OPEN COMPOSABLE COMPATIBILITY LAB

DapuStor R5100D — 15.36TB SSD Test Results

The Third Party Test Results for the DapuStor R5100D are based on a comprehensive evaluation to ensure compatibility, performance, and reliability performed by the Open Composable Compatibility Lab (OCCL). The assessment covers basic interoperability and specialized workload performance using industry-standard benchmarking tools. This test result is not an endorsement of the third-party product by Western Digital and no warranty of the product is expressed or implied by Western Digital or the OCCL.

For more information related OCCL, see: https://www.opencomposable.com/.

Drive Details

Drive	DapuStor R5100D
Form Factor	U.2 15mm
Interface	PCIe® Gen4, NVMe™ 1.4
Security	N/A
Power	22W (Active)
Power Idle	6.5W
Part Number	DPRD31016TT515T3010

The following table displays the status and results of the testing of a specific device. The four columns represent specific configurations which progressively increase in terms of complexity in the following order: Local benchmark x1 > Data24 x1 > Data24 x8 > Data24 x24. All devices will start with the Local x1 and Data24 x1. Poor performance or interoperability issues in any configuration can eliminate the device from further consideration. The individual tests are consistent with general industry practices and reporting. Western Digital's OpenFlex™ Data24 NVMe-oF™ Storage Platform extends the high performance of NVMe flash to shared storage. The storage platform provides low-latency sharing of NVMe SSDs over a high-performance Ethernet fabric to deliver similar performance to locally attached NVMe SSDs.

For additional information on Western Digital's OpenFlex Data24 NVMe-oF Storage Platform, see: https://www.westerndigital.com/products/data-center-platforms/openflex-data24-nvme-of-platform?sku=1ES2380.

DapuStor R5100D 15.36TB Top Line Performance

Test Description	Local x1	Data24 x1	Data24 x8	Data24 x24
Read Bandwidth (128KB) MB/s	7,042	6,743	45,435	138,272
Write Bandwidth (128KB) MB/s	6,495	6,493	35,521	104,415
Random Read (4KB)K IOPS	1,680	1,380	8,080	24,359
Random Write (4KB) K IOPS	327	319	2,533	7,736
Random Mixed (4KB) K IOPS	766	751	5,932	17,739
4K Random Write Latency (µs)	5.737	17.154	17.409	17.674
4K Random Read Latency (µs)	62.376	70.172	70.451	70.172
4K Random Write 4-9s µs	22.059	30.976	30.933	31.147
4K Random Read 4-9s µs	95.403	101.888	109.227	109.454

DapuStor R5100D SSD Test Results

nX scores are used to display how devices perform compared to a baseline. The following example uses the “Local x1” device.

- 1.00X: Matches the baseline performance.
- → 1.00X: Faster / Better than the baseline.
- Example: 2.00X is twice as fast as the baseline.
- ← 1.00X: Slower / Worse than the baseline.

Example: 0.50X is half as fast as the baseline.
Key Point: A higher nX score always indicates better performance relative to the baseline, regardless of the specific metric (IOPS, Bandwidth, Latency, or QoS).

DapuStor R5100D 15.36TB Normalized to Local x1 Top Line Performance

Test Description	Local x1	Data24 x1[1]	Data24 x8[2]	Data24 x24[3]
Read Bandwidth (128KB) MB/s	1X	0.96X	6.45X	19.64X
Write Bandwidth (128KB) MB/s	1X	1.00X	5.47X	16.08X
Random Read (4KB)K IOPS	1X	0.82X	4.81X	14.50X
Random Write (4KB) K IOPS	1X	0.98X	7.75X	23.67X
Random Mixed (4KB) K IOPS	1X	0.98X	7.75X	23.17X
4K Random Write Latency (µs)	1X	**0.33X**	**0.33X**	**0.32X**
4K Random Read Latency (µs)	1X	**0.89X**	**0.89X**	**0.89X**
4K Random Write 4-9s µs	1X	**0.71X**	**0.71X**	**0.71X**
4K Random Read 4-9s µs	1X	**0.94X**	**0.87X**	**0.87X**

Coefficients of Variation (CoV) are a standard statistical measure that are directly comparable to other CoVs as opposed to Standard Deviations (SD) that can only be compared if the mean is the same for two sets of data. CoV = SD/MEAN. NAND storage has a higher variability than DRAM, for example, that is highly consistent. NAND is a noise technology that has higher error rates than most solid state memory. Each manufacturing process has its own baseline error rate. These error rates are based on one second intervals provided by standard monitoring tools like iosstat.

DapuStor R5100D 15.36T CoV Analysis

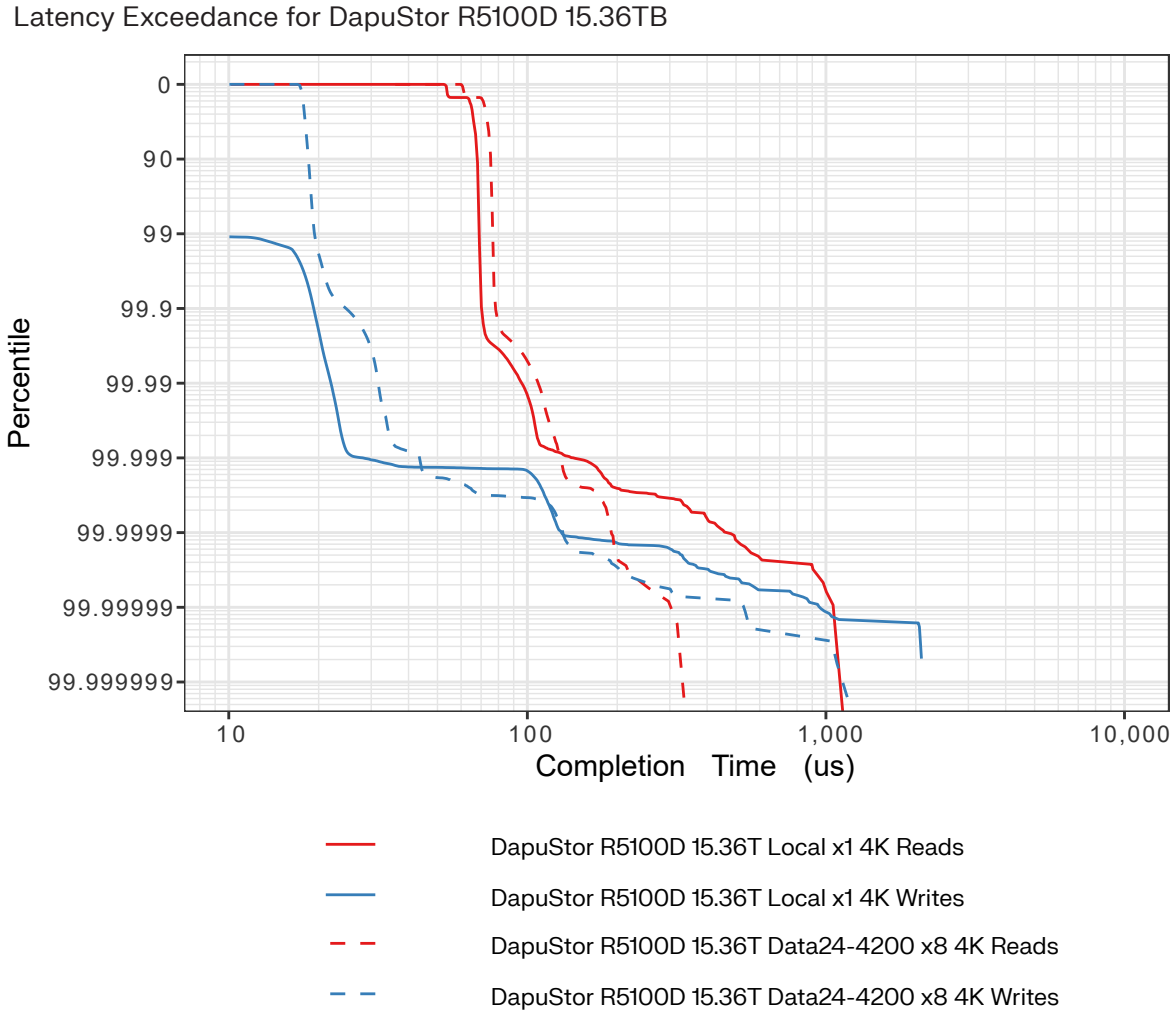
Test Description	Local x1	Data24 x1	Data24 x8	Data24 x24
Read Bandwidth (128KB) MB/s	0.0003%	0.244%	0.244%	0.913%
Write Bandwidth (128KB) MB/s	0.0002%	0.028%	0.028%	0.919%
Random Read (4KB)K IOPS	0.0002%	0.089%	0.089%	0.137%
Random Write (4KB) K IOPS	0.013%	0.032%	0.032%	0.016%
Random Mixed (4KB) K IOPS	0.009%	0.028%	0.028%	0.010%
4K Random Write Latency (µs)	0.211%	4.313%	4.313%	0.122%
4K Random Read Latency (µs)	0.019%	0.945%	0.945%	0.318%
4K Random Write 4-9s µs	0.547%	4.687%	4.687%	0.244%
4K Random Read 4-9s µs	1.012%	0.821%	0.821%	0.409%

[1,2,3] For the last four entries in the column, the Latency or 4-9s QOS values greater 1x indicate slower response time.

DapuStor R5100D SSD Test Results

Exceedance Chart

The following charts contain the technical and most accurate information. Exceedance charts are typically used for only single drive, single process, queue depth one analysis as in the following example. The chart is the most fundamental measurement of SSD or disk performance as it shows the minimum latency as well as the expected error rate and latency for the device under test. These results are often referred to as the “number of nines”. For example, “4-9s” shows the latency or response time for 9999 of 10000 IOs. The number of IOs grows exponentially with the increase in the number of nines. This chart shows for 6-9s that the best performer for random writes is the small blue dotted line at approximately 90 µs. Random writes are faster than random reads, because random writes are cached in the asynchronous write buffer and are periodically written to the underlying NAND media. Exceedance charts can be run and compared as long as all tests were run on similar systems using the same workload.



Western Digital.

5601 Great Oaks Parkway
San Jose, CA 95119, USA
www.westerndigital.com