swissbit®

Product Fact Sheet

Tailored to your workload

N4200 Series

PCIe Gen 4.0 SSD specifically engineered for datacenter

Date: January 25, 2023
Revision: 1.01

Made in Germany

Product Summary

Swissbit's datacenter SSD enables server engineers to achieve reliable, high storage capacity that delivers consistently high performance and low latency. The N4200 is able to measure its respective workload. Thanks to this unique feature, the workload profile can be analyzed and the firmware configured accordingly, tailored to a specific workload profile, e.g. for web, streaming, application and cache servers. The firmware optimally matched to the workload profile keeps write amplification low and improves endurance.

- **Capacities:** 7.68 TB, 15.36 TB
- **Form Factor:** 2.5", U.3 (100.4mm x 69.9mm x 15.0mm)
- **Compliance[1]:** PCI Express (PCIe) Specification Revision 4.0
- **Interface:** Gen4 x 4 Lanes
- **Command Sets:** Supports NVMe 1.4
- **Target Performance:**
  - Read Performance: Sequential Read up to 7,030 MBytes/s, Random Read 4K up to 512,930 IOPS
  - Write Performance: Sequential Write up to 4,503 MBytes/s, Random Write 4K up to 271,957 IOPS
- **Operating Temperature Range[2]:** 0 °C to 70 °C
- **Storage Temperature Range:** -40 °C to 85 °C
- **Power:**
  - Power Supply 12 V
  - Idle Power 7.4 W
  - Sequential Read Power 15.6 W
  - Thermal Throttling supported
- **Data Retention[3]:** 1 Years @ Life Begin; 3 Months @ Life End, @40°C
- **Shock/Vibration:**
  - Non-operational shock: 700G, half-sine
  - Vibration during operation: 1.8GRMS 5-500-5 Hz
  - Vibration (non-operation): 3.13GRMS, 5-800-5 Hz
- **High-Performance Processor with Integrated, Parallel Flash Interface Engines:**
  - Enterprise Grade Triple-Level Cell (eTLC) 3D NAND Flash
  - DDR4 DRAM based Controller architecture
- **High Reliability:**
  - Mean Time To Failure (MTTF): > 2,000,000 hours
  - Data Reliability: < 1 sector per 10^{17} bits

[1] To check the compatibility of the customer system and the storage device is part of the customer's responsibility. Swissbit can provide guidance and support on request.
[2] Adequate airflow is required, typical ambient temperature 0-35°C.
[3] NAND Flash suppliers refer to JEDEC JESD47 and JESD22 for Data Retention testing. Based on the information provided by the NAND Flash suppliers, Data Retention is targeted as shown for reference.

Product Features

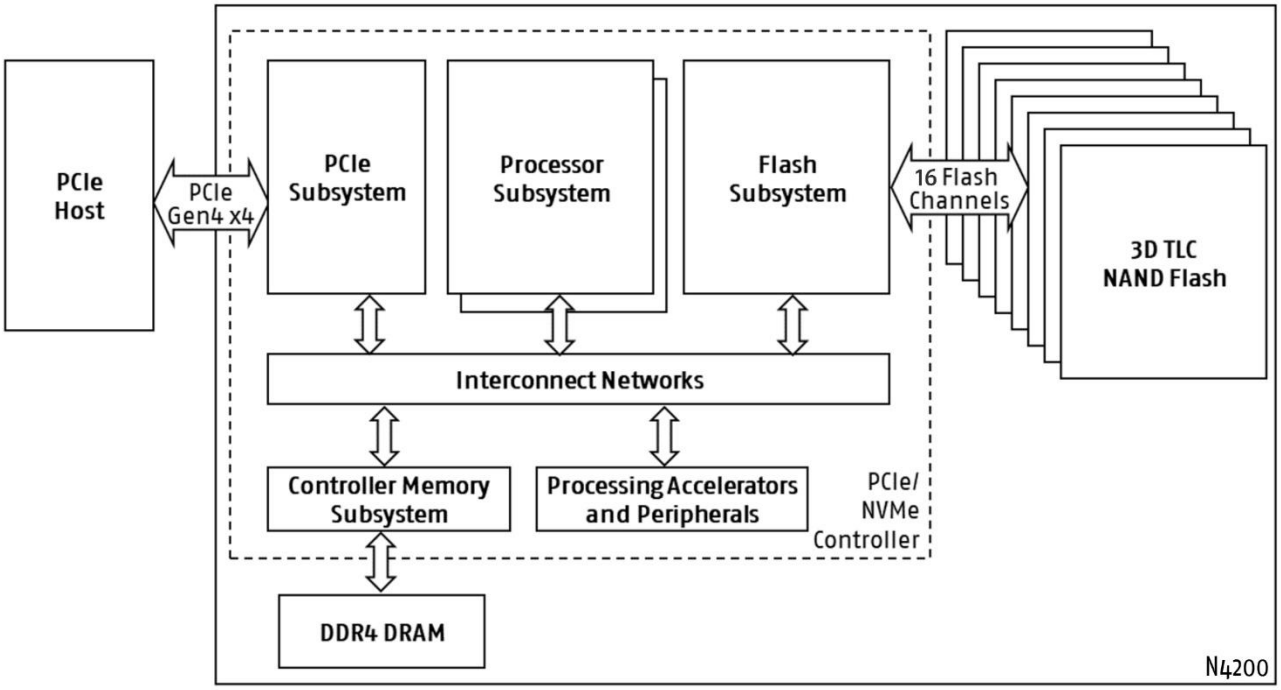
- Modular flash SSD controller architecture designed specifically for the extreme workload demands of cloud and data center environments
- QoS for Performance and Latency Consistency, Consistent Performance and Latency over life with complex mixed workloads
- Real World Workload Consistent Performance and Latency over life
- Hot / Cold Data Management
- In-System, Real Time Workload Analysis
- Tunable to workload – Optimize to application type or workload
- Advanced Wear Leveling – Adapts to Workloads
- Customized features and statistics
- Over-temperature protection
- Thermal throttling
- Asynchronous Power Loss Protection
- Flexible Overprovisioning
- In-Field Firmware Update[4]
- Sanitize (secure erase)
- FW activation and commit without requiring a reset
- Data Care Management
  - Active: Adaptive Read Refresh
  - Passive: Background Media Scan
- Lifetime Enhancements
  - Dynamic Bad Block Remapping
  - Write Amplification Reduction
- Data set management support (TRIM)
- Enterprise-Grade Self-Monitoring, Analysis, and Reporting Technology (S.M.A.R.T., Telemetry)
- RoHS / REACH Compliant

[4] The support of In-Field FW update capabilities on host systems is recommended.

Product Description

The Swissbit® N4200 SSD leverages the U.3 form factor, PCIe electrical interface and NVMe standard to provide a high performance, high capacity enterprise grade SSD. The NVMe controller and the newest 3D NAND flash technology provides robust, non-volatile storage solution for today's cloud applications. A functional block diagram of the N4200 SSD is provided below in Figure 1.

Figure 1:N4200 Functional Block Diagram



The N4200 SSD incorporates a U.3 host connector to support host read/write, control, and power activity per the applicable JEDEC specification.

The on-board NVMe controller manages the interface between the host and the non-volatile NAND flash memory array. The controller is designed to support PCIe interface speeds and utilizes a high performance processing subsystem, providing an optimum balance between read/write performance, Data Care Management, and power fail protection.

The N-4200 is an innovative approach designed specifically to tackle complex cloud applications delivering the best and most consistent throughput and latency in the industry.

Related Documentation

- NVM Express – Revision 1.4, (https://nvmexpress.org/)

Performance Specifications

The N4200 target read/write sequential and random performance benchmarks are detailed in the following Table 1.

Table 1: Read/Write Performance[5]

Capacity	Sequential Read (MBPS)	Sequential Write (MBPS)	Random Read 4K (IOPS)	Random Write 4K (IOPS)
7.68 TByte	7,030	3,742	512,930	271,957
15.36 TByte	6,869	4,503	480,480	160,422

Endurance Specification

The endurance values depend on adjustable overprovisioning, ECC, set points optimized for environment and workload.

Table 2: Endurance Specification

Capacity	Endurance DWPD[6]	Endurance PBW
7.68 TByte	2.05	26.1
15.36 TByte	1.50	38.3

Power Consumption Specification

Table 3: Power Consumption

Capacity	Operating voltage	Idle Power (W)	Sequential Read Power (W)	Sequential Write Power (W)
7.68 TByte	12V (±8%)	7.3	14.4	19.2
15.36 TByte	12V (±8%)	7.4	15.6	21.0

Drive Geometry Specification

The N4200 drive geometry is set to report industry standard LBA settings per the IDEMA standard (LBA1-03). The values for each capacity are shown.

Table 4: Geometry Specification

Raw Capacity	User Capacity[7]	Total LBA	User Addressable Bytes
		Decimal	(Unformatted)
8.0 TByte	7.68 TByte	15,002,931,888	7,681,501,126,656
16.0 TByte	15.36TByte	30,001,856,512	15,360,950,534,144

Why Swissbit?

Swissbit is focused on the design, development, manufacture, and support of leading edge memory and storage solutions for the worldwide OEM/ODM marketplace. As a global supplier, Swissbit recognizes and addressees the higher level of application requirements of today's enterprise, industrial, Netcom, and automotive customers by providing best-in-class products and services, with uncompromised attention to driving overall value and quality.

[5] The values are measured using Crystal Disk Mark 8. Performance depends on flash type and number, file/cluster size, and burst speed.
[6] DWPD: Drive Write Per Day. One full drive per day means the drive can be written and re-written to the full capacity once a day for the specified lifetime. Actual results may vary due to system configurations, usage and other factors. The endurance is related to a service life of 5 years and depends on the application profile.
[7] 1 GByte = 10^9 bytes

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SN4200UB15T4C SN4200UB7T68C SN4200UB15T4C-1MAA-1AA-STD SN4200UB7T68C-1TA8-1AA-STD