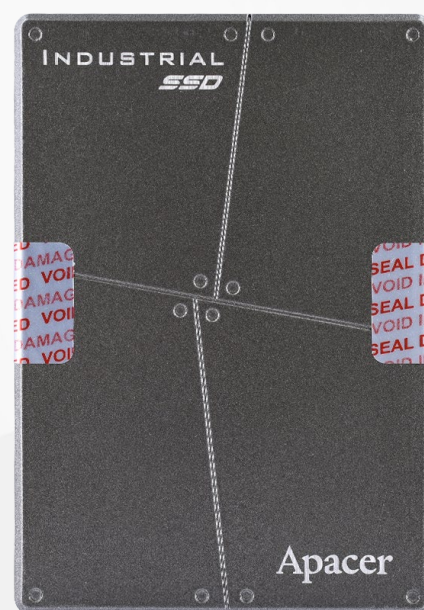
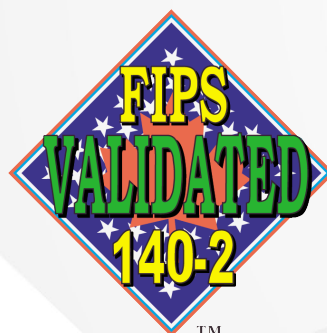


RoHS Compliant

FIPS 140-2 Serial ATA Flash Drive

SV240-25 BiCS5 Product Specifications



May 24, 2023

Version 1.1



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Specifications Overview:

- **Compliance with SATA Revision 3.2**
 - SATA 6 Gb/s interface
 - Backward compatible with SATA 1.5 and 3 Gb/s interfaces
 - ATA command set-4 (ACS-4)
- **Capacity**
 - 240, 480, 960, 1920 GB
- **Performance¹**
 - Burst read/write: 600 MB/sec
 - Sequential read: Up to 560 MB/sec
 - Sequential write: Up to 500 MB/sec
 - Random read (4K): Up to 94,000 IOPS
 - Random write (4K): Up to 80,000 IOPS
- **Flash Management**
 - Low-Density Parity-Check (LDPC) Code
 - Global Wear Leveling
 - Flash bad-block management
 - Flash Translation Layer: Page Mapping
 - S.M.A.R.T.
 - DataDefender™
 - ATA Secure Erase
 - Device Sleep
 - TRIM
 - Hyper Cache Technology
 - Over-provisioning
 - DataRAID™
 - SMART Read Refresh™
- **NAND Flash Type: 3D TLC (BiCS5)**
- **MTBF: >3,000,000 hours**
- **Endurance (in drive writes per day: DWPD)**
 - 240 GB: 2.20 DWPD
 - 480 GB: 2.20 DWPD
 - 960 GB: 2.18 DWPD
 - 1920 GB: 2.2 DWPD
- **Temperature Range**
 - Operating:
 - Standard: 0°C to 70°C
 - Wide: -40°C to 85°C
 - Storage: -55°C to 100°C
- **Supply Voltage**
 - 5V ± 10%
- **Power Consumption¹**
 - Active mode (Max.): 405 mA
 - Idle mode: 60 mA
- **SATA Power Management Modes**
- **DRAM Cache for Enhanced Random Performance**
- **Connector Type**
 - 7-pin SATA signal connector
 - 15-pin SATA power connector
- **Form Factor**
 - 2.5"
 - Dimensions: 100.00 x 69.84 x 9.30, unit: mm
 - Net weight: 95g ± 5%
- **Security**
 - AES 256-bit hardware encryption
 - Trusted Computing Group (TCG) Opal 2.0
- **Reliability**
 - Thermal Sensor
 - Thermal Throttling
 - End-to-End Data Protection
- **FIPS 140-2 Level 2 Certified: certificate number #4386**
- **RoHS Compliant**

Note:

1. Varies from capacities. The values for performances and power consumptions presented are typical and may vary depending on flash configurations or platform settings. The term idle refers to the standby state of the device.

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1. General Description

Apacer's SV240-25 is a solid-state drive with military-grade encryption that conforms to the FIPS 140-2 Level 2 cryptographic standard, designed as the standard 2.5" form factor and compliant with SATA III standard with excellent performance. Utilizing 3D NAND for higher capacity up to 1920GB and providing more power efficiency than 2D NAND, the hardware encrypted SSD provides enhanced data security and delivers exceptional read/write speed, making it the ideal solution for industries that require the high demand for FIPS 140-2 Certification.

The FIPS 140-2 validated SV240-25 incorporates a variety of cutting-edge technologies featuring multiple approaches to data protection. Designed and built under the rigorous testing verification process conducted by the National Institute of Standards for Technology (NIST), the FIPS validation provides the strength of encryption algorithms, unbreakable user authentication methods and secure Data Encryption Key (DEK) management to eliminate the most sophisticated cybersecurity threats. The Level 2 validation ensures tamper-evidence through the use of special coatings, seals and labels to prevent security information from being detected. The SSD also delivers enhanced data security storage by implementing the AES 256-bit hardware encryption and Opal specifications.

In addition to data safety, SV240-25 also features a variety of reliability features implemented on both hardware and firmware levels. On the hardware level, SV240-25 is built with not only a powerful SATA controller that supports on-the-module ECC as well as LDPC (Low Density Parity Check) ECC engine to extend SSD endurance and increase data reliability, but also a built-in thermal sensor to monitor the temperature of the SSD via S.M.A.R.T health monitoring and configured with thermal throttling to dynamically adjust frequency scaling to enhance data reliability and provide sustained performance while overheating.

On the firmware level, SV240-25 comes with an error-checking mechanism called End-to-End Data Protection to ensure all data in transit is protected against transient errors, thereby enhancing protection as well as the trustworthiness and reliability of the drive. SMART Read Refresh helps avoid read disturbances and ensure the health of all blocks in the NAND flash, thereby extending the expected operational lifetime multiplied by Global Wear Leveling. Data integrity and stability of data transmission can be further guaranteed by DataDefender, ensuring that products are protected from power disruptions and can function smoothly even in harsh environments. Moreover, the level of protection against data loss increases with DataRAID to provide fault tolerance and improve data availability in the event of a drive failure. With these technologies available for employment, mission-critical data is safeguarded against unauthorized access and protected from errors and power outages at all times, and no data will be compromised as SV240-25 adheres to the FIPS 140-2 Level 2 standard.

Apacer SV240-25 is a military-grade industrial SSD designed for security-conscious companies and organizations that require high standard for data cryptography. With exceptional performance, enhanced security and reliability features, SV240-25, combined with the capability for customization, provides industry-best secure SSD solutions with FIPS 140-2 validation for customers ranging from government, defense and healthcare sectors to financial institutions to tailor to their needs.

2. Functional Block

Apacer SV240-25 includes a single-chip controller designed with a DRAM and flash media. The controller integrates the flash management unit to support multi-channel, multi-bank flash arrays. Figure 2-1 shows the functional block diagram.

Note: The actual number of NAND flash used on Apacer SV240-25 varies from capacities. The illustration is for reference only.

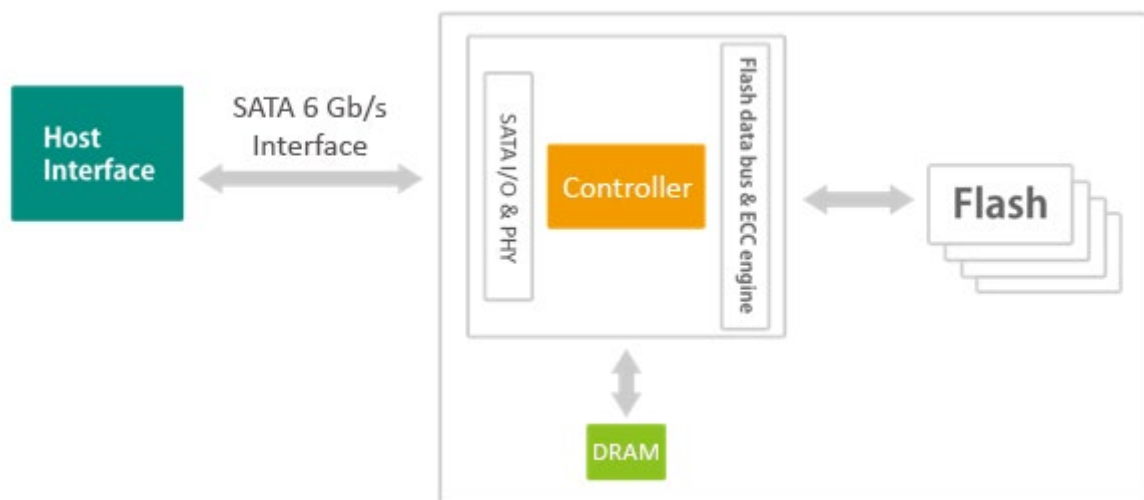


Figure 2-1 Functional Block Diagram

3. Pin Assignments

Table 3-1 describes the signal segment, and Table 3-2, power segment.

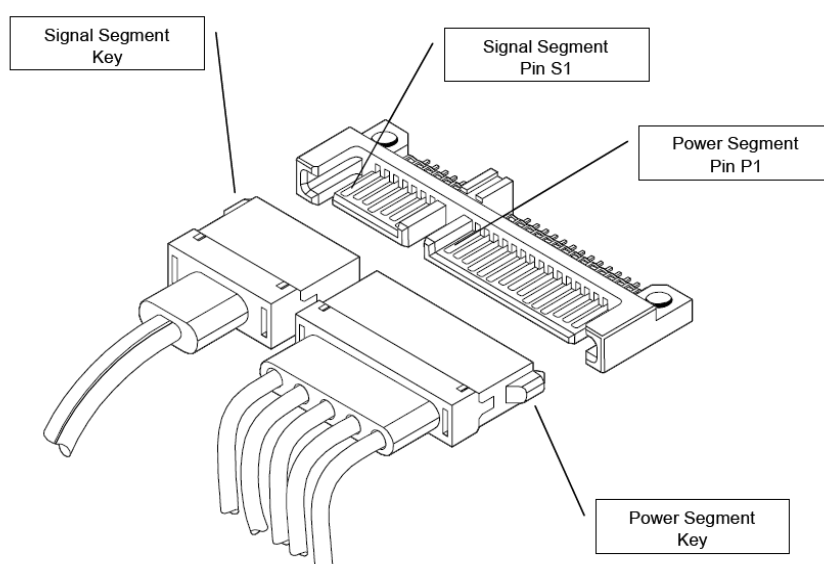


Figure 3-1 SATA Connectors

Table 3-1 Signal Segment

| Pin | Type | Description |
|-----|------|--------------------------------|
| S1 | GND | |
| S2 | RxP | + Differential Receive Signal |
| S3 | RxN | - Differential Receive Signal |
| S4 | GND | |
| S5 | TxN | - Differential Transmit Signal |
| S6 | TxP | + Differential Transmit Signal |
| S7 | GND | |

Table 3-2 Power Segment

| Pin | Signal/Description |
|-----|---|
| P1 | Unused (3.3V) |
| P2 | Unused (3.3V) |
| P3 | Device Sleep |
| P4 | Reserved for Apacer use only ¹ |
| P5 | Ground |
| P6 | Ground |
| P7 | 5V |
| P8 | 5V |
| P9 | 5V |
| P10 | Ground |
| P11 | Reserved for Apacer use only ¹ |
| P12 | Ground |
| P13 | Unused (12V) |
| P14 | Unused (12V) |
| P15 | Unused (12V) |

Note:

1. Reserved by Apacer, please do not connect to a host.

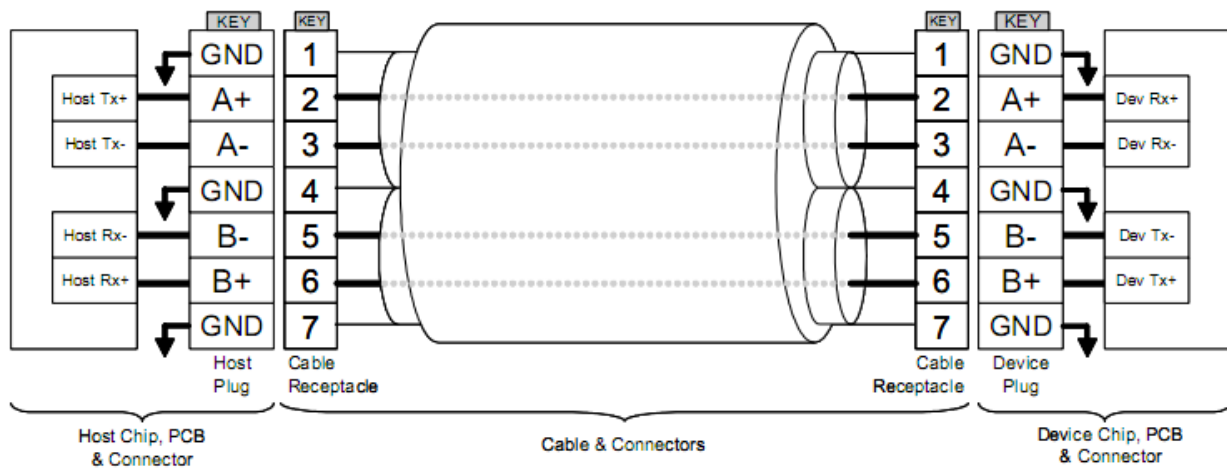


Figure 3-2 SATA Cable/Connector Connection Diagram

The connector on the left represents the Host with TX/RX differential pairs connected to a cable. The connector on the right shows the Device with TX/RX differential pairs also connected to the cable. Notice also the ground path connecting the shielding of the cable to the Cable Receptacle.

4. Product Specifications

4.1 Capacity

Capacity specifications of SV240-25 are available as shown in Table 4-1. It lists the specific capacity and the default numbers of heads, sectors and cylinders for each product line.

Table 4-1 Capacity Specifications

| Capacity | Total bytes | Cylinders | Heads | Sectors | Total LBA |
|----------|-------------------|-----------|-------|---------|---------------|
| 240 GB | 240,057,409,536 | 16,383 | 16 | 63 | 468,862,128 |
| 480 GB | 480,103,981,056 | 16,383 | 16 | 63 | 937,703,088 |
| 960 GB | 960,197,124,096 | 16,383 | 16 | 63 | 1,875,385,008 |
| 1920 GB | 1,920,383,410,176 | 16,383 | 16 | 63 | 3,750,748,848 |

Notes:

- Display of total bytes varies from operating systems.
- 1 GB = 1,000,000,000 bytes; 1 sector = 512 bytes.
- LBA count addressed in the table above indicates total user storage capacity and will remain the same throughout the lifespan of the device. However, the total usable capacity of the SSD is most likely to be less than the total physical capacity because a small portion of the capacity is reserved for device maintenance usages.

4.2 Performance

Performance of SV240-25 is listed below in Table 4-2.

Table 4-2 Performance Specifications

| Capacity \ Performance | 240 GB | 480 GB | 960 GB | 1920 GB |
|--------------------------------|--------|--------|--------|---------|
| Sequential Read (MB/s) | 560 | 560 | 560 | 560 |
| Sequential Write (MB/s) | 470 | 485 | 500 | 490 |
| 4K Random Read (IOPS) | 73,000 | 94,000 | 94,000 | 94,000 |
| 4K Random Write (IOPS) | 80,000 | 80,000 | 80,000 | 80,000 |

Notes:

- Results may differ from various flash configurations or host system setting.
- Sequential read/write is based on CrystalDiskMark 8.0.4 with file size 1,000MB.
- Random read/write is measured using IOMeter with Queue Depth 32.

4.3 Environmental Specifications

Environmental specifications of SV240-25 product are shown in Table 4-3.

Table 4-3 Environmental Specifications

| Parameter | Type | Specifications |
|-------------|---------------|---|
| Temperature | Operating | 0°C to 70°C (Standard); -40°C to 85°C (Wide) |
| | Non-operating | -55°C to 100°C |
| Vibration | Operating | 7.69 GRMS, 20~2000 Hz/random (compliant with MIL-STD-810G) |
| | Non-operating | 4.02 GRMS, 15~2000 Hz/random (compliant with MIL-STD-810G) |
| Shock | Operating | Acceleration, 50(G)/11(ms)/half sine (compliant with MIL-STD-202G) |
| | Non-operating | Acceleration, 1500(G)/0.5(ms)/half sine (compliant with MIL-STD-883K) |

Note: This Environmental Specification table indicates the conditions for testing the device. Real world usages may affect the results.

4.4 Mean Time Between Failures (MTBF)

Mean Time Between Failures (MTBF) is predicted based on reliability data for the individual components in SV240-25. The prediction result for SV240-25 is more than 3,000,000 hours.

Note: The MTBF is predicated and calculated based on "Telcordia Technologies Special Report, SR-332, Issue 3" method.

4.5 Certification and Compliance

SV240-25 complies with the following standards:

- CE
- UKCA
- FCC
- RoHS
- MIL-STD-810G

4.6 Endurance

The endurance of a storage device is predicted by Drive Writes Per Day based on several factors related to usage, such as the amount of data written into the drive, block management conditions, and daily workload for the drive. Thus, key factors, such as Write Amplifications and the number of P/E cycles, can influence the lifespan of the drive.

Table 4-4 Endurance Specifications

| Capacity | Drive Writes Per Day |
|----------|----------------------|
| 240 GB | 2.20 |
| 480 GB | 2.20 |
| 960 GB | 2.18 |
| 1920 GB | 2.2 |

Notes:

- This estimation complies with JEDEC JESD-219, Enterprise endurance workload of random data with payload size distribution.
- Flash vendor guaranteed 3D NAND TLC P/E cycle: 3K
- WAF may vary from capacity, flash configurations and writing behavior on each platform.
- 1 Terabyte = 1,024 GB
- DWPD (Drive Write Per Day) is calculated based on the number of times that user overwrites the entire capacity of an SSD per day of its lifetime during the warranty period. (3D NAND TLC warranty: 3 years)

5. Flash Management

5.1 Error Correction/Detection

SV240-25 implements a hardware ECC scheme, based on the Low Density Parity Check (LDPC). LDPC is a class of linear block error correcting code which has apparent coding gain over BCH code because LDPC code includes both hard decoding and soft decoding algorithms. With the error rate decreasing, LDPC can extend SSD endurance and increase data reliability while reading raw data inside a flash chip.

5.2 Bad Block Management

Current production technology is unable to guarantee total reliability of NAND flash memory array. When a flash memory device leaves factory, it comes with a minimal number of initial bad blocks during production or out-of-factory as there is no currently known technology that produce flash chips free of bad blocks. In addition, bad blocks may develop during program/erase cycles. Since bad blocks are inevitable, the solution is to keep them in control. Apacer flash devices are programmed with ECC, page mapping technique and S.M.A.R.T to reduce invalidity or error. Once bad blocks are detected, data in those blocks will be transferred to free blocks and error will be corrected by designated algorithms.

5.3 Global Wear Leveling

Flash memory devices differ from Hard Disk Drives (HDDs) in terms of how blocks are utilized. For HDDs, when a change is made to stored data, like erase or update, the controller mechanism on HDDs will perform overwrites on blocks. Unlike HDDs, flash blocks cannot be overwritten and each P/E cycle wears down the lifespan of blocks gradually. Repeatedly program/erase cycles performed on the same memory cells will eventually cause some blocks to age faster than others. This would bring flash storages to their end of service term sooner. Global wear leveling is an important mechanism that levels out the wearing of all blocks so that the wearing-down of all blocks can be almost evenly distributed. This will increase the lifespan of SSDs.

5.4 DataDefender™

Apacer's DataDefender is an advanced technology of power failure management which combines both firmware and hardware mechanisms to ensure data integrity. When power disruption occurs, the low voltage detector will be triggered. When this happens, the SSD's protection mechanism is activated and cuts off data transmission from the host. Once the power supply is resumed, the firmware protection mechanism will ensure the integrity of the firmware as well as the data already written into the NAND flash media.

Note: The controller unit of this product model is designed with a DRAM as a write cache for improved performance and data efficiency. Though unlikely to happen in most cases, the data cached in the volatile DRAM might be potentially affected if a sudden power loss takes place before the cached data is flushed into non-volatile NAND flash memory.

5.5 ATA Secure Erase

ATA Secure Erase is an ATA disk purging command currently embedded in most of the storage drives. Defined in ATA specifications, (ATA) Secure Erase is part of Security Feature Set that allows storage drives to erase all user data areas. The erase process usually runs on the firmware level as most of the ATA-based storage media currently in the market are built-in with this command. ATA Secure Erase can securely wipe out the user data in the drive and protects it from malicious attack.

5.6 TRIM

TRIM is a SATA command that helps improve the read/write performance and efficiency of solid-state drives (SSD). The command enables the host operating system to inform SSD controller which blocks contain invalid data, mostly because of the erase commands from host. The invalid will be discarded permanently and the SSD will retain more space for itself.

5.7 Flash Translation Layer – Page Mapping

Page mapping is an advanced flash management technology whose essence lies in the ability to gather data, distribute the data into flash pages automatically, and then schedule the data to be evenly written. Page-level mapping uses one page as the unit of mapping. The most important characteristic is that each logical page can be mapped to any physical page on the flash memory device. This mapping algorithm allows different sizes of data to be written to a block as if the data is written to a data pool and it does not need to take extra operations to process a write command. Thus, page mapping is adopted to increase random access speed and improve SSD lifespan, reduce block erase frequency, and achieve optimized performance and lifespan.

5.8 Device Sleep (DevSleep or DEVSLP) Mode

Device Sleep is a feature that allows SATA devices to enter a low power mode by designating a particular pin as DEVSLP signal with an aim to reducing power consumption.

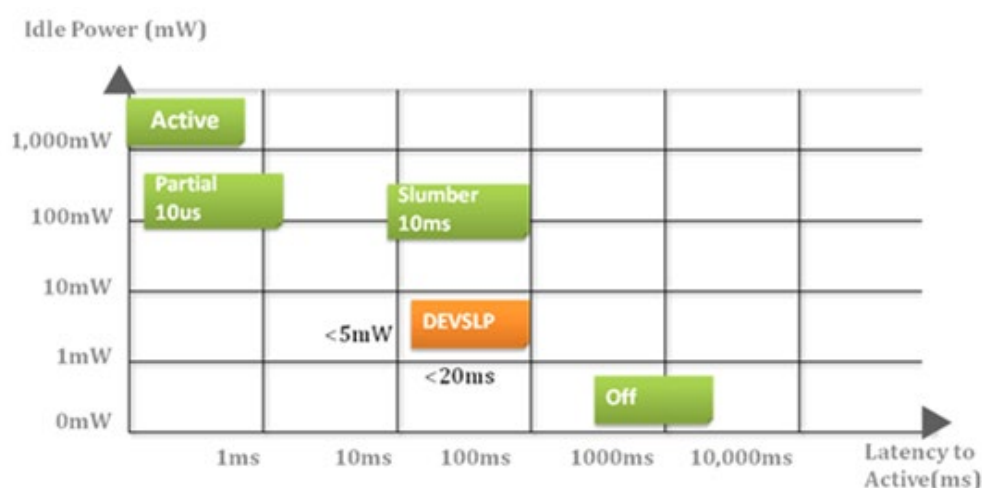


Figure 5-1 Device Sleep

5.9 SATA Power Management

By complying with SATA 6 Gb/s specifications, the SSD supports the following SATA power saving modes:

- ACTIVE: PHY ready, full power, TX & RX operational
- PARTIAL: Reduces power, resumes in under 10 μ s (microseconds)
- SLUMBER: Reduces power, resumes in under 10 ms (milliseconds)
- HIPM: Host-Initiated Power Management
- DIPM: Device-Initiated Power Management
- AUTO-SLUMBER: Automatic transition from partial to slumber.
- Device Sleep (DevSleep or DEVSLP): PHY powered down; power consumption \leq 5 mW; host assertion time \leq 10 ms; exit timeout from this state \leq 20 ms (unless specified otherwise in SATA Identify Device Log).

Note: The behaviors of power management features would depend on host/device settings.

5.10 Hyper Cache Technology

Apacer proprietary Hyper Cache technology uses a portion of the available capacity as SLC (1bit-per-cell) NAND flash memory, called Hyper cache mode. When data is written to SSD, the firmware will direct the data to Hyper Cache mode, providing excellent performance to handle various scenarios in industrial use.

5.11 Over-provisioning

Over-provisioning (OP) is a certain portion of the SSD capacity exclusively for increasing Garbage Collection (GC) efficiency, especially when the SSD is filled to full capacity or performs a heavy mixed-random workload. OP has the advantages of providing extended life expectancy, reliable data integrity, and high sustained write performance.

5.12 DataRAID™

Apacer's DataRAID algorithm applies an additional level of protection and error-checking. Using this algorithm, a certain amount of space is given over to aggregating and resaving the existing parity data used for error checking. So, in the event that data becomes corrupted, the parity data can be compared to the existing uncorrupted data and the content of the corrupted data can be rebuilt.

5.13 SMART Read Refresh™

Apacer's SMART Read Refresh plays a proactive role in avoiding read disturb errors from occurring to ensure health status of all blocks of NAND flash. Developed for read-intensive applications in particular, SMART Read Refresh is employed to make sure that during read operations, when the read operation threshold is reached, the data is refreshed by re-writing it to a different block for subsequent use.

6. Security and Reliability Features

6.1 Advanced Encryption Standard

Advanced Encryption Standard (AES) is a specification for the encryption of electronic data. AES has been adopted by the U.S. government since 2001 to protect classified information and is now widely implemented in embedded computing applications. The AES algorithm used in software and hardware is symmetric so that encrypting/decrypting requires the same encryption key. Without the key, the encrypted data is inaccessible to ensure information security.

Notably in flash memory applications, AES 256-bit hardware encryption is the mainstream to protect sensitive or confidential data. The hardware encryption provides better performance, reliability, and security than software encryption. It uses a dedicated processor, which is built inside the controller, to process the encryption and decryption. This enormously shortens the processing time and makes it efficient.

6.2 TCG Opal

Developed by the Trusted Computing Group (TCG), an organization whose members work together to formulate industry standards, Opal is a set of security specifications used for applying hardware-based encryption to storage devices.

Hardware encryption has many advantages. First of all, it transfers the computational load of the encryption process to dedicated processors, reducing the stress on the host system's CPU. In addition, storage devices complying with Opal specifications are self-encryption devices. Opal specifications also feature boot authentication. When the drive is being accessed, the shadow MBR will request the drive password at boot. The drive will only unlock and decrypt if the correct password is supplied. The other feature is LBA-specific permissions. Users are assigned different permissions for LBA ranges created by the device administrator. Each LBA range is password-protected and can only be accessed by users with the correct key to perform permitted actions (read/write/erase).

6.3 Thermal Sensor

Apacer Thermal Sensor is a digital temperature sensor with serial interface. By using a designated pin for transmission, storage device owners are able to read temperature data.

6.4 Thermal Throttling

Thermal throttling can monitor the temperature of the SSD equipped with a built-in thermal sensor via S.M.A.R.T. commands. This method can ensure the temperature of the device stays within temperature limits by drive throttling, i.e. reducing the speed of the drive when the device temperature reaches the threshold level, so as to prevent overheating, guarantee data reliability, and prolong product lifespan. When the temperature exceeds the maximum threshold level, thermal throttling will be triggered to reduce performance step by step to prevent hardware components from being damaged. Performance is only permitted to drop to the extent necessary for recovering a stable temperature to cool down the device's temperature. Once the temperature decreases to the minimum threshold value, transfer speeds will rise back to its optimum performance level.

6.5 End-to-End Data Protection

End-to-End Data Protection is a feature implemented in Apacer SSD products that extends error control to cover the entire path from the host computer to the drive and back, and ensure data integrity at multiple points in the path to enable reliable delivery of data transfers. Unlike ECC which does not exhibit the ability to determine the occurrence of errors throughout the process of data transmission, End-to-End Data Protection allows SSD controller to identify an error created anywhere in the path and report the error to the host computer before it is written to the drive. This error-checking and error-reporting mechanism therefore guarantees the trustworthiness and reliability of the SSD.

7. Software Interface

7.1 Command Set

This section defines the software requirements and the format of the commands the host sends to SV240-25. Commands are issued to SV240-25 by loading the required registers in the command block with the supplied parameters, and then writing the command code to the Command register.

Table 7-1 Command Set

| Code | Command | Code | Command |
|------|------------------------------|------|-------------------------|
| E5h | CHECK POWER MODE | F4h | SECURITY ERASE UNIT |
| 06h | DATA SET MANAGEMENT | F5h | SECURITY FREEZE LOCK |
| 92h | DOWNLOAD MICROCODE | F1h | SECURITY SET PASSWORD |
| 90h | EXECUTE DEVICE DIAGNOSTIC | F2h | SECURITY UNLOCK |
| E7h | FLUSH CACHE | 70h | SEEK |
| EAh | FLUSH CACHE EXT | EFh | SET FEATURES |
| ECh | IDENTIFY DEVICE | C6h | SET MULTIPLE MODE |
| E3h | IDLE | E6h | SLEEP |
| E1h | IDLE IMMEDIATE | B0h | SMART |
| 91h | INITIALIZE DEVICE PARAMETERS | E2h | STANDBY |
| E4h | READ BUFFER | E0h | STANDBY IMMEDIATE |
| C8h | READ DMA | E8h | WRITE BUFFER |
| 25h | READ DMA EXT | CAh | WRITE DMA |
| 60h | READ FPDMA QUEUED | 35h | WRITE DMA EXT |
| C4h | READ MULTIPLE | 3Dh | WRITE DMA FUA EXT |
| 29h | READ MULTIPLE EXT | 61h | WRITE FPDMA QUEUED |
| 2Fh | READ LOG EXT | 3Fh | WRITE LOG EXT |
| 47h | READ LOG DMA EXT | 57h | WRITE LOG DMA EXT |
| 20h | READ SECTOR | C5h | WRITE MULTIPLE |
| 24h | READ SECTOR EXT | 39h | WRITE MULTIPLE EXT |
| 40h | READ VERIFY SECTORS | CEh | WRITE MULTIPLE FUA EXT |
| 42h | READ VERIFY SECTORS EXT | 30h | WRITE SECTOR |
| 10h | RECALIBRATE | 34h | WRITE SECTOR EXT |
| F6h | SECURITY DISABLE PASSWORD | 45h | WRITE UNCORRECTABLE EXT |
| F3h | SECURITY ERASE PREPARE | | |

Table 7-2 Trusted Computing Feature Set

| Code | Command | Code | Command |
|------|---------------------|------|------------------|
| 5Ch | TRUSTED RECEIVE | 5Eh | TRUSTED SEND |
| 5Dh | TRUSTED RECEIVE DMA | 5Fh | TRUSTED SEND DMA |

7.2 S.M.A.R.T.

SMART, an acronym for Self-Monitoring, Analysis and Reporting Technology, is an open standard that allows a hard disk drive to automatically detect its health and report potential failures. When a failure is recorded by SMART, users can choose to replace the drive to prevent unexpected outage or data loss. Moreover, SMART can inform users of impending failures while there is still time to perform proactive actions, such as copy data to another device.

Table 7-3 SMART Subcommand Set

| Code | SMART Subcommand |
|------|-----------------------------------|
| D0h | READ DATA |
| D1h | READ ATTRIBUTE THRESHOLDS |
| D2h | ENABLE/DISABLE ATTRIBUTE AUTOSAVE |
| D4h | EXECUTE OFF-LINE IMMEDIATE |
| D5h | SMART READ LOG |
| D6h | SMART WRITE LOG |
| D8h | ENABLE OPERATIONS |
| D9h | DISABLE OPERATIONS |
| DAh | RETURN STATUS |

Table 7-4 General SMART Attribute Structure

| Bytes | Description |
|-------|-------------|
| 0 | ID (Hex) |
| 1 – 2 | Status Flag |
| 3 | Value |
| 4 | Worst |
| 5*-11 | Raw Data |

*Byte 5: LSB

Table 7-5 SMART Attribute ID List

| ID (Hex) | Attribute Name |
|------------|------------------------------------|
| 9 (0x09) | Power-on Hours |
| 12 (0x0C) | Power Cycle Count |
| 163 (0xA3) | Maximum Erase Count |
| 164 (0xA4) | Average Erase Count |
| 166 (0xA6) | Total Later Bad Block Count |
| 167 (0xA7) | SSD Protect Mode (Vendor Specific) |
| 168 (0xA8) | SATA PHY Error Count |
| 171 (0xAB) | Program Fail Count |
| 172 (0xAC) | Erase Fail Count |
| 175 (0xAF) | Bad Cluster Table Count |
| 192 (0xC0) | Unexpected Power Loss Count |
| 194 (0xC2) | Temperature |
| 231 (0xE7) | Lifetime Left |
| 241 (0xF1) | Total Sectors of Write |

8. Electrical Specifications

8.1 Operating Voltage

Table 8-1 lists the supply voltage for SV240-25.

Table 8-1 Operating Range

| Item | Range |
|----------------|--------------|
| Supply Voltage | 5V \pm 10% |

8.2 Power Consumption

Table 8-2 lists the power consumption for SV240-25.

Table 8-2 Power Consumption (Unit: mA)

| Mode \ Capacity | 240 GB | 480 GB | 960 GB | 1920 GB |
|-----------------|--------|--------|--------|---------|
| Active (Max.) | 365 | 405 | 405 | 405 |
| Idle | 55 | 55 | 60 | 60 |

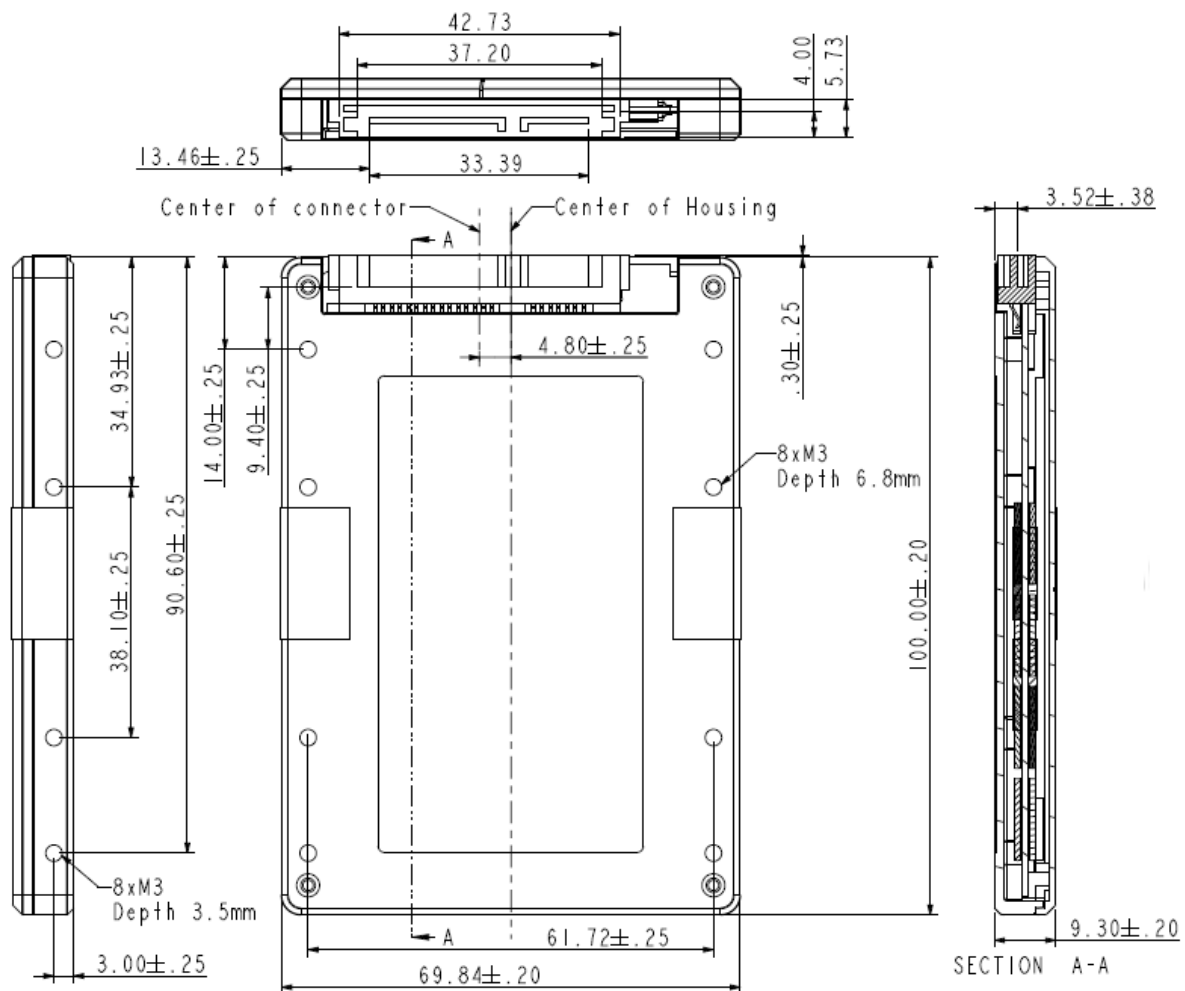
Notes:

- All values are typical and may vary depending on flash configurations or host system settings.
- Power consumption is measured using CrystalDiskMark 8.0.4.

9. Mechanical Specifications

Table 9-1 Physical Information

| Parameter | Unit | 240 GB | 480 GB | 960 GB | 1920 GB |
|-----------|--------|---------------|--------|--------|---------|
| Length | mm | 100.00 ± 0.20 | | | |
| Width | | 69.84 ± 0.20 | | | |
| Height | | 9.30 ± 0.20 | | | |
| Weight | g ± 5% | 90.69 | 91.89 | 93.69 | 95 |



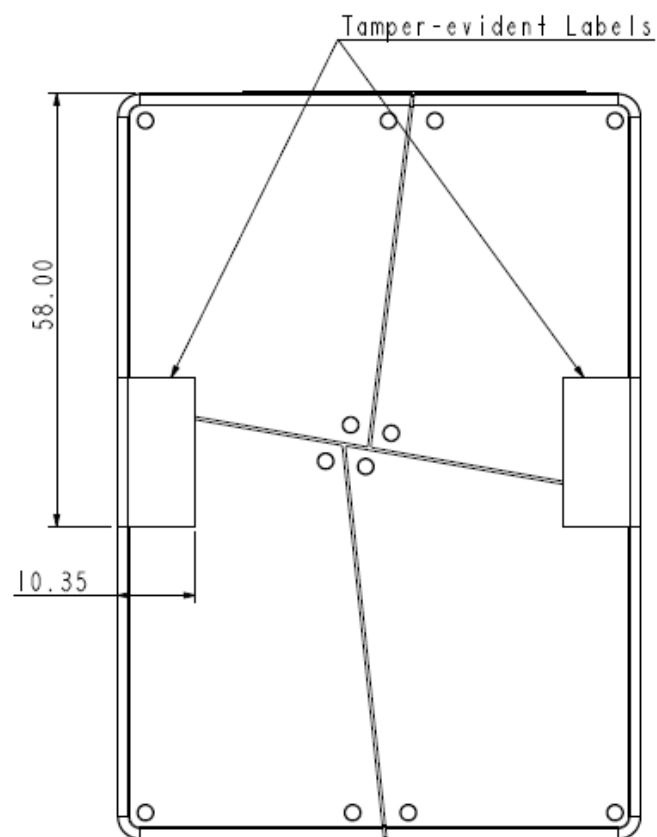


Figure 9-1 Physical Dimensions

10. Product Ordering Information

10.1 Product Code Designations

Apacer's SV240-25 SSD is available in different configurations and densities. See the chart below for a comprehensive list of options for the SV240-25 series devices.

| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| | A | 1 | 2 | . | A | 2 | 5 | X | X | F | . | X | X | X | F | X |

| | |
|--|--|
| Code 1-3 (Product Line & Form Factor) | SATA+25 |
| Code 5-6 (Model/Solution) | SV240 with TCG Opal |
| Code 7-8 (Product Capacity) | 5J: 240GB 5K: 480GB 5L: 960GB 5M: 1920GB |
| Code 9 (Flash Type & Product Temp) | G: 3D TLC Standard temperature H: 3D TLC Wide temperature |
| Code 10 (Product Spec) | 2.5" 7mm plastic housing |
| Code 12-14 (Version Number) | Random numbers generated by system |
| Code 15-16 (Firmware Version) | F3/F4: FIPS 140-2 firmware version |

10.2 Valid Combinations

The following table lists the available models of the SV240-25 series which are in mass production or will be in mass production. Consult your Apacer sales representative to confirm availability of valid combinations and to determine availability of new combinations.

| Capacity | Standard Temperature | Wide Temperature |
|----------|----------------------|------------------|
| 240GB | A12.A25JGF.001F3 | A12.A25JHF.001F4 |
| 480GB | A12.A25KGF.001F3 | A12.A25KHF.001F4 |
| 960GB | A12.A25LGF.001F3 | A12.A25LHF.002F4 |
| 1920GB | A12.A25MGF.001F3 | A12.A25MHF.002F4 |

Revision History

| Revision | Description | Date |
|----------|----------------------------------|-----------|
| 1.0 | Initial release | 3/29/2023 |
| 1.1 | Added thermal throttling support | 5/24/2023 |

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