

# Inspiron 5481

## 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.

© 2018 Dell Inc. or its subsidiaries. All rights reserved. Dell, EMC, and other trademarks are trademarks of Dell Inc. or its subsidiaries. Other trademarks may be trademarks of their respective owners.

# Contents

<b>1 Before working inside your computer</b> .....	<b>8</b>
Before you begin .....	8
<b>2 After working inside your computer</b> .....	<b>9</b>
<b>3 Safety instructions</b> .....	<b>10</b>
Electrostatic discharge—ESD protection.....	10
ESD field service kit .....	11
Transporting sensitive components.....	12
<b>4 Recommended tools</b> .....	<b>13</b>
<b>5 Screw list</b> .....	<b>14</b>
<b>6 Removing the base cover</b> .....	<b>15</b>
Procedure.....	15
<b>7 Replacing the base cover</b> .....	<b>17</b>
Procedure.....	17
<b>8 Removing the battery</b> .....	<b>19</b>
Prerequisites.....	19
Procedure.....	19
<b>9 Replacing the battery</b> .....	<b>21</b>
Procedure.....	21
Post-requisites.....	22
<b>10 Removing the coin-cell battery</b> .....	<b>23</b>
Procedure.....	23
<b>11 Replacing the coin-cell battery</b> .....	<b>24</b>
Procedure.....	24
<b>12 Removing the memory modules</b> .....	<b>25</b>
Removing the wireless card.....	25
Prerequisites.....	25
Procedure.....	25
Procedure.....	26
<b>13 Replacing the memory modules</b> .....	<b>27</b>
Procedure.....	27
Replacing the wireless card.....	28

Procedure.....	28
Post-requisites.....	29
<b>14 Removing the solid-state drive/Intel Optane memory module.....</b>	<b>30</b>
Prerequisites.....	30
Procedure.....	30
<b>15 Replacing the solid-state drive/Intel Optane memory module.....</b>	<b>31</b>
Procedure.....	31
Post-requisites.....	31
<b>16 Removing the hard drive.....</b>	<b>32</b>
Prerequisites.....	32
Procedure.....	32
<b>17 Replacing the hard drive.....</b>	<b>34</b>
Procedure.....	34
Post-requisites.....	35
<b>18 Removing the heat sink.....</b>	<b>36</b>
Prerequisites.....	36
Procedure.....	36
<b>19 Replacing the heat sink.....</b>	<b>37</b>
Procedure.....	37
Post-requisites.....	37
<b>20 Removing the fan.....</b>	<b>38</b>
Procedure.....	38
<b>21 Replacing the fan.....</b>	<b>39</b>
Procedure.....	39
<b>22 Removing the speakers.....</b>	<b>40</b>
Prerequisites.....	40
Procedure.....	40
<b>23 Replacing the speakers.....</b>	<b>41</b>
Procedure.....	41
Post-requisites.....	41
<b>24 Removing the I/O board.....</b>	<b>42</b>
Prerequisites.....	42
Procedure.....	42
<b>25 Replacing the I/O board.....</b>	<b>43</b>
Procedure.....	43
Post-requisites.....	43

<b>26 Removing the power-adapter port.....</b>	<b>44</b>
Procedure.....	44
<b>27 Replacing the power-adapter port.....</b>	<b>45</b>
Procedure.....	45
<b>28 Removing the wireless card.....</b>	<b>46</b>
Prerequisites.....	46
Procedure.....	46
<b>29 Replacing the wireless card.....</b>	<b>48</b>
Procedure.....	48
Post-requisites.....	48
<b>30 Removing the display assembly.....</b>	<b>49</b>
Prerequisites.....	49
Procedure.....	49
<b>31 Replacing the display assembly.....</b>	<b>51</b>
Procedure.....	51
Post-requisites.....	52
<b>32 Removing the display back-cover and antenna assembly.....</b>	<b>53</b>
Prerequisites.....	53
Procedure.....	53
<b>33 Replacing the display back-cover and antenna assembly.....</b>	<b>55</b>
Procedure.....	55
Post-requisites.....	56
<b>34 Removing the display hinges.....</b>	<b>57</b>
Prerequisites.....	57
Procedure.....	57
<b>35 Replacing the display hinges.....</b>	<b>58</b>
Procedure.....	58
Post-requisites.....	58
<b>36 Removing the camera.....</b>	<b>59</b>
Prerequisites.....	59
Procedure.....	59
<b>37 Replacing the camera.....</b>	<b>60</b>
Procedure.....	60
Post-requisites.....	60
<b>38 Removing the display cable.....</b>	<b>61</b>

Prerequisites.....	61
Procedure.....	61
<b>39 Replacing the display cable.....</b>	<b>62</b>
Procedure.....	62
Post-requisites.....	62
<b>40 Removing the display panel.....</b>	<b>63</b>
Prerequisites.....	63
Procedure.....	63
<b>41 Replacing the display panel.....</b>	<b>64</b>
Procedure.....	64
Post-requisites.....	64
<b>42 Removing the system board.....</b>	<b>65</b>
Prerequisites.....	65
Procedure.....	65
<b>43 Replacing the system board.....</b>	<b>68</b>
Procedure.....	68
Post-requisites.....	69
<b>44 Removing the touchpad.....</b>	<b>71</b>
Prerequisites.....	71
Procedure.....	71
<b>45 Replacing the touchpad.....</b>	<b>73</b>
Procedure.....	73
Post-requisites.....	74
<b>46 Removing the palm-rest and keyboard assembly.....</b>	<b>75</b>
Prerequisites.....	75
Procedure.....	75
<b>47 Replacing the palm-rest and keyboard assembly.....</b>	<b>76</b>
Procedure.....	76
Post-requisites.....	76
<b>48 Device drivers.....</b>	<b>78</b>
Intel Chipset Software Installation Utility.....	78
Video drivers.....	78
Intel Serial IO driver.....	78
Intel Serial IO driver.....	78
Intel Trusted Execution Engine Interface.....	78
Intel Virtual Button driver.....	78
Wireless and Bluetooth drivers.....	78

<b>49 System setup.....</b>	<b>79</b>
Boot Sequence.....	79
Navigation keys.....	79
BIOS overview.....	79
Entering BIOS setup program.....	80
System setup options.....	80
Clearing CMOS settings.....	84
Clearing BIOS (System Setup) and System passwords.....	84
<b>50 Troubleshooting.....</b>	<b>85</b>
Flashing the BIOS.....	85
Flashing BIOS (USB key).....	85
Enhanced Pre-Boot System Assessment (ePSA) diagnostics.....	85
Running the ePSA diagnostics.....	86
Diagnostics.....	86
Enabling Intel Optane memory.....	87
Disabling Intel Optane memory.....	87
WiFi power cycle.....	87
Flea power release.....	87
<b>51 Getting help and contacting Dell.....</b>	<b>88</b>

# 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

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.

## After working inside your computer

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

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.

## Safety instructions

Use the following safety guidelines to protect your computer from potential damage and ensure your personal safety.

-  **NOTE:** Before working inside your computer, read the safety information that 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).
-  **NOTE:** Disconnect all power sources before opening the computer cover or panels. After you finish working inside the computer, replace all covers, panels, and screws before connecting to the electrical outlet.
-  **CAUTION:** To avoid damaging the computer, ensure that the work surface is flat and clean.
-  **CAUTION:** To avoid damaging the components and cards, handle them by their edges, and avoid touching pins and 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 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 on its connector or on its pull tab, not on the cable itself. Some cables have connectors with locking tabs or thumb-screws that you must disengage before disconnecting the cable. When disconnecting cables, keep them evenly aligned to avoid bending any connector pins. When connecting cables, ensure that the ports and connectors are correctly oriented and aligned.
-  **CAUTION:** Press and eject any installed card from the media-card reader.

## 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.

## Lifting equipment

Adhere to the following guidelines when lifting heavy weight equipment:

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

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

## Recommended tools

The procedures in this document may require the following tools:

- Philips screwdriver #1
- Flat-head screwdriver
- Plastic scribe

## Screw list

**Table 1. Screw list**

Component	Secured to	Screw type	Quantity	Screw image
Base cover	Palm-rest and keyboard assembly	M2x6	6	
Battery	Palm-rest and keyboard assembly	M2x3	4	
Hard-drive assembly	Palm-rest and keyboard assembly	M2x3	4	
Hard-drive bracket	Hard drive	M3x3	4	
Solid-state drive	Palm-rest and keyboard assembly	M2x2 Big Head	1	
I/O board	Palm-rest and keyboard assembly	M2x3	1	
Fan	Palm-rest and keyboard assembly	M2x3	2	
Wireless card	System board	M2x3	1	
Power-adaptor port	Palm-rest and keyboard assembly	M2x3	1	
System board	Palm-rest and keyboard assembly	M2x2 Big Head	4	
Touchpad bracket	Palm-rest and keyboard assembly	M2x2 Big Head	3	
Touchpad	Palm-rest and keyboard assembly	M2x2 Big Head	4	
Display assembly	Palm-rest and keyboard assembly	M2.5x4	6	
Display assembly	Palm-rest and keyboard assembly	M2x3	2	
Display hinges	Display back-cover and antenna assembly	M2.5x2.5 Big Head	6	
Display hinges	Display back-cover and antenna assembly	M2x3	2	

## Removing the base cover

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

### Procedure

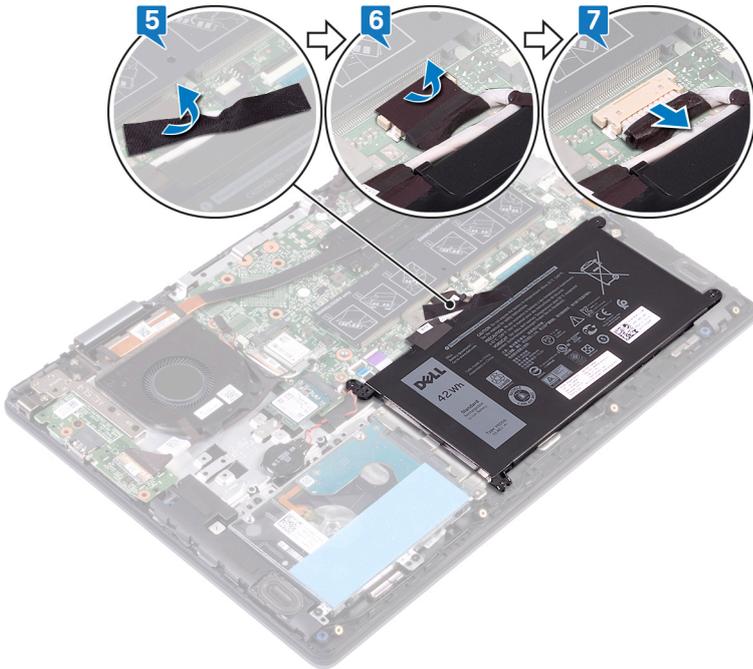
1. Remove the six screws (M2.5x6) that secure the base cover to the palm-rest and keyboard assembly.
2. Loosen the three captive screws that secure the base cover to the palm-rest and keyboard assembly.



3. Using your fingertips, pry the base cover off the palm-rest and keyboard assembly from the top left corner.
4. Lift the base cover off the palm-rest and keyboard assembly.



5. Peel off the tape that secures the battery cable to the battery.
6. Peel the tape that secures the battery cable to the battery-cable connector.
7. Disconnect the battery cable from the system board.



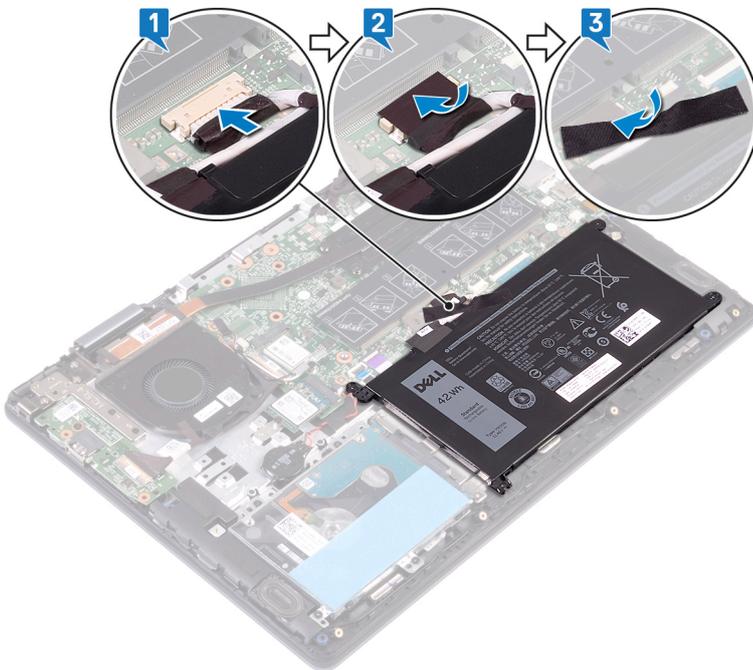
8. Turn the computer over, open the display, then press and hold the power button for 15 seconds to ground the system board.

# Replacing the base cover

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Procedure

1. Close the display and turn the computer over. Connect the battery cable to the system board.
2. Adhere the tape that secures the battery cable to the battery-cable connector.
3. Adhere the tape that secures the battery cable to the battery.



4. Align the tabs on the base cover with the slots on the palm-rest and keyboard assembly and snap the base cover into place.



5. Tighten the three captive screws that secure the base cover to the palm-rest and keyboard assembly.
6. Replace the six screws (M2.5x6) that secure the base cover to the palm-rest and keyboard assembly.



# Removing the battery

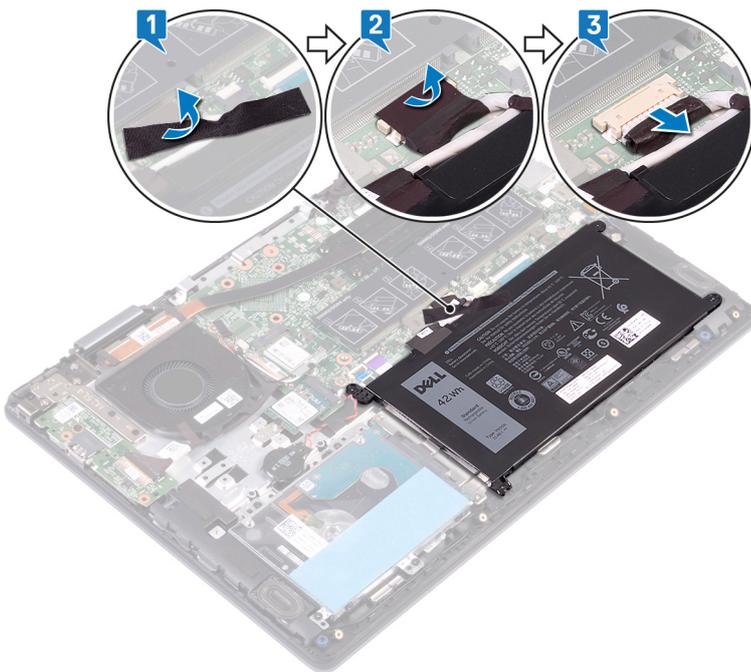
**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

## Prerequisites

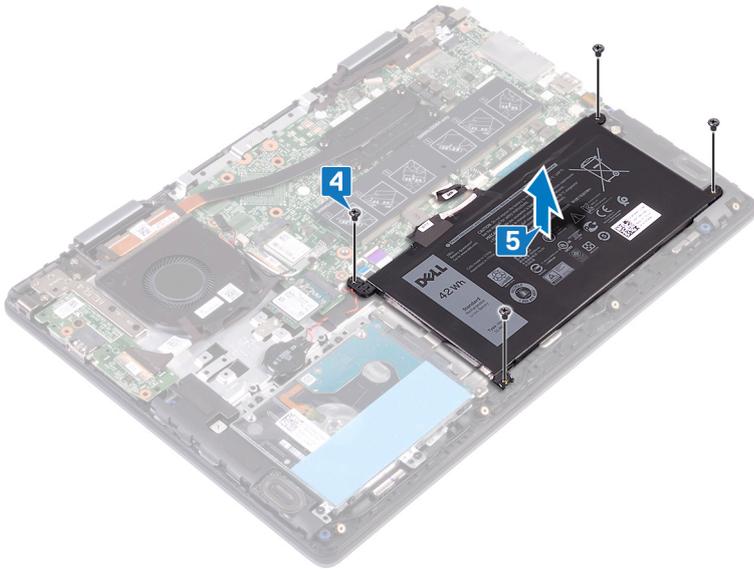
Remove the [base cover](#).

## Procedure

1. Peel off the tape that secures the battery cable to the battery.
2. Peel the tape that secures the battery cable to the battery-cable connector.
3. Disconnect the battery cable from the system board.



4. Remove the four screws (M2x3) that secure the battery to the palm-rest and keyboard assembly.
5. Lift the battery off the palm-rest and keyboard assembly.

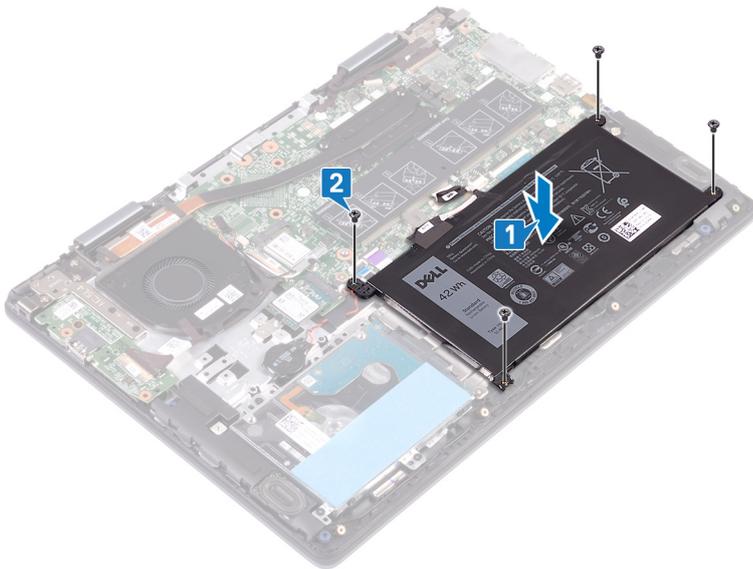


# Replacing the battery

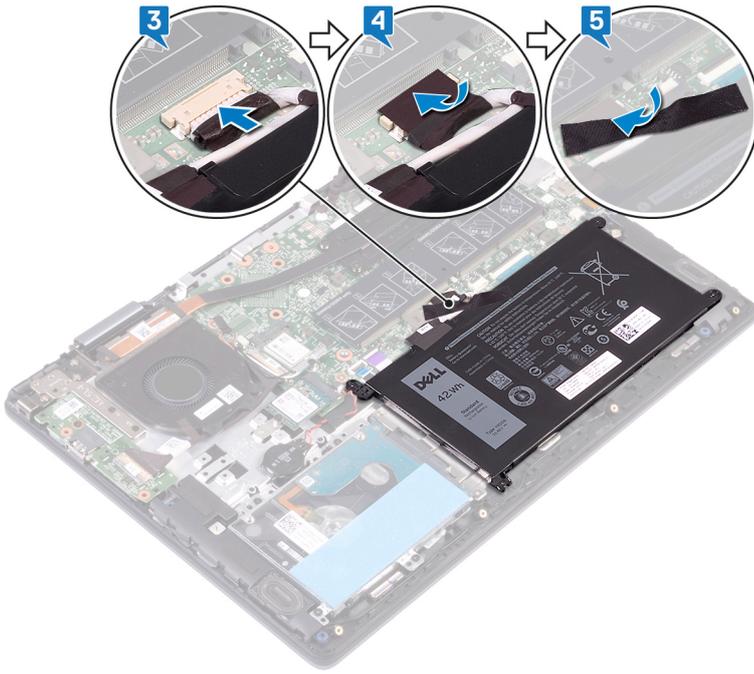
**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

## Procedure

1. Align the screw holes on the battery with the screw holes on the palm-rest and keyboard assembly.
2. Replace the four screws (M2x3) that secure the battery to the palm-rest and keyboard assembly.



3. Connect the battery cable to the system board.
4. Adhere the tape that secures the battery cable to the battery-cable connector.
5. Adhere the tape that secures the battery cable to the battery.



## Post-requisites

Replace the [base cover](#).

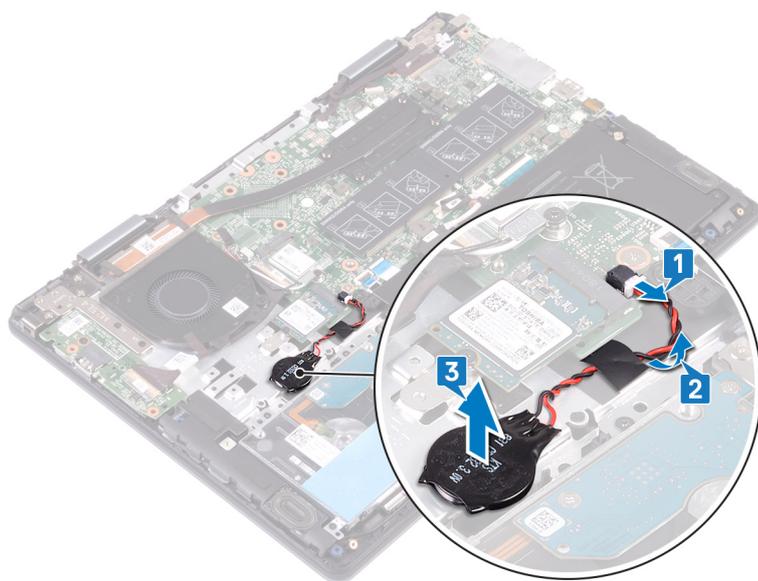
## Removing the coin-cell battery

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

**CAUTION:** Removing the coin-cell battery resets the BIOS setup program's settings to default. It is recommended that you note the BIOS setup program's settings before removing the coin-cell battery.

### Procedure

1. Disconnect the coin-cell battery cable from the system board.
2. Remove the coin-cell battery cable from the routing guides on the palm-rest and keyboard assembly.
3. Peel the coin-cell battery off the palm-rest and keyboard assembly.

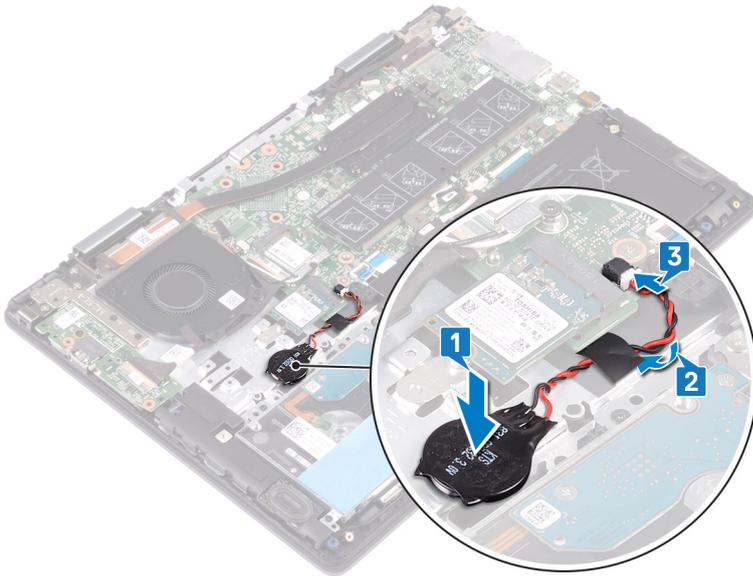


# Replacing the coin-cell battery

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Procedure

1. Adhere the coin-cell battery to the palm-rest and keyboard assembly.
2. Route the coin-cell battery cable through the routing guides on the palm-rest and keyboard assembly.
3. Connect the coin-cell battery cable to the system board.



# Removing the memory modules

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Removing the wireless card

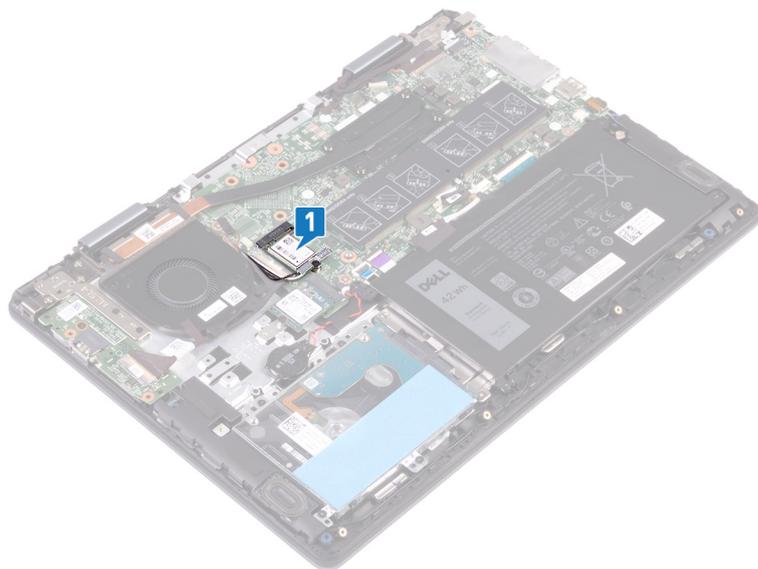
**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

## Prerequisites

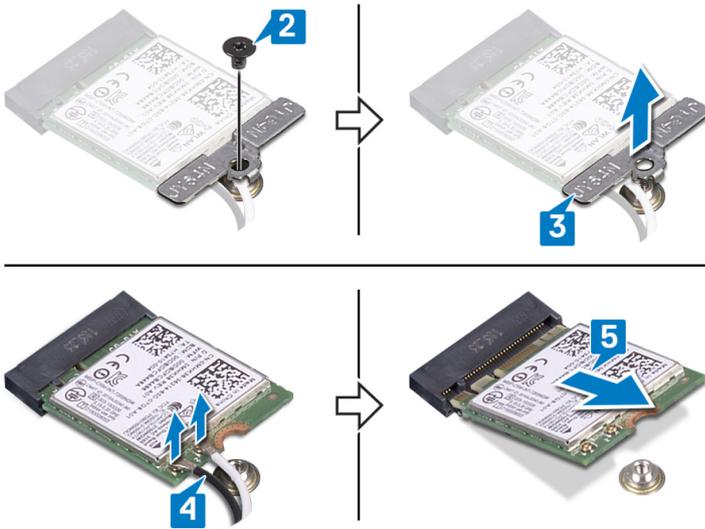
Remove the [base cover](#).

## Procedure

1. Locate the wireless card on the system board.

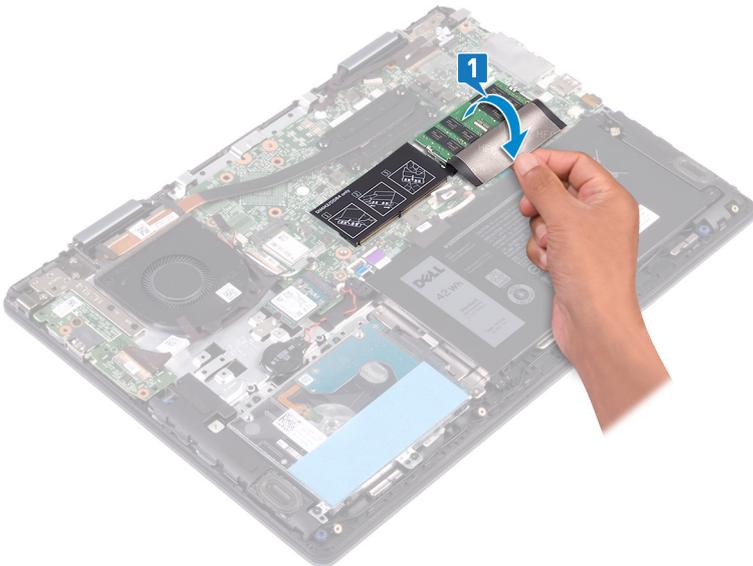


2. Remove the screw (M2x3) that secures the wireless-card bracket and wireless card to the system board.
3. Lift the wireless-card bracket off the wireless card.
4. Disconnect the antenna cables from the wireless card.
5. Slide and remove the wireless card from the wireless-card slot.

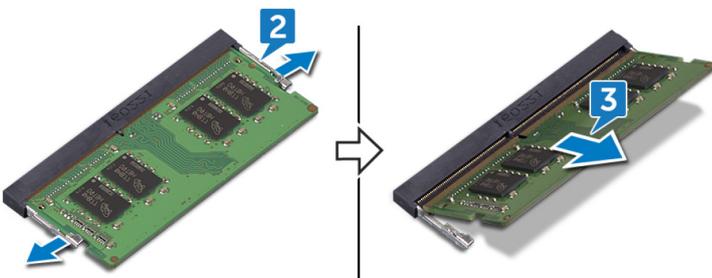


## Procedure

1. Locate the memory module on the system board and lift the mylar that covers the memory modules.



2. Use your fingertips to carefully spread apart the securing-clips on each end of the memory-module slot until the memory module pops up.
3. Remove the memory module from the memory-module slot.

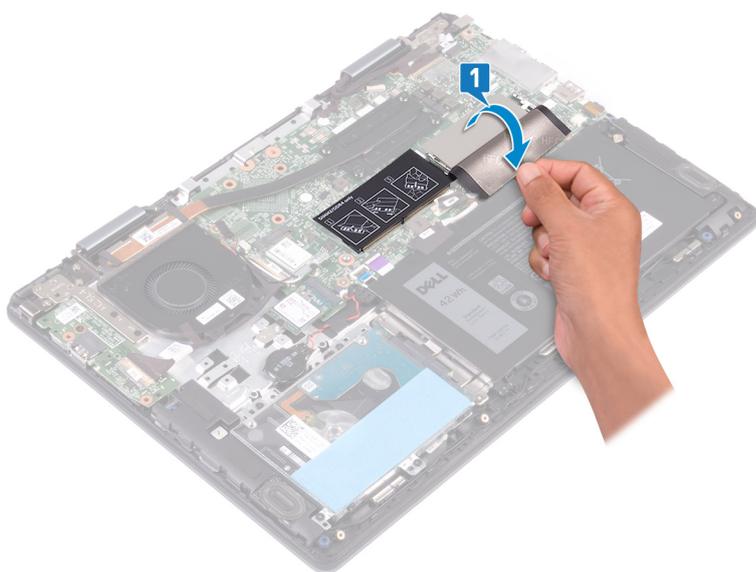


# Replacing the memory modules

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

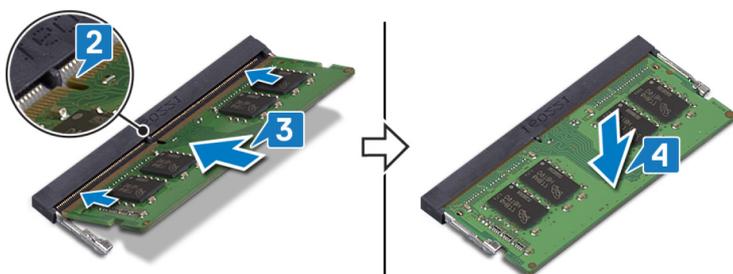
## Procedure

1. Locate the memory modules on the system board and lift the mylar that covers the memory modules.

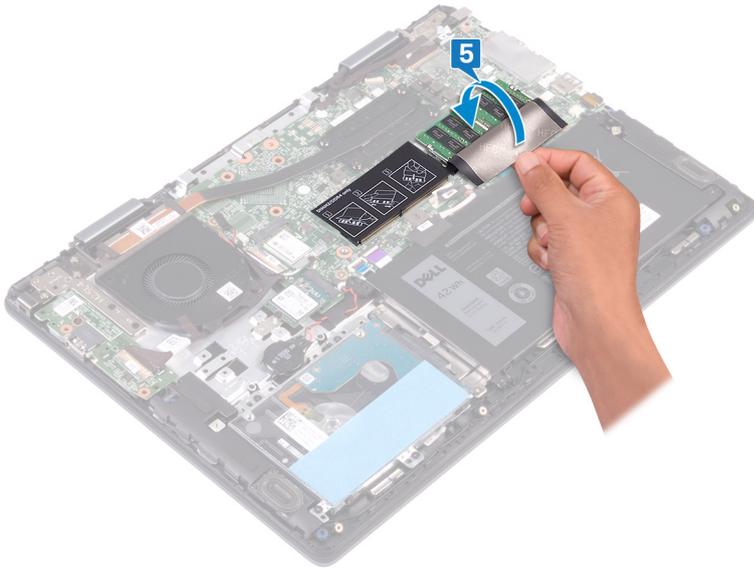


2. Align the notch on the memory module with the tab on the memory-module slot.
3. Slide the memory module firmly into the slot at an angle.
4. Press the memory module down until it clicks into place.

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



5. Release the mylar that covers the memory modules on the system board.



## Replacing the wireless card

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

### Procedure

**CAUTION:** To avoid damage to the wireless card, do not place any cables under it.

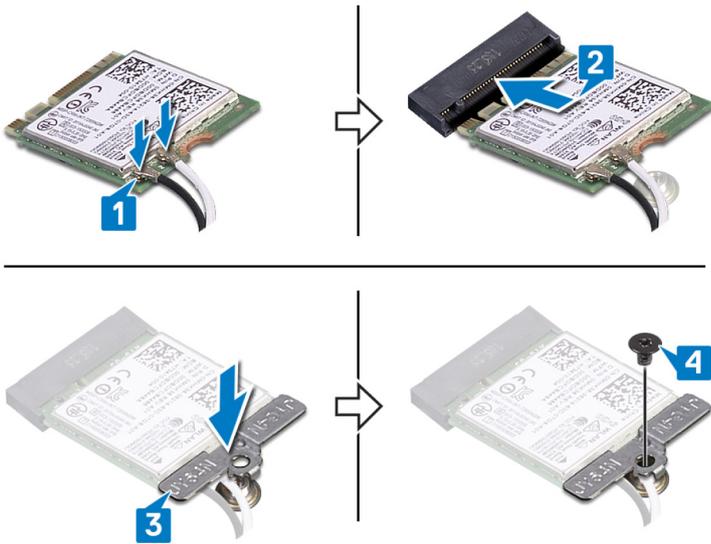
1. Connect the antenna cables to the wireless card.
2. Align the notch on the wireless card with the tab on the wireless-card slot and slide the wireless card at an angle into the wireless-card slot.

The following table provides the antenna-cable color scheme for the wireless card supported by your computer.

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

Connectors on the wireless card	Antenna-cable color
Main (white triangle)	White
Auxiliary (black triangle)	Black

3. Align the screw hole on the wireless-card bracket with the screw hole on the wireless card and the system board.
4. Replace the screw (M2x3) that secures the wireless-card bracket and wireless card to the system board.



## Post-requisites

Replace the [base cover](#).

# Removing the solid-state drive/Intel Optane memory module

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

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

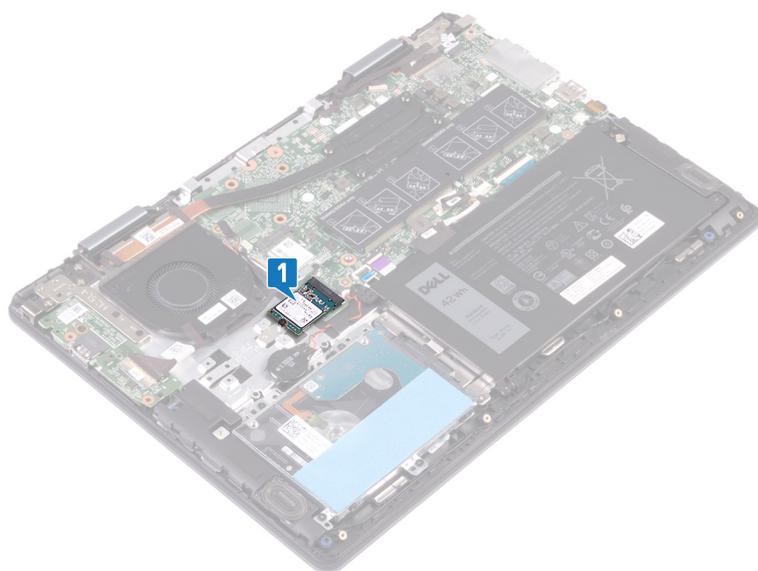
## Prerequisites

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

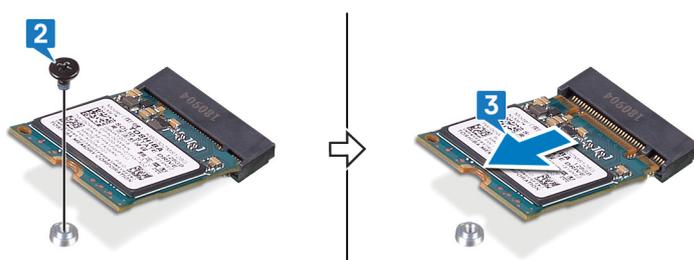
Remove the [base cover](#).

## Procedure

1. Locate the solid-state drive/Intel Optane memory module on the system board.



2. Remove the screw (M2x2) that secures the solid-state drive/Intel Optane memory module to the palm-rest and keyboard assembly.
3. Slide and remove the solid-state drive/Intel Optane memory module from the solid-state drive/Intel Optane memory module slot.



# Replacing the solid-state drive/Intel Optane memory module

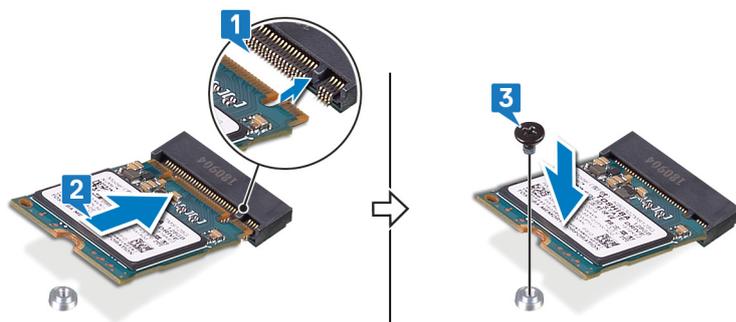
Enable the Intel Optane memory after you replace the Intel Optane memory module. For more information about enabling the Intel Optane memory, see [Enabling Intel Optane memory](#).

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

**CAUTION:** Solid-state drives are fragile. Exercise care when handling the solid-state drive.

## Procedure

1. Align the notch on the solid-state drive/Intel Optane memory module with the tab on the solid-state drive/Intel Optane memory module slot.
2. Slide the solid-state drive/Intel Optane memory module firmly into the solid-state drive/Intel Optane memory module slot at an angle.
3. Press the other end of the solid-state drive/Intel Optane memory module and replace the screw (M2x2) that secures the solid-state drive/Intel Optane memory module to the palm-rest and keyboard assembly.



## Post-requisites

Replace the [base cover](#).

**CAUTION:** Enable the Intel Optane memory after you replace the Intel Optane memory module. For more information about enabling the Intel Optane memory, see [Enabling Intel Optane memory](#).

## Removing the hard drive

If your computer is using a SATA storage device accelerated by Intel Optane memory, disable Intel Optane before removing the SATA storage device. For more information about disabling the Intel Optane, see [Disabling Intel Optane](#).

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

**CAUTION:** Hard drives are fragile. Exercise care when handling the hard drive.

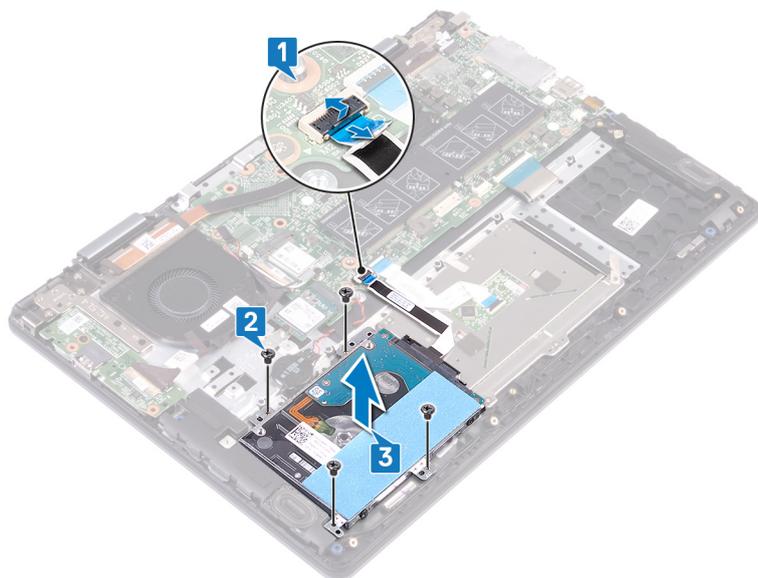
**CAUTION:** To avoid data loss, do not remove the hard drive while the computer is in sleep or on state.

### Prerequisites

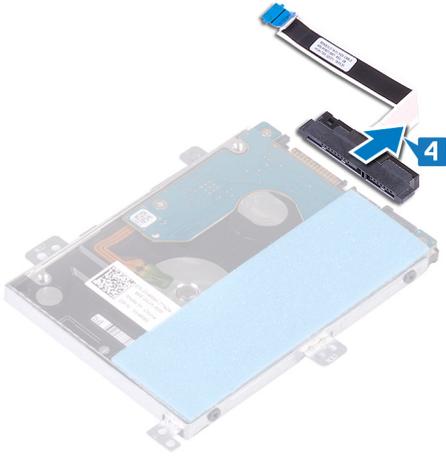
1. Remove the [base cover](#).
2. Remove the [battery](#).

### Procedure

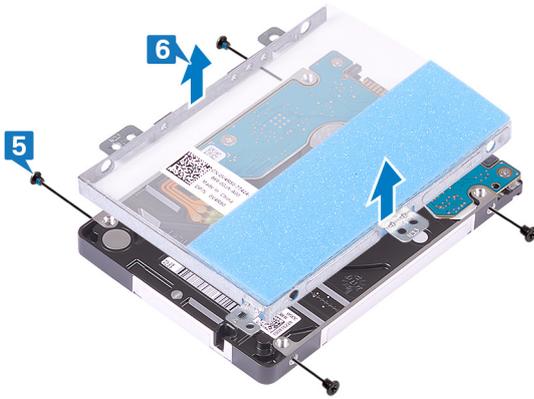
1. Open the latch, and disconnect the hard-drive cable from the system board.
2. Remove the four screws (M2x3) that secure the hard-drive assembly to the palm-rest and keyboard assembly.
3. Lift the hard-drive assembly along with its cable off the palm-rest and keyboard assembly.



4. Disconnect the interposer from the hard-drive assembly.



5. Remove the four screws (M3x3) that secure the hard-drive bracket to the hard drive.
6. Remove the hard-drive bracket off the hard drive.



# Replacing the hard drive

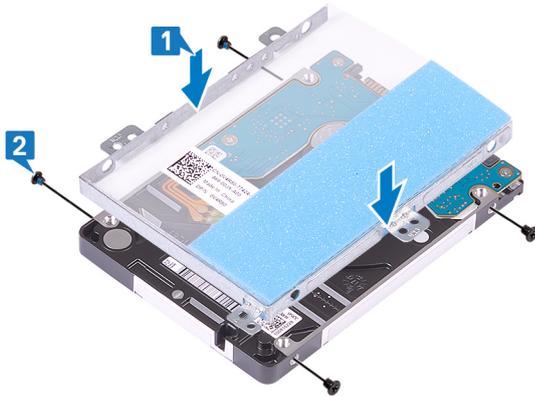
Enable Intel Optane after replacing the SATA storage. For more information about enabling the Intel Optane, see [Enabling Intel Optane](#).

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

**CAUTION:** Hard drives are fragile. Exercise care when handling the hard drive.

## Procedure

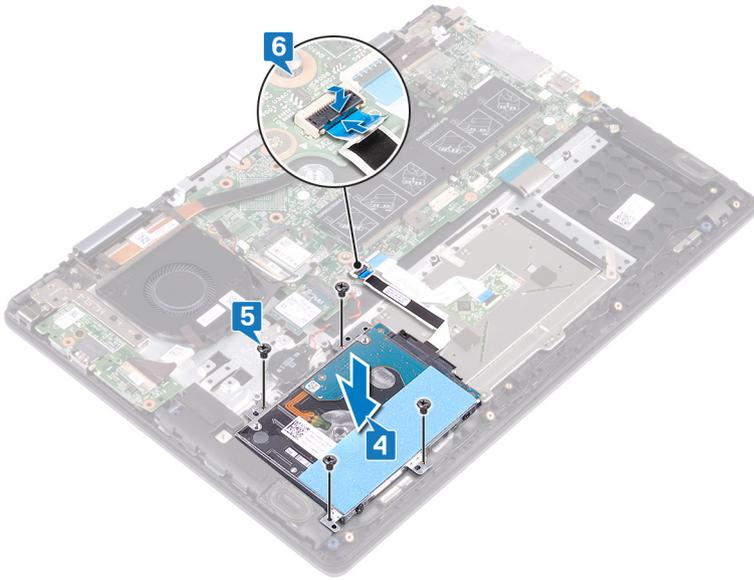
1. Align the screw holes on the hard-drive bracket with the screw holes on the hard drive.
2. Replace the four screws (M3x3) that secure the hard-drive bracket to the hard drive.



3. Connect the interposer to the hard-drive assembly.



4. Align the screw holes on the hard-drive assembly with the screw holes on the palm-rest and keyboard assembly.
5. Replace the four screws (M2x3) that secure the hard-drive assembly to the palm-rest and keyboard assembly.
6. Connect the hard-drive cable to the connector on the system board.



## Post-requisites

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

## Removing the heat sink

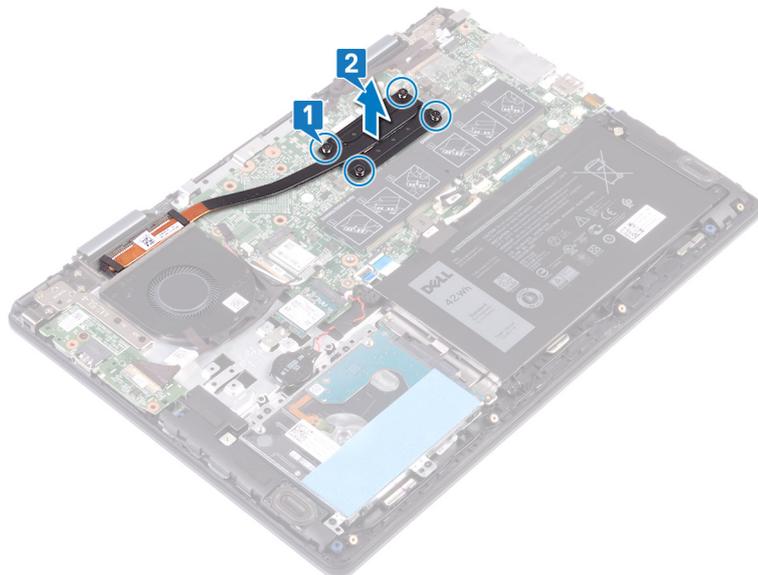
- NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).
- NOTE:** The heat sink may become hot during normal operation. Allow sufficient time for the heat sink to cool before you touch it.
- CAUTION:** For maximum cooling of the processor, do not touch the heat transfer areas on the heat sink. The oils in your skin can reduce the heat transfer capability of the thermal grease.

### Prerequisites

Remove the [base cover](#).

### Procedure

- In reverse order (as indicated on the heat-sink), loosen the four captive screws that secure the heat sink to the system board.  
**NOTE:** The number of screws may vary depending on the configuration ordered.
- Lift the heat sink off the system board.



## Replacing the heat sink

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

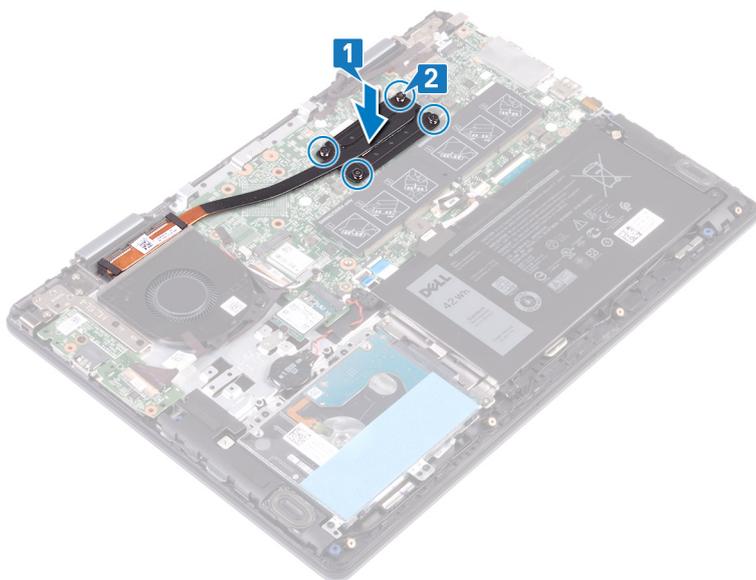
**CAUTION:** Incorrect alignment of the heat sink can damage the system board and processor.

**NOTE:** If either the system board or the heat sink is replaced, use the thermal pad provided in the kit to ensure that thermal conductivity is achieved.

### Procedure

1. Align the screw holes on the heat sink with the screw holes on the system board.
2. In sequential order (as indicated on the heat-sink), tighten the four captive screws that secure the heat sink to the system board.

**NOTE:** The number of screws may vary depending on the configuration ordered.



### Post-requisites

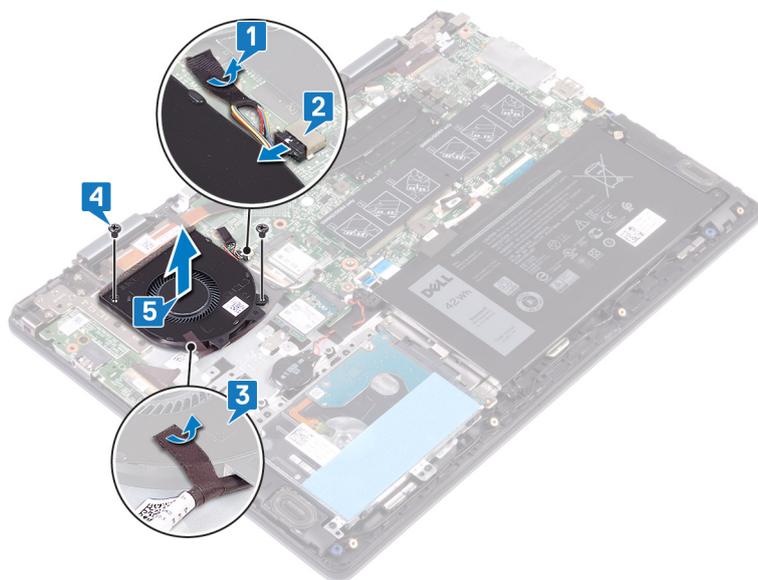
Replace the [base cover](#).

## Removing the fan

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

### Procedure

1. Peel off the tape that secures the fan cable to the system board.
2. Disconnect the fan cable from the system board.
3. Peel off the tape that secures the I/O-board cable to the fan.
4. Remove the two screws (M2x3) that secure the fan to the palm-rest and keyboard assembly.
5. Lift the fan off the palm-rest and keyboard assembly.

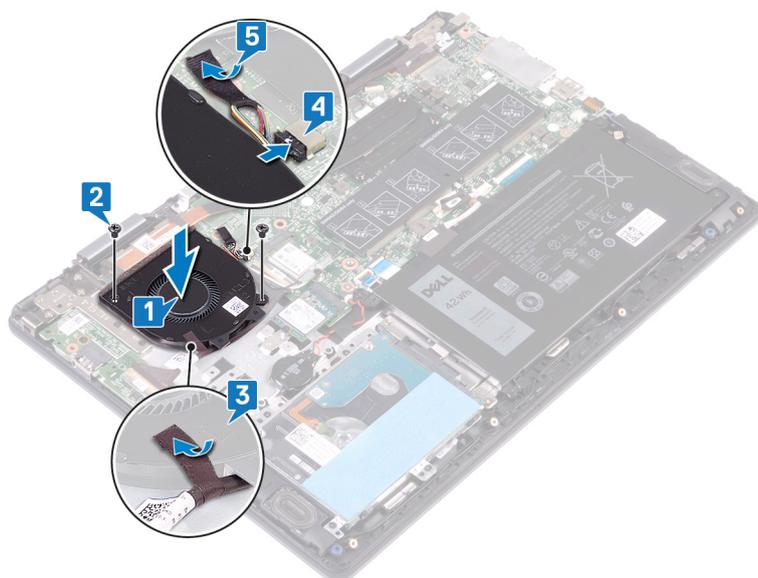


## Replacing the fan

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

### Procedure

1. Align the screw holes on the fan with the screw holes on the palm-rest and keyboard assembly.
2. Replace the two screws (M2x3) securing the fan to the palm-rest and keyboard assembly.
3. Adhere the tape that secures the I/O-board cable to the fan.
4. Connect the fan cable to the system board.
5. Adhere the tape that secures the fan cable to the system board.



# Removing the speakers

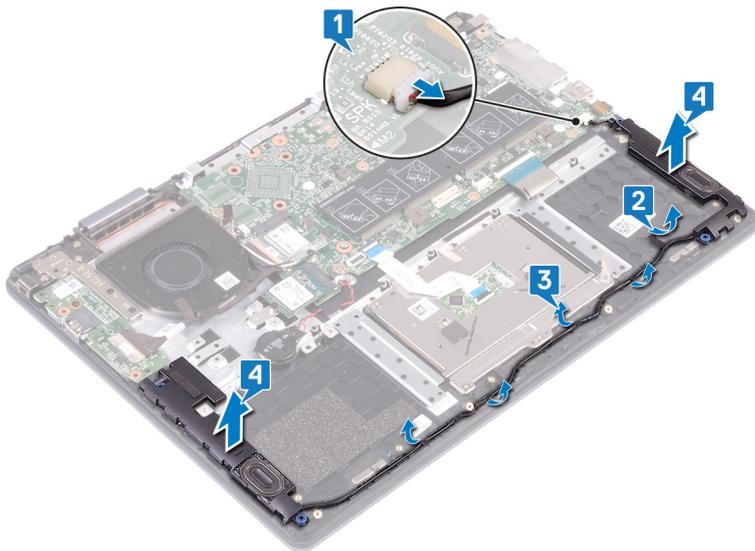
**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

## Prerequisites

Remove the [base cover](#).

## Procedure

1. Disconnect the speaker cable from the system board.
2. Peel off the tape that secures the speaker cable to the palm-rest and keyboard assembly.
3. Note the cable routing, and remove the speaker cable from the routing guides on the palm-rest and keyboard assembly.
4. Remove the speakers, along with the cable from the palm-rest and keyboard assembly.

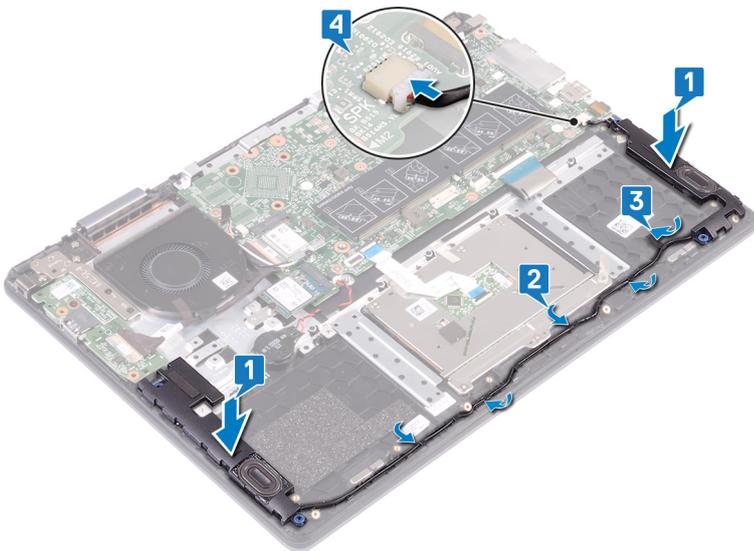


# Replacing the speakers

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Procedure

1. Using the alignment posts, align and place the speakers on the palm-rest and keyboard assembly.  
**NOTE:** Replace the rubber grommets if they are pushed up while replacing the speakers.
2. Route the speaker cable through the routing guides on the palm-rest and keyboard assembly.
3. Adhere the tape that secures the speaker cable to the palm-rest and keyboard assembly.
4. Connect the speaker cable to the system board.



## Post-requisites

Replace the [base cover](#).

# Removing the I/O board

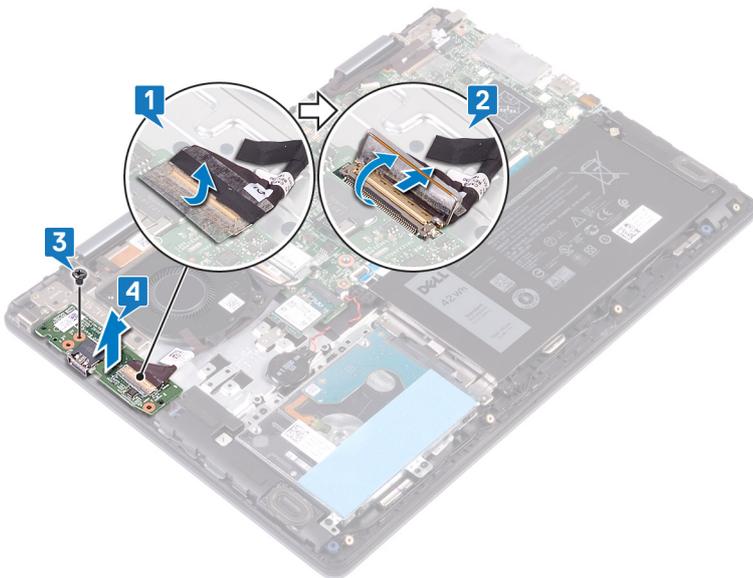
**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

## Prerequisites

Remove the [base cover](#).

## Procedure

1. Peel off the tape that secures the I/O-board cable to the I/O board.
2. Open the latch, and disconnect the I/O-board cable from the I/O board.
3. Remove the screw (M2x3) that secures the I/O board to the palm-rest and keyboard assembly.
4. Lift the I/O board off the palm-rest and keyboard assembly.

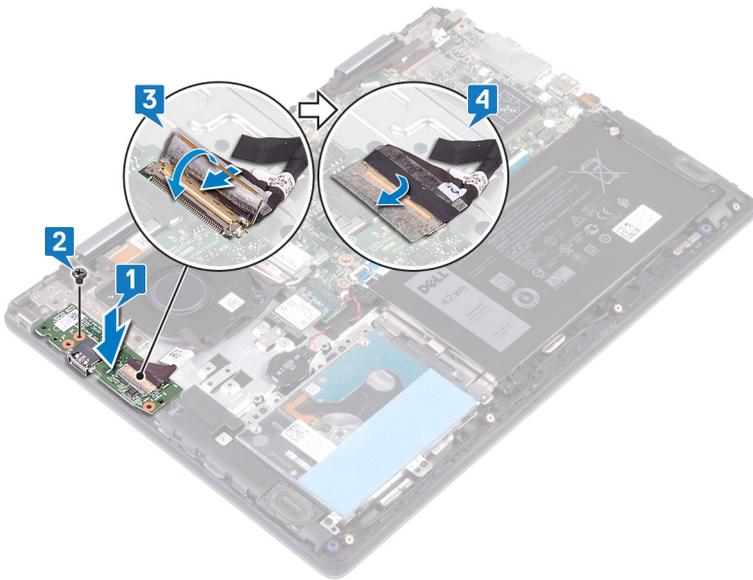


# Replacing the I/O board

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Procedure

1. Place the I/O board on the palm-rest and keyboard assembly, and then align the screw holes on the I/O board with the screw holes on the palm-rest and keyboard assembly.
2. Replace the screw (M2x3) that secures the I/O board to the palm-rest and keyboard assembly.
3. Slide the I/O-board cable into the connector on the I/O board and close the latch to secure the cable.
4. Adhere the tape that secures the I/O-board cable to the I/O board.



## Post-requisites

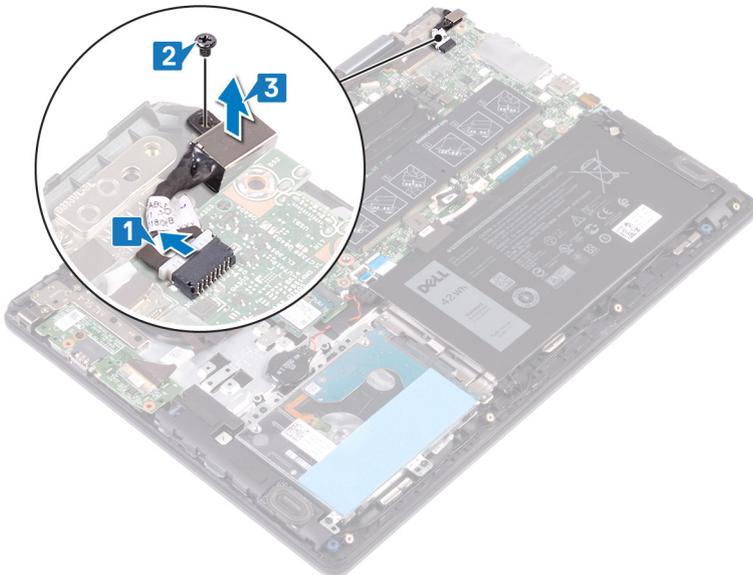
Replace the [base cover](#).

## Removing the power-adapter port

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

### Procedure

1. Disconnect the power-adapter port cable from the system board.
2. Remove the screw (M2x3) that secures the power-adapter port to the palm-rest and keyboard assembly.
3. Lift the power-adapter port along with its cable off the palm-rest and keyboard assembly.

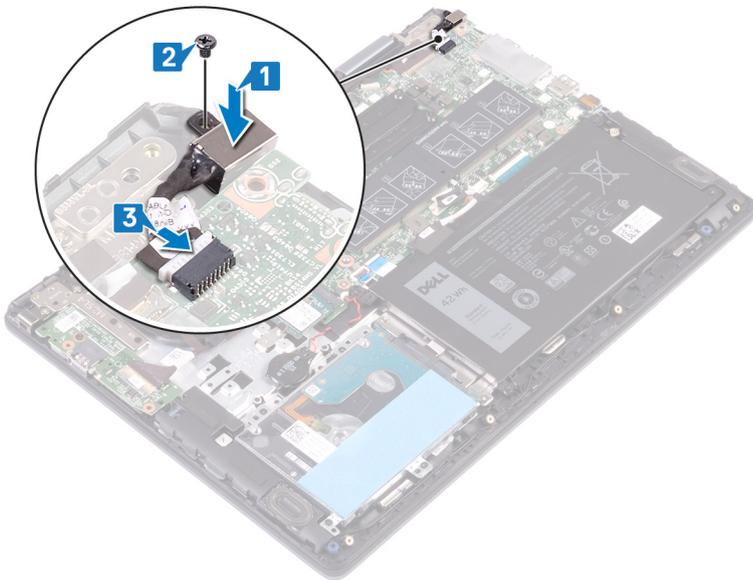


# Replacing the power-adapter port

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Procedure

1. Place the power-adapter port into the slot on the palm-rest and keyboard assembly, and then align the screw hole on the power-adapter port with the screw hole on the palm-rest and keyboard assembly.
2. Replace the screw (M2x3) that secures the power-adapter port to the palm-rest and keyboard assembly.
3. Connect the power-adapter port cable to the system board.



# Removing the wireless card

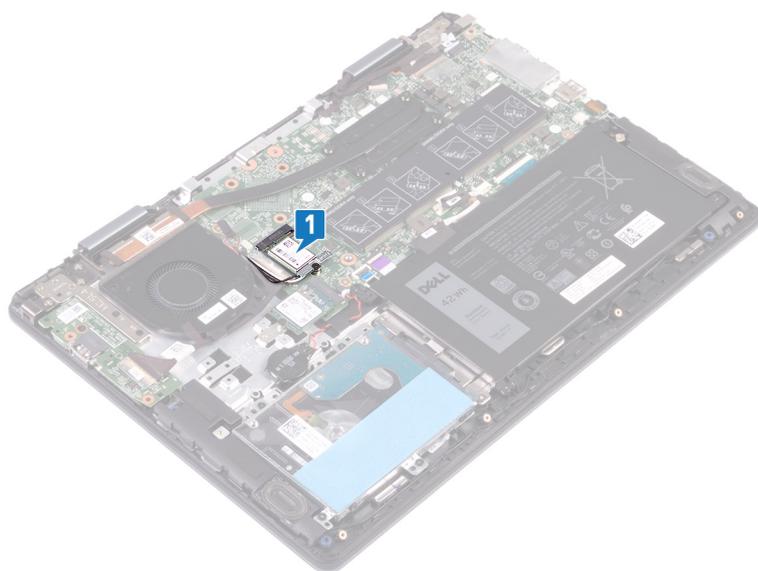
**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

## Prerequisites

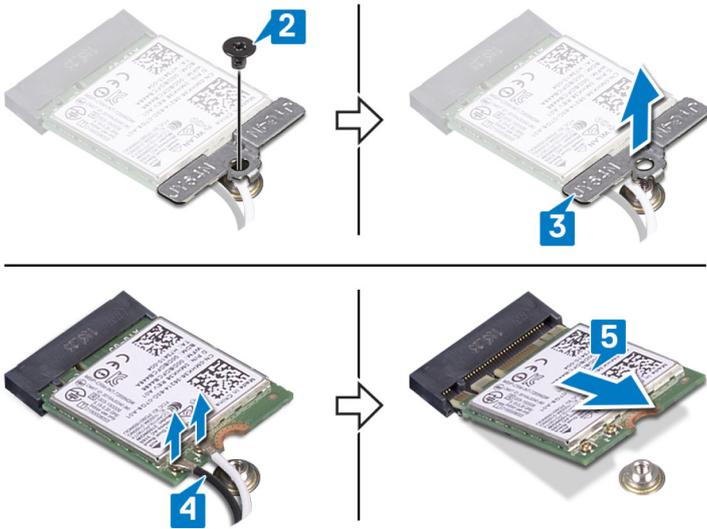
Remove the [base cover](#).

## Procedure

1. Locate the wireless card on the system board.



2. Remove the screw (M2x3) that secures the wireless-card bracket and wireless card to the system board.
3. Lift the wireless-card bracket off the wireless card.
4. Disconnect the antenna cables from the wireless card.
5. Slide and remove the wireless card from the wireless-card slot.



# Replacing the wireless card

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Procedure

**CAUTION:** To avoid damage to the wireless card, do not place any cables under it.

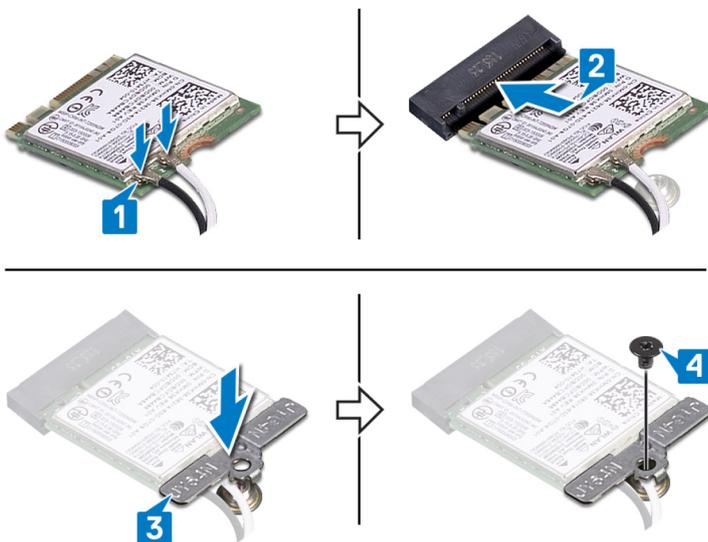
1. Connect the antenna cables to the wireless card.
2. Align the notch on the wireless card with the tab on the wireless-card slot and slide the wireless card at an angle into the wireless-card slot.

The following table provides the antenna-cable color scheme for the wireless card supported by your computer.

**Table 3. Antenna-cable color scheme**

Connectors on the wireless card	Antenna-cable color
Main (white triangle)	White
Auxiliary (black triangle)	Black

3. Align the screw hole on the wireless-card bracket with the screw hole on the wireless card and the system board.
4. Replace the screw (M2x3) that secures the wireless-card bracket and wireless card to the system board.



## Post-requisites

Replace the [base cover](#).

## Removing the display assembly

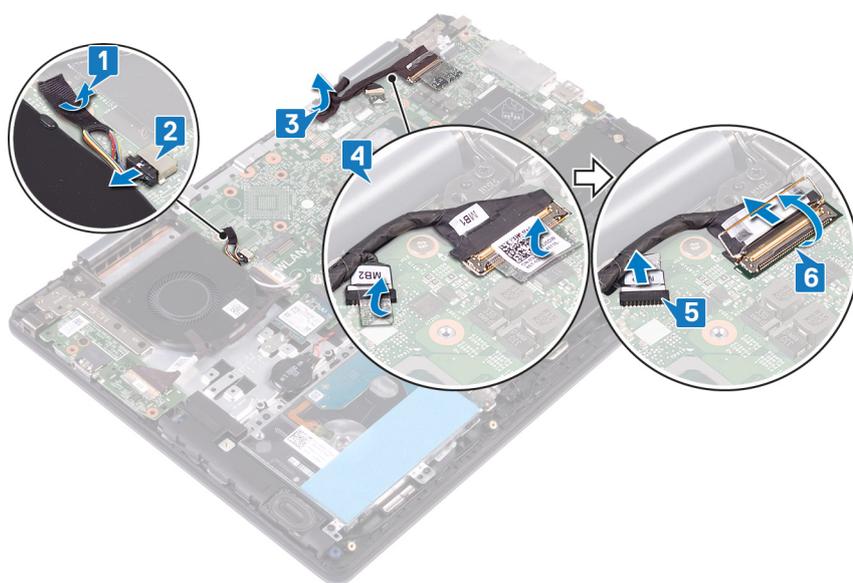
**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

### Prerequisites

1. Remove the [base cover](#).
2. Remove the [wireless card](#).

### Procedure

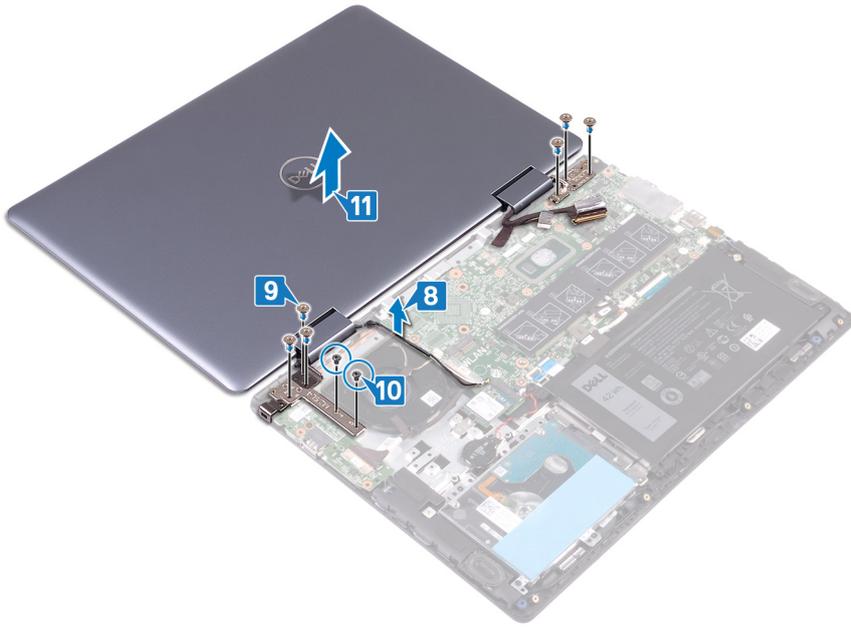
1. Peel off the tape that secures the fan cable to the system board.
2. Disconnect the fan cable from the system board.
3. Peel off the tape that secures the touchscreen cable and the display cable to the system board.
4. Peel off the tape that secures the touchscreen cable and the display cable to their respective connectors on the system board.
5. Open the latch, and disconnect the touchscreen cable from the system board.
6. Open the latch, and disconnect the display cable from the system board.



7. Turn the computer over, and open the display as far as possible. Then place the computer face down on a flat surface.

**CAUTION:** Place the computer on a soft and clean surface to avoid scratching the display.

8. Remove the antenna cables from the routing guides on the palm-rest and keyboard assembly.
9. Remove the six screws (M2.5x4) that secure the display assembly to the palm-rest and keyboard assembly.
10. Remove the two screws (M2x3) that secure the display assembly to the palm-rest and keyboard assembly.
11. Gently lift the display assembly off the palm-rest and keyboard assembly.



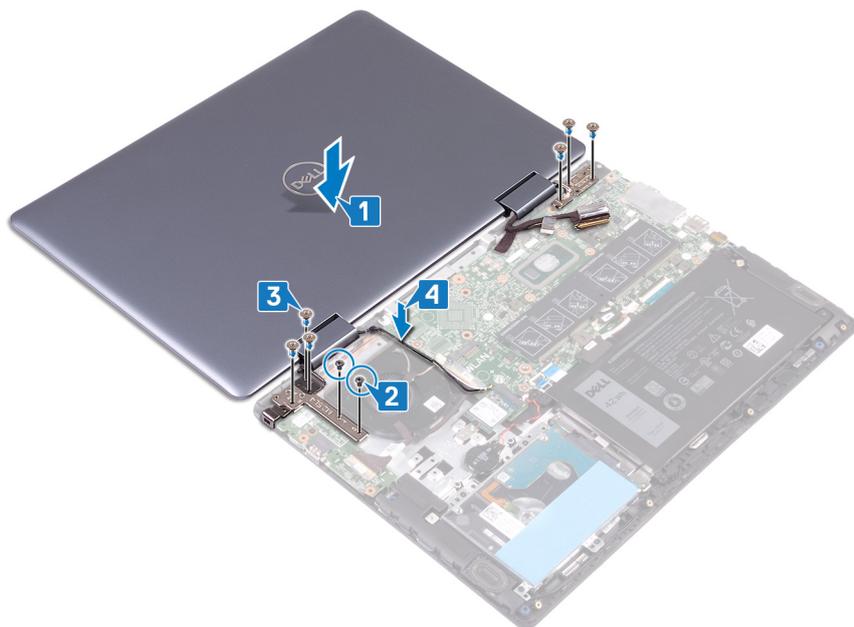
# Replacing the display assembly

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in **Before working inside your computer**. After working inside your computer, follow the instructions in **After working inside 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).

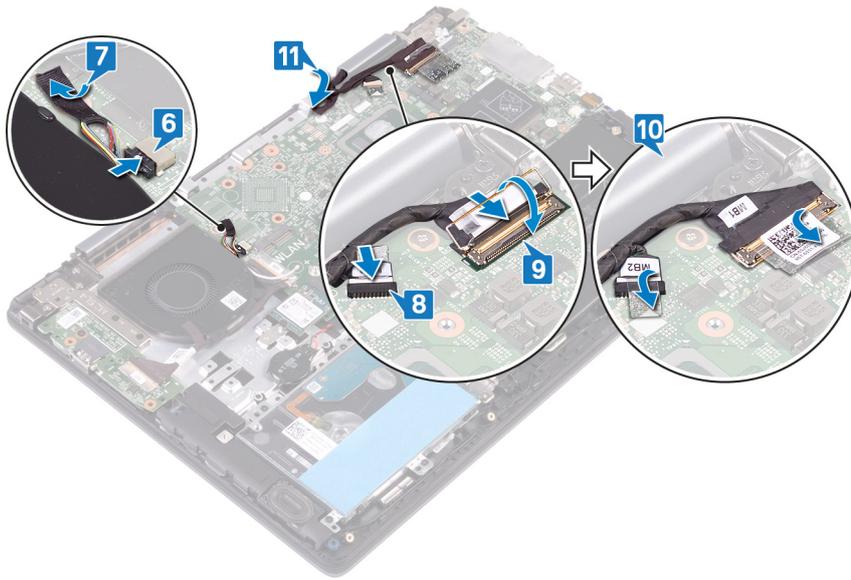
## Procedure

**CAUTION:** Place the computer on a soft and clean surface to avoid scratching the display.

1. Align the screw holes on the display assembly with the screw holes on the palm-rest and keyboard assembly.
2. Replace the two screws (M2x3) that secure the display assembly to the palm-rest and keyboard assembly.
3. Replace the six screws (M2.5x4) that secure the display assembly to the palm-rest and keyboard assembly.
4. Route the antenna cables through the routing guides on the palm-rest and keyboard assembly.



5. Close the display, and turn the computer over.
6. Connect the fan cable to the system board.
7. Adhere the tape that secures the fan cable to the system board.
8. Slide the touchscreen cable into the slot on the system board and close the latch to secure the cable.
9. Slide the display cable into the slot on the system board and close the latch to secure the cable.
10. Adhere the tape that secures the touchscreen cable to the system board.
11. Adhere the tape that secures the display cable to the system board.



## Post-requisites

1. Replace the [wireless card](#).
2. Replace the [base cover](#).

# Removing the display back-cover and antenna assembly

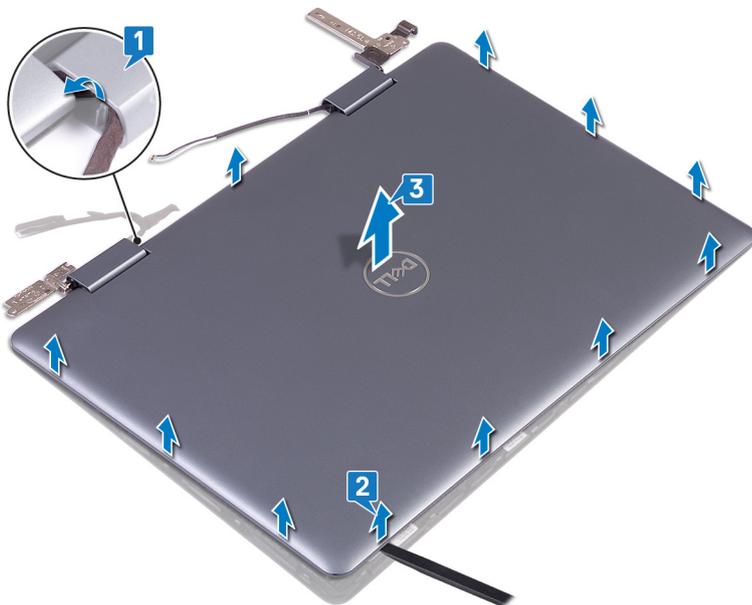
**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

## Prerequisites

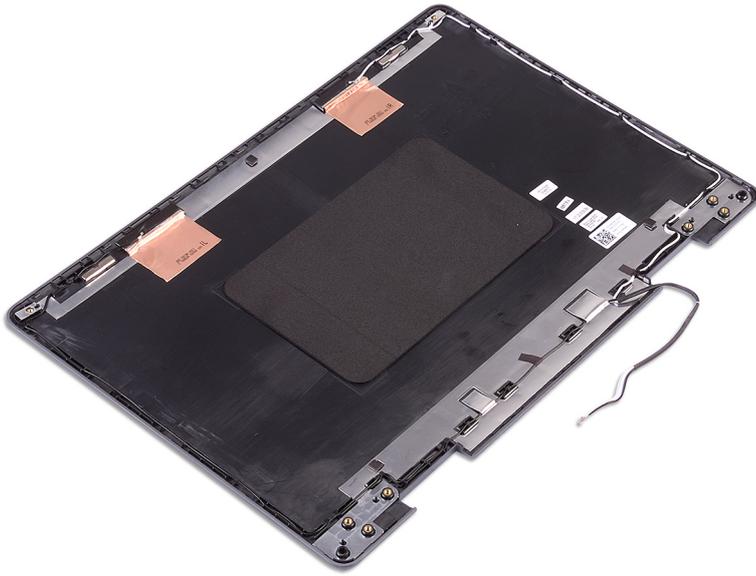
1. Remove the [base cover](#).
2. Remove the [battery](#).
3. Remove the [wireless card](#).
4. Remove the [display assembly](#).

## Procedure

1. Remove the display cable and touchscreen-board cable from the routing guide on the display hinge.
2. Using a plastic scribe, pry up the display back-cover and antenna assembly from the corner to release the tabs from the slots on the display panel.
3. Lift the display back-cover and antenna assembly off the display panel.



4. Turn the display back-cover and antenna assembly over.
5. Remove the [display hinges](#).
6. After performing all the above steps, you are left with the display back-cover and antenna assembly.

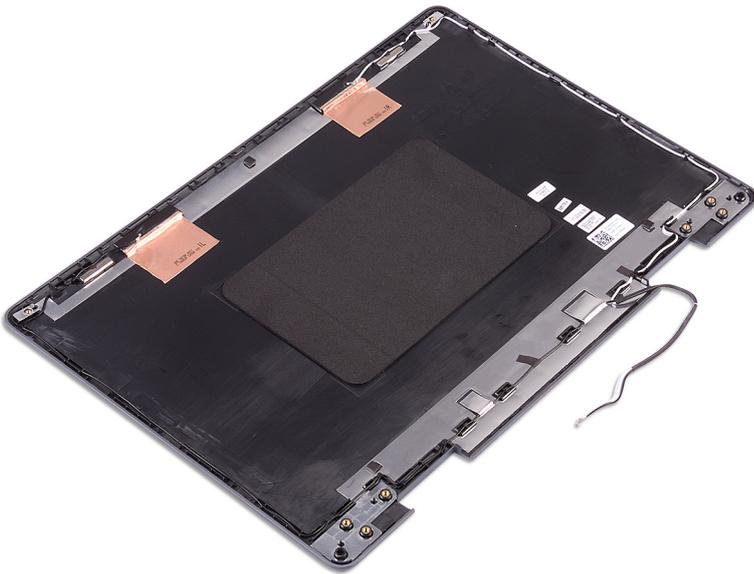


# Replacing the display back-cover and antenna assembly

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Procedure

1. Place the display back-cover and antenna assembly on a clean and flat surface.



2. Replace the [display hinges](#).
3. Place the display panel on to the display back-cover and antenna assembly.
4. Snap the display panel into place.
5. Route the display cable and touchscreen-board cable through the routing guide on the display hinge.



## Post-requisites

1. Replace the [display assembly](#).
2. Replace the [wireless card](#).
3. Replace the [battery](#).
4. Replace the [base cover](#).

# Removing the display hinges

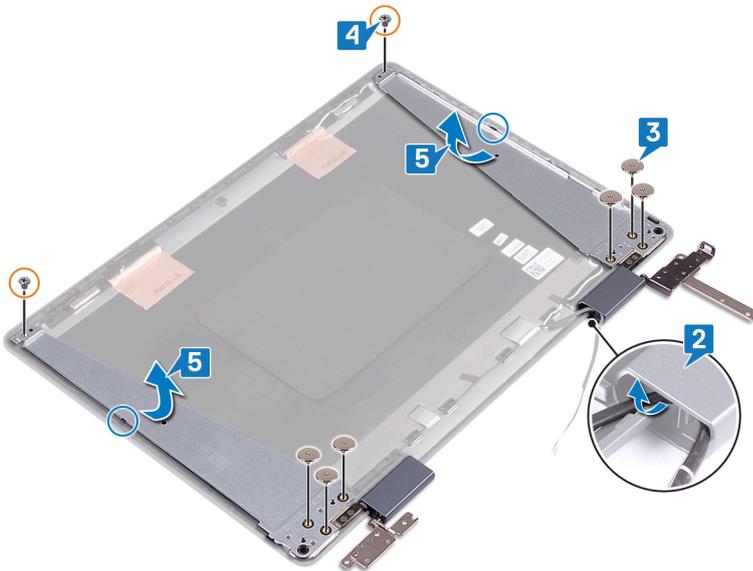
**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

## Prerequisites

1. Remove the [base cover](#).
2. Remove the [battery](#).
3. Remove the [wireless card](#).
4. Remove the [display assembly](#).
5. Follow the procedure from step 1 to step 3 in "[Removing the display back-cover and antenna assembly](#)".

## Procedure

1. Place the display-back cover and antenna assembly on a flat surface.
2. Remove the antenna cables from the routing guide on the display hinge.
3. Remove the six screws (M2.5x2.5) that secure the display hinges to the display back-cover and antenna assembly.
4. Remove the two screws (M2x3) that secure the display hinges to the display back-cover and antenna assembly.
5. Lift the display hinges off the display back-cover and antenna assembly.

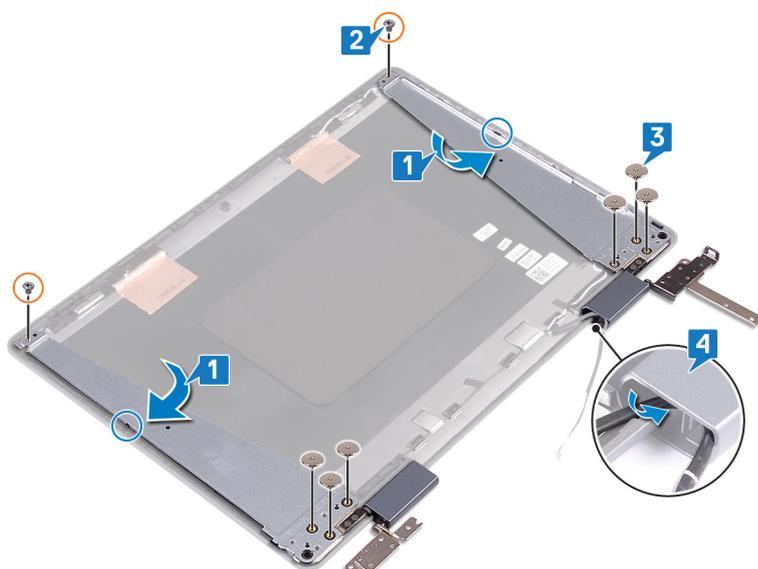


# Replacing the display hinges

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Procedure

1. Align the screw holes on the display hinges with the screw holes on the display back-cover and antenna assembly.
2. Replace the two screws (M2x3) that secure the display hinges to the display back-cover and antenna assembly.
3. Replace the six screws (M2.5x2.5) that secure the display hinges to the display back-cover and antenna assembly.
4. Route the antenna cables through the routing guide on the display hinge and secure it in place.



## Post-requisites

1. Follow the procedure from step 3 to step 5 in "[Replacing the display back-cover and antenna assembly](#)".
2. Replace the [display assembly](#).
3. Replace the [wireless card](#).
4. Replace the [battery](#).
5. Replace the [base cover](#).

## Removing the camera

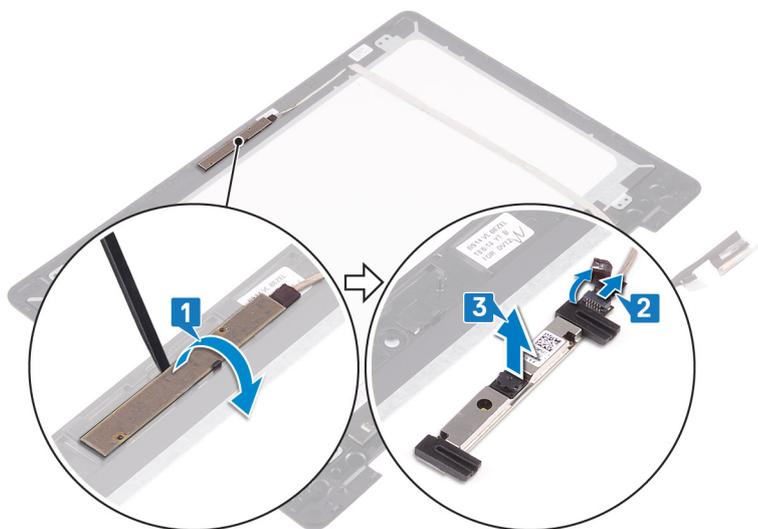
**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

### Prerequisites

1. Remove the [base cover](#).
2. Remove the [battery](#).
3. Remove the [wireless card](#).
4. Remove the [display assembly](#).
5. Follow the procedure from step 1 to step 3 in "[Removing the display back-cover and antenna assembly](#)".

### Procedure

1. Using a plastic scribe, pry up the camera module and turn it over.
2. Peel off the tape that secures the camera cable to the camera module and disconnect the camera cable from the camera module.
3. Lift the camera module off the display panel.



# Replacing the camera

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Procedure

1. Slide the camera cable into the connector on the camera module and adhere the tape that secures the camera cable to the camera module.
2. Using the alignment post, adhere the camera module on the display panel.



## Post-requisites

1. Follow the procedure from step 3 to step 5 in "[Replacing the display back-cover and antenna assembly](#)".
2. Replace the [display assembly](#).
3. Replace the [wireless card](#).
4. Replace the [battery](#).
5. Replace the [base cover](#).

# Removing the display cable

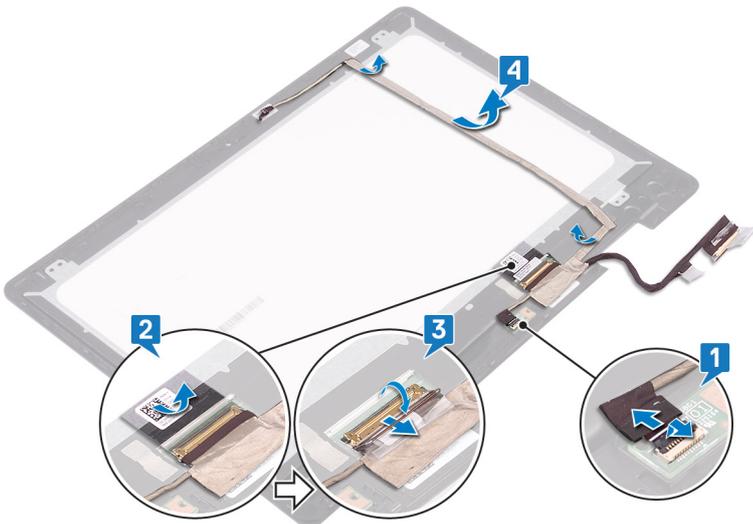
**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

## Prerequisites

1. Remove the [base cover](#).
2. Remove the [battery](#).
3. Remove the [wireless card](#).
4. Remove the [display assembly](#).
5. Follow the procedure from step 1 to step 3 in "[Removing the display back-cover and antenna assembly](#)".
6. Remove the [camera](#).

## Procedure

1. Disconnect the camera cable from the display panel.
2. Peel off the tape that secures the display cable to the display panel.
3. Open the latch, and disconnect the display cable.
4. Lift the display cable off the display panel.

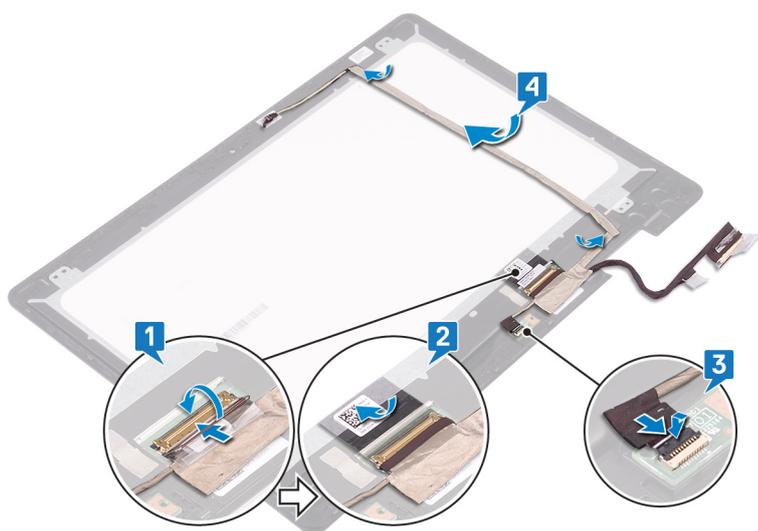


## Replacing the display cable

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

### Procedure

1. Slide the display cable into the connector and close the latch to secure the cable.
2. Adhere the cable tape that secures the display cable to the display panel.
3. Connect the camera cable to the display panel.
4. Adhere the camera cable on the display panel.



### Post-requisites

1. Replace the [camera](#).
2. Follow the procedure from step 3 to step 5 in "[Replacing the display back-cover and antenna assembly](#)".
3. Replace the [display assembly](#).
4. Replace the [wireless card](#).
5. Replace the [battery](#).
6. Replace the [base cover](#).

# Removing the display panel

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Prerequisites

1. Remove the [base cover](#).
2. Remove the [battery](#).
3. Remove the [wireless card](#).
4. Remove the [display assembly](#).
5. Follow the procedure from step 1 to step 3 in "[Removing the display back-cover and antenna assembly](#)".
6. Remove the [camera](#).
7. Remove the [display cable](#).

## Procedure

After performing the steps in prerequisites, we are left with the display panel.



# Replacing the display panel

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Procedure

Place the display panel on a clean and flat surface.



## Post-requisites

1. Replace the [display cable](#).
2. Replace the [camera](#).
3. Follow the procedure from step 3 to step 5 in "[Replacing the display back-cover and antenna assembly](#)".
4. Replace the [display assembly](#).
5. Replace the [wireless card](#).
6. Replace the [battery](#).
7. Replace the [base cover](#).

# Removing the system board

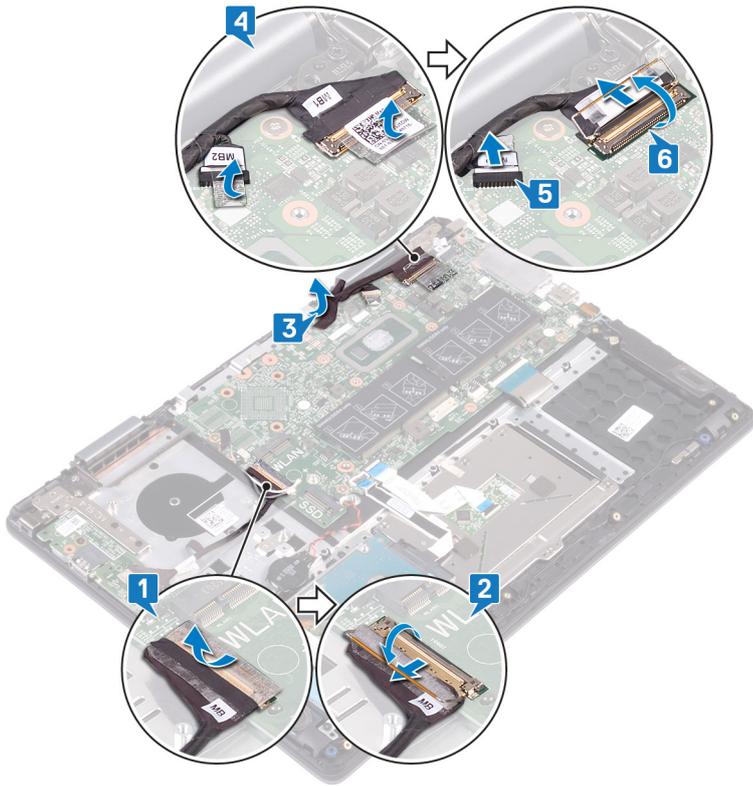
- NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).
- NOTE:** Your computer's Service Tag is stored in the system board. You must enter the Service Tag in the BIOS setup program after you replace the system board.
- NOTE:** Replacing the system board removes any changes you have made to the BIOS using the BIOS setup program. You must make the appropriate changes again after you replace the system board.
- NOTE:** Before disconnecting the cables from the system board, note the location of the connectors so that you can reconnect the cables correctly after you replace the system board.

## Prerequisites

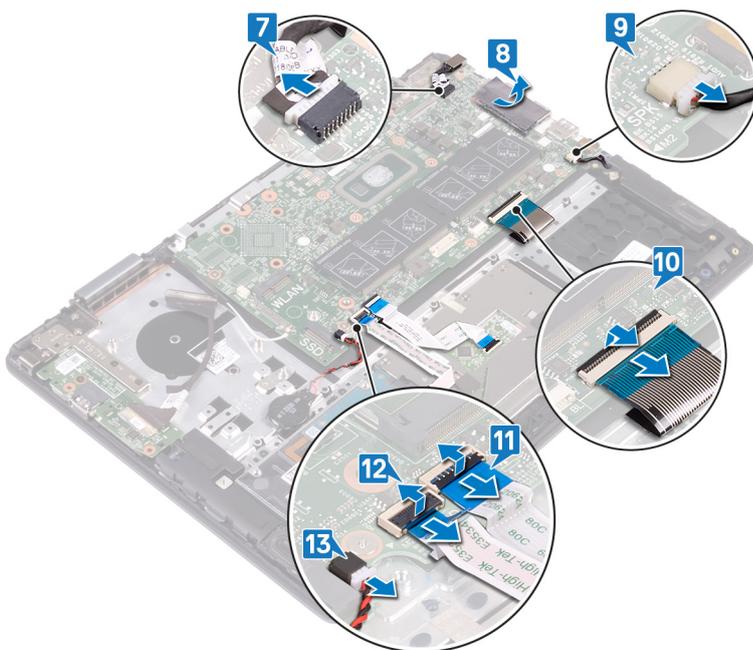
1. Remove the [base cover](#).
2. Remove the [battery](#).
3. Remove the [memory modules](#).
4. Remove the [coin-cell battery](#).
5. Remove the [solid-state drive/Intel Optane memory module](#).
6. Remove the [fan](#).
7. Remove the [heat sink](#).
8. Remove the [wireless card](#).

## Procedure

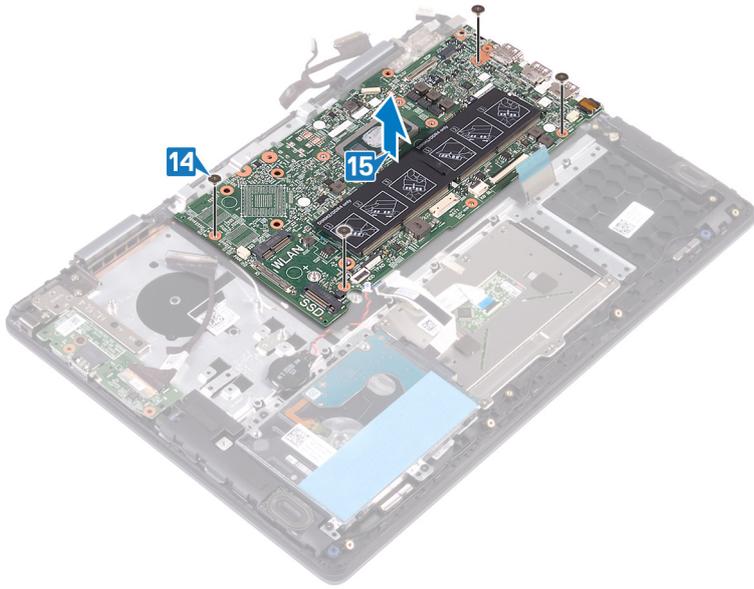
1. Peel off the tape that secures the I/O-board cable to the system board.
2. Open the latch, and disconnect the I/O-board cable from the system board.
3. Remove the touch-screen board cable and the display cable from the routing guides on the palm-rest and keyboard assembly.
4. Peel off the tapes that secure the display cable and touch-screen board cable to the system board.
5. Disconnect the touch-screen board cable from the system board.
6. Open the latches, and disconnect the display cable from the system board.



7. Disconnect the power-adaptor port cable from the system board.
8. Peel off the tape that covers the USB ports on the system board.
9. Disconnect the speaker cable from the system board.
10. Open the latch, and disconnect the keyboard cable from the system board.
11. Open the latch, and disconnect the touchpad cable from the system board.
12. Open the latch, and disconnect the hard-drive cable from the system board.
13. Disconnect the coin-cell battery cable from the system board.



14. Remove the four screws (M2x2) that secure the system board to the palm-rest and keyboard assembly.
15. Lift the system board off the palm-rest and keyboard assembly.

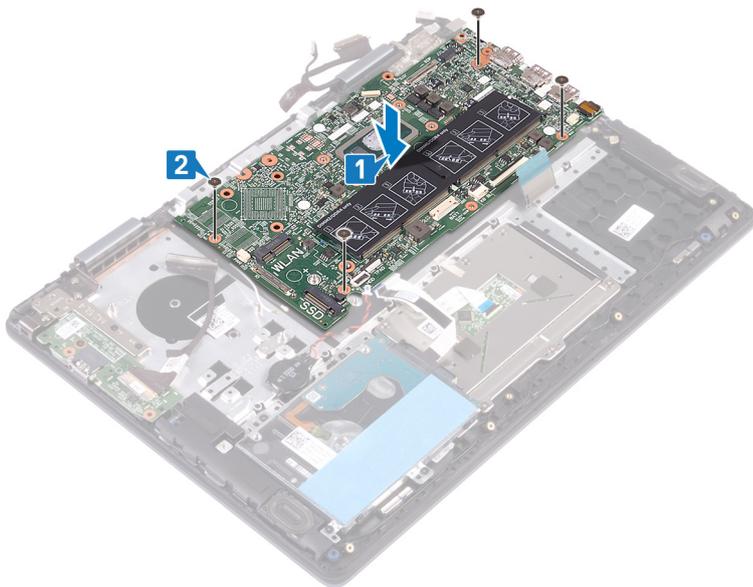


# Replacing the system board

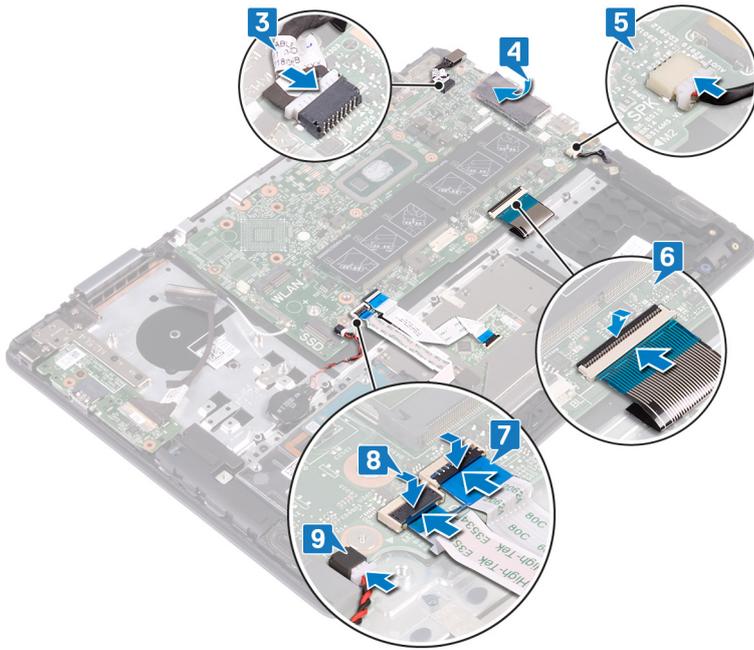
- NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).
- NOTE:** Your computer's Service Tag is stored in the system board. You must enter the Service Tag in the BIOS setup program after you replace the system board.
- NOTE:** Replacing the system board removes any changes you have made to the BIOS using the BIOS setup program. You must make the appropriate changes again after you replace the system board.

## Procedure

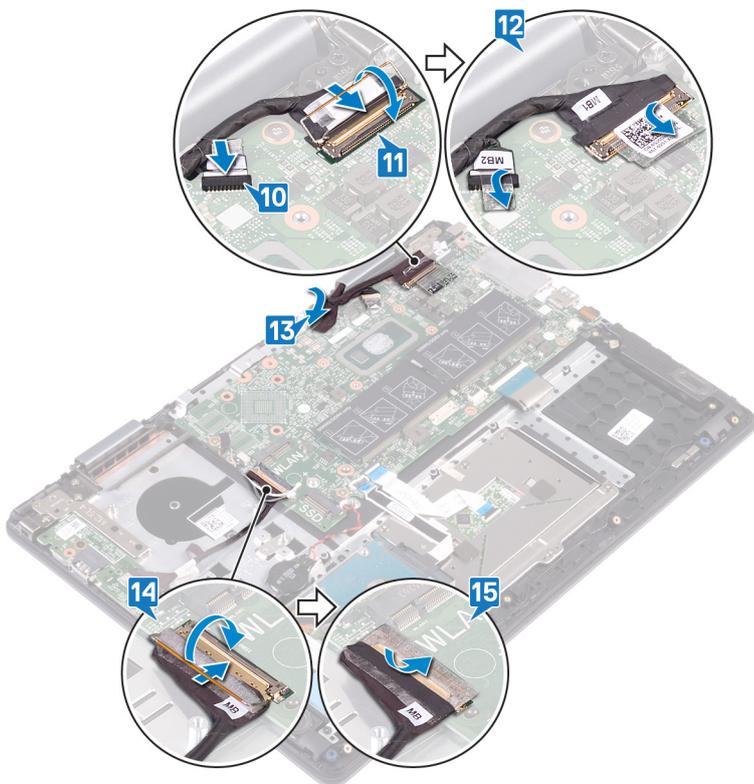
1. Align the screw holes on the system board with the screw holes on the palm-rest and keyboard assembly.
2. Replace the four screws (M2x2) that secure the system board to the palm-rest and keyboard assembly.



3. Connect the power-adapter port cable to the system board.
4. Adhere the tape that covers the USB ports on the system board.
5. Connect the speaker cable to the system board.
6. Slide the keyboard cable into the connector on the system board and close the latch to secure the cable.
7. Slide the touchpad cable into the connector on the system board and close the latch to secure the cable.
8. Slide the hard-drive cable into the connector on the system board and close the latch to secure the cable.
9. Connect the coin-cell battery to the system board.



10. Connect the touch-screen board cable to the system board.
11. Slide the display cable into the connector on the system board and close the latch to secure the cable.
12. Adhere the tapes that secure the display cable and touch-screen board cable to their respective connectors on the system board.
13. Route the touch-screen board cable and the display cable through the routing guides on the palm-rest and keyboard assembly.
14. Slide the I/O-board cable into the connector on the system board and close the latch to secure the cable.
15. Adhere the tape that secures the I/O-board cable to the system board.



## Post-requisites

1. Replace the [wireless card](#).

2. Replace the [heat sink](#).
3. Replace the [fan](#).
4. Replace the [solid-state drive/Intel Optane memory module](#).
5. Replace the [coin-cell battery](#).
6. Replace the [memory modules](#).
7. Replace the [battery](#).
8. Replace the [base cover](#).

# Removing the touchpad

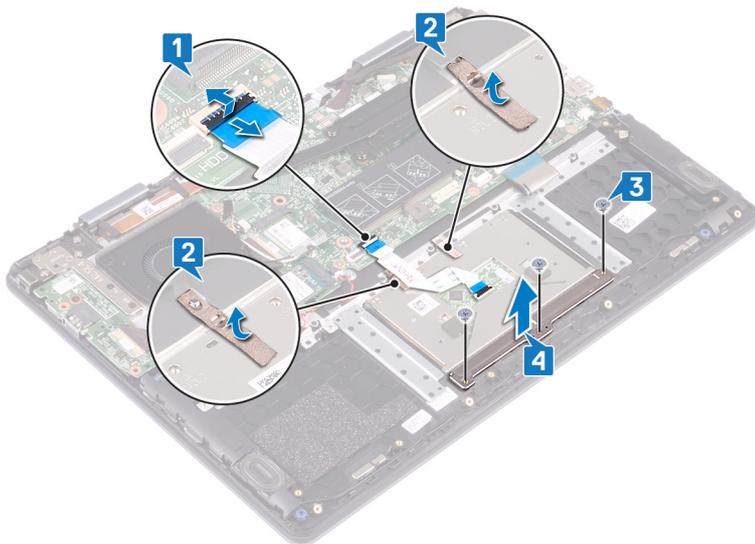
**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

## Prerequisites

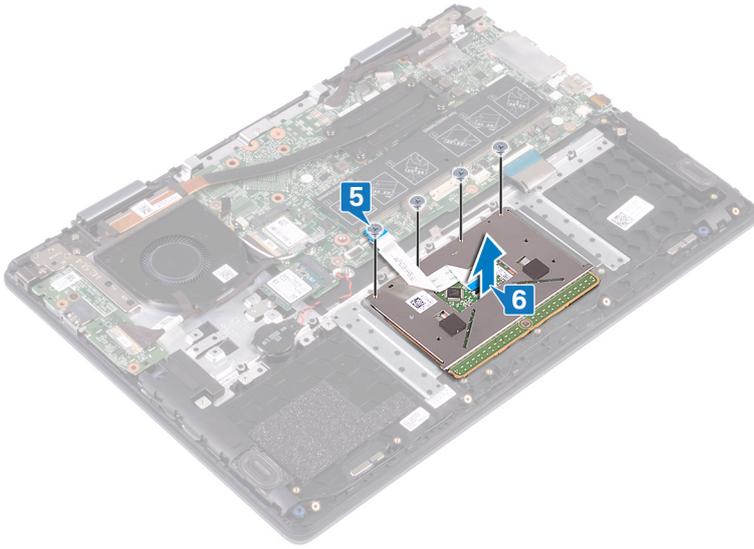
1. Remove the [base cover](#).
2. Remove the [battery](#).

## Procedure

1. Open the latch, and disconnect the touchpad cable from the system board.
2. Peel the tapes that secure the touchpad to the palm-rest and keyboard assembly.
3. Remove the three screws (M2x2) that secure the touchpad bracket to the palm-rest and keyboard assembly.
4. Lift the touchpad bracket off the palm-rest and keyboard assembly.



5. Remove the four screws (M2x2) that secure the touchpad to the palm-rest and keyboard assembly.
6. Lift the touchpad, along with the cable, at an angle from under the touch-pad bracket off the palm-rest and keyboard assembly.

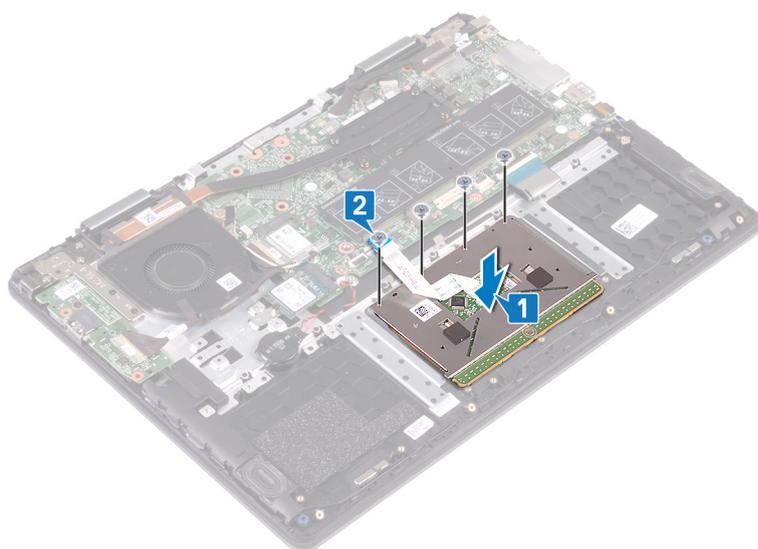


## Replacing the touchpad

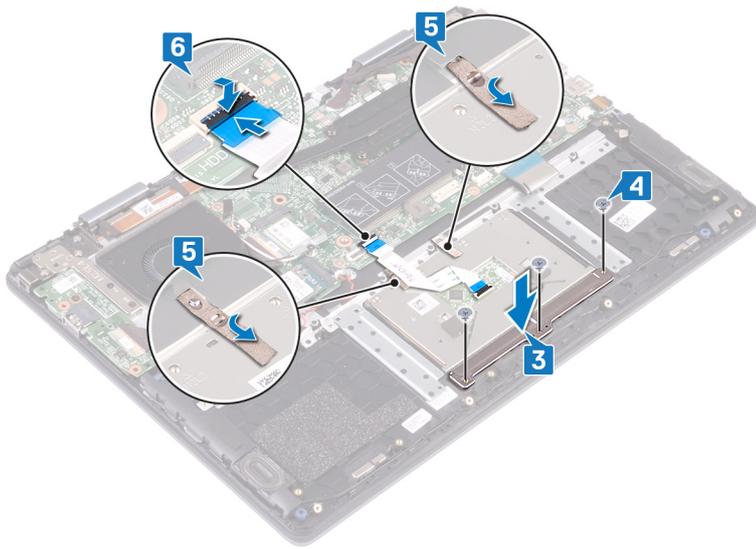
**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside your computer](#). For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).

### Procedure

1. Align the screw holes on the touchpad with the screw holes on the palm-rest and keyboard assembly.
2. Replace the four screws (M2x2) that secure the touchpad to the palm-rest and keyboard assembly.



3. Align the screw holes on the touchpad bracket with the screw holes on the touchpad.
4. Replace the three screws (M2x2) that secure the touchpad bracket to the touchpad.
5. Adhere the tapes that secure the touchpad to the keyboard shield.
6. Slide the touchpad cable into the connector on the system board and close the latch to secure the cable.



## Post-requisites

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

# Removing the palm-rest and keyboard assembly

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Prerequisites

1. Remove the [base cover](#).
2. Remove the [battery](#).
3. Remove the [memory modules](#).
4. Remove the [coin-cell battery](#).
5. Remove the [solid-state drive/Intel Optane memory module](#).
6. Remove the [hard drive](#).
7. Remove the [heat sink](#).
8. Remove the [fan](#).
9. Remove the [I/O board](#).
10. Remove the [speakers](#).
11. Remove the [power-adapter port](#).
12. Remove the [wireless card](#).
13. Remove the [display assembly](#).
14. Remove the [system board](#).
15. Remove the [touchpad](#).

## Procedure

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



# Replacing the palm-rest and keyboard assembly

**NOTE:** Before working inside your computer, read the safety information that shipped with your computer and follow the steps in [Before working inside your computer](#). After working inside your computer, follow the instructions in [After working inside 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).

## Procedure

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



## Post-requisites

1. Replace the [touchpad](#).
2. Replace the [system board](#).
3. Replace the [display assembly](#).
4. Replace the [wireless card](#).
5. Replace the [power-adapter port](#).
6. Replace the [speakers](#).
7. Replace the [I/O board](#).
8. Replace the [fan](#).
9. Replace the [heat sink](#).
10. Replace the [hard drive](#).
11. Replace the [solid-state drive/Intel Optane memory module](#).
12. Replace the [coin-cell battery](#).
13. Replace the [memory modules](#).
14. Replace the [battery](#).

15. Replace the [base cover](#).

## Device drivers

### Intel Chipset Software Installation Utility

In the Device Manager, check if the chipset driver is installed.

Install the Intel chipset updates from [www.dell.com/support](http://www.dell.com/support).

### Video drivers

In the Device Manager, check if the video driver is installed.

Install the video driver update from [www.dell.com/support](http://www.dell.com/support).

### Intel Serial IO driver

In the Device Manager, check if the Intel Serial IO driver is installed.

Install the driver updates from [www.dell.com/support](http://www.dell.com/support).

### Intel Serial IO driver

In the Device Manager, check if the Intel Serial IO driver is installed.

Install the driver updates from [www.dell.com/support](http://www.dell.com/support).

### Intel Trusted Execution Engine Interface

In the Device Manager, check if the Intel Trusted Execution Engine Interface driver is installed.

Install the driver update from [www.dell.com/support](http://www.dell.com/support).

### Intel Virtual Button driver

In the Device Manager, check if the Intel Virtual Button driver is installed.

Install the driver updates from [www.dell.com/support](http://www.dell.com/support).

### Wireless and Bluetooth drivers

In the Device Manager, check if the network card driver is installed.

Install the driver updates from [www.dell.com/support](http://www.dell.com/support).

In the Device Manager, check if the Bluetooth driver is installed.

Install the driver updates from [www.dell.com/support](http://www.dell.com/support).

## System setup

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

### 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

**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.

### Navigation keys

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

Keys	Navigation
<b>Up arrow</b>	Moves to the previous field.
<b>Down arrow</b>	Moves to the next field.
<b>Enter</b>	Selects a value in the selected field (if applicable) or follow the link in the field.
<b>Spacebar</b>	Expands or collapses a drop-down list, if applicable.
<b>Tab</b>	Moves to the next focus area. <b>NOTE:</b> For the standard graphics browser only.
<b>Esc</b>	Moves to the previous page until you view the main screen. Pressing Esc in the main screen displays a message that prompts you to save any unsaved changes and restarts the system.

### BIOS overview

**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.

## Entering BIOS setup program

1. Turn on (or restart) your computer.
2. During POST, when the DELL logo is displayed, watch for the F2 prompt to appear, and then press F2 immediately.

**NOTE:** The F2 prompt indicates that the keyboard is initialized. This prompt can appear very quickly, so you must watch for it, and then press F2. If you press F2 before the F2 prompt, this keystroke is lost. If you wait too long and the operating system logo appears, continue to wait until you see the desktop. Then, turn off your computer and try again.

## System setup options

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

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

### General-System Information

#### System Information

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.

#### Memory Information

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 used for the memory.
DIMM A Size	Displays the DIMM A memory size.
DIMM B Size	Displays the DIMM B memory size.

#### Processor Information

Processor Type	Displays the processor type.
Core Count	Displays the number of cores on the processor.
Processor ID	Displays the processor identification code.
Current Clock Speed	Displays the current processor clock speed.
Minimum Clock Speed	Displays the minimum processor clock speed.
Maximum Clock Speed	Displays the maximum processor clock speed.
Processor L2 Cache	Displays the processor L2 Cache size.
Processor L3 Cache	Displays the processor L3 Cache size.
HT Capable	Displays whether the processor is HyperThreading (HT) capable.
64-Bit Technology	Displays whether 64-bit technology is used.

## General-System Information

---

### Device Information

SATA-0	Displays the SATA-0 device information of the computer.
SATA-1	Displays the SATA-1 device information of the computer.
LOM MAC Address	Displays the LAN On Motherboard (LOM) MAC address of the computer.
Video Controller	Displays the video controller type 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.
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.
<b>Battery Information</b>	Displays whether bluetooth is installed in the computer.

### Boot Sequence

Boot Sequence	Displays the boot sequence.
Boot List Option	Displays the available boot options.

### Advanced Boot Options

Enable Legacy Option ROMs	Enables or disables the Legacy Option ROMs.
---------------------------	---

### UEFI Boot Path Security

Enables or disables the user to enter Admin password when booting a UEFI boot path from the F12 Boot Menu.

### Date/Time

Displays the current date in MM/DD/YY format and current time in HH:MM:SS AM/PM format.

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

## System Configuration

---

<b>SATA Operation</b>	Configure operating mode of the integrated SATA hard drive controller.
<b>Drives</b>	Enables or disables various drives on board.
<b>SMART Reporting</b>	Enables or disables Self-Monitoring, Analysis, and Reporting Technology (SMART) during system startup.
<b>USB 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 Port	Enables or disables booting from USB mass storage devices connected to external USB port.
<b>USB PowerShare</b>	Enables or disables the USB PowerShare.
<b>Audio</b>	Enables or disables the integrated audio controller.
<b>Keyboard Illumination</b>	Enables you to choose the mode of the keyboard illumination feature.
<b>Keyboard Backlight Timeout on AC</b>	Enables you to define the timeout value for the keyboard backlight when a power adapter is plugged.
<b>Keyboard Backlight Timeout on Battery</b>	Enables you to define the timeout value for the keyboard backlight when the computer is running on battery.
<b>Miscellaneous Devices</b>	Enable or disable various onboard devices.

## System Configuration

---

Enable Camera	Enable or disable the camera.
---------------	-------------------------------

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

### Video

---

LCD Brightness	Set the panel brightness independently for Battery and AC power.
----------------	--

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

### Security

---

Admin Password	Set, change, or delete the administrator password.
System Password	Set, change, or delete the system password.
Internal HDD-0 Password	Set, change, or delete the internal hard-disk drive password.
Strong Password	Enable or disable strong passwords.
Password Configuration	Control the minimum and maximum number of characters allowed for the Admin and System passwords.
Password Bypass	Bypass the System (Boot) Password and the internal HDD password prompts during a system restart.
Password Change	Enable or disable changes to the System and Hard Disk passwords when an administrator password is set.
Non-Admin Setup Changes	Determines whether changes to the setup option are permitted when an administrator password is set.
UEFI Capsule Firmware Updates	Enable or disable BIOS updates through UEFI capsule update packages.
PTT Security	Enable or disable Platform Trust Technology (PTT) visibility to the operating system.
Computrace(R)	Enable or disable the BIOS module interface of the optional Computrace(R) Service from Absolute Software.
Admin Setup Lockout	Enable to prevent users from entering Setup when an Admin Password is set.
Master Password Lockout	Enables or disables the master password lockout support.
SMM Security Mitigation	Enables or disables additional UEFI Security Mitigation protections.

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

### Secure Boot

---

Secure Boot Enable	Enables or disables the secure boot feature.
Secure Boot Mode	Enables or disables the user to choose the secure boot mode.

### Expert Key Management

Enable Custom Mode	Enables or disables custom mode.
Expert Key Management	Enables or disables Expert Key Management.
Custom Mode Key Management	Select the custom values for expert key management.

**Table 9. System setup options—Intel Software Guard Extensions menu**

### Intel Software Guard Extensions

---

Intel SGX Enable	Enable or disable Intel Software Guard Extensions.
Enclave Memory Size	Set the Intel Software Guard Extensions Enclave Reserve Memory Size.

### Performance

Multi Core Support	Enable multiple cores. Default: Enabled.
--------------------	---

## Intel Software Guard Extensions

Intel SpeedStep	Enable or disable Intel Speedstep Technology. Default: Enabled.
	<b>i</b> <b>NOTE: If enabled, the processor clock speed and core voltage are adjusted dynamically based on the processor load.</b>
C-States Control	Enable or disable additional processor sleep states. Default: Enabled.
Intel TurboBoost	Enable or disable Intel TurboBoost mode of the processor. Default: Enabled.
HyperThread Control	Enable or disable HyperThreading in the processor. Default: Enabled.

## Power Management

AC Behavior	Enables the system to turn on automatically, when AC is inserted.
Enable Intel Speed Shift Technology	Enables or disables the Intel Speed Shift technology support.
Auto On Time	Enable to set the computer to turn on automatically every day or on a preselected date and time. This option can be configured only if the Auto On Time is set to Everyday, Weekdays, or Selected Days. Default: Disabled.
USB Wake Support	Enables the USB devices to wake the computer from Standby.
Block Sleep	Enables you to block entering to sleep mode in OS environment.
Advanced Battery Charge Configuration	Enables Advanced Battery Charge Configuration from the beginning of the day to a specified work period.
Primary Battery Charge Configuration	Sets the primary battery charge settings with a preselected custom charge start and stop. Default: Adaptive.

## POST Behavior

Adapter Warnings	Enable adapter warnings. Default: Enabled.
Fn Lock Options	Enable or disable the Fn lock mode.
Fastboot	Enable to set the speed of the boot process. Default: Thorough.
Extend BIOS POST Time	Set the BIOS POST time.
Full Screen Logo	Enables you to display full screen logo if your image matches screen resolution.
Warning and Errors	Enables the computer to pause when warnings and errors are detected during boot process.
MAC Address Pass Through	Replaces the external NIC MAC address.

**Table 10. System setup options—Virtualization Support menu**

## Virtualization Support

Virtualization	Specify whether a Virtual Machine Monitor (VMM) can utilize the additional hardware capabilities provided by Intel Virtualization Technology.
VT for Direct I/O	Specify whether a Virtual Machine Monitor (VMM) can utilize the additional hardware capabilities provided by Intel Virtualization Technology for Direct I/O.

**Table 11. System setup options—Wireless menu**

**Wireless**

Wireless Switch	Determine which wireless devices can be controlled by the Wireless Switch.
Wireless Device Enable	Enable or disable internal wireless devices.

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

**Maintenance**

Service Tag	Display the system's Service Tag.
Asset Tag	Create a system Asset Tag.
BIOS Downgrade	Control flashing of the system firmware to previous revisions.
Data Wipe	Enable to securely erase data from all internal storage devices.
BIOS Recovery	Enable the user to recover from certain corrupted BIOS conditions from a recovery file on the user primary hard drive or an external USB key.
First Power On Date	Sets ownership date.

**Table 13. System setup options—System Logs menu**

**System Logs**

BIOS Events	Display BIOS events.
Thermal Events	Display the Thermal events.
Power Events	Display the Power events.

**Table 14. System setup options—SupportAssist System Resolution menu**

**SupportAssist System Resolution**

Auto OS Recovery Threshold	Control the automatic boot flow for SupportAssist System Resolution Console and for the Dell OS Recovery tool.
SupportAssist OS Recovery	Enable or disable the boot flow for the SupportAssist OS Recovery tool when certain system errors.

## Clearing CMOS settings

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

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](#).

## Clearing BIOS (System Setup) and System passwords

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

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

## Troubleshooting

### Flashing the BIOS

You may need to flash (update) the BIOS when an update is available or when you replace the system board.

Follow these steps to flash the BIOS:

1. Turn on your computer.
2. Go to [www.dell.com/support](http://www.dell.com/support).
3. Click **Product support**, 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 > Find it myself**.
5. Select the operating system installed on your computer.
6. Scroll down the page and expand **BIOS**.
7. Click **Download** to download the latest version of the BIOS for your computer.
8. After the download is complete, navigate to the folder where you saved the BIOS update file.
9. Double-click the BIOS update file icon and follow the instructions on the screen.

### Flashing BIOS (USB key)

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 [SLN143196](https://www.dell.com/support/SLN143196) 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.

### Enhanced Pre-Boot System Assessment (ePSA) diagnostics

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

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

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

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

For more information, see [Dell EPSA Diagnostic 3.0](#).

## Running the ePSA diagnostics

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

## Diagnostics

### Power and battery-status light:

Indicates the power state and battery state of the computer.

**Solid white** – Power adapter is connected and the battery is charging.

**Solid amber** – Battery charge is low or critical.

**Off** – Battery is fully charged.

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 light patterns and what they indicate.

**Table 15. Diagnostics**

Light pattern	Problem description
2,1	CPU failure
2,2	System board: BIOS and ROM failure
2,3	No memory or RAM detected
2,4	Memory or RAM failure
2,5	Invalid memory installed
2,6	System board or chipset error
2,7	LCD failure
3,1	CMOS battery failure
3,2	PCI/video card failure
3,3	Recovery image not found
3,4	Recovery image found but invalid

**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.

## Enabling Intel Optane memory

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

 **CAUTION:** Do not try to remove the Intel Rapid Storage Technology driver after disabling Intel Optane memory, 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 or the Intel Optane memory module from the system.

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.
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.

## WiFi power cycle

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

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

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

## Flea power release

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:

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.

# 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 16. Self-help resources

Information about Dell products and services

[www.dell.com](http://www.dell.com)

Dell Help & Support app



Accessing help

In Windows search, type **Help** and **Support**, and press Enter.

Online help for operating system

[www.dell.com/support/windows](http://www.dell.com/support/windows)

Troubleshooting information, user manuals, setup instructions, product specifications, technical help blogs, drivers, software updates, and so on.

[www.dell.com/support](http://www.dell.com/support)

Dell knowledge base articles for a variety of computer concerns.

1. Go to [www.dell.com/support](http://www.dell.com/support).
2. Type the subject or keyword in the **Search** box.
3. Click **Search** to retrieve the related articles.

Learn and know the following information about your product:

See *Me and My Dell* at [www.dell.com/support/manuals](http://www.dell.com/support/manuals).

- Product specifications
- Operating system
- Setting up and using your product
- Data backup
- Troubleshooting and diagnostics
- Factory and system restore
- BIOS information

To locate the *Me and My Dell* relevant to your product, identify your product through one of the following:

- Select **Detect Product**.
- Locate your product through the drop-down menu under **View Products**.
- Enter the **Service Tag number** or **Product ID** in the search bar.

## 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 and product, and some services may not be available in your country.

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