SQFlash Storage Modules

Reliable Industrial Storage Solution with Security Features Built-in

╱ **PATA Interface**
╱ **SATA Interface**
╱ **PCIe Interface**
╱ **USB Interface**
╱ **SD Card**

Durability

Customization

Longevity

Security

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About SQFlash-The Perfect Storage Solution

Based on our embedded market insights accumulated over decades, we developed SQFlash – the perfect industrial storage solution with a full range of product support and value-added services. Advantech SQFlash was designed with industrial operation in mind and provides highly reliable flash memory solutions with excellent compatibility, performance and security. Designing your application with SQFlash will decrease integration effort significantly and increase overall system stability.

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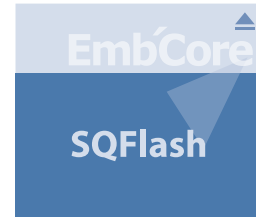
SQFlash

▶ Advantech SQFlash Features

High Durability with Leading Flash Management Technology

Advantech's SQFlash incorporates industry-leading flash management functions such as: Power Failure Protection, Global Wear-leveling Algorithm, Read Disturbance, Fragment Writing and Flush Management, to keep data integrity and extend product life spans. Users can access information about their flash drive through the SQFlash software package to make sure their system is healthy and functioning at its optimum performance.

Complete Data Security Solution with Unique Software

Advantech has developed an assortment of unique and value-added software to deliver extraordinary functions in device health monitoring and data security, to protect intellectual property and all your valuable data.

Commitment to Premium Quality & Longevity

SQFlash was verified with all Advantech platforms and fully tested in rugged environments to ensure its high compatibility and reliability. It provides 3-year longevity and at least 15-month lifecycle information to service long design-in schedules for embedded projects.

Hardware

Software   **Firmware**

Customization Services

Total Industrial Storage

Onboard Solution
Micro SSD

Traditional Embedded
CF, DOM, CFash, mSAT

▶ Full Range SQFlash Industrial Storage Selection

Advantech SQFlash provides a full range of storage products including: CF, DOM, CFast, mSATA, Half-slim and 2.5″ SSD. Besides traditional flash storage products, Advantech extents the depth of its product portfolio and launches the Micro SSD line for small form factor systems. Also, a brand new PCIe line offers ultimate performance for server applications.

▶ Value-Added Software Services and Package

SQFlash security and software package

To implement security functions on flash storage or the host system always requires huge software and firmware effort. SQFlash security and software package simplifies this process by offering complete utilities and API for each of the security functions such as: Security ID, Write Protection, and Emergency Erase. System integrators can easily pick up and integrate these functions into their own software and system design to accomplish higher security level solutions.

Customization service for hardware and software

In industrial markets, it's common to have special applications require either unique hardware design or specific software functionality. Advantech is fully experienced and capable in providing such customization services to perfectly meet field requirements.

AES

Flash Lock

Flash Vault

Utilities & APIs

Write Protection

Security ID

Del
Emergency Erase

Solutions from SQFlash

SQFlash Security and Software Package

d Storage Selection
TA, Half-slim, 2.5" SSD

Server Storage Solution
SATA III and PCIe

Durability **Security** **Longevity**

SQFlash is all about Security

Complete Data Security Solution with Unique Software

Solid state drives are the place where we store all our data, which means most security requirements are directly related to that storage. SQFlash utility is a software package developed by Advantech that provides various security functions for flash storage with a friendly UI for users to manage their SQFlash modules.

Chip Encryption
Integrated high security internal encryption

Advantech SQFlash supports flash drive internal encryption by utilizing an AES (Advanced Encryption Standard) chip, which encrypts all data with a 256-bit string before writing to the Flash IC. This means hackers cannot steal confidential content even by reading the Flash Chip directly. Flash Lock and Emergency Erase and just two of the functions that have been developed for the AES chip.

▶Flash Lock

Flash Lock has been developed by Advantech for locking up the SSD with the host. With the function enabled, the SSD can only work with a designated platform and cannot be accessed by connecting a locked SSD to other platforms or card readers. This means your data is totally secure.

▶Emergency Erase and Secure Erase

In critical situations, some users would rather destroy data instead of having to risk compromising their data. So the Emergency Erase function was developed which can wipe data within 10 milliseconds. This can be triggered through GPIO on SSD or through software commands. The Emergency Erase function can be set with different security levels based on requirements such as:

Data Erase:

Firmware remains intact in this mode so the drive is still usable after an erase.

Firmware Erase:

The drive will immediately become unusable after execution since firmware will be destroyed in just a few milliseconds.

Global Elimination:

Once the erase command is triggered, the controller will proceed to erase data first to make sure nothing will exist on the storage media. Next, firmware will also be removed to make the disk unusable.

Software Protection

Protects your unique software application IP

▶ Security ID

The Security ID function implements a checking mechanism between the customer's software and flash storage, so users can protect their application knowing that it will only be executable on specific SQFlash models. The maximum Security ID length is up to 256 bytes so users can define their own security strings. C# programming sample code is also available from the SQFlash utility for your reference.

Data Security

Protects data from unauthorized modification or access

▶ Write Protection

This typical security function is very popular for thin clients and gaming, and Advantech offers different approaches to write protect the disk or partition in order to prevent data from being compromised. The function is offered with a simple software utility for control. It is also available with a hardware switch or GPIO for all Advantech SATA 630 series products.
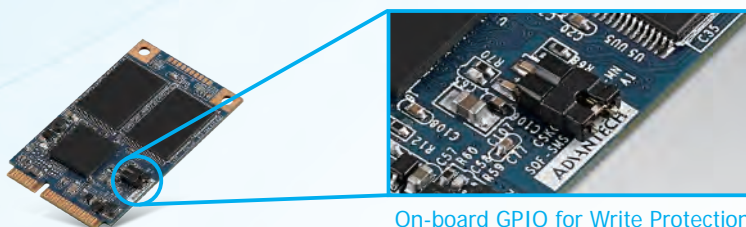
On-board GPIO for Write Protection

▶ Flash Vault

Flash Vault can be considered as Write Protection + Read Protection, which is designed for hiding data inside of your flash storage. Once the function has been enabled, the whole disk or specific partition cannot be either read or written and all the data inside becomes inaccessible—just like putting confidential documents into a vault.

SQFlash Selection Table

PATA

Model Name	SQF-P10 CF Card	SQF-PDM PATA DOM	SQF-P25 PATA 2.5" SSD
Transfer Mode	UDMA 2 / UDMA 4 / UDMA 5	UDMA 2 / UDMA 4	UDMA4
Flash Type	SLC / Ultra MLC / MLC	SLC	SLC / Ultra MLC / MLC
Capacity	256 MB ~ 64 GB	1 GB ~ 16 GB	4 GB ~ 256 GB
Performance (MB/s)	4 channel: 83/87 2 channel: 43/40 1 channel: 22/15	2 channel: 40/29	SLC - 4 channel: 65/55 MLC - 2 channel: 63/28
Power Specification	5V, 160mA	5V, 160mA	5V, 210mA
Operation Temperature	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C

## SATA 530 / 630 – Embedded Storage Series

Model Name	SQF-SMS mSATA	SQF-SHM Half Size mSATA	SQF-SLM SATA Slim	SQF-S10 CFast
Transfer Mode	SATA III (6.0Gb)	SATA III (6.0Gb)	SATA III (6.0Gb)	SATA III (6.0Gb)
Flash Type	SLC / Ultra MLC / MLC	SLC / Ultra MLC / MLC	SLC / Ultra MLC / MLC	SLC / Ultra MLC / MLC
Capacity	1 GB ~ 256 GB	1 GB ~ 256 GB	1 GB ~ 256 GB	1 GB ~ 128 GB
Performance (MB/s)	SLC: 500/150 Ultra MLC: 520/190 MLC: 510/190	SLC: 500/150 Ultra MLC: 520/200 MLC: 520/200	SLC: 500/150 Ultra MLC: 520/190 MLC: 510/190	SLC: 500/150 Ultra MLC: 520/200 MLC: 520/200
Power Specification	3.3V, 500mA	3.3V, 480mA	5V, 370mA	3.3V, 480mA
Operation Temperature	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C

Model Name	SQF-SDM SATA DOM	SQF-SDM Vertical SATA DOM	SQF-SM6 M.2 2260	SQF-SUS Micro SSD
Transfer Mode	SATA III (6.0Gb)	SATA III (6.0Gb)	SATA III (6.0Gb)	SATA III (6.0Gb)
Flash Type	SLC / Ultra MLC / MLC	SLC / MLC	SLC / Ultra MLC / MLC	Ultra MLC / MLC
Capacity	1 GB ~ 256 GB	2 GB ~ 128 GB	1 GB ~ 256 GB	4 GB ~ 64 GB
Performance (MB/s)	SLC: 500/150 Ultra MLC: 520/200 MLC: 520/200	SLC: 120/100 MLC: 450/150	SLC: 500/150 Ultra MLC: 520/200 MLC: 520/200	Ultra MLC: 520/200 MLC: 520/200
Power Specification	5V, 500mA	5V, 250mA	3.3V, 480mA	3.3V, 500mA
Operation Temperature	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C

SATA 820 – High Performance Industrial Storage
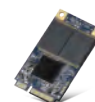
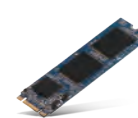| Model Name	SQF-S25 2.5″ SATA SSD	SQF-SMS mSATA
Transfer Mode	SATA III (6.0Gb)	SATA III (6.0Gb)
Flash Type	SLC / Ultra MLC / MLC	SLC / Ultra MLC / MLC
Capacity	16 GB ~ 1 TB	16 GB ~ 512 GB
Performance (MB/s)	SLC: 520/400 Ultra MLC: 520/490 MLC: 520/420	SLC: 520/400 Ultra MLC: 520/460 MLC: 510/380
Power Specification	5V, 1.3A	3.3V, 950mA
Operation Temperature	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C

USB & SD Card

Model Name	SQF-UDM	SQF-ISD
Transfer Mode	USB 2.0	SDIO
Flash Type	SLC / MLC	SLC / Ultra MLC / MLC
Capacity	1 GB ~ 64 GB	1 GB ~ 64 GB
Performance (MB/s)	SLC: 25/15 MLC: 22/10	SLC: 32/26 MLC: 30/12
Power Specification	5V, 100 mA	3.3V, 145 mA
Operation Temperature	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C

SATA T1 & PCIe T1

Model Name	SQF-S25 2.5″ SATA SSD	SQF-C25	SQF-CMP	SQF-CM8
Transfer Mode	SATA III (6.0Gb)	PCIe Gen. III x4	PCIe Gen. III x1	PCIe Gen. III x2
Flash Type	SLC / Ultra MLC / MLC	SLC / Ultra MLC / MLC	SLC / Ultra MLC / MLC	SLC / Ultra MLC / MLC
Capacity	128 GB ~ 2 TB	128 GB ~ 2 TB	16 GB ~ 512 GB	16 GB ~ 512 GB
Performance (MB/s)	530/500	2.8/1.5 (GB/s)	700/400	1.5/0.8 (GB/s)
Power Specification	5V, 2A	5V, 2A	3.3V, 1.5A	3.3V, 1.5A
Operation Temperature	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C

2015 New SQFlash Family Introduction

Advantech Micro SSD Onboard Storage Solution

The best implementation of secure storage

SQF-SUS 630 Series

Embedded applications nowadays need to be slim with low power consumption, and they also require a higher standard of security and performance. The latest SQFlash Micro SSD solution from Advantech is the answer to this trend. Micro SSD is empowered with exactly the same controller technology of SQFlash 630 series, and packs it into a single chip solution with Flash IC wafer inside. So Micro SSD shares all the powerful features with other SQFlash product series such as Flash Vault, Security ID, Write Protection.

Comparison Table

	Micro SSD	SATA DOM
Physical Dimensions	16 x 20 x 1.4 mm	44.7 x 22.2 x 6.9 mm
Power Consumption	Max. 1.62 W	Max. 2.45 W
Performance (MB per sec.)	Read: 530, Write: 205	Read: 530, Write: 205

Micro SSD storage solution for ATM - Flash Vault

Embedded applications such as digital signage, ATM, and thin clients need regular maintenance. Micro SSD is a good solution for storing operating logs and maintenance utilities. To prevent unauthorized access to this area, Flash Vault can be applied to onboard Micro SSD to make it become a secure vault for confidential data or for recovery of OS images. This is a more convenient solution than providing utilities with other external USB drives.

Micro SSD storage solution for KIOSK - Write protection

In Kiosk applications, direct interaction with users mean the system and software inside the Kiosk are exposed to the risk of being altered or damaged. Advantech Digital Media Player DS-370 with Micro SSD and our value-added software built-in can prevent such drawbacks. The system can be recovered to its original state upon each reboot to keep providing a consistent experience to customers.

Advantech Server Grade Storage Solution – T1 Series

Faster with higher reliability

Reliability is the greatest concern for server storage administrators. SQFlash debuts its sever SSD line with the latest technology to offer the most stable performance with the highest endurance. Furthermore, for applications with unstable power supplies, SQFlash also features a super capacitor design to stabilize the power input. SQFlash T1 series server grade SSD is available in SATA 6.0Gb and PCIe Gen. III x4 interfaces with popular form factors such as 2.5", SFF-8639, MiniPCIe, and M.2.
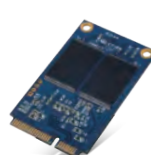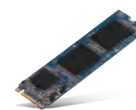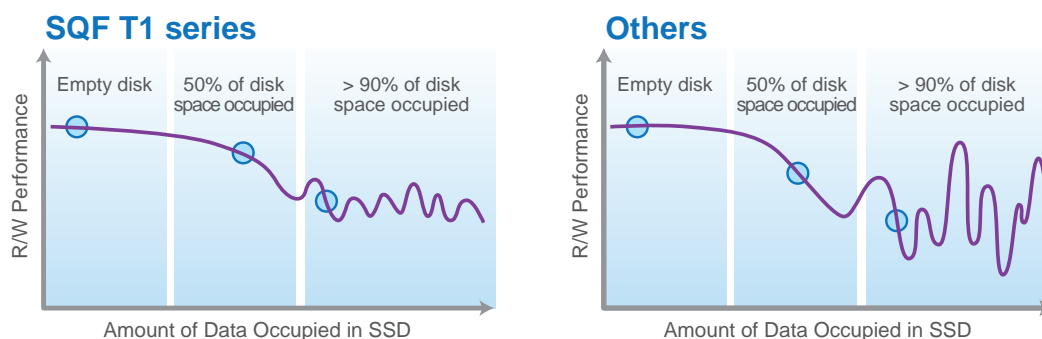
| SQF-S25 T1 | SQF-C25 T1 | SQF-CMP T1 | SQF-CM8 T1 |

▶ High Performance Design with Quad Core Controller

The SQFlash server grade SSD line is powered by a controller IC with quad core technology inside. There is a dedicated computing core for handling host and SSD communication, where the other computing cores are focused on data processing among Flash IC inside the SSD. This multitasking storage management not only gives high performance, but also stable throughput no matter if the SSD is empty or full.

SQF T1 series

Empty disk | 50% of disk space occupied | > 90% of disk space occupied

R/W Performance

Amount of Data Occupied in SSD

Others

Empty disk | 50% of disk space occupied | > 90% of disk space occupied

R/W Performance

Amount of Data Occupied in SSD

▶ Protection for power fluctuations

SQFlash T1 series supports an internal super capacitor for applications with strong electrical interference, which helps stabilize the SSD internal power supply and improve overall signal quality. The temperature inside the SSD enclosure is generally over 50 Celsius, so for better endurance, SQFlash only applies wide temperature industrial grade tantalum capacitors.

Industrial Flash Module with Security ID for POS System

Point-of-sale systems were first used in the retail industry as a way to speed up customer transactions. When products or services are sold, the sell price, quantity and trading details are transferred to a back-end system via front-end facilities that typically include a computer, monitor, cash drawer, receipt printer, barcode scanner, and credit card processing device. As they increase in popularity, POS systems are being designed to handle more and more functions, from sales and returns, to customer spending statistics and analysis. This helps retailers more easily manage their daily business as well as providing valuable customer shopping trends and purchasing data.

Application Requirement

POS hardware development has matured over the years, and now the main focus has switched to POS software. The POS industry has developed different kinds of software to fulfill a broad variety of market demands, and with this development has come the need for better software protection. One customer tried KeyPro to protect their application. KeyPro is a USB flash disk that contains a software security key inside. The customer's application needed only to configure the KeyPro API in order to create a security key that protects valuable IP and data.

Solutions

After evaluating the market, the customer ultimately chose Advantech's Industrial Flash Storage—SQFlash with Security ID technology—which provides a secure mechanism to protect applications without the need for extra parts or cost, and comes with a user friendly user interface. They also chose Advantech's AIMB-562 Kiosk motherboard to complete their total solution. By using Advantech's Security ID technology, the customer's POS application is fully protected and can only be executed in conjunction with the SQFlash module, providing ultimate data security. Advantech not only provides various kinds of boards with different form factors, but also provides software services and peripheral modules. This helps customers integrate their systems better and adds value to their applications.

Benefits

▪ No extra cost or parts, and comes with a user-friendly software interface
▪ SQFlash comes with a 3-year lifespan and fixed specification support
▪ Provides the ultimate in intellectual property protection
▪ Integrated services from boards to software and modules

Industrial Flash Modules Secure Gaming Applications

In the United States, the legal gambling industry comprises about 500 casinos and hotels, with a total annual revenue of around $90 billion. People go to Las Vegas or Atlantic City for entertainment and fun, visiting many different kinds of casinos. The casinos offer various types of games, such as video poker, blackjack, baccarat, roulette and many others, but the most popular game is still the slot machine. On average, each casino pays around US$20 million in taxes annually. The gaming industry helps drive local economies and has become an important source of income for government as well.

Application Requirement

Because of the huge profits generated, competition is fierce and every casino tries to improve and update their facilities to attract and keep customers coming in the doors, so gaming machine design has become a major focus of attention. One of Advantech's gaming industry customers found that after placing their machines in one of the largest casinos, a data drive was stolen by a competitor, who copied and reproduced their intellectual property and applications. Needless to say, this caused a significant loss to the original company and forced them to think seriously about security and how to protect their gaming machines from unscrupulous competitors in the gambling world.
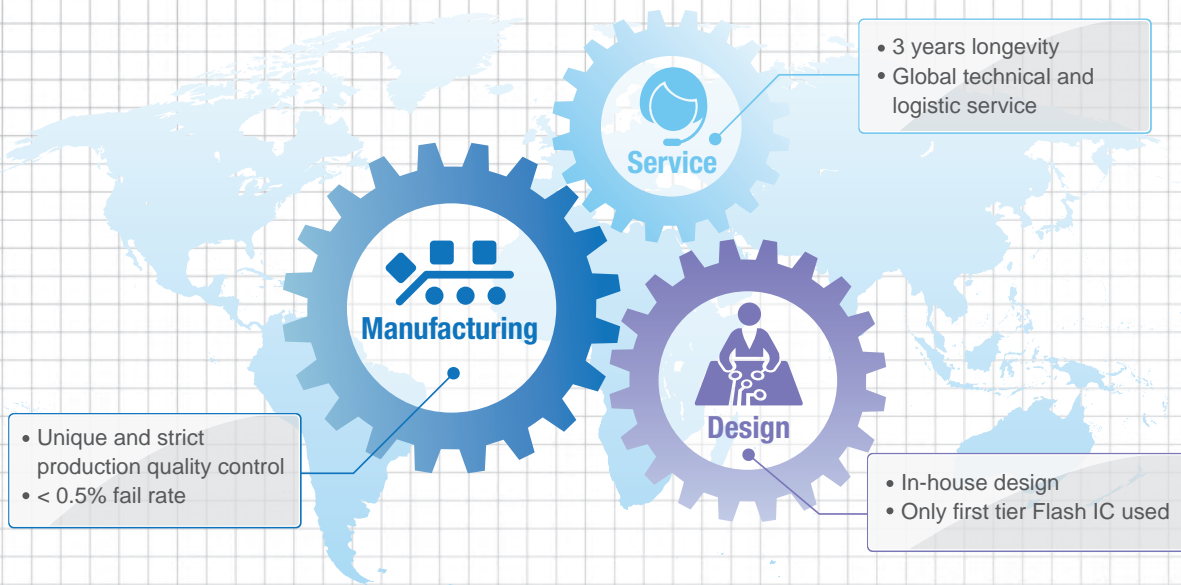
Solutions

Suffering from serious damage to its profits, this gaming industry player was eager to find a security solution that would protect its applications. They researched the marketplace and chose Advantech's Industrial Flash Storage– SQFlash with Flash Lock, and an AIMB-212 motherboard. Flash Lock disables and secures the entire SQFlash contents as soon as the power goes off, and it cannot be booted or read by any other platform or USB card reader. The only way to read the locked SQFlash is to boot from a corresponding platform that has the matching password and unlock mechanism. This feature protected the customer's important assets, freeing them from worry and allowing them to focus on the development of entertaining gaming content. Advantech provides integrated products and services—from boards, to software, to modules. These total solutions not only provide convenient, one-stop shopping, but also lead to enhanced devices and products.

Benefits

▪ Fixed specification support and 3-year longevity for SQFlash
▪ Worry-free protection for intellectual property
▪ SQFlash available to suit every kind of motherboard
▪ One-stop shopping assures both time and cost efficiency

Advantech SQFlash Global Services

- 3 years longevity
- Global technical and logistic service

Service

Manufacturing

Design

- Unique and strict production quality control
- < 0.5% fail rate

- In-house design
- Only first tier Flash IC used

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