# Kingston® SSD OM8PDP3 Series

# Product Specification

Version 1.2

Aug. 2020

## Part Number Information

| | | | |
|---|---|---|---|
| OM8PDP364B-A01 | Capacity: 64GB | M.2 2280 | With Kioxia BiCS4 TLC Flash IC<br>FW Version: EDFK0S03 |
| OM8PDP3128B-A01 | Capacity: 128GB | M.2 2280 | With Kioxia BiCS4 TLC Flash IC<br>FW Version: EDFK0S03 |
| OM8PDP3256B-A01 | Capacity: 256GB | M.2 2280 | With Kioxia BiCS4 TLC Flash IC<br>FW Version: EDFK0S03 |
| OM8PDP3512B-A01 | Capacity: 512GB | M.2 2280 | With Kioxia BiCS4 TLC Flash IC<br>FW Version: EDFK0S03 |
| OM8PDP31024B-A01 | Capacity: 1024GB | M.2 2280 | With Kioxia BiCS4 TLC Flash IC<br>FW Version: EDFK0S03 |

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# Content

## Revision History

| Rev. | Date | Changed Contents |
|---|---|---|
| v1.0 | 2020.06.15 | 1st version republished |
| v1.1 | 2020.06.25 | Add the Label informaiton |
| V1.2 | 2020.08.15 | Add 1TB/64GB capacity |

# 1. Introduction

## 1.1 General Description

The Kingston® SSD OM8PDP3 is designed and built for personal computing machines, providing the mobility, stability, reliability and powerless capability. The Kingston® SSD OM8PDP3 utilizes a PCIe Gen3 x4 interface, Non-Volatile Memory Express protocol and adopt PS5013-E13T controller, Kioxia NAND Flash. The device comes in M.2 2280-S3-M form factor.

Hard drive replacement - Solid-state drives are the next evolution of PC storage and run faster, quieter and cooler than the aging technology inside hard drives. With no moving parts, SSDs are also more durable and more reliable than hard drives.

For desktops and notebooks - Kingston solid-state drives will make your system more responsive, so it boots quicker, loads applications faster and shuts down faster.

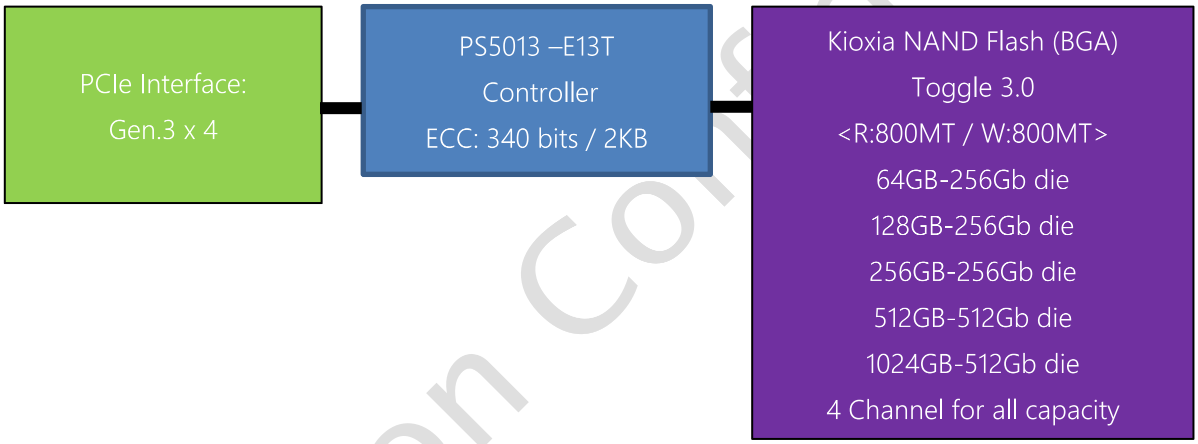

Fig 1-1: Kingston SSD OM8PDP3 Block Diagram

## 1.2 Advanced Flash Management

### 1.2.1 Background Garbage Collection

SSDs incorporate advanced controllers that manage the NAND Flash storage. Kingston® uses Phison®-based controllers in specific SSDs to provide customers with better endurance and performance. These controllers use proprietary technologies to conduct Garbage Collection (GC).

When files are deleted in an Operating System such as Windows, the OS just marks its internal file table indicating that the file is deleted. On hard disk drives (HDDs), the now-invalid data remains there and can be directly overwritten by the system to store new data.

NAND Flash-based devices cannot overwrite data that is already there. They have to go through a Program/Erase cycle; to write to an already used block of data, an SSD controller would first copy all valid data (that which is still in use) and write it to empty pages of a different block, erase all the cells in the current block (both valid and invalid data), and then start writing new data to the newly erased block. This process is called Garbage Collection. Newer OSs also support the TRIM command, whereby the OS notifies the SSD that it has deleted specific files so that the SSD can better manage the GC process to recover that space earlier and prevent saving and moving all that invalid data.

### 1.2.2 Wear-Leveling

Kingston Flash storage devices incorporate controllers utilizing advanced wear-leveling technology, which distributes the number of P/E cycles (program/erase) across the Flash memory evenly. Wear-leveling thus extends the useful life of a drive and help maintain consistent performance levels over the life of the drive.

## 1.3 Functional Description

| Key Feature | Specification |
|---|---|
| APST | Support |
| ASPM/PCI-PM | Support |
| Multiple Submission and Completion Queues | Support (Up to queue depth=64K) |
| S.M.A.R.T | Support |
| Trim Command | Support |
| Modern Standby | Support |
| TCG Pyrite 2.0 Specification | Support |
| NVMe Revision 1.3 | Support |
| Dynamic & Static Wear-Leveling | Support |
| Background Garbage Collection | Support |
| Compatible with PCIe I/II/III x 4 interface | Support |
| Power Management:<br>(1) PS00<br>(2) PS01<br>(3) PS02<br>(4) PS03<br>(5) PS04 | Support |

Table 1-1: Kingston SSD OM8PDP3 Functional Description

# 2. General Product Specification

## 2.1 Capacity

Addressable sectors follow the IDEMA organization standard, reference to *Document LBA1-03 LBA Count for Disk Drives Standard*.

Detail information can refer to website: http://www.idema.org/

| Unformatted Capacity[1] | Total User Addressable Sectors in LBA Mode[2] |
|---|---|
| 64GB | 125,034,840 |
| 128GB | 250,069,680 |
| 256GB | 500,118,192 |
| 512GB | 1,000,215,216 |
| 1024GB | 2,000,430,432 |

Table 2-1: Kingston SSD OM8PDP3 Capacity Specification

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[1] 1 GB = 1,000,000,000 bytes and not all of the memory can be used for storage.

[2] 1 sector = 512 bytes

## 2.2 Fundamental Specification

◆ Capacity – supporting unformatted capacities[1] of 64GB, 128GB, 256GB, 512GB and 1024GB

◆ Form-Factor –NGFF-2280, M.2 type

◆ Interface – PCIe Gen.3 x4

◆ Based on out-of-box performance, speed may vary due to host hardware, software configuration and usage.

◆ Performance[2] –

| ■ Capacity | 64GB | 128 GB | 256 GB | 512 GB | 1024GB |
|---|---|---|---|---|---|
| ■ Sequential Read | 1000MB/s | 2200 MB/s | 2400 MB/s | 2400 MB/s | 2400MB/s |
| ■ Sequential Write | 150MB/s | 530 MB/s | 1100 MB/s | 1100 MB/s | 1800MB/s |
| ■ 4K Random Read (QD32) | 35000 IOPs | 100,000 IOPs | 150,000 IOPs | 150,000 IOPs | 150,000 IOPS |
| ■ 4K Random Write (QD32) | 30000 IOPs | 90,000 IOPs | 100,000 IOPs | 100,000 IOPs | 120,000 IOPS |

◆ Power consumption[3] –

| ■ Capacity | 64GB | 128 GB | 256 GB | 512 GB | 1024GB |
|---|---|---|---|---|---|
| ■ Maximum Read | 2.2W | 2.30 W | 2.50 W | 2.50 W | 2.50W |
| ■ Maximum Write | 2.2W | 2.30 W | 2.50 W | 2.50 W | 3.00W |
| ■ Avg. consumption | 0.15W | 0.18 W | 0.20 W | 0.20 W | 0.20W |
| ■ L1.2 Substate | 5mW | 5 mW | 5 mW | 5 mW | 5mW |

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[1] 1 GB = 1,000,000,000 bytes and not all of the memory can be used for storage.

[2] Performance data reveal the Max. performance consequence, based on CrystalDiskMark test result.
TT (at SSD SMART 70°C) enable performance will reduce to Seq. R/W = 1200/200 MB/s, and will down to 120/30 MB/s at most .

[3] Maximum Power bases on MobileMark2014 workload.
Avg. consumption bases on MobileMark2014 workload.

## 2.3 Power Specification

| Parameter | Specification |
|---|---|
| Input Voltage | 3.3V +/- 5% |
| Maximum Ripple | 3.3V +/- 10% |

Table 2-2: Kingston SSD OM8PDP3 Power Specification

## 2.4 Endurance Specification

| Parameter | Value |
|---|---|
| Uncorrectable Bit Error Rate(UBER) | Less than 1 sector $10^{15}$ bits read |
| Mean Time between Failure(MTBF) | 1,500,000 hours |

Table 2-3: Kingston SSD OM8PDP3 Endurance Specification

## 2.5 Warranty Policy

Kingston warrants to the original end user customer that its products are free from defects in material and workmanship. This product is covered by Kingston warranty for one of the following periods, whichever occurs first:

( i ) Three years from the date of purchase by the original end user customer

( ii ) Until the date when the SSD reached its TBW threshold as measured by Kingston software.

| Parameter | Specification |
|---|---|
| Warranty Period | 3 years warranty |
| TBW[1]<br>(Terabyte Written) | 64G-40TBW<br>128G – 80 TBW<br>256G – 160 TBW<br>512G – 320 TBW<br>1024G – 640 TBW |

Table 2-4: Kingston SSD OM8PDP3 Warranty Policy

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[1] The value of TBW is calculated by WAF (Write Amplification Factor), which is measured with JEDEC 219A Standard Client Workload.

# 3. Physical Specification

The M.2 2280 Form-Factor complies with NGFF M.2 SSD standard. Detail mechanical design parameters as below. Tolerance data also included.

| Parameter | Specification |
|---|---|
| Length | 80.00mm ±0.15mm |
| Width | 22.00mm ±0.15mm |
| Thickness | 2.40mm (max) |
| Height | 1.50mm (S3) (max) |
| Weight | 9 g (max) |

Table 3-1: Mechanical Design Parameters

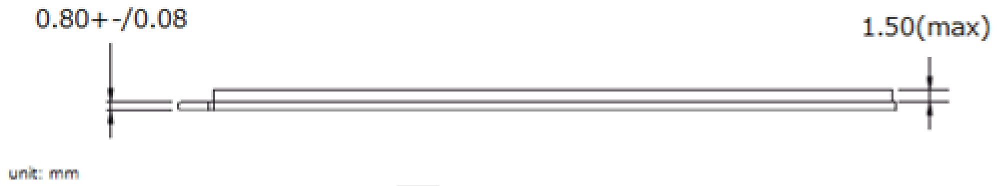

Figure 3-1: Side View of SSD

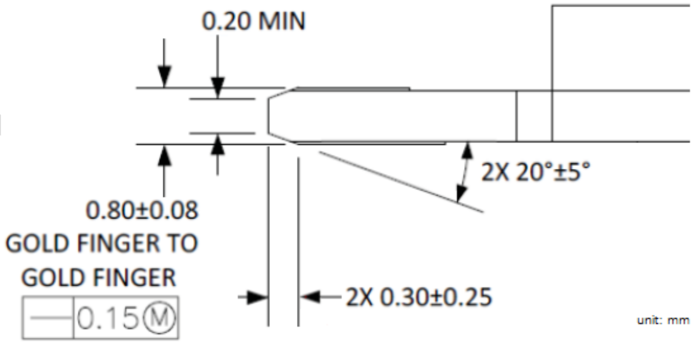

Figure 3-2: Side View of M.2 Connector

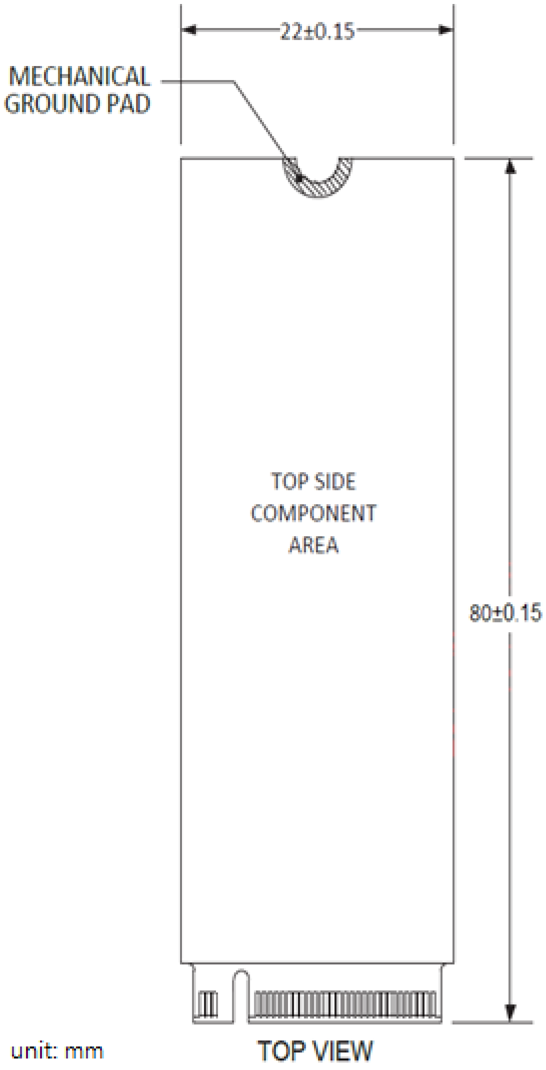

Figure 3-3: Top View of SSD

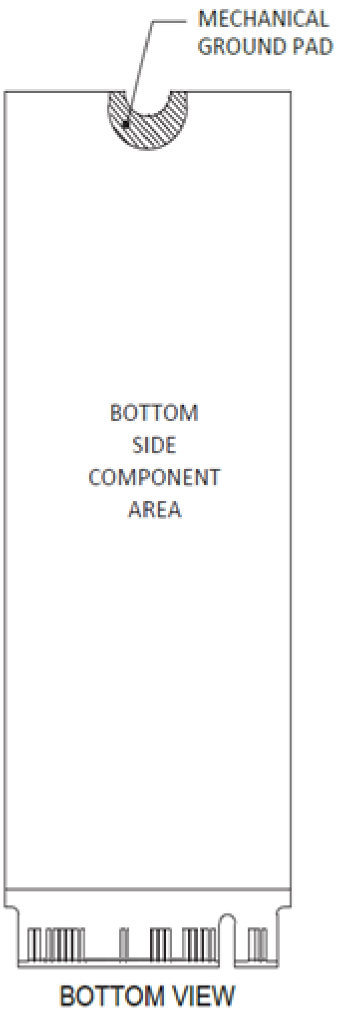

Figure 3-4: Bottom View of SSD

# 4. Environment Specification

## 4.1 Storage Specification

OM8PDP3 SSD is known as the consumer grade storage product.

| Environment | Mode | Min | Max | Unit |
|---|---|---|---|---|
| Temperature[1] | Operating | 0 | 70 | ℃ |
| | Storage | -40 | 85 | ℃ |
| Humidity | Operating | | 85 | % |
| | Storage | | 85 | % |

Table 4-1: Kingston SSD OM8PDP3 Environment Specification

## 4.2 Durability Specification

Every material needs to pass the IQC unit' s Visual Inspection and quality test. Regular durability test includes the new PCBA and the running material. To make sure product durability is consistence.

| Item | Mode | Timing/Frequency | Max |
|---|---|---|---|
| Shock | Operating | @0.5ms/half wave sin | 1000G |
| | Non-operating | @0.5ms/half wave sin | 1500G |
| Vibration | Operating | 7-800Hz | $2.17G_{rms}$ |
| | Non-operating | 20-2000Hz | $20G_{rms}$ |

Table 4-2: Kingston SSD OM8PDP3 Durability Specification

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[1] Temperature is measured by sensor, from SMART Attributes.

## 4.3 Safety Compliance Specification

The Kingston SSD OM8PDP3 is certified to comply with the following standards

| Certification | Standard |
|---|---|
| CE | EN 55032:2015, Class B<br>EN 55024:2015<br>IEC 61000-4-2:2008[1]<br>IEC 61000-4-3:2006/A2:2010<br>IEC 61000-4-4:2004+A1:2010<br>IEC 61000-4-6:2008<br>IEC 61000-4-8:2009 |
| FCC | 47 CFR Part 15, Subpart B, Class B<br>ANSI C63.4:2014 |
| Canada | ICES-003:2016 |
| RCM | AS/NZS CISPR 22:2009, Class B |
| VCCI | VCCI V-3/2012.04, Class B<br>VCCI V-4/2012.04, Class B |
| BSMI | CNS 13438, Class B<br>CNS 15663 |
| Other | HF, LF, RoHS, KCC, TUV, UKCA(TBD) |

Table 4-4: Kingston SSD OM8PDP3 Safety Compliance Specification

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[1] IEC 61000-4-2 Electrostatic discharge (ESD) criteria:
Air Discharge: 8KV, Class A;
Contact Discharge: 4KV, Class A

## 5. Pin Definition

| Pin # | Type | Description | Pin # | Type | Description |
|---|---|---|---|---|---|
| P1 | GND | Connect to GND | P31 | TXP1 | PCIe TX Differential signal |
| P2 | +3.3V AUX1 | 3.3V Source | P32 | N/C | No Connect |
| P3 | GND | Connect to GND | P33 | GND | Connect to GND |
| P4 | +3.3V AUX2 | 3.3V Source | P34 | N/C | No Connect |
| P5 | TXN3 | PCIe TX Differential signal | P35 | RXN1 | PCIe RX Differential signal |
| P6 | N/C | No Connect | P36 | N/C | No Connect |
| P7 | TXP3 | PCIe TX Differential signal | P37 | RXP1 | PCIe RX Differential signal |
| P8 | PLN | Power Loss Notification | P38 | N/C | No Connect |
| P9 | GND | Connect to GND | P39 | GND | Connect to GND |
| P10 | DAS | Device Activity Signal | P40 | N/C | No Connect |
| P11 | RXN3 | PCIe RX Differential signal | P41 | TXN0 | PCIe TX Differential signal |
| P12 | +3.3V AUX3 | 3.3V Source | P42 | N/C | No Connect |
| P13 | RXP3 | PCIe RX Differential signal | P43 | TXP0 | PCIe TX Differential signal |
| P14 | +3.3V AUX4 | 3.3V Source | P44 | N/C | No Connect |
| P15 | GND | Connect to GND | P45 | GND | Connect to GND |
| P16 | +3.3V AUX5 | 3.3V Source | P46 | N/C | No Connect |
| P17 | TXN2 | PCIe TX Differential signal | P47 | RXN0 | PCIe RX Differential signal |
| P18 | +3.3V AUX6 | 3.3V Source | P48 | N/C | No Connect |
| P19 | TXP2 | PCIe TX Differential signal | P49 | RXP0 | PCIe RX Differential signal |
| P20 | N/C | No Connect | P50 | PERST# | PE-Reset defined by PCIe Mini CEM Spec |
| P21 | GND | Connect to GND | P51 | GND | Connect to GND |
| P22 | N/C | No Connect | P52 | CLKREQ# | Clock Request defined by PCIe Mini CEM Spec. Used by L1 PM Substates as well. |
| P23 | RXN2 | PCIe RX Differential signal | P53 | REFCLKN | PCIe reference clock signals |
| P24 | N/C | No Connect | P54 | N/C | No Connect |
| P25 | RXP2 | PCIe RX Differential signal | P55 | REFCLKP | PCIe reference clock signals |
| P26 | N/C | No Connect | P56 | N/C | No Connect |
| P27 | GND | Connect to GND | P57 | GND | Connect to GND |
| P28 | N/C | No Connect | P58 | N/C | No Connect |
| P29 | TXN1 | PCIe TX Differential signal | P59 | Module Key | No Connect |
| P30 | PLA | Power Loss Acknowledge | P60 | Module Key | No Connect |

| | | | | | |
|---|---|---|---|---|---|
| P61 | Module Key | No Connect | P69 | N/C | No Connect |
| P62 | Module Key | No Connect | P70 | +3.3V AUX7 | 3.3V Source |
| P63 | Module Key | No Connect | P71 | GND | Connect to GND |
| P64 | Module Key | No Connect | P72 | +3.3V AUX8 | 3.3V Source |
| P65 | Module Key | No Connect | P73 | GND | Connect to GND |
| P66 | Module Key | No Connect | P74 | +3.3V AUX9 | 3.3V Source |
| P67 | N/C | No Connect | P75 | GND | Connect to GND |
| P68 | N/C | No Connect | | | |

Table 5-1: Pin Assignment

# 6. Supported NVMe Command List

The Admin Command Set defines the commands that may be submitted to the Admin Submission Queue. Admin commands should not be impacted by the state of I/O queues (e.g., a full I/O completion queue should not delay or stall the Delete I/O Submission Queue command). Table 6-2 defines Admin commands that are specific to the NVM Command Set.

| Op Code | Command |
|---|---|
| 00h | Delete I/O Submission Queue |
| 01h | Create I/O Submission Queue |
| 02h | Get Log Page |
| 04h | Delete I/O Completion Queue |
| 05h | Create I/O Completion Queue |
| 06h | Identify |
| 08h | Abort |
| 09h | Set Features |
| 0Ah | Get Features |
| 0Ch | Asynchronous Event Request |
| 10h | Firmware Commit[1] |
| 11h | Firmware Image Download |

Table 6-1: Supported Admin Command

| Op Code | Command |
|---|---|
| 80h | Format NVM |
| 81h | Security Send |
| 82h | Security Receive |

Table 6-2: Supported Admin Command – NVM Command Set Specific

| Op Code | Command |
|---|---|
| 00h | Flush |
| 01h | Write |
| 02h | Read |
| 04h | Write Uncorrectable |
| 05h | Compare |
| 08h | Write Zeroes |
| 09h | Dataset Management |

Table 6-3: Supported NVM Command

## 7. Label Definition

Label definition on the label samples (as Fig. 7-1) is only for demonstration of every part on the label, not real information. Detail information is in Table 7-1.

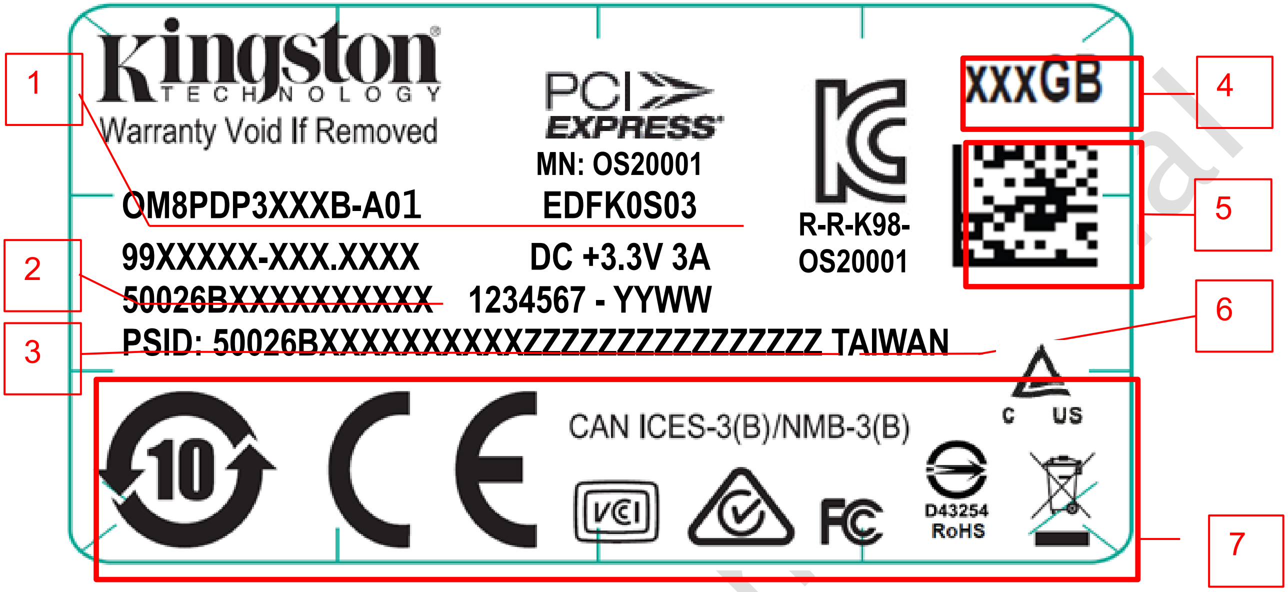


Figure 7-1: Label Sample

| No. | Item | Display Sample | Remark |
|---|---|---|---|
| 1 | i) SKU<br>ii) Firmware | i) OM8PDP3XXXB-A01<br>ii) EDFK0S03 | i) KTC SKU number (Part number)<br>ii) Firmware. |
| 2 | Serial Number | 50026BXXXXXXXXXX | Format: 50026BXXXXXXXXXX<br>* XXXXXXXXXX : Suffix code |
| 3 | PSID | 50026BXXXXXXXXXXZZZZZZZZZZZZZZZZ | Format: SN+ZZZZZZZZZZZZZZZZ<br>* ZZZZZZZZZZZZZZZZ: Suffix code |
| 4 | Capacity | 64GB,128GB, 256GB, 512GB,1024GB | |
| 5 | 2D Barcode | SKU+PSID | 2D Barcode |
| 6 | Product COO | TAIWAN / CHINA | |
| 7 | Compliance logos | | |

Table 7-1: Label Information

## 8. Package Specification

Content Loading definition: 1 Tray = 15 pcs, 1 pizza = 10 Trays = 150pcs SSD

**Tray Size: 348 x 188 x 10.8 (mm x mm x mm)**

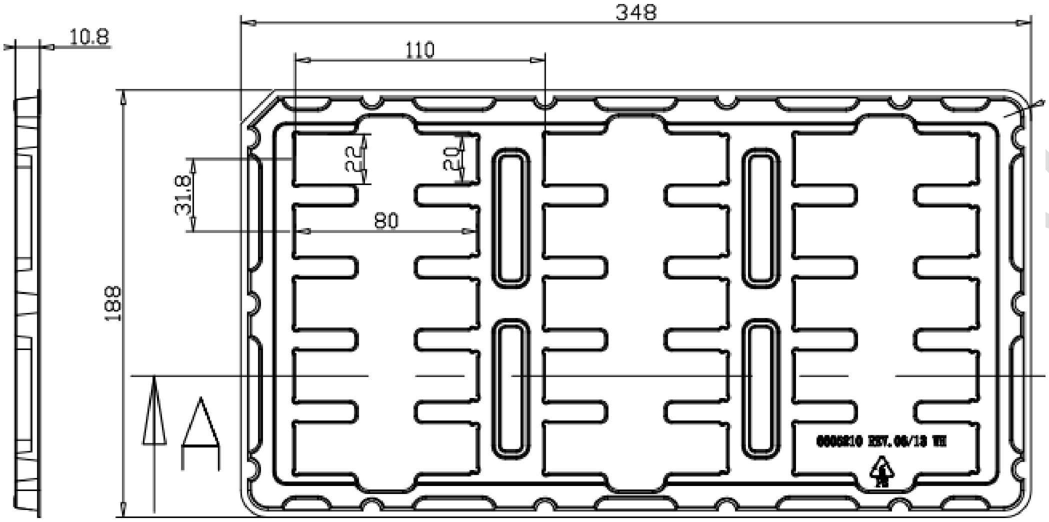


Figure 8-1: Pizza Box

**Pizza Box Size: 368 x 205 x 78 (mm x mm x mm)**

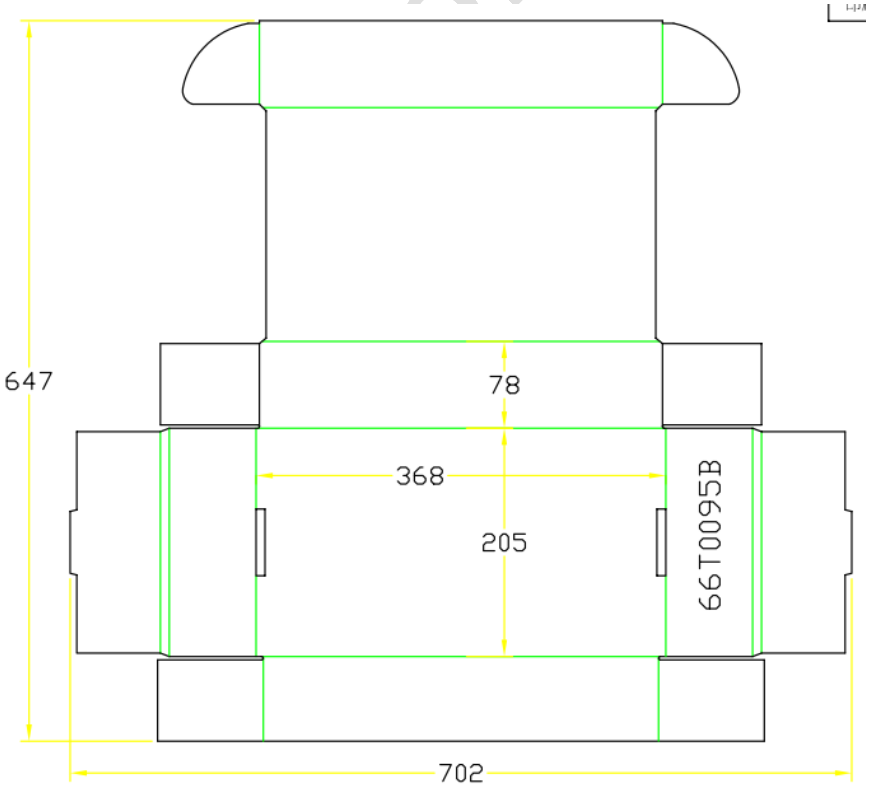


Figure 8-2: Pizza Box

# 9. SMART Attributes

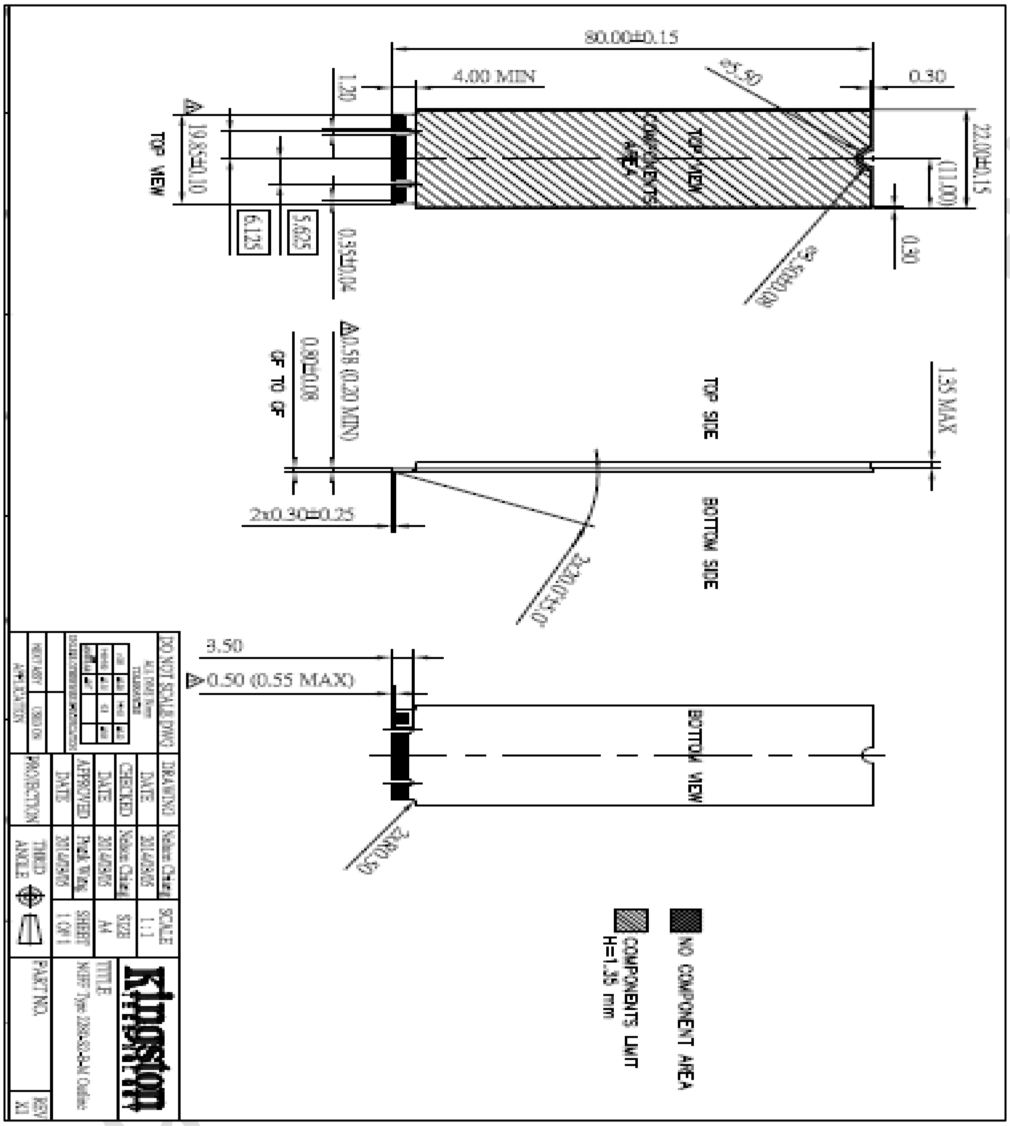
SMART Attributes provide the SSD's detail working information, like power-on hours or write from host…etc. to help SSD vendor to monitor the health situation and diagnosis while SSD have been damaged or panic under abnormal user behavior.

| Attribute Description | Unit |
|---|---|
| Critical Warning | - |
| Composite Temperature | K |
| Available Spare | % |
| Available Spare Threshold | % |
| Percentage Used | % |
| Data Units Read | 1000sector |
| Data Units Written | 1000sector |
| Host Read Commands | Count |
| Host Write Commands | Count |
| Controller Busy Time | Count |
| Power Cycles | Count |
| Power On Hours | Count |
| Unsafe Shutdowns | Count |
| Media and Data Integrity Errors: | Count |

Table 9-1: SMART Attribute

# 10. Appendix

## 1. Connector Outline



## 2. Method of fixation

| | |
|---|---|
| Screw Type | #4-40(4L/Silver) |
| Minimum depth of screw hole | NA |
| Torque force by screwdriver | 3 +/-0.3 kg |

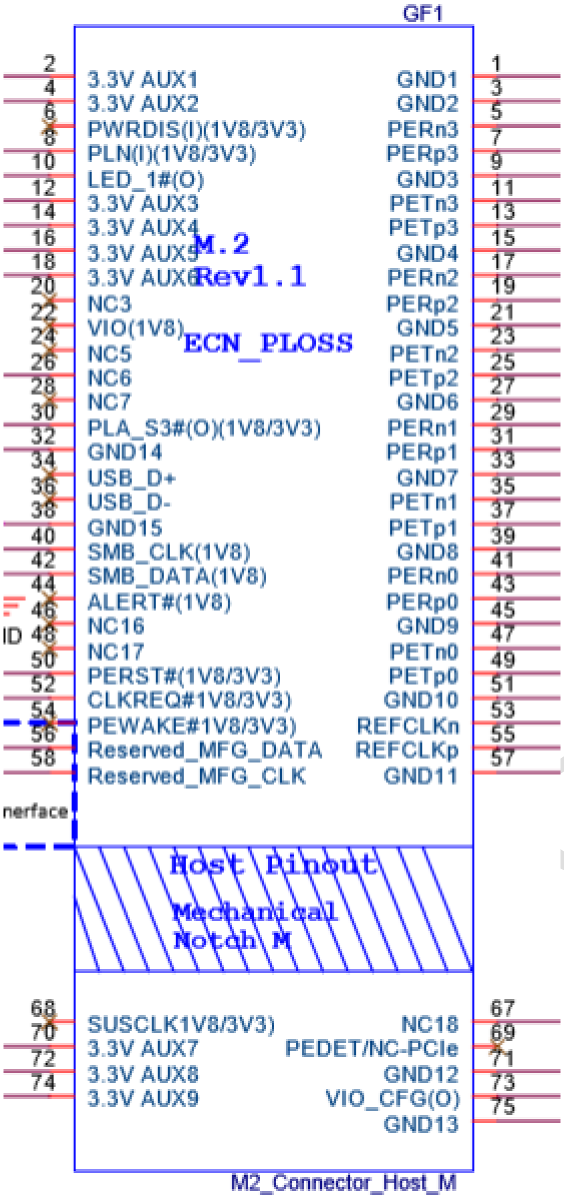
## 3. Delivery specification

| **Parts number** | **OM8PDP3XXXB-A01** |
|---|---|
| **Firmware revision** | EDFK0S03 |

## 4. Terminal specification

| Plating | Plating Electric plating |
|---|---|
| Plating thickness | t ≧ 30 um |

## 5. Power connector pin assignment



## 6. Packing specification

6-1 Label

| Parts number | **OM8PDP3XXXB-A01** |
|---|---|
| W/O | Work Order number |
| D/C | Date code yyww |
| QTY | Quantity |

6-2 Pallet