



## Kingston® SSD OM8PGP4 Series

### Product Specification

V1.1

Nov. 2023

#### Part Number Information

OM8PGP4128Q-A0	Capacity: 128GB	M.2 2280	With Kioxia BiCS5 TLC Flash IC FW Version: ELFK00.2
OM8PGP4256Q-A0	Capacity: 256GB	M.2 2280	With Kioxia BiCS5 TLC Flash IC FW Version: ELFK0S.6
OM8PGP4512Q-A0	Capacity: 512GB	M.2 2280	With Kioxia BiCS5 TLC Flash IC FW Version: ELFK0S.6
OM8PGP41024Q-A0	Capacity: 1024GB	M.2 2280	With Kioxia BiCS5 TLC Flash IC FW Version: ELFK0S.6

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## Revision History

Rev.	Date	Changed Contents
V1.0	2022.11.03	First version republished
V1.1	2023.11.24	Add 128GB information

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## 1. Introduction

### 1.1 General Description

The Kingston® SSD OM8PGP4 is designed and built for personal computing machines, providing the mobility, stability, reliability and power loss handling capability. The Kingston® SSD OM8PGP4 utilizes a PCIe Gen4 x4 interface, Non-Volatile Memory Express protocol and adopt PS5021-E21T 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.

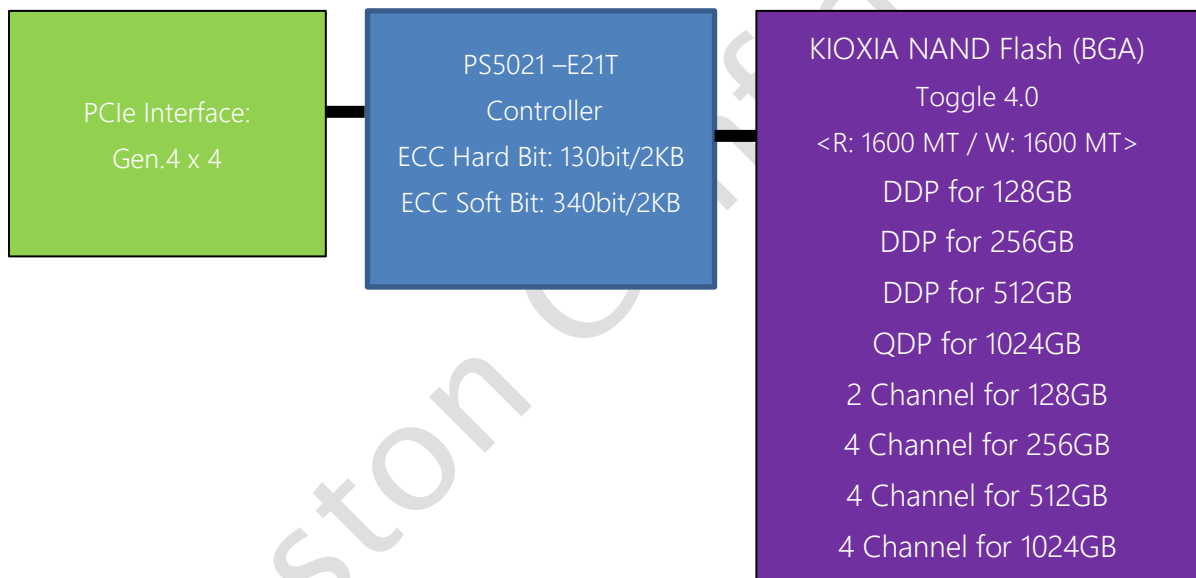


Fig 1-1: Kingston SSD OM8PGP4 Block Diagram

## **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 1.4	Support
Dynamic & Static Wear-Leveling	Support
Background Garbage Collection	Support
Compatible with PCIe I/II/III/IV x 4 interface	Support
Power Management: (1) PS00 (2) PS01 (3) PS02 (4) PS03 (5) PS04	Support

Table 1-1: Kingston SSD OM8PGP4 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 <sup>1</sup>	Total User Addressable Sectors in LBA Mode <sup>2</sup>
128GB	250,069,680
256GB	500,118,192
512GB	1,000,215,216
1024GB	2,000,409,264

Table 2-1: Kingston SSD OM8PGP4 Capacity Specification

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<sup>1</sup> 1 GB = 1,000,000,000 bytes and not all of the memory can be used for storage.

<sup>2</sup> 1 sector = 512 bytes

## 2.2 Fundamental Specification

- ◆ Capacity – supporting unformatted capacities<sup>1</sup> of 128GB, 256GB, 512GB and 1024GB
- ◆ Form-Factor –NGFF-2280, M.2 type
- ◆ Interface – PCIe Gen.4 x4
- ◆ Based on out-of-box performance, speed may vary due to host hardware, software configuration and usage.

### ◆ Performance<sup>2</sup> –

■ Capacity	128GB	256 GB	512 GB	1024 GB
■ Sequential Read	1,800 MB/s	3,900 MB/s	4,700 MB/s	4,700 MB/s
■ Sequential Write	930 MB/s	1,800 MB/s	3,400 MB/s	3,800 MB/s
■ 4K Random Read (QD32)	110 K IOPS	230K IOPs	460K IOPs	690K IOPs
■ 4K Random Write (QD32)	170 K IOPS	410K IOPs	690K IOPs	790K IOPs

### ◆ Power consumption<sup>3</sup> –

■ Capacity	128GB	256 GB	512 GB	1024 GB
■ Maximum Read	1.5W	1.6W	1.6W	1.6W
■ Maximum Write	2.0W	2.9W	4.1W	4.5W
■ Avg. consumption	0.09W	0.06W	0.06W	0.06W
■ L1.2 Substate	1.35mW	1.6mW	1.6mW	1.6mW

<sup>1</sup> 1 GB = 1,000,000,000 bytes and not all of the memory can be used for storage.

<sup>2</sup> Performance data reveal the Max. performance consequence, based on CrystalDiskMark 8.0.4.

the CDM settings is "NVMe SSD", and 1GiB size for 5-cycle test as OS drive under AC mode.

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

<sup>3</sup> Maximum Power bases on IOMeter Read/Write workload. Average bases on MobileMark2018 workload.



## 2.3 Power Specification

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

Table 2-2: Kingston SSD OM8PGP4 Power Specification

## 2.4 Endurance Specification

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

Table 2-3: Kingston SSD OM8PGP4 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 <sup>1</sup> (Terabyte Written)	128GB – 80 TBW
	256GB – 160 TBW
	512GB – 320 TBW
	1024GB – 640 TBW

Table 2-4: Kingston SSD OM8PGP4 Warranty Policy

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<sup>1</sup>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 $\pm$ 0.15mm
Width	22.00mm $\pm$ 0.15mm
Thickness	2.40mm (max)
Height	1.50mm (S3) (max)
Weight	9g (max)

Table 3-1: Mechanical Design Parameters



Figure 3-1: Side View of SSD

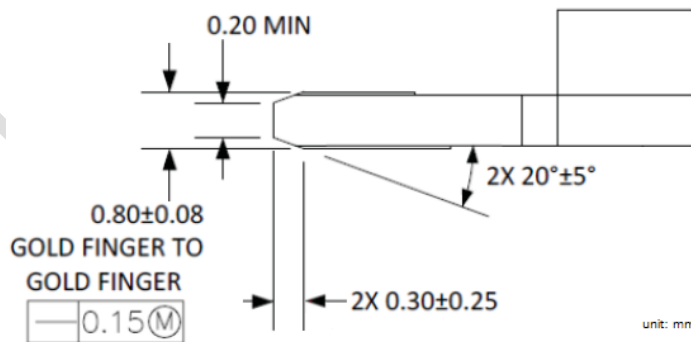


Figure 3-2: Side View of M.2 Connector



Figure 3-3: Top View of SSD

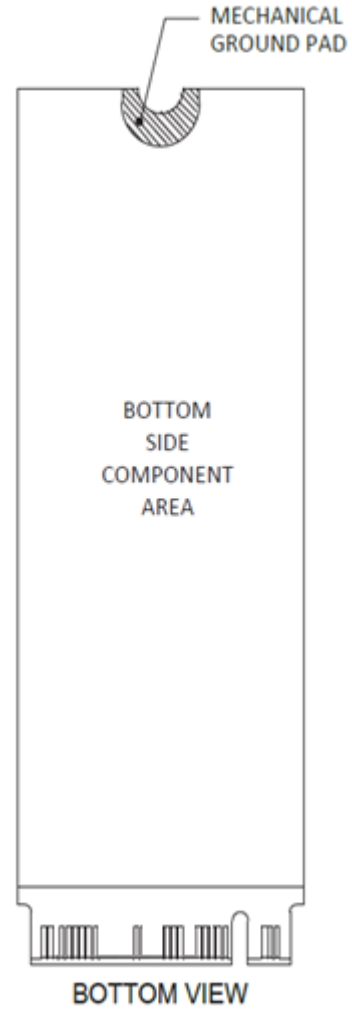


Figure 3-4: Bottom View of SSD

## 4. Environment Specification

### 4.1 Storage Specification

OM8PGP4 SSD is known as the consumer grade storage product.

Environment	Mode	Min	Max	Unit
Temperature <sup>1</sup>	Operating	0	70	°C
	Storage	-40	85	°C
Humidity	Operating		85	%
	Storage		85	%

Table 4-1: Kingston SSD OM8PGP4 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 <sub>rms</sub>
	Non-operating	20-2000Hz	20G <sub>rms</sub>

Table 4-2: Kingston SSD OM8PGP4 Durability Specification

<sup>1</sup> Temperature is measured by sensor, from SMART Attributes.

### 4.3 Safety Compliance Specification

The Kingston SSD OM8PGP4 is certified to comply with the following standards

Certification	Standard
CE	EN 55032:2015+A11:2020 EN 55035:2017+A11:2020
FCC	FCC 47 CFR Part 15, Subpart B: 2020
ICES	ICES-003 Issue 7 (2020)
RCM	AS/NZS CISPR 32:2015
VCCI	VCCI-CISPR 32:2016
BSMI	CNS 13438 (95 full version) Category B or CNS 15936 (full version 105) Class B
CB	CB IEC 62368-1:2018 CB IEC 62368-1:2014
LVD	EN 62368-1:2014+A11:2017 IEC 62368-1:2014
TUV	UL 62368-1:2019 CSA C22.2 NO. 62368-1:19
KCC	KCC KN 32, KN 35
UKCA	BS EN 55032:2015+A11:2020 BS EN 55035:2017+A11:2020
Others	RoHS, REACH/SVHC, California Prop 65

Table 4-3: Kingston SSD OM8PGP4 Safety Compliance Specification

## 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	N/C	No Connect	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	N/C	No Connect
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

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## 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 <sup>1</sup>
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



## 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)

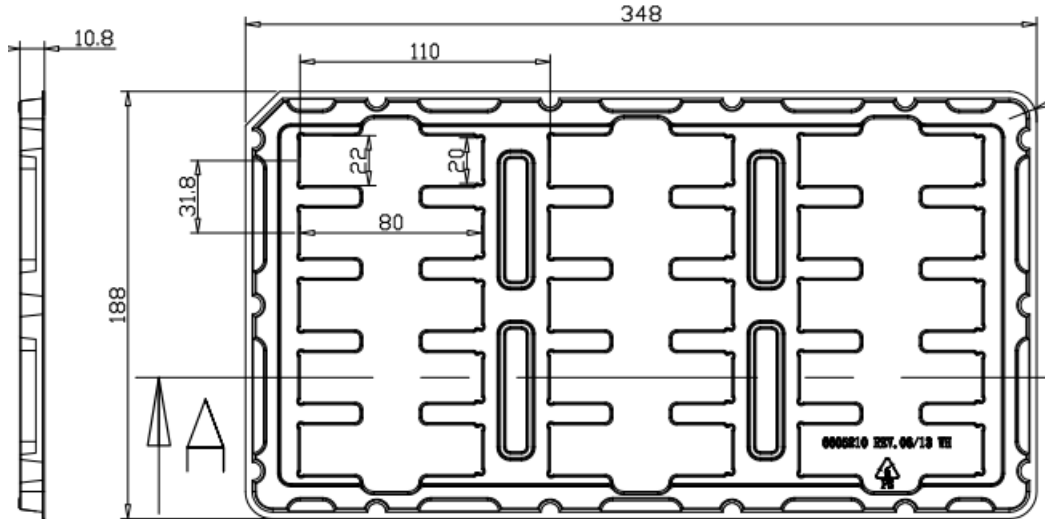


Figure 8-1: Tray

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

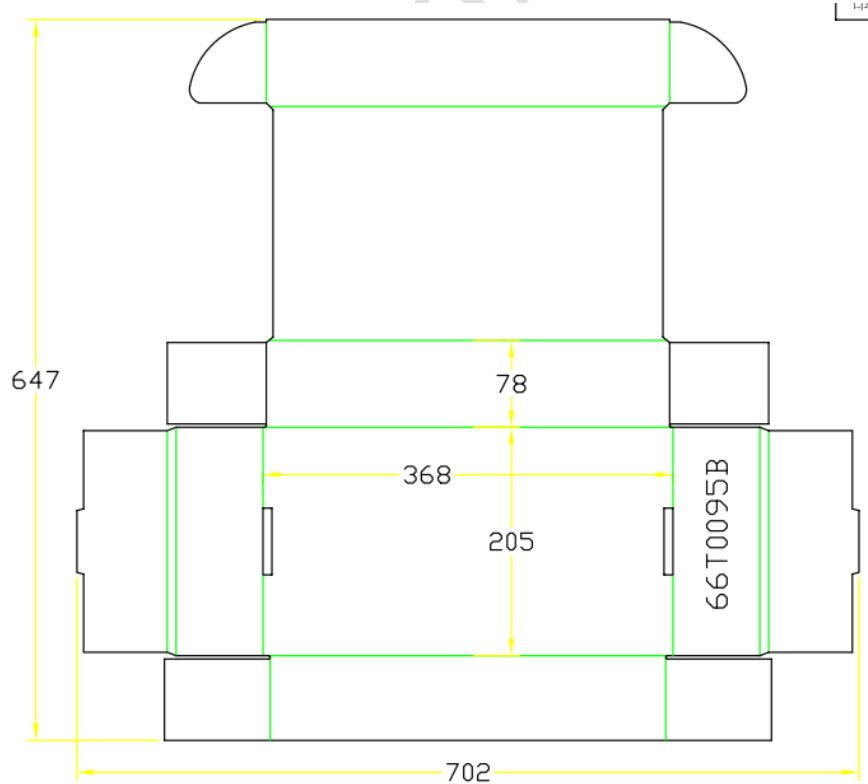


Figure 8-2: Pizza Box

## 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