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Swissbit SSD Power Management without supercaps

White Paper

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management without
supercaps

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Most NAND Flash based 2.5" SSDs have RAM caches for high IOPS, the contents of which take multiple write cycles (written to flash) to store safely. This takes many milliseconds. These designs therefore include internal supercaps or similar technologies to hold up the power rail long enough for these processes to complete.

One of the disadvantages of this scheme is that the extra RAM memory and supercaps add to the physical space, cost and unreliability of the product (compared to Swissbit 2.5" SSDs). Swissbit considers this an advantage of our architecture which does not require supercaps – because the data cache is replaced by non-volatile memory. The key thing in our design is that our SSD does not have to save the state of the SSD from RAM into flash when the power goes down. The operational state of the SSD is always in NAND Flash and it's always valid.

This requires a level of attention to detail in the data management processes done by our SSD controller which is dramatically different to that of other types of SSD. It stems from a different viewpoint in which the design of our SSD's starts with the Flash memory media in mind – and asks the question – what happens when the power goes down?

We then extrapolate all the design rules back from that. Those rules of Flash block management require very tight integration between the SSD controller and the power management system. The PSU (power supply unit) management system is not a "bolt-on" or afterthought – as it appears to be in many other common Flash SSD designs. Our SSDs consequently are the most reliable SSDs in the power down scenario. And they are more reliable than other types of SSD's because they have fewer parts, like capacitors and supercaps which can fail more easily. Supercaps are sensitive by temperature and not reliable enough for our temperature range and long life time target use cases. Additionally Swissbit performs extensive testing prior to shipping any of our products.

The actual product Series of 2.5" SSD without supercaps called P-120 for PATA interface, X-200 and X-500 Series for SATA interface.

2 Document History

Table 1: Document Revision History

Date	Revision	Details
22-March-2013	1.0	First release

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