

PD5 Series

Enterprise-grade PCIe SSD

Specifications

Capacity

- U.2 :
Pro: 3.84TB / 7.68TB / 15.36TB
Max: 3.2TB / 6.4TB / 12.8TB

Components

- Flash: 3D TLC
- DRAM: DDR4

Compliance

- PCIe Gen5x4
- Surprise insertion / surprise removal (SISR) and hot-plug capable

Performance (up to)¹

- Sequential read (128K): 14 GB/s
- Sequential write (128K): 10 GB/s
- Random 4K read: 2,600K IOPS
- Random 4K write: 750K IOPS
- Random 8K read: 1,650K IOPS
- Random 8K write: 460K IOPS

Power management

- Auto idle
- PCIe link power management
- Temperature monitoring and throttling

Security

- NVM Format

Reliability

- Advanced LDPC error correction
- Global static and dynamic wear leveling
- Hardware Power Loss Protection (PLP)
- UBER: <1 sector per 10¹⁷ bits read
- MTBF: 2.0 million hours

Endurance²

- Pro: Up to 1 DWPD @5 Years
- Max: Up to 3 DWPD @5 Years

Data retention

- JESD219-compliant

Compatibility

- Windows 11/10
- Windows Server 2016/2012 R2/2012
- CentOS, Fedora, FreeBSD, openSUSE, Red Hat, Ubuntu, VMware ESXi, Citrix, KVM

Mechanical form factor

- U.2: 100.5 mm x 69.85 mm x 14.8 mm

Power consumption (TYP)

- Active: <24 W
- Idle: <8 W

Environment

- Operating temperature: 0–70 °C
- Storage temperature: -40–85 °C

Shock & vibration

- Operating: 50 G
(11 ms duration, half sine wave)
- Non-operating: 1000 G
(0.5 ms duration, half sine wave)
- Vibration: 3 G
(peak, 2–500 Hz)

Warranty

- 5-year limited warranty³

Specification notes:

- Performance claims
 - Actual performance may vary based on the hardware, software, and overall system configuration.
 - Sequential performance is measured with 128 KB transfer size, QD 32 and 4 KB alignment with Iometer.
 - Random performance is sustained performance measured with 4K/8K transfer size, QD 32 and 4 KB alignment with Iometer.
 - Performance test platform: CPU: Intel Core i7 4770K; motherboard: ASUS Z87-DELUXE; chipset: Intel Z87 Express; OS: Windows 8.1 Pro x64.
- Endurance claims
 - DWPD stands for Drive Writes Per Day. TBW = DWPD * capacity * warranty * 365 / 1000.
 - Access patterns used for random workload during endurance testing is compliant with the JESD219 standard.
- Limited warranty details: please refer to limited warranty policy and warranty terms.

Table of Contents

Specifications	1
Product datasheet.....	3
1. Order information	3
2. Part number decoder	3
3. Product overview.....	4
3.1 Exascend PD5 Series	4
3.2 Customization and tuning services.....	4
4. Detailed specifications.....	5
4.1 Capacity	5
4.2 Performance	5
4.3 Environment specification.....	6
4.4 Power consumption.....	6
4.5 Reliability	6
5. Physical dimension diagram	7
5.1 U.2 board.....	7
6. Pin Assignment	8
6.1 U.2 connector	8
7. Compliance.....	10
8. Supported NVMe commands	10
9. Supported Command Descriptions.....	11
9.1 Supported Mandatory Log Page	11
9.2 NVM Command Set	11
9.3 Supported Get Log Page Command	11
9.4 S.M.A.R.T/Health Attributes.....	12
9.5 Additional S.M.A.R.T/Health Attributes	14
9.6 Device Self-test Log	17
Legal information.....	17
Limited Warranty Policy	17
Warranty Terms.....	17
Disclaimer of liability	18
Copyright notice.....	18
Contact information.....	18
Revision history.....	19

Product datasheet

1. Order information

The following table lists the standard part numbers for Exascend PD5 Series SSD. For customization and design service inquiries, including – but not limited to – custom operating temperature, capacity, over-provisioning, endurance, performance, and power, please contact your Exascend account manager or send us an email at sales@exascend.com.

Table 1: PD5 Series SSD product list

PART NUMBER	CONFIGURATION	CAPACITY*	FLASH TYPE	FORM FACTOR
EXPD5U3840GB	Pro	3840GB *	3D TLC	U.2
EXPD5U7680GB	Pro	7680GB *	3D TLC	U.2
EXPD5U15360GB	Pro	15360GB *	3D TLC	U.2
EXPD5U3200GB	Max	3200GB *	3D TLC	U.2
EXPD5U6400GB	Max	6400GB *	3D TLC	U.2
EXPD5U12800GB	Max	12800GB *	3D TLC	U.2

*1GB=1,000,000,000 Bytes

2. Part number decoder

1	2	3	4	5
EX	PD5	U	3840GB	-X

1. Exascend
2. Product series: PD5, PCIe Gen 5 x 4
3. Form factor: U=U.2
4. Capacity
5. Customer code

3. Product overview

3.1 Exascend PD5 Series

Exascend provides customizable hardware and firmware design, manufacturing, and service of cutting-edge SSD products and advanced storage systems. Our products are designed specifically for high reliability commercial, enterprise data center, and cloud computing applications. By combining world class design R&D, and superior execution in delivery and support capabilities, Exascend strives to provide customers with the best in class product and service, enabling enhanced boot times, faster application load times, reduced power consumption and extended reliability.

Exascend PD5 series product supports U.2 form factors, integrating high speed PCIe Gen 5x 4 interface with third generation 3D TLC NAND flash memory technology, delivering capacities up to 15.36TB.

Key product highlights include:

- Consistently High IOPS, Throughput and Sustained Low Latency
- Firmware Upgrade without Reset
- Whole Disk Encryption with AES-XTS 256bit & Security Erase
- EUI64/NGUID
- Data Path Protection Guaranteed UBER within 10-17
- Enterprise Power Failure Protection Technology
- Temperature Monitoring and Throttling
- Self-Monitoring, Analysis, and Reporting Technology (S.M.A.R.T)
- Flexible Power Management
- Hot Pluggable
- Device Self-test
- Support NVMe-MI for Out-of-band Management
- Data Set Management Command (TRIM)
- Timestamp
- Weighted Round Robin (WRR)
- Telemetry
- Sanitize
- Secure Boot
- Secure Download
- Persistent Event Log

3.2 Customization and tuning services

Exascend provides customized hardware and firmware design services, tailoring cutting-edge SSD products for advanced storage systems. Combining world-class R&D and engineering support capabilities, Exascend provides customers with best-in-class products and services, enabling enhanced boot times, faster-loading applications, reduced power consumption, and extended reliability. To learn more about our extended engineering support services, e.g., tailored capacity, over-provisioning, extended operating temperature range, endurance, performance, power, and longevity, please contact your Exascend account manager or send us an email at sales@exascend.com.

4. Detailed specifications

Exascend PD5 SSD consists solely of semiconductor devices, it does not contain any mechanical part such as platter (disk), motor and suspension as traditional hard disk drive. Thus, it exhibits superior performance, capacity, reliability, ruggedness, low power, and small form factor profiles that qualified to be the best storage solution for enterprise application with extreme workloads and increased MTBF requirements.

Exascend PD5 SSD uses a single-chip flash controller to manage multiple NAND Flash memory modules. The controller works with a host system to allow data to be written to and read from the Flash memory modules through a PCIe interface.

4.1 Capacity

Table 2: Exascend PD5 series logical block address configuration

PD5 series	TOTAL USER ADDRESSABLE SECTORS IN LBA MODE (512 Bytes)	TOTAL USER ADDRESSABLE SECTORS IN LBA MODE (4096 Bytes)
3840 GB	7,501,476,528	937,684,566
7680 GB	15,002,931,888	1,875,366,486
15360 GB	30,005,842,608	3,750,730,326
3200 GB	6,251,233,968	781,404,246
6400 GB	12,502,446,768	1,562,805,846
12800 GB	25,004,872,368	3,125,609,046

Notes:

- The LBA count shown represents total user-accessible storage capacity and will remain the same throughout the drive's lifetime.
- The total usable capacity of the SSD may be less than the total physical capacity because a small portion of the capacity is used for NAND flash management and maintenance purposes.

4.2 Performance

Table 3: Drive performance – PD5 Series

	UNIT	PD5 PRO SERIES			PD5 MAX SERIES		
Capacity	GB	3840GB	7680GB	15360GB	3200GB	6400GB	12800GB
Sequential Read (128K)	GB/s	14	14	13.5	14	14	13.5
Sequential Write (128K)	GB/s	5.7	10	9.5	5.7	10	9.5
Random read (4KB)	IOPS	2600K	2600K	2600K	2600K	2600K	2600K
Random write (4KB)	IOPS	310K	500K	510K	550K	730K	750K
Random read (8KB)	IOPS	1650K	1650K	1650K	1650K	1650K	1650K
Random write (8KB)	IOPS	150K	270K	220K	280K	450K	460K
Random 4KB 70/30 Read/Write	IOPS	640K	880K	1060K	890K	1200K	1400K
Random 8KB 70/30 Read/Write	IOPS	380K	540K	620K	590K	760K	860K
DWPD (5 years)		1 @ JESD219			3 @ JESD219		
TBW		7,008	14,016	28,032	17,520	35,040	70,080
Form factor		U.2					

Notes:

- Measured with device connected as secondary drive.
- Actual performance may vary based on the hardware, software, and overall system configuration.
- Sequential performance is measured with 128 KB transfer size, QD 32 and 4 KB alignment with Iometer.
- Random performance is sustained performance measured with 4K/8K transfer size, QD 32 and 4 KB alignment with Iometer.
- Performance test platform: CPU: Intel Core i7 4770K; motherboard: ASUS Z87-DELUXE; chipset: Intel Z87 Express; OS: Windows 8.1 Pro x64.

4.3 Environment specification

Table 5: Environmental specification table

PARAMETER	VALUE
Operating temperature	Case: 0-70 °C
Storage temperature	-40–85 °C
Power supply voltage range	U.2: 12.0 V ±10%
Humidity (non-condensing)	5–95% (Operating)

4.4 Power consumption

Table 6: PD5 series power consumption table

PARAMETER	3840GB	7680GB	15360GB	3200GB	6400GB	12800GB	UNIT
Avg Sequential/Random Read	<15/16	<16/18	<16/19	<15/16	<16/18	<16/19	W
Avg Sequential/Random Write	<16/15	<22/20	<23/20	<16/15	<22/17	<23/20	W
Idle mode power (average)	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	W

4.5 Reliability

Products in the Exascend PD5 series meet or exceed SSD endurance and data retention requirements as specified in the JESD218 standard. Reliability specifications are listed in the following table.

Table 7: Reliability table

PARAMETER	VALUE
Mean Time Between Failures (MTBF) Mean Time Between Failures is a measure of how reliable a hardware product or a component is. The value describes the expected time between two failures.	2,000,000 hours
Uncorrectable Bit Error Rate (UBER) A metric for the rate of occurrence of data errors, equal to the number of data errors per bits read.	<1 sector per 10 ¹⁷

5. Physical dimension diagram

5.1 U.2 board

Figure 2: U.2 physical dimension diagram

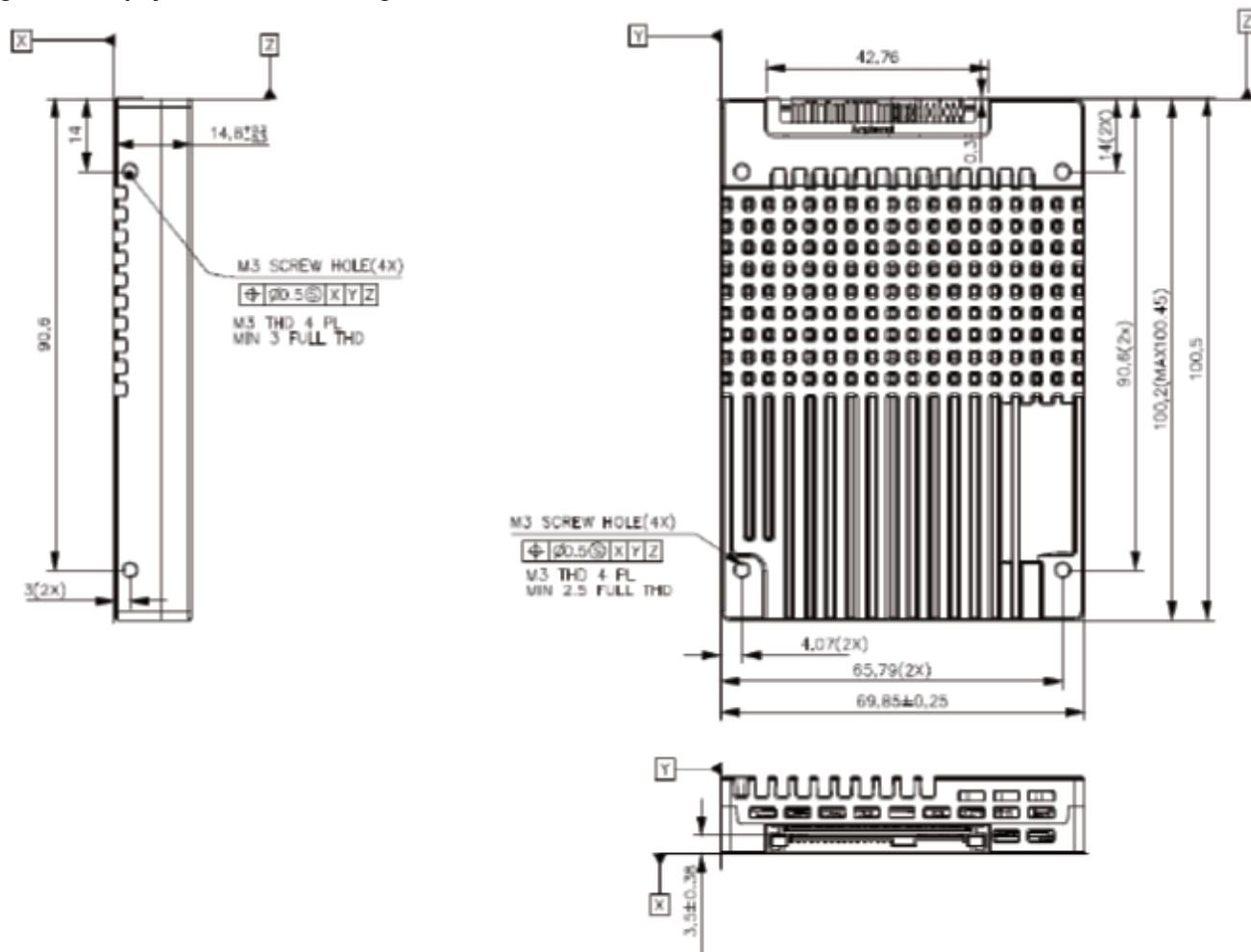


Table 8: Physical dimensions for U.2

PHYSICAL DIMENSIONS	VALUE	UNIT
Length	100	mm
Width	69.85	mm
Thickness	14.8	mm

6. Pin Assignment

6.1 U.2 connector

Table 14: U.2 connector signal name, power pin assignment, and description

PIN NAME	SIGNAL NAME	DESCRIPTION
S1	GND	Ground
S2	NA	Not used (SATA/SAS)
S3	NA	Not used (SATA/SAS)
S4	GND	Ground
S5	NA	Not used (SATA/SAS)
S6	NA	Not used (SATA/SAS)
S7	GND	Ground
E1	REFCLK1+	No connection (Single Port Only)
E2	REFCLK1-	No connection (Single Port Only)
E3	3.3Vaux	3.3 V auxiliary Power
E4	PERST1#	No connection (Single Port Only)
E5	PERST0#	Fundamental reset port 0
E6	RSVD	Reserved
P1	NA	Not used (SATAe/SAS)
P2	NA	Not used (SATAe/SAS)
P3	NA	Not used (SATAe)
P4	IfDet#	Interface type detect
P5	GND	Ground
P6	GND	Ground
P7	NA	Not used (SATA/SAS)
P8	NA	Not used (SATA/SAS)
P9	NA	Not used (SATA/SAS)
P10	PRSNT_N	Presence detect
P11	Activity	Activity indicator
P12	GND	Ground
P13	+12V_pre	12V Power
P14	+12V	12 V Power
P15	+12V	12 V Power
E7	REFCLK0+	Reference clock port 0 +
E8	REFCLK0-	Reference clock port 0 -
E9	GND	Ground
E10	PETp0	Transmitter differential pair, Lane 0
E11	PETn0	Transmitter differential pair, Lane 0
E12	GND	Ground
E13	PERn0	Receiver differential pair, Lane 0

E14	PERp0	Receiver differential pair, Lane 0
E15	GND	Ground
E16	RSVD	Reserved
S8	GND	Ground
S9	NA	Not used (SATAe/SAS)
S10	NA	Not used (SATAe/SAS)
S11	GND	Ground
S12	NA	Not used (SATAe/SAS)
S13	NA	Not used (SATAe/SAS)
S14	GND	Ground
S15	RSVD	Reserved
S16	GND	Ground
S17	PETp1	Transmitter differential pair, Lane 1
S18	PETn1	Transmitter differential pair, Lane 1
S19	GND	Ground
S20	PERn1	Receiver differential pair, Lane 1
S21	PERp1	Receiver differential pair, Lane 1
S22	GND	Ground
S23	PETp2	Transmitter differential pair, Lane 2
S24	PETn2	Transmitter differential pair, Lane 2
S25	GND	Ground
S26	PERn2	Receiver differential pair, Lane 2
S27	PERp2	Receiver differential pair, Lane 2
S28	GND	Ground
E17	PETp3	Transmitter differential pair, Lane 3
E18	PETn3	Transmitter differential pair, Lane 3
E19	GND	Ground
E20	PERn3	Receiver differential pair, Lane 3
E21	PERp3	Receiver differential pair, Lane 3
E22	GND	Ground
E23	SMCLK	SMBus clock
E24	SMDAT	SMBus data
E25	DualPortEn N	Dual port enable

7. Compliance

Exascend PD5 SSD complies with the following specifications:

- FCC
- CE
- RoHS

8. Supported NVMe commands

Exascend PD5 SSD support the NVMe commands that are shown in the following table. For details about the NVMe commands, please refer to the NVMe 1.4 command set specifications.

Table 17: Admin commands

COMMAND NAME	CODE (HEX)	COMMAND NAME	CODE (HEX)
Delete I/O submission queue	00h	Abort	08h
Create I/O completion queue	01h	Set features	09h
Get log page	02h	Get features	0Ah
Delete I/O submission queue	04h	Asynchronous event request	0Ch
Create I/O completion queue	05h	Firmware commit	10h
Identify	06h	Firmware image download	11h

Table 18: I/O commands

COMMAND NAME	CODE (HEX)	COMMAND NAME	CODE (HEX)
Flush	00h	Compare	05h
Write	01h	Dataset management	09h
Read	02h	Write zeroes	08h
Write uncorrectable error	04h		

Table 19: Get log commands

COMMAND NAME	CODE (HEX)	COMMAND NAME	CODE (HEX)
Reserved	00h	S.M.A.R.T. / health information	02h
Error information	01h	Firmware information	03h

9. Supported Command Descriptions

9.1 Supported Mandatory Log Page

The NVMe Admin Command Set defines the commands that may be submitted to the Admin Submission Queue. Exascend PD5 series support below listed mandatory and optional admin command set.

Supported NVMe mandatory admin command set

- Create I/O submission queue
- Create I/O completion queue
- Delete I/O completion queue
- Delete I/O submission queue
- Get Log Page
- Identify
- Abort
- Set Features
- Get Features
- Asynchronous Event Notification

Supported NVMe optional admin command set

- Namespace Management
- Namespace Attachment
- Firmware Commit
- Firmware Image Download
- Format NVM (User Data Erase supported)
- Device Self-test
- Sanitize

9.2 NVM Command Set

Exascend PD5 series support below listed mandatory and optional NVMe command set.

Supported NVMe mandatory command set

- Flush
- Write
- Read

Supported NVMe optional command set

- Dataset Management (Deallocate only)

9.3 Supported Get Log Page Command

The Get Log Page command returns a data buffer containing the log page requested. Exascend PD5 Series SSD support below listed mandatory and optional get log page commands.

Supported Mandatory Log Page

- Error Information Log (01h)
- SMART / Health Information Log (02h)
Details refer to Table 25: Supported Standard SMART/Health Information Log (Log Identifier 02h)
- Firmware Slot Information Log (03h)
- Changed Namespace List Log (04h)
- Commands Supported and Effects Log (05h)
- Device Self-test Log (06h)
Details refer to Table 27: Supported Device Self-test Log (Log Identifier 06h)
- Telemetry Host-Initiated Log (07h)
Details refer to Table 28: Supported Telemetry Host-Initiated log (Log Identifier 07h)
- Telemetry Controller-Initiated Log (08h)
Details refer to Table 29: Supported Telemetry Controller-Initiated Log (Log Identifier 08h)

- Persistent Event Log (0Dh)
Details refer to Table 30: Supported Persistent Event Log (Log Identifier 0Dh)
- Sanitize Status Log (81h)
Details refer to Table 31: Supported Sanitize Status Log (Log Identifier 81h)

Supported Vendor Unique Log Page

- Vendor Specific SMART (CAh)
Details refer to Table 26: Supported Additional SMART/Health Information Log (Log Identifier CAh)

9.4 S.M.A.R.T/Health Attributes

Exascend PD5 series SMART and health information is over the life of the controller and is retained across power cycles. The following table lists the supported SMART attributes.

Table 20: Supported Standard SMART/Health Information Log (Log Identifier 02h)

BYTE	DESCRIPTION													
00	Critical warning: This field indicates critical warnings for the state of the controller. These bits if set, flag various warning sources. Critical warnings may result in an asynchronous event notification to the host.													
	<table> <tr> <th>Bit</th><th>Definition</th></tr> <tr> <td>0</td><td>If set to '1', then the available spare space has fallen below the threshold.</td></tr> <tr> <td>1</td><td>If set to '1', then the temperature has exceeded a critical threshold.</td></tr> <tr> <td>2</td><td>If set to '1', then the percentage of device Life Used exceeds 100 that degrades device reliability.</td></tr> <tr> <td>3</td><td>If set to '1', then the media has been placed in read only mode.</td></tr> <tr> <td>4</td><td>If set to '1', then the volatile memory backup device has failed. This field is only valid if the controller has a volatile memory backup solution.</td></tr> <tr> <td>7:5</td><td>Reserved</td></tr> </table>	Bit	Definition	0	If set to '1', then the available spare space has fallen below the threshold.	1	If set to '1', then the temperature has exceeded a critical threshold.	2	If set to '1', then the percentage of device Life Used exceeds 100 that degrades device reliability.	3	If set to '1', then the media has been placed in read only mode.	4	If set to '1', then the volatile memory backup device has failed. This field is only valid if the controller has a volatile memory backup solution.	7:5
Bit	Definition													
0	If set to '1', then the available spare space has fallen below the threshold.													
1	If set to '1', then the temperature has exceeded a critical threshold.													
2	If set to '1', then the percentage of device Life Used exceeds 100 that degrades device reliability.													
3	If set to '1', then the media has been placed in read only mode.													
4	If set to '1', then the volatile memory backup device has failed. This field is only valid if the controller has a volatile memory backup solution.													
7:5	Reserved													
2:1	Composite temperature: Contains a value corresponding to a temperature in degrees Kelvin that represents the current composite temperature of the controller and namespace(s) associated with that controller. The manner this value is computed is implementation-specific and may not represent the actual temperature of any physical point in the NVM subsystem. The value of this field may be used to trigger an asynchronous event. Warning and critical overheating composite temperature threshold values are reported by the WCTEMP and CCTEMP fields in the Identify Controller data structure.													
3	Available spare: Contains a normalized percentage (0 to 100%) of the remaining spare capacity available.													
4	Available spare threshold: When the <i>available spare</i> falls below the threshold indicated in this field, an asynchronous event completion may occur. The value is indicated as a normalized percentage (0 to 100%).													
5	Percentage used: Contains a vendor-specific estimate of the percentage of NVM subsystem life used based on the actual usage and the manufacturer's prediction of NVM life. A value of 100 indicates that the estimated endurance of the NVM in the NVM subsystem has been consumed but may not indicate an NVM subsystem failure. The value allowed to exceed 100. Percentages greater than 254 shall be represented as 255. This value shall be updated once per power-on hour (when the controller is not in a sleep state).													
47:32	Sectors read: Contains the number of 512-byte user data units read from the controller; This value is reported in thousands (i.e., a value of 1 corresponds to 1000 units of 512 bytes read) and is rounded up. When the LBA size is a value other than 512 bytes, the controller shall convert the amount of data read to 512-byte units.													

63:48	Sectors written: Contains the number of 512-byte user data units written to the controller. This value is reported in thousands (i.e., a value of 1 corresponds to 1000 units of 512 bytes written) and is rounded up. When the LBA size is a value other than 512 bytes, the controller shall convert the amount of data written to 512-byte units. For the NVMe* command set, logical blocks written as part of write operations shall be included in this value.
79:64	Host read commands: Indicates the number of read commands completed by the controller. For the NVMe command set, this is the number of <i>compare</i> and <i>read</i> commands
95:80	Host write commands: Indicates the number of write commands completed by the controller. For the NVMe command set, this is the number of <i>write</i> commands.
111:96	Controller busy time: Contains the amount of time the controller is busy with I/O commands. The controller is busy when there is a command outstanding to an I/O queue (specifically, a command was issued via an I/O submission queue tail doorbell write and the corresponding completion queue entry has not been posted yet to the associated I/O completion queue). This value is reported in minutes.
127:112	Power cycles: Contains the number of power cycles.
143:128	Power-on hours: Indicates the number of actively power-on hours. This does not include time the controller was powered and in a lower state condition.
159:144	Number of unsafe shutdowns: Indicates the number of unsafe shutdowns. This count is incremented when a shutdown notification (CC.SHN) is not received prior to loss of power
175:160	Number of media errors: Indicates the number of occurrences where the controller detected an unrecovered data integrity error. Errors such as uncorrectable ECC, CRC checksum failure, or LBA tag mismatch are included in this field.
195:192	Warning composite temperature time: Indicates the amount of time in minutes that the controller is operational and the Composite Temperature is greater than or equal to the Warning Composite Temperature Threshold (WCTEMP) field and less than the Critical Composite Temperature Threshold (CCTEMP) field in the Identify Controller data structure. If the value of the WCTEMP or CCTEMP field is 0h, then this field is always cleared to 0h regardless of the Composite Temperature value.
199:196	Critical composite temperature time: Contains the amount of time in minutes that the controller is operational, and the Composite Temperature is greater the Critical Composite Temperature Threshold (CCTEMP) field in the Identify Controller data structure. If the value of the CCTEMP field is 0h, then this field is always cleared to 0h regardless of the Composite Temperature value.
219:216	Thermal Management Temperature 1 Transition Count: Contains the number of times that performed thermal management action once exceeds TMT1 threshold.
223:220	Thermal Management Temperature 2 Transition Count: Contains the number of times that performed thermal management action once exceeds TMT2 threshold.
227:224	Total Time for Thermal Management Temperature1: Contains the number of seconds that performed thermal management action once exceeds TMT1 threshold.
231:228	Total Time for Thermal Management Temperature2: Contains the number of seconds that performed thermal management action once exceeds TMT2 threshold.

9.5 Additional S.M.A.R.T/Health Attributes

Exascend PD5 series vendor specific SMART and health information is over the life of the controller and is retained across power cycles. The following table lists the supported additional SMART attributes.

Table 21: Supported Additional SMART/Health Information Log (Log Identifier CAh)

BYTE	Attribute	DESCRIPTION
0	AB (Program Fail Count)	Raw value: shows total count of program fails. Normalized value: beginning at 100, shows the percent remaining of allowable program fails.
2:1	Reserved	
3	Normalized Value	
4	Reserved	
10:5	Current raw value	
11	Reserved	
12	AC (Erase Fail Count)	Raw value: shows total count of erase fails. Normalized value: beginning at 100, shows the percent remaining of allowable erase fails.
14:13	Reserved	
15	Normalized Value	
16	Reserved	
22:17	Current raw value	
23	Reserved	
24	AD (Wear-Leveling Count)	Raw value: Bytes 1-0: Min. erase cycle. Bytes 3-2: Max. erase cycle. Bytes 5-4: Avg. erase cycles. Normalized value: decrements from 100 to 0.
26:25	Reserved	
27	Normalized Value	
28	Reserved	
34:29	Current raw value	
35	Reserved	
36	B8 (End to End Error Detection Count)	Raw value: reports number of End-to-End detected and uncorrected errors by hardware. Normalized value: always 100.
38:37	Reserved	
39	Normalized Value	
40	Reserved	
46:41	Current raw value	
47	Reserved	
48	C7 (CRC Error Count)	Raw value: shows total number of PCIe Interface CRC errors encountered, as specified in PCIe Link Performance Counter Parameter for “Bad TLP”. Byte 0~3: The CRC Error Count of its Port. Normalized value: always 100.
50:49	Reserved	
51	Normalized Value	
52	Reserved	
58:53	Current raw value	
96	EA (Thermal Throttle Status)	Raw value: reports Percent Throttle Status and Count of events. Byte 0: Throttle status reported as integer percentage. (100 is active, 0 is inactive.) Bytes 1-4: Throttling event count. Number of times thermal throttle has activated. Preserved over power cycles. Byte 5: Reserved. Normalized value: always 100.
9:87	Reserved	
99	Normalized Value	
100	Reserved	
106:101	Current raw value	
132	F4 (NAND Bytes Written)	Nand sectors written divided by 65536 (1count=32MiB). Normalized value: 100
134:133	Reserved	
135	Normalized Value	
136	Reserved	
142:137	Current raw value	
143	Reserved	
144	F5 (Host Bytes Written)	Host sectors written divided by 65536 (1count=32MiB). Normalized value: 100.
146:145	Reserved	
147	Normalized Value	
148	Reserved	
154:149	Current raw value	
155	Reserved	

156	F6 (the remaining lifetime of the system area)	The current value is normalized; represents the number of write operations used in the system tray. Value 0x64/100 (d) reflects the fact that in the system area allotted space for write operations exhausted.
158:157	Reserved	
159	Normalized Value	
160	Reserved	
166:161	Current raw value	
167	Reserved	Raw value: Raw value reports the number of read from NAND in 32MiB increments. Normalized value: always 100.
168	FA (NAND Bytes Read)	
170:169	Reserved	
171	Normalized Value	
172	Reserved	
178:173	Current raw value	Raw value: reports Max Min and current temperature in Kelvin since shipping out. Byte 0-1: The maximum temperature value sampled from the temperature sensor. Bytes 2-3: The min temperature value sampled from the temperature sensor. Bytes 4-5: The current temperature value sampled from the temperature sensor. Normalized value: always 100.
179	Reserved	
180	E7 (Temperature)	
182:181	Reserved	
183	Normalized Value	
184	Reserved	Raw value: reports Max Min and average power consumption in watts. Byte 0-1: The maximum power consumption value. Bytes 2-3: The min average power consumption value. Bytes 4-5: The average power consumption value Normalized value: always 100
190:185	Current Raw Value	
191	Reserved	
192	E8 (Power Consumption)	
194:193	Reserved	
195	Normalized Value	Raw value: reports Max Min and current temperature in Kelvin since power on. Byte 0-1: The maximum temperature value sampled from the temperature sensor. Bytes 2-3: The min temperature value sampled from the temperature sensor. Bytes 4-5: The current temperature value sampled from the temperature sensor. Normalized value: always 100.
196	Reserved	
202:197	Current Raw Value	
203	Reserved	
204	AF (Power on Temperature)	
206:205	Reserved	Raw Value of Read Fail Count. Normalized Value: 100.
207	Normalized Value	
208	Reserved	
214:209	Current Raw Value	
215	Reserved	Raw value: Throttle Status and total throttling time. Byte 0: 1 Throttling is active, 0 Throttling is not active. Bytes 1-4: the total time of throttling active in minutes since this time power on. Bytes 5: reserve. Normalized value: always 100
227	Reserved	
228	F2 (Read Fail Count)	
230:229	Reserved	
231	Normalized Value	
232	Reserved	Raw value: The count of Host Read Flash Media Error. Normalized value: always 100.
238:233	Current Raw Value	
239	Reserved	
240	EB (Thermal Throttle Time)	
242:241	Reserved	
243	Normalized Value	Raw value: The count of Host Read Flash Media Error. Normalized value: always 100.
244	Reserved	
250:245	Current Raw Value	
251	Reserved	
252	ED (Flash Error Media Count)	
254:253	Reserved	Raw value: The count of Host Read Flash Media Error. Normalized value: always 100.
255	Normalized Value	
256	Reserved	
262:257	Current Raw Value	
263	Reserved	

264	NAND Bytes Read (F8h)(aka Media Bytes Read)	Raw value: The number of read from NAND in 32MiB increments. Normalized value: always 100
266:265	Reserved	
267	Normalized Value	
268	Reserved	
274:269	Current Raw Value	Raw value: Max Min and Current temperature value sampled from temperature sensor in Kelvin since shipping out Byte 0-1: The maximum temperature Byte 2-3: The minimum temperature Byte 4-5: The current temperature Normalized value: always 100
275	Reserved	
276	Temp_since_born (E7h)	
278:277	Reserved	
279	Normalized Value	
280	Reserved	Raw value: Max Min and average power consumption in watts Byte 0-1: The maximum power consumption value Byte 2-3: The minimum power consumption value Byte 4-5: The average power consumption value Normalized value: always 100
286:281	Current Raw Value	
287	Reserved	
288	Power Consumption (E8h)	
290:289	Reserved	Raw value: Max Min and current temperature value sampled from temperature sensor in Kelvin since power on Byte 0-1: The maximum temperature Byte 2-3: The minimum temperature Byte 4-5: The current temperature Normalized value: always 100
291	Normalized Value	
292	Reserved	
298:293	Current Raw Value	
299	Reserved	
300	Temp_since_bootup (AFh)	Raw value: Throttle status and total throttling time Byte 0: 1 indicates throttling is active, 0 indicates throttling is not active. Byte 1-4: the total time of throttling active in minutes since latest power on. Byte 5: reserved Normalized value: always 100
302:301	Reserved	
303	Normalized Value	
304	Reserved	
310:305	Current Raw Value	
311	Reserved	Raw value: Throttle status and total throttling time Byte 0: 1 indicates throttling is active, 0 indicates throttling is not active. Byte 1-4: the total time of throttling active in minutes since latest power on. Byte 5: reserved Normalized value: always 100
312	Thermal Throttle Time (EBh)	
314:313	Reserved	
315	Normalized Value	
316	Reserved	
322:317	Current Raw Value	Reserved
323	Reserved	

9.6 Device Self-test Log

Exascend PD5 series support Device self-test (DST) operation which is a diagnostic testing sequence that tests the functionality of the drive. Failures or the percentage complete of the operation during self-test reported in Device Self-test Log (Log Identifier 06h). Log will be cleared after power cycle.

Table 22: Supported Device Self-test Log (Log Identifier 06h)

BYTE	Attribute	DESCRIPTION
0	Current Device Self-Test Operation	This field defines the current device self-test operation.
1	Current Device Self-Test Completion	This field defines the completion status of the current device self- test.
3:2	Reserved	
31:4	Newest Self-test Result Data Structure	Details refer to NVMe 1.4 specification Get Log Page - Self-test Result Data Structure
...	...	...
563:536	20th newest Self-test Result Data Structure	Details refer to NVMe 1.4 specification Get Log Page - Self-test Result Data Structure

Legal information

Limited Warranty Policy

Exascend, Inc. ("Exascend") warrants that Exascend's product, in its original sealed packaging, will be free from defects in materials and workmanship. Subject to the conditions and limitations set forth below, Exascend will either repair or replace any part of its products that prove defective by reason of improper workmanship or materials. This warranty is non-transferable and valid only for the original purchaser of the Exascend products, except where prohibited by law. The original sales receipt or invoice, or a copy thereof, is required to establish the purchase date and original purchaser.

1. This warranty supersedes all other warranties and representations, whether oral or written, between you and Exascend. Exascend makes no other warranties, including any warranty of merchantability or fitness for a particular purpose, whether expressly or implied.
2. All warranties, whether express or implied, are limited to the periods of time set forth below. Some states and jurisdictions do not allow such exclusion of implied warranties, limitations or warranty period, so above restrictions may not apply to you.
3. Exascend may acknowledge or read and save the data and information (collectively, "Information") stored in the product during after-services. Exascend hereby agrees that Exascend will not disclose any Information to any third parties, except Exascend's employees, who may need to access the Information, with or without your prior written consent.

Warranty Terms

We offer five (5) years limited warranty for our enterprise products.

The warranty period is the SHORTER OF:

- a period of five (5) years beginning from the date of purchase; or
- the period ending when the drive reached advertised DWPD or TBW rating; or
- the period ending when the device's Lifespan indicator has reached 0% or below.

This Limited Warranty will not apply to, and Exascend will have no liability or obligation with respect to, problems or damage resulting from any of the following: (i) accident, modification, neglect, abuse, careless or incorrect handling, misuse or improper operation, disassembly, misapplication or use in unusual physical environments or under operating conditions not approved by Exascend (including, but not limited to, use of the Product with an improper voltage supply); (ii) normal wear and tear; (iii) removal of label(s) or sticker(s) provided on or with the Product (including all warranty or quality-control stickers, product serial or electronic numbers); (iv) problems relating to or residing in non-Exascend hardware, software or other items with which the Product is used; (v) use in an environment, in a manner or for a purpose for which the Product was not designed or not in accordance with Exascend's published documentation; (vi) installation, modification, alteration or repair by

anyone other than Exascend or its authorized representatives; (vii) problems that do not relate to materials or workmanship or that have an insignificant impairment on the use or operation of the Product; or (viii) problems related to consumables; (ix) Product purchased “AS-IS” or “with known faults, defects or problems.” Additionally, Exascend will have no liability or obligation to recover any data in the Product.

Disclaimer of liability

Exascend, Inc. reserves the right to make changes to specifications and product descriptions such as but not limited to numbers, parameters and other technical information contained herein without notice. Please contact Exascend, Inc. to obtain the latest specifications. Exascend, Inc. grants no warranty with respect to this datasheet, explicit or implied, and is not liable for direct or indirect damages. Some states do not grant the exclusion of incidental damages and as such this statement may not be valid in such states. The provisions of the datasheet do not convey to the purchaser of the device any license under any patent right or other intellectual property right of Exascend, Inc.

Customers must not use Exascend products in applications where a device failure or malfunction may cause personal injury or death, e.g., in life support systems or devices.

Exascend shall not be liable for any loss, injury or damage caused by use of the products in any of the following applications:

- Medical-related devices, life support, medical measurement devices, etc.
- Control devices for trains, ships, mass transportation systems or automotive vehicles, etc.
- Specific applications including military/defense-related equipment, aerospace, nuclear facility control systems, etc.
- Safety systems for disaster prevention/crime prevention, etc.

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Revision history

Table 21: Exascend PD5 series datasheet revision history

REVISION	DESCRIPTION	DATE
001	First released	February, 2024
002	Add 3200 GB/6400 GB/12800 GB	February, 2024