# PRODUCT BRIEF

Intel® SSD D5-P4320
Data Center, PCI Express*

# Intel® QLC 3D NAND SSD with PCIe*
# Large, Affordable Capacity. Reliable Storage.

## Intel delivers the industry's first PCIe* QLC 3D NAND SSD for the Data Center[1] – a new generation of large, affordable, and reliable drives

The Intel® SSD D5-P4320 delivers big, affordable, and reliable storage to the warm data tier. With 33% more bits per cell than TLC,[2] the D5-P4320 drives will enable 3x storage consolidation[3] compared to hard disk drives (HDDs), leading to lower operational costs. As the industry's first PCIe*-enabled QLC drive for the data center, the D5-P4320 provides the ability to scale to large capacities and deliver the performance needed for storage workload requirements.

### Store More: Big Capacities Store Massive Quantities of Data

Aerial density describes how many bits of data are stored in a given square millimeter of storage media. The Intel® SSD D5-P4320 with QLC technology offers an aerial density advantage of 33% more bits per cell than the prior generation of Intel® 3D NAND. The result? Higher capacity, cost-effective PCIe drives optimized for read-intensive storage workloads. The D5-P4320 is currently available in a U.2 form factor with 7.68TB capacity. Available for limited deployments is the larger capacity 15.36TB Intel® SSD D5-P4326 in the U.2 and EDSFF* "Ruler" form factors, making them ideal for bulk storage requirements.

### Save More: High Density Reduces Operational Cost

Today's data center storage often relies on a mix of HDD and SSD technologies. The Intel® SSD D5-P4320 delivers high capacity and lower operational cost for the capacity or "warm" data storage layer traditionally served by hybrid or HDD arrays. With its higher density, Intel® QLC SSDs means fewer drives to support, power and cool. In addition QLC SSDs have a lower annual failure rate, which further reduces costs.

### Do More: PCIe Accelerates Workloads at Large Capacities

All QLC-enabled SSDs are not created equal. In addition to massive capacities, the D5-P4320 is built on the PCIe* interface, which delivers higher maximum performance than the SATA interface. The D5-P4320 SKUs allow for much denser systems while enabling performance per TB to continue scaling well beyond SATA-based QLC SSDs. The Intel® QLC SSDs, when combined with Intel® Optane™ technology, accelerate the speed of frequently accessed data, at the price and capacity of massive storage.

### Backed by Intel Experience and Innovation

Intel brings longstanding expertise and leadership in data management to address the capacity and performance issues of today's data centers. Prepare for the future with Intel® QLC SSDs with PCIe, backed by Intel's technology and manufacturing leadership.

| Features At-a-Glance | |
|---|---|
| Model | Intel® SSD D5-P4320 |
| Capacity and Form Factor | U.2 2.5" (15mm): 7.68 TB |
| NAND Flash Memory | 64-layer, Intel® QLC 3D NAND |
| Interface | PCIe Gen3.1 x 4 |
| Bandwidth | Sequential R/W up to 3200/1000 MB/s |
| | Random R/W up to 427K/36K IOPS |
| Annualized Failure Rate | ≤ 0.44% |
| Endurance Rating | Sequential write up to 12.3 PBW<br>Random write up to 2.8 PBW |
| Power Consumption | Active: 15W<br>Idle: ~5w<br>Enhanced power-loss data protection |
| Operating Temperature | $0^0$ C – $70^0$ C SMART temperature |
| Warranty | 5-year limited warranty |

*For more up-to-date product specifications, visit ark.intel.com*

Learn more now at intel.com/ssd

1. Based on Intel achieving PRQ status of Intel® SD D5-P4320 on July 13, 2018
2. 33% more bits per cell. TLC (tri-level cell) contains 3 bits per cell and QLC (quad level cell) contains 4 bits per cell. Calculated as (4-3)/3 = 33% more bits per cell.
3. Consolidate storage footprint up to 3x. Based on 4TB 3.5' HDD - WD Gold TB Enterprise class 7200 RPM SSD configuration based on 7.68TB Intel® D5-P4320 QLC SSD: 3 2U nodes per 1PB - 1,106TB total using 144 7.68TB D5-P4320 SSDs; 48 2.5" SSDs per 2U node using 2.5" U.2 from factor; 3 2U nodes for 6U total. HDD configuration based on 4TB 3.5' HDD: - 10 2U nodes per 1PB – 960TB total based on 24 3.5" HDDs per 2U. Note that 4TB HDDs are used in this comparison as we are targeting "warm" storage meaning that a certain capacity is needed, but performance is also important and 4TB HDDs perform much better than larger capacity HDDs.

Performance results are based on testing as of June 24, 2018 and may not reflect all publicly available security updates. See configuration disclosure for details. No product or component can be absolutely secure.

Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more complete information visit www.intel.com/benchmarks.

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Performance varies depending on system configuration. Check with your system manufacturer or retailer or learn more at intel.com/ssd.

Cost reduction scenarios described are intended as examples of how a given Intel- based product, in the specified circumstances and configurations, may affect future costs and provide cost savings. Circumstances will vary. Intel does not guarantee any costs or cost reduction.

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