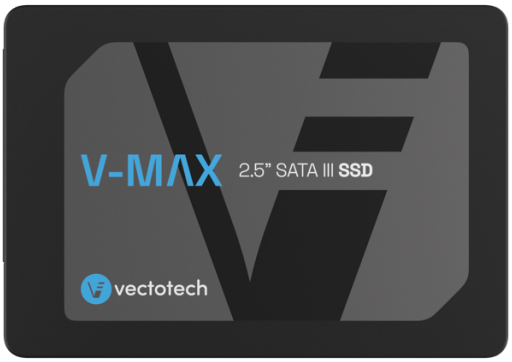
V-MAX 2.5” SATA SSD Specification

3 YEAR WARRANTY



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Product Overview

- **Capacity**
  - 4000GB
- **Form Factor**
  - 2.5 Inch
- **SATA Interface**
  - SATA III
- **Compliance**
  - SATA Revision 3.2
- **Flash Interface**
  - Transfer rate up to 533MBps
  - Up to 16pcs of BGA132/LGA152 flash
- **Performance**
  - Read: up to 550 MB/s
  - Write: up to 530 MB/s
- **Reliability**
  - Mean Time Between Failure (MTBF) 1.5 million hours
  - Uncorrectable Bit Error Rate (UBER) < 1 sector per 10^{16} bits read
- **Advanced Flash Management**
  - Advanced Wear Leveling
  - Bad Block Management
  - TRIM
  - SMART
  - Over-Provision
  - Firmware Update
- **Power Consumption[2]**
  - Active < 3.2 W
  - Idle < 1.5 W
- **Temperature Range[3]**
  - Operation: 0°C ~ 70°C
  - Storage: -40°C ~ 85°C
- **RoHS compliant**
- **Features Support List:**
  - End to end data path protection
  - Thermal throttling
  - SmartECC™
  - SmartRefresh™
  - Drive log

Notes:

1. Refer to Chapter 2 for more details
2. Refer to Chapter 4, Section 4.2 Power Consumption for more details.
3. Operation temperature is measured by device temperature sensor.

Capacity	Flash Structure	Performance				Power Consumption		
		CrystalDiskMark		ATTO		Read (W)	Write (W)	Idle (W)
		Read (MB/s)	Write (MB/s)	Read (MB/s)	Write (MB/s)			
4000GB	512GBx8, KIC BiCS4	550	530	550	530	2.8	3.2	1.5

NOTES:

1. Performance is measured based on the following conditions:
   A. CrystalDiskMark 6.0.0, 1GB range, QD=32
   B. IOMeter, 1GB range, 4K data size, QD=32
   C. ATTO, transfer Size 8192 KB
2. Power consumption is measured during the sequential read and write operations performed by CrystalDiskMark

- **Capacity**
  - 4,000GB
- **Electrical/Physical Interface**
  - Compliant with SATA Revision 3.2
  - Compatible with SATA 1.5Gbps, 3Gbps and 6Gbps interface
  - Support power management
  - Support expanded register for SATA protocol 48 bits addressing mode
- **Supported NAND Flash**
  - Support up to 32 Flash Chip Enables (CE) within a single design
  - Support up to 16pcs of BGA132/LGA152 flash
  - Support 8-bit I/O NAND Flash
  - Support ONFI 2.3, ONFI 3.0, ONFI 3.2 and ONFI 4.0 interface
    - KIC BiCS4 TLC
- **ECC Scheme**
  - V-MAX SSD applies LDPC of ECC algorithm.
- **Supported Sector size**
  - 512 Bytes
- **UART / GPIO**
- **Support SMART and TRIM commands**
- **LBA Range**
  - IDEMA standard

Capacity	Configuration	Flash Type	TBW
4000GB	512GBx8	BiCS4 TLC, 512Gb ODP	13685

NOTES:

1. TBW may differ according to flash configuration and platform.
2. The test followed JEDEC219A client endurance workload.
3. The endurance of SSD could be estimated based on user behavior, NAND endurance cycles, and write amplification factor. It is not guaranteed by flash vendor.

■ **Performance**

Capacity	Flash Structure	Flash Type	Sequential (CDM)		Random (1GB Burst)	
			Read (MB/s)	Write (MB/s)	Read (IOPS)	Write (IOPS)
4000GB	512GBx8	BiCS4 TLC, 512Gb ODP	550	530	98K	88K

NOTES:

1. Performance may differ according to flash configuration and platform.
2. The tables are for reference only. Any criteria for accepting goods shall be further discussed based on different flash configurations.
3. Performance is measured with the following conditions
   (a) CrystalDiskMark 6.0.0, 1GB range, QD=32
   (b) IOMeter, 1GB range, 4K data size, QD=32

3.1. Environmental Conditions

3.1.1. Temperature and Humidity

Table 3-1 High Temperature Test Condition

	Temperature	Humidity
Operation	70°C[1]	0% RH
Storage	85°C	0% RH

Table 3-2 Low Temperature Test Condition

	Temperature	Humidity
Operation	0°C	0% RH
Storage	-40°C	0% RH

Table 3-3 High Humidity Test Condition

	Temperature	Humidity
Operation	40°C	90% RH
Storage	40°C	93% RH

Table 3-4 Temperature Cycle Test

	Temperature
Operation	0°C
	70°C[1]
Storage	-40°C
	85°C

NOTES:

1. Operation temperature is measured by device temperature sensor. Airflow is suggested and it will allow device to be operated at appropriate temperature for each component during heavy workloads environment.

3.1.2. Shock

Table 3-5 Shock

	Acceleration Force	Number of Shock
Non-operational	1500G	6 faces of each unit, 3 times for each face

3.1.3. Vibration

Table 3-6 Vibration

	Condition	
	Frequency/Displacement	**Frequency/Acceleration**
Non-operational	20Hz~80Hz/1.52mm	80Hz~2000Hz/20G

3.1.4. Drop

Table 3-7 Drop

	Height of Drop	Number of Drop
Non-operational	80cm free fall	6 face of each unit

3.1.5. Bending

Table 3-8 Bending

	Force	Action
Non-operational	≥ 50N	Hold 1min/5times

3.1.6. Durability

Table 3-9 Durability

	Condition
Non-operational	1000 mating cycles

3.1.7. Electrostatic Discharge (ESD)

Table 3-10 V-MAX 2.5'' SATA SSD Contact ESD Specification

Device	Capacity	Temperature	Relative Humidity	+/- 4KV	Result
2.5'' SSD	4000GB	24.0°C	49% (RH)	Device functions are affected, but EUT will be back to its normal or operational state automatically.	PASS

3.1.8. EMI Compliance

- FCC: CISPR22
- CE: EN55022

3.2. MTBF

MTBF, Mean Time Between Failures, is a measure of reliability of a device. Its value represents the average time between a repair and the next failure. The unit of MTBF is in hours. The higher the MTBF value, the higher the reliability of the device.

Our MTBF result is based on simulation software (Brand/Model). Please note that a lower MTBF should be expected for higher capacity drives, and we apply the lowest MTBF for all capacities.

3.3. Certification & Compliance

- RoHS
- WHQL
- SATA Revision 3.2

4.1. Supply Voltage

Table 4-1 Supply Voltage of V-MAX 2.5'' SATA SSD

	2.5" SSD
Parameter	**Rating**
Operating Voltage	5V, + / - 5%
Rise Time (Max/Min)	100 ms / 0.1 ms
Fall Time (Max/Min)	1 s / 10 ms
Min. Off Time	5 s

4.2. Power Consumption

Table 4-2 Power Consumption

Capacity	Flash Structure	CE#	Read (W)	Write (W)	Idle (W)
4000GB	BiCS4 TLC, 512GBx8	64	2.8	3.2	1.5

NOTES:

1. Based on SCEMHxxx-series under ambient temperature.
2. Use CrystalDiskMark 6.0.0 with the setting of 1000MB. Sequentially read and write the disk for 5 times, and measure power consumption during sequential Read [1/5]~[5/5] or sequential Write [1/5]~[5/5]
3. Power Consumption may differ according to flash configuration and platform.
4. The measured power voltage is 5V.

Dimension: 100mm (L) x 69.85mm (W) x 7.00mm (H)

