCD Built-in Self-Test (BIST).....	111
System diagnostic lights.....	112
Real-Time Clock (RTC Reset).....	113
Recovering the operating system.....	113
Backup media and recovery options.....	113

Wi-Fi power cycle.....	113
Drain residual flea power (perform hard reset).....	114
LED Indicators and Characteristics.....	114
Battery charge and status LED	114
Chapter 7: Getting help.....	115
Contacting Dell.....	115

Working on your computer

Topics:

- [Safety instructions](#)

Safety instructions

Prerequisites

Use the following safety guidelines to protect your computer from potential damage and to ensure your personal safety. Unless otherwise noted, each procedure included in this document assumes that the following conditions exist:

- You have read the safety information that shipped with your computer.
- A component can be replaced or, if purchased separately, installed by performing the removal procedure in reverse order.

About this task

⚠ WARNING: Before working inside your computer, read the safety information that shipped with your computer. For additional safety best practices information, see the [Regulatory Compliance Homepage](#)

⚠ CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

⚠ CAUTION: To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface at the same time as touching a connector on the back of the computer.

⚠ CAUTION: Handle components and cards with care. Do not touch the components or contacts on a card. Hold a card by its edges or by its metal mounting bracket. Hold a component such as a processor by its edges, not by its pins.

⚠ CAUTION: When you disconnect a cable, pull on its connector or on its pull-tab, not on the cable itself. Some cables have connectors with locking tabs; if you are disconnecting this type of cable, press in on the locking tabs before you disconnect the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before you connect a cable, ensure that both connectors are correctly oriented and aligned.

ⓘ NOTE: Disconnect all power sources before opening the computer cover or panels. After you finish working inside the computer, replace all covers, panels, and screws before connecting to the power source.

⚠ CAUTION: Exercise caution when handling Lithium-ion batteries in laptops. Swollen batteries should not be used and should be replaced and disposed properly.

ⓘ NOTE: The color of your computer and certain components may appear differently than shown in this document.


Before working inside your computer

About this task

ⓘ NOTE: The images in this document may differ from your computer depending on the configuration you ordered.

Steps

1. Save and close all open files and exit all open applications.
2. Shut down your computer. For Windows operating system, click **Start > Power > Shut down**.

 **NOTE:** If you are using a different operating system, see the documentation of your operating system for shut-down instructions.

3. Disconnect your computer and all attached devices from their electrical outlets.
4. Disconnect all attached network devices and peripherals, such as keyboard, mouse, and monitor from your computer.

 **CAUTION:** To disconnect a network cable, first unplug the cable from your computer and then unplug the cable from the network device.

5. Remove any media card and optical disc from your computer, if applicable.

Safety precautions

The safety precautions chapter details the primary steps to be taken before performing any disassembly instructions.

Observe the following safety precautions before you perform any installation or break/fix procedures involving disassembly or reassembly:

- Turn off the system and all attached peripherals.
- Disconnect the system and all attached peripherals from AC power.
- Disconnect all network cables, telephone, and telecommunications lines from the system.
- Use an ESD field service kit when working inside any to avoid electrostatic discharge (ESD) damage.
- After removing any system component, carefully place the removed component on an anti-static mat.
- Wear shoes with non-conductive rubber soles to reduce the chance of getting electrocuted.

Standby power

Dell products with standby power must be unplugged before you open the case. Systems that incorporate standby power are essentially powered while turned off. The internal power enables the system to be remotely turned on (wake on LAN) and suspended into a sleep mode and has other advanced power management features.

Unplugging, pressing and holding the power button for 20 seconds should discharge residual power in the system board.

Bonding

Bonding is a method for connecting two or more grounding conductors to the same electrical potential. This is done through the use of a field service electrostatic discharge (ESD) kit. When connecting a bonding wire, ensure that it is connected to bare metal and never to a painted or non-metal surface. The wrist strap should be secure and in full contact with your skin, and ensure that you remove all jewelry such as watches, bracelets, or rings prior to bonding yourself and the equipment.

Electrostatic discharge—ESD protection

ESD is a major concern when you handle electronic components, especially sensitive components such as expansion cards, processors, memory modules, and system boards. Slight charges can damage circuits in ways that may not be obvious, such as intermittent problems or a shortened product life span. As the industry pushes for lower power requirements and increased density, ESD protection is an increasing concern.

Due to the increased density of semiconductors used in recent Dell products, the sensitivity to static damage is now higher than in previous Dell products. For this reason, some previously approved methods of handling parts are no longer applicable.

Two recognized types of ESD damage are catastrophic and intermittent failures.

- **Catastrophic** – Catastrophic failures represent approximately 20 percent of ESD-related failures. The damage causes an immediate and complete loss of device functionality. An example of catastrophic failure is a memory DIMM that has received a static shock and immediately generates a "No POST/No Video" symptom with a beep code that is emitted for missing or nonfunctional memory.
- **Intermittent** – Intermittent failures represent approximately 80 percent of ESD-related failures. The high rate of intermittent failures means that most of the time when damage occurs, it is not immediately recognizable. The DIMM

receives a static shock, but the tracing is merely weakened and does not immediately produce outward symptoms that are related to the damage. The weakened trace may take weeks or months to melt, and in the meantime may cause degradation of memory integrity, intermittent memory errors, and so on.

The more difficult type of damage to recognize and troubleshoot is the intermittent (also called latent or "walking wounded") failure.

Perform the following steps to prevent ESD damage:

- Use a wired ESD wrist strap that is properly grounded. Wireless anti-static straps do not provide adequate protection. Touching the chassis before handling parts does not ensure adequate ESD protection on parts with increased sensitivity to ESD damage.
- Handle all static-sensitive components in a static-safe area. If possible, use anti-static floor pads and workbench pads.
- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the anti-static packing material until you are ready to install the component. Before unwrapping the anti-static packaging, ensure that you discharge static electricity from your body.
- Before transporting a static-sensitive component, place it in an anti-static container or packaging.

ESD Field Service kit

The unmonitored Field Service kit is the most commonly used service kit. Each Field Service kit includes three main components: anti-static mat, wrist strap, and bonding wire.

Components of an ESD field service kit

The components of an ESD field service kit are:

- **Anti-Static Mat** – The anti-static mat is dissipative and parts can be placed on it during service procedures. When using an anti-static mat, your wrist strap should be snug and the bonding wire should be connected to the mat and to any bare metal on the computer being worked on. Once deployed properly, service parts can be removed from the ESD bag and placed directly on the mat. ESD-sensitive items are safe in your hand, on the ESD mat, in the computer, or inside an ESD bag.
- **Wrist Strap and Bonding Wire** – The wrist strap and bonding wire can be either directly connected between your wrist and bare metal on the hardware if the ESD mat is not required, or connected to the anti-static mat to protect hardware that is temporarily placed on the mat. The physical connection of the wrist strap and bonding wire between your skin, the ESD mat, and the hardware is known as bonding. Use only Field Service kits with a wrist strap, mat, and bonding wire. Never use wireless wrist straps. Always be aware that the internal wires of a wrist strap are prone to damage from normal wear and tear, and must be checked regularly with a wrist strap tester in order to avoid accidental ESD hardware damage. It is recommended to test the wrist strap and bonding wire at least once per week.
- **ESD Wrist Strap Tester** – The wires inside an ESD strap are prone to damage over time. When using an unmonitored kit, it is a best practice to regularly test the strap prior to each service call, and at a minimum, test once per week. A wrist strap tester is the best method for doing this test. If you do not have your own wrist strap tester, check with your regional office to find out if they have one. To perform the test, plug the bonding-wire of wrist-strap into the tester while it is strapped to your wrist and push the button to test. A green LED is lit if the test is successful; a red LED is lit and an alarm sounds if the test fails.
- **Insulator Elements** – It is critical to keep ESD sensitive devices, such as plastic heat sink casings, away from internal parts that are insulators and often highly charged.
- **Working Environment** – Before deploying the ESD Field Service kit, assess the situation at the customer location. For example, deploying the kit for a server environment is different than for a desktop or laptop environment. Servers are typically installed in a rack within a data center; desktops or laptops are typically placed on office desks or cubicles. Always look for a large open flat work area that is free of clutter and large enough to deploy the ESD kit with additional space to accommodate the type of computer that is being repaired. The workspace should also be free of insulators that can cause an ESD event. On the work area, insulators such as Styrofoam and other plastics should always be moved at least 12 inches or 30 centimeters away from sensitive parts before physically handling any hardware components.
- **ESD Packaging** – All ESD-sensitive devices must be shipped and received in static-safe packaging. Metal, static-shielded bags are preferred. However, you should always return the damaged part using the same ESD bag and packaging that the new part arrived in. The ESD bag should be folded over and taped shut and all the same foam packing material should be used in the original box that the new part arrived in. ESD-sensitive devices should be removed from packaging only at an ESD-protected work surface, and parts should never be placed on top of the ESD bag because only the inside of the bag is shielded. Always place parts in your hand, on the ESD mat, in the computer, or inside an anti-static bag.
- **Transporting Sensitive Components** – When transporting ESD sensitive components such as replacement parts or parts to be returned to Dell, it is critical to place these parts in anti-static bags for safe transport.

ESD protection summary

It is recommended to always use the traditional wired ESD grounding wrist strap and protective anti-static mat when servicing Dell products. In addition, it is critical to keep sensitive parts separate from all insulator parts while performing service and use anti-static bags for transporting sensitive components.

Transporting sensitive components

When transporting ESD sensitive components such as replacement parts or parts to be returned to Dell, it is critical to place these parts in anti-static bags for safe transport.

Lifting equipment

Adhere to the following guidelines when lifting heavy equipment:

 **CAUTION: Do not lift greater than 50 pounds. Always obtain additional resources or use a mechanical lifting device.**

1. Get a firm balanced footing. Keep your feet apart for a stable base, and point your toes out.
2. Tighten stomach muscles. Abdominal muscles support your spine when you lift, offsetting the force of the load.
3. Lift with your legs, not your back.
4. Keep the load close. The closer it is to your spine, the less force it exerts on your back.
5. Keep your back upright, whether lifting or setting down the load. Do not add the weight of your body to the load. Avoid twisting your body and back.
6. Follow the same technique in reverse to set the load down.

After working inside your computer

About this task

 **CAUTION: Leaving stray or loose screws inside your computer may severely damage your computer.**

Steps

1. Replace all screws and ensure that no stray screws remain inside your computer.
2. Connect any external devices, peripherals, or cables you removed before working on your computer.
3. Replace any media cards, discs, or any other parts that you removed before working on your computer.
4. Connect your computer and all attached devices to their electrical outlets.
5. Turn on your computer.

Technology and components

NOTE: Instructions that are provided in the following section are applicable on computers that are shipped with the Windows operating system. Windows is factory-installed with this computer.

Topics:

- [DDR4](#)
- [USB features](#)
- [USB Type-C](#)
- [HDMI 1.4](#)
- [USB features](#)
- [Power button LED behavior](#)

DDR4

DDR4 (double data rate fourth generation) memory is a higher-speed successor to the DDR2 and DDR3 technologies and allows up to 512 GB in capacity, compared to the DDR3's maximum of 128 GB per DIMM. DDR4 synchronous dynamic random-access memory is keyed differently from both SDRAM and DDR to prevent the user from installing the wrong type of memory into the system.

DDR4 needs 20 percent less or just 1.2 volts, compared to DDR3 which requires 1.5 volts of electrical power to operate. DDR4 also supports a new, deep power-down mode that allows the host device to go into standby without needing to refresh its memory. Deep power-down mode is expected to reduce standby power consumption by 40 to 50 percent.

DDR4 Details

There are subtle differences between DDR3 and DDR4 memory modules, as listed below.

Key notch difference

The key notch on a DDR4 module is in a different location from the key notch on a DDR3 module. Both notches are on the insertion edge but the notch location on the DDR4 is slightly different, to prevent the module from being installed into an incompatible board or platform.

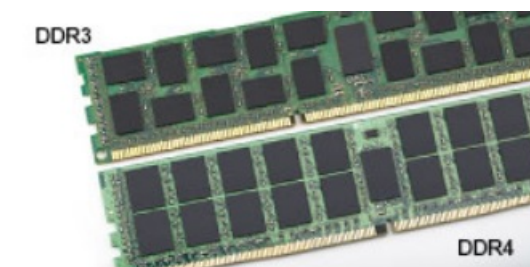


Figure 1. Notch difference

Increased thickness

DDR4 modules are slightly thicker than DDR3, to accommodate more signal layers.

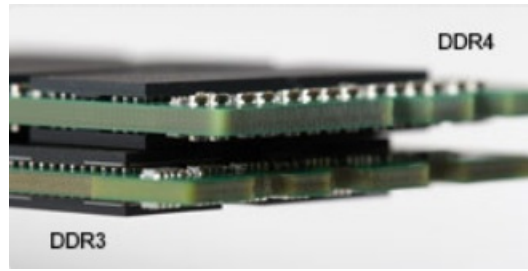


Figure 2. Thickness difference

Curved edge

DDR4 modules feature a curved edge to help with insertion and alleviate stress on the PCB during memory installation.

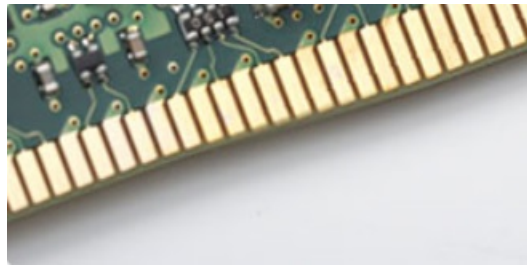


Figure 3. Curved edge

Memory Errors

Memory errors on the system display the new ON-FLASH-FLASH or ON-FLASH-ON failure code. If all memory fails, the LCD does not turn on. Troubleshoot for possible memory failure by trying known good memory modules in the memory connectors on the bottom of the system or under the keyboard, as in some portable systems.

NOTE: The DDR4 memory is imbedded in board and not a replaceable DIMM as shown and referred.

USB features

Universal Serial Bus, or USB, was introduced in 1996. It dramatically simplified the connection between host computers and peripheral devices like mice, keyboards, external drivers, and printers.

Table 1. USB evolution

Type	Data Transfer Rate	Category	Introduction Year
USB 2.0	480 Mbps	High Speed	2000
USB 3.0/USB 3.1 Gen 1	5 Gbps	SuperSpeed	2010
USB 3.1 Gen 2	10 Gbps	SuperSpeed	2013

USB 3.0/USB 3.1 Gen 1 (SuperSpeed USB)

For years, the USB 2.0 has been firmly entrenched as the de facto interface standard in the PC world with about 6 billion devices sold, and yet the need for more speed grows by ever faster computing hardware and ever greater bandwidth demands. The USB 3.0/USB 3.1 Gen 1 finally has the answer to the consumers' demands with a theoretically 10 times faster than its predecessor. In a nutshell, USB 3.1 Gen 1 features are as follows:

- Higher transfer rates (up to 5 Gbps)
- Increased maximum bus power and increased device current draw to better accommodate power-hungry devices
- New power management features

- Full-duplex data transfers and support for new transfer types
- Backward USB 2.0 compatibility
- New connectors and cable

The topics below cover some of the most commonly asked questions regarding USB 3.0/USB 3.1 Gen 1.

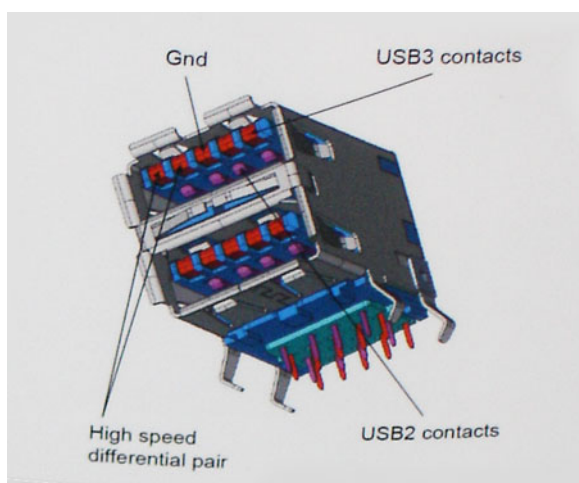


Speed

Currently, there are 3 speed modes defined by the latest USB 3.0/USB 3.1 Gen 1 specification. They are Super-Speed, Hi-Speed and Full-Speed. The new SuperSpeed mode has a transfer rate of 4.8 Gbps. While the specification retains Hi-Speed, and Full-Speed USB mode, commonly known as USB 2.0 and 1.1 respectively, the slower modes still operate at 480 Mbps and 12 Mbps respectively and are kept to maintain backward compatibility.

USB 3.0/USB 3.1 Gen 1 achieves the much higher performance by the technical changes below:

- An additional physical bus that is added in parallel with the existing USB 2.0 bus (refer to the picture below).
- USB 2.0 previously had four wires (power, ground, and a pair for differential data); USB 3.0/USB 3.1 Gen 1 adds four more for two pairs of differential signals (receive and transmit) for a combined total of eight connections in the connectors and cabling.
- USB 3.0/USB 3.1 Gen 1 utilizes the bidirectional data interface, rather than USB 2.0's half-duplex arrangement. This gives a 10-fold increase in theoretical bandwidth.



With today's ever increasing demands placed on data transfers with high-definition video content, terabyte storage devices, high megapixel count digital cameras etc., USB 2.0 may not be fast enough. Furthermore, no USB 2.0 connection could ever come close to the 480Mbps theoretical maximum throughput, making data transfer at around 320 Mbps (40 MB/s) — the actual real-world maximum. Similarly, USB 3.0/USB 3.1 Gen 1 connections will never achieve 4.8Gbps. We will likely see a real-world maximum rate of 400MB/s with overheads. At this speed, USB 3.0/USB 3.1 Gen 1 is a 10x improvement over USB 2.0.

Applications

USB 3.0/USB 3.1 Gen 1 opens up the laneways and provides more headroom for devices to deliver a better overall experience. Where USB video was barely tolerable previously (both from a maximum resolution, latency, and video compression perspective), it's easy to imagine that with 5-10 times the bandwidth available, USB video solutions should work that much better. Single-link DVI requires almost 2Gbps throughput. Where 480Mbps was limiting, 5Gbps is more than promising. With its promised 4.8Gbps speed, the standard will find its way into some products that previously weren't USB territory, like external RAID storage systems.

Listed below are some of the available SuperSpeed USB 3.0/USB 3.1 Gen 1 products:

- External Desktop USB 3.0/USB 3.1 Gen 1 Hard Drives
- Portable USB 3.0/USB 3.1 Gen 1 Hard Drives

- USB 3.0/USB 3.1 Gen 1 Drive Docks & Adapters
- USB 3.0/USB 3.1 Gen 1 Flash Drives & Readers
- USB 3.0/USB 3.1 Gen 1 Solid-state Drives
- USB 3.0/USB 3.1 Gen 1 RAIDs
- Optical Media Drives
- Multimedia Devices
- Networking
- USB 3.0/USB 3.1 Gen 1 Adapter Cards & Hubs

Compatibility

The good news is that USB 3.0/USB 3.1 Gen 1 has been carefully planned from the start to peacefully co-exist with USB 2.0. First of all, while USB 3.0/USB 3.1 Gen 1 specifies new physical connections and thus new cables to take advantage of the higher speed capability of the new protocol, the connector itself remains the same rectangular shape with the four USB 2.0 contacts in the exact same location as before. Five new connections to carry receive and transmitted data independently are present on USB 3.0/USB 3.1 Gen 1 cables and only come into contact when connected to a proper SuperSpeed USB connection.

USB Type-C

USB Type-C is a new, tiny physical connector. The connector itself can support various exciting new USB standards like USB 3.1 and USB power delivery (USB PD).

Alternate Mode

USB Type-C is a new connector standard that is very small. It is about a third the size of an old USB Type-A plug. This is a single connector standard that every device should be able to use. USB Type-C ports can support a variety of different protocols using "alternate modes," which allows you to have adapters that can output HDMI, VGA, DisplayPort, or other types of connections from that single USB port

USB Power Delivery

The USB PD specification is also closely intertwined with USB Type-C. Currently, smartphones, tablets, and other mobile devices often use a USB connection to charge. A USB 2.0 connection provides up to 2.5 watts of power — that'll charge your phone, but that's about it. A laptop might require up to 60 watts, for example. The USB Power Delivery specification ups this power delivery to 100 watts. It's bi-directional, so a device can either send or receive power. And this power can be transferred at the same time the device is transmitting data across the connection.

This could spell the end of all those proprietary laptop charging cables, with everything charging via a standard USB connection. You could charge your laptop from one of those portable battery packs you charge your smartphones and other portable devices from today. You could plug your laptop into an external display connected to a power cable, and that external display would charge your laptop as you used it as an external display — all via the one little USB Type-C connection. To use this, the device and the cable have to support USB Power Delivery. Just having a USB Type-C connection doesn't necessarily mean they do.

USB Type-C and USB 3.1

USB 3.1 is a new USB standard. USB 3's theoretical bandwidth is 5 Gbps, while USB 3.1's is 10 Gbps. That's double the bandwidth, as fast as a first-generation Thunderbolt connector. USB Type-C isn't the same thing as USB 3.1. USB Type-C is just a connector shape, and the underlying technology could just be USB 2 or USB 3.0. In fact, Nokia's N1 Android tablet uses a USB Type-C connector, but underneath it's all USB 2.0 — not even USB 3.0. However, these technologies are closely related.

Thunderbolt over USB Type-C

Thunderbolt is a hardware interface that combines data, video, audio, and power in a single connection. Thunderbolt combines PCI Express (PCIe) and DisplayPort (DP) into one serial signal, and additionally provides DC power, all in one cable. Thunderbolt

1 and Thunderbolt 2 use the same connector as miniDP (DisplayPort) to connect to peripherals, while Thunderbolt 3 uses a USB Type-C connector.

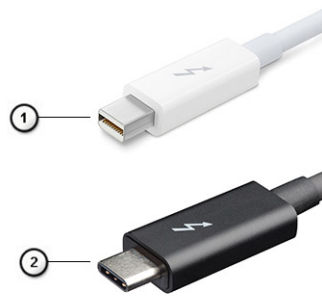


Figure 4. Thunderbolt 1 and Thunderbolt 3

1. Thunderbolt 1 and Thunderbolt 2 (using a miniDP connector)
2. Thunderbolt 3 (using a USB Type-C connector)

Thunderbolt 3 over USB Type-C

Thunderbolt 3 brings Thunderbolt to USB Type-C at speeds up to 40 Gbps, creating one compact port that does it all - delivering the fastest, most versatile connection to any dock, display or data device like an external hard drive. Thunderbolt 3 uses a USB Type-C connector/port to connect to supported peripherals.

1. Thunderbolt 3 uses USB Type-C connector and cables - It is compact and reversible
2. Thunderbolt 3 supports speed up to 40 Gbps
3. DisplayPort 1.4 – compatible with existing DisplayPort monitors, devices and cables
4. USB Power Delivery - Up to 130W on supported computers

Key Features of Thunderbolt 3 over USB Type-C

1. Thunderbolt, USB, DisplayPort and power on USB Type-C on a single cable (features vary between different products)
2. USB Type-C connector and cables which are compact and reversible
3. Supports Thunderbolt Networking (*varies between different products)
4. Supports up to 4K displays
5. Up to 40 Gbps

i **NOTE:** Data transfer speed may vary between different devices.

Thunderbolt Icons



Protocol	USB Type-A	USB Type-C	Notes
Thunderbolt	Not Applicable		Will use industry standard icon regardless of port style (i.e., mDP or USB Type-C)
Thunderbolt w/ Power Delivery	Not Applicable		Up to 130 Watts via USB Type-C

Figure 5. Thunderbolt Iconography Variations

HDMI 1.4

This topic explains the HDMI 1.4 and its features along with the advantages.

HDMI (High-Definition Multimedia Interface) is an industry-supported, uncompressed, all-digital audio/video interface. HDMI provides an interface between any compatible digital audio/video source, such as a DVD player, or A/V receiver and a

compatible digital audio and/or video monitor, such as a digital TV (DTV). The intended applications for HDMI TVs, and DVD players. The primary advantage is cable reduction and content protection provisions. HDMI supports standard, enhanced, or high-definition video, plus multichannel digital audio on a single cable.

NOTE: The HDMI 1.4 will provide 5.1 channel audio support.

HDMI 1.4 Features

- **HDMI Ethernet Channel** - Adds high-speed networking to an HDMI link, allowing users to take full advantage of their IP-enabled devices without a separate Ethernet cable
- **Audio Return Channel** - Allows an HDMI-connected TV with a built-in tuner to send audio data "upstream" to a surround audio system, eliminating the need for a separate audio cable
- **3D** - Defines input/output protocols for major 3D video formats, paving the way for true 3D gaming and 3D home theater applications
- **Content Type** - Real-time signaling of content types between display and source devices, enabling a TV to optimize picture settings based on content type
- **Additional Color Spaces** - Adds support for additional color models used in digital photography and computer graphics
- **4K Support** - Enables video resolutions far beyond 1080p, supporting next-generation displays that will rival the Digital Cinema systems used in many commercial movie theaters
- **HDMI Micro Connector** - A new, smaller connector for phones and other portable devices, supporting video resolutions up to 1080p
- **Automotive Connection System** - New cables and connectors for automotive video systems, designed to meet the unique demands of the motoring environment while delivering true HD quality

Advantages of HDMI

- Quality HDMI transfers uncompressed digital audio and video for the highest, crispest image quality.
- Low -cost HDMI provides the quality and functionality of a digital interface while also supporting uncompressed video formats in a simple, cost-effective manner
- Audio HDMI supports multiple audio formats from standard stereo to multichannel surround sound
- HDMI combines video and multichannel audio into a single cable, eliminating the cost, complexity, and confusion of multiple cables currently used in A/V systems
- HDMI supports communication between the video source (such as a DVD player) and the DTV, enabling new functionality

USB features

Universal Serial Bus, or USB, was introduced in 1996. It dramatically simplified the connection between host computers and peripheral devices like mice, keyboards, external drivers, and printers.

Let's take a quick look on the USB evolution referencing to the table below.

Table 2. USB evolution

Type	Data Transfer Rate	Category	Introduction Year
USB 2.0	480 Mbps	High Speed	2000
USB 3.0/USB 3.1 Gen 1	5 Gbps	Super Speed	2010
USB 3.1 Gen 2	10 Gbps	Super Speed	2013

USB 3.0/USB 3.1 Gen 1 (SuperSpeed USB)

For years, the USB 2.0 has been firmly entrenched as the de facto interface standard in the PC world with about 6 billion devices sold, and yet the need for more speed grows by ever faster computing hardware and ever greater bandwidth demands. The USB 3.0/USB 3.1 Gen 1 finally has the answer to the consumers' demands with a theoretically 10 times faster than its predecessor. In a nutshell, USB 3.1 Gen 1 features are as follows:

- Higher transfer rates (up to 5 Gbps)
- Increased maximum bus power and increased device current draw to better accommodate power-hungry devices
- New power management features
- Full-duplex data transfers and support for new transfer types
- Backward USB 2.0 compatibility
- New connectors and cable

The topics below cover some of the most commonly asked questions regarding USB 3.0/USB 3.1 Gen 1.

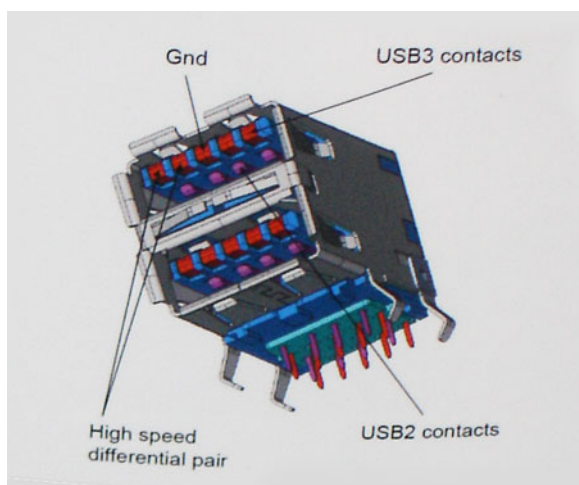


Speed

Currently, there are 3 speed modes defined by the latest USB 3.0/USB 3.1 Gen 1 specification. They are Super-Speed, Hi-Speed and Full-Speed. The new SuperSpeed mode has a transfer rate of 4.8Gbps. While the specification retains Hi-Speed, and Full-Speed USB mode, commonly known as USB 2.0 and 1.1 respectively, the slower modes still operate at 480Mbps and 12Mbps respectively and are kept to maintain backward compatibility.

USB 3.0/USB 3.1 Gen 1 achieves the much higher performance by the technical changes below:

- An additional physical bus that is added in parallel with the existing USB 2.0 bus (refer to the picture below).
- USB 2.0 previously had four wires (power, ground, and a pair for differential data); USB 3.0/USB 3.1 Gen 1 adds four more for two pairs of differential signals (receive and transmit) for a combined total of eight connections in the connectors and cabling.
- USB 3.0/USB 3.1 Gen 1 utilizes the bidirectional data interface, rather than USB 2.0's half-duplex arrangement. This gives a 10-fold increase in theoretical bandwidth.



With today's ever increasing demands placed on data transfers with high-definition video content, terabyte storage devices, high megapixel count digital cameras etc., USB 2.0 may not be fast enough. Furthermore, no USB 2.0 connection could ever come close to the 480Mbps theoretical maximum throughput, making data transfer at around 320Mbps (40MB/s) — the actual real-world maximum. Similarly, USB 3.0/USB 3.1 Gen 1 connections will never achieve 4.8Gbps. We will likely see a real-world maximum rate of 400MB/s with overheads. At this speed, USB 3.0/USB 3.1 Gen 1 is a 10x improvement over USB 2.0.

Applications

USB 3.0/USB 3.1 Gen 1 opens up the laneways and provides more headroom for devices to deliver a better overall experience. Where USB video was barely tolerable previously (both from a maximum resolution, latency, and video compression perspective), it's easy to imagine that with 5-10 times the bandwidth available, USB video solutions should work that much better. Single-link DVI requires almost 2Gbps throughput. Where 480Mbps was limiting, 5Gbps is more than promising. With its promised 4.8Gbps speed, the standard will find its way into some products that previously weren't USB territory, like external RAID storage systems.

Listed below are some of the available SuperSpeed USB 3.0/USB 3.1 Gen 1 products:

- External Desktop USB 3.0/USB 3.1 Gen 1 Hard Drives
- Portable USB 3.0/USB 3.1 Gen 1 Hard Drives
- USB 3.0/USB 3.1 Gen 1 Drive Docks & Adapters
- USB 3.0/USB 3.1 Gen 1 Flash Drives & Readers
- USB 3.0/USB 3.1 Gen 1 Solid-state Drives
- USB 3.0/USB 3.1 Gen 1 RAID's
- Optical Media Drives
- Multimedia Devices
- Networking
- USB 3.0/USB 3.1 Gen 1 Adapter Cards & Hubs

Compatibility

The good news is that USB 3.0/USB 3.1 Gen 1 has been carefully planned from the start to peacefully co-exist with USB 2.0. First of all, while USB 3.0/USB 3.1 Gen 1 specifies new physical connections and thus new cables to take advantage of the higher speed capability of the new protocol, the connector itself remains the same rectangular shape with the four USB 2.0 contacts in the exact same location as before. Five new connections to carry receive and transmitted data independently are present on USB 3.0/USB 3.1 Gen 1 cables and only come into contact when connected to a proper SuperSpeed USB connection.

Windows 10 will be bringing native support for USB 3.1 Gen 1 controllers. This is in contrast to previous versions of Windows, which continue to require separate drivers for USB 3.0/USB 3.1 Gen 1 controllers.

Power button LED behavior

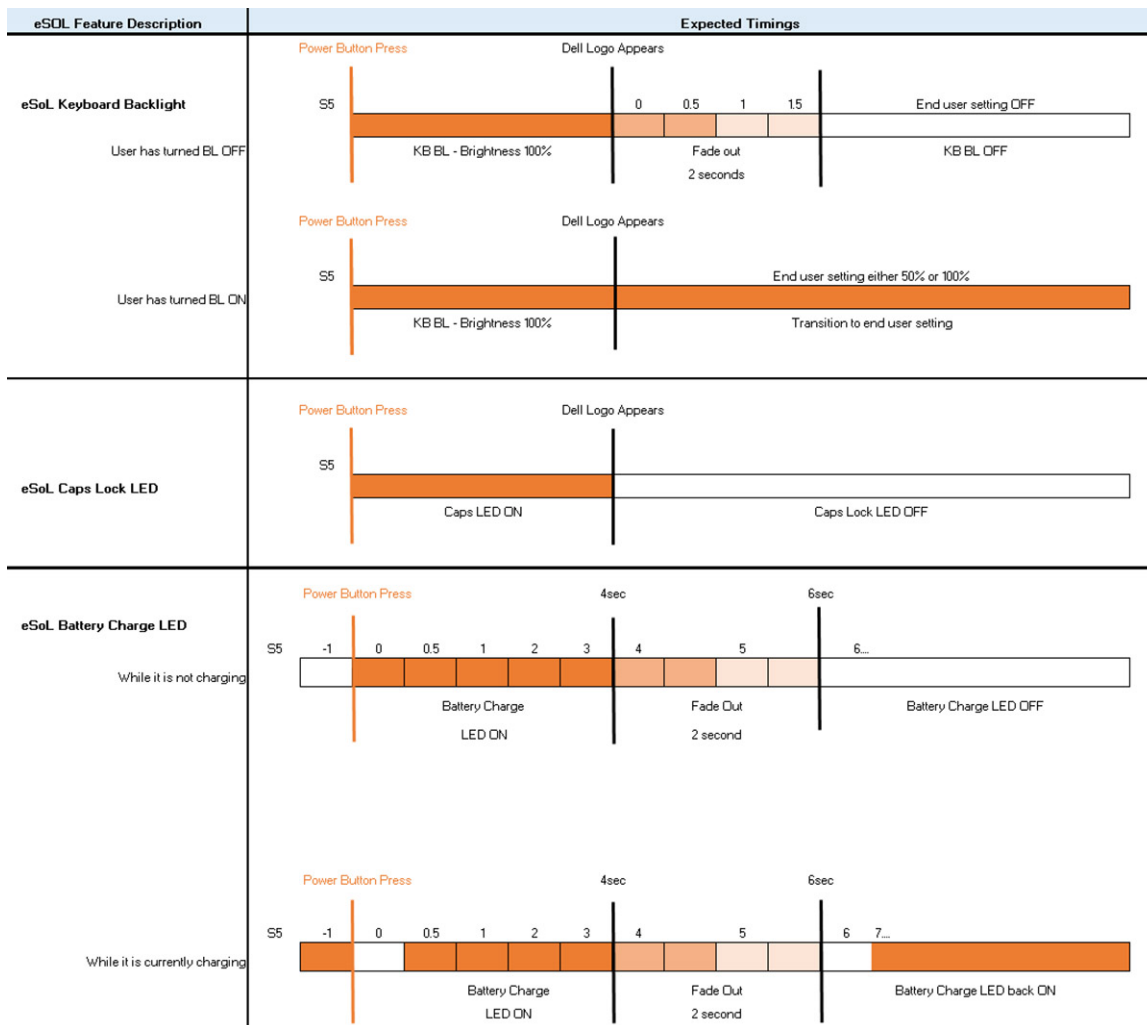
On certain Dell Latitude systems, the power button LED is used to provide an indication of the system status, and as a result the power button illuminates when pressed. The systems with the optional power button/fingerprint reader will have no LED under the power button and hence will apply the available LED's in the system to provide an indication of the system status.

Power button LED behavior without Fingerprint reader

- System is ON (S0) = LED illuminates solid white.
- System in Sleep/Standby (S3, SOix) = LED is off
- System is Off/Hibernating (S4/S5) = LED is off

Power On and LED behavior with Fingerprint reader

- Pressing the power button for a duration between 50 msec to 2 sec turns on the device.
- Power button does not register additional presses until the SOL (Sign-Of-Life) has been provided to the user.
- System LED's illuminates upon pressing the power button.
- All the available LED's (Keyboard backlit/ Keyboard caps lock LED/ Battery Charge LED) illuminates and displays specified behavior.
- The auditory tone is Off by default. It can be enabled in the BIOS setup.
- Safeguards do not time out if the device gets hung during the logon process.
- Dell logo: Turns on within 2 secs after pressing the power button.
- Full boot: Within 22 secs after pressing the power button.
- Below is the example timelines:

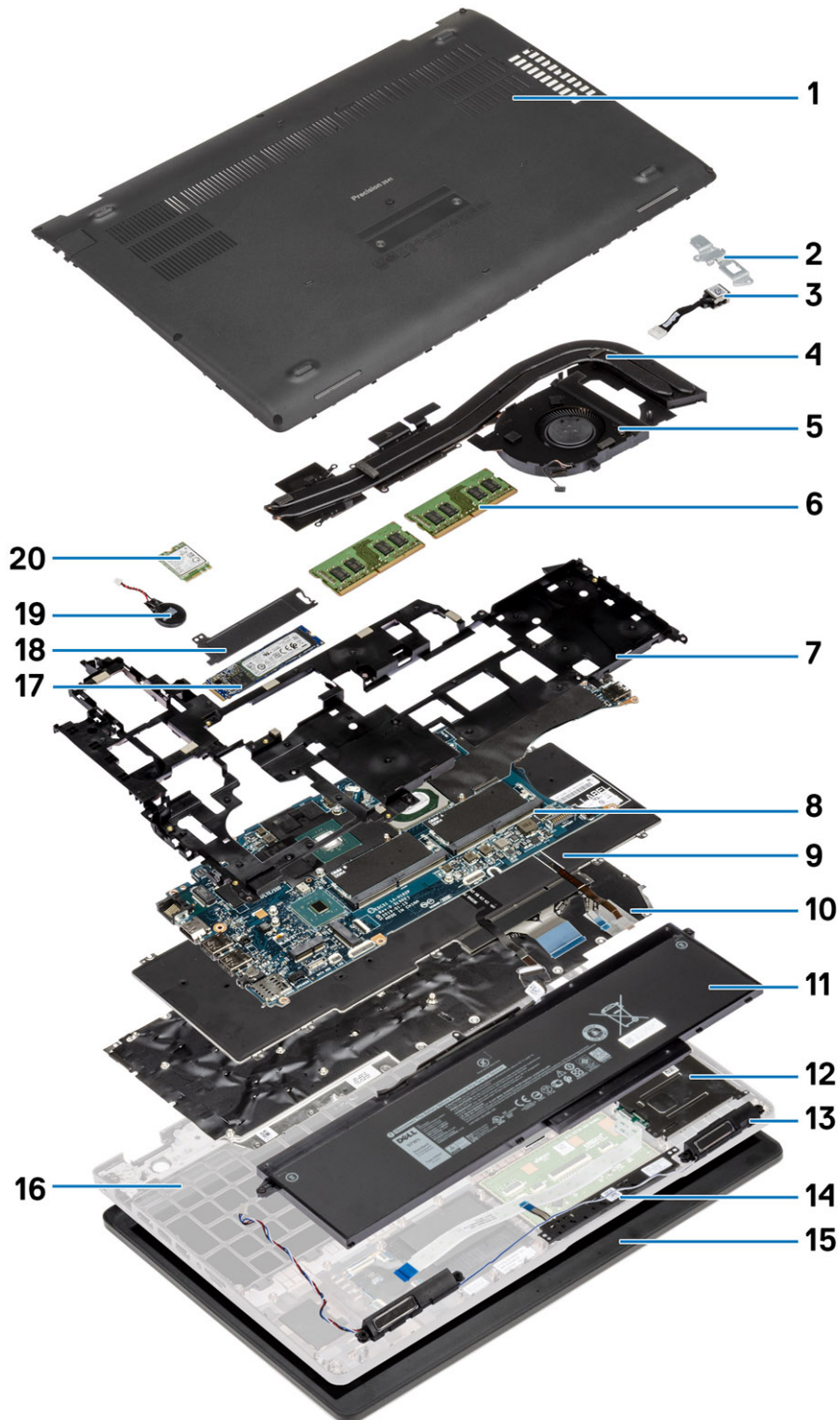


Power button with fingerprint reader will have no LED and will leverage the available LED's in the system to provide indication of the system status

- **Power Adapter LED:**
 - The LED on Power adapter connector illuminates white when power is supplied from electrical outlet.
- **Battery Indicator LED:**
 - If the computer is connected to an electrical outlet, the battery light operates as follows:
 1. Solid white -the battery is charging. When the charge is complete the LED turns off.
 - If the computer is running on a battery, the battery light operates as follows:
 1. Off -the battery is adequately charged (or the computer is turned off).
 2. Solid amber -the battery charge is critically low. A low battery state is approximately 30 minutes or less of battery life remaining.
- **Camera LED**
 - White LED activates when camera is on.
- **Mic Mute LED:**
 - When activated (muted), the mic mute LED on the F4 Key should illuminate WHITE.
- **RJ45 LEDs:**
 - [Table 3. LED on either side of RJ45 port](#)


Link speed indicator (LHS)	Activity indicator (RHS)
Green	Amber

Major components of your system



1. Base cover
2. DC-in metal bracket

3. DC-in port
4. Heatsink assembly
5. Heatsink fan
6. Memory modules
7. Inner frame
8. Memory module slot
9. Keyboard
10. Keyboard bracket
11. Battery
12. SmartCard reader
13. Speakers
14. Touchpad buttons
15. Display assembly
16. Palmrest assembly
17. Solid state drive
18. SSD thermal plate
19. Coin-cell battery
20. WWAN card

 **NOTE:** Dell provides a list of components and their part numbers for the original system configuration purchased. These parts are available according to warranty coverages purchased by the customer. Contact your Dell sales representative for purchase options.

Disassembly and reassembly

NOTE: The images in this document may differ from your computer depending on the configuration you ordered.

Topics:

- Base cover
- Battery
- Memory module
- WLAN card
- WWAN card
- Hard-drive assembly
- Coin-cell battery
- DC-in port
- Solid-state drive
- Inner frame
- Touchpad buttons
- SmartCard reader
- Touchpad buttons
- LED board
- Speakers
- Heatsink assembly-Discrete
- Heatsink assembly-UMA
- System board
- Keyboard assembly
- Keyboard bracket
- Power button
- Display assembly
- Display bezel
- Hinge caps
- Display panel
- Palmrest assembly

Base cover

Removing the base cover

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).

About this task

The figure indicates the location of the base cover and provides a visual representation of the removal procedure.



5x
M2.5x6.3

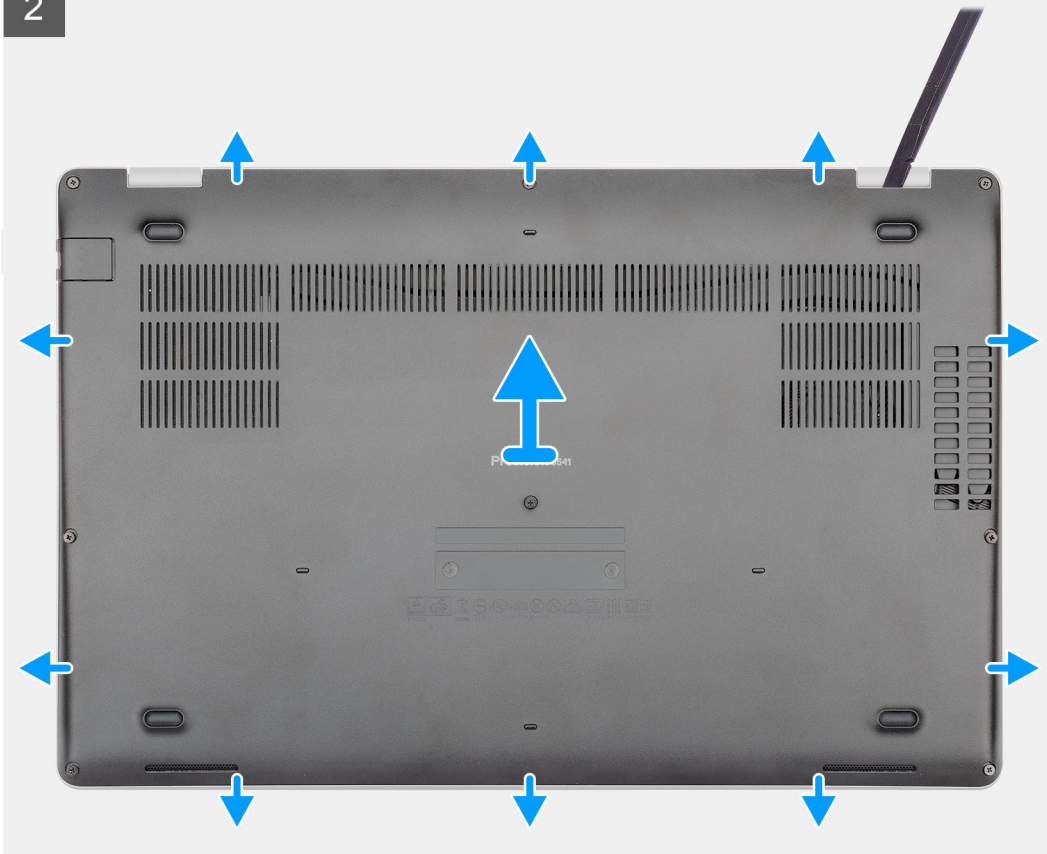


3x
M2.5x8

1



2



Steps

1. Remove the five (M2.5x6.3) and three (M2.5x8) captive screws that secure the base cover to the computer.
2. Pry the base cover starting from the right hinge and work your way around.
3. Lift the base cover away from the computer.

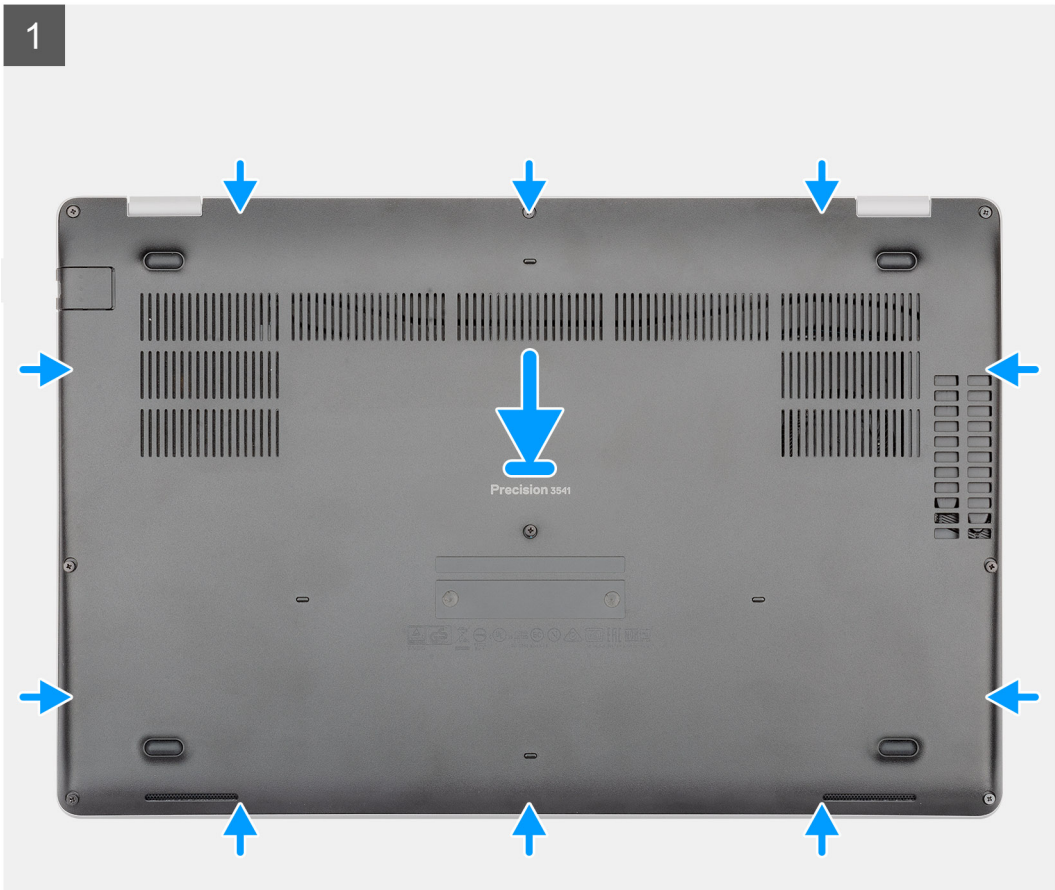
Installing the base cover

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

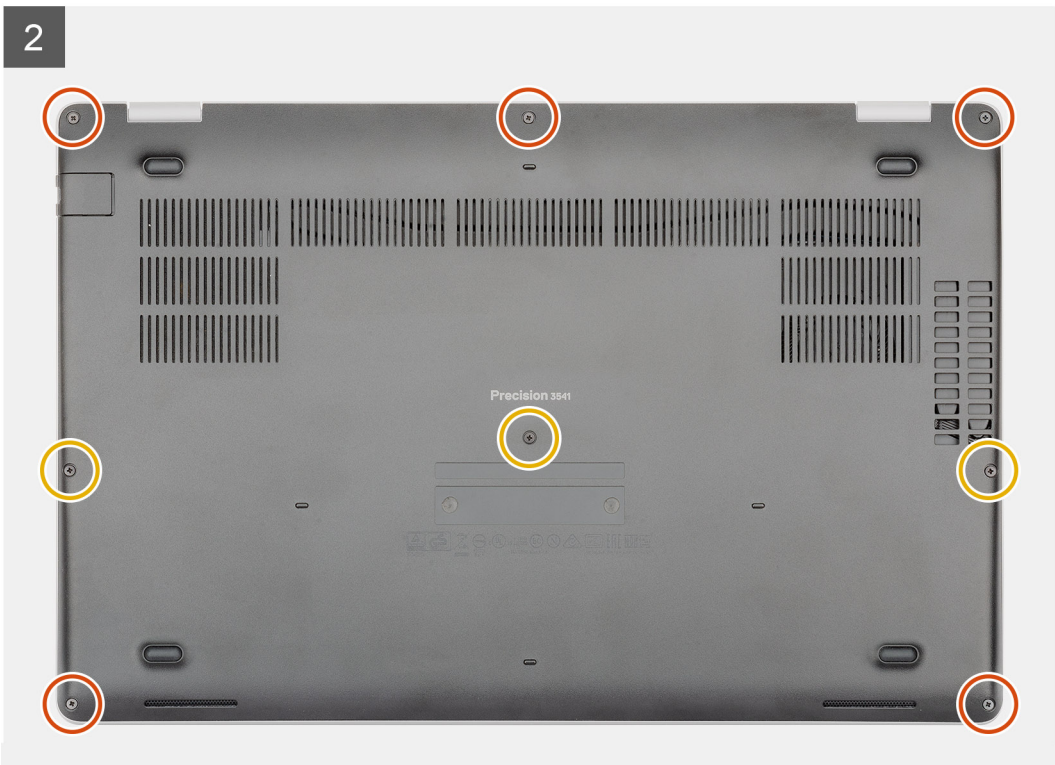
The figure indicates the location of the base cover and provides a visual representation of the installation procedure.



5x
M2.5x6.3



3x
M2.5x8



Steps

1. Place the base cover on the palm-rest and keyboard assembly, and snap the base cover into place.
2. Replace the five (M2.5x6.3) and three (M2.5x8) captive screws to secure the base cover to the computer.

Next steps

1. Follow the procedure in [After working inside your computer](#).

Battery

Rechargeable Li-ion battery precautions

CAUTION:

- Exercise caution when handling rechargeable Li-ion batteries.
- Discharge the battery completely before removing it. Disconnect the AC power adapter from the computer and operate the computer solely on battery power—the battery is fully discharged when the computer no longer turns on when the power button is pressed.
- Do not crush, drop, mutilate, or penetrate the battery with foreign objects.
- Do not expose the battery to high temperatures, or disassemble battery packs and cells.
- Do not apply pressure to the surface of the battery.
- Do not bend the battery.
- Do not use tools of any kind to pry on or against the battery.
- Ensure any screws during the servicing of this product are not lost or misplaced, to prevent accidental puncture or damage to the battery and other computer components.
- If the battery gets stuck inside your computer as a result of swelling, do not try to release it as puncturing, bending, or crushing a rechargeable Li-ion battery can be dangerous. In such an instance, contact Dell technical support for assistance. See [Contact Support at Dell Support Site](#).
- Always purchase genuine batteries from [Dell Site](#) or authorized Dell partners and resellers.
- Swollen batteries should not be used and should be replaced and disposed properly. For guidelines on how to handle and replace swollen rechargeable Li-ion batteries, see [Handling swollen rechargeable Li-ion batteries](#).

Removing the battery

Prerequisites

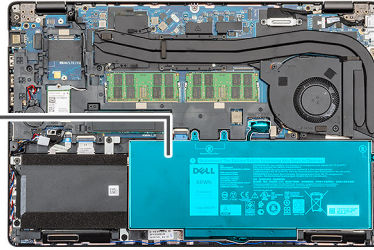
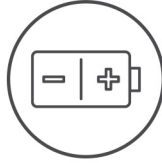
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).

About this task

The figure indicates the location of the battery and provides a visual representation of the removal procedure.



1x
M2x6



Steps

1. Disconnect the battery cable from the system board.
2. Remove the single (M2x6) captive screw that secures the battery computer.
3. Lift the battery off the computer.

Installing the battery

Prerequisites

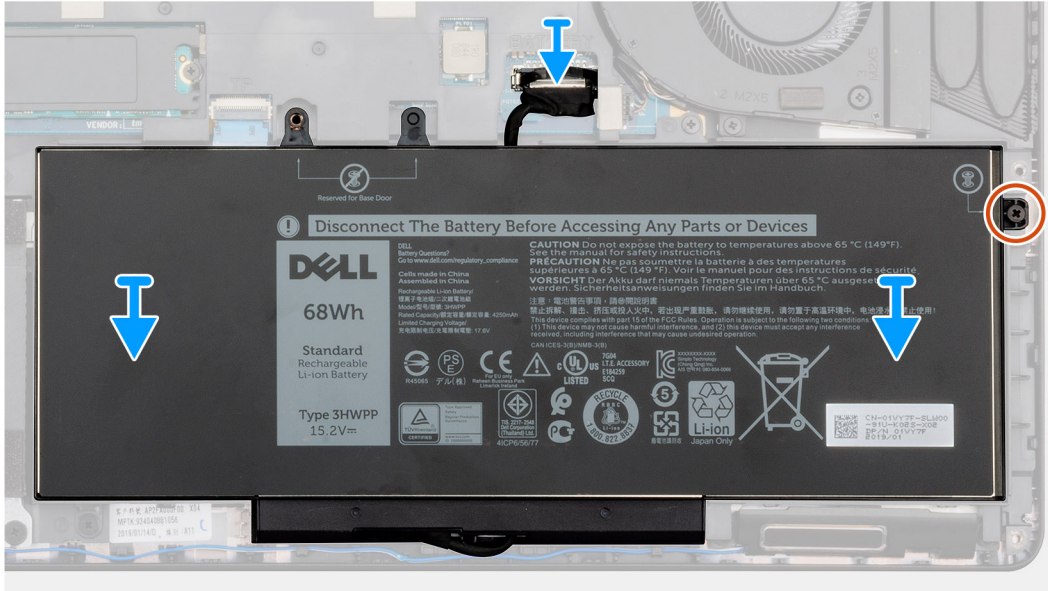
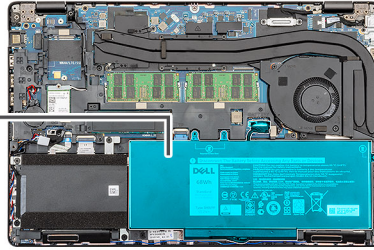
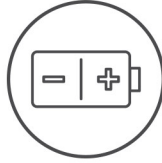
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the battery and provides a visual representation of the installation procedure.



1x
M2x6



Steps

1. Place the battery on the palm-rest and keyboard assembly and align the screw holes on the battery with the screw holes on the palm-rest and keyboard assembly.
2. Replace the single (M2x6) captive screw that secures the battery to the computer.
3. Connect the battery cable to the system board.

Next steps

1. Install the [base cover](#).
2. Follow the procedure in [After working inside your computer](#).

Memory module

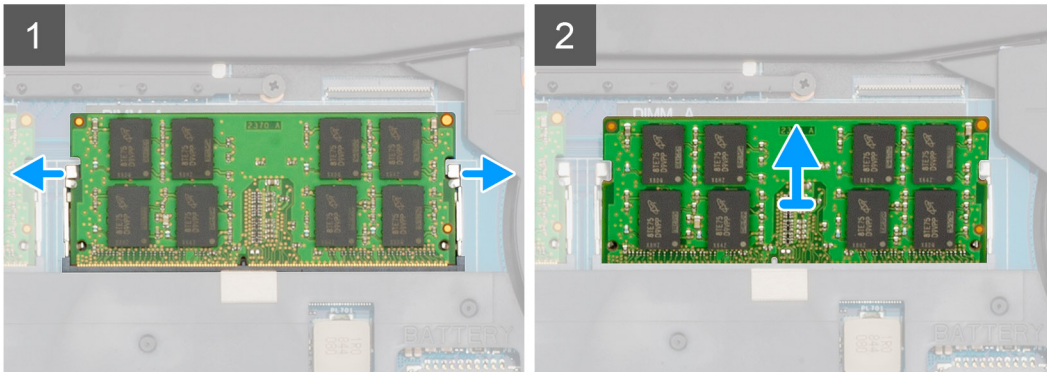
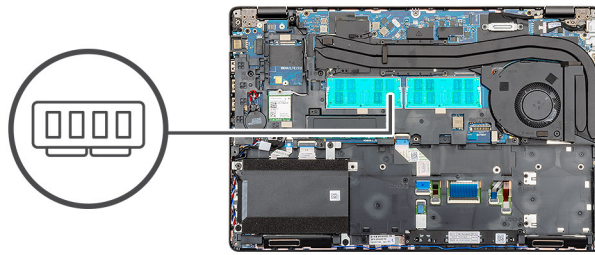
Removing the memory modules

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

About this task

The figure indicates the location of the memory module and provides a visual representation of the removal procedure.



Steps

1. Using your finger tips gently spread apart the securing-clips on each end of the memory-module slot until the memory module pops up.
2. Slide and remove the memory module off the memory module slot on the system board.

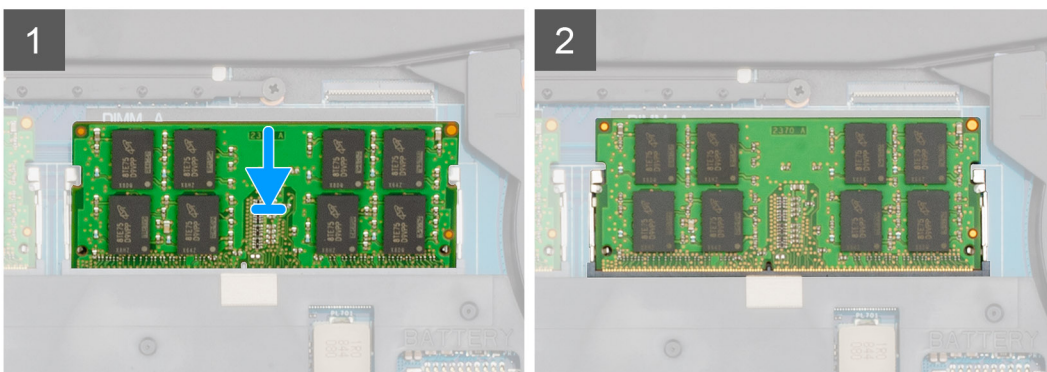
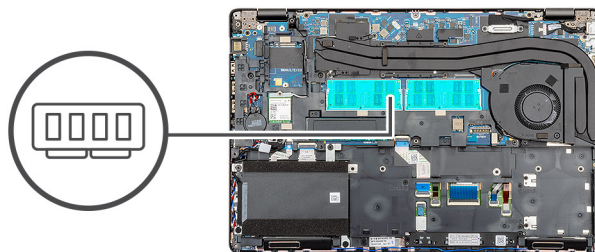
Installing the memory modules

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.


About this task

The figure indicates the location of the memory module and provides a visual representation of the installation procedure.



Steps

1. Align the notch on the memory module with the tab on the memory-module slot.
2. Slide the memory module firmly into the slot at an angle.
3. Press the memory module down until it clicks into place.

 **NOTE:** If you do not hear the click, remove the memory module and reinstall it.

Next steps

1. Install the [battery](#).
2. Install the [base cover](#).
3. Follow the procedure in [After working inside your computer](#).

WLAN card

Removing the WLAN card

Prerequisites

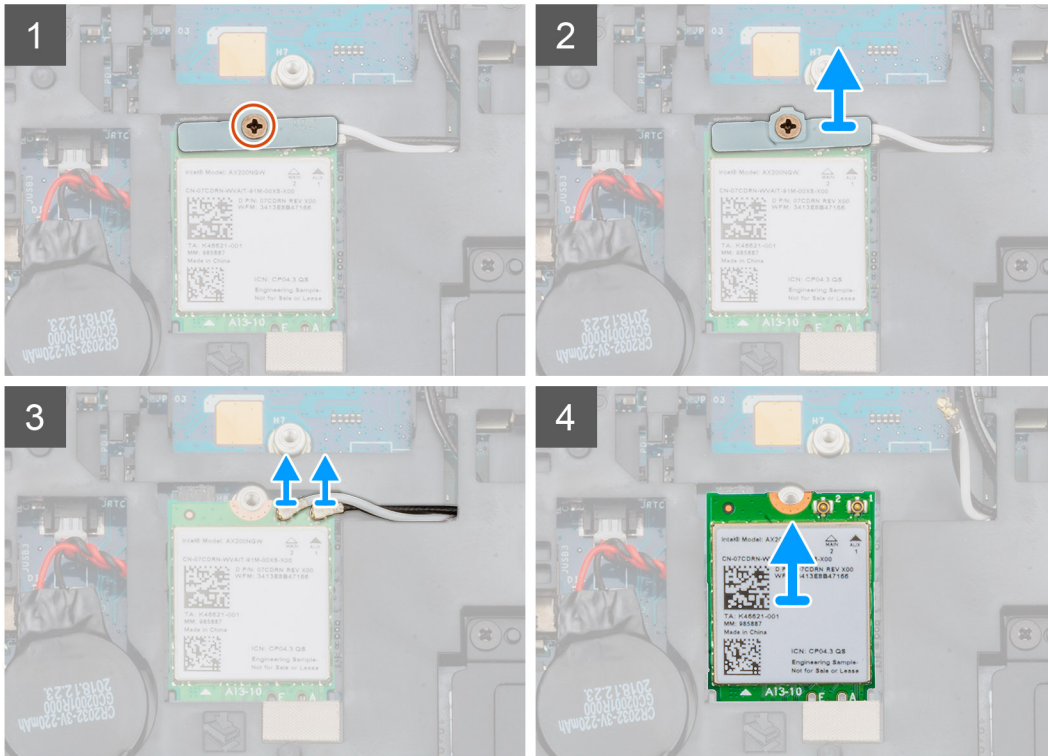
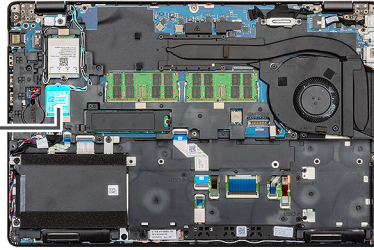
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

About this task

The figure indicates the location of the WLAN card and provides a visual representation of the removal procedure.



1x
M2x3



Steps

1. Locate the WLAN card on your computer.
2. Remove the single (M2x3) screw that secures the WLAN bracket.
3. Remove the WLAN bracket from the computer.
4. Disconnect the WLAN cables from the WLAN module.
5. Remove the WLAN card out of the computer.

Installing the WLAN card

Prerequisites

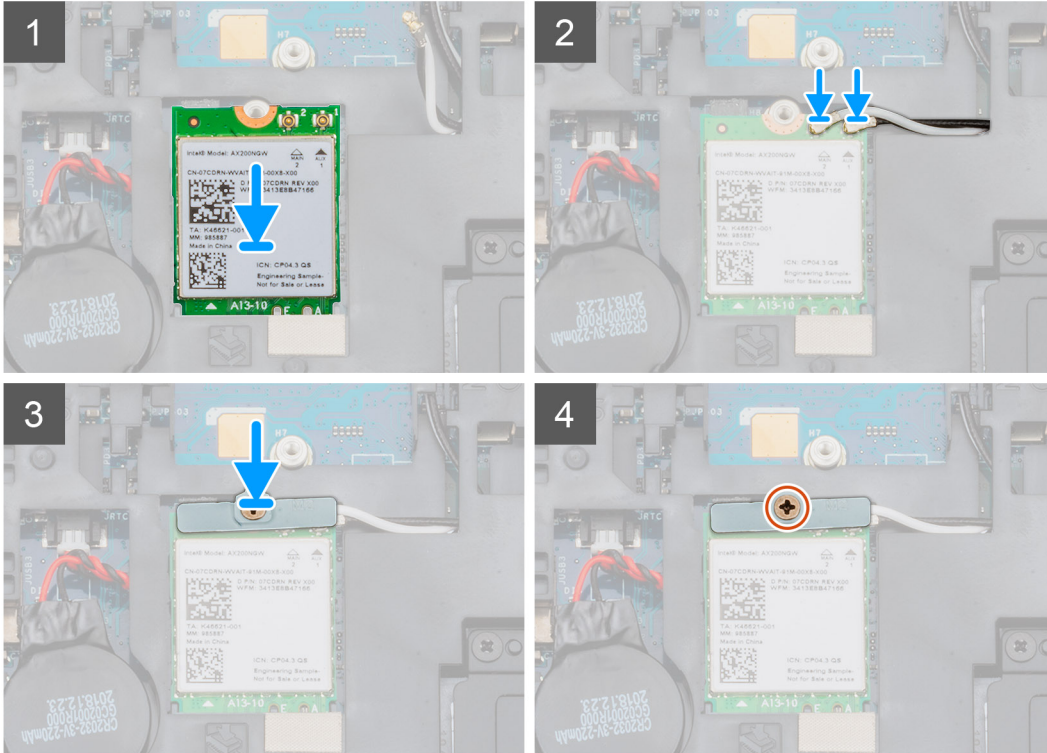
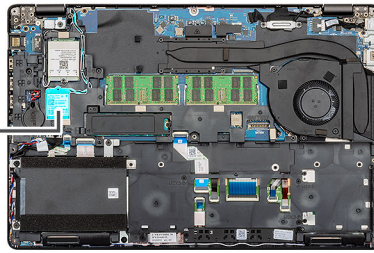
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the WLAN card and provides a visual representation of the installation procedure.



1x
M2x3



Steps

1. Locate the WLAN card slot on your computer.
2. Slide the WLAN card into the slot on the system board.
3. Reconnect the WLAN card cables to the WLAN module.
4. Place the WLAN bracket on the WLAN card and secure it with the single (M2x3) screw.

Next steps

1. Install the [battery](#).
2. Install the [base cover](#).
3. Follow the procedure in [After working inside your computer](#).

WWAN card

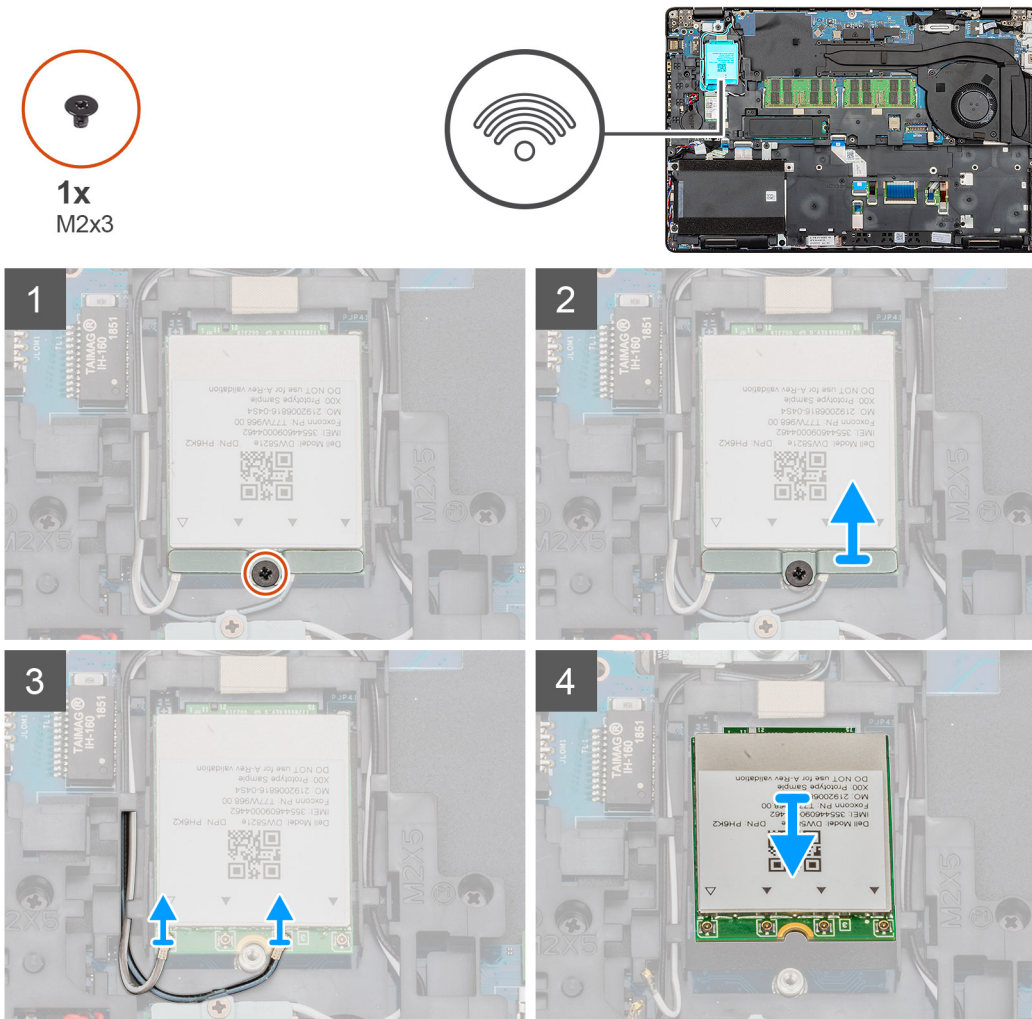
Removing the WWAN

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

About this task

The figure indicates the location of the WWAN card and provides a visual representation of the removal procedure.



Steps

1. Locate the WWAN on your computer.
2. Remove the single (M2x3) screw that secures the WWAN metal bracket to the computer.
3. Lift the WWAN metal bracket away from the computer.
4. Disconnect the WWAN cables from the WWAN card module.
5. Slide the WWAN card out of the system.

Installing the WWAN

Prerequisites

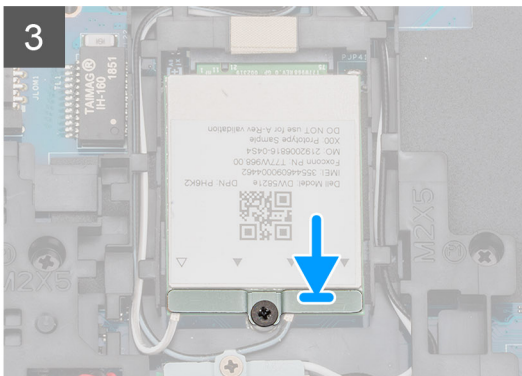
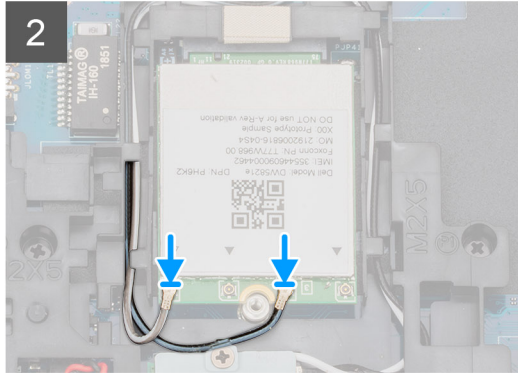
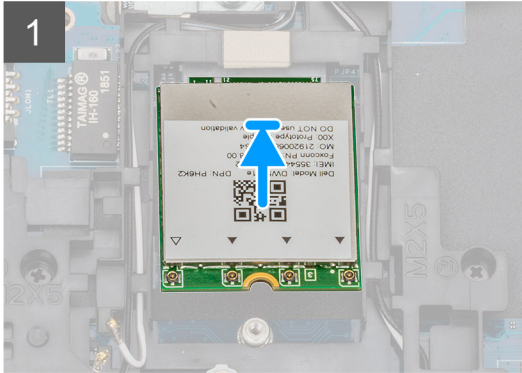
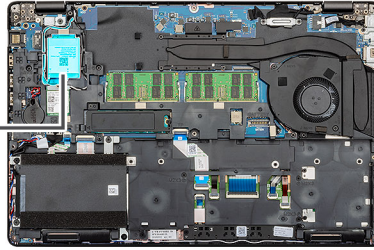
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the WWAN card and provides a visual representation of the installation procedure.



1x
M2x3



Steps

1. Locate the WWAN slot on your computer.
2. Slide the WWAN card into the slot on your computer.
3. Reconnect the WWAN cables to the WWAN card module.
4. Place the WWAN metal bracket on the WWAN card module.
5. Replace the single (M2x3) screw to secure the module to the computer.

Next steps

1. Install the [battery](#).
2. Install the [base cover](#).
3. Follow the procedure in [After working inside your computer](#).

Hard-drive assembly

Removing the Hard drive

Prerequisites

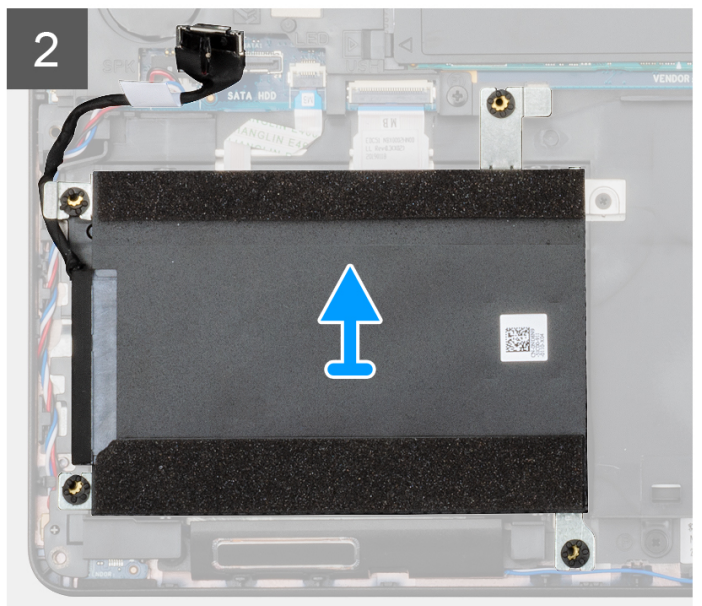
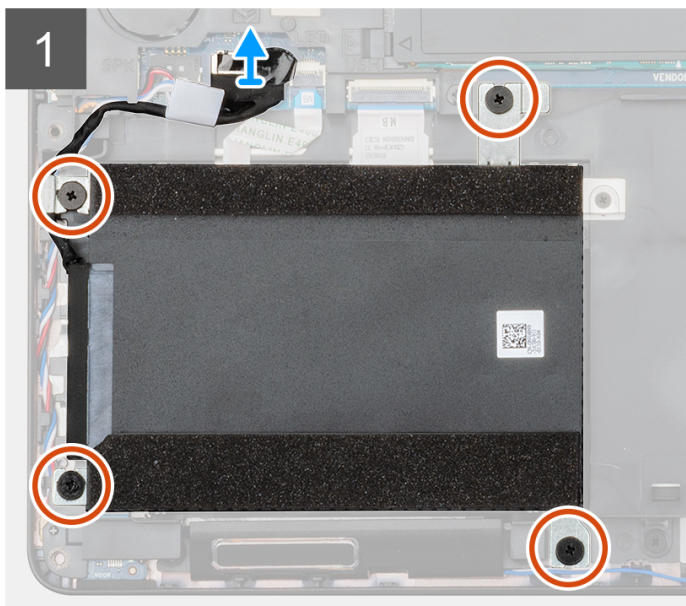
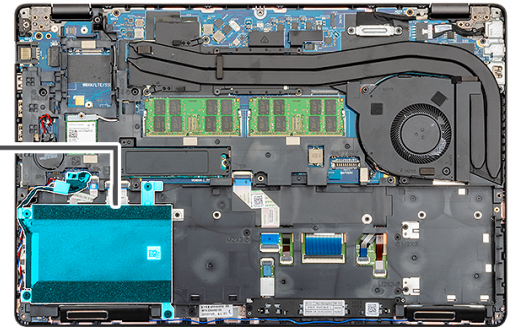
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

About this task

The figure indicates the location of the HDD and provides a visual representation of the removal procedure.



4x
M2x5.4



Steps

1. Locate the HDD on your computer.
2. Disconnect the HDD cable from the system board.
3. Remove the four (M2x5.4) screws that secure the HDD to the system board.
4. Remove the HDD from the computer.

Installing the Hard drive

Prerequisites

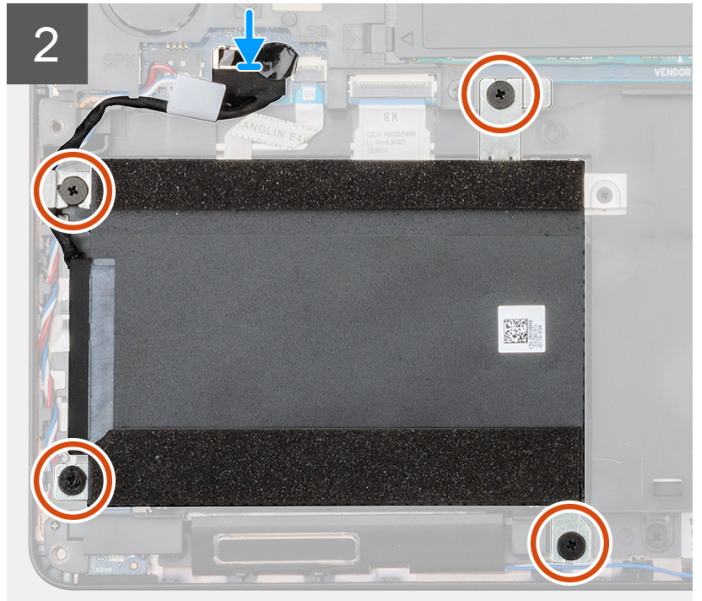
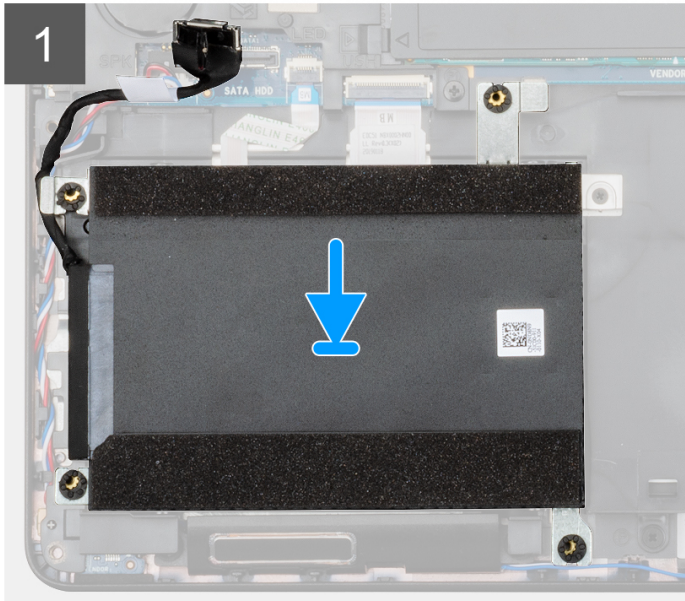
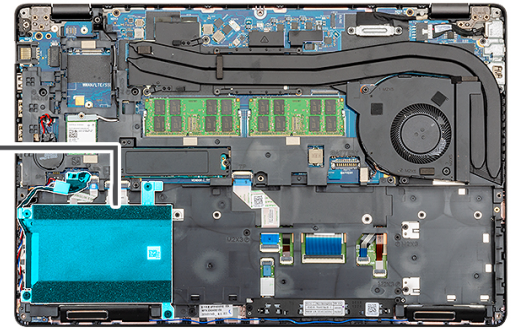
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the HDD and provides a visual representation of the installation procedure.



4x
M2x5.4



Steps

1. Locate the system board slot on your computer.
2. Align and install the HDD into the computer
3. Install the four (M2x5.4) screws that secure the HDD to the computer.
4. Connect the HDD cable on to the connector on the system board.

Next steps

1. Install the [battery](#).
2. Install the [base cover](#).
3. Follow the procedure in [After working inside your computer](#).

Coin-cell battery

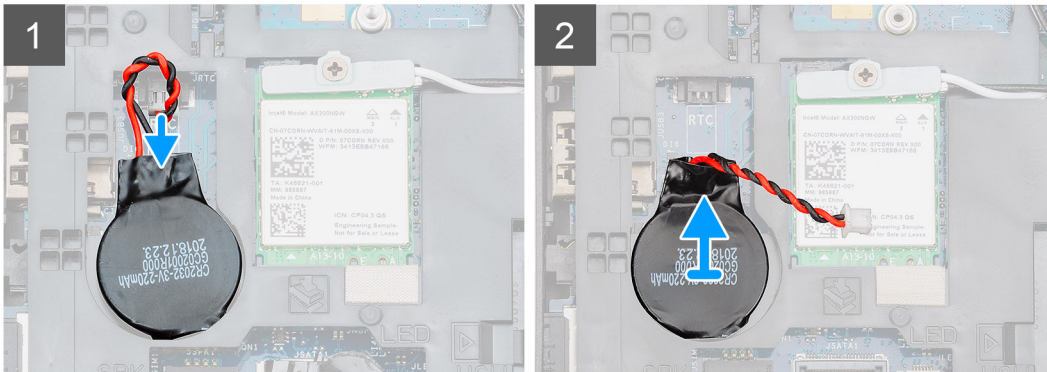
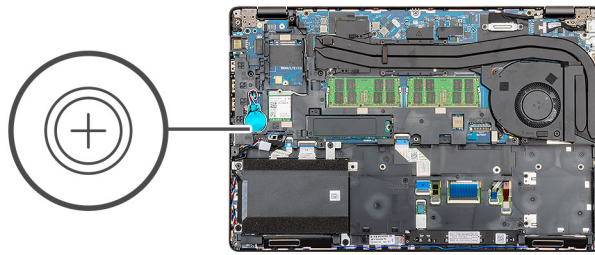
Removing the Coin-cell

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

About this task

The figure indicates the location of the Coin-cell and provides a visual representation of the removal procedure.



Steps

1. Locate the Coin-cell on your computer.
2. Disconnect the coin-cell cable from the system board.
3. Lift the coin-cell out of the computer.

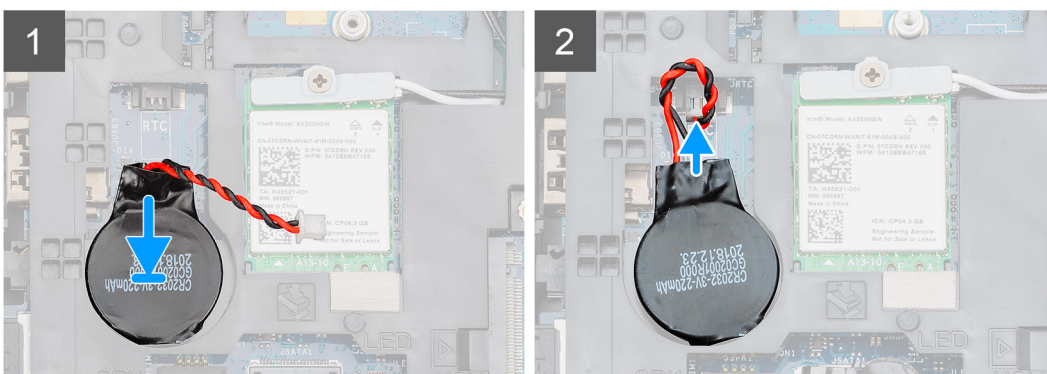
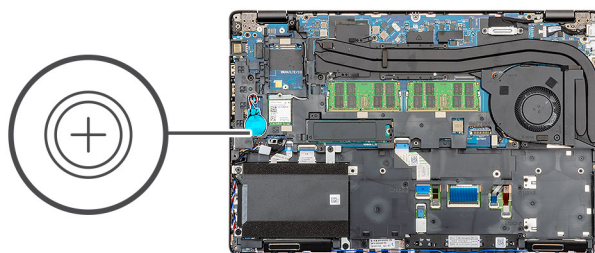
Installing the Coin-cell

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the coin-cell and provides a visual representation of the installation procedure.



Steps

1. Locate the coin-cell slot on your computer.
2. Adhere the coin-cell on to the slot.
3. Reconnect the coin-cell cable to the system board.

Next steps

1. Install the [battery](#).
2. Install the [base cover](#).
3. Follow the procedure in [After working inside your computer](#).

DC-in port

Removing the DC-in

Prerequisites

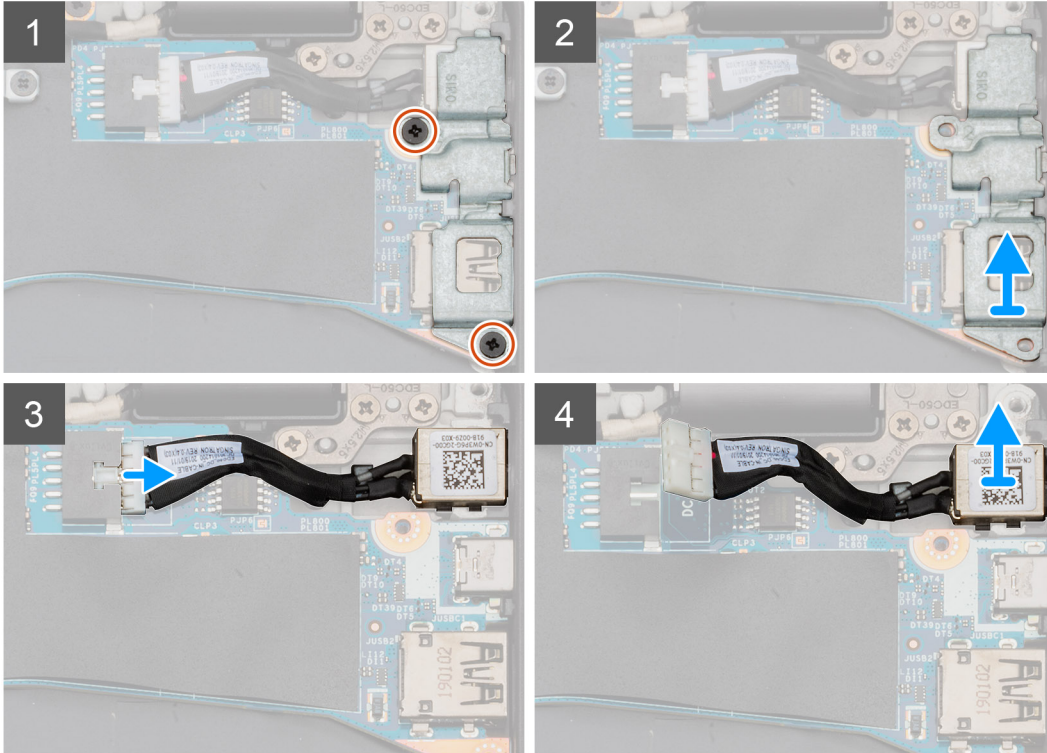
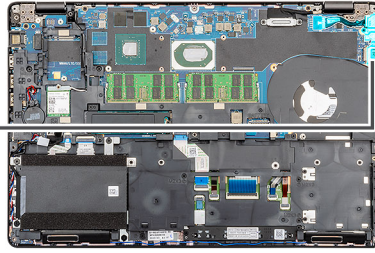
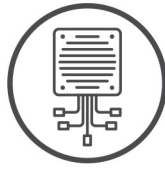
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [heat sink](#).

About this task

The figure indicates the location of the DC-in and provides a visual representation of the removal procedure.



2x
M2x5



Steps

1. Locate the DC-in port on your computer.
2. Remove the two (M2x5) that secures the DC-in and USB Type-C metal bracket.
3. Lift the DC-in and USB Type-C metal bracket from the computer.
4. Disconnect the DC-in cable from the system board.
5. Remove the DC-in port from the computer.

Installing the DC-in

Prerequisites

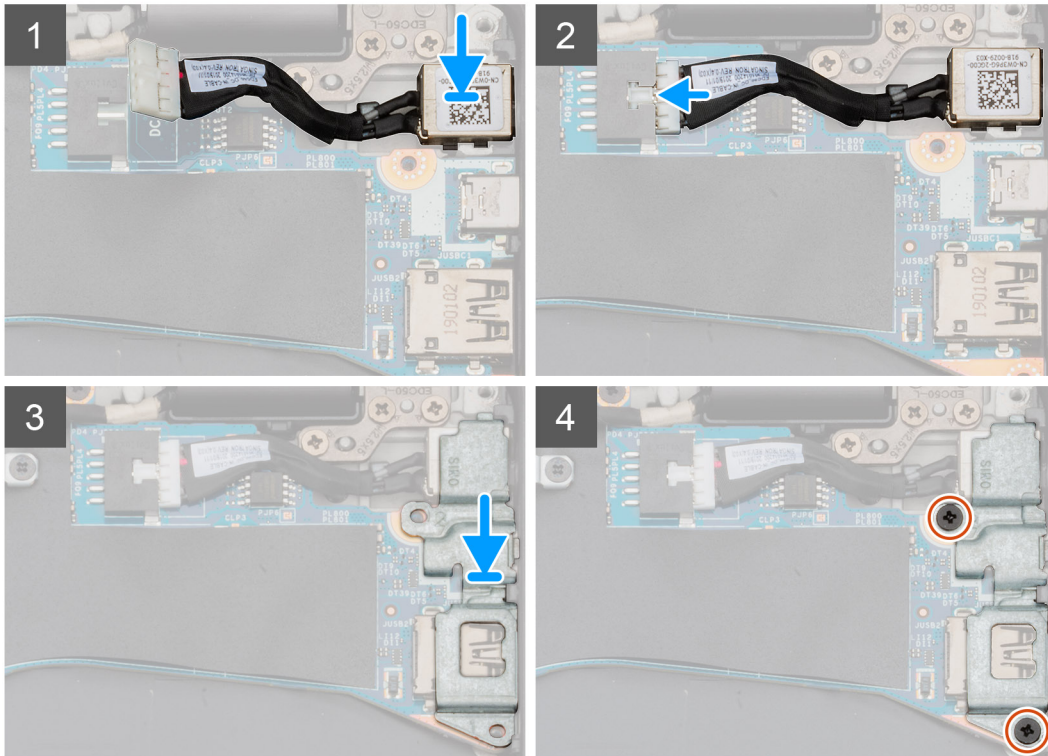
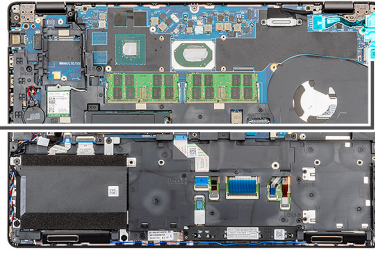
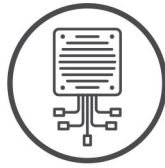
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the DC-in and provides a visual representation of the installation procedure.



2x
M2x5



Steps

1. Locate the DC-in slot on your computer.
2. Insert the DC-in port into the slot on your computer.
3. Connect the DC-in cable to the system board.
4. Place the DC-in and USB Type-C metal bracket on the DC-in port.
5. Install the two screws (M2x5) that secures the DC-in and USB Type-C metal bracket to the system board.

Next steps

1. Install the [heat sink](#) (for discrete only).
2. Install the [battery](#).
3. Install the [base cover](#).
4. Follow the procedure in [After working inside your computer](#).

Solid-state drive

Removing the SSD

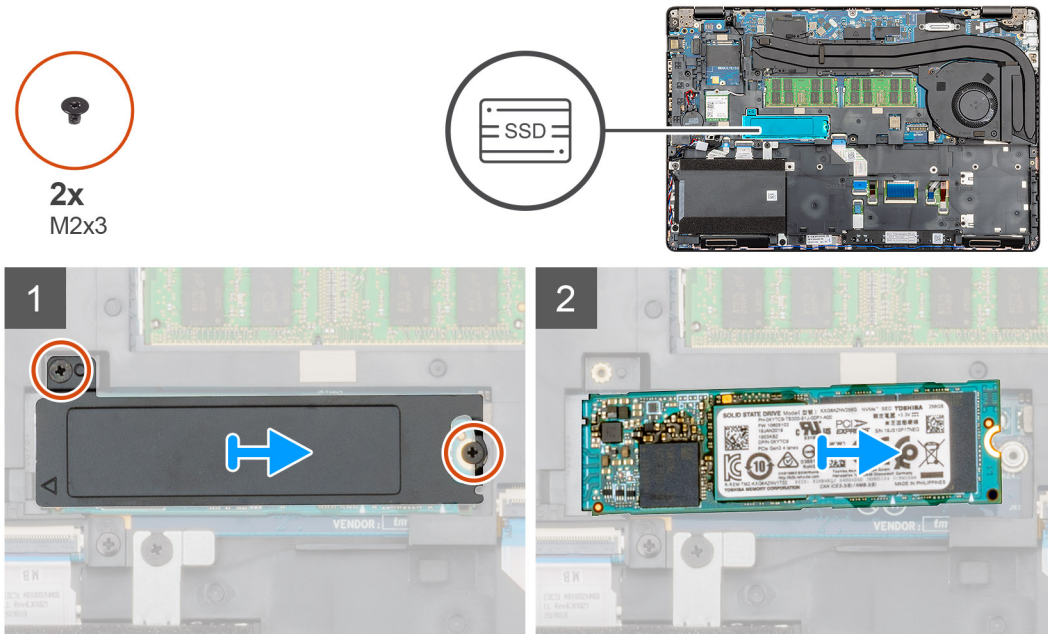
Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).

3. Remove the [battery](#).

About this task

The figure indicates the location of the SSD and provides a visual representation of the removal procedure.



Steps

1. Locate the SSD on your computer.
2. Remove two (M2x3) screws that secure the SSD module to the computer.
3. Remove the SSD thermal plate and slide the SSD out of the computer.

Installing the SSD

Prerequisites

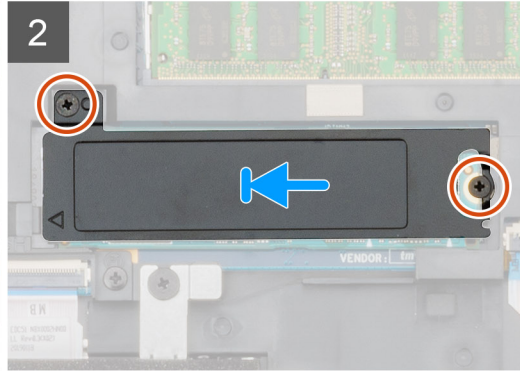
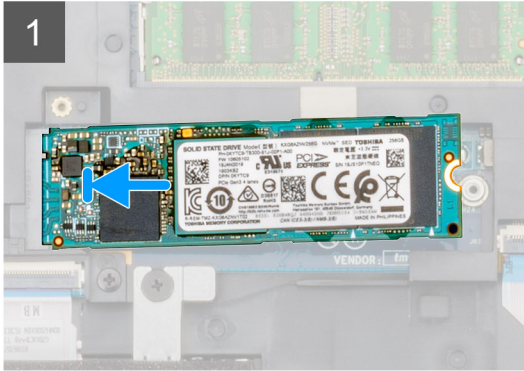
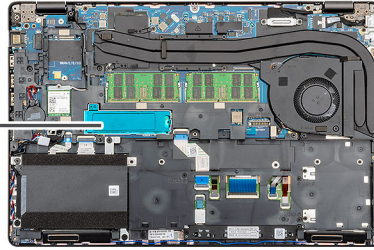
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the SSD and provides a visual representation of the installation procedure.



2x
M2x3



Steps

1. Locate the SSD slot on your computer.
2. Slide the SSD into the slot.
3. Place the SSD thermal plate over the SSD module.
4. Replace the two (M2x3) screws to secure the SSD module to the computer.

Next steps

1. Install the [battery](#).
2. Install the [base cover](#).
3. Follow the procedure in [After working inside your computer](#).

Inner frame

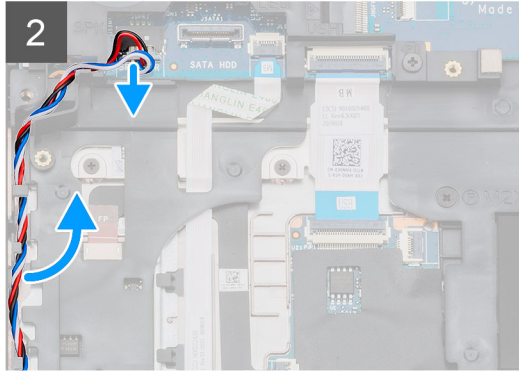
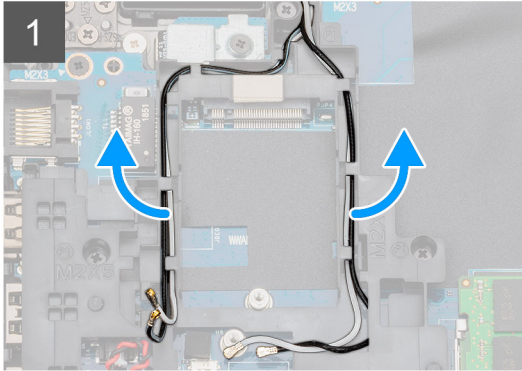
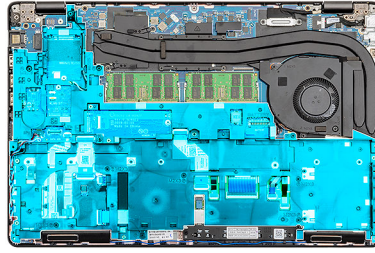
Removing the inner frame

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [solid state drive](#).
5. Remove the [HDD](#).
6. Remove the [WLAN card](#).
7. Remove the [WWAN card](#).

About this task

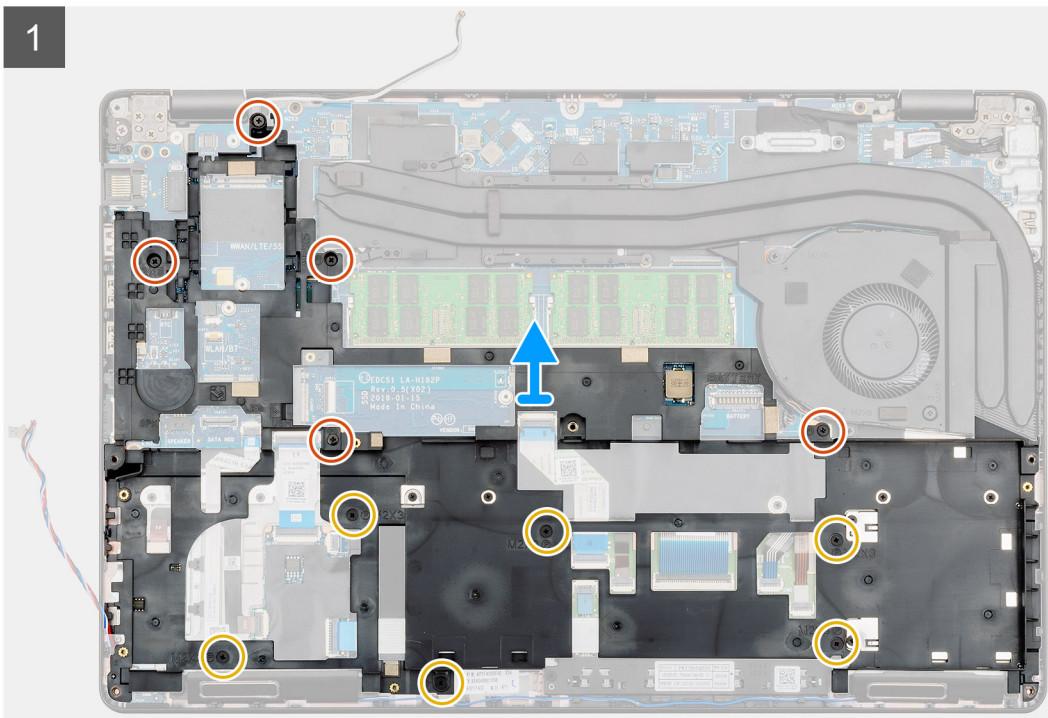
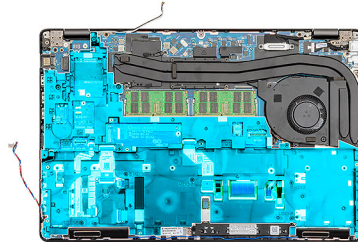
The figure indicates the location of the inner frame and provides a visual representation of the removal procedure.



5x
M2x5



6x
M2x3



Steps

1. Locate the system board on your computer.
2. Unroute the WWAN and WLAN card cables from the routing clips.
3. Disconnect and unroute the speaker cable.

4. Remove the five (M2x5) and six (M2x3) screws that secure the inner frame to the computer.
5. Lift the inner frame out of the computer.

Installing the inner frame

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

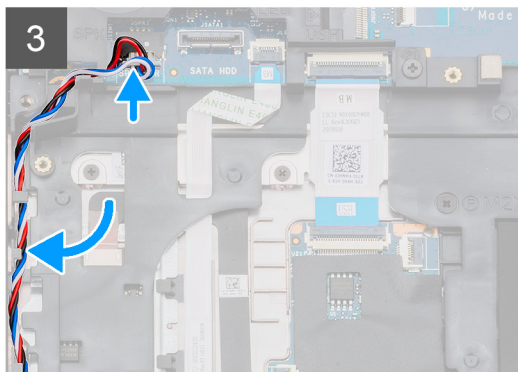
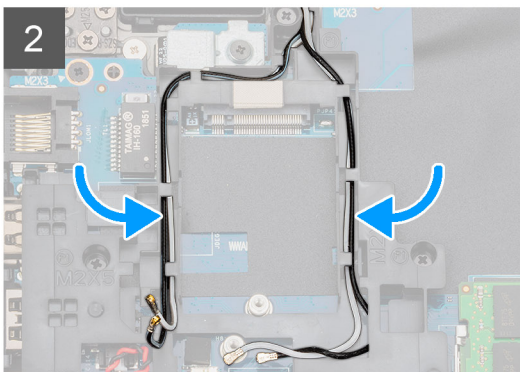
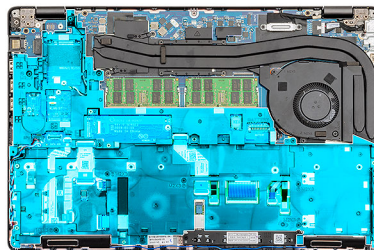
The figure indicates the location of the inner frame and provides a visual representation of the installation procedure.



5x
M2x5



6x
M2x3



Steps

1. Locate the Inner frame slot on your computer.
2. Align and place the inner frame into the slot on your computer.
3. Install the five (M2x5) and six (M2x3) that secure the inner frame to the computer.

4. Route the WWAN and WLAN card cable through the retention clips on the frame.
5. Route the Speaker through the retention clips and connect it to the system board.

Next steps

1. Install the [WWAN card](#).
2. Install the [WLAN card](#).
3. Install the [HDD](#).
4. Install the [solid state drive](#).
5. Install the [battery](#).
6. Install the [base cover](#).
7. Follow the procedure in [After working inside your computer](#).

Touchpad buttons

Touchpad buttons

Removing the touchpad buttons

Prerequisites

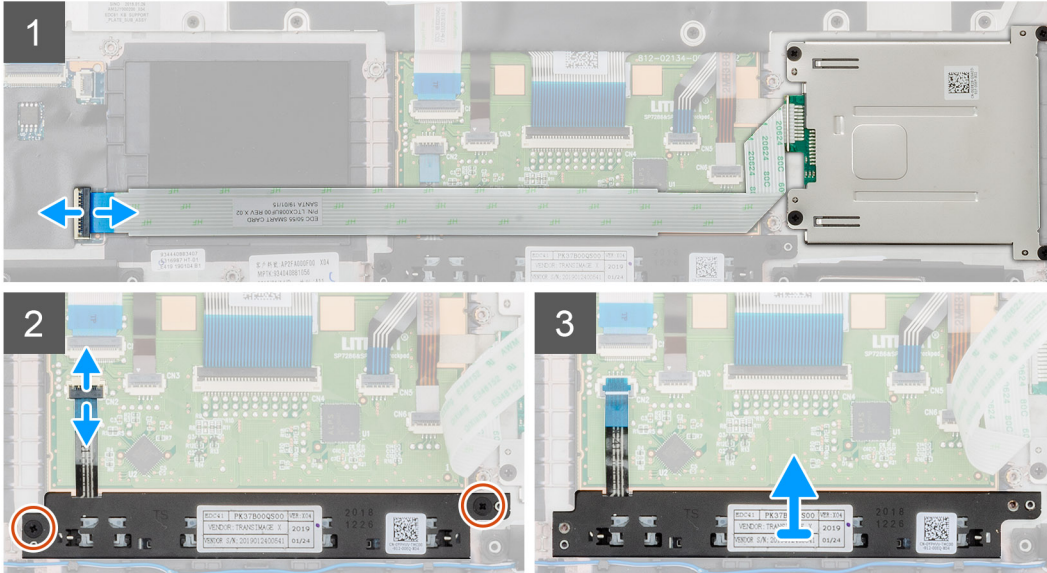
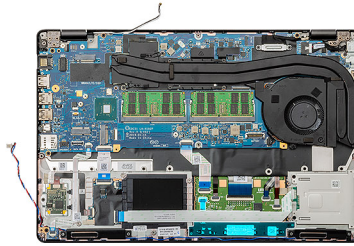
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [solid state drive](#).
5. Remove the [HDD](#).
6. Remove the [WLAN card](#).
7. Remove the [WWAN card](#).
8. Remove the [inner frame](#).

About this task

The figure indicates the location of the touchpad buttons and provides a visual representation of the removal procedure.



2x
M2x3



Steps

1. Locate the touchpad buttons board on your computer.
2. Open the latch and disconnect the smart card reader board cable from the system board.
3. Open the latch and disconnect the touchpad buttons cable from the connector.
4. Remove the two (M2x3) screws that secure the touchpad buttons to the palmrest.
5. Lift the touchpad buttons out of the computer.

Installing the touchpad buttons

Prerequisites

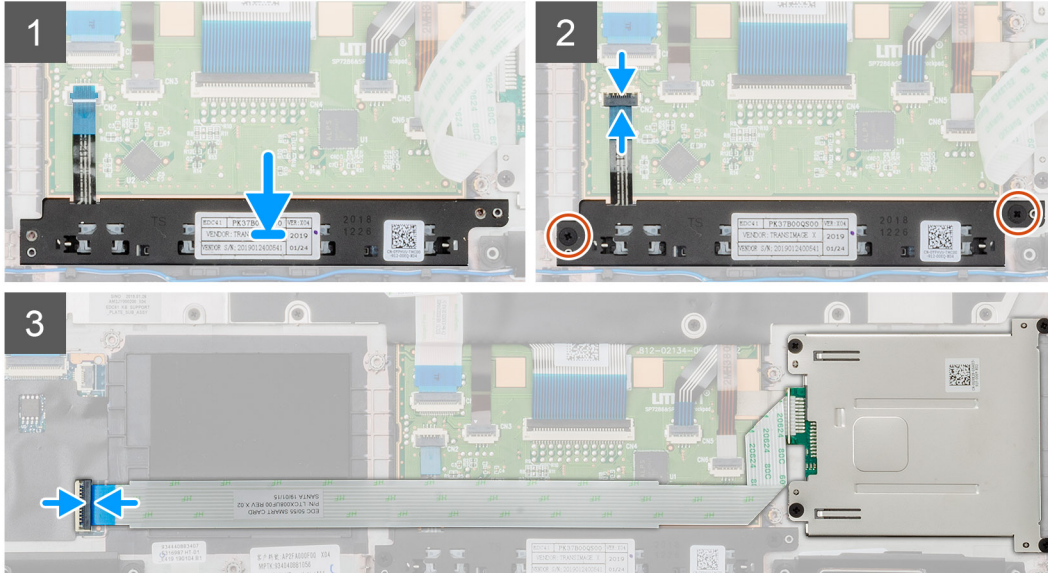
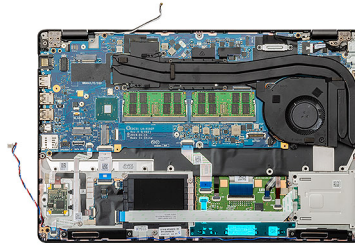
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the touchpad buttons and provides a visual representation of the installation procedure.



2x
M2x3



Steps

1. Locate the touchpad buttons slot on your computer.
2. Align and place the touchpad buttons into the slot on your computer.
3. Connect the touchpad buttons cable to the connector on the computer and secure the latch.
4. Install the two (M2x3) screws to secure the touchpad buttons on to the computer.
5. Connect the smart card reader cable to its connector and secure the latch.

Next steps

1. Install the [inner frame](#).
2. Install the [WWAN card](#).
3. Install the [WLAN card](#).
4. Install the [HDD](#).
5. Install the [solid state drive](#).
6. Install the [battery](#).
7. Install the [base cover](#).
8. Follow the procedure in [After working inside your computer](#).

SmartCard reader

Removing the smart card reader board

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [solid state drive](#).

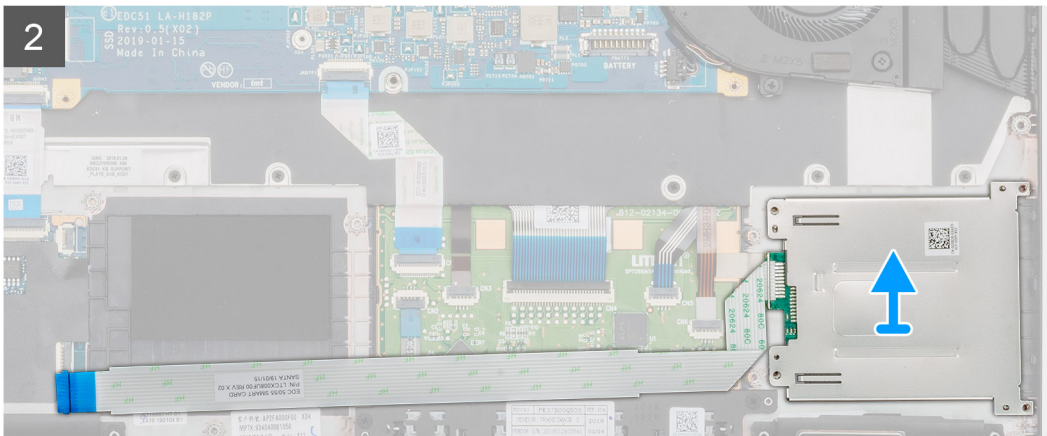
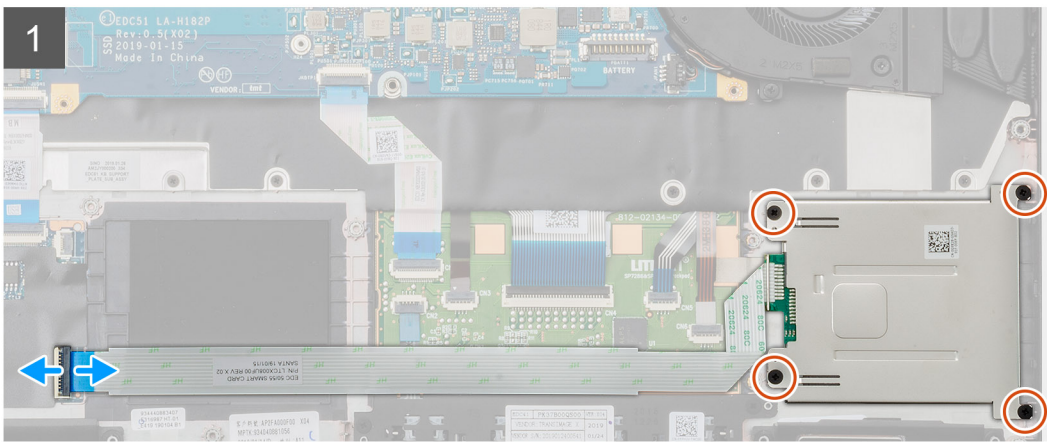
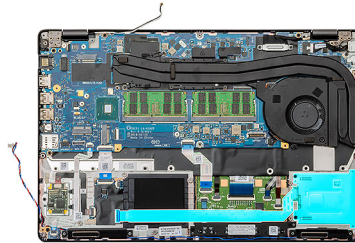
5. Remove the [HDD](#).
6. Remove the [WLAN card](#).
7. Remove the [WWAN card](#).
8. Remove the [inner frame](#).

About this task

The figure indicates the location of the smart card reader board and provides a visual representation of the removal procedure.



4x
M2x3



Steps

1. Locate the Smart card reader board on your computer.
2. Open the latch and disconnect the Smart card reader board cable from the system board.
3. Remove the four (M2X3) screws that secure the smart card reader board to the computer.
4. Lift the smart card reader module out of the computer.

Installing the smart card reader board

Prerequisites

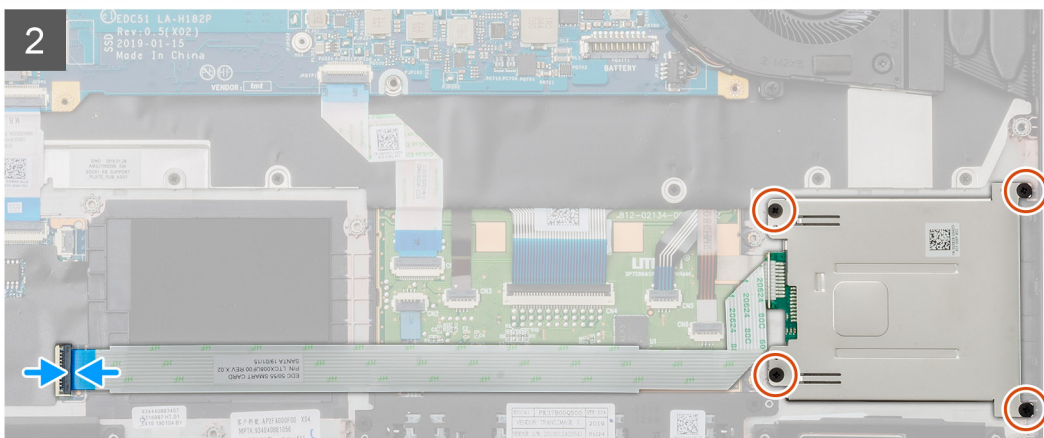
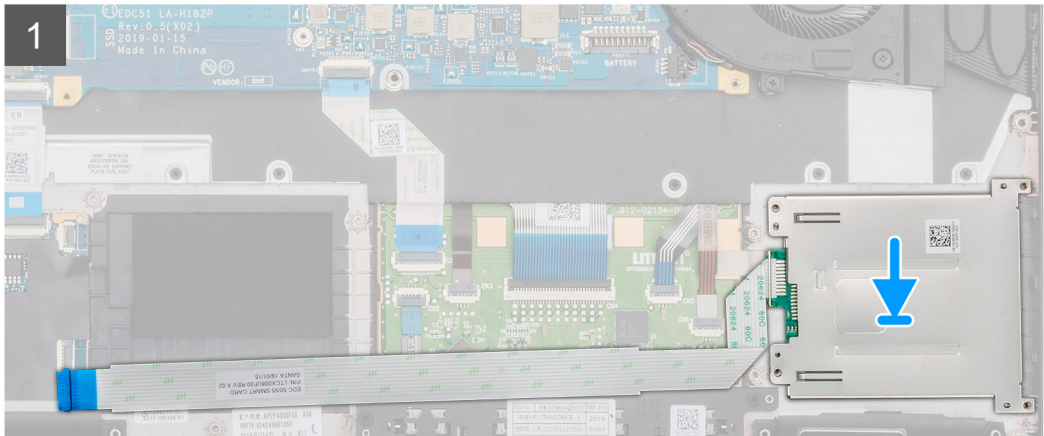
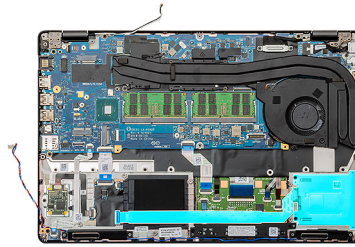
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the smart card reader board and provides a visual representation of the installation procedure.



4x
M2x3



Steps

1. Locate the smart card reader board slot on your computer.
2. Align and place the smart card reader board into the slot on your computer.
3. Install the four (M2X3) screws that secure the smart card reader board to the computer.
4. Connect the smart card reader cable on to the connector on the system board and lock the latch.

Next steps

1. Install the [inner frame](#).
2. Install the [WWAN card](#).
3. Install the [WLAN card](#).
4. Install the [HDD](#).
5. Install the [solid state drive](#).
6. Install the [battery](#).
7. Install the [base cover](#).
8. Follow the procedure in [After working inside your computer](#).

Touchpad buttons

Removing the touchpad buttons

Prerequisites

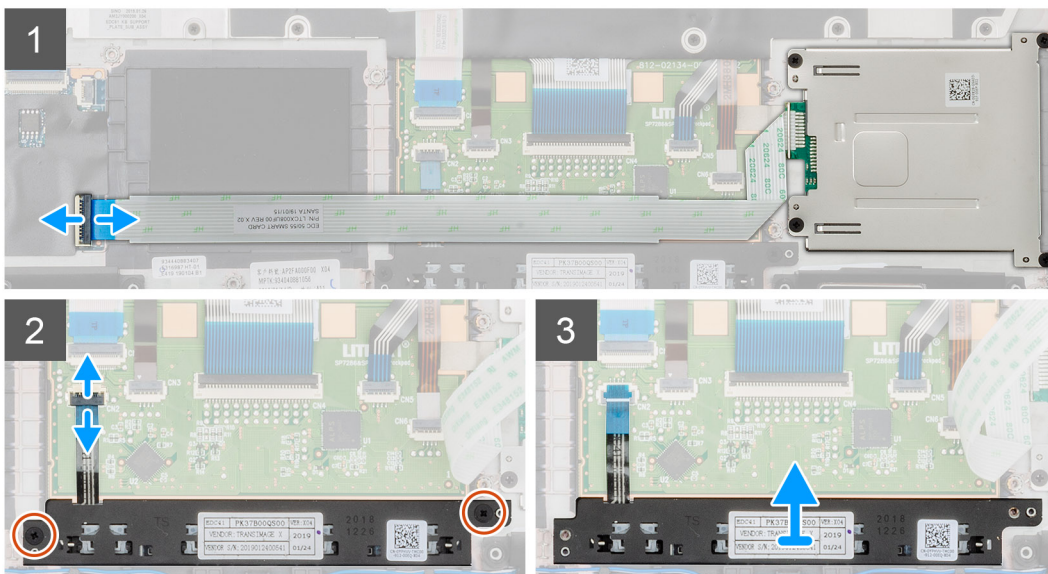
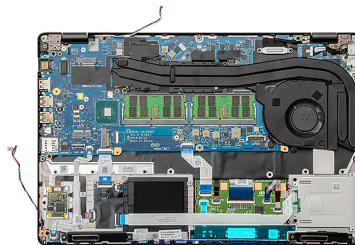
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [solid state drive](#).
5. Remove the [HDD](#).
6. Remove the [WLAN card](#).
7. Remove the [WWAN card](#).
8. Remove the [inner frame](#).

About this task

The figure indicates the location of the touchpad buttons and provides a visual representation of the removal procedure.



2x
M2x3



Steps

1. Locate the touchpad buttons board on your computer.
2. Open the latch and disconnect the smart card reader board cable from the system board.
3. Open the latch and disconnect the touchpad buttons cable from the connector.
4. Remove the two (M2x3) screws that secure the touchpad buttons to the palmrest.
5. Lift the touchpad buttons out of the computer.

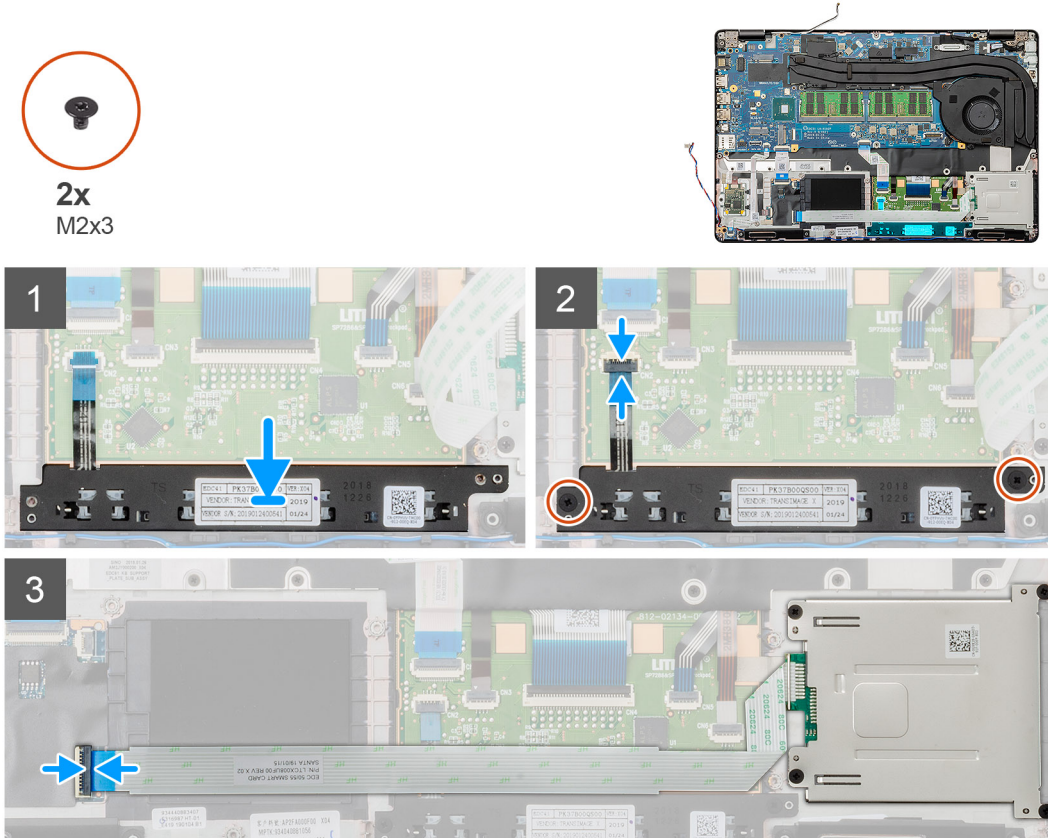
Installing the touchpad buttons

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the touchpad buttons and provides a visual representation of the installation procedure.



Steps

1. Locate the touchpad buttons slot on your computer.
2. Align and place the touchpad buttons into the slot on your computer.
3. Connect the touchpad buttons cable to the connector on the computer and secure the latch.
4. Install the two (M2x3) screws to secure the touchpad buttons on to the computer.
5. Connect the smart card reader cable to its connector and secure the latch.

Next steps

1. Install the [inner frame](#).
2. Install the [WWAN card](#).
3. Install the [WLAN card](#).
4. Install the [HDD](#).
5. Install the [solid state drive](#).
6. Install the [battery](#).
7. Install the [base cover](#).
8. Follow the procedure in [After working inside your computer](#).

LED board

Removing the LED board

Prerequisites

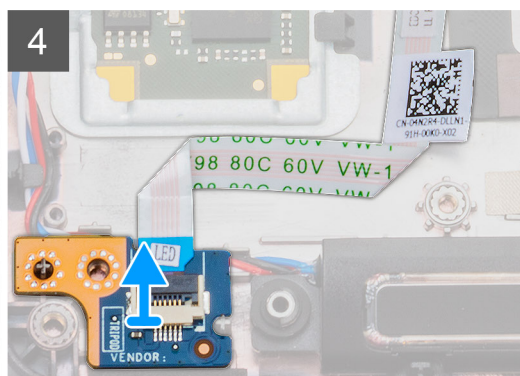
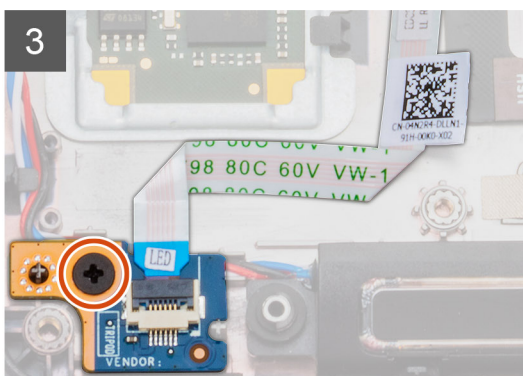
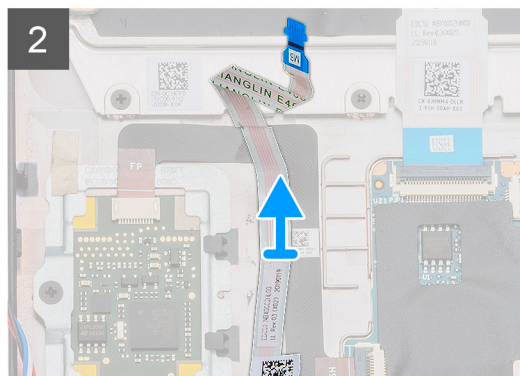
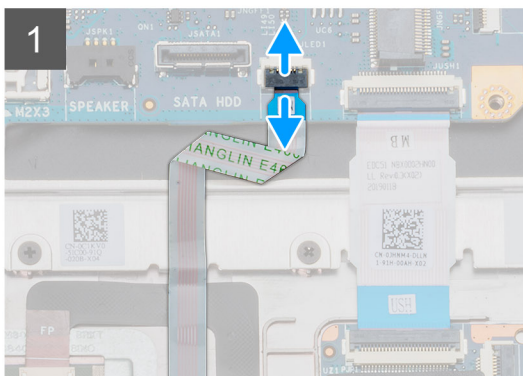
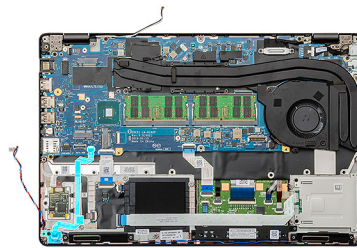
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [solid state drive](#).
5. Remove the [HDD](#).
6. Remove the [WLAN card](#).
7. Remove the [WWAN card](#).
8. Remove the [inner frame](#).

About this task

The figure indicates the location of the LED board and provides a visual representation of the removal procedure.



1x
M2x3



Steps

1. Locate the LED board on your computer.
2. Open the latch and disconnect the LED board cable from the system board.
3. Peel back the LED board cable.

NOTE: The LED board cable is secured to the computer by an adhesive strip.

4. Remove the single (M2x3) screw that secures the LED board to the computer.
5. Lift the LED board out of the computer.

Installing the LED board

Prerequisites

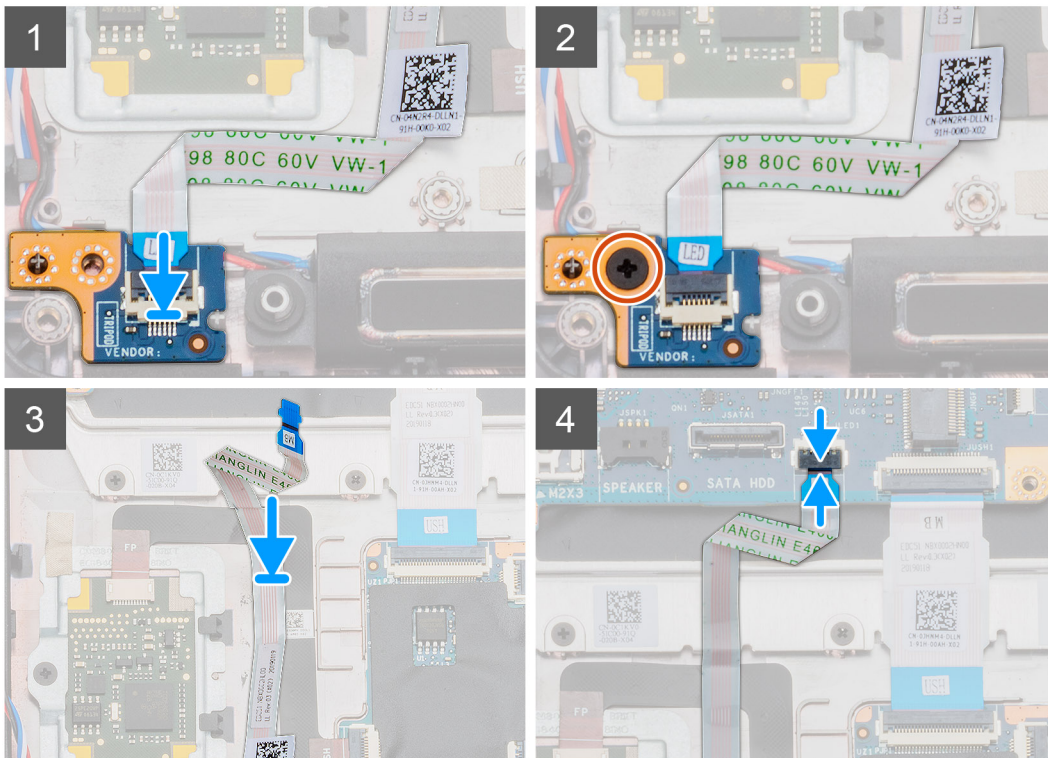
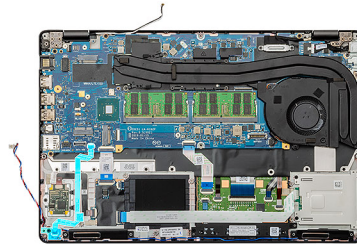
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the LED board and provides a visual representation of the installation procedure.



1x
M2x3



Steps

1. Locate the LED board slot on your computer.
2. Align and place the LED board on the slot on your computer.
3. Install the single (M2x3) screw that secures the LED board to the computer.
4. Adhere the LED board cable to the adhesive strip on the computer.
5. Connect the LED board cable to the connector on the system board.

Next steps

1. Install the [inner frame](#).
2. Install the [WWAN card](#).
3. Install the [WLAN card](#).
4. Install the [HDD](#).
5. Install the [solid state drive](#).
6. Install the [battery](#).
7. Install the [base cover](#).
8. Follow the procedure in [After working inside your computer](#).

Speakers

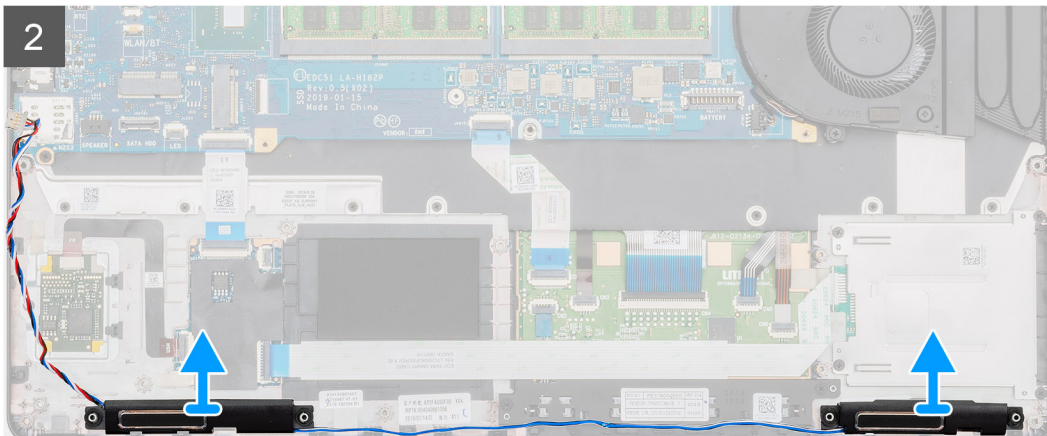
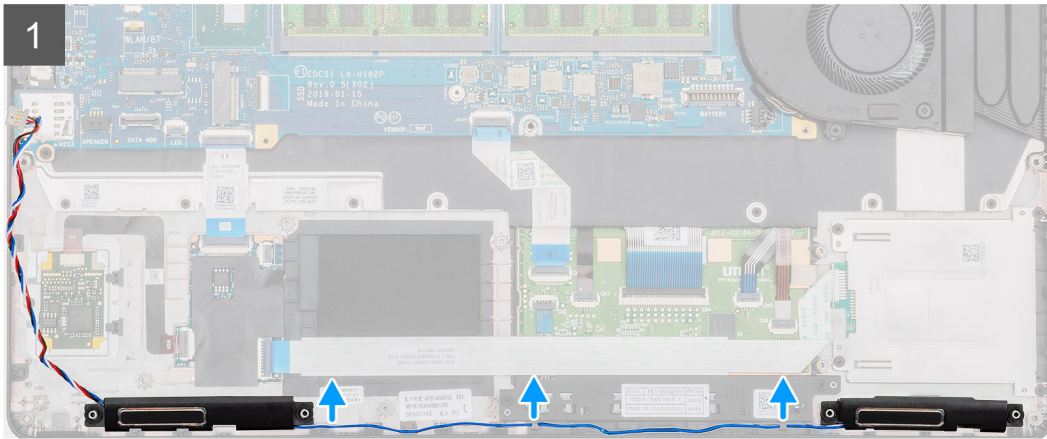
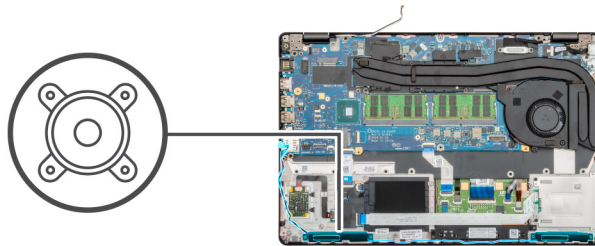
Removing the speakers

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [solid state drive](#).
5. Remove the [HDD](#).
6. Remove the [WLAN card](#).
7. Remove the [WWAN card](#).
8. Remove the [inner frame](#).
9. Remove the [LED board](#).

About this task

The figure indicates the location of the speakers and provides a visual representation of the removal procedure.



Steps

1. Locate the speakers on your computer.
2. Unroute the speaker cables from the retention clips on the computer.
3. Lift the speakers out of the computer.

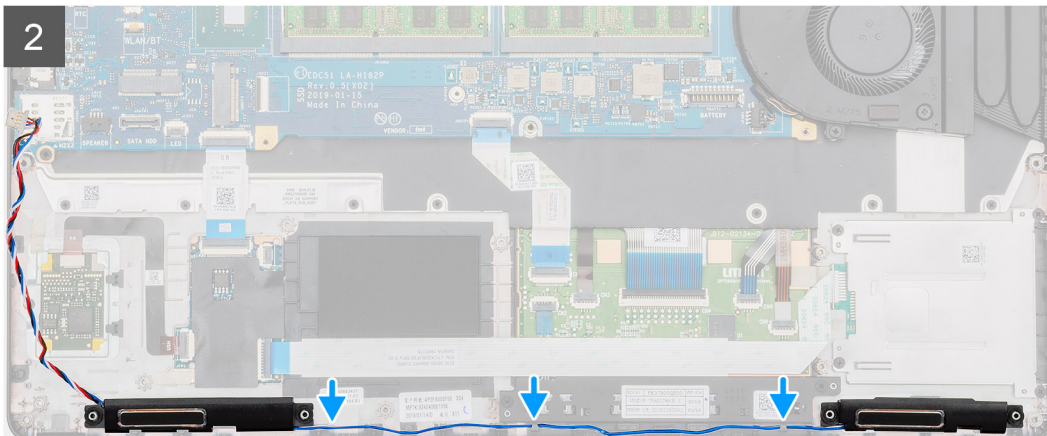
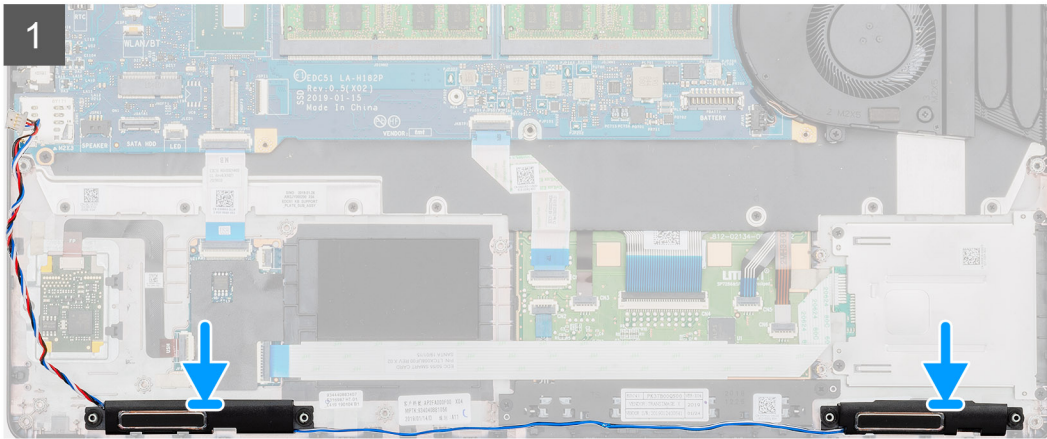
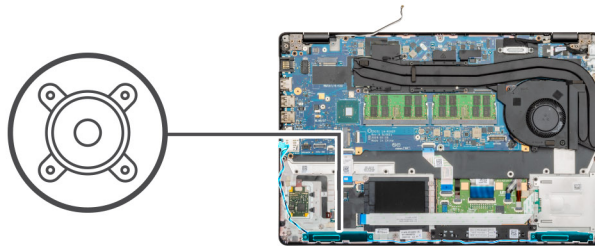
Installing the speakers

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the speakers and provides a visual representation of the installation procedure.



Steps

1. Locate the speakers slot on your computer.
2. Align and place the speakers in the slot on your computer.
3. Route the speaker cables through the retention clips on your computer.

Next steps

1. Install the [LED board](#).
2. Install the [inner frame](#).
3. Install the [WWAN card](#).
4. Install the [WLAN card](#).
5. Install the [HDD](#).
6. Install the [solid state drive](#).
7. Install the [battery](#).
8. Install the [base cover](#).
9. Follow the procedure in [After working inside your computer](#).

Heatsink assembly-Discrete

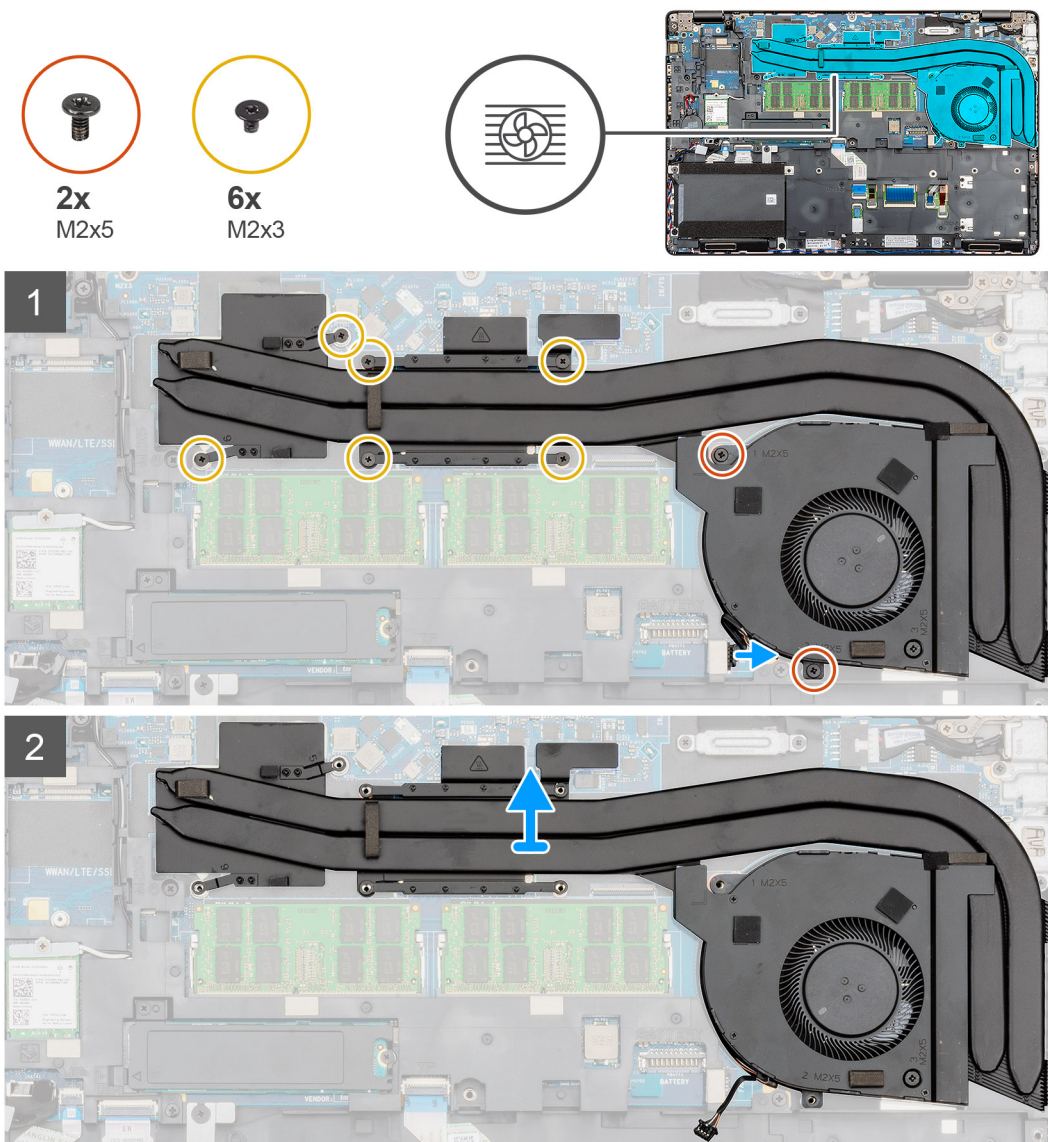
Removing the heatsink assembly-discrete

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

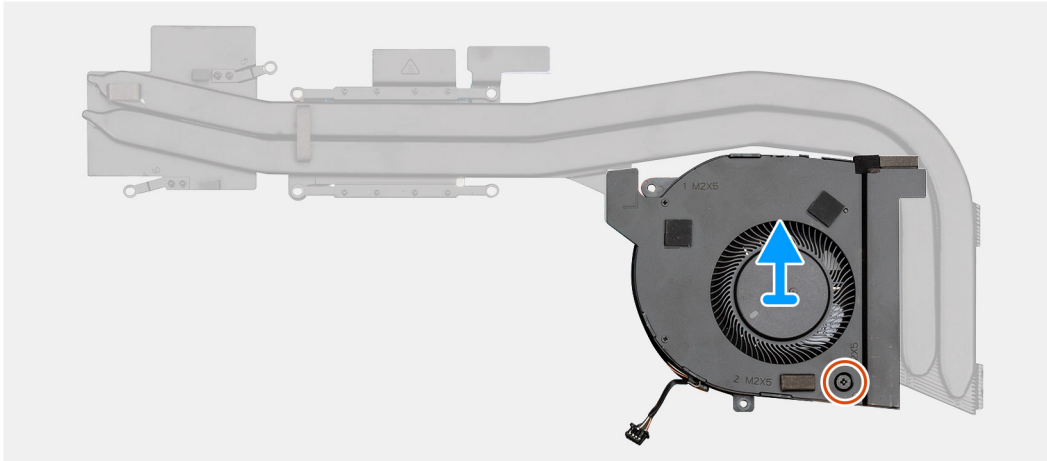
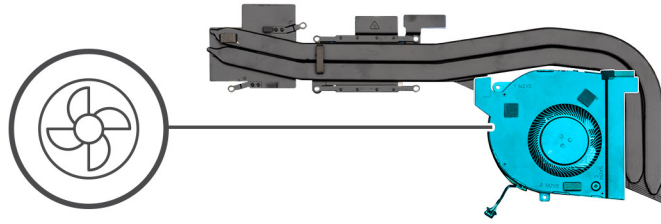
About this task

The figure indicates the location of the Heatsink and provides a visual representation of the removal procedure.





1x
M2x5



Steps

1. Locate the heatsink assembly on your computer.
2. Remove the two (M2x5) and six (M2x3) captive screws that secures the heatsink assembly to the computer.
3. Disconnect the heatsink fan cable from the system board.
4. Lift the heatsink assembly out of the computer.
5. Remove the single (M2x5) screw that secures the heatsink fan to the heatsink assembly.
6. Lift the heatsink fan from the heatsink assembly.

Installing the heatsink assembly-discrete

Prerequisites

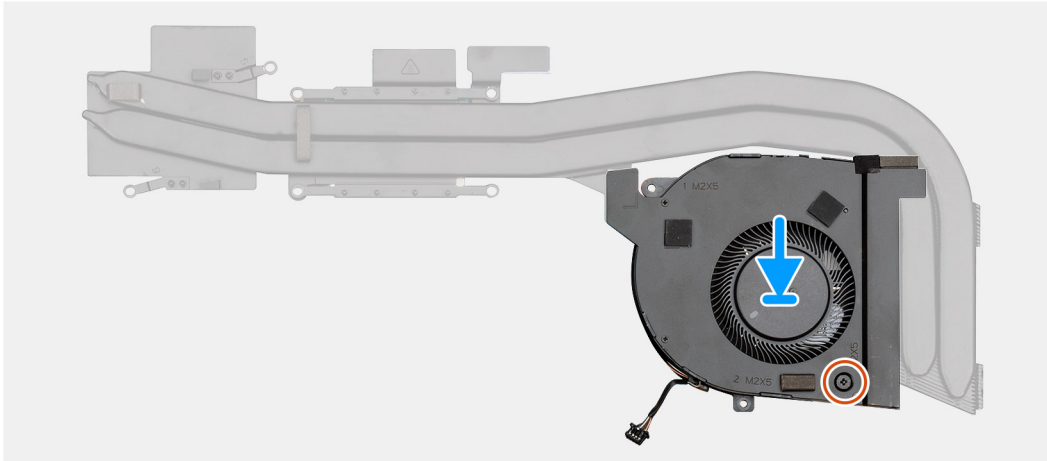
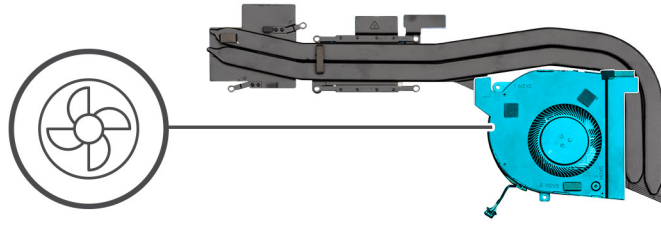
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the heatsink and provides a visual representation of the installation procedure.



1x
M2x5

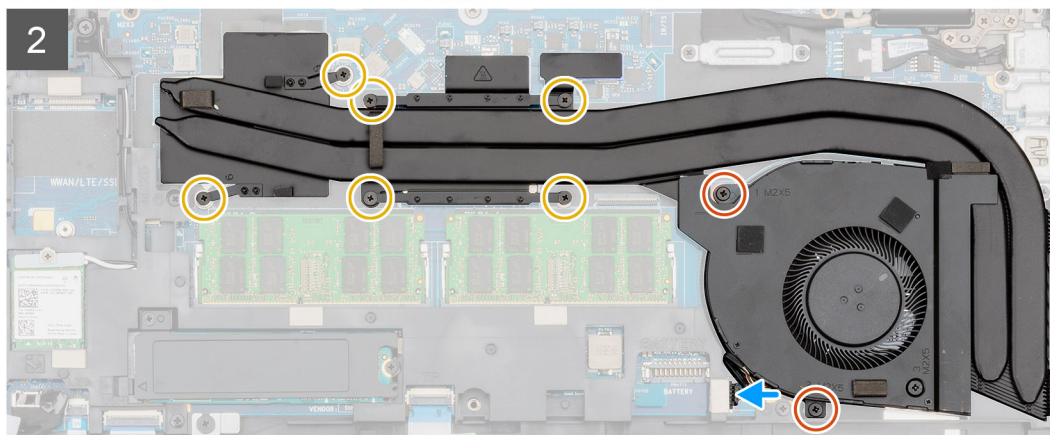




2x
M2x5



6x
M2x3



Steps

1. Locate the heatsink slot on your computer.
2. Align and place the heatsink fan on to the heatsink assembly.
3. Install the single (M2x5) screw that secures the heatsink fan to the heatsink assembly.
4. Align and place the heatsink assembly into the slot of your computer.
5. Install the two (M2x5) and six (M2x3) to secure the heatsink assembly to the computer.

NOTE: Install the screws as per the callout on the heatsink.

6. Connect the heatsink fan cable on to the connector on the system board.

Next steps

1. Install the [battery](#).
2. Install the [base cover](#).
3. Follow the procedure in [After working inside your computer](#).

Heatsink assembly-UMA

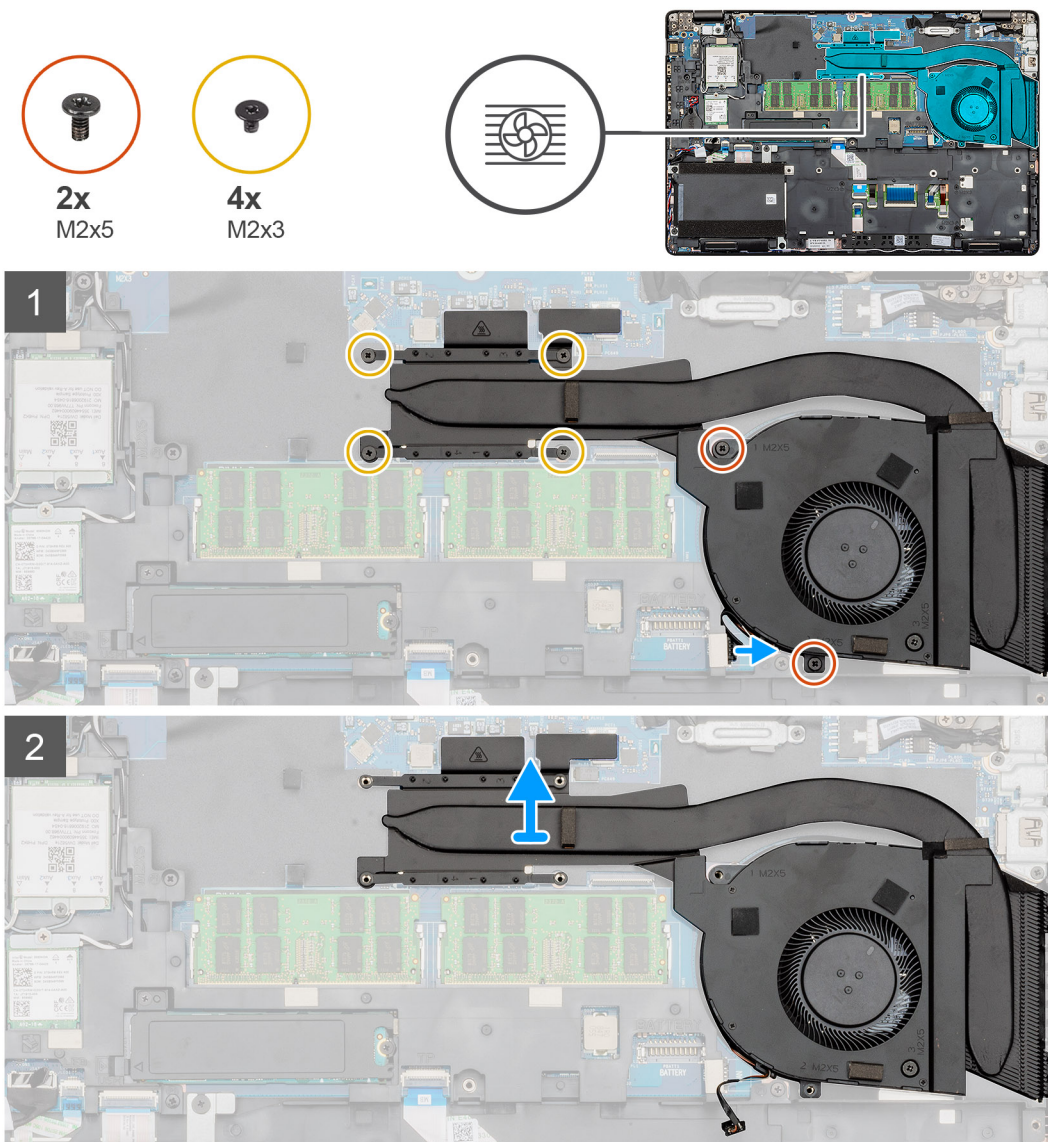
Removing the heatsink assembly-UMA

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

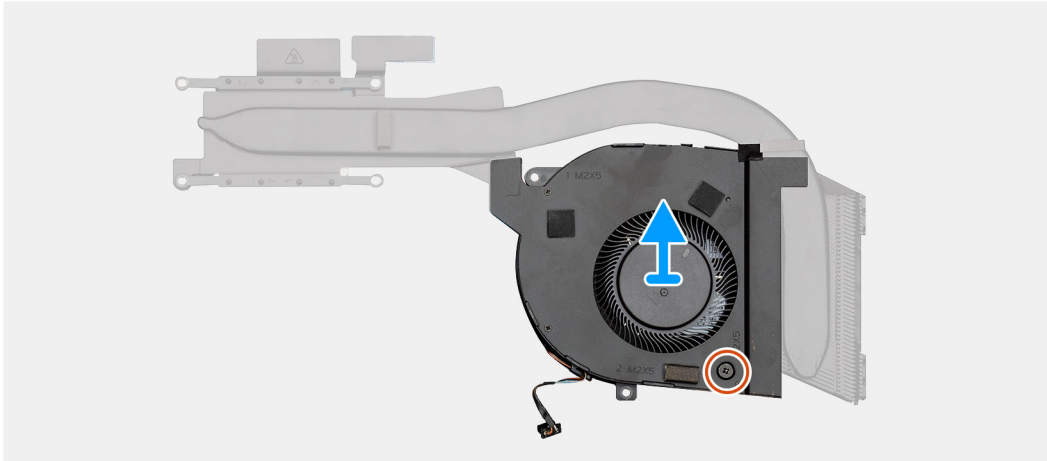
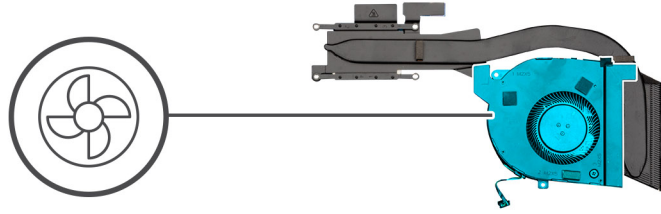
About this task

The figure indicates the location of the Heatsink assembly and provides a visual representation of the removal procedure.





1x
M2x5



Steps

1. Locate the heatsink on your computer.
2. Remove the two (M2x5) and four (M2x3) that secures the heatsink assembly to the computer.

i | **NOTE:** Remove the screws as per the callout on the heatsink module.

3. Disconnect the heatsink fan cable from the system board.
4. Lift the heatsink assembly out of the computer.
5. Remove the single (M2x5) screw that secures the heatsink fan to the heatsink assembly.
6. Lift the heatsink fan from the heatsink assembly.

Installing the heatsink assembly-UMA

Prerequisites

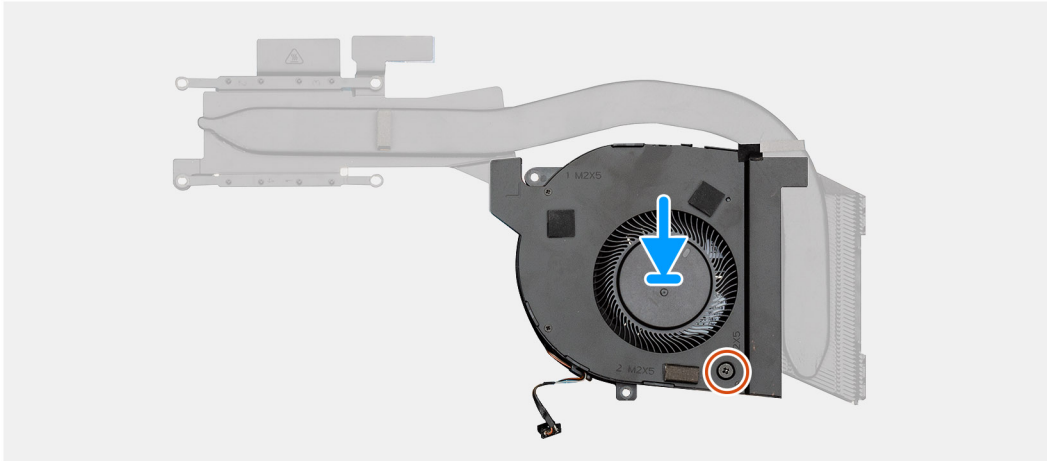
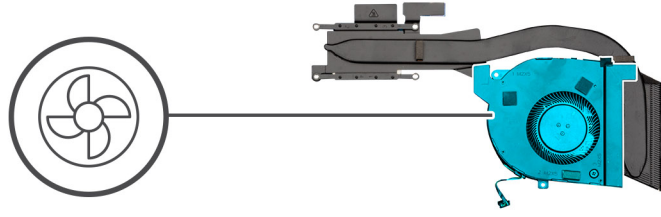
If you are replacing a component, remove the existing component before performing the installation procedure.

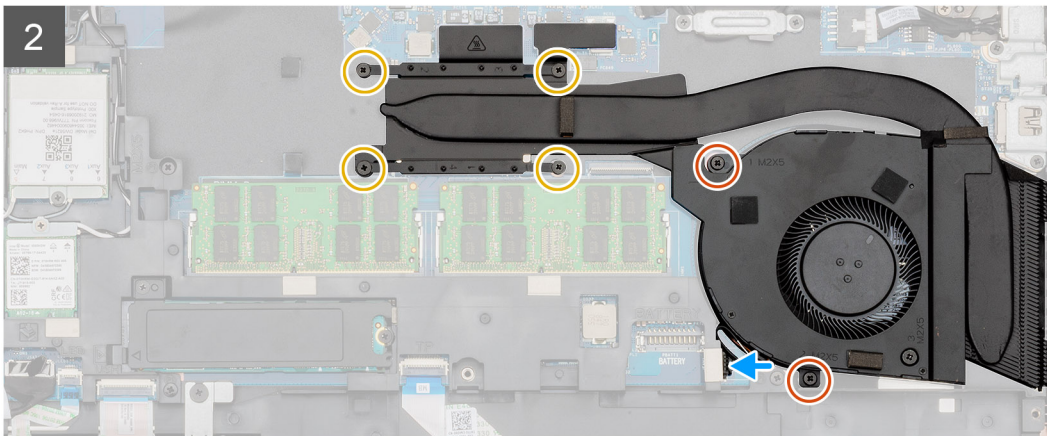
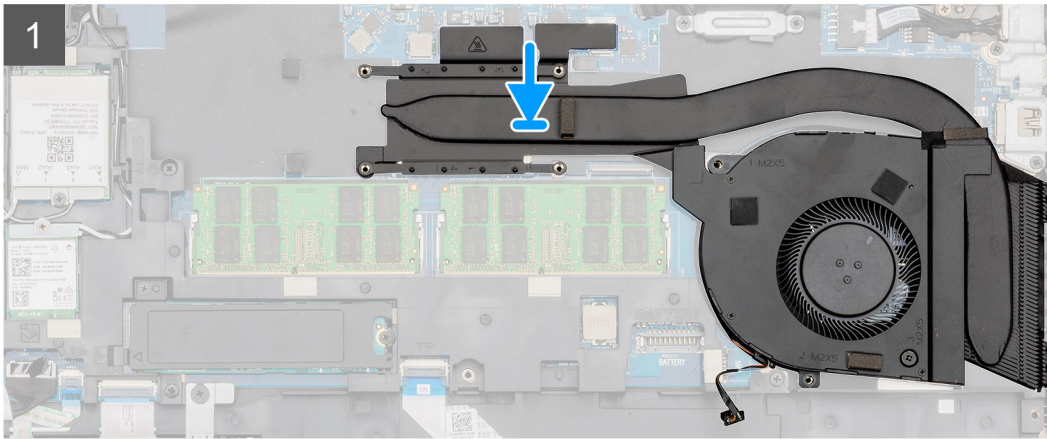
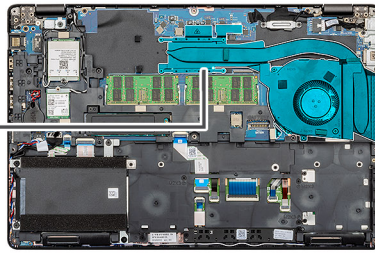
About this task

The figure indicates the location of the heatsink assembly and provides a visual representation of the installation procedure.




1x
M2x5





Steps

1. Locate the heatsink slot on your computer.
2. Align and place the heatsink fan on to the heatsink assembly.
3. Install the single (M2x5) screw that secures the heatsink fan to the heatsink assembly.
4. Align and place the heatsink assembly into the slot of your computer.
5. Install the two (M2x5) and four (M2x3) captive screws to secure the heatsink assembly to the computer.

 **NOTE:** Install the screws as per the callout on the heatsink.

6. Connect the heatsink fan cable on to the connector on the system board.

Next steps

1. Install the [battery](#).
2. Install the [base cover](#).
3. Follow the procedure in [After working inside your computer](#).

System board

Removing the system board

Prerequisites

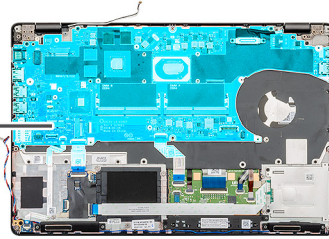
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [solid state drive](#).
5. Remove the [HDD](#).
6. Remove the [WLAN card](#).
7. Remove the [WWAN card](#).
8. Remove the [inner frame](#).
9. Remove the [heat sink](#).
10. Remove the [memory module](#).

About this task

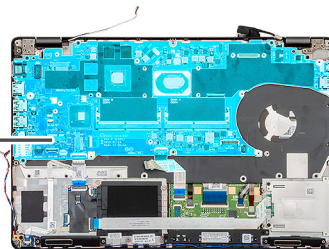
The figure indicates the location of the system board and provides a visual representation of the removal procedure.



3x
M2x3



4x
M2x3



Steps

1. Locate the system board on your computer.
2. Remove the single (M2x3) screw that secures the fingerprint reader metal bracket.
3. Remove the fingerprint metal bracket from the computer and flip the fingerprint sensor over.
4. Disconnect the camera cable from the system board.
5. Remove the two screws that secure the EDP metal bracket.
6. Lift the EDP metal bracket from the computer.
7. Peel the tape that secures the display cable to the system board.
8. Open the latch and disconnect the display cable from the system board.
9. Disconnect the LED board cable, touchpad cable and the keyboard cable from the system board connector.
10. Remove the four (M2x3) screws that secure the system board to the palm-rest and keyboard assembly.
11. Lift the system board off the palm-rest and keyboard assembly.

Installing the system board

Prerequisites

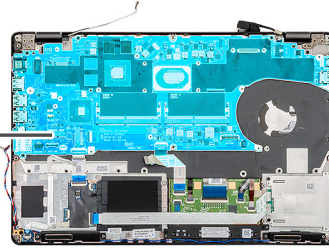
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

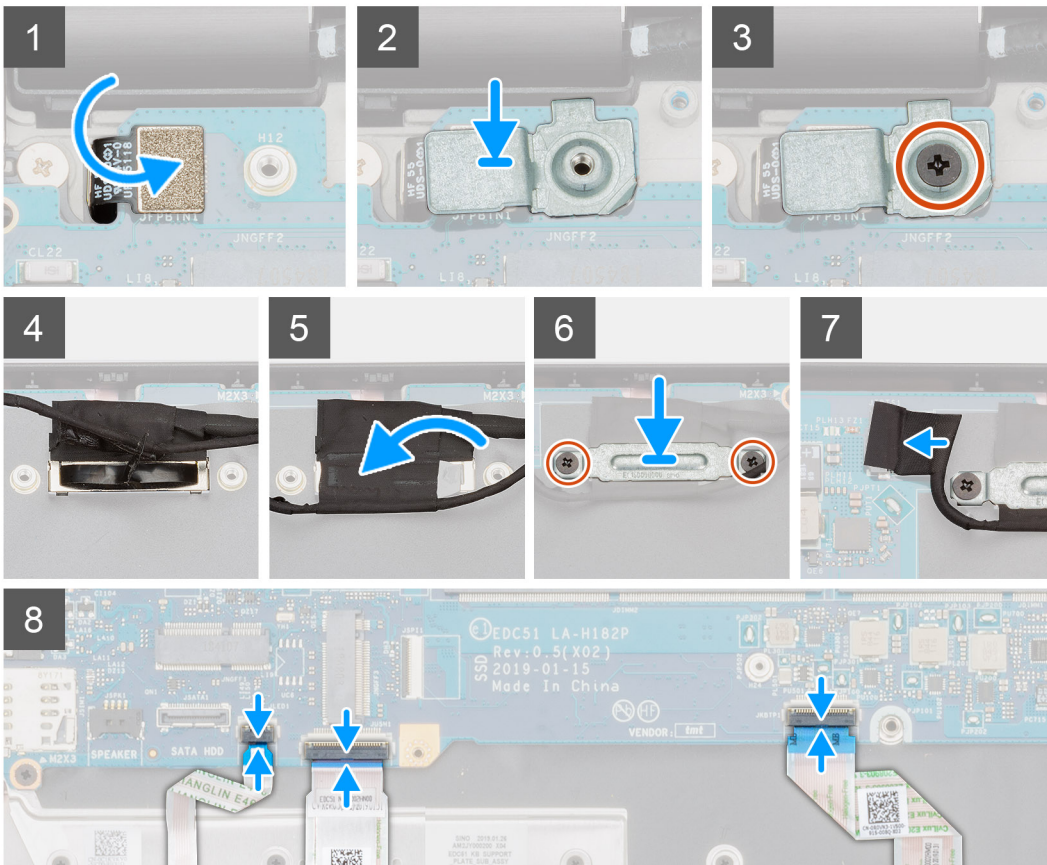
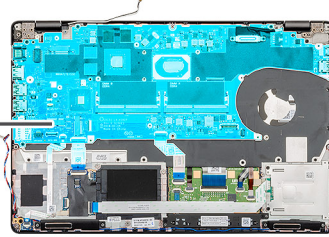
The figure indicates the location of the system board and provides a visual representation of the installation procedure.



4x
M2x3



3x
M2x3



Steps

1. Locate the system board slot on your computer.
2. Slide the ports on the system board into the slots on the palm-rest and keyboard assembly and align the screw holes on the system board with the screw holes on the palm-rest and keyboard assembly.
3. Install the four (M2x3) screws that secure the system board to the palm-rest and keyboard assembly.
4. Align and place the fingerprint reader sensor on to the slot on the computer.
5. Place the finger print reader metal bracket over the finger print sensor.
6. Replace the single (M2x3) screw to secure the metal bracket to the computer.
7. Connect the display cable on to the connector on the system board.
8. Adhere the tape that secures the display board to the system board.
9. Install the two screws (M2x3) that secure the EDP metal bracket to the system board.
10. Connect the keyboard cable to the system board and close the latch to secure the cable.
11. Connect the touchpad cable to the system board and close the latch to secure the cable.
12. Connect the LED board cable to the system board.

Next steps


1. Install the [memory module](#).
2. Install the [heat sink](#).
3. Install the [inner frame](#).
4. Install the [WWAN card](#).
5. Install the [WLAN card](#).
6. Install the [HDD](#).
7. Install the [solid state drive](#).
8. Install the [battery](#).
9. Install the [base cover](#).
10. Follow the procedure in [After working inside your computer](#).

Keyboard assembly

Removing the Keyboard

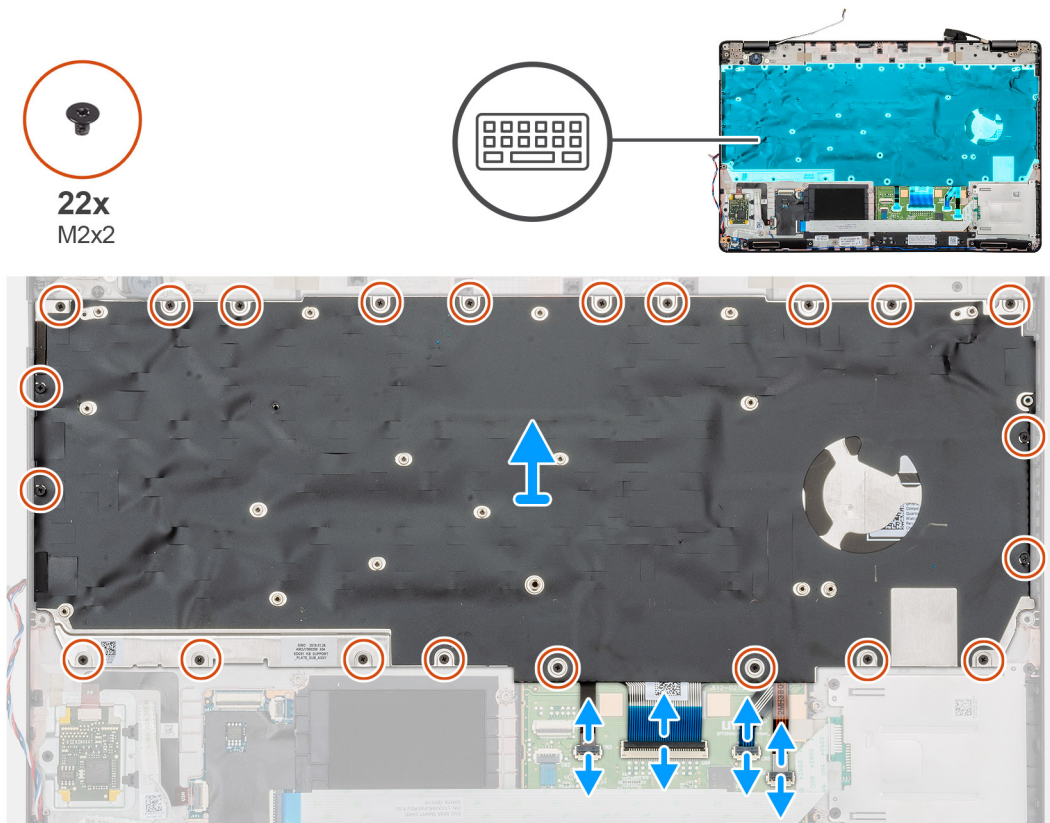
Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [solid state drive](#).
5. Remove the [HDD](#).
6. Remove the [WLAN card](#).
7. Remove the [WWAN card](#).
8. Remove the [inner frame](#).
9. Remove the [memory module](#).
10. Remove the [system board](#).

 **NOTE:** System board can be removed with heatsink attached.

About this task

The figure indicates the location of the keyboard and provides a visual representation of the removal procedure.



Steps

1. Locate the Keyboard on your computer.
2. Open the latch and disconnect the Keyboard, keyboard backlit cables from the palmrest.
3. Remove the 22 (M2x2) screws that secure the keyboard to the chassis of your computer.
4. Lift the keyboard out of the computer.

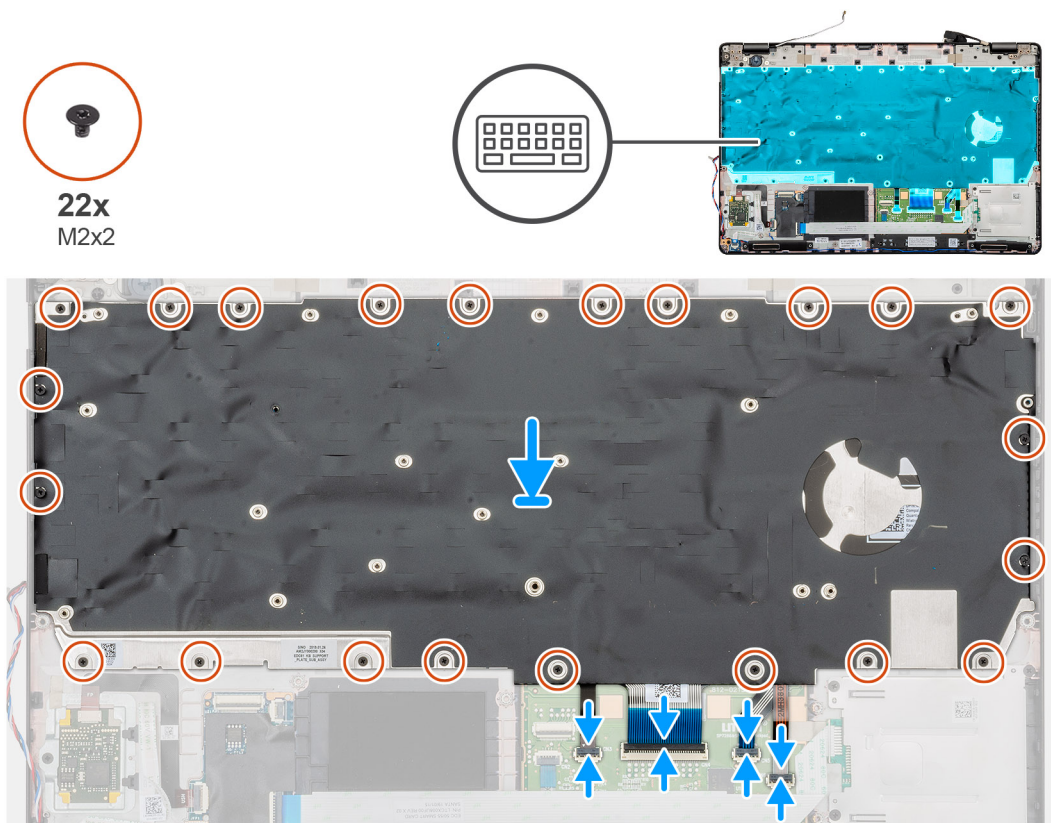
Installing the Keyboard

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the keyboard and provides a visual representation of the installation procedure.



Steps

1. Locate the Keyboard slot on your computer.
2. Align and place the keyboard into the slot on your computer.
3. Install the 22 (M2x2) screws that secure the keyboard to the chassis of the computer.
4. Connect the keyboard, keyboard backlit cables on to the connector on the palmrest.

Next steps

1. Install the [system board](#).
NOTE: System board can be removed with heatsink attached.
2. Install the [memory module](#)
3. Install the [inner frame](#).
4. Install the [WWAN card](#).
5. Install the [WLAN card](#).
6. Install the [HDD](#).
7. Install the [solid state drive](#).
8. Install the [battery](#).
9. Install the [base cover](#).
10. Follow the procedure in [After working inside your computer](#).

Keyboard bracket

Removing the keyboard bracket

Prerequisites

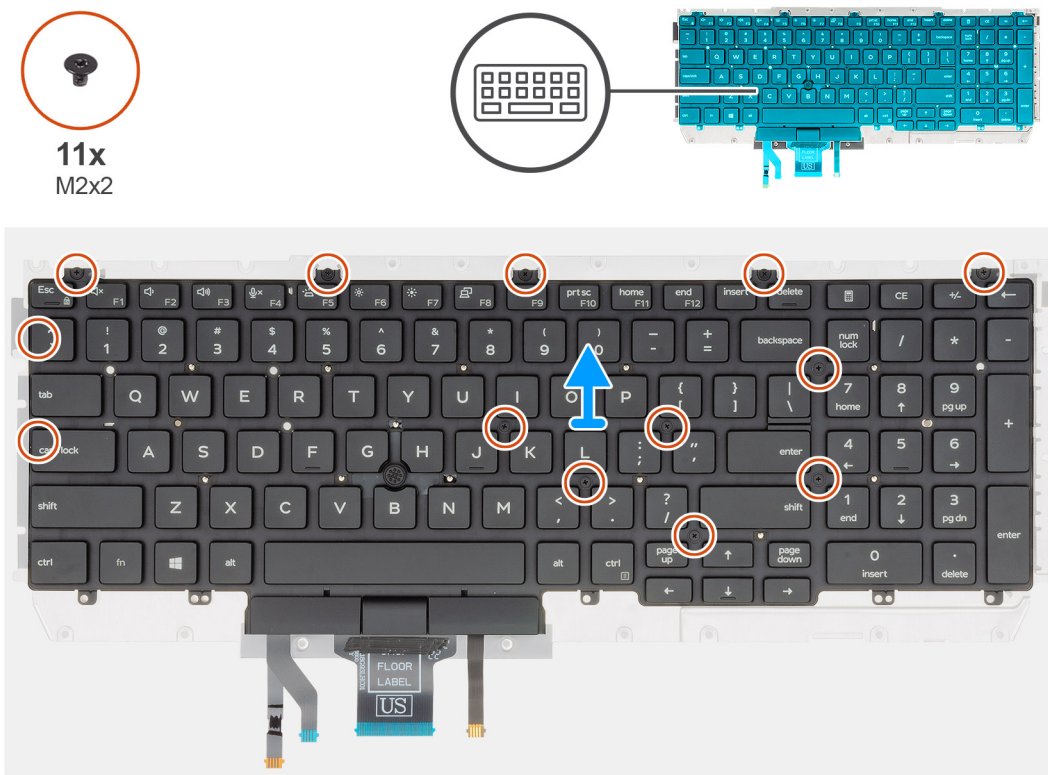
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).

3. Remove the [battery](#).
 4. Remove the [solid-state drive](#).
 5. Remove the [HDD](#).
 6. Remove the [WLAN card](#).
 7. Remove the [WWAN card](#).
 8. Remove the [inner frame](#).
 9. Remove the [memory module](#).
 10. Remove the [system board](#)
- i** **NOTE:** System board can be removed with heatsink attached.

11. Remove the [keyboard](#).

About this task

The figure indicates the location of the keyboard bracket and provides a visual representation of the removal procedure.



Steps

1. Locate the keyboard bracket on your computer.
2. Remove the eleven (M2x2) screws that secure the keyboard bracket to the keyboard assembly.
3. Lift the keyboard away from the keyboard bracket.

Installing the keyboard bracket

Prerequisites

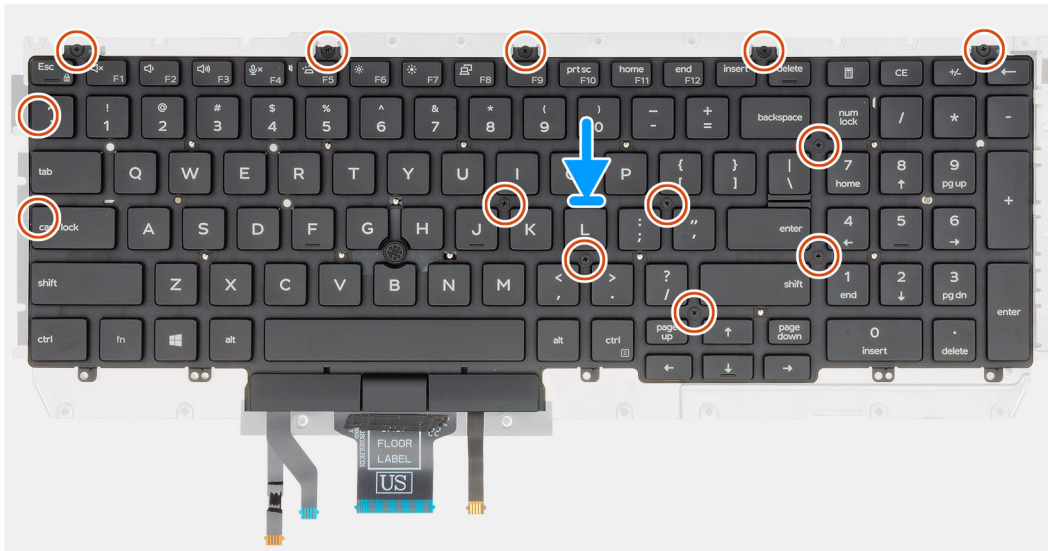
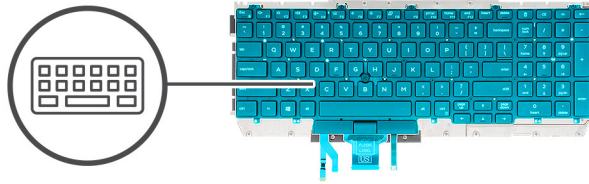
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the keyboard bracket and provides a visual representation of the installation procedure.



11x
M2x2



Steps

1. Locate the keyboard bracket slot on your computer.
2. Align and place the keyboard on the keyboard bracket.
3. Press down on the lattice at the snap points, in order to secure the keyboard assembly to the palmrest.

NOTE: The keyboard has multiple snap points on the lattice side which must be pushed down firmly after the keyboard is replaced.

4. Install the eleven (M2x2) screws to secure the keyboard to the keyboard bracket.

Next steps


1. Install the [keyboard](#).
2. Install the [system board](#).
NOTE: System board can be removed with heatsink attached.
3. Install the [memory module](#).
4. Install the [inner frame](#).
5. Install the [WWAN card](#).
6. Install the [WLAN card](#).
7. Install the [HDD](#).
8. Install the [solid state drive](#).
9. Install the [battery](#).
10. Install the [base cover](#).
11. Follow the procedure in [After working inside your computer](#).

Power button

Removing the power button with fingerprint reader

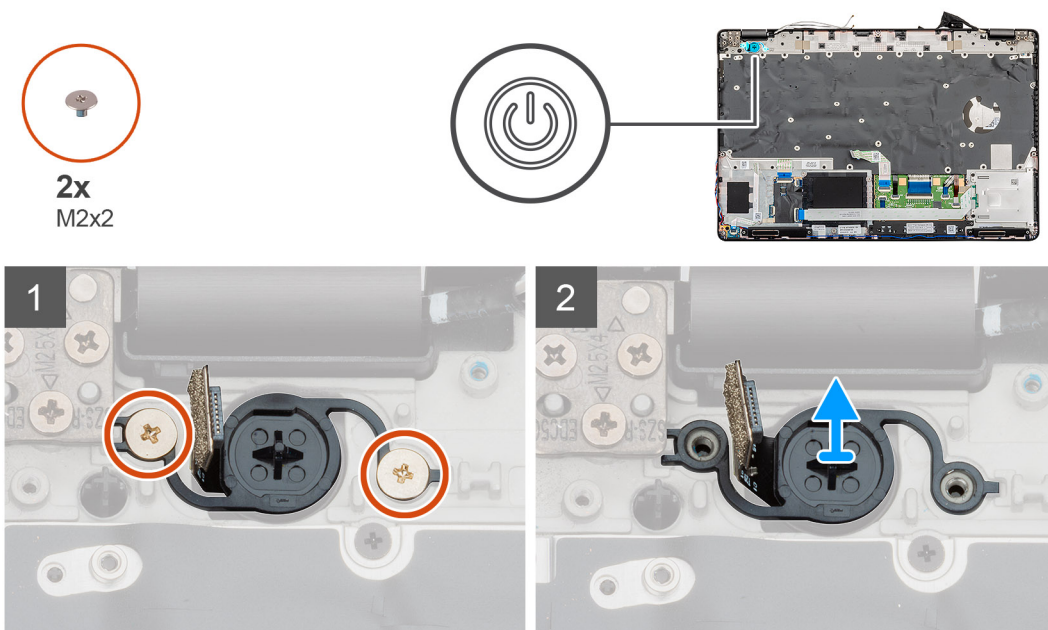
Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [solid state drive](#).
5. Remove the [HDD](#).
6. Remove the [WLAN card](#).
7. Remove the [WWAN card](#).
8. Remove the [inner frame](#).
9. Remove the [memory module](#).
10. Remove the [system board](#).

 **NOTE:** The system board can be removed along with the heat sink.

About this task

The figure indicates the location of the power button with fingerprint reader and provides a visual representation of the removal procedure.



Steps

1. Locate the power button with fingerprint reader on your computer.
2. Remove the two (M2x2) screws that secure the power button to chassis of your computer.
3. Lift the power button with fingerprint out of the computer.

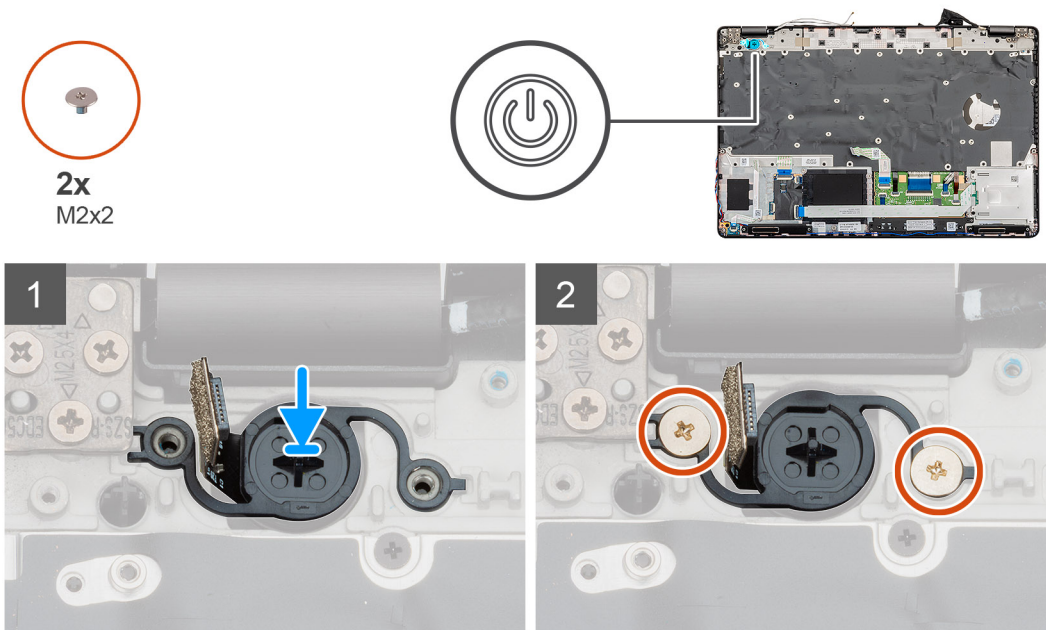
Installing the power button with fingerprint

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the power button with fingerprint and provides a visual representation of the installation procedure.



Steps

1. Locate the power button with fingerprint slot on your computer.
2. Align and place the power button with fingerprint into the slot on your computer.
3. Install the two (M2x2) screws that secure the power button to chassis of your computer.

Next steps

1. Install the [system board](#).
2. Install the [memory module](#).
3. Install the [inner frame](#).
4. Install the [WWAN card](#).
5. Install the [WLAN card](#).
6. Install the [HDD](#).
7. Install the [solid state drive](#).
8. Install the [battery](#).
9. Install the [base cover](#).
10. Follow the procedure in [After working inside your computer](#).

Display assembly

Removing the display assembly

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [WLAN card](#).
5. Remove the [WWAN card](#).

About this task

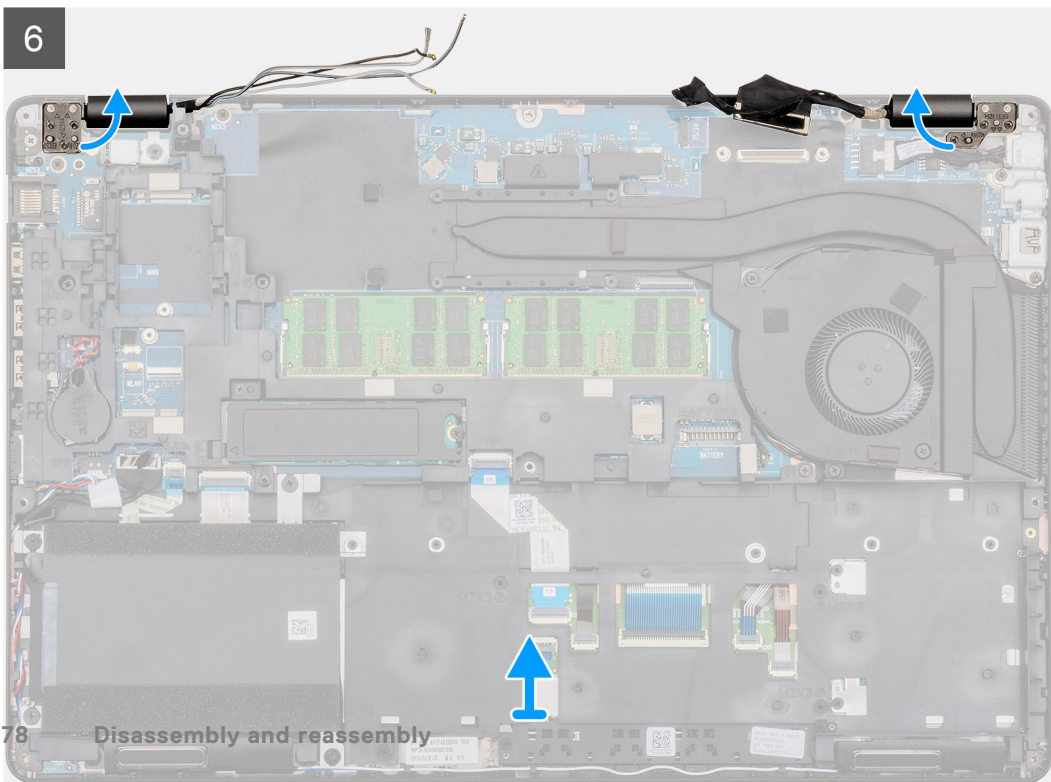
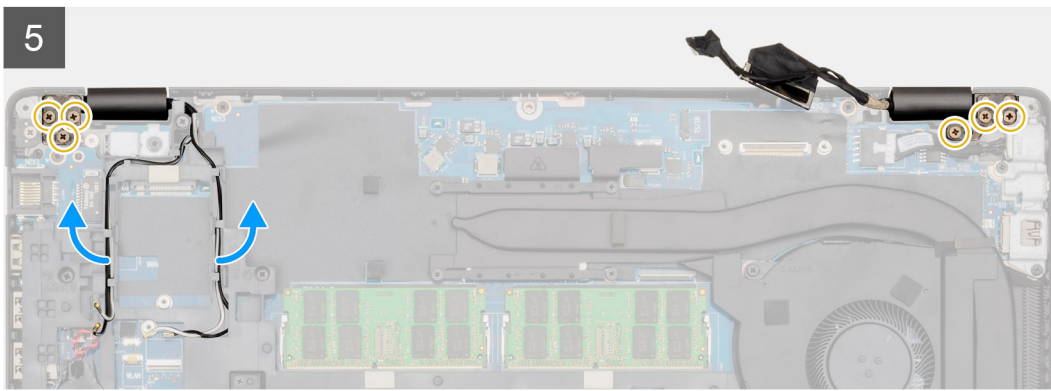
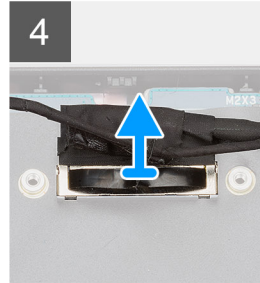
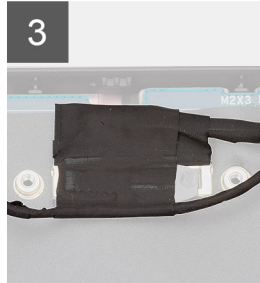
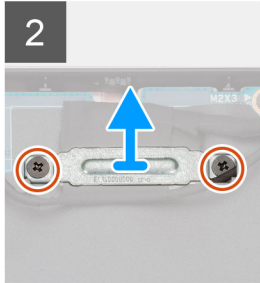
The figure indicates the location of the display assembly and provides a visual representation of the removal procedure.

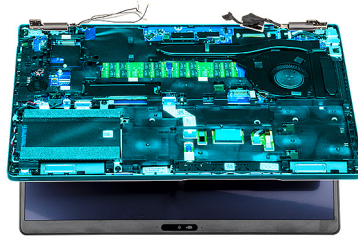


2x
M2x3

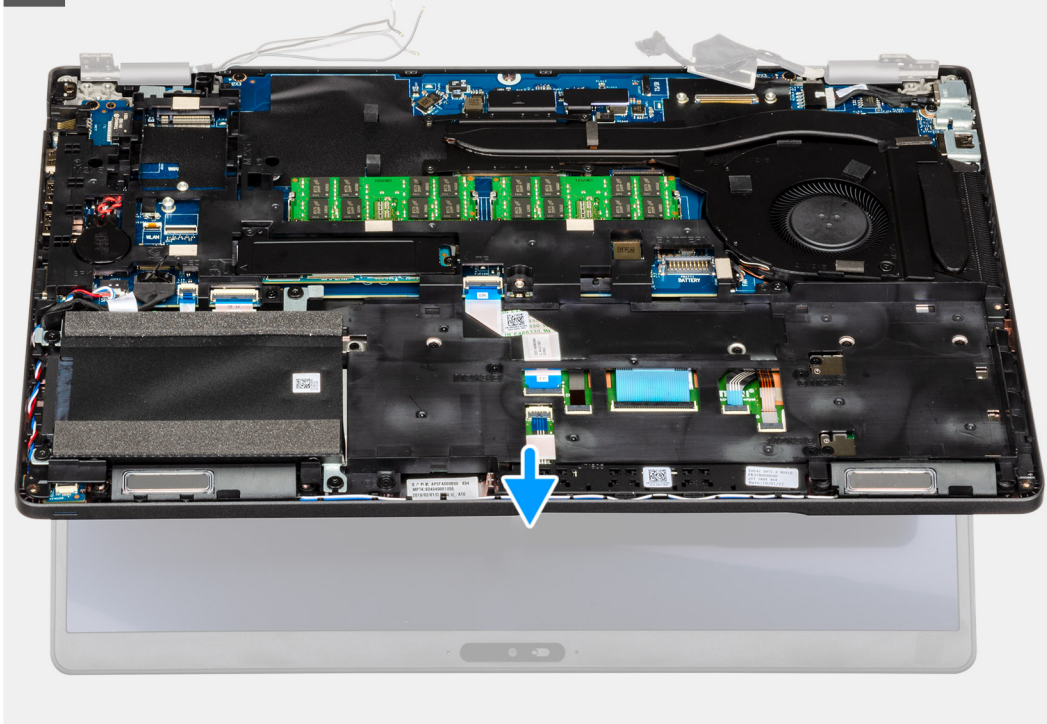


6x
M2.5x4





7



8



Steps

1. Locate the display cable, touchscreen cable and display hinges on your computer.
2. Peel back the tape and disconnect the touchscreen cable.
3. Remove the two (M2x3) screws that secure the EDP metal bracket to the computer.
4. Peel the tape that secures the display cable to the system board.
5. Open the latch and disconnect the display cable from the system board.
6. Unroute the WLAN and WWAN cables from the retention clips.
7. Remove the six (M2.5x4) screws that secure the display hinges to the chassis of your computer.
8. Open the display hinges at an angle of 90 degrees and slightly open the display.
9. Remove the palm-rest and keyboard assembly off the display assembly.

Installing the display assembly

Prerequisites

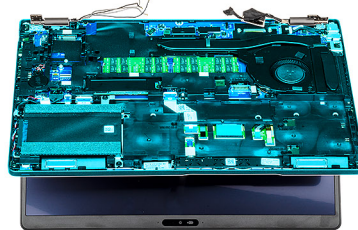
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

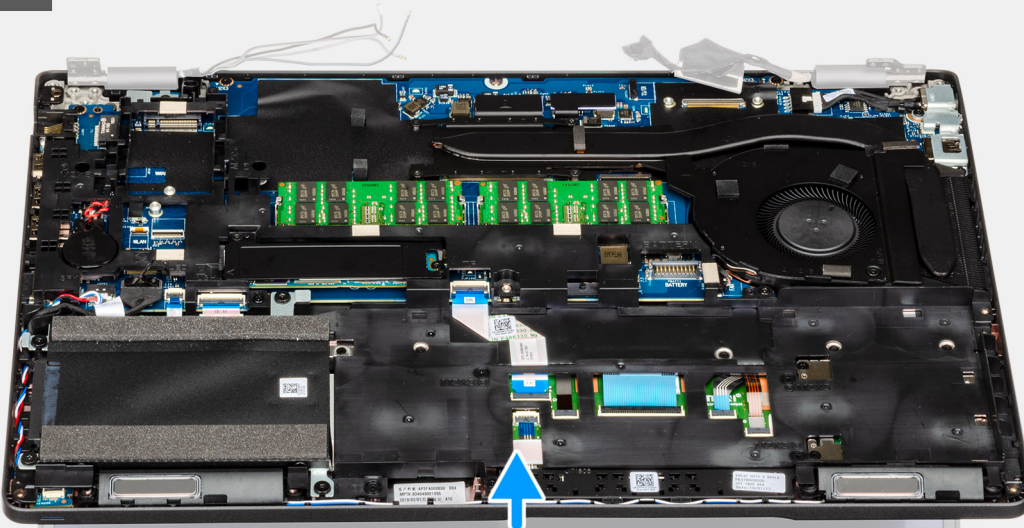
The figure indicates the location of the component and provides a visual representation of the installation procedure.

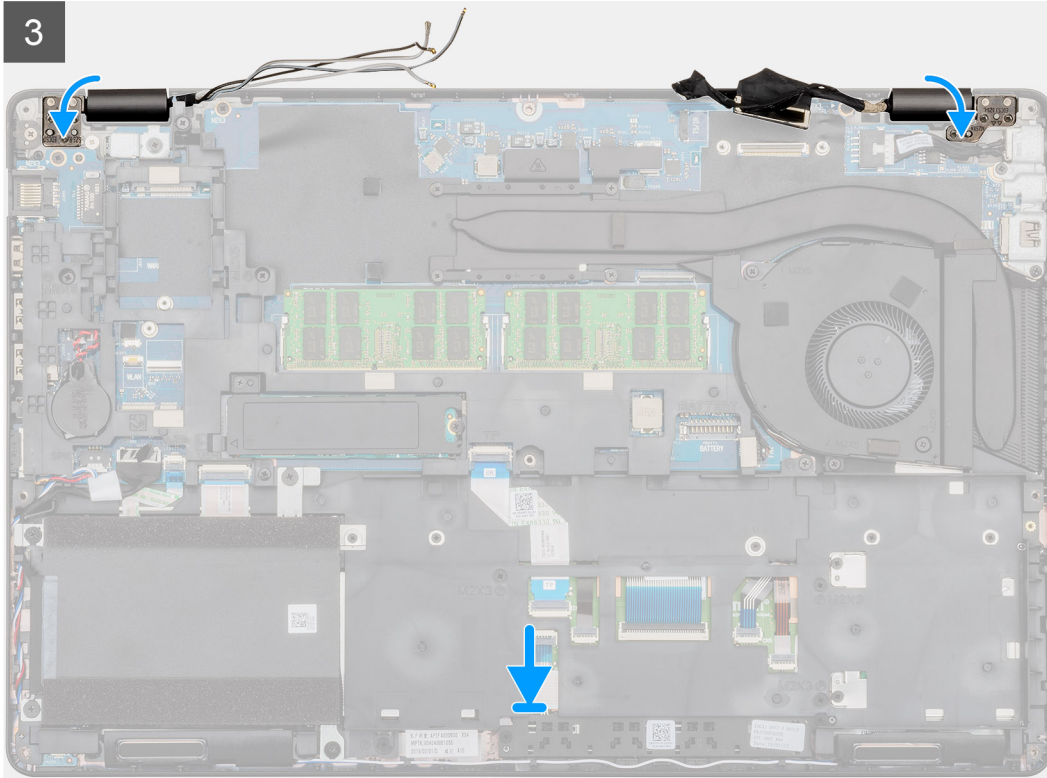
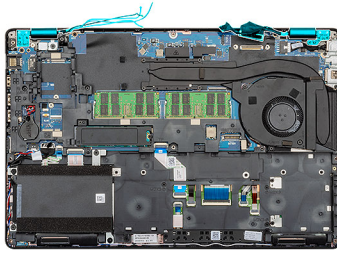


1



2

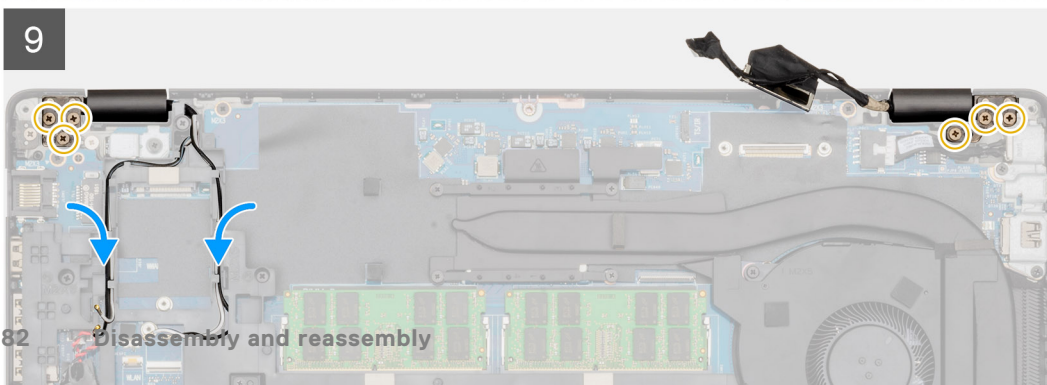
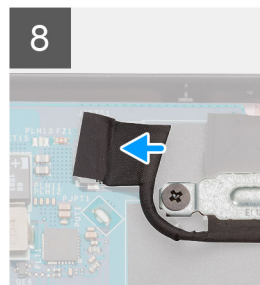
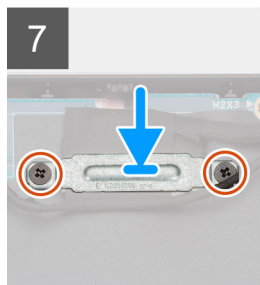
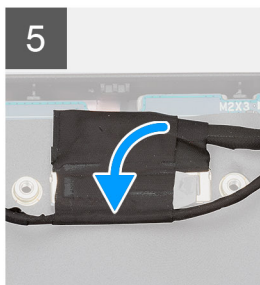
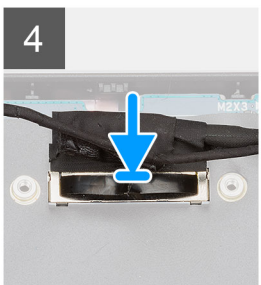
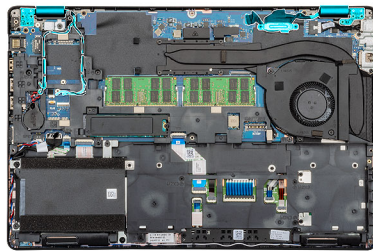




2x
M2x3



6x
M2.5x4



Steps

1. Place the display assembly on a clean and flat surface.
2. Align and place the palm-rest and keyboard assembly on the display assembly.
3. Using the alignment posts, close the display hinges.
4. Connect the display cable to the system board and adhere the tape to secure the display cable.
5. Place the EDP metal bracket on the display cable connector.
6. Replace the two (M2x3) screw to secure the EDP metal bracket to the system board.
7. Connect the touchscreen cable to the connector on the system board.
8. Replace the six (M2.5x4) screws that secure the display hinge to the chassis of the computer.
9. Route the WWAN cable and the WLAN cable through the retention clips provided.

Next steps

1. Install the [WWAN card](#).
2. Install the [WLAN card](#).
3. Install the [battery](#).
4. Install the [base cover](#).
5. Follow the procedure in [After working inside your computer](#).

Display bezel

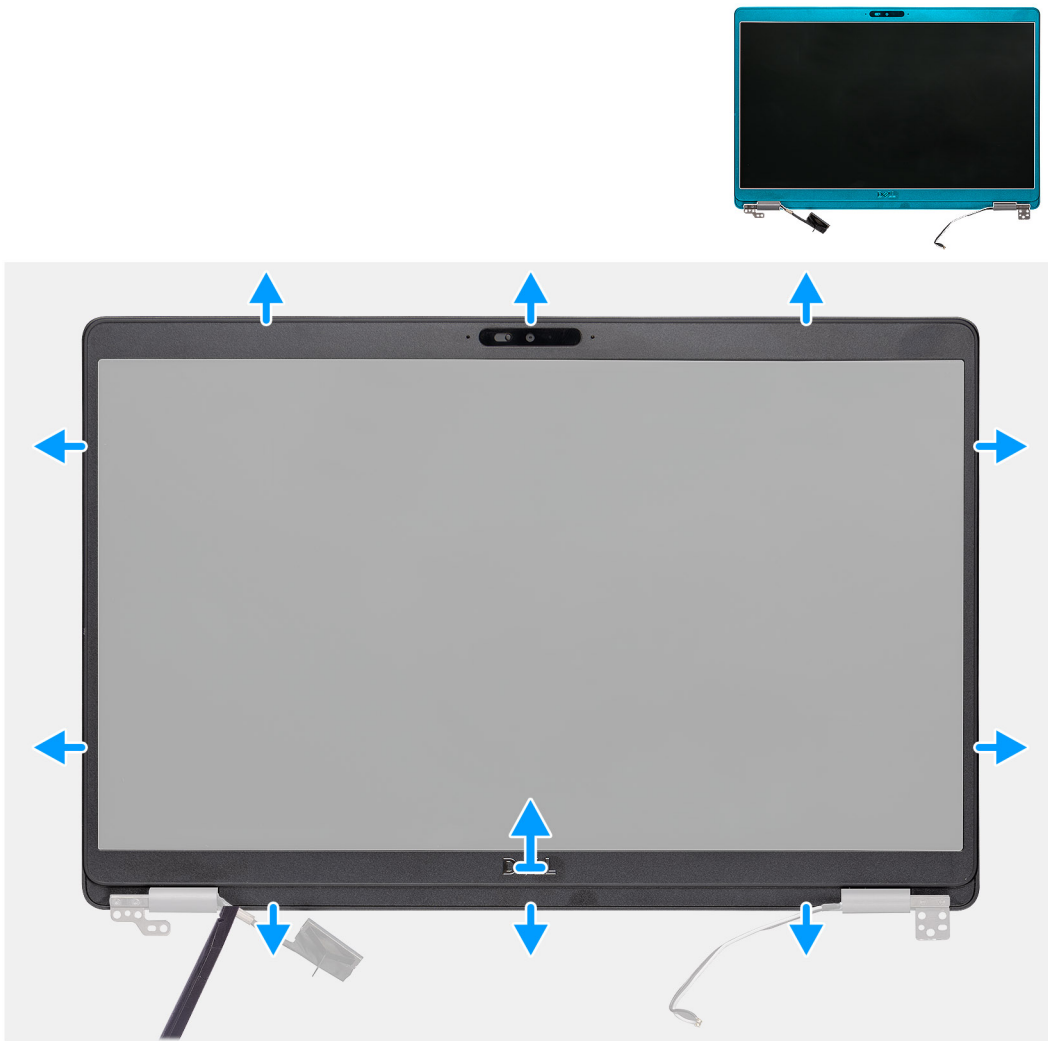
Removing the display bezel

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [WLAN card](#).
5. Remove the [WWAN card](#).
6. Remove the [display assembly](#).

About this task

The figure indicates the location of the display bezel and provides a visual representation of the removal procedure.



Steps

1. Use a plastic scribe to pry open the bottom edge of the display bezel beginning from the recesses near the hinges.
2. Work your way around the edges of the display bezel to release it from the display back cover and antenna assembly.
3. Remove the display bezel off the display back-cover and antenna assembly.

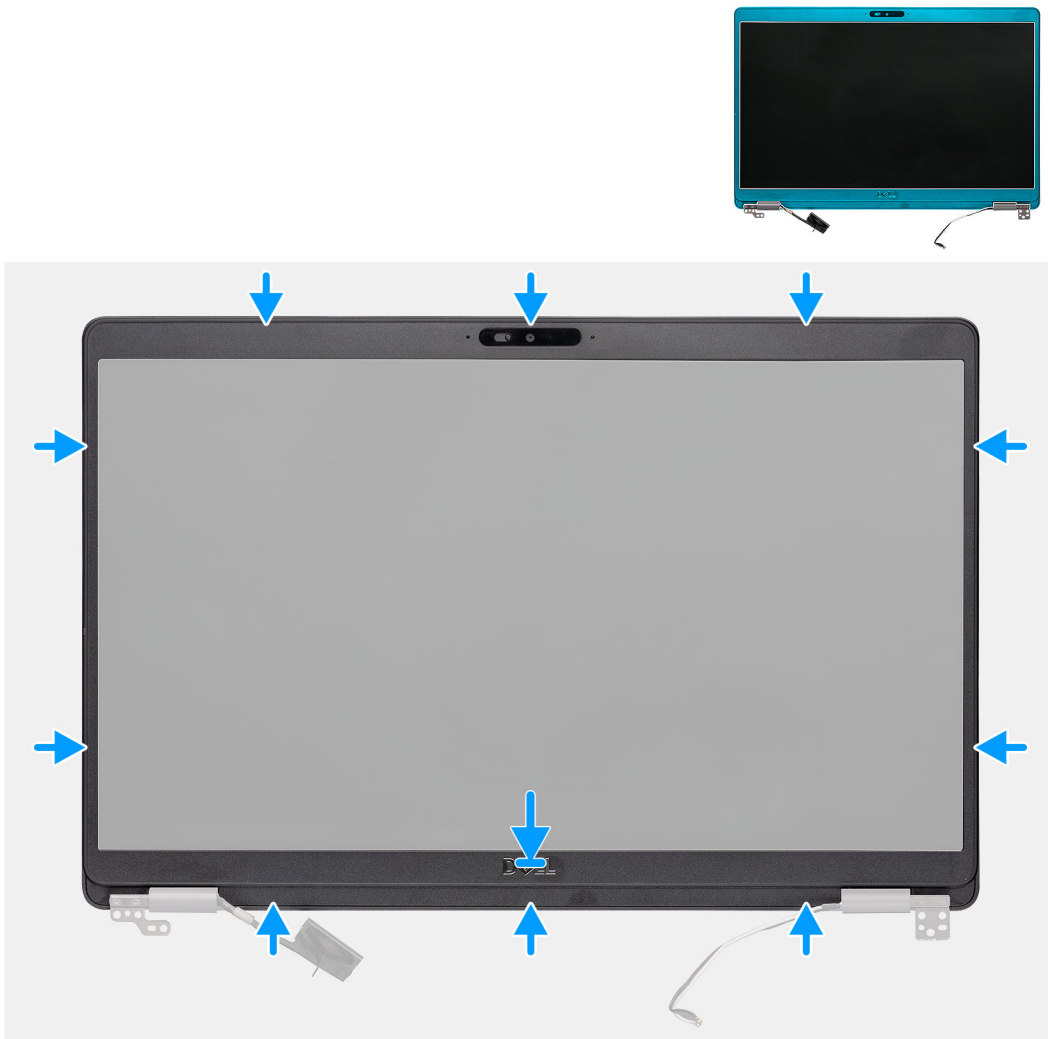
Installing the display bezel

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the display bezel and provides a visual representation of the installation procedure.



Steps

Align the display bezel with the display back-cover and antenna assembly, and gently snap the display bezel into place.

Next steps

1. Install the [display assembly](#).
2. Install the [WWAN card](#).
3. Install the [WLAN card](#).
4. Install the [battery](#).
5. Install the [base cover](#).
6. Follow the procedure in [After working inside your computer](#).

Hinge caps

Removing the hinge caps

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [display assembly](#).

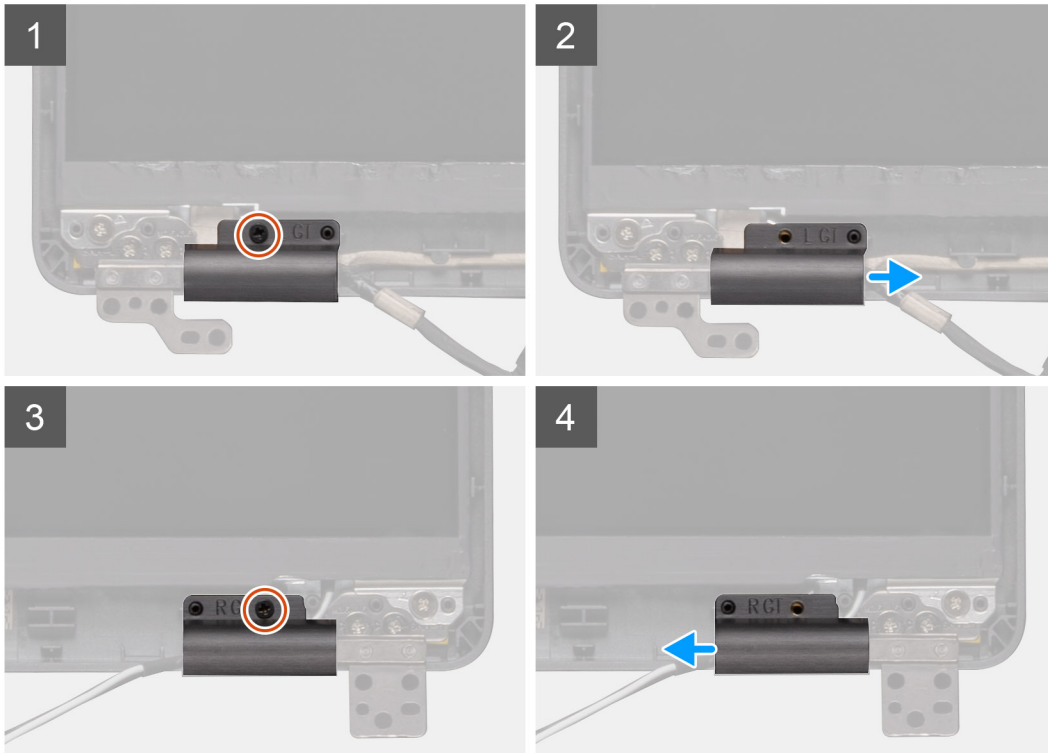
5. Remove the [display bezel](#).

About this task

The figure indicates the location of the hinge caps and provides a visual representation of the removal procedure.



2x
M2x2.5



Steps

1. Locate the hinge cap on the display back cover.
2. Remove the two (M2x2.5) screws that secure the hinge caps to the chassis.
3. Pinch the hinge caps to release the hinge caps from the ribs on the display back cover and then slide inwards to remove the hinge caps from the display hinge.

Installing the hinge caps

Prerequisites

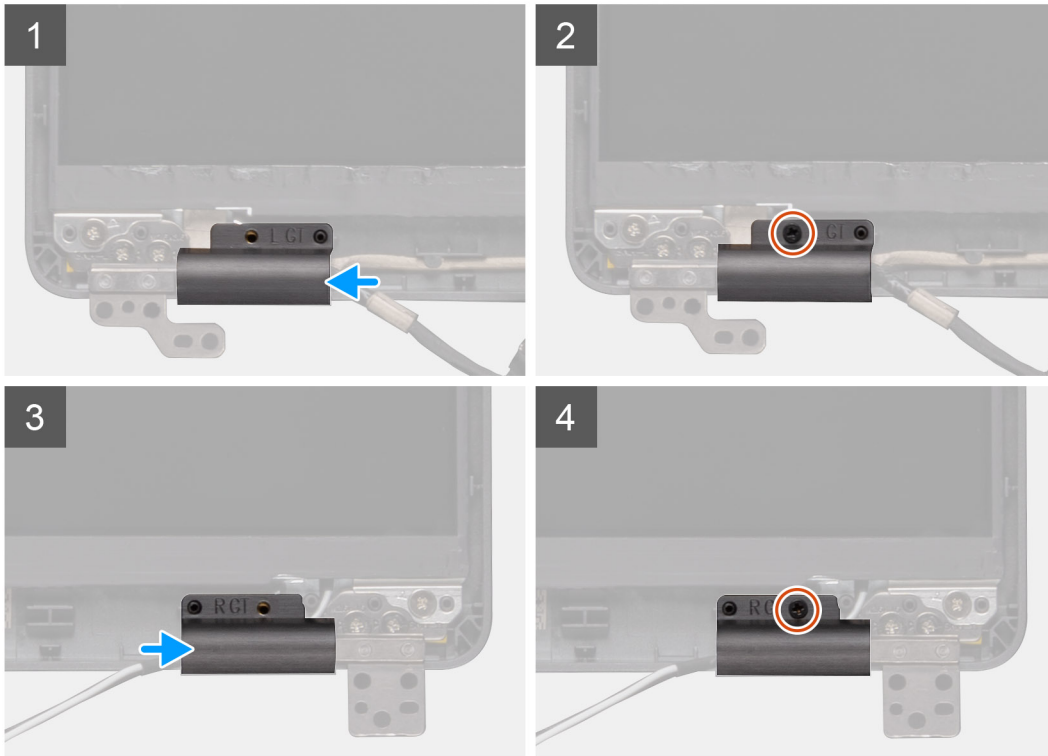
If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the hinge caps and provides a visual representation of the installation procedure.



2x
M2x2.5



Steps

1. Place the hinge caps and slide outward on the display hinges.
2. Replace the two (M2x2.5) screws to secure the hinge caps to the display hinge.

Next steps

1. Install the [display bezel](#).
2. Install the [display assembly](#).
3. Install the [WWAN card](#).
4. Install the [WLAN card](#).
5. Install the [battery](#).
6. Install the [base cover](#).
7. Follow the procedure in [After working inside your computer](#).

Display panel

Removing the display panel

Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).

3. Remove the [battery](#).
4. Remove the [WLAN card](#).
5. Remove the [WWAN card](#).
6. Remove the [display assembly](#).
7. Remove the [display bezel](#).
8. Remove the [hinge caps](#).

About this task

The figure indicates the location of the display panel and provides a visual representation of the removal procedure.



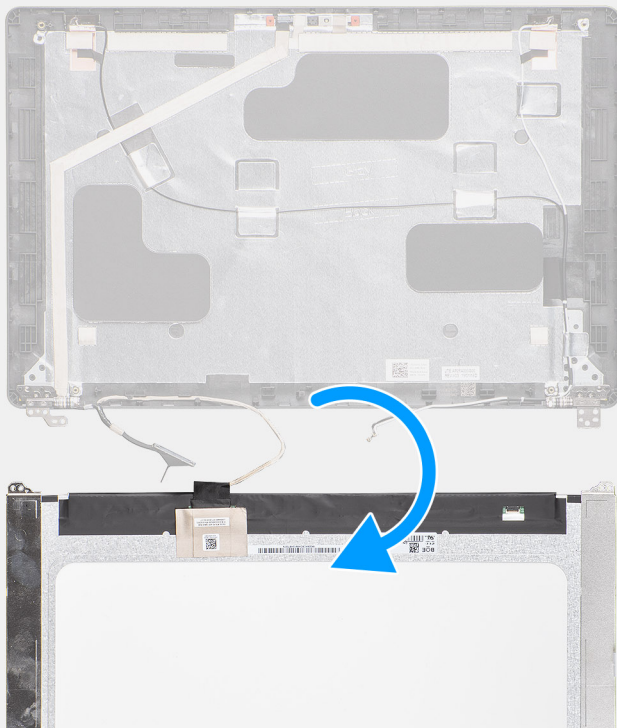
4x
M2.5x3.5

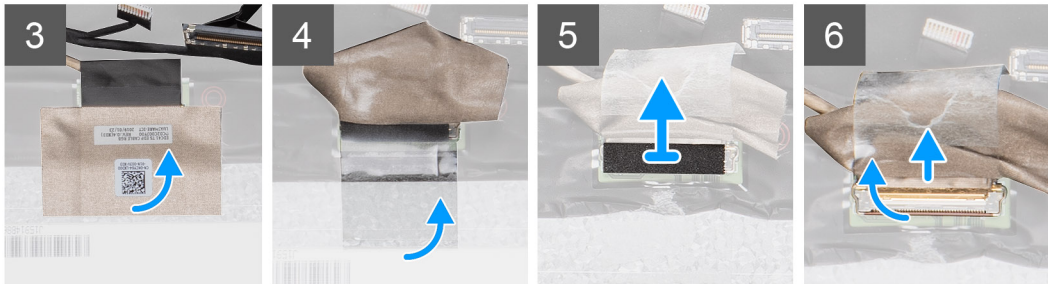


1



2





Steps

1. Locate the display panel on the display back cover assembly.
2. Remove the four (M2.5x3.5) screws that secure the display panel to the display assembly.
3. Lift to turn over the display panel to access the display cable.
4. Peel the conductive tape on the display cable connector.
5. Lift the latch and disconnect the display cable from the connector on the display panel.

NOTE: Do not pull and release the Stretch (SR) Tapes from the display panel. There is no need to separate the brackets from the display panel.

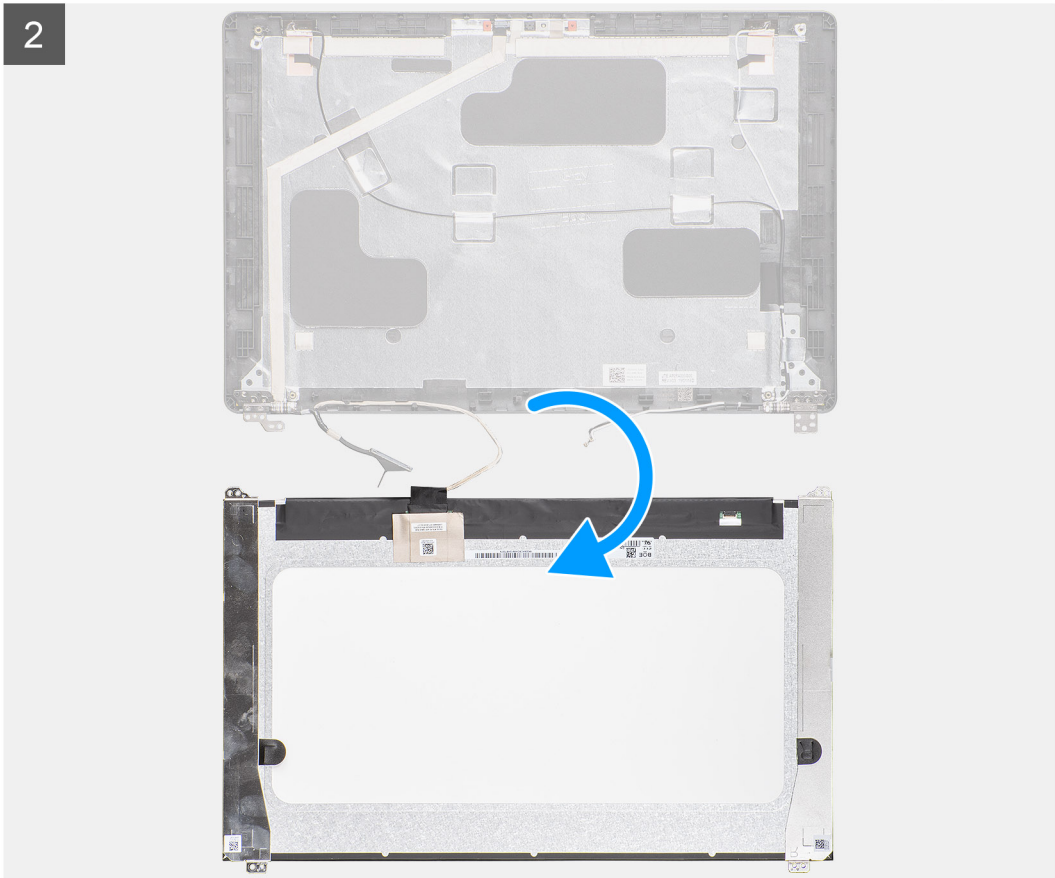
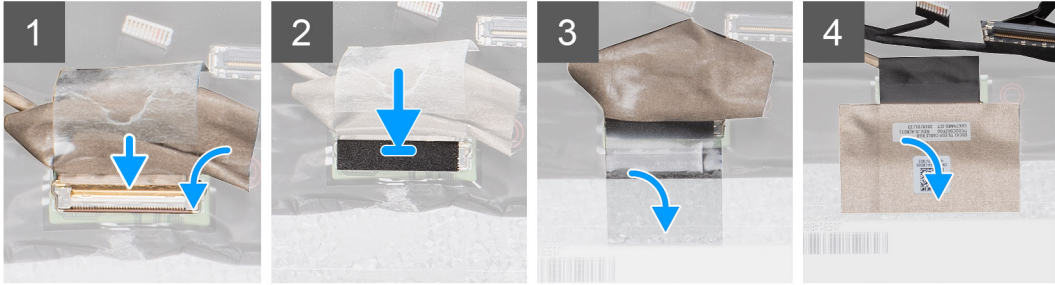
Installing the display panel

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the display panel and provides a visual representation of the installation procedure.



4x
M2.5x3.5



Disassembly and reassembly



Steps

1. Connect the display cable to the connector and close the latch.
2. Adhere the adhesive strip to secure the display cable connector.
3. Adhere the conductive tape to secure the display cable connector.
4. Replace the four (M2.5x3.5) screws that secure the display panel to the display assembly.

Next steps


1. Install the [hinge caps](#).
2. Install the [display bezel](#).
3. Install the [display assembly](#).
4. Install the [WWAN card](#).
5. Install the [WLAN card](#).
6. Install the [battery](#).
7. Install the [base cover](#).
8. Follow the procedure in [After working inside your computer](#).

Palmrest assembly

Removing the palm-rest and keyboard assembly

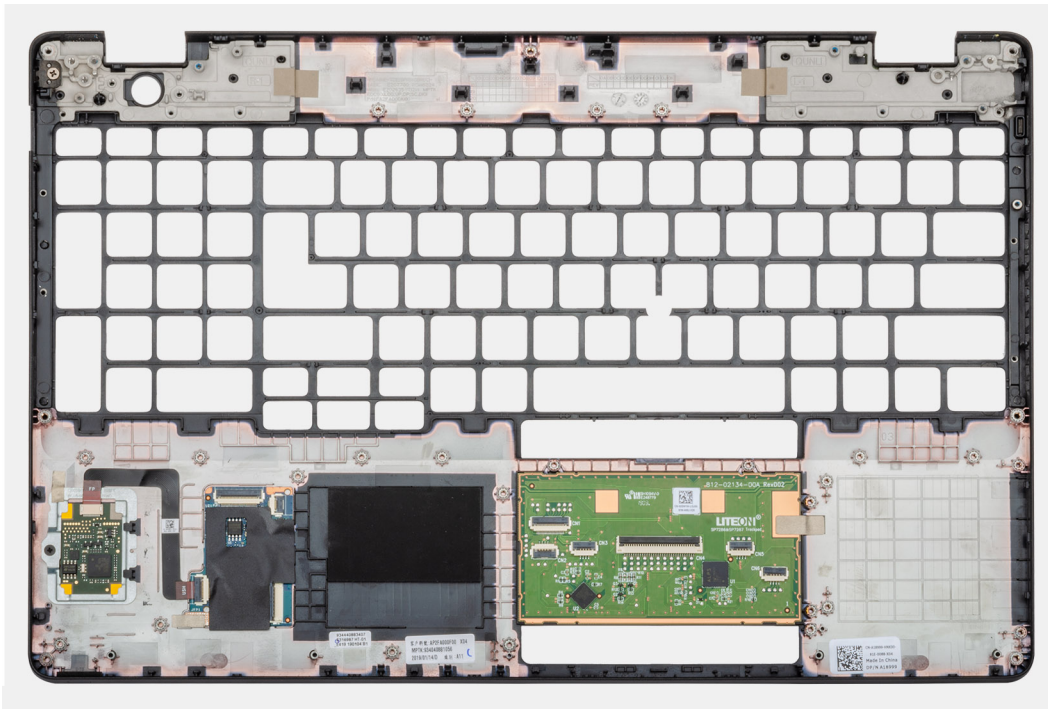
Prerequisites

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [solid state drive](#).
5. Remove the [HDD](#).
6. Remove the [WLAN card](#).
7. Remove the [WWAN card](#).
8. Remove the [inner frame](#).
9. Remove the [memory module](#).
10. Remove the [LED board](#).
11. Remove the [speakers](#).
12. Remove the [display assembly](#).
13. Remove the [power button with fingerprint reader](#).
14. Remove the [DC-in port](#).
15. Remove the [touchpad](#).
16. Remove the [system board](#).

 **NOTE:** The system board can be removed along with the heat sink.

About this task

The figure indicates the location of the palm-rest and keyboard assembly and provides a visual representation of the removal procedure.



Steps

After performing the steps in the pre-requisites, we are left with the palm-rest and keyboard assembly.

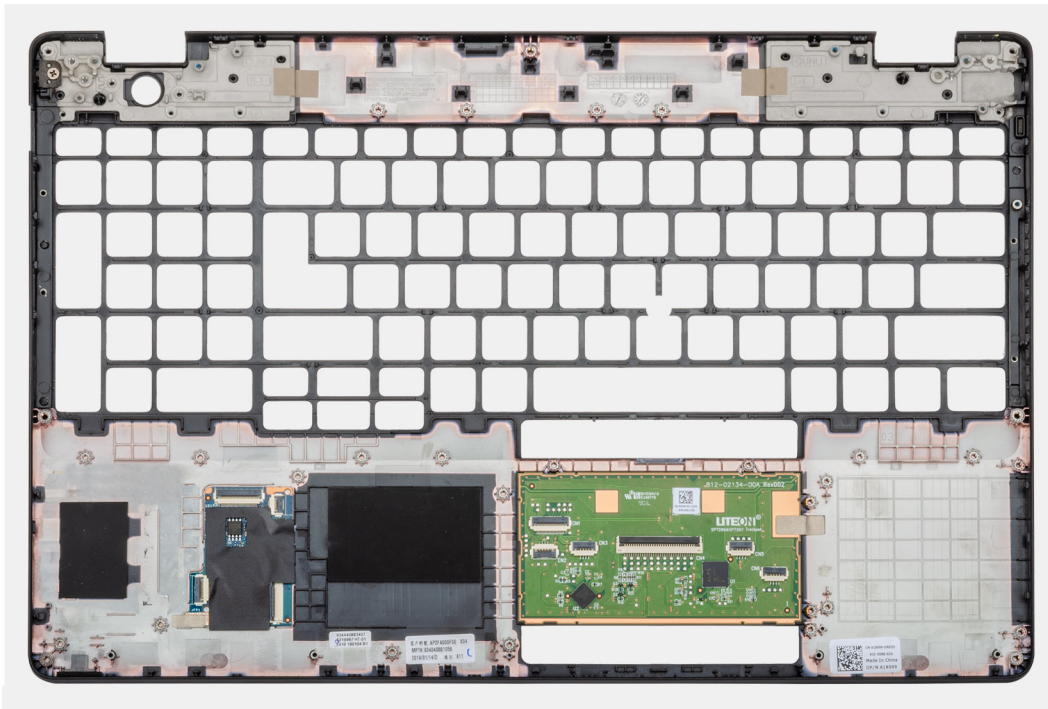
Installing the palm-rest and keyboard assembly

Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

About this task

The figure indicates the location of the palm-rest and keyboard assembly and provides a visual representation of the installation procedure.



Steps

Place the palm-rest and keyboard assembly on a flat surface.

Next steps

1. Install the [system board](#).
2. Install the [touchpad](#).
3. Install the [DC-in port](#).
4. Install the [power button with fingerprint reader](#).
5. Install the [display assembly](#).
6. Install the [speakers](#).
7. Install the [LED board](#).
8. Install the [memory module](#).
9. Install the [inner frame](#).
10. Install the [WWAN card](#).
11. Install the [WLAN card](#).
12. Install the [HDD](#).
13. Install the [solid state drive](#).
14. Install the [battery](#).
15. Install the [base cover](#).
16. Follow the procedure in [After working inside your computer](#).

BIOS Setup

CAUTION: Unless you are an expert computer user, do not change the settings in the BIOS Setup. Certain changes can make your computer work incorrectly.

NOTE: Depending on the computer and its installed devices, the items that are listed in this section may or may not be displayed.

NOTE: Before you change the settings in BIOS Setup, it is recommended that you note down the original settings for future reference.

Use BIOS Setup for the following purposes:

- Get information about the hardware installed in your computer, such as the amount of RAM and the size of the storage device.
- Change the system configuration information.
- Set or change a user-selectable option, such as the user password, type of hard drive installed, and enabling or disabling base devices.

Topics:

- [Boot menu](#)
- [BIOS overview](#)
- [Boot Sequence](#)
- [Entering BIOS Setup](#)
- [Navigation keys](#)
- [F12 One Time Boot menu](#)
- [System setup options](#)
- [Updating the BIOS](#)
- [System and setup password](#)
- [Clearing BIOS \(System Setup\) and System passwords](#)

Boot menu

Press <F12> when the Dell logo appears to initiate a one-time boot menu with a list of the valid boot devices for the system. Diagnostics and BIOS Setup options are also included in this menu. The devices listed on the boot menu depend on the bootable devices in the system. This menu is useful when you are attempting to boot to a particular device or to bring up the diagnostics for the system. Using the boot menu does not make any changes to the boot order stored in the BIOS.

The options are:

- UEFI Boot:
 - Windows Boot Manager
- Other Options:
 - BIOS Setup
 - BIOS Flash Update
 - Diagnostics
 - Change Boot Mode Settings

BIOS overview

The BIOS manages data flow between the computer's operating system and attached devices such as hard disk, video adapter, keyboard, mouse, and printer.

Boot Sequence

Boot sequence enables you to bypass the System Setup–defined boot device order and boot directly to a specific device (for example: optical drive or hard drive). During the Power-on Self-Test (POST), when the Dell logo appears, you can:

- Access System Setup by pressing F2 key
- Bring up the one-time boot menu by pressing F12 key.

The one-time boot menu displays the devices that you can boot from including the diagnostic option. The boot menu options are:

- Removable Drive (if available)
- STXXXX Drive
i **NOTE:** XXXX denotes the SATA drive number.
- Optical Drive (if available)
- SATA Hard Drive (if available)
- Diagnostics
i **NOTE:** Choosing **Diagnostics**, displays the **SupportAssist** screen.

The boot sequence screen also displays the option to access the System Setup screen.

Entering BIOS Setup

Steps

1. Turn on your computer.
2. Press F2 immediately to enter the BIOS Setup.

i **NOTE:** If you wait too long and the operating system logo appears, continue to wait until you see the desktop. Then, turn off your computer and try again.

Navigation keys

i **NOTE:** For most of the System Setup options, changes that you make are recorded but do not take effect until you restart the computer.

Table 4. Navigation keys

Keys	Navigation
Up arrow	Moves to the previous field.
Down arrow	Moves to the next field.
Enter	Selects a value in the selected field (if applicable) or follows the link in the field.
Spacebar	Expands or collapses a drop-down list, if applicable.
Tab	Moves to the next focus area. i NOTE: For the standard graphical user interface only.
Esc	Moves to the previous page until you view the main screen. Pressing Esc in the main screen displays a message that prompts you to save any unsaved changes and restart the computer.

F12 One Time Boot menu

To enter the One Time Boot menu, turn on your computer, and then press F12 immediately.

i **NOTE:** It is recommended to shut down the computer, if it is on.

The F12 One Time Boot menu displays the devices that you can boot from including the diagnostic option. The boot menu options are:

- Removable Drive (if available)
- STXXXX Drive (if available)

i **NOTE:** XXX denotes the SATA drive number.

- Optical Drive (if available)
- SATA Hard Drive (if available)
- Diagnostics

The boot sequence screen also displays the option to access System Setup.

System setup options

i **NOTE:** Depending on the and its installed devices, the items that are listed in this section may or may not appear.

General options

Table 5. General

Option	Description
System Information	Displays the following information: <ul style="list-style-type: none">• System Information: Displays BIOS Version, Service Tag, Asset Tag, Ownership Tag, Manufacture Date, Ownership Date, and the Express Service Code.• Memory Information: Displays Memory Installed, Memory Available, Memory Speed, Memory Channel Mode, Memory Technology, DIMM A size, and DIMM B size• Processor Information: Displays Processor Type, Core Count, Processor ID, Current Clock Speed, Minimum Clock Speed, Maximum Clock Speed, Processor L2 Cache, Processor L3 Cache, HT Capable, and 64-Bit Technology.• Device Information: Displays Primary HDD, M.2 PCIe SSD-0, LOM MAC Address, Video Controller, Video BIOS Version, Video Memory, Panel type, Native Resolution, Audio Controller, Wi-Fi Device, and Bluetooth Device.
Battery Information	Displays the battery status health and whether the AC adapter is installed.
Boot Sequence	Allows you to specify the order in which the computer attempts to find an operating system from the devices specified in this list.
UEFI Boot Path Security	This option controls whether or not the system will prompt the user to enter the Admin password when booting a UEFI boot path from the F12 Boot Menu. <ul style="list-style-type: none">• Always, Except Internal HDD—Default• Always, Except Internal HDD&PXE• Always• Never
Date/Time	Allows you to set the date and time settings. Changes to the system date and time take effect immediately.

System information

Table 6. System Configuration

Option	Description
Integrated NIC	Allows you to configure the on-board LAN controller. <ul style="list-style-type: none"> • Disabled = The internal LAN is off and not visible to the operating system. • Enabled = The internal LAN is enabled. • Enabled w/PXE = The internal LAN is enabled (with PXE boot) (selected by default)
SATA Operation	Allows you to configure the operating mode of the integrated hard drive controller. <ul style="list-style-type: none"> • Disabled = The SATA controllers are hidden • AHCI = SATA is configured for AHCI mode • RAID ON = SATA is configured to support RAID mode (selected by default)
Drives	Allows you to enable or disable the various drives on-board: <ul style="list-style-type: none"> • SATA-2 (enabled by default) • M.2 PCIe SSD-0 (enabled by default)
Smart Reporting	This field controls whether hard drive errors for integrated drives are reported during system startup. The Enable Smart Reporting option is disabled by default.
USB Configuration	Allows you to enable or disable the integrated USB controller for: <ul style="list-style-type: none"> • Enable USB Boot Support • Enable External USB Port All the options are enabled by default.
Thunderbolt Adapter Configuration	This section allows Thunderbolt Adapter Configuration. <ul style="list-style-type: none"> • Thunderbolt-is enabled by default • Enable Thunderbolt Boot Support-is disabled • No security-is disabled • User configuration-enabled by default • Secure connect-is disabled • Display port and USB Only-is disabled
USB PowerShare	This option configures the USB PowerShare feature behavior. <ul style="list-style-type: none"> • Enable USB PowerShare - disabled by default This feature is intended to allow users to power or charge external devices, such as phones and portable music players, using the stored system battery power through the USB PowerShare port on the notebook, while the notebook is in a sleep state.
Audio	Allows you to enable or disable the integrated audio controller. The option Enable Audio is selected by default. <ul style="list-style-type: none"> • Enable Microphone • Enable Internal Speaker Both the options are selected by default.
Keyboard Illumination	This field lets you choose the operating mode of the keyboard illumination feature. The keyboard brightness level can be set from 0% to 100%. The options are: <ul style="list-style-type: none"> • Disabled • Dim • Bright-enabled by default
Keyboard Backlight Timeout on AC	The Keyboard Backlight Timeout dims out with AC option. The main keyboard illumination feature is not affected. Keyboard Illumination will continue to support the various illumination levels. This field has an effect when the backlight is enabled. The options are: <ul style="list-style-type: none"> • 5 sec • 10 sec-enabled by default


Table 6. System Configuration (continued)

Option	Description
	<ul style="list-style-type: none"> • 15 sec • 30 sec • 1 min • 5 min • 15 min • Never
Keyboard Backlight Timeout on Battery	<p>The Keyboard Backlight Timeout dims out with the Battery option. The main keyboard illumination feature is not affected. Keyboard illumination will continue to support the various illumination levels. This field has an effect when the backlight is enabled. The options are:</p> <ul style="list-style-type: none"> • 5 sec • 10 sec-enabled by default • 15 sec • 30 sec • 1 min • 5 min • 15 min • Never
Unobtrusive Mode	<ul style="list-style-type: none"> • Enable Unobtrusive Mode (disabled by default) <p>When enabled pressing Fn+Shift+B will turn off all light and sound emissions in the system. Press Fn+Shift+B to resume normal operation.</p>
Miscellaneous Devices	<p>Allows you to enable or disable the following devices:</p> <ul style="list-style-type: none"> • Enable Camera (enabled by default) • Enable Hard Drive Free Fall Protection(enabled by default) • Enable Secure Digital (SD) Card (enabled by default) • Secure Digital (SD) Card Boot • Secure Digital (SD) Card Read-Only Mode
MAC Address Pass-Through	<ul style="list-style-type: none"> • System Unique MAC Address (disabled by default) • Integrated NIC 1 MAC Address • Disabled <p>The feature replaces the external NIC MAC address (in a supported dock or dongle) with the selected MAC address from the system. The default option is to use the Passthrough MAC address.</p>

Video

Option	Description
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LCD Brightness	Allows you to set the display brightness depending up on the power source—On Battery and On AC. The LCD brightness is independent for battery and AC adapter. It can be set using the slider.
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 **NOTE:** The video setting is visible only when a video card is installed into the system.

Security

Table 7. Security

Option	Description
Admin Password	Allows you to set, change, and delete the admin password.

Table 7. Security (continued)


Option	Description
System Password	Allows you to set, change, and delete the system password.
Internal HDD-2 Password	This option lets you set, change, or delete the password on the system's internal hard disk drive (HDD).
Strong Password	This option lets you enable or disable strong passwords for the system.
Password Configuration	Allows you to control the minimum and maximum number of characters allowed for a administrative password and the system password. The range of characters is between 4 and 32.
Password Bypass	<p>This option lets you bypass the System (Boot) Password and the internal HDD password prompts during a system restart.</p> <ul style="list-style-type: none"> ● Disabled — Always prompt for the system and internal HDD password when they are set. This option is enabled by default. ● Reboot Bypass — Bypass the password prompts on Restarts (warm boots). <p>i NOTE: The system will always prompt for the system and internal HDD passwords when powered on from the off state (a cold boot). Also, the system will always prompt for passwords on any module bay HDDs that may be present.</p>
Password Change	<p>This option lets you determine whether changes to the System and Hard Disk passwords are permitted when an administrator password is set.</p> <p>Allow Non-Admin Password Changes - This option is enabled by default.</p>
UEFI Capsule Firmware Updates	This option controls whether this system allows BIOS updates via UEFI capsule update packages. This option is selected by default. Disabling this option will block BIOS updates from services such as Microsoft Windows Update and Linux Vendor Firmware Service (LVFS)
TPM 2.0 Security	<p>Allows you to control whether the Trusted Platform Module (TPM) is visible to the operating system.</p> <ul style="list-style-type: none"> ● TPM On (default) ● Clear ● PPI Bypass for Enable Commands ● PPI Bypass for Disable Commands ● PPI Bypass for Clear Commands ● Attestation Enable (default) ● Key Storage Enable (default) ● SHA-256 (default) <p>Choose any one option:</p> <ul style="list-style-type: none"> ● Disabled ● Enabled (default)
Absolute	<p>This field lets you Enable, Disable or Permanently Disable the BIOS module interface of the optional Absolute Persistence Module service from Absolute Software.</p> <ul style="list-style-type: none"> ● Enabled - This option is selected by default. ● Disabled ● Permanently Disabled
OROM Keyboard Access	<p>This option determines whether users are able to enter Option ROM configuration screen via hotkeys during boot.</p> <ul style="list-style-type: none"> ● Enabled (default) ● Disabled ● One Time Enable
Admin Setup Lockout	Allows you to prevent users from entering Setup when Admin password is set. This option is not set by default.
Master Password Lockout	Allows you to disable master password support Hard Disk passwords need to be cleared before the settings can be changed. This option is not set by default.

Table 7. Security (continued)

Option	Description
SMM Security Mitigation	Allows you to enable or disable additional UEFI SMM Security Mitigation protections. This option is not set by default.

Secure boot

Table 8. Secure Boot

Option	Description
Secure Boot Enable	Allows you to enable or disable Secure Boot feature <ul style="list-style-type: none"> Secure Boot Enable Option is not selected.
Secure Boot Mode	Allows you to modify the behavior of Secure Boot to allow evaluation or enforcement of UEFI driver signatures. <ul style="list-style-type: none"> Deployed Mode (default) Audit Mode
Expert key Management	Allows you to manipulate the security key databases only if the system is in Custom Mode. The Enable Custom Mode option is disabled by default. The options are: <ul style="list-style-type: none"> PK (default) KEK db dbx If you enable the Custom Mode , the relevant options for PK, KEK, db, and dbx appear. The options are: <ul style="list-style-type: none"> Save to File- Saves the key to a user-selected file Replace from File- Replaces the current key with a key from a user-selected file Append from File- Adds a key to the current database from a user-selected file Delete- Deletes the selected key Reset All Keys- Resets to default setting Delete All Keys- Deletes all the keys <p> NOTE: If you disable the Custom Mode, all the changes made will be erased and the keys will restore to default settings.</p>

Intel Software Guard Extensions

Table 9. Intel Software Guard Extensions

Option	Description
Intel SGX Enable	This field specifies you to provide a secured environment for running code/storing sensitive information in the context of the main OS. Click one of the following options: <ul style="list-style-type: none"> Disabled Enabled Software controlled—Default
Enclave Memory Size	This option sets SGX Enclave Reserve Memory Size Click one of the following options: <ul style="list-style-type: none"> 32 MB 64 MB 128 MB—Default

Performance

Table 10. Performance

Option	Description
Multi Core Support	<p>This field specifies whether the process has one or all cores enabled. The performance of some applications improves with the additional cores.</p> <ul style="list-style-type: none"> • All—Default • 1 • 2 • 3
Intel SpeedStep	<p>Allows you to enable or disable the Intel SpeedStep mode of processor.</p> <ul style="list-style-type: none"> • Enable Intel SpeedStep <p>This option is set by default.</p>
C-States Control	<p>Allows you to enable or disable the additional processor sleep states.</p> <ul style="list-style-type: none"> • C states <p>This option is set by default.</p>
Intel TurboBoost	<p>Allows you to enable or disable the Intel TurboBoost mode of the processor.</p> <ul style="list-style-type: none"> • Enable Intel TurboBoost <p>This option is set by default.</p>
Hyper-Thread Control	<p>Allows you to enable or disable the HyperThreading in the processor.</p> <ul style="list-style-type: none"> • Disabled • Enabled—Default

Power management

Option	Description
AC Behavior	<p>Allows you to enable or disable the computer from turning on automatically when an AC adapter is connected.</p> <p>Default setting: Wake on AC is not selected.</p>
Enable Intel Speed Shift Technology	<ul style="list-style-type: none"> • Enable Intel Speed Shift Technology <p>Default setting: Enabled</p>
Auto On Time	<p>Allows you to set the time at which the computer must turn on automatically. The options are:</p> <ul style="list-style-type: none"> • Disabled • Every Day • Weekdays • Select Days <p>Default setting: Disabled</p>
USB Wake Support	<p>Allows you to enable USB devices to wake the system from Standby.</p>

Option	Description
	<p>i NOTE: This feature is only functional when the AC power adapter is connected. If the AC power adapter is removed during Standby, the system setup removes power from all the USB ports to conserve battery power.</p> <ul style="list-style-type: none"> • Enable USB Wake Support
Wireless Radio Control	<p>If Enabled, this feature will sense the connection of the system to a wired network and subsequently disable the selected wireless radios (WLAN and/ or WWAN).</p> <ul style="list-style-type: none"> • Control WLAN radio - is disabled
Wake on LAN	<p>Allows you to enable or disable the feature that powers on the computer from the Off state when triggered by a LAN signal.</p> <ul style="list-style-type: none"> • Disabled • LAN Only • LAN with PXE Boot <p>Default setting: Disabled</p>
Block Sleep	<p>This option lets you to block entering to sleep in OS environment. When enabled system won't go to sleep.</p> <p>Block Sleep - is disabled</p>
Peak Shift	<p>This option enables you to minimize the AC power consumption during the peak power times of day. After you enable this option, your system runs only in battery even if the AC is attached.</p> <ul style="list-style-type: none"> • Enable peak shift—is disabled • Set battery threshold (15% to 100%) - 15 % (enabled by default)
Advanced Battery Charge Configuration	<p>This option enables you to maximize the battery health. By enabling this option, your system uses the standard charging algorithm and other techniques, during the non work hours to improve the battery health.</p> <p>Enable Advanced Battery Charge Mode- is disabled</p>
Primary Battery Charge Configuration	<p>Allows you to select the charging mode for the battery. The options are:</p> <ul style="list-style-type: none"> • Adaptive—enabled by default • Standard—Fully charges your battery at a standard rate. • ExpressCharge—The battery charges over a shorter time using Dell's fast charging technology. • Primarily AC use • Custom <p>If Custom Charge is selected, you can also configure Custom Charge Start and Custom Charge Stop.</p> <p>i NOTE: All charging mode may not be available for all the batteries. To enable this option, disable the Advanced Battery Charge Configuration option.</p>

POST behavior

Option	Description
Adapter Warnings	<p>Allows you to enable or disable the system setup (BIOS) warning messages when you use certain power adapters.</p> <p>Default setting: Enable Adapter Warnings</p>
Numlock Enable	<p>Allows you to enable the Numlock option when the computer boots.</p> <p>Enable Network. This option is enabled by default.</p>
Fn Lock Options	<p>Allows you to let hot key combinations Fn + Esc toggle the primary behavior of F1–F12, between their standard and secondary functions. If you disable this option, you cannot toggle dynamically the primary behavior of these keys. The available options are:</p> <ul style="list-style-type: none"> • Fn Lock—enabled by default • Lock Mode Enable/Secondary—enabled by default

Option	Description
	<ul style="list-style-type: none"> • Lock Mode Disable/Standard
Fastboot	<p>Allows you to speed up the boot process by bypassing some of the compatibility steps. The options are:</p> <ul style="list-style-type: none"> • Minimal • Thorough—enabled by default • Auto
Extended BIOS POST Time	<p>Allows you to create an extra preboot delay. The options are:</p> <ul style="list-style-type: none"> • 0 seconds—enabled by default. • 5 seconds • 10 seconds
Full Screen Log	<ul style="list-style-type: none"> • Enable Full Screen Logo—not enabled
Warnings and errors	<ul style="list-style-type: none"> • Prompt on warnings and errors—enabled by default • Continue on warnings • Continue on warnings and errors

Manageability

Option	Description
Intel AMT Capability	<p>Allows you to provision AMT and MEBx Hotkey function is enabled during the system boot.</p> <ul style="list-style-type: none"> • Disabled • Enabled - by default • Restrict MEBx Access
USB Provision	<p>When enabled Intel AMT can be provisioned using the local provisioning file using a USB storage device.</p> <ul style="list-style-type: none"> • Enable USB Provision - disabled by default
MEBX Hotkey	<p>Allows you to specify whether the MEBx Hotkey function should be enabled during the system boot.</p> <ul style="list-style-type: none"> • Enable MEBx hotkey—enabled by default

Virtualization support

Option	Description
Virtualization	<p>This field specifies whether a virtual Machine Monitor (VMM) can utilize the conditional hardware capabilities provided by Intel Virtualization Technology.</p> <p>Enable Intel Virtualization Technology—enabled by default.</p>
VT for Direct I/O	<p>Enables or disables the Virtual Machine Monitor (VMM) from utilizing the additional hardware capabilities provided by Intel® Virtualization technology for direct I/O.</p> <p>Enable VT for Direct I/O - enabled by default.</p>
Trusted Execution	<p>This option specifies whether a Measured Virtual Machine Monitor (MVMM) can utilize the additional hardware capabilities provided by Intel Trusted Execution Technology. The TPM Virtualization Technology, and the Virtualization technology for direct I/O must be enabled to use this feature.</p> <p>Trusted Execution - disabled by default.</p>

Wireless

Option Description

Wireless Device Enable	Allows you to enable or disable the internal wireless devices. <ul style="list-style-type: none">• WLAN• Bluetooth All the options are enabled by default.
-------------------------------	---

Maintenance screen

Option Description

Service Tag	Displays the Service Tag of your computer.
Asset Tag	Allows you to create a system asset tag if an asset tag is not already set. This option is not set by default.
BIOS Downgrade	This controls flashing of the system firmware to previous revisions. Option 'Allow BIOS downgrade' is enabled by default.
Data Wipe	This field allows users to erase the data securely from all internal storage devices. Option 'Wipe on Next boot' is not enabled by default. The following is list of devices affected: <ul style="list-style-type: none">• Internal SATA HDD/SSD• Internal M.2 SATA SDD• Internal M.2 PCIe SSD• Internal eMMC
BIOS Recovery	This field allows you to recover from certain corrupted BIOS conditions from a recover file on the user primary hard drive or an external USB key. <ul style="list-style-type: none">• BIOS Recovery from Hard Drive—enabled by default• Always perform integrity check—disabled by default
First Power On Date	This option lets you set Ownership date. <ul style="list-style-type: none">• Set Ownership Date—disabled by default

System logs


Option Description

BIOS Events	Allows you to view and clear the System Setup (BIOS) POST events.
Thermal Events	Allows you to view and clear the System Setup (Thermal) events.
Power Events	Allows you to view and clear the System Setup (Power) events.


Updating the BIOS

Updating the BIOS in Windows

About this task

 **CAUTION:** If BitLocker is not suspended before updating the BIOS, the next time you reboot the computer it will not recognize the BitLocker key. You will then be prompted to enter the recovery key to progress, and the computer will ask for this on each reboot. If the recovery key is not known this can result in data loss or an unnecessary operating system reinstall. For more information about this subject, search in the Knowledge Base Resource at [Dell Support Site](#).

Steps


1. Go to [Dell Support Site](#).
2. Click **Product support**. In the **Search support** box, enter the Service Tag of your computer, and then click **Search**.
 **NOTE:** If you do not have the Service Tag, use the SupportAssist feature to automatically identify your computer. You can also use the product ID or manually browse for your computer model.
3. Click **Drivers & Downloads**. Expand **Find drivers**.
4. Select the operating system installed on your computer.
5. In the **Category** drop-down list, select **BIOS**.
6. Select the latest version of BIOS, and click **Download** to download the BIOS file for your computer.
7. After the download is complete, browse the folder where you saved the BIOS update file.
8. Double-click the BIOS update file icon and follow the on-screen instructions.
For more information, search in the Knowledge Base Resource at [Dell Support Site](#).

Updating the BIOS in Linux and Ubuntu

To update the system BIOS on a computer that is installed with Linux or Ubuntu, see the knowledge base article [000131486](#) at [Dell Support Site](#).

Updating the BIOS using the USB drive in Windows

About this task

 **CAUTION:** If BitLocker is not suspended before updating the BIOS, the next time you reboot the computer it will not recognize the BitLocker key. You will then be prompted to enter the recovery key to progress, and the computer will ask for this on each reboot. If the recovery key is not known this can result in data loss or an unnecessary operating system reinstall. For more information about this subject, search in the Knowledge Base Resource at [Dell Support Site](#).


Steps

1. Follow the procedure from step 1 to step 6 in [Updating the BIOS in Windows](#) to download the latest BIOS setup program file.
2. Create a bootable USB drive. For more information, search in the Knowledge Base Resource at [Dell Support Site](#).
3. Copy the BIOS setup program file to the bootable USB drive.
4. Connect the bootable USB drive to the computer that needs the BIOS update.
5. Restart the computer and press **F12**.
6. Select the USB drive from the **One Time Boot Menu**.
7. Type the BIOS setup program filename and press **Enter**.
The **BIOS Update Utility** appears.
8. Follow the on-screen instructions to complete the BIOS update.

Updating the BIOS from the F12 One-Time boot menu

Update your computer BIOS using the BIOS update.exe file that is copied to a FAT32 USB drive and booting from the F12 One-Time boot menu.


About this task

 **CAUTION:** If BitLocker is not suspended before updating the BIOS, the next time you reboot the computer it will not recognize the BitLocker key. You will then be prompted to enter the recovery key to progress, and the computer will ask for this on each reboot. If the recovery key is not known this can result in data loss or an unnecessary operating system reinstall. For more information about this subject, search in the Knowledge Base Resource at [Dell Support Site](#).

BIOS Update

You can run the BIOS update file from Windows using a bootable USB drive or you can also update the BIOS from the F12 One-Time boot menu on the computer.

Most of the Dell computers built after 2012 have this capability, and you can confirm by booting your computer to the F12 One-Time Boot Menu to see if BIOS FLASH UPDATE is listed as a boot option for your computer. If the option is listed, then the BIOS supports this BIOS update option.


 **NOTE:** Only computers with the BIOS Flash Update option in the F12 One-Time boot menu can use this function.

Updating from the One-Time boot menu

To update your BIOS from the F12 One-Time boot menu, you need the following:

- USB drive formatted to the FAT32 file system (key does not have to be bootable)
- BIOS executable file that you downloaded from the Dell Support website and copied to the root of the USB drive
- AC power adapter that is connected to the computer
- Functional computer battery to flash the BIOS

Perform the following steps to perform the BIOS update flash process from the F12 menu:

 **CAUTION:** Do not turn off the computer during the BIOS update process. The computer may not boot if you turn off your computer.

Steps

1. From a turn off state, insert the USB drive where you copied the flash into a USB port of the computer.
2. Turn on the computer and press F12 to access the One-Time Boot Menu, select BIOS Update using the mouse or arrow keys then press Enter.
The flash BIOS menu is displayed.
3. Click **Flash from file**.
4. Select an external USB device.
5. Select the file and double-click the flash target file, and then click **Submit**.
6. Click **Update BIOS**. The computer restarts to flash the BIOS.
7. The computer will restart after the BIOS update is completed.

System and setup password


Table 11. System and setup password

Password type	Description
System password	Password that you must enter to log in to your system.
Setup password	Password that you must enter to access and make changes to the BIOS settings of your computer.

You can create a system password and a setup password to secure your computer.

 **CAUTION:** The password features provide a basic level of security for the data on your computer.

 **CAUTION:** Anyone can access the data that is stored on your computer, when not locked and left unattended.

 **NOTE:** System and setup password feature is disabled.

Assigning a system setup password

Prerequisites

You can assign a new **System or Admin Password** only when the status is in **Not Set**.

About this task

To enter the system setup, press F12 immediately after a power-on or reboot.

Steps

1. In the **System BIOS** or **System Setup** screen, select **Security** and press Enter.
The **Security** screen is displayed.
2. Select **System/Admin Password** and create a password in the **Enter the new password** field.
Use the following guidelines to assign the system password:
 - A password can have up to 32 characters.
 - At least one special character: ! " # \$ % & ' () * + , - . / : ; < = > ? @ [\] ^ _ ` { | }
 - Numbers 0 through 9.
 - Upper case letters from A to Z.
 - Lower case letters from a to z.
3. Type the system password that you entered earlier in the **Confirm new password** field and click **OK**.
4. Press Esc and save the changes as prompted by the pop-up message.
5. Press Y to save the changes.
The computer restarts.

Deleting or changing an existing system setup password


Prerequisites

Ensure that the **Password Status** is Unlocked (in the System Setup) before attempting to delete or change the existing System and/or Setup password. You cannot delete or change an existing System or Setup password, if the **Password Status** is Locked.

About this task

To enter the System Setup, press F2 immediately after a power-on or reboot.


Steps

1. In the **System BIOS** or **System Setup** screen, select **System Security** and press Enter.
The **System Security** screen is displayed.
2. In the **System Security** screen, verify that the Password Status is **Unlocked**.
3. Select **System Password**, update, or delete the existing system password, and press Enter or Tab.
4. Select **Setup Password**, update, or delete the existing setup password, and press Enter or Tab.
 **NOTE:** If you change the System and/or Setup password, reenter the new password when prompted. If you delete the System and/or Setup password, confirm the deletion when prompted.
5. Press Esc. A message prompts you to save the changes.
6. Press Y to save the changes and exit from System Setup.
The computer restarts.

Clearing BIOS (System Setup) and System passwords

About this task

To clear the computer or BIOS passwords, contact Dell technical support as described at [Contact Support at Dell Support Site](#).

-  **NOTE:** For information about how to reset Windows or application passwords, see the documentation accompanying Windows or your application.

Troubleshooting

Topics:

- [Handling swollen rechargeable Li-ion batteries](#)
- [Dell SupportAssist Pre-boot System Performance Check diagnostics](#)
- [Built-in self-test \(BIST\)](#)
- [System diagnostic lights](#)
- [Real-Time Clock \(RTC Reset\)](#)
- [Recovering the operating system](#)
- [Backup media and recovery options](#)
- [Wi-Fi power cycle](#)
- [Drain residual flea power \(perform hard reset\)](#)
- [LED Indicators and Characteristics](#)

Handling swollen rechargeable Li-ion batteries

Like most laptops, Dell laptops use Lithium-ion batteries. One type of Lithium-ion battery is the rechargeable Li-ion battery. Rechargeable Li-ion batteries have increased in popularity in recent years and have become standard in the electronics industry due to customer preferences for a slim form factor (especially with newer ultra-thin laptops) and long battery life. Inherent to rechargeable Li-ion battery technology is the potential for swelling of the battery cells.

A swollen battery may impact the performance of the laptop. To prevent possible further damage to the device enclosure or internal components leading to malfunction, discontinue the use of the laptop and discharge it by disconnecting the AC adapter and letting the battery drain.

Swollen batteries should not be used and should be replaced and disposed of properly. We recommend contacting Dell product support for options to replace a swollen battery under the terms of the applicable warranty or service contract, including options for replacement by a Dell authorized service technician.

The guidelines for handling and replacing rechargeable Li-ion batteries are as follows:

- Exercise caution when handling rechargeable Li-ion batteries.
- Discharge the battery before removing it from the system. To discharge the battery, unplug the AC adapter from the system and operate the system only on battery power. When the system will no longer turn on when the power button is pressed, the battery is fully discharged.
- Do not crush, drop, mutilate, or penetrate the battery with foreign objects.
- Do not expose the battery to high temperatures, or disassemble battery packs and cells.
- Do not apply pressure to the surface of the battery.
- Do not bend the battery.
- Do not use tools of any type to pry on or against the battery.
- If a battery gets stuck in a device as a result of swelling, do not try to free it as puncturing, bending, or crushing a battery can be dangerous.
- Do not attempt to reassemble a damaged or swollen battery into a laptop.
- Swollen batteries that are covered under warranty should be returned to Dell in an approved shipping container (provided by Dell)—this is to comply with transportation regulations. Swollen batteries that are not covered under warranty should be disposed of at an approved recycling center. Contact Dell product support at [Dell Support Site](#) for assistance and further instructions.
- Using a non-Dell or incompatible battery may increase the risk of fire or explosion. Replace the battery only with a compatible battery purchased from Dell that is designed to work with your Dell computer. Do not use a battery from other computers with your computer. Always purchase genuine batteries from [Dell Site](#) or otherwise directly from Dell.


Rechargeable Li-ion batteries can swell for various reasons such as age, number of charge cycles, or exposure to high heat. For more information about how to improve the performance and lifespan of the laptop battery and to minimize the possibility of occurrence of the issue, search Dell Laptop Battery in the Knowledge Base Resource at [Dell Support Site](#).

Dell SupportAssist Pre-boot System Performance Check diagnostics

About this task

SupportAssist diagnostics (also known as system diagnostics) performs a complete check of your hardware. The Dell SupportAssist Pre-boot System Performance Check diagnostics is embedded with the BIOS and launched by the BIOS internally. The embedded system diagnostics provides options for particular devices or device groups allowing you to:

- Run tests automatically or in an interactive mode.
- Repeat the tests.
- Display or save test results.
- Run thorough tests to introduce additional test options to provide extra information about one or more failed devices.
- View status messages that inform you the tests are completed successfully.
- View error messages that inform you of problems encountered during testing.

 **NOTE:** Some tests for specific devices require user interaction. Always ensure that you are present at the computer terminal when the diagnostic tests are performed.

For more information, see the knowledge base article [000180971](#).

Running the SupportAssist Pre-Boot System Performance Check


Steps

1. Turn on your computer.
2. As the computer boots, press the F12 key as the Dell logo appears.
3. On the boot menu screen, select the **Diagnostics** option.
4. Click the arrow at the bottom left corner.
Diagnostics front page is displayed.
5. Click the arrow in the lower-right corner to go to the page listing.
The items that are detected are listed.
6. To run a diagnostic test on a specific device, press Esc and click **Yes** to stop the diagnostic test.
7. Select the device from the left pane and click **Run Tests**.
8. If there are any issues, error codes are displayed.
Note the error code and validation number and contact Dell.


Built-in self-test (BIST)

M-BIST

M-BIST (Built In Self-Test) is the system board built-in self-test diagnostics tool that improves the diagnostics accuracy of system board Embedded Controller (EC) failures.

 **NOTE:** M-BIST can be manually initiated before Power On Self-Test (POST).

How to run M-BIST

 **NOTE:** M-BIST must be initiated on the computer from a power-off state that is either connected to AC power or with a battery only.

1. Press and hold both the **M** key on the keyboard and the **power button** to initiate M-BIST.
2. The battery indicator LED may exhibit two states:
 - a. OFF: No fault was detected with the system board.
 - b. AMBER: Amber indicates a problem with the system board.

- If there is a failure with the system board, the battery status LED flashes one of the following error codes for 30 seconds:

Table 12. LED error codes

Blinking Pattern		Possible Problem
Amber	White	
2	1	CPU Failure
2	8	LCD Power Rail Failure
1	1	TPM Detection Failure
2	4	Memory/RAM failure

- If there is no failure with the system board, the LCD cycles through the solid color screens that are described in the LCD-BIST section for 30 seconds and then turn off.

LCD Power rail test (L-BIST)

L-BIST is an enhancement to the single LED error code diagnostics and is automatically initiated during POST. L-BIST will check the LCD power rail. If there is no power being supplied to the LCD (that is if the L-BIST circuit fails), the battery status LED flashes either an error code [2,8] or an error code [2,7].

NOTE: If L-BIST fails, LCD-BIST cannot function as no power will be supplied to the LCD.

How to invoke the L-BIST Test:

- Press the power button to start the computer.
- If the computer does not start up normally, look at the battery status LED:
 - If the battery status LED flashes an error code [2,7], the display cable may not be connected properly.
 - If the battery status LED flashes an error code [2,8], there is a failure on the LCD power rail of the system board, hence there is no power that is supplied to the LCD.
- For cases, when a [2,7] error code is shown, check to see if the display cable is properly connected.
- For cases when a [2,8] error code is shown, replace the system board.

LCD Built-in Self-Test (BIST)

Dell laptops have a built-in diagnostic tool that helps you determine if the screen abnormality you are experiencing is an inherent problem with the LCD (screen) of the Dell laptop or with the video card (GPU) and computer settings.

When you notice screen abnormalities like flickering, distortion, clarity issues, fuzzy or blurry image, horizontal or vertical lines, color fade and so on, it is always a good practice to isolate the LCD (screen) by running the Built-In Self-Test (BIST).

How to invoke the LCD BIST Test

- Power off the Dell laptop.
- Disconnect any peripherals that are connected to the laptop. Connect only the AC adapter (charger) to the laptop.
- Ensure that the LCD (screen) is clean (no dust particles on the surface of the screen).
- Press and hold the **D** key and **Power on** the laptop to enter LCD built-in self-test (BIST) mode. Continue to hold the D key until the computer boots up.
- The screen displays solid colors and change colors on the entire screen to white, black, red, green, and blue twice.
- Then it displays the colors white, black, and red.
- Carefully inspect the screen for abnormalities (any lines, fuzzy color, or distortion on the screen).
- At the end of the last solid color (red), the computer shuts down.

NOTE: Dell SupportAssist Preboot diagnostics upon launch initiates an LCD BIST first, expecting a user intervention to confirm functionality of the LCD.

System diagnostic lights

Battery-status light

Indicates the power and battery-charge status.

Solid white — Power adapter is connected and the battery has more than 5 percent charge.

Amber — Computer is running on battery and the battery has less than 5 percent charge.

Off

- A power adapter is connected, and the battery is fully charged.
- The computer is running on a battery, and the battery has more than 5 percent charge.
- The computer is in sleep state, hibernation, or turned off.

The power and battery-status light blinks amber along with beep codes indicating failures.

For example, the power and battery-status light blinks amber two times followed by a pause, and then blinks white three times followed by a pause. This 2,3 pattern continues until the system is turned off indicating no memory or RAM is detected.

The following table shows different power and battery-status light patterns and associated problems.

Table 13. LED codes

Diagnostic light codes	Problem description	Recommended Solution
1,1	TPM Detection Failure	Replace System Board.
1,2	Unrecoverable SPI Flash Failure	Replace System Board.
2,1	CPU failure	Run the Intel CPU diagnostics tools. If the problem persists, replace the system board.
2,2	Motherboard covers BIOS corruption or ROM error	Flash latest BIOS version. If the problem persists, replace the system board.
2,3	No Memory/RAM detected	Confirm that the memory module is installed properly. If the problem persists, replace the memory module.
2,4	Memory/RAM Failure	Reset the memory module. If the problem persists, replace the memory module.
2,5	Invalid memory installed	Reset the memory module. If the problem persists, replace the memory module.
2,6	Motherboard/Chipset Error	Flash latest BIOS version. If the problem persists, replace the system board.
2,7	LCD failure - SBIOS message	Flash latest BIOS version. If the problem persists, replace the LCD module.
2,8	LCD failure - EC detection of power rail failure	Replace the system board.
3,1	CMOS battery failure	Reset the CMOS battery connection. If the problem persists, replace the RTC battery.
3,2	PCI of Video card/chip failure	Replace the system board.
3,3	BIOS Recovery Image not found	Flash latest BIOS version. If the problem persists, replace the system board.
3,4	Recovery Image found but invalid	Flash latest BIOS version. If the problem persists, replace the system board.
3,5	EC ran into power sequencing failure	Replace the system board.
3,6	Flash corruption detected by SBIOS	Replace the system board.
3,7	Timeout waiting on ME to reply to HECI message	Replace the system board.

Camera status indicator: Indicates whether the camera is in use.

- Solid white — Camera is in use.
- Off — Camera is not in use.

Caps Lock status indicator: Indicates whether the Caps Lock is enabled or disabled.

- Solid white — Caps Lock enabled.
- Off—Caps Lock disabled.

Real-Time Clock (RTC Reset)

The Real Time Clock (RTC) reset function allows you or the service technician to recover Dell systems from No POST/No Power/No Boot situations. The legacy jumper enabled RTC reset has been retired on these models.

Start the RTC reset with the system powered off and connected to AC power. Press and hold the power button for 20 seconds. The system RTC Reset occurs after you release the power button.

Recovering the operating system

When your computer is unable to boot to the operating system even after repeated attempts, it automatically starts Dell SupportAssist OS Recovery.

Dell SupportAssist OS Recovery is a stand-alone tool that is preinstalled in all Dell computers that are installed with the Windows operating system. It consists of tools to diagnose and troubleshoot issues that may occur before your computer boots to the operating system. It enables you to diagnose hardware issues, repair your computer, back up your files, or restore your computer to its factory state.

You can also download it from the Dell Support website to troubleshoot and fix your computer when it fails to boot into their primary operating system due to software or hardware failures.

For more information about the Dell SupportAssist OS Recovery, see *Dell SupportAssist OS Recovery User's Guide at Serviceability Tools at the Dell Support Site*. Click **SupportAssist** and then, click **SupportAssist OS Recovery**.

Backup media and recovery options

It is recommended to create a recovery drive to troubleshoot and fix problems that may occur with Windows. Dell proposes multiple options for recovering the Windows operating system on your Dell computer. For more information, see [Dell Windows Backup Media and Recovery Options](#).

Wi-Fi power cycle

About this task

If your computer is unable to access the Internet due to Wi-Fi connectivity issues a Wi-Fi power cycle procedure may be performed. The following procedure provides the instructions on how to conduct a Wi-Fi power cycle:

 **NOTE:** Some Internet Service Providers (ISPs) provide a modem or router combo device.

Steps

1. Turn off your computer.
2. Turn off the modem.
3. Turn off the wireless router.
4. Wait for 30 seconds.
5. Turn on the wireless router.
6. Turn on the modem.
7. Turn on your computer.

Drain residual flea power (perform hard reset)

About this task

Flea power is the residual static electricity that remains in the computer even after it has been powered off and the battery is removed.


For your safety, and to protect the sensitive electronic components in your computer, you are requested to drain residual flea power before removing or replacing any components in your computer.

Draining residual flea power, also known as a performing a "hard reset," is also a common troubleshooting step if your computer does not turn on or boot into the operating system.


Perform the following steps to drain the residual flea power:

Steps

1. Turn off your computer.
2. Disconnect the power adapter from your computer.
3. Remove the base cover.
4. Remove the battery.

 **CAUTION:** The battery is a Field Replaceable Unit (FRU) and the removal/installation is intended for authorized service technicians only.

5. Press and hold the power button for 20 seconds to drain the flea power.
6. Install the battery.
7. Install the base cover.
8. Connect the power adapter to your computer.
9. Turn on your computer.

 **NOTE:** For more information about performing a hard reset, search in the Knowledge Base Resource at [Dell Support Site](#).

LED Indicators and Characteristics

Battery charge and status LED

Table 14. Battery charge and status LED Indicator

Power Source	LED Behavior	computer Power State	Battery Charge Level
AC Adapter	Off	S0 - S5	Fully Charged
AC Adapter	Solid White	S0 - S5	< Fully Charged
Battery	Off	S0 - S5	11-100%
Battery	Solid Amber (590+/-3 nm)	S0 - S5	< 10%

- S0 (ON) - Computer is turned on.
- S4 (Hibernate) - The computer consumes the least power compared to all other sleep states. The computer is almost at an OFF state, expect for a trickle power. The context data is written to hard drive.
- S5 (OFF) - The computer is in a shutdown state.


Getting help

Topics:

- [Contacting Dell](#)

Contacting Dell

Prerequisites

 **NOTE:** If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

About this task

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

Steps

1. Go to **Dell.com/support**.
2. Select your support category.
3. Verify your country or region in the **Choose a Country/Region** drop-down list at the bottom of the page.
4. Select the appropriate service or support link based on your need.