

How to overclock Raspberry Pi 4

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Overclocking the CPU and GPU can often deliver noticeable performance boost, especially useful if you perform resource-intensive tasks, such as gaming, streaming high-resolution media content or using it. Raspberry Pi is a mini laptop.

1. 26 awesome apps from the tiny Raspberry Pi computer

Everything you need to know about overclocking

Overclocking means that the CPU and memory settings run at speeds above their official clock speed.

Despite the performance benefits, many people avoid overclocking for fear of voiding the warranty. Unlike some organizations, the Raspberry Pi Foundation supports overclocking, so you can follow this guide without having to worry about warranty issues. However, you should also carefully review the Raspberry Pi Foundation's guidelines to make sure you don't accidentally void the warranty!

Things to prepare

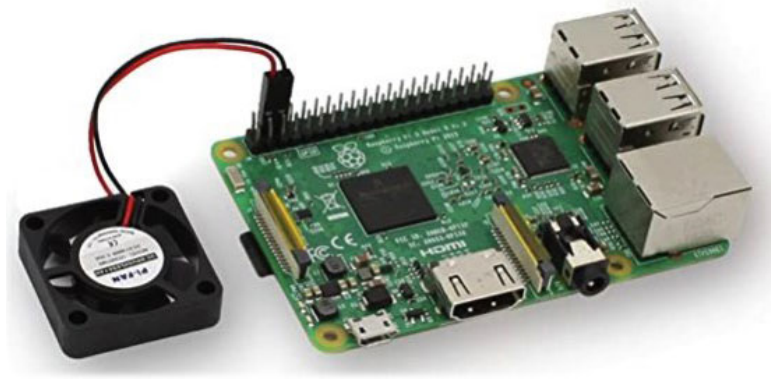
To complete this tutorial, you will need:

1. Raspberry Pi 4
2. Keyboard and how to attach this keyboard to a Raspberry Pi
3. Screen
4. Micro HDMI cable
5. SD card is compatible with Raspberry Pi model. You'll wipe this SD card, so make sure it doesn't contain anything you want to keep.
6. A good quality power supply. If you are going to overclock a Raspberry Pi, then you should choose the official Raspberry Pi Universal Power Supply. By using official power, you can be confident that your Raspberry Pi has enough power to run at overclocking speed.



You should choose the official Raspberry Pi Universal Power Supply

1. A way to cool the Raspberry Pi. When the processor is working 'heavier', it gets hotter. Without reducing the heat generated by the Raspberry Pi, you will not benefit from overclocking. There are many different options for cooling your Raspberry Pi, including a heatsink, stand-alone fan or fan case, or you may even want to venture out and create your own water cooling setup!

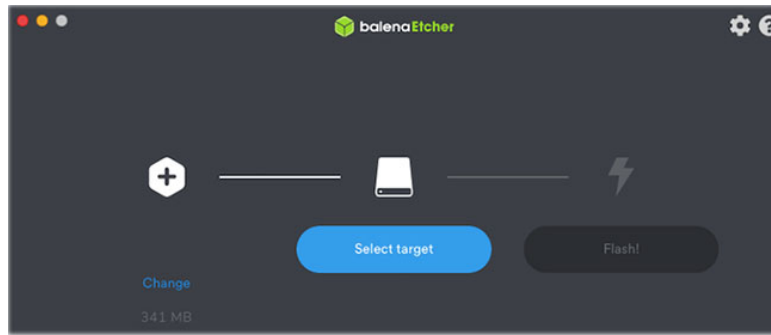


Raspberry Pi cooling device

Install the official Raspberry Pi operating system

For the purpose of this tutorial, we will write the Raspbian operating system to the SD card, using Etcher. If you don't have Etcher installed, you can download it for free from Balena's website.

1. Visit the Raspbian website and download the latest version.
2. Insert an SD card into a laptop or computer.
3. Launch the Etcher application.
4. In Etcher, click **Select image** and then select the Raspbian system image you have just downloaded.



Select the Raspbian system image you have just downloaded

1. Click **Select target** and select the **target** boot media, in this case SD card.

Now, Etcher will flash the Raspbian system image to the SD card.

Boot into Raspbian

When Raspbian is installed:

1. Remove the SD card from the computer and insert the card into the Raspberry Pi.
2. Attach the monitor to the Raspberry Pi with the micro HDMI cable.
3. Attach the keyboard to the Raspberry Pi device.
4. Plug the Raspberry Pi into a power source.
5. Raspbian will now start automatically.

Consider updating to the latest release

If you want to experience the best overclocking capabilities, then you'll need to upgrade Raspbian to the latest experimental firmware build. Note that test releases are likely to contain bugs, errors, and many other issues, so you should not use them in production environments.

Reference: [How to update your Raspberry Pi to the latest Raspbian operating system to learn how.](#)

Benchmark Raspberry Pi

Before you overclock your device, you might want to record some information about your device's current performance for later comparisons!

There are many benchmarking tools on the market, but the article will use **Sysbench**.

Alternatively, you can skip this step completely and move straight to overclocking.

In the Raspbian toolbar, select the Terminal icon. Enter the following command in Terminal:

```
sudo apt-get install sysbench
```

Once Sysbench is installed, you can get basic information about the Raspberry Pi's performance, by entering the following command in Terminal:

```
sysbench --test=cpu --cpu-max-prime=2000 --num-threads=4 run > pre-benchmark.txt
```

This command will create a '**pre-benchmark**' text file containing information about the current performance of the Raspberry Pi.

CPU overclocking

When overclocking the CPU, you will increase the clock speed of the central processor, helping to increase performance. Most of the workload on the Raspberry Pi is affected by the clock speed instead of the graphics processing unit. After overclocking your CPU, you'll experience noticeable performance improvements, no matter how you use your Raspberry Pi.

To edit the config.txt file of the Raspberry Pi, run the following Terminal command:

```
sudo nano /boot/config.txt
```

Now, the **config.txt** file will open in Raspbian's Nano text editor with root privileges.

You can overclock the CPU by making some changes to these core configuration settings:

1. Scroll to the bottom of the file and find the section marked **[pi4]**.
2. On a new line immediately below **[pi4]** , add the following information:

```
over_voltage=2arm_freq=1750
```

Alternatively, if you have the latest test software installed, you can try these values ??instead:

```
over_voltage=6arm_freq=2147
```

3. Save changes with **Ctrl + O** and exit the file with the shortcut **Ctrl + X**

You need to restart the Raspberry Pi 4 before these new configuration settings are loaded, so run the following command in the Terminal window:

```
sudo reboot
```

If the overclocking is successful, then Raspbian will start using the new configuration settings.

Check the result!

If you've taken the time to create a report before overclocking, now is the time to create a second report and compare the results.

Launch a Terminal window by clicking the small icon on the toolbar, then run the following command:

```
sysbench --test=cpu --cpu-max-prime=2000 --num-threads=4 run > post-benchmark.txt
```

This will create a **'post-benchmark' report**. To view the reports, select the file icon in the Raspbian toolbar and open the **'pre-benchmark'** and **'post-benchmark' files**. You can now compare these reports to see exactly how much CPU increase has been achieved!

Overclock the GPU

Now, let's switch to GPU:

1. Open Terminal and run the following command:

```
sudo nano /boot/config.txt
```

2. Scroll to the **[pi4]** section and add the following to the new line:

```
gpu_freq=600
```

If you have the latest test firmware, you can try increasing this number to **750**.

```
gpu_freq=750
```

3. If you overclock both CPU and GPU, look for the line `over_voltage=2` and change it to:

```
over_voltage=6
```

4. Save changes using the shortcut `Ctrl + O` and exit the Nano application with the shortcut `Ctrl + X`

Now, all you need to do is restart the Raspberry Pi and the changes will take effect!

You finished reading the article "**How to overclock Raspberry Pi 4**" edited by the [TipsMake](#) team. We hope this article has provided you with many useful tech tips and tricks. You can search for similar articles on tips and guides. Thank you for reading and for following us regularly.