

# Dell Precision 7730

## 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.

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# Working on your computer


## Topics:


- [Safety instructions](#)
- [Turning off your computer — Windows 10](#)
- [Before working inside your computer](#)
- [After working inside your computer](#)


## Safety instructions


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.


 **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.


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

## Turning off your computer — Windows 10

 **CAUTION:** To avoid losing data, save and close all open files and exit all open programs before you turn off your computer or remove the side cover.

1. Click or tap .
2. Click or tap  and then click or tap **Shut down**.

 **NOTE:** Ensure that the computer and all attached devices are turned off. If your computer and attached devices did not automatically turn off when you shut down your operating system, press and hold the power button for about 6 seconds to turn them off.


## Before working inside your computer

1. Ensure that your work surface is flat and clean to prevent the computer cover from being scratched.
2. Turn off your computer.
3. If the computer is connected to a docking device (docked), undock it.
4. Disconnect all network cables from the computer (if available).

 **CAUTION:** If your computer has an RJ45 port, disconnect the network cable by first unplugging the cable from your computer.

5. Disconnect your computer and all attached devices from their electrical outlets.
6. Open the display.
7. Press and hold the power button for few seconds, to ground the system board.


 **CAUTION:** To guard against electrical shock unplug your computer from the electrical outlet before performing Step # 8.

 **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.

8. Remove any installed ExpressCards or Smart Cards from the appropriate slots.

## After working inside your computer

After you complete any replacement procedure, ensure that you connect external devices, cards, and cables before turning on your computer.

 **CAUTION:** To avoid damage to the computer, use only the battery designed for this particular Dell computer. Do not use batteries designed for other Dell computers.

1. Connect any external devices, such as a port replicator or media base, and replace any cards, such as an ExpressCard.
2. Connect any telephone or network cables to your computer.

 **CAUTION:** To connect a network cable, first plug the cable into the network device and then plug it into the computer.

3. Connect your computer and all attached devices to their electrical outlets.
4. Turn on your computer.

# Technology and components

This chapter details the technology and components available in the system.

## Topics:

- [HDMI 2.0](#)
- [USB features](#)
- [USB Type-C](#)

## HDMI 2.0

This topic explains the HDMI 2.0 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.

### HDMI 2.0 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 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	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.

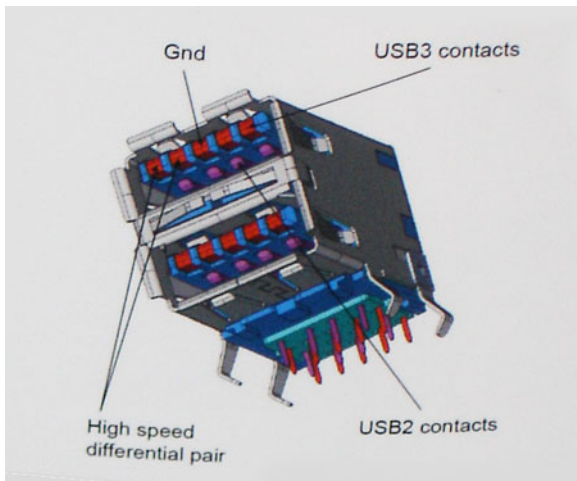


## Speed

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 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.

Windows 8/10 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.

Microsoft announced that Windows 7 would have USB 3.1 Gen 1 support, perhaps not on its immediate release, but in a subsequent Service Pack or update. It is not out of the question to think that following a successful release of USB 3.0/USB 3.1 Gen 1 support in Windows 7, SuperSpeed support would trickle down to Vista. Microsoft has confirmed this by stating that most of their partners share the opinion that Vista should also support USB 3.0/USB 3.1 Gen 1.

# 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.

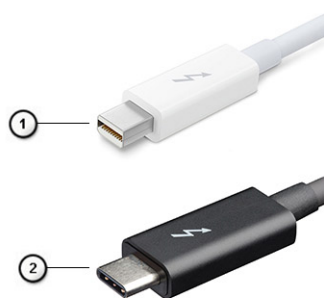
This could spell the end of all those proprietary laptop charging cables, with everything charging via a standard USB connection. You could charge your laptop from one of those portable battery packs you charge your smartphones and other portable devices from today. You could plug your laptop into an 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 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 1. 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 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 1.2 – 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

 **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 2. Thunderbolt Iconography Variations**

# Removing and installing components


## Topics:

- Recommended tools
- Screw size list
- SD card
- Battery cover
- Battery
- Hard drive
- Hard drive interposer board
- Keyboard lattice and Keyboard
- Base cover
- Memory modules
- WWAN card
- WLAN card
- Solid State Drive — optional
- Coin-cell battery
- Power connector port
- Palm rest
- Touchpad button
- SIM card
- Smart card cage
- Speaker
- LED board
- Heat sink assembly
- Graphics card
- System board
- Display assembly
- Display bezel
- Display hinges
- Display panel
- Camera
- eDP cable
- Display bracket

## Recommended tools










The procedures in this document require the following tools:

- Phillips #0 screwdriver
- Phillips #1 screwdriver
- Plastic scribe

 **NOTE:** The #0 screw driver is for screws 0-1 and the #1 screw driver is for screws 2-4

# Screw size list

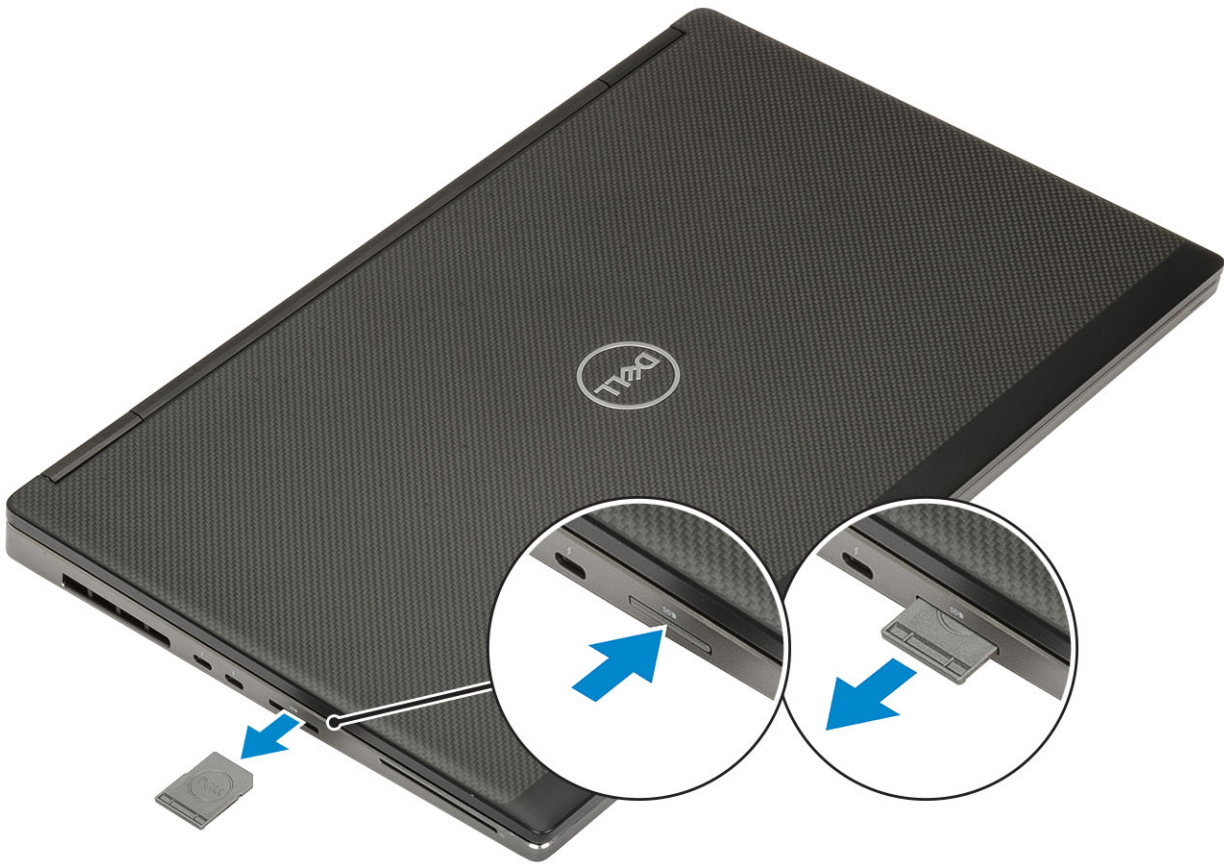
**Table 2. Precision 7730**

Component	Screw type	Quantity	Image
SSD thermal plate	M2.0x3.0	1 per SSD	
M.2 SSD card		1 per SSD	
HDD Interposer board		1	
WLAN card		1	
WWAN		1	
Power connector port		1	
eDP bracket		2	
Display panel		4	
Smart card cage		2	
Palmrest		6	
HDD Interposer board holder		3	
LED board		1	
Display support bracket		6	
Touchpad button		2	
Beam connector	M2.0x3.0	2	
Keyboard	M2.0x2.5	5	
Base cover	M2.5x5.0	2	
Type-C bracket	M2.0x5.0	3	
HDD Interposer board		1	
4 Cell Battery	M2.5x3.0	2	
6 Cell Battery		3	
HDD assembly		4	
Display hinge	M2.5x4.0	6	
Hinge cap		4	
GPU card	M2.5x5.0	3	
System board		2	
Palmrest		15	
Display assembly (bottom)		2	
Display assembly (rear)	M2.5x6.0	2	
HDD bracket	M3.0x3.0	4	

# SD card

## Removing SD card

1. Follow the procedure in [Before working inside your computer](#).
2. Press the SD card in to release it from the system.
3. Slide the SD card out of the system.



## Installing SD card

1. Slide the SD card into its slot until it clicks into place.

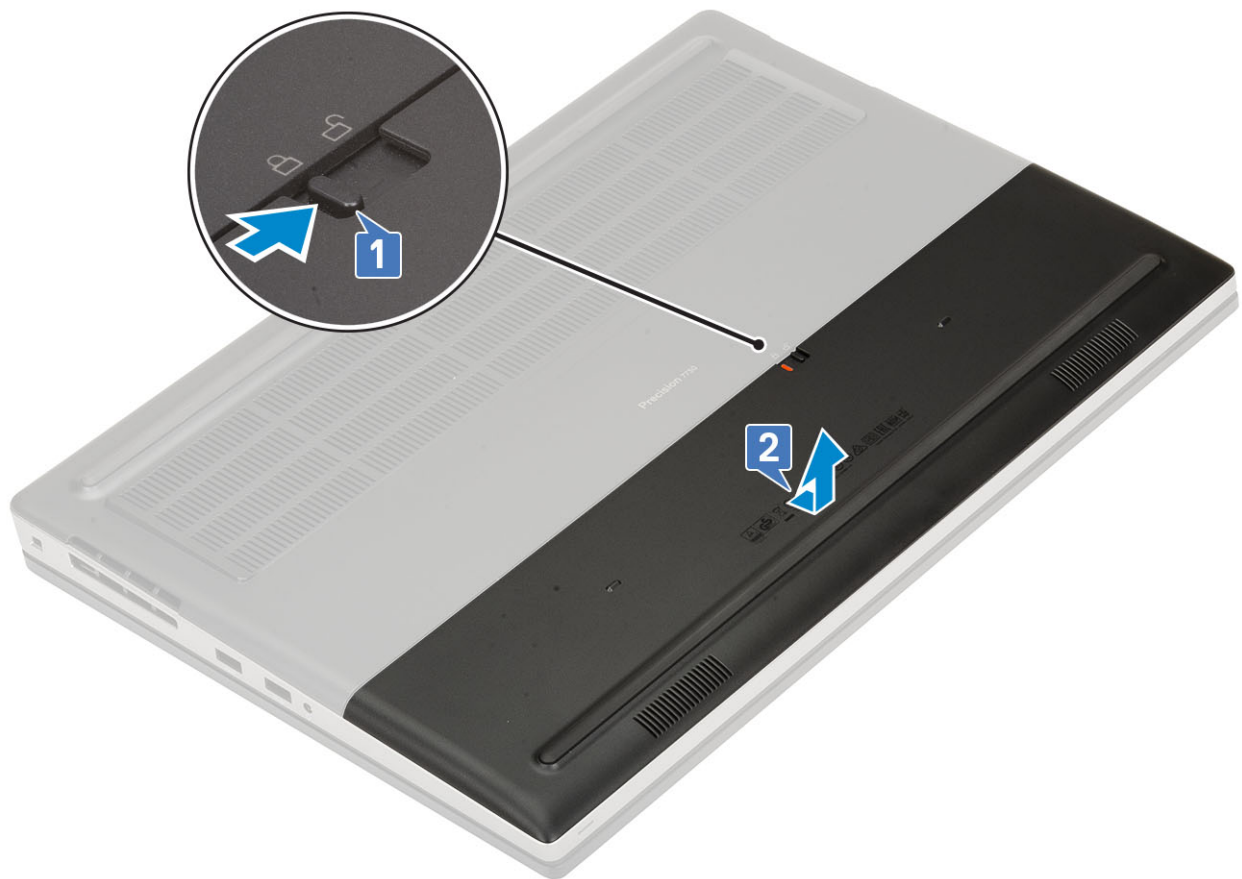


2. Follow the procedure in [After working inside your computer](#).

## Battery cover

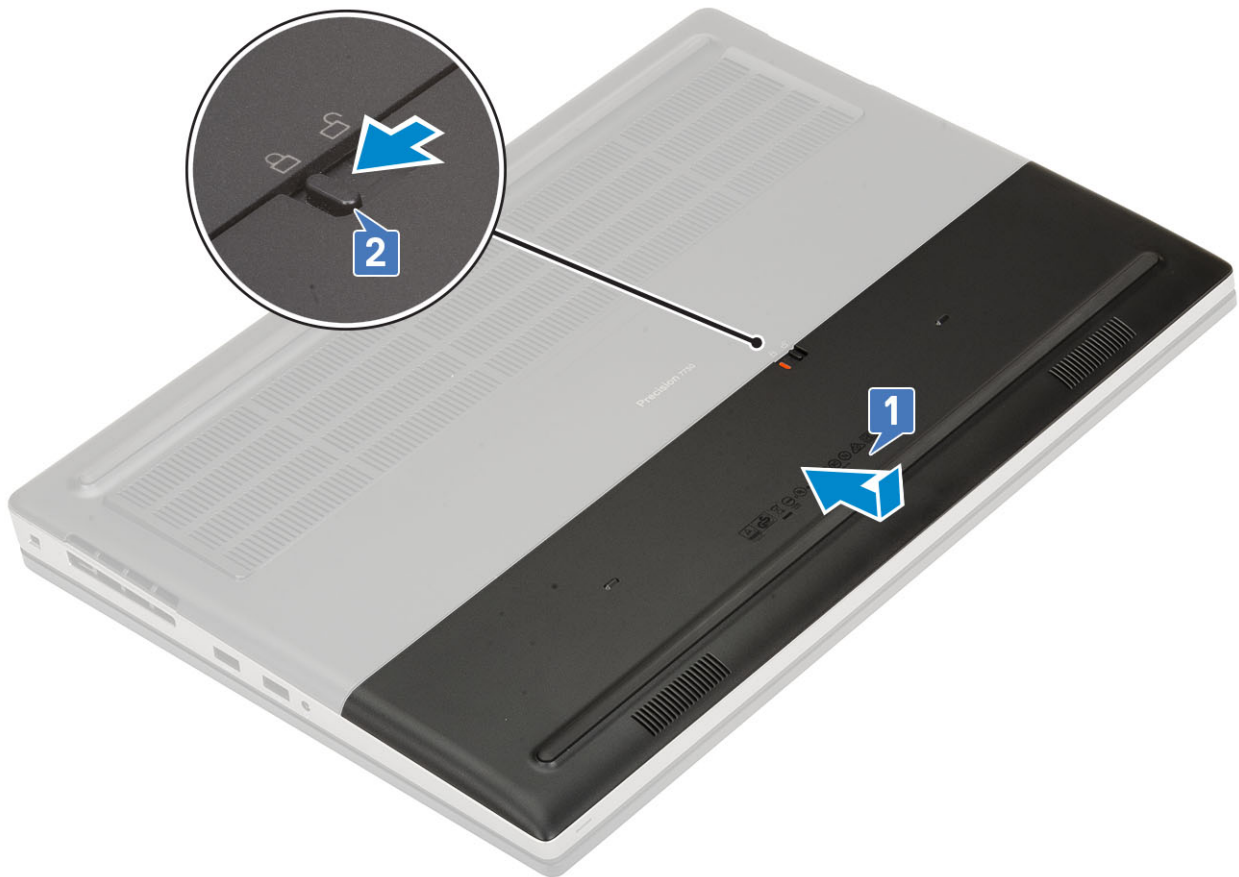
### Removing the battery cover

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [SD card](#).
3. To remove the battery cover:
  - a. Slide the battery cover release latch towards the unlock icon to release the battery cover [1].
  - b. Slide the battery cover outwards and lift the cover to remove it from the system [2].



## Installing the battery cover

1. To install the battery cover:
  - a. Slide the battery cover into its slot until it clicks into place [1].
  - b. The release latch automatically springs back to the lock position [2].



2. Install the [SD card](#).
3. Follow the procedure in [After working inside your computer](#).

## Battery

### Lithium-ion battery precautions

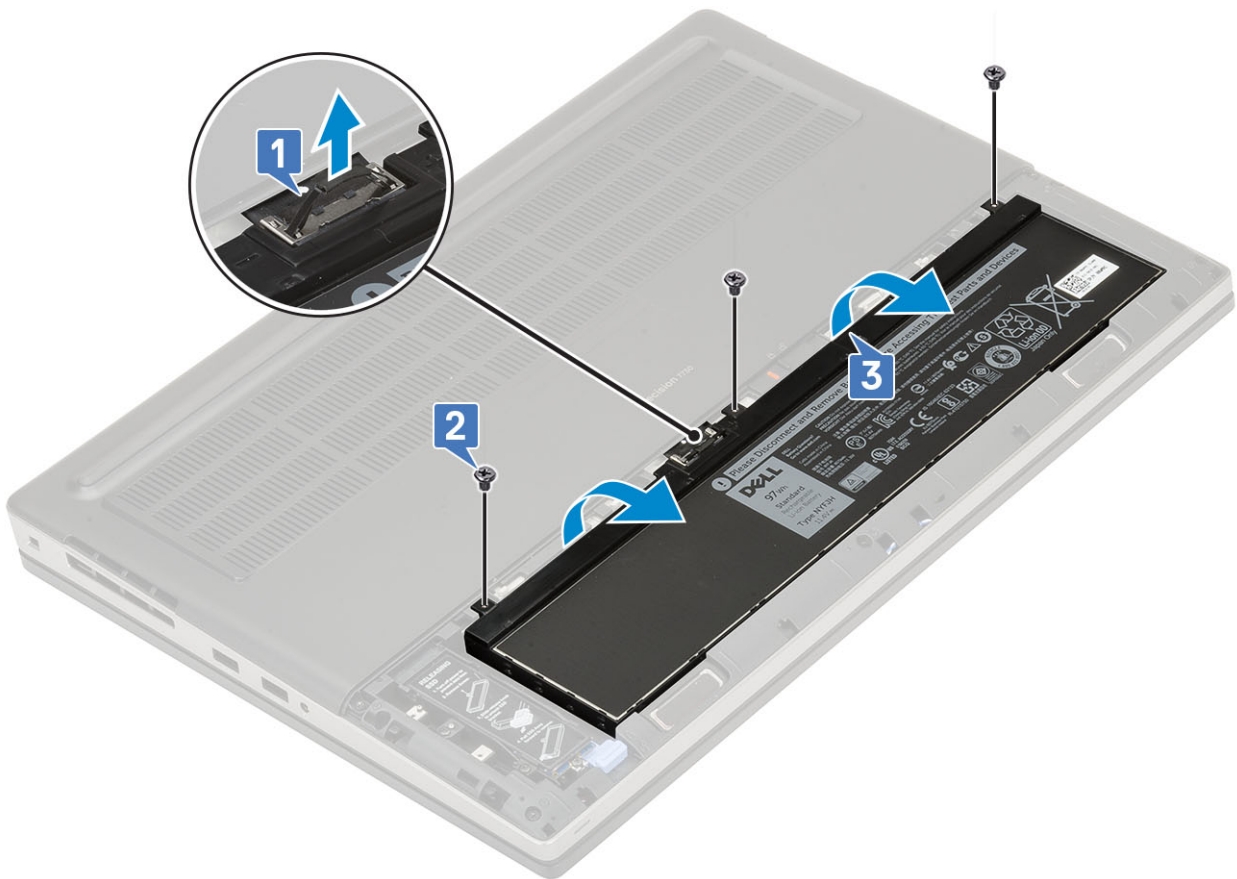
#### ⚠ CAUTION:

- Exercise caution when handling Lithium-ion batteries.
- Discharge the battery as much as possible before removing it from the system. This can be done by disconnecting the AC adapter from the system to allow the battery to drain.
- 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 system components.
- 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 Lithium-ion battery can be dangerous. In such an instance, contact for assistance and further instructions.
- 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 lithium-ion battery can be dangerous. In such an instance, contact Dell technical support for assistance. See <https://www.dell.com/support>.

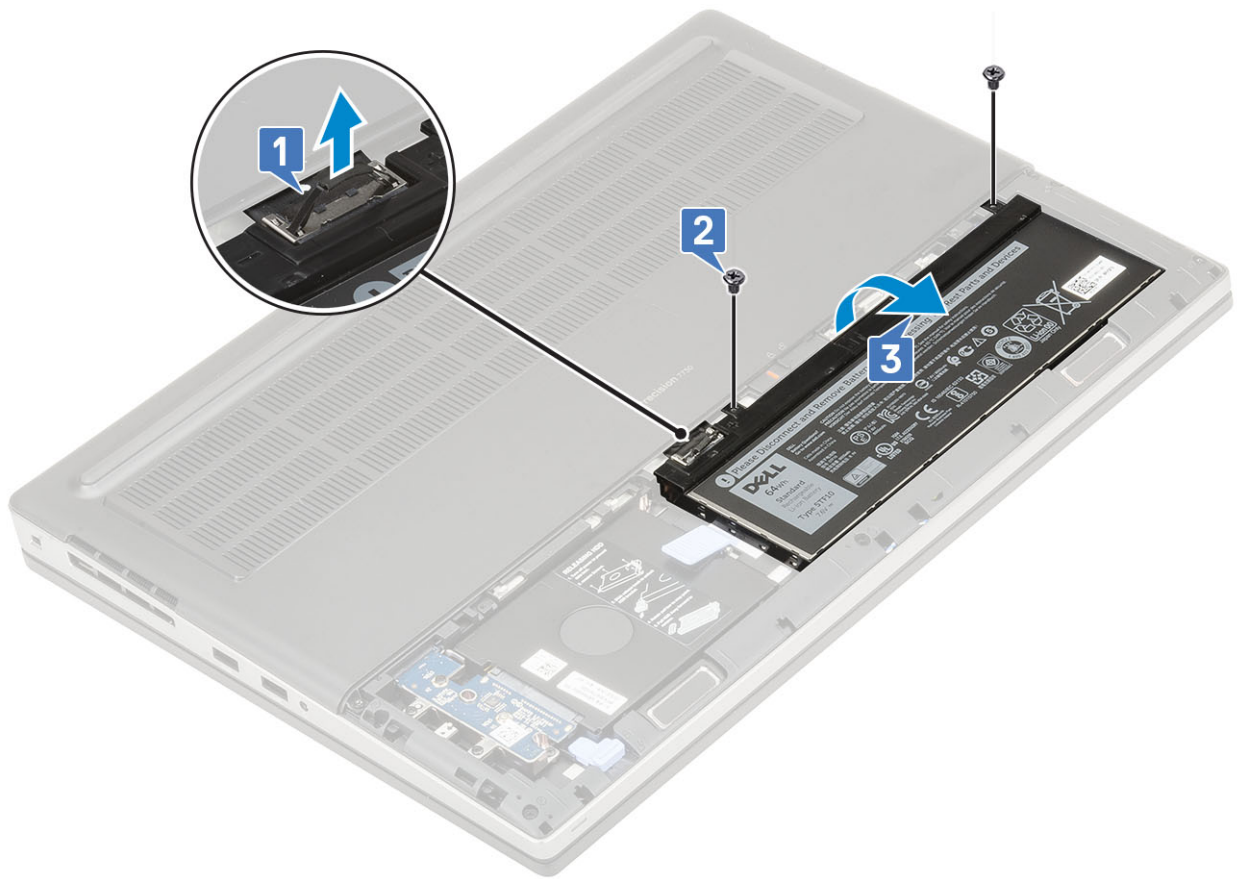
- Always purchase genuine batteries from <https://www.dell.com> or authorized Dell partners and resellers.

## Removing the battery

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
3. To remove the 6-cell battery:
  - a. Disconnect the battery cable from the connector on the battery [1].
  - b. Remove the 3 (M2.5x3.0) screws that secure the battery to the system [2].
  - c. Remove the battery away from the system [3].

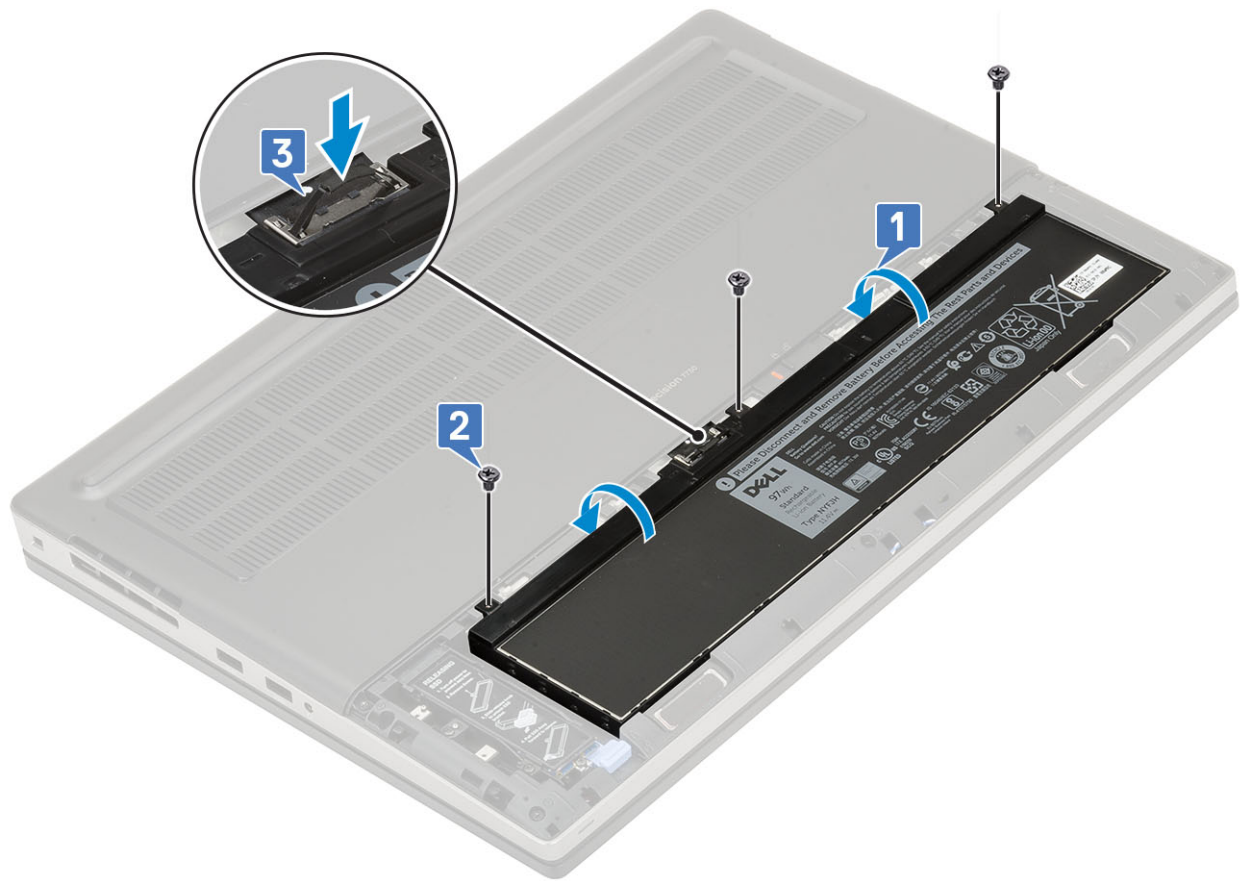


4. To remove the 4-cell battery:
  - a. Disconnect the battery cable from the connector on the battery [1].
  - b. Remove the 2 (M2.5x3.0) screws that secure the battery to the system [2].
  - c. Remove the battery away from the system [3].



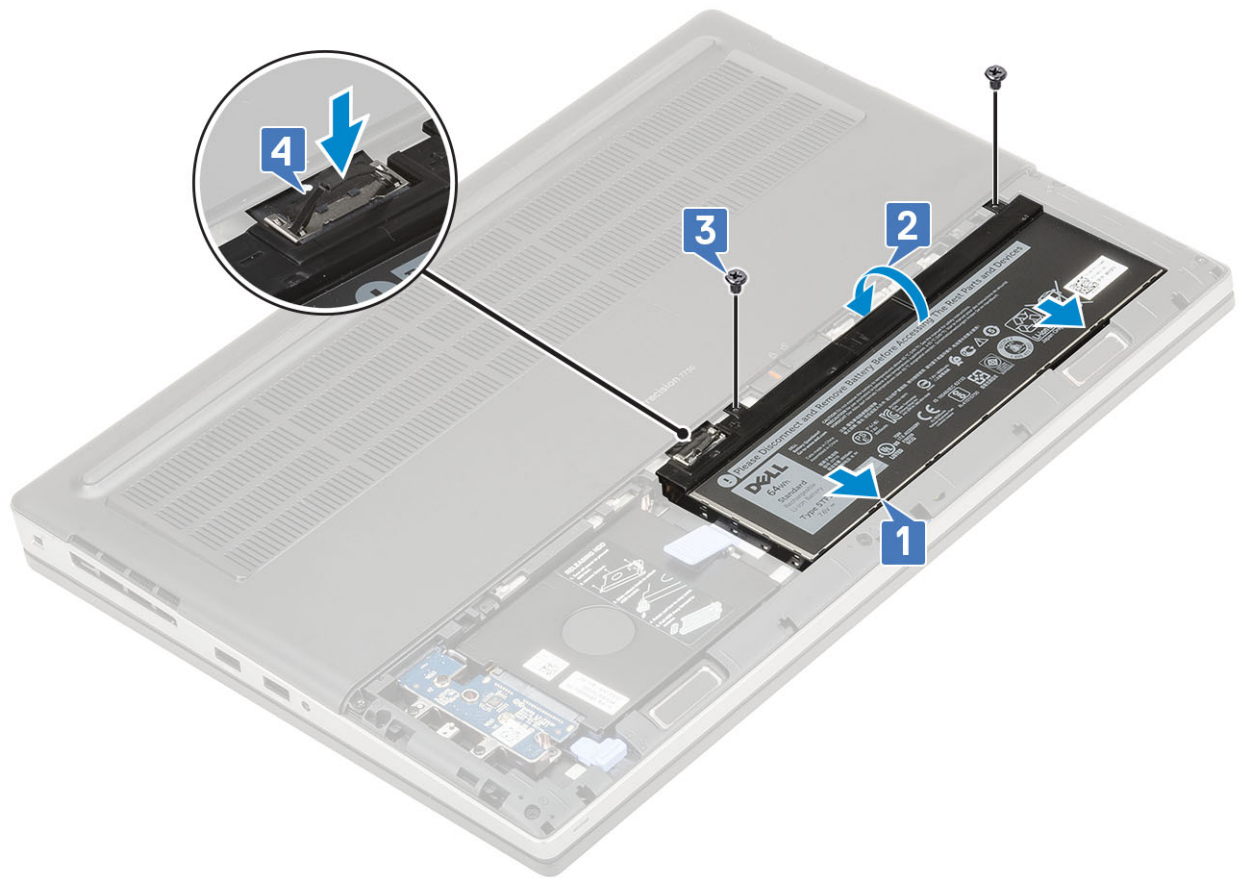
## Installing the battery

1. To install the 6-cell battery:
  - a. Place the battery onto its slot in the system [1].
  - b. Replace the 3 (M2.5x3.0) screws to secure the battery to the system [2].
  - c. Connect the battery cable to the connector in the battery [3].



2. To install the 4-cell battery:

- a. Place the battery onto its slot in the system [1 , 2].
- b. Replace the 2 (M2.5x3.0) screws to secure the battery to the system [3].
- c. Connect the battery cable to the connector in the system board [4].

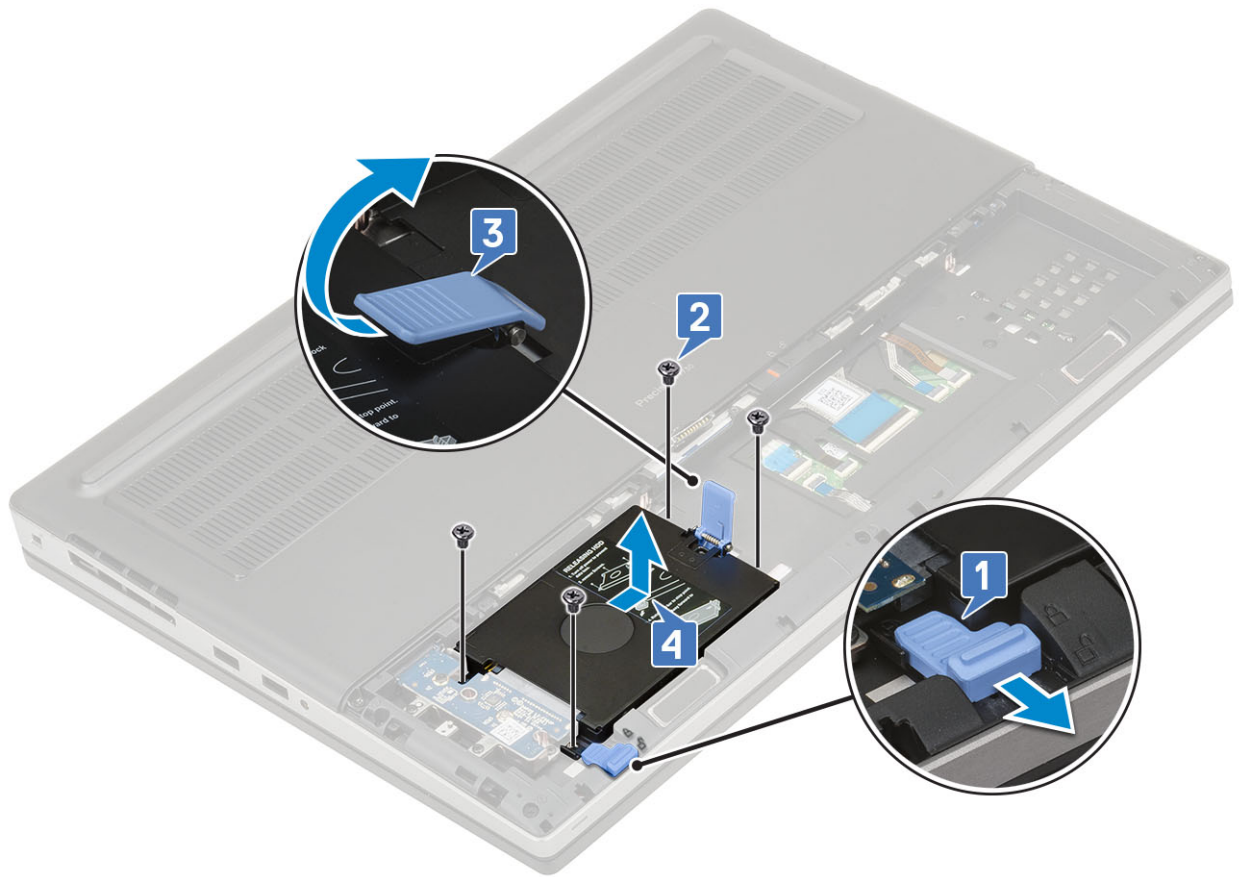


3. Install the:
  - a. [battery cover](#)
  - b. [SD card](#)
4. Follow the procedure in [After working inside your computer](#).

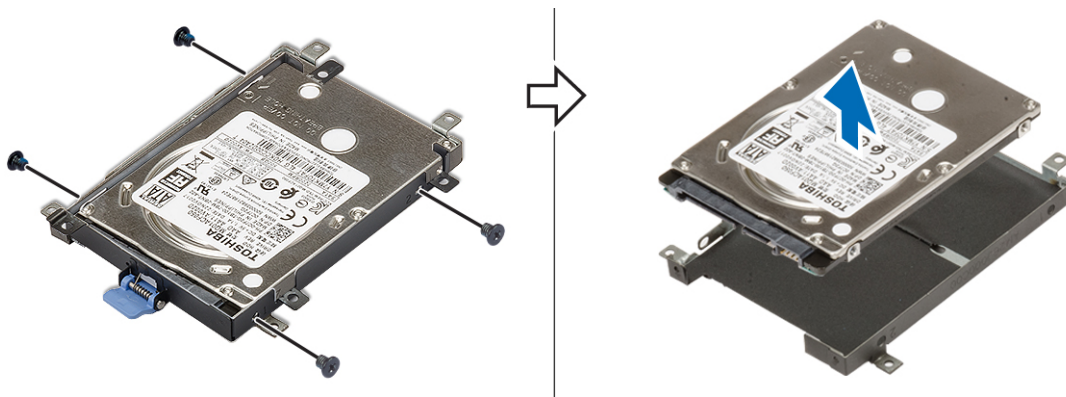
## Hard drive

### Removing the hard drive assembly

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [SD card](#)
  - b. [battery cover](#)
3. To remove hard drive assembly:
  - a. Slide the hard drive release latch into the unlock position [1].
  - b. Remove the 4 (M2.5x3.0) screws that secure the hard drive assembly to the system [2].
  - c. Flip up the tab at the end of the hard drive assembly [3].
  - d. Lift the hard drive assembly from the system [4].

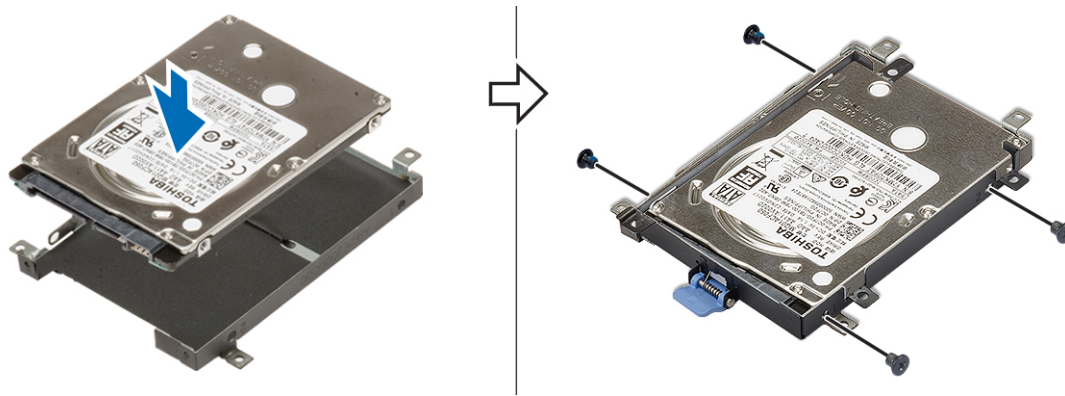


- e. Remove the 4 (M3.0x3.0) screws that secure the hard drive assembly to the hard drive bracket.
- f. Remove the hard drive from the hard drive bracket.

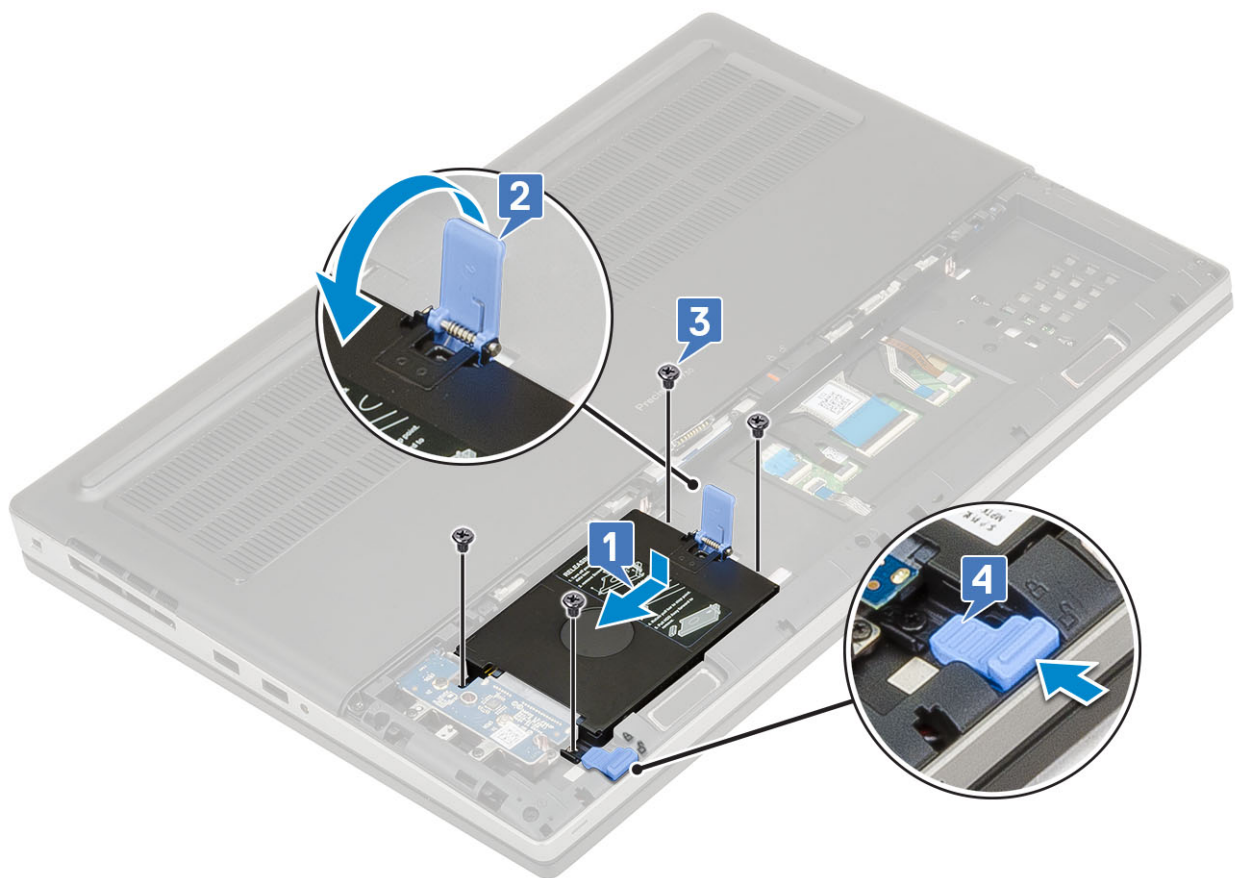


## Installing the hard drive assembly

- 1. To install the hard drive assembly:
  - a. Place the hard drive to the hard drive bracket and replace the 4 (M3.0x3.0) screws to secure the hard drive to the hard drive bracket.



- b. Insert the hard drive assembly into its slot in the system [1].
- c. Flip down the tab at the end of the hard drive assembly [2].
- d. Replace the 4 (M2.5x3.0) screws to secure the hard drive assembly to the system [3].
- e. Slide the hard drive release latch into the lock position [4].



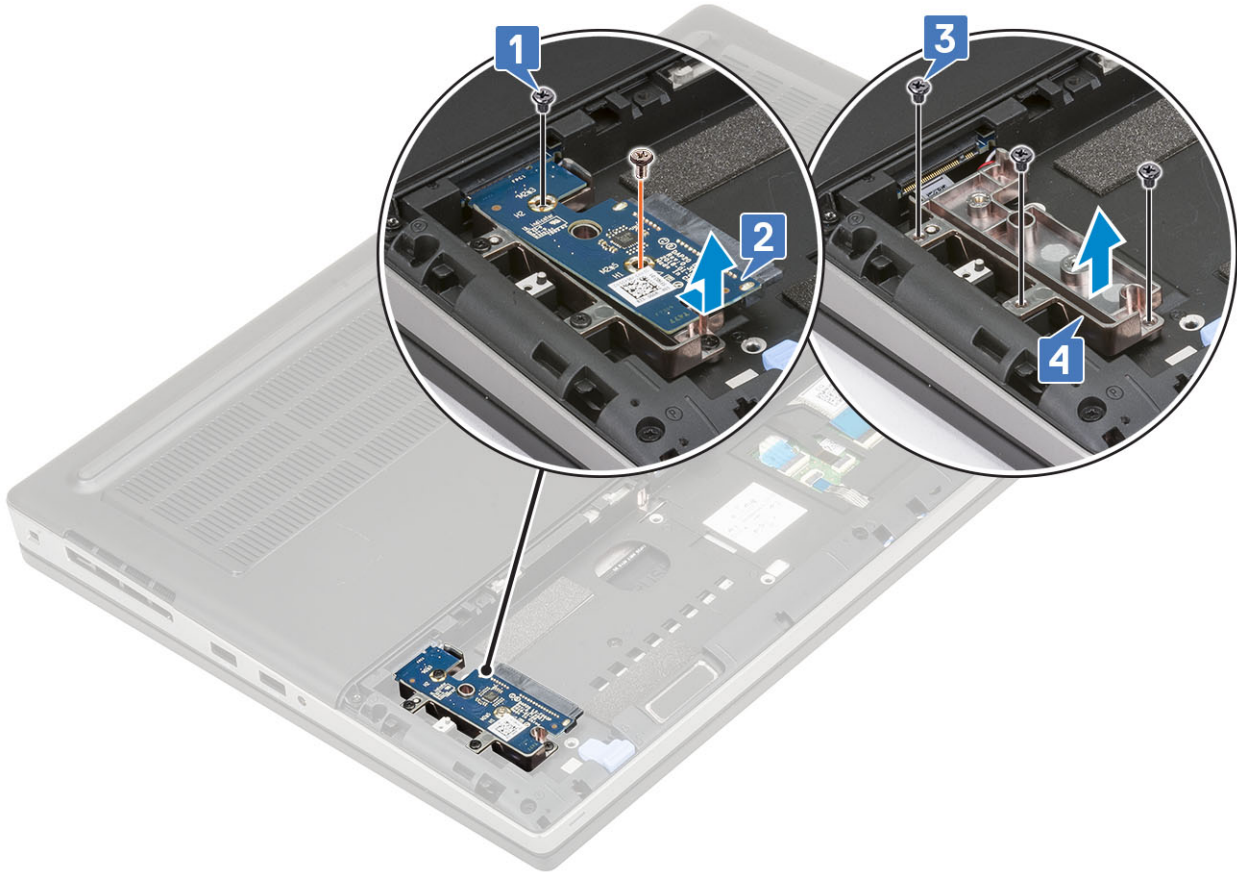
2. Install the:
  - a. battery cover
  - b. SD card
3. Follow the procedure in [After working inside your computer](#).

## Hard drive interposer board

### Removing the hard drive interposer board

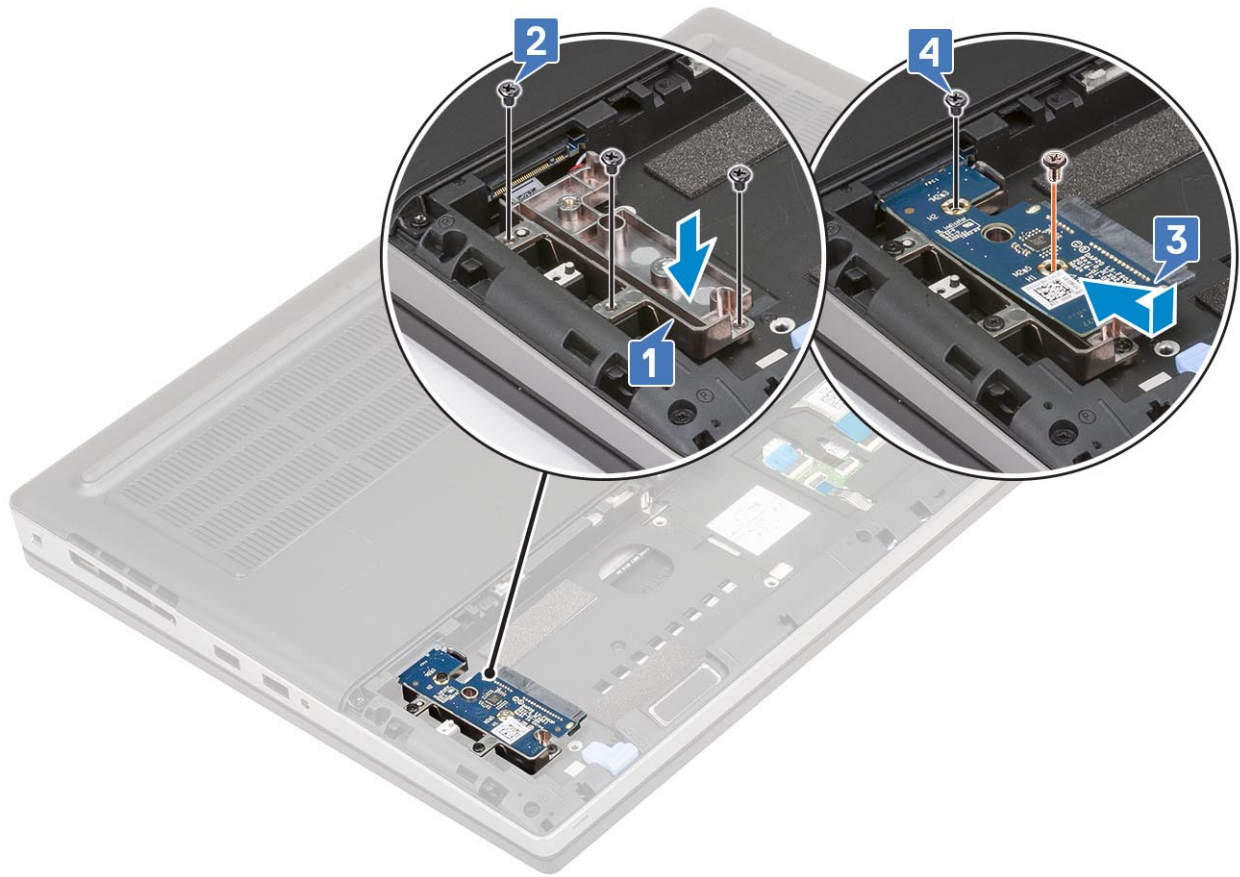
1. Follow the procedures in [Before working inside your computer](#).
2. Remove the:

- a. SD card
  - b. battery cover
  - c. hard drive
3. To remove the hard drive interposer board:
- a. Remove the single (M2.0x3.0) and the single (M2.0x5.0) screw that secures the hard drive interposer board to the hard drive interposer board holder [1].
  - b. Remove the hard drive interposer board from the system [2].
  - c. Remove the 3 (M2.0x3.0) screws that secure the hard drive interposer board holder to the system [3].
  - d. Remove the hard drive interposer board holder from the system [4].



## Installing the hard drive interposer board

1. To install the hard drive interposer board:
- a. Align the hard drive interposer board holder into its position on the system [1].
  - b. Replace the 3 (M2.0x3.0) screws to secure the hard drive interposer board holder to the system [2].
  - c. Place the hard drive interposer board into its position on the hard drive interposer board holder [3].
  - d. Replace the single (M2.0x3.0) and the single (M2.0x5.0) screw to secure the hard drive interposer board to the hard drive interposer board holder [4].

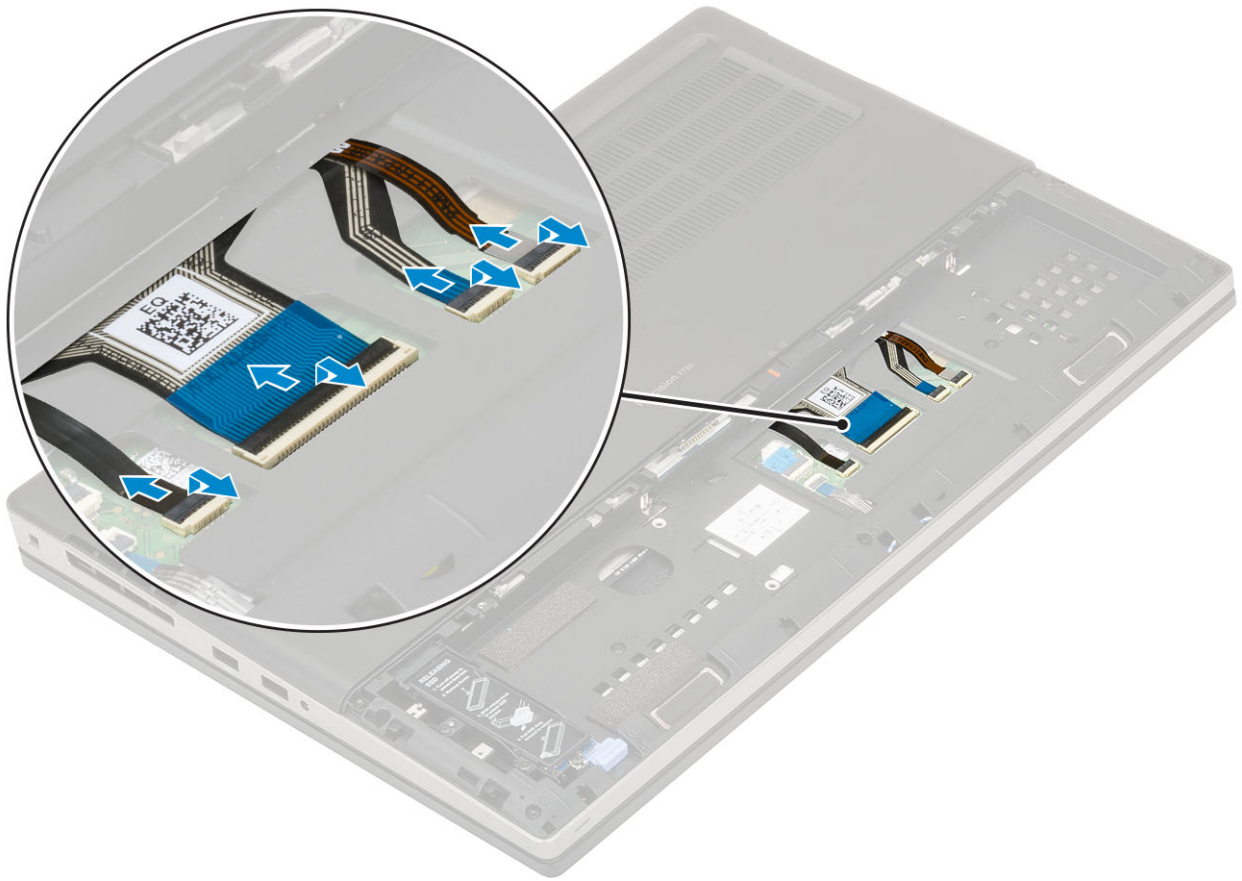


2. Install the:
  - a. [hard drive](#)
  - b. [battery cover](#)
  - c. [SD card](#)
3. Follow the procedure in [After working inside your computer](#).

## Keyboard lattice and Keyboard

### Removing the keyboard

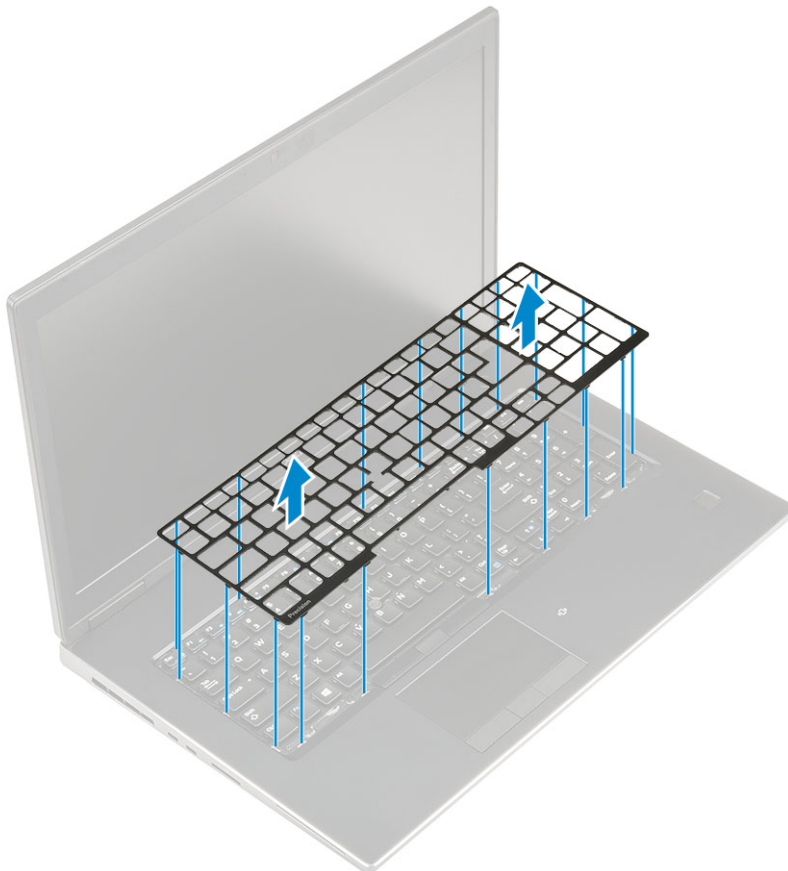
1. Follow the procedures in [Before working inside your computer](#).
2. Remove the:
  - a. [SD card](#)
  - b. [battery cover](#)
  - c. [battery](#)
3. To remove the keyboard:
  - a. Lift the latch and disconnect the keyboard cable, fingerprint cable and the fingerprint button cable from the connectors on the system board.



- b. Turn-over and open the system at 90° angle.
- c. Using a plastic scribe pry the keyboard lattice starting from the recess points on the top edge [1,2] and work along the sides and bottom edge of the keyboard lattice.

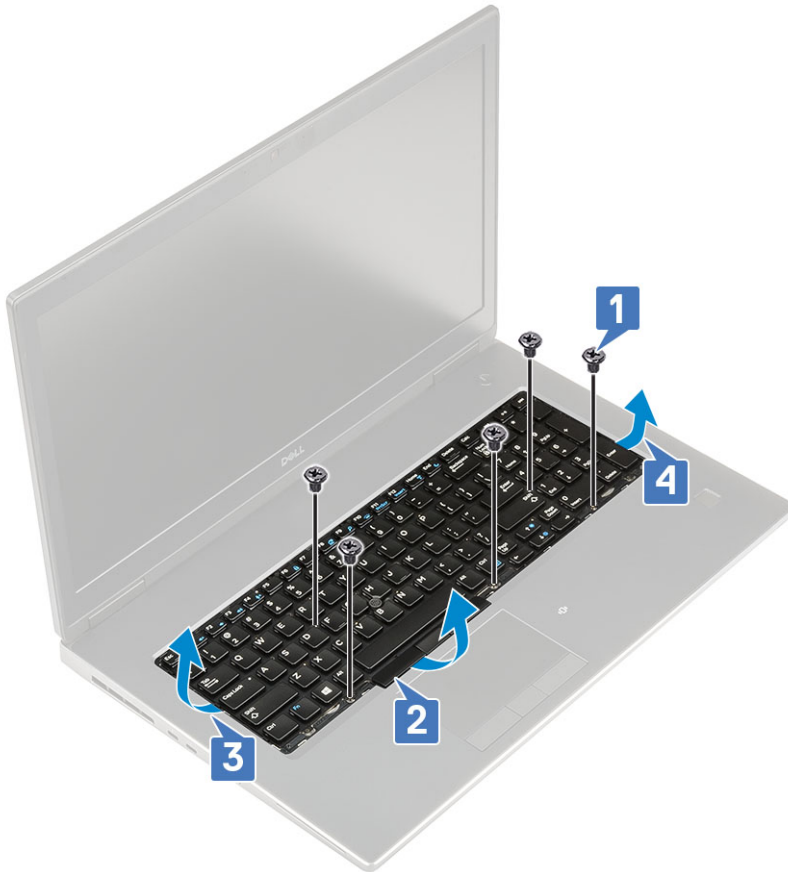


d. Lift the keyboard lattice away from the system.



e. Remove the 5 (M2.0x2.5) screws that secure the keyboard to the palmrest [1].

f. Pry the bottom edge of the keyboard and then work along the left and right sides of the keyboard [2,3,4].



g. Slide and remove the keyboard from the system.

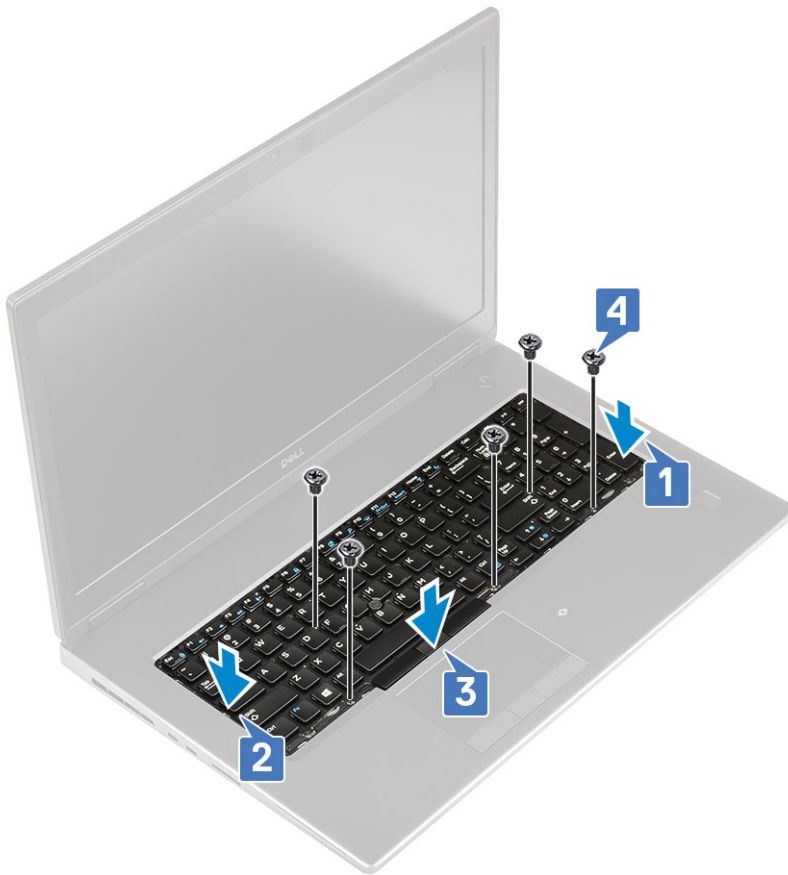


## Installing the keyboard

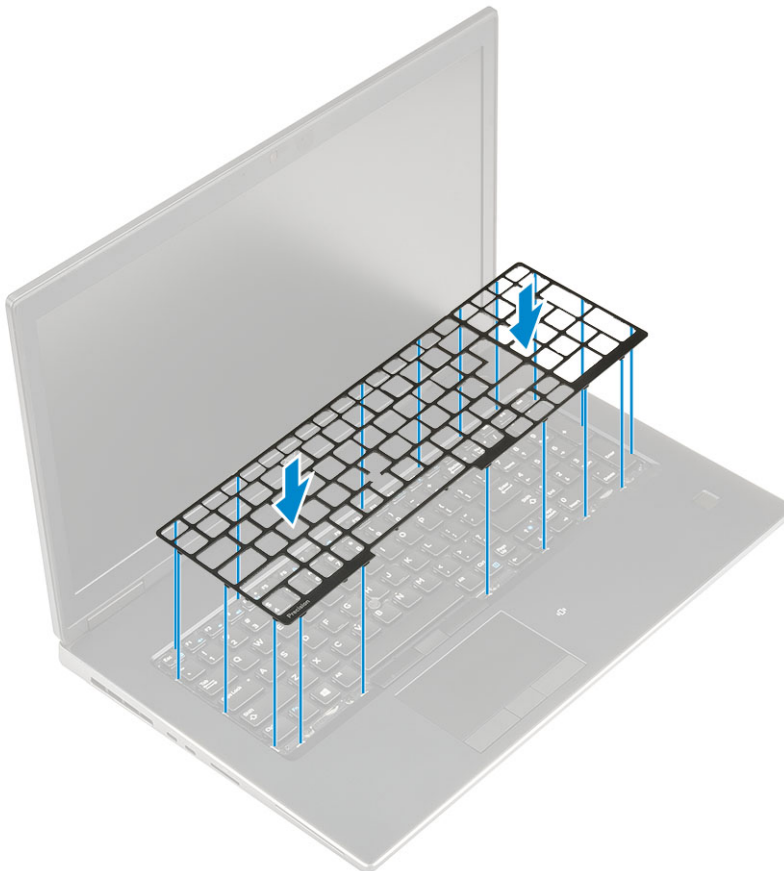
1. To install the keyboard:
  - a. Align the keyboard and route the cables back through to the bottom of the compartment.



- b. Press and align the keyboard to its compartment working along the left, right and bottom edges [1,2,3].
    - c. Replace the 5 (M2.0x2.5) screws to secure the keyboard to the palmrest [4].

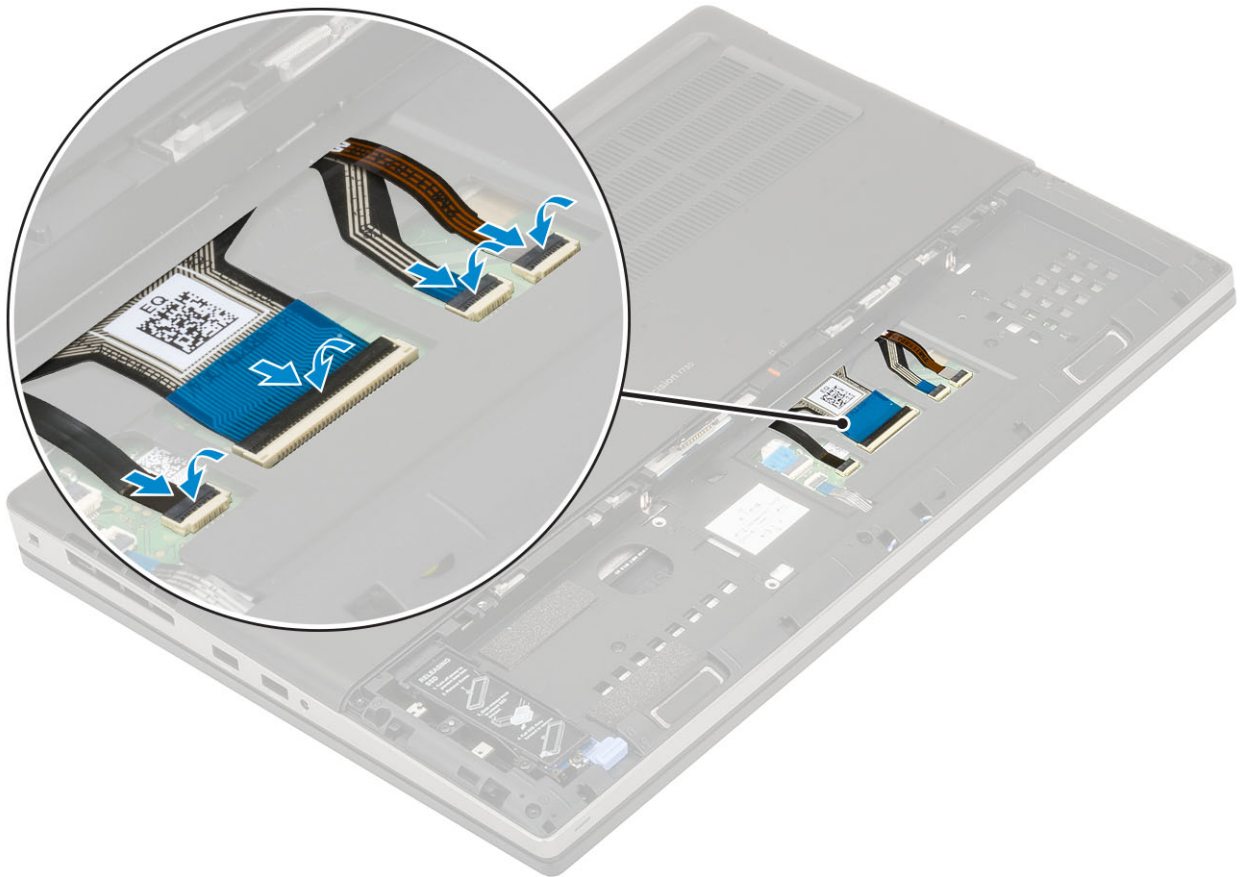


d. Align the keyboard lattice to its position on the keyboard and ensure that the keyboard lattice clicks into its place.



e. Turn-over the system at 90° angle to access the keyboard cables.

- f. Connect the keyboard cable, fingerprint cable and fingerprint button cable to the connectors on the system board.



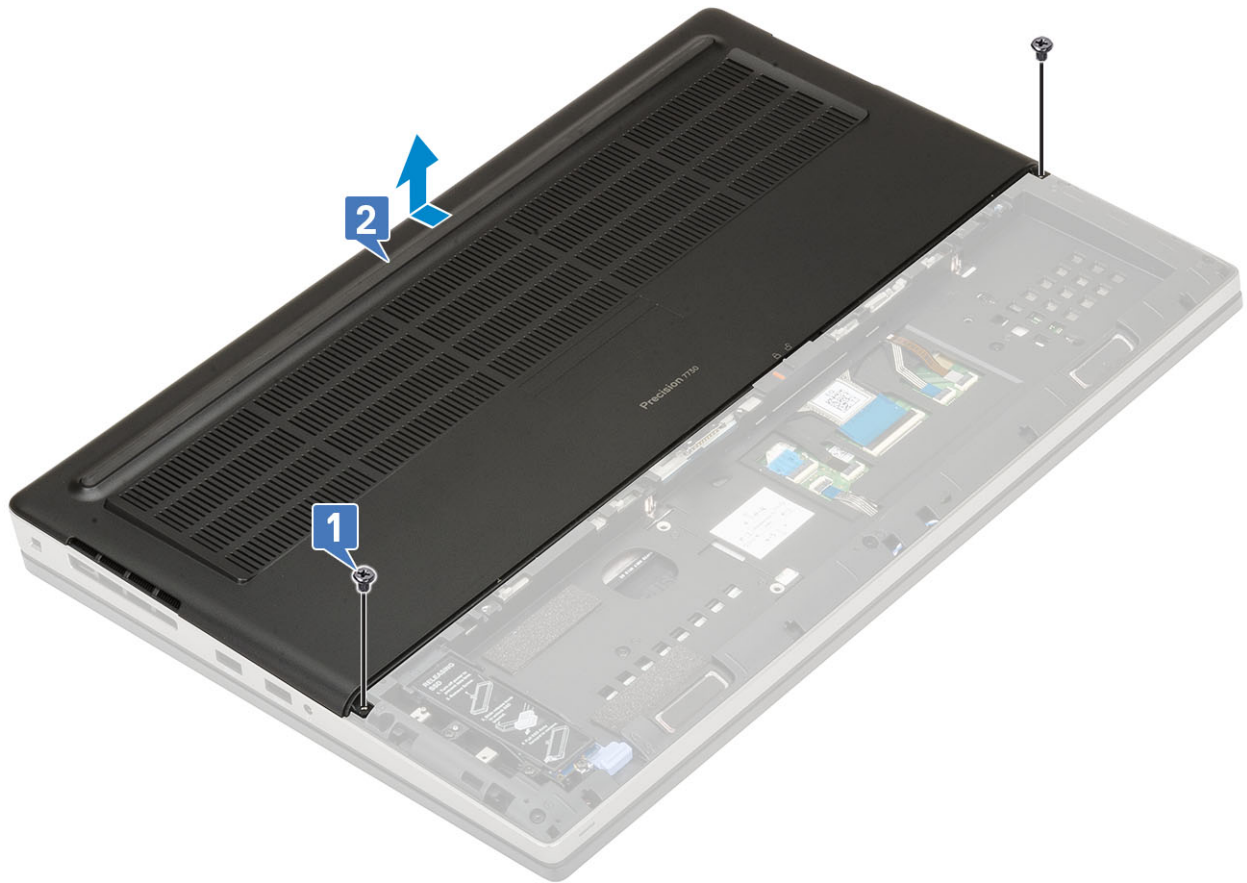
**NOTE:** Ensure that you fold the keyboard data cable in perfect alignment.

2. **NOTE:** Ensure that you fold the keyboard data cable in perfect alignment.
3. Install the:
  - a. battery
  - b. battery cover
  - c. SD card
4. Follow the procedure in [After working inside your computer](#).

## Base cover

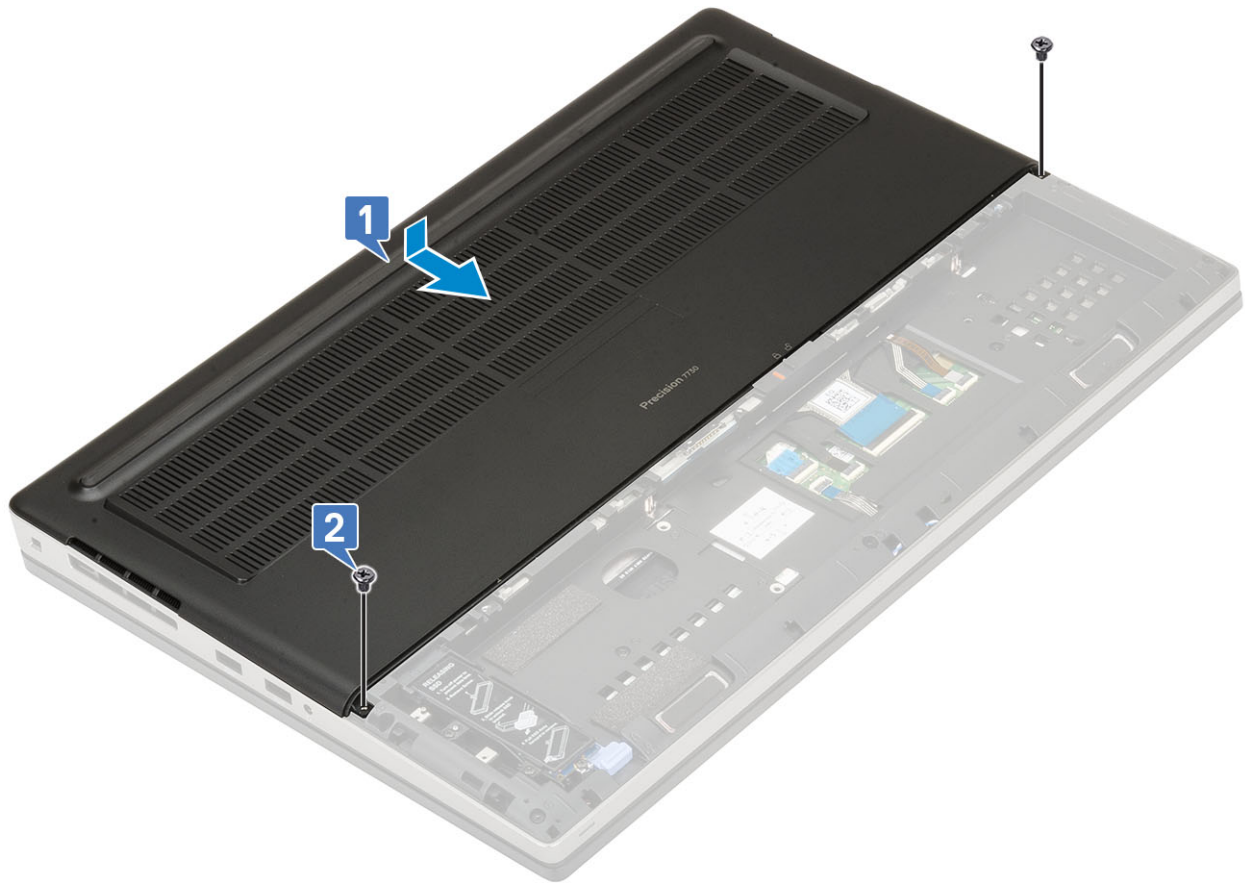
### Removing the base cover

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
3. To remove the base cover:
  - a. Remove the 2 (M2.5X5.0) screws that secure the base cover to the system [1].
  - b. Slide the rubber feet towards the rear end to disengage the base cover and lift the base cover away from the system [2].



## Installing the base cover

1. To install the base cover:
  - a. Slide the base cover to align with the screw holes on the system [1].
  - b. Replace the 2 (M2.5X5.0) screws to secure the base cover to the system [2].

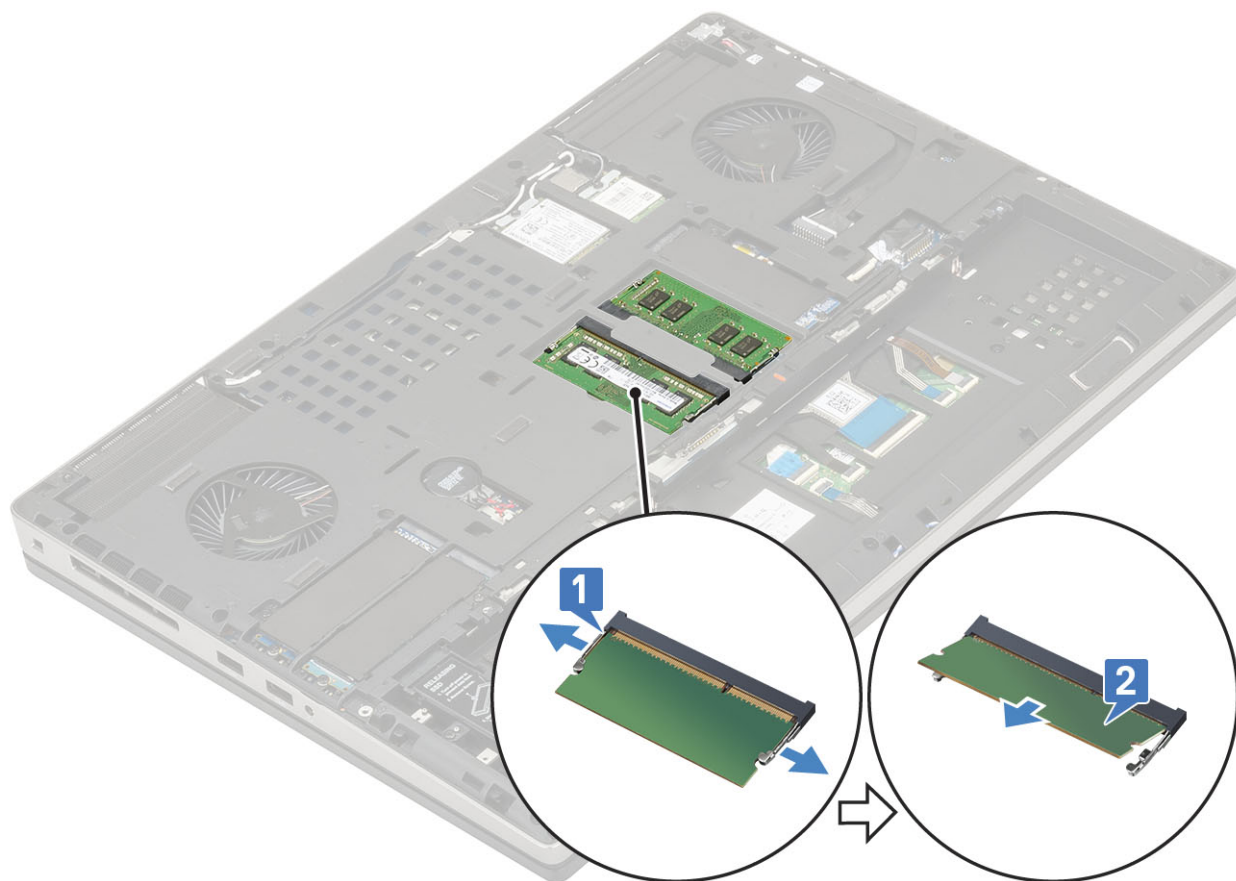


2. Install the:
  - a. [battery](#)
  - b. [battery cover](#)
  - c. [SD card](#)
3. Follow the procedure in [After working inside your computer](#).

## Memory modules

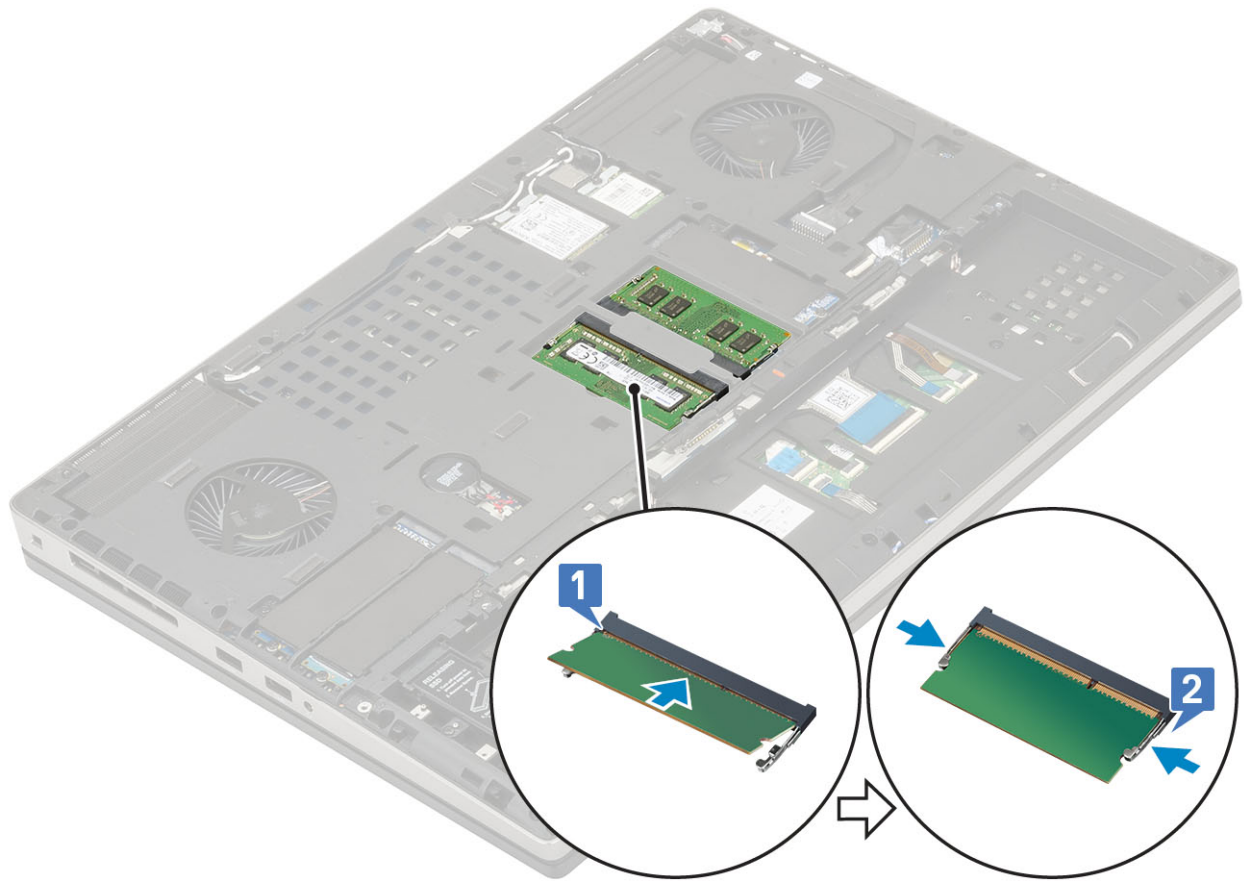
### Removing the primary memory module

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [SD card](#)
  - b. [battery cover](#)
  - c. [battery](#)
  - d. [base cover](#)
3. To remove primary memory module:
  - a. Pry the retention clips away from the memory module until it pops up.
  - b. Lift the memory module and remove it from the system.



## Installing the primary memory module

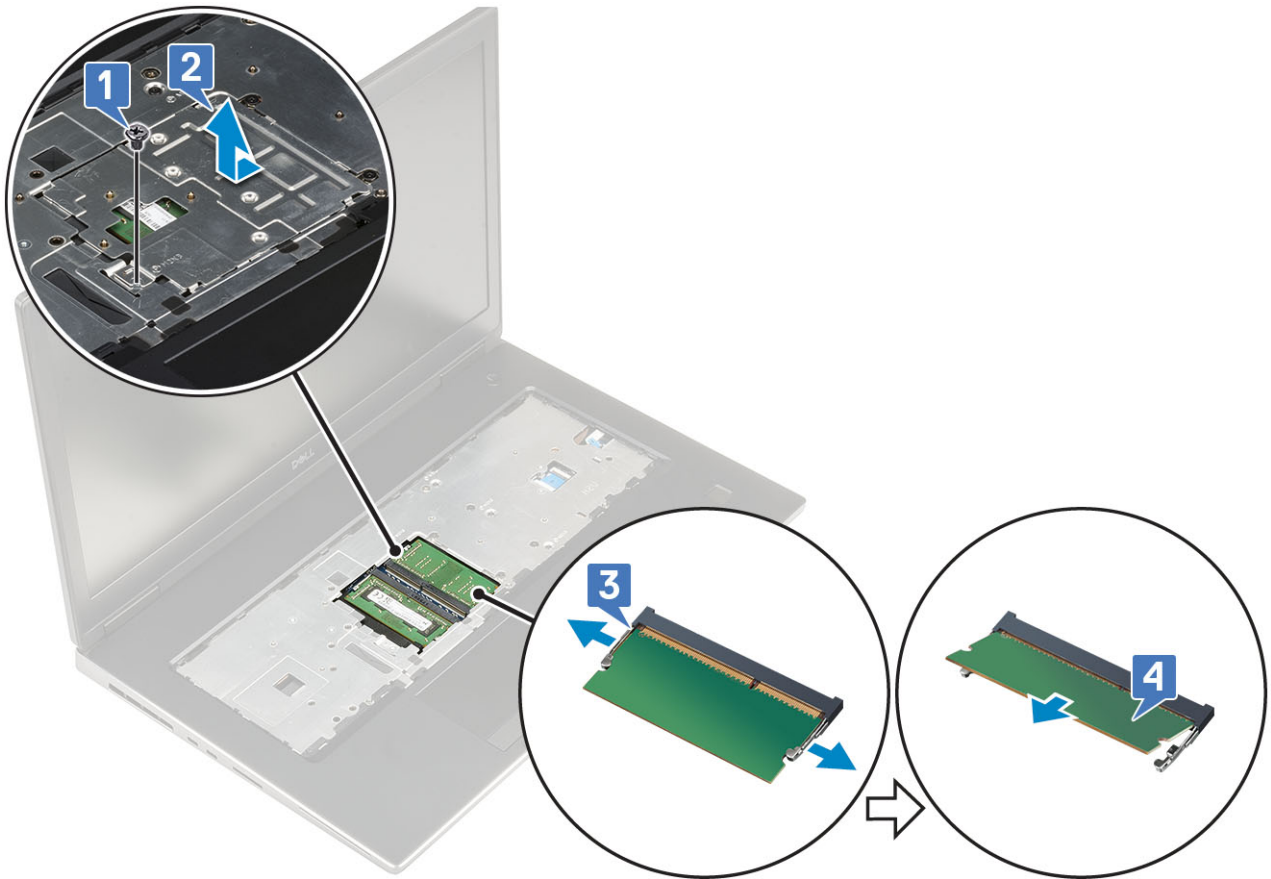
1. To install the primary memory module:
  - a. Insert the memory module into the memory socket.
  - b. Press the clips to secure the memory module to the system board.



2. Install the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [battery cover](#)
  - d. [SD card](#)
3. Follow the procedure in [After working inside your computer](#).

## Removing the secondary memory module

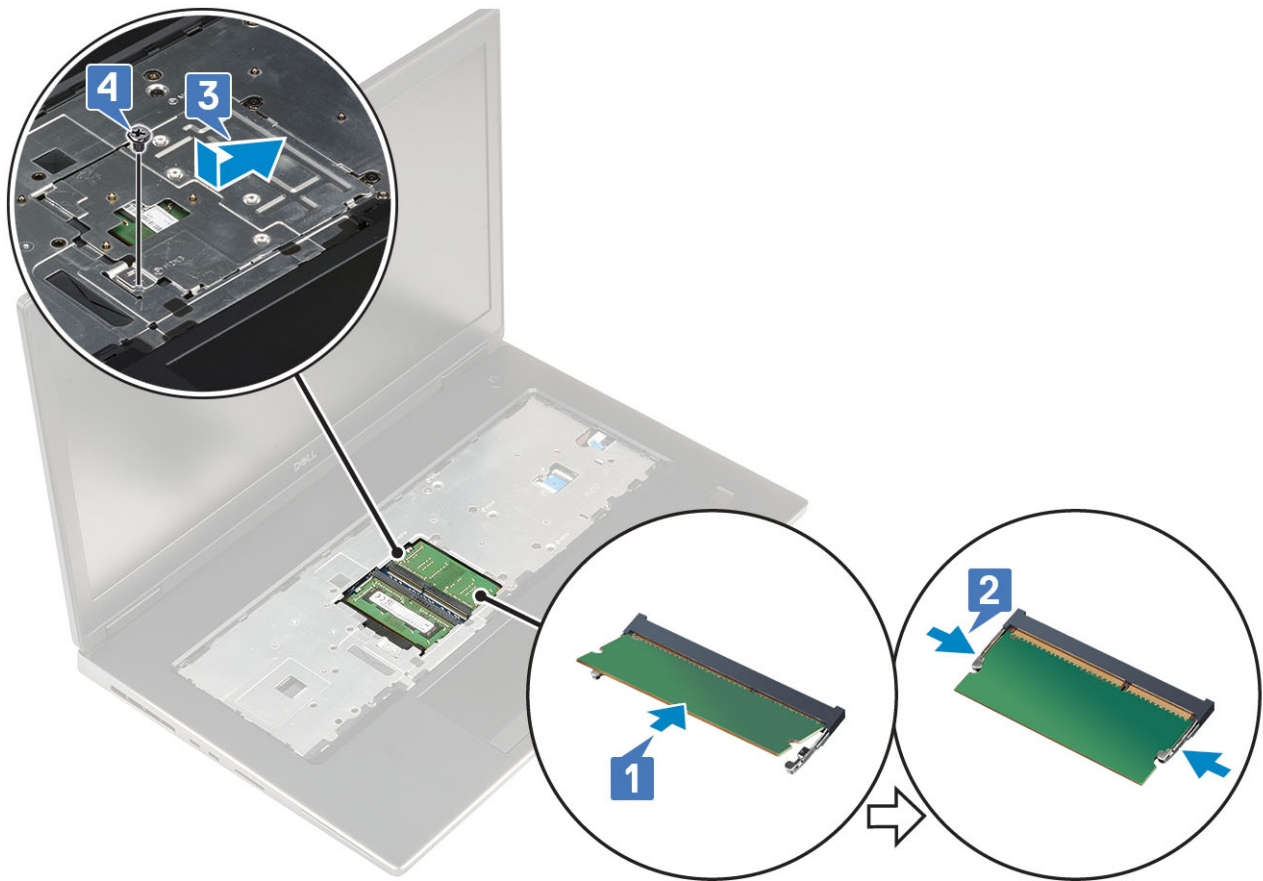
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [SD card](#)
  - b. [battery cover](#)
  - c. [battery](#)
  - d. [keyboard](#)
3. To remove the secondary memory module:
  - a. Remove the single (M2.0x3.0) screw that secures the memory shield [1].
  - b. Slide and lift the memory shield from the memory module on the system [2].
  - c. Pry the retention clips away from the memory module until it pops up [3].
  - d. Lift the memory module and remove it from the system [4].



**i** NOTE: Repeat step (c) and (d) if there is another memory installed.

## Installing the secondary memory module

1. To install the secondary memory module:
  - a. Insert the memory module into the memory socket [1].
  - b. Press the clips to secure the memory module to the system board [2].
  - c. Slide in the memory shield on the memory module [3].
  - d. Replace the single (M2.0x3.0) screw to secure the memory shield to the memory module [4].

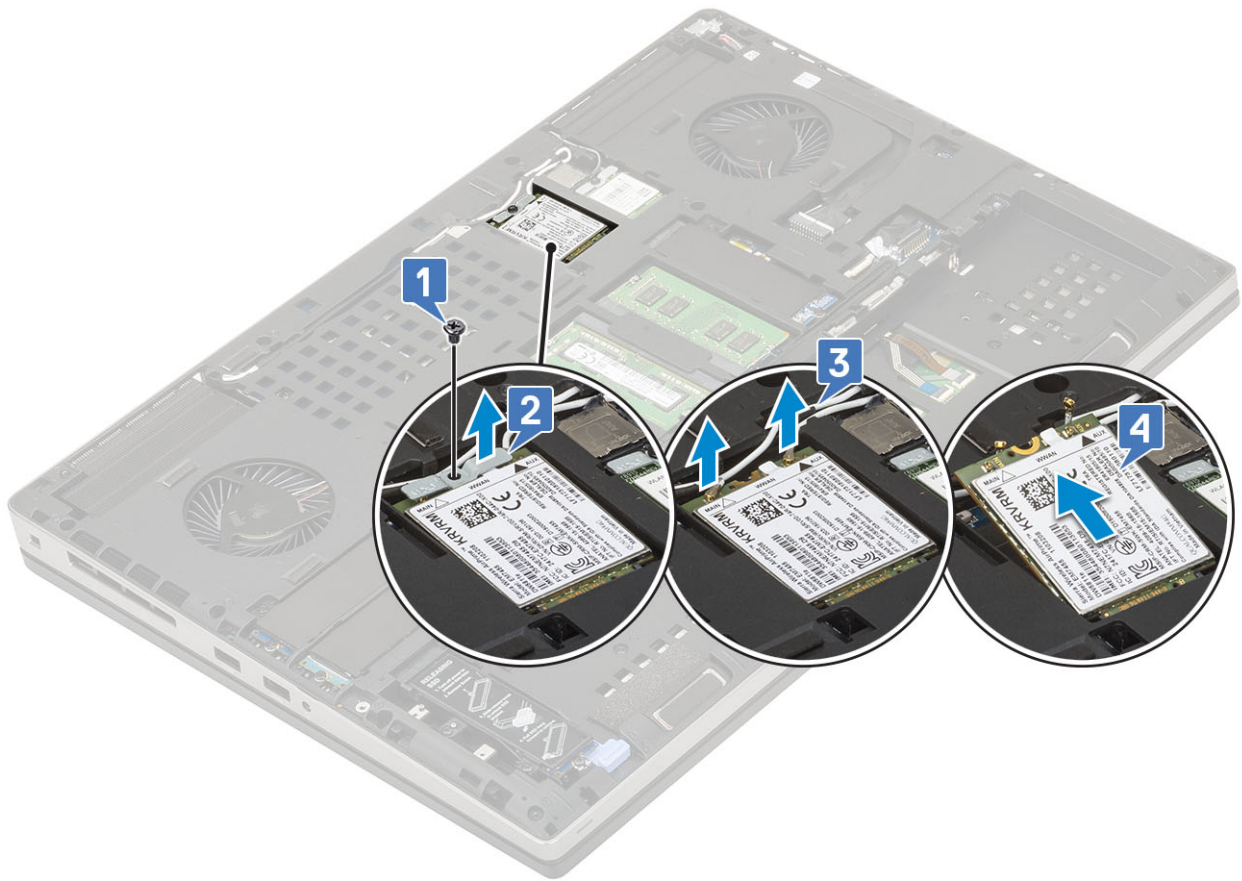


2. Install the:
  - a. keyboard
  - b. battery
  - c. battery cover
  - d. SD card
3. Follow the procedure in [After working inside your computer](#).

## WWAN card

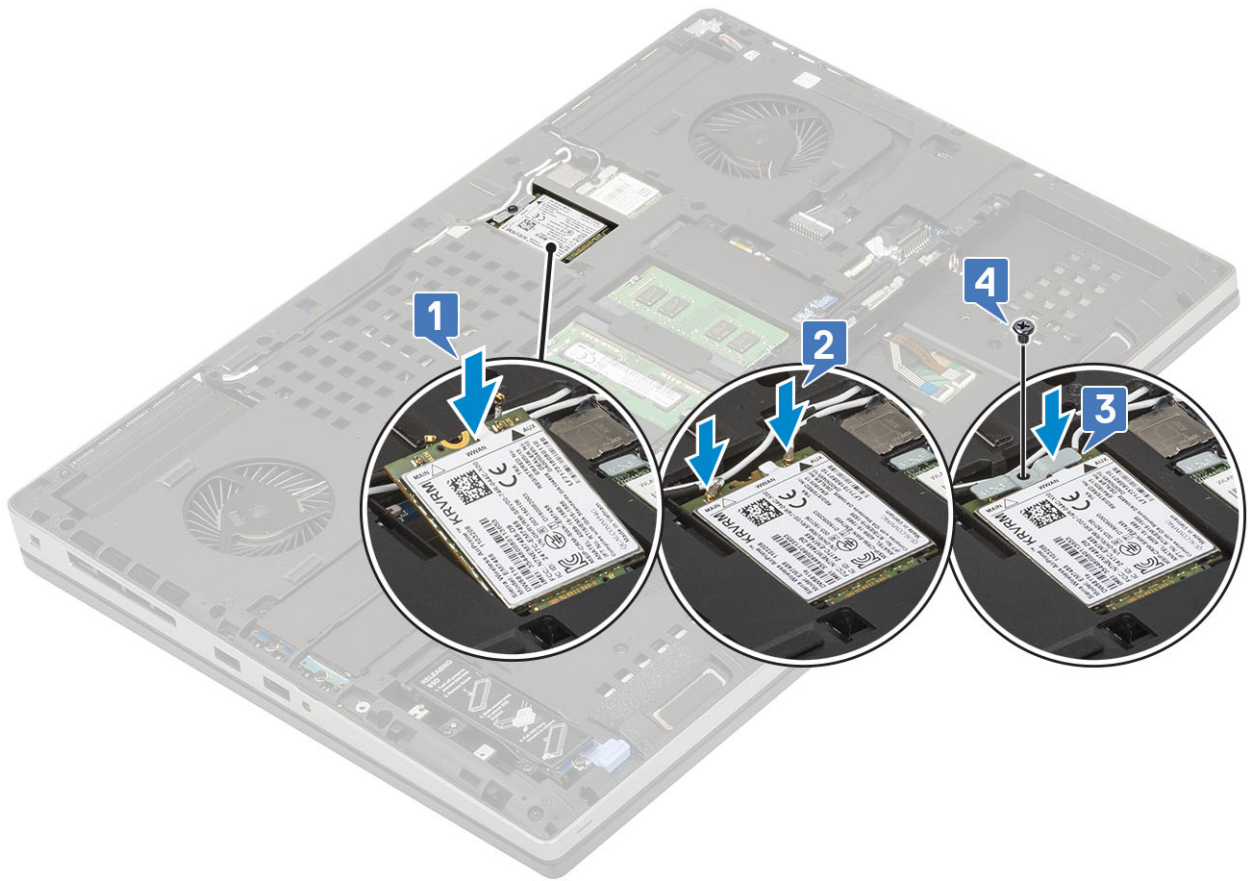
### Removing WWAN card

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. base cover
3. To remove the WWAN card:
  - a. Remove the single (M2.0x3.0) screw that secures the WWAN metal bracket to the system board [1].
  - b. Remove the WWAN metal bracket that secures the WWAN antenna cables [2].
  - c. Disconnect and unrout the WWAN antenna cables connected to the WWAN card [3].
  - d. Remove the WWAN card from the WWAN card slot in the system board [4].



## Installing the WWAN card

1. To install the WWAN card:
  - a. Slide the WWAN card to the WWAN card slot on the system board [1].
  - b. Route the WWAN antenna cables through the routing channel.
  - c. Connect the antenna cables to the connectors on the WWAN card [2].
  - d. Align the WWAN metal bracket above the WWAN card and replace the single (M2.0x3.0) screw to secure the WWAN metal bracket to the system board [3,4].

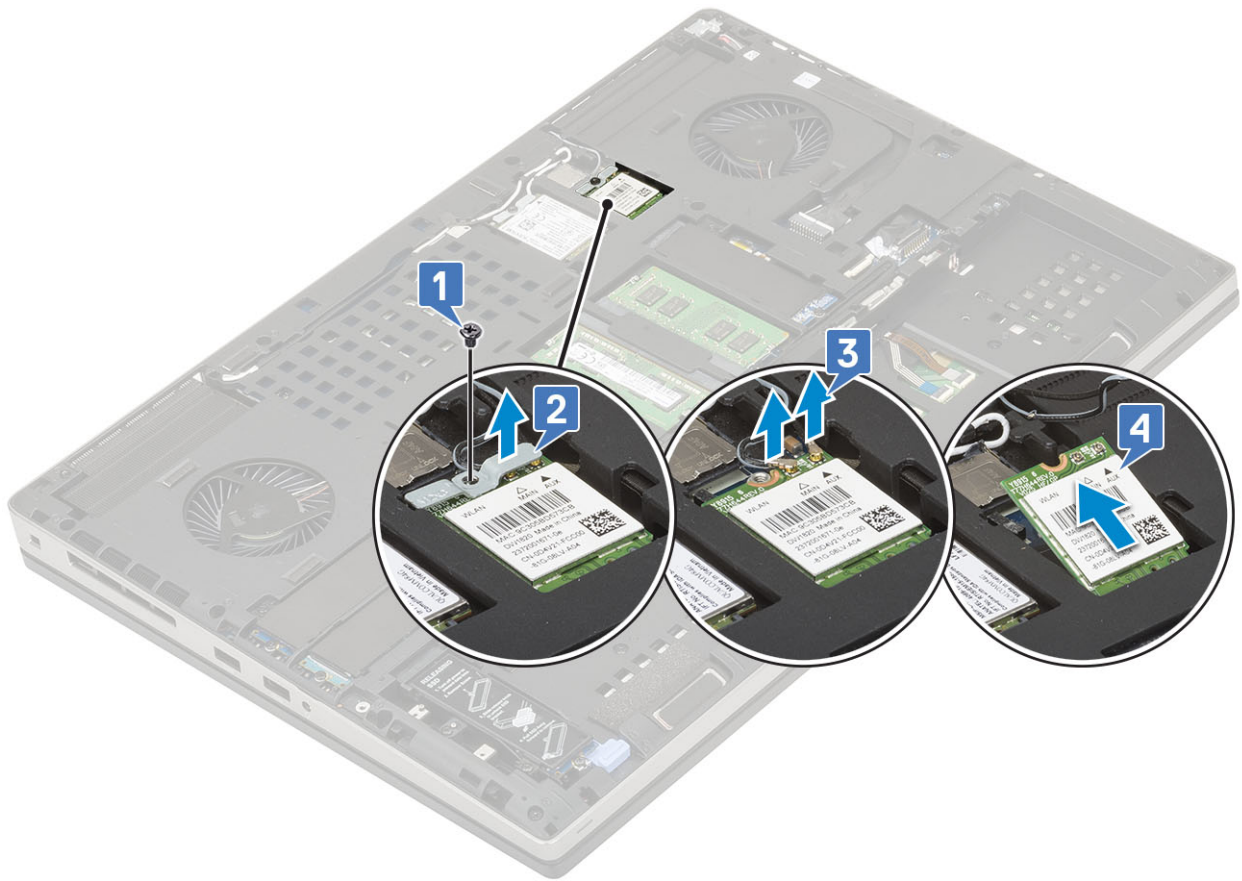


2. Install the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [battery cover](#)
  - d. [SD card](#)
3. Follow the procedure in [After working inside your computer](#).

## WLAN card

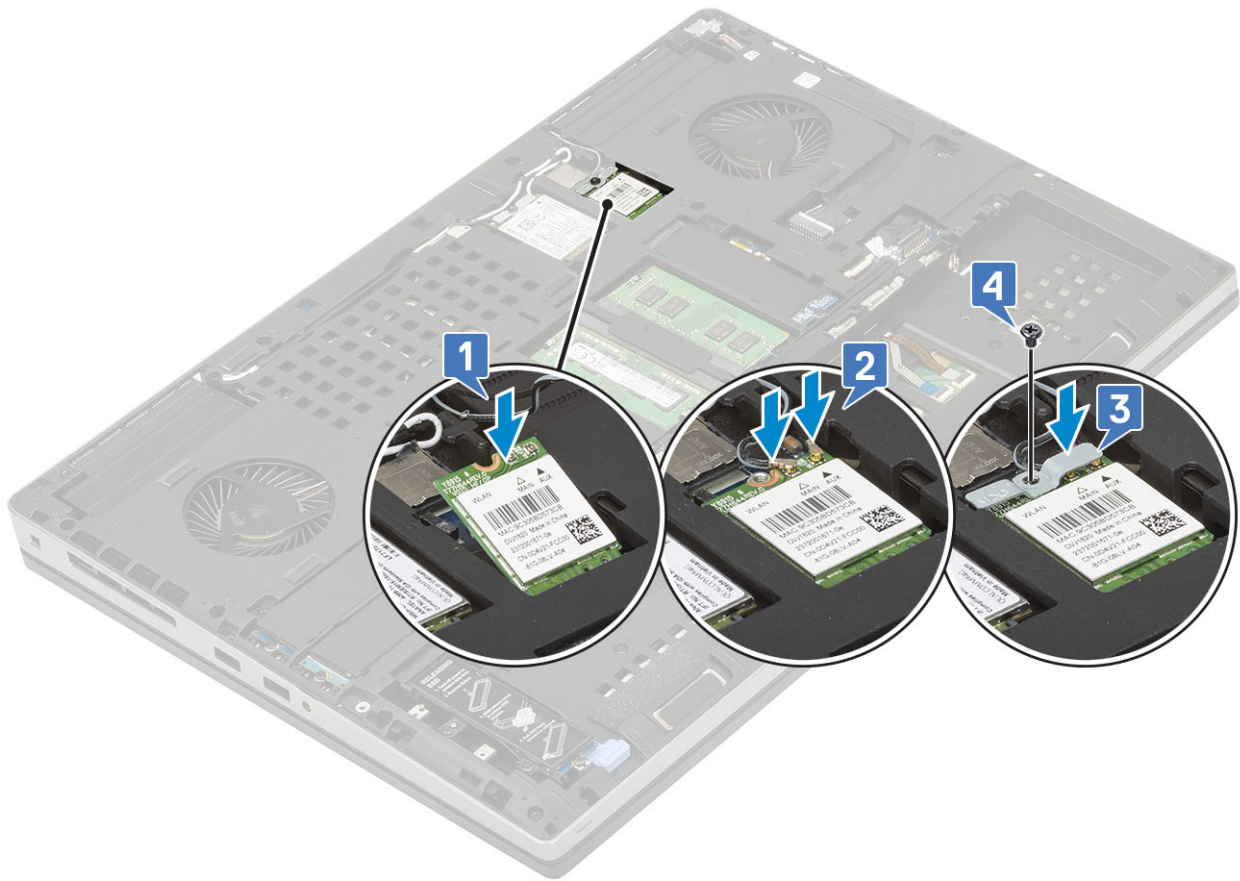
### Removing the WLAN card

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [SD card](#)
  - b. [battery cover](#)
  - c. [battery](#)
  - d. [base cover](#)
3. To remove the WLAN card:
  - a. Remove the single (M2.0x3.0) screw that secures the WLAN metal bracket to the system board [1].
  - b. Remove the WLAN metal bracket that secures the WLAN antenna cables [2].
  - c. Disconnect and un-route the antenna cables connected to the WLAN card [3].
  - d. Remove the WLAN card from the WLAN card slot in the system board [4].



## Installing the WLAN card

1. To install the WLAN card:
  - a. Slide the WLAN card to the WLAN card slot in the system board [1].
  - b. Route the WLAN antenna cables through the routing channel.
  - c. Connect the antenna cables to the connectors in the WLAN card [2].
  - d. Align the WLAN metal bracket above the WLAN card and replace the single (M2.0x3.0) screw to secure the WLAN metal bracket to the system board [3,4].



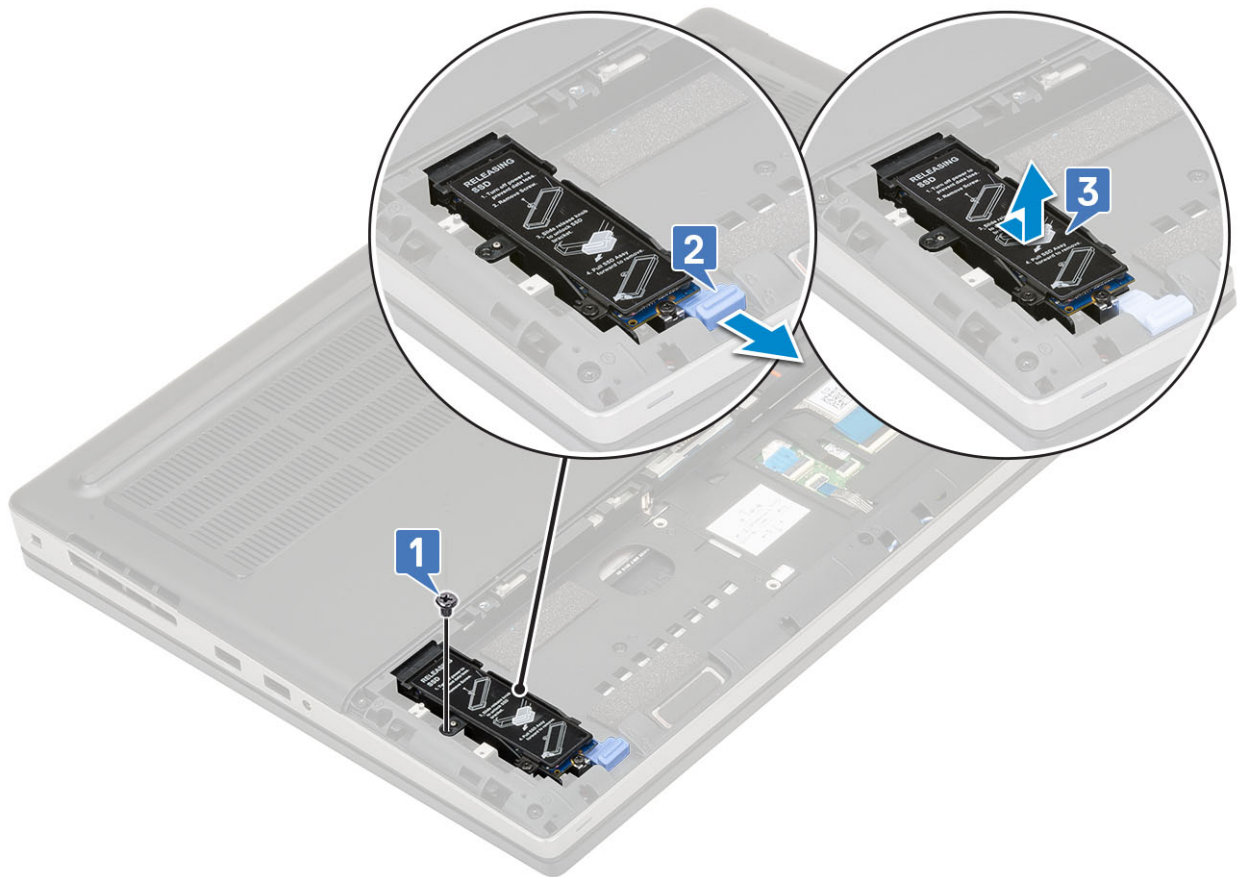
2. Install the:
  - a. base cover
  - b. battery
  - c. battery cover
  - d. SD card
3. Follow the procedure in [After working inside your computer](#).

## Solid State Drive — optional

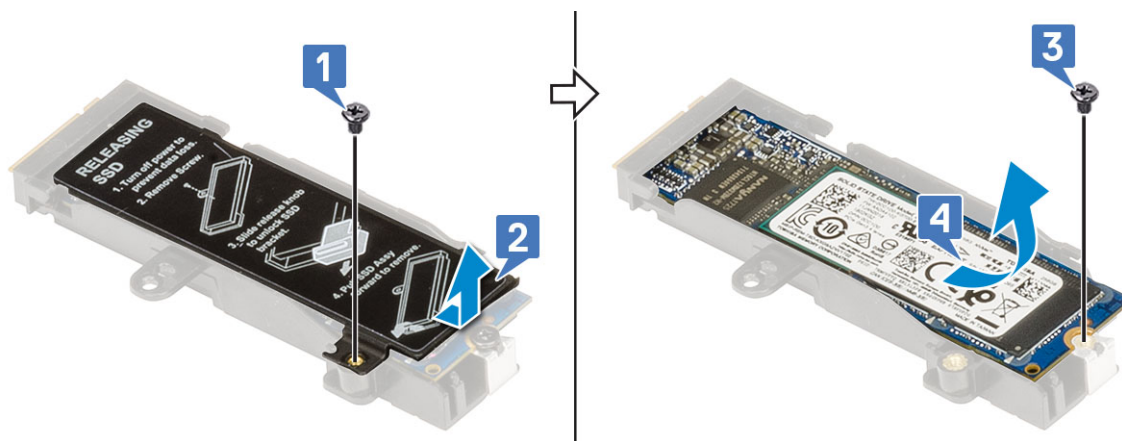
### Removing the M.2 Solid State Drive—SSD module

1. Follow the procedures in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. base cover

**NOTE:** Removal of base cover is required only to access the M.2 SSD module in slot 3, 5 or 6.
3. To remove the M.2 SSD module (Slot 4):
  - a. Remove the single (M2.0x3.0) screw that secures the SSD assembly to the system [1].
  - b. Pull the release latch to unlock the SSD assembly [2].
  - c. Remove the SSD assembly from the system [3].

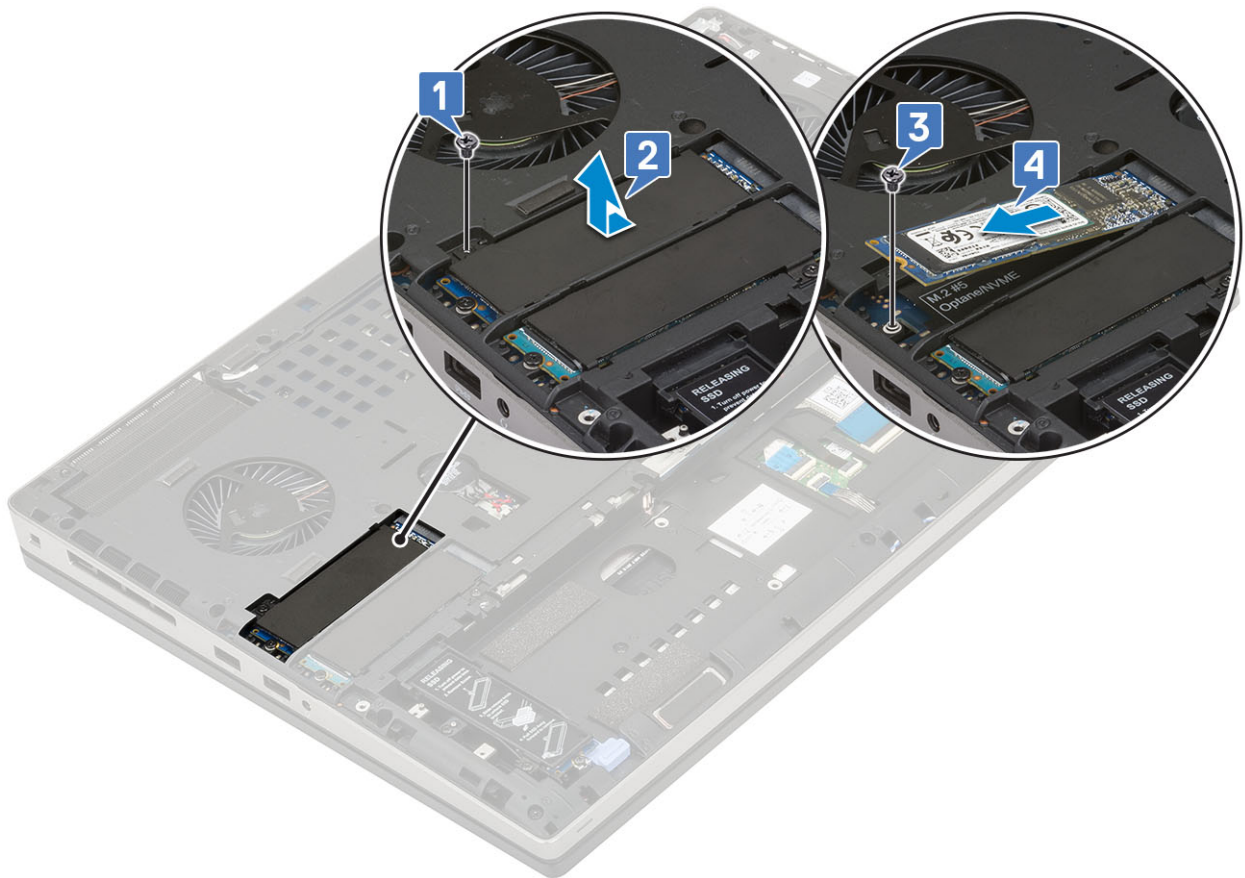
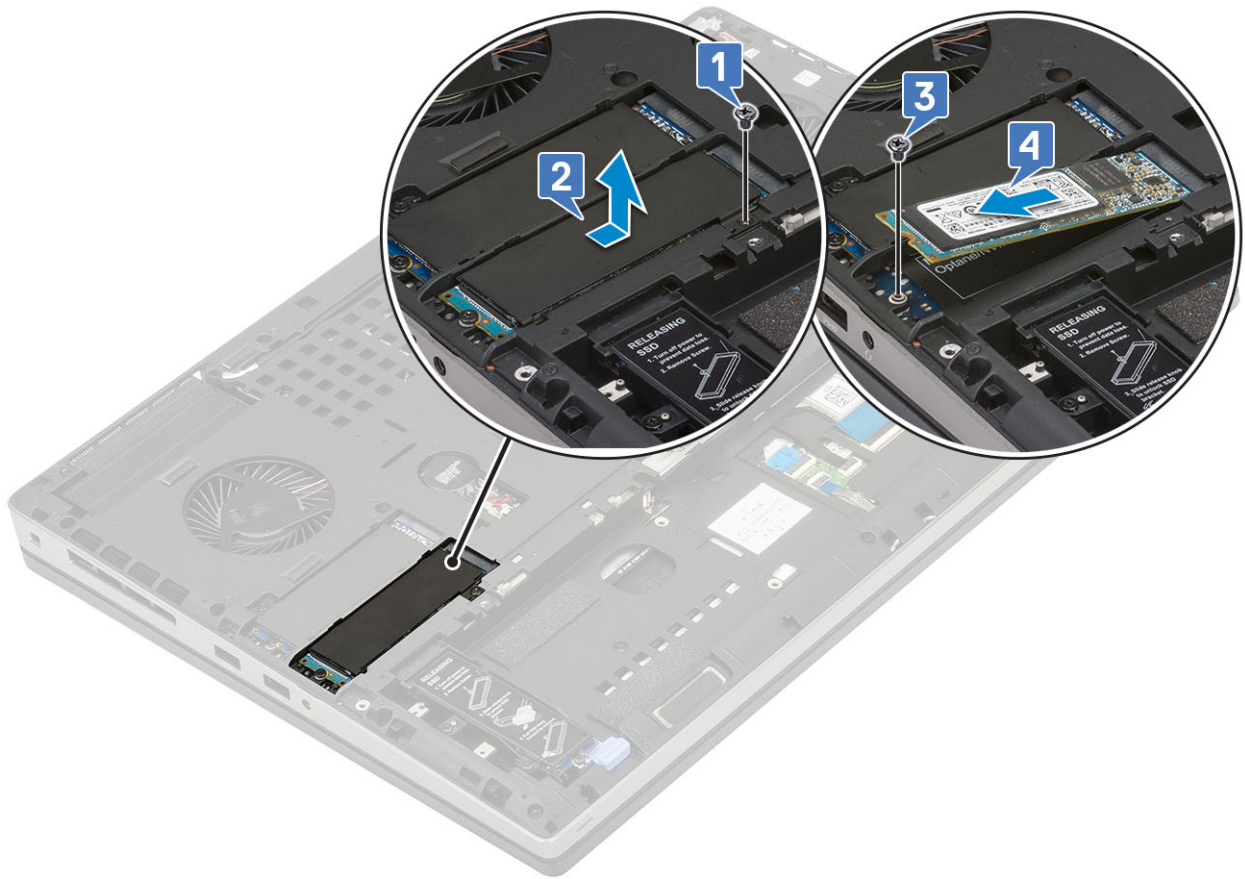


- d. Remove the single (M2.0x3.0) screw that secures the thermal plate to the SSD assembly [1].
- e. Remove the thermal plate away from the SSD assembly [2].
- f. Remove the single (M2.0x3.0) screw that secures M.2 SSD to the SSD holder [3].
- g. Remove the M.2 SSD from the SSD holder [4].



- 4. To remove the M.2 SSD module (Slot 3, 5 or 6):
  - a. Remove the single (M2.0x3.0) screw that secures the thermal plate to the system [1].
  - b. Slide and remove the thermal plate [2].
  - c. Remove the single (M2.0x3.0) screw that secures the M.2 SSD to the system board [3].
  - d. Remove the M.2 SSD from the system [4].

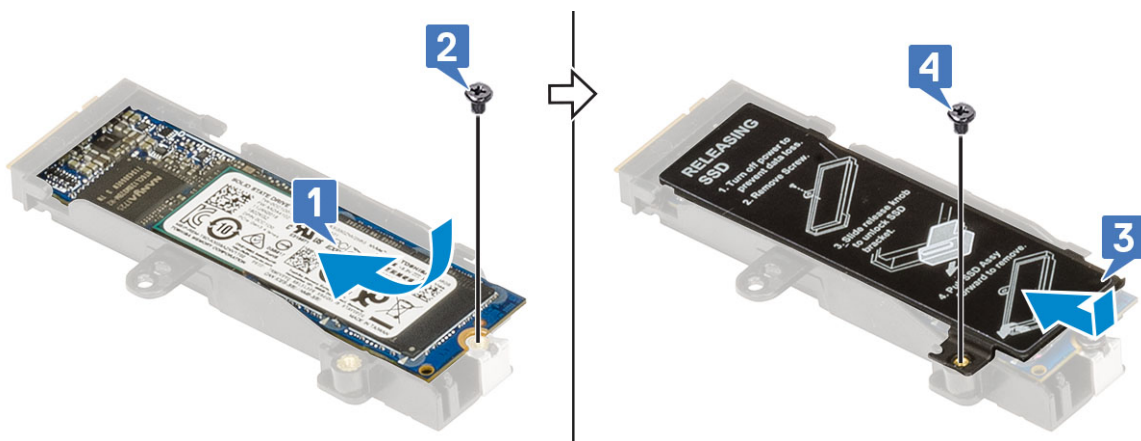
**NOTE:** Repeat the above steps for removal of other M.2 SSD installed.



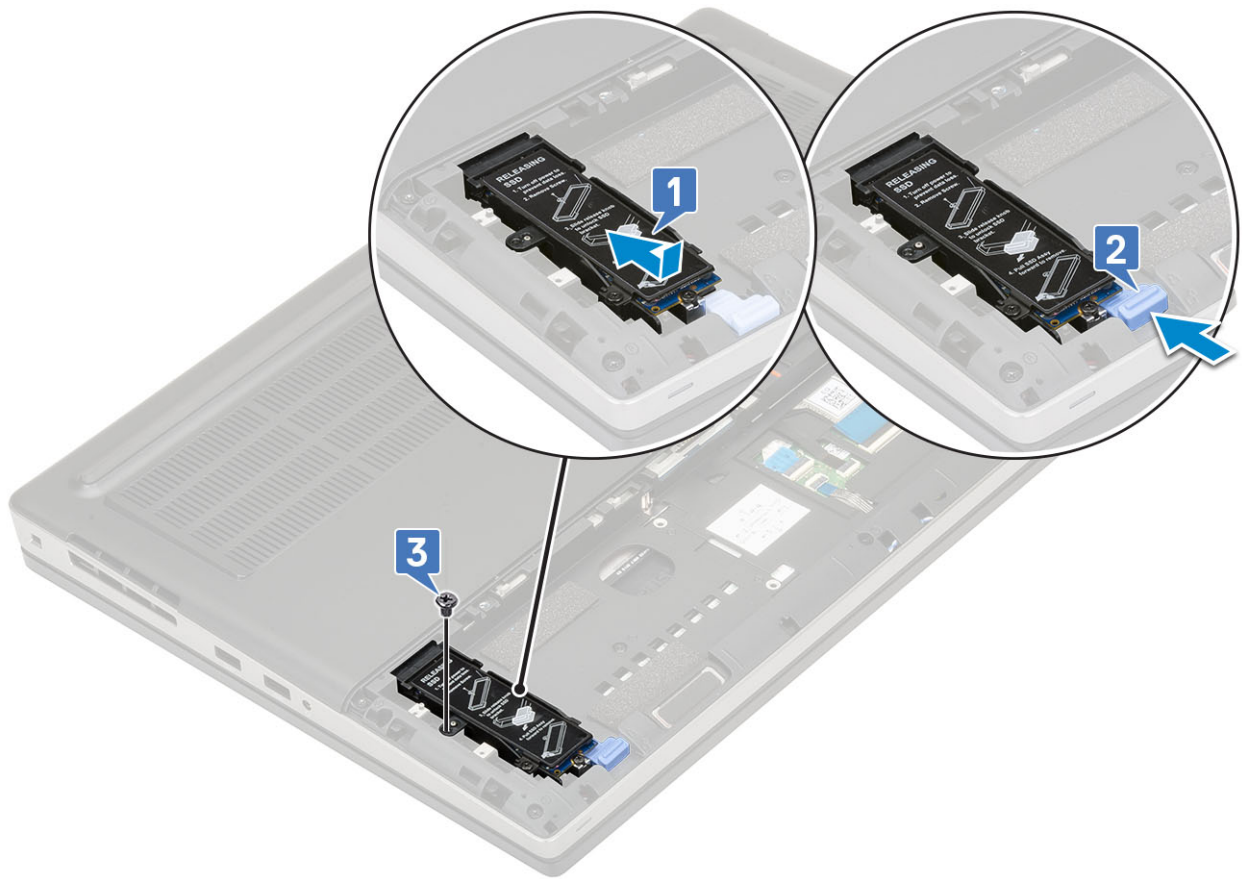


## Installing the M.2 SSD module

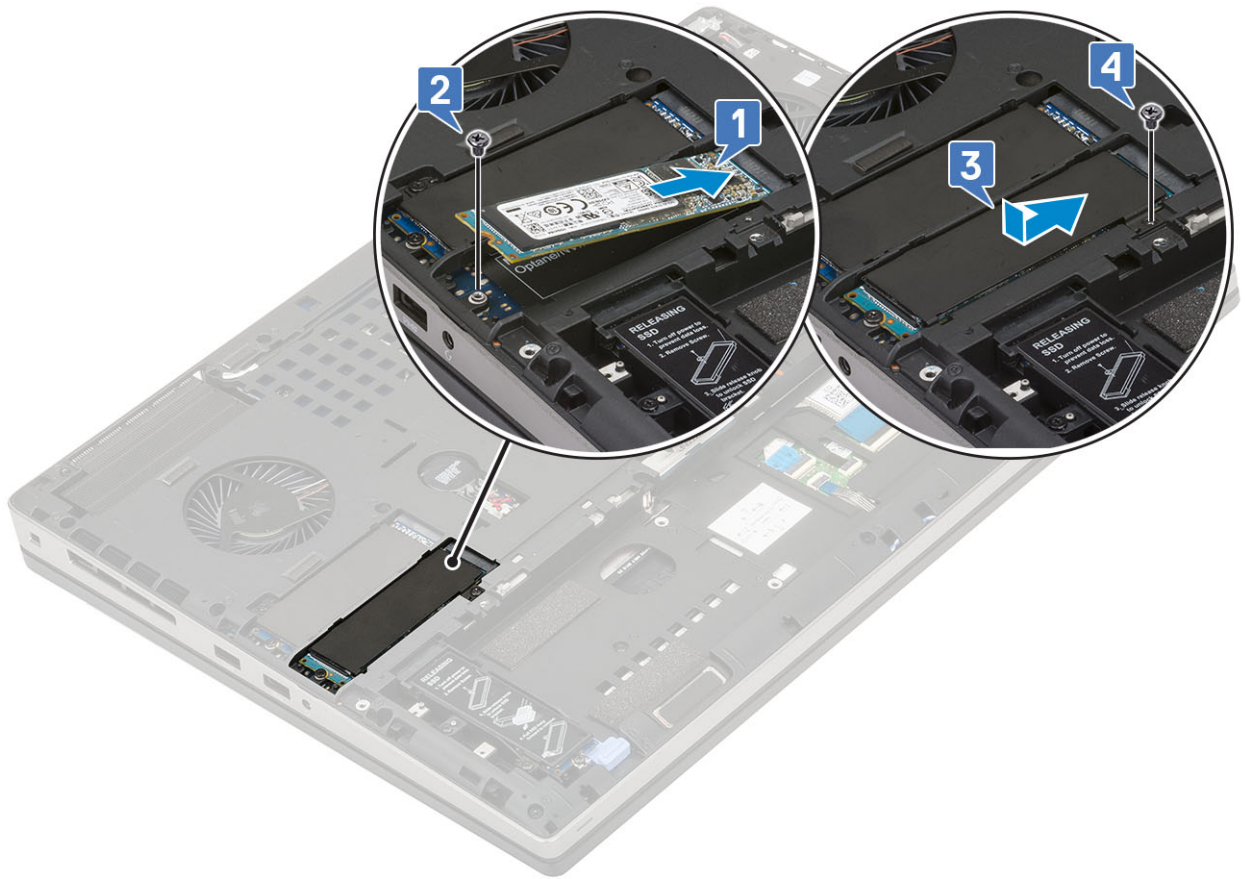
1. To install the M.2 SSD module (Slot 4):
  - a. Place the M.2 SSD into the slot in the SSD holder [1].
  - b. Replace the single (M2.0x3.0) screw to secure the M.2 SSD to the SSD holder [2].
  - c. Place the thermal plate above the M.2 SSD assembly [3].
  - d. Replace the single (M2.0x3.0) screw to secure the thermal plate to the M.2 SSD assembly [4].



- e. Align the M.2 SSD assembly into its slot in the system [1].
- f. Slide the release latch to lock the M.2 SSD assembly into its slot [2].
- g. Replace the single (M2.0x3.0) screw to secure the M.2 SSD assembly to the system [3].



2. To install the M.2 SSD module (Slot 3, 5 or 6):
  - a. Place the M.2 SSD into its slot in the system [1].
  - b. Replace the single (M2.0x3.0) screw to secure the M.2 SSD to the system board [2].
  - c. Place the thermal plate above the M.2 SSD module [3].
  - d. Replace the single (M2.0x3.0) screw to secure the thermal plate to the M.2 SSD [4].





3. Install the:
  - a. [base cover](#)  
**i** **NOTE:** Installing of base cover is required only if the M.2 SSD module in slot 3, 5 or 6 are accessed.
  - b. [battery](#)
  - c. [battery cover](#)
  - d. [SD card](#)
4. Follow the procedure in [After working inside your computer](#).

## Coin-cell battery

### Removing the coin cell battery

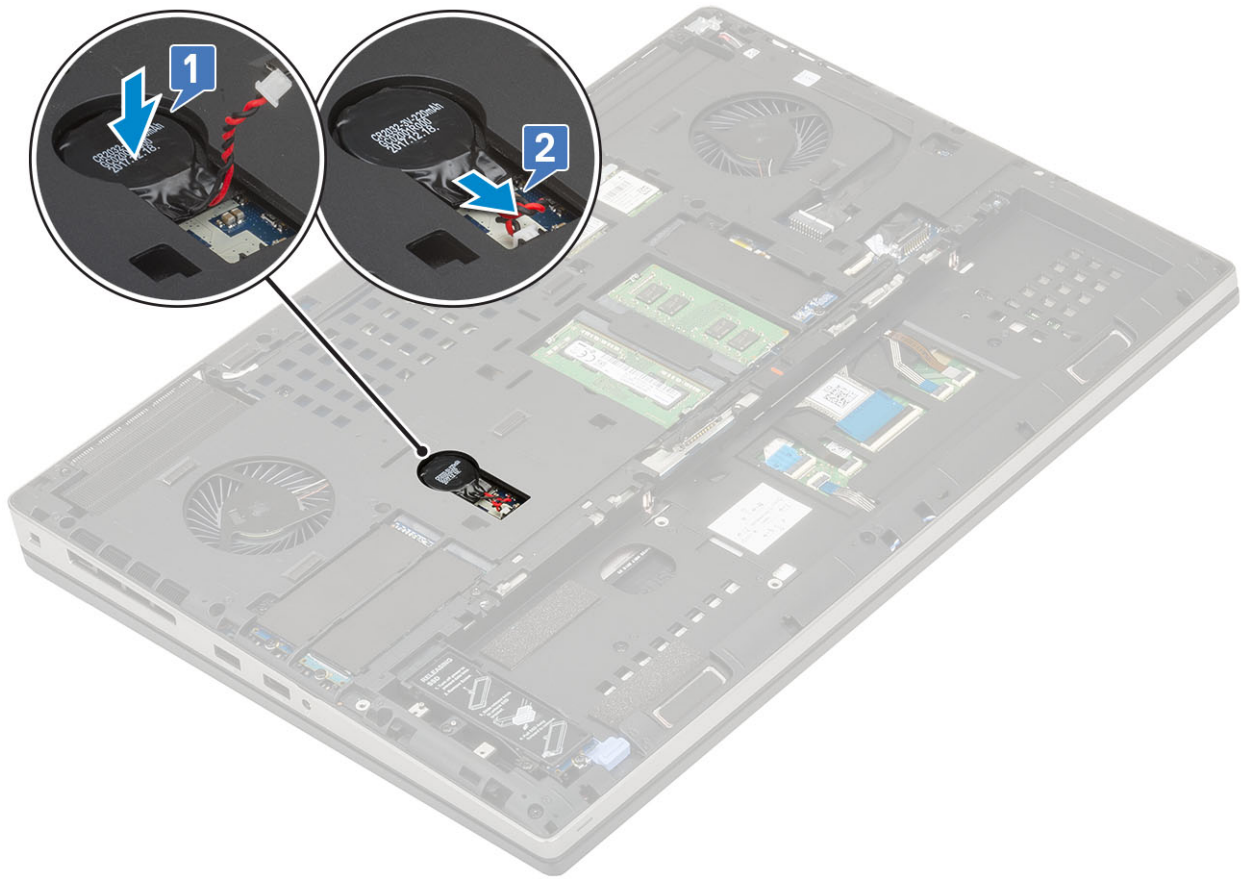
1. Follow the procedures in [Before working inside your computer](#).
2. Remove the:
  - a. [SD card](#)
  - b. [battery cover](#)
  - c. [battery](#)
  - d. [base cover](#)
3. To remove coin cell battery:
  - a. Disconnect the coin cell battery cable from the system [1].
  - b. Pry and lift the coin cell battery from the system [2].



**CAUTION:** Disconnecting coin cell battery may reset BIOS settings, time and date within System Settings, cause BitLocker or other security resets.

## Installing the coin cell battery

1. To install the coin cell battery:
  - a. Replace the coin cell battery in its slot on the system.
  - b. Connect the coin cell battery cable to the system.

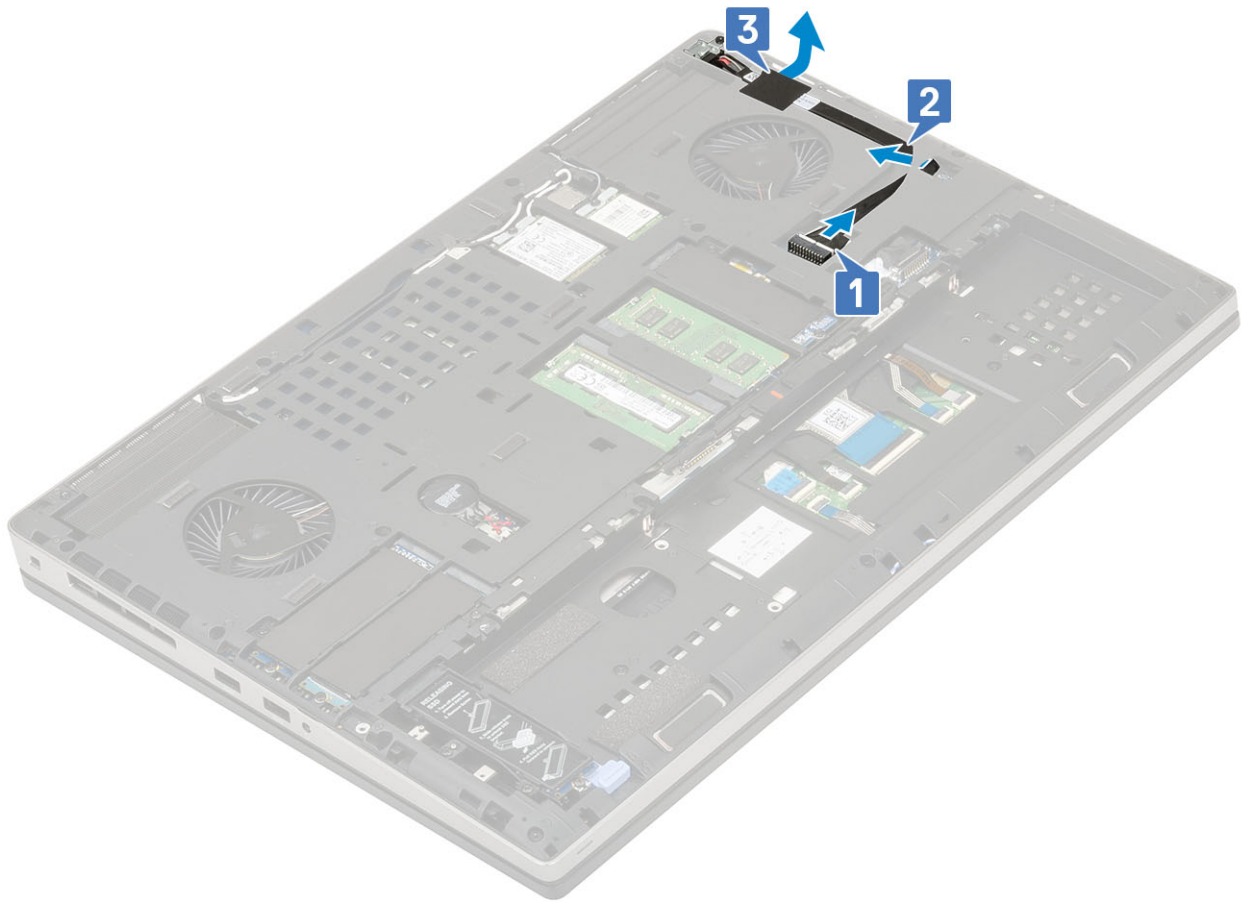


2. Install the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [battery cover](#)
  - d. [SD card](#)
3. Follow the procedure in [After working inside your computer](#).

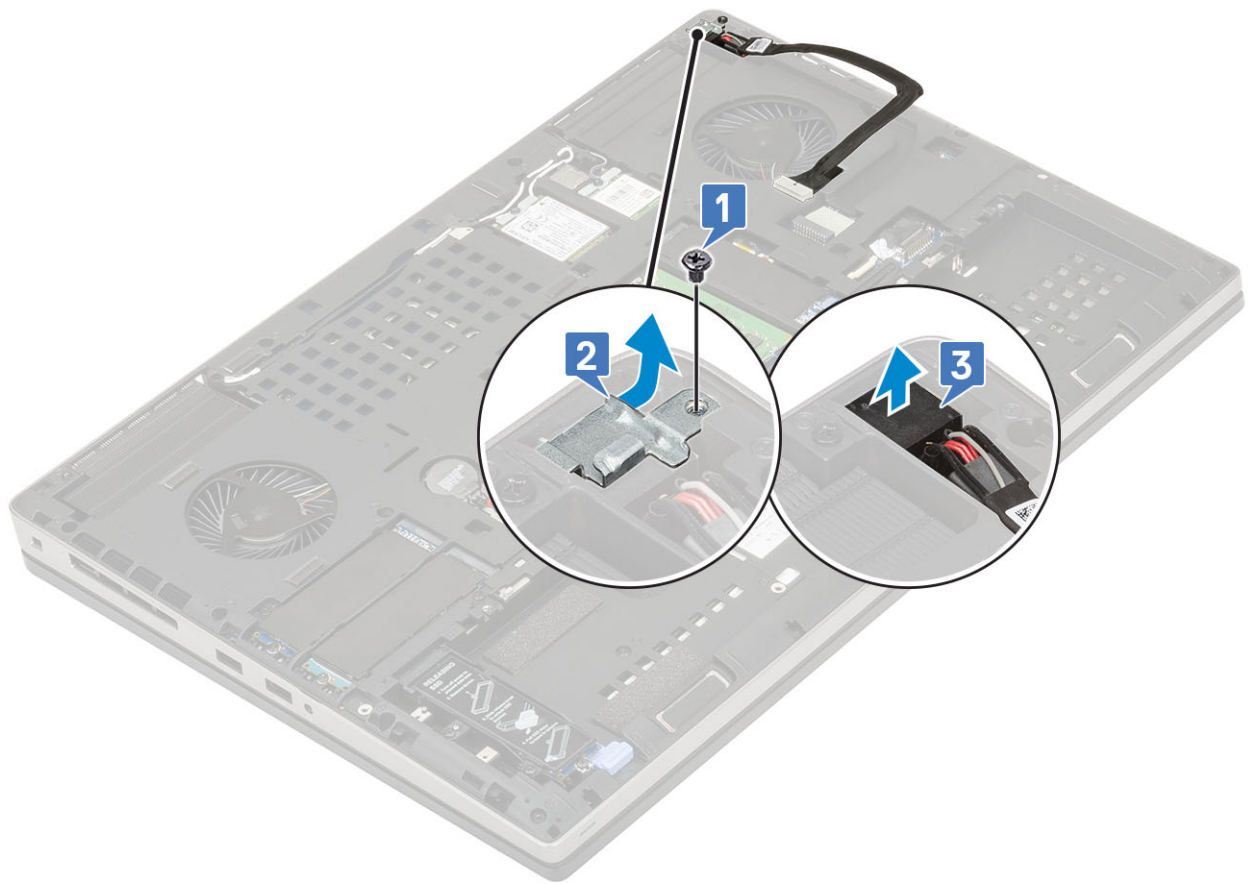
## Power connector port

### Removing the power connector port

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [SD card](#)
  - b. [battery cover](#)
  - c. [battery](#)
  - d. [base cover](#)
3. To remove power connector port:
  - a. Disconnect the power connector cable from the connector on the system board [1].
  - b. Peel the adhesive tape that secures the power connector cable to the system and unroute the cable [2, 3].

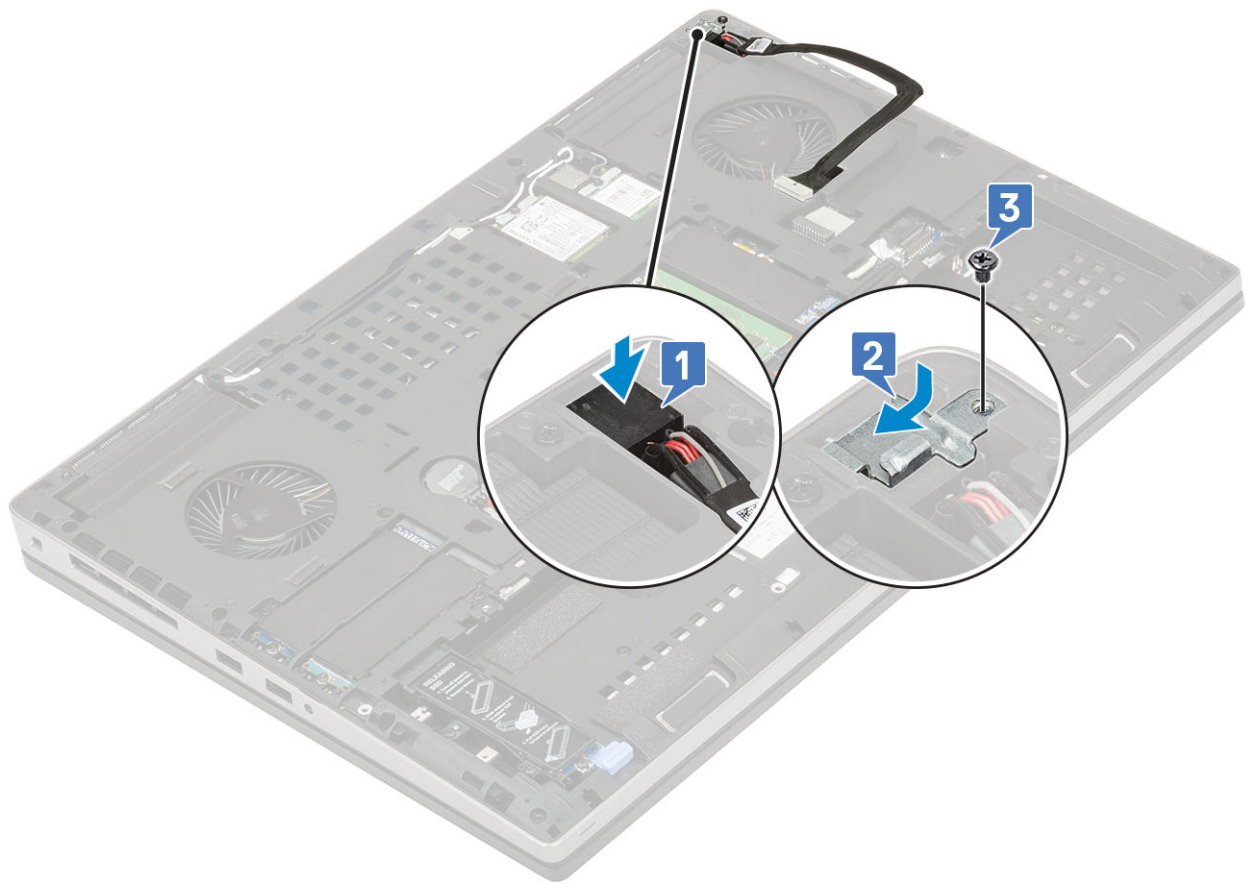


- c. Remove the single (M2.0x3.0) screw that secures the power connector cable metal bracket to the system [1].
- d. Remove the metal bracket away from the system [2].
- e. Lift the power connector port from the system [3].

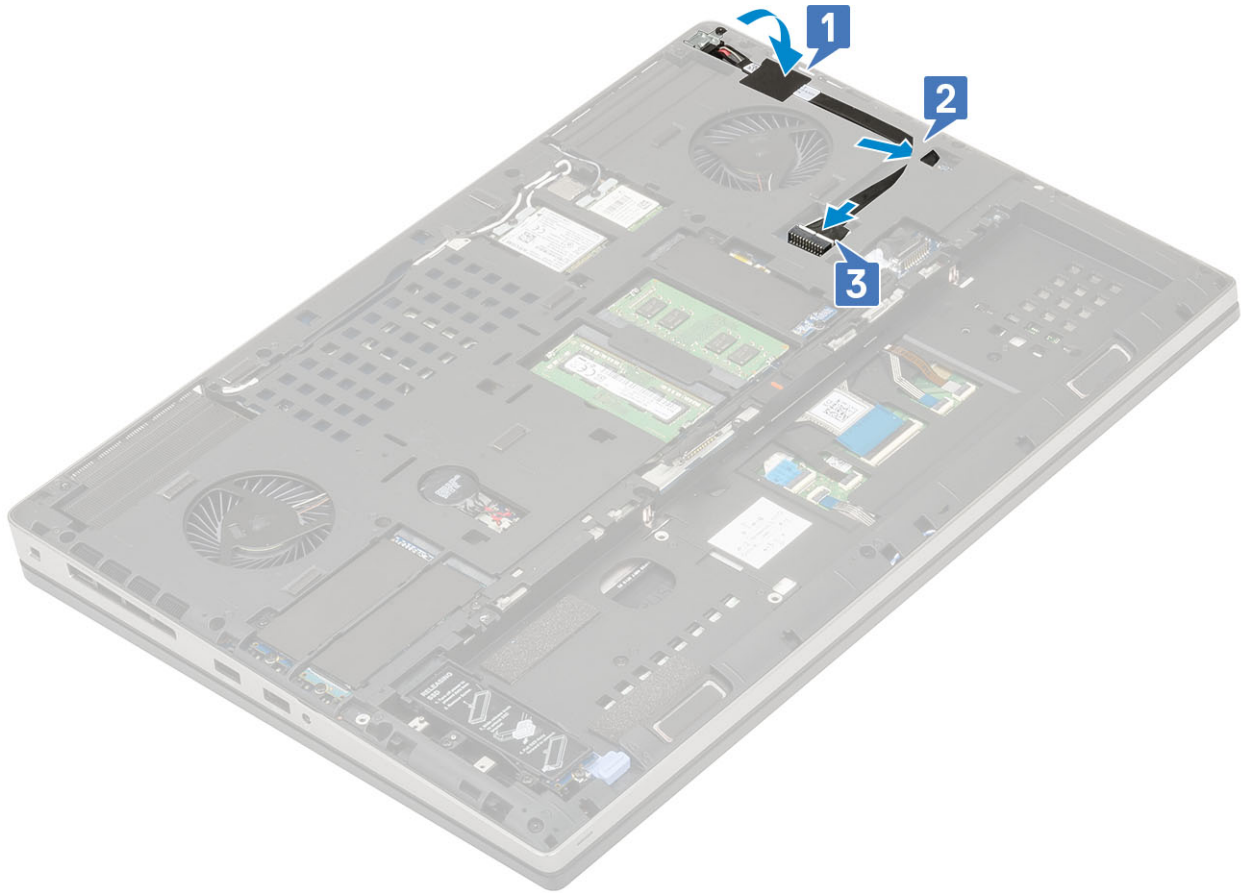


## Installing the power connector port

1. To install the power connector port:
  - a. Connect the power connector port to the system [1].
  - b. Place the power connector cable metal bracket [2].
  - c. Replace the single (M2.0x3.0) screw to secure the metal bracket to the system [3].



- d. Affix the adhesive tape to secure the power connector cable in place [1].
- e. Route the cable through the routing channel and affix the adhesive tape [2].
- f. Connect the power connector cable to the connector on the system board [3].

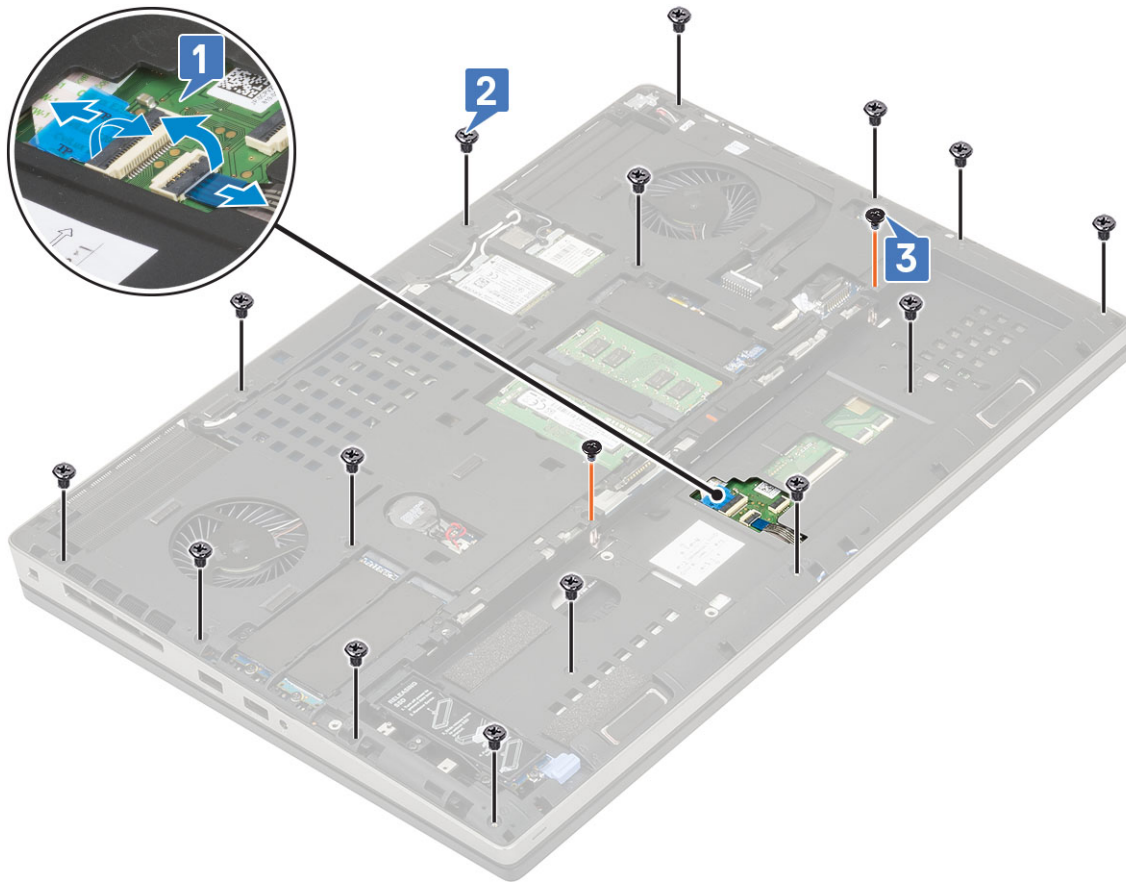


2. Install the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [battery cover](#)
  - d. [SD card](#)
3. Follow the procedure in [After working inside your computer](#).

## Palm rest

### Removing the palmrest

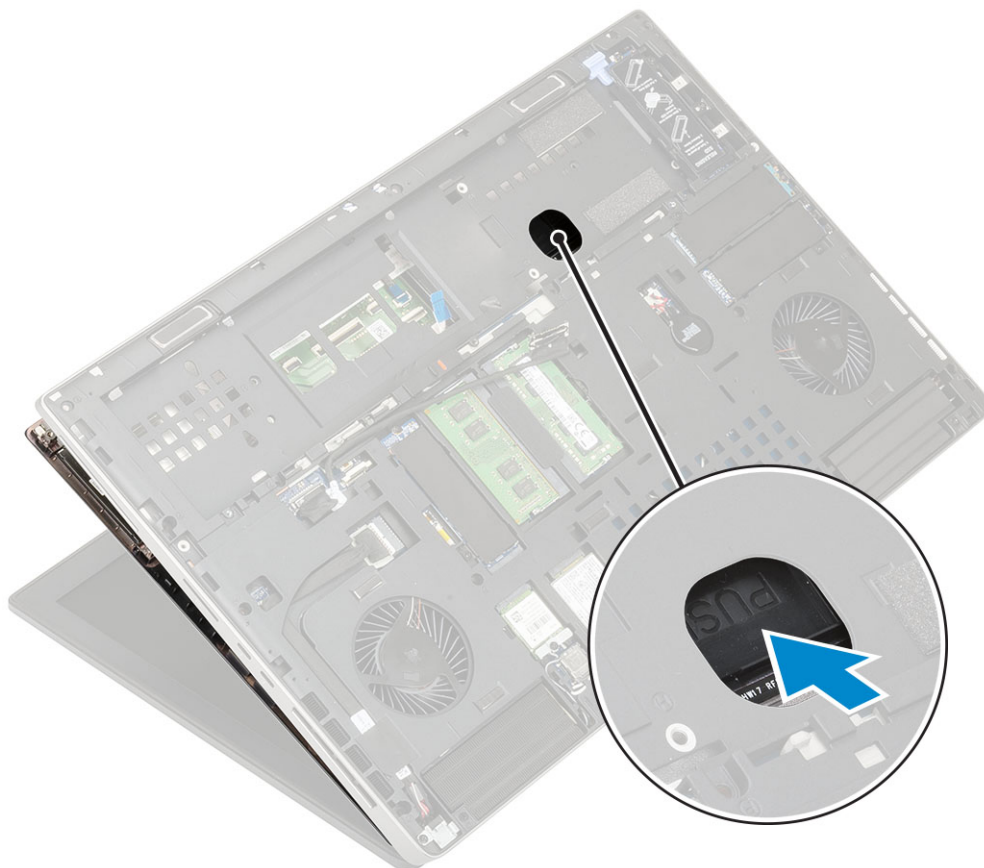
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [SD card](#)
  - b. [battery cover](#)
  - c. [battery](#)
  - d. [keyboard](#)
  - e. [hard drive](#)
  - f. [base cover](#)
3. To remove the palmrest:
  - a. Lift the latches and disconnect the touchpad and touchpad button cables from the connectors on the system board [1].
  - b. Remove the 15 (M2.5x5.0) and the 2 (M2.0x3.0) screws that secure the palmrest assembly in place [2, 3].



- c. Turn the system around and disconnect the system board cable and power button cable from the connectors on the system board [1, 2].
- d. Remove the 4 (M2.0x3.0) screws that secure the palmrest to the system [3].



e. Push the hole at the bottom of the system to release the palmrest from the bottom chassis.



f. Lift and remove the palmrest from the system.



## Installing the palmrest

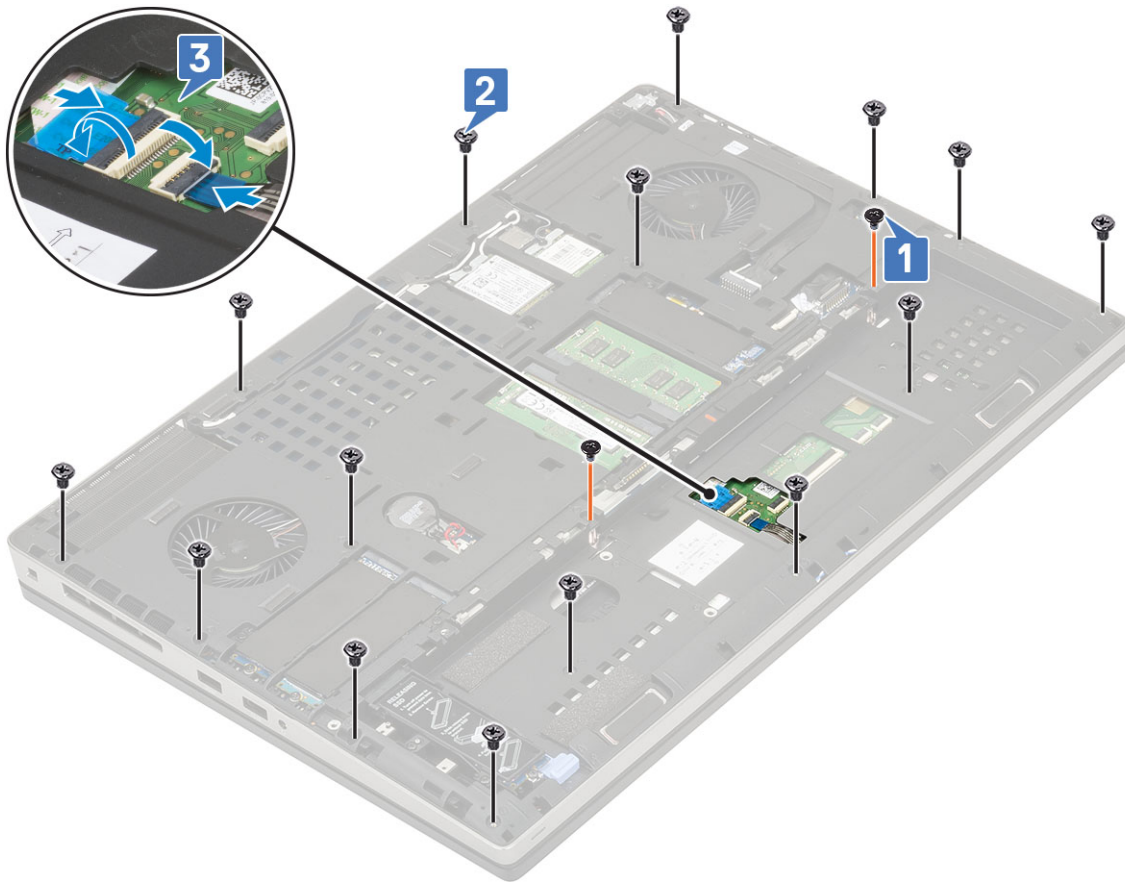
1. To install the palmrest:
  - a. Align the palmrest on the system and press until it snaps in its place [1, 2].



- b. Replace the 4 (M2.0x3.0) screws to secure the palmrest to the system [1].
- c. Connect the system board and power button cable to the connectors on the system board [2,3, 4].



- d. Turn the system and replace the 15 (M2.5x5.0) and the 2 (M2.0x3.0) screws to secure the palmrest to the system [1, 2].
- e. Connect the touchpad and touchpad button cables to the connectors on the system board and lock the latch [3].



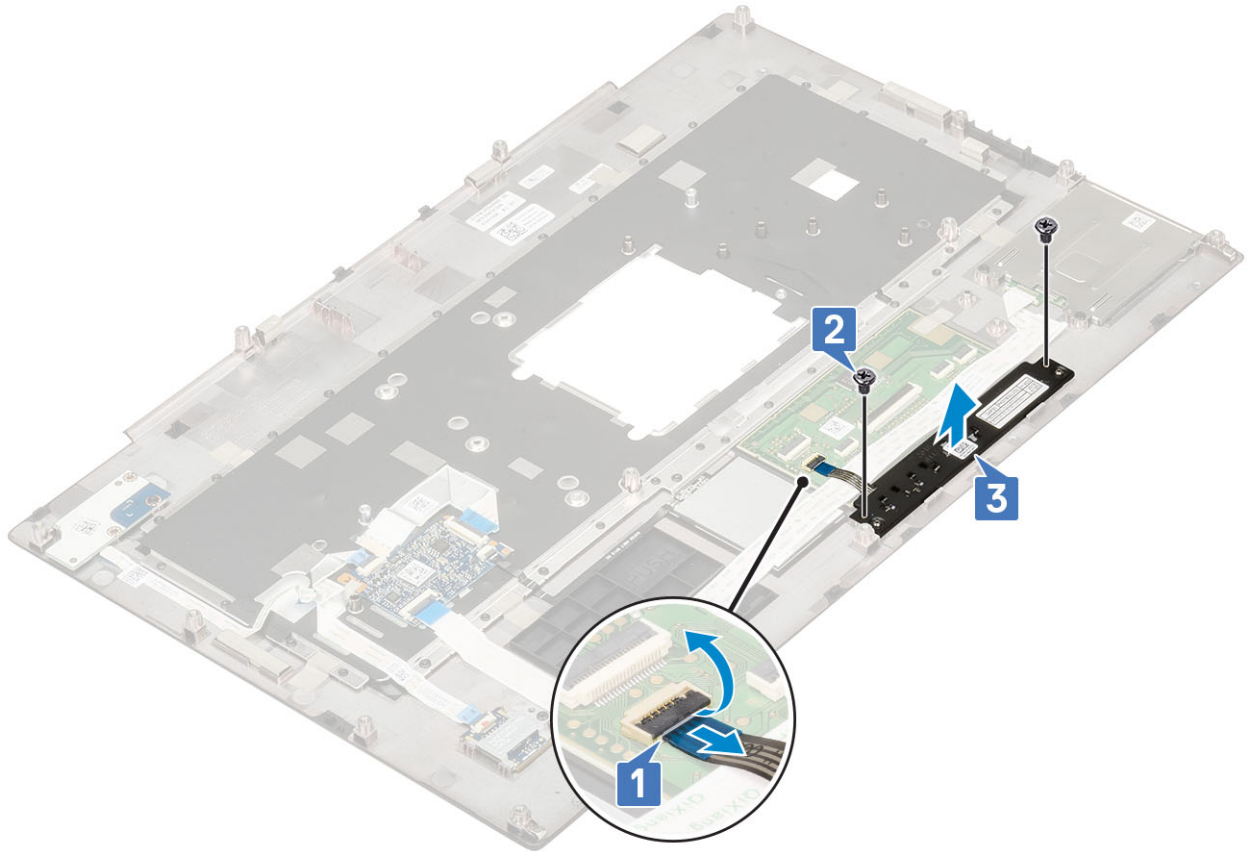
2. Install the:
  - a. base cover
  - b. keyboard
  - c. hard disk
  - d. battery
  - e. battery cover
  - f. SD card
3. Follow the procedure in [After working inside your computer](#).

## Touchpad button

### Removing the Touchpad buttons

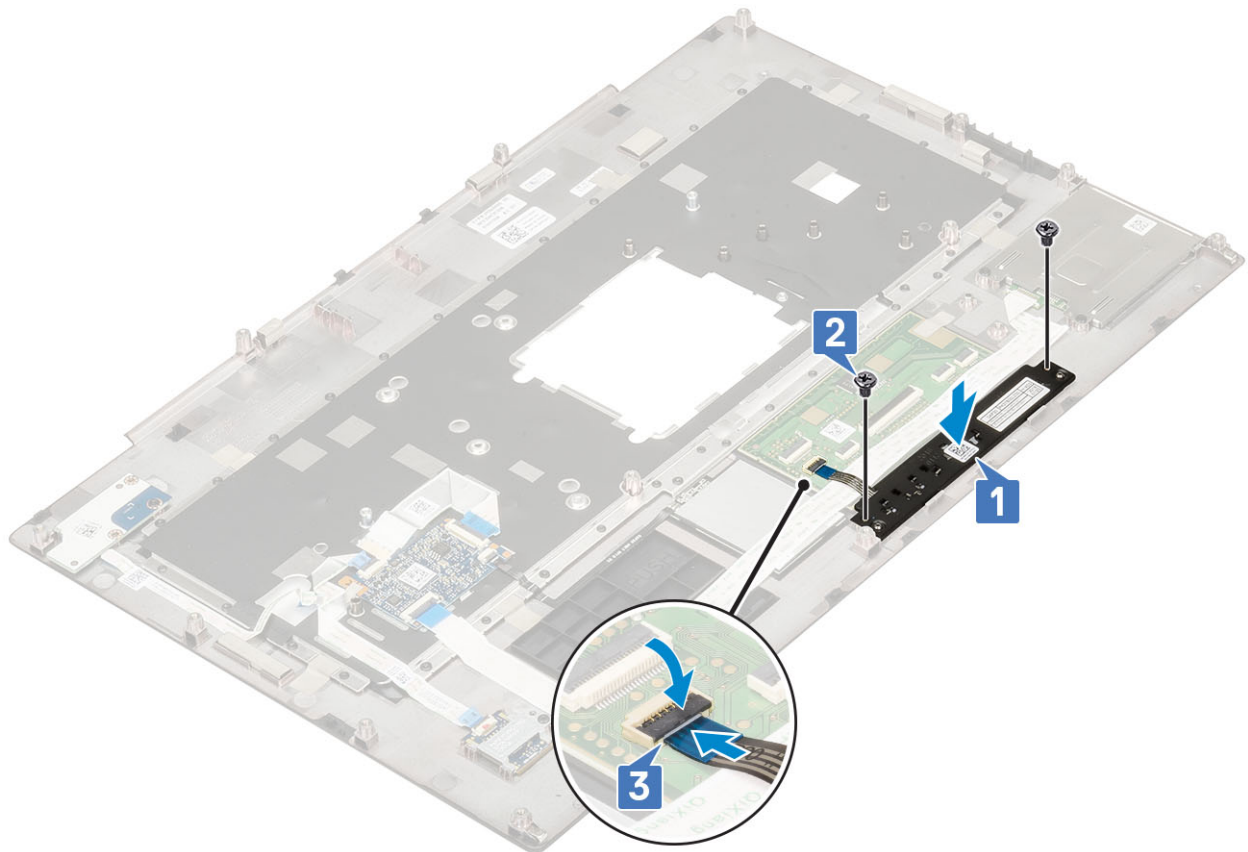
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. keyboard
  - e. hard drive
  - f. base cover
  - g. palmrest
3. To remove touchpad buttons:
  - a. Disconnect the touchpad cable from the touchpad [1].

- b. Remove the 2 (M2.0x3.0) screws that secure the touchpad buttons to the palmrest [2].
- c. Remove the touchpad button from the palmrest [3].



## Installing the Touchpad button

- 1. To install the touchpad button:
  - a. Place the touchpad button into its slot in the palmrest [1].
  - b. Replace the 2 (M2.0x3.0) screws to secure the touchpad button to the palmrest [2].
  - c. Connect the touchpad button cable to the connector in the touchpad [3].



2. Install the:
  - a. palmrest
  - b. base cover
  - c. hard drive
  - d. keyboard
  - e. battery
  - f. battery cover
  - g. SD card
3. Follow the procedure in [After working inside your computer](#).

## SIM card

### Removing SIM card

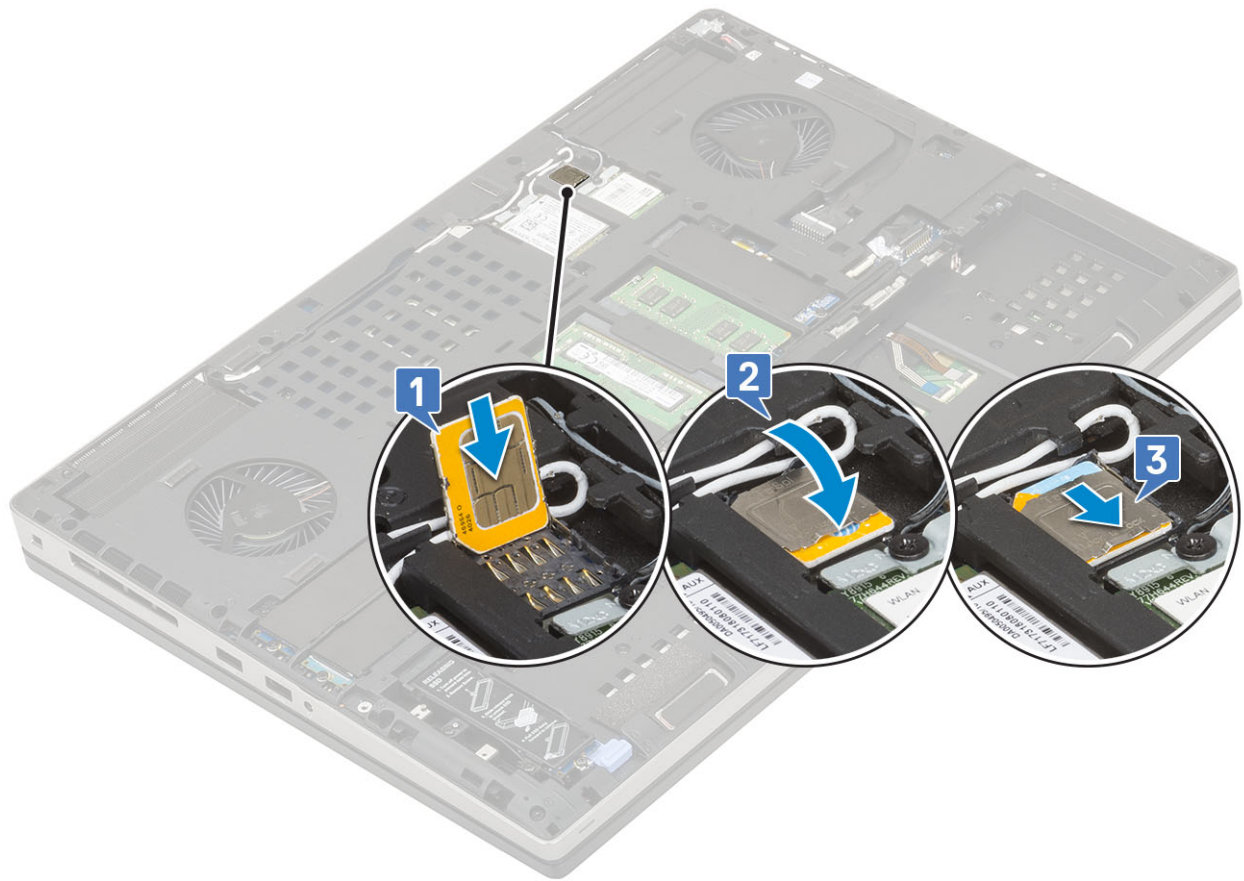
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. base cover
3. To remove SIM card:
  - a. Gently slide the SIM card cover towards the rear of the system to unlock the SIM card cover [1].
 

**CAUTION: The SIM card cover is very fragile and can be easily damaged if it is not properly unlocked before opening.**
  - b. Flip the SIM card cover from the bottom edge [2].
  - c. Lift the SIM card from the SIM card compartment [3].



## Installing SIM card

1. To install the SIM card:
  - a. Slide the SIM card into the SIM card compartment [1].
  - b. Snap the SIM card cover down [2].
  - c. Slide the SIM card cover towards the front of the system to lock the SIM card cover [3].

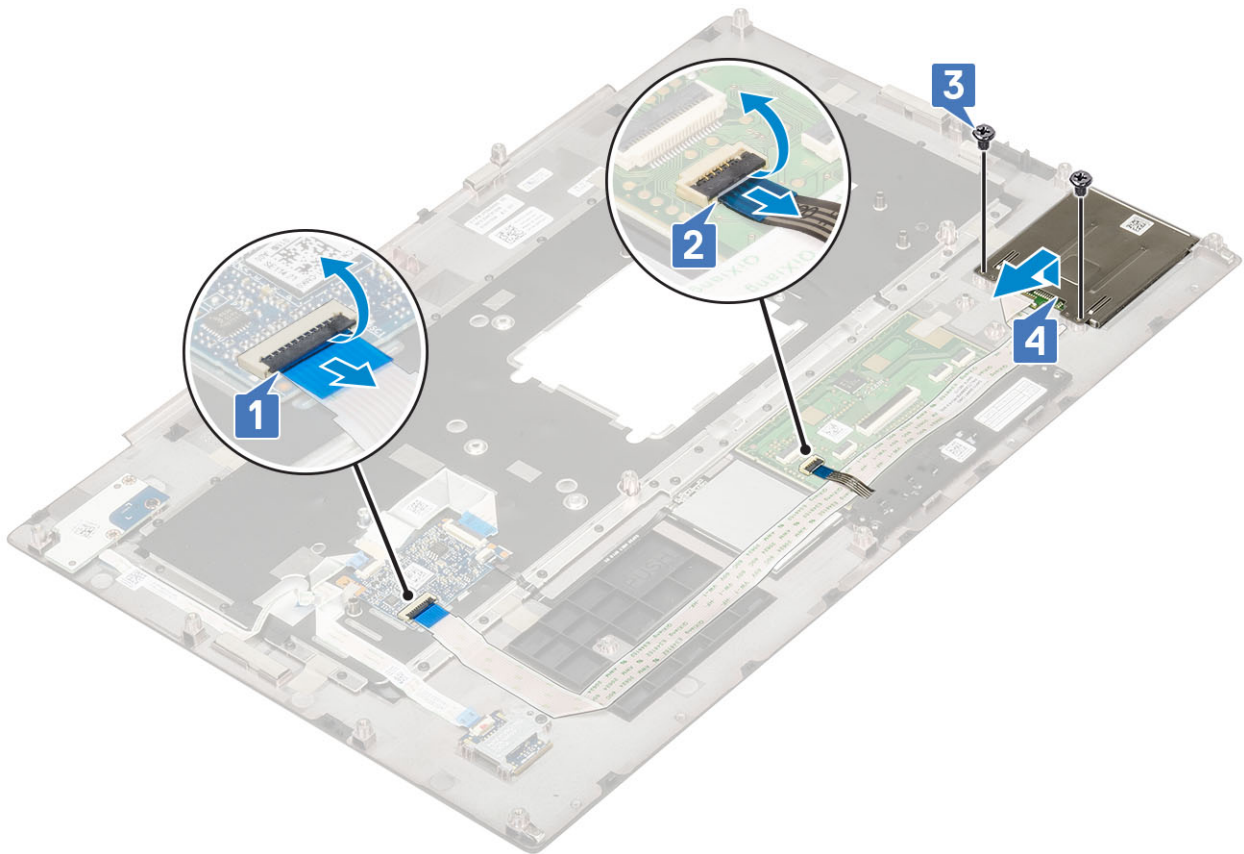


2. Install the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [battery cover](#)
  - d. [SD card](#)
3. Follow the procedure in [After working inside your computer](#).

## Smart card cage

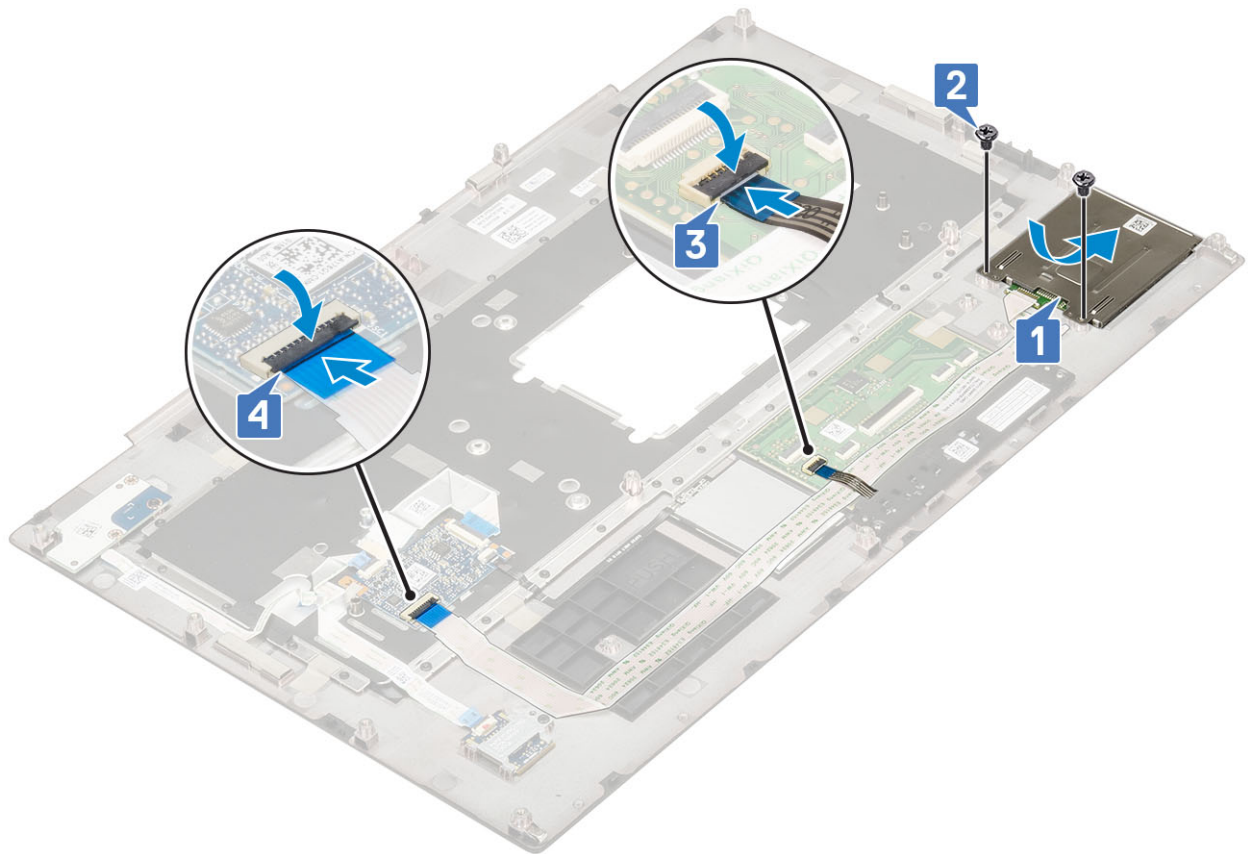
### Removing the smart card cage

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [SD card](#)
  - b. [battery cover](#)
  - c. [battery](#)
  - d. [keyboard](#)
  - e. [hard drive](#)
  - f. [base cover](#)
  - g. [palmrest](#)
3. To remove power switch board:
  - a. Disconnect the smart card cage cable from the connector on the system board [1].
  - b. Disconnect the touchpad button cable from the connector on the touchpad [2].
  - c. Pry the smart card cage cable.
  - d. Remove the 2 (M2.0X3.0) screws that secure the smart card cage to the system [3].
  - e. Remove the smart card cage from the system [4].



## Installing the smart card cage

1. To install the smart card cage:
  - a. Place the smart card cage into its slot in the system [1].
  - b. Replace the 2 (M2.0X3.0) screws to secure the smart card cage to the system [2].
  - c. Affix the smart card cable .
  - d. Connect the touchpad button cable to the connector on the touchpad [3].
  - e. Connect the smart card cage cable to the connector on the system [4]

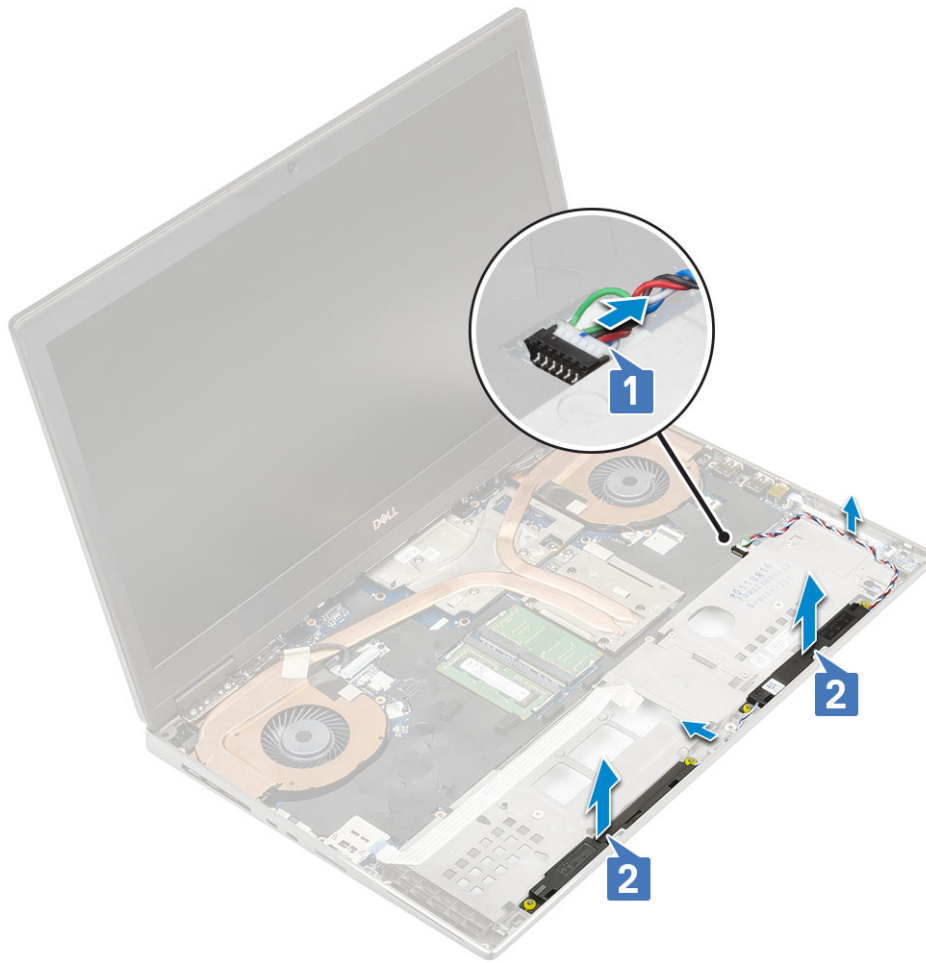


2. Install the:
  - a. palmrest
  - b. base cover
  - c. hard drive
  - d. keyboard
  - e. battery
  - f. battery cover
  - g. SD card
3. Follow the procedure in [After working inside your computer](#).

## Speaker

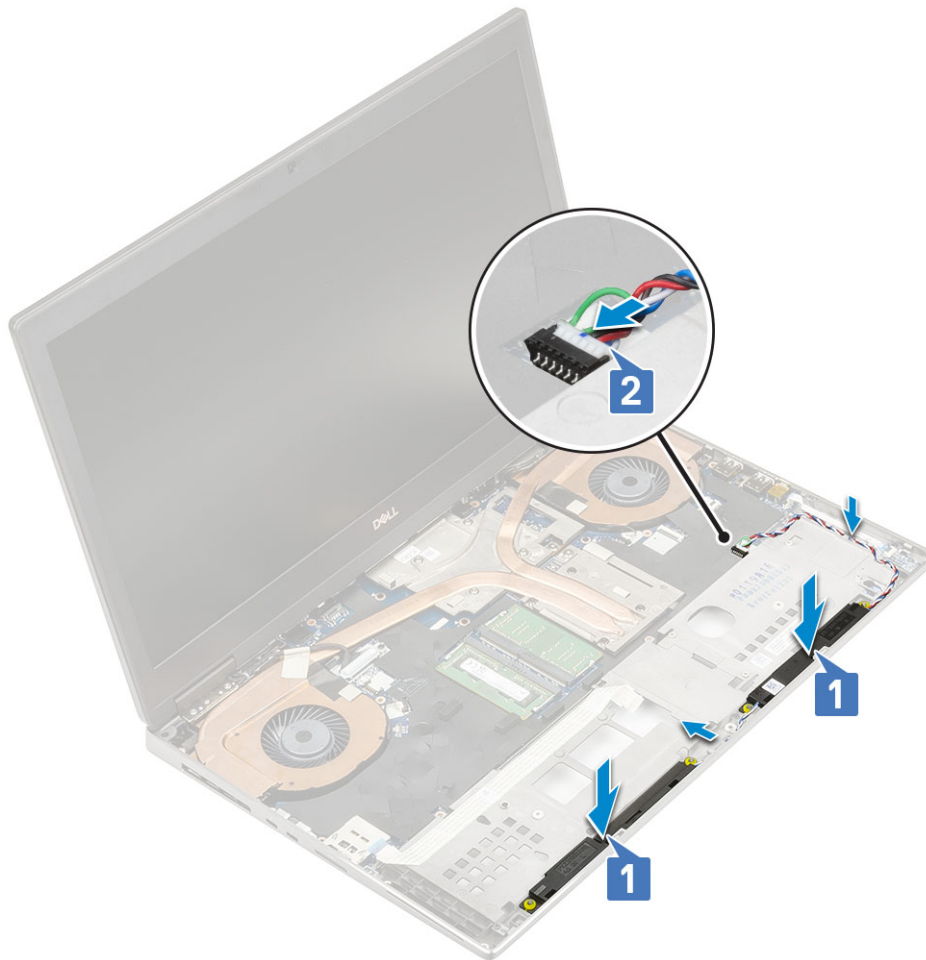
### Removing the speakers

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. keyboard
  - e. hard drive
  - f. base cover
  - g. palmrest
3. To remove the speaker:
  - a. Disconnect the speaker cable from the system board [1].
  - b. Unroute the speaker cable and remove the cable from the routing channels.
  - c. Lift the speakers, along with the speaker cable and remove it away from the system [2].



## Installing the speakers

1. To install the speaker:
  - a. Align the speakers along the slots on the system [1].
  - b. Route the speaker cable through the routing channels on the system.
  - c. Connect the speaker cable to the connector on the system board [2].



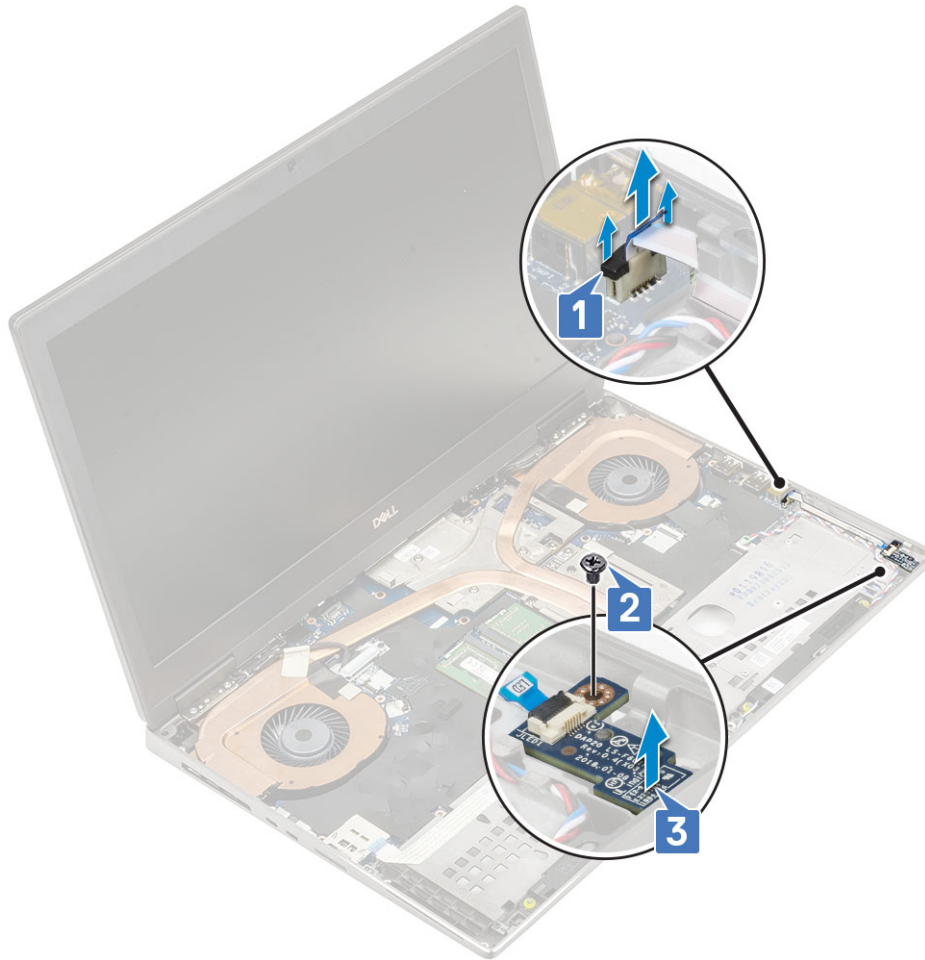
2. Install the:
  - a. palmrest
  - b. base cover
  - c. hard drive
  - d. keyboard
  - e. battery
  - f. battery cover
  - g. SD card
3. Follow the procedure in [After working inside your computer](#).

## LED board

### Removing the LED board

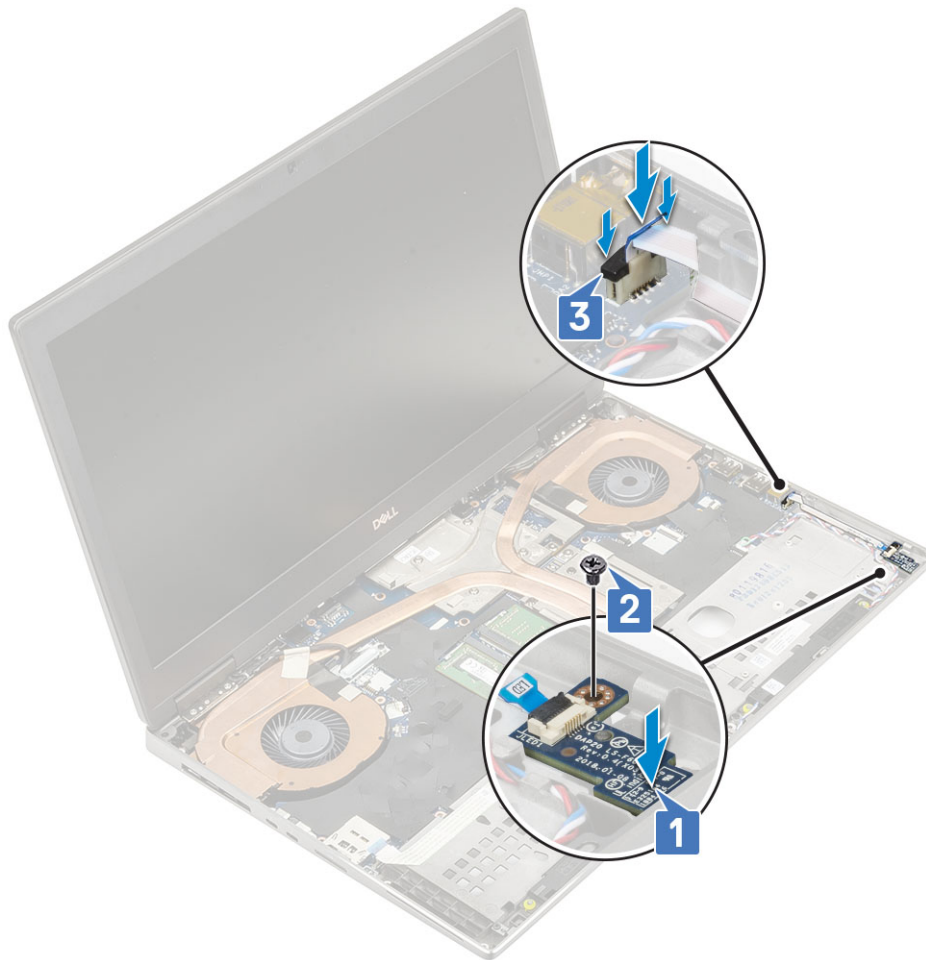
1. Follow the procedures in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. keyboard
  - e. hard drive
  - f. base cover
  - g. palmrest
3. To remove LED board:

- a. Lift the tab and disconnect the LED-board cable from the system board [1].
- b. Peel the LED-board cable from the system.
- c. Remove the single (M2.0x3.0) screw that secures the LED board to the system [2].
- d. Remove the LED board from the system [3].



## Installing the LED board

1. To install the LED board:
  - a. Align the LED board to its original position on the system [1].
  - b. Replace the single (M2.0x3.0) screw to secure the LED board to the system [2].
  - c. Affix the LED-board cable.
  - d. Connect the LED-board cable to the connector in the system board [3].



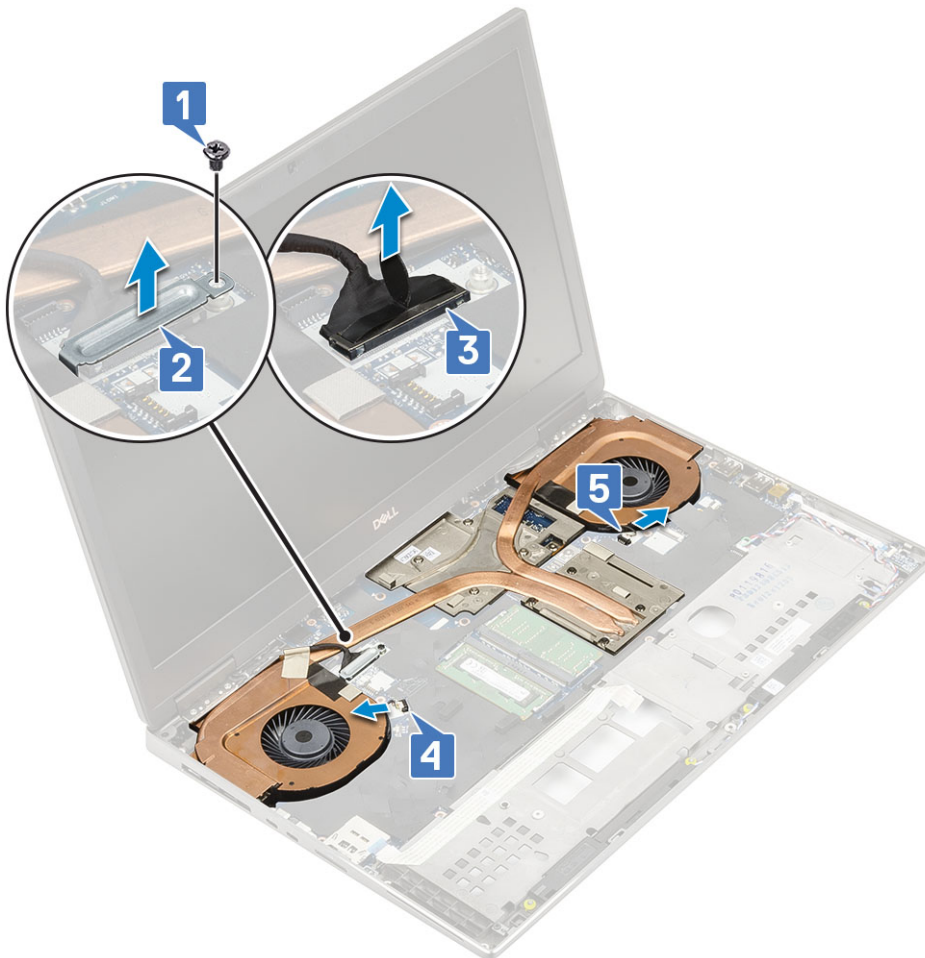
2. Install the:
  - a. palmrest
  - b. base cover
  - c. hard drive
  - d. keyboard
  - e. battery
  - f. battery cover
  - g. SD card
3. Follow the procedure in [After working inside your computer](#).

## Heat sink assembly

### Removing the heat sink assembly

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. keyboard
  - e. hard drive
  - f. base cover
  - g. palmrest
3. To remove heat sink:

- a. Remove the single (M2.0x3.0) screw that secures the eDP cable bracket to the system board [1].
- b. Remove the eDP cable bracket from the system [2].
- c. Disconnect the eDP cable from the connector on the system board [3].
- d. Pry the adhesive tape that secures the eDP cable in place.
- e. Disconnect the two fan cables from the connector on the system board [4,5].



- f. Loosen the 8 captive screws that secure the heat sink assembly to the system board [1].  
*i* **NOTE:** Remove the captive screws in the order stamped onto the heat sink next to the screws [1 > 2 > 3 > 4 > 5 > 6 > 7 > 8].
- g. Lift the heat sink assembly [2].



h. Slide and remove the heat sink assembly from the system.

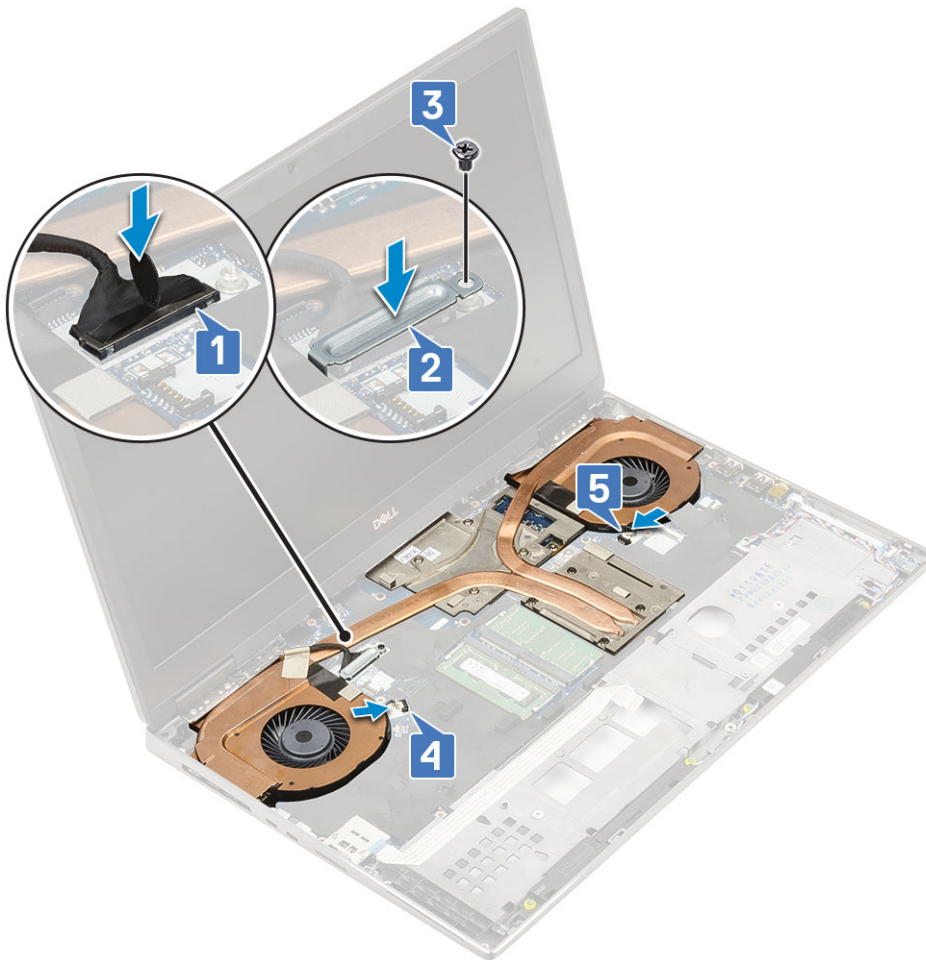


## Installing the heat sink assembly

1. To install the heat sink assembly:
  - a. Insert the heat-sink assembly in its slot on the system [1].
  - b. Tighten the 8 captive screws to secure the heat-sink assembly to the system board [2].
    - NOTE:** Tighten the captive screws in the order stamped onto the heat sink next to the screws [1 > 2 > 3 > 4 > 5 > 6 > 7 > 8].



- c. Connect the eDP cable to the connector on the system board and affix the adhesive tape to secure the eDP cable in place [1].
- d. Place and align the display cable bracket above the eDP cable connector [2].
- e. Replace the single (M2.0x3.0) screw to secure the eDP cable bracket to the system board [3].
- f. Connect the two fan cables to the connector on the system board [4, 5].



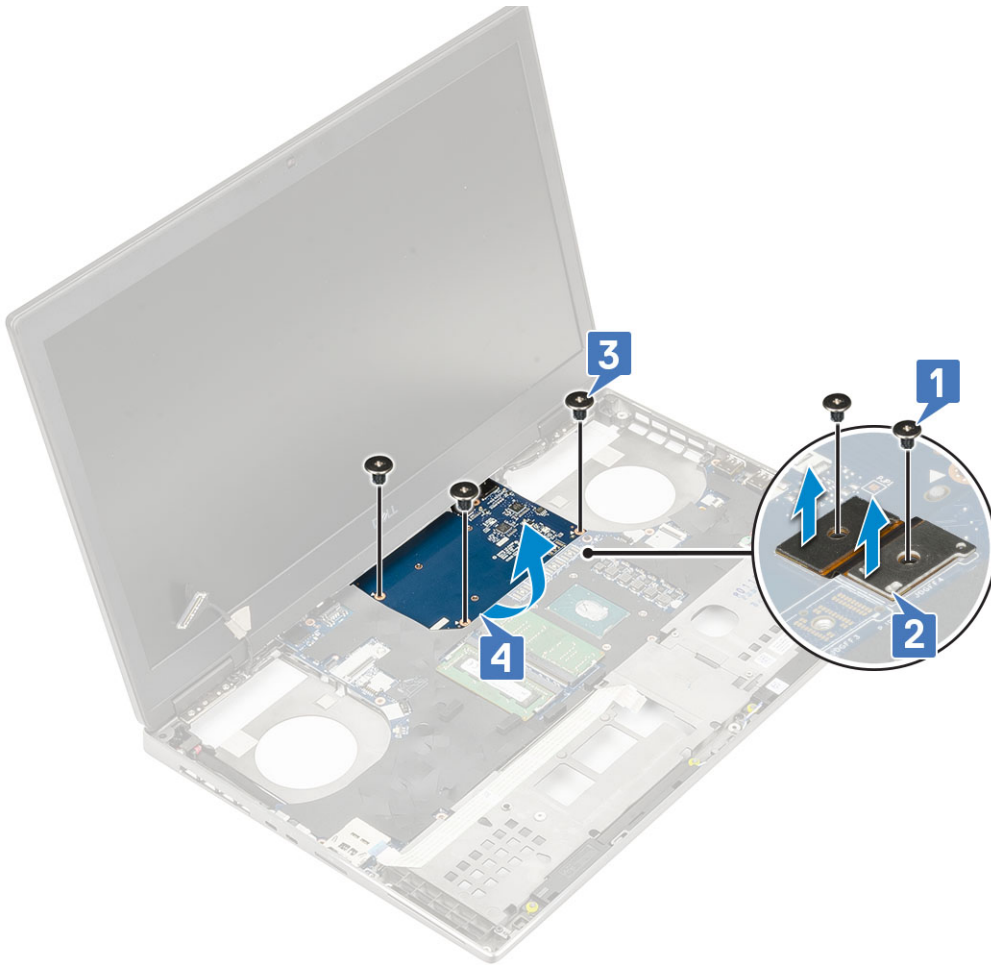
2. Install the:
  - a. palmrest
  - b. base cover
  - c. hard drive
  - d. keyboard
  - e. battery
  - f. battery cover
  - g. SD card
3. Follow the procedure in [After working inside your computer](#).

## Graphics card

### Removing the graphics card

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. keyboard
  - e. hard drive
  - f. base cover
  - g. palmrest
  - h. heatsink assembly

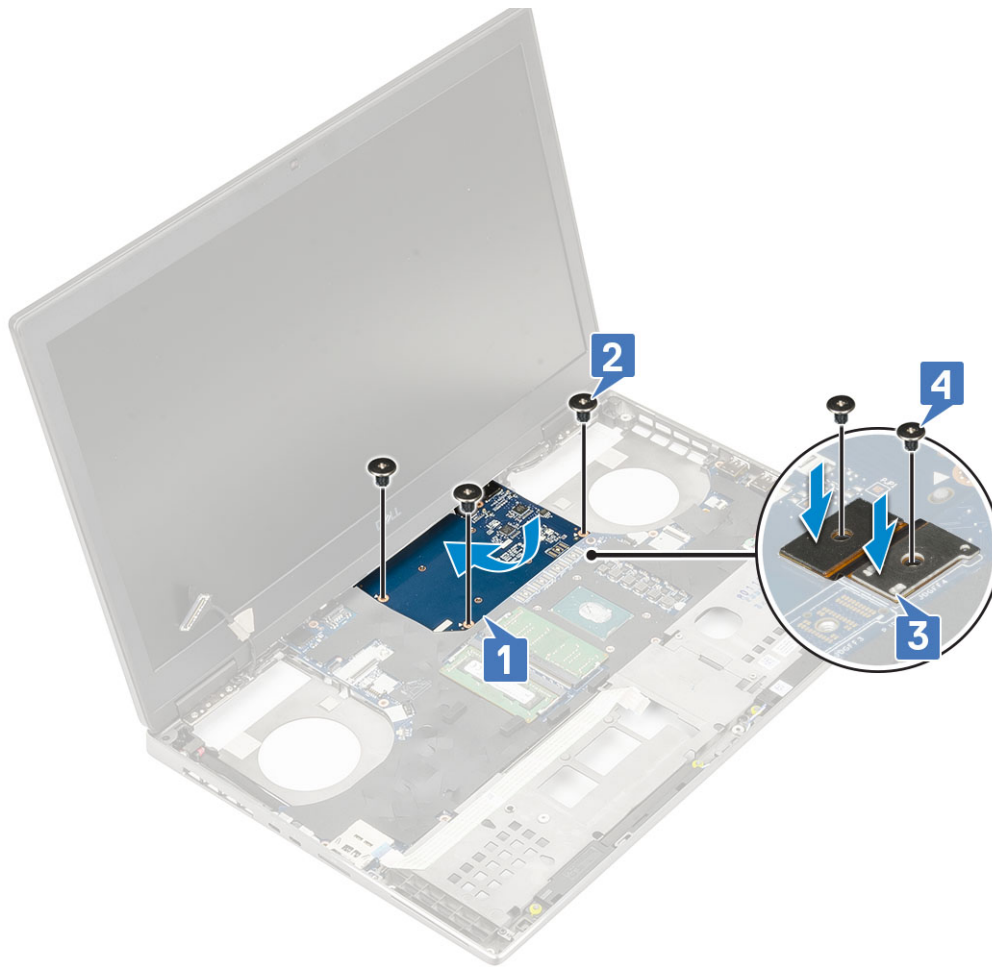
3. To remove the graphics card:
  - a. Remove the 2 (M2.0x3.0) screws that secure the beam connector to the system board [1].
  - b. Remove the beam connector from the system board [2].
  - c. Remove the 3 (M2.5x5.0) screws that secure the graphics card to the system board [3].
  - d. Remove the graphics card from the system [4].



**NOTE:** The above procedures are for UMA graphics card. Systems shipped with UMA GPU card do not have GPU power cable. However, for discrete models shipped with either a 128 MB or 256 MB VRAM GPU card, you need to disconnect the GPU power cable before removing the GPU card.

## Installing the graphics card

1. To install the graphics card:
  - a. Slide the graphics card into its original position in the system [1].
  - b. Replace the 3 (M2.5x5.0) screws to secure the graphics card to the system board [2].
  - c. Replace the beam connector [3].
  - d. Replace the 2 (M2.0x3.0) screws to secure the beam connector to the system board [4].



2. **i** **NOTE:** The above procedures are for UMA graphics card. Systems shipped with UMA GPU card do not have GPU power cable. However, for discrete models shipped with either a 128 MB or 256 MB VRAM GPU card, you need to connect the GPU power cable after installing the GPU card.

Install the:

- a. [heat sink assembly](#)
  - b. [palmrest](#)
  - c. [base cover](#)
  - d. [hard drive](#)
  - e. [keyboard](#)
  - f. [battery](#)
  - g. [battery cover](#)
  - h. [SD card](#)
3. Follow the procedure in [After working inside your computer](#).

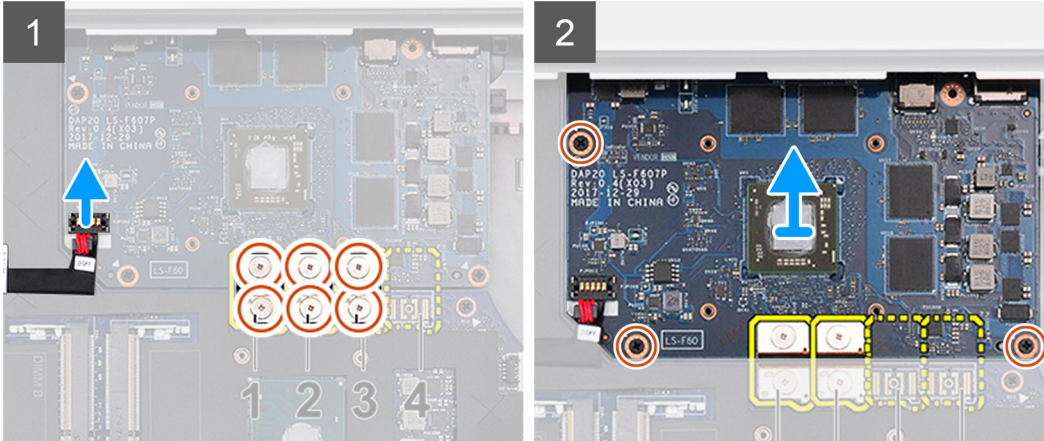
## Removing the discrete graphics card

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [SD card](#)
  - b. [battery cover](#)
  - c. [battery](#)
  - d. [keyboard](#)
  - e. [hard drive](#)
  - f. [base cover](#)
  - g. [palmrest](#)

h. [heatsink assembly](#)

3. To remove the graphics card:

- a. Carefully disconnect the discrete GPU power cable from its connector on the GPU card.
- b. Remove the six screws securing the beam connectors.
- c. Remove the 3 (M2.5x5.0) screws that secure the graphics card to the system board.
- d. Remove the graphics card from the system.

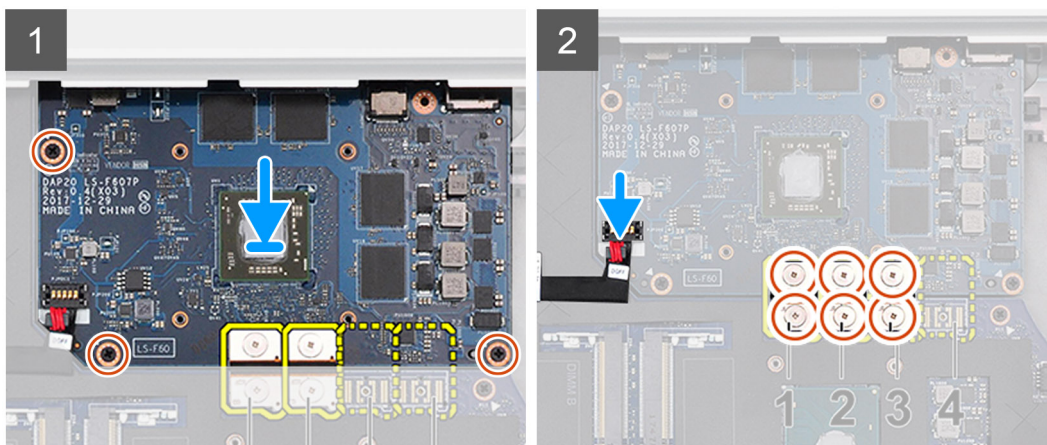


**NOTE:** The above procedures are for discrete graphics card. Systems shipped with UMA GPU card do not have GPU power cable. However, for discrete models shipped with either a 128 MB or 256 MB VRAM GPU card, you need to disconnect the GPU power cable before removing the GPU card.

## Installing the discrete graphics card

1. To install the discrete graphics card:

- a. Slide the graphics card into its original position in the system.
- b. Replace the 3 (M2.5x5.0) screws to secure the graphics card to the system board.
- c. Carefully connect the discrete GPU power cable from its connector on the GPU card.
- d. Replace the beam connector.
- e. Replace the six screws that secure the beam connectors.



**NOTE:** The above procedures are for discrete graphics card. Systems shipped with UMA GPU card do not have GPU power cable. However, for discrete models shipped with either a 128 MB or 256 MB VRAM GPU card, you need to connect the GPU power cable after installing the GPU card.

Install the:

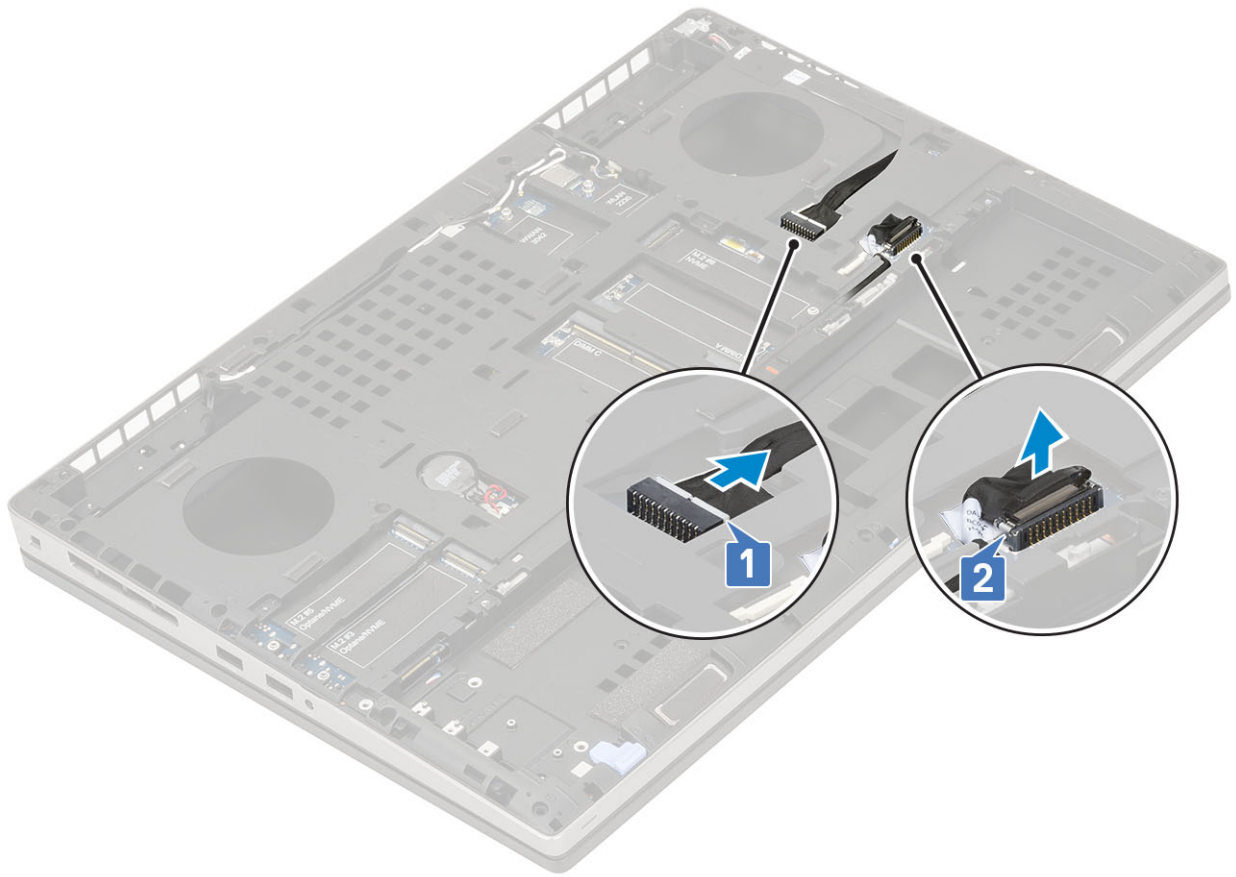
- a. [heat sink assembly](#)

- b. palmrest
  - c. base cover
  - d. hard drive
  - e. keyboard
  - f. battery
  - g. battery cover
  - h. SD card
3. Follow the procedure in [After working inside your computer](#).

## System board

### Removing the system board

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. hard drive
  - e. hard drive interposer board
  - f. keyboard
  - g. base cover
  - h. primary memory
  - i. secondary memory
  - j. WLAN card
  - k. WWAN card
  - l. M.2 SSD card
  - m. SIM card
  - n. palmrest
  - o. heat sink assembly
  - p. graphic card
3. To disconnect the system board:
  - a. Disconnect the power connector cable and battery cable from the connectors on the system board [1, 2].



- b. Remove the 3 (M2.0x5.0) screws that secure the Type-C USB bracket to the system [1].
- c. Remove the Type-C USB bracket from the system [2].
- d. Disconnect the touchpad cable [3], speaker cable [4] and LED board cable [5] from the connectors on the system board.

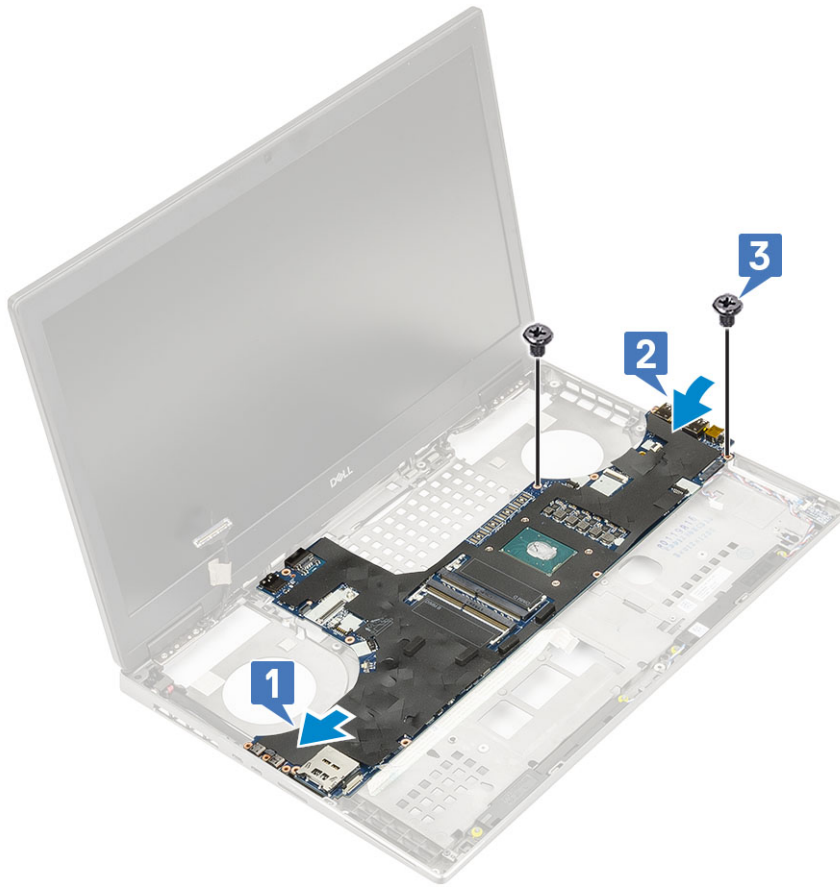


- e. Remove the 2 (M2.5x5.0) screws that secure the system board in place [1].
- f. Lift the right side of the system board and remove the system board from the system chassis [2, 3].



## Installing the system board

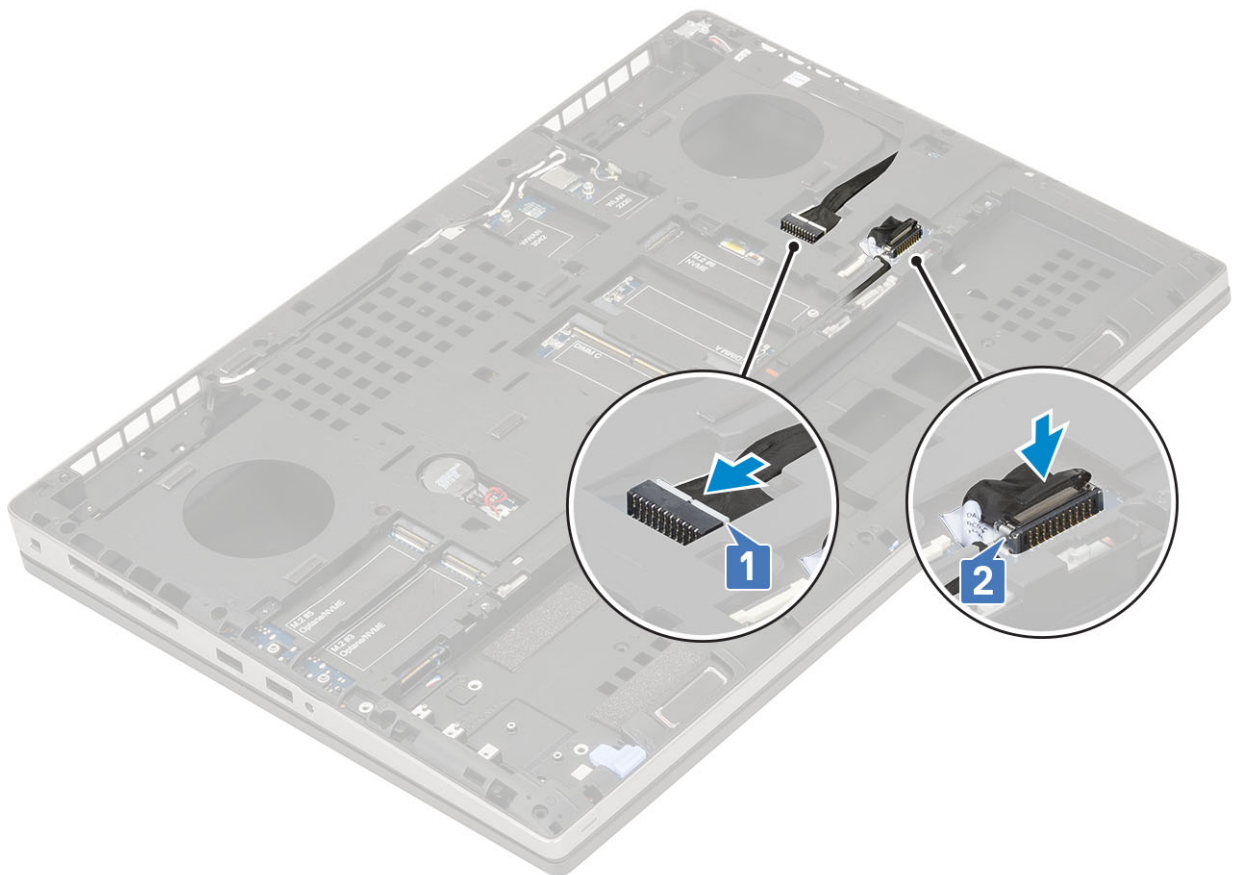
1. To install the system board:
  - a. Align the system board into its original position on the system [1, 2].
  - b. Replace the 2 (M2.5x5.0) screws to secure the system board in place [3].



- c. Connect the LED board cable [1], speaker cable [2] and touchpad cable [3] to the connectors on the system board.
- d. Place the Type-C USB bracket onto its slot on the system [4].
- e. Replace the 3 (M2.0x5.0) screws to secure the Type-C USB bracket to the system [5].



f. Connect the power connector cable and battery cable to the connectors on the system board [1, 2].



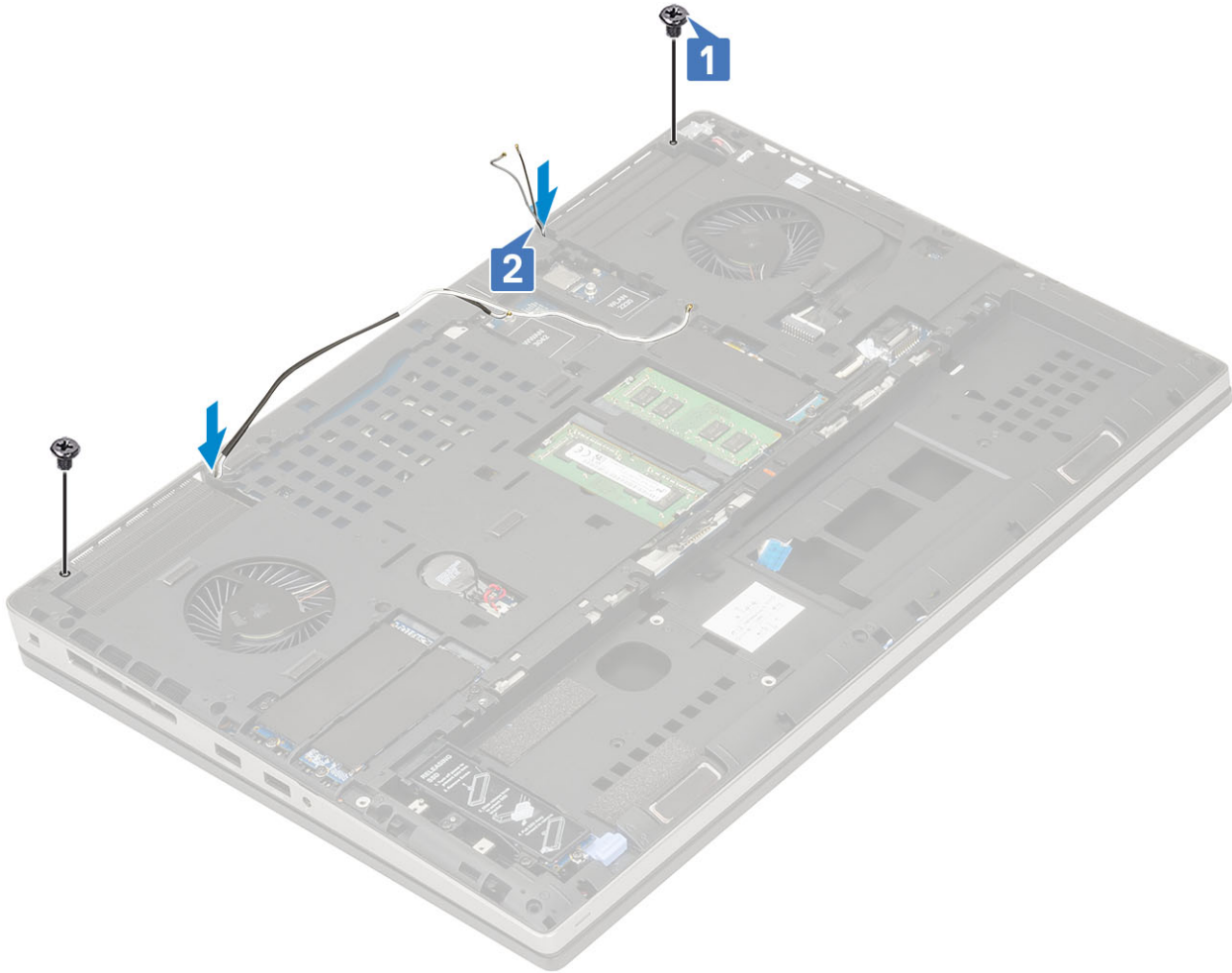
2. Install the:

- a. graphic card
  - b. heat sink assembly
  - c. palmrest
  - d. SIM card
  - e. M.2 SSD card
  - f. WWAN card
  - g. WLAN card
  - h. primary memory
  - i. secondary memory
  - j. base cover
  - k. keyboard
  - l. hard drive interposer board
  - m. hard drive
  - n. battery
  - o. battery cover
  - p. SD card
3. Follow the procedure in [After working inside your computer](#).

## Display assembly

### Removing the display assembly

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. keyboard
  - e. hard drive
  - f. base cover
  - g. WWAN card
  - h. WLAN card
  - i. palmrest
3. To remove display assembly:
  - a. Remove the 2 (M2.5x5.0) screws at the bottom of the system that secures the display assembly in place [1].
  - b. Unroute all the wireless antenna cables from the routing channels at the bottom of the system and next to the hinge caps [2] and unthread the antenna cables.



c. Remove the 2 (M2.5x6.0) screws at the rear of the system that secures the display assembly in place.

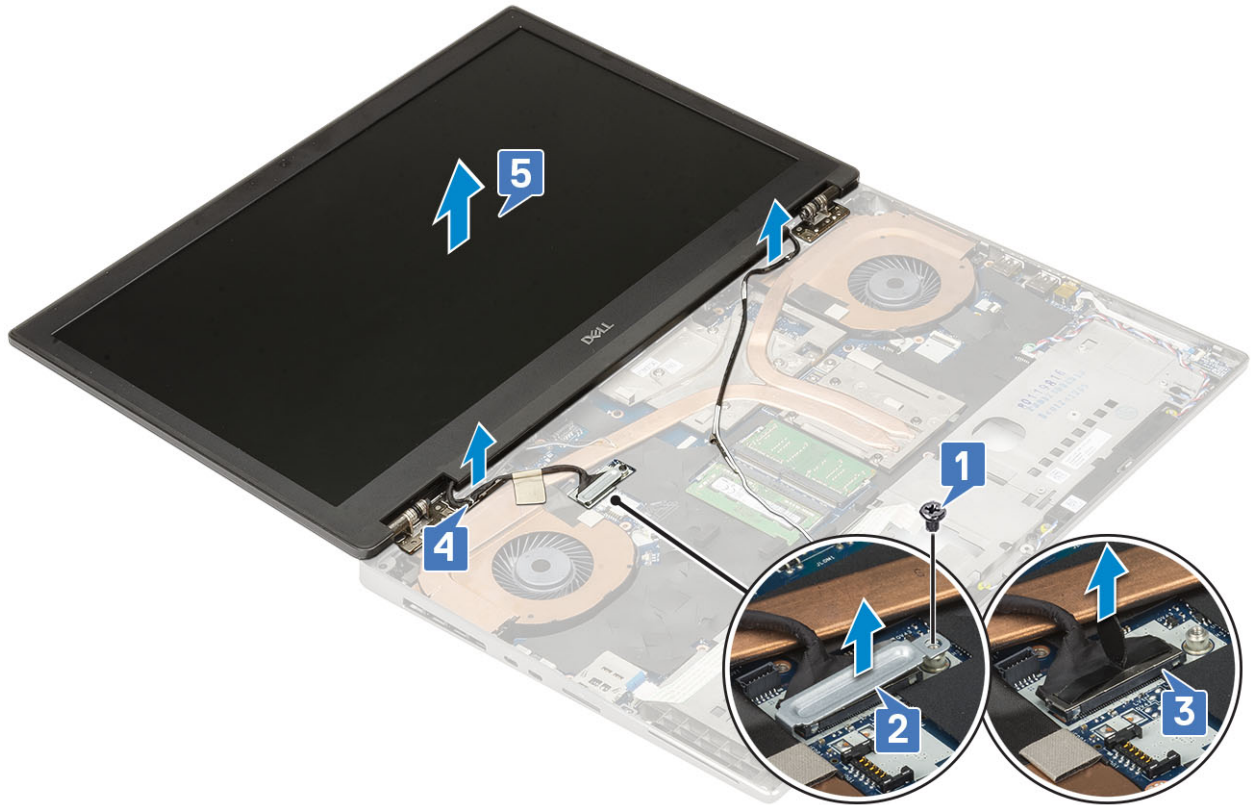


- d. Open the display assembly to a 180-degree angle.
- e. Remove the 4 (M2.5x4.0) screws that secures the display hinge caps to the system [1].
- f. Remove the display hinge caps from the system [2].



- g. Remove the single (M2.0x3.0) screw that secures the eDP cable bracket to the system board [1].
- h. Remove the eDP cable bracket [2].

- i. Disconnect the eDP cable from the connector on the system board [3].
- j. Peel the adhesive tape that secures the eDP cable in place [4].
- k. Unroute the wireless cable from the routing channels located next to the hinges .
- l. Remove the display assembly [5].

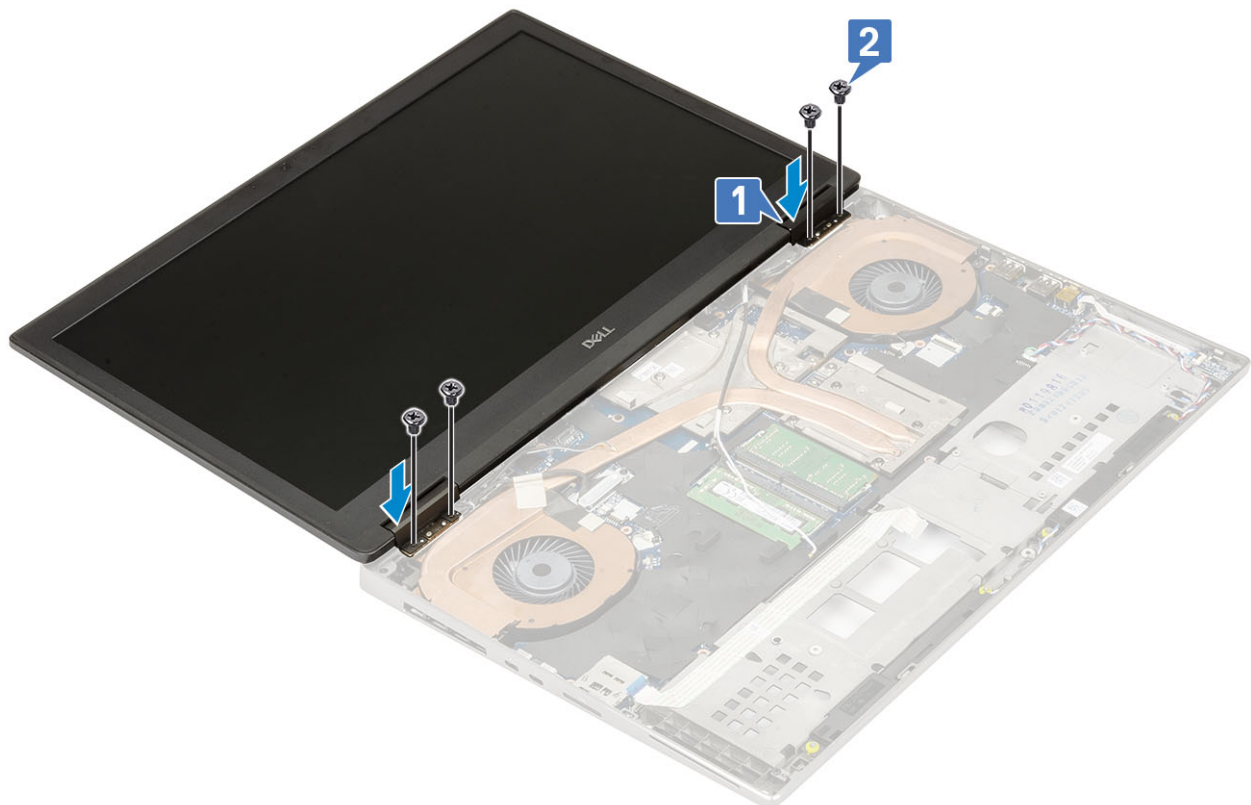


## Installing the display assembly

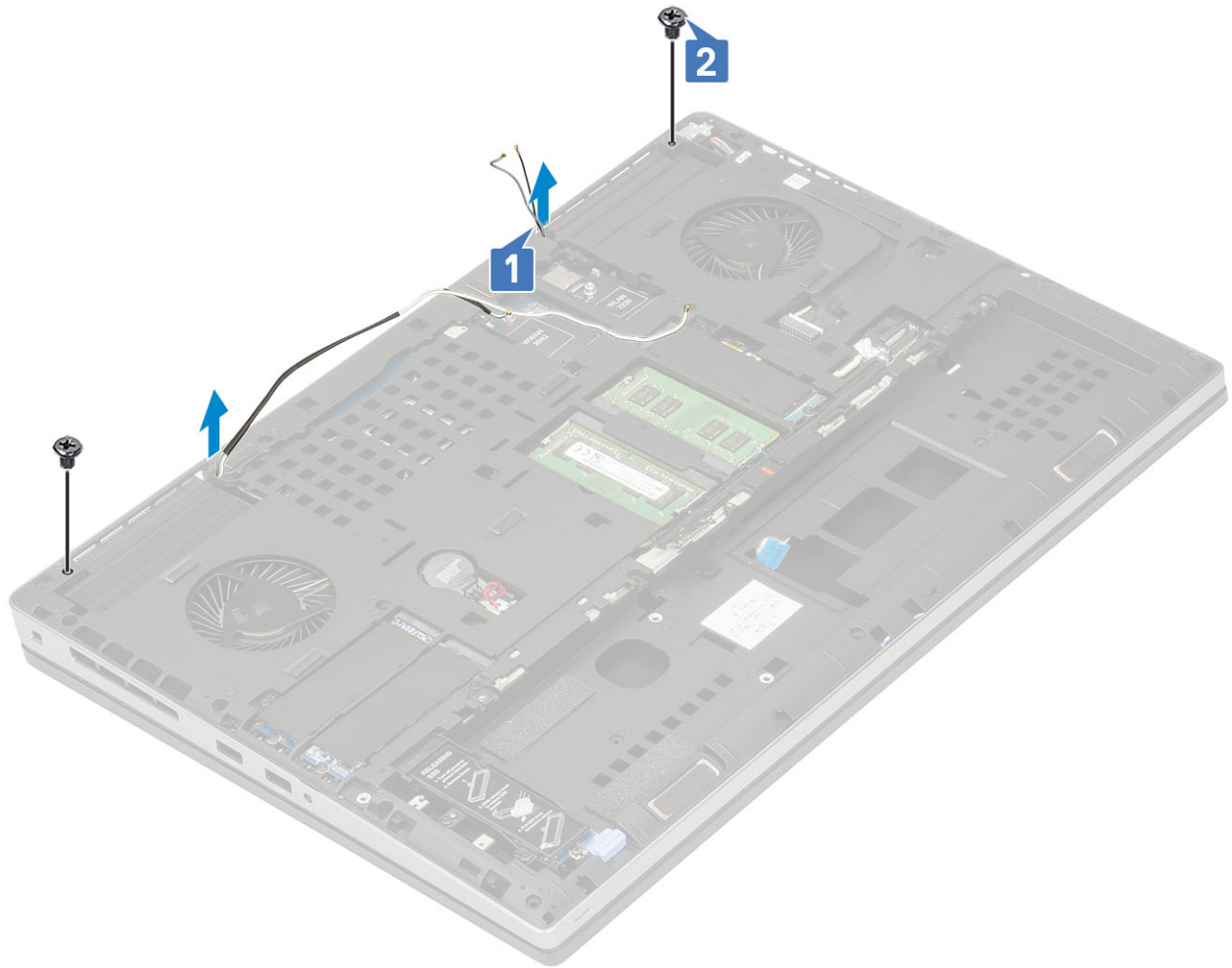
1. To install display assembly:
  - a. Align the display assembly into the slots on the system [1].
  - b. Route the wireless cable located next to the hinges .
  - c. Affix the adhesive tape to secure the eDP cable in place [2].
  - d. Connect the eDP cable to the connector on the system board [3].
  - e. Place the eDP cable bracket and replace the single (M2.0x3.0) screw to secure the eDP cable bracket to the system board [4, 5].



- f. Align the display hinge caps and replace the 4 (M2.5x4.0) screws to secure the display hinge caps to the system [1, 2].



- g. Close the display assembly and replace the 2 (M2.5x6.0) screws at the rear of the system to secure the display assembly in place.
- h. Route all the wireless antenna cables to the routing channels at the bottom of the system and next to the hinge caps [1].
- i. Replace the 2 (M2.5x5.0) screws at the bottom of the system to secure the display assembly in place [2].



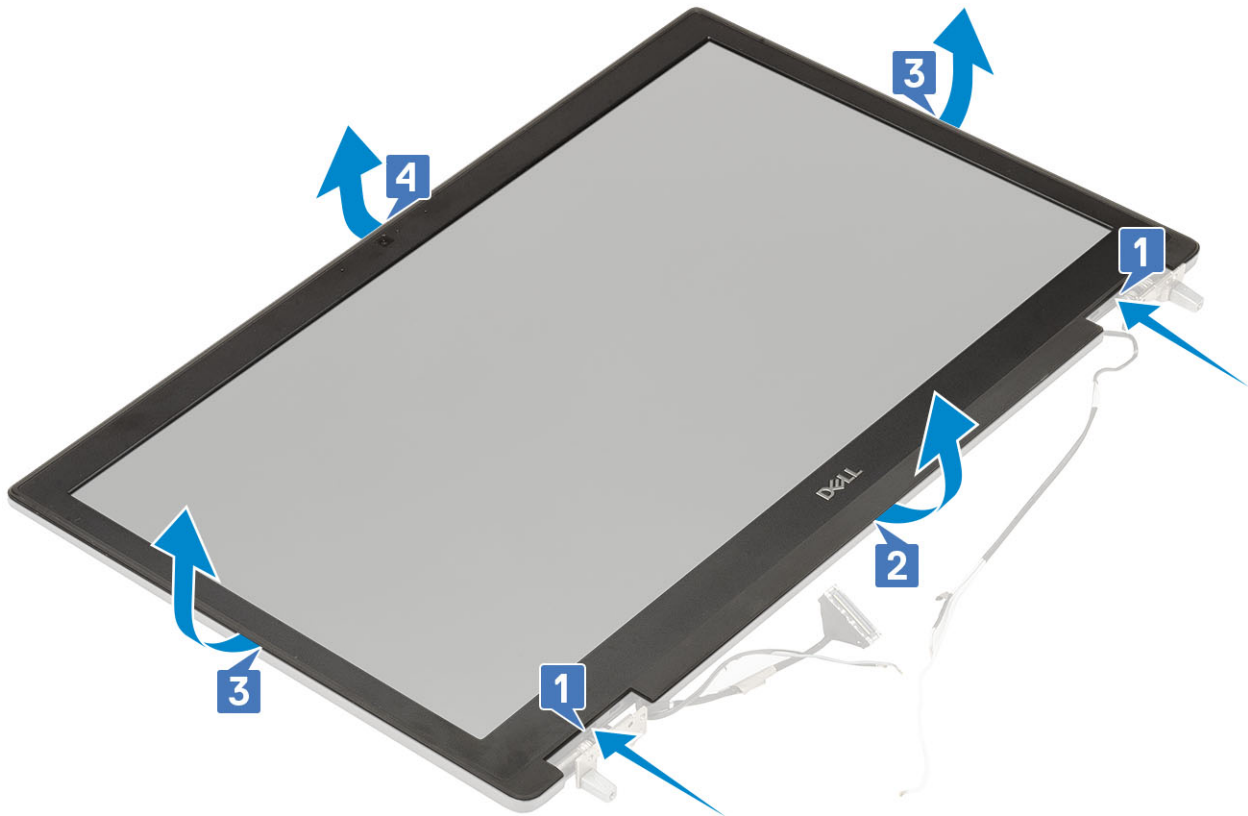
2. Install the:
  - a. palmrest
  - b. WWAN card
  - c. WLAN card
  - d. base cover
  - e. hard drive
  - f. keyboard
  - g. battery
  - h. battery cover
  - i. SD card
3. Follow the procedure in [After working inside your computer](#).

## Display bezel

### Removing the display bezel

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. keyboard
  - e. hard drive
  - f. base cover

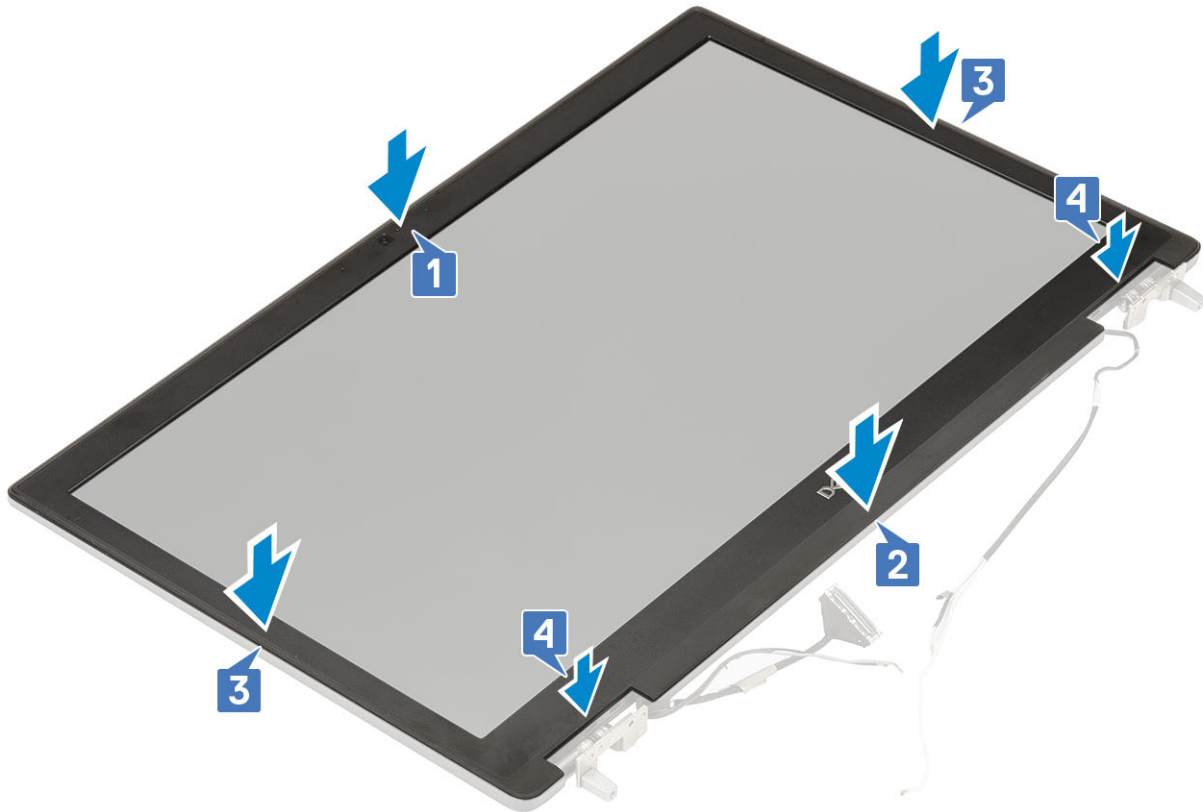
- g. WWAN card
  - h. WLAN card
  - i. palmrest
  - j. display assembly
3. To remove display bezel:
- a. Using a plastic scribe pry the two recess points at the bottom edge of the display bezel [1].
  - b. Pry around the sides and top edge of the display bezel [2, 3, 4].
- i** **NOTE:** While prying the display bezel, make sure to pry along the outside edge of the display bezel using your hands—using a screw driver or other sharp objects may damage the display cover.



**i** **NOTE:** The display bezel shipped with a non-touch display is a disposable part and should be replaced with a new display bezel anytime it is removed from the system.

## Installing the display bezel

1. To install the display bezel:
- a. Place the display bezel on the display assembly.
  - b. Press the edges of the display bezel until it clicks onto the display assembly [1, 2, 3, 4].



2. Install the:
  - a. display assembly
  - b. palmrest
  - c. WWAN card
  - d. WLAN card
  - e. base cover
  - f. hard drive
  - g. keyboard
  - h. battery
  - i. battery cover
  - j. SD card
3. Follow the procedure in [After working inside your computer](#).

## Display hinges

### Removing the display hinge

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. keyboard
  - e. hard drive
  - f. base cover
  - g. WWAN card
  - h. WLAN card
  - i. palmrest

- j. display assembly
  - k. display bezel
  - l. display panel
3. To remove display hinge:
- a. Remove the 6 (M2.5x4.0) screws that secure the display hinges to the display assembly [1].
  - b. Remove the display hinges [2].



## Installing the display hinge

1. To install display hinge:
- a. Place the display hinge in its slot on the display assembly [1].
  - b. Replace the 6 (M2.5x4.0) screws to secure the display hinge to the display assembly [2].



2. Install the:
  - a. display panel
  - b. display bezel
  - c. display assembly
  - d. palmrest
  - e. WWAN card
  - f. WLAN card
  - g. base cover
  - h. hard drive
  - i. keyboard
  - j. battery
  - k. battery cover
  - l. SD card
3. Follow the procedure in [After working inside your computer](#).

## Display panel

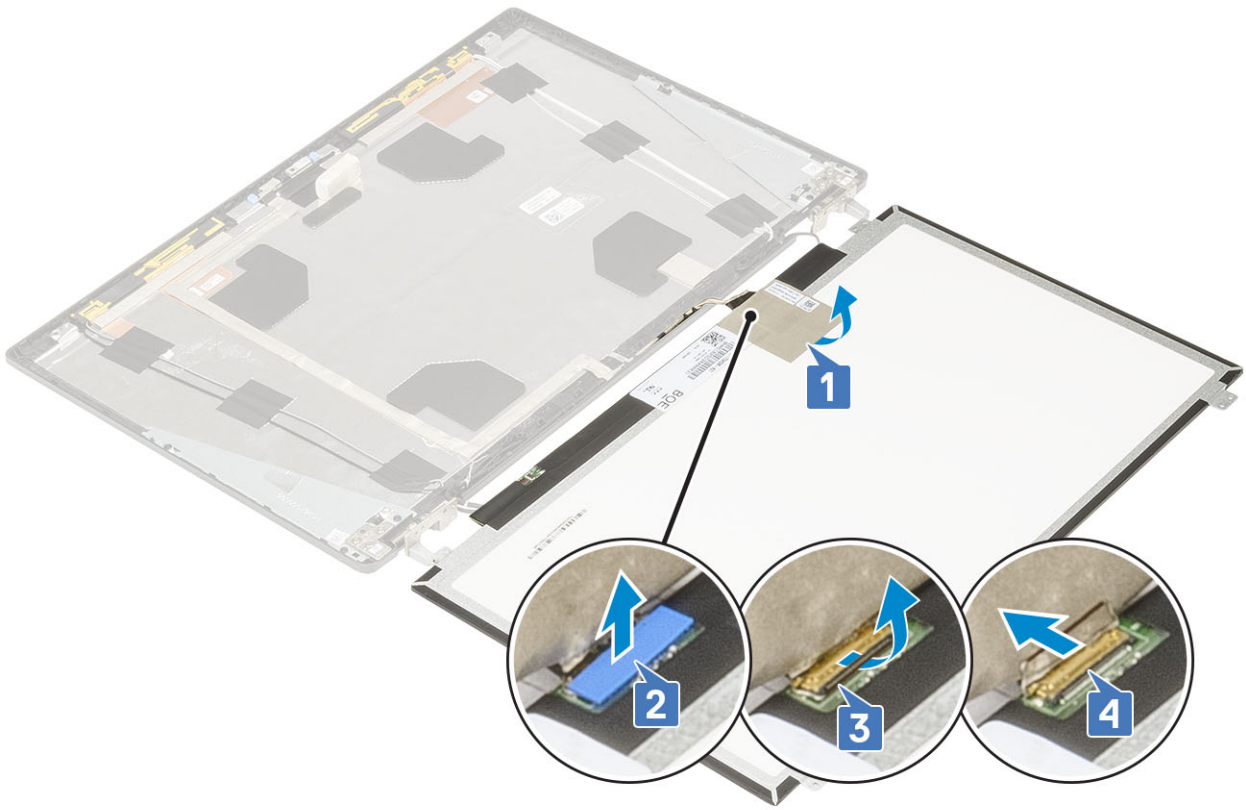
### Removing the display panel

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. keyboard
  - e. hard drive
  - f. base cover
  - g. WWAN card

- h. WLAN card
  - i. palmrest
  - j. display assembly
  - k. display bezel
3. To remove screws from the display panel :
- a. Remove the 4 (M2.0X3.0) screws that secure the display panel to the display assembly [1].
  - b. Lift the display panel and turn the display panel over to access the eDP cable [2].



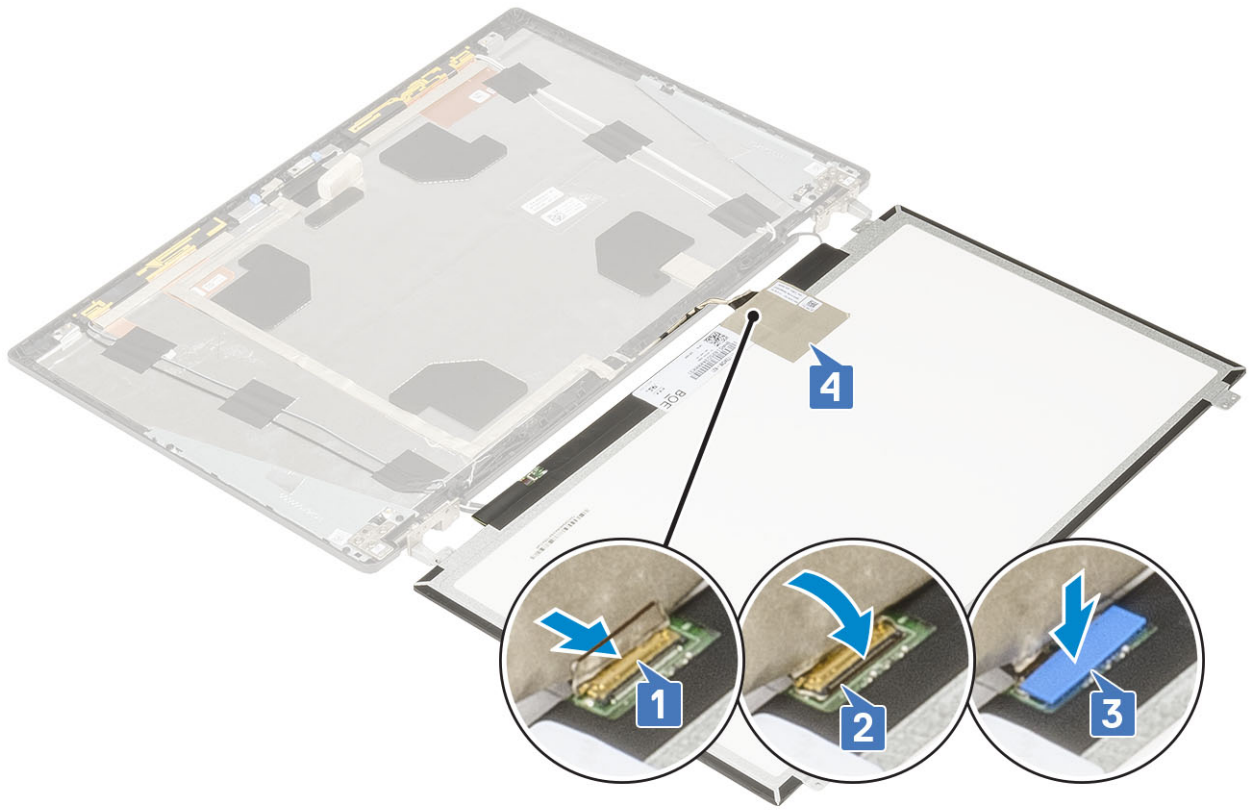
4. To remove display panel:
- a. Peel the adhesive tape to access the eDP cable [1].
  - b. Peel the adhesive tapes that secures the eDP cable [2].
  - c. Lift the metal tab and disconnect the eDP cable from the connector on the display panel [3, 4].



5. Remove the display panel.

## Installing the display panel

1. To install the display panel:
  - a. Connect the eDP cable to the connector on the back of the display panel and affix the adhesive tape [1, 2, 3, 4].



- b. Align the display panel with the tabs on the display assembly.
- c. Replace the 4 (M2.0X3) screws to secure the display panel to the display assembly.

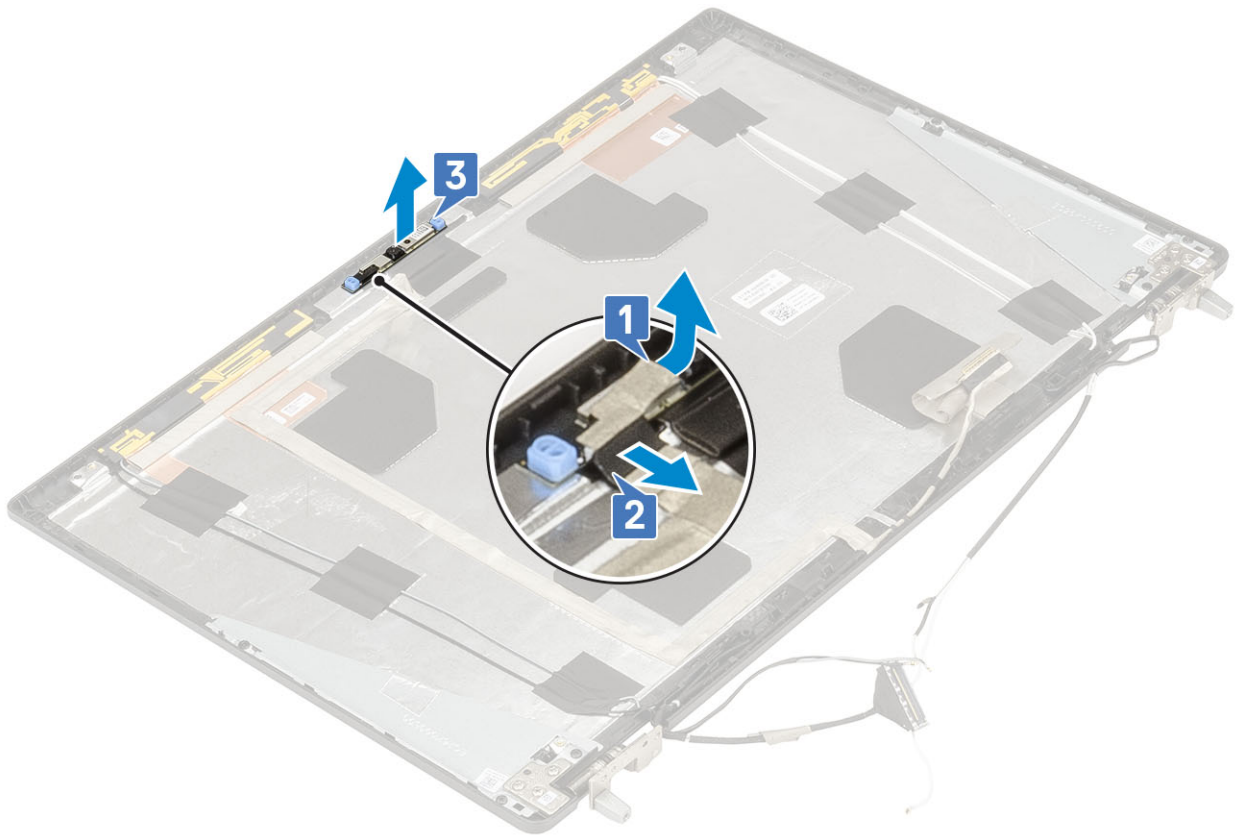


2. Install the:
  - a. display bezel
  - b. display assembly
  - c. palmrest
  - d. WWAN card
  - e. WLAN card
  - f. base cover
  - g. hard drive
  - h. keyboard
  - i. battery
  - j. battery cover
  - k. SD card
3. Follow the procedure in [After working inside your computer](#).

## Camera

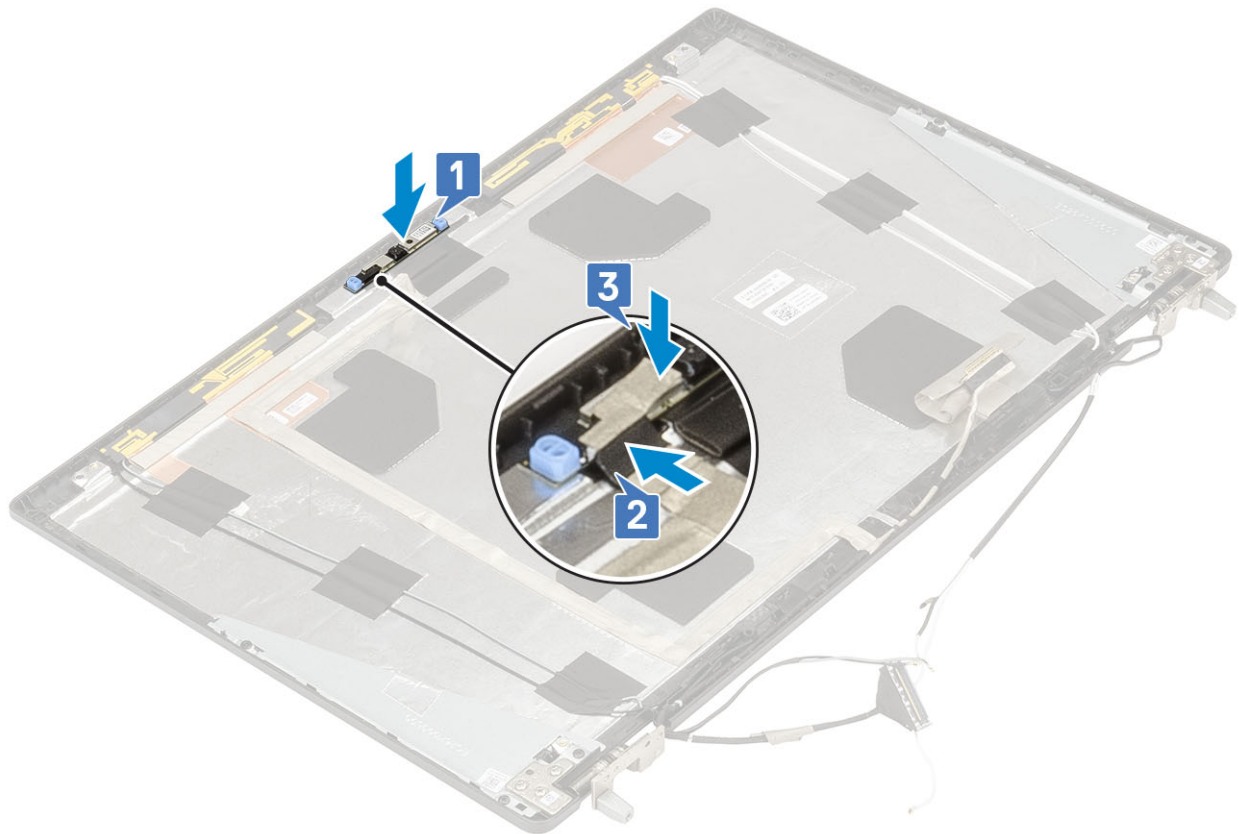
### Removing the camera

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. keyboard
  - e. hard drive
  - f. base cover
  - g. WWAN card
  - h. WLAN card
  - i. palmrest
  - j. display assembly
  - k. display bezel
  - l. display panel
3. To remove camera:
  - a. Peel the adhesive tape that covers the camera module [1].
  - b. Disconnect the eDP cable from the camera module [2].
  - c. Carefully pry the camera module from the system [3].



## Installing the camera

1. To install the camera:
  - a. Place the camera module in its slot on the system [1].
  - b. Connect the eDP cable to the camera module [2].
  - c. Affix the adhesive tape to cover the camera module [3].



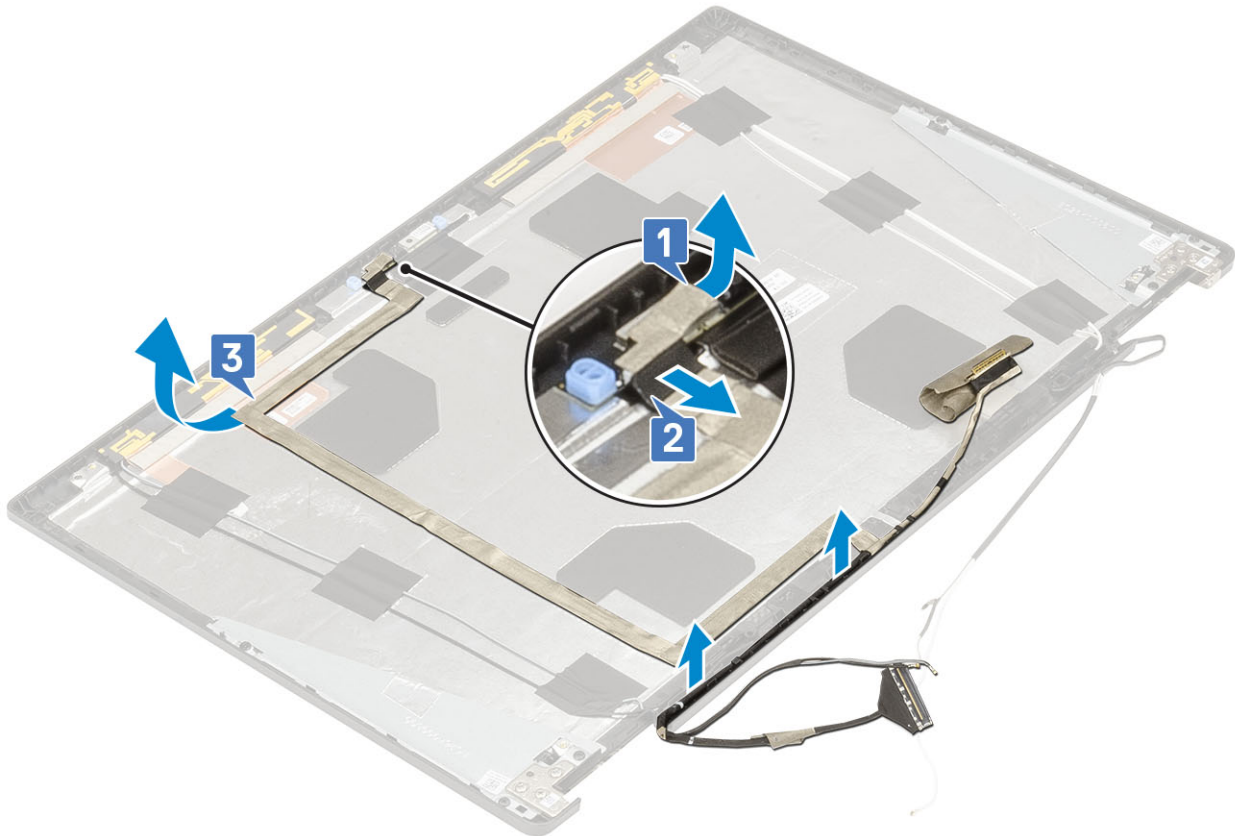
2. Install the:
  - a. display panel
  - b. display bezel
  - c. display assembly
  - d. palmrest
  - e. WWAN card
  - f. WLAN card
  - g. base cover
  - h. hard drive
  - i. keyboard
  - j. battery
  - k. battery cover
  - l. SD card
3. Follow the procedure in [After working inside your computer](#).

## eDP cable

### Removing the eDP cable

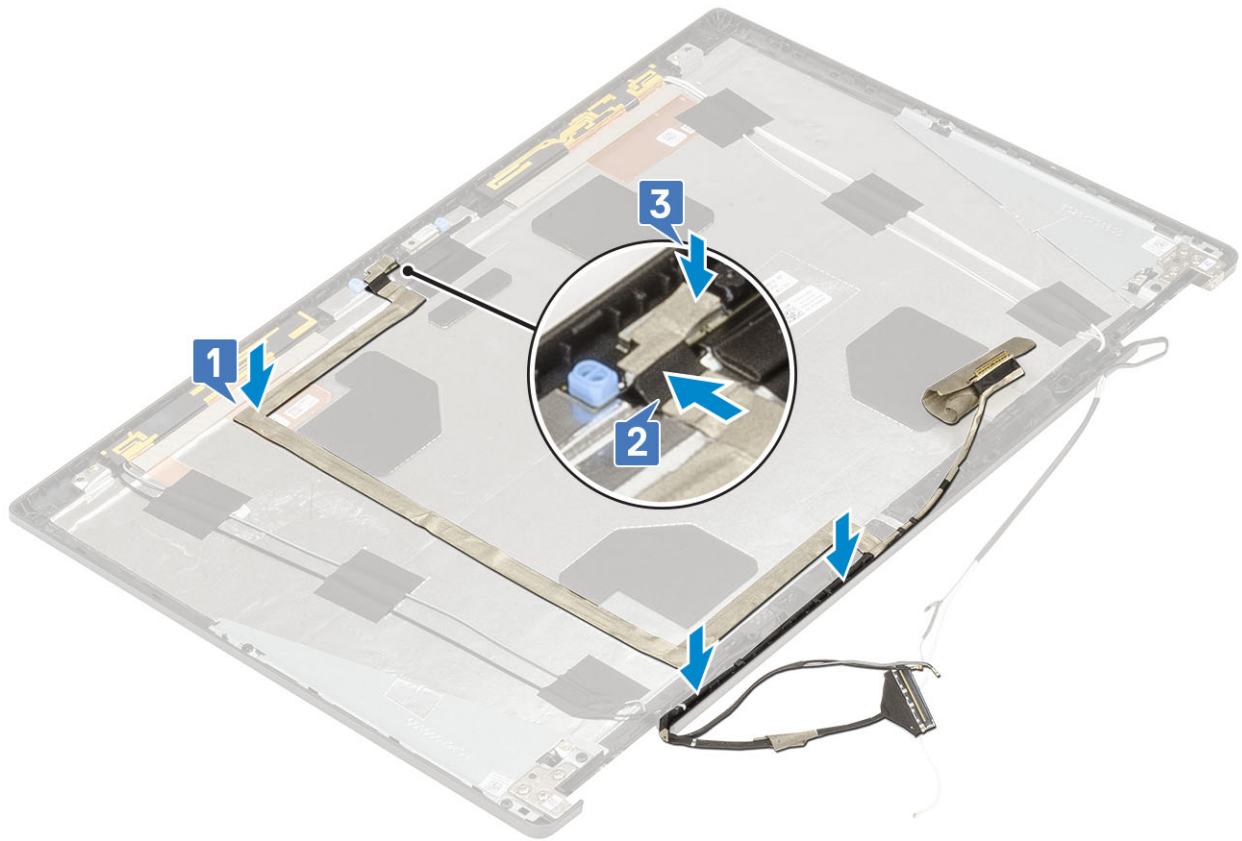
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. keyboard
  - e. hard drive
  - f. base cover

- g. WWAN card
  - h. WLAN card
  - i. palmrest
  - j. display assembly
  - k. display bezel
  - l. display panel
3. To remove eDP cable:
- a. Peel the adhesive tape covering the camera module [1].
  - b. Disconnect the eDP cable from the camera module [2].
  - c. Peel the eDP cable from the display cover and unroute the cable from the routing channels [3].
  - d. Remove the eDP cable from the system.



## Installing the eDP cable

1. To install eDP cable:
- a. Route and affix the eDP cable on the display cover [1].
  - b. Connect the eDP cable to the connector on the camera module [2].
  - c. Affix the adhesive tape covering the camera module [3].



2. Install the:
  - a. display panel
  - b. display bezel
  - c. display assembly
  - d. palmrest
  - e. WWAN card
  - f. WLAN card
  - g. base cover
  - h. hard drive
  - i. keyboard
  - j. battery cover
  - k. battery
  - l. SD card
3. Follow the procedure in [After working inside your computer](#).

## Display bracket

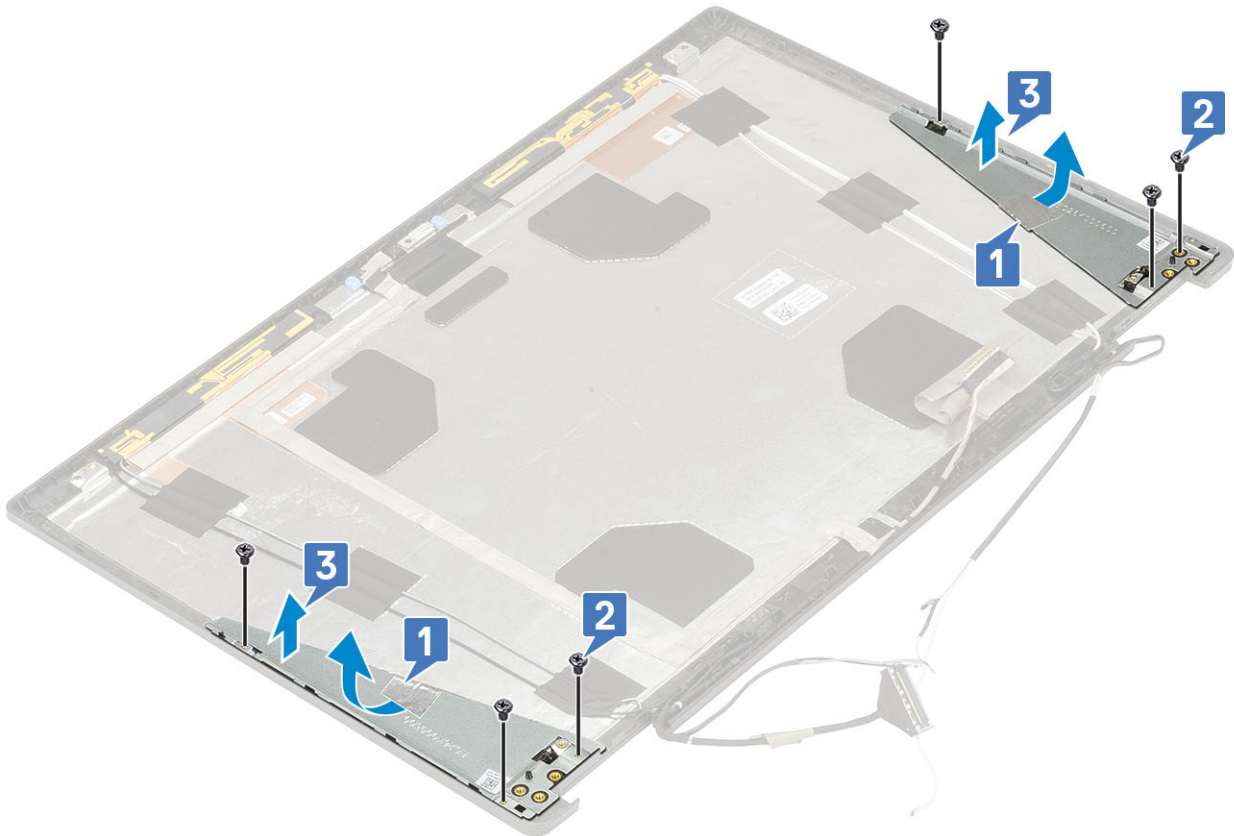
### Removing the display support bracket

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. SD card
  - b. battery cover
  - c. battery
  - d. keyboard
  - e. hard drive
  - f. base cover

- g. WWAN card
- h. WLAN card
- i. palmrest
- j. display assembly
- k. display bezel
- l. display panel
- m. display hinge

3. To remove display bracket:

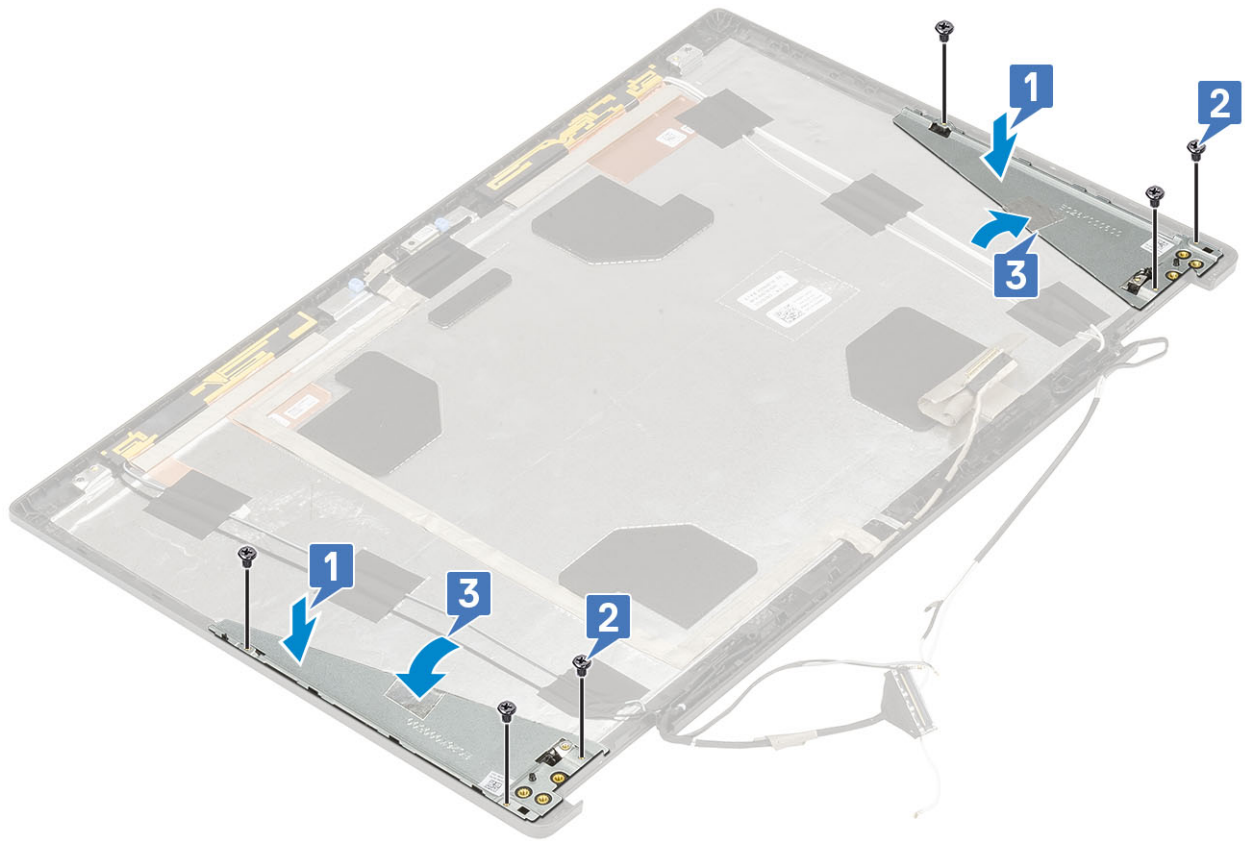
- a. Peel the adhesive tape that covers the display support bracket [1].
- b. Remove the 6 (M2.0x3.0) screws that secure the display support brackets to the display cover [2].
- c. Remove the display support brackets from the display cover [3].



## Installing the display support bracket

1. To install the display support bracket:

- a. Place the display brackets onto its slot on the display cover [1].
- b. Replace the 6 (M2.0x3.0) screws to secure the display bracket to the display cover [2].
- c. Affix the adhesive tape to cover the display support bracket [3].



2. Install the:
  - a. display hinge
  - b. display panel
  - c. display bezel
  - d. display assembly
  - e. palmrest
  - f. WWAN card
  - g. WLAN card
  - h. base cover
  - i. hard drive
  - j. keyboard
  - k. battery
  - l. battery cover
  - m. SD card
3. 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 program. Certain changes can make your computer work incorrectly.

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

**NOTE:** Before you change BIOS Setup program, it is recommended that you write down the BIOS Setup program screen information for future reference.

Use the BIOS Setup program for the following purposes:

- Get information about the hardware installed in your computer, such as the amount of RAM and the size of the hard drive.
- 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:

- [BIOS overview](#)
- [Entering BIOS setup program](#)
- [Navigation keys](#)
- [One time boot menu](#)
- [System setup options](#)
- [Updating the BIOS](#)
- [System and setup password](#)
- [Clearing CMOS settings](#)
- [Clearing BIOS \(System Setup\) and System passwords](#)

## 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.

## Entering BIOS setup program

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

**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

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

Keys	Navigation
<b>Up arrow</b>	Moves to the previous field.
<b>Down arrow</b>	Moves to the next field.

Keys	Navigation
<b>Enter</b>	Selects a value in the selected field (if applicable) or follow the link in the field.
<b>Spacebar</b>	Expands or collapses a drop-down list, if applicable.
<b>Tab</b>	Moves to the next focus area.
<b>Esc</b>	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 restarts the system.

## One time boot menu

To enter **one time boot menu**, turn on your computer, and then press F12 immediately.

**NOTE:** It is recommended to shutdown the computer if it is on.

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 (if available)
  - 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 the System Setup screen.

## System setup options

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

### General options

Table 3. General


Option	Description
<b>System Information</b>	This section lists the primary hardware features of your computer. The options are: <ul style="list-style-type: none"> <li>• <b>System Information</b></li> <li>• <b>Memory Configuration</b></li> <li>• <b>Processor Information</b></li> <li>• <b>Device Information</b></li> </ul>
<b>Battery Information</b>	Displays the battery status and the type of AC adapter connected to the computer.
<b>Boot Sequence</b>	Allows you to change the order in which the computer attempts to find an operating system. The options are: <ul style="list-style-type: none"> <li>• <b>Windows Boot Manager</b></li> <li>• <b>Boot List Option-UEFI is the enabled by default.</b></li> </ul>
<b>UEFI Boot Path Security</b>	Allows you to control whether the system prompts the user to enter the Admin password when booting to a UEFI boot path.

**Table 3. General (continued)**


Option	Description
	<p>Click one of the following options:</p> <ul style="list-style-type: none"> <li>● <b>Always, Except Internal HDD</b>—Default</li> <li>● <b>Always</b></li> <li>● <b>Never</b></li> </ul>
<b>Date/Time</b>	<p>Allows you to set the date and time. The change to the system date and time takes effect immediately.</p>

## System configuration

**Table 4. System Configuration**

Option	Description
<b>Integrated NIC</b>	<p>Allows you to configure the integrated network controller.</p> <p>Click one of the following options:</p> <ul style="list-style-type: none"> <li>● <b>Disabled</b></li> <li>● <b>Enabled</b></li> <li>● <b>Enabled w/PXE</b>—Default</li> </ul>
<b>SATA Operation</b>	<p>Allows you to configure the operating mode of the integrated SATA hard-drive controller.</p> <p>Click one of the following options:</p> <ul style="list-style-type: none"> <li>● <b>Disabled</b></li> <li>● <b>AHCI</b></li> <li>● <b>RAID On</b>—Default</li> </ul> <p> <b>NOTE:</b> SATA is configured to support RAID mode.</p>
<b>Drives</b>	<p>Allows you to enable or disable various drives on board.</p> <p>The options are:</p> <ul style="list-style-type: none"> <li>● <b>SATA-0</b></li> <li>● <b>SATA-1</b></li> <li>● <b>SATA-4</b></li> <li>● <b>M.2 PCIe SSD-0</b></li> <li>● <b>M.2 PCIe SSD-1</b></li> </ul> <p>All the options are set by default.</p>
<b>SMART Reporting</b>	<p>This field controls whether hard drive errors for integrated drives are reported during system startup. This technology is part of the SMART (Self Monitoring Analysis and Reporting Technology) specification. This option is disabled by default.</p> <ul style="list-style-type: none"> <li>● <b>Enable SMART Reporting</b></li> </ul>
<b>USB Configuration</b>	<p>Allows you to enable or disable the internal/integrated USB configuration.</p> <p>The options are:</p> <ul style="list-style-type: none"> <li>● <b>Enable USB Boot Support</b></li> <li>● <b>Enable External USB Ports</b></li> </ul> <p>All the options are set by default.</p>

**Table 4. System Configuration (continued)**

Option	Description
	<p> <b>NOTE:</b> USB keyboard and mouse always work in the BIOS setup irrespective of these settings.</p>
<b>Dell Type-C Dock Configuration</b>	<p>Always allow Dell docks. This setting affects only the Type-C ports connected to a Dell WD or TB dock.</p>
<b>Thunderbolt Adapter Configuration</b>	<p>Allows you to configure the Thunderbolt adapter security settings within the operating system.</p> <p>The options are:</p> <ul style="list-style-type: none"> <li>● <b>Enable Thunderbolt Technology Support</b>—Default</li> <li>● <b>Enable Thunderbolt Adapter Boot Support</b></li> <li>● <b>Enable Thunderbolt Adapter Pre-boot Modules</b></li> </ul> <p>Choose any one option:</p> <ul style="list-style-type: none"> <li>● <b>Security level - No Security</b></li> <li>● <b>Security level - User Authorization</b>—Default</li> <li>● <b>Security level - Secure Connect</b></li> <li>● <b>Security level - Display Port Only</b></li> </ul>
<b>Thunderbolt Auto Switch</b>	<p>Allows auto switch the thunderbolt option.</p>
<b>USB PowerShare</b>	<p>This field configures the USB PowerShare feature behavior. This option allows you to charge external devices using the stored system battery power through the USB PowerShare port (disabled by default).</p> <ul style="list-style-type: none"> <li>● <b>Enable USB PowerShare</b></li> </ul>
<b>Audio</b>	<p>Allows you to enable or disable the integrated audio controller. By default, the <b>Enable Audio</b> option is selected.</p> <p>The options are:</p> <ul style="list-style-type: none"> <li>● <b>Enable Microphone</b></li> <li>● <b>Enable Internal Speaker</b></li> </ul> <p>This option is set by default.</p>
<b>Keyboard Illumination</b>	<p>This field lets you choose the operating mode of the keyboard illumination feature. The keyboard brightness level can be set from 0% to 100%.</p> <p>The options are:</p> <ul style="list-style-type: none"> <li>● <b>Disabled</b></li> <li>● <b>Dim</b></li> <li>● <b>Bright</b>—Default</li> </ul>
<b>Keyboard Backlight Tmeout on AC</b>	<p>Allows to define the timeout value for the keyboard backlight when an AC adapter is plugged in the system. The Keyboard Backlight tiemout value is only in effect when the backlight is enabled.</p> <ul style="list-style-type: none"> <li>● <b>5 seconds</b></li> <li>● <b>10 seconds</b>—Default</li> <li>● <b>15 seconds</b></li> <li>● <b>30 seconds</b></li> <li>● <b>1 minute</b></li> <li>● <b>5 minutes</b></li> <li>● <b>15 minutes</b></li> <li>● <b>Never</b></li> </ul>

**Table 4. System Configuration (continued)**

Option	Description
<b>Keyboard Backlight Timeout on Battery</b>	<p>Allows to define the timeout value for the keyboard backlight when the system is running only on battery power. The Keyboard Backlight timeout value is only in effect when the backlight is enabled.</p> <ul style="list-style-type: none"> <li>● <b>5 seconds</b></li> <li>● <b>10 seconds</b>—Default</li> <li>● <b>15 seconds</b></li> <li>● <b>30 seconds</b></li> <li>● <b>1 minute</b></li> <li>● <b>5 minutes</b></li> <li>● <b>15 minutes</b></li> <li>● <b>Never</b></li> </ul>
<b>Touchscreen</b>	<p>This field controls whether the touchscreen is enabled or disabled.</p>
<b>Unobtrusive Mode</b>	<p>Allows you to turn off all light and sound emissions in the system when you press Fn+F7. This option is disabled by default.</p>
<b>Miscellaneous devices</b>	<p>Allows you to enable or disable various on board devices.</p> <ul style="list-style-type: none"> <li>● <b>Enable Camera</b>—Default</li> <li>● <b>Enable Hard Drive Free Fall Protection</b>—Default</li> <li>● <b>Enable Secure Digital (SD) Card</b>—Default</li> <li>● <b>Secure Digital (SD) Card Boot</b></li> <li>● <b>Secure Digital Card (SD) Read-Only Mode</b></li> </ul>
<b>MAC Address Pass-Through</b>	<p>This 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> <p>When the Integrated NIC option is selected, we recommend one of the following:</p> <ul style="list-style-type: none"> <li>● Disable the integrated NIC in the BIOS to prevent any issues from multiple NICs on the network with identical MAC addresses.</li> <li>● If the Integrated NIC cannot be disabled, do not connect it to the same network as your dock or USB Ethernet dongle.</li> </ul>



## Video screen options

**Table 5. Video**


Option	Description
<b>LCD Brightness</b>	<p>Allows you to set the display brightness depending upon the power source. On Battery (50% is default) and On AC (100% default).</p>
<b>Switchable Graphics</b>	<p>This option enables or disables switchable graphics technologies such as NVIDIA Optimus and SMD PowerExpress.</p> <p>It should only be enabled for Windows 7 and later versions of Windows or the Ubuntu OS. This feature is not applicable to other operating systems.</p>

# Security

Table 6. Security

Option	Description
<b>Admin Password</b>	<p>Allows you to set, change, or delete the administrator(admin) password.</p> <p>The entries to set password are:</p> <ul style="list-style-type: none"> <li>• <b>Enter the old password:</b></li> <li>• <b>Enter the new password:</b></li> <li>• <b>Confirm new password:</b></li> </ul> <p>Click <b>OK</b> once you set the password.</p> <p> <b>NOTE:</b> For the first time login, "Enter the old password:" field is marked to "Not set". Hence, password has to be set for the first time you login and then you can change or delete the password.</p>
<b>System Password</b>	<p>Allows you to set, change, or delete the System password.</p> <p>The entries to set password are:</p> <ul style="list-style-type: none"> <li>• <b>Enter the old password:</b></li> <li>• <b>Enter the new password:</b></li> <li>• <b>Confirm new password:</b></li> </ul> <p>Click <b>OK</b> once you set the password.</p> <p> <b>NOTE:</b> For the first time login, "Enter the old password:" field is marked to "Not set". Hence, password has to be set for the first time you login and then you can change or delete the password.</p>
<b>Strong Password</b>	<p>Allows you to enforce the option to always set strong password.</p> <ul style="list-style-type: none"> <li>• <b>Enable Strong Password</b></li> </ul> <p>This option is not set by default.</p>
<b>Password Configuration</b>	<p>You can define the length of your password. Min = 4, Max = 32</p>
<b>Password Bypass</b>	<p>Allows you to bypass the System password and the Internal HDD password, when it is set, during a system restart.</p> <p>Click one of the options:</p> <ul style="list-style-type: none"> <li>• <b>Disabled</b>—Default</li> <li>• <b>Reboot bypass</b></li> </ul>
<b>Password Change</b>	<p>Allows you to change the System password when the administrator password is set.</p> <ul style="list-style-type: none"> <li>• <b>Allow Non-Admin Password Changes</b></li> </ul> <p>This option is set by default.</p>
<b>Non-Admin Setup Changes</b>	<p>Allows you to determine whether changes to the setup options are allowed when an Administrator Password is set. If disabled the setup options are locked by the admin password.</p> <ul style="list-style-type: none"> <li>• <b>Allow Wireless Switch Changes</b></li> </ul> <p>This option is not set by default.</p>
<b>UEFI Capsule Firmware Updates</b>	<p>Allows you to update the system BIOS via UEFI capsule update packages.</p> <ul style="list-style-type: none"> <li>• <b>Enable UEFI Capsule Firmware Updates</b></li> </ul> <p>This option is set by default.</p>
<b>TPM 2.0 Security</b>	<p>Allows you to enable or disable the Trusted Platform Module (TPM) during POST.</p>

**Table 6. Security (continued)**

Option	Description
	<p>The options are:</p> <ul style="list-style-type: none"> <li>• <b>TPM On</b>—Default</li> <li>• <b>Clear</b></li> <li>• <b>PPI Bypass for Enable Command</b>—Default</li> <li>• <b>PPI Bypass for Disable Command</b></li> <li>• <b>PPI Bypass for Clear Command</b></li> <li>• <b>Attestation Enable</b>—Default</li> <li>• <b>Key Storage Enable</b>—Default</li> <li>• <b>SHA-256</b>—Default</li> </ul>
<b>Absolute (R)</b>	<p>Allows you to activate or disable the optional Computrace software.</p> <p>The options are:</p> <ul style="list-style-type: none"> <li>• <b>Deactivate</b></li> <li>• <b>Disable</b></li> <li>• <b>Activate</b>—Default</li> </ul>
<b>OROM keyboard Access</b>	<p>Allows you to enable or disable Option ROM configuration screens via hotkeys during boot.</p> <ul style="list-style-type: none"> <li>• <b>Enable</b>—Default</li> <li>• <b>Disable</b></li> <li>• <b>One Time Enable</b></li> </ul>
<b>Admin Setup Lockout</b>	<p>Allows you to prevent users from entering Setup when an administrator password is set.</p> <ul style="list-style-type: none"> <li>• <b>Enable Admin Setup Lockout</b></li> </ul> <p>This option is not set by default.</p>
<b>Master Password Lockout</b>	<p>Allows you to disable master password support.</p> <ul style="list-style-type: none"> <li>• <b>Enable Master Password Lockout</b></li> </ul> <p>This option is not set by default.</p> <p> <b>NOTE:</b> Hard Disk password should be cleared before the settings can be changed.</p>
<b>SMM Security Mitigation</b>	<p>Allows you to enable or disable additional UEFI SMM Security Mitigation protection.</p> <ul style="list-style-type: none"> <li>• <b>SMM Security Mitigation</b></li> </ul> <p>This option is not set by default.</p>

## Secure Boot

**Table 7. Secure Boot**

Option	Description
<b>Secure Boot Enable</b>	<p>Allows you to enable or disable the Secure Boot Feature.</p> <ul style="list-style-type: none"> <li>• <b>Secure Boot Enable</b>—Default</li> </ul>
<b>Secure Boot Mode</b>	<p>Changes to the Secure Boot operation mode modifies the behaviour of Secure Boot to allow evaluation of UEFI driver signatures.</p> <p>Choose one of the option:</p> <ul style="list-style-type: none"> <li>• <b>Deployed Mode</b>—Default</li> <li>• <b>Audit Mode</b></li> </ul>

**Table 7. Secure Boot (continued)**

Option	Description
<b>Expert Key Management</b>	<p>Allows you to enable or disable Expert Key Management.</p> <ul style="list-style-type: none"> <li>● <b>Enable Custom Mode</b></li> </ul> <p>This option is not set by default.</p> <p>The Custom Mode Key Management options are:</p> <ul style="list-style-type: none"> <li>● <b>PK</b>—Default</li> <li>● <b>KEK</b></li> <li>● <b>db</b></li> <li>● <b>dbx</b></li> </ul>

## Intel Software Guard Extensions options

**Table 8. Intel Software Guard Extensions**

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

## Performance

**Table 9. Performance**

Option	Description
<b>Multi Core Support</b>	<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"> <li>● <b>All</b>—Default</li> <li>● <b>1</b></li> <li>● <b>2</b></li> <li>● <b>3</b></li> </ul>
<b>Intel SpeedStep</b>	<p>Allows you to enable or disable the Intel SpeedStep mode of processor.</p> <ul style="list-style-type: none"> <li>● <b>Enable Intel SpeedStep</b></li> </ul> <p>This option is set by default.</p>
<b>C-States Control</b>	<p>Allows you to enable or disable the additional processor sleep states.</p> <ul style="list-style-type: none"> <li>● <b>C states</b></li> </ul>

**Table 9. Performance (continued)**


Option	Description
	This option is set by default.
<b>Intel TurboBoost</b>	Allows you to enable or disable the Intel TurboBoost mode of the processor. <ul style="list-style-type: none"> <li>● <b>Enable Intel TurboBoost</b></li> </ul> This option is set by default.
<b>Hyper-Thread Control</b>	Allows you to enable or disable the HyperThreading in the processor. <ul style="list-style-type: none"> <li>● <b>Disabled</b></li> <li>● <b>Enabled</b>—Default</li> </ul>

## Power management

**Table 10. Power Management**

Option	Description
<b>AC Behavior</b>	Allows you to enable or disable the computer from turning on automatically when an AC adapter is connected. <ul style="list-style-type: none"> <li>● <b>Wake on AC</b></li> </ul> This option is not set by default.
<b>Enable Intel Speed Shift Technology</b>	Allows you to enable or disable the Intel Speed Shift Technology. <ul style="list-style-type: none"> <li>● <b>Enabled</b>—Default</li> </ul>
<b>Auto On Time</b>	Allows you to set the time at which the computer must turn on automatically. The options are: <ul style="list-style-type: none"> <li>● <b>Disabled</b>—Default</li> <li>● <b>Every Day</b></li> <li>● <b>Weekdays</b></li> <li>● <b>Select Days</b></li> </ul> This option is not set by default.
<b>USB Wake Support</b>	Allows you to enable USB devices to wake the system from standby. <ul style="list-style-type: none"> <li>● <b>Enable USB Wake Support</b></li> </ul> This option is not set by default.
<b>Wireless Radio Control</b>	This option if enabled, will sense the connection of the system to a wired network and subsequently disable the selected wireless radios (WLAN and/or WWAN). Upon disconnection from the wired network the selected wireless radio will be enabled. <ul style="list-style-type: none"> <li>● <b>Control WLAN radio</b></li> <li>● <b>Control WWAN radio</b></li> </ul> This option is not set by default.
<b>Wake on LAN</b>	This option allows the computer to power up from the off state when triggered by a special LAN signal. Wake-up from the Standby state is unaffected by this setting and must be enabled in the operating system. This feature only works when the computer is connected to AC power supply. <ul style="list-style-type: none"> <li>● <b>Disabled</b>—Default - Does not allow the system to power on by special LAN signals when it receives a wake-up signal from the LAN or wireless LAN.</li> <li>● <b>LAN Only</b> - Allows the system to be powered on by special LAN signals.</li> </ul>

**Table 10. Power Management (continued)**

Option	Description
	<ul style="list-style-type: none"> <li>● <b>WLAN Only</b> - Allows the system to be powered on by special WLAN signals.</li> <li>● <b>LAN or WLAN</b> - Allows the system to be powered on by special LAN or WLAN signals.</li> </ul>
<b>Block Sleep</b>	Allows you to block entering to sleep in OS environment.
<b>Advanced Battery Charge Configuration</b>	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.
<b>Primary Battery Charge Configuration</b>	<p>Allows you to select the charging mode for the battery.</p> <p>The options are:</p> <ul style="list-style-type: none"> <li>● <b>Adaptive</b>—Default</li> <li>● <b>Standard</b> - Fully charges your battery at a standard rate.</li> <li>● <b>ExpressCharge</b>- The battery charges over a shorter period of time using Dell's fast charging technology.</li> <li>● <b>Primarily AC use</b></li> <li>● <b>Custom</b></li> </ul> <p>If Custom Charge is selected, you can also configure Custom Charge Start and Custom Charge Stop.</p> <p> <b>NOTE:</b> All charging mode may not be available for all the batteries. To enable this option, disable the <b>Advanced Battery Charge Configuration</b> option.</p>

## Post behavior

**Table 11. POST Behavior**

Option	Description
<b>Adapter Warnings</b>	<p>Allows you to enable or disable the system setup (BIOS) warning messages when you use certain power adapters.</p> <ul style="list-style-type: none"> <li>● <b>Enable Adapter Warnings</b>—Default</li> </ul>
<b>Numlock Enable</b>	<p>Allows you to enable or disable the Numlock function when the system boots.</p> <ul style="list-style-type: none"> <li>● <b>Enable Numlock</b>—Default</li> </ul>
<b>Fn Lock Options</b>	<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.</p> <ul style="list-style-type: none"> <li>● <b>Fn Lock</b>—Default</li> </ul> <p>Click one of the following options:</p> <ul style="list-style-type: none"> <li>● <b>Lock Mode Disable/Standard</b></li> <li>● <b>Lock Mode Enable/Secondary</b>—Default</li> </ul>
<b>Fastboot</b>	<p>Allows you to speed up the boot process by bypassing some of the compatibility steps.</p> <p>Click one of the following options:</p> <ul style="list-style-type: none"> <li>● <b>Minimal</b></li> <li>● <b>Thorough</b>—Default</li> <li>● <b>Auto</b></li> </ul>
<b>Extended BIOS POST Time</b>	<p>Allows you to create an additional preboot delay.</p> <p>Click one of the following options:</p> <ul style="list-style-type: none"> <li>● <b>0 seconds</b>—Default</li> </ul>

**Table 11. POST Behavior (continued)**

Option	Description
	<ul style="list-style-type: none"> <li>● <b>5 seconds</b></li> <li>● <b>10 seconds</b></li> </ul>
<b>Full Screen Logo</b>	<p>Allows you to display full screen logo, if your image matches screen resolution.</p> <ul style="list-style-type: none"> <li>● <b>Enable Full Screen Logo</b></li> </ul> <p>This option is not set by default.</p>
<b>Sign of Life Indication</b>	<p>Allows the system to indicate during POST that the power button press has been acknowledged by turning on the keyboard backlight.</p>
<b>Warnings and Errors</b>	<p>Allows you to select different options to either stop, prompt and wait for user input, continue when warnings are detected but pause on errors, or continue when either warnings or errors are detected during the POST process.</p> <p>Click one of the following options:</p> <ul style="list-style-type: none"> <li>● <b>Prompt on Warnings and Errors</b>—Default</li> <li>● <b>Continue on Warnings</b></li> <li>● <b>Continue on Warnings and Errors</b></li> </ul>

## Virtualization support

**Table 12. Virtualization Support**

Option	Description
<b>Virtualization</b>	<p>This option specifies whether a Virtual Machine Monitor (VMM) can utilize the additional hardware capabilities provided by the Intel Virtualization technology.</p> <ul style="list-style-type: none"> <li>● <b>Enable Intel Virtualization Technology</b></li> </ul> <p>This option is set by default.</p>
<b>VT for Direct I/O</b>	<p>Enables or disables the Virtual Machine Monitor (VMM) from utilizing the additional hardware capabilities provided by the Intel Virtualization technology for direct I/O.</p> <ul style="list-style-type: none"> <li>● <b>Enable VT for Direct I/O</b></li> </ul> <p>This option is set by default.</p>

## Wireless options

**Table 13. Wireless**


Option	Description
<b>Wireless Switch</b>	<p>Allows to set the wireless devices that can be controlled by the wireless switch.</p> <p>The options are:</p> <ul style="list-style-type: none"> <li>● <b>WWAN</b></li> <li>● <b>GPS (on WWAN Module)</b></li> <li>● <b>WLAN</b></li> <li>● <b>Bluetooth</b></li> </ul> <p>All the options are enabled by default.</p>
<b>Wireless Device Enable</b>	<p>Allows you to enable or disable the internal wireless devices.</p> <p>The options are:</p>

**Table 13. Wireless (continued)**

Option	Description
	<ul style="list-style-type: none"> <li>• <b>WWAN/GPS</b></li> <li>• <b>WLAN</b></li> <li>• <b>Bluetooth</b></li> </ul> <p>All the options are enabled by default.</p>

## Maintenance

**Table 14. Maintenance**

Option	Description
<b>Service Tag</b>	Displays the service tag of your computer.
<b>Asset Tag</b>	Allows you to create a system asset tag if an asset tag is not already set. This option is not set by default.
<b>BIOS Downgrade</b>	Allows you to flash previous revisions of the system firmware. <ul style="list-style-type: none"> <li>• <b>Allow BIOS Downgrade</b></li> </ul> This option is set by default.
<b>Data Wipe</b>	Allows you to securely erase data from all internal storage devices. <ul style="list-style-type: none"> <li>• <b>Wipe on Next Boot</b></li> </ul> This option is not set by default.
<b>BIOS Recovery</b>	<p><b>BIOS Recovery from Hard Drive</b>—This option is set by default. Allows you to recover the corrupted BIOS from a recovery file on the HDD or an external USB drive.</p> <p><b>BIOS Auto-Recovery</b>— Allows you to recover the BIOS automatically.</p> <p> <b>NOTE:</b> <b>BIOS Recovery from Hard Drive</b> field should be enabled.</p> <p><b>Always Perform Integrity Check</b>—Performs integrity check on every boot.</p>


## System logs

**Table 15. System Logs**


Option	Description
<b>BIOS events</b>	Allows you to view and clear the System Setup (BIOS) POST events.
<b>Thermal Events</b>	Allows you to view and clear the System Setup (Thermal) events.
<b>Power Events</b>	Allows you to view and clear the System Setup (Power) events.

## Updating the BIOS

### Updating the BIOS in Windows

 **CAUTION:** If BitLocker is not suspended before updating the BIOS, the next time you reboot the system it will not recognize the BitLocker key. You will then be prompted to enter the recovery key to progress and the


**system 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 re-install. For more information on this subject, see Knowledge Article: <https://www.dell.com/support/article/sln153694>**

1. Go to [www.dell.com/support](http://www.dell.com/support).
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, see knowledge base article [000124211](https://www.dell.com/support/article/000124211) at [www.dell.com/support](http://www.dell.com/support).

## 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](https://www.dell.com/support/article/000131486) at [www.dell.com/support](http://www.dell.com/support).


## Updating the BIOS using the USB drive in Windows

 **CAUTION:** If BitLocker is not suspended before updating the BIOS, the next time you reboot the system it will not recognize the BitLocker key. You will then be prompted to enter the recovery key to progress and the system 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 re-install. For more information on this subject, see Knowledge Article: <https://www.dell.com/support/article/sln153694>

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, see the knowledge base article [000145519](https://www.dell.com/support/article/000145519) at [www.dell.com/support](http://www.dell.com/support).
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.

 **CAUTION:** If BitLocker is not suspended before updating the BIOS, the next time you reboot the system it will not recognize the BitLocker key. You will then be prompted to enter the recovery key to progress and the system 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 re-install. For more information on this subject, see Knowledge Article: <https://www.dell.com/support/article/sln153694>

### 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 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.

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 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 16. 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 if it is not locked and left unattended.

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

### Assigning a system setup password

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

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

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

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.

To enter the System Setup, press F12 immediately after a power-on or reboot.

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 **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 and a message prompts you to save the changes.
6. Press Y to save the changes and exit from System Setup.  
The computer restarts.


## Clearing CMOS settings

 **CAUTION:** Clearing CMOS settings will reset the BIOS settings on your computer.

1. Remove the [SD card](#)
2. Remove the [battery cover](#)
3. Disconnect the battery cable from the system board.
4. Remove the [base cover](#)
5. Remove the [coin-cell battery](#).
6. Wait for one minute.
7. Replace the [coin-cell battery](#).
8. Replace the [base cover](#)
9. Connect the battery cable to the system board.
10. Replace the [battery cover](#)
11. Replace the [SD card](#).

## Clearing BIOS (System Setup) and System passwords

To clear the system or BIOS passwords, contact Dell technical support as described at [www.dell.com/contactdell](http://www.dell.com/contactdell).

 **NOTE:** For information on how to reset Windows or application passwords, refer to the documentation accompanying Windows or your application.

# Troubleshooting

## Topics:

- [Handling swollen Lithium-ion batteries](#)
- [Enhanced Pre-Boot System Assessment — ePSA diagnostics](#)
- [Built-in self-test \(BIST\)](#)
- [Diagnostic LED](#)
- [Recovering the operating system](#)
- [Real-Time Clock \(RTC Reset\)](#)
- [Battery status LED](#)
- [Backup media and recovery options](#)
- [WiFi power cycle](#)
- [Drain residual flea power \(perform hard reset\)](#)

## Handling swollen Lithium-ion batteries

Like most laptops, Dell laptops use lithium-ion batteries. One type of lithium-ion battery is the lithium-ion polymer battery. Lithium-ion polymer 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 lithium-ion polymer battery technology is the potential for swelling of the battery cells.

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 Lithium-ion batteries are as follows:


- Exercise caution when handling Lithium-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 power 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 <https://www.dell.com/support> 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 <https://www.dell.com> or otherwise directly from Dell.


Lithium-ion batteries can swell for various reasons such as age, number of charge cycles, or exposure to high heat. For more information on how to improve the performance and lifespan of the laptop battery and to minimize the possibility of occurrence of the issue, see [Dell Laptop Battery - Frequently Asked Questions](#).

# Enhanced Pre-Boot System Assessment — ePSA diagnostics

The ePSA diagnostics (also known as system diagnostics) performs a complete check of your hardware. The ePSA is embedded with the BIOS and is launched by the BIOS internally. The embedded system diagnostics provides a set of options for particular devices or device groups allowing you to:

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


 **CAUTION:** Use the system diagnostics to test only your computer. Using this program with other computers may cause invalid results or error messages.

 **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.

## Running the ePSA Diagnostics

Invoke diagnostics boot by either of the methods that are suggested below:

1. Power on the computer.
2. As the computer boots, press the F12 key when the Dell logo is displayed.
3. In the boot menu screen, use Up/Down arrow key to select the **Diagnostics** option and then press **Enter**.


 **NOTE:** The **Enhanced Pre-boot System Assessment** window displays, listing all devices detected in the computer. The diagnostics starts running the tests on all the detected devices.

4. Press the arrow in the lower-right corner to go to the page listing. The detected items are listed and tested.
5. To run a diagnostic test on a specific device, press Esc and click **Yes** to stop the diagnostic test.
6. Select the device from the left pane and click **Run Tests**.
7. If there are any issues, error codes are displayed. Note the error code and contact Dell.  
or
8. Shut down the computer.
9. Press and hold the Fn key, while pressing the power button, and then release both.
10. Repeat steps 3–7 above.

## Built-in self-test (BIST)

### M-BIST

M-BIST (Built In Self-Test) is the system board's 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 POST (Power On Self Test).

### How to run M-BIST

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

1. Press and hold both the **M** key on the keyboard and the **power button** to initiate M-BIST.
2. With both the **M** key and the **power button** held down, the battery indicator LED may exhibit two states:
  - a. OFF: No fault detected with the system board
  - b. AMBER: Indicates a problem with the system board
3. If there is a failure with the system board, the battery status LED will flash one of the following error codes for 30 seconds:

**Table 17. 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	Unrecoverable SPI Failure

4. If there is no failure with the system board, the LCD will cycle through the solid color screens described in the LCD-BIST section for 30 seconds and then power 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 (i.e., the L-BIST circuit fails), the battery status LED will flash 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 L-BIST Test:

1. Press the power button to start the system.
2. If the system 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 supplied to the LCD.
3. For cases, when a [2,7] error code is shown, check to see if the display cable is properly connected.
4. 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 PC settings.

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

### How to invoke LCD BIST Test

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

**i NOTE:** Dell SupportAssist Pre-boot diagnostics upon launch, initiates an LCD BIST first, expecting a user intervention confirm functionality of the LCD.

## Diagnostic LED

This section details the diagnostic features of the battery LED.

Instead of beep codes, errors are indicated via the bicolor Battery Charge/Status LED. A specific blink pattern is followed by flashing a pattern of flashes in amber, followed by white. The pattern then repeats.

**i NOTE:** The diagnostic pattern will consist of a two digit number being represented by a first group of LED blinks (1 through 9) in amber, followed by a 1.5 second pause with the LED off, and then a second group of LED blinks (1 through 9) in white. This is then followed by a three second pause, with the LED off, before repeating over again. Each LED blink takes 0.5 seconds.

The system will not shutdown when displaying the Diagnostic Error Codes.

Diagnostic Error Codes will always supersede any other use of the LED. For instance, on Notebooks, battery codes for Low Battery or Battery Failure situations will not be displayed when Diagnostic Error Codes are being displayed.

**Table 18. Diagnostic LED**

Blinking Pattern		Possible Problem	Suggested Resolution
Amber	White		
2	1	CPU failure	Replace the system board
2	2	System Board failure (included BIOS corruption or ROM error)	Flash latest BIOS version. If problem persists, replace the system board
2	3	No Memory/ RAM detected	Confirm that the memory module is installed properly. If problem persists, replace the memory module
2	4	Memory / RAM failure	Replace the memory module
2	5	Invalid memory installed	Replace the memory module
2	6	System board / Chipset Error / Clock failure / Gate A20 failure / Super I/O failure / Keyboard controller failure	Replace the system board
2	7	LCD failure	Replace the LCD
3	1	RTC power failure	Replace the CMOS battery
3	2	PCI or Video card/chip failure	Replace the system board
3	3	BIOS Recovery image not found	Flash latest BIOS version. If problem persists, replace the system board
3	4	BIOS Recovery image found but invalid	Flash latest BIOS version. If problem persists, replace the system board

## 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 standalone tool that is preinstalled in all Dell computers installed with 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 [www.dell.com/serviceabilitytools](http://www.dell.com/serviceabilitytools). Click **SupportAssist** and then, click **SupportAssist OS Recovery**.

## 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.

## Battery status LED

**Table 19. Battery status LED**

Power Source	LED behavior	System Power State	Battery Charge Level
AC Adapter	Solid White	S0	0-100%
AC Adapter	Solid White	S4/S5	< Fully Charged
AC Adapter	Off	S4/S5	Fully Charged
Battery	Amber	S0	< = 10%
Battery	Off	S0	> 10%
Battery	Off	S4/S5	0-100%


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

## 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 Windows operating system on your Dell PC. For more information, see [Dell Windows Backup Media and Recovery Options](#).

## WiFi power cycle

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

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

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)


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 power on or boot into the operating system.

### To drain residual flea power (perform a hard reset)

1. Turn off your computer.
2. Disconnect the power adapter from your computer.
3. Remove the base cover.
4. Remove the battery.
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, see the knowledge base article [000130881](https://www.dell.com/support) at [www.dell.com/support](https://www.dell.com/support).

# Getting help

## Topics:

- [Contacting Dell](#)

## Contacting Dell

 **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.

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:

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.