Kingston® SSD OM8TAP4 Series

Product Specification

Version 1.0

Oct. 2024

Part Number Information

Kingston Part Number	Capacity	Form Factor	FW Version	Series	Flash IC
OM8TAP4512K1-A00	512GB	M.2 2280	P4ER3B31	OS23002	Kioxia BiCS6 QLC
OM8TAP41024K1-A00	1024GB	M.2 2280	P4ER3B31	OS23002	Kioxia BiCS6 QLC
OM8TAP42048K1-A00	2048GB	M.2 2280	P4ER3B31	OS23002	Kioxia BiCS6 QLC

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Content

Revision History

Rev.	Date	Changed Contents
V1.0	2024.10.25	First version published

1. Introduction

1.1 General Description

The Kingston® SSD OM8TAP4 is designed and built for personal computing machines, providing the mobility, stability, reliability and powerless capability. The Kingston® SSD OM8TAP4 utilizes a PCIe Gen4 x4 interface, Non-Volatile Memory Express protocol and adopt TC2201 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 OM8TAP4 Block Diagram

1.2 Advanced Flash Management

1.2.1 Garbage Collection

SSDs incorporate advanced controllers that manage the NAND Flash storage. Kingston® uses Tenafe®-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 Global 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 2.0a [1]	Support
Dynamic & Static Wear-Leveling	Support
Background Garbage Collection	Support
Compatible with PCIe I/II/III x 4 interface	Support
Power Management: (1) PS00 (2) PS01 (3) PS02 (4) PS03 (5) PS04	Support

Table 1-1: Kingston SSD OM8TAP4 Functional Description

[1] Does not support CRMS (Controller Ready Mode Support)

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]
512GB	1,000,215,216
1024GB	2,000,409,264
2048GB	4,000,797,360

Table 2-1: Kingston SSD OM8TAP4 Capacity Specification

[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 512GB, 1024GB and 2048GB

◆Form-Factor –NGFF-2280, M.2 type

◆Interface – PCIe Gen.4 x4

◆**Performance[2] –**

■ Capacity	512GB	1024GB	2048GB
■ Sequential Read	5900 MB/s	6100 MB/s	6100 MB/s
■ Sequential Write	3700 MB/s	5300 MB/s	5400 MB/s
■ 4K Random Read (QD32)	550K IOPs	700K IOPs	700K IOPs
■ 4K Random Write (QD32)	630K IOPs	630K IOPs	680K IOPs

◆**Power consumption[3] –**

■ Capacity	512GB	1024GB	2048GB
■ Maximum Read (Seq.)	1.9 W	1.9 W	1.9 W
■ Maximum Write (Seq.)	3.5 W	4.1 W	4.1 W
■ Avg. consumption	110 mW	125 mW	125 mW
■ PS4 L1.2 Substate	<3.5 mW	<3.5 mW	<3.5 mW

[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 v8.0.4 NVMe setting Based on out-of-box performance, speed may have 10% variation due to host hardware, software configuration and usage.

[3] Maximum Power bases on IOMeter Read/Write workload. Average bases on MobileMark2025 workload.

2.3 Power Specification

Parameter	Specification
Input Voltage	3.3V +/- 5%

Table 2-2: Kingston SSD OM8TAP4 Power Specification

2.4 Endurance Specification

Parameter	Requirement
Uncorrectable Bit Error Rate(UBER)	$\leqq 10^{-15}$
Mean Time between Failure(MTBF)	1,500,000 hours

Table 2-3: Kingston SSD OM8TAP4 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] (Terabyte Written)	512G – 160 TBW 1024G – 320 TBW 2048 G – 640 TBW

Table 2-4: Kingston SSD OM8TAP4 Warranty Policy

[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	7 g (max)

Table 3-1: Mechanical Design Parameters

Figure 3-1: Side View of SSD

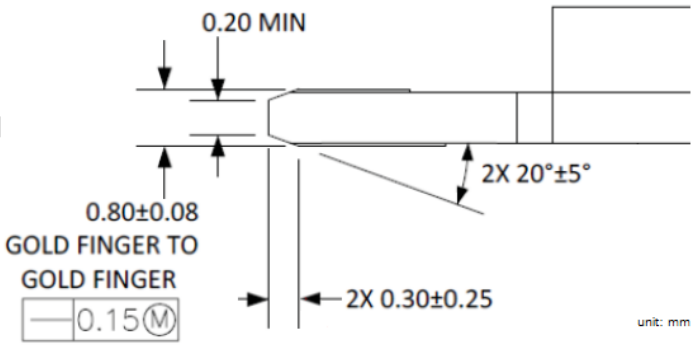

Figure 3-2: Side View of M.2 Connector

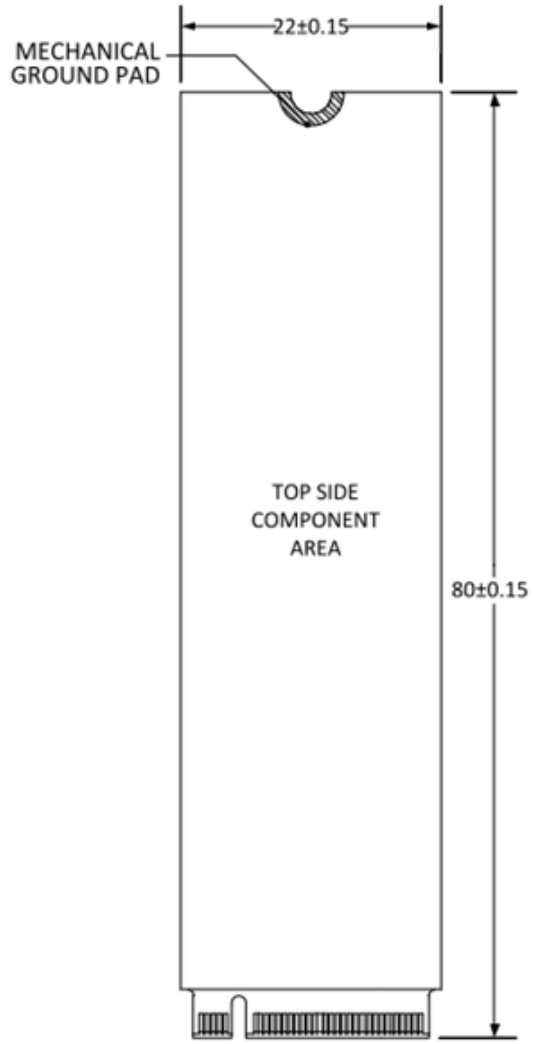

Figure 3-3: Top View of SSD

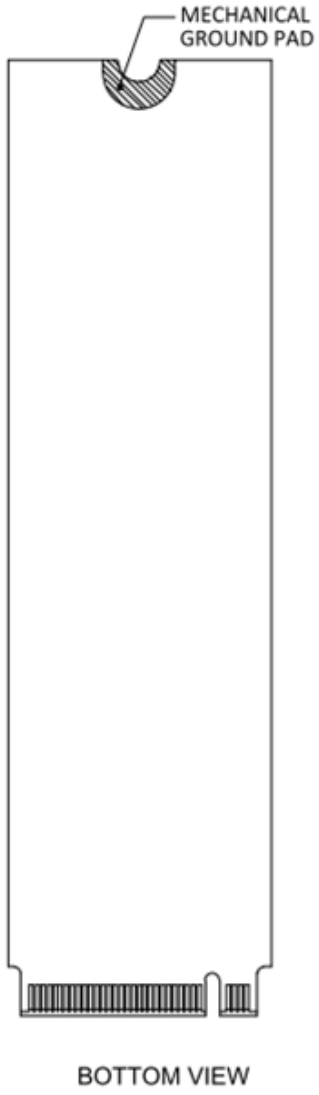

Figure 3-4: Bottom View of SSD

4. Environment Specification

4.1 Storage Specification

OM8TAP4 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 OM8TAP4 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	Test Criteria
Shock	Operating	105G Acceleration peak 6.5ms pulse duration
Vibration	Non-operating	Sin-wave, 10-1000Hz 10G acceleration

Table 4-2: Kingston SSD OM8TAP4 Durability Specification

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

4.3 Safety Compliance Specification

The Kingston SSD OM8TAP4 is certified to comply with the following standards

Certification	Standard
CE	EN 55032:2015+A11:2020+A1:2020 EN 55035:2017+A11:2020
FCC	FCC 47 CFR Part 15, Subpart B: 2023
ICES	ICES-003: Issue 7 (2020)
RCM	AS/NZS CISPR 32:2015 AMD 1:2020
VCCI	VCCI-CISPR 32:2016
BSMI	CNS 15936 (full version 105) Class B
CB/LVD	CB IEC 62368-1:2018 CB IEC 62368-1:2014 EN 62368-1:2014+A1:2017
TUV	UL 62368-1:2019 CSA C22.2 NO. 62368-1:19
KCC	KCC KN32, KN35
UKCA	BS EN55032:2015+A1:2020 BS EN 55035:2017+A11:2020
Other	Environmental compliance https://www.kingston.com/en/company/environmental-compliance

Table 4-4: Kingston SSD OM8TAP4 Safety Compliance Specification

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Electrostatic discharge (ESD) criteria:

Air Discharge: 8KV, Class B;

Contact Discharge: 4KV, Class B

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	GND	Connect to GND
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	GND	Connect to GND
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(Not support)	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.

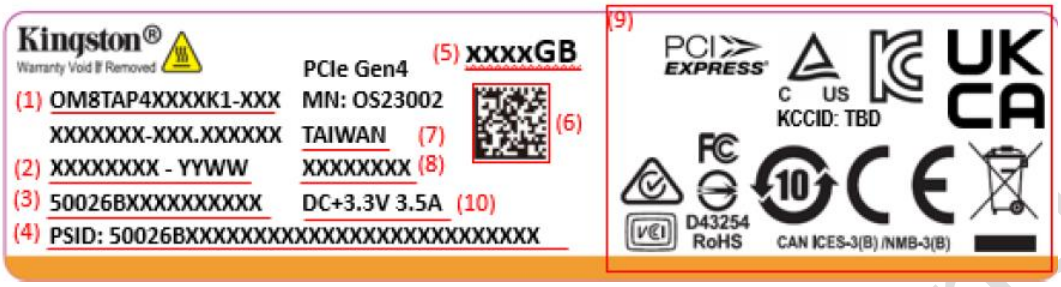

Figure 7-1: Label Sample

No.	Item	Display Sample	Remark
1	SKU	OM8TAP4xxxxK1-Axx	i) KTC SKU number (Part number) ii) XXXX = device capacity (may be 3~4 digits, depending on device capacity)
2	WO / DC	XXXXXXXX - YYWW	
3	Serial Number	50026BXXXXXXXXXX	Format: 50026BXXXXXXXXXX * XXXXXXXXXX: Suffix code
4	PSID	50026BXXXXXXXXXXZZZZZZZZZZZZZZZZ	Format: SN+ZZZZZZZZZZZZZZZZ * ZZZZZZZZZZZZZZZZ: Suffix code
5	Capacity	512GB, 1024GB, 2048GB	
6	2D Barcode	SKU+PSID	
7	Product Made in	TAIWAN / CHINA	
8	Firmware	P4ER3B31	
9	Compliance logos		
10	Current/Voltage	DC+3.3V 3.5A	

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)

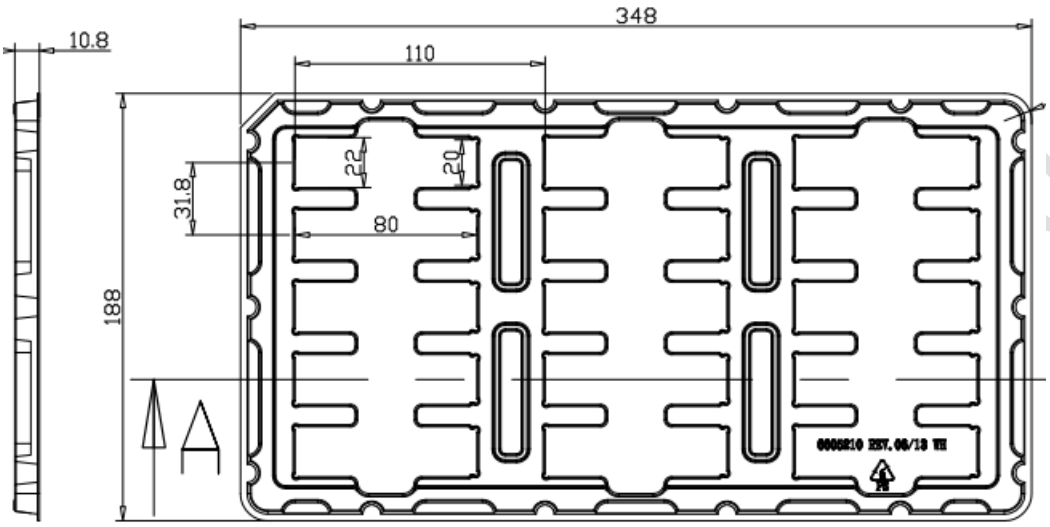

Figure 8-1: Pizza Box

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

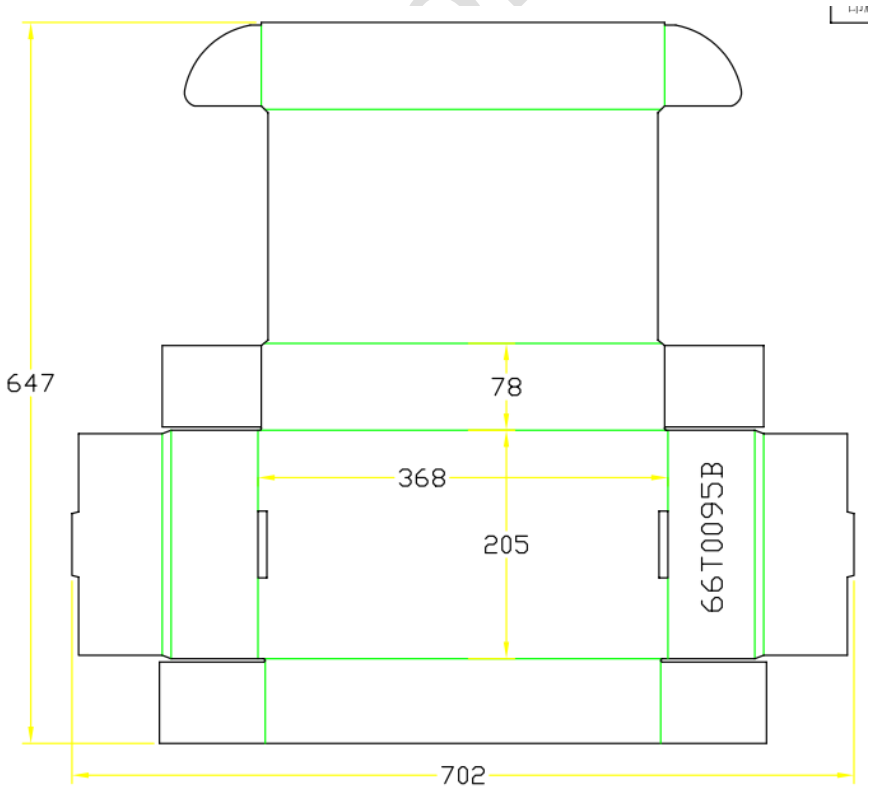

Figure 8-2: Pizza Box

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
Number of Error Information Log Entries	Count

Table 9-1: SMART Attribute