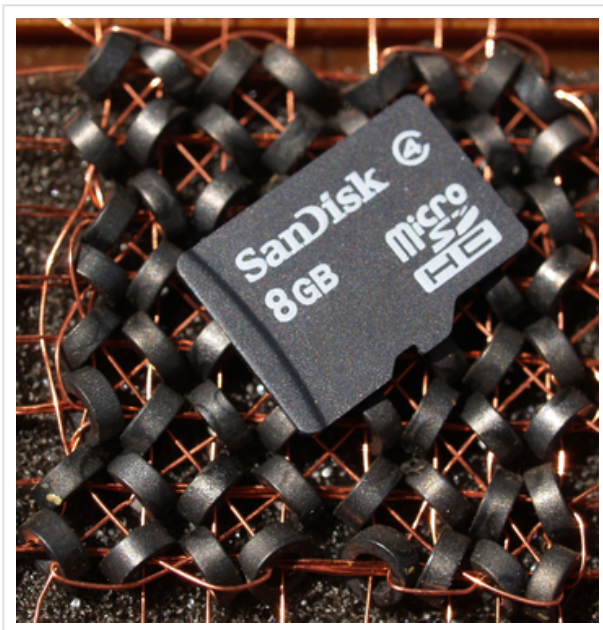


# Teuthida Technologies Home

All about embedded systems engineering.

## Small Wonders

Posted on [April 24, 2020](#)



I want to write today about the amazing feat of technological advancement illustrated by this picture.

There are two memory systems shown. In the background, a core memory fragment with an 8 byte capacity and resting on top of it, a Micro SD card with an 8 Gig capacity.

Here's the clincher. While these memory systems both have a similar total cost, the SD card has a **billion** (1,073,741,824 to be exact) times the capacity! Now, for such small devices, there's a lot to know about them. It turns out that we're all in luck. The YouTube channel [Explaining Computers](#) does a fantastic job of... explaining computer stuff! In particular, a [recent video](#) did such a fantastic job of making the complex world of SD memory devices simple that I just had to take notes. The summary of those notes is [here](#).

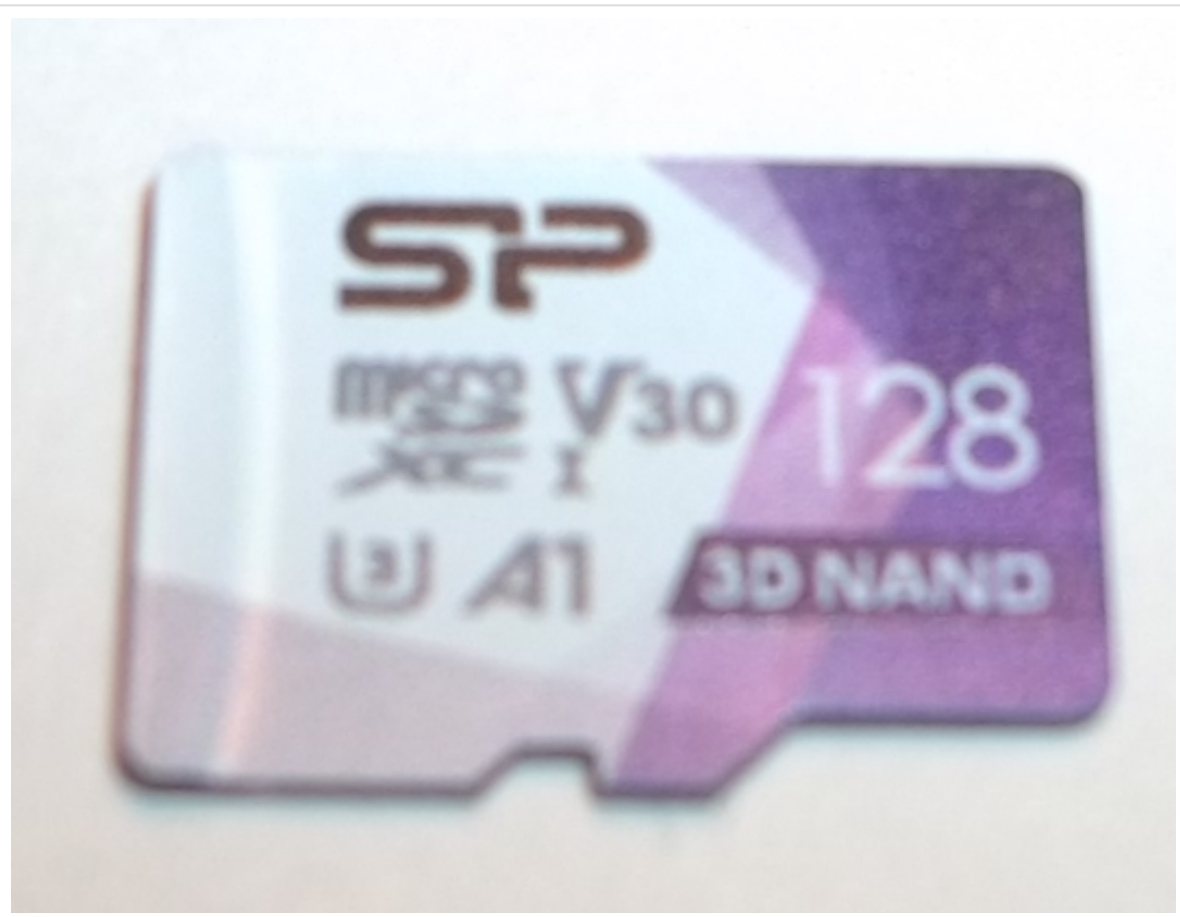
Given the amount of effort that went into the video, I do not think it appropriate to reproduce that material here. You should [watch the video](#) for yourself or at least refer to the [notes](#). Instead, I thought it might be useful to examine some actual SD cards and see what can be learned from their various markings:



Let's start off with an older device. We can see that this is a 4 Gig High Capacity (HC) Micro SD card, with a write speed of 4 MB per second (C4). It has no other attributes specified.



The second example is the popular Samsung EVO, 32 Gig High Capacity (HC) Micro SD card. It has a write speed of 10 MB per second (U1). Sorry, the HC part is just barely legible in the picture, but it is there.



Our last example is the newest device that I own. It has the most attributes, namely: 128 Gig, Extended Capacity (XC), a write speed of 30 MB per second (U3 and V30), a bus speed of 104 MB per second (I) and a basic, level 1 application rating (A1).

Initially, SD media were designed for devices like cameras and other media recorders. That is why earlier specifications placed such emphasis on write speed above all. Lately, we've been seeing these devices being used as the non-volatile memory of small computers like the Raspberry Pi. While media recorders typically blast out large amounts of data to one file at a time, applications often read and write to a very large number of smaller files. This usage pattern has resulted in a new emphasis on application performance and the A1 and A2 ratings. A great look at this is also to be found at my favorite source [here](#).

Finally, a disclaimer. I have no relationship with the video blog Explaining Computers, beyond subscribing and being a fan. I receive no recognition or compensation of any kind for this posting. I simply feel that this information is useful and should be made available.

The next time you go shopping for SD memory, it would be a good idea to know what the specifications are and what they mean. It could make the difference between poor or unreliable performance with a slow device or paying too much for performance or features you don't need.

Your truly

Peter Camilleri (aka Squidly Jones)

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