

Industrial nanoUSB

SLC series

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

Innodisk Approver	Customer Approver

Table of contents

REVISION HISTORY	3
1. Introduction	6
2. Features	6
3. Pin Assignment	8
4. Specifications	8
4.1 CE and FCC Compatibility	8
4.2 RoHS Compliance	8
4.3 Reliability	8
5. Environmental Specifications	9
5.1 Temperature Ranges	9
5.2 Humidity	9
5.3 Shock and Vibration	9
5.4 Mean Time between Failures (MTBF)	9
5.5 Mechanical Dimensions	10
5.6 Electrical Specifications	10
5.6.1 Absolute Maximum Ratings	10
5.6.2 Operating Conditions	10
6. i-S.M.A.R.T Utility	11
7. Part Number Rule	13

REVISION HISTORY

Revision	Description	Date
Preliminary	First Release	2012/11/14
Rev 1.0	Add CE/FCC Report	2013/4/15
Rev 1.1	Modify Appearance of Industrial nanoUSB	2013/9/12
Rev. 1.2	Modify PN rule	2016/2/4
Rev. 1.3	Add TBW	2016/10/11
Rev. 1.4	Modify Part Number rule	2016/10/14

List of Tables

Table 1: Industrial nanoUSB Pin Assignments	8
Table 2: Shock/Vibration Testing for Industrial nanoUSB	9
Table 3: Industrial nanoUSB MTBF	9
Table 4: Industrial nanoUSB	10
Table 5: Industrial nanoUSB Operating Conditions	10

List of Figures

Figure 1: Appearance of Industrial nanoUSB	6
Figure 2: Mechanical Dimension of Industrial nanoUSB	10
Figure 3: User Interface of i-S.M.A.R.T Utility	11

1. Introduction

The Innodisk Industrial nanoUSB is the smallest industrial USB storage in the world. It electrically complies with High-speed USB 2.0 interface & backward compatible with USB 1.1. In order to fulfill the industrial applications, Industrial nanoUSB is embedded with SLC NAND flash. Moreover, it features enhanced power cycling which ensures data integrity in flash when abnormal power failure happens.

The Industrial nanoUSB offers following key features which make it more reliable, such as being ESD resistant to 8KV (contact discharge) and 15KV (air discharge). At the same time, it also features a wide operating temperature range from -40°C to 85°C, making it well-suited for industrial control applications in a variety of different rugged operating conditions. Also, the health of Industrial nanoUSB can be monitored by a specific i-S.M.A.R.T utility.



Figure 1: Appearance of Industrial nanoUSB

2. Features

The Industrial nanoUSB provides following features:

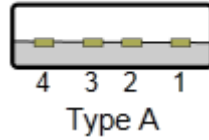
- NAND flash type: SLC
- Capacities: 1GB, 2GB, 4GB, 8GB
- High-speed USB 2.0 interface; backward compatible with USB 1.1
- BCH ECC: 16bits/1KBytes
- High performance (Sequential Read/Write, Max, MB/sec):
 - 4GB/8GB: 19/17
 - 2GB: 18/15
 - 1GB:18/13
- Customized PID/VID (specify 4bits for each ID, Hexadecimal(0~F)
Ex: PID: 182C; VID: 019F
- Global Wear-leveling supported
- Power supply: 5V DC \pm 5%
- Low power consumption (Max.):

- Read: 90mA
- Write: 90mA
- Idle: 60mA
- ESD Proof:
 - Air Discharge: 15KV
 - Contact Discharge: 8KV
- Temperature range:
 - Operating:
 - 0°C ~ +70°C (Standard grade)
 - 40°C ~ +80°C (Industrial grade)
 - Storage: -55°C ~ +95°C
- Humidity: 10-95%, non-condensing
- Environmental reliability:
 - Vibration: 7 Hz to 2K Hz, 5G, 3 axes
 - Shock: Duration: 0.5ms, 50G, 3 axes
- Dimension (W x L x H): 15.4 x 19.4 x 6.9 (±0.2mm)
- Certification: CE, FCC, RoHS
- Weight: 2.6g

3. Pin Assignment

Please refer to Table 1 for Industrial nanoUSB pin assignments.

Table 1: Industrial nanoUSB Pin Assignments



Pin No.	Name	Description
1	VBUS	+5V
2	D-	Data -
3	D+	Data +
4	GND	Ground

4. Specifications

4.1 CE and FCC Compatibility

The Innodisk Industrial nanoUSB conforms to CE requirements and FCC standards.

4.2 RoHS Compliance

The Innodisk Industrial nanoUSB is fully compliant with RoHS directive.

4.3 Reliability

Table 2: Industrial nanoUSB TBW

Parameter	Value
Read Cycles	Unlimited Read Cycles
Flash Endurance	60,000 P/E cycles
Wear-Leveling Algorithm	Support
Bad Blocks Management	Support
Error Correct Code	Support
TBW(Sequential Write)	Unit: TB
1GB	32.4
2GB	64.8
4GB	129.6
8GB	259.2

5. Environmental Specifications

5.1 Temperature Ranges

- Operating Temperature Range:
 - ◆ 0°C ~ +70°C (Standard grade)
 - ◆ -40°C ~ +85°C (Industrial grade)
- Storage Temperature Range: -55°C to +95°C

5.2 Humidity

Relative Humidity: 10-95%, non-condensing.

5.3 Shock and Vibration

Table 3: Shock/Vibration Testing for Industrial nanoUSB

Reliability	Test Conditions	Reference
Vibration	7 Hz to 2000 Hz, 5G, 3 axes	IEC 68-2-6
Shock	Duration: 0.5ms, 50G, 3 axes	IEC 68-2-27

5.4 Mean Time between Failures (MTBF)

Table 3 summarizes the MTBF prediction results for various Industrial nanoUSB 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 4: Industrial nanoUSB MTBF

Product	Condition	MTBF (Hours)
Industrial nanoUSB	Telcordia SR-332 GB, 25°C	3,000,000

5.5 Mechanical Dimensions

- Dimension (W x L x H): 15.4 x 19.4 x 6.9 ($\pm 0.2\text{mm}$)

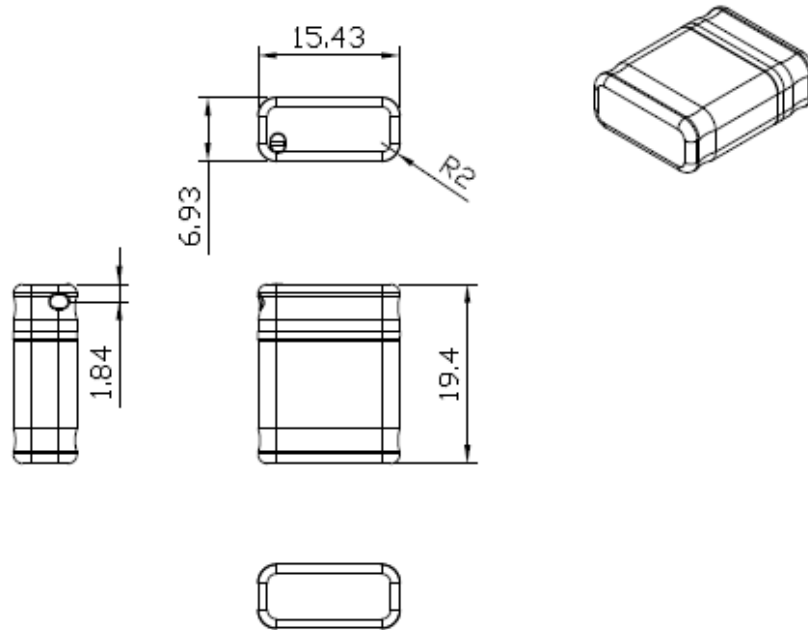


Figure 2: Mechanical Dimension of Industrial nanoUSB

5.6 Electrical Specifications

5.6.1 Absolute Maximum Ratings

Table 5: Industrial nanoUSB

Item	Symbol	Rating	Unit
Storage Temperature	T _{Storage}	-55 ~ +95	°C
Ambient Operating Temperature	T _a	0 ~ +70	°C
3.3V supply voltage	VCC33	-0.3 ~ 3.6	V
1.8V supply voltage	VCC18	-0.3 ~ 2	V
3.3V buffer input voltage	V _{in33}	-0.3 ~ 3.6	V
3.3V/5V buffer input voltage	V _{in335}	-0.3 ~ 5	V
1.8V buffer input voltage	V _{in18}	-0.3 ~ 2	V

5.6.2 Operating Conditions

Table 6: Industrial nanoUSB Operating Conditions

Item	Symbol	Rating	Unit
USB 5V supply voltage	USB _{in}	3.2 ~ 5.5	V
3.3V supply voltage	VDD33	3.0 ~ 3.6	V
1.8V supply voltage	VDD18	1.6 ~ 2	V

6. i-S.M.A.R.T Utility

The health of Industrial nanoUSB can be monitored by a specific i-S.M.A.R.T utility as below:

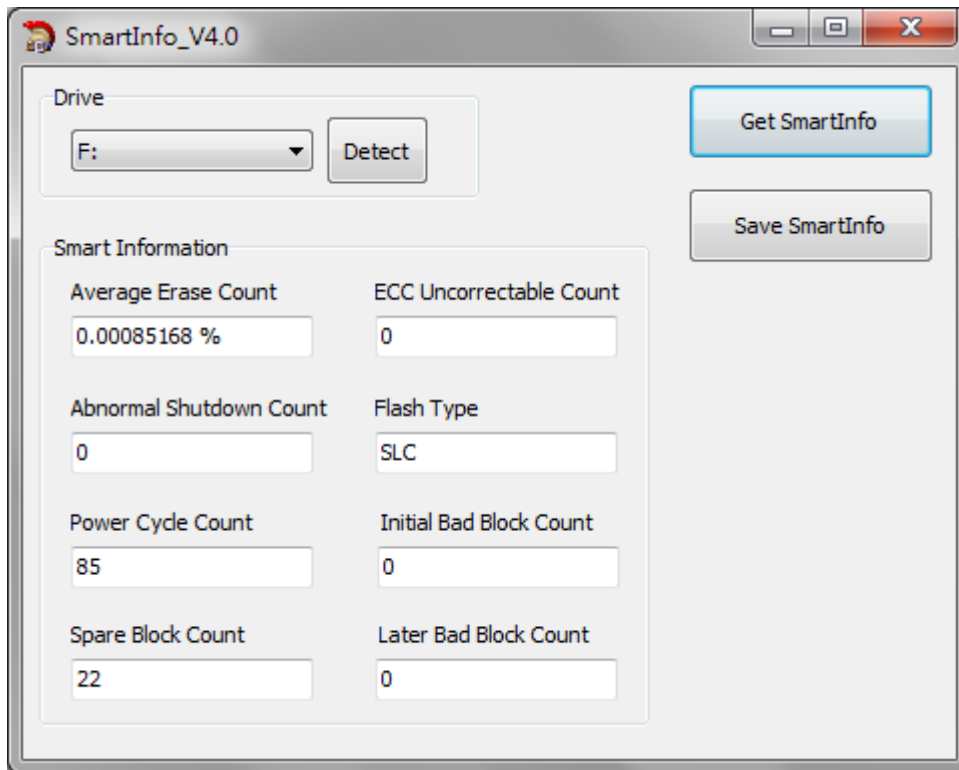


Figure 3: User Interface of i-S.M.A.R.T Utility

Detailed Description for SMART Information:

- **Average Erase Count**

Value: To record average erase ratio. This value is calculated by “total erase counts”, “Flash P/E cycles”, “Flash total blocks”.

Initial value = 00.00%

Maximum value = 100.00%

- **Abnormal Shutdown Count**

Value: To record abnormal shutdown condition. Increasing this value by 1 when detected error in the power on stage.

Initial value = 0.

Maximum value = 4294967295.

- **Power Cycle Count**

Value: To record power cycle condition. Increasing this value by 1 when a power Cycle (both normal and abnormal) occurred.

Initial value = 0.

Maximum value = 4294967295.

- **Spare Block Count**

Value: To record spare block counts. Decreasing this variable when detected run-time bad blocks. (note: run-time bad blocks may be "erase error", "program error", "read error".)

Initial value = depends on Flash.

Maximum value = 255.

Minimum value = 0.

- **ECC Uncorrectable Count**

Value: To record ECC uncorrectable block counts. Increase this value by 1 when fatal error occurred in Flash read operation.

Initial value = 0.

Maximum value = 255.

- **Flash Type**

Value: To determinate mounted Flash type, and always keep in original value.

0: SLC, 1: MLC.

Initial value = depends on Flash.

- **Initial Bad Block Count**

Value: To record initial bad blocks when MP process, and always keep in original value.

Initial value = depends on Flash.

Maximum value = 65535.

- **Later Bad Block Count**

Value: To record run time bad blocks. Increasing this variable when detected run-time bad blocks.

Initial value = 0.

Maximum value = 65535.

7. Part Number Rule

Part Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	D	E	U	N	-	0	8	G	S	2	4	A	W	1	S	B	-			
														2		T				
Description	Disk	Industrial nanoUSB			-	Capacity		Category			Internal control	Operation Temp.	Internal Control	Channel	Flash		Customized Code			
Definition																				
Code 1st (Disk)											Code 12th (Internal control)									
D: Disk											Code 13th (Operation Temperature)									
Code 2nd ~ 4th (Form Factor)											C: Standard Grade (0°C ~ +70°C)									
EUN: Industrial nanoUSB											W: Industrial Grade (-40°C ~ +85°C)									
Code 6th ~8th (Capacity)											Code 14th (Internal Control)									
01G: 1GB											1: Toshiba SLC (1GB)									
02G: 2GB											2: Micron SLC (2/4/8GB)									
04G: 4GB											Code 15th (Channel)									
08G: 8GB											S: Single									
Code 9th ~11th (Category)											Code 16th (Flash)									
S24: Industrial nanoUSB											B: Toshiba SLC (1GB)									
											T: Micron SLC (2/4/8GB)									

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宜鼎國際股份有限公司 Innodisk Corporation

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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



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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



Verification of Compliance

Product Name : Industrial Nano USB
 Model Number : DEUN-XXXS23A%1S&
 XXX : 01G-08G
 % : Operation Temperature (C, W)
 & : NAND Flash Type (B, T)

Applicant : InnoDisk Corporation
 Address : 9F, No.100, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 221,
 Taiwan

Report Number : O22-U070-1211-300
 Issue Date : December 12, 2012

Applicable Standards : EN 55022:2010 Class B ITE
 AS/NZS CISPR22:2009 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.



TAF 0905
 FCC CAB Code TW1653
 NVLAP Lab Code 200575-0
 IC Code 4699A
 VCCI Accep. No. B-1527, C-1609, T-1441, G-10,
 C-4490, T-1334, G-614



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 Fax: 886-2-25984546

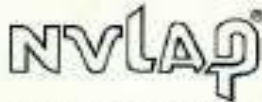
(Taun-Yu Shih General Manager)

Date: December 12, 2012

Verification of Compliance

Product Name : Industrial Nano USB
Model Number : DEUN-XXXS23A%1S&
 XXX : 01G-08G
 % : Operation Temperature (C, W)
 & : NAND Flash Type (B, T)
Applicant : InnoDisk Corporation
Address : 9F, No.100, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 221,
 Taiwan
Report Number : F-U070-1211-300
Issue Date : December 12, 2012
Applicable Standards : FCC Part 15, Subpart B Class B ITE
 ANSI C63.4:2003
 Industry Canada ICES-003 Issue 4
 CSA-IEC CISPR22: 02 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 200575-4

EAF 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



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(Tsun-Yu Shih/ General Manager)

Date: December 12, 2012