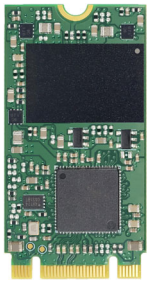
Kanaga M.2 Type 2242 SATA Solid-State Drive

Series 3 (Gen1), SATA-III (6Gb/s), 3D TLC

KGFEM4C (C/I) 30GB – 240GB

Datasheet - Rev. 1.0



1. Description

SunChip's Kanaga Series 3 M.2 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 networking, industrial automation, medical monitoring and gaming equipment, point-of-sale terminals and data recorders.

Features

Capacity
- 30GB, 60GB, 120GB, 240GB

3D TLC NAND

Sequential Performance(1)
- 128kB Sequential Read: 540 MB/s (QD: 32)
- 128kB Sequential Write: 520 MB/s (QD: 32)

Random Performance(1)
- 4kB IOPS Read: up to 65,000
- 4kB IOPS Write: up to 72,000

Voltage Supply: 3.3V±5%

Power Consumption(1)
- 128kB Sequential Read: 1.20 W
- 128kB Sequential Write: 1.30 W
- 4kB Random Read: 1.30 W
- 4kB Random Write: 1.40 W
- Idle: 0.40 W

Temperature Ranges
- Commercial: 0ºC to 70ºC
- Industrial: -40ºC to 85ºC
- Non-Operating: -40ºC to 85ºC

Reliability
- Advanced LDPC ECC
- MTBF: >2M hours

Endurance(1)
- JESD219A: 214 TBW
- Sequential: 370 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 2242-D2-B-M Form Factor
- Length x Width x Height mm (inches)
  42.00 (1.650) x 22.00 (0.866) x 2.60 (0.102)

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)
- ATA Security Erase

(1) Based on the 240GB 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)[1]	User-Addressable LBA[2]	User-Addressable Capacity Bytes
30	58,626,288	30,016,659,456
60	117,231,408	60,022,480,896
120	234,441,648	120,034,123,776
240	468,862,128	240,057,409,536

(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
30	490	270	30,000	63,000
60	500	270	30,000	63,000
120	540	460	37,000	71,000
240	540	510	55,000	72,000

(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[1] 128kB, QD = 32	Sequential Write[1] 128kB, QD = 32	Random Read[1] 4kB, QD = 32	Random Write[1] 4kB, QD = 32	Idle	Unit
30	1.20	1.30	1.30	1.40	0.40	W
60	1.50	1.40	1.20	1.20	0.40	W
120	1.20	1.30	1.30	1.40	0.40	W
240	1.20	1.30	1.30	1.40	0.40	W

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

Temperature and Humidity

Part Number	Operating Temperature	Non-Operating [1] Temperature	Humidity (Non-Condensing)
VSFEM4CCxxxG-V11	0ºC to 70ºC	-40ºC to 85ºC	5% to 95%
VSFEM4CIxxxG-V11	-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

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)
30	17	0.50	40	1.20
60	45	0.68	86	1.30
120	98	0.74	180	1.37
240	214	0.80	370	1.40
(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.