

# Industrial SSD and Memory

## SQFlash and SQRAM for AIoT Applications

- ✓ Product Offerings
- ✓ Value-Added Software
- ✓ Market Solutions
- ✓ Application Stories
- ✓ Product Selection



**ADVANTECH**

*Enabling an Intelligent Planet*

[www.advantech.com](http://www.advantech.com)

# Advantech Industrial SSD & Memory Solutions

Advantech provides a wide range of memory products, including Industrial SSD, DDR, and I/O extension modules. We are committed to providing high-quality modules and security with corresponding software utilities and solutions. These include Advantech DeviceOn/SQ Manager, Trellix whitelisting and Acronis backup solutions — which simplifies real-time status and lifespan monitoring. Advantech delivers total solutions for a diverse range of embedded, automation, transportation, and networking applications. In addition, these solutions are compatible with all Advantech platforms. The SQFlash and SQRAM are your best peripheral choices for processing intensive data so as to accelerate IoT and AIoT transformations.

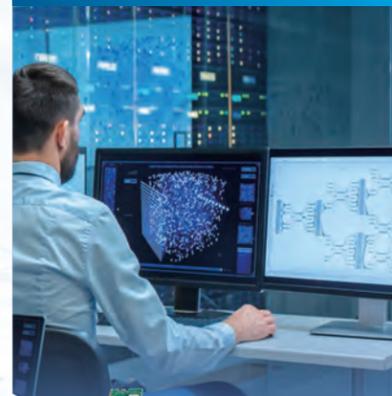
## High-Performance Embedded Computing Solutions

High Speed SMT Machine



SQR-UD5N SQF-C8M 930

Control Center



SQR-RD4N SQF-CU2 ER-1

AOI Inspection Machines



SQR-SD5N(ECC) SQF-S25 840

Automated Boiler Welding



SQR-SD4E SQF-SMS 650

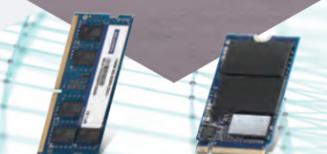
## Multiple Robotics Environment

ARM Robotics



SQR-SD4N SQF-C8M 720

Cold Chain Logistics



SQR-SD4I SQF-C4M 720

### 360-Degree Security

Security is at the heart of our solutions. Our SQFlash series offers a full spectrum of protection. These measures include data encryption (TCG-OPAL Compliant with FIPS Certification), data erase and protection, and built-in security via a user-friendly UI. In addition, our solutions feature Trellix and Acronis integration as security and backup solutions.

### Ruggedized Design

Advantech's SQFlash is equipped with advanced multi-stage power failure protection and is capable of operation in broad temperature environments. SQRAM features a conformal coating and sidefill to prevent corrosion by acid and/or water. These features remedy problems caused by high humidity or unexpected shock/vibration.

### Industry-Leading Reliability

Advantech uses tier 1 chips from original IC vendors. The module assembly also passes in-house vibration and burn-in tests to ensure consistent quality. We leverage strict 100% screen testing and 3-year longevity to guarantee industrial grade stability and reliable 24/7 operation. We offer 3-5 years of extended longevity support.

### Flexible Customization

To meet different application needs, Advantech provides 30-day design to order services such as security features through hardware jumper, thermal throttling setting, conformal coating/underfill, extend longevity, and SPD tuning with full hardware, software, and firmware support.

### Self-Management

Device management is the foundation of industrial and IoT applications. Advantech industrial storage and memory solutions are equipped with DeviceOn/SQ Manager, a real-time self-management software, to enable lifetime prediction, remote device monitoring, and remote monitoring and management.

# SQFlash

## Leading Industrial SSD Solutions

We used our decades of embedded market experience to develop SQFlash, creating an excellent industrial storage solution with a full range of product support and value-added services. Advantech SQFlash SSDs are designed with industrial operation in mind, and provide highly-reliable storage with excellent compatibility, performance, and security. All our products are built with a TCG-OPAL self-encryption disk functionality powered by AES-256 internal encryption, and Advantech's unique Flash Lock function for disk protection.



### Key Features



#### Comprehensive Security

- FIPS certified SQFlash SSD
- TCG-OPAL compliant
- Crypto Erase and Military Erase
- Trellix & Acronis software integration



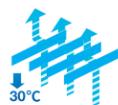
#### High-Endurance Solutions

- 10 x more durable SSD with 3D sTLC solution (P/E cycle: up to 100k)
- Industrial extended temperature support
- DeviceOn/SQ Manager delivers endurance and reliable monitoring



#### Power Failure Protection

- Comprehensive protection ensures data integrity
- Built-in voltage stabilizer for internal power supply
- Reliable startup power sequence



#### Thermal Solution on NVMe SSD

- Industrial heatsink cools SSD by up to 30 °C
- Flexible thermal grease prevents physical damage
- Smart thermal throttling against sudden performance drop
- Remote health and temperature monitoring



#### Flexible Customization Service

- 30-day time to market design-in service
- Extended longevity: 3 ~ 5 years
- Early access to the latest Storage technology
- System integration with FPGA and firmware support

The Advantech SQFlash series supports various interfaces — including SATA, PCIe/ NVMe, and PATA/ IDE — and multiple form factors — including 2.5" SSD, mSATA, M.2, DOM, CFast, and half-slim SSD. SQFlash also features multiple temperature range customization. In addition, the SATA/ PCIe SSDs delivers superior performance, better durability, and high capacities to applications that handle sensitive data or required security.

	Embedded Series	Performance Series	Edge Server
NVMe (PCIe Gen.4)	<b>730</b> <ul style="list-style-type: none"> <li>• M.2 2230 (M key)</li> <li>• M.2 2280 (M key)</li> </ul>	<b>930</b> <ul style="list-style-type: none"> <li>• M.2 2280 (M key)</li> </ul>	<b>ER-1 / EU-1</b> <ul style="list-style-type: none"> <li>• U.2 2.5" SSD (SFF-8639)</li> <li>• U.3 2.5" SSD (SFF-TA-1001)</li> </ul>
NVMe (PCIe Gen.3)	<b>720</b> <ul style="list-style-type: none"> <li>• M.2 2230 (A+E key)</li> <li>• M.2 2242 (M key)</li> <li>• M.2 2280 (M/ B+M key)</li> <li>• CFX (Type B)</li> </ul>	<b>920</b> <ul style="list-style-type: none"> <li>• M.2 2280 (M key)</li> <li>• U.2 2.5" SSD (SFF-8639)</li> </ul> <b>920F</b> <ul style="list-style-type: none"> <li>• M.2 2280 (M key)</li> </ul>	
SATA	<b>650</b> <ul style="list-style-type: none"> <li>• 2.5" SSD / Half-slim SSD</li> <li>• mSATA / Half-sized mSATA</li> <li>• M.2 2242 / 2280 (B+M key)</li> <li>• CFast</li> </ul>	<b>840</b> <ul style="list-style-type: none"> <li>• 2.5" SSD</li> <li>• mSATA</li> <li>• M.2 2280 (B+M key)</li> </ul> <b>840F</b> <ul style="list-style-type: none"> <li>• 2.5" SSD</li> <li>• M.2 2280 (B+M key)</li> </ul>	<b>840V Power Loss Protection</b> <ul style="list-style-type: none"> <li>• 2.5" SSD</li> </ul> <b>840L Enterprise</b> <ul style="list-style-type: none"> <li>• 2.5" SSD</li> </ul>

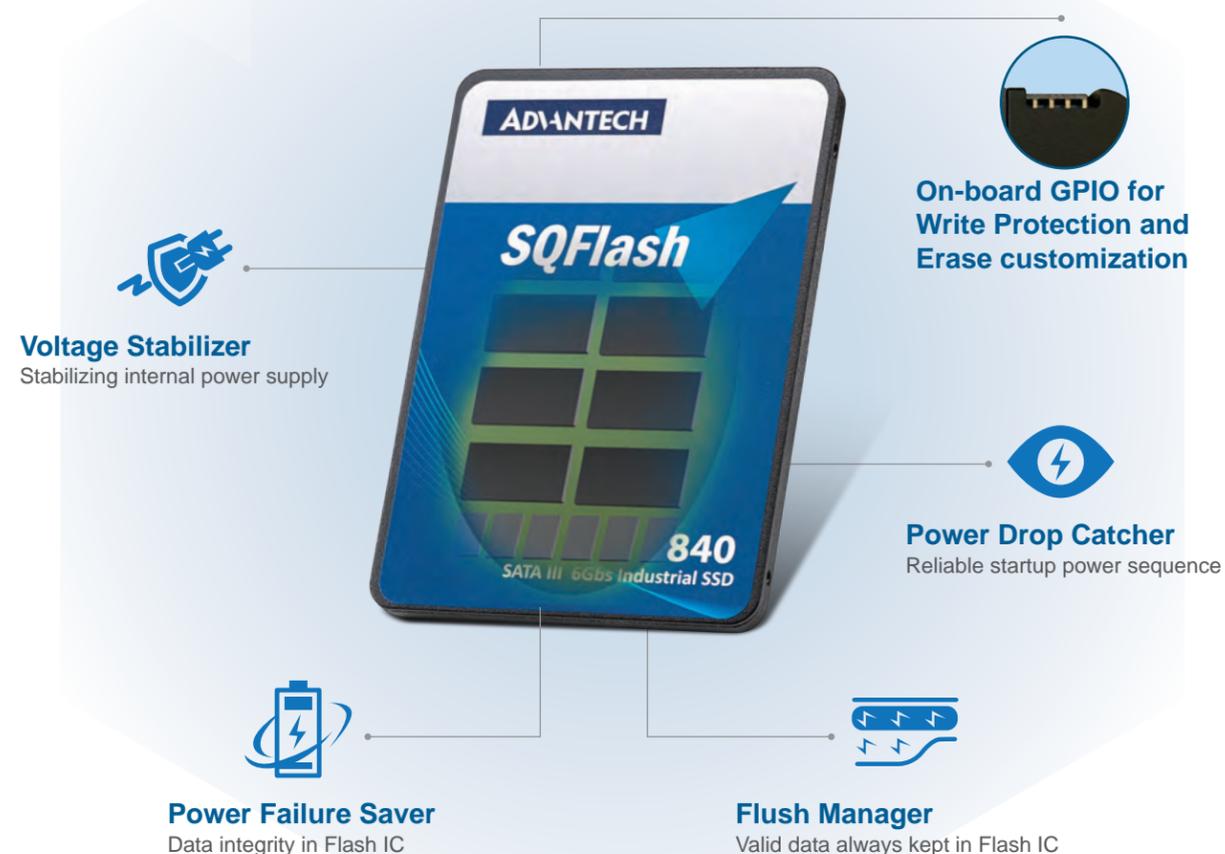
Cards and Onboard SSD	SQF-P10 CF Card	SQF-ISD SD Card	SQF-MSD Micro SD	SQF-MMC eMMC	SQF-SUS SATA onboard SSD	SQF-CUS PCIe Onboard SSD

### FIPS 140-2 Level 2 certifications

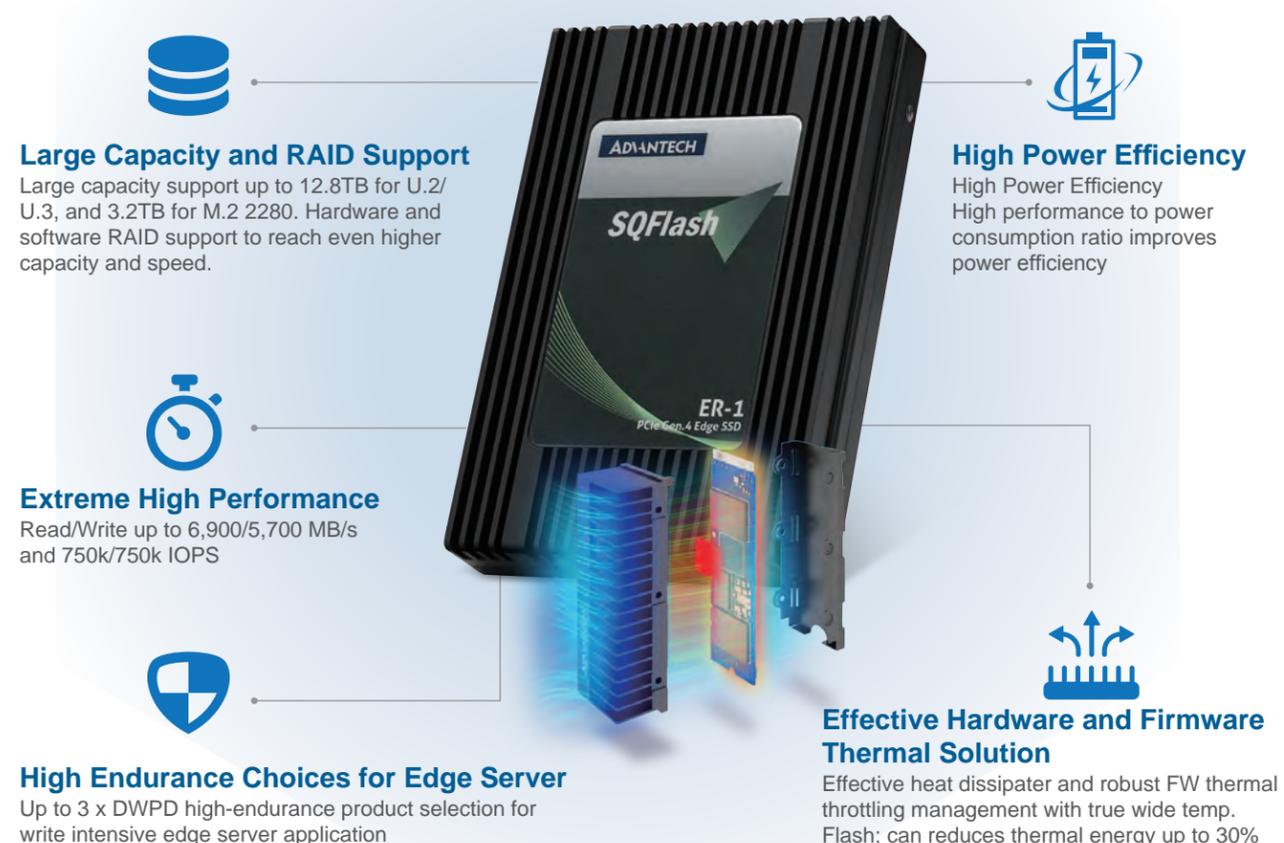


Advantech SQFlash SSD security design is verified by National Institute of Standards and Technology (NIST), an agency of US government. SQFlash 840F and 920F series meet FIPS 140-2 Level 2 certifications. The SQFlash has passed rigorous line-by-line review process, aimed at minimizing data leakage risks and protecting user data.

## Power Failure Protection



## Robust Thermal Management



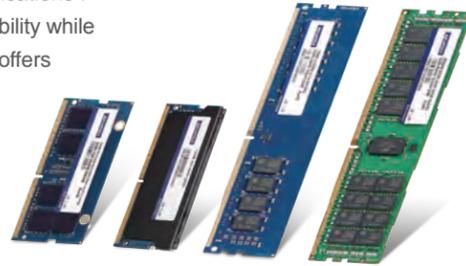
Flash Type	SLC	Ultra MLC	3D sTLC	
			BiCS4 (96-layer)	BiCS5 (112-layer)
Storage	1 bit / cell			
P/E Cycles (3D sTLC/TLC with LBPC and RAID ECC)	60k +	30k +	30k +	50k +
Op. Temp.	C-temp. 0-70 °C (T <sub>a</sub> )			
	M-temp. --			
	I-temp. -40-85 °C (T <sub>a</sub> )			
Write Performance	Highest	High	High	
Cost-per-bit	\$\$\$\$\$	\$\$\$\$	\$\$\$	
Power Consumption	Lowest	Middle	Middle	

MLC	3D TLC		
	BiCS3 (64-layer)	BiCS4 (96-layer)	BiCS5 (112-layer)
2 bits / cell	3 bits / cell		
3k +	3k +	3k +	3k +
0-70 °C (T <sub>a</sub> )	0-70 °C (T <sub>c</sub> )	0-70 °C (T <sub>a</sub> )	0-70 °C (T <sub>a</sub> )
--	--	--	-20-85 °C (T <sub>a</sub> )
-40-85 °C (T <sub>a</sub> )	-40-85 °C (T <sub>c</sub> )	--	-40-85 °C (T <sub>a</sub> )
Low	Middle	Middle	Middle
\$\$\$	\$\$	\$\$	\$
Highest	Low	Middle	Low

# SGRAM

## Pioneering Industrial Reliable Memory

SGRAM delivers a wide spectrum product portfolio for AI and industrial applications. All SGRAM memory modules use fixed die ICs to ensure quality and compatibility while providing a 3-year longevity guarantee & limited lifetime warranty. The series offers ruggedized wide temperature solutions with an extra sidefill and coating service for harsh environments. Our unique software solution helps you easily monitor SGRAM temperature and status.



### Key Features



#### Anti-Sulfur Technology

- Special alloy materials used as passive components, which have passed the anti-sulfuration test to operate steadily in a harsh environments



#### 30µm Gold Finger

- Extra-thick gold-plated connectors ensure signal transmission and high stability
- User friendly Chamfer Golden finger



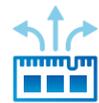
#### Smart DRAM Management Software

- Monitor operating temperatures and real-time system speeds
- Overheating alerts
- Background dynamic monitoring



#### Wide-Temperature Support

- Diverse temperature range support
- Extended temperature: -20-85 °C
- Wide temperature: -40-85 °C
- Ultra wide temperature: -40-105 °C / -40-125 °C



#### Industrial Heatsink Solution

- Ability to quickly disperse heat in high-temperature environments
- Compatible with all form factors



#### Robust Design

- 48hr burn-in test program
- Rugged DIMM with mounting holes resist shock and extreme vibration
- Fixed BOM and 3-year longevity



#### Customization Services

- Conformal coating
- Sidefill



#### SPD Write Protect

- Secure DRAM parameter settings
- Reversible Software Write Protection(RSWP)



#### Military Mechanical Certification

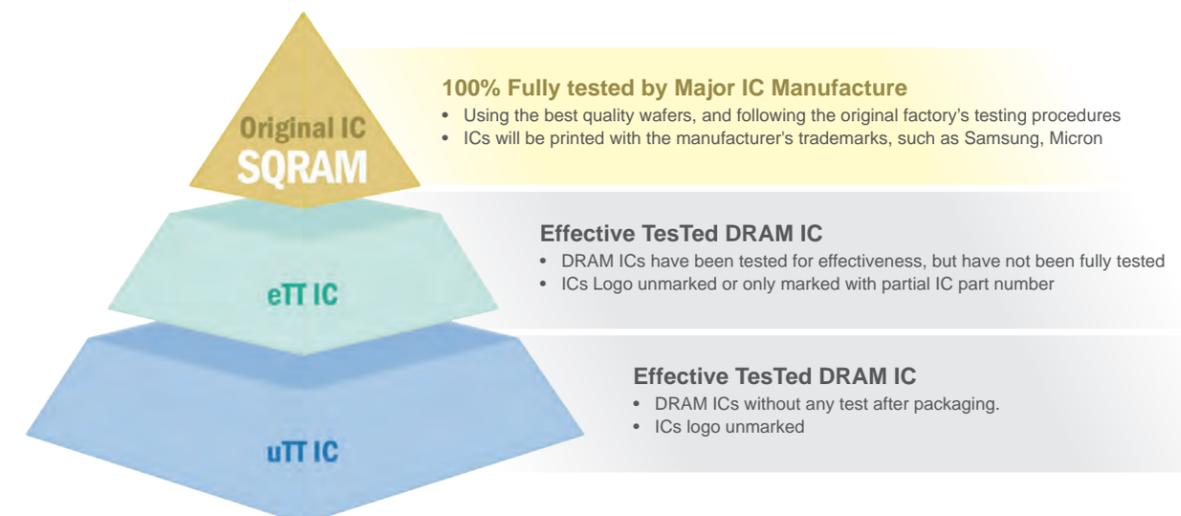
- MIL-810G verified
- Passed test with 6 directions, 18 shocks

Advantech SGRAM series offers a range of product lines including Unbuffered DIMM, ECC DIMM, Server DIMM, and Rugged DIMM with speeds of DDR4, DDR3, DDR2, and DDR1. The latest DDR5 is ready to give you a total upgrade in operating performance.

	Embedded Series	Robust Series	Server Series
DDR5	<b>SODIMM</b> <ul style="list-style-type: none"> <li>• SQR-SD5N</li> </ul> <b>UDIMM</b> <ul style="list-style-type: none"> <li>• SQR-UD5N</li> </ul>	<b>SODIMM</b> <ul style="list-style-type: none"> <li>• SQR-SD5I/SQR-SD5U</li> </ul> <b>Rugged DIMM</b> <ul style="list-style-type: none"> <li>• SQR-YD5N</li> </ul> <b>ECC DIMM</b> <ul style="list-style-type: none"> <li>• SQR-SD5I(ECC)</li> </ul>	<b>RDIMM</b> <ul style="list-style-type: none"> <li>• SQR-RD5N</li> </ul> <b>ECC DIMM</b> <ul style="list-style-type: none"> <li>• SQR-SD5(ECC)</li> <li>• SQR-UD5(ECC)</li> </ul>
DDR4	<b>SODIMM</b> <ul style="list-style-type: none"> <li>• SQR-SD4N</li> </ul> <b>UDIMM</b> <ul style="list-style-type: none"> <li>• SQR-UD4N</li> </ul>	<b>SODIMM</b> <ul style="list-style-type: none"> <li>• SQR-SD4I/SQR-SD4E</li> </ul> <b>Rugged DIMM</b> <ul style="list-style-type: none"> <li>• SQR-YD4N</li> </ul> <b>ECC DIMM</b> <ul style="list-style-type: none"> <li>• SQR-SD4I(ECC)</li> </ul>	<b>RDIMM</b> <ul style="list-style-type: none"> <li>• SQR-RD4N</li> </ul> <b>LRDIMM</b> <ul style="list-style-type: none"> <li>• SQR-LD4N</li> </ul> <b>ECC DIMM</b> <ul style="list-style-type: none"> <li>• SQR-SD4(ECC)</li> <li>• SQR-UD4(ECC)</li> </ul>
DDR3	<b>SODIMM</b> <ul style="list-style-type: none"> <li>• SQR-SD3N</li> </ul> <b>UDIMM</b> <ul style="list-style-type: none"> <li>• SQR-UD3N</li> </ul>	<b>SODIMM</b> <ul style="list-style-type: none"> <li>• SQR-SD3I</li> </ul> <b>Heatsink DIMM</b> <ul style="list-style-type: none"> <li>• SQR-HS3I</li> </ul> <b>ECC DIMM</b> <ul style="list-style-type: none"> <li>• SQR-SD3I(ECC)</li> </ul>	<b>ECC DIMM</b> <ul style="list-style-type: none"> <li>• SQR-SD3(ECC)</li> </ul>

### Memory IC Quality Level

Advantech's industrial-grade SGRAM memory modules are only selected original-grade IC chips which have passed through various rigorous internal tests to ensure the highest quality.



# DeviceOn/SQ Manager

Intelligent Monitoring Tool With Cloud Capabilities

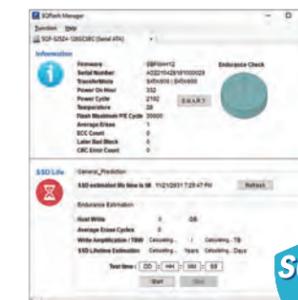


DeviceOn/SQ Manager is a smart software utility that secures data 24/7. Indeed, it allows users to access information on disk health, lifespan, device power-on time, temperature, power-cycle, and event logs in real-time for diagnostic purposes. Advantech's solution enables users to execute predictive maintenance and budget for repair and replacement early. The software significantly reduces service times and cost by helping users monitor and diagnose systems remotely, as well as update mass edge devices over the air. Additionally, SQ Manager provides full spectrum of security protection in different OS and BIOS. Users can contact Advantech's technical support for immediate action upon receiving alerts. Advantech also provides customized services such as conformal coating/underfill and SPD tuning with full hardware, software, and firmware aimed at supporting diverse applications.

## SSD Health Performance Monitoring

### Disk status and endurance estimation

- Monitor SQFlash health status. Early-warning mechanism can be performed with API integration
- Real time SSD endurance prediction based on user operation history



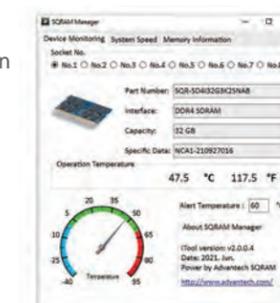
### Disk security management and encryption

TCG OPAL compliant drive encryption and Crypto Erase

## DRAM Dynamic Speed/Thermal Monitoring

### DRAM real-time status processing

- System speed monitoring
- Easily check system memory information include speed, capacity loading and operating temperature
- Memory SPD timing information
- Memory product record



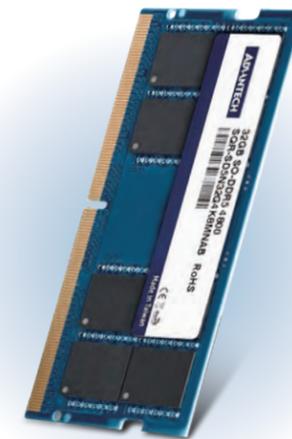
### Temperature Alerts

- Thermal alert will be trigger when memory operating temperature overheat.
- Alert temperature could be set up depends on user environment.



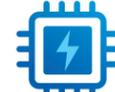
## Pioneering DDR5 Choice

SQRAM leverages next-gen technology to deliver excellent performance, compatibility, and efficient power management with a 2-fold increase in speed, and an innovative channel structure that empowers industrial, high-performance computing (HPC) and AI inference applications.



### Advanced-Fast Performance

- Data rate 3200~6400MT/s,
- 50% faster compared to DDR4.



### PMIC Adopted

- Make for better power supply and higher signal integrity.



### On-Die ECC Support

- Detect and correct the error before sending data to the CPU to enhance system stability.



### Independent Dual-channel Transfer

- 2 sub-channel per DIMM increase performance

## Exclusive Ultra-Wide Temperature Solution

The ultra-wide temperature series is an innovative solution for critical markets, delivering industrial-grade stability with a wide range of operating temperature from -40-125 °C. The rugged design is an excellent choice for temperature-sensitive applications like transportation or mission critical markets.



### Sidefill Technology



### Upper Industrial 48HR Burn-in program



### Automotive Grade IC



### Operating Environment Heat up to 125 °C

# Embedded Extension Modules

## Dynamic Connectivity for Versatile Applications

Advantech's embedded extension modules (EXM) are standard full-sized Mini PCIe modules equipped with variety of I/O interfaces. EXM users can extend extra interface ports without customization or board modification. This eases EXM modules/adaptor integration and delivers high flexibility to a diverse range of embedded, automation, transportation, and networking applications.



EXM modules provide standard full size Mini PCIe modules that support a variety of I/O for embedded boards and systems.

### Product Highlights



- Adapter  
**EXM-CMPF1** A or E key
- M.2 (NGFF) to mPCIe (PCIe+USB) adapter
  - Supports MiniPCIe thru PCIe and USB
  - Full-size MiniPCIe with -40 ~ 85 °C



- SATA Port  
**EXM-520**
- Supports PCIe to 2-Ch SATA III port
  - Mini PCIe thru PCIe interface
  - Full-size Mini PCIe with -10 ~ 70 °C



- Giga LAN Port  
**EXM-510**
- Supports PCIe to 1-Ch Giga LAN port
  - MiniPCIe thru PCIe interface
  - Full-size MiniPCIe with -40 ~ 85 °C



- Giga LAN Port  
**EXM-523**
- Supports PCIe to 2-Ch Giga LAN port
  - MiniPCIe thru Pcle interface
  - Full-size MiniPCIe + Extension board with 0 ~ 70 °C

### Applications



Elevator Communication  
Quickly extend CANBus interfaces



CANBus  
**EXM-320**



Fanless Box PC  
**ARK-2121**



Kiosk Applications  
Quickly extend USB 3.0 interfaces



USB 3.0  
**EXM-521**



Embedded Box PC  
**AIMB-B2274**



HMI  
Quickly extend high-speed serial COM modules



Serial COM  
**EXM-311**



MI/O-Compact SBC  
**MIO-5272**



Railway NVR Applications  
Quickly extend serial ATA ports



SATA Port  
**EXM-520**



Fanless Compact System  
**ITX-5710**

## Automation

Industrial automation applications require memory and storage solutions with excellent stability, longevity and endurance. Automation application high-frequency write functions accentuate the importance of high endurance design, and 3 years of longevity support. Advantech offers SLC flash technology for applications that require the absolute best endurance. Using sTLC delivers 10 x the endurance of standard TLC and is significantly more cost effective than comparable SLC.



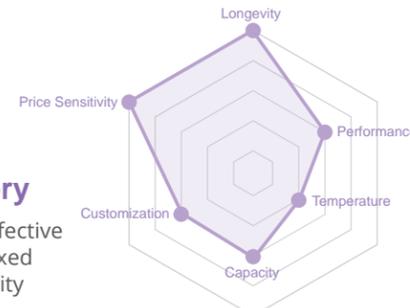
### Storage

- 24/7 operation
- Extraordinary reliability and endurance
- Remote life monitoring



### Memory

- Cost effective
- BOM fixed
- Longevity



**AMF-P10**  
512MB - 256GB  
0 ~ 70 °C / -40 ~85 °C

**SQF-SMS 650**  
32GB - 2TB  
0~70 °C / -20~85 °C / -40~85 °C

**SQR SD3N**  
SODIMM  
1600  
0~85 °C  
2GB - 8GB

**SQR-SD4N**  
SODIMM  
2666 / 3200  
0~85 °C  
4GB - 32GB

## Defense/Aerospace

Advantech provides ruggedized storage and memory solutions that meet the challenges presented by wide temperature and high humidity during 24/7 operation in military and aerospace applications. Advantech solutions are designed with an integrated suite of security features — including data encryption, emergency erase, and Trellix & Acronis security and backup solutions that keep data safe.



### Storage

- Ruggedized design and customization
- Advanced security features
- Greater longevity



### Memory

- Wide temperature
- High speed
- Coating / Sidfill service



**SQF-S25 840**  
240GB - 15.3TB  
0-70 °C / -40~85 °C

**SQF-C8M 720**  
128GB - 2TB  
0-70 °C / -20~85 °C /  
-40~85 °C

**SQR-YD4I**  
Rugged DIMM  
2666 / 3200  
-40~85 °C  
16GB - 32GB

**SOR-SD5(ECC)**  
ECC SODIMM  
4800 / 5600  
0~85 °C / -40~85 °C  
16GB - 32GB

## Transportation

Due to harsh operating environments and strict certification needs, ruggedized design and extra longevity are frequent requests for transportation applications. Advantech offers SQFlash and SQRAM products with market-leading ruggedness and 3 to 5 year longevity period, which enhance product reliability for applications like surveillance, data logging, and infotainment in the transportation field.



### Storage

- Advanced thermal solution
- Large capacity
- Utility and AES-256-bit support



### Memory

- High speed
- High capacity
- Corrosion resistance



**SQF-S25 840**  
240GB - 15.3TB  
0-70 °C / -40~85 °C

**SQF-C25 920**  
240GB - 15.3TB  
0-70 °C / -40~85 °C

**SQR-YD4I**  
Rugged DIMM  
2666 / 3200  
-40~85 °C  
16GB - 32GB

**SQR-SD4I**  
SODIMM  
2666 / 3200  
-40~85 °C  
4GB - 32GB

## Networking

Reliable 24/7 operation is mandatory for networking applications. Advantech provides the latest storage and memory solutions such as NVMe SSD and DDR4 memory at 2666/2933/3200 MHz which delivers the highest performance, capacity, and maximum endurance the industry demands.



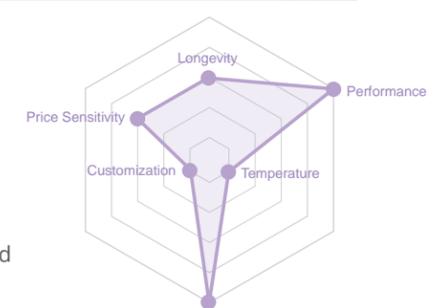
### Storage

- Quad-core processor
- Power efficiency and high endurance
- Remote monitor and management



### Memory

- Server grade
- Extreme speed
- High capacity
- ECC function



**SQF-CU2 ER-1**  
400GB - 12.8TB  
0-70 °C / -40~85 °C

**SQF S25 840L**  
480GB - 3.8TB  
0 ~ 70 °C

**SQR-RD4N**  
2666 / 3200  
0~85 °C  
8GB - 128GB

**SQR-UD5N(ECC)**  
ECC UDIMM  
4800 / 5600  
0~85 °C  
16GB - 32GB



## Multiple Temperature Support SATA & NVMe SSDs for EV Charger

Region: North America

### Project Introduction

The widening adoption of EV, BEV, and HEV are increasing demands for charging stations at garages or in outdoor public parking lots. These charging stations need storage solutions that support efficient and reliable operation at a wide range of operating temperatures. The Advantech SQFlash 650 SATA and 720 NVMe SSD solutions are excellent choices for such applications.

### Project Requirements

Electric vehicles often have a limited charge capacity that runs out after several hours of driving. Fast, effective, and stable charging services are necessary for their successful operation. This makes system storage solutions capable of enduring wide operating temperatures and outdoor operation crucial.

- SSDs need to function stably in diverse environments
- They need to endure constant, daily use for years on end

### Project Description

The Advantech SQFlash 650 SATA and 720 NVMe SSDs is an excellent solution for such applications. These SSD use KIOXIA's BiCS 3D NAND Flash technology and support up to 2 TB per drive capacity at different temperature ranges (between -40 - 85 °C). Whether applied in private garages or outdoor parking lots, EV charging stations must be capable enduring different environments. Advantech SQFlash 650 SATA and 720 NVMe SSDs are capable of robust operation in such situations.

### Product Specifications

SQFlash 650 SATA and 720 NVMe SSDs

- Up to 2TB (0 - 70 °C / -20 - 85 °C / -40 - 85 °C)
- 100% burn in test at production line before shipment
- SQFlash stress test for 24-hr high-low burn-in test with 100% full loading criteria; and low temperature boot up test with 1000cycles



## SQFlash Ultra-Speed Rugged NVMe PCIe Gen4 SSD for 5G Edge Computing in Data Logging Applications

Region: Europe

### Project Introduction

5G edge servers used in Data Logging applications must provide low-latency, high-bandwidth computing resources at the network edge. This enables faster and more efficient data processing. These resources are particularly useful in surveillance, in-vehicle, and aviation applications.

### Project Requirements

The demand for mission-critical data loggers is driven by the need for reliable and accurate data collection in extreme environments with high-stress conditions. The use of storage servers or Network Attached Storage (NAS) enables secure and efficient storage and retrieval of mission-critical data — including maps, images, and video footage. NAS for mission-critical data also enable real-time data processing and analysis to empower situational awareness, intelligence gathering, and decision-making.

### Project Description

ER-1, SQFlash NVMe PCIe Gen4 SSD, is designed for high-speed, low-latency data transmission and processes. ER-1 adopts KIOXIA's BiCS 3D NAND Flash technology, supports read and write performance up to 7,100 and 6,700 MB/s, and a capacity of up to 15.3 TB per drive. M.2 2280 and U.2 ER-1 leverage Advantech industrial heat sinks along with robust firmware thermal throttling mechanism. To maximize heat dissipation, these heatsinks are used in conjunction with thermal grease. This provides outstanding mechanical flexibility and reduces the risk of physical damage caused by abrupt temperature changes. In the application, Advantech SQFlash ER-1 NVMe SSD is used as an SED drive. It is compliant with TCG-OPAL 2.0 and supports AES-256 encryption. Likewise, it comes with diverse security erase functions powered with SQErase tool.

### Product Specifications

SQF-CU2 ER-1 and SQF-C8M ER-1

- SQFlash ER-1 DWPD 1 / DWPD 3 NVMe SSD up to 15.3TB / 6.4TB (0 - 70 °C / -40 - 85 °C)
- 100% burn in test at the production line before shipment
- SQFlash stress test for 24-hr high-low burn-in test with 100% full loading criteria; and low temperature boot up test with 1000cycles





## Memory Solution for Highway Toll Stations

Region: Africa

### Project Introduction

An SI in Morocco needed a memory solution for highway toll stations. Indeed, they needed to upgrade to faster DRAM solutions with larger capacity and better reliability to ensure efficient collection. After the upgrade, the machines at the station were able to process data faster. This resulted in reduced waiting times and improved efficiency.

### Problem Statement

Tolling machines operate outdoors in environments with heavy of vibration. They need to be reliable and vibration resistant, and to provide excellent longevity. In sum, they needed to endure daily use on the side of busy highways.

Advantech's SGRAM solution with 30μ" chamfer edge gold finger solution enhances the vibration resistance and durability of memory modules. Gold finger connectors provide a reliable, high-speed interface between the DRAM modules and machines. The connector interface is more reliable and can withstand the harsh conditions presented by industrial applications.

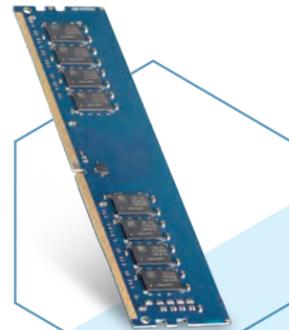
### Project Description

The SGRAM solutions in this case were tested in diverse traffic conditions to ensure performance and reliability. In the end, the machines with upgraded DRAM modules processed transactions faster with lower error rates, while demonstrating improved stability in heavy traffic conditions.

### Product Specifications

SQR-UD4N

- Industrial-grade IC with high-quality Samsung original IC & fixed die
- 100% reliability burn-in and vibration testing program
- Anti-Sulfuration provide protection when used in harsh environments



### Why Advantech:

- **30μ" Chamfer edge Gold Fingers**
- **3yrs longevity fixed die**
- **Limited lifetime warranty**
- **Compatibility with motherboard AIMB-706**



## Durable designed DDR4 memory against minus degree environment for Outdoor EV chargers

Region: Europe

### Project Introduction

EV charging units are often installed in outdoor environments with extremely low temperatures. As the climates or seasons change, EV charger station devices face challenges created by unpredictable temperatures. Wide temperature DRAM memory peripherals avoid operational problems by stabilizing functionality in harsh environments.

### Customer Pain Points

Our customers in Europe face critical cold weather challenges. Indeed, winter conditions cause system boot up problems and unstable operation in outdoor applications. Accordingly, wide temperature systems and robust DRAM memory is necessary for harsh environment operation.

- Unstable system operation and boot up problems in cold weather
- Challenges arise when the weather changes suddenly, during heavy rains, or after dusk

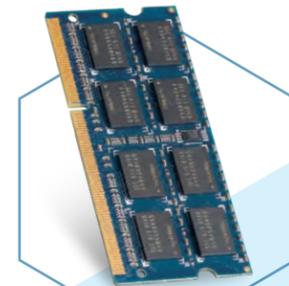
### Project Description

The European customer in this case had a rugged motherboard but needed a memory solution capable of enduring cold temperatures. Accordingly, industrial DRAM memory was chosen to stabilize system operation.

### Product Specifications

SQR-SD3I

- SQR is tested via a 24-hr high-low burn-in stress test (-40-85 °C) with 100% full loading criteria; and low temperature boot up with 1000 cycles
- Qualified by 3rd party to ensure 30u" thickness golden finger and provide stable data transfer quality even when used in outdoor applications
- 100% inspection with customized criteria before shipment



### Why Advantech:

- **Reliable product quality**
- **3yrs longevity stable supplying**
- **Customization service**
- **Prompt and professional technical team support**

# SQFlash Industrial Storage Modules

## SATA SSD

Performance Series      Power Loss Protection      Enterprise Series      FIPS Certified



Model Name	SQF-S25 840 series	SQF-SM8 840 series	SQF-SMS 840 series	SQF-S25 840V series	SQF-S25 840L series	SQF-S25 840F series	SQF-SM8 840F series
<b>Form Factor</b>	2.5" SATA SSD	M.2 2280 SATA SSD (NGFF)	mSATA SSD (MO-300A)	2.5" SATA SSD	2.5" SATA SSD	2.5" SATA SSD	M.2 2280 SATA SSD
<b>Transfer Protocol</b>	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s
<b>Connector</b>	7 + 15 pin SATA	M.2 with B+M key SATA pin-out	Mini PCIe with SATA pin-out	7 + 15 pin SATA	7 + 15 pin SATA	7 + 15 pin SATA	M.2 with B+M key SATA pin-out
<b>Flash Type</b>	3D TLC / sTLC	3D TLC	3D TLC	3D TLC	3D TLC	3D TLC	3D TLC
<b>Maximum Power Consumption</b>	4.6W	3.0W	3.0W	3.7W	3.4W	2.2W	2.0W
<b>Capacity</b>	TLC: 240GB - 15.3TB sTLC: 60GB - 1.9TB	240GB - 1.9TB	240GB - 1.9TB	240GB - 7.6TB	240GB - 7.6TB	240GB - 1.9TB	240GB - 1.9TB
<b>Maximum Read / Write Performance (MB/s)</b>	Sequential: 550 / 530 Random IOPS@4K: 100K/90K	Sequential: 550 / 530 Random IOPS@4K: 100K/90K	Sequential: 550 / 520 Random IOPS@4K: 100K/90K	Sequential: 550 / 530 Random IOPS@4K: 100K / 100K	Sequential: 550 / 530 Random IOPS@4K: 100K/90K	Sequential: 550 / 530 Random IOPS@4K: 100K/90K	Sequential: 550 / 530 Random IOPS@4K: 100K/90K
<b>Op. Temperature</b>	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -40 - 85 °C
<b>DeviceOn/ SQ Manager</b>	Supported	Supported	Supported	Supported	Supported	Supported	Supported
<b>Shock</b>	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms			
<b>Vibration</b>	20G, Peak / 80 -2,000 Hz	20G, Peak / 80 -2,000 Hz	20G, Peak / 80 -2,000 Hz	20G, Peak / 80 -2,000 Hz			

Embedded Series



Model Name	SQF-S25 650 series	SQF-SMS 650 series	SQF-S8B 650 series	SQF-S4B 650 series	SQF-SHM 650 series	SQF-S10 650 series	SQF-SLM 650 series
<b>Form Factor</b>	2.5" SATA SSD	mSATA SSD	M.2 2280 SATA SSD	M.2 2242 SATA SSD	Half-size mSATA SSD	CFast SATA SSD Card	Half Slim SATA SSD
<b>Transfer Protocol</b>	SATA 6Gb/s						
<b>Connector</b>	7 + 15 pin SATA	Mini PCIe with SATA pin-out	M.2 with B+M key SATA pin-out	M.2 with B+M key SATA pin-out	Mini PCIe with SATA pin-out	CFast Type-I	7 + 15 pin SATA
<b>Flash Type</b>	3D TLC / sTLC	3D TLC					
<b>Maximum Power Consumption</b>	1.8W	1.8W	1.8W	1.8W	1.3W	1.6W	1.4W
<b>Capacity</b>	TLC: 64GB - 2TB sTLC: 32GB - 512GB	TLC: 64GB - 2TB sTLC: 32GB - 512GB	TLC: 64GB - 2TB sTLC: 32GB - 512GB	TLC: 64GB - 1TB sTLC: 32GB - 256GB	TLC: 64GB - 1TB sTLC: 32GB - 256GB	TLC: 64GB - 512GB sTLC: 32GB - 128GB	TLC: 64GB - 1TB
<b>Maximum Read / Write Performance (MB/s)</b>	Sequential: 550 / 520 Random IOPS@4K: 96K/86K	Sequential: 550 / 510 Random IOPS@4K: 89K/86K	Sequential: 550 / 510 Random IOPS@4K: 91K/85K	Sequential: 550 / 520 Random IOPS@4K: 96K/87K			
<b>Op. Temperature</b>	0 - 70 °C / -20 - 85 °C / -40 - 85 °C	0 - 70 °C / -20 - 85 °C / -40 - 85 °C	0 - 70 °C / -20 - 85 °C / -40 - 85 °C	0 - 70 °C / -20 - 85 °C / -40 - 85 °C	0 - 70 °C / -20 - 85 °C / -40 - 85 °C	0 - 70 °C / -20 - 85 °C / -40 - 85 °C	0 - 70 °C / -20 - 85 °C / -40 - 85 °C
<b>DeviceOn/ SQ Manager</b>	Supported						
<b>Shock</b>	1,500G, Peak / 0.5 ms						
<b>Vibration</b>	20G, Peak / 80 -2,000 Hz						

## NVMe SSD

Edge Server      Enterprise Series      Embedded Series



Model Name	SQF-CU2 ER-1 series	SQF-C8M ER-1 series	SQF-C8M 930 series	25SQF-C25 920 series	SQF-C8M 920 series	SQF-C3A 720 series	SQF-C4M 720 series	SQF-C8B 720 series	SQF-C8M 720 series	SQF-CFX 720 series
<b>Form Factor</b>	2.5" U.2 NVMe SSD	M.2 2280 NVMe SSD	M.2 2280 NVMe SSD	2.5" U.2 NVMe SSD	M.2 2280 NVMe SSD	M.2 2230 NVMe SSD (NGFF)	M.2 2242 NVMe SSD (NGFF)	M.2 2280 NVMe SSD (NGFF)	M.2 2280 NVMe SSD (NGFF)	CFexpress card
<b>Transfer Protocol</b>	PCIe Gen.4 x4	PCIe Gen.4 x4	PCIe Gen.4 x4	PCIe Gen.3 x4	PCIe Gen.3 x4	PCIe Gen.3 x2	PCIe Gen.3 x4	PCIe Gen.3 x2	PCIe Gen.3 x4	PCIe Gen.3 x2
<b>Connector</b>	U.2 NVMe Interface (SFF-8639)	M.2 M key with PCIe pin-out	M.2 M key with PCIe pin-out	U.2 NVMe Interface (SFF-8639)	M.2 M key with PCIe pin-out	M.2 A+E key with PCIe pin-out	M.2 M key with PCIe pin-out	M.2 B+M key with PCIe pin-out	M.2 M key with PCIe pin-out	CFexpress (Type B)
<b>Flash Type</b>	3D TLC	3D TLC	3D TLC	3D TLC	3D TLC	3D TLC / sTLC	3D TLC / sTLC	3D TLC / sTLC	3D TLC / sTLC	3D TLC / sTLC
<b>Maximum Power Consumption</b>	11.5W	7.3W	11W	7.5W	5.5W	2.0W	3.6W	3.0W	3.6W	3.4W
<b>Capacity</b>	400GB - 6.4TB	400GB - 3.2TB	400GB - 3.8TB	400GB - 15.3TB	240GB - 1.9TB	TLC: 128GB - 512GB sTLC: 32GB - 128GB	TLC: 128GB - 2TB sTLC: 32GB - 512GB	TLC: 128GB - 2TB sTLC: 32GB - 512GB	TLC: 128GB - 2TB sTLC: 32GB - 512GB	TLC: 128GB - 1TB sTLC: 32GB - 256GB
<b>Maximum Read / Write Performance (MB/s)</b>	Seq. : 6,900 / 5,700 Ran. IOPS@4k: 779k / 761k	Seq. : 6,500 / 5,000 Ran. IOPS@4k: 779k / 753k	Seq. : 7,200 / 6,300 Ran. IOPS@4k: 550k / 1000k	Seq. : 3,300 / 3,000 Ran. IOPS@4k: 650k / 470k	Seq. : 3,300 / 3,000 Ran. IOPS@4k: 650k / 650k	Seq. : 1,200 / 900 Ran. IOPS@4k: 130k / 210k	Seq. : 2,450 / 1,900 Ran. IOPS@4k: 250k / 420k	Seq. : 1,750 / 1,650 Ran. IOPS@4k: 260k / 380k	Seq. : 2,450 / 1,900 Ran. IOPS@4k: 250k / 420k	Seq. : 1,750 / 1,650 Ran. IOPS@4k: 270k / 380k
<b>Op. Temperature</b>	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -20 - 85 °C / -40 - 85 °C	0 - 70 °C / -20 - 85 °C / -40 - 85 °C	0 - 70 °C / -20 - 85 °C / -40 - 85 °C	0 - 70 °C / -20 - 85 °C / -40 - 85 °C	0 - 70 °C / -20 - 85 °C / -40 - 85 °C
<b>DeviceOn/ SQ Manager</b>	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
<b>Shock</b>	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5ms	1,500G, Peak / 0.5ms	1,500G, Peak / 0.5ms	1,500G, Peak / 0.5ms	1,500G, Peak / 0.5ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms
<b>Vibration</b>	20G, Peak / 80 -2,000 Hz	20G, Peak / 80 -2,000 Hz	20G, Peak / 80 -2,000 Hz	20G, Peak / 80 -2,000Hz	20G, Peak / 80 -2,000 Hz	20G, Peak / 80 -2,000Hz	20G, Peak / 80 -2,000 Hz			

## Other Flash Product

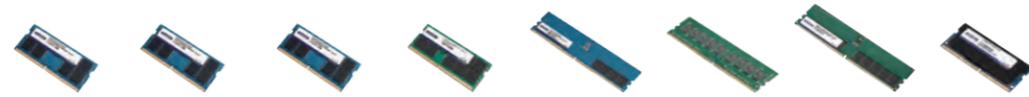
Onboard BGA SSD      eMMC      High Speed Card      Pen Drive



Model Name	SQF-CUS 730 series	SQF-SUS 640 series	SQF-MM5	SQF-MMC	SQF-1SD	SQF-MSD	SQF-UPD
<b>Form Factor</b>	291 ball BGA -1620	156 ball BGA -1620	153 ball BGA -1113	100 ball BGA -1113	SD Card	Micro SD Card	USD Drive
<b>Transfer Protocol</b>	PCIe Gen.4 x4	SATA 6Gb/s	eMMC 5.0	eMMC 5.0	UHS-I, CL10, A2 SD / SPI	UHS-I, CL10, A2 SD / SPI	USB 3.2 GEN 1
<b>Connector</b>	N/A	N/A	N/A	N/A	9-pin	8-pin	USB-A
<b>Flash Type</b>	3D TLC	MLC / UMLC / 3D TLC	MLC / UMLC / 3D TLC	MLC / UMLC	3D TLC / sTLC	3D TLC / sTLC	3D TLC
<b>Maximum Power Consumption</b>	3.2W	1.5W	0.4W	0.4W	1.4W	1.4W	1.8W
<b>Capacity</b>	256GB - 1TB	4GB - 512GB	2GB - 64GB	2GB - 64GB	16GB - 256GB	16GB - 512GB	64GB - 256GB
<b>Maximum Read / Write Performance (MB/s)</b>	Seq. : 3,700 / 3,000 Random IOPS@4k: 600k / 310k	Seq. : 550 / 490 Random IOPS@4k: 74k / 86k	Seq. : 250/ 150 HS200 Upto 200MB/s HS400 Upto 400MB/s	Seq. : 250/ 150 HS200 Upto 200MB/s HS400 Upto 400MB/s	Seq. : 100/ 93 Random IOPS@4k: 9.8k / 2.7k (Up to V30)	Seq. : 100/ 93 Random IOPS@4k: 9.8k / 3.8k (Up to V30)	Seq. : 210/ 60
<b>Op. Temperature</b>	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -40 - 85 °C	0 - 70 °C / -40 - 85 °C	-25 - 85 °C / -40 - 85 °C	-25 - 85 °C / -40 - 85 °C	0 - 70 °C

## SQRAM Industrial Memory Modules

DDR5 **NEW**



Series	SQR-SD5N	SQR-SD5I	SQR-SD5U	SQR-SD5 (ECC)	SQR-UD5N	SQR-UD5 (ECC)	SQR-RD5N	SQR-HS5N
Interface	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5	DDR5
Form Factor	SODIMM	SODIMM	SODIMM	SODIMM	UDIMM	UDIMM	RDIMM	SODIMM
Pin	262pin	262pin	262pin	262pin	288pin	262pin	288pin	262pin
Frequency(MHz)	5600/4800	5600/4800	5600/4800	5600/4800	5600/4800	5600/4800	5600/4800	5600/4800
Capacity	8/16/24/32/48	8/16/24/32/48	8/16/32	16/32	8/16/24/32/48	16/32GB	16/32/64/128GB	8/16/24/32/48
Voltage	1.1v	1.1v	1.1v	1.1v	1.1v	1.1v	1.1v	1.1v
Temperature	0-95°C	-40-95°C	-40-105°C	0-95°C	0-95°C	0-95°C	0-95°C	0-95°C

DDR4



Series	SQR-SD4N	SQR-SD4I	SQR-SD4E	SQR-SD4 (ECC)	SQR-UD4N	SQR-UD4 (ECC)	SQR-RD4N	SQR-RD4I	SQR-YD4N	SQR-HS4N
Interface	DDR4	DDR4	DDR4	DDR4	DDR4	DDR4	DDR4	DDR4	DDR4	DDR4
Form Factor	SODIMM	SODIMM	SODIMM	SODIMM	UDIMM	UDIMM	RDIMM	RDIMM	RUGGED DIMM	SODIMM
Pin	262pin	262pin	262pin	262pin	288pin	288pin	288pin	288pin	260pin	262pin
Frequency(MHz)	3200/2666	3200/2666	3200	3200/2666	3200/2666	3200/2666	3200/2666	3200/2666	3200/2666	3200/2666
Capacity	8/16/32GB	8/16/32GB	8/16/32GB	8/16/32GB	8/16/32GB	4/8/16/32GB	8/16/32/64/128GB	8/16/32/64/128GB	16/32GB	8/16/32GB
Voltage	1.2v	1.2v	1.2v	1.2v	1.2v	1.2v	1.2v	1.2v	1.2v	1.2v
Temperature	0-85°C	-40-85°C	-40-125°C	0-85°C	0-85°C	0-85°C	0-85°C	-40-85°C	0-85°C	0-85°C

DDR3/DDR2/DDR1



Series	SQR-SD3N	SQR-SD3I	SQR-SD3 (ECC)	SQR-UD3N	SQR-UD3N (ECC)	SQR-HS3N	SQR-SD2N	SQR-SD1N
Interface	DDR3	DDR3	DDR3	DDR3	DDR3	DDR3	DDR2	DDR1
Form Factor	SODIMM	SODIMM	SODIMM	UDIMM	UDIMM	SODIMM	SODIMM	SODIMM
Pin	204pin	204pin	204pin	240pin	240pin	204pin	200pin	200pin
Frequency(MHz)	1600	1600	1600	1600	1600	1600	667	333
Capacity	2/4/8GB	2/4/8GB	2/4/8GB	2/4/8GB	2/4/8GB	2/4/8GB	1G/2G	512M/1G
Voltage	1.35v	1.35v	1.35v	1.35v	1.35v	1.35v	1.8v	2.5v
Temperature	0-85°C	-40-85°C	0-85°C	0-85°C	0-85°C	0-85°C	0-85°C	0-85°C

## EXM Embedded Extension Modules

Adapter



Model Name	EXM-CMPF1 (A key)	EXM-CMPF1 (E key)	EXM-110 (EMIO-100TL)
Type	M.2 (NGFF) to mPCIe (PCIe+USB) adapter	M.2 (NGFF) to mPCIe (PCIe+USB) adapter	LVDS to 1-Ch RGB TTL port
Communication Interface	PCIe and USB	PCIe and USB	18/24-bit LVDS
Interface Connector	MiniPCIe thru PCIe and USB	MiniPCIe thru PCIe and USB	External 18/24-bit LVDS, DF13-20DP-1.25V
Channel Connector	1 (2230/2242 A key)	1 (2230/2242 E key)	1
Operating Temperature	-40 ~ 85 °C	-40 ~ 85 °C	-10 ~ 70 °C
Storage Temperature	-40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C
LED Status	Activated indicator	Activated indicator	-
Dimensions (L x W x H)	50.59 x 30 x 15 mm (1.98 x 1.18 x .78 in)	50.5 x 30 x 15 mm (1.98 x 1.18 x .59 in)	50.5 x 30 x 15 mm (1.98 x 1.18 x .59 in)

PCIe Signal



Model Name	EXM-510 (EMIO-100E)	EXM-523	EXM-520 (EMIO-200SA)	EXM-521 (EMIO-200U3)	EXM-522	EXM-540
Type	PCIe to 1-Ch Giga LAN port	PCIe to 2-Ch Giga LAN port	PCIe to 2-Ch SATA III port	PCIe to 2-Ch USB 3.0 port	PCIe to 2-Ch USB 2.0 port	PCIe to 4-Ch USB 2.0 port
Communication Interface	PCIe	PCIe	PCIe	PCIe	PCIe	PCIe
Interface Connector	MiniPCIe thru PCIe	MiniPCIe thru PCIe	MiniPCIe thru PCIe	MiniPCIe thru PCIe	H/S MiniPCIe thru PCIe	MiniPCIe thru PCIe
Channel Connector	1	2	2	2	2	4
Operating Temperature	-40 ~ 85 °C	0 ~ 70 °C	-10 ~ 70 °C	-40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C
Storage Temperature	-40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C
LED Status	Reserve the LED signal for external usage	Reserve the LED signal for external usage	Activated indicator	-	-	-
Dimensions (L x W x H)	50.5 x 30 x 20 mm (1.98 x 1.18 x .78 in)	50.5 x 30 x 20 mm (1.98 x 1.18 x .78 in) + iDoor PCB Board	50.5 x 30 x 20 mm (1.98 x 1.18 x .78 in)	50.5 x 30 x 15 mm (1.98 x 1.18 x .59 in)	26.65 x 30 x 15 mm (1.04 x 1.18 x .59 in)	50.5 x 30 x 15 mm (1.98 x 1.18 x .59 in)

Note: "-" : means Not Applicable (N/A)

USB Signal



Model Name	EXM-310 (EMIO-100P)	EXM-311 (EMIO-100S)	EXM-321 (EMIO-210S)	EXM-322 (EMIO-220S)	EXM-320 (EMCB-200U)
Type	USB to 1-Ch Parallel port	USB to 1-Ch High Speed Serial COM port	USB to 2-Ch High Speed RS-232 port	USB to 2-Ch High Speed RS-422/RS-485 port	USB to 2-Ch CANBus port
Communication Interface	Combo USB (Internal/ External)	Combo USB (Internal/ External)			
Interface Connector	Internal USB port: MiniPCIe thru USB External USB port: 2.0 mm, 1x4-pin, male type wafer box	Internal USB port: MiniPCIe thru USB External USB port: 2.0 mm, 1x4-pin, male type wafer box	Internal USB port: MiniPCIe thru USB External USB port: 2.0 mm, 1x4-pin, male type wafer box	Internal USB port: MiniPCIe thru USB External USB port: 2.0 mm, 1x4-pin, male type wafer box	Internal USB port: MiniPCIe thru USB External USB port: 2.0 mm, 2x5-pin, male header
Channel Connector	1	1	2	2	2
Operating Temperature	0 ~ 70 °C	-40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C
Storage Temperature	-40 ~ 85 °C	-40 ~ 85 °C			
LED Status	Activated indicator	Activated indicator	Power On/Off: Red LED COM-1 working ; Green LED COM-2 working; Green LED	Power On/Off: Red LED COM-1 working ; Green LED COM-2 working; Green LED	Activated indicator
Dimensions (L x W x H)	50.5 x 30 x 15 mm (1.98 x 1.18 x .59 in)	50.5 x 30 x 20 mm (1.98 x 1.18 x .78 in)	50.5 x 30 x 15 mm (1.98 x 1.18 x .59 in)	50.5 x 30 x 20 mm (1.98 x 1.18 x .78 in)	50.5 x 30 x 15 mm (1.98 x 1.18 x .59 in)

## SQFlash Storage Modules

### Complete Form Factor Selection

2.5" SSD, mSATA, M.2, DOM, CFast, and Half-slim solutions



### Advanced Thermal Solution

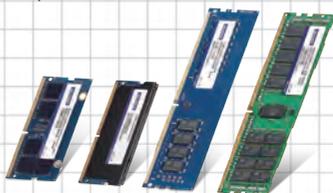
Industrial heatsink on high-capacity NVMe SSDs



## SQRAM Memory Modules

### Smart-Management Memory

SODIMM, UDIMM, ECC DIMM, and RDIMM with monitoring software



### Exclusive Ultra Wide Temperature Solution

SQR-SD4E (-40 ~ 125 °C)  
Original Micron Automotive Grade IC Adopted  
Anti-Sulfur & Sidefill Technology Support  
Limited lifetime warranty



Learn more



Mini-site

## Regional Service and Customization Centers

**China** Kunshan  
86-512-5777-5666

**Taiwan** Taipei  
886-2-2792-7818

**Netherlands** Eindhoven  
31-40-267-7000

**Poland** Warsaw  
00800-2426-8080

**USA** Milpitas, CA  
1-408-519-3898

## Worldwide Offices

### Greater China

**China**  
Toll Free 800-810-0345  
Beijing 86-10-6298-4346  
Shanghai 86-21-3632-1616  
Shenzhen 86-755-8212-4222  
Chengdu 86-28-8545-0198  
Hong Kong 852-2720-5118

**Taiwan**  
Toll Free 0800-777-111  
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