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Built with Purpose, Designed for Performance.

Intel® Data Center SSDs based on EDSFF: The perfect fit

Break free from the limitations of legacy data center SSD form factors with the revolutionary E1.L and E1.S Intel® SSDs based on Enterprise and Data Center SSD Form Factor (EDSFF). Designed from the ground up, EDSFF-based SSDs deliver the building blocks for scalable solutions. Increased operational efficiency and massive space consolidation reducing the storage physical footprint, results in lower TCO. Featuring a common connector and pinout, the array of flexible, future-ready features enable a broad range of interoperable designs.

Designed to meet top data center storage challenges

Creation of EDSFF was guided by three principles: enable scale, optimize total cost of ownership, and enable a dynamic range of solutions.

These principles were driven by key data center storage challenges, as surveyed from top IT decision makers, including: ability to scale capacity to support data and application growth, driving down the cost of storage—lowering operating and capital expenditures, while increasing storage agility, and deliver required application performance without compromises. With a healthy and growing ecosystem, Intel supports EDSFF as the data center form factor standard of the future.

Now you have options

The E1.L and E1.S give you options for a variety of data center needs.

E1.L is a form factor optimized for disaggregated systems. Providing high per server capacity, E1.L enables up to 32 drives per rack unit for massive storage power. In addition to capacity, this form factor provides key features of thermal efficiency, full serviceability, scalability, and future ready performance.

E1.S provides the best of U.2 and M.2.—a scalable, flexible, power, and thermally efficient SSD building block. This form factor was designed for high-volume hyperscale, and allows system flexibility, increased storage density, modular scaling, improved serviceability, and more efficient cooling optimized for 1U servers.

Optimized capacity

EDSFF drives were designed to optimize capacity per drive. With 36 media sites on the E1.L this drive can scale to higher capacities without expensive and complex die stacking. The Intel SSD E1.L can scale up to 30.72TB of capacity, which means you can reach nearly 1PB of storage in 1U.[1] This provides up to 10 times rack consolidation compared to 8TB U.2 15mm drives. operational reliability.[2]

- Consolidate and accelerate warm storage.
- Enable 1PB of storage in just 1U.
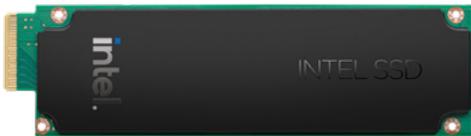
Space isn't all it saves

E1.L provides programmable LEDs to quickly locate failed drives, offline drives, and un-populated slots. With a carrier-less design and an integrated latch, the E1.L removes the need for drive carriers. Advanced enclosure management with slot level power control enables single drive isolation. The E1.L is up to 2 times more thermally efficient than U.2 15mm drives,[3] while the E1.S is up to 3 times more thermally efficient than U.2 7mm drives.[4] With a combination of built in serviceability and thermal efficiency, EDSFF drives allow you to increase operational efficiency at scale.

Intel® SSDs Available in EDSFF		
Model	**Intel® SSD DC P4510**	**Intel® SSD DC P4511**
Capacity and Form Factor	E1.L: 15.36TB	E1.S: 4TB
Interface	PCIe 3.1 x4, NVMe 1.2	PCIe 3.1 x4, NVMe 1.2
Media	Intel® 3D NAND Technology, 64-layer, TLC	Intel® 3D NAND Technology, 64-layer, TLC
Performance	128K Sequential R/W up to 3,100/3,100 MB/s	128K Sequential R/W up to 2,800/2,400 MB/s
	Random 4KB R/W up to 583K/131K IOPS	Random 4KB R/W up to 610K/75K IOPS
Endurance	Up to 22.7 PBW	Up to 3.33 PBW
Reliability	UBER: 1 sector per 10^{17} bits read MTBF: 2 million hours	UBER: 1 sector per 10^{17} bits read MTBF: 2 million hours
Power	Up to 16 Watt	Up to 12.5 Watt
Warranty	5-year limited warranty	5-year limited warranty
Model	**Intel® SSD D5-P4326**	**Intel® SSD D5-P316 - Available Q2'21**
Capacity and Form Factor	E1.L: 15.36TB, 30.72TB	E1.L: 15.36TB, 30.72TB
Interface	PCIe 3.1 x4, NVMe 1.2	PCIe 4.0 x4, NVMe 1.3c
Media	Intel® 3D NAND Technology, 64-layer, QLC	Intel® 3D NAND Technology, 144-layer, QLC
Performance	128K Sequential R/W up to 3,200/1,600 MB/s	128K Sequential R/W up to 7,000/3,600 MB/s
	Random 4KB R/W up to 580K/15K IOPS	Random 4K Read up to 800K IOPS Random 64K Write up to 510 MBps Random 64K 70/30 R/W up to 1,170 MBps
Endurance	Up to 0.18 DWPD	Up to 0.41 DWPD
Reliability	UBER: 1 sector per 10^{17} bits read MTBF: 2 million hours	UBER: 1 sector per 10^{17} bits read MTBF: 2 million hours
Power	Active: 20W Idle: 5W	Active: 25W Idle: 5W
Warranty	5-year limited warranty	5-year limited warranty

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1. Source- Intel. 983TB total using 32 30.72TB SSDs; 32 SSDs per 1U node using E1.L form factor. Based on 30.72TB Intel® SSD D5-P4326 available at a future date.

2. Source- Intel. Comparing maximum capacity per 1 rack unit of 32 Intel® SSD D5-P4326 30.72TB (available at a later date) of 983TB to 10 rack units of Intel® SSD DC P4500 8TB of 960TB.

3. Source – Intel. Comparing airflow required to maintain equivalent temperature of a 4TB U.2 15mm Intel® SSD DC P4500 to a 4TB EDSFF-based form factor for Intel® SSD DC P4500. Results have been estimated or simulated using internal analysis or architecture simulation or modeling, and provided for informational purposes. Simulation involves three drives for each form factor in a sheet metal representation of a server, 12.5mm pitch for the EDSFF-based form factor, 1000m elevation, limiting SSD on case temp of 70°C or thermal throttling performance, whichever comes first. 5°C guard band. Results used as a proxy for airflow anticipated on EDSFF spec compliant form factor Intel® SSD P4510.

4. Source – Intel. Comparing airflow required to maintain equivalent temperature of an 8TB U.2 7mm Intel® SSD DC P4500 to a 8TB EDSFF E1.S form factor for Intel® SSD DC P4510. Results have been estimated or simulated using internal analysis or architecture simulation or modeling, and provided for informational purposes. Simulation involves comparing the 1U server implementations of each form factor. E1.S is vertically oriented at an 11mm pitch, and the U.2 7mm is horizontally oriented at an 18mm pitch. Both form factors are surrounded in a sheet metal representation of a server. Each form factor is limited by condition to initiate thermal throttling.

Performance varies by use, configuration and other factors. Learn more at www.Intel.com/PerformanceIndex.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.

Your costs and results may vary.

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