

Industrial Peripheral Solutions

Industrial Storage, Memory and I/O Extension Modules

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

SQFlash



SQRAM



EXM



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 have McAfee software integrated and provides complete security functions from data encryption, to data protection and security via a friendly UI for user management.

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.

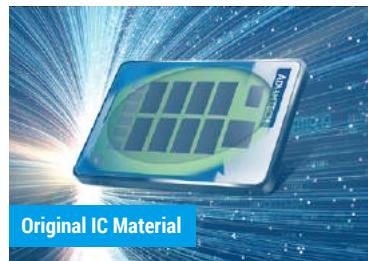
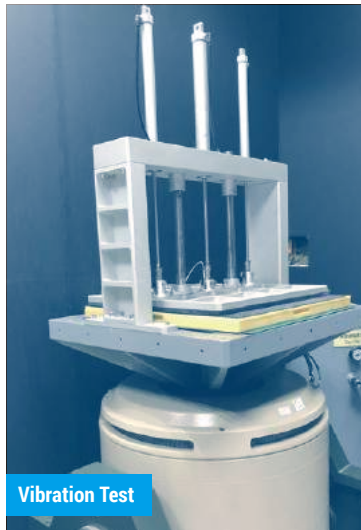
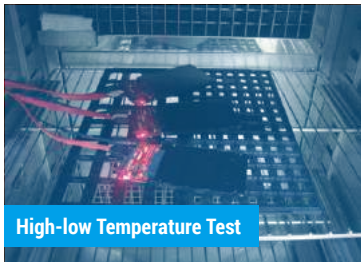
Flexible Customization

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.



Embedded High Quality and Endurance

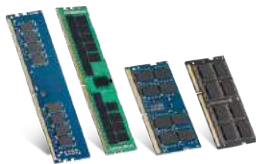
All Advantech industrial peripheral modules use the tier 1 chips from original IC vendors and pass in-house vibration tests, burn-in tests, and 100% screen testing to guarantee industrial-grade stability and reliability for a multitude of applications.



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, registered DIMM, and Rugged DIMM included DDR4, DDR3, DDR2 and DDR1 for industrial applications.

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 Storage Modules

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

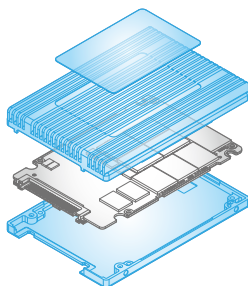
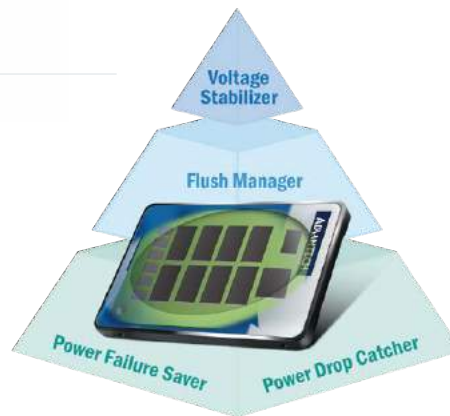


Comprehensive "SQ"rity

SQFlash is all about security. Our SSDs have the most comprehensive security functions from monitoring and data security, to software protection.

360° Power Failure Protection

SQFlash is designed with the most advanced and complete multi-stage power failure protection that ensures zero data loss under any circumstances.



Thermal Solution on NVMe SSD

Advantech's advanced thermal solution greatly improves thermal performance and stable operation of SQFlash NVMe SSD-based products, making them suitable for wide temperature and harsh environments.



	 Embedded Series	 Performance Series				
NVMe	 710 <ul style="list-style-type: none"> • M.2 2280 SSD (B+M key) • MiniPCIe SSD 	 920 <ul style="list-style-type: none"> • U.2 2.5" SSD • M.2 2280 SSD (M key) 				
SATA	 630 / 640 <ul style="list-style-type: none"> • 2.5" SSD / Half-slim SSD • mSATA / Half-size mSATA • M.2 2242 / 2260 / 2280 SSD (B+M key) • CFast / SATA DOM 	 830 / 840 <ul style="list-style-type: none"> • 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-ISD	SQF-MSD	SQF-MMC	SQF-SUS

Data Logger for Autopilot Application



Data logging is a fundamental task of data analysis. For autopilot 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 830 provides high performance 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 DRAM for Industrial Markets

SGRAM memory includes SODIMM, UDIMM, ECC DIMM, VLP, and RDIMM for industrial applications. All memory modules are designed using original IC chips from leading reputable vendors and they follow a rigorous test program to ensure durable and reliable quality. In addition, all SGRAM memory use fixed die IC for quality and compatibility and they provide ruggedized wide temperature solutions with an extra underfill and coating service for harsh environments.

Key Features



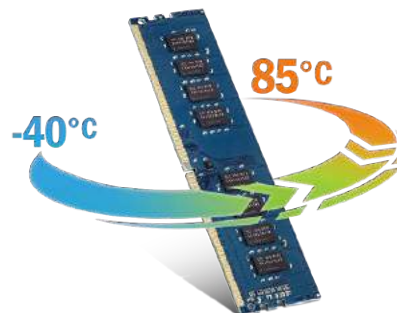
Anti-sulfur Protection

Compared to traditional DRAM memory, SGRAM memory adopts key components such as anti-sulfur resistors to prevent damage from sulfur dioxide in harsh environments with high temperatures, humidity, and air pollution. SGRAM offers secure memory with DRAM SPD lock to ensure stable operation.



Conformal Coating and Underfill

To prevent corrosion, acid and water problems caused by high humidity, or unexpected shock and vibration, SGRAM offers a conformal coating and underfill services to enhance system reliability and ruggedness.



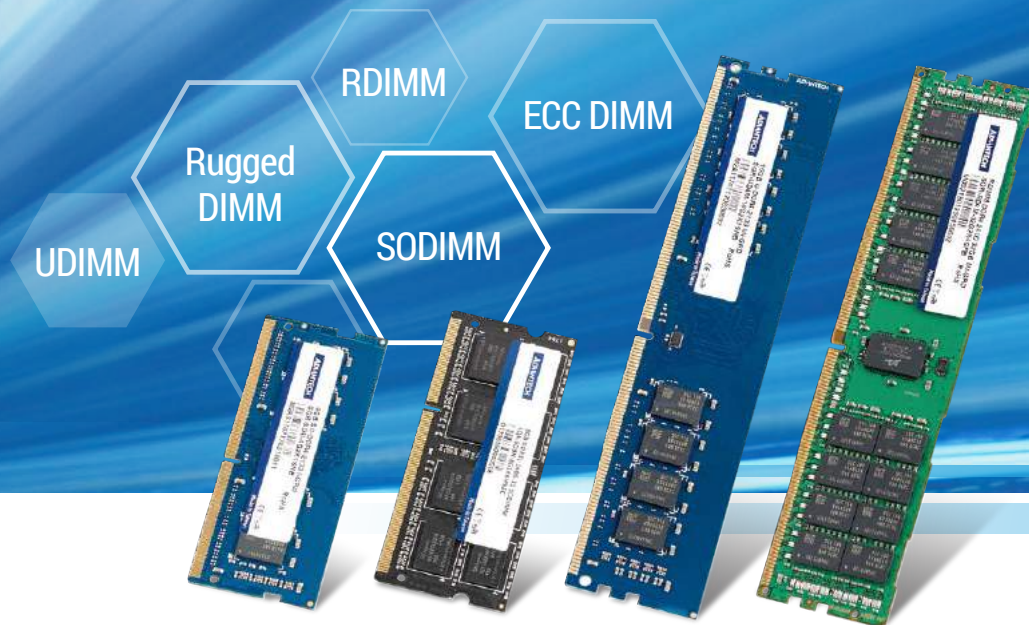
Wide Temperature Ranges



SGRAM offers a comprehensive product portfolio in wide temperature ranges from extreme wide temp. of -40~85 °C, extended temp. of -20~85 °C, to standard temp. of 0~85 °C. All SGRAM modules undergo 12hr burn-in tests with strict high/low temperature stress and humidity testing.



Longevity with Fixed BOM

Advantech SGRAM provides a fixed BOM and die to ensure consistent quality and controllability for 3-year longevity.



	 Embedded Series	 Robust Series	 Performance Series
DDR3L	SQR-UD3N SQR-SD3M <ul style="list-style-type: none"> • SO/U DIMM • 0~85 °C/ -20~85 °C • Thermal sensor 	SQR-SD3I <ul style="list-style-type: none"> • SODIMM • -40~85 °C • Thermal sensor • ECC function 	 SQR-UD3N <ul style="list-style-type: none"> • U/ECC DIMM • 0~85 °C • ECC function
DDR4	SQR-UD4N SQR-SD4M <ul style="list-style-type: none"> • SO/U DIMM • 0~85 °C/ -20~85 °C • Thermal sensor 	 SQR-SD4I <ul style="list-style-type: none"> • SO/ ECC DIMM • -40~85 °C • Thermal sensor • ECC function 	 SQR-RD4N <ul style="list-style-type: none"> • Registered DIMM • 0~85 °C/-40~85 °C • ECC function with register

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

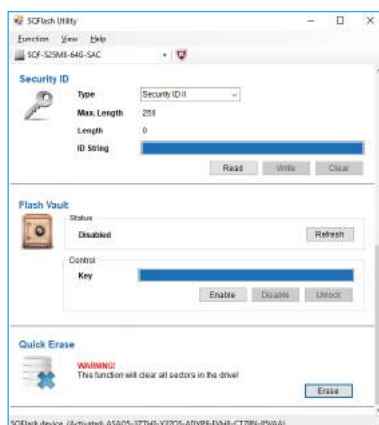
SQ Manager software utility is designed to work with all Advantech storage and memory modules and helps you manage your SQFlash SSDs and SQRAM DRAMs with an intuitive user interface. With SQ Manager, you can easily monitor the real-time status and lifespan of your SQ products.

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/ EdgeSense

Cloud-based Management

Remote Monitoring and Predictive Maintenance

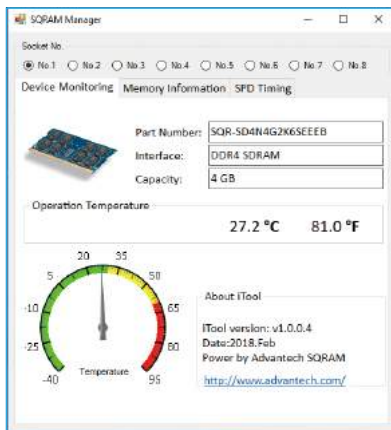
SQFlash product monitoring functions are supported through the WISE-PaaS cloud platform and cloud-based services. Device health information can also be collected in a cloud database, with applied predictive algorithms so users can receive timely warnings if a device has problems.

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.



Manage up to 8-Slot SGRAM Memory Modules

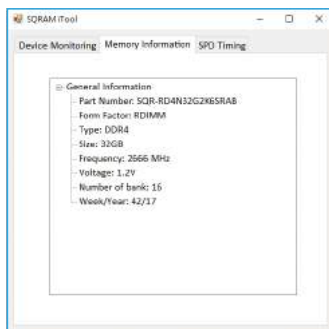


Operating Temperature Monitoring

Memory temperature is usually going to be much higher than other components. SQRAM tools can provide dynamic real-time memory temperature readings.

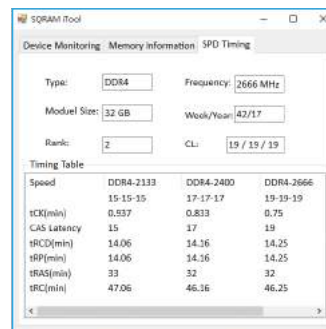
Temperature Alerts

This function shows not only temperature status but also alerts the user when memory temperatures are over 65°C. It reminds the user to check system temperatures to prevent heat issues causing overall system problems.



SPD Information

Serial device presence detection is stored on EEPROM and tells the system about module size, production date, speed and voltage. All information is helpful for a user checking detailed memory specifications.



Timing Table

Timing tables always contains important information when an SPD need to be fine-tuned. It provides info on different speeds for reference or helps problem solving.

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



Kiosk Applications
Quickly extend USB 3.0 interface



CANBus
EXM-320



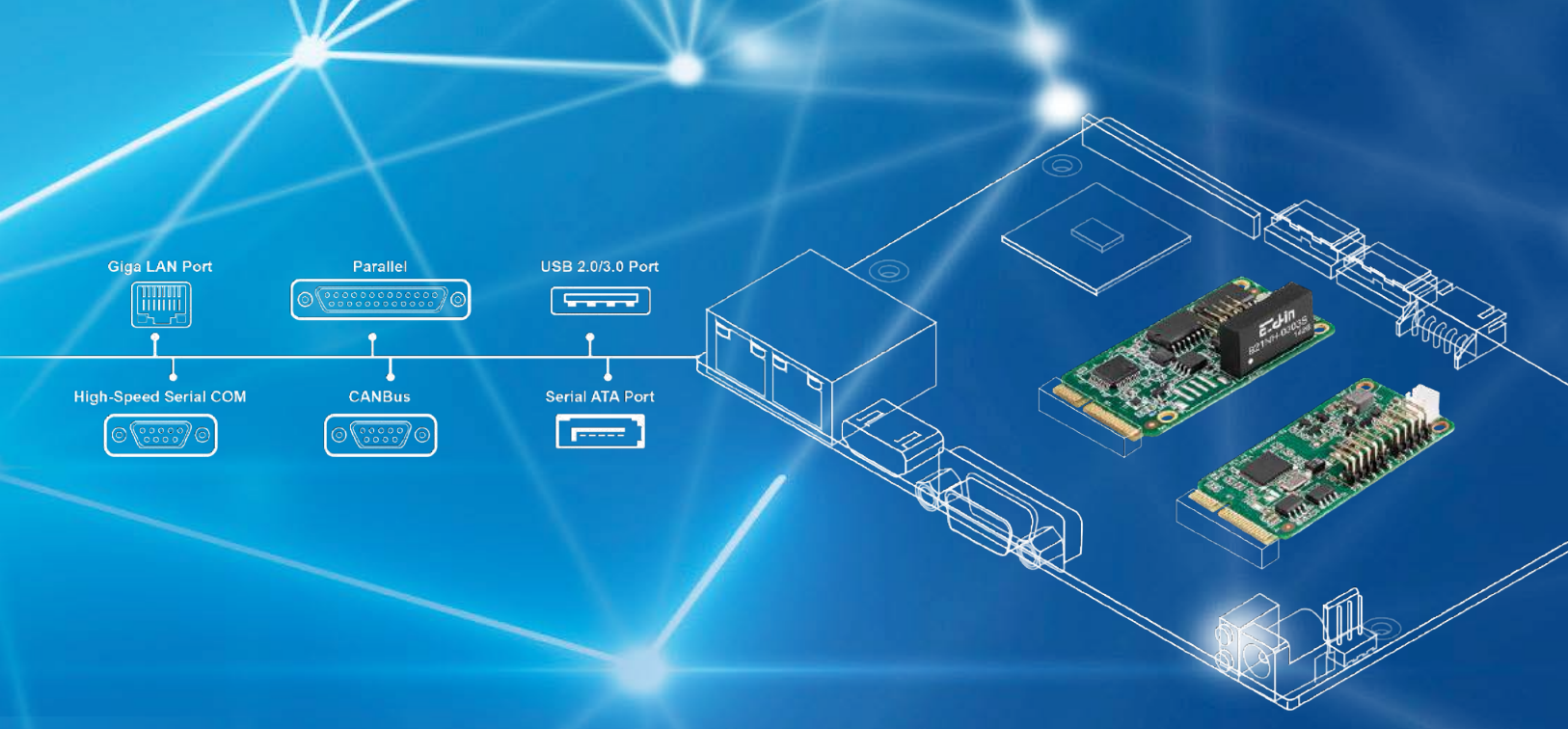
Fanless Box PC
ARK-2121



USB 3.0
EXM-521



Embedded Box PC
AIMB-B2274



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 PCIe interface
- Full-size MiniPCIe + Extension board with 0 ~ 70 °C



HMI
Quickly extend high-speed serial COM module



Serial COM
EXM-311



MIO-Compact SBC
MIO-5272



Railway NVR Applications
Quickly extend serial ATA port



SATA Port
EXM-520



Fanless Compact System
ITX-5710

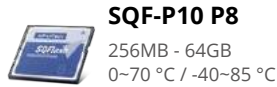
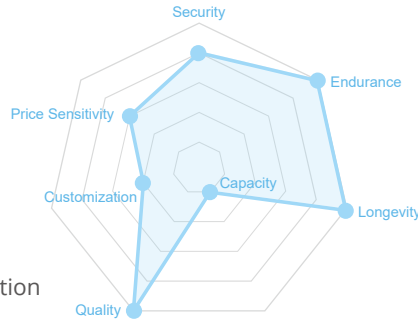
Automation

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.



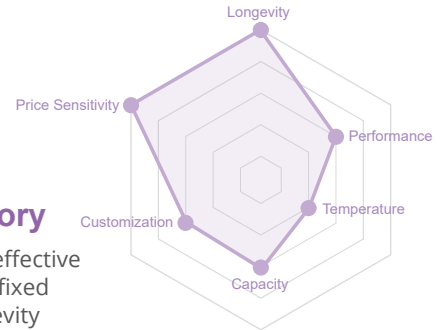
Storage

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



Memory

- Cost effective
- BOM fixed
- Longevity



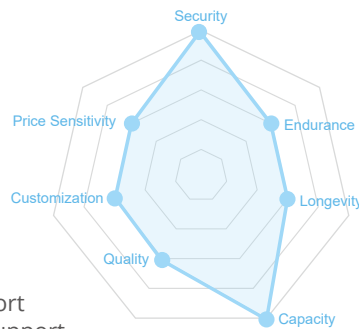
Transportation

In public transportation areas like railways or in-vehicle industries, the demand for high resolution video for surveillance or data logging is booming, which results in the need for bigger and bigger capacity storage and memory. The performance and rugged nature of SSD and DRAM is suitable for public spaces. Security and high performance are also high priorities for stable recording quality and video processing.



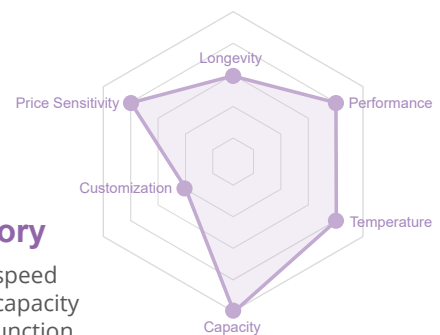
Storage

- Quad-core processor
- Wide temperature support
- Utility and AES-256-bit support



Memory

- High speed
- High capacity
- ECC function



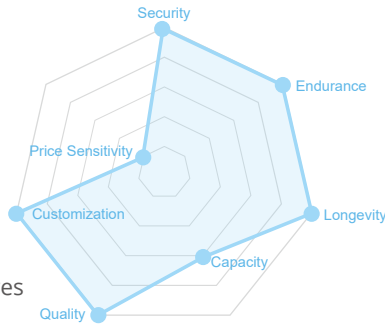
Defense/ Aerospace

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 security functions to keep your data safe.



Storage

- Ruggedized design
- Advanced security features
- Greater longevity

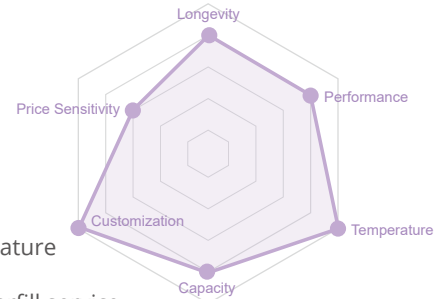


SQF-S25 840
240GB - 8TB
0-70 °C / -40~85 °C

SQF-CM8 710
64GB - 1TB
0-70 °C / -40~85 °C

Memory

- Wide temperature
- High speed
- Coating/underfill service



SQR-YD4I
Rugged DIMM
0~85 °C / -40~85 °C
up to 32 GB

SOR-SD4I(ECC)
ECC DIMM
0~85 °C / -40~85 °C
up to 32GB

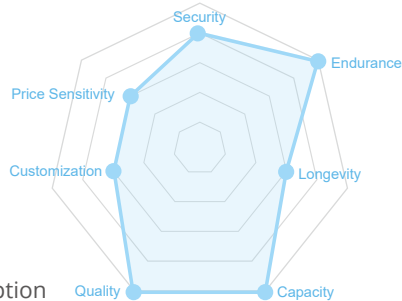
Networking

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 MT/s which delivers the highest performance, capacity, and maximum endurance the industry demands.



Storage

- Quad-core processor
- Lower power consumption
- SQ management utility

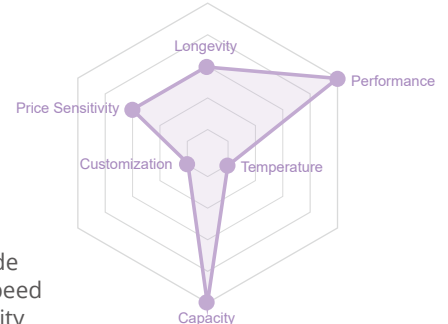


SQF-S25 840
240GB - 8TB
0-70 °C / -40~85 °C

SQF-C25 920
240GB - 8TB
0-70 °C / -40~85 °C

Memory

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



SQR-RD4N
RDIMM 2400/2666
Up to 128GB

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

Case Studies

SQFlash SSD Protects Data from Sudden Power Failures for In-Vehicle Applications

System design for in-vehicle applications always present a big challenge because they need to cope with dramatic changes in operating environments such as wide temperature fluctuations, strong vibration, and humidity. Furthermore, because of power supply instability, they also need to cope with fluctuating power environments, so the system design needs to take into account a lot of unexpected scenarios as well as be extra reliable to prevent data loss.



Application Requirements

One of our developer partners had a project involving in-vehicle surveillance systems. They needed a storage solution that took into account environmental vibration and needed to feature extended wide temperature operation and anti-vibration design. Because the data carried in the storage is related to passenger and traffic safety, it needed safe and secure methods for the prevention of data loss in case of serious power fluctuations. In addition to all this, for automotive electronics, electromagnetic interference (EMI) is also an issue, so the challenge was how to make sure the storage system performed 100% reliably during operations.

Project Implementation

The surveillance system included four high speed SATA ports that were designed with 2TB high capacity storage on each truck. The customer picked Advantech's SQFlash 910S series SATA SSD as storage, which was designed with the most advanced power failure protection from the IC level upwards. The controller IC manages low level data integrity to ensure each bit of data was 100% protected. The power circuit on the SSD board was designed with internal power management to ensure the smoothest power on/off curve and to prevent unstable power scenarios. SQFlash never caches data inside the SSD itself, but by using flush management control, valid data is always properly stored in non-volatile memory. Last but not least, SQFlash 910S series comes equipped with a series of industrial grade wide temperature tantalum capacitors that work with the power management circuit and corresponding firmware to ensure that the circuits inside the SSD always have the most stable power input. For enhanced security, Advantech's SQFlash SSD supports AES-256 internal encryption with the inclusion of an AES chip that encrypts all data before it is written to the flash IC. Thus, even if raw IC flash data is maliciously obtained, it will not be decodable. This internal encryption further provides a quick erase possibility under critical situations, so all data in the SSD can be erased within 10ms. And for added flexibility, to trigger the erase operation SQFlash provides a hardware GPIO pin, as well as a customizable set of software key commands, which even enable the possibility of erasing data remotely. SQFlash 910S series is fully tested to pass all EMI certifications with Advantech embedded systems. So, with Advantech's SQFlash Design-to-Order Service (DTOS), which provides a reliable total storage solution, the customer successfully implemented a storage array with superior SSD performance and extensive security and data protection functions for their in-vehicel surveillance system.

Benefits

- Comprehensive storage design experience from Advantech to deliver a highly integrated and reliable SSD solution.
- Advanced power failure protection design to cope with potential unstable power supplies.
- Comprehensive security functions supported by SQFlash to enhance overall system security and data protection.
- Conformal coating and IC side fill can be supported for SSD usage in ruggedized applications.
- Reliable, ruggedized industrial-grade SSD has the durability to withstand extreme operating environments.

SQRAM 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 SQRAM 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



Embedded

Model Name	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	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
Connector	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 TLC (BiCS3)	3D TLC (BiCS3)	SLC / Ultra MLC / MLC	SLC / Ultra MLC / MLC	SLC / Ultra MLC / MLC	Ultra MLC / MLC / 3D TLC (BiCS3)	Ultra MLC / MLC / 3D TLC (BiCS3)
Maximum Power Consumption	720	900	1,080 mA	1,260 mA	1,260 mA	530 mA	750 mA
Capacity	240GB ~ 8TB	240GB ~ 2TB	64GB ~ 2TB	32GB ~ 1TB	32GB ~ 1TB	16GB ~ 1TB	16GB ~ 1TB
Maximum Read / Write Performance (MB/s)	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 / -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
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



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 (BiCS3)	Ultra MLC / MLC / 3D TLC (BiCS3)	Ultra MLC / MLC / 3D TLC (BiCS3)	Ultra MLC / MLC / 3D TLC (BiCS3)	Ultra MLC / MLC / 3D TLC (BiCS3)	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 ~ 1TB	8GB ~ 256GB	1GB ~ 128GB	2GB ~ 64GB
Maximum 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-CMS 710 series	SQF-CM8 710 series
Form factor	2.5" U.2 NVMe SSD	M.2 2280 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
Connector	U.2 NVMe Interface (SFF 8639)	M.2 M-key with PCIe pin-out	Mini PCIe with PCIe pin-out	M.2 B+M key with PCIe pin-out
Flash Type	3D TLC (BiCS3)	3D TLC (BiCS3)	3D TLC (BiCS3)	3D TLC (BiCS3)
Maximum Power Consumption	790 mA	2,430	957 mA	1,261 mA
Capacity	240GB ~ 8TB	240GB ~ 2TB	64GB-1TB	128GB-1TB
Maximum Read / Write Performance (MB/s)	Read: upto 3,200 Write: upto 3,000	Read: upto 3,200 Write: upto 2,700	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
SQFlash Utility/ SQFlash Manager	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
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

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 (BiCS3)	SLC / Ultra MLC / MLC / 3D TLC (BiCS3)	Ultra MLC / MLC / 3D TLC (BiCS3)	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 ~ 256GB	1GB ~ 1TB	1 GB ~ 512GB	2 GB ~ 256 GB	4GB ~ 128GB
Maximum 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
Frequene(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							

*SGRAM Manager bundles with Advantech SUSIAccess

Ruggedized DRAM Modules

Rugged SODIMM



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
Frequene(MHz)	2666	3200/2666/2400	1866/1600	667/800	333/400	3200/2666/2400	1866/1600
Capacity	8/16/32GB	2/4/8/16/32GB	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						

*SGRAM Manager bundles with Advantech SUSIAccess

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
Frequene(MHz)	2400	3200/2666/2400	2400	3200/2666/2400	1600	2666	3200/2666/2400	1600
Capacity	64/128GB	8/16/32GB	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*	Supported							

* SGRAM Manager support by SMBus

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

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