

Samsung DC Toolkit 3.0

User Guide

Revision 1.0

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Revision History

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Preface

Samsung DC Toolkit is designed to help users with easy-to-use disk management and diagnostic features for server and data center usage. In addition to providing vital SSD status information, Samsung DC Toolkit will assist users in updating firmware, initializing drives, and etc.

This document is intended as a guide for how to use Samsung DC Toolkit under the server/data center environments. It provides a command line interface to interact with the Samsung SSD Drives.

This document describes how to use the Samsung DC Toolkit software.

Who should read this manual?

This manual is intended for Samsung DC Toolkit users. This manual assumes that the user is familiar with Windows operating systems.

What does this manual cover?

This manual contains the following chapters and appendix:

- Chapter 1, Preface
- Chapter 2, Abbreviations, gives the description of various abbreviations.
- Chapter 3, Introduction, describes Samsung DC Toolkit.
- Chapter 4, Command Line Options, describes the command line options for different features.
- Chapter 5, Examples, describes the features of the Samsung DC Toolkit

Cautions

1. Samsung DC Toolkit is only for Samsung SSD products and is not recommended for use with other products.
2. Samsung Electronics is not liable for any data loss or other damages that occur while using the software.
3. Samsung is not able to provide any data restoration service in the event of data loss.

For more information, please refer to Samsung DC Toolkit Agreement on End User License (EULA) at the end of this document.

Abbreviations

Mode	LED status
DCToolkit	DCToolkit_Vx.x.x commonly called DCToolkit
ATA	Advanced Technology Attachment
HDD	Hard Disk Drive
CLI	Command Line Interface
IO	Input Output
PATA	Parallel ATA
SATA	Serial ATA
SSD	Solid State Drive
S.M.A.R.T.	Self-Monitoring, Analysis, and Reporting Technology
NVMe	Non-Volatile Memory Express

Requirements and Warnings

Hardware Requirements

SSD

The following Samsung SSDs are supported

- Samsung SSD PM983a
- Samsung SSD PM9A3
- Samsung SSD PM893

Software Requirements

The tool is supported on the following environments.

OS	Comments
Windows Server 2022	Limited support for some NVMe
Ubuntu 18.04 LTS	Full support

Warning

1. When going through ERRORMOD ND update, program hangs and cannot exit.
2. The action entered during FW update in Windows OS can be changed by the device driver.

Known Issue

1. On Marvell controller, the DC Toolkit feature may not work properly after hot plugging.
2. FW update feature used on OS disk may result in undefined behavior. So, OS reboot is strongly recommended immediately after FW update to OS disk.
3. When logging temperature to specific file path, please type file path without quotation mark to get expected output.
4. Random removal of disks after the system booting or refreshing would result in malfunctions of Device List Feature(-L).

Features

This user guide describes the commands necessary to interact with Samsung SSD drives. The functionality includes:

OS	Comments
Device List	Detect list of attached Samsung SSD Drives in the system
SMART	Display smart information and log temperature of the connected Samsung SSD drive, and estimate the lifetime of Samsung SSD
Firmware Update	Update the old firmware of the SSD to the new version
FA Log	Extract the log data from a core view block of the SSD
PLP	Enables the user to extract the PLP log data from a core view block of the SSD
DSLRL	Extract DSLR data (SATA supported)
SNOR	Extract dump from SNOR as PLP dump (NVMe supported)
On-demand Dump	Extract dump at the time the user requests (NVMe supported)
Firmware Info Check	Display the firmware slot information (NVMe supported)
Disk Error Info Check	Display the Error Information (NVMe supported)
Disk Temp Check	Display the temperature of selected device (NVMe supported)
Disk Life Time Check	Display the remained life time of the selected device (%) (NVMe supported)
Help	Show detailed help

SATA Products

PM893

Feature	OS / Driver	
	Server 2022 / Inbox Driver	Linux 18.04 LTS
Device List	○	○
SMART	○	○
Firmware Update	○	○
FA Log	○	○
PLP	○	○
DSLRL	○	○

NVMe Product – Support Function per OS Version

PM983a/PM9A3

Feature	OS / Driver	
	Server 2022 / Inbox Driver	Linux 18.04 LTS
Device List	○	○
SMART	○	○
Firmware Update	○	○
FA Log	○	○
SNOR	○	○
On-demand Dump	○	○
Firmware Info Check	○	○
Disk Error Info	○	○
Disk Temp Check	○	○
Disk Life Time Check	○	○

Command Line Options

The Samsung DC Toolkit uses Command Line Interface (CLI)

The table given below briefly explains the available command line options. The detailed description of each feature is provided in the next sections of this chapter. For the purpose of illustration, the name of the tool for all examples will be “DCToolkit” to simplify documentation.

OS	Comments
-H [--help]	SATA, NVMe
-L [--list]	SATA, NVMe
-F [--firmware-update]	SATA
-S [--smart]	SATA
-V [--vendor-utility]	SATA
-NG [--nvme-get-log-page]	NVMe
-ND [--nvme-firmware-download]	NVMe
-NV [--nvme-vendor-utility]	NVMe

Description of Command Line

Option	Description	Arguments	Arguments Description
-L	Show disks Attached to the system.	N/A	N/A
-F	Used to update the firmware of the selected disk connected to HOST system.	-d [--disk]	Used to input the physical disk index listed in the --list command.
		-p [--fwpackage-path]	Path to the directory containing firmware files.
		--force [--force]	Used to bypass the user prompt.
		-s [--source]	Source firmware revision, use with option 'A'.
-S	Used to select a specific drive connected to the system and get the	-d [--disk]	Used to input the physical disk index listed in the --list command.
		-q [--query]	Displays the available LBA percentage
		-t [--temperature]	Logs the temperature of the SSD in the file path provided or if no argument is given, then temperature will be logged into file in default folder, refer to Smart temperature logging file location
-V	Used to execute Vendor Utility Commands for specified disk.	-d [--disk]	Used to input the physical disk index listed in the --list command.
		-fa [--FALog-dump]	Extract the log data from a coreview block of the SSD. This is also called CTrace Dump.
		-plp [--PLP-log]	Enables the user to extract the PLP log data from a coreview block of the SSD.
		-dslr [--DSLRL]	Extract DSLR information from the SSD.
		-p [--path]	Set the path for saving the Output file.

Option	Description	Arguments	Arguments Description
-NG	Display Log Pages on specified NVMe disk	-d [--disk]	Used to input the physical disk index listed in the --list command.
		-e [--error]	Display the Error Information.
		-s [--smart]	Display the SMART/Health information.
		-se [--smart-extended]	Extracts the extended SMART values.
		-f [--firmware]	Display the firmware slot information.
		-t [--temperature]	Display the temperature of selected device.
		-l [--lifetime]	Display the remained life time of the selected device (%)

Option	Description	Arguments	Arguments Description
-ND	Updates firmware to specified NVMe disk	-d [--disk]	Used to input the physical disk index listed in the --list command.
		-p [--path]	Firmware image path to download on specified disk.
		-a [--action]	Specifies the action that is taken on the image downloaded with the Firmware Download Feature.
		-s [--slot]	Specifies the firmware slot that shall be used for Commit Action, if applicable.
		-src [--source]	Source firmware revision, use with option 'A' (update multiple devices at ones).
		--force [--force]	Used to bypass the user prompt.
-NV	Extract the log data from a coreview block of the SSD.	-d [--disk]	Used to input the physical disk index listed in the --list command.
		-fa [--falog-dump]	Extract the log data from a coreview block of the SSD.
		-snor [--snor-log]	Extract the log data from SNOR of the SSD
		-de [--ondemand-dump]	Extract the dump from the SSD at the time the user requests
		-p [--path]	Set the path for saving the Output file.
		N/A	N/A
-H	Used to display the command line options		

How to Use DC Toolkit

Starting Samsung DC Toolkit software

Find a DCToolkit file and execute.

```
Usage: DCToolkit.exe [operation] ...

Allowed Operations:
-----
-L      [ --list                ] Shows disks attached to the system
-F      [ --firmware-update     ] Updates firmware to specified disk
-S      [ --smart               ] Shows SMART values of specified disk
-V      [ --vendor-utility      ] Execute Vendor Unique command on specified disk
-NG     [ --nvme-get-log-pages  ] Display Log Pages on specified NVMe disk
-ND     [ --nvme-firmware-download ] Updates firmware to specified NVMe disk
-NV     [ --nvme-vendor-utility ] Execute Vendor Unique command on specified NVMe disk
-H      [ --help                ] Shows detailed help
-license [ -license            ] Shows the End User License Agreement
-----
```

	Commands
Arguments	None
Used with	-L[--list], -F [--firmware-update], S [--smart], V [--vendor-utility], -NG [--nvme-get-log-pages], -ND [--nvme-firmware-download], -NV [--nvme-vendor-utility], -H[--hlep], -license[-license]
Usage	DCToolkit --list DCToolkit --disk 1 --firmware-update --path <filepath> DCToolkit --disk 1 --smart DCToolkit --disk 1 --vendor-utility DCToolkit --disk 1:c --nvme-get-log-pages DCToolkit --disk 1:c --nvme-firmware-download --path {path} --action 1 --slot 2 DCToolkit --disk 1:c --nvme-vendor-utility DCToolkit --help [or] DCToolkit -L DCToolkit -d 1 -F -p <fwpackage-path> DCToolkit -d 1 -S DCToolkit -d 1 -V DCToolkit -d 1 -NG DCToolkit -d 1:c -ND -p {path} -a 1 -s 0 DCToolkit -d 1:c -NV DCToolkit -H

-H [--help]

Display the command line options which are supported by DCToolkit application.

	Commands
Arguments	None
Used with	None
Usage	DCToolkit --help

[or] DCToolkit -H

-d [--disk]

--disk is used to input the physical disk index listed in the --list command.

※ Note: Arguments provided above are only for illustration purpose.

For SSDs directly connected to the system, the disk number should be inputted as “-d 0” and for RAID configuration “-d 2:0:1”, where

2 -Library type, 0 -Controller number, and 1 -disk number.

-L [--list]

Display a list of attached Samsung SSDs.

Commands	
Arguments	None
Used with	None
Usage	DCToolkit --list [or] DCToolkit -L

Reference Output

Disk Number	Path	Model	Serial Number	Firmware	Optionrom Version	Capacity	Drive Health	Total Bytes Written	NVMe Driver
1	\\.\PHYSICALDRIVE1	SAMSUNG MZ7L31T9HBLT-00A07	S6ESNE0NB00654	JXTC304Q	N/A	1788 GB	GOOD	0.00 TB	N/A
1:c	\\.\PHYSICALDRIVE3	SAMSUNG NVMe SSD PM9A3	DCPM9A3FP1K97101379	ERRORMOD	LNUSRG39	32 GB	N/A	N/A	Windows Inbox Driver

<List>

※Note

For normal SSDs connected directly to the system, the “Disk Number” is displayed as a single or natural number (0 or 1 or 2 etc.), but under RAID configuration, the “Disk Number” will be shown in libtype:ctrlid:diskid format(eg- 2:0:1), where 2 – Library type, 0 – Controller Number and 1 – Disk Number. Refer to 4.3 Display Disk List.

In case of NVME device, the Disk Number is displayed as dual number (0:c or 1:c or 2:c etc).

In the case of the capacity listed, the capacity is different from the capacity of model name (IDEMA rule)

-S [--smart]

Used to select a specific drive connected to the system and get the SMART Value.

For example, if --disk X is specified, where X is the physical disk index, it lists down the SMART attributes of the disk X connected to HOST system.

Also used to log temperature of the disk and estimate its life time and the percentage of the available LBA to replace.

```

-----
Usage:
  DCToolkit.exe -d [diskindex] -S [ --smart ] [parameter-list]

Example:
  DCToolkit.exe --disk 1 --smart [or] DCToolkit.exe -d 1 -S
  DCToolkit.exe --disk 1 --smart --temperature [or] DCToolkit.exe -d 1 -S -t
  DCToolkit.exe --disk 1 --smart --temperature --path [file-path] [or] DCToolkit.exe -d 1 -S -t -p [file-path]
  DCToolkit.exe --disk 1 --smart --query [or] DCToolkit.exe -d 1 -S -q

  DCToolkit.exe --disk 1 --smart --execute [sub-option] [or] DCToolkit.exe -d 1 -S -e [sub-option]
  [sub-option] for --execute are --[offline/captive | short/extended/selective]
  [sub-option] --abort and --checkstatus

Sub Options:
  -d [ --disk      ] Disk-Number of the disk to show S M A R T values of
  -t [ --temperature ] Enables the user to log the temperature of the disk
  -q [ --query     ] Display the percentage of the available LBA to replace
  -e [ --execute   ] Execute SMART Self-Test on the specified disk.
-----

```

	Commands
Arguments	-t [--temperature] Enables the user to log the temperature of the disk. -q [--query] Displays the percentage of the available LBA to replace. subcommands.
Used with	--disk [or] -d
Usage	DCToolkit --disk 1 --smart DCToolkit --disk 1 --smart --temperature : Use default folder location DCToolkit --disk 1 --smart --temperature /home/ : Use /home/ folder location DCToolkit --disk 1 --smart --query [or] DCToolkit -d 1 -S DCToolkit -d 1 -S -t : Uses default folder location DCToolkit -d 1 -S -t /home/ : Uses /home/ folder location DCToolkit -d 1 -S -q

Note:

- Default folder location is %appdata%DCToolkit/SMARTFiles/. Temperature will be logged into a file "Log_Temperature.txt" in default location if no valid file path is provided.

Reference Output

```

-----
Disk Number: 1 | Model Name: SAMSUNG MZ7L31T9HBLT-00A07_S6ESNE0NB00654 | Firmware Version: JXTC304Q
-----
| ID | Description | Raw | Raw(hex) | Normalized | Worst | Threshold | Status |
-----
| 5 | Reallocated Sector Count | 0 | 0x0 | 100 | 100 | 10 | OK |
| 9 | Power-on Hours | 24 | 0x18 | 99 | 99 | 0 | OK |
| 12 | Power-on Count | 4 | 0x4 | 99 | 99 | 0 | OK |
| 177 | Wear Leveling Count | 848 | 0x350 | 88 | 88 | 5 | OK |
| 179 | Used Reserved Block Count (total) | 0 | 0x0 | 100 | 100 | 10 | OK |
| 180 | Unused Reserved Block Count (total) | 1543 | 0x607 | 100 | 100 | 10 | OK |
| 181 | Program Fail Count (total) | 0 | 0x0 | 100 | 100 | 10 | OK |
| 182 | Erase Fail Count (total) | 0 | 0x0 | 100 | 100 | 10 | OK |
| 183 | Runtime Bad Count (total) | 0 | 0x0 | 100 | 100 | 10 | OK |
| 184 | E2E Error Detection | 0 | 0x0 | 100 | 100 | 97 | OK |
| 187 | Uncorrectable Error Count | 0 | 0x0 | 100 | 100 | 0 | OK |
| 190 | Airflow Temperature | 37 | 0x25 | 63 | 61 | 0 | OK |
| 194 | HDD Temperature | 171800395813 | 0x28001a0025 | 63 | 60 | 0 | OK |
| 195 | ECC Error Rate | 0 | 0x0 | 200 | 200 | 0 | OK |
| 197 | Current Pending Sector Count | 0 | 0x0 | 100 | 100 | 0 | OK |
| 199 | CRC Error Count | 0 | 0x0 | 100 | 100 | 0 | OK |
| 202 | SSD Mode Status | 0 | 0x0 | 100 | 100 | 10 | OK |
| 235 | POR Recovery Count | 0 | 0x0 | 100 | 100 | 0 | OK |
| 241 | Total LBAs Written | 0 | 0x0 | 100 | 100 | 0 | OK |
| 242 | Total LBAs Read | 111686 | 0x1b446 | 99 | 99 | 0 | OK |
| 243 | SATA Interface Downshifts (total) | 0 | 0x0 | 100 | 100 | 0 | OK |
| 244 | Thermal Throttle Status | 0 | 0x0 | 100 | 100 | 0 | OK |
| 245 | Timed Workload Media Wear | 65535 | 0xffff | 100 | 100 | 0 | OK |
| 246 | Timed Workload Host Read/Write Ratio | 65535 | 0xffff | 100 | 100 | 0 | OK |
| 247 | Timed Workload Timer | 65535 | 0xffff | 100 | 100 | 0 | OK |
| 251 | NAND Writes | 0 | 0x0 | 100 | 100 | 0 | OK |
-----
WAI(Wear Acceleration Index): Calculation Failed because TBW is 0.
-----
[SUCCESS] Smart feature completed successfully.
-----

```

<simple SMART value >

-F [--firmware-update]

Update the firmware of the selected Samsung SSD connected to the Host system.

If --force is not used, then the user will be prompted whether or not to continue the command.

When using A(updating multiple devices), primary device is exclusive because of stability.

```
-----
Usage:
  DCToolkit.exe -d [diskindex] -F [ --firmware-update ] [parameter-list]

Example:
  DCToolkit.exe --disk 1 --firmware-update --fwpackage-path /path/dsrdenc
  [or] DCToolkit.exe -d 1 -F -p /path/dsrdenc
  DCToolkit.exe --disk 1 --firmware-update --fwpackage-path /path/dsrdenc
  [or] DCToolkit.exe -d 1 -F -p /path/dsrdenc
  DCToolkit.exe --disk 1 --firmware-update --fwpackage-path /path/dsrdenc
  [or] DCToolkit.exe -d 1 -F -p /path/dsrdenc
  DCToolkit.exe --disk 1 --firmware-update --fwpackage-path /path/dsrdenc --force
  [or] DCToolkit.exe -d 1 -F -p /path/dsrdenc --force
  DCToolkit.exe --disk A --firmware-update --fwpackage-path /path/dsrdenc --source "ABCD1234" (--force)
  [or] DCToolkit.exe -d A -F -p /path/dsrdenc -s "ABCD1234" (--force)

Sub Options:
  -d [ --disk          ] Disk-Number of the disk or A to select all supported disks to update firmware on.
  -p [ --fwpackage-path ] Path to the FW binary file.
  --force [ --force    ] Enables the user to perform Firmware Download without prompting for any confirmations.
  -s [ --source        ] source firmware revision, use with option 'A'(update multiple devices at ones).
  A [ A               ] updating all SATA devices(except primary device) to specific target firmware, use character 'A' instead of disk number.
-----
```

	Commands
Arguments	<fwpackage-path> [This argument provides the path to the directory containing firmware files and it should be given just after the switch]
Used with	--disk [or] -d
Usage	DCToolkit --disk 1 --firmware-update --fwpackage-path < fwpackage-path > (--force) DCToolkit --disk A --firmware-update --fwpackage-path < fwpackage-path > --source abcd1234 (--force) [or] DCToolkit -d 1 -F -p < fwpackage-path > (--force) DCToolkit -d A -F -p < fwpackage-path > -s abcd1234 (--force) (adcd1234 means FW revision)

Reference Output

```
-----
Disk Number: 1 | Model Name: SAMSUNG MZ7L31T9HBLT-00A07 | Firmware Version: JXTC304Q
-----
[[ WARNING ]]

Please Note that Firmware Update may format the disk and you will lose your data.
Please Ensure that data backup is taken before proceeding to Firmware Update.
If you are sure then only proceed, otherwise restart the application after taking a backup.
Continue Firmware Update ? [ yes ]: yes
-----
[F/W Update] Disk is Updated with the New Firmware.
-----
[F/W Update] Success
-----
```

<FW update>

-V [--vendor-utility]

Used to execute Vendor Utility Commands

Output file will be saved under the path %appdata%DCToolkit\VendorUtility\ by default if no other path is specified.

```
-----
Usage:
  DCToolkit.exe -d [diskindex] -V [ --vendor-utility ] [parameter-list]

Example:
  DCToolkit.exe --disk 1 --vendor-utility --FALog-dump [or] DCToolkit.exe -d 1 -V -fa
  DCToolkit.exe --disk 1 --vendor-utility --FALog-dump --path c:\ [or] DCToolkit.exe -d 1 -V -fa -p c:\
  DCToolkit.exe --disk 1 --vendor-utility --PLP-log [or] DCToolkit.exe -d 1 -V -plp
  DCToolkit.exe --disk 1 --vendor-utility --PLP-log --path c:\ [or] DCToolkit.exe -d 1 -V -plp -p c:\
  DCToolkit.exe --disk 1 --vendor-utility --DSLr [or] DCToolkit.exe -d 1 -V -dslr
  DCToolkit.exe --disk 1 --vendor-utility --DSLr --path c:\ [or] DCToolkit.exe -d 1 -V -dslr -p c:\

Sub Options:
  -d [ --disk          ] Disk-Number of the disk to execute Vendor Utility command.
  -fa [ --FALog-dump ] Extract the log data from a coreview block of the SSD.
  -plp [ --PLP-log    ] Enables the user to extract the PLP log data from a coreview block of the SSD.
  -dslr [ --DSLr      ] Extracts DSLR from the SSD.
  -p [ --path         ] Output path to make output file
-----
```

	Commands
Arguments	-fa [--FALog-dump] Enables the user to extract the log data from a coreview block of the SSD -plp [--PLP-log] Enables the user to extract the PLP log data from a coreview block of the SSD.(Maximum size: 780MB) -dslr [--DSLr] Extract DSLR data from the SSD -p [--path] Set the path for saving the Log data
Used with	--disk [or] -d
Usage	DCToolkit --disk 1 --vendor-utility --FALog-dump (--path ./) DCToolkit --disk 1 --vendor-utility --PLP-log (--path ./) DCToolkit --disk 1 --vendor-utility --DSLr (--path ./) [or] DCToolkit -d 1 -V -fa (-p ./) DCToolkit -d 1 -V -plp (-p ./) DCToolkit -d 1 -V -dslr (-p ./)

Reference Output

```
-----
Disk Number: 1 | Model Name: SAMSUNG MZ7L31T9HBLT-00A07 | Firmware Version: JXTC404Q
-----
FA data output: C:\Users\TestPC04\AppData\Roaming\DCToolkit\VendorUtility\20231006_16h54m57s_JXTC404Q_S6ESNE0NB00654_FADump.zip
-----
```

<Get FA Log>

```
-----
Disk Number: 1 | Model Name: SAMSUNG MZ7L31T9HBLT-00A07 | Firmware Version: JXTC404Q
-----
(66048/66048)
FA data output: C:\Users\TestPC04\AppData\Roaming\DCToolkit\VendorUtility\20231006_20h54m23s_JXTC404Q_S6ESNE0NB00654_PLPDump.zip
-----
```

<Get PLP Dump>

```
-----
Disk Number: 1 | Model Name: SAMSUNG MZ7L31T9HBLT-00A07 | Firmware Version: JXTC404Q
-----
Retrieving UDATA [15] of 15
DSLRL data output: C:\Users\TestPC04\AppData\Roaming\DCToolkit\VendorUtility\20231006_20h21m36s_JXTC404Q_S6ESNE0NB00654_DSLR.txt
-----
```

<Get DSLR Dump>

-NG [--nvme-get-log-pages]

Display Log Pages on specified NVMe disk

```
-----
Usage:
  DCToolkit.exe -d [diskindex] -NG [ --nvme-get-log-pages ] [parameter-list]

Example:
  DCToolkit.exe --disk 0:c --nvme-get-log-pages --error {count}
  DCToolkit.exe --disk 0:c --nvme-get-log-pages --smart
  DCToolkit.exe --disk 0:c --nvme-get-log-pages --smart-extended
  DCToolkit.exe --disk 0:c --nvme-get-log-pages --firmware
  DCToolkit.exe --disk 0:c --nvme-get-log-pages --temperature
  DCToolkit.exe --disk 0:c --nvme-get-log-pages --lifetime
  [or]
  DCToolkit.exe -d 0:c -NG -e {count}
  DCToolkit.exe -d 0:c -NG -s
  DCToolkit.exe -d 0:c -NG -se
  DCToolkit.exe -d 0:c -NG -f
  DCToolkit.exe -d 0:c -NG -t
  DCToolkit.exe -d 0:c -NG -l

Sub Options:
  -d [ --disk          ] Disk-Number of the disk to get log pages.
  -e [ --error        ] Display the Error Information.
  -s [ --smart        ] Display the SMART/Health information.
  -se [ --smart-extended ] Extracts the extended SMART values.
  -f [ --firmware     ] Display the firmware slot information.
  -t [ --temperature  ] Display the temperature of selected device.
  -l [ --lifetime     ] Display the remained life time of the selected device (%).
-----
```


	Commands
Arguments	-e [--error] Display the Error Information. -s [--smart] Display the SMART/Health information. -se[--smart-extended] Extract the extended SMART values. -f [--firmware] Display the firmware slot information. -t [--temperature] Display the temperature of selected device. -l [--lifetime] Display the remained life time of the selected device (%).
Used with	--disk [or] -d
Usage	DCToolkit --disk 1:c --nvme-get-log-pages --error {count} DCToolkit --disk 1:c --nvme-get-log-pages --smart DCToolkit --disk 1:c --nvme-get-log-pages --smart-extended DCToolkit --disk 1:c --nvme-get-log-pages --firmware DCToolkit --disk 1:c --nvme-get-log-pages --temperature DCToolkit --disk 1:c --nvme-get-log-pages --lifetime [or] DCToolkit -d 1:c -NG -e {count} DCToolkit -d 1:c -NG -s DCToolkit -d 1:c -NG -se DCToolkit -d 1:c -NG -f DCToolkit -d 1:c -NG -t DCToolkit -d 1:c -NG -l

Reference Output

```

-----
Disk Number: 1:c | Model Name: SAMSUNG NVMe SSD PM9A3 | Firmware Version: GDC7502Q
-----
| Index | Bytes | Description | Value |
-----
| 0 | 7:0 | Error Count | 0x0000000000000000 |
| | 9:8 | Submission Queue ID | 0x0000 |
| | 11:10 | Command ID | 0x0000 |
| | 13:12 | Status Field | 0x0000 |
| | 15:14 | Parameter Error Location | 0x0000 |
| | 23:16 | LBA | 0x0000000000000000 |
| | 27:24 | Namespace | 0x00000000 |
| | 28 | VendorSpecific Information Available | 0x00 |
| | 39:32 | Command Specific Information | 0x0000000000000000 |
-----
[Success] Get Log Page Feature completed successfully
-----

```

<Get error info>


```

-----
Disk Number: 1:c | Model Name: SAMSUNG NVMe SSD PM9A3 | Firmware Version: ERRORMOD
-----
| Bytes | Description | Value |
-----
| 0 | Critical Warning | 0x04 |
| 2:1 | Composite Temperature | 0x0130 |
| 3 | Available Spare | 0x64 |
| 4 | Available Spare Threshold | 0x0A |
| 5 | Percentage Used | 0x00 |
| 47:32 | Data Units Read | 0x00000000000000000000000000000001B |
| 63:48 | Data Units Written | 0x00000000000000000000000000000084 |
| 79:64 | Host Read Commands | 0x000000000000000000000000000000ED5 |
| 95:80 | Host Write Commands | 0x000000000000000000000000000000202 |
| 111:96 | Controller Busy Time | 0x00000000000000000000000000000000A |
| 127:112 | Power Cycle | 0x00000000000000000000000000000002D |
| 143:128 | Power On Hours | 0x000000000000000000000000000000016 |
| 159:144 | Unsafe Shutdowns | 0x00000000000000000000000000000001F |
| 175:160 | Media and Data Integrity Errors | 0x000000000000000000000000000000002 |
| 191:176 | Number of Error Information Log Entries | 0x000000000000000000000000000000002 |
| 195:192 | Warning Composite Temperature Time | 0x00000000 |
| 199:196 | Critical Composite Temperature Time | 0x00000000 |
| 201:200 | Temperature Sensor 1 | 0x0130 |
| 203:202 | Temperature Sensor 2 | 0x014B |
| 205:204 | Temperature Sensor 3 | 0x0000 |
| 207:206 | Temperature Sensor 4 | 0x0000 |
| 209:208 | Temperature Sensor 5 | 0x0000 |
| 211:210 | Temperature Sensor 6 | 0x0000 |
| 213:212 | Temperature Sensor 7 | 0x0000 |
| 215:214 | Temperature Sensor 8 | 0x0000 |
-----

[Success] Get Log Page Feature completed successfully
-----

```

<Get NVMe SMART data>

```

-----
Disk Number: 1:c | Model Name: SAMSUNG NVMe SSD PM9A3 | Firmware Version: GDC7502Q
-----
| Bytes | Description | Value |
-----
| 2:0 | Life time Program Fail Cnt (Attribute ID) | 0x0000AB |
| 4:3 | Life time Program Fail Cnt (Normalized Value) | 0x0064 |
| 11:5 | Life time Program Fail Cnt (Current Raw Value) | 0x0000000000000000 |
| 14:12 | Life time Erase Fail Cnt (Attribute ID) | 0x0000AC |
| 16:15 | Life time Erase Fail Cnt (Normalized Value) | 0x0064 |
| 23:17 | Life time Erase Fail Cnt (Current Raw Value) | 0x0000000000000000 |
| 26:24 | Life time Wearlevel Cnt (Attribute ID) | 0x0000AD |
| 28:27 | Life time Wearlevel Cnt (Normalized Value) | 0x0063 |
| 35:29 | Life time Wearlevel Cnt (Current Raw Value) | 0x0000800090008 |
| 38:36 | Life time E2E Error Cnt (Attribute ID) | 0x0000B8 |
| 40:39 | Life time E2E Error Cnt(Normalized Value) | 0x0064 |
| 47:41 | Life time E2E Error Cnt(Current Raw Value) | 0x0000000000000000 |
| 50:48 | nLifetimeCRCErrCnt (Attribute ID) | 0x0000C7 |
| 52:51 | nLifetimeCRCErrCnt (Normalized Value) | 0x0064 |
| 59:53 | nLifetimeCRCErrCnt(Current Raw Value) | 0x0000000000000000 |
| 62:60 | nMediaWearPctg(Attribute ID) | 0x0000E2 |
| 64:63 | nMediaWearPctg(Normalized Value) | 0x0064 |
| 71:65 | nMediaWearPctg(Current Raw Value) | 0x0000000000000000 |
| 74:72 | nHostReadPctg(Attribute ID) | 0x0000E3 |
| 76:75 | nHostReadPctg(Normalized Value) | 0x0064 |
-----

```

<Get Extended SMART data>

```
1:c | SAMSUNG NVMe SSD PM9A3 | GDC7502Q
-----
Kelvin degree : 317 K
Celsius degree: 44 C
-----
[Success] Get Log Page Feature completed successfully
-----
```

<Get temperature>

```
Current activated firmware: slot(#1, GDC7502Q)
Next to be applied firmware: EMPTY

Firmware Slot Information:

Slot #1: GDC7502Q
Slot #2: EMPTY
Slot #3: EMPTY
Slot #4: EMPTY
Slot #5: EMPTY
Slot #6: EMPTY
Slot #7: EMPTY
Slot #8: EMPTY
-----
[Success] Get Log Page Feature completed successfully
-----
```

<Get Firmware Info>

```
Estimated Life Time: 99 %
-----
[Success] Get Log Page Feature completed successfully
-----
```

<Get life time>

-ND [--nvme-firmware-download]

Updates firmware to specified NVMe disk. Some FW revision is activated immediately without reset. Because of this, result of action option 1(need reset) may defer to FW revision.

When using A(updating multiple devices), primary device can be exclusive because of stability.

```

-----
Usage:
  DCToolkit.exe -d [diskindex] -ND [ --nvme-firmware-download ] [parameter-list]

Example:
  DCToolkit.exe --disk 0:c --nvme-firmware-download --path {path} --action 1 --slot 2
  DCToolkit.exe --disk A --nvme-firmware-download --path {path} --action 1 --slot 2 --source "ABCD1234" (--force)
  [or]
  DCToolkit.exe -d 0:c -ND -p {path} -a 1 -s 2
  DCToolkit.exe -d A -ND -p {path} -a 1 -s 2 -src "ABCD1234" (--force)

Action:
  0: Downloaded image replace the image specified by the Firmware Slot
  This image is not activated

  1: Downloaded image replaces the image specified by the Firmware Slot.
  This image is activated at the next reset

Sub Options:
  -d [ --disk      ] Disk-Number of the disk to download the firmware image
  -p [ --path      ] Firmware image path to download on specified disk
  -a [ --action    ] Specifies the action that is taken on the image downloaded
                    with the Firmware Download Feature
  -s [ --slot      ] Specifies the firmware slot that shall be used for Commit Action,
                    if applicable
  -src [ --source  ] source firmware revision, use with option 'A'(update multiple devices at
                    ones).
  A [ A           ] updating all NVMe devices(except primary device) to specific target firmw
                    are, use character 'A' instead of disk number.
  --force [ --force ] Enable the user to download firmware image without prompting for any conf
                    irmations
-----

```

	Commands
Arguments	<p>-p [--path] Firmware image path to download on specified disk</p> <p>-a [--action] Specifies the action that is taken on the image downloaded with the Firmware Download Feature</p> <p>-s [--slot] Specifies the firmware slot that shall be used for Commit Action, if applicable</p> <p>-scr [--source] Used to download specific firmware to specific devices among all the connected devices, it is used along with 'A' option</p> <p>A [A] Access to all the connected NVMe devices without using specific device number</p> <p>Action: 0: Downloaded image replace the image specified by the Firmware Slot This image is not activated 1: Downloaded image replaces the image specified by the Firmware Slot. This image is activated at the next reset</p>
Used with	--disk [or] -d
Usage	<p>DCToolkit --disk 1 --nvme-firmware-download --path {path} --action 1 --slot 2 (--force)</p> <p>DCToolkit --disk A --nvme-firmware-download --path {path} --action 1 --slot 2 --source "abcd1234" (--force)</p> <p>[or]</p> <p>DCToolkit -d 1:c -ND -p {path} -a 1 -s 2 (--force)</p> <p>DCToolkit -d A -ND -p {path} -a 1 -s 2 -src "abcd1234" (--force)</p> <p>abcd1234 means FW revision</p> <p>DCToolkit -d 1:c -NM -sl 900000000</p>

Detail Sub Option

a0	download fw at slot	FW IMAGE DOWNLOAD COMMAND + FW COMMIT (Commit Action 000b)COMMAND	v1.1 SPEC
a1	download fw and activation after reset at slot	FW IMAGE DOWNLOAD COMMAND + FW COMMIT (Commit Action 001b)COMMAND	v1.1 SPEC

Reference Output

<NVMe FW Update>

```

-----
Disk Number: 1:c | Model Name: SAMSUNG NVMe SSD PM9A3 | Firmware Version: ERRORMOD
-----
[[ WARNING ]]

Please Note that Firmware Update may format the disk and you will lose your data
Please Ensure that data backup is taken before proceeding to Firmware Update
If you are sure then only proceed, otherwise restart the application after taking a backup
Continue Firmware image download ? [ yes ]: yes
-----
[SUCCESS] Downloaded firmware image successfully
-----

```

-NV [--nvme-vendor-utility]

This function does not support at Windows Inbox driver. Execute Vendor Unique command on specified NVMe disk. Output file will be saved under the path %appdata%DCToolkit\VendorUtility\ by default if no other path is specified.

```

Usage:
  DCToolkit.exe -d [diskindex] -NV [ --nvme-vendor-utility ] [parameter-list]

Example:
  DCToolkit.exe --disk 0:c --nvme-vendor-utility --falog-dump [or]
  DCToolkit.exe -d 0:c -NV -fa
  DCToolkit.exe --disk 0:c --nvme-vendor-utility --falog-dump --path c:\ [or]
  DCToolkit.exe -d 0:c -NV -fa -p c:\
  DCToolkit.exe --disk 0:c --nvme-vendor-utility --ondemand-dump [or]
  DCToolkit.exe -d 0:c -NV -de
  DCToolkit.exe --disk 0:c --nvme-vendor-utility --ondemand-dump --path c:\ [or]
  DCToolkit.exe -d 0:c -NV -de -p c:\
  DCToolkit.exe --disk 0:c --nvme-vendor-utility --snor-log [or] DCToolkit.exe -d 0:c -NV -snor
  DCToolkit.exe --disk 0:c --nvme-vendor-utility --snor-log --path c:\ [or]
  DCToolkit.exe -d 0:c -NV -snor -p c:\

Sub Options:
  -d [ --disk          ] Disk-Number of the disk to execute VU feature.
  -fa [ --falog-dump  ] Extract the log data from a coreview block of the SSD.
  -de [ --ondemand-dump ] Extract the Ondemand Dump from the SSD.
  -snor [ --snor-log   ] Extract the SNOR Log from the SSD.
  -p [ --path         ] Output path to make output file

```

	Commands
Arguments	-fa [--falog-dump] Extract the log data from a core view block of the SSD. -snor [--snor-log] Extract the log data from SNOR of the SSD -de [--ondemand-dump] Extract the dump from the SSD at the time the user requests -p [--path] Set the path for saving the Log data
Used with	--disk [or] -d
Usage	DCToolkit --disk 1:c --nvme-vendor-utility --falog-dump (--path C:\) DCToolkit --disk 1:c --nvme-vendor-utility --snor-log (--path C:\) DCToolkit --disk 1:c --nvme-vendor-utility --ondemand-dump (--path C:\) [or] DCToolkit -d 1:c -NV -fa (-p C:\) DCToolkit -d 1:c -NV -snor (-p C:\) DCToolkit -d 1:c -NV -de (-p C:\)

Reference Output

```

-----
Disk Number: 1:c | Model Name: SAMSUNG NVMe SSD PM9A3 | Firmware Version: ERRORMOD
-----
FA data output: C:\Users\TestPC04\AppData\Roaming\DCToolkit\VendorUtility\20231010_19h49m40s_ERRORMOD_DCPM9A3FP1K97101379_CrashDump.zip
-----

```

<Get FA Log>

```

-----
Disk Number: 1:c | Model Name: SAMSUNG NVMe SSD PM9A3 | Firmware Version: GDC7502Q
-----
Data output: C:\Users\TestPC04\AppData\Roaming\DCToolkit\VendorUtility\20231010_20h02m49s_GDC7502Q_DCPM9A3FP1K97101379_SNORDump_4KB.zip
Data output: C:\Users\TestPC04\AppData\Roaming\DCToolkit\VendorUtility\20231010_20h02m50s_GDC7502Q_DCPM9A3FP1K97101379_SNORDump_Full.zip
-----

```

<Get SNOR Dump>


```
-----
Disk Number: 1:c | Model Name: SAMSUNG NVMe SSD PM9A3 | Firmware Version: GDC7502Q
-----
Data output: C:\Users\TestPC04\AppData\Roaming\DCToolkit\VendorUtility\20231010_20h02m00s_GDC7502Q_DCPM9A3FP1K97101379_OnDemand_Dump.zip
-----
```

<Get Ondemand Dump>

Display Tool Help

The help table can be displayed using the --help command line option:

```
DCToolkit --help
or
DCToolkit -H
```

Display Disk List

The -L or --list option will display a list of Samsung SSDs which shows the Model Name, Firmware version, Capacity, Disk Health, TBW etc.

```
DCToolkit --list
or
DCToolkit -L
```

SMART Information of the Disks

This feature is used to select a specific disk connected to the system and get the SMART value of the disk. This feature will also log the temperature of the SSD and display the estimated life time of the SSD and the percentage of the available LBA to replace.

The below Command Line option will perform the SMART operation:

```
DCToolkit --disk 1 --smart
DCToolkit --disk 1 --smart --temperature (use default location)
DCToolkit --disk 1 --smart --temperature /home/ (store the file in /home/)
DCToolkit --disk 1 --smart --query

DCToolkit --disk 1:c --nvme-get-log-pages --error {count}
DCToolkit --disk 1:c --nvme-get-log-pages --smart
DCToolkit --disk 1:c --nvme-get-log-pages --smart-extended
DCToolkit --disk 1:c --nvme-get-log-pages --firmware
DCToolkit --disk 1:c --nvme-get-log-pages --temperature
DCToolkit --disk 1:c --nvme-get-log-pages --lifetime
or
DCToolkit -d 1 -S
DCToolkit -d 1 -S -t (use default location)
DCToolkit -d 1 -S -t /home/ (store the file in /home/)
DCToolkit -d 1 -S -q
DCToolkit -d 1:c -NG -e {count}
DCToolkit -d 1:c -NG -s
DCToolkit -d 1:c -NG -se
DCToolkit -d 1:c -NG -f
DCToolkit -d 1:c -NG -t
DCToolkit -d 1:c -NG -l
```

Note: If no file path is provided to -t command, temperature is logged in the file located at %appdata%DCToolkit/SMARTFiles/. Filename would be Log_Temperature.txt.

The default locations for Smart temperature logging files are:

Firmware Update

This feature is useful for changing SSD's firmware from old version to new version.

The below given CLI input will perform the firmware update operation on the selected disk:

```
DCToolkit --disk 1 --firmware-update --path <fw-path>
DCToolkit --disk 1:c --nvme-firmware-download --path <fw-path> --action 1 --slot 2
DCToolkit --disk A --firmware-update --path <fw-path> --source <target FW>
or
DCToolkit -d 1 -F -p <fw-path>
DCToolkit -d 1:c -ND -p <fw-path> -a 1 -s 2
DCToolkit -d A -F -p <fw-path> -s <target FW>
```

Vendor Utility

This feature will perform Vendor Utility features such as:

Get the FA-log-dump data

```
DCToolkit --disk 1 --vendor-utility --FALog-dump (--path [output path])
DCToolkit --disk 1:c --nvme-vendor-utility --FALog-dump (--path [output path])
DCToolkit --disk 1 --vendor-utility --PLP-log (--path [output path])
DCToolkit --disk 1:c --nvme-vendor-utility --PLP-log (--path [output path])
DCToolkit --disk 1 --vendor-utility --DSLRL (--path [output path])
DCToolkit --disk 1:c --nvme-vendor-utility --snor-log (--path [output path])
DCToolkit --disk 1:c --nvme-vendor-utility --ondemand-dump (--path [output path])
[or]
DCToolkit -d 1 -V -fa (-p [output path])
DCToolkit -d 1:c -NV -fa (-p [output path])
DCToolkit -d 1 -V -plp (-p [output path])
DCToolkit -d 1:c -NV -plp (-p [output path])
DCToolkit -d 1 -V -dslr (-p [output path])
DCToolkit -d 1:c -NV -snor (-p [output path])
DCToolkit -d 1:c -NV -de (-p [output path])
```

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