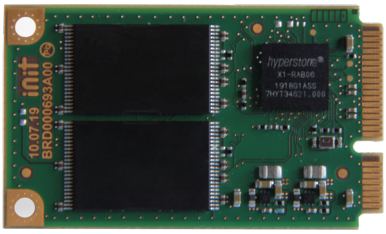
INIT designs industrial mSATA module with Hyperstone for Public Transportation Devices

Ensuring a durable, highly reliable and performant storage solution can be tough. However, INIT, one of the world's leading solution providers in the public transportation sector has achieved just that.

The storage market is saturated with 'one size fits all' solutions and when INIT became aware that there was no suitable mSATA available fitting their industrially demanding requirements, the company decided to take matters into their own hands and develop their own.



INIT integrated a range of high-end components into their mSATA SSD, but it was the implementation of the industrial grade X1 flash memory controller from Hyperstone managing the BiCS FLASH™ 3D flash memory from Kioxia which ensured the product met the stringent demands of their application.

While there are a range of controllers on the market supporting different flash types, form factors and performance targets, there are few which simultaneously manage to prioritize and balance industrial demands of data integrity, power fail robustness and performance.

The compact mSATA module has been integrated into several sought after INIT products, namely the

- VENDstation (stationary ticket vending machine)
- EVENDpc3 (PC-based ticket printer and on-board computer)
- COPILOTpc3 (an on-board computer and vehicle communication platform)
- COPILOTrail (a PC-based on-board computer for the rail sector)

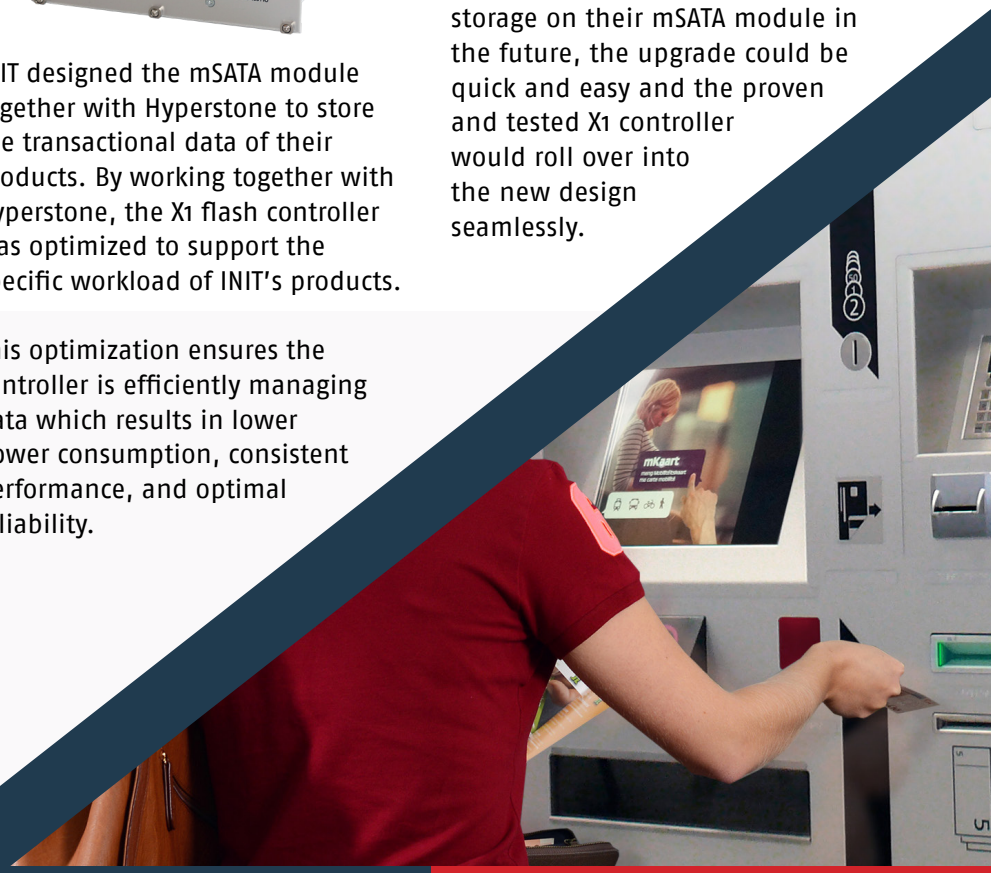
INIT designed the mSATA module together with Hyperstone to store the transactional data of their products. By working together with Hyperstone, the X1 flash controller was optimized to support the specific workload of INIT's products.

This optimization ensures the controller is efficiently managing data which results in lower power consumption, consistent performance, and optimal reliability.

Considering future flash support

Designed with two Kioxia 16GB MLC flashes operated in SLC (Single-Level-Cell) mode, INIT got the benefits of higher density flashes being operated in a more reliable manner. By operating MLC flashes in SLC mode, one halves the available density but increases the program-erase cycle endurance, data retention and lowers the write amplification factor significantly which in turn improves the overall service lifetime.

Another benefit of the Hyperstone X1 controller in this context is the wide range of supported NAND flash components and technologies. If INIT decided to upgrade the flash storage on their mSATA module in the future, the upgrade could be quick and easy and the proven and tested X1 controller would roll over into the new design seamlessly.



Considering ESD and Shock Resistance

Other important aspects of the mSATA design were ESD and shock resistance. Transport solutions must often deal with vibrations and shock caused by the vehicles that carry them. Also, exposure to electrical discharges need to be considered in high-voltage and fast-moving applications such as transportation. Hence, ESD robustness needs to be factored into the design that will carry out its life in such rough and turbulent ecosystem. To circumvent this, INIT chose mSATA as their form factor of choice. While the X1 controller supports a range of different form factors, this module is ideal for transport solutions for three main reasons.

Firstly, mSATA's compact shape lends itself well to ensuring a sturdy implementation. Secondly, the mSATA board can be fixed to the main board through two screw holes in the top corners of the PCB. Securing its position like this makes it more immune to shock and hazardous vibrations. Lastly, the convenience of this form factor is ideal as it is easily exchangeable.

Why Hyperstones X1?

INITs testing determined the modules with Hyperstone controllers to be the most power fail safe and reliable for their on-board PCs within the VENDstation, EVENDpc3, COPILOTrail and COPILOTpc3.

In the event of a sudden power failure, the X1 can minimize the damage on data that was supposed to be written onto the flash. The DRAMless controller and the proprietary firmware architecture from Hyperstone ensure integrity of the device at all times. A number of redundancies, back-up and on-the-fly maintenance features ensure reliable operation.

Ultimately, flash controller suppliers handle power fail robustness differently depending on how they prioritize reliability, performance, and other system-level trade-offs. Because Hyperstone focuses on industrial markets, the X1 controller is the ideal choice to manage the data on the INIT mSATA drives for Public Transportation Devices.

Sourcing NAND Flash

Hyperstone can support companies in their NAND flash needs. If you are having difficulties sourcing and purchasing the right NAND flash for your solution, get in touch with us today and we will support your storage needs personally.

The X1 flash memory controller can be implemented on mSATA, M.2 and a range of other SATA compliant form factors and ensures longevity and a strong sustained performance. The controller's health monitoring software hySMART™ furthermore strengthens the solution within the industrial environment. Additionally, there are vast differences in the operating temperature in comparison with consumer products. Commercial NAND flash based memory drives are specified to operating conditions of 0°C to 70°C or sometimes even less, while industrial memory controllers like the X1 are specified and thoroughly tested at temperatures from -40°C to +85°C.

hyperstone®

About Hyperstone GmbH

Hyperstone is a fabless semiconductor company based in Constance, Germany with a strong focus on world class flash memory controllers for industrial embedded markets. Its products set the standard for high-reliability flash management providing confidence for NAND flash performance in mission critical situations. Hyperstone has been part of Swissbit Holding AG since 2020.

To learn more visit: www.hyperstone.com

About INIT

As a worldwide leading supplier of integrated planning, dispatching, telematics and ticketing systems for buses and trains, INIT has been assisting transport companies in making public transport more attractive, faster and more efficient for more than 40 years. Today, more than 1,100 transport companies rely on INIT's innovative hard- and software solutions.

To learn more visit: www.initse.com

Hyperstone GmbH | Reichenaustr. 39a | 78467 Constance | +49 7531 9803 0