Apacer

RoHS Compliant

Solid State Drive

Apacer Professional 2.5” NAS SSD Product Specifications

August 4, 2020

Version 1.2

Apacer Technology Inc.
1F, No.32, Zhongcheng Rd., Tucheng Dist., New Taipei City, Taiwan, R.O.C
Tel: +886-2-2267-8000 Fax: +886-2-2267-2261
www.apacer.com

Apacer

Specifications Overview:

- **Compliance with SATA Revision 3.2**
  - SATA 6 Gb/s interface
  - Backward compatible with SATA 1.5/3 Gb/s interfaces
- **Capacity**
  - 128, 256, 512 GB
  - 1 TB
- **Performance***
  - Burst read/write: 600 MB/sec
  - Sequential read: Up to 550 MB/sec
  - Sequential write: Up to 500 MB/sec
  - Random read (4K): Up to 84,000 IOPS
  - Random write (4K): Up to 86,000 IOPS
- **Flash Management**
  - Global Wear Leveling
  - Flash bad-block management
  - S.M.A.R.T.
  - TRIM
- **NAND Flash Type:** 3D TLC
- **MTBF:** >2,000,000 hours
- **Endurance (in Terabytes Written: TBW)**
  - 128 GB: 175 TBW
  - 256 GB: 385 TBW
  - 512 GB: 820 TBW
  - 1 TB: 2,065 TBW
- **Temperature Range**
  - Operating: 0°C to 70°C
  - Storage: -40°C to 70°C
- **Supply Voltage**
  - 5.0 V ± 5%
- **Power Consumption***
  - Active mode: 2,100 mW
  - Idle mode: 335 mW
- **Connector Type**
  - 7-pin SATA signal connector
  - 15-pin SATA power connector
- **Form Factor**
  - 2.5”
  - Dimensions: 100.00 x 69.85 x 6.90, unit: mm
- **RoHS Compliant**
- **Warranty: 5 years or TBW (whichever occurs first)**

*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.

© 2020 Apacer Technology Inc.

Table of Contents

© 2020 Apacer Technology Inc.

1. Product Specifications

1.1 Performance

Performance of Apacer Professional 2.5” SSD is listed below in Table 1-1.

Table 1-1 Performance Specifications

Performance \ Capacity	128 GB	256 GB	512 GB	1 TB
Sequential Read* (MB/s)	550	550	550	550
Sequential Write* (MB/s)	450	490	490	500
Random Read IOPS (4K)**	65,000	84,000	75,000	80,000
Random Write IOPS (4K)**	81,000	86,000	68,000	75,000

Note:
Results may differ from various flash configurations or host system setting.
*Sequential performance is based on CrystalDiskMark 5.2.1 with file size 1,000MB.
**Random performance measured using IOMeter with Queue Depth 32.

1.2 Environmental Specifications

Environmental specifications of Apacer Professional 2.5” SSD are shown in Table 1-2.

Table 1-2 Environmental Specifications

Environment	Specifications
Temperature	0°C to 70°C (Operating)
	-40°C to 70°C (Non-operating)
Vibration	Non-operating: Sine wave, 15(G), 10~2000(Hz), Operating: Random, 7.69(GRMS), 20~2000(Hz)
Shock	Non-operating: Acceleration, 1,500 G, 0.5 ms Operating: Peak acceleration, 50 G, 11 ms

1.3 Mean Time Between Failures (MTBF)

Mean Time Between Failures (MTBF) is predicted based on reliability data for the individual components in Apacer Professional 2.5” SSD. The prediction result for Apacer Professional 2.5” SSD is more than 2,000,000 hours.

Note: The MTBF is predicated and calculated based on “Telcordia Technologies Special Report, SR-332, Issue 2” method.

© 2020 Apacer Technology Inc.

1.4 Endurance

The endurance of a storage device is predicted by TeraBytes Written 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	TeraBytes Written
128 GB	175
256 GB	385
512 GB	820
1 TB	2,065

Note:

- The endurance of SSD could be estimated based on users' behaviors, NAND endurance cycles, and write amplification factor. It is not guaranteed by the flash vendor.
- TBW may vary from flash configuration and platform.

1.5 Certification and Compliance

Apacer Professional 2.5" SSD complies with the following standards:

- CE
- FCC
- RoHS

© 2020 Apacer Technology Inc.

2. Flash Management

2.1 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, block 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.

2.2 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.

2.3 S.M.A.R.T.

S.M.A.R.T. is an abbreviation for Self-Monitoring, Analysis and Reporting Technology, a self-monitoring system that provides indicators of drive health as well as potential disk problems. It serves as a warning for users from unscheduled downtime by monitoring and displaying critical drive information. Ideally, this should allow taking proactive actions to prevent drive failure and make use of S.M.A.R.T. information for future product development reference.

2.4 TRIM

TRIM, though in capital letters usually, is a memory computation command rather than an abbreviation. It is mainly a SATA command that enables the operating system to inform the SSD (Solid State Drive) which blocks of previously stored data are no longer valid, due to erases by the host or operating system, such as file deletions or disk formatting. Once notified, SSD will begin the discard of the invalid LBAs and retain more space for itself, in fact, the discarded is no longer recoverable.

When an LBA is replaced by the operating system, as with overwrite of a file, the SSD is informed that the originally occupied LBA is determined as no longer in use or invalid. The SSD will not save those blocks in garbage collected sectors. Noticeably, a file deletion command by host or operating system never actually erases the actual content, but marks the file as deleted. This issue is even specifically noticeable for flash based memory devices, such as SSDs. In fact, an SSD will keep garbage collecting the invalid, previously occupied LBAs, if it is not informed that these LBAs can be erased. Thus, the SSD would experience a significant performance downfall.

© 2020 Apacer Technology Inc.

3. Electrical Specifications

3.1 Operating Voltage

Table 3-1 lists the supply voltage for Apacer Professional 2.5” SSD.

Table 3-1 Operating Range

Item	Range
Supply Voltage	5V ± 5% (4.75-5.25V)

3.2 Power Consumption

Table 3-2 lists the power consumption for Apacer Professional 2.5” SSD.

Table 3-2 Power Consumption

Capacity / Mode	128 GB	256 GB	512GB	1 TB
Active (mW)	1,720	1,750	2,000	2,100
Idle (mW)	320	325	335	330

Note:
*All values are typical and may vary depending on flash configurations or host system settings.
**Active power is an average power measurement performed using CrystalDiskMark with 128KB sequential read/write transfers.

© 2020 Apacer Technology Inc.

4. Physical Characteristics

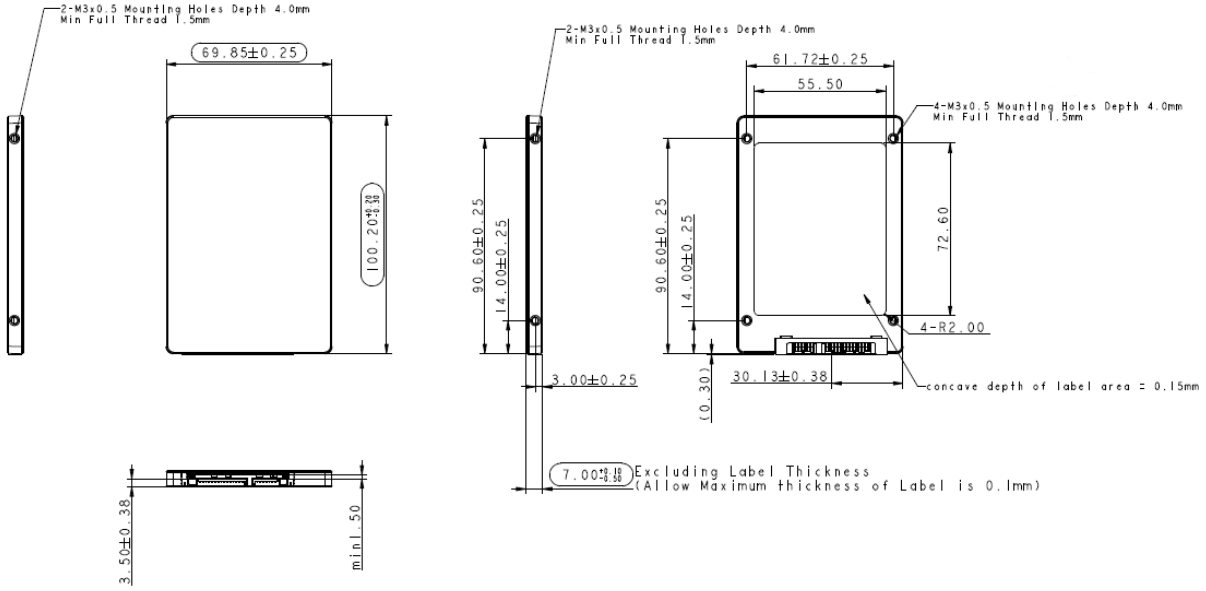

Figure 4-1 Physical Dimensions

© 2020 Apacer Technology Inc.

5. Product Ordering Information

Capacity	Retail P/N
128GB	AP128GPPSS25-R
256GB	AP256GPPSS25-R
512GB	AP512GPPSS25-R
1TB	AP1TPPSS25-R

Note: Valid combinations are those products 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.

© 2020 Apacer Technology Inc.

Revision History

Revision	Description	Date
1.0	Initial release	6/17/2020
1.1	Updated Endurance on Specifications Overview page and 1.4 Endurance	6/23/2020
1.2	Updated warranty period from 3 years to 5 years on Specifications Overview page	8/4/2020

© 2020 Apacer Technology Inc.

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

© 2020 Apacer Technology Inc.