Innodisk's Storage Solution for In-Vehicle Computing Systems

Industrial SSD & DRAM for harsh environments: low power, heat & shock resistance

innodisk

www.innodisk.com

Introduction

Specialized storage solutions for all in-vehicle computing system application requirements

Innodisk's flash and DRAM products for in-vehicle computing systems are designed for operation in the harsh interior of automobiles. Our low power consumption, and heat and shock resistance make our most reliable automotive storage solution. This series of products are EMI resistant, and compliant with the standards of E-Mark (EU), SAE J1113 (US), and ISO 7637-2.

There are many challenges when it comes to designing products for in-vehicle computing systems. The power supply for a vehicle can be affected by many factors, and power supply instability and power shortage are common issues. To effectively operate outdoors, these systems need to work under high temperature, strong vibrations, humid and dusty environments. Most in-vehicle systems use ARM architecture, requiring specialized storage solutions to ensure stability.

Innodisk's in-vehicle computing storage solutions use our exclusive iCell technology to save data during sudden power failures, and with a low power consumption design, they can prevent problems caused by power volatility in vehicles. Our products are compliant with the United States Military Standard MIL-STD-810F/G, so that the storage system can remain fully operational during strong impact. The thermal sensor and wide temperature range design protect the system against extreme weather conditions, and the conformal coating prevents problems caused by moisture, dust, and chemicals to extend the products' life cycle. Innodisk offers 32-bit DRAM for systems using ARM architecture; this option is a rarity in the market.

Characteristics of Our In-Vehicle Computing Storage Solutions :

- EMI-resistance certified by auto motive standards (Flash)
- Exclusive iCell and iData Guard technologies, to prevent data loss during power failures (Flash)
- Low power consumption design (Flash)
- Thermal sensor and wide temperature range
- Rugged design and compliant with MIL-STD-810 F/G
- Conformal coating compliant with MIL- I-46058C
- Supports systems using the ARM architecture (DRAM)

Characteristics of Innodisk's In-Vehicle Computing Storage Products

Challenge 1 :

Electromagnetic disturbance from multiple systems in vehicles

Solution :

EMI-resistant by automotive standards

Innodisk is the first peripheral supplier to obtain the European E-Mark certification, and the only storage solution provider with multiple in-vehicle computing compliant standards for EMI resistance. There are multiple peripherals and electronic devices in a vehicle, and our certified products ensure no electromagnetic disturbance. All products designed for this application are certified before they are integrated into vehicle systems. We ensure system reliability at the end application and provide double protection to our clients.

Challenge 2 :

Instability of power supply in vehicles

Solution :

Exclusive iCell and iData Guard technologies to save data during power failures

Innodisk's exclusive iCell and iData Guard are integrated SSD technologies for our firmware and hardware. The multiple capacitors design provides a power buffer to the SSD so that the last piece of data on the DRAM can be safely discharged to flash storage. At the same time, the data protection mechanism is activated to reject data commands from the host. This design can prevent incomplete data from being recorded and cause a bad block in the NAND flash.

Challenge 3 :

Power shortage in vehicles

Solution :

Low power consumption design

Innodisk's flash products support "slumber" mode with a low power consumption design, which significantly reduces power usage by 50% when compared to that of the "power saving" mode. Most storage devices save power by reducing transmission frequency of flash. However, our design puts the device to sleep, preventing signal transmission. A convenient "wake up" function is implemented to return the device.

Challenge 4 :

High temperature in vehicles

Solution :

Thermal sensor and wide temperature range design

Innodisk's flash and DRAM products are compliant with RoHS standards and made to operate under a wide temperature rage. They can cope with extreme temperature conditions, with functional temperature range between -40 to 85 degrees Celsius. In addition, the flash products built-in thermal sensor gives a warning when the temperature of the device is too high. After receiving the warning signal, the control IC of the SSD will automatically adjust the transmitting frequency to ensure stable performance under extreme temperature.

Challenge 5 :

Shocks caused by vehicle moving

Solution :

Military standard shock-resistance and rugged DRAM design

Our in-vehicle computing flash and DRAM products are compliant with the US military standard MIL-STD-810F/G, for shock and vibration. Normally the PCB and the main board are connected by a slot, but our rugged DRAM design uses a customized mounting pad which makes the device less likely to be affected by vibrations, and it interrupts the signals of the gold contacts and ensures more reliable and stable DRAM operation.

Challenge 6 :

The dusty and humid environment inside vehicles

Solution :

Conformal coating to protect the storage device

Innodisk is very experienced with applying protective coatings on flash and DRAM. The conformal coating is a non-conductive cover that is about 0.03-0.13 mm. It is compliant with MIL- I-46058C, and also acceptable by IPC-A-610 electronic component standards. All components that are coated are resistant to moisture, dirt, dust, and chemicals.

Innodisk is proud to partner with industry leader HumiSeal for our raw materials. The entire process takes place in a dustless facility to prevent other substances from contaminating the product during transportation.

Challenge 7 :

In-vehicle computing systems have unique specifications

Solution :

Supports ARM architecture

We specifically chose a non-mainstream specification: 32-bit DRAM module for in-vehicle computing systems. This specification is suitable for non-x86 systems, and it works well with ARM architecture commonly used for tablets and mobile devices.

Applications

Still using average storage products for your vehicle systems?

Innodisk's in-vehicle computing storage solutions can help you face the challenges of the harsh interior environments of vehicles.

Our Production

Innodisk has implemented ISO/ TS 16949 quality control system to meet the quality standards of the automotive industry. We have obtained the quality control certification for ISO/ TS 16949, indicating that the storage products we produce pass the strict quality inspection standards of the automotive industry.

The ISO/ TS 16949 standards were made to meet the requirements by key vehicle export countries, such as the US, Germany, France, and Italy. Obtaining this certification can help reduce the cost for system providers by avoiding multiple certifications.

Innodisk flash memory products and DRAM modules are produced in our own industrial-grade factory to ensure consistent product quality. All products passed a 3 minute long rigorous vibration test to make sure the products can work properly in extreme conditions and to meet the standards of a wide range of industrial, military, and server applications. With own purpose-built memory production facility, we can provide flexible production that caters to our customers' needs, as well as increase productivity, provide on-time delivery, and ensure a steady, continuous supply of products.

All products passed a 3 minute long rigorous vibration test to make sure the products can work properly in extreme conditions

Flash Products

Model Name	iCF 1ME	2.5" SATA SSD 3MR-P	2.5" SATA SSD 3MG-P
Key Features	1. Budget friendly MLC-based solution 2. Enhanced power cycling management	1. Compliant with MIL-STD-810-F/G 2. HW/SW Data Security(QEraser/ Destroy/ SEraser/ Write Protect) 3. iCell supported, 100% data protection	1. EverGreen L² architecture 2. 7mm height mechanical design 3. Excellent random performance
Interface	PATA	SATA III 6.0Gb/s	SATA III 6.0Gb/s
Flash Type	MLC	MLC	MLC
Capacity	4GB-128GB	32GB-512GB	8GB-512GB
Max. Channel	2	4	4
Sequential R/W (MB/sec, max.)	110/65	500/260	460/240
Max. Power Consumption	1.05W (5V x 150mA) 0.69W (3.3V x 150mA)	5W (5V x 1A)	5W (5V x 1A)
Thermal Sensor	N	STD : N , W/T : Y	
External DRAM Buffer	N	Y	Y
iCell	N	Y	Optional
TRIM	N	Y	Y
ATA Security	Y	Y	Y
S.M.A.R.T	Y	Y	Y
Dimension (WxLxH/mm)	42.8 x 36.4 x 3.3	69.8 x 99.8 x 9.2	70.0 x 100.1 x 7.0
Environment	Vibration: 20G@7~2000Hz Shock: 1500G@0.5ms Storage Temperature: -55°C ~ +95°C MTBF: >3 million		
Standard Temp. OP (0°C~+70°C)	DECFC-XXXD53%C***	DRS25-XXXD67SC***	DGS25-XXXD67%C***(P)
Wide Temp. OP (-40°C~+85°C)	DECFC-XXXD53%W***	DRS25-XXXD67SW***	DGS25-XXXD67%W***(P)
Notes	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) %=Flash Type		

Model Name	iCF 1SE	CFast 3ME	CFast 3SE	mSATA 3ME	mSATA 3SE
Key Features	1. High quality SLC-based solution 2. Enhanced power cycling management	1. Compliant with CFast 2.0 standard 2. Budget friendly MLC-based solution 3. Write protect	1. Compliant with CFast 2.0 standard 2. Excellent data transfer speed 3. Write protect	1. Excellent data transfer speed and IOPS 2. Budget- friendly MLC-based solution	1. Excellent data transfer speed and IOPS 2. High quality SLC-based solution
Interface	PATA	SATA III 6.0Gb/s	SATA III 6.0Gb/s	SATA III 6.0Gb/s	SATA III 6.0Gb/s
Flash Type	SLC	MLC	SLC	MLC	SLC
Capacity	128MB-8GB	4GB-128GB	1GB-64GB	4GB-128GB	1GB-64GB
Max. Channel	2	2	4	4	4
Sequential R/W (MB/sec, max.)	40/20	300/150	470/250	510/160	510/250
Max. Power Consumption	0.57W (5V x 115mA) 0.39W (3.3V x 121mA)	1.1W (3.3V x 320mA)	1.1W (3.3V x 360mA)	1.1W (3.3V x 335 mA)	1.1W (3.3V x 319 mA)
Thermal Sensor	N	STD : N , W/T : Y			
External DRAM Buffer	N	N	N	N	N
iCell	N	N	N	N	N
TRIM	N	N	N	N	N
ATA Security	Y	Y	Y	Y	Y
S.M.A.R.T	Y	Y	Y	Y	Y
Dimension (WxLxH/mm)	42.8 x 36.4 x 3.3	42.8 x 36.4 x3.6	42.8 x 36.4 x3.6	29.8 x 50.8 x 4.4	29.8 x 50.8 x 4.4
Environment	Vibration: 20G@7~2000Hz Shock: 1500G@0.5ms Storage Temperature: -55°C ~ +95°C MTBF: >3 million				
Standard Temp. OP (0°C~+70°C)	DC1M-XXXD41AC***	DECFA-XXXD07%C***	DECFA-XXXD07AC*** DECFA-XXXD06SC***	DEMSR-XXXD07%C*** DEMSR-XXXD06%C***	DEMSR-XXXD06SC*** DEMSR-XXXD07SC***
Wide Temp. OP (-40°C~+85°C)	DC1M-XXXD41AW***	DECFA-XXXD07%W***	DECFA-XXXD07AW*** DECFA-XXXD06SW***	DEMSR-XXXD07%W*** DEMSR-XXXD06%W***	DEMSR-XXXD06SW*** DEMSR-XXXD07SW***
Notes	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) %=Flash Type				

DRAM Products




Series	Rugged DIMM (Wide Temp)	Wide Temperature	32 bits	Mini R-DIMM
Module Type	DDR2 SODIMM	DDR3 SODIMM	DDR2 SODIMM	DDR3 SODIMM
Frequency	800Mhz/667Mhz/533Mhz/400Mhz	1600Mhz/1333Mhz/1066Mhz	800Mhz/667Mhz/533Mhz/400Mhz	1600Mhz/1333Mhz/1066Mhz
Capacity	1GB/2GB	1GB/2GB/4GB/8GB	128MB/1GB/2GB	1GB/2GB/4GB/8GB/16G
Function	Non-ECC Unbuffered Memory	Non-ECC Unbuffered Memory	Non-ECC Unbuffered Memory	Registered Memory
Pin Number	200pin	204pin	200pin	244pin
Width	32Bits/64Bits	64Bits	32Bits	72Bits
Voltage	1.8V	1.5V/1.35V	1.8V	1.35V / 1.5V
PCB Height	1.57 Inches	1.18 Inches	1.18 Inches	1.18 Inches
Operation Temperature	-40 ~ 85℃	-40 ~ 85℃	0 ~ 85℃	0 ~ 85℃
Golden finger 30μ"	√	√	N	√
Value-Added Service (*Optional)	*Conformal Coating / Wide Temperature			




Series	Standard Solution	Single DIMM(Front Side)	Registered SO-DIMM	Unbuffered w/ECC Solution
Module Type	DDR3 SODIMM	DDR3 SODIMM	DDR3 SODIMM	DDR3 SODIMM
Frequency	1600Mhz/1333Mhz/1066Mhz	1600Mhz/1333Mhz/1066Mhz	1600Mhz/1333Mhz/1066Mhz	1600Mhz/1333Mhz/1066Mhz
Capacity	1GB/2GB/4GB/8GB	1GB/2GB/4GB	1GB/2GB/4GB/8GB/16GB	1GB/2GB/4GB/8GB
Function	Non-ECC Unbuffered Memory	Non-ECC Unbuffered Memory	Registered SO-DIMM Memory	With ECC Unbuffered Memory
Pin Number	204pin	204pin	204pin	204pin
Width	64Bits	64Bits	72Bits	72Bits
Voltage	1.5V/1.35V	1.5V/1.35V	1.35V / 1.5V	1.35V / 1.5V
PCB Height	1.18 Inches	1.18 Inches	1.18 Inches	1.18 Inches
Operation Temperature	0 ~ 85℃	0 ~ 85℃	0 ~ 85℃	0 ~ 85℃
Golden finger 30μ"	N	√	√	√
Value-Added Service (*Optional)	*Conformal Coating			

About Innodisk

Innodisk is a service driven provider of flash and DRAM products for the industrial and enterprise applications. With satisfied customers across the embedded, military, enterprise computing 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 the high IOPS flash arrays for industrial and enterprise applications. The new business lines are leading our next step in being a comprehensive industrial system service provider and flash storage solution provider.

Absolute Service

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

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.

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