innodisk

Total Solution For Industrial Flash Storage

1.8" SATA SSD

3TG6-P Series

Customer: _____

Customer Part Number: _____

Innodisk Part Number: _____

Innodisk Model Name: _____

Date: _____

Innodisk Approver	Customer Approver

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Revision History

Revision	Description	Date
Preliminary	First Released	Oct., 2018
Rev 1.0	Modify Performance Table Modify Power Consumption Table Modify SMART Attributes Table	Feb., 2019
Rev 1.1	Add TRIM note Modify Performance Table Update RoHS Report	Apr., 2019
Rev 1.2	Modify Performance Table Update Power Consumption Table Add Die RIAD Add Quick Erase (optional) Modify SMART Attribute Table Update RoHS Report to 2019 version Update CE/FCC Report	May, 2019
Rev 1.3	Update power requirement and pin assignment.	May., 2020
Rev 1.4	Revised LBA	Nov., 2021

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1. Product Overview

1.1 Introduction of Innodisk 1.8” SATA SSD 3TG6-P

Innodisk 1.8” SATA SSD 3TG6-P products provide high capacity flash memory Solid State Drive (SSD) that electrically complies with Serial ATA (SATA) standard. It supports SATA III standard (6.0GHz) with high performance. Innodisk1.8” SATA SSD 3TG6-P is designed for industrial field, and supports several standard features, including TRIM, NCQ, and S.M.A.R.T. The SSD have good performance, no latency time and small seek time. It effectively reduces the booting time of operation system and the power consumption is less than hard disk drive (HDD).

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 1.8” SATA SSD 3TG6-P is available in follow capacities:

1.8” SATA SSD 3TG6-P 128GB 1.8” SATA SSD 3TG6-P 256GB

1.8” SATA SSD 3TG6-P 512GB 1.8” SATA SSD 3TG6-P 1TB

Figure 1: Innodisk 1.8” SATA SSD 3TG6-P

1.3 SATA Interface

Innodisk 1.8” SATA SSD 3TG6-P supports SATA III interface, and backward compliant with SATA I and SATA II.

1.4 1.8-inch Form Factor

The Industry-standard 1.8-inch form factor design with metal material case is easy for installation, which has a compact design 54.0mm (W) x78.5mm (L) x 5.0mm (H)

2.Product Specifications

2.1 Capacity and Device Parameters

1.8” SATA SSD 3TG6-P device parameters are shown in Table 1.

Table 1: Device parameters

Capacity	LBA	Cylinders	Heads	Sectors	User Capacity(MB)
128GB	234441648	16383	16	63	114473
256GB	468862128	16383	16	63	228936
512GB	937703088	16383	16	63	457862
1TB	1875385008	16383	16	63	915715

2.2 Performance

Burst Transfer Rate: 6.0Gbps

Table 2: Performance

Capacity	128GB	256GB	512GB	1TB
Sequential* Read (max.)	560 MB/s	550 MB/s	560 MB/s	530 MB/s
Sequential Write (max.)	130 MB/s	280 MB/s	520 MB/s	460 MB/s
4KB Random Read (QD32)	40000 IOPS	71000 IOPS	84000 IOPS	85000 IOPS
4KB Random Write (QD32)	33000 IOPS	52000 IOPS	70000 IOPS	69000 IOPS

Note: * Sequential performance based on CrystalDiskMark 5.1.2 with file size 1000MB

2.3 Electrical Specifications

2.3.1 Power Requirement

Table 3: Innodisk 1.8” SATA SSD 3TG6-P Power Requirement

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

2.3.2 Power Consumption

Table 4: Power Consumption

Mode	128GB (mA)	256GB (mA)	512GB (mA)	1TB (mA)
Vin = 5.0V				
Read(RMS)	412	432	496	518
Read(Peak)	640	694	805	827
Write(RMS)	336	440	636	669
Write(Peak)	571	700	949	1130
Idle	198	198	213	219
Boot-Up	348	380	394	421
Vin = 3.3V				
Read(RMS)	597	616	677	683
Read(Peak)	876	959	995	1020
Write(RMS)	482	636	889	913
Write(Peak)	795	879	1280	1530
Idle	294	290	286	260
Boot-Up	557	915	787	786

* Target: 1.8” SATA SSD 3TG6-P 128GB - 1TB

2.4 Environmental Specifications

2.4.1 Temperature Ranges

Table 5: Temperature range for 1.8” SATA SSD 3TG6-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 1.8” SATA SSD 3TG6-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 various1.8” SATA SSD 3TG6-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: 1.8” SATA SSD 3TG6-P MTBF

Product	Condition	MTBF (Hours)
Innodisk 1.8” SATA SSD 3TG6-P	Telcordia SR-332 GB, 25°C	>3,000,000

2.5 CE and FCC Compatibility

1.8” SATA SSD 3TG6-P conforms to CE and FCC requirements.

2.6 RoHS Compliance

1.8” SATA SSD 3TG6-P is fully compliant with RoHS directive.

2.7 Reliability

Parameter	Value	
Read Cycles	Unlimited Read Cycles	
Flash endurance	3,000 P/E cycles	
Wear-Leveling Algorithm	Support	
Bad Blocks Management	Support	
Error Correct Code	Support	
TBW* (Total Bytes Written) Unit:TB		
Capacity	**Sequential workload**	**Client workload**
128GB	340.9	150
256GB	681.8	300
512GB	1364	600
1TB	2663	1172

*Note:

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

2. Client: Follow JESD218 Test method and JESD219A Workload, tested by ULINK.

3. Based on out-of-box performance.

2.8 Transfer Mode

1.8” SATA SSD 3TG6-P support following transfer mode:

Serial ATA III 6.0Gbps

Serial ATA II 3.0Gbps

Serial ATA I 1.5Gbps

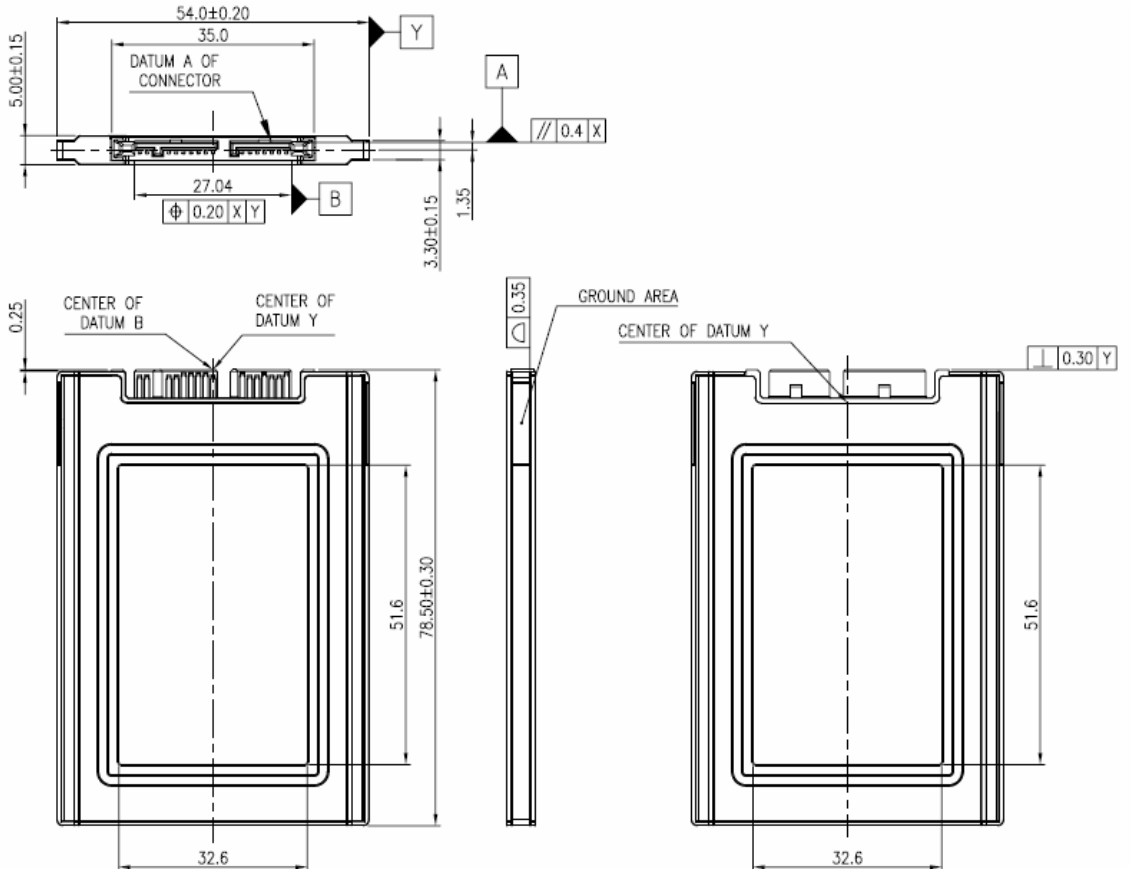
2.9 Pin Assignment

Innodisk 1.8” SATA SSD 3TG6-P uses a standard SATA pin-out. See Table 8 for 1.8” SATA SSD 3TG6-P pin assignment.

Table 8: Innodisk 1.8” SATA SSD 3TG6-P Pin Assignment

Name	Type	Description
S1	GND	NA
S2	A+	Differential Signal Pair A
S3	A-	
S4	GND	NA
S5	B-	Differential Signal Pair B
S6	B+	
S7	GND	NA
Key and Spacing separate signal and power segments		
P1	V33	3.3V Power
P2	V33	3.3V Power, Pre-charge
P3	GND	NA
P4	GND	NA
P5	V5	5V Power, Pre-charge
P6	V5	5V Power
P7	R	Reserved
Key	Key	Key
P8	Optional	Vendor specific
P9	Optional	Vendor specific

2.10 Mechanical Dimensions



2.11 Assembly Weight

An Innodisk 1.8” SATA SSD 3TG6-P within 3D TLC flash ICs, 32GB’s weight is 55 grams approx. The total weight of SSD will be less than 60 grams.

2.12 Seek Time

Innodisk 1.8” SATA SSD 3TG6-P is not a magnetic rotating design. There is no seek or rotational latency required.

2.13 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.

2.14 NAND Flash Memory

Innodisk 1.8” SATA SSD 3TG6-P uses 3D TLC NAND flash memory, with 3,000 program & erase cycles, which is non-volatility, high reliability and high speed memory storage.

3. Theory of Operation

3.1 Overview

Figure 2 shows the operation of Innodisk 1.8” SATA SSD 3TG6-P from the system level, including the major hardware blocks.

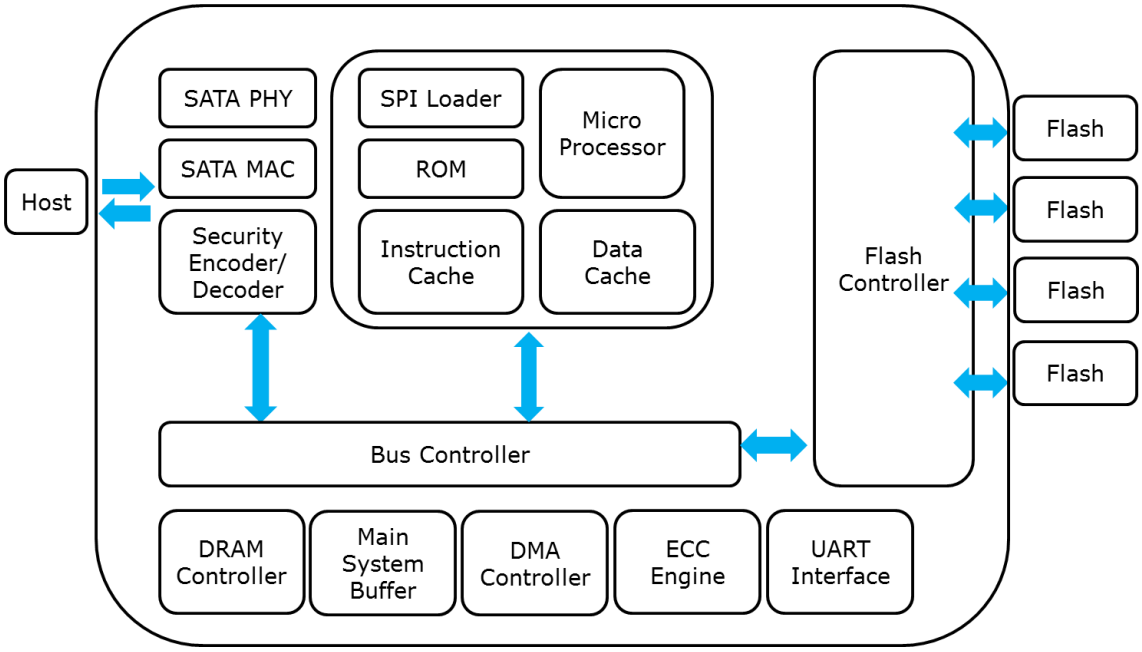


Figure 2: Innodisk 1.8” SATA SSD 3TG6-P Block Diagram

Innodisk 1.8” SATA SSD 3TG6-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.

* iCell is optional feature with different part number.

3.2 SATA Controller

Innodisk 1.8” SATA SSD 3TG6-P is designed with 88SS1080, a SATA III 6.0Gbps controller, 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

Innodisk 1.8”SATA SSD 3TG6-P is designed with hardware LDPC ECC engine with hard-decision

and soft-decision decoding. Low-density parity-check (LDPC) codes have excellent error correcting performance close to the Shannon limit when decoded with the belief-propagation (BP) algorithm using soft-decision information.

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 1.8” SATA SSD 3TG6-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 SSD. 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/TRIM

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 iCell Technology (Optional)

iCell circuit is designed with several capacitors to be able to provide power after host power off.

The SSD controller can write all DRAM buffer data to flash, so that is why 1.8” SATA SSD 3TG6-P can ensure all data can be written to disk without any data loss.

3.9 iPower Guard

iPower Guard technology is a set of preventive measures that protect the SSD in an unstable power supply environment. This comprehensive package comprises safeguards for start-up and shut-down to maintain device performance and ensure data integrity.

3.10 Die RAID

Die RAID is a controller function which leveraged user capacity to back up the data in NAND flash. Die RAID supported can ensure the user data in the NAND Flash more consistent in certain scenario. Innodisk 2.5” SATA SSD 3TG6-P series is default enable the Die RAID function for the industrial application.

3.11 Quick Erase (optional)

Quick Erase function is designed for emergency data erase in few seconds by providing ATA command.

3.11.1 Quick Erase Command

- Protocol: No Data

-Inputs

Table 9: Execute Quick Erase command for inputs information

Register	7	6	5	4	3	2	1	0
Features	21h							
Sector Count	41h							
LBA Low	Na							
LBA Mid	Na							
LBA High	Na							
Device	1	1	1	0	Na			
Command	82h							

-Normal Outputs

Table 10: Quick Erase command for normal output information

Register	7	6	5	4	3	2	1	0
Error	Na							
Sector Count	Na							
LBA Low	Na							

LBA Mid	Na							
LBA High	Na							
Device	obs	Na	obs	DEV	Na	Na	Na	Na
Status	BSY	DRDY	DF	Na	DRQ	Na	Na	ERR

Device register-

DEV shall specify the selected device.

Status register

BSY will be cleared to zero indicating command completion

DRDY will be set to one.

DF (Device Fault) will be cleared to zero.

DRQ will be cleared to zero

ERR will be cleared to zero.

4. Installation Requirements

4.1 1.8” SATA SSD 3TG6-P Pin Directions

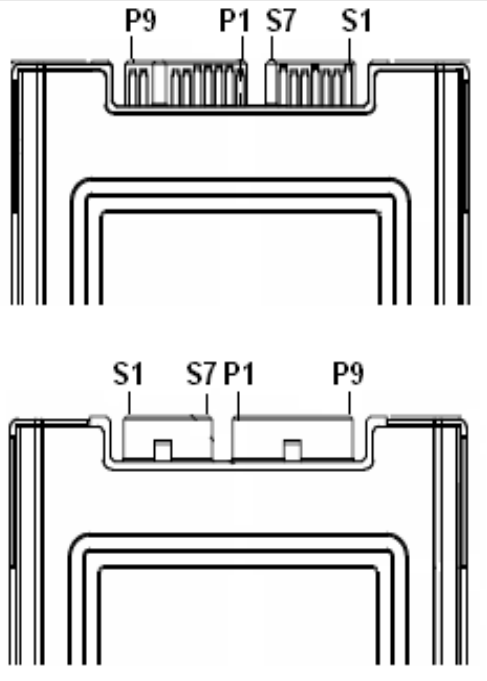


Figure 3: Signal Segment and Power Segment

4.2 Electrical Connections for 1.8” SATA SSD 3TG6-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. Innodisk 1.8” SATA SSD 3MR3-P can be configured as a boot device.

5. SMART Feature Set

Innodisk 3TG6-P series support the SMART command set and defines some vendor-specific data to report SMART attributes of SSD.

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

5.1 SMART Attributes

Innodisk 3TG6-P series SMART data attributes are listed in following table.

Attribute ID (hex)	Raw Attribute Value							Attribute Name
5 (05h)	LSB			MSB	00	00	00	Later Bad
9 (09h)	LSB			MSB	00	00	00	Power-On hours Count
12 (0Ch)	LSB			MSB	00	00	00	Drive Power Cycle Count
163 (A3h)	LSB					MSB	00	Total Bad Block Count
165 (A5h)	LSB			MSB	00	00	00	Max Erase count
167 (A7h)	LSB			MSB	00	00	00	Avg Erase count
169 (A9h)	LSB	00	00	00	00	00	00	Device Life
170 (AAh)	LSB					MSB	00	Spare Block Count
171 (ABh)	LSB					MSB	00	Program fail count
172 (ACh)	LSB					MSB	00	Erase fail count
184 (B8h)	LSB			MSB	00	00	00	Error Corrected Count
187 (BBh)	LSB			MSB	00	00	00	Reported Uncorrect Count
192 (C0h)	LSB			MSB	00	00	00	Unexpected Power Loss Count
194 (C2h)	Cur.*	00	MIN	00	MAX	03	Cur. *	Temperature
229 (E5h)	ID 0	ID 1	ID 2	ID 3	ID 4	ID 5	00	Flash ID
235 (EBh)		MSB	LSB	MSB	LSB	MSB	LSB	Later bad block info (Read/Write/Erase)
241 (F1h)	LSB					MSB	00	Total LBA written(LBA=32MB)
242 (F2h)	LSB					MSB	00	Total LBA read(LBA=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	**G**	**S**	**1**	**8**	**-**	**A**	**2**	**8**	**M**	**7**	**1**	**E**	**C**	**1**	**Q**	**F**	**(P)**	**-**	**X**	**X**
Description	Disk	1.8” SATA SSD					Capacity			Category			Flash mode	Operation Temp.	Internal Control	CH.	Flash	icell		Customized Code	

Definition	
Code 1st (Disk)	**Code 13th (Flash mode)**
D : Disk	E: 64 layers 3D TLC
Code 2nd ~ 5th (Form Factor)	**Code 14th (Operation Temperature)**
GS18: 1.8” SATA SSD	C: Standard Grade (0℃~ +70℃)
Code 7th ~9th (Capacity)	W: Industrial Grade (-40℃~ +85℃)
A28: 128GB	**Code 15th (Internal control)**
B56: 256GB	1:PCB version
C12:512GB	
01T: 1TB	
	Code 16th (Channel of data transfer)
Code 10th ~12th (Series)	Q: Quad Channels
M71: SATA 3TG6-P	
	Code 17th (Flash Type)
	F: Kioxia 3D TLC
	Code 18th (iCell)
	P: Optional
	Code 20th ~21th (Customized code)

Appendix

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 EM Flash and Dram 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.

三、 本公司聲明我們的產品符合 RoHS指令的附件中(7a)、(7c-I)允許豁免。
We declare, our products permitted by the following exemptions specified in the Annex of the RoHS directive.
※ (7a) Lead in high melting temperature type solders(i.e. lead-based alloys containing 85% by weight or more lead).
※ (7C-I) Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectric devices, or in a glass or ceramic matrix compound.

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

宜鼎國際股份有限公司

Innodisk Corporation

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

Date 日期： 2018 / 07 / 01

宜鼎國際股份有限公司
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 197 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 / 01 / 31

Certificate

Issue Date: May 15, 2019
Ref. Report No. ISL-19HE120CE

Product Name	:	1.8" SATA SSD
Model(s)	:	1.8" SATA SSD 3$@#-&($: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)-:marketing differentiation, (- or empty) &:Product line: (empty, P:Plus))
Brand	:	Innodisk
Responsible Party	:	INNODISK CORPORATION
Address	:	3F-7., No. 237, Sec. 1, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

We, International Standards Laboratory Corp., hereby certify that:

The sample ISL received which bearing the trade name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in European Council Directive EMC Directive 2014/30/EU. And Our laboratories is the accredited laboratories and are approved according to ISO/IEC 17025. The device was passed the test performed according to :

CE

Standards:
EN 55032:2015+AC:2016, CISPR 32: 2015+COR1:2016: Class B
AS/NZS CISPR 32:2015: Class B
EN 61000-3-2:2014 and IEC 61000-3-2:2014
EN 61000-3-3: 2013 and IEC 61000-3-3: 2013
EN 55024: 2010+A1:2015 and CISPR 24: 2010+A1:2015
EN 61000-4-2: 2009 and IEC 61000-4-2: 2008
EN 61000-4-3: 2006+A1: 2008 +A2: 2010 and
IEC 61000-4-3:2006+A1: 2007+A2: 2010
EN 61000-4-4:2012 and IEC 61000-4-4:2012
EN 61000-4-5: 2014+A1:2017 and IEC 61000-4-5: 2014+A1:2017
EN 61000-4-6:2014+AC:2015 and IEC 61000-4-6:2013
EN 61000-4-8: 2010 and IEC 61000-4-8: 2009
EN 61000-4-11: 2004+A1:2017 and IEC 61000-4-11: 2004+A1:2017

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Bert Chen

Bert Chen / Director

International Standards Laboratory Corp.
☐ **LT LAB:**
No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan
Tel: 886-3-407-1718; Fax: 886-3-407-1738

Certificate

Issue Date: May 15, 2019
Ref. Report No. ISL-19HE120FB

Product Name	:	1.8" SATA SSD
Model(s)	:	1.8" SATA SSD 3$@#-&(S: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)-:marketing differentiation, (- or empty) &:Product line: (empty, P:Plus))
Brand	:	Innodisk
Applicant	:	INNODISK CORPORATION
Address	:	3F-7., No. 237, Sec. 1, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan

We, International Standard: Laboratory Corp., hereby certify that:

The sample ISL received which bearing the trade name and model specified above has shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified. (refer to Test Report if any modifications were made for compliance). And Our laboratories is the accredited laboratories and are approved according to ISO/IEC 17025.

Standards:

FCC CFR Title 47 Part 15 Subpart B: Section 15.107 and 15.109
ANSI C63.4-2014
Industry Canada Interference-Causing Equipment Standard ICES-003 Issue 6: 2016
Class B

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Bert Chen

Bert Chen / Director

International Standard: Laboratory Corp.
☐ **LT LAB:**
No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan
Tel: 886-3-407-1718; Fax: 886-3-407-1738

ISL International Standards Laboratory Corp. http://www.isl.com.tw

MSL Declaration of Conformity

1. Purpose: MSL (Moisture Sensitivity Levels) specification statement for all Innodisk products

2. Scope: For All Innodisk finish goods

3. Responsibilities: QA

4. Reference:

   4.1 JEDEC, S-STD-020

   4.2 JEDEC,J-STD-033

5. Description

   5.1 Innodisk Products Level: All Innodisk products meet MSL Level 1

   5.2 Floor Life Time: Refer following table

	Soak Requirements					
	Floor Life		Standard		Accelerated	
Level	Time	Cond degC/%RH	Time (hrs)	Cond degC/%RH	Time (hrs)	Cond degC/%RH
1	unlimited	<=30/85%	168+5/-0	85/85	n/a	n/a
2	1 year	<=30/60%	168+5/-0	85/60	n/a	n/a
2a	4 weeks	<=30/60%	696+5/-0	30/60	120+1/-0	60/60
3	168 hours	<=30/60%	192+5/-0	30/60	40+1/-0	60/60
4	72 hours	<=30/60%	96+2/-0	30/60	20+0.5/-0	60/60
5	48 hours	<=30/60%	72+2/-0	30/60	15+0.5/-0	60/60
5a	24 hours	<=30/60%	48+2/-0	30/60	10+0.5/-0	60/60
6	TOL	<=30/60%	TOL	30/60	n/a	60/60

Innodisk Corporation
Quality Assurance Div
Manager
Yi Chuan Chen
Date: 2018.09.21

Headquarter (Taiwan) : HTTP://WWW.INNODISK.COM E-MAIL: SALES@INNODISK.COM
TEL: +886-2-7703-3000 ADD: 5F., No. 237, Sec. 1, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan(R.O.C.)
USA Office: usasales@InnoDisk.com / Europe: eusales@InnoDisk.com / Japan: jpsales@InnoDisk.com / China: sales_cn@InnoDisk.com