2017 Edition

Innodisk's High Performance Solutions for Aerospace and Defense Applications

Rugged SSD, DRAM and isolated expansion card for storage, memory and communication

innodisk

The Aerospace and Defense Industries: Unique Challenges

The aerospace and defense industries are capital intensive, and the applications in these industries that require embedded flash and DRAM products are very vulnerable to failure.

In a defense environment, only the most rugged storage products can handle environmental challenges, such as shock and vibration, extreme temperatures and electromagnetic interference. These products must also handle vital security challenges, such as protecting sensitive data and preventing data breaches.

Since the technology in these industries changes quickly, and each defense application has its own specific requirements, working with storage vendors that can provide long-term support and ensure the long-term availability of products is crucial.

As a result, it is important for manufacturers not only to use the right storage products for aerospace and defense applications but also to work with the right storage vendors.

Requirements:

- **Compliant with MIL-STD**
- **Operational in extreme environments**
- **Data security**

- **Sustained (uninterrupted) performance**
- **Product longevity and support**
- **Customization**

Innodisk Storage

Innodisk's industrial embedded flash and DRAM storage meet all of today's aerospace and defense application requirements.

Innodisk's storage products are fully compliant with aerospace and defense standards, and are built with a wide array of features to ensure outstanding performance in extreme environments and security-sensitive situations.

With our InnoRobust® feature set, we not only guarantee that our storage products are fully protected against heat, dust, extreme cold and heat, shock, vibration, and other environmental stresses, but we also deliver industry-leading data protection technologies to keep sensitive information secure. Our flash storage and DRAM modules are also backed by a dedicated engineering support team, and come with BOM control and flexible customization options.

MIL-STD-810G Compliant

Military-Grade System Design Standard

Innodisk products meet the strict specifications set by United States Military Standards for all products used in military and defense applications.

MIL-I-46058C Compliant

Silicone Conformal Coating Standard

Innodisk products comply with conformal coating standards to ensure maximum protection in harsh environments.

innodisk

Innodisk's flash and DRAM storage products are used in a wide variety of aerospace and defense applications.

3MG2-P SSD with AES Engine

Enhances Data Security

As the aerospace and defense industry grows more reliant on technology, data security is ever more critical for national security. Adding encryption has been a common method to ensure data security. Currently, AES (Advanced Encryption Standard) is adopted by NIST as the US Federal Information Processing Standard (FIPS). AES offers an effective way to protect all types of classified data. It is widely used for securing sensitive information throughout aerospace and defense industries. To support the requirements and demands of the market, Innodisk developed the 3MG2-P SSD equipped with an AES 256-bit engine. This product combines a reliable and rugged design with superior performance.

Features
- Equipped with hardware-based AES 256-bit Key
- Instant data erase when destroying the AES key
- TCG OPAL 2.0: independent LBA ranges with independent access control to read/write/erase
- Compliant with TCG OPAL for IEEE 1667
- Capacity up to 2TB
- Exclusive L² architecture
- iData Guard technology for abnormal power failure
- DEVSLP supported for low power consumption
- Supports wide temperature from -40℃ to 85℃
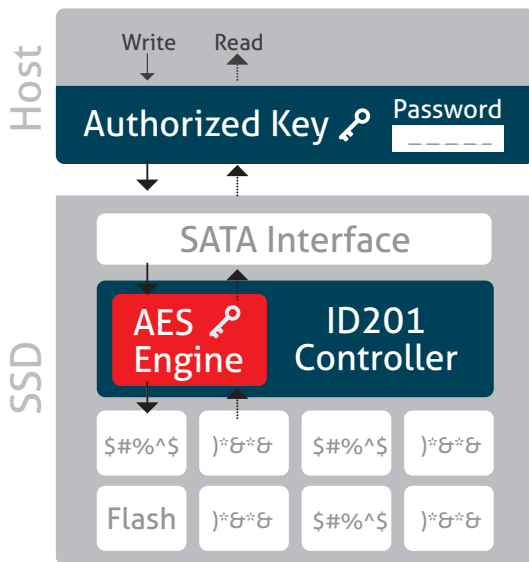
How does Innodisk 3MG2-P AES encryption work ?

After the 3MG2-P receives the data package from the host, the AES engine encrypts the data packets and saves the encrypted data into a NAND flash. This action ensures that there is no unauthorized access to the data in the NAND flash. In addition, the authorized key is set to be locked and prevented from being accessed after a power cycle. The 3MG2-P with AES encryption and an ATA security-authorized key can provide advanced security protection for your data with the encryption key being stored in a secured area of the SSD. You can quickly destroy the data on the drive by simply destroying the AES key which takes less than 1 second to perform; and without the AES key, the data cannot be unencrypted.

Add-on Value Selections

Conformal Coating

Innodisk conformal coating refers to the chemical materials that are applied in layers to cover components. The thickness of the coating ranges between 0.03 mm and 0.13 mm. Conformal coating protects against moisture, contaminant, dust and acid-or-alkaline materials, meeting IPC-A-610 standards for electronic components.

Side Fill

Side fill is value-added technology that can improve device reliability and extend product life. By applying resin on three sides of the IC, side fill can reinforce the joints between the BGA and the PCB, thus increasing robustness. We highly recommend taking advantage of our side fill for aerospace & defense applications, ensuring that your device will remain operational during strong tremors or stringent thermal cycling.

The Advantages of Our Products

Resistance to Severe Shock and Vibration

Innodisk's ruggedized design solves the problem of damage caused by severe shock and vibration. Our stringent testing and flexible design ensure rock-solid performance in military vehicles and aircraft that must operate in harsh conditions. In addition, our modules are clamped with through-holes, which further reduces the possibility of damage caused by shock and vibration.

Reduces the possibility of damage caused by shock and vibration.
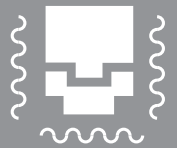
Ensures maximum protection in harsh environments.

Moisture-Proof, Dust-Proof, and Chemical-Proof

At Innodisk, we apply a protective coating to all our flash disks and DRAM modules that are designed for aerospace and defense applications. This conformal coating ensures maximum protection in harsh environments, where moisture, dust and other particles, and chemical exposure can destroy the operability of storage disks and DRAM modules.

Data Protection in Case of Abnormal Power Failure

Our proprietary iCell technology uses capacitors with voltage detectors to ensure the instant and reliable total transfer of buffer data to flash storage. iCell's sophisticated data buffer management guarantees that all buffer data is flushed to the flash chip before a total power loss.

Guarantees all buffer data is flushed to the flash chip before total power loss.

## Ensures that SSDs stay within temperature limits.
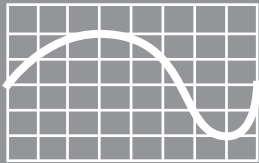
Prevention of Failure Due to Overheating

Innodisk's Thermal Sensor instructs the SSD to either change speed or throttle back on flash access, ensuring that the SSD stays within temperature limits, and thus preventing failure due to overheating.

Operational in Extreme Temperatures

Mission-critical-grade vehicles and equipment operate in a wide range of temperatures, and stresses caused by very low or very high temperatures can lead to loss of data integrity. Our modules are rigorously tested to ensure operability in extreme temperatures, ranging from -40°C to 85°C.

Operability in extreme temperatures, ranging from -40°C to 85°C.
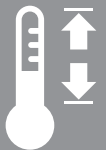
Erases 128GB of data in seven seconds.

Data Security: Erase, and Destroy

Our data security system provides quick erase, and secure destroy technologies that meet the standards of the U.S. Navy, Air Force, and Army, the Department of Defense, the National Security Agency, and the National Industrial Security Program Operating Manual Supplement (NISPOMSUP). In addition, our proprietary QEraser function can erase 128GB data in just seven seconds.

Avoid ECC failure during an unexpected loss of power

Our iData Guard technology is comprised of a built-in low power detector and firmware power-down recovery algorithm that prevents ECC failure occurring caused by data inconsistencies due to loss of power. Once the low power detector is triggered, a safe power-down recovery algorithm is executed to help prevent data loss and ensure data integrity.

A patented and enhanced Power Cycling data management system to ensure data integrity.

Our Service and Support

A Dedicated Engineering Support Team

Our dedicated engineering support team is available to ensure that all of our products for aerospace and defense applications are backed by a comprehensive service system. Our software, hardware, firmware, R & D, and field-application engineers all work closely together to provide world-class support for each and every aerospace and defense application.

BOM Control

Aerospace and defense data storage applications benefit from a fixed configuration, and fixed-BOM orders ensure product longevity and stability.

Customization

Our rugged products are specially tailored to fit the needs of each aerospace and defense application. A variety of speeds, capacities, sizes, and data security options are available for customization. Our DRAM modules include low profile, 32-bit, SO-DIMM, Long DIMM, VLP-DIMM, Mini-DIMM, and single side for space maximization.

innodisk

We are dedicated to providing our customers with the absolute best service.

Successful Story

InnoRobust™ Data Security and Conformal Coating Ensure the Data Integrity and Lifespan of Devices

Situation

Embedded systems for aerospace and defense require system integrity with reliable and secure erase functions to strengthen cyberspace protection. The Russia-based contractor, which is well known for providing systems to the submarine fleet, took part in a project aimed at upgrading the onboard navigation system. The in-dash embedded navigational system used for surveillance and monitoring is critical for homeland security.

When upgrading the navigation system there was a few challenges that needed to be addressed, such as electronic devices operating in a highly corrosive environment, surges and spikes caused by an unstable power supply – and the most crucial aspect, the data integrity of the system with regards to secure and erase functions.

Solution

Innodisk's team worked together with the customer to reach a solution that met all the requirements for data integrity. First off, we recommended an InnoRobust™ solution equipped with a customized DOS tool which ensures that the system is backward compatible with SATA II and SATA I. Our InnoRobust™ Data Security feature set offers different levels of Secure and Erase functions with solid field tests and proven records. The ultimate data gatekeeper – Physical Data Destroy – is a self-destruct design initiated through high current run through the SSD to destroy the control and flash IC, thus eliminating all data within 2 seconds. However, considering this project demanded an even more cautious approach, the circuit design was re-layered to ensure that the IC controller and NAND flash would be destroyed simultaneously in less than 5 milliseconds (MS).
To mitigate problems arising from a high saline and acidic environment, the Innodisk team also recommended conformal coating on the surface of the storage devices. With this coating shield, not only do the storage devices have increased lifespan and product reliability, but the cost of system maintenance is also significantly reduced.

Result

Amongst the embedded storage device suppliers in the market, Innodisk provides additional value to enhance system performance, reliability and usability. Through the InnoRobust™ Data Security feature set, the data integrity of the system is ensured. The added layer of our conformal coating service on the operating devices offers increased longevity against harsh environmental conditions. Innodisk is committed to working with customers from the design stage to system completion, as we believe we can expand business together through partnership and solid cooperation.
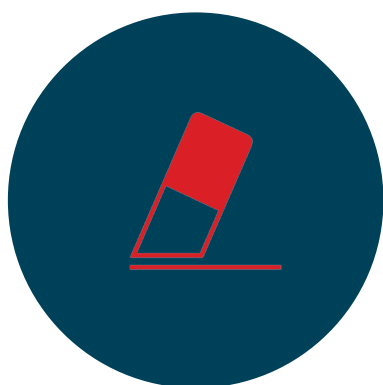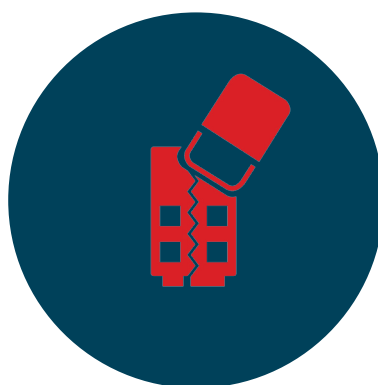
Flash Firmware

Security Erase

Security Erase is designed for emergency data erasure compliant with the following military standards :

|	
DoD 5220.22-M	USA-Army 380-19
USA-AF AFSSI 5020	NISPOMSUP Chap 8, Sect. 8-501
USA Navy NAVSO P-5239-26	NSA Manual 9-12
NSA Manual 130-2	IRIG 106

Quick Erase

In an emergency, Quick Erase will erase data within a few seconds.

Destroy

Innodisk's destroy function implements an ultimate data erase of the SSD. Once Destroy has been triggered, all confidential data, SSD information and even firmware will be erased and unrecoverable.
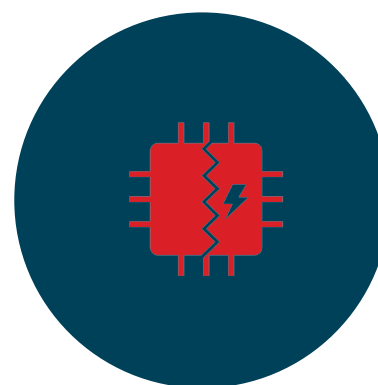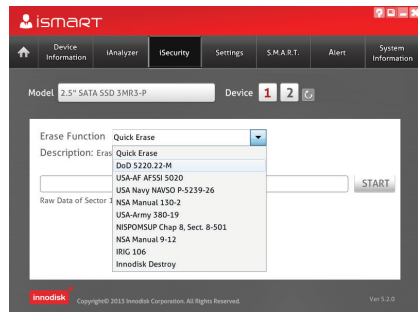

Physical Destroy

Physical Destroy uses high voltage to completely destroy flash cells and firmware, making data completely unrecoverable.

Technologies

Software	Hardware

iSMART

The iSecurity function under iSMART allows the user to easily operate the data erase command. The user may select the data erase function, monitor erase progress and also compare data before and after the erase.

Power on Protection

New circuit protection is dually designed to allow uninterrupted SSD functionality in an abnormal power supply situationas well as emergency startups or system shutdowns.

Stable Power Control

Optimized power circuits and established OCP/OVP mechanisms prevents electronic components from burning out due to voltage and current surges.

Flash Product

Featured here are 4 of Innodisk's advanced flash products for aerospace and defense applications.

Model Name	1.8" SATA SSD 3MR3-P	2.5" SATA SSD 3MR3-P	2.5" SATA SSD 3MR2-P	2.5" SATA SSD 3SR3-P
Key Features	1. 1.8" SATA III solution for industrial field 2. iSMART disk health monitoring 3. Intelligent error recovery system 4. Excellent data transfer speed 5. Enhanced power cycling management	1. Compliant with MIL-STD-810-G 2. HW/SW Data Security (Quick Erase/Destroy/ Security Erase/ Write Protect) 3. iCell supported, 100% data protection	1. Compliant with MIL-STD-810-G 2. Data security (Quick Erase/Secure Erase/ Destroy/Write Protect) 3. High random performance 4. iData Guard/iCell technology for data protection	1. Compliant with MIL-STD-810-G 2. HW/SW Data Security (Quick Erase/ Destroy/ Security Erase/ Write Protect) 3. iCell supported, 100% data protection
Interface	SATA III 6Gb/s	SATA III 6.0Gb/s	SATA III 6.0Gb/s	SATA III 6.0Gb/s
Flash Type	MLC	MLC	MLC	SLC
Capacity	8GB - 512GB	64GB~512GB	8GB - 1TB	8GB~512GB
Max. Channel	4	4	4	4
Sequential R/W (MB/sec, max.)	480/220	490/270	520/450	490/280
Max. Power consumption	1.7W (5V x 340mA)	4.5W (5V x 900mA)	6W (5V x 1.2mA)	2.65W (5V x 530mA)
Thermal Sensor	STD: N W/T: Y	STD: N W/T: Y	Y	STD: N W/T: Y
External DRAM Buffer	Y	Y	Y	Y
iData Guard	Y	Y	Y	Y
iCell	N	Y	Y	Y
TRIM	Y	Y	Y	Y
ATA Security	Y	Y	Y	Y
S.M.A.R.T	Y	Y	Y	Y
iSecurity	Y	Y	Y	Y
Dimension (WxLxH/mm)	54.0 x 78.5 x 5.0	69.8 x 99.8 x 9.2	69.8 x 100.1 x 6.9	69.8 x 99.8 x 9.2
Environment	Vibration: 20G@7~2000Hz Shock: 1500G@0.5ms Storage Temperature: -55°C ~ +95°C MTBF: >3 million hours			
Standard temp. OP(0°C~+70°C)	DRS18-XXXD70%C***	DRS25-XXXD70%C***	DRS25-XXXD81%C***P	DRS25-XXXD70SC***
Wide temp. OP(-40°C~+85°C)	DRS18-XXXD70%W***	DRS25-XXXD70%W***	DRS25-XXXD81%W***P	DRS25-XXXD70SW***
Note	XXX = density (02GB=02G, 04GB=04G, 08GB=08G, 16GB=16G, 32GB=32G, 64GB=64G, 128GB=A28, 256GB=B56, 512GB=C12, 1TB=01T, 2TB=02T) ***= flash configuration (internal control code) %=Flash			

DRAM Products

Featured here are 13 of Innodisk's advanced DRAM products for aerospace and defense applications.

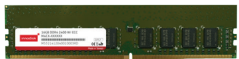|	Rugged DIMM			Mini DIMM		
Module Type	DDR4 SODIMM	DDR3 SODIMM	DDR2 SODIMM	DDR4 Mini DIMM	DDR3 Mini DIMM	DDR3 Mini RDIMM
Data Rate	2133 MT/s, 2400 MT/s	1333 MT/s, 1600 MT/s, 1866 MT/s	400 MT/s, 533 MT/s 667 MT/s, 800 MT/s	2133 MT/s, 2400 MT/s	1066 MT/s, 1333 MT/s, 1600 MT/s	
Capacity	4GB/8GB/16GB	1GB/2GB /4GB/8GB/16G	512MB/1GB/2GB/4GB	4GB/8GB/16GB	1GB/2GB/4GB/8GB	1GB/2GB/ 4GB/8GB/16GB
Function	Non-ECC Unbuffered Memory			With ECC Unbuffered Memory		Registered Memory
Pin Number	260 pin	204 pin	200 pin	288 pin	244 pins	
Width	32 Bits/64 Bits			72 Bits		
Voltage	1.2V	1.35V/1.5V	1.8V	1.2 V	1.5V / 1.35V	
PCB Height	1.18 inches		1.53 inches	0.738 inches (VLP)	0.738 inches (VLP)/ 0.72 inches (ULP)	1.18 inches/ 0.738 inches (VLP)
Operation Temperature	-40°C ~ 85 °C			0°C ~ 85 °C		
512GB	-	-	M2GK-12SFXCXX	-	-	-
1GB	-	M3GW-1GSJXCXX	M2G0-1GSFOCXX	-	M3M0-1GSFOLXX	M3M0-1GSJVLXX
2GB	-	M3GW-2GSSXCXX	M2G0-2GSFOCXX	-	M3M0-2GSJOLXX	M3M0-2GSJVLXX
4GB	M4GS-4GSSXCXX	M3GW-4GSSXCXX	-	M4M0-4GSS5CXX	M3M0-4GSSOLXX	M3M0-4GSSVLXX
8GB	M4GS-8GSSXCXX	M3GW-8GSSXCXX	-	M4M0-8GS15CXX	M3MW-8GHT9LXX	M3M0-8GSSWLXX
16GB	M4GS-AGS1XCXX	M3GW-AGSSXCXX	-	M4M0-AGS1YCXX	-	M3M0-AGM1WLXX
	Speed Reference: 400 MT/s= G3, 533 MT/s=H4, 667 MT/s=J5, 800 MT/s=K6 1066 MT/s=M7, 1333 MT/s=N9, 1600 MT/s=PC, 1866 MT/s=QE, 2133 MT/s=RG, 2400 MT/s=SJ					

	DIMM/SODIMM		DIMM/ SODIMM w/ECC	
Module Type	DDR4 SODIMM	DDR4 Long DIMM	DDR4 SODIMM	DDR4 Long DIMM
Data Rate	2133 MT/s, 2400 MT/s		2133 MT/s, 2400 MT/s	
Capacity	2GB/4GB/8GB/16GB	4GB/8GB/16GB	4GB/8GB/16GB	
Function	Non-ECC Unbuffered Memory		With ECC Unbuffered Memory	
Pin Number	260 pin	288 pin	260 pin	288 pin
Width	64 Bits		72Bits	
Voltage	1.2V		1.2V	
PCB Height	1.18 inches	1.23 inches	1.18 Inches	1.23 inches
Operation Temperature	0°C ~ 85 °C		0°C ~ 85°C	
2GB	M4S0-2GSVZCXX	-	-	-
4GB	M4S0-4GSSNCXX	M4U0-4GSSJCXX	M4D0-4GSSPCXX	M4C0-4GSSLCXX
8GB	M4S0-8GSSOCXX	M4U0-8GSSKCXX	M4D0-8GSSQCXX	M4C0-8GSSMCXX
16Gb	M4S0-AGS1OCXX	M4U0-AGS1KCXX	M4D0-AGS1QCXX	M4C0-AGS1MCXX
	Speed Reference: 400 MT/s= G3, 533 MT/s=H4, 667 MT/s=J5, 800 MT/s=K6 1066 MT/s=M7, 1333 MT/s=N9, 1600 MT/s=PC, 1866 MT/s=QE, 2133 MT/s=RG, 2400 MT/s=SJ			

	Wide Temperature		
Module Type	**DDR4 Long DIMM/ SODIMM ECC DIMM/ ECC SODIMM**	**DDR3 Long DIMM/ SODIMM ECC DIMM/ ECC SODIMM**	**DDR2 SODIMM**
Data Rate	2133 MT/s	1333 MT/s, 1600 MT/s, 1866 MT/s	400 MT/s, 533 MT/s, 667 MT/s, 800 MT/s
Capacity	4GB/8GB/16GB	1GB/2GB/4GB/8GB/16GB	512 MB/1GB/2GB/4GB
Function	With or without ECC		Non ECC Unbuffered Memory
Pin Number	288/260 pin	240/204 pin	240/200 pin
Width	64/72 Bits	64/72 Bits	64 Bits
Voltage	1.2V	1.35V/ 1.5V	1.8V
PCB Height	1.23 inches/ 1.18 inches	1.18 inches	1.18 inches
Operation Temperature	-40°C ~ 85 °C		
512MB	-	-	M2S0-12PC5IXX
1GB	-	M3S0-1GSFC5XX	M2S0-1GMF5IXX
2GB	-	M3S0-2GSJC5XX	M2S0-2GMF6IXX
4GB	M4U0-4GSSJ5XX/ M4S0-4GSSN5XX/ M4C0-4GSSL5XX/ M4D0-4GSSP5XX	M3S0-4GSSC5XX	M2S0-4GMJ6IXX
8GB	M4U0-8GSSK5XX/ M4S0-8GSSO5XX/ M4C0-8GSSM5XX/M4D0-8GSSQ5XX/	M3S0-8GSSD5XX	-
16GB	M4U0-AGS1K5XX / M4S0-AGS1O5XX/ M4C0-AGS1M5XX/ M4D0-AGS1Q5XX	M3S0-AGM1D5XX	-
Speed Reference: 400 MT/s= G3, 533 MT/s=H4, 667 MT/s=J5, 800 MT/s=K6 1066 MT/s=M7, 1333 MT/s=N9, 1600 MT/s=PC, 1866 MT/s=QE, 2133 MT/s=RG, 2400 MT/s=SJ			

DDR4 XRDIMM

In order to meet the high standards of the aerospace and defense industry, our XRDIMM comes equipped with several advantages meeting the requirements for robust DRAM modules. We offer two densities of DDR4 XRDIMM, 8GB & 16GB, both with an integrated error checking and correction function. With its 300-pin socket connector, Innodisk's XRDIMM exceeds the pin number standard established by the SFF Special Interest Group (SFF-SIG), ensuring a firm connection between the CPU and DRAM module. Additionally, our XRDIMM DRAM module features two mounting holes which ensures a secure attachment to the host CPU board.
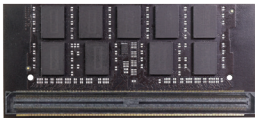
This customized design enables XRDIMM to be highly resistant to shock and vibration, providing a more reliable performance for the aerospace and defense vertical market. We also offer other value-added services, such as side fill and coating, further strengthening the durability of the module.

Module Type	**DDR4 SODIMM**
Data Rate	2133 MT/s, 2400 MT/s
Capacity	4GB/8GB/16GB
Function	Non-ECC Unbuffered Memory
Pin Number	260 pin
Width	32 Bits/64 Bits
Voltage	1.2V
PCB Height	1.18 inches
Operation Temperature	-40°C ~ 85 °C
8GB	M4X0-8GSSXMXX
16GB	M4X0-AGS1QMXX

Embedded Peripherals

Communication modules
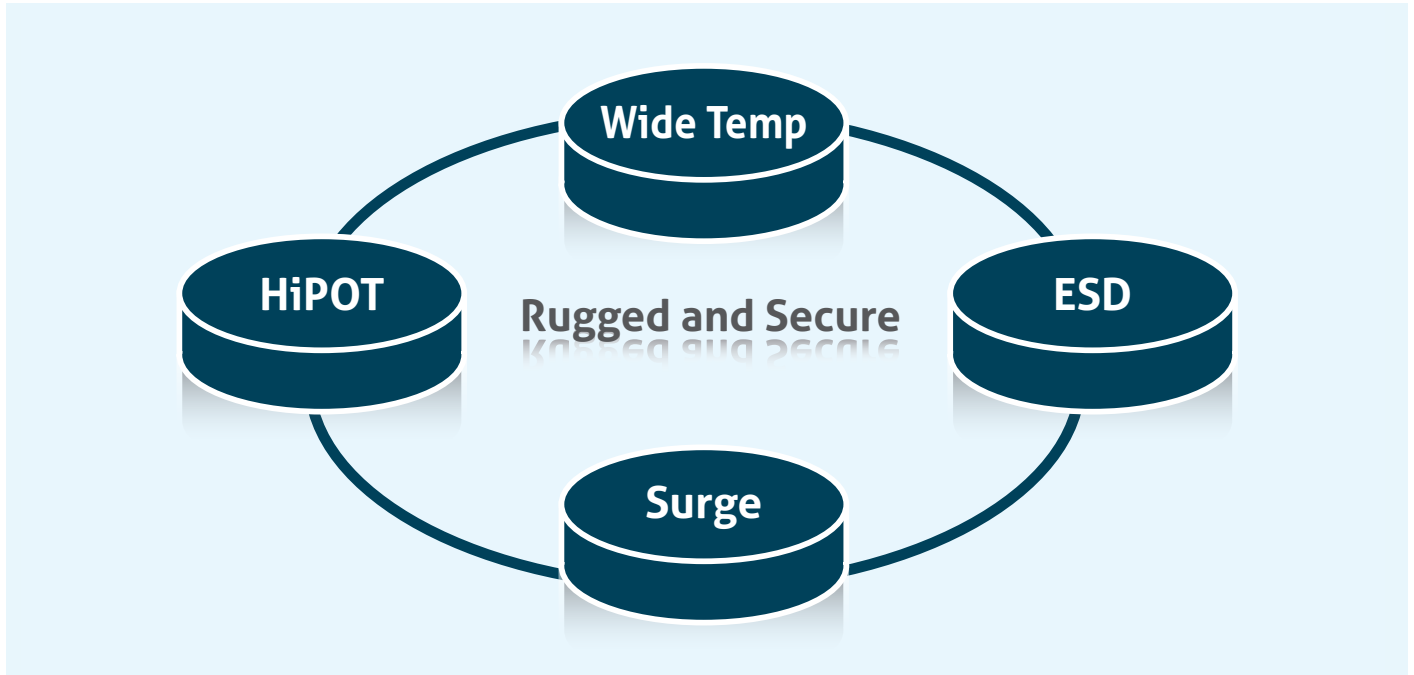
Galvanic Isolation and ESD protection

The circuit design of our expansion cards use reliable transformers and transceivers to exchange information and power between high voltage areas and controllers. Through this design, the flow of current is denied a direct conduction path to the rear systems, thus preventing damage to your device.

Innodisk isolation design complies with EN61000-4-5 surge protection and IEC 60950-1:2005 + A1: 2009 + A2:2013 HiPOT up to 2500V and our embedded peripheral cards provides a reliable Electrostatic Discharge Protection that complies with the EN61000-4-2 (ESD) Air-15kV, Contact-8kV standard.

CANBus

Controller Area Network Bus: A vehicle bus-standard that allows electronic control devices to communicate with each other without the presence of a host computer, allowing for a drastic simplification and reduction of on-board wiring.

Model Name	EMUC-B201
Module Type	USB to dual isolated CANbus 2.0B module
Key Features	1. mPCIe form factor. Two channels CANbus 2.0B(DB-9 x 2) backward compatible with 2.0A 2. Complies with EN61000-4-5 2.5kV Surge protection 3. Complies with IEC 60950-1:2005 + A1: 2009 + A2:2013 2.5kV HiPOT protection 4. Complies with EN61000-4-2 (ESD) Air-15kV, Contact-8kV 5. Supports -40 to +85 degrees 6. Supports 3rd mounting hole and USB Pin header for out-of-minicard installation 7. Supports baud rate 50/125/250/500/1000K 8. Termination resistor enabled/disabled by jumper
Form-Factor	mPCIe
Input I/F	USB 2.0
Input Connector	mPCIe or 5Pin Header
Output I/F	CANbus 2.0B x 2
Output Connector	DB-9 x 2
Dimensions(W*L*H/mm)	30.0 x 50.9 x 8.35
Operating Temperature	Wide temp : -40°~85°C
Order Info.	EMUC-B201-W1

LAN

Gigabit Ethernet: Commonly used in Local Area Network (LAN) to retrieve content and services from the Internet.

Model Name	EMPL-G101	EMPL-G201
Module Type	mPCIe to single isolated GbE LAN module	mPCIe to dual isolated GbE LAN module
Key Features	1. Single isolated GbE LAN ports 2. Complies with EN61000-4-5 2kV surge protection 3. Complies with IEC 60950 1:2005 + A1: 2009 + A2:2013 2kV HiPOT protection 4. Complies with EN61000-4-2 (ESD) Air-15kV, Contact-8kV 5. Flexible daughter board with cable to fit into different system 6. Supports mounting terminal or bracket for daughter board 7. Optional industrial temperature(-40℃ to +85℃) support	1. Dual isolated GbE LAN ports 2. Complies with EN61000-4-5 2kV surge protection 3. Complies with IEC 60950-1:2005 + A1: 2009 + A2:2013 2kV HiPOT protection 4. Complies with EN61000-4-2 (ESD) Air-15kV, Contact-8kV 5. Flexible daughter board with cable to fit into different system 6. Supports mounting terminal or bracket for daughter board 7. Optional industrial temperature (-40℃ to +85℃) support
Form-Factor	mPCIe	mPCIe
Input I/F	PCI Express 2.1	PCI Express 2.1
Input Connector	mPCIe	mPCIe
Output I/F	GbE LAN x 1	GbE LAN x 2
Output Connector	RJ45 x 1	RJ45 x 2
Dimensions(W*L*H/mm)	30.0 x 50.9 x 7.6	30.0 x 50.9 x 7.6
Operating Temperature	STD temp : 0°~70℃ Wide temp : -40°~85℃	STD temp : 0°~70℃ Wide temp : -40°~85℃
Order Info.	EMPL-G101-C1 EMPL-G101-W1 EMPL-G101-C2(with bracket) EMPL-G101-W2 (with bracket)	EMPL-G201-C1 EMPL-G201-W1 EMPL-G201-C2(with bracket) EMPL-G201-W2 (with bracket)

Serial

RS-232/422/485: A standardized interface that offers a cost-effective solution to a wide range of devices.

Model Name	EMU2-X2S1	EMU2-X1S1	EMP2-X4S1	EMP2-X4S2
Module Type	USB to dual isolated RS-232 module	USB to Single isolated RS-232 module	mPCIe to four Isolated RS-485 Module	mPCIe to two Isolated RS-422 & RS-485 Module
Key Features	1. USB specification Rev. 2.0 compliant 2. Up to 1 Mbps serial data rate. 512-byte FIFOs 3. Full RS232 functions with DB9 connector 4. Supports port-to-port and port-to-computer isolation, complies with IEC 60950-1:2005 + A1: 2009 + A2:2013 2.5kV HiPOT protection 5. Complies with EN61000-4-2 (ESD) Air-15kV, Contact-8kV 6. Supports 3rd mounting hole and USB Pin header for out-of-minicard installation 7. Industrial temperature (-40 ºC to 85 ºC) operation	1. USB specification Rev. 2.0 compliant 2. Up to 1 Mbps serial data rate. 512-byte FIFOs 3. Full RS232 functions with DB9 connector 4. Supports port-to-port and port-to-computer isolation, complies with IEC 60950-1:2005 + A1: 2009 + A2:2013 2.5kV HiPOT protection 5. Complies with EN61000-4-2 (ESD) Air-15kV, Contact-8kV 6. Supports 3rd mounting hole and USB Pin header for out-of-minicard installation 7. Industrial temperature (-40 ºC to 85 ºC) operation	1. PCI-Express specification Rev. 2.0 compliant 2. Up to 10 Mbps serial data rate. 16C550 compatible. 256-byte FIFOs 3. Supports port-to-computer isolation, complies with IEC 60950-1:2005 + A1: 2009 + A2:2013 2.5kV HiPOT protection 4. Complies with EN61000-4-2 (ESD) Air-15kV, Contact-8kV 5. Termination Resistor by switch setting 6. Industrial temperature (-40 ºC to 85 ºC) operation	1. PCI-Express specification Rev. 2.0 compliant 2. Up to 10 Mbps serial data rate. 16C550 compatible. 256-byte FIFOs 3. Supports port-to-computer isolation, complies with IEC 60950-1:2005 + A1: 2009 + A2:2013 2.5kV HiPOT protection 4. Complies with EN61000-4-2 (ESD) Air-15kV, Contact-8kV 5. Termination Resistor by switch setting 6. Industrial temperature (-40 ºC to 85 ºC) operation
Form-Factor	mPCIe	mPCIe	mPCIe	mPCIe
Input I/F	USB 2.0	USB 2.0	PCI Express 2.0	PCI Express 2.0
Input Connector	mPCIe or 5Pin Header	mPCIe or 5Pin Header	mPCIe	mPCIe
Output I/F	RS-232 x 2	RS-232 x 1	RS-485 x 4	RS-422 x 2, RS-485 x 2
Output Connector	DB-9 x 2	DB-9 x 1	DB-9 x 4	DB-9 x 4
Dimensions(W*L*H/mm)	30.0 x 50.9 x 8.25	30.0 x 50.9 x 8.25	30.0 x 50.9 x 12.55	30.0 x 50.9 x 12.55
Operating Temperature	Wide temp : -40~85℃	Wide temp : -40~85℃	Wide temp : -40~85℃	Wide temp : -40~85℃
Order Info.	EMU2-X2S1-W1	EMU2-X1S1-W1	EMP2-X4S1-W1	EMP2-X4S2-W1

ABOUT US

Innodisk is a service-driven provider of flash memory, DRAM modules and embedded peripherals for industrial and enterprise applications. With satisfied customers across the embedded, aerospace and defense, cloud storage markets and more, we have set ourselves apart with a commitment to dependable products and unparalleled service. This has resulted in products, including embedded peripherals, designed to supplement existing industrial solutions and high IOPS flash arrays for industrial and enterprise applications. The expanded business lines are leading our next steps in being a comprehensive solution and service provider in the industrial storage industry.

Founded in 2005 and headquartered in Taipei, Taiwan, Innodisk services clients globally with engineering experts and sales teams in China, Europe, Japan, and the United States. With abundant experience and an unrivaled knowledge of the memory industry, Innodisk develops products with excellent quality, remarkable performance and the highest reliability.

For more information about Innodisk, please visit http://www.innodisk.com.

Our Advantages

Firmware Team	**Intellectual Property**	**Purpose-Built Factory**
Our in-house firmware team has years of customization experience. This dedicated team responds quickly and accurately to customer requests and delivers highly reliable tailor-made solutions.	With over 62 product design patents, we develop innovative technology that enhances and benefits industrial applications.	All Innodisk products are manufactured in our own industrial-grade factory. We utilize advanced production technology in both pre- and post-production stages to improve the protection of components.

Service is not just what we do. It's who we are.

Absolute Service

Absolute Service is our pledge and our guide. It infuses everything we do at Innodisk.

Absolute Service is our promise to deliver the most comprehensive service in every situation. It's the philosophy that guides us in all interactions with our customers and business partners. It's the spirit of friendliness and enthusiasm that fills each member of the Innodisk team.

Absolute Service is our absolute commitment to our customers.

Headquarters
Innodisk Corporation

5F, No. 237, Sec. 1, Datong Rd., Xizhi Dist.,
New Taipei City, 221, Taiwan

T +886-2-7703-3000
F +886-2-7703-3555
E sales@innodisk.com

Branch Offices

Japan

K.I Bldg 2F/4F, 1-1-14,
Nihonbashiningyocho Chuo-ku,
Tokyo 103-0013 Japan
T +81-3-6667-0161
F +81-3-6667-0162
E jpsales@innodisk.com

Europe

Insulindelaan 115A,
5642CV, Eindhoven
The Netherlands
T +31-(0)40 3045 400
F +31-(0)40 3045 419
E eusales@innodisk.com

USA

42996 Osgood Road,
Fremont, CA 94539 USA
T +1-510-770-9421
F +1-510-770-9424
E usasales@innodisk.com

9 Timber Ln, Marlboro NJ 07746
T +1-732-8530455
F +1-732-7846401

China

602,6 Floor,building A ,Hengyue
Center, No.19 Dengliang Road,
Nanshan Dist.,Shenzhen
T +86-755-2167-3689
 +86-755-2167-3690
F +86-755-2167-3691
E sales_cn@innodisk.com

Shanghai **T** +86-21-315-93340
 T +86 21-315-93341
Beijing **T** +86-10-62669919

For more warranty details, please contact the Innodisk Sales Department or visit our website:
www.innodisk.com

innodisk