Industrial Grade Peripheral Solutions

Wide Range of Industrial Storage, Memory and I/O Extension Module

- PCIe Enterprise SSD
- SATA / PATA SSD
- mSATA / NGFF(M.2) / DOM
- CF / CFast / SD / USB
- DDR 2 / 3 / 4 Memory Module
- Extension I/O Module



ADVANTECH

Enabling an Intelligent Planet

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Advantech Industrial Peripheral Design-in Services

Worldwide No 1 Industrial Peripheral Provider

Advantech has decades of the experience with industrial motherboards and IPC product development and has now extended its product coverage to industrial grade peripherals such as SSD, DRAM and I/O extension modules. We aim to provide dependable products with better longevity to industrial and semi-industrial application developers. All our modules have proven compatibility with other Advantech platforms.

Professional Design & Technical Consultancy

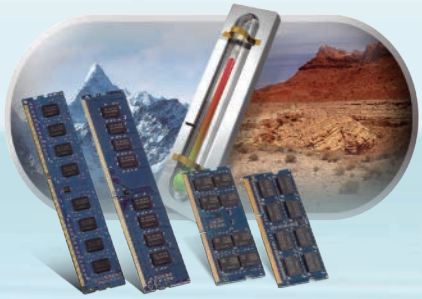
Unique Software for Data Security Solution

Advantech Industrial Storage SQFlash modules use cutting edge technology for data protection of intelligent property or confidential information. SQFlash provides unique software to end users for easy security function settings.

DTOS Services

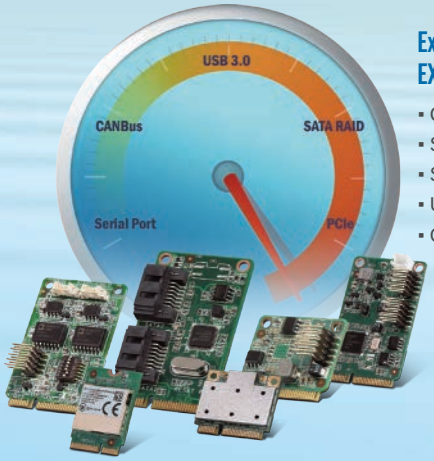
Advantech Industrial Peripherals provide in-house design, testing and customization services to fulfill all kinds of requests. Advantech ensures the products are JEDEC compliant with flexible Firmware / SPD tuning support capability.

Wide Range of Industrial Storage, Memory and I/O Extension Modules



Industrial Memory
SQRAM

- Wide Temp. DDR2/ DDR3/DDR4
- Minus Temp. DDR3/DDR4
- ECC DIMM DDR3/DDR4
- RDIMM: DDR4



Extension I/O
EXM

- CANBus
- SATA III w/ RAID function
- Serial/Parallel
- USB 2.0/3.0
- GigaLAN



Industrial Storage
SQFlash

- CFast
- DOM
- mSATA
- M.2 (NGFF)
- 2.5” SSD
- U.2 (NVMe)



Original IC Design



Industrial-grade Products & Services

Longevity Program

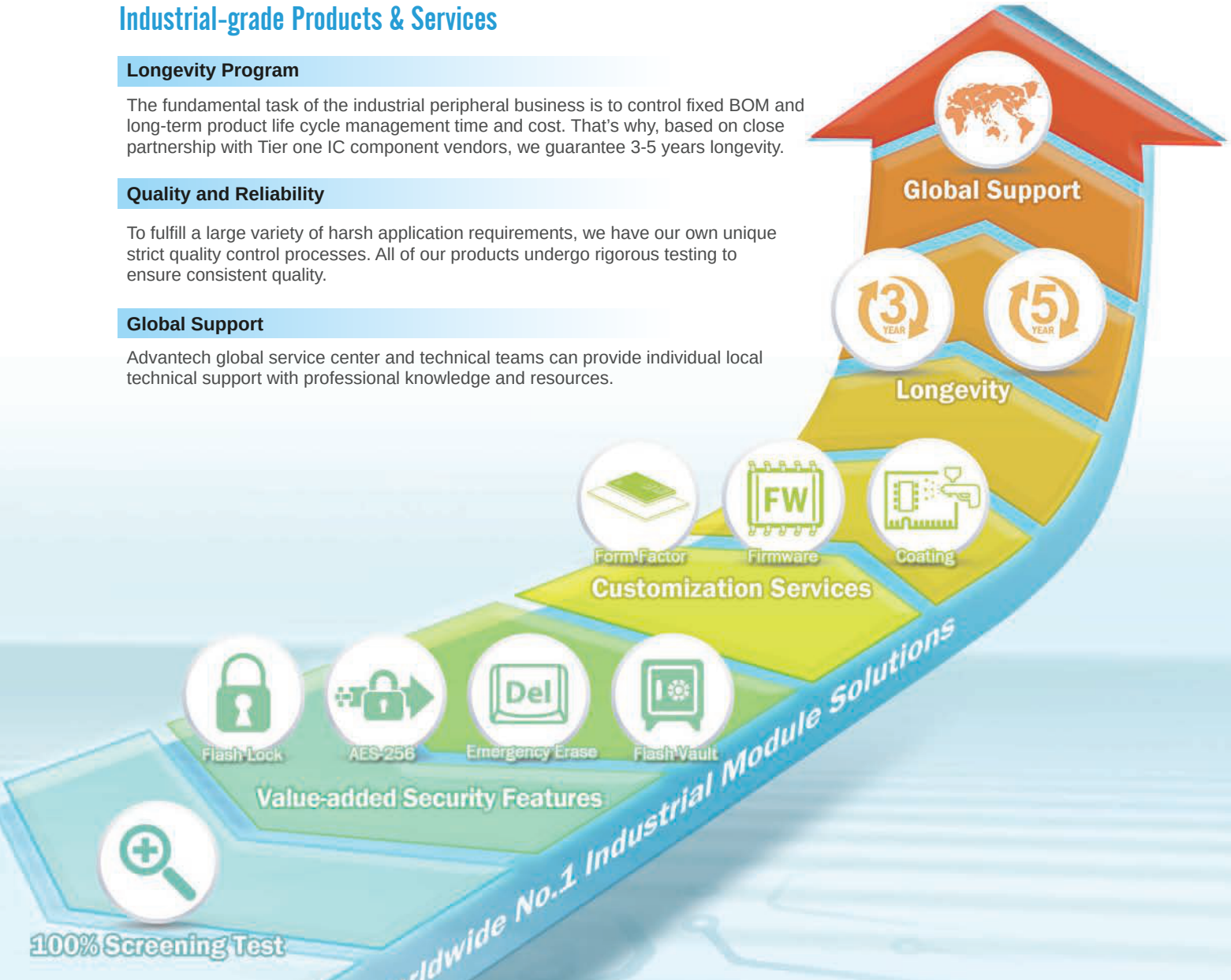
The fundamental task of the industrial peripheral business is to control fixed BOM and long-term product life cycle management time and cost. That's why, based on close partnership with Tier one IC component vendors, we guarantee 3-5 years longevity.

Quality and Reliability

To fulfill a large variety of harsh application requirements, we have our own unique strict quality control processes. All of our products undergo rigorous testing to ensure consistent quality.

Global Support

Advantech global service center and technical teams can provide individual local technical support with professional knowledge and resources.



SQFlash- World No. 1 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 was designed with industrial operation in mind and provides highly reliable flash memory solutions with excellent compatibility, performance and security.

Complete Security Solution

SQFlash is all about security since Solid State Drives are the place where we store all our data so we've included our SQFlash utility, which provides various security functions for flash storage with a friendly UI for users to manage their SQFlash modules. Designing your application with our SQFlash will decrease integration effort significantly and increase overall system stability.

Flash Lock
To prevent accidental data disclosure we bond SQFlash with hardware so content is 100% secure.

AES
Real-time encryption of data before programming to Flash IC, so there's no way to acquire data even by reading the Flash IC directly.

Flash Vault
Protects data in SQFlash from unauthorized access or modification.



SMART
Monitor your SQFlash health to help you plan your SSD maintenance schedule.

Security ID
Protects software intellectual property from duplication or unauthorized usage.

Write Protect
Write protection can easily be set by jumper or SQFlash utility so your data cannot be tampered with.

Emergency Erase
Erasing of all data within 10ms for critical situations.

Data Reliability

Fundamental to SSD reliability is how SSDs perform data management, especially in unstable power scenarios. SQFlash designed with the most advanced and complete multi-stage power failure protection that ensures that no matter which kind of scenario, you will be fully covered by our advanced product functions.

Complete Power Failure Protection

The multi-stage power failure protection of SQFlash is built into the SSD building blocks. From the core storage area of the Flash IC, the Power Failure Saver feature ensures data integrity. SQFlash also features Power Drop Catcher to handle glitches from voltage drops, and Flush Manager to ensure all valid data is safely stored in the Flash IC. The SSD can be optionally built with a Voltage Stabilizer to provide a stable operating environment for SSD components in case of serious power fluctuations.



Voltage Stabilizer

To minimize the risk in fluctuating power environments, Advantech designed a power stabilizing array to constantly provide sufficient power for internal components to ensure reliable data transfers.

Flush Manager

Designed with internal RAM buffer instead of data cache, so all valid data goes to the Flash IC directly without any delay.

Power Failure Saver

Built-in power failure protection mechanism to prevent data read / writes in low power scenarios. The SSD controller will also scan the block for integrity issues after power resumes.

Power Drop Catcher

Built-in a power management IC to maintain stable voltage in case of sudden drop out scenarios and restoration of the SSD work environment afterwards.

Case Studies

PCIe SSD in Enterprise for Scientific Analysis Applications



Scientific analysis often includes huge amounts of data. For example, the human genome contains more than 3,000 million base-pairs. To map all the DNA sequences and create the genome simulation requires not only massive computing power, but also high data throughput and storage. In particle physics, a microscopic description of a system typically contains particles in the order of 10^{23} which requires massive resources to analyze. Scientific research has become more and more sophisticated and requires corresponding computing power with data throughput to match in order to make the breakthroughs we need in our quest for knowledge.

Application Requirements

Scientific workstations are constructed for handling high computation tasks that can process complicated data calculations and graphical simulations. A bio lab in Taiwan recently chose Advantech's SOM-5991 to build an upgradable workstation with a 4 port SATA SSD RAID setup for genome simulation. However, researchers found the workstation was only running at 30% CPU performance, so after several rounds of tests, they concluded that storage throughput was the biggest bottleneck that constrained overall performance and they started to think about improving the speed of the storage by using PCIe SSD.

Benefits

- Standard NVMe specification natively supported by most OS and platforms.
- Extremely high performance with flexibility provides even more multi-tasking simulation options.
- SQFlash Utility for comprehensive security support with enhanced data security and reliability.

Advantech SQFlash Design-To-Order Service for Defense and Aerospace



Computing system design for defense and aerospace applications are always a big challenge, they need to cope with dramatic changes in operating environments such as wide temperature fluctuations and humidity. They also need to cope with high vibration and shock impacts during operation. So the system design needs to be compact and solid, but also needs to have super reliable connectors. This becomes a significant issue if the system needs a bunch of peripherals to be integrated, storage being one of the most important ones. Furthermore, the data contained in the storage is highly confidential so proper security protection is mandatory.

Application Requirements

An Unmanned Aerial Vehicle (UAV) designer is making UAV with a suitable surveillance system. Considering the environmental vibrations, the surveillance system needed to be super rugged and support a wide range of temperature fluctuations. With Advantech's SQFlash Design-to-Order Service (DTOS), the customer now has successfully implemented a ruggedized mainboard product with superior SSD solution includes two high speed SATA ports that were requested with 1TB high capacity storage per each, and the whole SSD module is designed to be soldered directly on mainboard to make storage ultimately anti-shock and vibration. For enhanced security, SQFlash supports AES-256 internal encryption to encrypt all data before it is written to the Flash IC and provides a quick erase possibility under critical situations, so all of the data in the SSD can be erased within 10ms.

Benefits

- Leverages comprehensive experience of storage product design from Advantech to deliver a highly integrated and reliable SSD solution.
- Comprehensive security functions supported by SQFlash enhance the overall system security and data protection.
- Reliable, ruggedized industrial-grade SSD has the durability to withstand extreme operating environments.

SQFlash Product Portfolio



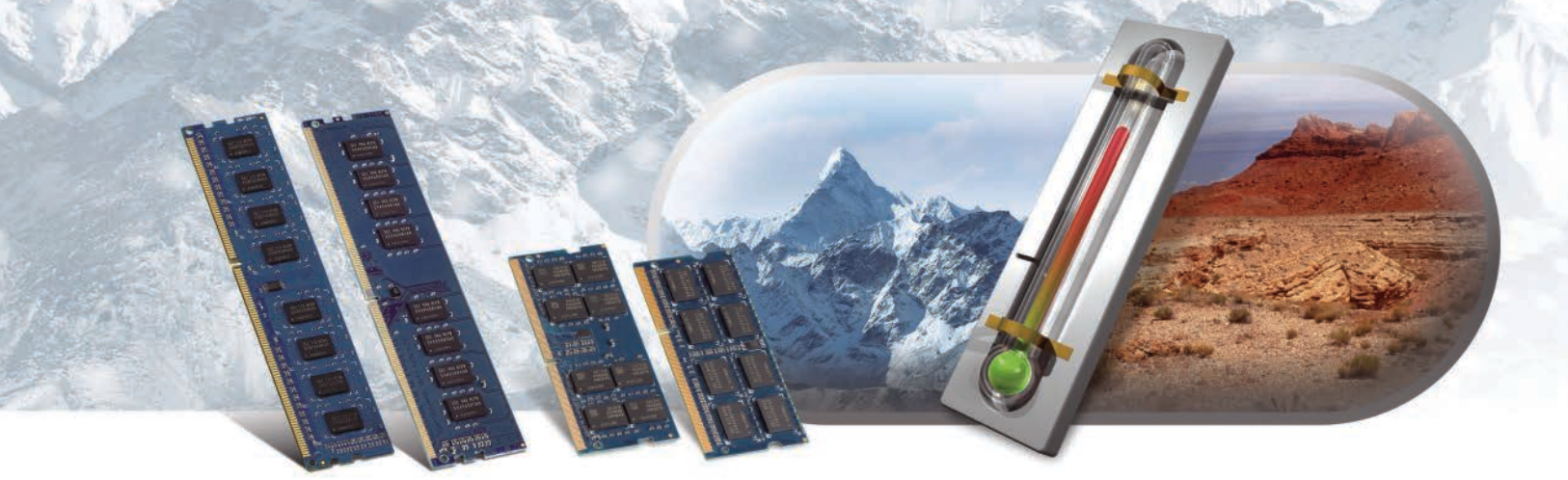
Product series	Enterprise SSD			Embedded SSD		Embedded M.2 Storage			
Model Name	SQF-C25 910C	SQF-CM8 910C	SQF-S25 910S	SQF-S25 830	SQF-S25 630	SQF-SM8 830	SQF-SM4 630	SQF-SM6 630	SQF-SM8 630
Transfer Protocol	PCIe Gen. III x4	PCIe Gen. III x4	SATA 6Gb/s	SATA 6Gb/s		SATA 6Gb/s			
Connector	U.2 (SFF-8639)	M.2 M Key	7 + 15 pin SATA	7 + 15 pin SATA		M.2 B + M Key			
Flash Type	SLC / Ultra MLC / MLC								
Maximum Power Consumption	750 mA	2750 mA	1,000 mA	1,000 mA	400mA	500mA	500mA	600mA	600mA
Capacity	100GB ~ 1600GB	100GB ~ 800GB	100GB ~ 1600GB	64GB ~ 2TB	1GB - 256GB	64GB ~ 1TB	8GB - 256GB	1GB - 256GB	1G-256GB
Maximum Read / Write Performance (MB/s)	Sequential: 2,500 / 1,300 Burst IOPS@4K: 300K / 250K Sustain IOPS@4K: 25K / 25K	Sequential: 2,500 / 1,300 Burst IOPS@4K: 300K / 250K Sustain IOPS@4K: 25K / 25K	Sequential: 550 / 530 Burst IOPS@4K: 100K / 100K Sustain IOPS@4K: 20K / 20K	Sequential: 550 / 530 Burst IOPS@4K: 100K / 100K Sustain IOPS@4K: 10K / 10K	SLC: 500/150 Ultra MLC: 520/190 MLC: 510/190	Sequential: 530 / 500 Burst IOPS@4K: 90K / 90K Sustain IOPS@4K: 8K / 8K	SLC: 500/150 Ultra MLC: 520/170 MLC: 490/170	SLC: 500/150 Ultra MLC: 520/190 MLC: 510/190	SLC: 500/150 Ultra MLC: 520/190 MLC: 500/190
Op. Temperature	0 ~ 70° C		0 ~ 70° C / -40 ~ 85° C						



Product series	Embedded SSD and Modules						PATA Storage and SD Card			
Model Name	SQF-SMS 630	SQF-SHM 630	SQF-SLM 630	SQF-SDM 630	SQF-S10 630	SQF-SUS 630	SQF-P10 P8/P9	SQF-PDM	SQF-P25 P9	SQF-ISD
Transfer Protocol	SATA 6Gb/s						UDMA 2 / UDMA 4 / UDMA 5	UDMA 2 / UDMA 4	UDMA 4	SDIO
Connector	Mini PCIe with SATA pin-out	Mini PCIe with SATA pin-out	7 + 15 pin SATA	7-pin Female	CFast Type-I	Onboard	CF Type-I	44-pin Female / 40-pin Female	44-pin Male	SD 9-pin
Flash Type	SLC / Ultra MLC / MLC					Ultra MLC / MLC	SLC / Ultra MLC / MLC	SLC	SLC / MLC	SLC / MLC
Maximum Power Consumption	500 mA	480 mA	370 mA	480 mA	480 mA	500 mA	160 mA	160 mA	210 mA	100 mA
Capacity	1GB ~ 256GB	1GB ~ 256GB	1GB ~ 256GB	1GB ~ 256GB	1GB ~ 256GB	2GB ~ 64GB	256MB ~ 64GB	1GB ~ 16GB	4GB ~ 256GB	1GB ~ 128GB
Maximum Read / Write Performance (MB/s)	SLC: 500/150 Ultra MLC: 520/195 MLC: 510/190	SLC: 65/60 Ultra MLC: 520/195 MLC: 510/190	SLC: 500/150 Ultra MLC: 520/195 MLC: 510/190	SLC: 500/150 Ultra MLC: 520/195 MLC: 520/200	SLC: 500/150 Ultra MLC: 520/195 MLC: 520/195	Ultra MLC: 490/190 MLC: 480/190	4 channel: 83/87 2 channel: 43/40 1 channel: 22/15	2 channel: 40/29	SLC: 65/55 MLC: 63/28	SLC: 25/15 MLC: 22/10
Op. Temperature	0 ~ 70° C / -40 ~ 85° C									

SQRAM- Pioneering DRAM for Industrial Markets

SQRAM series provides durable and reliable memory modules for rugged environments with extreme high and low temperature and performance needs.



Unique Features and High Standard Quality Control

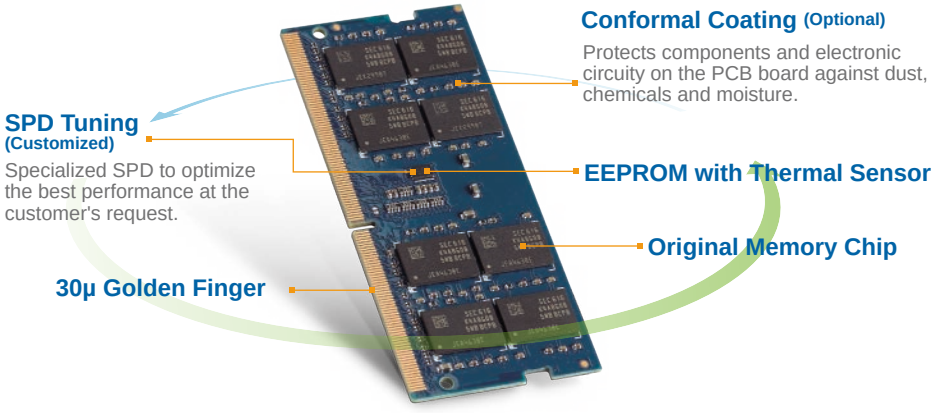
Rigorous Testing Process Leads Reliable Quality

SQRAM only uses the best chips from the original IC vendors to ensure quality consistency, also with strict high/low stress testing (-40~85°C) to guarantee industrial grade stability and reliability for various applications.



100% Screening Test

To ensure SQRAM quality consistency, 100% screen testing is an essential requirement for critical applications in the embedded industry. SQRAM guarantees industrial grade reliability and compatibility via strict in-house testing processes. We also offer customized services such as conformal coating, extended longevity and SPD tuning for specific project requirements.



SQRAM Product Portfolio

Advantech SQRAM product portfolio includes UDIMM, SODIMM, RDIMM and ECCDIMM, all with wide temperature (-40~85 C) and extended temperature range support (-20~85 C) for certain modules. The comprehensive product lineup is suitable for industrial and semi-industrial applications in transportation, medical, machine automation, military, gaming, POS, IPC and more.



Model Name	SQR-SD4I	SQR-SD4M	SQR-SD4I-ECC	SQR-UD4I	SQR-SD3M
Category	DDR4	DDR4	DDR4	DDR4	DDR3
Clock Speed	2133 / 2400 Mbps	2133 / 2400 Mbps	2133 / 2400 Mbps	2133 / 2400 Mbps	1066/1333/1600 Mbps
Pin/DIMM	260pin SO-DIMM	260pin SO-DIMM	260pin SO-DIMM	288pin U-DIMM	204pin SO-DIMM
Capacity	4GB to 16GB	4G to 16GB	4GB to 16GB	4GB to 16GB	2GB to 8GB
Power Supply	SSTL_12	SSTL_12	SSTL_12	SSTL_12	SSTL_15
Voltage	1.2V +/- 0.06V	1.2V +/- 0.06V	1.2V +/- 0.06V	1.2V +/- 0.06V	1.35V ± 0.1V 1.5V ± 0.075V
Operation Temp	-40 ~ 85°C	-20 ~ 85°C	-40 ~ 85°C	-40 ~ 85°C	-20 ~ 85°C
Dimension (mm)	69.6 x 30	69.6 x 30	69.6 x 30	133.35 x 31.25	67.6 x 30



Model Name	SQR-SD3I	SQR-UD3I	SQR-SD3I-ECC	SQR-SD2I
Category	DDR3	DDR3	DDR3	DDR2
Clock Speed	1333/1600 Mbps	1333 Mbps	1333/1600 Mbps	667 Mbps
Pin/DIMM	204pin SO-DIMM	240pin DIMM	204pin SO-DIMM	200pin SO-DIMM
Capacity	2GB to 8GB	1GB to 4GB	2GB to 8GB	1GB to 2GB
Power Supply	SSTL_15	SSTL_15	SSTL_15	SSTL_18
Voltage	1.35V ± 0.1V 1.5V ± 0.075V	1.5V ± 0.075V	1.5V ± 0.075V	1.8V ± 0.1V
Operation Temp	-40 ~ 85°C	-40 ~ 85°C	-40 ~ 85°C	-40 ~ 85°C
Dimension (mm)	67.6 x 30	133.35 x 30	67.6 x 30	67.6 x 30

New DDR4 Release

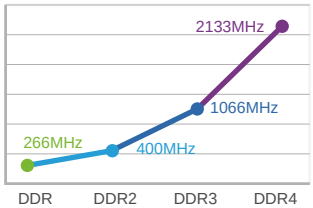
Higher Efficiency



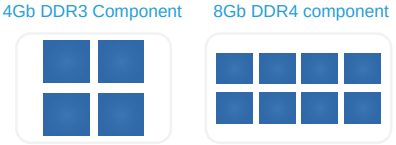
Low Power Consumption
DDR3 1.5V DDR4 1.2V

Reduces System Temp

Higher Speed



More Density



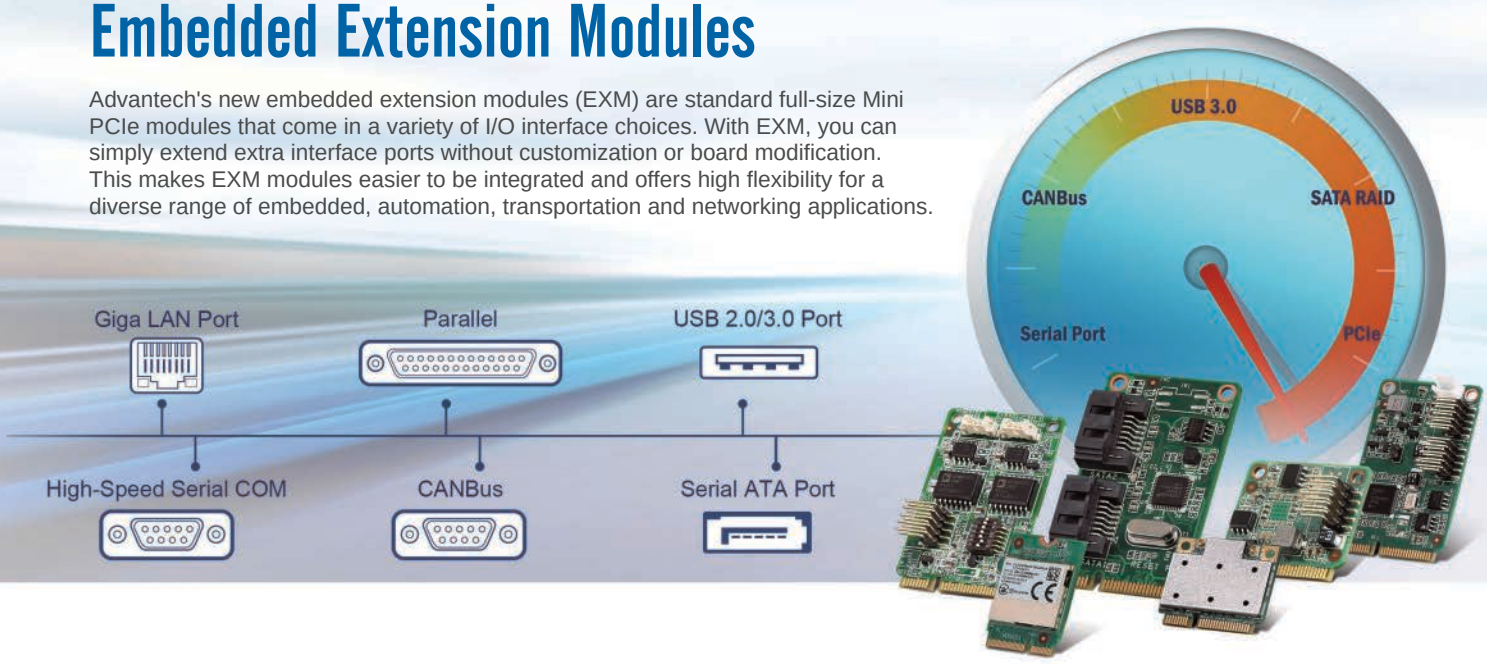
More capacity per component allows for higher density modules.

Next generation DDR4 memory technology delivers faster speeds and reduces power consumption by up to 20% with more bandwidth.

- Higher speed: DDR4 provides up to 50% performance improvement for faster processing
- Low power consumption: decreased voltage for lower cost computing and reduced system temperature
- Higher capacity: bandwidth increase from 8 to 16 banks 16GB capacity

Embedded Extension Modules

Advantech's new 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 modules easier to be integrated and offers high flexibility for a diverse range of embedded, automation, transportation and networking applications.



Flexible I/O Interface Choices

Including CANBus, Parallel, Serial, GigaLAN, SATA III and USB 2.0/3.0 interface selections.

Wide Temperature Support

Some Modules are designed with wide temperature support -40 ~ 80°C to fulfill critical applications.

Software Support

We provide CANBus API for easier I/O communication deployment. Both Windows and Linux versions are available.

Case Studies Quickly Develop Specific I/O Interface for Your Applications

Quickly Extend CANBus Interface
for Elevator Communication



CANBus
EXM-320

Fanless Box IPC
ARK-2151V

Quickly Extend USB 3.0 Interface
for Kiosk Applications



USB 3.0
EXM-521

Industrial Box PC
AIMB-B2274

Quickly Extend High-Speed Serial COM Module
for HMI



Serial COM
EXM-311

MI/O-Compact SBC
MIO-5251

Quickly Extend Serial ATA Port
for Railway NVR Application



SATA Port
EXM-520

Fanless Compact System
ITX-5710

EXM Extension Module Product Portfolio







Model Name	EXM-CMPF1 (KEY A)	EXM-CMPF1 (KEY E)	EXM-110
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 KEY A)	1 (2230/2242 KEY E)	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











Model Name	EXM-310	EXM-311	EXM-320	EXM-321	EXM-322
Type	USB to 1-Ch Parallel port	USB to 1-Ch High Speed Serial COM port	USB to 2-Ch CANBus port	USB to 2-Ch High Speed RS-232 port	USB to 2-Ch High Speed RS-422/RS-485 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, 2x5-pin, male header	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
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	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
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 15 mm	50.59 x 30 x 20 mm





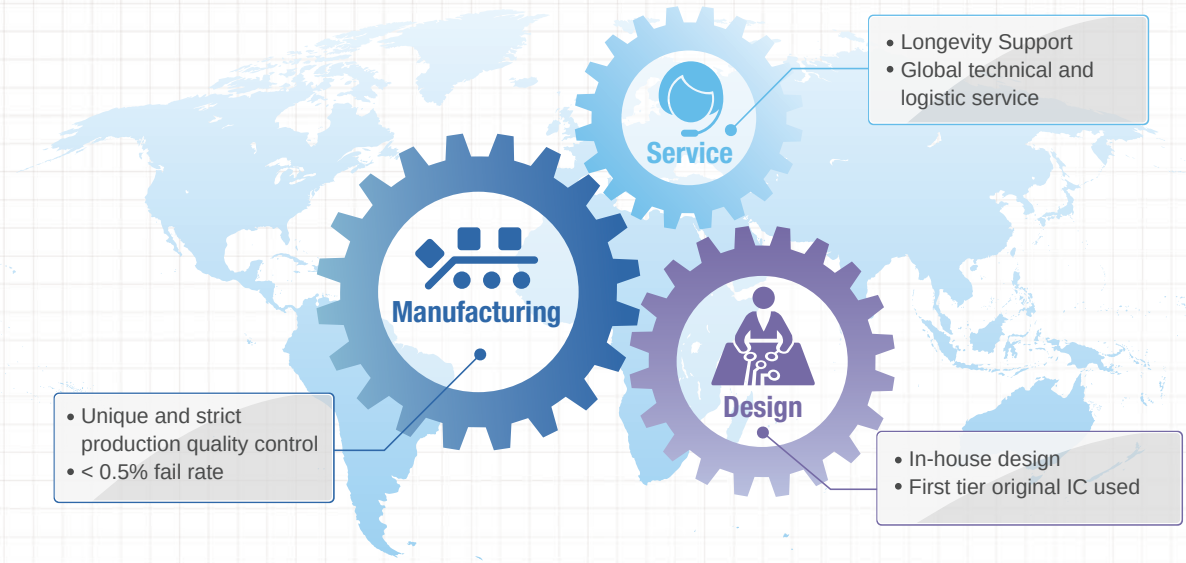






Model Name	EXM-510	EXM-520	EXM-521	EXM-522	EXM-540
Type	PCIe to 1-Ch Giga LAN port	PCIe to 2-Ch SATA III port	PCIe to 2-Ch USB 3.0 port	PCIe to 2-Ch USB 2.0 port	PCIe to 4-Ch USB 2.0 port
Communication Interface	PCIe	PCIe	PCIe	PCIe	PCIe
Interface Connector	MiniPCIe thru PCIe	MiniPCIe thru PCIe	MiniPCIe thru PCIe	MiniPCIe thru PCIe	MiniPCIe thru PCIe
Channel Connector	1	2	2	2	4
Operating Temperature	-40 ~ 85°C	0 ~ 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
LED Status	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	50.59 x 30 x 15 mm	26.65 x 30 x 15 mm	50.59 x 30 x 15 mm

Advantech Industrial Peripheral Services



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Hong Kong	852-2720-5118

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Singapore

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

Czech Republi

Ústí nad Orlicí	420-465-521-020

Ireland

Oranmore	353-91-792444

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