

# Dell Precision 3510 Owner's Manual

Regulatory Model: P48F  
Regulatory Type: P48F001



# Notes, cautions, and warnings

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

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

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

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Rev. A00


# Working on your computer


## Safety instructions


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


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


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


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

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

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

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


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

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


## Before working inside your computer

To avoid damaging your computer, perform the following steps before you begin working inside the computer.

1. Ensure that you follow the [Safety instructions](#).
2. Ensure that your work surface is flat and clean to prevent the computer cover from being scratched.
3. Turn off your computer, see [Turning off your computer](#).





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

4. Disconnect all the network cables from the computer.
5. Disconnect your computer and all attached devices from the electrical outlets.
6. Press and hold the power button while the computer is unplugged to ground the system board.
7. Remove the cover.

 **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.**


## Turning off your computer

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


1. Turning off your computer:
  - In Windows 10 (using a touch enabled device or mouse):
    1. Click or tap .
    2. Click or tap  and then click or touch **Shut down**.
  - In Windows 8 (using a touch enabled device):
    1. Swipe in from the right edge of the screen, opening the **Charms** menu and select **Settings**.
    2. Tap  and then tap **Shut down**
  - In Windows 8 (using a mouse):
    1. Point to upper-right corner of the screen and click **Settings**.
    2. Click  and then click **Shut down**.
  - In Windows 7:
    1. Click **Start**.
    2. Click **Shut Down**.
2. Ensure that the computer and all attached devices are turned off. If your computer and attached devices did not automatically turn off when you shut down your operating system, press and hold the power button for about 6 seconds to turn them off.

## After working inside your computer

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

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

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

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

3. Replace the battery.
4. Replace the base cover.
5. Connect your computer and all attached devices to their electrical outlets.
6. Turn on your computer.

# Removing and installing components

This section provides detailed information on how to remove or install the components from your computer.

## Recommended tools

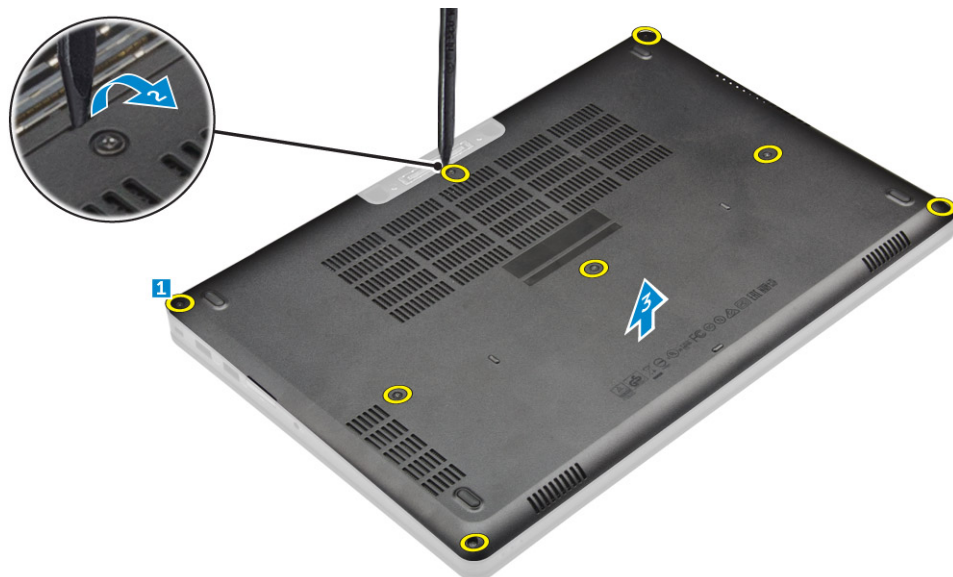
The procedures in this document require the following tools:

- Small flat blade screwdriver
- Phillips #0 screwdriver
- Phillips #1 screwdriver
- Small plastic scribe

## Removing the base cover

1. Follow the procedure in [Before working inside your computer](#).
2. To remove the base cover:
  - a. Loosen the screws that secure the base cover to the computer [1].
  - b. Lift the base cover from the edge and remove it from the computer [2, 3].


 **NOTE:** You may need a plastic scribe to lift the base cover from the edges.



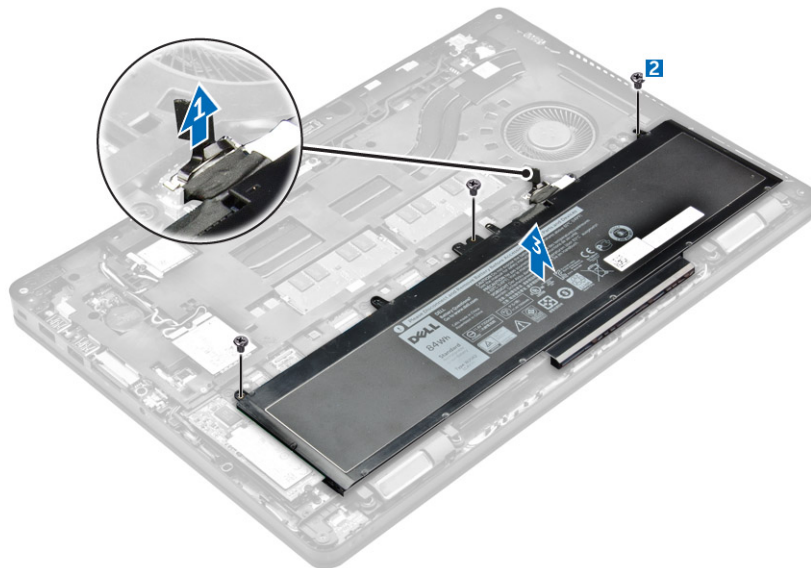
## Installing the base cover

1. Align the base cover with the screw holders on the computer.
2. Press the edges of the cover until it clicks into place.
3. Tighten the screws to secure the base cover to the computer.
4. Follow the procedure in [After working inside your computer](#).

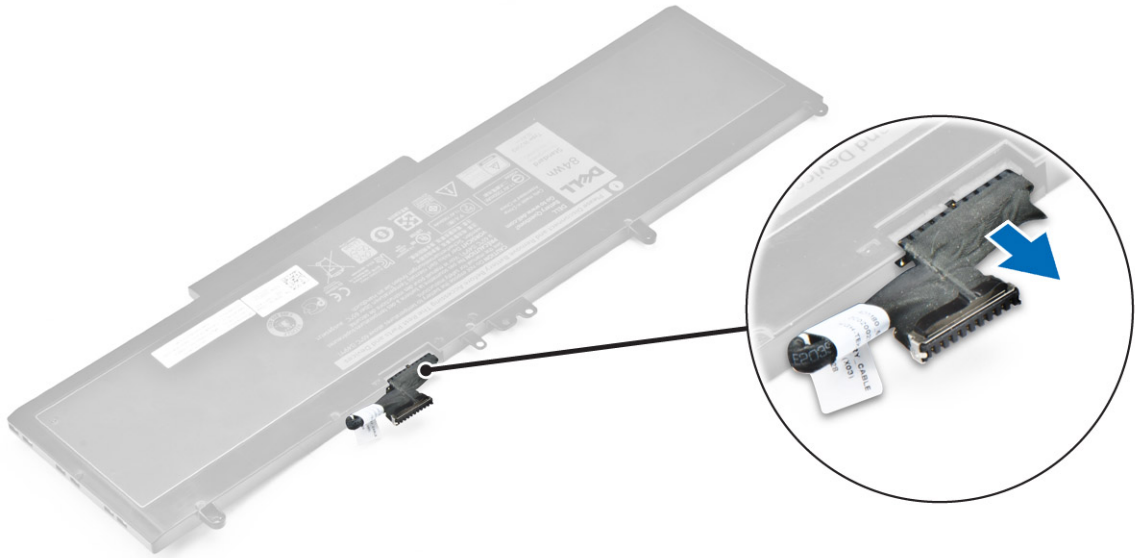
## Removing the battery

 **NOTE:** If your computer supports the 6-cell battery, it will not support a hard drive.

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the [base cover](#).
3. To remove the battery:
  - a. Disconnect the battery cable from the connector on the system board [1].
  - b. Remove the screws that secure the battery to the computer [2].
  - c. Lift the battery away from the computer [3].



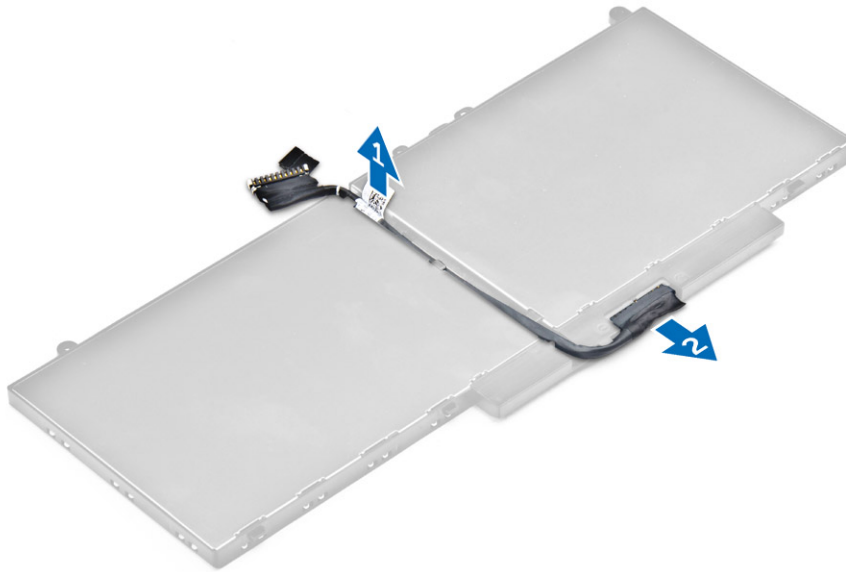
4. Disconnect the cable from the battery.




 **NOTE:** This step is applicable only for a 6-cell battery

5. Unroute the cable from the routing channel [1] and remove the cable from the battery [2].

 **NOTE:** This step is applicable only for a 4-cell battery.



## Installing the battery

 **NOTE:** If your computer supports the 6-cell battery, it will not support a hard drive.

1. Connect the battery cable to the connector on the battery.
2. Route the battery cable through the routing channel on the battery.

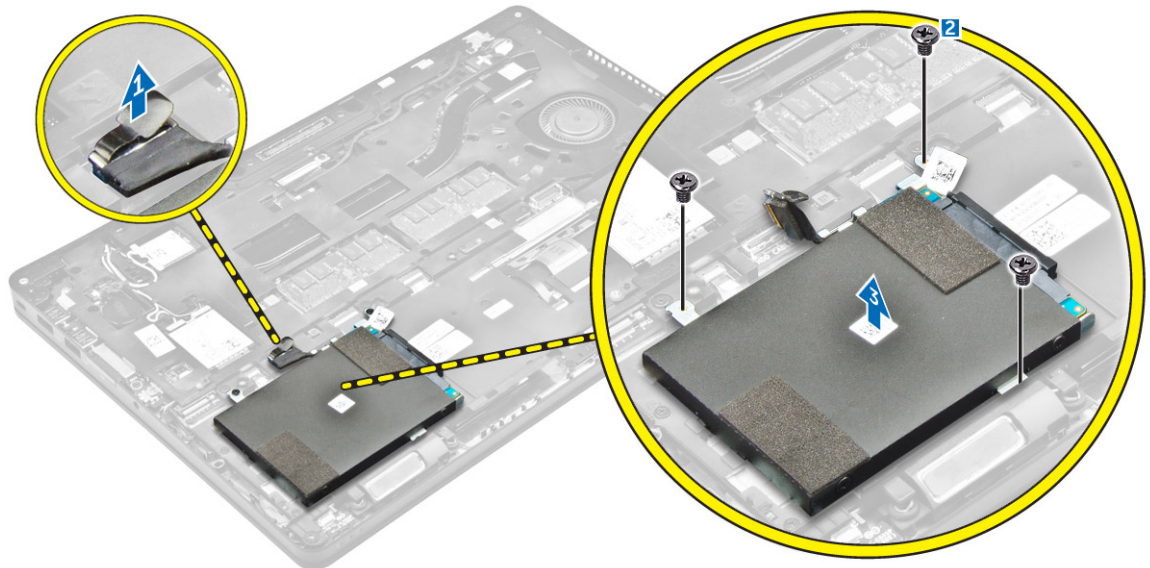


 **NOTE:** This step is applicable only for a 4-cell battery.

3. Insert the battery into the slot on the computer.
4. Tighten the screws to secure the battery to the computer.
5. Connect the battery cable to the connector on the system board.
6. Install the [base cover](#).
7. Follow the procedure in [After working inside your computer](#).

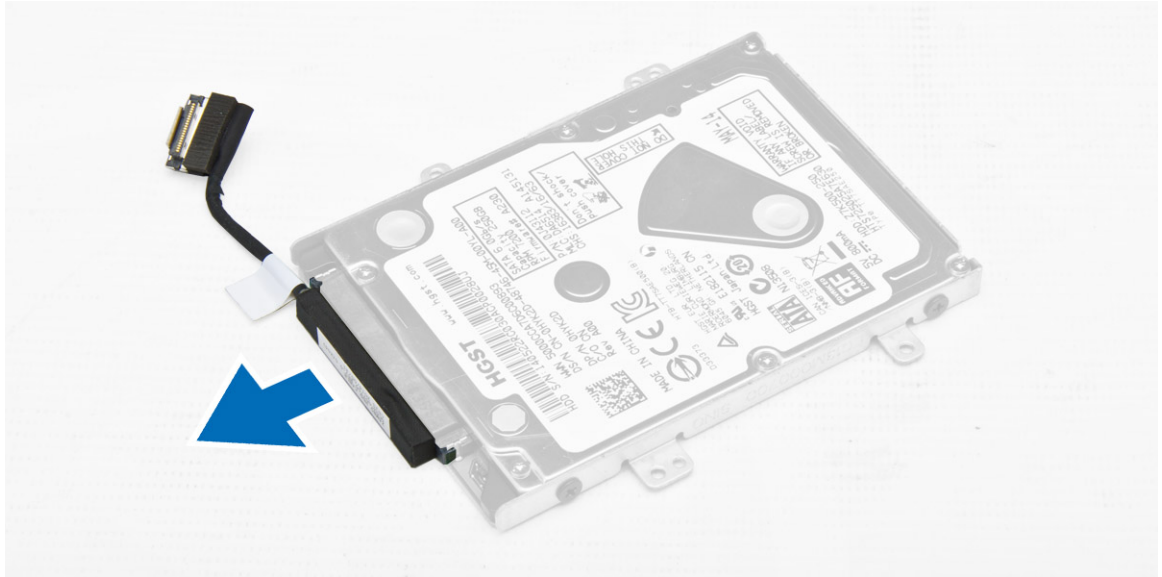
## Removing the hard drive assembly

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
3. To remove the hard drive assembly:
  - a. Disconnect the hard drive cable from the connector on the system board [1].
  - b. Remove the screws that secure the hard drive assembly to the computer [2].
  - c. Lift the hard drive assembly away from the computer [3].

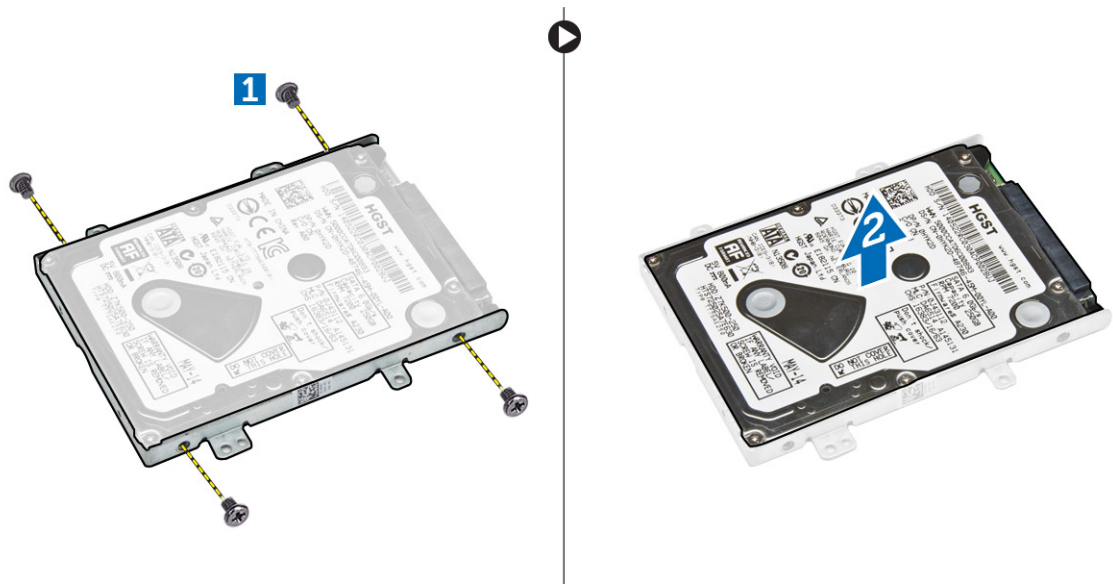


## Removing the hard drive from the hard drive bracket

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [hard drive assembly](#)
3. Pull the hard drive cable to remove it from the connector.



4. Remove the screws that secure the hard drive bracket to the hard drive [1] and lift the hard drive from the hard drive bracket [2].



## Installing the hard drive into the hard drive bracket

1. Align the screw holders on the hard drive with the screws on the hard drive bracket.
2. Insert the hard drive into the hard drive bracket.
3. Tighten the screws to secure the hard drive to the hard drive bracket.
4. Install the:
  - a. [hard drive assembly](#)
  - b. [battery](#)
  - c. [base cover](#)

5. Follow the procedure in [After working inside your system](#).

## Installing the hard drive assembly

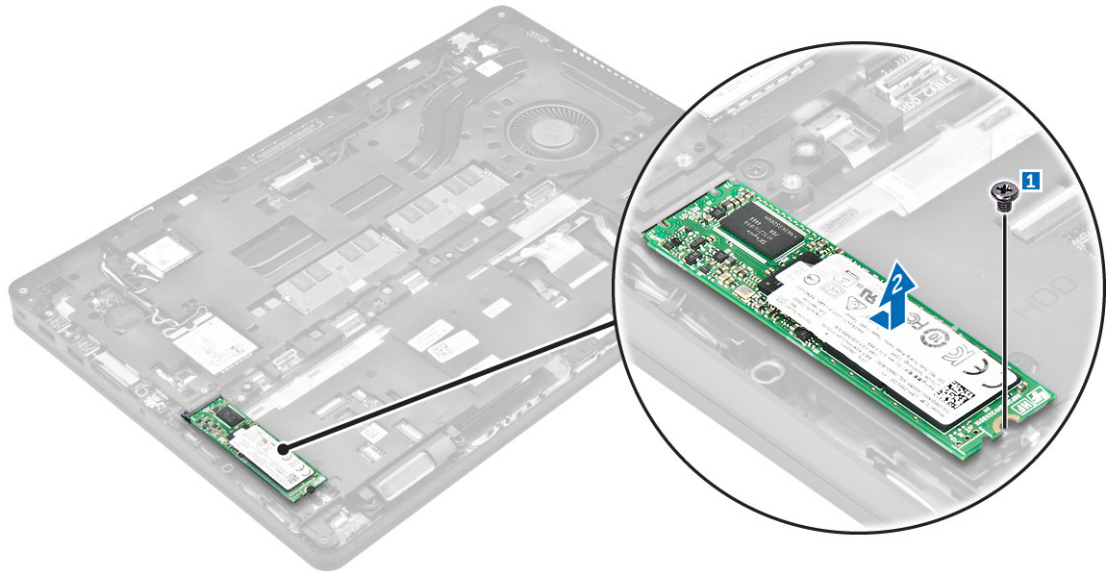
1. Insert the hard drive assembly into the slot on the computer.
2. Tighten the screws to secure the hard drive assembly to the computer.
3. Connect the hard drive cable to the connector on the hard drive and on the system board.
4. Install the:
  - a. [battery](#)
  - b. [base cover](#)
5. Follow the procedures in [After working inside your system](#).

## Installing the optional M.2 SSD

1. Insert the SSD into the connector on the computer.
2. Tighten the screw to secure the SSD to the computer.
3. Install the:
  - a. [battery](#)
  - b. [base cover](#)
4. Follow the procedure in [After working inside your computer](#).

## Removing the optional M.2 Solid State Drive (SSD)

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
3. To remove the SSD:
  - a. Remove the screw that secures the SSD to the computer [1].
  - b. Slide and lift the SSD from the computer [2].

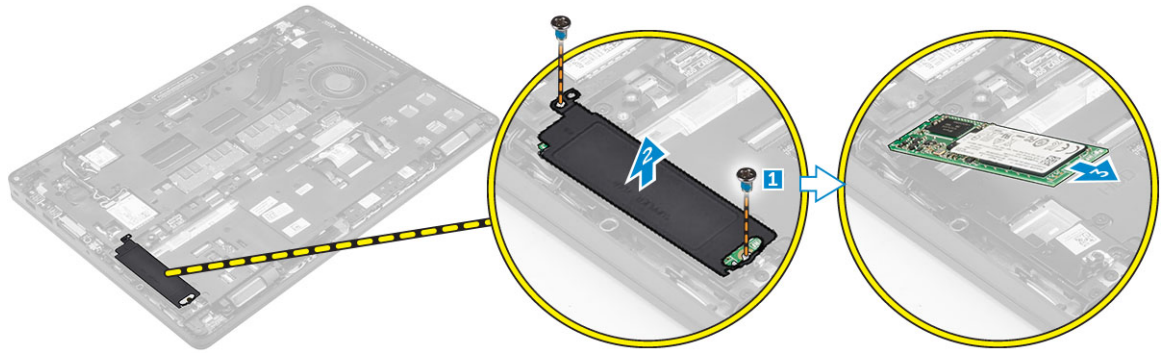


## Installing the optional PCIe SSD

1. Insert the SSD clip into the slot on the computer.
2. Tighten the screw to secure the SSD clip to the computer.
3. Insert the SSD into the connector on the computer.
4. Place the SSD bracket over the SSD and tighten the screws to secure it to the computer.
5. Install the:
  - a. [battery](#)
  - b. [base cover](#)
6. Follow the procedure in [After working inside your computer](#).

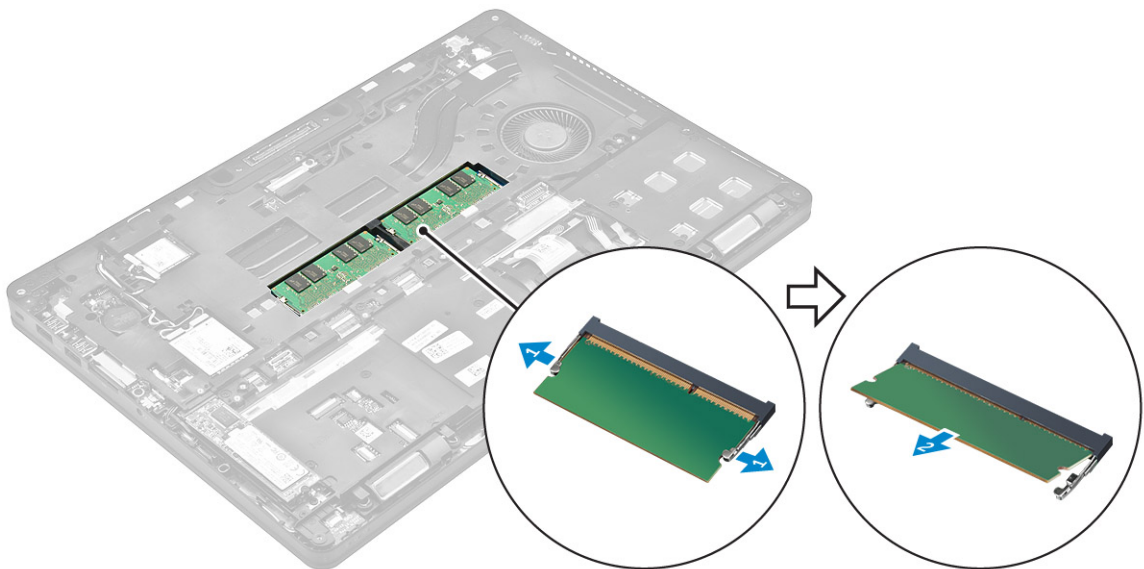
## Removing the optional PCIe SSD

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
3. To remove the PCIe SSD:
  - a. Remove the screws that secure the SSD bracket to the SSD [1].
  - b. Remove the SSD bracket [2].
  - c. Remove the SSD from the computer [3].



## Removing the memory module

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
3. Pull the clips securing the memory module until the memory module pops up [1].
4. Remove the memory module from the system board [2].

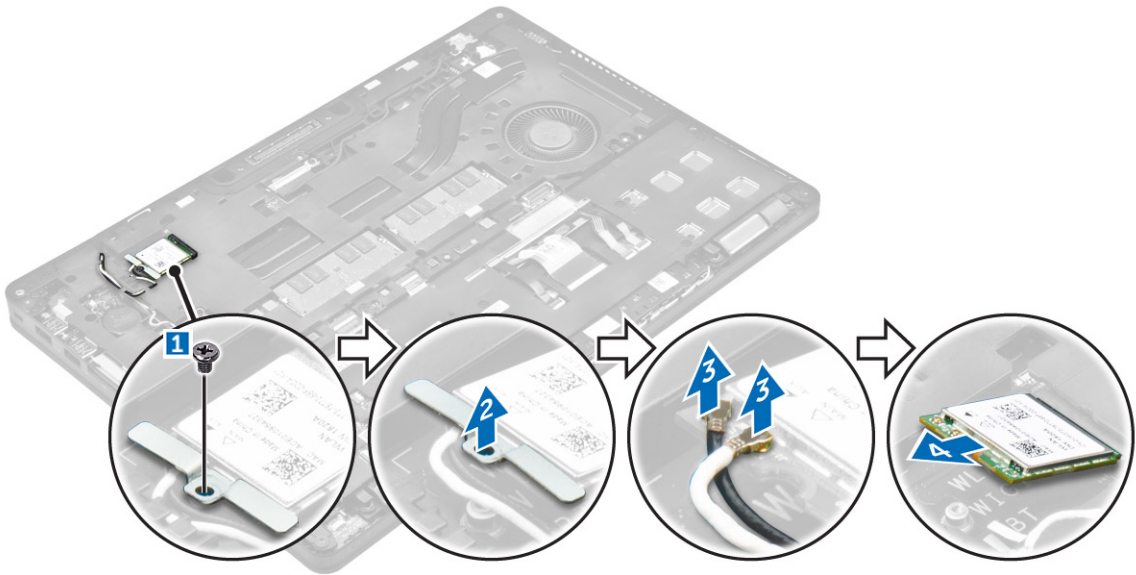


## Installing the memory module

1. Insert the memory module into the memory module socket until the clips secure the memory module.
2. Install the:
  - a. [battery](#)
  - b. [base cover](#)
3. Follow the procedures in [After working inside your computer](#).

## Removing the WLAN card

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
3. To remove the WLAN card:
  - a. Remove the screw that secures the metal bracket to the WLAN card [1].
  - b. Remove the metal bracket [2].
  - c. Disconnect the WLAN cables from the connectors on the WLAN card [3].
  - d. Unroute the WLAN cables from the routing channel.
  - e. Remove the WLAN card from the computer [4].



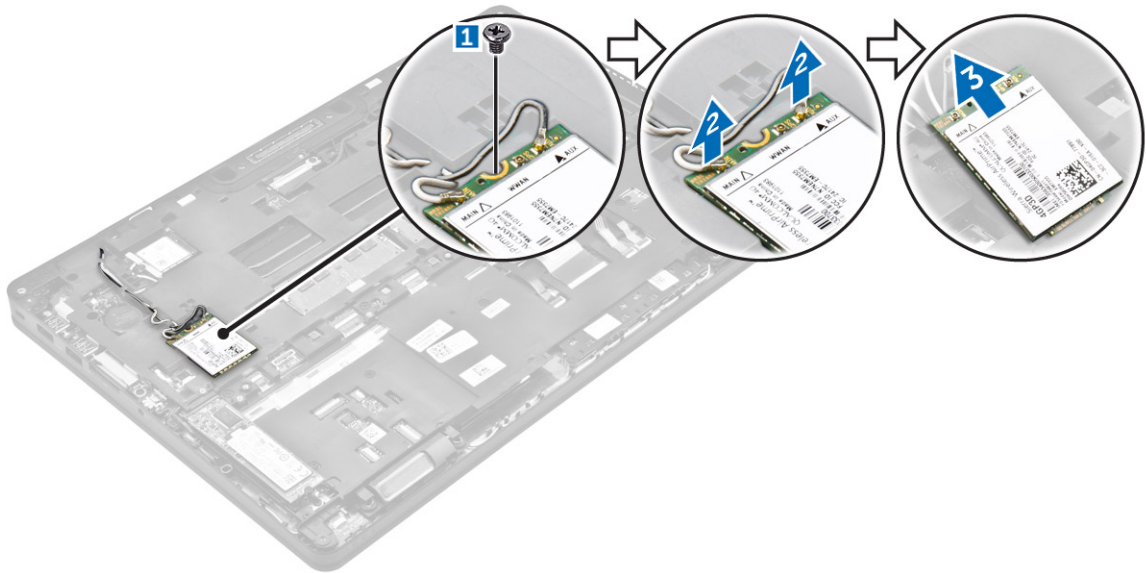
## Installing the WLAN card

1. Insert the WLAN card into the slot on the computer.
2. Route the WLAN cables through the routing channel.
3. Connect the WLAN cables to the connectors on the WLAN Card.
4. Place the metal bracket and tighten the screw to secure it to the computer.
5. Install the:
  - a. [battery](#)
  - b. [base cover](#)
6. Follow the procedure in [After working inside your system](#).

## Removing the WWAN card

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

- a. [base cover](#)
- b. [battery](#)
- 3. To remove the WWAN card:
  - a. Remove the screw that secures the WWAN card [1].
  - b. Disconnect the WWAN cables from the connectors on the WWAN card [2].
  - c. Unroute the WWAN cables from the routing channel.
  - d. Remove the WWAN card from the computer [3].



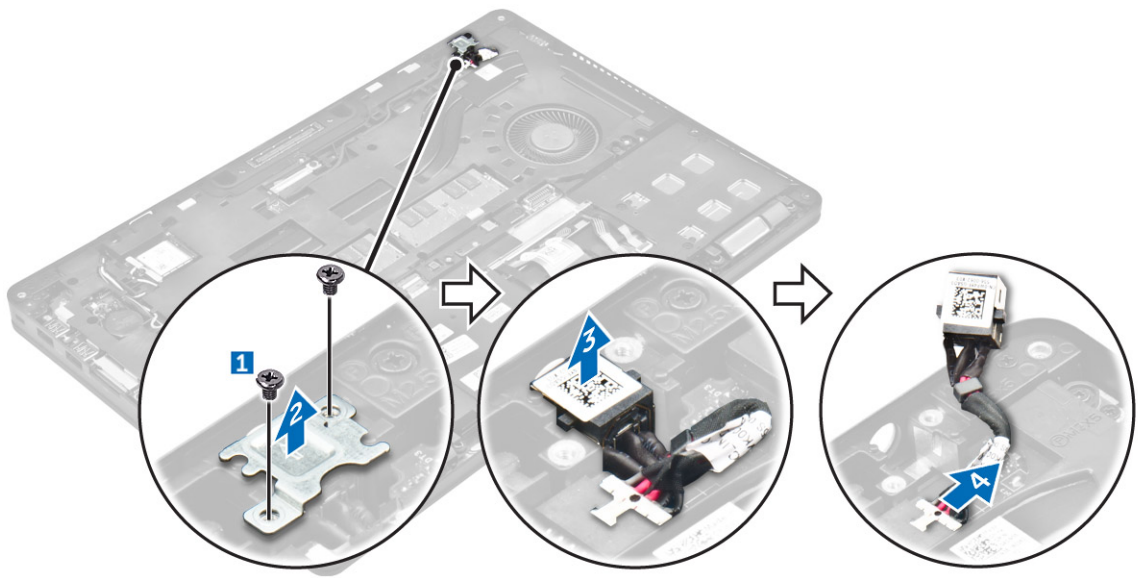
## Installing the WWAN card

1. Insert the WWAN card into the slot on the computer.
2. Route the WWAN cables through the routing channel.
3. Connect the WWAN cables to the connectors on the WWAN card.
4. Tighten the screw to secure the WWAN card to the computer
5. Install the:
  - a. [battery](#)
  - b. [base cover](#)
6. Follow the procedure in [After working inside your computer](#).

## Removing the power connector port

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
3. To remove the power connector port:
  - a. Remove the screws to release the metal bracket on the power connector port [1].
  - b. Lift the metal bracket from the computer [2].
  - c. Remove the power connector port from the computer [3].

- d. Disconnect the power connector port cable from the computer [4].



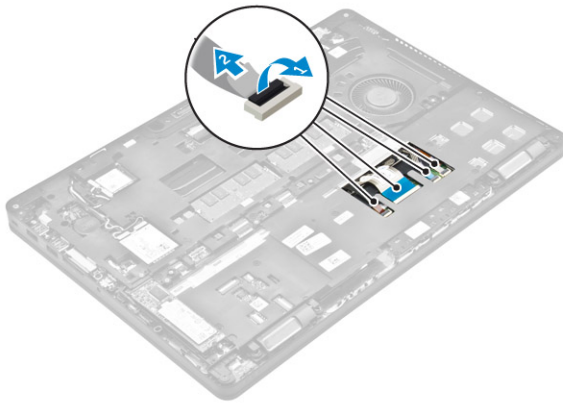
## Installing the power connector port

1. Insert the power connector port into the slot on the computer.
2. Place the metal bracket on the power connector port.
3. Tighten the screw to secure the power connector port to the computer.
4. Route the power connector port cable through the routing channels.
5. Connect the power connector port cable to the connector on the system board.
6. Install the:
  - a. [battery](#)
  - b. [base cover](#)
7. Follow the procedure in [After working inside your computer](#).

## Removing the keyboard

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
3. To remove the keyboard trim:
  - a. Disconnect the keyboard cables from the connectors on the system board [1, 2].
  - b. Using a plastic scribe, lift the keyboard trim from the edges to release it from the keyboard [3, 4, 5].





4. To remove the keyboard:
  - a. Remove the screws that secure the keyboard to the computer [1].
  - b. Lift the keyboard and slide it to remove it from computer [2, 3].



## Installing the keyboard

1. Align the keyboard with the screw holders on the computer.
2. Tighten the screws to secure the keyboard to the computer.
3. Align the keyboard trim with the tabs on the computer and press it until it clicks into place.
4. Connect the keyboard cables to the connectors on the system board.
5. Install the:
  - a. [battery](#)
  - b. [base cover](#)
6. Follow the procedure in [After working inside your system](#).

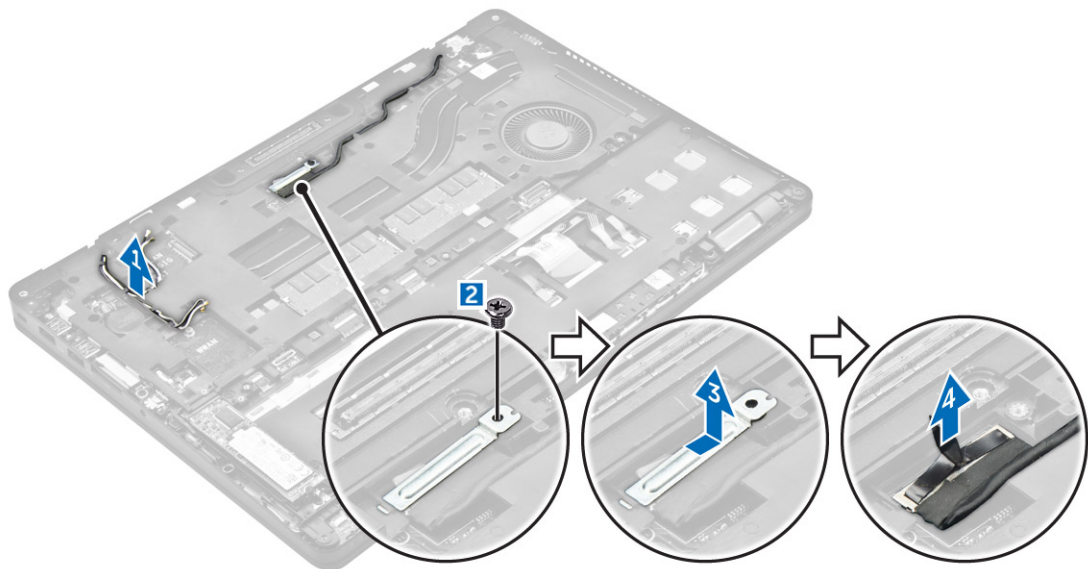
## Removing the display assembly

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

- c. [WLAN](#)
  - d. [WWAN](#)
3. To remove the display hinge brackets:
- a. Remove the screw that secures the display hinge bracket to the computer [1].
  - b. Remove the display hinge bracket from the computer [2].

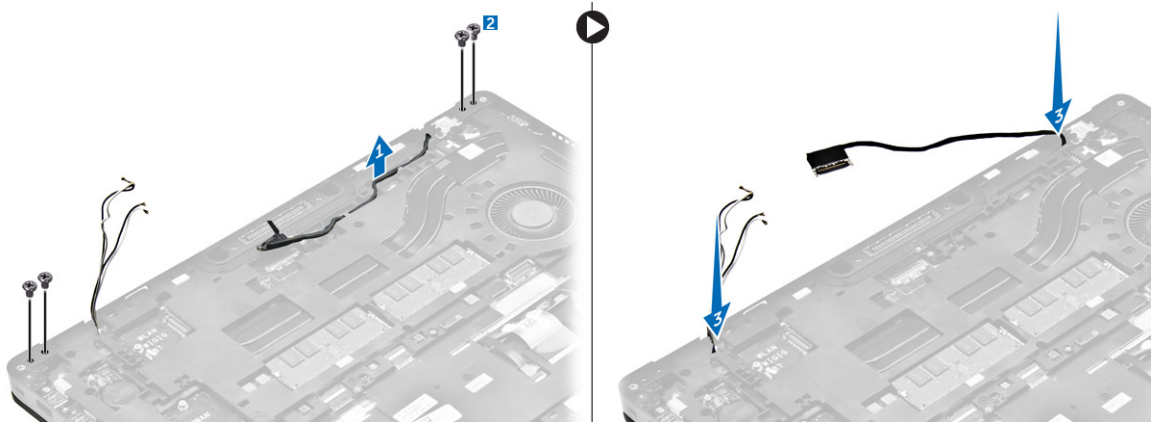


4. To disconnect display cable:
- a. Unroute the WLAN and WWAN cables from the dock frame [1].
  - b. Remove the screw that secures the eDP cable bracket to the computer [2].
  - c. Remove the eDP cable bracket to access the display cable [3].
  - d. Disconnect the eDP cable from the system board [4].



5. To disconnect the display assembly:
- a. Unroute the display cable from the dock frame [1].

- b. Remove the screws that secure the display assembly [2]
- c. Release the antenna cables and display cable from the routing channel [3].



6. To remove the display assembly:
  - a. Remove the screws that secure the display assembly to the computer [1].
  - b. Open the display [2] and lift the display assembly to remove it from the computer [3].



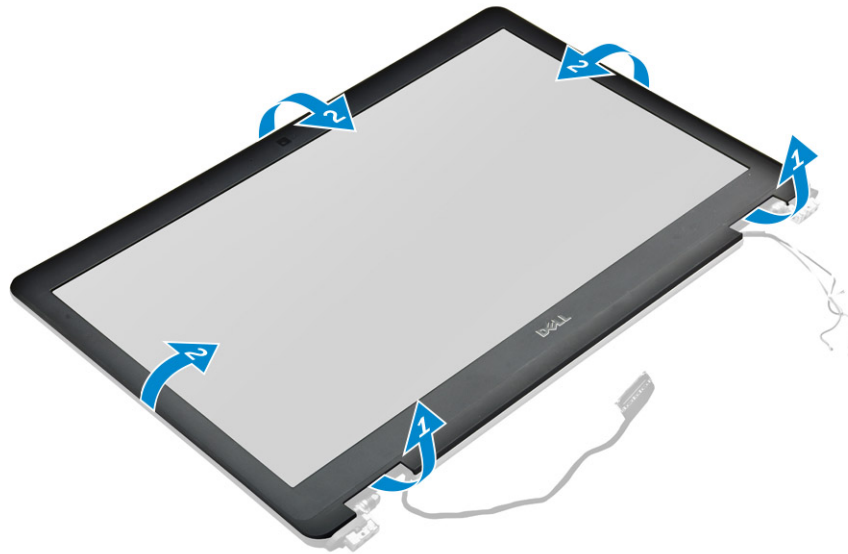
## Installing the display assembly

1. Place the display assembly to align with the screw holders on the computer.
2. Tighten the screws to secure the display assembly to the computer.
3. Route the display cable through the routing channel and route the antenna cables by pushing it through the hole.
4. Connect the antenna cables and display cable to the connectors.
5. Place the display cable bracket over the connector and tighten the screw to secure the display cable to the computer.
6. Place the display hinge bracket and tighten the screw to secure it to the computer.
7. Install the:
  - a. [WLAN](#)
  - b. [WWAN](#)
  - c. [battery](#)
  - d. [base cover](#)

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

## Removing the display bezel

1. Follow the procedure in [Before working inside your computer.](#)
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [display assembly](#)
3. Using a plastic scribe, release the tabs on the edges to release the display bezel from the display assembly [1, 2].
4. Remove the display bezel from the display assembly.



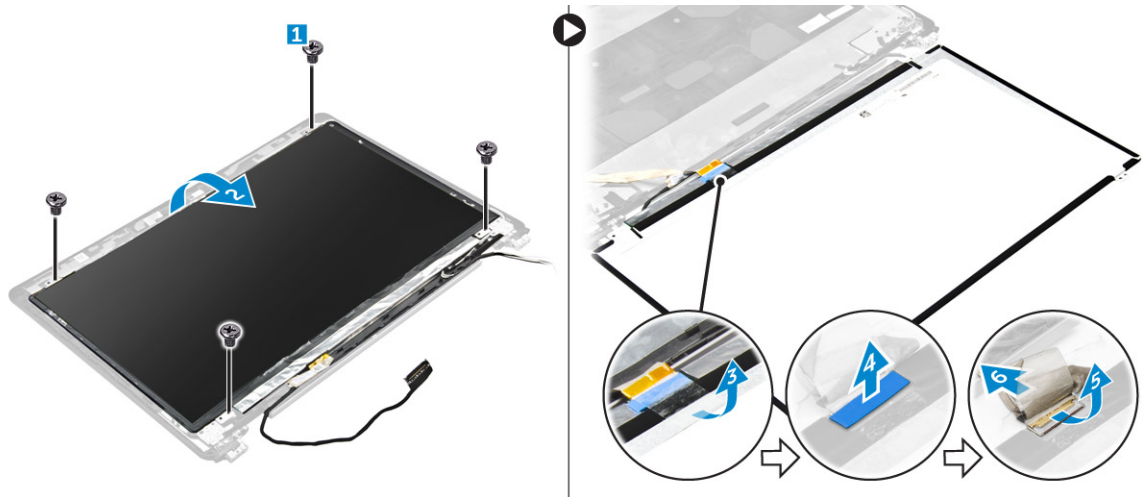
## Installing the display bezel

1. Place the display bezel on the display assembly.
2. Press the edges of the display bezel until it clicks onto the display assembly.
3. Install the:
  - a. [display assembly](#)
  - b. [battery](#)
  - c. [base cover](#)
4. Follow the procedure in [After working inside your system.](#)

## Removing the display panel

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

- c. [display assembly](#)
- d. [display bezel](#)
- 3. To remove the display panel:
  - a. Remove the screws that secure the display panel to the display assembly [1].
  - b. Lift the display panel and flip the display panel to access the eDP cable [2].
  - c. Peel the adhesive tape [3] to access the eDP cable.
  - d. Disconnect the eDP cable from the connector [4, 5, 6].
  - e. Lift the display panel from the computer.



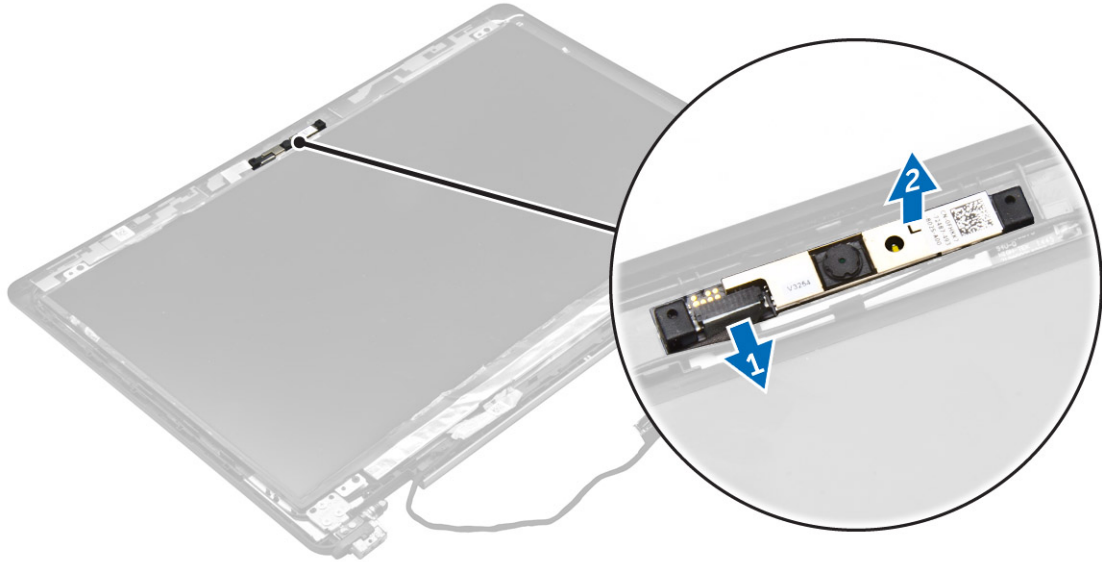
## Installing the display panel

1. Connect the eDP cable to the connector and fix the adhesive tape.
2. Align the display panel with the screw holders on the display assembly.
3. Tighten the screws to secure the display panel to the display assembly.
4. Install the:
  - a. [display assembly](#)
  - b. [display bezel](#)
  - c. [battery](#)
  - d. [base cover](#)
5. Follow the procedure in [After working inside your system.](#)

## Removing the camera

1. Follow the procedure in [Before working inside your computer.](#)
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [WLAN card](#)
  - d. [WWAN card](#)
  - e. [display assembly](#)
  - f. [display bezel](#)
3. To remove the camera:

- a. Disconnect the camera cable from the connector on the display assembly [1].
- b. Lift the camera away from the display assembly [2].



## Installing the camera

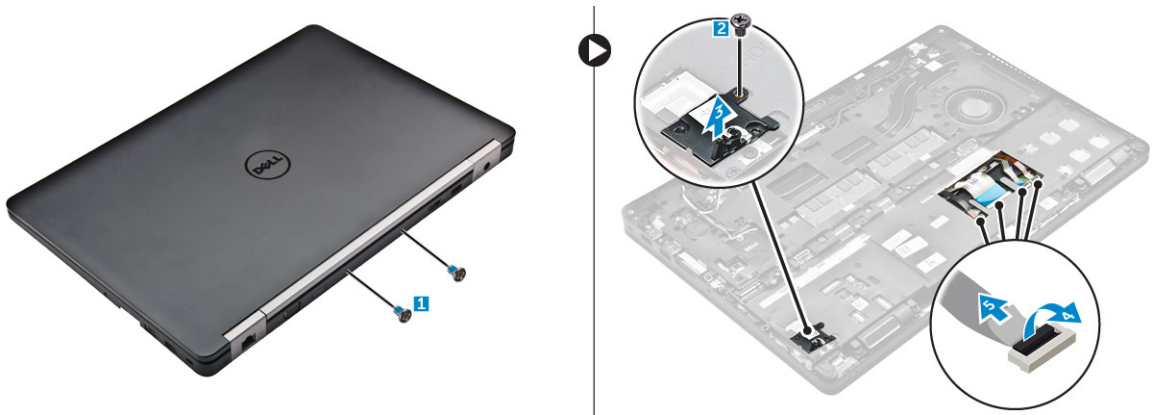
1. Place the camera on the display assembly.
2. Connect the camera cable to the connector on the display assembly
3. Install the:
  - a. [display bezel](#)
  - b. [display assembly](#)
  - c. [WWAN](#)
  - d. [WLAN](#)
  - e. [battery](#)
  - f. [base cover](#)
4. Follow the procedure in [After working inside your system](#).

## Removing the dock frame

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - d. [WLAN card](#)
  - e. [WWAN card](#)
3. To remove the dock frame connectors:
  - a. Remove the screws that secure the dock frame to the computer [1].
  - b. Remove the screw and lift the SSD plate from the computer [2, 3].

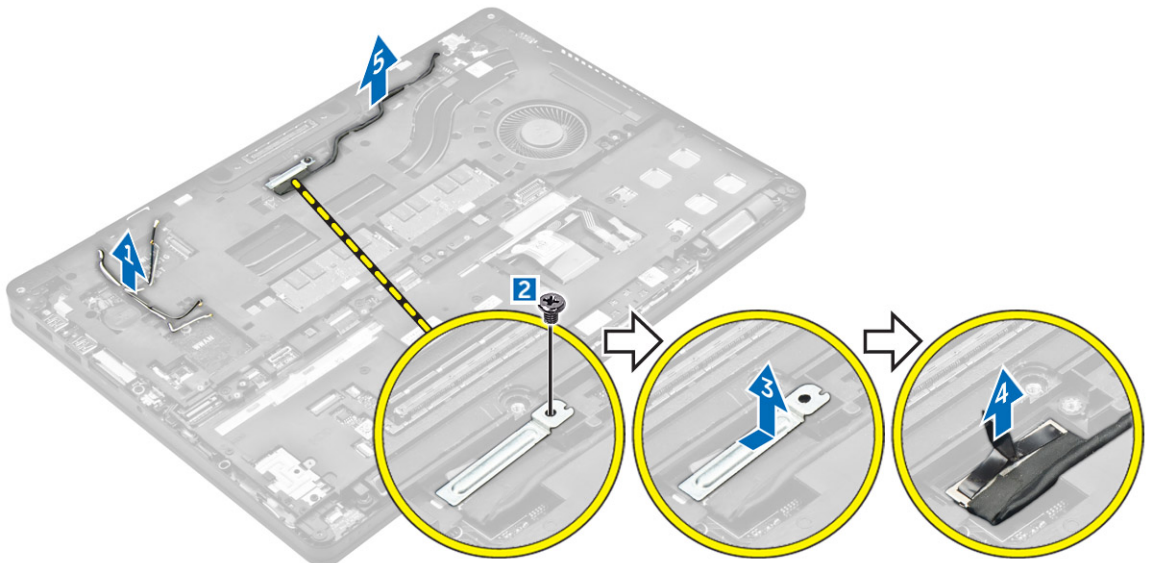
 **NOTE:** This step is required only if the PCIe SSD card is removed.

c. Disconnect the keyboard cables [4, 5].



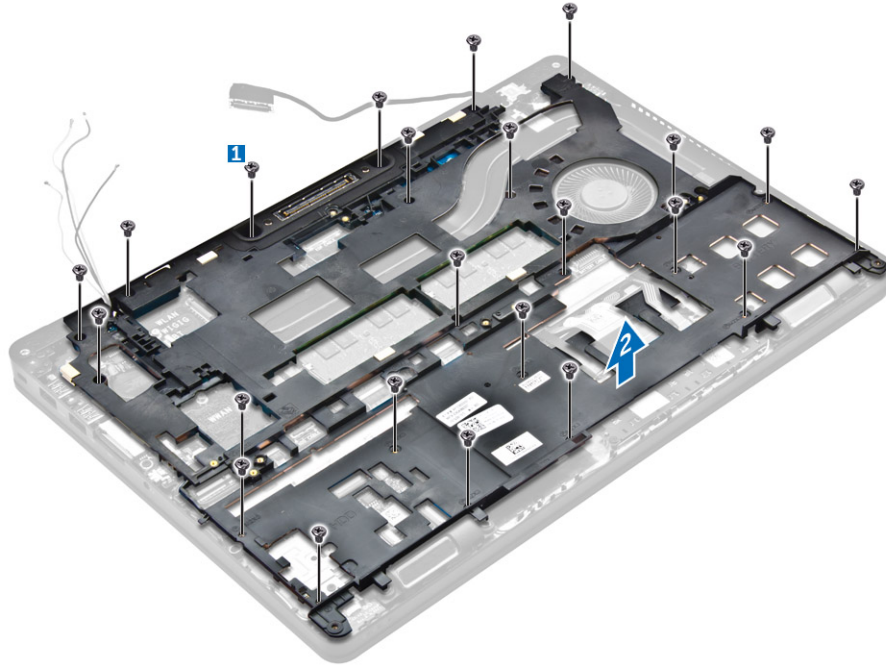
4. To remove the eDP cable:

- a. Unroute the WWAN and WLAN cables from the dock frame [1].
- b. Remove the screw and lift the metal bracket [2, 3].
- c. Disconnect the eDP cable [4].




5. To remove the dock frame:

- a. Remove the screws that secure the dock frame to the computer [1].
- b. Lift the dock frame from the computer [2].



## Installing the dock frame

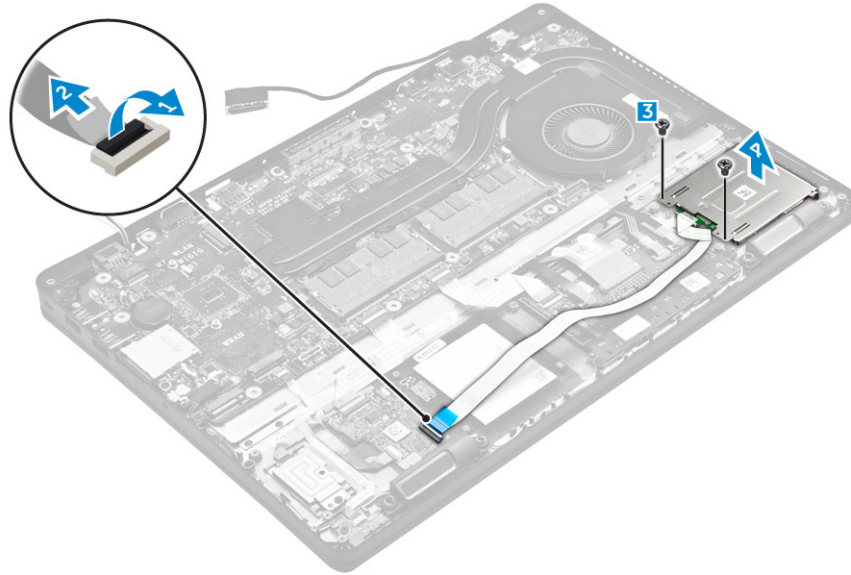
1. Place the dock frame on the computer and tighten the screws.
2. Connect the eDP cable.
3. Place the metal bracket and tighten the screw.
4. Connect the keyboard cable.
5. Place the SSD plate and tighten the screw to secure it.  
 **NOTE:** This step is required only if the PCIe SSD card is removed.
6. Tighten the screws to secure the dock frame to the computer.
7. Install the:
  - a. [WWAN card](#)
  - b. [WLAN card](#)
  - c. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - d. [battery](#)
  - e. [base cover](#)
8. Follow the procedure in [After working inside your system](#).

## Removing the optional SmartCard reader board

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - d. [dock frame](#)



3. To remove the SmartCard reader board:
  - a. Disconnect the SmartCard reader board cable from the USH board [1, 2].
  - b. Peel the cable to release from the adhesive.
  - c. Remove the screws that secure the SmartCard reader board to the computer [3].
  - d. Lift the SmartCard reader board from the computer [4].



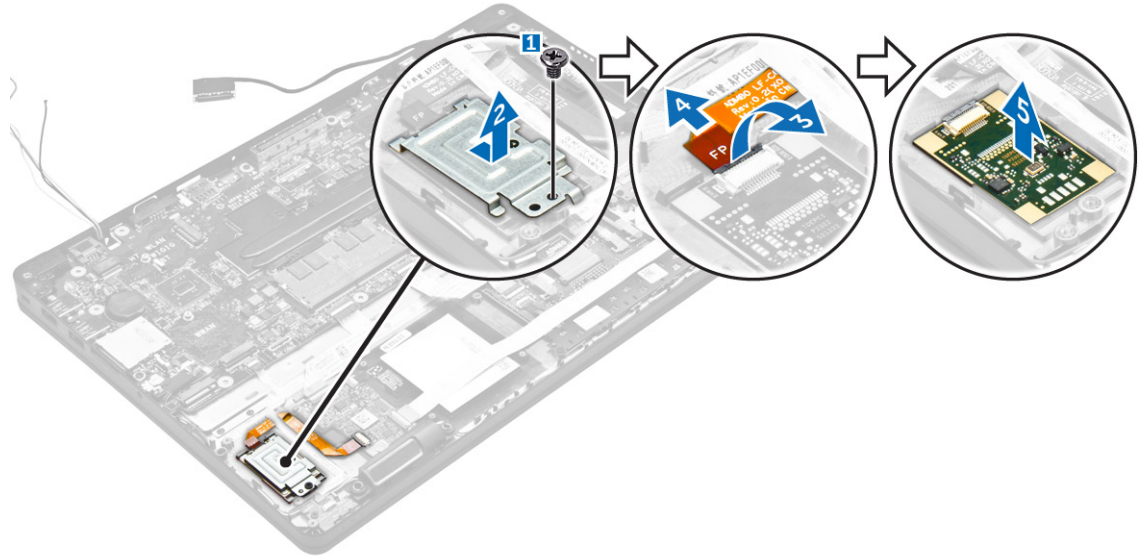
## Installing the optional SmartCard reader board

1. Insert the SmartCard reader board into the slot on the computer.
2. Tighten the screws to secure the SmartCard reader board to the computer.
3. Connect the SmartCard reader cable to the connector on the USH board.
4. Install the:
  - a. [dock frame](#)
  - b. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - c. [battery](#)
  - d. [base cover](#)
5. Follow the procedure in [After working inside your computer](#).

## Removing the optional finger print reader board

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - d. [dock frame](#)
  - e. [WLAN card](#)
  - f. [WWAN card](#)
3. To remove the finger print reader board:

- a. Remove the screw to release the metal bracket that secures the finger print reader board to the computer [1].
- b. Lift the metal bracket from the computer [2].
- c. Disconnect the finger print reader cable from the finger print reader board [3] [4].
- d. Lift the finger print reader board from the computer [5].



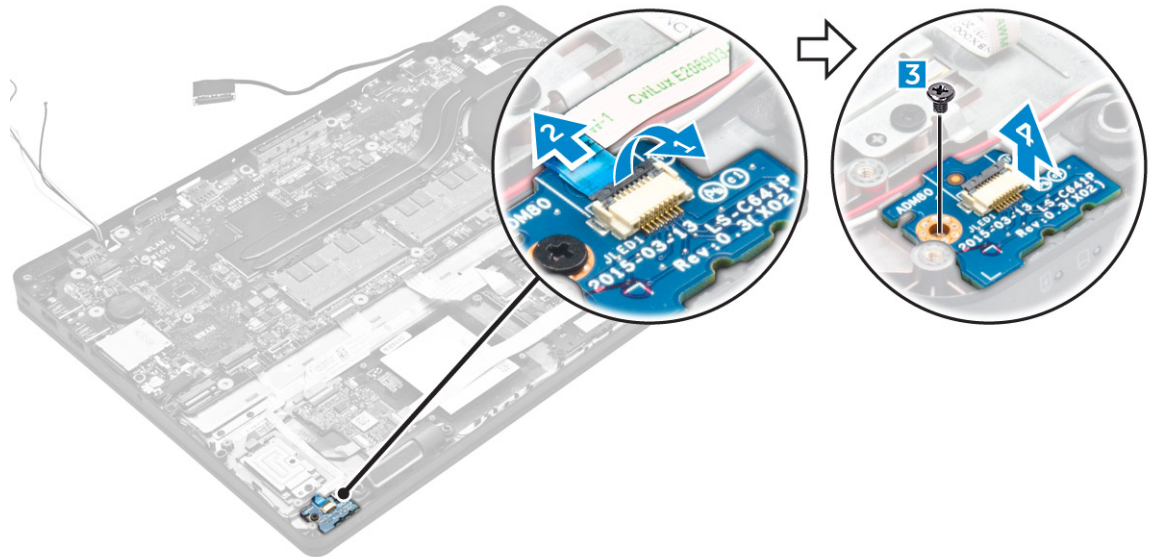
## Installing the optional finger print reader board

1. Insert the finger print reader board into the slot on the computer.
2. Connect the finger print reader cable to the finger print reader board.
3. Place the metal bracket on the finger print reader board and tighten the screw to secure the finger print reader board.
4. Install the:
  - a. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - b. [dock frame](#)
  - c. [WLAN card](#)
  - d. [WWAN card](#)
  - e. [battery](#)
  - f. [base cover](#)
5. Follow the procedure in [After working inside your system](#).

## Removing the LED board

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - d. [dock frame](#)
3. To remove the LED board:

- a. Disconnect the LED board cable from the connector on the LED board [1, 2].
- b. Remove the screw that secures the LED board to the computer [3].
- c. Lift the LED board from the computer [4].



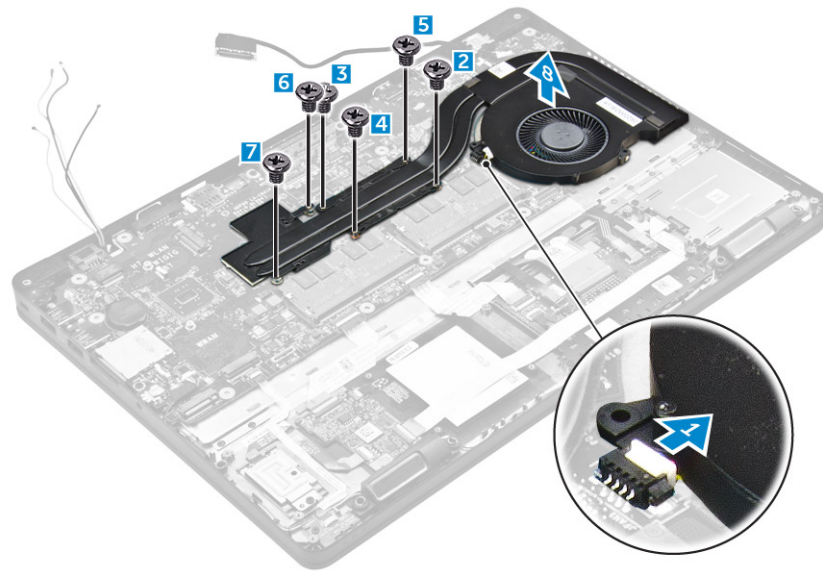
## Installing the LED board

1. Insert the LED board into the slot on the computer.
2. Tighten the screw that secures the LED board to the computer.
3. Connect the LED board cable to the connector on the LED board.
4. Install the:
  - a. [dock frame](#)
  - b. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - c. [battery](#)
  - d. [base cover](#)
5. Follow the procedure in [After working inside your computer](#).

## Removing the heat sink assembly

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - d. [WLAN](#)
  - e. [WWAN](#)
  - f. [dock frame](#)
3. To remove the heat sink:
  - a. Disconnect the fan cable [1].
  - b. Remove the screws that secure the heat sink assembly to the system board [2, 3, 4, 5, 6, 7].

- c. Lift the heat sink assembly from the system board [8].

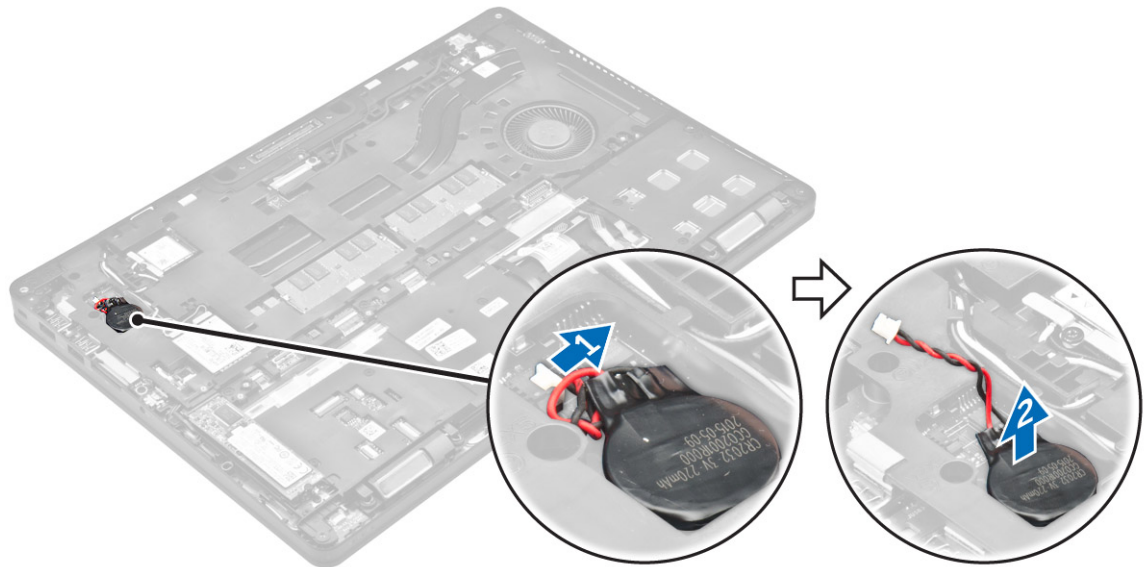


## Installing the heat sink assembly

1. Place the heat sink assembly on the system board and align it with the screw holders.
2. Tighten the screws to secure the heat sink assembly to the system board.
3. Connect the fan cable to the connector on the system board.
4. Install the:
  - a. [dock frame](#)
  - b. [WWAN](#)
  - c. [WLAN](#)
  - d. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - e. [battery](#)
  - f. [base cover](#)
5. Follow the procedure in [After working inside your computer](#).

## Removing the coin cell battery

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
3. To remove the coin cell battery:
  - a. Disconnect the coin cell battery cable from the connector on the system board [1].
  - b. Lift the coin cell battery to release it from the adhesive and remove it from the system board [2].

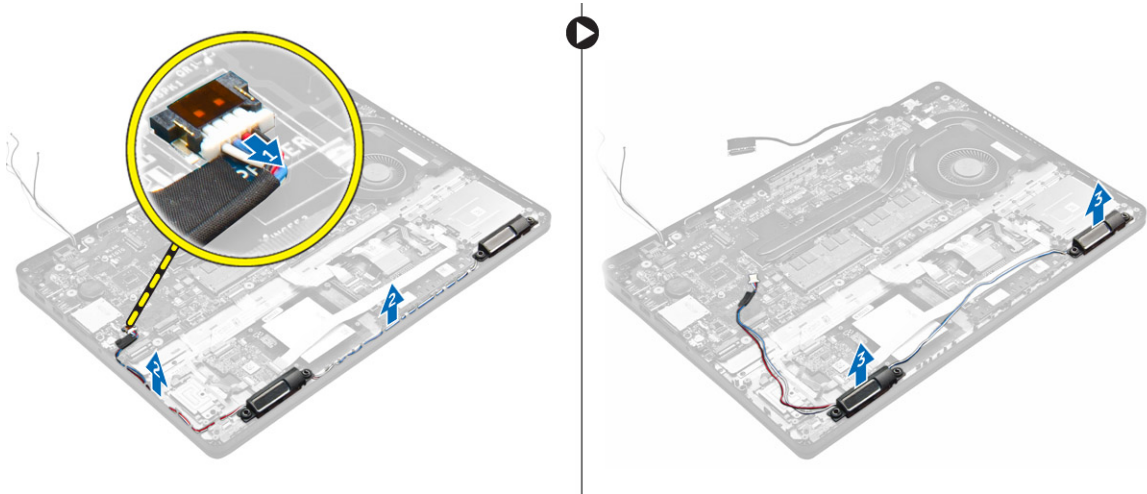


## Installing the coin cell battery

1. Place the coin cell battery into the slot on the system board.
2. Connect the coin cell battery cable to the connector on the system board.
3. Install the:
  - a. [battery](#)
  - b. [base cover](#)
4. Follow the procedure in [After working inside your computer](#).

## Removing the speakers

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [memory module](#)
  - d. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - e. [dock frame](#)
3. To remove the speaker:
  - a. Disconnect the speaker cable [1].
  - b. Disconnect the LED board cable from the LED board.
  - c. Unroute the cables from the retention clips on the computer [2].
  - d. Lift the speaker from the computer [3].

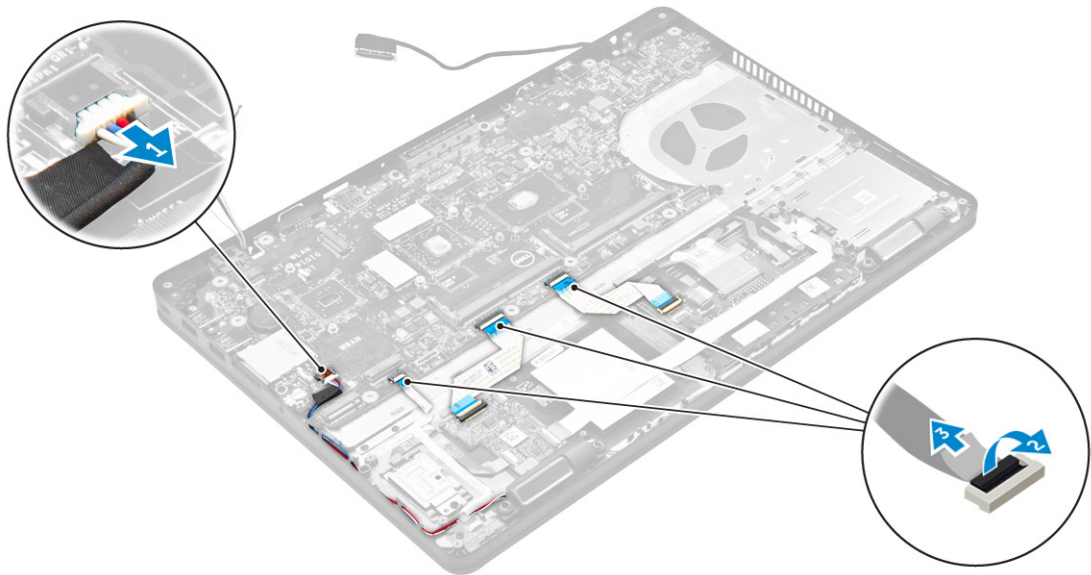


## Installing the speakers

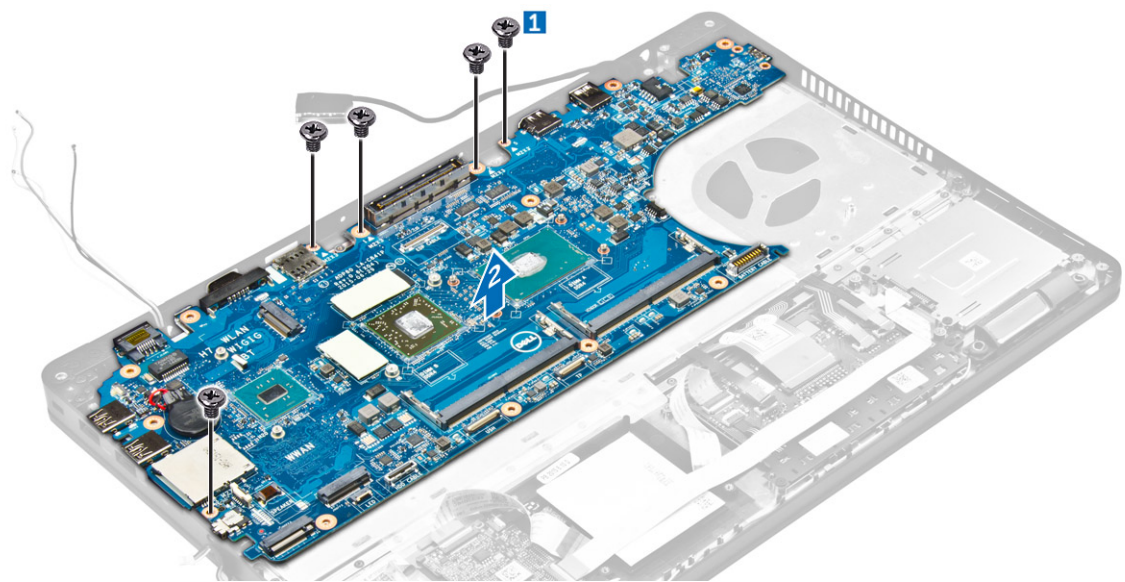
1. Place the speakers into the slots on the computer.
2. Route the speaker cable through the retention clips through the routing channel.
3. Connect the speaker cable to the connector on the system board.
4. Install the:
  - a. [dock frame](#)
  - b. [WLAN](#)
  - c. [WWAN](#)
  - d. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - e. [battery](#)
  - f. [base cover](#)
5. Follow the procedure in [After working inside your computer](#).

## Removing the system board

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
  - a. [base cover](#)
  - b. [battery](#)
  - c. [memory module](#)
  - d. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - e. [WLAN card](#)
  - f. [WWAN card](#)
  - g. [keyboard](#)
  - h. [dock frame](#)
  - i. [power connector port](#)
3. Disconnect the speaker cables [1], touch pad and system board cables [2, 3] from the system board.



4. To remove the system board:
  - a. Remove the screws that secure the system board to the chassis [1].
  - b. Slide the system board to disengage the connectors from the slots on the back of the computer.
  - c. Lift the system board from the computer [2].




## Installing the system board

1. Align the system board with the screw holders on the computer.
2. Tighten the screws to secure the system board to the computer.
3. Connect the speaker cable to its connector on the system and route the cable through its routing channels.
4. Connect the speaker, power connector and coin cell battery cables to the connectors on the system board:

5. Install the:
  - a. [power connector port](#)
  - b. [WLAN](#)
  - c. [heat sink assembly](#)
  - d. [WWAN](#)
  - e. [dock frame](#)
  - f. [hard drive assembly](#) or [M.2 SSD](#) or [PCIe SSD](#)
  - g. [keyboard](#)
  - h. [memory module](#)
  - i. [battery](#)
  - j. [base cover](#)
6. Follow the procedure in [After working inside your computer](#).



## System setup options



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

### 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
- 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

The following table displays the system setup 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.

**Table 1. Navigation keys**

Keys	Navigation
Up arrow	Moves to the previous field.
Down arrow	Moves to the next field.
Enter	Allows you to select a value in the selected field (if applicable) or follow the link in the field.
Spacebar	Expands or collapses a drop-down list, if applicable.


Keys	Navigation
Tab	Moves to the next focus area.  <b>NOTE:</b> For the standard graphics browser only.
Esc	Moves to the previous page till 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.
F1	Displays the System Setup help file.

## System Setup overview

System Setup allows you to:


- Change the system configuration information after you add, change, or remove any hardware in your computer.
- Set or change a user-selectable option such as the user password.
- Read the current amount of memory or set the type of hard drive installed.


Before you use System Setup, it is recommended that you write down the System Setup screen information for future reference.

 **CAUTION:** Unless you are an expert computer user, do not change the settings for this program. Certain changes can cause your computer to work incorrectly.

## Accessing System Setup

1. Turn on (or restart) your computer.
2. After the white Dell logo appears, press F2 immediately.  
The System Setup page is displayed.

 **NOTE:** If you wait too long and the operating system logo appears, wait until you see the desktop. Then, shut down or restart your computer and try again.

 **NOTE:** After the Dell logo appears, you can also press F12 and then select **BIOS setup**.

## General screen options


This section lists the primary hardware features of your computer.

Option	Description
<b>System Information</b>	<ul style="list-style-type: none"> <li>• System Information: Displays BIOS Version, Service Tag, Asset Tag, Ownership Tag, Ownership Date, Manufacture Date, and the Express Service Code.</li> <li>• Memory Information: Displays Memory Installed, Memory Available, Memory Speed, Memory Channels Mode, Memory Technology, DIMM A Size, DIMM B Size.</li> <li>• Processor Information: Displays Processor Type, Core Count, Processor ID, Current Clock Speed, Minimum Clock Speed, Maximum Clock Speed, Processor L2 Cache, Processor L3 Cache, HT Capable, and 64-Bit technology.</li> <li>• Device Information: Displays Primary Hard Drive, SATA-0, M.2PCIe SSD-0, Dock eSATA Device, LOM MAC Address, Video Controller, Video BIOS Version, Video</li> </ul>

Option	Description
	Memory, Panel Type, Native Resolution, Audio Controller, WiFi Device, WiGig Device, Cellular Device, Bluetooth Device.
<b>Battery Information</b>	Displays the battery status and the type of AC adapter connected to the computer.
<b>Boot Sequence</b>	<p><b>Boot Sequence</b> Allows you to change the order in which the computer attempts to find an operating system. The options are:</p> <ul style="list-style-type: none"> <li>• Windows Boot Manager</li> <li>• UEFI: Hard drive details</li> </ul> <p><b>Boot List Options</b> Allows you to change the boot list option:</p> <ul style="list-style-type: none"> <li>• Legacy</li> <li>• UEFI (enabled by default)</li> </ul>
<b>Advanced Boot Options</b>	This option allows you the legacy option ROMs to load. By default, the <b>Enable Legacy Option ROMs</b> is disabled.
<b>Date/Time</b>	Allows you to change the date and time.

## System Configuration screen options


Option	Description
<b>Integrated NIC</b>	<p>Allows you to configure the integrated network controller. The options are:</p> <ul style="list-style-type: none"> <li>• Disabled</li> <li>• Enabled</li> <li>• Enabled w/PXE: This option is enabled by default.</li> </ul>
<b>Parallel Port</b>	<p>Allows you to configure the parallel port on the docking station. The options are:</p> <ul style="list-style-type: none"> <li>• Disabled</li> <li>• AT: This option is enabled by default.</li> <li>• PS2</li> <li>• ECP</li> </ul>
<b>Serial Port</b>	<p>Allows you to configure the integrated serial port. The options are:</p> <ul style="list-style-type: none"> <li>• Disabled</li> <li>• COM1: This option is enabled by default.</li> <li>• COM2</li> <li>• COM3</li> <li>• COM4</li> </ul>

Option	Description
<b>SATA Operation</b>	<p>Allows you to configure the internal SATA hard-drive controller. The options are:</p> <ul style="list-style-type: none"> <li>• Disabled</li> <li>• AHCI</li> <li>• RAID On: This option is enabled by default.</li> </ul>
<b>Drives</b>	<p>Allows you to configure the SATA drives on board. All drives are enabled by default. The options are:</p> <ul style="list-style-type: none"> <li>• SATA-0</li> <li>• SATA-1</li> <li>• SATA-2</li> <li>• M.2 PCIe SSD-0</li> </ul>
<b>SMART Reporting</b>	<p>This field controls whether hard drive errors for integrated drives are reported during system startup. This technology is part of the SMART (Self Monitoring Analysis and Reporting Technology) specification. This option is disabled by default.</p> <ul style="list-style-type: none"> <li>• Enable SMART Reporting</li> </ul>
<b>USB/Thunderbolt Configuration</b>	<p>This is an optional feature.</p> <p>This field configures the integrated USB controller. If Boot Support is enabled, the system is allowed to boot any type of USB Mass Storage Devices (HDD, memory key, floppy).</p> <p>If USB port is enabled, device attached to this port is enabled and available for OS.</p> <p>If USB port is disabled, the OS cannot see any device attached to this port.</p> <p>The options are:</p> <ul style="list-style-type: none"> <li>• Enable USB Boot Support (by default enable)</li> <li>• Enable External USB Port (by default enable)</li> <li>• Enable Thunderbolt Port (by default enable).</li> <li>• Enable Thunderbolt Boot Support. This is an optional feature.</li> <li>• Always Allows Dell Docks. This is an optional feature.</li> <li>• Enables Thunderbolt (and PCIe behind TBT) Pre-boot</li> </ul> <p> <b>NOTE:</b> USB keyboard and mouse always work in the BIOS setup irrespective of these settings.</p>
<b>USB PowerShare</b>	<p>This field configures the USB PowerShare feature behavior. This option allows you to charge external devices using the stored system battery power through the USB PowerShare port.</p>
<b>Audio</b>	<p>This field enables or disables the integrated audio controller. By default, the <b>Enable Audio</b> option is selected. The options are:</p> <ul style="list-style-type: none"> <li>• Enable Microphone (by default enable)</li> </ul>



Option	Description
	<ul style="list-style-type: none"> <li>• Enable Internal Speaker (by default enable)</li> </ul>
<b>Keyboard Illumination</b>	<p>This field lets you choose the operating mode of the keyboard illumination feature. The keyboard brightness level can be set from 0% to 100%. The options are:</p> <ul style="list-style-type: none"> <li>• Disabled</li> <li>• Dim</li> <li>• Bright (enabled by default)</li> </ul>
<b>Keyboard Backlight with AC</b>	<p>The Keyboard Backlight with AC option does not affect the main keyboard illumination feature. Keyboard Illumination will continue to support the various illumination levels. This field has an effect when the backlight is enabled.</p>
<b>Touchscreen</b>	<p>This option controls to enabled or disabled the touchscreen.</p>
<b>Unobtrusive Mode</b>	<p>This option, when enabled, pressing Fn+F7 turns off all light and sound emissions in the system. To resume normal operation, press Fn+F7 again. This option is disabled by default.</p>
<b>Miscellaneous Devices</b>	<p>Allows you to enable or disable the following devices:</p> <ul style="list-style-type: none"> <li>• Enable Camera (enabled by default)</li> <li>• SD Card Read Only</li> <li>• Enable Hard Drive Free Fall Protection (enabled by default)</li> <li>• Enable Media Card</li> <li>• Disable Media Card</li> </ul>




## Video screen options


Option	Description
<b>LCD Brightness</b>	<p>Allows you to set the display brightness depending up on the power source (On Battery and On AC).</p>

 **NOTE:** The video setting will be visible only when a video card is installed into the system.

## Security screen options


Option	Description
<b>Admin Password</b>	<p>Allows you to set, change, or delete the administrator (admin) password.</p> <p> <b>NOTE:</b> You must set the admin password before you set the system or hard drive password. Deleting the admin password automatically deletes the system password and the hard drive password.</p> <p> <b>NOTE:</b> Successful password changes take effect immediately.</p> <p>Default setting: Not set</p>

Option	Description
<b>System Password</b>	<p>Allows you to set, change or delete the system password.</p> <p> <b>NOTE:</b> Successful password changes take effect immediately.</p> <p>Default setting: Not set</p>
<b>Mini Card SSD Password</b>	<p>Allows you to set, change or delete the Mini Card SSD Password.</p> <p> <b>NOTE:</b> Successful password changes take effect immediately.</p> <p>Default setting: Not set</p>
<b>Strong Password</b>	<p>Allows you to enforce the option to always set strong passwords.</p> <p>Default Setting: Enable Strong Password is not selected.</p> <p> <b>NOTE:</b> If Strong Password is enabled, Admin and System passwords must contain at least one uppercase character, one lowercase character and be at least 8 characters long.</p>
<b>Password Configuration</b>	<p>Allows you to determine the minimum and maximum length of Administrator and System passwords.</p>
<b>Password Bypass</b>	<p>Allows you to enable or disable the permission to bypass the System and the Internal HDD password, when they are set. The options are:</p> <ul style="list-style-type: none"> <li>• Disabled</li> <li>• Reboot bypass</li> </ul> <p>Default setting: Disabled</p>
<b>Password Change</b>	<p>Allows you to enable the disable permission to the System and Hard Drive passwords when the admin password is set.</p> <p>Default setting: <b>Allow Non-Admin Password Changes</b> is selected.</p>
<b>Non-Admin Setup Changes</b>	<p>Allows you to determine whether changes to the setup options are allowed when an Administrator Password is set. If disabled the setup options are locked by the admin password.</p>
<b>TPM 1.2 Security</b>	<p>Allows you to enable the Trusted Platform Module (TPM) during POST. The options are:</p> <ul style="list-style-type: none"> <li>• TPM On (enabled by default)</li> <li>• Clear</li> <li>• PPI Bypass for Enabled Commands</li> <li>• PPI Bypass for Disabled Commands</li> <li>• Disabled</li> <li>• Enabled</li> </ul>

Option	Description
<b>Computrace</b>	<p>Allows you to activate or disable the optional Computrace software. The options are:</p> <ul style="list-style-type: none"> <li>• Deactivate</li> <li>• Disable</li> <li>• Activate</li> </ul> <p> <b>NOTE:</b> The Activate and Disable options will permanently activate or disable the feature and no further changes will be allowed</p> <p>Default setting: Deactivate</p>
<b>CPU XD Support</b>	<p>Allows you to enable the Execute Disable mode of the processor.</p> <p>Enable CPU XD Support (default)</p>
<b>OROM Keyboard Access</b>	<p>Allows you to set an option to enter the Option ROM Configuration screens using hotkeys during boot. The options are:</p> <ul style="list-style-type: none"> <li>• Enable</li> <li>• One Time Enable</li> <li>• Disable</li> </ul> <p>Default setting: Enable</p>

## Secure Boot screen options

Option	Description
<b>Secure Boot Enable</b>	<p>This option enables or disables the <b>Secure Boot</b> feature.</p> <ul style="list-style-type: none"> <li>• Disabled</li> <li>• Enabled</li> </ul> <p>Default setting: Enabled.</p>
<b>Expert Key Management</b>	<p>Allows you to manipulate the security key databases only if the system is in Custom Mode. The <b>Enable Custom Mode</b> option is disabled by default. The options are:</p> <ul style="list-style-type: none"> <li>• PK</li> <li>• KEK</li> <li>• db</li> <li>• dbx</li> </ul> <p>If you enable the <b>Custom Mode</b>, the relevant options for <b>PK, KEK, db, and dbx</b> appear. The options are:</p> <ul style="list-style-type: none"> <li>• <b>Save to File</b>—Saves the key to a user-selected file</li> </ul>

Option	Description
	<ul style="list-style-type: none"> <li>• <b>Replace from File</b>—Replaces the current key with a key from a user-selected file</li> <li>• <b>Append from File</b>—Adds a key to the current database from a user-selected file</li> <li>• <b>Delete</b>—Deletes the selected key</li> <li>• <b>Reset All Keys</b>—Resets to default setting</li> <li>• <b>Delete All Keys</b>—Deletes all the keys</li> </ul>
	<p> <b>NOTE:</b> If you disable the <b>Custom Mode</b>, all the changes made will be erased and the keys will restore to default settings.</p>

## Intel Software Guard Extensions screen options

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


## Performance screen options

Option	Description
<b>Multi Core Support</b>	<p>This field specifies whether the process has one or all cores enabled. The performance of some applications improves with the additional cores. This option is enabled by default. Allows you to enable or disable multi-core support for the processor. The installed processor supports two cores. If you enable Multi Core Support, two cores are enabled. If you disable Multi Core Support, one core is enabled.</p> <ul style="list-style-type: none"> <li>• Enable Multi Core Support</li> </ul> <p>Default setting: The option is enabled.</p>
<b>Intel SpeedStep</b>	<p>Allows you to enable or disable the Intel SpeedStep feature.</p> <ul style="list-style-type: none"> <li>• Enable Intel SpeedStep</li> </ul>




Option	Description
	Default setting: The option is enabled.
<b>C-States Control</b>	<p>Allows you to enable or disable the additional processor sleep states.</p> <ul style="list-style-type: none"> <li>• C states</li> </ul> <p>Default setting: The option is enabled.</p>
<b>Intel TurboBoost</b>	<p>Allows you to enable or disable the Intel TurboBoost mode of the processor.</p> <ul style="list-style-type: none"> <li>• Enable Intel TurboBoost</li> </ul> <p>Default setting: The option is enabled.</p>
<b>Hyper-Thread Control</b>	<p>Allows you to enable or disable the Hyper-Threading in the processor.</p> <ul style="list-style-type: none"> <li>• Disabled</li> <li>• Enabled</li> </ul> <p>Default setting: Enabled.</p>


## Power Management screen options

Option	Description
<b>AC Behavior</b>	<p>Allows you to enable or disable the computer from turning on automatically when an AC adapter is connected.</p> <p>Default setting: Wake on AC is not selected.</p>
<b>Auto On Time</b>	<p>Allows you to set the time at which the computer must turn on automatically. The options are:</p> <ul style="list-style-type: none"> <li>• Disabled</li> <li>• Every Day</li> <li>• Weekdays</li> <li>• Select Days</li> </ul> <p>Default setting: Disabled</p>
<b>USB Wake Support</b>	<p>Allows you to enable USB devices to wake the system from Standby.</p> <p> <b>NOTE:</b> This feature is only functional when the AC power adapter is connected. If the AC power adapter is removed during Standby, the system setup removes power from all the USB ports to conserve battery power.</p> <ul style="list-style-type: none"> <li>• Enable USB Wake Support</li> </ul> <p>Default setting: The option is disabled.</p>

Option	Description
<b>Wireless Radio Control</b>	<p>Allows you to enable or disable the feature that automatically switches from wired or wireless networks without depending on the physical connection.</p> <ul style="list-style-type: none"> <li>• Control WLAN Radio</li> <li>• Control WWAN Radio</li> </ul> <p>Default setting: The option is disabled.</p>
<b>Wake on LAN/WLAN</b>	<p>Allows you to enable or disable the feature that powers on the computer from the Off state when triggered by a LAN signal.</p> <ul style="list-style-type: none"> <li>• Disabled</li> <li>• LAN Only</li> <li>• WLAN Only</li> <li>• LAN or WLAN</li> </ul> <p>Default setting: Disabled</p>
<b>Block Sleep</b>	<p>This option lets you block entering to sleep (S3 state) in operating system environment.</p> <p>Block Sleep (S3 state)</p> <p>Default setting: This option is disabled</p>
<b>Peak Shift</b>	<p>This option enables you to minimize the AC power consumption during the peak power times of day. After you enable this option, your system runs only in battery even if the AC is attached.</p>
<b>Dock Support on Battery</b>	<p>This option allows you to use the docking station when AC power is absent but only when the battery is above a certain charge percentage. The percentage may change per battery and per platform.</p> <ul style="list-style-type: none"> <li>• Dock Support on Battery</li> </ul> <p>Default setting: Disabled</p>
<b>Advanced Battery Charge Configuration</b>	<p>This option enables you to maximize the battery health. By enabling this option, your system uses the standard charging algorithm and other techniques, during the non-work hours to improve the battery health.</p> <p>Disabled</p> <p>Default setting: Disabled</p>
<b>Primary Battery Charge Configuration</b>	<p>Allows you to select the charging mode for the battery. The options are:</p> <ul style="list-style-type: none"> <li>• Adaptive</li> <li>• Standard — Fully charges your battery at a standard rate.</li> <li>• ExpressCharge — The battery charges over a shorter period of time using Dell's fast charging technology. This option is enabled by default.</li> </ul>

Option	Description
	<ul style="list-style-type: none"> <li>• Primarily AC use</li> <li>• Custom</li> </ul> <p>If Custom Charge is selected, you can also configure Custom Charge Start and Custom Charge Stop.</p> <p> <b>NOTE:</b> All charging mode may not be available for all the batteries. To enable this option, disable the <b>Advanced Battery Charge Configuration</b> option.</p>

## POST Behavior screen options

Option	Description
<b>Adapter Warnings</b>	<p>Allows you to enable or disable the system setup (BIOS) warning messages when you use certain power adapters.</p> <p>Default setting: Enable Adapter Warnings</p>
<b>Keypad (Embedded)</b>	<p>Allows you to choose one of two methods to enable the keypad that is embedded in the internal keyboard.</p> <ul style="list-style-type: none"> <li>• Fn Key Only: This option is enabled by default.</li> <li>• By Numlock</li> </ul> <p> <b>NOTE:</b> When setup is running, this option has no effect. Setup works in Fn Key Only mode.</p>
<b>Mouse/Touchpad</b>	<p>Allows you to define how the system handles mouse and touch pad input. The options are:</p> <ul style="list-style-type: none"> <li>• Serial Mouse</li> <li>• PS2 Mouse</li> <li>• Touchpad/PS-2 Mouse: This option is enabled by default.</li> </ul>
<b>Numlock Enable</b>	<p>Allows you to enable the Numlock option when the computer boots.</p> <p>Enable Network. This option is enabled by default.</p>
<b>Fn Key Emulation</b>	<p>Allows you to set the option where the Scroll Lock key is used to simulate the Fn key feature.</p> <p>Enable Fn Key Emulation (default)</p>
<b>Fn Lock Options</b>	<p>Allows you to let hot key combinations Fn + Esc toggle the primary behavior of F1–F12, between their standard and secondary functions. If you disable this option, you cannot toggle dynamically the primary behavior of these keys. The available options are:</p> <ul style="list-style-type: none"> <li>• Fn Lock. This option is selected by default.</li> <li>• Lock Mode Disable/Standard</li> </ul>


Option	Description
	<ul style="list-style-type: none"> <li>Lock Mode Enable/Secondary</li> </ul>
<b>MEBx Hotkey</b>	<p>Allows you to specify whether the MEBx Hotkey function should enable, during the system boot.</p> <p>Default Setting: Enable MEBx Hotkey</p>
<b>Fastboot</b>	<p>Allows you to speed up the boot process by bypassing some of the compatibility steps. The options are:</p> <ul style="list-style-type: none"> <li>Minimal</li> <li>Thorough (default)</li> <li>Auto</li> </ul>
<b>Extended BIOS POST Time</b>	<p>Allows you to create an additional preboot delay. The options are:</p> <ul style="list-style-type: none"> <li>0 seconds. This option is enabled by default.</li> <li>5 seconds</li> <li>10 seconds</li> </ul>

## Virtualization support screen options

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

## Wireless screen options

Option	Description
<b>Wireless Switch</b>	<p>Allows to set the wireless devices that can be controlled by the wireless switch. The options are:</p> <ul style="list-style-type: none"> <li>WWAN</li> </ul>

Option	Description
	<ul style="list-style-type: none"> <li>• GPS (on WWAN Module)</li> <li>• WLAN/WiGig</li> <li>• Bluetooth</li> </ul> <p>All the options are enabled by default.</p> <p> <b>NOTE:</b> For WLAN and WiGig enable or disable controls are tied together and they cannot be enabled or disabled independently.</p>
<b>Wireless Device Enable</b>	<p>Allows you to enable or disable the internal wireless devices.</p> <ul style="list-style-type: none"> <li>• WWAN/GPS</li> <li>• WLAN/WiGig</li> <li>• Bluetooth</li> </ul> <p>All the options are enabled by default.</p>

## Maintenance screen options

Option	Description
<b>Service Tag</b>	Displays the Service Tag of your computer.
<b>Asset Tag</b>	Allows you to create a system asset tag if an asset tag is not already set. This option is not set by default.
<b>BIOS Downgrade</b>	This controls flashing of the system firmware to previous revisions.
<b>Data Wipe</b>	<p>This field allows users to erase the data securely from all internal storage devices. The following is list of devices affected:</p> <ul style="list-style-type: none"> <li>• Internal HDD</li> <li>• Internal SDD</li> <li>• Internal mSATA</li> <li>• Internal eMMC</li> </ul>
<b>BIOS Recovery</b>	<p>This field allows you to recover from certain corrupted BIOS conditions from a recover file on the user primary hard drive or an external USB key.</p> <ul style="list-style-type: none"> <li>• BIOS Recovery from Hard Drive (enabled by default)</li> </ul>




## System Log screen options

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

Option	Description
Power Events	Allows you to view and clear the System Setup (Power) events.

## Updating the BIOS

It is recommended to update your BIOS (System Setup), on replacing the system board or if an update is available. For laptops, ensure that your computer battery is fully charged and connected to a power outlet

1. Restart the computer.
  2. Go to **Dell.com/support**.
  3. Enter the **Service Tag** or **Express Service Code** and click **Submit**.
    -  **NOTE:** To locate the Service Tag, click **Where is my Service Tag?**
    -  **NOTE:** If you cannot find your Service Tag, click **Detect My Product**. Proceed with the instructions on screen.
  4. If you are unable to locate or find the Service Tag, click the Product Category of your computer.
  5. Choose the **Product Type** from the list.
  6. Select your computer model and the **Product Support** page of your computer appears.
  7. Click **Get drivers** and click **View All Drivers**.  
The Drivers and Downloads page opens.
  8. On the Drivers and Downloads screen, under the **Operating System** drop-down list, select **BIOS**.
  9. Identify the latest BIOS file and click **Download File**.  
You can also analyze which drivers need an update. To do this for your product, click **Analyze System for Updates** and follow the instructions on the screen.
  10. Select your preferred download method in the **Please select your download method below** window, click **Download File**.  
The **File Download** window appears.
  11. Click **Save** to save the file on your computer.
  12. Click **Run** to install the updated BIOS settings on your computer.  
Follow the instructions on the screen.
-  **NOTE:** It is recommended not to update the BIOS version for more than 3 revisions. For example: If you want to update the BIOS from 1.0 to 7.0, then install version 4.0 first and then install version 7.0.


## System and setup password

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

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


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

 **CAUTION:** Anyone can access the data stored on your computer if it is not locked and left unattended.

 **NOTE:** Your computer is shipped with the system and setup password feature disabled.

## Assigning a system password and setup password

You can assign a new **System Password** and/or **Setup Password** or change an existing **System Password** and/or **Setup Password** only when **Password Status** is **Unlocked**. If the Password Status is **Locked**, you cannot change the System Password.

 **NOTE:** If the password jumper is disabled, the existing System Password and Setup Password are deleted and you need not provide the system password to log on to the computer.

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

1. In the **System BIOS** or **System Setup** screen, select **System Security** and press Enter.  
The **System Security** screen appears.
2. In the **System Security** screen, verify that **Password Status** is **Unlocked**.
3. Select **System Password**, enter your system password, and press Enter or Tab.  
Use the following guidelines to assign the system password:
  - A password can have up to 32 characters.
  - The password can contain the numbers 0 through 9.
  - Only lower case letters are valid, upper case letters are not allowed.
  - Only the following special characters are allowed: space, ("), (+), (,), (-), (.), (/), (:), (D), (\), (I), (').

Re-enter the system password when prompted.


4. Type the system password that you entered earlier and click **OK**.
5. Select **Setup Password**, type your system password and press Enter or Tab.  
A message prompts you to re-type the setup password.
6. Type the setup password that you entered earlier and click **OK**.
7. Press Esc and a message prompts you to save the changes.
8. Press Y to save the changes.  
The computer reboots.

## Deleting or changing an existing system and/or setup password

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

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


1. In the **System BIOS** or **System Setup** screen, select **System Security** and press Enter.  
The **System Security** screen is displayed.
2. In the **System Security** screen, verify that **Password Status** is **Unlocked**.
3. Select **System Password**, alter or delete the existing system password and press Enter or Tab.
4. Select **Setup Password**, alter or delete the existing setup password and press Enter or Tab.




 **NOTE:** If you change the System and/or Setup password, re-enter the new password when promoted. If you delete the System and/or Setup password, confirm the deletion when promoted.

5. Press Esc and a message prompts you to save the changes.
6. Press Y to save the changes and exit from System Setup.  
The computer reboots.



## Technical specifications

 **NOTE:** Offerings may vary by region. For more information regarding the configuration of your computer in:

- Windows 10, click or tap **Start**  → **Settings** → **System** → **About**.
- Windows 8.1 and Windows 8, click or tap **Start**  → **PC Settings** → **PC and devices** → **PC Info**.
- Windows 7, click **Start** , right-click **My Computer**, and then select **Properties**.

## System specifications

Feature	Specification
Chipset	Intel 6th Generation processors
DRAM bus width	64-bit
Flash EPROM	SPI 128 Mbits
PCIe bus	100 MHz
External Bus Frequency	PCIe Gen3 (8 GT/s)

## Processor specifications

Feature	Specification
Types	Intel Core i5 series or i7 series or Intel Xeon
L3 cache	
i5 series	<ul style="list-style-type: none"> <li>• non Vpro — 6 MB</li> <li>• vPro — 8 MB</li> </ul>
i7 series	<ul style="list-style-type: none"> <li>• vPro — 8 MB</li> </ul>
Intel Xeon	8 MB

## Memory specifications

Feature	Specification
Memory connector	Two SODIMM slots
Memory capacity	4 GB and 8 GB
Memory type	DDR4 SDRAM
Speed	2133 MHz
Minimum memory	4 GB
Maximum memory	8 GB

 **NOTE:** Intel Xeon processor supports Error Correcting Code (ECC) memory.

## Audio specifications

Feature	Specification
Types	High-definition audio
Controller	Realtek ALC3235
Stereo conversion	Digital audio-out through HDMI — up to 7.1 compressed and uncompressed audio
Internal interface	High-definition audio codec
External interface	Stereo headset/mic combo
Speakers	Two
Internal speaker amplifier	2 W (RMS) per channel
Volume controls	Hot keys

## Video specifications

Feature	Specification
Type	Integrated on system board, hardware accelerated
UMA controller	Intel HD Graphics 530 AMD Radeon R7M370
Data bus	Integrated video

Feature	Specification
External display support	<ul style="list-style-type: none"> <li>• 19-pin HDMI connector</li> <li>• 15-pin VGA connector</li> </ul>

## Camera specifications

Feature	Specification
HD Panel Resolution	1366 x 768 pixels
FHD Panel Resolution	1920 x 1080 pixels
HD Panel Video Resolution (maximum)	1366 x 768 pixels
FHD Panel Video Resolution (maximum)	1920 x 1080 pixels
Diagonal viewing angle	74°

## Communication specifications

Features	Specification
Network adapter	10/100/1000 Mb/s Ethernet (RJ-45)
Wireless	Internal wireless local area network (WLAN), wireless wide area network (WWAN), wireless gigabit (WiGig).



**NOTE:** WWAN and WiGig is optional. Bluetooth 4.1

## Port and connector specifications

Feature	Specification
Audio	Stereo headset/mic combo
Video	<ul style="list-style-type: none"> <li>• One 19-pin HDMI connector</li> <li>• 15 pin VGA connector</li> </ul>
Network adapter	One RJ-45 connector
USB	Three USB3.0, One USB 3.0 with PowerShare

Feature	Specification
Memory card reader	Up to SD4.0
Micro SIM (uSIM) card	One external (optional)
Docking port	Docking has two options: <ul style="list-style-type: none"> <li>• One e-docking port</li> <li>• Optional Thunderbolt 3 cable docking port</li> </ul>

## Contactless smart card specifications

Feature	Specification
Supported Smart Cards/ Technologies	BTO with USH

## Display specifications

Feature	Specification
Type	<ul style="list-style-type: none"> <li>• Non-touch FHD anti-glare</li> <li>• HD anti-glare</li> </ul>
Height	360 mm (14.17 inches)
Width	224.3 mm (8.83 inches)
Diagonal	396.24 mm (15.6 inches)
Active area (X/Y)	344.23 mm x 193.54 mm
<b>Non-touch FHD anti-glare:</b>	
Maximum resolution	1920 x 1080
Maximum brightness	300 nits
Refresh rate	60 Hz
Maximum viewing angles (horizontal)	80/80
Maximum viewing angles (vertical)	80/80
Pixel pitch	0.179 mm (0.007 inches)

Feature	Specification
<b>Touch FHD anti-glare:</b>	
Maximum resolution	1920 x 1080
Maximum brightness	300 nits
Refresh rate	60 Hz
Maximum viewing angles (horizontal)	80/80
Maximum viewing angles (vertical)	80/80
Pixel pitch	0.179 mm (0.007 inches)
<b>HD anti-glare:</b>	
Maximum resolution	1366 x 768
Maximum brightness	200 nits
Refresh rate	60 Hz
Maximum viewing angles (horizontal)	40/40
Maximum viewing angles (vertical)	+10/-30
Pixel pitch	0.252 mm (0.01 inches)

## Keyboard specifications

Feature	Specification
Number of keys	<ul style="list-style-type: none"> <li>• United States: 103 keys</li> <li>• United Kingdom: 104 keys</li> <li>• Japan: 107 keys</li> <li>• Brazil: 106 keys</li> </ul>

## Touchpad specifications

Feature	Specification
<b>Active Area:</b>	
X-axis	99.50 mm

Feature	Specification
Y-axis	53.00 mm

## Battery specifications

Feature	Specification
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Type	<ul style="list-style-type: none"> <li>62 Whr (4-cell)</li> <li>84 Whr (6-cell)</li> </ul>
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### 62 Whr (4-cell):

Depth	233.00 mm (9.17 inches)
Height	7.05 mm (0.27 inch)
Width	94.80 mm (3.73 inches)
Weight	325 g (0.72 lb)
Voltage	7.6 V DC

### 84 Whr (6-cell):

Depth	332.00 mm (13.07 inches)
Height	7.7 mm (0.303 inches)
Width	92.6 mm (3.65 inches)
Weight	430.00 g (0.95 lb)
Voltage	11.4 V DC
Life span	300 discharge per charge cycles

### Temperature range

Operating	<ul style="list-style-type: none"> <li>Charge: 0°C to 50°C (32°F to 158°F)</li> <li>Discharge: 0°C to 70°C (32°F to 122°F)</li> <li>Operating: 0°C to 35°C (32°F to 95°F)</li> </ul>
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Non-operating	- 20°C to 65°C (- 4°F to 149°F)
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Coin cell battery	3 V CR2032 lithium coin cell
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## AC Adapter specifications

Feature	Specification
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Type	130 W
Input voltage	100 V AC to 240 V AC

Feature	Specification
Input current (maximum)	1.5 A
Input frequency	50 Hz to 60 Hz
Output current	3.34 A
Rated output voltage	19.5 +/- 1.0 V DC
Temperature range (Operating)	0°C to 40°C (32°F to 104°F)
Temperature range (Non-Operating)	-40°C to 70°C (-40°F to 158°F)

## Physical specifications

Feature	Specification
Front height	<ul style="list-style-type: none"> <li>• Non touch – 24.55 mm (0.97 inch)</li> <li>• Touch – 24.55 mm (0.97 inch)</li> </ul>
Back height	<ul style="list-style-type: none"> <li>• Non touch – 24.55 mm (0.97 inch)</li> <li>• Touch – 26.10 mm (1.03 inch)</li> </ul>
Width	377.10 mm (14.85 inches)
Depth	252.60 mm (9.94 inches)
Weight	<ul style="list-style-type: none"> <li>• Non touch – 4.92 lb (2.23 kg)</li> <li>• Touch – 5.44 lb (2.47 kg)</li> </ul>

## Environmental specifications

Temperature	Specifications
Operating	0°C to 35°C (32°F to 95°F)
Storage	-40°C to 65°C (-40°F to 149°F)
Relative humidity (maximum)	Specifications
Operating	10 % to 90 % (non condensing)
Storage	5 % to 95 % (non condensing)

<b>Altitude (maximum)</b>	<b>Specifications</b>
<b>Operating</b>	0 m to 3048 m (0 ft to 10,000 ft)
<b>Non-operating</b>	0 m to 10,668 m (0 ft to 35,000 ft)
<b>Airborne contaminant level</b>	G1 as defined by ISA-71.04-1985




# Diagnostics


If you experience a problem with your computer, run the ePSA diagnostics before contacting Dell for technical assistance. The purpose of running diagnostics is to test your computer's hardware without requiring additional equipment or risking data loss. If you are unable to fix the problem yourself, service and support personnel can use the diagnostics results to help you solve the problem.

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

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

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

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

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

You can launch the ePSA diagnostics in two ways:






1. Power-on the 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.  
The **Enhanced Pre-boot System Assessment** window displays, listing all devices detected in the computer. The diagnostics starts running the tests on all the detected devices.
4. If you wish to run a diagnostic test on a specific device, press Esc and click **Yes** to stop the diagnostic test.
5. Select the device from the left pane and click **Run Tests**
6. If there are any issues, error codes are displayed.  
Note the error code and contact Dell.

OR


1. Shutdown the computer.
2. Press and hold the fn key, while pressing the power button, and then release both.  
The **Enhanced Pre-boot System Assessment** window displays, listing all devices detected in the computer. The diagnostics starts running the tests on all the detected devices.
3. On the boot menu screen, select the **Diagnostics** option.  
The **Enhanced Pre-boot System Assessment** window displays, listing all devices detected in the computer. The diagnostics starts running the tests on all the detected devices.
4. If you wish to run a diagnostic test on a specific device, press Esc and click **Yes** to stop the diagnostic test.
5. Select the device from the left pane and click **Run Tests**
6. If there are any issues, error codes are displayed.  
Note the error code and contact Dell.

## Device status lights

**Table 2. Device status lights**

Icon	Name	Description
	Power status light	Turns on when you turn on the computer and blinks when the computer is in a power management mode.
	Hard drive status light	Turns on when the computer reads or writes data.
	Battery charge indicator	Turns on steadily or blinks to indicate battery charge status.  <b>NOTE:</b> Refer to the following table for Battery charge LED indicator codes.
	WiFi indicator	Turns on when wireless networking is enabled.

The device status LEDs are usually located either on the top or left side of the keyboard. They display the storage, battery and wireless devices connectivity and activity. Apart from that they can be useful as a diagnostic tool when there's a possible failure to the system.

 **NOTE:** The position of the power status light may vary depending on the system.

The following table lists how to read the LED codes when possible errors occur.

**Table 3. Battery charge LED indicator**

Amber blinking pattern	Problem description	Suggested resolution
2,1	CPU	CPU failure
2,2	System board: BIOS ROM	System board, covers BIOS corruption or ROM error
2,3	Memory	No memory/RAM detected

<b>Amber blinking pattern</b>	<b>Problem description</b>	<b>Suggested resolution</b>
2,4	Memory	Memory/RAM failure
2,5	Memory	Invalid memory installed
2,6	System board: Chipset	System board / Chipset error
2,7	LCD	Replace the system board
3,1	RTC Power Failure	CMOS battery failure
3,2	PCI/Video	PCI or video card/chip failure

The blinking patterns will consist of 2 set of numbers being represented by (First Group: Amber blinks, Second Group: White blinks)

 **NOTE:**

1. First Group: The LED blinks 1 to 9 times followed by a brief pause with LED off at the interval of 1.5 seconds.(This is in Amber color)
2. Second Group: The LED blinks 1 to 9 times, that would be then followed by a longer pause before the next cycle starts again at the interval of 1.5 seconds.(This is in White color)

For Example: No Memory detected (2,3), Battery LED blinks two times of amber color followed by a pause, and then blinks three times of white color. The Battery LED will pause for 3 seconds before the next cycle repeat itself again.

## Battery status lights

If the computer is connected to an electrical outlet, the battery light operates as follows:

**Alternately blinking amber light and white light** An unauthenticated or unsupported non-Dell AC adapter is attached to your laptop.


**Alternately blinking amber light with steady white light** Temporary battery failure with AC adapter present.

**Constantly blinking amber light** Fatal battery failure with AC adapter present.

**Light off** Battery in full charge mode with AC adapter present.

**White light on** Battery in charge mode with AC adapter present.

## Contacting Dell

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

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

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