

P15 Gen 2/T15g Gen 2/P17 Gen 2  
User Guide

**ThinkPad**



**Lenovo**

## **Read this first**

Before using this documentation and the product it supports, ensure that you read and understand the following:

- *Safety and Warranty Guide*
- *Setup Guide*
- [Generic Safety and Compliance Notices](#)

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## Discover your Lenovo notebook

**Thank you for choosing a Lenovo® notebook! We are dedicated to delivering the best solution to you.**

Before starting your tour, please read the following information:

- Illustrations in this documentation might look different from your product.
- Depending on the model, some optional accessories, features, software programs, and user interface instructions might not be applicable to your computer.
- Documentation content is subject to change without notice. To get the latest documentation, go to <https://pcsupport.lenovo.com>.













# Chapter 1. Meet your computer

## Front view

P15 Gen 2 and T15g Gen 2



	Infrared camera * / Camera *		Webcam privacy shutter *
	Microphone *		Touch screen *
	Power button		TrackPoint® pointing stick
	Fingerprint reader		Trackpad
	TrackPoint buttons		Speaker



## **Webcam privacy shutter**

Slide the webcam privacy shutter to cover or uncover the camera lens. It is designed to protect your privacy.










### **Related topics**

- “Log in with your face ID (for selected models)” on page 28
- “Use the touch screen (for selected models of P15 Gen 2 / T15g Gen 2)” on page 16
- “Log in with your fingerprint” on page 27
- “Use the TrackPoint pointing device” on page 13
- “Use the trackpad” on page 15



## P17 Gen 2



	Infrared camera * / Camera *		Webcam privacy shutter *
	Microphone *		Power button
	TrackPoint® pointing stick		Fingerprint reader
	Trackpad		TrackPoint buttons
	Speaker		

\* for selected models

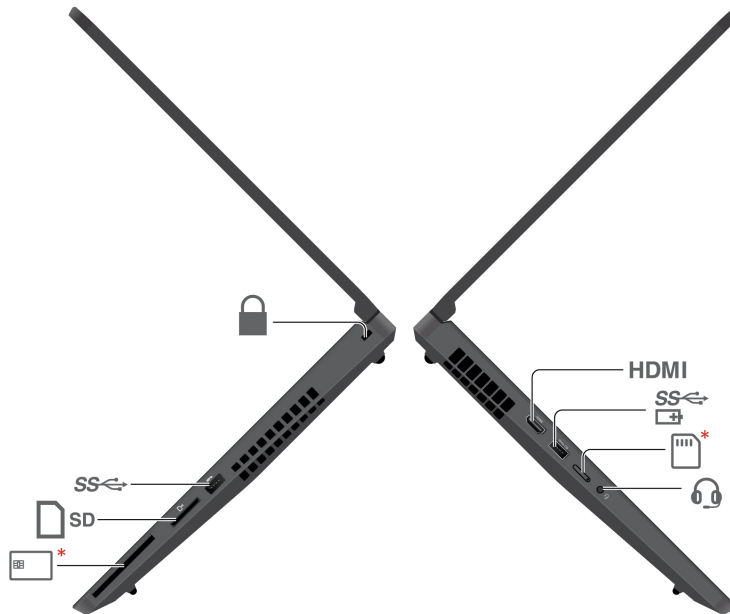
### Webcam privacy shutter

Slide the webcam privacy shutter to cover or uncover the camera lens. It is designed to protect your privacy.

**Related topics**

- “Log in with your face ID (for selected models)” on page 28
- “Log in with your fingerprint” on page 27
- “Use the TrackPoint pointing device” on page 13
- “Use the trackpad” on page 15

## Side view



<b>HDMI</b>	HDMI™ connector	<b>SS</b>	Always on USB 3.2 connector Gen 1
	Nano-SIM-card tray		Audio connector
	Smart-card slot*		SD card reader
<b>SS</b>	USB 3.2 connector Gen 1		Security-lock slot

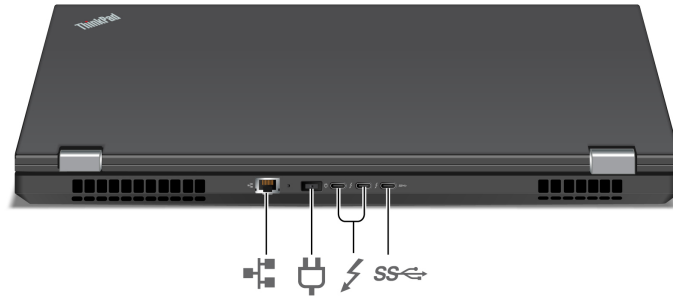
### HDMI HDMI connector

The HDMI connector on your computer supports the HDMI 2.1 standard by default. If you connect an external display to your computer through the HDMI connector with an uncertified HDMI cable, the external display might not work. In this case, use a certified HDMI 2.1 cable instead.

#### Related topics

- “Charge the computer” on page 23
- “USB specifications” on page 8
- “Use a SD card or smart card (for selected models)” on page 24
- “Lock the computer” on page 27

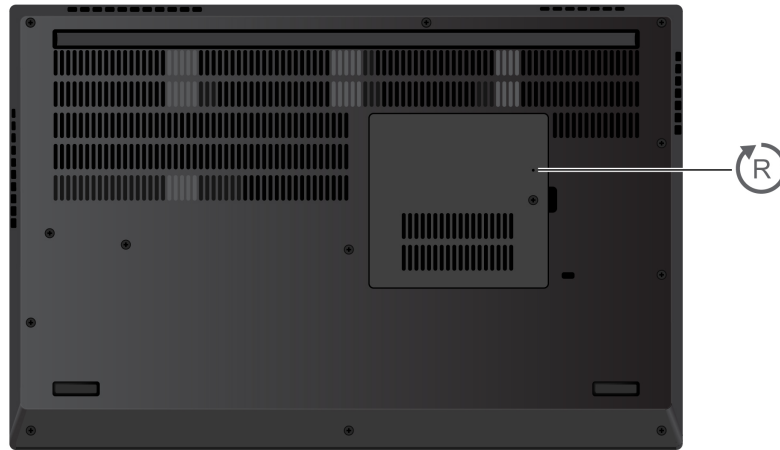
## Rear view



	Ethernet connector		Power connector
	USB-C (Thunderbolt 4) connectors		USB-C (3.2 Gen 2) connector

---

## Bottom view



### Emergency-reset hole

If the computer stops responding and you cannot turn it off by pressing the power button, reset your computer:

1. Disconnect your computer from ac power.
2. Insert a straightened paper clip into the hole to cut off power supply temporarily.
3. Connect your computer to ac power and then turn on your computer.

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## Features and specifications

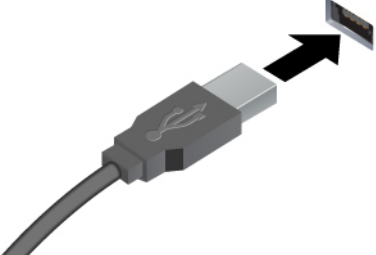



For detailed specifications of your computer, go to <https://psref.lenovo.com> and search by product.

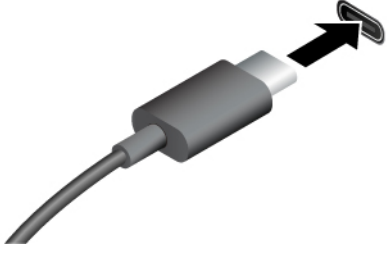


<b>Memory</b>	<ul style="list-style-type: none"><li>• Four slots</li><li>• Double data rate 4 (DDR4) small outline dual in-line memory module (SODIMM), up to 128 GB in total</li></ul>
<b>Storage device</b>	<ul style="list-style-type: none"><li>• Three slots, 2280 M.2 solid-state drive, up to 2 TB for each slot</li></ul>
<b>Display</b>	<ul style="list-style-type: none"><li>• P15 Gen 2 and T15g Gen 2:<ul style="list-style-type: none"><li>– Organic Light-Emitting Diode (OLED) display or color display with In-Plane Switching (IPS)</li><li>– Display ratio: 16:9</li><li>– Display resolution: 1920 x 1080 pixels or 3840 x 2160 pixels</li><li>– Multi-touch technology (for selected models)</li></ul></li><li>• P17 Gen 2:<ul style="list-style-type: none"><li>– Color display with IPS</li><li>– Display ratio: 16:9</li><li>– Display resolution: 1920 x 1080 pixels or 3840 x 2160 pixels</li></ul></li></ul> <p><b>Notes:</b> For non-OLED display with High-Dynamic Range (HDR) function, this function only works under <b>Hybrid Graphics</b> mode. To switch the display setting between <b>Hybrid Graphics</b> mode and <b>Discrete Graphics</b> mode:</p> <ol style="list-style-type: none"><li>1. Restart the computer. When the logo screen is displayed, press F1 to enter the UEFI BIOS menu.</li><li>2. Select <b>Config</b> → <b>Display</b> → <b>Graphic Devices</b> and follow the on-screen instructions.</li></ol>
<b>Security features</b>	<ul style="list-style-type: none"><li>• Face authentication *</li><li>• Fingerprint reader</li><li>• Trusted Platform Module (TPM) *</li></ul>
<b>Wireless features</b>	<ul style="list-style-type: none"><li>• Bluetooth</li><li>• GPS (available on models with wireless WAN card only) *</li><li>• Wireless LAN</li><li>• Wireless WAN (4G or 5G) *</li></ul> <p><b>Note:</b> The 4G or 5G cellular service is provided by authorized mobile service carriers in some countries or regions. You must have a cellular plan from a service carrier to connect to the cellular network. The cellular data plan might vary by location.</p>

\* for selected models

## USB specifications

**Note:** Depending on the model, some USB connectors might not be available on your computer.

Connector name	Description
 <ul style="list-style-type: none"> <li>•  USB 2.0 connector</li> <li>•  USB 3.2 connector Gen 1</li> <li>•  USB 3.2 connector Gen 2</li> </ul>	<p>Connect USB-compatible devices, such as a USB keyboard, USB mouse, USB storage device, or USB printer.</p>

 <ul style="list-style-type: none"> <li>• USB-C (3.2 Gen 1) connector</li> <li>• USB-C (3.2 Gen 2) connector</li> <li>•  USB-C (Thunderbolt 3) connector</li> <li>•  USB-C (Thunderbolt 4) connector</li> </ul>	<ul style="list-style-type: none"> <li>• Charge USB-C compatible devices with the output voltage and current of 5 V and 1.5 A.</li> <li>• Connect to an external display: <ul style="list-style-type: none"> <li>– USB-C to VGA: up to 1920 x 1200 pixels, 60 Hz</li> <li>– USB-C to DP: up to 5120 x 3200 pixels, 60 Hz</li> </ul> </li> <li>• Connect to USB-C accessories to help expand your computer functionality. To purchase USB-C accessories, go to <a href="https://www.lenovo.com/accessories">https://www.lenovo.com/accessories</a>.</li> </ul>
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### Statement on USB transfer rate

Depending on many factors such as the processing capability of the host and peripheral devices, file attributes, and other factors related to system configuration and operating environments, the actual transfer rate using the various USB connectors on this device will vary and will be slower than the data rate listed below for each corresponding device.

USB device	Data rate (Gbit/s)
3.2 Gen 1 / 3.1 Gen 1	5
3.2 Gen 2 / 3.1 Gen 2	10
3.2 Gen 2 × 2	20
Thunderbolt 3	40
Thunderbolt 4	40





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## Chapter 2. Get started with your computer

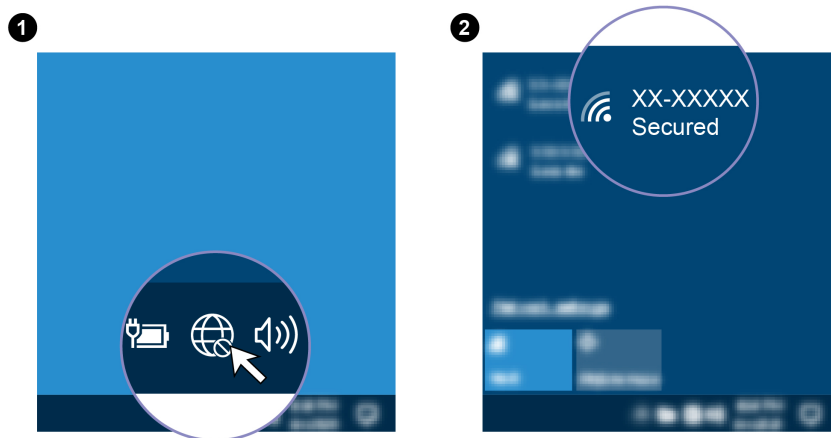
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### Access networks

This section helps you connect to a wireless or wired network.

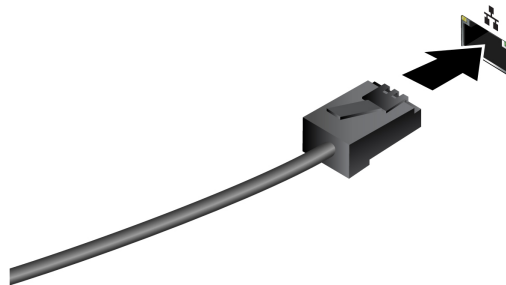
#### Connect to Wi-Fi networks

Click the network icon in the Windows® notification area, and then select a network for connection. Provide required information, if needed.



#### Connect to the wired Ethernet

Connect your computer to a local network through the Ethernet connector on your computer with an Ethernet cable.



#### Connect to a cellular network (for selected models)

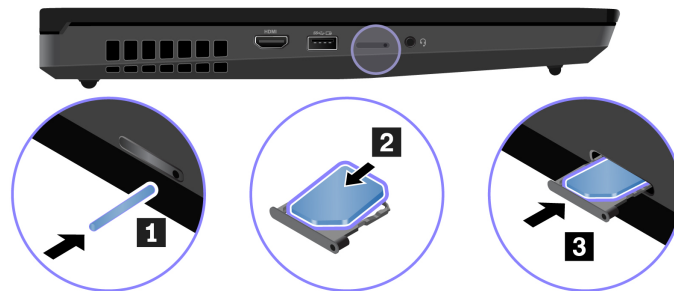
If your computer has a wireless wide area network (WAN) card and a nano-SIM card installed, you can connect to a cellular data network and get online everywhere.

**Note:** The cellular service is provided by authorized mobile service carriers in some countries or regions. You must have a cellular plan from a service carrier to connect to the cellular network.

To establish a cellular connection:

1. Turn off the computer.

2. Locate the nano-SIM card slot and insert the nano-SIM card as shown. Note the orientation of the card and ensure that it is seated correctly.



3. Turn on the computer.
4. Click the network icon, and then select the cellular network icon from the list. Provide required information, if needed.

## Turn on the Airplane mode

When the Airplane mode is enabled, all wireless features are disabled.

1. Click the action center icon in the Windows notification area.
2. Click **Airplane mode** to turn on the Airplane mode.

## Interact with your computer

Your computer provides you various ways to navigate the screen.


















## Use the keyboard shortcuts

The special keys on the keyboard help you work more effectively.



<https://support.lenovo.com/us/en/videos/vid500145>

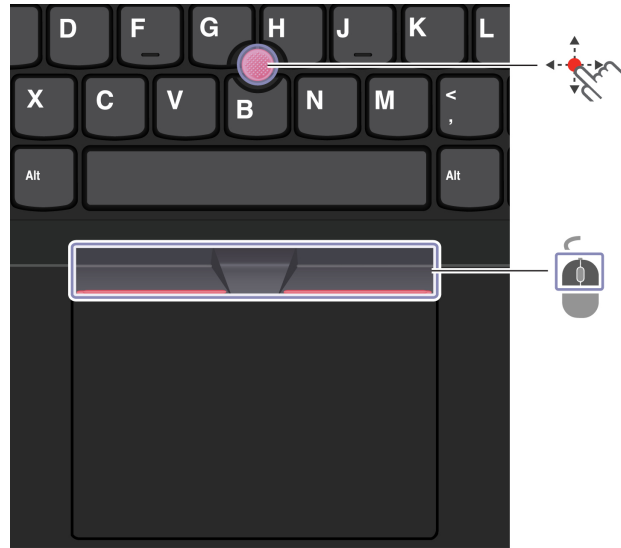
	<p>Invoke the special function printed as an icon on each key or standard function of F1–F12 function keys.</p>
	<p>FnLock indicator on: standard function</p>
	<p>FnLock indicator off: special function</p>
	<p>Enable / disable speakers</p>
	<p>Decrease volume</p>
	<p>Increase volume</p>
	<p>Enable / disable microphones</p>
	<p>Darken display</p>
	<p>Brighten display</p>

	Manage external displays
	Enable / disable wireless
	Open / collapse notification center
	Answer incoming calls on Microsoft Teams
	Decline incoming calls on Microsoft Teams
	Open the Vantage app. You can customize the function of this key on the Vantage app.
	Open calculator
	Enter sleep mode
	Open Snipping Tool
	Toggle keyboard backlight (for selected models)
	Break operation
	Pause operation
	Scroll contents
	Send system request
	Enter sleep mode To wake up the computer, press Fn or the power button.
	Go to beginning
	Go to end

## Use the TrackPoint pointing device

The TrackPoint pointing device enables you to perform all the functions of a traditional mouse, such as pointing, clicking, and scrolling.

## Use the TrackPoint pointing device



### TrackPoint pointing stick

Use your finger to apply pressure to the pointing-stick nonslip cap in any direction parallel to the keyboard. The pointer on the screen moves accordingly. The higher the pressure applied, the faster the pointer moves.



### TrackPoint buttons

The left-click button and right-click button correspond to the left and right buttons on a traditional mouse. Press and hold the dotted middle button while using your finger to applying pressure to the pointing stick in the vertical or horizontal direction. Then, you can scroll through the document, Web site, or apps.

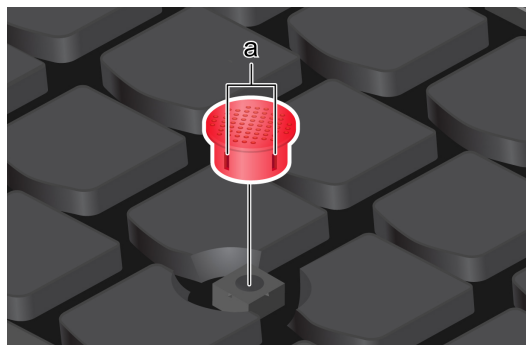
## Disable the TrackPoint pointing device

The TrackPoint pointing device is active by default. To disable the device:

1. Open the **Start** menu, and then click **Settings** → **Devices** → **Mouse**.
2. Follow the on-screen instructions to disable TrackPoint.

## Replace the pointing-stick nonslip cap

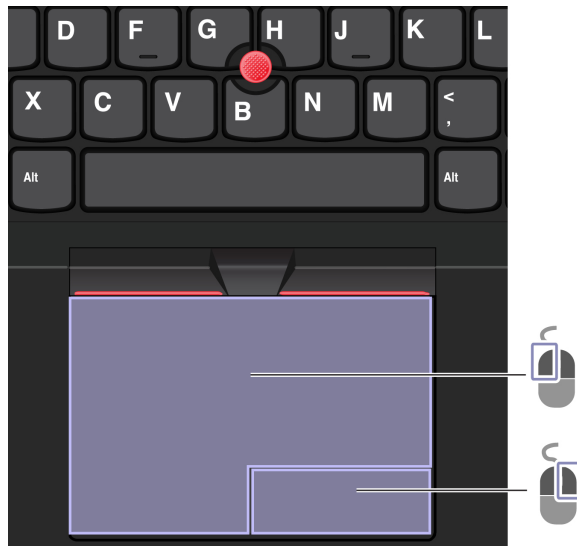
**Note:** Ensure that the new cap has grooves **a**.



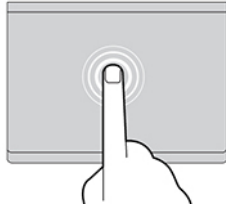
## Use the trackpad

You can use the trackpad to perform all the pointing, clicking, and scrolling functions of a traditional mouse.

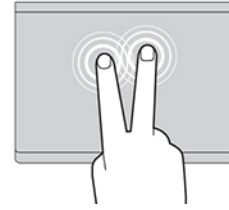
### Use the trackpad



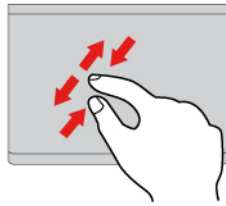
## Use the touch gestures



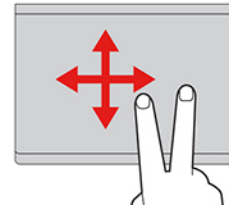
Tap once to select or open an item.



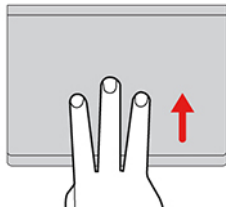
Tap twice quickly to display a shortcut menu.



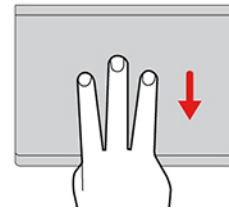
Two-finger zoom in or zoom out.



Scroll through items.



Open the task view to see all open windows.



Show the desktop.

### Notes:

- When using two or more fingers, ensure that you position your fingers slightly apart.
- Some gestures are not available if the last action was done from the TrackPoint pointing device.
- Some gestures are only available when you are using certain apps.
- If the trackpad surface is stained with oil, turn off the computer first. Then, gently wipe the trackpad surface with a soft and lint-free cloth moistened with lukewarm water or computer cleaner.

For more gestures, see the help information of the pointing device.

### Disable the trackpad

The trackpad is active by default. To disable the device:

1. Open the **Start** menu, and then click **Settings** → **Devices** → **Touchpad**.
2. In the Touchpad section, turn off the **Touchpad** control.

## Use the touch screen (for selected models of P15 Gen 2 / T15g Gen 2)

If your computer display supports the multi-touch function, you can navigate the screen with simple touch gestures.

**Note:** Some gestures might not be available when you are using certain apps.



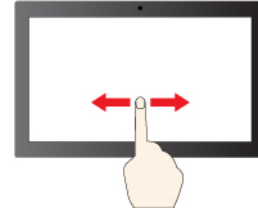
Tap once to single click



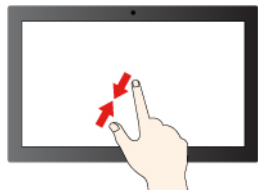
Tap twice quickly to double-click



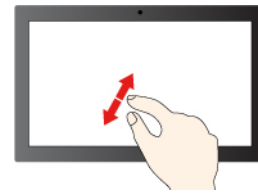
Tap and hold to right-click



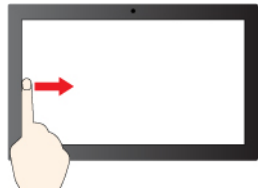
Slide to scroll through items



Zoom out



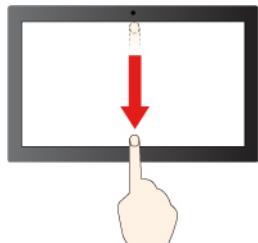
Zoom in



Swipe from the left: view all open windows

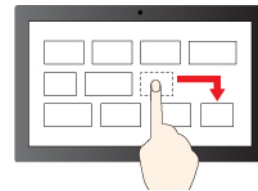


Swipe from the right: open action center



Swipe downwards shortly: show title bar

Swipe downwards: close the current app



Drag

### Maintenance tips:

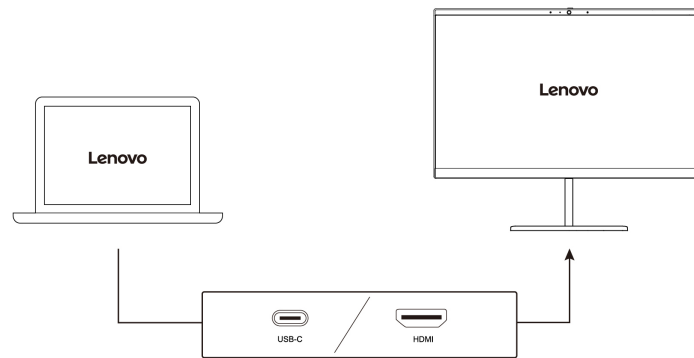
- Turn off the computer before cleaning the touch screen.
- Use a dry, soft, and lint-free cloth or a piece of absorbent cotton to remove fingerprints or dust from the touch screen. Do not apply solvents to the cloth.
- The touch screen is a glass panel covered with a plastic film. Do not apply pressure or place any metallic object on the screen, which might damage the touch panel or cause it to malfunction.
- Do not use fingernails, gloved fingers, or inanimate objects for input on the screen.
- Regularly calibrate the accuracy of the finger input to avoid a discrepancy.

## Connect to an external display

Connect your computer to a projector or a monitor to give presentations or expand your workspace.

### Connect to a wired display

If your computer cannot detect the external display, right-click a blank area on the desktop and select display settings. Then follow the on-screen instructions to detect the external display.



### Supported resolution



The following table lists the supported maximum resolution of the external display. For more information, go to <https://psref.lenovo.com> and search by product.

**Note:** Refresh rate above 60 Hz is also supported. If you set the refresh rate above 60 Hz, the maximum resolution might be limited.

Connect the external display to	Supported resolution
HDMI connector	Up to 8K / 60 Hz
USB-C (3.2 Gen 2) connector	Up to 5K / 60 Hz
USB-C (Thunderbolt 4) connector	Up to 5K / 60 Hz




### Connect to a wireless display

To use a wireless display, ensure that both your computer and the external display support the Miracast® feature.

Press  +  and then select a wireless display to connect with.



## Set the display mode

Press  or  +  and then select a display mode of your preference.

## Change display settings

1. Right-click a blank area on the desktop and select display settings.
2. Select the display that you want to configure and change display settings of your preference.

You can change the settings for both the computer display and the external display. For example, you can define which one is the main display and which one is the secondary display. You also can change the resolution and orientation.

---

## Lenovo Pen Pro

Selected models of P15 Gen 2 and T15g Gen 2 come with a Lenovo Pen Pro (referred to as pen in this section). The Lenovo Pen Pro (a rechargeable stylus pen) enables you to write and draw in a natural manner. To purchase the pen, go to <https://www.lenovo.com/accessories>.

**Note:** The color of the pen might vary by country or region. Depending on the model, the pen might look slightly different from the illustrations in this topic.

### Pen overview



---

#### Bottom barrel button



To erase text or drawings, hold the button to erase the object in supported apps.

---

#### Top barrel button



To right-click, hold the button and tap the screen in supported apps.

---

#### USB-C connector



Use the ac power adapter that comes with your foldable PC to charge the pen.

---

#### LED indicator



When the LED indicator blinks in amber, the pen battery power is low. The LED indicator is in solid amber during charging and is solid green when the pen is fully charged. The pen is fully charged in about two hours.

---

#### Top pen button



Hold the top pen button for at least three seconds to enable Bluetooth pairing on the pen.

## Notes:

- The default function of each barrel button might vary in different apps.
- To customize the barrel button functions, use Lenovo Pen Settings. If Lenovo Pen Settings is not installed on your computer, download and install the latest WinTab driver from <https://support.lenovo.com>.

## Pair the pen

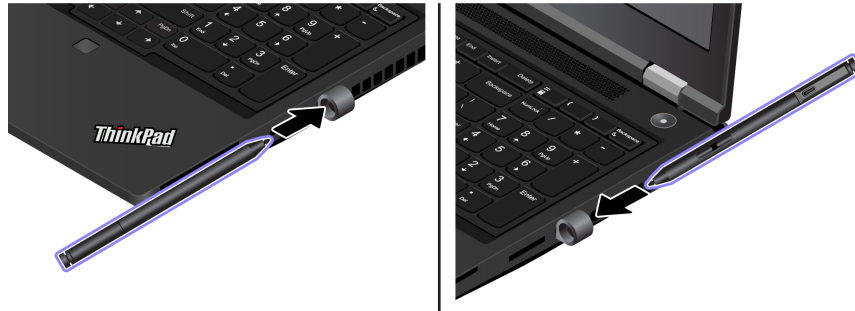
1. Enable Bluetooth pairing on the pen by pressing and holding the top of the pen for at least three seconds until the LED indicator flashes in green.
2. Enable Bluetooth pairing on your computer to discover and pair the pen. See “Set up a Bluetooth connection” on page 24. The pen is discoverable as Lenovo Pen Pro.

After pairing, press or double-press the top pen button to access more functions. To customize the top pen button functions, use Lenovo Pen Settings or open the Start menu and click **Settings → Devices → Pen & Windows Ink → Pen shortcuts**.

## Store the pen

The pen is delivered with a pen holder. To store the pen on the computer:

1. Insert the pen holder into the USB connector on the computer.
2. Insert the pen into the pen holder in any ways as shown.



## Maintenance tips

- The pen is not waterproof. Keep the pen away from water and excessive moisture.
- The pen contains pressure sensors. Apply an appropriate amount of pressure when writing on the screen. Do not subject the pen to shock or vibration.
- If possible, place your pen in a well-ventilated and dry area without direct exposure to sunshine.
- Do not use or store the pen in a place where excessive changes in temperature may occur such as in a car.

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## Chapter 3. Explore your computer

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### Lenovo apps

This section provides introduction to the Vantage and Lenovo Quick Clean apps.

#### The Vantage app

The preinstalled Vantage app is a customized one-stop solution to help you maintain your computer with automated updates and fixes, configure hardware settings, and get personalized support.

To access the Vantage app, type *Vantage* in the Windows search box.

#### Key features

The Vantage app enables you to:

- Know the device status easily and customize device settings.
- Download and install UEFI BIOS, firmware, and driver updates to keep your computer up-to-date.
- Monitor your computer health, and secure your computer against outside threats.
- Scan your computer hardware and diagnose hardware problems.
- Look up warranty status (online).
- Access *User Guide* and helpful articles.

#### Notes:

- The available features vary depending on the computer model.
- The Vantage app makes periodic updates of the features to keep improving your experience with your computer. The description of features might be different from that on your actual user interface.

#### Lenovo Quick Clean



Depending on the model, your computer might support the Lenovo Quick Clean feature. The preinstalled Lenovo Quick Clean enables you to temporarily disable the keyboard, screen, trackpad, and TrackPoint pointing device for cleaning.

To access Lenovo Quick Clean, do one of the following:

- Type *Lenovo Quick Clean* in the Windows search box.
- Press *Fn* and the right *Shift* key at the same time.


To download the latest version of Lenovo Quick Clean, go to <https://pcsupport.lenovo.com>.

---

### Color calibration (for selected models)

The factory color calibration feature is available on computer models preinstalled with the X-Rite Color Assistant program. This feature enables you to render color images or graphics on your display close to the original intent as much as possible.

For computer with the factory color calibration feature, the color profiles are preinstalled. You can switch between color profiles as desired:

1. Click the triangular icon in the Windows notification area to show hidden icons. Then, right-click .
2. Follow the on-screen instructions to select a profile as desired.

Lenovo provides backup color profiles in Lenovo Cloud. You might need to restore or install color profiles in the following situations:





- If any color profile is lost or damaged, a window will be displayed to remind you to restore the color profiles. Click **Yes** in the window prompted, and the color profiles will be restored from Lenovo Cloud automatically.
- If your display has been replaced by a Lenovo-authorized service provider, do the following to install new color profiles:
  1. Connect your computer to the network and close the X-Rite Color Assistant program.
  2. Go to C:\Program files (x86)\X-Rite Color Assistant and locate the ProfileUpdaterForDisplayReplacement.exe file.
  3. Double-click the EXE file. Then, follow the on-screen instructions to input the display serial number and click **Submit**.

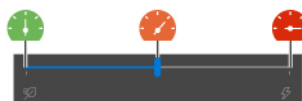
**Note:** When the new color profiles are installed successfully, a window will be displayed.

---

## Intelligent Cooling

The Intelligent Cooling feature enables your computer to work in the following three modes:

-  Quiet mode: the lower fan speed
-  Balanced mode: balanced performance and fan speed
-  Performance mode: the highest performance and normal fan speed
-  Ultra-performance mode: the best performance and higher fan speed



on ac power



on battery power

To select the preferred mode:

1. Click the battery status icon in the Windows notification area.
2. Move the slider to select the preferred mode.

**Note:** In Ultra-performance mode or performance mode, avoid keeping your hands, your lap, or any other part of your body in contact with a hot section of the computer for 10 seconds or above.

---

## Use the Cool and Quiet on lap feature

The Cool and Quiet on lap feature helps cool down your computer when it becomes hot. Any extended contact with your body, even through clothing, could cause discomfort. If you prefer using your computer on the lap, it is recommended that you enable the Cool and Quiet on lap feature in UEFI BIOS:

1. Enter the UEFI BIOS menu. See “Enter the UEFI BIOS menu” on page 31.

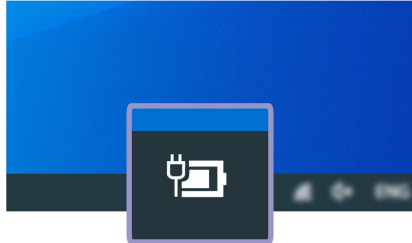
2. Click **Config** and turn on the **Cool and Quiet on lap mode** switch.

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## Manage power

Use the information in this section to achieve the best balance between performance and power efficiency.

### Check the battery status

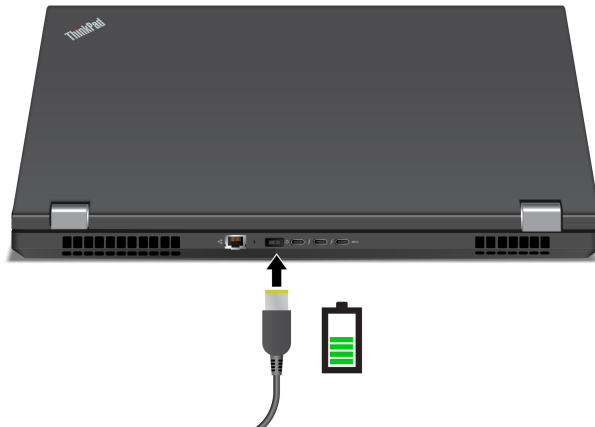


Click the battery icon in the Windows notification area to check the battery status, view the current power plan, change the power mode, and access battery settings quickly. For more details about your battery, refer to the Vantage app.

### Charge the computer

Power source of the ac power adapter:

- Power: 170 W or 230 W (depending on the model)
- Sine-wave input at 50 Hz to 60 Hz
- Input rating of the ac power adapter: 100 V to 240 V ac, 50 Hz to 60 Hz



When the battery power is low, charge your battery by connecting your computer to ac power. Your ac power adapter supports the rapid charge function, the battery is 80% charged in about one hour when the computer is turned off. The actual charging time depends on the battery size, the physical environment, and whether you are using the computer.

**Note:** To maximize the life of the battery, use the battery until the charge is depleted and recharge the battery completely before using it. Once the battery is fully charged, it must discharge to 94% or lower before it will be allowed to recharge again.

## Change the power settings

For ENERGY STAR® compliant computers, the following power plan takes effect when your computer has been idle for a specified duration:

- Turn off the display: After 10 minutes
- Put the computer to sleep: After 10 minutes

To reset the power plan:

1. Right-click the battery status icon and select **Power Options**.
2. Choose or customize a power plan of your preference.

To reset the power button function:

1. Right-click the battery status icon and select **Power Options** → **Change what the power buttons do**.
2. Change the settings as you prefer.

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## Transfer data

Quickly share your files using the built-in Bluetooth among devices with the same features. You also can insert a SD card or smart card to transfer data.

## Set up a Bluetooth connection

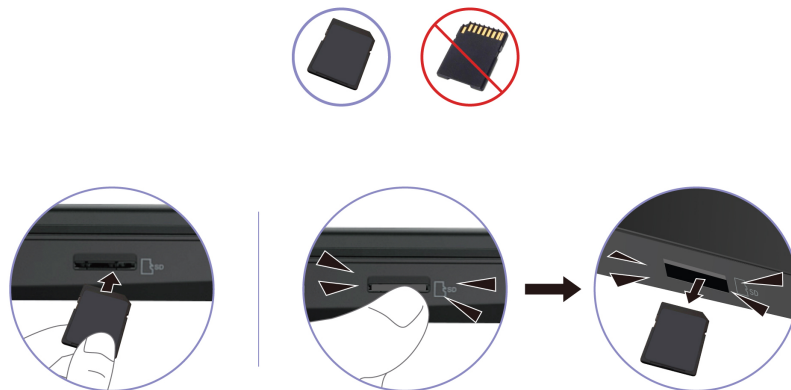
You can connect all types of Bluetooth-enabled devices to your computer, such as a keyboard, a mouse, a smartphone, or speakers. To ensure successful connection, place the devices at most 10 meters (33 feet) from the computer.

1. Type Bluetooth in the Windows search box and then press Enter.
2. Turn on Bluetooth, if it is off.
3. Select a Bluetooth device, and then follow the on-screen instructions.

## Use a SD card or smart card (for selected models)

You can insert a SD card or smart card to transfer data.

### Install or remove a SD card



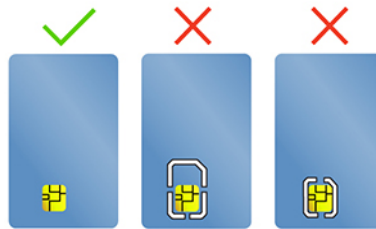
**Attention:** Before removing the card:

1. Click the triangular icon in the Windows notification area to show hidden icons. Right-click the icon prompting you to safely remove hardware and eject media.
2. Select the corresponding item to eject the card from the Windows operating system.
3. Press the card and remove it from your computer. Store the card safely for future use.

### Supported smart card

Supported smart card specifications: 85.60 mm (3.37 inches) x 53.98 mm (2.13 inches)

**Attention:** Smart cards with slits are not supported. Do not insert such a smart card into the smart-card slot of your computer. Otherwise, the reader might get damaged.



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## Accessories

This section provides instructions on how to use hardware accessories to expand your computer functionalities.

### Purchase accessories

Lenovo has a number of hardware accessories and upgrades to help expand the functionalities of your computer. Options include memory modules, storage devices, network cards, port replicators or docking stations, batteries, power adapters, keyboards, mice, and more.

To shop at Lenovo, go to <https://www.lenovo.com/accessories>.





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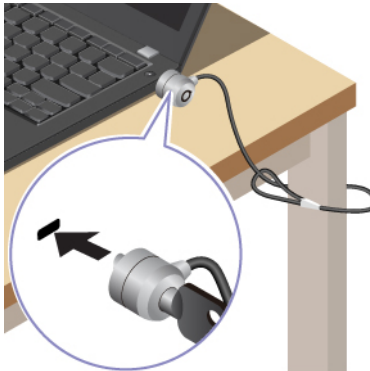
## Chapter 4. Secure your computer and information

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### Lock the computer

Lock your computer to a desk, table, or other fixtures through a compatible security cable lock.

**Note:** You are responsible for evaluating, selecting, and implementing the locking device and security feature. Lenovo is not responsible for the locking device and security feature. You can purchase the cable locks at <https://smartfind.lenovo.com>.



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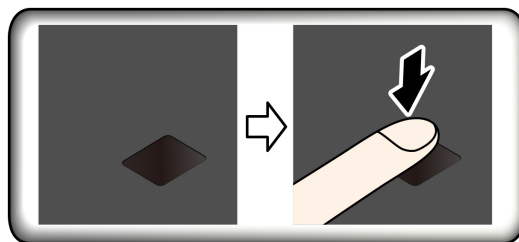
### Log in with your fingerprint

Enroll your fingerprints and unlock computer by scanning your fingerprints on the fingerprint reader.

1. Type Sign-in options in the Windows search box and then press Enter.
2. Select the fingerprint setting and then follow the on-screen instruction to enroll your fingerprint.

**Note:** It is recommended that you put your finger at the middle of the fingerprint reader during enrollment and enroll more than one fingerprint in case of any injuries to your fingers. After the enrollment, the fingerprints are associated with the Windows password automatically.

3. Log in with your fingerprint.



#### Associate your fingerprints with UEFI BIOS passwords

You can associate your fingerprints with your power-on password and hard disk password. See “Associate your fingerprints with passwords (for selected models)” on page 30.

#### Maintenance tips:

- Do not scratch the surface of the reader with anything hard.
- Do not use or touch the reader with a wet, dirty, wrinkled, or injured finger.

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## Log in with your face ID (for selected models)

For models come with a webcam privacy shutter, slide the webcam privacy shutter to uncover the camera lens before using the Windows Hello face recognition.

Create your face ID and unlock your computer by scanning your face:

1. Type Sign-in options in the Windows search box and then press Enter.
2. Select the face ID setting and then follow the on-screen instruction to create your face ID.

---

## Protect data against power loss (for selected models)

NVMe (Non-Volatile Memory express) M.2 solid-state drive features the Lenovo-unique PLP (Power Loss Protection) function to avoid data loss or damage. If your computer is not responding and you might have to shut down your computer by pressing and holding the power button for several seconds. In this case, the PLP function enables your computer data to be saved timely. However, there is no guarantee that all data is saved in any situation. To check the type of your M.2 solid-state drive:

1. Restart the computer. When the logo screen is displayed, press F10 to enter the Lenovo diagnostics window.
2. On the TOOLS tab, select **SYSTEM INFORMATION** → **STORAGE** using the arrow keys.
3. Locate the **Device Type** section to check the information

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## UEFI BIOS passwords

You can set passwords in UEFI (Unified Extensible Firmware Interface) BIOS (Basic Input/Output System) to strengthen the security of your computer.

### Password types

You can set a power-on password, supervisor password, system management password, or NVMe password in UEFI BIOS to prevent unauthorized access to your computer. However, you are not prompted to enter any UEFI BIOS password when your computer resumes from sleep mode.

#### Power-on password

If you set a power-on password, a window is displayed on the screen when you turn on the computer. Enter the correct password to use the computer.

#### Supervisor password

The supervisor password protects the system information stored in UEFI BIOS. When entering the UEFI BIOS menu, enter the correct supervisor password in the window prompted. You also can press Enter to skip the password prompt. However, you cannot change most of the system configuration options in UEFI BIOS.

If you have set both the supervisor password and power-on password, you can use the supervisor password to access your computer when you turn it on. The supervisor password overrides the power-on password.

#### System management password

The system management password can also protect the system information stored in UEFI BIOS like a supervisor password, but it has lower authority by default. The system management password can be set through the UEFI BIOS menu or through Windows Management Instrumentation (WMI) with the Lenovo client-management interface.

You can enable the system management password to have the same authority as the supervisor password to control security-related features. To customize the authority of the system management password through the UEFI BIOS menu:

1. Restart the computer. When the logo screen is displayed, press F1 to enter the UEFI BIOS menu.
2. Select **Security → Password → System Management Password Access Control**.
3. Follow the on-screen instructions.

If you have set both the supervisor password and the system management password, the supervisor password overrides the system management password. If you have set both the system management password and the power-on password, the system management password overrides the power-on password.

### **NVMe passwords**

The NVMe password prevents unauthorized access to the data on the storage drive. When an NVMe password is set, you are prompted to type a correct password each time you try to access the storage drive.

- **Single Password**

When a Single NVMe password is set, the user must enter the user NVMe password to access files and applications on the storage drive.

- **Dual Password (User + Admin)**

The admin NVMe password is set and used by a system administrator. It enables the administrator to access any storage drive in a system or any computer connected in the same network. The administrator can also assign a user NVMe password for each computer in the network. The user of the computer can change the user NVMe password as desired, but only the administrator can remove the user NVMe password.

When prompted to enter an NVMe password, press F1 to switch between the admin NVMe password and user NVMe password.

**Notes:** The NVMe password is not available in the following situations:

- A Trusted Computing Group (TCG) Opal-compliant storage drive and a TCG Opal management software program are installed in the computer, and the TCG Opal management software program is activated.
- An eDrive storage drive is installed in the computer preinstalled with the Windows operating system.

## **Set, change, and remove a password**

Before you start, print these instructions.

1. Restart the computer. When the logo screen is displayed, press F1 to enter the UEFI BIOS menu.
2. Select **Security → Password** by using the arrow keys.
3. Select the password type. Then, follow the on-screen instructions to set, change, or remove a password.

You should record all your passwords and store them in a safe place. If you forget any of your passwords, any potential repair actions required are not covered under warranty.

### **What to do if you forget your power-on password**

If you forget your power-on password, do the following to remove the power-on password:

- If you have set a supervisor password and remember it:
  1. Restart the computer. When the logo screen is displayed, immediately press F1.
  2. Type the supervisor password to enter the UEFI BIOS menu.

3. Select **Security → Password → Power-On Password** by using the arrow keys.
  4. Type the current supervisor password in the **Enter Current Password** field. Then, leave the **Enter New Password** field blank, and press Enter twice.
  5. In the Changes have been saved window, press Enter.
  6. Press F10 to save changes and exit the UEFI BIOS menu.
- If you have not set a supervisor password, contact a Lenovo authorized service provider to have the power-on password removed.

### **What to do if you forget your NVMe password**

If you forget your NVMe password (Single password) or both user and admin NVMe passwords (Dual password), Lenovo cannot reset your passwords or recover data from the storage drive. You can contact a Lenovo authorized service provider to have the storage drive replaced. A fee will be charged for parts and service. If the storage drive is a CRU (Customer Replaceable Unit), you can also contact Lenovo to purchase a new storage drive to replace the old one by yourself. To check whether the storage drive is a CRU and the relevant replacement procedure, see Chapter 6 “CRU replacement” on page 37.

### **What to do if you forget your supervisor password**

If you forget your supervisor password, there is no service procedure to remove the password. You have to contact a Lenovo authorized service provider to have the system board replaced. A fee will be charged for parts and service.

### **What to do if you forget your system management password**

If you forget your system management password, do the following to remove the system management password:

- If you have set a supervisor password and remember it:
  1. Restart the computer. When the logo screen is displayed, immediately press F1.
  2. Type the supervisor password to enter the UEFI BIOS menu.
  3. Select **Security → Password → System Management Password** by using the arrow keys.
  4. Type the current supervisor password in the **Enter Current Password** field. Then, leave the **Enter New Password** field blank, and press Enter twice.
  5. In the Changes have been saved window, press Enter.
  6. Press F10 to save changes and exit the UEFI BIOS menu.
- If you have not set a supervisor password, contact a Lenovo authorized service provider to have the system management password removed.

## **Associate your fingerprints with passwords (for selected models)**

Do the following to associate your fingerprints with the power-on password and hard disk password:

1. Turn off and then turn on the computer.
2. When prompted, scan your finger on the fingerprint reader.
3. Enter your power-on password, NVMe password, or both as required. The association is established.

When you start the computer again, you can use your fingerprints to log in to the computer without entering your Windows password, power-on password, or hard disk password. To change settings, press F1 to enter the UEFI BIOS menu, and then select **Security → Fingerprint**.

**Attention:** If you always use your fingerprint to log in to the computer, you might forget your passwords. Write down your passwords, and keep them in a safe place.

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## Chapter 5. Configure advanced settings

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### UEFI BIOS

UEFI BIOS is the first program that the computer runs. When the computer turns on, UEFI BIOS performs a self test to make sure that various devices in the computer are functioning.

#### Enter the UEFI BIOS menu

Restart the computer. When the logo screen is displayed, press F1 to enter the UEFI BIOS menu.

#### Navigate in the UEFI BIOS interface

You can navigate in the UEFI BIOS interface by pressing the following keys:

- F1: General Help
- F9: Setup Defaults
- F10: Save and Exit
- F5 / F6: Change boot priority order
- ↑ ↓ or PgUp / PgDn: Select / Scroll page
- ← →: Move keyboard focus
- Esc: Back / Close dialog
- Enter: Select / Open submenu

#### Set the system date and time

1. Restart the computer. When the logo screen is displayed, press F1.
2. Select **Date/Time** and set the system date and time as desired.
3. Press F10 to save changes and exit.

#### Change the startup sequence

1. Restart the computer. When the logo screen is displayed, press F1.
2. Select **Startup → Boot**. Then, press Enter. The default device order list is displayed.

**Note:** No bootable device is displayed if the computer cannot start from any devices or the operating system cannot be found.

3. Set the startup sequence as desired.
4. Press F10 to save the changes and exit.

To change the startup sequence temporarily:

1. Restart the computer. When the logo screen is displayed, press F12.
2. Select the device that you want the computer to start from and press Enter.

#### Update UEFI BIOS

When you install a new program, device driver, or hardware component, you might need to update UEFI BIOS.

Download and install the latest UEFI BIOS update package by one of the following methods:

- Open the Vantage app to check the available update packages. If the latest UEFI BIOS update package is available, follow the on-screen instructions to download and install the package.
- Go to <https://pcsupport.lenovo.com> and select the entry for your computer. Then, follow the on-screen instructions to download and install the latest UEFI BIOS update package.

To know more about UEFI BIOS, visit Knowledge Base of your computer at <https://pcsupport.lenovo.com>.

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## RAID

Redundant Array of Independent Disks (RAID) is a technology that provides increased storage functions and reliability through redundancy. It also can improve data storage reliability and fault tolerance compared with single-drive storage systems. Data loss resulting from a drive failure can be prevented by reconstructing missing data from the remaining drives.

When a group of independent physical storage drives is set up to use RAID technology, they are in a RAID array. This array distributes data across multiple storage drives, but the array appears to the host computer as one single storage unit. Creating and using RAID arrays provides high performance, such as the expedited I/O performance, because several drives can be accessed simultaneously.

### Storage drive requirements for RAID levels

Your computer supports the following internal storage drives:

- M.2 Non-Volatile Memory Express (NVMe) solid-state drive

**Note:** Ensure that your computer has two identical storage drives installed (two M.2 NVMe solid-state drives with the same capacity) for supported RAID levels. If only one drive is installed, or two different types of drives are installed, the following information does not apply.

Your computer supports the following RAID levels:

- RAID 0: striped disk array (missing data resulting from a drive failure cannot be reconstructed)
  - Consist of two identical storage drives
  - Supported strip size: 4 KB, 8 KB, 16 KB, 32 KB, 64 KB, or 128 KB
  - Better performance without fault tolerance
  - Higher risk of data loss resulting from a member drive failure compared with non-RAID configuration
- RAID 1: mirrored disk array
  - Consist of two identical storage drives
  - Improved reading performance and 100% redundancy

### Enter the Intel RST configuration utility

1. Ensure that RAID is enabled in the UEFI BIOS menu:
  - a. Restart the computer. When the logo screen is displayed, press F1 to enter the UEFI BIOS menu.
  - b. Select **Config** → **Storage** → **VMD Controller** → **On** and then press Enter.
  - c. Press F10 to save changes and exit.
2. Restart the computer. When the logo screen is displayed, press F1 to enter the UEFI BIOS menu.
3. Select **Config** → **Storage** → **Intel (R) Rapid Storage Technology** and then press Enter.

The Intel (R) Rapid Storage Technology window opens and the following options are displayed:

- **Create RAID Volume:** Create a RAID volume. If no internal storage drives can be used, this option is not available.
  - **RAID Volumes:** Confirm the information of the created RAID volumes.
  - **Non-RAID Physical Disks:** Confirm the information of all non-RAID drives.
4. Press the up and down arrow keys to select an option. Press Enter to enter the menu for the selected option. Press Esc to exit the Intel RST configuration utility.

## Create RAID volumes

**Attention:** All the existing data stored on the selected drives will be erased while the RAID volume is being created.

1. Enter the Intel RST configuration utility.
2. Select **Create RAID Volume**, and then press Enter to open the CREATE RAID VOLUME window.
3. Select and configure the options one by one.
  - a. **Name:** Use the default name or type a preferred name for the RAID volume.
  - b. **RAID Level:** Press Enter to change the RAID between RAID 0 (Stripe) and RAID 1 (Mirror).
  - c. **Select Disks:** Select a drive and press Spacebar or Enter to add it into a group. The drive that cannot be used to create a RAID volume is not selectable. An **X** mark is displayed next to the selected drive.
  - d. **Strip Size:** Select a strip size and press Enter to complete the configuration. This option is only available for RAID 0.
  - e. **Capacity:** Customize the capacity of the RAID volume. The default RAID volume is the largest value.
  - f. **Create Volume:** Press Enter to finish configurations of the preceding options and create a volume.

**Note:** The **Create Volume** option might not be selectable for some reasons, for example, if different types of drives are selected, the option is not selectable. If it is not selectable, see the message displayed under **Create Volume** for reference.

After the RAID volume is created, the Intel (R) Rapid Storage Technology window is displayed, and the created volume is displayed under **RAID Volumes**.

4. Press F10 to save changes and exit.

## Delete RAID volumes

**Attention:** All the existing data stored on the selected drives will be erased after you delete RAID volumes.

1. Enter the Intel RST configuration utility.
2. Select the volume that you want to delete under **RAID Volumes**. Press Enter to open the RAID VOLUME INFO window.
3. Select **Delete** and press Enter to delete it from the **RAID Volumes** list.
4. When prompted, select **Yes** to confirm the deletion of the selected RAID volume.

After you delete the RAID volume, the Intel (R) Rapid Storage Technology window is displayed. Member drives of the deleted volume are displayed under **Non-RAID Physical Disks**.

5. Press F10 to save changes and exit.

## Reset storage drives to non-RAID

**Attention:** All the existing data stored on the selected drive will be erased after you reset it to non-RAID.

1. Enter the Intel RST configuration utility.

2. Select the volume that you want to reset under **RAID Volumes**. Press Enter to open the RAID VOLUME INFO window.
3. Select the drive that you want to reset under **RAID Member Disks**. Press Enter to open the PHYSICAL DISK INFO window.
4. Select **Reset to Non-RAID** and press Enter. When prompted, select **Yes** to confirm the reset action.  
After the reset process finishes, the Intel (R) Rapid Storage Technology window is displayed. The reset drive is listed under **Non-RAID Physical Disks**, and the volume of the reset drive is still listed under **RAID Volumes**. However, the status is changed from **Normal** to **Failed** or **Degraded**.
5. Press F10 to save changes and exit.

## Rebuild RAID 1 volumes

If the status of a RAID 1 volume is **Failed** or **Degraded**, you can rebuild it through the Intel RST configuration utility. To rebuild a RAID 1 volume, ensure that at least one member drive of the RAID 1 volume works correctly. Replace the failed storage drive with a new one that has the same capacity before you rebuild a RAID 1 volume.

1. Enter the Intel RST configuration utility.
2. Select the volume that you want to rebuild under **RAID Volumes**. Press Enter to open the RAID VOLUME INFO window.
3. Select **Rebuild** and press Enter to open the Rebuild Volume window.
4. Select the drive that you want to rebuild and press Enter to initiate the rebuild process.  
After you initiate the rebuild process, the Intel (R) Rapid Storage Technology window is displayed. The RAID 1 volume under rebuilding is displayed under **RAID Volumes** with a **Rebuilding** mark.
5. Wait a few minutes. When the rebuild process finishes successfully, the **Rebuilding** mark is changed to the **Normal** mark.
6. Press F10 to save changes and exit.

---

## Install a Windows operating system and drivers

This section provides instructions on installing a Windows operating system and device drivers.

### Install a Windows operating system

Microsoft constantly makes updates to the Windows operating system. Before installing a particular Windows version, check the compatibility list for the Windows version. For details, go to <https://support.lenovo.com/us/en/solutions/windows-support>.

#### Attention:

- It is recommended that you update your operating system through official channels. Any unofficial update might cause security risks.
  - The process of installing a new operating system deletes all the data on your internal storage drive, including the data stored in a hidden folder.
1. If you are using the Windows BitLocker® Drive Encryption feature and your computer has a Trusted Platform Module, ensure that you have disabled the feature.
  2. Ensure that the security chip is set to **Active**.
    - a. Restart the computer. When the logo screen is displayed, press F1 to enter the UEFI BIOS menu.
    - b. Select **Security** → **Security Chip** and press Enter. The **Security Chip** submenu opens.
    - c. Ensure that the security chip for TPM 2.0 is set to **Active**.



- d. Press F10 to save the settings and exit.
3. Connect the drive that contains the operating system installation program to the computer.
4. Restart the computer. When the logo screen is displayed, press F1 to enter the UEFI BIOS menu.
5. Select **Startup → Boot** to display the **Boot Priority Order** submenu.
6. Select the drive that contains the operating system installation program, for example, **USB HDD**. Then, press Esc.

**Attention:** After you change the startup sequence, ensure that you select the correct device during a copy, a save, or a format operation. If you select the wrong device, the data on that device might be erased or overwritten.

7. Select **Restart** and ensure that **OS Optimized Defaults** is enabled. Then, press F10 to save the settings and exit.
8. Follow the on-screen instructions to install the device drivers and necessary programs.
9. After installing the device drivers, apply Windows Update to get the latest updates, for example the security patches.

### **Install device drivers**

You should download the latest driver for a component when you notice poor performance from that component or when you added a component. This action might eliminate the driver as the potential cause of a problem. Download and install the latest driver by one of the following methods:

- Open the Vantage app to check the available update packages. Select the update packages you want, and then follow the on-screen instructions to download and install the packages.
- Go to <https://pcsupport.lenovo.com> and select the entry for your computer. Then, follow the on-screen instructions to download and install necessary drivers and software.



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## Chapter 6. CRU replacement

Customer Replaceable Units (CRUs) are parts that can be upgraded or replaced by the customer. The computers contain the following types of CRUs:

- **Self-service CRUs:** Refer to parts that can be installed or replaced easily by customer themselves or by trained service technicians at an additional cost.
- **Optional-service CRUs:** Refer to parts that can be installed or replaced by customers with a greater skill level. Trained service technicians can also provide service to install or replace the parts under the type of warranty designated for the customer's machine.

If you intend on installing a CRU, Lenovo will ship the CRU to you. CRU information and replacement instructions are shipped with your product and are available from Lenovo at any time upon request. You might be required to return the defective part that is replaced by the CRU. When return is required: (1) return instructions, a prepaid shipping label, and a container will be included with the replacement CRU; and (2) you might be charged for the replacement CRU if Lenovo does not receive the defective CRU within thirty (30) days of your receipt of the replacement CRU. For full details, see the Lenovo Limited Warranty documentation at [https://www.lenovo.com/warranty/llw\\_02](https://www.lenovo.com/warranty/llw_02).

---

### CRU list

The following is a list of CRUs of your computer.

#### Self-service CRUs

- ac power adapter
- Bottom door
- Nano-SIM-card tray \*
- Power cord
- Lenovo Pen Pro (for selected models of P15 Gen 2 and T15g Gen 2)

#### Optional-service CRUs

- Keyboard
- Memory module
- M.2 solid-state drive
- Service bracket

\* for selected models

**Note:** Replacement of any parts not listed above, including the built-in rechargeable battery, must be done by a Lenovo-authorized repair facility or technician. Go to <https://support.lenovo.com/partnerlocation> for more information.

---

### Disable Fast Startup and the built-in battery

Before replacing any CRU, ensure that you disable Fast Startup first and then disable the built-in battery.

To disable Fast Startup:

1. Go to **Control Panel** and view by Large icons or Small icons.

2. Click **Power Options**, and then click **Choose what the power buttons do** on the left pane.
3. Click **Change settings that are currently unavailable** at the top.
4. If prompted by User Account Control (UAC), click **Yes**.
5. Clear the **Turn on fast startup** check box, and then click **Save changes**.

To disable the built-in battery:

1. Restart your computer. When the logo screen is displayed, immediately press F1 to enter the UEFI BIOS menu.
2. Select **Config** → **Power**. The **Power** submenu is displayed.
3. Select **Disable Built-in Battery** and press Enter.
4. Select **Yes** in the Setup Confirmation window. The built-in battery is disabled and the computer turns off automatically. Wait three to five minutes to let the computer cool.

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## Replace a CRU

Follow the replacement procedure to replace a CRU.

### Bottom door

#### Prerequisite

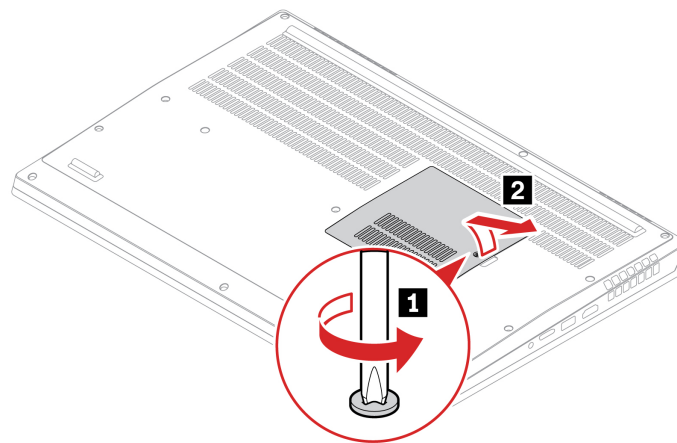
Before you start, read [Generic Safety and Compliance Notices](#) and print the following instructions.

**Note:** Do not remove the bottom door when your computer is connected to ac power. Otherwise, there might be a risk of short circuits.

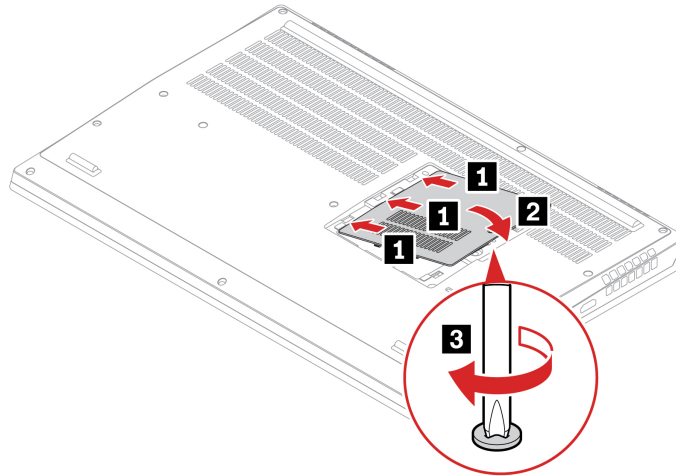
For access, do the following:

1. Disable the built-in battery. See “Disable Fast Startup and the built-in battery” on page 37.
2. Turn off the computer and disconnect the computer from ac power and all connected cables.
3. Close the computer display and turn over the computer.

#### Removal procedure



## Installation procedure



## Troubleshooting

If the computer does not start up after you reinstall the bottom door, disconnect the ac power adapter and then reconnect it to the computer.

## Keyboard

### Prerequisite

Before you start, read [Generic Safety and Compliance Notices](#) and print the following instructions.

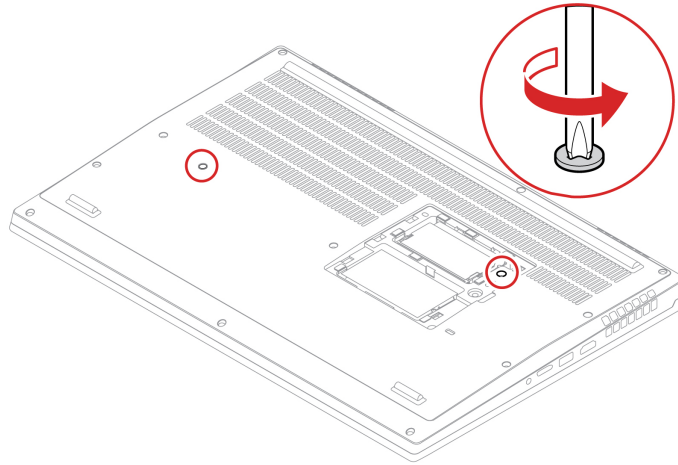
For access, do the following:

1. Disable the built-in battery. See “Disable Fast Startup and the built-in battery” on page 37.
2. Turn off the computer and disconnect the computer from ac power and all connected cables.
3. Remove the bottom door. See “Bottom door” on page 38.

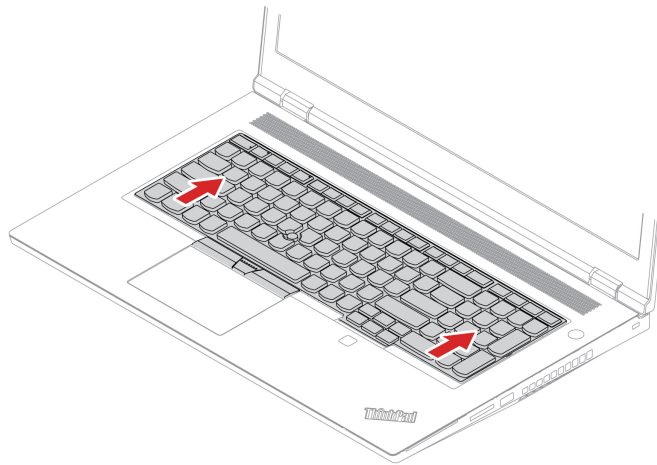
### Removal procedure

**Note:** You might be instructed to slide the keyboard frame forward or backward in some of the following steps. In this case, ensure that you do not press or hold the keys while sliding the keyboard frame. Otherwise, the keyboard frame cannot be moved.

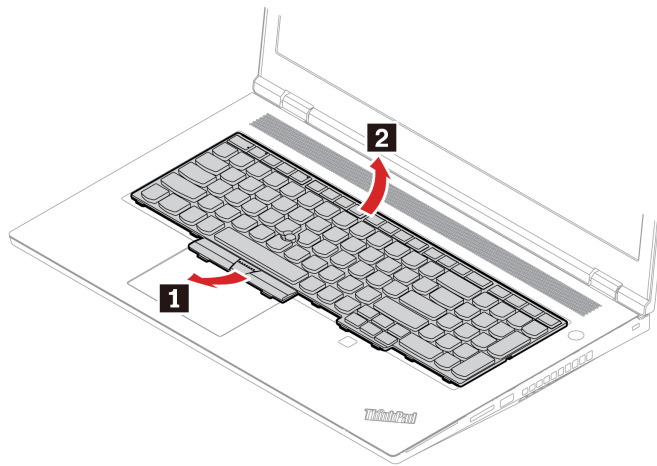
1. Loosen the screws that secure the keyboard.



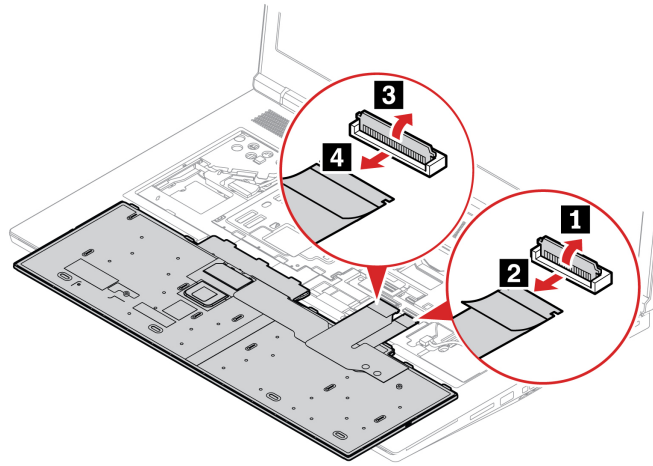
2. Push the keyboard in the direction as shown by arrows to release the latches from the keyboard bezel.



3. Pivot the keyboard slightly upward **1** and then turn the keyboard over **2**.



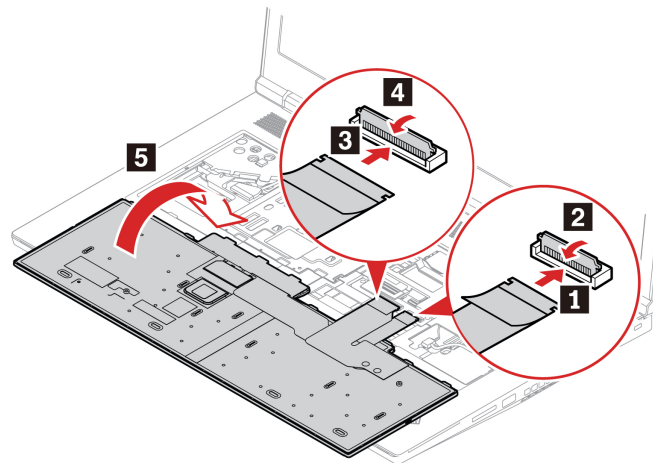
4. Put the keyboard on the palm rest as shown and detach the connectors. Then, remove the keyboard.



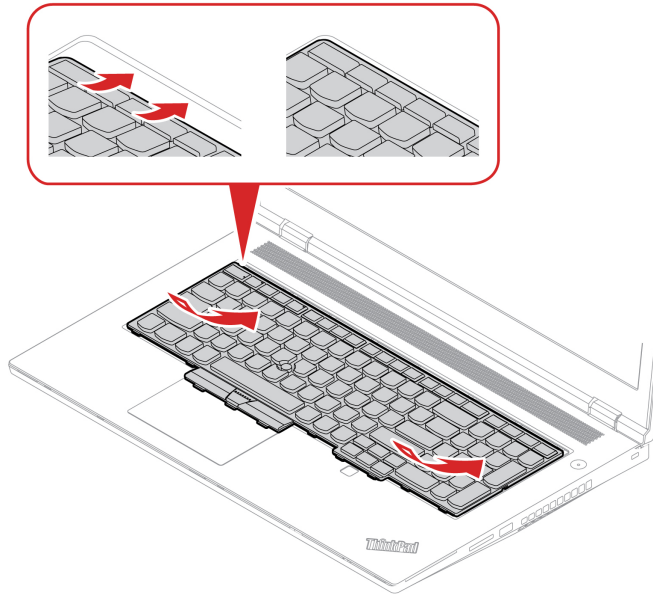
### Installation procedure

**Note:** You might be instructed to slide the keyboard frame forward or backward in some of the following steps. In this case, ensure that you do not press or hold the keys while sliding the keyboard frame. Otherwise, the keyboard frame cannot be moved.

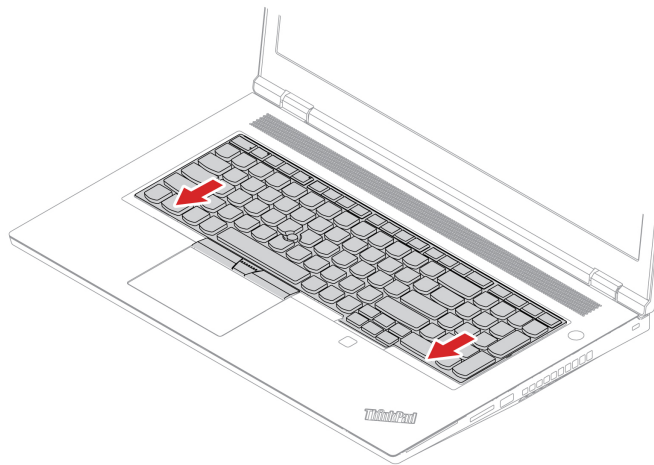
1. Attach the connectors and then turn the keyboard over.



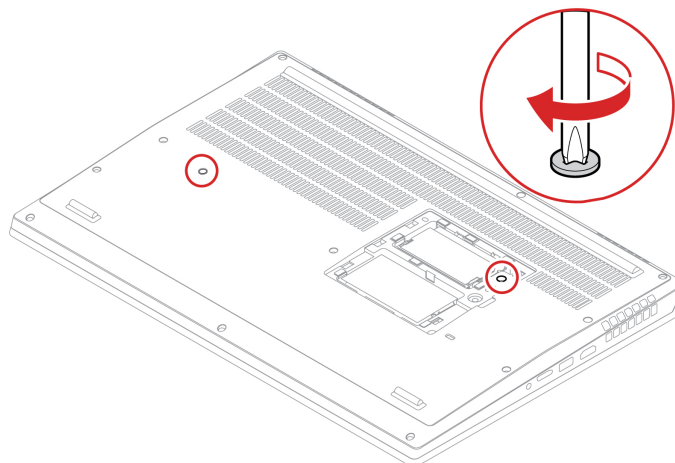
2. Insert the keyboard into the keyboard bezel as shown. Ensure that the top edge of the keyboard (the edge that is close to the display) is under the keyboard bezel.



3. Slide the keyboard in the direction as shown. Ensure that the latches are secured under the keyboard frame.



4. Turn the computer over and tighten the screws to secure the keyboard.





5. Connect the ac power adapter and all disconnected cables to the computer.

## Service bracket

### Prerequisite

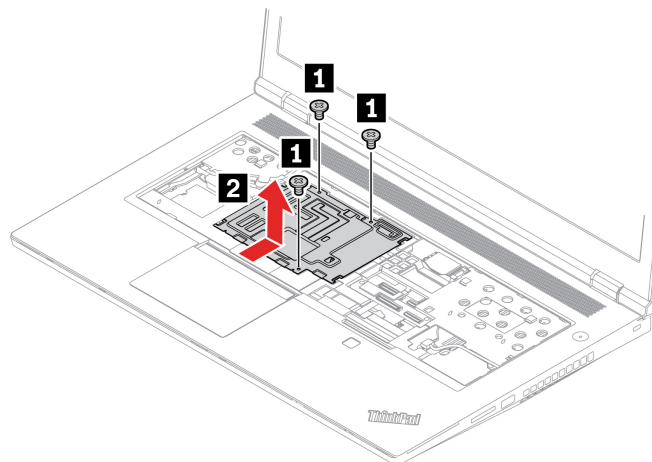
Before you start, read [Generic Safety and Compliance Notices](#) and print the following instructions.

**Attention:** Do not touch the contact edge of the memory module. Otherwise, the memory module might get damaged.

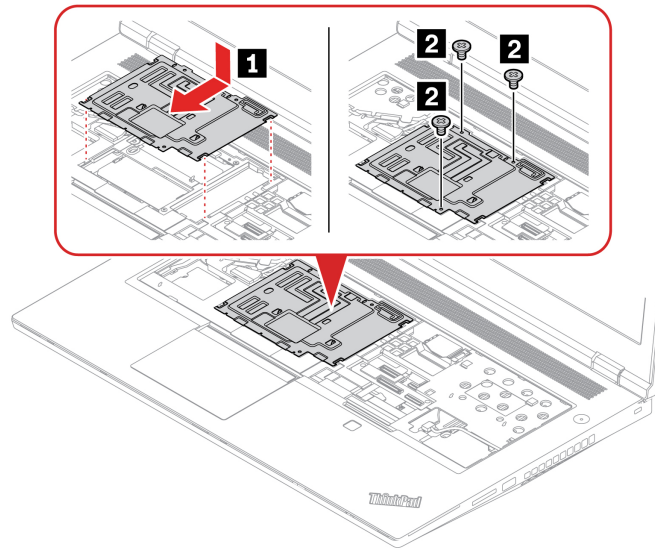
For access, do the following:

1. Disable the built-in battery. See “Disable Fast Startup and the built-in battery” on page 37.
2. Turn off the computer and disconnect the computer from ac power and all connected cables.
3. Close the computer display and turn the computer over.
4. Remove the bottom door. See “Bottom door” on page 38.
5. Remove the keyboard. See “Keyboard” on page 39.

### Removal procedure



## Installation procedure



## M.2 solid-state drive

### Prerequisite

Before you start, read [Generic Safety and Compliance Notices](#) and print the following instructions.

**Attention:** If you replace a M.2 solid-state drive, you might need to install a new operating system. For details on how to install a new operating system, see “Install a Windows operating system and drivers” on page 34.

The M.2 solid-state drive is sensitive. Inappropriate handling might cause damage and permanent loss of data.

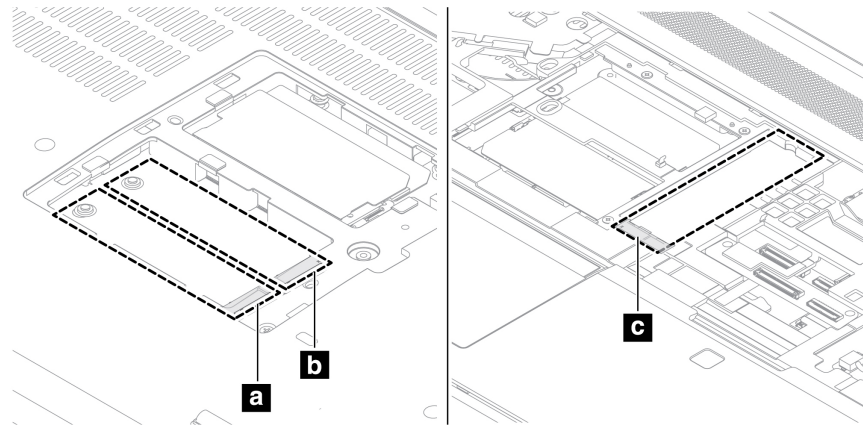
When handling the M.2 solid-state drive, observe the following guidelines:

- Replace the M.2 solid-state drive only for upgrade or repair. The M.2 solid-state drive is not designed for frequent changes or replacement.
- Before replacing the M.2 solid-state drive, make a backup copy of all the data that you want to keep.
- Do not apply pressure to the M.2 solid-state drive.
- Do not touch the contact edge or circuit board of the M.2 solid-state drive. Otherwise, the M.2 solid-state drive might get damaged.
- Do not make the M.2 solid-state drive subject to physical shocks or vibration. Put the M.2 solid-state drive on a soft material, such as cloth, to absorb physical shocks.

Your computer comes with three M.2-solid-state-drive slots in total. Slot **a** and slot **b** are under the bottom door, and slot **c** is under the keyboard. When you configure the M.2-solid-state-drive slot in the UEFI BIOS menu, ensure that you select the correct menu item.

- Slot **a**: NVMe1
- Slot **b**: NVMe2
- Slot **c**: NVMe0

**Note:** For better performance, when you install a Gen-4 M.2 solid-state drive, ensure that you install it in slot **c**.

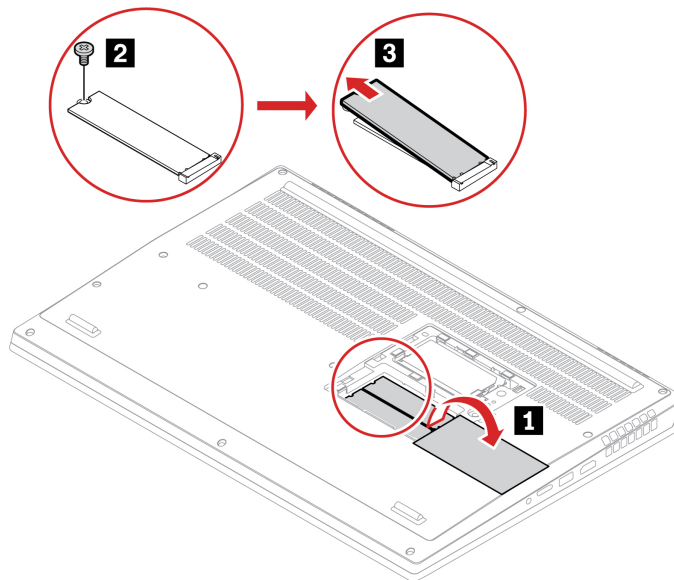


### M.2 solid-state drive under the bottom door

For access, do the following:

1. Disable the built-in battery. See “Disable Fast Startup and the built-in battery” on page 37.
2. Turn off the computer and disconnect the computer from ac power and all connected cables.
3. Close the computer display and turn the computer over.
4. Remove the bottom door. See “Bottom door” on page 38.

### Removal procedure

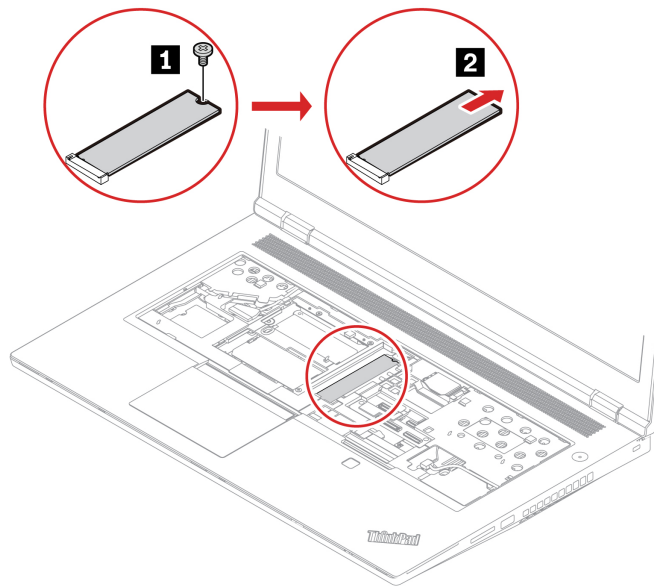


## M.2 solid-state drive under the keyboard

For access, do the following:

1. Disable the built-in battery. See “Disable Fast Startup and the built-in battery” on page 37.
2. Turn off the computer and disconnect the computer from ac power and all connected cables.
3. Close the computer display and turn the computer over.
4. Remove the bottom door. See “Bottom door” on page 38.
5. Remove the keyboard. See “Keyboard” on page 39.
6. Remove the service bracket. See “Service bracket” on page 43.

### Removal procedure



## Memory module

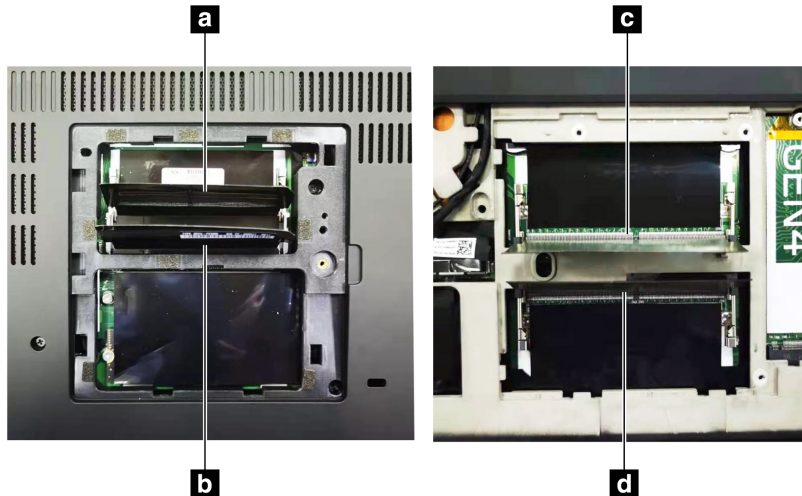
### Prerequisite

Before you start, read [Generic Safety and Compliance Notices](#) and print the following instructions.

**Attention:** Do not touch the contact edge of the memory module. Otherwise, the memory module might get damaged.

## Important notice about memory module installation

Your computer comes with four memory module slots, and supports up to 128 GB memory module in total. Slot **a** and slot **b** are under the bottom door, and slot **c** and slot **d** are under the keyboard. When installing or replacing a memory module, use the following guidelines for better performance:



**Important:** It is recommended that you follow below installation rules. Otherwise, the computer might either not start or not perform well.

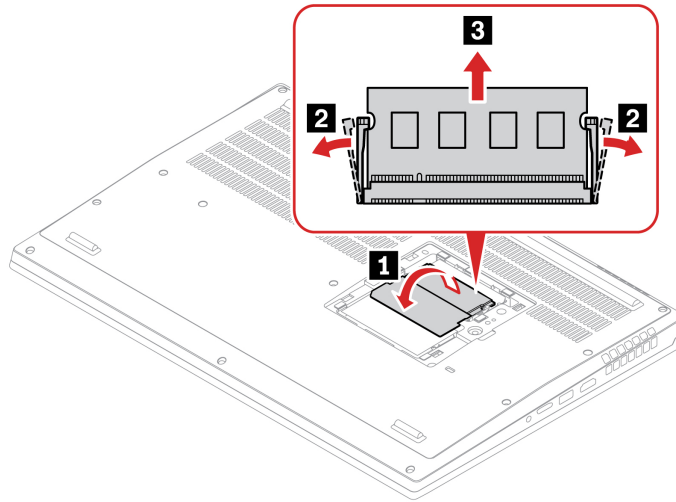
- To install one or two memory modules in total, install it/them in the slots under the bottom cover. Do not install it/them in the slots under the keyboard.
- To install three or four memory modules in total, install two memory modules in the slots under the bottom cover first. Then install the third and fourth memory modules in the slots under the keyboard.
- Your computer supports up to 128 GB memory module in total, and it is recommended that you use memory modules with the same capacity and speed for best dual-channel memory performance.
- Replace only with a memory module of the type recommended by Lenovo.

### Memory module under the bottom door

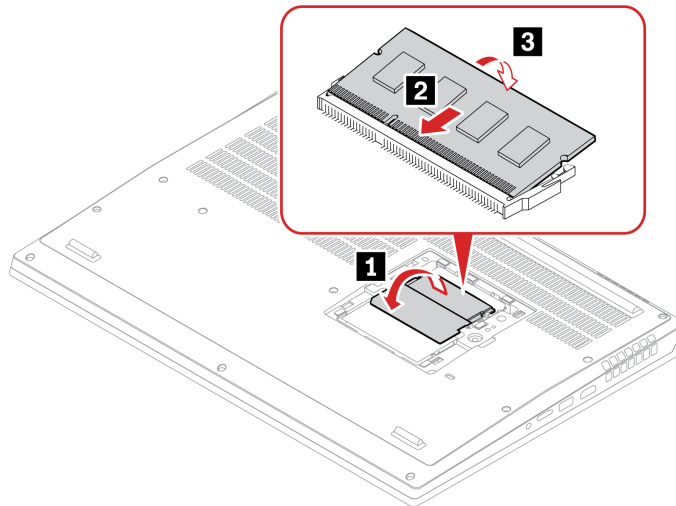
For access, do the following:

1. Disable the built-in battery. See “Disable Fast Startup and the built-in battery” on page 37.
2. Turn off the computer and disconnect the computer from ac power and all connected cables.
3. Close the computer display and turn the computer over.
4. Remove the bottom door. See “Bottom door” on page 38.

## Removal procedure



## Installation procedure

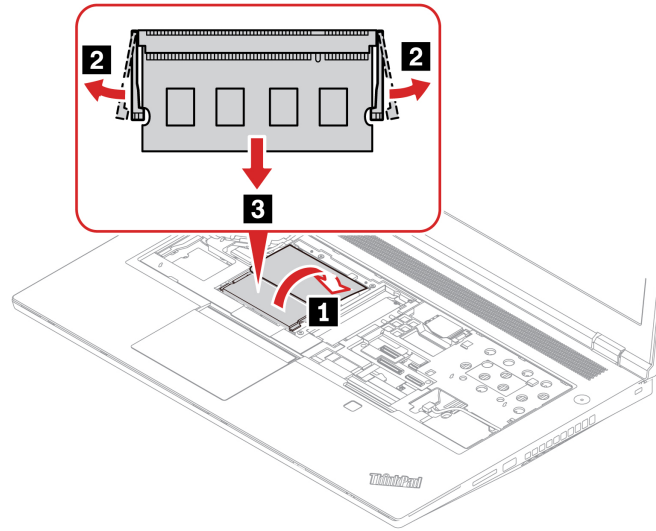


## Memory module under the keyboard

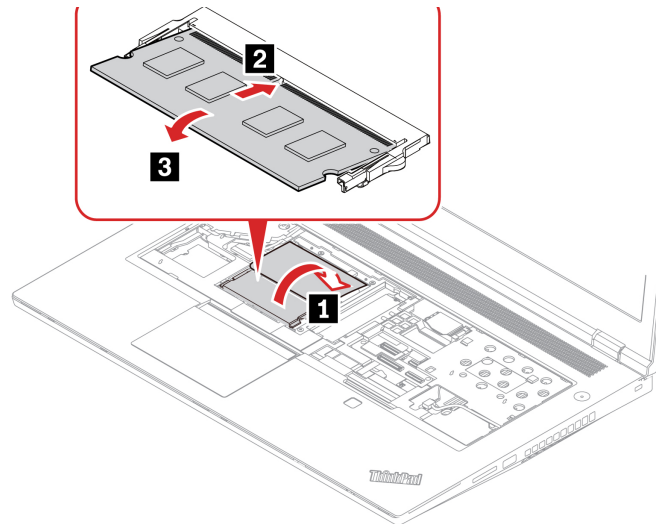
For access, do the following:

1. Disable the built-in battery. See “Disable Fast Startup and the built-in battery” on page 37.
2. Turn off the computer and disconnect the computer from ac power and all connected cables.
3. Close the computer display and turn the computer over.
4. Remove the bottom door. See “Bottom door” on page 38.
5. Remove the keyboard. See “Keyboard” on page 39.
6. Remove the service bracket. See “Service bracket” on page 43.

## Removal procedure



## Installation procedure








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## Chapter 7. Help and support

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### Frequently asked questions

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How do I access <b>Control Panel</b> ?	Type Control Panel in the Windows search box and then press Enter.
How do I turn off my computer?	Open the <b>Start</b> menu and click  <b>Power</b> . Then, click <b>Shut down</b> .
How do I partition my storage drive?	<a href="https://support.lenovo.com/solutions/ht503851">https://support.lenovo.com/solutions/ht503851</a>
What do I do if my computer stops responding.	<ol style="list-style-type: none"><li>1. Press and hold the power button until the computer turns off. Then, restart the computer.</li><li>2. If step 1 does not work:<ul style="list-style-type: none"><li>• For models with an emergency reset hole: Insert a straightened paper clip into the emergency reset hole to cut off power supply temporarily. Then, restart the computer with ac power connected.</li><li>• For models without an emergency reset hole:<ul style="list-style-type: none"><li>– For models with the removable battery, remove the removable battery and disconnect all power sources. Then, reconnect to ac power and restart the computer.</li><li>– For models with the built-in battery, disconnect all power sources. Press and hold the power button for about seven seconds. Then, reconnect to ac power and restart the computer.</li></ul></li></ul></li></ol>
What do I do if I spill liquid on the computer?	<ol style="list-style-type: none"><li>1. Carefully unplug the ac power adapter and turn off the computer immediately. The more quickly you stop the current from passing through the computer the more likely you will reduce damage from short circuits. <b>Attention:</b> Although you might lose some data or work by turning off the computer immediately, leaving the computer on might make your computer unusable.</li><li>2. Do not try to drain out the liquid by turning over the computer. If your computer has keyboard drainage holes on the bottom, the liquid will be drained out through the holes.</li><li>3. Wait until you are certain that all the liquid is dry before turning on your computer.</li></ol>
How do I enter the UEFI BIOS menu?	Restart the computer. When the logo screen is displayed, press F1 to enter the UEFI BIOS menu.
Where can I get the latest device drivers and UEFI BIOS?	<ul style="list-style-type: none"><li>• From the Vantage app. See “Install a Windows operating system and drivers” on page 34 and “Update UEFI BIOS” on page 31.</li><li>• Download from Lenovo Support Web site at <a href="https://pcsupport.lenovo.com">https://pcsupport.lenovo.com</a>.</li></ul>

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## Error messages

If you see a message that is not included in the following table, record the error message first, then shut down the computer and call Lenovo for help. See “Lenovo Customer Support Center” on page 56.

Message	Solution
0190: Critical low-battery error	The computer turned off because the battery power is low. Connect the ac power adapter to the computer and charge the batteries.
0191: System Security - Invalid remote change requested	The system configuration change has failed. Confirm the operation and try again.
0199: System Security - Security password retry count exceeded.	This message is displayed when you enter a wrong supervisor password more than three times. Confirm the supervisor password and try again.
0271: Check Date and Time settings.	The date or the time is not set in the computer. Enter the UEFI BIOS menu and set the date and time.
210x/211x: Detection/Read error on HDDx/SSDx	The storage drive is not working. Reinstall the storage drive. If the problem still exists, replace the storage drive.
Error: The non-volatile system UEFI variable storage is nearly full.	<p><b>Note:</b> This error indicates that the operating system or programs cannot create, modify, or delete data in the non-volatile system UEFI variable storage due to insufficient storage space after POST.</p> <p>The non-volatile system UEFI variable storage is used by the UEFI BIOS and by the operating system or programs. This error occurs when the operating system or programs store large amounts of data in the variable storage. All data needed for POST, such as UEFI BIOS setup settings, chipset, or platform configuration data, are stored in a separate UEFI variable storage. Press F1 after the error message is displayed to enter the UEFI BIOS menu. A dialog asks for confirmation to clean up the storage. If you select “Yes”, all data that were created by the operating system or programs will be deleted except global variables defined by the Unified Extensible Firmware Interface Specification. If you select “No”, all data will be kept, but the operating system or programs will not be able to create, modify, or delete data in the storage.</p> <p>If this error happens at a service center, Lenovo authorized service personnel will clean up the non-volatile system UEFI variable storage using the preceding solution.</p>
Fan error. Press ESC to startup with limited performance.	The thermal fan might not work correctly. After the error message is displayed, press ESC within five seconds to start up the computer with limited performance. Otherwise, the computer will shut down immediately. If the problem still exists when you starts up next time, have your computer serviced.

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## Beep errors

Lenovo SmartBeep technology enables you to decode beep errors with your smartphone when a black screen occurs with beeps from your computer. To decode the beep error with Lenovo SmartBeep technology:

1. Go to <https://support.lenovo.com/smartbeep> or scan the following QR Code.



2. Download the proper diagnostic app and install it on your smartphone.
3. Run the diagnostic app and place the smartphone near the computer.
4. Press Fn on your computer to emit the beep again. The diagnostic app decodes the beep error and shows possible solutions on the smartphone.

**Note:** Do not attempt to service a product yourself unless instructed to do so by the Customer Support Center or product documentation. Only use a Lenovo-authorized service provider to repair your product.

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## Self-help resources

Use the following self-help resources to learn more about the computer and troubleshoot problems.

Resources	How to access?
Troubleshooting and FAQ	<ul style="list-style-type: none"><li>• <a href="https://www.lenovo.com/tips">https://www.lenovo.com/tips</a></li><li>• <a href="https://forums.lenovo.com">https://forums.lenovo.com</a></li></ul>
Accessibility information	<a href="https://www.lenovo.com/accessibility">https://www.lenovo.com/accessibility</a>
Reset or restore Windows	<ul style="list-style-type: none"><li>• Use Lenovo recovery options.<ol style="list-style-type: none"><li>1. Go to <a href="https://support.lenovo.com/HowToCreateLenovoRecovery">https://support.lenovo.com/HowToCreateLenovoRecovery</a>.</li><li>2. Follow the on-screen instructions.</li></ol></li><li>• Use Windows recovery options.<ol style="list-style-type: none"><li>1. Go to <a href="https://pcsupport.lenovo.com">https://pcsupport.lenovo.com</a>.</li><li>2. Detect your computer or manually select your computer model.</li><li>3. Click <b>Diagnostics → Operating System Diagnostics</b> and then follow the on-screen instructions.</li></ol></li></ul>
Use the Vantage app to: <ul style="list-style-type: none"><li>• Configure device settings.</li><li>• Download and install UEFI BIOS, drivers, and firmware updates.</li><li>• Secure your computer from outside threats.</li><li>• Diagnose hardware problems.</li><li>• Check the computer warranty status.</li><li>• Access <i>User Guide</i> and helpful articles.</li></ul>	Type Vantage in the Windows search box and then press Enter.
<b>Note:</b> The available features vary depending on the computer model.	
Product documentation: <ul style="list-style-type: none"><li>• <i>Safety and Warranty Guide</i></li><li>• <i>Generic Safety and Compliance Notices</i></li><li>• <i>Setup Guide</i></li><li>• <i>This User Guide</i></li><li>• <i>Regulatory Notice</i></li></ul>	Go to <a href="https://pcsupport.lenovo.com">https://pcsupport.lenovo.com</a> . Then, follow the on-screen instructions to filter out the documentation you want.

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Resources	How to access?
<p>Lenovo Support Web site with the latest support information of the following:</p> <ul style="list-style-type: none"> <li>• Drivers and software</li> <li>• Diagnostic solutions</li> <li>• Product and service warranty</li> <li>• Product and parts details</li> <li>• Knowledge base and frequently asked questions</li> </ul>	<p><a href="https://pcsupport.lenovo.com">https://pcsupport.lenovo.com</a></p>
<p>Windows help information</p>	<ul style="list-style-type: none"> <li>• Open the Start menu and click <b>Get Help or Tips</b>.</li> <li>• Use Windows Search or the Cortana® personal assistant.</li> <li>• Microsoft support Web site: <a href="https://support.microsoft.com">https://support.microsoft.com</a></li> </ul>

## Windows label

Your computer might have a Windows Genuine Microsoft label affixed to its cover depending on the following factors:

- Your geographic location
- Edition of Windows that is preinstalled

Go to <https://www.microsoft.com/en-us/howtotell/Hardware.aspx> for illustrations of the various types of Genuine Microsoft labels.

- In the People's Republic of China, the Genuine Microsoft label is required on all computer models preinstalled with any edition of the Windows operating system.
- In other countries and regions, the Genuine Microsoft label is required only on computer models licensed for Windows Pro editions.

The absence of a Genuine Microsoft label does not indicate that the preinstalled Windows version is not genuine. For details on how to tell whether your preinstalled Windows product is genuine, refer to the information provided by Microsoft at <https://www.microsoft.com/en-us/howtotell/default.aspx>.

There are no external, visual indicators of the Product ID or Windows version for which the computer is licensed. Instead, the Product ID is recorded in the computer firmware. Whenever a Windows product is installed, the installation program checks the computer firmware for a valid, matching Product ID to complete the activation.

In some cases, an earlier Windows version might be preinstalled under the terms of the Windows Pro edition license downgrade rights.

## Call Lenovo

If you have tried to correct the problem yourself and still need help, you can call Lenovo Customer Support Center.

## Before you contact Lenovo

Prepare the following before you contact Lenovo:

1. Record the problem symptoms and details:

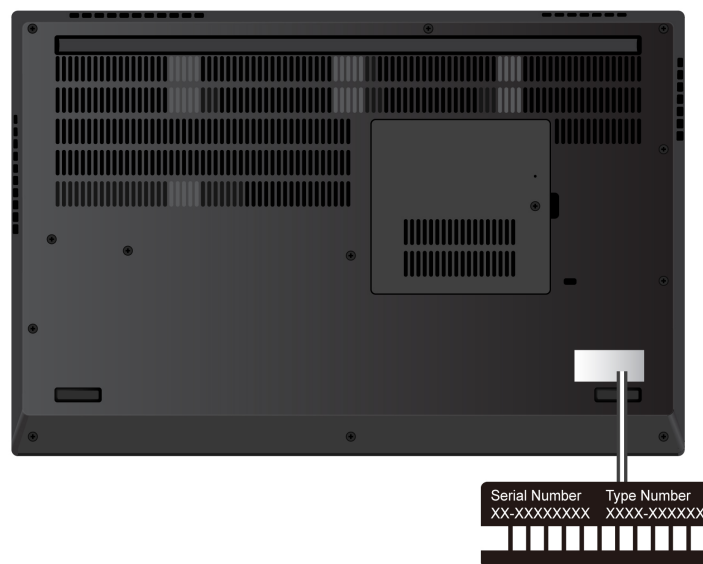
- What is the problem? Is it continuous or intermittent?
- Any error message or error code?
- What operating system are you using? Which version?
- Which software applications were running at the time of the problem?
- Can the problem be reproduced? If so, how?

2. Record the system information:

- Product name
- Machine type and serial number

The following illustration shows where to find the machine type and serial number of your computer.

**Note:** Depending on the model, your computer might look different from the following illustration.



## Lenovo Customer Support Center

During the warranty period, you can call Lenovo Customer Support Center for help.

### Telephone numbers

For a list of the Lenovo Support phone numbers for your country or region, go to <https://pcsupport.lenovo.com/supportphonenumberlist> for the latest phone numbers.

**Note:** Phone numbers are subject to change without notice. If the number for your country or region is not provided, contact your Lenovo reseller or Lenovo marketing representative.

### Services available during the warranty period

- Problem determination - Trained personnel are available to assist you with determining if you have a hardware problem and deciding what action is necessary to fix the problem.
- Lenovo hardware repair - If the problem is determined to be caused by Lenovo hardware under warranty, trained service personnel are available to provide the applicable level of service.
- Engineering change management - Occasionally, there might be changes that are required after a product has been sold. Lenovo or your reseller, if authorized by Lenovo, will make selected Engineering Changes (ECs) that apply to your hardware available.

### **Services not covered**

- Replacement or use of parts not manufactured for or by Lenovo or nonwarranted parts
- Identification of software problem sources
- Configuration of UEFI BIOS as part of an installation or upgrade
- Changes, modifications, or upgrades to device drivers
- Installation and maintenance of network operating systems (NOS)
- Installation and maintenance of programs

For the terms and conditions of the Lenovo Limited Warranty that apply to your Lenovo hardware product, go to:

- [https://www.lenovo.com/warranty/llw\\_02](https://www.lenovo.com/warranty/llw_02)
- <https://pcsupport.lenovo.com/warrantylookup>

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### **Purchase additional services**

During and after the warranty period, you can purchase additional services from Lenovo at <https://pcsupport.lenovo.com/warrantyupgrade>.

Service availability and service name might vary by country or region.





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## Appendix A. Compliance information

For compliance information, refer to *Regulatory Notice* at <https://pcsupport.lenovo.com> and *Generic Safety and Compliance Notices* at [https://pcsupport.lenovo.com/docs/generic\\_notices](https://pcsupport.lenovo.com/docs/generic_notices).

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### Certification-related information

Product name	Compliance ID	Machine type(s)
ThinkPad P15 Gen 2	<ul style="list-style-type: none"><li>• TP00124C</li><li>• TP00124C0<sup>1</sup></li><li>• TP00124C1<sup>1</sup></li><li>• TP00124C2<sup>1</sup></li></ul>	20YQ and 20YR
ThinkPad T15g Gen 2	<ul style="list-style-type: none"><li>• TP00124C</li><li>• TP00124C0<sup>1</sup></li><li>• TP00124C2<sup>1</sup></li></ul>	20YS and 20YT
ThinkPad P17 Gen 2	<ul style="list-style-type: none"><li>• TP00125C</li><li>• TP00125C0<sup>1</sup></li></ul>	20YU and 20YV

<sup>1</sup> for India only

Further compliance information related to your product is available at <https://www.lenovo.com/compliance>.

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### Locate the UltraConnect wireless antennas

Your computer has an UltraConnect™ wireless antenna system. You can enable wireless communication wherever you are.

The following illustration shows the antenna locations on your computer:

### P15 Gen 2 / T15g Gen 2



- 1** Wireless LAN antenna (auxiliary)
- 2** Wireless WAN antenna (main, for selected models)
- 3** Wireless WAN antenna (auxiliary, for selected models)
- 4** Wireless LAN antenna (main)
- 5** 4x4 MIMO Wireless-WAN antenna (Main, for selected models)
- 6** 4x4 MIMO Wireless-WAN antenna (Auxiliary, for selected models)

## P17 Gen 2



- 1** Wireless LAN antenna (main)
- 2** Wireless WAN antenna (main, for selected models)
- 3** Wireless WAN antenna (auxiliary, for selected models)
- 4** Wireless LAN antenna (auxiliary)
- 5** 4x4 MIMO Wireless-WAN antenna (Main, for selected models)
- 6** 4x4 MIMO Wireless-WAN antenna (Auxiliary, for selected models)

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## Operating environment

### Maximum altitude (without pressurization)

3048 m (10 000 ft)

### Temperature

- Operating: 5°C to 35°C (41°F to 95°F)
- Storage and transportation in original shipping packaging: -20°C to 60°C (-4°F to 140°F)
- Storage without packaging: 5°C to 43°C (41°F to 109°F)

**Note:** When you charge the battery, its temperature must be no lower than 10°C (50°F).

**Relative humidity**

- Operating: 8% to 95% at wet-bulb temperature 23°C (73°F)
- Storage and transportation: 5% to 95% at wet-bulb temperature 27°C (81°F)

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## Appendix B. Notices and trademarks

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