Performance NVMe™ SSDs Enable Enterprise Workloads

NVMe™ adoption in the data center continues to grow as modern applications and workloads demand more performance. Performance NVMe SSDs are designed for primary storage for HPC servers and primary storage in external storage arrays. Performance NVMe SSDs target cloud compute and enterprise workloads that require low latency to data and high availability of data. These applications include real-time data analytics, cloud computing, OLTP/OLAP databases, artificial intelligence (AI), machine learning (ML), pattern recognition and virtualization. The Ultrastar DC SN840 is Western Digital’s 3rd generation of performance NVMe SSD for data center with PCIe Gen 3.1 (dual-port), NVMe 1.3, providing up to 3,470/3,330 MB/s Sequential Read/Write and up to 503K IOPS mixed random 70/30 read/write performance.

Dual-port Leadership

Ultrastar DC SN840 extends Western Digital’s leadership in dual-port architecture by vertically integrating proven flash controllers. Dual-port high availability supports two redundant paths to the SSD, and is critical to ensuring access to data in the event of a failure in the data path.

Quality, Reliability and Security

Ultrastar DC SN840 is built on Western Digital’s 96-layer 3D TLC NAND, with capacities up to 15.36TB in a U.2 2.5" form factor. It offers two endurance classes for workloads; 1 DW/D for read intensive workloads common with the majority of enterprise applications and cloud services, and 3 DW/D for higher write or mixed use workloads such as running SQL. The DC SN840 has a five-year limited warranty with enterprise reliability MTBF of 2.5M hours (projected). The DC SN840 offers security options with Secure Erase (SE), Instant Secure Erase (ISE) with an AES-256 encryption engine, TCG Ruby and FIPS 140-2 validation (forthcoming).

Applications & Workloads

- High performance computing (HPC)
- High availability storage arrays
- All mixed use workloads
- Artificial Intelligence/Machine Learning
- Online transaction processing (OLTP) and online analytical processing (OLAP)
- Real-time analytics
- Pattern recognition
- Virtualization

Features

- Western Digital dual-port NVMe 1.3c compliant controller; PCIe 3.1
- Western Digital 96-Layer 3D TLC NAND
- 1 and 3 DW/D
- Performance: up to RR = 780K IOPS, RW = 257K IOPS, Mixed Random 70/30 Read/Write = 503K IOPS
- MTBF rating of 2.5 million hours (projected)
- Security Options: Secure Erase (SE) and Instant Secure Erase (ISE), TCG Ruby, FIPS 140-2 validation (forthcoming)
- 5-year limited warranty
- Enterprise features including – 128 namespaces, atomic writes, multiple sector sizes, protection information, SGL, NVMe-MI version 1.1

Applications & Workloads

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- All mixed use workloads
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## Specifications

### Model Information

<table>
<thead>
<tr>
<th>Endurance²</th>
<th>Capacity</th>
<th>Maximum Petabytes Written²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 DW/D</td>
<td>1,920GB</td>
<td>3.504</td>
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<tr>
<td>1 DW/D</td>
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<td>1 DW/D</td>
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<td>3 DW/D</td>
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<td>3 DW/D</td>
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<tr>
<td>3 DW/D</td>
<td>6,400GB</td>
<td>35.04</td>
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</table>

### Configuration

#### Interface

- Western Digital NVMe 1.3c Controller, Dual Port PCIe 3.1 1x4 or 2x2

#### Form Factor

- U.2 2.5-inch, 15mm

#### Flash Memory Technology

- Western Digital 96-Layer 3D TLC NAND

### Performance

<table>
<thead>
<tr>
<th>Read Throughput (max MB/s, Seq 64KiB)</th>
<th>Write Throughput (max MB/s, Seq 64KiB)</th>
<th>Read IOPS (max, Rnd 4KiB)</th>
<th>Write IOPS (max, Rnd 4KiB)</th>
<th>Mixed IOPS</th>
<th>Read Latency (μs, avg.)³</th>
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<tbody>
<tr>
<td>3470</td>
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<td>108K</td>
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<td>160K</td>
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<td>472K</td>
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</tbody>
</table>

### Reliability

- **Uncorrectable Bit Error Rate (UBER)**: 1 in 10¹⁷
- **MTBF**: 2.5M hours (projected)
- **Annualized Failure Rate**: 0.35%
- **Availability**: 24x7
- **Limited Warranty**: 5 years
- **Data Retention**: 40°C/90-day equivalent

### Power

- **Operating (W)**: 18
- **Idle (W)**: 6

### Physical Size

- **z-height (mm)**: 15
- **Dimensions (width x length, mm)**: 69.85 x 100.45
- **Weight (g, max)**: 172

### Environmental

- **Operating Temperature**: 0°C to 70°C (Case)
- **Non-Operating Temperature**: -40°C to 85°C

### Part Number

<table>
<thead>
<tr>
<th>SE</th>
<th>ISE</th>
<th>TCG Ruby</th>
<th>TCG FIPS 140-2</th>
<th>Model Number</th>
<th>Capacity</th>
<th>Endurance</th>
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<td>6,400GB</td>
<td>3 DW/D</td>
</tr>
</tbody>
</table>

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1. *One megabyte (MB) is equal to one million bytes, one gigabyte (GB) is equal to 1,000MB (one billion bytes), one terabyte (TB) is equal to 1,000GB (one trillion bytes), and one petabyte (PB) is equal to 1,000TB. Actual user capacity may be less due to operating environment.*
2. *Endurance rating based on DW/D using 4KiB 100% random write and JESD 219 workloads over 5 years.*
3. *Average random read latency at 4KiB, QD=1*
4. *MTBF and AFR specifications will be based on a sample population and are estimated by statistical measurements and acceleration algorithms under typical operating conditions for this drive model. MTBF and AFR ratings do not predict an individual drive’s reliability and do not constitute a warranty.*
5. *The warranty for the product will expire on the earlier of (i) the date when the flash media has reached one-percent (1%) of its remaining life or (ii) the expiration of the time period associated with the product.*
6. *Values are based on ambient temperature. Avoid non-operational exposure to temperatures in excess of 40°C for periods exceeding three months.*

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