

Product Guide

Providing Trust in Data & Identities

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

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

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Key segments we address



Industrial Automation



Edge Computing



Critical Infrastructure (Medical, Financial, Utilities)



Industrial PC



Enterprise & Networking/ Communications



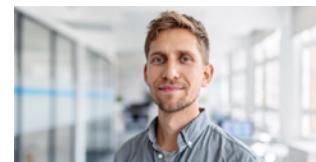
Transportation



Defense



Public Sector & Governmental Agencies





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



Core



IoT

Datacenter

Enterprise

Networking

Telecom

IoT

Applications

- 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

- Workload optimization
- Computational storage
- Software defined storage
- Reduction CO2 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

- PCIe U.3 Gen4
- PCIe EDSFF: E1.S, E3, E1.L

- PCIe m.2
- PCIe U.3 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
- CExpress
- eMMC, PCIe BGA

Swissbit Products

D2200

N3202, D2200
A1x00, X-75

N2x00, E2x00, N3x00,
N3202, X-7xm2

N2x00, E2x00, EM-3x
U-58, S-5x(u), S-600(u)

S-600(u), S-5x(u)
C-56, F-86, G2x00
EM-30, E2x00

Datacenter 2.5" PCIe SSD

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



Information

Type	U.2 Datacenter SSD
Standard & Interface	PCIe Gen 5.0 x4 lanes / NVMe 2.0b
Form Factor	U.2
Outline Dimensions	100.4 mm x 69.9 mm x 14.8 mm
Flash Type	3D NAND eTLC
Density Range	3.84 TB - 15.4 TB
Data Retention	1 year @ life begin 3 months @ life end
Endurance [DWPD] Enterprise	1 DWPD for 5 years

Temperature

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

Performance

Sequential Read (MB/s)	up to 14,000
Sequential Write (MB/s)	up to 10,000
Random 4KB Read (IOPS)	up to 2,600k
Random 4KB Write (IOPS)	up to 510k
FTL/Cache Support	DDR4 DRAM

Robustness

MTBF	≥ 2,000,000 hours
Data Reliability	< 1 sector per 10 ¹⁷ bits

Electrical Data

Voltage	VCC: 12 V ± 8%
Average Power, Mixed Rd/Wr	< 20 W

Feature List

Features & Tools	<ul style="list-style-type: none">powersafe™ functionalityFull Data Path ProtectionS.M.A.R.TFlexible power managementHot pluggableTRIMMulti-namespace support up to 128 EUI64/NGUIDSupport NVMe-MI 1.2b, support MCTP over SMBusFirmware upgrade without resetTimestampTelemetryWeighted Round Robin (WRR)Persistent event logAES-XTS 256 data encryptionTCG OPAL 2.0Secure bootCrypto erase
More Information	For more details see www.swissbit.com/product-finder

PCIe SSD Modules

N2000 / N2600

N3000 / N3602 / N3202

A1200 / A1000

D2200 E1.S



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 5.0 x4 / NVMe 2.0b
Form Factor	M.2 2280, 2242, 2230	M.2 2280, 2242	E1.S 9.5 mm
Outline Dimensions	80, 42, 30 x 22 x 3.5 mm	80, 42 x 22 x 3.58 mm	111.25 x 33.7 x 9.5 mm
Flash Type	3D NAND TLC / pSLC	3D NAND TLC / pSLC / eTLC	3D NAND eTLC
Density Range ¹⁾	TLC: 60 GB – 480 GB pSLC: 20 GB – 160 GB	TLC: 240 GB – 3,840 GB pSLC: 80 GB – 320 GB eTLC: 240 GB – 1,920 GB	480 GB – 1.92 TB 3.84 TB – 7.68 TB
Data Retention	TLC, pSLC: 10 years @ life begin / 1 year @ life end eTLC: 3 years @ life begin, 4 months @life end		
Endurance	Enterprise ²⁾ up to 0.32 / 9.1 DWPD	up to 0.8/15.3/1.5 DWPD	1 DWPD
1 years @ life begin / 3 months @ life end			
1 DWPD	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 Extended: -25 to +85 °C	Commercial: 0 to +70°C
Storage Temperature	-40 to +85 °C			

Performance

Sequential Read (MB/s)	up to 1,770 / 1,750	up to 3,850 / 3,850 / 3,850	up to 6,810	up to 14,000
Sequential Write (MB/s)	up to 830 / 830	up to 3,340 / 3,350 / 3,340	up to 1,890	up to 10,000
Random 4KB Read (IOPS)	up to 140k / 140k	up to 455k / 393k / 461k	up to 1,220k	up to 2,600k
Random 4KB Write (IOPS)	up to 130k / 130k	up to 457k / 516k / 380k	up to 425k	up to 470k

Robustness

MTBF	≥ 2,000,000 hours	≥ 3,000,000 hours	≥ 2,000,000 hours
Shock		1,500 g, 0.5 ms	1,000 g, 0.5 ms
Vibration		50 g, 80 – 2,000 Hz	20 g, 20 – 2,000 Hz
Humidity		85% RH 85 °C, 1,000 hrs	5% – 93% RH

Electrical Data

Voltage	3.3 V ± 5%	12 V (- 20%, + 10%)
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Feature List

Features & Tools ¹⁾	HMB support (Host Memory Buffer)	DRAM support HW powersafe™ on 2280(P)	DDR4 DRAM support HW powersafe™	DDR4 DRAM support HW powersafe™
	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			
E2E Data Protection S.M.A.R.T Flexible power mgmt Multi-namespace support EUI64/NGUID 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				

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

2.5" SATA 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. The X-7X range is based on 3D NAND TLC with focus on best TCO. The X-76 is the flagship with 3D NAND pSLC offering best endurance per cost.

X-600 / X-66 / X-60



X-75 / X-75 P



X-73 / X-76



Information

Type	2.5" SATA Gen3 SSD		
Interface Data Transfer Mode	SATA Gen3 -6Gb/s		
Connector	ATA8		
Outline Dimensions	15 + 7 pin Serial ATA		
Flash Type	SLC / pSLC / MLC	3D NAND TLC	3D NAND TLC / pSLC
Density Range	SLC: X-600: 8 GB – 256 GB pSLC: X-66: 16 GB – 480 GB MLC: X-60: 30 GB – 960 GB	X-75: 60 GB – 1,920 GB X-75 P: 120 GB – 1,920 GB	X-73: 30 GB – 1,920 GB X-76: 10 GB – 320 GB
Data Retention	10 years @ life begin 1 year @ life end		
Endurance [DWPD]*	36.3 / 15.1 / 2.3	max 1.2 / 1.2	max 1.2 / 22.7

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 / 525	up to 565 / 560	up to 565 / 560
Sequential Write (MB/s)	up to 425 / 450 / 460	up to 495 / 500	up to 495 / 480
Random 4KB Read (IOPS)	up to 79,000 / 80,000 / 74,300	up to 77,200 / 77,700	up to 77,200 / 74,000
Random 4KB Write (IOPS)	up to 76,000 / 75,000 / 77,900	up to 79,400 / 69,600	up to 79,400 / 84,900

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%	5 V ± 10%
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Feature List

Features & Tools	FW based Power Fail Safety NCQ, TRIM AES 256 Encryption optional SBDM Tool & SDK	HW powersafe™ protection optional	FW based Power Fail Safety
		E2E Data Path Protection AES 256 Encryption optional TCG OPAL optional	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 SSD Modules

Information			
Type	M0-300 mSATA	M0-297 SLIM SATA	M.2 2242
Interface Data Transfer Mode		SATA Gen3 -6Gbit/s ATA8	
Connector	52 pos. Edge Connector PCI Express (PCIe) mini	15 + 7 pin Serial ATA Connector	75 pos. Edge Connector B & M key
Outline Dimensions	50.8 x 29.85 mm	54 x 39 mm	22 x 42 mm
Thickness (MAX)	3.8 mm	4.0 mm	3.58 mm
Flash Type	SLC		
Density Range	8 GB - 128 GB	16 GB - 128 GB	8 GB - 64 GB
Data Retention	10 years @ life begin 1 year @ life end		
Endurance [DWPD]*	33.8		
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)	up to 520	up to 520	up to 520
Sequential Write (MB/s)	up to 405	up to 245	up to 405
Random 4KB Read (IOPS)	up to 76,000	up to 76,000	up to 76,000
Random 4KB Write (IOPS)	up to 73,000	up to 54,000	up to 73,000
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%	5 V ± 10%	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)		
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 SSD Modules

Equally to the SATA 2.5" drives, the Swissbit mSATA (M0-300), SLIM SATA (M0-297) and the 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 X-86, X-75, X-76, X-60, X-66 and X-600 target different use cases including OS booting, data logging, surveillance recording or vaulting. The X-78m2 additionally targets light enterprise applications.

	X-66m2	X-66m2 / X-60m2	X-60s	X-66m / X-60m
pSLC		Only X-60m2		
MLC				
Information				
Type	M.2 2242	M.2 2260 / 2280	M0-297 SLIM SATA	M0-300 mSATA
Interface Data Transfer Mode			SATA Gen3 – 6Gbit/s ATA8	
Connector		75 pos. Edge Connector B & M key	15 + 7 pin Serial ATA Connector	52 pos. Edge Connector PCI Express (PCIe) mini
Outline Dimensions	22 x 42 mm	22 x 60 / 80 mm	54 x 39 mm	50.8 x 29.85 mm
Thickness (MAX)	3.58 mm	3.58 mm	4.0 mm	3.8 mm
Flash Type	pSLC	pSLC / MLC	MLC	pSLC / MLC
Density Range	pSLC MLC	16 GB – 120 GB 30 GB – 960 GB	16 GB – 240 GB 30 GB – 960 GB	30 GB – 480 GB 30 GB – 480 GB
Data Retention			10 years @ life begin 1 year @ life end	
Endurance [DWPD]*	13.2	13.2 / 2.0	2.0	13.2 / 2.0
Temperature				
Operating Temperature			Commercial: 0 °C to +70 °C Industrial: -40°C to $+85^{\circ}\text{C}$	
Storage Temperature			-40°C to $+85^{\circ}\text{C}$	
Performance				
Sequential Read (MB/s)	up to 520	up to 520 / 520	up to 520	up to 520 / 520
Sequential Write (MB/s)	up to 415	up to 450 / 460	up to 450	up to 450 / 450
Random 4KB Read (IOPS)	up to 80,000	up to 80,000 / 75,000	up to 75,000	up to 80,000 / 75,000
Random 4KB Write (IOPS)	up to 73,000	up to 75,000 / 75,000	up to 75,000	up to 75,000 / 75,000
Robustness				
MTBF			$\geq 2,000,000$ 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 \pm 5%	5 V \pm 10%	3.3 V \pm 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)		
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 SSD Modules

X-86m2



**X-75m2 / X-75m2 (P)
X-76m2 / X-78m2**



**X-75s / X-76s
X-78s**



**X-75m / X-76m
X-78m**



Information

Type	M.2 2242	M.2 2280	M0-297 SLIM SATA	M0-300 mSATA	
Interface Data Transfer Mode	SATA Gen3 –6Gbit/s ATA8				
Connector	75 pos. Edge Connector B & M key		15 + 7 pin Serial ATA	52 pos. PCI Express (PCIe) mini	
Outline Dimensions	22 x 42 mm	22 x 80 mm	54 x 39 mm	50.8 x 29.85 mm	
Thickness (MAX)	3.58 mm	3.58 mm	4.0 mm	3.8 mm	
Flash Type	3D NAND pSLC	X-75*: 3D NAND TLC X-76*: 3D NAND pSLC X-78*: high endurance 3D NAND pSLC			
Density Range	X-86m2: 10 GB – 160 GB	X-75m2: 30 GB – 960 GB X-76m2: 10 GB – 160 GB X-78m2: 40 GB – 320 GB	X-75m2: 30 GB – 1,920 GB X-75m2P: 240 GB – 1,920 GB X-76m2: 10 GB – 320 GB X-78m2: 40 GB – 640 GB	X-75s: 30 GB – 960 GB X-76s: 10 GB – 320 GB X-78s: 40 GB – 320 GB	X-75m: 30 GB – 960 GB X-76m: 10 GB – 320 GB
Data Retention	10 years @ life begin 1 year @ life end X-78m2: 3 months at EOL				
Endurance [DWPD]*	X-86: max 13.3	X-75*: max 1.2 X-76*: max 22.7 X-78m2: 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 370	up to 565/560/560	up to 565/560	up to 565/565	up to 565/560
Sequential Write (MB/s)	up to 225	up to 495/480/490	up to 500/480	up to 495/490	up to 495/480
Random 4KB Read (IOPS)	up to 13,100	up to 76,000/72,900/72,900	up to 77,700/74,000	up to 73,600/77,400	up to 73,600/74,000
Random 4KB Write (IOPS)	up to 8,300	up to 79,400/84,900/85,900	up to 79,400/84,900	up to 79,400/84,900	up to 79,400/84,900

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	3.3 V ± 5%	5 V ± 10%	3.3 V ± 5%
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Feature List

Features & Tools	E2E Data Path Protection AES 256 Encryption (optional) / TCG OPAL 2.0 (optional) FW based Power Fail Safety X-75m2 P: HW powersafe™ protection 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.

G2000



G2600

Information

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 x 29.6 x 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 830	up to 930
Random 4KB Read (IOPS)	up to 140k	up to 138k
Random 4KB Write (IOPS)	up to 134k	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%	
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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

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 cost/performance optimized 3D NAND F-86. The different product families are equipped with a rich feature set and are fulfilling the high Swissbit quality requirements.



Information

Type	CFast™ Card				
Interface	CFast™ 2.0 – SATA Gen3 6Gbit/s ATA8				
Data Transfer Mode	CFast™ Type I				
Connector	CFast™ Type I				
Outline Dimensions	36.4 x 42.8 x 3.6 mm				
Flash Type	SLC	3D NAND pSLC	SLC	pSLC / MLC	pSLC / MLC
Density Range	2 GB – 64 GB	10 – 160 GB	4 GB – 64 GB	pSLC: 4 GB – 120 GB MLC: 8 GB – 240 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	36.3	13.3 / 1.98	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)	up to 320	up to 375	up to 520	up to 520 / 520	up to 510 / 500
Sequential Write (MB/s)	up to 170	up to 225	up to 245	up to 415 / 180	up to 415 / 330
Random 4KB Read (IOPS)	up to 10,500	up to 13,100	up to 76,000	up to 80,000 / 72,000	up to 32,00 / 53,500
Random 4KB Write (IOPS)	up to 7,100	up to 8,500	up to 54,000	up to 75,000 / 43,000	up to 66,000 / 74,000

Robustness

MTBF	≥ 2,000,000 hours				
Shock	500 g, 0.5 ms	1,500 g, 0.5 ms			500 g, 1 ms
Vibration	20 g, 80 – 2,000 Hz	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%				
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Feature List

Features & Tools	E2E Data Path Protection	–							
	Proven Power Fail Safety SBDM Tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring F-86 / F-6x: 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

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



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



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					
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)	up to 95	up to 95	up to 97	up to 97
Sequential Write (MB/s)	up to 55	up to 84	up to 38	up to 90
Random 4KB Read (IOPS)	up to 1200	up to 1,960	up to 3,750	up to 4,950
Random 4KB Write (IOPS)	up to 1200	up to 780	up to 1,800	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
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Feature List

Features & Tools	Support SD SPI mode, Proven FW based Power Fail Safety, Sophisticated Wear Leveling & Bad Block Mgmt, Autonomous Data Care Mgmt, 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
	Optimized for high read/write traffic for demanding industrial applications, Read Disturb Mgmt, Autonomous Data Care Mgmt, Real industrial temperature range with full cross temperature support, Proven FW based Power Fail Safety		
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	SD 6.1, UHS-I, speed class 10/U3/V30/A2	SD 6.1, UHS-I, speed class 10/U3/V30/A2
Connector	microSD			
Outline Dimensions	15 x 11 x 0.7 / 1 mm			
Flash Type	SLC	3D NAND TLC	3D NAND pSLC	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	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			
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Feature List

Features & Tools	Optimized for high read/write traffic for demanding industrial applications, Read Disturb Mgmt, Autonomous Data Care Mgmt, Real industrial temperature range with full cross temperature support, Proven 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
More Information	For more details see www.swissbit.com/product-finder		

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.



Information

Type	eUSB Flash Module				
Interface	USB 3.1				
Data Transfer Mode	Super Speed / High / Full				
Connector	Standard: 2.54 mm -10 Pin (key option) Low Profile: 2.00 mm -10 Pin (key option)				
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)	up to 174 / 175 / 180	up to 180 / 190 / 150	up to 197 / 156		
Sequential Write (MB/s)	up to 91 / 110 / 76	up to 100 / 110 / 60	up to 126 / 64		
Random 4KB Read (IOPS)	up to 2,980 / 3,200 / 4,100	up to 3,700 / 4,000 / 3,200	up to 3,850 / 2,850		
Random 4KB Write (IOPS)	up to 1,060 / 1,100 / 1,680	up to 2,000 / 1,500 / 900	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

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 Mixoo 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		
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 27 / 25 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 240 / 230
Sequential Write (MB/s)	up to 21 / 120	up to 230	up to 90 / 30
Random 4KB Read (IOPS)	up to 3,800 / 6,700	up to 39,500	up to 2,000 / 4,500
Random 4KB Write (IOPS)	up to 1,400 / 6,700	up to 41,500	up to 1,600 / 1,200

Electrical Data

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

The EN-20 is a PCIe 3.1 /NVMe 1.3 product with DRAM support and up to 4 lane operation mode offers both a high performance and short latency for modern applications. Data care management with background adaptive read refresh and media scan maintains the retention of the Flash blocks and enables long product utilization even for sparsely writing applications. For high endurance demand the EN-26 with 3D NAND pSLC offers tenfold higher endurance compared to EN-20. E2000 and E2600 are latest upgrades with new high density NAND Flash.

EN-20 / E2000



EN-26 / E2600

Information

Type	PCIe M.2 1620 BGA	
Standard & Interface	PCIe Gen 3.1 x4 / NVMe 1.3	
Package	BGA, 0.8mm pitch	
Outline Dimensions	16 x 20 x 1.8 mm	
Flash Type	3D NAND TLC	3D NAND pSLC
Density Range	15 GB – 480 GB / 60 GB – 960 GB	5 GB – 160 GB / 20 GB – 320 GB
Data Retention	10 years @ life begin 1 year @ life end	
Endurance [DWPD]*	Up to 1.8 / 2.2	Up to 54 / 78

Temperature

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

Performance

Sequential Read (MB/s)	up to 1,770 / 1,750	up to 1,780 / 1,780
Sequential Write (MB/s)	up to 750 / 860	up to 760 / 870
Random 4KB Read (IOPS)	up to 140k / 140k	up to 140k / 89k
Random 4KB Write (IOPS)	up to 112k / 134k	up to 136k / 136k

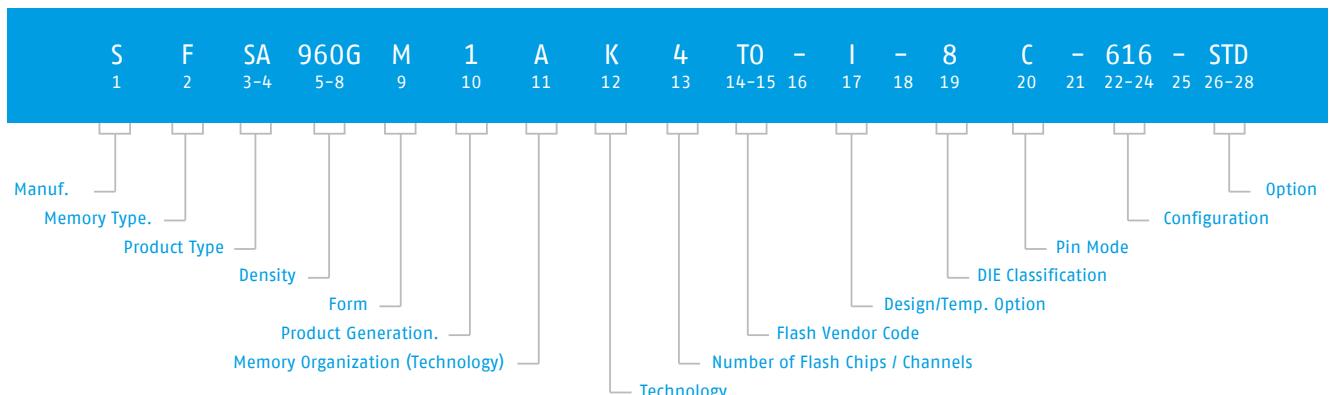
Electrical Data

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
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

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 : CFEExpress
 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

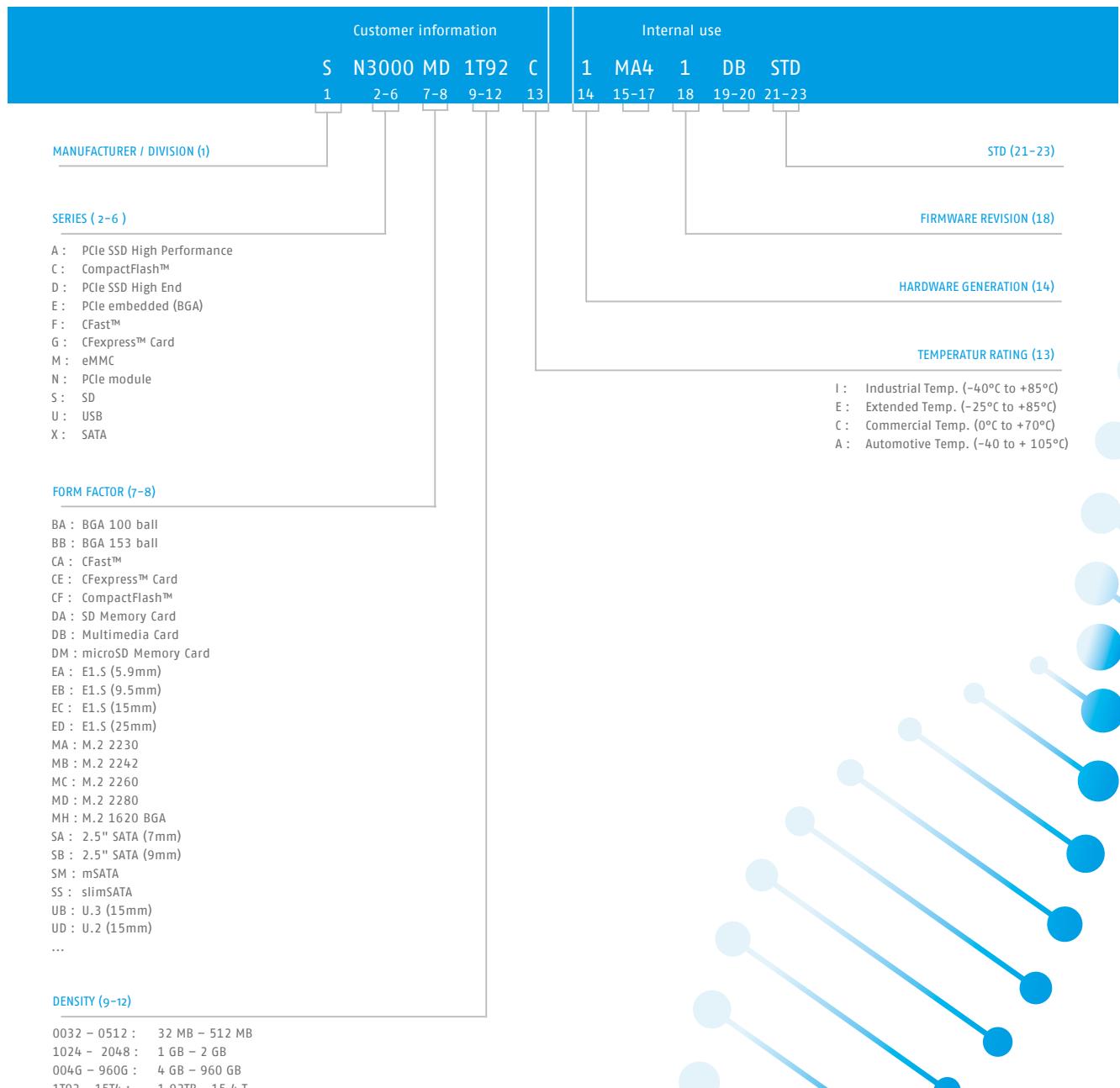
Density (5-8)

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





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



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. MicroSD Card) we developed processes for stacking multiple large dies, wire bonding the smallest bond pads, and molding the narrowest clearances.

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



Protect Your Digital Identity

iShield Key – 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 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 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	iShield Key 2 Pro	iShield Key FIDO2 MIFARE	iShield Key Pro MIFARE	iShield Key FIDO2 FIPS	iShield Key Pro FIPS
FIDO2	✓	✓	✓	✓	✓	✓
PIV (Smartcard)		✓		✓		✓
OTP (HOTP, TOTP)		✓		✓		✓
At least 300 passkeys	✓	✓	✓	✓	✓	✓
MIFARE	✓	✓	✓	✓		
FIPS	✓	✓			✓	✓



Data Protection Solution

Made in Germany

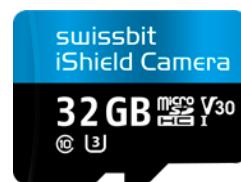
The easiest and most secure way to archive data

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.

Secure video and photo recording

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.





Secure Embedded Systems

Easy-to-integrate and retrofittable hardware based security products

Swissbit provides easy-to-integrate and retrofittable hardware based security products together with software development kits (SDK) and customization services, enabling manufacturers to offer systems with secured devices, secure data storage, and secure data communication.



Retrofittable plug & play hardware security module for IoT devices

The iShield HSM is a plug and play USB security anchor that allows system integrators to upgrade existing AWS IoT Greengrass devices with a hardware security module, making it the perfect retrofit solution for finished hardware designs & in field devices. iShield HSM securely stores the device's private key and certificate so that they aren't exposed or duplicated in software.



Security Upgrade Kit: create trust in your embedded system

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.





Swissbit TSE (Fiscal Solution)

Fiscal solution for Germany

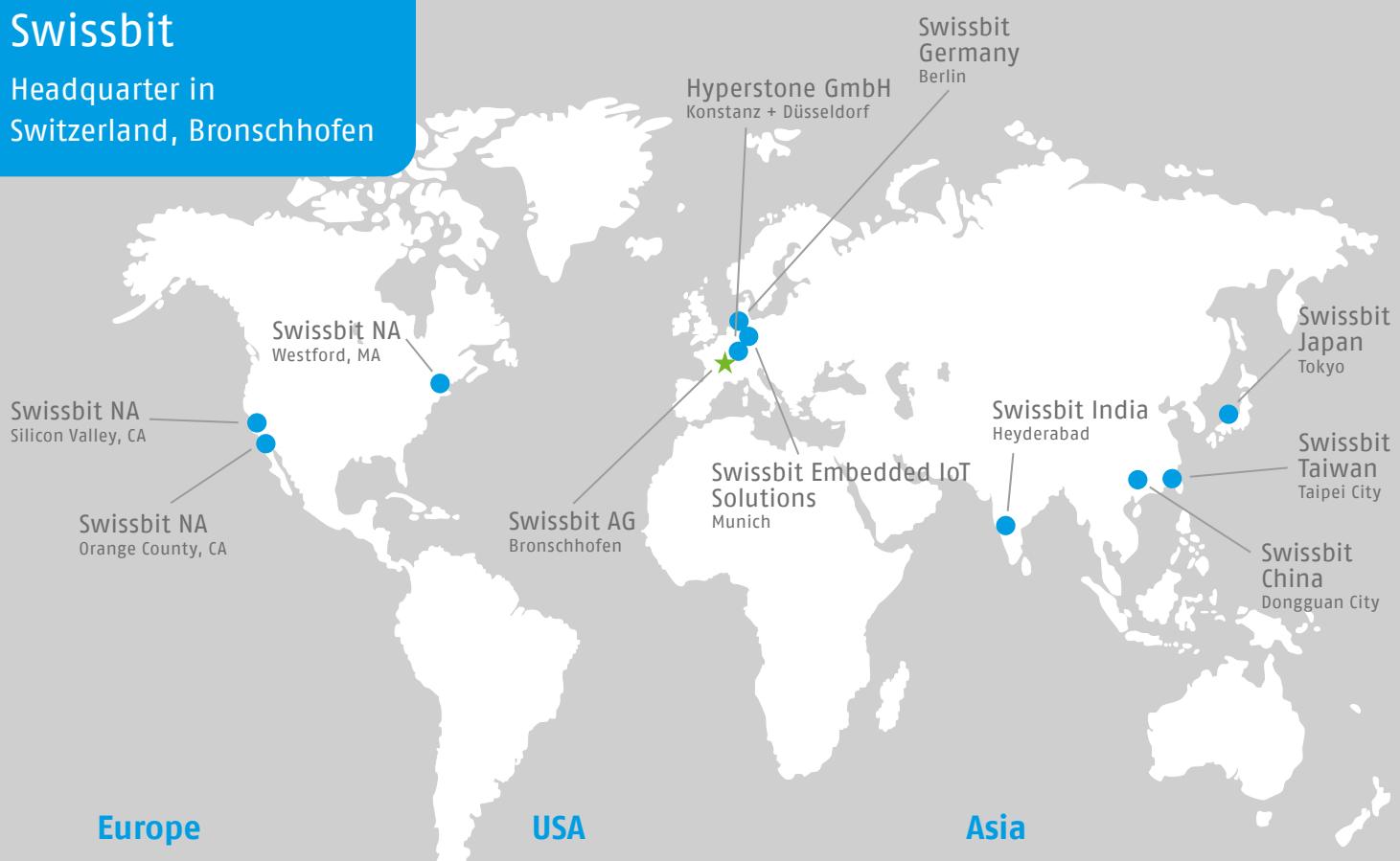
Swissbit is a complete provider of tamper proof recording solutions for POS data in accordance with the German Cash Security Ordinance (KassenSichV). Whether single devices, networked POS systems in a LAN or online capable POS systems with a cloud connection, Swissbit provides an easy to integrate, flexible and secure TSE connection for all scenarios. All TSE products have an optional connection to the fiscalization platform MeinFiskal of DATEV with further additional services



- **Standalone Solution**
- **LAN Solution**
- **Cloud Solution**

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