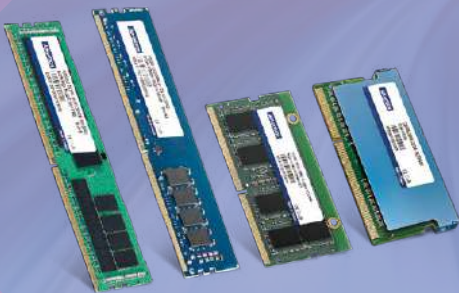


Industrial SSD and Memory

Design-In Service for Peripheral Solutions

- ✓ Product Offering
- ✓ Value-added Software
- ✓ Market Solutions
- ✓ Application Story
- ✓ Product Selection

SQGRAM



Superior
Performance

SQFlash



Security
Inside

EXM



Dynamic
Connectivity

ADVANTECH

Enabling an Intelligent Planet

www.advantech.com

Advantech Industrial Peripheral Solutions

Advantech provides industrial grade SSD, DRAM and I/O extension module peripherals that offer proven compatibility with all other Advantech platforms.

Industry-leading Reliability

Advantech uses only the best chips from original IC vendors to ensure consistent quality, and also applies strict 100% screen testing and 3-year longevity to guarantee industrial-grade stability and reliable 24/7 operation. Extended longevity support is offered for between 3-5 years.

Security Inside

Security is at the heart of our solutions. Our SQFlash series offers complete security functions from data encryption, to data protection, with built-in security via a friendly UI for user management. What's more, with McAfee and Acronis security and backup solution integration, SQFlash provides a full spectrum of protection for customers.

Self-Management

Device management is the foundation of industrial and IoT applications. Advantech industrial storage and memory solutions are equipped with real-time self-management software for health status, lifetime prediction, remote device monitoring, and online PMQ.

Flexible Customization

To meet different application needs, Advantech provides customized services such as conformal coating/underfill, extended longevity, and SPD tuning with full hardware, software and firmware support.



360-Degree Security

- TCG-OPAL Enabled
- Secure Erase
- 3rd Party Integration

Ruggedized Design

- Power Failure Protection
- Thermal Solution
- Coating and Underfill

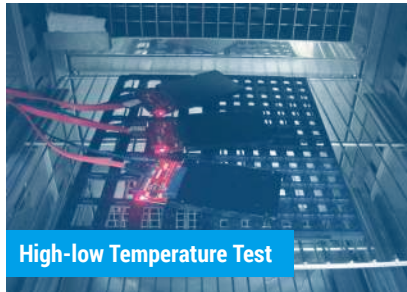
Flexible Customization

- 30-Day DTOS
- Firmware Customization
- 3-to-5 Year Longevity

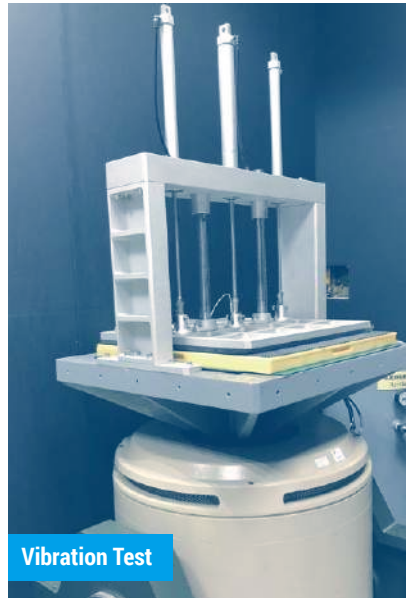


High Quality and Endurance for Industrial Applications

All Advantech industrial peripheral modules use the tier 1 chips from original IC vendors and pass in-house vibration tests, burn-in tests, and 100% screen testing to guarantee industrial-grade stability and reliability for a multitude of applications.



High-low Temperature Test



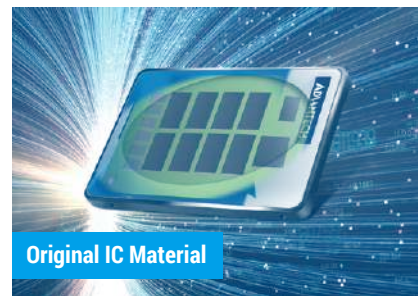
Vibration Test



100% Screening Test



Burn-in Test



Original IC Material

SQFlash

Industrial Storage Solutions

SQFlash series supports various interfaces such as SATA, PCIe/ NVMe, and PATA/IDE with multiple form factors including 2.5" SSD, mSATA, M.2, DOM, CFast, half-slim SSD and more.



SQRAM

Industrial Memory Solutions

SQRAM series offers a comprehensive range of product lines including Unbuffered DIMM, ECC DIMM, Server DIMM and Rugged DIMM with speeds of DDR4, DDR3, DDR2 and DDR1.

EXM

Embedded Extension Modules

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



SQFlash

Leading Industrial SSD Solutions

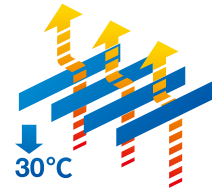
Based on our embedded market experience accumulated over decades, we developed SQFlash to be the perfect industrial storage solution with a full range of product support and value-added services. Advantech SQFlash SSDs are designed with industrial operation in mind and provide highly reliable storage solutions with excellent compatibility, performance, and security. All our products are built with a TCG-OPAL self-encryption disk function powered by AES-256 internal encryption and Advantech's unique Flash Lock function for disk protection.

Key Features



Comprehensive Security

- TCG-OPAL and TCG-Enterprise compliant
- Quick Erase and Military Erase
- McAfee & Acronis software integration



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



Power Failure Protection

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



Flexible Customization Service

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



Embedded Series

NVMe



710 / 720

- M.2 2280 SSD (B+M key)
- M.2 2230 SSD (A+E key)
- MiniPCIe SSD

SATA



630 / 640

- 2.5" SSD / Half-slim SSD
- mSATA / Half-size mSATA
- M.2 2242 / 2260 / 2280 SSD (B+M key)
- CFast / SATA DOM



Performance Series



920

- U.2 2.5" SSD
- M.2 2280 SSD (M key)



830 / 840

- 2.5" SSD
- mSATA
- M.2 2280 SSD (B+M key)

CF, PATA SSD, SD,
Micro SD, eMMC,
Micro SSD



SQF-P10



SQF-P25



SQF-1SD



SQF-MSD



SQF-MMC



SQF-SUS

Data Logger for Autonomous Driving Application



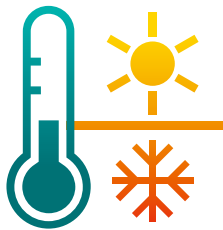
Data logging is a fundamental task of data analysis. For autonomous driving applications, data logging includes not only numerical data, but also massive amounts of visual data like high resolution video, so reliable storage with stable performance is crucial. SQFlash 840 and 920 series SSD provide high capacity up to 8TB and stability by offering complete power failure protection and wide temperature support. Last but not least, by using the built-in SQFlash utility, SSD and valuable data can be protected from hacking or unauthorized access.

SGRAM

Pioneering 3200MHz DRAM for Industrial Markets

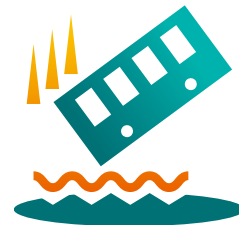
SGRAM delivers a wide spectrum product portfolio for AI and industrial applications and all SGRAM memory modules use fixed die ICs to ensure quality and compatibility while providing a 3-year longevity guarantee. The series offers ruggedized wide temperature solutions with an extra underfill and coating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

Key Features



Wide-temperature Support

- Wide temperature of -40~85 °C
- Extended temperature of -20~85 °C
- Optional industrial heatsink



Robust Solution

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



Smart DRAM Management Software

- Manage up to 8-slot SGRAM memory modules
- Easy to monitor operating temperature and real-time system speed
- Friendly UI to set overheat alert threshold
- Background dynamic monitoring



Customization and Value-added Service

- Conformal coating/ underfill
- Anti-sulfur protection
- SPD security



Embedded Series

DDR1 / DDR2

SQR-SD1N / SQR-SD2N

- 800/667
- 512MB/1GB

DDR3

SQR-SD3N / SQR-UD3N

- 1866/1600
- 2/4/8GB

DDR4

SQR-SD4N / SQR-UD4N

- 3200/2933
- 2/4/8/16/32GB



Robust Series

Wide-Temperature

SQR-SD4I / SQR-SD3I

- -20~85°C/-40~85°C
- 2/4/8/16/32GB*

Rugged DIMM

SQR-YD4I / SQR-YD4N

- Mounting holes
- Military verification

Thermal Management

SQR-HS4N

- Heatsink design
- 16/32GB



Server Series

R DIMM

SQR-RD4N

- DDR4 - 3200/2933
- 8/16/32GB

LR DIMM

SQR-LD4N

- DDR4 - 3200/2666
- 32/64GB

ECC DIMM

SQR-UD4(E)

- DDR4 - 2666/2400
- 4/8/16/32GB

*: DDR3/DDR4 capacity

Rugged Mobile Server for Military Applications



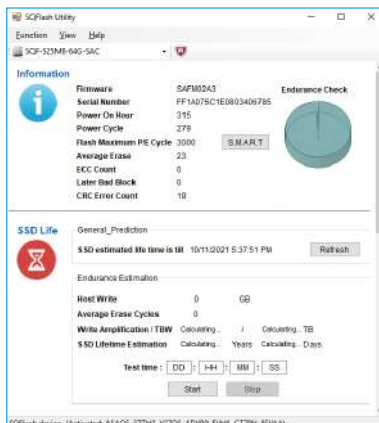
To process masses of data and confirm absolute accuracy of data collection, high performance registered memory is a necessary solution for military data processing applications. In addition, extreme climates with wide temperatures fluctuations from -40 to 85 °C were a huge operating challenge for the rugged mobile server. 32GB of SQR-RD4N with ECC provided a unique wide temperature registered DIMM solution. SQRAM SQR-RD4N offered super reliable quality and delivered a flexible product solution to fulfill the military request.

SQ Manager

High Security, Easy Management

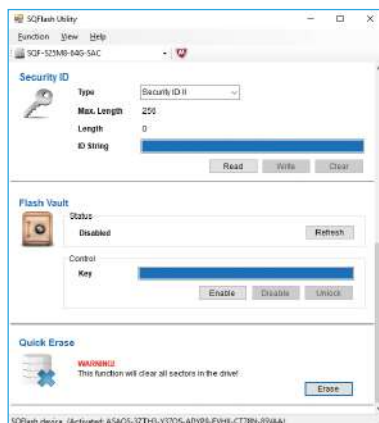
SQ Manager software utility is designed to work with all Advantech storage and memory modules and helps you manage your SQFlash SSDs and SDRAM DRAMs with an intuitive user interface. With SQ Manager, you can easily monitor the real-time status and lifespan of your SQ products.

SSD Health and Performance Monitoring



Disk Status and Endurance Estimation

This utility provides not only a clear pie-chart to show disk wear status, but also real-time status updates including operating information like power-on time, temperature, power-cycle counts, and any error logs for diagnostic purposes. In addition, by analyzing previous usage patterns, the utility can give a clear prediction of how long you can expect the drive to operate reliably. A handy calculator is also available for counting disk writes from the host, so it can help to estimate the amount of written information based on a specific application scenario.



Disk Security Management and Encryption

The disk security function focuses on protecting customer's software, drive accessibility, and data accessibility. With the function enabled, data can be protected from hacking or misuse by unauthorized users.

TCG Compliant Drive Encryption and Quick Erase

Benefitting from an AES-256 encryption engine, the integrated TCG-OPAL self-encryption disk functions seamlessly in the SQFlash via the Flash Lock (patented) feature. It provides a Quick Erase function that can purge the disk within 10 milliseconds.

WISE-PaaS/DeviceOn

Cloud-based Management

Remote Monitoring and Predictive Maintenance

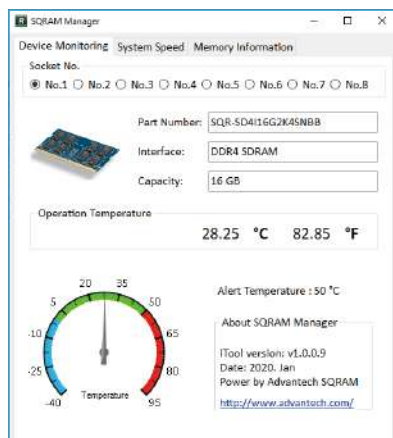
SQFlash product monitoring functions are supported through the WISE-PaaS cloud platform and cloud-based services. Device health information can also be collected in a cloud database, with applied predictive algorithms so users can receive timely warnings if a device has problems.

WISE-PaaS and Cloud Software Package

SQFlash has built-in anti-virus / malware software powered by McAfee and featuring whitelist protection. An Acronis utility is also built-in for disk backup and recovery functions.

McAfee **Acronis**

Smart Memory Temperature Monitoring

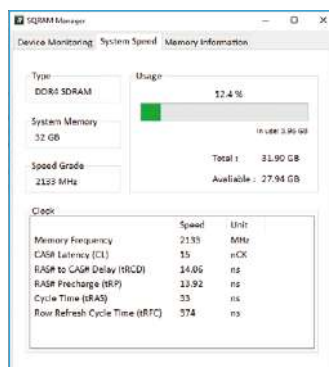


Dynamic Temperature Monitoring

Memory temperature is usually going to be much higher than other components. SQRAM Manager can provide dynamic real-time memory temperature readings, and can run in the background.

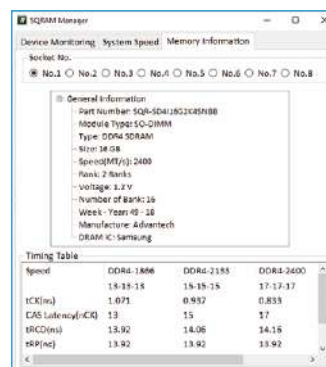
Overheating Alerts

This function not only shows temperature status, but it also alerts users when memory temperatures are over 65°C. In addition, users can set thresholds for temperature alerts according to specific application needs. SQRAM Manager helps users more efficiently monitor system temperatures and prevent overheating issues.



System Speed

SQRAM is not only for SQRAM memory temperature monitoring, but also checks dynamic system DRAM health levels including usage, capacity, and speed.



Memory Information

This function shows memory details such as original IC chip manufacturer, speed specification, and manufacturing production information. Together with a timing table definition showing different levels of speed, it allows engineers to check if timing clock numbers need to be fine-tuned.

Embedded Extension Modules

Dynamic Connectivity for Versatile Applications

Advantech's embedded extension modules (EXM) are standard full-size Mini PCIe modules that come in a variety of I/O interface choices. With EXM, you can simply extend extra interface ports without customization or board modification. This makes EXM's modules/adapters easier to be integrated and offers high flexibility for a diverse range of embedded, automation, transportation and networking applications.

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
- MiniPCIe thru PCIe interface
- Full-size MiniPCIe with -10 ~ 70 °C

Applications



Elevator Communication
Quickly extend CANBus interface



CANBus
EXM-320



Fanless Box PC
ARK-2121



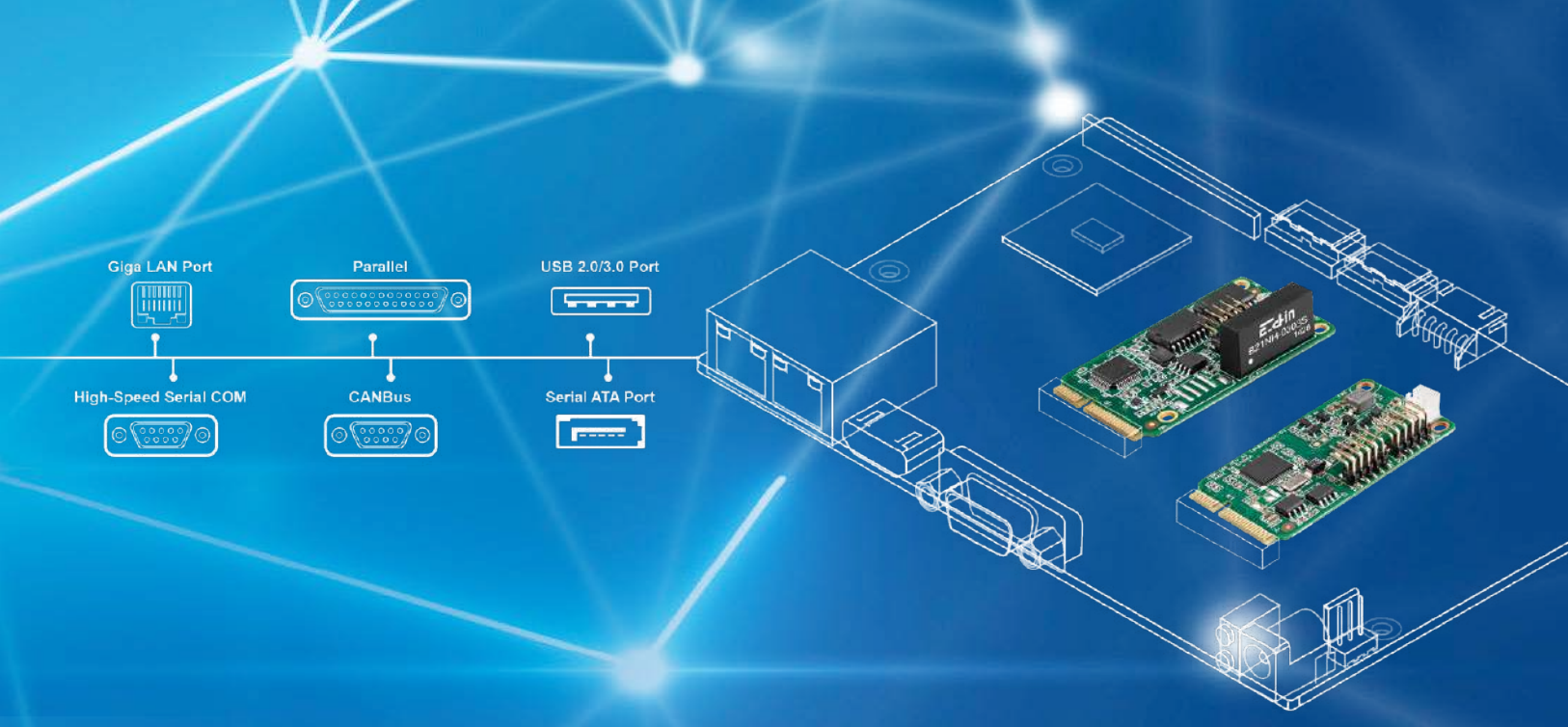
Kiosk Applications
Quickly extend USB 3.0 interface



USB 3.0
EXM-521



Embedded Box PC
AIMB-B2274



Giga LAN Port
EXM-510

- Supports PCIe to 1-Ch Giga LAN port
- MiniPCle thru PCIe interface
- Full-size MiniPCle with -40 ~ 85 °C



Giga LAN Port
EXM-523

- Supports PCIe to 2-Ch Giga LAN port
- MiniPCle thru PCIe interface
- Full-size MiniPCle + Extension board with 0 ~ 70 °C



HMI
Quickly extend high-speed serial COM module



Serial COM
EXM-311



MI/O-Compact SBC
MIO-5272



Railway NVR Applications
Quickly extend serial ATA port



SATA Port
EXM-520



Fanless Compact System
ITX-5710

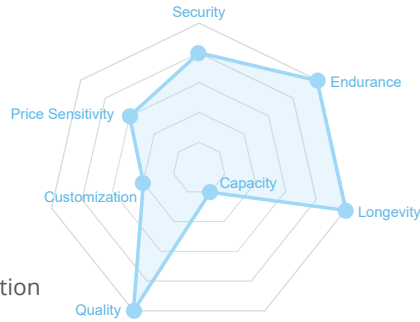
Automation

Industrial automation applications require great stability, longevity and extreme endurance when it comes to storage and memory. Due to the high frequency of write functions for industrial automation applications, very high endurance is of the utmost importance, as is over 3 years of longevity support. Advantech offers SLC flash technology for applications that require the absolute best endurance. With Ultra MLC you can achieve 10x the endurance of standard MLC whilst having a big price benefit over SLC.



Storage

- 24/7 operation
- End-to-end data protection
- Remote life monitoring



SQF-P10 P8
256MB - 64GB
0~70 °C / -40~85 °C



SQF-SMS 640
16GB - 1TB
0~70 °C / -40~85 °C



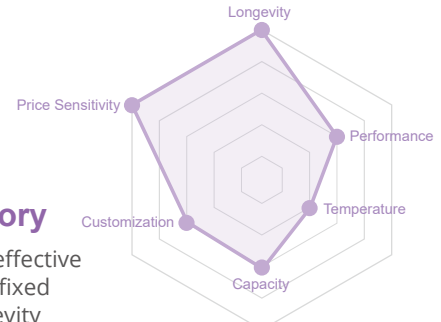
SQR SD3N
SODIMM
1600/1866
0~85 °C
2/4/8GB



SQR-SD4N
SODIMM
2400/2666/3200
0~85 °C
up to 32GB

Memory

- Cost effective
- BOM fixed
- Longevity



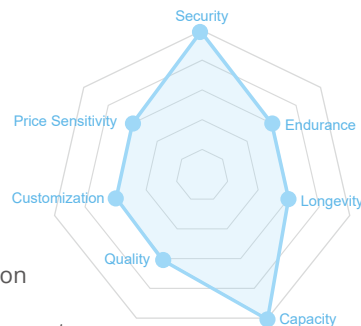
Transportation

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
- Power failure protection
- Utility and AES-256-bit support



SQF-S25 840
240GB - 7.6TB
0~70 °C / -40~85 °C



SQF-C25 920
240GB - 7.6TB
0~70 °C / -40~85 °C



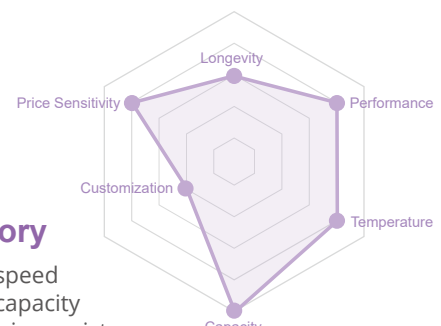
SQR-YD4I
Rugged DIMM
2400/2666
-40~85 °C
up to 32 GB



SQR-SD4I
SODIMM
2400/2666/3200
-40~85 °C
up to 32 GB

Memory

- High speed
- High capacity
- Corrosion resistance



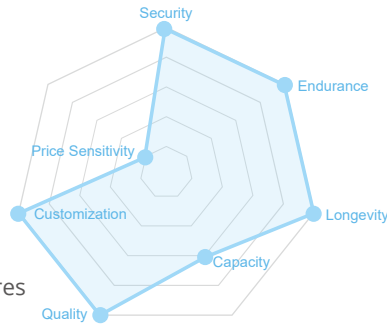
Defense/ Aerospace

To meet the challenges of wide temperature and high humidity and to ensure 24/7 continuous operation in military and aerospace applications, Advantech provides ruggedized storage and memory modules to address the military needs for non-volatile, high security, high reliability solutions. Our solutions are designed with an integrated suite of security features including data encryption, emergency erase, and McAfee and Acronis security and backup solutions to keep your data safe.



Storage

- Ruggedized design
- Advanced security features
- Greater longevity



SQF-S25 840
240GB - 7.6TB
0-70 °C / -40~85 °C



SQF-CM8 710
128GB - 512GB
0-70 °C / -40~85 °C



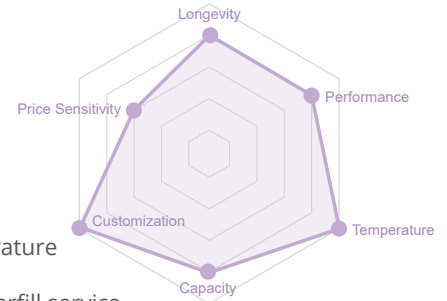
SQR-YD4I
Rugged DIMM
2400/2666
-40~85 °C
up to 32 GB



SOR-SD4(ECC)
ECC DIMM
2400/2666/3200
0~85 °C / -40~85 °C
up to 32GB

Memory

- Wide temperature
- High speed
- Coating/underfill service



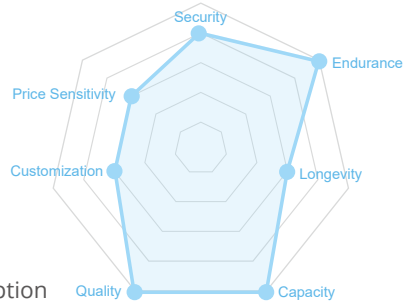
Networking

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
- Lower power consumption
- SQ management utility



SQF-S25 845
480GB - 1.9TB
0-70 °C



SQF-C25 920
240GB - 7.6TB
0-70 °C / -40~85 °C



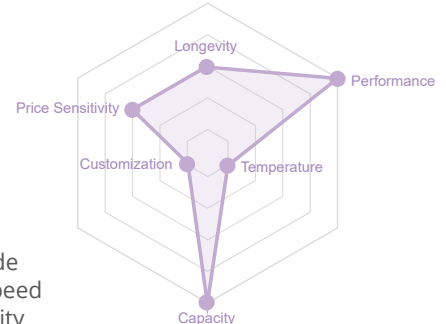
SQR-RD4N
RDIMM
2666/2933/3200
Up to 64GB



SQR-SD4N(ECC)
ECC DIMM
2400/2666
Up to 32GB

Memory

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



Case Studies

SQFlash Presents Wide-temperature 8TB NVMe SSDs for Autonomous Driving

For transport applications like surveillance, in-vehicle data logging, and auto-piloting, there is a significant demand for reliable, high-capacity, high-performance storage to efficiently store high volumes of vision-based data. In many cases, such systems may also need to operate in challenging environments with wide temperature ranges, strong vibration levels, and/or unstable power supplies. While SSDs built on nonvolatile NAND flash memory are the technology of choice, there can be issues related to heat dissipation and decreased reliability when deploying them in industrial applications.



Application Requirements

Advantech supported a project involving in-vehicle video recording and a data logging system. The requirement was for a high-capacity data collection system in a very small form factor that would take advantage of the performance of PCIe SSDs using the NVMe communications protocol. Designed for global deployment, the complete system was expected to operate at temperatures down to -20 °C and up to 70 °C. While applying multiple NVMe SSDs in a system provides excellent throughput with strong performance, putting together 6 to 12 pieces of the high power consumption NVMe SSD also generates substantial heat. Due to the fact that the system had to be very compact to fit into in-vehicle applications, heat dissipation was a major obstacle.

Project Implementation

In this case, Advantech's SQFlash 920 NVMe SSDs provided the perfect solution. The SSDs used Toshiba's BiCS 3D NAND flash technology, supported capacity of up to 8 TB per drive, and came with built-in power failure protection and advanced security technologies.

Developed with Advantech's significant expertise in thermal management and embedded system design, the SSD adopted an innovative heatsink design that helped reduce internal temperatures by up to 30 °C when compared to NVMe SSDs that rely purely on thermal throttling as the only passive temperature control (which also slows down SSD performance dramatically). To maximize heat dissipation, these heatsinks were used in conjunction with thermal grease; providing outstanding mechanical flexibility to avoid the risk of physical damage to the SSD components from an abrupt temperature change. Due to built-in thermal sensors in the NVMe SSD, it was possible to monitor SSD working temperatures, present SMART data, and control the system fan automatically in order to actively take away the heat from this compact system. The customer easily accessed thermal information through the Advantech WISE-PaaS cloud platform with the SSD PMQ (Predictive Maintenance Quality) function and set thresholds for the system alarm and/or adjusted workloads automatically. Finally, the Advantech SQFlash NVMe SSD, as a TCG-OPAL 2.0 compliant drive, came with Advantech's patented security feature: "Flash Lock." This feature enabled the SSD to bond with the mainboard automatically when needed. It helped in protecting data from unauthorized access and further ensured data confidentiality.

This high-performance and ruggedized NVMe SSDs solution proved to be ideally suited to the customer's requirements. Advantech's design-in capabilities and manufacturing services also helped improve the time-to-market for the customer's newest product release.

Benefits

- Outstanding thermal solution from Advantech further enhances NVMe SSD performance in extreme environments.
- Advanced power failure protection design to cope with potential unstable power supplies.
- Professional IPC system design service seamlessly integrates cutting-edge SSD technology into a ruggedized in-vehicle system.
- Comprehensive security functions supported by SQFlash improve the overall system security and ensure data protection.
- Smart remote management software monitors SSDs health and performance.

SGRAM Provides Extreme Ruggedized Solution for Aircraft

Aerospace and defense systems require rugged and reliable platforms that can operate in challenging environments. Conditions in these fields are characterized by extreme heat, cold, dust, shock, and vibration. When it comes to DRAM memory modules inside these systems, individual bit errors are common as they operate under extreme conditions, meaning their DRAM modules are repeatedly tested to their specification limits.



Application Requirements

Our customer was involved in a project making flight instrument panels for Airbus and required a ruggedized memory solution to cope with mission-critical environments. A major concern was that memory modules would be affected by humidity and Airbus needed their systems to be highly resistant to moisture and humidity. They needed a ruggedized memory solution with the promise that key components could operate continuously 24/7 in Airbus aircraft under extreme conditions with total safety.

Project Implementation

The Airbus flight instrument panels included Advantech's industrial grade SQR-SD3M SODIMM 1.35V low voltage DRAM DDR3 8GB memory. To operate in extreme conditions, each DDR3 DRAM module is designed with reliable and wide temperature IC chip and 30u" PCB and is verified for severe thermal shock in wide temperature ranges of -40°C ~ 85°C for 12 hours in our burn-in test program. In addition to humidity tests in our special chambers, we apply a conformal coating on the PCB module for base resistance against corrosion, acid, and water problems. Moreover, SQR-SD3M also has under fill epoxy applied on the PCB substrate and IC chip to protect solder connections against vibration or shock. This outstanding protection extends durability and protects against drops and vibration. Last but not least, all key information is stored in EEPROM. In order to ensure the DRAM works without impact from system noise, we lock the read only EEPROM function to protect against accidental write overs. This highly reliability and durable SGRAM memory solution perfectly fulfilled the customer's request and our severe test program and extra ruggedizing service perfect fitted their mission critical requirements.

Benefits

- Advanced EEPROM protected design ensures DRAM operates without impact from M/B data interference.
- 100% reliability burn-in and vibration testing program.
- Conformal coating and IC side fill services.
- Reliable, ruggedized industrial-grade DRAM with -40°C to 85°C wide operating temperature testing to withstand extreme operating environments.

Product Selection

SQFlash Industrial Storage Modules

SATA SSD

Extreme Performance

NEW

NEW

NEW



Embedded

Model Name	SQF-S25 845 series	SQF-S25 840 series	SQF-SM8 840 series	SQF-S25 830 series	SQF-SMS 830 series	SQF-SM8 830 series	SQF-S25 640 series	SQF-SM8 640 series
Form factor	2.5" SATA SSD	2.5" SATA SSD	M.2 2280 SATA SSD (NGFF)	2.5" SATA SSD	mSATA SSD (MO-300A)	M.2 2280 SATA SSD (NGFF)	2.5" SATA SSD	M.2 2280 SATA SSD (NGFF)
Transfer Protocol	SATA 6Gb/s	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	7 + 15 pin SATA	M.2 with B+M key SATA pin-out	7 + 15 pin SATA	Mini PCIe with SATA pin-out	M.2 with B+M key SATA pin-out	7 + 15 pin SATA	M.2 with B+M key SATA pin-out
Flash Type	3D eTLC	3D TLC	3D TLC	SLC / Ultra MLC / MLC	SLC / Ultra MLC / MLC	SLC / Ultra MLC / MLC	Ultra MLC / MLC / 3D TLC	Ultra MLC / MLC / 3D TLC
Maximum Power Consumption	900 mA	720 mA	900 mA	1,080 mA	1,260 mA	1,260 mA	530 mA	750 mA
Capacity	480GB ~ 1.9TB	240GB ~ 7.6TB	240GB ~ 1.9TB	64GB ~ 2TB	32GB ~ 512GB	32GB ~ 512GB	16GB ~ 1TB	16GB ~ 1TB
Maimum Read / Write Performance (MB/s)	Sequential: 560.1 / 533.3 Random IOPS@4K: 98K / 72K	Sequential: 550 / 530 Random IOPS@4K: 100K / 90K	Sequential: 550 / 530 Random IOPS@4K: 100K / 90K	Sequential: 550 / 530 Random IOPS@4K: 100K / 100K	Sequential: 540 / 480 Random IOPS@4K: 88K / 91K	Sequential: 540 / 480 Random IOPS@4K: 88K / 91K	Sequential: 560 / 490 Random IOPS@4K: 86K / 91K	Sequential: 560 / 490 Random IOPS@4K: 86K / 91K
Op. Temperature	0~70°C	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C	0 ~ 70 °C	0 ~ 70 °C / -40 ~ 85 °C	0 ~ 70 °C / -40 ~ 85 °C
SQFlash Utility/ SQFlash Manager	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Shock	1,500G, Peak / 0.5ms	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 / 80~2,000Hz	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz

Embedded



Model Name	SQF-SM4 640 series	SQF-SMS 640 series	SQF-SHM 640 series	SQF-S10 640 series	SQF-SLM 640 series	SQF-SM6 630 series	SQF-SDM 630 series	SQF-SUS 630 series
Form factor	M.2 2242 SATA SSD (NGFF)	mSATA SSD (MO-300A)	H/S mSATA SSD (MO-300B)	CFAST	Half-Slim SSD	M.2 2260 SATA SSD (NGFF)	SATA DOM	Micro SSD
Transfer Protocol	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s	SATA 6Gb/s
Connector	M.2 with B+M key SATA pin-out	Mini PCIe with SATA pin-out	Mini PCIe with SATA pin-out	CFAST Type-I	7 + 15 pin SATA	M.2 with B+M key SATA pin-out	7-pin Female	Onboard
Flash Type	Ultra MLC / MLC / 3D TLC	Ultra MLC / MLC / 3D TLC	Ultra MLC / MLC / 3D TLC	Ultra MLC / MLC / 3D TLC	Ultra MLC / MLC / 3D TLC	SLC / Ultra MLC / MLC	SLC / Ultra MLC / MLC	Ultra MLC / MLC
Maximum Power Consumption	500 mA	750 mA	500 mA	500 mA	500 mA	500 mA	480 mA	500 mA
Capacity	16GB ~ 512GB	16GB ~ 1TB	16GB ~ 512GB	16GB ~ 256GB	16GB ~ 512GB	4GB ~ 256GB	1GB ~ 256GB	4GB ~ 64GB
Maimum Read / Write Performance (MB/s)	Sequential: 560 / 500 Random IOPS@4K: 86K / 91K	Sequential: 560 / 490 Random IOPS@4K: 86K / 91K	Sequential: 560 / 490 Random IOPS@4K: 86K / 91K	Sequential: 560 / 470 Random IOPS@4K: 82K / 82K	Sequential: 560 / 490 Random IOPS@4K: 86K / 91K	SLC: 500 / 150 Ultra MLC: 520 / 170 MLC: 490 / 170	SLC: 500 / 150 Ultra MLC: 520 / 195 MLC: 520 / 200	Ultra MLC: 490/190 MLC: 480/190
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	0 ~ 70 °C / -40 ~ 85 °C
SQFlash Utility/ SQFlash Manager	Supported	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Shock	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 ms	1,500G, Peak / 0.5 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	20G, Peak / 80 ~2,000 Hz

NVMe SSD

Enterprise

Embedded



Model Name	SQF-C25 920 series	SQF-CM8 920 series	SQF-CM3 720 Series	SQF-CMS 710 series	SQF-CM8 710 series
Form factor	2.5" U.2 NVMe SSD	M.2 2280 NVMe SSD (NGFF)	M.2 2230 NVMe SSD (NGFF)	Full-size Mini PCIe SSD	M.2 2280 NVMe SSD (NGFF)
Transfer Protocol	PCIe Gen3 x4	PCIe Gen3 x4	PCIe Gen3 x2	PCIe Gen3 x2	PCIe Gen3 x2
Connector	U.2 NVMe Interface (SFF 8639)	M.2 M-key with PCIe pin-out	M.2 A+E key with PCIe pin-out	Mini PCIe with PCIe pin-out	M.2 B+M key with PCIe pin-out
Flash Type	3D TLC	3D TLC	3D TLC	3D TLC	3D TLC
Maximum Power Consumption	790 mA	2,430 mA	910 mA	957 mA	1,261 mA
Capacity	240GB ~7.6TB	240GB ~1.9TB	128GB ~ 512GB	64GB ~ 1TB	128GB ~ 512GB
Maimum Read / Write Performance (MB/s)	Read: upto 3,200 Write: upto 3,000	Read: upto 3,200 Write: upto 2,700	Read: upto 850 Write: upto 780	Read: upto 1,560 Write: upto 1,000	Read: upto 1,600 Write: upto 1,000
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
SQFlash Utility/ SQFlash Manager	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 / 0.5 ms	1,500G, Peak / 0.5 ms
Vibration	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80~2,000Hz	20G, Peak / 80 ~2,000 Hz	20G, Peak / 80 ~2,000 Hz

PATA/SD/eMMC/USB Storage



Model Name	SQF-P10 P8/P9	SQF-PDM	SQF-P25 P9	SQF-ISD	SQF-MSD	SQF-MMC	SQF-UPD
Form factor	CF card	PATA DOM	2.5" PATA SSD	Industrial SD	Industrial Micro SD	Industrial eMMC	USB Pen Drive
Interface	IDE / PCMCIA	IDE	IDE	SD	SD	eMMC	USB
Transfer Protocol	UDMA 2 / UDMA 4 / UDMA 5	UDMA2 / UDMA 4	UDMA 4	SD 6.x	SD 6.x	eMMC 5.x	USB 3.1/2.0/1.1
Connector	CF Type-I	44-pin Female / 40-pin Female	44-pin Male	SD 9-pin	SD 9-pin	onboard	USB type
Flash Type	SLC / Ultra MLC / MLC	SLC	SLC / Ultra MLC / MLC	SLC / Ultra MLC / MLC / 3D TLC	SLC / Ultra MLC / MLC / 3D TLC	Ultra MLC / MLC / 3D TLC	MLC
Maximum Power Consumption	160 mA	160 mA	210 mA	100 mA	200 mA	200 mA	190 mA
Capacity	256MB ~ 512 MB 1GB ~ 64GB	1GB ~ 16GB	4GB ~ 512GB	1GB ~ 256G	1GB ~ 256GB	4GB ~ 128GB	4GB ~ 256GB
Maimum Read / Write Performance (MB/s)	4 channel: 83/87 2 channel: 43/40 1 channel: 22/15	2 channel: 40/29	SLC: 65/55 MLC: 63/28	Read: up to 100 Write up to 90	Read: up to 100 Write: up to 90	Read: up to 310 Write: up to 200	MLC: TBD
Op. Temperature	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	-25 ~ 85 °C / -40 ~ 85 °C	0 ~ 70 °C
SQFlash Utility/ SQFlash Manager	Supported	Supported	Supported	Not Supported	Not Supported	Not Supported	Not 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	5G, Peak / 10 ~2,000 Hz	5G, Peak / 10 ~2,000 Hz	5G, Peak / 10 ~2,000 Hz	15G, Peak / 10 ~2,000 Hz

Product Selection

SGRAM Industrial Memory Modules

Embedded DRAM Modules

SODIMM



UDIMM



Model	SQR-SD4N	SQR-SD4M	SQR-SD3N	SQR-SD3M	SQR-UD4N	SQR-UD4M	SQR-UD3N	SQR-UD3M
DDR	DDR4	DDR4	DDR3L	DDR3L	DDR4	DDR4	DDR3L	DDR3L
DIMM Type	SODIMM	SODIMM	SODIMM	SODIMM	UDIMM	UDIMM	UDIMM	UDIMM
Pin Number	260pin	260pin	204pin	204pin	288pin	288pin	240pin	240pin
Frequency(MHz)	3200/2666/2400	3200/2666/2400	1866/1600	1866/1600	3200/2666/2400	3200/2666/2400	1866/1600	1866/1600
Capacity	2/4/8/16/32GB	2/4/8/16GB	2/4/8GB	2/4/8GB	2/4/8/16/32GB	2/4/8/16GB	2/4/8GB	2/4/8GB
Voltage	1.2V	1.2V	1.35V/1.5V	1.35V/1.5V	1.2V	1.2V	1.35V/1.5V	1.35V/1.5V
Operating Temperature	0 ~ 85 °C	-20 ~ 85 °C	0 ~ 85 °C	-20 ~ 85 °C	0 ~ 85 °C	-20 ~ 85 °C	0 ~ 85 °C	-20 ~ 85 °C
SGRAM Manager	Supported							

Ruggedized DRAM Modules

Rugged SODIMM



NEW

SODIMM



UDIMM



Model	SQR-YD4	SQR-SD4I	SQR-SD3I	SQR-SD2I	SQR-SD1M	SQR-UD4I	SQR-UD3I
DDR	DDR4	DDR4	DDR3L	DDR2	DDR1	DDR4	DDR3L
DIMM Type	Rugged SODIMM	SODIMM	SODIMM	SODIMM	SODIMM	UDIMM	UDIMM
Pin Number	260pin	260pin	204pin	200pin	200pin	288pin	240pin
Frequency(MHz)	2666	3200/2666/2400	1866/1600	800/667	400/333	3200/2666/2400	1866/1600
Capacity	8/16/32GB	4/8/16/32GB	2/4/8GB	1/2GB	512MB/1GB	4/8/16/32GB	2/4/8GB
Voltage	1.2V	1.2V	1.35V/1.5V	1.8V	2.5V	1.2V	1.35V/1.5V
Operating Temperature	0 ~ 85 °C / -40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C	0 ~ 85 °C / -20 ~ 85 °C	-40 ~ 85 °C	-40 ~ 85 °C
Value-Added Service	Conformal Coating/Underfill (Optional)						
SGRAM Manager	Supported						

High Performance & Server DRAM Modules

LRDIMM



RDIMM



UDIMM ECC



Rugged SODIMM



SODIMM ECC



Model	SQR-LD4N	SQR-RD4N	SQR-RD4I	SQR-UD4N (ECC)	SQR-UD3N (ECC)	SQR-YD4 (ECC)	SQR-SD4 (ECC)	SQR-SD3 (ECC)
DDR	DDR4	DDR4	DDR4	DDR4	DDR3L	DDR4	DDR4	DDR3L
DIMM Type	LRDIMM	RDIMM	RDIMM	UDIMM	UDIMM	Rugged SODIMM	SODIMM	SODIMM
Pin Number	288pin	288pin	288pin	288pin	240pin	260pin	260pin	260pin
Frequency(MHz)	2400	3200/2666/2400	2400	2666/2400	1600	2666	2666/2400	1600
Capacity	64/128GB	8/16/32GB	8/16/32GB	4/8/16/32GB	2/4/8GB	8/16/32GB	4/8/16/32GB	2/4/8GB
Voltage	1.2V	1.2V	1.2V	1.2V	1.35V/1.5V	1.2V	1.2V	1.35V/1.5V
Operating Temperature	0 ~ 85 °C	0 ~ 85 °C	-40 ~ 85 °C	0 ~ 85 °C	0 ~ 85 °C	0 ~ 85 °C / -40 ~ 85 °C	0 ~ 85 °C / -40 ~ 85 °C	0 ~ 85 °C / -40 ~ 85 °C
Function	ECC	ECC	ECC	ECC	ECC	ECC	ECC	ECC
Register	Yes	Yes	Yes	x	x	x	x	x
SGRAM Manager	Not Supported			Supported				

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	50.59 x 30 x 15 mm	50.59 x 30 x 15 mm

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)	50.59 x 30 x 20 mm	50.59 x 30 x 20 mm + iDoor PCB Board	50.59 x 30 x 20 mm	50.59 x 30 x 15 mm	26.65 x 30 x 15 mm	50.59 x 30 x 15 mm

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)	50.59 x 30 x 15 mm	50.59 x 30 x 20 mm	50.59 x 30 x 15 mm	50.59 x 30 x w20 mm	50.59 x 30 x 15 mm

SQFlash Storage Modules

Complete Form Factor Selection

2.5" SSD, mSATA, M.2, DOM, CFAST, Half-Slim, etc.



Advanced Thermal Solution

Industrial heatsink on high-capacity NVMe SSDs



0~55 °C

0~70 °C

-10~70 °C

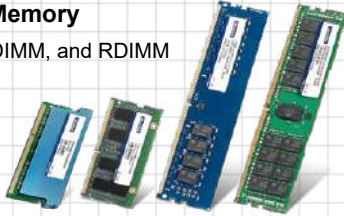
-40~70 °C

-40~85 °C

SQRAM Memory Modules

Smart-Management Memory

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



Thermal & Robust Solution

Optional heatsinks and Rugged DIMM against extreme vibration and shock



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