

# Vostro 3881

## Service Manual



## Notes, cautions, and warnings

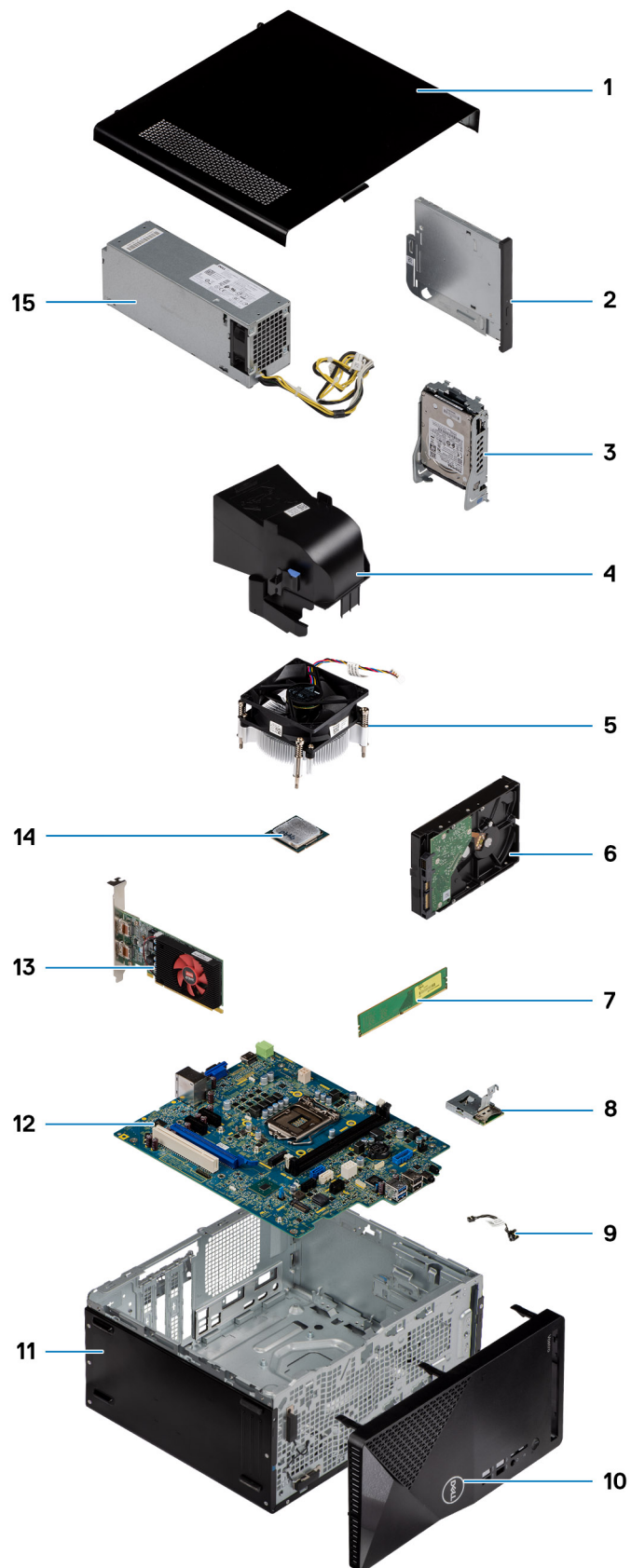
 **NOTE:** A NOTE indicates important information that helps you make better use of your product.

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

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



# Major components of your system





1. Side cover
2. Optical drive
3. 2.5-inch hard-drive assembly
4. Fan shroud
5. Heatsink assembly
6. 3.5-inch hard drive
7. Memory module
8. Media-card reader
9. Power button switch
10. Front bezel
11. Chassis
12. System board
13. Graphics card
14. Processor
15. Power-supply unit

# Technology and components

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

## 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.

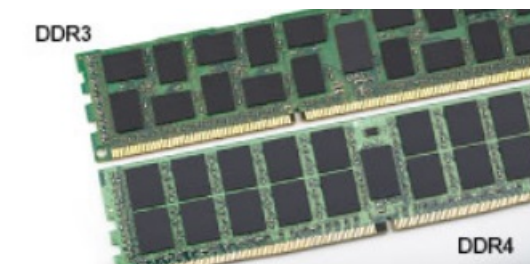
DDR4 needs 20 percent less or just 1.2 volts, compared to DDR3 which requires 1.5 volts of electrical power to operate. DDR4 also supports a new, deep power-down mode that allows the host device to go into standby without needing to refresh its memory. Deep power-down mode is expected to reduce standby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

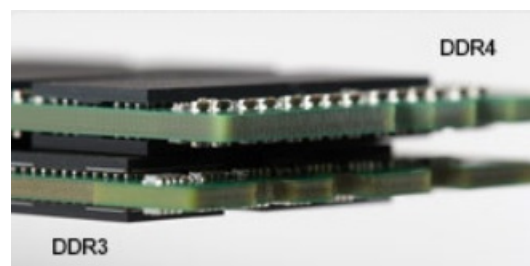
The key notch on a DDR4 module is in a different location from the key notch on a DDR3 module. Both notches are on the insertion edge but the notch location on the DDR4 is slightly different, to prevent the module from being installed into an incompatible board or platform.



**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.

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

## 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 1. USB evolution**

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

## USB 3.0/USB 3.1 Gen 1 (SuperSpeed USB)

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

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

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

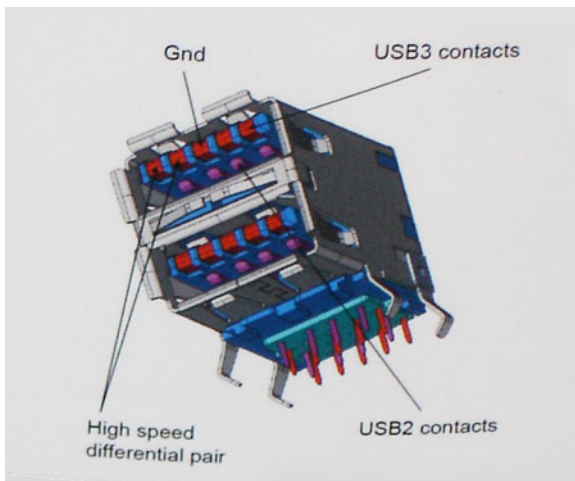


## Speed

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

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

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



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

## Applications

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

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

- External Desktop USB 3.0/USB 3.1 Gen 1 Hard Drives
- Portable USB 3.0/USB 3.1 Gen 1 Hard Drives
- USB 3.0/USB 3.1 Gen 1 Drive Docks & Adapters
- USB 3.0/USB 3.1 Gen 1 Flash Drives & Readers
- USB 3.0/USB 3.1 Gen 1 Solid-state Drives
- USB 3.0/USB 3.1 Gen 1 RAID's
- 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 standards like USB 3.1 and USB power delivery (USB PD).

### Alternate Mode

USB Type-C is a new connector standard that is very small. It is 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 same as of USB 3.1 Gen 1, while USB 3.1 Gen 2's bandwidth is 10 Gbps. 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.

## Advantages of DisplayPort over USB Type-C

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

# HDMI 2.0

This topic explains the HDMI 2.0 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.

## HDMI 2.0 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

# Working on your computer


## Safety instructions

Use the following safety guidelines to protect your computer from potential damage and to ensure your personal safety. Unless otherwise noted, each procedure included in this document assumes that you have read the safety information that shipped with your computer.


-  **WARNING:** Before working inside your computer, read the safety information that is shipped with your computer. For more safety best practices, see the Regulatory Compliance home page at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).
-  **WARNING:** Disconnect your computer from all power sources before opening the computer cover or panels. After you finish working inside the computer, replace all covers, panels, and screws before connecting your computer to an electrical outlet.
-  **CAUTION:** To avoid damaging the computer, ensure that the work surface is flat, dry, and clean.
-  **CAUTION:** To avoid damaging the components and cards, handle them by their edges, and avoid touching the pins and the contacts.
-  **CAUTION:** You should only perform troubleshooting and repairs as authorized or directed by the Dell technical assistance team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. See the safety instructions that is shipped with the product or at [www.dell.com/regulatory\\_compliance](http://www.dell.com/regulatory_compliance).
-  **CAUTION:** Before touching anything inside your computer, ground yourself by touching an unpainted metal surface, such as the metal at the back of the computer. While you work, periodically touch an unpainted metal surface to dissipate static electricity which could harm internal components.
-  **CAUTION:** When you disconnect a cable, pull it by its connector or its pull tab, not the cable itself. Some cables have connectors with locking tabs or thumbscrews that you must disengage before disconnecting the cable. When disconnecting cables, keep them evenly aligned to avoid bending the connector pins. When connecting cables, ensure that the ports and the connectors are correctly oriented and aligned.
-  **CAUTION:** Press and eject any installed card from the media-card reader.
-  **CAUTION:** Exercise caution when handling Lithium-ion batteries in laptops. Swollen batteries should not be used and should be replaced and disposed properly.
-  **NOTE:** The color of your computer and certain components may appear differently than shown in this document.

## Before working inside your computer

### About this task

-  **NOTE:** The images in this document may differ from your computer depending on the configuration you ordered.

### Steps

1. Save and close all open files and exit all open applications.
2. Shut down your computer. Click **Start** >  **Power** > **Shut down**.



**NOTE:** If you are using a different operating system, see the documentation of your operating system for shut-down instructions.

3. Disconnect your computer and all attached devices from their electrical outlets.
4. Disconnect all attached network devices and peripherals, such as keyboard, mouse, and monitor from your computer.



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

5. Remove any media card and optical disc from your computer, if applicable.

## 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 desktop 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 20 seconds should discharge residual power in the system board.

## 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.

## After working inside your computer

### About this task

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

### Steps

1. Replace all screws and ensure that no stray screws remain inside your computer.
2. Connect any external devices, peripherals, or cables you removed before working on your computer.
3. Replace any media cards, discs, or any other parts that you removed before working on your computer.
4. Connect your computer and all attached devices to their electrical outlets.
5. Turn on your computer.

# Disassembly and reassembly

## Recommended tools

The procedures in this document may require the following tools:

- Phillips screwdriver #1 and #2
- Plastic scribe

## Screw List

The following table shows the screw list and the images for different components.

- NOTE:** When removing screws from a component, it is recommended to note the screw type, the quantity of screws, and then place them in a screw storage box. This is to ensure that the correct number of screws and correct screw type is restored when the component is replaced.
- NOTE:** Some computers have magnetic surfaces. Ensure that the screws are not left attached to such surface when replacing a component.
- NOTE:** Screw color may vary with the configuration ordered.

**Table 2. Screw list**









Component	Screw type	Quantity	Image
Side cover	#6-32	2	
M.2 2230/2280 Solid-state drive	M2x3	1	
Wireless card	M2x3	1	
Power supply unit	#6-32	3	
Fan and heat-sink assembly	#6-32	4	
2.5 in. hard-drive bracket	M3x3.5	4	
3.5 in. hard-drive	#6-32	4	


Table 2. Screw list (continued)

Component	Screw type	Quantity	Image
System board	#6-32	9	

## Side cover

### Removing the side cover

**Prerequisites**

1. Follow the procedure in [Before working on your computer](#).  
 **NOTE:** Ensure that the security cable is removed from the security-cable slot (if applicable).

**About this task**

The following images indicate the location of the side cover and provide a visual representation of the removal procedure.



2



#### Steps

1. Loosen the two thumb screws (#6-32) that secures the side cover to the computer chassis.
2. Using the tab on the side cover, slide the cover towards the back and remove the side cover off the chassis.

## Installing the side cover

#### Prerequisites

If you are replacing a component, remove the existing component before performing the installation process.

#### About this task

The following image indicates the location of the side cover and provides a visual representation of the installation procedure.



### Steps

1. Align the tabs on the side cover with the slots on the chassis, and slide it towards the front of the computer.
2. Tighten the two thumb screws (#6-32) to secure the side cover to the chassis.

### Next steps

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

# Front bezel

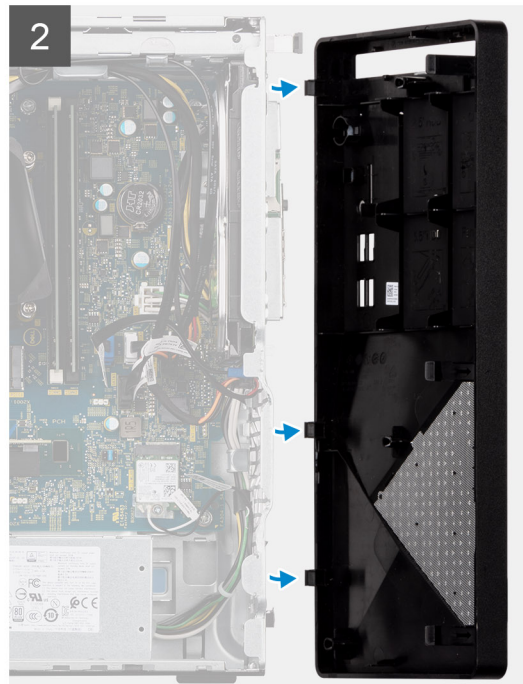
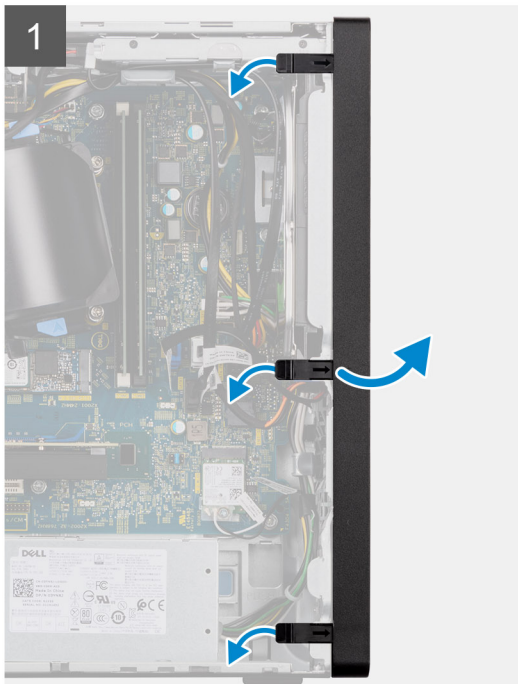
## Removing the front bezel

### Prerequisites

1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).

### About this task

The following images indicate the location of the front bezel and provide a visual representation of the removal procedure.



### Steps

1. Gently pry and release the front-cover tabs sequentially from the top.
2. Rotate the front cover outward from the chassis.
3. Remove the front bezel from the computer.

## Installing the front bezel

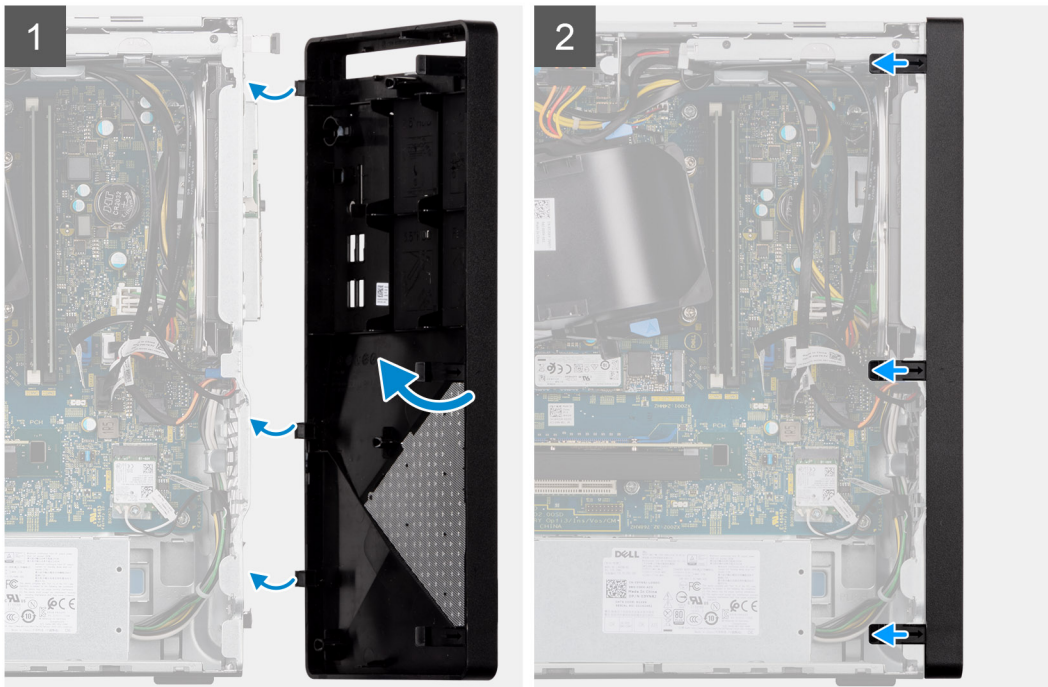
### Prerequisites

If you are replacing a component, remove the existing component before performing the installation process.



### About this task

The following image indicates the location of the front bezel and provides a visual representation of the installation procedure.



### Steps

1. Position the front bezel to align the tab holders on the bezel with the slots on the chassis.
2. Press the bezel until the tabs clicks into place and tighten the three hooks in place.

### Next steps

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

## Fan shroud

### Removing the fan shroud

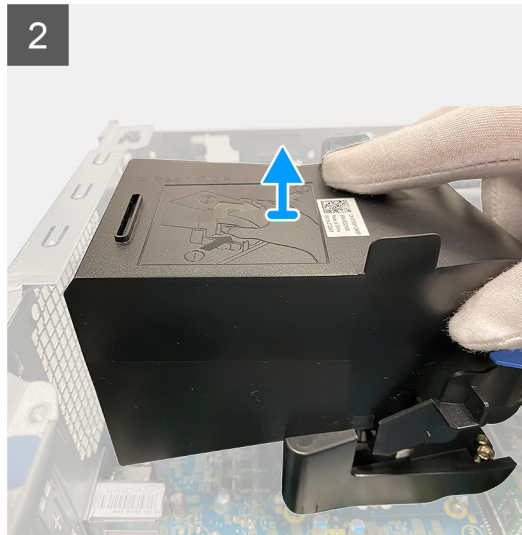
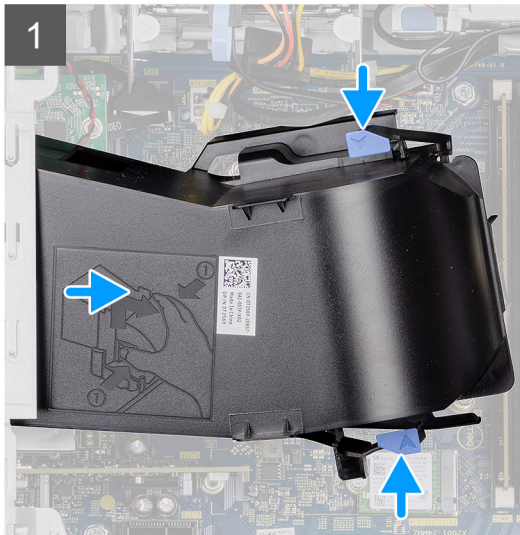
#### Prerequisites

1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).

### About this task

The following images indicate the location of the fan duct and provide a visual representation of the removal procedure.





### Steps

1. Lay the computer with its right side facing down. Press on both securing clips to release the fan shroud from the fan and heat-sink assembly.
2. Lift and remove the fan duct from the computer.

## Installing the fan shroud

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation process.

### About this task

The following image indicates the location of the fan shroud and provides a visual representation of the installation procedure.

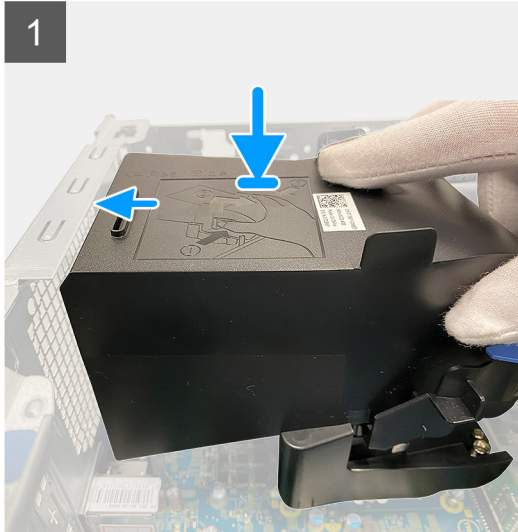


image of installing the fan

shroud

### Steps

1. Position the fan duct to align it with the retention slots on the system board.
2. Press the fan duct and ensure the retention clips snap into place.

### Next steps

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

## Memory modules

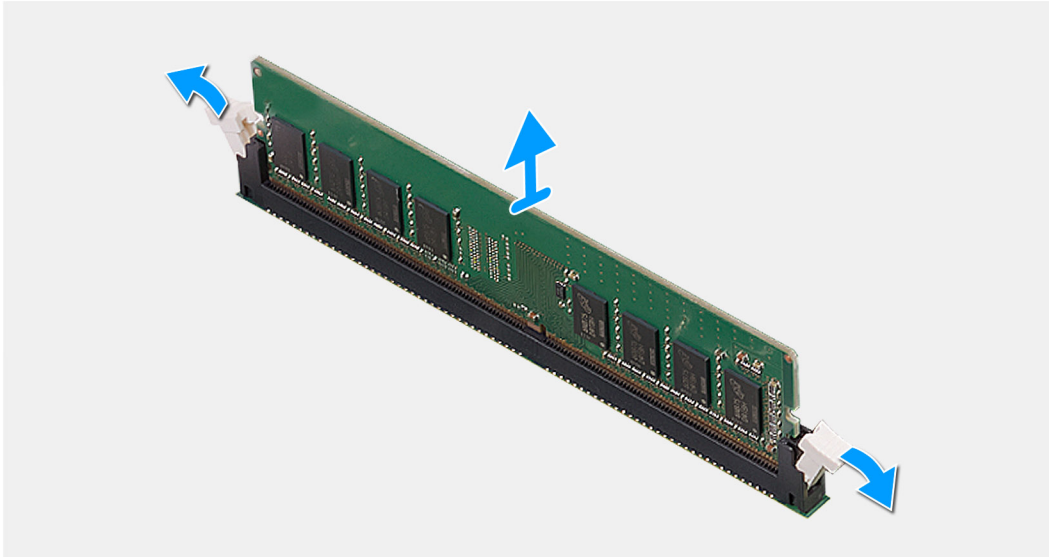
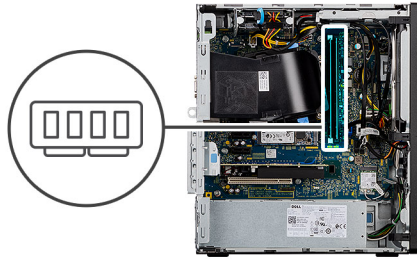
### Removing the memory modules

#### Prerequisites

1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).

#### About this task

The following images indicate the location of the memory modules and provide a visual representation of the removal procedure.



### Steps

1. Push the securing-clips from both sides away from the memory module until the memory module pops up.
  2. Slide and remove the memory module from the memory-module slot.
- NOTE:** Repeat step 2 to step 3 to remove any other memory modules installed in your computer.
- NOTE:** Make a note of the slot and the orientation of the memory module in order to install the replacement in the correct slot.
- NOTE:** If the memory module is difficult to remove, gently ease the memory module back and forth to remove it from the slot.

## Installing the memory modules

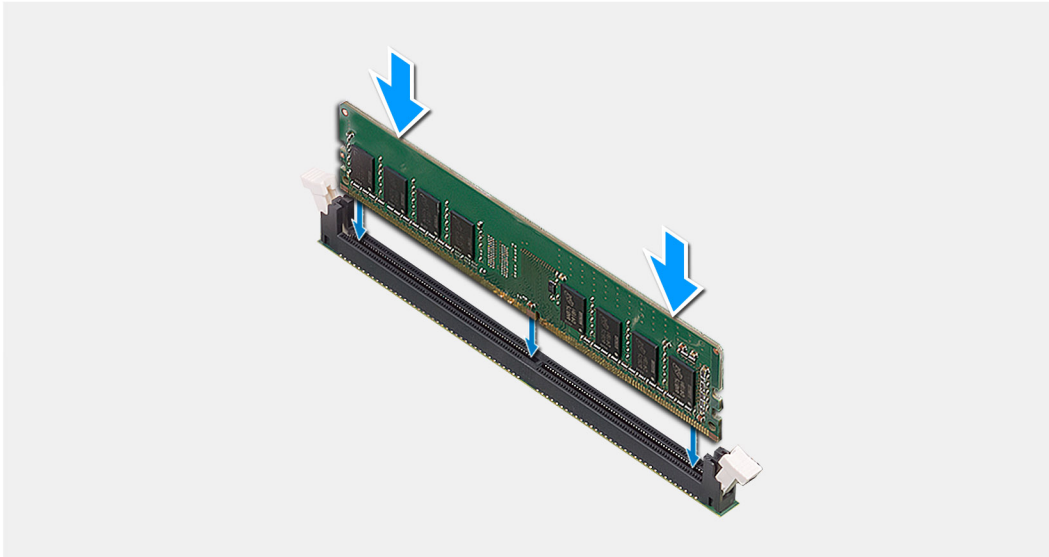
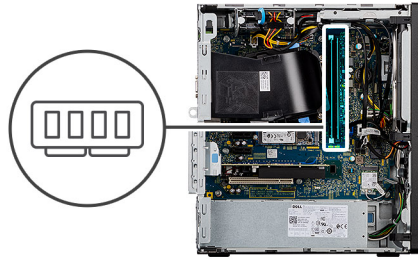
### Prerequisites

If you are replacing a component, remove the existing component before performing the installation process.

### About this task

- NOTE:** Caution: To prevent damage to the memory module, hold the memory module by the edges. Do not touch the components on the memory module.

The following image indicates the location of the memory modules and provides a visual representation of the installation procedure.



### Steps

1. Ensure that the securing-clips are in an open position.
2. Align the notch on the memory module with the tab on the memory-module slot.
3. Insert the memory module into the memory-module connector until the memory module snaps into position and the securing clip locks in place. Slide the memory module firmly into the slot at an angle and press the memory module down until it clicks into place.

**NOTE:** The securing-clips return to the locked position. If you do not hear the click, remove the memory module and reinstall it.

**NOTE:** Repeat step 1 to step 3 when installing more than one memory module in your computer.

### Next steps

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

## Hard-drive assembly

### Removing the primary 2.5-inch hard-drive assembly

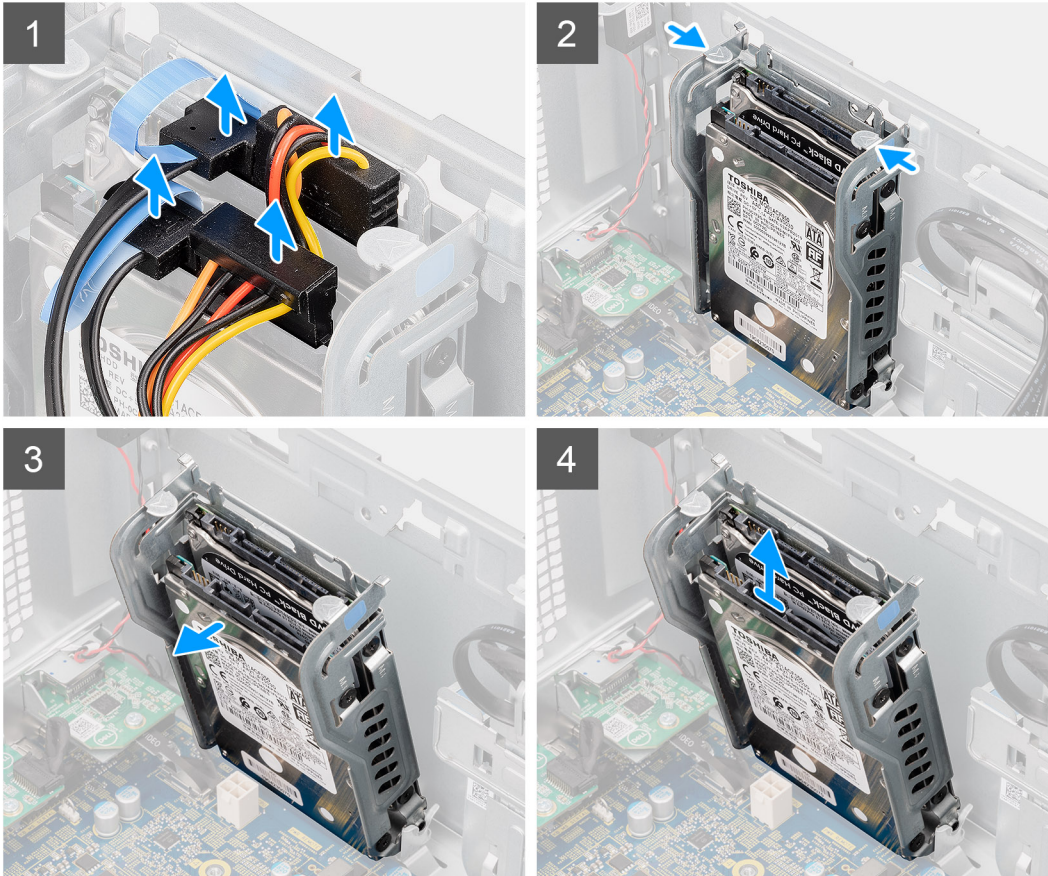
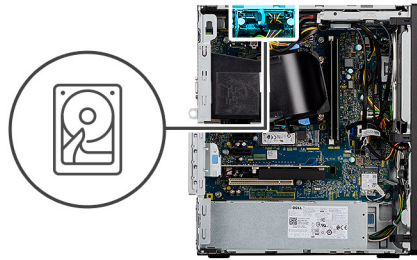
#### Prerequisites

1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).
3. Remove the [front bezel](#).



## About this task

The following images indicate the location of the 2.5-inch hard-drive assembly and provide a visual representation of the removal procedure.



## Steps

1. For 2.5-inch hard drive set as the primary storage device on the system, disconnect the data cable and power cable from the connectors on the 2.5-inch hard drive.  
**i NOTE:** For primary 2.5-inch hard drive, the other end of the data cable is connected to the SATA0 connector on the system board.
2. Press both the release tabs on the hard-drive assembly to free it from the mounting points on the chassis.
3. Bring the assembly forward to free the lower side of the assembly from the chassis.  
**i NOTE:** Note the orientation of the hard drive so that you can replace it correctly.
4. Lift and remove the hard-drive assembly away from the chassis.

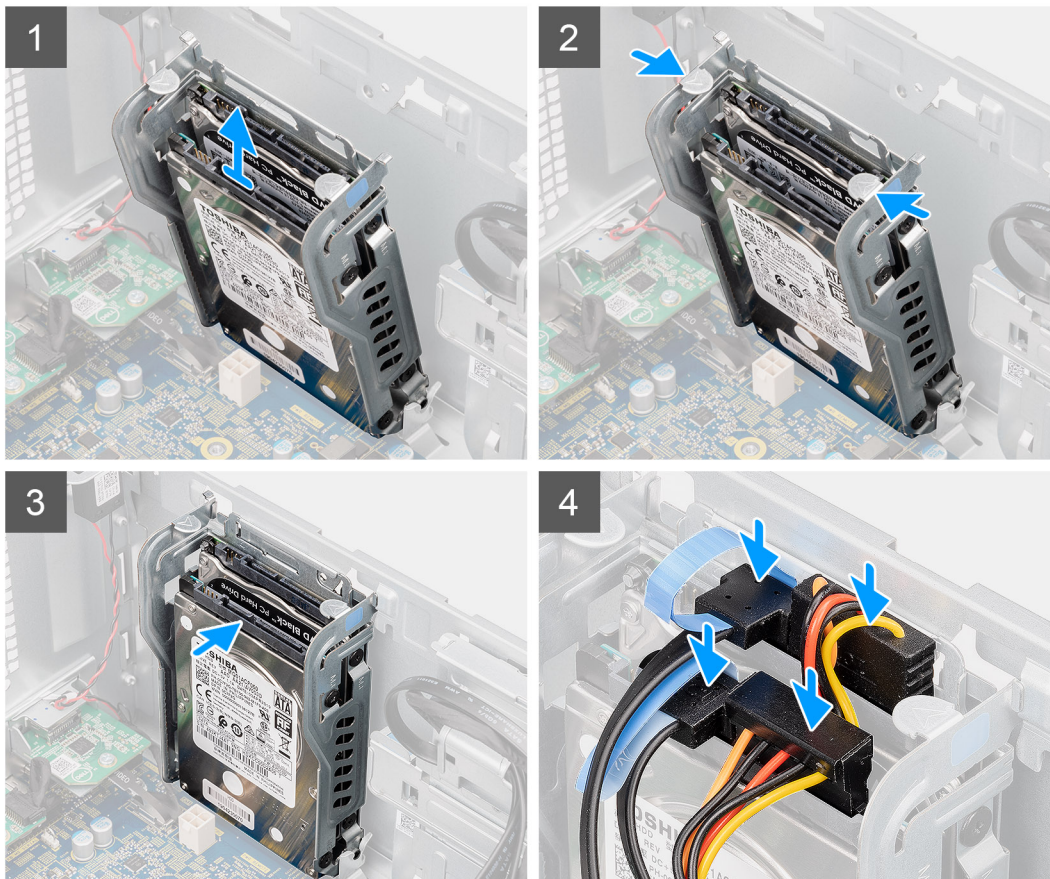
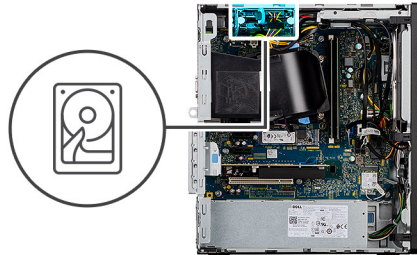
# Installing the primary 2.5-inch hard-drive assembly

## Prerequisites

If you are replacing a component, remove the existing component before performing the installation process.

## About this task

The following image indicates the location of the 2.5-inch hard-drive assembly and provides a visual representation of the installation procedure.



## Steps

1. Place the hard-drive assembly on the mounting point at the bottom of the chassis.
2. Press the release tabs on the hard-drive assembly and push the assembly back into place to secure it to the chassis.
3. Reconnect the data and power cables to the 2.5-inch hard drive.

## Next steps

1. Install the [front bezel](#).
2. Install the [side cover](#).
3. Follow the procedure in [After working inside your computer](#).




# Removing the 2.5-inch hard-drives

## Prerequisites

1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).
3. Remove the [hard-drive assembly](#).

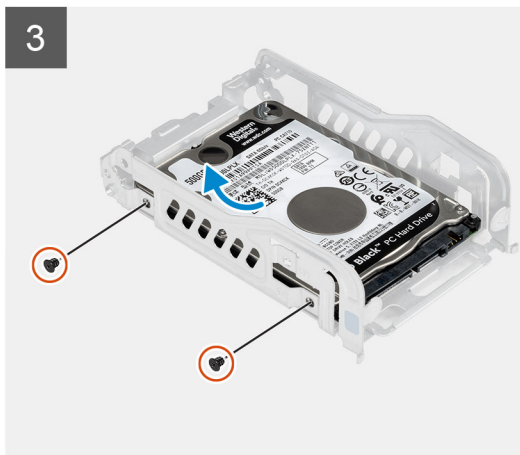
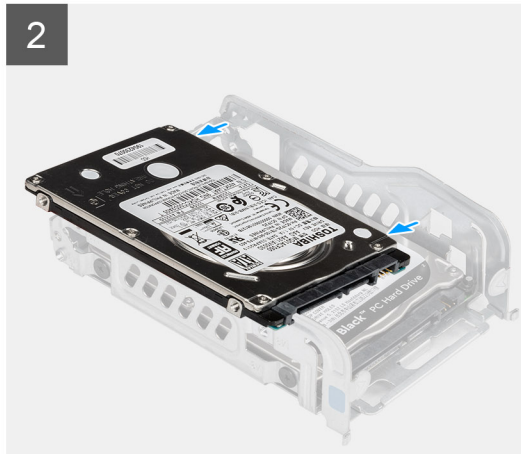
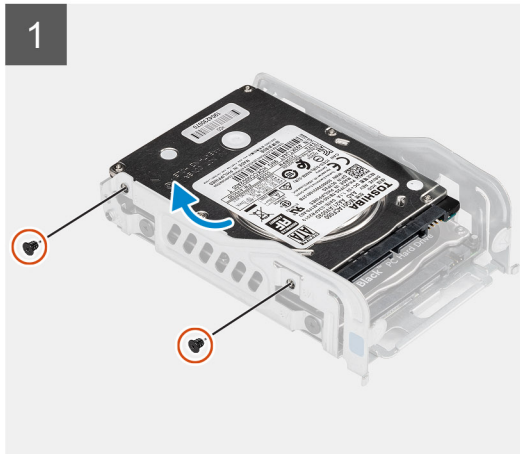
## About this task

 **NOTE:** Based on the configuration ordered, there should be two 2.5-inch hard-drives in the assembly.

The following images indicate the location of the 2.5-inch hard-drive and provides a visual representation of the removal procedure.



4x  
M3x3.5



## Steps

1. Remove the two (M3x3.5) screws that secure the first hard-drive to the hard-drive assembly.
2. Lift and slide the hard-drive from the hard-drive assembly.
3. Remove the two (M3x3.5) screws that secure the second hard-drive to the hard-drive assembly.
4. Lift and slide the second hard-drive from the hard-drive assembly.

# Installing the 2.5-inch hard-drives

## Prerequisites

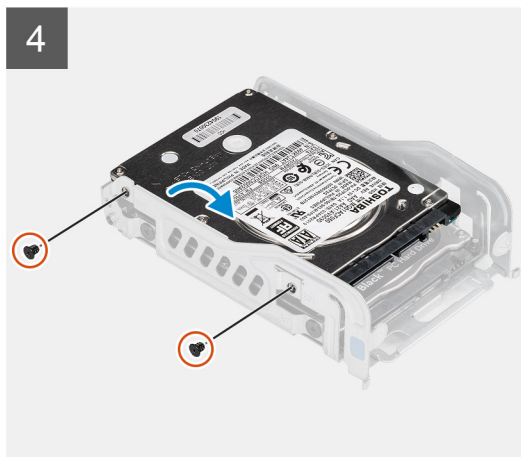
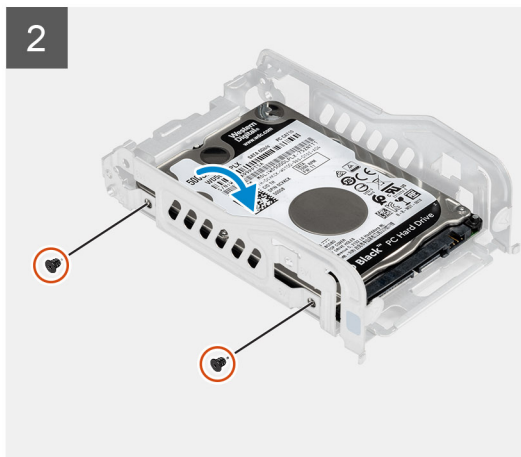
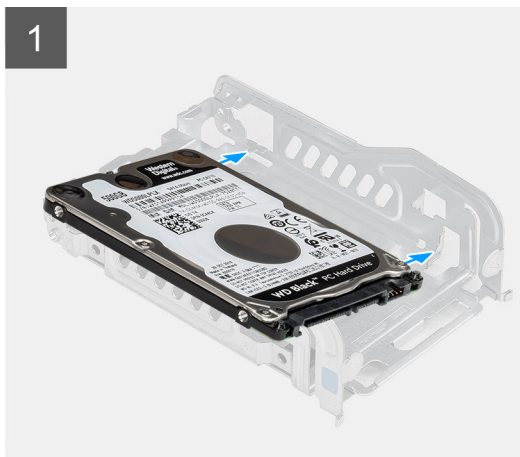
If you are replacing a component, remove the existing component before performing the installation process.

## About this task

The following image indicates the location of the 2.5-inch hard-drive and provides a visual representation of the installation procedure.



4x  
M3x3.5



## Steps

1. Place the first hard drive into the hard-drive assembly and align the slots on the bracket with the slots on the hard-drive.
2. Replace the two (M3x3.5) screws to secure the first hard-drive to the hard-drive assembly.
3. Place the second hard-drive into the hard-drive assembly and align the slots on the bracket with the slots on the hard-drive.
4. Replace the two (M3x3.5) screws to secure the second hard-drive to the hard-drive assembly.

## Next steps

1. Install the [hard-drive assembly](#).
2. Install the [side cover](#).



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

## 3.5-inch hard drive

### Removing the 3.5-inch hard-drive assembly

#### Prerequisites

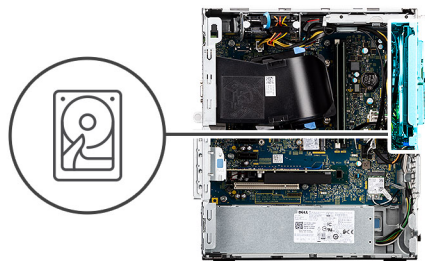
1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).

#### About this task

The following images indicate the location of the 3.5-inch hard-drive assembly and provides a visual representation of the removal procedure.



4x  
6-32



#### Steps

1. Disconnect the data and power cables from the 3.5-inch hard-drive.
2. Remove the four (#6-32) screws that secure the 3.5-inch hard-drive.
3. Lift the hard-drive assembly away from the chassis.

### Installing the 3.5-inch hard-drive assembly

#### Prerequisites

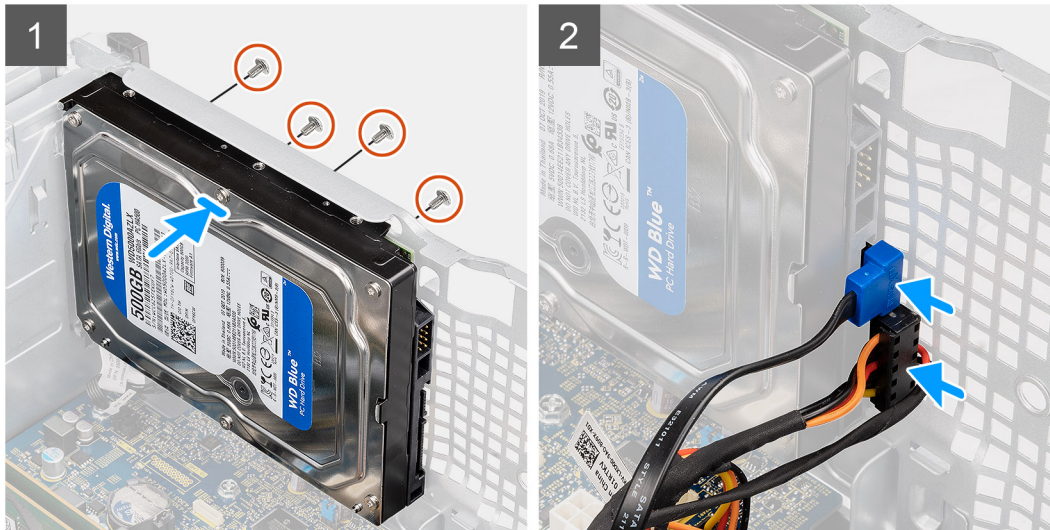
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following images indicate the location of the 3.5-inch hard-drive assembly and provides a visual representation of the installation procedure.



4x  
6-32



### Steps

1. Insert the 3.5-inch hard-drive assembly into the hard drive cage.
2. Align the hard-drive assembly with the tabs on the chassis.
3. Install the four (#6-32) screws to fix the 3.5-inch hard-drive in place.
4. Route the power cable and data cable through the routing guides on the hard-drive assembly and connect the cables to the hard-drive.

### Next steps

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

## Solid-state drive

### Removing the M.2 2230 solid-state drive

#### Prerequisites

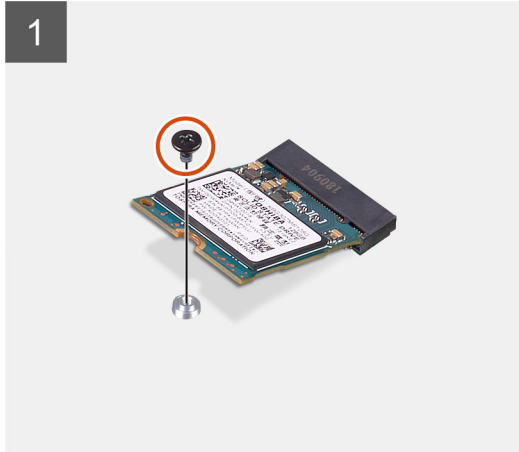
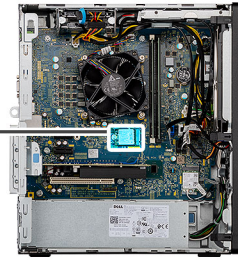
1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).

### About this task

The following images indicate the location of the M.2 2230 solid-state drive and provide a visual representation of the removal procedure.



1x  
M2x3



### Steps

1. Remove the screw (M2x3) that secures the solid-state drive to the system board.
2. Slide and lift the solid-state drive from the M.2 card slot on the system board.

## Installing the M.2 2230 solid-state drive

### Prerequisites

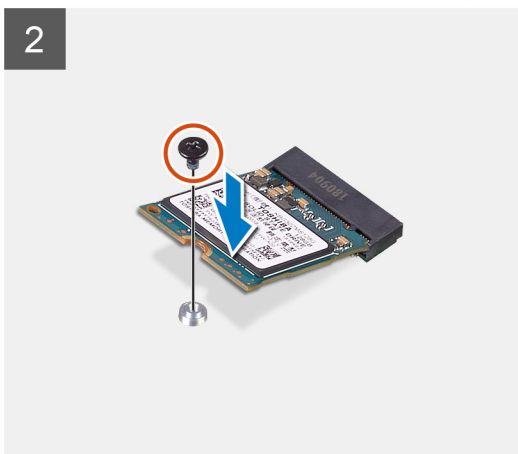
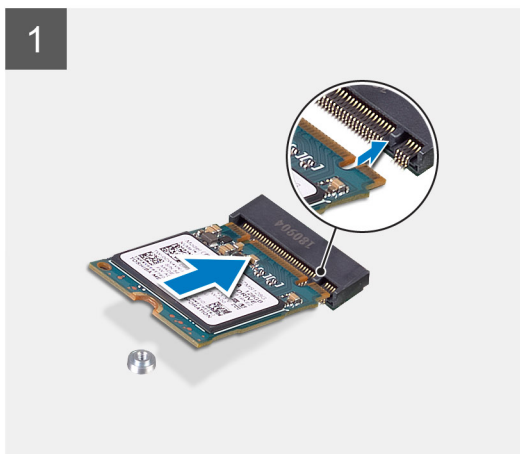
If you are replacing a component, remove the existing component before performing the installation process.

### About this task

The following image indicates the location of the M.2 2230 solid-state drive and provides a visual representation of the installation procedure.



1x  
M2x3



### Steps

1. Align the notch on the solid-state drive with the tab on the M.2 card slot.
2. Slide the solid-state drive into the M.2 card slot on the system board.
3. Install the screw (M2x3) to secure the solid-state drive to the system board.

### Next steps

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

## Removing the M.2 2280 solid-state drive

### Prerequisites

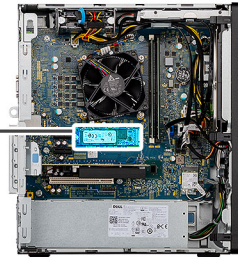
1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).

### About this task

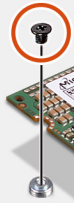
The following images indicate the location of the M.2 2280 solid-state drive and provide a visual representation of the removal procedure.



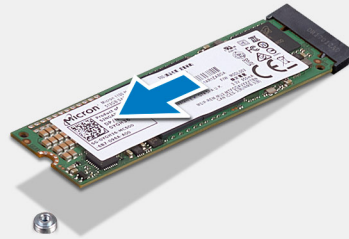
1x  
M2x3



1



2



### Steps

1. Remove the screw (M2x3) that secures the solid-state drive to the system board.
2. Slide and lift the solid-state drive from the M.2 card slot on the system board.

## Installing the M.2 2280 solid-state drive

### Prerequisites

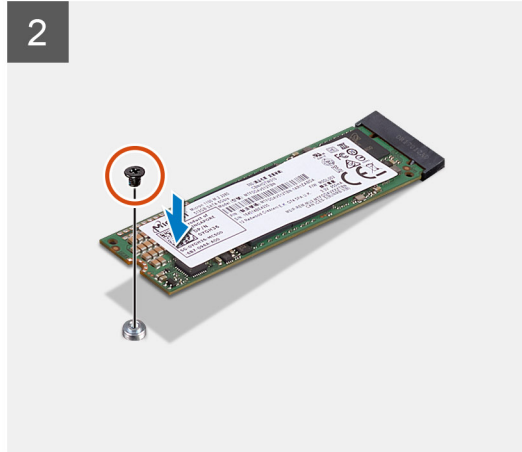
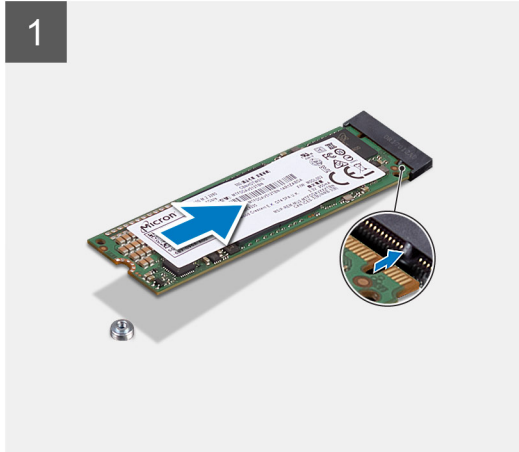
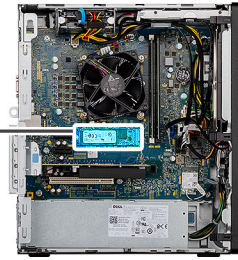
If you are replacing a component, remove the existing component before performing the installation process.

### About this task

The following image indicates the location of the M.2 2280 solid-state drive and provides a visual representation of the installation procedure.



1x  
M2x3



### Steps

1. Align the notch on the solid-state drive with the tab on the M.2 card slot.
2. Slide the solid-state drive into the M.2 card slot on the system board.
3. Install the screw (M2x3) to secure the solid-state drive to the system board.

### Next steps

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

## Coin-cell battery

### Installing the coin-cell battery

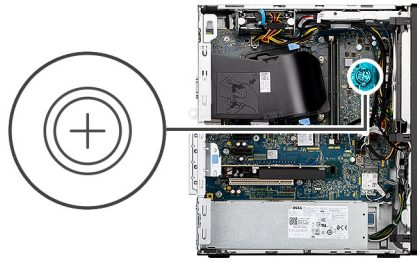
#### Prerequisites

If you are replacing a component, remove the existing component before performing the installation process.

#### About this task

The following image indicates the location of the coin-cell battery and provides a visual representation of the installation procedure.





### Steps

1. Insert the coin-cell battery into its slot on the system board with the positive side (+) label facing up.
2. Press down and snap the coin-cell battery into the slot on the system board.

### Next steps

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

## Removing the coin-cell battery

### Prerequisites

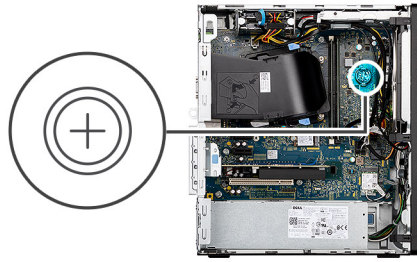
1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).

### About this task

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

**NOTE:** After a service incident where the system board is replaced, or when the coin-cell battery is replaced an RTC reset cycle will occur. When an RTC Reset cycle occurs, the computer turns on and off three times. An "Invalid Configuration" error message is displayed prompting you to enter the BIOS and configure the date and time. The computer starts functioning normally after setting the date and time.

The following images indicate the location of the coin-cell battery and provide a visual representation of the removal procedure.



### Steps

1. Using a plastic scribe, push the coin-cell battery securing-clip on the coin-cell battery socket to release the coin-cell battery out of the slot on the system board.
2. Lift the coin-cell battery off its slot on the system board.

## Wireless card

### Removing the wireless card

#### Prerequisites

1. Follow the procedure in [Before working on your computer](#).
  2. Remove the [side cover](#).
  3. Remove the powered GPU.
- NOTE:** This step is required only if the system is configured with powered GPU.

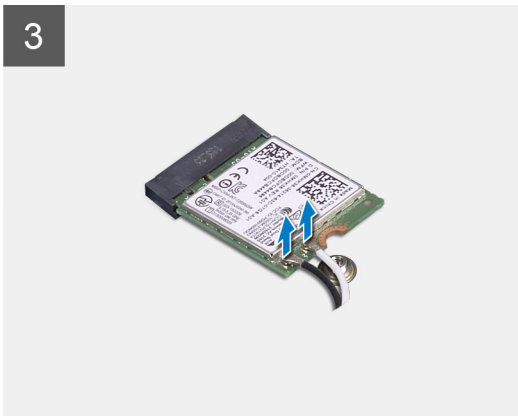
#### About this task

The following images indicate the location of the wireless card and provide a visual representation of the removal procedure.





1x  
M2x3



### Steps

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

## Installing the wireless card

### Prerequisites

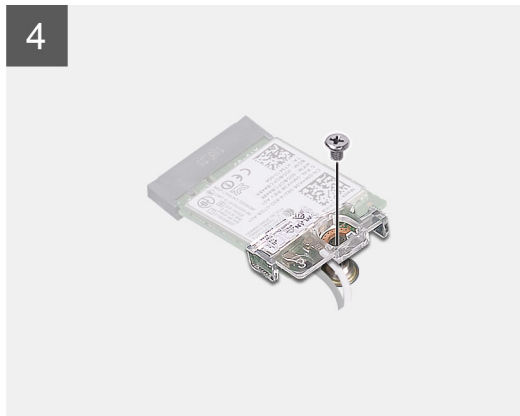
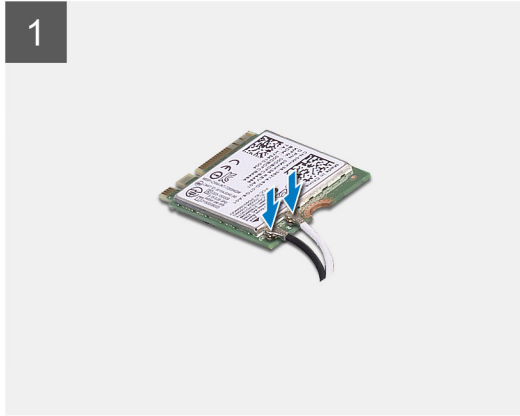
If you are replacing a component, remove the existing component before performing the installation process.

### About this task

The following image indicates the location of the wireless card and provides a visual representation of the installation procedure.



1x  
M2x3



## Steps


1. Connect the antenna cables to the wireless card.  
The following table provides the antenna-cable color scheme for the wireless card of your computer.

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

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

2. Slide and place the wireless-card bracket on the wireless card.
3. Align the notch on the wireless card with the tab on the wireless-card slot.
4. Slide the wireless card at an angle into the wireless-card slot.
5. Replace the screw (M2x3) that secures the wireless card to the system board.

## Next steps

1. Install the [Powered GPU](#).  
 **NOTE:** This step is required only if the system is configured with powered GPU.
2. Install the [Side Cover](#).

3. Follow the procedure in [Working inside your computer](#).

## Graphics card

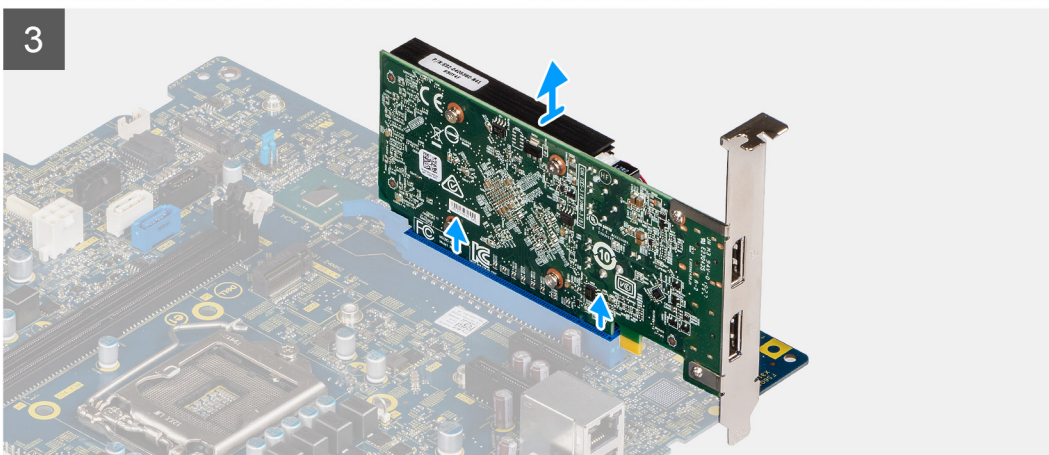
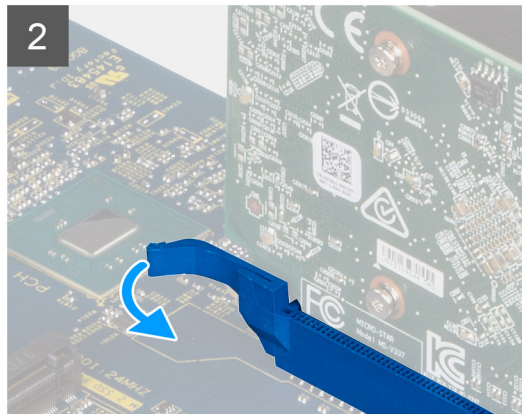
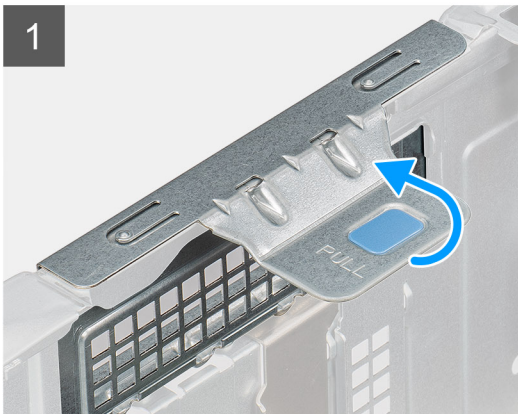
### Removing the graphics card

#### Prerequisites

1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).

#### About this task

The following images indicate the location of the graphics card and provides a visual representation of the removal procedure.



#### Steps

1. Lay the computer with its right side facing down.
2. Locate the graphics card installed in the PCIe x16 card slot.
3. Lift the pull tab and open the expansion-card door.

4. Push and hold the securing tab on the graphics-card slot and lift the graphics card from the PCIe x16 card slot.

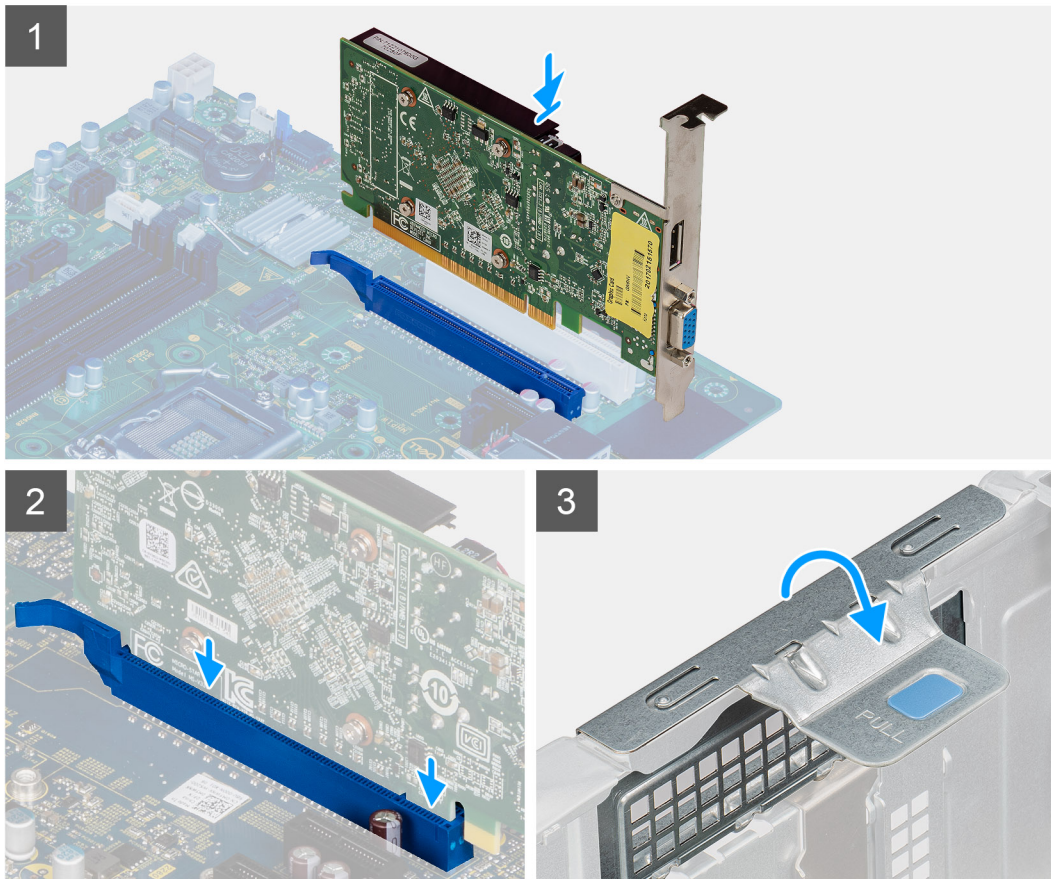
## Installing the graphics card

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following images indicate the location of the graphics card and provides a visual representation of the installation procedure.



### Steps

1. Align the graphics card with the PCIe x16 card slot on the system board.
2. Using the alignment post, connect the card in the connector and press down firmly. Ensure that the card is firmly seated.
3. Close the expansion-card door.

### Next steps

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




# Power-supply unit

## Removing the power-supply unit

### Prerequisites

1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).

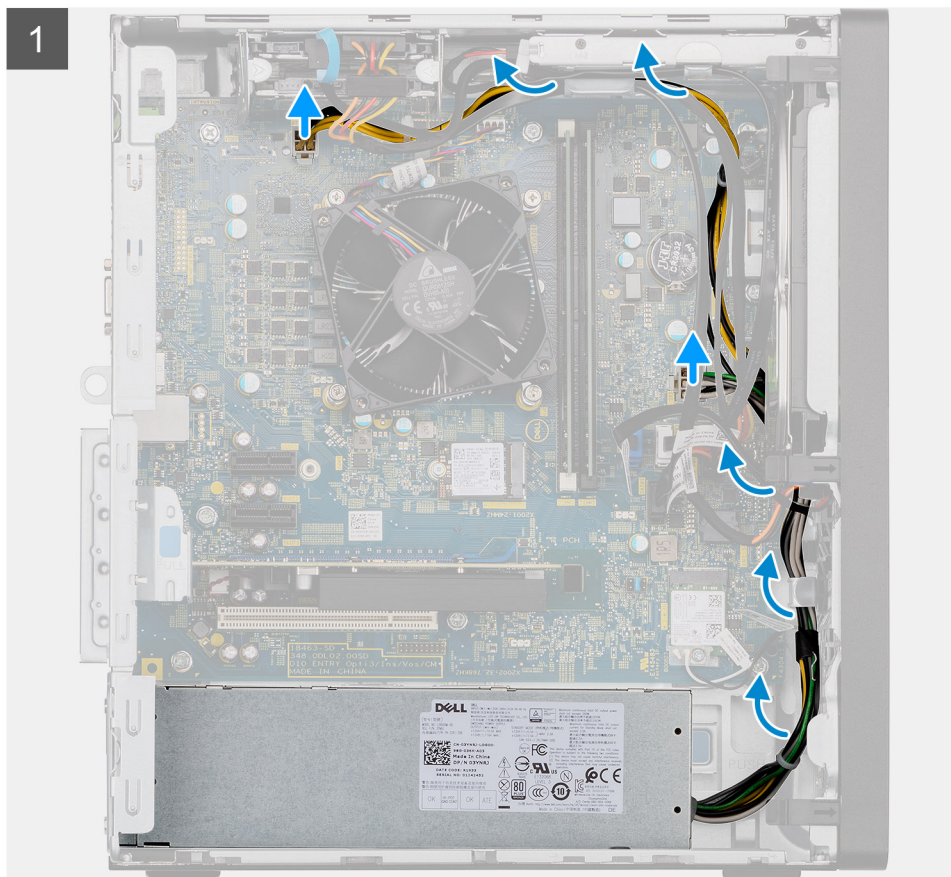
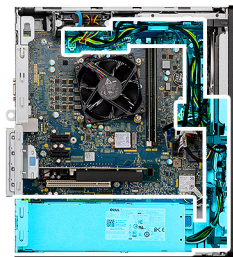
 **NOTE:** Note the routing of all cables as you remove them so that you can route them correctly while you are replacing the power-supply unit.

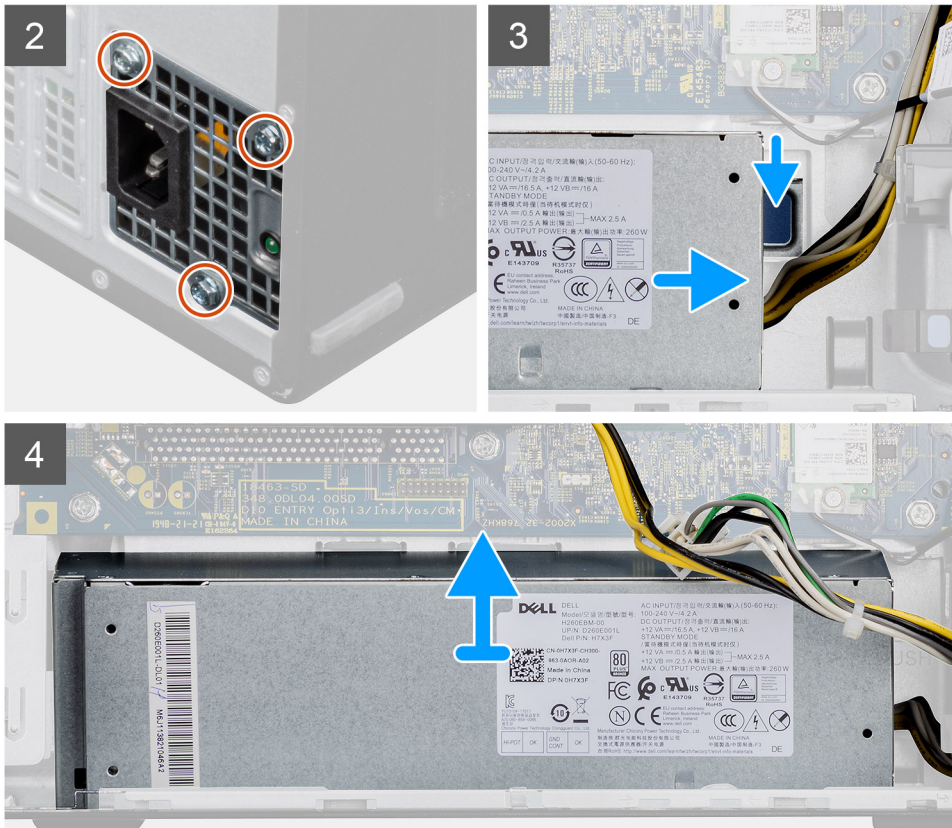
### About this task

The following images indicate the location of the power-supply unit and provides a visual representation of the removal procedure.



**3x**  
6-32





## Steps

1. Lay the computer with its right side facing down.
2. Disconnect the power cables from the system board and unroute them from the routing guides on the chassis.
  - NOTE:** The power-supply cable is connected to the system board at two locations and supply power to the following components at the two location:
    - Processor - ATX CPU connector
    - System board - ATX SYS connector
3. Remove the three (#6-32) screws that secure the power-supply to the chassis.
4. Press down on the securing clip to release the power supply from the chassis.
5. Slide and lift the power supply from its slot on the chassis.

## Installing the power-supply unit

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

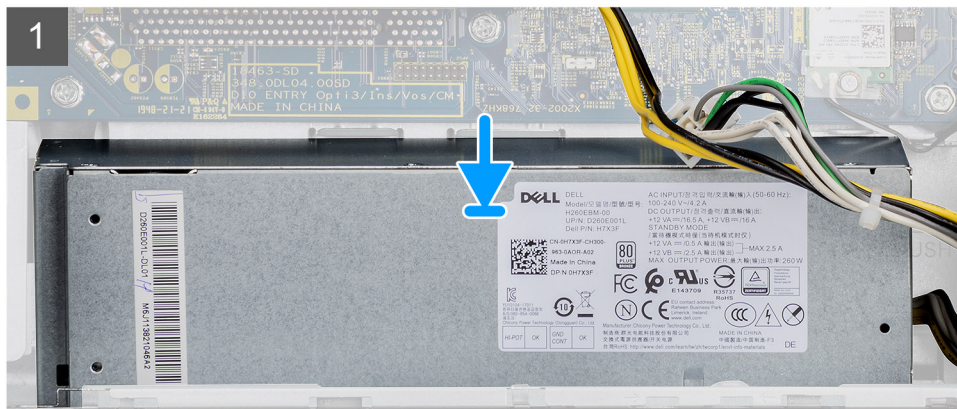
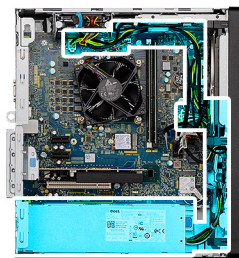
**WARNING:** The cables and ports on the back of the power-supply unit are color-coded to indicate the different power wattage. Ensure that you plug in the cable to the correct port. Failure to do so may result in damaging the power-supply unit and/or system components.

### About this task

The following images indicate the location of the power-supply unit and provides a visual representation of the installation procedure.



3x  
6-32







### Steps

1. Place and slide the power supply into its slot on the chassis.
2. Replace the three (#6-32) screws to secure the power-supply unit to the chassis.
3. Route the power cable through the routing guides on the chassis and connect the power cables to their respective connectors on the system board.

**i NOTE:** The power-supply cable is connected to the system board at two locations and supply power to the following components at the two location:

- Processor - ATX CPU connector
- System board - ATX SYS connector

### Next steps

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

## Optical drive

### Removing the optical drive

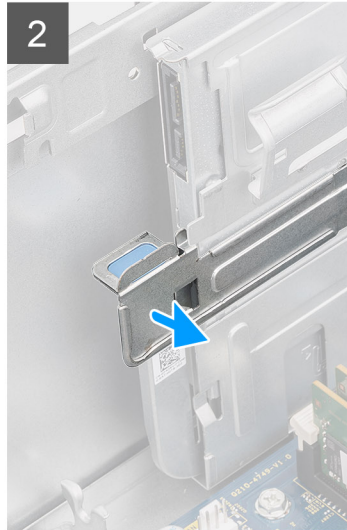
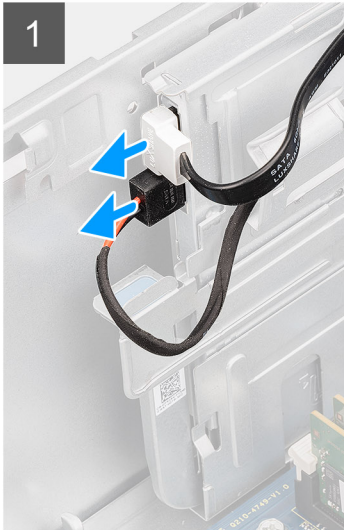
#### Prerequisites

1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).
3. Remove the [front bezel](#).



### About this task

The following images indicate the location of the optical drive and provides a visual representation of the removal procedure.



### Steps

1. Disconnect the power and data cable from the optical drive.
2. Pull down on the retention tab to release the optical drive.
3. Slide and remove the optical drive from the front slot on the chassis.

## Installing the optical drive

### Prerequisites

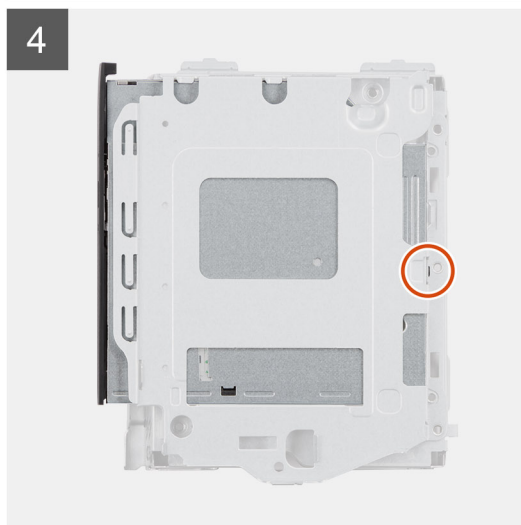
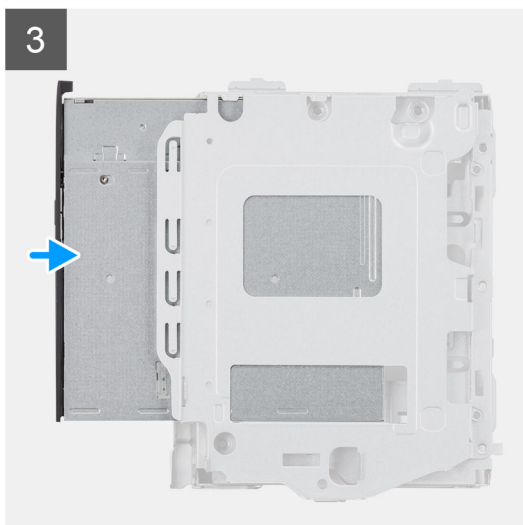
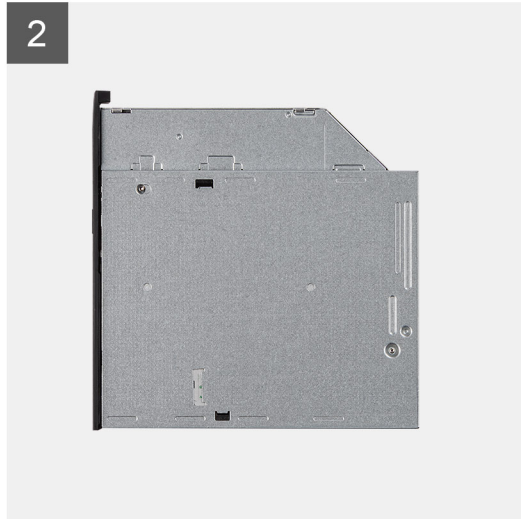
If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following images indicate the location of the optical drive and provide a visual representation of the installation procedure.



1x  
M2x3



### Steps

1. Slide and install the optical drive into its slot on the chassis.
2. Replace the single screw (M2x3) that secure the optical drive to the chassis.
3. Connect the optical-drive power cable to the connector on the optical drive.
4. Connect the optical-drive data cable to the connector on the optical drive.

### Next steps

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

# Optical drive bezel

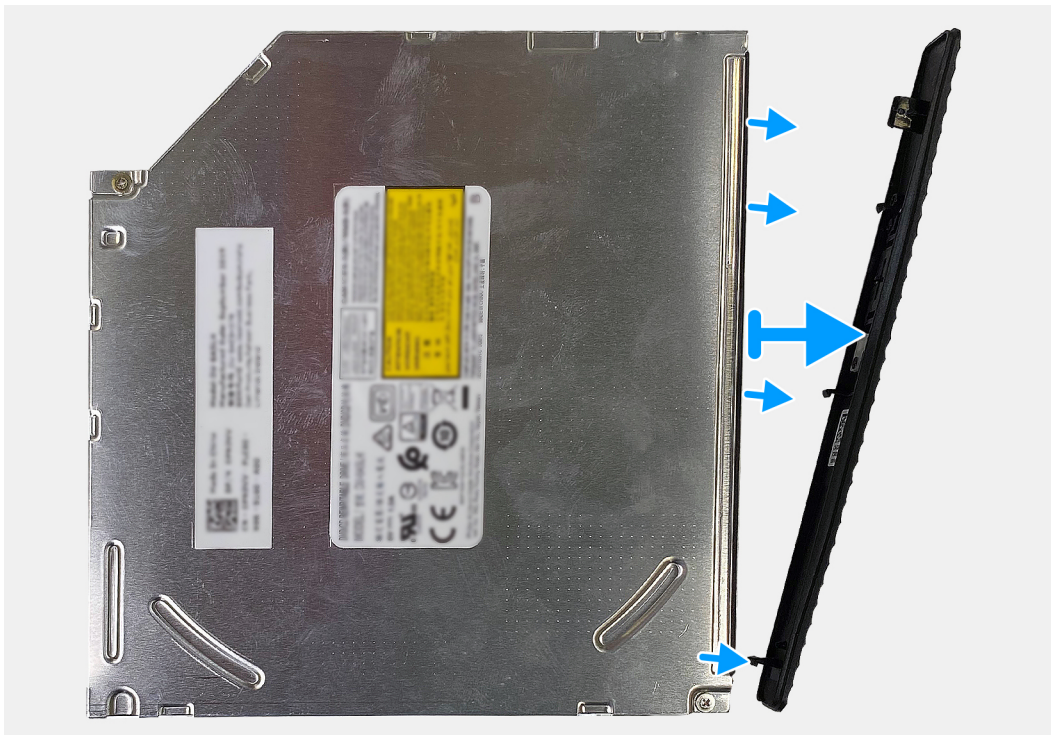
## Removing the optical drive bezel

### Prerequisites

1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).
3. Remove the [optical drive](#).

### About this task

The following images indicate the location of the optical drive bezel and provides a visual representation of the removal procedure.



### Steps

Pry the bezel from the optical drive.

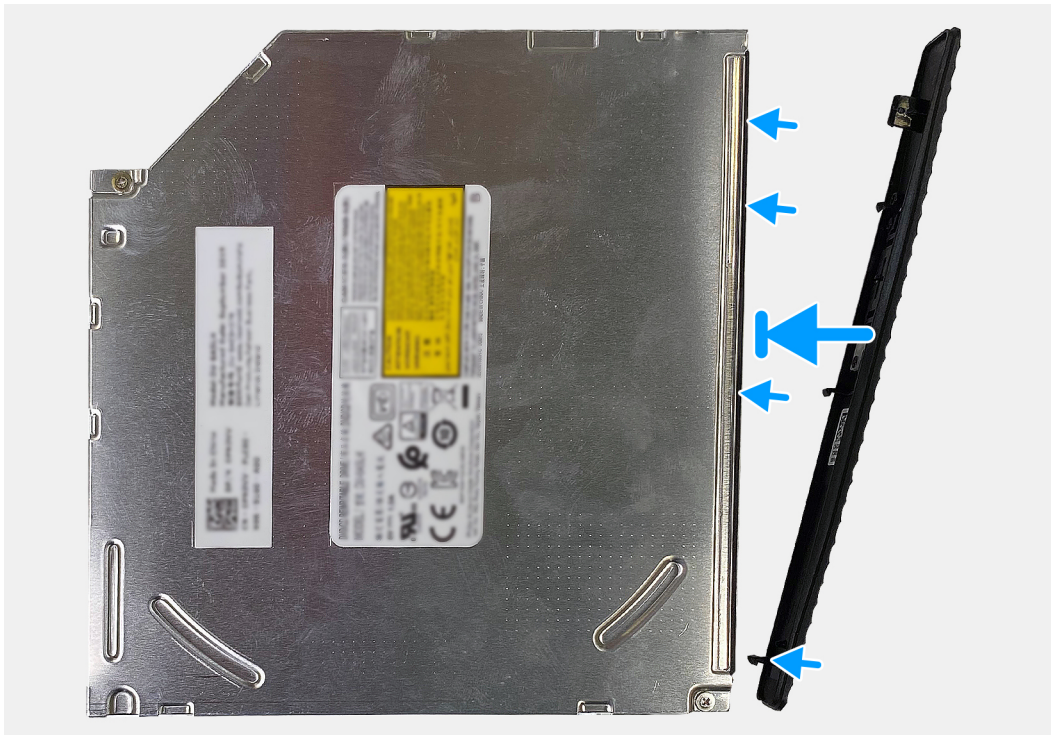
## Installing the optical drive bezel

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following images indicate the location of optical drive bezel and provides a visual representation of the installation procedure.



### Steps

1. Place the optical drive bezel on the optical drive, aligning the hooks on the optical drive bezel with the slots on the optical drive.
2. Press down on the optical drive bezel to secure it on the optical drive.

### Next steps

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

## Fan and heat-sink assembly

### Removing the fan and heat-sink assembly

#### Prerequisites

1. Follow the procedure in [Before working on your computer](#).

**WARNING:** The heat sink may become hot during normal operation. Allow sufficient time for the heat sink to cool before touching it.

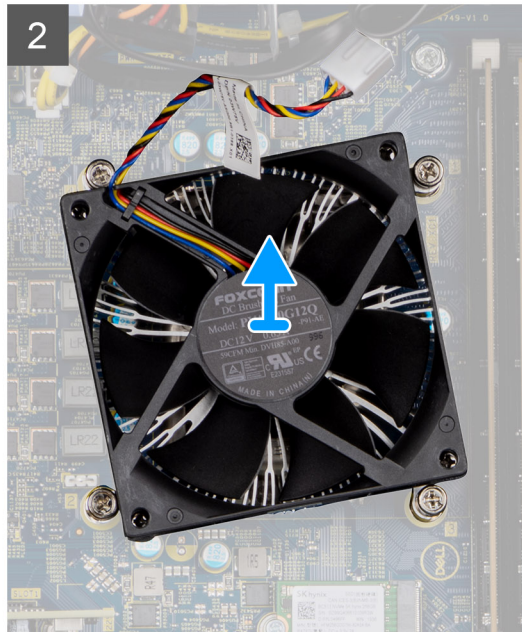
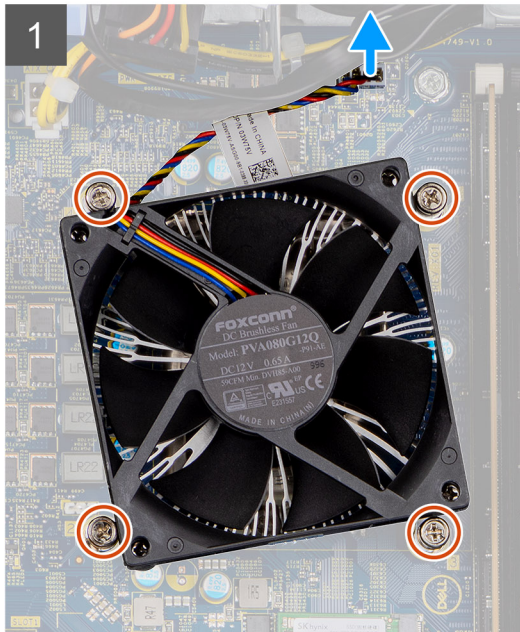
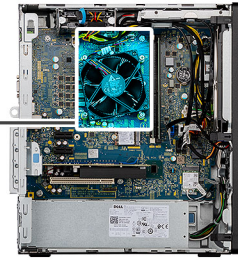
**CAUTION:** For maximum cooling of the processor, do not touch the heat transfer areas on the heat sink. The oils in your skin can reduce the heat transfer capability of the thermal grease.

2. Remove the [side cover](#).
3. Remove the [fan shroud](#).

#### About this task

The following images indicate the location of the fan and heat-sink, and provide a visual representation of the removal procedure.





## Steps

1. Disconnect the fan cable from the connector on the system board.
2. In a reverse sequential order (4>3>2>1) loosen the four captive screws that secure the fan and heat-sink assembly to the system board.
3. Lift the fan and heat-sink assembly off the system board.

## Installing the fan and heat-sink assembly

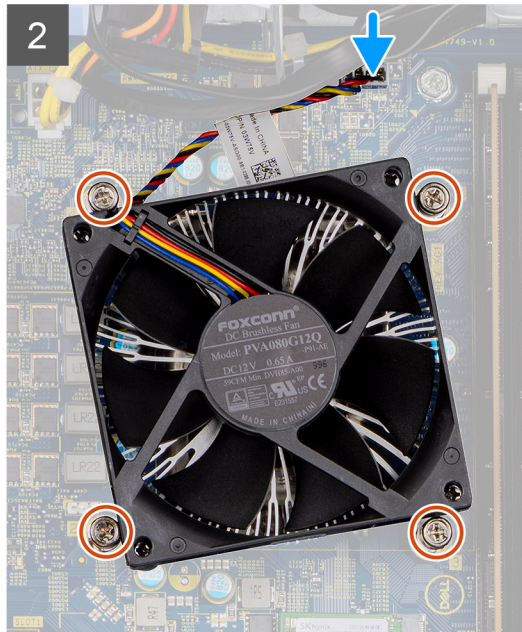
### Prerequisites

If you are replacing a component, remove the existing component before performing the installation process.

### About this task

**NOTE:** If either the processor or the fan and heat-sink assembly is replaced, use the thermal grease provided in the kit to ensure that thermal conductivity is maintained.

The following image indicates the location of the fan and heat-sink assembly, and provides a visual representation of the installation procedure.



### Steps

1. Gently place the fan and heat-sink assembly on the processor.
2. Align the screw holes on the fan and heat-sink assembly with the screw holes on the system board.
3. In sequential order (1>2>3>4) tighten the four captive screws that secure the fan and heat-sink assembly to the system board.
4. Connect the fan cable to the connector on the system board.

### Next steps

1. Install the [fan shroud](#).
2. Install the [side cover](#).
3. Follow the procedure in [After working inside your computer](#).

## Processor

### Removing the processor

#### Prerequisites

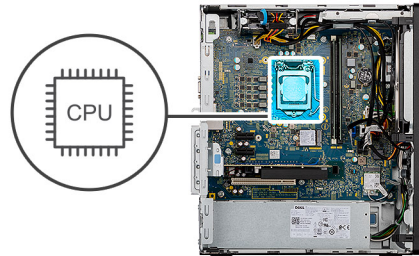
1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).
3. Remove the [fan shroud](#).
4. Remove the [fan and heat sink assembly](#).

**NOTE:** Caution: The processor may become hot during normal operation. Allow sufficient time for the processor to cool before you touch it.

**NOTE:** Caution: For maximum cooling of the processor, do not touch the heat transfer areas on the heat sink. The oils in your skin can reduce the heat transfer capability of the thermal grease.

### About this task

The following images indicate the location of the processor and provide a visual representation of the removal procedure.



### Steps

1. Press the release lever down and then push it away from the processor to release it from the securing tab.
2. Lift the lever upward to lift the processor cover.

**CAUTION:** When removing the processor, do not touch any of the pins inside the socket or allow any objects to fall on the pins in the socket.

3. Gently lift the processor from its socket on the system board.

## Installing the processor

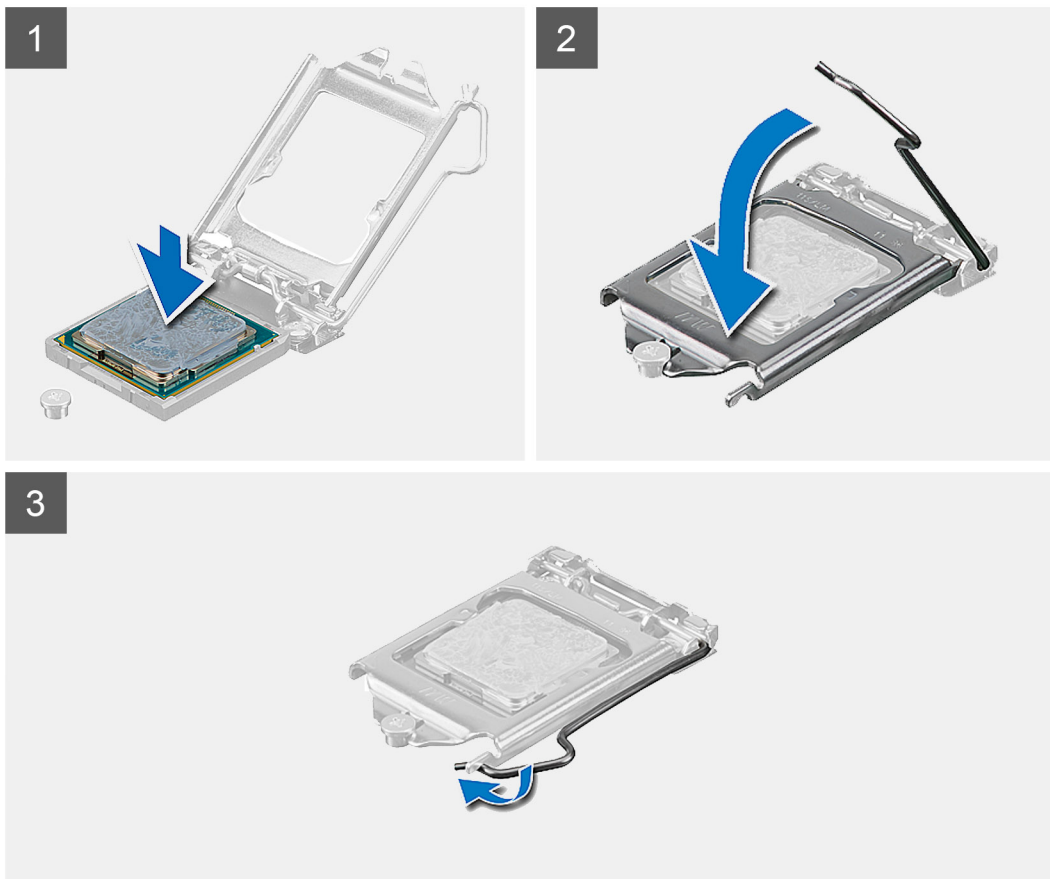
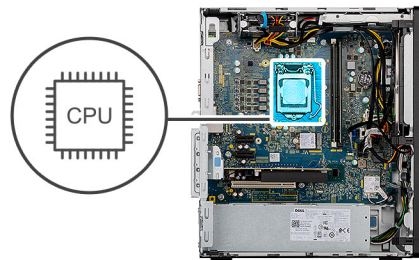
### Prerequisites

If you are replacing a component, remove the existing component before performing the installation process.

### About this task

**NOTE:** If either the processor or the fan and heat-sink assembly is replaced, use the thermal grease that is provided in the kit to ensure that thermal conductivity is maintained.

The following image indicates the location of the processor and provides a visual representation of the installation procedure.



### Steps

1. Ensure that the release lever on the processor socket is fully extended in the open position.
2. Align the pin-1 corner of the processor with the pin-1 corner of the processor socket, and then place the processor in the processor socket.

**NOTE:** The pin-1 corner of the processor has a triangle that aligns with the triangle on the pin-1 corner on the processor socket. When the processor is properly seated, all four corners are aligned at the same height. If one or more corners of the processor are higher than the others, the processor is not seated properly.
3. When the processor is fully seated in the socket, close the processor cover.
4. Pivot the release-lever down and place it under the tab on the processor cover.

### Next steps

1. Install the [fan and heat-sink assembly](#).
2. Install the [fan shroud](#).



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

## Graphical processing unit

### Removing the powered GPU

#### Prerequisites

1. Follow the procedure in **before working inside your computer**.
2. Remove the [side cover](#).

#### About this task

The following images indicate the location of the powered graphical processing unit and provides a visual representation of the removal procedure.

#### Steps

1. Disconnect the two power cables from the connectors on the powered GPU through the cable holder.
2. Unroute the power cable from the retention tab on the cable holder.
3. Press the securing clips on both side of the cable holder and slide the powered GPU cable holder out of the computer.
4. Locate the GPU.
5. Lift the pull tab to open the PCIe door.
6. Push and hold the securing tab on the graphics-card slot and lift the powered GPU away from the graphics-card slot.

### Installing the powered GPU

#### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

#### About this task

The following images indicate the location of the powered graphical processing unit and provides a visual representation of the installation procedure.

#### Steps

1. Align the powered GPU with the PCI-Express card connector on the system board.
2. Using the alignment post, connect the powered GPU in the connector and press down firmly. Ensure that the powered GPU is firmly seated.
3. Lift the pull tab to close the PCIe door.
4. Align the triangles on the powered GPU cable holder with the triangles on the chassis.
5. Place the powered GPU cable holder on the computer chassis until it clicks to place.
6. Route the power cable through the retention tab on the cable holder.
7. Connect the two power cables, through the slot on the cable holder, to the connector on the powered GPU.

#### Next steps

1. Install the [Side cover](#).
2. Follow the procedure in **After working on your computer**.

# Power button

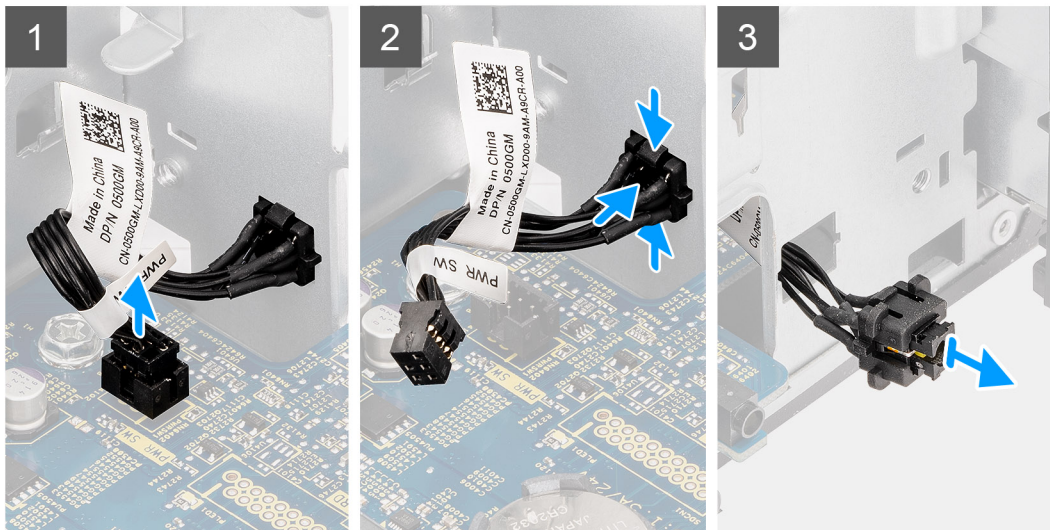
## Removing the power button

### Prerequisites

1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).
3. Remove the [front bezel](#).

### About this task

The following images indicate the location of the power button and provides a visual representation of the removal procedure.



### Steps

1. Disconnect the power button cable from the connector on the system board.
2. Press the release tabs on the power button module and push it out to the front-side of the chassis.
3. Remove the power button out from the chassis.

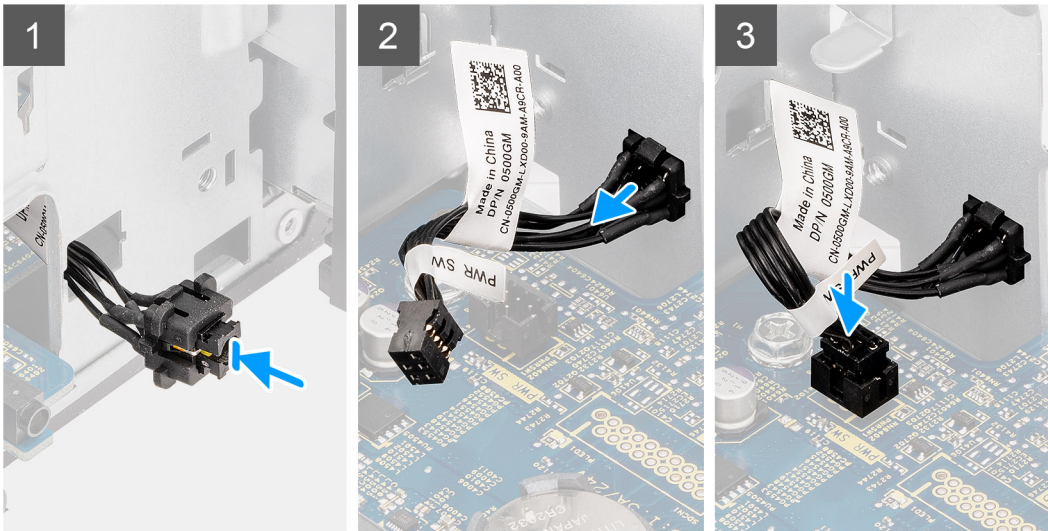
## Installing the power button

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following images indicate the location of the power button and provides a visual representation of the installation procedure.



### Steps

1. Insert the power button switch into the slot from the front-side of the chassis.
2. Push the power button in until you hear a click from the retention tabs.
3. Connect the power button cable to the connector on the system board.

### Next steps

1. Install the [front bezel](#).
2. Install the [side cover](#).
3. Follow the procedure in [After working inside your computer](#).

## Intrusion switch

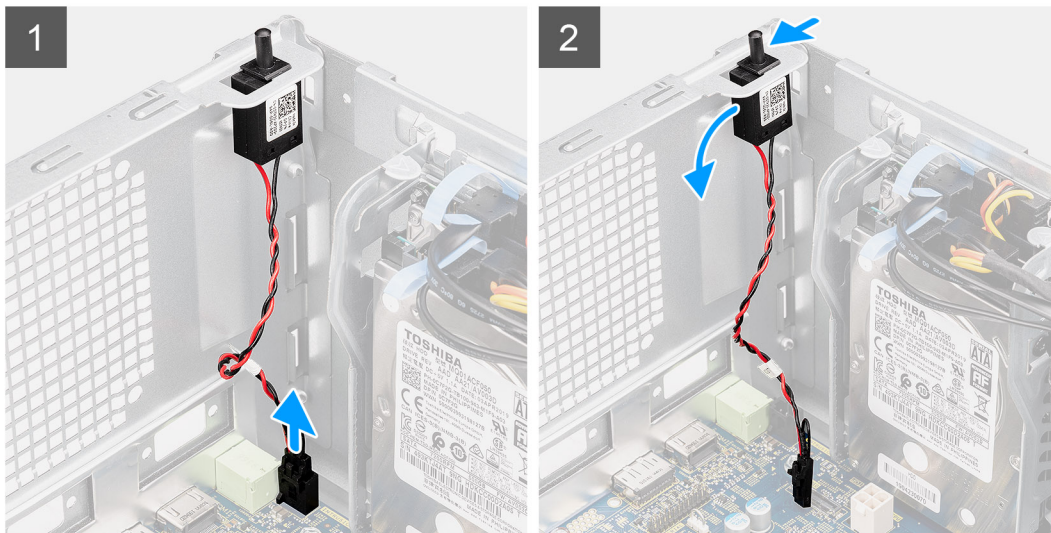
### Removing the intrusion switch

#### Prerequisites

1. Follow the procedure in [Before working on your computer](#).
2. Remove the [side cover](#).

#### About this task

The following images indicate the location of the intrusion switch and provides a visual representation of the removal procedure.



### Steps

1. Disconnect the intruder switch cable from the connector on the system board.
2. Slide and remove the intrusion switch from the chassis.

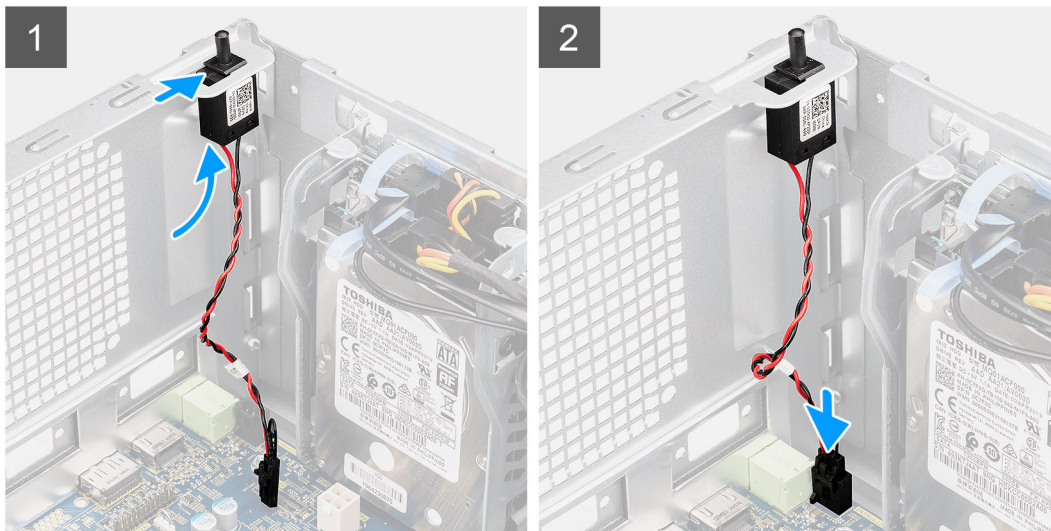
## Installing the intrusion switch

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

### About this task

The following images indicate the location of the intrusion switch and provides a visual representation of the installation procedure.



### Steps

1. Insert the intrusion switch into its slot and slide the switch to secure it into the slot.
2. Connect the intruder switch cable to the connector on the system board.

### Next steps

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

## System board

### Removing the system board

#### Prerequisites

1. Follow the procedure in [Before working on your computer](#).
  - NOTE:** Your computer's Service Tag is stored in the system board. You must enter the Service Tag in the BIOS setup program after you replace the system board.
  - NOTE:** Replacing the system board removes any changes that you have made to the BIOS using the BIOS setup program. You must make the appropriate changes again after you replace the system board.
  - NOTE:** Before disconnecting the cables from the system board, note the location of the connectors so that you can reconnect the cables correctly after you replace the system board.
2. Remove the [side cover](#).
3. Remove the [front bezel](#).
4. Remove the [memory module](#).
5. Remove the [M2 2230 SSD / M2.2280 SSD](#)
6. Remove the [graphics card](#).
7. Remove the [coin-cell battery](#).



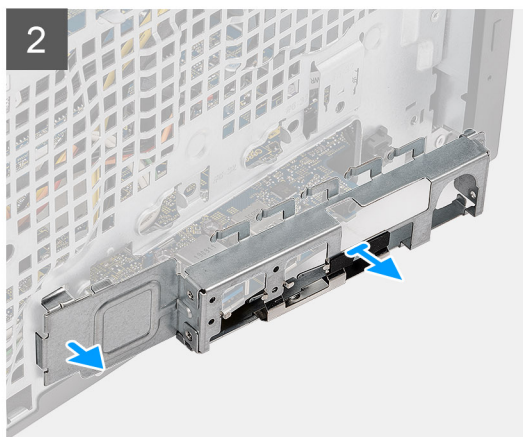
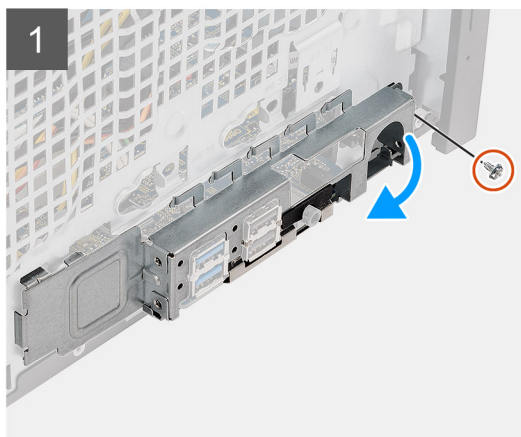
8. Remove the fan and heat sink assembly.
9. Remove the processor.

#### About this task

The following images indicate the location of the system board and provides a visual representation of the removal procedure.



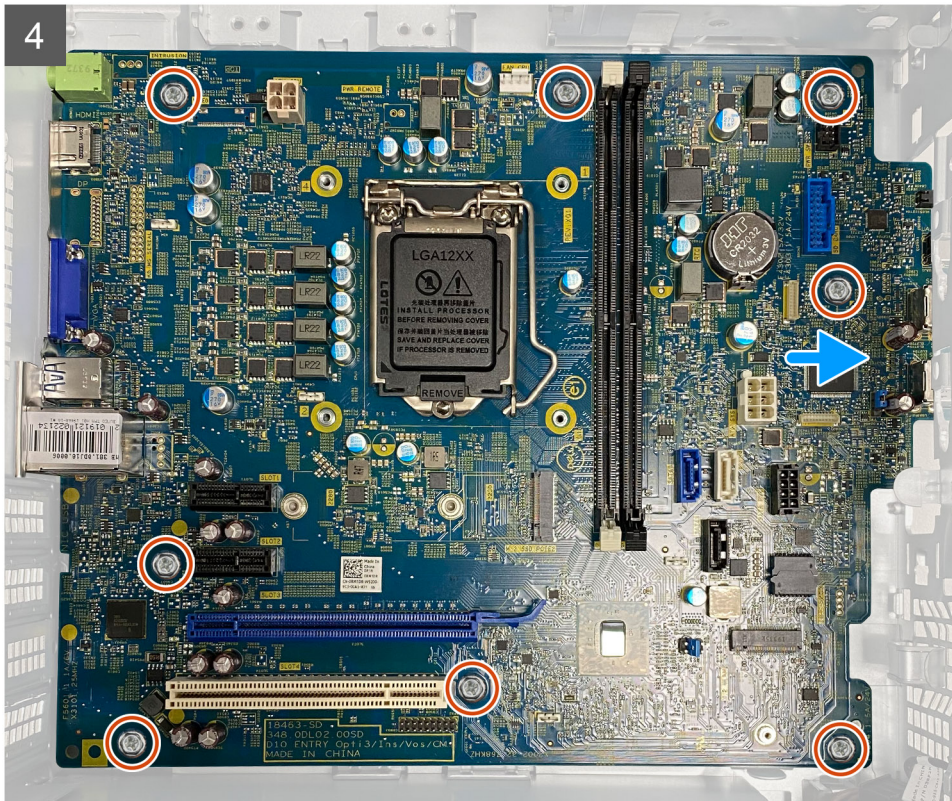
**9x**  
6-32











## Steps

1. Remove the single screw (#6-32) that secures the front I/O-bracket to the chassis.
2. Slide and remove the front I/O-bracket from the chassis.
3. Disconnect the following cables that are connected to the system board and remove them from the routing points on the chassis:



- Power-supply cables
  - Hard-drive cables
  - Power-button cable
4. Remove the eight (#6-32) screws that secure the system board to the chassis.
  5. Carefully lift the system board at an angle and remove the system board off the chassis.

## Installing the system board

### Prerequisites

If you are replacing a component, remove the existing component before performing the installation procedure.

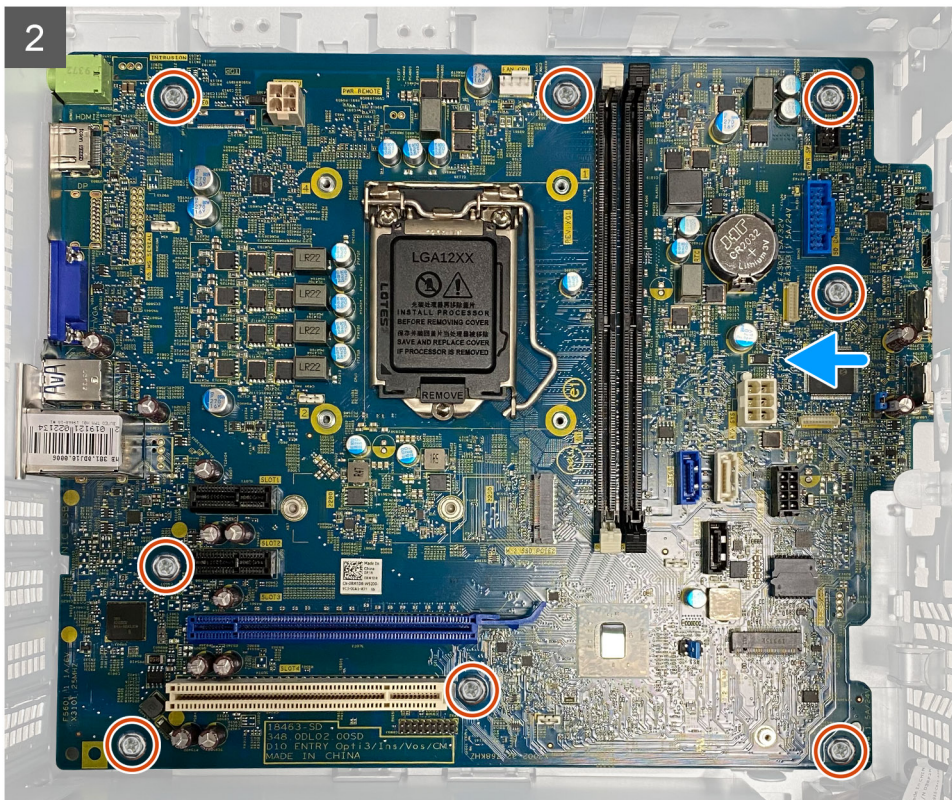
### About this task

The following images indicate the location of the system board and provides a visual representation of the installation procedure.



**9x**  
6-32



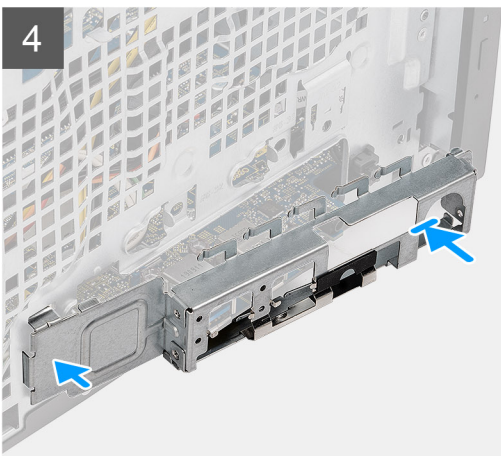




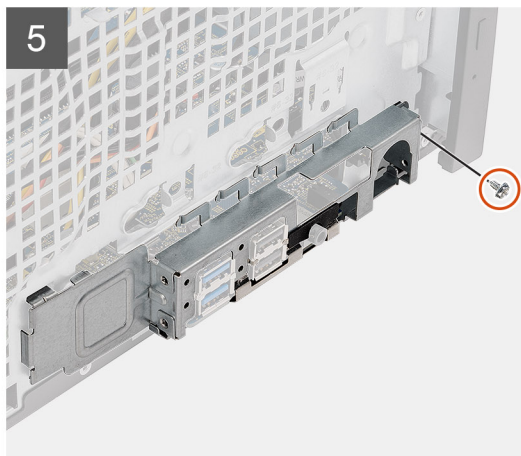
3



4



5





### Steps

1. Place the system board onto the chassis and ensure that the chassis screw holes align with the ones on the system board.
2. Replace the eight screws (#6-32) that secure the system board to the chassis.
3. Using the routing points on the chassis, route and reconnect the following cables to the connectors on the system board:
  - Power-supply cables

- Hard-drive cables
  - Power-button cable
4. Slide the front I/O-ports on the system board into the front I/O-slots on the chassis and align the screw holes on the system board with the screw holes on the chassis.
  5. Replace the single screw (#6-32) to secure the front I/O-bracket to the chassis.

### Next steps

1. Install the [processor](#).
  2. Install the [fan and heat-sink](#).
  3. Install the [coin-cell battery](#).
  4. Install the [graphics card](#).
  5. Install the [M.2 2230 SSD](#)/ [M.2 2280 SSD](#).
  6. Install the [memory module](#).
  7. Install the [front bezel](#).
  8. Install the [Side cover](#).
  9. Follow the procedure in [After working inside your computer](#).
-  **NOTE:** Your computer's Service Tag is stored in the system board. You must enter the Service Tag in the BIOS setup program after you replace the system board.
-  **NOTE:** Replacing the system board removes any changes that you have made to the BIOS using the BIOS setup program. You must make the appropriate changes again after you replace the system board.



# Troubleshooting

## Real-Time Clock (RTC Reset)

The Real Time Clock (RTC) reset function allows you or the service technician to recover Dell Inspiron, systems from No POST/No Power/No Boot situations. The legacy jumper enabled RTC reset has been retired on these models.

Start the RTC reset with the system powered off and connected to AC power. Press and hold the power button for thirty (30) seconds. The system RTC Reset occurs after you release the power button.

## System diagnostic lights

### Power-supply diagnostics light

Indicates the status of the power-supply in either of the two states:

- Off: No Power
- On: Power is supplied.

### Power button light

**Table 4. Power button LED status**

Power button LED state	System state	Description
Off	<ul style="list-style-type: none"> <li>• S4</li> <li>• S5</li> </ul>	There is in Hibernate or Off state.
Solid White	S0	Working state
Solid Amber		Various sleep states or No POST
Blinking Amber/White		Failure to POST

This platform relies on the Power button LED light blinking in an amber/white pattern to determine a failure as listed in the following table:

### NOTE:

The blinking patterns consists of two numbers (representing First Group: Amber blinks, Second Group: White blinks).

- **First Group:** The Power button LED light blinks Amber, 1 to 9 times followed by a short pause with LED off for a couple of seconds.
- **Second Group:** The Power button LED light then blinks White, 1 to 9 times, followed by a longer pause before the next cycle starts again after a short interval.

**Example:** No Memory detected (2,3). Power button LED blinks 2-times in Amber followed by a pause, and then blinks 3-times in White. The Power button LED will pause for few seconds before the next cycle repeats itself again.

**Table 5. Diagnostic LED status**

Blinking pattern		Problem description	Suggested resolution
Amber	White		
1	2	Unrecoverable SPI flash failure	

**Table 5. Diagnostic LED status (continued)**

Blinking pattern		Problem description	Suggested resolution
2	1	CPU failure	<ul style="list-style-type: none"> <li>Run the Intel CPU diagnostics tools.</li> <li>If problem persists, replace the system board.</li> </ul>
2	2	System board failure (including BIOS corruption or ROM error)	<ul style="list-style-type: none"> <li>Flash latest BIOS version.</li> <li>If problem persists, replace the system board.</li> </ul>
2	3	No memory/RAM detected	<ul style="list-style-type: none"> <li>Confirm that the memory module is installed properly.</li> <li>If problem persists, replace the memory module.</li> </ul>
2	4	Memory/RAM failure	<ul style="list-style-type: none"> <li>Reset the memory module.</li> <li>If problem persists, replace the memory module.</li> </ul>
2	5	Invalid Memory installed	<ul style="list-style-type: none"> <li>Reset the memory module.</li> <li>If problem persists, replace the memory module.</li> </ul>
2	6	System board error, chipset error, clock failure, gate A20 failure, super I/O failure, keyboard controller failure	<ul style="list-style-type: none"> <li>Flash latest BIOS version.</li> <li>If problem persists, replace the system board.</li> </ul>
3	1	CMOS battery failure	<ul style="list-style-type: none"> <li>Reset the CMOS battery connection.</li> <li>If problem persists, replace the RTS battery.</li> </ul>
3	2	PCIe or video card/chip failure	<ul style="list-style-type: none"> <li>Replace the system board.</li> </ul>
3	3	BIOS recovery image not found	<ul style="list-style-type: none"> <li>Flash latest BIOS version.</li> <li>If problem persists, replace the system board.</li> </ul>
3	4	BIOS recovery image found but invalid	<ul style="list-style-type: none"> <li>Flash latest BIOS version.</li> <li>If problem persists, replace the system board.</li> </ul>
3	5	Power Rail Failure	<ul style="list-style-type: none"> <li>EC ran into power sequencing failure.</li> <li>If problem persists, replace the system board.</li> </ul>
3	6	Bad SPI volume error	<ul style="list-style-type: none"> <li>Flash corruption detected by SBIOS.</li> <li>If problem persists, replace the system board.</li> </ul>
3	7	Intel ME (Management Engine) error	<ul style="list-style-type: none"> <li>Timeout waiting on ME to reply to HECI message.</li> <li>If problem persists, replace the system board.</li> </ul>
4	2	CPU power cable connection issue	

# System diagnostic lights

## Power-supply diagnostics light

Indicates the power-supply state.

## Hard-drive activity light

Turns on when the computer reads from or writes to the hard drive.

**Table 6. Diagnostic-light codes**

Diagnostic light codes (Amber, white)	Problem description
1,2	Unrecoverable SPI Flash Failure
2,1	CPU failure
2,2	System board failure, corrupt BIOS, ROM error
2,3	No memory/RAM detected
2,4	Memory/RAM failure
2,5	Invalid Memory installed
2,6	System board error, chipset error, clock failure, gate A20 failure, super I/O failure, keyboard controller failure
3,1	CMOS battery failure
3,2	PCIe or video card/chip failure
3,3	BIOS recovery image not found
3,4	BIOS recovery image found but invalid
3,5	Power Rail Failure
3,6	Paid SPI volume error
3,7	Intel ME (Management Engine) error
4,2	CPU power cable connection issue

# Diagnostic error messages

**Table 7. Diagnostic error messages**

Error messages	Description
AUXILIARY DEVICE FAILURE	The touchpad or external mouse may be faulty. For an external mouse, check the cable connection. Enable the <b>Pointing Device</b> option in the System Setup program.
BAD COMMAND OR FILE NAME	Ensure that you have spelled the command correctly, put spaces in the proper place, and used the correct path name.
CACHE DISABLED DUE TO FAILURE	The primary cache internal to the microprocessor has failed. <b>Contact Dell</b>
CD DRIVE CONTROLLER FAILURE	The optical drive does not respond to commands from the computer.
DATA ERROR	The hard drive cannot read the data.
DECREASING AVAILABLE MEMORY	One or more memory modules may be faulty or improperly seated. Reinstall the memory modules or, if necessary, replace them.

**Table 7. Diagnostic error messages (continued)**

Error messages	Description
DISK C: FAILED INITIALIZATION	The hard drive failed initialization. Run the hard drive tests in <b>Dell Diagnostics</b> .
DRIVE NOT READY	The operation requires a hard drive in the bay before it can continue. Install a hard drive in the hard drive bay.
ERROR READING PCMCIA CARD	The computer cannot identify the ExpressCard. Reinsert the card or try another card.
EXTENDED MEMORY SIZE HAS CHANGED	The amount of memory recorded in non-volatile memory (NVRAM) does not match the memory module installed in the computer. Restart the computer. If the error appears again, <b>Contact Dell</b>
THE FILE BEING COPIED IS TOO LARGE FOR THE DESTINATION DRIVE	The file that you are trying to copy is too large to fit on the disk, or the disk is full. Try copying the file to a different disk or use a larger capacity disk.
A FILENAME CANNOT CONTAIN ANY OF THE FOLLOWING CHARACTERS: \ / : * ? " < >   -	Do not use these characters in filenames.
GATE A20 FAILURE	A memory module may be loose. Reinstall the memory module or, if necessary, replace it.
GENERAL FAILURE	The operating system is unable to carry out the command. The message is usually followed by specific information. For example, <code>Printer out of paper</code> . Take the appropriate action.
HARD-DISK DRIVE CONFIGURATION ERROR	The computer cannot identify the drive type. Shut down the computer, remove the hard drive, and boot the computer from an optical drive. Then, shut down the computer, reinstall the hard drive, and restart the computer. Run the <b>Hard Disk Drive</b> tests in <b>Dell Diagnostics</b> .
HARD-DISK DRIVE CONTROLLER FAILURE 0	The hard drive does not respond to commands from the computer. Shut down the computer, remove the hard drive, and boot the computer from an optical drive. Then, shut down the computer, reinstall the hard drive, and restart the computer. If the problem persists, try another drive. Run the <b>Hard Disk Drive</b> tests in <b>Dell Diagnostics</b> .
HARD-DISK DRIVE FAILURE	The hard drive does not respond to commands from the computer. Shut down the computer, remove the hard drive, and boot the computer from an optical drive. Then, shut down the computer, reinstall the hard drive, and restart the computer. If the problem persists, try another drive. Run the <b>Hard Disk Drive</b> tests in <b>Dell Diagnostics</b> .
HARD-DISK DRIVE READ FAILURE	The hard drive may be defective. Shut down the computer, remove the hard drive, and boot the computer from an optical. Then, shut down the computer, reinstall the hard drive, and restart the computer. If the problem persists, try another drive. Run the <b>Hard Disk Drive</b> tests in <b>Dell Diagnostics</b> .
INSERT BOOTABLE MEDIA	The operating system is trying to boot to non-bootable media, such as an optical drive. Insert bootable media.
INVALID CONFIGURATION INFORMATION-PLEASE RUN SYSTEM SETUP PROGRAM	The system configuration information does not match the hardware configuration. The message is most likely to occur after a memory module is installed. Correct the appropriate options in the system setup program.
KEYBOARD CLOCK LINE FAILURE	For external keyboards, check the cable connection. Run the <b>Keyboard Controller</b> test in <b>Dell Diagnostics</b> .

**Table 7. Diagnostic error messages (continued)**

Error messages	Description
KEYBOARD CONTROLLER FAILURE	For external keyboards, check the cable connection. Restart the computer, and avoid touching the keyboard or the mouse during the boot routine. Run the <b>Keyboard Controller</b> test in <b>Dell Diagnostics</b> .
KEYBOARD DATA LINE FAILURE	For external keyboards, check the cable connection. Run the <b>Keyboard Controller</b> test in <b>Dell Diagnostics</b> .
KEYBOARD STUCK KEY FAILURE	For external keyboards or keypads, check the cable connection. Restart the computer, and avoid touching the keyboard or keys during the boot routine. Run the <b>Stuck Key</b> test in <b>Dell Diagnostics</b> .
LICENSED CONTENT IS NOT ACCESSIBLE IN MEDIADIRECT	Dell MediaDirect cannot verify the Digital Rights Management (DRM) restrictions on the file, so the file cannot be played.
MEMORY ADDRESS LINE FAILURE AT ADDRESS, READ VALUE EXPECTING VALUE	A memory module may be faulty or improperly seated. Reinstall the memory module or, if necessary, replace it.
MEMORY ALLOCATION ERROR	The software you are attempting to run is conflicting with the operating system, another program, or a utility. Shut down the computer, wait for 30 seconds, and then restart it. Run the program again. If the error message still appears, see the software documentation.
MEMORY DOUBLE WORD LOGIC FAILURE AT ADDRESS, READ VALUE EXPECTING VALUE	A memory module may be faulty or improperly seated. Reinstall the memory module or, if necessary, replace it.
MEMORY ODD/EVEN LOGIC FAILURE AT ADDRESS, READ VALUE EXPECTING VALUE	A memory module may be faulty or improperly seated. Reinstall the memory module or, if necessary, replace it.
MEMORY WRITE/READ FAILURE AT ADDRESS, READ VALUE EXPECTING VALUE	A memory module may be faulty or improperly seated. Reinstall the memory module or, if necessary, replace it.
NO BOOT DEVICE AVAILABLE	The computer cannot find the hard drive. If the hard drive is your boot device, ensure that the drive is installed, properly seated, and partitioned as a boot device.
NO BOOT SECTOR ON HARD DRIVE	The operating system may be corrupted, <b>Contact Dell</b> .
NO TIMER TICK INTERRUPT	A chip on the system board may be malfunctioning. Run the <b>System Set</b> tests in <b>Dell Diagnostics</b> .
NOT ENOUGH MEMORY OR RESOURCES. EXIT SOME PROGRAMS AND TRY AGAIN	You have too many programs open. Close all windows and open the program that you want to use.
OPERATING SYSTEM NOT FOUND	Reinstall the operating system. If the problem persists, <b>Contact Dell</b> .
OPTIONAL ROM BAD CHECKSUM	The optional ROM has failed. <b>Contact Dell</b> .
SECTOR NOT FOUND	The operating system cannot locate a sector on the hard drive. You may have a defective sector or corrupted File Allocation Table (FAT) on the hard drive. Run the Windows error-checking utility to check the file structure on the hard drive. See <b>Windows Help and Support</b> for instructions (click <b>Start &gt; Help and Support</b> ). If a large number of sectors are defective, back up the data (if possible), and then format the hard drive.
SEEK ERROR	The operating system cannot find a specific track on the hard drive.
SHUTDOWN FAILURE	A chip on the system board may be malfunctioning. Run the <b>System Set</b> tests in <b>Dell Diagnostics</b> . If the message reappears, <b>Contact Dell</b> .



**Table 7. Diagnostic error messages (continued)**

Error messages	Description
TIME-OF-DAY CLOCK LOST POWER	System configuration settings are corrupted. Connect your computer to an electrical outlet to charge the battery. If the problem persists, try to restore the data by entering the System Setup program, then immediately exit the program. If the message reappears, <b>Contact Dell</b> .
TIME-OF-DAY CLOCK STOPPED	The reserve battery that supports the system configuration settings may require recharging. Connect your computer to an electrical outlet to charge the battery. If the problem persists, <b>Contact Dell</b> .
TIME-OF-DAY NOT SET-PLEASE RUN THE SYSTEM SETUP PROGRAM	The time or date stored in the system setup program does not match the system clock. Correct the settings for the <b>Date and Time</b> options.
TIMER CHIP COUNTER 2 FAILED	A chip on the system board may be malfunctioning. Run the <b>System Set</b> tests in <b>Dell Diagnostics</b> .
UNEXPECTED INTERRUPT IN PROTECTED MODE	The keyboard controller may be malfunctioning, or a memory module may be loose. Run the <b>System Memory</b> tests and the <b>Keyboard Controller</b> test in <b>Dell Diagnostics</b> or <b>Contact Dell</b> .
X:\ IS NOT ACCESSIBLE. THE DEVICE IS NOT READY	Insert a disk into the drive and try again.

## System error messages

**Table 8. System error messages**

System message	Description
Alert! Previous attempts at booting this system have failed at checkpoint [nnnn]. For help in resolving this problem, please note this checkpoint and contact Dell Technical Support	The computer failed to complete the boot routine three consecutive times for the same error.
CMOS checksum error	RTC is reset, <b>BIOS Setup</b> default has been loaded.
CPU fan failure	CPU fan has failed.
System fan failure	System fan has failed.
Hard-disk drive failure	Possible hard disk drive failure during POST.
Keyboard failure	Keyboard failure or loose cable. If reseating the cable does not solve the problem, replace the keyboard.
No boot device available	No bootable partition on hard disk drive, the hard disk drive cable is loose, or no bootable device exists. <ul style="list-style-type: none"> <li>If the hard drive is your boot device, ensure that the cables are connected and that the drive is installed properly and partitioned as a boot device.</li> <li>Enter system setup and ensure that the boot sequence information is correct.</li> </ul>
No timer tick interrupt	A chip on the system board might be malfunctioning or motherboard failure.
NOTICE - Hard Drive SELF MONITORING SYSTEM has reported that a parameter has exceeded its normal operating range. Dell recommends that you back up your data regularly. A	S.M.A.R.T error, possible hard disk drive failure.

**Table 8. System error messages (continued)**

System message	Description
parameter out of range may or may not indicate a potential hard drive problem	

## 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](http://www.dell.com/serviceabilitytools). Click **SupportAssist** and then, click **SupportAssist OS Recovery**.


## Updating the BIOS using the USB drive in Windows

### Steps

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](http://www.dell.com/support).
3. Copy the BIOS setup program file to the bootable USB drive.
4. Connect the bootable USB drive to the computer that needs the BIOS update.
5. Restart the computer and press **F12**.
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 in Windows


### Steps

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

# WiFi power cycle

## About this task

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.

## Steps



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.

# 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 9. Self-help resources**

Self-help resources	Resource location
Information about Dell products and services	<a href="http://www.dell.com">www.dell.com</a>
My Dell app	
Tips	
Contact Support	In Windows search, type <code>Contact Support</code> , and press Enter.
Online help for operating system	<a href="http://www.dell.com/support/windows">www.dell.com/support/windows</a>
Access top solutions, diagnostics, drivers and downloads, and learn more about your computer through videos, manuals and documents.	<p>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 <a href="http://www.dell.com/support">www.dell.com/support</a>.</p> <p>For more information on how to find the Service Tag for your computer, see <a href="#">Locate the Service Tag on your computer</a>.</p>
Dell knowledge base articles for a variety of computer concerns	<ol style="list-style-type: none"> <li>1. Go to <a href="http://www.dell.com/support">www.dell.com/support</a>.</li> <li>2. On the menu bar at the top of the Support page, select <b>Support &gt; Knowledge Base</b>.</li> <li>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.</li> </ol>

## Contacting Dell

To contact Dell for sales, technical support, or customer service issues, see [www.dell.com/contactdell](http://www.dell.com/contactdell).

 **NOTE:** Availability varies by country/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.