

# Inspiron 7490

## 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 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 you have read the safety information that shipped with your computer.


 **WARNING:** Before working inside your computer, read the safety information that is shipped with your computer. For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).


 **WARNING:** Disconnect your computer from 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 your computer to an electrical outlet.

 **CAUTION:** To avoid damaging the computer, ensure that the work surface is flat, dry, and clean.

 **CAUTION:** To avoid damaging the components and cards, handle them by their edges, and avoid touching the pins and the contacts.

 **CAUTION:** You should only perform troubleshooting and repairs as authorized or directed by the Dell technical assistance team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. See the safety instructions that is shipped with the product or at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

 **CAUTION:** Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate static electricity which could harm internal components.


 **CAUTION:** When you disconnect a cable, pull it by its connector or its pull tab, not the cable itself. Some cables have connectors with locking tabs or thumbscrews that you must disengage before disconnecting the cable. When disconnecting cables, keep them evenly aligned to avoid bending the connector pins. When connecting cables, ensure that the ports and the connectors are correctly oriented and aligned.

 **CAUTION:** Press and eject any installed card from the media-card reader.

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

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

## Before working inside your computer


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

## Before you begin

### Steps

1. Save and close all open files and exit all open applications.

2. Shut down your computer. Click **Start > Power > Shut down**.

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

3. Disconnect your computer and all attached devices from their electrical outlets.
4. Disconnect all attached network devices and peripherals, such as keyboard, mouse, and monitor from your computer.
5. Remove any media card and optical disc from your computer, if applicable.

## Electrostatic discharge—ESD protection

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

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

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

- **Catastrophic** – Catastrophic failures represent approximately 20 percent of ESD-related failures. The damage causes an immediate and complete loss of device functionality. An example of catastrophic failure is a memory DIMM that has received a static shock and immediately generates a "No POST/No Video" symptom with a beep code emitted for missing or nonfunctional memory.
- **Intermittent** – Intermittent failures represent approximately 80 percent of ESD-related failures. The high rate of intermittent failures means that most of the time when damage occurs, it is not immediately recognizable. The DIMM receives a static shock, but the tracing is merely weakened and does not immediately produce outward symptoms related to the damage. The weakened trace may take weeks or months to melt, and in the meantime may cause degradation of memory integrity, intermittent memory errors, etc.

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

Perform the following steps to prevent ESD damage:

- Use a wired ESD wrist strap that is properly grounded. The use of wireless anti-static straps is no longer allowed; they do not provide adequate protection. Touching the chassis before handling parts does not ensure adequate ESD protection on parts with increased sensitivity to ESD damage.
- Handle all static-sensitive components in a static-safe area. If possible, use anti-static floor pads and workbench pads.
- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the anti-static packing material until you are ready to install the component. Before unwrapping the anti-static packaging, ensure that you discharge static electricity from your body.
- Before transporting a static-sensitive component, place it in an anti-static container or packaging.

## ESD field service kit

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

### Components of an ESD field service kit

The components of an ESD field service kit are:

- **Anti-Static Mat** – The anti-static mat is dissipative and parts can be placed on it during service procedures. When using an anti-static mat, your wrist strap should be snug and the bonding wire should be connected to the mat and to any bare metal on the system being worked on. Once deployed properly, service parts can be removed from the ESD bag and placed directly on the mat. ESD-sensitive items are safe in your hand, on the ESD mat, in the system, or inside a bag.
- **Wrist Strap and Bonding Wire** – The wrist strap and bonding wire can be either directly connected between your wrist and bare metal on the hardware if the ESD mat is not required, or connected to the anti-static mat to protect hardware that is temporarily placed on the mat. The physical connection of the wrist strap and bonding wire between your skin, the ESD mat, and the hardware is known as bonding. Use only Field Service kits with a wrist strap, mat, and bonding wire. Never use wireless wrist straps. Always be aware that the internal wires of a wrist strap are prone to damage from normal wear

and tear, and must be checked regularly with a wrist strap tester in order to avoid accidental ESD hardware damage. It is recommended to test the wrist strap and bonding wire at least once per week.

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

## ESD protection summary


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

## Transporting sensitive components

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

## After working inside your computer

### About this task

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

### Steps

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

## Removing and installing components

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

### Recommended tools

The procedures in this document require the following tools:

- Phillips #0 screwdriver
- Phillips #1 screwdriver
- Phillips #2 screwdriver
- Plastic scribe
- T-30 torx screwdriver

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






### Screw list

**NOTE:** When removing screws from a component, it is recommended to note the screw type, the quantity of screws, and then place them in a screw storage box. This is to ensure that the correct number of screws and correct screw type is restored when the component is replaced.













**NOTE:** Some computers have magnetic surfaces. Ensure that the screws are not left attached to such surface when replacing a component.

**NOTE:** Screw color may vary with the configuration ordered.

**Table 1. Screw list**

Component	Secured to	Screw type	Quantity	Screw image
Base cover	Palm-rest assembly	M2x3.5	6	
Battery	Palm-rest assembly	M2x2	4	
Solid-state drive shield <b>NOTE:</b> Available only on computers shipped with solid-state drive with a capacity more than 512 GB.	System board	M2x3	1	
Heat sink (on computers shipped with discrete graphics card)	System board	M2x3	5	
Heat sink (on computers shipped with integrated graphics card)	System board	M2x3	4	

**Table 1. Screw list (continued)**

Component	Secured to	Screw type	Quantity	Screw image
Fan	Palm-rest assembly	M2x3	3	
WLAN-card bracket	WLAN card	M1.6x2.5	1	
Touchpad	Palm-rest assembly	M1.6x2	4	
Hinges	Palm-rest assembly	M2x4.5	4	
Display-cable bracket	System board	M2x3.5	3	
I/O board	Palm-rest assembly	M2x3	3	
Power button	Palm-rest assembly	M1.4x2.3	2	
Power button with optional fingerprint reader  <b>NOTE:</b> Applicable for computers shipped with a fingerprint reader.	Palm-rest assembly	M1.4x2.3	2	
System board	Palm-rest assembly	M2x3	1	
Keyboard	Palm-rest assembly	M1.2x1.5	28	
Fan bracket	Keyboard	M1.4x2.3	1	

## Nano-SIM card tray


### Removing the Nano-SIM card tray

#### Prerequisites

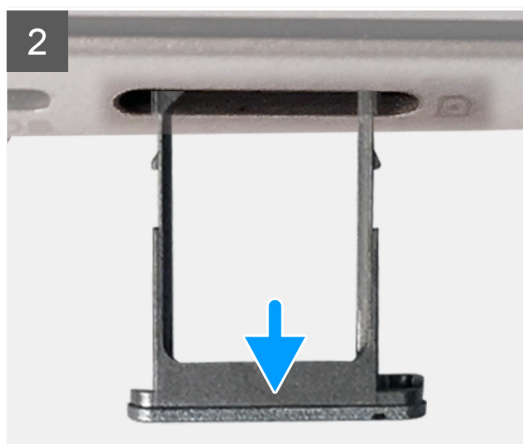
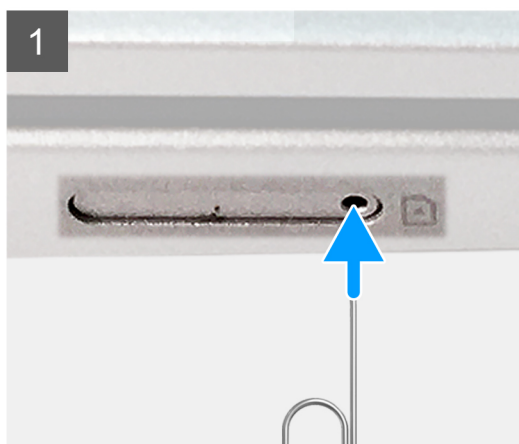
1. Follow the procedure in [before working inside your computer](#).

#### About this task

The following image indicates the location of the Nano-SIM card tray and provides a visual representation of the removal procedure.

 **NOTE:** The Nano-SIM card slot is available in your computer depending on the region and configuration you ordered.





### Steps

1. Insert the SIM eject tool (or paper clip) into the hole, next to the Nano-SIM card tray until the tray pops out.
2. Pull the tray out of the computer.


## Installing the Nano-SIM card tray

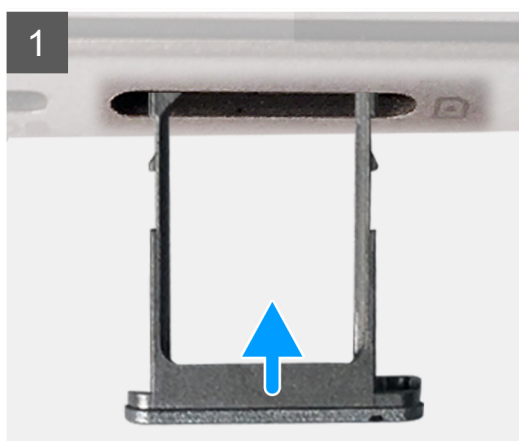
### Prerequisites

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

### About this task

The following image indicates the location of the Nano-SIM card tray and provides a visual representation of the removal procedure.

 **NOTE:** The Nano-SIM card slot is available in your computer depending on the region and configuration you ordered.



### Steps

Push the Nano-SIM card tray back into the slot.

## Base cover

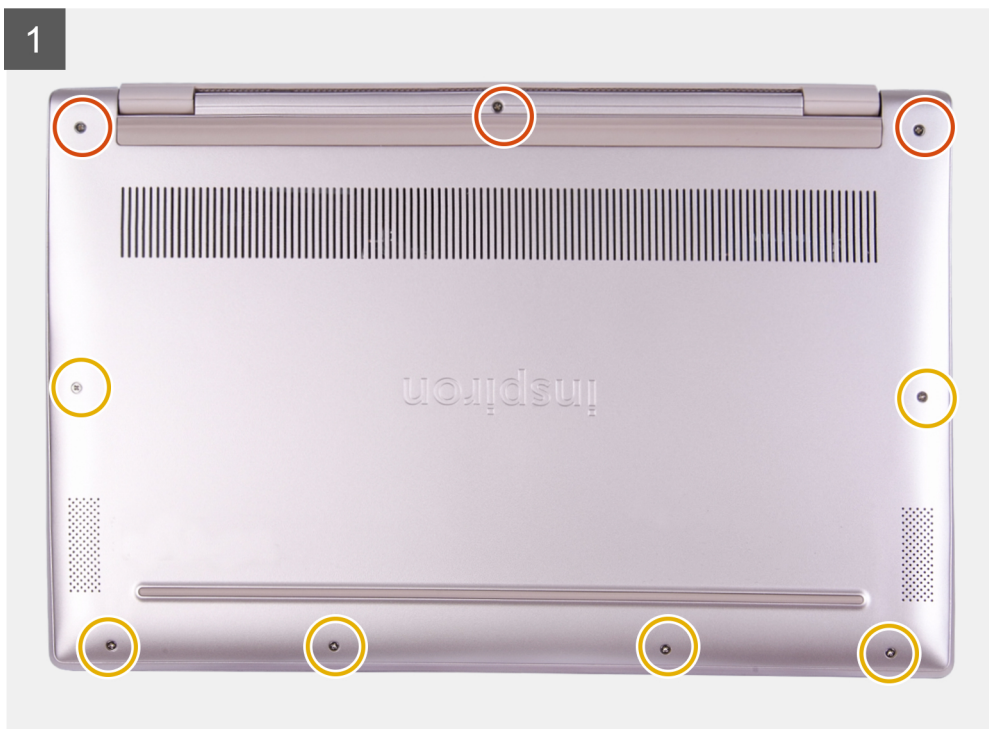
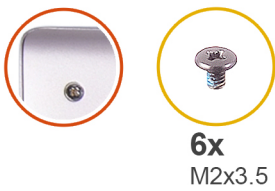
### Removing the base cover

#### Prerequisites

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

#### About this task

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



2



### Steps

1. Loosen the three captive screws on the base cover.
2. Remove the six screws (M2x3.5) that secure the base cover to the palm-rest assembly.
3. Using a plastic scribe, pry the base cover starting from the top-left corner of the palm-rest assembly.
4. Lift the base cover off the palm-rest assembly.

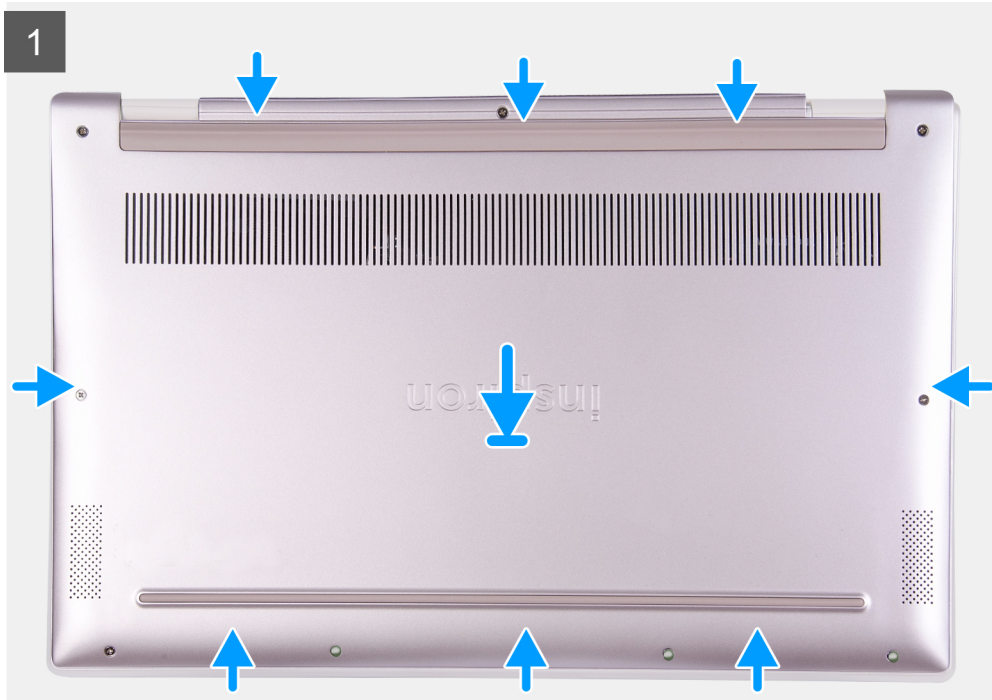
## Installing the base cover

### Prerequisites

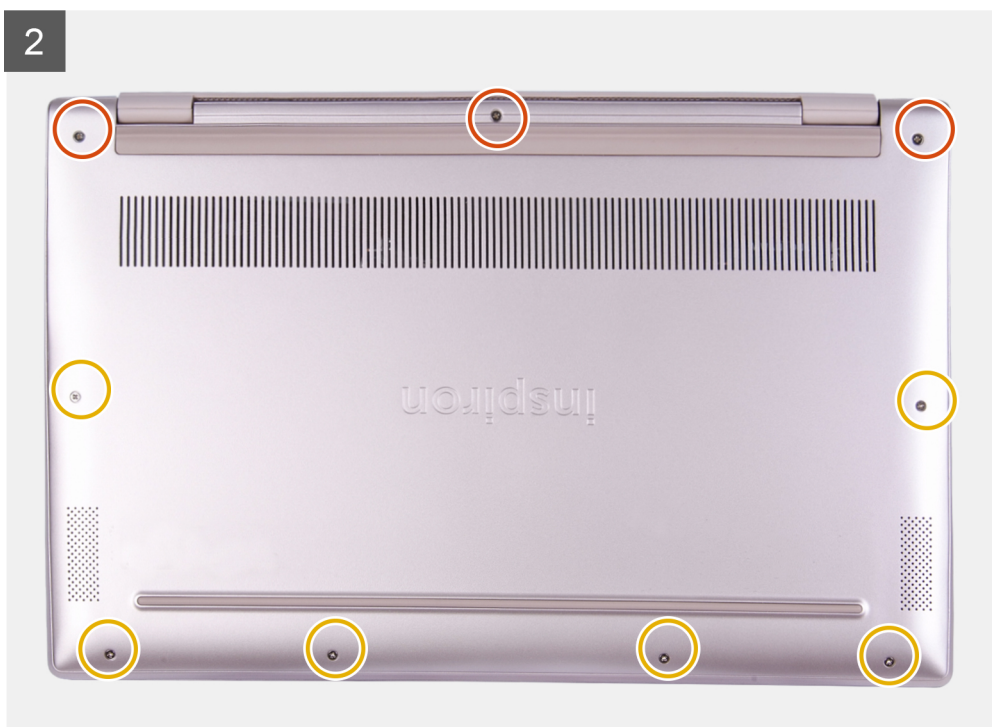
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

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



**6x**  
M2x3.5



### Steps

1. Align the base cover on the palm-rest assembly, and snap the base cover into place.
2. Replace the six screws (M2x3.5) that secure the base cover to the palm-rest assembly.
3. Tighten the three captive screws that secure the base cover to the palm-rest assembly.



## Next steps


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

# Solid-state drive/Intel Optane

## Removing the M.2 2280 solid-state drive/Intel Optane

### Prerequisites

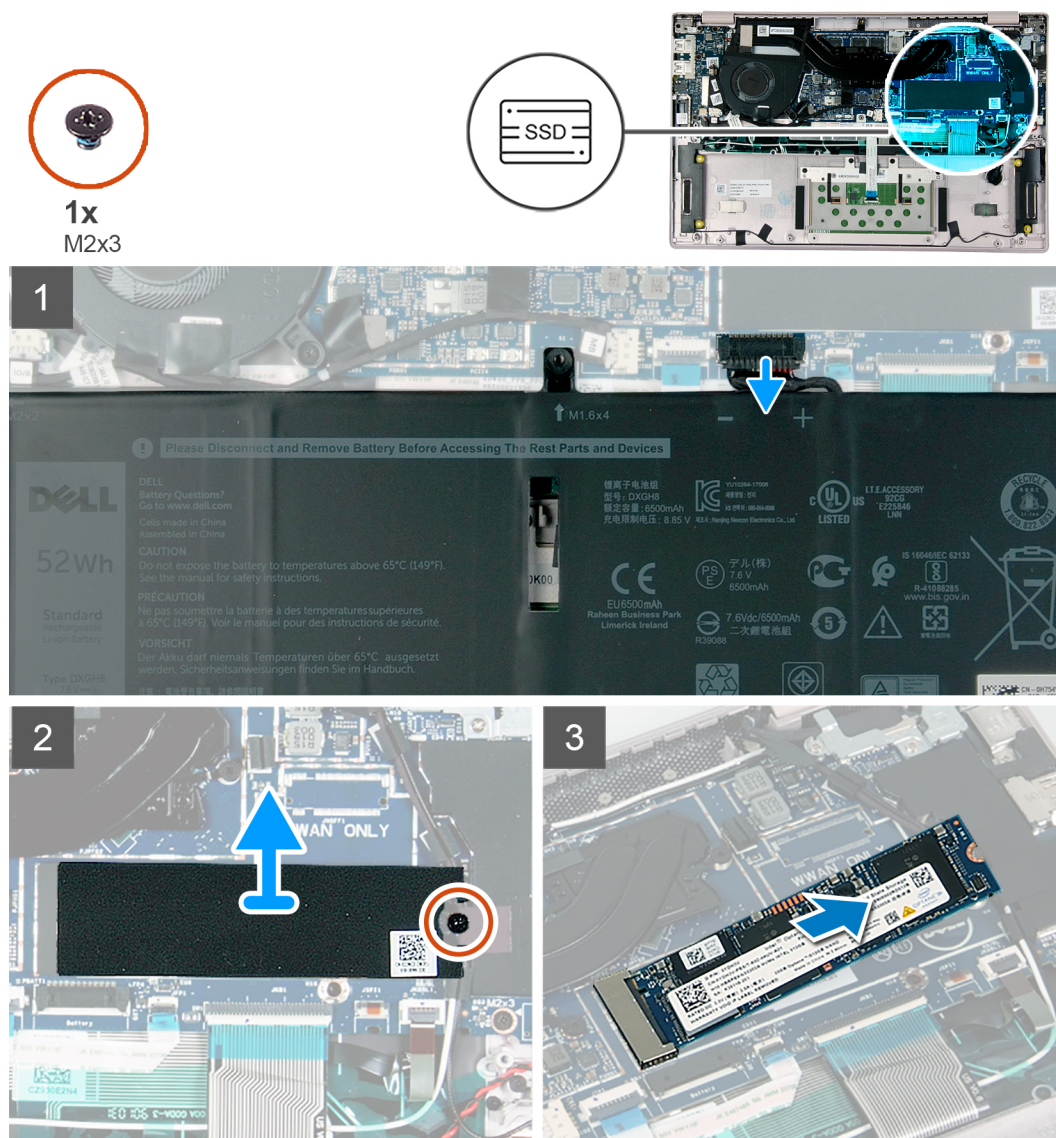
1. Follow the procedure in [before working inside your computer](#).
2. Remove the [base cover](#).

 **NOTE:** M.2 2280 solid-state drive/Intel Optane is supported in computers shipped with WLAN card only.


### About this task

You need to disable the Intel Optane device before removing it from your computer. For more information about disabling the Intel Optane device, see [Disabling Intel Optane memory](#).

The following image indicates the location of the M.2 2280 solid-state drive/Intel Optane and provides a visual representation of the removal procedure.




## Steps

1. Disconnect the battery cable from the system board.
2. Remove the screw (M2x3) that secures the solid-state drive shield to the system board.  
 **NOTE:** Solid-state drive shield is available only in computers that are shipped with Intel Optane or solid-state drive that has a capacity of more than 512 GB.
3. Gently remove the solid-state drive shield off the solid-state drive slot on the system board.
4. Slide and remove the M.2 2280 solid-state drive/Intel Optane off the solid-state drive slot on the system board.

## Installing the M.2 2280 solid-state drive/Intel Optane

### Prerequisites

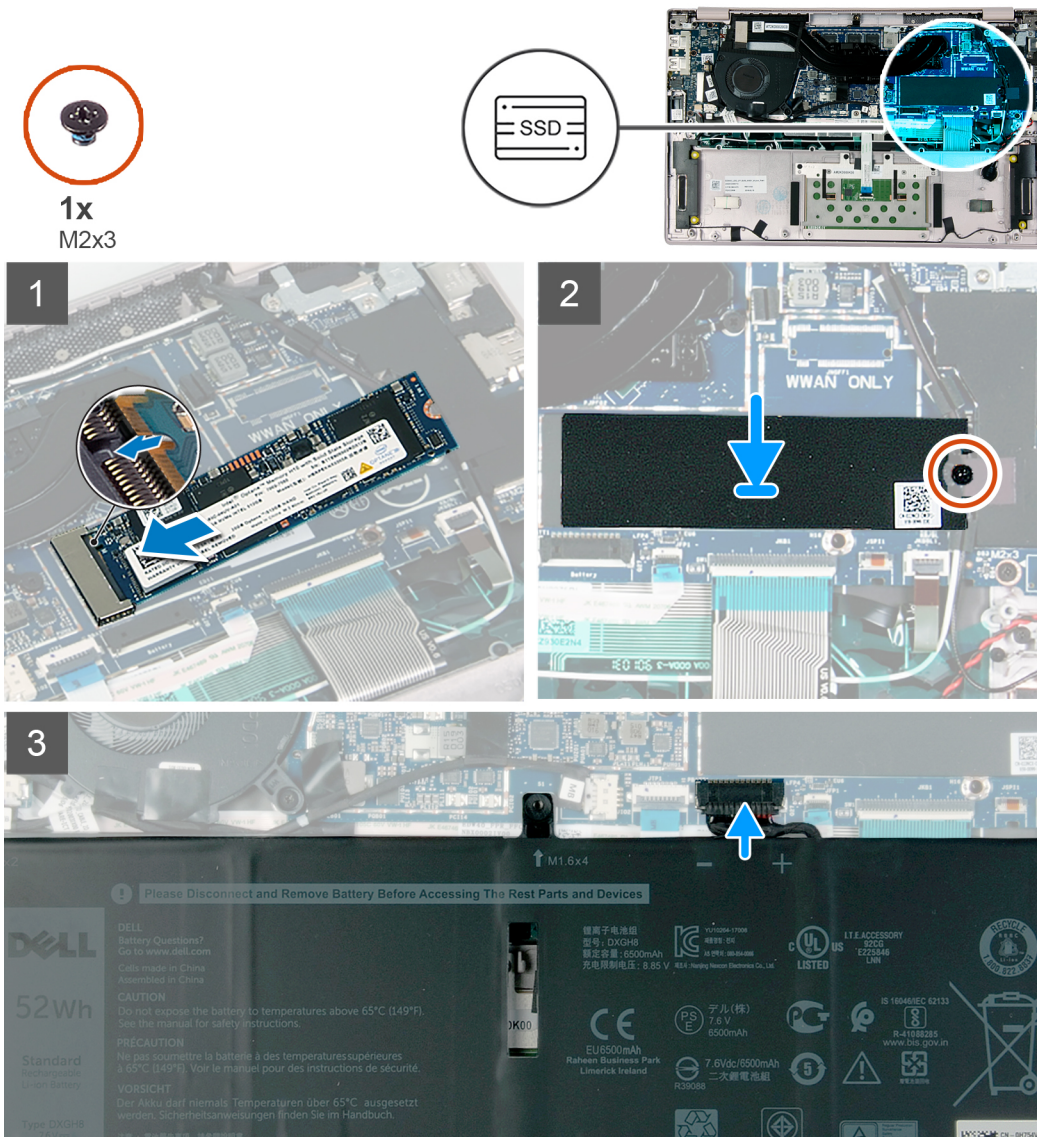
If you are replacing a component, remove the existing component before performing the installation procedure.

 **NOTE:** M.2 2280 solid-state drive/Intel Optane is supported in computers shipped with WLAN card only.

### About this task

Enable the Intel Optane device after you replace it. For more information about enabling the Intel Optane device, see [Enabling Intel Optane memory](#).

The following image indicates the location of the M.2 2280 solid-state drive/Intel Optane and provides a visual representation of the installation procedure.



## Steps

1. Align the notch on the M.2 2280 solid-state drive/Intel Optane with the tab on the solid-state drive slot.
2. Slide the M.2 2280 solid-state drive/Intel Optane into the solid-state drive slot on the system board.
3. Align and replace the solid-state drive shield on the solid-state drive slot on the system board.

**NOTE:** Solid-state drive shield is available only in computers that are shipped with Intel Optane or solid-state drive that has a capacity of more than 512 GB.

4. Replace the screw (M2x3) that secures the solid-state drive shield to the system board.
5. Connect the battery cable to the system board.

## Next steps

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



# Solid-state drive


## Removing the M.2 2230 solid-state drive

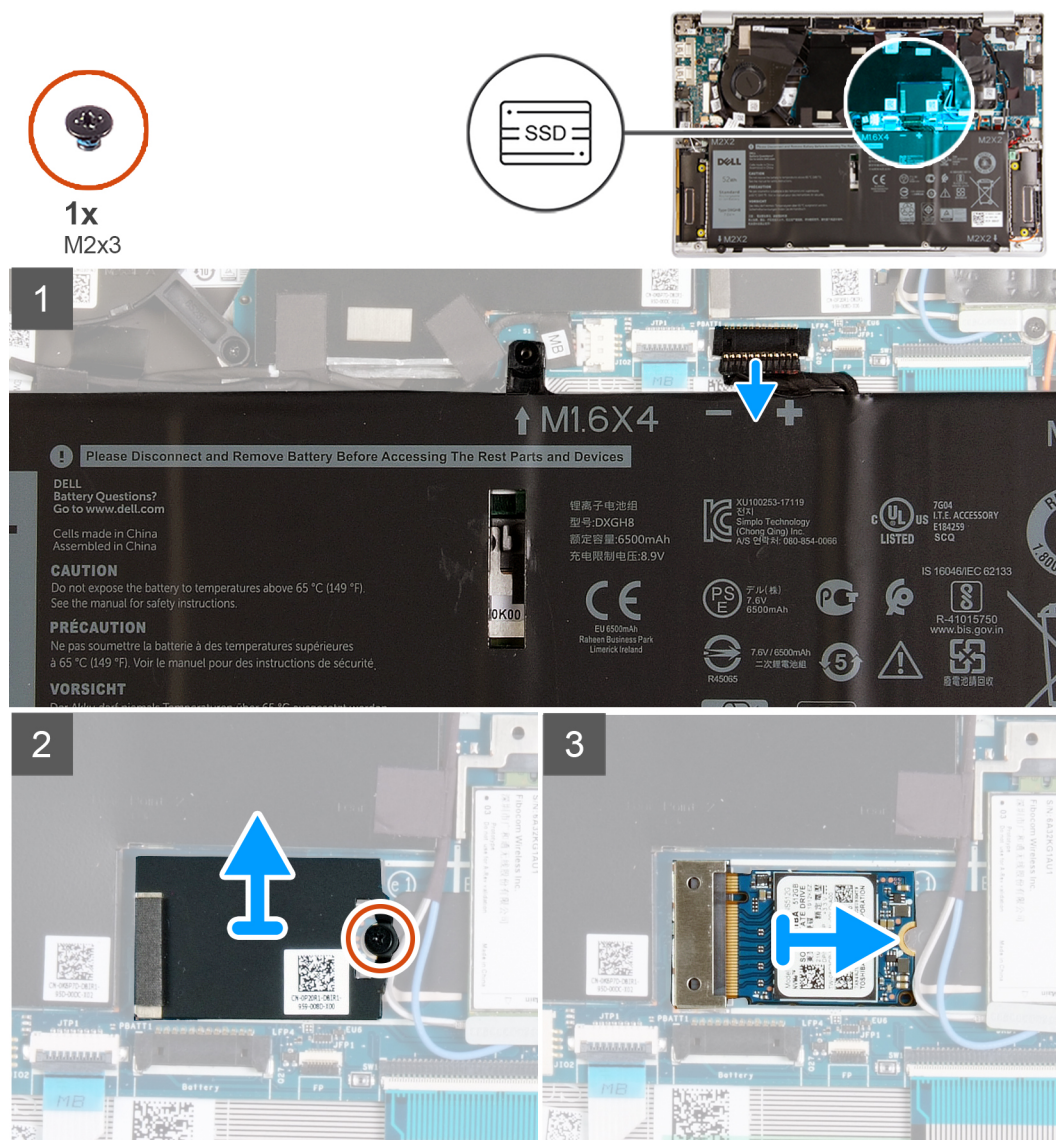
### Prerequisites

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

### About this task

The following image indicates the location of the M.2 2230 solid-state drive and provides a visual representation of the removal procedure.

 **NOTE:** Computers shipped with WWAN card supports only M.2 2230 solid-state drive.



### Steps

1. Disconnect the battery cable from the system board.
2. Remove the screw (M2x3) that secures the solid-state drive bracket to the system board.
3. Slide and remove the solid-state drive bracket off the M.2 2230 solid-state drive on the system board.



- Slide and remove the solid-state drive shield off the M.2 2230 solid-state drive on the system board.

**NOTE:** Applicable in computers shipped with WWAN card.

- Slide and remove the M.2 2230 solid-state drive off the solid-state drive slot on the system board.

## Installing the M.2 2230 solid-state drive

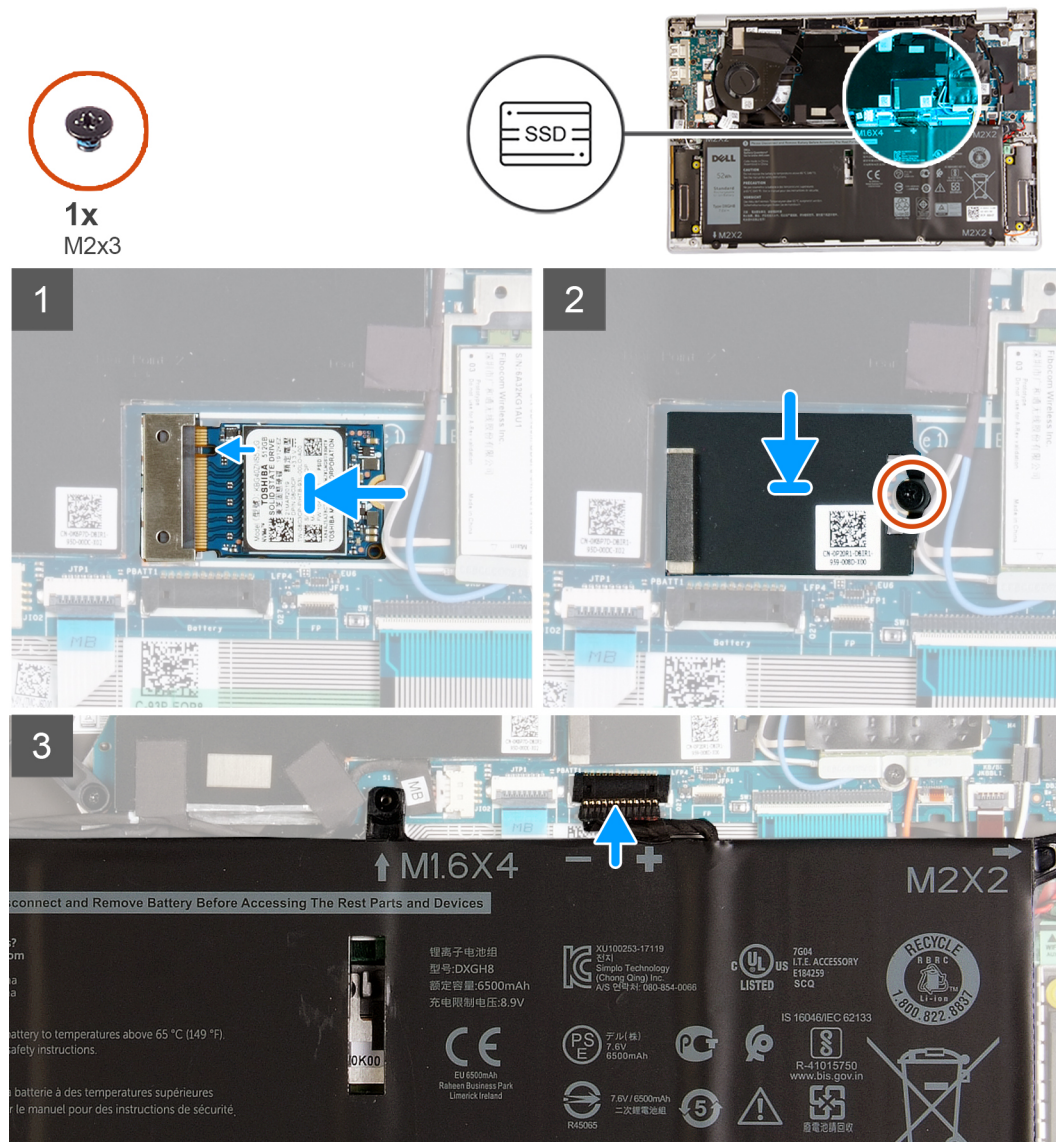
### Prerequisites

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

### About this task

The following image indicates the location of the M.2 2230 solid-state drive and provides a visual representation of the installation procedure.


**NOTE:** Computers shipped with WWAN card supports only M.2 2230 solid-state drive.



### Steps

- Align the notch on the M.2 2230 solid-state drive with the tab on the solid-state drive slot and slide the M.2 2230 solid-state drive into the solid-state drive slot on the system board.

2. Place the solid-state shield on to the M.2 2230 solid-state drive on the system board.

 **NOTE:** Applicable in computers shipped with WWAN card.

3. Slide the solid-state bracket on to the M.2 2230 solid-state drive on the system board.
4. Replace the screw (M2x3) that secures the M.2 2230 solid-state drive to the system board.
5. Connect the battery cable to the system board.

#### Next steps

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

## Battery

### Lithium-ion battery precautions

#### CAUTION:

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

## Removing the battery

#### Prerequisites

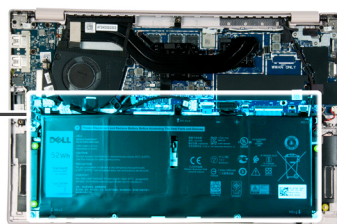
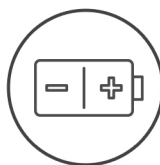
1. Follow the procedure in [before working inside your computer](#).
2. Remove the [base cover](#).

#### About this task

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



4x  
M2x2



## Steps

1. Disconnect the battery cable from the system board.
2. Remove the four screws (M2x2) that secure the battery to the palm-rest assembly.
3. Lift the battery off the palm-rest assembly.

## Installing the battery

### Prerequisites

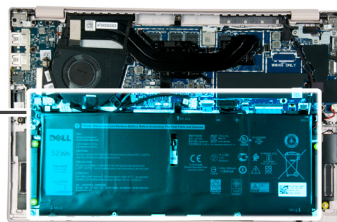
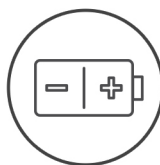
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

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



4x  
M2x2



### Steps

1. Using the alignment post, place the battery on the palm-rest assembly.
2. Connect the battery cable to the system board.
3. Replace the four screws (M2x2) that secure the battery to the palm-rest assembly.

### Next steps

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

## Coin-cell battery

### Removing the coin-cell battery

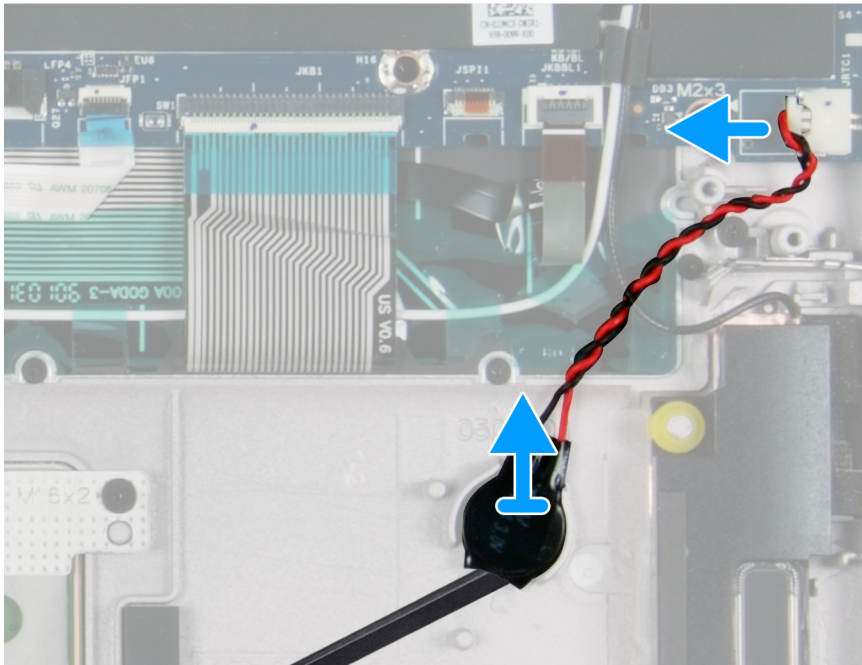
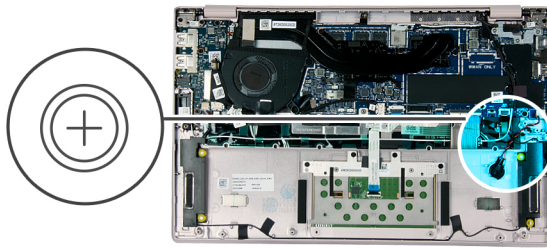
#### Prerequisites

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

#### About this task

The following image indicates the location of the coin-cell battery and provides a visual representation of the removal procedure.





### Steps

1. Disconnect the coin-cell battery cable from the system board.
2. Using a plastic scribe, lift and peel the coin-cell battery off the palm-rest assembly.

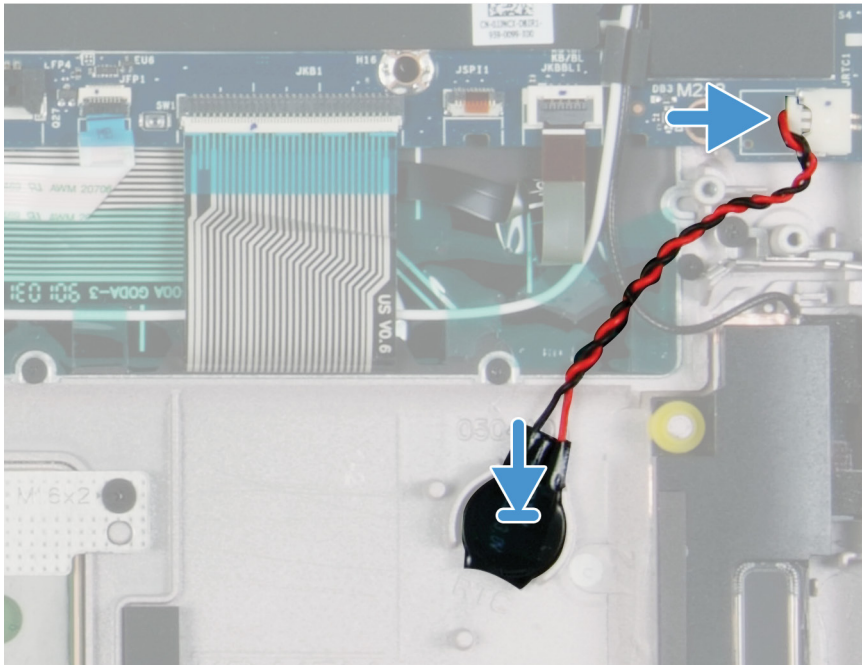
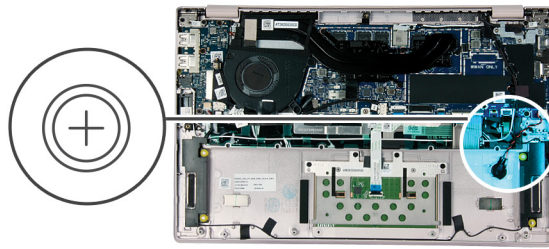
## Installing the coin-cell battery

### Prerequisites

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

### About this task

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



### Steps

1. Adhere the coin-cell battery to the slot on the palm-rest assembly.
2. Connect the coin-cell battery cable to the system board.

### Next steps

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

## WWAN card

### Removing the WWAN card

#### Prerequisites

**NOTE:** This procedure is only applicable for computers shipped with a WWAN configuration.

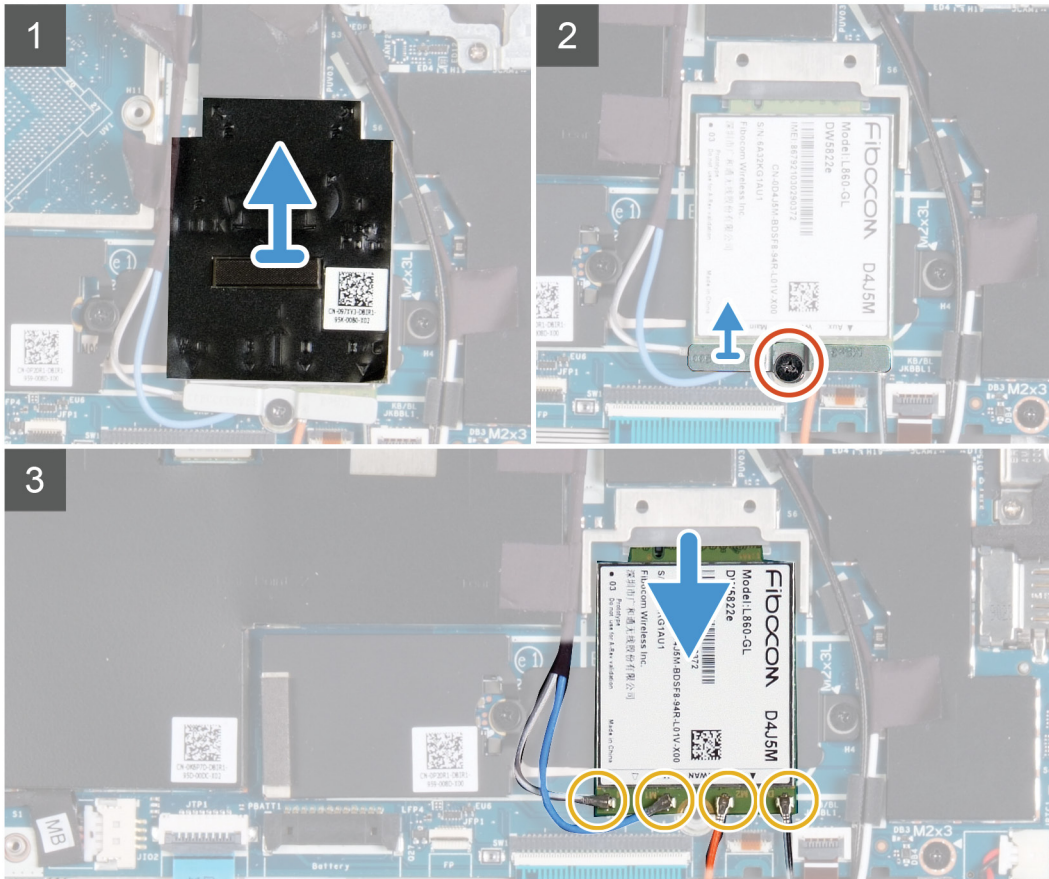
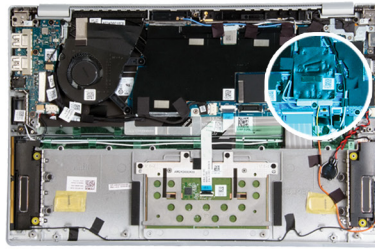
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

#### About this task

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



1x  
M2x3



## Steps

1. Lift the WWAN-card shield off the WWAN card.
2. Remove the screw (M2x3) that secures the WWAN-card bracket to the WWAN card.
3. Note the alignment of the WWAN-card bracket before lifting it off the WWAN card.
4. Disconnect the antenna cables from the WWAN card.
5. Slide and remove the WWAN card from the WWAN card slot.

## Installing the WWAN card

### Prerequisites

**i** **NOTE:** This procedure is only applicable for computers shipped with a WWAN configuration.

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

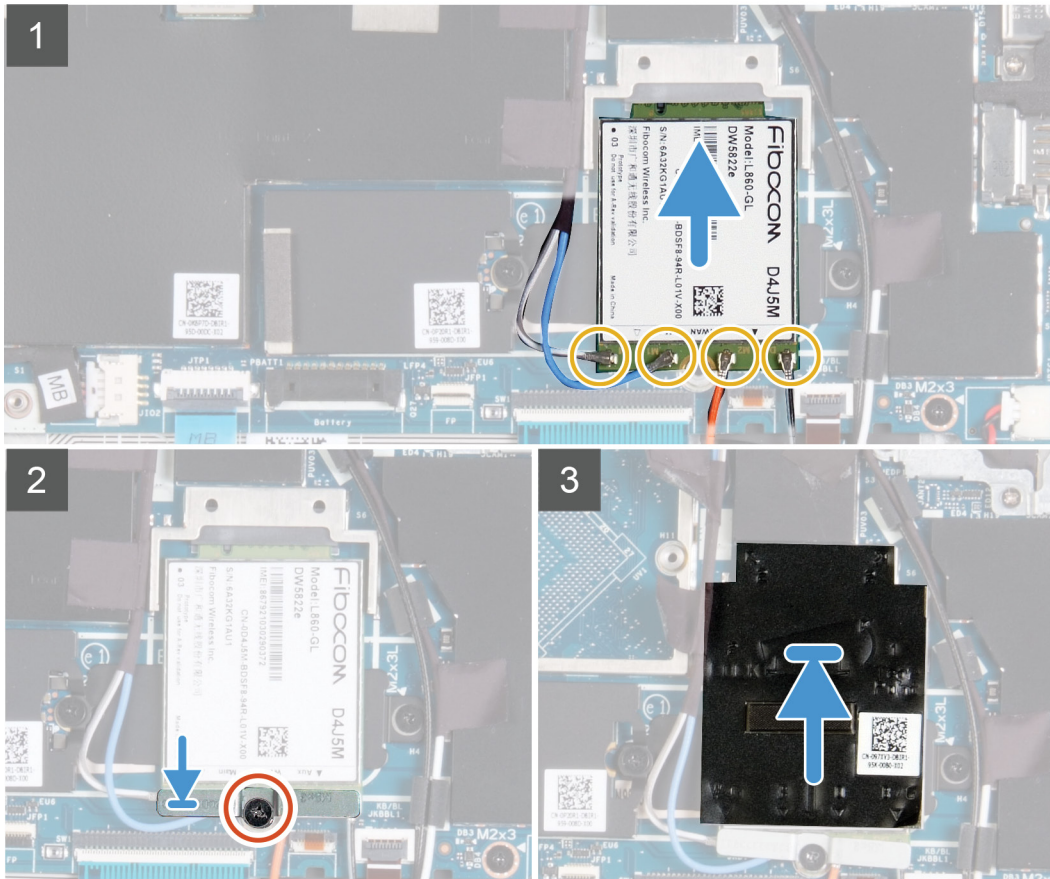
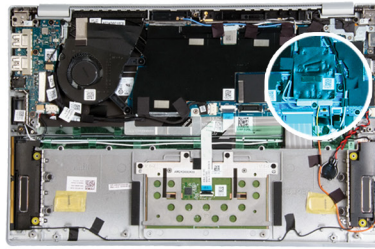
### About this task

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





1x  
M2x3



## Steps

1. Align the notch on the WWAN card with the tab on the WWAN-card slot and insert the WWAN card at an angle into the WWAN-card slot.
2. Connect the antenna cables to the WWAN card and align the WWAN-card bracket on the WWAN card.  
The following table provides the antenna-cable color scheme for the WWAN card supported by your computer.

**Table 2. Antenna-cable color scheme**

Connectors on the WWAN card	Antenna-cable color
M	White/Grey
M1	Blue
M2	Orange
D/G	Black/Grey

3. Replace the screw (M2x3) that secures the WWAN bracket to the WWAN card.
4. Place the WWAN-card shield on the WWAN card.



### Next steps

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

## Heat sink

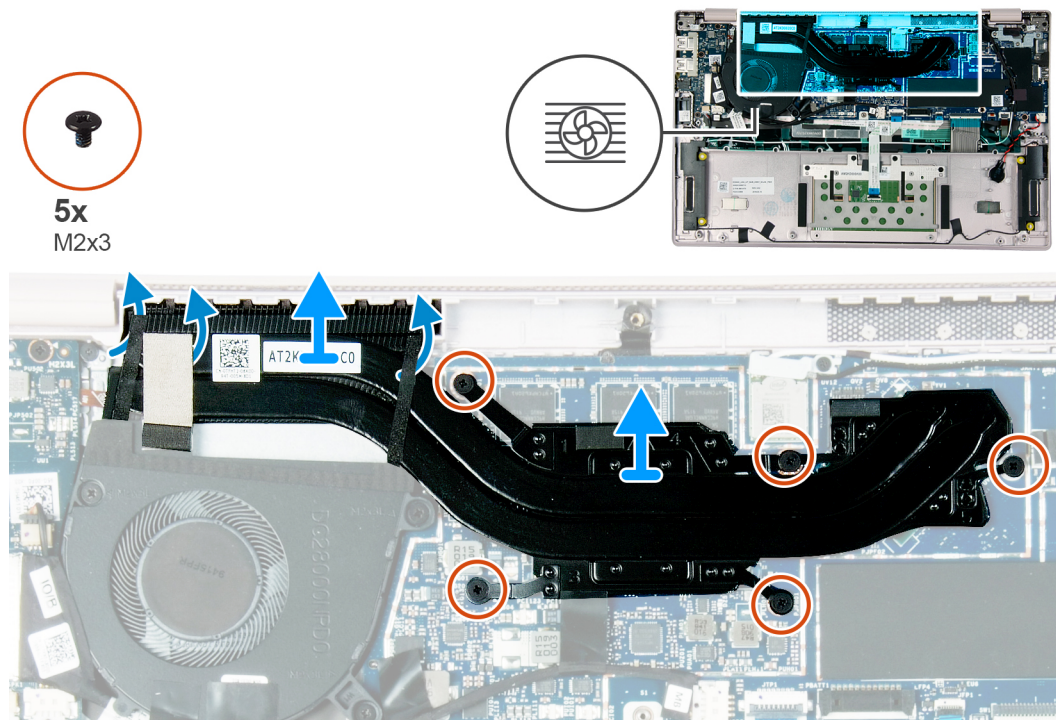
### Removing the heatsink (on computers shipped with discrete graphics card)

#### Prerequisites

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

#### About this task

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



#### Steps

1. Peel the tapes that secure the fan to the fan to the heat sink.
2. In the reverse sequential order (5>4>3>2>1) as indicated on the heat sink, remove the five screws (M2x3) that secure the heat sink to the system board.
3. Lift the heat sink off the system board.

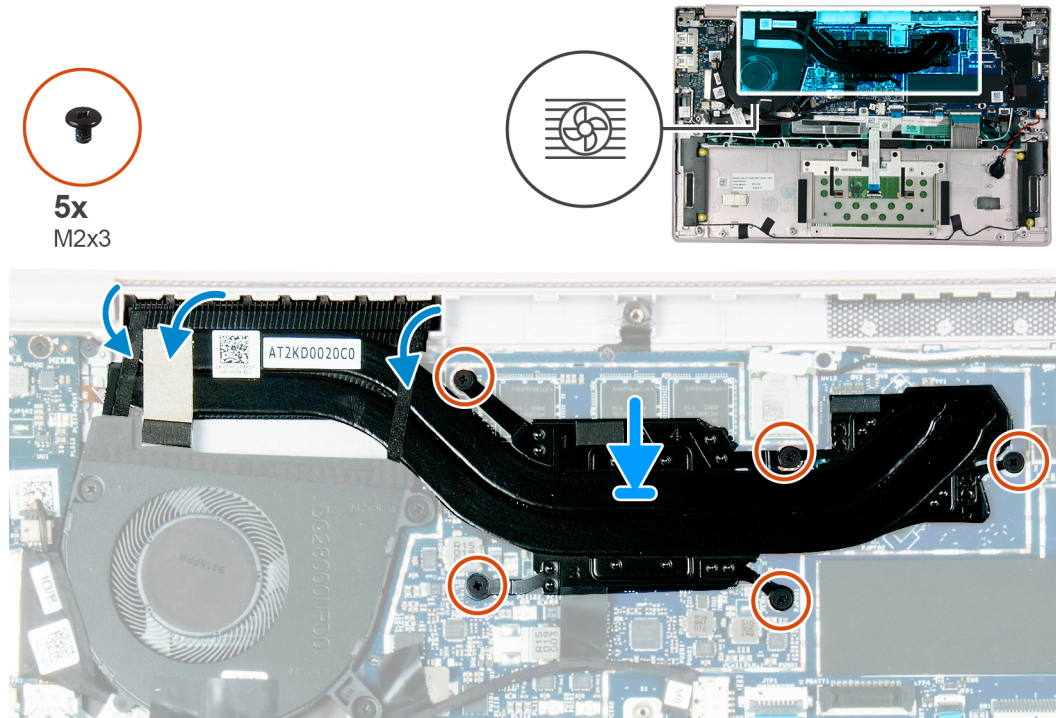
# Installing the heat sink (on computers shipped with discrete graphics card)

## Prerequisites

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

## About this task

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



## Steps

1. Place and align the screw holes on the heat sink with the screw holes on the system board.
2. In sequential order (1>2>3>4>5) as indicated on the heat sink, replace the five screws (M2x3) that secure the heat sink to the system board.
3. Place the shield on the heat sink.
4. Adhere the tapes that secure the WWAN antenna cables to the shield on the heat sink.
5. Adhere the tapes that secure the I/O-board cable to the shield on the heat sink.
6. Adhere the tapes that secure the fan to the heat sink.

## Next steps

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

# Removing the heatsink (on computers shipped with integrated graphics card)

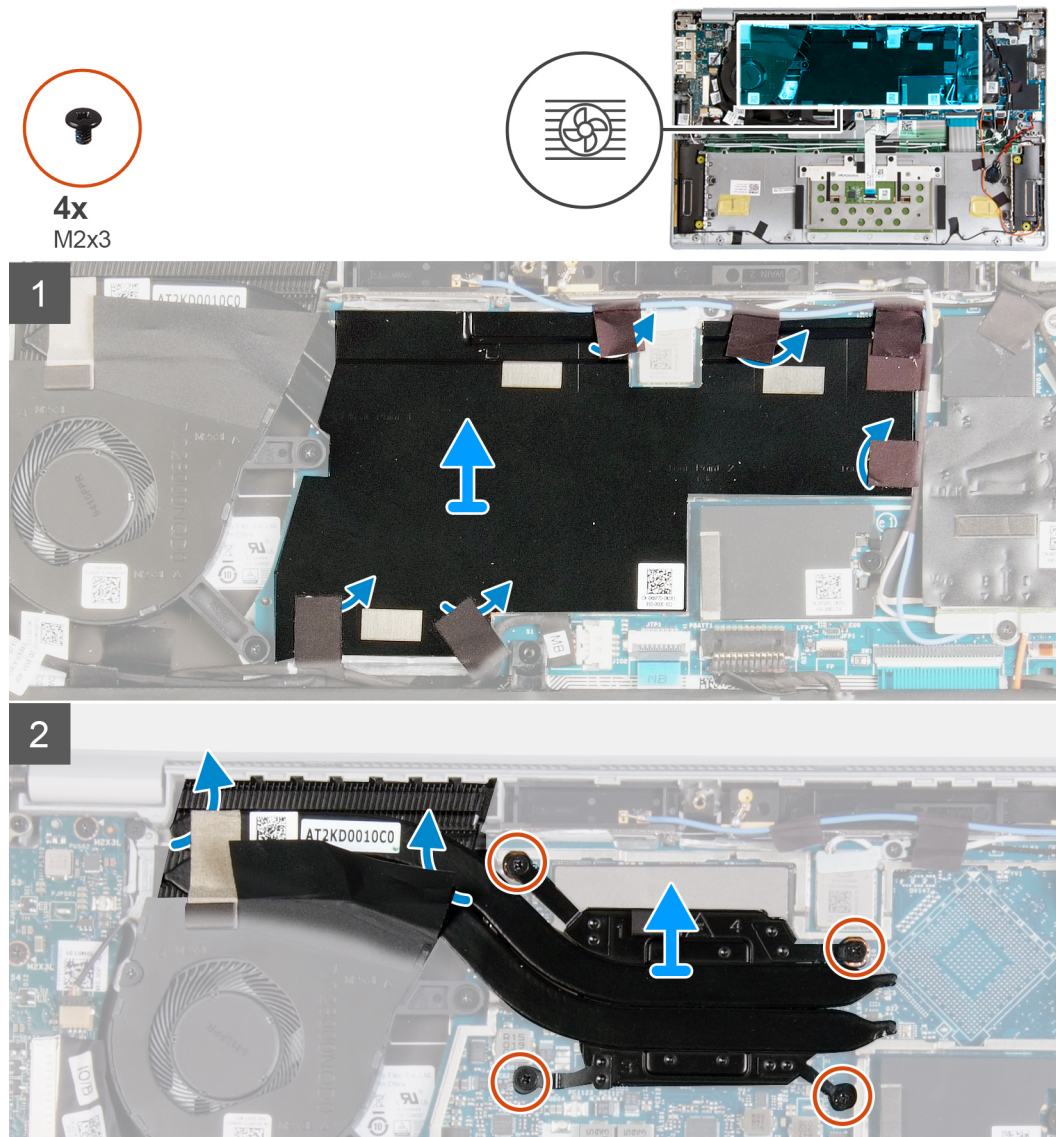
## Prerequisites

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

2. Remove the [base cover](#).
3. Remove the [battery](#).

### About this task

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



### Steps

1. Peel the tapes that secure the fan to the fan to the heat sink.
2. Peel the tapes that secure the I/O-board cable to the shield on the heat sink.
3. Peel the tapes that secure the WWAN antenna cables to the shield on the heat sink.
4. Lift the shield off the heat sink.
5. In the reverse sequential order (4>3>2>1) as indicated on the heat sink, remove the four screws (M2x3) that secure the heat sink to the system board.
6. Lift the heat sink off the system board.



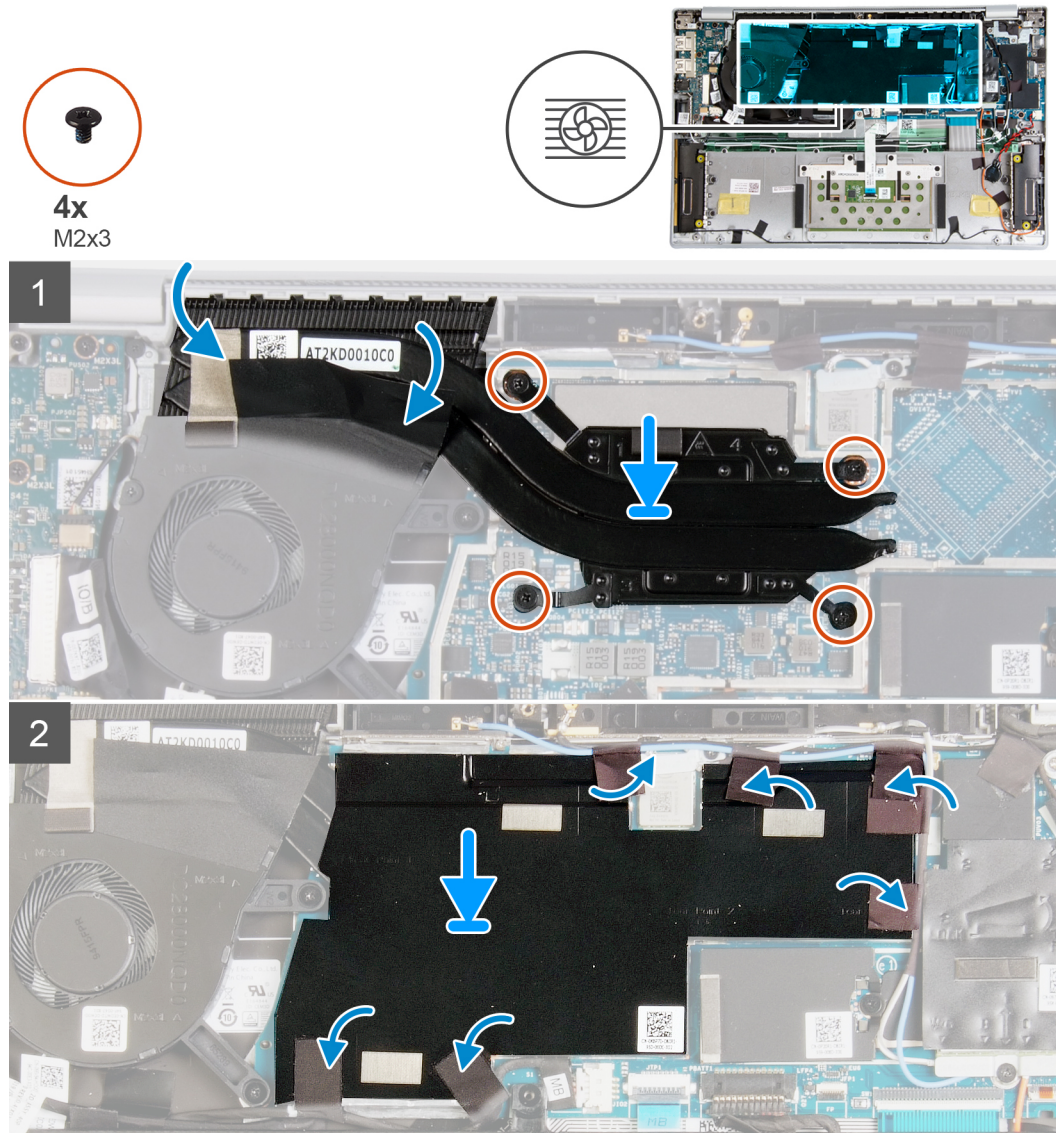
# Installing the heat sink (on computers shipped with integrated graphics card)

## Prerequisites

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

## About this task

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



## Steps

1. Place and align the screw holes on the heat sink with the screw holes on the system board.
2. In sequential order (1>2>3>4) as indicated on the heat sink, replace the four screws (M2x3) that secure the heat sink to the system board.
3. Adhere the tapes that secure the fan to the heat sink.

## Next steps

1. Install the [battery](#).
2. Install the [base cover](#).

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

## Fan

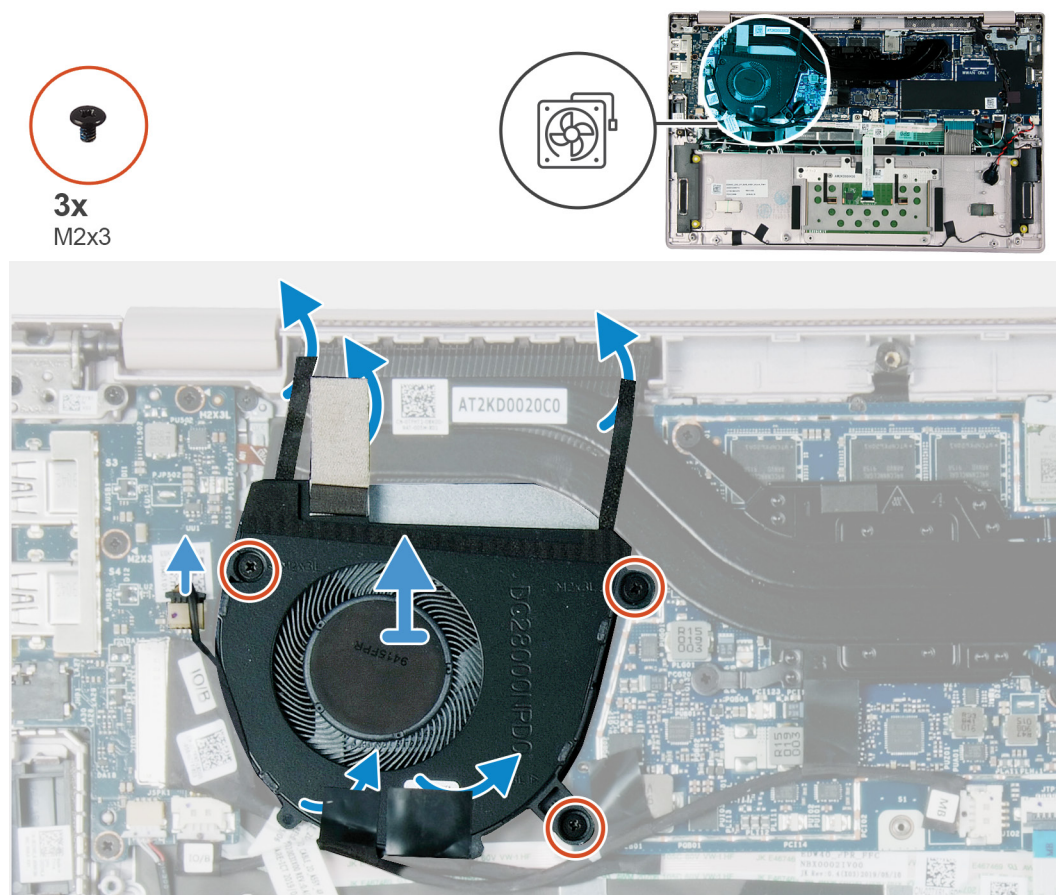
### Removing the fan (on computers shipped with discrete graphics card)

#### Prerequisites

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

#### About this task

The following image indicates the location of fan and provides a visual representation of the removal procedure.



#### Steps

1. Disconnect the fan cable from the I/O board.
2. Peel the tapes (3) that secure the I/O-board cable to the fan.
3. Peel the tapes (2) that secure the fan to the heat sink and the palm-rest assembly.
4. Remove the three screws (M2x3) that secure the fan to the palm-rest assembly.
5. Slide and lift the fan slightly off the palm-rest assembly.



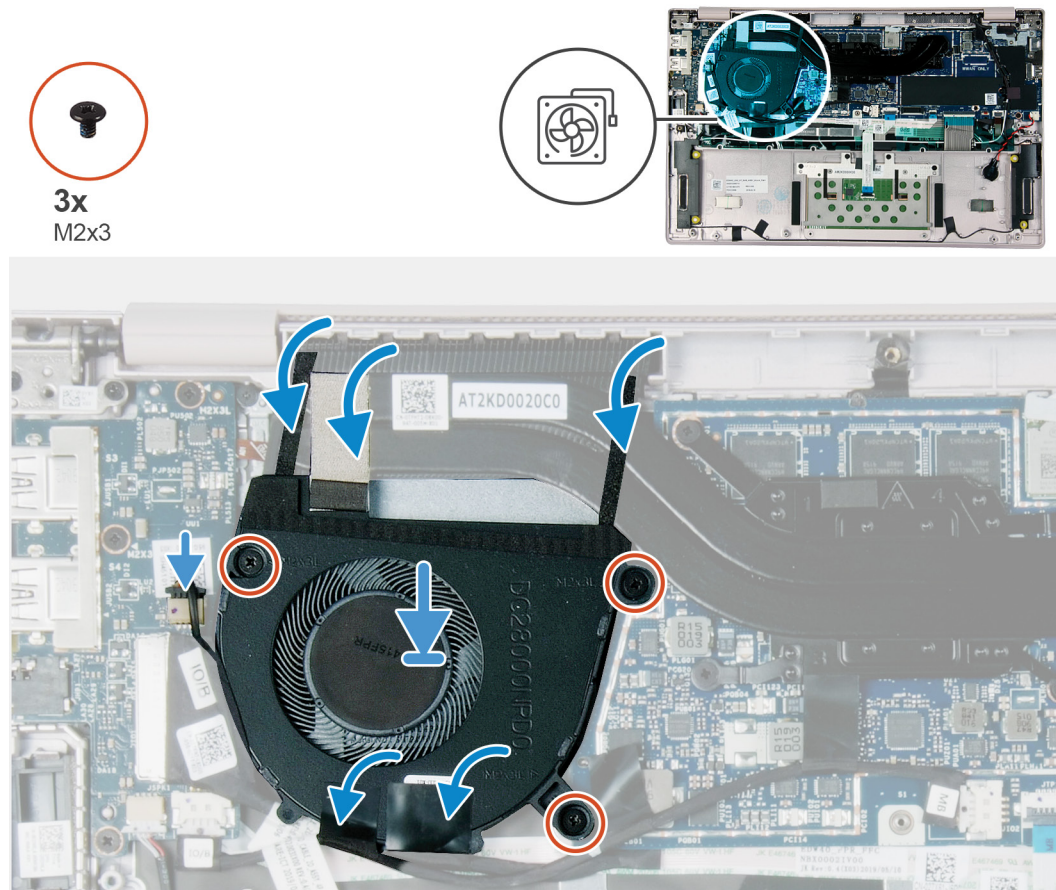
# Installing the fan (on computers shipped with discrete graphics card)

## Prerequisites

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

## About this task

The following image indicates the location of fan and provides a visual representation of the installation procedure.



## Steps

1. Place and align the screw holes on the fan with the screw holes on the palm-rest assembly.
2. Replace the three screws (M2x3) that secure the fan to the palm-rest assembly.
3. Adhere the tapes (2) that secure the fan to the heat sink and the palm-rest assembly.
4. Adhere the tapes (3) that secure the I/O-board cable to the fan.
5. Connect the fan cable to the system board.

## Next steps

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

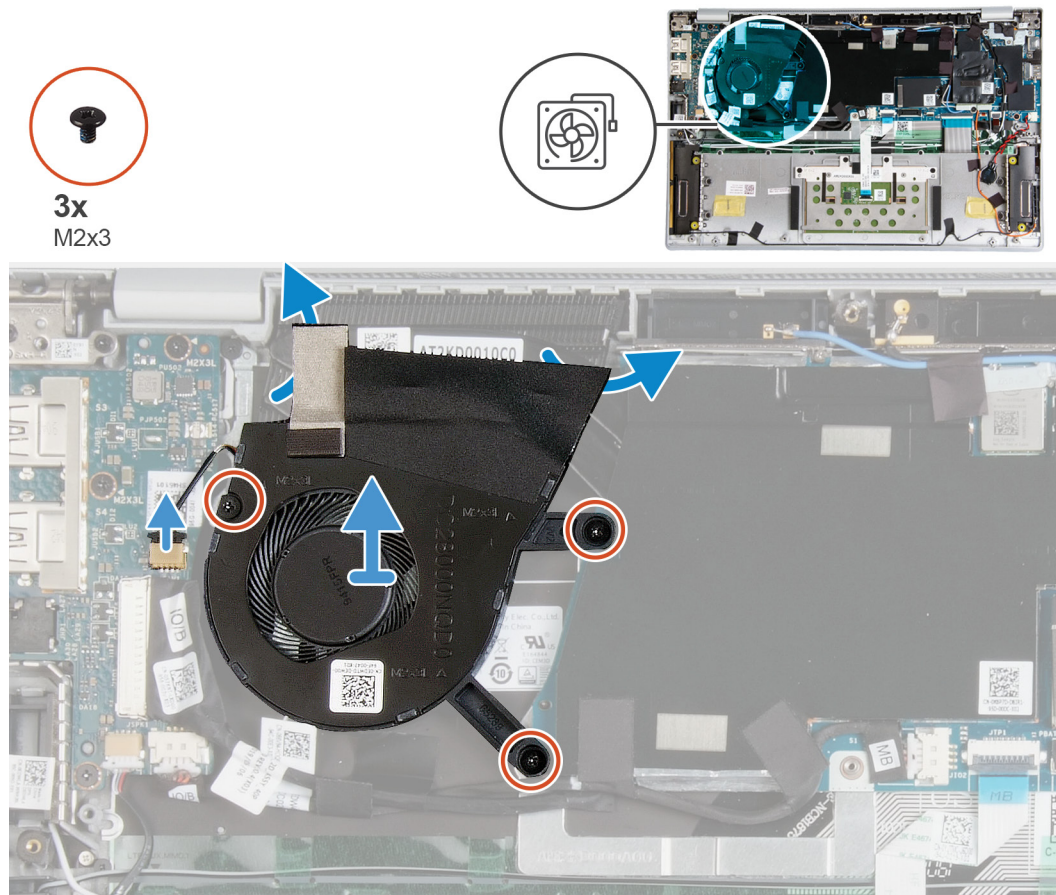
# Removing the fan (on computers shipped with integrated graphics card)

## Prerequisites

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

## About this task

The following image indicates the location of fan and provides a visual representation of the removal procedure.



## Steps

1. Disconnect the fan cable from the I/O board.
2. Peel the tape that secures the fan to the heat sink and the palm-rest assembly.
3. Remove the three screws (M2x3) that secure the fan to the palm-rest assembly.
4. Slide and lift the fan slightly off the palm-rest assembly.

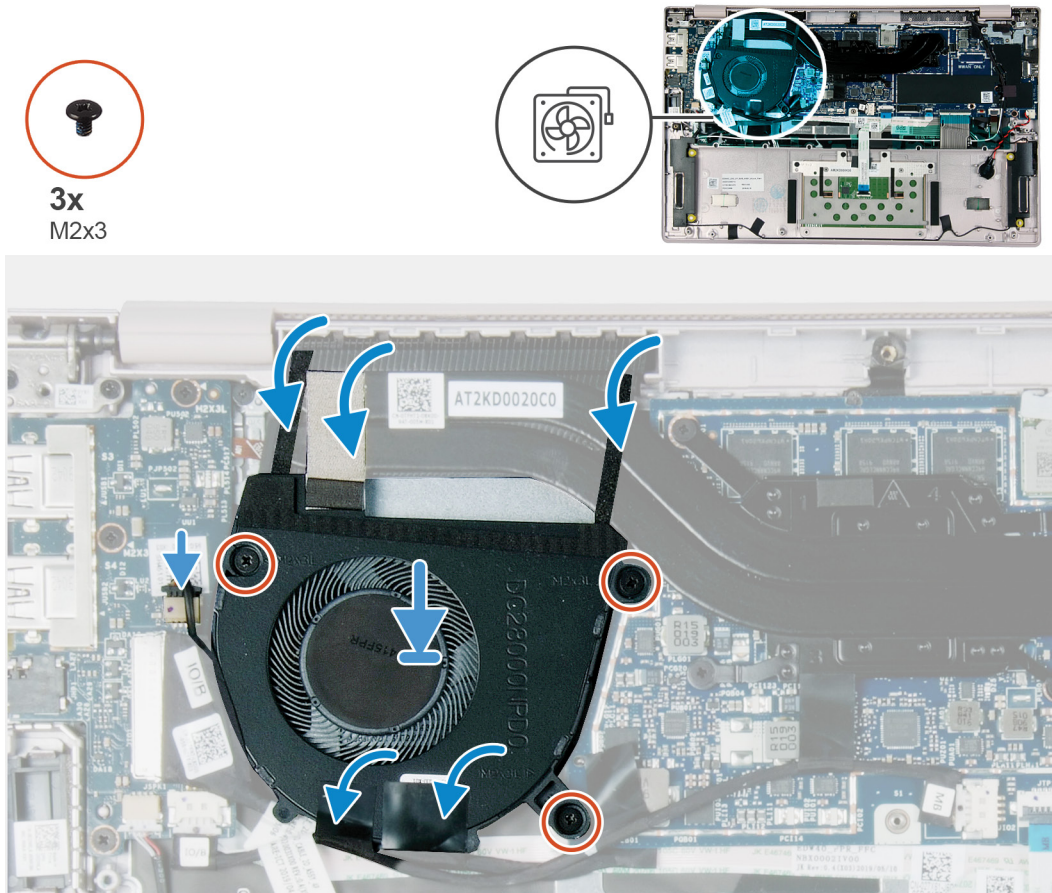
# Installing the fan (on computers shipped with integrated graphics card)

## Prerequisites

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

### About this task

The following image indicates the location of fan and provides a visual representation of the installation procedure.



### Steps

1. Place and align the screw holes on the fan with the screw holes on the palm-rest assembly.
2. Replace the three screws (M2x3) that secure the fan to the palm-rest assembly.
3. Adhere the tapes (2) that secure the fan to the heat sink and the palm-rest assembly.
4. Adhere the tapes (3) that secure the I/O-board cable to the fan.
5. Connect the fan cable to the system board.

### Next steps

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

## Speakers

### Removing the speaker

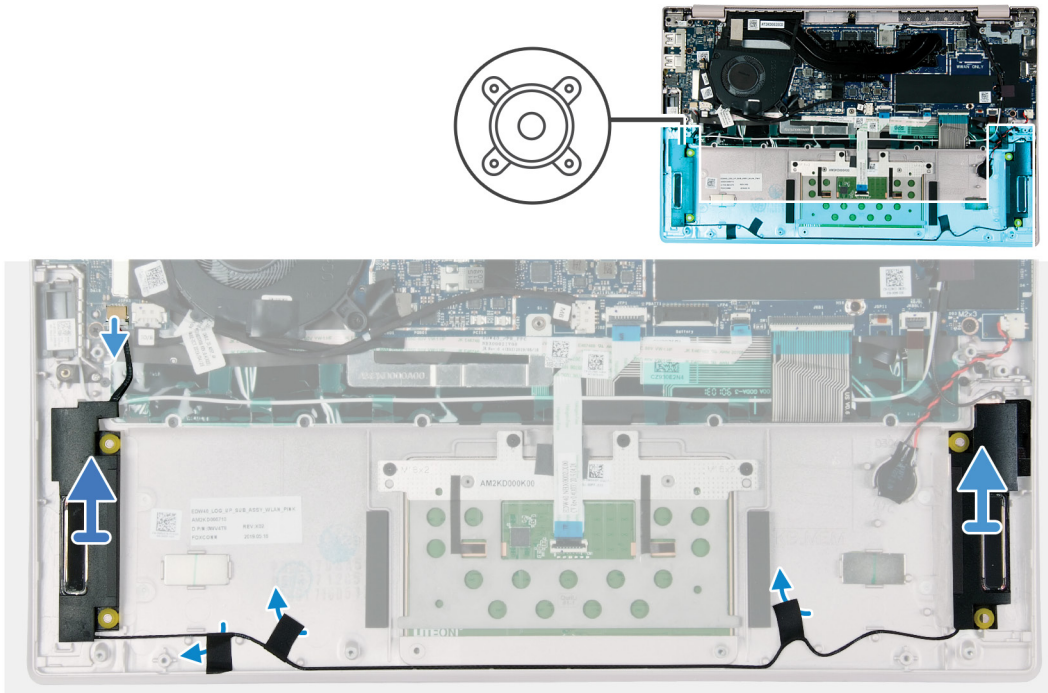
#### Prerequisites

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



### About this task

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



### Steps

1. Disconnect the speaker cable from the I/O board.
2. Peel the tapes that secure the speaker cable to the palm-rest assembly.
3. Note the routing of the speaker cable and remove the speaker cable from the routing guides on the palm-rest assembly.  
**NOTE:** Note the position of the rubber grommets before lifting the speakers.
4. Lift the speakers, along with the cable, off the palm-rest assembly.

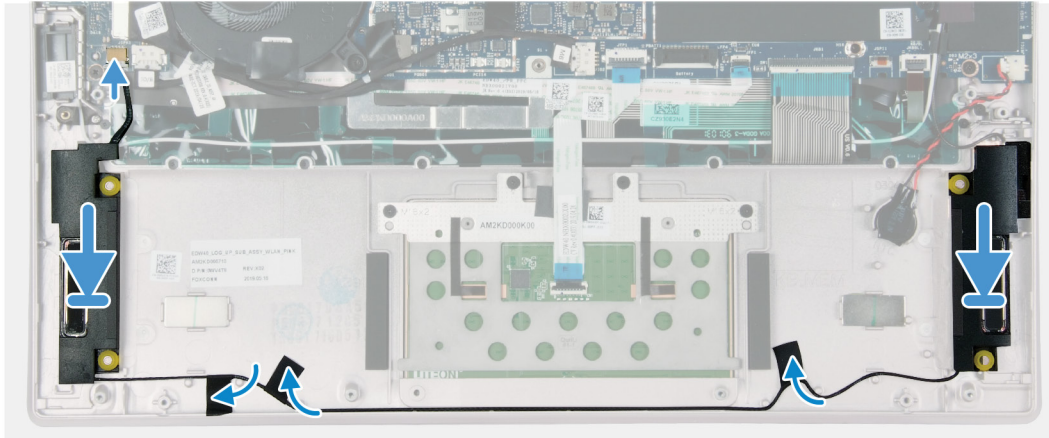
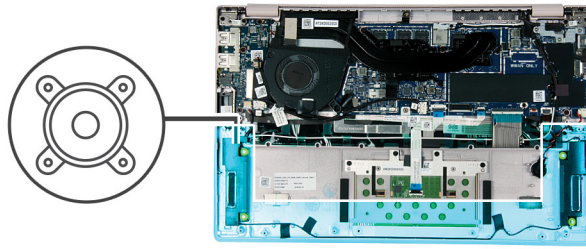
## Installing the speaker

### Prerequisites

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

### About this task

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



### Steps

1. Using the alignment posts and rubber grommets, place the speakers in the slots on the palm-rest assembly.

**NOTE:** Push the rubber grommets into the slots if it pops out.

2. Route the speaker cable through the routing guides on the palm-rest assembly.
3. Adhere the tapes that secure the speaker cable to the palm-rest assembly.
4. Connect the speaker cable to the I/O board.

### Next steps

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

## Touchpad

### Removing the touchpad

#### Prerequisites

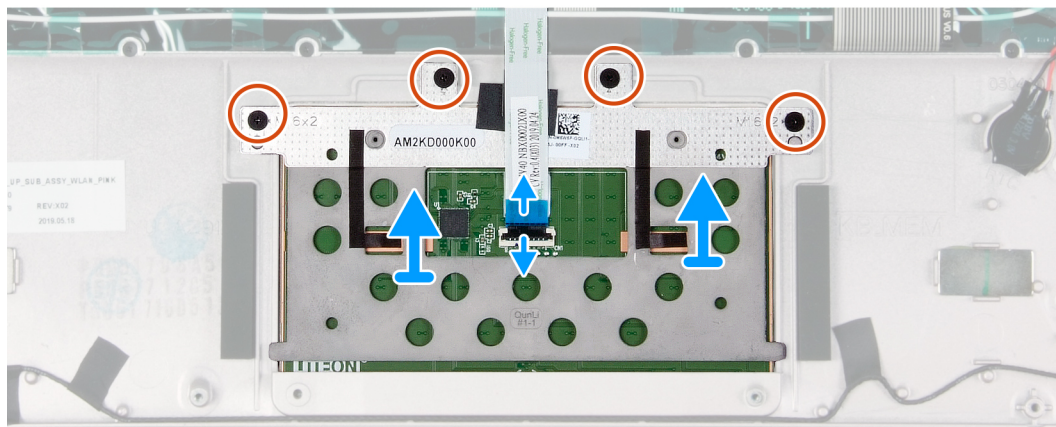
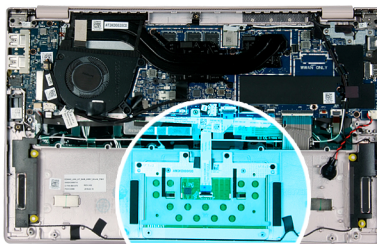
1. Follow the procedure in [before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).

#### About this task

The following image indicates the location of touchpad and provides a visual representation of the removal procedure.



**4x**  
M1.6x2



### Steps

1. Open the latch and disconnect the touchpad cable from the touchpad.
2. Remove the four (M1.6x2) screws that secure the touchpad bracket to the palm-rest assembly.
3. Peel the touchpad cable from the touchpad.
4. Slide and lift the touchpad along with the bracket off the palm-rest assembly.

## Installing the touchpad

### Prerequisites

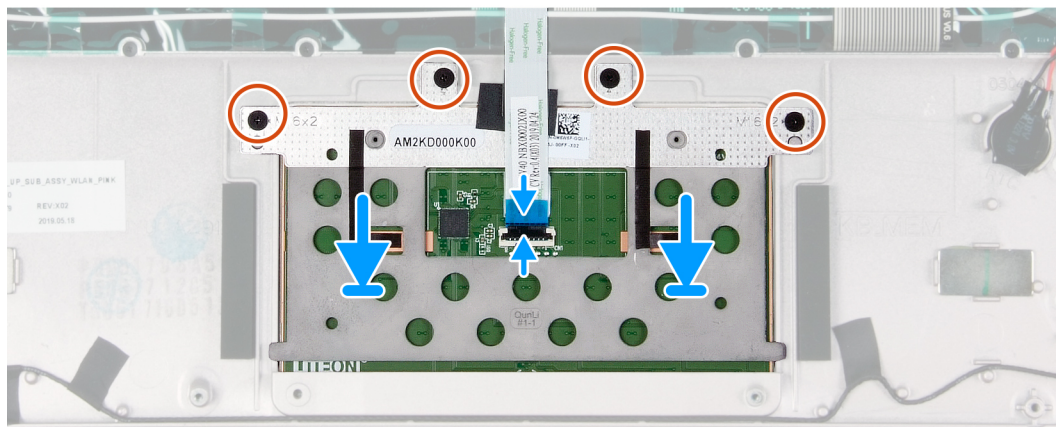
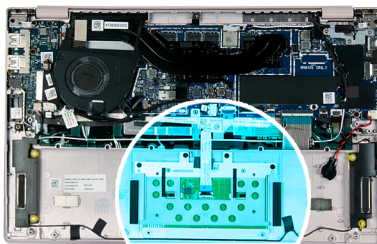
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following image indicates the location of touchpad and provides a visual representation of the installation procedure.



**4x**  
M1.6x2



### Steps

1. Using the alignment post, slide and place the touchpad along with the bracket into the slot on the palm-rest assembly.
2. Adhere the touchpad cable from the touchpad.
3. Replace the four (M1.6x2) screws that secure the touchpad bracket to the palm-rest assembly.
4. Slide the touchpad cable into its connector on the touchpad and close the latch to secure the cable.

### Next steps

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

## Display assembly

### Removing the display assembly

#### Prerequisites

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

#### About this task

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

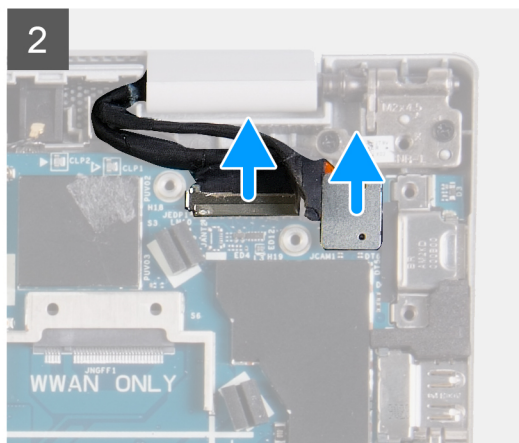
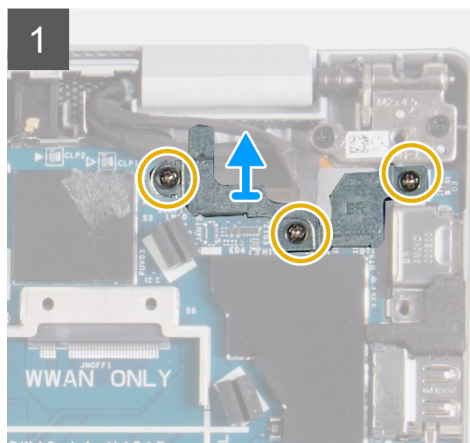
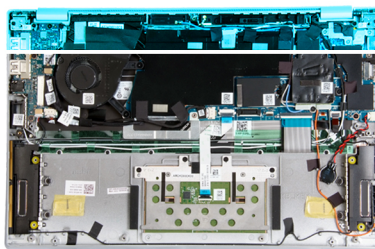




4x  
M2x4.5




3x  
M2x3.5



### Steps

1. Remove the three screws (M2x3.5) that secures the display-cable bracket to the system board.
2. Lift the display-cable bracket off the system board.

3. Pull the display cable from the connector to disconnect the display cable from the system board.
4. Pull the touchscreen cable from the connector to disconnect the touchscreen cable from the system board.

 **NOTE:** Applicable only on computers with touchscreen configuration.

5. Turn the computer over and open the display at an angle of 90 degrees.
6. Turn the computer over again and place it on the edge of the table in a position that allows access to the screws on the display hinges.
7. Remove the four screws (M2x4.5) that secure the display hinges to the palm-rest assembly.
8. Carefully lift the display assembly from the palm-rest assembly.
9. Carefully place the display assembly on a clean and flat surface.



## Installing the display assembly

### Prerequisites

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

### About this task

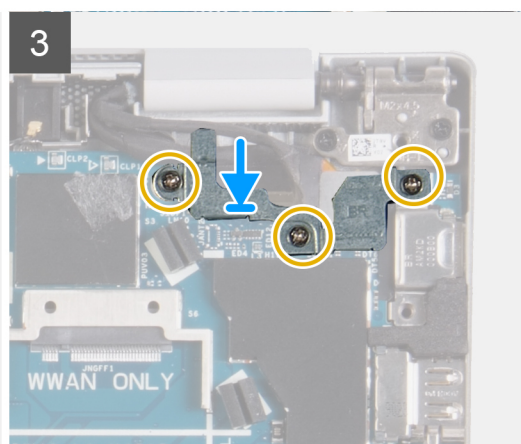
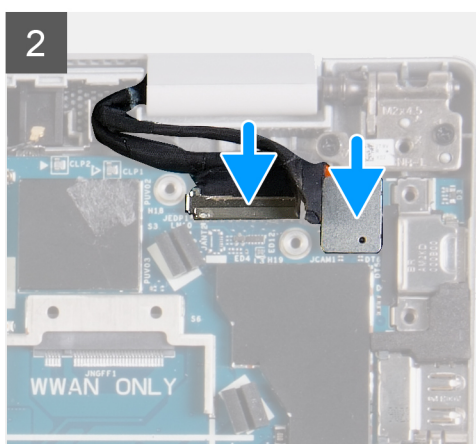
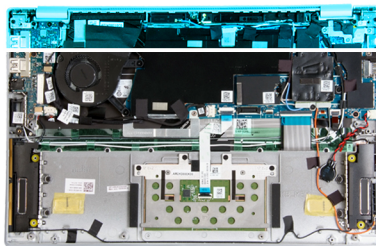
The following image indicates the location of display assembly and provides a visual representation of the installation procedure.



4x  
M2x4.5



3x  
M2x3.5



### Steps

1. Place the palm-rest assembly at the edge of the table.
2. Align the screw holes on the palm-rest assembly with the screw holes on the display hinges.
3. Close the display and turn the computer over.



4. Replace the four screws (M2x4.5) that secures the display hinges to the palm-rest assembly.
5. Slide the display cable into the connector to connect the display cable on to the connector on the system board.
6. Slide the touchscreen cable into the connector to connect the touchscreen cable on to the connector on the system board.

**NOTE:** Applicable only on computers with touchscreen configuration.

7. Align and place the display-cable bracket on the display cable.
8. Replace the three screws (M2x3.5) that secure the display-cable bracket to the system board.

### Next steps

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

## I/O board

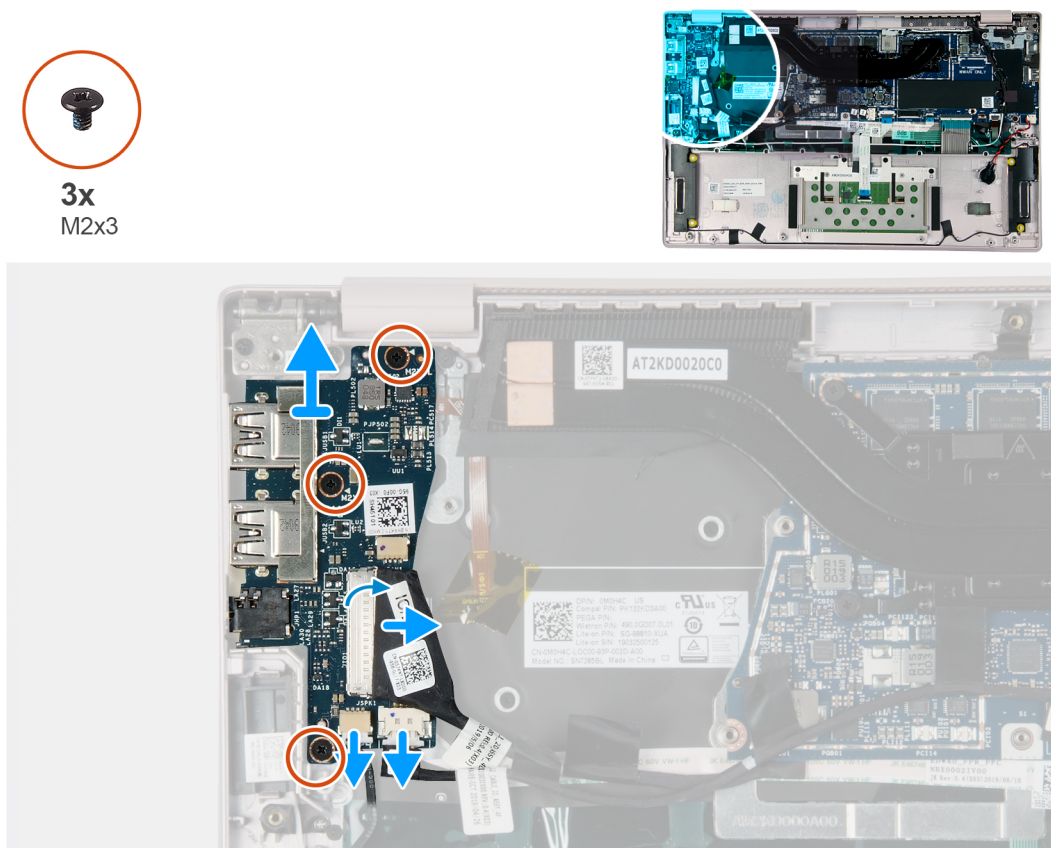
### Removing the I/O board

#### Prerequisites

1. Follow the procedure in [before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [fan \(discrete graphics card\)](#) or [fan \(integrated graphics card\)](#), whichever applicable.

#### About this task

The following image indicates the location of I/O board and provides a visual representation of the removal procedure.





## Steps

1. Disconnect the speaker cable from the I/O board.
2. Disconnect the I/O-board power cable from the I/O board.
3. Open the latch and disconnect the I/O-board data cable from the I/O board.

 **CAUTION:** Do not disconnect the 40-pin I/O-board cable from the I/O board without removing the latch. The connector will be damaged if you attempt to disconnect the cable without opening the latch.

4. Remove the three screws (M2x3) that secure the I/O board to the palm-rest assembly.
5. Lift the I/O board off the palm-rest assembly.

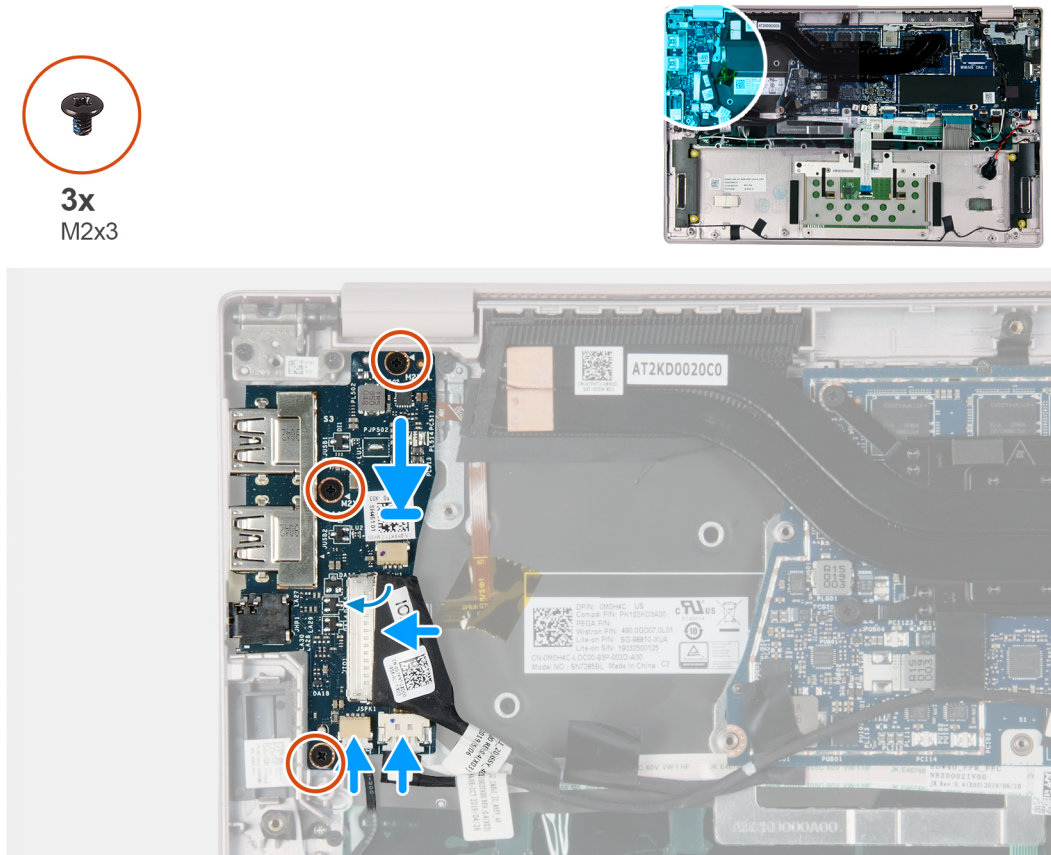
## Installing the I/O board

### Prerequisites

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

### About this task

The following image indicates the location of I/O board and provides a visual representation of the installation procedure.



## Steps

1. Using the alignment post, place the I/O board on the palm-rest assembly.
2. Replace the three screws (M2x3) that secure the I/O board to the palm-rest assembly.
3. Connect the I/O-board data cable to the I/O board and close the latch to secure the cable.
4. Connect the I/O-board power cable from the I/O board.
5. Connect the speaker cable from the I/O board.

### Next steps

1. Install the [fan \(discrete graphics card\)](#) or [fan \(integrated graphics card\)](#), whichever applicable.
2. Install the [battery](#).
3. Install the [base cover](#).
4. Follow the procedure in [after working inside your computer](#).

## Power button

### Removing the power button

#### Prerequisites

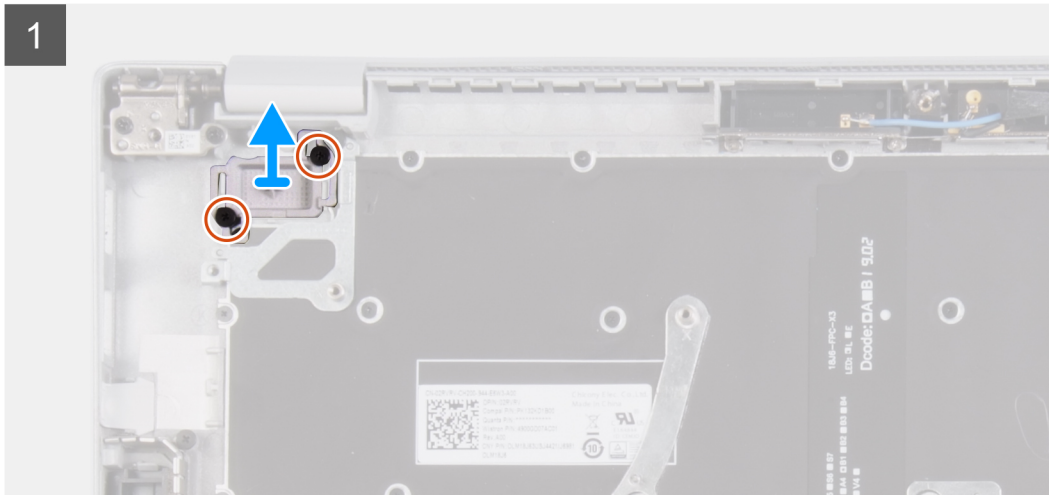
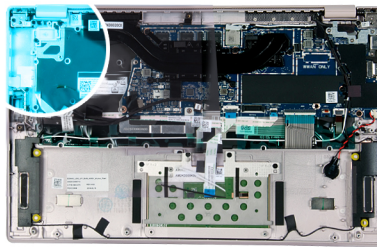
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [fan \(discrete graphics card\)](#) or [fan \(integrated graphics card\)](#), whichever applicable.
5. Remove the [I/O board](#).

#### About this task

The following image indicates the location of power button and provides a visual representation of the removal procedure.



2x  
M1.4x2.3



#### Steps

1. Remove the two screws (M1.4x2.3) that secure the power button to the palm-rest assembly.
2. Lift the power button off the palm-rest assembly.

## Installing the power button

### Prerequisites

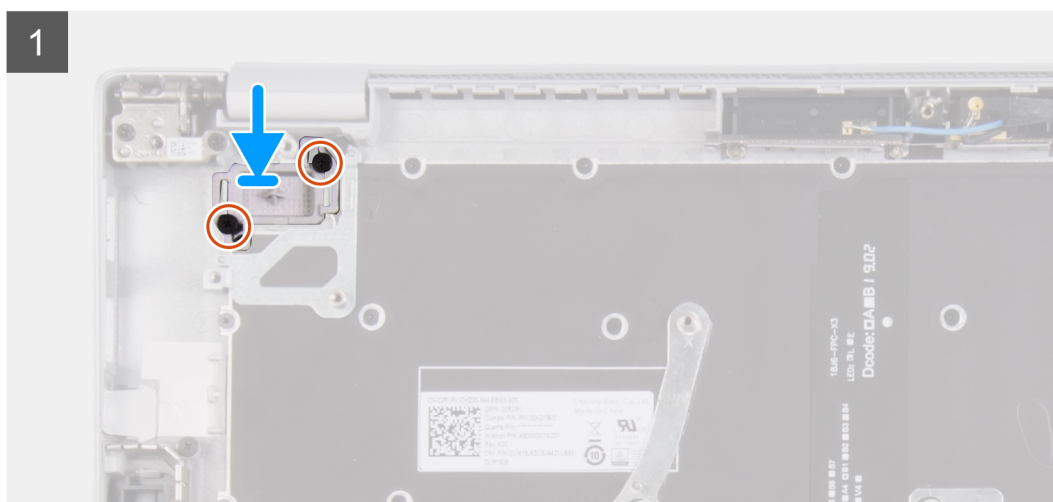
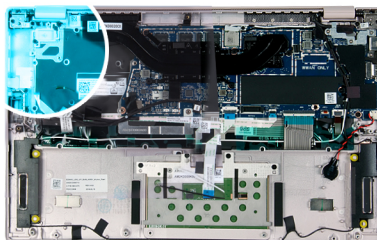
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following image indicates the location of power button and provides a visual representation of the installation procedure.



2x  
M1.4x2.3



### Steps

1. Align the screw holes on the power button with the screw hole on the palm-rest assembly.
2. Replace the two screws (M1.4x2.3) that secure the power button to the palm-rest assembly.


### Next steps

1. Install the [I/O board](#).
2. Install the [fan \(discrete graphics card\)](#) or [fan \(integrated graphics card\)](#), whichever applicable.
3. Install the [battery](#).
4. Install the [base cover](#).
5. Follow the procedure in [After working inside your computer](#).

## Power button with optional fingerprint reader

## Removing the power button with optional fingerprint reader

### Prerequisites

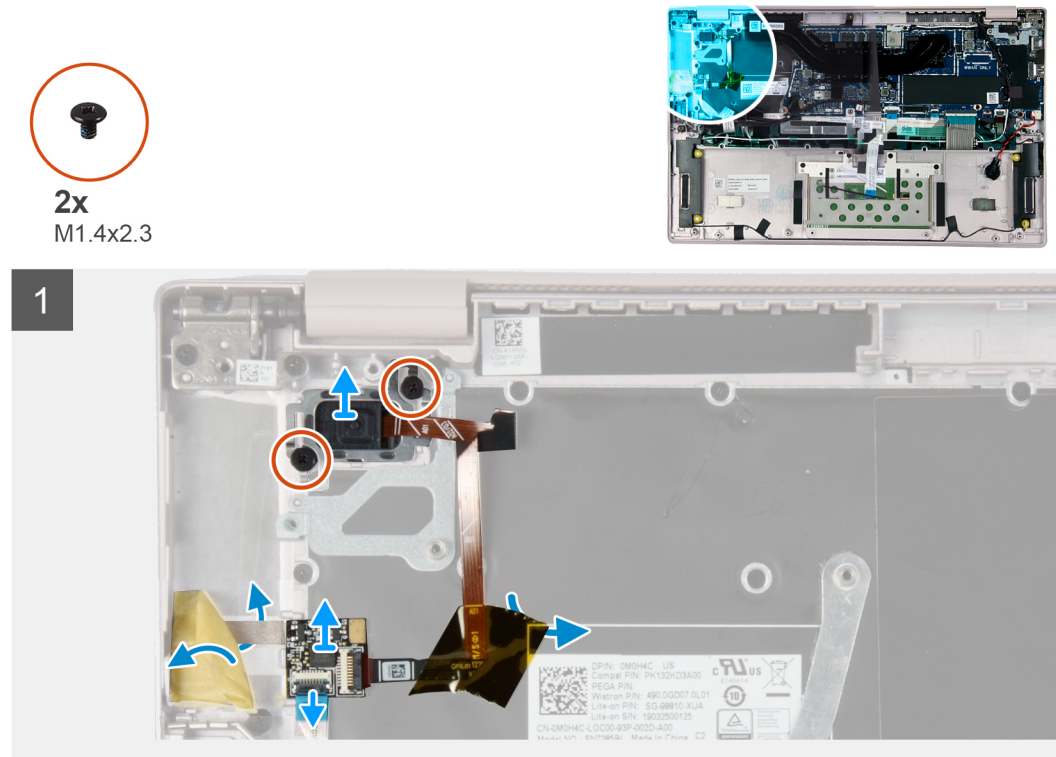
 **NOTE:** This procedure is only applicable for computers shipped with a fingerprint reader.

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

3. Remove the [battery](#).
4. Remove the [fan \(discrete graphics card\)](#) or [fan \(integrated graphics card\)](#), whichever applicable.
5. Remove the [I/O board](#).

### About this task

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



### Steps

1. Remove the two screws (M1.4x2.3) that secure the power button with fingerprint reader to the palm-rest assembly.
2. Open the latch and disconnect the power-button cable from the fingerprint-reader board.
3. Peel the tapes that secure the finger-print reader cable and the fingerprint-reader board to the keyboard.
4. Lift the power button with optional fingerprint-reader, along with the finger-print reader cable off the palm-rest assembly.

## Installing the power button with optional fingerprint reader

### Prerequisites

**NOTE:** This procedure is only applicable for computers shipped with a fingerprint reader.

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

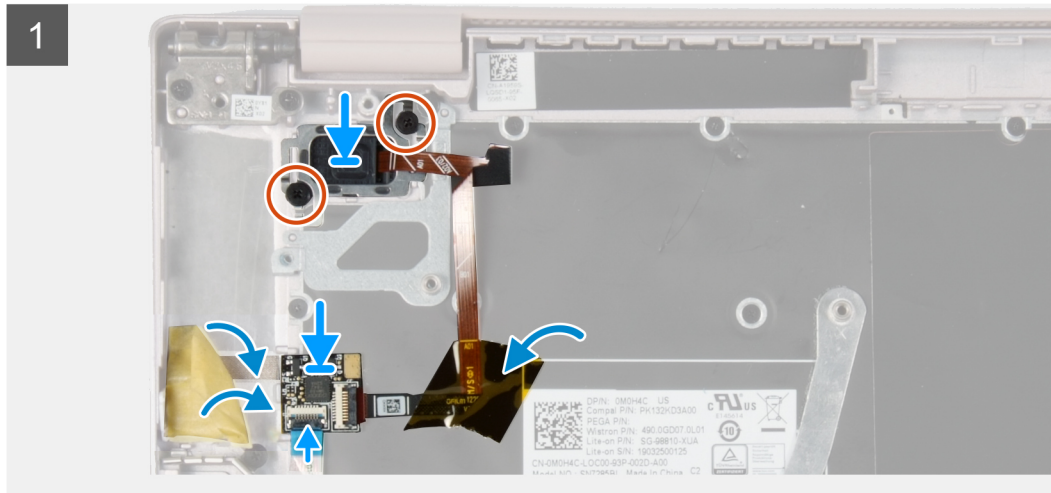
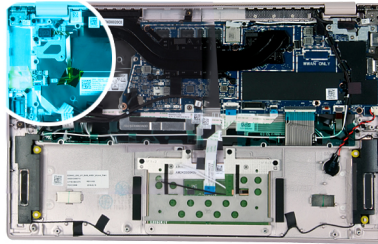
### About this task

The following image indicates the location of power button with optional fingerprint reader and provides a visual representation of the installation procedure.





2x  
M1.4x2.3



## Steps

1. Align and place the power button with fingerprint reader on the palm-rest assembly.
2. Adhere the tapes that secure the finger-print reader cable and the fingerprint-reader board to the keyboard.
3. Close the latch and connect the power-button cable to the fingerprint-reader board.
4. Replace the two screws (M1.4x2.3) that secure the power button with optional fingerprint reader to the palm-rest and keyboard assembly.

## Next steps

1. Install the [I/O board](#).
2. Install the [fan \(discrete graphics card\)](#) or [fan \(integrated graphics card\)](#), whichever applicable.
3. Install the [battery](#).
4. Install the [base cover](#).
5. Follow the procedure in [After working inside your computer](#).

# System board

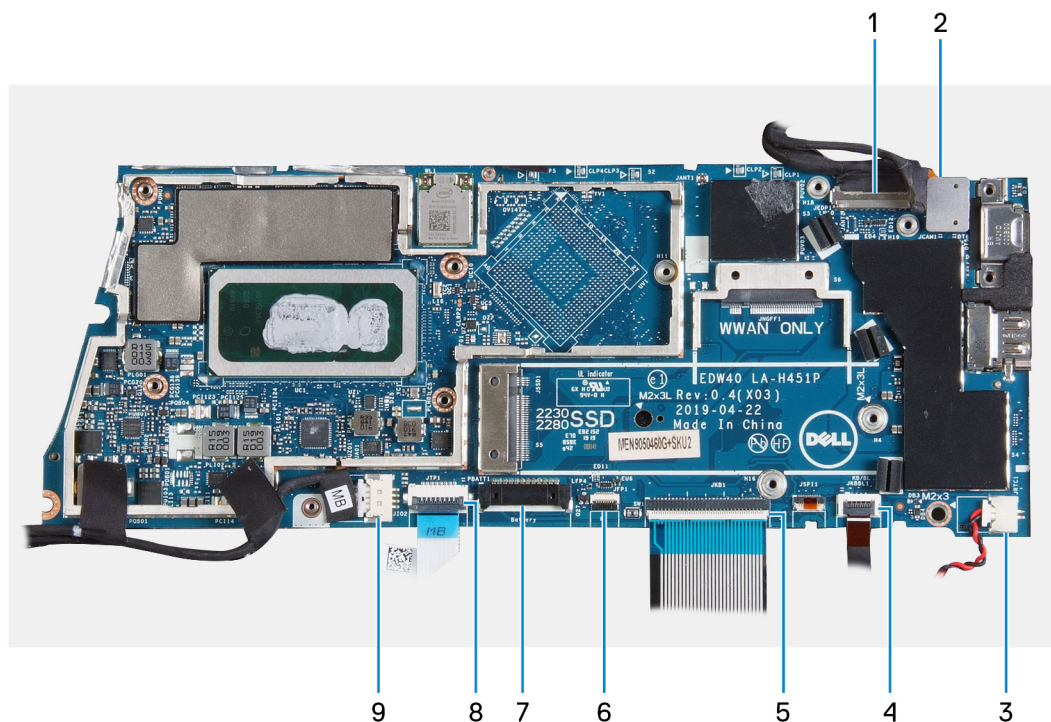
## Removing the system board

### Prerequisites

1. Follow the procedure in [before working inside your computer](#).
2. Remove the [Nano-SIM card tray](#).  
**NOTE:** The Nano-SIM card slot is available in your computer, depending on the region and configuration you ordered.
3. Remove the [base cover](#).
4. Remove the [battery](#).
5. Remove the [M.2 2280 solid-state drive/Intel Optane](#) or [M.2 2230 solid-state drive](#), whichever applicable.
6. Remove the [fan \(discrete graphics card\)](#) or [fan \(integrated graphics card\)](#), whichever applicable.
7. Remove the [heat sink \(discrete graphics card\)](#) or [heat sink \(integrated graphics card\)](#), whichever applicable.

## About this task

The following image indicates the connectors on your system board.



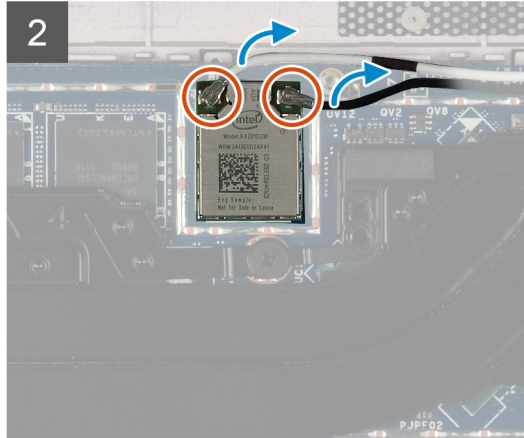
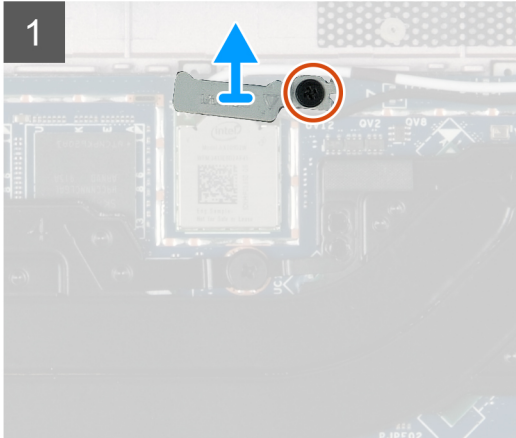
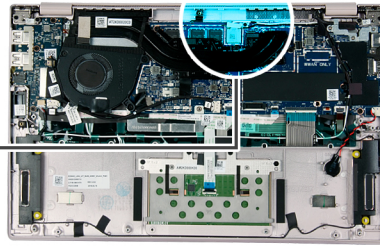
**Figure 1. System-board connectors**

- |                            |                                                                |
|----------------------------|----------------------------------------------------------------|
| 1. Display cable           | 2. Touchscreen cable (available only in touchscreen computers) |
| 3. Coin-cell battery cable | 4. Keyboard-backlit cable                                      |
| 5. Keyboard cable          | 6. Fingerprint-reader cable                                    |
| 7. Battery cable           | 8. Touchpad cable                                              |
| 9. I/O-board cable         |                                                                |

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



**1x**  
M1.6x2.5



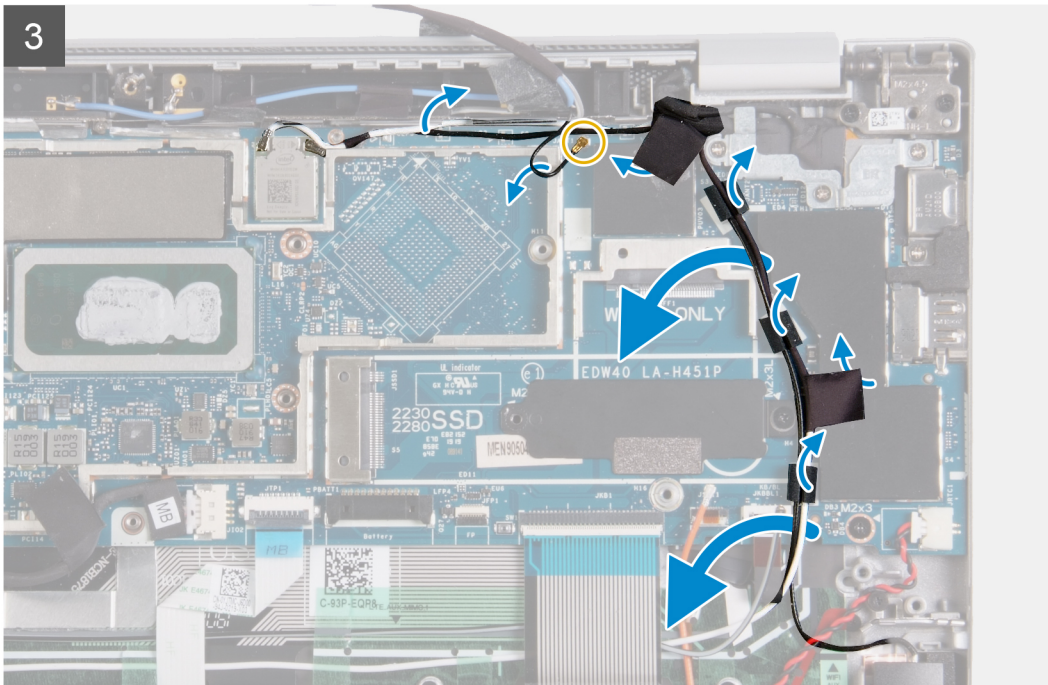
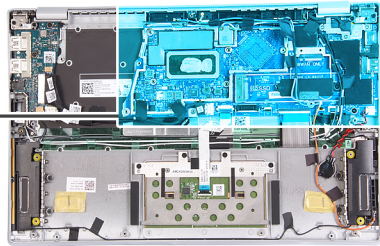
**3x**  
M2x3.5



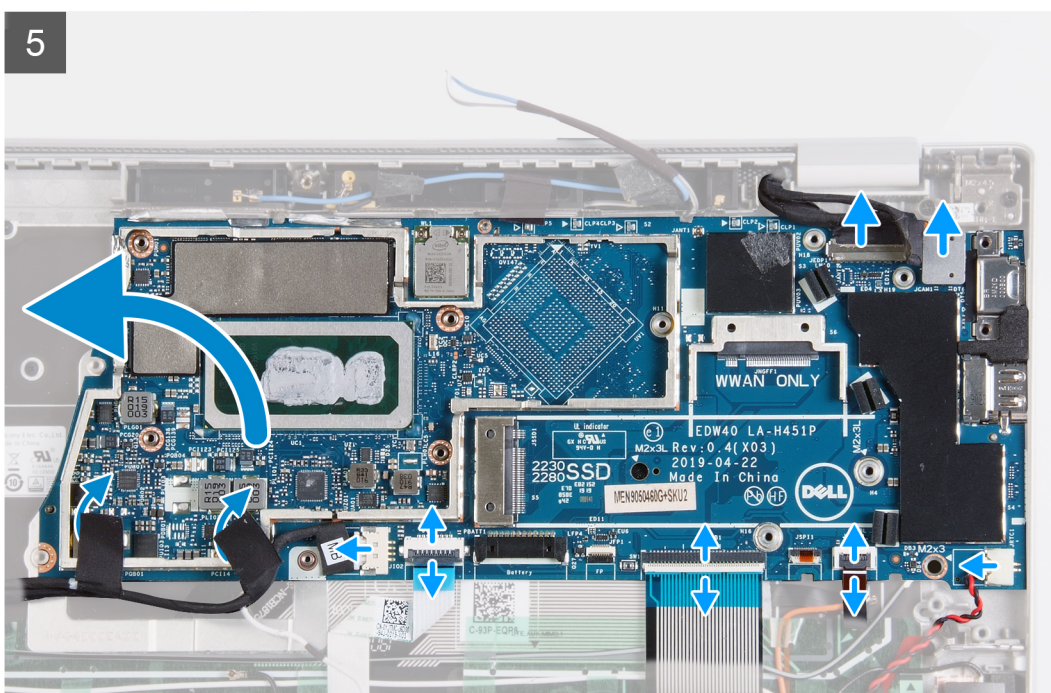
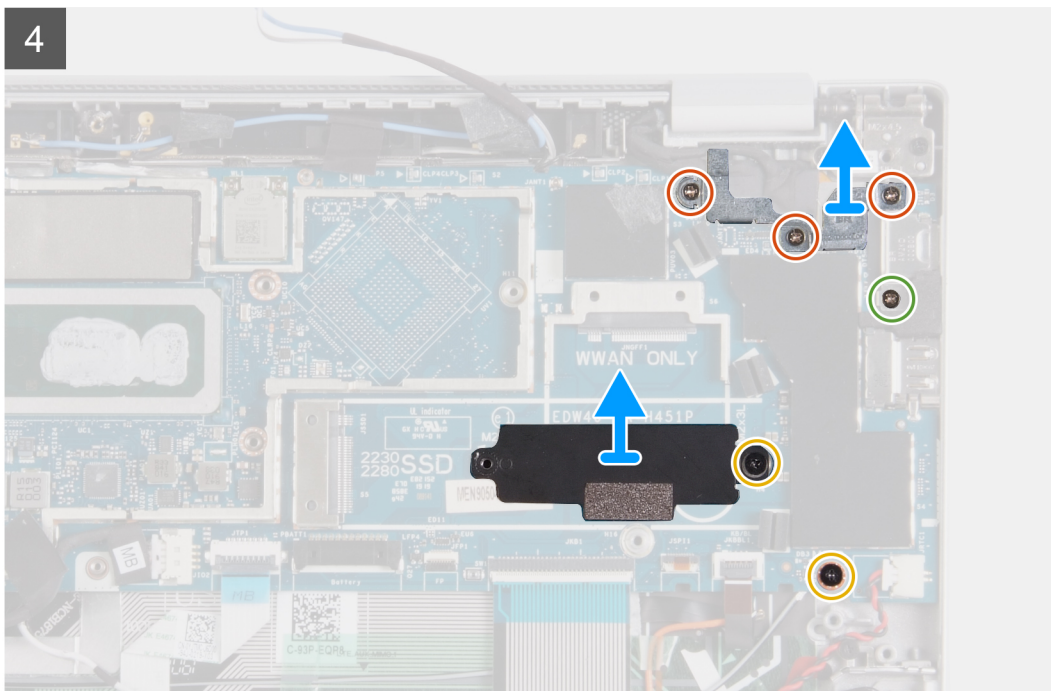
**2x**  
M2x3



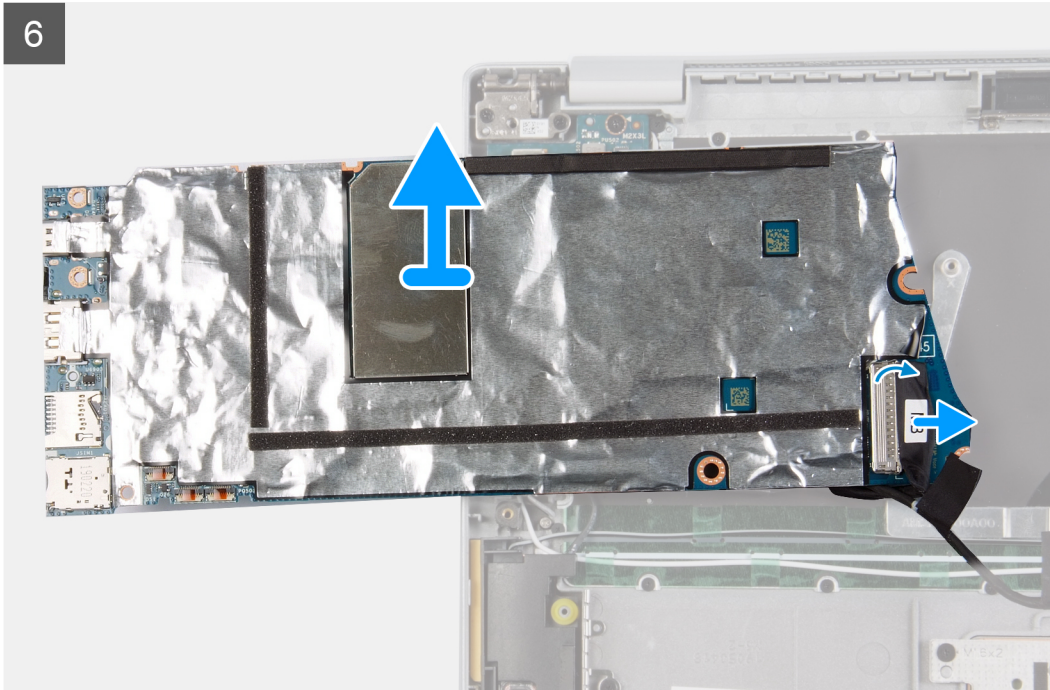
**1x**  
M2x3.5











### Steps

1. Remove the screw (M1.6x2.5) that secures the WLAN-card bracket to the WLAN card.
2. Lift the WLAN-card bracket off the WLAN card.
3. Disconnect the WLAN antenna cables from the WLAN card.
4. Peel the tapes that secure the WLAN antenna cables to the system board and remove them from the routing guides on the system board.
5. Remove the screw (M2x3.5) that secures the USB Type-C port bracket to the system board.
6. Remove the three screws (M2x3.5) that secure the display-cable bracket to the system board.
7. Disconnect the display cable from the system board.
8. Disconnect the touchscreen cable from the system board.
9. **NOTE:** Applicable on computers with touchscreen configuration.
10. Remove the screw (M2x3) that secures the solid-state drive extension bracket to the system board and palm-rest assembly.
11. Disconnect the P-sensor cable from the system board.
12. **NOTE:** Applicable on computers shipped with WWAN card.
13. Disconnect the coin-cell battery cable from the system board.
14. Peel the tape that secures the I/O-board cable to the system board.
15. Open the latch and disconnect the I/O-board cable from the system board.
16. Open the latch and disconnect the fingerprint-reader cable from the system board.
17. Open the latch and disconnect the touchpad cable from the system board.
18. Open the latch and disconnect the keyboard cable from the system board.
19. Open the latch and disconnect the keyboard-backlit cable from the system board.
20. Gently release the ports on the system board from the slots on the palm-rest assembly and lift the system board off the palm-rest assembly.
21. Turn the system board over and disconnect the I/O-board data cable from the connector on the system board.

**NOTE:** When replacing the system board, technician must remember to connect the I/O-board cable to the I/O connector that is located under the system board; Failing to do so, will result in additional repair time of replacing the system board again. Turn the system board over to access the I/O connector that is located under the system board

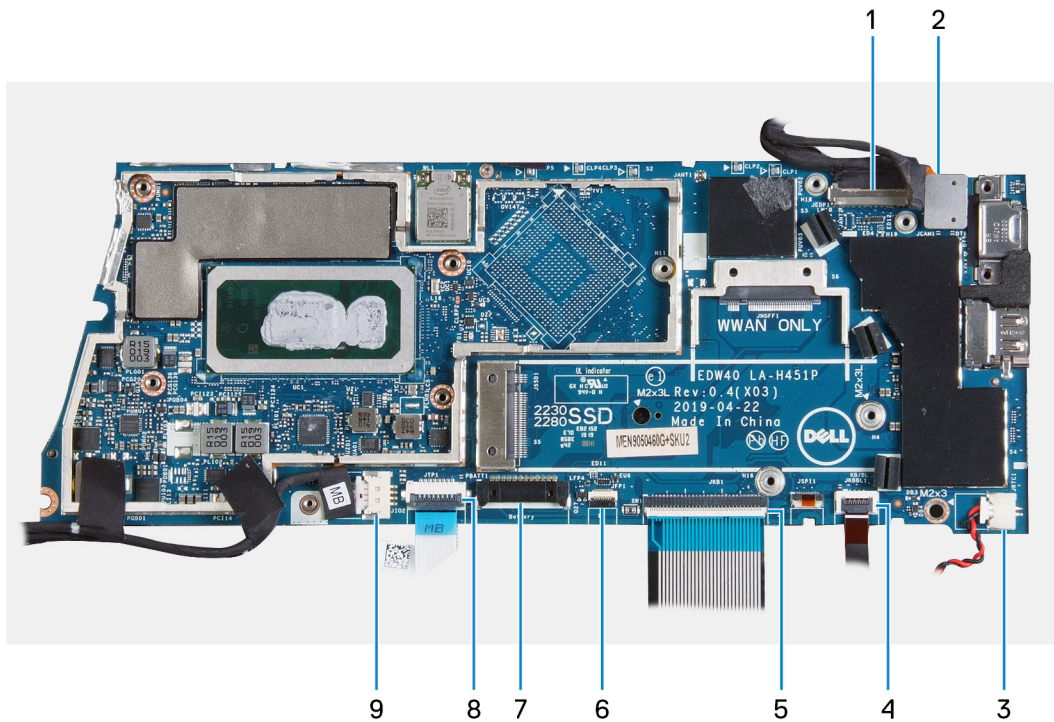
# Installing the system board

## Prerequisites

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

## About this task

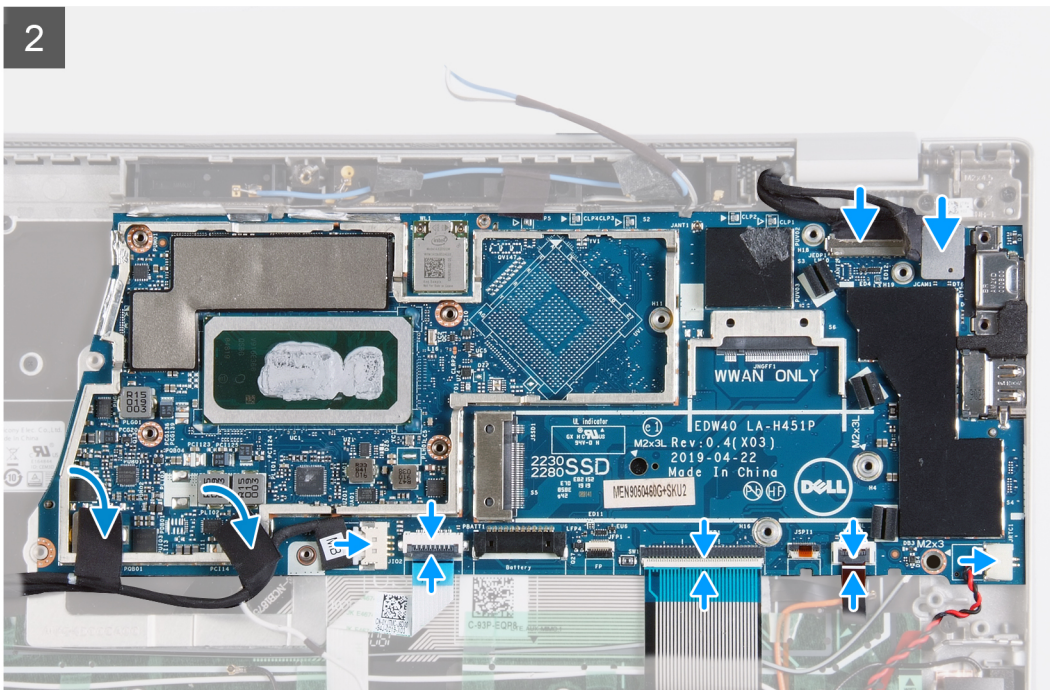
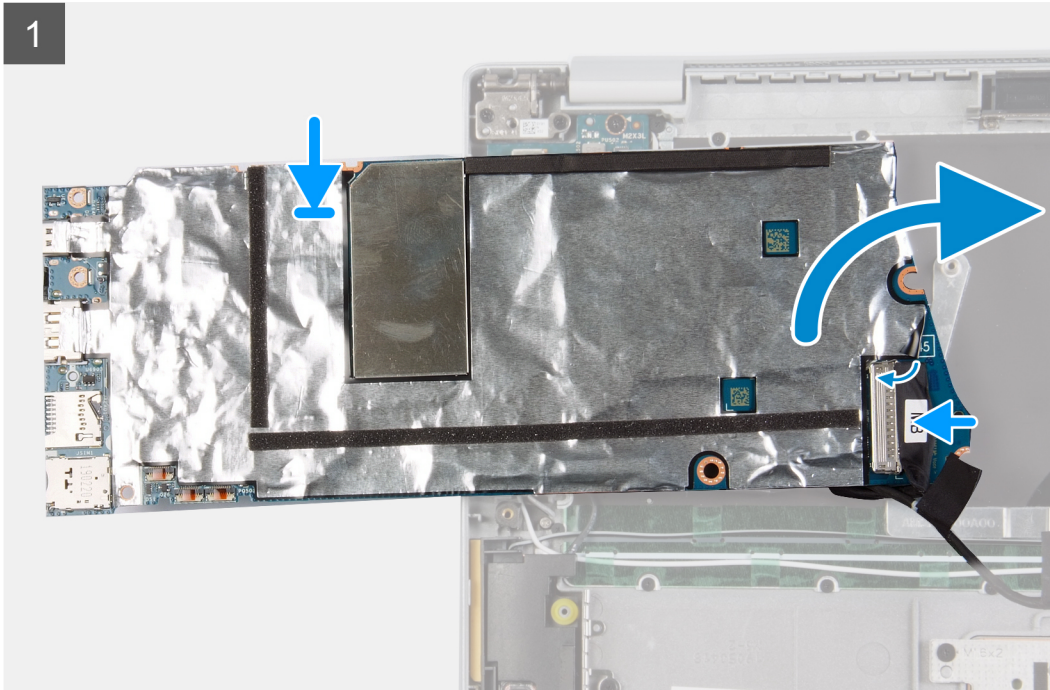
The following image indicates the connectors on your system board.



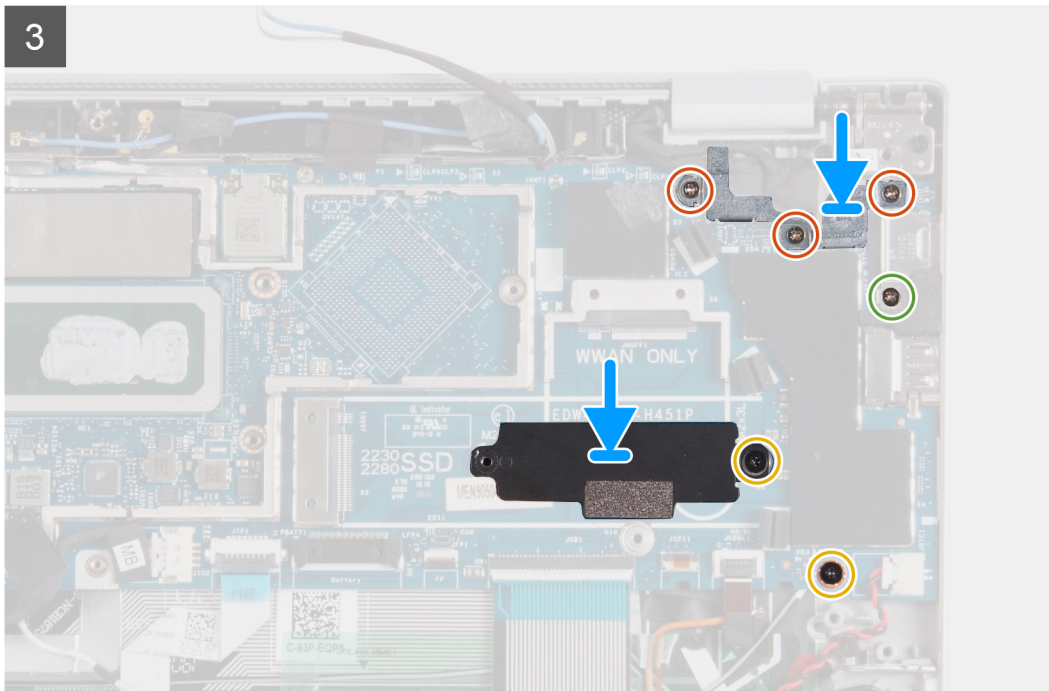
**Figure 2. System-board connectors**

- |                            |                                                                |
|----------------------------|----------------------------------------------------------------|
| 1. Display cable           | 2. Touchscreen cable (available only in touchscreen computers) |
| 3. Coin-cell battery cable | 4. Keyboard-backlit cable                                      |
| 5. Keyboard cable          | 6. Fingerprint-reader cable                                    |
| 7. Battery cable           | 8. Touchpad cable                                              |
| 9. I/O-board cable         |                                                                |

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







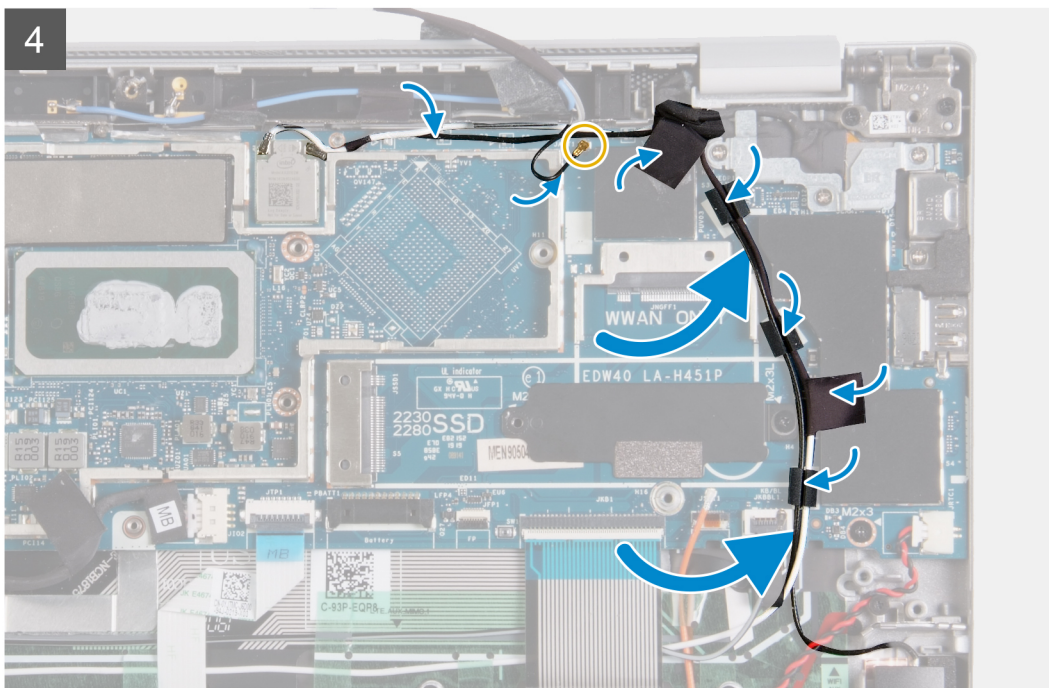
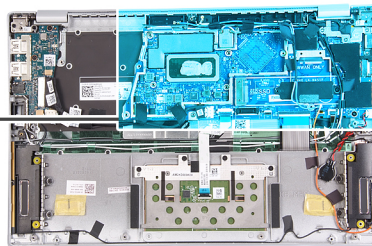
**3x**  
M2x3.5



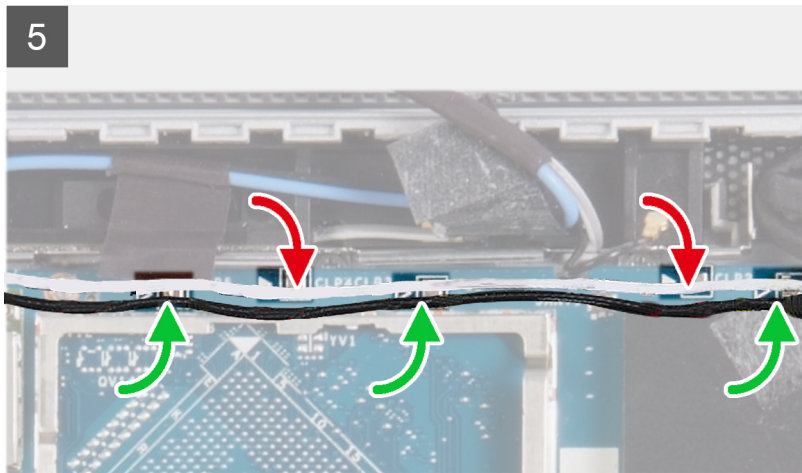
**2x**  
M2x3



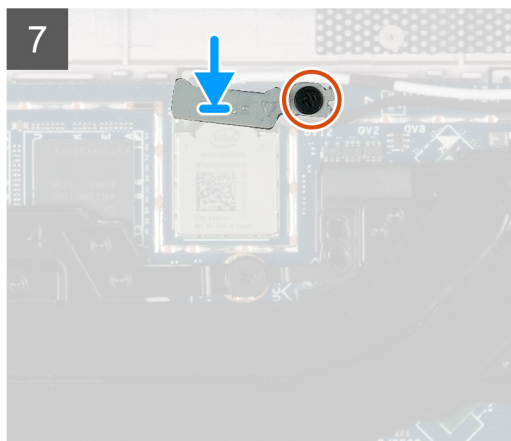
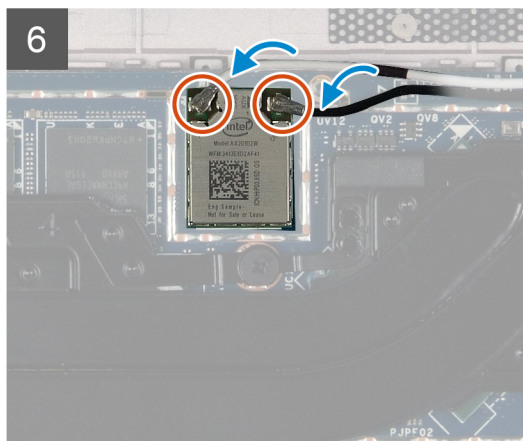
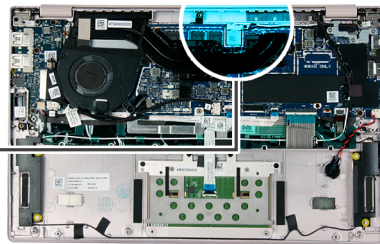
**1x**  
M2x3.5







1x  
M1.6x2.5



## Steps

1. Connect the I/O-board data cable to the connector on the system board.
 

**NOTE:** When replacing the system board, technician must remember to connect the I/O-board cable to the I/O connector that is located under the system board; Failing to do so, will result in additional repair time of replacing the system board again. Turn the system board over to access the I/O connector that is located under the system board
2. Slide the ports on the system board into the slots on the palm-rest assembly and align the screw holes on the system board with the screw holes on the keyboard assembly.
3. Connect the keyboard-backlit cable to the system board and close the latch to secure the cable.
4. Connect the keyboard cable to the system board and close the latch to secure the cable.
5. Connect the touchpad cable to the system board and close the latch to secure the cable.
6. Connect the fingerprint-reader cable to the system board and close the latch to secure the cable.
7. Connect the I/O-board cable to the system board and close the latch to secure the cable.
8. Adhere the tape that secures the I/O-board cable to the system board.
9. Connect the coin-cell battery cable to the system board.
10. Connect the P-sensor cable from the system board.

**NOTE:** Applicable on computers shipped with WWAN card.

11. Replace the screw (M2x3) that secures the system board to the palm-rest assembly.
12. Replace the screw (M2x3) that secures the solid-state drive extension bracket to the system board and palm-rest assembly.
13. Slide the display cable on to the connector on the system board.
14. Slide the touchscreen cable on to the connector on the system board.

**NOTE:** Applicable only on computers with touchscreen configuration.

15. Replace the three screws (M2x3.5) that secure the display-cable bracket to the system board.
16. Replace the screw (M2x3.5) that secures the USB Type-C port bracket to the system board.
17. Route the WLAN antenna cables along the routing guides and adhere the tapes that secure the WLAN antenna cables to the system board.
18. Connect the WLAN antenna cables to the WLAN card.
19. Align and place the WLAN card bracket on the WLAN card.
20. Replace the screw (M1.6x2.5) to secure the WLAN card bracket to the WLAN card.

### Next steps

1. Install the [heat sink \(discrete graphics card\)](#) or [heat sink \(integrated graphics card\)](#), whichever applicable.
2. Install the [fan \(discrete graphics card\)](#) or [fan \(integrated graphics card\)](#), whichever applicable.
3. Install the [M.2 2280 solid-state drive/Intel Optane](#) or [M.2 2230 solid-state drive](#), whichever applicable.
4. Install the [battery](#).
5. Install the [base cover](#).
6. Install the [Nano-SIM card tray](#).

**NOTE:** The Nano-SIM card slot is available in your computer, depending on the region and configuration you ordered.

7. Follow the procedure in [after working inside your computer](#).

## Keyboard

### Removing the keyboard

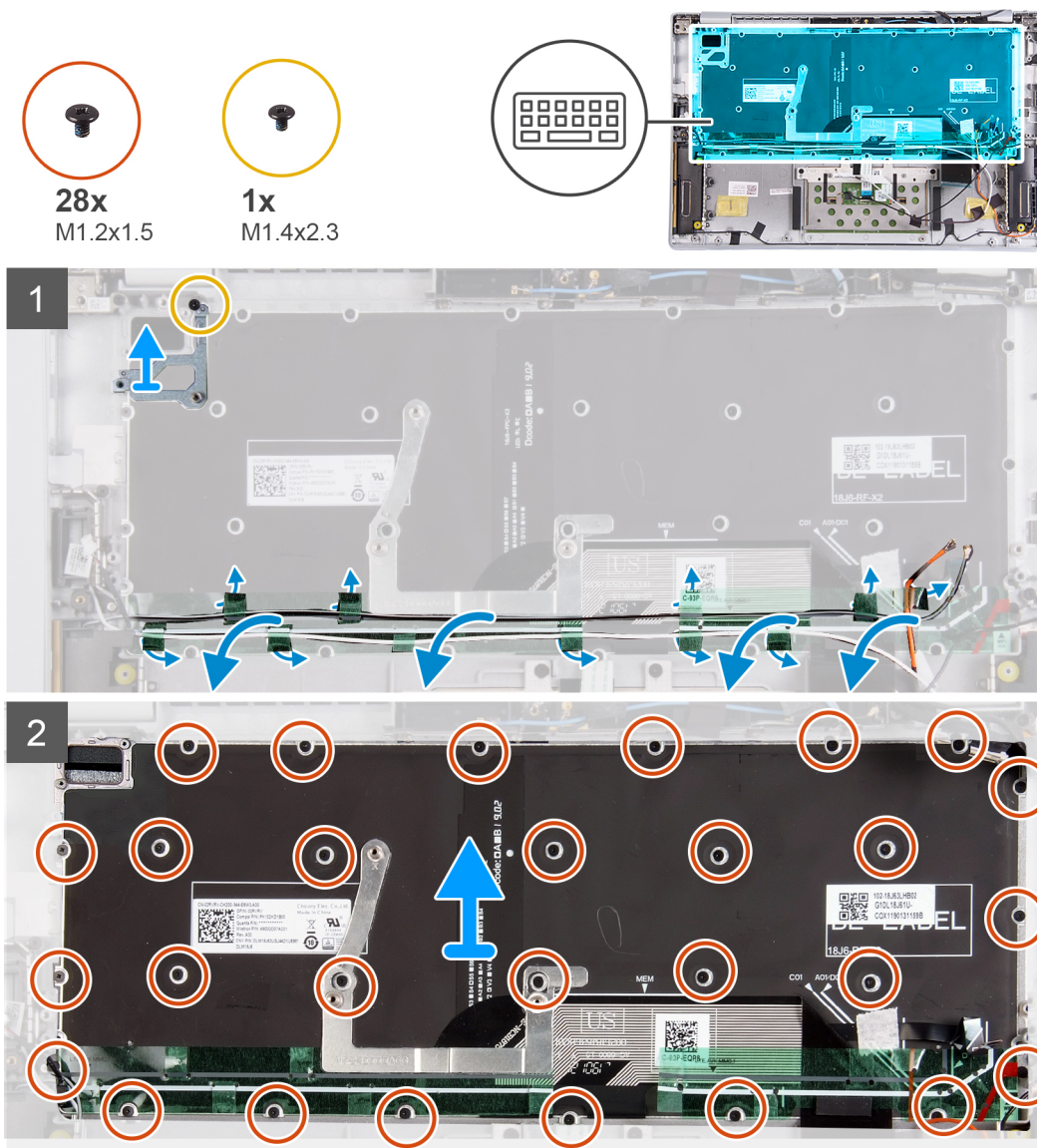
#### Prerequisites

1. Follow the procedure in [before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [M.2 2280 solid-state drive/Intel Optane](#) or [M.2 2230 solid-state drive](#), whichever applicable.
5. Remove the [display assembly](#).
6. Remove the [fan \(discrete graphics card\)](#) or [fan \(integrated graphics card\)](#), whichever applicable.
7. Remove the [heat sink \(discrete graphics card\)](#) or [heat sink \(integrated graphics card\)](#), whichever applicable.
8. Remove the [speakers](#).
9. Remove the [I/O board](#).
10. Remove the [power button with optional fingerprint reader](#).
11. Remove the [system board](#).

**NOTE:** The system board can be removed with the heatsink attached to avoid breaking the thermal bond between system board and heatsink.

#### About this task

The following image indicates the keyboard and provides a visual representation of the removal procedure.



## Steps

1. Remove the screw (M1.4x2.3) that secures the fan bracket to the palmrest.
2. Remove the fan bracket off the palmrest.
3. Peel the tapes that secure the antenna cables to the keyboard.  
i **NOTE:** Applicable on computers shipped with WWAN card.
4. Remove the 28 screws (M1.2x1.5) that secure the keyboard to the palmrest.
5. Lift the keyboard off the palmrest.

## Installing the keyboard

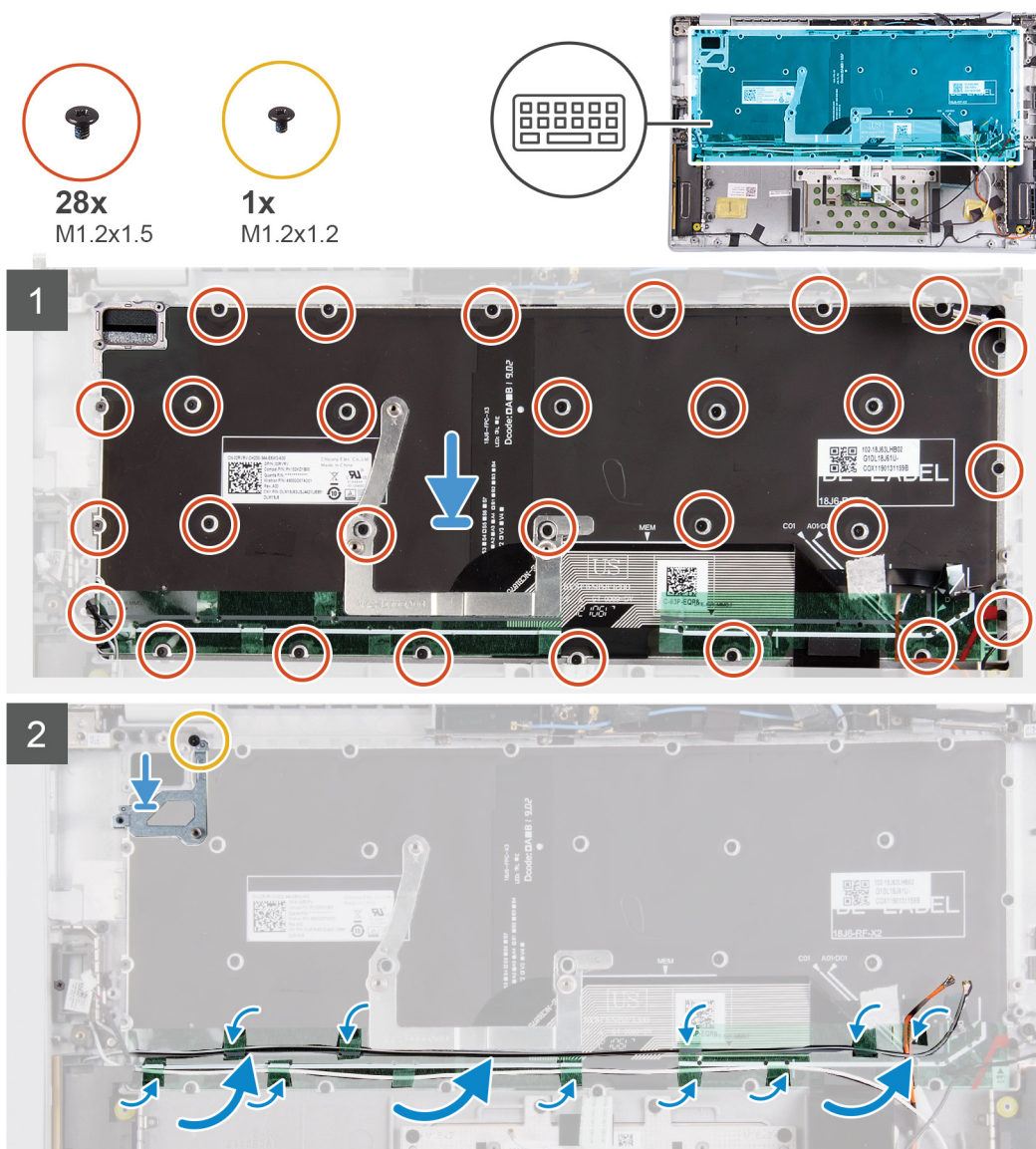
### Prerequisites

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

### About this task

The following image indicates the keyboard and provides a visual representation of the installation procedure.





## Steps

1. Align the screw holes on the keyboard with the screw holes on the palmrest.
2. Replace the 28 screws (M1.2x1.5) that secure the keyboard to the palmrest.
3. Adhere the tapes that secure the antenna cables to the keyboard.

**NOTE:** Applicable on computers shipped with WWAN card.

4. Align the screw holes on the fan bracket with the screw holes on the palmrest.
5. Remove the screw (M1.4x2.3) that secures the fan bracket to the palmrest.

## Next steps

1. Install the [system board](#).

**NOTE:** The system board can be removed with the heatsink attached to avoid breaking the thermal bond between system board and heatsink.

2. Install the [power button with optional fingerprint reader](#).
3. Install the [I/O board](#).
4. Install the [speakers](#).
5. Install the [heat sink \(discrete graphics card\)](#) or [heat sink \(integrated graphics card\)](#), whichever applicable.
6. Install the [fan \(discrete graphics card\)](#) or [fan \(integrated graphics card\)](#), whichever applicable.
7. Install the [display assembly](#).



8. Install the [M.2 2280 solid-state drive/Intel Optane](#) or [M.2 2230 solid-state drive](#), whichever applicable.
9. Install the [battery](#).
10. Install the [base cover](#).
11. Follow the procedure in [after working inside your computer](#).

## Palmrest

### Removing the palmrest

#### Prerequisites

1. Follow the procedure in [before working inside your computer](#).
2. Remove the [base cover](#).
3. Remove the [battery](#).
4. Remove the [M.2 2280 solid-state drive/Intel Optane](#) or [M.2 2230 solid-state drive](#), whichever applicable.
5. Remove the [display assembly](#).
6. Remove the [fan \(discrete graphics card\)](#) or [fan \(integrated graphics card\)](#), whichever applicable.
7. Remove the [speakers](#).
8. Remove the [heat sink \(discrete graphics card\)](#) or [heat sink \(integrated graphics card\)](#), whichever applicable.  
**i NOTE:** The system board can be removed and installed together with the heat sink attached. This will simplify the system board removal and avoid breaking the thermal bond between the system board and heat sink.
9. Remove the [I/O board](#).
10. Remove the [power button with optional fingerprint reader](#).
11. Remove the [system board](#).
12. Remove the [keyboard](#).

#### About this task

The following image indicates the palmrest and provides a visual representation of the removal procedure.



## Steps

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

# Installing the palmrest

## Prerequisites

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

## About this task

The following image indicates the palmrest and provides a visual representation of the installation procedure.



## Steps

Place the palmrest on a flat surface.




## Next steps

1. Install the [keyboard](#).
2. Install the [system board](#).
3. Install the [power button with optional fingerprint reader](#).
4. Install the [I/O board](#).
5. Install the [heat sink \(discrete graphics card\)](#) or [heat sink \(integrated graphics card\)](#), whichever applicable.
6. Install the [speakers](#).
7. Install the [fan \(discrete graphics card\)](#) or [fan \(integrated graphics card\)](#), whichever applicable.
8. Install the [display assembly](#).
9. Install the [M.2 2280 solid-state drive/Intel Optane](#) or [M.2 2230 solid-state drive](#), whichever applicable.
10. Install the [battery](#).
11. Install the [base cover](#).
12. Follow the procedure in [After working inside your computer](#).

## Device drivers


### Downloading the audio driver


#### Steps

1. Turn on your computer.
2. Go to [www.dell.com/support](http://www.dell.com/support).
3. Enter the Service Tag of your computer, and then click **Submit**.  
 **NOTE:** If you do not have the Service Tag, use the auto-detect feature or manually browse for your computer model.
4. Click **Drivers & downloads**.
5. Click the **Detect Drivers** button.
6. Review and agree to the Terms and Conditions to use **SupportAssist**, then click **Continue**.
7. If necessary, your computer starts to download and install **SupportAssist**.  
 **NOTE:** Review on-screen instructions for browser-specific instructions.
8. Click **View Drivers for My System**.
9. Click **Download and Install** to download and install all driver updates detected for your computer.
10. Select a location to save the files.
11. If prompted, approve requests from **User Account Control** to make changes on the system.
12. The application installs all drivers and updates identified.  
 **NOTE:** Not all files can be installed automatically. Review the installation summary to identify if manual installation is necessary.
13. For manual download and installation, click **Category**.
14. Click **Audio** in the drop-down list.
15. Click **Download** to download the audio driver for your computer.
16. After the download is complete, navigate to the folder where you saved the audio driver file.
17. Double-click the audio driver file icon and follow the instructions on the screen to install the driver.


### Downloading the network driver

#### Steps

1. Turn on your computer.
2. Go to [www.dell.com/support](http://www.dell.com/support).
3. Enter the Service Tag of your computer, and then click **Submit**.  
 **NOTE:** If you do not have the Service Tag, use the auto-detect feature or manually browse for your computer model.
4. Click **Drivers & downloads**.
5. Click the **Detect Drivers** button.
6. Review and agree to the Terms and Conditions to use **SupportAssist**, then click **Continue**.
7. If necessary, your computer starts to download and install **SupportAssist**.

 **NOTE:** Review on-screen instructions for browser-specific instructions.

8. Click **View Drivers for My System**.
9. Click **Download and Install** to download and install all driver updates detected for your computer.
10. Select a location to save the files.
11. If prompted, approve requests from **User Account Control** to make changes on the system.
12. The application installs all drivers and updates identified.


 **NOTE:** Not all files can be installed automatically. Review the installation summary to identify if manual installation is necessary.

13. For manual download and installation, click **Category**.
14. Click **Network** in the drop-down list.
15. Click **Download** to download the network driver for your computer.
16. After the download is complete, navigate to the folder where you saved the network driver file.
17. Double-click the network driver file icon and follow the instructions on the screen to install the driver.


## Downloading the chipset driver

### Steps


1. Turn on your computer.
2. Go to [www.dell.com/support](http://www.dell.com/support).
3. Enter the Service Tag of your computer, and then click **Submit**.

 **NOTE:** If you do not have the Service Tag, use the auto-detect feature or manually browse for your computer model.

4. Click **Drivers & downloads**.
5. Click the **Detect Drivers** button.
6. Review and agree to the Terms and Conditions to use **SupportAssist**, then click **Continue**.
7. If necessary, your computer starts to download and install **SupportAssist**.

 **NOTE:** Review on-screen instructions for browser-specific instructions.

8. Click **View Drivers for My System**.
9. Click **Download and Install** to download and install all driver updates detected for your computer.
10. Select a location to save the files.
11. If prompted, approve requests from **User Account Control** to make changes on the system.
12. The application installs all drivers and updates identified.

 **NOTE:** Not all files can be installed automatically. Review the installation summary to identify if manual installation is necessary.

13. For manual download and installation, click **Category**.
14. Click **Chipset** in the drop-down list.
15. Click **Download** to download the chipset driver for your computer.
16. After the download is complete, navigate to the folder where you saved the saved the chipset driver file.
17. Double-click the chipset driver file icon and follow the instructions on the screen to install the driver.


## Downloading the media-card reader driver

### Steps

1. Turn on your computer.
2. Go to [www.dell.com/support](http://www.dell.com/support).




3. Enter the Service Tag of your computer, and then click **Submit**.

 **NOTE:** If you do not have the Service Tag, use the auto-detect feature or manually browse for your computer model.

4. Click **Drivers & downloads**.
5. Click the **Detect Drivers** button.
6. Review and agree to the Terms and Conditions to use **SupportAssist**, then click **Continue**.
7. If necessary, your computer starts to download and install **SupportAssist**.

 **NOTE:** Review on-screen instructions for browser-specific instructions.

8. Click **View Drivers for My System**.
9. Click **Download and Install** to download and install all driver updates detected for your computer.
10. Select a location to save the files.
11. If prompted, approve requests from **User Account Control** to make changes on the system.
12. The application installs all drivers and updates identified.


 **NOTE:** Not all files can be installed automatically. Review the installation summary to identify if manual installation is necessary.

13. For manual download and installation, click **Category**.
14. Click **Chipset** in the drop-down list.
15. Click **Download** to download the media-card reader driver for your computer.
16. After the download is complete, navigate to the folder where you saved the media-card reader driver file.
17. Double-click the media-card reader driver file icon and follow the instructions on the screen to install the driver.


## Downloading the WiFi driver

### Steps


1. Turn on your computer.
2. Go to [www.dell.com/support](http://www.dell.com/support).
3. Enter the Service Tag of your computer, and then click **Submit**.

 **NOTE:** If you do not have the Service Tag, use the auto-detect feature or manually browse for your computer model.

4. Click **Drivers & downloads**.
5. Click the **Detect Drivers** button.
6. Review and agree to the Terms and Conditions to use **SupportAssist**, then click **Continue**.
7. If necessary, your computer starts to download and install **SupportAssist**.

 **NOTE:** Review on-screen instructions for browser-specific instructions.




8. Click **View Drivers for My System**.
9. Click **Download and Install** to download and install all driver updates detected for your computer.
10. Select a location to save the files.
11. If prompted, approve requests from **User Account Control** to make changes on the system.
12. The application installs all drivers and updates identified.

 **NOTE:** Not all files can be installed automatically. Review the installation summary to identify if manual installation is necessary.

13. For manual download and installation, click **Category**.
14. Click **Network** in the drop-down list.
15. Click **Download** to download the WiFi driver for your computer.
16. After the download is complete, navigate to the folder where you saved the WiFi driver file.
17. Double-click the WiFi driver icon and follow the instructions on the screen to install the driver.



# Downloading the USB driver

## Steps

1. Turn on your computer.
2. Go to [www.dell.com/support](http://www.dell.com/support).
3. Enter the Service Tag of your computer, and then click **Submit**.  
 **NOTE:** If you do not have the Service Tag, use the auto-detect feature or manually browse for your computer model.
4. Click **Drivers & downloads**.
5. Click the **Detect Drivers** button.
6. Review and agree to the Terms and Conditions to use **SupportAssist**, then click **Continue**.
7. If necessary, your computer starts to download and install **SupportAssist**.  
 **NOTE:** Review on-screen instructions for browser-specific instructions.
8. Click **View Drivers for My System**.
9. Click **Download and Install** to download and install all driver updates detected for your computer.
10. Select a location to save the files.
11. If prompted, approve requests from **User Account Control** to make changes on the system.
12. The application installs all drivers and updates identified.  
 **NOTE:** Not all files can be installed automatically. Review the installation summary to identify if manual installation is necessary.
13. For manual download and installation, click **Category**.
14. Click **Chipset** in the drop-down list.
15. Click **Download** to download the USB driver for your computer.
16. After the download is complete, navigate to the folder where you saved the USB driver file.
17. Double-click the USB driver file icon and follow the instructions on the screen to install the driver.

# Downloading the graphics driver

## Steps


1. Turn on your computer.
2. Go to [www.dell.com/support](http://www.dell.com/support).
3. Enter the Service Tag of your computer, and then click **Submit**.  
 **NOTE:** If you do not have the Service Tag, use the auto-detect feature or manually browse for your computer model.
4. Click **Drivers & downloads**.
5. Click the **Detect Drivers** button.
6. Review and agree to the Terms and Conditions to use **SupportAssist**, then click **Continue**.
7. If necessary, your computer starts to download and install **SupportAssist**.  
 **NOTE:** Review on-screen instructions for browser-specific instructions.
8. Click **View Drivers for My System**.
9. Click **Download and Install** to download and install all driver updates detected for your computer.
10. Select a location to save the files.
11. If prompted, approve requests from **User Account Control** to make changes on the system.
12. The application installs all drivers and updates identified.




**NOTE:** Not all files can be installed automatically. Review the installation summary to identify if manual installation is necessary.

13. For manual download and installation, click **Category**.
14. Click **Video** in the drop-down list.
15. Click **Download** to download the graphics driver for your computer.
16. After the download is complete, navigate to the folder where you saved the graphics driver file.
17. Double-click the graphics driver file icon and follow the instructions on the screen to install the driver.

# System 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:** 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.

## 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

### About this task

Turn on (or restart) your computer and press F2 immediately.


## Boot Sequence

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


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

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

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


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

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

 **NOTE:** Choosing **Diagnostics**, will display the **ePSA diagnostics** screen.

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

## System setup options

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



**Table 3. System setup options—System information menu**

<b>Overview</b>	
BIOS Version	Displays the BIOS version number.
Service Tag	Displays the Service Tag of the computer.
Asset Tag	Displays the Asset Tag of the computer.
Ownership Tag	Displays the ownership tag of the computer.
Manufacture Date	Displays the manufacture date of the computer.
Ownership Date	Displays the ownership date of the computer.
Express Service Code	Displays the express service code of the computer.
Ownership Tag	Displays the ownership tag of the computer.
Signed Firmware Update	Displays whether the signed firmware update is enabled.
<b>Battery</b>	Displays the battery health information.
Primary	Displays the primary battery.
Battery Level	Displays the battery level.
Battery State	Displays the battery state.
Health	Displays the battery health.
AC Adapter	Displays whether an AC adapter is installed.
<b>Processor Information</b>	
Processor Type	Displays the processor type.
Maximum Clock Speed	Displays the maximum processor clock speed.
Core Count	Displays the number of cores on the processor.
Processor L2 Cache	Displays the processor L2 Cache size.
Processor ID	Displays the processor identification code.
Processor L3 Cache	Displays the processor L3 Cache size.
Current Clock Speed	Displays the current processor clock speed.
Minimum Clock Speed	Displays the minimum processor clock speed.
Microcode Version	Displays the microcode version.
Intel Hyper-Threading Capable	Displays whether the processor is Hyper-Threading (HT) capable.
64-Bit Technology	Displays whether 64-bit technology is used.
<b>Memory Information</b>	
Memory Installed	Displays the total computer memory installed.
Memory Available	Displays the total computer memory available.
Memory Speed	Displays the memory speed.
Memory Channel Mode	Displays single or dual channel mode.
Memory Technology	Displays the technology that is used for the memory.
<b>Device Information</b>	
Video Controller	Displays the integrate graphics information of the computer.
dGPU Video Controller	Displays the discrete graphics information of the computer.
Video BIOS Version	Displays the video BIOS version of the computer.
Video Memory	Displays the video memory information of the computer.
Panel Type	Displays the Panel Type of the computer.

**Table 3. System setup options—System information menu (continued)**

Overview	
Native Resolution	Displays the native resolution of the computer.
Audio Controller	Displays the audio controller information of the computer.
Wi-Fi Device	Displays the wireless device information of the computer.
Bluetooth Device	Displays the Bluetooth device information of the computer.


**Table 4. System setup options—Boot options menu**

Boot options	
<b>Advanced Boot Options</b>	
Enable UEFI Network Stack	Enables or disables UEFI Network Stack. Default: OFF.
<b>Boot Mode</b>	
Boot Mode: UEFI only	Displays the boot mode of this computer.
Enable Boot Devices	Enables or disables boot devices for this computer.
Boot Sequence	Displays the boot sequence.
<b>BIOS Setup Advanced Mode</b>	Enables or disables advanced BIOS settings. Default: ON.
<b>UEFI Boot Path Security</b>	Enables or disables the system to prompt the user to enter the Admin password when booting a UEFI boot path from the F12 boot menu. Default: Always Except Internal HDD.

**Table 5. System setup options—System Configuration menu**

System Configuration	
<b>Date/Time</b>	
Date	Sets the computer date in MM/DD/YYYY format. Changes to the date take effect immediately.
Time	Sets the computer time in HH/MM/SS 24-hour format. You can switch between 12-hour and 24-hour clock. Changes to the time take effect immediately.
<b>Enable SMART Reporting</b>	Enables or disables SMART (Self-Monitoring, Analysis, and Reporting Technology) during computer startup to report hard drive errors. Default: OFF.
<b>Enable Audio</b>	Enables or disables all integrated audio controller. Default: ON.
<b>Enable Microphone</b>	Enables or disables microphone. Default: ON.
<b>Enable Internal Speaker</b>	Enables or disables internal speaker. Default: ON.
<b>USB/Thunderbolt Configuration</b>	
Enable Boot Support	Enables or disables booting from USB mass storage devices such as external hard drive, optical drive, and USB drive.
Enable External USB Ports	Enables or disables USB ports to be functional in an operating system environment.

**Table 5. System setup options—System Configuration menu (continued)**

System Configuration	
Enable Thunderbolt Technology Support	Enables or disables Thunderbolt Technology support.
Enable Thunderbolt Boot Support	Enables or disables Thunderbolt boot support.
Enable Thunderbolt (and PCIe behind TBT) pre-boot modules	Enables or disables Thunderbolt pre-boot modules.
<b>SATA Operation</b>	Configures operating mode of the integrated SATA hard drive controller. Default: RAID. SATA is configured to support RAID (Intel Rapid Restore Technology).
<b>Drives</b>	Enables or disables various onboard drives.
M.2 PCIe SSD-0/SATA-2	Default: ON.
SATA-0	Default: ON.
Drive Information	Displays the information of various onboard drives.
<b>Miscellaneous Devices</b>	Enables or disables various onboard devices.
Enable Camera	Enables or disables the camera. Default: ON.
Keyboard Illumination	Configures the operating mode of the keyboard illumination feature. Default: Disabled. The keyboard illumination will always be off.
Keyboard Backlight Timeout on AC	Configures the timeout value for the keyboard when an AC adapter is connected to the computer. The keyboard backlight timeout value is only effect when the backlight is enabled. Default: 10 seconds.
Keyboard Backlight Timeout on Battery	Configures the timeout value for the keyboard when the computer is running on battery. The keyboard backlight timeout value is only effect when the backlight is enabled. Default: 10 seconds.
Touchscreen	Enables or disables the touchscreen for the operating system.  <b>NOTE:</b> Touchscreen will always work in the BIOS setup irrespective of this setting. Default: ON.


**Table 6. System setup options—Video menu**

Video	
<b>LCD Brightness</b>	
Brightness on battery power	Sets the screen brightness when the computer is running on battery power.
Brightness on AC power	Sets the screen brightness when the computer is running on AC power.
<b>EcoPower</b>	Enables or disables EcoPower which increases the battery life by reducing the screen brightness when appropriate. Default: ON.

**Table 7. System setup options—Security menu**

Security	
Enable Admin Setup Lockout	Enables or disables the user from entering BIOS Setup when an Admin Password is set. Default: OFF.

**Table 7. System setup options—Security menu (continued)**

<b>Security</b>	
Password Bypass	Bypass the System (Boot) Password and the internal hard drive password prompts during a system restart.  Default: Disabled.
Enable Non-Admin Password Changes	Enables or disables the user to change the system and hard drive password without the need for admin password.  Default: ON.
<b>Non-Admin Setup Changes</b>	
Allow Wireless Switch Changes	Enables or disables changes to the setup option when an Administrator password is set.  Default: OFF.
Enable UEFI Capsule Firmware Updates	Enables or disables BIOS updates through UEFI capsule update packages.
<b>Absolute</b>	Enable or disable the BIOS module interface of the optional Absolute Persistence Module (R) service from Absolute Software.
<b>Intel Platform Trust Technology On</b>	Enables or disables Platform Trust Technology (PTT) visibility to the operating system.  Default: ON.
PPI Bypass for Clear Commands	Enables or disables the operating system to skip BIOS Physical Presence Interface (PPI) user prompts when issuing the Clear command.  Default: OFF.
Clear	Enables or disables the computer to clear the PTT owner information, and returns the PTT to the default state.  Default: OFF.
<b>Intel SGX</b>	Enables or disables the Intel Software Guard Extensions (SGX) to provide a secured environment for running code/storing sensitive information.  Default: Software Control
<b>SMM Security Mitigation</b>	Enables or disables additional UEFI SMM Security Mitigation protections.  Default: OFF.   <b>NOTE:</b> This feature may cause compatibility issues or loss of functionality with some legacy tools and applications.
Enable Strong Passwords	Enables or disables strong passwords.  Default: OFF.
<b>Password Configuration</b>	Control the minimum and maximum number of characters that are allowed for Admin and System passwords.
<b>Admin Password</b>	Sets, Changes, or deletes the administrator (admin) password (sometimes called the "setup" password).
<b>System Password</b>	Sets, Changes, or deletes the system password.
Enable Master Password Lockout	Enables or disables the master password support.  Default: OFF.

**Table 8. System setup options—Secure Boot menu**

<b>Secure Boot</b>	
Enable Secure Boot	Enables or disables the computer to boot using only validated boot software.  Default: OFF.



**Table 8. System setup options—Secure Boot menu (continued)**

Secure Boot	
	<p><b>NOTE:</b> For Secure Boot to be enabled, the computer needs to be in UEFI boot mode and the Enable Legacy Option ROMs option needs to be turned off.</p>
Secure Boot Mode	<p>Selects the Secure Boot operation mode.</p> <p>Default: Deployed Mode.</p> <p><b>NOTE:</b> Deployed Mode should be selected for normal operation of Secure Boot.</p>

**Table 9. System setup options—Expert Key Management menu**

Expert Key Management	
Enable Custom Mode	<p>Enables or disables the keys in the PK, KEK, db, and dbx security key databases to be modified.</p> <p>Default: OFF.</p>
Custom Mode Key Management	<p>Selects the custom values for expert key management.</p> <p>Default: PK.</p>

**Table 10. System setup options—Performance menu**

Performance	
Intel Hyper-Threading Technology	<p>Enables or disables the Intel Hyper-Threading Technology to use processor resources more efficiently.</p> <p>Default: ON.</p>
Intel SpeedStep	<p>Enables or disables the Intel SpeedStep Technology to dynamically adjust processor voltage and core frequency, decreasing average power consumption and heat production.</p> <p>Default: ON.</p>
Intel TurboBoost Technology	<p>Enabled or disabled the Intel TurboBoost mode of the processor. If enabled, the Intel TurboBoost driver increases the performance of the CPU or graphics processor.</p> <p>Default: ON.</p>
Multi-Core Support	<p>Changes the number of CPU cores available to the operating system. The default value is set to the maximum number of cores.</p> <p>Default: All Cores.</p>
Enable C-State Control	<p>Enables or disables the CPU's ability to enter and exit low-power states.</p> <p>Default: ON.</p>

**Table 11. System setup options—Power Management menu**

Power Management	
Wake on AC	<p>Enables the computer to turn on and go to boot when AC power is supplied to the computer.</p> <p>Default: OFF.</p>
Wake on Dell USB-C Dock	<p>Enables the USB-C dock to wake the computer from Standby mode.</p> <p>Default: ON.</p>

**Table 11. System setup options—Power Management menu (continued)**

**Power Management**

	<p><b>NOTE:</b> This feature works only if the power adapter is connected to the computer.</p>
Auto on Time	<p>Enables the computer to automatically power on for defined days and times.</p> <p>Default: Disabled. The system will not automatically power up.</p>
Battery Charge Configuration	<p>Enables the computer to run on battery during power usage hours. Use the below options to prevent AC power usage between certain times of each day.</p> <p>Default: Adaptive. Battery settings are adaptively optimized based on your typical battery usage pattern.</p>
Enable Advanced Battery Charge Configuration	<p>Enables Advanced Battery Charge Configuration from the beginning of the day to a specified work period. Advanced Battery Charged maximizes battery health while still supporting heavy use during the work day.</p> <p>Default: OFF.</p>
Block Sleep	<p>Blocks the computer from entering Sleep (S3) mode in the operating system.</p> <p>Default: OFF.</p> <p><b>NOTE:</b> If enabled, the computer will not go to sleep, Intel Rapid Start will be disabled automatically, and the operating system power option will be blank if it was set to Sleep.</p>
Enable Intel Speed Shift Technology	<p>Enables or disables Intel Speed Shift Technology support which enables the operating system to select the appropriate processor performance automatically.</p> <p>Default: ON.</p>
Lid Switch	<p>Enables the computer to power up from the off state whenever the lid is opened.</p> <p>Default: ON.</p>

**Table 12. System setup options—Wireless menu**

<b>Wireless</b>	
<b>Wireless Device Enable</b>	<p>Determines which wireless devices can be controlled by the Wireless Switch. For Windows 8 systems, this is controlled by an operating system drive directly. As a result, the setting does not affect the Wireless Switch behavior.</p> <p><b>NOTE:</b> When both WLAN and WiGig are present, enable/disable controls are tied together. Thus, they cannot be enabled or disabled independently.</p>
WWAN/GPS	<p>Default: ON.</p> <p><b>NOTE:</b> Applicable on computers shipped with WWAN card.</p>
WLAN	Default: ON.
Bluetooth	Default: ON.
<b>Wireless Device Enable</b>	Enable or disable internal WLAN/Bluetooth devices.
WLAN	Default: ON.
Bluetooth	Default: ON.

**Table 13. System setup options—POST Behavior menu****POST Behavior**

Numlock Enable	Enables or disables Numlock when the computer boots. Default: ON.
Enable Adapter Warnings	Enables the computer to display adapter warning messages during boot. Default: ON.
Extend BIOS POST Time	Configures the BIOS POST (Power-On Self-Test) load time. Default: 0 seconds.
Fastboot	Configures the speed of the UEFI boot process. Default: Thorough. Performs complete hardware and configuration initialization during boot.
Fn Lock Options	Enables or disables the Fn lock mode. Default: ON.
Lock Mode	Default: Lock Mode Secondary. Lock Mode Secondary = If this option is selected, the F1-F12 keys scan the code for their secondary functions.
Pull Screen Logo	Enabled or disabled the computer to display full screen logo if the image match screen resolution. Default: OFF.
Warnings and Errors	Selects an action on encountering a warning or error during boot. Default: Prompt on Warnings and Errors. Stop, prompt and wait for user input when warnings or errors are detected. <b>i NOTE:</b> Errors deemed critical to the operation of the computer hardware will always halt the computer.


**Table 14. System setup options—Virtualization menu**

Virtualization	
Intel Virtualization Technology	Enables the computer to run a virtual machine monitor (VMM). Default: ON.
VT for Direct I/O	Enables the computer to perform Virtualization Technology for Direct I/O (VT-d). VT-d is an Intel method that provides virtualization for memory map I/O. Default: ON.

**Table 15. System setup options—Maintenance menu**

Maintenance	
Asset Tag	Creates a system Asset Tag that can be used by an IT administrator to uniquely identify a particular system. Once set in BIOS, the Asset Tag cannot be changed.
Service Tag	Displays the Service Tag of the computer.
BIOS Recovery from Hard Drive	Enables the computer to recover from a bad BIOS image, as long as the Boot Block portion is intact and functioning. Default: ON. <b>i NOTE:</b> BIOS recovery is designed to fix the main BIOS block and cannot work if the Boot Block is damaged. In addition, this feature cannot work in the event of EC corruption, ME corruption, or a hardware issue. The recovery image must exist on an unencrypted partition on the drive.

**Table 15. System setup options—Maintenance menu (continued)**

Maintenance	
BIOS Auto-Recovery	Enables the computer to automatically recover the BIOS without user actions. This feature requires BIOS Recovery from Hard Drive to be set to Enabled. Default: OFF.
Start Data Wipe	 <b>CAUTION: This Secure Wipe Operation will delete information in a way that it cannot be reconstructed.</b> If enabled, the BIOS will queue up a data wipe cycle for storage devices that are connected to the motherboard on the next reboot. Default: OFF.
Allow BIOS Downgrade	Controls flashing of the system firmware to previous revisions. Default: ON.

**Table 16. System setup options—System Logs menu**

System Logs	
Power Event Log	Displays Power events. Default: Keep.
BIOS Event Log	Displays BIOS events. Default: Keep.
Thermal Event Log	Displays Thermal events. Default: Keep.

**Table 17. System setup options—SupportAssist menu**

SupportAssist	
Dell Auto operating system Recovery Threshold	Controls the automatic boot flow for SupportAssist System Resolution Console and for Dell operating system Recovery tool. Default: 2.
SupportAssist operating system Recovery	Enables or disables the boot flow for SupportAssist operating system Recovery tool in the even of certain system errors. Default: ON.


## System and setup password

**Table 18. System and setup password**

Password type	Description
System password	Password that you must enter to log on 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 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

### Prerequisites

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

### About this task

To enter the system setup, press F2 immediately after a power-on or re-boot.

### Steps

1. In the **System BIOS** or **System Setup** screen, select **Security** and press Enter.  
The **Security** screen is displayed.
2. Select **System/Admin Password** and create a password in the **Enter the new password** field.  
Use the following guidelines to assign the system password:
  - A password can have up to 32 characters.
  - The password can contain the numbers 0 through 9.
  - Only lower case letters are valid, upper case letters are not allowed.
  - Only the following special characters are allowed: space, ("), (+), (.), (-), (/), (:), ([), (\), (]), (`).
3. Type the system password that you entered earlier in the **Confirm new password** field and click **OK**.
4. Press Esc and a message prompts you to save the changes.
5. Press Y to save the changes.  
The computer reboots.

## Deleting or changing an existing system setup password


### Prerequisites

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

### About this task

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

### Steps

1. In the **System BIOS** or **System Setup** screen, select **System Security** and press Enter.  
The **System Security** screen is displayed.
2. In the **System Security** screen, verify that **Password Status** is **Unlocked**.
3. Select **System Password**, alter or delete the existing system password and press Enter or Tab.
4. Select **Setup Password**, alter or delete the existing setup password and press Enter or Tab.  
 **NOTE:** If you change the System and/or Setup password, re-enter 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 reboot.

## Clearing CMOS settings

### About this task

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

### Steps

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


## Real Time Clock (RTC) battery reset

Press and hold the power button for 25 seconds to force Real Time Clock (RTC) battery reset.

## Clearing BIOS (System Setup) and System passwords

### About this task

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.


## Updating the BIOS

### Updating the BIOS in Windows environment

#### About this task

Follow these steps to update the BIOS:

#### Steps

1. Turn on your computer.
2. Go to [www.dell.com/support](http://www.dell.com/support).
3. 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 product ID or manually browse for your computer model.
4. Click **Drivers & Downloads**. Expand **Find drivers**.
5. Select the operating system installed on your computer.
6. Scroll down the page and expand **BIOS**.
7. In the **Category** drop-down list, select **BIOS**.  
The latest version of BIOS is displayed.
8. Select the update and click **Download** to download the latest version of the BIOS for your computer.
9. After the download is complete, browse the folder where you saved the BIOS update file.
10. Double-click the BIOS update file icon and follow the on-screen instructions.

## Flashing BIOS (USB key)

### Steps

1. Follow the procedure from step 1 to step 7 in "[Flashing the BIOS](#)" to download the latest BIOS setup program file.
2. Create a bootable USB drive. For more information see the knowledge base 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** when the Dell logo is displayed on the screen.
6. Boot to the USB drive from the **One Time Boot Menu**.
7. Type the BIOS setup program filename and press **Enter**.
8. The **BIOS Update Utility** appears. Follow the instructions on the screen to complete the BIOS update.

## Updating the BIOS from the F12 One-Time boot menu


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

### About this task

#### 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.

### Steps

1. From a turn off state, insert the USB drive where you copied the flash into a USB port of the computer.
2. Turn on the computer and press F12 to access the One-Time Boot Menu, select BIOS Update using the mouse or arrow keys then press Enter.  
The flash BIOS menu is displayed.
3. Click **Flash from file**.
4. Select 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.

# Troubleshooting

## 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](#).

## SupportAssist diagnostics

### About this task

The SupportAssist diagnostics (previously known as ePSA diagnostics) performs a complete check of your hardware. The SupportAssist diagnostics is embedded in the BIOS and is launched by it internally. The SupportAssist diagnostics provides a set of options for particular devices or device groups. It allows 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 and provide extra information about the failed device(s)
- View status messages that indicate if the tests are completed successfully
- View error messages that indicate if problems were encountered during the test

**NOTE:** Some tests are meant for specific devices and require user interaction. Ensure that you are present in front of the computer when the diagnostic tests are performed.

For more information, see [SupportAssist Pre-Boot System Performance Check](#).

## System diagnostic lights

### Battery-status light

Indicates the power and battery-charge status.

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

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

#### Off

- Power adapter is connected and the battery is fully charged.
- Computer is running on battery and the battery has more than 5 percent charge.
- Computer is in sleep state, hibernation, or turned off.

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

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

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

**Table 19. LED codes**

Diagnostic light codes	Problem description
2,1	Processor failure
2,2	System board: BIOS or ROM (Read-Only Memory) failure
2,3	No memory or RAM (Random-Access Memory) detected
2,4	Memory or RAM (Random-Access Memory) failure
2,5	Invalid memory installed
2,6	System-board or chipset error
2,7	Display failure
2,8	Power rail failure
3,1	Coin-cell battery failure
3,2	PCI, video card/chip failure
3,3	Recovery image not found
3,4	Recovery image found but invalid
3,5	Power-rail failure
3,6	System BIOS Flash incomplete
3,7	Management Engine (ME) error

**Camera status light:** Indicates whether the camera is in use.

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

**Caps Lock status light:** Indicates whether Caps Lock is enabled or disabled.

- Solid white — Caps Lock enabled.

- Off — Caps Lock disabled.

# 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 20. 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 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.

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

# 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**.

## WiFi power cycle

### About this task

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.

### Steps

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

## Flea power release

### About this task

Flea power is the residual static electricity that remains on the computer even after it has been powered off and the battery has been removed. The following procedure provides the instructions on how to conduct flea power release:


### Steps

1. Turn off your computer.
2. Disconnect the power adapter from your computer.
3. Press and hold the power button for 15 seconds to drain the flea power.
4. Connect the power adapter to your computer.
5. Turn on your computer.

## Enabling Intel Optane memory


### Steps


1. On the taskbar, click the search box, and then type **Intel Rapid Storage Technology**.
2. Click **Intel Rapid Storage Technology**.  
The **Intel Rapid Storage Technology** window is displayed.

3. On the **Status** tab, click **Enable** to enable the Intel Optane memory.
  4. On the warning screen, select a compatible fast drive, and then click **Yes** to continue enabling Intel Optane memory.
  5. Click **Intel Optane memory > Reboot** to complete enabling your Intel Optane memory.
-  **NOTE:** Applications may take up to three subsequent launches after enablement to see the full performance benefits.

## Disabling Intel Optane memory


### About this task

 **CAUTION:** After disabling Intel Optane memory, do not uninstall the driver for Intel Rapid Storage Technology as it will result in a blue screen error. The Intel Rapid Storage Technology user interface can be removed without uninstalling the driver.

 **NOTE:** Disabling Intel Optane memory is required before removing the SATA storage device accelerated by the Intel Optane memory module from the computer.

### Steps

1. On the taskbar, click the search box, and then type **Intel Rapid Storage Technology**.
2. Click **Intel Rapid Storage Technology**.  
The **Intel Rapid Storage Technology** window is displayed.
3. On the **Intel Optane memory** tab, click **Disable** to disable the Intel Optane memory.

 **NOTE:** For computers in which Intel Optane memory acts as a primary storage, do not disable the Intel Optane memory. The **Disable** option will be grayed out.
4. Click **Yes** if you accept the warning.  
The disabling progress is displayed.
5. Click **Reboot** to complete disabling your Intel Optane memory and restart your computer.





# Getting help and contacting Dell

## Self-help resources


You can get information and help on Dell products and services using these self-help resources:


**Table 21. Self-help resources**

Self-help resources	Resource location
Information about Dell products and services	<a href="http://www.dell.com">www.dell.com</a>
My Dell	
Tips	
Contact Support	In Windows search, type <code>Contact Support</code> , and press Enter.
Online help for operating system	<a href="http://www.dell.com/support/windows">www.dell.com/support/windows</a> <a href="http://www.dell.com/support/linux">www.dell.com/support/linux</a>
Access top solutions, diagnostics, drivers and downloads, and learn more about your computer through videos, manuals and documents.	Your Dell computer is uniquely identified by a Service Tag or Express Service Code. To view relevant support resources for your Dell computer, enter the Service Tag or Express Service Code at <a href="http://www.dell.com/support">www.dell.com/support</a> . For more information on how to find the Service Tag for your computer, see <a href="#">Locate the Service Tag on your computer</a> .
Dell knowledge base articles for a variety of computer concerns	<ol style="list-style-type: none"> <li>1. Go to <a href="http://www.dell.com/support">www.dell.com/support</a>.</li> <li>2. On the menu bar at the top of the Support page, select <b>Support &gt; Knowledge Base</b>.</li> <li>3. In the Search field on the Knowledge Base page, type the keyword, topic, or model number, and then click or tap the search icon to view the related articles.</li> </ol>

## Contacting Dell

To contact Dell for sales, technical support, or customer service issues, see [www.dell.com/contactdell](http://www.dell.com/contactdell).

 **NOTE:** Availability varies by country/region and product, and some services may not be available in your country/region.

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