

Samsung SSD PM863 and SM863 for Data Centers

Groundbreaking SSDs that raise the bar on satisfying big data demands



An enormous increase in Internet traffic and data volume is challenging data centers

Keep ahead of ever-increasing data demands

The rapid increase in Internet traffic has placed huge demands on data centers, spurred on by businesses and consumers alike. To stay abreast of the enormous volumes, velocity and varieties of data, data centers are turning to faster-performing SSDs to meet customer demand. As much of the huge daily volume of this data is unstructured, there is also an increasing need for big data analysis to help improve operational efficiency and provide better service. In order to handle these extremely large data sets and perform big data analytics efficiently, SSDs are needed to accomplish the ultrafast processing required.

Satisfy big data demands with SSDs optimized for 24/7 data center use

The Samsung 863 Series satisfy these big data requirements with two innovative SSDs, the PM863 and the SM863. Each is specially engineered for specific applications. The PM863, engineered for mixed workload data centers, boasts high-performance random read/write (R/W) workloads, such as Content Delivery Networks (CDNs), streaming and web servers. On the other hand, the SM863 is optimized for write-intensive applications, such as Online Transaction Processing (OLTP) and email and database servers, able to process massive amounts of information with high efficiency.



Maintain consistent performance with low latency

Choose the SSD that suits specific workload requirements

With the rise of personal, mobile, social and cloud computing, real-time response is essential. These changing environments are leading data centers to turn to SSDs in order to handle their big data demands. Some data centers process write-intensive workloads while others handle mixed workloads. Therefore, selecting the correct SSD for the task at hand is vitally important, and Samsung offers both.

Both the Samsung PM863 and SM863 SSD outclass other products in terms of IOPS consistency, latency and quality of service (QoS).

PM863 - Ideal for mixed workloads



Mixed Workload

The PM863 SSD delivers high random IOPS, lower latency, higher reliability and reduced Total Cost of Ownership (TCO) under mixed workloads. Ideal for CDNs, streaming and web servers, the PM863 maintains an IOPS consistency level of 90 percent or higher under virtually any write ratio conditions, based on internal tests.* Its constant and equal response time makes the PM863 an excellent choice for environments that must comply with a Service Level Agreement (SLA), such as cloud services.

* Internal tests were conducted with PM863 960 GB.

	120 GB	240 GB	480 GB	960 GB	1,920 GB	3,840 GB
Sequential Read (128 KB, MB/s)	380	520	525	520	510	540
Sequential Write (128 KB, MB/s)	125	245	460	475	475	480
Random Read (4 KB, IOPS)	86K	99K	99K	99K	99K	99K
Random Write (4 KB, IOPS)	5K	10K	17K	18K	18K	18K

Table 1. Sequential R/W and sustained random R/W performance of the PM863

	120 GB	240 GB	480 GB	960 GB	1,920 GB	3,840 GB
Random Read (4 KB)	98%	98%	98%	98%	98%	99%
Random Write (4 KB)	94%	94%	94%	94%	90%	95%

Table 2. IOPS consistency of the PM863^{1,2}

NOTE:

1. IOPS consistency measured using Fio® with queue depth 32.
2. IOPS consistency (%) = (99.9% IOPS) / (Average IOPS) x 100

SM863 - Ideal for write-intensive workloads



Write Intensive

With its high-level performance, endurance, security and power efficiency, the SM863 SSD is the ideal choice for OLTP and email and database servers. The SM863 delivers exceptional sequential R/W speeds of up to 520/485 MB/s and 4 KB random R/W IOPS of up to 97K/29K. Its extremely low latency and high level of QoS provide fast processing and analysis of massive amounts of information in demanding data center environments.

	120 GB	240 GB	480 GB	960 GB	1,920 GB
Sequential Read (128 KB, MB/s)	500	520	520	520	520
Sequential Write (128 KB, MB/s)	460	485	485	485	485
Random Read (8 KB, IOPS)	57K	57K	57K	57K	57K
Random Write (8 KB, IOPS)	6K	10K	13K	14K	14K
Random Read (4 KB, IOPS)	97K	97K	97K	97K	97K
Random Write (4 KB, IOPS)	12K	20K	26K	28K	29K

Table 3. Sequential R/W and sustained random R/W performance of the SM863

	120 GB	240 GB	480 GB	960 GB	1,920 GB
Random Read (4 KB)	99%	99%	99%	99%	99%
Random Write (4 KB)	93%	97%	97%	97%	97%

Table 4. IOPS consistency of the SM863^{1,2}

NOTE:

1. IOPS consistency measured using Fio® with queue depth 32.
2. IOPS consistency (%) = (99.9% IOPS) / (Average IOPS) x 100



Trust the leader of memory technology to deliver solid and reliable service for your data centers

Safeguard priceless data with robust Samsung features

V-NAND Technology

Equipped with the innovative Samsung V-NAND architecture, the PM863 and SM863 help sustain data center performance 24/7, 365 days a year by providing higher endurance than planar NAND.

Enhanced Data Integrity

Both the PM863 and SM863 prevent data corruption and secure data integrity. End-to-end protection ensures output data remains consistent with input data along the entire data transfer path from the host interface to the NAND flash memory without error. Using the Error Correcting Code (ECC) engine, it detects and remedies signal discrepancies in real time. Power-loss Protection using built-in tantalum capacitors guards against data corruption and loss in the write cache in the event of power failures.

Dynamic Thermal Guard

The Dynamic Thermal Guard algorithm monitors the temperature of the SSD by throttling back the performance in order to prevent thermal shutdown.

Self-Encrypting Drive*

The SM863 ensures data protection with the Samsung AES 256-bit, hardware-based Self-Encrypting Drive (SED). Data is secured with significantly less performance degradation, resulting in better performance, security and manageability.

* This only applies to SM863.



Lower TCO* without sacrificing performance

The PM863 and the SM863 boast better performance-power ratio than mechanical drives. This power-efficiency reduces the operating costs of data centers.

The NAND flash-based PM863 and SM863 provide high reliability, guaranteed with 2 Million Mean Time Between Failure (MTBF) and the Total Bytes Written (TBW) found in Table 5 and 6.

	120 GB	240 GB	480 GB	960 GB	1,920 GB	3,840 GB
TBW¹	170 TB	350 TB	700 TB	1,400 TB	2,800 TB	5,600 TB
MTBF²	2,000,000 Hours					

Table 5. TBW and MTBF of PM863

	120 GB	240 GB	480 GB	960 GB	1,920 GB
TBW¹	770 TB	1,540 TB	3,080 TB	6,160 TB	12,320 TB
MTBF²	2,000,000 Hours				

Table 6. TBW and MTBF of SM863

NOTE:

1. TBW is measured while running 100% random 4 KB writes across the entire SSD.
2. MTBF is Mean Time Between Failure. As same word, annual failure ratio is 0.438%.

Both the PM863 and SM863 use the same 2.5-inch SATA interface, eliminating the need to change the existing infrastructure when converting to a Samsung SSD, further saving TCO. In addition, the PM863 is available in capacity options up to 3,840 GB, which can also save server space.

* The TCO results can vary depending upon the application and the conditions of the contract.

Rely on a global leader in cutting-edge SSD technology

Samsung is a leading SSD provider that designs and integrates all the crucial components of the SSDs in house: the DRAM, NAND flash, controller and firmware. As the global leader in innovative V-NAND technology, and with intimate knowledge of every component and part of the SSD, Samsung can fine-tune each element at every stage of development to ensure perfect synergy.

PM863 Technical Specifications

		MZ-7LM120Z	MZ-7LM240Z	MZ-7LM480Z	MZ-7LM960Z	MZ-7LM1T9Z	MZ-7LM3T8Z
Application	Data Center						
Capacity¹	120 GB	240 GB	480 GB	960 GB	1,920 GB	3,840 GB	
Form Factor	2.5" Type						
Interface	SATA 6 Gb/s Interface, compatible with SATA 3 Gb/s & SATA 1.5 Gb/s interface						
Dimension (WxHxD)	Max. 100.2 x 69.85 x 6.8 (mm)						
Weight	Max. 60 g						
NAND Type	Samsung 32 layer V-NAND						
Controller	Samsung 7th Generation SATA 6 Gbps Controller for Data Center						
Performance²	Sequential Read (128 KB)	Up to 380 MB/sec	Up to 520 MB/sec	Up to 525 MB/sec	Up to 520 MB/sec	Up to 510 MB/sec	Up to 540 MB/sec
	Sequential Write (128 KB)	Up to 125 MB/sec	Up to 245 MB/sec	Up to 460 MB/sec	Up to 475 MB/sec	Up to 475 MB/sec	Up to 480 MB/sec
	Random Read (4 KB, QD32)	Up to 86,000 IOPS	Up to 99,000 IOPS	Up to 99,000 IOPS	Up to 99,000 IOPS	Up to 99,000 IOPS	Up to 99,000 IOPS
	Random Write (4 KB, QD32)	Up to 5,000 IOPS	Up to 10,000 IOPS	Up to 17,000 IOPS	Up to 18,000 IOPS	Up to 18,000 IOPS	Up to 18,000 IOPS
Average Power Consumption³ (system level)	Active Read / Write: Up to 3.0 Watt / 4.1 Watt, Idle : 1.3 Watt						
Allowable Voltage	5.0 V ± 5%						
Reliability (MTBF)	2,000,000 Hours						
Operating Temperature	0 - 70°C						
Shock	1,500 G & 0.5 ms						
TBW⁴	170 TB	350 TB	700 TB	1,400 TB	2,800 TB	5,600 TB	

- 1 GB = 1 Billion bytes by IDEMA. Actual usable capacity may be less (due to formatting, partitioning, operating system, applications or otherwise).
- Actual performance may vary depending on use conditions and environment.
 - 1) Performance measured using IOMeter 2006 with queue depth 32, C216 Intel® SATA 6G port.
 - 2) Measurements are performed on whole LBA range.
 - 3) Write cache enabled.
 - 4) 1 MB/sec = 1,048,576 bytes/sec was used in sequential performance.
- Actual power consumption may vary depending on system hardware & configuration. Active write power is measured on 128 KB sequential write and active read power is measured on 4 KB random read.
- TBW is measured while running 100% random 4 KB writes across the entire SSD.

SM863 Technical Specifications

		MZ-7KM120Z	MZ-7KM240Z	MZ-7KM480Z	MZ-7KM960Z	MZ-7KM1T9Z
Application		Data Center				
Capacity¹		120 GB	240 GB	480 GB	960 GB	1,920 GB
Form Factor		2.5" Type				
Interface		SATA 6 Gb/s Interface, compatible with SATA 3 Gb/s & SATA 1.5 Gb/s interface				
Dimension (WxHxD)		Max. 100.2 x 69.85 x 6.8 (mm)				
Weight		Max. 60 g				
NAND Type		Samsung 32 layer V-NAND				
Controller		Samsung 7th Generation SATA 6 Gbps Controller for Data Center				
Encryption Support		AES 256-bit				
Performance²	Sequential Read (128 KB)	Up to 500 MB/sec	Up to 520 MB/sec	Up to 520 MB/sec	Up to 520 MB/sec	Up to 520 MB/sec
	Sequential Write (128 KB)	Up to 460 MB/sec	Up to 485 MB/sec	Up to 485 MB/sec	Up to 485 MB/sec	Up to 485 MB/sec
	Random Read (4 KB, QD32)	Up to 97,000 IOPS	Up to 97,000 IOPS	Up to 97,000 IOPS	Up to 97,000 IOPS	Up to 97,000 IOPS
	Random Write (4 KB, QD32)	Up to 12,000 IOPS	Up to 20,000 IOPS	Up to 26,000 IOPS	Up to 28,000 IOPS	Up to 29,000 IOPS
Average Power Consumption³ (system level)		Active Read / Write: Up to 2.4 Watt / 3.1 Watt, Idle : 1.3 Watt				
Allowable Voltage		5.0 V ± 5%				
Reliability (MTBF)		2,000,000 Hours				
Operating Temperature		0 - 70°C				
Shock		1,500 G & 0.5 ms				
TBW⁴		770 TB	1,540 TB	3,080 TB	6,160 TB	12,320 TB

- 1 GB = 1 Billion bytes by IDEMA. Actual usable capacity may be less (due to formatting, partitioning, operating system, applications or otherwise).
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- Actual power consumption may vary depending on system hardware & configuration. Active write power is measured on 128 KB sequential write and active read power is measured on 4 KB random read.
- TBW is measured while running 100% random 4 KB writes across the entire SSD.



Legal and additional information

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Samsung Electronics Co., Ltd. inspires the world and shapes the future with transformative ideas and technologies, redefining the worlds of TVs, smartphones, wearable devices, tablets, cameras, digital appliances, printers, medical equipment, network systems, and semiconductor and LED solutions. We are also leading in the Internet of Things space through, among others, our Smart Home and Digital Health initiatives. We employ 319,000 people across 84 countries with annual sales of US \$196 billion. To discover more, please visit our official website at www.samsung.com and our official blog at global.samsungtomorrow.com

For more information

For more information about the Samsung 863 Series, visit www.samsung.com/ssd or www.samsung.com/samsungssd.

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