

Latitude 3490

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

Safety precautions

The safety precautions chapter details the primary steps to be taken before performing any disassembly instructions.

Observe the following safety precautions before you perform any installation or break/fix procedures involving disassembly or reassembly:

- Turn off the system and all attached peripherals.
- Disconnect the system and all attached peripherals from AC power.
- Disconnect all network cables, telephone, and telecommunications lines from the system.
- Use an ESD field service kit when working inside any notebook to avoid electrostatic discharge (ESD) damage.
- After removing any system component, carefully place the removed component on an anti-static mat.
- Wear shoes with non-conductive rubber soles to reduce the chance of getting electrocuted.

Standby power

Dell products with standby power must be unplugged before you open the case. Systems that incorporate standby power are essentially powered while turned off. The internal power enables the system to be remotely turned on (wake on LAN) and suspended into a sleep mode and has other advanced power management features.

Unplugging, pressing and holding the power button for 15 seconds should discharge residual power in the system board notebooks.

Bonding

Bonding is a method for connecting two or more grounding conductors to the same electrical potential. This is done through the use of a field service electrostatic discharge (ESD) kit. When connecting a bonding wire, ensure that it is connected to bare metal and never to a painted or non-metal surface. The wrist strap should be secure and in full contact with your skin, and ensure that you remove all jewelry such as watches, bracelets, or rings prior to bonding yourself and the equipment.

Electrostatic discharge—ESD protection

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

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

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

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

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

Perform the following steps to prevent ESD damage:

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

ESD field service kit

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

Components of an ESD field service kit

The components of an ESD field service kit are:

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

ESD protection summary

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

Transporting sensitive components

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

Lifting equipment

Adhere to the following guidelines when lifting heavy weight equipment:

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

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

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 any external devices, cards, and cables before turning on your computer.

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

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

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

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

Disassembly and reassembly

Recommended tools

The procedures in this document require the following tools:

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

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

Screw size list

Table 1. Screw size list

Component	M2x2 	M2x3 	M2x4 
Hinge Bracket L + R to LCD cover			
LCD panel	4		
TP Dome support bracket to palmrest	2		
Touchpad panel	4		
Heatsink		3	
Type-C bracket to System board		1	
HDD bracket to HDD Module			
Dc-IN to palmrest		1	
System board to palmrest			1
Power board to palmrest	1		
VGA board to palmrest		2	
WWAN board to palmrest		1	
SD reader and coin cell battery holder		2	
Hinge bracket L + R to palmrest			
HDD bracket to palmrest			
FAN to palmrest			
Battery to palmrest		5	

Table 1. Screw size list (continued)

Component	M2x2 	M2x3 	M2x4 
WLAN module to System board		1	
WWAN module to WWAN board		1	
SSD to palmrest			
FP bracket to palmrest	1		

SIM tray – optional

SIM tray is an optional component. You will see a SIM tray only in systems shipped with a WWAN card.

Removing the SIM tray – WWAN models

1. Follow the procedure [Before working inside your computer](#)
2. Open the SIM card slot cover on the right side of the system.



3. Insert the tip of a paperclip into the hole of the SIM tray slot and then pull out and remove the SIM tray.



Installing the SIM tray – WWAN models

1. Align and push the SIM tray back into the SIM tray slot.
2. Close the SIM card slot cover.
3. Follow the procedure in [After working inside your computer](#)

SD card

Removing the SD card

1. Follow the procedure [Before working inside your computer](#)
2. Pull the SD card to remove it from the system.



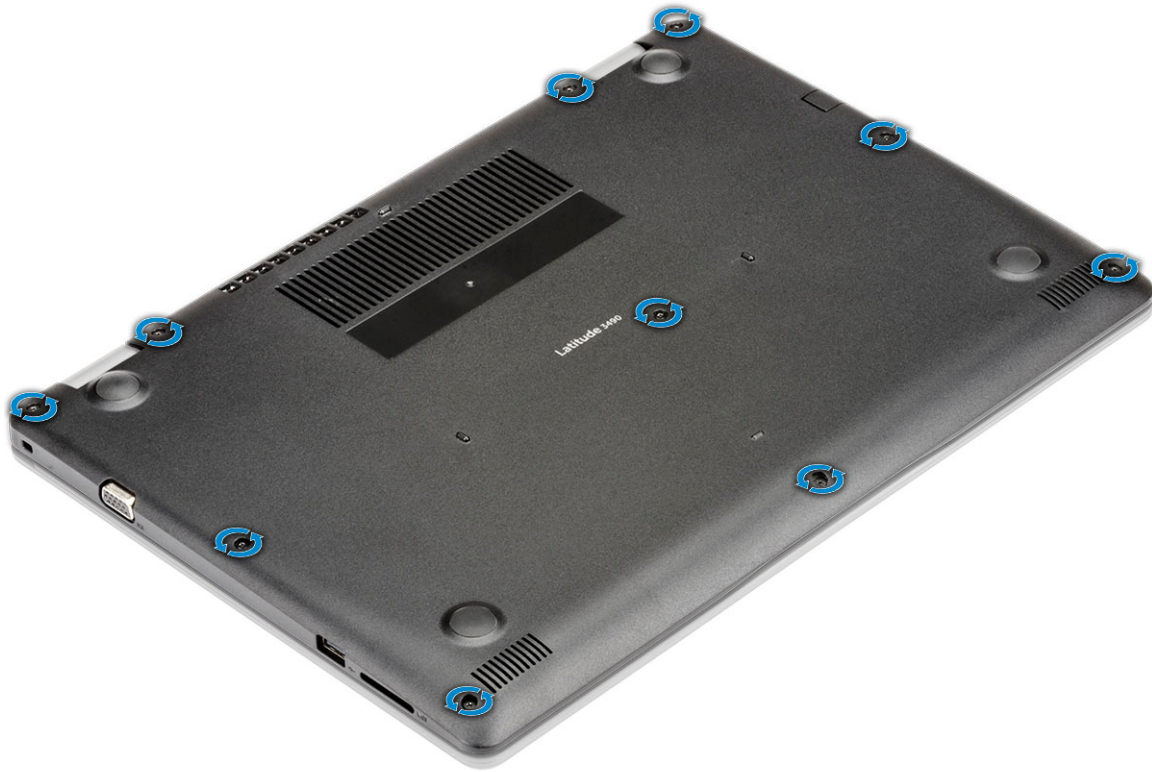
Installing the SD card

1. Push the SD card into its slot until the SD card gets secured.
2. Follow the procedure in [After working inside your computer](#)

Base Cover

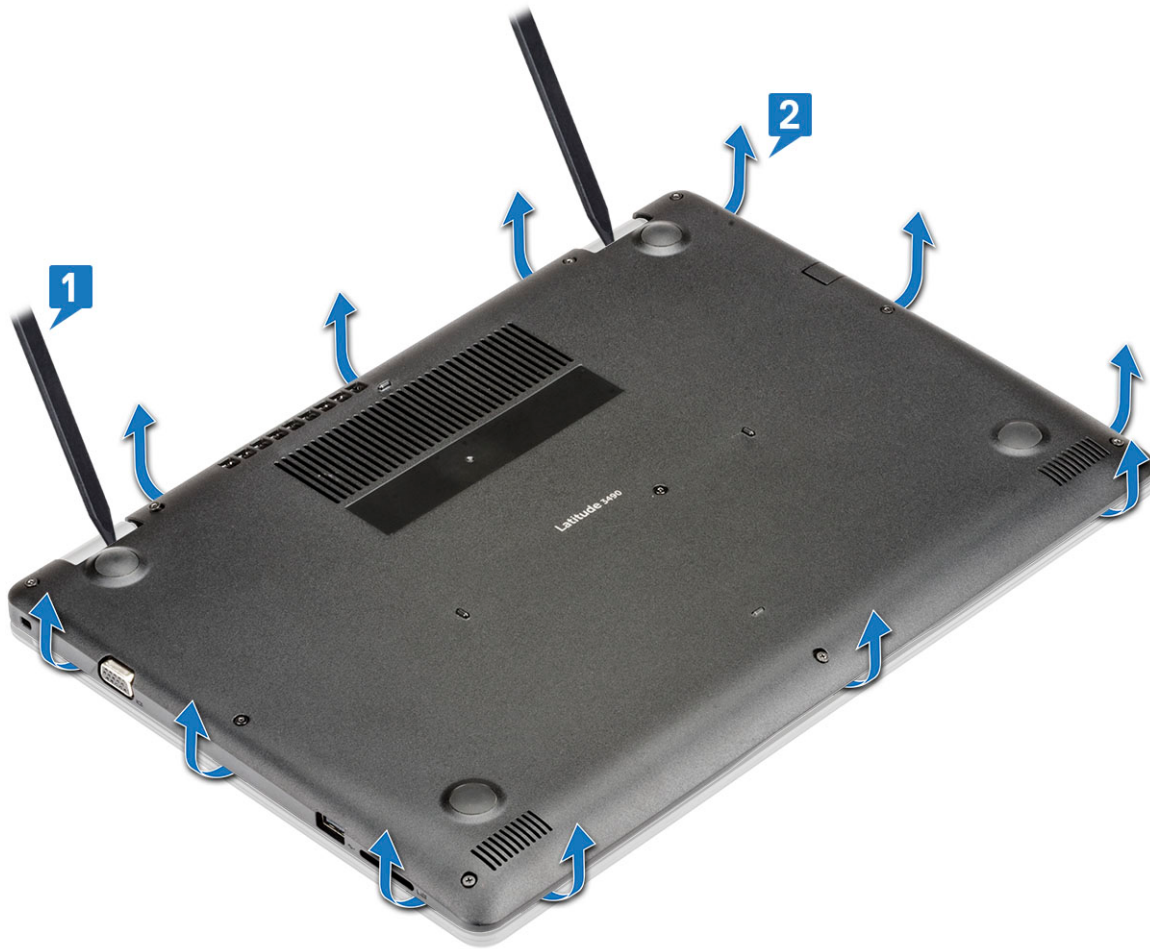
Removing the base cover

1. Follow the procedure in [Before working inside your computer](#)
2. Remove the [SIM tray \(WWAN models\)](#):
3. Remove the [SD card](#)
4. To remove the base cover:
 - a. Loosen the 10 M2.5xL8.5 captive screws that secure the base cover to the computer .



- b. Pry the base cover from the upper right edge [1] and continue to pry the outer edges of the base cover in clockwise direction [2].

 **NOTE:** You must use a plastic scribe to pry the base cover from the edge [1].



5. Lift the right side and then the left side of the base cover.

i **NOTE:** The VGA port and the plastic from the base cover, must lift right side (as shown in illustration) up at an angle then release the left side in order to not get caught on the VGA port and damage either the base cover or VGA port.



Installing base cover

1. Align the base cover with the screw holders on the computer.
2. Press the edges of the cover until it clicks into place.
3. Tighten the 10 M2.5xL8.5 screws to secure the base cover to the computer.

NOTE: Make sure while installing the base cover not to get caught on the VGA port and damage either the base cover or VGA port.

4. Remove the [SD card](#)
5. Install the [SIM tray \(WWAN models\)](#).
6. Follow the procedure in [After working inside your computer](#)

Battery

Lithium-ion battery precautions

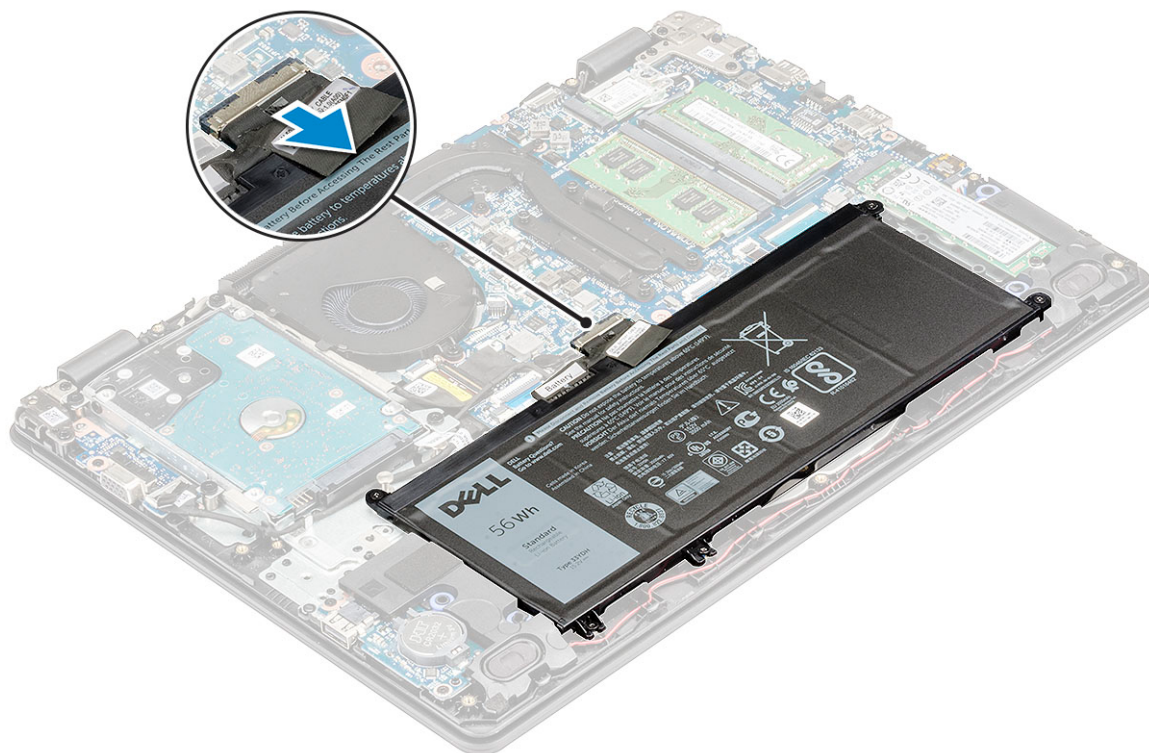
⚠ CAUTION:

- Exercise caution when handling Lithium-ion batteries.
- Discharge the battery as much as possible before removing it from the system. This can be done by disconnecting the AC adapter from the system to allow the battery to drain.
- Do not crush, drop, mutilate, or penetrate the battery with foreign objects.
- Do not expose the battery to high temperatures, or disassemble battery packs and cells.
- Do not apply pressure to the surface of the battery.
- Do not bend the battery.
- Do not use tools of any kind to pry on or against the battery.

- Ensure any screws during the servicing of this product are not lost or misplaced, to prevent accidental puncture or damage to the battery and other system components.
- If a battery gets stuck in a device as a result of swelling, do not try to free it as puncturing, bending, or crushing a Lithium-ion battery can be dangerous. In such an instance, contact for assistance and further instructions.
- If the battery gets stuck inside your computer as a result of swelling, do not try to release it as puncturing, bending, or crushing a lithium-ion battery can be dangerous. In such an instance, contact Dell technical support for assistance. See <https://www.dell.com/support>.
- Always purchase genuine batteries from <https://www.dell.com> or authorized Dell partners and resellers.

Removing battery

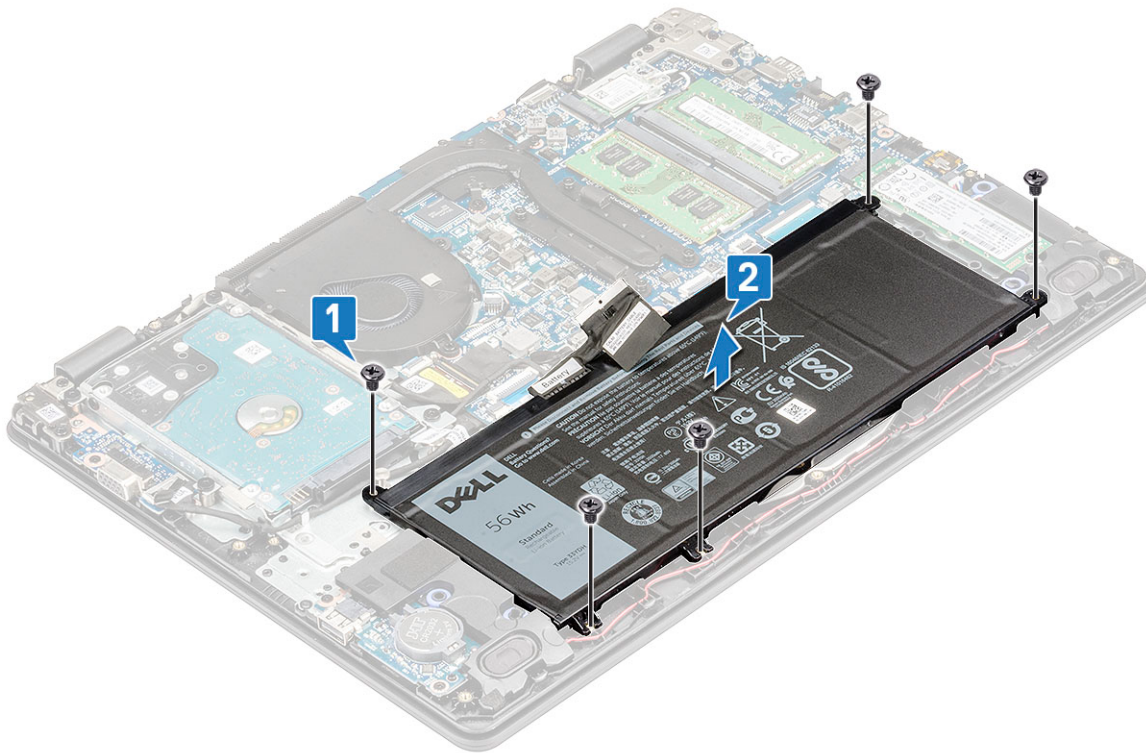
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [Removing the SIM tray – WWAN models](#) on page 11
 - b. [base cover](#)
3. To remove the battery:
 - a. Disconnect the battery cable from the connector on the system board .



- b. Remove the 5 M2x3 screws that secure the battery to the computer [1].

NOTE: The 3-cell battery has only 3 screws.

- c. Lift the battery away from the computer [2].



Installing the battery

1. Insert the battery into the slot on the computer.
2. Replace the 5 M2x3 screws to secure the battery to the computer.

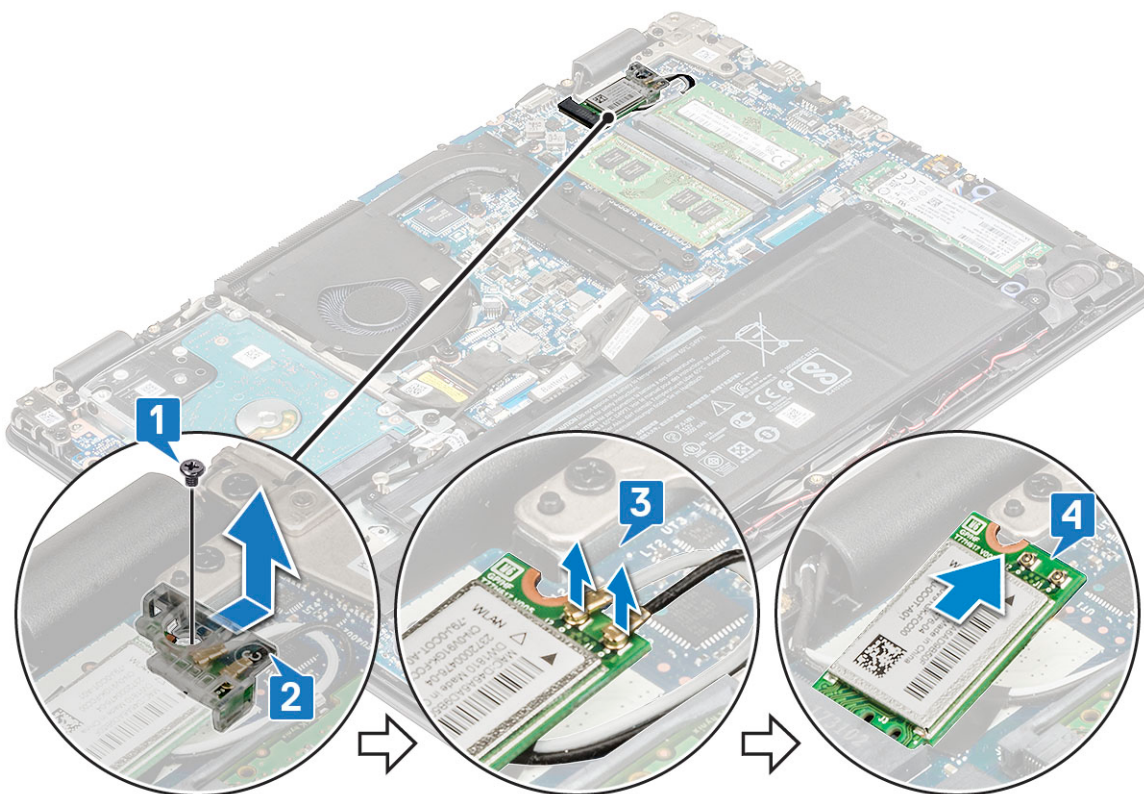
NOTE: The 3-cell battery has only 3 screws.

3. Connect the battery cable to the connector on the system board.
4. Install the:
 - a. [base cover](#)
 - b. [SIM tray \(WWAN models\)](#)
5. Follow the procedure in [After working inside your computer](#).

WLAN Card

Removing the WLAN card

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [Removing the SIM tray – WWAN models](#) on page 11
 - b. [base cover](#)
3. To remove the WLAN card:
 - a. Remove the M2x3 screw that secures the WLAN bracket to the system [1].
 - b. Slightly pull the bracket and lift it off the WLAN card [2].
 - c. Disconnect the WLAN antenna cables from the connectors on the WLAN card [3].
 - d. Pull the WLAN card from its connector on the system board [4].



Installing the WLAN card

1. Insert the WLAN card into its connector on the system board.
2. Route the antenna cables on the wireless card slot and secure the antennas underneath the wireless card, and then connect the two antenna cables to the connectors on the WLAN card.

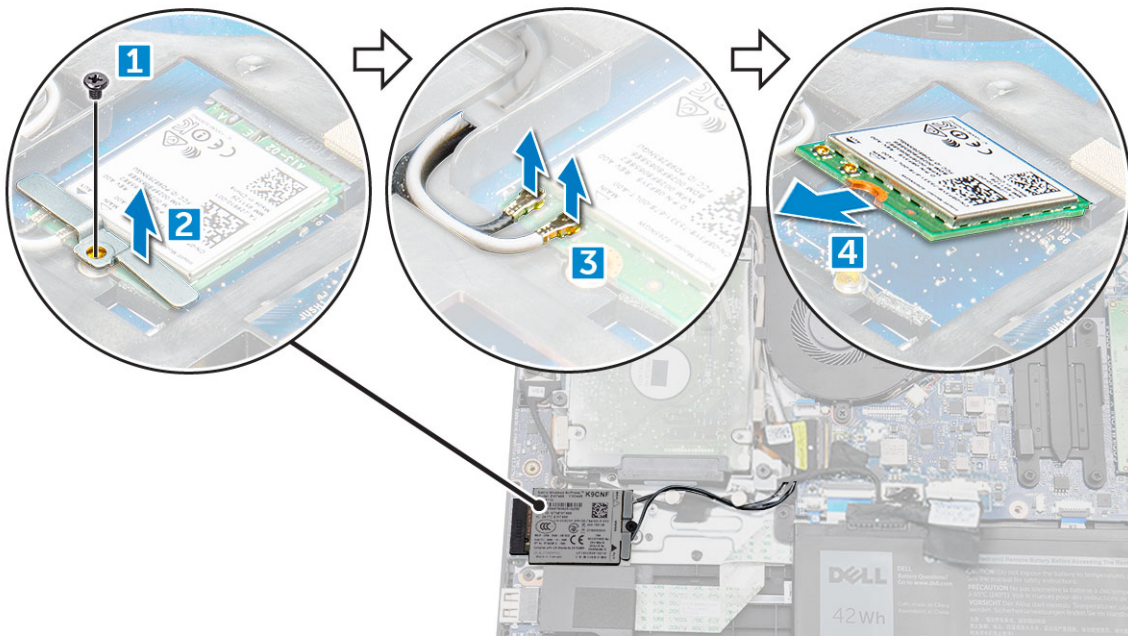
NOTE: Connect the MAIN antenna (white) to the MAIN pin and AUX antenna (black) to the AUX pin, respectively.

3. Replace the WLAN bracket on the WLAN card.
4. Tighten the M2x3 screw to secure the WLAN card and card holder to the system board.
5. Install the:
 - a. [base cover](#)
 - b. [SIM tray \(WWAN models\)](#)
6. Follow the procedure in [After working inside your computer](#)

WWAN card – optional

Removing the WWAN daughterboard

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [Removing the SIM tray – WWAN models](#) on page 11
 - b. [base cover](#)
3. To remove the WWAN card:
 - a. Remove the M2x3 screw that secures the WWAN metal bracket to the system [1] and then lift and remove the metal bracket off the WWAN card [2].
 - b. Disconnect the two antenna cables from the WWAN card [3].
 - c. Pull out the WWAN card from its connector on the WWAN daughterboard [4].



Installing the WWAN daughterboard

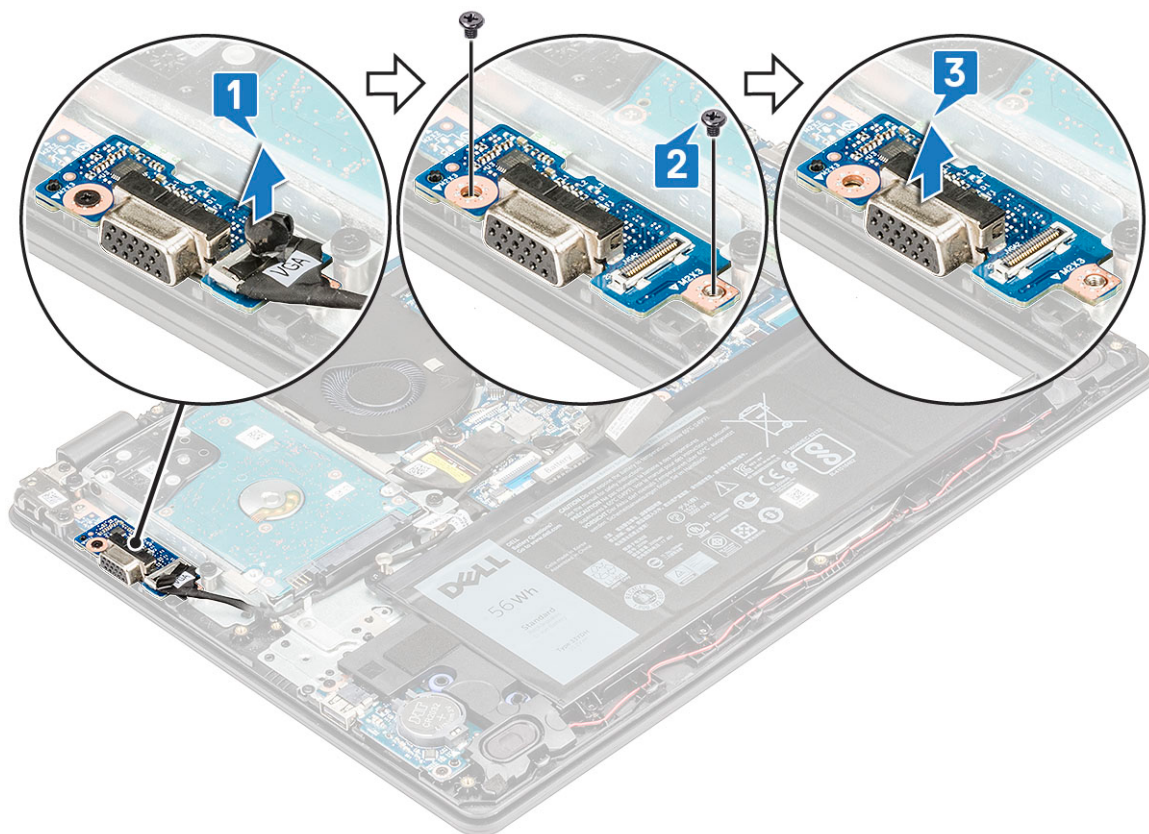
1. Insert the WWAN card into its connector on the WWAN daughterboard.
2. Connect the two antenna cables to the WWAN card.

NOTE: The WWAN antennas should be routed underneath the display cable and above the VGA daughter board cable, and then secured with the adhesive tape on the palm-rest.
3. Replace the metal bracket on the WWAN.
4. Tighten the M2x3 screw to secure the WWAN card and bracket to the WWAN daughterboard.
5. Install the:
 - a.
 - b. [base cover](#)
 - c. [Installing the SIM tray – WWAN models](#) on page 11
6. Follow the procedure in [After working inside your computer](#)

VGA board

Removing VGA board

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b. [battery](#)
3. To remove the VGA board:
 - a. Disconnect the VGA daughter board cable from the VGA daughter board [1].
 - b. Remove the two M2x3 screws that secure the VGA board to the system [2].
 - c. Lift the VGA board from the system [3].



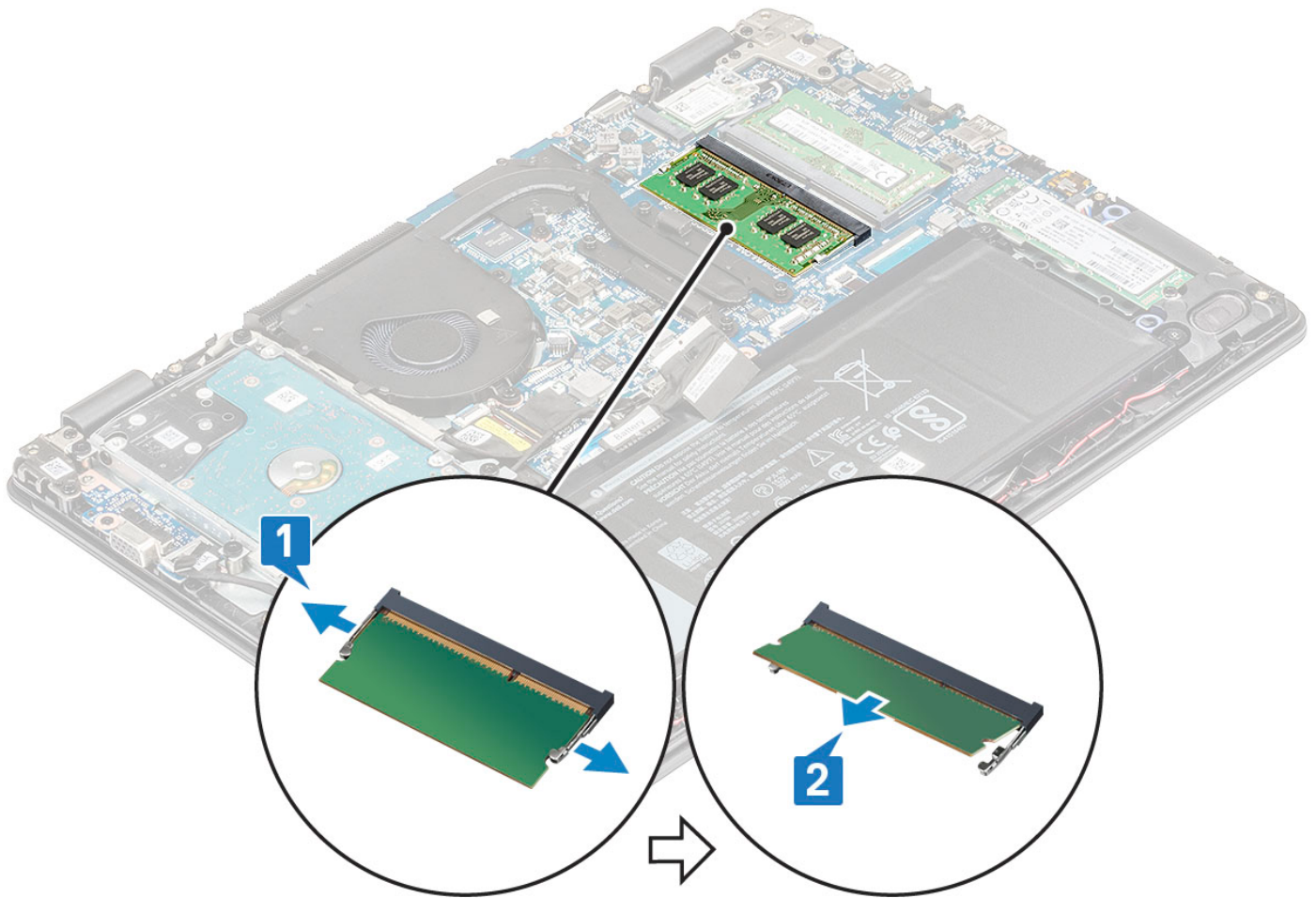
Installing VGA board

1. Place the VGA board in its slot on the system.
2. Replace the two M2x3 screws to secure the VGA board to the system.
3. Connect the VGA daughter board cable to the VGA daughter board.
4. Install the:
 - a. [battery](#)
 - b. [base cover](#)
5. Follow the procedure in [After working inside your computer](#).

Memory Module

Removing the memory module

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [Removing the SIM tray – WWAN models](#) on page 11
 - b. [base cover](#)
 - c. [battery](#)
3. To remove the memory module:
 - a. Pry apart the memory module latches until the memory module pops out [1].
 - b. Lift and remove the memory module from the system board [2].



Installing the memory module

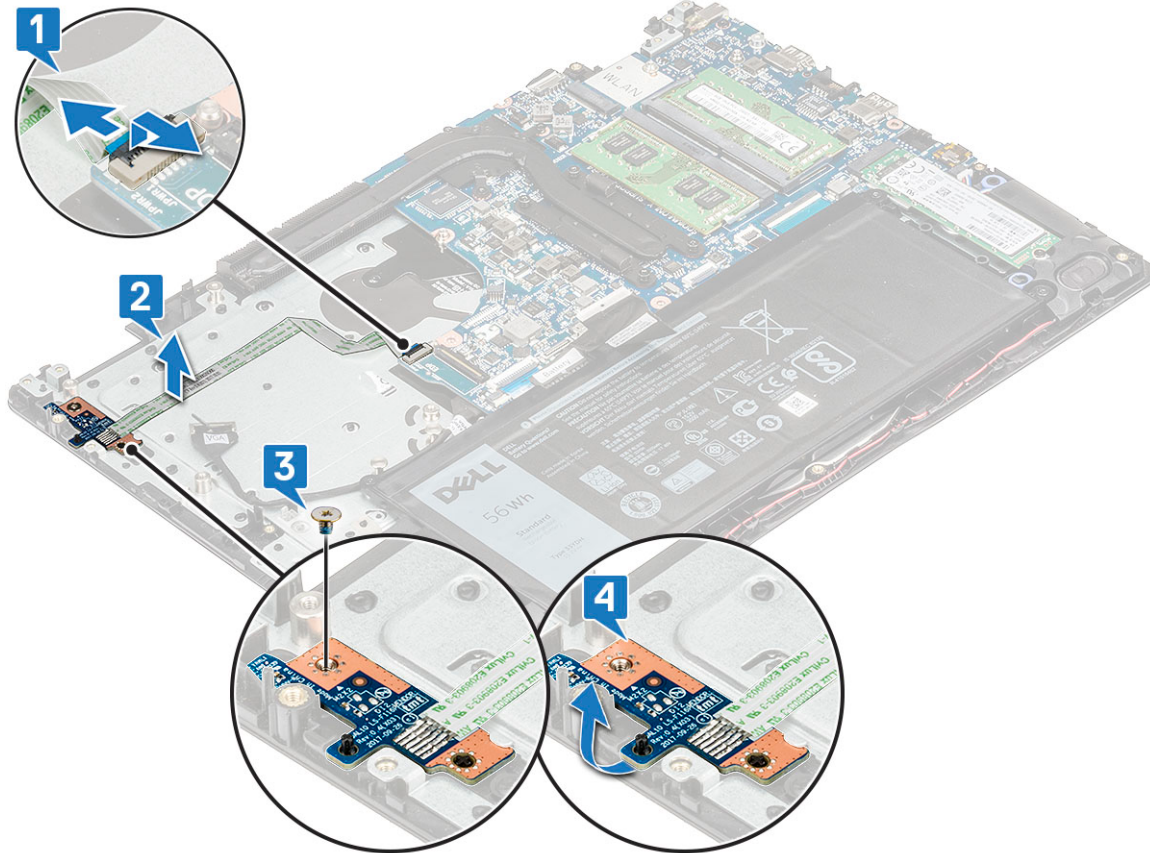
1. Insert the memory module into its connector at a 30 degree angle until the contacts are fully seated into the slot. Then, press the module until the clips secure the memory module.
2. Install the:
 - a. [battery](#)
 - b. [base cover](#)
3. Follow the procedure in [After working inside your computer.](#)

Power button board

Removing power button board

1. Follow the procedure in [Before working inside your computer.](#)
2. Remove the:
 - a. [Removing the SIM tray – WWAN models](#) on page 11
 - b. [base cover](#)
 - c. [battery](#)
 - d. [Hard disk](#)
 - e. [System fan](#)
 - f. [VGA board](#)
3. To remove the power button board:

- a. Disconnect the power button board cable from its connector on the system board [1] and peel the adhesive to release it [2].
- b. Remove the M2x2 screw that secures the power button board to the system [3].
- c. Slightly pull and lift the power button board from the system [4].



Installing power button board

1. Place the power button board in its slot to secure it under the metal clip.
2. Tighten the M2x2 screw that secures the power button board to the system.
3. Secure the adhesive-backed power button board cable to the system and then connect the cable to its connector on the system board.
4. Install the:
 - a. [VGA board](#)
 - b. [system fan](#)
 - c. [hard disk](#)
 - d. [battery](#)
 - e. [base cover](#)
 - f. [SIM tray \(WWAM models\)](#)
5. Follow the procedure in [After working inside your computer](#).

Heat sink

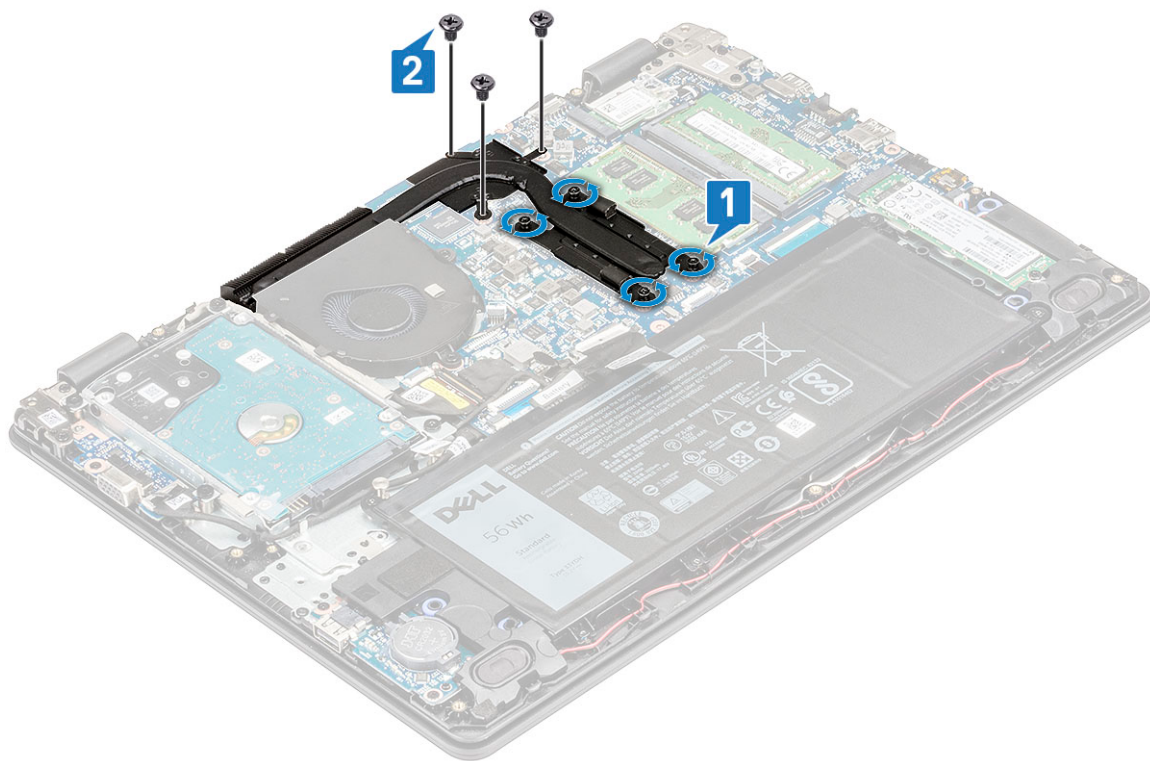
Removing the heatsink

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

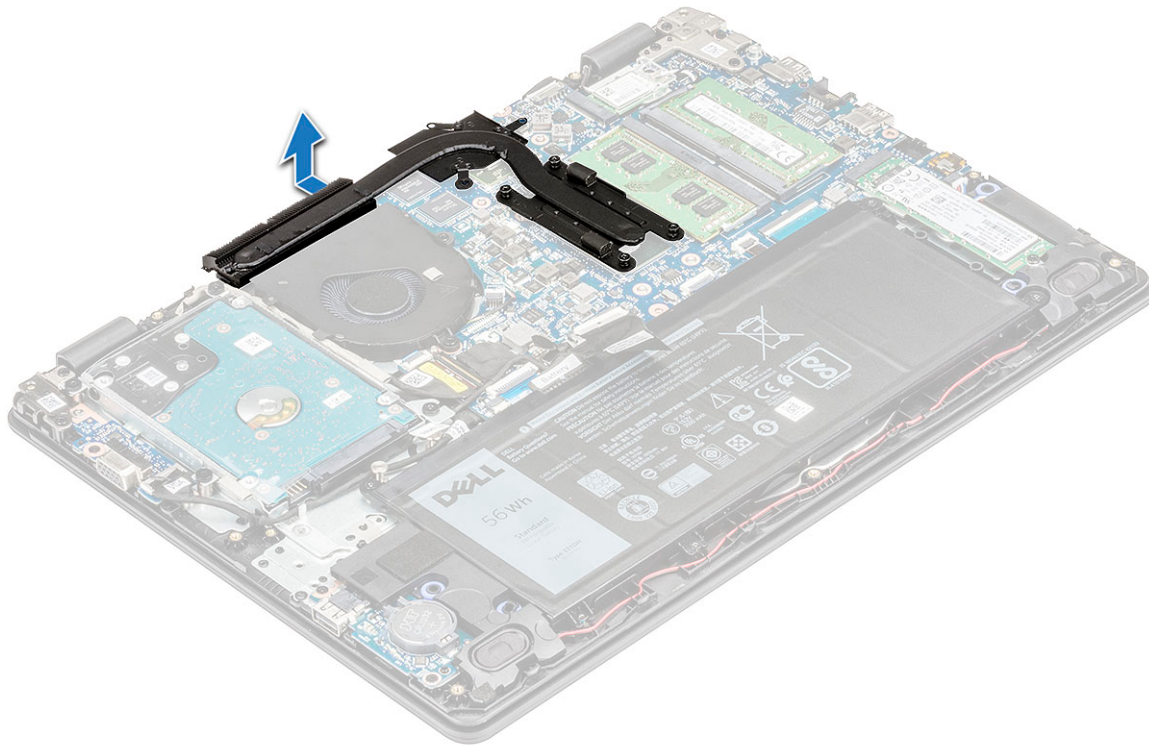
- a. base cover
- 3. To remove the heatsink:
 - a. Loosen the 4 M2.5x2.5 captive screws that secure the heatsink to the computer [1], and then remove another 3 M2x3 screws to release it from the system [2].

NOTE: Remove the heat sink screws in sequential order as indicated on the heat-sink.

NOTE: The UMA heatsink has 4 (M2x3) screws.



- b. Lift the heatsink away from the computer [2].



Installing the heatsink

1. Insert the heatsink into the slot on the computer.
2. Tighten the M2.5x2.5 screws and replace the three M2x3 screws to secure the heatsink to the computer.

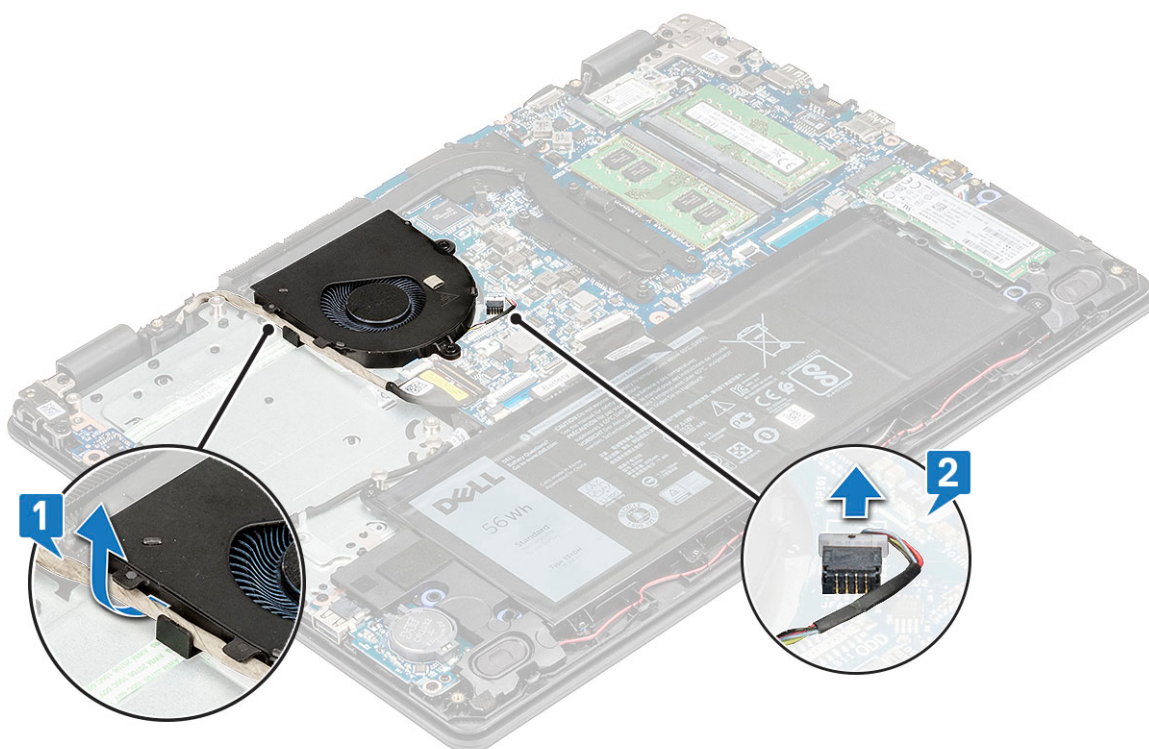
i **NOTE:** Tighten the heat sink screws in sequential order as indicated on the heat-sink.

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

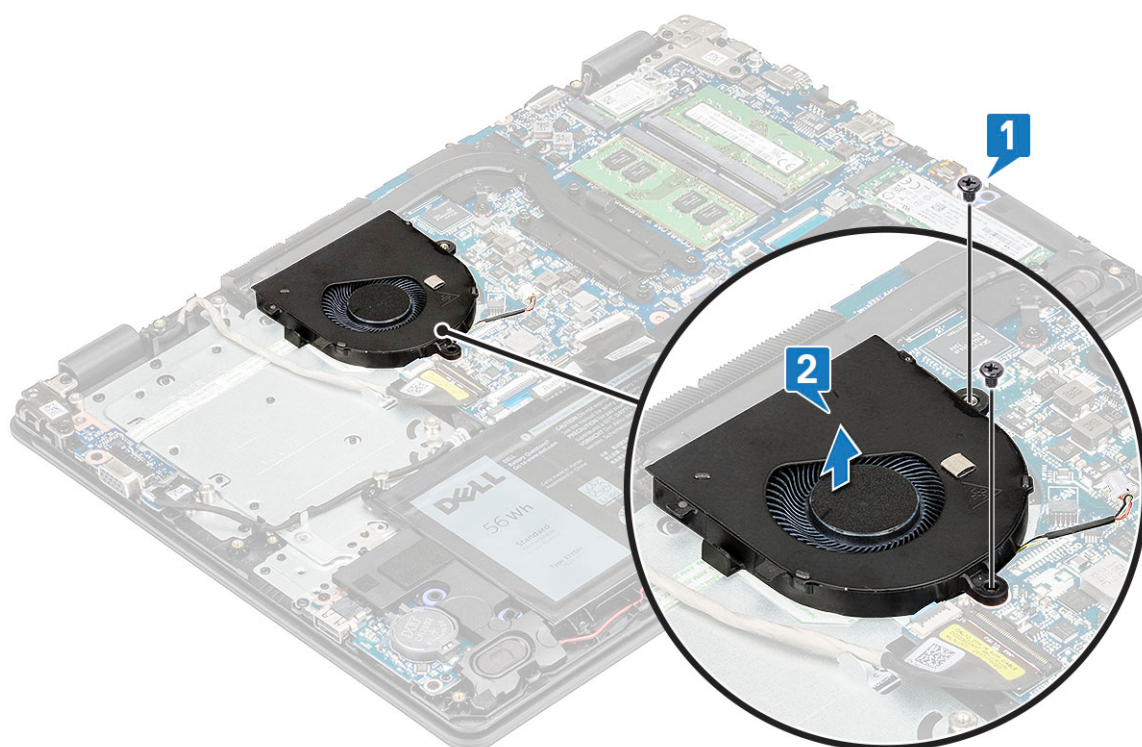
System Fan

Removing the system fan

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b. [battery](#)
3. To remove the system fan:
 - a. Unroute the eDP cable from its routing channel on the system fan [1] and disconnect the system fan cable from its connector on the system board [2].



b. Remove the 2 M2.5x5 screws that secure the fan to the computer [1] and lift the fan off the computer [2].



Installing the system fan

1. Place the fan on the computer.
2. Tighten the 2 M2.5x5 screws to secure the fan to the computer.
3. Connect the fan cable to the system board.
4. Route the eDP cable through its routing channel on the system fan.

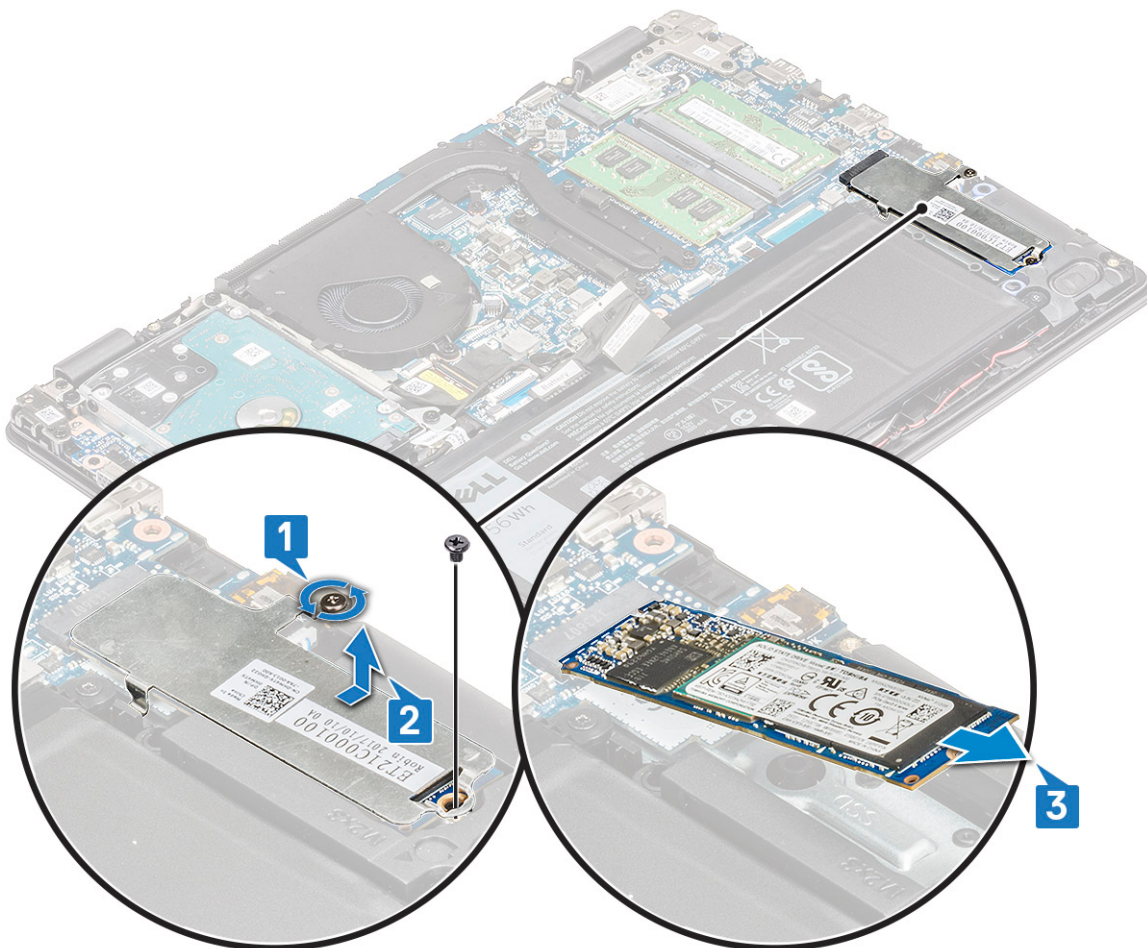
NOTE: Display cable should be routed above the WWAN antennas (for models shipped with a WWAN card), and then secured with conductive tape on the palm rest.

5. Install the:
 - a. [battery](#)
 - b. [base cover](#)
6. Follow the procedure in [After working inside your computer](#).

M2. SATA Solid State Drive (SSD)

Removing the M2. SSD card

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b.
3. To remove the Solid State Drive (SSD) card:
 - a. Remove the two (M2x3) screws that secures the SSD bracket to the system [1], and lift the bracket from the system [2].
 - b. Slide and lift the SSD from the system [3].



Installing the M2. SSD card

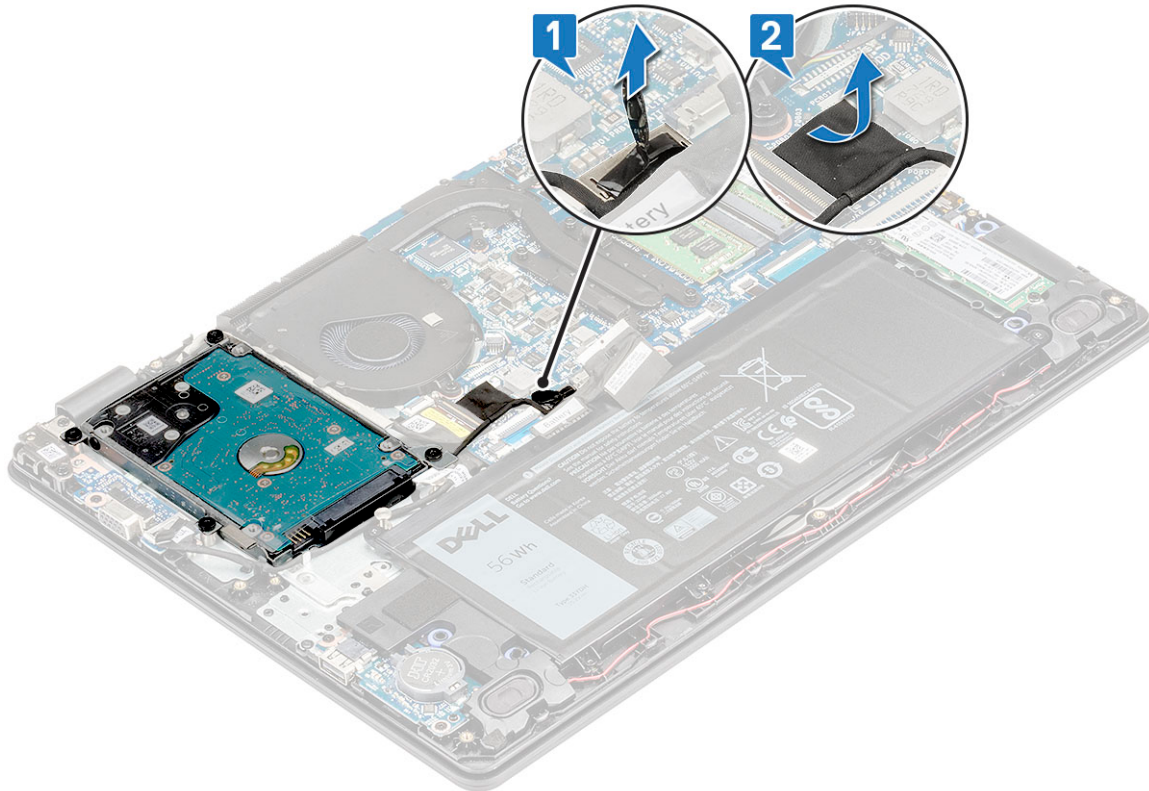
1. Insert the SSD card into its slot on the system.

2. Place the SSD bracket in its slot on the computer and replace the two (M2x3) screws to secure it to the system.
3. Install the: .
 - a. [base cover](#)
4. Follow the procedure in [After working inside your computer](#).

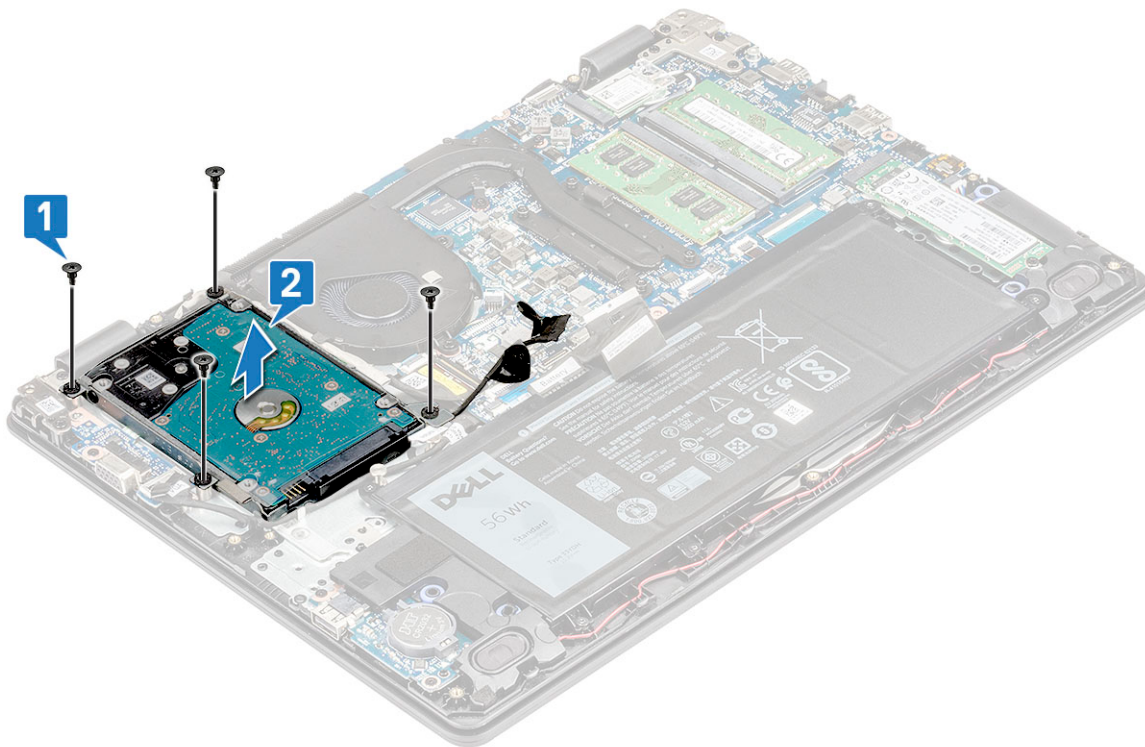
Hard drive

Removing the hard disk drive

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [Removing the SIM tray – WWAN models](#) on page 11
 - b. [base cover](#)
 - c. [battery](#)
3. To remove the hard disk drive (HDD):
 - a. Disconnect the HDD cable from the system board [1].
 - b. Peel the adhesive tape that secures the HDD cable to the system board [2]



- c. Remove the 4 M2.0x5.5 screws that secure the HDD to the palmrest [1].
- d. Lift the HDD from the computer [2].



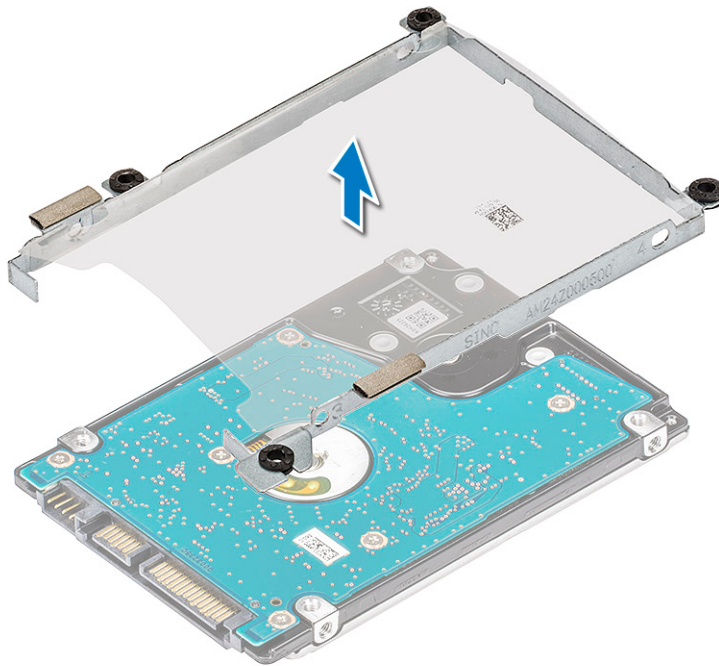
4. Disconnect the HDD cable interposer.



5. Then, remove the M3x3 screws to detach the bracket from the HDD.



6. Lift the HDD bracket to remove it from the HDD.



Installing the hard disk drive

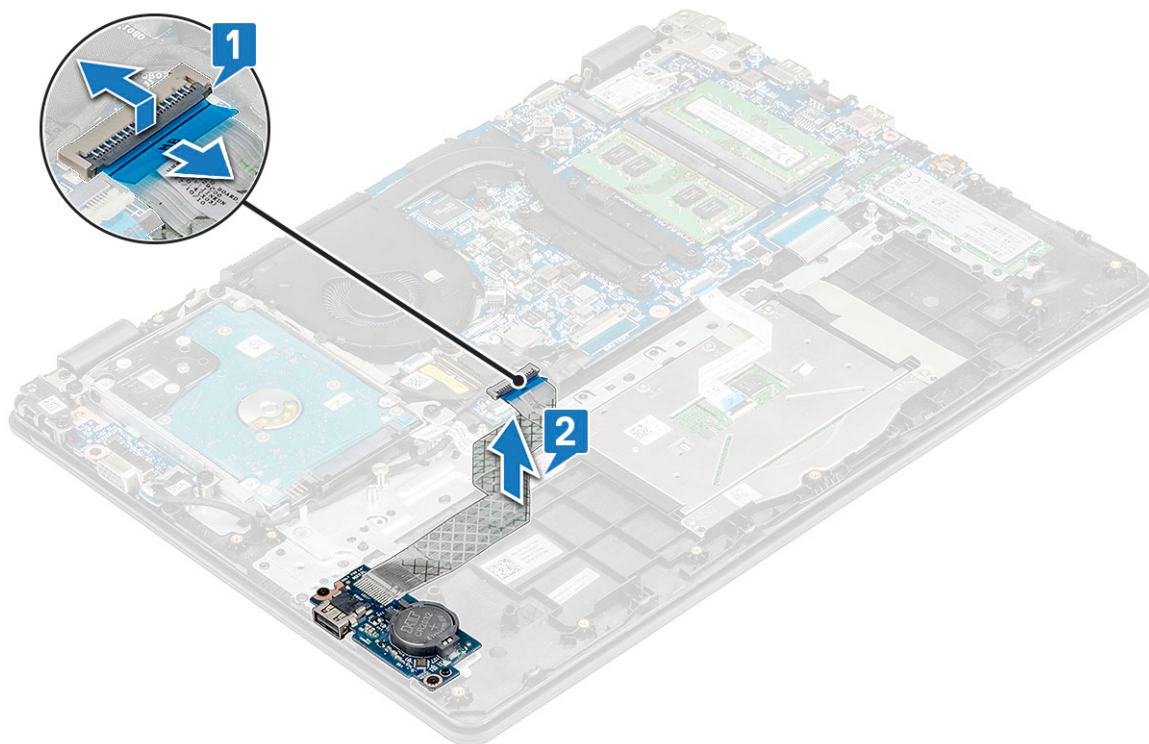
1. Tighten the M3xL3 screws that secure the bracket to the HDD.
2. Connect the HDD cable interposer.
3. Insert the HDD into the connector on the computer.
4. Tighten the 4 M2.0x5.5 screws to secure the HDD to the computer.
5. Route the hard drive cable underneath the bottom-right corner of the hard drive bracket and affix the adhesive tape to secure the hard drive cable to the system board.
6. Connect the HDD cable to the system board.

7. Install the:
 - a. [battery](#)
 - b. [base cover](#)
8. Follow the procedure in [After working inside your computer](#).

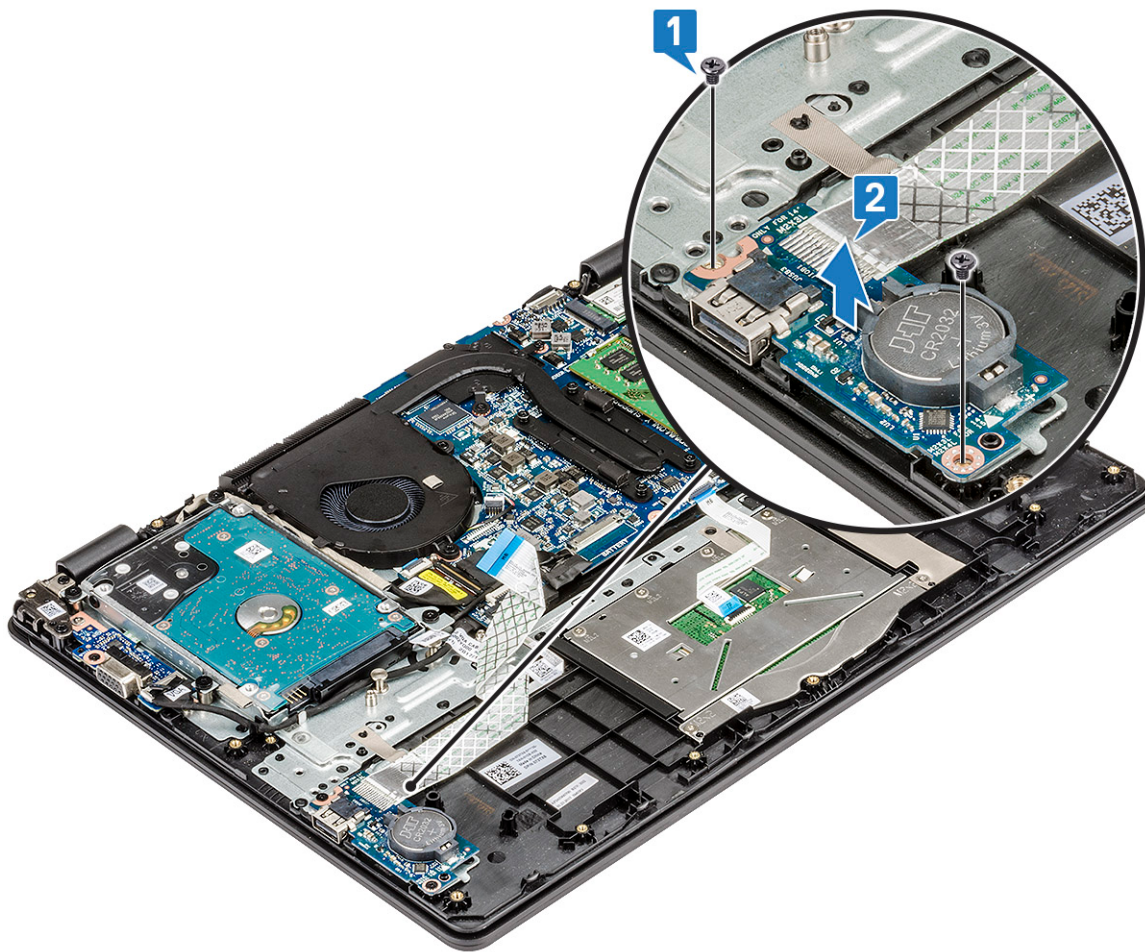
Input-Output board, SD card and coin cell battery holder

Removing the Input-Output board, SD card and coin cell battery holder

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b. [battery](#)
 - c. [speaker](#)
3. To remove the Input-Output (I/O) board:
 - a. Disconnect the I/O board cable [1], peel the adhesive tape that secures the I/O cable to the system [2].



- b. Remove the two M2x3 screws that secure the I/O board to the system [1] and lift the I/O board off the palmrest [2].



Installing the Input-Output board, SD card and coin cell battery holder

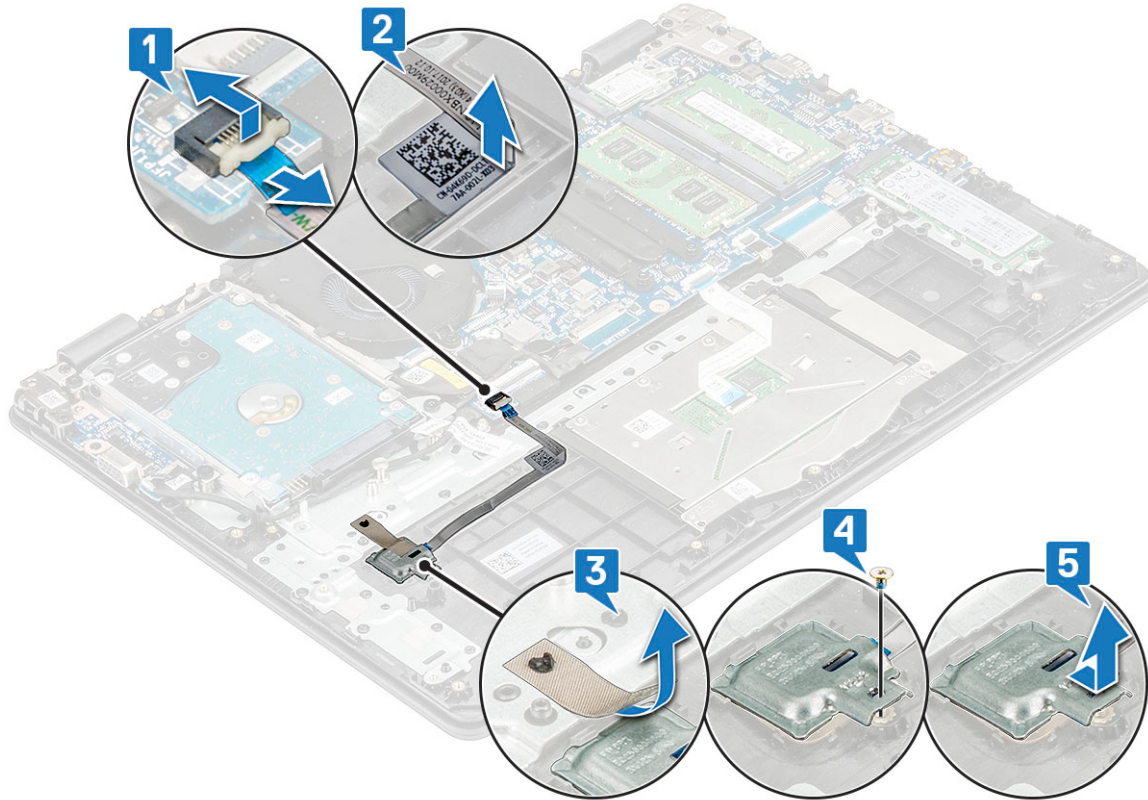
1. Place the Input-Output (I/O) board into its slot on the palmrest.
2. Replace the M2x3 screws to secure the I/O board to the palmrest.
3. Connect the I/O board cable to its connector on the system board.
4. Install the:
 - a. [speaker](#)
 - b. [battery](#)
 - c. [base cover](#)
5. Follow the procedure in [After working inside your computer](#)

Fingerprint reader – optional

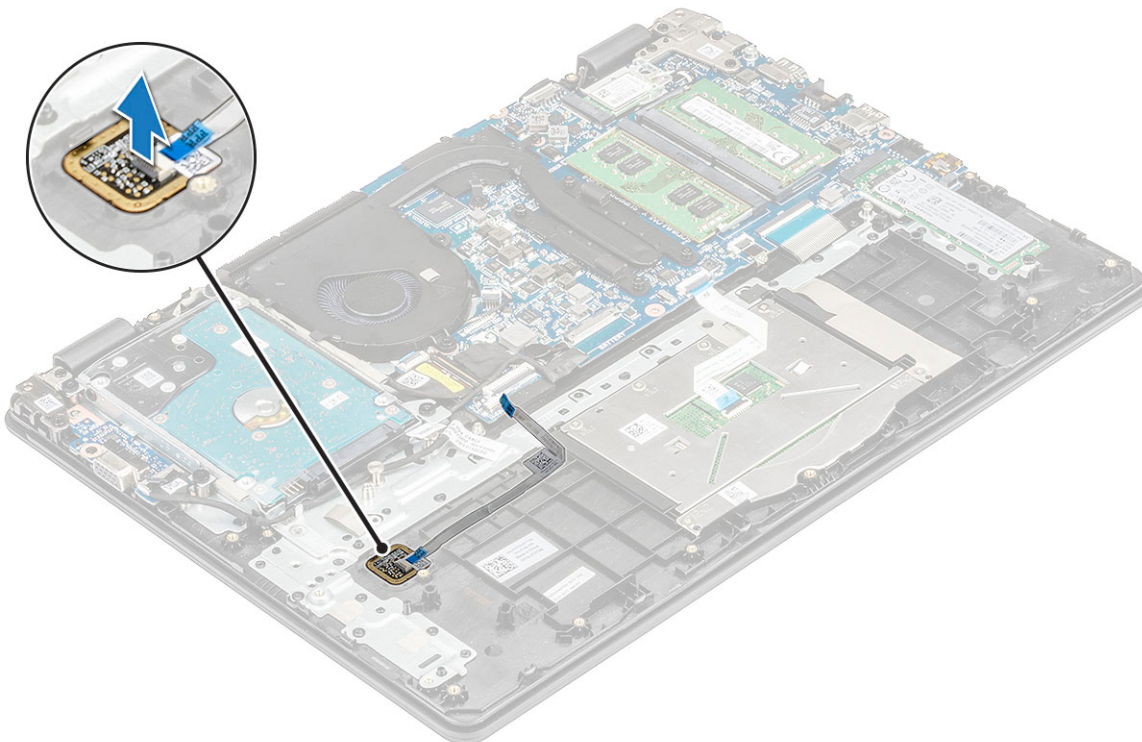
Removing the fingerprint reader

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

- a. Disconnect the fingerprint reader cable from its connector on the system board [1], peel the adhesive that secures the cable to the palmrest [2].
- b. Peel the adhesive tape that secures the fingerprint reader to the palmrest [3].
- c. Remove the M2x2 screw securing the metal bracket of the connector [4] and lift it off the computer [5]



- d. Lift the fingerprint reader off the computer



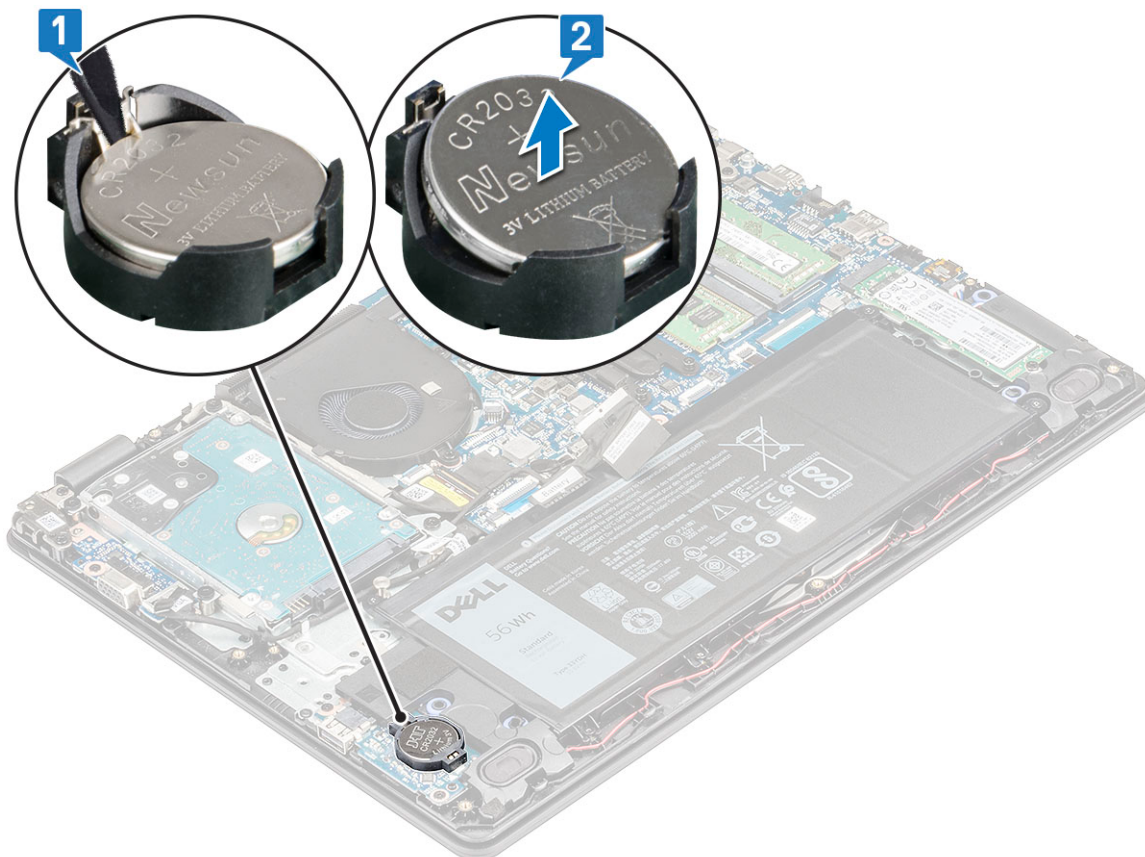
Installing the fingerprint reader

1. Place the fingerprint reader into the slot on the palmrest.
2. Place the metal bracket on the fingerprint reader and replace the M2x2 screw to secure the fingerprint reader to the system.
3. Secure the metal bracket on the fingerprint reader with an adhesive tape.
4. Affix the adhesive-backed cable to secure it to the palmrest.
5. Connect the fingerprint reader cable to the connector on the system board.
6. Install the:
 - a. [battery](#)
 - b. [base cover](#)
7. Follow the procedure in [After working inside your computer](#)

Coin cell battery

Removing the coin cell battery

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b. [battery](#)
3. To remove the coin cell:
 - a. Pry the coin cell battery until it pops out from its slot [1].
 - b. Lift and remove the coin cell from the system [2].



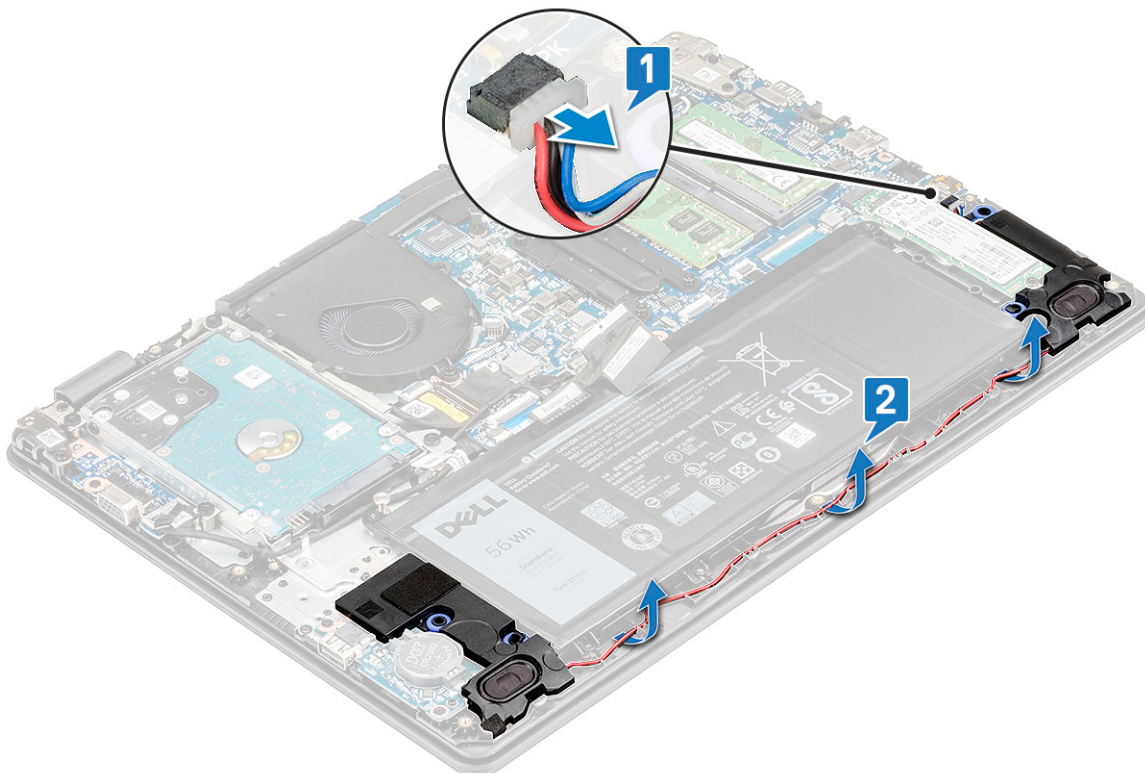
Installing the coincell battery

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

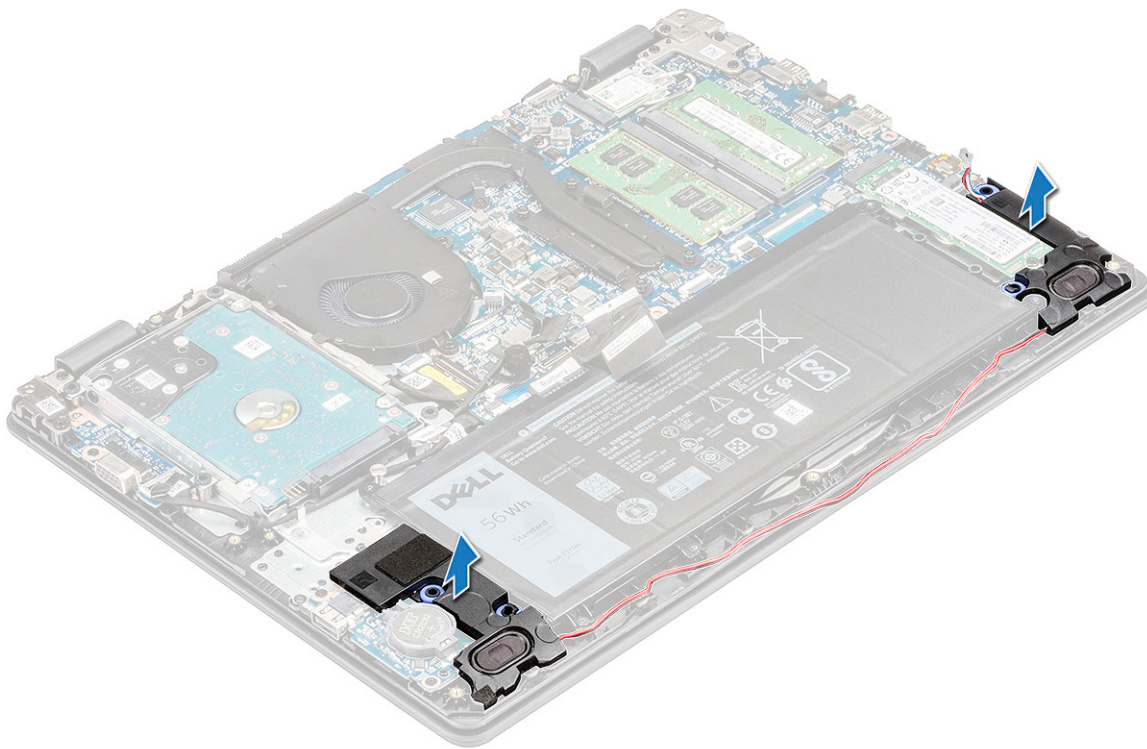
Speakers

Removing the speakers

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b. [battery](#)
3. To remove the speakers:
 - a. Disconnect the speaker cable from the connector on the system board [1].
 - b. Unroute the speaker cable from the routing channel [2].



4. Lift the speakers from the computer.



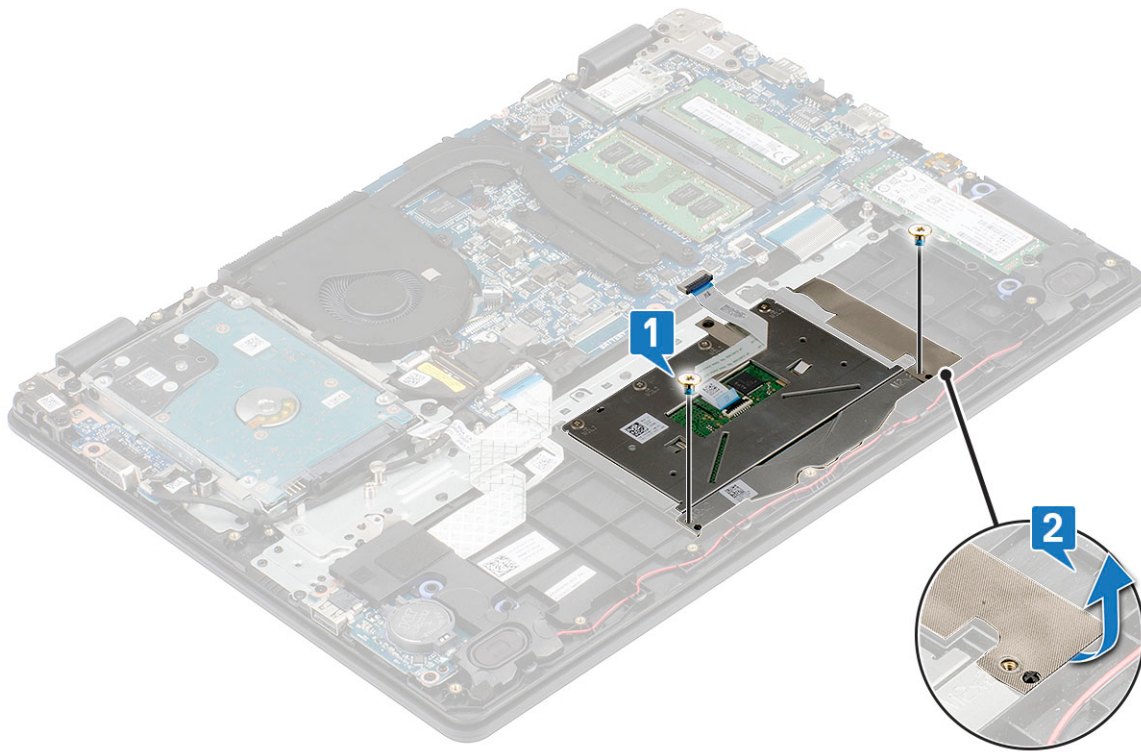
Installing the speakers

1. Place the speakers into the slots on the computer.
2. Route the speaker cable through its routing channel.
3. Connect the speaker cable to the connector on the system board.
4. Install the:
 - a. [battery](#)
 - b. [base cover](#)
5. Follow the procedure in [After working inside your computer](#).

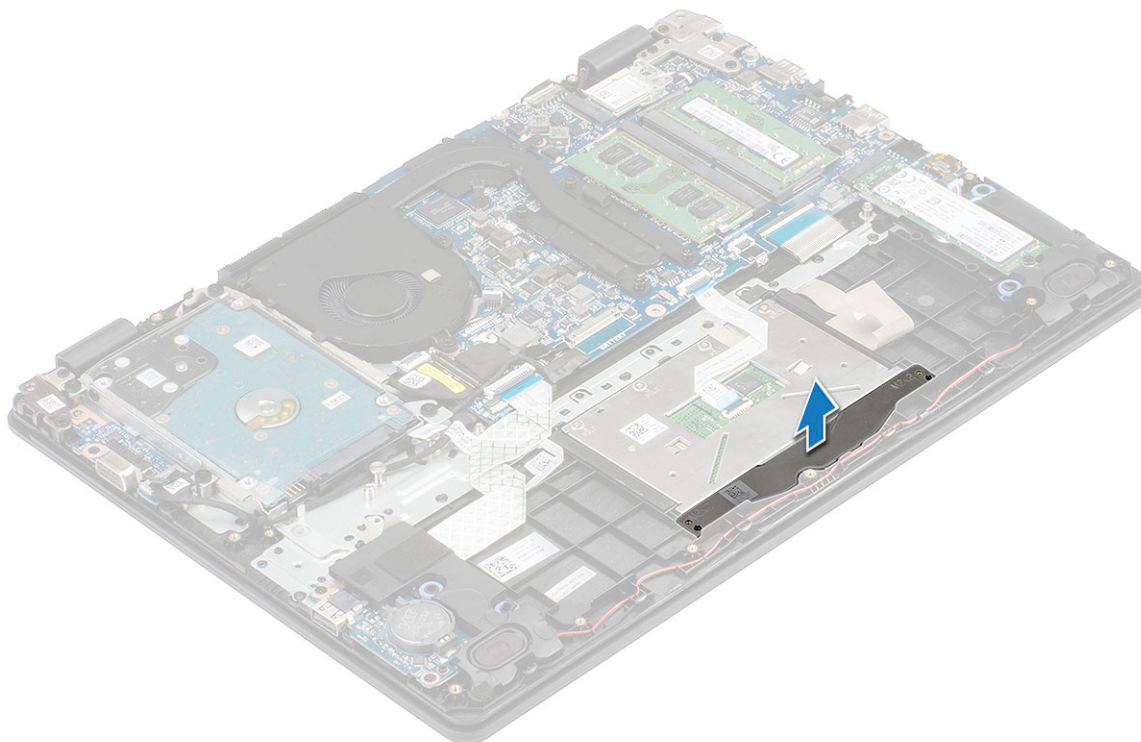
Touchpad panel

Removing the touchpad

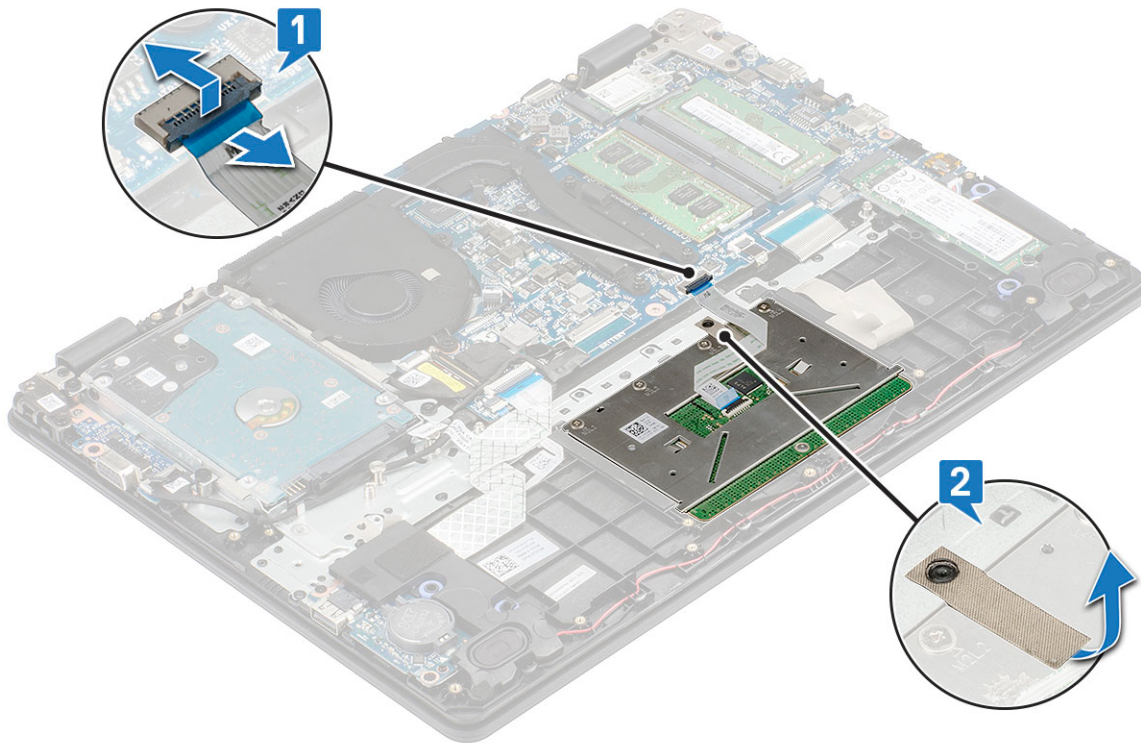
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b. [battery](#)
3. Remove the two M2x2 screws that secures the touchpad bracket to the system [1].
4. Peel off the adhesive tape that secures the touchpad bracket [2].



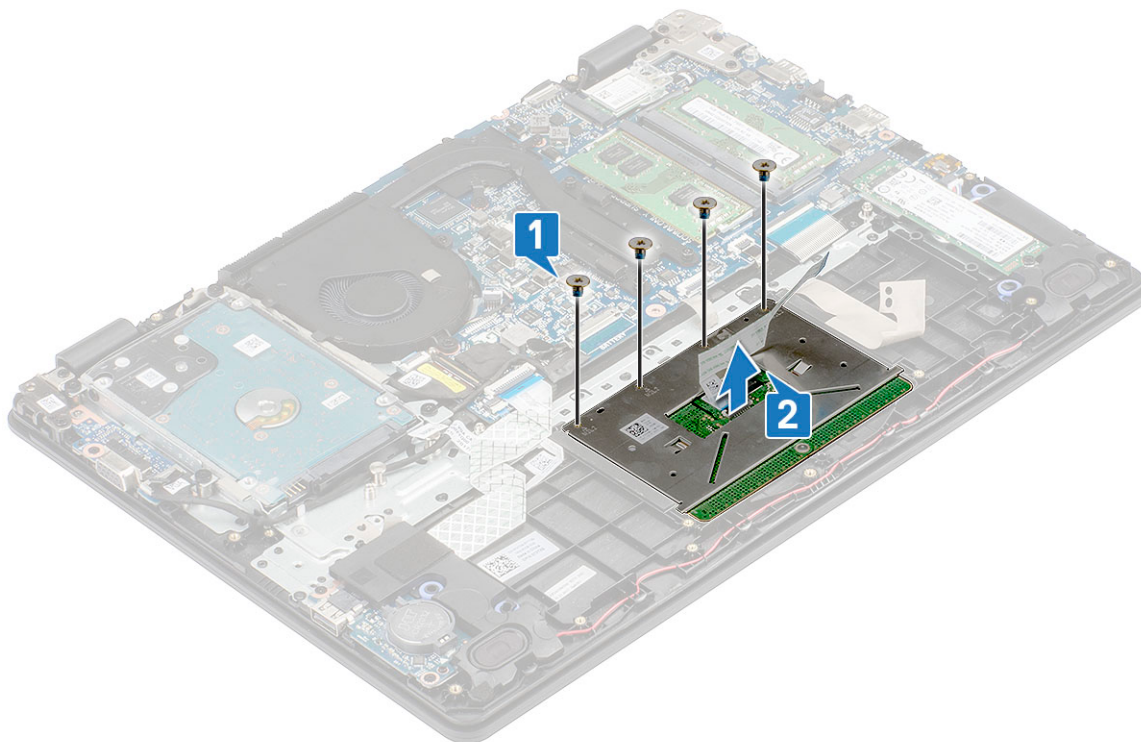
5. Lift the metal bracket from the system.



6. Disconnect the touchpad cable from its connector on the system board [1] and Peel off the adhesive that secures the TP cable to the touchpad to release it from the touchpad.
7. Peel off the adhesive tape that secures the touchpad panel [2].



8. Remove the four M2x2 screws that secure the touchpad on the computer [1] and lift the touchpad from the system [2].



Installing the touchpad

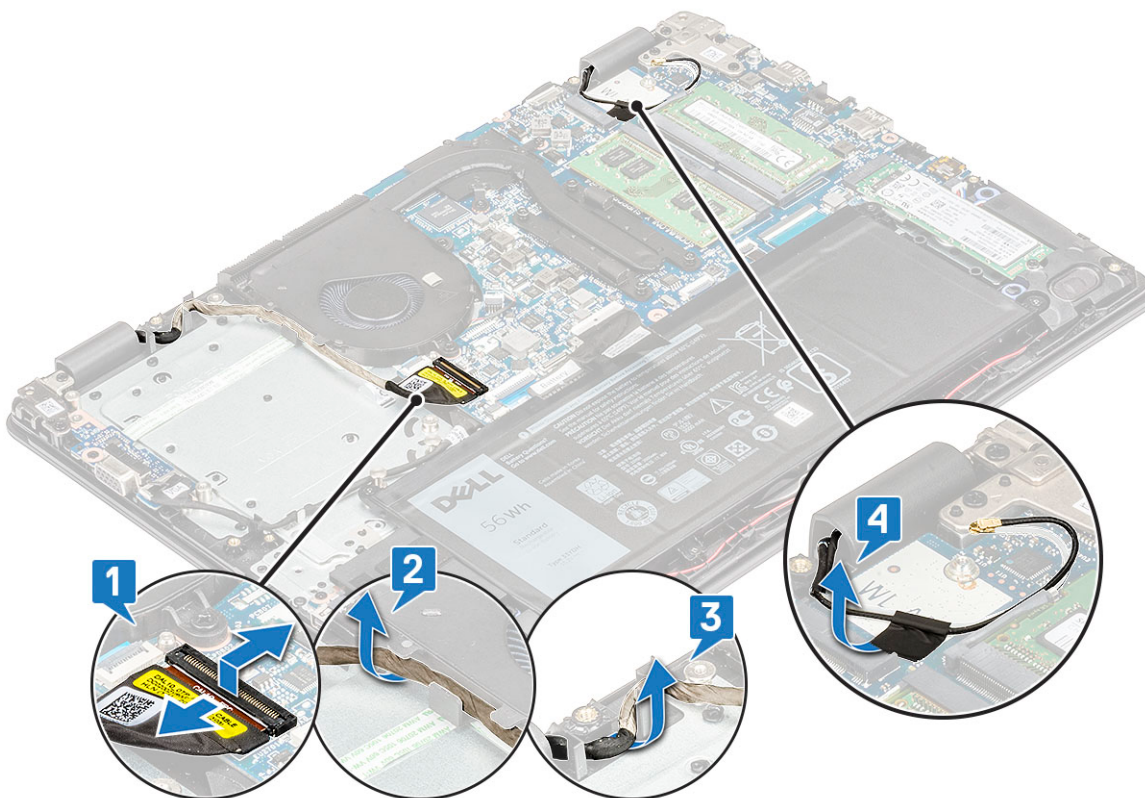
1. Place the touchpad into the slot on the system and replace the four M2x2 screws to secure it to the system.
2. Affix the adhesive tape to secure the touchpad pane.
3. Connect the touchpad cable to the connector and affix the adhesive-backed cable to secure it to the touchpad.
4. Align and place touchpad bracket over the plastic hold down and replace the two M2x2 screws to secure it.

5. Affix the adhesive tape to secure the touchpad bracket
6. Install the:
 - a. [battery](#)
 - b. [base cover](#)
7. Follow the procedure in [After working inside your computer](#).

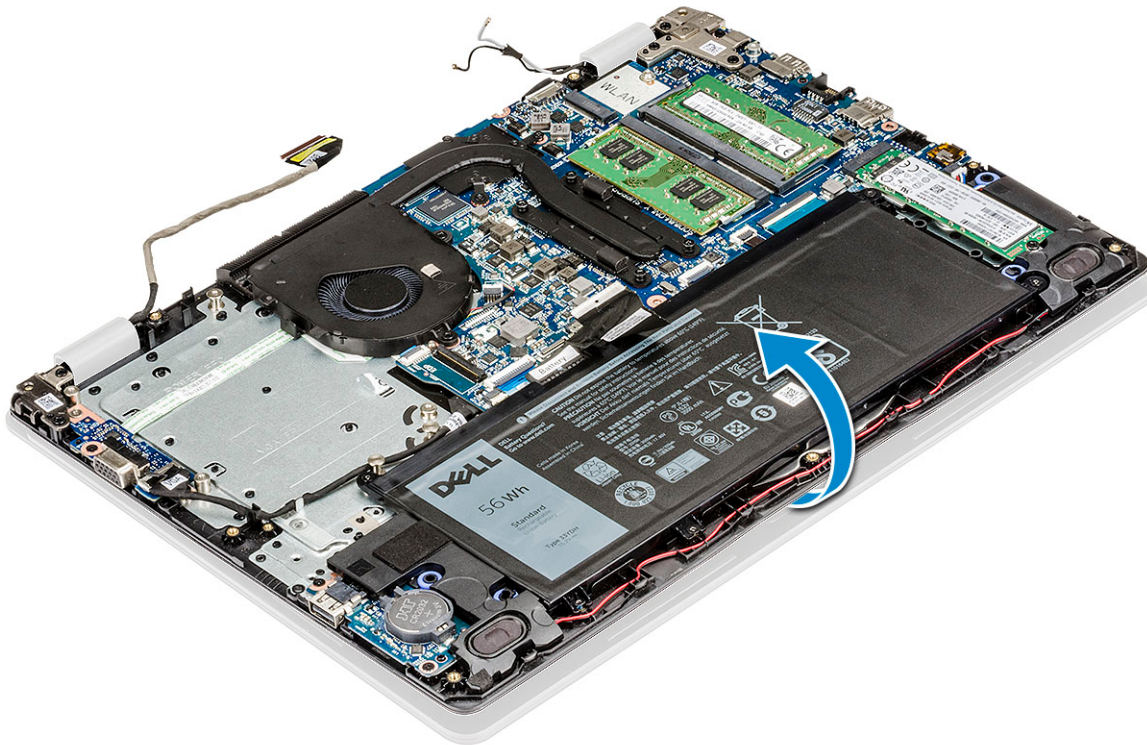
Display assembly

Removing the display assembly

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b. [battery](#)
 - c. [hard drive](#)
 - d. [Removing the WLAN card](#) on page 17
3. Remove the eDP cable from its connector on the system board [1] and unroute the cable from the routing channel on the system fan [2].
4. Unroute the eDP cable from the routing channel on the system [3].
5. Peel the tape securing the WLAN cables [4] and unroute the cables from the routing channel.



6. Then, open the palmrest assembly and flip over the computer on a flat surfaced table.



7. Remove the 5 M2.5x5 screws that secure the hinge brackets to palm rest [1] and lift the display assembly away from the computer [2].



Installing the display assembly

1. Place the display assembly to align with the screw holders on the computer.
2. Replace the 5 M2.5x5 screws to secure the hinge brackets to palm rest.
3. Turn over the computer
4. Route the WLAN cables through the routing channel and secure the cables to the system with adhesive tape.

5. Route the display cable through the routing channel on the system fan and the clip on the system, and connect the display cable to its connector on the system board.

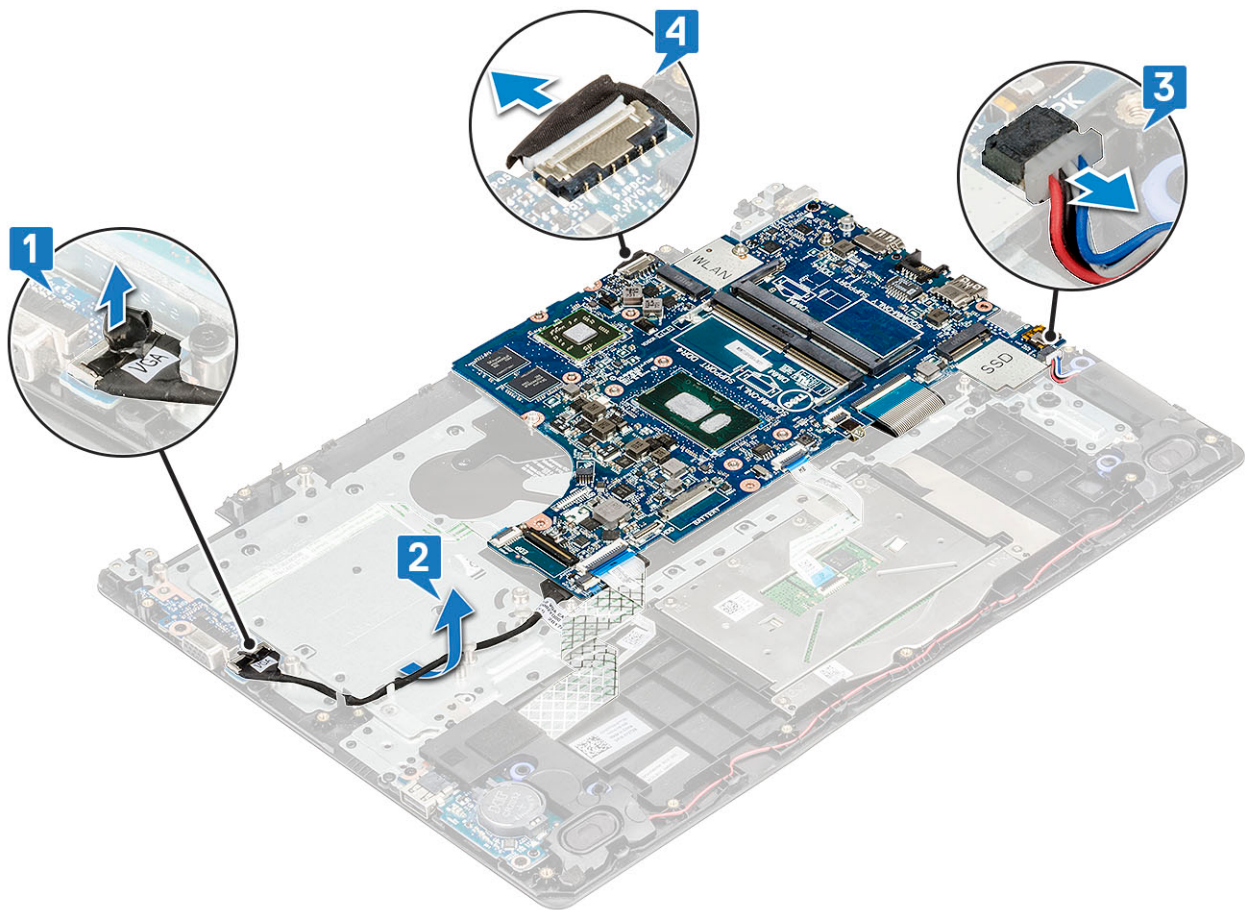
 **NOTE:** Display cable should be routed above the WWAN antennas (for models shipped with a WWAN card), and then secured with conductive tape on the palm rest.

6. Install the:
 - a. [Installing the WWAN daughterboard](#) on page 19
 - b. [Installing the WLAN card](#) on page 18
 - c. [hard drive](#)
 - d. [battery](#)
 - e. [base cover](#)
7. Follow the procedure in [After working inside your computer](#)

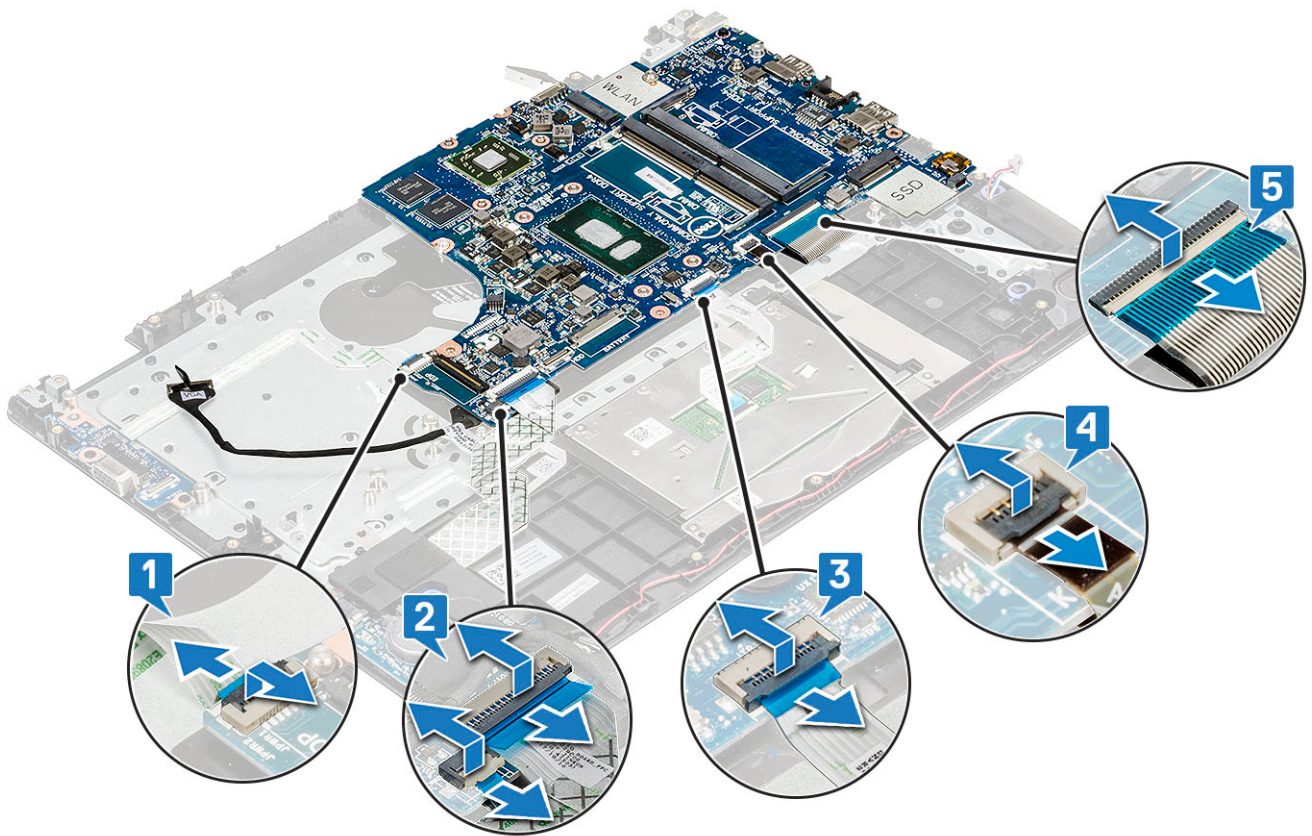
System board

Removing system board

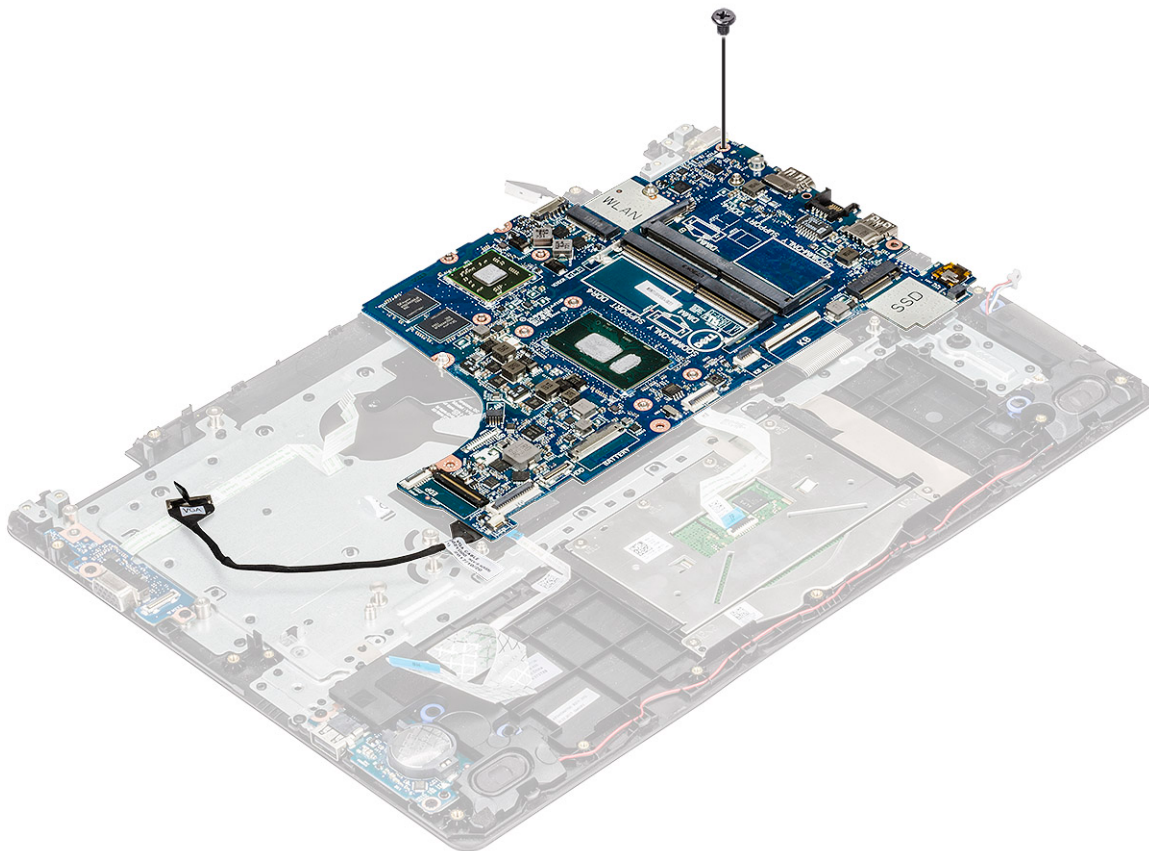
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b. [battery](#)
 - c. [M2. SSD](#)
 - d. [hard drive](#)
 - e. [fan](#)
 - f. [WLAN card](#)
 - g. [WWAN card](#)
 - h. [display assembly](#)
3. Disconnect the following cables and connectors:
 - a. VGA cable [1]
 - b. Unroute the VGA cable from the routing channel [2]
 - c. Speaker cable connector [3]
 - d. DC-in cable [4]



4. Disconnect the following cables :
- a. Power button board cable [1]
 - b. I/O cable and fingerprint reader cable [2]
 - c. Touchpad cable [3]
 - d. Keyboard backlight cable [4]
 - e. Keyboard cable [5]

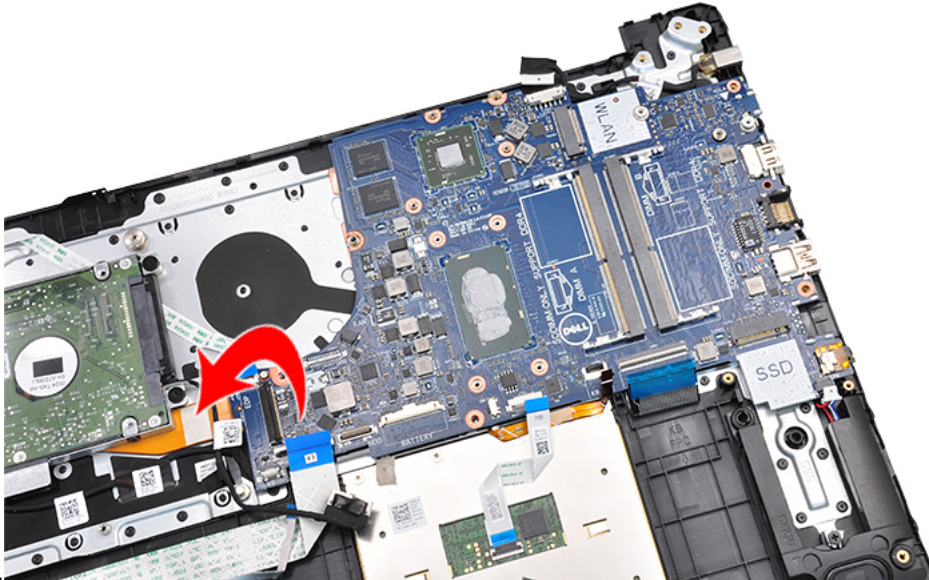


5. Remove the M2x4 screw that secures the system board to the system.



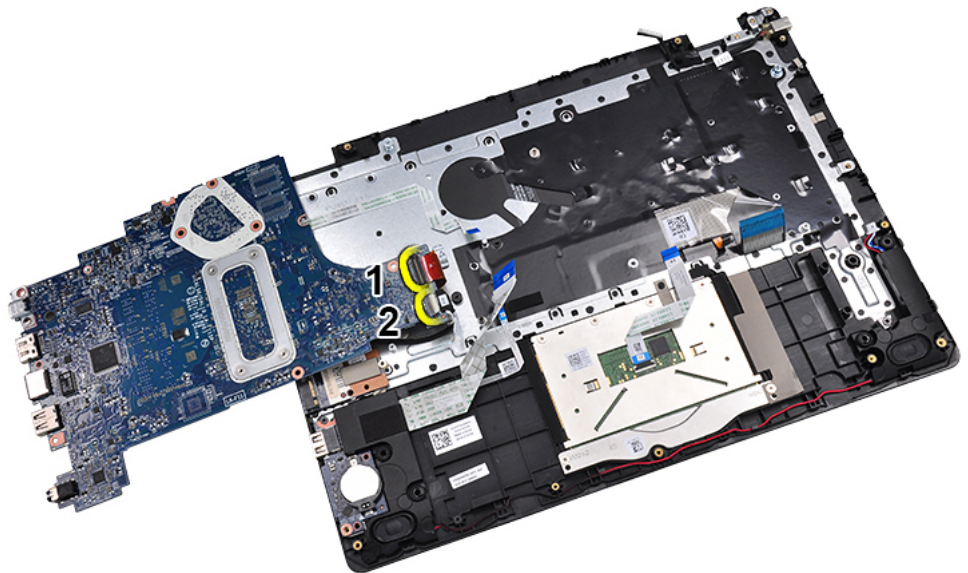
6. To remove the system board:
 - For systems shipped with WWAN card and VGA:

- a. Carefully lift the right side of the system board and flip it



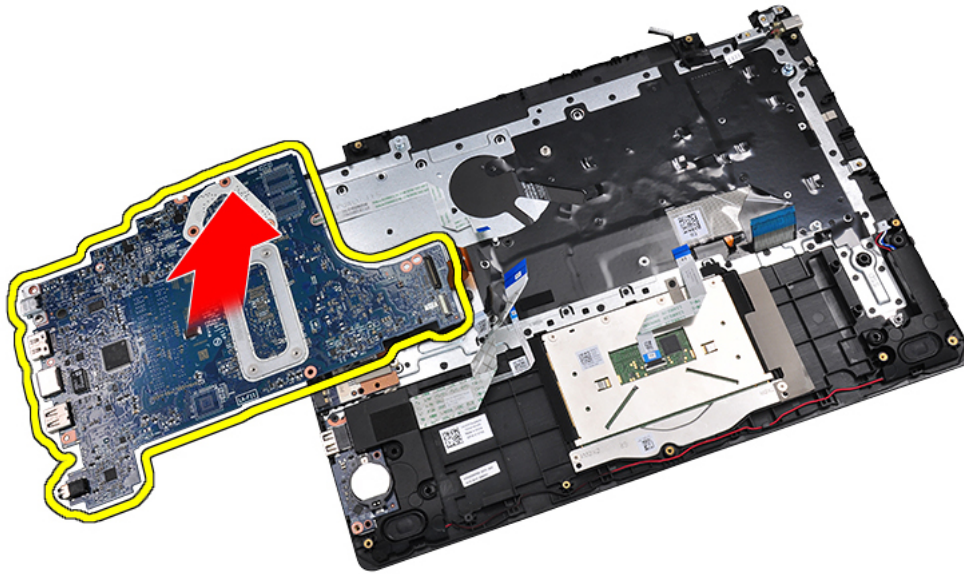
over.

- b. Disconnect the WWAN daughter board FPC [1] and VGA daughter board cable [2] from the connectors on the bottom

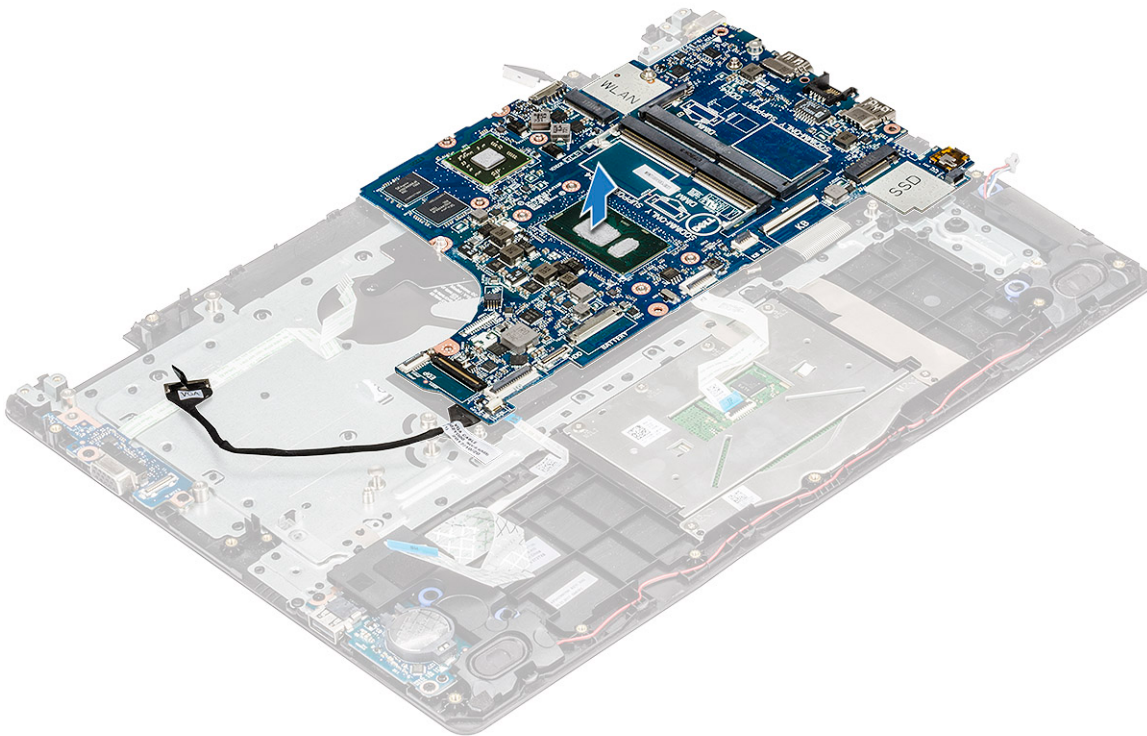


side of the system board.

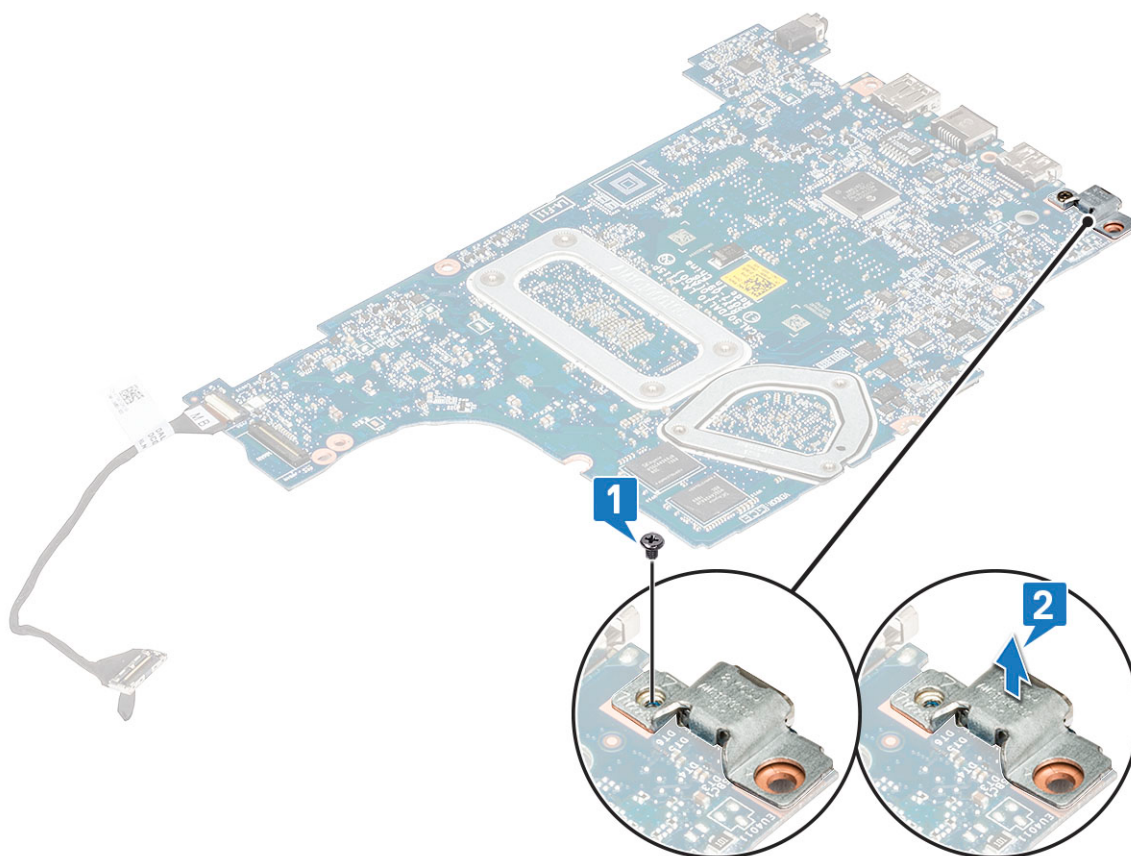
- c. Lift the system board from the system.



- For other configurations, flip the system board to disconnect the VGA board cable..



7. Remove the screw securing the USB Type-C bracket to the system board [1] and lift the USB Type-C bracket from the system board [2].



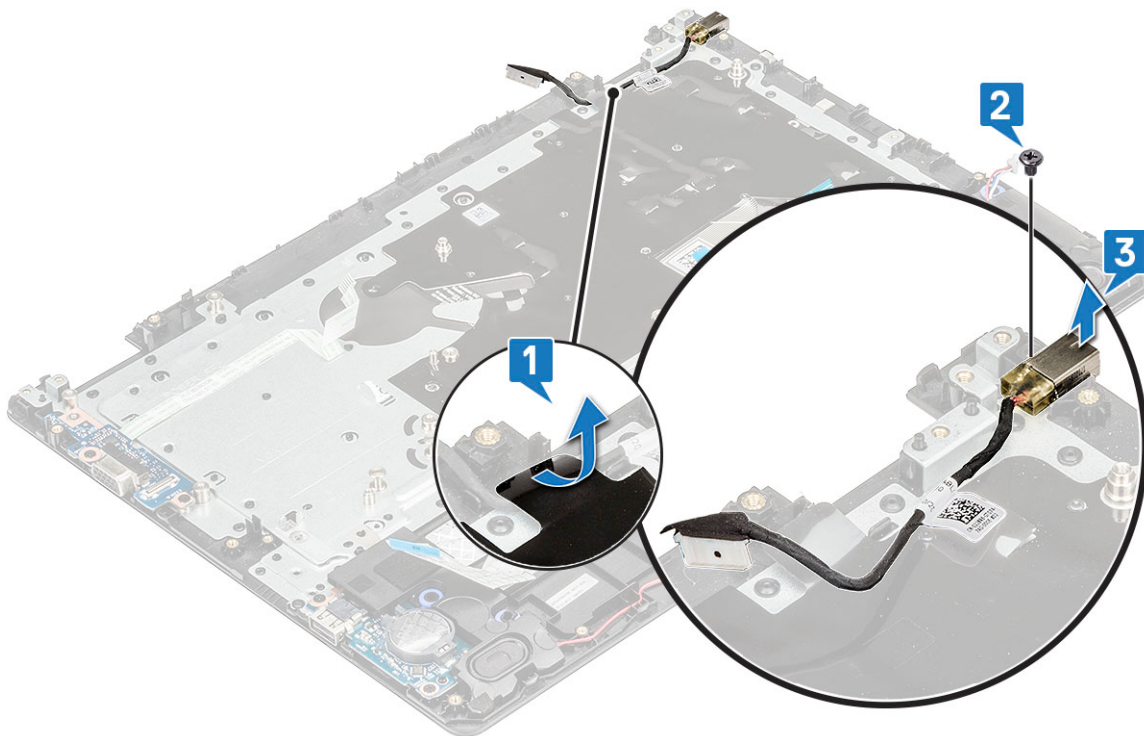
Installing the system board

1. Connect the WWAN and VGA board cables to the connectors on the bottom side of the system board.
i NOTE: This step is applicable only for systems shipped with WWAN card and VGA board reader.
2. Align the system board with the screw holders on the computer.
3. Tighten the M2x4 screw to secure the system board to the computer.
4. Connect the Power button board, I/O, touchpad, keyboard backlight, and the keyboard cables to their respective connectors.
5. Connect the DC-in, Speaker, and the VGA cables to their respective connectors.
6. Route the VGA cable through its routing channel.
7. Install the:
 - a. [display assembly](#)
 - b. [WWAN card](#)
 - c. [WLAN card](#)
 - d. [fan](#)
 - e. [hard drive](#)
 - f. [M2. SSD](#)
 - g. [battery](#)
 - h. [base cover](#)
8. Follow the procedure in [After working inside your computer](#).

DC-In Port

Removing the DC-in port

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b. [battery](#)
 - c. [memory](#)
 - d. [heatsink](#)
 - e. [M2. SSD](#)
 - f. [hard drive](#)
 - g. [fan](#)
 - h. [WLAN card](#)
 - i. [WWAN card](#)
 - j. [display assembly](#)
 - k. [system board](#)
3. To remove the DC-in port:
 - a. Peel the tape securing the power-adaptor cable in place.
 - b. Unroute the power-adaptor cable [1].
 - c. Remove the M2x3 screw that secures the DC-in port to the palmrest [2].
 - d. Lift and remove the DC-in port from the system [3].



Installing the DC-in port

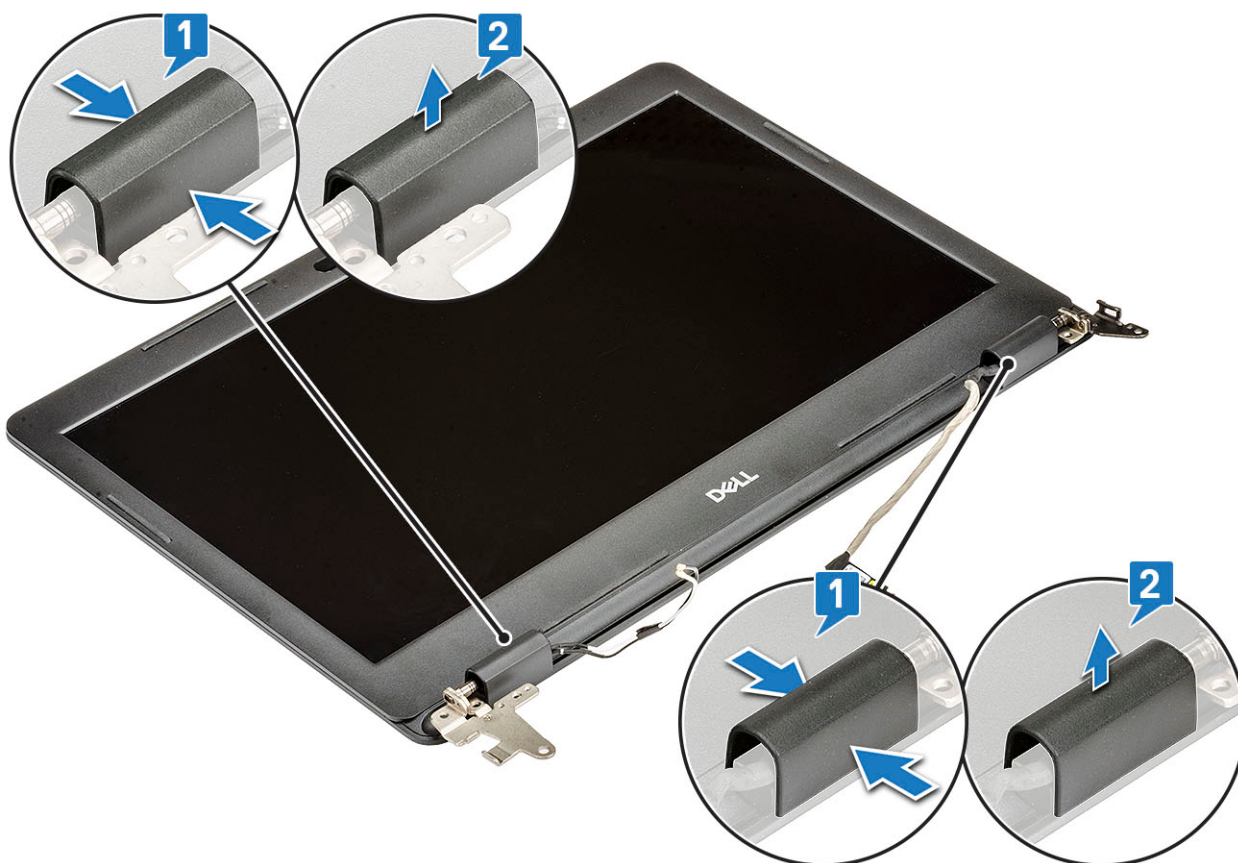
1. Place the DC-in port in its place on the palmrest.
2. Replace the M2x3 screw to secure the port to the palmrest.
3. Route the DC-in cable through its routing channel.
4. Secure the DC-in cable with the adhesive tape.
5. Install the:

- a. [system board](#)
 - b. [display assembly](#)
 - c. [WLAN card](#)
 - d. [WWAN card](#)
 - e. [fan](#)
 - f. [hard drive](#)
 - g. [M2. SSD](#)
 - h. [heatsink](#)
 - i. [memory](#)
 - j. [battery](#)
 - k. [base cover](#)
6. Follow the procedure in [After working inside your computer](#)

Display hinge cover

Removing display hinge cover

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b. [battery](#)
 - c. [hard drive](#)
 - d. [Removing the WLAN card](#) on page 17
 - e. [Removing the WWAN daughterboard](#) on page 18
 - f. [display assembly](#)
3. To remove the display hinge cover:
 - a. Press the display hinge cover from both sides [1].
 - b. Lift the display hinge cover away from the display hinge [2].
 - c. Repeat step a and step b to remove the other display hinge cover.



Installing display hinge cover

1. Place the display hinge cover on the display hinge and press to secure it to the system.
2. Install the:
 - a. [display assembly](#)
 - b. [Installing the WWAN daughterboard](#) on page 19
 - c. [Installing the WLAN card](#) on page 18
 - d. [hard drive](#)
 - e. [battery](#)
 - f. [base cover](#)
3. Follow the procedure in [After working inside your computer](#).

LCD Bezel

Removing the LCD bezel

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b. [battery](#)
 - c. [hard drive](#)
 - d. [Removing the WLAN card](#) on page 17
 - e. [Removing the WWAN daughterboard](#) on page 18
 - f. [display assembly](#)
 - g. [display hinge cover](#)

3. Using a plastic scribe, gently open the bezel by prying from the outer edge of the top side of the display bezel [1] , and then continue throughout the system [2]. Lift the bezel away from the system.

NOTE: Use a plastic scribe and handle the bezel with your hands to avoid leaving glue residue on the display panel



Installing the LCD bezel

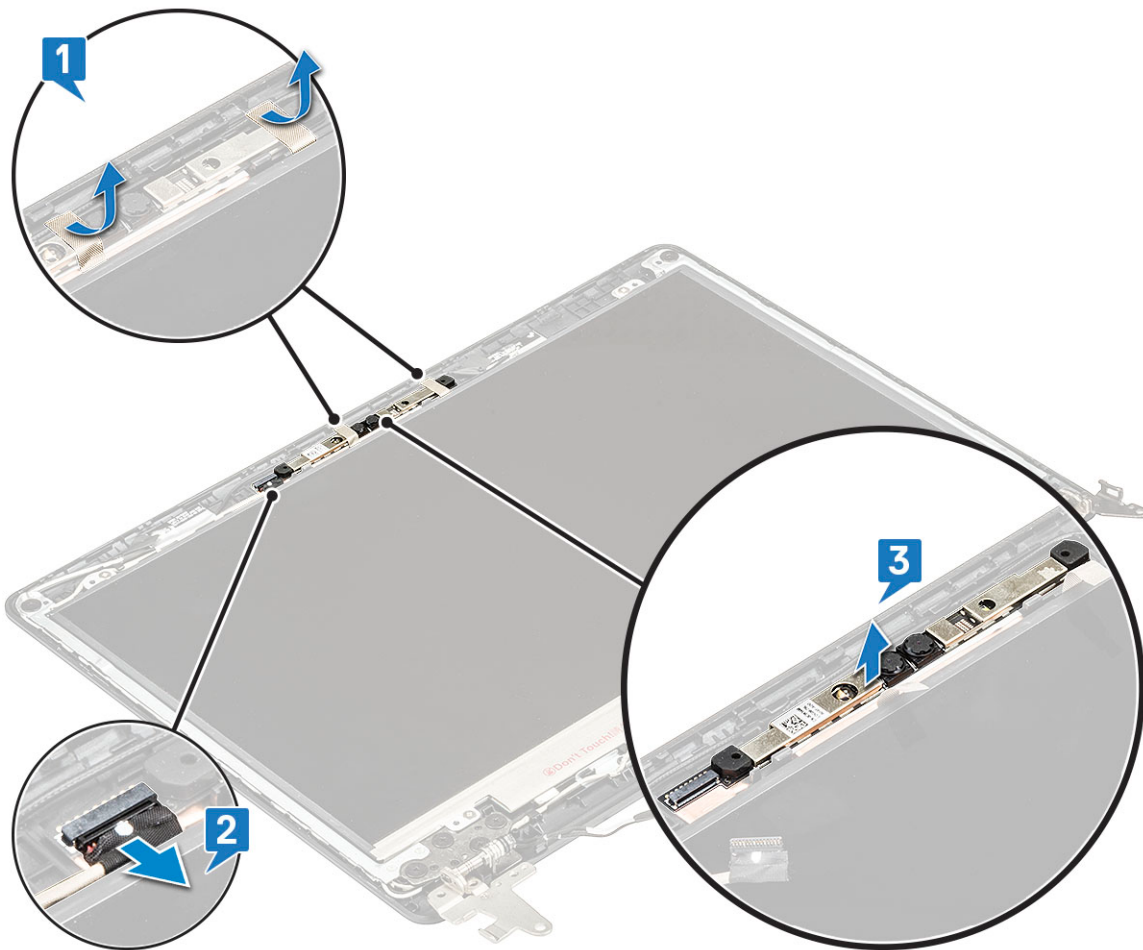
1. Replace the bezel and gently press on the edges to snap the bezel into place.
2. Install the:
 - a. display hinge cover
 - b. display assembly
 - c. [Installing the WWAN daughterboard](#) on page 19
 - d. [Installing the WLAN card](#) on page 18
 - e. hard drive
 - f. battery
 - g. base cover
3. Follow the procedure in [After working inside your computer](#)

Camera

Removing the camera

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. base cover
 - b. battery
 - c. [Removing the WLAN card](#) on page 17
 - d. [Removing the WWAN daughterboard](#) on page 18

- e. [display assembly](#)
 - f. [display hinge cover](#)
 - g. [LCD bezel](#)
3. Remove the adhesive tapes securing the camera to the LCD back cover [1].
 4. Disconnect the camera cable [2] and lift the camera to release it from the adhesive securing it to the LCD back cover [3].



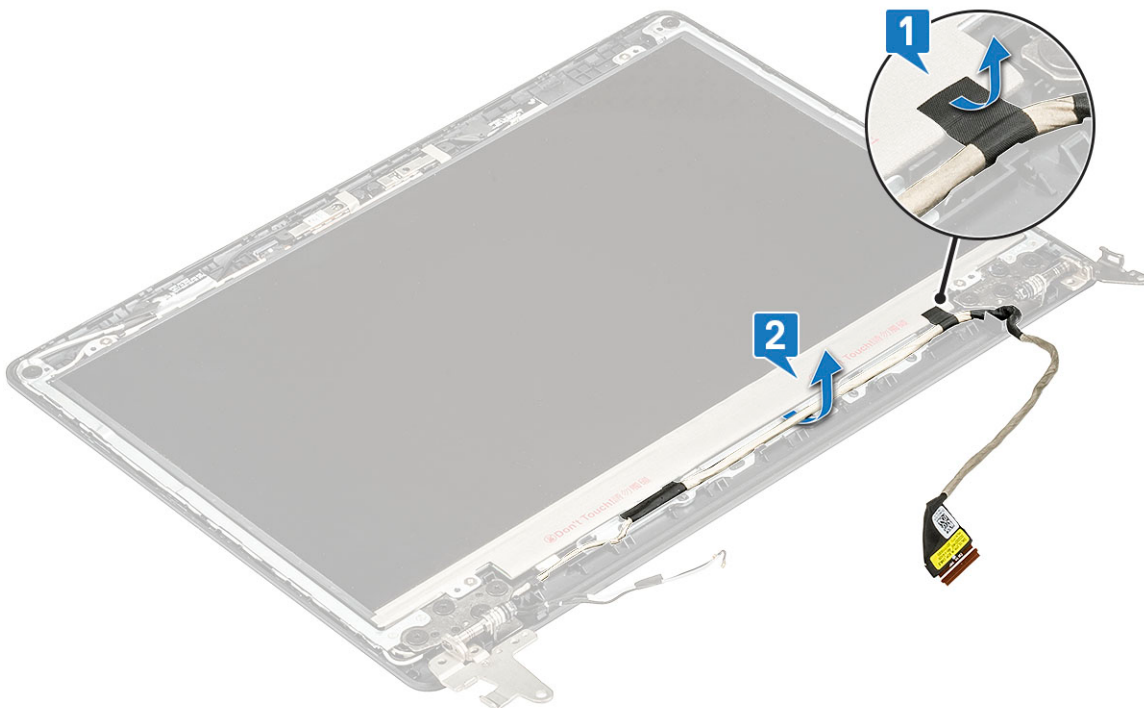
Installing the camera

1. Place the camera on the LCD back cover.
2. Connect the camera cable to its connector.
3. Affix the adhesive tapes to secure the camera to the LCD back cover.
4. Install the:
 - a. [LCD bezel](#)
 - b. [display hinge cover](#)
 - c. [display assembly](#)
 - d. [Installing the WWAN daughterboard](#) on page 19
 - e. [WLAN](#)
 - f. [battery](#)
 - g. [base cover](#)
5. Follow the procedure in [After working inside your computer](#)

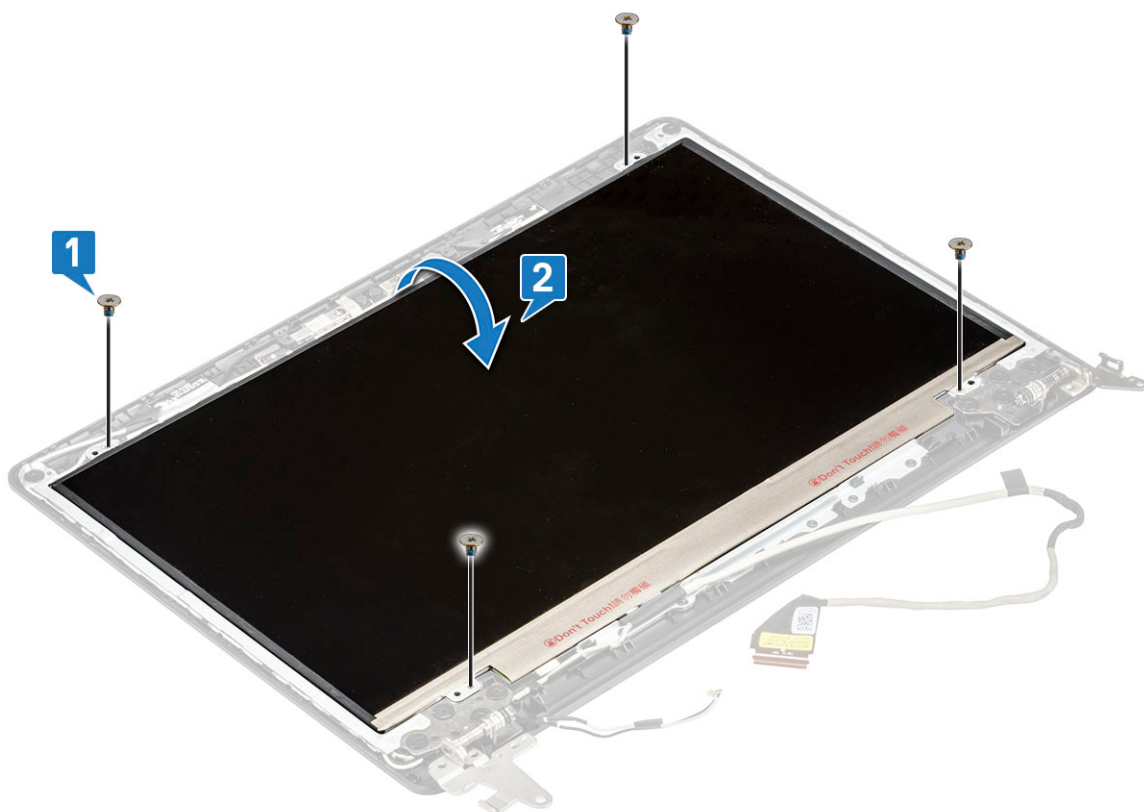
LCD Panel

Removing the LCD panel

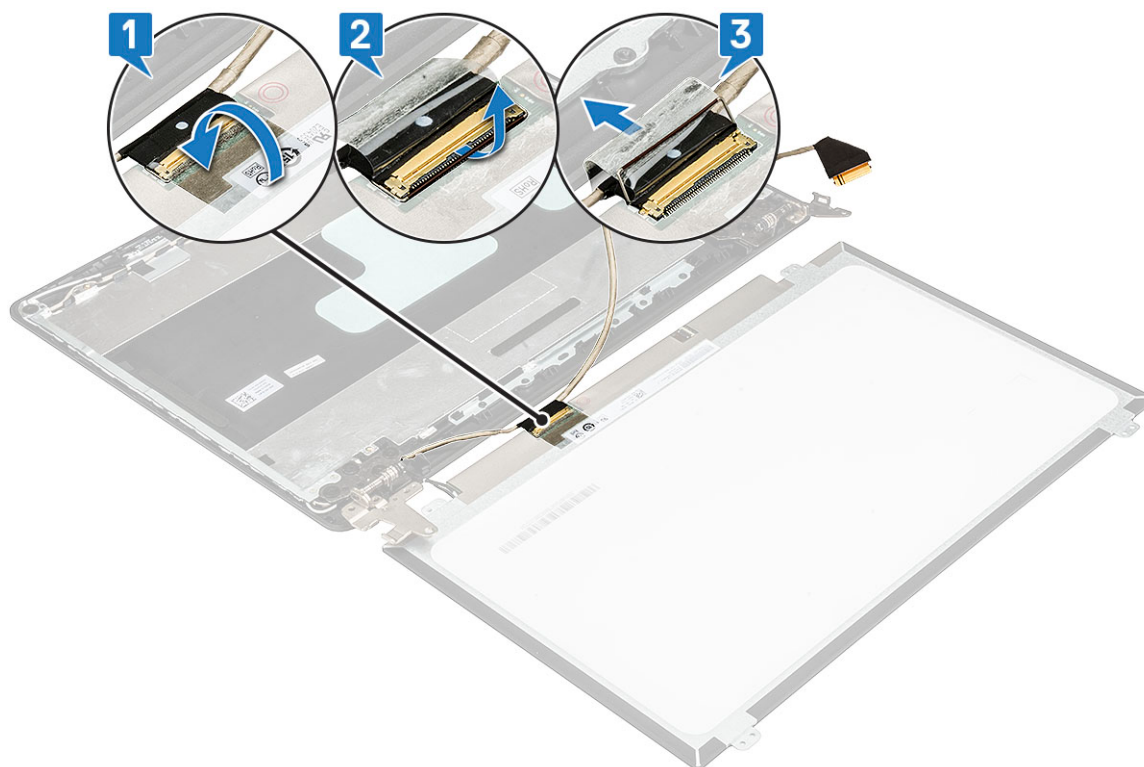
1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b. [hard drive](#)
 - c. [battery](#)
 - d. [Removing the WLAN card](#) on page 17
 - e. [Removing the WWAN daughterboard](#) on page 18
 - f. [display assembly](#)
 - g. [display hinge cover](#)
 - h. [LCD bezel](#)
3. Remove the adhesive tape that secures the eDP cable to the display panel [1].
4. Unroute the eDP cable from the routing channel [2].



5. Then, remove the 4 M2x2 screws [1] securing the LCD panel to the LCD back cover and flip it over to expose the eDP cable connector [2].



6. Lift up the adhesive sticker [1] and disconnect the cable from the LCD panel [2,3].



Installing the LCD Panel

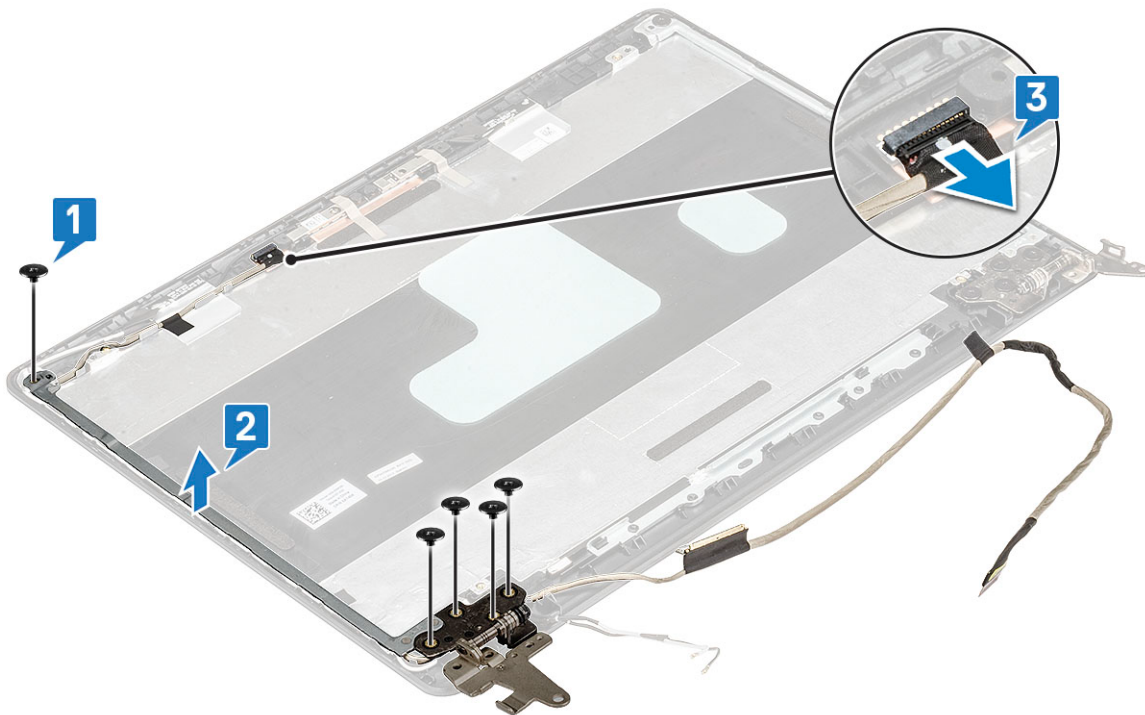
1. Connect the LCD cable to its connector on the back side of the LCD panel.
2. Affix the adhesive sticker.

3. Place the LCD panel on the LCD back cover and align the LCD panel with the screw holders on the LCD back cover.
4. Replace the 4 M2x2 screws to secure the LCD panel to the LCD back cover.
5. Route the eDP cable through the routing channel and secure the cable to the display panel with an adhesive tape.
6. Install the:
 - a. [LCD bezel](#)
 - b. [display hinge cover](#)
 - c. [display assembly](#)
 - d. [WLAN](#)
 - e. [Installing the WLAN card](#) on page 18
 - f. [hard drive](#)
 - g. [battery](#)
 - h. [base cover](#)
7. Follow the procedure in [After working inside your computer](#)

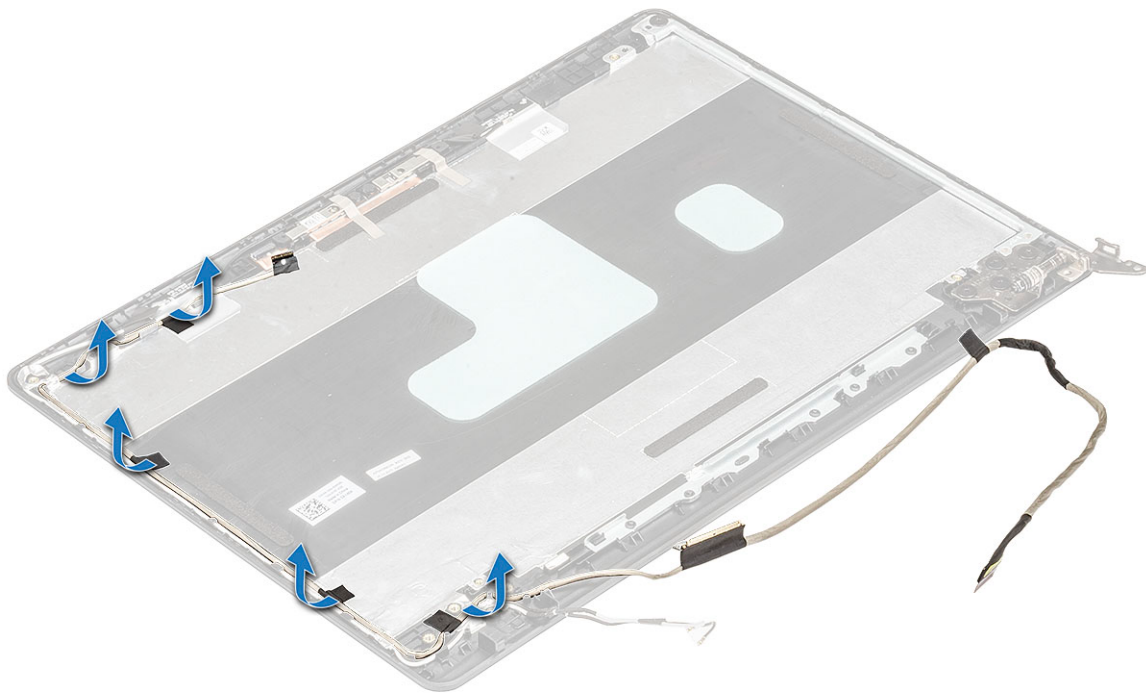
eDP and camera cable

Removing the eDP and camera cable

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. [base cover](#)
 - b. [hard drive](#)
 - c. [battery](#)
 - d. [Removing the WLAN card](#) on page 17
 - e. [Removing the WWAN daughterboard](#) on page 18
 - f. [display assembly](#)
 - g. [display hinge cover](#)
 - h. [LCD bezel](#)
 - i. [LCD panel](#)
3. Remove the 5 M2.5x2.5 screws securing the left hinge bracket to the LCD back cover [1] and lift the bracket away from the LCD back cover [2].
4. Disconnect the camera cable from its connector on the LCD back cover [3].



5. Peel the adhesive tapes securing the display cable to the LCD back cover and unroute it from the routing channel.



Installing the eDP and camera cable

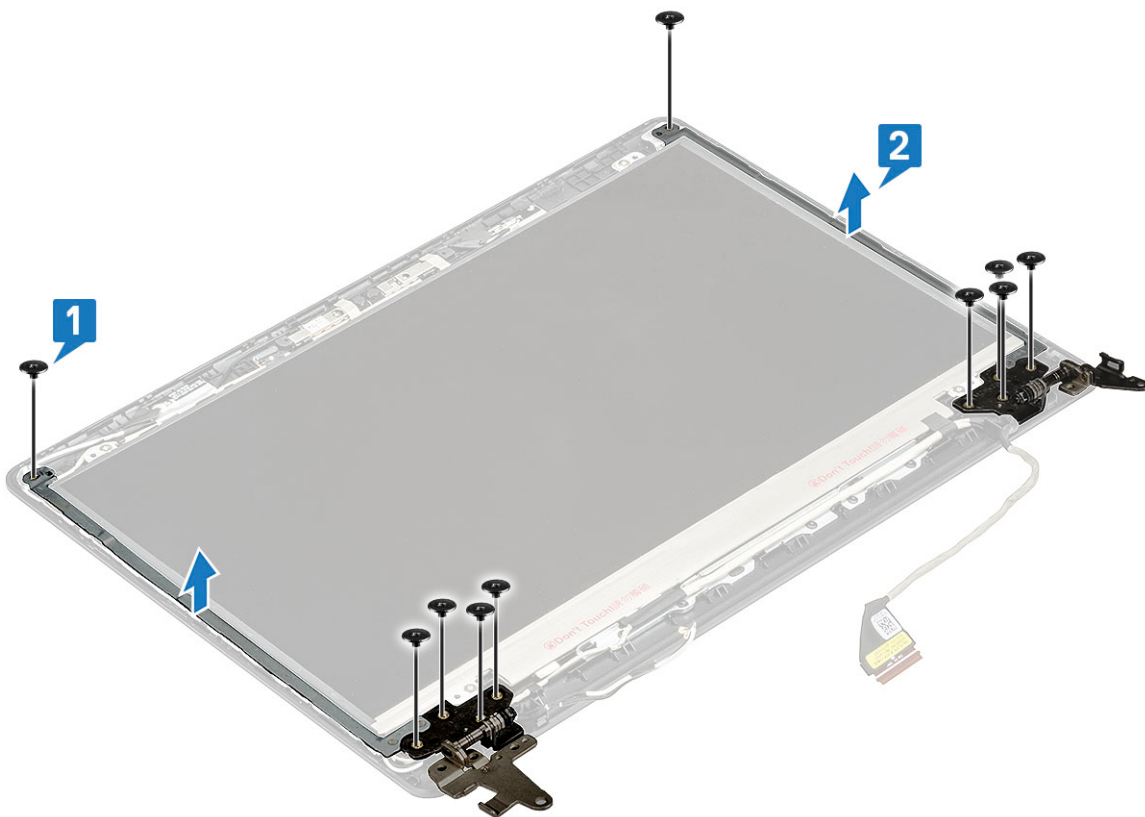
1. Route the display cable through its routing channel and secure the display cable to the LCD back cover with the adhesive tapes.
2. Connect the camera cable to its connector on the LCD back cover.
3. Replace the 5 M2.5x2.5 screws to secure the left hinge bracket to the LCD back cover.
4. Secure the eDP cable to the LCD back cover with adhesive tapes.
5. Install the:

- a. LCD panel
 - b. LCD bezel
 - c. display hinge cover
 - d. display assembly
 - e. WWAN
 - f. [Installing the WLAN card on page 18](#)
 - g. hard drive
 - h. battery
 - i. base cover
6. Follow the procedure in [After working inside your computer](#)

LCD Hinge

Removing the LCD hinge

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. base cover
 - b. battery
 - c. [Removing the WLAN card on page 17](#)
 - d. [Removing the WWAN daughterboard on page 18](#)
 - e. display assembly
 - f. LCD bezel
3. Remove the 10 M2.5x2.5 screws that secure the left and right hinge brackets to the LCD back cover [1] and remove it from the system [2].



Installing the LCD hinge

1. Place the left and right hinge brackets on the LCD back cover, align with the lock tabs on the side of LCD back cover.
2. Tighten the 10 M2.5x2.5 screws to secure the left and right hinge brackets to the LCD back cover.
3. Install the:
 - a. LCD bezel
 - b. display assembly
 - c. WWAN card
 - d. Installing the WLAN card on page 18
 - e. battery
 - f. base cover
4. Follow the procedure in [After working inside your computer](#)

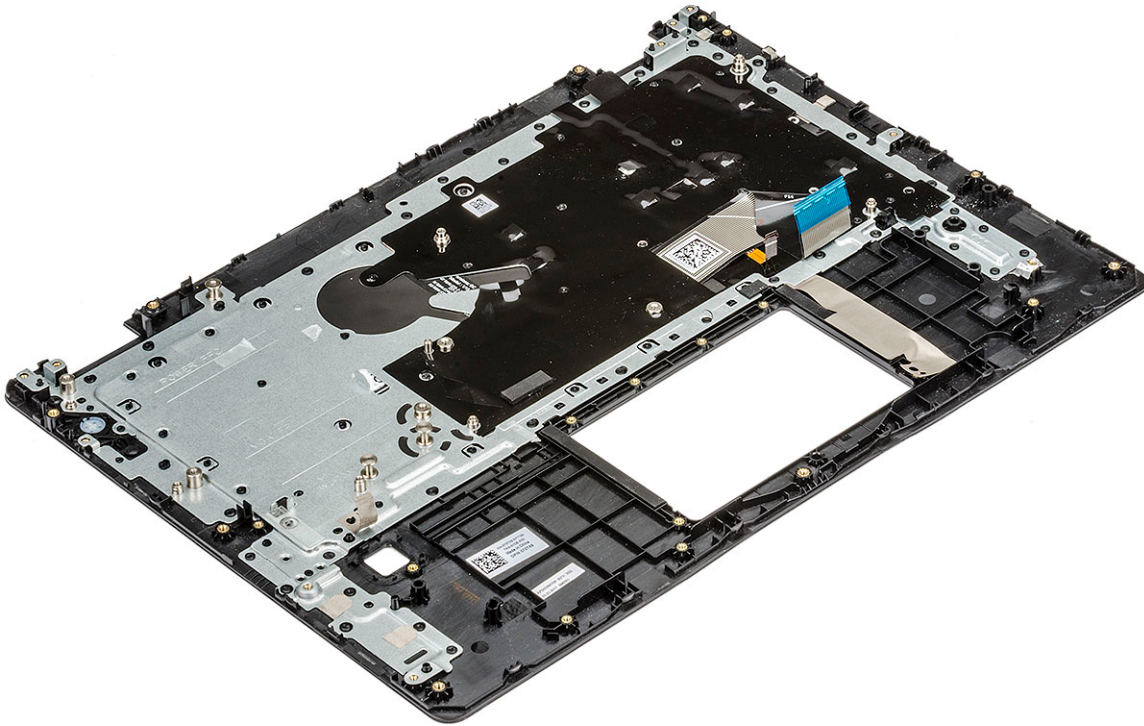
Keyboard and Palm rest assembly

Removing the keyboard and palm rest assembly

1. Follow the procedure in [Before working inside your computer](#).
2. Remove the:
 - a. base cover
 - b. battery
 - c. heatsink
 - d. fan
 - e. WLAN card
 - f. WWAN card
 - g. memory module
 - h. HDD
 - i. DC-in port
 - j. I/O board
 - k. coincell battery
 - l. speakers
 - m. touchpad
 - n. display assembly
 - o. system board

 **NOTE:** The component you are left with is the keyboard and palm rest assembly.

 **NOTE:** Keyboard and palm rest assembly on this model is referred to as **Assembly Keyboard**.



3. Install the following components on the new keyboard and palm rest assembly.
 - a. [system board](#)
 - b. [display assembly](#)
 - c. [touchpad](#)
 - d. [speakers](#)
 - e. [coin cell battery](#)
 - f. [I/O board](#)
 - g. [DC-in port](#)
 - h. [memory module](#)
 - i. [WLAN card](#)
 - j. [WWAN card](#)
 - k. [HDD](#)
 - l. [fan](#)
 - m. [heatsink](#)
 - n. [battery](#)
 - o. [base cover](#)
4. Follow the procedure in [After working inside your computer](#).

Technical specifications

Processor

The system is built with Intel Celeron Processors and Core i processors.

Table 2. Supported processors

Processors Support List	UMA Graphics
Intel® Celeron™ 3865U (2 MB Cache, 2 cores, 15 W, up to 1.8 GHz)	Intel® HD Graphics 610
Intel® Core™ i3-6006U (3 MB Cache, 2 cores, 15 W, up to 2.0 GHz)	Intel® HD Graphics 520
Intel® Core™ i5-7200U (3 MB Cache, 2 cores, 15 W, up to 3.1 GHz)	Intel® HD Graphics 620
Intel® Core™ i3-7130U (3 MB Cache, 2 cores, 15 W, up to 2.7 GHz)	Intel® HD Graphics 620
Intel® Core™ i5-8350U (6 MB Cache, 4 cores, 15 W, up to 3.6 GHz)	Intel® UHD Graphics 620
Intel® Core™ i7-8550U (8 MB Cache, 4 cores, 15 W, up to 4.0 GHz)	Intel® UHD Graphics 620
Intel® Core™ i5-8250U (6 MB Cache, 4 cores, 15 W, up to 3.4 GHz)	Intel® UHD Graphics 620

Memory

Your computer supports a maximum of 32 GB of memory when you use two 16 GB DIMMs; however, 32-bit operating systems, such as the 32-bit version of Microsoft Windows 10, can only use a maximum of 4GB of address space. Moreover, certain components within the computer require address space in the 4GB range. Any address space reserved for these components cannot be used by computer memory; therefore, the amount of memory available to a 32-bit operating system is less than 4GB. •Greater than 4GB memory requires a 64-bit operating system.

Memory	Feature
SoDIMM Slots	2
Minimum Memory Configuration	4 GB
Maximum Memory Configuration	32 GB
DIMM Configurations:	(1 X 4 GB; 1 x 8 GB; 1 x 16 GB; 2 x 4 GB; 2 x 8 GB; 2 x 16 GB;) • 2133 MHz DDR4 for 6th and 7th generation processors • 2400 MHz DDR4 for 8th generation processors

Storage specifications

- 2.5" 500GB 7200 RPM (7mm)
- 2.5" 500GB 8GB Hybrid (7mm)
- 2.5" 1TB 8GB Hybrid (7mm)
- 2.5" 1TB 5400RPM SMR (7mm)
- 128GB M.2 2280 SATA SSD
- 256GB M.2 2280 SATA SSD
- 256GB M.2 2280 PCIe SSD
- 512GB M.2 2280 PCIe SSD

Audio specifications

Feature	Specification
Types	High-definition audio
Controller	Realtek ALC3246
Stereo conversion	Stereo conversion: 16/20/24-bit (analog-to-digital and digital-to-analog)
Internal interface	High-definition audio codec
External interface	microphone-in and stereo headphones/speakers universal connector
Speakers	Two
Internal speaker amplifier	• 2.5 W (RMS) per channel (peak) • 2 W (RMS) per channel (average)
Volume controls	Hot keys • Fn+F2 - Volume Down • Fn+F3 - Volume Up

Video specifications

Table 3. Table showing video specifications

Feature	Specification
Type	Integrated on system board, hardware accelerated
Controller	UMA : • Sky Lake: Intel HD Graphics 520 • Kaby Lake: Intel HD Graphics 610\620, Intel UHD Graphics 620 Discrete: • AMD Radeon 530
External display support	VGA, HDMI 1.4 and DisplayPort over Type-C

Webcam specifications

This topic lists out the detailed camera specifications.

Easy Remote Collaboration:

- Video conference online with a built-in camera.
- Touch configurations include Infra-Red camera which is dedicated to support Windows Hello feature but also functions as normal RGB camera.

Table 4. Webcam specifications

Webcam Features	HD	VGA Infra-Red	
	RGB	Infra-Red	RGB
Camera Type	HD fixed focus	VGA fixed focus	HD fixed focus
Sensor Type	CMOS sensor technology	CMOS sensor technology	CMOS sensor technology
Resolution: Motion Video	Up to 1280 x 720 (0.92 MP)	Up to 640 X 480 (0.3 MP)	Up to 1280 x 720 (0.92 MP)
Resolution: Still Image	Up to 1280 x 720 (0.92MP)	Up to 640 X 480 (0.3MP)	Up to 1280 x 720 (0.92MP)
Imaging Rate	Up to 30 frames per second	Up to 30 frames per second	Up to 30 frames per second

Wired communications

Table 5. Realtek RTL8111-HSD Gigabit Ethernet Controller

Network Adapter (NIC)	
Realtek RTL8111-HSD Gigabit Ethernet Controller	Integrated on system board
External connector type	RJ-45
Data Rates	10/100/1000 Mbps
Controller bus architecture	PCI-e V1.1x1
Power consumption (full operation per data rate connection speed)	1000 Mbps: 828 mW 100 Mbps: 441.77 mW 10 Mbps: 387.94 mW
Power consumption (standby operation)	WOL Disabled: 10mW (Disabled using driver) No Link (w/ WOL): 51.89 mW (cable Disconnect) 10 Mbps Idle (w/ WOL): 68 mW 100 Mbps Idle (w/ WOL): 176 mW
IEEE standards compliance	802.3, 802.3ab, 802.3u, 802.az
Boot ROM Support	Support boot from PXE option ROM
Network Transfer Rate	Full duplex at 10, 100, or 1000 Mbps and Half duplex at 10 or 100 Mbps.
Operating Temp/Storage Temp	0C to 70C / -55C to 125C
Operating Humidity	30°C / 60% RH (Level 3)
Operating System Driver support	Linux, Win7, Win10
Manageability	WOL, PXE

Wireless communications

Table 6. Qualcomm QCA9377 802.11ac MU-MIMO Dual Band (1x1) Wi-Fi + Bluetooth 4.1 LE M.2 Wireless Card

Attribute	Specification
Host interface	M.2 2230 form factor (WiFi– PCIe, Bluetooth – USB)
Network standard	802.11a, 802.11b, 802.11g, 802.11n and 802.11ac
11ac Wave2 feature	MU-MIMO RX
Wi-Fi Alliance Certifications	802.11a, 802.11b, 802.11g, WPA, WPA2, WMM, 11ac, Wifi-Direct, WMM-Power Save, WifiProtected Setup, Voice-Personal
Operating Frequency Bands	2.4 GHz (802.11b/g/n) and 5 GHz (802.11a/n/ac)
Dual Diversity Antenna Switching	Dual diversity antenna switching for systems designed with main and auxiliary antennas
Data Rate	802.11ac – Up to 433 Mbps; 802.11n - Up to 150 Mbps; 802.11a/g - Up to 54 Mbps 802.11b - Up to 11 Mbps
Receive Sensitivity	802.11ac: -59 dBm@ 433.3 Mbps 802.11n/a: -65 dBm@ 150 Mbps ; -68 dBm @ 72.2Mbps 802.11g/a: -72 dBm@ 54 Mbps 802.11b: -85 dBm@ 11 Mbps
Security Authentication EAP Methods	Open, Shared, WPA, WPA-PSK, WPA2, WPA2-PSK EAP-TLS, EAP-TTLS (MSCHAPv2), PEAPv0(EAP-MS-CHAPv2)
Client Utility	Native Wi-Fi and Bluetooth Microsoft UI support
Radio On/Off	Hardware and software on/off disables transmit and receive to comply with aviation in-flight restrictions
Roaming	Seamless roaming between 802.11a, 802.11b, 802.11b/g, 802.11n and 802.11ac access points
Wake On Wireless	Supported
Miracast (WiFi Display)	Supports Miracast (WiFi Display) on Win8.1/10
Wireless PAN Standard	Dual-mode Bluetooth™ 4.1, BLE
Bluetooth Data rates	Up to 3Mbps
Bluetooth Operating Frequency Bands	2.4GHz
Transmission	FHSS (Frequency Hopping Spread Spectrum)
Bluetooth Data Encryption	128-bit encryption
Bluetooth Receive Sensitivity	-70dBm@BER≤0.01% (EDR) -100dBm@BER≤30.8% (LE nominal)
Temperature	Operating temperature -10° to +65° C Storage temperature of -40° to +70° C

Table 6. Qualcomm QCA9377 802.11ac MU-MIMO Dual Band (1x1) Wi-Fi + Bluetooth 4.1 LE M.2 Wireless Card (continued)

Attribute	Specification
Humidity	Up to 90%

Table 7. Qualcomm QCA61x4A 802.11ac MU-MIMO Dual Band (2x2) Wi-Fi + Bluetooth 4.1 LE M.2 Wireless Card

Attribute	Specification
Host interface	M.2 2230 form factor (WiFi– PCIe, Bluetooth – USB)
Network standard	802.11a, 802.11b, 802.11g, 802.11n and 802.11ac
11ac Wave2 feature	MU-MIMO RX
Wi-Fi Alliance Certifications	802.11a, 802.11b, 802.11g, WPA, WPA2, WMM, 11ac, Wifi-Direct, WMM-Power Save, WifiProtected Setup, Voice-Personal
Operating Frequency Bands	2.4 GHz (802.11b/g/n) and 5 GHz (802.11a/n/ac)
Dual Diversity Antenna Switching	Dual diversity antenna switching for systems designed with main and auxiliary antennas 2x2 MIMO operation when in 802.11n mode with 2x2 or greater Access Point
Data Rate	802.11ac – Up to 867 Mbps; 802.11n - Up to 450 Mbps; 802.11a/g - Up to 54 Mbps 802.11b - Up to 11 Mbps
Receive Sensitivity	802.11ac: -59 dBm@ 400 Mbps; - 57dBm @ 866.7Mbps 802.11n/a: -67 dBm@ 300 Mbps ; -70 dBm @ 144.4Mbps 802.11g/a: -75 dBm@ 54 Mbps 802.11b: -85 dBm@ 11 Mbps
Security Authentication EAP Methods	Open, Shared, WPA, WPA-PSK, WPA2, WPA2-PSK EAP-TLS, EAP-TTLS (MSCHAPv2), PEAPv0(EAP-MS-CHAPv2)
Client Utility	Native Wi-Fi and Bluetooth Microsoft UI support
Radio On/Off	Hardware and software on/off disables transmit and receive to comply with aviation in-flight restrictions
Roaming	Seamless roaming between 802.11a, 802.11b, 802.11b/g, 802.11n and 802.11ac access points
Wake On Wireless	Supported
Miracast (WiFi Display)	Supports Miracast (WiFi Display) on Win8.1/10
Wireless PAN Standard	Dual-mode Bluetooth™ 4.1, BLE
Bluetooth Data rates	Up to 3Mbps
Bluetooth Operating Frequency Bands	2.4GHz
Transmission	FHSS (Frequency Hopping Spread Spectrum)
Bluetooth Data Encryption	128-bit encryption

Table 7. Qualcomm QCA61x4A 802.11ac MU-MIMO Dual Band (2x2) Wi-Fi + Bluetooth 4.1 LE M.2 Wireless Card (continued)

Attribute	Specification
Bluetooth Receive Sensitivity	-70dBm@BER≤0.01% (EDR) -100dBm@BER≤30.8% (LE nominal)
Temperature	Operating temperature -10° to +65° C Storage temperature of -45° to +70° C
Humidity	Up to 90%

Table 8. Intel® Dual Band Wireless-AC 8265 802.11AC 2x2 Wi-Fi + BT 4.2 LE M.2 Wireless Card

Attribute	Specification
Host interface	M.2 2230 form factor (WiFi– PCIe, Bluetooth – USB)
Network standard	IEEE 802.11a/b/g/n/ac MU-MIMO RX
Wi-Fi Alliance Certifications	802.11a/b/g/n/ac, WPA, WPA2, WMM, WPS, Wi-Fi Direct
Operating Frequency Bands	2.4 GHz and 5 GHz
Dual Stream N	Support for two transmit and receive antennas enable better wireless at the same distance when compared to older 802.11a/b/g solutions.
Data Rate	Up to 867 Mbps
Power Consumption	Optimized power modes (sleep states) reduce power consumption during periods of inactivity
Authentication Authentication Protocols Encryption Product Safety	WPA and WPA2, 802.1X (EAP-TLS, TTLS, PEAP, LEAP, EAP-FAST), EAP-SIM, EAP-AKA PAP, CHAP, TLS, GTC, MS-CHAP, MS-CHAPv2 64-bit and 128-bit WEP, 128-bit AES-CCMP UL, C-UL, CB (IEC60950-1)
Management Capabilities Alerting	Support for Intel® AMT 11.x on KabyLake
Government Compliance	FIPS, FISMA
Client Utility	Intel PRO/Set Wireless Software v19.0 and later.
Radio On/Off	Supported
Roaming	Supports seamless roaming between respective access points (802.11b, 802.11g, 802.11a/b/g, and 802.11a/b/g/n/ac)
Wake On Wireless	Supported
Wireless Display	Native Miracast support by Windows 8.1 and 10
Wireless PAN Standard	Dual Mode Bluetooth 4.2, BLE (HW ready, SW depends on OS, Windows 10 supports up to Bluetooth 4.1)
Bluetooth Data rates	2.4GHz
Bluetooth Operating Frequency Bands	128-bit encryption
Bluetooth Profiles Supported	For Windows 7, includes DID, HID, PAN, HCRP, SPP, HFP, HSP DUN, OPP, FTP, BIP, BPP, SYNCH, A2DP(source/sink), AVRCP (target/controller), HOGP (LE HID)

Table 8. Intel® Dual Band Wireless-AC 8265 802.11AC 2x2 Wi-Fi + BT 4.2 LE M.2 Wireless Card (continued)

Attribute	Specification
	Support for Microsoft Inbox Bluetooth profiles in Windows 8.1 and future OS versions.
Bluetooth Data Encryption	128-bit encryption
Bluetooth Output Power	Power class 1
Temperature	Operating temperature 0° to +50° C (Full performance at shield temperatures up to 80° C) Storage temperature of -40° to +70° C
Humidity	Up to 90% RH non-condensing (at temperatures of 25° C to 35° C)

Table 9. DW5811e Snapdragon™ X7 LTE (US AT&T, Verizon, Sprint Wireless, Canada Rogers, Telus, and Generic)

Carrier	Verizon	AT&T	Sprint	Rogers	Telus	Generic
Network	LTE CAT6	LTE CAT6	LTE CAT6	LTE CAT6	LTE CAT6	LTE CAT6
Speed (Downlink)	< 300 Mbps	< 300 Mbps	< 300 Mbps	< 300 Mbps	< 300 Mbps	< 300 Mbps
Speed (Uplink)	< 50 Mbps	< 50 Mbps	< 50 Mbps	< 50 Mbps	< 50 Mbps	< 50 Mbps
Fallback Network	NA	HSPA+	NA	HSPA+	HSPA+	HSPA+
Fallback Speed (Downlink)	NA	HSPA+ 42 Mbps	NA	HSPA+ 42 Mbps	HSPA+ 42 Mbps	HSPA+ 42 Mbps
Frequency Bands	Band 4, 13 LTE	Band 13 LTE Band 2, 4, 5, 17 and 7	Band 25, 26, 41 LTE	Band 13 LTE Band 2, 4, 5, 17 and 7	Band 13 LTE Band 2, 4, 5, 17 and 7	Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 17, 20, 25, 26, 29, 30, 41 LTE
LTE/WWAN Antenna	Main (Tx/Rx) +Aux (Rx/GNSS)	Main (Tx/Rx) +Aux (Rx/GNSS)	Main (Tx/Rx) +Aux (Rx/GNSS)	Main (Tx/Rx) +Aux (Rx/GNSS)	Main (Tx/Rx) +Aux (Rx/GNSS)	Main (Tx/Rx) +Aux (Rx/GNSS)
Operating System Support	Windows 8.1, 32/64 bits Windows 7, 32/64 bits Windows 10, 32/64 bits	Windows 8.1, 32/64 bits Windows 7, 32/64 bits Windows 10, 32/64 bits	Windows 8.1, 32/64 bits Windows 7, 32/64 bits Windows 10, 32/64 bits	Windows 8.1, 32/64 bits Windows 7, 32/64 bits Windows 10, 32/64 bits	Windows 8.1, 32/64 bits Windows 7, 32/64 bits Windows 10, 32/64 bits	Windows 8.1, 32/64 bits Windows 7, 32/64 bits Windows 10, 32/64 bits
Host Interface	Supported both USB 3.1 Gen 1/ USB 2.0	Supported both USB 3.1 Gen 1/ USB 2.0	Supported both USB 3.1 Gen 1/ USB 2.0	Supported both USB 3.1 Gen 1/ USB 2.0	Supported both USB 3.1 Gen 1/ USB 2.0	Supported both USB 3.1 Gen 1/ USB 2.0

Table 10. Qualcomm Snapdragon X7 HSPA+ (DW5811e) for China and Indonesia regions

Carrier	Generic	China / Indonesia
Network	HSPA+	HSPA+
Speed (Downlink)	< 100 Mbps	< 100 Mbps
Speed (Uplink)	< 50 Mbps	< 50 Mbps

Table 10. Qualcomm Snapdragon X7 HSPA+ (DW5811e) for China and Indonesia regions (continued)

Carrier	Generic	China / Indonesia
Fallback Network	HSPA+	HSPA+
Fallback Speed (Downlink)	HSPA+ 42 Mbps	HSPA+ 42 Mbps
Frequency Bands	Band 1, 2, 3, 4, 5, 8, HSPA+	Band 1, 2, 3, 4, 5, 8, HSPA+
SIM	Yes	Yes
LTE/WWAN Antenna	Main (Tx/Rx) +Aux (Rx/GNSS)	Main (Tx/Rx) +Aux (Rx/GNSS)
Operating System Support	Windows 8.1, 32/64 bits Windows 10, 32/64 bits	Windows 8.1, 32/64 bits Windows 10, 32/64 bits
GNSS	Supports both autonomous GNSS (GPS + GLONASS) and assisted GNSS (A-GNSS)	Supports both autonomous GNSS (GPS + GLONASS) and assisted GNSS (A-GNSS)
Host Interface	USB 3.1 Gen 1/USB 2.0	USB 3.1 Gen 1/USB 2.0

Ports and Connectors

Table 11. Ports and Connectors

Feature	Specifications
USB	USB Type-C with display port and power delivery
Modem	NA
Audio	Two channel high definition audio Waves MaxxAudio Pro Stereo conversion: 24-bit (analog-to-digital and digital-to-analog) Internal Interface - high-definition audio codec. External Interface - microphone-in and stereo headphones/speakers universal connector Speakers:Power / Peak Power: 2X2Wrms/2X2.5Wpeak, Internal speaker amplifier: 2 watt per channel, Internal microphone: digital microphone dual microphone with camera) No volume control buttons, only support hot-key keyboard button
Expansion	SD 3.0 Memory card reader
Express Card	NA

Display specifications

This topic lists out the detailed display specifications.

Table 12. 3490 Display specifications

	14.0– HD Non touch	14.0– FHD Non touch	14.0– FHD Touch
Type	HD Anti-Glare	FHD Anti-Glare	FHD True-Life
Luminance/ Brightness (typical)	HD 220nits	FHD 220 nits	FHD 220 nits
Diagonal	14.0 inches	14.0 inches	14.0 inches
Native Resolution	HD 1366x768	FHD 1920x1080	FHD 1920x1080
Megapixels (millions of pixels)	HD 1.05	FHD 2.07	FHD 2.07
Pixels per Inch (PPI)	112 for HD	157 for FHD	157 for FHD
Contrast Ratio (min)	300:1 for HD	600:1 for FHD	600:1 for FHD
Refresh Rate	60 Hz	60 Hz	60 Hz
Horizontal Viewing Angle (min)	HD +40/- 40 degrees	FHD +80/- 80 degrees	FHD +80/- 80 degrees
Vertical Viewing Angle (min)	HD +10/-30 degrees	FHD +80/-80 degrees	FHD +80/- 80 degrees
Pixel Pitch	HD 0.226 mm	FHD 0.161 mm	FHD 0.161 mm
Power Consumption (max)	HD 3.0 W	FHD 2.85 W	FHD 3.5 W

Keyboards Hot Key Definitions

Table 13. Keyboards Hot Key Definitions

Fn Key Combination	Function
Fn+ESC	Fn Toggle
Fn+ F1	Speaker Mute
Fn + F2	Volume Down
Fn + F3	Volume Up
Fn + F4	Rewind
Fn + F5	Play/Pause
Fn + F6	Fast forward

Table 13. Keyboards Hot Key Definitions (continued)

Fn + F8	Display Toggle (Win + P)
Fn + F9	Search
Fn + F10	Increase Keyboard Backlight Brightness
Fn + F11	Brightness up
Fn + F12	Brightness down
Fn + Printscreen	Wireless

- Primary behavior is F1–F12 keys; Secondary behavior is media keys.
- Fn Lock only switches primary and secondary behavior on F1–F12
- F7 will behave the same because there is no secondary behavior

Function short cut keys

You can perform several actions using the function short cut keys.

- If Fn + F3 is for increasing volume, then you must press the Fn key and F3 keys together to increase the volume.
- If you wish to use the function keys directly without pressing the Fn key for each action, then you can activate the function key lock. Press Fn and Esc keys together to activate the function key lock. This activates the function key.

Touchpad

Table 14. TouchPad

Dimensions	3490
Width	105 mm
Height	65 mm

Table 15. Supported gestures for Windows 10

Supported Gestures
Cursor moving
Clicking/ tapping
Click and drag
2-finger scroll
2-finger Pinch/ Zoom
2-finger tapping
3-finger tapping (Invoke Cortana)
3-finger swipe up (See all open windows)
3-finger swipe down (Show the desktop)
3-finger swipe right or left (Switch between open windows)
4-finger tapping (Invoke Action Center)

Table 15. Supported gestures for Windows 10 (continued)

Supported Gestures
4-finger swipe right or left (Switch virtual desktops)

Battery specifications

This topic lists out the detailed battery specifications.

Table 16. Battery specifications

	42 Whr (3 Cell) Lithium ion with ExpressCharge	56 Whr (4 Cell) Lithium ion with ExpressCharge
Type	Li-polymer	Li-polymer
Length	184.00 mm (7.24 inch)	233.06 mm (9.170 inch)
Width	97.00 mm (3.82 inch)	90.73 mm (3.572 inch)
Weight	185 g	250.00 g
Height	5.90 mm (0.23 inch)	5.90 mm (0.23 inch)
Voltage	11.4 VDC	15.2 VDC
Typical Amp-hour capacity	3.5 Ahr	3.67 Ahr
Typical Watt-hour capacity	42 Whr	56 Whr
Temperature:		
Operating	- Charge: 0 °C to 50 °C (32 °F to 122 °F) - Discharge: 0 °C to 70 °C (32 °F to 158 °F)	- Charge: 0 °C to 50 °C (32 °F to 122 °F) - Discharge: 0 °C to 70 °C (32 °F to 158 °F)
Non-operating	-20 °C to 65 °C (-4 °F to 149 °F)	-20 °C to 65 °C (-4 °F to 149 °F)
Charging time:		
Express Charge mode	0~15°C: 4 hours 16~45°C: 2 hours 46~60°C: 3 hours	0~15°C: 4 hours 16~45°C: 2 hours 46~60°C: 3 hours
Standard mode	0~15°C: 4 hours 16~60°C: 3 hours	0~15°C: 4 hours 16~60°C: 3 hours
ExpressCharge capable	Yes	Yes
BattMan capable	Yes	Yes

Adapter options

This topic lists the adapter specifications.

Table 17. AC adapter options

Wattage	E4 65W - 65 Watt AC AdapterE4	E4 65W BFR/PVC free
System supportability	UMA/Discrete	UMA/Discrete
Input voltage	100 to 240 VAC	100 to 240 VAC
Input current (max)	1.7 A	1.7 A

Table 17. AC adapter options (continued)

Input Frequency	50 Hz to 60 Hz	50 Hz to 60 Hz
Output current	3.34 A (continuous)	3.34 A (continuous)
Rated output voltage	19.5 VDC	19.5 VDC
Weight (kg)	0.23	0.29
Barrel connectors	7.4 mm	7.4 mm
Dimensions (HxWxD inches)	1.1x1.9x4.3	1.1 x 1.9 x 4.3
Dimensions (HxWxD mm)	28 x 47 x 108	28 x 47 x 108
Temperature range:	0° to 40°C	0° to 40°C
Operating	32° to 104°F	32° to 104°F
Storage	-40° to 70°C -40° to 158°F	-40° to 70°C -40° to 158°F

System dimensions

This topic lists out the dimensions of the computer in detail.

System dimension

Weight (pounds/ kilogram) Starts from 3.79 lb / 1.72 kg

Dimensions inches:

Height 0.82 in (21.0 mm)

Width 13.34 in (339.0 mm)

Depth 9.52 in (241.9 mm)

 **NOTE:** System weight and shipping weight is based on a typical configuration and may vary based on the actual configuration.

Security options

This topic lists the security information.

- TPM 2.0 FIPS 140-2 Certified, TCG Certified (Windows® 10 only)
- Noble Wedge Lock Slot
- Optional Touch Fingerprint Reader
- Optional DDP|E Encryption Software

Operating conditions

Table 18. Operating conditions

Model	Dell Latitude 3000 series
Temperature Range	Operating 0° to 35°C (32° to 95°F)

Table 18. Operating conditions (continued)

Model	Dell Latitude 3000 series
	Storage –40° to 65°C (–40° to 149°F)
Relative humidity (maximum)	Operating 10% to 90% Storage 0% to 95%
Altitude (maximum)	Operating 0 to 3048 m (0 to 10,000 ft) Storage 0 to 10,668 m (0 to 35,000 ft)

Technology and components

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

Power adapter

This laptop is shipped with 4.5 mm barrel plug on power adapter.

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.

DDR4

DDR4 (double data rate fourth generation) memory is a higher-speed successor to the DDR2 and DDR3 technologies and allows up to 512 GB in capacity, compared to the DDR3's maximum of 128 GB per DIMM. DDR4 synchronous dynamic random-access memory is keyed differently from both SDRAM and DDR to prevent the user from installing the wrong type of memory into the system.

DDR4 needs 20 percent less or just 1.2 volts, compared to DDR3 which requires 1.5 volts of electrical power to operate. DDR4 also supports a new, deep power-down mode that allows the host device to go into standby without needing to refresh its memory. Deep power-down mode is expected to reduce standby power consumption by 40 to 50 percent.

DDR4 Details

There are subtle differences between DDR3 and DDR4 memory modules, as listed below.

Key notch difference

The key notch on a DDR4 module is in a different location from the key notch on a DDR3 module. Both notches are on the insertion edge but the notch location on the DDR4 is slightly different, to prevent the module from being installed into an incompatible board or platform.

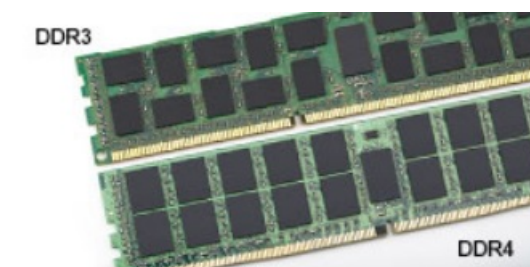


Figure 1. Notch difference

Increased thickness

DDR4 modules are slightly thicker than DDR3, to accommodate more signal layers.

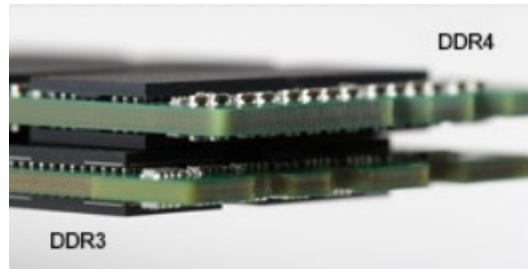


Figure 2. Thickness difference

Curved edge

DDR4 modules feature a curved edge to help with insertion and alleviate stress on the PCB during memory installation.



Figure 3. Curved edge

Memory Errors

Memory errors on the system display the new ON-FLASH-FLASH or ON-FLASH-ON failure code. If all memory fails, the LCD does not turn on. Troubleshoot for possible memory failure by trying known good memory modules in the memory connectors on the bottom of the system or under the keyboard, as in some portable systems.

USB features

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

Let's take a quick look on the USB evolution referencing to the table below.

Table 19. USB evolution

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

USB 3.0/USB 3.1 Gen 1 (SuperSpeed USB)

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

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

- Backward USB 2.0 compatibility
- New connectors and cable

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

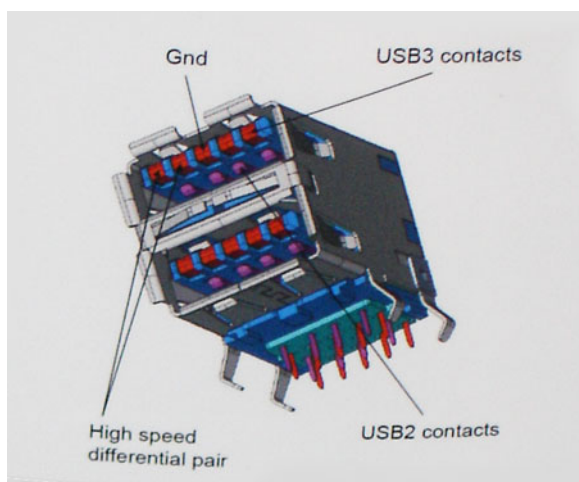


Speed

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

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

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



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

Applications

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

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

- External Desktop USB 3.0/USB 3.1 Gen 1 Hard Drives
- Portable USB 3.0/USB 3.1 Gen 1 Hard Drives
- USB 3.0/USB 3.1 Gen 1 Drive Docks & Adapters
- USB 3.0/USB 3.1 Gen 1 Flash Drives & Readers

- USB 3.0/USB 3.1 Gen 1 Solid-state Drives
- USB 3.0/USB 3.1 Gen 1 RAIDs
- Optical Media Drives
- Multimedia Devices
- Networking
- USB 3.0/USB 3.1 Gen 1 Adapter Cards & Hubs

Compatibility

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

Windows 8/10 will be bringing native support for USB 3.1 Gen 1 controllers. This is in contrast to previous versions of Windows, which continue to require separate drivers for USB 3.0/USB 3.1 Gen 1 controllers.

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

Advantages of Displayport over USB Type-C

- Full DisplayPort audio/video (A/V) performance (up to 4K at 60Hz)
- SuperSpeed USB (USB 3.1) data
- Reversible plug orientation and cable direction
- Backwards compatibility to VGA, DVI with adaptors
- Supports HDMI 2.0a and is backwards compatible with previous versions

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.

 **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

USB Type-C

USB Type-C is a new, tiny physical connector. The connector itself can support various exciting new USB standard like USB 3.1 and USB power delivery (USB PD).

Alternate Mode

USB Type-C is a new connector standard that's very small. It's about a third the size of an old USB Type-A plug. This is a single connector standard that every device should be able to use. USB Type-C ports can support a variety of different protocols using "alternate modes," which allows you to have adapters that can output HDMI, VGA, DisplayPort, or other types of connections from that single USB port

USB Power Delivery

The USB PD specification is also closely intertwined with USB Type-C. Currently, smartphones, tablets, and other mobile devices often use a USB connection to charge. A USB 2.0 connection provides up to 2.5 watts of power — that'll charge your phone, but that's about it. A laptop might require up to 60 watts, for example. The USB Power Delivery specification ups this power delivery to 100 watts. It's bi-directional, so a device can either send or receive power. And this power can be transferred at the same time the device is transmitting data across the connection.

This could spell the end of all those proprietary laptop charging cables, with everything charging via a standard USB connection. You could charge your laptop from one of those portable battery packs you charge your smartphones and other portable devices from today. You could plug your laptop into an external display connected to a power cable, and that external display would charge your laptop as you used it as an external display — all via the one little USB Type-C connection. To use this, the device and the cable have to support USB Power Delivery. Just having a USB Type-C connection doesn't necessarily mean they do.

USB Type-C and USB 3.1

USB 3.1 is a new USB standard. USB 3's theoretical bandwidth is 5 Gbps, while USB 3.1 Gen2 is 10Gbps. That's double the bandwidth, as fast as a first-generation Thunderbolt connector. USB Type-C isn't the same thing as USB 3.1. USB Type-C is just a connector shape, and the underlying technology could just be USB 2 or USB 3.0. In fact, Nokia's N1 Android tablet uses a USB Type-C connector, but underneath it's all USB 2.0 — not even USB 3.0. However, these technologies are closely related.

System setup options

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

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 20. Navigation keys

Keys	Navigation
Up arrow	Moves to the previous field.
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.  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.

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

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

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

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

System Setup overview

System Setup allows you to:

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

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

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

Accessing System Setup

1. Turn on (or restart) your computer.
2. After the white Dell logo appears, press F2 immediately.

The System Setup page is displayed.

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

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

General screen options

This section lists the primary hardware features of your computer.

Option	Description
System Information	This section lists the primary hardware features of your computer. • System Information: Displays BIOS Version, Service Tag, Asset Tag, Ownership Tag, Ownership Date, Manufacture Date, Express Service Code. Signed firmware update is enabled by default • Memory Information: Displays Memory Installed, Memory Available, Memory Speed, Memory Channels Mode, Memory Technology, DIMM A Size, and DIMM B 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: Primary HDD, M.2 SATA SSD, M.2 PCIe SSD-0, LOC MAC Address, Video Controller, dGPU Video Controller, Video BIOS Version, Video Memory, Panel Type, Native Resolution, Audio Controller, Wi-Fi Device, Cellular device, and Bluetooth Device
Battery Information	Displays the battery status health and whether the AC adapter is installed.
Boot Sequence	Allows you to change the order in which the computer attempts to find an operating system. • Windows Boot Manager (Default) • Boot List Option

Option	Description
	○ Legacy External Devices ○ UEFI (System Default)
Advanced Boot Options	This option allows you the legacy option ROMs to load. By default, the Enable Legacy Option ROMs is disabled. Enable Attempt Legacy Boot is enabled by default.
UEFI boot path security	● Always, except internal HDD (Default) ● Always ● Never
Date/Time	Allows you to change the date and time.

System Configuration screen options

Option	Description
Integrated NIC	Controls the on-board LAN controller. The option Enable Network Stack is not selected by default. options: ● Disabled ● Enabled ● Enabled w/PXE (default)
SATA Operation	Allows you to configure the operating mode of the integrated SATA hard drive controller. ● Disabled ● AHCI ● RAID On — default
Drives	Allows you to enable or disable various drives on board. ● SATA-0 (default) ● SATA-2 (default) ● M.2 PCIe SSD-0 (default)
SMART Reporting	Controls whether hard drive errors for integrated drivers are reported during system startup. The option 'Enable Smart Reporting' is not selected by default.
USB Configuration	This is an optional feature. 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. If USB port is enabled, device attached to this port is enabled and available for OS. If USB port is disabled, the OS cannot see any device attached to this port. The options are: ● Enable USB Boot Support (default) ● Enable External USB Port (default)  NOTE: USB keyboard and mouse always work in the BIOS setup irrespective of these settings.
Dell Type-C Dock Configuration	The option 'Always Allow Dell Docks' is selected by default. When set to enabled, allows connection to the Dell WD and TB family of docks (Type-C docks) independent of USB and Thunderbolt Adapter configuration settings. When set to disabled, the docks will be controlled via the USB and Thunderbolt Adapter configuration settings.
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. The option Enable USB Powershare is disabled by default.
Audio	This field enables or disables the integrated audio controller. By default, the Enable Audio option is selected. The options are:

Option	Description
	• Enable Microphone—by default enable • Enable Internal Speaker—(default enable)
Keyboard illumination	The options are: • Disabled • Dim • Bright (default)
Keyboard Backlight Timeout on AC	The options are: • 5 seconds • 10 seconds (default) • 15 seconds • 30 seconds • 1 minute • 5 minutes • 15 minutes • Never
Keyboard Backlight Timeout on Battery	This feature determines the timeout value for the keyboard backlight when the system is running only on battery power. The options are: • 5 seconds • 10 seconds (default) • 15 seconds • 30 seconds • 1 minute • 5 minutes • 15 minutes • Never
Touchscreen	Controls whether the touchscreen is enabled or disabled. The touch screen option is enabled by default.
Unobtrusive Mode	When enabled, pressing Fn+F7 will turn off all light and sound emissions from the system. • Disabled — default
Miscellaneous Devices	Allows you to enable or disable the following devices: • Enable Camera (default) • Enable Secure Digital (SD) Card (default) • Secure Digital (SD) Card Read-Only Mode • Enable Hard Drive Free Fall Protection (default) • Secure Digital (SD) Card Boot

Video screen options

Option	Description
LCD Brightness	Allows you to set the display brightness depending up on the power source—On Battery and On AC. The LCD brightness is independent for battery and AC adapter. It can be set using the slider.

Security screen options

Option	Description
Admin Password	Allows you to set, change, or delete the administrator (admin) password.

Option	Description
	 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.  NOTE: Successful password changes take effect immediately. Default setting: Not set
System Password	Allows you to set, change, or delete the system password.  NOTE: Successful password changes take effect immediately. Default setting: Not set
Internal HDD-0 Password	Allows you to set, change, or delete the administrator password.  NOTE: Successful password changes take effect immediately. Default setting: Not set
M.2 SATA SSD-2 Password	Allows you to set, change, or delete the system's SATA solid state drive (SSD).  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.  NOTE: If Strong Password is enabled, the Admin and System passwords must contain at least one uppercase character, one lowercase character and be at least eight characters long.
Password Configuration	Allows you to specify the minimum and max password lengths of the Administrator and System passwords. • min-4—by default, if you want to change you can increase the number. • max-32—you can decrease the number.
Password Bypass	Allows you to enable or disable the permission to bypass the System and the Internal HDD password, when they are set. The options are: • Disabled —enabled by default • Reboot bypass
Password Change	Allows you to enable the disable permission to the System and Hard Drive passwords when the admin password is set. Default setting: Allow Non-Admin Password Changes is selected.
Non-Admin Setup Changes	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. Option "Allow wireless switch changes" is not selected by default.
UEFI Capsule Firmware Updates	Allows you to enable or disable. This option controls whether this system allows BIOS updated via UEFI capsule update packages. The options are: • Enable UEFI Capsule Firmware Updates—enabled by default
TPM 2.0 Security	Allows you to enable the Trusted Platform Module (TPM) during POST. The options are: • TPM On—enabled by default • Clear • PPI Bypass for Enable Commands—enabled by default • PPI Bypass for Disable Commands • PPI Bypass for Clear Command • Attestation enable—enabled by default • Key storage enable—enabled by default • SHA-256—enabled by default • Disabled

Option	Description
	• Enabled—enabled by default  NOTE: To upgrade or downgrade TPM 2.0, download the TPM wrapper tool—software.
Computrace	Allows you to activate or disable the optional Computrace software. The options are: • Deactivate • Disable • Activate—enabled by default  NOTE: The Activate, Deactivate, and Disable options will permanently activate or disable the feature and no further changes will be allowed.
CPU XD Support	Allows you to enable the Execute Disable mode of the processor. Enable CPU XD Support—enabled by default
OROM Keyboard Access	options: Enabled (default) Disabled One Time Enable
Admin Setup Lockout	Allows you to prevent users from entering Setup when an Administrator password is set. Default Setting: The option-Enable Admin Setup lockout is disabled by default.
Master password lockout	This option is not enabled by default
SMM Security Mitigation	This option enables or disables additional UEFI SMM Security Mitigation protection. The operating system can use this feature to help protect the secure environment created by virtualization based security. The option is disabled by default.

Secure Boot screen options

Option	Description
Secure Boot Enable	This option enables or disables the Secure Boot feature. • Disabled • Enabled (Default)
Expert Key Management	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: • PK—enabled by default • KEK • db • dbx If you enable the Custom Mode, the relevant options for PK, KEK, db, and dbx appear. The options are: • 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  NOTE: If you disable the Custom Mode, all the changes made are erased and the keys restore to default settings.

Intel Software Guard Extensions screen options

Option	Description
Intel SGX Enable	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: • Disabled • Enabled • Software Controlled (default)
Enclave Memory Size	This option sets SGX Enclave Reserve Memory Size . The options are: • 32 MB • 64 MB • 128 MB

Performance screen options

Option	Description
Multi-Core Support	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. Options: • All (selected by default) • 1 • 2 • 3
Intel SpeedStep	Allows you to enable or disable the Intel SpeedStep feature. • Enable Intel SpeedStep Default setting: The option is enabled.
C-States Control	Allows you to enable or disable the additional processor sleep states. • C states Default setting: The option is enabled.
Intel TurboBoost	Allows you to enable or disable the Intel TurboBoost mode of the processor. • Enable Intel TurboBoost Default setting: The option is enabled.
HyperThread Control	Enables or disables HyperThreading in the processor. • Enabled — default • Disabled

Power management screen options

Option	Description
AC Behavior	Allows you to enable or disable the computer from turning on automatically when an AC adapter is connected. Default setting: Wake on AC is not selected.

Option	Description
Enable Intel Speed shift Technology	This option is enabled by default.
Auto On Time	Allows you to set the time at which the computer must turn on automatically. The options are: • Disabled • Every Day • Weekdays • Select Days Default setting: Disabled
USB Wake Support	Allows you to enable USB devices to wake the system from Standby.  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. • Enable USB Wake Support • Wake on Dell USB-C dock Default setting: Wake on Dell USB-C dock is enabled.
Wireless Radio Control	Options: • Control WLAN radio • Control WWAN radio None of the options are selected by default
Wake on WLAN	Allows you to enable or disable the feature that powers on the computer from the Off state when triggered by a LAN signal. • Disabled (default) • LAN only • WLAN only • LAN or WLAN • LAN with PXE Boot
Block Sleep	This option lets you block entering to sleep (S3 state) in operating system environment. Block Sleep (S3 state) Default setting: This option is disabled
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. • Enable peak shift is not selected by default • Set battery threshold (15% to 100%) - 15 % (enabled by default)
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 nonwork hours to improve the battery health. Enable Advanced Battery Charge Mode is disabled by default
Primary Battery Charge Configuration	Allows you to select the charging mode for the battery. The options are: • Adaptive—enabled by default • Standard—Fully charges your battery at a standard rate. • ExpressCharge—The battery charges over a shorter time using Dell's fast charging technology This option is enabled by default. • Primarily AC use • Custom If Custom Charge is selected, you can also configure Custom Charge Start and Custom Charge Stop.  NOTE: All charging mode may not be available for all the batteries. To enable this option, disable the Advanced Battery Charge Configuration option.

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
Numlock Enable	This option specifies whether the Numlock function should be enable when the system boots. The option 'Enable Numlock' is selected by default.
Fn Key Emulation	Allows you to use the <Scroll Lock> key on an external PS/2 keyboard the same way you use the <Fn> key on the computer's internal keyboard. • 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: • Lock Mode Disable/Standard—enabled by default • Lock Mode Enable or Secondary
Fastboot	Allows you to speed up the boot process by bypassing some of the compatibility steps. The options are: • Minimal • Thorough—enabled by default • Auto
Extended BIOS POST Time	Allows you to create an extra preboot delay. The options are: • 0 seconds—enabled by default. • 5 seconds • 10 seconds
Full Screen Logo	• Enable Full Screen Logo—not enabled
Warnings and Errors	This option causes the boot process to only pause when warnings or errors are detected, rather than stop, prompt, and wait for user input. • Prompt on Warnings and Errors — enabled (default) • Continue on warnings • Continue on Warnings and Errors
Sign of Life Indication	The option " Enable Sign of Life Keyboard Backlight Indication" is not selected by default

Virtualization support screen options

Option	Description
Virtualization	Allows you to enable or disable the Intel Virtualization Technology. Enable Intel Virtualization Technology: This option is enabled by 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: This option is enabled by default.

Wireless screen options

Option	Description
Wireless Switch	This setting determines which wireless devices can be controlled by the Wireless Switch.

Option	Description
	• WWAN — enabled by default • WLAN — enabled by default • Bluetooth — enabled by default • GPS (on WWAN Module) — enabled by default
Wireless Device Enable	Allows you to enable or disable the internal wireless devices. • WLAN • Bluetooth • WWAN/GPS 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. Option 'Allow BIOS downgrade' is enabled by default.
Data Wipe	This field allows users to erase the data securely from all internal storage devices. Option 'Wipe on Next boot' is not enabled by default. The following is list of devices affected: • Internal SATA HDD/SSD • Internal M.2 SATA SDD • 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. • BIOS Recovery from Hard Drive—enabled by default • BIOS Auto-Recovery

System logs 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.

SupportAssist system resolution

Option	Description
Auto OS Recovery Threshold	The Auto OS Recovery Threshold setup option controls the automatic boot flow for SupportAssist System Resolution Console and for Dell OS Recovery Tool. • OFF • 1 • 2 (default) • 3

Verifying system memory in system setup BIOS

1. Turn on or restart your system.
2. Perform the following actions after the Dell logo is displayed
 - With keyboard — Tap F2 until the Entering BIOS setup message appears. To enter the Boot selection menu, tap F12.
3. On the left pane, select **Settings > General > System Information**.
The memory information is displayed on the right pane.

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](https://www.dell.com/support/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](https://www.dell.com/support/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](https://www.dell.com/support/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 21. System and setup password

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

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

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

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

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

Assigning a system setup password

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

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

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

Deleting or changing an existing system setup password

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

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

1. In the **System BIOS** or **System Setup** screen, select **System Security** and press Enter.
The **System Security** screen is displayed.
2. In the **System Security** screen, verify that **Password Status** is **Unlocked**.
3. Select **System Password**, update, or delete the existing system password, and press Enter or Tab.
4. Select **Setup Password**, update, or delete the existing setup password, and press Enter or Tab.
 **NOTE:** If you change the System and/or Setup password, reenter the new password when prompted. If you delete the System and/or Setup password, confirm the deletion when prompted.
5. Press Esc and a message prompts you to save the changes.
6. Press Y to save the changes and exit from System Setup.
The computer restarts.

Clearing CMOS settings

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

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

Clearing BIOS (System Setup) and System passwords

To clear the system or BIOS passwords, contact Dell technical support as described at www.dell.com/contactdell.

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

Software

This chapter details the supported operating systems along with instructions on how to install the drivers.

Operating system configurations

This topic lists the operating system supported by

Table 22. Operating systems

Windows 10	• Microsoft Windows 10 Home 64 bit • Microsoft Windows10 Professional 64 bit • Microsoft Windows 10 National Academic 64-bit (Bid Desk)
Others	• Ubuntu 16.04 LTS 64-bit • NeoKylin 6.0 64 bit

Downloading drivers

1. Turn on the notebook.
2. Go to **Dell.com/support**.
3. Click **Product Support**, enter the Service Tag of your notebook, and then click **Submit**.

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

4. Click **Drivers and Downloads**.
5. Select the operating system installed on your notebook.
6. Scroll down the page and select the driver to install.
7. Click **Download File** to download the driver for your notebook.
8. After the download is complete, navigate to the folder where you saved the driver file.
9. Double-click the driver file icon and follow the instructions on the screen.

Chipset driver

The chipset driver helps the system identify the components and install necessary drivers accurately. Verify that the chipset was installed in the system by checking the below controllers. Many of the common devices are visible under Other Devices if no drivers are installed. The unknown devices disappear once you install the chipset driver.

Make sure to install the following drivers, some of them may exist by default.

- Intel HID Event Filter Driver
- Intel Dynamic Platform and Thermal Framework Driver
- Intel serial IO driver
- Management Engine
- Realtek PCI-E memory card

Serial IO driver

Verify if the drivers for Touchpad, IR camera, and keyboard and are installed.

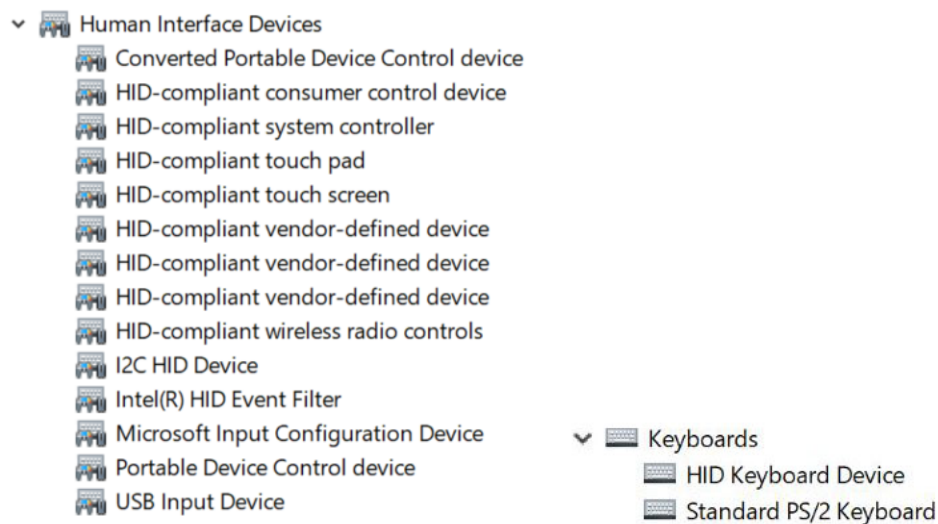


Figure 4. Serial IO driver

Graphics controller driver

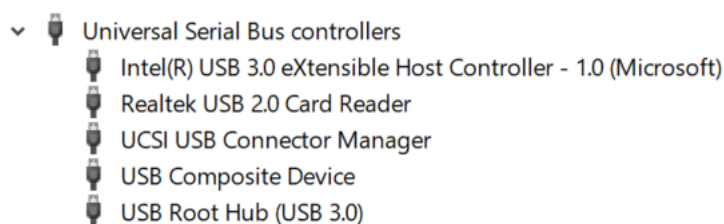
Verify if the graphics controller driver is already installed in the computer.

Table 23. Graphics controller driver

Before Installation	After Installation
None	

USB drivers

Verify if the USB drivers are already installed in the computer.



Network drivers

Install the WLAN and Bluetooth drivers from the Dell support site.

Table 24. Network drivers

Before installation	After installation
---------------------	--------------------

Table 24. Network drivers (continued)

Network adapters Bluetooth Device (Personal Area Network) Bluetooth Device (RFCOMM Protocol TDI)	Network adapters Bluetooth Device (Personal Area Network) Bluetooth Device (RFCOMM Protocol TDI) Qualcomm QCA9377 802.11ac Wireless Adapter Realtek PCIe GBE Family Controller WAN Miniport (IKEv2) WAN Miniport (IP) WAN Miniport (IPv6) WAN Miniport (L2TP) WAN Miniport (Network Monitor) WAN Miniport (PPPOE) WAN Miniport (PPTP) WAN Miniport (SSTP)
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Realtek Audio

Verify if audio drivers are already installed in the computer.

Table 25. Realtek audio

Before Installation	After Installation
Sound, video and game controllers Intel(R) Display Audio	Sound, video and game controllers Intel(R) Display Audio Realtek Audio

Serial ATA drivers

Install the latest Intel Rapid Storage driver for best performance. Using the default Windows storage drivers is not recommended. Verify if the default serial ATA drivers are installed in the computer.

Storage controllers

Intel(R) Chipset SATA/PCIe RST Premium Controller

Microsoft Storage Spaces Controller

Security drivers

This section lists the security devices in the Device Manager.

Security device drivers

Verify if the security device drivers are installed in the computer.

Security devices

Trusted Platform Module 2.0

Troubleshooting

Handling swollen Lithium-ion batteries

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

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

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

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

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

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

Dell SupportAssist Pre-boot System Performance Check diagnostics

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

- Run tests automatically or in an interactive mode
- Repeat tests
- Display or save test results
- Run thorough tests to introduce additional test options to provide extra information about the failed device(s)

- View status messages that inform you if tests are completed successfully
- View error messages that inform you of problems encountered during testing

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

For more information, see <https://www.dell.com/support/kbdoc/000180971>.

Running the SupportAssist Pre-Boot System Performance Check

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

Built-in self-test (BIST)

M-BIST

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

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

How to run M-BIST

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

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

Table 26. LED error codes

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

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

LCD Power rail test (L-BIST)

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

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

How to invoke L-BIST Test:

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

LCD Built-in Self Test (BIST)

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

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

How to invoke LCD BIST Test

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

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

Beep codes

 **NOTE:** Some notebook systems use a sequence of audible beeps to give an indication as to possible failed hardware components. Please see [000132041](#) table to help troubleshoot your computer for more information on how to diagnose and troubleshoot these codes.

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](#).

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

To drain residual flea power (perform a hard reset)

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



NOTE: For more information about performing a hard reset, see the knowledge base article [000130881](https://www.dell.com/support/article/sln000130881) 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.