



# Kanaga M.2 Type 2280 Solid-State Drive

PCIe Gen3 x4 / NVMe 1.4 - Series 3 - Industrial

## KGPM28CE

Datasheet - Rev. 1.0



## 1. Description

SunChip's Kanaga Series 3 M.2 NVMe PCIe solid-state drive (SSD) technology is a performance-oriented solution designed for the unique storage demands and workload requirements of a broad range of industrial embedded systems, including communications equipment, industrial automation, medical imaging, transportation control, and data recorders where read and write demands are higher than typical boot or mixed workload solutions. Kanaga Series 3 M.2 NVMe PCIe solid-state drives are mainstream productivity solutions designed to provide the ideal balance of power, performance, endurance, reliability, long ordering life, and cost all in a rugged industrial design suitable for environmental extremes.

### Features

#### Capacity

- KGPM28CEXI: 40GB, 80GB, 160GB, 320GB
- KGPM28CECI: 120GB, 240GB, 480GB, 960GB

#### NAND: 3D TLC / pSLC

#### Sequential Performance<sup>(1)</sup>

- 128kB Sequential Read: up to 3,150 MB/s
- 128kB Sequential Write: up to 2,000 MB/s

#### Random Performance<sup>(1)</sup>

- 4kB IOPS Read: up to 170,000
- 4kB IOPS Write: up to 210,000

#### Power<sup>(1)</sup>: 3.3V±5%

- 128kB Sequential Read: 3.6 W
- 128kB Sequential Write: 3.1 W
- 4kB Random Read: 2.4 W
- 4kB Random Write: 2.2 W
- Idle: 1 W

#### Temperature Ranges

- Industrial: -40°C to 85°C
- Non-Operating: -40°C to 85°C

#### Reliability

- Advanced LDPC ECC
- MTBF: >2M hours

#### Endurance<sup>(1)</sup>

- JESD219A: 2,560 TBW
- Sequential: 9,750 TBW

#### vtGuard® Power Fail Protection

- Integrated power fail protection
- Preserves static data in the event of power failure
- Cache/buffer contents restored at power-on

#### SMART Attribute Reporting

- Monitors device health
- Anticipates and predicts failures

#### Mechanical Dimensions

- M.2 Type 2280-D2-M Form Factor
- Length x Width x Height mm (inches)  
80.00 (3.14) x 22.00 (0.866) x 2.20 (0.087)

#### Compliance

- PCIe Specification, Revision 3.1a
- NVMe Specification, Revision 1.4
- FCC, CE, UL, RoHS, WEEE

#### Environmental (Non-operating)

- Humidity (non-condensing): 5% to 95%
- Shock: 1500G, half-sine wave, 0.5ms duration

#### Data Security

- Integrated AES-256 encryption (data-at-rest)
- Sanitize Block Erase
- TCG/Opal 2.0 compliant SEDs (Option)

(1) Based on the KGPM28CEXI 320GB device



Electrostatic Discharge (ESD) can damage this device. When handling the device, always wear a grounded wrist strap and use a static dissipative surface.



Any damage to the unit that occurs after its removal from the shipping package and ESD protective bag is the responsibility of the user.

## 2. Specifications

### Capacity

Unformatted Capacity (GB) <sup>(1)</sup>	User-Addressable LBA <sup>(2)</sup>	User-Addressable Capacity (Bytes)
40	78,161,328	40,018,599,936
80	156,301,488	80,026,361,856
120	234,441,648	120,234,441,648
160	312,581,808	160,041,885,696
240	468,862,128	240,057,409,536
320	625,142,448	320,072,933,376
480	937,703,088	480,103,981,056
960	1,875,385,008	960,197,124,096

(1) 1GB = 1,000,000,000 bytes. LBA: Logical Block Address; Logical Block Size = 512 Bytes/1 Sector.  
(2) LBA: Logical Block Address; Logical Block Size = 512 Bytes/1 Sector.

### Performance

Capacity (GB)	Performance Throughput <sup>(1)</sup> 128kB File, Queue Depth (QD) = 64		IOPS <sup>(1)</sup> 4kB File, Queue Depth (QD) = 64	
	Sequential Read MB/s	Sequential Write MB/s	100% Random Read	100% Random Write
<b>KGPM28CEXixxx-yyyy</b>				
40	1,350	650	43,500	140,000
80	2,750	1,300	85,000	270,000
160	3,050	2,000	165,000	285,000
320	3,150	2,000	170,000	210,000
<b>KGPM28CECIxxx-yyyy</b>				
120	1,350	650	43,500	140,000
240	2,750	1,300	85,000	270,000
480	3,050	2,000	165,000	285,000
960	3,150	2,000	170,000	290,000

(1) Performance is based on fresh out-of-box condition formatted with NTFS filesystem and running CrystalDiskMark 8.0.0 with file size 1024MB. Actual results may vary depending on file system, workload, and SSD condition.

### Power Consumption - 3.3V Supply

Capacity (GB)	Sequential Read <sup>(1)</sup> 128kB, QD = 64	Sequential Write <sup>(1)</sup> 128kB, QD = 64	Random Read <sup>(1)</sup> 4kB, QD = 64	Random Write <sup>(1)</sup> 4kB, QD = 64	Idle	Unit
<b>KGPM28CEXixxx-yyyy</b>						
40	2.20	1.80	1.50	1.55	1.0	W
80	3.30	2.50	1.70	1.80	1.0	W
160	3.50	3.10	2.15	1.90	1.0	W
320	3.60	3.10	2.40	2.20	1.0	W
<b>KGPM28CECIxxx-yyyy</b>						
120	2.20	1.80	1.50	1.55	1.0	W
240	2.50	2.00	1.70	1.80	1.0	W
480	3.50	3.10	2.15	1.90	1.0	W
960	3.60	3.10	2.40	2.20	1.0	W

(1) Power consumption tests were done using Oakgate test system at 25°C

## Temperature and Humidity

Part Number	Operating Temperature	Non-Operating <sup>(1)</sup> Temperature	Humidity (Non-Condensing)
VTPM28CEIxxx-yyyy	-40°C to 85°C	-40°C to 85°C	5% to 95%
VTPM28CECIxxx-yyyy	-40°C to 85°C	-40°C to 85°C	5% to 95%

(1) Maximum non-operating temperature assumes data is stored on the SSD. Temperatures above 85°C are beyond NAND specification for data retention. Please see *Temperature Considerations for Industrial Embedded SSDs* whitepaper under the industrial SSD section of Virtium website (Virtium.com)

## Shock and Vibration

Reliability	Test Conditions	Reference Standards
Shock	1500G, half-sine wave, 0.5ms duration	JESD22-B110B.01
Vibration	20G, 20 Hz to 2000 Hz	JESD22-B103B.01

## Interface

Interface	PCI Express Base Specification Rev 3.1a
Protocol	NVM Express Revision 1.4

### 3. Reliability

#### Endurance

KGPM28CEIxxx-yyyy				
Capacity (GB)	JESD218A <sup>(1)</sup> & JESD219 Enterprise Workloads		100% Sequential Workloads	
	Total Bytes Written TBW (TB)	Drive Writes per day (5 years)	Total Bytes Written TBW (TB)	Drive Writes per day (5 years)
40	300	4.11	1,200	16.43
80	640	4.38	2,440	16.71
160	1,280	4.38	4,850	16.61
320	2,560	4.38	9,750	16.69

(1) JESD218A assumes an active temperature at 55°C and a retention temperature at 40°C

KGPM28CEIxxx-yyyy				
Capacity (GB)	JESD218A <sup>(1)</sup> & JESD219 Enterprise Workloads		100% Sequential Workloads	
	Total Bytes Written TBW (TB)	Drive Writes per day (3 years)	Total Bytes Written TBW (TB)	Drive Writes per day (3 years)
120	96	0.73	360	2.74
240	192	0.73	730	2.78
480	384	0.73	1,460	2.78
960	768	0.73	2,920	2.78

(1) JESD218A assumes an active temperature at 55°C and a retention temperature at 40°C

#### Mean Time Between Failures (MTBF)

The SSD achieves a MTBF of greater than 2,000,000 hours predicted and is derived from the component reliability data using Telcordia SR-332 methods at 40°C and tested under standard environmental operating conditions.

#### vtGuard® Power-Fail Protection

vtGuard is an integrated power failure protection technology that will preserve data on the SSD if a sudden power failure should occur. It will also transfer the write cache (metadata, mapping tables) contents to the non-volatile flash and restore the contents upon power restoration. This data will be preserved regardless of the duration of the power failure event. This technology also ensures that the SSD will be recoverable after sudden power failure events although a rebuild of the mapping tables may delay readiness of the SSD on the ensuing power cycle on larger capacities.