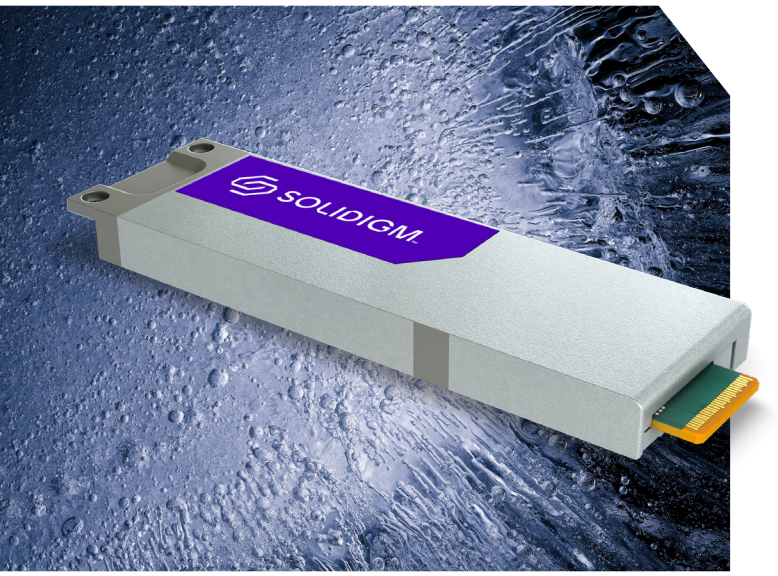
SOLIDIGM

Solidigm™ D7-PS1010 E1.S

PRODUCT BRIEF

Leading The Charge in Direct Liquid-Cooled Storage Technology For The AI Era

Solidigm is expanding the high performance D7-PS1010 family with the powerful first-to-market single-sided cold plate liquid-cooling SSD.



Both 9.5mm and 15mm form factors are available in 3.84TB and 7.68TB capacities.

The rapid expansion of Artificial Intelligence (AI) and High-Performance Computing (HPC) workloads is reshaping data center infrastructure, driving unprecedented increases in compute, network, and storage density, leading to higher thermal output and power consumption. Traditional air-cooling systems are increasingly inadequate for managing the heat generated by these advanced intensive workloads, especially in dense GPU server environments,[1] as components push the boundaries of thermal and power efficiency.

Direct Liquid Cooling (DLC), or cold-plate cooling, offers a transformative solution – delivering targeted, efficient cooling directly to critical server components. This approach not only enhances thermal and system performance, but also reduces operational costs and enables innovative, fanless server designs.

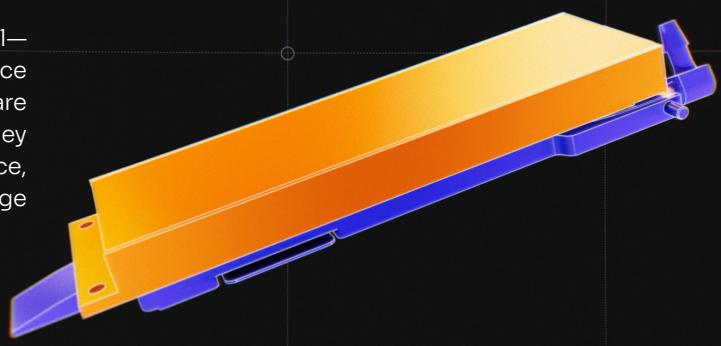
The cool storage solution: The Solidigm™ D7-PS1010 E1.S SSD, represents a breakthrough in thermal optimization. Designed specifically for next-generation AI server architectures, it addresses the dual challenges of heat management and cost efficiency, delivering the high performance required for demanding AI workloads. With customer-first innovations in mind, this PCIe 5.0 SSD is equipped to keep cool in the fiery AI era.

Product Features		
Product Name	Solidigm™ D7-PS1010	
Interface	PCIe 5.0	
Media	176L TLC 3D NAND	
User Capacity (TB)	3.84 and 7.68	
Form Factor and Cooling	9.5mm Cold Plate Cooling or Air-cooled	15mm Air-cooled only
Endurance Rating	Standard Endurance (SE)	
Endurance (5-yr)	1.0 DWPD	
Max Lifetime PBW (5-yr)	14 PBW @ 7.68TB	
Max Avg Active Read & Write Power	25W (PCIe 5.0 and 4.0)	
Idle Power	5W (EU Lot 9-compliant)	
MTBF	2.5 Million Hours (**25% higher**)[2]	
UBER	Tested to 1E-18 (**10x higher**)[3]	

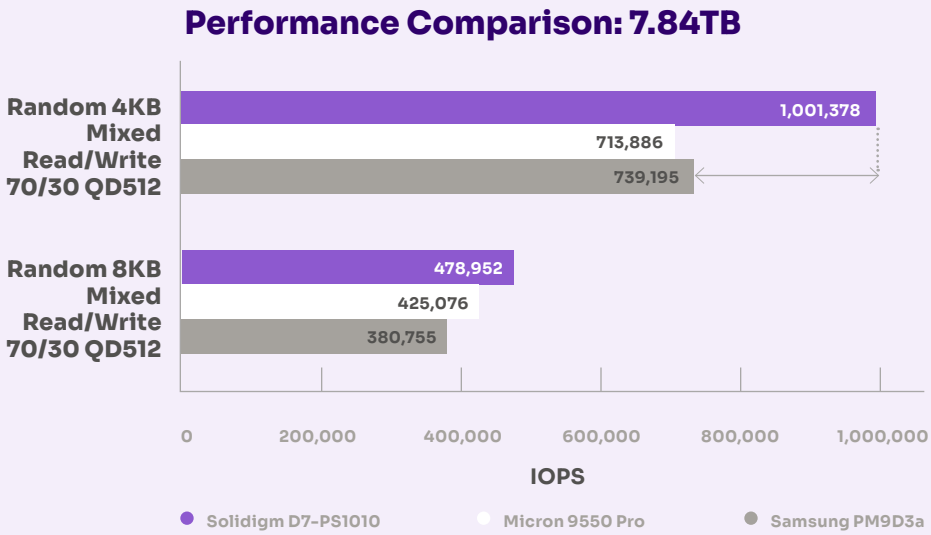
Product	Sequential Read 128KB	Sequential Write 128KB	Random Read 4KB	Random Write 4KB
Solidigm™ D7-PS1010	**1.12X** Up to 14,500 MB/s	**1.62X** Up to 10,500 MB/s	**1.18X** Up to 3.3M IOPS	**1.60X** Up to 400K IOPS
Samsung PM9D3a baseline	1.0X Up to 13,000 MB/s	1.0X Up to 6,500 MB/s	1.0X Up to 2.8M IOPS	1.0X Up to 250K IOPS
Micron 9550	1.08X Up to 14,000 MB/s	1.54X Up to 10,000 MB/s	1.18X Up to 3.3M IOPS	1.60X Up to 400K IOPS
Kioxia XD8	0.96X Up to 12,000 MB/s	0.89X Up to 5,800 MB/s	0.82X Up to 2.3M IOPS	1.0X Up to 150K IOPS

Unmatched Performance[4]

In today's data-driven world, instant access isn't optional—it's essential. Leveraging class-leading performance advancements and deep industry expertise, our drives are engineered and calibrated for real-world workloads. They set the benchmark not only in four-corner performance, but also under diverse I/O conditions across a wide range of applications powered by AI, ML, and HPC.



Solidigm™ D7-PS1010 Performance			
Workload	**Unit**	**3.84TB**	**7.68TB**
128KB Sequential Read	GB/s	14.5	14.5
128KB Sequential Write	GB/s	8.4	14.5
4KB Random Read	IOPS	3,200K	3,300K
4KB Random Write	IOPS	315K	400K
4KB Random Mixed 70/30 RR/RW	IOPS	729K	950K



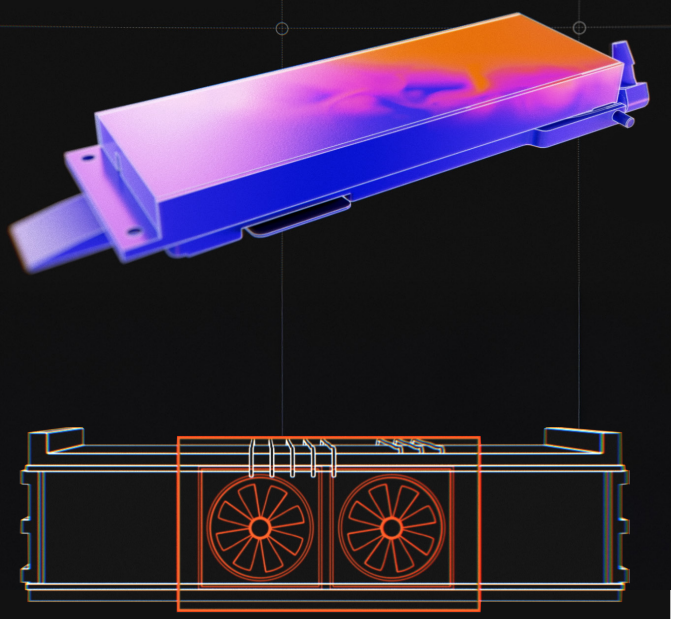
Performance Comparison: Random Mixed

Experience up to 40% better random read/write performance compared to the Micron 9550 Pro, and up to 35% better random read/write performance compared to Samsung PM9D3a.[5]

Efficient Cooling Design for the AI Era:

The processing and storage of AI workloads generate immense amounts of heat in the modern data center. As AI workloads continue to scale in complexity and intensity, modern data centers face unprecedented thermal challenges. The heat generated by high-performance computing tasks is no longer a secondary concern: it is a critical design factor. The Solidigm cooling solution addresses this shift, offering thermal management that enables more energy-efficient data center designs.

With thermal considerations heating up, we set out to create a unique solution optimized for extreme AI compute operating environments. Other SSDs using direct liquid cooling dissipate heat primarily from the side of the drive touching the cold plate but can't efficiently cool the critical components on both sides of the drive. Direct Attach Storage (DAS) SSD performance can suffer if any single component exceeds operating temperature specifications, which can impact overall server performance. Solidigm has brought to market the world's first SSD enclosure with a thermal solution that actively cools both sides of an E1.S drive using a single cold plate.



Key Advantages: Air-cooled

Superior Energy Efficiency: The Solidigm D7-PS1010 E1.S 15mm air-cooled SSD drops energy usage by up to 33% when compared to similar solutions.[6]

Air-Cooled SSD **Cooling Energy Savings**

E1.S SSD	Workload Power (W)	SSD Cooling Energy per Year	Compare
Micron 9550 (15mm **air-cooled**)	19.0W	**5.35 kWh**	1.0x (baseline)
Solidigm D7-PS1010 (15mm **air-cooled**)	22.0W	**3.61 kWh**	0.67x

33% lower cooling energy usage

Key Advantages: Liquid-cooled

Optimized for AI workloads: Designed to handle the thermal output of AI-driven operations, the D7-PS1010 will provide stable and efficient DAS performance.

Superior Energy Efficiency: The D7-PS1010 E1.S 9.5mm liquid-cooled cold-plate drops energy usage by up to 84% when compared to the competition's air-cooled comparable.[7]

Forward-looking Design: By 2027, next-generation rack-scale GPU platforms will support 8 times the number of GPUs as compared to today's state-of-the-art systems.[8] Our 9.5mm E1.S solution helps to enable this progress in server density by eliminating the need for loud and inefficient air-cooling fans, reducing the physical footprint of cooling infrastructure. This fanless GPU server solution allows for more density without compromising efficient performance and cooling energy usage.

Cold-Plate **Energy Savings** vs. Air-Cooled SSDs

E1.S SSD	Workload Power (W)	SSD Cooling Energy per Year	Compare
Micron 9550 (15mm **air-cooled**)	19.0W	**5.35 kWh**	1.0x (baseline)
Solidigm D7-PS1010 (9.5mm **liquid-cooled**)	22.0W	**0.85 kWh**	0.16x

84% lower cooling energy usage vs. AC SSDs

1. https://www.datacenterknowledge.com/data-storage/liquid-cooled-ssd-eases-ai-data-center-heat-challenges

2. As compared to previous generation Solidigm™ D7-P5520 7.68TB. See Solidigm D7-PS1010/PS1030 product brief for performance, exceptions and modifications for compliance/support details.

3. As compared to previous generation Solidigm™ D7-P5520 7.68TB. See Solidigm D7-PS1010/PS1030 product brief for performance, exceptions and modifications for compliance/support details.

4. Solidigm expects up to 5% variation in throughput between drive-to-drive runs. Sequential performance is measured with Queue Depth 128 (1 Worker), Random performance is measured with Queue Depth 512 (QD64 x 8), at Power Mode set to PS0.FIO Version 3.35 and SPDK Version 23.01 are utilized in Solidigm measurement environment with 32 Core CPUs and 256GB DRAMs. Measurements are performed on full LBA span of the drive with pre-conditions for 100% read workloads. Any change in the system or drive configuration may impact drive performance. Transfer Block Size greater than 32K is recommended for NVMe SGL feature.

5. Source: Solidigm internal testing. Server: Supermicro ASG-1115S-NE316R. Mainboard: Supermicro Server Board H13SSF, Version 2.0. BIOS: SE5C6200.86B.4018.D65.2010201151. CPU: AMD Epyc 9374F, CPU Sockets: 1, Number of Cores: 32. DRAM: DDR5 256GB. OS: Rocky Linus Release 8.10, Kernel Version: 4.18.0-553.el8_10.x86_64. Tool: NVMe Driver: Inbox, FIO Version: 3.19. Storage: Solidigm D7-PS1010, Micron 9550 Pro, Samsung PM9D3a

6: Source - Solidigm. Results are calculated from airflow and pressure drop measurements of fluid in a typical server fan/pump condition for 35C air and 45C liquid inlet temperature while running worst thermal workload for 8 E1.S eSSDs.

7. Source - Solidigm. Results are calculated from airflow and pressure drop measurements of fluid in a typical server fan/pump condition for 35C air and 45C liquid inlet temperature while running worst thermal workload for 8 E1.S eSSDs.

8. Source: https://www.datacenterdynamics.com/en/news/nvidias-rubin-ultra-nvl576-rack-expected-to-be-600kw-coming-second-half-of-2027/

Four-corners competitive comparison SSDs:

Samsung 9D3a

Micron 9550

Kioxia XD8

All product plans, roadmaps, specifications, and product descriptions are subject to change without notice.

Nothing herein is intended to create any express or implied warranty, including without limitation, the implied warranties of merchantability, fitness for a particular purpose, and non-infringement, or any warranty arising from course of performance, course of dealing, or usage in trade.

The products described in this document may contain design defects or errors known as “errata,” which may cause the product to deviate from published specifications. Current characterized errata are available on request.

Contact your Solidigm representative or your distributor to obtain the latest specifications before placing your product order.

For copies of this document, documents that are referenced within, or other Solidigm literature, please contact your Solidigm representative.

All products, computer systems, dates, and figures specified are preliminary based on current expectations, and are subject to change without notice.

SOLIDIGM and the Solidigm “S” logo are trademarks of Solidigm Inc., registered in the United States, People’s Republic of China, Taiwan, Hong Kong, Singapore, the European Union, the United Kingdom, Mexico, and other countries.

Solidigm may make changes to specifications and product descriptions at any time, without notice. Designers must not rely on the absence or characteristics of any features or instructions marked “reserved” or “undefined.” Solidigm reserves these for future definition and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to them. The information here is subject to change without notice. Do not finalize a design with this information.

Tests document performance of components on a particular test, in specific systems. Differences in hardware, software, or configuration will affect actual performance. Consult other sources of information to evaluate performance as you consider your purchase.

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

Solidigm or Intel optimizations, for Solidigm or Intel compilers or other products, may not provide optimized performance to the same degree for non-Solidigm or Intel products. Solidigm or Intel technologies may require enabled hardware, software, or service activation.

Your costs and results may vary.

Solidigm does not control or audit third-party data. You should consult other sources to evaluate accuracy.

Some results have been estimated or simulated using internal Solidigm analysis or architecture simulation or modeling, and provided to you for information purposes only. Any differences in your system hardware, software or configuration may affect your actual performance.