Latitude 7490

Owner's Manual

Notes, cautions, and warnings

(i) **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.**

Contents

Working on your computer

Topics:

- Safety precautions
- Before working inside your computer
- After working inside 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. Remove the battery from 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.

Before working inside your computer

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

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

5. Disconnect your computer and all attached devices from their electrical outlets.
6. Open the display.
7. Press and hold the power button for few seconds, to ground the system board.

   △ **CAUTION: To guard against electrical shock unplug your computer from the electrical outlet before performing Step # 8.**

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

8. Remove any installed ExpressCards or Smart Cards from the appropriate slots.

After working inside your computer

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

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

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

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

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

Removing and installing components

Topics:

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. Latitude 7490 - Screw size list

Component	M2.5x 6.0	M2.5x5.0	M2.0 x 5.0	M2.5 x 4.0	M2.0x3.0	M2.0 x 2.5	M2.0 x 2.0
Back cover	8 (captive screw)						
Battery (3-cell)			1				
Battery (4-cell)			2				

Table 1. Latitude 7490 - Screw size list (continued)

Component	M2.5x 6.0	M2.5x5.0	M2.0 x 5.0	M2.5 x 4.0	M2.0x3.0	M2.0 x 2.5	M2.0 x 2.0
Solid State drive					1		
Heat sink and fan			2		4		
WWAN card					1		
WLAN card					1		
Power connector port					1		
ESD bracket						2	
EDP bracket			1				
Touchpad buttons					2		
Fingerprint reader					1		
LED board					1		
Smart card reader cage					2		
Display hinge				6			
Display panel					4		
Keyboard support plate						18	
Keyboard							5
System board			3				
USB Type C bracket					2		
Thermal module					4		
DC In bracket					1		
K-Lock bracket			1				

Subscriber identification module card

Removing SIM card or SIM card tray

(i) **NOTE:** SIM card or SIM card tray removal is only available on systems that are shipped with WWAN module. Hence, removing procedure is only applicable for systems that are shipped with WWAN module.

⚠️ **CAUTION: Removing the SIM card with the system is turned On, may cause data loss or damage to the card. Ensure that your system is turned off or the network connections are disabled.**

1. Insert a paperclip or a SIM card removal tool into the pinhole on the SIM card tray.
2. Use a scribe to pull the SIM card tray.
3. If a SIM card is available, remove the SIM card from the SIM card tray.
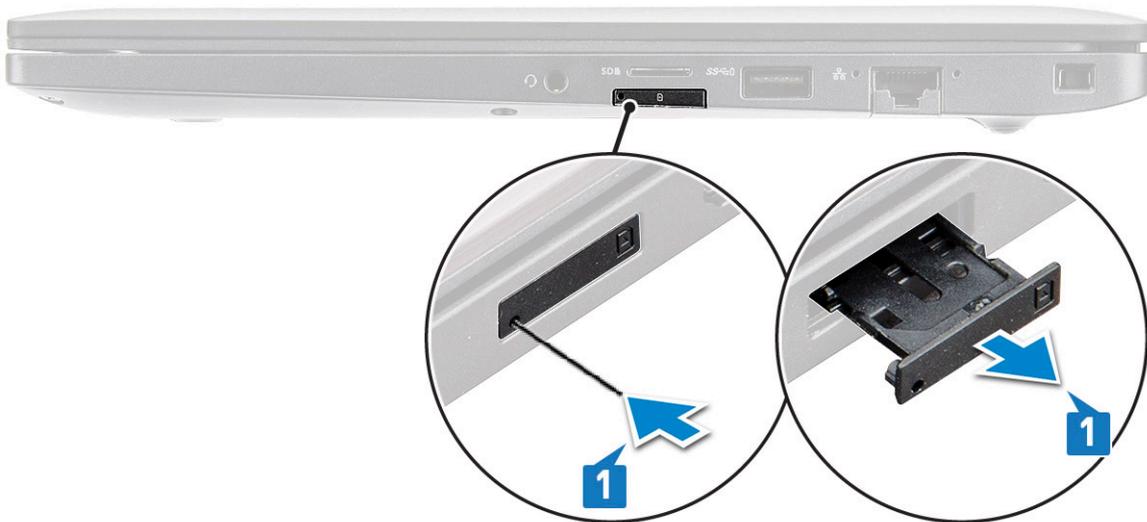
Replacing SIM card

1. Insert a paperclip or a SIM card removal tool into the pinhole on the SIM card tray.
2. Use a scribe to pull the SIM card tray
3. Place on the SIM card on the tray.
4. Insert the SIM card tray into the slot.

Removing dummy SIM card tray

For models shipped with a WWAN card, the SIM card tray must first be removed from the system before removing the system board. To remove the SIM card tray from the system follow the steps outlined in the disassembly section.

ⓘ **NOTE:** For models shipped with a wireless card only, a dummy SIM card tray must first be removed from the system before removing the system board. The following are the steps for removing the dummy SIM card tray:

1. Push the release latch located on the SIM card slot inwards.
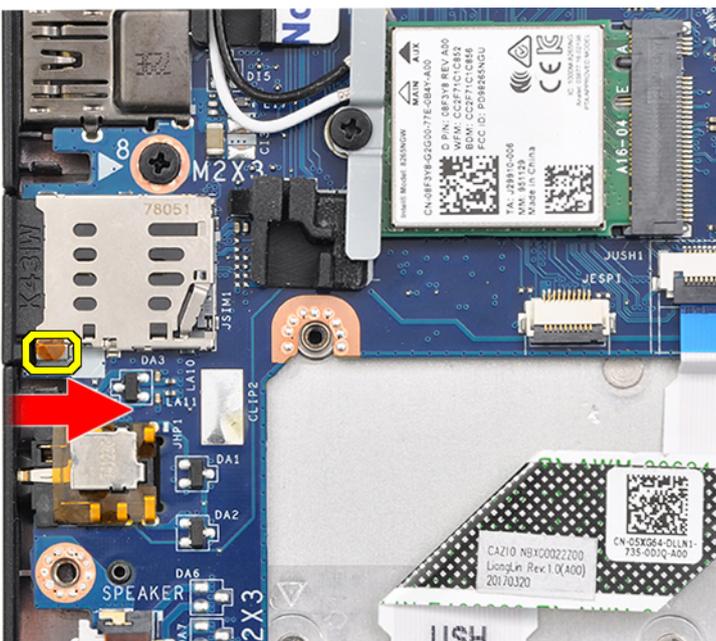
2. Slide the dummy SIM card tray out of the system.

Base cover

Removing base cover

1. Follow the procedure in Before working inside your computer.
2. To release the base cover:
   a. Loosen the eight (M2.5 x 6.0) captive screws that secure the base cover to the system [1].

   ⓘ **NOTE:** Exercise caution when loosening the screws. Angle the screw driver to match the head of the screws (Bottom Two) to avoid a possible stripped screw head.

   b. Use a plastic scribe to release the base cover from the edge [2].

3. Lift the base cover from the system.

Installing base cover

1. Align the base cover tabs to the slots on the edges of the system.
2. Press the edges of the cover until it clicks into place.
3. To secure the base cover to the system, tighten the eight (M2.5 x 6.0) captive screws .

   (i) **NOTE:** Exercise caution when tightening the screws. Angle the screw driver to match the head of the screw to avoid a possible stripped screw head.

4. Follow the procedure in After working inside your computer.

Battery

Lithium-ion battery precautions

⚠ **CAUTION:**
- **Exercise caution when handling Lithium-ion batteries.**
- **Discharge the battery completely before removing it. Disconnect the AC power adapter from the system and operate the computer solely on battery power—the battery is fully discharged when the computer no longer turns on when the power button is pressed.**
- **Do not crush, drop, mutilate, or penetrate the battery with foreign objects.**
- **Do not expose the battery to high temperatures, or disassemble battery packs and cells.**
- **Do not apply pressure to the surface of the battery.**
- **Do not bend the battery.**
- **Do not use tools of any kind to pry on or against the battery.**

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

Removing battery

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. To remove the battery:
   a. Disconnect the battery cable from the connector on the system board [1].

   (i) **NOTE:** The Latitude features either a 3-cell or 4-cell battery, which needs to be removed before replacing the customer replaceable unit (CRU) parts. Therefore, when performing any disassembly procedure, the battery connection must be disconnected immediately after removing the bottom cover. This procedure is required to disconnect all power sources from the system and to prevent the system from accidentally switching on and shorting the components.

   b. Remove the two (M2.0 x 5.0) screws that secure the battery to the computer [2].

   (i) **NOTE:** A 3-cell battery has a single screw, and a 4-cell battery has two screws. Hence, the image displayed below is a 4-cell battery.

   c. Lift the battery from the system [3].
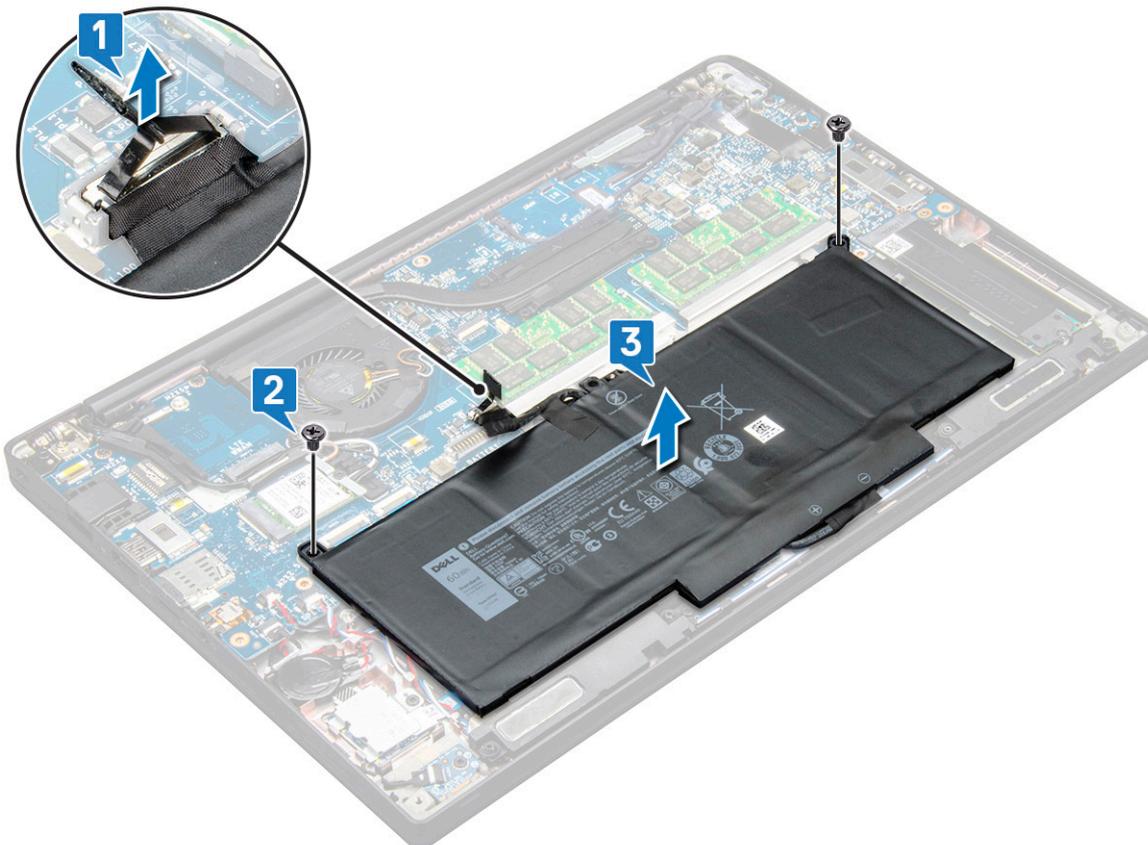
Installing battery

1. Route the battery cable through the routing clip and connect the battery cable to the connector on the system board.

   (i) **NOTE:** Route the battery cable, if the cable at the base of the battery is un routed.

2. Insert the lower edge of the battery into the slot on the chassis and then seat the battery.
3. Tighten the two (M2.0 x 5.0) screws to secure the battery to the system.

   (i) **NOTE:** A small battery (3-cell) has a single screw, a larger battery (4-cell) has two screws.

4. Install the base cover
5. Follow the procedure in After working inside your computer.

Solid state drive

Removing Solid State Drive

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. To remove the Solid State Drive:
   a. Loosen the two (M2.0 x 3.0) captive screws that secure the Solid State Drive bracket [1].
   b. Remove the Solid State Drive bracket (optional) [2].
   c. Remove the Solid State Drive from the system [3].
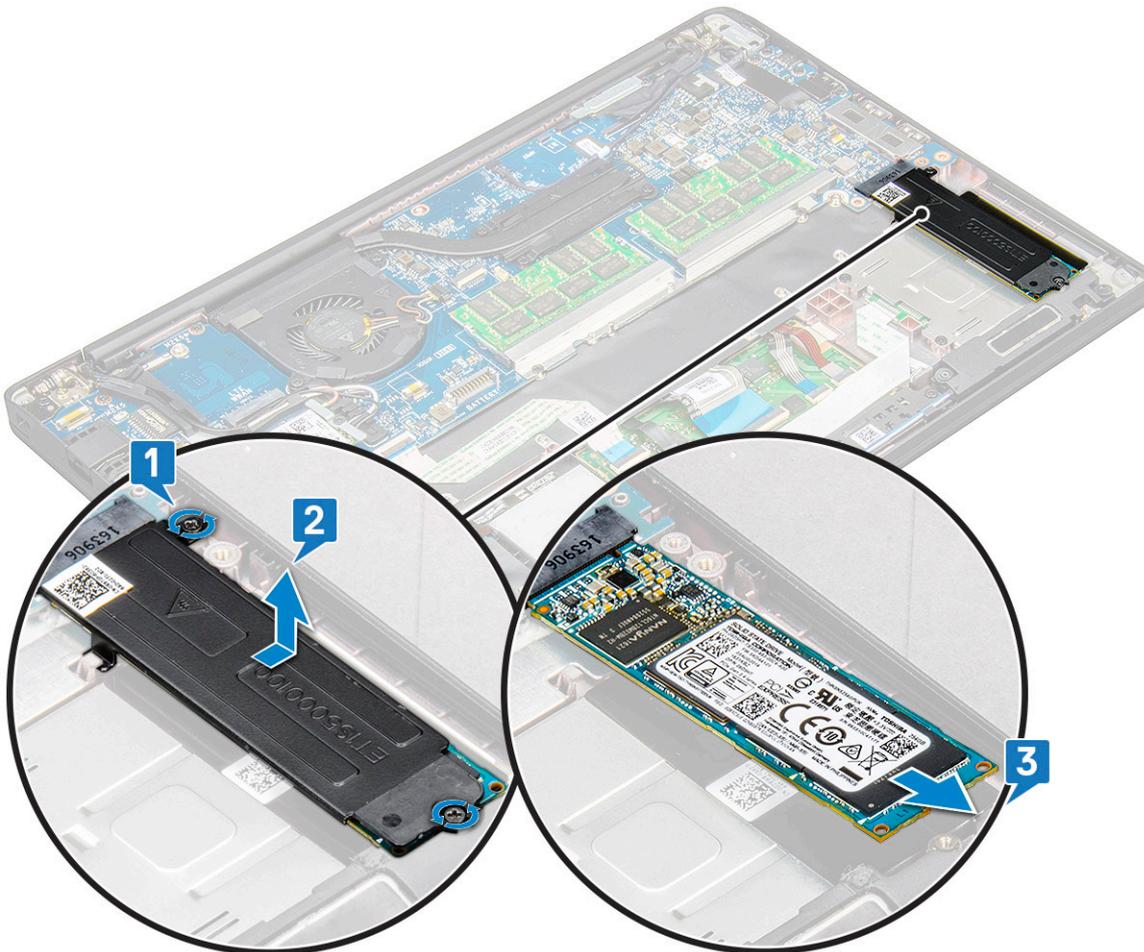
Installing Solid State Drive

1. Insert the Solid State Drive into the connector.
2. Install the Solid State Drive bracket over the Solid State Drive.

   (i) **NOTE:** When installing the Solid State Drive bracket, ensure that the tab on the bracket is held securely with the tab on the palm rest.

3. Tighten the two (M2.0 x 3.0) screws to secure the Solid State Drive to the Solid State Drive bracket and in turn to the Palmrest.
4. Connect the battery cable to the connector on the system board.
5. Install the base cover.
6. Follow the procedure in After working inside your computer.

Speaker

Removing speaker module

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. To release the speaker module:
   a. Disconnect the speaker cable from the connector on the system board [1].

      (i) **NOTE:** Use a plastic scribe to release the cable from the connector. Do not pull the cable as it may result in breakage

   b. Un-route the speaker cable from the two routing clips on the side of touchpad buttons [2].
   c. Remove the tape that secures the speaker cables to the touchpad board [3].
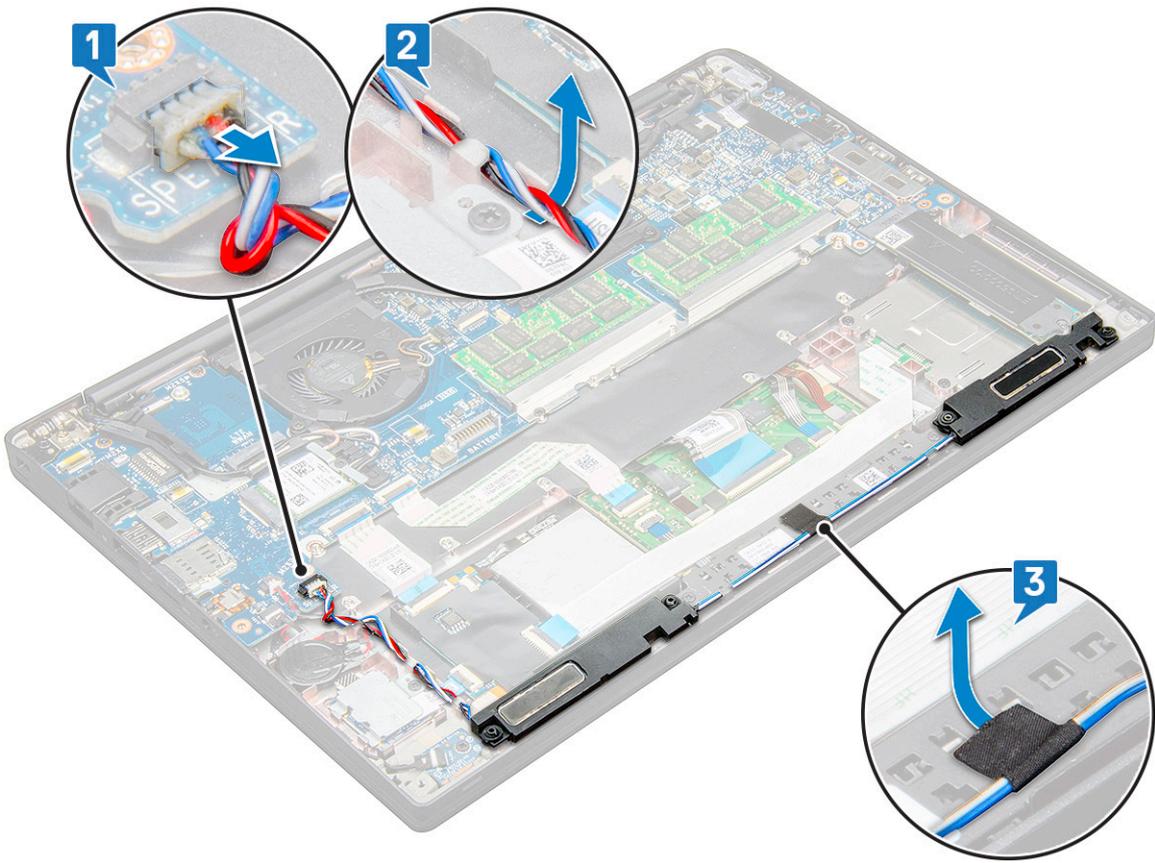
5. Lift the speaker module from the computer.
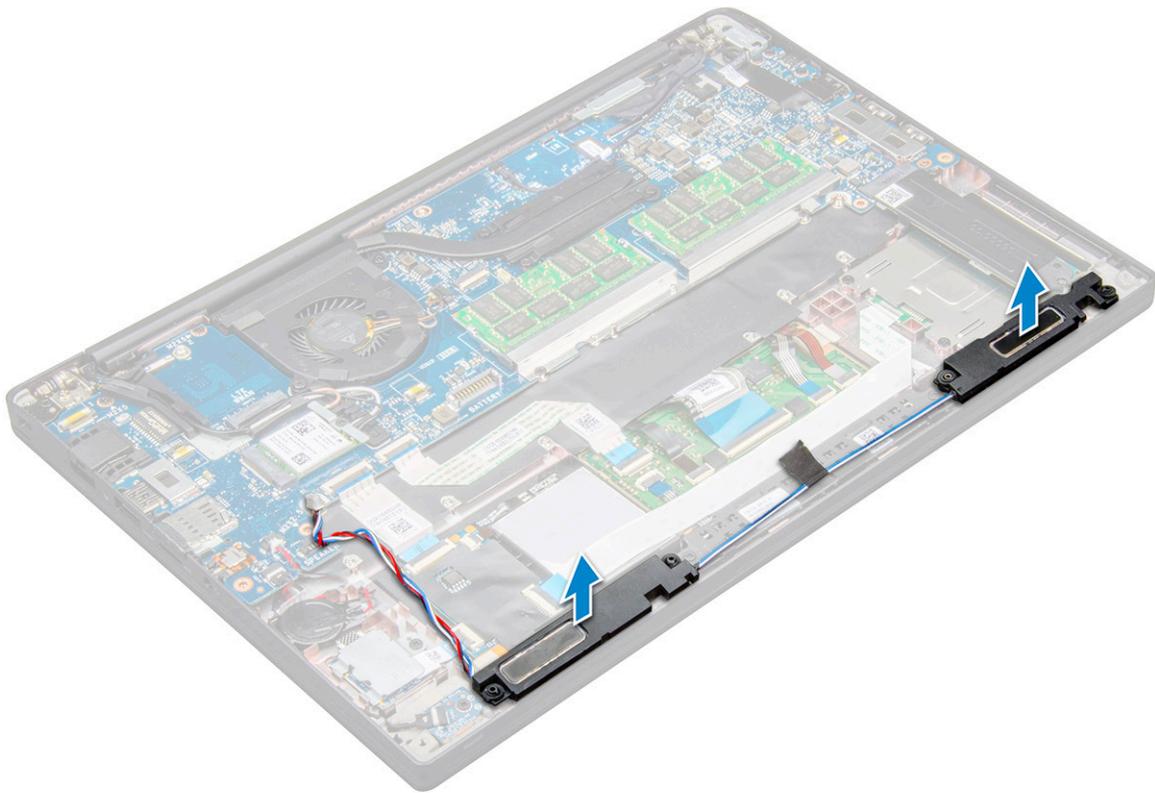
Installing speaker module

1. Place the speaker module into the slots on the system.
2. Route the speaker cable through the retention clips on the system.

   (i) **NOTE:** For Latitude 7490, the speaker cable must be routed correctly in the routing channels on the palm-rest and the routing channels along the bottom edge of the touchpad buttons. Now, using the piece of tape attached to the speaker cable, secure it to the touchpad buttons

3. Connect the speaker cable to the connector on the system board.
4. Connect the battery cable to the connector on the system board.
5. Install the base cover.
6. 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 base cover.
3. Disconnect the battery cable from the connector on the system board.
4. To remove the coin cell battery:
   a. Disconnect the coin cell battery cable from the connector on the system board [1].

      (i) **NOTE:** You must un-route the coin cell battery cable from the routing channel.

      (i) **NOTE:** When removing or replacing the RTC battery or system board for Latitude 7490, the RTC battery cable must be routed in the routing channels and secured within the notch on the system board.

   b. Lift the coin cell battery to release it from the adhesive [2].
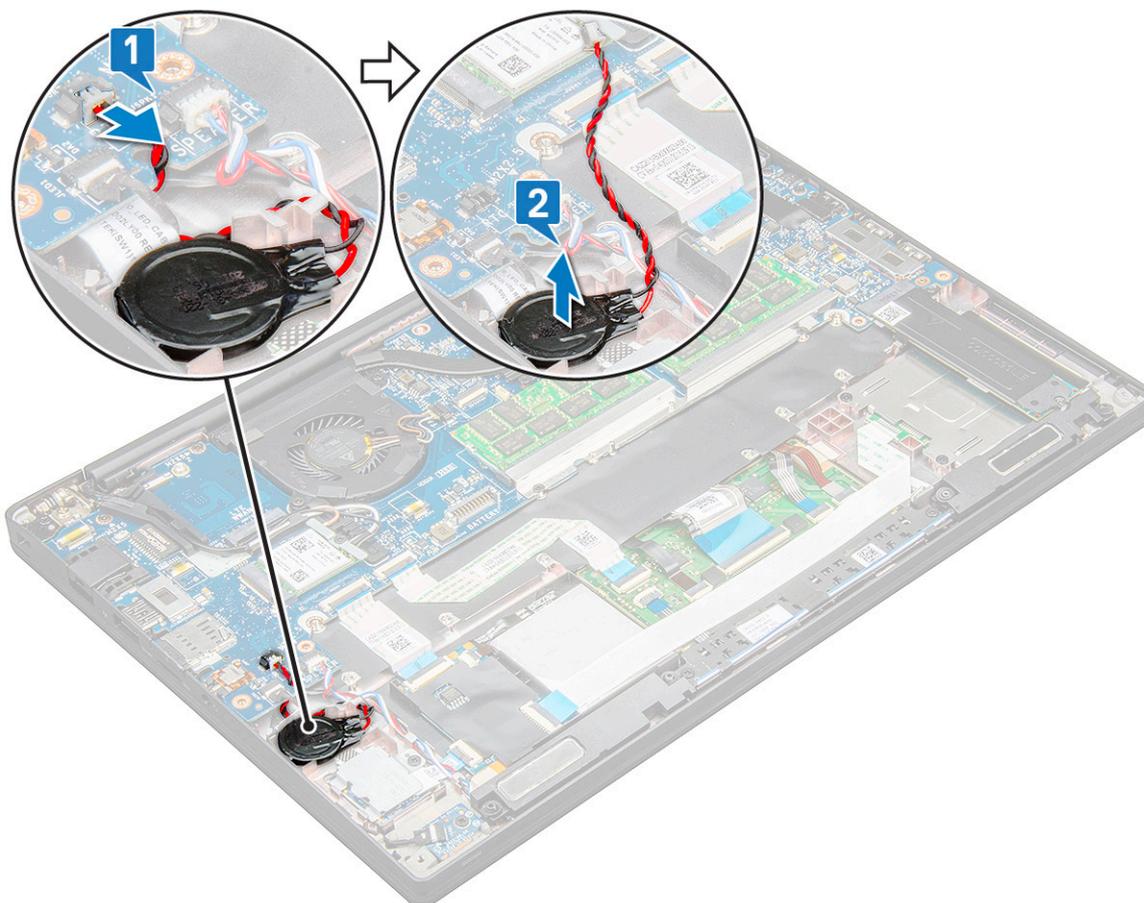
ⓘ **NOTE:** When removing or replacing the RTC battery or the system board for Latitude 7290, the RTC battery must be placed and secured with its adhesive onto the fingerprint reader bracket.

Installing coin cell battery

1. Affix the coin cell battery on the slot inside the computer.
2. Route the coin cell battery cable through the routing channel before connecting the cable.
3. Connect the coin cell battery cable to the connector on the system board.

   ⓘ **NOTE:** When removing or replacing the RTC battery or system board for Latitude 7490, the RTC battery cable must be routed in the routing channels and secured within the notch on the system board.

4. Connect the battery cable to the connector on the system board.
5. Install the base cover.
6. Follow the procedure in After working inside your computer.

WWAN card

Removing WWAN card

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. To remove the WWAN card:
   a. Remove the M2.0 x 3.0 screw that secures the WWAN bracket to the WWAN card [1].

b. Lift the WWAN bracket that secures the WWAN card [2] .

c. Disconnect the WWAN cables from the connectors on the WWAN card [3] .
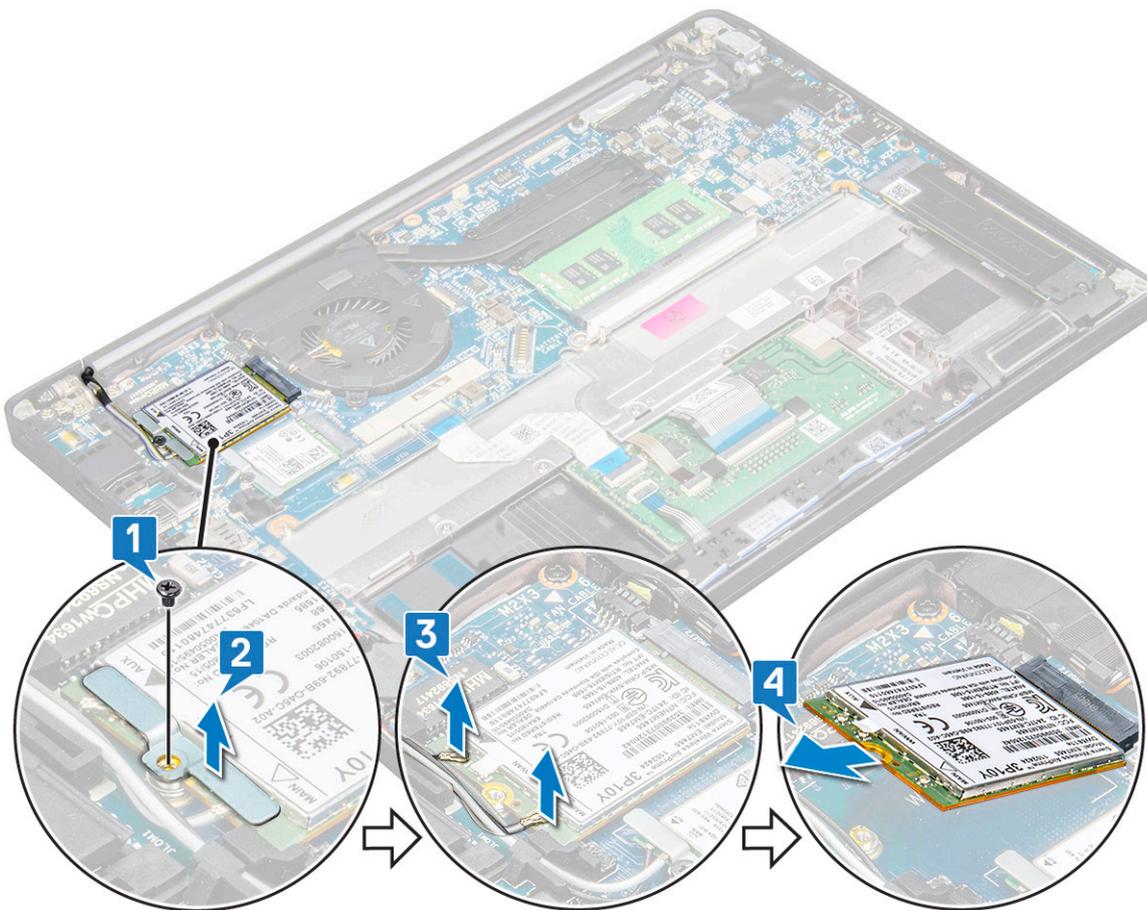
ⓘ **NOTE:** There is an adhesive pad on the routing pad of the system board which secure the wireless and WWAN cards. Removing the wireless or WWAN card requires a small amount of additional force to separate the card from the adhesive pads

5. Remove the WWAN card:

Installing WWAN card

1. Insert the WWAN card into the connector on the system board.
2. Connect the WWAN cables to the connectors on the WWAN card.
3. Place the metal bracket and tighten the M2.0 x 3.0 screw to secure it to the computer.
4. Connect the battery cable to the connector on the system board.
5. Install the base cover.
6. Follow the procedure in After working inside your computer.

ⓘ **NOTE:** The IMEI number can also be found on the WWAN card.

ⓘ **NOTE:** When installing the wireless and WWAN antennae must be routed correctly into the routing pads/clips on the system board. For models shipped with a wireless card only, the technicians must always ensure that protective sleeves are used to isolate the antenna connectors before reassembling the system.

WLAN card

Removing WLAN card

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. To remove the WLAN card:
   a. Remove the M2.0 x 3.0 screw that secures the metal bracket to the WLAN card [1].
   b. Lift the metal bracket [2].
   c. Disconnect the WLAN cables from the connectors on the WLAN card [3].

   (i) **NOTE:** There is an adhesive pad on the routing pad of the system board which secure the wireless and WWAN cards. Removing the wireless or WWAN card requires a small amount of additional force to separate the card from the adhesive pads.

   d. Remove the WLAN card from the system [4].
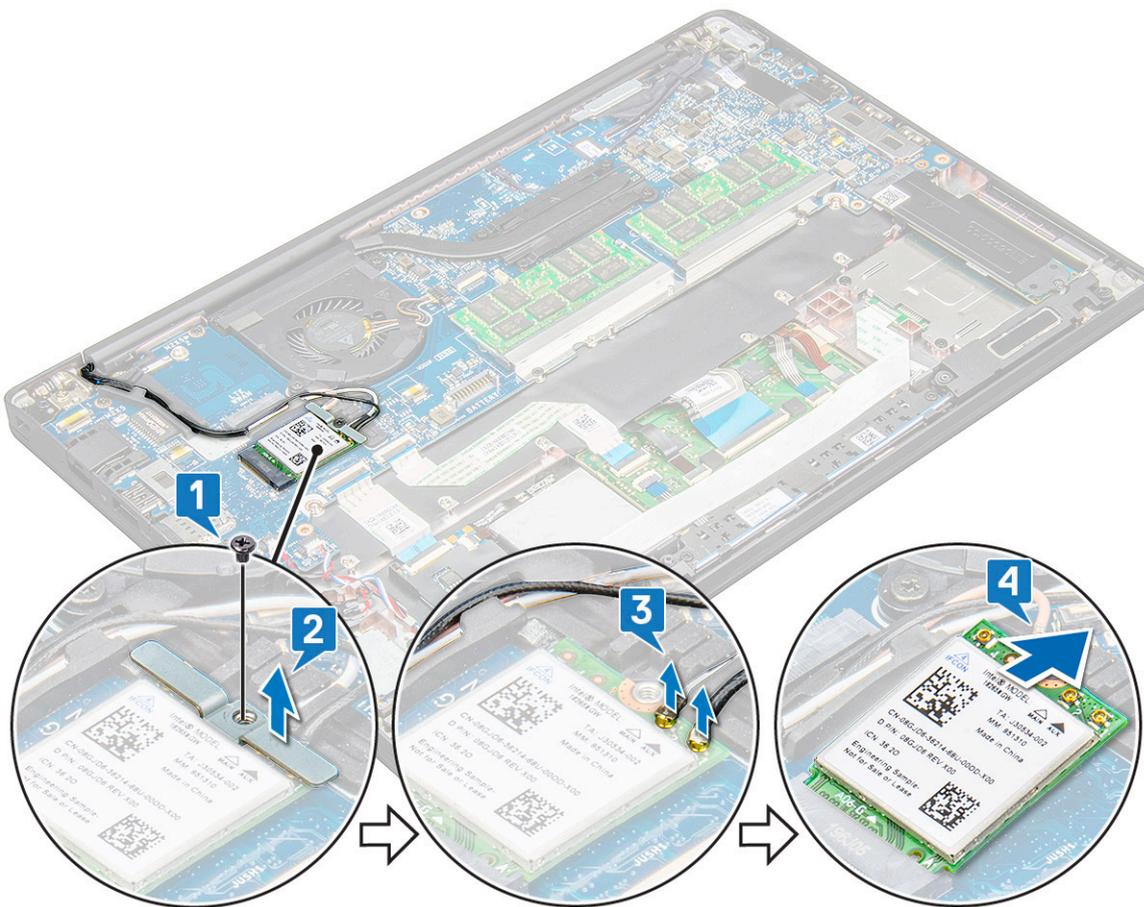
Installing WLAN card

1. Insert the WLAN card into the connector on the system board.
2. Connect the WLAN cables to the connectors on the WLAN card.
3. Place the metal bracket and tighten the M2.0 x 3.0 screw to secure it to the WLAN card.

> (i) **NOTE:** When installing the wireless and WWAN antennae must be routed correctly into the routing pads/clips on the system board. For models shipped with a wireless card only, the technicians must always ensure that protective sleeves are used to isolate the antenna connectors before reassembling the system.

4. Connect the battery cable to the connector on the system board.
5. Install the base cover.
6. Follow the procedure in After working inside your computer.

Memory modules

Removing memory module

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. To remove the memory module:
   a. Pull the clips securing the memory module until the module snaps-out [1].
   b. Remove the memory module from the connector on the system board [2].
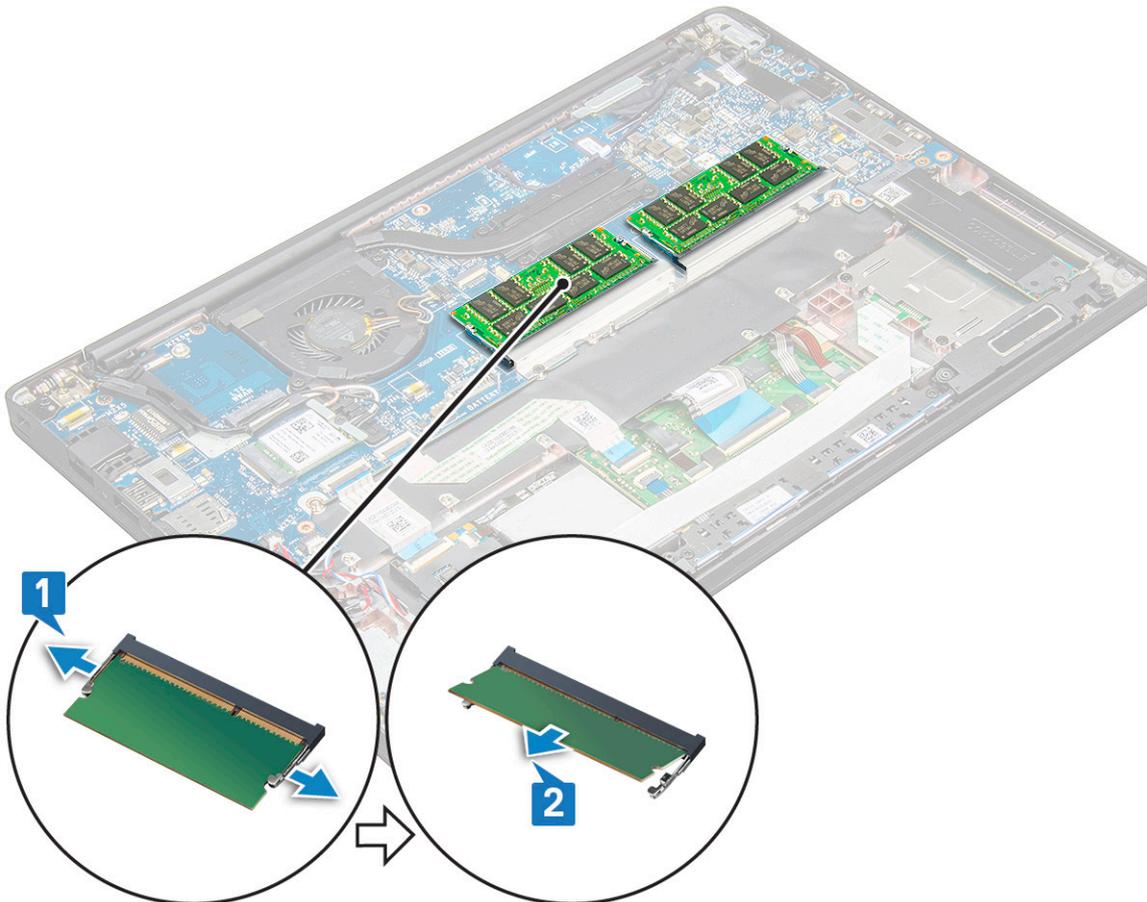
Installing memory module

1. Insert module in connector then press Module down onto clips unit it snaps in.
2. Connect the battery cable to the connector on the system board.
3. Install the base cover.

4. Follow the procedures in After working inside your computer.

Heat sink

Removing heat sink assembly

Heat sink assembly consists of heat sink and the system fan.

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. Connect the battery cable to the connector on the system board.
4. To remove the heat sink assembly:

   (i) **NOTE:** To identify the number of screws, see the screw list.

   a. Remove the 2 (M2.0 x 5.0) screws that secure the system fan and the 4 (M2.0 x 3.0) that secures the heat sink assembly to the system board [2].

   (i) **NOTE:** Remove the screws in the order of the callout numbers [1, 2, 3, 4] as indicated on the heat sink.

   b. Lift and flip over the heat sink assembly from the system board.
   c. Disconnect the fan cable from the system board [1].
   d. Separate the heat sink assembly from the system.

Installing heat sink assembly

Heat sink assembly consists of heat sink and the system fan.

1. Align the heat sink assembly with screw holders on the system board.
2. Connect the fan cable to the connector on the system board.
3. Replace the M2.0 x 3.0 screws to secure the heat sink assembly to the system board.

(i) **NOTE:** Replace the screws in the order of the callout numbers [1, 2, 3, 4] as indicated on the heat sink.

4. Connect the battery cable to the connector on the system board.
5. Install the base cover.
6. Follow the procedure in After working inside your computer.

LED board

## Removing LED board

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. To remove the LED board:
   a. Disconnect the LED cable from the LED board [1].

   ⚠️ **CAUTION: Avoid pulling the cable as it would result in breaking the cable connector. Instead, use a scribe to push the edges of the cable connector to release the LED cable.**

   b. Remove the M2.0 x 2.5 screw that secures the LED board to the system [2].
   c. Lift the LED board from the system [3].

Installing LED board

1. Insert the LED board into the slot on the computer.

2. Replace the M2.0 x 2.5 screw to secure the LED board.
3. Connect the LED cable to the LED board.

   (i) **NOTE:** For Latitude 7490, the LED daughter board cable must be routed underneath the securing latch on the palm-rest, and the label should be placed underneath the system board.

4. Connect the battery cable to the connector on the system board.
5. Install the base cover.
6. Follow the procedure in After working inside your computer.

Smart card module

Removing smart card cage

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. Remove the PCIe SSD card.
5. To disconnect the smart card cable:
   a. Disconnect the smart card cable [1].
   b. Lift the smart card cable that is affixed to the touchpad module [2].
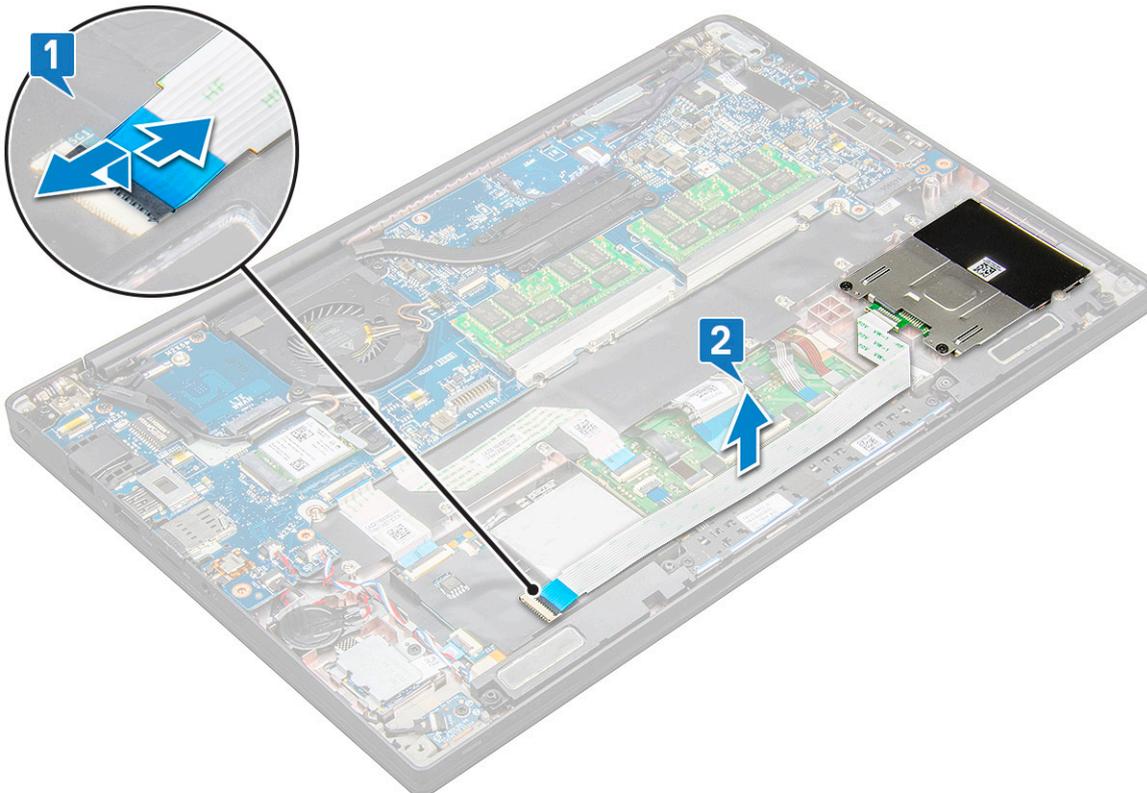
6. To remove the smart card cage:

   (i) **NOTE:** To identify the number of screws, see screw list

   a. Remove the two (M2.0 x 3.0) screws that secure the smart card cage to the system [1].
   b. Slide and lift the smart card cage from the system [2].

Installing smart card cage

1. Slide the smart card cage into the slot to align with the tabs on the system.
2. Replace the two (M2.0 x 3.0) screws to secure the smart card cage to the system.
3. Affix the smart card cable and connect it to the connector on the system .
4. Install the PCIe SSD card.
5. Connect the battery cable to the connector on the system board.
6. Install the base cover.
7. Follow the procedure in After working inside your computer.
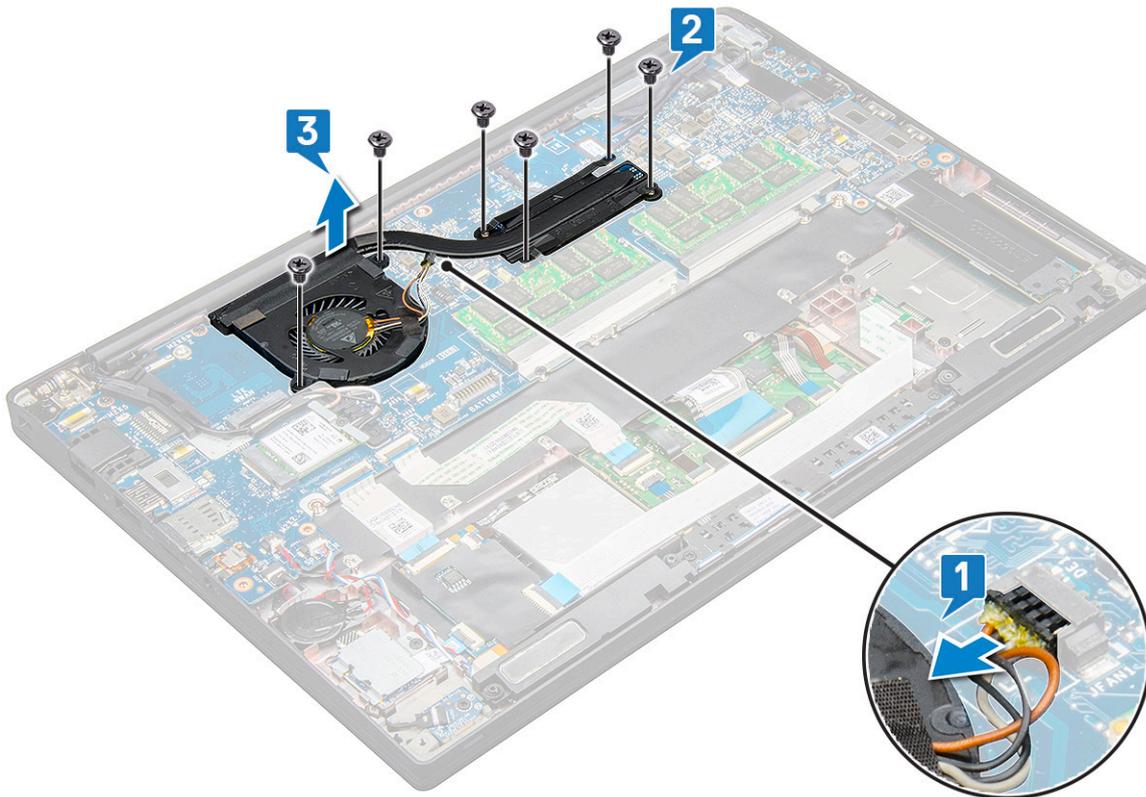
Touchpad buttons board

Removing touchpad buttons board

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. Remove the speaker.
5. Remove the smart card module.
6. To remove the touchpad buttons board:
   a. Disconnect the touchpad buttons board cable from the touchpad board [1].

> (i) **NOTE:** The touchpad buttons board cable is below the smart card cable.

   b. Remove the two (M2.0 x 3.0) screws that secure the touchpad buttons board [2].

> (i) **NOTE:** To identify the screws, see screw list.

   c. Lift the touchpad buttons board from the system [3].
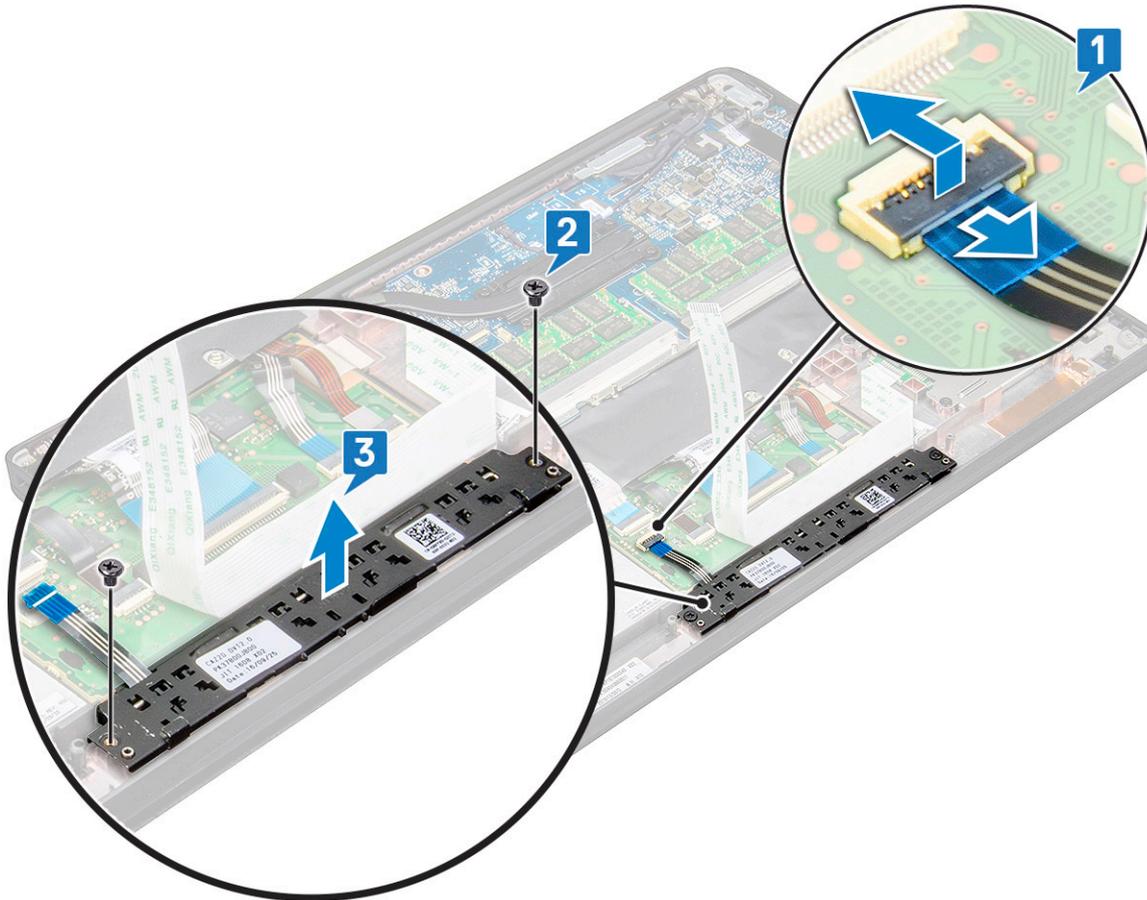
Installing touchpad buttons board

1. Insert the touchpad buttons board into the slot to align the tabs with the grooves on the system.
2. Replace the two (M2.0 x 3.0) screws to secure the touchpad buttons board to the system.
3. Connect the touchpad buttons board cable to the connector on the touchpad board.
4. Install the smart card module.
5. Install the speaker.
6. Connect the battery cable to the connector on the system board.
7. Install the base cover.
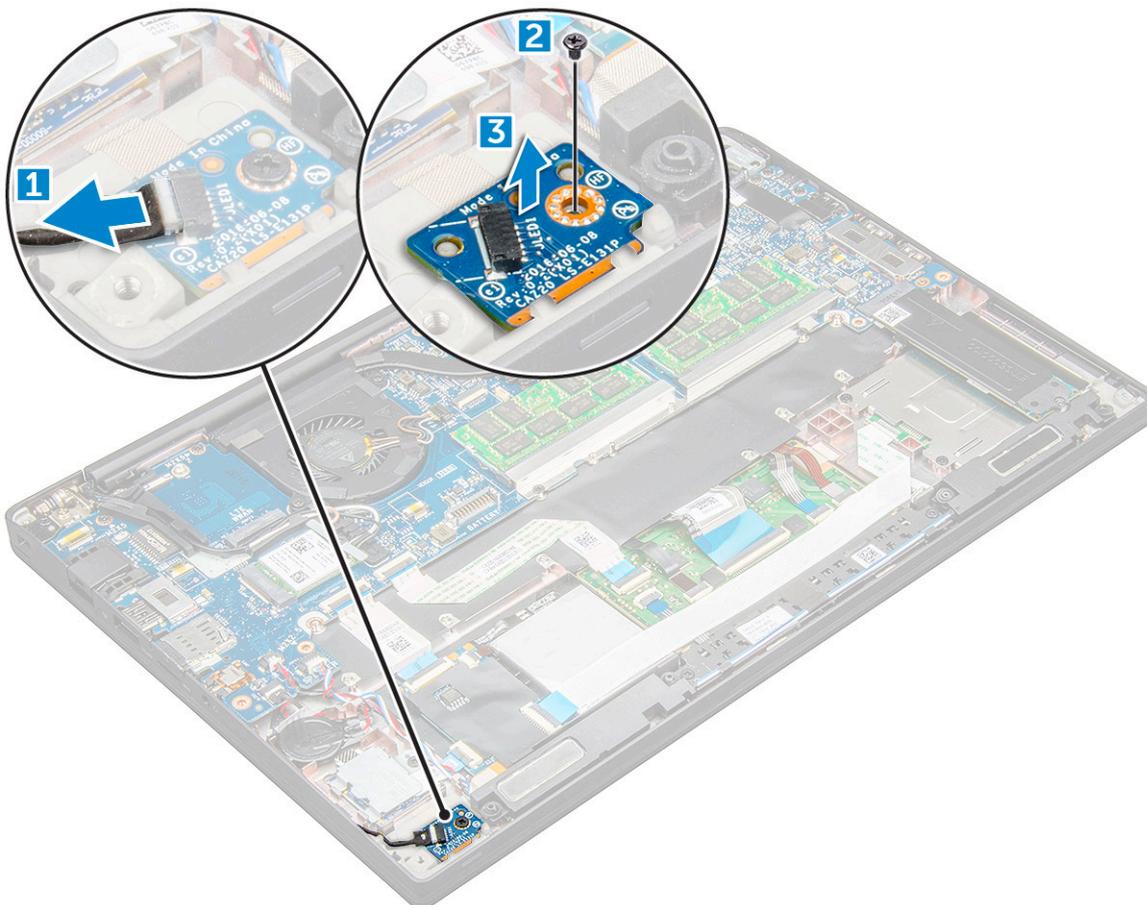8. Follow the procedure in After working inside your computer.

Power connector port

Removing power connector port

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.

3. Disconnect the battery cable from the connector on the system board.
4. To remove the power connector port:
   a. Disconnect the power connector port cable from the system board [1].

   > (i) **NOTE:** Use a plastic scribe to release the cable from the connector. Do not pull the cable as it may result in breakage.

   b. Remove the M2.0 x 3.0 screw to release the metal bracket on the power connector port [2].
   c. Lift the metal bracket from the system [3].
   d. Remove the power connector port from the computer [4].
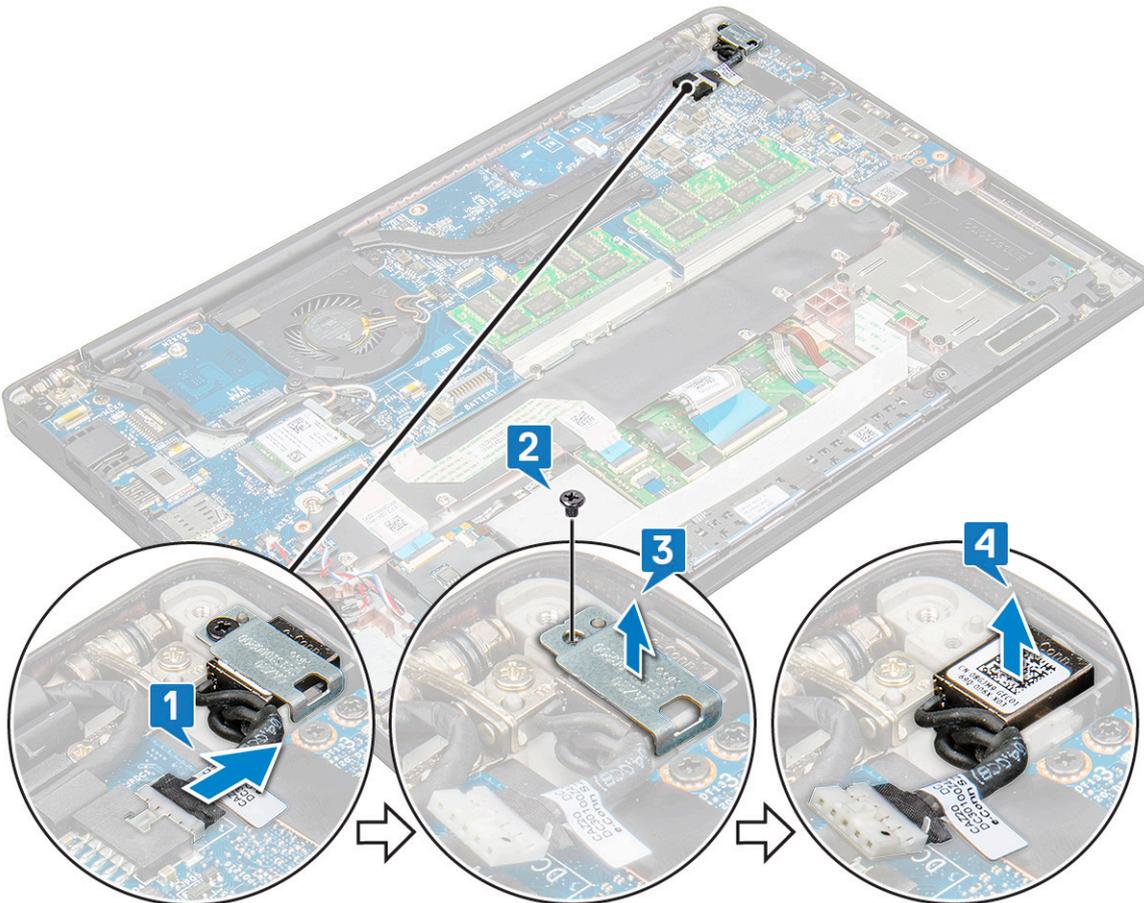
Installing power connector port

1. Install the power connector port into the slot on the system.
2. Place the metal bracket on the power connector port.
3. Replace the M2.0 x 3.0 screw to secure the power connector port to the system.
4. Connect the power connector port cable to the connector on the system board.
5. Connect the battery cable to the connector on the system board.
6. Install the base cover.
7. Follow the procedure in After working inside your computer.
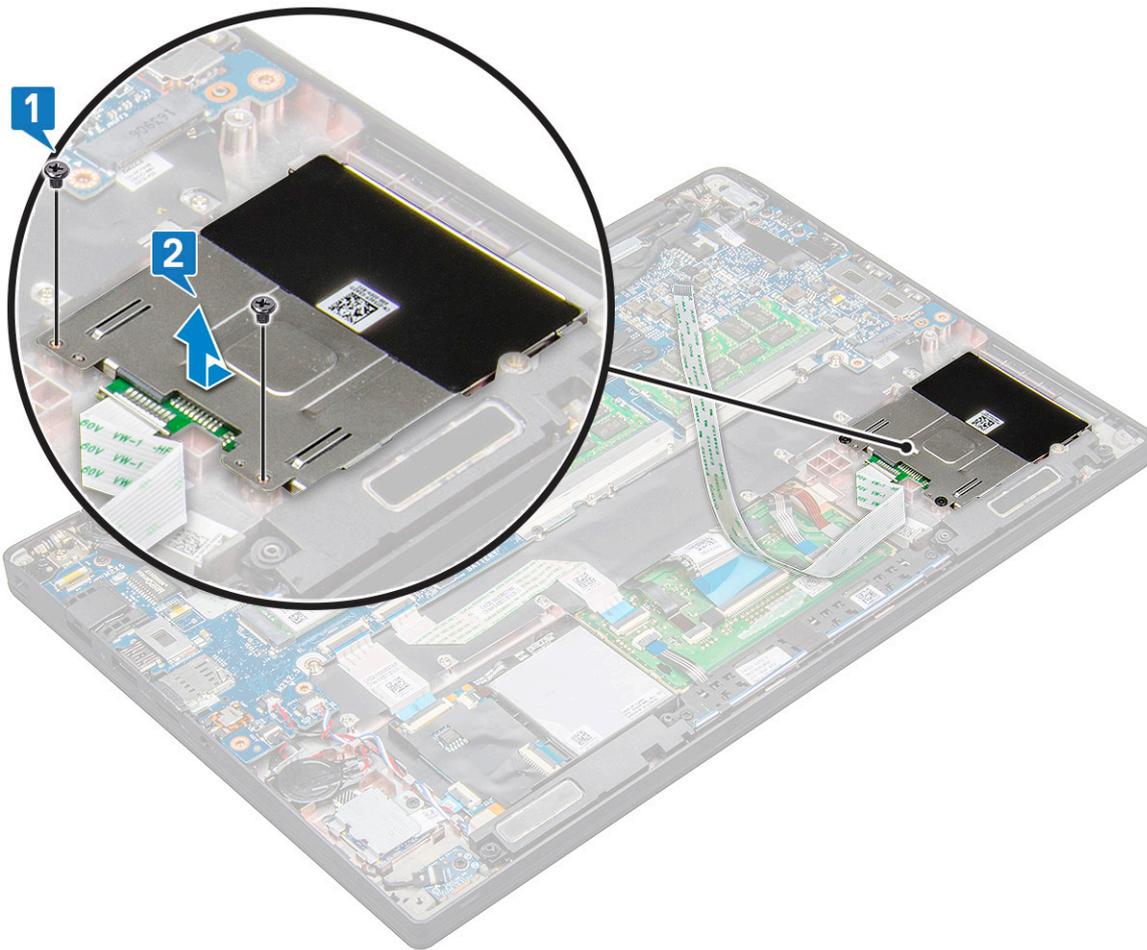
Display Assembly

Removing display assembly

1. Follow the procedure in Before working inside your computer.

2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. Remove the WLAN card.
5. Remove the WWAN card.

ⓘ **NOTE:** To identify the number of screws, see screw list.

6. To remove the display assembly:
   a. Disconnect the IR camera cable from the system board [1].
   b. Un route the WLAN and WWAN cables from the routing channels [2].
   c. Remove the M2.0x3.0 screw that secures the eDP bracket [3].

   ⓘ **NOTE:** The display cable of Latitude 7290 is secured by a display bracket and a piece of tape adhered to the power-adapter connector on the system board. When removing the display assembly or system board, the display bracket must be removed and the piece of tape must be peeled back in order to disconnect the display cable.

   d. Lift the eDP bracket from the eDP cable [4].
   e. Lift the eDP cable to disconnect it from the connector on the system board [5].
   f. Un route the eDP cable from the routing channel [6].
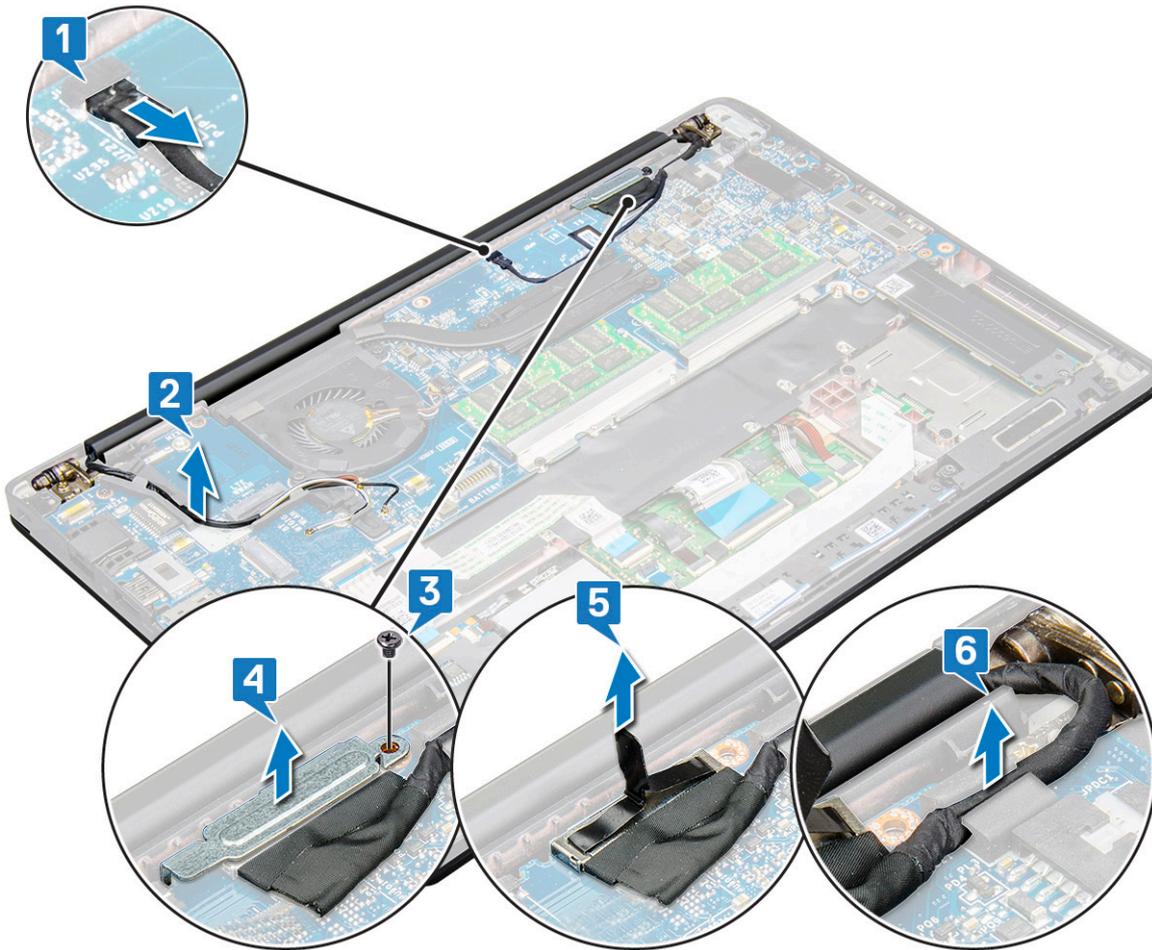
7. To remove the display assembly:
   a. Open the display of the computer and lay it on a flat surface at 180-degree angle.
   b. Remove the six (M2.5 x 3.5) screws that secure the display hinge to the display assembly [1].
   c. Lift the display assembly from the system.
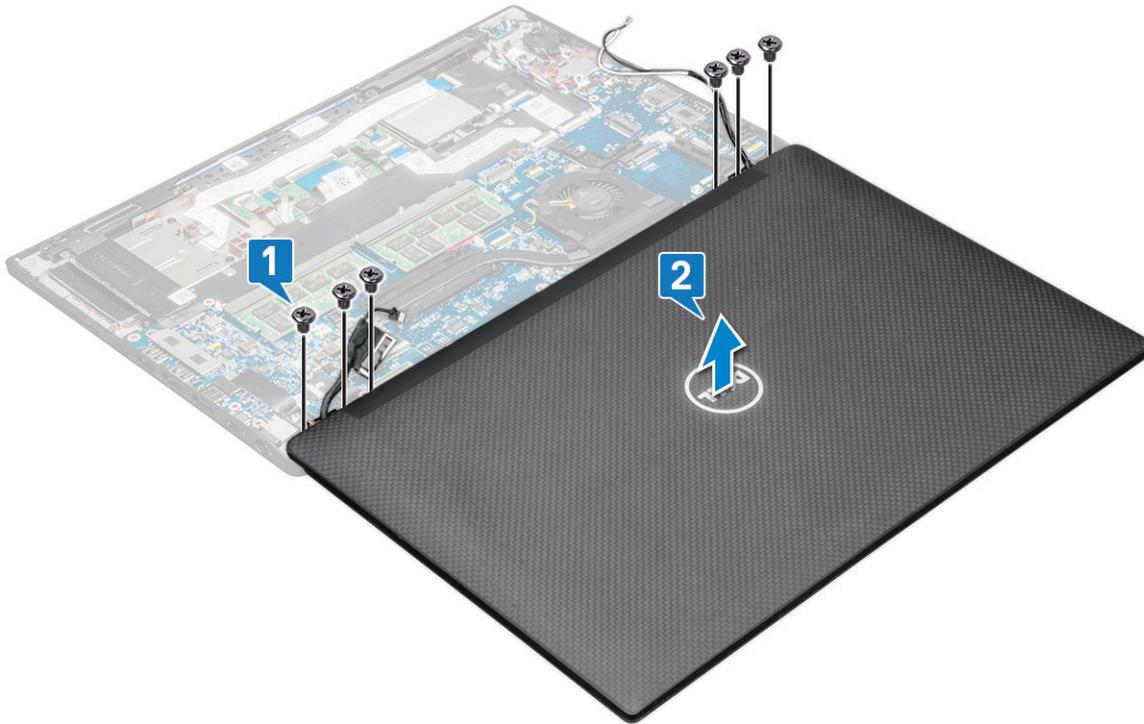
Installing display assembly

1. Place the base of the computer on a clean flat surface.
2. Install the display assembly to align it with the display hinge holders on the system.
3. Holding the display assembly, replace the six (M2.5 x 3.5) screws to secure the display hinges on the system display assembly with the system unit.
4. Route the eDP cable from the routing channel.
5. Affix the tapes to secure the eDP cable (display cable) to the system board.
6. Connect the eDP cable to the connector on the system board.

   (i) **NOTE:** WLAN and WWAN antennas must be routed correctly into the routing pads on the system board and protective sleeves must be used to isolate the antenna connectors.

7. Install the eDP metal bracket on the eDP cable and tighten the M2.0 x 3.0 screws.
8. Connect the IR camera cable to the system board.
9. Route the WLAN and WWAN cables through the routing channels.
10. Install the WLAN card.
11. Install the WWAN card.
12. Connect the battery cable to the connector on the system board.
13. Install the base cover.
14. Follow the procedure in After working inside your computer.

Touch display panel

Removing touch display panel

(i) **NOTE:** The touch display panel removal procedure is applicable only for systems with touch display configuration.

1. Follow the procedure in Before working inside your computer.

2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. Remove the WLAN card.
5. Remove the WWAN card.
6. Remove the display assembly.
7. To remove the touch display panel:
   a. Use a plastic scribe to loosen the edges of the display panel.

   b. Flip the display screen over from the top.
   c. Peel the adhesive tape [1], Mylar shield [2].
   d. Release the latch [3], and disconnect the eDP cable [4].
   e. Peel the adhesive tape [5], and disconnect the IR cable [6].

8. Remove the display bezel from the display assembly.

Installing touch display panel

ⓘ **NOTE:** The touch display panel installation procedure is applicable only for systems with touch display configuration.

1. Place the display panel on the display assembly.
2. Reconnect the IR cable and eDP cable.
3. Replace the adhesive tapes and the Mylar shield.
4. Press the edges of the display panel until it clicks into the display assembly.
5. Install the display assembly.
6. Install the WLAN card.
7. Install the WWAN card.
8. Connect the battery cable to the connector on the system board.
9. Install the base cover.
10. Follow the procedure in After working inside your computer.

Display Bezel

Removing display bezel (nontouch)

ⓘ **NOTE:** The display bezel removal procedure is applicable only for nontouch display configuration.

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. Remove the WLAN card.
5. Remove the WWAN card.
6. Remove the display assembly.
7. To remove the display bezel:

   ⚠ **CAUTION: The adhesive used on the LCD bezel to seal it with the LCD itself, makes it hard to remove the bezel as the adhesive is strong and tends to stay stuck to the LCD portion and can peel up the layers or crack the glass when trying to pry the two items apart.**

   a. Use a plastic scribe, find recess to loosen the bottom edge of the display bezel [1].
   b. Loosen the tabs on the edges of the display [2,3,4].
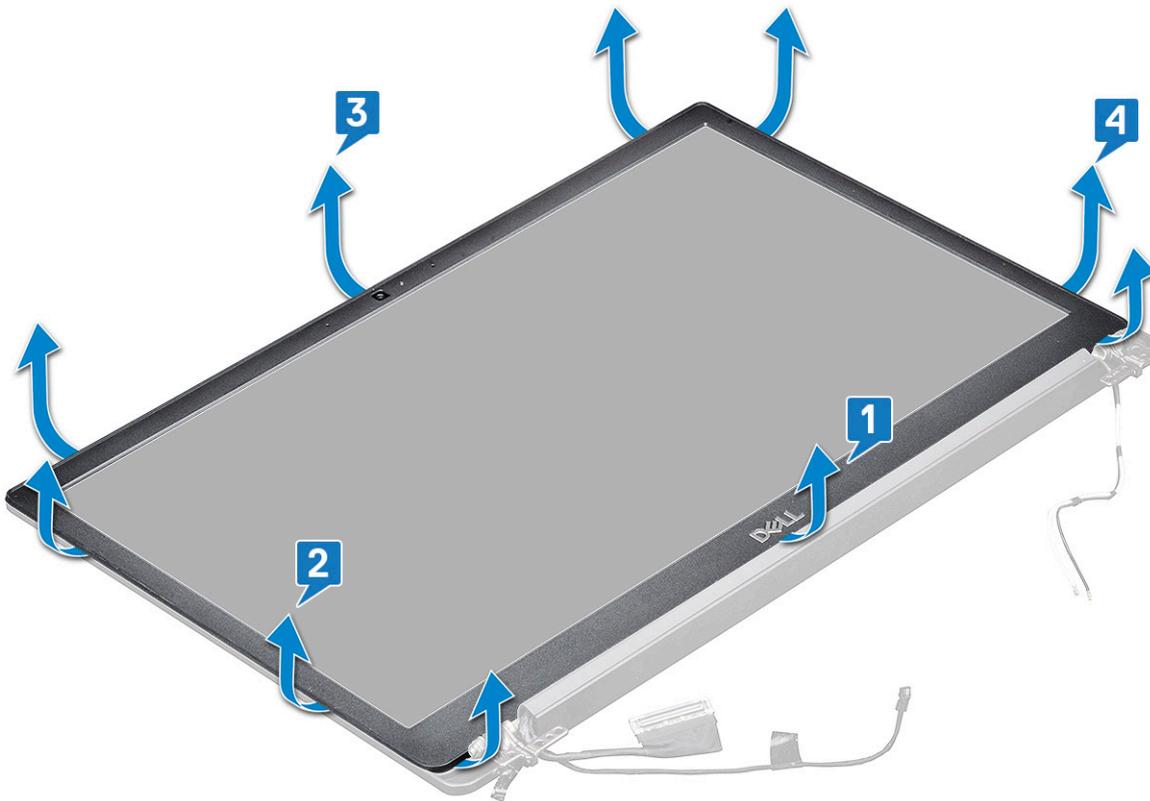
   ⚠ **CAUTION: The adhesive used on the LCD bezel to seal it with the LCD itself, pry at edges and work your way around to release the bezel. Seal can peel the layers up or crack the glass when trying to force pry the two items apart.**

8. Remove the display bezel from the display assembly.

Installing display bezel (nontouch)

ⓘ **NOTE:** The display bezel installation procedure is applicable only for nontouch display configuration.

1. Place the display bezel on the display assembly.
2. Press the edges of the display bezel until it clicks onto the display assembly.

   ⓘ **NOTE:** Adhesive is used to secure the display bezel to the display panel.

3. Install the display assembly.

4. Install the WLAN card.
5. Install the WWAN card.
6. Connect the battery cable to the connector on the system board.
7. Install the base cover.
8. Follow the procedure in After working inside your computer.
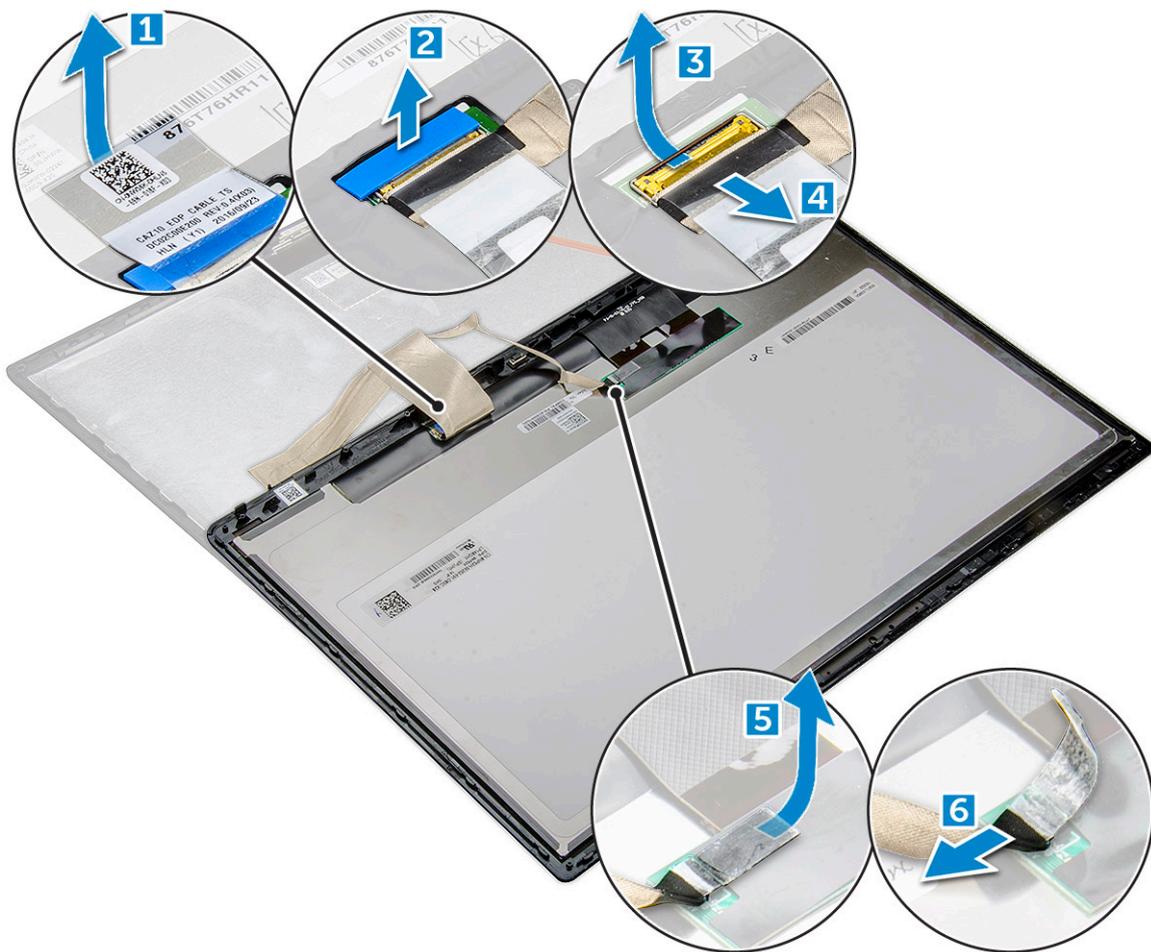
Nontouch display panel

Removing the display panel (nontouch)

ⓘ **NOTE:** The display panel removal procedure is applicable only for nontouch display configuration.

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. Remove the WLAN card.
5. Remove the WWAN card.
6. Remove the display assembly.
7. Remove the display bezel.
8. Remove the hinge caps.
9. To remove the display panel:
   a. Remove the two (M2.0 x 2.0) screws on the panel [1].
   b. Lift the bottom edge of the display panel [2].
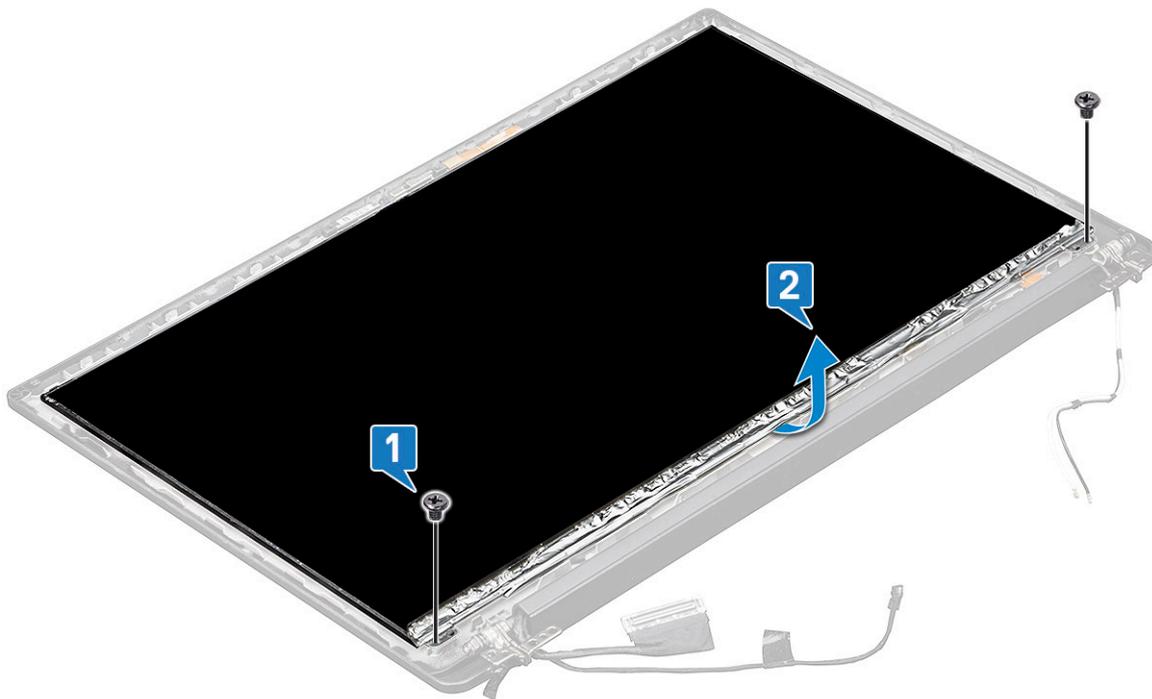
c. Slide the display panel away from the system from the bottom [1], and flip the display panel over [2].
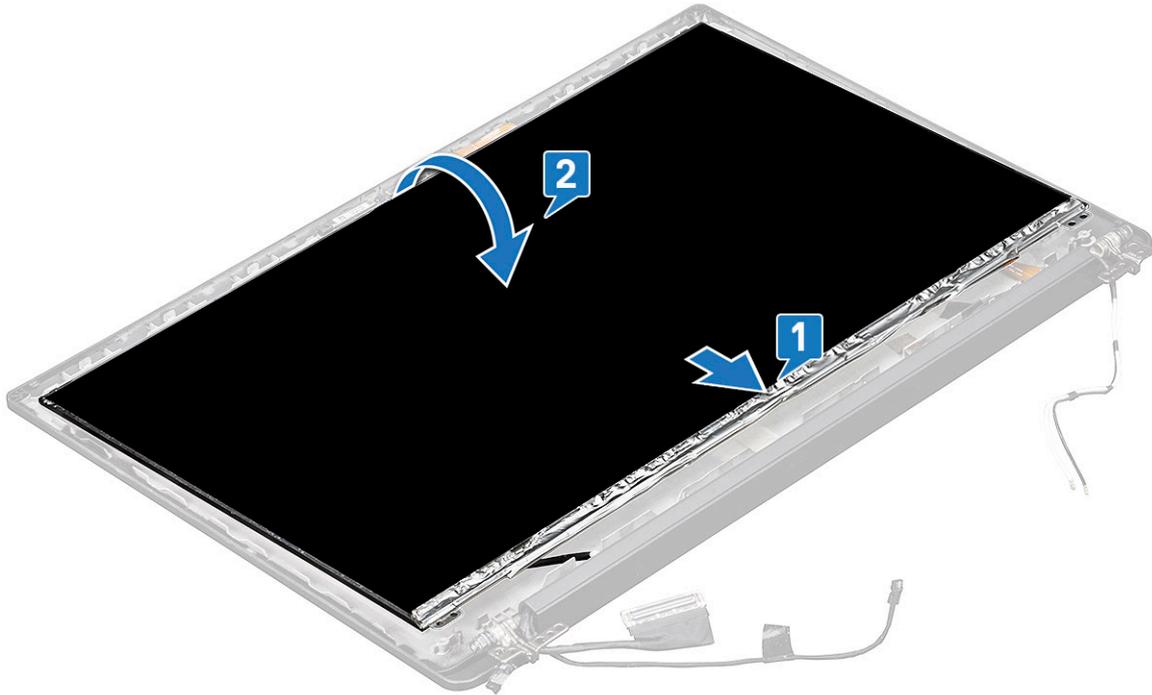
d. Peel off the display connector adhesive strip from the display panel [1].
e. Peel off the mylar tape securing the display cable on the back of the display panel [2].
f. Lift the metal tab and disconnect the display cable from the back of the display panel [3,4].
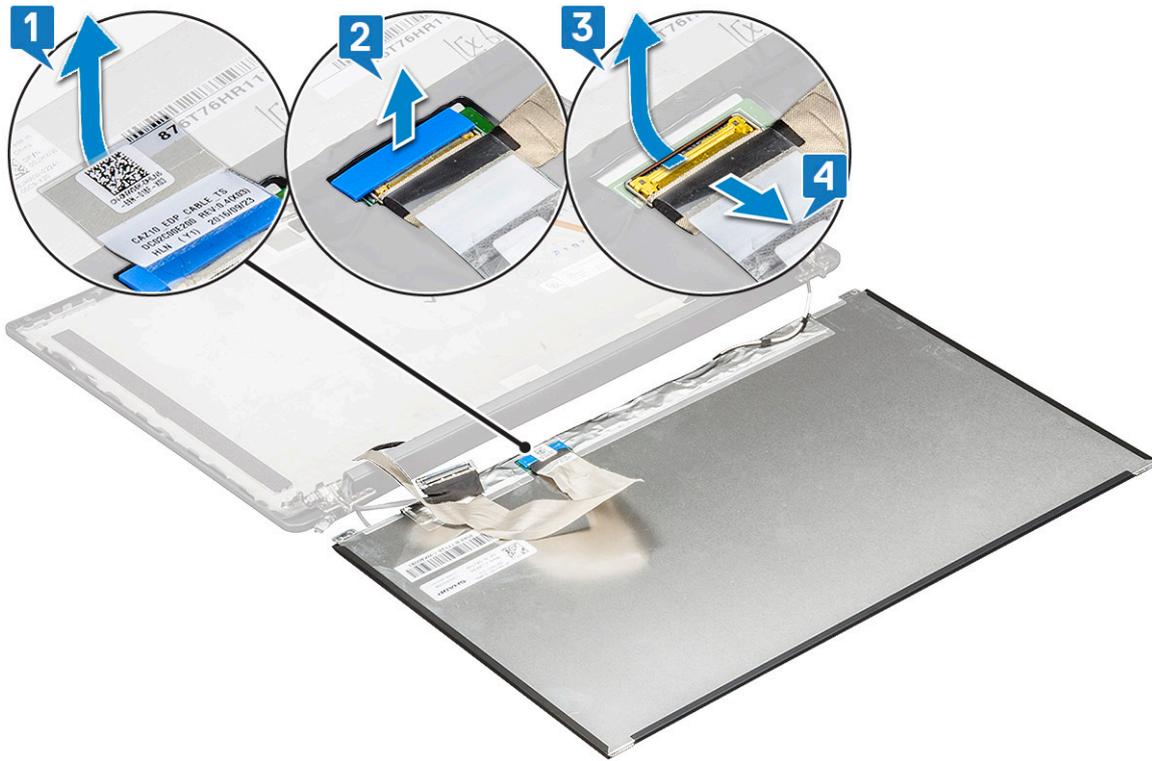
g. Remove the display panel.

Installing the display panel (nontouch)

(i) **NOTE:** The display panel installation procedure is applicable only for nontouch display configuration.

1. Connect the display cable on the back of the display panel.

   (i) **NOTE:** For Latitude 7490, the LED daughter board cable must be routed underneath the securing latch on the palm-rest, and the label should be placed underneath the system board.

2. Affix the mylar tape securing the display cable on the back of the display panel.
3. Affix display connector adhesive strip to the display panel.
4. Flip the display panel over and slide the display panel towards the system.
5. Replace the two (M2.0 x 2.0) screws on the panel.
6. Install the bezel.
7. Install the hinge cap.
8. Install the display assembly.
9. Install the WLAN card.
10. Install the WWAN card.
11. Connect the battery cable to the connector on the system board.
12. Install the base cover.
13. Follow the procedure in After working inside your computer.

Camera Microphone Module

Removing camera-microphone module

The removal procedure of the microphone camera module is only for a nontouch display configuration.

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. Remove the WLAN card.
5. Remove the WWAN card.
6. Remove the display assembly.
7. Remove the bezel.
8. Remove the display hinge.
9. To remove the camera microphone module:
   a. Lift the plastic bracket to disconnect the FPC from the camera microphone module [1].
   b. Using a plastic scribe, pry up the camera module from the top side of the compartment on the display back cover [2].
   c. Remove the camera module.
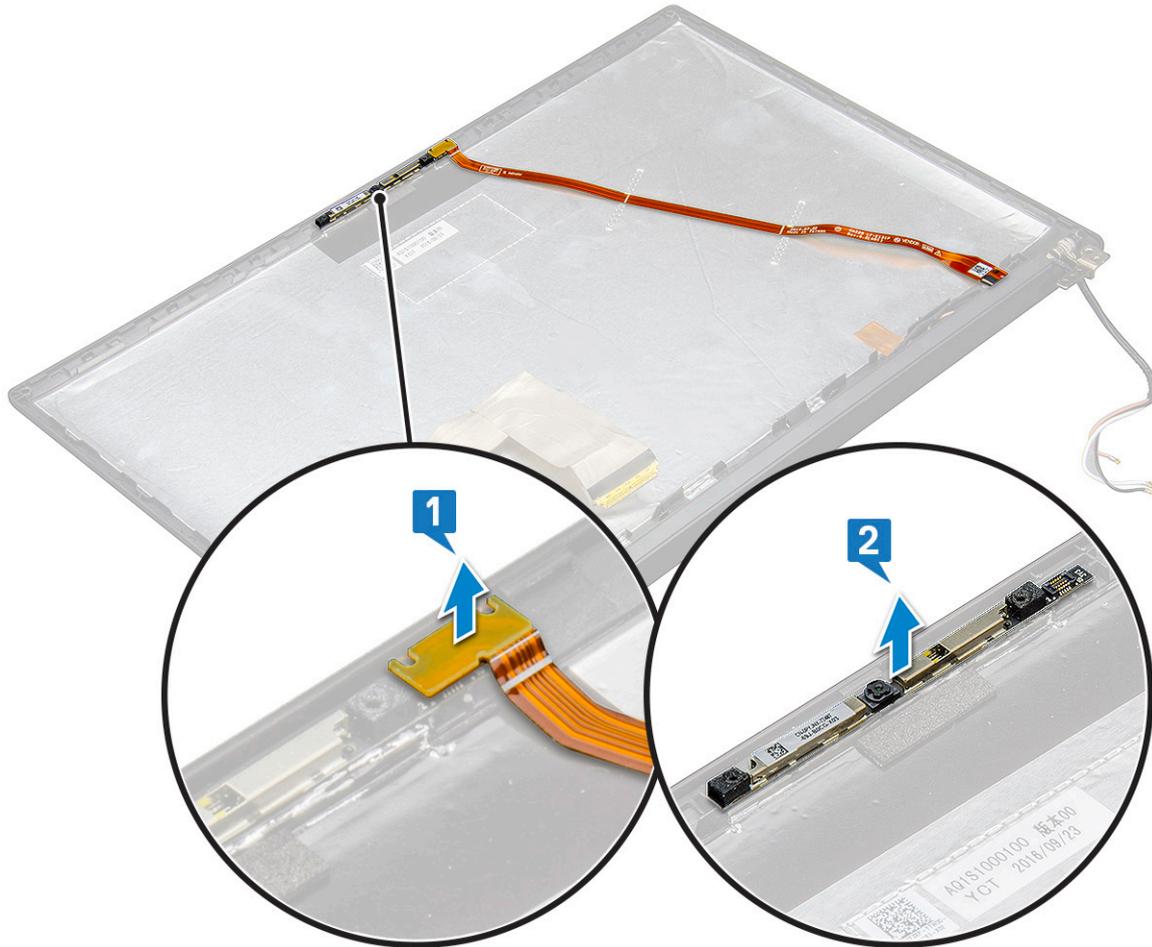
10. To remove the camera microphone module:

   a. Peel off the two pieces of conductive tape covering the camera microphone module [1].

   ⓘ **NOTE:** The conductive tape is a separate part from the camera module that must be removed and then reattached when replacing the camera microphone module.

   b. Lift the camera microphone module [2].
   c. Disconnect the camera FPC from the camera module [3].
   d. Lift and remove the camera microphone module [4].
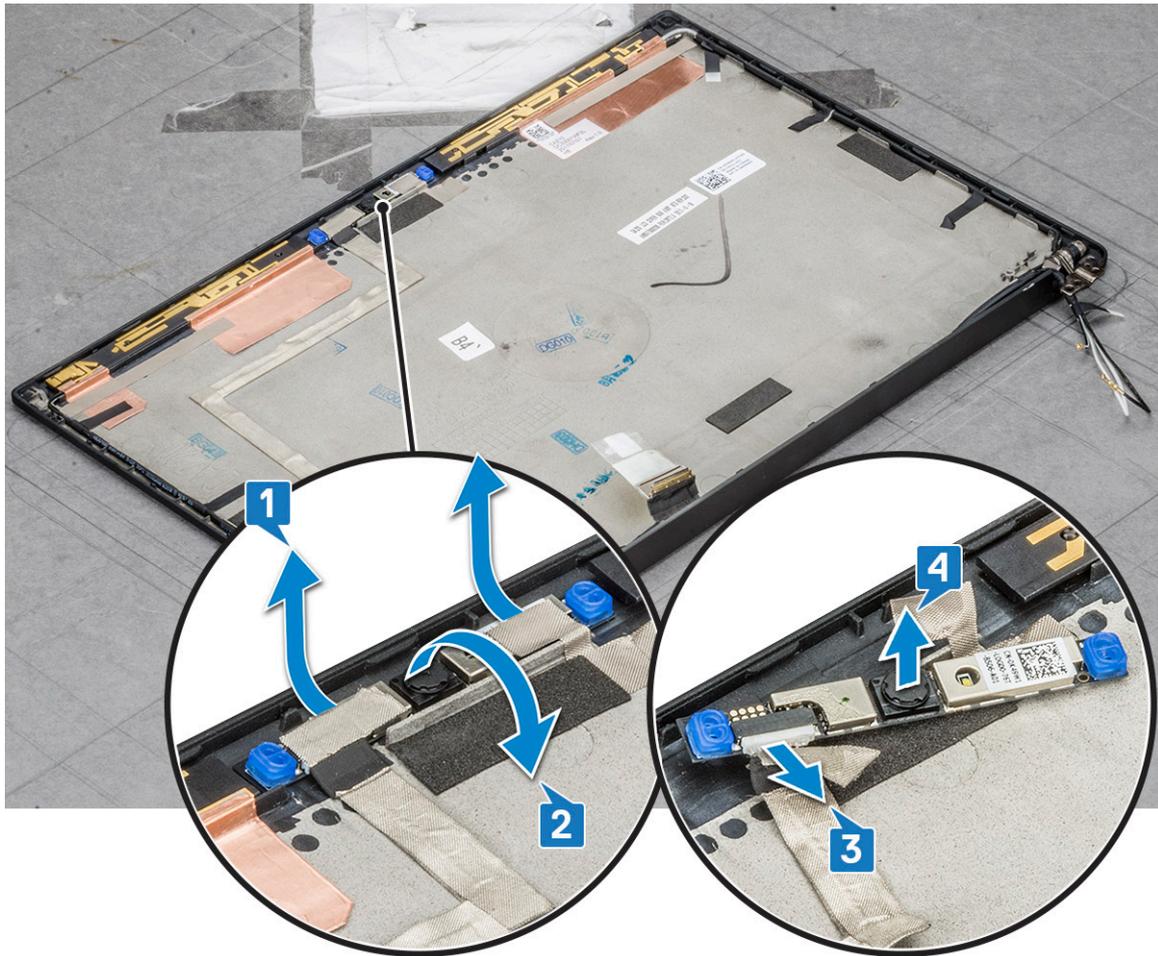
Installing camera

The installation procedure is applicable only for systems shipping with a nontouch display configuration.

1. Insert the camera module into the slot on the display assembly.
2. Connect the camera cable.
3. Install the display bezel.
4. Install the display assembly.
5. Install the display hinges.
6. Install the display panel.
7. Install the WLAN card.
8. Install the WWAN card.
9. Connect the battery cable to the connector on the system board.
10. Install the base cover.
11. Follow the procedure in After working inside your computer.

> (i) **NOTE:** The two conductive tape pieces must be removed and then reattached when replacing the camera module.

Display Hinge Caps

Removing the display hinge cap

1. Follow the procedure in Before working inside your computer.

2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. Remove the WLAN card.
5. Remove the WWAN card.
6. Remove the display assembly.
7. Slide hinge cap from left to the right to release and remove the display hinge cap from the display panel.

Installing the display hinge cap

1. Place the display hinge cap on the slot and slide it back to fit on the display assembly.

   (i) **NOTE:** The display cable, touch sensor cable (for models shipped with a touchscreen display assembly), and ASA antenna cable (for models shipped with an infinity bezel) must be routed correctly in the routing channels around the left display hinge. Then, using the piece of tape attached to the display cable, secure it to the display back-cover.

2. Install the display assembly.
3. Install the WLAN card.
4. Install the WWAN card.
5. Connect the battery cable to the connector on the system board.
6. Install the base cover.
7. Follow the procedure in After working inside your computer.

System board

Removing system board

1. Follow the procedure in Before working inside your computer.

   (i) **NOTE:** If your computer is shipped with a WWAN card, then the removal of a blank SIM card tray is a requirement.

2. Remove the SIM card.

3. Remove the dummy SIM card tray.
4. Remove the base cover.
5. Disconnect the battery cable from the connector on the system board.
6. Remove the memory module.
7. Remove the PCIe SSD.
8. Remove the WLAN card.
9. Remove the WWAN card.
10. Remove the heat sink assembly.

To identify the screws, seescrew list.

11. To remove the memory module bracket:
    a. Remove the two (M2.0 x 3.0) screws that secure memory module bracket to the system board [1].
    b. Lift the memory module bracket from the system board [2].
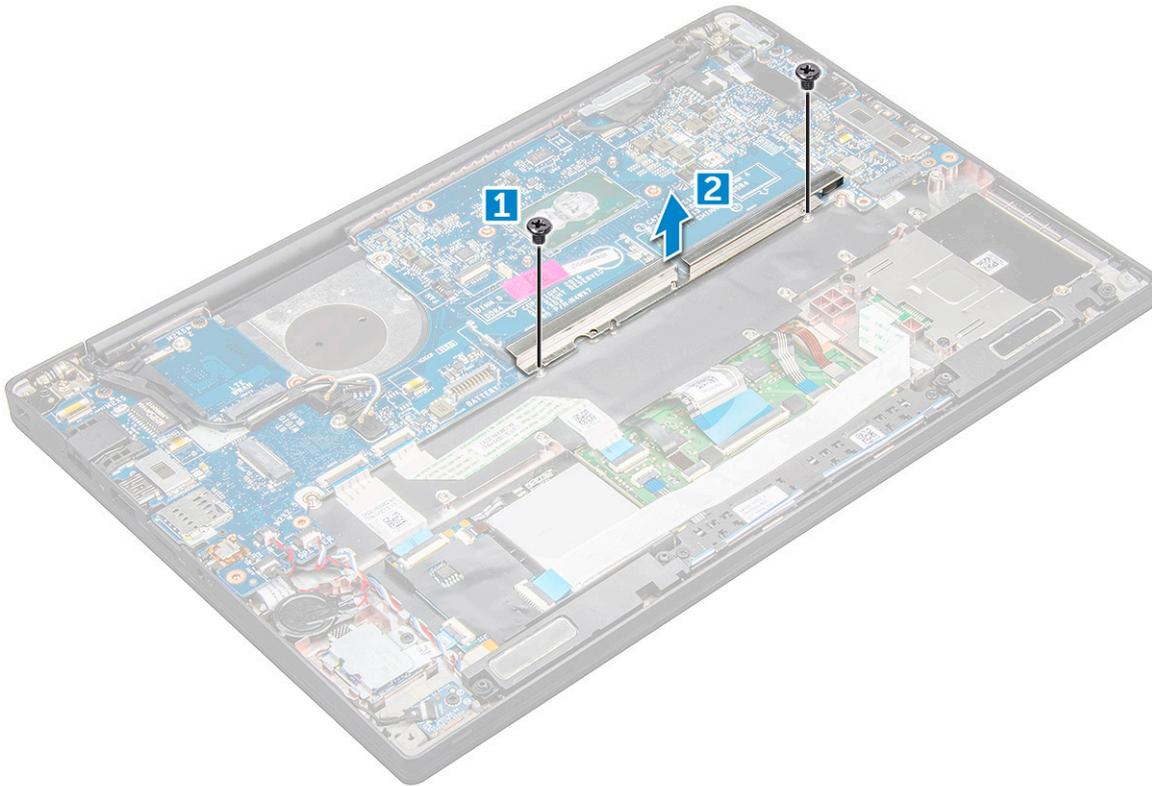
12. To disconnect the eDP cable:display assembly
13. To disconnect the cables:

   ⓘ **NOTE:** To disconnect the speaker, LED board, coin cell battery, and the power connector port cables, use a plastic scribe to release the cables from the connectors. Do not pull the cable as it may result in breakage.

    a. speaker cable [1]
    b. LED board cable [2]
    c. coin cell battery cable [3]
    d. touchpad cable and USH board cable [4]
    e. power connector port [5]
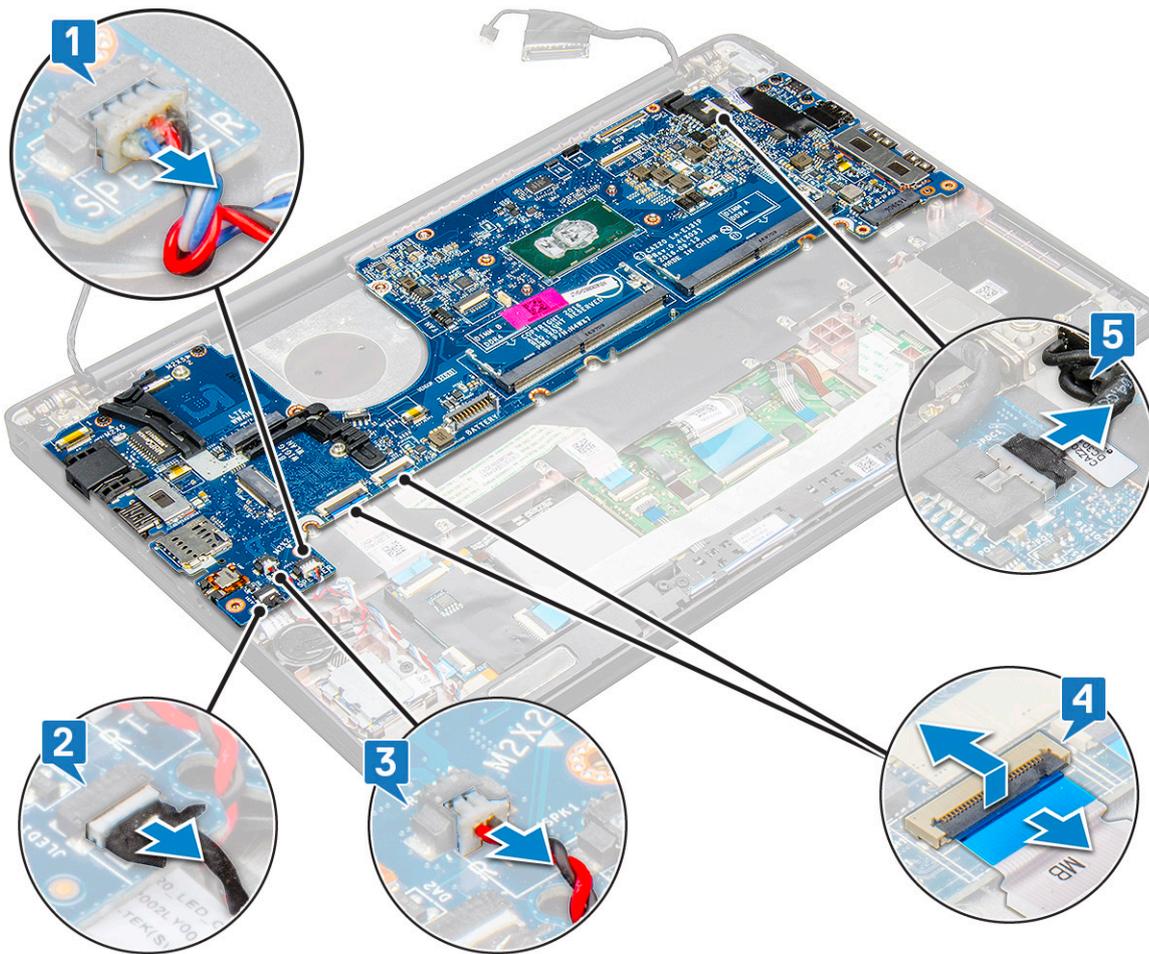
14. To remove the system board:
    a. Remove the USB type-C bracket.
       Image does not display the USB type-C bracket removal.
    b. Remove the three (M2.0 x 5.0) screws that secure the system board [1].
    c. Lift the system board away from the computer [2].
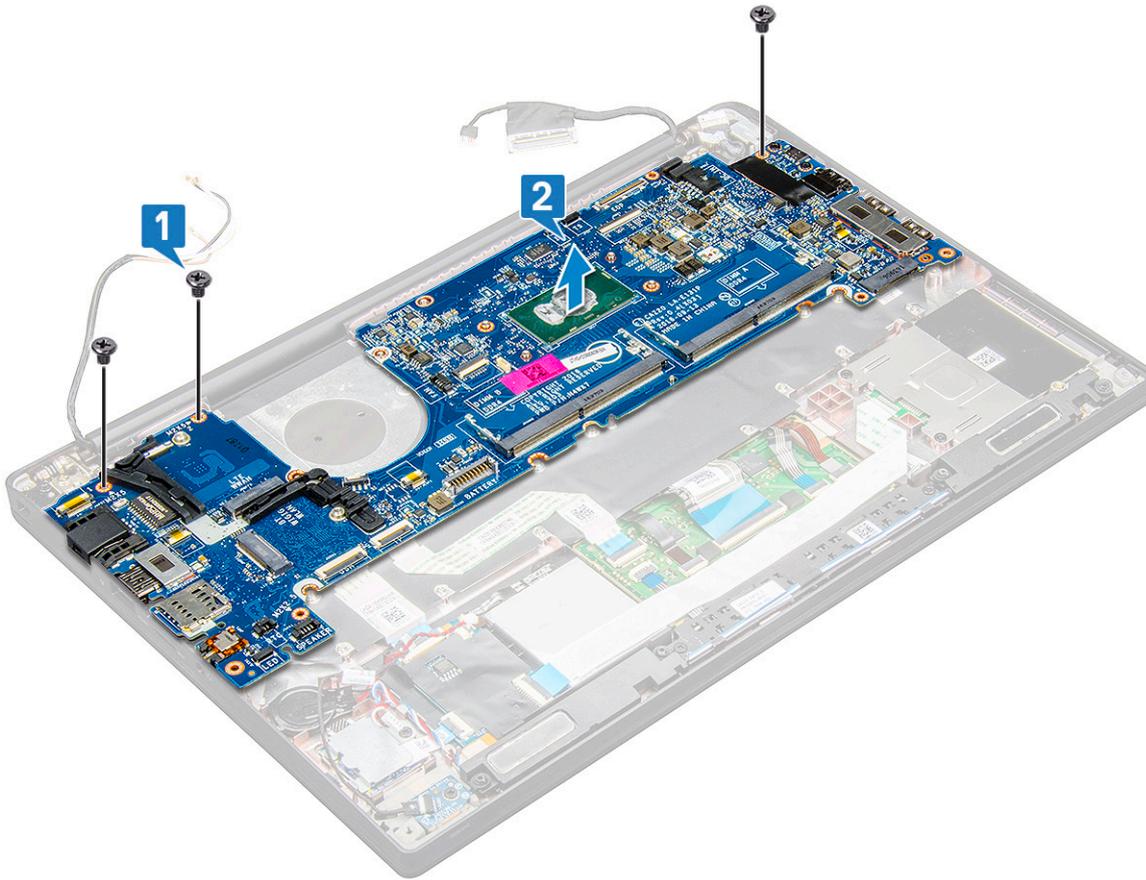
15. Remove the two (M2.0x5.0) screws that secure the USB Type-C bracket.
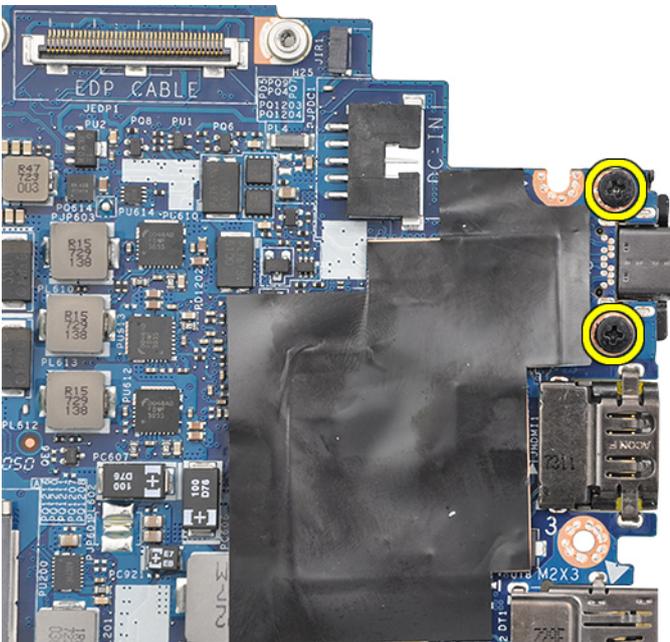
16. Flip the system board, peel off the tapes securing the bracket and remove the USB Type-C port from the system board.
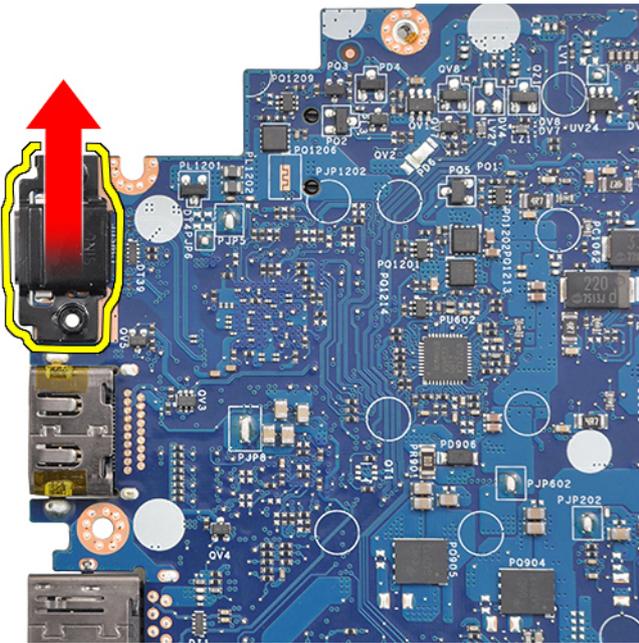
ⓘ **NOTE:** When removing or reinstalling the USB Type-C bracket to the system board, technicians must place the system board on an ESD mat to avoid damage.

Installing system board

1. Align the system board with the screw holders on the system.
2. Replace the M2.0 x 3.0 screws to secure the system board to the system.
3. Connect the speaker, LED board, coin cell battery, touchpad, and USH cables, and power connector, cables to the connectors on the system board.
4. Connect the eDP cable to the connector on the system board.
5. Place the metal bracket over the eDP cable and replace the M2.0 x 3.0 screws to secure it.
6. Place the metal bracket over the memory module connectors and replace the M2.0 x 3.0 screws to secure it to the system.

   ⓘ **NOTE:** Replacement system boards do not include the SIM card tray (if available), USB Type-C bracket, and DDR ESD bracket and must be transferred.

7. Install the heat sink.
8. Install the WLAN card.
9. Install the WWAN card.
10. Install the PCIe SSD card.
11. Install the memory module.
12. Connect the battery cable to the connector on the system board.
13. Install the base cover.
14. Install the dummy SIM card tray.
15. Install the SIM card.
16. Follow the procedure in After working inside your computer.

Keyboard

Removing keyboard assembly

ⓘ **NOTE:** The keyboard and the keyboard tray together are called the keyboard assembly.

1. Follow the procedure in Before working inside your computer.
2. Remove the base cover.
3. Disconnect the battery cable from the connector on the system board.
4. Remove the memory module.
5. Remove the PCIe SSD.
6. Remove the WLAN card.
7. Remove the WWAN card.
8. Remove the heat sink assembly.
9. Remove the system board.
10. Disconnect the cables from the palmrest end:
    a. keyboard cable [1]
    b. keyboard backlight cable [2] , USH Board cable(Optional)
    c. Touchpad and USH board cables [3,4]
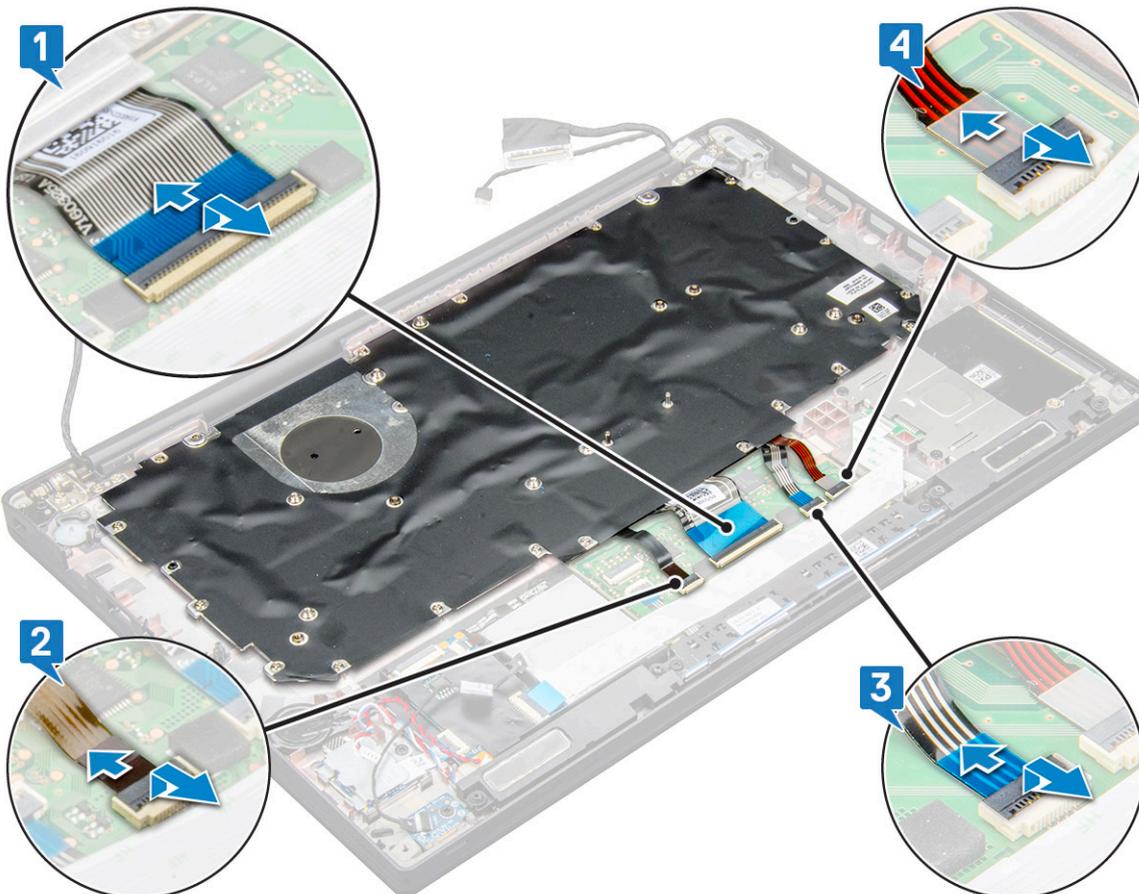
11. To remove the keyboard assembly:

    ⓘ **NOTE:** To identify the screws, see screw list

    a. Remove the 18 (M2.0 x 2.5) screws that secure the keyboard [1].
    b. Lift the keyboard assembly from the chassis [2].
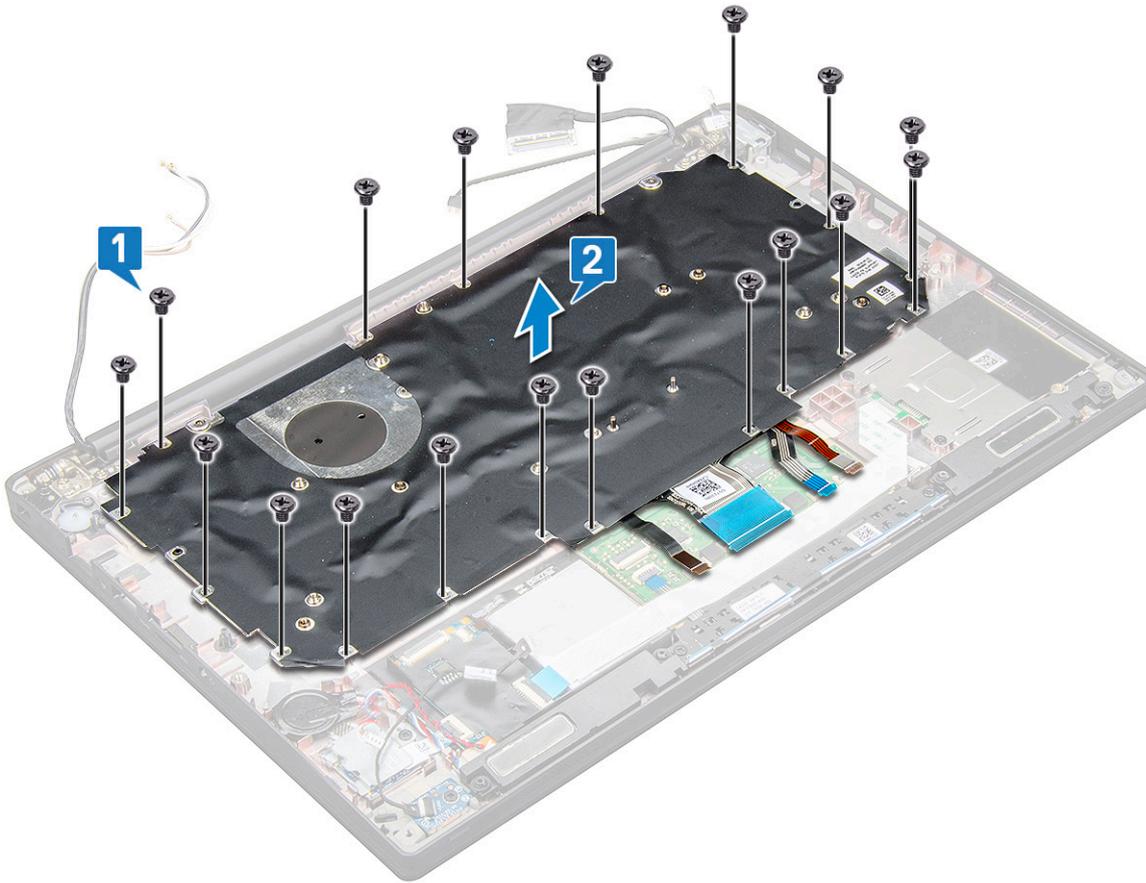
Removing keyboard from keyboard tray

1. Follow the procedure in Before working inside your computer.
2. Remove the keyboard assembly.
3. Remove the five M2.0 x 2.0 screws that secure the keyboard to the keyboard assembly.

4. Lift the keyboard away from the keyboard tray.

Installing keyboard to keyboard tray

1. Align the keyboard with the screw holders on the keyboard tray.

2. Tighten the five M2.0 x 2.0 screws to secure the keyboard to the keyboard tray.

3. Install the keyboard assembly.

Installing keyboard assembly

ⓘ **NOTE:** The keyboard and the keyboard tray together are called the keyboard assembly.

ⓘ **NOTE:** The keyboard has multiple snap points on the lattice side which must be pushed down firmly at the snap points in order to secure and fit it to the replacement keyboard.

1. Align the keyboard assembly with the screw holders on the computer.
2. Tighten the M2.0 x 2.5 screws that secure the keyboard to the chassis.
3. Connect the keyboard cable, USH board cable (optional), keyboard backlight cable, and touchpad cable to the connectors on the touchpad buttons board.
4. Install the system board.
5. Install the heat sink.
6. Install the WLAN card.
7. Install the WWAN card.
8. Install the PCIe SSD card.
9. Install the memory module.
10. Connect the battery cable to the connector on the system board.
11. Install the base cover.
12. Follow the procedure in After working inside your computer.

Palm rest

## Replacing palm rest

1. Follow the procedure in Before working inside your computer.
2. Remove the:
   a. base cover
   b. battery
   c. memory module
   d. PCIe SSD
   e. WLAN card
   f. WWAN card
   g. heat sink assembly

h. system board
i. power connector port
j. coin cell battery
k. speaker

The component you are left with is the palm rest.

3. Replace the palm rest.
4. Install the:
   a. speaker
   b. coin cell battery
   c. power connector port
   d. system board
   e. heat sink
   f. WLAN card
   g. WWAN card
   h. PCIe SSD card
   i. memory module
   j. battery
   k. base cover
5. Follow the procedure in After working inside your computer.

Technology and components

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

Topics:

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.
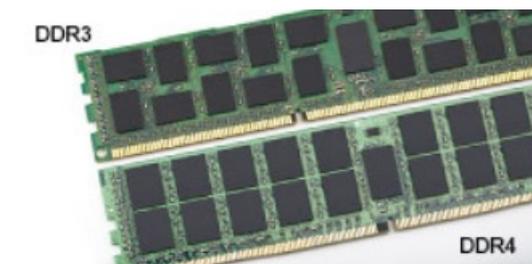
Figure 1. Notch difference

Increased thickness

DDR4 modules are slightly thicker than DDR3, to accommodate more signal layers.
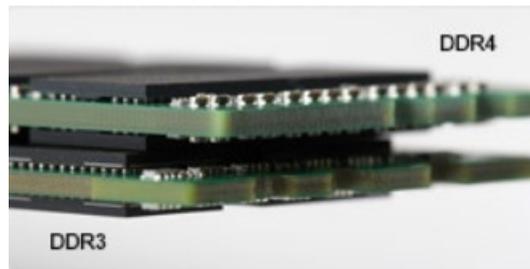
Figure 2. Thickness difference

Curved edge

DDR4 modules feature a curved edge to help with insertion and alleviate stress on the PCB during memory installation.
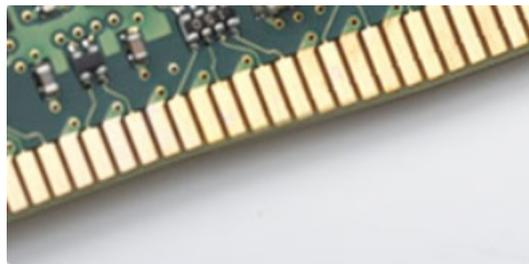
Figure 3. Curved edge

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.

(i) **NOTE:** The DDR4 memory is imbedded in board and not a replaceable DIMM as shown and referred.

HDMI 1.4

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

HDMI (High-Definition Multimedia Interface) is an industry-supported, uncompressed, all-digital audio/video interface. HDMI provides an interface between any compatible digital audio/video source, such as a DVD player, or A/V receiver and a compatible digital audio and/or video monitor, such as a digital TV (DTV). The intended applications for HDMI TVs, and DVD players. The primary advantage is cable reduction and content protection provisions. HDMI supports standard, enhanced, or high-definition video, plus multichannel digital audio on a single cable.

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

HDMI 1.4 Features

● **HDMI Ethernet Channel** - Adds high-speed networking to an HDMI link, allowing users to take full advantage of their IP-enabled devices without a separate Ethernet cable
● **Audio Return Channel** - Allows an HDMI-connected TV with a built-in tuner to send audio data "upstream" to a surround audio system, eliminating the need for a separate audio cable
● **3D** - Defines input/output protocols for major 3D video formats, paving the way for true 3D gaming and 3D home theater applications
● **Content Type** - Real-time signaling of content types between display and source devices, enabling a TV to optimize picture settings based on content type
● **Additional Color Spaces** - Adds support for additional color models used in digital photography and computer graphics

- **4K Support** - Enables video resolutions far beyond 1080p, supporting next-generation displays that will rival the Digital Cinema systems used in many commercial movie theaters
- **HDMI Micro Connector** - A new, smaller connector for phones and other portable devices, supporting video resolutions up to 1080p
- **Automotive Connection System** - New cables and connectors for automotive video systems, designed to meet the unique demands of the motoring environment while delivering true HD quality

Advantages of HDMI

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

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.

Table 2. USB evolution

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

USB 3.0/USB 3.1 Gen 1 (SuperSpeed USB)

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

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

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

Speed

Currently, there are 3 speed modes defined by the latest USB 3.0/USB 3.1 Gen 1 specification. They are Super-Speed, Hi-Speed and Full-Speed. The new SuperSpeed mode has a transfer rate of 4.8 Gbps. While the specification retains Hi-Speed, and

Full-Speed USB mode, commonly known as USB 2.0 and 1.1 respectively, the slower modes still operate at 480 Mbps and 12 Mbps respectively and are kept to maintain backward compatibility.

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

● An additional physical bus that is added in parallel with the existing USB 2.0 bus (refer to the picture below).
● USB 2.0 previously had four wires (power, ground, and a pair for differential data); USB 3.0/USB 3.1 Gen 1 adds four more for two pairs of differential signals (receive and transmit) for a combined total of eight connections in the connectors and cabling.
● USB 3.0/USB 3.1 Gen 1 utilizes the bidirectional data interface, rather than USB 2.0's half-duplex arrangement. This gives a 10-fold increase in theoretical bandwidth.
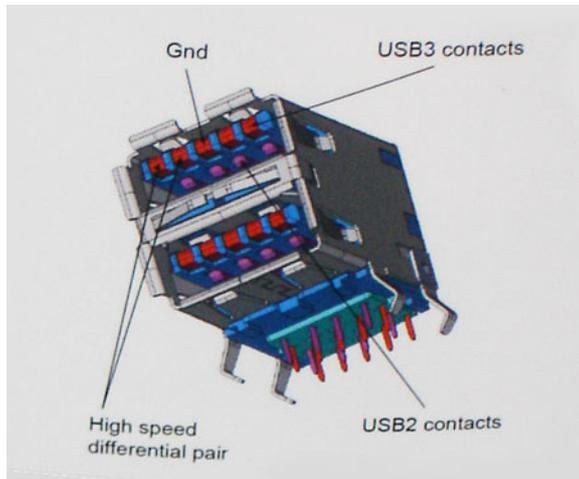
With today's ever increasing demands placed on data transfers with high-definition video content, terabyte storage devices, high megapixel count digital cameras etc., USB 2.0 may not be fast enough. Furthermore, no USB 2.0 connection could ever come close to the 480Mbps theoretical maximum throughput, making data transfer at around 320 Mbps (40 MB/s) — the actual real-world maximum. Similarly, USB 3.0/USB 3.1 Gen 1 connections will never achieve 4.8Gbps. We will likely see a real-world maximum rate of 400MB/s with overheads. At this speed, USB 3.0/USB 3.1 Gen 1 is a 10x improvement over USB 2.0.

Applications

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

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

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

Compatibility

The good news is that USB 3.0/USB 3.1 Gen 1 has been carefully planned from the start to peacefully co-exist with USB 2.0. First of all, while USB 3.0/USB 3.1 Gen 1 specifies new physical connections and thus new cables to take advantage of the

higher speed capability of the new protocol, the connector itself remains the same rectangular shape with the four USB 2.0 contacts in the exact same location as before. Five new connections to carry receive and transmitted data independently are present on USB 3.0/USB 3.1 Gen 1 cables and only come into contact when connected to a proper SuperSpeed USB connection.

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 is10Gbps . 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.

Thunderbolt over USB Type-C

Thunderbolt is a hardware interface that combines data, video, audio, and power in a single connection. Thunderbolt combines PCI Express (PCIe) and DisplayPort (DP) into one serial signal, and additionally provides DC power, all in one cable. Thunderbolt 1 and Thunderbolt 2 use the same connector [1] as miniDP (DisplayPort) to connect to peripherals, while Thunderbolt 3 uses a USB Type-C connector [2].

Figure 4. Thunderbolt 1 and Thunderbolt 3

1. Thunderbolt 1 and Thunderbolt 2 (using a miniDP connector)
2. Thunderbolt 3 (using a USB Type-C connector)

Thunderbolt 3 over USB Type-C

Thunderbolt 3 brings Thunderbolt to USB Type-C at speeds up to 40 Gbps, creating one compact port that does it all - delivering the fastest, most versatile connection to any dock, display or data device like an external hard drive. Thunderbolt 3 uses a USB Type-C connector/port to connect to supported peripherals.

1. Thunderbolt 3 uses USB Type-C connector and cables - It is compact and reversible
2. Thunderbolt 3 supports speed up to 40 Gbps
3. DisplayPort 1.2 – compatible with existing DisplayPort monitors, devices and cables
4. USB Power Delivery - Up to 130W on supported computers

Key Features of Thunderbolt 3 over USB Type-C

1. Thunderbolt, USB, DisplayPort and power on USB Type-C on a single cable (features vary between different products)
2. USB Type-C connector and cables which are compact and reversible
3. Supports Thunderbolt Networking (*varies between different products)
4. Supports up to 4K displays
5. Up to 40 Gbps

(i) **NOTE:** Data transfer speed may vary between different devices.

System specifications

Topics:

- Technical specifications
- Hot key combinations

Technical specifications

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

Table 3. Specifications

Type	Feature
Processor family	Intel Core i5-8250U (Quad Core, 3.4GHz, 6M Cache, 15 W) Intel Core i5-8350U (Quad Core, 3.6GHz, 6M Cache, 15 W) vPro Intel Core i7-8650U (Quad Core, 3.9 GHz, 8M Cache, 15 W) vPro Intel Core i3-7130U (Dual Core, 2.7 GHz, 3M cache, 15 W) Intel Core i5-7300U (Dual Core, 3.5 GHz, 3M Cache, 15 W) vPro
System	- Chipset: Intel Kaby Lake - U/R—Integrated in the processor - DRAM bus width: 64 - Bit - Flash EPROM: SPI 128 Mbits - PCIe bus: 100 MHz - External Bus Frequency: DMI 3.0-8GT/s
Operating System	- Microsoft Windows 10 Home - Microsoft Windows 10 Pro 64 bit - Ubuntu 16.04 LTS - Windows 10 China Netcom Govt Edition Support (China only)
Memory	- DDR4 2400 SDRAM operates at 2133 with Intel 7th Gen - DDR4 2400 SDRAM operates at 2400 with Intel 8th Gen 2 DIMM slots supporting up to 32 GB
Video	- Intel HD Graphics 620 (7th Gen Intel Core) - Intel UHD Graphics 620 (8th Gen Intel Core)
Audio	- Types: Four-channel high-definition audio - Controller: Realtek ALC3246 - Stereo conversion: 24-bit-analog-to-digital and digital-to-analog - Internal interface: High-definition audio - External interface: Microphone-in, stereo headphones, and headset combo connector - Speakers: Two - Internal speaker amplifier: 2 W (RMS) per channel - Volume controls: Hot keys
Display	14.0 inch HD (1366 x 768) Anti-Glare, HD CAM/Mic, WLAN capable, Mag Alloy back, Non Touch

Table 3. Specifications (continued)

	● 14.0 inch HD (1366 x 768) Anti-Glare, HD CAM/Mic, WLAN/WWAN, Mag Alloy back, Non Touch
	● 14.0 inch FHD (1920 x 1080) Anti-Glare, HD CAM/Mic, WLAN capable, Mag Alloy back, Non Touch
	● 14.0 inch FHD (1920 x 1080) Anti-Glare, HD CAM/Mic, WWAN/ WLAN, Mag Alloy back, Non Touch
	● 14.0 inch FHD (1920 x 1080) Anti-Glare, Mic only, WLAN capable, Mag Alloy back, Non Touch
	● 14.0 inch FHD (1920 x 1080) Anti-Glare, Super Low Power Panel (SLP), HD CAM/Mic, WLAN w/ASA, Narrow Border Mag Alloy back, Non Touch
	● 14.0 inch FHD (1920 x 1080) Anti-Glare, Super Low Power Panel (SLP), IR CAM/Mic, WLAN w/ASA, Narrow Border Mag Alloy back, Non Touch
	● 14.0 inch FHD (1920 x 1080), Anti-Glare, HD CAM/Mic, WLAN/ WWAN, Mag Alloy back, On-cell Touch
	● 14.0 inch FHD (1920 x 1080), Anti-Glare, HD CAM/Mic, WLAN w/ ASA, Narrow Border Carbon Fiber back, On-cell Touch
	● 14.0 inch FHD (1920 x 1080), Anti-Glare, IR CAM/Mic, WLAN w/ASA, Narrow Border Carbon Fiber back, On-cell Touch
Storage options	Primary Storage: ● 128 GB M.2 2280 SATA 2280 SSD ● 256 GB M.2 2280 SATA 2280 SSD ● 512 GB M.2 2280 SATA 2280 SSD ● 512 GB M.2 2280 SATA SED 2280 SSD ● 128 GB M.2 2280 PCIe SSD ● 256 GB M.2 2280 PCIe SSD ● 512 GB M.2 2280 PCIe SSD ● 1 TB M.2 2280 PCIe SSD ● 256 GB M.2 2280 PCIe SED SSD ● 512 GB M.2 2280 PCIe SED SSD
Security	TPM 2.0 FIPS 140-2 Certified, TCG Certified (February 2018) Optional Hardware Authentication Bundle 1: FIPS 201 Contacted Smart Card with Control Vault 2.0 Advanced Authentication with FIPS 140-2 Level 3 Certification Optional Hardware Authentication Bundle 2: Touch Fingerprint Reader, FIPS 201 Contacted Smart Card, Contactless Smart Card, NFC, Control Vault 2.0 Advanced Authentication with FIPS 140-2 Level 3 Certification
Docking options	● Dell Business Dock WD15 (optional) ● Dell Business Thunderbolt Dock - TB16(optional for Thunderbolt 3 equipped systems only)
Multimedia	● Integrated High-Quality Speakers ● Headset and mic combo jack ● Noise reducing array microphones ● Optional HD or IR Cam or No webcam
Optical Drive Options	External Options Only
Battery options	● 42 Whr Prismatic, ExpressCharge Capable ● 60 Whr Polymer, ExpressCharge Capable ● 60 Whr Long Life Cycle (polymer) 42 WHr (3-cell): ● Length: 95.9 mm (3.78 inch) ● Width: 5.70 mm (0.22 inch)

Table 3. Specifications (continued)

	• Height: 18.50 mm (0.71 inch) • Weight: 185.00 g (0.41lb) • Battery Capacity : 3.68 mAhr 60 WHr (4-cell): • Length: 95.9mm (3.78 inch) • Width: 5.70mm (0.22 inch) • Height: 18.50 mm (0.71 inch) • Weight: 270.00 g (0.6lb) • Battery Capacity: 7.89 mAhr 60 WHr Long Life Cycle battery (polymer): • Length: 95.9mm (3.78 inch) • Width: 5.70mm (0.22 inch) • Height: 18.50 mm (0.71 inch) • Weight: 270.00 g (0.6lb) • Battery Capacity: 7.89 mAhr
Maximum Runtime Config	• 7490 fixed hardware configuration that allows user to get significant hours of additional runtime • It features a new Super-Low-Power (SLP) panel that enables the majority of the power savings. Backlight power draw is significantly lower than standard FHD panel ⓘ **NOTE:** Up to 20 hrs. battery run time (~18% improvement over standard FHD panel) with this configuration using FHD SLP panel with 60Whr battery
Power adapter	• Type: E5 65 W or E5 90 W • Input voltage: 100 V AC to 240 V AC • Input current-maximum:1.7 A • Input frequency: 50 Hz to 60 Hz • Output current: 3.34 A and 4.62 A • Rated output voltage: 19.5 V DC • Weight: 230 g (65 W) and 320 g (90 W) • Dimensions: 22 x 66 x 106 mm (65 W) and 22 x 66 x 130 (90 W) • Temperature range-Operating: 0°C to 40°C (32°F to 104°F) • Temperature range-Non-Operating: -40°C to 70°C (-40°F to 158°F)
Communications	Network adapter: Intel i219LM Gigabit Ethernet Controller,10/100/1000 Mb/s Ethernet (RJ-45) Wireless and Modem: • Qualcomm QCA61x4A 802.11ac Dual Band (2x2) Wireless Adapter + Bluetooth 4.1 Wireless Card • Intel Dual-Band Wireless-AC 8265 Wi-Fi Wireless Card (No BT) (2x2) • Intel Dual-Band Wireless-AC 8265 Wi-Fi + BT4.2 Wireless Card (2x2) • Intel Tri-Band Wireless-AC 18265 WiGig + Wi-Fi + BT4.2 Wireless Card • Qualcomm Snapdragon™ X7 LTE-A (DW5811e) • Qualcomm Snapdragon™ X7 HSPA+ (DW5811e) • Qualcomm Snapdragon™ X7 LTE-A (DW5816e)
Ports, Slots, and Chassis	• HDMI 1.4(1) • Universal Jack • MultiMedia card reader (SD 4.0) • uSIM (external) • 3x USB 3.1 Gen1 (one with PowerShare)

Table 3. Specifications (continued)

	• DisplayPort over USB Type-C(optional Thunderbolt 3(1) • RJ45 • Optional Smartcard • Noble lock wedge slot • DC-in
Camera	• Type: HD fixed focus • Sensor type: CMOS sensor technology • Imaging rate: Up to 30 frames per second • Video Resolution: 1280 x 720 pixels (0.92 MP)
Touchpad	Active area • X-axis—99.50 mm • Y-axis—53.0 mm • X/Y position resolution— X: 1048cpi; Y:984cpi • Multi-touch—Configurable single finger and multi-finger gestures
Internal Keyboards	• 14.1 inches Single Pointing, non backlit • 14.1 inches Dual Pointing, backlit
Physical specifications	• Front height to Back (Non Touch) : 0.69 to 0.70 inches; 7.47 to 17.9 • Width: 13.03 inch; 331.0 mm • Depth: 8.70 inch; 220.9 mm • Starting weight: 1.4 kg; 3.11 lbs
Environmental specifications	Temperature Specifications • Operating: 0°C to 35°C (32°F to 95°F) • Storage : −40°C to 65°C (−40°F to 149°F) Relative humidity—maximum Specifications • Operating: 10% to 90% (non-condensing) • Storage: 5% to 95% (non-condensing) Altitude—maximum Specifications • Operating: 0 to 3048 m (0 to 10,000 ft) • Non-operating: 5% to 95% (non-condensing) • Airborne contaminant level: G2 or lower as defined by ISA S71.04–1985

Display specifications in detail

Table 4. 14.0 inches (16:9) AG HD (1366 x 768) WLED 200 nits (typ) eDP 1.2 ,HD CAM/Mic, WLAN capable, Mag Alloy back, Non Touch

Feature	Specification
Type	HD Anti-Glare
Luminance (typical)	200 nits
Dimensions (Active Area)	• Height: 173.95 mm(maximum) • Width: 309.4 mm(maximum) • Diagonal: 14.0 inch
Native Resolution	1366 x 768
Megapixels	1.05
Pixels per Inch (PPI)	112
Contrast Ratio (min)	300:1

Table 4. 14.0 inches (16:9) AG HD (1366 x 768) WLED 200 nits (typ) eDP 1.2 ,HD CAM/Mic, WLAN capable, Mag Alloy back, Non Touch (continued)

Response Time (max)	25 msec rise/fall
Refresh Rate	60 Hz
Horizontal View Angle (min)	+/- 40 degrees
Vertical View Angle (min)	+10/-30 degrees
Pixel Pitch	0.2265 mm
Power Consumption (maximum)	2.8 W

Table 5. 14.0 inches (16:9) AG HD (1366 x 768) WLED 200 nits (typ) eDP 1.2 ,HHD CAM/Mic, WLAN/ WWAN, Mag Alloy back, Non Touch

Feature	Specification
Type	HD Anti-Glare
Luminance (typical)	200 nits
Dimensions (Active Area)	- Height: 173.95 mm(maximum) - Width: 309.4 mm(maximum) - Diagonal: 14.0 inch
Native Resolution	1366 x 768
Megapixels	1.05
Pixels per Inch (PPI)	112
Contrast Ratio (min)	300:1
Response Time (max)	25 msec rise/fall
Refresh Rate	60 Hz
Horizontal View Angle (min)	+/- 40 degrees
Vertical View Angle (min)	+10/-30 degrees
Pixel Pitch	0.2265 mm
Power Consumption (maximum)	2.8 W

Table 6. 14.0 inches (16:9) AG FHD (1920 x 1080) 300 nits, eDP 1.3 w/PSR, IPS, HD CAM/Mic, WLAN capable, Mag Alloy back, Non Touch

Feature	Specification
Type	FHD Anti-Glare
Luminance (typical)	300 nits
Dimensions (Active Area)	- Height: 173.95 mm(maximum) - Width: 309.4 mm(maximum) - Diagonal: 14.0 inch
Native Resolution	1920 x 1080
Megapixels	2.07
Pixels per Inch (PPI)	157
Contrast Ratio (min)	600:1
Response Time (max)	35 msec black to white
Refresh Rate	60 Hz
Horizontal View Angle (min)	+/- 80 degrees

Table 6. 14.0 inches (16:9) AG FHD (1920 x 1080) 300 nits, eDP 1.3 w/PSR, IPS, HD CAM/Mic, WLAN capable, Mag Alloy back, Non Touch (continued)

Vertical View Angle (min)	+/- 80 degrees
Pixel Pitch	0.161 x 0.161 mm
Power Consumption (maximum)	3.8 W

Table 7. 14.0 inches (16:9) AG FHD (1920 x 1080) 300 nits, eDP 1.3 w/PSR, IPS, HD CAM/Mic, WWAN/ WLAN, Mag Alloy back, Non Touch

Feature	Specification
Type	FHD Anti-Glare
Luminance (typical)	300 nits
Dimensions (Active Area)	● Height: 173.95 mm (maximum) without metal tabs mm ● Width: 309.4 mm(maximum) ● Diagonal: 14.0 inch
Native Resolution	1920 x 1080
Megapixels	2.07
Pixels per Inch (PPI)	157
Contrast Ratio (min)	1000:1
Response Time (max)	35 msec black to white
Refresh Rate	60 Hz
Horizontal View Angle (min)	+/- 80 degrees
Vertical View Angle (min)	+/- 80 degrees
Pixel Pitch	0.161 x 0.161 mm
Power Consumption (maximum)	3.8 W

Table 8. 14.0 inches (16:9) AG FHD (1920 x 1080) 300 nits, eDP 1.3 w/PSR, IPS, Mic only, WLAN capable, Mag Alloy back, Non Touch

Feature	Specification
Type	FHD Anti-Glare
Luminance (typical)	300 nits
Dimensions (Active Area)	● Height: 173.95 mm(maximum) ● Width: 309.4 mm(maximum) ● Diagonal: 14.0 inch
Native Resolution	1920 x 1080
Megapixels	2.07
Pixels per Inch (PPI)	157
Contrast Ratio (min)	600:1
Response Time (max)	35 msec black to white
Refresh Rate	60 Hz
Horizontal View Angle (min)	+/- 80 degrees
Vertical View Angle (min)	+/- 80 degrees
Pixel Pitch	0.161 x 0.161 mm
Power Consumption (maximum)	3.8 W

Table 9. 14.0 inches (16:9) AG FHD (1920 x 1080) 300 nits, eDP 1.3 w/PSR, IPS, Super Low Power Panel (SLP), HD CAM/Mic, WLAN w/ASA, Narrow Border Mag Alloy back, Non Touch

Feature	Specification
Type	FHD Anti-Glare
Luminance (typical)	300 nits
Dimensions (Active Area)	- Height: 173.95 mm(maximum) without metal tabs - Width: 309.4 mm(maximum) - Diagonal: 14.0 inch
Native Resolution	1920 x 1080
Megapixels	2.07
Pixels per Inch (PPI)	157
Contrast Ratio (min)	1000:1
Response Time (max)	35 msec black to white
Refresh Rate	60 Hz
Horizontal View Angle (min)	+/- 80 degrees
Vertical View Angle (min)	+/- 80 degrees
Pixel Pitch	0.161 x 0.161 mm
Power Consumption (maximum)	1.99 W

Table 10. 14.0 inches (16:9) AG FHD (1920 x 1080) 300 nits, eDP 1.3 w/PSR, IPS, Super Low Power Panel (SLP), IR CAM/Mic, WLAN w/ASA, Narrow Border Mag Alloy back, Non Touch

Feature	Specification
Type	FHD Anti-Glare
Luminance (typical)	300 nits
Dimensions (Active Area)	- Height: 173.95 mm(maximum) without metal tabs - Width: 309.4 mm(maximum) - Diagonal: 14.0 inch
Native Resolution	1920 x 1080
Megapixels	2.07
Pixels per Inch (PPI)	157
Contrast Ratio (min)	1000:1
Response Time (max)	35 msec black to white
Refresh Rate	60 Hz
Horizontal View Angle (min)	+/- 80 degrees
Vertical View Angle (min)	+/- 80 degrees
Pixel Pitch	0.161 x 0.161 mm
Power Consumption (maximum)	1.99 W

Table 11. 14.0 inches (16:9) AG FHD (1920 x 1080) 300 nits, eDP 1.3 w/PSR, IPS, HD CAM/Mic, WLAN/ WWAN, Mag Alloy back, On-cell Touch

Feature	Specification
Type	FHD Anti-Glare
Luminance (typical)	300 nits

Table 11. 14.0 inches (16:9) AG FHD (1920 x 1080) 300 nits, eDP 1.3 w/PSR, IPS, HD CAM/Mic, WLAN/ WWAN, Mag Alloy back, On-cell Touch (continued)

Dimensions (Active Area)	- Height: 173.95 mm(maximum) - Width: 309.4 mm(maximum) - Diagonal: 14.0 inch
Native Resolution	1920 x 1080
Megapixels	2.07
Pixels per Inch (PPI)	157
Contrast Ratio (min)	600:1
Response Time (max)	35 msec black to white
Refresh Rate	60 Hz
Horizontal View Angle (min)	+/- 80 degrees
Vertical View Angle (min)	+/- 80 degrees
Pixel Pitch	0.161 x 0.161 mm
Power Consumption (maximum)	4.1 W

Table 12. 14.0 inches (16:9) AG FHD (1920 x 1080) 300 nits, eDP 1.3 w/PSR, IPS, HD CAM/Mic, WLAN w/ASA, Narrow Border Carbon Fiber back, On-cell Touch

Feature	Specification
Type	FHD Anti-Glare
Luminance (typical)	300 nits
Dimensions (Active Area)	- Height: 173.95 mm(maximum) - Width: 309.4 mm(maximum) - Diagonal: 14.0 inch
Native Resolution	1920 x 1080
Megapixels	2.07
Pixels per Inch (PPI)	157
Contrast Ratio (min)	600:1
Response Time (max)	35 msec black to white
Refresh Rate	60 Hz
Horizontal View Angle (min)	+/- 80 degrees
Vertical View Angle (min)	+/- 80 degrees
Pixel Pitch	0.161 x 0.161 mm
Power Consumption (maximum)	4.1 W

Table 13. 14.0 inches (16:9) AG FHD (1920 x 1080) 300 nits, eDP 1.3 w/PSR, IPS, IR CAM/Mic, WLAN w/ASA, Narrow Border Carbon Fiber back, On-cell Touch

Feature	Specification
Type	FHD Anti-Glare
Luminance (typical)	300 nits
Dimensions (Active Area)	- Height: 173.95 mm(maximum) - Width: 309.4 mm(maximum) - Diagonal: 14.0 inch

Native Resolution	1920 x 1080
Megapixels	2.07
Pixels per Inch (PPI)	157
Contrast Ratio (min)	600:1
Response Time (max)	35 msec black to white
Refresh Rate	60 Hz
Horizontal View Angle (min)	+/- 80 degrees
Vertical View Angle (min)	+/- 80 degrees
Pixel Pitch	0.161 x 0.161 mm
Power Consumption (maximum)	4.1 W

Hot key combinations

Table 14. Hot key combinations

Function key combination	Latitude 7490
Fn+ESC	Fn Toggle
Fn+ F1	Speaker Mute
Fn+ F2	Volume Down
Fn+ F3	Volume Up
Fn+ F4	Mic Mute
Fn+ F5	Num Lock
Fn+ F6	Scroll Lock
Fn+ F8	Display Toggle (Win + P)
Fn+ F9	Search
Fn+ F10	Increase keyboard back light brightness
Fn+ F11	Decrease display brightness
Fn+ F12	Increase display brightness
Fn + Prt Scr	WLAN on/off
Fn + Insert	Sleep
Fn + Left Cursor	Home
Fn + Right Cursor	End

5

System setup

System setup enables you to manage your notebook hardware and specify BIOS level options. From the System setup, you can:

- Change the NVRAM settings after you add or remove hardware
- View the system hardware configuration
- Enable or disable integrated devices
- Set performance and power management thresholds
- Manage your computer security

Topics:

- BIOS overview
- Entering BIOS setup program
- Navigation keys
- One time boot menu
- System setup options
- General screen options
- System Configuration screen options
- Video screen options
- Security screen options
- Secure Boot screen options
- Intel software guard extensions screen options
- Performance screen options
- Power management screen options
- POST behavior screen options
- Manageability
- Virtualization support screen options
- Wireless screen options
- Maintenance screen options
- System logs screen options
- Admin and System password
- Updating the BIOS
- System and setup password
- Clearing CMOS settings
- Clearing BIOS (System Setup) and System passwords

BIOS overview

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

Entering BIOS setup program

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

   (i) **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 15. 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 options

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

General screen options

This section lists the primary hardware features of your computer.

Option	Description
System Information	This section lists the primary hardware features of your computer. • System Information: Displays BIOS Version, Service Tag, Asset Tag, Ownership Tag, Ownership Date, Manufacture Date, Express Service Code, the Signed Firmware update—enabled by default • Memory Information: Displays Memory Installed, Memory Available, Memory Speed, Memory Channels Mode, Memory Technology, DIMM ASize, DIMM B Size,

Option	Description
	• Processor Information: Displays Processor Type, Core Count, Processor ID, Current Clock Speed, Minimum Clock Speed, Maximum Clock Speed, Processor L2 Cache, Processor L3 Cache, HT Capable, and 64-Bit Technology
	• Device Information: Displays M.2 SATA, M.2 PCIe SSD-0, LOM MAC Address, Passthrough MAC address, Video Controller, Video BIOS Version, Video Memory, Panel Type, Native Resolution, Audio Controller, Wi-Fi Device, WiGig Device, Cellular Device, 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. Legacy Boot Sequence • Diskette Drive • Internal HDD • USB Storage Device • CD/DVD/CD-RW Drive • Onboard NIC UEFI Boot option • Windows Boot Manager(Default) **Boot list Options** • Legacy • UEFI—selected by default
Advanced Boot Options	This option allows you the legacy option ROMs to load. By default, the **Enable Legacy Option ROMs** is disabled. Enable Attempt Legacy Boot is disabled by default.
UEFI boot path security	• Always, except internal HDD • Always • Never
Date/Time	Allows you to change the date and time.

System Configuration screen options

Option	Description
Integrated NIC	Allows you to configure the integrated network controller. The options are: • Disabled • Enabled • Enable UEFI network stack: This option is enabled by default. • Enabled w/PXE
SATA Operation	Allows you to configure the internal SATA hard-drive controller. The options are: • Disabled • AHCI • RAID On: This option is enabled by default.
Drives	Allows you to configure the SATA drives on board. All drives are enabled by default. The options are: • SATA-2 • M.2 PCI-e SSD-0
SMART Reporting	This field controls whether hard drive errors for integrated drives are reported during system startup. This technology is part of the SMART (Self-Monitoring Analysis and Reporting Technology) specification. This option is disabled by default. • Enable SMART Reporting
USB Configuration	This is an optional feature.

Option	Description
	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—enabled by default
	● Enable External USB Port—enabled by default
	ⓘ **NOTE:** USB keyboard and mouse always work in the BIOS setup irrespective of these settings.
Dell Type-C Dock Configuration	**Always Allow Dell Docs**.This option is enabled by default.
Thunderbolt Adaptor Configuration	● **Enable Thunderbolt Technology Support**.This option is enabled by default. ● **Enable Thunderbolt Adaptor Boot Support** ● **Enable Thunderbolt Adaptor Pre-boot Modules** ● **Security level—No Security** ● **Security level—User Authorization**.This option is enabled by default. ● **Security level—Secure Connect** ● **Security level—Display Port Only**
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. This option 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: ● Enable Microphone—by default enable ● Enable Internal Speaker—by default enable
Keyboard Illumination	This field lets you choose the operating mode of the keyboard illumination feature. The keyboard brightness level can be set from 0% to 100%. The options are: ● Disabled ● Dim ● Bright—enabled by default
Keyboard Backlight with AC	The Keyboard Backlight with AC option does not affect the main keyboard illumination feature. Keyboard Illumination will continue to support the various illumination levels. This field has an effect when the backlight is enabled. This option is enabled by default.
Keyboard Backlight Timeout on AC	The Keyboard Backlight Timeout dims out with AC option. The main keyboard illumination feature is not affected. Keyboard Illumination will continue to support the various illumination levels. This field has an effect when the backlight is enabled. The options are: ● 5 sec ● 10 sec—enabled by default ● 15 sec ● 30 sec ● 1 min ● 5 min ● 15 min ● Never
Keyboard Backlight Timeout on Battery	The Keyboard Backlight Timeout dims out with the Battery option. The main keyboard illumination feature is not affected. Keyboard Illumination will continue to support the various illumination levels. This field has an effect when the backlight is enabled. The options are: ● 5 sec ● 10 sec—enabled by default ● 15 sec ● 30 sec ● 1 min

Option	Description
	• 5 min • 15 min • Never
Unobtrusive Mode	This option, when enabled, pressing Fn+F7 turns off all light and sound emissions in the system. To resume normal operation, press Fn+F7 again. This option is disabled by default.
Miscellaneous Devices	Allows you to enable or disable the following devices: • Enable Camera—enabled by default • Secure Digital (SD) card—enabled by default • Secure Digital (SD) card boot • Secure Digital (SD) card read-only-mode

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.

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

Security screen options

Option	Description
Admin Password	Allows you to set, change, or delete the administrator (admin) password. (i) **NOTE:** You must set the admin password before you set the system or hard drive password. Deleting the admin password automatically deletes the system password and the hard drive password. (i) **NOTE:** Successful password changes take effect immediately. Default setting: Not set
System Password	Allows you to set, change, or delete the system password. (i) **NOTE:** Successful password changes take effect immediately. Default setting: Not set
Strong Password	Allows you to enforce the option to always set strong passwords. Default Setting: Enable Strong Password is not selected. (i) **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 8 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 • Reboot bypass Default setting: Disabled

Option	Description
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	This option controls if the system allows BIOS updates through UEFI capsule packages. ● **Enable UEFI Capsule Firmware Updates**. This option is enabled by default.
TPM 2.0 Security	Allows you to enable the Trusted Platform Module (TPM) during POST. The options are: ● UEFI capsule Firmware updates—enabled by default ● TPM On—enabled by default ● Clear ● PPI Bypass for Enable Commands ● PPI Bypass for Disabled Commands ● Attestation enable—enabled by default ● Key storage enable—enabled by default ● SHA-256—enabled by default ● Disabled ● 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 and Disable options will permanently activate or disable the feature and no further changes are 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	Allows you to set an option to enter the Option ROM Configuration screens using hotkeys during boot. The options are: ● Enabled ● One Time Enable ● Disable Default setting: Enable
Admin Setup Lockout	Allows you to prevent users from entering Setup when an Administrator password is set. Default Setting: This option is enabled
Master password lockout	This option is not enabled by default
SMM Security Mitigation	This option enables or disables additional UEFI SMM Security Mitigation protections. ● **SMM Security Mitigation**

Secure Boot screen options

Option	Description
Secure Boot Enable	This option enables or disables the **Secure Boot** feature. ● Disabled ● Enabled Default setting: Disabled
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 setting: Software Controlled
Enclave Memory Size	This option sets **SGX Enclave Reserve Memory Size**. The options are: ● 32 MB ● 64 MB ● 128 MB—enabled by default

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. ● Enable Multi-Core Support Default setting: The option is enabled.
Intel SpeedStep	Allows you to enable or disable the Intel SpeedStep feature. ● Enable Intel SpeedStep

Option	Description
	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	Allows you to enable or disable the Hyper-Threading in the processor. ● Disabled ● Enabled Default setting: Enabled is selected.

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.
Enable Intel Speed Shift Technology	This option is used to enable or disable Intel speed shift technoloy. Default setting: Enable Intel Speed Shift Technology is enabled.
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: The option is disabled.
Wireless Radio Control	Allows you to enable or disable the feature that automatically switches from wired or wireless networks without depending on the physical connection. ● Control WLAN Radio ● Control WWAN Radio Default setting: The options are disabled.
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 ● LAN Only ● WLAN Only ● LAN or WLAN

Option	Description
	- Disabled - WLAN Default setting: Disabled
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 - Set battery threshold (15% to 100%) - 15 % (enabled by default) - Enable peak shift—is disabled - 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. Disabled Default setting: Disabled
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.
Sleep mode	OS Automatic selection—enabled by default Force S3
Type-C connector power	7.5 Watts 15 Watts—enabled by default

POST behavior screen options

Option	Description
Adapter Warnings	Allows you to enable or disable the system setup (BIOS) warning messages when you use certain power adapters. Default setting: Enable Adapter Warnings
Keypad (Embedded)	Allows you to choose one of two methods to enable the keypad that is embedded in the internal keyboard. - Fn Key Only—default. - By Numlock ⓘ **NOTE:** When setup is running, this option has no effect. Setup works in Fn Key Only mode.
Numlock Enable	Allows you to enable the Numlock option when the computer boots. Enable Network. This option is enabled by default.
Fn Key Emulation	Allows you to set the option where the Scroll Lock key is used to simulate the Fn key feature.

Option	Description
	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: ● Fn Lock—enabled by default ● Lock Mode Disable/Standard—enabled by default ● Lock Mode Enable/Secondary
Fastboot	Allows you to speed up the boot process by bypassing some of the compatibility steps. The options are: ● Minimal—enabled by default ● Thorough ● 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 Log	● Enable Full Screen Logo—not enabled
Warnings and errors	● Prompt on warnings and errors—enabled by default ● Continue on warnings ● Continue on warnings and errors

Manageability

Option	Description
USB provision	Enable USB provision is not selected by default
MEBX Hotkey —enabled by default	Allows you to specify whether the MEBx Hotkey function should enable, during the system boot. ● Disabled ● Enabled Default setting: Enabled

Virtualization support screen options

Option	Description
Virtualization	This field specifies whether a virtual Machine Monitor (VMM) can utilize the conditional hardware capabilities provided by Intel Virtualization Technology. Enable Intel Virtualization Technology—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 - enabled by default.
Trusted Execution	This option specifies whether a Measured Virtual Machine Monitor (MVMM) can utilize the additional hardware capabilities provided by Intel Trusted Execution Technology. The TPM Virtualization Technology, and the Virtualization technology for direct I/O must be enabled to use this feature. Trusted Execution - disabled by default.

Wireless screen options

Option	Description
Wireless Switch	Allows to set the wireless devices that can be controlled by the wireless switch. The options are: ● WWAN ● GPS (on WWAN Module) ● WLAN ● Bluetooth All the options are enabled by default. ⓘ NOTE: For WLAN enable or disable controls are tied together and they cannot be enabled or disabled independently.
Wireless Device Enable	Allows you to enable or disable the internal wireless devices. ● WWAN/GPS ● WLAN ● Bluetooth All the options are enabled by default.

ⓘ NOTE: IMEI number for WWAN can be found ont the outer box or the WWAN card.

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 ● Always perform integrity check—disabled by default

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.

Admin and System password

You can create a system or admin password to secure your computer.

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

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

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

ⓘ **NOTE:** By default system and admin password features are 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 F2 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.
   - The password can contain the numbers 0 through 9.
   - Only lower case letters are valid, upper case letters are not allowed.
   - Only the following special characters are allowed: space, ("), (+), (,), (-), (.), (/), (;), ([), (\), (]), (`).
3. Type the system password that you entered earlier in the **Confirm new password** field and click **OK**.
4. Press **Esc** and a message prompts you to save the changes.
5. Press **Y** to save the changes.
   The computer reboots.

Deleting or changing an existing system setup password

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

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

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

   ⓘ **NOTE:** If you change the System and/or Setup password, re enter the new password when prompted. If you delete the System and 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.

Updating the BIOS

Updating the BIOS in Windows

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

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

   ⓘ **NOTE:** If you do not have the Service Tag, use the SupportAssist feature to automatically identify your computer. You can also use the product ID or manually browse for your computer model.

3. Click **Drivers & Downloads**. Expand **Find drivers**.
4. Select the operating system installed on your computer.
5. In the **Category** drop-down list, select **BIOS**.
6. Select the latest version of BIOS, and click **Download** to download the BIOS file for your computer.
7. After the download is complete, browse the folder where you saved the BIOS update file.
8. Double-click the BIOS update file icon and follow the on-screen instructions.

   For more information, see knowledge base article 000124211 at www.dell.com/support.

Updating the BIOS in Linux and Ubuntu

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

Updating the BIOS using the USB drive in Windows

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

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

Updating the BIOS from the F12 One-Time boot menu

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

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

BIOS Update

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

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

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

Updating from the One-Time boot menu

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

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

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

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

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

System and setup password

Table 16. 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.

(i) **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.

Topics:

- Supported operating systems
- Downloading Windows drivers
- Chipset driver
- Video driver
- Audio driver
- Network driver
- USB driver
- Storage driver
- Other drivers

Supported operating systems

The topic lists the operating systems supported for system.

Table 17. Supported operating systems

Supported operating systems	Description
Windows 10	- Microsoft Windows 10 Pro 64-bit - Microsoft Windows 10 Home 64-bit
Other	- Ubuntu 16.04 LTS SP1 64-bit - NeoKylin v6.0 64-bit (China)

Downloading Windows 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**.

   (i) **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

Verify if the Intel chipset and Intel Management Engine Interface drivers are already installed in the system.

- ∨ 🖥 System devices
  - 🖥 ACPI Fixed Feature Button
  - 🖥 ACPI Lid
  - 🖥 ACPI Power Button
  - 🖥 ACPI Processor Aggregator
  - 🖥 ACPI Sleep Button
  - 🖥 ACPI Thermal Zone
  - 🖥 Charge Arbitration Driver
  - 🖥 Composite Bus Enumerator
  - 🖥 Dell Diag Control Device
  - 🖥 Dell System Analyzer Control Device
  - 🖥 Ethertronics Active Steering Driver
  - 🖥 High precision event timer
  - 🖥 Intel(R) Management Engine Interface
  - 🖥 Intel(R) Power Engine Plug-in
  - 🖥 Intel(R) Serial IO I2C Host Controller - 9D60
  - 🖥 Intel(R) Serial IO I2C Host Controller - 9D61
  - 🖥 Intel(R) Serial IO I2C Host Controller - 9D62
  - 🖥 Intel(R) Serial IO I2C Host Controller - 9D63
  - 🖥 Intel(R) Serial IO I2C Host Controller - 9D64
  - 🖥 Intel(R) Smart Sound Technology (Intel(R) SST) Audio Controller
  - 🖥 Intel(R) Smart Sound Technology (Intel(R) SST) OED
  - 🖥 Intel(R) Xeon(R) E3 - 1200 v6/7th Gen Intel(R) Core(TM) Host Bridge/DRAM Registers - 5914
  - 🖥 Legacy device
  - 🖥 Microsoft ACPI-Compliant Embedded Controller
  - 🖥 Microsoft ACPI-Compliant System
  - 🖥 Microsoft System Management BIOS Driver
  - 🖥 Microsoft UEFI-Compliant System
  - 🖥 Microsoft Virtual Drive Enumerator
  - 🖥 Microsoft Windows Management Interface for ACPI
  - 🖥 Microsoft Windows Management Interface for ACPI

- Intel(R) Serial IO I2C Host Controller - 9D62
- Intel(R) Serial IO I2C Host Controller - 9D63
- Intel(R) Serial IO I2C Host Controller - 9D64
- Intel(R) Smart Sound Technology (Intel(R) SST) Audio Controller
- Intel(R) Smart Sound Technology (Intel(R) SST) OED
- Intel(R) Xeon(R) E3 - 1200 v6/7th Gen Intel(R) Core(TM) Host Bridge/DRAM Registers - 5914
- Legacy device
- Microsoft ACPI-Compliant Embedded Controller
- Microsoft ACPI-Compliant System
- Microsoft System Management BIOS Driver
- Microsoft UEFI-Compliant System
- Microsoft Virtual Drive Enumerator
- Microsoft Windows Management Interface for ACPI
- Microsoft Windows Management Interface for ACPI
- Mobile 6th/7th Generation Intel(R) Processor Family I/O PCI Express Root Port #1 - 9D10
- Mobile 6th/7th Generation Intel(R) Processor Family I/O PCI Express Root Port #3 - 9D12
- Mobile 6th/7th Generation Intel(R) Processor Family I/O PCI Express Root Port #5 - 9D14
- Mobile 6th/7th Generation Intel(R) Processor Family I/O PMC - 9D21
- Mobile 6th/7th Generation Intel(R) Processor Family I/O SMBUS - 9D23
- Mobile 6th/7th Generation Intel(R) Processor Family I/O Thermal subsystem - 9D31
- Mobile 7th Generation Intel(R) Processor Family I/O LPC Controller (U with iHDCP2.2 Premium) - 9D4E
- NDIS Virtual Network Adapter Enumerator
- NFC USB Bus Driver
- PCI Express Root Complex
- Plug and Play Software Device Enumerator
- Programmable interrupt controller
- Remote Desktop Device Redirector Bus
- System CMOS/real time clock
- System timer
- UMBus Root Bus Enumerator

Video driver

Verify if the video driver is already installed in the system.

- Display adapters
    - Intel(R) UHD Graphics 620

Audio driver

Verify if audio drivers is already installed in the system.

- Sound, video and game controllers
    - Intel(R) Display Audio
    - Realtek Audio
- Audio inputs and outputs
    - Microphone Array (Realtek Audio)
    - Speakers / Headphones (Realtek Audio)

Network driver

This system comes with both LAN and WiFi drivers and is able to detect the LAN and WiFi without going through the drivers installation.

- Network adapters
  - Bluetooth Device (Personal Area Network)
  - Bluetooth Device (RFCOMM Protocol TDI)
  - Intel(R) Ethernet Connection (4) I219-LM
  - Qualcomm QCA61x4A 802.11ac Wireless Adapter
  - 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)

USB driver

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

- Universal Serial Bus controllers
  - Intel(R) USB 3.0 eXtensible Host Controller - 1.0 (Microsoft)
  - UCSI USB Connector Manager
  - USB Composite Device
  - USB Composite Device
  - USB Root Hub (USB 3.0)

Storage driver

Verify if the storage controller drivers are installed in the system.

- Storage controllers
  - Intel(R) Chipset SATA/PCIe RST Premium Controller
  - Microsoft Storage Spaces Controller
- Disk drives
  - NVMe KXG50ZNV512G NVM

Other drivers

This section lists driver details for all the other components in the Device Manager.

Security device driver

Verify if the security device driver is installed in the system.

- Security devices
  - Trusted Platform Module 2.0

HID

Verify if the HID driver is installed in the system.

- Human Interface Devices
  - Converted Portable Device Control device
  - Dell Touchpad
  - HID-compliant consumer control device
  - HID-compliant system controller
  - HID-compliant touch pad
  - HID-compliant vendor-defined device
  - HID-compliant wireless radio controls
  - I2C HID Device
  - Intel(R) HID Event Filter
  - Microsoft Input Configuration Device
  - Portable Device Control device

Control Vault Device

Verify if the control vault device driver is installed in the system.

- ControlVault Device
  - Dell ControlVault w/ Fingerprint Touch Sensor

Proximity device

Verify if the proximity device driver is installed in the system.

- Proximity devices
  - NFC Proximity Provider

Smart card reader

Verify if the smart card reader drivers are installed in the system.

- Smart card readers
  - Microsoft Usbccid Smartcard Reader (WUDF)
  - Microsoft Usbccid Smartcard Reader (WUDF)

Biometric device

Verify if the Biometric device driver is installed in the system

- Biometric devices
  - Control Vault w/ Fingerprint Touch Sensor

Image device driver

Verify if the image device driver is installed in the system.

- ∨ 📷 Imaging devices
  - 📷 Integrated Webcam

Troubleshooting

Topics:

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 Enhanced Pre-Boot System Assessment — ePSA Diagnostic 3.0

You can invoke the ePSA diagnostics by either of the following ways :
- Press the F12 key when the system posts and choose **ePSA or Diagnostics** option on One Time Boot Menu.
- Press and hold Fn(Function key on keyboard) and **Power On** (PWR) the system.

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 18. 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.

Diagnostic LED behavior

Table 19. Diagnostic LED behavior

Blinking pattern		Problem description	Suggested resolution
Amber	White		
1	1	TPM detection failure	Replace the system board.
1	2	Unrecoverable SPI Flash Failure	Replace the system board.
1	5	EC unable to program i-Fuse	Replace the system board.
1	6	Generic catch-all for ungraceful EC code flow errors	Disconnect all power source (AC, battery, coin cell) and drain flea power by pressing and holding down power button for 3~5 seconds.
2	1	CPU failure	● Run the Dell Support Assist/Dell Diagnostics tool. ● If problem persists, replace the system board.
2	2	System board failure (included BIOS corruption or ROM error)	● Flash latest BIOS version ● If problem persists, replace the system board.

Table 19. Diagnostic LED behavior (continued)

Blinking pattern		Problem description	Suggested resolution
Amber	White		
2	3	No memory/RAM detected	- Confirm that the memory module is installed properly. - If problem persists, replace the memory module.
2	4	Memory/RAM failure	- Reset and swap memory modules among the slots. - If problem persists, replace the memory module.
2	5	Invalid memory installed	- Reset and swap memory modules among the slots. - If problem persists, replace the memory module.
2	6	System board/Chipset Error	Replace the system board.
2	7	LCD failure (SBIOS message)	Replace the LCD module.
2	8	LCD failure (EC detection of power rail failure)	Replace the system board.
3	1	CMOS battery failure	- Reset the main battery connection. - If problem persists, replace the main battery.
3	2	PCI or Video card/chip failure	Replace the system board.
3	3	BIOS Recovery image not found	- Flash latest BIOS version - If problem persists, replace the system board.
3	4	BIOS Recovery image found but invalid	- Flash latest BIOS version - If problem persists, replace the system board.
3	5	Power rail failure	Replace the system board.
3	6	Flash corruption detected by SBIOS.	- Press power button for over 25 seconds to do RTC reset. If problem persists, replace the system board. - Disconnect all power source (AC, battery, coin cell) and drain flea power by pressing and holding down power button 3~5 seconds to ensure all power are drained. - Run "BIOS recovery from USB", and the instructions are in the website Dell support.

Table 19. Diagnostic LED behavior (continued)

Blinking pattern		Problem description	Suggested resolution
Amber	**White**		
			● If problem persists, replace the system board.
3	7	Timeout waiting on ME to reply to HECI message.	Replace the system board.

ⓘ **NOTE:** Blinking 3-3-3 LEDs on Lock LED (Caps-Lock or Nums-Lock), Power button LED (without Fingerprint reader), and Diagnostic LED indicates failure to provide input during LCD panel test on Dell SupportAssist Pre-boot System Performance Check diagnostics.

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 at www.dell.com/support.

Getting help and contacting Dell

Self-help resources

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

Table 20. Self-help resources

Self-help resources	Resource location
Information about Dell products and services	www.dell.com
My Dell app	
Tips	
Contact Support	In Windows search, type `Contact Support`, and press Enter.
Online help for operating system	www.dell.com/support/windows www.dell.com/support/linux
Access top solutions, diagnostics, drivers and downloads, and learn more about your computer through videos, manuals and documents.	Your Dell computer is uniquely identified by a Service Tag or Express Service Code. To view relevant support resources for your Dell computer, enter the Service Tag or Express Service Code at www.dell.com/support. For more information on how to find the Service Tag for your computer, see Locate the Service Tag on your computer.
Dell knowledge base articles for a variety of computer concerns	1. Go to www.dell.com/support. 2. On the menu bar at the top of the Support page, select **Support** > **Knowledge Base**. 3. In the Search field on the Knowledge Base page, type the keyword, topic, or model number, and then click or tap the search icon to view the related articles.

Contacting Dell

To contact Dell for sales, technical support, or customer service issues, see www.dell.com/contactdell.

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

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