Kanaga 2.5-Inch SATA Solid-State Drive

Series 6 (Gen2), SATA-III (6Gb/s), Industrial

KGS250AB

Datasheet - Rev. 1.1

1. Description

SunChip’s Kanaga Series 6 2.5” is high-performance SATA-III 6Gb/s embedded solid-state drive (SSD) technology designed for the unique capacity and workload requirements of a broad range of embedded systems, including telco and networking, industrial PC and automation, test and measurement, medical diagnostics and imaging, transportation, defense command and control, self-serve kiosk and POS, security and surveillance, and data recorders.

Features

Capacity
- KGS250ABXI: 80GB, 160GB, 320GB, 640GB
- KGS250ABCI: 240GB, 480GB, 960GB, 1920GB

NAND: 3D TLC / pSLC (BiCS5)

Sequential Performance(1)
- 128kB Sequential Read: 560 MB/s (QD: 32)
- 128kB Sequential Write: 490 MB/s (QD: 32)

Random Performance(1)
- 4kB IOPS Read: up to 70,500 (QD: 32)
- 4kB IOPS Write: up to 79,600 (QD: 32)

Power(1): 5.0V ±10%
- 128kB Sequential Read: 1.8 W
- 128kB Sequential Write: 2.1 W
- 4kB Random Read: 1.7 W
- 4kB Random Write: 2.0 W
- Idle: 0.7 W **Temperature Ranges**
- Industrial: -40ºC to 85ºC
- Non-Operating: -40ºC to 85ºC **Reliability**
- Advanced LDPC ECC
- MTBF: >2M hours **Endurance(1)**
- JESD219A: 3,315 TBW
- Sequential: 19,920 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
- 2.5-Inch Form Factor
- Length x Width x Height mm (inches) 100.5 (3.96) x 69.85 (2.75) x 7.0 (0.275)

Compliance
- SATA Revision 3.1 (SATA-III 6Gb/s)
- ATA/ATAPI-8 (ACS-3)
- FCC, CE, UL, RoHS, WEEE

Environmental (Non-operating)
- Humidity (non-condensing): 5% to 95%
- Shock: 1500G, half-sine wave, 0.5ms duration
- Vibration: 20G, 20 Hz to 2000 Hz

Data Security
- Integrated AES-256 encryption (data-at-rest)
- Sanitize Crypto Erase
- Sanitize Block Erase
- TCG/ Opal 2.0-compliant SED (Option)

(1) Based on the KGS250ABXI 640GB 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[1] (GB)	User-Addressable LBA[2]	User-Addressable Capacity Bytes
80	156,301,488	80,026,361,856
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
640	1,250,263,728	640,135,028,736
960	1,875,385,008	960,197,124,096
1920	3,750,748,848	1,920,383,410,176

(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[1] 128kB File, Queue Depth (QD) = 32		IOPS[1] 4kB File, Queue Depth (QD) = 32	
	Sequential Read MB/s	Sequential Write MB/s	100% Random Read	100% Random Write
KGS250ABXIxxx-0011				
80	564	442	67,200	79,100
160	564	452	70,300	70,400
320	564	452	70,200	69,000
640	560	490	70,500	79,600
KGS250ABCIxxx-0011				
240	560	150	51,600	37,900
480	560	320	73,900	68,000
960	560	500	76,500	68,100
1920	560	490	77,000	66,000

(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 - 5V Supply

Capacity (GB)	Sequential Read[1] 128kB, QD = 32	Sequential Write[1] 128kB, QD = 32	Random Read[1] 4kB, QD = 32	Random Write[1] 4kB, QD = 32	Idle	Unit
KGS250ABXIxxx-0011						
80	1.6	1.8	1.6	1.7	0.6	W
160	1.6	1.9	1.6	1.9	0.7	W
320	1.6	1.9	1.6	1.9	0.6	W
640	1.8	2.1	1.7	2.0	0.7	W
KGS250ABCIxxx-0011						
240	1.7	2.0	1.8	1.9	0.5	W
480	1.8	2.4	1.9	2.2	0.5	W
960	1.8	2.8	1.8	2.4	0.5	W
1920	1.8	2.8	1.8	2.4	0.5	W

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

Temperature and Humidity

Part Number	Operating Temperature	Non-Operating (1) Temperature	Humidity (Non-Condensing)
KGS250ABXIxxx-0011	-40ºC to 85ºC	-40ºC to 85ºC	5% to 95%
KGS250ABCIxxx-0011	-40ºC to 85ºC	-40ºC to 85ºC	5% to 95%

(1) Maximum non-operating temperature assumes data is stored on the SSD. Temperatures above 85ºC 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

3. Reliability

Endurance

KGS250ABXIxxx-0011				
Capacity (GB)	JESD218A(1) & 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)
80	601	4.11	2,547	17.44
160	1,124	3.84	5,049	17.29
320	1,909	3.26	9,940	17.02
640	3,315	2.83	19,920	17.05

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

KGS250ABCIxxx-0011				
Capacity (GB)	JESD218A(1) & 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)
240	60	0.23	670	2.55
480	270	0.52	1,430	2.73
960	670	0.63	2,970	2.82
1920	1,490	0.71	5,650	2.70

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

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 40ºC 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.