Summary

- PCIe 3.0 x4 NVM Express SSD for Client PCs
- M.2 (2280)
- Samsung V-NAND
- Samsung Polaris controller
- Samsung Magician Software for SSD management

THE SAMSUNG NVMe SSD 960 PRO

The new Samsung SSD 960PRO is the 2nd generation NVMe SSD for Samsung’s client PC SSD. As such, the Samsung SSD 960 PRO is designed for professionals & enthusiasts that are seeking next generation performance and endurance. It offers the ultimate in performance, breaks storage limits for the m.2 form factor and banks on its solid reliability to offer customers the most advanced SSD technology currently available for client PCs.

Samsung's unique and innovative V-NAND flash memory architecture is a breakthrough in overcoming the density limitations, while improving on the performance and endurance of today’s conventional planar NAND architecture. V-NAND is fabricated by stacking layers vertically over one another rather than decreasing the cells dimensions and trying to fit itself onto a fixed horizontal space resulting in higher density and better performance utilizing a smaller footprint.

Experience next-generation professional performance and endurance

This cutting-edge V-NAND-based NVMe
SSD supports PCI Express® Gen 3 x4 lanes, providing a higher bandwidth and lower latency to process even more massive amounts of data than our previous-generation NVMe SSD.

Building on the PCIe Gen. 3.0 x 4 lane interface and support of the NVMe 1.2 protocol, the 960PRO, in combination with our advanced 3rd generation V-NAND and newly developed Polaris controller is able to offer sequential read performance of 3,500MB/s and sequential write speeds of 2,100MB/s. The 960PRO achieves random performance of up to 440,000IOPS and 360,000IOPS for read and write operations respectively for industry leading performance across key metrics.

**Breaking storage limits**

Thanks to our advanced packaging technology, the use of a four-landing-design and the integration of the DRAM and Polaris Controller in a Package-on-Package solution the 960PRO becomes the world’s first client PC SSD in the standard 2280 m.2 form factor to be able to pack 2TB of capacity. For greater consumer choice, the 960PRO will also be available in 1TB and 512GB versions.

**Bank on solid reliability**

The 960 PRO, thanks to the use of our 3rd generation V-NAND Flash technology, offers users not only improved performance and higher density, but also solid reliability. The 960 PRO’s improved thermal solutions, advanced hardware encryption and enhanced endurance enable users to confidently entrust their data to their SSD.

**Improved thermal solutions**

In most cases of data transfers, heavy workloads can induce heat and result in high temperatures. Once temperatures reach a threshold, memory performance may be adversely affected. As the leader in SSD memory solutions, the 960 PRO adopts a new heat spreader for dissipating heat more efficiently during heavy workload use. It achieves this by integrating a thin copper film and because copper is a great heat conductor it helps to shed heat faster than would be possible without the label. Furthermore, the new 4 landing design also improves thermal characteristics, as it can reduce heat generation per unit area.

**Advanced data encryption**

The 960 PRO provides the same data encryption features as other Samsung SATA SSDs. Self-Encrypting Drive (SED) security technology will help keep data safe at all times. It 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 performance degradation that you may experience with a software-based encryption. Also, the 960PRO is compliant with advanced security management solutions (TCG Opal).

**Enhanced endurance**

When users spend money on an SSD, first of all, they consider value for money and want an SSD that will last. Starting with the 850 PRO, Samsung’s 1st V-NAND SATA SSD, Samsung’s V-NAND changed the paradigm. Now in its 3rd generation, the 960 PRO boasts Total Bytes Written of up to 1.2 Petabytes for the 2TB model.
# Technical Specifications

## Samsung SSD 960 PRO

### Usage Application
- Client PCs

### Interface
- PCIe Gen 3.0 x4, NVMe 1.2(partial)

### Hardware Information
- **Capacity**
  - 512GB
  - 1TB(1,024GB)
  - 2TB(2,048GB)
- **Controller**
  - Samsung Polaris Controller
- **NAND Flash Memory**
  - Samsung V-NAND Flash memory
- **DRAM Cache Memory**
  - 512MB LP DDR3
  - 1GB LP DDR3
  - 2GB LP DDR3
- **Dimension**
  - Max 80.15 x Max 22.15 x Max 2.38 (mm)
- **Form Factor**
  - M.2(2280)

### Performance (Up to.)
- **Sequential Read**
  - 3,500MB/s
- **Sequential Write**
  - 2,100MB/s
- **QD 1**
  - Ran. Read: 14,000 IOPS
  - Ran. Write: 50,000 IOPS
- **QD 32**
  - Ran. Read: 330,000 IOPS
  - Ran. Write: 360,000 IOPS

### Power Consumption**
- **Idle**
  - Typ. 40mW
- **Active (AVG.)**
  - Read: Typ. 5.1W
  - Write: Typ. 4.7W
  - DEVSLP: L1.2 mode
- **DEVSLEEP**
  - Typ. 5mW

### Data Security
- AES 256-bit for User Data Encryption, TCG/Opal

### Supporting Features
- TRIM(Required OS support), Garbage Collection, S.M.A.R.T

### Temperature
- **Operating**
  - 0°C to 70°C
  - (Measured by SMART Temperature. Proper airflow recommended)
- **Non-Operating**
  - -45°C to 85°C

### Humidity
- 5% to 95%, non-condensing

### Shock
- Non-Operating: 1,500G, duration: 0.5ms, 3 axis

### Vibration
- Non-Operating: 20~2,000Hz, 20G

### Reliability
- **MTBF**
  - 1.5 million hours

### Weight
- **Model**
  - Max 8.3g
  - Max 8.5g
  - Max 9g

### Warranty
- **Total Bytes Written**
  - 400 TBW**
  - 800 TBW**
  - 1,200 TBW**
- **Period**
  - 5 years limited

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*Sequential performance measurements based on CrystalDiskMark 5.1.2, and Random performance measurements based on Iometer 1.1.0. Performance may vary based on SSD’s firmware version, system hardware & configuration. Test system configuration: Intel Core i7-6700K @ 4.0GHz, DDR4 1,700MHz 16GB, OS – Windows10 Pro x64, ASRock Z170 EXTREME 7***

Power consumption measured with Iometer 1.1.0 with Intel i7-5820K @ 3.3GHz, DDR4 8GB, ASUS X99-M WS/SE, OS- Windows10 Pro x64 and APST on

***TBW means Terabytes Written

†† M.2 is a specification of form factor for ultra-thin PCs, The M.2 standard allows widths 12, 16, 22 and 30mm and lengths of 16, 26, 30, 38, 42, 69, 80 and 110 mm, Commercially M.2 is popular with width 22mm and lengths 30, 42, 60, 80 and 110mm. Samsung provides the most popular form factor with 22mm X 80mm model (i.e., 2280) to consider user convenience.

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DATA SHEET
Rev. 1.0, September., 2016
## Product Lineup

<table>
<thead>
<tr>
<th>Density</th>
<th>Model Name</th>
<th>Box Contents</th>
<th>Model Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2TB (2,048GB*)</td>
<td>MZ-V6P2T0</td>
<td>Samsung SSD 960 PRO 2TB Warranty statement</td>
<td>MZ-V6P2T0BW</td>
</tr>
<tr>
<td>1TB (1,024GB*)</td>
<td>MZ-V6P1T0</td>
<td>Samsung SSD 960 PRO 1TB Warranty statement</td>
<td>MZ-V6P1T0BW</td>
</tr>
<tr>
<td>512 GB*</td>
<td>MZ-V6P512</td>
<td>Samsung SSD 960 PRO 512GB Warranty statement</td>
<td>MZ-V6P512BW</td>
</tr>
</tbody>
</table>

* GB: 1GB = 1,000,000,000 bytes. A certain portion of capacity may be used for system file and maintenance use, thus the actual capacity may differ that indicated on the product label.

For more information, please visit [www.samsung.com/ssd](http://www.samsung.com/ssd) and [www.samsungssd.com](http://www.samsungssd.com)

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