

Building a Robust Edge Platform for 24/7 Semiconductor Automation



Project Background

Highly complex systems is critical in semiconductor manufacturing environments. Data from sensors and other devices are used to control manufacturing processes and ensure product quality. SQFlash sTLC Flash technology provides reliable SLC-level durability and high speed for 24/7 automated machines to store and process data in real time, ensuring optimal performance and preventing downtime. To further enhance reliability and security, the ARK-1251 embedded system serves as the host platform, featuring IEC 62443-4-2 certification for robust cybersecurity.

Customer's Pain Points

In a semiconductor manufacturing environment, factory automation plays a crucial role in maintaining efficiency and productivity. Automated machines and systems operate continuously, 24 hours a day, 7 days a week, to produce goods and services. The integration of system with SSD should meet the requirements by combining high-speed data processing, industrial-grade durability, and strong cybersecurity protection, ensuring consistent and reliable system operation under continuous workloads.

Benefits

Previous SSDs using single-level cell (SLC) flash offered fast speeds and high durability but were costly and limited in capacity, making them unsuitable for modern factories' growing data demands. To overcome these challenges, SQFlash introduces SSDs with sTLC (pseudo SLC) Flash technology—enhanced 3D TLC Flash that achieves SLC-level endurance. Supporting up to 50k–100k program-erase cycles, SQFlash sTLC SSDs provide near-SLC performance, high capacity, and robust reliability for continuous 24/7 industrial workloads. Complementing this storage solution, the ARK-1251 embedded system serves as the industrial computing core. Designed for edge automation, it integrates IEC 62443-4-2 certified cybersecurity, wide-temperature operation, and vibration resistance for harsh factory environments. Its scalable I/O design supports diverse connectivity—from field sensors to control networks—while AI acceleration enables real-time analytics and intelligent decision-making at the edge.

Together, SQFlash SSDs and the ARK-1251 system create a powerful, secure edge computing platform that ensures reliable data acquisition, processing, and analysis. This integration boosts smart factory performance, minimizes downtime, and delivers scalable, future-ready automation.



SQF-S8B 650 sTLC

ARK-1251

Why Advantech

- Flash storage up to 2TB (0 ~ 70°C / -40 ~ 85°C)
- MODEL NAME: SQFlash SATA 840, 650 and NVMe PCIe 920, 720 sTLC Series
- 100% burn-in test on a production line before shipment
- SQFlash stress tested for 24hr: high-low burn-in test with 100% full loading criteria, and low-temperature boot-up test with 1000 cycles