Western Digital.

PRODUCT MANUAL

PC SN730 NVMe™ SSD

For Generic OEM

00-01-WW-04-00047

Revision History

Revision	Date	Description	Reference
1.0	November 22, 2019	Initial release.	

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1.0 PREFACE

1.1 Typographical Conventions

This document uses the typographical conventions listed and shown in Table 1-1.

Table 1-1. Typographical Conventions

Convention	Usage	Examples
Note:	Important additional information or further explanation of a topic.	*Note*: A weekly backup is recommended.
Bold	A command or system input that you type, or text or a button displayed on a screen.	Click **HELP** for details on disaster recovery.
Italics	Italic font indicates any of the following: ■ ***A term with a specific meaning*** in the context of this document. ■ *Emphasis* on specific information. ■ *Reference* to another document.	Detailed information on ***disaster recovery*** methods is available in *Administrator Guide*.
Blue Text	References hyperlinks.	For more details, visit www.westerndigital.com

1.2 Glossary of Abbreviations and Acronyms

This section shows the glossary of abbreviations and acronyms used in this document.

Table 1-2. Glossary of Abbreviations and Acronyms

Abbreviation/Acronyms	Definition
AES	Advanced Encryption Standard
APST	Autonomous Power State Transitions
ASPM	Active State Power Management
ECC	Error Correction Code
EDC	Error Detection Code
ESD	Electrostatic Discharge
FFU	Field Firmware Update
FW	Firmware
HCTM	Host Control Thermal Management
LBA	Logical Block Addressing
LDPC	Low-Density Parity Check
MLC	Multi Level Cell
MTTF	Mean Time to Failure
NVMe	Non-Volatile Memory Express
PCIe	Peripheral Component Interconnect Express
RTD3	Runtime D3
SSC	Security Subsystem Class
SD	Storage Device
SED	Self-Encrypting Drive
SLC	Single Level Cell
SSD	Solid State Drive
TBW	Terabytes Written
TCG	Trusted Computing Group
TLC	Triple Level Cell

2.0 INTRODUCTION

This manual describes the functional, mechanical, and interface specifications of the Western Digital® PC SN730 NVMe™ SSD.

2.1 General Description

The Western Digital PC SN730 NVMe SSD was designed to deliver high performance and ultra-low power standby mode for Notebooks, Desktops and Ultrathin NVMe platforms.

The proven Western Digital in-house architecture is optimized for the client SSD, both corporate and commercial, platforms needs. Among other features, the PC SN730 NVME SSD supports the nCache™ 3.0 for SLC management, the power optimized 3 Gear LDPC Hardware Engine, BICS4 multi-pages XOR protection and a full ECC data-path protection.

The nCache 3.0 is the 3rd Generation of Western Digital Caching architecture, introducing both Reads and Writes speed enhancements. It supports an enhanced evacuation policy, allowing the SLC to be empty faster, and as well as direct-TLC access for faster (write) direct access.

The PC SN730 NVME SSD is optimized for the demanding power and thermal management requirements of low power hosts. It features an NVMe Low-Power state, NVMe Power Management, NVMe HCTM (Host Control Thermal Management), NVMe APST (Autonomous Power State Transitions) and NVMe ASPM (Active State Power Management). In addition, PC SN730 NVME SSD includes a self-thermal throttling mechanism as the last level of thermal protection

The PC SN730 NVME SSD is available in M.2 2280 single sided form factor, with capacities of 256, 512 and 1024 gigabytes (GB)[1].

[1] 1 gigabyte (GB) = 1 billion bytes. Actual capacity may be less due to operating environment.

2.2 Key Features and Specification

Table 2-1. Key Features and Specifications for Western Digital PC SN730 NVMe SSD

Memory Supported	Western Digital BiCS4 256Gb 2P X3
Unformatted Capacities[1]	256GB, 512GB, 1024GB
Form Factors	M.2 2280 S3-M
Host Interface	PCIe Gen3 x4
Host Protocol	NVM Express 1.3
Security Protocol	▪ Non-SED SKU: TCG Pyrite 2.0 and ATA Password ▪ SED SKU: TCG Opal 2.01 and ATA Password
Performance[2]	▪ Sequential Read: Up to 3,400 MB/s ▪ Sequential Write: Up to 3,100 MB/s ▪ Random Read 4K: Up to 550K IOPS ▪ Random Write 4K: Up to 550K IOPS
Average Power[3]	100mW
Low Power[4]	3.5mW
Data Path Protection	Full ECC Data Path
Flush Management	LDPC Engine + multi page XOR protection
Data Path Protection	Full ECC Data Path
Code Protection	Secure Boot
SLC Cache	nCache 3.0
Thermal Throttling	▪ NVMe Host Control Thermal Management (HCTM) ▪ Self-Throttling
Power Management	▪ NVMe Power Management ▪ NVMe Autonomous Power State Transitions (APST) ▪ Active State Power Management (ASPM)
Mean Time to Failure (MTTF)	1.75M hours
Uncorrectable bit error rate (UBER)	1 bit per 10^{16} bits read
Operating Temperature[5]	0°C to 70°C
Non-Operating Temperature and Storage[6]	-55°C to +85°C
Non-Operating Vibration	$4.9G_{RMS}$, 7 to 800Hz, 15min/axis on 3 axes
Operating Vibration	$5G_{RMS}$, 10 to 2,000Hz, 15min/axis on 3 axes
Operating and Non-Operating Shock	1500G, 0.5ms, half sine, 3 pulses x 6 surfaces

[1] *Logical capacity of the drive conforms to the IDEMA HDD Specification. See www.idema.org for details. A portion of the drive capacity is not available for data storage. 1 gigabyte (GB) = 1 billion bytes.*

[2] *Performance is measured by CrystalDiskMark 6.0.2 using 1GB LBA range. Windows 10 using Microsoft driver build 17134.112, Secondary drive FOB. ASUS Z270-A platform with Intel® i7-7700K 4.2Ghz processor. C-state On.*

[3] *Average Power as measured by MobileMark™ 2014 on i5-8250U Kabylake-R, Windows 10 RS5 1809 build 17763.195, iRST 15.44.0.1010, primary drive. Average 5s.*

[4] *Low Power referring to NVMe PS4 at 25°C.*

[5] *Operational temperature is defined as temperature reported by the drive. Note that drive temperature readings are expected to be higher than ambient temperature when the SSD is placed inside a system.*

[6] *Non-operating storage temperature does not guarantee data retention beyond endurance and data retention specifications.*

2.3 Functional Description

The Western Digital PC SN730 NVMe SSD supports the following features:

- NVM Express 1.3 compliance
- In-house 3 gears LDPC engine with advanced DSP capabilities in hardware
- NAND XOR protection for multi-page recovery
- Dynamic and static wear-leveling to extend the life of the SSD
- TCG Pyrite Security for device lock
- Secure Boot including RSA Authentication
- Secure FFU

2.4 Advanced Flash Management

2.4.1 Defect and Error Management

The PC SN730 NVME SSD contains an enhanced defect and error management system. If necessary, the device will rewrite data from a defective block to a good block. This action is completely transparent to the host and does not consume any user data space.

2.4.2 Wear Leveling

NAND based SSDs use dynamic and static wear leveling and automatic block management to ensure an even distribution of write/erase cycles throughout the entire device. These processes guarantee high data reliability and maximize flash life expectancy. Wear leveling is done between all TLC blocks and separately between all SLC blocks.

2.4.3 Bad Block Management

Bad blocks are occasionally created during the life cycle of a flash component. These bad blocks must be marked and replaced dynamically in order to prevent read/write failures. When a bad block is detected, the embedded Bad Block Mapping algorithm removes the block from future use.

2.4.4 Background Garbage Collection

The flash management firmware will perform internal house-keeping activities, such consolidating and flushing the SLC blocks to the TLC storage or reorganizing the data in the TLC array or SLC array. These activities are performed in the background and are transparent to the host, thus improving performance while providing a seamless user experience.

2.4.5 SLC Cache - nCache 3.0

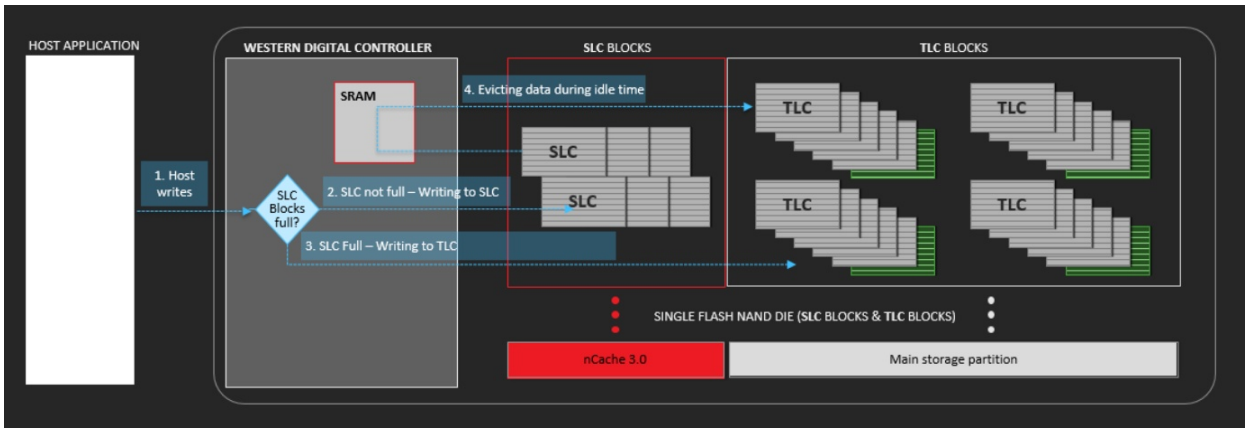
The nCache 3.0 is a pool of X1 (SLC) blocks for sequential and random host operations. These X1 blocks are used as write cache to accumulate and consolidate all writes at high speed.

The PC SN730 NVME SSD utilize the nCache 3.0 tiered caching which further improves performance and power efficiently by introducing several enhancements as:

- Direct TLC (write) Access - improves sustain-write-access power efficiency and write throughput.
- Enhanced Evacuation Policy - improves the write-burst access speed.

As mentioned above, the nCache 3.0 works in the background to flush them into the larger X3 (TLC) storage blocks and uses optimized write transaction sizes to maximize endurance. Once the SLC blocks are full the Drive will continue to program TLC blocks directly, and will re-locate the data from SLC to TLC on Idle times.

Figure 2-1. Western Digital PC SN730 NVMe SSD Tiered Caching Technology



2.4.6 Error Correction Layers

The PC SN730 NVME SSD advanced Error Correction and Data recovery mechanism constructed from multi layers of protection:

- **Multi Gear LDPC Engine** – The PC SN730 NVME SSD LDPC use Multi-Gear Hardware LDPC Engine tailored for Western Digital 3D NAND. The ultra-low power and high speed - Gear1 Mode, help reduce the overall power consumed by the LDPC during reads and writes.
- **Hardware DSP and Soft Decode** – Hardware accelerators used for enhanced Error Correction; at high BER rates.
- **XOR Recovery** – The XOR Recovery is an extreme and rare protection layer. It is a RAID-Like protection and is able to recovery multi-pages at need.

3.0 General Product Specifications

3.1 Interface

The PC SN730 NVME SSD is a PCI Express Gen3 x4 SSD.

Complies with:

- PCI Express 3.0 up to four lanes, and a bit rate of 2.5Gbps or 5Gbps or 8Gbps
- Configurable Lane width: x1, x2 and x4
- NVM Express Rev 1.3

3.2 Hardware Configuration

Table 3-1 provides the basic hardware configuration values for the PC SN730 NVME SSD.

Table 3-1. PC SN730 NVMe SSD Hardware Configuration

SSD Capacity	Form Factor	NAND Technology	Memory
256GB	M.2 2280-S3-M	BiCS4 256Gb 2P X3	2 x 4D BGA
512GB	M.2 2280-S3-M	BiCS4 256Gb 2P X3	2 x 8D BGA
1024GB	M.2 2280-S3-M	BiCS4 256Gb 2P X3	2 x 16D BGA

3.3 Capacity

Table 3-2. Western Digital CL SN730 NVMe SSD Capacity Specification

Unformatted Capacity[1]	Sectors in LBA Mode[2]	Available Form Factors
256GB	500,118,192	M.2 2280-S3-M
512GB	1,000,215,216	M.2 2280-S3-M
1024GB	2,000,409,264	M.2 2280-S3-M

[1] 1 gigabyte (GB) = 1 billion bytes. Some of the listed capacity is used for formatting and other functions, and thus is not available for data storage.
[2] 1 Sector = 512 bytes. LBA count based on IDEMA standard.

4.0 PERFORMANCE

Table 4-1 includes the PC SN730 NVMe SSD performance in a system that supports PCI Express Gen3 x4, FOB in CDM and PC Mark Vantage.

Table 4-1. Western Digital PC SN730 NVMe SSD M.2 2280 Performance

Parameter	Queue Depth / Threads	256GB	512GB	1024GB
Sequential Read 128KB MB/s[1]	QD=32, T = 1	3,150	3,400	3,400
Sequential Write 128KB MB/s[1]	QD=32, T = 1	2,100	2,700	3,100
Random Read 4KB (32QD) IOPS[1]	QD=32, T = 8	270,000	460,000	550,000
Random Write 4KB (32QD) IOPS[1]	QD=32, T = 8	280,000	400,000	550,000

[1] Test Conditions: Performance is measured by CrystalDiskMark 6.0.2 using 1GB LBA range. Windows 10 using Microsoft driver build 17134.112, Secondary drive FOB. ASUS Z270-A platform with Intel® i7-7700K 4.2Ghz processor. C-state On.

5.0 Power Characteristics

5.1 Supply Voltage

Table 5-1. Western Digital PC SN730 NVMe SSD Supply Voltage

Parameter	Specification
Input Voltage M.2 2280	3.3V ± 5%
Maximum Ripple	100mV (peak to peak), 100Hz to 6MHz
Maximum Supply Rise Time	100ms

5.2 Average Active-Power Consumption[1]

The *average active-power consumption* is defined as the blended read/write/idle power used by the drive while in operation with a commonly used operating system. It is measured using the MobileMark™ benchmark, average 5 seconds. During this test Microsoft StorNVMe driver triggers non-operative low power state.

This benchmark simulates the typical usage of user applications in a Windows environment, providing a reproducible test for measuring average active-power consumption.

Table 5-2. Western Digital PC SN730 NVMe SSD Average Active-Power Consumption

Form Factor	Input Voltage	Test Suite	Unit	256GB	512GB	1024GB
M.2 2280	3.3V ± 5%	Productivity	mW	100	100	100

5.3 Operating Power Consumption – Average Maximum[2]

Average maximum operating power consumption is measured while the PC SN730 NVME SSD is continuously processing sequential read and write commands (tested separately) for at least 1 minute, with a transfer size of 256 sectors per command (128KB), queue depth of 32 and 1 thread. The sampling interval is 125 milliseconds. This benchmark is designed to test the worst-case scenario, when continuous power is required by the PC SN730 NVME SSD during long read or write command sequences.

Table 5-3. Western Digital PC SN730 NVMe SSD Average Max Power Consumption

Form Factor	Input Voltage	Test	Unit	256GB	512TB	1024GB
M.2 2280	3.3V ± 5%	Read	mW	3,900	4,700	5,200
			A	1.18	1.42	1.58
		Write	mW	2,900	4,100	5,400
			A	0.88	1.24	1.64

[1] Measured using MobileMark™ 2014 on ASUS B9440UA, i5-7200U, Windows 10 RS5 1809 build 17763.529, iRST 15.44.0.1010, primary drive. Average power.

[2] Measured at 25°C. Power consumption can vary due to input voltage and ambient temperature variation.

5.4 Peak Power and In-Rush Current

Peak power consumption is the maximum instantaneous power consumption measured while the PC SN730 NVME SSD is continuously processing sequential read and write commands (tested separately) for at least 1 minute, with a transfer size of 256 sectors per command (128KB), queue depth of 32 and 1 threads. The sampling interval is 10µs. This benchmark is designed to test the worst-case scenario, when continuous power is required by the PC SN730 NVME SSD during long read or write command sequences.

Maximum in-rush current refers to the maximum instantaneous power consumption of the PC SN730 NVME SSD drive after a power cycle until all voltage rails required for operation are stabilized to their nominal values on the drive. The sampling interval is 10µs.

Table 5-4. Western Digital PC SN730 NVMe SSD Peak Power and In-Rush Current

Form Factor	Input Voltage	Test	Unit	256GB	512GB	1024GB
M.2 2280	3.3V ± 5%	Peak Power (10us)	mW	5,610	6,270	7,590
			A	1.7	1.9	2.3
		Max In-Rush	mW	6,930	6,930	6,930
			A	2.1	2.1	2.1

5.5 NVMe Power Management

The PC SN730 NVME SSD supports NVMe power management. Product Identify reports 5 NVMe power modes as detailed below.

L1.2 mode enabled and asynchronously controlled by the PCI Express layer.

Table 5-5 details the power consumption and performance per power state. Power consumption and performance are measured during sustained sequential write or sustained sequential read as defined in *Section 4.0 Performance on page 13*.

Table 5-5. PC SN730 NVMe SSD Power Consumption and Performance Per NVMe Power State

Power Mode	Device State	Sustained Sequential Read/Write up to [MB/s]	Avg Power	Entry Latency (ENLAT)	Exit Latency (EXLAT)
PS0	Full Performance	256GB: 3,100 512GB: 3,400 1024GB: 3,400	256GB: 3.9W 512GB: 4.7W 1024GB: 5.4W	—	—
PS1	Light Throttling	256GB: 1,600 512GB: 1,600 1024GB: 1,600	256GB: 3.3W 512GB: 3.5W 1024GB: 3.7W	—	—
PS2	Heavy Throttling	256GB: 350 512GB: 350 1024GB: 350	256GB: 2.0W 512GB: 2.1W 1024GB: 2.2W	—	—
PS3	Non-Operational, Rapid recovery	—	256GB: 30mW 512GB: 30mW 1024GB: 30mW	4ms	10ms
PS4	Non-Operational, Slow Recovery	—	256GB: 3.5mW 512GB: 3.5mW 1024GB: 3.5mW	4.5ms	35ms

5.6 Graceful Power-off Requirements

On most operating systems, *Write Cache* is enabled by default. This feature is not specific to Western Digital SSD products. There may be data residing in the PC SN730 NVME SSD cache that have not been written to the flash memory. To ensure that the data is properly committed to flash memory, the PC SN730 NVME SSD requires the host to write 01b (normal shutdown) to the **Shutdown Notification (CC:SHN)** field. This command instructs the PC SN730 NVME SSD to write all of its volatile data cache to flash memory and returns a **GOOD** status to the host after its successful completion. This command is handled transparently by most operating systems during the shutdown sequence (for example, hibernation, shutdown, and standby.)

However, if power is lost without warning – leading to an ungraceful shutdown – data loss may occur. This may also lead to a longer power-on time for the subsequent power-up.

6.0 THERMAL THROTTLING

6.1 Self-Thermal Throttling

In order to protect the integrity of the data and prevent excessive heat dissipation, the PC SN730 NVME SSD utilizes several component temperature sensors (junction temperature) to monitor the SSD critical components temperatures. If a sensor temperature rises above the allowable limit, system performance is lowered until the temperature decreases to an acceptable level. The device returns to full performance when the temperature returns to a normal range.

Table 6-1 describes the performance results, while thermal throttling is activated.

Table 6-1. Western Digital PC SN730 NVMe SSD Performance Under Thermal Throttling

PC SN730 NVMe SSD Self-Throttling Mode	256GB		512GB		1TB	
	Sequential Read	Sustained Sequential Write	Sequential Read	Sustained Sequential Write	Sequential Read	Sustained Sequential Write
Power [W]	1.7W	1.7W	1.7W	1.7W	1.7W	1.7W
Performance[1] [MB/s]	40	40	40	40	40	40

[1] *While during self-throttling mode PC SN730 NVME SSD is keeping the power value flat; performance may be varied between devices due to process variation.*

6.2 Denial of Service

To avoid data corruption, and as a last protection measure, if the NAND temperature increases above the maximum allowed then the device will enter a denial of service state. A recovery to functional mode is only by a full power cycle.

7.0 ENDURANCE

The endurance of the PC SN730 NVME SSD is calculated using JEDEC client workload (JESD219), unconnected to power.

Endurance is a direct function of user workload and access pattern. It is defined in terms of Terabytes Written (TBW). Refer to Table 7-1 below.

Table 7-1. Western Digital PC SN730 NVMe SSD Endurance

Parameter	256GB	512GB	1024GB
Drive Endurance Data Retention I Year @ 30°C	200 TBW	300 TBW	400 TBW

8.0 SECURITY

8.1 Password Lock Through TCG Pyrite 2.0

The Western Digital PC SN730 NVMe SSD supports password locking of user data as defined in the following TCG specification: *TCG Storage Security Subsystem Class: Pyrite. Specification Version 2.0*.

The Western Digital PC SN730 NVMe SSD implementation of TCG Pyrite includes the following capabilities and characteristics:

- Provides a mechanism that locks access to the entire user media for NVMe read and write commands. When configured, access is locked automatically upon device power cycle.
- TCG Pyrite features:
  - 1 global locking range
  - Separate flags to control Read and Write locking
  - 1 admin authority, 2 user authorities
  - Revert
  - TCG DataStore table size is 128KB
  - Supported Pyrite authorities:
    - One SID to activate TCG security
    - One admin authority to configure locking and permissions
    - Up to two regular user authorities to unlock read and write commands
- Block SID is supported in accordance to TCG Storage Feature Set: Block SID Authentication
- PSID Revert feature for TCG Pyrite 2.0:
  - Level 0 discovery for PSID Extension Feature Descriptor
  - Physical Presence SID (PSID) is supported in accordance to TCG Storage Opal SSC Feature Set: PSID.
  - PSID Revert erases data using the Block Erase method
- System BIOS shall request and submit user password to unlock device during system boot
- Device supports up to 5 authentication attempts with wrong password. After that, it requires power cycle before accepting a new authentication
- Unlock password is not stored in device as a plain text, cryptographic digest is used instead
- By default, device is shipped with TCG security in inactive state and default credentials of SID authority. BIOS shall support the TCG Block SID Authentication feature to prevent malicious host applications from taking control over device security with default SID credentials.
- Encryption of user data and MBR shadowing are not supported.

8.2 Secure Erase

Western Digital PC SN730 NVMe SSD supports sanitization of user data using the Format NVM command in one of the following modes:

1. The No Secure Erase mode implements logical erase of user data: cleanup of FTL tables marks all blocks as unallocated. Subsequent read commands return zeroes for erased data.
2. The User Data Erase mode implements physical erase of user data with NAND block erase operation. The process covers all user LBAs including any spare and re-allocated blocks.
3. The Crypto Erase implements cryptographic erase of user data by eradicating its encryption key. The Crypto Erase mode is not supported on Non-SED devices.

Western Digital PC SN730 NVMe SSD SED supports sanitization of user data using the Sanitize command in one of the following modes: Block Erase and Crypto Erase. The Overwrite mode is not supported.

Sanitization of locked devices is supported on PC SN730 NVME SSD SED with PSID revert command.

Table 8-1 summarizes sanitization modes and their result:

Table 8-1. Western Digital PC SN730 NVMe SSD Format NVM Modes and Results

		PC SN730 NVMe SSD, Non-SED		
Command	**Mode**	**Operations**	**Data at Rest**	**Read Result**
Format NVM	000b (No Secured Erase)	FTL Cleanup	Last Written	Zeros
	001b (User Data Erase)	FTL Cleanup, Block Erase	Erased	Zeros
	010b (Crypto Erase)	N/A	N/A	N/A

8.3 Security of Read-Only Mode

Device enters Read-Only mode upon reaching End-of-Life conditions for user media. In this mode, it stops accepting commands that might write user or system data.

Format NVM in the User Data Erase and the Crypto Erase mode is also supported when device turns read only mode. It provides a secure option to erase all user data before disposal of the device or before returning it for FA. Successful status returned for the command is an indication of complete sanitization of user data. If device fails to complete the process, sanitization should be addressed by physical destroy methods, e.g. shredding.

Device preserves TCG locking settings as configured before transition to Read-Only mode. Host application shall be ready that NVMe commands Format NVM and Sanitize are aborted when device is Write-locked. Host shall unlock device with valid user password before applying the command. Alternatively, it shall use sanitization commands of the active TCG Opal protocol: TCG Revert.

8.4 Secure Field Firmware Update (FFU)

The genuine Western Digital firmware update image is encrypted and signed. The RSA digital signature algorithm with 2048-bit key is used for signing of the file, while AES-CBC-256 algorithm is used for encryption.

Device automatically verifies signature of a firmware update image during FFU and rejects images that fails the procedure. Root certificate is provisioned to permanent eFuse storage in SSD controller during device manufacturing. FW signing process in WD relies on HSM-based signing server for storage of private keys to guaranty protection of the key leakage and auditability of FW releases.

Device implements no interface to update device firmware that bypasses regular FFU commands and to disable digital signature verification.

8.5 Secure Boot

Device verifies digital signatures of firmware images loaded from NAND Flash storage before running them on CPU during boot. Signatures cover all parts of stored firmware including boot loader. Boot loader itself is verified by ROM, then it verifies other parts. If firmware verification fails, device enters fail mode when it does not provide access to user data.

Secure Boot uses RSA digital signature algorithm with 2048-bit keys. FW signing process in WD relies on HSM-based signing server for storage of private keys. SSD controller includes HW acceleration for RSA calculations to make sure that signature verification does not cause significant delays for device initialization.

8.6 Secure RMA

All Western Digital PC SN730 NVMe SSD devices implement hardware *locks* for debug access to SSD controller and for any vendor-specific diagnostic commands. Removing these *locks* is limited only to authorized engineers in WD facilities. They authenticate device RMA with RSA challenge-request protocol that uses WD HSM-based signing server to generate unlock tokens. Public key to verification of the process is provisioned to device during manufacturing with root certificate burned in controller eFuse.

9.0 PHYSICAL SPECIFICATIONS

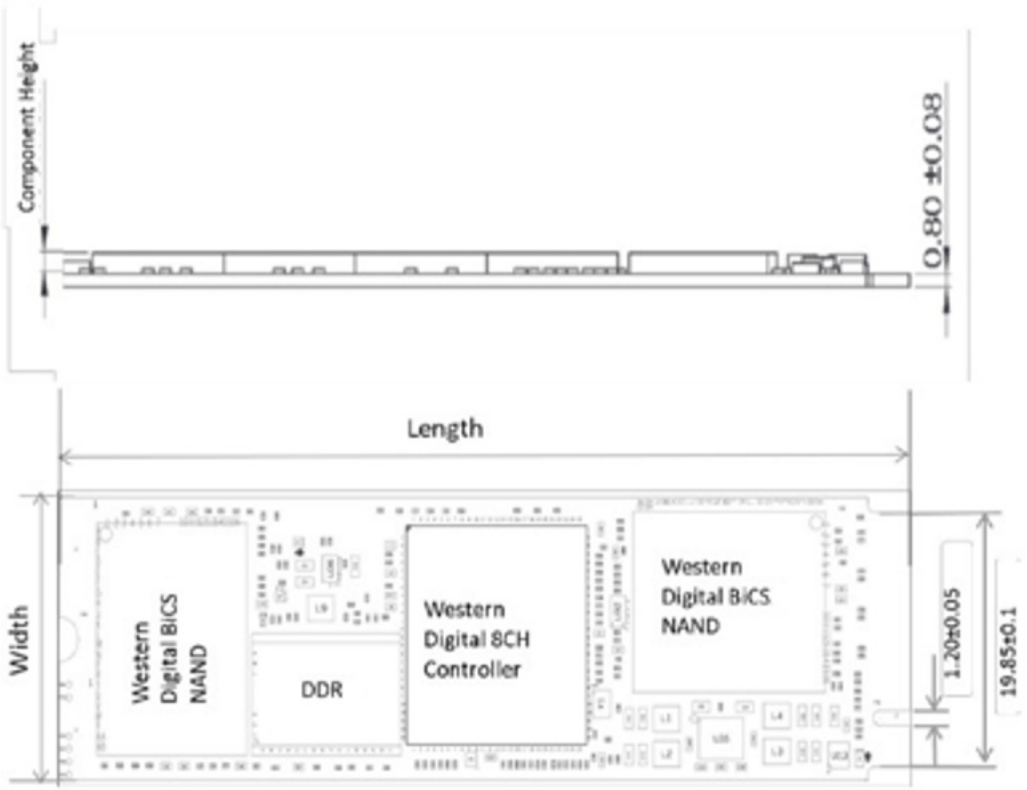
9.1 M.2 2280 Form Factor

The M.2 2280 form factor complies with *PCI Express M.2 (NGFF) Electromechanical Specification, rev. 1.1.*

Table 9-1. PC SN730 NVMe SSD M.2 2280 Form Factor Mechanical Specifications

Parameter	Specification
Type	256GB: M.2 2280 S3-M 512GB: M.2 2280 S3-M 1024GB: M.2 2280 S3-M
Width	22 ± 0.15mm
Length	80 ± 0.15mm
PCB Thickness	0.80 ± 0.08mm
Component Height	1.5mm
Thickness (max)	256GB: 2.23mm 512GB: 2.38mm 1024GB: 2.38mm
Typical Weight	7.3±0.5gr

Figure 9-1. Top and side view of the PC SN730 NVMe SSD



10.0 Environmental Specifications

10.1 Temperature

Table 10-1. Western Digital PC SN730 NVMe SSD Temperature Specification

Parameter	Specifications
Operational[1]	0°C to 70°C
Non-operational[2]	-55°C to 85°C

[1] Operational temperature is defined as temperature reported by the drive. Note that drive temperature readings are expected to be higher than ambient temperature when the SSD is placed inside a system.
[2] Non-operational storage temperature does not guarantee data retention.

10.2 Humidity

Table 10-2. Western Digital PC SN730 NVMe SSD Humidity Specification

Parameter		Specifications
Operational	Humidity (Non-condensation)	5% to 95%
	Maximum Wet Bulb	30°C
Non-Operational	Humidity (Non-condensation)	5% to 95%
	Maximum Wet Bulb	40°C

10.3 Vibration

Table 10-3. Western Digital PC SN730 NVMe SSD Vibration Specification

Parameter	Specifications
Non-Operation Vibration	$4.9G_{RMS}$, 7 to 800Hz, 15min/axis on 3 axes
Operating Vibration	$5G_{RMS}$, 10 to 2,000Hz, 15min/axis on 3 axes

10.4 Shock

Table 10-4. Western Digital PC SN730 NVMe SSD Shock Specification

Parameter	Acceleration Force
Operating and Non-Operational Shock	1500G,0.5ms, half sine, 3 pulses x 6 surfaces

10.5 Altitude

Table 10-5. Western Digital PC SN730 NVMe SSD Altitude Specification

Parameter	Specifications
Operational/Non-operational	-1500ft (-457m) to 40,000ft (12,192m)

10.6 Electrostatic Discharge (ESD)[1]

Table 10-6. Western Digital PC SN730 NVMe SSD ESD Specification

Parameter	Voltage
Contact	±4kV
Air	8kV

10.7 Acoustics

The PC SN730 NVMe SSD does not generate any acoustic noise (0dB).

10.8 Chemical Restrictions

The Western Digital PC SN730 NVMe SSD complies with the European Union's Restriction on Use of Hazardous Substances in Electrical and Electronic Equipment (EU RoHS) Directive 2011/65/EC and European Union's Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), Regulation (EC) 1907/2006.

Western Digital PC SN730 complies with the European Community Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE).

It also complies with China's management methods for controlling pollution by electronic information products (China RoHS).

[1] Tested per IEC 61000-4-2 Standard.

10.9 Regulatory Agency Approvals and Declarations

PC SN730 meets the standards of the following regulatory agencies:

- **Federal Communication Commission:** Verified to comply with FCC Rules for Radiated and Conducted Emission, Part 15, Subpart B, for Class B Equipment.

  This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
  - Reorient or relocate the receiving antenna.
  - Increase the separation between the equipment and receiver.
  - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
  - Consult the dealer or an experienced radio/TV technician for help.
- **Canada EMI Compliance:** Per ICES-003 Issue 5, Class B
- **CE Compliance for Europe Countries and Morocco:** Verified to comply with EN55032:2015 for RF Emissions and EN55024:1998, A1:2001 + A2:2003, EN61000-3-2:2000, EN61000-3-3:1995 + A1:2001 for Generic Immunity as applicable.

  Verified to meet or exceed Directive of Electromagnetic Compatibility 2014/30/EU and Safety Low Voltage Directive 2014/35/EU.
- **RCM Compliance for Australia and New Zealand:** Verified to comply with AS/NZ3548 for RF Emissions as required by the Australian Communications Authority.
- **Korean KC Mark:** Registered as a Class-B product with the South Korean Ministry of Information and Communication.
- **Taiwan BSMI ROHS Compliance:** Certified as a Class-B product with the Bureau of Standards Metrology and Inspection (BSMI ROHS).
- **Voluntary Control Council for Interference (VCCI):** Verified to comply with VCCI V-2 (V-3 Technical Requirements), the Voluntary Control Council for Interference by Information Technology Equipment.

  この装置は、クラスB機器です。この装置は、住宅環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
  取扱説明書に従って正しい取り扱いをして下さい。 VCCI－B

- **CB-Scheme Safety Standard**: Verified safety compliance per IEC 60950-1 (IEC System for Mutual Recognition of Test Certificates for Electrical Equipment (IECEE)).

- **Underwriters Laboratories for USA and Canada product safety**: Bi-National UL Standard CAN/CSA-C22.2 No. 60950/UL 60950-1 Standard for Safety of Information Technology Equipment, including Electrical Business Equipment.
- **EU Safety Compliance**: IEC 60950-1 per EN 60950-1, Standard for Safety of Information Technology Equipment, including Electrical Business Equipment.

11.0 Reliability Characteristics

11.1 Error Rate

The non-recoverable error rate is 1 error per 10^{17} bits read.

11.2 Mean Time to Failure (MTTF)[1]

Mean Time to Failure (MTTF) is the reliability figure most often used for electronic equipment. The Western Digital PC SN730 NVMe SSD has an estimated MTTF using a prediction methodology based in accordance with the Telcordia Special Report SR-332. The prediction is based on a Parts Stress Analysis.

Quality levels were defined as industrial grade (I) for all of the components. The detailed prediction for the system was performed at a temperature of 25°C in a GB (ground, benign) environment.

Table 11-1 summarizes the estimated MTTF results for each capacity.

Table 11-1. Western Digital PC SN730 NVMe SSD MTTF

Capacity	Condition	MTTF (Hours)
256GB	Telcordia SR-332, GB, 25°C	1,752,000
512GB	Telcordia SR-332, GB, 25°C	1,752,000
1024GB	Telcordia SR-332, GB, 25°C	1,752,000

[1] Based on internal testing using Telcordia stress part testing.

12.0 Windows Device Certifications

12.1 HCK Certification

The PC SN730 NVMe SSD certified with Windows HCK (Hardware Certification Kit) for Windows 7.

- Category: Device
- Product Type: Hard Drive

12.2 HLK Certification

The PC SN730 NVMe SSD certified with Windows HLK (Hardware Lab Kit) for Windows 10.

- Category: Device
- Product Type: Hard Drive

13.0 Interface

13.1 Supported Standards

The PC SN730 NVMe SSD complies with the following standards:

- PCI Express® Base Specification Revision 3.0

13.2 Pin Assignments - M.2 2280, M Key

Table 13-1. M.2 Pin Assignments

Pin #	Function	Pin #	Function
1	GND	2	3.3V
3	GND	4	3.3V
5	PETn3	6	NC
7	PETp3	8	PLN
9	GND	10	LED/DAS
11	PERn3	12	3.3V
13	PERp3	14	3.3V
15	GND	16	3.3V
17	PETn2	18	3.3V
19	PETp2	20	NC
21	GND	22	NC
23	PERn2	24	NC
25	PERp2	26	NC
27	GND	28	NC
29	PETn1	30	NC
31	PETp1	32	NC
33	GND	34	NC
35	PERn1	36	NC
37	PERp1	38	NC
39	GND	40	NC
41	PETn0	42	NC
43	PETp0	44	NC
45	GND	46	NC
47	PERn0	48	NC
49	PERp0	50	PERST#
51	GND	52	CLKREQ#
53	REFCLKn	54	NC
55	REFCLKp	56	NC
57	GND	58	NC
59	M key	60	M key
61		62	
63		64	
65		66	
67	NC	68	NC
69	NC	70	3.3V
71	GND	72	3.3V
73	GND	74	3.3V
75	GND		

14.0 Supported NVMe Commands and Features

14.1 NVMe Command Set

PC SN730 NVMe SSD support NVMe 1.3 standard command set and the following configurations:

- 1 Namespace
- 64 Queues
- 8 Async. Events Notifications

Table 14-1. Admin Commands

Command Name	Opcode	Comment
Delete I/O Submission Queue	00h	
Create I/O Submission Queue	01h	
Get Log Page	02h	
Delete I/O Completion Queue	04h	
Create I/O Completion Queue	05h	
Identify	06h	
Abort	08h	
Set Features	09h	
Get Features	0Ah	
Asynchronous Event Request	0Ch	Maximum of 8.
Firmware Commit	10h	
Firmware Image Download	11h	
Device Self-Test	14h	
Format NVM (User Data Erase)	80h	
Security Send	81h	
Security Receive	82h	
Sanitize	84h	

Table 14-2. NVM Commands

Command Name	Opcode	Comment
Flush	00h	
Write	01h	
Read	02h	
Write Uncorrectable	04h	
Compare	05h	
Write Zeros	08h	
Dataset Management	09h	

Table 14-3. Set Features/Get Features

Command Name	Opcode	Comment
Feature Identifiers – Mandatory	Arbitration	
Feature Identifiers – Mandatory	Power Management	
Feature Identifiers – Optional	LBA Range Type	
Feature Identifiers – Mandatory	Temperature Threshold	
Feature Identifiers – Mandatory	Error Recovery	
Feature Identifiers – Optional	Volatile Write Cache	
Feature Identifiers – Mandatory	Number of Queues	
Feature Identifiers – Mandatory	Interrupt Coalescing	
Feature Identifiers – Mandatory	Interrupt Vector Configuration	
Feature Identifiers – Mandatory	Write Atomicity	
Feature Identifiers – Mandatory	Asynchronous Event Configuration	
Feature Identifiers – Optional	Autonomous Power State Transition	
Feature Identifiers – Optional	Host Controlled Thermal Management	
Feature Identifiers – Optional	Non-Operational Power State Configuration	
Feature Identifiers - Optional	Telemetry	
Feature Identifiers - Optional	Sanitize Operations	

14.2 Identify Controller Response

Table 14-4 defines the specifics of the Identify Controller returned by the PC SN730 NVMe SSD.

Table 14-4. Controller Capabilities and Features

Bytes	Field	Value	Comments
01:00	PCI Vendor ID (VID)	15B7h	
03:02	PCI Subsystem Vendor ID (SSVID)	15B7h	
23:04	Serial Number (SN)	Variable	Unique serial number in ASCII
63:24	Model Number (MN)	"WDC PC SN730" and SKU	
71:64	Firmware Revision (FR)	Variable	Format: 8 numeric digits
72	Recommended Arbitration Burst (RAB)	4h	
75:73	IEEE OUI Identifier (IEEE)	001B44h	
76	Controller Multi-Path I/O and Namespace Sharing Capabilities (CMIC)	0h	7-3 Reserved 2 0 = PCI Function 1 0 = Single Controller 0 0 = Single PCIe Port

Table 14-4. Controller Capabilities and Features (Continued)

Bytes	Field	Value	Comments
77	Maximum Data Transfer Size (MDTS)	7h	512KB
79:78	Controller ID (CNTLID)	2017h	
83:80	Version (VER)	10300h	
87:84	RTD3 Resume Latency (RTD3R)	7A120h	500,000us
91:88	RTD3 Entry Latency (RTD3E)	F4240h	1,000,000us
95:92	Optional Asynchronous Events Supported (OAES)	200h	
99:96	Controller Attributes (CTRATT)	2h	
239:100	Reserved	0h	
255:240	NVMe Management Interface	0h	

Table 14-5. Admin Command Set Attributes and Optional Controller Capabilities

Bytes	Field	Value	Comments
257:256	Optional Admin Command Support (OACS)	17h	Supported commands: ■ Security Send and Security Receive ■ Format NVM ■ Firmware Commit and Firmware Image Download ■ Device Self-Test 15-9 Reserved 8-5 0=not supported 4 1 = Device Self-test command is supported 3 0 = no support for the Namespace Management and Namespace Attachment commands 2 1 = Firmware Commit and Firmware Image Download commands are supported 1 1 = Format NVMe command is supported 0 1 = Security Send and Security Receive commands are supported
258	Abort Command Limit (ACL)	4h	5 Abort commands supported
259	Asynchronous Event Request Limit (AERL)	7h	8 AERs supported
260	Firmware Updates (FRMW)	14h	7-5 Reserved 4 1 = firmware activation without a reset is supported 3-1 010 = 2 firmware slots are supported 0 1 = slot 1 is read only 0 = slot 1 is read/write

Table 14-5. Admin Command Set Attributes and Optional Controller Capabilities (Continued)

Bytes	Field	Value	Comments
261	Log Page Attributes (LPA)	1Eh	Command Effects log page supported 7-3 Reserved 3 1 = support for Telemetry Host-Initiated and Telemetry Controller-Initiated log pages and sending Telemetry log 2 1 = support for extended data for Get Log Page 1 1 = Command Effects Log page is supported 0 0 = no support for SMART/Health information log page on a per namespace basis
262	Error Log Page Entries (ELPE)	FFh	256 entries supported
263	Number of Power States Support (NPSS)	4h	
264	Admin Vendor Specific Command Configuration (AVSCC)	1h	7-1 Reserved 0 1 = All Admin Vendor Specific Commands use the format as defined by NVMe standard
265	Autonomous Power State Transition Attributes (APSTA)	1h	Autonomous power state transitions supported
267:266	Warning Composite Temperature Threshold (WCTEMP)	165h	357°K (83.85°C)
269:268	Critical Composite Temperature Threshold (CCTEMP)	169h	361°K (87.85°C)
271:270	Maximum Time for Firmware Activation (MTFA)	32h	5 seconds
275:272	Host Memory Buffer Preferred Size (HMPRE)	0h	
279:276	Host Memory Buffer Minimum Size (HMMIN)	0h	
295:280	Total NVMe Capacity (TNVMCAP)	256GB: 3B9E656000 512GB: 773C256000 1024GB: EE77A56000	
311:296	Unallocated NVM Capacity (UNVMCAP)	0h	
315:312	Replay Protected Memory Block Support (RPMBS)	0h	
317:316	Extended Device Self-Test Time (EDSTT)	256GB:1Ah 512GB:34h 1024GB:68h	
318	Device Self-test Options (DSTO)	1h	
319	Firmware Update Granularity (FWUG)	1h	
321:320	Keep Alive Support (KAS)	0h	
322:323	Host Controlled Thermal Management Attributes (HCTMA)	1h	

Table 14-5. Admin Command Set Attributes and Optional Controller Capabilities (Continued)

Bytes	Field	Value	Comments
324:325	Minimum Thermal Management Temperature (MNTMT)	111h	
326:327	Maximum Thermal Management Temperature (MXTMT)	165h	
328:331	Sanitize Capabilities (SANICAP)	Non-SED: 2h SED: 3h	Bit 1 = Support Block Erase Bit 0 = Support Crypto Erase (SED only)
332:335	Host Memory Buffer Minimum Descriptor Entry Size (HMMINDS)	0h	
336:337	Host Memory Maximum Descriptors Entries (HMMAXD)	0h	
511:338	Reserved	0h	

Table 14-6. NVM Command Set Attributes

Bytes	Field	Value	Comments
512	Submission Queue Entry Size (SQES)	66h	7-4 0110 = Maximum Submission Queue entry size is 6. 3-0 0110 = Required Submission Queue entry size is 6.
513	Completion Queue Entry Size (CQES)	44h	7-4 0100 = Maximum Completion Queue entry size is 4. 3-0 0100 = Required Completion Queue entry size is 4.
515:514	Maximum Outstanding Commands (MAXCMD)	0h	
519:516	Number of Namespaces (NN)	1h	Supporting one Namespace
521:520	Optional NVM Command Support (ONCS)	5Fh	15-7 Reserved 5 0 = Reservations are not supported. 4 1 = Save field in the Set Features command and the Select field in the Get Features command are supported. 3 1 = Write Zero command is not supported. 2 1 = Dataset Management command is supported. 1 1 = Write Uncorrectable command is supported. 0 1 = Compare command is not supported.
523:522	Fused Operation Support (FUSES)	0h	
524	Format NVM Attributes (FNA)	Non-SED: 0h SED: 4h	
525	Volatile Write Cache (VWC)	7h	7-1 Reserved 0 1 = Volatile write cache is present.

Table 14-6. NVM Command Set Attributes (Continued)

Bytes	Field	Value	Comments
527:526	Atomic Write Unit Normal (AWUN)	0h	
529:528	Atomic Write Unit Power Fail (AWUPF)	0h	
530	NVM Vendor Specific Command Configuration (NVSCC)	1h	7-1 Reserved 0 1 = All NVM Vendor Specific Commands use the format defined in NVMe standard for Vendor Specific commands.
531	Reserved	0h	
533:532	Atomic Compare and Write Unit (ACWU)	0h	
535:534	Reserved	0h	
539:536	SGL Support (SGLS)	0h	
767:540	Reserved	0h	
1023:768	NVM Subsystem NVMe Qualified Name (SUBNQN)	–	
1791:1024	Reserved	0h	
2047:1792	NVMe over fabric identify.	0h	

Table 14-7. Power State Descriptors

Bytes	Field	Value	Comments
2079:2048	Power State 0 Descriptor (PSD0)	MP 256GB:1F4 MP 512GB:226 MP 1024GB:258 MXPS: 0 NOPS: 0 ENLAT: 0 EXLAT: 0 RRT: 0 RRL: 0 RWT: 0 RWL: 0 IDLP: 0h IPS: 00b ACTP: 000h APW: 000b APS: 00b	255-184 Reserved 183-182 Active Power Scale (APS) 181-179 Reserved 178-176 Active Power Workload (APW) 175-160 Active Power (ACTP) 159-152 Reserved 151-150 Idle Power Scale (IPS) 149-144 Reserved 143-128 Idle Power (IDLP) 127-125 Reserved 124-120 Relative Write Latency (RWL) 119-117 Reserved 116-112 Relative Write Throughout 111-109 Reserved 108-104 Relative Read Latency (RRL) 103-101 Reserved 100-96 Relative Read Throughput (RRT) 95-64 Exit Latency (EXLAT) 63-32 Entry Latency (ENLAT) 31-26 Reserved 25 Non-Operational State (NOPS) 24 Max Power Scale (MXPS) 23-16 Reserved 15-00 Maximum Power (MP)

Table 14-7. Power State Descriptors (Continued)

Bytes	Field	Value	Comments
2111-2080	Power State 1 Descriptor (PSD1)	MP:15Eh MXPS: 0b NOPS: 0b ENLAT: 0h EXLAT: 0h RRT: 0001b RRL: 0001b RWT: 0001b RWL: 0001b IDLP: 0h IPS: 00b ACTP: 0h APW: 000b APS: 00b	255-184 Reserved 183-182 Active Power Scale (APS) 181-179 Reserved 178-176 Active Power Workload (APW) 175-160 Active Power (ACTP) 159-152 Reserved 151-150 Idle Power Scale (IPS) 149-144 Reserved 143-128 Idle Power (IDLP) 127-125 Reserved 124-120 Relative Write Latency (RWL) 119-117 Reserved 116-112 Relative Write Throughout 111-109 Reserved 108-104 Relative Read Latency (RRL) 103-101 Reserved 100-96 Relative Read Throughput (RRT) 95-64 Exit Latency (EXLAT) 63-32 Entry Latency (ENLAT) 31-26 Reserved 25 Non-Operational State (NOPS) 24 Max Power Scale (MXPS) 23-16 Reserved 15-00 Maximum Power (MP)
2143-2112	Power State 2 Descriptor (PSD2)	MP: 12Ch MXPS: 0b NOPS: 0b ENLAT: 0b EXLAT: 0b RRT: 0010b RRL: 0010b RWT: 0010b RWL: 0010b IDLP: 0h IPS: 00b ACTP: 0h APW: 000b APS: 00b	255-184 Reserved 183-182 Active Power Scale (APS) 181-179 Reserved 178-176 Active Power Workload (APW) 175-160 Active Power (ACTP) 159-152 Reserved 151-150 Idle Power Scale (IPS) 149-144 Reserved 143-128 Idle Power (IDLP) 127-125 Reserved 124-120 Relative Write Latency (RWL) 119-117 Reserved 116-112 Relative Write Throughout 111-109 Reserved 108-104 Relative Read Latency (RRL) 103-101 Reserved 100-96 Relative Read Throughput (RRT) 95-64 Exit Latency (EXLAT) 63-32 Entry Latency (ENLAT) 31-26 Reserved 25 Non-Operational State (NOPS) 24 Max Power Scale (MXPS) 23-16 Reserved 15-00 Maximum Power (MP)

Table 14-7. Power State Descriptors (Continued)

Bytes	Field	Value	Comments
2175:2144	Power State 3 Descriptor (PSD3)	MP 256GB:2BCh MP 512GB:2BCh MP 1024GB:3E8h MXPS: 1b NOPS:1b ENLAT: FA0h EXLAT: 2710h RRT: 0011b RRL: 0011b RWT: 0011b RWL: 0011b IDLP: 0h IPS: 0b ACTP: 00h APW: 000b APS: 000b	255-184 Reserved 183-182 Active Power Scale (APS) 181-179 Reserved 178-176 Active Power Workload (APW) 175-160 Active Power (ACTP) 159-152 Reserved 151-150 Idle Power Scale (IPS) 149-144 Reserved 143-128 Idle Power (IDLP) 127-125 Reserved 124-120 Relative Write Latency (RWL) 119-117 Reserved 116-112 Relative Write Throughout 111-109 Reserved 108-104 Relative Read Latency (RRL) 103-101 Reserved 100-96 Relative Read Throughput (RRT) 95-64 Exit Latency (EXLAT) 63-32 Entry Latency (ENLAT) 31-26 Reserved 25 Non-Operational State (NOPS) 24 Max Power Scale (MXPS) 23-16 Reserved 15-00 Maximum Power (MP)
2207:2176	Power State 4 Descriptor (PSD4)	MP: 0019h MXPS: 1b NOPS:1b ENLAT: FA0h EXLAT: 9C40h RRT: 0100b RRL: 0100b RWT: 0100b RWL: 0100b IDLP: 0h IPS: 0b ACTP: 00h APW: 000b APS: 000b	255-184 Reserved 183-182 Active Power Scale (APS) 181-179 Reserved 178-176 Active Power Workload (APW) 175-160 Active Power (ACTP) 159-152 Reserved 151-150 Idle Power Scale (IPS) 149-144 Reserved 143-128 Idle Power (IDLP) 127-125 Reserved 124-120 Relative Write Latency (RWL) 119-117 Reserved 116-112 Relative Write Throughout 111-109 Reserved 108-104 Relative Read Latency (RRL) 103-101 Reserved 100-96 Relative Read Throughput (RRT) 95-64 Exit Latency (EXLAT) 63-32 Entry Latency (ENLAT) 31-26 Reserved 25 Non-Operational State (NOPS) 24 Max Power Scale (MXPS) 23-16 Reserved 15-00 Maximum Power (MP)
3071:2208	Power State Descriptors 5-31 (PSD5 – PSD31)	0h	N/A

Table 14-8. Vendor Specific (VS)

Bytes	Field	Value	Comments
4095:3072	Vendor Specific (VS)	—	

14.3 Log Pages

PC SN730 NVMe SSD supports the following log pages:

Table 14-9. PC SN730 NVMe SSD Log Pages

Identifier	Log Page	Reference
01h	Error Information	NVM Express specification
02h	SMART / Health Information	NVM Express specification
03h	Firmware Slot Information	NVM Express specification
05h	Commands Supported and Effects Log	NVM Express specification
06h	Device Self-Test	NVM Express specification
07h	Telemetry Host-Initiated	NVM Express specification
08h	Telemetry Controller-Initiated	NVM Express specification
0Dh	Persistent Event Log	NVM Express specification
81h	Sanitize Status	NVM Express specification
CDh	Vendor Specific Program/Erase Counters	Refer to the following sections.

14.3.1 SMART/Health Information (Log Identifier 02h)

Table 14-10. Western Digital PC SN730 NVMe SSD SMART/Health Information

Bytes	Attribute Name	Comment
0	Critical Warning	
2:1	Composite Temperature	Upon exiting low-power states, it may take up to one second for accurate temperature reporting.
3	Available Spare	
4	Available Spare Threshold	
5	Percentage Used	
47:32	Data Units Read	
63:48	Data Units Written	
79:64	Host Read Commands	
95:80	Host Write Commands	
111:96	Controller Busy Time	
127:112	Power Cycles	
143:128	Power On Hours	
159:144	Unsafe Shutdowns	
175:160	Media and Data Integrity Errors	
191:176	Number of Error Information Log Entries	
195:192	Warning Composite Temperature Time	
199:196	Critical Composite Temperature Time	

14.3.2 Program/Erase SMART Counters (Log Identifier CDh)

Table 14-11. Program/Erase SMART Counters (Log Identifier CDh)

Bytes	Attribute Name	Comment
3:0	Minimum Program/Erase Counter for TLC	
7:4	Maximum Program/Erase Counter for TLC	
11:8	Average Program/Erase Counter for TLC	
15:12	Minimum Program/Erase Counter for SLC	
19:16	Maximum Program/Erase Counter for SLC	
23:20	Average Program/Erase Counter for SLC	

15.0 Ordering Information

Refer to the examples below as reference for ordering SKUs.

Table 15-1. PC SN730 NVMe SSD Ordering Information

SDG(I/F)FCT-CCCC-YYYY	
Item	**Definition**
SD	Western Digital
G	Generation: B
(I/F)	Interface and Security P- PCI Express (non-secure version) Q- PCI Express (SED)
F	Form Factor: N - M.2 2280
C	Controller: T – Triton 8CH Package
T	NAND Technology: Y – BiCS4 256Gb 2P TLC
CCCC	Capacity: 256G: 256G 512G: 512G 1T00: 1024G
YYYY	Customer Code Reference: None for Generic OEM

Table 15-2 below shows the PC SN730 NVMe SSD SKUs.

Table 15-2. PC SN730 NVMe SSD Products SKUs

SKU Number	Capacity	Form Factor	Type
SDBPNTY-256G	256GB	M.2 2280 M-S3	non-SED
SDBPNTY-512G	512GB	M.2 2280 M-S3	non-SED
SDBPNTY-1T00	1024GB	M.2 2280 M-S3	non-SED
SDBQNTY-256G	256GB	M.2 2280 M-S3	SED
SDBQNTY-512G	512GB	M.2 2280 M-S3	SED
SDBQNTY-1T00	1024GB	M.2 2280 M-S3	SED

16.0 Contact Information

Visit https://www.westerndigital.com/products/internal-drives.

For further product information, contact your Western Digital Sales representative, or send inquiries to OEMProducts@wdc.com.

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