



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

innodisk

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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.



Innodisk's industrial embedded flash and DRAM storage products are being 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. We also provide two kinds of Advanced Encryption Standard (AES) for the encryption of data to upgrade the level of the data security.

(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.)

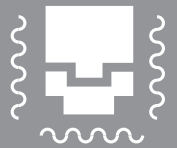
The Advantages of Our Products



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.



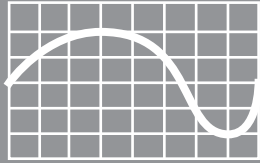
Data Protection in Case of Abnormal Power Failure

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.



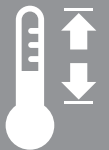
Prevention of Failure Due to Overheating

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: 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.

Data Security: Write Protect and Encryption

Our data security system provides effective write protect and Advanced Encryption Standard (AES-256), a specification for the encryption of data established by U.S. National Institute of Standard and Technology (NIST). There are two options for AES solution, one is via I²C to connect a key Token and SSD to enable AES cryptography, another one is through API to manage AES key.

Use encryption to prevent unauthorized people from viewing and changing data



Our Service and Support

A Dedicated Engineering Support Team

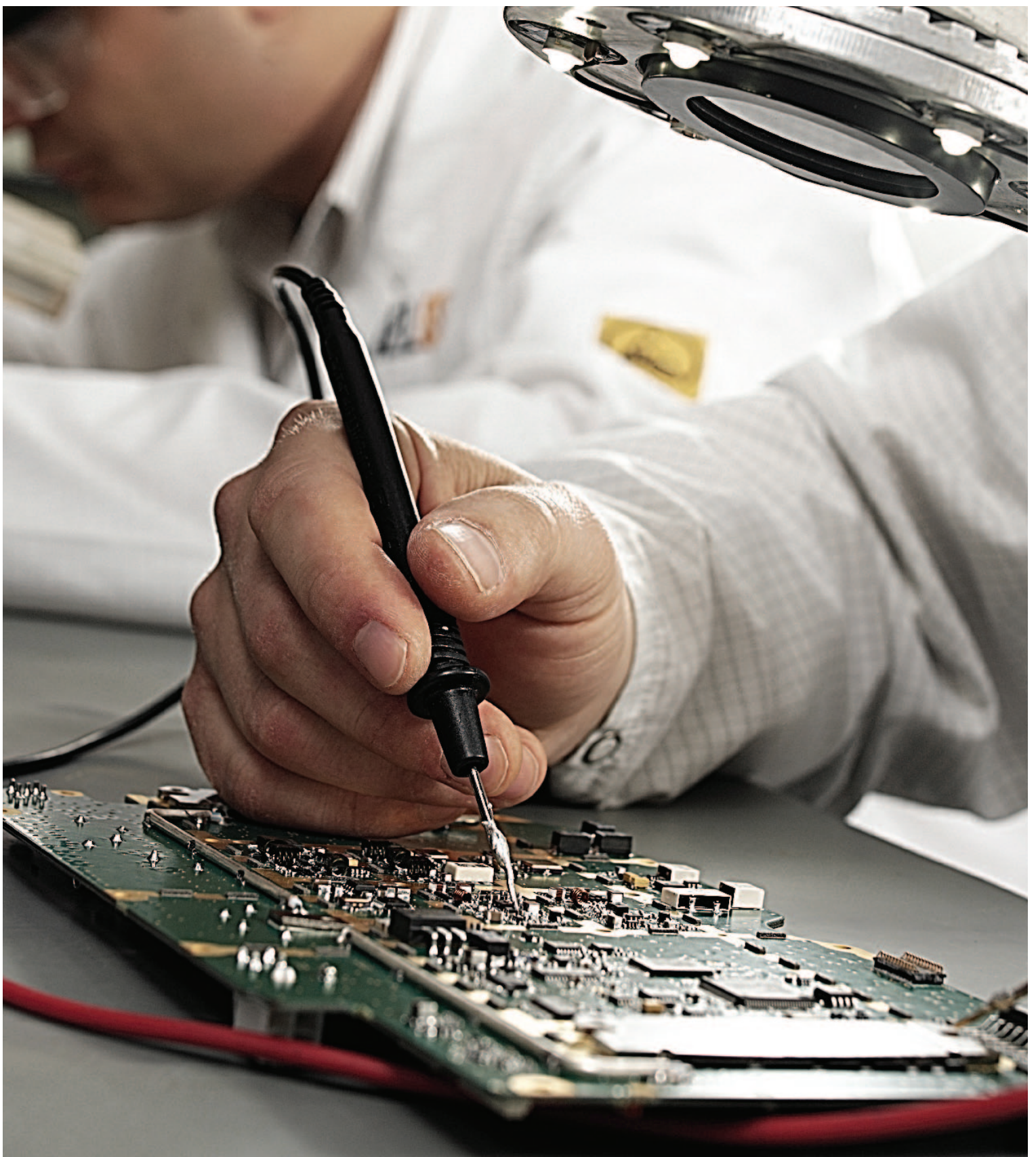
Our dedicated engineering support team is available to ensure that all of our products for aerospace and defense applications are backed by a comprehensive service system. Our software, hardware, firmware, R & D, and field-application engineers all work closely together to provide world-class support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



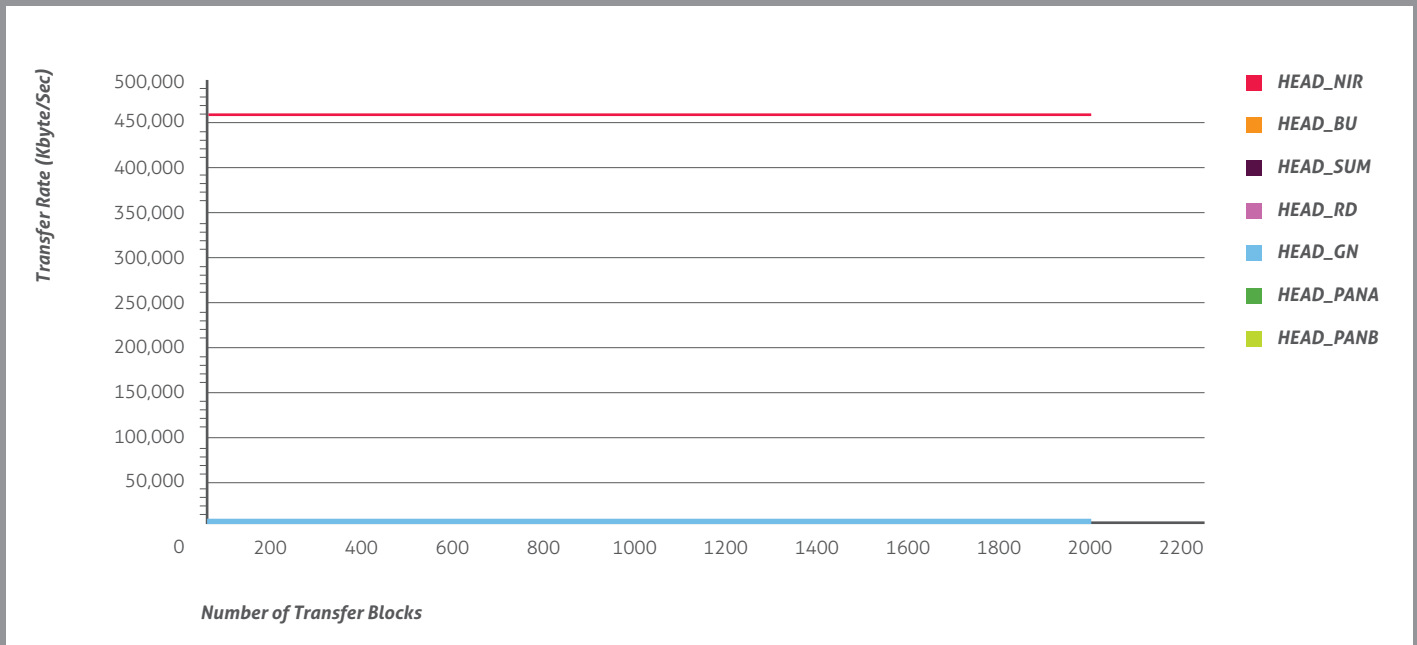
High-Speed Airborne Applications

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.

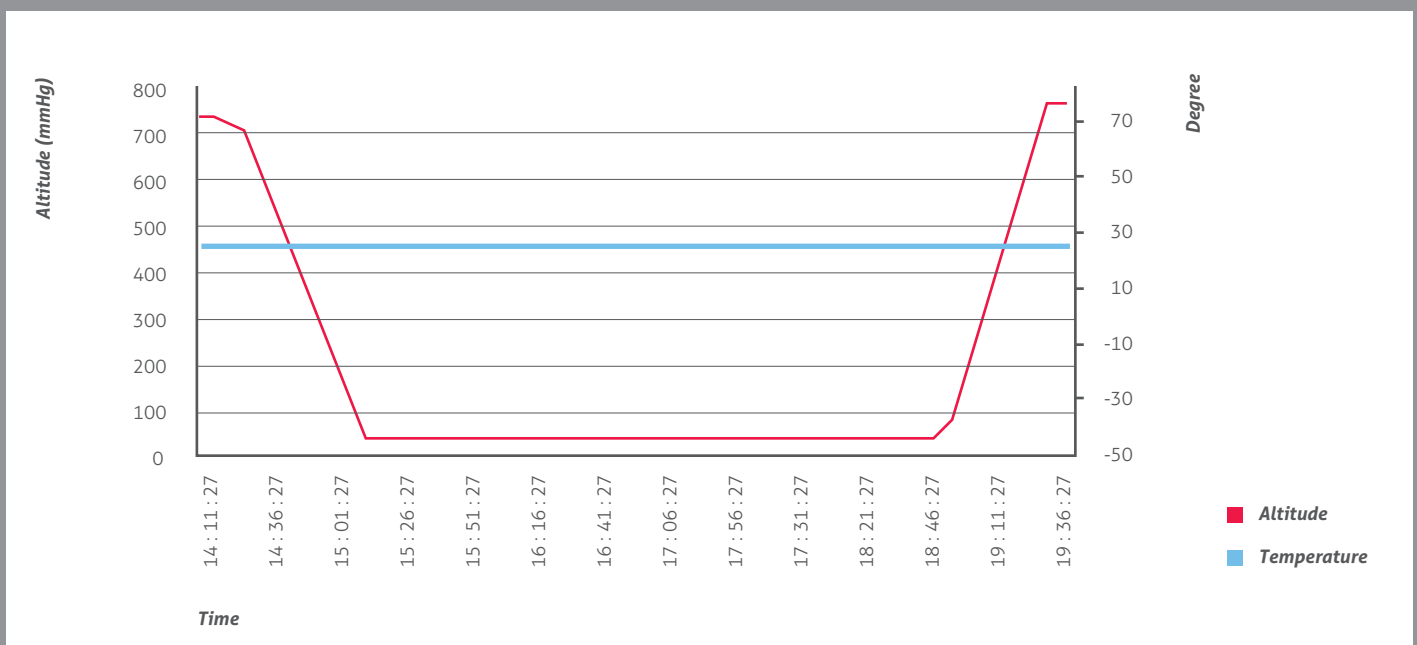
Real-World Applications

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.



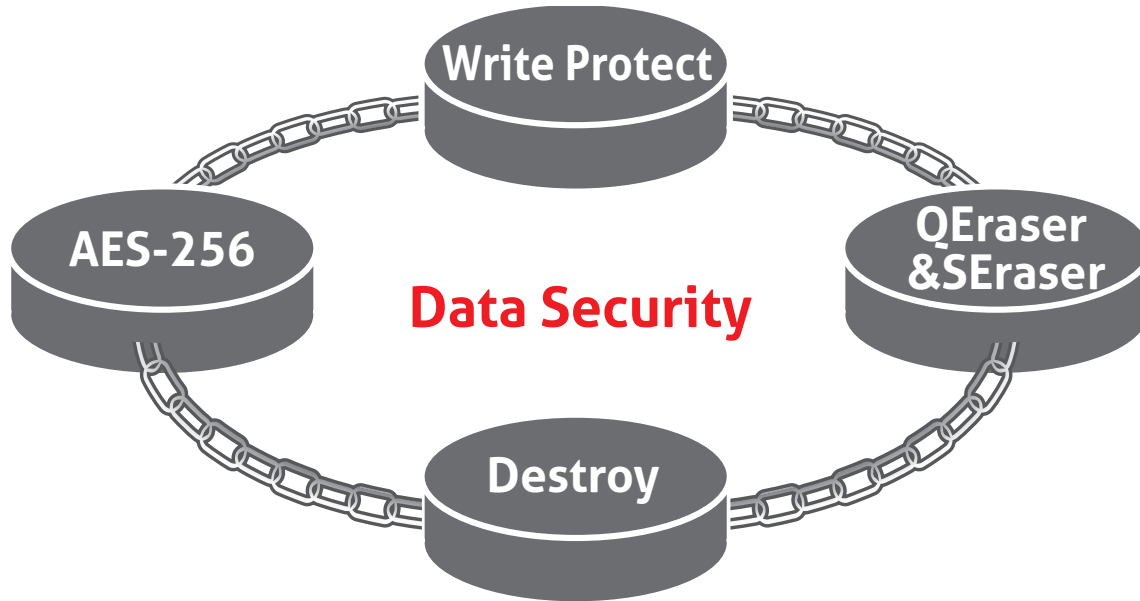
Innodisk's dedicated engineering support team ensures that the firmware for this application is customized to specific algorithm/data transfer requirements. Using customized firmware, our military-grade SSDs deliver sustained data capturing for high-speed airborne data logging.



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.



Innodisk flash and DRAM storage products designed for aerospace and defense through multi ways to supply extremely high level data security



Model name	2.5" SATA SSD 3SR-P	InnoRobust II 2.5" SATA SSD	InnoRobust II 1.8" SATA SSD	2.5" SATA SSD 1SR
Interface	SATA III 6.0Gb/s	SATA II 3.0Gb/s	SATA II 3.0Gb/s	SATA I 1.5Gb/s
Flash Type	SLC	SLC	SLC	SLC
Capacity	16GB-256GB	8GB-256GB	8GB-128GB	8GB- 256GB
Max. Channel	4	8	8	8
Sequential R/W (MB/sec, max.)	510/340	170/140	170/140	120/70
Max. Power consumption	2.5W (5Vx500mA)	3.75W (5V x 750mA)	2.5W(5V x 500mA)	4W(5V x 800mA)
Thermal Sensor	Y	Y	Y	Y
External DRAM Buffer	Y	Y	Y	Y
iCell	Y	Y	N	Optional
TRIM	Y	Y	Y	Y
ATA Security	Y	Y	Y	Y
S.M.A.R.T	Y	Y	Y	Y
Dimension (WxLxH/mm)	69.8 X 100.1 X 9.3	69.8 X 100.1 X 9.3	54.0x78.5x5.0	69.8 X 100.1 X 9.3
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)	DRS25-XXXD67SC***	D2SN-XXXJ21AC*** D2SN-XXXJ21AK***	D1SN-XXXJ21AC*** D1SN-XXXJ21AK***	DRS25-XXXJ21AC *** DRS25-XXXJ21AK***
Extended temp. OP(-20°C~+85°C)	N	N	N	N
Wide temp. OP (-40°C~+85°C)	DRS25-XXXD67SW***	D2SN-XXXJ21AW*** D2SN-XXXJ21AT***	D1SN-XXXJ21AW*** D1SN-XXXJ21AT***	DRS25-XXXJ21AW*** DRS25-XXXJ21AT***
Note	xxx = density (02GB=02G, 04GB=04G, 08GB=08G, 16GB=16G, 32GB=32G, 64GB=64G, 128GB=A28, 256GB=B56, 512GB=C12) ***= flash configuration (internal control code)			



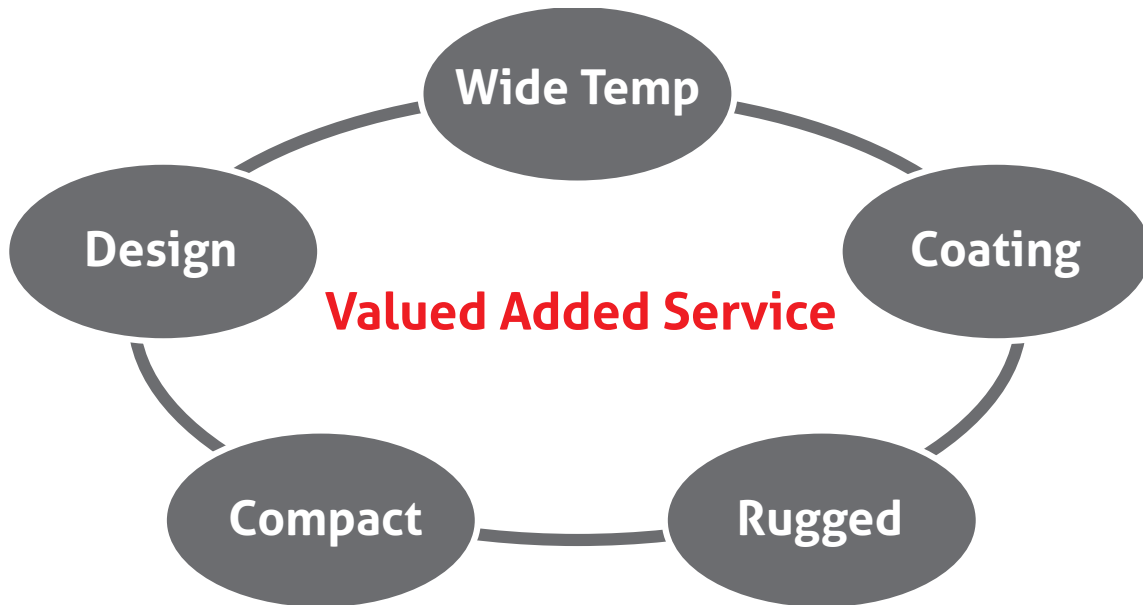
Model name	2.5" SATA SSD 3MR-P	InnoRobust II 2.5" SATA SSD	InnoRobust II 1.8" SATA SSD	2.5" SATA SSD 1MR
Interface	SATA III 6.0Gb/s	SATA II 3.0Gb/s	SATA II 3.0Gb/s	SATA I 1.5Gb/s
Flash Type	MLC	MLC	MLC	MLC
Capacity	32GB-256GB	32GB-512GB	32GB-256GB	32GB- 512GB
Max. Channel	4	8	8	8
Sequential R/W (MB/sec, max.)	460/240	220/120	220/120	120/70
Max. Power consumption	2.5W (5Vx500mA)	3.75W(5V x 750mA)	2.5W(5V x 500mA)	4W(5V x 800mA)
Thermal Sensor	Y	Y	Y	Y
External DRAM Buffer	Y	Y	Y	Y
iCell	Y	Y	N	Optional
TRIM	Y	Y	Y	Y
ATA Security	Y	Y	Y	Y
S.M.A.R.T	Y	Y	Y	Y
Dimension (WxLxH/mm)	69.8 X 100.1 X 9.3	69.8 X 100.1 X 9.3	54.0x78.5x5.0	69.8 X 100.1 X 9.3
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)	DRS25-XXXD67SC***	D2SN-XXXJ21AC*** D2SN-XXXJ21AK***	D1SN-XXXJ21AC*** D1SN-XXXJ21AK***	DRS25-XXXJ21AC*** DRS25-XXXJ21AK***
Extended temp. OP (-20°C~+85°C)	N	D2SN-XXXJ21AE*** D2SN-XXXJ21AT***	D1SN-XXXJ21AE*** D1SN-XXXJ21AT***	DRS25-XXXJ21AE*** DRS25-XXXJ21AT***
Wide temp. OP (-40°C~+85°C)	DRS25-XXXD67SW***	N	N	N
Note	xxx = density (02GB=02G, 04GB=04G, 08GB=08G, 16GB=16G, 32GB=32G, 64GB=64G, 128GB=A28, 256GB=B56, 512GB=C12) ***= flash configuration (internal control code)			





Model name	SATA Slim 2SR	SATA Slim 2MR	mSATA 2SR	mSATA 2MR
Interface	SATA II 3.0Gb/s	SATA II 3.0Gb/s	SATA II 3.0Gb/s	SATA II 3.0Gb/s
Flash Type	SLC	MLC	SLC	MLC
Capacity	8GB-128GB	32GB-256GB	4GB-64GB	16GB- 128GB
Max. Channel	8	8	4	4
Sequential R/W (MB/sec, max.)	185/145	190/120	110/90	130/65
Max. Power consumption	2.1W (5V x 420mA)	1.9W (5V x 380mA)	1.72W (3.3V x 520mA)	1.82W (3.3V x 550mA)
Thermal Sensor	Y	Y	Y	Y
External DRAM Buffer	Y	Y	N	Y
iCell	N	N	N	N
TRIM	Y	Y	Y	Y
ATA Security	Y	Y	Y	Y
S.M.A.R.T	Y	Y	Y	Y
Dimension (WxLxH/mm)	54.0x 39.0x 6.5	54.0x 39.0x 6.5	29.8 x 50.8 x 4.1	29.8 x 50.8 x 4.1
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)	DRSLM-XXXJ21AC*** DRSLM-XXXJ21AK***	DRSLM-XXXJ21AC*** DRSLM-XXXJ21AK***	"DRMSR-XXXJ21AC*** DRMSR-XXXJ21AK***"	DRMSR-XXXJ21AC*** DRMSR-XXXJ21AK***
Extended temp. OP (-20°C~+85°C)	N	DRSLM-XXXJ21AE*** DRSLM-XXXJ21AT***	N	DRMSR-XXXJ21AE*** DRMSR-XXXJ21AT***
Wide temp. OP (-40°C~+85°C)	DRSLM-XXXJ21AW*** DRSLM-XXXJ21AT***	N	DRMSR-XXXJ21AW*** DRMSR-XXXJ21AT***	N
Note	xxx = density (02GB=02G, 04GB=04G, 08GB=08G, 16GB=16G, 32GB=32G, 64GB=64G, 128GB=A28, 256GB=B56, 512GB=C12) ***= flash configuration (internal control code)			





DRAM Products





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



Through excellent customized products, Innodisk can offer a valued ,expertise and total solution to customers.

		Rugged DIMM		Wide Temperature	
					
Module Type		DDR2 SODIMM	DDR2 SODIMM (Wide Temp)	DDR3 SO DIMM	DDR3 DIMM
Frequency		1600Mhz/1333Mhz/1066Mhz		1600Mhz/1333Mhz/1066Mhz	
Capacity		1GB/2GB		1 GB / 2 GB / 4 GB / 8 GB	
Function		Non-ECC Unbuffer Memory		Non-ECC Unbuffer Memory	
Pin Number		144pin		204pin	240pin
Width		32Bits		64 bits	
Voltage		1.8V		1.50V	
PCB Height		1.378 Inches		1.18 Inches	
Operation Temperature		0°C ~ 85 °C	-40°C ~ 85 °C	-40°C ~ 85°C	
	1GB	M2HK-1GHFUC**(128x8)1Rank	Need to Confirm	M3SP-1GHFCl**(128x8)1Rank	M3UP-1GHFBI**(128X8)1Rank
		-	-	-	-
		-	-	-	-
	2GB	M2HK-2GMJUC**(128X8)2Rank	M2GK-1GPFCA**(128*8)1R	M3SP-2GHFDI**(128X8)2Rank	M3UP-2GHFAI**(128X8)2Rank
		-	-	M3SP-2GHJCI**(256X8)1Rank	M3UP-2GHJBI**(256X8)1Rank
		-	-	M3SP-4GHJDI**(256X8)2Rank	M3UP-4GHJAI**(256X8)2Rank
	4GB	-	-	M3SP-4GHSCI**(512X8)1Rank	M3UP-4GHSBI**(512X8)1Rank
		-	-	M3SP-8GHSDI**(512X8)2Rank	M3UP-8GHSALI**(512X8)2Rank
	8GB	-	-	-	-
		-	-	-	-
		**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 SODIMM	DDR2 DIMM	SO DIMM	DIMM	
Frequency		800Mhz/667Mhz/533Mhz/400Mhz		400Mhz/333Mhz/266MHZ		
Capacity		512MB/1GB/2GB/4GB		512MB/1GB		
Function		Non-ECC Unbuffer Memory		Non-ECC Unbuffer Memory		
Pin Number		200pin	240pin	200pin	184pin	
Width		64Bits		64 bits		
Voltage		1.8V		2.6V		
PCB Height		1.18 Inches		1.18 Inches		
Operation Temperature		-40°C ~ 85 °C		-40°C ~ 85°C		
	512MB	M2SK-12HC51**(64X8)1Rank	M2UK-12HC71**(64X8)1Rank	M1SF-12SC41**(64X8)1Rank	M1UF-12SC21**(64X8)1Rank	
		-	-	-	-	
	1GB	M2SK-1GHC61**(64X8)2Rank	M2UK-1GHCQ1**(64X8)2Rank	M1SF-1GSCX1**(64X8)2Rank	M1UF-12SC21**(64X8)2Rank	
		M2SK-1GHF51**(128X8)1Rank	M2UK-1GHF71**(128X8)1Rank	-	-	
	2GB	M2SK-2GHF61**(128X8)2Rank	M2UK-2GHFQ1**(128X8)2Rank	-	-	
		-	-	-	-	
	4GB	M2SK-4GMJ21**(256X8)2Rank	M2UK-4GMJQ1**(256X8)2Rank	-	-	
		-	-	-	-	
	8GB	-	-	-	-	
		-	-	-	-	
	**Speed 800Mhz=06, 667Mhz=J6, 533Mhz=H4, 400Mhz=G3 1R=1Rank / 2R=2Rank			**Speed 400Mhz=03, 333Mhz=DB, 266Mhz=C2 1R=1Rank / 2R=2Rank		

		Mini DIMM		SO DIMM w/ECC		
						
Module Type		DDR3 SODIMM	DDR3 DIMM	DDR3 SO DIMM	DDR3 DIMM	
Frequency		1600Mhz/1333Mhz/1066Mhz		1600Mhz/1333Mhz/1066Mhz		
Capacity		2GB/4GB/8GB		1 GB / 2 GB / 4 GB / 8 GB		
Function		with ECC Unbuffer Memory	Registered Memory	with ECC Unbuffer Memory		
Pin Number		244pin		204pin	240pin	
Width		72Bits		72Bits		
Voltage		1.5V / 1.35V		1.5V / 1.35V		
PCB Height		**0.72 Inches(VLP) *0.70 Inches(ULP)	0.72 Inches(VLP)	1.18 Inches	0.72 Inches(VLP)	
Operation Temperature		0°C ~ 85 °C		0°C ~ 85°C		
	1GB	#M3Mx-1GHFOx**(128X8)1Rank	M3Mx-1GHFPx**(128X8)1Rank	M3Dx-1GHF2x**(128X8)1Rank	M3Ux-1GHF4x**(128X8)1Rank	
		-	-	-	-	
	2GB	#M3Mx-2GHJOx**(256X8)1Rank	M3Mx-2GHJPx**(256X8)1Rank	M3Dx-2GHJ2x**(256X8)1Rank	M3Ux-2GHJ4x**(256X8)2Rank	
		-	-	-	-	
	4GB	#M3Mx-4GHSOx**(512X8)1Rank	M3Mx-4GHSPx**(512X8)1Rank	M3Dx-4GHS2x**(512X8)1Rank	M3Ux-4GHS4x**(512X8)1Rank	
		-	-	-	-	
	8GB	##M3Mx-8GHS5x**(512X8)2Rank	M3Mx-8GHSWx**(512X8)2Rank	M3Dx-8GHS9x**(512X8)2Rank	M3Ux-8GHS5x**(512X8)2Rank	
		-	-	-	-	
	** Speed 1600Mhz=0C 1333Mhz= 09 ,1066Mhz= M7 ,800Mhz= L6 ## 0.72Inch. VLP #0.70Inch. ULP			Speed 1600Mhz=0C, 1333Mhz=09, 1066Mhz=M7 800Mhz=L6,1R=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 knowledgeable 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:

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