

Dell Precision 7520

Owner's Manual



Notes, cautions, and warnings

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

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

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

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Working on your computer

Topics:

- Safety instructions
- Turning off your — Windows
- Before working inside your computer
- After working inside your computer

Safety instructions

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

- You have read the safety information that shipped with your computer.
 - A component can be replaced or, if purchased separately, installed by performing the removal procedure in the reverse order.
- i** **NOTE:** Disconnect all power sources before opening the computer cover or panels. After you finish working inside the computer, replace all covers, panels, and screws before connecting to the power source.
- i** **NOTE:** 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
- △ 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 that is grounded to ground yourself before you touch the computer to perform any disassembly tasks.
- △ 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.
- i** **NOTE:** The color of your computer and certain components may appear differently than shown in this document.

Turning off your — Windows

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

1. Click or tap .

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

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

Before working inside your computer

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

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

5. Disconnect your computer and all attached devices from their electrical outlets.
 6. Open the display.
 7. Press and hold the power button for few seconds, to ground the system board.
-  **CAUTION:** To guard against electrical shock unplug your computer from the electrical outlet before performing Step # 8.
-  **CAUTION:** To avoid electrostatic discharge, ground yourself by using a wrist grounding strap or by periodically touching an unpainted metal surface at the same time as touching a connector on the back of the computer.
8. Remove any installed ExpressCards or Smart Cards from the appropriate slots.

After working inside your computer

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

-  **CAUTION:** To avoid damage to the computer, use only the battery designed for this particular Dell computer. Do not use batteries designed for other Dell computers.
1. Connect any external devices, such as a port replicator or media base, and replace any cards, such as an ExpressCard.
 2. Connect any telephone or network cables to your computer.
-  **CAUTION:** To connect a network cable, first plug the cable into the network device and then plug it into the computer.
3. Connect your computer and all attached devices to their electrical outlets.
 4. Turn on your computer.

Disassembly and reassembly

Topics:

- Recommended tools
- SD card
- Battery cover
- Battery
- Hard drive
- Hard drive cable connector
- Keyboard lattice and Keyboard
- Base cover
- SIM card
- Memory modules
- WWAN card
- WLAN card
- Solid State Drive
- Coin-cell battery
- Power connector port
- Palm rest
- Speaker
- Input-Output board
- Heat sink
- Graphics card
- System board
- Fingerprint reader
- Touchpad
- Display assembly
- Power switch board
- ExpressCard Reader
- USB board
- Display bezel
- Display panel
- Display bracket
- Display hinges
- eDP cable
- Camera
- Display cover

Recommended tools

The procedures in this document may require the following tools:

- Phillips #0 screwdriver
- Phillips #1 screwdriver
- Plastic scribe-Recommended for field technician

SD card

Removing SD card

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



3. Remove the SD card from the computer.

Installing SD card

1. Slide the SD card into its slot until it clicks into place.
2. Follow the procedure in [After working inside your computer](#).

Battery cover

Removing the battery cover

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



Installing the battery cover

1. Slide the battery cover into its slot until it clicks into place.
2. Follow the procedure in [After working inside your computer](#).

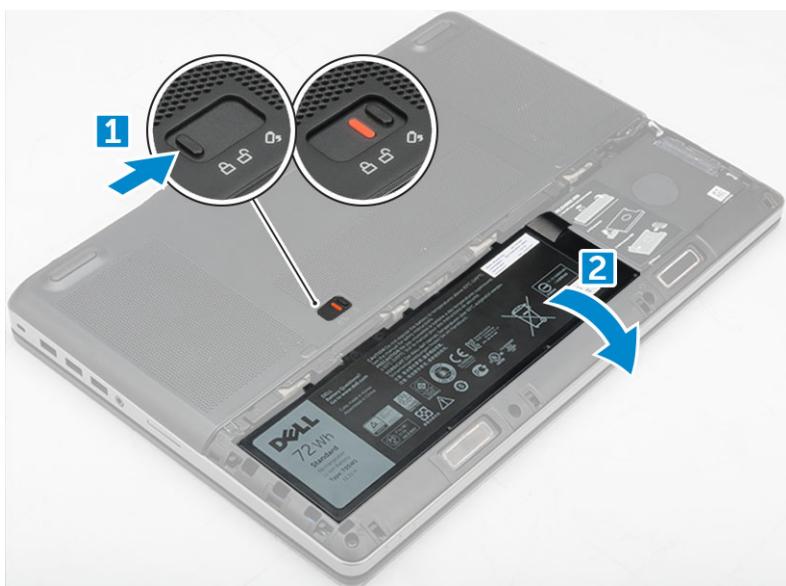
Battery

Lithium-ion battery precautions

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

Removing the battery

- Follow the procedure in [Before working inside your computer](#).
- Remove the [battery cover](#).
- To remove battery:
 - Slide the release latch towards from the unlock icon to unlock the battery[1].
 - Lift and remove the battery from the computer [2].



Installing the battery

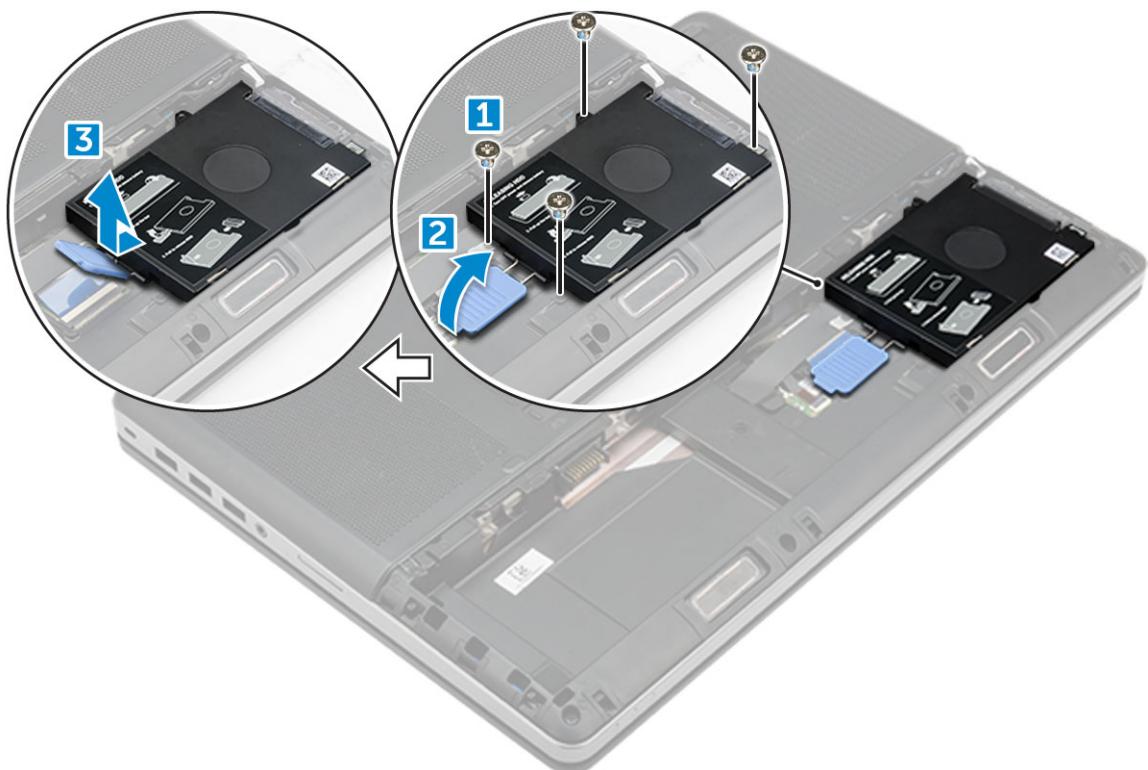
- Slide the battery into its slot until it clicks into place.

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

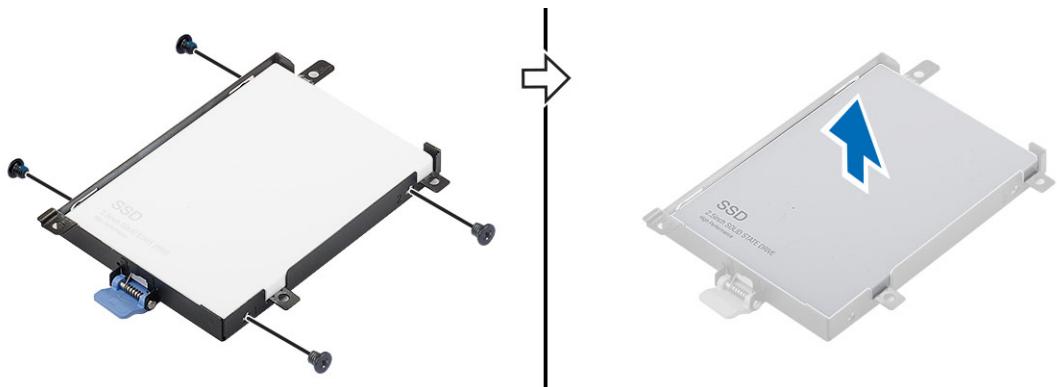
Hard drive

Removing the hard drive

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [battery cover](#)
 - b. [battery](#)
3. To remove hard drive:
 - a. Remove the M3.0x3.0 screws that secure the hard drive to the computer [1].
 - b. Lift the hard drive latch to release the hard drive [2].
 - c. Slide and lift the hard drive from the computer [3].



4. Remove the M3.0x3.0 screws that secure the hard drive. Lift the hard drive from the bracket.



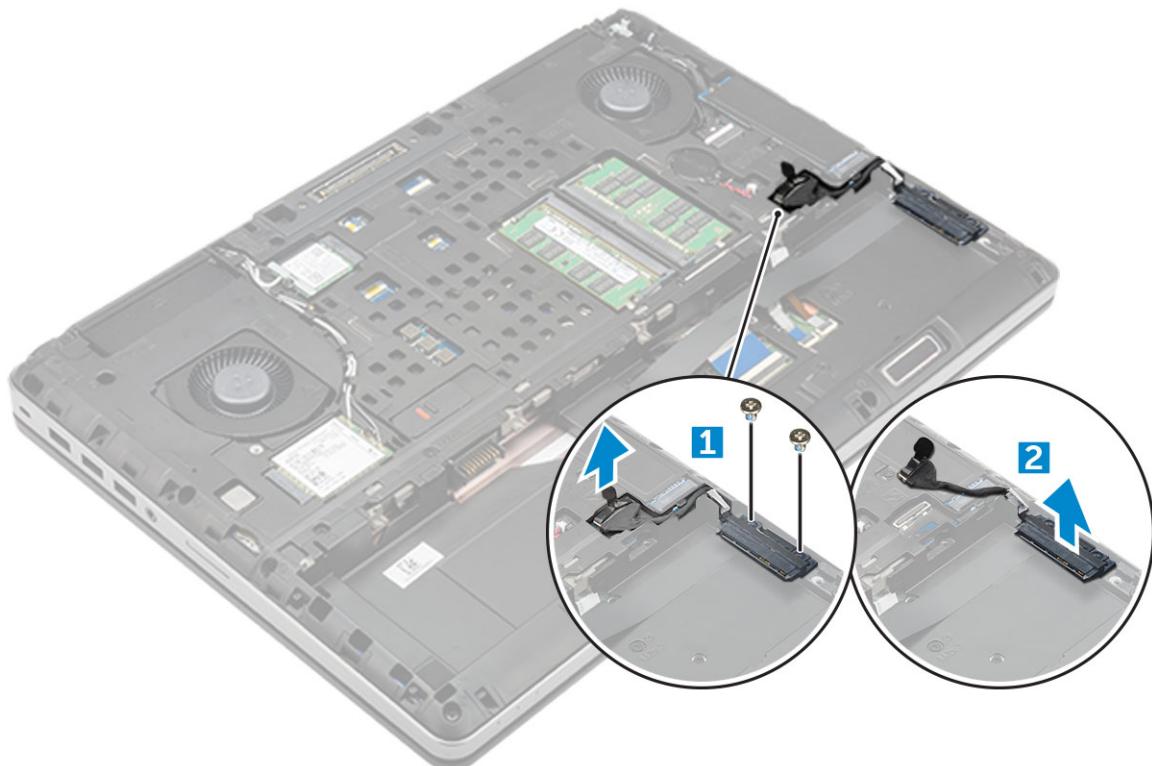
Installing the hard drive

1. Replace the M3.0x3.0 screws to secure the hard drive to the hard drive bracket.
2. Insert the hard drive into its slot in the computer.
3. Replace the M3.0x3.0 screws to secure the hard drive to the computer.
4. Install the:
 - a. [battery](#)
 - b. [battery cover](#)
5. Follow the procedure in [After working inside your computer](#).

Hard drive cable connector

Removing the hard drive cable connector

1. Follow the procedures in [Before working inside your computer](#).
2. Remove the:
 - a. [battery cover](#)
 - b. [battery](#)
 - c. [base cover](#)
 - d. [hard drive](#)
3. To remove the hard drive cable connector:
 - a. Remove the M2.5x5.0 screws that secure the hard drive connector to the system board [1].
 - b. Remove the hard drive cable connector from the computer [2].



Installing the hard drive cable connector

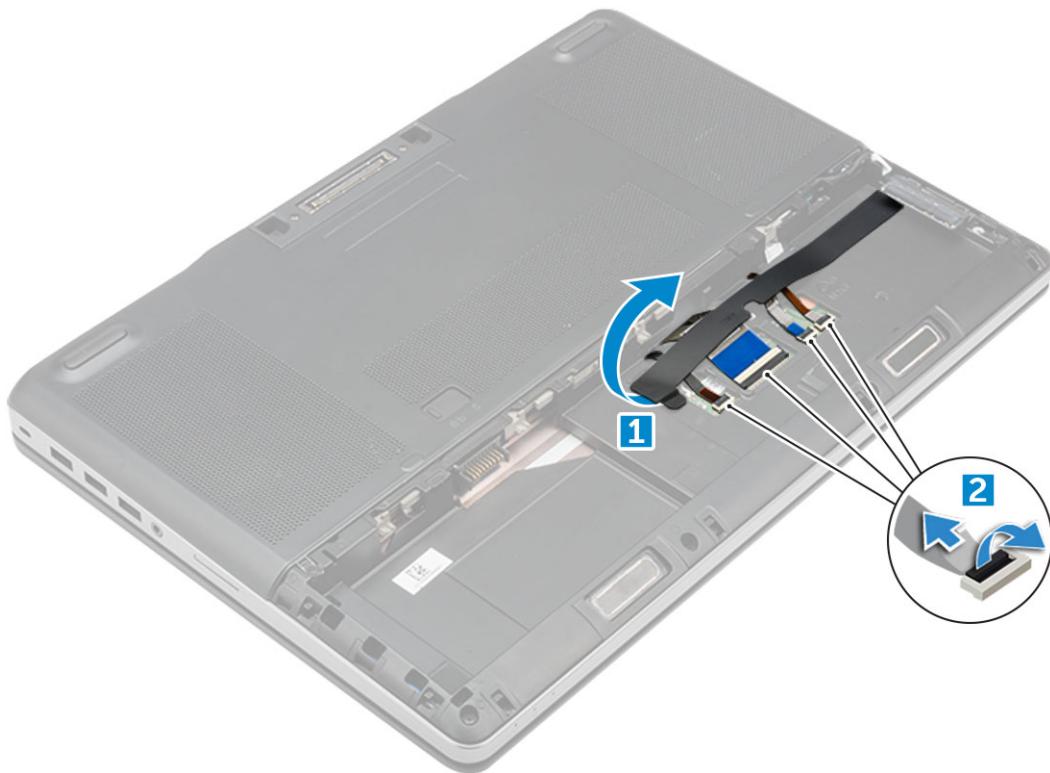
1. Connect the hard drive cable to the system board.

2. Insert and route the cable through the routing channel.
3. Replace the M2.5x5.0 screws to secure the hard drive cable connector to the computer.
4. Install the:
 - a. [hard drive](#)
 - b. [base cover](#)
 - c. [battery](#)
 - d. [battery cover](#)
5. Follow the procedure in [After working inside your computer](#).

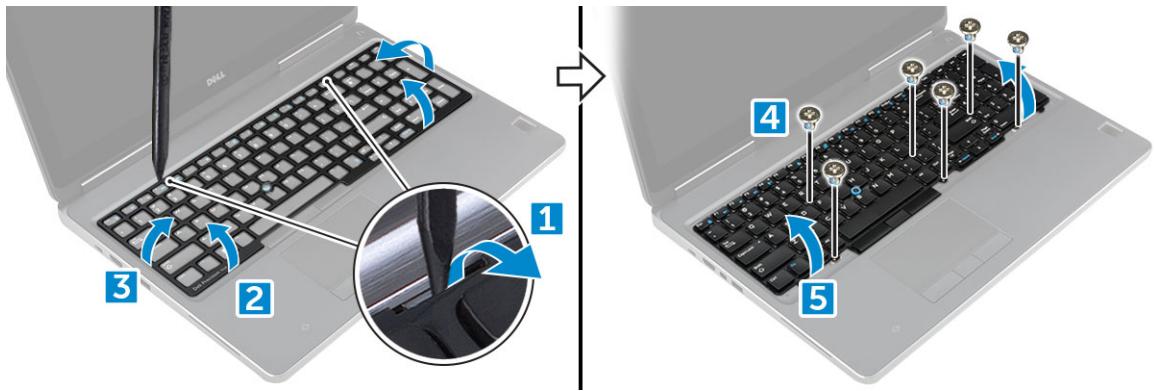
Keyboard lattice and Keyboard

Removing the keyboard

1. Follow the procedures in [Before working inside your computer](#).
2. Remove the:
 - a. [battery cover](#)
 - b. [battery](#)
 - c. [hard drive](#)
3. To remove keyboard cable:



- a. Peel the tape to access the keyboard cable [1].
- b. Disconnect the keyboard cables from the touchpad board [2]
4. To remove the keyboard:
 - a. Using plastic scribe pry the keyboard trim from the bottom and work along the top edge and remove it from the computer [1, 2, 3].
 - b. Remove the M2.0x2.5 screws that secure the keyboard to the computer [4].
 - c. Lift and slide the keyboard to remove it away from the computer [5].



Installing the keyboard

1. Align the keyboard and route the cables back through to the bottom of the compartment.
 2. Press and align the keyboard to its compartment.
 3. Replace the screws to secure the keyboard to the computer.
 4. Slide the keyboard trim and align it to its position on the computer. Ensure that the keyboard trim clicks into its place
 5. Connect the keyboard data cables to the touchpad board.
- (i) NOTE:** Ensure that you fold the keyboard data cable in perfect alignment.
6. Affix the tape on the keyboard data cables.
 7. Install the:
 - a. hard drive
 - b. battery
 - c. battery cover
 8. Follow the procedure in [After working inside your computer](#).

Base cover

Removing the base cover

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



Installing the base cover

1. Slide the base cover to align with the screw holes on the computer.
2. Replace the M2.5X5.0 screws to secure the base cover to the computer.
3. Install the:
 - a. [battery](#)
 - b. [battery cover](#)
4. Follow the procedure in [After working inside your computer](#).

SIM card

Removing the SIM card

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [battery cover](#)
 - b. [battery](#)
 - c. [base cover](#)
3. To remove the SIM card press in on the card to release.

(i) NOTE: During installation or removal of the SIM card, always ensure all data is backed up properly.



Installing the SIM card

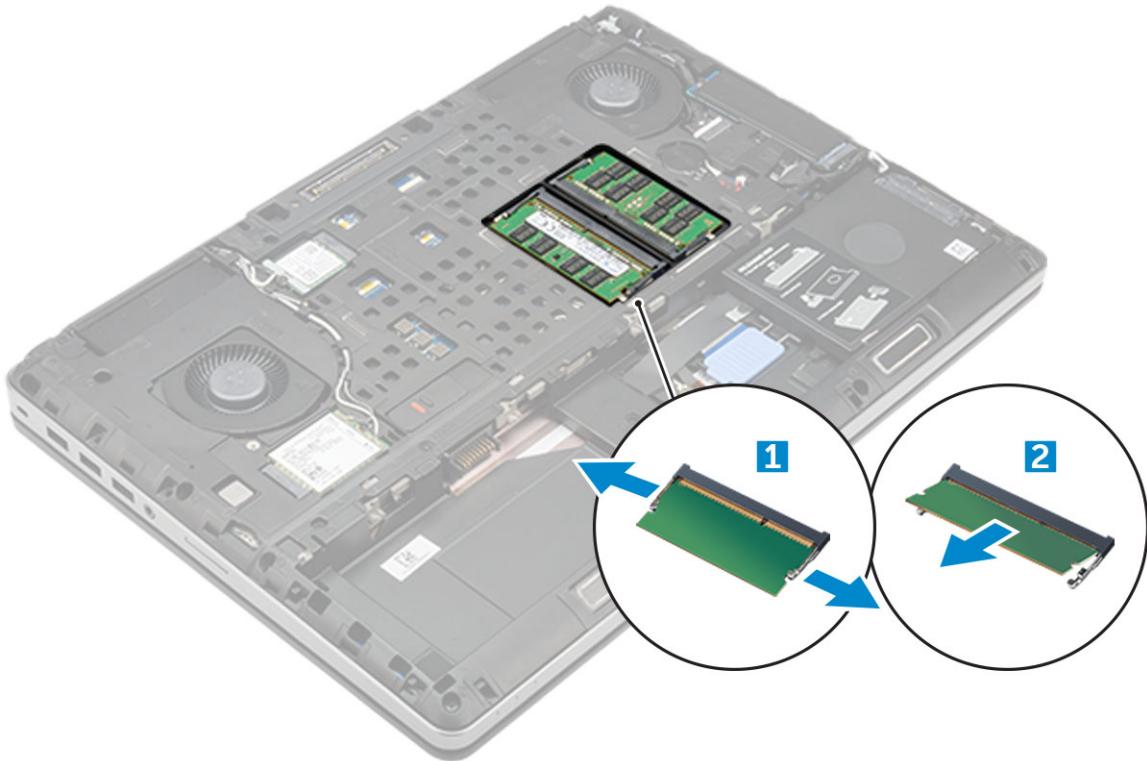
1. Slide in the SIM Card into its compartment and press until its fully engaged with a click sound.
2. **i|NOTE:** During installation or removal of the SIM card, always ensure all data is backed up properly.
2. Install the:
 - a. [base cover](#)
 - b. [battery](#)
 - c. [battery cover](#)
3. Follow the procedure in [After working inside your computer](#).

Memory modules

Removing the primary memory module

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

- b. Lift the memory module and remove it from the computer.

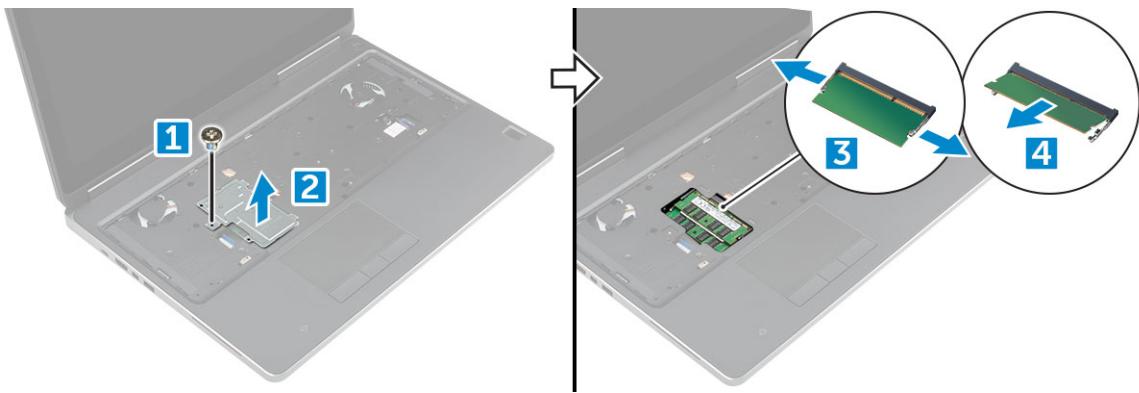


Installing the primary memory module

1. Insert the memory module into the memory socket.
- (i) NOTE:** Installing one or three memory modules leads to system performance issues.
2. Press the clips to secure the memory module to the system board.
 3. Install the:
 - a. [base cover](#)
 - b. [battery](#)
 - c. [battery cover](#)
 4. Follow the procedure in [After working inside your computer](#).

Removing the secondary memory module

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



Installing the secondary memory module

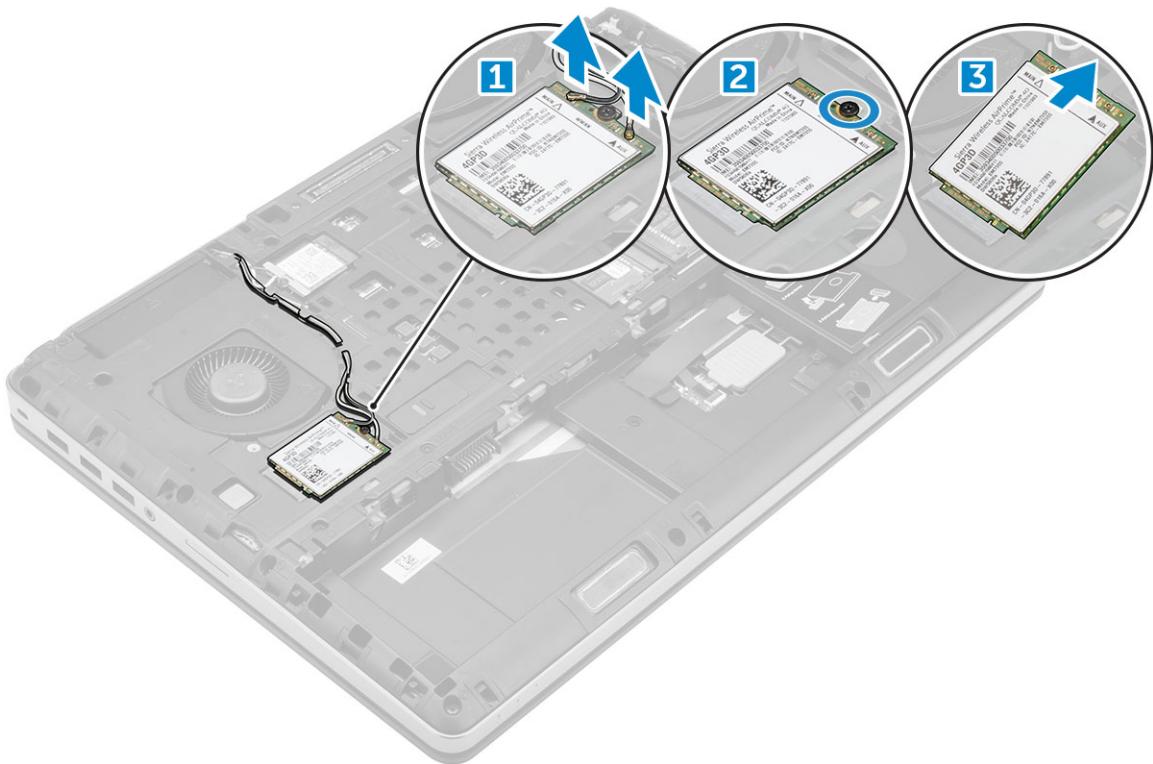
1. Insert the memory module into the memory socket.
2. Press the clips to secure the memory module to the system board.
3. Place the memory shield in its original position on the memory module and tighten the screw to secure it to the computer.
4. Install the:
 - a. keyboard
 - b. hard drive
 - c. battery
 - d. battery cover
5. Follow the procedure in [After working inside your computer](#).

WWAN card

Removing Wireless Wide Area Network - WWAN card

i **NOTE:** Depending on the configuration you choose, you may or may not have WWAN card.

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



Installing the WWAN card

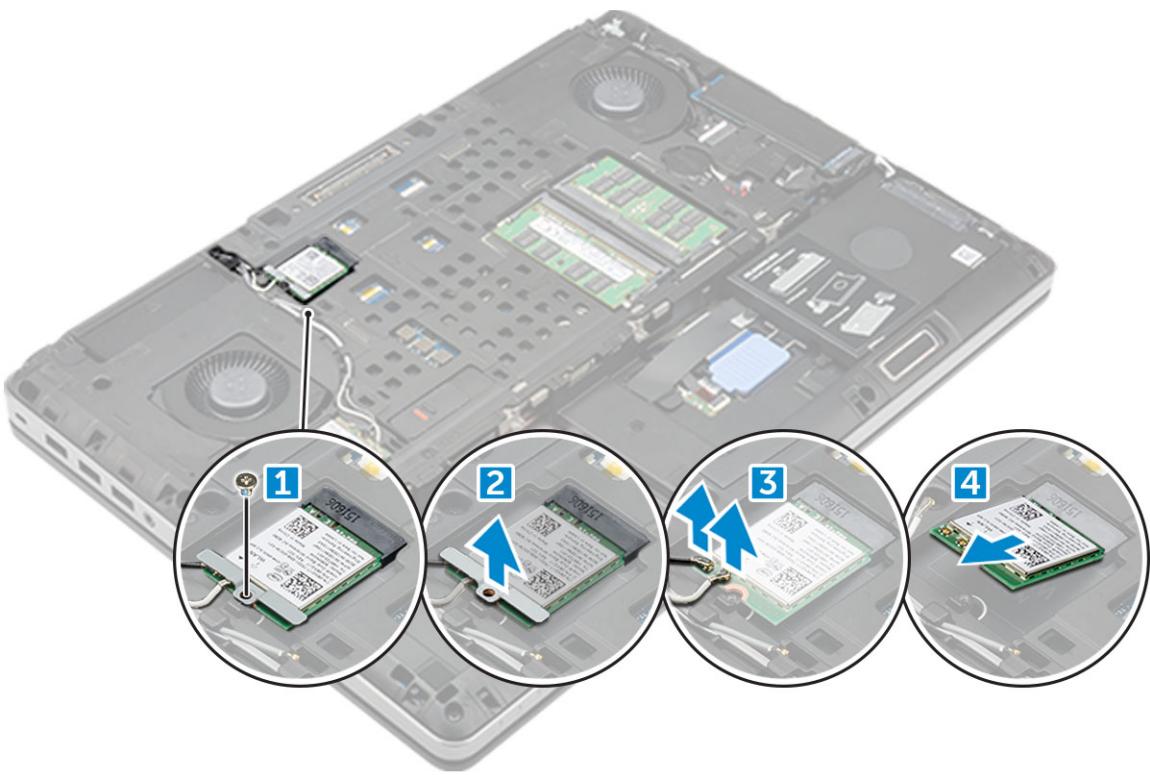
i **NOTE:** Depending on the configuration you choose, you may or may not have WWAN card.

1. Slide the WWAN card to the WWAN card slot.
2. Replace the M2.0x3.0 screw to secure the WWAN card to the computer.
3. Route the antenna cables through the routing channels and connect them to the WWAN card.
4. Install the:
 - a. [base cover](#)
 - b. [battery](#)
 - c. [battery cover](#)
5. Follow the procedure in [After working inside your computer](#).

WLAN card

Removing the Wireless Local Area Network - WLAN card

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



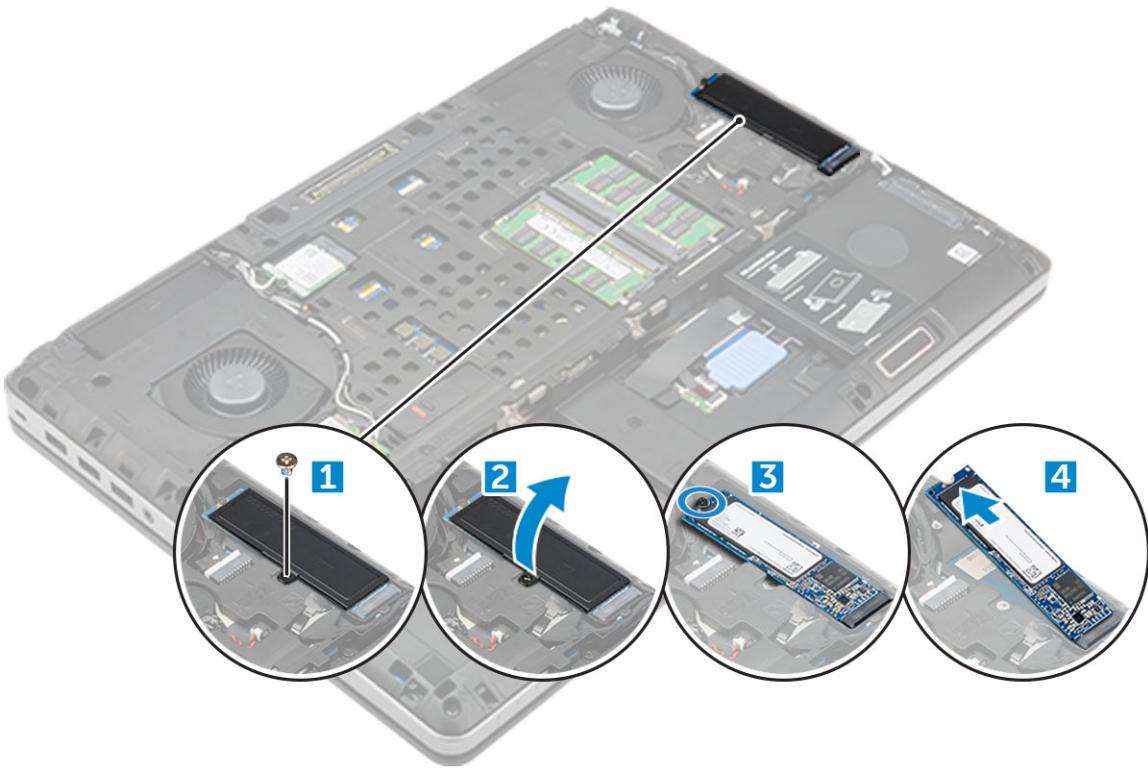
Installing the WLAN Card

1. Insert the WLAN card in its slot on the computer.
2. Route the antenna cables through the routing channel and connect them to the WLAN card.
3. Align the shield and tighten the M2.0x3.0 screw to secure the WLAN card to the computer.
4. Install the:
 - a. base cover
 - b. battery
 - c. battery cover
5. Follow the procedures in [After working inside your computer](#).

Solid State Drive

Removing the M.2 Solid State Drive -SSD module

1. Follow the procedures in [Before working inside your computer](#).
2. Remove the:
 - a. battery cover
 - b. battery
 - c. base cover
3. To remove the SSD module:
 - a. Remove the M2.0x3.0 screw that secures the thermal plate to the computer.
 - b. Remove the thermal plate from the computer.
 - c. Remove the M2.0x3.0 screw that secures the SSD to the computer.
 - d. Remove the SSD away from the computer.



Installing the M.2 SSD module

1. Place the SSD in its slot.
2. Replace the M2.0x3.0 screw to secure the SSD to the computer.
3. Place the thermal plate on the SSD.
4. Replace the M2.0x3.0 screw to secure the thermal plate to the computer.
5. Install the:
 - a. [base cover](#)
 - b. [battery](#)
 - c. [battery cover](#)
6. Follow the procedure in [After working inside your computer](#).

Coin-cell battery

Removing the coin cell battery

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



Installing the coin cell battery

1. Replace the coin cell battery in its slot on the computer.
 2. Connect the coin cell battery cable to the computer.
- (i) | NOTE:** Ensure that the coin cell battery cable does not protrude outside its compartment.
3. Install the:
 - a. base cover
 - b. battery
 - c. battery cover
 4. Follow the procedure in [After working inside your computer](#).

Power connector port

Removing the power connector port

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. battery cover
 - b. battery
 - c. base cover
3. To remove power connector port:
 - a. Disconnect the power connector cable from the computer [1].
 - b. Remove the M2.5x5.0 screw to remove the bracket from the computer .
 - c. Lift the power connector port from the computer [2].



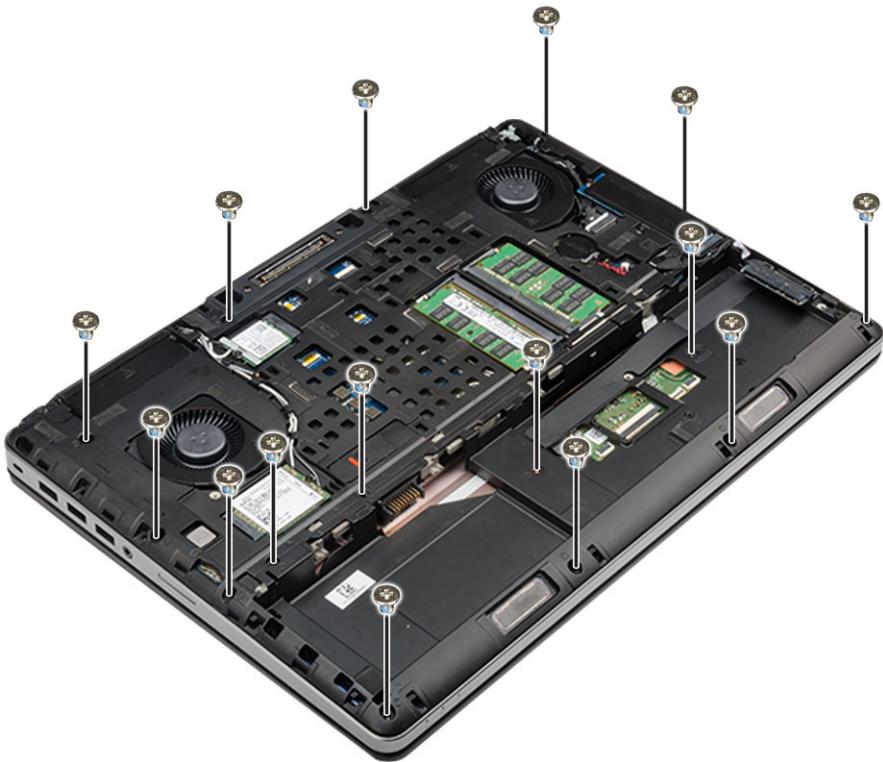
Installing the power connector port

1. Replace the power connector cable on the computer.
2. Route the cable through the routing channel
3. Replace the M2.5x5.0 screw to secure the power connector port to the computer.
4. Connect the power connector cable.
5. Install the:
 - a. base cover
 - b. battery
 - c. battery cover
6. Follow the procedure in [After working inside your computer](#).

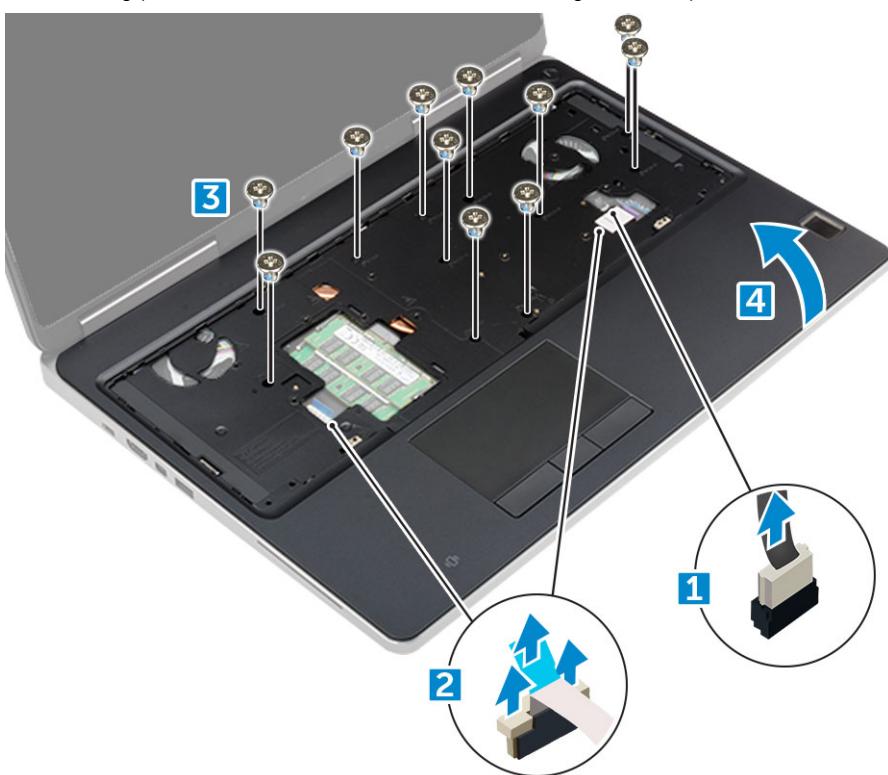
Palm rest

Removing the palmrest

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. battery cover
 - b. battery
 - c. base cover
 - d. hard drive
 - e. keyboard
3. Remove the 15 screws (M2.5x5.0, M2.0x8.0, M2.0x3.0) at the bottom of the computer which secure the palmrest to the computer .



4. To remove palmrest:
- Lift the tab and disconnect the fan cable [1] and system board cable [2].
 - Remove the 11 screws (M2.5x5.0, M2.0x3.0) that secure the palmrest to the computer [3].
 - By using plastic scribe release the tabs on the edges of the palmrest and remove the palmrest from the computer [4].



Installing the palmrest

- Align the palmrest on the computer and press until it snaps in its place.

2. Replace the 11 screws M2.5x5.0, M2.0x3.0) that secure the palmrest to the computer.
3. Connect the following cables:
 - a. system board cable
 - b. fan cable
4. Flip the computer and tighten the 15 screws (M2.5x5.0, M2.0x8.0, M2.0x3.0) at the bottom of the computer.
5. Install the:
 - a. keyboard
 - b. hard drive
 - c. base cover
 - d. battery
 - e. battery cover
6. Follow the procedure in [After working inside your computer](#).

Speaker

Removing the speakers

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



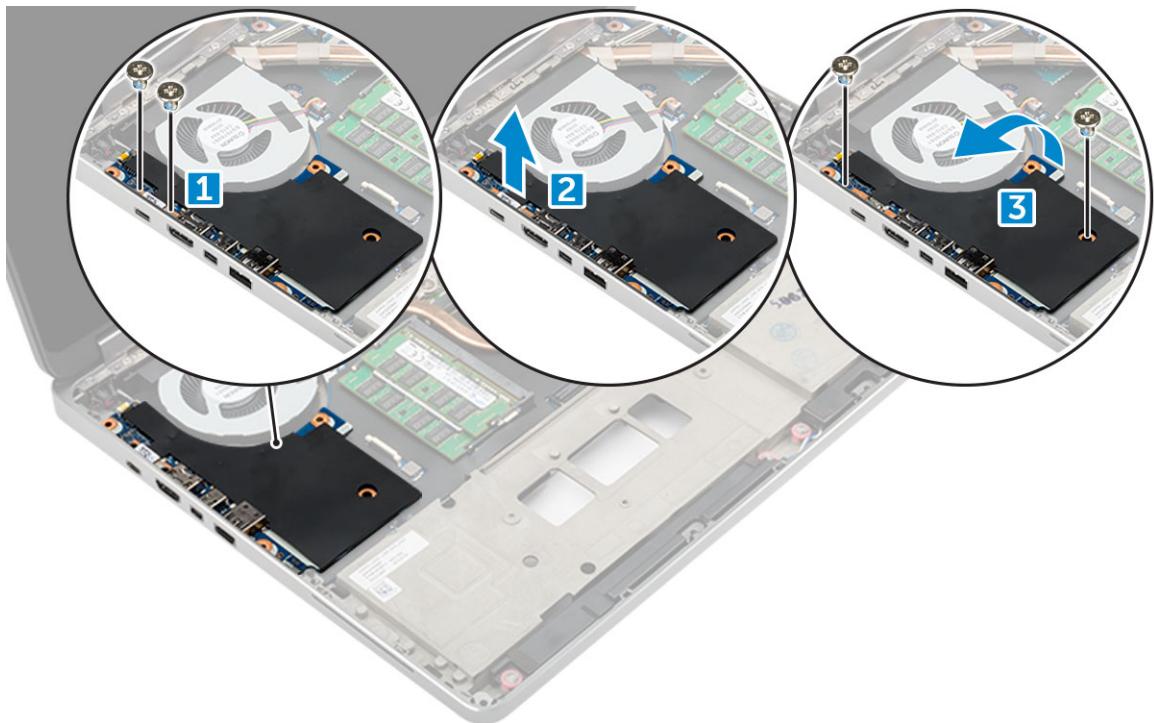
Installing the speakers

1. Align the speakers along the slots on the computer.
2. Route the speaker cable through the routing tabs on the computer.
3. Connect the speaker cable to the system board.
4. Install the:
 - a. palmrest
 - b. keyboard
 - c. hard drive
 - d. base cover
 - e. battery
 - f. battery cover
5. Follow the procedure in [After working inside your computer](#).

Input-Output board

Removing the left Input-Output -IO board

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. battery cover
 - b. battery
 - c. base cover
 - d. hard drive
 - e. keyboard
 - f. palmrest
3. To remove I/O board:
 - a. Remove the M2.5x5.0 screws that secure the thunderbolt bracket to the computer [1].
 - b. Lift the bracket from the thunderbolt connector [2].
 - c. Remove the M2.5x5.0 screws that secure the I/O board to the computer [3].
 - d. Lift the I/O board upwards to and remove it from the computer.

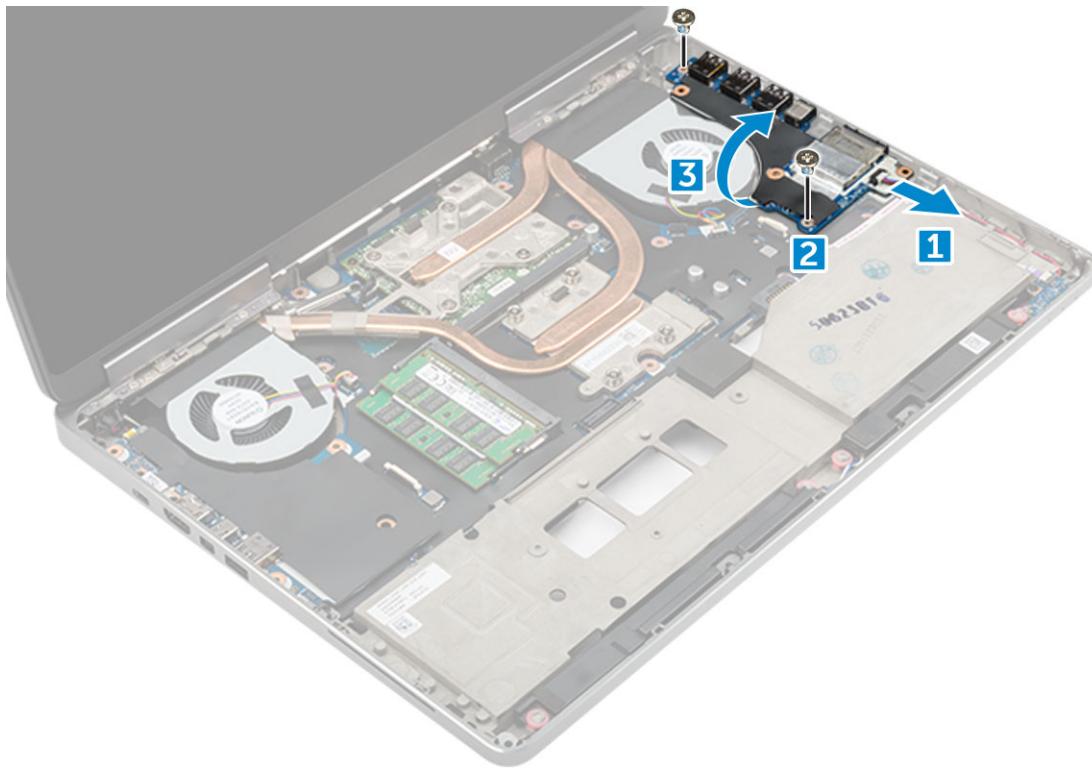


Installing the left IO board

1. Slide the I/O board into its slot on the computer.
2. Install the thunderbolt bracket.
3. Replace the M2.5x5.0 screws to secure the I/O board to the computer.
4. Install the:
 - a. palmrest
 - b. keyboard
 - c. hard drive
 - d. base cover
 - e. battery
 - f. battery cover
5. Follow the procedures in [After working inside your computer](#).

Removing the right Input-Output - IO board

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. SD card
 - b. battery cover
 - c. battery
 - d. base cover
 - e. hard drive
 - f. keyboard
 - g. palmrest
3. To remove I/O board:
 - a. Disconnect the right speaker cable from the I/O board [1].
 - b. Remove the M2.5x5.0 screws that secure the I/O board to the computer [2].
 - c. Lift the I/O board upwards to and remove it from the computer [3].



Installing the right IO board

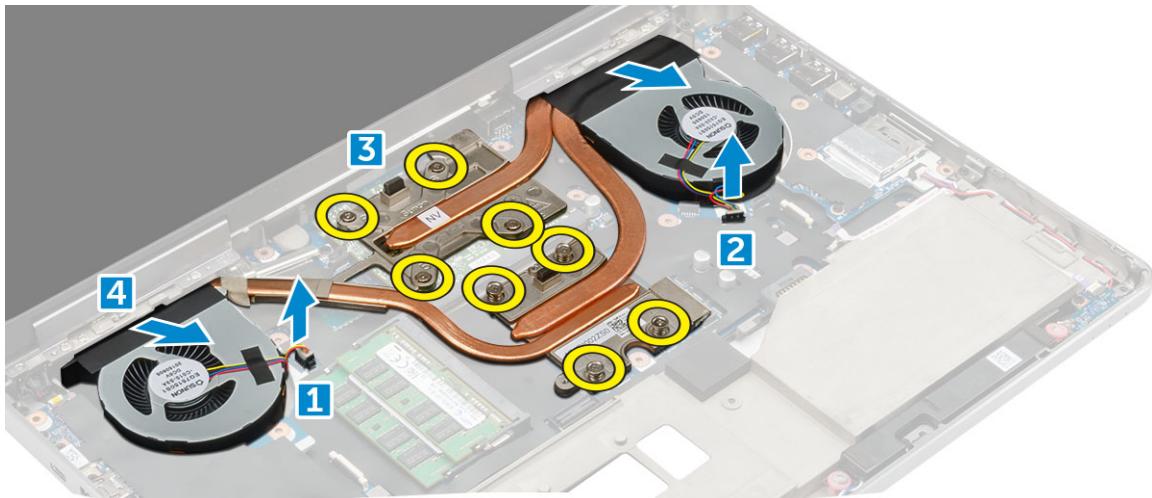
1. Connect the I/O board connector cable and slide the I/O board into its slot on the computer.
2. Replace the M2.5x5.0 screws to secure the I/O board to the computer.
3. Connect the speaker cable to the I/O board.
4. Install the:
 - a. palmrest
 - b. keyboard
 - c. hard drive
 - d. base cover
 - e. battery
 - f. battery cover
 - g. SD card
5. Follow the procedure in [After working inside your computer](#).

Heat sink

Removing the heat sink assembly

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

- a. Disconnect the fan cables from the computer [1, 2].
 - b. Loosen the captive M2.5x5.0 screws that secure the heat sink assembly to the computer [3].
- (i) NOTE:** Remove the screws that secure the heat sink to the system board in the order stamped onto the heat sink next to the screws [1, 2, 3, 4, 5, 6, 7, 8].
- c. Peel off the tape on the heat sink assembly.
 - d. Lift and remove the heat sink assembly from the computer [4].



Installing the heat sink assembly

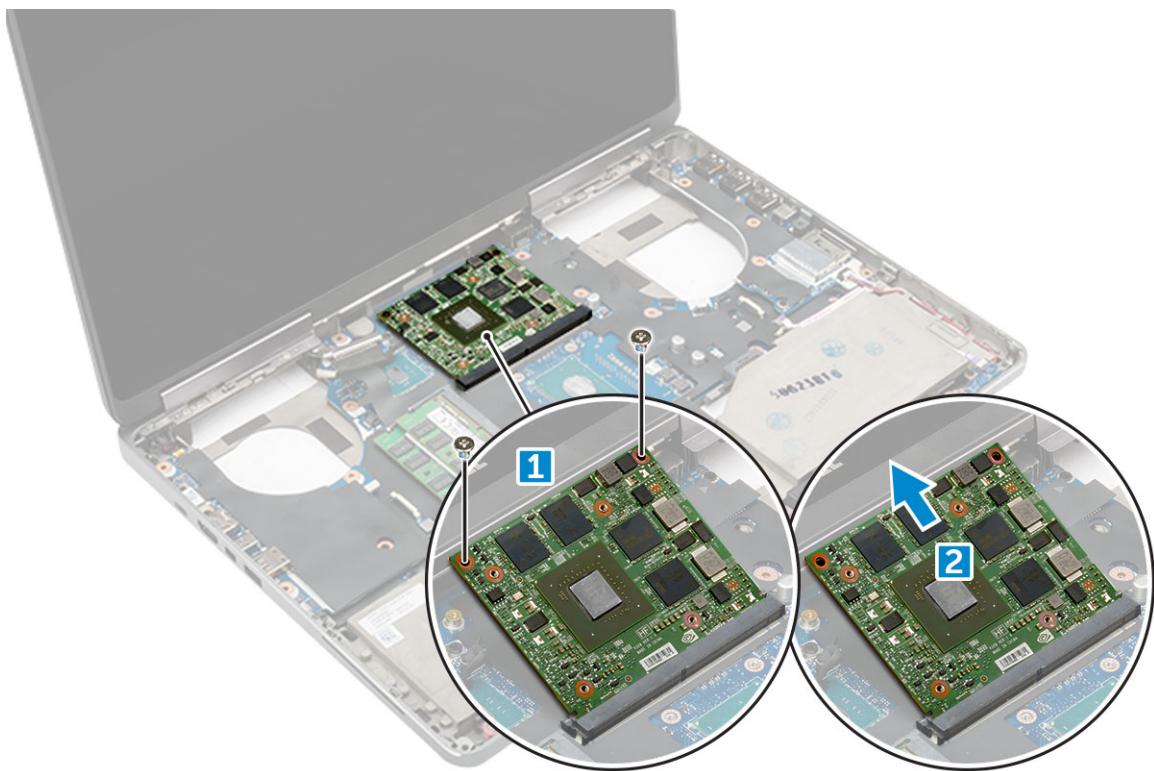
1. Insert the heat-sink assembly in its slot.
 2. Affix the tape on the heat sink assembly.
 3. Tighten the captive M2.5x5.0 screws to secure the heat-sink assembly to the computer.
- (i) NOTE:** Tighten the screws on the system board in the order stamped onto the heat sink next to the screws [1, 2, 3, 4, 5, 6, 7, 8].
4. Connect the fan cables to the system board.
 5. Install the:
 - a. palmrest
 - b. keyboard
 - c. hard drive
 - d. base cover
 - e. battery
 - f. battery cover
 6. Follow the procedure in [After working inside your computer](#).

Graphics card

Removing the graphic card

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

- f. palmrest
 - g. heat sink
3. To remove the graphic card:
- a. Remove the M2.0x3.0 screws that secure the graphic card to the computer [1].
 - b. Remove the graphic card from the computer [2].



Installing the graphic card

1. Slide the graphic card into its original position in the computer.
2. Replace the M2.0x3.0 screws to secure the graphic card to the computer.
3. Install the:
 - a. heat sink
 - b. palmrest
 - c. keyboard
 - d. hard drive
 - e. base cover
 - f. battery
 - g. battery cover
4. Follow the procedure in [After working inside your computer](#).

System board

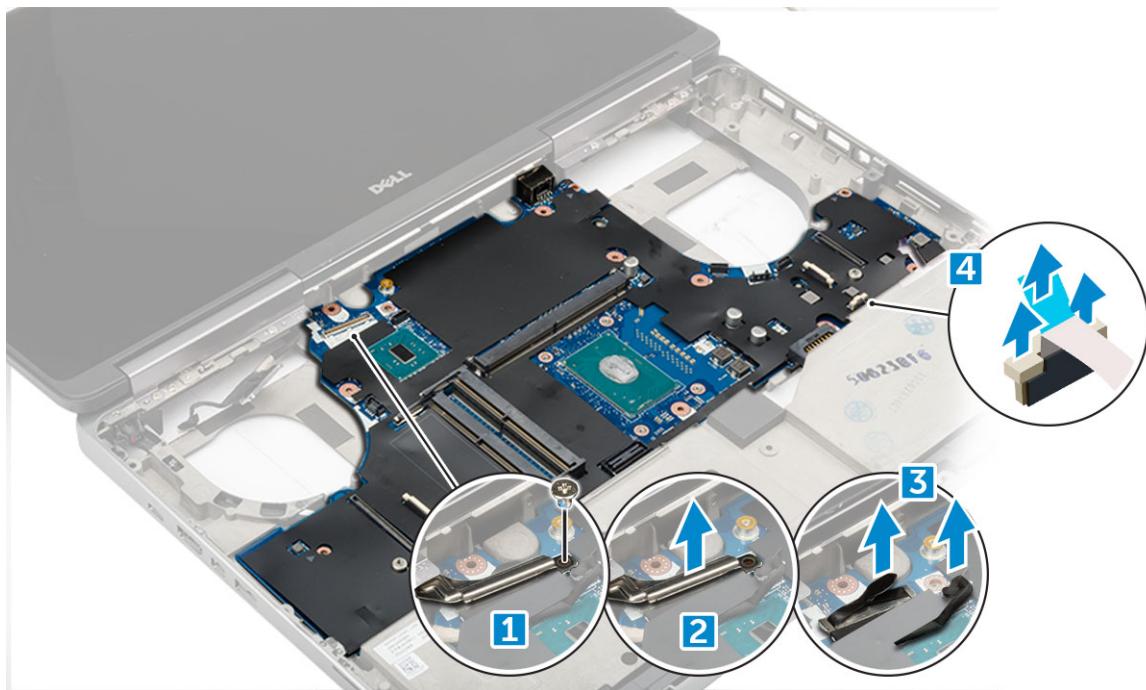
Removing the system board

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

- d. base cover
- e. hard drive
- f. keyboard
- g. hard drive cable
- h. secondary memory
- i. primary memory
- j. WLAN card
- k. WWAN card
- l. M.2 SSD card
- m. graphic card
- n. power connector port
- o. palmrest
- p. I/O board (left)
- q. I/O board (right)
- r. heat sink

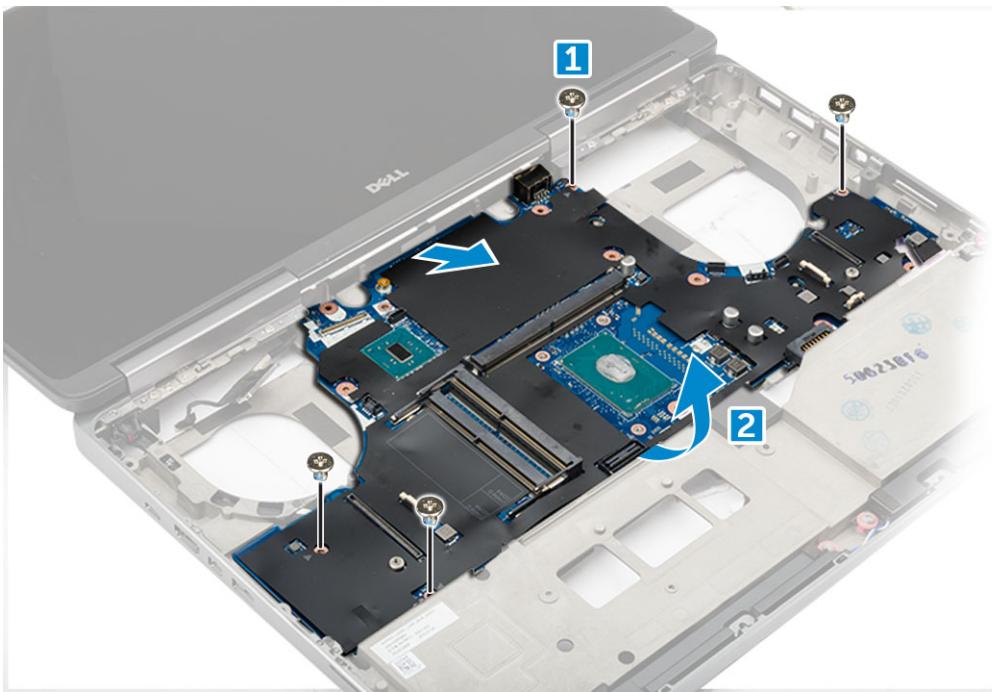
3. To disconnect and remove the eDP cable:

- a. Remove the M2.5x5.0 screw that secure the shield to the system board [1].
- b. Lift the metal shield away from the eDP cable [2].
- c. Disconnect the eDP cable [3].
- d. Lift the tab and disconnect the power connector cable [4].



4. To remove system board:

- a. Remove the M2.5X5.0 screws that secure the system board [1].
- b. Slide and lift system board from the computer [2].



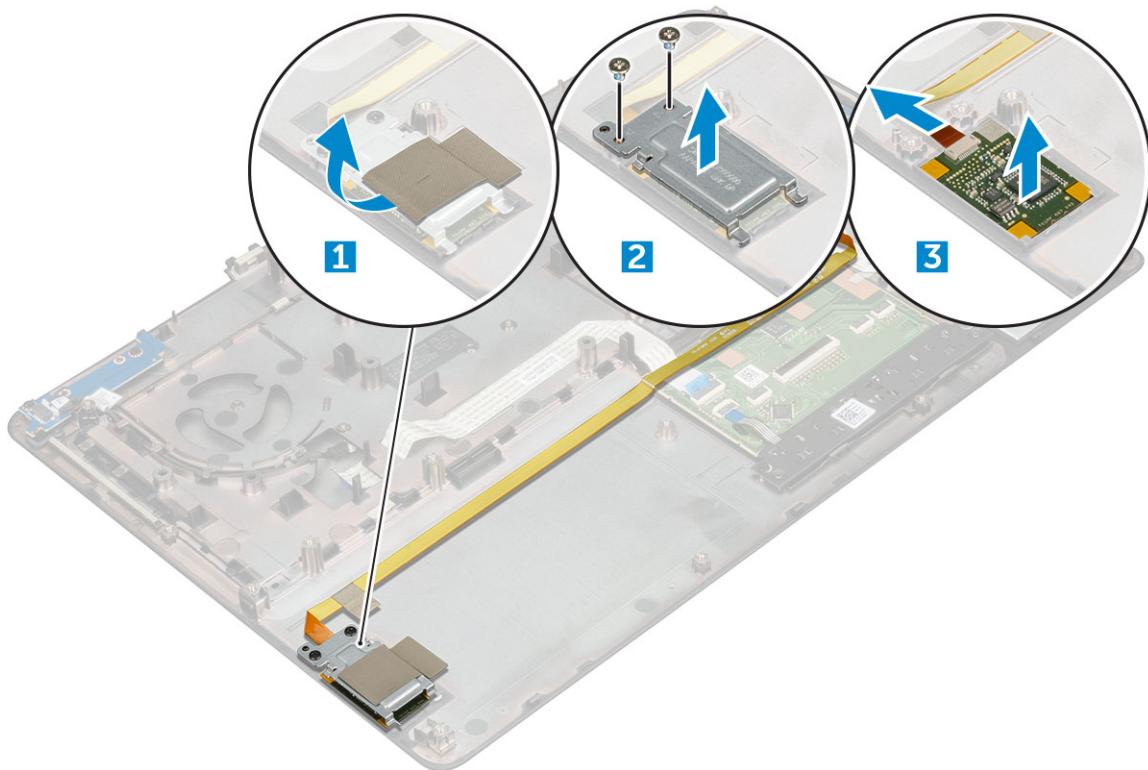
Installing the system board

1. Align the system board into its original position on the computer.
2. Replace the M2.5x5.0 screws to secure the system board to the computer.
3. Connect the following cables:
 - a. power connector
 - b. eDP
4. Place the metal bracket and tighten the M2.5x5.0 screw to secure the eDP cable to the computer.
5. Install the:
 - a. heat sink
 - b. I/O board (right)
 - c. I/O board (left)
 - d. palmrest
 - e. power connector port
 - f. graphic card
 - g. M.2 SSD card
 - h. WWAN card
 - i. WLAN card
 - j. primary memory
 - k. secondary memory
 - l. HDD cable
 - m. keyboard
 - n. hard drive
 - o. base cover
 - p. battery
 - q. battery cover
 - r. SD card
6. Follow the procedure in [After working inside your computer](#).

Fingerprint reader

Removing the fingerprint reader

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. SD card
 - b. battery cover
 - c. battery
 - d. base cover
 - e. hard drive
 - f. keyboard
 - g. hard drive cable
 - h. secondary memory
 - i. primary memory
 - j. WLAN card
 - k. WWAN card
 - l. M.2 SSD card
 - m. graphic card
 - n. power connector port
 - o. palmrest
3. To remove fingerprint reader:
 - a. Peel the adhesive tape that secures fingerprint reader [1].
 - b. Remove and lift the M2.0X3 screws that secure metal bracket on the chassis [2].
 - c. Disconnect the cable and lift the fingerprint reader from the chassis [3].



Installing the fingerprint reader

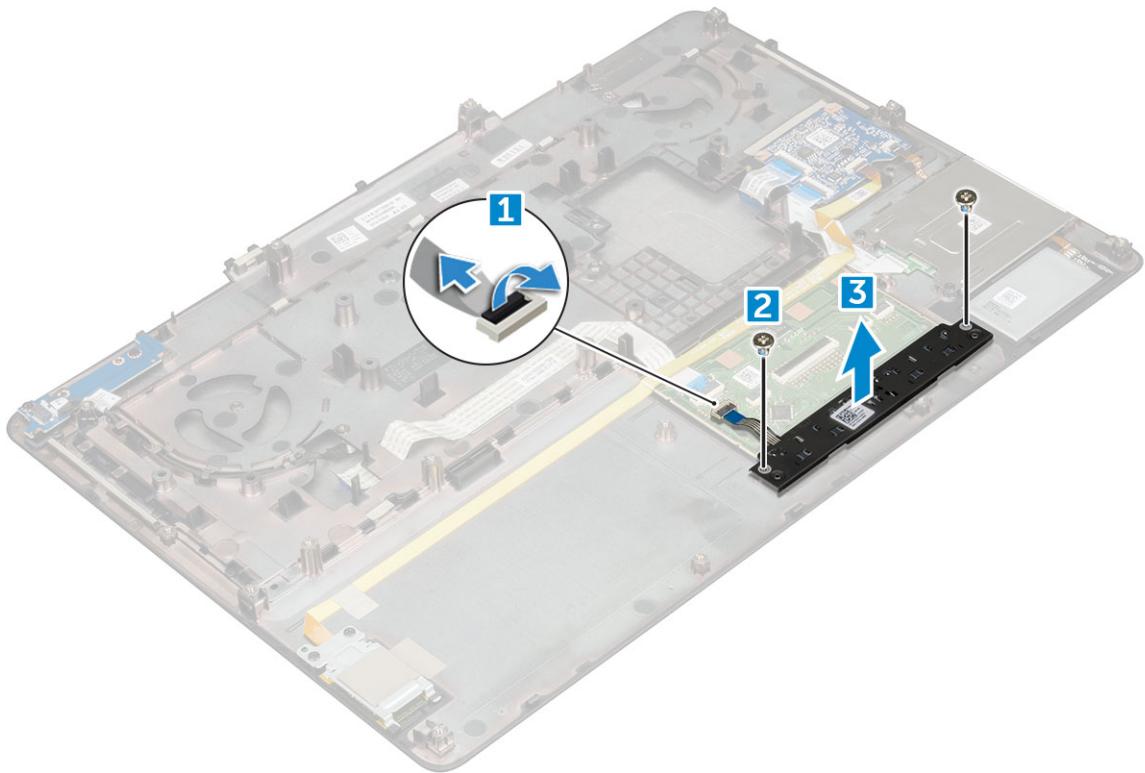
1. Align the fingerprint reader into its original position on the chassis.
2. Connect the finger print reader cable.

3. Place the metal bracket on the chassis.
4. Replace the M2.0X3 screws to secure the fingerprint reader to the chassis.
5. Affix the adhesive tape to secure the fingerprint reader.
6. Install the:
 - a. palmrest
 - b. power connector port
 - c. graphic card
 - d. M.2 SSD card
 - e. WWAN card
 - f. WLAN card
 - g. primary memory
 - h. secondary memory
 - i. HDD cable
 - j. keyboard
 - k. hard drive
 - l. base cover
 - m. battery
 - n. battery cover
 - o. SD card
7. Follow the procedure in [After working inside your computer](#).

Touchpad

Removing the touchpad

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. battery cover
 - b. battery
 - c. base cover
 - d. hard drive
 - e. keyboard
 - f. palmrest
 - g. system board
3. To remove the touchpad:
 - a. Lift and disconnect the touchpad cable from the computer [1].
 - b. Remove the M2.0X3 screws that secure the touchpad to the computer [2].
 - c. Lift the touchpad from the computer [3].



Installing the touchpad

1. Place the touchpad into the slot on the computer.
2. Replace the M2.0X3 screws that secures touchpad on the computer.
3. Connect the touchpad cable to the computer.
4. Install the:
 - a. system board
 - b. palmrest
 - c. keyboard
 - d. hard drive
 - e. base cover
 - f. battery
 - g. battery cover
5. Follow the procedure in [After working inside your computer](#).

Display assembly

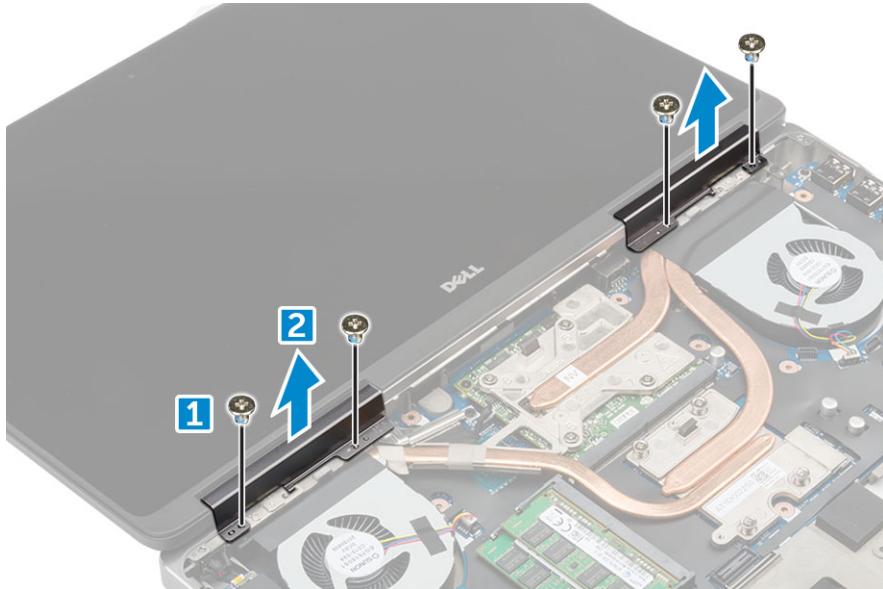
Removing the display assembly

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

h. palmrest

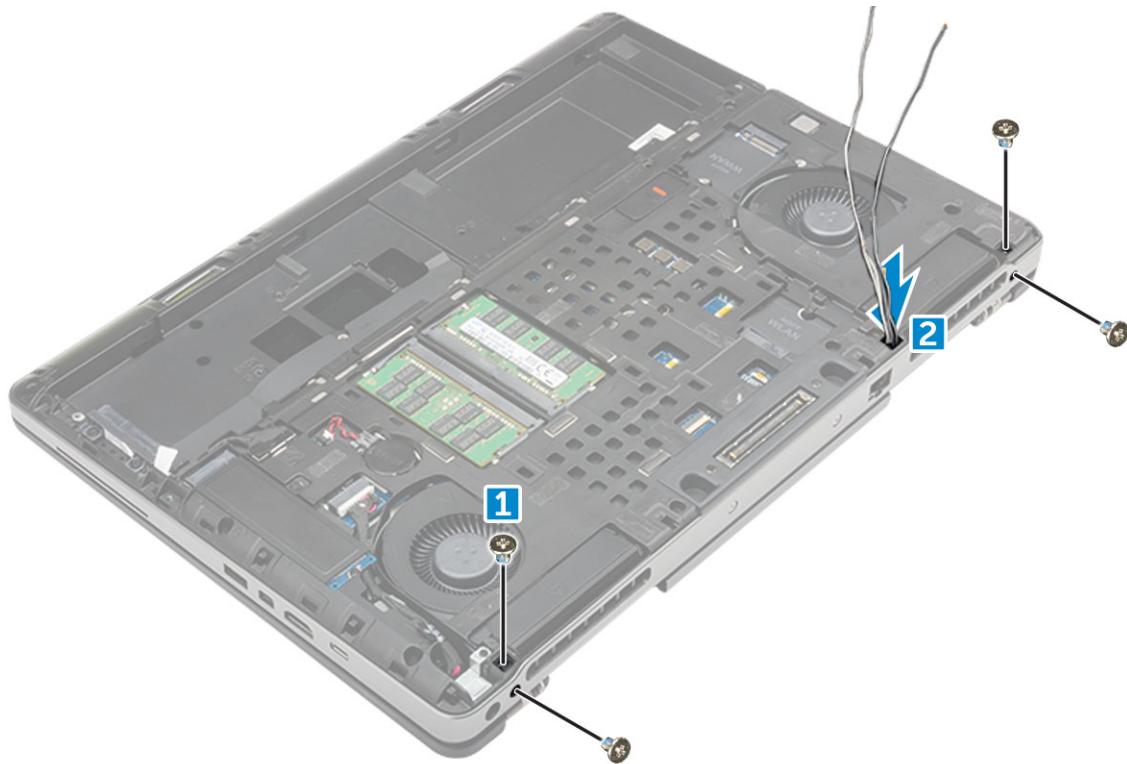
3. To remove hinge cap:

- a. Remove the M2.5x4.0 screws that secure the hinge caps [1].
- b. Remove the hinge caps from the computer [2].



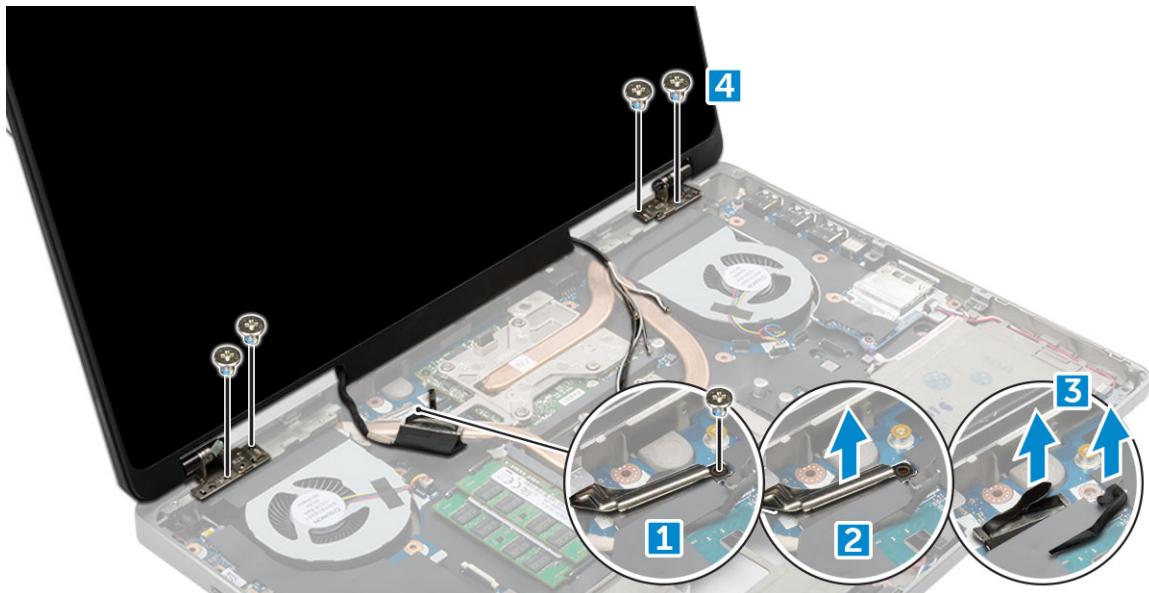
4. To disconnect antenna cables:

- a. Flip the computer and remove the M2.0X3 screws from the computer [1].
- b. Pull the antenna cables through the routing hole [2].



5. To remove display assembly:

- a. Flip the computer and open the display.
- b. Remove the M2.0X3 screw that secures the eDP cable bracket [1].
- c. Remove the eDP cable bracket [2].
- d. Peel off the tape on the heat sink and disconnect the eDP cable from the system board [3].
- e. Remove the M2.0X3 screws that secure the display assembly to the computer and remove it from the computer [4].



Installing the display assembly

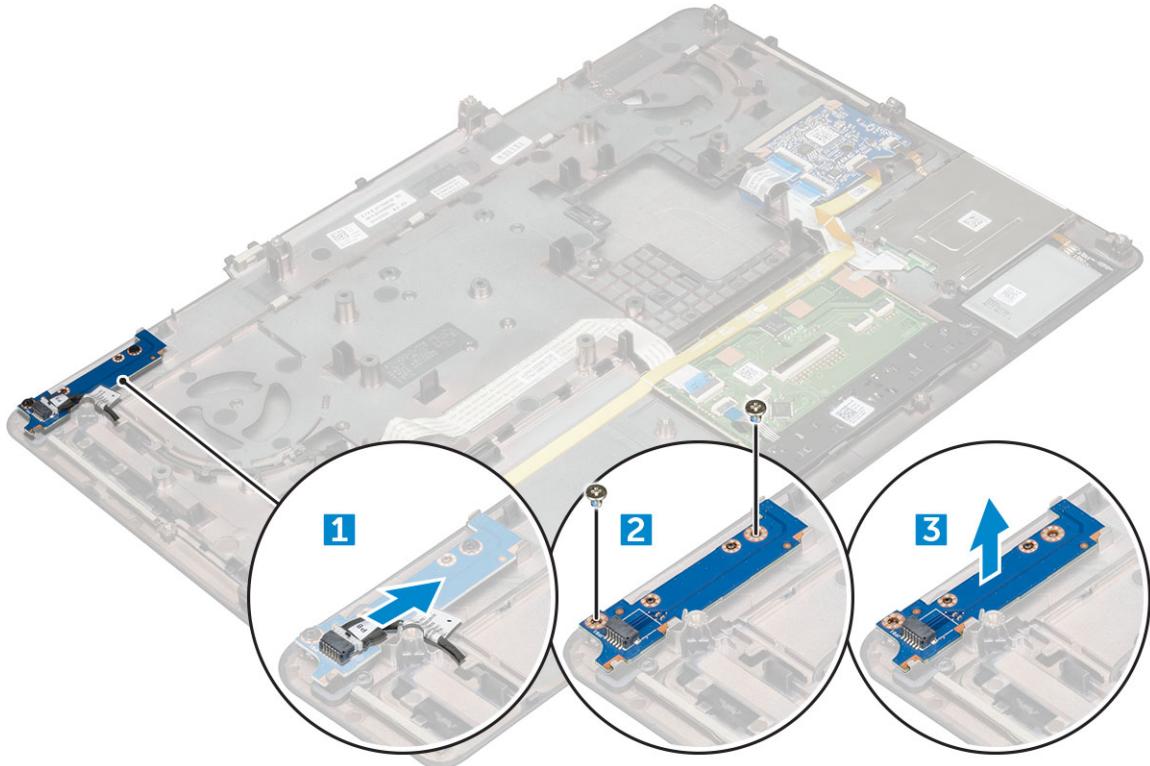
1. Insert the display assembly into the slots on the computer.
2. Replace the M2.0X3 screws to secure the display assembly in place.
3. Affix the tape on the heat sink.
4. Connect the eDP cable to the connectors on the system board.
5. Insert the wireless antenna cables through the routing hole on the chassis.
6. Replace the display assembly M2.0X3 screws at the bottom and back of the computer.
7. Align the display hinge cap and tighten the M2.5x4.0 screws to secure it to the computer.
8. Connect the antenna cables to the connectors.
9. Install the:
 - a. palmrest
 - b. WWAN card
 - c. WLAN card
 - d. keyboard
 - e. hard drive
 - f. base cover
 - g. battery
 - h. battery cover
10. Follow the procedure in [After working inside your computer](#).

Power switch board

Removing the power switch board

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

3. To remove power switch board:
 - a. Disconnect the power switch board cable from the computer [1].
 - b. Remove the M2.0X3 screws that secure power switch board to the computer [2].
 - c. Remove the power switch board from the computer [3].



Installing the power switch board

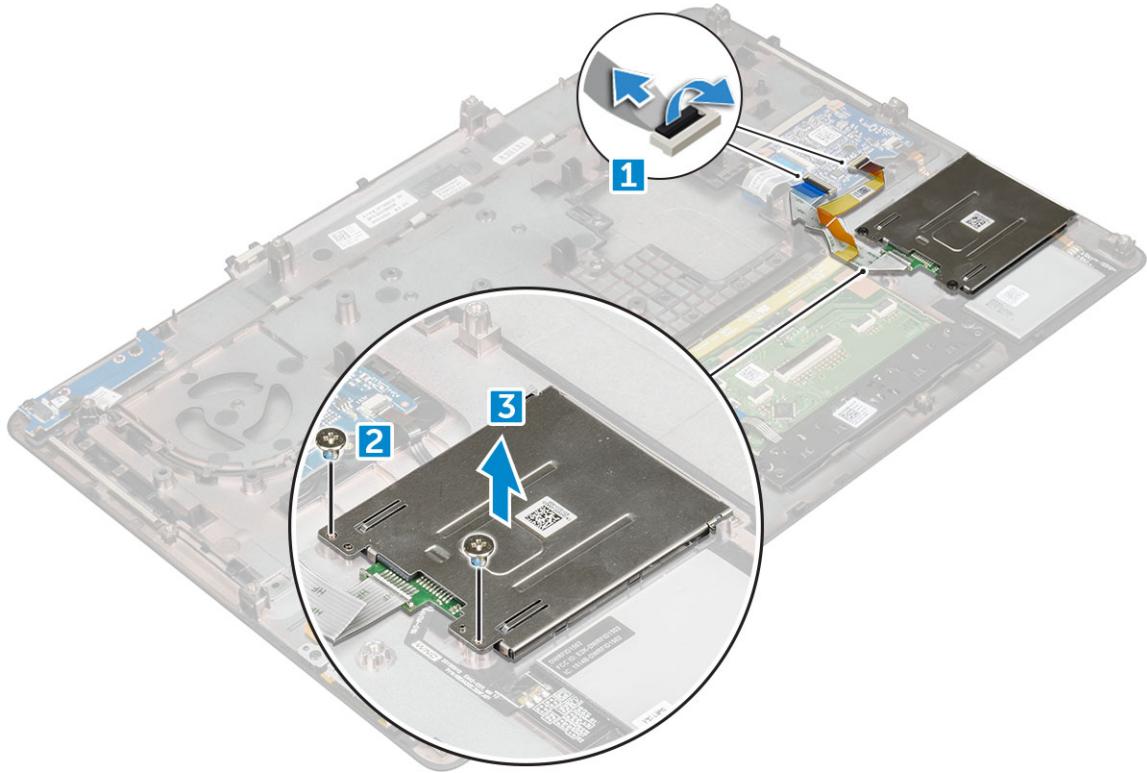
1. Place the power switch in the slot on the computer.
2. Replace the M2.0X3 screws that secure power switch board on the computer.
3. Connect the power switch board cable on the computer.
4. Install the:
 - a. palmrest
 - b. keyboard
 - c. hard drive
 - d. base cover
 - e. battery
 - f. battery cover
5. Follow the procedure in [After working inside your computer](#).

ExpressCard Reader

Removing the expresscard

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

- d. hard drive
 - e. keyboard
 - f. palmrest
3. To remove expresscard:
- a. Disconnect the expresscard cable from the computer [1].
 - b. Remove the M2.5x5.0 screws that secure expresscard to the computer [2].
 - c. Remove the expresscard board from the computer [3].



Installing the expresscard

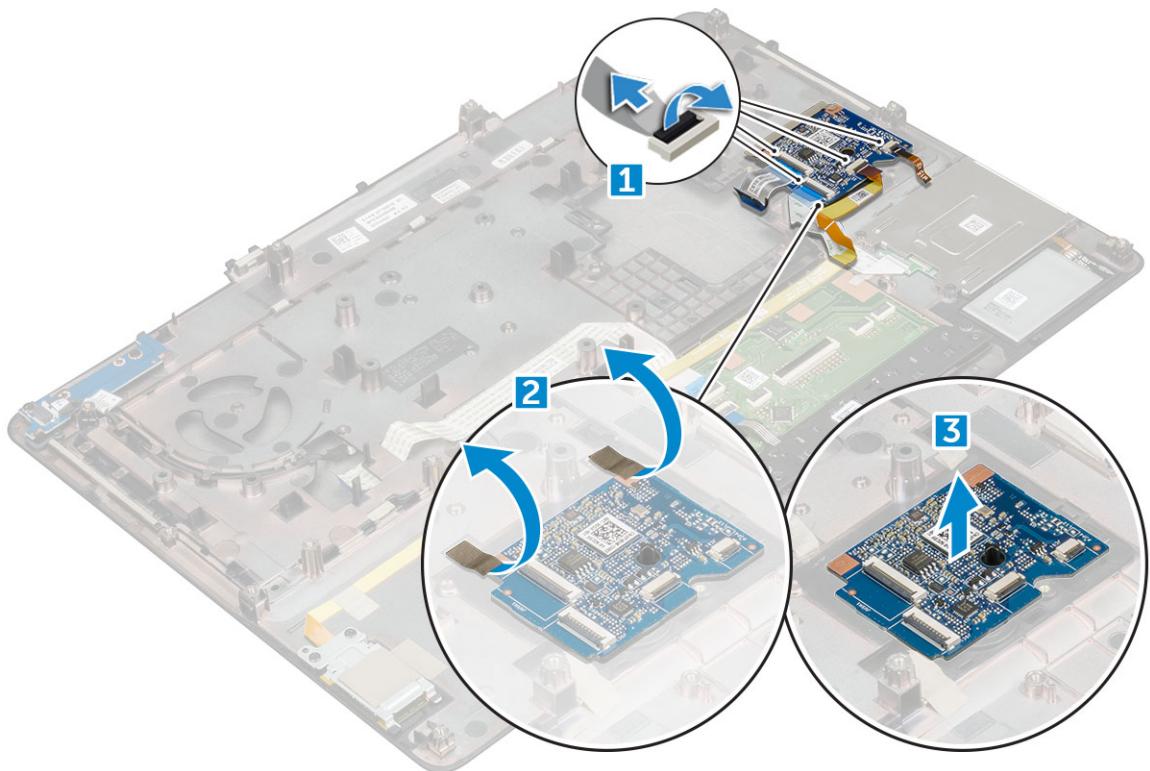
1. Place the expresscard on the computer.
2. Replace the M2.5x5.0 screws that secure expresscard on the computer.
3. Connect the expresscard cable.
4. Install the:
 - a. palmrest
 - b. keyboard
 - c. hard drive
 - d. base cover
 - e. battery
 - f. battery cover
5. Follow the procedure in [After working inside your computer](#).

USB board

Removing the USB board

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

- a. battery cover
 - b. battery
 - c. base cover
 - d. hard drive
 - e. keyboard
 - f. palmrest
3. To remove USB board:
- a. Disconnect the USB board cable from the computer [1].
 - b. Remove the adhesive tape that secures USB board to the computer [2].
 - c. Lift the USB board from the computer [3].



Installing the USB board

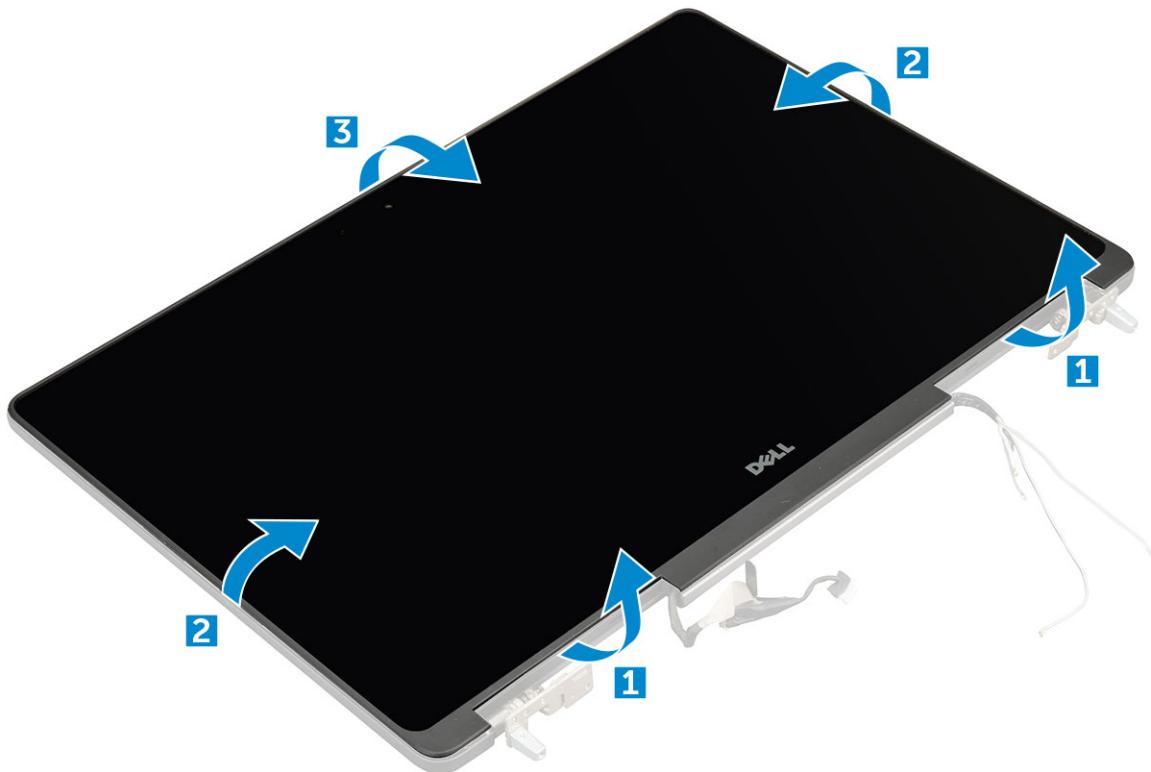
1. Place the USB board on the computer.
2. Affix the adhesive tape to secure the USB board on the computer
3. Connect the USB board cable.
4. Install the:
 - a. palmrest
 - b. keyboard
 - c. hard drive
 - d. base cover
 - e. battery
 - f. battery cover
5. Follow the procedure in [After working inside your computer](#).

Display bezel

Removing the display bezel

i | NOTE: For non touch systems perform following steps..

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [battery cover](#)
 - b. [battery](#)
 - c. [base cover](#)
 - d. [hard drive](#)
 - e. [keyboard](#)
 - f. [palmrest](#)
 - g. [display assembly](#)
3. To remove display bezel:
 - a. Pry up all the edges of the display bezel [1, 2, 3] using a plastic scribe.



Installing the display bezel

i | NOTE: For non touch systems perform following steps.

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. [palmrest](#)
 - c. [keyboard](#)
 - d. [hard drive](#)

- e. base cover
 - f. battery
 - g. battery cover
4. Follow the procedure in [After working inside your computer](#).

Display panel

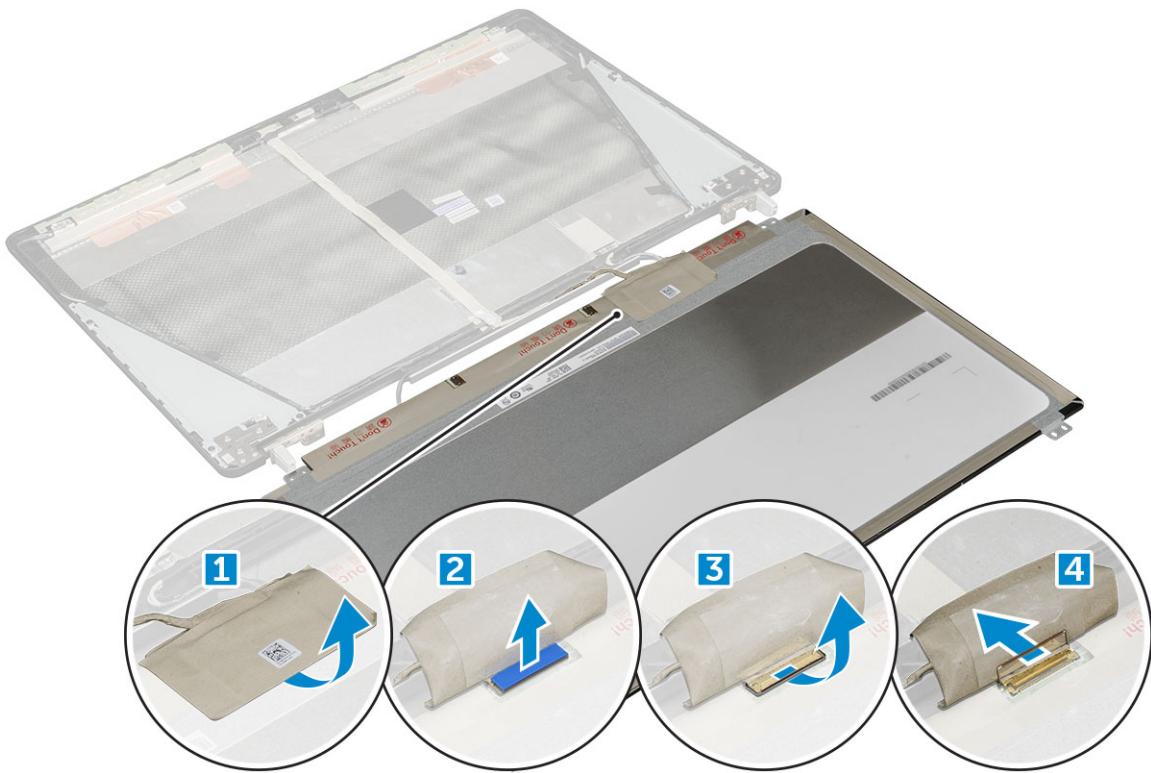
Removing the display panel

(i) NOTE: For non touch systems perform following step.

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. battery cover
 - b. battery
 - c. base cover
 - d. hard drive
 - e. keyboard
 - f. palmrest
 - g. display assembly
 - h. display bezel
3. To remove screws from the display panel :
 - a. Remove the M2.0X3 screws that secure the display panel to the display assembly [1].
 - b. Lift the display panel and turn the display panel over to access the eDP cable [2].



4. To remove display panel:
 - a. Peel the adhesive tape to access the eDP cable [1].
 - b. Remove the blue adhesive tape [2].
 - c. Lift the metal tab display panel [3].
 - d. Disconnect the cable and lift the display panel.



Installing the display panel

(i) NOTE: For non touch systems perform following steps.

1. To install the display panel:
 - a. Connect the eDP cable to the connector on the back of the display panel and affix the adhesive tape.
 - b. Align the display panel with the tabs on the display assembly.
 - c. Replace the M2.0X3 screws to secure the display panel to the display assembly.
2. Install the:
 - a. display bezel
 - b. display assembly
 - c. palmrest
 - d. keyboard
 - e. hard drive
 - f. base cover
 - g. battery
 - h. battery cover
3. Follow the procedure in [After working inside your computer](#).

Removing the display panel

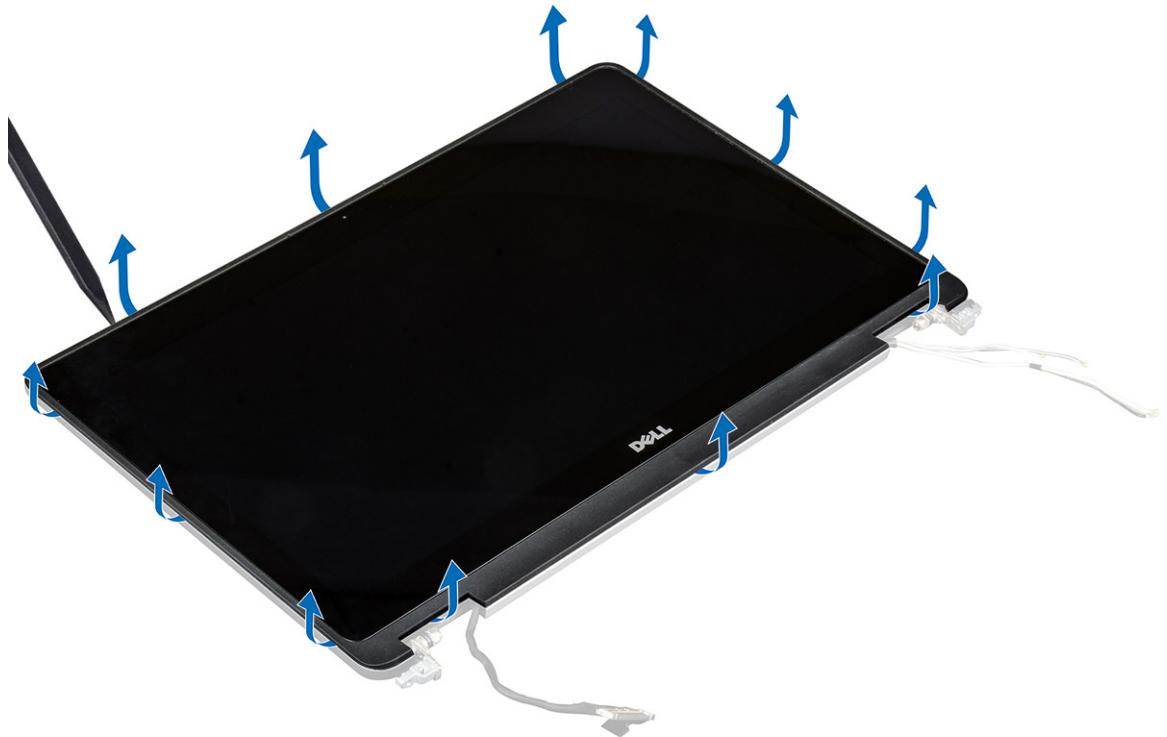
(i) NOTE: For touch systems perform following step.

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

- f. palmrest
- g. display assembly
- h. display bezel

3. To remove the display panel:

- a. Using a plastic scribe lift the edges of the display panel to disengage it from the display assembly.

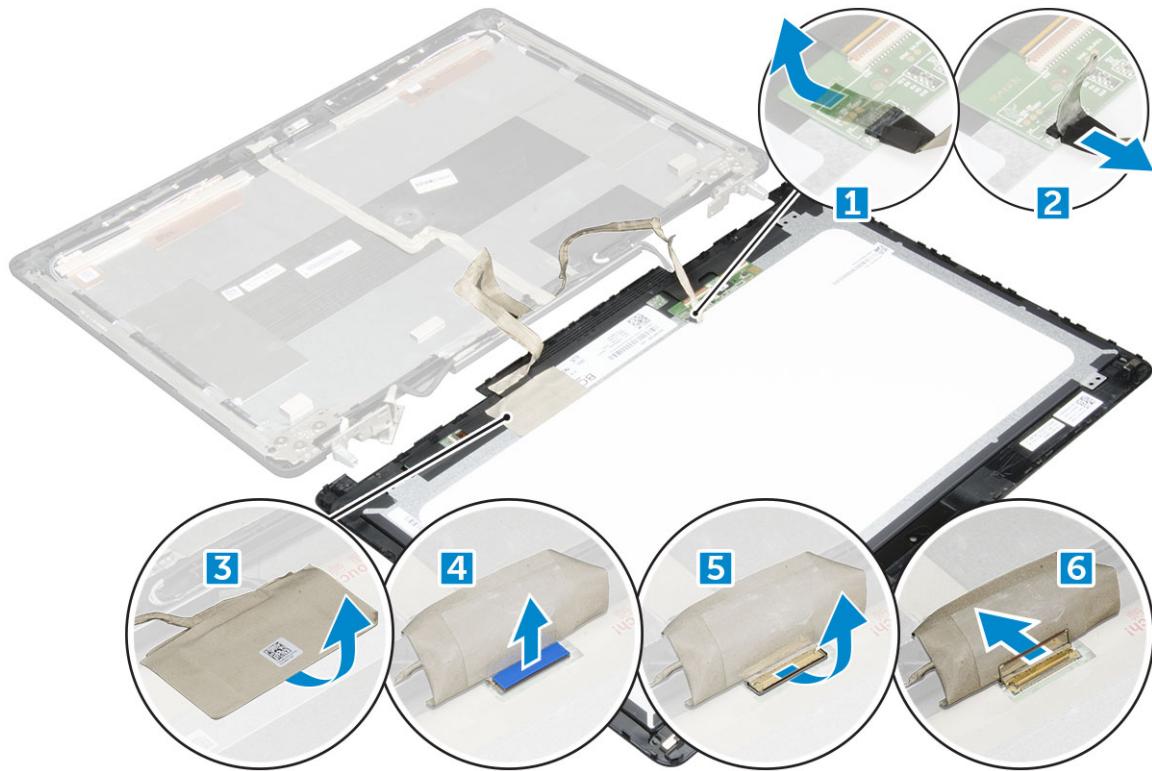


- b. Lift the display panel and turn the display panel over to access the eDP and display cables.



- c. Peel the adhesive tape to access the eDP cable [1, 3].

- d. Disconnect the eDP and display cables from the connector on the back of the display panel [2, , 4, 6].



Installing the display panel

(i) NOTE: For touch systems perform following steps.

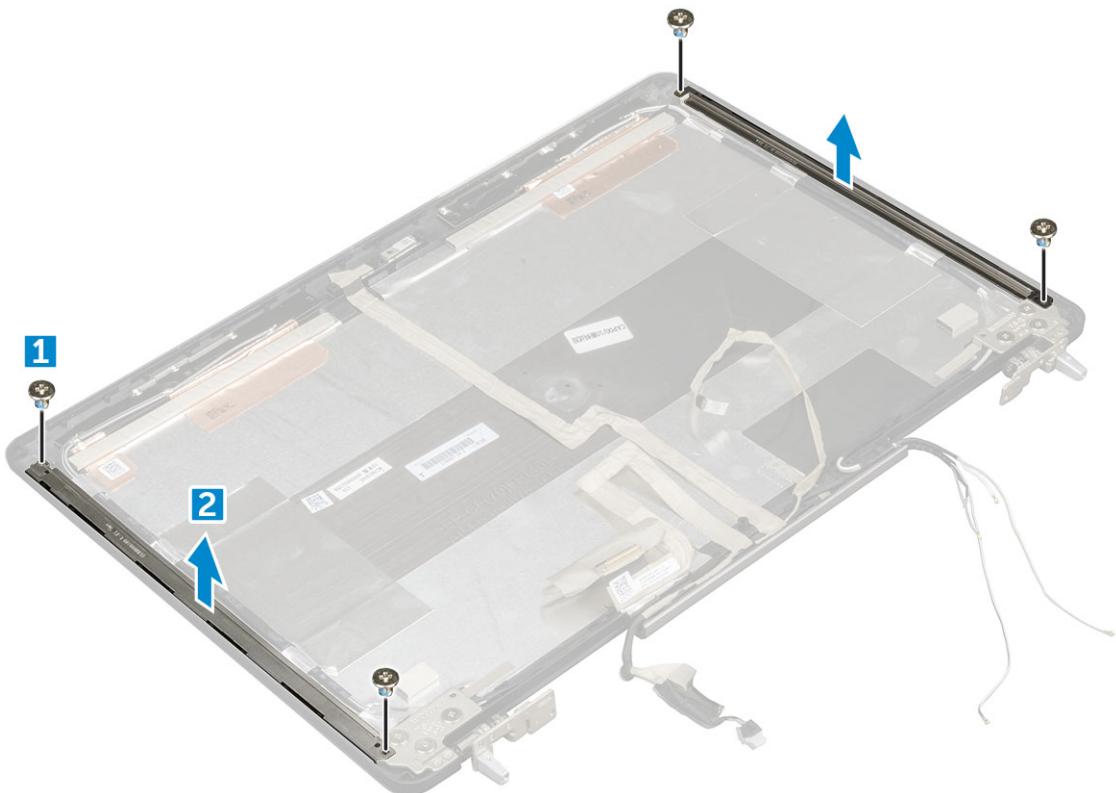
1. To install the display panel for touch systems:
 - a. Place the display panel on a flat surface.
 - b. Connect the eDP and display cables to the connector on the back of the display panel and affix the adhesive tape.
 - c. Turn the display assembly over.
 - d. Align the display panel with the tabs on the display assembly.
 - e. Press the edges of the display panel to secure it to the display assembly.
2. Install the:
 - a. [display bezel](#)
 - b. [display assembly](#)
 - c. [palmrest](#)
 - d. [keyboard](#)
 - e. [hard drive](#)
 - f. [base cover](#)
 - g. [battery](#)
 - h. [battery cover](#)
3. Follow the procedure in [After working inside your computer](#).

Display bracket

Removing the display bracket

(i) NOTE: For non touch systems perform following steps.

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [battery cover](#)
 - b. [battery](#)
 - c. [base cover](#)
 - d. [hard drive](#)
 - e. [keyboard](#)
 - f. [palmrest](#)
 - g. [display assembly](#)
 - h. [display bezel](#)
 - i. [display panel](#)
3. To remove display bracket:
 - a. Remove the M2.5x4.0 screws that secure display cover [1].
 - b. Remove the display brackets from the display cover [2].



Installing the display bracket

 **NOTE:** For non touch systems perform following steps.

1. Place the display brackets in its slot on the display cover.
2. Replace the M2.5x4.0 screws to secure the display bracket..
3. Install the:
 - a. [display panel](#)
 - b. [display bezel](#)
 - c. [display assembly](#)
 - d. [palmrest](#)
 - e. [keyboard](#)
 - f. [hard drive](#)
 - g. [base cover](#)
 - h. [battery](#)

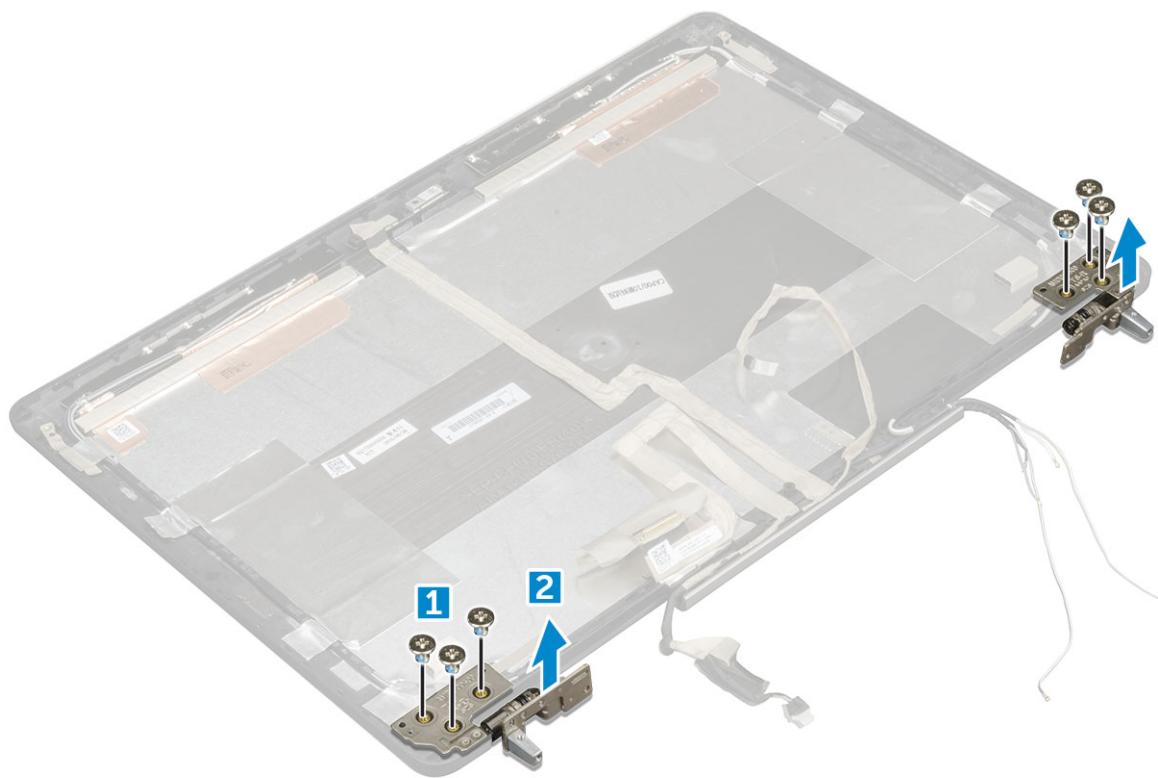
- i. [battery cover](#)
4. Follow the procedure in [After working inside your computer](#).

Display hinges

Removing the display hinge

i NOTE: For non touch systems perform following steps.

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [battery cover](#)
 - b. [battery](#)
 - c. [base cover](#)
 - d. [hard drive](#)
 - e. [keyboard](#)
 - f. [palmsrest](#)
 - g. [display assembly](#)
 - h. [display bezel](#)
 - i. [display panel](#)
3. To remove display hinge:
 - a. Remove the M2.5x4.0 screws that secure display hinges [1].
 - b. Remove the display hinges from the display cover [2].



Installing the display hinge

i NOTE: For non touch systems perform following steps.

1. Place the display hinge in its slot on the display cover.

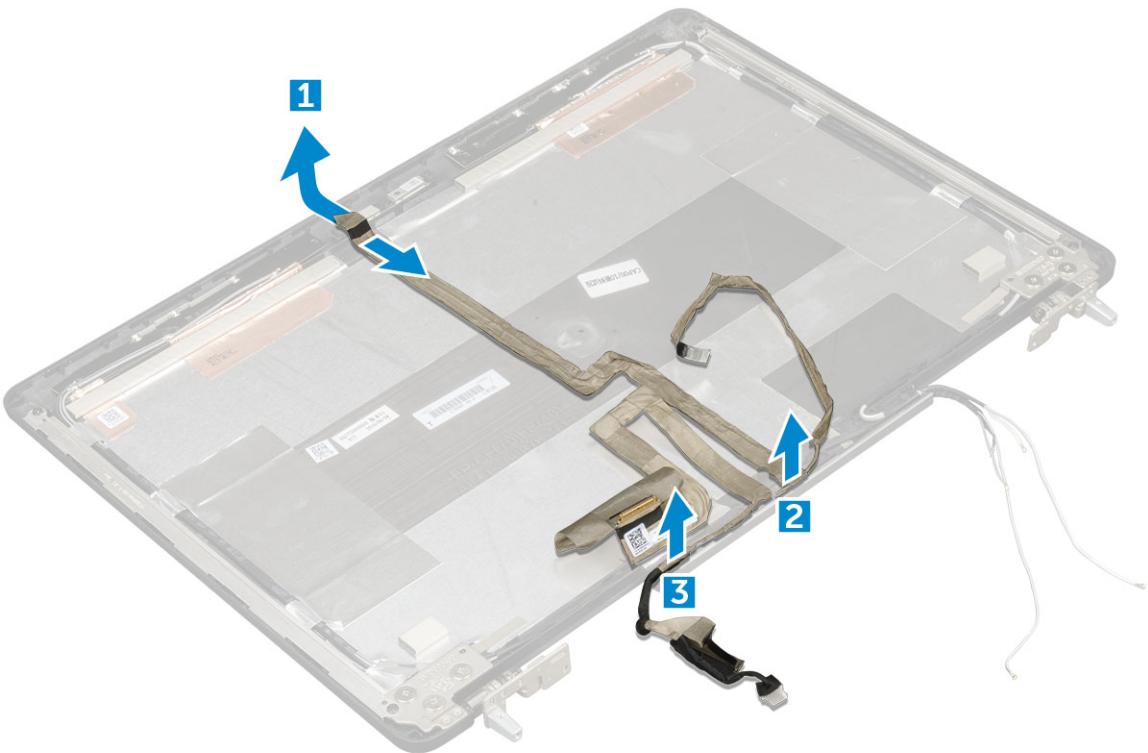
2. Replace the M2.5x4.0 screws to secure the display hinge.
3. Install the:
 - a. [display panel](#)
 - b. [display bezel](#)
 - c. [display assembly](#)
 - d. [palmrest](#)
 - e. [keyboard](#)
 - f. [hard drive](#)
 - g. [base cover](#)
 - h. [battery](#)
 - i. [battery cover](#)
4. Follow the procedure in [After working inside your computer](#).

eDP cable

Removing the eDP cable

 **NOTE:** For non touch systems perform following steps.

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [battery cover](#)
 - b. [battery](#)
 - c. [base cover](#)
 - d. [hard drive](#)
 - e. [keyboard](#)
 - f. [palmrest](#)
 - g. [display assembly](#)
 - h. [display bezel](#)
 - i. [display panel](#)
3. To remove eDP cable:
 - a. Peel the eDP cable [1].
 - b. Unroute the eDP cable from the display cover [2, 3].



Installing the eDP cable

i **NOTE:** For non touch systems perform following steps.

1. Route the eDP cable on the display cover.
2. Affix the eDP cable on the display cover.
3. Install the:
 - a. display panel
 - b. display bezel
 - c. display assembly
 - d. palmrest
 - e. keyboard
 - f. hard drive
 - g. base cover
 - h. battery
 - i. battery cover
4. Follow the procedure in [After working inside your computer](#).

Camera

Removing the camera

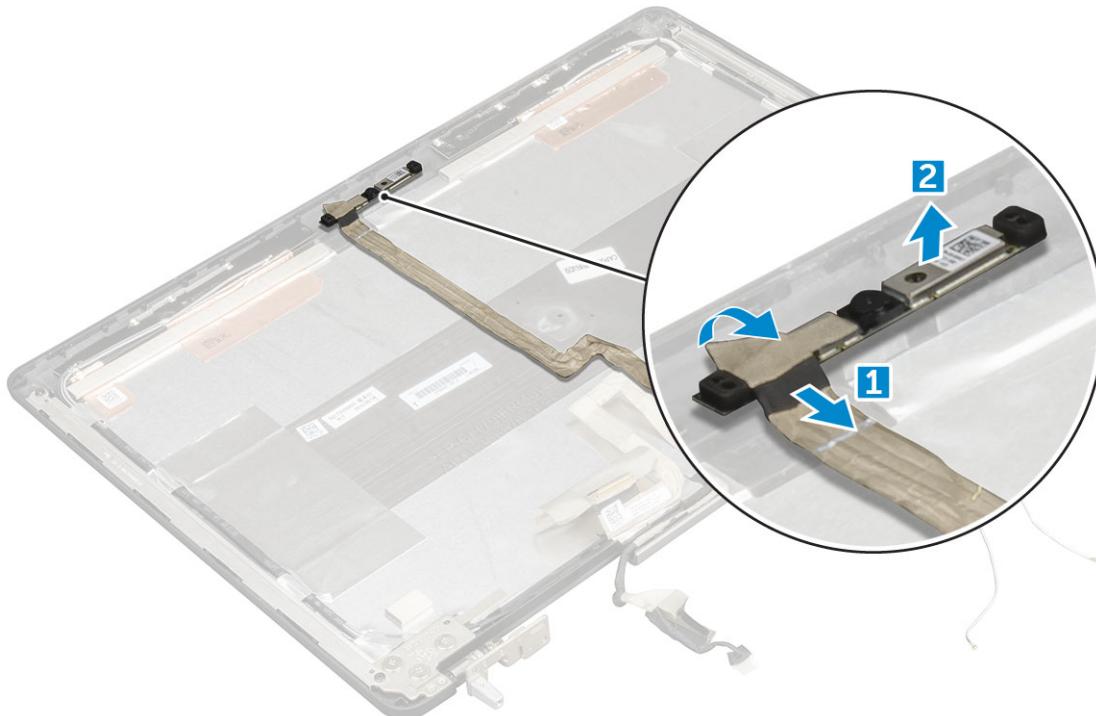
i **NOTE:** For non touch systems perform following steps.

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

- c. base cover
- d. hard drive
- e. keyboard
- f. palmrest
- g. display assembly
- h. display bezel

3. To remove camera:

- a. Peel the eDP cable and disconnect the camera cable from the computer [1].
- b. Lift the camera module from the computer [2].



Installing the camera

(i) NOTE: For non touch systems perform following steps.

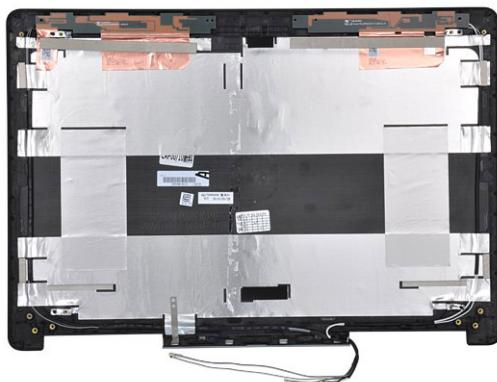
1. Place the camera module in its slot on the computer.
2. Connect the camera cable.
3. Affix the eDP cable.
4. Install the:
 - a. display bezel
 - b. display assembly
 - c. palmrest
 - d. keyboard
 - e. hard drive
 - f. base cover
 - g. battery
 - h. battery cover
5. Follow the procedure in [After working inside your computer](#).

Display cover

Replacing the display cover

i | NOTE: For non touch systems perform following steps.

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [battery cover](#)
 - b. [battery](#)
 - c. [base cover](#)
 - d. [hard drive](#)
 - e. [keyboard](#)
 - f. [palmrest](#)
 - g. [display assembly](#)
 - h. [display bezel](#)
 - i. [display panel](#)
 - j. [display bracket](#)
 - k. [display hinge](#)
 - l. [camera](#)
 - m. [eDP cable](#)



The component you are left with is the display cover.

3. Install:
 - a. [eDP cable](#)
 - b. [camera](#)
 - c. [display hinge](#)
 - d. [display bracket](#)
 - e. [display panel](#)
 - f. [display bezel](#)
 - g. [display assembly](#)
 - h. [palmrest](#)
 - i. [keyboard](#)
 - j. [hard drive](#)
 - k. [base cover](#)
 - l. [battery](#)
 - m. [battery cover](#)
4. Follow the procedure in [After working inside your computer](#).

Technology and components

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

Topics:

- Power adapter
- Processors
- USB features
- HDMI 1.4

Power adapter

This laptop is shipped with 180 W power adapters.

⚠ | WARNING: When you disconnect the power adapter cable from the laptop, grasp the connector, not the cable itself, and then pull firmly but gently to avoid damaging the cable.

⚠ | WARNING: The power adapter works with electrical outlets worldwide. However, power connectors and power strips vary among countries. Using an incompatible cable or improperly connecting the cable to the power strip or electrical outlet may cause fire or equipment damage.

Processors

Latitude 7520 is shipped with any of the following processors:

7th generation processors (KabyLake)

- Intel Core Xeon E3-1535M v6 (Quad Core Xeon 3.10GHz, 4.20GHz Turbo, 8MB 45W)
- Intel Core Xeon E3-1505M v6 (Quad Core Xeon 3.00GHz, 4.00GHz Turbo, 8MB 45W)
- Intel Core i7-7920HQ (Quad Core 3.10GHz, 4.10GHz Turbo, 8MB 45W)
- Intel Core i7-7820HQ (Quad Core 2.90GHz, 3.90GHz Turbo, 8MB 45W)
- Intel Core i7-7700HQ (Quad Core 2.80GHz, 3.80GHz Turbo, 6MB 45W)- non vPro
- Intel Core i5-7440HQ (Quad Core 2.80GHz, 3.80GHz Turbo, 6MB 45W)
- Intel Core i5-7300HQ (Quad Core 2.50GHz, 3.50GHz Turbo, 6MB 45W)

6th generation processors (Skylake)

- Intel Core Xeon E3-1575M v5 (Quad Core Xeon 3.00GHz, 3.90GHz Turbo, 8MB 45W)
- Intel Core Xeon E3-1545M v5 (Quad Core Xeon 2.90GHz, 3.80GHz Turbo, 8MB 45W)
- Intel Core i7-6920HQ (Quad Core 2.90GHz, 3.80GHz Turbo, 8MB 45W)
- Intel Core i7-6820HQ (Quad Core 2.70GHz, 3.60GHz Turbo, 8MB 45W)

(i) | NOTE: The clock speed and performance varies depending on the workload and other variables.

Kaby Lake — 7th Generation Intel Core processors

The 7th Gen Intel Core processor (Kaby Lake) family is the successor of 6th generation processors (Skylake). It's main features include:

- Intel 14nm Manufacturing Process Technology
- Intel Turbo Boost Technology
- Intel Hyper Threading Technology
- Intel Built-in Visuals

- Intel HD graphics - exceptional videos, editing smallest details in the videos
- Intel Quick Sync Video - excellent video conferencing capability, quick video editing and authoring
- Intel Clear Video HD - visual quality and color fidelity enhancements for HD playback and immersing web browsing
- Integrated memory controller
- Intel Smart Cache
- Optional Intel vPro technology (on i5/i7) with Active Management Technology 11.6
- Intel Rapid Storage Technology

i **NOTE:** Windows 7 and 8 are not supported by systems with 7th generation processors

USB features

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

Table 1. USB evolution

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

USB 3.0/USB 3.1 Gen 1 (SuperSpeed USB)

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

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

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

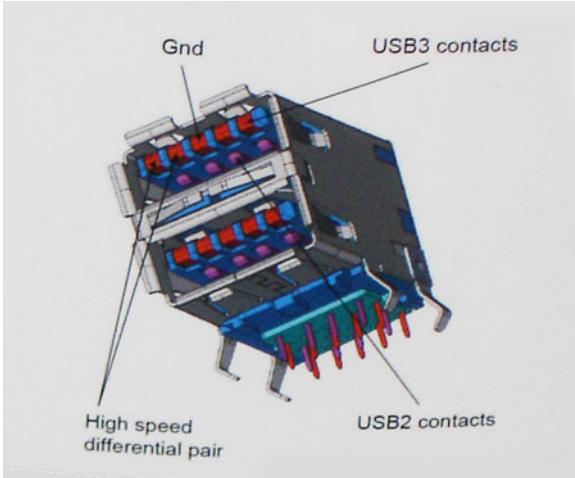


Speed

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

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

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



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

Applications

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

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

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

Compatibility

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

HDMI 1.4

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

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

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

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

HDMI 1.4 Features

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

Advantages of HDMI

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

System specifications

(i) NOTE: Offerings may vary by region. The following specifications are only those required by law to ship with your computer. For more information about the configuration of your computer, go to **Help and Support** in your Windows operating system and select the option to view information about your computer.

Topics:

- System information
- Processor
- Memory
- Video
- Audio
- Communication
- Expansion bus
- Ports and connectors
- Display
- Keyboard
- Touchpad
- Camera (Optional)
- Storage
- Battery
- AC adapter
- Contactless smart card
- Physical dimension
- Environmental

System information

Feature	Specification
System Chipset	Intel CM238 Chipset
Interrupt Levels	Interrupt Controller <ul style="list-style-type: none"> • Supports up to eight legacy interrupt pins • Supports PCI 2.3 Message Signaled Interrupts • Integrated IO APIC capability with 24 interrupts • Supports Processor System Bus interrupt delivery
BIOS Chip (NVRAM)	64Mbit (8MB) & 32Mbit (4MB)

Processor

Feature	Specification
Processor type	6th generation Intel i7, Xeon processors (SkyLake) <ul style="list-style-type: none"> • 7th generation Intel Core i5, i7 and Xeon processors (KabyLake)
L1 cache	Up to 32 KB cache depending on processor type

L2 cache	Up to 256 KB cache depending on processor type
L3 cache	Up to 8 MB cache depending on processor type
Intel Smart cache with Last Level Cache	Up to 8 MB cache depending on processor type

Memory

Feature	Specification
Type	DDR4 SDRAM ECC and Non-ECC
Speed	<ul style="list-style-type: none"> • 2400 MHz • 2667 MHz (Non-ECC only)
Connectors	4
Capacity	8GB, 16 GB
Minimum Memory	8 GB (1 x 8 GB)
Maximum memory	<ul style="list-style-type: none"> • 4 DIMM slots: up to 64GB DDR4 Non - ECC 2400MHz • Up to 64GB DDR4 ECC DDR4 2400MHz • Up to 32GB DDR4 2667MHz SuperSpeed memory

Video

Feature	Specification
Type	MXM type-A add-in card
Data bus	PCIE x16, Gen3
Video controller and memory:	<ul style="list-style-type: none"> • Intel HD GFX (7th generation processors will only be offered with i5-7300HQ, i7-7920HQ and E3-1535M v6 CPUs) • NVIDIA Quadro M1200 w/4GB GDDR5 • NVIDIA Quadro M2200 w/4GB GDDR5 • Radeon Pro WX 4130 w/2GB GDDR5 • Radeon Pro WX 4150 w/4GB GDDR5

Audio

Features	Specification
Integrated	dual-channel High-Definition audio

Communication

Feature	Specification
Ethernet adapter	network interface card capable of 10/100/1000 mb/s communication
Wireless	<p>WLAN options:</p> <ul style="list-style-type: none"> • Intel WiFi Link 8265 2x2 802.11ac+BT 4.2 (vPro)

- Intel WiFi Link 8265 2x2 802.11ac NBT (vPro)
 - Dell DW 1820 2x2 802.11ac+BT 4.2 US
- Optional Mobile broadband and GPS
- DW5811e (Gobi 4G/LTE - FMC)
 - DW5814e (Gobi 4G/LTE)

Expansion bus

Feature	Specification
Bus Type	PCI Express 1.0, 2.0 and 3.0, SATA 1.0A, 2.0 and 3.0, USB 2.0 and 3.0
Bus Width	PCIe X16
BIOS Chip (NVRAM)	128 Mb (16 MB)

Ports and connectors

Feature	Specification
Audio	Universal audio jack connector
Network Adapter	one RJ45 connector
USB C connector with Thunderbolt	one (optional)
USB 3.1 with Gen 1 (with PowerShare)	four
Video	HDMI 1.4, mDP 1.4
Memory card reader	SD 4.0
Docking port	one
Micro Subscriber Identity Module (Micro SIM) port	one
Smart card (optional)	one

Display

Features	Specification
Type	<ul style="list-style-type: none"> • FHD (1920 x 1080) • UHD (3840 x 2160)
Size	15.6 inches
Dimensions:	
Height	193.59 mm (7.62 inches)
Width	344.16 mm (13.54 inches)
Diagonal	396.24 mm (15.60 inches)

Active area (X/Y)	<ul style="list-style-type: none"> • FHD (1920 x 1080) • UHD (3840 x 2160)
Maximum resolution	<ul style="list-style-type: none"> • FHD (1920 x 1080) • UHD (3840 x 2160)
Maximum Brightness	<ul style="list-style-type: none"> • 15.6" FHD TN Anti-Glare LED-backlit —220 nits • 15.6" UltraSharp™ FHD IPS Wide View Anti-Glare LED-backlit —300 nits • 15.6" UltraSharp™ FHD IPS Touch Wide View LED-backlit—350 nits • 15.6" UltraSharp™ UHD IGZO Wide View Anti-Glare LED-backlit—300 nits
Operating angle	0° (closed) to 135°
Refresh rate	60 Hz
Minimum viewing angles:	
Horizontal	<ul style="list-style-type: none"> • FHD (40/80/80) • UHD (80)
Vertical	<ul style="list-style-type: none"> • FHD (10/80/80) • UHD (80)

Keyboard

Features	Specification
Number of keys	<ul style="list-style-type: none"> • United States: 103 keys • United Kingdom: 104 keys • Brazil: 106 keys • Japan: 107 keys
Layout	QWERTY/AZERTY/Kanji

Touchpad

Features	Specification
X/Y position resolution	<ul style="list-style-type: none"> • X: 41.27+-4.13 counts/mm • Y: 38.75+-3.88 counts/mm • 1048/984 cpi
Size	Sensor-active area: <ul style="list-style-type: none"> • Width: 99.5mm (3.92 inches) • Height: 53mm (2.09 inches)
Multi-Touch	Configurable single finger and multi-finger gestures

Camera (Optional)

Features	Specification
Type	CMOS Sensor
Still Resolution	1280 x 720 Pixels (Maximum)
Video Resolution	1280 x 720 Pixels (Maximum)
Diagonal	74 degrees

Storage

Features	Specification
Storage:	<ul style="list-style-type: none">• SATA 1 (1.5 Gb/s)• SATA 2 (3.0 Gb/s)• SATA 3 (6 Gb/s)• PCIe express
Options	<ul style="list-style-type: none">• 500GB 2.5" 7mm SATA (7200 RPM) Hard Drive• 1TB 2.5" 7mm SATA (7200 RPM) Hard Drive• 2TB 2.5" 7mm SATA (5400 RPM) Hard Drive• 256GB 2.5" 7mm SATA Solid State Drive Class 20• 360GB 2.5" 7mm SATA Solid State Drive Class 20• 512GB 2.5" 7mm SATA Solid State Drive Class 20• 512GB 2.5" 7mm SATA SED Solid State Drive Class 20• 1TB 2.5" 7mm SATA Solid State Drive Class 20• M.2 PCIe 256GB SSD Class 40• M.2 PCIe 512GB SSD Class 40• M.2 PCIe 512GB SED SSD Class 40• M.2 PCIe 1TB SSD Class 40• M.2 PCIe 2TB SSD Class 40• M.2 PCIe 512GB SSD Class 50• M.2 PCIe 1TB SSD Class 50• M.2 PCIe 2TB SSD Class 50

Battery

Features	Specification
Wattage	72Whr/ 91Whr/ 88Whr
Type	lithium ion
Length	243.89 mm (9.6inches)
Height	18.45 mm (0.73inches)
Width	71.30 mm (2.81inches)
Weight	18.45 mm (0.73inches)
Voltage	400.00 g (0.88 lb)
Life span	<ul style="list-style-type: none">• 300 discharge/charge cycles• 1000 discharge/charge cycles (LCL)
Temperature range:	
Operating	<ul style="list-style-type: none">• Charge: 0°C to 50°C (32°F to 158°F)• Discharge: 0°C to 70°C (32°F to 122°F)
Non-Operating	-20°C to 65°C (4°F to 149°F)
Coin-cell battery	3 V CR2032 lithium ion cell

AC adapter

Features	Specification
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Input voltage	100 VAC to 240 VAC
Input current (maximum)	2.34 A
Input frequency	50 Hz to 60 Hz
Output power	180 W
Output current	9.23 A
Rated output voltage	19.50 VDC
Height	30 mm (1.18 inches)
Width	155 mm (6.10 inches)
Depth	76.2 mm (3.0 inches)
Weight	0.58 kg (1.28 lb)
Temperature range:	
Operating	0°C to 40°C (32°F to 104°F)
Non-Operating	-40°C to 70°C (-40°F to 158°F)

Contactless smart card

Features	Specification
Supported Smart Cards and technologies	<ul style="list-style-type: none"> ISO14443A — 160 kbps, 212 kbps, 424 kbps, and 848 kbps ISO14443B — 160 kbps, 212 kbps, 424 kbps, and 848 kbps ISO15693 HID iClass FIPS201 NXP Desfire

Physical dimension

Feature	Specification
Weight (pounds/kilograms)	6.17 lbs (2.80 kgs)
Dimensions	
Height (inches/mm)	
Front (non-touch)	1.09 inches (27.7 mm)
Rear (non-touch)	1.30 inches (33.0mm)
Front (touch)	1.12 inches (28.4 mm)
Rear (touch)	1.33 inches (33.7mm)
Width (inches/mm)	14.88 inches (378 mm)
Depth (inches/mm)	10.28 inches (261 mm)

Environmental

Feature	Specification
Temperature range:	
Operating	10° C to 35° C (50° to 95° F)
Storage	-40° C to 65° C (-40° to 149° F)
Relative humidity (maximum):	
Storage	20% to 80% (non-condensing)
Maximum vibration:	
Operating	5 to 350 Hz at 0.0002 G ² /Hz
Storage	5 to 500 Hz at 0.001 to 0.01 G ² /Hz
Maximum shock:	
Operating	40 G +/- 5% with pulse duration of 2 msec +/-10% (equivalent to 51 cm/sec [20 in/sec])
Storage	105 G +/- 5% with pulse duration of 2 msec +/-10% (equivalent to 127 cm/sec [50 in/sec])
Maximum Altitude:	
Operating	-15.2 to 3048 m (-50 to 10,000 ft)
Storage	-15.2 to 10,668 m (-50 to 35,000 ft)

BIOS setup

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

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

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

Use the BIOS Setup program for the following purposes:

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

Topics:

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

BIOS overview

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

Entering BIOS setup program

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

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

Navigation keys

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

Table 2. Navigation keys

Keys	Navigation
Up arrow	Moves to the previous field.

Table 2. Navigation keys (continued)

Keys	Navigation
Down arrow	Moves to the next field.
Enter	Selects 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.
Tab	Moves to the next focus area. (i) NOTE: For the standard graphics browser only.
Esc	Moves to the previous page until you view the main screen. Pressing Esc in the main screen displays a message that prompts you to save any unsaved changes and restarts the system.

One time boot menu

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

(i) NOTE: It is recommended to shutdown the computer if it is on.

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

- Removable Drive (if available)
- STXXXX Drive (if available)
(i) NOTE: XXX denotes the SATA drive number.
- Optical Drive (if available)
- SATA Hard Drive (if available)
- Diagnostics

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

System setup options

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

General screen options

This section lists the primary hardware features of your computer.

Option	Description
System Information	This section lists the primary hardware features of your computer. <ul style="list-style-type: none">• System Information: Displays BIOS Version, Service Tag, Asset Tag, Ownership Tag, Ownership Date, Manufacture Date, and the Express Service Code.• Memory Information: Displays Memory Installed, Memory Available, Memory Speed, Memory Channels Mode, Memory Technology, DIMM ASize, DIMM B Size, DIMM CSize, DIMM D Size,• Processor Information: Displays Processor Type, Core Count, Processor ID, Current Clock Speed, Minimum Clock Speed, Maximum Clock Speed, Processor L2 Cache, Processor L3 Cache, HT Capable, and 64-Bit Technology.• Device Information: Displays Primary Hard Drive, SATA-0, M.2 PCIe SSD-0, Dock eSATA Device, LOM MAC Address, Passthrough MAC address, Video Controller, dGPU video controller, Video BIOS Version, Video Memory, Panel Type, Native Resolution, Audio Controller, Wi-Fi Device, Cellular Device, Bluetooth Device.

Option	Description
Battery Information	Displays the battery status and the type of AC adapter connected to the computer.
Boot Sequence	Allows you to change the order in which the computer attempts to find an operating system. <ul style="list-style-type: none"> ● Windows Boot Manager ● Boot list options: <ul style="list-style-type: none"> ○ Legacy <ul style="list-style-type: none"> ■ Diskette Drive ■ Internal HDD ■ USB Storage Device ■ CD/DVD/CD-RW Drive ■ Onboard NIC ○ UEFI (selected by default)
Advanced Boot Options	This option allows you the legacy option ROMs to load. By default, the Enable Legacy Option ROMs is enabled. <ul style="list-style-type: none"> ● Enable Attempt Legacy Boot
UEFI boot path security	<ul style="list-style-type: none"> ● Always, except internal HDD (selected by default) ● Always ● Never
Date/Time	Allows you to change the date and time.

System Configuration screen options

Option	Description
Integrated NIC	Allows you to configure the integrated network controller. The options are: <ul style="list-style-type: none"> ● Disabled ● Enabled ● Enabled w/PXE: This option is enabled by default.
Parallel Port	Allows you to configure the parallel port on the docking station. The options are: <ul style="list-style-type: none"> ● Disabled ● AT: This option is enabled by default. ● PS2 ● ECP
Serial Port	Allows you to configure the integrated serial port. The options are: <ul style="list-style-type: none"> ● Disabled ● COM1: This option is selected by default. ● COM2 ● COM3 ● COM4
SATA Operation	Allows you to configure the internal SATA hard-drive controller. The options are: <ul style="list-style-type: none"> ● Disabled ● AHCI ● RAID On: This option is enabled by default.
Drives	Allows you to configure the SATA drives on board. All drives are enabled by default. The options are: <ul style="list-style-type: none"> ● SATA-0 ● SATA-1 ● M.2 PCI-e SSD-0 ● SATA-3
SMART Reporting	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.

Option	Description
USB Configuration	<ul style="list-style-type: none"> Enable SMART Reporting <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"> Enable Boot support (by default enable) Enable Thunderbolt ports (by default enable) Always Allow dell docks Enable external USB ports <p>Others:</p> <ul style="list-style-type: none"> Enable Thubderbolt Boot Support Enable Thunderbolt (and PCIE behind TBT) Pre-boot Security level-no security Security level-user configuration (selected by default) Security level-secure connect Security level- Display port only <p>i NOTE: USB keyboard and mouse always work in the BIOS setup irrespective of these settings.</p>
USB PowerShare	This field configures the USB PowerShare feature behavior. This option allows you to charge external devices using the stored system battery power through the USB PowerShare port (disabled by default)..
Audio	This field enables or disables the integrated audio controller. By default, the Enable Audio option is selected. The options are: <ul style="list-style-type: none"> Enable Microphone (by default enable) Enable Internal Speaker (by default enable)
Keyboard Illumination	This field lets you choose the operating mode of the keyboard illumination feature. The keyboard brightness level can be set from 0% to 100%. The options are: <ul style="list-style-type: none"> Disabled (selected by default) Dim Bright
Keyboard Backlight with AC	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 (selected by default).
Keyboard Backlight Timeout on AC	The Keyboard Backlight Time-out dims out with AC option. The main keyboard illumination feature is not affected. Keyboard Illumination will continue to support the various illumination levels. This field has an effect when the backlight is enabled. <ul style="list-style-type: none"> 5 sec 10 sec (selected by default) 15 sec 30 sec 1 min 5 min 15 min never
Touchscreen	Controls whether the touch screen is enabled or disabled (enabled by default).
Keyboard Backlight Timeout on Battery	The Keyboard Backlight Time-out dims out with Battery option. The main keyboard illumination feature is not affected. Keyboard Illumination will continue to support the various illumination levels. This field has an effect when the backlight is enabled. <ul style="list-style-type: none"> 5 sec

Option	Description
	<ul style="list-style-type: none"> • 10 sec (selected by default) • 15 sec • 30 sec • 1 min • 5 min • 15 min • never
Unobtrusive Mode	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.
Miscellaneous Devices	Allows you to enable or disable the following devices: <ul style="list-style-type: none"> • Enable Camera —enabled by default • Enable Expresscard (selected by default) • Enable HardDrive Free Fall Protection (selected by default) • WiFi Radio (selected by default) • Enable Secure Digital (SD) Card (selected by default) • Secure Digital (SD) Card Read-Only Mode • Secure Digital (SD) Card Boot

Video screen options

Option	Description
LCD Brightness	Allows you to set the display brightness depending upon the power source. On Battery(50% is default) and On AC (100 % default).
Switchable Graphics	<ul style="list-style-type: none"> • Enable Switchable Graphics (selected by default) • Enable Dock Display Port (selected by default) • Discrete Graphics Controller Direct Output Mode

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

Security screen options

Option	Description
Admin Password	Allows you to set, change, or delete the administrator (admin) password. (i) NOTE: 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. (i) NOTE: Successful password changes take effect immediately. Default setting: Not set
System Password	Allows you to set, change or delete the system password. (i) NOTE: Successful password changes take effect immediately. Default setting: Not set
Internal HDD-2 Password	Allows you to set, change, or delete the administrator password. (i) NOTE: Successful password changes take effect immediately. Default setting: Not set
Strong Password	Allows you to enforce the option to always set strong passwords. Default Setting: Enable Strong Password is not selected.

Option	Description
	i NOTE: 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.
Password Configuration	<p>Allows you to specify the minimum and max password lengths of Administrator and System passwords.</p> <ul style="list-style-type: none"> minimum -4(by default, if you want to change you can increase the number) maximum -32 (you can decrease the number)
Password Bypass	<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"> Disabled Reboot bypass <p>Default setting: Disabled</p>
Password Change	<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: Allow Non-Admin Password Changes is selected.</p>
Non-Admin Setup Changes	<p>Allows you to determine whether changes to the setup options are allowed when an Administrator Password is set. If disabled the setup options are locked by the admin password.</p> <ul style="list-style-type: none"> allow wireless switch changes
UEFI Capsule Firmware Updates	<p>Allows you to enable or disable. This option controls whether this system allows BIOS updated via UEFI capsule update packages. The options are:</p> <ul style="list-style-type: none"> Enable UEFI Capsule Firmware—enabled by default
TPM 1.2/2.0 Security	<p>Allows you to enable the Trusted Platform Module (TPM) during POST. The options are:</p> <ul style="list-style-type: none"> TPM On (selected by default) Clear (option is disabled) PPI Bypass for Enabled Commands (selected by default) PPI Bypass for Disabled Commands Disabled Enabled Attestation enable (selected by default) Key storage enable (selected by default) SHA-256 (selected by default)
	i NOTE: To upgrade or downgrade TPM1.2/2.0, download the TPM wrapper tool (software).
Computrace	<p>Allows you to activate or disable the optional Computrace software. The options are:</p> <ul style="list-style-type: none"> Deactivate Disable Activate (selected by default)
	i NOTE: The Activate and Disable options will permanently activate or disable the feature and no further changes will be allowed
CPU XD Support	<p>Allows you to enable the Execute Disable mode of the processor.</p> <p>Enable CPU XD Support (default)</p>
OROM Keyboard Access	<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"> Enable One Time Enable Disable <p>Default setting: Enable</p>
Admin Setup Lockout	<p>Allows you to prevent users from entering Setup when an Administrator password is set.</p> <p>Default Setting: Disabled</p>

Option	Description
Master password lockout	This option is not selected by default

Secure Boot screen options

Option	Description
Secure Boot Enable	<p>This option enables or disables the Secure Boot feature.</p> <ul style="list-style-type: none"> Disabled Enabled <p>Default setting: Enabled.</p>
Expert Key Management	<p>Allows you to manipulate the security key databases only if the system is in Custom Mode. The Enable Custom Mode option is disabled by default. The options are:</p> <ul style="list-style-type: none"> PK—enabled by default KEK db dbx <p>If you enable the Custom Mode, the relevant options for PK, KEK, db, and dbx appear. The options are:</p> <ul style="list-style-type: none"> Save to File—Saves the key to a user-selected file Replace from File—Replaces the current key with a key from a user-selected file Append from File—Adds a key to the current database from a user-selected file Delete—Deletes the selected key Reset All Keys—Resets to default setting Delete All Keys—Deletes all the keys <p>NOTE: If you disable the Custom Mode, all the changes made are erased and the keys restore to default settings.</p>

Intel Software Guard Extensions screen options

Option	Description
Intel SGX Enable	<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"> Disabled Enabled Software controlled (default)
Enclave Memory Size	<p>This option sets SGX Enclave Reserve Memory Size. The options are:</p> <ul style="list-style-type: none"> 32 MB 64 MB 128 MB (default)

Performance screen options

Option	Description
Multi Core Support	<p>This field specifies whether the process has one or all cores enabled. The performance of some applications improves with the additional cores. 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"> All (selected by default)

Option	Description
	<ul style="list-style-type: none"> • 1 • 2 • 3
Intel SpeedStep	<p>Allows you to enable or disable the Intel SpeedStep feature.</p> <ul style="list-style-type: none"> • Enable Intel SpeedStep <p>Default setting: The option is enabled.</p>
C-States Control	<p>Allows you to enable or disable the additional processor sleep states.</p> <ul style="list-style-type: none"> • C states <p>Default setting: The option is enabled.</p>
Intel TurboBoost	<p>Allows you to enable or disable the Intel TurboBoost mode of the processor.</p> <ul style="list-style-type: none"> • Enable Intel TurboBoost <p>Default setting: The option is enabled.</p>
Hyper-Thread Control	<p>Allows you to enable or disable the Hyper-Threading in the processor.</p> <ul style="list-style-type: none"> • Disabled • Enabled <p>Default setting: Enabled.</p>

Power Management screen options

Option	Description
AC Behavior	<p>Allows you to enable or disable the computer from turning on automatically when an AC adapter is connected.</p> <p>Default setting: Wake on AC is not selected.</p>
Auto On Time	<p>Allows you to set the time at which the computer must turn on automatically. The options are:</p> <ul style="list-style-type: none"> • Disabled • Every Day • Weekdays • Select Days <p>Default setting: Disabled</p>
Deep Sleep Control	<ul style="list-style-type: none"> • Disabled (selected by default) • Enabled in S5 only • Enabled in S4 and S5
USB Wake Support	<p>Allows you to enable USB devices to wake the system from Standby.</p> <p>(i) NOTE: This feature is only functional when the AC power adapter is connected. If the AC power adapter is removed during Standby, the system setup removes power from all the USB ports to conserve battery power.</p> <ul style="list-style-type: none"> • Enable USB Wake Support • Wake on Dell USB-C dock
Wireless Radio Control	<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"> • Control WLAN Radio • Control WWAN Radio
Wake on LAN/WLAN	<p>Allows you to enable or disable the feature that powers on the computer from the Off state when triggered by a LAN signal.</p> <ul style="list-style-type: none"> • Disabled • LAN Only

Option	Description
	<ul style="list-style-type: none"> • WLAN Only • LAN or WLAN <p>Default setting: Disabled</p>
Peak Shift	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. <ul style="list-style-type: none"> • Enable peak shift (disabled) • Set battery threshold
Advanced Battery Charge Configuration	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.
Primary Battery Charge Configuration	Allows you to select the charging mode for the battery. The options are: <ul style="list-style-type: none"> • Adaptive (default) • Standard — Fully charges your battery at a standard rate. • ExpressCharge — The battery charges over a shorter period of time using Dell's fast charging technology. This option is enabled by default. • Primarily AC use • Custom <p>If Custom Charge is selected, you can also configure Custom Charge Start and Custom Charge Stop.</p> <p>i NOTE: All charging mode may not be available for all the batteries. To enable this option, disable the Advanced Battery Charge Configuration option.</p>
Type-C connector power	<ul style="list-style-type: none"> • 7.5 Watts(selected by default) • 15 Watts

POST Behavior screen options

Option	Description
Adapter Warnings	Allows you to enable or disable the system setup (BIOS) warning messages when you use certain power adapters. Default setting: Enable Adapter Warnings
Keypad (Embedded)	Allows you to choose one of two methods to enable the keypad that is embedded in the internal keyboard. <ul style="list-style-type: none"> • Fn Key Only: This option is enabled by default. • By Numlock <p>i NOTE: When setup is running, this option has no effect. Setup works in Fn Key Only mode.</p>
Mouse/Touchpad	Allows you to define how the system handles mouse and touch pad input. The options are: <ul style="list-style-type: none"> • Serial Mouse • PS2 Mouse • Touchpad/PS-2 Mouse: This option is enabled by default.
Numlock Enable	Allows you to enable the Numlock option when the computer boots. Enable Network. This option is enabled by default.
Fn Key Emulation	Allows you to set the option where the Scroll Lock key is used to simulate the Fn key feature. Enable Fn Key Emulation (default)
Fn Lock Options	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: <ul style="list-style-type: none"> • Fn Lock. This option is selected by default. • Lock Mode Disable/Standard (selected by default.) • Lock Mode Enable/Secondary

Manageability screen options

Option	Description
MEBx Hotkey	Allows you to specify whether the MEBx Hotkey function should enable, during the system boot. Default Setting: Enable MEBx Hotkey
Fastboot	Allows you to speed up the boot process by bypassing some of the compatibility steps. The options are: <ul style="list-style-type: none">Minimal (default)ThoroughAuto
Extended BIOS POST Time	Allows you to create an additional preboot delay. The options are: <ul style="list-style-type: none">0 seconds. This option is enabled by default.5 seconds10 seconds
Full Screen Log	Allows you to specify whether the Full Screen Log (disabled by default). <ul style="list-style-type: none">Prompt on warnings and errors (selected by default)Continue on warningsContinue on warnings and errors

Virtualization support screen options

Option	Description
Virtualization	Allows you to enable or disable the Intel Virtualization Technology. Enable Intel Virtualization Technology (default).
VT for Direct I/O	Enables or disables the Virtual Machine Monitor (VMM) from utilizing the additional hardware capabilities provided by Intel® Virtualization technology for direct I/O. Enable VT for Direct I/O - enabled by default.
Trusted Execution	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. Trusted Execution

Wireless screen options

Option	Description
Wireless Switch	Allows to set the wireless devices that can be controlled by the wireless switch. The options are: <ul style="list-style-type: none">WWANGPS (on WWAN Module)WLANBluetooth All the options are enabled by default. NOTE: For WLAN and WiGig enable or disable controls are tied together and they cannot be enabled or disabled independently.
Wireless Device Enable	Allows you to enable or disable the internal wireless devices. <ul style="list-style-type: none">WWAN/GPSWLANBluetooth

Option	Description
	All the options are enabled by default.

Maintenance screen options

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

System Log screen options

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

Updating the BIOS

Updating the BIOS in Windows

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

1. Go to www.dell.com/support.
2. Click **Product support**. In the **Search support** box, enter the Service Tag of your computer, and then click **Search**.

 **NOTE:** If you do not have the Service Tag, use the SupportAssist feature to automatically identify your computer. You can also use the product ID or manually browse for your computer model.
3. Click **Drivers & Downloads**. Expand **Find drivers**.
4. Select the operating system installed on your computer.
5. In the **Category** drop-down list, select **BIOS**.

6. Select the latest version of BIOS, and click **Download** to download the BIOS file for your computer.
7. After the download is complete, browse the folder where you saved the BIOS update file.
8. Double-click the BIOS update file icon and follow the on-screen instructions.
For more information, see knowledge base article [000124211](#) at www.dell.com/support.

Updating the BIOS in Linux and Ubuntu

To update the system BIOS on a computer that is installed with Linux or Ubuntu, see the knowledge base article [000131486](#) at www.dell.com/support.

Updating the BIOS using the USB drive in Windows

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

1. Follow the procedure from step 1 to step 6 in [Updating the BIOS in Windows](#) to download the latest BIOS setup program file.
2. Create a bootable USB drive. For more information, see the knowledge base article [000145519](#) at www.dell.com/support.
3. Copy the BIOS setup program file to the bootable USB drive.
4. Connect the bootable USB drive to the computer that needs the BIOS update.
5. Restart the computer and press **F12**.
6. Select the USB drive from the **One Time Boot Menu**.
7. Type the BIOS setup program filename and press **Enter**.
The **BIOS Update Utility** appears.
8. Follow the on-screen instructions to complete the BIOS update.

Updating the BIOS from the F12 One-Time boot menu

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

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

BIOS Update

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

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

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

Updating from the One-Time boot menu

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

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

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

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

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

System and setup password

Table 3. System and setup password

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

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

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

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

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

Assigning a system setup password

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

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

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

Deleting or changing an existing system setup password

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

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

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

 **NOTE:** If you change the System and/or Setup password, reenter the new password when prompted. If you delete the System and/or Setup password, confirm the deletion when prompted.

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

Clearing CMOS settings

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

1. Remove the:
 - a. [battery cover](#)
 - b. [battery](#)
 - c. [base cover](#)
2. Remove the [coin-cell battery](#).
3. Wait for one minute.
4. Replace the [coin-cell battery](#).
5. Replace the:
 - a. [base cover](#)
 - b. [battery](#)
 - c. [battery 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.

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

Troubleshooting

Topics:

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

Handling swollen Lithium-ion batteries

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

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

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

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

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

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

Enhanced Pre-Boot System Assessment — ePSA diagnostics

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

The ePSA diagnostics can be initiated by the FN+PWR buttons while powering on the computer.

- 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

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

Running the ePSA Diagnostics

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

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

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

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

Testing memory using ePSA

1. Turn on or restart your computer.
2. Press F12 or press Fn+PWR to invoke the ePSA diagnostics.
The PreBoot System Assessment (PSA) starts on your computer.

i | NOTE: If you wait too long and the operating system logo appears, continue to wait until you see the login screen/desktop screen. Turn off the computer and try again.

If the memory test results in 25 or less errors, then the RMT basic feature automatically fixes the issues. The test will indicate a pass result since the defect(s) have been removed. If the memory test results in 26 - 50 errors, the RMT basic feature masks the defective memory blocks and results in pass with no memory replacement requirement. If the memory test results in more than 50 errors, then the test is stalled and the result indicates that memory module replacement is required.

Built-in self-test (BIST)

M-BIST

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

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

How to run M-BIST

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

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

Table 4. LED error codes

Blinking Pattern		Possible Problem
Amber	White	
2	1	CPU Failure
2	8	LCD Power Rail Failure
1	1	TPM Detection Failure
2	4	Unrecoverable SPI Failure

4. If there is no failure with the system board, the LCD will cycle through the solid color screens described in the LCD-BIST section for 30 seconds and then power off.

LCD Power rail test (L-BIST)

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

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

How to invoke L-BIST Test:

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

LCD Built-in Self Test (BIST)

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

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

How to invoke LCD BIST Test

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

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

Diagnostic LED

This section details the diagnostic features of the battery LED in a notebook.

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

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

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

Table 5. LED pattern

Blinking pattern		Problem Description	Suggested Resolution
Amber	White		
2	1	processor	processor failure
2	2	system board, BIOS ROM	system board, covers BIOS corruption or ROM error
2	3	memory	no memory/no RAM detected
2	4	memory	memory failure/RAM failure
2	5	memory	invalid memory installed
2	6	system board; chipset	system board/ chipset error
2	7	display	display failure
3	1	RTC power failure	coin-cell battery failure
3	2	PCI/Video	PCI/Video card/chip failure
3	3	BIOS recovery 1	recovery image not found
3	4	BIOS recovery 2	recovery image found but invalid

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. Re-plug battery connector, replace battery if the issue reoccurs.
Alternately blinking amber light with steady white light	Temporary battery failure with AC adapter present. Re-plug battery connector, replace battery if the issue reoccurs.
Constantly blinking amber light	Fatal battery failure with AC adapter present. Fatal battery, replace the battery.
Light off	Battery in full charge mode with AC adapter present.
White light on	Battery in charge mode with AC adapter present.

Recovering the operating system

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

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

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

For more information about the Dell SupportAssist OS Recovery, see *Dell SupportAssist OS Recovery User's Guide* at www.dell.com/serviceabilitytools. Click **SupportAssist** and then, click **SupportAssist OS Recovery**.

Real Time Clock reset

The Real Time Clock (RTC) reset function allows you to recover your Dell system from **No POST/No Boot/No Power** situations. To initiate the RTC reset on the system make sure system is in a power-off state and is connected to power source . Press and hold the power button for 25 seconds and then release the power button. Go to [how to reset real time clock](#).

(i) NOTE: If AC power is disconnected from the system during the process or the power button is held longer than 40 seconds, the RTC reset process is aborted.

The RTC reset will reset the BIOS to Defaults, un-provision Intel vPro and reset the system date and time. The following items are unaffected by the RTC reset:

- Service Tag
- Asset Tag
- Ownership Tag
- Admin Password
- System Password
- HDD Password
- TPM on and Active
- Key Databases
- System Logs

The following items may or may not reset based on your custom BIOS setting selections:

- The Boot List
- Enable Legacy OROMs
- Secure Boot Enable

- Allow BIOS Downgrade

Backup media and recovery options

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

WiFi power cycle

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

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

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

Drain residual flea power (perform hard reset)

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

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

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

To drain residual flea power (perform a hard reset)

1. Turn off your computer.
2. Disconnect the power adapter from your computer.
3. Remove the base cover.
4. Remove the battery.
5. Press and hold the power button for 20 seconds to drain the flea power.
6. Install the battery.
7. Install the base cover.
8. Connect the power adapter to your computer.
9. Turn on your computer.

 **NOTE:** For more information about performing a hard reset, see the knowledge base article [000130881](#) at www.dell.com/support.

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.