Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

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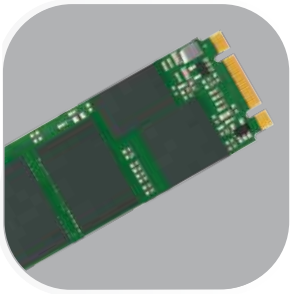
swissbit®

EMBEDDED MEMORY & STORAGE SOLUTIONS

AUTOMOTIVE COMMUNICATIONS INDUSTRIAL NETWORKING SECURITY



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WHY CHOOSE SWISSBIT

Swissbit, the largest independent embedded memory and storage solutions manufacturer in Europe, was created through a management buy-out from Siemens Semiconductor in 2001. With over 20 years of experience in the memory & storage industry Swissbit has become a world class leader in technology, supplying high quality, high reliability memory & storage solutions with all established DRAM and Flash interfaces.

Overview of services Swissbit is offering its customers:

PRODUCTS

- Complete line of DRAM modules and NAND Flash Solid State Drives with industry standard interfaces and form factors
- Both, leading edge technology and legacy product offerings
- Extended and Industrial temperature grade products
- Chip-On-Board (COB) and System-in-Package technology
- Small form factor removable NAND flash cards
- Memory In Package Solutions
- Mobile Security Solutions, like Secure Micro SD, SD and more
- Security firmware, drivers and SDK

SALES SERVICE AND ENGINEERING SUPPORT

- Fast, effective and competent sales staff on hand to serve your needs
- Our expert technical staff is available for quick response
- Joint product qualification service
- In-house manufacturing in Germany
- Design-in support

CUSTOMIZATION

- Custom memory & storage solutions
- Security features
- Individual marking
- Design-in support
- Conformal coating

OEM SERVICES

- Controlled Bill of Materials (BOM)
- Serialization and lot code tracking
- Support of long life cycles
- Stringent PCN and ECN process

TEST FOR RELIABILITY

- Final extended and industrial temperature testing with KTI and Tanisys Technology equipment
- World class Swissbit application testing
- System Level Test During Burn-In (TDBI) Environmental Testing according to industrial and automotive standards

COMPLIANCE TO

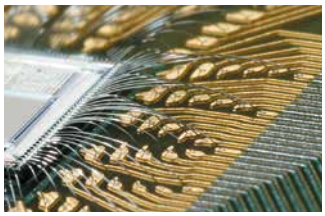
- JEDEC, SDA, CFA, USB-IF, SATA-IO
- RoHS, REACH, WEEE
- UL
- FCC, CE

QUALITY STANDARDS

- ISO 9001:2008
- TS 16949
- ISO 14001

ASSOCIATIONS

- JEDEC
- CompactFlash Association (CFA)
- SATA-IO
- USB Implementer Forum
- Secure Digital Association (SDA)
- Memory Implementers Forum
- Small Form Factor Special Interest Group SFF-SIG



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SWISSBIT TARGET APPLICATIONS

INDUSTRY

Typical applications:

Industrial Automation
- Process- / motion control
- Industrial PC / Embedded
- Industrial Measurement
- Building Technology
- Identification / Access Systems
- Surveillance

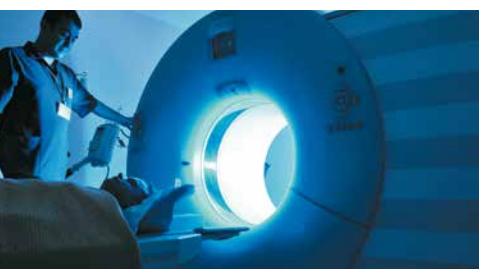
Energy
- Energy Distribution
- Energy Consumption
- Smart grid

Infotainment
- POS Terminals
- Information Terminals
- Ticket- / Vending Terminals
- Digital Signage & Advertising
- Casino Gaming
- VLTs & Lottery Terminals

Healthcare
- Diagnostics
- Point of Care testing
- Mobil Systems
- Imaging

Transportation
- Train Control and Monitoring Systems (TCMS)
- Multifunctional Terminals
- Data Recorders

Aerospace & Defense
- In-flight Entertainment & Communication (IFE&C)
- Communications, Command, Control and Intelligence (C4ISR)
- Combat Management Systems
- Battlefield Sensor Systems



Memory and Non-Volatile Storage solutions for embedded applications must provide reliable operation, even in the most extreme conditions (e.g., temperature, shock and vibration). As such, both the qualification cycle and the needed support life cycle for these products far exceed devices designed for typical consumer applications.
Swissbit's embedded memory & storage solutions are the perfect fit for such demanding applications. They offer highest reliability and quality with long availability and controlled BOM. In order to guarantee such high quality standards, each product undergoes thorough functional testing before being released for shipment.

AUTOMOTIVE

Typical applications:

- Entertainment Systems
- Navigation Systems
- Head unit / Dashboard
- Black box / Crash recorder

The increasing varieties of infotainment and dashboard applications in our cars today require significantly higher storage capacities than before. All components used in Automotive need to operate in a wide temperature range and withstand sudden power loss as well as shock and vibration. Additionally very low failure rates are essential as replacements of malfunctioning parts can incur high costs. Swissbit is the only independent embedded memory & storage manufacturer with TS16949. Our new S-40 SD and Micro SD Memory Card lineup caters to the demands of an automotive application, offering highest reliability and quality at competitive prices.

NETWORKING/COMMUNICATION

Typical applications:

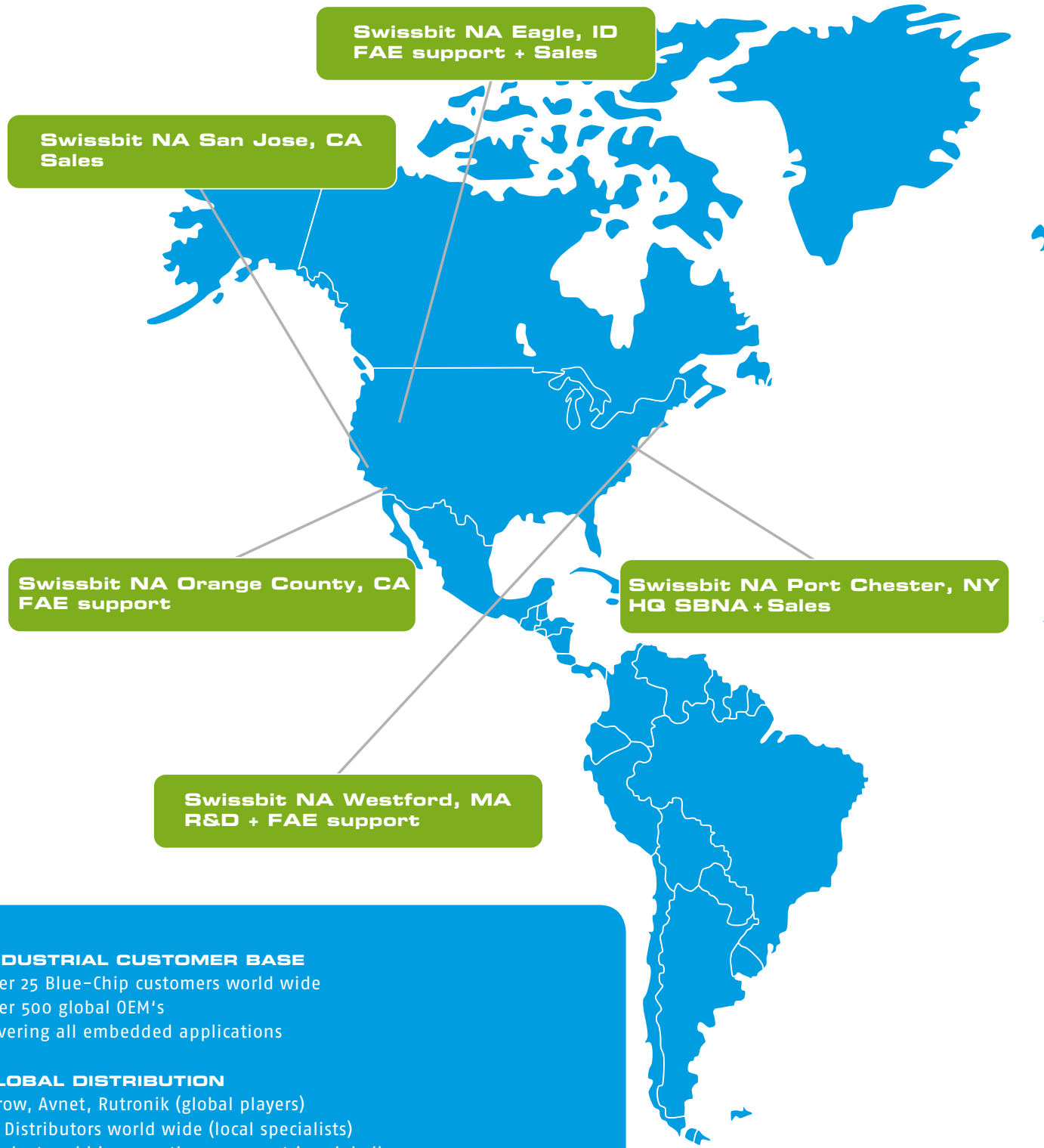
- Base Station (BTS)
- WiMAX (WAC)
- Radio Network Controller (RNC)
- Video / IPTV – transcoding / storage
- Signaling Gateway

Telecommunication infrastructure is implemented globally in every possible climate zone, therefore the equipment has to operate under most severe weather conditions such as heat, cold, humidity or dust. This results in a long and expensive qualification and testing process and the need for products that guarantee long-term availability in order to minimize the number of re-qualifications.
Our cards provide features that are particularly suitable for NetCom applications, where high reliability, longer duty cycles and on field firmware upgrade are key requirements.
Swissbit product portfolio is very much focused on product and form factors that will be dominant in the near future in NetCom sector, such as small form factors like our newest SATA III devices like M.2, mSATA and slimSATA.
Among our solutions, we have customized products able to guarantee a high level of random performance that meets or exceeds most NetCom application requirements.
Swissbit's embedded memory & storage solutions are tested specifically for rough environmental conditions and guarantee industry leading reliability standards. Long-term relationships with our suppliers allow us to guarantee a fixed BOM along with the highest possible longevity.

SECURITY

Governments, Enterprises, Banks and Industry demand for high-end security. Swissbit's secure storage solutions offer smart modularization of algorithms and secure storage of encryption keys in one runtime environment. Thus solution providers can fully concentrate on system design while the computation of cryptographic operations is delegated to the trusted execution environment e.g. a smart card in the flash memory device. The Swissbit Security Interface supports all relevant mobile, portable, embedded and PC platforms.

CLOSE TO OUR CUSTOMERS - GLOBAL PRESENCE



INDUSTRIAL CUSTOMER BASE
Over 25 Blue-Chip customers world wide
Over 500 global OEM's
Covering all embedded applications

GLOBAL DISTRIBUTION
Arrow, Avnet, Rutronik (global players)
20 Distributors world wide (local specialists)
Products sold in more than 50 countries globally

GLOBAL WEBSHOP PARTNERS
Digikey, Element 14 (Farnell), Mouser, webg@te (Rutronik)

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WIDE TEMPERATURE SUPPORT

Swissbit's embedded memory & storage solutions are designed and approved for reliable operation over a wide temperature range. The products are verified at temperature corners and pre-stressed with a burn-in operating functional test (Test During Burn In – TDBI).

ESD AND EMI SAFE

The product designs are in line with the latest regulations for electrostatic discharge and electromagnetic interference. Swissbit strives to exceed these limits with our own in-house technology and production capabilities, for example with System-in-Package (SiP) competence.

SHOCK AND VIBRATION

Robustness is one of our key specification targets. The design, assembly and use of selected materials guarantee an extremely solid design which has been validated by extensive testing.

LIFE TIME MONITORING (LTM)

The Swissbit Life Time Monitoring feature enables users to access the memory device's detailed Life Time Status and allows predicting imminent failure avoiding unexpected data loss. This feature uses an extended S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) interface or vendor specific commands to retrieve the Flash product information.

ZONE PROTECTION

The device allows the configuration of multiple zones with either no protection, write protection or access protected settings. Each zone is secured with a separate password. A Windows tool or a programming library are available.

SECURE ERASE (SANITIZE/PURGE)/ FAST ERASE

This feature uses an uninterruptable sequence of data erase commands. Even a power off can't stop the process which will continue upon restoration of power. The optional enhanced feature allows the customer to sanitize the data according to different standards like DoD, NSA, IREC, etc. The purge algorithm can be started by a software command or through a hardware pin.

CONFORMAL COATING

Swissbit offers a special protective coating on selected products. This coating is a thin polyurethane film which protects against aggressive environmental conditions such as dust, moisture or corrosive gas.

TEMPERATURE SENSOR

The sensor allows the host hardware or software to monitor the memory device temperature to improve data reliability in the target application environment.

HEAT SPREADER

Heat Spreaders for DRAM modules allow temperature hot spots to be dissipated over a larger surface area and improve the module's reliability.

POWER FAIL PROTECTION & RECOVERY

Intelligent Power Fail Protection & Recovery protects data from unexpected power loss. During an unintentional shutdown, firmware routines and an intelligent hardware architecture ensure that all system and user data will be stored to the NAND.

WEAR LEVELING

Sophisticated Wear Leveling & Bad Block Management ensure that Flash cells are sparingly and equally used in order to prolong life time of the device.

READ-ONLY OPTIMIZED

In many industrial applications the data is written to the NAND Flash once and is only read afterwards. For such cases the firmware can be optimized in order to guarantee highest possible data retention and less read disturb.

TRIM SUPPORT

The TRIM command allows the operating system to inform the SSD which blocks of data are no longer considered in use and can be wiped internally which increases system performance in following write accesses. With TRIM Support data scrap can be deleted in advance which otherwise would slow down future write operations to the involved blocks.

LOW POWER CONSUMPTION

Lower power consumption in electronic devices increases the value of the product as they save energy cost, prolong battery life time and reduce heat generation in the device and hence require less cooling.

DATA CARE MANAGEMENT

Various effects like data retention, read disturb limits or temperature can impact data reliability. The latest generation of Swissbit products use special methods to maintain and refresh the data for higher data integrity.

LONGEVITY

The longevity product lines use special components with a long-term supply commitment of up to 10years. These products offer lowest TCO in demanding applications with high requalification cost.

SECURITY FEATURES

TRUE HARDWARE RNG

True random numbers are generated inside the secure element. True randomness is the key prerequisite for secure systems to prevent brute force attacks.

SECURE VOICE

Secure Voice calls are a requirement for confidential communication. Swissbit Security products are optimal for fast, secure, and user friendly secure voice solutions.

DIGITAL SIGNATURE AND VERFICATION

Digital signatures are very popular and inevitable to protect against manipulation of data or code.

ELLIPTIC CURVE CRYPTOGRAPHY SUPPORT

Elliptic curves are faster and more efficient compared to RSA cryptography.

HARDWARE BASED DATA ENCRYPTION

Hardware based security is key when it comes to replaceability, simple workflows and trusted runtime environments.

SECURE CD-ROM

The flash memory can be switched to read-only partially or in total. This function ensures that e.g. important data can only be modified after PIN authentication.

MOBILE BANKING AND EPURSE

Swissbit Security products for mobile banking and payment offer strong authentication and offline security.

DATA PROTECTION AND ENCRYPTION

Various data protection modes ensure privacy of stored data. The card offers a data safe function with strong AES encryption and PIN access protection.

DEVICE PROTECTION BY DUAL FACTOR AUTHENTICATION

The user needs to have the card and know the PIN.

SECURE LOGGING

In a large hidden storage any system event log, tax data, consumption data or audit trails can be stored securely in write-once mode, queue mode or random access mode.

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Swissbit's focus is on embedded applications. Our designs and support are specialized for global OEM's and their demanding applications. Swissbit provides the highest level of support with our unique 360° customer service. This customer centric approach enables Swissbit to develop solution-driven products for the most demanding applications. We support our customers through entire product-life-cycle with pre-sales, sales and after-sales processes and will recommend the best solution for their requirements, or even tailor products to specific needs. Through close cooperation between our FAEs, in-house development, manufacturing teams and our strategic suppliers we can achieve and guarantee long-term product availability and support. Swissbit is committed to providing our customers with the best product solutions and support for both current and future requirements.

AFTER-SALES

- Responsive service
- Solution driven
- Failure analysis (8D reports)
- Reliability monitoring
- Legacy support & longevity programs
- PCN process
- Firmware updates / upgrades

PRE-SALES

- Design-in support
- Joint qualification
- Qualification reports
- Customizations
- Fast prototyping
- Client specific testing
- Custom labeling
- Technology consulting and training
- Validation support (CMTL, USB-IF, JEDEC, SDA etc.)

360° Customer Service

SALES

- Global Key Accounting
- Worldwide Channel service
- Product Life Cycle Management
- Active sampling process
- Market information
- Worldwide logistics services
- Long-term and Service contracts

SWISSBIT'S EMBEDDED STORAGE SOLUTIONS

OEM's of various industries require a variety of memory and storage solutions. In contrast of typical consumer devices, Swissbit's embedded memory & storage solutions are designed for highest reliability in extreme environmental conditions. They come with a large feature set tailored to the demand of the industrial, automotive and netcom markets and with our commitment to long-term availbility.
Swissbit's embedded memory & storage solutions portfolio covers all relevant interfaces and form factors including SD and Micro SD Memory Cards, CompactFlash™ & CFast™ Cards, 2.5" PATA & SATA SSDs, SLIM SATA & mSATA SSDs, M.2 and USB Flash Drives (UFD) & modules.
Our sophisticated Flash handling algorithms optimize performance and life time of the Single Level Cell (SLC) and Multi Level Cell (MLC) NAND Flash used in our products.

Product development according to stringent design rules and extensive product qualification procedures ensure the electrical and mechanical robustness of Swissbit's embedded storage solutions. All products are offered in commercial (0°C to +70°C) and industrial (-40°C to +85°C) temperature ranges. The available Flash handling features include diagnostic information, built-in Error Correction, Bad Block Management, static and dynamic Wear Leveling and Power Fail Protection. Our service team can offer product life time calculations for special use cases with specific workloads. The diagnostic features we provide enable our customers to access device state information and schedule replacements before the system stops working.

	SLC	EM-MLC	MLC	TLC
Chip Capacity	++	+++	+++	++++
Cost per Bit	++++	+++	++	+
Reliability & Endurance	++++	+++	++	+
Industrial Temperature	++++	+++	+++	+
Write Performance	++++	+++	+++	+
ECC Requirement	+	++	++	++++
Data Retention	++++	++	++	+
Longevity	++++	+++	++	+

NAND FLASH TECHNOLOGY COMPARISON

++++ highest; +++ high; ++medium; +low

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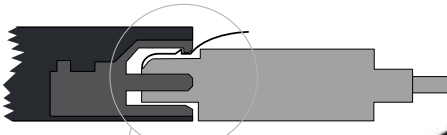
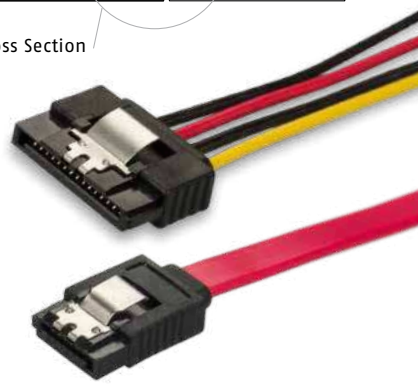
Swissbit offers various 2.5" SSDs with PATA & SATA interfaces. Swissbit's X-500 & X-55 SATA II SSDs are designed as a rugged and extremely reliable storage solution for reliable operation in harsh environmental conditions such as wide temperature range, shock, vibration or humidity. They use the most reliable SLC (X-500) or EM-MLC (X-55) NAND Flash available on the market today and comprise a large number of features. These features include various options for Secure Erase, Purge and Sanitize methods as well as detailed, S.M.A.R.T. based Life Time Monitoring tools that allow the user to have full control of mission critical data at any given time. The BCH-ECC (Error Correction Code) in combination with an intelligent Power Fail Protection mechanism guarantees the highest possible data reliability. Special features such as ATA-8, NCQ and TRIM commands enable higher sequential and random performance while providing the high level of reliability required in industrial applications.
The X-500 SSDs are the ideal solution for applications requiring the highest level of endurance or maximum longevity.
The X-55 series were designed for industrial applications with a balanced read / write workload and offer a more than 10x higher endurance compared to SSDs using standard MLC.

The P-120 (PATA) and X-200 (SATA II) complement Swissbit's 2.5" SSD Product Portfolio and are an ideal fit for low to medium density applications. They are designed for long-term industrial usage and support key requirements such as long data retention, no compromise Power Fail Safety and long product life cycles.



Cross Section



LOCKING / LATCHING SATA CONNECTOR

Swissbit's X-500 & X-55 SSDs are designed with a latching SATA connector. Multiple notches support the latching cables for highest vibration and shock resistance.

X-55	●	●	●	●	●	◐	●	★	●	●	●	○
X-500	●	●	●	●	●	◐	●	★	●	●	●	●
X-200	●	●	●	●	○	◐	○	★	●	●	○	●
P-120	●	●	●	●	◐	◐	○	●	●	◐	○	○

★ Industry Leading; ● default implemented; ◐ on request; ○ not available

	2.5" SATA SSD	2.5" SATA SSD	2.5" SATA SSD	2.5" PATA SSD
Series Name	X-55	X-500	X-200	P-120
Interface Data Transfer Mode	SATA II – 3 Gbit/s up to UDMA6 / PIO4/ MDMA2			IDE / PATA up to UDMA4 / PIO4 / MDMA2
Connector	15 + 7 pin serial ATA with latch protection / special feature connector		15 + 7 pin serial ATA	ATA 44 pin, 2 mm pitch
Outline Dimensions	100.2 x 69.85 x 9.3 mm		100.2 x 69.85 x 9 mm	
Flash Type	EM-MLC	SLC		
Density Range	30 GB – 960 GB	16 GB – 512 GB	4 GB – 8 GB	4 GB – 32 GB
Data Retention	5 years @ life begin 3 months @ life end	10 years @ life begin 1 year @ life end		
Endurance	420 / 310 TBW (60 GB, JEDEC Client / Enterprise W/L)	2700 / 370 TBW (64 GB, JEDEC Client / Enterprise W/L)	100'000 P/E cycles (Flash cell level)	
Operating Temperature	Commercial: 0°C to +70°C Industrial: –40°C to +85°C			
Storage Temperature	–55°C to +95°C		–50°C to +100°C	
Performance				
Burst Rate	up to 300 MB/sec	up to 300 MB/sec	up to 300 MB/s	up to 66 MB/s
Sequential Read (MB/s)	up to 220 MB/sec	up to 240 MB/sec	up to 120 MB/s	up to 45 MB/s
Sequential Write (MB/s)	up to 160 MB/sec	up to 200 MB/sec	up to 95 MB/s	up to 35 MB/s
Random 4KB Read (IOPS)	up to 12'000	up to 14'500	up to 3'100	up to 3'840
Random 4KB Write (IOPS)	up to 5'500	up to 7'000	up to 25	up to 51
MTBF	≥ 2'000'000 hours		≥ 2'500'000 hours	
Shock	MIL-STD810; 2'000 G, 0.4 ms; 50 G, 11 ms		1 500 G	
Vibration	MIL-STD810; 20 G, 10–2'000 Hz random		20 G	
Humidity	85 % RH 85°C, 1'000 hrs			
Voltage	5V ± 10 % 3.3V optional		5 V ± 10 %	
Power Consumption	Slumber 140 mA max 700 mA Idle 200 mA		UDMA6 typ 260 mA max 320 mA Idle 140 mA	PIO typ 55 mA UDMA typ 135 mA Idle 5 mA
Features & Tools	Proven Power Fail Safety ATA security feature set Enhanced Secure Erase, Purge and Sanitize features (MIL STD) SBLTM Tool & SDK for S.M.A.R.T. based Life Time Monitoring NCQ, TRIM Advanced Wear Leveling & Bad Block management In-field firmware update		Proven Power Fail Safety Security Features available SBLTM Tool & SDK for S.M.A.R.T. based Life Time Monitoring Wear Leveling & Bad Block management	
Part Number	SFSAxxxxQvBJxss-t-dd-rrr-ccc		SFSAxxxxQvBRxss-t-dd-2r6-STD	SFPAxxxxQvB0xss-t-dd-2r3-STD

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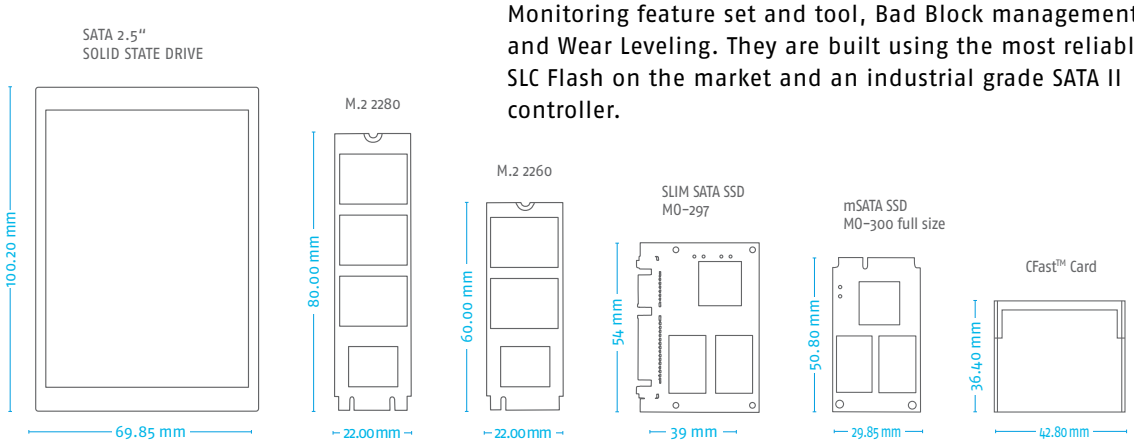
Swissbit's mSATA (M0-300), SLIM SATA (M0-297) and the new M.2 SSDs are ideal solutions for embedded applications requiring Solid State storage in smaller, removable form factors. Our SATA SSD modules offer a long service life combined with controlled BOM and a change notification proccess. Each unit undergoes extensive testing at the full temperature range before being released for shipment.

The X-60 SATA III series is Swissbit's latest development. The SSD Modules will be available as mSATA (X-60m), SLIM SATA (X-60s) and M.2 (X-60m2). They were designed for all industrial, netcom and automotive applications requiring high data transfer rates up to 525 MB/s in sequential access and 75'000 IOPS in 4KB random access. In addition, they offer a wide range of features such as Swissbit's proven Power Fail Safety, ATA security feature set, Data Care Management tools, a Windows or Linux tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring, NCQ, TRIM, advanced Wear Leveling & Bad Block management and in-field firmware update functionality.

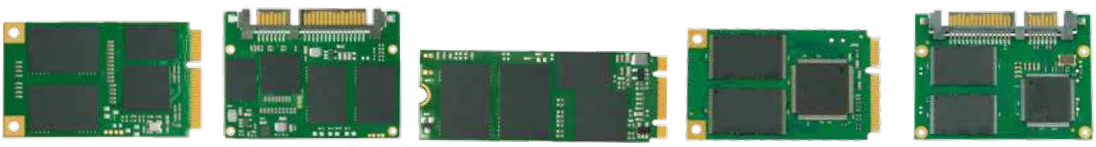
Our SLC based X-200m mSATA and X-200s SLIM SATA SSDs are highly reliable storage solutions and are available with a range of features such as industrial temperature support from -40°C to +85°C, shock and vibration resistance, Power Fail Protection, Conformal Coating, a Life Time Monitoring feature set and tool, Bad Block management and Wear Leveling. They are built using the most reliable SLC Flash on the market and an industrial grade SATA II controller.



PRODUCT SIZE COMPARISION

X-60m	●	●	★	●	◐	●	★	●	●	●	★	○
X-60s	●	●	★	●	◐	●	★	●	●	●	★	○
X-60m2	●	●	★	●	◐	●	★	●	●	●	★	○
X-200m	●	●	●	○	◐	○	●	●	●	○	○	●
X-200s	●	●	●	○	◐	○	●	●	●	○	○	●

★ Industry Leading; ● default implemented; ◐ on request; ○ not available



	MO-300 FULL SIZE	MO-297 SLIM SATA	M.2 2260/2280	MO-300 FULL SIZE	MO-297 SLIM SATA
Series Name	X-60m	X-60s	X-60m2	X-200m	X-200s
Interface Data Transfer Mode	SATA III – 6Gbit/s ATA8			SATA II – 3 Gbit/s up to PIO4, MDMA2, UDMA6	
Connector	52 pin PCI Express (PCIe) mini	15 + 7 pin Serial ATA	M.2 SATA	52 pin PCI Express (PCIe) mini	15 + 7 pin Serial ATA
Outline Dimensions	50.8 x 29.85 x 3.3 mm	54 x 39 x 4 mm	22 x 60 / 80 x 3.6 mm	50.8 x 29.85 x 3.3 mm	54 x 39 x 4 mm
Flash Type	MLC			SLC	
Density Range	16 GB – 480 GB			2 GB – 64 GB	
Data Retention	10 years @ life begin 1 year @ life end				
Endurance	30 TBW (60GB, JEDEC Enterprise Workload)			100'000 P/E cycles (Flash cell level)	
Operating Temperature	Commercial: 0°C to +70°C Industrial: –40°C to +85°C				
Storage Temperature	–50°C to +95°C			–50°C to +100°C	
Performance Burst Rate Sequential Read (MB/s) Sequential Write (MB/s) Random 4KB Read (IOPS Random 4KB Write (IOPS)	up to 600 MB/sec up to 525 MB/sec up to 450 MB/sec up to 75'000 up to 75'000			up to 300 MB/s up to 120 MB/s up to 95 MB/s up to 3'100 up to 25	
Voltage	3.3 V ± 5 %	5 V ± 10 %	3.3 V ± 5 %	3.3 V ± 5 %	5 V ± 10 %
Power Consumption	typ 450 mA max 650 mA Idle 90 mA	typ 300 mA max 450 mA Idle 60 mA	typ 450 mA max 650 mA Idle 90 mA	typ 300 mA max 490 mA Idle 180 mA	typ 260 mA max 320 mA Idle 140 mA
Tools	Proven Power Fail Safety Enhanced Secure Erase, Purge and Sanitize features (MIL STD) SBLTM Tool & SDK for S.M.A.R.T. based Life Time Monitoring NCQ, TRIM Advanced Wear Leveling & Bad Block management In-field firmware update			Proven power fail safety SBLTM Tool & SDK for S.M.A.R.T. based Life Time Monitoring Advanced Wear Leveling & Bad Block management	
Part Number	SFSAxxxxUvAAxss-t-dd-xrx-STD	SFSAxxxxVvAAxss-t-dd-xrx-STD	SFSAxxxxMvAAxss-t-dd-xrx-STD	SFSAxxxxUvBRxss-t-dd-2r6-STD	SFSAxxxxVvBRxss-t-dd-2r6-STD

X-60 series: target specification

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CFAST™ CARDS

CFast™ cards combine two existing industry standards into a single product: the CompactFlash™ (CF) card form factor and the Serial ATA (SATA) interface commonly used in Hard Disks. 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), high altitude and rough environmental conditions. Swissbit's CFast™ cards provide rugged storage for embedded and industrial systems where performance, data and system reliability, Power Fail Protection and flexibility are important design considerations.
Swissbit CFast™ Cards operate with a 3.3 Volt low power source and support three SATA power management states: Active, Partial and Slumber. This standard is a perfect choice for both boot devices and as removable media for applications requiring low to medium storage densities with a small footprint. Additionally, the Swissbit CFast™ cards come with full engineering and customization support, S.M.A.R.T. based Life Time Monitoring features, our intelligent Flash Management algorithms and Error Correction, guaranteeing the highest level of reliability even in rough application environments.

Swissbit's latest innovation is the F-60 SATA III CFast™ card series. Using state of the art controller and MLC Flash technology, the F-60 achieves data transfer rates up to 525 MB/s in sequential access and 70'000 IOPS in 4KB random access. In addition, the F-60 series feature Swissbit's proven Power Fail Safety, ATA security feature set, enhanced Secure Erase tools, a Windows or Linux tool & SDK for detailed S.M.A.R.T. based Life Time Monitoring, NCQ, TRIM, advanced Wear Leveling & Bad Block management or in-field firmware update functionality.

F-60	●	●	●	★	●	◐	●	★	●	●	●	★	○
F-240	●	●	●	★	◐	◐	○	★	●	★	●	○	●
F-100	●	●	●	●	○	◐	○	●	●	●	○	○	○

★ Industry Leading; ● default implemented; ◐ on request; ○ not available

	CFAST™ CARD	CFAST™ CARD	CFAST™ CARD
Series Name	F-60	F-240	F-100
Interface Data Transfer Mode	CFast™ 2.0 – SATA III – 6 Gbit/s ATA8	CFast™ 1.0 – SATA II – 3 Gbit/s ATA7	
Connector	CFast™ Type I		
Outline Dimensions	36.4 x 42.8 x 3.6 mm		
Flash Type	MLC	SLC	
Density Range	16 GB – 240 GB	2 GB – 64 GB	2 GB – 32 GB
Data Retention	10 years @ life begin 1 year @ life end		
Endurance	30 TBW (60 GB, JEDEC Enterprise Workload)	100'000 P/E cycles (Flash cell level)	100'000 P/E cycles (Flash cell level)
Operating Temperature	Commercial: 0°C to +70°C Industrial: -40°C to +85°C		
Storage Temperature	-50°C to +100°C		
Performance Burst Rate Sequential Read (MB/s) Sequential Write (MB/s) Random 4KB Read (IOPS Random 4KB Write (IOPS)	 up to 600 MB/s up to 525 MB/s up to 340 MB/s up to 70'000 up to 40'000	 up to 300 MB/s up to 130 MB/s up to 100 MB/s up to 3'300 up to 95	 up to 300 MB/s up to 120 MB/s up to 95 MB/s up to 3'600 up to 30
MTBF	≥ 2'500'000 hours		
Shock	1 500 G		
Vibration	20 G		
Humidity	85 % RH 85°C, 1'000 hrs		
Voltage	3.3 V ± 5 %		
Power Consumption	typ 450 mA max 650 mA DEVSLP <5 mA	typ 140 mA max 250 mA Idle 55 mA PHYSLP <20 mA	typ 300 mA max 420 mA Idle 180 mA
Features & Tools	Proven Power Fail Safety Enhanced Secure Erase, Purge and Sanitize features (MIL STD) SBLTM Tool & SDK for S.M.A.R.T. based Life Time Monitoring NCQ, TRIM Advanced Wear Leveling & Bad Block management In-field firmware update	Proven Power Fail Safety Security & SBZoneProtection features available SBLTM Tool & SDK for S.M.A.R.T. based Life Time Monitoring Evaluation kit with 2.5" SATA adapter board available Sophisticated Wear Leveling & Bad Block management Read Disturb Management TRIM Low Power Consumption	Proven Power Fail Safety SBLTM Tool & SDK for S.M.A.R.T. based Life Time Monitoring Evaluation kit with 2.5" SATA adapter board available Advanced Wear Leveling & Bad Block management
Part Number	SFCAxxxxHvAAxss-t-dd-xrx-STD	SFCAxxxxHvBVxss-t-dd-2r6-STD	SFCAxxxxHvBRxss-t-dd-2r6-STD

F-60: target specification

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To this day, CompactFlash™ (CF) cards are still the most popular Flash based storage solution used in the embedded and industrial markets and the CompactFlash™ Card form factor and connector are well established. Swissbit's CF Cards were developed with strong focus on quality, reliability, robustness and longevity. We only select high-quality components and apply design rules fitting the stringent requirements of our customers. Hardware and firmware were tested and qualified by our experienced technical team and features and functionality have been proven in many challenging customer applications. Swissbit's CF Series C-3x0 and C-4x0 are offered in both, commercial (0°C to 70°C) and industrial (-40°C to 85°C) temperature ranges, providing rugged and reliable memory for a wide range of demanding use cases. They are designed to solve a broad range of concerns from compatibility, booting and Power Fail Safety concerns to long-term supply, controlled BOM and outstanding Flash protocol handling techniques to ensure highest possible data integrity. In contrast to commonly promoted sequential performance values, Swissbit is especially focused on optimized random access speed, one of the key requirements in legacy embedded CompactFlash applications.

Swissbit's most recent CF Card product family is the C-300 Longevity series which offers maximum long term availability (at least until 2021). In addition, the C-300 Longevity CF Card ensures optimized backward compatibility to legacy systems, high random access speed and a wide range of capacities from 32 MB to 8 GB using highly reliable SLC Flash with 100'000 program / erase cycles.

FEATURE COMPARISON

	C-300	C-300 Longevity	C-320	C-440
Power Fail Protection	●	●	●	●
Power Fail Recovery	●	●	●	●
SLC NAND Flash	●	●	●	●
Controlled BOM / PCN Process	●	●	●	●
Standard S.M.A.R.T. Support	◐	◐	●	●
Security Erase / Security Feature Set	○	○	◐	◐
Read Optimized	○	●	●	●
High Small file write performance	○	●	○	●
Read Disturb Management	○	○	◐	●
Trim support	○	○	○	●
PC-Card mode compatibility / legacy system	●	●	●	◐

● default available; ◐ optional; ○ not available;

C-300	●	●	●	●	○	◐	★	●	○	○	●
C-300 LONGEVITY	●	●	●	★	○	◐	★	●	●	○	★
C-320	●	●	●	●	◐	◐	★	●	◐	○	●
C-440	●	●	●	★	◐	◐	★	●	★	●	●

★ Industry Leading; ● default implemented; ◐ on request; ○ not available

	COMPACTFLASH™ CARD	COMPACTFLASH™ CARD	COMPACTFLASH™ CARD	COMPACTFLASH™ CARD
Series Name	C-300	C-300 Longevity	C-320	C-440
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			
Density Range	128 MB to 8 GB	32 MB to 8 GB	2 GB to 32 GB	2 GB to 64 GB
Data Retention	10 years @ life begin 1 year @ life end			
Endurance	100'000 P/E Cycles (Flash Cell Level)			
Operating Temperature	Commercial: 0°C to +70°C Industrial: -40°C to +85°C			
Storage Temperature	-50°C to +100°C			
Performance				
Burst Rate	up to 66 MB/s	up to 66 MB/s	up to 66 MB/s	up to 133 MB/s
Sequential Read (MB/s)	up to 37 MB/s	up to 37 MB/s	up to 45 MB/s	up to 65 MB/s
Sequential Write (MB/s)	up to 20 MB/s	up to 20 MB/s	up to 35 MB/s	up to 40 MB/s
Random 4KB Read (IOPS)	up to 3'300	up to 3'300	up to 2'800	up to 2'400
Random 4KB Write (IOPS)	up to 40	up to 50	up to 44	up to 300 (with TRIM)
MTBF	≥ 3'000'000 hours			
Shock	1 500 G			
Vibration	20 G			
Humidity	85 % RH 85°C, 1 000 hrs			
Voltage	3.3 V ± 5 % 5 V ± 10 %			
Power Consumption	PIO typ 50 mA @ 3.3 V DMA typ 70 mA @ 3.3 V DMA typ 110 mA @ 5 V		PIO typ 60 mA @ 3.3 V DMA typ 90 mA @ 3.3 V DMA typ 130 mA @ 5 V	PIO typ 60 mA @ 3.3 V DMA typ 80 mA @ 3.3 V DMA typ 90 mA @ 5 V
Features & Tools	Proven Power Fail Safety Security & SBZoneProtection features available SBLTM Tool & SDK for S.M.A.R.T. based Life Time Monitoring Sophisticated Wear Leveling & Bad Block management			Proven Power Fail Safety Security & SBZoneProtection features available SBLTM Tool & SDK for S.M.A.R.T. based Life Time Monitoring Sophisticated Wear Leveling & Bad Block management Read Disturb Management TRIM
Part Number	SFCFxxxxHxBKxss-t-xx-5I3-SMA	SFCFxxxxHxBKxss-t-xx-5I3-SMA	SFCFxxxxHxB0xss-t-dd-5I3-SMA	SFCFxxxxHvBUxss-t-dd-5I7-STD

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FLASH MANAGEMENT MECHANISM

- Optimized Error Correction Code
- Efficient algorithms for Bad Block Management
- Real Life Time Monitoring
- Sophisticated Wear Leveling & Bad Block Management
- Power Fail Protection

MICRO SD MEMORY CARDS

Swissbit's Industrial Micro SD Memory Cards are designed, manufactured and tested to withstand extreme environmental conditions.
Each of our product series is designed for a broad embedded use case with its unique requirements towards longevity, life time, endurance, temperature, data retention and cost. In addition to the existing Micro SD Memory Card series, Swissbit has recently introduced the S-40u which targets read-centric applications that require the highest level of data reliability for long periods of time. The combination of MLC (Multi Level Cell) NAND Flash with innovative controller and firmware technology enable prolonged data retention and extended life cycles despite the write endurance limitations of MLC Flash. The special firmware features in the S-40u include a powerful built-in Error Correction, Read Retry, Autonomous Data Care Management, Life Time Monitoring & diagnostic features, Randomizer, Wear Leveling & Bad Block Management algorithms and intelligent Power Fail Protection.
The new S-45u (MLC version) and S-450u (SLC version) series include the same set of sophisticated features and, through the implementation of UHS-I, support data transfer rates of up to 80 MB/s.
All Swissbit Micro SD Cards can withstand extreme environmental conditions. They provide the highest level of mechanical stability and enhanced ESD protection. Furthermore, the hard gold SD connectors endure a minimum of 20'000 insertion cycles.

S-300U	●	●	●	○	●	●	●	●	○	●
S-200U	●	●	●	●	●	★	●	○	○	●
S-40U / S-45U	●	●	●	★	●	★	●	★	★	○
S-450U	●	●	●	★	●	★	●	★	★	●

★ Industry Leading; ● default implemented; ○ not available

WORLD'S MOST RELIABLE SLC FLASH FITTING MICRO SD

	MICRO SD MEMORY CARD (SD / SDHC)	MICRO SD MEMORY CARD (SD / SDHC)	MICRO SD MEMORY CARD (SD / SDHC)	MICRO SD MEMORY CARD (SD / SDHC)	MICRO SD MEMORY CARD (SD / SDHC)
Series Name	S-300µ	S-200µ	S-40µ	S-45µ	S-450µ
Interface Data Transfer Mode	SD 2.0, Class 6 / 10	SD 2.0, Class 6	SD 3.0, Class 6	SD 3.0, Class 10, UHS-I	
Connector	Micro SD				
Outline Dimensions	15 x 11 x 0.7 / 1 mm				
Flash Type	SLC		MLC		SLC
Density Range	2 GB (SD) 4 GB – 8 GB (SDHC)	512 MB – 2 GB (SD)	4 GB – 16 GB (SDHC)		512 MB – 2 GB (SD) 4 GB – 16 GB (SDHC)
Data Retention	10 years @ life begin 1 year @ life end				
Endurance	100'000 P/E Cycles (Flash Cell Level)		3'000 P/E Cycles (Flash Cell Level)		100'000 P/E Cycles (Flash Cell Level)
Operating Temperature	Extended: -25°C to +85°C Industrial: -40°C to +85°C				
Storage Temperature	-40°C to +85°C	-40°C to +100°C			
Performance Burst Rate Sequential Read (MB/s) Sequential Write (MB/s)	 up to 25 MB/s up to 24 MB/s up to 22 MB/s	 up to 25 MB/s up to 21 MB/s up to 18 MB/s	 up to 25 MB/s up to 24 MB/s up to 11 MB/s	 up to 104 MB/s up to 70 MB/s up to 14 MB/s	 up to 104 MB/s up to 80 MB/s up to 75 MB/s
MTBF	≥ 3'000'000 hours				
Shock	1 500 G				
Vibration	50 G				
Humidity	93 % RH 40°C, 500 hrs	85 % RH 85°C, 1 000 hrs			
Voltage	2.7 – 3.6 V Normal 2.0 – 3.6 V Basic Communication				
Power Consumption	Read typ 50 mA Write typ 50 mA	Read typ 30 mA Write typ 40 mA	Read typ 40 mA Write typ 60 mA	Read typ 100 mA Write typ 100 mA	
Features & Tools	Proven Power Fail Safety Advanced Wear Leveling & Bad Block management	Proven Power Fail Safety Diagnostic features Life Time Monitoring Sophisticated Wear Leveling & Bad Block management	Proven Power Fail Safety SBLTM Tool & SDK for detailed Life Time Monitoring Sophisticated Wear Leveling & Bad Block management Autonomous Data Care Management		
Part Number	SFSDxxxxLvBWxss-t-dd-1r1-STD	SFSDxxxxNxBNxss-t-dd-1r1-STD	SFSDxxxxNxBMxss-t-de-1r1-STD d=G,L,H	SFSDxxxxNxBMxss-t-de-2r1-STD d=G,L,H	SFSDxxxxNxBMxss-t-de-2r1-STD d=M,D,Q

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FLASH MANAGEMENT MECHANISM

- Optimized Error Correction Code
- Efficient algorithms for Bad Block Management
- Diagnostic with real Life Time Monitoring
- Sophisticated Wear Leveling & Bad Block Management
- Power Fail Protection

SD MEMORY CARDS

Swissbit's Industrial Secure Digital (SD) card series are designed, manufactured and tested to withstand extreme environmental conditions.
The use of SLC Flash in the S-200 / 220 series combined with an industrial grade Flash controller provide a number of enhanced product features such as built-in Error Correction, Wear Leveling & Bad Block Management algorithms, Power Fail Protection and power saving modes. The housing with special connector support provides resistance against bending and torque.
In addition to the existing SD Memory Card series, Swissbit has recently introduced the S-40 which targets read-centric applications that require the highest level of data reliability for long periods of time. The combination of MLC (Multi Level Cell) NAND Flash with innovative controller and firmware technology enable prolonged data retention and extended life cycles despite the write endurance limitations of MLC Flash. The special firmware features in the S-40 include a powerful built-in Error Correction, Read Retry, Autonomous Data Care Management, Life Time Monitoring & diagnostic features, Randomizer, Wear Leveling & Bad Block Management algorithms and intelligent Power Fail Protection.
The new S-45 (MLC version) and S-450 (SLC version) series include the same set of sophisticated features and, through the implementation of UHS-I, support data transfer rates of up to 80 MB/s.
All Swissbit SD Cards can withstand extreme environmental conditions. They provide the highest level of mechanical stability and enhanced ESD protection. Furthermore, the hard gold SD connectors endure a minimum of 20'000 insertion cycles.

S-200 / 220	●	●	●	●	○	★	●	○	○	●
S-40 / S-45	●	●	●	★	●	★	●	★	★	○
S-450	●	●	●	★	●	★	●	★	★	●

★ Industry Leading; ● default implemented; ○ not available

WORLD'S MOST RELIABLE SLC FLASH

	SD MEMORY CARD (SD / SDHC)	SD MEMORY CARD (SD / SDHC)	SD MEMORY CARD (SD / SDHC)	SD MEMORY CARD (SD / SDHC)
Series Name	S-200 / 220	S-40	S-45	S-450
Interface Data Transfer Mode	SD 2.0, Class 6 / 10	SD 3.0, Class 6	SD 3.0, Class 10, UHS-I	
Connector	SD			
Outline Dimensions	32 x 24 x 2.1 mm			
Flash Type	SLC	MLC		SLC
Density Range	512 MB – 2 GB (SD) 4 GB – 8 GB (SDHC)	4 GB – 32 GB (SDHC)		512 MB – 2 GB (SD) 4 GB – 32 GB (SDHC)
Data Retention	10 years @ life begin 1 year @ life end			
Endurance	100'000 P/E Cycles (Flash Cell Level)	3'000 P/E Cycles (Flash Cell Level)		100'000 P/E Cycles (Flash Cell Level)
Operating Temperature	Extended: –25°C to +85°C Industrial: –40°C to +85°C			
Storage Temperature	–40°C to +100°C			
Performance Burst Rate Sequential Read (MB/s) Sequential Write (MB/s)	 up to 25 MB/s up to 21 MB/s up to 18 MB/s	 up to 25 MB/s up to 24 MB/s up to 11 MB/s	 up to 104 MB/s up to 70 MB/s up to 14 MB/s	 up to 104 MB/s up to 80 MB/s up to 75 MB/s
MTBF	≥ 3'000'000 hours			
Shock	1 000 G	1 500 G		
Vibration	15 G	50 G		
Humidity	85 % RH 85°C, 1 000 hrs			
Voltage	2.7 – 3.6 V Normal 2.0 – 3.6 V Basic Communication			
Power Consumption	Read typ 28 mA Write typ 55 mA	Read typ 40 mA Write typ 60 mA	Read typ 100 mA Write typ 100 mA	
Features & Tools	Proven Power Fail Safety Diagnostic features & Life Time Monitoring through SD / SPI command set Sophisticated Wear Leveling & Bad Block management	Proven Power Fail Safety SBLTM Tool & SDK for detailed Life Time Monitoring Sophisticated Wear Leveling & Bad Block management Autonomous Data Care Management		
Part Number	SFSDxxxxLvBNxss-t-dd-1r1-STD	SFSDxxxxLxBMxss-t-de-1r1-STD d=G,L,H	SFSDxxxxLxBMxss-t-de-2r1-STD d=G,L,H	SFSDxxxxLxBMxss-t-de-2r1-STD d=M,D,Q

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USB FLASH DRIVES / MODULES

The Universal Serial Bus (USB) interface is very well established and has almost entirely replaced any other forms of serial or parallel interfaces for computer peripherals and memory storage devices. Advantages of USB are its flexibility, fast sequential data transfer rate and the ability to obtain power through the connector. Most computer and embedded systems support these devices either via the standard USB connector or internal on-board terminal headers. Swissbit offers both options in different form factors and in commercial and industrial operating temperature ranges. State of the art NAND Flash handling algorithms, stringent component selection, product change control and a 100% in-process final system test at full temperature range (-40°C to +85°C) qualify Swissbit's USB Flash Drive (UFDs) for embedded and industrial markets.

Swissbit's U-110 Series (USB Flash Module) offers a no compromise flash based storage solution for:

- Embedded PCs that need a rugged reliable storage solution
- Servers with backup or recovery functionality
- General industrial computers with needs for easy to use boot mediums

All Swissbit USB solutions combine security features and Life Time Monitoring tools for product life control.

U-110	●	○	●	●	●	●	●
uniteCONTRAST II	●	●	●	●	●	●	●
MINITWIST/CAP II	○	●	●	●	●	●	○

● default implemented; ◐ on request; ○ not available

	USB FLASH MODULE	USB FLASH DRIVE	USB FLASH DRIVE
Series Name	U-110	unitedCONTRAST II	miniTWIST/CAP II
Interface Data Transfer Mode	USB 2.0 full / high speed		
Connector	Standard: 2.54 mm - 10 Pin Low Profile: 2.00 mm - 10 Pin	USB 2.0 A-Plug	
Outline Dimensions	Standard: 36.8 mm x 26.65 mm x 9.6 mm Low Profile: 36.8 mm x 26.65 mm x 5.7 mm	68.0 mm x 18.0 mm x 8.0 mm	55 mm x 16 mm x 7-8 mm
Flash Type	SLC		
Density Range	1 GB to 16 GB	512 MB to 16 GB	128 MB to 4 GB
Data Retention	10 years @ life begin 1 year @ life end		
Endurance	100'000 P/E Cycles (Flash Cell Level)		
Operating Temperature	Commercial: 0°C to +70°C Industrial: -40°C to +85°C		Commercial: 0°C to +70°C
Storage Temperature	-50°C to +100°C		
Performance Burst Rate Sequential Read (MB/s) Sequential Write (MB/s) Random 4KB Read (IOPS Random 4KB Write (IOPS	up to 60 MB/s up to 32 MB/s up to 23 MB/s up to 1 600 up to 30		up to 60 MB/s up to 18 MB/s up to 12 MB/s up to 1 300 up to 33
MTBF	≥ 3'000'000 hours		
Shock	50 G		
Vibration	15 G		
Humidity	85 % RH 85°C, 500 hrs		
Voltage	5 V ± 10 % (3.3 V ± 5 % optional)	5 V ± 10 %	
Power Consumption	Full Speed typ 90 mA High Speed typ 100 mA		Full Speed typ 80 mA High Speed typ 100 mA
Features & Tools	Proven Power Fail Safety Windows / Linux – Spare block read out Bootable USB Drive Supports latest OS as Fixed Drive Connector pitch variations available Shock & vibration resistant	Proven Power Fail Safety Windows / Linux – Spare block read out Hot Pluggable / Plug & Play Optimized Wear Leveling Security features Password manager available	Proven Power Fail Safety Windows / Linux – Spare block read out Small form factor Optimized Wear Leveling Password manager available
Part Number	2.54 mm: SFUIxxxxJvBPxss-t-dd-2r1-STD 2.00 mm: SFUIxxxxKvBPxss-t-dd-2r1-STD	SFU2xxxxEvBPxss-t-dd-1r1-STD	SFU2xxxxDvBP1ss-t-dd-1r1-STD

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