ALL ABOUT HARDKERNEL'S EMMC MODULES
THE ODROID ADVANTAGE

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Hardkernel's removable clip eMMC modules, which are usually soldered into the board, are unique to ODROIDs.

The Exynos-4412 CPU includes an eMMC 4.41 compatible host controller, with a maximum bus speed limited to 100MB/sec, an actual clock speed of 48Mhz with DDR. The ODROID-X, X2, U2, U3, Q and Q2 are all based on the Exynos-4412 CPU.

The Exynos-5410 CPU, which is used by the the ODROID-XU, XU+E and XU-Lite, includes an eMMC 5.0 compatible host controller. However, the hardware design was unable to support the eMMC 5.0 HS400 mode, because there was no public specification of eMMC 5.0 when we designed the ODROID-XU. As a result, all the XU series have the eMMC 4.5 (HS200) specification which reaches a maximum speed of 160MB/sec since the actual clock speed is 160Mhz with SDR.

The Exynos-5422 CPU also has an eMMC 5.0 compatible host controller. The ODROID-XU3 is based on Exynos-5422 and supports the eMMC HS400 mode. The actual clock is 166Mhz and 330MB/sec of host bus bandwidth by DDR.

We've been selling 2 different eMMC modules: The Green or Blue PCB has the eMMC 4.5 chips.

The Red PCB has the eMMC 5.0 chips. The eMMC 5.0 chip is slightly smaller but it has the same BGA array size, so that we can keep using the same PCB.

Most eMMC manufactures are moving to eMMC 5.0. So it is hard to purchase the eMMC 4.5 chips anymore except for the lower capacity like 4GB and 8GB. Recently, we started using 16GB and 32GB eMMC chips from Sandisk while we keep buying 8GB and 64GB eMMC from Toshiba.

When you install a new OS image onto the eMMC module, you need a USB memory card reader and an eMMC-to-MicroSD converter board (reader board). Please refer to the images below to understand how to use it.

The reader board can't be detected by a few USB memory card readers. So it is worthwhile to check the compatibility list at http://bit.ly/1nPBE4i.

The chart on the following page is the full list of eMMC modules we are selling now. The round label indicates the OS and capacity.

The eMMC 4.5 Blue(or Green) PCBs will be obsolete soon except for 8GB models.

Even you have a different or wrong eMMC, you can use it for your ODROID if you install a proper boot loader and OS image.

Reference

The eMMC board schematics
http://bit.ly/1p4TX6N

The reader board schematics
http://bit.ly/1p9j0Z3.

The following page is a handy guide to all of Hardkernel eMMC modules!

The eMMC reader attaches to the eMMC module with a small clip

Top view of eMMC reader and eMMC module inserted into SD card reader

Bottom view of eMMC reader and eMMC module inserted into SD card reader

EMMC MODULE REFERENCE CHART
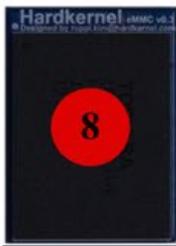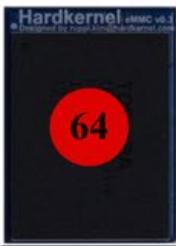
Android for U2/U3 Green	8	16	16	32	64	64
	8GB	16GB	16GB	32GB	64GB	64GB
Ubuntu For U2/U3 Red	8	16	16	32	64	64
	8GB	16GB	16GB	32GB	64GB	64GB
Android For X2 Yellow	8	16	16	32	64	64
	8GB	16GB	16GB	32GB	64GB	64GB
Android For XU Blue	8	16	16	32	64	64
	8GB	16GB	16GB	32GB	64GB	64GB
Ubuntu for XU3 Light Blue			16	32		64
			16GB	32GB		64GB
Android For XU3 White			16	32		64
			16GB	32GB		64GB