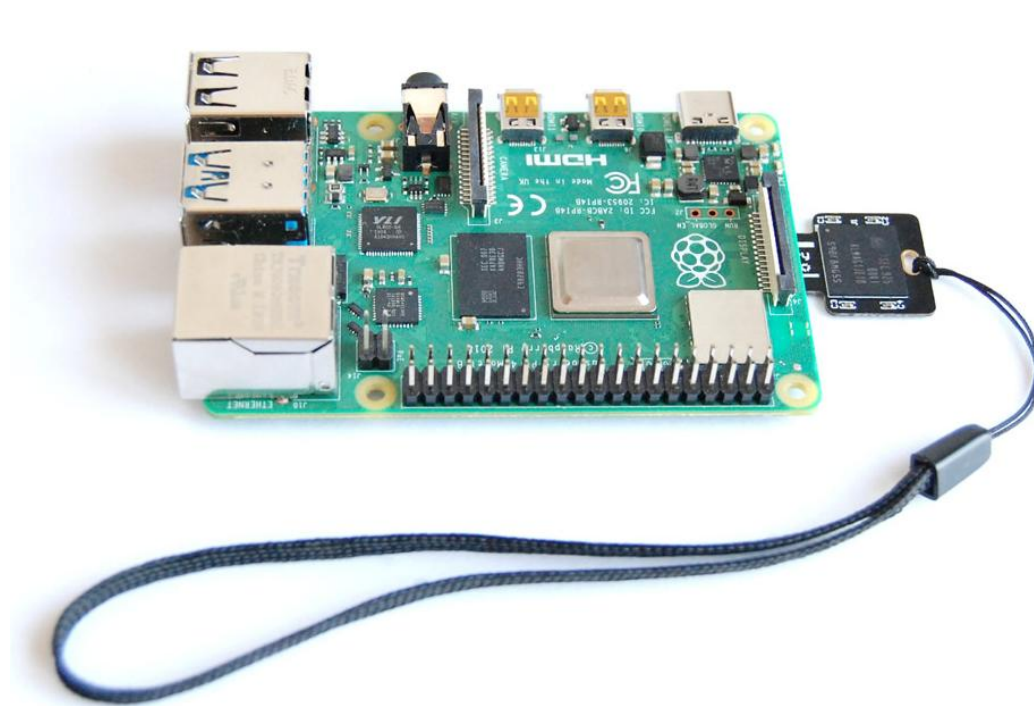


# RasPiKey

Plug & Play eMMC Module for Raspberry Pi

User Manual (revision 1.00)



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## What is RasPiKey?

RasPiKey is a 16GB eMMC module that can be inserted into Raspberry Pi's micro SD card slot. It works like a micro SD card with better read/write performance (especially on 4k read/write) and have longer lifetime. RasPiKey has Raspbian preinstalled and allows you [configure SSH login and Wi-Fi connection](#) before booting your Raspberry Pi. As a result, you can use your Raspberry Pi without display, keyboard and mouse, and access your Raspberry Pi via SSH session.

RasPiKey is a “plug and play” accessory to most Raspberry Pi models. The only exception is Raspberry Pi 4B, which needs to [update the bootloader](#) beforehand.



## What is in the Package?

Each RasPiKey package contains:

- RasPiKey board x 1
- lanyard x 1



## RasPiKey Specifications

Dimension:	32mm x 19mm x 1.6mm
Weight	1g
eMMC	Samsung KLMAG1JETD-B041 ( <a href="#">datasheet</a> )
Working Voltage	3.3V
Benchmarks	hdparm test: ~23 MB/sec dd test: ~23 MB/s 4k read: ~11 MB/s 4k write: ~10 MB/s
Operating Temperature	-30°C~80°C (-22°F~176°F)
Storage Temperature	-40°C~85°C (-40°F~185°F)
Humidity	0~80%RH, no condensing

## **Before Booting with RasPiKey**

If you are not using Raspberry Pi 4B, and you have display, keyboard and monitor connected to your Raspberry Pi, you can just insert RasPiKey into the micro SD card slot and directly use it like a normal SD card.

### ***Update Bootloader (for Raspberry Pi 4B only)***

If you are using Raspberry Pi 4B, you need to update the bootloader to have RasPiKey supported. The new bootloader can be downloaded [here](#).

Here we offer a much simpler way to update the bootloader:

1. Download this [update\\_bootloader.zip](#) file, or you can find it in RasPiKey's boot partition.
2. Extract its content to a micro SD card
3. Insert the micro SD card into Raspberry Pi and power on
4. Wait for a few seconds until the green LED on Raspberry Pi blinks with a specific pattern (quickly blinks 4 times, waits and then repeat).
5. Power off and remove the micro SD card.

After going through these steps, you have updated the bootloader on your Raspberry Pi 4B, and now it can work with RasPiKey.

### ***Enable SSH Login and Configure Wi-Fi Connection***

If you want to use your Raspberry Pi without connecting any monitor, keyboard or mouse, you can enable SSH login and configure Wi-Fi connection before you boot your Raspberry Pi with RasPiKey.

You will need a computer with micro SD card reader. If your computer doesn't come with micro SD card reader, you can use a USB SD card reader.

After inserting RasPiKey into micro SD card reader, its "boot" partition will be recognized as a USB disk on your computer (usually named "boot"). There you can find these files:

- RasPiKey.exe
- RasPiKey\_MAC
- RasPiKey\_ARM
- RasPiKey\_X86
- RasPiKey.zip



## Using RasPiKey

You can use RasPiKey like a normal micro SD card. You insert it into the micro SD card slot on Raspberry Pi, and then power it on.

If your Raspberry Pi has display, keyboard and mouse connected, you have nothing to worry about and immediately enjoy using your Pi with RasPiKey.



If your Pi doesn't have display, keyboard or mouse, you may want to use it via SSH session, which needs your Pi to be connected to your network. If you have [configured the Wi-Fi connection](#) beforehand, you just need to wait until your Raspberry Pi finishes the boot and connect to your Wi-Fi. Or you use a network cable to connect Raspberry Pi to your local network.

Given the empty "ssh" file is in RasPiKey's boot partition, you can ensure SSH login will be enabled on your Raspberry Pi.

You can use this command to login via SSH session:

```
ssh pi@raspberrypi
```

Sometimes it may complain about not knowing the "raspberrypi" host. In the majority of cases this problem will disappear after waiting for a while. If the problem persists, you can use this command to list all machines in your network:

```
arp -a
```

This command exists in Windows, Mac OS X and Linux, what a handy tool!

If you run this command before and after booting your Raspberry Pi, you can figure out which IP address is for your Pi, by comparing the outputs of this command. Then you can login with:

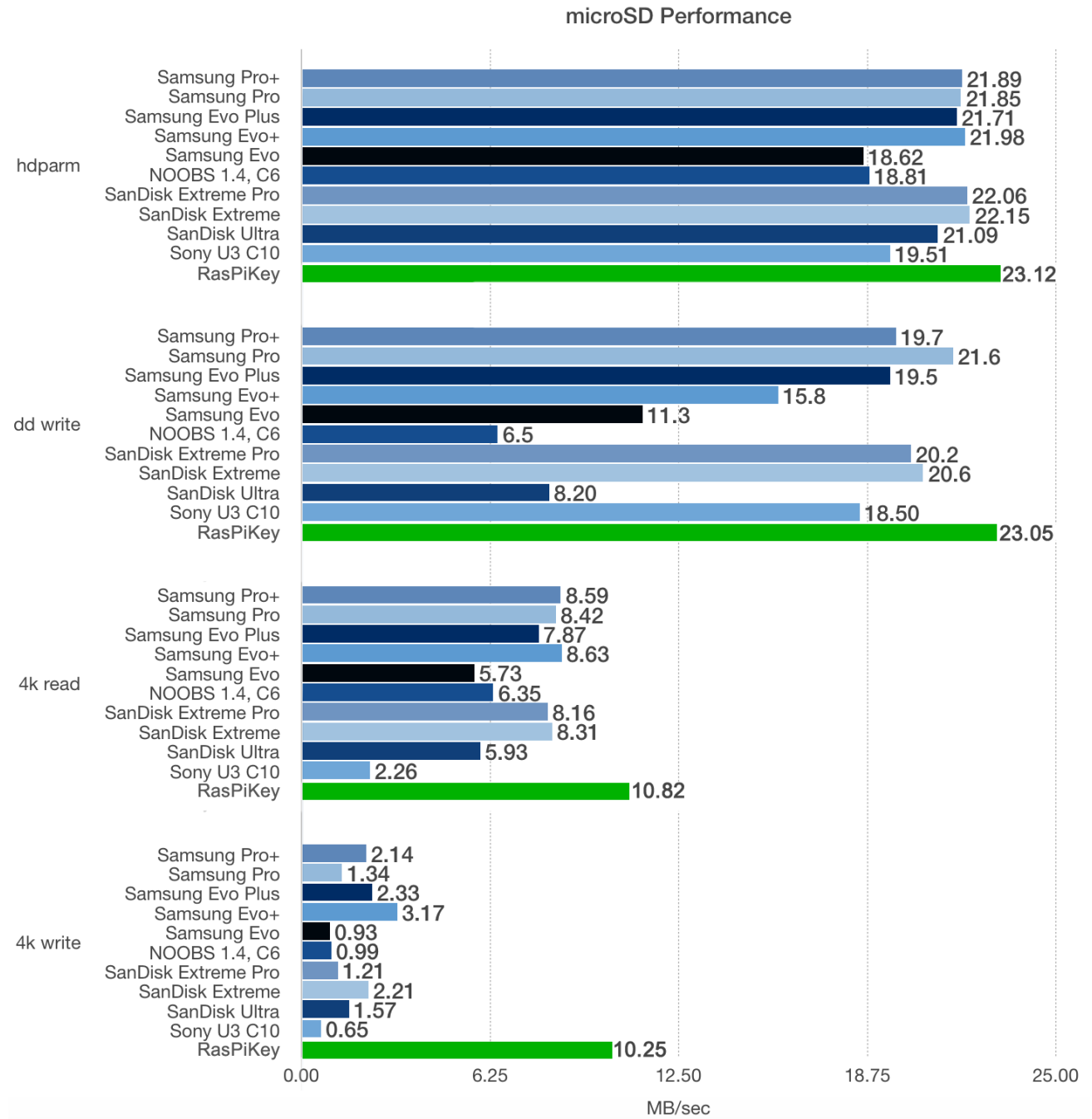
```
ssh pi@<IP address of your Pi>
```



## Benchmarks

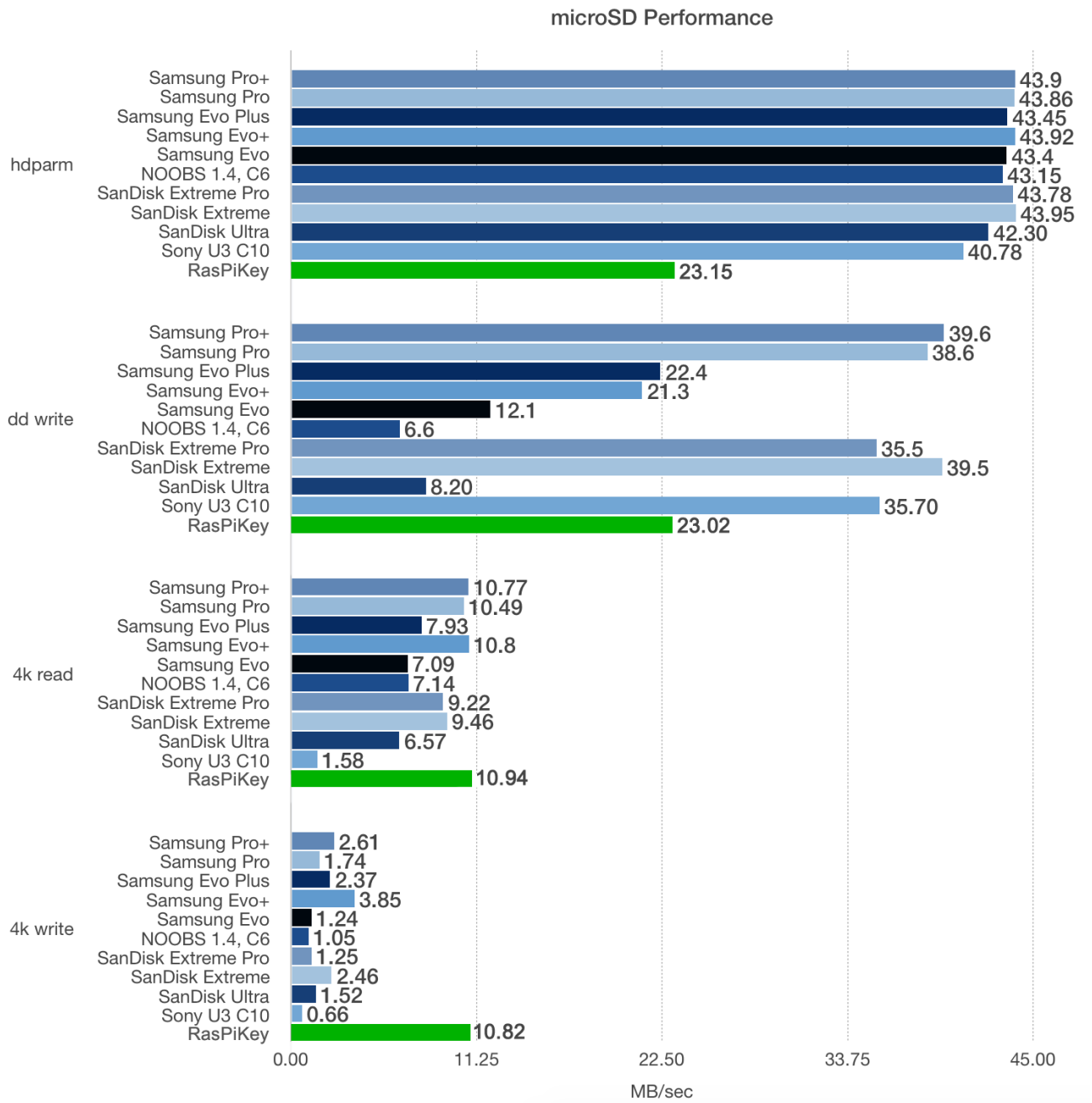
We follow Jeff Geerling's blog posts (thank you Jeff) to do the benchmarks for RasPiKey.

Jeff wrote [this blog post](#) about the benchmarks on Raspberry Pi 3B+. We do exactly the same benchmarks with RasPiKey and append the result to the diagram from Jeff's blog post:



**Benchmarks on Raspberry Pi 3B+**

Jeff also wrote [another blog post](#) about the benchmarks on Raspberry Pi 4B. Again we do exactly the same benchmarks with RasPiKey and append the result to the diagram from Jeff's blog post:



## Benchmarks on Raspberry Pi 4B

In benchmarks on Raspberry Pi 3B+, RasPiKey is the all-around winner, while in benchmarks on Raspberry Pi 4B, RasPiKey's performance is not that good (although 4k write speed is still outstanding).

This is because Raspberry Pi 3B+ has a rather slow controller for SD card, and RasPiKey has maxed out the controller's performance. In Raspberry Pi 4B, the controller for SD card is much faster and

with the support from new SD card driver, those high-class SD cards can also max out the controller's performance. However at the time being RasPiKey (eMMC) only gets limited support on Raspberry Pi 4B, and use rather low frequency (similar to the frequency in Raspberry Pi 3B+) on the SD controller, and hence can only achieve similar speed in Raspberry Pi 3B+.

We would like to thank Tim Gover (Raspberry Pi Trading Ltd) for the help on supporting RasPiKey on Raspberry Pi 4B. Although his team is extremely busy and supporting eMMC has very low priority, Tim still allocated some time to work on this and unlock the possibility to use RasPikey on Raspberry Pi 4B.

Hopefully in the future, Raspberry Pi 4B will support eMMC even better, and RasPiKey can get the best performance it might reach.

## Revision History

Revision	Date	Description
<b>1.00</b>	2019.10.26	Initial revision