Samsung V-NAND SSD 970 EVO

2018 Data Sheet

Revision 1.0

DISCLAIMER

SAMSUNG ELECTRONICS RESERVES THE RIGHT TO CHANGE PRODUCTS, INFORMATION AND SPECIFICATIONS WITHOUT NOTICE.

Products and specifications discussed herein are for reference purposes only. All information discussed herein may change without notice and is provided on an “AS IS” basis, without warranties of any kind. This document and all information discussed herein remain the sole and exclusive property of Samsung Electronics. No license of any patent, copyright, mask work, trademark or any other intellectual property right is granted by one party to the other party under this document, by implication, estoppels or otherwise. Samsung products are not intended for use in life support, critical care, medical, safety equipment, or similar applications where product failure could result in loss of life or personal or physical harm, or any military or defense application, or any governmental procurement to which special terms or provisions may apply. For updates or additional information about Samsung products, contact your nearest Samsung office.

COPYRIGHT © 2018

TRADEMARKS & SERVICE MARKS

The Samsung Logo is the trademark of Samsung Electronics. Adobe is a trademark and Adobe Acrobat is a registered trademark of Adobe Systems Incorporated. All other company and product names may be trademarks of the respective companies with which they are associated.

Revision History

Revision Number	Description	Revision Date
001	Initial Release	April 2018

THE SAMSUNG SSD 970 EVO

The Samsung SSD 970 EVO is the 2nd generation of Samsung's 3bit-MLC NVMe SSDs for client PC. The Samsung 970 EVO is specially designed for tech savvies, gamers and professionals who frequently work on video creation/editing or simulation that requires high workloads. Featuring the latest Samsung 3bit-MLC V-NAND technology and a newly enhanced Phoenix controller, the 970 EVO delivers unrivaled next level performance and exceptional reliability in a small M.2 2280 form factor, offering customers the most advanced Samsung SSD technology currently available for Client PCs.

Next Level SSD Speed

In combination with the latest Samsung V-NAND technology, powerful Phoenix Controller and upgraded Intelligent TurboWrite technology, the 970 EVO delivers stunning sequential read/write performance of up to 3,500/2,500 MB/s respectively and random performance of up to 500,000/480,000 IOPS for read/write respectively. Upgraded Intelligent TurboWrite technology uses a large buffer size of up to 78GB to enable faster sequential write speeds, which improves the user experience especially when transferring large files or using application which requires high-workloads.

Unparalleled Reliability

The 970 EVO boasts exceptional endurance with up to 1,200 TBW, which is 50 percent higher than that of the previous model, thanks to the latest Samsung V-NAND technology.* Thermal control solutions enable enhanced performance with reduced heat risk. Dynamic Thermal Guard(DTG) technology proactively prevents overheating, and a heat spreader with an integrated thin copper film dissipates heat more efficiently. A new nickel coating on the Phoenix controller also helps to shed heat faster during heavy workload use in order to ensure the high levels of quality and reliability for which Samsung is known. The 970 EVO offers more time period of 5-year warranty versus that of 960 EVO.

*All documented endurance test results are obtained in compliance with JESD218 standards. Please visit www.jedec.org for detailed information on the standard.

System Design Flexibility

The 970 EVO enables convenient storage expansion across many different devices. The 970 EVO comes in a broad range of capacity options, including a single-sided 2TB version, made possible through Samsung's latest 512Gb V-NAND technology. In addition, the 970 EVO offers high power efficiency as well as exceptional speeds, making it the ideal solution to use with application ranging from ultra-thin computing to high-performance computing systems.

Advanced Data Encryption

The 970 EVO provides multiple advanced data encryption features. Self-Encrypting Drive (SED) security technology will help keep data safe at all times. The 970 EVO includes an AES 256-bit hardware-based encryption engine to ensure that your personal files remain secure. Being hardware-based, the encryption engine secures your data without the performance degradation that you may experience with software-based encryption. Also, the 970 EVO is compliant with various advanced security management solutions (TCG Opal and Encrypted Drive-IEEE1667).

Samsung Data Migration and Magician Software

The 970 EVO comes with Samsung Data Migration and Magician software, which is easy to install and makes management of your SSD simple.* Samsung Data Migration software is easy to use, yet provides a very powerful "Custom Cloning" feature that makes migration effortless even when the amount of source data is greater than the SSD's capacity. Magician provides personalized firmware checks and additional functionality tailored to the drives of individual users. It even updates the firmware automatically to make sure that the drive's performance stays up to date.

*To download Samsung Data Migration and Magician, please visit www.samsung.com/samsungssd

TECHINCAL SPECIFICATIONS

Samsung SSD 970 EVO						
Usage Application	Client PCs					
Interface	PCIe Gen 3.0 x4, NVMe 1.3					
Hardware Information	Capacity[1]		250GB	500GB	1TB	2TB
	Controller		Samsung Phoenix Controller			
	NAND Flash Memory		Samsung V-NAND 3bit MLC			
	DRAM Cache Memory		512MB LPDDR4		1GB LPDDR4	2GB LPDDR4
	Dimensions		Max 80.15 x Max 22.15 x Max 2.38(mm)			
	Form Factor		M.2(2280)[2]			
Performance (Up to.)[3]	Sequential Read		3,400 MB/s			3,500 MB/s
	Sequential Write[3]		1,500 MB/s	2,300 MB/s	2,500 MB/s	
	QD 1 Thread 1	Ran. Read	15,000 IOPS			
		Ran. Write	50,000 IOPS			
	QD 32 Thread 4	Ran. Read	200,000 IOPS	370,000 IOPS	500,000 IOPS	
		Ran. Write	350,000 IOPS	450,000 IOPS		480,000 IOPS
Power Consumption[4]	Idle (ASPT on)		30 mW			
	Active (Avg.)	Read	5.4 W	5.7 W	6 W	
		Write	4.2 W	5.8 W	6 W	
	DEVSLP	L1.2 mode	5 mW			
Reliability	Temp.	Operating	0°C to 70°C (Measured by S.M.A.R.T. Temperature. Proper airflow recommended)			
		Non-Operating	-45°C to 85°C			
	Humidity		5% to 95%, non-condensing			
	Shock	Non-Operating	1,500G(Gravity), duration: 0.5ms, 3 axis			
	Vibration	Non-Operating	20~2,000Hz, 20G			
	MTBF		1.5 million hours			
Warranty[8]	TBW[5] [6]		150TB	300TB	600TB	1,200TB
	Period		5 years, Limited[7]			
Supporting Features	TRIM (Required OS support), Garbage Collection, S.M.A.R.T					
Data Security	AES 256-bit Full Disk Encryption, TCG/Opal V2.0, Encrypted Drive(IEEE1667)					

1) 1GB = 1,000,000,000 bytes by IDEMA. A certain portion of capacity may be used for system file and maintenance use, thus the actual available capacity may differ from the labeled capacity.
2) M.2 is a specification of a form factor for ultra-thin PCs, The M.2 standard allows widths of 12, 16, 22 and 30mm and lengths of 16, 26, 30, 38, 42, 69, 80 and 110mm. Commercially M.2 is popular with width a 22mm and lengths of 30, 42, 60, 80 and 110mm. Samsung provides the most popular form factor, which is 22mm x 80mm (i.e., 2280), for the convenience of customers.
3) Sequential Write performance measurements are based on TurboWrite technology. The sequential write performances after TurboWrite region are: 300 MB/s(250GB), 600 MB/s(500GB), 1,200 MB/s(1TB) and 1,250 MB/s(2TB). Random Write performance measurements are based on TurboWrite technology. The random write performances after TurboWrite region are: 80,000 IOPS(250GB), 160,000 IOPS(500GB) and 300,000 IOPS(1TB/2TB). Performance may vary based on SSD's firmware, system hardware & configuration and other factors. Please refer to testing configuration and notes on the next page.
4) Please refer to testing configuration and notes on the next page.
5) All documented endurance test results are obtained in compliance with JESD218 Standards. Please visit www/jedec.org for detailed information on JESD218 Standards.
6) TBW means Terabytes Written.
7) Please refer to the detailed warranty statement at http://samsung.com/samsungssd
8) Warranty provides coverage for the stated time period or the TBW, whichever comes first.

PRODUCT LINEUP

Density	Model Name	Box Contents	Model Code
250GB*	MZ-V7E250	Samsung SSD 970 EVO 250GB Warranty Statement	MZ-V7E250BW
500GB*	MZ-V7E500	Samsung SSD 970 EVO 500GB Warranty Statement	MZ-V7E500BW
1TB (1,000GB*)	MZ-V7E1T0	Samsung SSD 970 EVO 1TB Warranty Statement	MZ-V7E51T0BW
2TB (2,000GB*)	MZ-V7E2T0	Samsung SSD 970 EVO 2TB Warranty Statement	MZ-V7E52T0BW

* GB: 1GB = 1,000,000,000 bytes. The actual usable capacity may be less than the labeled capacity.

For more information, including but not limited to the warranty provided for this product, please visit www.samsung.com/ssd and www.samsungssd.com. To download the latest software & manuals, please visit www.samsung.com/samsungssd.

※ Testing Configuration and notes

Below you will find a list of system configurations Samsung used to obtain the results reported in this Data Sheet.

	Read/Write Performance	Power Consumption
NVMe Interface	PCIe Gen 3.0 x4	PCIe Gen 3.0 x4
OS	Windows 10 Build 10240	Windows 10 PRO K x64
CPU	Intel Core i7™ -7700K @ 4.2GHz	Intel Core i7™ -7700K @ 4.2GHz
Memory	Samsung DDR4 32GB (16GB x 2ea)	DDR4 16GB (8GB x 2ea)
Chipset	ASUS PRIME Z270-A	Gigabyte GA-Z270X
Test Program	Sequential/Random : IOmeter 1.1.0	IOmeter 1.1.0