Product Guide

Providing Trust in Data & Identities

Ensuring reliable data storage, data protection and secure access for critical applications.

25 YEARS | swissbit

About Swissbit

Made in Germany

Our vision

Building a connected world where data and identities are trusted to retain digital sovereignty.

Our mission

We provide industry-leading data storage and endpoint protection solutions that ensure reliable data storage, data protection, and secure access for critical applications. This enables our customers to accelerate digital transformation across various industries.

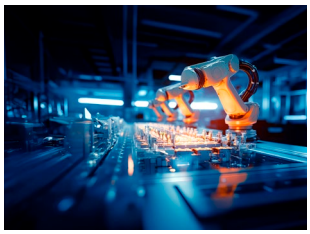
Our production site

High-quality manufacture and mass customization factory established 2019 with 10.000m² floor space incl. clean room for 2 million units units per month, depending on product mix

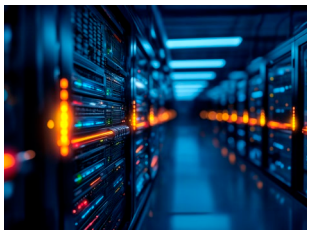
Content

Key segments we address

Manufacturing & Automation



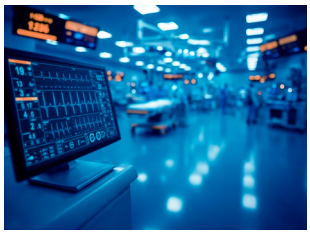
Data Center & Enterprise



Network & Communications

Defense & Aerospace

Healthcare



Transportation

Our solutions

Reliable Data Storage Products

- Industrial data storage
- Data storage for networking solution
- Enterprise data storage

Digital Identity & Secure Access Solutions

- Authentication
- Access control
- Identity management

Data Protection Solutions

- IP and license protection
- Secure boot
- Encryption

Reliable Data Storage Products

From the Cloud to the Edge

Cloud

Datacenter | **Enterprise**

Core

Networking | **Telecom**

IoT

IoT

Applications

Datacenter	Enterprise	Networking	Telecom	IoT
• Cloud infrastructure • AI infrastructure • Machine learning • IoT, big data	• Enterprise server • Enterprise storage • Private Cloud Infrastructure	• Router • Switches • Gateways	• Open RAN, • Base station • Antenna	• PLCs, HMIs • Industrial automation • Building automation • Industrial gateway

Trends

Datacenter	Enterprise	Networking	Telecom	IoT
• Workload optimization • Computational storage • Software defined storage • Reduction C02 footprint	• Consolidation FFs • Thermal consideration • Technology transitions • Virtualized applications	• Boot drive + storage • Consolidation FFs • Secure boot • Endurance optimization	• Interoperability • Physical security • Device miniaturization	• Predictive maintenance • Elimination field failures • Cybersecurity risk mitigation • Longevity/support

Form Factors, Interfaces

Datacenter	Enterprise	Networking	Telecom	IoT
• PCIe U.2 Gen4 • PCIe EDSFF: E1.S, E3, E1.L	• PCIe m.2 • PCIe U.2 Gen4 • PCIe EDSFF: E1.S • SATA 2.5"	• PCIe BGA Gen3 • PCIe m.2 Gen3/4 • SATA m.2	• PCIe BGA Gen3 • eMMC • eUSB, uSD	• SD Memory Cards • CFast • CompactFlash • CFexpress • eMMC, PCIe BGA

Swissbit Products

Datacenter	Enterprise	Networking	Telecom	IoT
D2200 N7000 A2x00	N3202, D2200 A1200, A2x00 X-7x, N7000	N2x00, E2x00 N3x0x, N7000 X-7xm2, A2x00	N2x00, E2x00, EM-3x U-58, S-5x(u), S-600(u)	S-600(u), S-5x(u) C-56, F-86, F-75, G2x00 EM-30, M1X00, E2x00

PCIe 2.5" and E1.S SSDs

Unlock the potential of your data with our cutting-edge storage solutions! As Big Data, AI, and enterprise integration drive exponential data growth, you need a robust infrastructure that scales seamlessly. Our SSDs offer unparalleled performance with low power consumption, top-notch security, and effortless remote management. Elevate your cloud data centers and enterprise servers with our reliable, high-quality storage designed for today's demands and tomorrow's challenges. Experience unmatched efficiency and expandability—choose the best for your growing needs!

	D2200 U.2	D2200 E1.S	A2200 U.2	A2000 E1.S A2200 E1.S	N3000 U.2
					
Information					
Type	U.2 Datacenter SSD	E1.S PCIe / NVMe	U.2 SSD	E1.S PCIe / NVMe	U.2 SSD
Standard & Interface	PCIe Gen 5.0 x4 / NVMe 2.0b		PCIe Gen 4.0 x4 / NVMe 1.4		
Form Factor	U.2	E1.S 9.5mm	U.2	E1.S 5.9mm, 9.5mm	U.2
Outline Dimensions	100.4 x 69.9 x 14.8 mm	111.25 x 33.7 x 9.5 mm	100.4 x 69.9 x 14.8 mm	111.25 x 33.7 x 9.5 mm 111.25 x 33.7 x 5.9 mm	100.4 x 69.9 x 7 mm
Flash Type	3D NAND eTLC	3D NAND eTLC	3D NAND eTLC	3D NAND TLC / eTLC	3D NAND TLC
Density Range	7.68 TB – 30.7 TB	7.68 TB – 15.4 TB	2.0 TB – 7.68 TB	A2000: 480 GB – 3,840 GB A2200: 2.0 TB – 7.68 TB	240 GB – 3,840 GB
Data Retention	1 year @ life begin / 3 months @ life end		TLC: 10 years @ life begin / 1 year @ life end eTLC: 1 years @ life begin / 3 months @ life end		
Endurance [DWPD] **Enterprise WL**	1 DWPD for 5 years			A2000: 0.3 DWPD for 5 years A2200: 1 DWPD for 5 years	Up to 0.9 DWPD
Temperature					
Operating Temperature	Commercial: 0°C to +70°C		Commercial: 0°C to 70°C Extended: -25°C to 85°C Industrial: -40°C to +85°C		Commercial: 0°C to +70°C
Storage Temperature	-40°C to +85°C				
Performance					
Sequential Read (MB/s)	up to 14,000	up to 14,000	up to 14,000	up to 7,100	up to 3,850
Sequential Write (MB/s)	up to 10,000	up to 10,000	up to 10,000	up to 6,100	up to 3,340
Random 4KB Read (IOPS)	up to 2,600k	up to 2,600k	up to 2,600k	up to 1,200k	up to 456k
Random 4KB Write (IOPS)	up to 510k	up to 470k	up to 510k	up to 440k	up to 505k
FTL/Cache Support	DDR4 DRAM	DDR4 DRAM	DDR4 DRAM	DDR4 DRAM	DDR4 DRAM
Robustness					
MTBF	≥ 2,000,000 hours				≥ 3,000,000 hours
Data Reliability	< 1 sector per 10^{17} bits				< 1 sector per 10^{16} bits
Shock	1,000 g, 0.5 ms				1,500 g, 0.5 ms
Vibration	3.13 Grms, 2-800 Hz				50 g, 80-2,000 Hz
Humidity	5% - 95% RH				
Electrical Data					
Voltage	12 V				
Average Power, Mixed Rd/Wr	< 20 W		< 10W		< 5W
Feature List					
Features & Tools	OCP compliant HW powersafe™ functionality E2E Data Protection S.M.A.R.T Flexible power mgmt Hot pluggable Multi-namespace support Support NVMe-MI 1.2b, support MCTP over SMB FW upgrade w.o. reset Timestamp, Telemetry Weighted Round Robin Persistent event log AES-XTS 256 encryption TCG OPAL 2.0, Secure Boot Crypto erase		HW powersafe™ functionality E2E Data Protection S.M.A.R.T Flexible power mgmt. Support NVMe-MI 1.2b, support MCTP over SMB FW upgrade w.o. reset Timestamp, Telemetry Weighted Round Robin Persistent event log AES-XTS 256 encryption TCG OPAL 2.0, Sec Boot Crypto erase		Active and Passive Data Care Management AES 256 / E2E Data Path Protection FW Power Fail Data Loss Protection Active State Power Management (ASPM) Support TCG OPAL 2.0 SBDM Tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring
More Information	For more details see www.swissbit.com/product-finder				

PCIe M.2 SSD Modules

	N2000 / N2600	N3000 / N3002 N3602	N7000 / N7600 N7001 / N7601	A1200	A2000 / A2200
					
Information					
Type	M.2 PCIe M key / NVMe				
Standard & Interface	PCIe Gen 3.1 x4 / NVMe 1.3	PCIe Gen 4.0 x4 / NVMe 1.4	PCIe Gen 4.0 x4 / NVMe 2.0	PCIe Gen 4.0 x4 / NVMe 1.4	
Form Factor	M.2 2280, 2242, 2230	M.2 2280, 2242	M.2 2280, 2242	M.2 2280	M.2 2280
Outline Dimensions	80, 42, 30 x 22 x 3.5 mm	80, 42 x 22 x 3.58 mm	80, 42 x 22 x 3.58 mm	80 x 22 x 3.8 mm	80 x 22 x 3.8 mm
Flash Type	3D NAND TLC / pSLC	N300x: 3D NAND TLC N3600: 3D NAND pSLC	3D NAND TLC / pSLC	3D NAND eTLC	A2000: 3D NAND TLC A2200: 3D NAND eTLC
Density Range[1]	TLC: 60 GB – 480 GB pSLC: 20 GB – 160 GB	TLC: 240 GB – 3,84/1.92 TB pSLC: 80 GB – 640 GB	TLC: 240 GB – 3,84/1.92 TB pSLC: 80 GB – 1,280/640 GB	480 GB – 1.92 TB	480 GB – 3,84 TB
Data Retention	TLC, pSLC: 10 years @ life begin / 1 year @ life end			TLC: 10 years @ life begin / 1 year @ life end eTLC: 1 years @ life begin / 3 months @ life end	
Endurance Enterprise[2]	up to 0.32 / 9.1 DWPD	up to 0.3 / 9 DWPD	Up to 0.3 / 10 DWPD	1 DWPD	A2000: 0.3 DWPD A2200: 1 DWPD
Temperature					
Operating Temperature	Commercial: 0 to 70°C Industrial: -40 to 85°C	Industrial: -40 to +85°C	Commercial: 0 to 70°C Industrial: -40 to 85°C	Commercial: 0 to 70°C Extended: -25 to 85°C	Commercial: 0 to 70°C Extended: -25 to 85°C Industrial: -40 to +85°C
Storage Temperature	-40 to +85°C				
Performance					
Sequential Read (MB/s) **Sequential Write (MB/s)** **Random 4KB Read (IOPS)** **Random 4KB Write (IOPS)**	up to 1,770 / 1,750 up to 830 / 830 up to 140k / 140k up to 130k / 130k	up to 3,850 / 3,850 up to 3,340 / 3,350 up to 456k / 456k up to 505k / 516k	up to 6,660 up to 6,150 up to 608k up to 958k	up to 6,420 up to 1,890 up to 1,170k up to 423k	up to 7,340 / 7,300 up to 4,050 / 4,100 up to 1,540k / 1,540k up to 880k / 880k
FTL / Cache support	HMB support	DDR4 DRAM	HMB support	DDR4 DRAM	DDR4 DRAM
Robustness					
MTBF	≥ 2,000,000 hours	≥ 3,000,000 hours		≥ 2,500,000 hours	
Data Reliability		< 1 sector per 10^{17} bits	< 1 sector per 10^{16} bits	< 1 sector per 10^{17} bits	
Shock	1,500 g, 0.5 ms				
Vibration	50 g, 80–2,000 Hz			20 g, 20 – 2,000 Hz	50 g, 80–2,000 Hz
Humidity	85% RH 85°C, 1,000 hrs			5% – 93% RH	85% RH 85°C, 1,000 hrs
Electrical Data					
Voltage	3.3 V ± 5%				
Feature List					
	Active and Passive Data Care Management AES 256 / E2E Data Path Protection FW Power Fail Data Loss Protection Active State Power Management (ASPM) Support TCG OPAL 2.0 SBDM Tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring		NVMe-MI 1.2 support Out of Band MCTP over SMBUS FW update via Out of Band mechanism AES256 encryption TCG Opal 2.0 SED, Crypto erase OCP secure boot Signed firmware PLN/PLA recovery support Host Controlled Thermal Management	E2E Data Protection S.M.A.R.T Flexible power mgmt	
Features & Tools				Support NVMe-MI 1.2b, support MCTP over SMB Timestamp, Telemetry Weighted Round Robin Persistent event log AES 256 encryption TCG OPAL 2.0, Sec Boot Crypto erase	Support NVMe-MI 1.2b, support MCTP over SMB FW upgrade w.o. reset Timestamp, Telemetry Weighted Round Robin Persistent event log AES-XTS 256 encryption TCG OPAL 2.0, Sec Boot Crypto erase
More Information	For more details see www.swissbit.com/product-finder				

[1] Not all densities and configurations may be available. Customization on request
[2] DWPD values are according to JESD219 Enterprise Endurance Workload based on a service life of 3 years for TLC and 5 years for eTLC drives, unless indicated differently

SATA 2.5" SSDs

Swissbit's 2.5" SSDs are ideal solutions for embedded applications requiring reliable and long service life storage. The X-60 SATA 6Gb/s series is Swissbit's MLC based solution as a mature, longevity product. X-600 has best-in-class endurance, using SLC technology while X-66 is the perfect compromise with MLC NAND in pSLC mode.

	X-600	X-66	X-60
	SLC / pSLC / MLC 		
Information			
Type	2.5" SATA Gen3 SSD		
Interface **Data Transfer Mode**	SATA Gen3 - 6Gbit/s ATA8		
Connector	15 + 7 pin Serial ATA		
Outline Dimensions	100 x 70 x 7 mm		
Flash Type	SLC	pSLC	MLC
Density Range	8 GB – 128 GB	16 GB – 480 GB	30 GB – 960 GB
Data Retention	10 years @ life begin | 1 year @ life end		
Endurance [DWPD]*	36.3	15.1	2.3
Temperature			
Operating Temperature	Commercial: 0°C to +70°C Industrial: -40°C to +85°C		
Storage Temperature	-40°C to +85°C		
Performance			
Sequential Read (MB/s) **Sequential Write (MB/s)** **Random 4KB Read (IOPS)** **Random 4KB Write (IOPS)**	up to 520 up to 425 up to 79,000 up to 76,000	up to 520 up to 450 up to 80,000 up to 75,000	up to 525 up to 460 up to 74,300 up to 77,900
Robustness			
MTBF	≥ 2,000,000 hours		
Shock	1,500 g, 0.5 ms		
Vibration	50 g, 80-2,000 Hz		
Humidity	85% RH 85°C, 1,000 hrs		
Electrical Data			
Voltage	5 V ± 10% / 3.3 V ± 5%		
Feature List			
Features & Tools	FW based Power Fail Safety NCQ, TRIM AES 256 Encryption optional SBDM Tool & SDK		
More Information	For more details see www.swissbit.com/product-finder		

* DWPD values are according to JESD219 Client Endurance Workload based on a service life of 3 years

SATA 2.5" SSDs

The X-7x and X1000 ranges are based on 3D NAND TLC with focus on best TCO. The X-76 and X1600 are the flagships with 3D NAND pSLC offering best endurance.

	X-75 / X-78	X-75 P	X-73	X1000 / X1600
				
Information				
Type	2.5" SATA Gen3 SSD			
Interface **Data Transfer Mode**	SATA Gen3 – 6Gbit/s ATA8			
Connector	15 + 7 pin Serial ATA			
Outline Dimensions	100 x 70 x 7 mm			
Flash Type	3D NAND TLC		3D NAND TLC	3D NAND TLC / pSLC
Density Range	X-75: 30 GB – 1,920 GB X-78: 10 GB – 320 GB	120 GB – 1,920 GB	30 GB – 1,920 GB	X100x: 240 GB – 1,920 GB X160x: 80 GB – 640 GB
Data Retention	10 years @ life begin | 1 year @ life end			
Endurance [DWPD]*	max 1.2 / 22.7	max 1.2	max 1.2	max 1.2 / 22.7
Temperature				
Operating Temperature	Commercial: 0°C to +70°C Industrial: -40°C to +85°C			Industrial: -40°C to +85°C
Storage Temperature	-40°C to +85°C			
Performance				
Sequential Read (MB/s) **Sequential Write (MB/s)** **Random 4KB Read (IOPS)** **Random 4KB Write (IOPS)**	up to 565 / 560 up to 495 / 480 up to 77,200 / 74,000 up to 79,400 / 84,900	up to 560 up to 500 up to 74,600 up to 73,600	up to 565 up to 495 up to 77,200 up to 79,400	up to 520 / 520 up to 500 / 500 up to 81,000 / 81,000 up to 70,000 / 70,000
Robustness				
MTBF	≥ 2,000,000 hours			
Shock	1,500 g, 0.5 ms			
Vibration	50 g, 80–2,000 Hz			
Humidity	85% RH 85°C, 1,000 hrs			
Electrical Data				
Voltage	5 V ± 10%			
Feature List				
	FW based Power Fail Safety	HW powersafe™ protection	FW based Power Fail Safety	FW based Power Fail Safety
Features & Tools	E2E Data Protection AES 256 Encryption optional TCG OPAL optional SBDM Tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring			E2E Data Protection AES 256 Encryption TCG OPAL 2.0 Crypto erase, Secure erase Secure Boot SBDM Tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring
More Information	For more details see www.swissbit.com/product-finder			

* DWPD values are according to JESD219 Client Endurance Workload based on a service life of 3 years

SATA M0-300 mSATA SSD Modules

Equally to the SATA 2.5" drives, the Swissbit mSATA (M0-300) SSDs target embedded applications which require solid state storage in small, removable form factors. The SSD modules are designed for robustness against frequent temperature changes within the -40°C to 85°C range, withstand high shock and vibration and offer superior performance and endurance. The families X-75m, X-78m, X-60m, X-66m and X-600m target different use cases including OS booting, data logging, surveillance recording or vaulting.




Information

	X-600m	X-66m / X-60m	X-75m	X-78m
Type	M0-300 mSATA			
Interface **Data Transfer Mode**	SATA Gen3 -6Gbit/s ATA8			
Connector	52 pos. Edge Connector PCI / Express (PCIe) mini			
Outline Dimensions	50.8 x 29.85 mm			
Thickness (MAX)	3.8 mm			
Flash Type	SLC	pSLC / MLC	3D NAND TLC	3D NAND pSLC
Density Range	8 GB – 128 GB	16 GB – 240 GB 30 GB – 480 GB	30 GB – 960 GB	10 GB – 320 GB
Data Retention	10 years @ life begin | 1 year @ life end			
Endurance [DWPD]*	33.8	13.2 / 2.0	max 1.2	max 68

Temperature

Operating Temperature	Commercial: 0°C to +70°C Industrial: -40°C to +85°C			
Storage Temperature	-40°C to +85°C			

Performance

Sequential Read (MB/s)	up to 520	up to 520 / 520	up to 565	up to 560
Sequential Write (MB/s)	up to 405	up to 450 / 450	up to 495	up to 480
Random 4KB Read (IOPS)	up to 76,000	up to 80,000 / 75,000	up to 73,600	up to 74,000
Random 4KB Write (IOPS)	up to 73,000	up to 75,000 / 75,000	up to 79,400	up to 84,900

Robustness

MTBF	≥ 2,000,000 hours
Shock	1,500 g, 0.5 ms
Vibration	50 g, 131 – 2,000 Hz
Humidity	85% RH 85°C, 1,000 hrs

Electrical Data

Voltage	3.3 V ± 5%

Feature List

Features & Tools	FW based Power Fail Safety SBDM Tool & SDK for S.M.A.R.T. based Life Time Monitoring AES 256 Encryption (optional)	E2E Data Path Protection AES 256 Encryption (optional) / TCG OPAL 2.0 (optional) FW based Power Fail Safety SBDM Tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring
More Information	For more details see www.swissbit.com/product-finder	

* DWPD values are according to JESD219 Client Endurance Workload based on a service life of 3 years

SATA M0-297 SLIM SATA SSD Modules

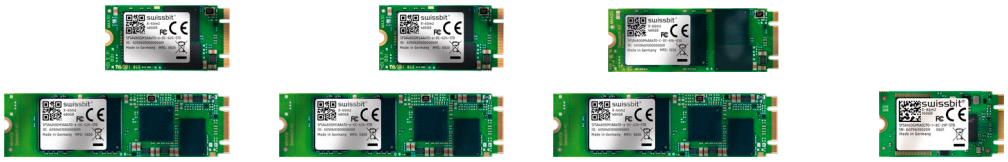
Equally to the SATA 2.5" drives, the Swissbit SLIM SATA (M0-297) SSDs target embedded applications which require solid state storage in small, removable form factors. The SSD modules are designed for robustness against frequent temperature changes within the -40°C to 85°C range, withstand high shock and vibration and offer superior performance and endurance. The families X-75s, X-78s, X-60s, and X-600s target different use cases including OS booting, data logging, surveillance recording or vaulting.

	X-600s	X-60s	X-75s	X-78s
				
Information				
Type	M0-297 SLIM SATA			
Interface **Data Transfer Mode**	SATA Gen3 -6Gbit/s ATA8			
Connector	15 + 7 pin Serial ATA Connector			
Outline Dimensions	54 x 39 mm			
Thickness (MAX)	4.0 mm			
Flash Type	SLC	MLC	3D NAND TLC	3D NAND pSLC
Density Range	8 GB - 128 GB	30 GB – 480 GB	30 GB - 960 GB	40 GB – 320 GB
Data Retention	10 years @ life begin | 1 year @ life end			
Endurance [DWPD]*	33.8	2.0	max 1.2	max 68
Temperature				
Operating Temperature	Commercial: 0°C to +70°C Industrial: -40°C to +85°C			
Storage Temperature	-40°C to +85°C			
Performance				
Sequential Read (MB/s) **Sequential Write (MB/s)** **Random 4KB Read (IOPS)** **Random 4KB Write (IOPS)**	up to 520 up to 405 up to 76,000 up to 73,000	up to 520 up to 450 up to 75,000 up to 75,000	up to 565 up to 495 up to 73,600 up to 79,400	up to 560 up to 480 up to 74,000 up to 84,900
Robustness				
MTBF	≥ 2,000,000 hours			
Shock	1,500 g, 0.5 ms			
Vibration	50 g, 131 - 2,000 Hz			
Humidity	85% RH 85°C, 1,000 hrs			
Electrical Data				
Voltage	5 V ± 10%			
Feature List				
Features & Tools	FW based Power Fail Safety SBDM Tool & SDK for S.M.A.R.T. based Life Time Monitoring AES 256 Encryption (optional)		E2E Data Path Protection AES 256 Encryption (optional) / TCG OPAL 2.0 (optional) FW based Power Fail Safety SBDM Tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring	
More Information	For more details see www.swissbit.com/product-finder			

* DWPD values are according to JESD219 Client Endurance Workload based on a service life of 3 years

SATA M.2 SSD Modules

Equally to the SATA 2.5" drives, the Swissbit M.2 SSDs target embedded applications which require solid state storage in small, removable form factors. The SSD modules are designed for robustness against frequent temperature changes within the -40°C to 85°C range, withstand high shock and vibration and offer superior performance and endurance. The families X1000, X1600, X-86m2, X-75m2, X-76m2, X-60m2, X-66m2 and X-600m2 target different use cases including OS booting, data logging, surveillance recording or vaulting.



Information

	X-600m2	X-66m2	X-60m2	X-86m2
Type	M.2 2242 / 2280	M.2 2242 / 2280	M.2 2260 / 2280	M.2 2242
Interface **Data Transfer Mode**	SATA Gen3 - 6Gbit/s ATA8			
Connector	75 pos. Edge Connector B & M key			
Outline Dimensions	22 x 42 / 80 mm	22 x 42 / 80 mm	22 x 60 / 80 mm	22 x 42 mm
Thickness (MAX)	3.58 mm			
Flash Type	SLC	pSLC	MLC	3D NAND pSLC
Density Range	2242: 8 – 64 GB 2280: 16 – 128 GB	2242: 16 – 120 GB 2280: 16 – 240 GB	2260: 30 – 480 GB 2280: 30 - 960 GB	10 GB– 160 GB
Data Retention	10 years @ life begin | 1 year @ life end			
Endurance [DWPD]*	36.3	13.2	2.0	max. 13.3

Temperature

Operating Temperature	Commercial: 0°C to +70°C Industrial: -40°C to +85°C
Storage Temperature	-40°C to +85°C

Performance

Sequential Read (MB/s)	up to 520 / 520	up to 520 / 520	up to 520 / 520	up to 370
Sequential Write (MB/s)	up to 245 / 405	up to 415 / 435	up to 450 / 460	up to 225
Random 4KB Read (IOPS)	up to 76,000 / 76,000	up to 80,000 / 80,000	up to 75,000 / 75,000	up to 13,100
Random 4KB Write (IOPS)	up to 54,000 / 73,000	up to 73,000 / 75,000	up to 75,000 / 75,000	up to 8,300

Robustness

MTBF	≥ 2,000,000 hours
Shock	1,500 g, 0.5 ms
Vibration	50 g, 80 - 2,000 Hz
Humidity	85% RH 85°C, 1,000 hrs

Electrical Data

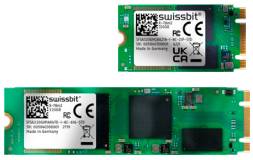
Voltage	3.3 V ± 5%

Feature List

Features & Tools	Data Care Management AHCI, TRIM, and NCQ Support 30 µinch Gold-Plated Connector (IPC-6012B Class 2 Compliant) FW based Power Fail Safety SBDM Tool & SDK for S.M.A.R.T. based Life Time Monitoring AES 256 Encryption (optional)
More Information	For more details see www.swissbit.com/product-finder

* DWPD values are according to JESD219 Client Endurance Workload based on a service life of 3 years

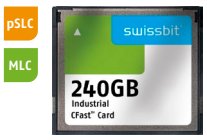
SATA M.2 SSD Modules

	X-75m2 X-75m2 P	X-78m2	X1000 m2	X1600 m2
				
Information				
Type	M.2 2242 / 2280	M.2 2242 / 2280	M.2 2242 / 2280	M.2 2242 / 2280
Interface **Data Transfer Mode**	SATA Gen3 -6Gbit/s ATA8			
Connector	75 pos. Edge Connector B & M key			
Outline Dimensions	22 x 42 / 80 mm			
Thickness (MAX)	3.58 mm			
Flash Type	3D NAND TLC	3D NAND pSLC	3D NAND TLC	3D NAND pSLC
Density Range	X-75m2 2242: 30 GB – 960 GB X-75m2 2280: 30 GB – 1,920 GB X-75m2 P: 240 GB – 1,920 GB	2242: 10 GB – 320 GB 2280: 30 GB – 1,920 GB	2242: 240 – 960 GB 2280: 240 – 1,920 GB	2242: 80 – 320 GB 2280: 80 – 640 GB
Data Retention	10 years @ life begin | 1 year @ life end			
Endurance [DWPD]*	max. 3.2	max. 81		
Temperature				
Operating Temperature	Commercial: 0°C to +70°C Industrial: -40°C to +85°C		Industrial: -40°C to +85°C	
Storage Temperature	-40°C to +85°C			
Performance				
Sequential Read (MB/s) **Sequential Write (MB/s)** **Random 4KB Read (IOPS)** **Random 4KB Write (IOPS)**	up to 565 up to 495 up to 75,900 up to 74,900	up to 560 / 560 up to 480 / 480 up to 72,900 / 74,000 up to 85,900 / 85,900	up to 520 up to 500 up to 81,000 up to 70,000	up to 520 up to 500 up to 81,000 up to 70,000
Robustness				
MTBF	≥ 2,000,000 hours			
Shock	1,500 g, 0.5 ms			
Vibration	50 g, 80 - 2,000 Hz			
Humidity	85% RH 85°C, 1,000 hrs			
Electrical Data				
Voltage	3.3 V ± 5%			
Feature List				
Features & Tools	HW powersafe™ protection Only X-75m2 P 2280 SBDM Tool & SDK for S.M.A.R.T. based Life Time Monitoring AES 256 Encryption (optional)	FW based Power Fail Safety SBDM Tool & SDK for S.M.A.R.T. based Life Time Monitoring AES 256 Encryption (optional)		
More Information	For more details see www.swissbit.com/product-finder			

* DWPD values are according to JESD219 Client Endurance Workload based on a service life of 3 years

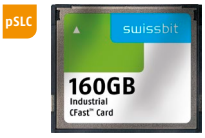
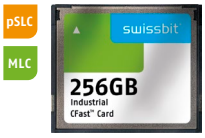
SATA CFAST™ Cards

CFast™ cards combine the CompactFlash™ (CF) card form factor and the Serial ATA (SATA) interface into a single product. CFast™ cards can replace both HDDs and CompactFlash™ cards in applications requiring small form factors, high endurance and the ability to withstand shock, vibration, extreme temperatures (-40°C to +85°C), and rough environmental conditions. The Swissbit CFast™ card portfolio covers the range from high-end SLC-based high-performance F-600 to the performance optimized 3D NAND F-75 and F-86. The different product families are equipped with a rich feature set and are fulfilling the high Swissbit quality requirements.

	F-600	F-66 / F-60	F-75	F-78
	SLC 	pSLC MLC 		
Information				
Type	CFast™ Card			
Interface **Data Transfer Mode**	CFast™ 2.0 – SATA Gen3 6Gbit/s ATA8			
Connector	CFast™ Type I			
Outline Dimensions	36.4 x 42.8 x 3.6 mm			
Flash Type	SLC	pSLC / MLC	3D NAND TLC	3D NAND pSLC
Density Range	4 GB – 64 GB	pSLC: 4 GB – 120 GB MLC: 8 GB – 240 GB	32 GB – 512 GB	32 GB – 128 GB
Data Retention	10 years @ life begin | 1 year @ life end			
Endurance [DWPD]*	36.3	13.3 / 1.98	up to 1.8	up to 97.2
Temperature				
Operating Temperature	Commercial: 0°C to +70°C Industrial: -40°C to +85°C			
Storage Temperature	-40°C to +85°C			
Performance				
Sequential Read (MB/s) **Sequential Write (MB/s)** **Random 4KB Read (IOPS)** **Random 4KB Write (IOPS)**	up to 520 up to 245 up to 76,000 up to 54,000	up to 520 / 520 up to 415 / 180 up to 80,000 / 72,000 up to 75,000 / 43,000	up to 550 up to 172 up to 53,600 up to 39,500	up to 560 up to 480 up to 72,900 up to 77,200
Robustness				
MTBF	≥ 2,000,000 hours			
Shock	1,500 g, 0.5 ms			
Vibration	50 g, 80-2,000 Hz			
Humidity	85% RH 85°C, 1,000 hrs			
Electrical Data				
Voltage	3.3 V ± 5%			
Feature List				
Features & Tools	DRAM cache Proven Power Fail Safety SBDM Tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring AES 256 Encryption (optional)		DRAM cache Proven Power Fail Safety Secure Boot TCG OPAL 2.00 AES256 Crypto Erase E2E Data Path Protection & SRAM ECC SBDM Tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring	
More Information	For more details see www.swissbit.com/product-finder			

* DWPD values are according to JESD219 Client Endurance Workload based on a service life of 3 years

SATA CFAST™ Cards

	F-800	F-86	F-56 / F-50
			
Information			
Type	CFast™ Card		
Interface **Data Transfer Mode**	CFast™ 2.0 – SATA Gen3 6Gbit/s ATA8		
Connector	CFast™ Type I		
Outline Dimensions	36.4 x 42.8 x 3.6 mm		
Flash Type	SLC	3D NAND pSLC	pSLC / MLC
Density Range	2 GB – 64 GB	10 – 160 GB	pSLC: 4 GB – 128 GB MLC: 8 GB – 256 GB
Data Retention	10 years @ life begin | 1 year @ life end		
Endurance [DWPD]*	max 32	max 13.3	max 7.98 / 1.50
Temperature			
Operating Temperature	Commercial: 0°C to +70°C Industrial: -40°C to +85°C		
Storage Temperature	-40°C to +85°C		
Performance			
Sequential Read (MB/s) **Sequential Write (MB/s)** **Random 4KB Read (IOPS)** **Random 4KB Write (IOPS)**	up to 320 up to 170 up to 10,500 up to 7,100	up to 375 up to 225 up to 13,100 up to 8,500	up to 510 / 500 up to 415 / 330 up to 32,000 / 53,500 up to 66,000 / 74,000
Robustness			
MTBF	≥ 2,000,000 hours		
Shock	1,500 g, 0.5 ms		500 g, 1 ms
Vibration	50 g, 80 – 2,000 Hz		20 g, 80 – 2,000 Hz
Humidity	85% RH 85°C, 1,000 hrs		
Electrical Data			
Voltage	3.3 V ± 5%		
Feature List			
Features & Tools	Proven Power Fail Safety SBDM Tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring AES 256 Encryption E2E Data Path Protection		Proven Power Fail Safety SBDM Tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring
More Information	For more details see www.swissbit.com/product-finder		

* DWPD values are according to JESD219 Client Endurance Workload based on a service life of 3 years

PCIe CFexpress™ Cards

CFexpress™ is hailed as the successor of the established Compact Flash and CFast-standards, created by the CompactFlash Association. Originally developed for high-end photography and other consumer applications, Swissbit has now applied the storage format to its latest products for use in demanding industrial applications. The CFexpress 2.0 Type B casing offers excellent mechanical protection in harsh environments. The gold-plated pins are completely covered and shielded from any form of contact, therefore offering protection from dust or moisture penetration, and at the same time, making the cards resistant to any vibration. The G2000 series offer high data rates, low power consumption and wide temperature range.

Information

	G2000	G2600
Type	CFexpress™ Type B Card	
Standard and Interface	CFexpress v2.00 PCIe 3.1 x2 / NVMe 1.3	
Connector	CFexpress 30u" AU	
Outline Dimensions	38.5 × 29.6 × 3.8 mm	
Flash Type	3D NAND TLC	3D NAND pSLC
Density Range	60 GB – 960 GB	20 GB – 320 GB
Data Retention	10 years @ life begin | 1 year @ life end	
Endurance [DWPD]*	Up to 2.2	Up to 78

Temperature

Operating Temperature	Industrial: -40°C to +85°C	
Storage Temperature	-40°C to +85°C	

Performance

Sequential Read (MB/s)	up to 1,610	up to 1,610
Sequential Write (MB/s)	up to 930	up to 930
Random 4KB Read (IOPS)	up to 140k	up to 138k
Random 4KB Write (IOPS)	up to 145k	up to 143k

Robustness

MTBF	≥ 2,000,000 hours
Shock	500 g, 1 ms
Vibration	20 g, 10 – 2,000 Hz
Humidity	90% RH 85°C, 96 hrs

Electrical Data

Voltage	3.3 V ± 5%

Feature List

Features & Tools	HMB Support End to End Data Path Protection AES 256 / TCG OPAL 2.0 Firmware based Power Fail Data Loss Protection Active State Power Management (ASPM) Support SBDM Tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring
More Information	For more details see www.swissbit.com/product-finder

* DWPD values are according to JESD219 Client Endurance Workload based on a service life of 3 years

CompactFlash™ Cards

To this day, CompactFlash™ (CF) cards are widely used as boot and data logging devices in many NetCom and industrial applications. Swissbit's dedication to these markets is shown by the broad portfolio and recent launch of a new product family. Swissbit products are developed with a strong focus on quality, reliability, robustness, and longevity. All Swissbit's CF Series are offered in both commercial (0°C to +70°C) and industrial (-40°C to +85°C) temperature ranges. Swissbit's most recent CF Card product families C-500 and C-56 are using page based Flash management and thus provide highest write IOPS rate as well as outstanding endurance.

C-350 / C-300L	C-500	C-56
SLC 	SLC  UDMA6 CF	pSLC  UDMA6 CF

Information

Type	CompactFlash™ Card		
Interface **Data Transfer Mode**	CFA4.1 True IDE / PC card - Up to UDMA4, MDMA4 & PIO6	CFA5.0 True IDE / PC card - Up to UDMA6, MDMA4 & PIO6	
Connector	CFC Type I		
Outline Dimensions	36.4 x 42.8 x 3.3 mm		
Flash Type	SLC		pSLC everbit™
Density Range	32 MB - 256 MB 128 MB - 1 GB	128 MB - 64 GB	4 GB - 64 GB
Data Retention	10 years @ life begin | 1 year @ life end		
Endurance [DWPD]*	max 3.40	max 3.50	max 1.35

Temperature

Operating Temperature	Commercial: 0°C to +70°C Industrial: -40°C to +85°C		
Storage Temperature	-40°C to +85°C		

Performance

Sequential Read (MB/s) **Sequential Write (MB/s)** **Random 4KB Read (IOPS)** **Random 4KB Write (IOPS)**	up to 22 up to 10 up to 3,000 up to 50	up to 64 up to 44 up to 3,200 up to 1,900	up to 115 up to 66 up to 5,000 up to 3,300

Robustness

MTBF	≥ 3,000,000 hours		
Shock	1,500 g		
Vibration	20 g		
Humidity	85% RH 85°C, 1,000 hrs		

Electrical Data

Voltage	3.3 V ± 10% / 5 V ± 10%		

Feature List

Features & Tools	Proven Power Fail Safety Security & SBZoneProtection features available SBDM Tool & SDK for S.M.A.R.T. based Life Time Monitoring	Page based FTL for maximum Endurance Proven Power Fail Safety Read Disturb Management TRIM Security & SBZoneProtection features available SBDM Tool & SDK for S.M.A.R.T. based Life Time Monitoring	
More Information	For more details see www.swissbit.com/product-finder		

* DWPD values are according to JESD219 Enterprise Endurance Workload based on a service life of 3 or 5 years

SD Memory Cards

Secure Digital (SD) memory cards and microSD cards have a widespread use in industrial and automotive applications, ranging from read only applications as in navigation systems to utilization as boot media, for video recording or data logging. Swissbit's Industrial Secure Digital (SD) card series are designed for high sustained performance and endurance and are manufactured and tested in Swissbit's own fab to withstand extreme environmental conditions.

	S-600	S-52	S-50	S-56
	SLC			
				
Information				
Type	SD Memory Card (SD / SDHC)	SD Memory Card (SDHC / SDXC)		
Interface **Data Transfer Mode**	SD 5.0, UHS-I, speed class 10/U3/V30	SD 6.1, UHS-I, speed class 10/U3/V30/A2 High performance type	SD 6.1, UHS-I, speed class 10/U3/V30/A2 High reliability type	
Connector	SD			
Outline Dimensions	32 x 24 x 2.1 mm			
Flash Type	SLC	3D NAND TLC		3D NAND pSLC
Density Range	512 MB – 32 GB	32 GB – 128 GB	16 GB – 512 GB	4 GB – 128 GB
Data Retention	10 years @ life begin | 1 year @ life end			
Endurance [P/E cycles]	100k	3k P/E cycles		30k up to 100k P/E cycles
Temperature				
Operating Temperature	Extended: -25°C to +85 C° Industrial: -40°C to +85°C			
Storage Temperature	-40°C to +85°C			
Performance				
Sequential Read (MB/s) **Sequential Write (MB/s)** **Random 4KB Read (IOPS)** **Random 4KB Write (IOPS)**	up to 95 up to 55 up to 1200 up to 1200	up to 95 up to 84 up to 1,960 up to 780	up to 97 up to 38 up to 3,750 up to 1,800	up to 97 up to 90 up to 4,950 up to 1,800
Robustness				
MTBF	≥ 3,000,000 hours			
Shock	1,500 g			
Vibration	50 g			
Humidity	85% RH 85°C, 1,000 hrs			
Electrical Data				
Voltage	2.7 -3.6 V			
Feature List				
Features & Tools	Optimized for high read/write traffic for demanding industrial applications. Read Disturb Management, Autonomous Data Care Management Real industrial temperature range with full cross temperature support Proven FW based Power Fail Safety	Optimized for seq. write use cases such as video recording, dash/body cams Automotive type AEC-100-3	High reliability type Optimized for random write use cases such as industrial data logging	
		Support SD SPI mode Proven FW based Power Fail Safety Sophisticated Wear Leveling & Bad Block management Autonomous Data Care Management SBDM Tool & SDK for detailed Life Time Monitoring		
More Information	For more details see www.swissbit.com/product-finder			

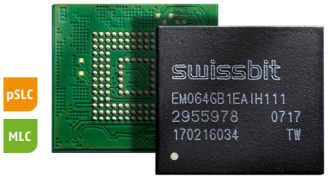
microSD Memory Cards

The SLC based S-600 / S-600u offer highest endurance and were recently introduced to offer increased longevity. The new S-52 / S-52u target automotive and video recording applications while S-50 / S-56 and S-50u / S-56u target typical high reliability use cases as seen in industrial environments. The 3D pSLC versions S-56 and S-56u offer best cost/endurance ratio.

	S-600u	S-52u	S-50u	S-56u
				
Information				
Type	microSD Memory Card (SD / SDHC)	microSD Memory Card (SDHC / SDXC)		
Interface Data Transfer Mode	SD 3.0, UHS-I speed class 10/U1	SD 6.1, UHS-I, speed class 10/U3/V30/A2 High performance type	SD 6.1, UHS-I, speed class 10/U3/V30/A2 High reliability type	
Connector	microSD			
Outline Dimensions	15 x 11 x 0.7 / 1 mm			
Flash Type	SLC	3D NAND TLC		3D NAND pSLC
Density Range	512 MB – 2 GB	32 GB - 128 GB	16 GB - 512 GB	4 GB - 128 GB
Data Retention	10 years @ life begin | 1 year @ life end			
Endurance [P/E cycles]	100k	3k		30k up to 100k
Temperature				
Operating Temperature	Extended: -25°C to +85°C Industrial: -40°C to +85°C	Industrial: -40°C to +85°C	Extended: -25°C to +85°C Industrial: -40°C to +85°C	
Storage Temperature	-40°C to +85°C			
Performance				
Sequential Read (MB/s)	up to 35	up to 95	up to 97	up to 97
Sequential Write (MB/s)	up to 21	up to 84	up to 39	up to 83
Random 4KB Read (IOPS)	up to 850	up to 1,960	up to 4,570	up to 4,950
Random 4KB Write (IOPS)	up to 1,200	up to 780	up to 1,935	up to 1,800
Robustness				
MTBR	≥ 3,000,000 hours			
Shock	1,500 g			
Vibration	50 g			
Humidity	85% RH 85°C, 1,000 hrs			
Electrical Data				
Voltage	2.7 - 3.6 V Normal			
Feature List				
Features & Tools	Optimized for high read/write traffic for demanding industrial applications. Read Disturb Management, Autonomous Data Care Management Real industrial temperature range with full cross temperature supportProven FW based Power Fail Safety Manufactured in a TS 16949 certified factory SBDM Tool & SDK for detailed Life Time Monitoring	Optimized for seq. write use cases such as video recording, dash/body cams Automotive type AEC-100-3	High reliability type Optimized for random write use cases such as industrial data logging	
		Support SD SPI mode Proven FW based Power Fail Safety Sophisticated Wear Leveling & Bad Block management Autonomous Data Care Management SBDM Tool & SDK for detailed Life Time Monitoring		
More Information	For more details see www.swissbit.com/product-finder			

e.MMC Managed NAND

Small form factor embedded systems have often used NAND components, which were directly interfaced and managed by the host controller software. This task has become a challenge due to the increasing complexity of NAND devices and their management. Managed NAND is the solution: a single small size BGA component incorporates multiple Flash dies, a NAND controller and the management firmware and eases the integration. Swissbit's e.MMC EM-20, EM-30 and M1x00 family covers multiple densities and interface speeds. Sophisticated NAND management makes the e.MMC ideal for applications like POS/POI, PLC, IoT, gaming, medical, or as a general boot medium for embedded applications.

EM-26 / EM-20	EM-36 / EM-30	M1700 / M1100
		

Information

Type	e.MMC		
Standard & Interface	e.MMC 5.0, 1-bit, 4-bit, 8-bit up to HS400	JEDEC e.MMC 5.1 1-bit, 4-bit, 8-bit up to HS400	
Package	153-ball BGA, 0.5mm pitch	153-ball BGA, 0.5mm pitch 100-ball BGA, 1.0mm pitch	153-ball BGA, 0.5mm pitch
Outline Dimensions	11.5 x 13 x 1 mm	11.5 x 13 x 1 mm 14 x 18 x 1.4 mm	11.5 x 13.1 x 1 mm
Flash Type	pSLC reliable mode / MLC	3D NAND pSLC / TLC	pSLC reliable mode / MLC
Density Range	2 GB – 32 GB pSLC / 4 GB – 64 GB MLC	5 GB – 160 GB pSLC / 4 GB – 512 GB TLC	4 GB / 8 GB (16 GB on request)
Data Retention	10 years @ life begin | 1 year @ life end		
Endurance	3k / 20k P/E cycles	3k / 30k up to 100k P/E cycles	Up to 128 / 8.1 TBW

Temperature

Operating Temperature	Industrial: -40°C to +85°C	Industrial: -40°C to +85°C Automotive: -40°C to +105°C
Storage Temperature	-40°C to +85°C	

Performance

Sequential Read (MB/s)	up to 174 / 240	up to 300	up to 290 / 290
Sequential Write (MB/s)	up to 21 / 120	up to 230	up to 116 / 119
Random 4KB Read (IOPS)	up to 3,800 / 6,700	up to 39,500	up to 17,300 / 16,900
Random 4KB Write (IOPS)	up to 1,400 / 6,700	up to 41,500	up to 12,500 / 14,300

Electrical Data

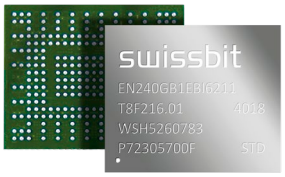
Voltage	VCCQ: 1.70 – 1.95 V / 2.70 – 3.60 V ; VCC: 2.70 – 3.60

Feature List

Features & Tools	High performance up to HS400 mode Sophisticated Wear Leveling & Read Disturb Management Page based FTL Management Production State Awareness Proven Power Fail Safety Security features secure erase & RPMB Data Preload, Customization EM-30, EM-36 AEC-Q Grade 2, ISO 27001, IATF 16949
More Information	For more details see www.swissbit.com/product-finder

PCIe BGA Managed NAND

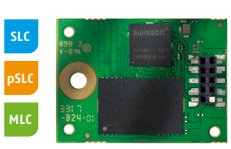
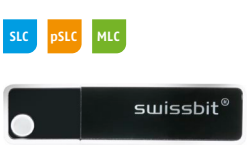
PCIe BGAs with HMB support and up to 4 lane operation mode offer both a high performance and short latency for modern applications. The firmware is tuned towards industrial systems with wide temperature range, high endurance and retention. The EN-20, E2000, and E7000 versions provide high capacity using 3D NAND TLC Flash while the EN-26, E2600, and E7600 operate in pSLC mode, offering highest retention and reliability.

	EN-20 / E2000	EN-26 / E2600	E7600 / E7000
			 Coming soon
Information			
Type	PCIe M.2 1620 BGA		
Standard & Interface	PCIe Gen 3.1 x4 / NVMe 1.3		PCIe Gen 4 x4 / NVMe 2.0
Package	BGA, 0.8mm pitch		
Outline Dimensions	16 x 20 x 1.8 mm		
Flash Type	3D NAND TLC	3D NAND pSLC	3D NAND pSLC / 3D NAND TLC
Density Range	15 GB – 480 GB / 60 GB – 960 GB	5 GB – 160 GB / 20 GB – 320 GB	40 GB–640 GB / 120 GB–1920 GB
Data Retention	10 years @ life begin | 1 year @ life end		
Endurance [DWPD]*	Up to 1.8 / 2.2	Up to 54 / 78	Up to 10 / 0.3
Temperature			
Operating Temperature	Industrial: -40°C to +85°C		
Storage Temperature	-40°C to +85°C		
Performance			
Sequential Read (MB/s)	up to 1,770 / 1,750	up to 1,780 / 1,780	up to 7,100
Sequential Write (MB/s)	up to 750 / 860	up to 760 / 870	up to 5,500
Random 4KB Read (IOPS)	up to 140k / 140k	up to 140k / 89k	up to 500k
Random 4KB Write (IOPS)	up to 112k / 134k	up to 136k / 136k	up to 950k
Electrical Data			
Voltage	3.3V ± 5%, 1.8V ± 5%, 0.9V ± 5%		
Feature List			
Features & Tools	HMB support Dynamic and Static Wear Leveling Page Mode Flash Translation Layer Data Care Management Write Amplification Reduction Power Fail Data Loss Protection In Field Firmware Update Self Monitoring, Analysis, and Reporting Technology (S.M.A.R.T.) AES256 Encryption		HMB support Power Fail Data Loss Protection In-Field Firmware UpdateSelf-Monitoring, Analysis, and Reporting Technology (S.M.A.R.T.) AES256 Encryption TCG Opal AEC-Q100-2 Write protect pin HW erase pin for fast-/secure erase
More Information	For more details see www.swissbit.com/product-finder		

* DWPD values are according to JESD219 Client Endurance Workload based on a service life of 3 years

USB Flash Memory

Swissbit's USB Flash Drives are a high performance, reliable USB storage solution designed for embedded and industrial applications. With highly reliable SLC NAND flash in a fixed BOM incl. the FW configuration or pSLC or MLC version, Swissbit supports the longest possible stable supply. This reduces the risk and compatibility issues together with minimized requalification. The new USB 3.1 products utilize a page based flash management which increases significantly the endurance and write performance.

	U-500 U-56 / U-58	U-500k U-56k / U-50k	U-56n U-50n Nano
			

Information

Type	eUSB Flash Module	USB Flash Drive	
Interface **Data Transfer Mode**	USB 3.1 Super Speed / High / Full	USB 3.1 Super Speed / High / Full	
Connector	Standard: 2.54 mm –10 Pin (key option) Low Profile: 2.00 mm –10 Pin (key option)	USB 3.0 Type A–Plug	
Outline Dimensions	Standard: 36.8 x 26.65 x 9.7 mm Low Profile: 36.8 x 26.65 x 6.0 mm	67.8 x 18.0 x 8.3 mm	24.0 x 12.1 x 4.5 mm
Flash Type	SLC / pSLC everbit™ / 3D pSLC / MLC durabit™		
Density Range	SLC: 4 GB – 32 GB pSLC: 4 GB – 32 GB 3D pSLC: 8 GB – 16 GB	SLC: 2 GB – 32 GB pSLC: 8 GB – 64 GB MLC: 16 GB – 128 GB	pSLC: 4 – 32 GB MLC: 8 – 64 GB
Data Retention	10 years @ life begin | 1 year @ life end		
Endurance [DWPD]*	U-500: 4.0 / U-58: 4.1 / U-56: 1.8		

Temperature

Operating Temperature	Commercial: 0°C to +70°C Industrial: –40°C to +85°C
Storage Temperature	–40°C to +85°C

Performance

Sequential Read (MB/s) **Sequential Write (MB/s)** **Random 4KB Read (IOPS)** **Random 4KB Write (IOPS)**	up to 174 / 175 / 180 up to 91 / 110 / 76 up to 2,980 / 3,200 / 4,100 up to 1,060 / 1,100 / 1,680	up to 180 / 190 / 150 up to 100 / 110 / 60 up to 3,700 / 4,000 / 3,200 up to 2,000 / 1,500 / 900	up to 197 / 156 up to 126 / 64 up to 3,850 / 2,850 up to 2,600 / 1,800

Robustness

MTBF	≥ 3,000,000 hours
Shock	1,500 g, 0.5 ms
Vibration	50 g
Humidity	85% RH 85°C, 1,000 hrs

Electrical Data

Voltage	3.3 V ±5% / 5 V ±10%	5 V ± 10%

Feature List

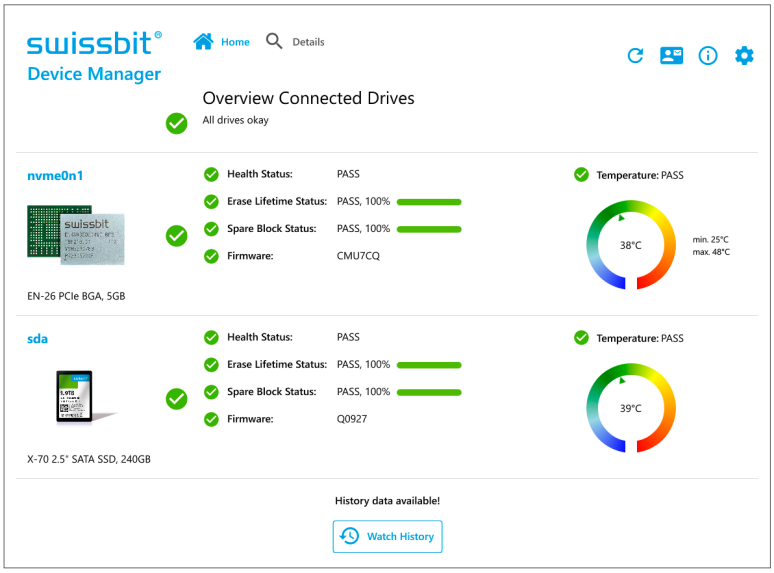
Features & Tools	Page based FTL for best write performance and endurance Proven Power Fail Safety Windows / Linux – Spare block read out Bootable USB Drive Supports latest OS as Fixed Drive (eUSB modules) and Removable Drive (USB Flash Drive) Connector pitch & key variations available Shock & vibration resistant
More Information	For more details see www.swissbit.com/product-finder

* DWPD values are according to JESD219 Enterprise Endurance Workload based on a service life of 3 or 5 years

Swissbit Device Manager Tool

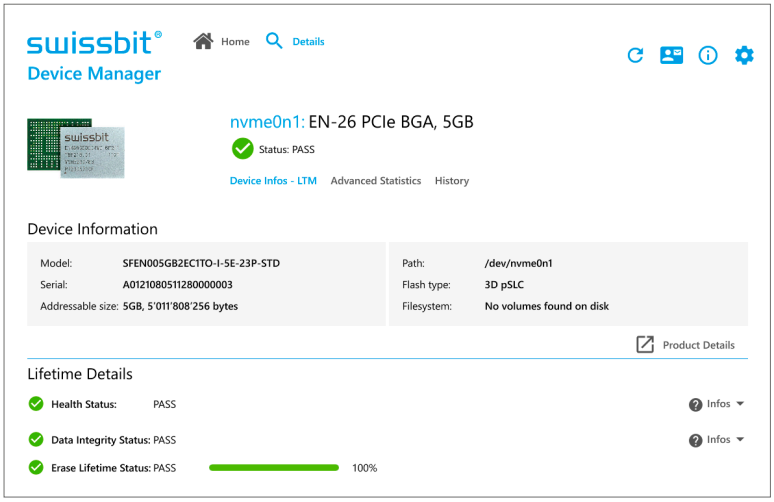
Flash Life Time Prediction

The Swissbit Device Manager Tool (SBDM) provides a detailed overview of the life time status of Swissbit products. This includes the standard S.M.A.R.T. parameter as well as down to the single block Flash utilization numbers. The tool can be used to extrapolate the life time expectation of a product in a real application by taking two snapshots before and after the test and evaluating the consumption through the test phase.

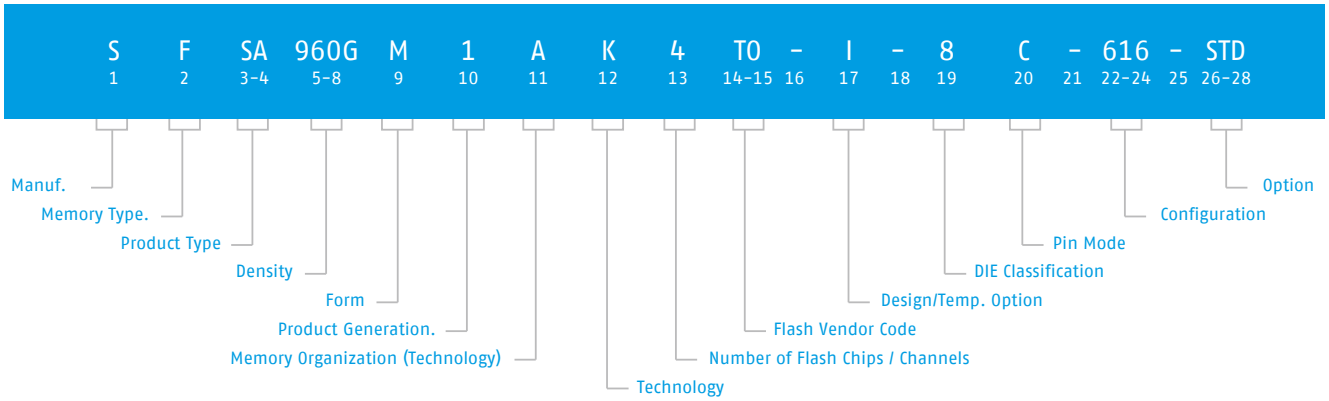


Swissbit Device Manager Tool

- Shows critical device health data in a user friendly app
- Visualization and accessibility of key telemetry data
- Common interface for any Swissbit storage product
- Identify need for maintenance and service
- Reduces machine down time and field failure costs
- Increases system reliability



Legacy Swissbit part number – The DNA of your specific product



Manufacturer/Memory Type (1–2)

SF : Swissbit Flash

Product Type (3–4)

CA : CFAST
CE : CFExpress
CF : Compact Flash
EM : Embedded MMC (eMMC)
EN : Embedded NVMe PCIe
EU : Embedded USB
MM : MMC
PA : PATA/IDE
PC : PCIe
SA : SATA
SD : SD, miniSD, microSD
U1 : USB 1.1 Drive
U2 : USB 2.0 Drive
U3 : USB 3.1 Drive
UI : UFD internal

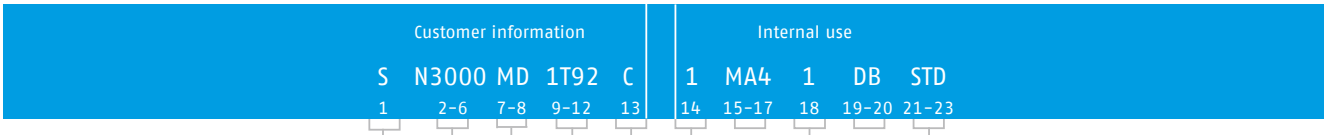
Density (5–8)

0	: No user space
16	: 16 MByte
32	: 32 MByte
64	: 64 MByte
128	: 128 MByte
256	: 256 MByte
512	: 512 MByte
1024	: 1 GByte
2048	: 2 GByte
3072	: 3 GByte
(004G) 4096	: 4 GByte
008G (8192)	: 8 GByte
016G (16GB)	: 16 GByte
025G / 030G / 032G	: 25 / 30 / 32 GByte
050G / 060G / 064G	: 50 / 60 / 64 GByte
100G / 120G / 128G	: 100 / 120 / 128 GByte
200G / 240G / 256G	: 200 / 240 / 256 GByte
400G / 480G / 512G	: 400 / 480 / 512 GByte
800G / 960G / 001T / 1T02	: 800 / 960 / 1024 GByte (1TByte)
1T92 / 002T	: 1920 / 2048 GByte (2TByte)

Design/Temp. Option (17)

I : Industrial Temp. (-40°C to +85°C)
E : Extended Temp. (-25°C to +85°C)
C : Commercial Temp. (0°C to +70°C)
A : Automotive Temp. (-40 to + 105°C)

New Swissbit part number –The DNA of your specific product



MANUFACTURER / DIVISION (1)

SERIES (2-6)

A : PCIe SSD High Performance
C : CompactFlash™
D : PCIe SSD High End
E : PCIe embedded (BGA)
F : CFast™
G : CFexpress™ Card
M : eMMC
N : PCIe module
S : SD
U : USB
X : SATA

FORM FACTOR (7-8)

BA : BGA 100 ball
BB : BGA 153 ball
CA : CFast™
CE : CFexpress™ Card
CF : CompactFlash™
DA : SD Memory Card
DB : Multimedia Card
DM : microSD Memory Card
EA : E1.S (5.9mm)
EB : E1.S (9.5mm)
EC : E1.S (15mm)
ED : E1.S (25mm)
MA : M.2 2230
MB : M.2 2242
MC : M.2 2260
MD : M.2 2280
MH : M.2 1620 BGA
SA : 2.5" SATA (7mm)
SB : 2.5" SATA (9mm)
SM : mSATA
SS : slimSATA
UB : U.3 (15mm)
UD : U.2 (15mm)
...

DENSITY (9-12)

0032 – 0512 : 32 MB – 512 MB
1024 - 2048 : 1 GB – 2 GB
004G – 960G : 4 GB – 960 GB
1T92 - 15T4 : 1.92TB - 15.4 T

STD (21-23)

FIRMWARE REVISION (18)

HARDWARE GENERATION (14)

TEMPERATUR RATING (13)

I : Industrial Temp. (-40°C to +85°C)
E : Extended Temp. (-25°C to +85°C)
C : Commercial Temp. (0°C to +70°C)
A : Automotive Temp. (-40 to + 105°C)

Made in Germany

Made in Germany

System in Package

System-in-Package (SiP) is the umbrella term for using advanced packaging and assembly technologies to integrate and test sensitive bare silicon dies or chips (active circuits) and supporting components (passives) into robust finished modules or components. Together with integrated software or firmware this will create a fully functional system solution.

From the very beginning, Swissbit successfully uses advanced packaging technologies to achieve the smallest form factors and to build multi-chip-packages. Moreover, Swissbit develops unique test hard- and software solutions for dedicated applications and temperature ranges.
With this electronic integration and testing approach, our products provide more functionality inside one package, various functional blocks (RF, digital, sensors, security, and memory) and passive components are combined. Having all necessary capabilities in-house we have the best design for reliability, test and manufacturing.
For our highly-integrated SiPs (e.g. e.MMC BGA) we developed processes for stacking multiple large dies, wire bonding the smallest bond pads, molding the narrowest clearances and balling BGA components.

Swissbit provides different assembly and packaging technologies (e.g SMT, CoB, FlipChip) in one single unit. The concentration of strong engineering and design knowhow and experience enables new, innovative electronic packages and devices for a wide range of applications.
Our customers benefit from a reduced development cost and higher yields and reliability. We use smart production organizations, which allows the production of small volume series with short lead times and on-time delivery in high product variations.
Swissbit produces and develops in accordance with ISO 9001, IATF 16949, ISO 27001 and ISO 14001 approved processes and is an experienced partner for global industrial and automotive accounts.

- Conformal Coating/Underfill
- Chip Bonding Die Stacking
- Flip Chip
- SMT
- FW & Data Pre-load
- Balling
- Grinding & Dicing
- Wire Bonding
- Die Attach / Adhesive Apply
- Housing
- Film Assisted TransferMolding
- Separation / Singulation
- Marking
- Testing Burn In
- Substrate PCB

Customization @ Swissbit

Your application is a unique solution which fulfills your customer requirements. Maybe standard memory products from the shelf don't fit for you. You have special needs regarding functionality, endurance, performance, reliability, labeling, tractability, identification, marking, design, branding, colors, regulations, approvals, data pre-load, packaging or others.
Therefore, we provide customized solutions to your specific requirements. We customize our product according your specific needs to solve your problems, reduce TCO, make your application better and your work easier. Together we analyze your application and find a solution within a short response time.

Configuration & Firmware Customization

Standard memory products may not always be optimized for a particular application's specific needs. We bridge this gap by customizing firmware and individual configurations, resulting in an optimized system performance and extended application functionality. Tailored configurations, tuned signal settings, and security features ensure increased system reliability, longevity, and security.

Labeling, Marking, Design, and Branding

To simplify product identification and handling, we offer the option to customize labeling, marking, and branding. By incorporating customer logos, specific part numbers, and QR or Data matrix codes, businesses can streamline logistics, enhance recognition and tracking, and protect against the use of unapproved memory products.

Pre-Load Service

The burden of software uploading and configuration during production can be eliminated with our Pre-Load Service. You can have your desired image, pre-format, or certificates loaded onto the memory device, reducing total cost of ownership, simplifying handling, and minimizing stock items.

Thermal Solutions

The performance behavior of storage modules can be affected by temperature variations. Swissbit tackles this by providing identification and simulation of real-world performance under varying temperatures. Our proven cooling concepts and tuning of thermal throttling behavior optimize system performance and reduce risks and costs in product development.

Environmental Protection

For applications requiring additional protection against hazardous gas and harsh environmental conditions, Swissbit offers a special protective coating on selected products. This enhances product reliability, service life, and resistance to moisture and corrosion.

Customized Packaging

Swissbit addresses logistical challenges by offering customized packaging options. Whether it's JEDEC Tray, Tape & Reel, Jewel case, or individual ESD packaging, you can benefit from simplified logistics and optimized automation production on your end.

Partnering with Swissbit: Unleashing the Full Potential

If you want to optimize system performance, enhance reliability and security, streamline logistics, and meet special industry-specific standards then contact our support team! With our cutting-edge production facility and technical expertise, we are pleased to help you easily achieve your specific project goals. Whether it's a complex technical requirement or a seemingly simple adjustment, customization is not just an option but an indispensable aspect of our product offering.

Security Technology for Industrial Systems and Corporate Security

Tamper-resistant hardware security modules and authentication keys protect industrial systems and corporate security

In an increasingly connected world, security is not optional – it's essential. From safeguarding sensitive data to verifying identities, robust authentication and cybersecurity are at the heart of digital trust.

Core security principles like authentication, encryption and secure storage protect systems and data across enterprise, government, public sector, and critical infrastructure. From industrial IoT to healthcare and smart cities, cybersecurity is key to safe, trusted digital operations.

Authentification Technology

Authentication is fundamental to digital trust, ensuring only authorized individuals access critical systems—from personal data to national infrastructure. In finance, it prevents fraud; in healthcare, it protects patient privacy; in manufacturing and aviation, it secures operations and continuity. As digital transformation accelerates, strong authentication enables secure innovation across industries.

Embedded Hardware based Security: The Foundation of Trust

Embedded hardware-based security is essential in protecting systems at their core, offering robust, tamper-resistant protection that software alone cannot guarantee.

At Swissbit, we enable cybersecurity through a range of certified, high-performance hardware solutions – including our Security Upgrade Kit, TSE modules, and Hardware Security Modules (HSMs). These solutions support industries with high security and compliance demands: retailers use signing modules for legally compliant transaction logging, industrial IoT systems rely on HSMs for secure device identities, and critical infrastructure operators use upgrade kits to strengthen their systems. Across sectors, from manufacturing to finance, we provide the foundation for trusted, hardware-anchored cybersecurity.

Trusted European Manufacturing

Made in Germany

Swissbit security products are manufactured in Berlin, Germany. European manufacturing provides supply chain transparency and traceability critical for deploying hardware security modules in defense, financial services, and government applications where component origins must be verifiable.

Decades of Security Expertise

Swissbit has developed hardware security solutions for industrial applications for over a decade. Our security portfolio spans FIPS-certified hardware security modules, FIDO authentication keys, and embedded security designed for long lifecycles in industrial automation, medical devices, and critical infrastructure.

Protect Your Digital Identity

iShield Key 2 – The strongest and most flexible hardware authentication

Swissbit makes the digital world safer and more convenient by protecting users' digital identities – on websites, in applications, across online services, and within company networks. It even secures physical access control. 90% of internet users are concerned about having their passwords compromised – and not without reason. Compromised credentials are the most common cause of malicious attacks, accounting for 61% of breaches.

The Swissbit iShield Key 2 series offers the strongest authentication, simultaneously simple, secure, and flexible. It actively protects users from online attacks, such as phishing, social engineering, and account takeover. Swissbit iShield Key 2 series complies with worldwide cybersecurity regulations including NIS-2 in the EU and the zero-trust strategy outlined by the OMB for US agencies.

Feature	iShield Key 2 FIDO2 USB-C	iShield Key 2 FIDO2 USB-A
FIDO2	✓	✓
PIV (Smartcard)	✓	✓
OTP (HOTP, TOTP)	✓	✓
Up to 300 passkeys	✓	✓
MIFARE	✓	✓
FIPS	✓	✓
HID SEOS	✓	✓

Broad Compatibility: Works with hundreds of services supporting FIDO2 and U2F (Google, Microsoft, AWS, etc.)

Standards: Supports FIDO U2F, FIDO2 (CTAP2.1), FIPS 140-3 Level 3, and optional Enterprise Attestation

Passkeys: Store up to 300 passkeys

Mobile Access: Quick, touch-and-go authentication with NFC

Remote Updates: Firmware updates supported remotely

Digital Signatures: Enables digital signing capabilities

Robust Security: Public/private key cryptography, HOTP (Event), TOTP (time-based), Smartcard (PIV-compatible), OpenSC compatibility

Physical Access: Supports MIFARE DESFire EV3 for secure access and additional features like payments, memberships, and digital tickets. Optional support for HID Seos, LEGIC advant/neon

Manufactured in Germany: Built with precision and quality

Data Protection Solution

Made in Germany

iShield Archive

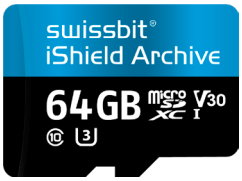
Reliable Encryption and Access Protection of Data

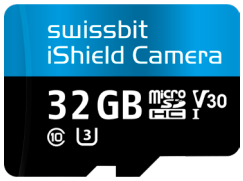
The microSD card Swissbit iShield Archive is a simple and retro-fittable security solution especially for the encryption and access protection of any data. It is plug-and-play and can optionally be used in WORM mode with role based access.
The solution also includes the
"**iShield Archive Card Tool**" (iAT) software.

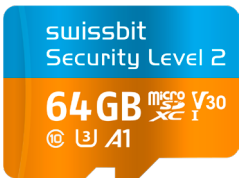
iShield Camera

Reliable Encryption and Access Protection of Video and Photo Data

The microSD card Swissbit iShield Camera is a simple and retro-fittable security solution especially for the encryption and access protection of video recordings. It is host-independent, i.e. plug-and-play, and can be used with a large number of camera types.
The solution also includes the
"**iShield Camera Card Tool**" (iCCT) software.







Security Upgrade Kit

Enhance data protection and ensure secure access, perfectly suited for retrofit solutions

With the Security Upgrade Kit, we want to significantly improve data security and individual access control for companies. In addition to compliance with relevant cyber security requirements, the user-friendly Security Upgrade Kit offers an industry-grade Security Level 2 microSD card at its core. The kit also includes hardware-based access control, real-time data encryption and the customization of protection profiles. As a retrofit solution, the Security Upgrade Kit offers maximum flexibility.

POS / RETAIL

Fiscalization in Europe

Across Europe, electronic point-of-sale (POS) systems are subject to country-specific fiscal regulations designed to prevent manipulation of transaction data and to ensure transparency, integrity and auditability. Swissbit supports POS manufacturers, system integrators and platform providers with proven security, storage and fiscal technologies that enable a legally compliant, scalable and future-proof implementation of national fiscal requirements. Swissbit acts strictly as a technology and component provider and does not perform any certifying, supervisory or governmental functions.

Germany

Swissbit offers both hardware-based TSE products in multiple form factors and cloud-based TSE solutions. Swissbit products provide the technical basis for compliance, while system manufacturers and operators remain responsible for correct integration and operation.

Relevant Swissbit products:

- Hardware TSE (USB, SD, microSD), Swissbit Cloud TSE
- Supporting tools for fiscal reporting and data export

France

Austria

Swissbit provides technical security and storage components that support the implementation of these principles at system level.

Relevant Swissbit products:

- Secure storage components for fiscal data
- Security building blocks for transaction logging and integrity protection
- Components suitable for local, cloud-based and hybrid POS architectures

Romania

Swissbit supplies specialized storage solutions that are used as components within nationally approved fiscal devices.

Relevant Swissbit products:

- WORM-based storage cards
- Fiscal journal and memory cards
- Industrial-grade embedded storage

Slovakia

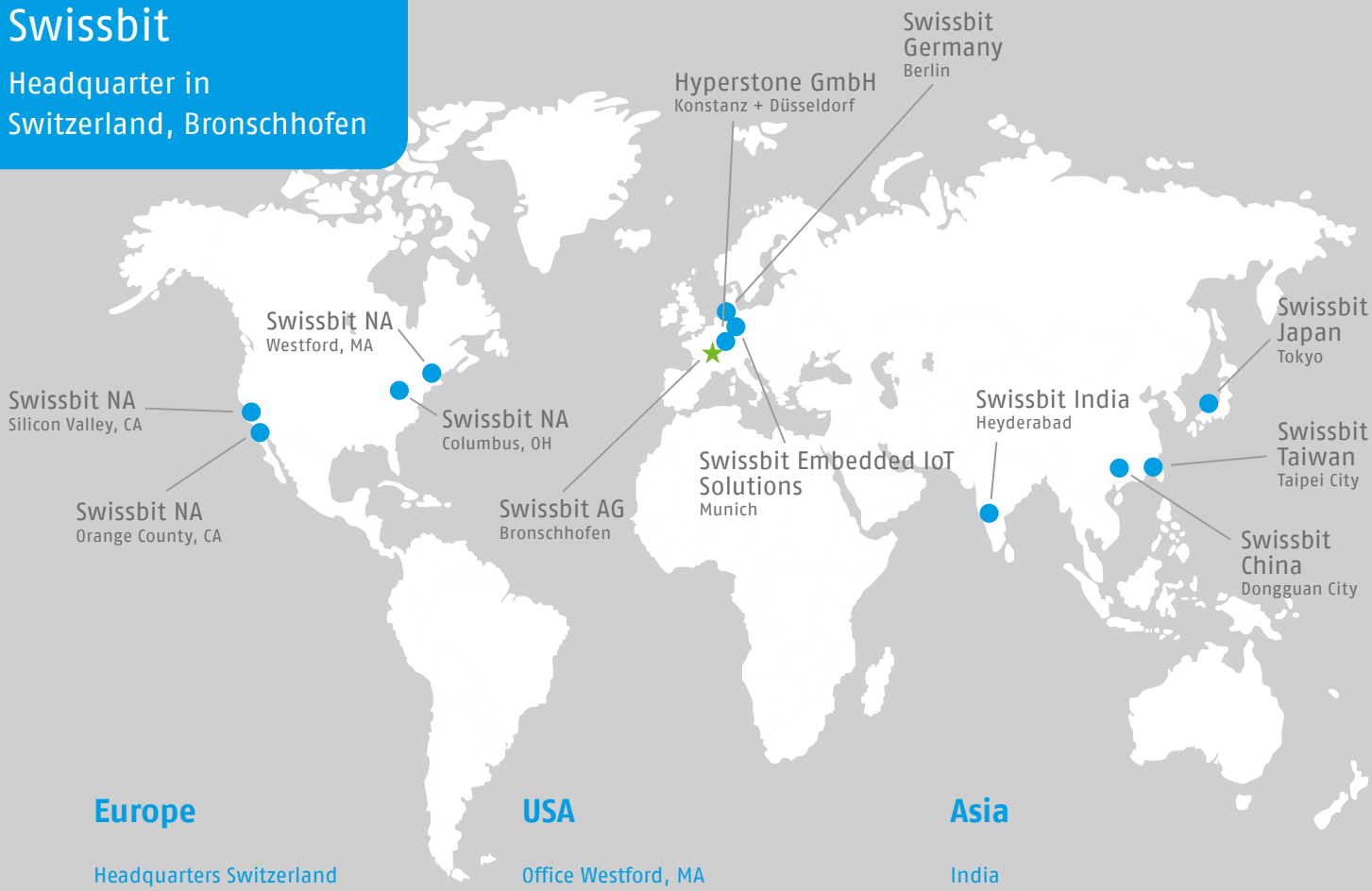
Swissbit provides storage technologies that are used as technical components within compliant fiscal systems. Responsibility for system-level compliance remains with the system manufacturer and operator.

Relevant Swissbit products:

- WORM-based storage solutions
- Embedded industrial memory for fiscal devices

Swissbit

Headquarter in
Switzerland, Bronschhofen



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