

mSATA

3MG2-P

AES Function

Customer: _____
Customer
Part
Number: _____
Innodisk
Part
Number: _____
Innodisk
Model Name: _____
Date: _____

Innodisk Approver	Customer Approver

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* TOTAL BYTES WRITTEN IS BASED ON JEDEC 218 (SOLID-STATE DRIVE	錯誤! 尚未定義書籤。
REQUIREMENTS AND ENDURANCE TEST METHOD)	錯誤! 尚未定義書籤。
** LIFESPAN IS CALCULATED BY DEVICE WRITTEN PER DAY	錯誤! 尚未定義書籤。
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REVISION HISTORY

Revision	Description	Date
1.0	Officially release	Feb, 2016
1.1	Add Toshiba 15nm performance	Aug., 2016
1.2	Update TBW & Toshiba 512GB mechanical diagram	March., 2017

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1. Product Overview

1.1 Introduction of Innodisk mSATA 3MG2-P

Innodisk mSATA 3MG2-P is designed with AES engine, which is built-in the controller. When controller receives the data package from host, AES engine encrypts the data package and save the encrypted data into NAND flash. Thus, unauthorized personal has no access to decrypt the data in NAND flash. Featuring L² architecture, the life span of the SSD is maximized by an evolved wear leveling algorithm. Furthermore, mSATA 3MG2-P supports TRIM for Windows 7, it can improves performance when deleting files.

mSATA 3MG2-P provides high capacity flash memory within JEDEC MO-300 spec., which electrically compatible with Serial ATA (SATA) standard, and supports SATA III standard (6.0GHz) with high performance.

Better power management which is achieved with DEVSLP is available with the mSATA 3MG2-P. It also features Innodisk iData Guard to protect against unexpected power failures. When the SSD detects power is lost, a special power protection algorithm uses onboard power to save volatile data to non-volatile storage.

1.2 Product View and Models

Innodisk MSATA 3MG2-P is available in follow capacities within MLC flash ICs.

mSATA 3MG2-P 16GB

mSATA 3MG2-P 128GB

mSATA 3MG2-P 32GB

mSATA 3MG2-P 256GB

mSATA 3MG2-P 64GB

mSATA 3MG2-P 512GB



Micron

Toshiba

Figure 1: Innodisk mSATA 3MG2-P with AES

1.3 SATA Interface

mSATA 3MG2-P supports SATA III interface, and backward compliant with Serial ATA Gen 1, Gen 2 and Gen 3 specification (Gen 3 supports 1.5Gbps /3.0Gbps/6.0Gbps data rate)..

1.4 Capacity

Innodisk MSATA 3MG2-P provides unformatted 16GB, 32GB, 64GB, 128GB, 256GB and 512GB capacities within MLC Flash IC.

1.5 MO-300 Form Factor

mSATA 300 has a compact design 29.85 mm (W) x 50.8 mm (L) x 4.85 mm (H) without metal material case, and is easy for installation.

2. Product Specifications

2.1 Capacity and Device Parameters

mSATA 3MG2-P device parameters are shown in Table 1.

Table 1: Device parameters

Capacity	LBA	Cylinders	Heads	Sectors	User Capacity(MB)
16GB	29323728	16383	16	63	14,318
32GB	60579792	16383	16	63	29,580
64GB	121138416	16383	16	63	59,150
128GB	242255664	16383	16	63	118,289
256GB	484490160	16383	16	63	236,567
512GB	968959152	16383	16	63	473,124

2.2 Performance

Burst Transfer Rate: 6.0 Gbps

Table 2: Performance

Micron	Capacity	16GB	32GB	64GB	128GB	256GB	512GB
	Sequential Read (max.)	110MB/s	220 MB/s	440 MB/s	530 MB/s	520 MB/s	520 MB/s
	Sequential Write (max.)	19 MB/s	37 MB/s	70 MB/s	140 MB/s	280 MB/s	370 MB/s
	4KB Random Read (QD32)	11,000 IOPS	21,000 IOPS	40,000 IOPS	58,000 IOPS	58,000 IOPS	68,000 IOPS
	4KB Random Write (QD32)	4,800 IOPS	9,400 IOPS	18,000 IOPS	38,000 IOPS	54,000 IOPS	69,000 IOPS

Note: Based on CrystalDiskMark 3.03 with file size 1000MB

Toshiba 15nm	Capacity	8GB	16GB	32GB	64GB	128GB	256GB	512GB
	Sequential Read (max.)	140 MB/s	280 MB/s	525 MB/s	525 MB/s	525 MB/s	530 MB/s	525 MB/s
	Sequential Write (max.)	25 MB/s	50 MB/s	100 MB/s	90 MB/s	180 MB/s	345 MB/s	365 MB/s
	4KB Random Read (QD32)	14,800 IOPS	28,000 IOPS	55,000 IOPS	52,000 IOPS	71,000 IOPS	71,000 IOPS	70,000 IOPS
	4KB Random Write (QD32)	6,700 IOPS	13,000 IOPS	26,000 IOPS	23,000 IOPS	45,000 IOPS	62,000 IOPS	60,000 IOPS

Note: Based on CrystalDiskMark 3.03 with file size 1000MB

2.3 Electrical Specifications

2.3.1 Power Requirement

Table 3: Innodisk MSATA 3MG2-P Power Requirement

Item	Symbol	Rating	Unit
Input voltage	V _{IN}	+3.3 DC +- 5% 500mA (max.)	V

2.3.2 Power Consumption

Table 4: Power Consumption

Mode	Power Consumption
Read	529 mA (max.)
Write	1640 mA (max.)
Idle	150 mA (max.)
DEVSLP Mode	3mW (min.)
Slumber Mode	30mW (min.)

* Target: mSATA 3MG2-P 512GB (Micron)

Mode	Power Consumption
Read	516 mA (max.)
Write	1340 mA (max.)

Idle	97 mA (max.)
DEVSLP Mode	3mW (min.)
Slumber Mode	30mW (min.)

* Target: mSATA 3MG2-P 512GB (Toshiba)

2.4 Environmental Specifications

2.4.1 Temperature Ranges

Table 5: Temperature range for mSATA 3MG2-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 mSATA 3MG2-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 mSATA 3MG2-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: mSATA 3MG2-P MTBF

Product	Condition	MTBF (Hours)
Innodisk mSATA 3MG2-P	Telcordia SR-332 GB, 25°C	>3,000,000

2.5 CE and FCC Compatibility

mSATA 3MG2-P conforms to CE and FCC requirements.

2.6 RoHS Compliance

mSATA 3MG2-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
iData Guard		Support
Thermal Sensor		Support
TBW* (Total Bytes Written)		Unit: TB
Capacity	Sequential workload	Client workload
08GB	21.3	9.4
16GB	42.6	18.8
32GB	85.2	37.5
64GB	170.5	75
128GB	340.9	150
256GB	681.8	300
512GB	1364	600
* 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. Based on out-of-box performance.		

2.8 Transfer Mode

MSATA 3MG2-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 mSATA 3MG2-P uses a standard SATA pin-out. See Table 8 for mSATA 3MG2-P pin assignment.

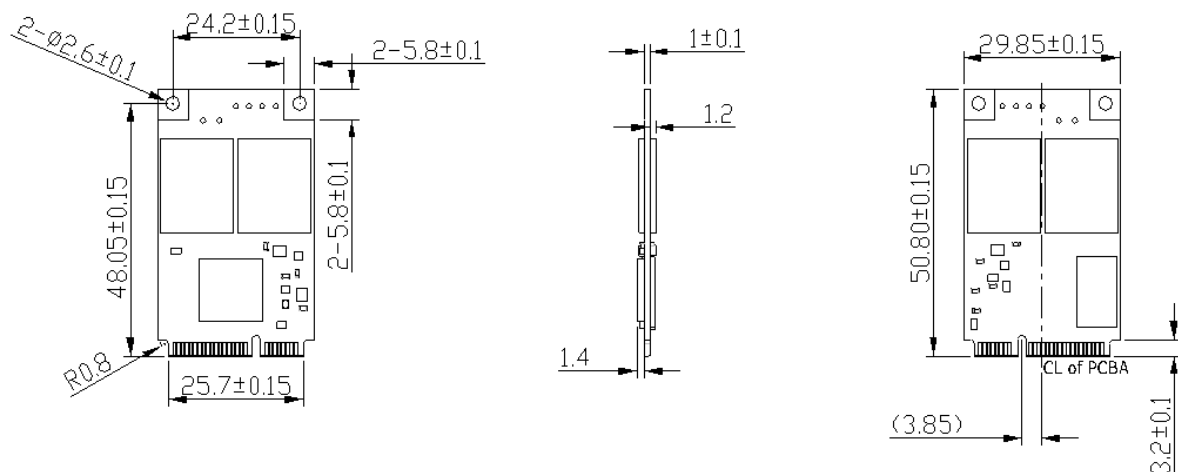
Table 8: Innodisk mSATA 3MG2-P Pin Assignment

Signal Name	Pin #	Pin #	Signal Name
GND	51	52	+3.3V
DAS	49	50	GND
NC	47	48	NC
NC	45	46	NC
NC	43	44	DEVSLP
+3.3V	41	42	NC
+3.3V	39	40	GND
GND	37	38	NC
GND	35	36	NC
RX+	33	34	GND
RX-	31	32	NC
GND	29	30	NC
GND	27	28	NC
TX-	25	26	GND
TX+	23	24	+3.3V
GND	21	22	NC
NC	19	20	NC
NC	17	18	GND
GND	15	16	NC
NC	13	14	NC
NC	11	12	NC
GND	9	10	NC
NC	7	8	NC
NC	5	6	NC

NC	3	4	GND
NC	1	2	+3.3V

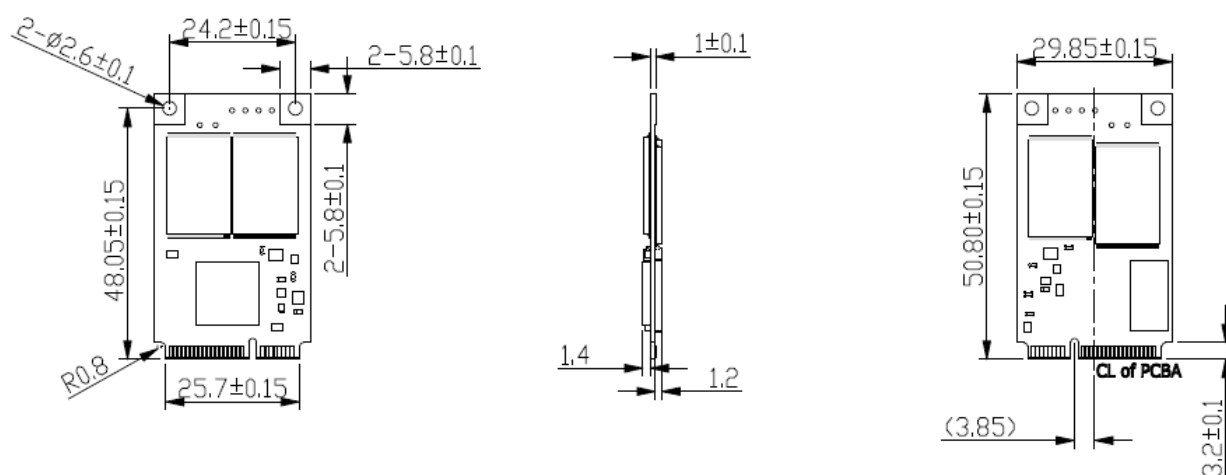
2.10 Mechanical Dimensions

Micron BGA



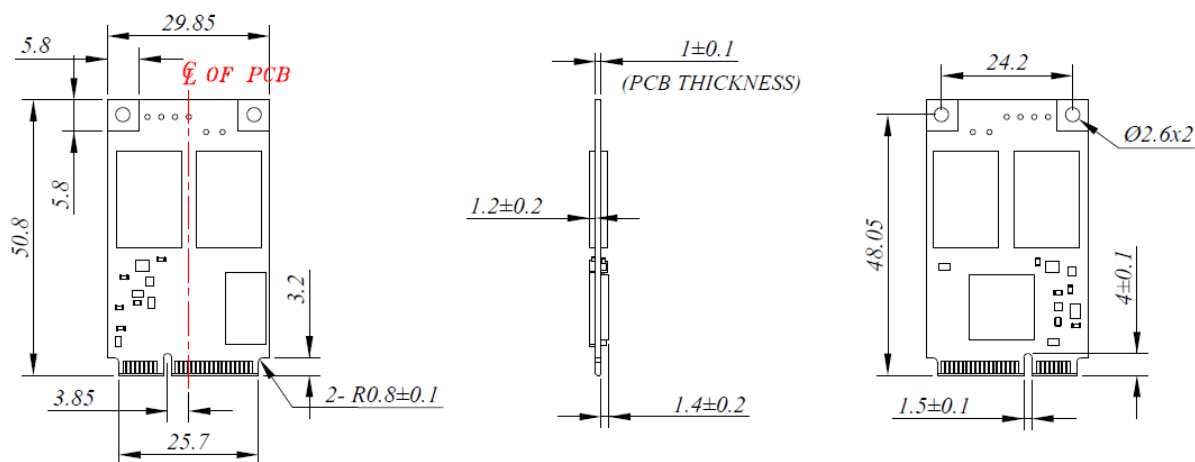
TOLERANCE:±0.20 mm
UNIT:mm

Toshiba TSOP



TOLERANCE:±0.20 mm
UNIT:mm

Toshiba BGA 512GB



TOLERANCE: $\pm 0.15\text{mm}$
UNIT: mm

2.11 Assembly Weight

An Innodisk mSATA 3MG2-P within MLC flash ICs, 32GB's weight is 10 grams approx.

2.12 Seek Time

Innodisk mSATA 3MG2-P is not a magnetic rotating design. There is no seek or rotational latency required.

2.13 NAND Flash Memory

Innodisk mSATA 3MG2-P uses Multi Level Cell (MLC) NAND flash memory, which is non-volatility, high reliability which has 3,000 program/erase times and high speed memory storage. Each cell stores 2 bits or holds four states per cell. Read or Write data to flash memory for SSD is control by microprocessor.

3. Theory of Operation

3.1 Overview

Figure 2 shows the operation of Innodisk mSATA 3MG2-P from the system level, including the major hardware blocks.

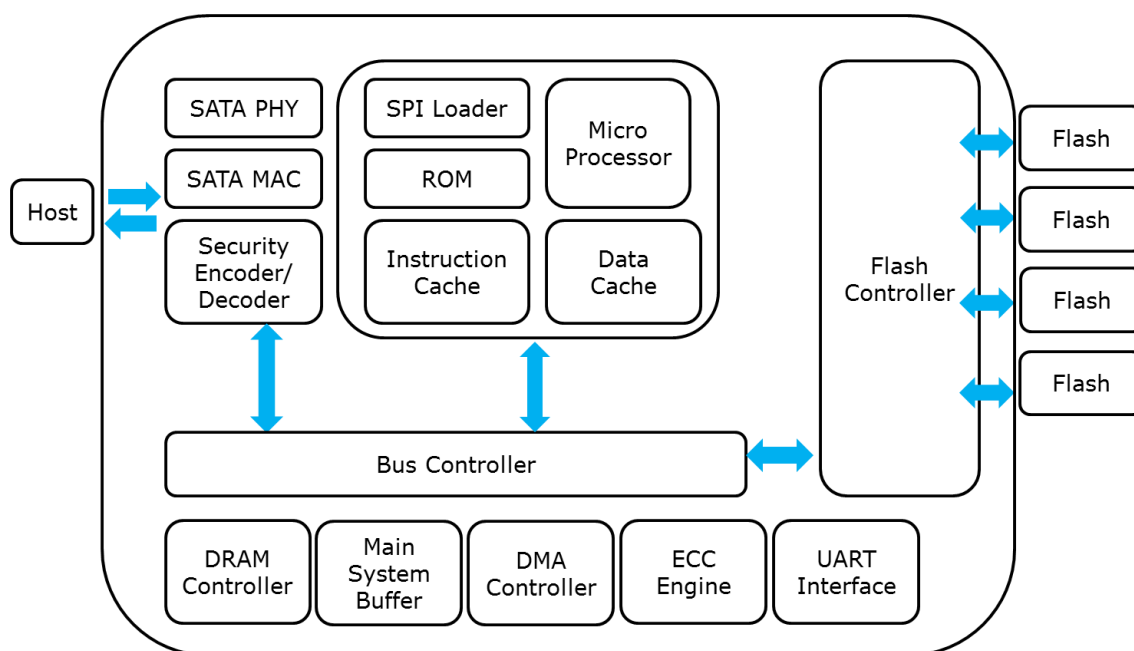


Figure 2: Innodisk mSATA 3MG2-P Block Diagram

Innodisk 2 mSATA 3MG2-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 mSATA 3MG2-P is designed with ID 201, a SATA III 6.0Gbps (Gen. 3) controller, which supports external DDR3 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 66 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 mSATA 3MG2-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 AES Function flow chart

In order to complete the physical security layer of protection, encryption needs to be paired with an ATA user password by ATA security command. After setting the authorized key by ATA security command, every time when you power on the system with SSD encrypted, you will be requested for a password to access the SSD. If the password is correct, the SSD will run well; if not, then you will not be able to access the SSD then.

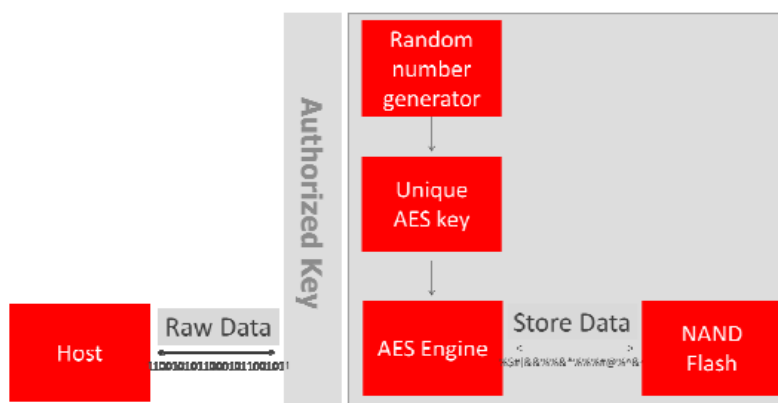


Figure 3: Innodisk mSATA 3MG2-P AES flow chart

4. Installation Requirements

4.1 mSATA 3MG2-P Pin Directions

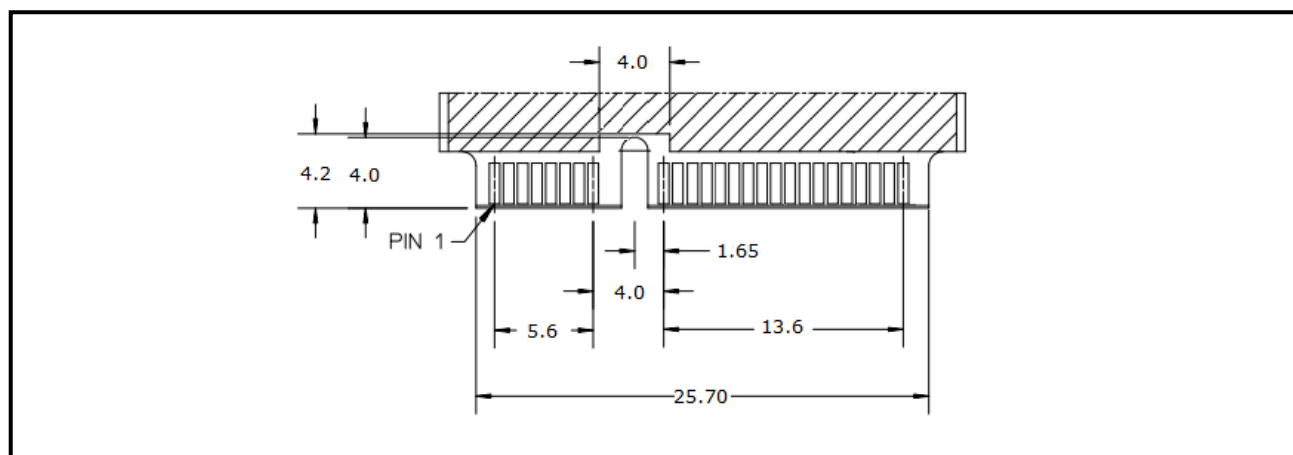


Figure 4: Signal Segment and Power Segment

4.2 Electrical Connections for mSATA 3MG2-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 mSATA 3MG2-P can be configured as a boot device.

5. SMART Feature Set

Innodisk 3MG2-P 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's 3MG2-P series SMART data attributes are listed in following table.

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	Maxumum 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	Reman 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. AES Algorithm Certification

The following provides technical information about controller implementations that have been validated as confirming to the Advanced Encryption Standard (AES) Algorithm, Deterministic Random Bit Generator (DRBG) Algorithm, and Secure Hash Standard (SHS).

6.1 AES Algorithm

Val. No	Operational Environment	Val. Date	Modes/States/Key sizes/Description/Notes
2474	Cadence NC-verilog Hardware simulator v10.20	May/24/2013	Using the tests found in The Advanced Encryption Standard Algorithm Validation Suite (AESAVS). This testing is performed by NVLAP accredited Cryptographic And Security Testing (CST) Laboratories. ECB (e/d; 128, 192, 256) XTS (KS: XTS_128) KS: XTS_256

6.2 DRBG Algorithm

Val. No	Operational Environment	Val. Date	Modes/States/Key sizes/Description/Notes
337	Cadence NC-verilog Hardware simulator v10.20	May/24/2013	Using the tests found in The DRBG Validation Suite (DRBGVS). This testing is performed by NVLAP accredited Cryptographic And Security Testing (CST) Laboratories. Hash Based DRBG: Prediction Resistance Tested: enabled and not enabled (SHA-256)

6.2 DRBG Algorithm

Val. No	Operational Environment	Val. Date	Modes/States/Key sizes/Description/Notes
2093	Cadence NC-verilog Hardware	May/24/2013	Has been validated as confirming to the Secure Hash Algorithm specified in Federal Information Processing Standard (FIPS) 180-3, Secure Hash

	simulator v10.20		Standard (SHS), using tests described in the Secure Hash Algorithm Validation System (SHAVS). This testing is performed by NVLAP accredited Cryptographic And Security Testing (CST) Laboratories. SHA-256
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7. Part Number Rule

CODE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
	D	G	M	S	R	-	3	2	G	D	8	2	S	C	A	D	N	-	X	X	
Description	Disk	mSATA 3MG2-P							Capacity			Category			Flash Mode	Operation Temp.	Internal Control	CH.	Flash	-	Customized Code
Definition																					
Code 1 st (Disk)												Code 13 th (Flash Mode)									
D : Disk												S: Synchronous flash									
Code 2 nd ~ 5 th (Form Factor)												B:15nm Synchronous flash									
GMSR: mSATA 3MG2-P												Code 14 th (Operation Temperature)									
Code 7 th ~9 th (Capacity)												C: Standard Grade (0℃ ~ +70℃)									
08G: 8GB												W: Industrial Grade (-40℃ ~ +85℃)									
16G: 16GB												Code 15 th (Internal control)									
32G: 32GB												A : BGA version									
64G: 64GB												1~9 : TSOP PCB version									
A28: 128GB												Code 16 th (Channel of data transfer)									
B56: 256GB												S: Single Channel									
C12: 512GB												D: Dual Channels									
Code 10 th ~12 th (Series)												Q: Quad Channels									
D82: mSATA 3MG2-P with AES engine												Code 17 th (Flash Type)									
												N: Micron MLC									
												C: Toshiba MLC									
												Code 19 th ~20 th (Customized Code)									

Appendix

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 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 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) 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)
Cd	< 100 ppm
Pb	< 1000 ppm
Hg	< 1000 ppm
Chromium VI (Cr+6)	< 1000 ppm
Polybromodiphenyl ether (PBDE)	< 1000 ppm
Polybrominated Biphenyls (PBB)	< 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： Richard Lee 李鐘亮

Company Representative Title 公司代表人職稱： CEO 執行長

Date 日期： 2014 / 07 / 29



(Company Stamp/公司大小章)

Verification of Compliance

Product Name : mSATA
 Model Number : mSATA 3\$*#-&
 \$:Flash type: (S:SLC,I:iSLC,M:MLC)
 *: Product line: (E:Embedded, G: EverGreen)
 #:controller:
 (empty:606/607/667/670, 2: SMI 2246XT/ 2246EN, 3:608/609)
 &: Product feature: (P: with DRAM, empty: without DRAM)
 Applicant : Innodisk Corporation
 Address : 5F.No.237, Sec. 1, Datong Rd., Xizhi Dist., New Taipei City 221,
 Taiwan (R.O.C.)
 Report Number : S3F-U070-1307-314
 Issue Date : December 10, 2014

Applicable Standards : FCC Part 15, Subpart B Class B ITE
 ANSI C63.4:2009
 Industry Canada ICES-003 Issue 5
 CAN/CSA-CISPR 22-10 Class B ITE

One sample of the designated product has been tested in our laboratory and found to be in compliance with the FCC rules cited above.



NVLAP LAB CODE 200575-0

TAF 0905

FCC CAB Code TW1053

IC Code 4699A

VCCI Accep. No. R-1527, C-1609, T-1441, G-10,
 C-4400, T-1334, G-614



Central Research Technology Co.

EMC Test Laboratory
 11, Lane 41, Fushuen St., Jungshan Chiu,
 Taipei, Taiwan, 104, R.O.C.
 Tel : 886-2-25984568
 Fax: 886-2-25984546

A handwritten signature in black ink, appearing to read 'T. Y. Shih'.

(Tsun-Yu Shih/ General Manager)

Date: December 10, 2014

Verification of Compliance

Product Name : mSATA
Model Number : mSATA 3\$*#-&
 \$:Flash type: (S:SLC,I:iSLC,M:MLC)
 *: Product line: (E:Embedded, G: EverGreen)
 #:controller:
 (empty:606/607/667/670, 2: SMI 2246XT/ 2246EN, 3:608/609)
 &: Product feature: (P: with DRAM, empty: without DRAM)
Applicant : Innodisk Corporation
Address : 5F.No.237, Sec. 1, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)
Report Number : S3O22-U070-1307-314
Issue Date : December 10, 2014
Applicable Standards : EN 55022:2010+AC:2011 Class B ITE
 AS/NZS CISPR22:2009+A1:2010 Class B ITE
 EN 55024:2010
 EN 61000-4-2:2009
 EN 61000-4-3:2006+A1:2008+A2:2010
 EN 61000-4-4:2004+A1:2010

Based on the EMC Directive 2004/108/EC and the specifications of the customer, one sample of the designated product has been tested in our laboratory and found to be in compliance with the EMC standards cited above.



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(Tsun-Yu Shih/ General Manager)

Date: December 10, 2014

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/>

REACH Declaration of Conformity

Manufacturer Product: All Innodisk EM Flash and Dram products

1.宜鼎國際股份有限公司（以下稱本公司）特此保證此售予貴公司之產品，皆符合歐盟化學品法案(Registration, Evaluation and Authorization of Chemicals; REACH)之規定

(<http://www.echa.europa.eu/de/candidate-list-table> last updated: 16/05/2014)。所提供之產品包含：(1) 產品或產品所使用到的所有原物料；(2)包裝材料；(3)設計、生產及重工過程中所使用到的所有原物料。

We Innodisk Corporation hereby declare that our products are in compliance with the requirements according to the REACH Regulation

(<http://www.echa.europa.eu/de/candidate-list-table> last updated: 16/06/2014).

Products include: 1) Product and raw material used by the product; 2) Packaging material; 3) Raw material used in the process of design, production and rework

2.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.

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: Richard Lee 李鐘亮

Company Representative Title 公司代表人職稱: CEO 執行長

Date 日期: 2014 / 07 / 29

