

2017 Edition

# Innodisk's Server Solutions

Reliable Boot-up Storage and DRAM Modules



**innodisk**



# Innodisk Server Products



## Requirements

- Sustained performance
- Quality assurance
- Product longevity and support
- Customization
- Compatibility

No matter the application, the main needs of server building can still be summed up as speed, scalability, longevity and energy efficiency. Innodisk's lineup of flash and DRAM products brings the needed performance with compact and efficient form factors.

With cable-less power alternatives, server boot up is handled in an efficient manner which simultaneously frees up more space for storage. Low profile, high-speed DRAM modules ensure that operations run smoothly while not impeding server airflow.

With a wide product portfolio and a strong focus on customer service, we can deliver the optimal solution for your server application.

# Benefits and Advantages



- Golden Finger 30µm
- RoHS Compliant
- Thermal Sensor
- CMTL Certified
- High Capacities, up to 128GB
- High Data Transfer Performance
- JEDEC Compliant

## DRAM Solutions

## Server-Ready Flash Storage

- Customizable, in-house designed Firmware
- Server Boot-up Drives
- Cable-less power alternatives through Pin7 and Pin8 technology
- High Capacities: SATADOM® up to 128GB/ M.2 up to 512GB
- iSMART Monitoring Tool
- OS Virtualization: Windows Server 2016/ Hyper-V, VMware vSphere Hypervisor
- Linux server OS: Ubuntu, Red Hat, SUSE, CentOS, Oracle


Innodisk DRAM products comprise a wide array of IC configurations in order to meet the different requirements of the server industries. They are CMTL certified and are supported by a majority of current motherboard and systems brands, including SuperMicro, Gigabyte, ASUS, Intel, Tyan, ASRock Rack.

Our Server Boot-up Drives have all passed the Windows Server 2016 WHCK/WHQL test. They are certified for the Windows Server 2016 operating system and are fully supported in the Hyper-V environment.

## Certifications



Windows  
Server  
2016  
Certified

A photograph of a server rack filled with network equipment. The focus is on several network modules, likely switches or routers, which are densely packed with blue Ethernet cables. The modules have various ports, including RJ45 and SFP ports, and are labeled with 'POWER' and 'FAN' indicators. The overall scene is dimly lit, emphasizing the metallic and plastic textures of the hardware.

Innodisk's industrial high performance modules meet all of today's server application requirements.

# Innodisk Boot-up Certified and Server-Ready Flash Storage Solutions

The Server Boot-up Drives are dedicated for server applications, and are available in both SATADOM<sup>®</sup> and M.2 2280 form factors. The drives provide excellent IOPS to boost system performance and high endurance for long term usage. Based on our long track-record in the industry we have optimized the hardware and firmware to maximize the performance for server applications.

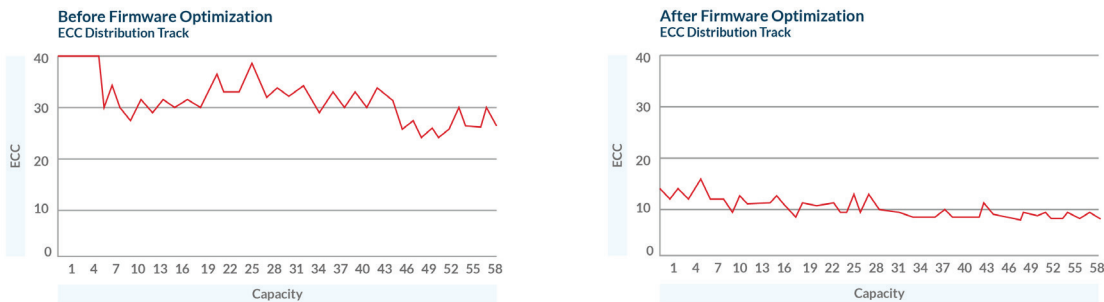
## Features

### iSLC

iSLC offers a cost-effective way for Server Boot-up Drives to perform at high capacity and high performance, while keeping tight control on expenditures. In addition, iSLC remains suitable for Server OS boot-up, which requires high reliability for continuous operations and endurance to handle the frequent random read/write operations. iSLC flash is designed to hit the sweet spot for Server Boot-up Drive applications.

### Data Retention

The Server Boot-up Drives implement evolved firmware algorithms that greatly extends data retention. In addition, the Boot-up Drives utilize LDPC error correcting code. These technologies reduce the overall error bit number by 60%, ensuring a much more reliable performance.



### Power On / Off Protection

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

#### Benefits

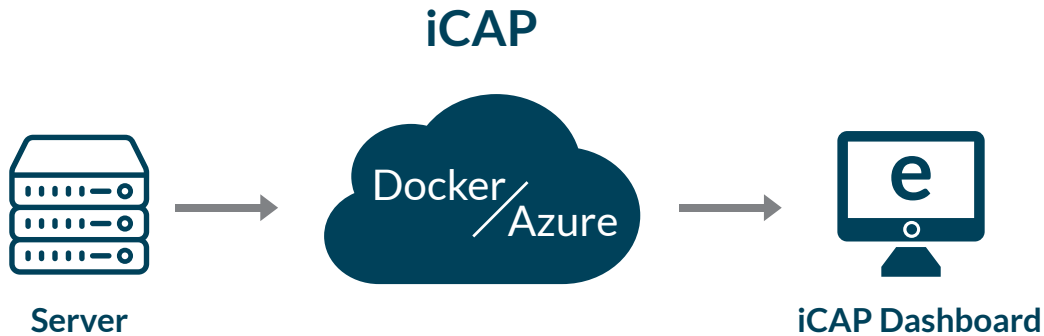
- Power on ramp-up time protection
- Power off slope protection
- Power stability in combination with iCell technology
- Zero delay to power on
- Auto power recovery



# iCAP - Cloud Administration Platform

With the advent of the Internet of Things every system integrator is faced with the task of how to successfully integrate a cloud computing system. Innodisk has developed a smart management system that enables the user to easily access the status of every connected device. In addition, this combined with our in-house designed tools, iSMART and iCOVER, can successfully predict remaining SSD lifetime. It also triggers alerts when certain preset thresholds are met, as well as providing a remote system backup and recovery service.

By utilizing the business intelligence gathered from the raw data, the operator can successfully implement further measure to grow business.



iCAP is a remote device management system available for both private and public clouds, which primarily focuses on storage status management and monitoring.

## Dashboard

- Information statistics
- Device location
- Event logging

## Device information

- OS /device status / alert

## Analysis

- SSD R/W behavior

## Remote Control

- System recovery & backup
- DIO management

## Certification & Validation



### Windows server 2016 Certified.

Innodisk Server Boot-up Drive had passed the Windows Server 2016 WHCK/WHQL test. This means that SATADOM<sup>®</sup> and M.2 Meets the Microsoft standards for compatibility and recommended practices with the Windows Server 2016 operating system. Products and Solutions that have earned the "Certified for Windows Server" logo are also fully supported in the Hyper-V environment.

- Meets the Microsoft standards for compatibility and recommended practices with the Windows Server 2016 operating system (WHCK/WHQL certified)
- Fully supported in Hyper-V environment

### VMware vSphere 6.5 Verified

VMware Knowledge Base defines several parameters for VMware vSphere applications. There are three areas where the Server Boot-up Drives excel: Boot Device, Coredump Device, Logging Device.

- Supports VMware vSphere virtualization software for server virtualization and cloud server applications
- Meets the vSphere boot drive TBW recommendations

### Linux Server OS Compatibility

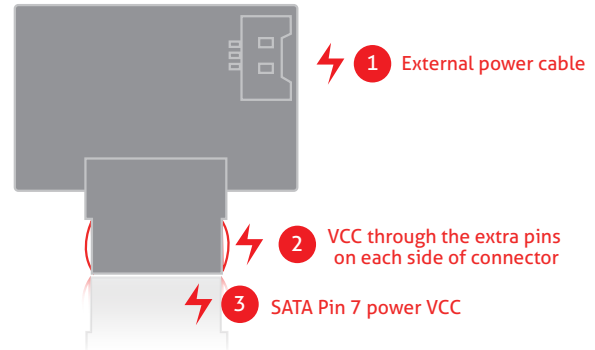
Innodisk has a long track record in the Server market, and based on our experience we know that the share of Linux Servers is comparable to that of Windows. Therefore, SATADOM<sup>®</sup> is also tested and verified for various Linux operating systems.

# SATADOM<sup>®</sup>

Innodisk's Serial ATA Disk on Module (SATADOM<sup>®</sup>) is the world's smallest form factor with exclusive built-in Pin 7 and Pin 8 VCC, which simplifies motherboard design. Since it has no external cables, it is more robust and enhances the disk functions of various industrial and enterprise applications. Innodisk's SATADOM<sup>®</sup> operates on the SATA III interface with faster data transfer rates and is available in capacities ranging from 4GB up to 128GB.

## Multiple Power Sources

For an even simpler integration, Innodisk's proprietary Cable-less power design enables Vcc power through a dedicated pin. The pin also makes the connection more robust while simultaneously allowing for a completely cable-less integration. The SATADOM<sup>®</sup> also allows for a multitude of external power cable solutions if so needed.



## Small Form Factor

The SATADOM<sup>®</sup> form factor is designed for 1U racks, allowing it to fit seamlessly into any server setup. Since SATADOM<sup>®</sup> has made a name for itself in the market, many of the major server board providers already offer products designed with independent SATADOM<sup>®</sup> connectors for server boot-up application.



Model Name	SATADOM-SL 3154	SATADOM-ML 3154	SATADOM-ML 3152-P	SATADOM-SL 3553
Interface	SATA III 6Gb/s			
Flash Type	iSLC	iSLC	iSLC	SLC
Capacity	16GB~64GB	128GB	16GB~128GB	4GB~32GB
Max. Channel	2	2	4	2
Sequential R/W (MB/sec, max.)	530/350	540/400	560/450	220/100
Random 4K R/W (IOPS, max.)	31K/30K	31K/31K	75K/81K	10K/17K
Max. Power consumption (Operation)	1.02W(5V x 204mA)	0.855W(5V x 171mA)	1.98W(5V x 396mA)	0.71W(5V x 142mA)
Thermal Sensor	Y	Y	Y	Y
External DRAM Buffer	N	N	Y	N
iData Guard	Y	Y	Y	Y
AES 256bit	N	N	Optional	N
TRIM	Y	Y	Y	Y
ATA Security	N	N	Y	N
S.M.A.R.T	Y	Y	Y	Y
Dimension (WxLxH/mm)	29.6 x 33.06 x 10.5	31.2 x 36.7 x 10.7	31.5 x 37.17 x 12.6	29.6 x 33.06 x 10.5
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)	DSSSL-XXXM41BC***#	DSSML-XXXM413C***#	DSSML-XXXD813C***#	DSSSL-XXXD09SC***#
Wide Temp.OP (-40°C~+85°C)	DSSSL-XXXM41BW***#	DSSML-XXXM413W***#	DSSML-XXXD813W***#	DSSSL-XXXD09SW***#
Notes	xxx = density (04GB=04G, 08GB=08G, 16GB=16G, 32GB=32G, 64GB=64G, 128GB=A28, 256GB=B56) *** = flash configuration (internal control code) # = power supply method (A=pin 8+ external power cable / B=Pin 7+ Pin 8 / F=Pin 7)			

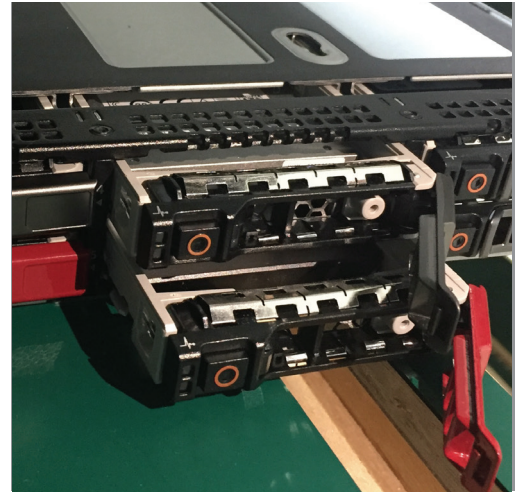


# SATADOM<sup>®</sup> Advantages

## Independent OS

- Independent OS storage that doesn't take up any additional storage bays.
- Frees up space for more flexible hot-swappable and back-up solutions.

# 1



## OS Redundancy

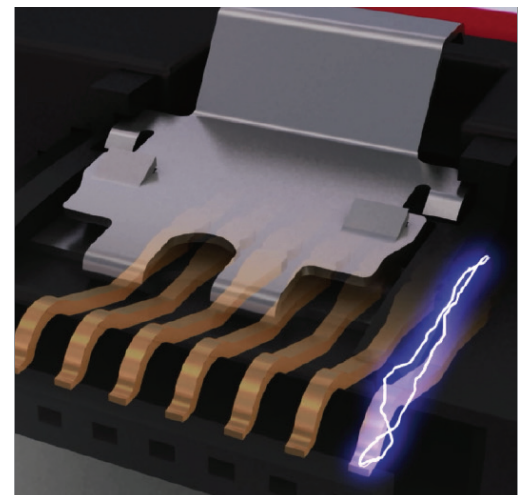
Since the SATADOM<sup>®</sup> contains the OS and critical software applications, a secondary device can automatically be reconfigured as a boot drive in the event of the first device failing.

# 2

## Cable-less SATA Power

Cable-less Power Supply - Patented Pin 7 / Pin 8 design.

# 3



## Small Form Factor

Lower than 1U (44.5mm), designed for 1U server space.

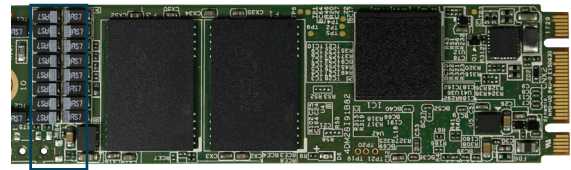
# 4

# M.2-SATA(NGFF)

M.2-SATA (NGFF) stands for Next Generation Form Factor and is comprised of several interfaces with a 67pin edge card connector. The Innodisk M.2-SATA (NGFF) comes capacities from 8GB to 512GB.

## Features

- Uses SATA 6Gb/s interface, compliant with M.2 type 2280 (B+M key)
- Excellent data transfer speed in small form factor
- iCell technology for power loss protection(optional)
- Supports iSMART disk health monitoring

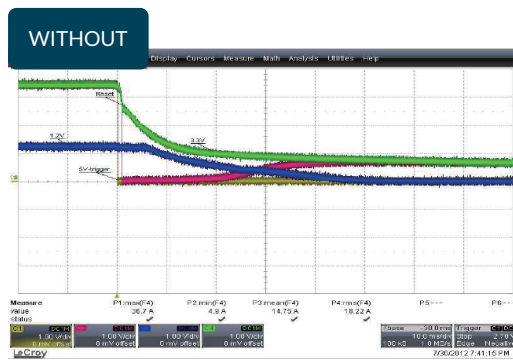


iCell:tantalum capacitor

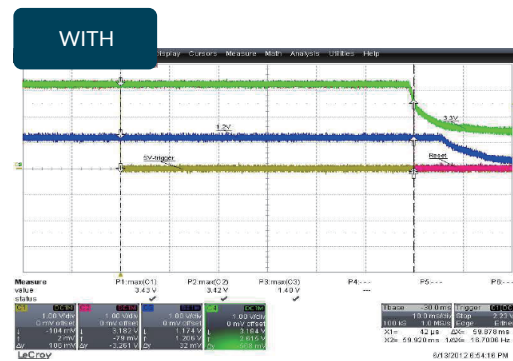
## iCell - Power Loss Protection and Health Monitoring

A smart data protection technology that is designed into the M.2 with several tantalum capacitors, which delivers an instantaneous discharge when low voltage is detected. iCell provides extended power to complete any command in progress and will transfer all data stored from the DRAM buffer to the NAND flash; ensuring data integrity in the event of a power failure.

Combining SMART technology with the iCell architecture enables the user to periodically check the health status of iCell capacitors and determine if further action is needed or if the drive needs to be replaced.



Sudden power outage WITHOUT iCell



Sudden power outage WITH iCell Technology



Model Name	M.2 (S80) 3IS4	M.2 (S80) 3IS2-P	M.2 (S80) 3IS5-P	M.2 (S80) 3SS3
Interface	SATA III 6.0Gb/s			
Flash Type	iSLC	iSLC	iSLC	SLC
Capacity	8GB~128GB	16GB~512GB	32GB~256GB	8GB~128GB
Max. Channel	2	4	4	4
Sequential R/W (MB/sec, max.)	530/360	530/460	560/520	380/220
IOPS(4K random read/write)	31K/31K	51K/47K	84K/82K	12K/20K
Max. Power consumption (operation)	0.9 W (3.3V x 270mA)	1.4W (3.3V x 435mA)	1.6W (3.3V x 480mA)	1.9W (3.3V x 600mA)
Thermal Sensor	Y	Y	Y	Y
External DRAM Buffer	N	Y	Y	N
iCell	N	N	Y	N
iData Guard	Y	Y	Y	Y
AES 256bit	N	Optional	Y	N
TRIM	Y	Y	Y	Y
ATA Security	Y	Y	Y	Y
S.M.A.R.T	Y	Y	Y	Y
Dimension (WxLxH/mm)	22.0x80.0x3.2	22.0x80.0x3.5	22.0x80.0x3.5	22.0x80.0x3.5
Environment	Shock: 1500G@0.5ms/Storage Temperature: -55°C ~ +95°C/MTBF: >3 million hours			
Standard Temp. OP (0°C~+70°C)	DSM28-XXXM413C***	DSM28-XXXD813C***	DSM28-XXXI913C***P	DSM28-XXXD08SC***
Wide Temp. OP (-40°C~+85°C)	DSM28-XXXM413W***	DSM28-XXXD813W***	DSM28-XXXI913W***P	DSM28-XXXD08SW***
Note	XXX = density (08GB=08G, 16GB=16G, 32GB=32G, 64GB=64G, 128GB=A28, 256GB=B56, 512GB=C12) ***= flash configuration (internal control code)			

# DRAM Products

## Server DIMM

With ever increasing data loads, it is crucial that the integrated server memory can deliver the needed performance. Innodisk DIMMs boasts high speeds and high performance that are required for server operations to run smoothly.

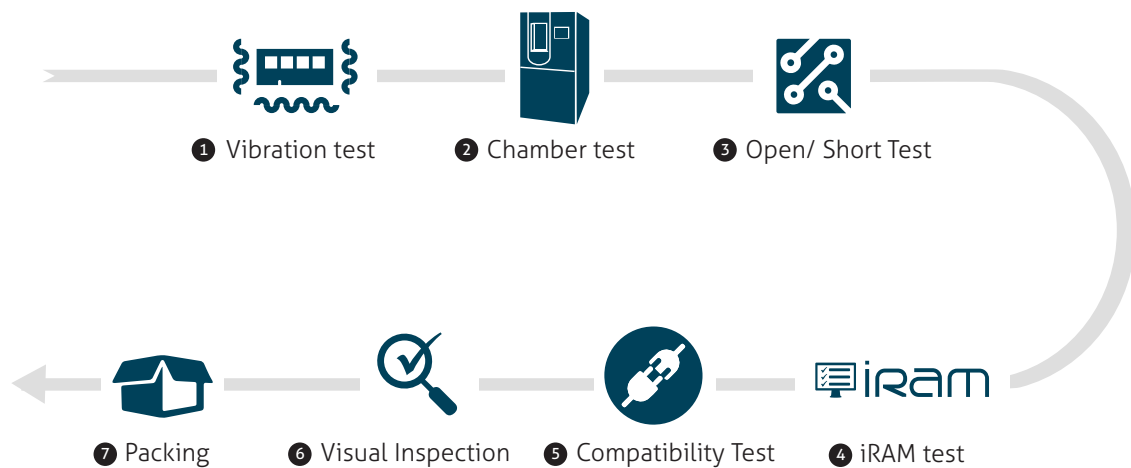
### Advantages

- Functionality: reduced server workload, small footprint that works toward a fan-less integration
- Reliability: all product use original IC with life warranty
- Performance: DDR4 DIMM has significantly higher performance and lower power consumption than DDR3
- Complete product line: we offer a complete product line for server applications – from RDIMM, ECC DIMM, to the Very Low-Profile & MINI DIMM

## iRAM

### Innodisk's exclusive testing software

iRAM consists of several stringent testing patterns. All ECC and RDIMM products are tested with iRAM before being shipped off to customers.



### iRAM Advantages

- Increased test stringency: ensures DRAM module quality
- Able to pinpoint individual defective IC : the only module house that can monitor ECC IC status
- Web-based diagnostic tool: high precision testing through simulating the customer's user-environment
- Multi-core 64bit test mode: increased efficiency

# Server DIMM



Series	Server Solution		
Module Type	<b>DDR4 LONG DIMM</b>	<b>DDR4 LONG DIMM VLP</b>	<b>DDR4 LONG DIMM</b>
Data Rate	2133 MT/s, 2400 MT/s, 2666 MT/s	2133 MT/s, 2400 MT/s, 2666 MT/s	2133 MT/s, 2400 MT/s, 2666 MT/s
Capacity	4GB/8GB/16GB/32GB	4GB/8GB/16GB/32GB	4GB/8GB/16GB
Function	Registered memory with ECC	Registered memory with ECC	Unbuffered memory with ECC
Pin Number	288 pin	288 pin	288 pin
Width	72 bits	72 bits	72 bits
Voltage	1.2V	1.2V	1.2V
Operation Temperature	0°C ~ 85°C	0°C ~ 85°C	0°C ~ 85°C
Part Number	M4R0-XXXXXXXX	M4R0-XXXXXXXX	M4C0-XXXXXXXX



Series	Server Solution	
Module Type	<b>DDR4 LOGN DIMM VLP</b>	<b>DDR4 LRDIMM</b>
Data Rate	2133 MT/s, 2400 MT/s, 2666 MT/s	2133 MT/s, 2400 MT/s
Capacity	4GB/8GB/16GB	32GB/64GB
Function	Unbuffered memory with ECC	Registered memory with ECC
Pin Number	288 pin	288 pin
Width	72 bits	72 bits
Voltage	1.2V	1.2V
Operation Temperature	0°C ~ 85°C	0°C ~ 85°C
Part Number	M4C0-XXXXXXXX	M4L0-XXXXXXXX

Remark : LRDIMM is sold in the US and may not be available in other markets



Series	Server Solution	
Module Type	<b>DDR4 SODIMM</b>	<b>DDR4 SODIMM VLP</b>
Data Rate	2133 MT/s, 2400 MT/s, 2666 MT/s	2133 MT/s, 2400 MT/s, 2666 MT/s
Capacity	4GB/8GB/16GB	4GB/8GB
Function	Unbuffered memory with ECC	Unbuffered memory with ECC
Pin Number	260 pin	260 pin
Width	72 bits	72 bits
Voltage	1.2V	1.2V
Operation Temperature	0°C ~ 85°C	0°C ~ 85°C
Part Number	M4D0-XXXXXXXX	M4D0-XXXXXXXX

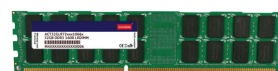


Series	Server Solution	
Module Type	<b>DDR4 MINI DIMM VLP</b>	<b>DDR4 MINI DIMM VLP</b>
Data Rate	2133 MT/s, 2400 MT/s, 2666 MT/s	2133 MT/s, 2400 MT/s, 2666 MT/s
Capacity	4GB/8GB	4GB/8GB/16GB
Function	Registered memory with ECC	Unbuffered memory with ECC
Pin Number	288 pin	288 pin
Width	72 bits	72 bits
Voltage	1.2V	1.2V
Operation Temperature	0°C ~ 85°C	0°C ~ 85°C
Part Number	M4M0-XXXXXXXX	M4M0-XXXXXXXX

Remark : Listed part numbers are mainly based on 2133MT/s module specification. Please consult your regional sales representative for other data rate options or most updated solutions.



Series	Server Solution		
Module Type	<b>DDR3 LONG DIMM</b>	<b>DDR3 LONG DIMM VLP</b>	<b>DDR3 LONG DIMM</b>
Data Rate	1066 MT/s, 1333 MT/s, 1600 MT/s, 1866 MT/s	1066 MT/s, 1333 MT/s, 1600 MT/s	1066 MT/s, 1333 MT/s, 1600 MT/s
Capacity	2GB/4GB/8GB/16GB	4GB/8GB	1GB/2GB/4GB/8GB/16GB
Function	Registered memory with ECC	Registered memory with ECC	Unbuffered memory with ECC
Pin Number	240 pin	240 pin	240 pin
Width	72 bits	72 bits	72 bits
Voltage	1.35V/1.5V	1.35V/1.5V	1.35V/1.5V
Operation Temperature	0°C ~ 85°C	0°C ~ 85°C	0°C ~ 85°C
Part Number	ACTXXHR72XXXXXXX-LV	ACTXXHR72XXXXXXX-LVP	M3C0-XXXXXXX



Series	Server Solution	
Module Type	<b>DDR3 LONG DIMM VLP</b>	<b>DDR3 LRDIMM</b>
Data Rate	1066 MT/s, 1333 MT/s, 1600 MT/s	1333 MT/s, 1600 MT/s
Capacity	2GB/4GB/8GB	32GB
Function	Unbuffered memory with ECC	Registered memory with ECC
Pin Number	240 pin	240 pin
Width	72 bits	72 bits
Voltage	1.35V/1.5V	1.35V/1.5V
Operation Temperature	0°C ~ 85°C	0°C ~ 85°C
Part Number	M3C0-XXXXXXX	ACT32GLR72T4KXXXXX

Remark : LRDIMM is sold in the US and may not be available in other markets



Series	Server Solution			
Module Type	<b>DDR3 SODIMM</b>	<b>DDR3 SODIMM ULP</b>	<b>DDR3 MINI DIMM</b>	<b>DDR3 MINI DIMM VLP</b>
Data Rate	1066 MT/s, 1333 MT/s, 1600 MT/s	1066 MT/s, 1333 MT/s, 1600 MT/s	1066 MT/s, 1333 MT/s, 1600 MT/s	1066 MT/s, 1333 MT/s, 1600 MT/s
Capacity	1GB/2GB/4GB/8GB/16GB	2GB/4GB	2GB/4GB/8GB	2GB/4GB
Function	Unbuffered memory with ECC	Unbuffered memory with ECC	Registered memory with ECC	Registered memory with ECC
Pin Number	204 pin	204 pin	244 pin	244 pin
Width	72 bits	72 bits	72 bits	72 bits
Voltage	1.35V/1.5V	1.35V/1.5V	1.35V/1.5V	1.35V/1.5V
Operation Temperature	0°C ~ 85°C	0°C ~ 85°C	0°C ~ 85°C	0°C ~ 85°C
Part Number	M3D0-XXXXXXX	M3D0-XXXXXXX	M3M0-XXXXXXX	M3M0-XXXXXXX



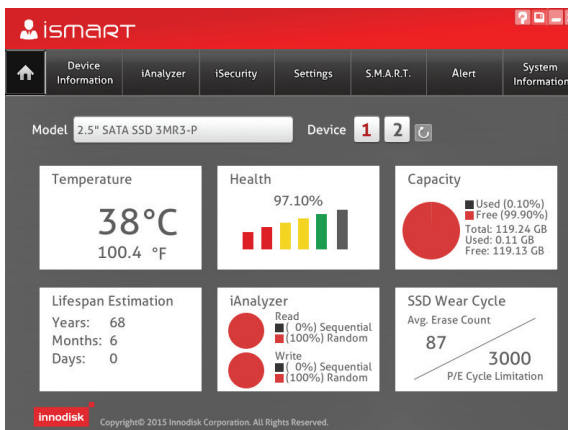
Series	Server Solution	
Module Type	<b>DDR3 MINI DIMM VLP</b>	<b>DDR3 MINI DIMM ULP</b>
Data Rate	1066 MT/s, 1333 MT/s, 1600 MT/s	1066 MT/s, 1333 MT/s, 1600 MT/s
Capacity	2GB/4GB/8GB	2GB/4GB
Function	Unbuffered memory with ECC	Unbuffered memory with ECC
Pin Number	244 pin	244 pin
Width	72 bits	72 bits
Voltage	1.35V/1.5V	1.35V/1.5V
Operation Temperature	0°C ~ 85°C	0°C ~ 85°C
Part Number	M3M0-XXXXXXX	M3M0-XXXXXXX

# iSMART

Innodisk's iSMART is designed to simplify information and provide an easy to read interface for the user. The iSMART tool monitors the health and lifespan of Innodisk's SSD. In addition, it provides details on usage patterns, and alerts users before it reaches failure. With iSMART, our customers are able to properly integrate Innodisk's SSD's into their solutions by carefully monitoring behavior and health during development, integration, and mass production.

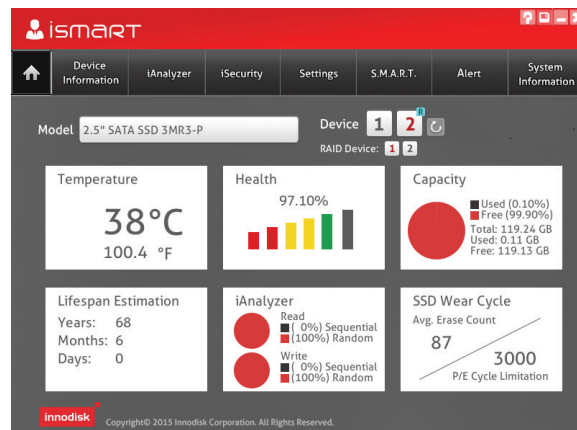
iSMART is supported under a Linux-based server system and ESXi. It provides every storage device's SMART values by vnder command, and also fully supports the iAnalyzer function. Innodisk also provides an iSMART API for system operators – helping the software designer to easily implement the SSD health monitor tool into their system.

## Dashboard



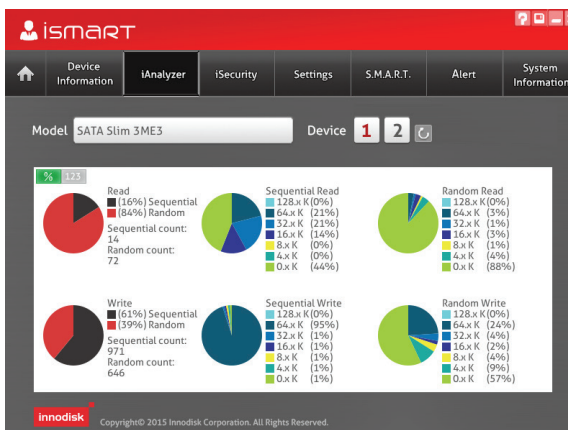
The Dashboard's home tab provides a summary or quick snapshot of each installed disks in the system. This page offers accurate data information regarding Temperature, Health, Capacity, Lifespan, iAnalyzer, and Notifications.

## RAID Support



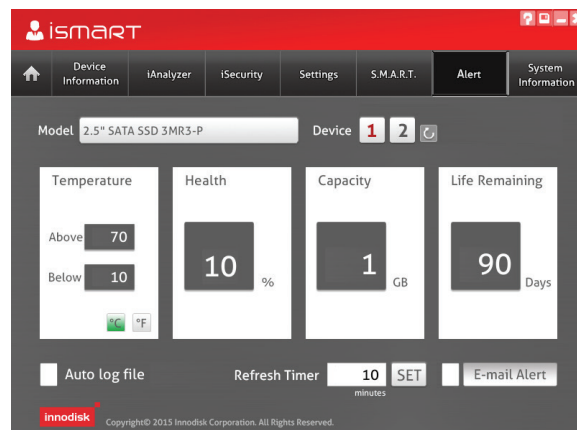
iSMART can monitor individual RAID devices through an API implement, thus giving you quick and easy access to the SMART attributes of every connected device.

## iAnalyzer



When activated, the iAnalyzer tab displays the read/write behaviors of the SSD in real time. This allows the user to understand their application usage of the SSD. Sequential and Random I/Os are easily broken down into percentages making them easy to read.

## Alert



The Alert tab helps the user set trigger points with Temperature, Health percentage, Remaining Capacity or Life Remaining. If these trigger points exceed their boundaries, the iSMART utility can send a warning and email to the user notifying them that something may fail.



# 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

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.



### Intellectual Property

With over 62 product design patents, we develop innovative technology that enhances and benefits industrial applications.



### Purpose-Built Factory

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

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