

swissbit®

SBDM – Swissbit Device Manager Tool

Users Guide

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1 Overview

SBDM (Swissbit Device Manager) for Windows is a utility program that reads status information from Swissbit products. It uses S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) and USB vendor specific commands to gather lifetime information.

It allows reading a number of device information and statistics:

- General device information, e.g. ATA model ID, serial number, firmware version
- Spare Blocks statistics (including number at time of production and current)
- Usage statistics (NAND Flash erase cycles)
- Various ECC / CRC counters
- History of all values is recorded per device

1.1 Supported product lines

The software supports Swissbit devices of the product lines:

CompactFlash:	C-300, C-310, C-320 (SMART capable only, -SMA ending), C-350, C-440, C-5*
SSD SATA:	X-100, X-110, X-200, X-500, X-6*, X-7*, X-86m2
CFast:	F-100, F-200, F-5x, F-60, F-600, F-8*
USB:	U-100, U-110, unitedCONTRAST I & II, miniTWIST II (support for basic information only), U-4*, U-5*
SD:	S-2* (support for Linux native SD interface only), S-4*, S-5*, S-6*
eMMC:	EM-2*, EM-3* (eMMC support for Linux native MMC interface only)
NVMe:	N-1*m2, EN-2*, N-2*m2, G-2*, N-3*m2

2 Deployment and Requirements

2.1 Windows

The executables can be run on any supported system without prior installation.

SBDM for Windows ships with the following executable files:

- SBDM.exe graphical user interface

The device database holding the history of each device is generated in the working directory:

- SBDM.db device database

There are some requirements and technical limitations for the use of the software:

- Administrator rights are necessary.
- Windows 7 or higher is needed.
- The device must be connected to a native interface (e.g. IDE / SATA, USB, SD or NVMe). Please check chapter Connecting a device indirectly (via bridge chip4.1 for additionally supported bridge chips).

2.2 Linux

The SBDM can be run on any supported system without prior installation.

SBDM for Linux ships with the following executable files:

- SBDM-armhf.ApplImage Graphical User Interface for armhf (armv7 32bit) ARM architectures
- SBDM-aarch64.ApplImage Graphical User Interface for aarch64 (armv8 64bit) ARM architectures
- SBDM-i386.ApplImage Graphical User Interface for 32bit architectures
- SBDM-x86_64.ApplImage Graphical User Interface for 64bit architectures

The device database holding the history of each device is generated in the working directory if it does not exist yet:

- SBDM.db device database

There are some requirements and technical limitations for the use of the software:

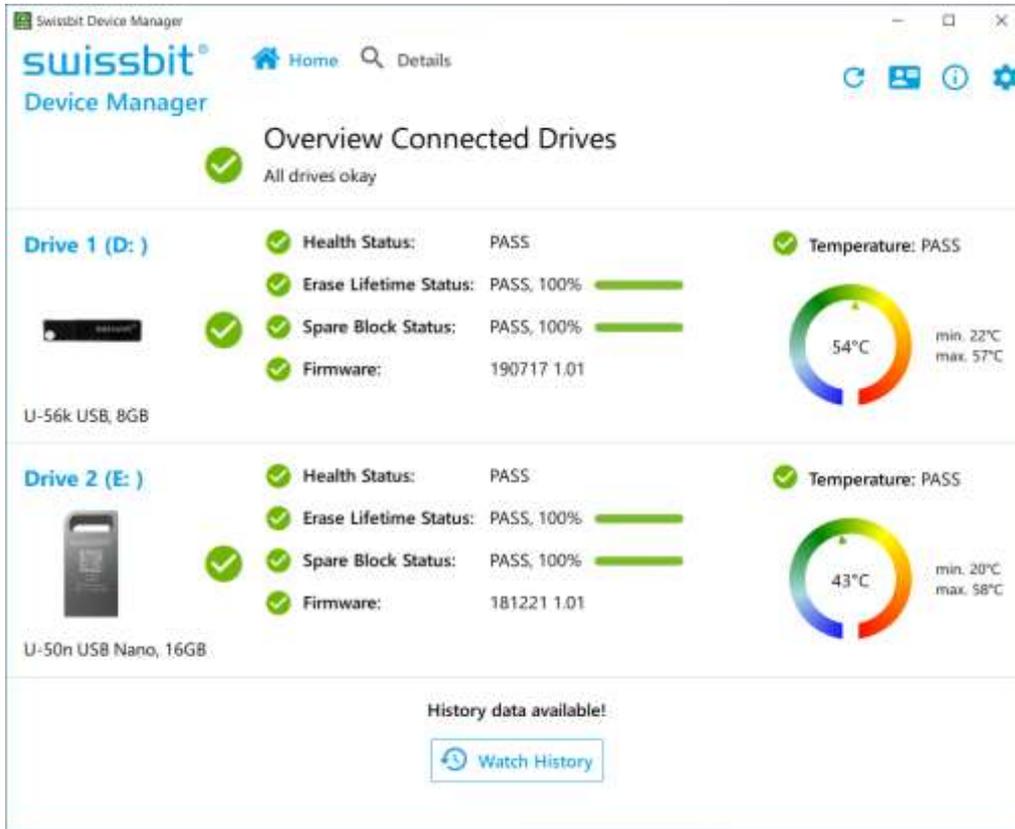
- Root rights are necessary
- Supported platforms currently are
 - o x86-32 (x86, 32-bit architecture)
 - o x86-64 (amd64, 64-bit architecture)
 - o armv7 architecture
 - o armv8 architecture
- Linux Kernel 2.4 or newer is needed
- GUI tool:
 - o Glibc 2.3 or newer
 - o Xcb and X11 libraries
- The device must be connected to a native interface (e.g. IDE / SATA, USB, SD or NVMe). Please check chapter Connecting a device indirectly (via bridge chip4.1 for additionally supported bridge chips).

3 Usage of graphical user interface

3.1 Launching SBDM

3.1.1 Windows

To start the application, launch SBDM.exe. The main screen will display all devices found in the system with the current status:



The drives are listed with the Windows internal drive number.

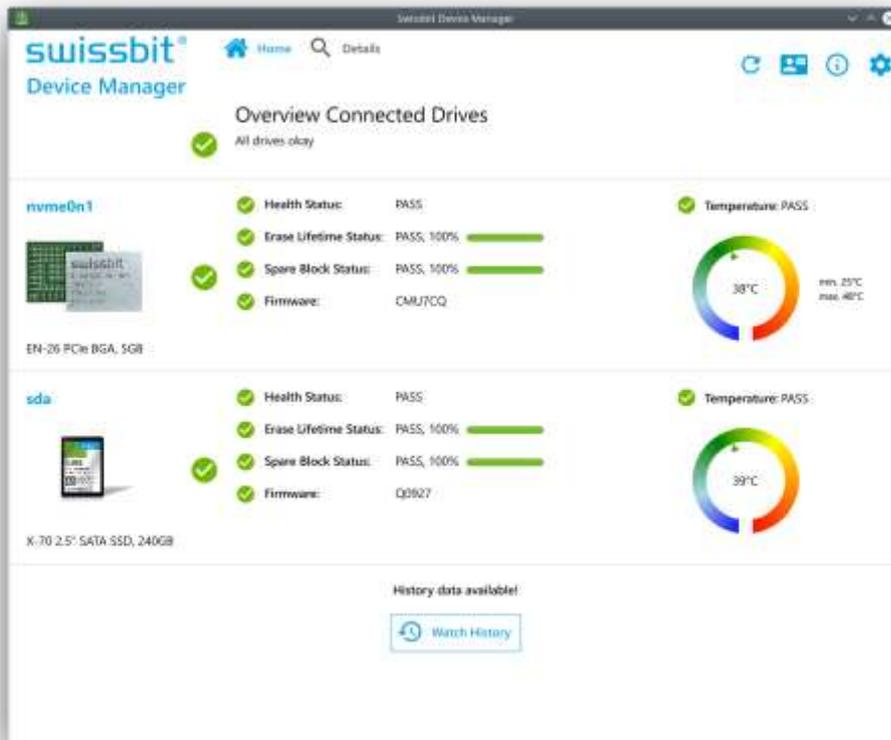
3.1.2 Linux

The Linux application is provided as AppImage package that already includes all required libraries. Please visit <https://appimage.org/> for more details.

To start the application:

1. Make executable with: `“chmod a+x SBDM-<arch>.AppImage”`
2. Start as root or with sudo: `“sudo ./SBDM-<arch>.AppImage”`

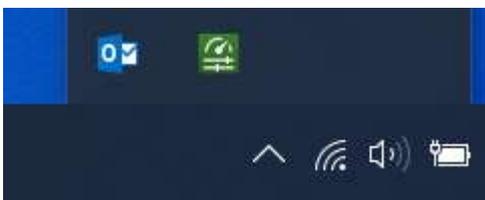
The main screen will display all devices found in the system with the current status:



3.2 System tray

3.2.1 Windows

The SBDM tool can be running in the background, showing in the system tray only.



Even when running in the background, it periodically checks the drives in the system and records history data.

To hide the Tool, just use the minimize buttons of Windows, or the “Hide” button. To open the tool up again, left click on the system tray icon.

3.2.2 Linux

The SBDM tool can be running in the background, showing in the system notification tray only (where the window manager provides a system tray).

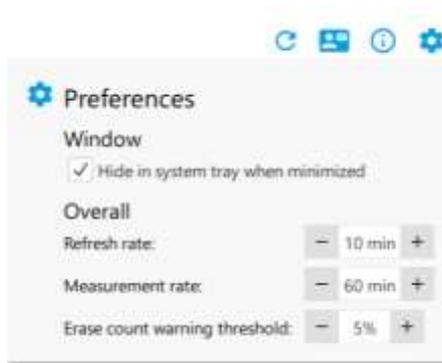


Even when running in the background, it periodically checks the drives in the system and records history data.

To hide the Tool, just use the minimize buttons of Windows, or the "Hide" button. To open the tool up again, left click on the system tray icon.

3.3 Settings

The SBDM tool supports changing appearance and monitoring settings.



Refresh rate:	Sets the periodic time for checking and refreshing life time data.
Measurement rate:	Sets the periodic time for storing life time data in the device database file.
Erase count warning threshold:	Sets the threshold for the "Erase Lifetime Status" when the SBDM tool will output a warning

3.4 Device Details

The Details page provides all available lifetime information for a selected device.

3.4.1 Device Infos

The Device Infos page provides an overview about the most important lifetime information. The page shows a status for all relevant properties of the device. The status can be "PASS", "WARNING" or "FAIL".

The screenshot displays the Swissbit Device Manager interface. At the top, there's a navigation bar with 'Home' and 'Details' links. The main header shows the device name 'sdd: X-76m2 M.2 SATA, 20GB' and its status 'Status: PASS'. Below this, there are tabs for 'Device Infos - LTM', 'Advanced Statistics', and 'History'. The 'Device information' section contains a table with the following data:

Model:	SFSA020GM2AK1TD-I-68-12P-STD	Path:	/dev/sdd
Serial:	AA00000000000000026	Flash type:	3D pSLC
Addressable size:	20GB, 20,094,718,976 bytes	Filesystem:	No volumes found on disk

Below the device information is a 'Product Details' link. The 'Lifetime Details' section shows several metrics, each with a green checkmark and a 'PASS' status:

- Health Status:** PASS
- Data Integrity Status:** PASS
- Erase Lifetime Status:** PASS. Includes a progress bar at 100%. Sub-headers: Native (3D pSLC), Remaining Erase Life Time: 100%, Average Erase Count: 0, Maximum Erase Count: 2, Rated Erase Count: 30,000.
- Spare Block Status:** PASS. Includes a progress bar at 100%.
- Firmware:** SBR15004
- Temperature:** PASS

Each item in the 'Lifetime Details' section has an 'Infos' dropdown menu to its right.

3.4.2 Advanced Statistics

The Advanced Information shows even more details about the device:

The screenshot displays the Swissbit Device Manager interface for an sdd: X-76m2 M.2 SATA, 20GB device. The status is PASS. The Advanced Statistics section provides the following data:

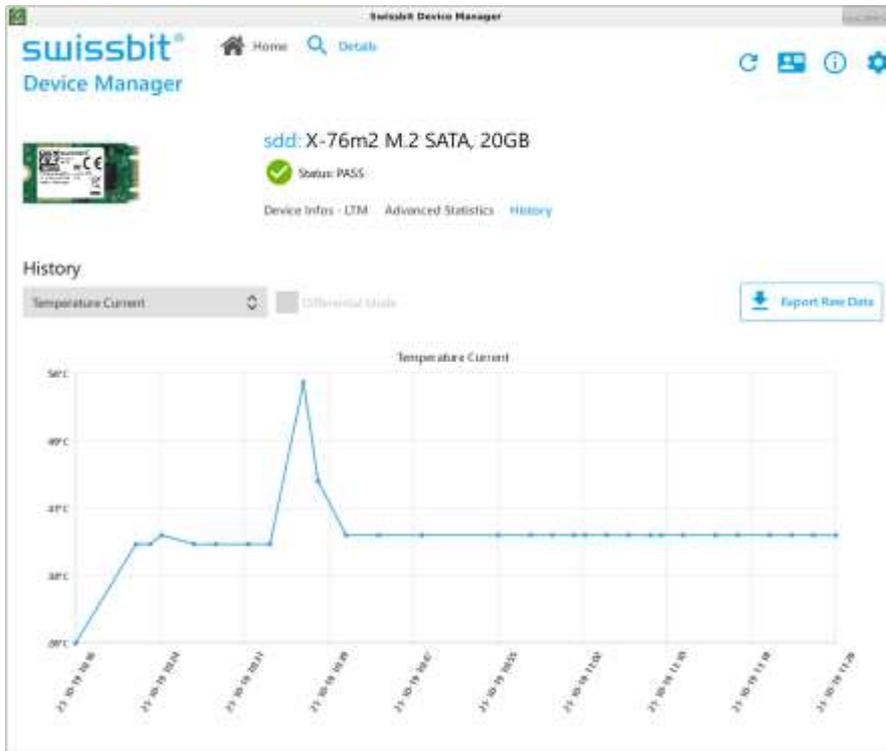
Metric	Value
Power on counter	5
Power on hours	1
Total flash block erases	754
Uncorrectable ECC errors	0
Refreshes based on ECC	0
Communication errors	0
Power On data repairs	3
Total Host LBA read	48,064,238 (22.9 GiB)
Total Host LBA written	23,014,994 (11 GiB)
Total Flash LBA written	23,322,880 (11.1 GiB)
Resulting WAF (Total)	1
Number of TRIM commands	0

The Spare Block Table section shows the following data:

Unit	Initial	Current
Total	230	230

3.4.3 Device History Charts

On the History page the progress of all values can be displayed on a chart:



This displays all samples that have been taken from the device. The lower axis designates the sample time, the left axis the value. Please note that the chart is only representative with multiple samples (several hours or days). To see how much the value has changed over time, select the "Differential Mode".

To export the logged data of the selected drive as XML or CSV file, please select "Export raw data".

4 Troubleshooting

4.1 Connecting a device indirectly (via bridge chip)

SBDM officially only supports bridge chips listed in this chapter. If a bridge chip (adapter) is used that is not supported the device might be not listed by SBDM at all or not all SBDM features might be supported.

4.1.1 NVMe

SBDM currently supports the following USB-NVMe bridge chips:

- JMicron JMS583
- ASMedia ASM236x

4.1.2 SD & eMMC

SBDM currently supports the following connections for Swissbit SD & eMMC series:

Method	S-200 / S-220(u)	S-4x(u)	S-5x(u)	EM-2x	EM-3x
Device connected directly to chipset	Yes (Linux only)	Yes	Yes	Yes (Linux only)	Yes (Linux only)
Device connected indirectly (Via USB-SD or USB-eMMC Reader)	No	Yes	Yes	No	No

4.1.3 CompactFlash

SBDM uses the S.M.A.R.T. standard to read out the lifetime information out of Swissbit CF Cards. USB card readers are quite difficult, because the USB Protocol does not natively support S.M.A.R.T. commands. They basically transfer only standard read and write commands, but do not forward the SMART commands to the card. There are some USB to IDE chipsets which do support SMART over special USB commands. There are several special standards/commands to transfer SMART over USB:

- SCSI/ATA Translation SAT(12)
- SCSI/ATA Translation SAT(16)
- Manufacturer specific: Cypress
- Manufacturer specific: JMicron

SBDM does support all of them and does try to detect if the reader does support one of them. To read out lifetime values, the card reader has to support one of those.

Unfortunately, we do not know about any USB->CF reader supporting one of these commands. Usually, "hot-plug-capable" CF/USB-adapters do not transfer the SMART information but traditional USB to IDE readers mostly do. These "not-hot-plug-capable" IDE adapters are often used to connect traditional IDE-HDDs to USB. These readers have an IDE-plug (ATAPI-40). Therefore, an IDE to CF connector board is needed additional to the reader to connect the CF card. PCMCIA cards slots (often built in a Laptop/Notebook) with a CF to PCMCIA adaptor work as well (Pc card mode).

USB/IDE-Adaptor/Reader recommendation: One approved example of a USB/IDE-adaptor is the Sharkoon Drivelink IDE/SATA to USB 2.0 adaptor: <http://en.sharkoon.com/product/1686/06403>

Attention: There is also a USB3 reader available from Sharkoon, but this one does not support SMART over USB!

Additional, an IDE to CF Adaptor-board is needed. It is important that the board is DMA capable. One of these DMA capable IDE/CF-Boards it the CFDISK.1E. from PC Engines: <http://pcengines.ch/cfieh.htm>

Alternatively, you can also use any standard motherboard (with an IDE Interface) and connect the card via IDE to CF Adaptor to the IDE port. The disadvantage of this is that you will have to boot the system with the card attached (IDE is not hot-plug-capable).

Another solution is to connect the CF card to a SATA port of your motherboard (CF -> IDE to CF Adaptor -> IDE to SATA adapter). This solution usually also supports hot-plug.

4.1.4 SATA / CFast

SATA-USB bridge chips with SCSI/ATA Translation (SAT) are supported by SBDM. Please see chapter 4.1.3 for details.

4.2 No drives detected on Linux

Please make sure SBDM is launched with root permission and that the SBDM-<arch>.ApplImage application file has execution rights (chmod +x ./SBDM-<arch>.ApplImage)

4.3 No SMART data on Windows for IDE / SATA

If the IDE / SATA chipset of the PC uses special drivers, it may not be possible to read the SMART information. Not all driver manufacturers support SMART using standardized interfaces. Best support is to be expected with the default Microsoft drivers or Intel chipset drivers.

4.4 SD card with write protection feature not detected

S-4xx family products allow reading out life time monitoring values over generic USB card readers. There are some limitations with USB card reader support.

The SBDM tools requires write access to the SD card for this functionality. Write protected cards are not guaranteed to be supported.

- Hardware write protection (by hardware switch) will never work (with any card reader)
- Software write protection by SD Temporary Write Protect or Permanent Write Protect will work with certain card readers only. Swissbit has successfully tested the following card readers:
 - o SanDisk MicroMate SDDR-113 (recommendation)
 - o Kingston FCR-HS219/1

4.5 Application is not properly rendered and very slow on embedded devices

Please make sure OpenGL drivers are enabled so hardware acceleration can be used. On embedded devices the CPU might not be powerful enough to render the SBDM application.

4.5.1 Raspberry Pi

For Raspberry Pi make sure to enable GL Driver.

1. Open the Raspberry Pi Software Configuration Tool with "sudo raspi-config"
2. Go to "Advanced Options"
3. Go to "GL Driver"
4. Enable "G1 GL (Full KMS)"
5. Reboot

5 SBDM Revision History

Date	Revision	Changes
2022-02-21	1.0.0	Initial Release based on feature set of SBLTM 1.7.2
2022-08-16	1.1.0	Add support for S-6* and N-3*m2 series

6 Document Revision History

Date	Revision	Changes
2022-02-08	1.00	First Release
2022-08-16	1.01	Update supported series