Apacer

RoHS Compliant

Serial ATA Flash Drive

Industrial ST18E-25 BiCS5 Product Specifications (Enterprise SSD Series)

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Version 1.1

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Specifications Overview:

- **Compliance with SATA Revision 3.1**
  - SATA 6 Gb/s interface
  - Backward compatible with SATA 1.5 and 3 Gb/s interfaces
  - ATA command set-4 (ACS-4)
- **Capacity**
  - 480, 960, 1920, 3840, 7680 GB
- **Performance**[1]
  - Burst read/write: 600 MB/sec
  - Sequential R/W: Up to 560/540 MB/sec
  - Random R/W (4K): Up to 99K/94K IOPS
  - Sustained seq. R/W: Up to 535/510 MB/sec
  - Sustained rand. R/W: Up to 97K/83K IOPS
  - Random R/W latency: 137/31 µs
  - Random R/W QoS: 0.22/0.20 ms
- **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.
  - ATA Secure Erase
  - TRIM
  - DataRAID™
  - SMART Read Refresh™
- **NAND Flash Type:** 3D TLC (BiCS5)
- **DRAM Cache for Enhanced Random Performance**
- **Enterprise Features**
  - CorePower
  - Thermal Sensor
  - Thermal Throttling
  - End-to-End Data Protection
- **Temperature Range**
  - Operating: 0°C to 70°C
  - Storage: -40°C to 85°C
- **Supply Voltage**
  - 5V ± 10%
- **Power Consumption**[1]
  - Active mode (Max.): 4.36 W
  - Idle mode: 1.59 W
  - Inrush current: 4.123 A
- **SATA Power Management Modes**
- **Reliability**
  - MTBF: >3,000,000 hours
  - Data Retention: 10 years
  - Endurance
    - 1 DWPD
    - 480 GB: 1,210 TBW
    - 960 GB: 1,725 TBW
    - 1920 GB: 3,564 TBW
    - 3840 GB: 9,682 TBW
    - 7680 GB: 14,650 TBW
- **Connector Type**
  - 7-pin SATA signal connector
  - 15-pin SATA power connector
- **Form Factor**
  - 2.5”
  - Dimensions: 100.00 x 69.85 x 7.00, unit: mm
  - Net weight: 68.26g ± 5%
- **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 ST18E-25 is a high performance and high endurance solid-state drive designed as the standard 2.5" form factor for enterprise applications. Utilizing 112-layer 3D TLC NAND Flash with the DDR4 for higher capacity up to 7680GB and providing more power efficiency, ST18E-25 delivers outstanding, stable performance up to 560 MB/s for sequential read and 540 MB/s for sequential write and ultra-low latency with optimized QoS. ST18E-25 also presents low power consumption compared with traditional hard drives, extended endurance of 1 drive writes per day for 5 years and all the advantages of NAND Flash management technologies to ensure data integrity and highest levels of reliability, making it the ideal solution for read-intensive, mixed-use server applications.

ST18E-25 features enterprise-class reliability features implemented on both hardware and firmware levels. On the hardware level, ST18E-25 is built with 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. With the support of CorePower, PV93E-M2110 ensures data integrity and stability of data transmission in the event of unexpected power loss. This is achieved by implementing a backup power supply with tantalum capacitors, which provide sufficient time to transfer all cached data to NAND flash.

On the firmware level, ST18E-25 is designed with an error-checking mechanism called End-to-End Data Protection to ensure all data in transit is protected against transient errors. To maintain consistent performance in the process of data transmission, ST18E-25 is configured with thermal throttling technology coupled with built-in thermal sensor to monitor the temperature of the SSD via S.M.A.R.T health monitoring and dynamically adjust frequency scaling to enhance data reliability and provide sustained performance while overheating.

In addition to data reliability, ST18E-25 incorporates a variety of cutting-edge technologies featuring multiple approaches to data security and integrity. Developed for read-intensive applications in particular, 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. 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.

ST18E-25 is an enterprise-class SSD designed for server applications that require consistent performance, low latency and continuous large file transfers for 24/7 uptime and reliability. With superior performance, instant responsiveness, advanced power loss protection technology and highest standard of reliability – whether in terms of data security, data integrity and data protection, ST18E-25 is an ideal solution for enterprise servers, data centers and cloud service providers.

2. Functional Block

Apacer ST18E-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 ST18E-25 varies from capacities. The illustration is for reference only.

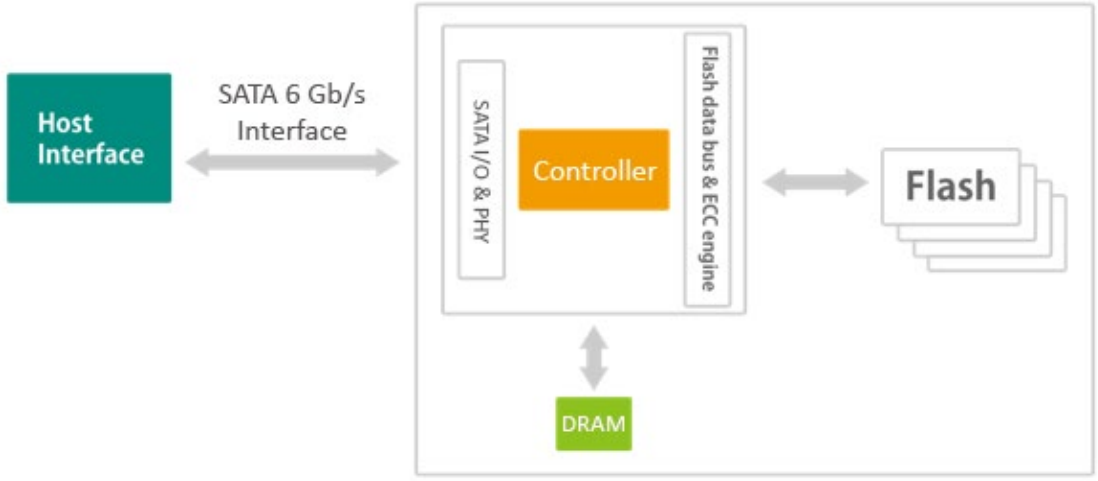


Figure 2-1 Functional Block Diagram

3. Pin Assignments

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

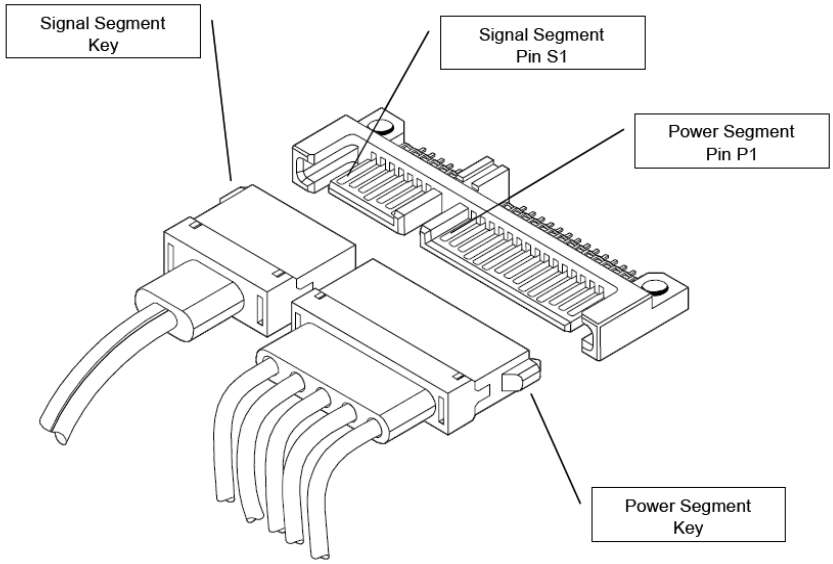


Figure 3-1 SATA Connectors

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	No Connect
P4	Ground
P5	Ground
P6	Ground
P7	5V
P8	5V
P9	5V
P10	Ground
P11	DAS
P12	Ground
P13	Unused (12V)
P14	Unused (12V)
P15	Unused (12V)

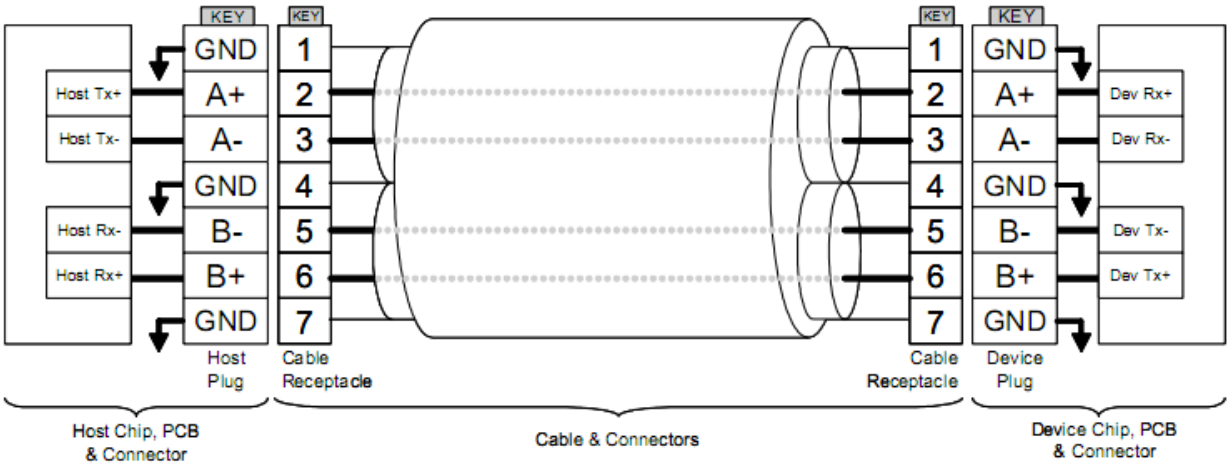


Figure 3-2 SATA Cable/Connector Connection Diagram

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 ST18E-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
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
3840 GB	3,840,755,982,336	16,383	16	63	7,501,476,528
7680 GB	7,681,501,126,656	16,383	16	63	15,002,931,888

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 ST18E-25 is listed below in Table 4-2 and 4-3.

Table 4-2 Performance

Performance	Unit	480 GB	960 GB	1920 GB	3840 GB	7680 GB
Sequential Read	MB/s	560	560	560	560	560
Sequential Write		465	540	540	535	535
4K Random Read	IOPS	98,000	99,000	99,000	99,000	99,000
4K Random Write		94,000	93,000	94,000	93,000	93,000

Notes:
- Performance 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 by using IOMeter with Queue Depth 32.

Table 4-3 Sustained Performance

Performance	Unit	480 GB	960 GB	1920 GB	3840 GB	7680 GB
Sequential Read	MB/s	535	535	535	535	535
Sequential Write		445	510	510	510	510
4K Random Read	IOPS	95,000	97,000	96,000	97,000	96,000
4K Random Write		39,000	35,000	54,000	83,000	83,000

Notes:
- Sustained sequential read/write is measured by using FIO with 128KB and 1024KB of data transfer size in Queue Depth 32 by 1 worker.
- Sustained random read/write is measured by using FIO with 4KB of data transfer size in Queue Depth 32 by 16 worker.

4.3 Latency

Table 4-4 Latency

Performance	Unit	480 GB	960 GB	1920 GB	3840 GB	7680 GB
Random Read	µs	110	118	118	116	137
Random Write		26	31	31	24	31

Note: Latency is measured by using the SNIA SSS (Solid State Storage) PTS (Performance Test Specification) with 4KB data transfer size in Queue Depth 1 by 1 worker.

4.4 Quality of Service (QoS)

Table 4-5 Quality of Service (QoS)

Quality of Service (99.9%)	Unit	480 GB	960 GB	1920 GB	3840 GB	7680 GB
Random Read	ms	0.15	0.16	0.16	0.20	0.22
Random Write		0.11	0.19	0.20	0.10	0.20

Notes:
- QoS is measured by using StorScore with Queue Depth 1 on 4KB random read and write.
- QoS is measured as the round-trip time taken for 99.9% of commands to host.

4.5 Environmental Specifications

Environmental specifications of ST18E-25 product are shown in Table 4-6.

Table 4-6 Environmental Specifications

Parameter	Type	Specifications
Temperature	Operating	0°C to 70°C
	Non-operating	-40°C to 85°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.

4.6 Mean Time Between Failures (MTBF)

Mean Time Between Failures (MTBF) is predicted based on reliability data for the individual components in ST18E-25. The prediction result for ST18E-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.

4.7 Certification and Compliance

ST18E-25 complies with the following standards:

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

4.8 Endurance

The endurance of a storage device is predicted by TeraBytes Written and 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 4-7 Endurance Specifications

Capacity	TeraBytes Written	Drive Writes Per Day
480 GB	1,210	1
960 GB	1,725	1
1920 GB	3,564	1
3840 GB	9,682	1
7680 GB	14,650	1

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.
- Depending on whichever occurs first, Apacer guarantees a warranty of 5 years or Terabytes Written.

4.9 Data Retention

Table 4-8 Data Retention

NAND Flash P/E Cycle	Value
100	10 years
3,000	1 year

Note: Data retention was evaluated at the temperature of 40°C.

5. Flash Management

5.1 Error Correction/Detection

ST18E-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 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.

5.5 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.

5.6 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.

5.7 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.

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

5.8 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.

5.9 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. Enterprise Features

6.1 CorePower

If the voltage supply is cut, for instance, accidental power off or sudden blackout, the data would be shortly lost. To protect SSD data integrity from this disastrous scenario, Apacer has developed the hardware-based technology named Apacer CorePower. The CorePower equips SSDs with electrolytic capacitors that can deliver urgent power current so that the flash controller can take this extended moment to flush cached data and essential metadata into NAND Flash blocks.

In addition to electrolytic capacitors which guarantee SSD data integrity, an inbuilt IC detector also serves the same purpose as well as ensures the stability of data transmission. The detector is designed to take proactive measures for the aforementioned disastrous scenario. When supply voltage drops below a minimum threshold, the detector will send out signals to the flash controller notifying it to stop operating to prevent poor performance or erratic operation. In the meanwhile, signals will also be sent to DRAM to have cached data flushed into NAND Flash blocks so as to avoid data loss, similar to the function performed by electrolytic capacitors.

ST18E-25 is equipped with Tantalum Capacitors which have lower power leakage, higher operating temperature and higher volume-efficiency (high capacitance in small volume) than many other types of capacitors. The compact size and the high reliability are ideal for embedded computing systems.

6.2 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.

6.3 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 guarantee data reliability, provide sustained performance while overheating, 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.

6.4 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 ST18E-25. Commands are issued to ST18E-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

Op Code	Command	Op Code	Command
00h	NOP	B0h	SMART
06h	DATA SET MANAGEMENT	B1h	DEVICE CONFIGURATION
10h	RECALIBRATE	C4h	READ MULTIPLE
20h	READ SECTOR(S)	C5h	WRITE MULTIPLE
21h	READ SECTOR(S) WITHOUT RETRY	C6h	SET MULTIPLE MODE
24h	READ SECTOR(S) EXT	C8h	READ DMA
25h	READ DMA EXT	C9h	READ DMA WITHOUT RETRY
27h	READ NATIVE MAX ADDRESS EXT	CAh	WRITE DMA
29h	READ MULTIPLE EXT	CBh	WRITE DMA WITHOUT RETRY
2Fh	READ LOG EXT	CEh	WRITE MULTIPLE FUA EXT
30h	WRITE SECTOR(S)	E0h	STANDBY IMMEDIATE
31h	WRITE SECTOR(S) WITHOUT RETRY	E1h	IDLE IMMEDIATE
34h	WRITE SECTOR(S) EXT	E2h	STANDBY
35h	WRITE DMA EXT	E3h	IDLE
37h	SET MAX: ADDRESS EXT	E4h	READ BUFFER
39h	WRITE MULTIPLE EXT	E5h	CHECK POWER MODE
3Dh	WRITE DMA FUA EXT	E6h	SLEEP
3Fh	WRITE LONG EXT	E7h	FLUSH CACHE
40h	READ VERIFY SECTOR(S)	E8h	WRITE BUFFER
41h	READ VERIFY SECTOR(S) WITHOUT RETRY	E9h	READ BUFFER DMA
42h	READ VERIFY SECTOR(S) EXT	EAh	FLUSH CACHE EXT
45h	WRITE UNCORRECTABLE EXT	EBh	WRITE BUFFER DMA
47h	READ LOG DMA EXT	ECh	IDENTIFY DEVICE
57h	WRITE LOG DMA EXT	EFh	SET FEATURES
60h	READ FPDMA QUEUED	F1h	SECURITY SET PASSWORD
61h	WRITE FPDMA QUEUED	F2h	SECURITY UNLOCK
70h	SEEK	F3h	SECURITY ERASE PREPARE
77h	SET DATE & TIME EXT	F4h	SECURITY ERASE UNIT
90h	EXECUTE DEVICE DIAGNOSTIC	F5h	SECURITY FREEZE LOCK

Op Code	Command	Op Code	Command
91h	INITIALIZE DEVICE PARAMETERS	F6h	SECURITY DISABLE PASSWORD
92h	DOWNLOAD MICROCODE PIO	F8h	READ NATIVE MAX ADDRESS
93h	DOWNLOAD MICROCODE DMA	F9h	SET MAX

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 7-2 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 7-3 General SMART Attribute Structure

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

*Byte 5: LSB

Table 7-4 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 ST18E-25.

Table 8-1 Operating Range

Item	Range
Supply Voltage	5V ± 10%

8.2 Power Consumption

Table 8-2 lists the power consumption for ST18E-25.

Table 8-2 Power Consumption

Mode	Unit	480 GB	960 GB	1920 GB	3840 GB	7680 GB
Read	W	2.81	3.18	3.26	3.34	3.73
Write		2.88	3.29	3.38	3.92	4.36
Idle		1.26	1.34	1.36	1.43	1.59

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.

8.3 Inrush Current

Table 8-3 Inrush Current

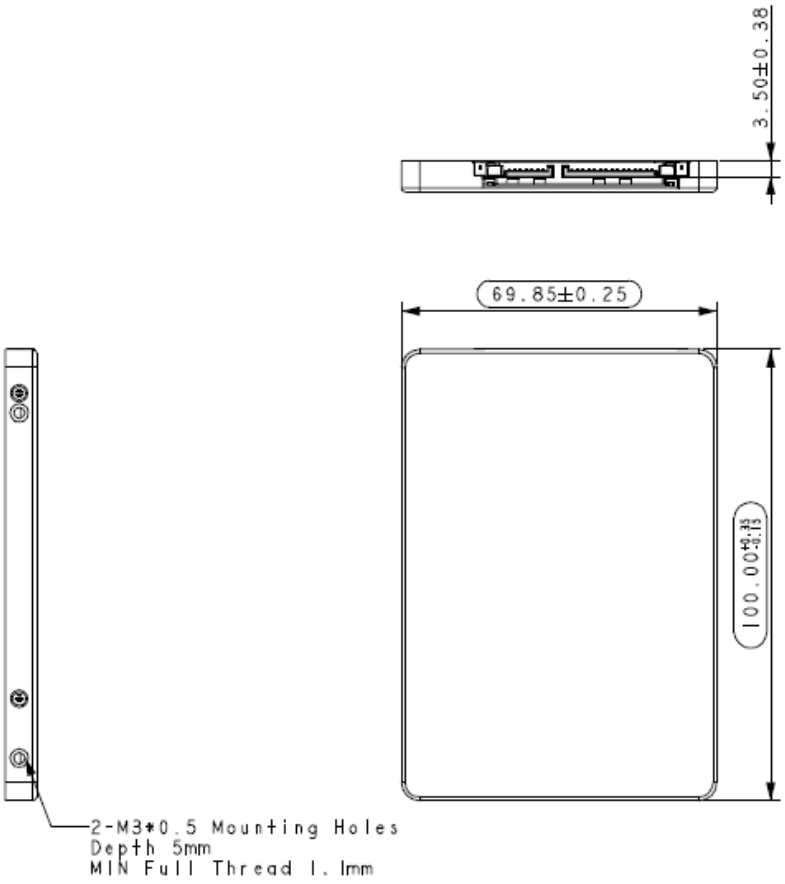
Inrush Current	480 GB	960 GB	1920 GB	3840 GB	7680 GB
5V	4.123A				

Note: The measurement result of inrush current is based on 7680GB.

9. Mechanical Specifications

Table 9-1 Physical Information

Parameter	Unit	480 GB	960 GB	1920 GB	3840 GB	7680 GB
Length	mm	100.00 +0.35/-0.15				
Width		69.85 ± 0.25				
Height		7.00 +0.10/-0.50				
Weight	g ± 5%	58.85	61.06	61.69	68.26	67.66



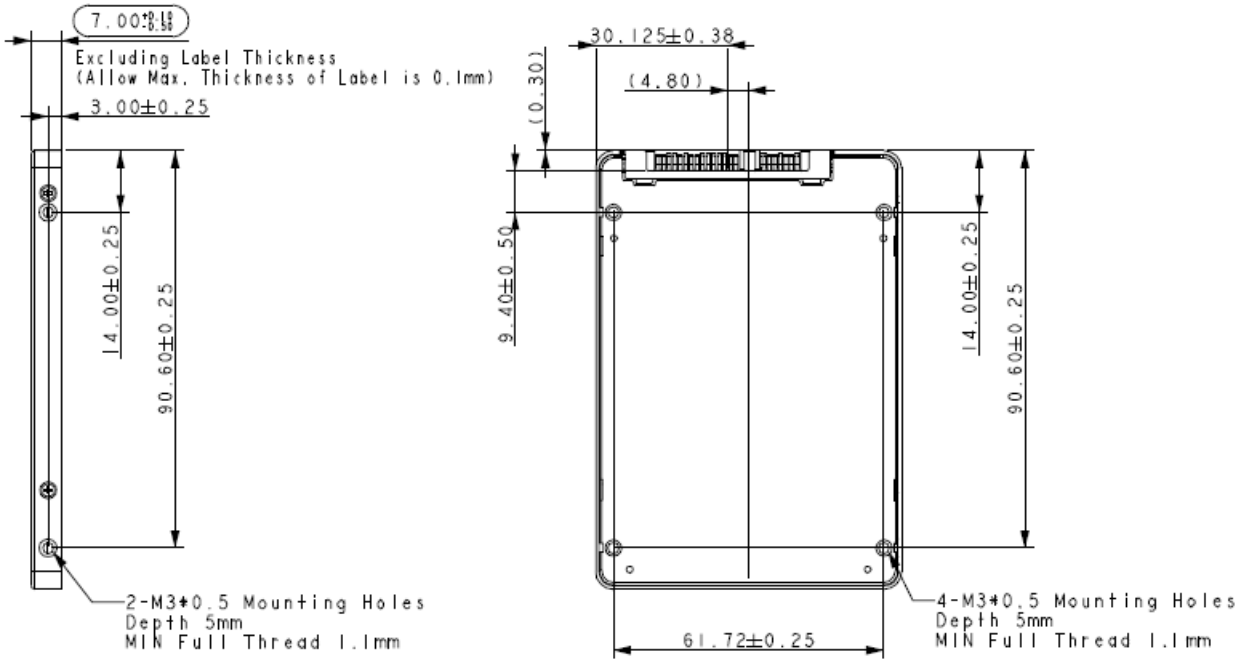


Figure 9-1 Physical Dimensions

10. Product Ordering Information

10.1 Product Code Designations

Apacer's ST18E-25 SSD is available in different configurations and densities. See the chart below for a comprehensive list of options for the ST18E-25 series devices.

Code	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	A	1	6	.	P	4	5	X	G	D	.	0	0	1	E	1

Code 1-3 (Product Line & Form Factor)	SATA 2.5 SSD
Code 5-6 (Model/Solution)	ST18E-25
Code 7-8 (Product Capacity)	5K: 480GB 5L: 960GB 5M: 1920GB 5N: 3840GB 5P: 7680GB
Code 9 (Flash Type & Product Temp)	3D TLC Standard Temperature
Code 10 (Product Spec)	2.5" 7mm metal housing
Code 12-14 (Version Number)	Random numbers generated by system
Code 15-16 (Firmware Version)	Thermal Sensor

10.2 Valid Combinations

The following table lists the available models of the ST18E-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	Valid Combination
480GB	A16.P45KGD.001E1
960GB	A16.P45LGD.001E1
1920GB	A16.P45MGD.001E1
3840GB	A16.P45NGD.001E1
7680GB	A16.P45PGD.001E1

Revision History

Revision	Description	Date
1.0	Initial release	10/31/2023
1.1	Removed Power Failure Management and added CorePower support	1/16/2024

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