Innodisk's Embedded Flash and DRAM Storage For Aerospace and Defense Applications

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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, and extreme temperatures. 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 standards***
- ***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-810F/G 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 rugged environments.

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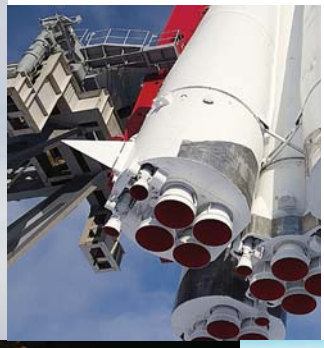
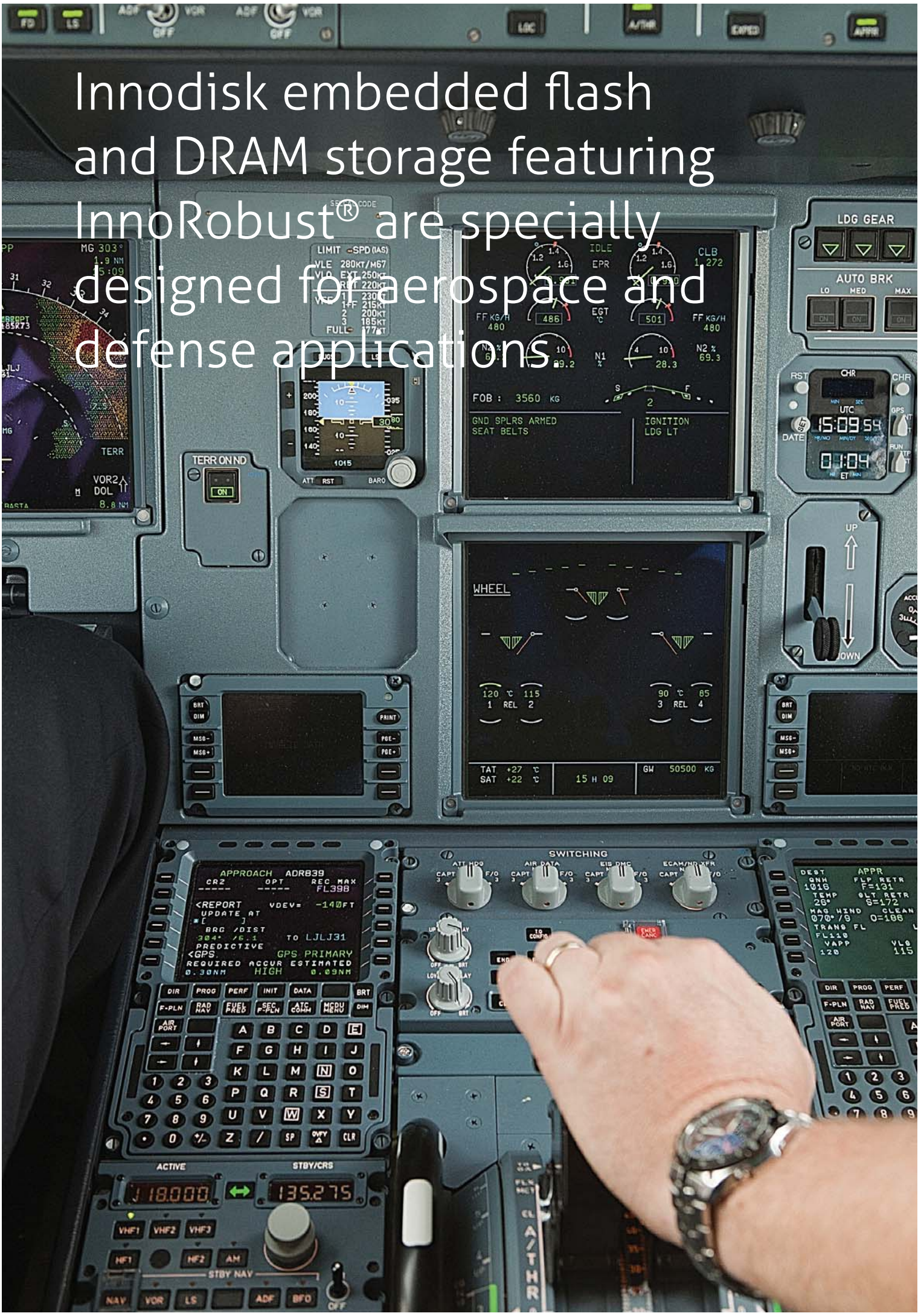


Innodisk's industrial embedded flash and DRAM storage products are beging used in a wide variety of aerospace and defense applications.



Innodisk embedded flash and DRAM storage featuring InnoRobust® are specially designed for aerospace and defense applications.

InnoRobust® Feature Set

The InnoRobust® feature set delivers all the operational robustness and ruggedness needed in defense industry environments.

Rugged Design

Our flash and DRAM storage products are compliant with the United States Military Standard MIL-STD-810F/G, for operation in harsh environments. Our DRAM modules also extend the JEDEC SO-DIMM standard by 10 mm, for a more secure mount to the CPU board.

Conformal Coating

Our flash and DRAM storage products are compliant with the MIL-I-46058C silicone conformal coating standard for protection against moisture, dust, and chemicals.

Wide Temperature Range

Our flash and DRAM storage products are RoHS compliant and are protected against extreme weather conditions, remaining fully operational in temperatures ranging from -40°C to +85°C.

Thermal Sensor

Our flash and DRAM storage products have built-in thermal sensors to ensure data reliability and to prevent failures due to overheating.

iCell Power Failure Management

Our iCell technology uses buffer management to store data in volatile DRAM, to prevent the loss of valuable data during sudden power failures.

(Available for flash only.)

Advanced Data Security

Our comprehensive data security suite for SSDs includes QEraser, SEraser, write protect, and self-destruct functions.

(Available for flash only.)

High Data Transfer Performance

Our SSDs feature sustained sequential read/write operations of up to 200/170 MB/sec and IOPS 4KB read/write operations of up to 3200/1700 MB/sec.

(Available for flash only.)

Golden Finger 30μ"

Our Golden Finger technology surpasses the JEDEC standard 3u" specification and delivers 30μ" pin width to DRAM modules for extra protection against scratches and environmental damage.

(Available for DRAM only.)

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 DRAM 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

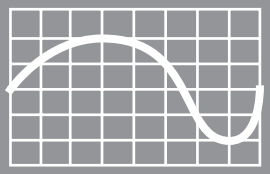
At Innodisk, we apply a protective coating to all our flash disks and DRAM modules that are designed for aerospace and defense applications. This conformal coating ensures maximum protection in harsh environments, where moisture, dust and other particles, and chemical exposure can destroy the operability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



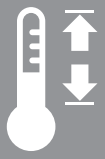
Prevention of Failure Due to Overheating

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, which, in turn, prevents failures 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 disk and memory failure. Our flash and DRAM 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: Protect, Erase, and Destroy

Our data security system provides effective write protect, 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 of data in just seven seconds.

Seamless Operation

Sustained, uninterruptible performance is essential for resource-intensive applications, such as video recording or real-time data acquisition. To guarantee seamless operation, we move required SSD tasks, such as garbage collection, to the background. This frees up read/write loading, allowing the SSD controller to store data in a stable and continuous way.

Stores data in a stable and continuous way.

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.


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

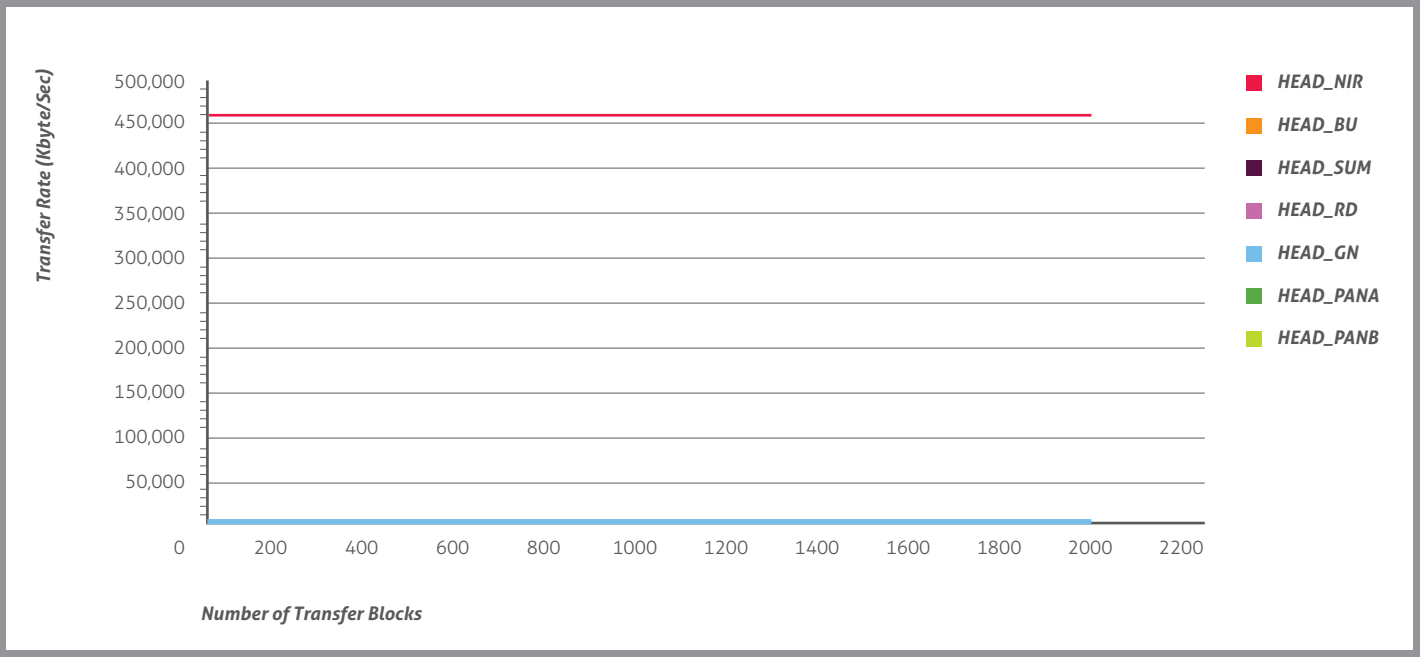
High-Speed Airborne Applications

High-speed airborne data recorders, installed with SSDs ranging in capacity from 512GB to 4TB, are used in a range of military applications, such as radar, sonar, signal intelligence, and image processing. These SSDs function at a high-sustained data transfer rate, ranging from 50Mbytes/sec to 800Mbytes/sec. For this type of rugged SSD operation, high-speed and low-latency data streaming are crucial.

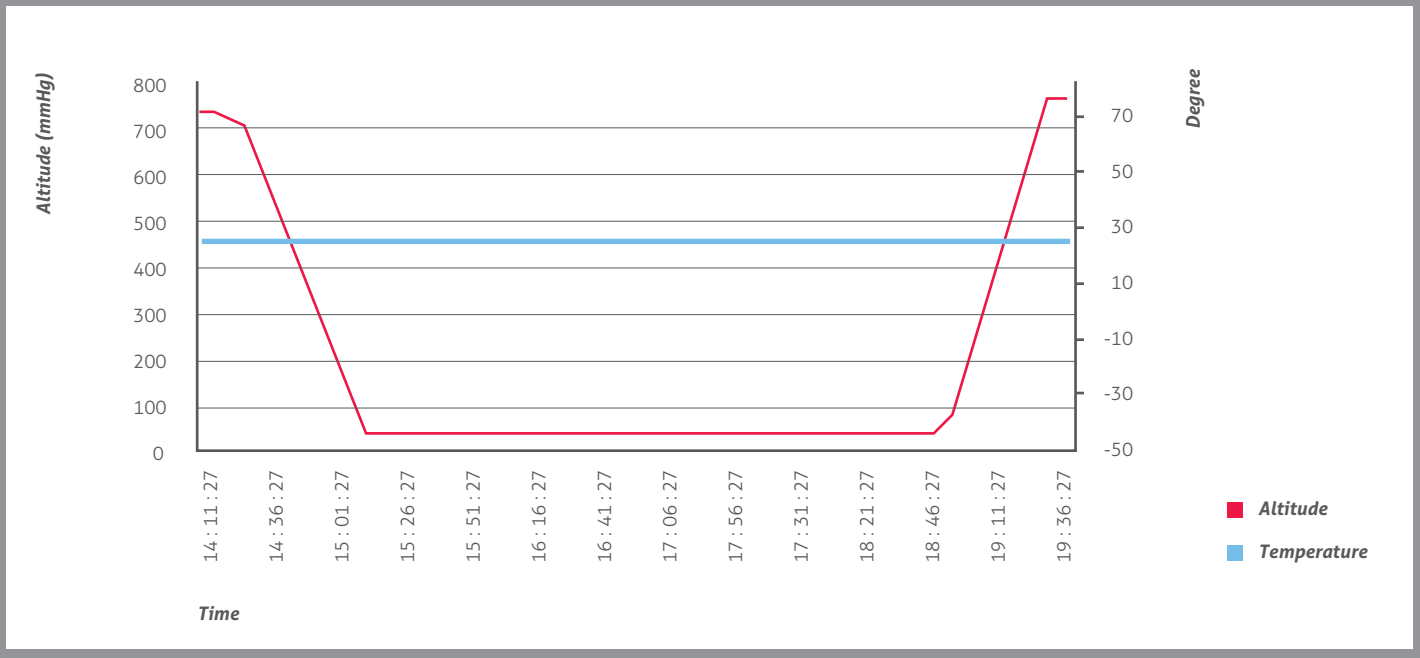
Real-World Applications

Innodisk Storage Products for High-Speed Airborne Applications

Ensuring normal operation in sub-zero flight conditions calls for tough, ruggedized SSD products. Innodisk's products for high-speed airborne data loggers include SSDs and DRAM modules with the InnoRobust® feature set. Our products provide all of the necessary shock and vibration protection, protective coating functionality, wide temperature operability, data security, and power failure management technology needed for this type of military-grade application.



Innodisk's dedicated engineering support team ensures that the firmware for this application is customized to specific algorithm/data transfer requirements. Using customized firmware, our military-grade SSDs deliver sustained data capturing for high-speed airborne data logging.



Our flash storage products have successfully reached the environmental standard MIL-STD-810F 500.4 and passed all simulation tests. Our products offer stable, high-speed performance at high altitudes.

Flash Products

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

Availability				
				
Model Name		**InnoRobust II 2.5" SATA SSD**	**2.5" SATA SSD 1SR**	**2.5" SATA SSD 1MR**
Interface		SATA II 3.0 Gb/s	SATA I 1.5 Gb/s	SATA I 1.5 Gb/s
Flash Type		SLC / MLC	SLC	MLC
Capacity	SLC	8 GB~ 256 GB	8 GB ~ 256 GB	–
	MLC	32 GB ~ 512 GB	–	32 GB ~ 51 2GB
Max. Channels		8	8	8
Sequential R/W (MB/sec., max.)	SLC	200 / 170	120 / 70	–
	MLC	200 / 180	–	120 / 70
Max. Power Consumption	SLC	3.75 W (5 V x 750 mA)	4W(5V x 800mA)	–
	MLC	2.30 W (5 V x 460 mA)	–	4W(5V x 800mA)
Key Features		InnoRobust® Feature Set		
iCell		√	√	√
Thermal Sensor		√	√	√
ATA Security		√	√	√
Conformal Coating		√	√	√
S.M.A.R.T		√	√	√
TRIM		√	√	√
External DRAM Buffer		√	√	√
Dimension (W x L x H)		69.8 x 100.1 x 9.3 mm	69.8 x 100.1 x 9.3 mm	69.8 x 100.1 x 9.3 mm
Environmental		MIL-STD-810F/G Standard, MTBF: 3 million hours		
Part No.	Standard Temp. (OP)	D2SN-XXXJ21AC*** D2SN-XXXJ21AK***	DRS25-XXXJ21ACXXB DRS25-XXXJ21AKXXB	DRS25-XXXJ21ACXXN DRS25-XXXJ21AKXXN
	Wide Temp. (OP)	D2SN-XXXJ21AW*** D2SN-XXXJ21AT***	DRS25-XXXJ21AWXXB DRS25-XXXJ21ATXXB	DRS25-XXXJ21AWXXN DRS25-XXXJ21ATXXN
Notes		XXX = SSD density (08G=8GB, 16G=16GB, 32G=32GB, 64G=64GB, A28=128GB, B56=256GB, C12=512GB) *** = flash figuration (internal control code) C/W: Standard Type; K/T: With Conformal Coating		

Availability						
						
Model Name		**InnoRobust II 1.8" SATA SSD**	**SATA Slim 2SR**	**SATA Slim 2MR**	**mSATA 2SR**	mSATA 2MR
Interface		SATA II 3.0 G	SATA II 3.0 G		SATA II 3.0 G	
Flash Type		SLC/MLC	SLC / MLC		SLC / MLC	
Capacity	SLC	8 GB ~ 128 GB	8 GB~64 GB		8 GB ~ 32 GB	
	MLC	32 GB ~ 256 GB	32 GB~ 256 GB		32 GB ~ 128 GB	
Max. Channels		8	8		4	
Sequential R/W (MB/sec., max.)	SLC	170 / 140	170/110		110 / 90	
	MLC	200/120	190 / 120		130 / 65	
Max. Power Consumption	SLC	2.5W(5V x 500mA)	2.6 W (5V x 520mA)		1.85 W (5Vx370mA)	
	MLC	–	2.5 W (5V x 500mA)		2.6 W (5Vx520mA)	
Key Features		InnoRobust® Feature Set				
iCell		–	–		–	
Thermal Sensor		√	–		–	
ATA Security		√	√		√	
Conformal Coating		√	√		√	
S.M.A.R.T		√	√		√	
TRIM		√	√		√	
External DRAM Buffer		√	√		√	
Dimension (W x L x H)		54.0x78.5x5.0mm	39.00 x 54.00 x 6.80 mm		29.85 x 50.80 x 3.50 mm	
Environmental		MIL-STD-810F/G Standard, MTBF: 3 million hours				
Part No.	Standard Temp. (OP)	D1SN-XXXJ21AC*** D1SN-XXXJ21AK***	DRSLM-XXXJ21AC*** DRSLM-XXXJ21AK***		DRMSR-XXXJ21AC*** DRMSR-XXXJ21AK***	
	Wide Temp. (OP)	D1SN-XXXJ21AW*** D1SN-XXXJ21AT***	DRSLM-XXXJ21AW*** DRSLM-XXXJ21AT***		DRMSR-XXXJ21AW*** DRMSR-XXXJ21AT***	
Notes		XXX = SSD density (08G=8GB, 16G=16GB, 32G=32GB, 64G=64GB, A28=128GB, B56=256GB, C12=512GB) *** = flash figuration (internal control code) C/W: Standard Type; K/T: With Conformal Coating				

DRAM Products

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

		Rugged DIMM		*Wide Temperature*	
					
Module Type		**DDR2 SODIMM**	**DDR2 SODIMM (Wide Temp)**	**DDR3 LONG DIMM**	**DDR3 SODIMM**
Frequency		800 MHz / 667 MHz / 533 MHz / 400 MHz		1600 MHz / 1333 MHz /1066 MHz	
Capacity		1 GB / 2 GB	512 MB / 1 GB / 2 GB	1 GB / 2 GB / 4 GB / 8 GB	
Function		Non-ECC Unbuffered Memory			
Pin Number		200 pin		240 pin	204 pin
Width		64 bits		64 bits	
Voltage		1.8V		1.50V / 1.35V	
PCB Height		1.57 inches		1.18 inches	
Operation Temperature		0°C ~ 85°C	-40°C ~ 85°C (-40°C ~ 105°C)	-40°C ~ 85°C	
Density P/N	256MB	—	—	—	—
	512MB	—	Need to Confirm	—	—
		—	—	—	—
		—	—	—	—
	1GB	M2GK-1GPFCC**(128*8)1R	M2GK-1GPFCA**(128*8)1R	M3UN-1GMFBI**(128*8)1R	M3SN-1GMFCI**(1 RANK)1R
		—	—	—	—
		—	—	—	—
		—	—	—	—
	2GB	M2GK-2GMJCC**(256*8)1R	M2GK-2GMJCA**(256*8)1R	M3UN-2GMFAI**(128*8)2R	M3SN-2GMFDI**(128*8)2R
		—	—	M3UN-2GMJBI**(256*8)1R	M3SN-2GMJCI**(256*8)1R
	4GB	—	—	M3UN-4GMJAI**(256*8)2R	M3SN-4GMJDI**(256*8)2R
		Speed 800Mhz=06, 667Mhz=J6, 533Mhz=H4, 400Mhz=G3 1R=1Rank / 2R=2Rank		Speed 1600Mhz=0C, 1333Mhz=09, 1066Mhz=M7 800Mhz=L6, 1R=1Rank / 2R=2Rank	

		Wide Temperature			
					
Module Type		**DDR2 LONG DIMM**	**DDR2 SODIMM**	**DDR LONG DIMM**	**DDR SODIMM**
Frequency		800 MHz / 667 MHz / 533 MHz / 400 MHz		400 MHz / 333 MHz / 266 MHz	
Capacity		512 MB / 1 GB / 2 GB		512 MB / 1 GB	
Function		Non-ECC Unbuffered Memory			
Pin Number		240 pin	200 pin	184 pin	200 pin
Width		64 bits / 72 bits			
Voltage		1.80 V		2.60 V	
PCB Height		1.18 inches			
Operation Temperature		-40°C ~ 85°C			
Density P/N	256MB	—	—	M1UF-56PB1I**(32*16)1R	M1SF-56PB3I**(32*16)2R
	512MB	M2UJ-12PC7I**(64*8)1R	M2SJ-12PBHI**(32*16)2R	M1UF-12SBRC**(32*16)2R	M1SF-12PB3I**(32*16)2R
		—	M2SJ-12PC5I**(64*8)1R	M1UF-12PB1I**(32*16)2R	M1SF-12PC4I**(64*8)1R
		—	—	M1UF-12PC2I**(64*8)1R	—
	1GB	M2UJ-1GPCQI**(64*8)2R	M2SJ-1GPC6I**(64*8)2R	M1UF-1GPC2I**(64*8)2R	M1SF-1GPCXI**(64*8)2R BGA
		M2UJ-1GPC3I**(64*8)2R	M2SK-1GPDHI**(64*16)1R	—	—
		M2UK-1GPF7I**(128*8)1R	M2SK-1GPF5I**(128*8)1R	—	—
		M2UK-1GMF7I**(128*8)1R	M2SK-1GMF5I**(128*8)1R	—	—
	2GB	M2UK-2GPFQI**(128*8)2R	M2SK-2GPF2I**(128*8)2R	—	—
		M2UK-2GMFQI**(128*8)2R	M2SK-2GMF6I**(128*8)2R	—	—
	4GB	—	M2SK-4GMJ6I**(256*8)2R	—	—
		Speed 800Mhz=06, 667Mhz=J6, 533Mhz=H4, 400Mhz=G3 1R=1Rank / 2R=2Rank		Speed 400Mhz=03, 333Mhz=DB, 266Mhz=C2 1R=1Rank / 2R=2Rank	

About Innodisk

Innodisk is a service-driven provider of industrial embedded flash and DRAM storage products and technologies, with a focus on the enterprise, industrial, aerospace, and defense industries.

At Innodisk, we are dedicated to serving our customers and business partners. Our devotion is best seen in our commitment to Absolute Service™, the spirit of friendly, enthusiastic service that fills each member of the Innodisk team. For us, service is not just something we do. It's who we are, and Absolute Service™ is the philosophy that guides us in everything we do.

Quality is vitally important when it comes to industrial embedded flash and DRAM storage products. That's why we manufacture all of our products in our own purpose-built memory production facility. In fact, we designed and built our production center to maximize manufacturing efficiency and guarantee the highest quality of our products.

Within the industry, we are widely-recognized for our expertise and responsiveness in the customization of industrial embedded memory. Our experienced in-house firmware development team, staffed by industry specialists, delivers fast turn-around and knowledgable support, providing our customer with the most effective firmware customization solutions.

We also take pride in our commitment to technical innovation. We pioneered Pin 7 VCC technology in the SATA interface, an Innodisk breakthrough that eliminates the need for power cables. This, in turn, enabled us to develop the SATADOM® form factor, a revolutionary interface-powered memory solution that has been certified by Intel and widely adopted by industrial and embedded system makers across the globe.

With a dedication to Absolute Service™ and a commitment to quality, customization, and innovation, Innodisk continues to provide our customers and business partners with the finest industrial embedded flash and DRAM storage products and technologies.

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

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