Apacer

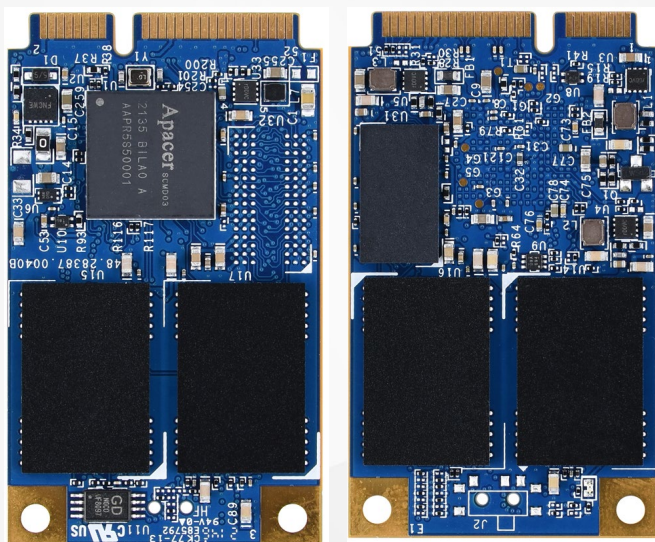**RoHS Compliant**

Serial ATA Flash Drive

Industrial SV240-300 BiCS5 Product Specifications

October 25, 2024

Version 1.3

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**
  - 120, 240, 480, 960, 1920 GB

- **Performance[1]**
  - Burst read/write: 600 MB/sec
  - Sequential read: Up to 565 MB/sec
  - Sequential write: Up to 505 MB/sec
  - Random read (4K): Up to 98,000 IOPS
  - Random write (4K): Up to 77,000 IOPS

- **DRAM Cache for Enhanced Random Performance**

- **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^{TM}
  - ATA Secure Erase
  - Device Sleep
  - TRIM
  - Hyper Cache Technology
  - Over-provisioning
  - SATA Power Management
  - DataRAID^{TM}
  - SMART Read Refresh^{TM}

- **Endurance (in drive writes per day: DWPD)**
  - 120 GB: 1.68 DWPD
  - 240 GB: 2.20 DWPD
  - 480 GB: 2.18 DWPD
  - 960 GB: 2.27 DWPD
  - 1920 GB: 2.18 DWPD

- **Temperature Range**
  - Operating (Tc):
    - Standard: 0°C to 70°C
    - Wide: -40°C to 85°C
  - Storage (Ta): -55°C to 100°C

- **Supply Voltage**
  - 3.3V ± 5%

- **Power Consumption[1]**
  - Active mode (Max.): 670 mA
  - Idle mode: 85 mA

- **NAND Flash Type:** 3D TLC (BiCS5)

- **MTBF:** >3,000,000 hours

- **Security**
  - AES 256-bit hardware encryption
  - Trusted Computing Group (TCG) Opal 2.0 (optional)

- **Reliability**
  - Thermal Sensor
  - End-to-End Data Protection

- **Connector Type**
  - 52-pin mSATA connector

- **Physical Characteristics**
  - Form factor: JEDEC MO-300
  - Dimensions: 50.80 x 29.85 x 4.85$_{(max.)}$, unit: mm
  - Net weight: 7.8g ± 5%

- **LED Indicator for Drive Behavior**

- **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.

Table of Contents

1. General Description

Apacer's SV240-300 is a well-balanced solid-state drive (SSD) with a standard form factor and exceptional performance. Designed with a SATA 6 Gb/s interface, SV240-300 fully complies with the latest SATA Revision 3.2 specifications, delivering outstanding read/write speeds. Its random performance is further enhanced by integrating DRAM into the internal controller, making it an ideal companion for heavy-loading industrial or server operations.

Utilizing 3D NAND technology for capacities up to 1920GB, SV240-300 offers greater power efficiency than 2D NAND. It features a powerful SATA controller supporting on-the-module ECC and an efficient wear-leveling scheme, and is equipped with an LDPC (Low Density Parity Check) ECC engine to extend SSD endurance and enhance data reliability. Additionally, SV240-300 includes a built-in thermal sensor that monitors the SSD temperature via S.M.A.R.T commands to prevent overheating. Operating under a 6 Gb/s interface, SV240-300 incorporates Apacer's latest S.M.A.R.T technology, primarily oriented for the newest SATA interface SSDs, for drive lifetime monitoring and analysis. For highly intensive applications, End-to-End Data Protection ensures data integrity across multiple points in the path, enabling reliable data transfers.

In terms of security, Advanced Encryption Standard (AES) and Trusted Computing Group (TCG) Opal (optional) safeguard data, providing users with peace of mind that their data is protected against unauthorized access. SV240-300 also includes numerous advanced features such as flash block management, page mapping, ATA secure erase, DataDefender, TRIM, device sleep, Hyper Cache technology, over-provisioning, power-saving modes, DataRAID, and SMART Read Refresh.

With exceptional performance, reliable dependability, and enhanced data protection, SV240-300 is an ideal storage or cache solution for various applications, including industrial, imaging, computing, and enterprise markets.

2. Functional Block

Apacer SV240-300 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 SV240-300 varies from capacities. The illustration is for reference only.
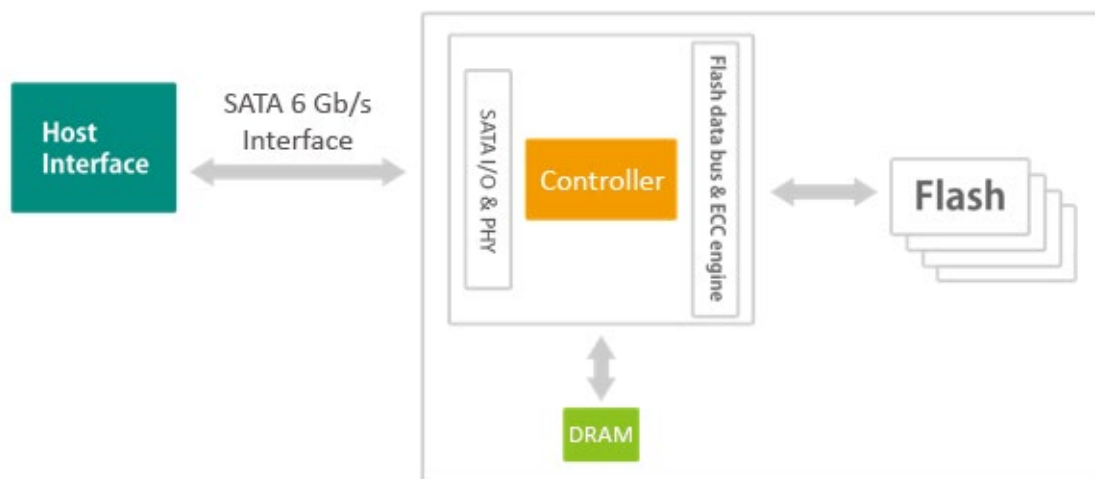

Figure 2-1 Functional Block Diagram

3. Pin Assignments

Pin assignment of the SV240-300 is shown in Figure 3-1 and described in Table 3-1.

Pin 1   Pin 51

Figure 3-1 Pin Assignments

Table 3-1 Pin Assignments

Pin #	Type	Description	Pin #	Type	Description
1	Reserved	No Connect	27	GND	Ground
2	+3.3V	3.3V source	28	Reserved	No Connect
3	Reserved	No Connect	29	GND	Ground
4	GND	Ground	30	Reserved	No Connect
5	Reserved	No Connect	31	-A	Host Transmitter Differential Signal Pair
6	Reserved	No Connect	32	Reserved	No Connect
7	Reserved	No Connect	33	+A	Host Transmitter Differential Signal Pair
8	Reserved	No Connect	34	GND	Ground
9	GND	Ground	35	GND	Ground
10	Reserved	No Connect	36	Reserved	No Connect
11	Reserved	No Connect	37	GND	Ground
12	Reserved	No Connect	38	Reserved	No Connect
13	Reserved	No Connect	39	+3.3V	3.3V source
14	Reserved	No Connect	40	GND	Ground
15	GND	Ground	41	+3.3V	3.3V source
16	Reserved	No Connect	42	Reserved	No Connect
17	Reserved	No Connect	43	Device Type	No Connect
18	GND	Ground	44	DEVSLP	Device Sleep
19	Reserved	Reserved for Apacer use only[1]	45	Reserved	Reserved for Apacer use only[1]
20	Reserved	No Connect	46	Reserved	No Connect
21	GND	Ground	47	Reserved	Reserved for Apacer use only[1]
22	Reserved	No Connect	48	Reserved	No Connect
23	+B	Host Receiver Differential Signal Pair	49	DAS/DSS	Device Activity Signal/Disable Staggered Spin-up

Pin #	Type	Description	Pin #	Type	Description
24	+3.3V	3.3V Source	50	GND	Ground
25	-B	Host Receiver Differential Signal Pair	51[2]	Detect	0 ohm
26	GND	Ground	52	+3.3V	3.3V source

Notes:
1. Reserved by Apacer, please do not connect to a host.
2. It is a presence detection pin that shall be connected to GND by a 0 ohm to 220 ohm Resistor on device. Please see the diagram below.
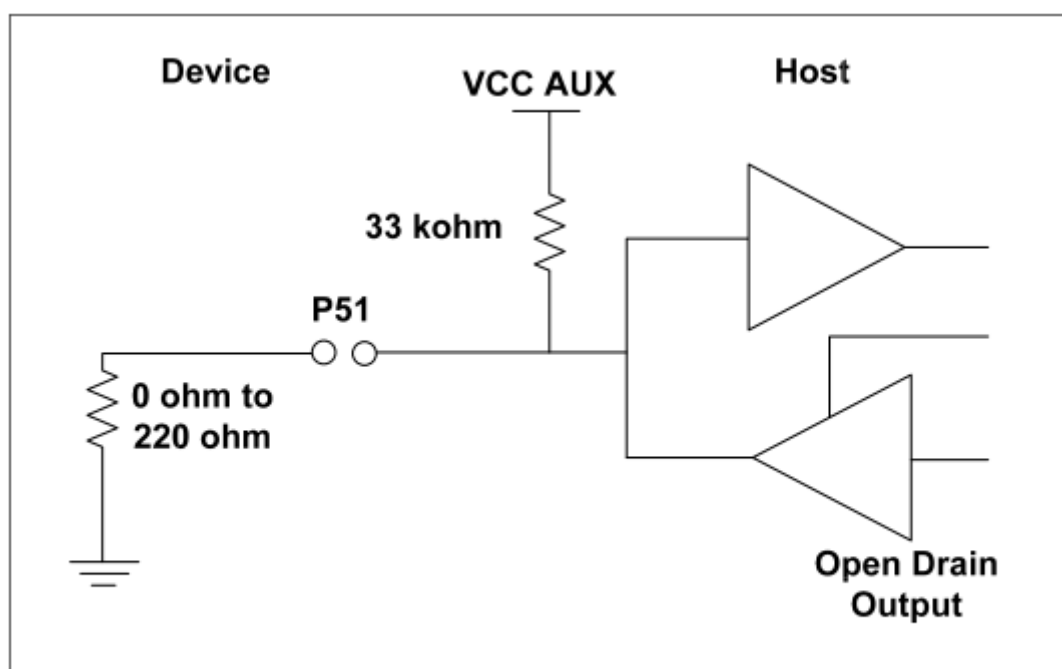
Bi-directional host-side implementation of P51 for compatibility with non-mSATA devices (informative)

4. Product Specifications

4.1 Capacity

Capacity specifications of SV240-300 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
120 GB	120,034,123,776	16,383	16	63	234,441,648
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 SV240-300 is listed below in Table 4-2.

Table 4-2 Performance Specifications

Performance \ Capacity	120 GB	240 GB	480 GB	960 GB	1920 GB
Sequential Read (MB/s)	560	560	560	565	560
Sequential Write (MB/s)	465	480	495	505	500
4K Random Read (IOPS)	44,000	73,000	98,000	98,000	97,000
4K Random Write (IOPS)	77,000	77,000	77,000	77,000	76,000

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

Environmental specifications of SV240-300 product are shown in Table 4-3.

Table 4-3 Environmental Specifications

Parameter	Type	Specifications
Temperature	Operating (Tc)	0°C to 70°C (Standard); -40°C to 85°C (Wide)
	Non-operating (Ta)	-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)

Notes:
- This Environmental Specification table indicates the conditions for testing the device. Real world usages may affect the results.
- Tc: case temperature; Ta: ambient temperature. The operating temperature is determined by the case temperature. Adequate airflow is advisable as it enables the device to maintain optimal temperatures, especially in environments with heavy workloads.

4.4 Mean Time Between Failures (MTBF)

Mean Time Between Failures (MTBF) is predicted based on reliability data for the individual components in SV240-300. The prediction result for SV240-300 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

SV240-300 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
120 GB	1.68
240 GB	2.20
480 GB	2.18
960 GB	2.27
1920 GB	2.18

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 cycles: 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)

4.7 LED Indicator Behavior

The behavior of the SV240-300 LED indicator is described in Table 4-5.

Table 4-5 LED Behavior

Location	LED	Description
LED A	DAS	LED blinks when the drive is being accessed
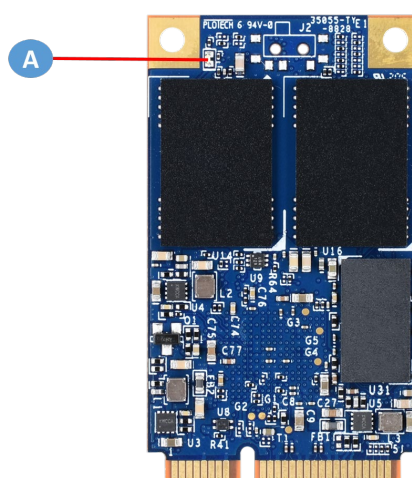
5. Flash Management

5.1 Error Correction/Detection

SV240-300 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 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.

5.5 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 DataDefender^{TM}

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.

5.7 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.

5.8 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.
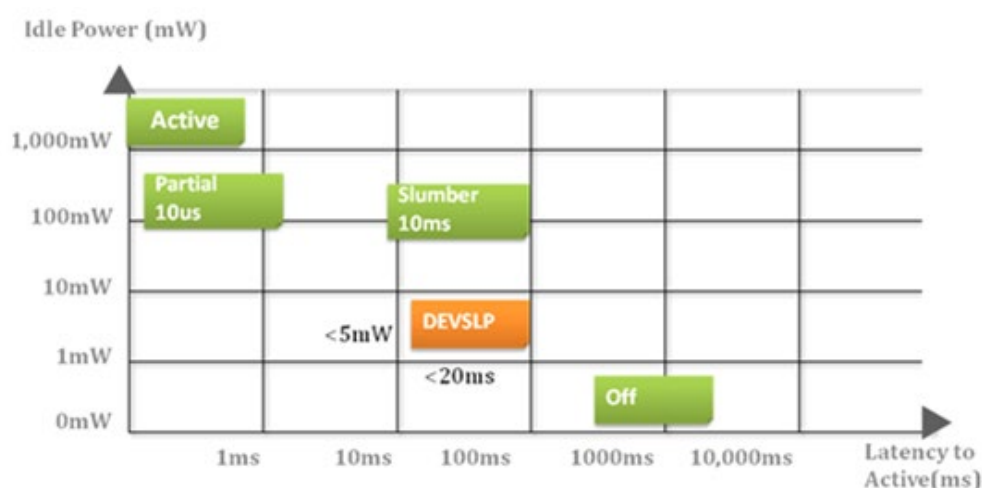

Figure 5-1 Device Sleep

5.9 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.

5.10 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.

5.11 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 µs (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 $\leqq$ 5 mW; host assertion time $\leqq$ 10 ms; exit timeout from this state $\leqq$ 20 ms (unless specified otherwise in SATA Identify Device Log).

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

5.12 DataRAID^{TM}

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^{TM}

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 (optional)

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 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 SV240-300. Commands are issued to SV240-300 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

Note: This feature set is only applicable to products implemented with AES and Opal functions.

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 SV240-300.

Table 8-1 Operating Range

Item	Range
Supply Voltage	3.3V ± 5% (3.135-3.465V)

8.2 Power Consumption

Table 8-2 lists the power consumption for SV240-300.

Table 8-2 Power Consumption

Capacity / Mode	Unit	120 GB	240 GB	480 GB	960 GB	1920 GB
Active (Max.)	mA	495	540	600	645	670
Idle		75	75	80	80	85

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 with file size 1,000MB.

9. Mechanical Specifications

Table 9-1 Physical Information

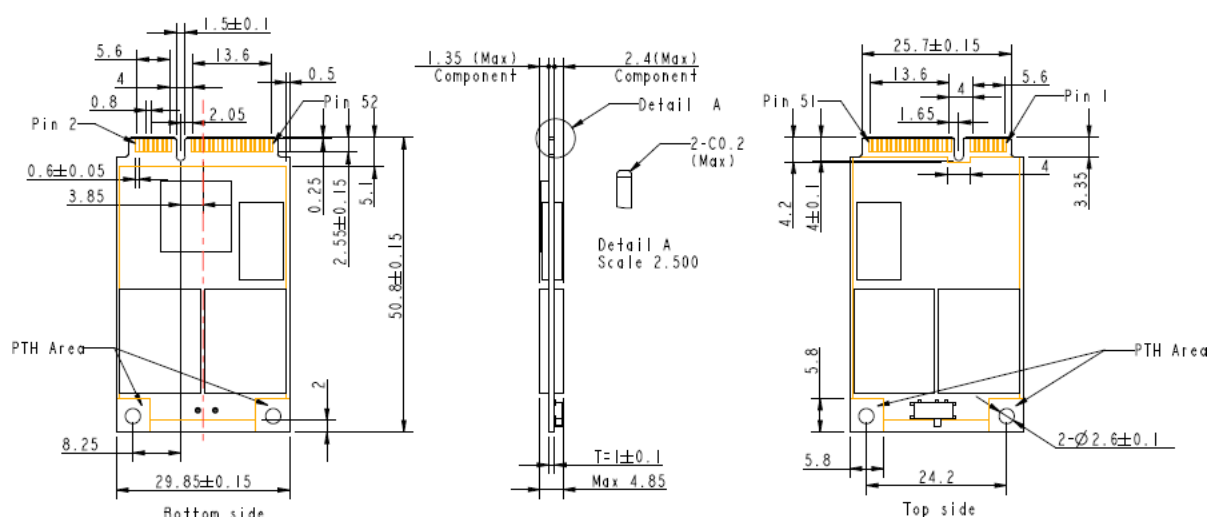| Parameter	Unit	120 GB	240 GB	480 GB	960 GB	1920 GB
Length	mm	50.80 ± 0.15				
Width		29.85 ± 0.15				
Height (Max.)		4.85				
Weight	g ± 5%	5.52	7.35	7.48	7.8	7.6

Figure 9-1 Physical Dimensions

10. Product Ordering Information

10.1 Product Code Designations

Apacer's SV240-300 SSD is available in different configurations and densities. See the chart below for a comprehensive list of options for the SV240-300 series devices.

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

Code 1-3 **(Product Line & Form Factor)**	SATA+ mSATA/MO300
Code 5-6 **(Model/Solution)**	24: SV240-300 A2 :SV240 with TCG Opal
Code 7-8 **(Product Capacity)**	5H: 120GB 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)**	MO300
Code 12-14 **(Version Number)**	Random numbers generated by system
Code 15-16 **(Firmware Version)**	78: Thermal Sensor DEVSLP OP 80: Thermal Sensor with DEVSLP + TCG Opal OP

10.2 Valid Combinations

The following tables list the available models of the SV240-300 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.

10.2.1 Without TCG Opal

Capacity	Standard Temperature	Wide Temperature
120GB	A72.245HGA.00478	A72.245HHA.00678
240GB	A72.245JGA.00478	A72.245JHA.00778
480GB	A72.245KGA.00478	A72.245KHA.00778
960GB	A72.245LGA.00578	A72.245LHA.00778
1920GB	A72.245MGA.00478	A72.245MHA.00678

10.2.2 With TCG Opal

Capacity	Standard Temperature	Wide Temperature
120GB	A72.A25HGA.00480	A72.A25HHA.00480
240GB	A72.A25JGA.00580	A72.A25JHA.00780
480GB	A72.A25KGA.00580	A72.A25KHA.00580
960GB	A72.A25LGA.00580	A72.A25LHA.00580
1920GB	A72.A25MGA.00480	A72.A25MHA.00480

Revision History

Revision	Description	Date
0.1	Preliminary release	8/4/2022
1.0	Official release	8/9/2022
1.1	Added 1920GB support	8/24/2022
1.2	- Added 120GB support - Updated Performance, Endurance, and Power Consumption on Specifications Overview page, Table 4-2, 4-4, and 8-2 - Added UKCA to 4.5 Certification and Compliance - Added Tc and Ta to operating and storage temperature respectively - Updated 10. Product Ordering Information due to firmware change	6/25/2024
1.3	Updated 10. Product Ordering Information	10/25/2024

Global Presence

Taiwan (Headquarters)
Apacer Technology Inc.
1F., No.32, Zhongcheng Rd., Tucheng Dist.,
New Taipei City 236, Taiwan R.O.C.
Tel: 886-2-2267-8000
Fax: 886-2-2267-2261
amtsales@apacer.com

U.S.A.
Apacer Memory America, Inc.
46732 Lakeview Blvd., Fremont, CA 94538
Tel: 1-408-518-8699
Fax: 1-510-249-9551
sa@apacerus.com

Japan
Apacer Technology Corp.
6F, Daiyontamachi Bldg., 2-17-12, Shibaura, Minato-Ku,
Tokyo, 108-0023, Japan
Tel: 81-3-5419-2668
Fax: 81-3-5419-0018
jpservices@apacer.com

Europe
Apacer Technology B.V.
Science Park Eindhoven 5051 5692 EB Son,
The Netherlands
Tel: 31-40-267-0000
Fax: 31-40-290-0686
sales@apacer.nl

China
Apacer Electronic (Shanghai) Co., Ltd
Room D, 22/FL, No.2, Lane 600, JieyunPlaza,
Tianshan RD, Shanghai, 200051, China
Tel: 86-21-6228-9939
Fax: 86-21-6228-9936
sales@apacer.com.cn

India
Apacer Technologies Pvt Ltd,
1874, South End C Cross, 9th Block Jayanagar,
Bangalore-560069, India
Tel: 91-80-4152-9061/62
Fax: 91-80-4170-0215
sales_india@apacer.com