

SQFlash SMART ID Definition

(For NVMe Products)

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Revision History

Rev.	Date	History
1.0	2020/08/18	1. Preliminary
1.1	2020/09/22	1. Update attribute and support list
1.2	2021/11/19	1. Update Support controller
1.3	2022/01/10	1. Update SMART description
1.3a	2022/04/07	1. Modify SMART ID
1.4	2023/01/07	1. Update attribute and support model
1.5	2023/07/12	1. Update standard definition attribute and support model

1. Introduction

1.1 How to look up table

The raw data you get from the SQFlash Manager is Dec code, so you are no need to transfer the RAW data again. But, if you're using a third-party tool, you will get the RAW data in Hex code, you may need to look up the mapping table and transfer the Hex data to Dec data.

Please refer to the below example: *I want to get the Temperature value from SSD.*

- Read by **SQFlash Manager**, you will get a value instead of the RAW data.

You will see the temperature field shown in decimal with °C.

<table style="width: 100%; border-collapse: collapse;"> <tr><td style="padding: 2px;">Current Temperature</td><td style="padding: 2px;">-</td><td style="padding: 2px;">33</td></tr> <tr><td style="padding: 2px;">Lowest Temperature</td><td style="padding: 2px;">-</td><td style="padding: 2px;">12</td></tr> <tr><td style="padding: 2px;">Highest Temperature</td><td style="padding: 2px;">-</td><td style="padding: 2px;">40</td></tr> <tr><td style="padding: 2px;">Chip Internal Temperature</td><td style="padding: 2px;">-</td><td style="padding: 2px;">49</td></tr> </table>	Current Temperature	-	33	Lowest Temperature	-	12	Highest Temperature	-	40	Chip Internal Temperature	-	49	<div style="font-size: small; margin-top: 5px;"> <p>SQFlash Manager SQFlash SSD health monitoring utility with endurance prediction and estimation functions. (NVMe SSD requires Windows 10 and above)</p> </div>
Current Temperature	-	33											
Lowest Temperature	-	12											
Highest Temperature	-	40											
Chip Internal Temperature	-	49											

- Read by the device log, you need to transfer the data from Hex to Dec data.

```

0 1 2 3 4 5 6 7 8 9 a b c d e f
0000: d8 1c cd 3e 01 00 00 00 40 29 23 51 01 00 00 00
0010: ca fb 13 00 00 00 00 00 87 01 00 00 58 00 00 00
0020: 00 00 00 00 59h 5Ah 5Bh 00 00 5Ch 00 00
0030: 00 00 00 00 3d 01 2b 01 47 01 00 00 4a 01 42 0c
    
```

The Raw data from byte 52~61 is 3D012b01470100004A01. After I look up the table and separate the raw data into four value as below table.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
59h	Current Temperature	C0h	2	[53:52]	°K
5Ah	Lowest Temperature	C0h	2	[55:54]	°K
5Bh	Highest Temperature	C0h	2	[57:56]	°K
5Ch	Current Controller Temperature	C0h	2	[61:60]	°K

And then I can get 4 values, (unit: °K)

- ID 59h, *Current Temperature* in Byte Index [53:52] = 013D (Hex) = 317 (decimal)
- ID 5Ah, *Lowest Temperature* in Byte Index [55:54] = 012B (Hex) = 299(decimal)
- ID 5Bh, *Lowest Temperature* in Byte Index [57:56] = 0147 (Hex) = 327(decimal)
- ID 5Ch, *Current Controller Temperature* in Byte Index [61:60] = 014A (Hex) = 330(decimal)

1.2 Support List

- SMART Data of Standard Definition: Reference SMART Information in [Chapter 2](#).
- SMART Data of Vendor Definition:
 - SQFlash 900 Series: Reference SMART Information in the [chapter 3.1](#)
 - SQFlash 920 Series
 - SQFlash 930 Series
 - SQFlash 700 Series: Reference SMART Information in the [chapter 3.1](#)
 - SQFlash 710 Series (Support from E8FM12A2/ E8TI14A2/ E8FMQ1AA)
 - SQFlash 720 Series
 - SQFlash 720 Series
 - SQFlash 730 Series
 - SQFlash ER Series: reference SMART data in the [chapter 3.1](#)
 - SQFlash EU-1 Series
 - SQFlash EU Series: reference SMART data in the [chapter 3.2](#)
 - SQFlash EU-1 Series

2. SQFlash SMART Data of Standard Defined

2.1 Table of SMART ID

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	Unit
01h	Critical Warning	02h	1	[0]	-
02h	Composite Temperature	02h	2	[2:1]	°K
03h	Available Spare	02h	1	[3]	%
04h	Available Spare Threshold	02h	1	[4]	%
05h	Percentage Used	02h	1	[5]	%
06h	Endurance Group Critical Warning Summary ⁵	02h	1	[6]	-
07-10h	Reserved	02h		[31:7]	-
11h	Data Units Read	02h	16	[47:32]	1000 Sectors
12h	Data Units Written (Host Write)	02h	16	[63:48]	1000 Sectors
13h	Host Read Commands	02h	16	[79:64]	count
14h	Host Write Commands	02h	16	[95:80]	count
15h	Controller Busy Time	02h	16	[111:96]	mins
16h	Power Cycles	02h	16	[127:112]	count
17h	Power on Hours	02h	16	[143:128]	hours
18h	Unsafe Shutdowns	02h	16	[159:144]	count
19h	Media and Data Integrity Errors	02h	16	[175:160]	times
1Ah	Number of Error Information Log Entries	02h	16	[191:176]	count
1Bh	Warning Composite Temperature Time	02h	4	[195:192]	mins
1Ch	Critical Composite Temperature Time	02h	4	[199:196]	mins
1Dh	Temperature Sensor 1	02h	2	[201:200]	°K
1Eh	Temperature Sensor 2	02h	2	[203:202]	°K
1Fh	Temperature Sensor 3	02h	2	[205:204]	°K
20h	Temperature Sensor 4	02h	2	[207:206]	°K
21h	Temperature Sensor 5	02h	2	[209:208]	°K
22h	Temperature Sensor 6	02h	2	[211:210]	°K
23h	Temperature Sensor 7	02h	2	[213:212]	°K
24h	Temperature Sensor 8	02h	2	[215:214]	°K
25h	Thermal Management Temperature 1 Transition Count ¹	02h	4	[219:216]	count
26h	Thermal Management Temperature 2 Transition Count ²	02h	4	[223:220]	count
27h	Total Time for Thermal Management Temperature 1 ³	02h	4	[227:224]	Second
28h	Total Time for Thermal Management Temperature 2 ⁴	02h	4	[231:228]	Second

29-4Fh	Reserved	02h		[511:232]	
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Note

- ¹ **25h Thermal Management Temperature 1 Transition Count:** Support from NVMe 1.3, before NVMe 1.2 is set for Reserved.
- ² **26h Thermal Management Temperature 2 Transition Count:** Support from NVMe 1.3, before NVMe 1.2 is set for Reserved.
- ³ **27h Total Time for Thermal Management Temperature 1:** Support from NVMe 1.3, before NVMe 1.2 is set for Reserved.
- ⁴ **28h Total Time for Thermal Management Temperature 2:** Support from NVMe 1.3, before NVMe 1.2 is set for Reserved.
- ⁵ **06h Endurance Group Critical Warning Summary:** Support from NVMe 1.4 specification, before NVMe 1.3 is set for Reserved.

2.2 SMART ID Statement of SMART Defined

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
01h	Critical Warning	02h	1	[0]	-

Critical Warning: According to NVMe spec, this field indicates critical warnings for the state of the controller. Each bit corresponds to a critical warning type; multiple bits may be set to '1'. If a bit cleared to '0', then that critical warning does not apply. Critical warnings may result in an asynchronous event notification to the host. Bits in this field represent the current associated state and are not persistent.

Bits	Definition
7:6	Reserved
5	If set to '1', then the Persistent Memory Region has become read-only or unreliable
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.
3	If set to '1', then the media has been placed in read-only mode. The controller shall not set this bit to '1' if the read-only condition on the media is a result of a change in the write protection state of a namespace
2	If set to '1', then the NVM subsystem reliability has been degraded due to significant media related errors or any internal error that degrades NVM subsystem reliability.
1	If set to '1', then the temperature is: a) greater than or equal to an over-temperature threshold; or b) less than or equal to an under temperature threshold,
0	If set to '1', then the available spare capacity has fallen below the threshold.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
02h	Composite Temperature	02h	2	[2:1]	°K

Composite Temperature is 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.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
03h	Available Spare	02h	1	[3]	%

Available Spare is which contains a normalized percentage (0% to 100%) of the remaining spare capacity available.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
04h	Available Spare Threshold	02h	1	[4]	%

Available Spare Threshold: When the Available Spare 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%). The values of 101 to 255 are reserved.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
05h	Percentage Used	02h	1	[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 is allowed to exceed 100.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
06h	Endurance Group Critical Warning Summary	02h	1	[5]	%

Endurance Group Critical Warning Summary: This field indicates critical warnings for the state of Endurance Groups. Each bit corresponds to a critical warning type, multiple bits may be set to ‘1’. If a bit is cleared to ‘0’, then that critical warning does not apply to any Endurance Group. Critical warnings may result in an asynchronous event notification to the host. Bits in this field represent the current associated state and are not persistent.

If a bit is set to ‘1’ in one or more Endurance Groups, then the corresponding bit shall be set to ‘1’ in this field.

Bits	Definition
7:4	Reserved
3	If set to ‘1’, then the namespaces in one or more Endurance Groups have been placed in read only mode not as a result of a change in the write protection state of a namespace.
2	If set to ‘1’, then the reliability of one or more Endurance Groups has been degraded due to significant media related errors or any internal error that degrades NVM subsystem reliability.
1	Reserved
0	If set to ‘1’, then the available spare capacity of one or more Endurance Groups has fallen below the threshold.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
11h	Data Units Read	02h	16	[47:32]	1000 Sectors

Data Units Read: The total data size that the Host read from the SSD controller. The unit is 1000 sectors.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
12h	Data Units Written (Host Write)	02h	16	[63:48]	1000 Sectors

Data Units Written: The total data size that the Host written from the SSD controller. The unit is 1000 sectors.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
13h	Host Read Commands	02h	16	[79:64]	count

Host Read Commands: The total counts of read commands completed by the SSD controller.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
14h	Host Write Commands	02h	16	[95:80]	count

Host Write Commands: The total counts of write commands completed by the SSD controller.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
15h	Controller Busy Time	02h	16	[111:96]	mins

Controller Busy Time: The amount of time the SSD controller is busy with I/O commands. The controller is busy when there is a command outstanding to an I/O Queue. This value was reported in minutes.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
16h	Power Cycles	02h	16	[127:112]	count

Power Cycles: The number of power cycles When SSD has one power on and power off cycle, the counter will add one.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
17h	Power on Hours	02h	16	[143:128]	hours

Power on Hours: The number of power-on hours. This may not include time that the SSD controller was powered and in a non-operational power state.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
18h	Unsafe Shutdowns	02h	16	[159:144]	count

Unsafe Shutdowns: The number of unsafe shutdowns. If SSD power off before host issues standby command, the Unsafe Shutdowns Count will add 1.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
19h	Media and Data Integrity Errors	02h	16	[175:160]	times

Media and Data Integrity Errors: 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. Errors introduced as a result of a Write Uncorrectable command may or may not be included in this field.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
1Ah	Number of Error Information Log Entries	02h	16	[191:176]	count

Number of Error Information Log Entries: The number of Error Information log entries over the life of the SSD controller.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
1Bh	Warning Composite Temperature Time	02h	4	[195:192]	mins

Warning Composite Temperature Time: The amount of time in minutes that the SSD controller is operational and the Composite Temperature is greater than or equal to the Warning Composite Temperature Threshold (WCTEMP, 90 degrees) field and less than the Critical Composite Temperature Threshold (CCTEMP, 95 degrees) field.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
1Ch	Critical Composite Temperature Time	02h	4	[199:196]	mins

Critical Composite Temperature Time: The amount of time in minutes that the SSD controller is operational and the Composite Temperature is greater than the Critical Composite Temperature Threshold (CCTEMP, 95 degrees) field.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
1Dh	Temperature Sensor 1	02h	2	[201:200]	°K

Temperature Sensor 1: Contains the current temperature reported by temperature sensor 1.

1. SQFlash 710 and 920 series did not set up temperature sensor 1.
2. SQFlash 720 series: temperature sensor 1 will report controller temperature (Tj).

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
1Eh	Temperature Sensor 2	02h	2	[203:202]	°K

Temperature Sensor 2: Contains the current temperature reported by temperature sensor 2.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
1Fh	Temperature Sensor 3	02h	2	[205:204]	°K

Temperature Sensor 3: Contains the current temperature reported by temperature sensor 3.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
20h	Temperature Sensor 4	02h	2	[207:206]	°K

Temperature Sensor 4: Contains the current temperature reported by temperature sensor 4.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
21h	Temperature Sensor 5	02h	2	[209:208]	°K

Temperature Sensor 5: Contains the current temperature reported by temperature sensor 5.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
22h	Temperature Sensor 6	02h	2	[211:210]	°K

Temperature Sensor 6: Contains the current temperature reported by temperature sensor 6.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
23h	Temperature Sensor 7	02h	2	[213:212]	°K

Temperature Sensor 7: Contains the current temperature reported by temperature sensor 7.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
24h	Temperature Sensor 8	02h	2	[215:214]	°K

Temperature Sensor 8: Contains the current temperature reported by temperature sensor 8.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
25h	Thermal Management Temperature 1 Transition Count	02h	4	[219:216]	count

Thermal Management Temperature 1 Transition Count: Contains the number of times the controller transitioned to lower power active power states or performed vendor specific thermal management actions while minimizing the impact on performance in order to attempt to reduce the Composite Temperature because of the host controlled thermal management feature. (i.e., the Composite Temperature rose above the Thermal Management Temperature 1.) This counter shall not wrap once it reaches its maximum value. A value of zero, indicates that this transition has never occurred or this field is not implemented.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
26h	Thermal Management Temperature 2 Transition Count	02h	4	[223:220]	count

Thermal Management Temperature 2 Transition Count: Contains the number of times the controller transitioned to lower power active power states or performed vendor specific thermal management actions regardless of the impact on performance (e.g., heavy throttling) in order to attempt to reduce the Composite Temperature because of the host controlled thermal management feature. (i.e., the Composite Temperature rose above the Thermal Management Temperature 2.) This counter shall not wrap once it reaches its maximum value. A value of zero, indicates that this transition has never occurred or this field is not implemented.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
27h	Total Time for Thermal Management Temperature 1	02h	4	[227:224]	seconds

Total Time for Thermal Management Temperature 1: Contains the number of seconds that the controller had transitioned to lower power active power states or performed vendor specific thermal management actions while minimizing the impact on performance in order to attempt to reduce the

Composite Temperature because of the host controlled thermal management feature. This counter shall not wrap once it reaches its maximum value. A value of zero, indicates that this transition has never occurred or this field is not implemented.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
28h	Total Time for Thermal Management Temperature 2	02h	4	[231:228]	seconds

Total Time for Thermal Management Temperature 2: Contains the number of seconds that the controller had transitioned to lower power active power states or performed vendor specific thermal management actions regardless of the impact on performance (e.g., heavy throttling) in order to attempt to reduce the Composite Temperature because of the host controlled thermal management feature. This counter shall not wrap once it reaches its maximum value. A value of zero, indicates that this transition has never occurred or this field is not implemented.

3. SQFlash SMART Data of Vendor Defined

3.1 SQFlash 700/900 Series

3.1.1 Table of SMART ID

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	Unit
50h	Flash Read Sector	C0h	8	[7:0]	sector
50h	Flash Read Sector	C0h	8	[7:0]	sector
51h	Flash Write Sector	C0h	8	[15:8]	sector
52h	UNC Error	C0h	8	[23:16]	count
53h	PHY Error	C0h	4	[27:24]	count
54h	Early Bad Block	C0h	4	[31:28]	count
55h	Later Bad Block	C0h	4	[35:32]	count
56h	Max Erase Count	C0h	4	[39:36]	count
57h	Average Erase Count	C0h	4	[43:40]	count
58h	Current Percent Spares	C0h	8	[51:44]	%
59h	Current Temperature	C0h	2	[53:52]	°K
5Ah	Lowest Temperature	C0h	2	[55:54]	°K
5Bh	Highest Temperature	C0h	2	[57:56]	°K
5Ch	Current Controller Temperature	C0h	2	[61:60]	°K
5Dh	Spare Blocks	C0h	2	[63:62]	count

3.1.2 SMART ID Statement of Vendor Defined

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
50h	Flash Read Sector	C0h	8	[7:0]	sector

Flash Read Sector: The total data size that Flash read. The unit is 1 sector/ 512 bytes.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
51h	Flash Write Sector	C0h	8	[15:8]	sector

Flash Write Sector: The total data size that Flash written. The unit is 1 sector/ 512 bytes.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
52h	UNC Error	C0h	8	[23:16]	count

UNC Error: The counts of the controller read Flash encounter UNC, also called uncorrectable ECC counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
53h	PHY Error	C0h	4	[27:24]	count

PHY Error: The counts of the PCIe PHY error.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
54h	Early Bad Block	C0h	4	[31:28]	count

Early Bad Block: Block is a capacity unit of NAND flash. The bad block is the damaged block that SSD controller mark as “no use”. Early bad block is the bad block that caused during manufacture. SQFlash standard is less than 2%.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
55h	Later Bad Block	C0h	4	[35:32]	count

Later Bad Block: Block is a capacity unit of NAND flash. The bad block is the damaged block that SSD controller mark as “no use”. Later bad block is caused by artificial usage. If the block has too many ECC, the SSD controller will mark the block as Later bad block(LBB). But, it also need to check the erase count. If the SSD is going to run out of their lifetime, the Later bad blocks are normal.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
56h	Max Erase Count	C0h	4	[39:36]	count

Max Erase Count: Erase count is the parameter that we check the lifetime of the SSD. Max erase count is the biggest erase count of all blocks.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
57h	Average Erase Count	C0h	4	[43:40]	count

Average Erase Count: Erase count is the parameter that we check the lifetime of the SSD. Average erase count is the average of all block's erase count.

The endurance of the SSD will depend on NAND flash type, please refer to the below table:

NAND flash type		Endurance (times)
SLC		60,000
3D sTLC(BiCS5)		50,000
Ultra MLC	3D sTLC(BiCS4)	30,000
3D cTLC		5,000
MLC	3D TLC (BiCS3/4/5)	3,000

For example, if the average erase count of the BiCS3 SSD is over 3,000 times, it means the SSD run out of their lifetime.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
58h	Current Percent Spares	C0h	8	[51:44]	%

Current Percent Spares: The current available spare blocks, and the value reported in percentage.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
59h	Current Temperature	C0h	2	[53:52]	°K

Current Temperature: The current temperature reported by the external thermal sensor.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
5Ah	Lowest Temperature	C0h	2	[55:54]	°K

Lowest Temperature: The lowest temperature reported by the external thermal sensor.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
5Bh	Highest Temperature	C0h	2	[57:56]	°K

Highest Temperature: The highest temperature reported by the external thermal sensor.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
5Ch	Current Controller Temperature	C0h	2	[61:60]	°K

Current Controller Temperature: The current controller temperature is reported by the internal thermal sensor by the SSD controller.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
5Dh	Spare Blocks	C0h	2	[63:62]	count

Spare Blocks: The current available spare blocks.

3.2 SQFlash EU Series

3.2.1 Table of SMART ID

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	Unit
70h	Device Capacity	D2h	8	[7:0]	sector
71h	User Capacity	D2h	8	[15:8]	sector
72h	NAND Read	D2h	8	[23:16]	sector
73h	NAND Write	D2h	8	[31:24]	sector
74h	NAND Erase Sector	D2h	8	[39:32]	sector
75h	Wear Leveling Mechanism Indicator	D2h	8	[47:40]	%
76h	SSD Life Used Percent	D2h	8	[55:48]	%
77h	Write Protect Indicator	D2h	1	[56]	bit
78h	Highest Temperature	D2h	2	[58:57]	K
79h	Read Fail Count	D2h	4	[62:59]	count
7Ah	Data E3D Error	D2h	4	[66:63]	count
7Bh	PHY Error Count	D2h	4	[70:67]	count
7Ch	Total Bad Block Count	D2h	4	[74:71]	count
7Dh	Total Early Bad Block Count	D2h	4	[78:75]	count
7Eh	Total Later Bad Block Count	D2h	4	[82:79]	count
7Fh	Read Fail Count	D2h	4	[86:83]	count
80h	Program Fail Count	D2h	4	[90:87]	count
81h	Erase Failure Count	D2h	4	[94:91]	count
82h	System Table Copy Count	D2h	8	[102:95]	count
83h	Read Move Table Count	D2h	8	[110:103]	count
84h	Data Read Retry Count	D2h	4	[114:111]	count
85h	RAID ECC Retry Count	D2h	4	[118:115]	count
86h	RAID ECC Failed Count	D2h	4	[122:119]	count
87h	Total Erase Count	D2h	8	[130:123]	count
88h	D2/D3 Max Erase Count	D2h	4	[134:131]	count
89h	D2/D3 Average Erase Count	D2h	4	[138:135]	count
8Ah	D2/D3 Min Erase Count	D2h	4	[142:139]	count
8Bh	Host Write Uncorrectable Sector Count	D2h	4	[154:151]	count
8Ch	Wear Leveling Count	D2h	4	[166:163]	count
8Dh	Chip Internal Temperature	D2h	2	[168:167]	K
8Eh	Thermal Throttling	D2h	2	[170:169]	count

8Fh	Thermal Throttling Time	D2h	2	[172:171]	second
90h	FW Code Update Count	D2h	8	[180:173]	count
91h	Flash UNC Error Count	D2h	8	[188:181]	count
92h	HB(Hard Bit) Retry Count	D2h	4	[192:189]	count
93h	SB(Soft Bit) Retry Count	D2h	4	[196:193]	count
94h	Power CAP Initial Error Count	D2h	4	[202:199]	count
95h	User Data RAID ECC Recovery Success	D2h	4	[206:203]	count
96h	User Data RAID ECC Recovery Failed	D2h	4	[210:207]	count
97h	Table RAID ECC Recovery Success	D2h	4	[214:211]	count
98h	Table RAID ECC Recovery Failed	D2h	4	[218:215]	count
99h	DDR Decode 1-bit Error Count	D2h	4	[223:220]	count
9Ah	Error Count of Thermal Sensor 1	D2h	2	[225:224]	count
9Bh	Error Count of Thermal Sensor 2	D2h	2	[227:226]	count
9Ch	Error Count of Thermal Sensor 3	D2h	2	[229:228]	count
9Dh	Error Count of Thermal Sensor 4	D2h	2	[231:230]	count
9Eh	Raw Data of Thermal sensor (Raw Data (2 Bytes) * 4 Sensors = 8 Bytes)	D2h	8	[239:232]	°C
9Fh	Data Soft RAID Recovery Success	D2h	4	[243:240]	count
A0h	Data Soft RAID Recovery Fail	D2h	4	[247:244]	count
A1h	DDR Corrected Error Count	D2h	4	[251:248]	count
A2h	DDR Detected Error Count	D2h	4	[255:252]	count
A3h	Controller cop1 SRAM Corrected Error Count	D2h	4	[259:256]	count
A4h	Controller cop1 SRAM Detected Error Count	D2h	4	[263:260]	count
A5h	Controller NVMe SRAM Corrected Error Count	D2h	4	[267:264]	count
A6h	Controller NVMe SRAM Detected Error Count	D2h	4	[271:268]	count
A7h	Controller PCIe MAC0 pl SRAM Corrected Error Count	D2h	4	[275:272]	count
A8h	Controller PCIe MAC0 pl SRAM Detected Error Count	D2h	4	[279:276]	count
A9h	Controller PCIe MAC0 tl SRAM Corrected Error Count	D2h	4	[283:280]	count
AAh	Controller PCIe MAC0 tl SRAM Detected Error Count	D2h	4	[287:284]	count
ABh	Controller PCIe MAC1 pl SRAM Corrected Error Count	D2h	4	[291:288]	count
ACh	Controller PCIe MAC1 pl SRAM Detected Error Count	D2h	4	[295:292]	count
ADh	Controller PCIe MAC1 tl SRAM Corrected Error Count	D2h	4	[299:296]	count
A Eh	Controller PCIe MAC1 tl SRAM Detected Error Count	D2h	4	[303:300]	count
AFh	Controller Host SRAM Corrected Error Count	D2h	4	[307:304]	count
B0h	Controller Host SRAM Detected Error Count	D2h	4	[311:308]	count

B1h	Controller HDMA SRAM Corrected Error Count	D2h	4	[315:312]	count
B2h	Controller HDMA SRAM Detected Error Count	D2h	4	[319:316]	count
B3h	Controller DDR0 SRAM Corrected Error Count	D2h	4	[323:320]	count
B4h	Controller DDR0 SRAM Detected Error Count	D2h	4	[327:324]	count
B5h	Controller FIP0 SRAM Corrected Error Count	D2h	4	[331:328]	count
B6h	Controller FIP0 SRAM Detected Error Count	D2h	4	[335:332]	count
B7h	Controller FIP1 SRAM Corrected Error Count	D2h	4	[339:336]	count
B8h	Controller FIP1 SRAM Detected Error Count	D2h	4	[343:340]	count
B9h	Controller FIP2 SRAM Corrected Error Count	D2h	4	[347:344]	count
Bah	Controller FIP2 SRAM Detected Error Count	D2h	4	[352:348]	count
BBh	Controller FIP3 SRAM Corrected Error Count	D2h	4	[355:353]	count
BCh	Controller FIP3 SRAM Detected Error Count	D2h	4	[359:356]	count
BDh	Controller aepu SRAM Corrected Error Count	D2h	4	[363:360]	count
BEh	Controller aepu SRAM Detected Error Count	D2h	4	[367:364]	count
BFh	Controller sys0 SRAM Corrected Error Count	D2h	4	[371:368]	count
COh	Controller sys0 SRAM Detected Error Count	D2h	4	[375:372]	count
C1h	Controller sbm SRAM Corrected Error Count	D2h	4	[379:376]	count
C2h	Controller sbm SRAM Detected Error Count	D2h	4	[383:380]	count
C3h	Controller sec SRAM Corrected Error Count	D2h	4	[387:384]	count
C4h	Controller sec SRAM Detected Error Count	D2h	4	[391:388]	count
C5h	Controller dbuf SRAM Corrected Error Count	D2h	4	[395:392]	count
C6h	Controller dbuf SRAM Detected Error Count	D2h	4	[399:396]	count
C7h	Controller dMAC SRAM Corrected Error Count	D2h	4	[403:400]	count
C8h	Controller dMAC SRAM Detected Error Count	D2h	4	[407:404]	count
C9h	Corrected Error Count	D2h	4	[411:408]	count
CAh	Detected Error Count	D2h	4	[415:412]	count
CBh	RSV	D2h			

3.2.2 SMART ID Statement of Vendor Defined

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
70h	Device Capacity	D2h	8	[7:0]	sector

Device Capacity: Drive native size by sector. The unit is 1 sector, 512 bytes.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
71h	User Capacity	D2h	8	[15:8]	sector

User Capacity: Drive media size by sector. The unit is 1 sector, 512 bytes.z

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
72h	NAND Read	D2h	8	[23:16]	sector

NAND Read: The data amount that read by NAND Flash. The unit is 1 sector, 512 bytes.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
73h	NAND Write	D2h	8	[31:24]	sector

NAND Write: The data amount that written into NAND Flash. The unit is 1 sector, 512 bytes.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
74h	NAND Erase Sector	D2h	8	[39:32]	sector

NAND Erase Sector: Sum of erase count from all sectors. The unit is 1 sector, 512 bytes.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
75h	Wear Leveling Mechanism Indicator	D2h	8	[47:40]	%

Wear Leveling Mechanism Indicator: It is a wear range delta which using “100* (Max Erase Count-Min Erase Count)/ NAND EOL Erase Count” to calculate. And the NAND EOL Erase Count depends on different kind of Flash IC.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
76h	SSD Life Used Percent	D2h	8	[55:48]	%

SSD Life Used Percent: The percentage of SSD Life Used which is calculated by average erase count and NAND reference erase count. 100 * Average of the Flash's block erase count / NAND EOL erase count.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
77h	Write Protect Indicator	D2h	1	[56]	bit

Write Protect Indicator: An index of system with table error, entering write protect mode and read-only mode.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
78h	Highest Temperature	D2h	2	[58:57]	K

Highest Temperature: The highest temperature after production reported by the external thermal sensor.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
79h	Read Fail Count	D2h	4	[62:59]	count

Read Fail Count: The count of NAND Flash read failure and triggered later bad block produce.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
7Ah	Data E3D Error	D2h	4	[66:63]	count

Data E3D Error: It is the data error coding between the controller and host. When the host reads data from the drive, the E3D error count will increase.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
7Bh	PHY Error Count	D2h	4	[70:67]	count

PHY Error Count: The counts of the PCIe PHY error, it shows error counts of PCIE bad signal events, the SSD controller will check PCIE bus bad signal quality event in every 4minutes. The PCIe PHY error indicated the PCIE link between host and SSD controller with bad link, please check the connection when the PHY error count keep increasing.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
7Ch	Total Bad Block Count	D2h	4	[74:71]	count

Total Bad Block Count: Block is a capacity unit of NAND flash. The bad block is the damaged block that SSD controller mark as “no use”. Total Bad Block Count include “Total Early Bad Block Count” and “Total Later Bad Block Count”.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
7Dh	Total Early Bad Block Count	D2h	4	[78:75]	count

Total Early Bad Block Count: Block is a capacity unit of NAND flash. The bad block is the damaged block that SSD controller mark as “no use”. Early bad block is the bad block that caused during manufacture. **SQFlash standard is less than 2%.**

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
7Eh	Total Later Bad Block Count	D2h	4	[82:79]	count

Total Later Bad Block Count: Block is a capacity unit of NAND flash. The bad block is the damaged block that SSD controller mark as “no use”. Later bad block is caused by artificial usage. If the block has too many ECC, the SSD controller will mark the block as Later bad block(LBB). But, it also need to check the erase count. If the SSD is going to run out of their lifetime, the Later bad blocks are normal.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
7Fh	Read Fail Count	D2h	4	[86:83]	count

Read Fail Count: The count of NAND Flash read failure and triggered later bad block produce.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
80h	Program Fail Count	D2h	4	[90:87]	count

Program Fail Count: The count of NAND Flash program failure and triggered later bad block produce.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
81h	Erase Failure Count	D2h	4	[94:91]	count

Erase Failure Count: The count of NAND erase failure and triggered later bad block produce.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
82h	System Table Copy Count	D2h	8	[102:95]	count

System Table Copy Count: Count of system block update since read fail. When the read retry or read error occurs during loading system block, it will trigger the system block refresh procedure. This item will record the counts of system table error and the later bad block counts of system table.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
83h	Read Move Table Count	D2h	8	[110:103]	count

Read Move Table Count: Count of data refresh, when SSD occurs read UNC but recovery by RAID and the refresh threshold of read disturb. (Including time of retention, fresh and RAID ECC).

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
84h	Data Read Retry Count	D2h	4	[114:111]	count

Data Read Retry Count: Count of SSD read by NAND Flash entering the process of hard bit retry or soft bit retry. This value did not include the RAID ECC retry count.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
85h	RAID ECC Retry Count	D2h	4	[118:115]	count

RAID ECC Retry Count: RAID ECC is a technology that using low-density parity check (LDPC) algorithm to do error checking and correction (ECC) parity capabilities in the storage, and this value records the counts entering into RAID ECC retry procedure.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
86h	RAID ECC Failed Count	D2h	4	[122:119]	count

RAID ECC Failed Count: RAID ECC is a technology that using low-density parity check (LDPC) algorithm to do error checking and correction (ECC) parity capabilities in the storage. And this value is showed the failure count of RAID ECC retry.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
87h	Total Erase Count	D2h	8	[130:123]	count

Total Erase Count: Erase count is the parameter that we check the lifetime of the SSD, and this value is the sum of erase count from all blocks.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
88h	D2/D3 Max Erase Count	D2h	4	[134:131]	count

D2/D3 Max Erase Count: Erase count is the parameter that we check the lifetime of the SSD. Max erase count is the biggest erase count of all blocks.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
89h	D2/D3 Average Erase Count	D2h	4	[138:135]	count

D2/D3 Average Erase Count: Erase count is the parameter that we check the lifetime of the SSD. Average erase count is the average of all block's erase count. The endurance of the SSD will depend on NAND flash type, please refer to the below table:

NAND flash type		Endurance (times)
SLC		60,000
3D sTLC(BiCS5)		50,000
Ultra MLC	3D sTLC(BiCS4)	30,000
3D cTLC		5,000
MLC	3D TLC (BiCS3/4/5)	3,000

For example, if the average erase count of the BiCS3 SSD is over 3,000 times, it means the SSD run out of their lifetime.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
8Ah	D2/D3 Min Erase Count	D2h	4	[142:139]	count

D2/D3 Min Erase Count: Erase count is the parameter that we check the lifetime of the SSD. Min erase count is the smallest erase count of all blocks.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
8Bh	Host Write Uncorrectable Sector Count	D2h	4	[154:151]	count

Host Write Uncorrectable Sector Count: Write Uncorrectable Sector Count by host.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
8Ch	Wear Leveling Count	D2h	4	[166:163]	count

Wear Leveling Count: SQFlash provides advanced Wear Leveling algorithm, which can efficiently spread out the flash usage through the whole flash media area. Moreover, by implementing both dynamic and static Wear Leveling algorithms, the life expectancy of the NAND flash is greatly improved. This field will record the counts of wear leveling been triggered.

#Wear-leveling will be triggered by following situation:

1. Max Erase Count – Min Erase Count > 150
2. Max Erase Count – AVG Erase Count > 64

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
8Dh	Chip Internal Temperature	D2h	2	[168:167]	K

Chip Internal Temperature: The current controller temperature is reported by the internal thermal sensor by the SSD controller.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
8Eh	Thermal Throttling	D2h	2	[170:169]	count

Thermal Throttling: Thermal Throttling function is for protecting the drive and reducing the possibility of read / write error due to overheat. When the Tc reach 77 Celsius, it will trigger and enter the thermal throttling procedure, and when the Tc cool down to 75 Celsius, the performance will be resumed. This field is counting the thermal throttling perform including entry and exit count.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
8Fh	Thermal Throttling Time	D2h	2	[172:171]	second

Thermal Throttling Time: Thermal Throttling function is for protecting the drive and reducing the possibility of read / write error due to overheat. When the Tc reach 77 Celsius, it will trigger and enter the thermal throttling procedure, and when the Tc cool down to 75 Celsius, the performance will be resumed. This field is recording the total time of the thermal throttling perform.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
90h	FW Code Update Count	D2h	8	[180:173]	count

FW Code Update Count: This field will be calculating the counts of the FW code update via DLMC (download microcode) procedure.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
91h	Flash UNC Error Count	D2h	8	[188:181]	count

Flash UNC Error Count: The counts of the controller read Flash encounter UNC, also called uncorrectable ECC counts. When all of retry operations and RAID ECC are failed, the Flash UNC Error Count will be increased. This item will calculate the UNC error count of user data area and system table area.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
92h	HB(Hard Bit) Retry Count	D2h	4	[192:189]	count

HB(Hard Bit) Retry Count: When the SSD occurs read fail during operation, it will go into the error handling flow. Error handling flow including multiple corrective mechanisms, such as RAID ECC, soft bit retry, and hard bit retry. This value shown the total counts of entering hard bit retry process.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
93h	SB(Soft Bit) Retry Count	D2h	4	[196:193]	count

SB(Soft Bit) Retry Count: When the SSD occurs read fail during operation, it will go into the error handling flow. Error handling flow including multiple corrective mechanisms, such as RAID ECC, soft bit retry process, and hard bit retry process. This value shown the total counts of entering soft bit retry process.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
94h	Power CAP Init Error Count	D2h	4	[202:199]	count

Power CAP Init Error Count: EU-1 product supports PLP with super-CAP, and this value records the counts of the power CAP initial failure.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
95h	User Data RAID ECC Recovery Success	D2h	4	[206:203]	count

User Data RAID ECC Recovery Success: When the SSD occurs read fail during operation, it will go into the error handling flow. Error handling flow including multiple corrective mechanisms, such as RAID ECC, soft bit retry process, and hard bit retry process. This value showed the success count of using RAID ECC to recovery the data block.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
96h	User Data RAID ECC Recovery Failed	D2h	4	[210:207]	count

User Data RAID ECC Recovery Failed: When the SSD occurs read fail during operation, it will go into the error handling flow. Error handling flow including multiple corrective mechanisms, such as RAID ECC, soft bit retry process, and hard bit retry process. This value showed the failed count of using RAID ECC to recovery the data block.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
97h	System Table RAID ECC Recovery Success	D2h	4	[214:211]	count

System Table RAID ECC Recovery Success: When the SSD occurs read fail during operation, it will go into the error handling flow. Error handling flow including multiple corrective mechanisms, such as RAID ECC, soft bit retry process, and hard bit retry process. This value showed the success count of using RAID ECC to recovery the system table.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
98h	System Table RAID ECC Recovery Failed	D2h	4	[218:215]	count

System Table RAID ECC Recovery Failed: When the SSD occurs read fail during operation, it will go into the error handling flow. Error handling flow including multiple corrective mechanisms, such as RAID ECC, soft bit retry process, and hard bit retry process. This value showed the failed count of using RAID ECC to recovery the system table.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
99h	DDR Decode 1-bit Error Count	D2h	4	[223:220]	count

DDR Decode 1-bit Error Count: The error count be corrective by Controller DDR.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
9Ah	Error Count of Thermal Sensor 1	D2h	2	[225:224]	count

Error Count of Thermal Sensor 1: The thermal error count will be increased when the sensor reported the temperature is over 125 Celsius or under -40 Celsius.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
9Bh	Error Count of Thermal Sensor 2	D2h	2	[227:226]	count

Error Count of Thermal Sensor 2: The thermal error count will be increased when the sensor reported the temperature is over 125 Celsius or under -40 Celsius.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
9Ch	Error Count of Thermal Sensor 3	D2h	2	[229:228]	count

Error Count of Thermal Sensor 3: The thermal error count will be increased when the sensor reported the temperature is over 125 Celsius or under -40 Celsius.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
9Dh	Error Count of Thermal Sensor 4	D2h	2	[231:230]	count

Error Count of Thermal Sensor 4: The thermal error count will be increased when the sensor reported the temperature is over 125 Celsius or under -40 Celsius.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
9Eh	Raw Data of Thermal sensor	D2h	8	[239:232]	°C

Raw Data of Thermal sensor: The raw data of thermal sensor at first error count (raw data(2 Bytes) * 4 sensors = 8 Bytes).

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
9Fh	Data Soft RAID Recovery Success	D2h	4	[243:240]	count

Data Soft RAID Recovery Success: When the SSD occurs read fail during operation, it will go into the error handling flow. Error handling flow including multiple corrective mechanisms, such as RAID ECC, soft bit retry process, and hard bit retry process. The item showed the success count of using Soft RAID ECC to recovery the data block.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
A0h	Data Soft RAID Recovery Fail	D2h	4	[247:244]	count

Data Soft RAID Recovery Fail: When the SSD occurs read fail during operation, it will go into the error handling flow. Error handling flow including multiple corrective mechanisms, such as RAID ECC, soft bit retry process, and hard bit retry process. The item showed the failed count of using Soft RAID ECC to recovery the data block.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
A1h	DDR Corrected Error Count	D2h	4	[251:248]	count

DDR Corrected Error Count: Counts that can be error-corrected by the Controller DDR.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
A2h	DDR Detected Error Count	D2h	4	[255:252]	count

DDR Detected Error Count: The error counts that can be detected by SSD Controller DDR which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
A3h	Controller cop1 SRAM Corrected Error Count	D2h	4	[259:256]	count

Controller cop1 SRAM Corrected Error Count: Counts that can be error-corrected by the Controller cop1 SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
A4h	Controller cop1 SRAM Detected Error Count	D2h	4	[263:260]	count

Controller cop1 SRAM Detected Error Count: The error counts that can be detected by SSD Controller cop1 SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
A5h	Controller NVMe SRAM Corrected Error Count	D2h	4	[267:264]	count

Controller NVMe SRAM Corrected Error Count: Counts that can be error-corrected by the Controller NVMe SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
A6h	Controller NVMe SRAM Detected Error Count	D2h	4	[271:268]	count

Controller NVMe SRAM Detected Error Count: The error counts that can be detected by SSD Controller NVMe SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
A7h	Controller PCIe MAC0 pl SRAM Corrected Error Count	D2h	4	[275:272]	count

Controller PCIe MAC0 pl SRAM Corrected Error Count: Counts that can be error-corrected by the Controller PCIe MAC0 pl SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
A8h	Controller PCIe MAC0 pl SRAM Detected Error Count	D2h	4	[279:276]	count

Controller PCIe MAC0 pl SRAM Detected Error Count: The error counts that can be detected by SSD Controller PCIe MAC0 pl SRAM which contains correctable and uncorrectable counts

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
A9h	Controller PCIe MAC0 tl SRAM Corrected Error Count	D2h	4	[283:280]	count

Controller PCIe MAC0 tl SRAM Corrected Error Count: Counts that can be error-corrected by the Controller PCIe MAC0 tl SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
AAh	Controller PCIe MAC0 tl SRAM Detected Error Count	D2h	4	[287:284]	count

Controller PCIe MAC0 tl SRAM Detected Error Count: The error counts that can be detected by SSD Controller PCIe MAC0 tl SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
ABh	Controller PCIe MAC1 pl SRAM Corrected Error Count	D2h	4	[291:288]	count

Controller PCIe MAC1 pl SRAM Corrected Error Count: Counts that can be error-corrected by the Controller PCIe MAC1 pl SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
ACh	Controller PCIe MAC1 pl SRAM Detected Error Count	D2h	4	[295:292]	count

Controller PCIe MAC1 pl SRAM Detected Error Count: The error counts that can be detected by SSD Controller PCIe MAC1 pl SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
ADh	Controller PCIe MAC1 tl SRAM Corrected Error Count	D2h	4	[299:296]	count

Controller PCIe MAC1 tl SRAM Corrected Error Count: Counts that can be error-corrected by the Controller PCIe MAC1 tl SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
A Eh	Controller PCIe MAC1 tl SRAM Detected Error Count	D2h	4	[303:300]	count

Controller PCIe MAC1 tl SRAM Detected Error Count: The error counts that can be detected by SSD Controller PCIe MAC1 tl SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
AFh	Controller Host SRAM Corrected Error Count	D2h	4	[307:304]	count

Controller Host SRAM Corrected Error Count: Counts that can be error-corrected by the Controller to Host SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
B0h	Controller Host SRAM Detected Error Count	D2h	4	[311:308]	count

Controller Host SRAM Detected Error Count: The error counts that can be detected by SSD Controller Host SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
B1h	Controller HDMA SRAM Corrected Error Count	D2h	4	[315:312]	count

Controller HDMA SRAM Corrected Error Count: Counts that can be error-corrected by the Controller HDMA SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
B2h	Controller HDMA SRAM Detected Error Count	D2h	4	[319:316]	count

Controller HDMA SRAM Detected Error Count: The error counts that can be detected by SSD Controller HDMA SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
B3h	Controller DDR0 SRAM Corrected Error Count	D2h	4	[323:320]	count

Controller DDR0 SRAM Corrected Error Count: Counts that can be error-corrected by the Controller DDR0 SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
B4h	Controller DDR0 SRAM Detected Error Count	D2h	4	[327:324]	count

Controller DDR0 SRAM Detected Error Count: The error counts that can be detected by SSD Controller DDR0 SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
B5h	Controller FIPO SRAM Corrected Error Count	D2h	4	[331:328]	count

Controller FIPO SRAM Corrected Error Count: The counts be corrective by SSD Controller FIPO SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
B6h	Controller FIP0 SRAM Detected Error Count	D2h	4	[335:332]	count

Controller FIP0 SRAM Detected Error Count: The error counts that can be detected by SSD Controller FIP0 SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
B7h	Controller FIP1 SRAM Corrected Error Count	D2h	4	[339:336]	count

Controller FIP1 SRAM Corrected Error Count: Counts that can be error-corrected by the Controller FIP1 SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
B8h	Controller FIP1 SRAM Detected Error Count	D2h	4	[343:340]	count

Controller FIP1 SRAM Detected Error Count: The error counts that can be detected by SSD Controller FIP1 SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
B9h	Controller FIP2 SRAM Corrected Error Count	D2h	4	[347:344]	count

Controller FIP2 SRAM Corrected Error Count: Counts that can be error-corrected by the Controller FIP2 SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
Bah	Controller FIP2 SRAM Detected Error Count	D2h	4	[352:348]	count

Controller FIP2 SRAM Detected Error Count: The error counts that can be detected by SSD Controller FIP2 SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
BBh	Controller FIP3 SRAM Corrected Error Count	D2h	4	[355:353]	count

Controller FIP3 SRAM Corrected Error Count: Counts that can be error-corrected by the Controller FIP3 SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
BCh	Controller FIP3 SRAM Detected Error Count	D2h	4	[359:356]	Count

Controller FIP3 SRAM Detected Error Count: The error counts that can be detected by SSD Controller FIP3 SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
BDh	Controller AEPU SRAM Corrected Error Count	D2h	4	[363:360]	count

Controller AEPU SRAM Corrected Error Count: Counts that can be error-corrected by the Controller AEPU SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
BEh	Controller AEPU SRAM Detected Error Count	D2h	4	[367:364]	count

Controller AEPU SRAM Detected Error Count: The error counts that can be detected by SSD Controller AEPU SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
BFh	Controller sys0 SRAM Corrected Error Count	D2h	4	[371:368]	count

Controller sys0 SRAM Corrected Error Count: Counts that can be error-corrected by the Controller sys0 SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
COh	Controller sys0 SRAM Detected Error Count	D2h	4	[375:372]	count

Controller sys0 SRAM Detected Error Count: The error counts that can be detected by SSD Controller sys0 SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
C1h	Controller SMBM SRAM Corrected Error Count	D2h	4	[379:376]	count

Controller SMBM SRAM Corrected Error Count: Counts that can be error-corrected by the Controller SMBM SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
C2h	Controller SMBM SRAM Detected Error Count	D2h	4	[383:380]	count

Controller SMBM SRAM Detected Error Count: The error counts that can be detected by SSD Controller SMBM SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
C3h	Controller sec SRAM Corrected Error Count	D2h	4	[387:384]	count

Controller sec SRAM Corrected Error Count: Counts that can be error-corrected by the Controller sec SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
C4h	Controller sec SRAM Detected Error Count	D2h	4	[391:388]	count

Controller sec SRAM Detected Error Count: The error counts that can be detected by SSD Controller sec SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
C5h	Controller dbuf SRAM Corrected Error Count	D2h	4	[395:392]	count

Controller dbuf SRAM Corrected Error Count: Counts that can be error-corrected by the Controller dbuf SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
C6h	Controller dbuf SRAM Detected Error Count	D2h	4	[399:396]	count

Controller dbuf SRAM Detected Error Count: The error counts that can be detected by SSD Controller dbuf SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
C7h	Controller dMAC SRAM Corrected Error Count	D2h	4	[403:400]	count

Controller dMAC SRAM Corrected Error Count: Counts that can be error-corrected by the Controller dMAC SRAM.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
C8h	Controller dMAC SRAM Detected Error Count	D2h	4	[407:404]	count

Controller dMAC SRAM Detected Error Count: The error counts that can be detected by SSD Controller dMAC SRAM which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
C9h	Corrected Error Count	D2h	4	[411:408]	count

Controller Corrected Error Count: The total counts which are corrected by SSD Controller.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
CAh	Detected Error Count	D2h	4	[415:412]	count

Controller Detected Error Count: The total error counts that can be detected by SSD Controller which contains correctable and uncorrectable counts.

ID	ATTRIBUTE_NAME	Log Identifier	# of Bytes	Byte index	
CBh	Reserved	D2h			

Reserved