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<td>Add CE/FCC Report</td>
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<td>Rev 1.1</td>
<td>Modify Appearance of Industrial Nano USB</td>
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1. Introduction

The Innodisk Industrial Nano USB 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 Nano USB 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 Nano USB 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 Nano USB can be monitored by a specific i-S.M.A.R.T utility.

![Image of Industrial Nano USB](image)

Figure 1: Appearance of Industrial Nano USB

2. Features

The Industrial Nano USB 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))
  
  Example: PID: 182C; VID: 019F
- Global Wear-leveling supported
- Power supply: 5V DC ± 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 Nano USB pin assignments.

```
<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VBUS</td>
<td>+5V</td>
</tr>
<tr>
<td>2</td>
<td>D-</td>
<td>Data -</td>
</tr>
<tr>
<td>3</td>
<td>D+</td>
<td>Data +</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td>Ground</td>
</tr>
</tbody>
</table>
```

Table 1: Industrial Nano USB Pin Assignments

4. Specifications

4.1 CE and FCC Compatibility

The InnoDisk Industrial Nano USB conforms to CE requirements and FCC standards.

4.2 RoHS Compliance

The InnoDisk Industrial Nano USB is fully compliant with RoHS directive.
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>
<thead>
<tr>
<th>Reliability</th>
<th>Test Conditions</th>
<th>Reference Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration</td>
<td>7 Hz to 2000 Hz, 5G, 3 axes</td>
<td>IEC 68-2-6</td>
</tr>
<tr>
<td>Shock</td>
<td>Duration: 0.5ms, 50G, 3 axes</td>
<td>IEC 68-2-27</td>
</tr>
</tbody>
</table>

5.4 Mean Time between Failures (MTBF)

Table 3 summarizes the MTBF prediction results for various Industrial Nano USB 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>
<thead>
<tr>
<th>Product</th>
<th>Condition</th>
<th>MTBF (Hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Nano USB</td>
<td>Telcordia SR-332 GB, 25°C</td>
<td>3,000,000</td>
</tr>
</tbody>
</table>
5.5 Mechanical Dimensions
- Dimension (W x L x H): 15.4 x 19.4 x 6.9 (±0.2mm)

![Figure 2: Mechanical Dimension of Industrial Nano USB](image)

5.6 Electrical Specifications

5.6.1 Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>TStorage</td>
<td>-55 ~ +95</td>
<td>°C</td>
</tr>
<tr>
<td>Ambient Operating Temperature</td>
<td>T_a</td>
<td>0 ~ +70</td>
<td>°C</td>
</tr>
<tr>
<td>3.3V supply voltage</td>
<td>VCC33</td>
<td>-0.3 ~ 3.6</td>
<td>V</td>
</tr>
<tr>
<td>1.8V supply voltage</td>
<td>VCC18</td>
<td>-0.3 ~ 2</td>
<td>V</td>
</tr>
<tr>
<td>3.3V buffer input voltage</td>
<td>Vin33</td>
<td>-0.3 ~ 3.6</td>
<td>V</td>
</tr>
<tr>
<td>3.3V/5V buffer input voltage</td>
<td>Vin335</td>
<td>-0.3 ~ 5</td>
<td>V</td>
</tr>
<tr>
<td>1.8V buffer input voltage</td>
<td>Vin18</td>
<td>-0.3 ~ 2</td>
<td>V</td>
</tr>
</tbody>
</table>

5.6.2 Operating Conditions

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Rating</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB 5V supply voltage</td>
<td>USBV_in</td>
<td>3.2 ~ 5.5</td>
<td>V</td>
</tr>
<tr>
<td>3.3V supply voltage</td>
<td>VDD33</td>
<td>3.0 ~ 3.6</td>
<td>V</td>
</tr>
</tbody>
</table>
6. **i-S.M.A.R.T Utility**

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

![User Interface of i-S.M.A.R.T Utility](image)

**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 fetal 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

<table>
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<tr>
<td>Code 1st (Disk)</td>
<td>Code 12th (Internal control)</td>
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<td>Code 13th (Operation Temperature)</td>
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<td>C: Standard Grade (0℃ ~ +70℃)</td>
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<td>EUN: Industrial Nano USB</td>
<td>W: Industrial Grade (-40℃ ~ +85℃)</td>
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<td>Code 6th ~ 8th (Capacity)</td>
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<td>04G: 4GB</td>
<td>S: Single</td>
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<td>Code 9th ~ 11th (Category)</td>
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<tr>
<td>B: Toshiba SLC (1GB)</td>
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<td>S23: Industrial Nano USB</td>
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<td>T: Micron SLC (2/4/8GB)</td>
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</tr>
</tbody>
</table>
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 61000-4-4:2004+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.

Central Research Technology Co.
EMC Test Laboratory
11, Lane 41, Fushuen St., Jungshan Chiu, Taipei, Taiwan, 104, R.O.C.
Tel : 886-2-25986568
Fax: 886-2-25986546

(Taun-Yu Shih V 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.

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 : 886-2-25984540

(Tsun-Yu Shih/ General Manager)
Date: December 12, 2012