# innodisk

# M.2 (S80)
## 3IS2-P Series

**Customer:**

**Customer Part Number:**

**Innodisk Part Number:**

**Innodisk Model Name:**

**Date:**

| Innodisk Approver | Customer Approver |
|---|---|
|  |  |

**Total Solution For Industrial Flash Storage**

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# REVISION HISTORY

| Revision | Description | Date |
|----------|-------------|------|
| Rev 1.0 | Official Released | Nov., 2017 |
| Rev 1.1 | Add caution notice and update REACH, RoHS | Aug. 2019 |

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# 1. Product Overview

## 1.1 Introduction of Innodisk M.2 (S80) 3IS2-P

Innodisk M.2 (S80) 3IS2-P is designed as the standard M.2 form factor with SATA interface, and supports SATA III standard (6.0Gb/s) with excellent performance. The form factor refers to the M.2(NGFF) specification which established by JEDEC.

Innodisk M.2 (S80) 3IS2-P is designed for server field. It effectively reduces the booting time of operation system and has less power consumption compared to hard disk drive (HDD). The great benefit of M.2 (S80) 3IS2-P is to be configured as a SATA boot device with no requirement on additional driver and without using a drive bay, making it perfect for server applications.

CAUTION *TRIM must be enabled.*

*TRIM enables SSD's controller to skip invalid data instead of moving. It can free up significant amount of resources, extends the lifespan of SSD by reducing erase, and write cycles on the SSD. Innodisk's handling of garbage collection along with TRIM command improves write performance on SSDs.*

## 1.2 Product View and Models

Innodisk M.2 (S80) 3IS2-P is available in follow capacities within iSLC * flash ICs.

*For the details of iSLC, refer to section 2.15

| M.2 (S80) 3IS2-P 16GB | M.2 (S80) 3IS2-P 128GB |
| M.2 (S80) 3IS2-P 32GB | M.2 (S80) 3IS2-P 256GB |
| M.2 (S80) 3IS2-P 64GB | M.2 (S80) 3IS2-P 512GB |

| 512GB | 16GB-256GB |
|---|---|
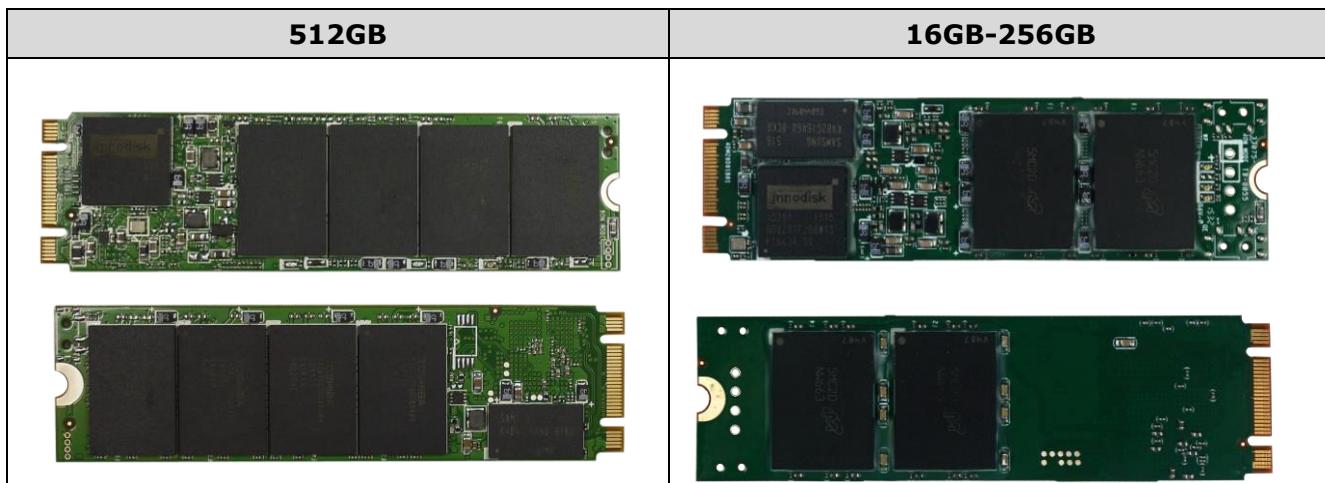


**Figure 1: Innodisk M.2 (S80) 3IS2-P (type 2280)**

## 1.3 SATA Interface

Innodisk M.2 (S80) 3IS2-P delivers high performance and reliability by SATA III interface and backward compatibility with SATA I and SATA II (Gen 3 supports 1.5Gbps /3.0Gbps/6.0Gbps data

rate). Sequential read speeds up to 560 MB/s and Sequential write speeds up to 450 MB/s. Also delivers Random 4K Read speeds up to 51,000 IOPS and Random 4K Write speeds up to 47,000 IOPS.

## 1.4 Key Features

- M.2 2280-D2-B-M standard.
- Low power consumption
- Thermal sensor
- Power loss protection with iData Guard™

## 1.5 Benefits of Server Boot-up Series

- Firmware optimized for server application
- Windows Server 2016 certified
- Linux Server OS verified*
  - Red Hat Enterprise Linux Server V7.3
  - Ubuntu V16.04
  - CentOS V7
  - Fedora V25
  - OpenSUSE V13.2
- Virtual machine applications verified*
  - VMware EXSi V6.5
  - Hyper-V (Windows Server 2016)
  - Oracle VM Server/ VM Manager
- iSMART supported
  - VMware
  - Windows Server Series OS
  - Linux Series OS

**\* For the details of Linux OS and VM application please connect Innodisk for the Test Report.**

# 2. Product Specifications

## 2.1 Capacity and Device Parameters

M.2 (S80) 3IS2-P device parameters are shown in Table 1.

**Table 1: Device parameters**

| Capacity | Cylinders | Heads | Sectors | LBA | user space |
|----------|-----------|-------|---------|-----|------------|
| 16GB | 16383 | 16 | 63 | 31277232 | 15,272 |
| 32GB | 16383 | 16 | 63 | 60579792 | 29,580 |
| 64GB | 16383 | 16 | 63 | 121138416 | 59,150 |
| 128GB | 16383 | 16 | 63 | 242255664 | 118,289 |
| 256GB | 16383 | 16 | 63 | 484490160 | 236,567 |
| 512GB | 16383 | 16 | 63 | 968959152 | 473,124 |

## 2.2 Performance

Burst Transfer Rate:   6.0Gbps

**Table 2: Performance**

| Capacity | 16GB | 32GB | 64GB | 128GB | 256GB | 512GB |
|----------|------|------|------|-------|-------|-------|
| Sequential Read* (QD32) | 300 MB/s | 560 MB/s | 560 MB/s | 560 MB/s | 560 MB/s | 560MB/s |
| Sequential Write* (QD32) | 120 MB/s | 240 MB/s | 320 MB/s | 450 MB/s | 450 MB/s | 450MB/s |
| 4KB Random* Read (QD32) | 34,000 IOPS | 51,000 IOPS | 52,000 IOPS | 53,000 IOPS | 52,000 IOPS | 51,000 IOPS |
| 4KB Random* Write (QD32) | 31,000 IOPS | 47,000 IOPS | 50,000 IOPS | 51,000 IOPS | 47,000 IOPS | 47,000 IOPS |

Note: * Performance based on CrystalDiskMark 3.01 with file size 1000MB of Queue Depth 32

## 2.3 Electrical Specifications

## 2.3.1 Power Requirement

**Table 3: Innodisk M.2 (S80) 3IS2-P Power Requirement**

| Item | Symbol | Rating | Unit |
|------|--------|--------|------|
| Input voltage | $V_{IN}$ | +3.3 DC +- 5% | V |

## 2.3.2 Power Consumption

**Table 4: Power Consumption**

| Mode | Power Consumption (mA) |
|---|---|
| Star-up | 810 |
| Read | 210 |
| Write | 450 |
| Idle | 120 |

Target: 512GB M.2 (S80) 3IS2-P

## 2.4 Environmental Specifications

## 2.4.1 Temperature Ranges

**Table 5: Temperature range for M.2 (S80) 3IS2-P**

| Temperature | Range |
|---|---|
| Operating | Standard Grade: 0°C to +70°C |
| | Industrial Grade:-40°C to +85°C |
| Storage | -55°C to +95°C |

## 2.4.2 Humidity

Relative Humidity: 10-95%, non-condensing

## 2.4.3 Shock and Vibration

**Table 6: Shock/Vibration Testing for M.2 (S80) 3IS2-P**

| Reliability | Test Conditions | Reference Standards |
|---|---|---|
| Vibration | 7 Hz to 2K Hz, 20G, 3 axes | IEC 68-2-6 |
| Mechanical Shock | Duration: 0.5ms, 1500 G, 3 axes | IEC 68-2-27 |

## 2.4.4 Mean Time between Failures (MTBF)

Table 7 summarizes the MTBF prediction results for various M.2 (S80) 3IS2-P configurations. The analysis was performed using a RAM Commander™ failure rate prediction.

· **Failure Rate**: The total number of failures within an item population, divided by the total number of life units expended by that population, during a particular measurement interval under stated condition.

- **Mean Time between Failures (MTBF)**: A basic measure of reliability for repairable items: The mean number of life units during which all parts of the item perform within their specified limits, during a particular measurement interval under stated conditions.

**Table 7: M.2 (S80) 3IS2-P MTBF**

| Product | Condition | MTBF (Hours) |
|---|---|---|
| Innodisk M.2 (S80) 3IS2-P | Telcordia SR-332 GB, 25°C | >3,000,000 |

## 2.5 CE and FCC Compatibility

M.2 (S80) 3IS2-P conforms to CE and FCC requirements.

## 2.6 RoHS Compliance

M.2 (S80) 3IS2-P is fully compliant with RoHS directive.

## 2.7 Windows Server 2016 Compatibility

M.2 (S80) 3IS2-P has 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.

## 2.8 Reliability

**Table 8: M.2 (S80) 3IS2-P TBW**

| Parameter | Value | | |
|---|---|---|---|
| Read Cycles | Unlimited Read Cycles | | |
| Flash endurance | 20,000 P/E cycles | | |
| Wear-Leveling Algorithm | Support | | |
| Bad Blocks Management | Support | | |
| Error Correct Code | Support | | |
| **(Total Bytes Written)**   Unit:TB | | | |
| **Capacity** | **Sequential workload** | **Client workload** | **Enterprise workload** |
| 16GB | 284.1 | 156.25 | 52.1 |
| 32GB | 568.2 | 312.5 | 104.2 |
| 64GB | 1136.4 | 625 | 208.4 |
| 128GB | 2272.8 | 1250 | 416.8 |
| 256GB | 4545.6 | 2500 | 833.6 |
| 512GB | 9091.2 | 5000 | 1667.2 |
| **DWDP (5 years)** | **9.96** | **5.48** | **1.83** |

* Note:

1. Sequential: Mainly sequential write, tested by Vdbench.

2. Client: Follow JESD218 Test method and JESD219A Workload, tested by ULINK. (The capacity lower than 64GB client workload is not specified in JEDEC219A, the values are estimated.)

3. Enterprise: Follow JESD218 Test method and JESD219A Workload, tested by Vdbench.

4.      Based on out-of-box performance.

## 2.9 Transfer Mode

M.2 (S80) 3IS2-P support following transfer mode:

Serial ATA III 6.0Gbps

Serial ATA II 3.0Gbps

Serial ATA I 1.5Gbps

## 2.10 Pin Assignment

Innodisk M.2 (S80) 3IS2-P uses a standard SATA pin-out. See Table 8 for M.2 (S80) 3IS2-P pin assignment.

**Table 9: Innodisk M.2 (S80) 3IS2-P Pin Assignment**

| Signal Name | Pin # | Pin # | Signal Name |
|---|---|---|---|
|  |  | 75 | GND |
| 3.3V | 74 | 73 | GND |
| 3.3V | 72 | 71 | GND |
| 3.3V | 70 | 69 | GND |
| NC | 68 | 67 | NC |
| Notch | 66 | 65 | Notch |
| Notch | 64 | 63 | Notch |
| Notch | 62 | 61 | Notch |
| Notch | 60 | 59 | Notch |
| NC | 58 |  |  |
| NC | 56 | 57 | GND |
| NC | 54 | 55 | NC |
| NC | 52 | 53 | NC |
| NC | 50 | 51 | GND |
| NC | 48 | 49 | RX+ |
| NC | 46 | 47 | RX- |
| NC | 44 | 45 | GND |
| NC | 42 | 43 | TX- |
| NC | 40 | 41 | TX+ |
| DEVSLP | 38 | 39 | GND |
| NC | 36 | 37 | NC |
| NC | 34 | 35 | NC |
| NC | 32 | 33 | GND |
| NC | 30 | 31 | NC |
| NC | 28 | 29 | NC |
| NC | 26 | 27 | GND |
| NC | 24 | 25 | NC |

| NC | 22 | 23 | NC |
|---|---|---|---|
| NC | 20 | 21 | GND |
| Notch | 18 | 19 | Notch |
| Notch | 16 | 17 | Notch |
| Notch | 14 | 15 | Notch |
| Notch | 12 | 13 | Notch |
| DAS/DSS | 10 | 11 | NC |
| NC | 8 | 9 | NC |
| NC | 6 | 7 | NC |
| 3.3V | 4 | 5 | NC |
| 3.3V | 2 | 3 | GND |
| | | 1 | GND |

## 2.11 Mechanical Dimensions
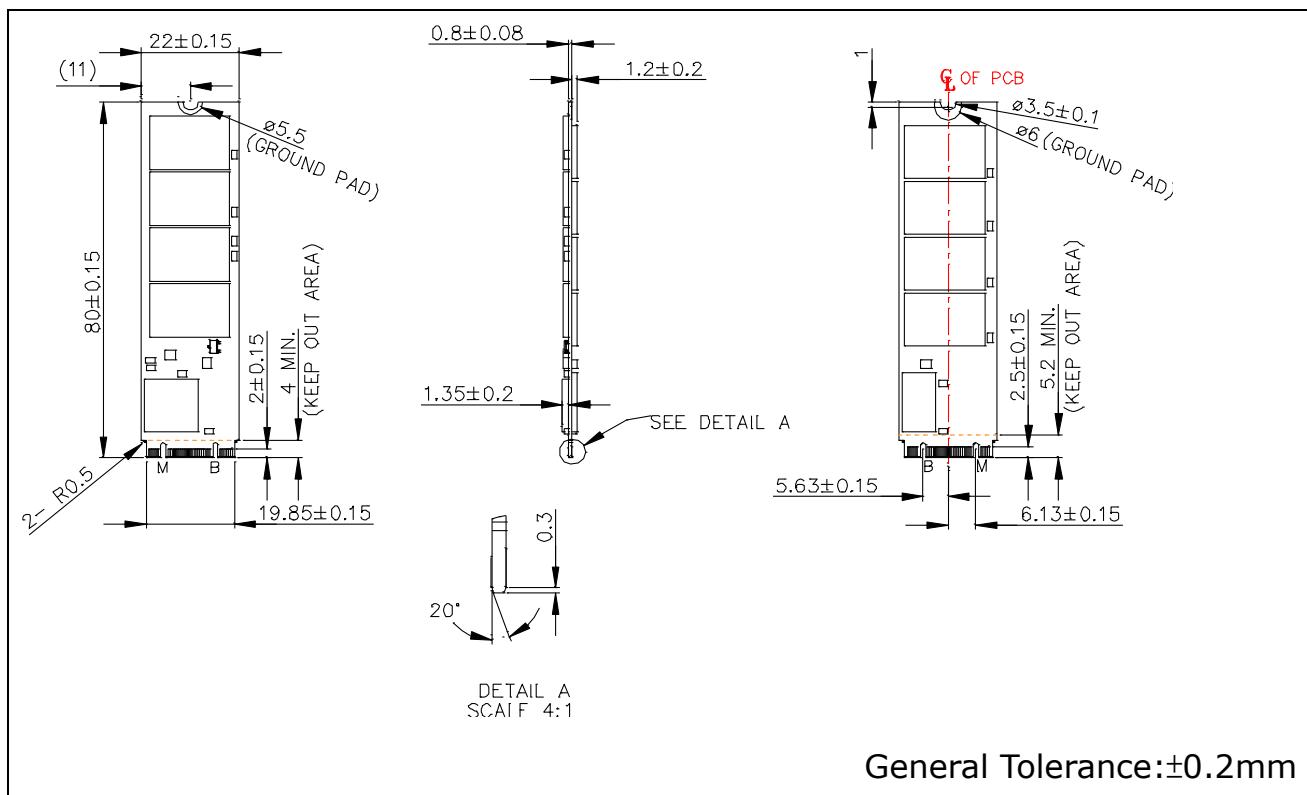


**Figure 2: DSM28-C12D813**QC(512GB)**
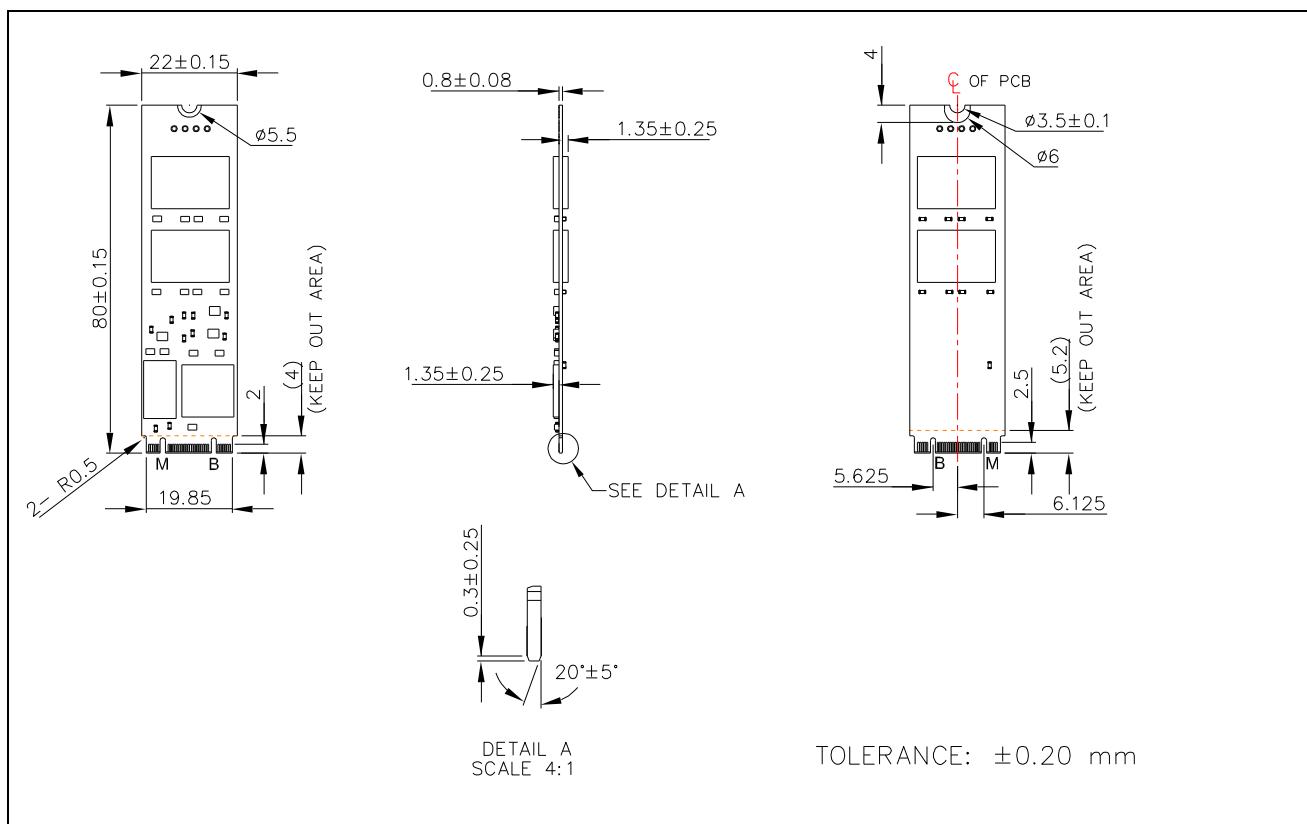


**Figure 3: DSM28-***D813**QC(16GB~256GB),**

## 2.12 Assembly Weight

An Innodisk M.2 (S80) 3IS2-P within flash ICs, 512GB's weight is 12 grams approximately.

## 2.13 Seek Time

Innodisk M.2 (S80) 3IS2-P is not a magnetic rotating design. There is no seek or rotational latency required.

## 2.14 Hot Plug

The SSD support hot plug function and can be removed or plugged-in during operation. User has to avoid hot plugging the SSD which is configured as boot device and installed operation system.

Surprise hot plug     : The insertion of a SATA device into a backplane (combine signal and power) that has power present. The device powers up and initiates an OOB sequence.

Surprise hot removal: The removal of a SATA device from a powered backplane, without first being placed in a quiescent state.

## 2.15 iSLC

Innodisk M.2 (S80) 3IS2-P uses Multi Level Cell (MLC) NAND flash memory to act as SLC flash by in-house firmware. iSLC is our exclusive technology designed to ensure longer-lasting and more reliable performance than conventional MLC NAND flash. Through the use of flash management algorithms, iSLC improves SSD endurance up to 20,000 cycles, increasing the lifespan to at least seven times longer than MLC-based solutions.

# 3. Theory of Operation

## 3.1 Overview

Figure 4 shows the operation of Innodisk M.2 (S80) 3IS2-P from the system level, including the major hardware blocks.
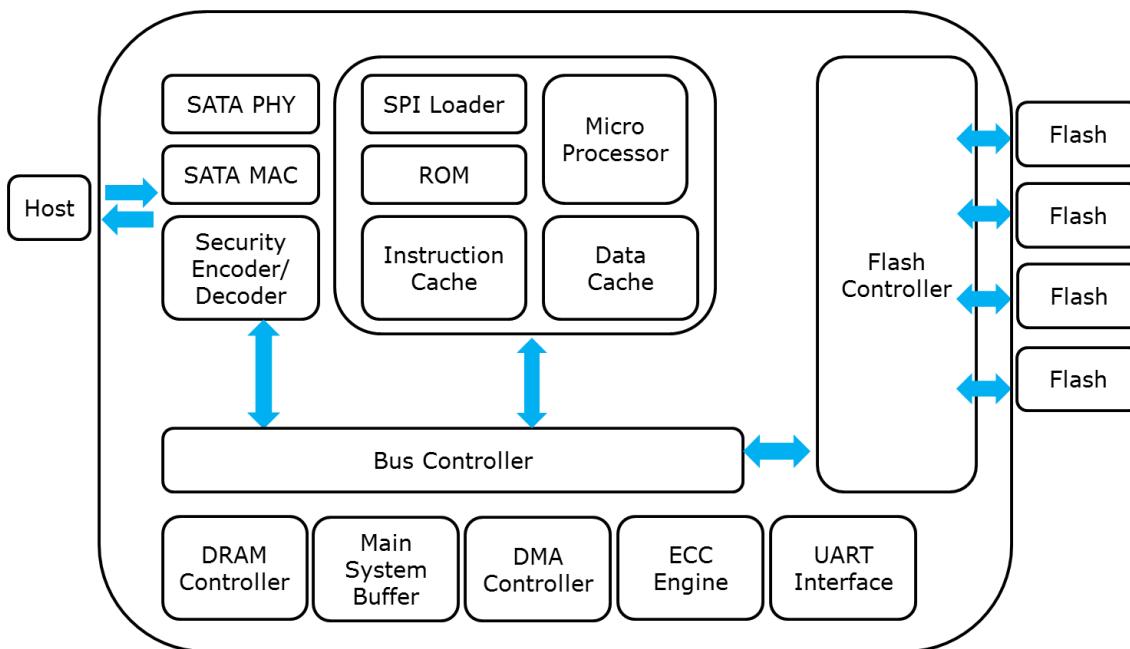


**Figure 4: Innodisk M.2 (S80) 3IS2-P Block Diagram**

Innodisk M.2 (S80) 3IS2-P integrates a SATA III controller and NAND flash memories. Communication with the host occurs through the host interface, using the standard ATA protocol. Communication with the flash device(s) occurs through the flash interface.

## 3.2 SATA III Controller

Innodisk M.2 (S80) 3IS2-P is designed with ID 201, a SATA III 6.0Gbps (Gen. 3) controller, which supports external DDDR3 DRAM. The Serial ATA physical, link and transport layers are compliant with Serial ATA Gen 1, Gen 2 and Gen 3 specification (Gen 3 supports 1.5Gbps/3.0Gbps/6.0Gbps data rate). The controller has 4 channels for flash interface.

## 3.3 Error Detection and Correction

Highly sophisticated Error Correction Code algorithms are implemented. The ECC unit consists of the Parity Unit (parity-byte generation) and the Syndrome Unit (syndrome-byte computation). This unit implements an algorithm that can correct 40 bits per 1024 bytes in an ECC block. Code-byte generation during write operations, as well as error detection during read operation, is implemented on the fly without any speed penalties.

## 3.4 Wear-Leveling

Flash memory can be erased within a limited number of times. This number is called the ***erase cycle limit*** or ***write endurance limit*** and is defined by the flash array vendor. The erase cycle limit applies to each individual erase block in the flash device.

Innodisk M.2 (S80) 3IS2-P uses a static wear-leveling algorithm to ensure that consecutive writes of a specific sector are not written physically to the same page/block in the flash. This spreads flash media usage evenly across all pages, thereby extending flash lifetime.

## 3.5 Bad Blocks Management

Bad Blocks are blocks that contain one or more invalid bits whose reliability are not guaranteed. The Bad Blocks may be presented while the SSD is shipped, or may develop during the life time of the SSD. When the Bad Blocks is detected, it will be flagged, and not be used anymore. The SSD implement Bad Blocks management, Bad Blocks replacement, Error Correct Code to avoid data error occurred. The functions will be enabled automatically to transfer data from Bad Blocks to spare blocks, and correct error bit.

## 3.6 iData Guard

Innodisk's iData Guard is a comprehensive data protection mechanism that functions before and after a sudden power outage to M.2. Low-power detection terminates data writing before an abnormal power-off, while table-remapping after power-on deletes corrupt data and maintains data integrity. Innodisk's iData Guard provides effective power cycling management, preventing data stored in flash from degrading with use.

## 3.7 Garbage Collection

Garbage collection and TRIM technology is used to maintain data consistency and perform continual data cleansing on SSDs. It runs as a background process, freeing up valuable controller resources while sorting good data into available blocks, and deleting bad blocks. It also significantly reduces write operations to the drive, thereby increasing the SSD's speed and lifespan.

## 3.8 TRIM

The TRIM command is designed to enable the operating system to notify the SSD which pages no longer contain valid data due to erases either by the user or operating system itself. During a delete operation, the OS will mark the sectors as free for new data and send a TRIM command to the SSD to mark them as not containing valid data. After that the SSD knows not to preserve the contents of the block when writing a page, resulting in less write amplification with fewer writes to the flash, higher write speed, and increased drive life.

# 4. Installation Requirements

## 4.1 M.2 (S80) 3IS2-P Pin Directions
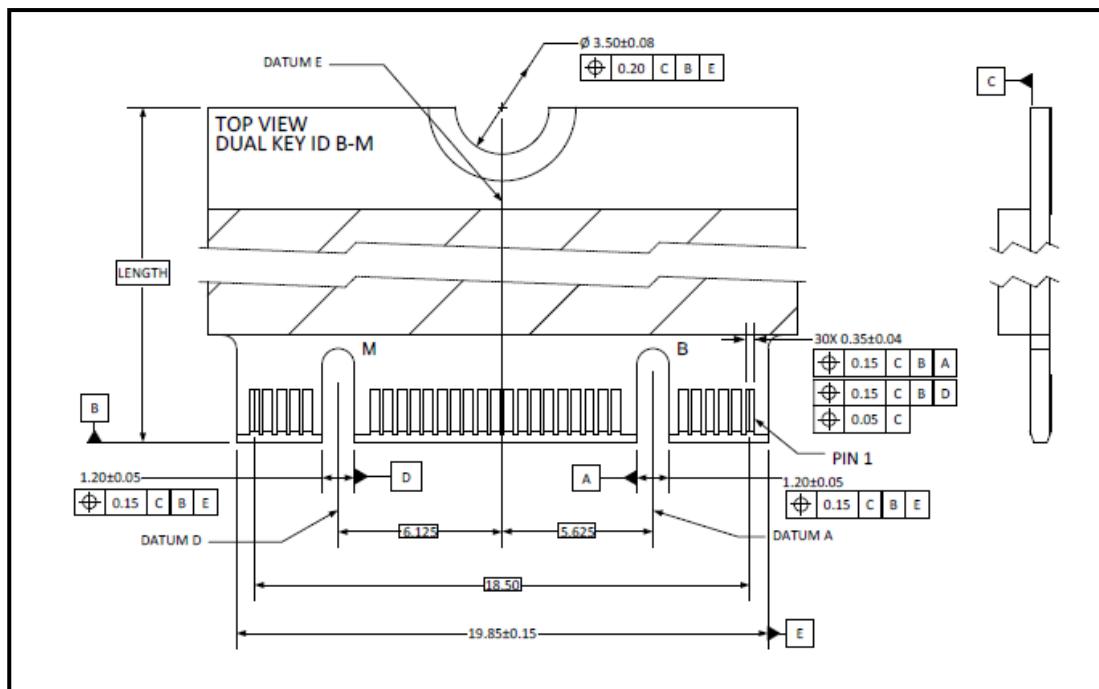


**Figure 5: Signal Segment and Power Segment**

## 4.2 Electrical Connections for M.2 (S80) 3IS2-P

A Serial ATA device may be either directly connected to a host or connected to a host through a cable. For connection via cable, the cable should be no longer than 1meter. The SATA interface has a separate connector for the power supply. Please refer to the pin description for further details.

## 4.3 Device Drive

No additional device drives are required. The Innodisk M.2 (S80) 3IS2-P can be configured as a boot device.

# 5. SMART Feature Set

Innodisk 3IS2-P series support the SMART command set to report SMART attributes of SSD for end user to check and monitor SMART values by iSMART tool.

## 5.1 iSMART

Intuitive software tool for SSD monitoring, lifetime prediction and alerts iSMART is a proprietary software developed to access the SMART attributes of Innodisk SATA devices. The software gives the user full access to all SMART related data as well as being able to monitor additional parameters through a simple and user-friendly interface In addition, the SMART attributes can be exported and further analyzed to gain a comprehensive picture of SSD health and status.

## 5.2 SMART Commmand

### Table 10: SMART command

| Value | Command | Value | Command |
|-------|---------|-------|---------|
| D0h | Read Data | D5h | Read Log |
| D1h | Read Attribute Threshold | D6h | Return Status |
| D2h | Enable/Disable Auto save | D8h | Enable SMART Operations |
| D3h | Save Attribute Values | D9h | Disable SMART Operations |
| D4h | Execute OFF-LINE Immediate | DAh | Return Status |

## 5.1 SMART Attributes

Innodisk 3IS2-P series SMART data attributes are listed in following table.

### Table 11: SMART attribute

| Attribute ID (hex) | Raw Attribute Value | | | | | | | Attribute Name |
|--------------------|-----|-----|-----|-----|-----|-----|-----|----------------|
| 1 (01h) | MSB | 00 | 00 | 00 | 00 | 00 | 00 | Raw Read Error Rate |
| 5 (05h) | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Reallocated Sector Count |
| 9 (09h) | LSB | | | MSB | 00 | 00 | 00 | Power-on Hours |
| 12 (0Ch) | LSB | | | MSB | 00 | 00 | 00 | Power Cycle Count |
| 160 (A0h) | LSB | | | MSB | 00 | 00 | 00 | Uncorrectable sector count when read/write |
| 161 (A1h) | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Number of valid spare block |
| 163 (A3h) | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Number of initial invalid block |
| 164 (A4h) | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Total erase count |
| 165 (A5h) | LSB | | | MSB | 00 | 00 | 00 | Maximum erase count |
| 166 (A6h) | LSB | | | MSB | 00 | 00 | 00 | Minimum erase count |
| 167 (A7h) | LSB | | | MSB | 00 | 00 | 00 | Average erase count |

| 168 (A8h) | LSB | | | MSB | 00 | 00 | 00 | Max erase count of spec |
|---|---|---|---|---|---|---|---|---|
| 169 (A9h) | LSB | | | MSB | 00 | 00 | 00 | Remain Life (percentage) |
| 175 (AFh) | LSB | | | MSB | 00 | 00 | 00 | Program fail count in worst die |
| 176 (B0h) | LSB | | | MSB | 00 | 00 | 00 | Erase fail count in worst die |
| 177 (B1h) | LSB | | | MSB | 00 | 00 | 00 | Total wear level count |
| 178 (B2h) | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Runtime invalid block count |
| 181 (B5h) | LSB | | | MSB | 00 | 00 | 00 | Total program fail count |
| 182 (B6h) | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Total erase fail count |
| 187 (BBh) | LSB | | | MSB | 00 | 00 | 00 | Uncorrectable error count |
| 192 (C0h) | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Power-Off Retract Count |
| 194 (C2h) | MSB | 00 | 00 | 00 | 00 | 00 | 00 | Controlled temperature |
| 195 (C3h) | LSB | | | MSB | 00 | 00 | 00 | Hardware ECC recovered |
| 196 (C4h) | LSB | | | MSB | 00 | 00 | 00 | Reallocation event count |
| 198 (C6h) | LSB | | | MSB | 00 | 00 | 00 | Uncorrectable error count off-line |
| 199 (C7h) | LSB | MSB | 00 | 00 | 00 | 00 | 00 | UltraDMA CRC error count |
| 225 (E1h) | LSB | | | | | | MSB | Total LBAs written (each write unit = 32MB) |
| 232 (E8h) | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Available reserved space |
| 241 (F1h) | LSB | | | | | | MSB | Total LBAs written (each write unit = 32MB) |
| 242 (F2h) | LSB | | | | | | MSB | Total LBAs read (each write unit = 32MB) |

# 6. Part Number Rule

| CODE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | D | S | M | 2 | 8 | - | B | 5 | 6 | D | 8 | 1 | 3 | C | A | Q | C | - | X | X | X |

| Definition | |
|---|---|
| **Code 1st (Disk)** | **Code 14th (Operation Temperature)** |
| D : Disk | C: Standard Grade (0℃～ +70℃) |
| **Code 2nd (Disk)** | W: Industrial Grade (-40℃～ +85℃) |
| S: Server series | |
| **Code 3rd ～5th (Form factor)** | **Code 15th (Internal control)** |
| M28: M.2-SATA Type 2280-D2-B-M | A~Z: BGA PCB version. |
| | |
| **Code 7th ～9th (Capacity)** | **Code 16th (Channel of data transfer)** |
| 32G: 32GB · B56: 256GB | Q: Quad Channels |
| 64G: 64GB · C12: 512GB | |
| A28: 128GB | |
| | |
| **Code 10th ～12th (Controller)** | **Code 17th (Flash Type)** |
| D81: ID201 | C: Toshiba MLC |
| | N: Micron MLC |
| **Code 13th (Flash mode)** | **Code 19th～21st (Customize code)** |
| 3: iSLC | |
| | |

# Appendix

**REACH**

## Innodisk Corporation
## REACH Declaration

Tel:(02)7703-3000 Fax:(02) 7703-3555 Internet: http://www.innodisk.com/

We hereby confirm that the product(s) delivered to

| Innodisk P/N | Description |
|---|---|
| All Innodisk EM FLASH Products | |

☐ contain(s) **no** hazardous substances or constituents exceeding the defined threshold 0.1 % by weight in homogenous material if not otherwise specified, as described in the candidate list table currently including 201 substances and shown on the ECHA website (http://echa.europa.eu/de/candidate-list-table).

☑ contain(s) one or more hazardous substances or constituents exceeding 0.1 % by weight in homogenous material if not otherwise specified in candidate list table. Where the threshold value is exceeded, the substances in question are to be declared in accompanying Appendix A .

☑ Comply with REACH Annex XVII.

### Guarantor

Company name 公司名稱： Innodisk Corporation 宜鼎國際股份有限公司

Company Representative 公司代表人： Randy Chien 簡川勝

Company Representative Title 公司代表人職稱： Chairman 董事長

Date 日期： 2019 / 07 / 24

**RoHS**

**innodisk**

宜鼎國際股份有限公司
**Innodisk Corporation**

Tel:(02)7703-3000 Fax:(02) 7703-3555 Internet: http://www.innodisk.com/

## RoHS 自我宣告書 (RoHS Declaration of Conformity)

### Manufacturer Product: All Innodisk EP products

一、 宜鼎國際股份有限公司（以下稱本公司）特此保證售予貴公司之所有產品，皆符合歐盟 2011/65/EU 及(EU) 2015/863 關於 RoHS 之規範要求。

Innodisk Corporation declares that all products sold to the company, are complied with European Union RoHS Directive (2011/65/EU) and (EU) 2015/863 requirement.

二、 本公司同意因本保證書或與本保證書相關事宜有所爭議時，雙方宜友好協商，達成協議。

Innodisk Corporation agrees that both parties shall settle any dispute arising from or in connection with this Declaration of Conformity by friendly negotiations.

| Name of hazardous substance | Limited of RoHS ppm（mg/kg） |
|---|---|
| 鉛（Pb） | < 1000 ppm |
| 汞（Hg） | < 1000 ppm |
| 鎘（Cd） | < 100 ppm |
| 六價鉻（Cr 6+） | < 1000 ppm |
| 多溴聯苯（PBBs） | < 1000 ppm |
| 多溴二苯醚（PBDEs） | < 1000 ppm |
| 鄰苯二甲酸二(2-乙基己基)酯（DEHP） | < 1000 ppm |
| 鄰苯二甲酸丁酯苯甲酯（BBP） | < 1000 ppm |
| 鄰苯二甲酸二丁酯（DBP） | < 1000 ppm |
| 鄰苯二甲酸二異丁酯（DIBP） | < 1000 ppm |

### 立 保 證 書 人 (Guarantor)

Company name 公司名稱： Innodisk Corporation 宜鼎國際股份有限公司

Company Representative 公司代表人： Randy Chien 簡川勝

Company Representative Title 公司代表人職稱： Chairman 董事長

Date 日期： 2018 / 07 / 01

**ALLION**
ISO/IEC 17025 Qualified

# WHQL Compliance Test Compliance Program

TM

## Test Report

Q

Company Name: InnoDisk Corporation

Model Name: M.2 (S80) 3IS2-P

WHQL Category: Storage

Test Start Date: 2017/9/30

Report Date: 2017/10/6

Overall Test Result: Pass

Family Model: M.2 (xxx) 3IS2-P
xxx : Family type include (S30, S42, S60, S80)

Project ID : SSD-IC-WHQL-006-1

**ALLION**
ISO/IEC 17025 Qualified

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Phone: +886-2-77228800 Fax: +886-2-26557879

Document Number : AR-TRL030807                    1/4

**CE**

# $C\,E$

## VERIFICATION OF COMPLIANCE

*This Verification of Compliance is hereby issued to the below named company. The test results of this report relate only to the tested sample identified in this report.*

### Technical Standard: EMC DIRECTIVE 2014/30/EU
### (EN55032 / EN55024)

**General Information**

Applicant:        Innodisk Corporation
                  5F., No. 237, Sec. 1, Datong Rd., Xizhi Dist.,
                  New Taipei City 22161, Taiwan (R.O.C)

**Product Description**

EUT Description:  M.2
Brand Name:       Innodisk
Model Number:     M.2 (S80) 3S*#-&
                  $:Flash type: (S:SLC, I:iSLC, M:MLC, T:3D TLC, A~Z:Others);
                  *:Product line: (E:Embedded, G:EverGreen, R:InnoRobust, S:Server, V:InnoREC, A~Z:Others);
                  #:Product Generation: (empty, 0~9);
                  &:Product line: (empty, P:Plus)

**Measurement Standard**

EN 55032: 2012 / AC: 2013
CISPR 32: 2012
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 55024: 2010 + A1: 2015
    (IEC 61000-4-2: 2008; IEC 61000-4-3: 2006 + A1: 2007 + A2: 2010; IEC 61000-4-4: 2012;
    IEC 61000-4-5: 2014; IEC 61000-4-6: 2013; IEC 61000-4-8: 2009; IEC 61000-4-11: 2004)

**Measurement Facilities**

Xindian Lab.:     Compliance Certification Services Inc.
                  No.163-1, Jhongsheng Rd., Xindian Dist.,New Taipei City, 23151 Taiwan.
                  Tel: +886-2-22170894 / Fax: +886-2-22171029

*This device has been shown to be in compliance with and was tested in accordance with the measurement procedures specified in the Standards & Specifications listed above and as indicated in the measurement report number: TT70504D05-E*

Sam Hu / Assistant Manager
Date: May 10, 2017

**CCSRF**
程智科技股份有限公司
Compliance Certification Services Inc.

**FCC**

# FC

## VERIFICATION OF COMPLIANCE

*This Verification of Compliance is hereby issued to the below named company. The test results of this report relate only to the tested sample identified in this report.*

### Technical Standard: FCC Part 15 Class B
### IC ICES-003

**General Information**

Applicant:  Innodisk Corporation
5F., No. 237, Sec. 1, Datong Rd., Xizhi Dist.,
New Taipei City 22161, Taiwan (R.O.C)

**Product Description**

EUT Description:  M.2
Brand Name:  Innodisk
Model Number:  M.2 (S80) 3S*#-&
$:Flash type: (S:SLC, I:iSLC, M:MLC, T:3D TLC, A~Z:Others);
*:Product line: (E:Embedded, G:EverGreen, R:InnoRobust, S:Server, V:InnoREC, A~Z:Others);
#:Product Generation: (empty, 0~9);
&:Product line: (empty, P:Plus)

**Measurement Facilities**

Xindian Lab.:  *Compliance Certification Services Inc.*
*No.163-1, Jhongsheng Rd., Xindian Dist., New Taipei City, 23151 Taiwan.*
*Tel: +886-2-22170894 / Fax: +886-2-22171029*

*This device has been shown to be in compliance with and was tested in accordance with the measurement procedures specified in the Standards & Specifications listed above and as indicated in the measurement report number: TI70504D05-D*

*Sam Hu / Assistant Manager*
*Date: May 10, 2017*

## CCSRF
程智科技股份有限公司
Compliance Certification Services Inc.