

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

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

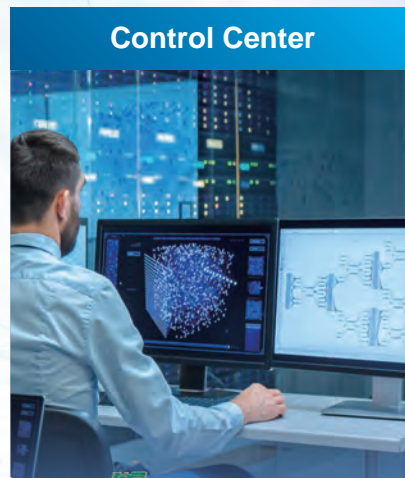


SQR-UD5N



SQF-C8M 930

Control Center

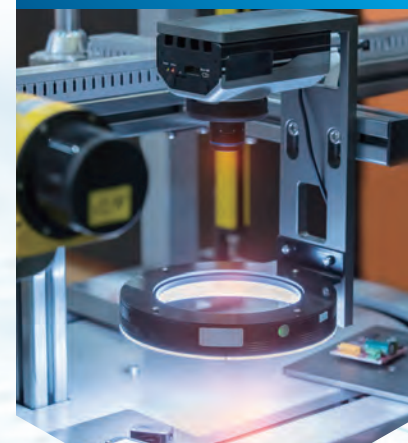


SQR-RD4N



SQF-CU2 ER-1

AOI Inspection Machines



SQR-SD5N(ECC)



SQF-S25 840

Automated Boiler Welding



SQR-SD4E



SQF-SMS 650

ARM Robotics



SQR-SD4N

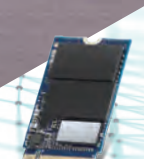


SQF-C8M 720

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



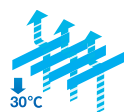
High-Endurance Solutions

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

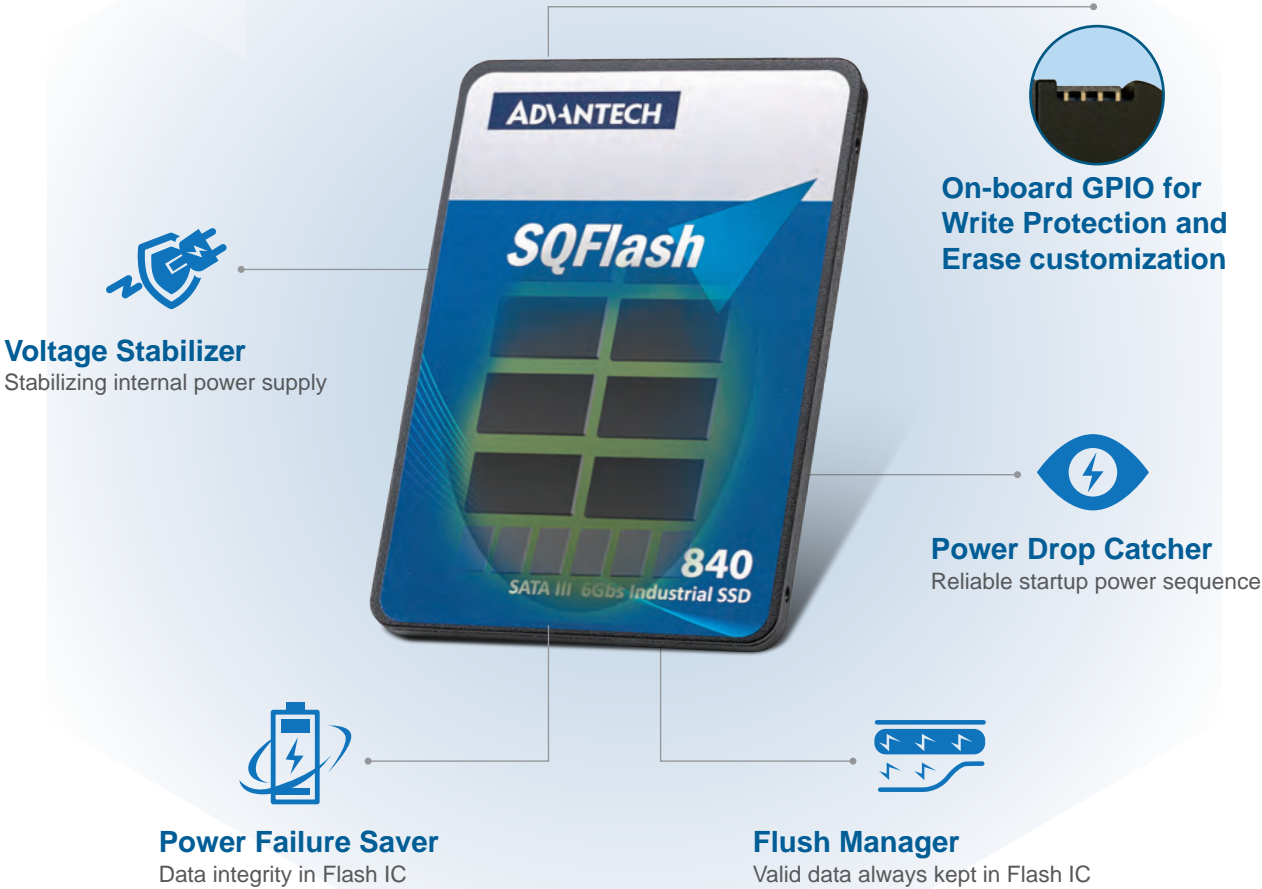
Cards and Onboard SSD	SQF-P10 CF Card	SQF-ISD SD Card	SQF-MSD Micro SD	SQF-MMC eMMC	SQF-SUS SATA onboard SSD	SQF-CUS PCIe Onboard SSD
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FIPS 140-2 Level 2 certifications



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



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

Robust Thermal Management

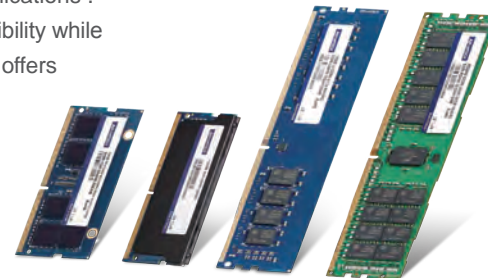


MLC	3D TLC		
	BiCS3 (64-layer)	BiCS4 (96-layer)	BiCS5 (112-layer)
2 bits / cell	3 bits / cell		
3k +	3k +	3k +	3k +
0-70 °C (T _a)	0-70 °C (T _c)	0-70 °C (T _a)	0-70 °C (T _a)
--	--	--	-20-85 °C (T _a)
-40-85 °C (T _a)	-40-85 °C (T _c)	--	-40-85 °C (T _a)
Low	Middle	Middle	Middle
\$\$\$	\$\$	\$\$	\$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



30μ Gold Finger

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



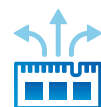
Smart DRAM Management Software

- 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

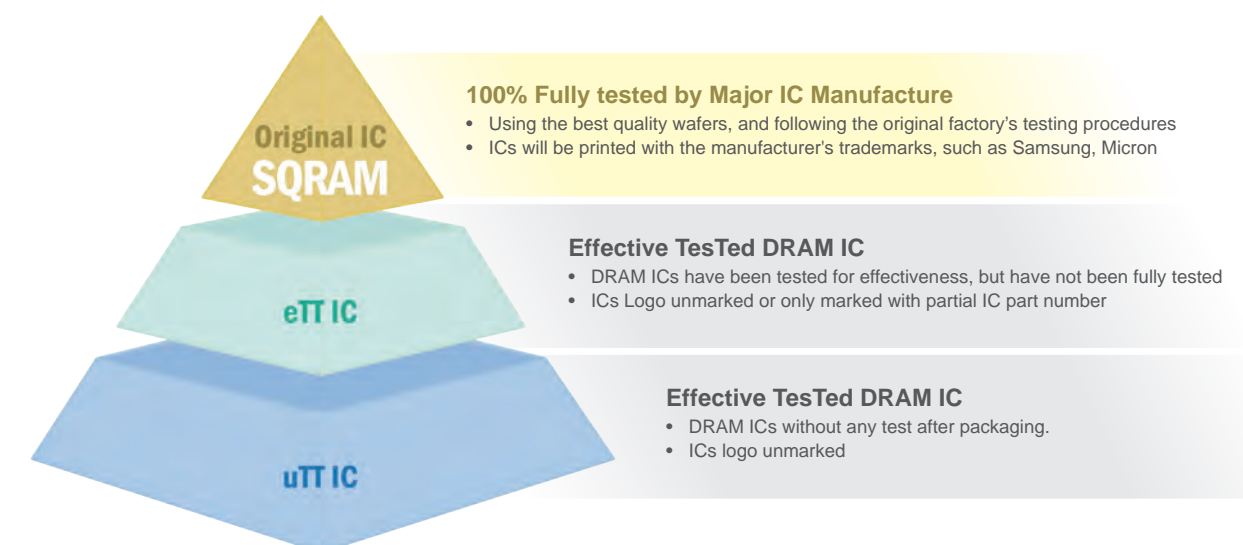
- MIL-810G verified
- Passed test with 6 directions, 18 shocks

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

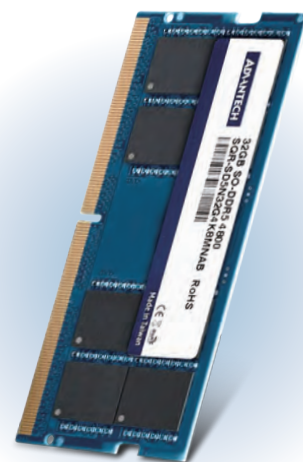
Memory IC Quality Level

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.



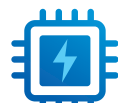
Pioneering DDR5 Choice

SGRAM 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.



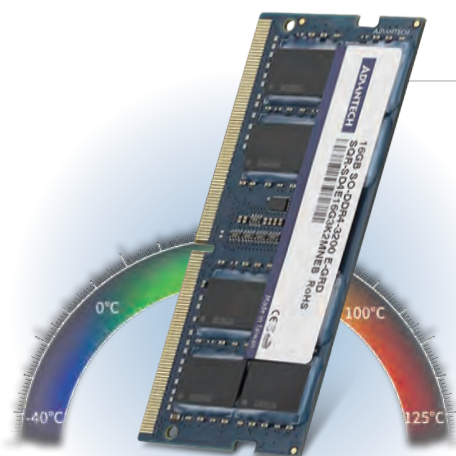
On-Die ECC Support

- 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.



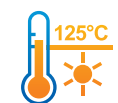
Sidefill Technology



Automotive Grade IC



Upper Industrial 48HR Burn-in program



Operating Environment Heat up to 125 °C

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

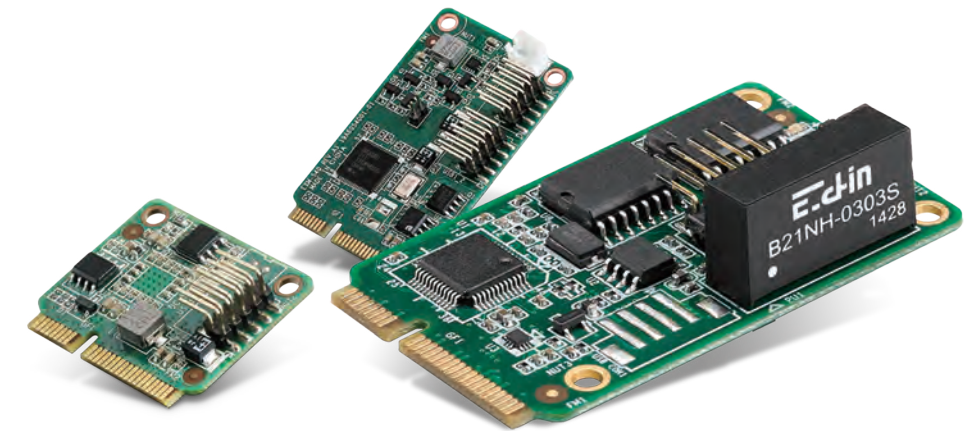
- Thermal alert will be trigger when memory operating temperature overheat.
- Alert temperature could be set up depends on user environment.



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

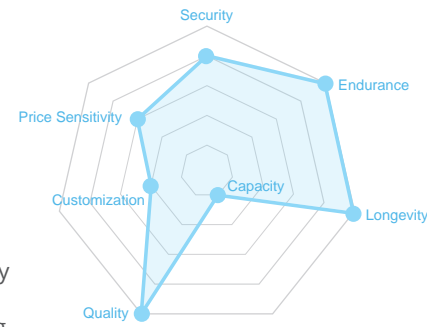
Automation

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.



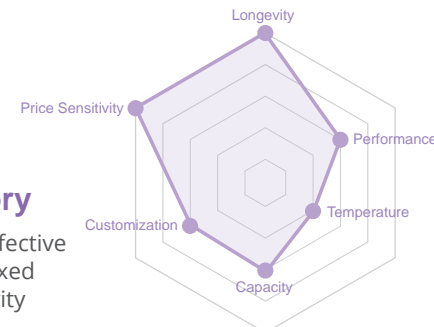
Storage

- 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

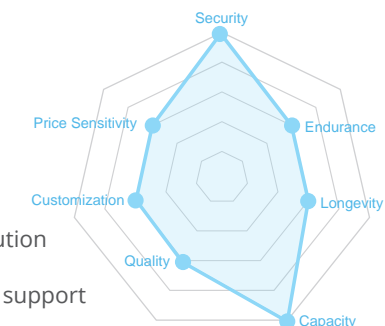
Transportation

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.



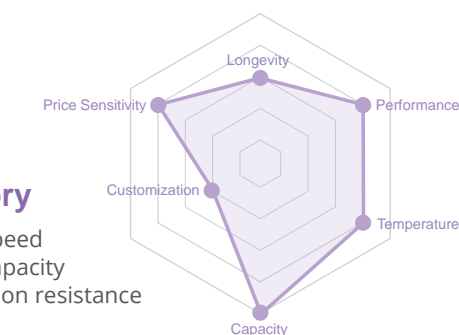
Storage

- 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

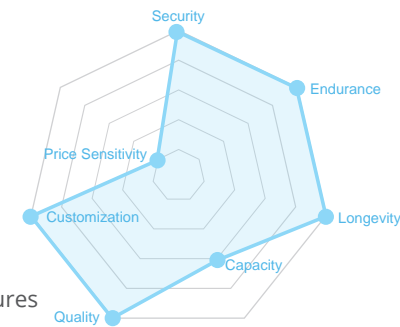
Defense/Aerospace

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.



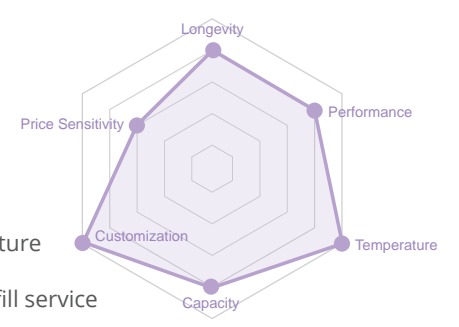
Storage

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



Memory

- Wide temperature
- High speed
- Coating / Sidefill 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

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

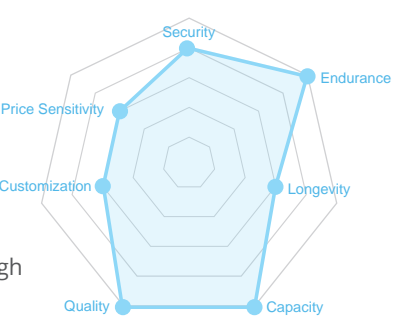
Networking

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.



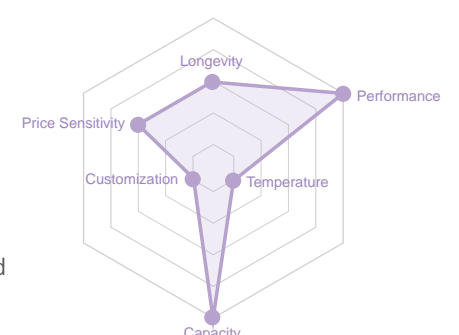
Storage

- 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.

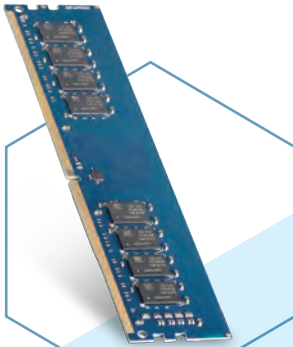
Project Description

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

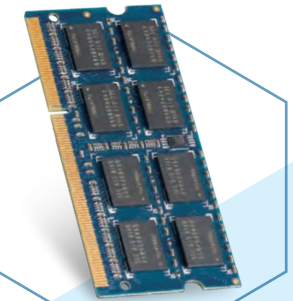
Project Description

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
Form Factor	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
Transfer Protocol	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s
Connector	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
Flash Type	3D TLC / sTLC	3D TLC	3D TLC	3D TLC	3D TLC	3D TLC	3D TLC
Maximum Power Consumption	4.6W	3.0W	3.0W	3.7W	3.4W	2.2W	2.0W
Capacity	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
Maximum Read / Write Performance (MB/s)	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
Op. 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	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C
DeviceOn/ SQ Manager	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Shock	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms
Vibration	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~ 2,000 Hz	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
Form Factor	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
Transfer Protocol	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s
Connector	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
Flash Type	3D TLC / sTLC	3D TLC / sTLC	3D TLC / sTLC	3D TLC / sTLC	3D TLC / sTLC	3D TLC / sTLC	3D TLC
Maximum Power Consumption	1.8W	1.8W	1.8W	1.8W	1.3W	1.6W	1.4W
Capacity	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
Maximum Read / Write Performance (MB/s)	Sequential: 550 / 520 Random IOPS@4K: 96K/86K	Sequential: 550 / 520 Random IOPS@4K: 96K/86K	Sequential: 550 / 520 Random IOPS@4K: 96K/86K	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
Op. Temperature	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
DeviceOn/ SQ Manager	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Shock	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms
Vibration	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz	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-CM8 920 series	SQF-C3A 720 series	SQF-C4M 720 series	SQF-C8B 720 series	SQF-C8M 720 series	SQF-CFX 720 series
Form Factor	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
Transfer Protocol	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
Connector	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)
Flash Type	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
Maximum Power Consumption	11.5W	7.3W	11W	7.5W	5.5W	2.0W	3.6W	3.0W	3.6W	3.4W
Capacity	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
Maximum Read / Write Performance (MB/s)	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: 590k / 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
Op. 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	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
DeviceOn/ SQ Manager	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Shock	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
Vibration	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	20G,Peak / 80 ~2,000 Hz	20G,Peak / 80 ~2,000 Hz	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
Form Factor	291 ball BGA -1620	156 ball BGA -1620	153 ball BGA -1113	100 ball BGA -1113	SD Card	Micro SD Card	USD Drive
Transfer Protocol	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
Connector	N/A	N/A	N/A	N/A	9-pin	8-pin	USB-A
Flash Type	3D TLC	MLC / UMLC / 3D TLC	MLC / UMLC / 3D TLC	MLC / UMLC	3D TLC / sTLC	3D TLC / sTLC	3D TLC
Maximum Power Consumption	3.2W	1.5W	0.4W	0.4W	1.4W	1.4W	1.8W
Capacity	256GB ~ 1TB	4GB ~ 512GB	2GB ~ 64GB	2GB ~ 64GB	16GB ~ 256GB	16GB ~ 512GB	64GB ~ 256GB
Maximum Read / Write Performance (MB/s)	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
Op. 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	-25 ~ 85 °C / -40 ~ 85 °C	-25 ~ 85 °C / -40 ~ 85 °C	0 ~ 70 °C

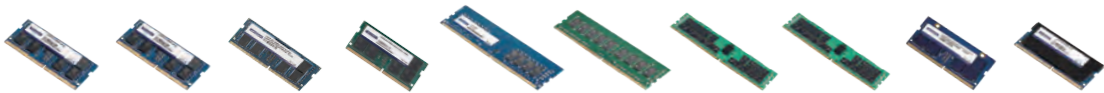
SGRAM Industrial Memory Modules

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
Frequence(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
Frequence(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
Frequence(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)	Combo USB (Internal/ External)	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	-40 ~ 85 °C	-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

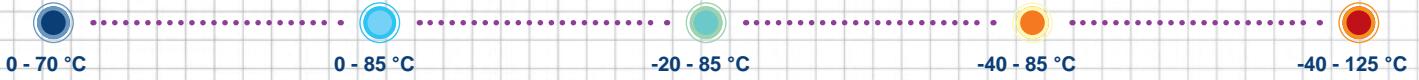
Complete Form Factor Selection

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



Advanced Thermal Solution

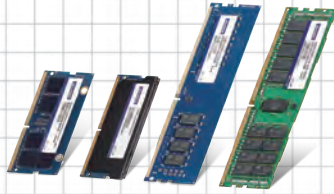
Industrial heatsink on high-capacity NVMe SSDs



SQRAM Memory Modules

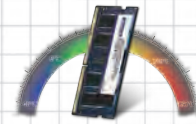
Smart-Management Memory

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



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
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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
Taipei & IoT Campus	886-2-2792-7818
Taichung	886-4-2372-5058
Kaohsiung	886-7-392-3600

Middle East and Africa

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Penang	60-4-537-9188

Thailand	
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Vietnam	
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Australia	
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Pune	91-94-2260-2349

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Düsseldorf	49-2103-97-855-0

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Milan	39-02-9544-961

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Madrid	34-91-668-86-76

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Stockholm	46-722-293423

Poland	
Warsaw	48-22-31-51-100

Russia	
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St. Petersburg	8-800-555-81-20

Czech Republic	
Ústí nad Orlicí	420-465-521-020

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Ottawa	1-815-434-8731

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São Paulo	55-11-5592-5367

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