

# Dell OptiPlex 5055 Small Form Factor

## Owner's Manual



## Notes, cautions, and warnings

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

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

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

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# Working on your computer

## Safety instructions

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

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

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

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

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

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

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

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

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

## Turning off your computer

### Turning off your — Windows

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

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

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

# Before working inside your computer

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

- 1 Ensure that you follow the [Safety Instruction](#).
- 2 Ensure that your work surface is flat and clean to prevent the computer cover from being scratched.
- 3 Turn off your computer.
- 4 Disconnect all network cables from the computer.

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

- 5 Disconnect your computer and all attached devices from their electrical outlets.
- 6 Press and hold the power button while the computer is unplugged to ground the system board.

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

# After working inside your computer

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

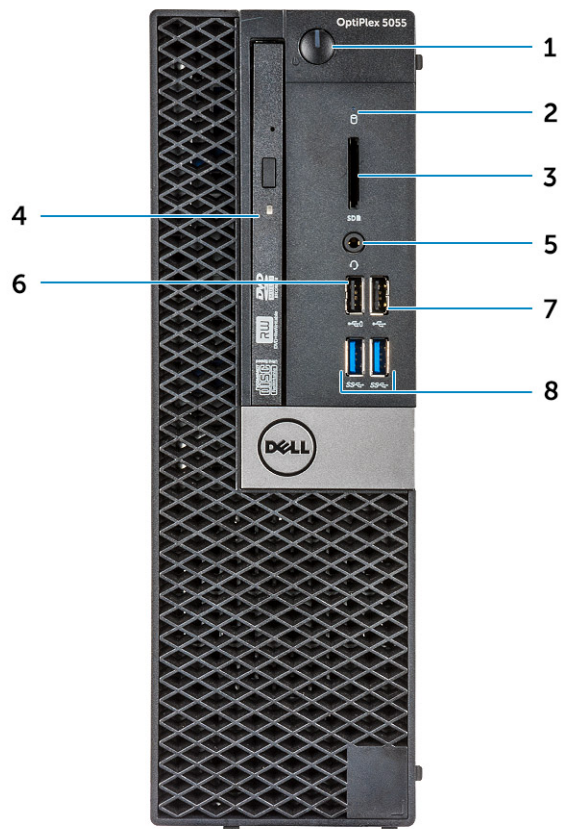
- 1 Connect any telephone or network cables to your computer.

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

- 2 Connect your computer and all attached devices to their electrical outlets.
- 3 Turn on your computer.
- 4 If required, verify that the computer works correctly by running **ePSA diagnostics**.

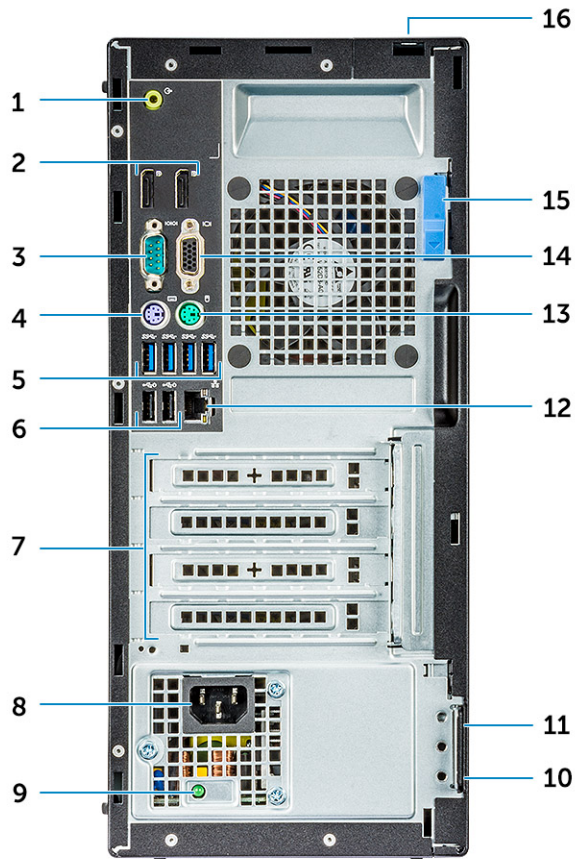
# Chassis

## Front chassis view



- |   |                               |   |                              |
|---|-------------------------------|---|------------------------------|
| 1 | Power button and power light  | 2 | Hard drive activity light    |
| 3 | Memory card reader (optional) | 4 | Optical drive (optional)     |
| 5 | Headset port                  | 6 | USB 2.0 port with PowerShare |
| 7 | USB 2.0 port                  | 8 | USB 3.1 Gen1 port            |

# Back chassis view



- |    |                                |    |   |
|----|--------------------------------|----|---|
| 1  | Line-out port                  | 2  | DisplayPort                             |
| 3  | Serial port                    | 4  | PS/2 keyboard port                      |
| 5  | USB 3.1 Gen1 port              | 6  | USB 2.0 ports (supports Smart Power On) |
| 7  | Expansion card slots           | 8  | Power connector port                    |
| 9  | Power supply diagnostic light  | 10 | Padlock ring                            |
| 11 | Kensington security cable slot | 12 | Network port                            |
| 13 | PS/2 mouse port                | 14 | VGA connector port (optional)           |
| 15 | Release latch                  | 16 | Cable cover lock slot                   |

# Disassembly and reassembly

## Back cover

### Removing cover

- 1 Follow the procedure in [Before working inside your computer](#).
- 2 To release cover:
  - a Slide the blue retention tab to the right to unlock the cover [1].
  - b Slide the cover toward the back of the computer [2].



- 3 Lift the cover to remove it from the computer.



## Installing cover

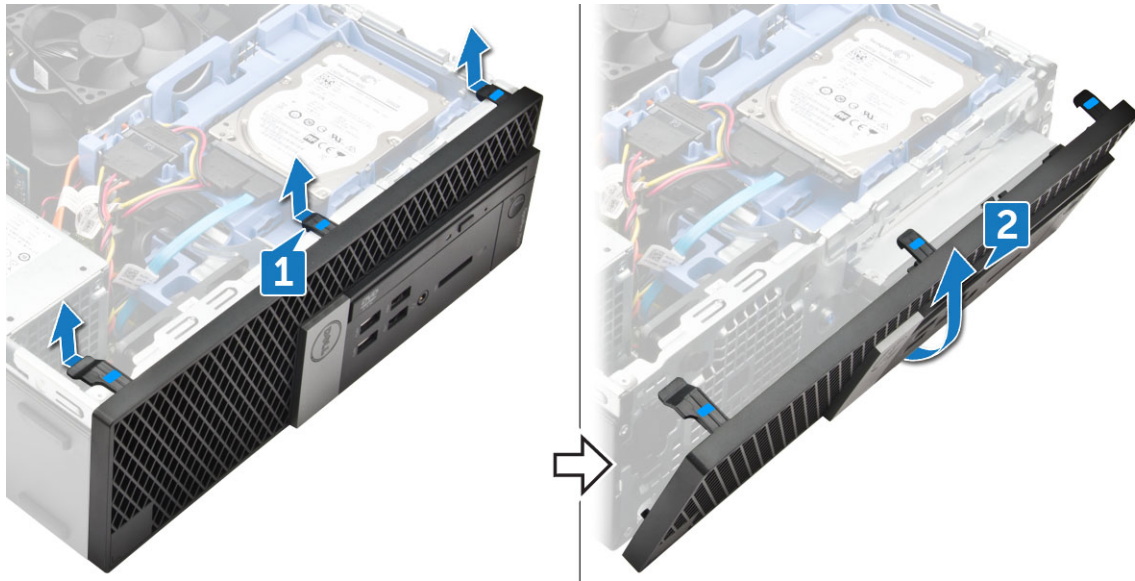
- 1 Place the cover on the computer and slide the cover forward until it clicks into place.
- 2 Follow the procedure in [After working inside your computer](#).

## Front Bezel

### Removing the front bezel

- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the [cover](#).
- 3 To remove front bezel:
  - a Lift the tabs to release the bezel from the chassis [1].
  - b Remove the front bezel from the computer [2].

**NOTE:** Please ensure that the tabs at the bottom of the bezel is also released before lifting the bezel.



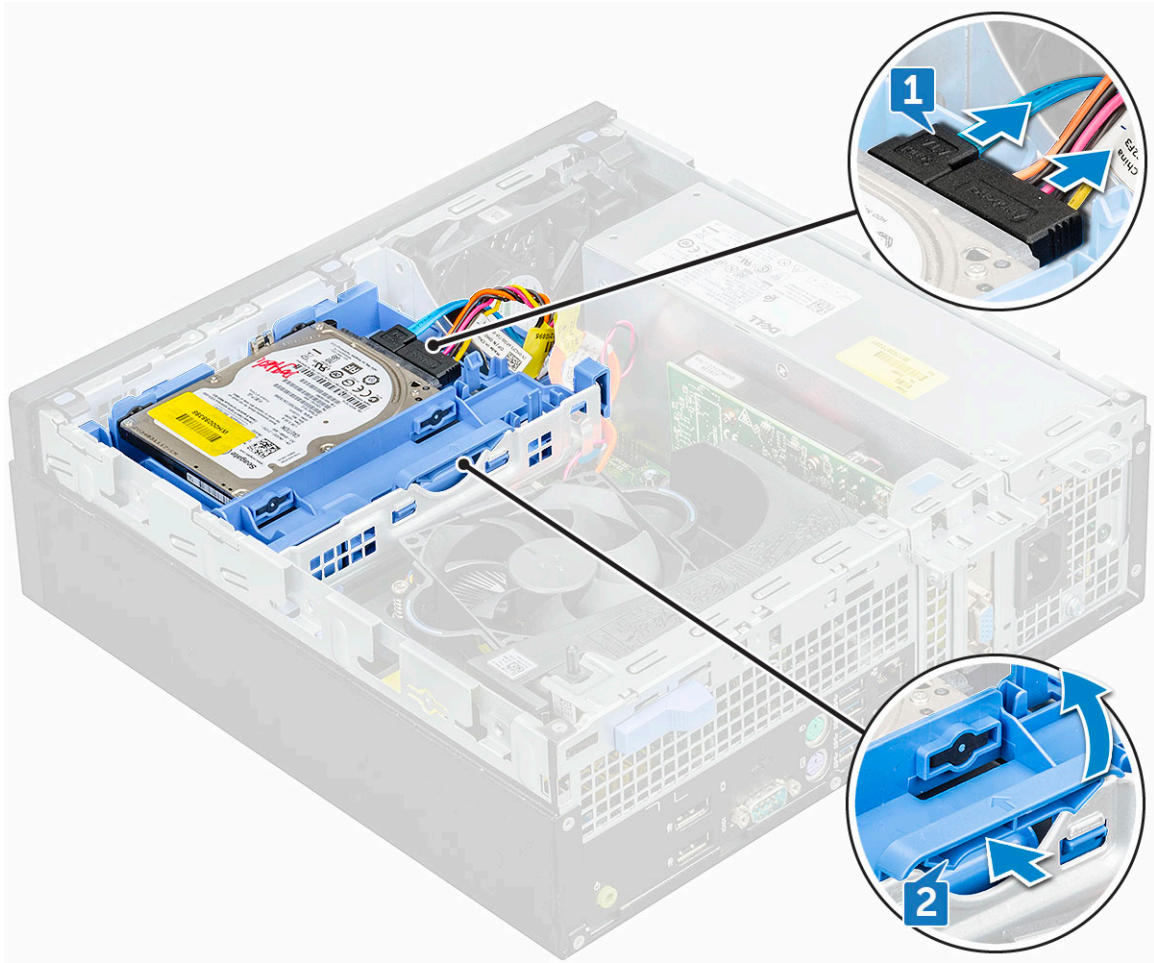
## Installing front bezel

- 1 Insert the tabs of the bezel into the slots on the chassis.
- 2 Press the bezel until the tabs click into place.
- 3 Install the [cover](#).
- 4 Follow the procedure in [After working inside your computer](#).

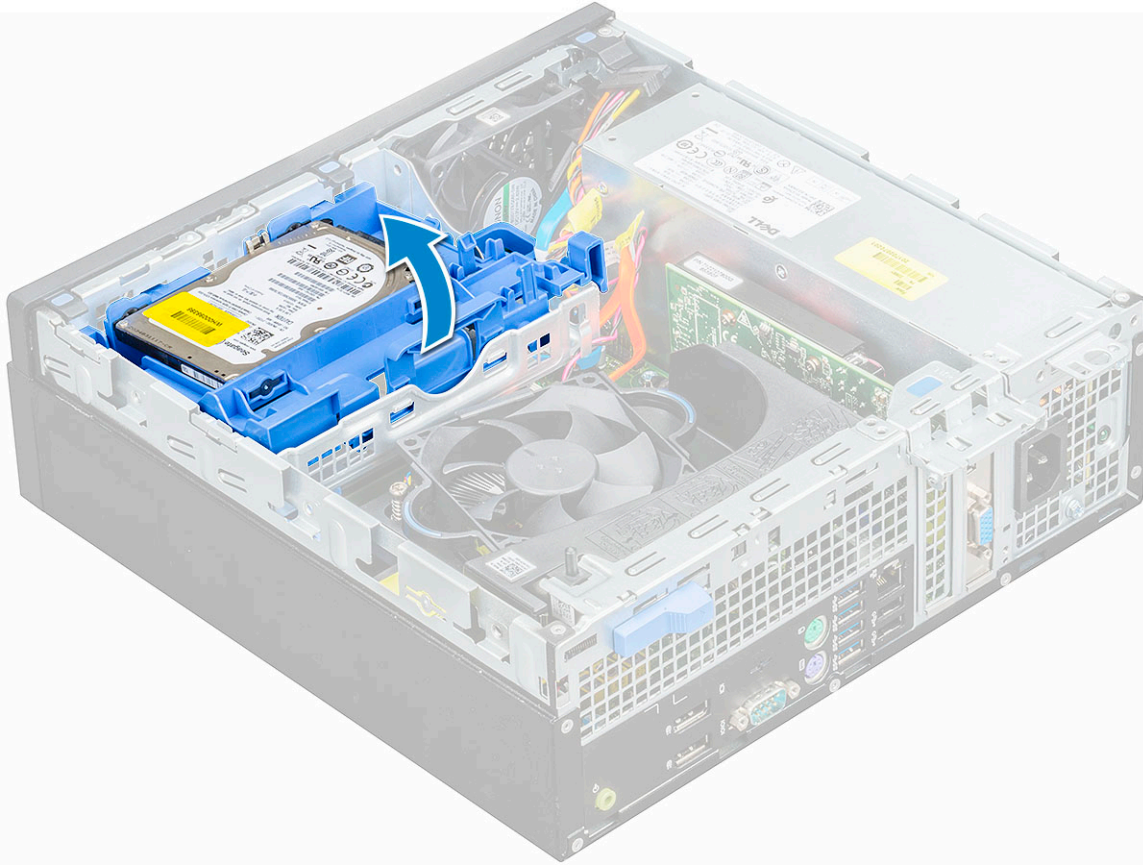
## Storage device

### Removing 2.5–inch hard drive assembly

- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the [cover](#).
- 3 To remove the 2.5-inch drive assembly:
  - a Disconnect the SATA cable and power cable from the drive [1].
  - b Push the tab to release drive assembly from the chassis [2].

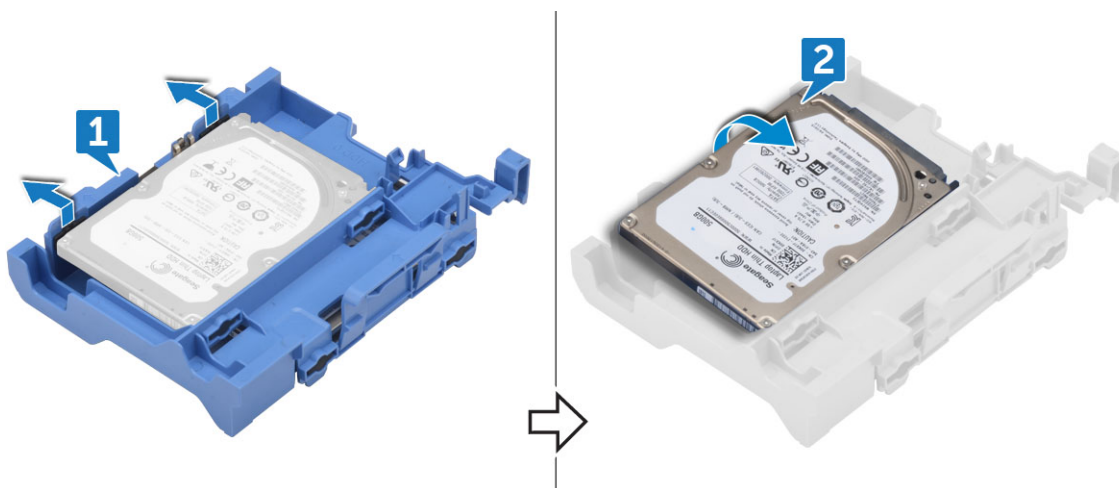


4 Slide and lift the hard drive assembly from the computer.



## Removing 2.5–inch hard drive from the hard drive bracket

- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the:
  - a cover
  - b 2.5 inch hard drive assembly
- 3 To remove hard drive bracket:
  - a Pull one side of the hard drive bracket to disengage the pins on the bracket from the slots on the hard drive [1].
  - b Lift the drive out of the 2.5-inch drive bracket [2].



## Installing 2.5–inch hard drive into the hard drive bracket

- 1 Flex the side of the hard drive bracket, to align and insert the pins on the bracket into the hard drive.
- 2 Insert the hard drive into the hard drive bracket until it clicks into place.
- 3 Install the:
  - a [2.5 inch hard drive assembly](#)
  - b [cover](#)
- 4 Follow the procedure in [After working inside your computer](#).

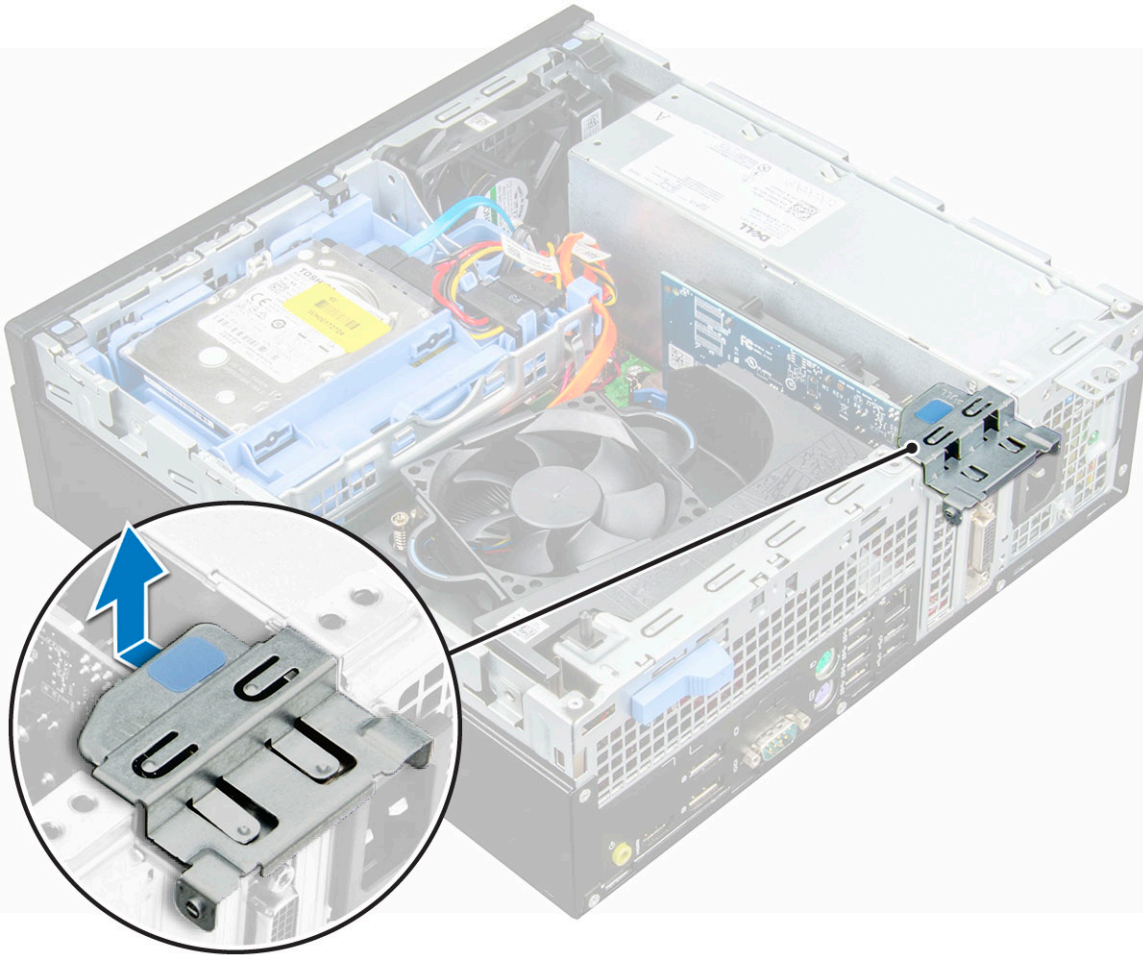
## Installing 2.5–inch hard drive assembly

- 1 Insert the drive assembly into the slot on the computer until it clicks into place.
- 2 Connect the SATA cable and the power cable to the connectors on the hard drive.
- 3 Install the [cover](#).
- 4 Follow the procedure in [After working inside your computer](#).

## Expansion card

### Removing PCIe expansion card

- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the:
  - a [cover](#)
  - b [front bezel](#)
- 3 Pull the metal tab to open the expansion card latch.



- 4 To remove the PCIe expansion card:
  - a Pull the release latch to unlock the PCIe expansion card [1].
  - b Push the release tab [2] and lift the PCIe expansion card out of the computer [3].

**NOTE:** The release tab is at the base of the expansion card.



- 5 Repeat the steps to remove any additional PCIe expansion cards.

## Installing PCIe expansion card

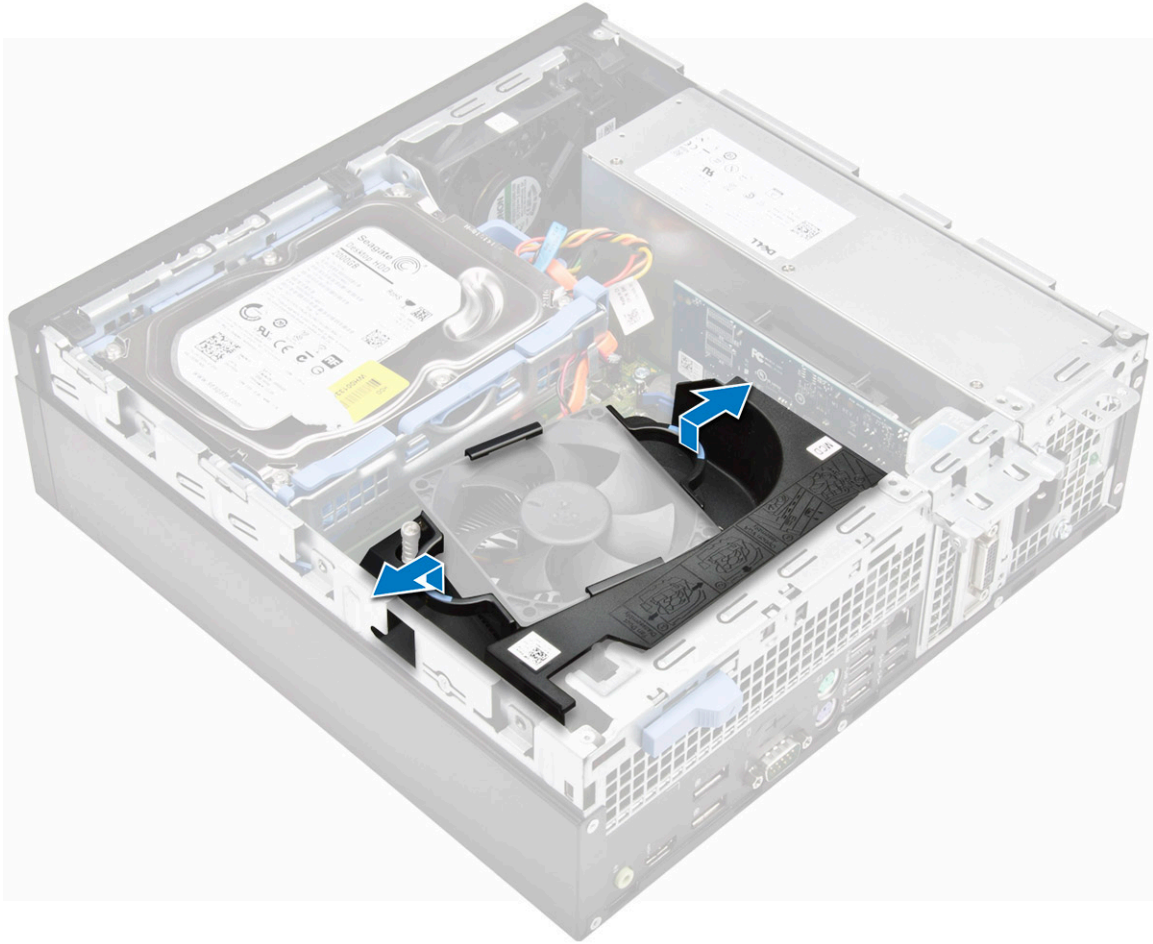
- 1 Insert the expansion card into the connector on the system board.
- 2 Press the expansion card until it clicks into place.
- 3 Close the expansion card latch and press it until it clicks into place.
- 4 Install the:
  - a front bezel
  - b cover
- 5 Follow the procedure in [After working inside your computer](#).

## Cooling shroud

### Removing the cooling shroud

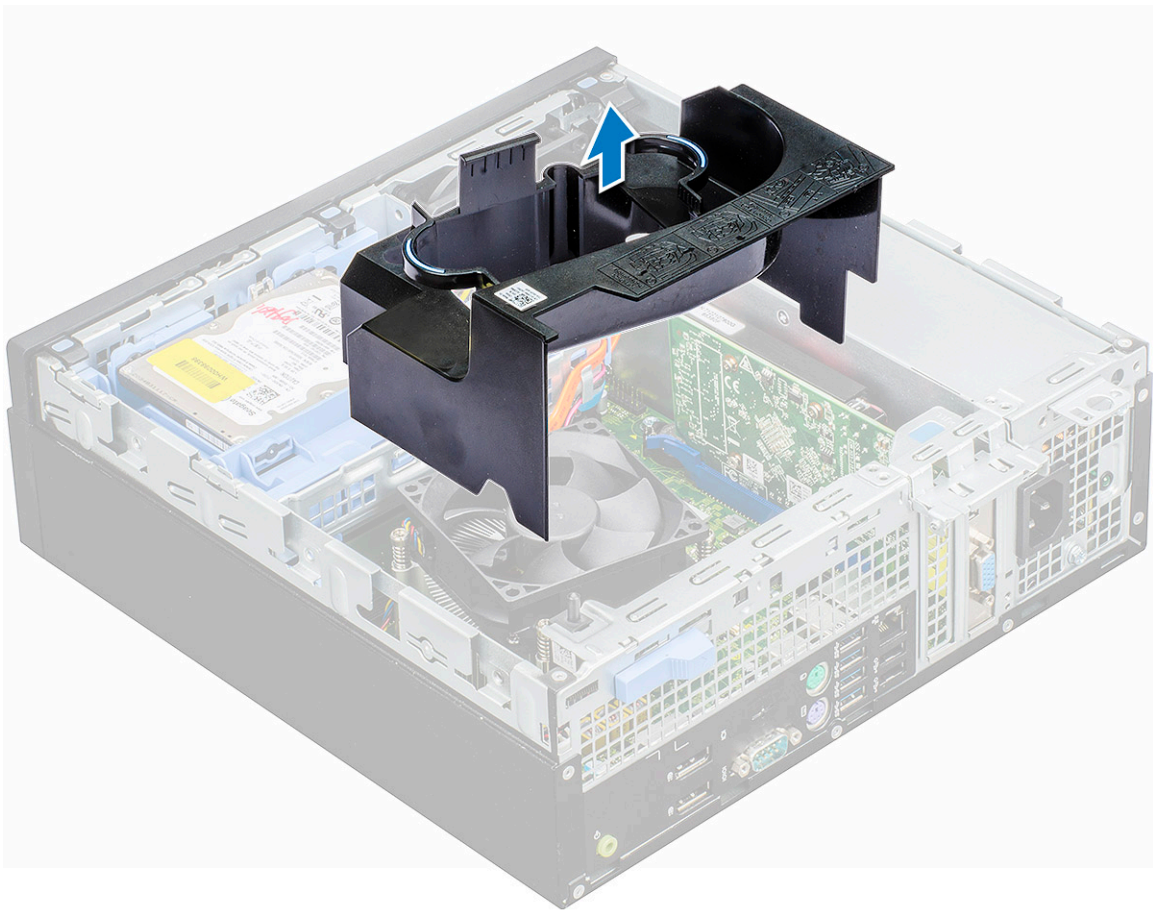
**NOTE:** Cooling shroud is encompasses the processor assembly and it must be removed to access the processor.

- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the [cover](#).
- 3 To remove cooling shroud:
  - a Holding the touch points, pull the fan duct bracker outwards to release the cooling shroud.



**NOTE:** Illustration on how to remove the shroud is also given on the shroud.

- b Lift the cooling shroud away from the chassis.



## Installing cooling shroud

**NOTE:** When inserting the shroud on the processor assembly, please ensure that the data and power cables of the optical drive do not get caught inside the shroud.

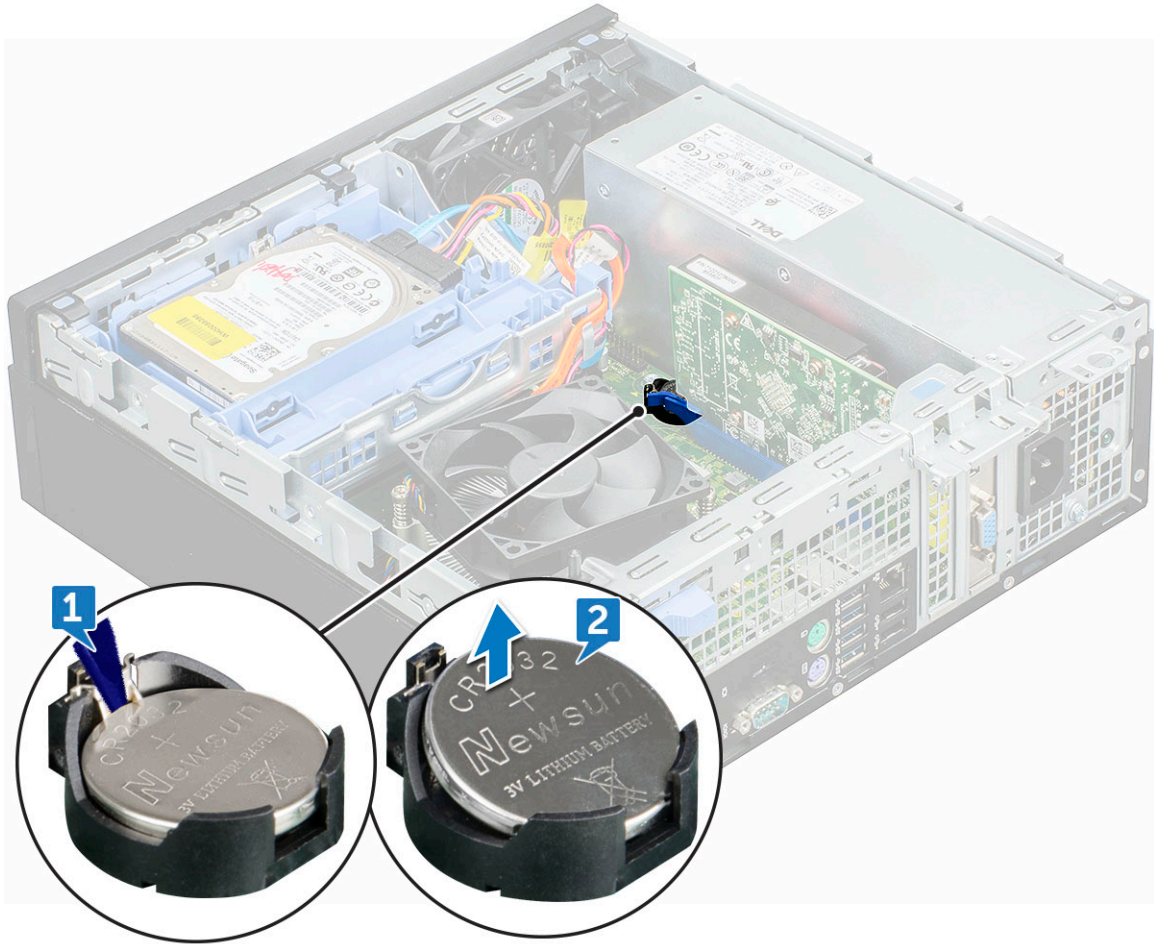
- 1 Align the slots on the cooling shroud, with the screws on the heat sink.
- 2 Insert the cooling shroud over the processor assembly.
- 3 Install the [cover](#).
- 4 Follow the procedure in [After working inside your computer](#).

## Coin-cell battery

### Removing coin cell battery

- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the:
  - a [cover](#)
  - b [cooling shroud](#)
  - c [expansion card](#)
- 3 To remove the coin cell battery:
  - a Using a plastic scribe press the release latch until the coin cell battery pops out [1].

- b Remove the coin cell battery from the connector on the system board [2].



## Installing coin cell battery

- 1 Hold the coin cell battery with the "+" sign facing up and slide it under the securing tabs at the positive side of the connector.
- 2 Press the battery into the connector until it locks into place.
- 3 Install the:
  - a expansion card
  - b cooling shroud
  - c cover
- 4 Follow the procedure in [After working inside your computer](#).

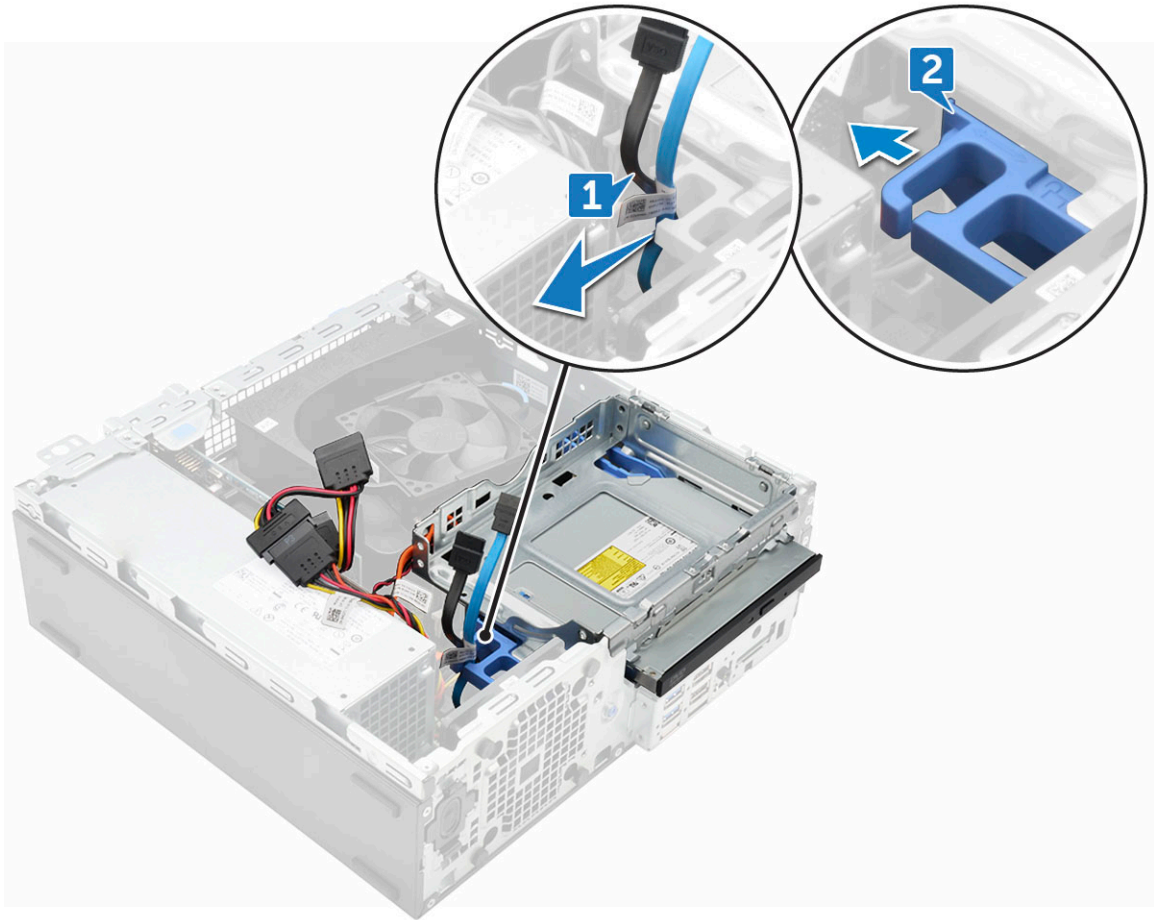
## Optical drive

### Removing optical drive

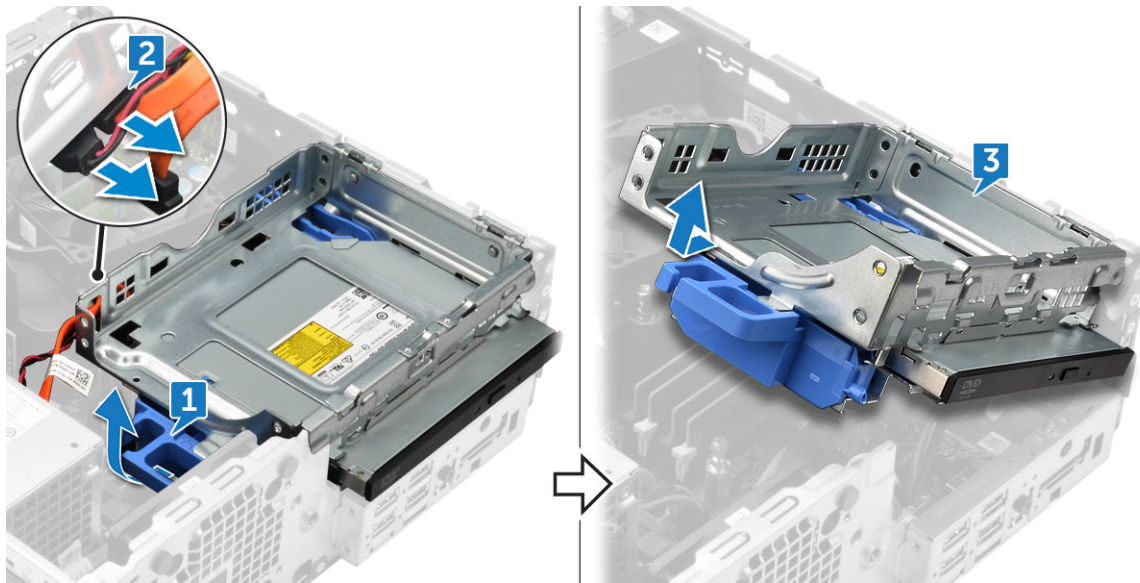
- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the:
  - a cover
  - b front bezel
  - c cooling shroud

d 2.5 inch hard drive assembly

- 3 To remove optical drive:
  - a Release the cables from the retention clip [1].
  - b Slide the blue tab to unlock the optical drive assembly [2].



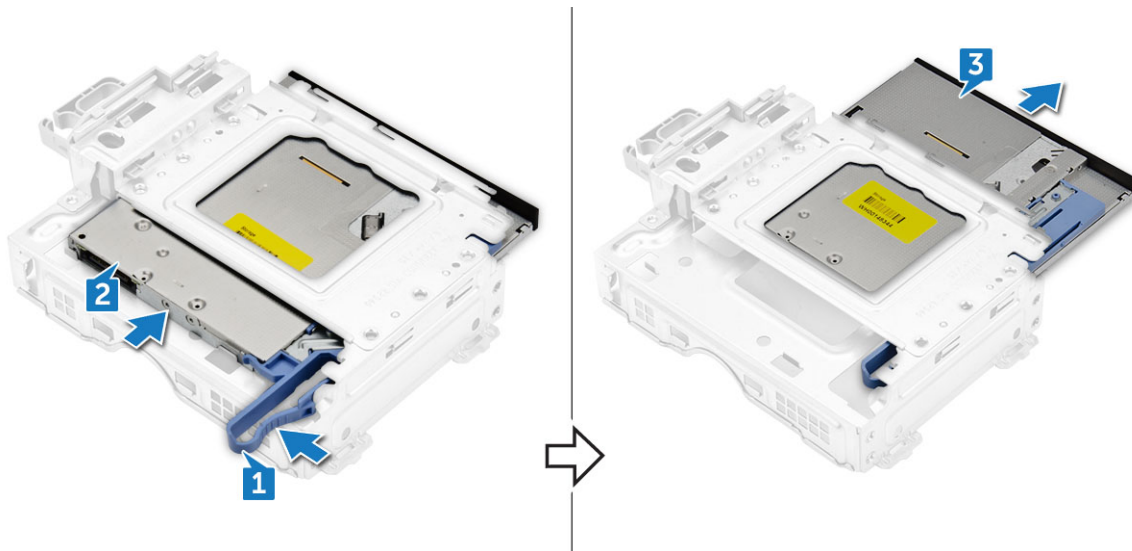
- 4 To remove the optical drive assembly:
  - a Pull the tab upward to release the assembly [1].
  - b Holding the tab, disconnect the optical drive cables [2].
  - c Slide and lift the optical drive assembly away from the computer [3].



① **NOTE:** After releasing the Optical drive, you can also flip the drive assembly for easy access to the drive cables.

① **NOTE:** The Optical drive cables are available on side of the drive assembly.

- 5 To remove the optical drive:
  - a Slide the tab to release the optical drive [1].
  - b Push the optical drive away from the assembly [2][3].



## Installing optical drive

- 1 Slide the optical drive into the optical drive assembly.
- 2 Align the tabs on the optical assembly with the slots on the computer.
- 3 Lower the optical drive assembly into the computer.
- 4 Lock the latch to secure the optical drive to the computer.
- 5 Connect the data and the power cables to the optical drive.
- 6 Install the:
  - a [2.5 inch hard drive assembly](#)

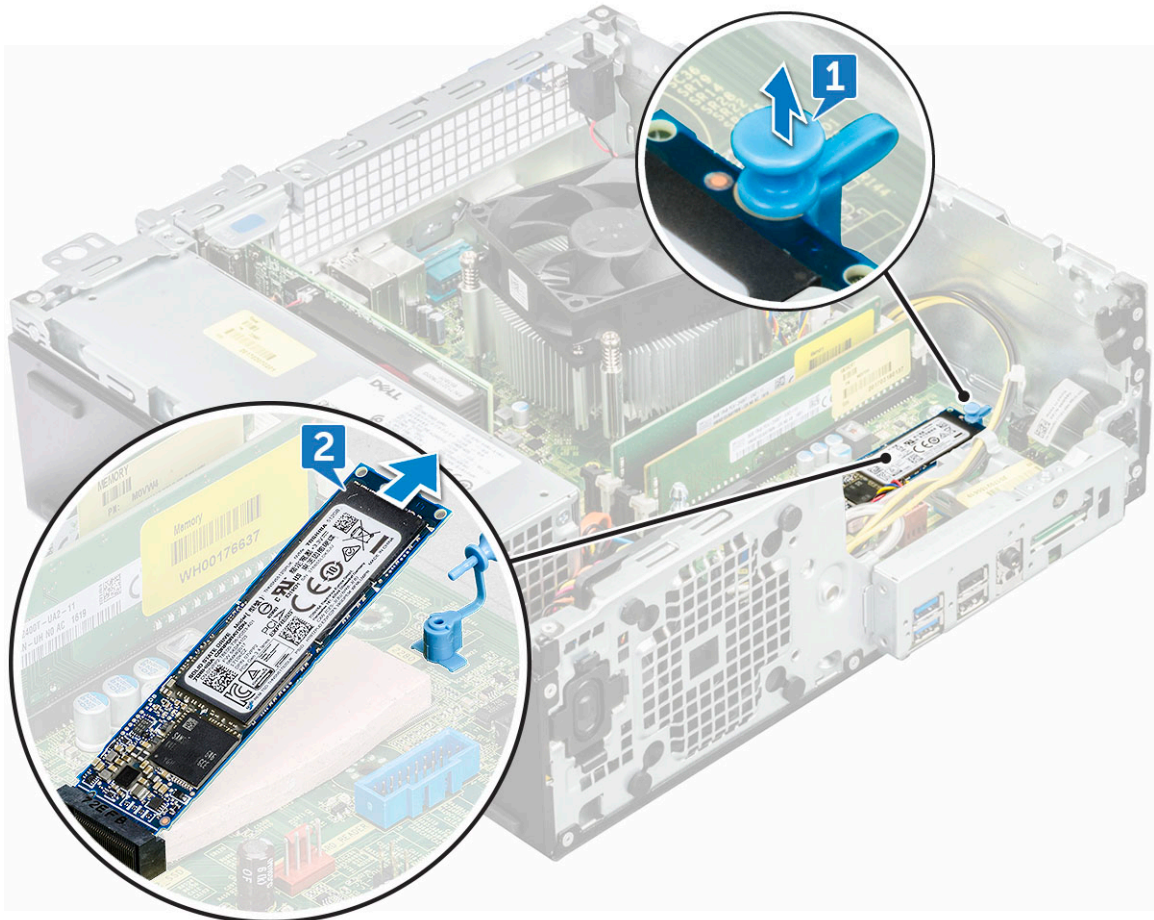
- b cooling shroud
- c front bezel
- d cover

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

## M.2 PCIe SSD

### Removing M.2 PCIe SSD

- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the:
  - a cover
  - b front bezel
  - c 2.5 inch hard drive assembly
  - d cooling shroud
  - e optical drive
- 3 To remove the M.2 PCIe SSD:
  - a Pull the blue plastic pin that secures the M.2 PCIe SSD to the system board [1].
  - b Disconnect the M.2 PCIe SSD from the connector on the system board [2].




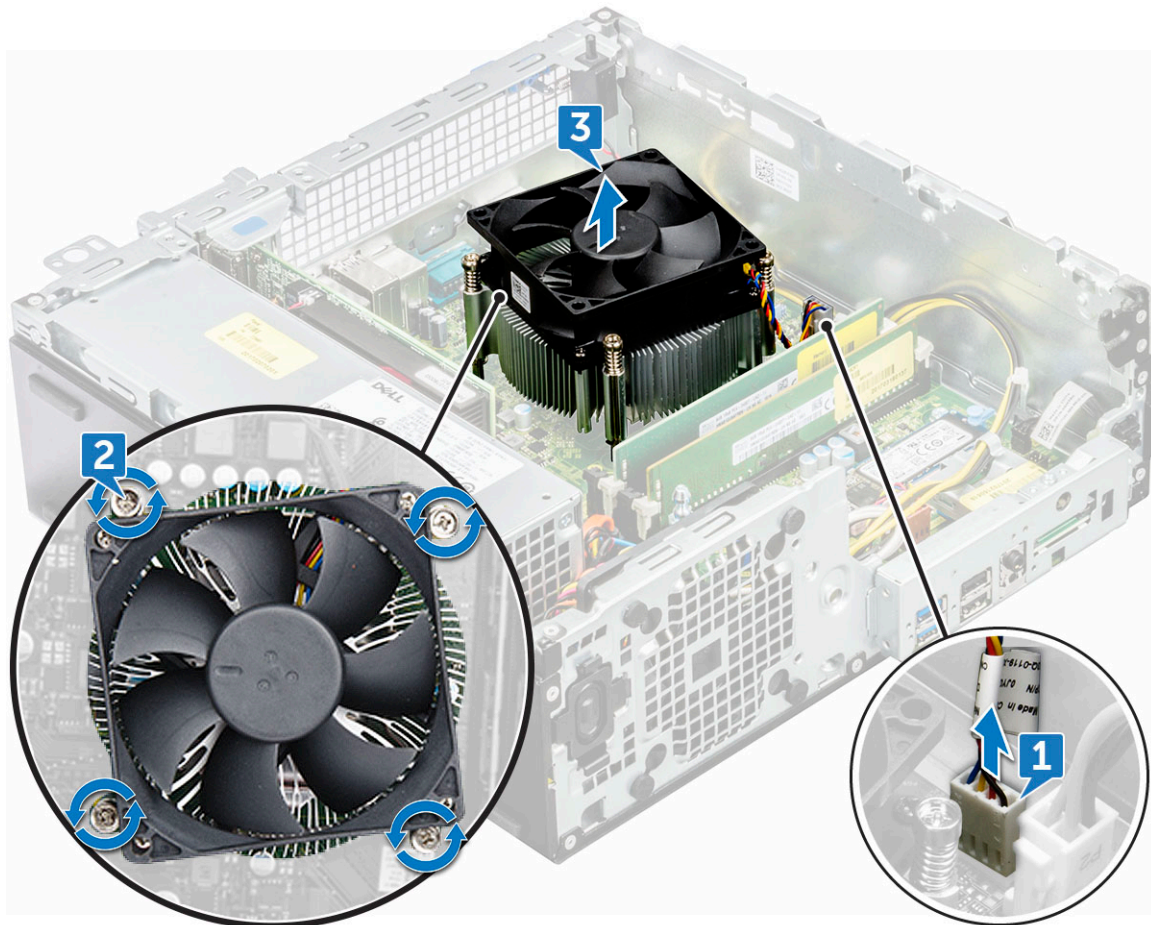
## Installing M.2 PCIe SSD

- 1 Insert the M.2 PCIe SSD to the connector
- 2 Press the blue plastic tab to secure the M.2 PCIe SSD.
- 3 Install the:
  - a optical drive
  - b cooling shroud
  - c 2.5 inch hard drive assembly
  - d front bezel
  - e cover
- 4 Follow the procedure in [After working inside your computer](#).

## Heat sink assembly

### Removing heat sink assembly

- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the:
  - a cover
  - b front bezel
  - c 2.5 inch hard drive assembly
  - d cooling shroud
  - e optical drive
- 3 To remove the heat sink assembly:
  - a Disconnect the heat sink assembly cable from the connector on the system board [1].
  - b Loosen the 6 captive screws that secure the heat sink assembly to the system board [2].  
 **NOTE: Loosen the screws based on the numbers available on the system board.**
  - c Lift the heat sink assembly away from the computer [3].



## Installing heat sink assembly

- 1 Align the screws of the heat sink assembly with the holders on the system board.
- 2 Place the heat sink assembly on the processor.
- 3 Replace the 6 captive screws to secure the heat sink assembly to the system board.

**NOTE:** Tighten the screws based on the order given in the system board.

- 4 Connect the heat sink assembly cable to the connector on the system board.
- 5 Install the:
  - a optical drive
  - b cooling shroud
  - c 2.5 inch hard drive assembly
  - d front bezel
  - e cover
- 6 Follow the procedure in [After working inside your computer](#).

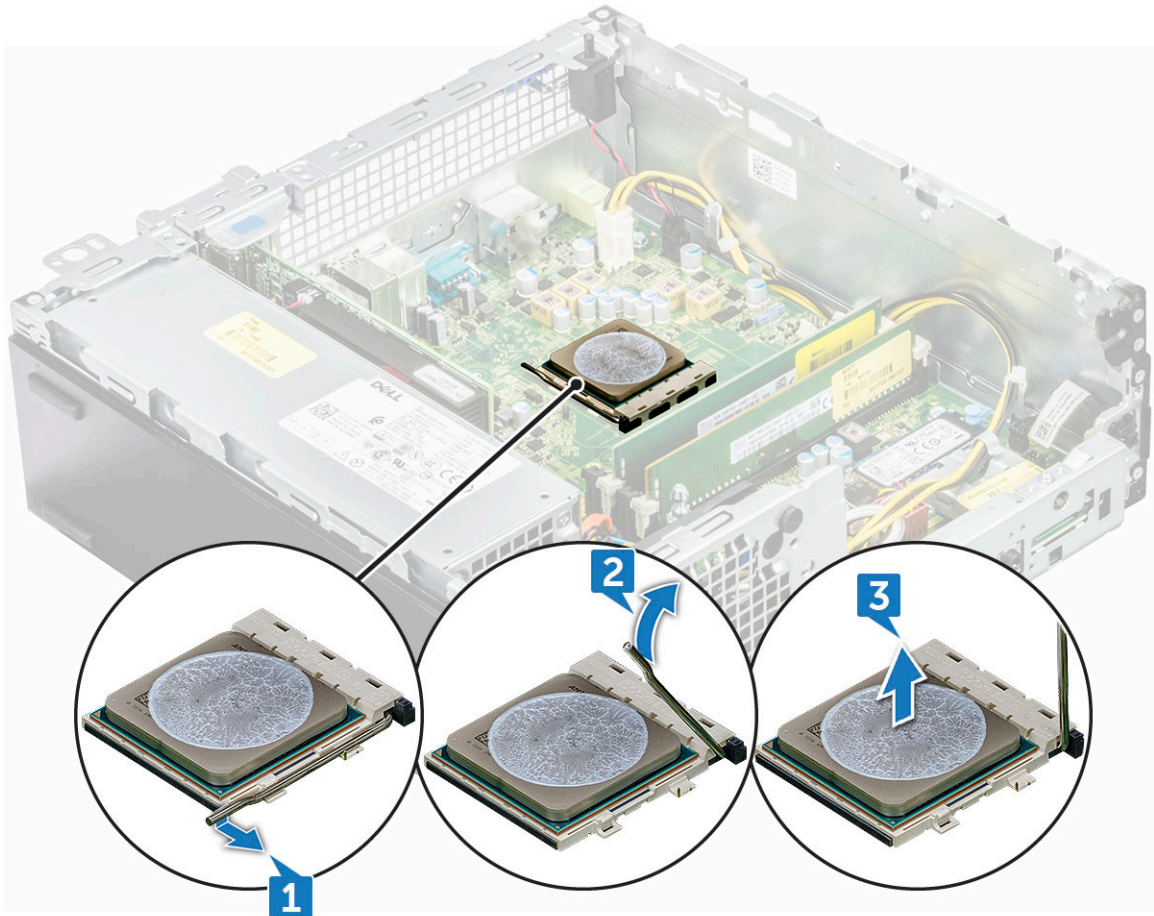
## Processor

### Removing the processor

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

- a cover
  - b front bezel
  - c 2.5 hard drive assembly
  - d cooling shroud
  - e optical drive
  - f heat sink assembly
- 3 To remove the processor:
- a Release the socket lever by pushing the lever down and out from under the tab on the processor shield [1].
  - b Lift the lever upward and lift the processor shield [2].
  - c Lift the processor out of the socket [3].

**CAUTION:** Do not touch the processor socket pins, they are fragile and can be permanently damaged. Be careful not to bend the pins in the processor socket when removing the processor out of the socket.



## Installing the processor

- 1 Align the processor with the socket keys.

**CAUTION:** Do not use force to seat the processor. When the processor is positioned correctly, it engages easily into the socket.

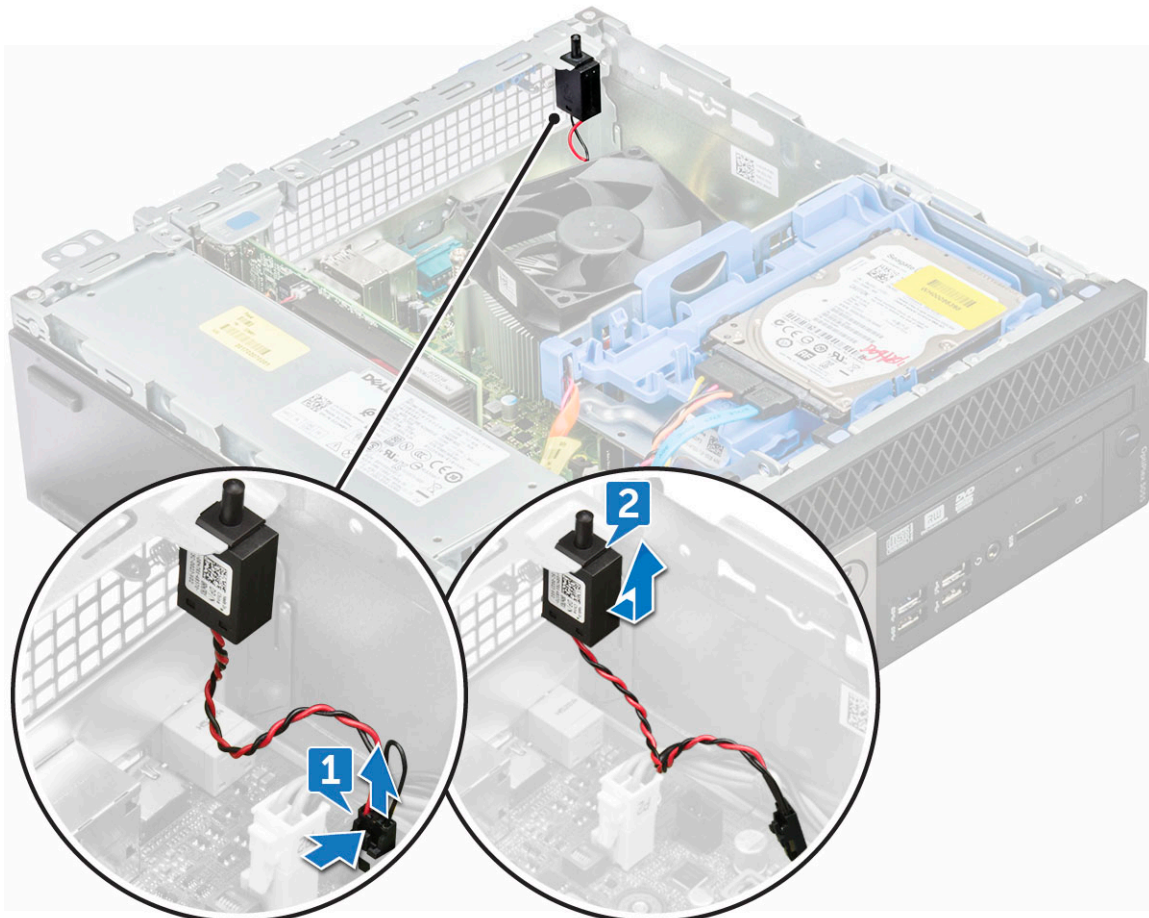
- 2 Align the pin-1 indicator of the processor with the triangle on the socket.
- 3 Place the processor on the socket such that the slots on the processor align with the socket keys.
- 4 Close the processor shield by sliding it under the retention screw.
- 5 Lower the socket lever and push it under the tab to lock it.

- 6 Install the:
  - a heat sink assembly
  - b optical drive
  - c cooling shroud
  - d 2.5 hard drive assembly
  - e front bezel
  - f cover
- 7 Follow the procedure in [After working inside your computer](#).

## Intrusion switch

### Removing intrusion switch

- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the:
  - a cover
  - b front bezel
  - c cooling shroud
- 3 To the intrusion switch:
  - a Disconnect the intrusion switch cable from the connector on the system board [1].
  - b Slide the intrusion switch and push it to remove from the chassis [2].



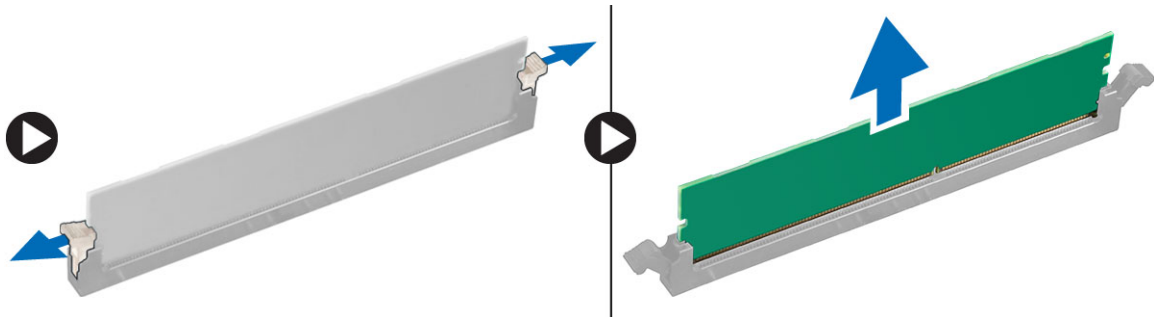
## Installing intrusion switch

- 1 Insert the intrusion switch into the slot on the computer.
- 2 Connect the intrusion switch cable to the connector on the system board.
- 3 Install the:
  - a cooling shroud
  - b front bezel
  - c cover
- 4 Follow the procedure in [After working inside your computer](#).

## Memory modules

### Removing memory module

- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the:
  - a cover
  - b front bezel
  - c 2.5 inch hard drive assembly
  - d cooling shroud
  - e optical drive
- 3 To remove the memory module:
  - a Push the tabs on both sides of the memory module.
  - b Lift the memory module from the connector on the system board.



### Installing memory module

- 1 Align the notch on the memory module with the tab on the memory module connector.
- 2 Insert the memory module into the memory module socket.
- 3 Press the memory module until the memory module retention tabs click into place.
- 4 Close the front panel door.
- 5 Install the:
  - a optical drive
  - b cooling shroud
  - c 2.5 inch hard drive assembly
  - d front bezel
  - e cover
- 6 Follow the procedure in [After working inside your computer](#).

# VGA Daughterboard

## Removing the VGA daughter board

- 1 Follow the procedure in [Before Working Inside Your Computer](#).
- 2 Remove the:
  - a [Back Cover](#)
  - b [Bezel](#)
- 3 Open the [Front Bezel Door](#)
- 4 To remove the VGA daughter board:
  - a Remove the screws that secure the VGA connector to the computer [1].
  - b Slide the VGA connector to release it from the computer [2].
  - c Remove the screw that secures the VGA daughter board to the computer [3].
  - d Lift the VGA daughter board using the handle to remove it from the computer [4].

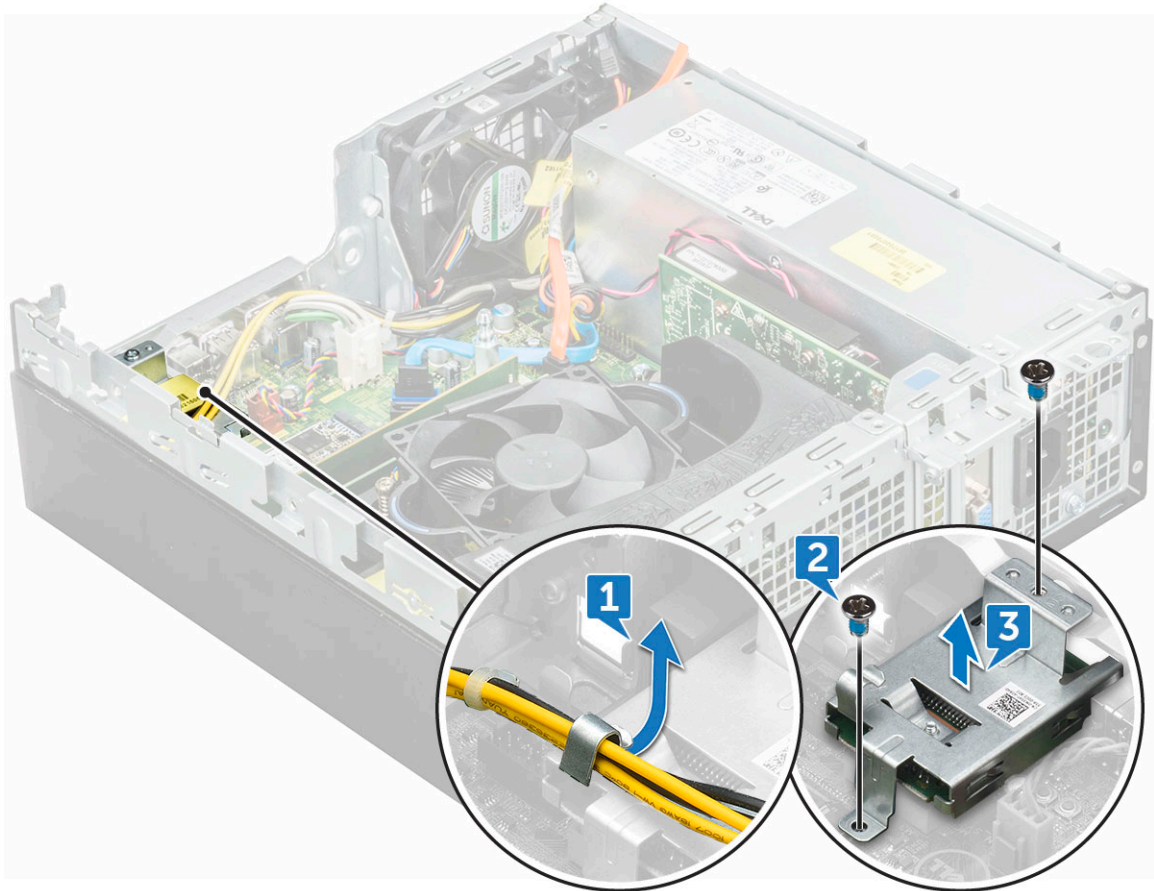
## Installing the VGA daughter board

- 1 Align the VGA daughter board with the screw holder on the system board.
- 2 Tighten the screw to secure the VGA daughter board to the system board.
- 3 Insert the VGA connector into the slot at the back of the computer.
- 4 Tighten the screws to secure the VGA connector to the computer.
- 5 Install the:
  - a [Bezel](#)
  - b [Cover](#)
- 6 Follow the procedure in [After Working Inside Your Computer](#).

# SD card

## Removing SD card reader

- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the:
  - a [cover](#)
  - b [front bezel](#)
  - c [2.5 inch hard drive assembly](#)
  - d [cooling shroud](#)
  - e [optical drive](#)
  - f [M.2 PCIe SSD](#)
- 3 To remove the SD card reader:
  - a Release the power cables from the retention clips on the SD card reader enclosure [1].
  - b Remove the 6 screws that secure the SD card reader [2].
  - c Lift the SD card reader away from the computer [3].



## Installing SD card reader

- 1 Place the SD card in the slot on the system board.
- 2 Tighten the 6 screw to secure the SD card reader to the front panel door.
- 3 Install the:
  - a [M.2 PCIe SSD](#)
  - b [optical drive](#)
  - c [cooling shroud](#)
  - d [2.5 inch hard drive assembly](#)
  - e [front bezel](#)
  - f [cover](#)
- 4 Follow the procedure in [After working inside your computer](#).

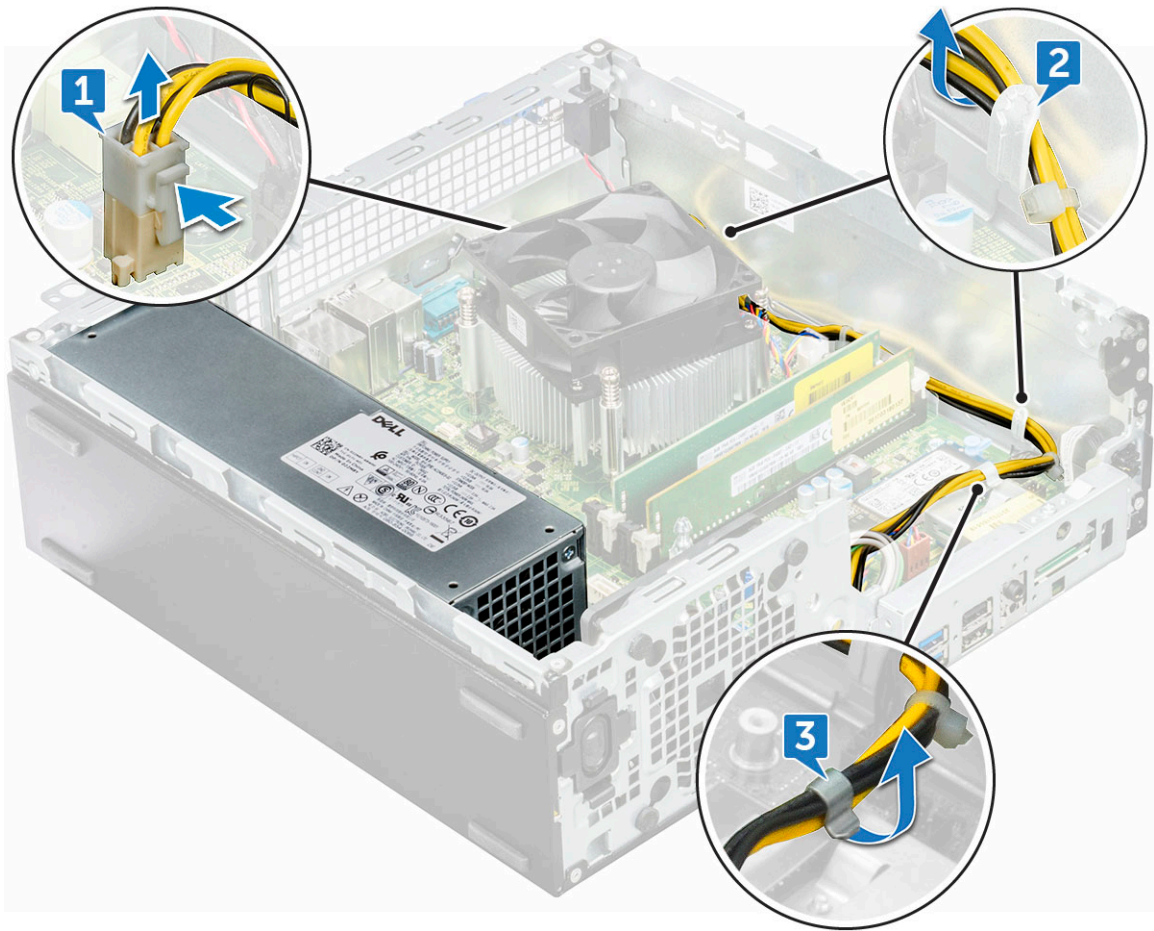
## Power supply unit

### Removing power supply unit — PSU

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

- c 2.5 inch hard drive assembly
- d cooling shroud
- e optical drive

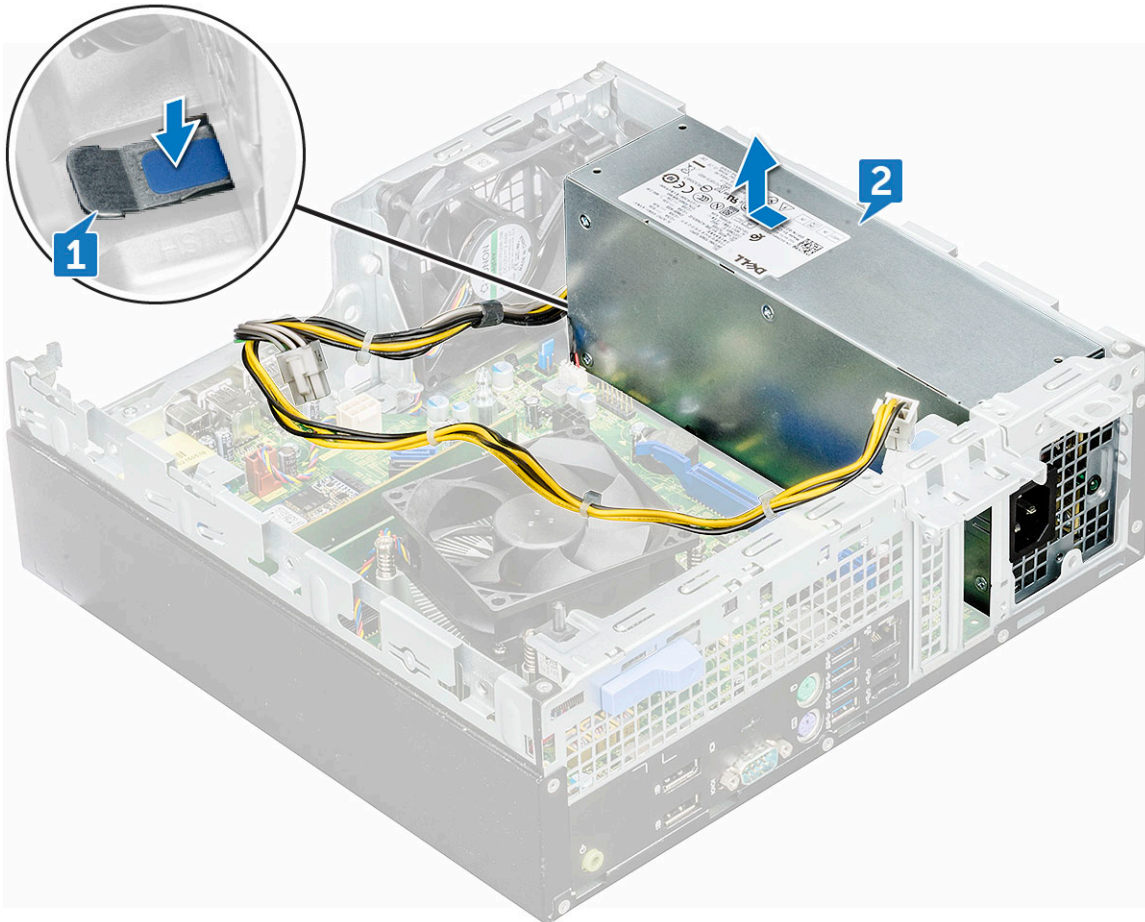
- 3 To release the PSU:
- a Disconnect the PSU cables from the connectors on the system board [1].
  - b Unroute the PSU cables from the retention clips [2, 3].



- 4 To disconnect the cables:
- a Disconnect the power cable from the system board [1] [2].
  - b Lift the cables away from the computer [3, 4].
  - c Remove the 6 screws that secure the PSU to the computer [5].



- 5 To remove the PSU:
- a Press the blue release tab [1]
  - b Slide the PSU and lift it away from the computer [2].



## Installing power supply unit — PSU

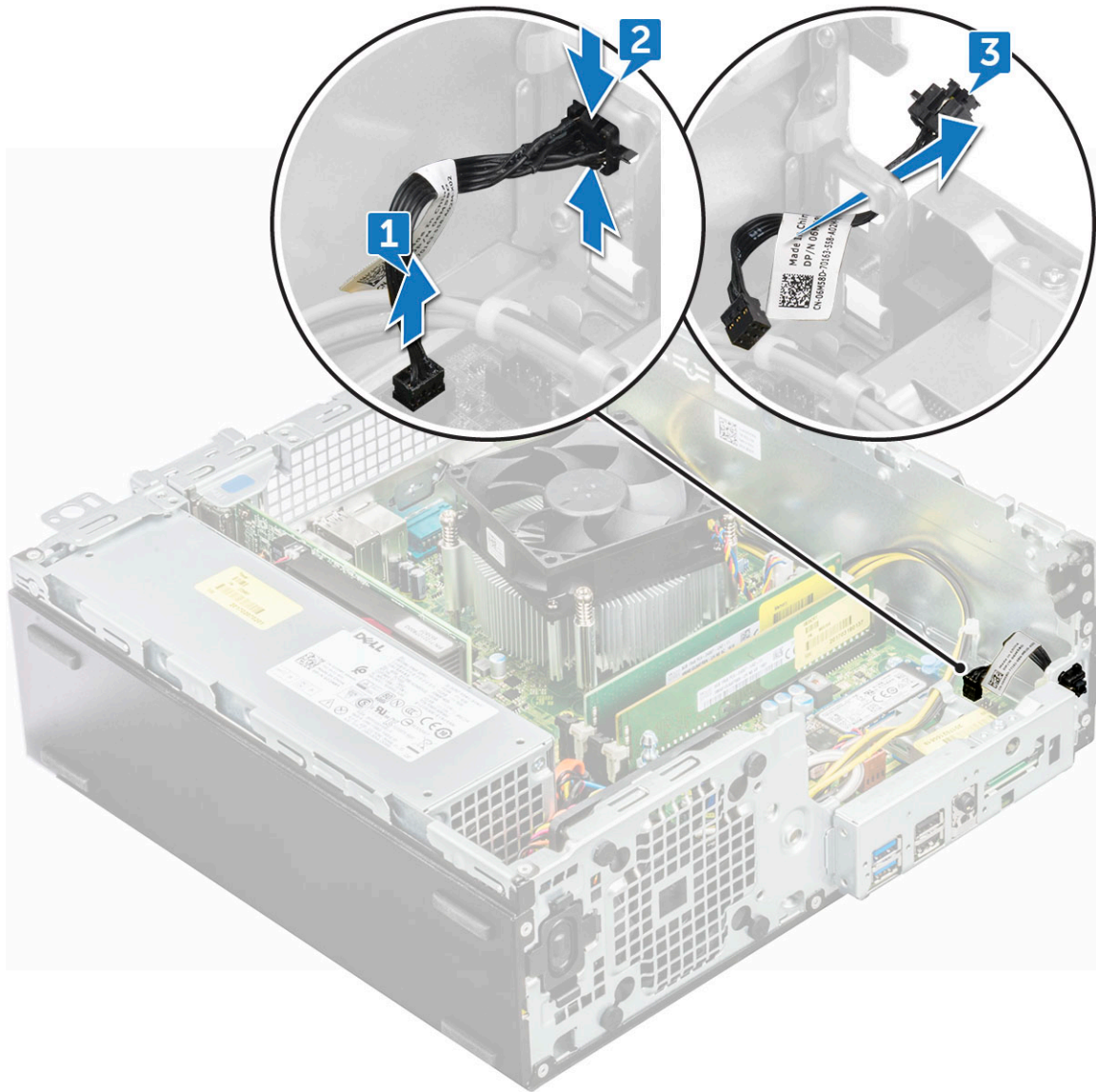
- 1 Insert the PSU into the slot.
- 2 Slide the PSU towards the back of the computer until it clicks into place.
- 3 Replace the screws( 6lbs) to secure the PSU to the computer.
- 4 Route the PSU cables through the retention clips.
- 5 Connect the PSU cables to the connectors on the system board.
- 6 Install the:
  - a optical drive
  - b cooling shroud
  - c 2.5 inch hard drive assembly
  - d front bezel
  - e cover
- 7 Follow the procedure in [After working inside your computer](#).

## Power switch

### Removing power switch

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

- a cover
  - b front bezel
  - c 2.5 inch hard drive assembly
  - d cooling shroud
  - e optical drive
- 3 To release the power switch:
- a Disconnect the power switch cable from the system board [1].
  - b Press the power switch retention tabs and pull out from the computer [2, 3].



## Installing power switch

- 1 Slide the power switch module into the slot on the chassis until it clicks into place.
- 2 Connect the power switch cable to the connector on the system board.
- 3 Install the:
  - a optical drive
  - b cooling shroud
  - c 2.5 inch hard drive assembly
  - d front bezel

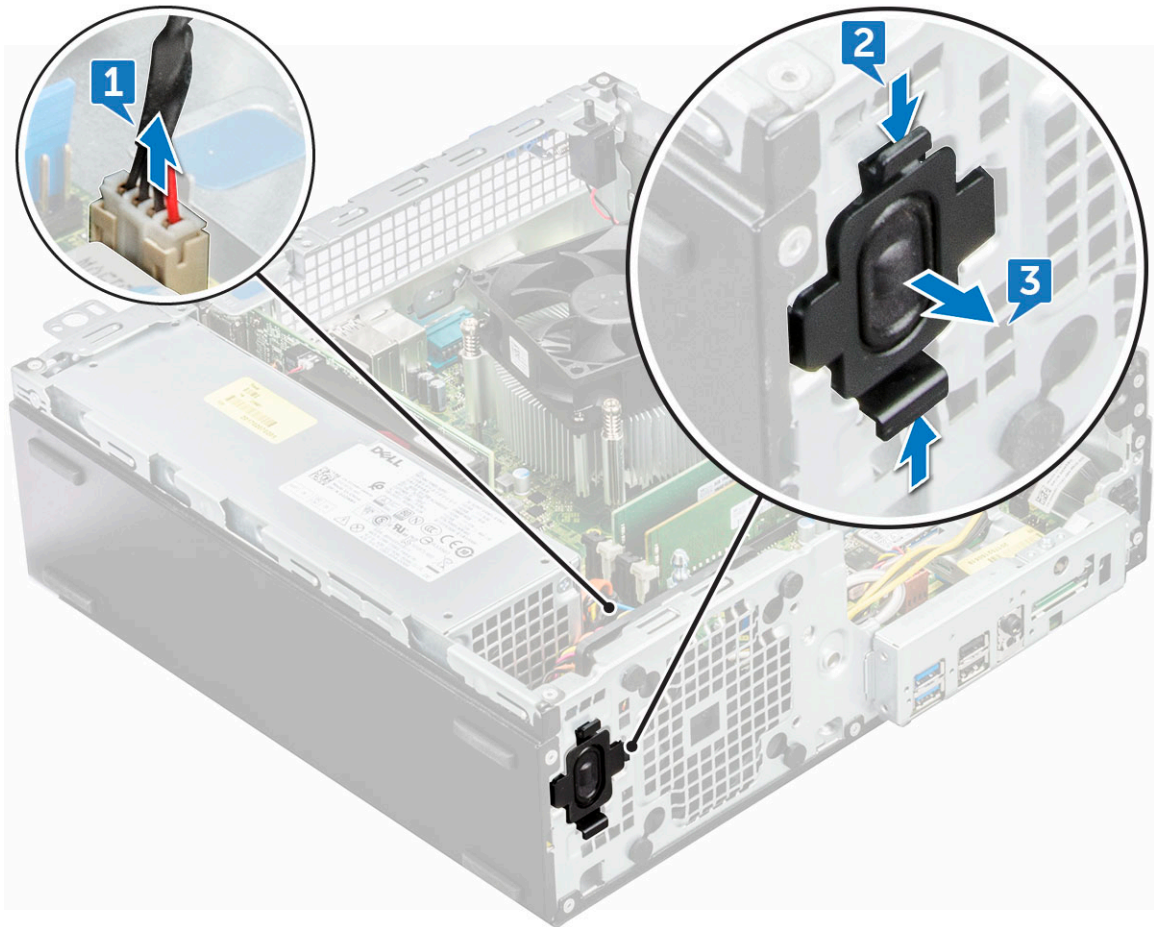
e cover

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

## Speaker

### Removing speaker

- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the:
  - a cover
  - b front bezel
  - c 2.5 inch hard drive assembly
  - d cooling shroud
  - e optical drive
- 3 To remove the speaker:
  - a Disconnect the speaker cable from the connector on the system board [1].
  - b Press the release tabs [2], and slide the speaker module [3] out of the slot.



### Installing speaker

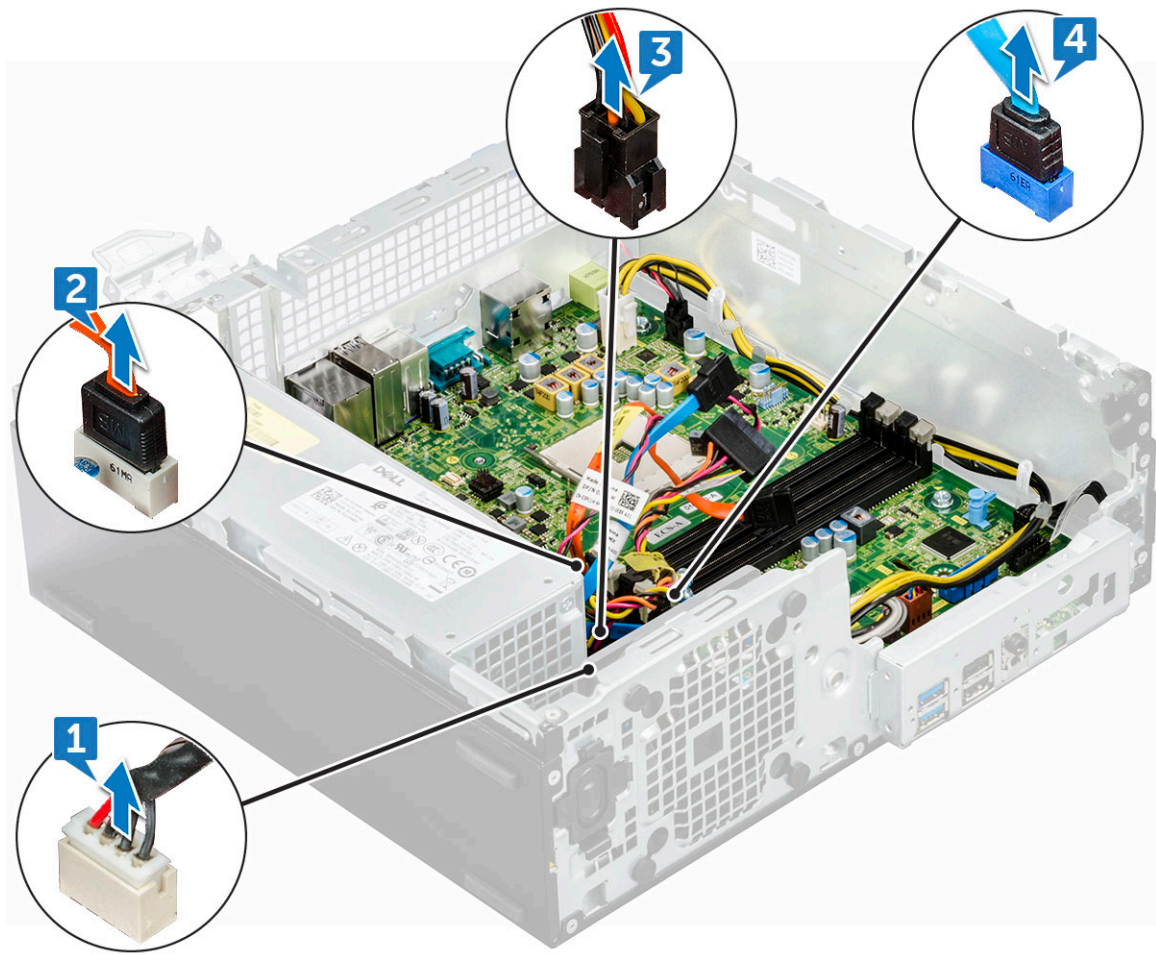
- 1 Insert the speaker into the slot and press it until it clicks into place.
- 2 Connect the speaker cable to the connector on the system board.

- 3 Install the:
  - a optical drive
  - b cooling shroud
  - c 2.5 inch hard drive assembly
  - d front bezel
  - e cover
- 4 Follow the procedure in [After working inside your computer](#).

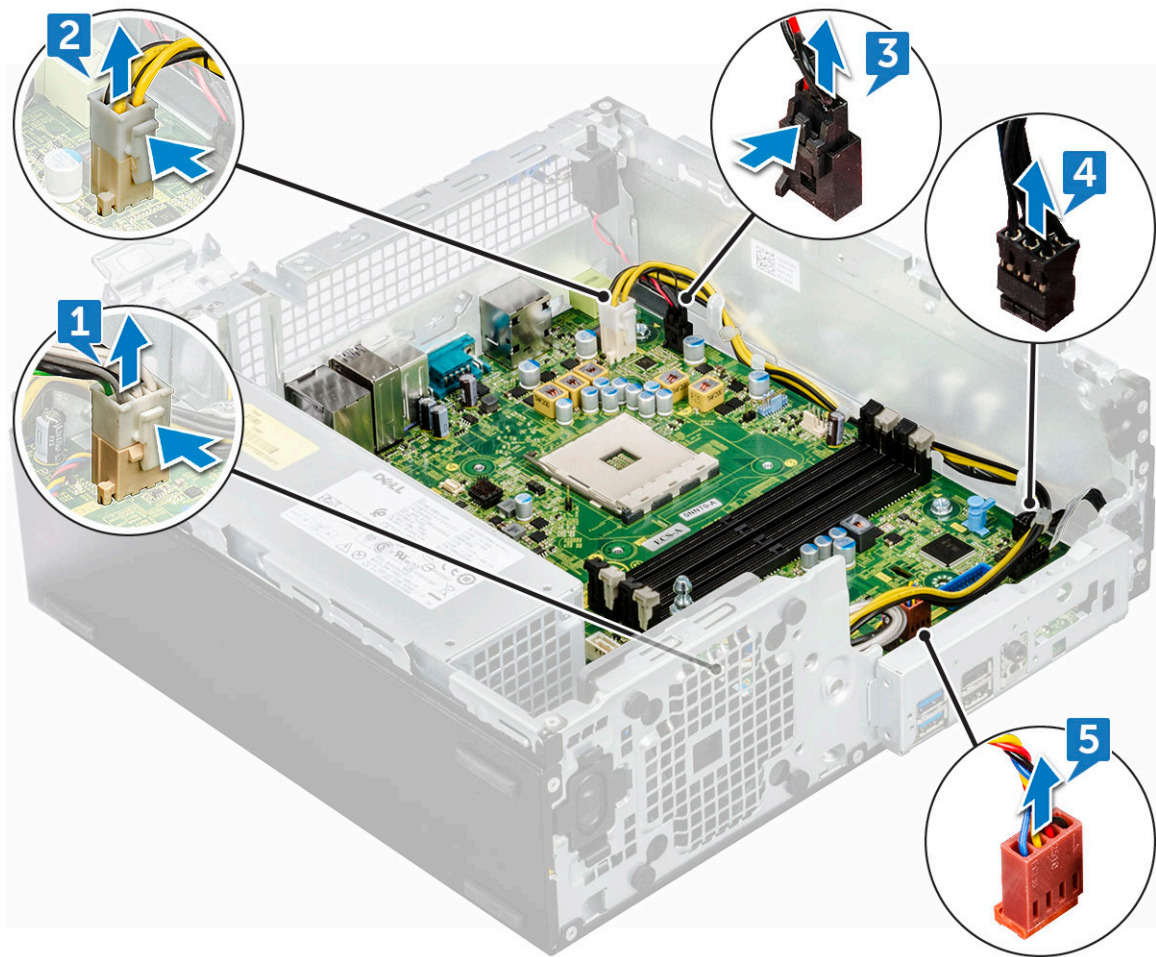
## System board

### Removing the system board

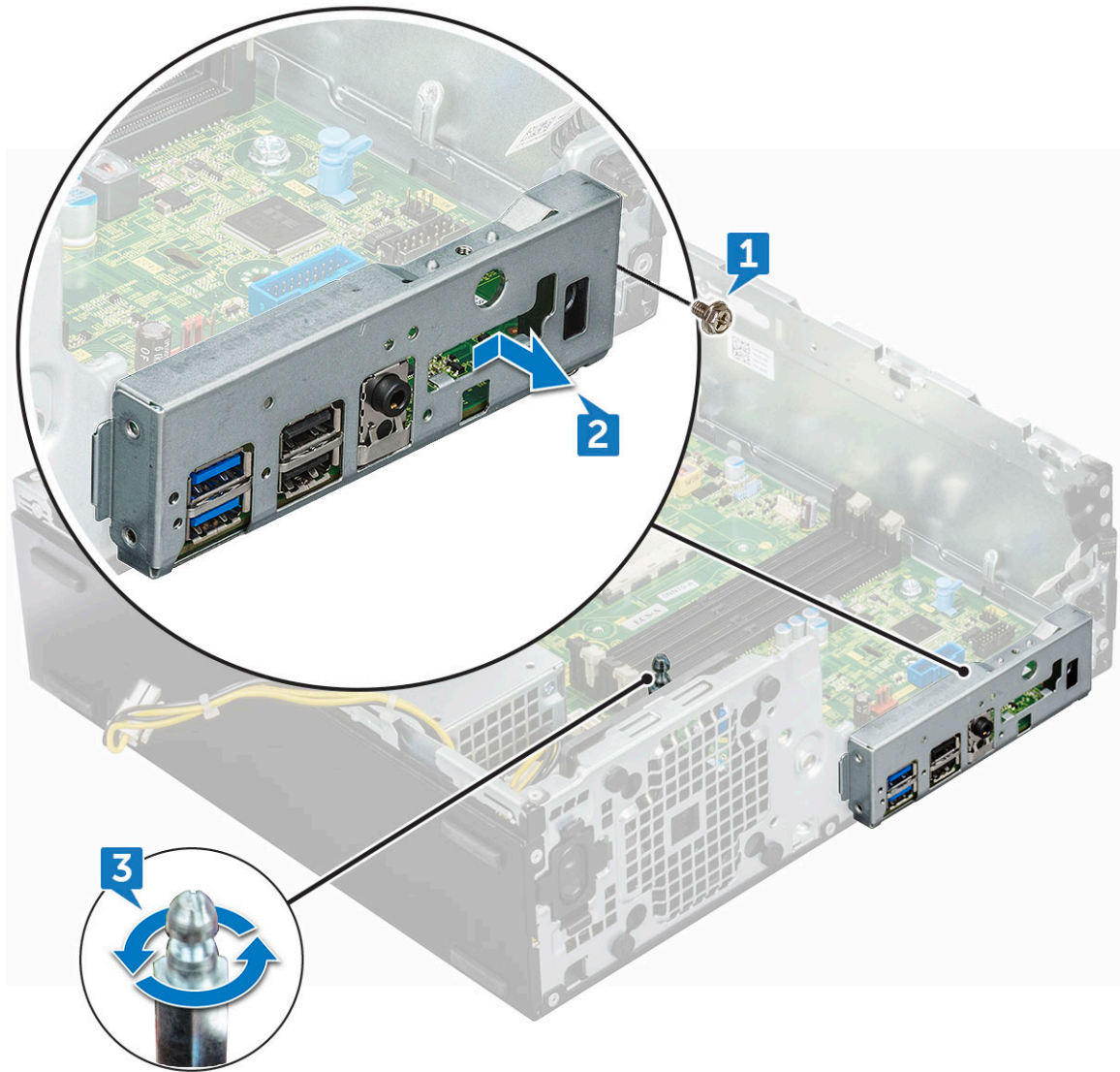
- 1 Follow the procedure in [Before working inside your computer](#).
- 2 Remove the:
  - a cover
  - b front bezel
  - c 2.5 inch hard drive assembly
  - d cooling shroud
  - e optical drive
  - f M.2 PCIe SSD
  - g heat sink assembly
  - h memory module
  - i processor
  - j expansion card
  - k SD card
- 3 Disconnect the following cables from the system board:
  - a speaker [1]
  - b 2.5-inch drive [2]
  - c optical drive [3]
  - d data cable [4]



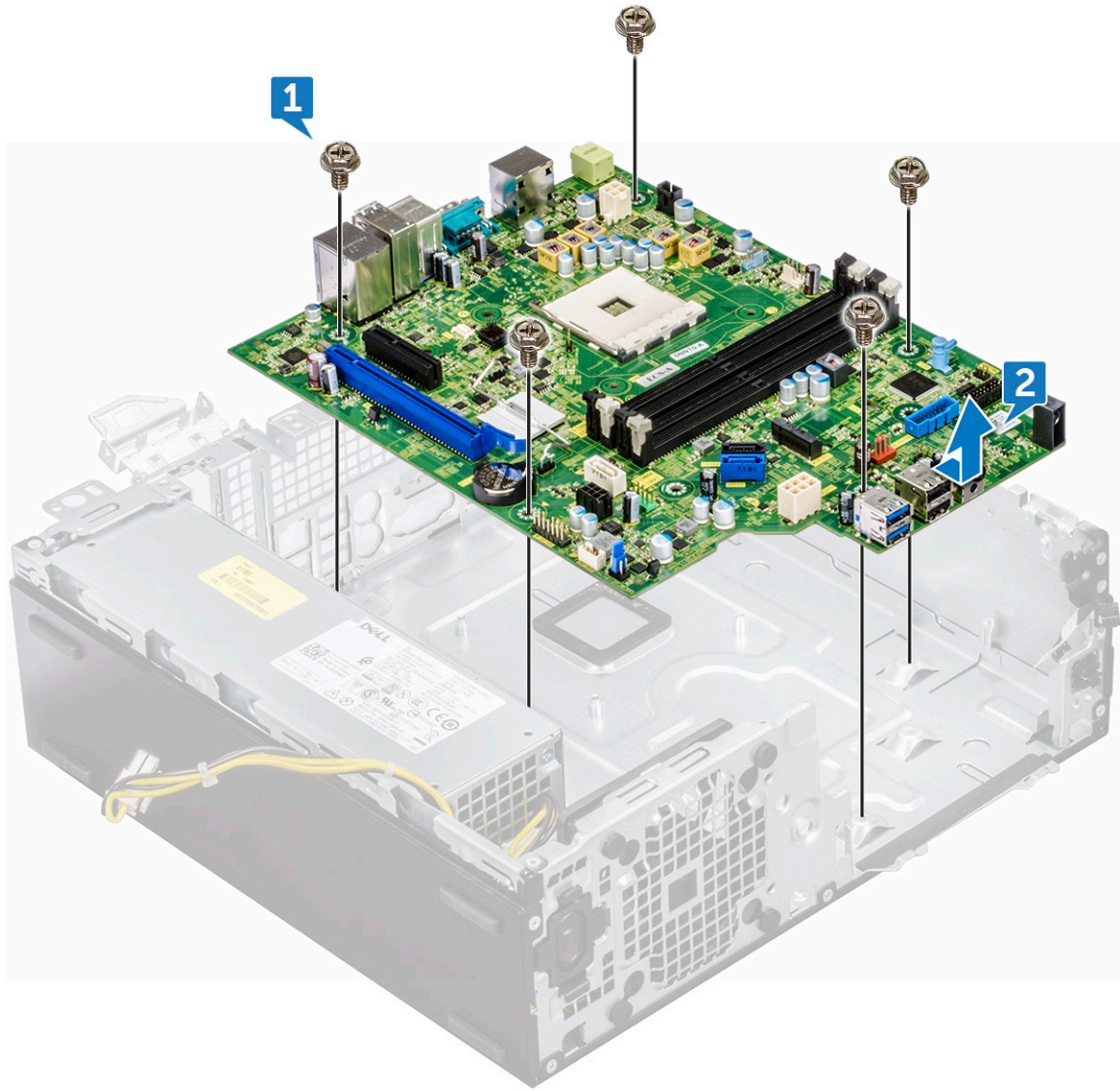
- 4 Disconnect the following cables and screw from the system board:
  - a PSU [1]
  - b hard drive and optical drive caddy stand off screw [2]
  - c PSU [3]
  - d power switch [4]
  - e intrusion switch [5]



- 5 To remove the I/O panel plate:
- a Remove the 6 screw that secures the I/O panel [1].
  - b Slide and push toward the front from the computer [2].



- 6 To remove the system board:
  - a Remove the 12 screws that secure the system board to the computer
  - b Slide and lift the system board away from the computer [2].



## Installing the system board

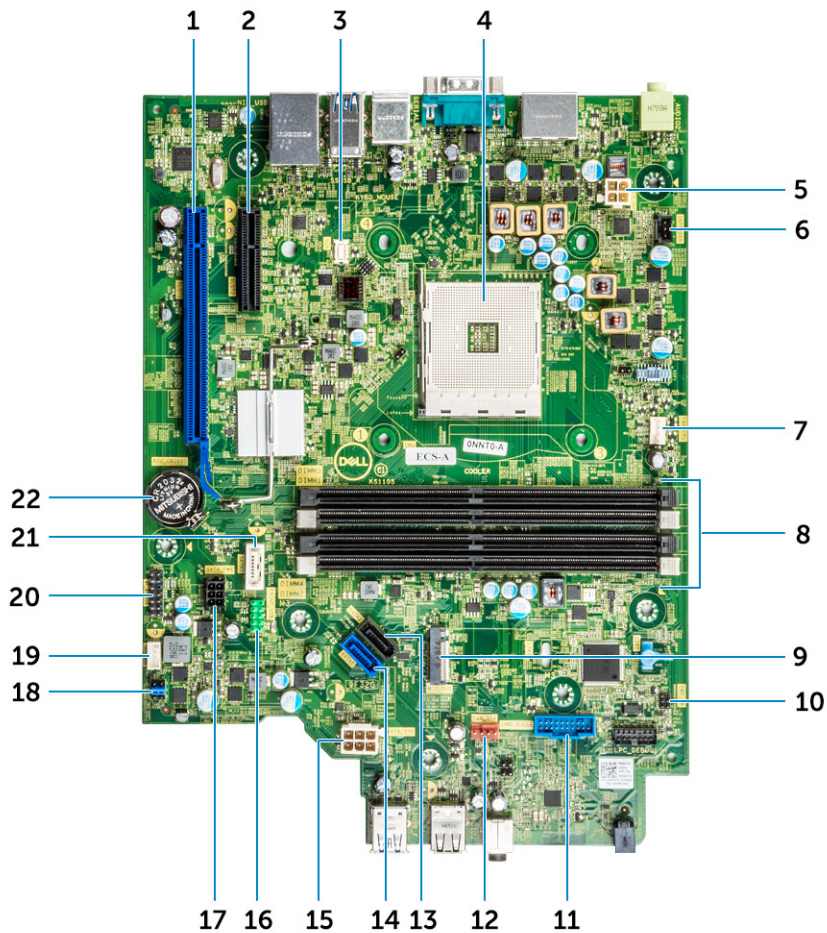
- 1 Hold the system board by its edges and align it toward the back of the computer.
- 2 Lower the system board into the chassis until the connectors at the back of the system board.
- 3 Align with the slots on the chassis, and the screw holes on the system board align with the standoffs on the computer.
- 4 Replace the screws (12 lbs) to secure the system board to the computer.
- 5 Route all the cables through the routing clips.
- 6 Align the cables with the pins on connectors on the system board and connect the following cables to the system board:
  - a intrusion switch
  - b optical drive
  - c hard drive
  - d PSU
  - e power switch
  - f power distribution for optical drive and hard drive
- 7 Install the:
  - a [expansion card](#)

- b memory module
- c heat sink assembly
- d SD card
- e M.2 PCIe SSD
- f processor
- g cooling shroud
- h optical drive
- i 2.5 inch hard drive assembly
- j front bezel
- k cover

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

## System board layout

This chapter explains about the motherboard's layout with name and location of its connectors.



- |    |   |    |   |
|----|---|----|---|
| 1  | PCI-e x16 Connector (SLOT2)               | 2  | PCI-e x4 Connector (SLOT1) - open ended X4 to support X16 |
| 3  | VGA Daughter Board Connector (VGA)        | 4  | Processor Socket (CPU)                                    |
| 5  | CPU Power Connector (ATX_CPU)             | 6  | Intrusion Switch Connector (INTRUDER)                     |
| 7  | CPU fan Connector (FAN_CPU)               | 8  | Memory Slots (DIMM1,DIMM2,DIMM3,DIMM4)                    |
| 9  | M.2 Slot 3 Connector (M.2_SSD)            | 10 | Power Switch Connector (PWR_SW)                           |
| 11 | Media Card Reader Connector (CARD_READER) | 12 | System fan Connector (FAN_SYS)                            |

- |    |  |    |  |
|----|--|----|--|
| 13 | SATA2 Connector Black Color (SATA2)      | 14 | SATA0 Connector Blue Color (SATA0)   |
| 15 | ATX Power Connector (ATX_SYS)            | 16 | Front USB2.0 Connector (Front_USB)   |
| 17 | HDD&ODD Power Cable Connector (SATA_PWR) | 18 | Clear CMOS Jumper (CMOS_CLR); Clear Password Jumper (PASSWORD_CLR); Clear Password ; Jumper (PASSWORD_CLR); Service Mode Jumper (SERVICE_MODE) |
| 19 | Internal Speaker Connector (INT_SPKR)    | 20 | Internal USB Connector (WF_BT_USB)   |
| 21 | SATA 1 Connector White Color (SATA1)     | 22 | Battery Connector (BATTERY)  |

# Technology and components

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

Topics:

- Systems management features
- In-Band Systems Management – Dell Client Command Suite
- Out-of-Band Systems Management – DASH
- AMD APUs, AMD Ryzen CPUs and APUs
- AMD PT B350
- AMD Radeon R7 M450
- AMD Radeon R5 M430
- USB features
- DDR4
- Active State Power Management

## Systems management features

**Overview:** Dell commercial systems come with a number of systems management options that are include by default for In-Band management with our Dell Client Command Suite. In-Band management meaning that the Operating System is functional and the device is connected to a network so that it can be managed. The Dell Client Command Suite of tools can be leveraged individually or with a systems management console like SCCM, LANDESK, KACE, etc.

We also offer Out-of-Band management as an option. Out-of-Band management is when the system does not have a functional operating system or is turned off and you still want to be able to manage the system in that state.

## In-Band Systems Management – Dell Client Command Suite

The Dell Client Command Suite of tools is free to download at <http://dell.com/command> and can be used with all OptiPlex desktops. It contains the following components that can be used individually, or in the case of SCCM in conjunction with our integration for SCCM.

**Dell Command | Deploy Driver Packs** - Bundles of system specific drivers (web hosted on [dell.com/command](http://dell.com/command)) that have been extracted and reduced to an OS consumable state for use with any OS deployment tool. Here is a link to Dell TechCenter where you can find the driver packs for each commercial client system: <http://en.community.dell.com/techcenter/enterprise-client/w/wiki/2065.dell-command-deploy-driver-packs-forenterprise-client-os-deployment>

**Dell Command | Configure** - A GUI based IT administrator tool for configuring and deploying hardware settings in either a pre-OS or post-OS environment. Example configurations include enabling TPM, restricting access to USB ports, locking the BIOS with BIOS passwords, disabling wireless/Bluetooth.

**Dell Command | Monitor** - A WMI (Windows Management Instrumentation) agent that provides deep hardware inventory and health monitoring along with command line and scripting capabilities that allow IT administrators to configure their hardware remotely.

**Dell Command | Update** - a factory-installed application that end-users, with administrative rights, may utilize to individually manage their own Dell updates. This tool leverages the Updates Catalog for scheduling and installing Dell updates (drivers, BIOS, firmware).

**Dell Command | Update Catalog** - Provides searchable metadata that is leveraged with Dell Command | Update and enables management consoles Dell KACE Appliances, LANDesk Management Systems and Microsoft System Center to retrieve the latest system specific updates (driver, firmware, or BIOS) for any Dell commercial client to be delivered seamlessly to end-users.

**Dell Command | PowerShell Provider** - Furthers the ability to standardize on this industry-leading scripting preference by enabling IT administrators to dynamically query and modify hardware settings with native PowerShell commands.

**Dell Command | Power Manager** - factory installed on all end-point devices with a battery (laptops, tablets) that enables modifications beyond the power options provided by the operating system.

**Dell Command | Integration Suite for System Center 2012** - This suite integrates all the key components of the Client Command Suite into Microsoft System Center Configuration Manager 2012 and later.

## Out-of-Band Systems Management – DASH

DMTF's Desktop and mobile Architecture for System Hardware (DASH) Standard is a suite of specifications that takes full advantage of DMTF's Web Services for Management (WS-Management) specification – delivering standards-based web services management for desktop and mobile client systems. Through DASH, DMTF provides the next generation of standards for secure out-of-band and remote management of desktop and mobile systems.

OptiPlex 5055 with DASH 1.2 on BCM5762 supports the following features such as remote power command, OOO Firmware Update.

To learn more about DMTF's DASH, visit DMTF's website at:<https://www.dmtf.org/standards/dash>

## AMD APUs, AMD Ryzen CPUs and APUs

This topic explains about the AMD's APUs, Ryzen series of CPUs and Ryzen series of APUs.

OptiPlex 5055 is offered with either of the three variants of AMD's A-Series APUs, Ryzen CPUs or APUs.

- OptiPlex 5055 A-Series: Offered with AMD Ryzen 7 Pro 1700, Ryzen 5 Pro 1500 and Ryzen 3 Pro 1300.
- OptiPlex 5055 Ryzen CPU: Offered with AMD PRO A12-9800, A10-9700, A8-9600, and A6-9500.
- OptiPlex 5055 Ryzen APU: Offered with Ryzen 3 Pro 2200G, Ryzen 5 Pro 2400G and Athlon Pro 200GE.

## AMD Advanced Processing Unit - APU

This topic explains AMD's Advanced processing Unit (APU)

The AMD Accelerated Processing Units (APU) are a series of 64-bit microprocessors designed aesthetically by AMD combining the capabilities of Central Processing Unit (CPU) and Graphical Processing Unit (GPU) on a single die(chip).

### Features:

- Heterogeneous System Architecture (HSA): An open-source, cross vendor set of specification allowing the integration of CPU and GPU on the same bus as CPU cores with coherent memory.
- Power Management: CPU and GPU share same power resources optimizing performance and availability.
- System Architecture Integration: Allows the GPU to be context switched, providing a multitasking environment with smart utilization of hardware resources across workloads.
- Open CL, C++: Support for Open CL and C++ language extensions.

## AMD Ryzen

This topic explains about the AMD's Ryzen series of processors.

AMD's Ryzen is a series of CPUs and APUs based on Zen micro architecture. Zen System On Chip(SoC) design allows the PCIe, SATA, and USB controllers reside on same chip as CPU's cores.

### Features:

- Performance: Simultaneous multithreading (SMT) to allow execution of two threads per core, increasing the Instruction Per Cycle(IPC) thus enhancing the processing throughput.
- Power: AMD's Sense MI technology employs sensors across the chip to dynamically scaling the frequency and voltage automatically defined in processor itself allowing better use of available resources.
- Security and Virtualization: Ryzen offers Secure Memory Encryption(SME) and Secure Encrypted Vitalization(SEV) for real time memory encryption securing the system from cold boot attacks.

## AMD Ryzen APUs

This topic explains AMD's Ryzen series of APUs.

Ryzen APUs are series of APU (CPU+GPU) offered with Vega 8/11 graphics processors. Ryzen APUs are performance enhancements over the predecessor Ryzen CPUs incorporating the GPU on same chip as CPU cores.

## AMD PT B350

### AMD B350

- Chipset is perfect for power-users who value flexibility and overclocking control, but don't need the maximum PCIe bandwidth required by multi-GPU configurations.
- AMD Socket AM4 represents the company's new future-proof platform targeting the fastest DDR4 memory.
- With processor-direct SATA and USB connectivity, configurable for real-world flexibility, the new AM4 platform takes advantage of the leading-edge features

## Specification

**Table 1. Specification**

Specification	Details
PCI Express Gen3 Graphics	1x16(AMD Ryzen™)1x8 (A-Series/AMD Athlon™)
USB 3.1 G2 + 3.1 G1 + 2.0	2+6+6
SATA + NVMe	4 + x2 NVMe (or 2 SATA 1 x4 NVMe on AMD Ryzen™ Processor).
SATA Express* (SATA & GPP PCIe G3*)	1
PCI Express® GP	x6 Gen2 (plus x2 PCIe Gen3 when no x4 NVMe)
SATA RAID	0,1,10
Dual PCI Express® slots	No
Over-clocking	Unlocked

## AMD Radeon R7 M450

### Key Specifications

The following table contains the key specifications of the AMD Radeon R7 M450:

**Table 2. Key Specifications**

<b>Specification</b>	<b>AMD Radeon R7 M450</b>
Product Line	AMD
API Supported	DirectX 12 , OpenCL 1.2 , OpenGL 4.3
Clock Speed	925 MHz
Bus Width	128-bit
Memory Clock Speed	1.125 GHz
Technology	DDR3 SDRAM
Max External Resolution	1920 x 1080
Interface Type	PCI Express 3.0 x16

## AMD Radeon R5 M430

The AMD Radeon R5 M430 is an entry level graphics card for laptops. It is based on the older Radeon R5 M330 / M335 or R7 M340.

### Key Specifications

The following table contains the key specifications of the AMD Radeon R5 M430:

**Table 3. Key Specifications**

<b>Specification</b>	<b>AMD Radeon R5 M430</b>
Radeon R5 M400 Series	Radeon R5 M430
Codename	Sun XT
Architecture	GCN
Pipelines	320 - unified
Memory Bus Width	64 Bit
Shared Memory	No
Technology	28 nm
DirectX	DirectX 12

## USB features

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

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

**Table 4. USB evolution**

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

## 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 3.1 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 3.1 Gen 1.

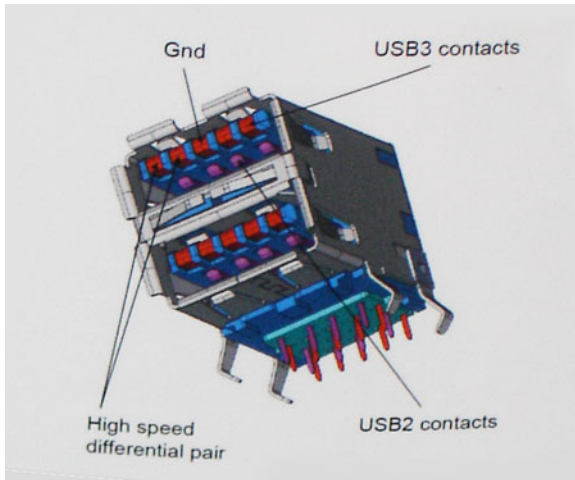


## Speed

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

USB 3.1 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 3.1 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 3.1 Gen 1 utilizes the bidirectional data interface, rather than USB 2.0's half-duplex arrangement. This gives a 10-fold increase in theoretical bandwidth.



With today's ever increasing demands placed on data transfers with high-definition video content, terabyte storage devices, high megapixel count digital cameras etc., USB 2.0 may not be fast enough. Furthermore, no USB 2.0 connection could ever come close to the 480Mbps theoretical maximum throughput, making data transfer at around 320Mbps (40MB/s) — the actual real-world maximum. Similarly, USB 3.1 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 3.1 Gen 1 is a 10x improvement over USB 2.0.

## Applications

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 3.1 Gen 1 products:

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

## Compatibility

The good news is that 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 3.1 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 3.1 Gen 1 cables and only come into contact when connected to a proper SuperSpeed USB connection.

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

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

Super-Speed support for Windows XP is unknown at this point. Given that XP is a seven-year-old operating system, the likelihood of this happening is remote.

## 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.

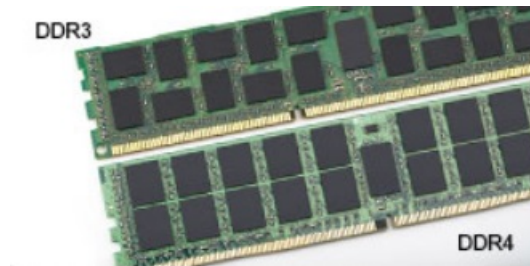
DDR4 needs 20 percent less or just 1.2 volts, compared to DDR3 which requires 1.5 volts of electrical power to operate. DDR4 also supports a new, deep power-down mode that allows the host device to go into standby without needing to refresh its memory. Deep power-down mode is expected to reduce standby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

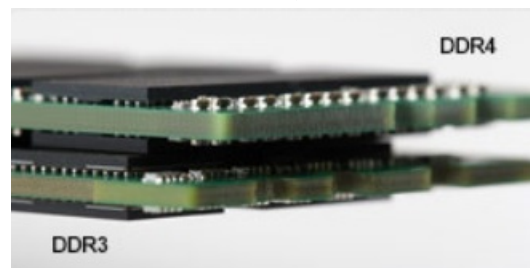
The key notch on a DDR4 module is in a different location from the key notch on a DDR3 module. Both notches are on the insertion edge but the notch location on the DDR4 is slightly different, to prevent the module from being installed into an incompatible board or platform.



**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.

## Active State Power Management

This section describes about the Active State Power Management (ASPM).

**ASPM** is the power management capability of hardware to effectively reduce usage of power by placing the PCI Express(PCIe) based serial link devices to low-power state when not in use.

ASPM is controlled by BIOS or the power management component of the operating system in two configurations.

- Disabled: PCIe devices operate on high-performance mode.
- L1 Mode: Bi-directional setting of the serially linked PCIe device to low-power state.

① | **NOTE: This mode provides with higher power saving at expense of latency when re-establishing the connection.**

The PCIe bus must be woken up from low-power mode to re-establish the connection with the device. This accounts for the latency, which is also referred to as ASPM exit latency.

# System setup

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

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

Topics:

- [Boot menu](#)
- [System Setup options](#)
- [Updating the BIOS in Windows](#)
- [Updating the Dell BIOS in Linux and Ubuntu environments](#)
- [Flashing the BIOS from the F12 One-Time boot menu](#)
- [Specifications](#)

## Boot menu

Press <F12> when the Dell™ logo appears to initiate a one-time boot menu with a list of the valid boot devices for the system. Diagnostics and BIOS Setup options are also included in this menu. The devices listed on the boot menu depend on the bootable devices in the system. This menu is useful when you are attempting to boot to a particular device or to bring up the diagnostics for the system. Using the boot menu does not make any changes to the boot order stored in the BIOS.

The options are:

- Legacy Boot:
  - Internal HDD
  - Onboard NIC
- UEFI Boot:
  - Windows Boot Manager
- Other Options:
  - BIOS Setup
  - BIOS Flash Update
  - Diagnostics
  - Change Boot Mode Settings

## System Setup options

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

**Table 5. General**


Option	Description
System Information	<p>Displays the following information:</p> <ul style="list-style-type: none"> <li>• System Information: Displays <b>BIOS Version, Service Tag, Asset Tag, Ownership Tag, Ownership Date, Manufacture Date, Express Service Code</b> and the <b>Singed Firmware Update</b>.</li> <li>• Memory Information: Displays <b>Memory Installed, Memory Available, Memory Speed, Memory Channel Mode, Memory Technology, DIMM 1 Size, DIMM 2 Size, DIMM 3 Size</b> and <b>DIMM 4 Size</b>.</li> <li>• PCI Information: Displays <b>SLOT1_M.2, SLOT2_M.2</b></li> <li>• Processor Information: Displays <b>Processor Type, Core Count, Current Clock Speed, Minimum Clock Speed, Maximum Clock Speed, Processor L2 Cache, Processor L3 Cache, HT Capable,</b> and <b>64-Bit Technology</b>.</li> <li>• Device Information: Displays <b>LOM MAC Address, Video Controller, Audio Controller</b>.</li> </ul>
Boot Sequence	<ul style="list-style-type: none"> <li>• Boot Mode</li> <li>• Boot List option: <ul style="list-style-type: none"> <li>– Legacy</li> <li>– UEFI (Default)</li> </ul> </li> <li>• Enable Boot Devices</li> <li>• Boot Sequence <ul style="list-style-type: none"> <li>– Add Boot Option</li> <li>– Remove Boot Option</li> <li>– View Boot Option</li> </ul> </li> </ul>
Advanced Boot Options	<p>Allows you to select the Enable Legacy Option ROMs option. By default, this option is selected.</p> <ul style="list-style-type: none"> <li>• Enabled(selected by default)</li> <li>• Disabled</li> </ul>
BIOS Setup Advanced Mode	<p>Allows you to select BIOS Setup Advanced Mode. By default, this option is selected.</p> <ul style="list-style-type: none"> <li>• Enabled(selected by default)</li> <li>• Disabled</li> </ul>
Date/Time	<p>Allows you to set the date and time settings. Changes to the system date and time take effect immediately.</p>

**Table 6. System Configuration**

Option	Description
Integrated NIC	<p>Allows you to control the on-board LAN controller. The option 'Enable UEFI Network Stack' is not selected by default. The options are:</p> <ul style="list-style-type: none"> <li>• Disabled</li> <li>• Enabled</li> <li>• Enabled w/PXE (default)</li> </ul> <p><b>i</b> <b>NOTE: Depending on the computer and its installed devices, the items listed in this section may or may not appear.</b></p>
Serial Port	<p>The options are:</p> <ul style="list-style-type: none"> <li>• COM1 (Enabled by default)</li> <li>• COM2 (Disabled by default)</li> <li>• COM3 (Disabled by default)</li> </ul>

Option	Description
	<ul style="list-style-type: none"> <li>COM4 (Disabled by default)</li> </ul>
SATA Operation	<p>Allows you to configure the operating mode of the integrated hard drive controller.</p> <ul style="list-style-type: none"> <li>Disabled = The SATA controllers are hidden</li> <li>AHCI (Enabled by default)</li> <li>RAID ON = SATA is configured to support RAID mode (Disabled by default)</li> </ul>
Drives	<p>Allows you to enable or disable the various drives on-board:</p> <ul style="list-style-type: none"> <li>SATA-0 (enabled by default)</li> <li>SATA-1</li> <li>SATA-2</li> <li>SATA-3</li> <li>M.2 PCIe SSD-0</li> </ul>
Smart Reporting	<p>This field controls whether hard drive errors for integrated drives are reported during system startup. The <b>Enable Smart Reporting option</b> is disabled by default.</p>
USB Configuration	<p>Allows you to enable or disable the integrated USB controller for:</p> <ul style="list-style-type: none"> <li>Enable Boot Support</li> <li>Enable Front USB Ports</li> <li>Enable Rear USB Ports</li> </ul> <p>All the options are enabled by default.</p>
USB PowerShare	<p>This option allows you to charge the external devices, such as mobile phones, music player. This option is disabled by default.</p>
Audio	<p>Allows you to enable or disable the integrated audio controller. The option <b>Enable Audio</b> is selected by default.</p> <ul style="list-style-type: none"> <li>Enable Microphone</li> <li>Enable Audio</li> <li>Enable Internal Speaker</li> </ul> <p>The options are selected by default.</p>
Miscellaneous Devices	<p>Allows you to enable or disable the Miscellaneous Devices. The option are</p> <ul style="list-style-type: none"> <li>Enable Secure Digital (SD) Card (Enabled by default)</li> <li>Secure Digital (SD) Card Read-Only mode</li> </ul>

**Table 7. Video**

Option	Description
Multi-Display	<p>The option is selected by default.</p>
Primary Display	<p>Allows you to select the primary display when multiple controllers are available in the system.</p> <ul style="list-style-type: none"> <li>Auto (default)</li> <li>Integrated Graphics</li> </ul> <p> <b>NOTE: If you do not select Auto, the on-board graphics device will be present and enabled.</b></p>

**Table 8. Security**

Option	Description
Admin Password	Allows you to set, change, and delete the admin password.
System Password	Allows you to set, change, and delete the system password.
Internal HDD-0 Password	Allows you to set, change, and delete the computer's internal HDD.
Internal HDD-1 Password	Allows you to set, change, and delete the computer's internal HDD.
Internal HDD-2 Password	Allows you to set, change, and delete the computer's internal HDD.
Strong Password	This option lets you enable or disable strong passwords for the system.
Password Configuration	Allows you to control the minimum and maximum number of characters allowed for an administrative password and the system password. The range of characters is between 4 and 32.
Password Change	This option lets you determine whether changes to the System and Hard Disk passwords are permitted when an administrator password is set. <b>Allow Non-Admin Password Changes</b> - This option is enabled by default.
UEFI Capsule Firmware Updates	This option controls whether this system allows BIOS updates via UEFI capsule update packages. This option is selected by default. Disabling this option will block BIOS updates from services such as Microsoft Windows Update and Linux Vendor Firmware Service (LVFS)
TPM 2.0 Security	Allows you to control whether the Trusted Platform Module (TPM) is visible to the operating system. <ul style="list-style-type: none"> <li>• TPM On (default) <ul style="list-style-type: none"> <li>– PPI Bypass for Enable Commands</li> <li>– PPI Bypass for Disable Commands</li> <li>– PPI Bypass for Clear Commands</li> <li>– Attestation Enable (default)</li> <li>– Key Storage Enable (default)</li> <li>– SHA-256 (default)</li> </ul> </li> <li>• Clear</li> <li>• TPM State <ul style="list-style-type: none"> <li>– Disable</li> <li>– Enable (default)</li> </ul> </li> </ul>
Computrace	This field lets you Activate or Disable the BIOS module interface of the optional Computrace Service from Absolute Software. Enables or disables the optional Computrace service designed for asset management. <ul style="list-style-type: none"> <li>• <b>Deactivate</b> - This option is selected by default.</li> <li>• Disable</li> <li>• Activate</li> </ul>
Chassis Intrusion	The options are: <ul style="list-style-type: none"> <li>• Disable (default)</li> <li>• Enable</li> <li>• On-Silent</li> </ul>
Admin Setup Lockout	Allows you to enable or disable the option to enter Setup when an Administrative password is set. This option is not set by default.

**Table 9. Secure Boot**

Option	Description
Secure Boot Enable	Allows you to enable or disable Secure Boot feature

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

**Table 10. Performance**

Option	Description
C States Control	Allows you to enable or disable additional processor sleep states. This option is enabled by default.
AMD TurboCore Technology	This options is disable by default.

**Table 11. Power Management**

Option	Description
AC Recovery	<p>Determines how the system responds when AC power is re-applied after a power loss. You can set the AC Recovery to:</p> <ul style="list-style-type: none"> <li>Power Off</li> <li>Power On</li> <li>Last Power State</li> </ul> <p>This option is Power Off by default.</p>
Auto On Time	<p>Sets time to automatically turn on the computer. Time is kept in standard 12-hour format (hour:minutes:seconds). Change the startup time by typing the values in the time and AM/PM fields.</p> <p><b>NOTE:</b> This feature does not work if you turn off your computer using the switch on a power strip or surge protector or if Auto Power is set to disabled.</p>
Deep Sleep Control	<p>Allows you to define the controls when Deep Sleep is enabled.</p> <ul style="list-style-type: none"> <li>Disabled</li> <li>Enabled in S5 only</li> <li>Enabled in S4 and S5</li> </ul> <p>This option is Enabled in S4 and S5 by default.</p>

Option	Description
Fan Control Override	Allows you to determine the speed of the system fan. When this option is enabled, the system fan runs at the maximum speed. This option is disabled by default.
USB Wake Support	Allows you to enable the USB devices to wake the computer from standby mode. The option "Enable USB Wake Support" is selected by default
Wake on LAN/WWAN	<p>This option allows the computer to power up from the off state when triggered by a special LAN signal. This feature only works when the computer is connected to AC power supply.</p> <ul style="list-style-type: none"> <li>• <b>Disabled</b> - Does not allow the system to power on by special LAN signals when it receives a wake-up signal from the LAN or wireless LAN.</li> <li>• <b>LAN</b> - Allows the system to be powered on by special LAN signals.</li> <li>• <b>WLAN Only</b> - Allows the system to be powered on by special WLAN signals.</li> <li>• <b>LAN or WLAN</b> - Allows the system to be powered on by special LAN signals or WLAN signals.</li> <li>• <b>LAN with PXE Boot</b> - A wakeup packet sent to the system in either the S4 or S5 state, that will cause the system to wake-up and immediately boot to PXE.</li> </ul> <p>This option is Disabled by default.</p>
Block Sleep	Allows you to block entering to sleep (S3 state) in OS environment. This option is disabled by default.

**Table 12. POST Behavior**

Option	Description
Numlock LED	Allows you to enable or disable the Numlock feature when your computer starts. This option is enabled by default.
Keyboard Errors	Allows you to enable or disable the keyboard error reporting when the computer starts. This option is enabled by default.
Warnings and Errors	<p>This option can speed up the boot process by bypassing some compatibility steps:</p> <ul style="list-style-type: none"> <li>• Prompt on Warnings and Errors (enabled by default)</li> <li>• Continue on Warnings</li> <li>• Continue on Warnings and Errors</li> </ul>
Extend BIOS POST Time	<p>The options are:</p> <ul style="list-style-type: none"> <li>• 0 seconds (default)</li> <li>• 5 seconds</li> <li>• 10 seconds</li> </ul>
Full Screen Logo	This option is disabled by default.

**Table 13. Virtualization Support**

Option	Description
AMD-V Technology	This option is enabled by default.
AMD-VI Technology	This option is enabled by default.

**Table 14. Maintenance**

Option	Description
Service Tag	Displays the Service Tag of your computer.
Asset Tag	Allows you to create a system asset tag if an asset tag is not already set. This option is set by default.

Option	Description
SERR Messages	Controls the SERR message mechanism. This option is set by default. Some graphics cards require that the SERR message mechanism be disabled.
Dell Development Configuration	This options is disabled by default.
BIOS Downgrade	Allows you to control flashing of the system firmware to the previous versions. This option is enabled by default.
	<b>NOTE:</b> If this option is not selected, the flashing of the system firmware to the previous versions is blocked.
Data Wipe	Allows you to securely erase the data from all the available internal storages, such as HDD, SSD, mSATA, and eMMC. The option Wipe on Next Boot is disabled by default.
BIOS recovery	Allows you to recover the corrupted BIOS conditions from the recovery files on the primary hard drive. The option <b>BIOS Recovery from Hard Drive</b> is selected by default

**Table 15. System Logs**

Option	Description
BIOS Events	Displays the system event log and allows you to: <ul style="list-style-type: none"> <li>· Clear Log</li> <li>· Mark all Entries</li> </ul>

**Table 16. SupportAssist System Resolution**

Option	Description
Auto OS Recovery Threshold	Options are: OFF, 1, 2 (default), 3.

## Updating the BIOS in Windows

It is recommended to update your BIOS (System Setup), when you replace the system board or if an update is available.

**NOTE:** If BitLocker is enabled, it must be suspended prior to updating the system BIOS, and then re-enabled after the BIOS update is completed.

- 1 Restart the computer.
  - 2 Go to **Dell.com/support**.
    - Enter the **Service Tag** or **Express Service Code** and click **Submit**.
    - Click **Detect Product** and follow the instructions on screen.
  - 3 If you are unable to detect or find the Service Tag, click **Choose from all products**.
  - 4 Choose the **Products** category from the list.
- NOTE:** Choose the appropriate category to reach the product page
- 5 Select your computer model and the **Product Support** page of your computer appears.
  - 6 Click **Get drivers** and click **Drivers and Downloads**.  
The Drivers and Downloads section opens.
  - 7 Click **Find it myself**.
  - 8 Click **BIOS** to view the BIOS versions.
  - 9 Identify the latest BIOS file and click **Download**.
  - 10 Select your preferred download method in the **Please select your download method below** window, click **Download File**.  
The **File Download** window appears.
  - 11 Click **Save** to save the file on your computer.
  - 12 Click **Run** to install the updated BIOS settings on your computer.

Follow the instructions on the screen.

## Updating BIOS on systems with BitLocker enabled

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

## Updating your system BIOS using a USB flash drive

If the system cannot load into Windows but there is still a need to update the BIOS, download the BIOS file using another system and save it to a bootable USB Flash Drive.

**① NOTE:** You will need to use a bootable USB Flash drive. Please refer to the following article for further details: <http://www.dell.com/support/article/sln143196>

- 1 Download the BIOS update .EXE file to another system.
- 2 Copy the file e.g. O9010A12.EXE onto the bootable USB Flash drive.
- 3 Insert the USB Flash drive into the system that requires the BIOS update.
- 4 Restart the system and press F12 when the Dell Splash logo appears to display the One Time Boot Menu.
- 5 Using arrow keys, select **USB Storage Device** and click Return.
- 6 The system will boot to a Diag C:\> prompt.
- 7 Run the file by typing the full filename e.g. O9010A12.exe and press Return.
- 8 The BIOS Update Utility will load, follow the instructions on screen.

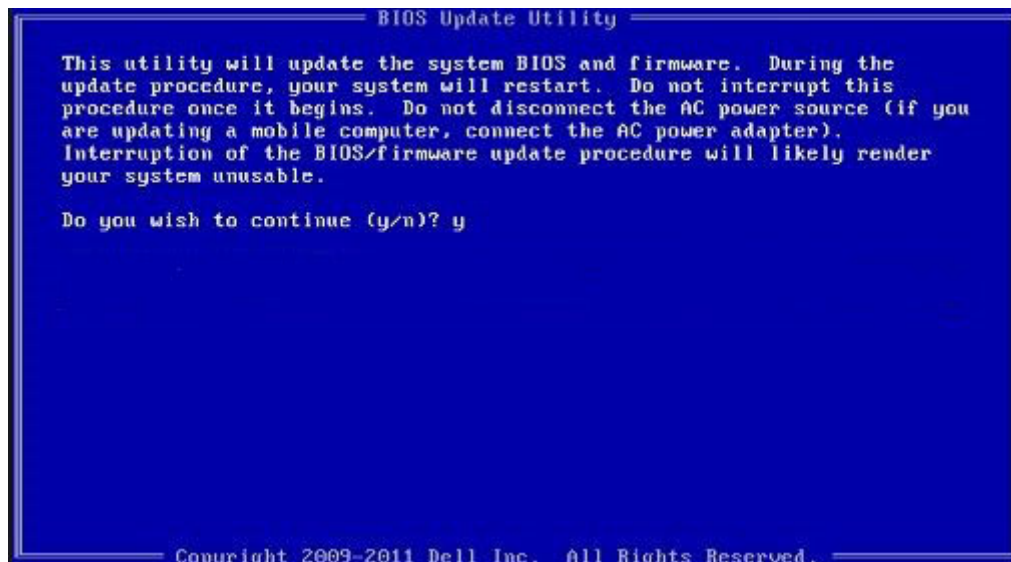


Figure 4. DOS BIOS Update Screen

## Updating the Dell BIOS in Linux and Ubuntu environments

If you want to update the system BIOS in a Linux environment such as Ubuntu, see <http://www.dell.com/support/article/sln171755>.

# Flashing the BIOS from the F12 One-Time boot menu

Updating your system BIOS using a BIOS update .exe file copied to a FAT32 USB key and booting from the F12 one time boot menu.

## BIOS Update

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

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

**NOTE:** Only systems with BIOS Flash Update option in the F12 One-Time Boot Menu can use this function.

## Updating from the One-Time Boot Menu

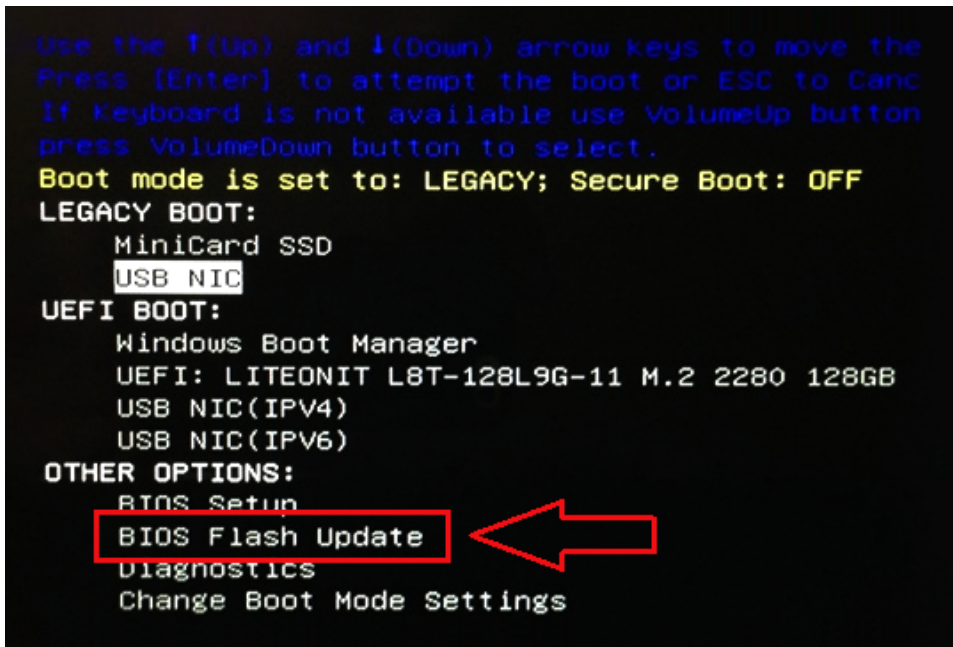
To update your BIOS from the F12 One-Time boot menu, you will need:

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

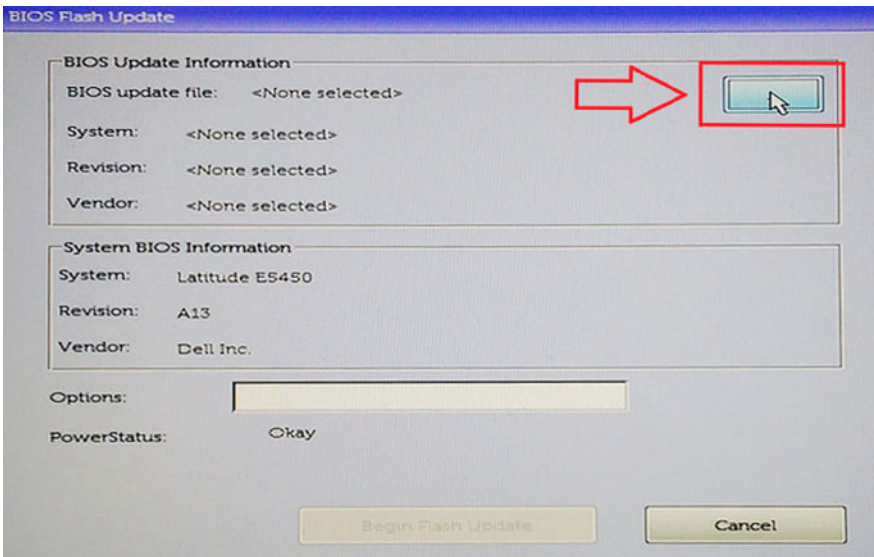
Perform the following steps to execute the BIOS update flash process from the F12 menu:

**CAUTION:** Do not power off the system during the BIOS update process. Powering off the system could make the system fail to boot.

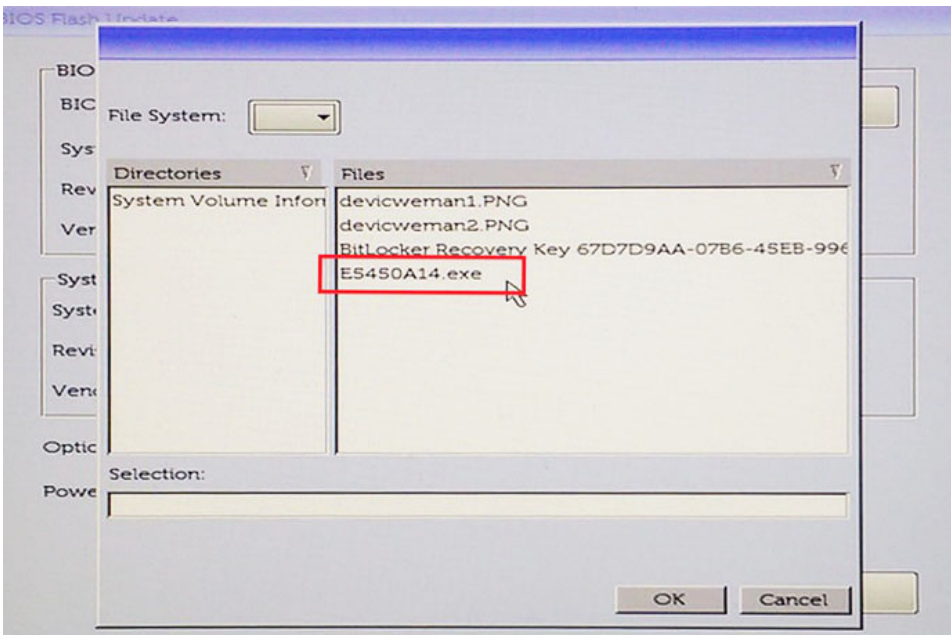
- 1 From a power off state, insert the USB key where you copied the flash into a USB port of the system .
- 2 Power on the system and press the F12 key to access the One-Time Boot Menu, Highlight BIOS Flash Update using the arrow keys then press **Enter**.



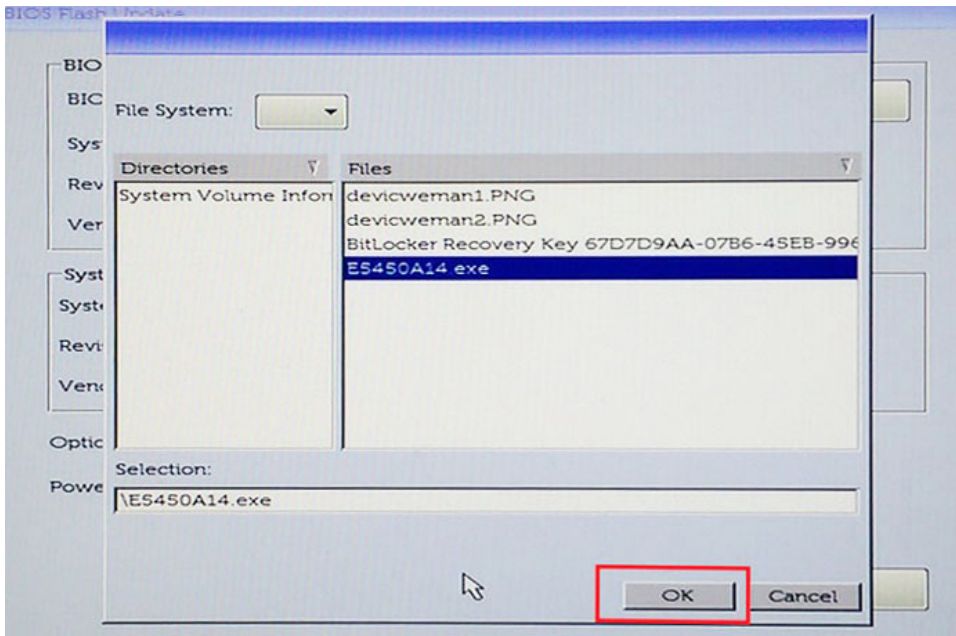
- 3 The Bios flash menu will open then click the browse button.



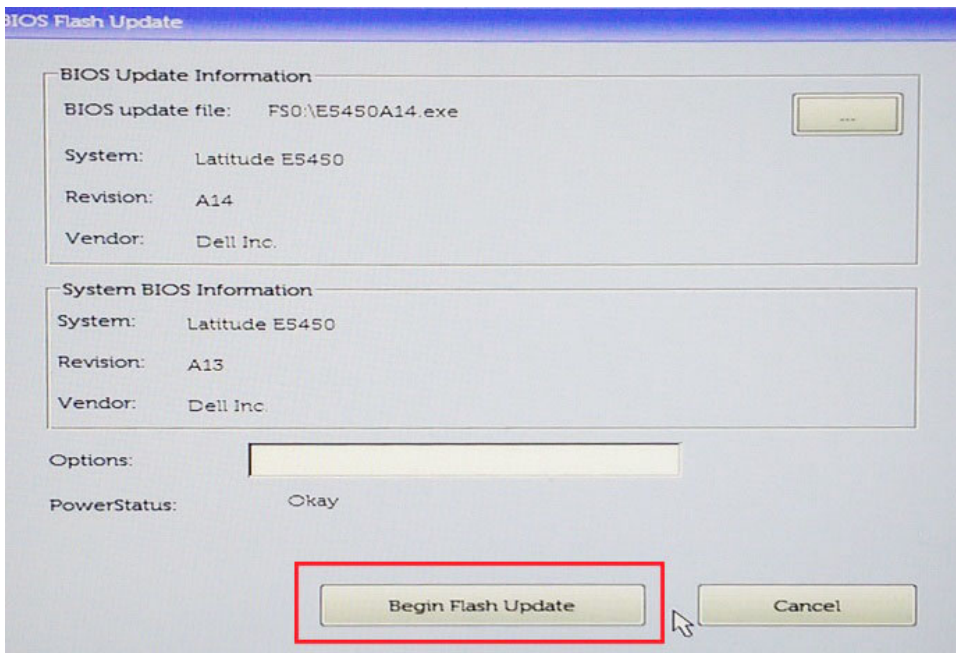
- 4 The E5450A14.exe file is shown as an example in the following screenshot. The actual file name may vary.



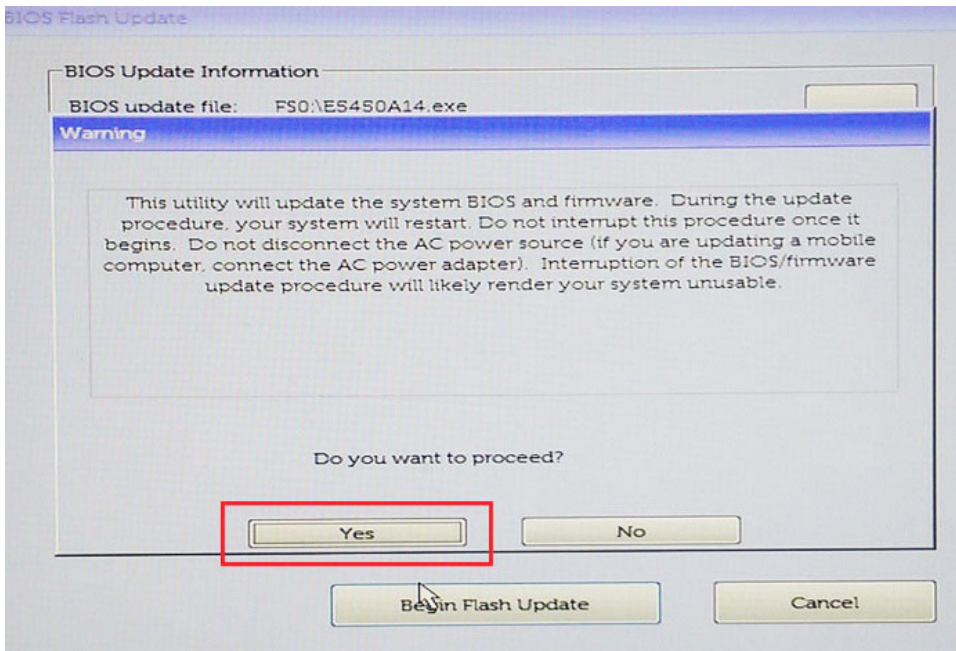
- 5 Once the file is selected, it will show in the file selection box and you can click the OK button to continue.



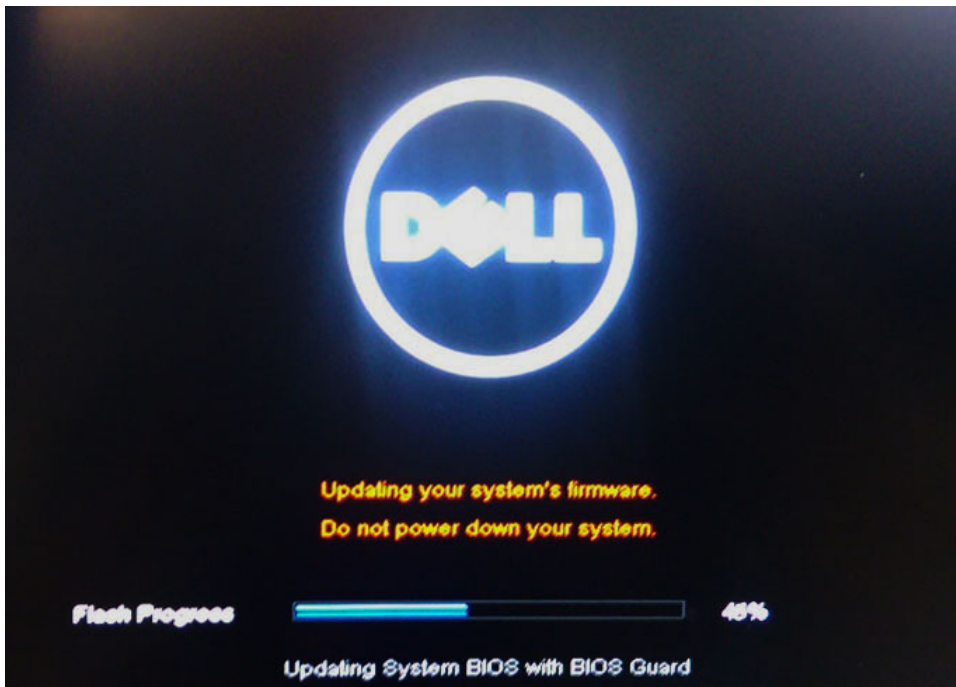
6 Click the **Begin Flash Update** button.



7 A warning box is displayed asking you if you want to proceed. Click the Yes button to begin the flash.



- 8 At this point the BIOS flash will execute, the system will reboot and then the BIOS flash will start and a progress bar will show the progress of the flash. Depending on the changes included in the update, the progress bar may go from zero to 100 multiple times and the flash process could take as long as 10 minutes. Generally this process takes two to three minutes.



- 9 Once complete, the system will reboot and the BIOS update process is completed.

## Specifications

① **NOTE:** Offerings may vary by region. For more information regarding the configuration of your computer in:

- Windows 10, click or tap **Start**  > **Settings** > **System** > **About**.

**Table 17. Chipset**

Feature	Specification
Chipset	AMD PT B350 Chipset

**Table 18. Processor**

Feature	Specification
Processor type	<ul style="list-style-type: none"> <li>· AMD R7 PRO A12-9800</li> <li>· AMD R7 PRO A10-9700</li> <li>· AMD R7 PRO A8-9600</li> <li>· AMD R7 PRO A6-9500</li> </ul>
Total cache	Up to 4MB

**Table 19. Memory**

Feature	Specification
Memory type	DDR4
Memory speed	Up to 2400 MHz
Memory connectors	Four DIMM slots
Memory capacity	Up to 64 GB
Minimum memory	4 GB (2 GB for Linux based OS only)
Maximum memory	64 GB

**Table 20. Video**

Feature	Specification
Integrated	AMD Radeon R7 Graphics [with PRO A12-9800 , A10-9700, A8-9600, A6-9500]
Optional	<ul style="list-style-type: none"> <li>· 1 GB AMD Radeon R5 430</li> <li>· 2 GB AMD Radeon R5 430</li> <li>· 4 GB AMD Radeon R7 450</li> </ul>

**Table 21. Audio**

Feature	Specification
Integrated	Realtek HDA Codec ALC3234

**Table 22. Network**

Feature	Specification
Integrated	BCM5762B0KMLG Broadcom ethernet controller

**Table 23. Expansion bus**

Feature	Specification
Bus type	USB 2.0, USB 3.1 Gen1, SATA 3, and PCIe up to Gen 3
Bus speed	<ul style="list-style-type: none"> <li>• USB 2.0 – 480 Mbps</li> <li>• USB 3.1 Gen1 – 5 Gbps</li> <li>• SATA 3.0 – 6 Gbps</li> <li>• PCIe – 8 Gbps</li> </ul>

**Table 24. Cards**

Feature	Specification
WLAN card	<ul style="list-style-type: none"> <li>• Intel Wireless-AC 8265 2x2</li> <li>• Intel Wireless-AC 3165 1x1</li> <li>• Bluetooth 4.1</li> </ul>
	<p><b>NOTE:</b> For optimal performance, it is recommended to use the wireless display feature with an access point that supports 5 GHz standard.</p>

**Table 25. Drives**

Feature	Specification
Internally accessible	<ul style="list-style-type: none"> <li>• 2.5-inch SATA drive bay</li> <li>• 3.5-inch SATA drive bay</li> <li>• M.2 SATA &amp; NVMe</li> </ul>

**Table 26. External connectors**

Feature	Specification
Audio	
Front panel	• Universal headset
Rear panel	• Line out connector
Network adapter	RJ-45 connector
Serial	PS2 and serial connector
USB 2.0	<ul style="list-style-type: none"> <li>• Front - 2</li> <li>• Back - 2</li> <li>• Internal -2</li> </ul>
USB 3.1 Gen1	<ul style="list-style-type: none"> <li>• Front - 2</li> <li>• Back - 4</li> <li>• Internal -0</li> </ul>
Video	<ul style="list-style-type: none"> <li>• 15-pin VGA connector (optional only support with A-Series APU)</li> <li>• DisplayPort 1.2 (optional 2*DP only support with A-Series APU)</li> </ul>

Feature	Specification
---------	---------------

 **NOTE:** Available video connectors may vary based on the optional graphic board selected.

**Table 27. Controls and lights**

Feature	Specification
Front of the computer	
Power button light	White light — Solid white light indicates power-on state; slow blinking white light indicates sleep state of the computer.
Drive activity light	White light — Slow blinking white light indicates that the computer is reading data from or writing data to the hard drive.
Back of the computer	
Link integrity light on integrated network adapter	Green — A 10 Mbps connection exists between the network and the computer.
	Green — A 100 Mbps connection exists between the network and the computer.
	Orange — A 1000 Mbps connection exists between the network and the computer.
	Off (no light) — The computer is not detecting a physical connection to the network.
Network activity light on integrated network adapter	Yellow light — A breathing yellow light indicates that network activity is present.
Power supply diagnostic light	Green light — The power supply is turned On and is functional. The power cable must be connected to the power connector (at the back of the computer) and the electrical outlet.

**Table 28. Power**

Feature	Specification
Wattage	240W
AC input voltage range	90 - 264Vac
AC input current (low ac range / high ac range)	4 A/ 2 A
AC input frequency	47 HZ/ 63 HZ
Coin cell battery	3 V CR2032 lithium-coin-cell

**Table 29. Physical dimension**

Physical	Small Form Factor
Height	29 cm (11.42 inches)
Width	9.26 cm(3.65 inches)
Depth	29.2 cm (11.50 inches)
Weight	5.26 kgs (11.57 lbs)

**Table 30. Environmental**

<b>Feature</b>	<b>Specification</b>
Temperature range	
Operating	5°C to 35°C (41°F to 95°F)
Non-Operating	-40°C to 65°C (-40°F to 149°F)
Relative humidity (maximum)	
Operating	20% to 80% (non condensing)
Non-Operating	5% to 95% (non condensing)
Maximum vibration	
Operating	0.66 Grms
Non-Operating	1.37 Grms
Maximum shock	
Operating	40 G
Non-Operating	105 G
Altitude	
Operating	-15.2 m to 3048 m (-50 to 10,000 ft)
Non-Operating	-15.20 m to 10,668 m (-50 ft to 35,000 ft)
Airborne contaminant level	G1 or lower as defined by ANSI/ISA-S71.04-1985

# Troubleshooting

## Diagnostic and Power LED codes

Table 31. Power LED states

Power LED light status	Possible cause	Troubleshooting steps
Off	The computer is either turned off or is not receiving power or in Hibernation mode.	<ul style="list-style-type: none"> <li>Re-seat the power cable in the power connector on the back of the computer and the electrical outlet.</li> <li>If the computer is plugged into a power strip, ensure that the power strip is plugged into an electrical outlet and is turned on. Also, bypass power protection devices, power strips, and power extension cables to verify that the computer turns on properly.</li> <li>Ensure the electrical outlet is working by testing it with another device, such as a lamp.</li> </ul>
Steady/blinking amber	Computer fails to complete POST or processor failure.	<ul style="list-style-type: none"> <li>Remove and reinstall any cards.</li> <li>Remove and reinstall the graphics card, if applicable.</li> <li>Ensure the power cable is connected to the system board and processor.</li> </ul>
Slow Blinking white light	Computer is in sleep mode.	<ul style="list-style-type: none"> <li>Press the power button to bring the computer out of the sleep mode.</li> <li>Ensure all power cables are securely connected to the system board.</li> <li>Ensure the main power cable and front panel cable are connected to the system board.</li> </ul>
Steady white	The computer is fully functional and in the On state.	<p>If the computer is not responding, do the following:</p> <ul style="list-style-type: none"> <li>Ensure the display is connected and turned on.</li> <li>If the display is connected and turned on, listen for a beep code.</li> </ul>

**NOTE:** Amber LED blinking pattern : The pattern is 2 or 3 blinks followed by a short pause then X number of blinks up to 7. The repeated pattern has a long pause inserted in the middle. Example 2,3 = 2 amber blinks, short pause, 3 amber blinks followed by long pause then repeats.

**Table 32. Diagnostic power LED codes**

State	State Name	Blinking Amber Pattern	Problem Description	Suggested Resolution
-	-	2 blinks > short pause > 1 blink > long pause > repeats	Bad Motherboard	Replace the motherboard
-	-	2 blinks > short pause > 2 blinks > long pause > repeats	Bad Motherboard, Power Supply or Power Supply cabling	If customer can assist to troubleshoot, narrow down the issue with PSU BIST Test, reseal cable.  If nothing works, replace the motherboard, power supply or cabling
-	-	2 blinks > short pause > 3 blinks > long pause > repeats	Bad Motherboard, Memory or Processor	If customer can assist to troubleshoot, narrow down the issue by reseating memory and swapping an available known good memory.  If nothing works, replace the motherboard, memory or processor
-	-	2 blinks > short pause > 4 blinks > long pause > repeats	Bad coin cell battery	If customer can assist to troubleshoot, narrow down the issue by swapping a known good coin cell battery if available.  If nothing works, replace the coin cell battery
S1	RCM	2 blinks > short pause > 5 blinks > long pause > repeats	BIOS Checksum Failure	System is in Recovery Mode.  Flash latest BIOS version. If problem persists, replace the motherboard
S2	CPU	2 blinks > short pause > 6 blinks > long pause > repeats	Bad Processor	CPU configuration activity is in progress or a CPU failure was detected. Replace the processor
S3	MEM	2 blinks > short pause > 7 blinks > long pause > repeats	Memory failures	Memory subsystem configuration activity is in progress. Appropriate memory modules were detected but a memory failure has occurred.

State	State Name	Blinking Amber Pattern	Problem Description	Suggested Resolution
				<p>If customer can assist to troubleshoot, narrow down the issue with reseating memory and swapping a known good memory if available.</p> <p>If nothing works, replace the memory.</p>
S4	PCI	<p>3 blinks &gt; short pause &gt;</p> <p>1 blinks &gt; long pause &gt; repeats</p>	PCI Device or Video subsystem failures	<p>PCIe device configuration activity is in progress or PCIe device failure was detected.</p> <p>If customer can assist to troubleshoot, narrow down the issue by reseating PCIe card and removing one by one to determine which card failed.</p> <p>If identified the PCIe card failed, replace the PCIe Card.</p> <p>If none of the PCIe Cards failed, replace the motherboard.</p>
S5	VID	<p>3 blinks &gt; short pause &gt;</p> <p>2 blinks &gt; long pause &gt; repeats</p>	Video Subsystem failure	<p>Video subsystem configuration activity in progress or video subsystem failure.</p> <p>If customer can assist to troubleshoot, narrow down the issue by removing one by one to determine which card failed.</p> <p>If identified the card failed, replace the card.</p> <p>If none of the card failed, replace the motherboard.</p>
S6	STO	<p>3 blinks &gt; short pause &gt;</p> <p>3 blinks &gt; long pause &gt; repeats</p>	No Memory detected	<p>If customer can assist to troubleshoot, narrow down the issue by removing one by one memory to determine which one failed and swapping to a known good memory if available to confirm.</p> <p>If identified the memory failed, replace the memory.</p>

State	State Name	Blinking Amber Pattern	Problem Description	Suggested Resolution
				If none of the memory failed, replace the motherboard.
S7	USB	3 blinks > short pause > 4 blinks > long pause > repeats	Storage Subsystem failure	<p>Possible storage device configuration in progress or storage subsystem failure.</p> <p>If customer can assist to troubleshoot, narrow down the issue by removing one by one storages on motherboard to determine which one failed.</p> <p>If identified the storage failed, replace the storage.</p> <p>If identified the storage failed, replace the storage.</p>
S8	MEM	3 blinks > short pause > 5 blinks > long pause > repeats	Memory configuration or incompatible error	<p>Memory subsystem configuration activity is in progress. No memory modules were detected.</p> <p>If customer can assist to troubleshoot, narrow down the issue by removing one by one the memory on motherboard to determine which one failed. Also, combining the configuration to validate appropriate combination.</p> <p>If identified the component failed, replace the component.</p> <p>If none of the component failed, replace the motherboard.</p>
S9	MBF	3 blinks > short pause > 6 blinks > long pause > repeats	System board failure	<p>Fatal system board failure detected.</p> <p>If customer can assist to troubleshoot, narrow down the issue by removing one by one the component on motherboard to determine which one failed.</p>

State	State Name	Blinking Amber Pattern	Problem Description	Suggested Resolution
				<p>If identified any of the component failed, replace the component.</p> <p>If none of the component failed, replace the motherboard.</p>
S10	MEM	<p>3 blinks &gt; short pause &gt;</p> <p>7 blinks &gt; long pause &gt; repeats</p>	Possible memory failure	<p>Memory subsystem configuration activity is in progress. Memory modules have been detected but appear to be incompatible or in an invalid configuration.</p> <p>If customer can assist to troubleshoot, narrow down the issue by removing one by one the memory on motherboard to determine which one failed.</p> <p>If identified the memory failed, replace the memory.</p> <p>If else, replace the motherboard.</p>

**⚠ WARNING:** The power LED only serve as an indicator of the progress through the POST process. These LEDs do not indicate the problem that caused the POST routine to stop

## Enhanced Pre-Boot System Assessment — ePSA diagnostics

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

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

You can invoke the ePSA diagnostics by tapping F12 key when the system posts and choose **ePSA or Diagnostics** option on One Time Boot Menu.

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

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

**ⓘ NOTE:** Regular ePSA's run for about 5 to 10 minutes, however, the extended test takes about three and half hours with only 8GB of ram in the system.

# Getting help

## Contacting Dell

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

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

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