swissbit®

INDUSTRIAL MEMORY SOLUTIONS
NAND FLASH PRODUCTS & DRAM MODULES

swissbit

32GB
Industrial CFast™ Card

made in germany

WHY CHOOSE SWISSBIT

Swissbit is the largest independent DRAM module and Flash storage manu-facturer in Europe. This enables Swissbit to be a global leader in technology supplying High Quality Memory solutions to the several key market areas which include Industrial, Embedded, Communications & Networking, Military & Aerospace, Automotive, Casino Gaming and Medical Equipment. Swissbit was created from a management buy-out from Siemens Memory Products in 2001 and has over 20 years of experience in the memory industry. Swissbit's commitment to high quality, reliability, exceptional customer service and competitive pricing is what enables our customers and partners to enjoy a constant source of supply and product commitment for their past, current and future requirements.

In more detail Swissbit offers to our customers the following areas of service:

PRODUCT DEPTH

- Complete line of DRAM modules and NAND Flash Solid State Drives with different interfaces and form factors
- Both leading edge technology and legacy product offerings
- Extended and Industrial temperature grade products
- Unique Chip-On-Board (COB) technology
- Small form factor removable NAND flash cards
- Memory In Package Solutions

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
- Worlds only COB DRAM memory module manufacturer

CUSTOMIZATION

- Custom DRAM module and Flash designs
- Security features
- Individual Labeling
- Design In support

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

- Advantest, King Tiger Technology and Tanisys Technology test equipment
- World Class Application Testing
- System Level Test During Burn-In (TDBI)
- Extended and Industrial Temperature Testing
- Environmental Testing

COMPLIANCE TO

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

QUALITY STANDARD

- ISO 9001:2008

ASSOCIATIONS

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

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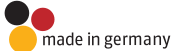
SD & MMC CARD

Swissbit's INDUSTRIAL product lines of SecureDigital (SD) &
Multimedia cards are specifically designed, manufactured
and tested to withstand extreme environmental conditions.
The use of SLC (Single Level Cell) Flash combined with a
32bit RISC controller provides a number of enhanced product
features such as built-in error correction, bad block manage-
ment, advanced wear leveling algorithms, power loss
protection and power saving modes. Special attention is
dedicated to the mechanical stability and enhanced ESD
protection. A high reliability housing with special connector
support provides resistance against bending and torque.
Furthermore, the gold plated SD connectors will last a
minimum of 10,000 insertions.

	MICROSD	SECUREDIGITAL (SD)	SECUREDIGITAL HIGH CAPACITY (SDHC)	MULTIMEDIA CARD
Series	S–200μ	S–200	S–220	M–100
Interface Compliance	SDA 2.0	SDA 2.0	SDA 2.0, SDHC class 10	MMC 3.31, 4.1 & 4.2
Connector	microSD	SD	SD	MMC
Physical Form	15.0 x 11.0 x (0.7) 1 mm	32.0 x 24.0 x 2.1 mm	32.0 x 24.0 x 2.1 mm	32.0 x 24.0 x 1.4 mm
Flash Type	SLC	SLC	SLC	SLC
Density	512 MB – 2 GB	512 MB – 2 GB	4 GB – 8 GB	128 MB
Operating Temperature	Extended: –25°C to +85°C Industrial: –40°C to +85°C	Extended: –25°C to +85°C Industrial: –40°C to +85°C	Extended: –25°C to +85°C Industrial: –40°C to +85°C	Extended: –25°C to +90°C Industrial: –40°C to +90°C
Storage Temperature	–40°C to +100°C	–40°C to +100°C	–40°C to +100°C	–40°C to +100°C
Shock	1,000 G	1,000 G	1,000 G	1,000 G
Vibration	15 G	15 G	15 G	15 G
Humidity	85 % RH 85°C, 1000 hrs	85 % RH 85°C, 1000 hrs	85 % RH 85°C, 1000 hrs	85 % RH 85°C, 1000 hrs
Data Transfer Mode	1 or 4 bit SD, SPI	1 or 4 bit SD, SPI	1 or 4 bit SD, SPI	1 bit MMC, SPI
Performance	Burst Rate up to 25 MB/s Read Seq. up to 24 MB/s Write Seq. up to 13 MB/s	Burst Rate up to 25 MB/s Read Seq. up to 24 MB/s Write Seq. up to 21 MB/s (512 MB–13 MB/s)	Burst Rate up to 25 MB/s Read Seq. up to 22 MB/s Write Seq. up to 20 MB/s	Burst Rate up to 6.5 MB/s Read Seq. up to 5.7 MB/s Write Seq. up to 5.9 MB/s
Voltage	2.7 – 3.6 V Normal 2.0 – 3.6 V Basic Communication	2.7 – 3.6 V Normal 2.0 – 3.6 V Basic Communication	2.7 – 3.6 V Normal 2.0 – 3.6 V Basic Communication	2.7 – 3.6 V Normal 2.0 – 3.6 V Basic Communication
Power Consumption	RW typ. 35 mA / max. 50 mA Sleep 0.3 mA (max)	RW typ. 35 mA / max. 50 mA Sleep 0.3 mA (max)	Read typ. 80 mA Write typ. 50 mA Sleep 0.3 mA (max)	RW typ. 8 mA / max. 15 mA Sleep 0.3 mA (max.)
Marking	Swissbit, Part Number, Lot Code, Mfg. Date	Swissbit, Density, CE, Pb free, Part Number, Lot Code, Mfg. Date	Swissbit, Density, CE, Pb free, Part Number, Lot Code, Mfg. Date	Swissbit, Density, CE, Pb free, Part Number, Lot Code, Mfg. Date
Target Application	Industrial Embedded Systems, Medical Solutions, Point–of–Sales, Gaming Industry, Automation Solutions, etc.			
Tools	Life Time Monitoring over SD command set			Life Time Monitoring over MMC command set
Part Number	SFSDxxxxNxBNxxx-x-xx-1x1-STD	SFSDxxxxLxBNxxx-x-xx-1x1-STD	SFSDxxxxLxBNxxx-x-xx-1x1-STD	SFMMxxxx0xBNxxx-x-xx-1x1-STD

– Compliant with SDA2.0 Specification
– Optimized Wear Leveling
– Life Time Monitoring over extended command set
– Intelligent Power Fail Protection & Recovery
– ESD Protection up to 15kV

– Compliant with MMC Specification
– Optimized Wear Leveling
– Life Time Monitoring over extended command set
– Intelligent Power Fail Protection & Recovery

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Solid State Drives (SSD) are drop−in replacements for traditional 2.5″ hard disk drives (HDD). Swissbit offers the Parallel ATA (PATA) interface SSD with 44−pin IDE connector and CompactFlash™ cards with up to 32GB of flash memory. Because SSD's have no moving parts, vibration and shock tolerance is extended significantly, making them a perfect choice for mobile applications where durability and reliability are crucial. No moving parts also remove the mechanical latencies found in traditional hard disk drives. This directly translates into faster start−up times and extremely low read and write latency times. Temperature ranges are extended and mean time between failure (MTBF) is improved many times compared with traditional HDDs, resulting in a longer operational life of the drive. Offered in standard or industrial temperature ranges, the Swissbit 2.5″ SSD is ideal for a wide range of applications in both commercial and industrial markets. At Swissbit we are committed to providing new, evolving and high−performance solid state drive designs based on the ATA interface in combination with SLC NAND flash.

	C-300	C-320	P-120
Power Fail Protection	++	++	++
Power Fail Recovery	++	++	++
Industrial Temperature Grade −40°C to 85°C	++	++	++
SLC NAND Flash	++	++	++
Controlled BOM / PCN Process	++	++	++
SBLifeTimeMonitoring (LTM)	++	++	++
Standard S.M.A.R.T. Support	+	++	++
SBLTM API/Library	+	++	++
SBLTM Application (Windows)	+	++	++
SBZoneProtection	−	+	+
SBZoneProtection Application (Windows)	−	+	+
Security Erase / Security Feature Set	−	+	+

++ default implemented; − not available; + on request
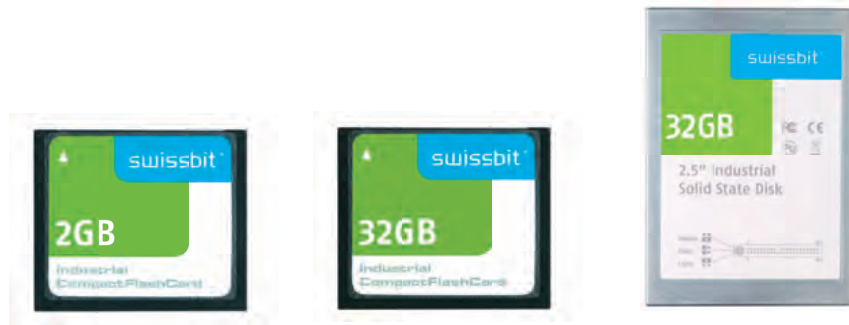
FEATURE COMPARISON

SBZoneProtection

The device allows configuring multiple zones with either no protection, write protection or access protected. Each zone is protected with a separate password. A Windows tool or a programming library are available. With this library, the functionality can easily be integrated in applications built by the customer.

SECURITY ERASE
SECURITY FEATURE SET

Security Erase is part of the standard security feature set. It allows triggering a quick erase of all user data by a software command. The security feature set also includes a password system that restricts access to user data stored on a device. That could be controlled by BIOS.

SBLifeTimeMonitoring (LTM)

The Swissbit Life Time Monitoring feature allows the device to report its detailed Life Time status, which allows users to predict imminent failure to avoid data loss. This feature uses and extends the standard S.M.A.R.T. (Self−Monitoring, Analysis and Reporting Technology) interface or vendor command set with Flash specific information.

	COMPACTFLASH™ CARD	COMPACTFLASH™ CARD	PATA SSD 2.5" SOLID STATE DRIVE
Series	C–300	C–320	P–120
Interface Compliance	CFA4.1 / CFA3.0	CFA4.1 / CFA3.0,	IDE / ATA 133
Connector	CFC Type I	CFC Type I	ATA 44 pin, 2 mm pitch Master/Slave
Physical Form	36.4 x 42.8 x 3.3 mm	36.4 x 42.8 x 3.3 mm	100.2 x 69.85 x 9.0 mm
Flash Type	SLC	SLC	SLC
Density	128 MB to 8 GB	2 GB to 32 GB	2 GB to 32 GB
Operating Temperature	Commercial: 0°C to +70°C Industrial: –40°C to +85°C	Commercial: 0°C to +70°C Industrial: –40°C to +85°C	Commercial: 0°C to +70°C Industrial: –40°C to +85°C
Storage Temperature	–50°C to +100°C	–50°C to +100°C	–50°C to +100°C
Shock	1,500 G	1,500 G	1,500 G
Vibration	20 G	20 G	20 G
Humidity	85 % RH 85°C, 1000 hrs	85 % RH 85°C, 1000 hrs	85 % RH 85°C, 1000 hrs
Data Transfer Mode	up to PIO6, MDMA4, UDMA4	up to PIO6, MDMA4, UDMA4	up to PIO4, MDMA2, UDMA4
Performance	Burst Rate up to 66 MB/s Read Seq. 1ch up to 24 MB/s 2ch up to 37 MB/s Write Seq. 1ch up to 10 MB/s 2ch up to 20 MB/s	Burst Rate up to 66 MB/s Read Seq. up to 45 MB/s Write Seq. up to 35 MB/s	Burst Rate up to 66 MB/s Read Seq. up to 45 MB/s Write Seq. up to 35 MB/s
Voltage	3.3 V +/– 10 %, 5 V +/– 10 %	3.3 V +/– 10 %, 5 V +/– 10 %	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. 55 mA @ 5 V DMA typ. 135 mA @ 5 V
Marking	WEEE, Swissbit, Density, CE, Part Number, Lot Code, RoHS	WEEE, Swissbit, Density, CE, Part Number, Lot Code, RoHS	Swissbit, Density, CE, Pbfree, Part Number, Lot Code, Mfg. Date, Pin Mode
Target Application	Industrial Embedded Systems, Medical Solutions, Point-of-Sales, Gaming Industry, Automation Solutions, etc.		
Tools	Windows Freeware Application, API/DLL for extended S.M.A.R.T. option		
Part Number	SFCFxxxxHxBK1xx-x-xx-5x3-SMA 1ch SFCFxxxxHxBKxxx-x-xx-5x3-SMA 2ch	SFCFxxxxHxB0xxx-x-xx-5x3-SMA	SFPAxxxxQxB0xxx-x-xx-2x3-STD

- Compliant with CFA 4.1 / CFA 3.0 Specification
- Optimized Wear Leveling
- S.M.A.R.T. support with extended command set
- Intelligent Power Fail Protection & Recovery
- Security Features available

- ATA 133 compliant
- Optimized Wear Leveling
- S.M.A.R.T. support with extended command set
- Intelligent Power Fail Protection & Recovery
- Security Features available

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The CFast™ card combines the original CompactFlash™ (CF) card form factor with a Serial ATA (SATA) interface. With this melting of two industry standards, the CFast™ card specification was created to allow new applications in the embedded and industrial markets. Often in these markets performance, speed, system downtime and flexibility are important design considerations. Swissbit's CFast™ addresses these challenges while maintaining a small package size and providing high-speed data transfer. The use of the SATA interface on CFast™ cards allows for a vast improvement over slower parallel data transfer methods by offering a bandwidth up to 300 MB/s. For engineers and designers CFast™ offers the small size, flexibility and features of a CF card while providing the simplicity and speed of a SATA communication interface. The CFast™ card can be operated using a single 3.3 V (+/-5 %) low power source and supports three SATA power management states: Active, Partial and Slumber. The CFast™ is a perfect choice for both fixed and removable applications where low to medium storage densities are required and the physical size of conventional mechanical or solid state hard drives are impractical. The migration effort to CFast™ is further simplified because it electrically complies with the Serial ATA International Organization standard and utilizes the same SATA command set.

Also available is the SATA 2.5" SSD form factor for less space relevant applications.

Hard Disk Drive HDD	Solid State Drive SSD
Advantages	**Advantages**
– Cheaper price – Higher densities – No R/W Limitation	– Faster system boot time – Lighter weight – Low power consumption – Long life time
Disadvantage	**Chance**
– Louder noise – Shock sensitive – Lower MTBF values	– Industrial standard compliance – Industrial like design and robustness – Real S.M.A.R.T. values are possible

DRIVE TECHNOLOGY COMPARISON

	CFAST™ CARD	SATA SSD 2.5" SOLID STATE DRIVE
Series	F-100	X-200
Interface Compliance	CFast™ – SATA II – 3 GBit/s	SATA II – 3 GBit/s
Connector	CFast™ Type I	15 + 7 pin Serial ATA
Physical Form	36.4 x 42.8 x 3.6 mm	100.2 x 69.85 x 9.0 mm
Flash Type	SLC	SLC
Density	4 GB – 32 GB	4 GB – 64 GB
Operating Temperature	Commercial: 0°C to +70°C Industrial: –40°C to +85°C	Commercial: 0°C to +70°C Industrial: –40°C to +85°C
Storage Temperature	–50°C to +100°C	–50°C to +100°C
Shock	1,500 G	1,500 G
Vibration	20 G	20 G
Humidity	85 % RH 85°C, 1000 hrs	85 % RH 85°C, 1000 hrs
Data Transfer Mode	up to PIO4, MDMA2, UDMA6	PIO, MDMA, UDMA6
Performance	Burst Rate up to 300 MB/s Read Seq. up to 105 MB/s Write Seq. up to 90 MB/s	Burst Rate up to 300 MB/s Read Seq. up to 120 MB/s Write Seq. up to 100 MB/s
Voltage	3.3 V +/– 5 %	5 V +/– 10 %

Power Consumption	UDMA6 typ. 300mA, max. 420mA
	                        Idle 220mA
		UDMA6 typ. 260mA, max. 320mA
		                        Idle 140mA

Marking	WEEE, Swissbit, Density, CE, Part Number, Lot Code, Mfg. Date, RoHS	Swissbit, Density, CE, Pb free, Part Number, Lot Code, Mfg. Date, RoHS
Target Application	Industrial Embedded Systems, Medical Solutions, Point-of-Sales, Gaming Industry, Automation Solutions, etc.	
Tools	Windows Freeware Application, API/DLL for extended S.M.A.R.T. option Evaluation kit with 2.5" SATA adapter board available	Windows Freeware Application, API/DLL for extended S.M.A.R.T. option
Part Number	SFCAxxxxHxBRxxx-x-xx-2x6-STD	SFSAxxxxQxBRxxx-x-xx-2x6-STD

– Alternative for Expensive SATA SSD – Replacement for CFC by SATA Chipset – Compliant with CFast™ Rev. 1.0 Specification – SATA II Interface Compliant – S.M.A.R.T. support – Advanced Wear Leveling & Block Management – Power Fail Protection – Security Features available	– Ideal Replacement for 2.5" SATA HDDs – Low Power Consumption – No Noise or Temperature Issues – Long Useful Life – S.M.A.R.T. support – Advanced Wear Leveling & Block Management – Power Fail Protection – Security Features available

UNIVERSAL SERIAL BUS · USB FLASH DRIVE

Universal Serial Bus (USB) interface is very well established and has completely overtaken other forms of serial or parallel interfaces for computer peripherals and memory storage devices. Advantages of USB are its flexibility, reasonably fast serial data transfer rate and its ability to obtain power through the connector. Almost every computer or embedded system supports devices with the standard USB–A–Plug and several internal on–board connectors. Swissbit is offering both in different form factors and in commercial and industrial operating temperature ranges. State of the art NAND Flash handling, stringent component selection and control qualify Swissbit's USB Flash Devices (UFDs) not only for commercial but also and especially for embedded and industrial markets. Security features and Life Time Monitoring Tools are supported and already designed into many customer applications.

	SLC	MLC
High Density		+
Low Cost Per Bit		+
Reliability & Durability	+	
Industrial Temperature	+	
Low–Power Consumption	+	
Write Performance	+	
Partial Program	+	
Low ECC Requirement	+	
Data Retention	+	
Longevity	+	

NAND FLASH TECHNOLOGY COMPARISION

	USB STICK	USB STICK	USB FLASH MODULE
Series	miniTWIST/CAP	unitedCONTRAST II	U–110
Interface Compliance	USB 2.0 high speed, USB1.1 compliant		
Connector	USB 2.0 A–Plug	USB 2.0 A–Plug	Standard: 2.54 mm – 10 Pin Low Profile: 2.00 mm – 10 Pin
Physical Form	55.0 mm x 16.0 mm x 7.0–8.0 mm	68.0 mm x 18.0 mm x 8.0 mm	36.8mm x 26.65 mm
Flash Type	SLC	SLC	SLC
Density	128 MB to 4 GB	512 MB to 8 GB	1 GB to 8 GB
Operating Temperature	Commercial: 0°C to +70°C	Commercial: 0°C to +70°C Extended: –25°C to +85°C	Commercial: 0°C to +70°C Extended: –25°C to +85°C
Storage Temperature	–50°C to +100°C	–50°C to +100°C	–50°C to +100°C
Shock	50 G	50 G	50 G
Vibration	15 G	15 G	15 G
Humidity	85 % RH 85°C, 1000 hrs	85 % RH 85°C, 1000 hrs	85 % RH 85°C, 1000 hrs
Data Transfer Mode	full / high speed	full / high speed	full / high speed
Performance	480 Mbit/s USB 2.0 high speed Read Seq. up to 18 MB/s Write Seq. up to 12 MB/s	480 Mbit/s USB 2.0 high speed Read Seq. up to 32 MB/s Write Seq. up to 23 MB/s	480 Mbit/s USB 2.0 high speed Read Seq. up to 32 MB/s Write Seq. up to 23 MB/s
Voltage	5 V +/–10 %	5 V +/–10 %	5 V +/–10 %
Power Consumption	Full Speed max. 80 mA High Speed max. 100 mA	Full Speed typ. 90 mA High Speed typ. 100 mA	Full Speed typ. 90 mA High Speed typ. 100 mA
Marking	WEEE, Swissbit	WEEE, Swissbit, Density	WEEE, Swissbit, Density, CE, FCC, Part Number, Lot Code
Target Application	Industrial Embedded Systems, Medical Solutions, Point–of–Sales, Gaming Industry, Automation Solutions, etc.		
Tools	Windows SpareBlock read out	Windows SpareBlock read out	Windows SpareBlock read out
Part Number	SFU2xxxxDxBPxxx–x–xx–1x1–STD	SFU2xxxxExBPxxx–x–xx–1x1–STD	SFUIxxxxJxBPxxx–x–xx–2x1–STD SFUIxxxxKxBPxxx–x–xx–2x1–STD

– Low Power Consumption
– Small Form Factor
– Optimized Wear Leveling
– Rotating Clip or Cap Option
– Password Manager available
	– Approved USB Host Solution
	– Hot Pluggable / Plug & Play
	– Optimized Wear Leveling
	– Custom Print Option
	– Security Features
	– Password Manager available
		– Bootable USB Drive
		– Compliant with USB
		  Specification 2.0
		– Support latest OS as Fixed Drive
		– Connector Pitch Variations
		– Robust Design and Shock
		  Vibration Resistant

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Swissbit commits to offer highest quality, JEDEC standard and customized DRAM modules for industrial applications. As a DRAM module manufacturer Swissbit uses strategic dual sources of DRAM suppliers to offer our customers a reliable, long term supply of leading edge and legacy memory module products. Special focus is put into working with suppliers that offer extended availability of DRAM die revisions, avoiding frequent requalification efforts with our customers.

Swissbit's quality focus starts with sourcing the highest quality grade DRAMs and where defined, utilizing fully compliant JEDEC module raw cards either as in-house PCB design or from top quality design partners. For all modules the passives and other active components selected are of the highest quality grade. Using Surface Mount Technology (SMT) and Chip-On-Board (COB) processes in production on fully certified facilities in Germany allows Swissbit to sustain a quality focus during the entire assembly process. Traceability is guaranteed through the complete manufacturing and testing flow. A means to ensure the highest quality level for our customer is Swissbit's world class application testing. Swissbit uses internally developed application software which tests 100 % of all modules under real world conditions with diverse pattern and stress methods and covers the complete memory array including ECC components by constantly adapting to newest memory controller features.
For industrial temperature grade modules the application tests are performed at −40°C and 85°C $_{TAMBIENT}$.

Accompanied by stringent internal product qualification, fast customer return processing and the dedication to be an always improving company, Swissbit constantly works on providing to our customers the best DRAM modules available on the market at a competitive price.
Swissbit is able and committed to design, manufacture and test customer specific module solutions. With broad experience from COB technology Swissbit can offer PCB design and layout services, development of individual test solutions, thermal simulations, DRAM component sourcing, controlled manufacturing and special coating options.

With Swissbit DRAM modules you can keep the total system cost at a minimum.

UNBUFFERED DIMM PRODUCTS
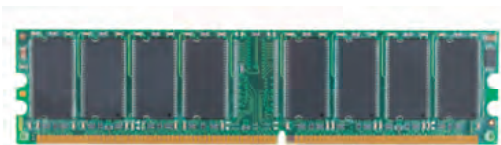
LONG UDIMM / STANDARD HEIGHT / WITH AND WITHOUT ECC

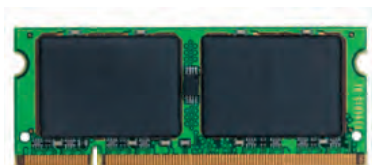|	Data Rate / CL	Density	Org	Height	Voltage	Pins	Partnumber	Package
DDR3-UDIMM	1333 / CL9	1 GB – 4 GB	x64	1.18" (29.97 mm)	1.50 V	240	SGUxxx64xxxxxxx-ssR	BGA
DDR3-UDIMM ECC	1333 / CL9	1 GB – 4 GB	x72	1.18" (29.97 mm)	1.50 V	240	SGUxxx72xxxxxxx-ssRT	BGA
DDR2-UDIMM	800 / CL6	512 MB – 2 GB	x64	1.18" (29.97 mm)	1.80 V	240	SEUxxx64xxxxxxx-ssR	BGA
DDR2-UDIMM ECC	800 / CL6	1 GB – 2 GB	x72	1.18" (29.97 mm)	1.80 V	240	SEUxxx72xxxxxxx-ssR	BGA
DDR1-UDIMM	400 / CL3	512 MB – 1 GB	x64	1.25" (31.75 mm)	2.50 V	184	SDUxxx64xxxxxxx-ssR	TSOP
DDR1-UDIMM	400 / CL3	512 MB – 1 GB	x64	1.00" (25.40 mm)	2.50 V	184	SDUxxx64xxxxxxx-ssR	COB
DDR1-UDIMM ECC	400 / CL3	512 MB – 1 GB	x72	1.25" (31.75 mm)	2.50 V	184	SDUxxx72xxxxxxx-ssR	TSOP
DDR1-UDIMM ECC	400 / CL3	512 MB – 1 GB	x72	1.00" (25.40 mm)	2.50 V	184	SDUxxx72xxxxxxx-ssR	COB
SDR-UDIMM	133 / CL3	256 MB – 512 MB	x64	1.15" (29.21 mm)	3.30 V	168	SSUxxx64xxxxxxx-ssR	TSOP
SDR-UDIMM ECC	133 / CL3	256 MB – 512 MB	x72	1.15" (29.21 mm)	3.30 V	168	SSUxxx72xxxxxxx-ssR	TSOP

SODIMM - SO-UDIMM / STANDARD AND REDUCED HEIGHT / WITH AND WITHOUT ECC

	Data Rate / CL	Density	Org	Height	Voltage	Pins	Partnumber	Package
DDR3-SODIMM	1333 / CL9	1 GB – 4 GB	x64	1.18" (29.97 mm)	1.50 V	204	SGNxxx64xxxxxxx-ssRT	BGA
DDR3-SO-UDIMM	1333 / CL9	1 GB – 4 GB	x72	1.18" (29.97 mm)	1.50 V	204	SGNxxx72xxxxxxx-ssRT	BGA
DDR2-SODIMM	800 / CL6	512 MB – 2 GB	x64	1.18" (29.97 mm)	1.80 V	200	SENxxx64xxxxxxx-ssR	BGA
DDR2-SODIMM	800 / CL6	1 GB – 2 GB	x64	0.94" / 1.18"	1.80 V	200	SENxxx64xxxxxxx-ssR	COB
DDR1-SODIMM	400 / CL3	256 MB – 1 GB	x64	1.25" (31.75 mm)	2.50 V	200	SDNxxx64xxxxxxx-ssR	BGA
DDR1-SODIMM	400 / CL3	256 MB – 2 GB	x64	1.00" (25.40 mm)	2.50 V	200	SDNxxx64xxxxxxx-ssR	BGA / COB
DDR1-SODIMM ECC	400 / CL3	256 MB – 1 GB	x72	1.00" (25.40 mm)	2.50 V	200	SDNxxx72xxxxxxx-ssR	COB
SDR-SODIMM	133 / CL3	128 MB – 1 GB	x64	1.00" (25.40 mm)	3.30 V	144	SSNxxx64xxxxxxx-ssR	COB
SDR-SODIMM ECC	133 / CL3	128 MB – 1 GB	x72	1.00" (25.40 mm)	3.30 V	144	SSNxxx72xxxxxxx-ssR	COB

MICRODIMM / 100PIN-DIMM

	Data Rate / CL	Density	Org	Height	Voltage	Pins	Partnumber	Package
DDR2-MicroDIMM	667 / CL5	1 GB	x64	1.18" (29.97 mm)	1.80 V	214	SEMxxx64xxxxxxx-ssR	BGA
DDR1-100PIN-DIMM	333 / CL2.5	128 MB – 512 MB	x32	1.10" (27.94 mm)	2.50 V	100	SDUxxx32xxxxxxx-ssR	TSOP

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Besides modules for commercial temperature range 0°C to 70°C, Swissbit also offers products for an extended temperature range of 0°C to 85°C TAMBIENT as well as full industrial temperature range –40°C to 85°C TAMBIENT. With intensive application testing of each individual module at low and high temperature, Swissbit ensures the highest quality and reliability of their products.

Swissbit offers different JEDEC RDIMM form factors from standard height RDIMM to VLP Mini RDIMM or SO-RDIMM. Each product has special benefits regarding space requirements, cooling, electrical performance and price per socket. The following list will make it easier for you to choose the right form factor.

	Orientation	Board space	Height requirement	Electrical Performance	Max DIMM Capacity	Cooling	Price per GB + socket
STD RDIMM	Top (std)	o	--	++	++	o	++
STD RDIMM	25°	–	o	++	++	–	+
STD RDIMM	22.5°	–	o	++	++	–	+
VLP RDIMM	Top (std)	o	o	++	+	+	+
VLP MINI RDIMM	Top (std)	+	o	++	o	+	o
VLP MINI RDIMM	25°	o	+	++	o	–	–
VLP MINI RDIMM	90°	–	+	++	o	--	–
SO-RDIMM	Top	++	--	+	o	++	–
SO-RDIMM	90° (std)	--	++	+	o	--	o

REGISTERED DIMM COMPARISON

++ optimal solution; + good; o neutral; – some limitations; -- higher restrictions for design

REGISTERED DIMM PRODUCTS
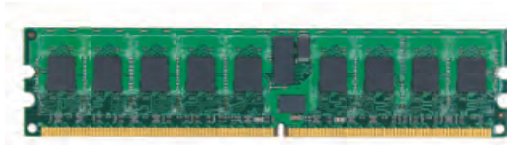
LONG RDIMM / STANDARD HEIGHT / WITH ECC AND C/A PARITY

	Data Rate / CL	Density	Org	Height	Voltage	Pins	Partnumber	Package
DDR3-RDIMM ECC+PARITY	1333 / CL9	1 GB – 4 GB	x72	1.18" (29.97 mm)	1.50 V	240	SGPxxx72xxxxxxx-ssRT	BGA
DDR2-RDIMM ECC+PARITY	800 / CL6	1 GB – 4 GB	x72	1.18" (29.97 mm)	1.80 V	240	SEPxxx72xxxxxxx-ssR	BGA
DDR1-RDIMM ECC	400 / CL3	512 MB – 2 GB	x72	1.20" (30.48 mm)	2.50 V	184	SDRxxx72xxxxxxx-ssR	TSOP / BGA
SDR-RDIMM ECC	133 / CL3	256 MB – 512 MB	x72	1.20" (30.48 mm)	3.30 V	168	SSRxxx72xxxxxxx-ssR	TSOP

LOW PROFILE LONG RDIMM, UDIMM / WITH ECC

	Data Rate / CL	Density	Org	Height	Voltage	Pins	Partnumber	Package
DDR3-RDIMM ECC+PARITY	1333 / CL9	2 GB – 4 GB	x72	0.70" (17.78 mm)	1.50 V	240	SGPxxx72xxxxxxx-ssR	BGA
DDR3-UDIMM ECC	1333 / CL9	2 GB – 4 GB	x72	0.70" (17.78 mm)	1.50 V	240	SGUxxx72xxxxxxx-ssR	BGA
DDR2-RDIMM ECC+PARITY	800 / CL6	1 GB – 2 GB	x72	0.72" (18.29 mm)	1.80 V	240	SEPxxx72xxxxxxx-ssR	BGA

VLP MINIRDIMM WITH ECC, REGISTERED SO-RDIMM WITH ECC

	Data Rate / CL	Density	Org	Height	Voltage	Pins	Partnumber	Package
DDR2-MiniRDIMM	667 / CL5	1 GB	x72	0.72" (18.29 mm)	1.80 V	244	SEHxxx72xxxxxxx-ssR	BGA
DDR2-SO-RDIMM	667 / CL5	1 GB – 2 GB	x72	1.18" (29.97 mm)	1.80 V	200	SEGxxx72xxxxxxx-ssR	BGA

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Swissbit is the world's only manufacturer utilizing Chip-On-Board (COB) technology to produce a robust line of DRAM memory modules that lend themselves to demanding Industrial and Embedded applications. With over 20 years of experience and success in the assembly of COB memory modules, Swissbit enables its customers to take advantage of COB features not found in Surface Mount Technology (SMT) memory modules.

COB DESCRIPTION

Chip-On-board (COB) technology involves mounting DRAM or Flash semiconductor dies directly on a substrate without the need of a packaged component. Eliminating the FBGA or TSOP component package reduces the required substrate area and assembly weight. The saving in area can be as much as 20% in some cases. Using conventional printed circuit boards (PCBs) and standard wire bonding technology, COB tech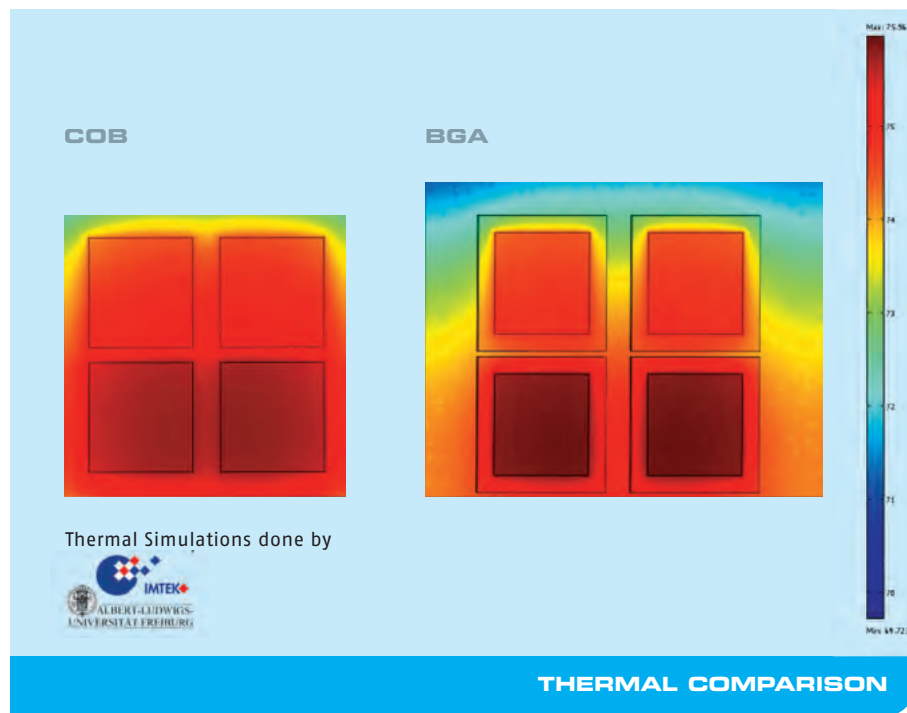nology can yield up to a factor of 5 in weight and volume reduction. COB technology also reduces the number of interconnects between an active die and the substrate (i.e. the package pins) which improves the overall circuit speed, leads to higher clock rates, better electrical performance and improved signal quality and increases the overall reliability of the module. A coating of an Epoxy encapsulent (or Glob Top) is applied that hermetically seals and protects the die and the wire bonded interconnections. The Glob Top also acts like a heat spreader between dies, improves heat emission, adds low coefficients of thermal expansion (CTEs) and provides a hermetically sealed module assembly. The die is glued directly to the PCB to provide increased heat dissipation from the die through the PCB. Swissbit encapsulates the semiconductor die onto the PCB as a total module package, the complete assembly is extensively temperature tested as a unit, not separate components prior to SMT assembly. This also enables Swissbit to offer its line of COB modules in four temperature grade levels.
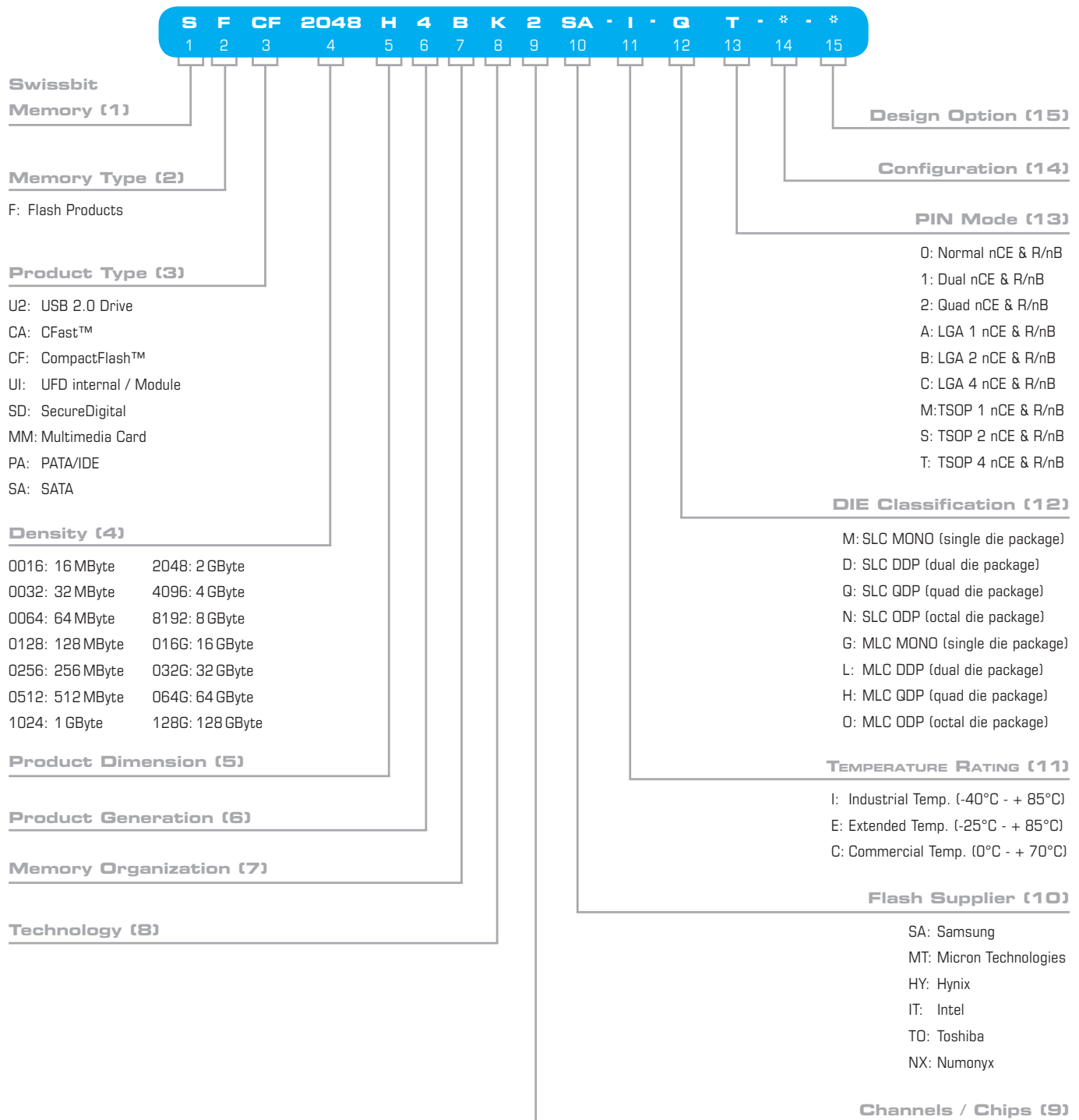

16

COB

BGA

Thermal Simulations done by

IMTEK
ALBERT-LUDWIGS-
UNIVERSITÄT FREIBURG

THERMAL COMPARISON
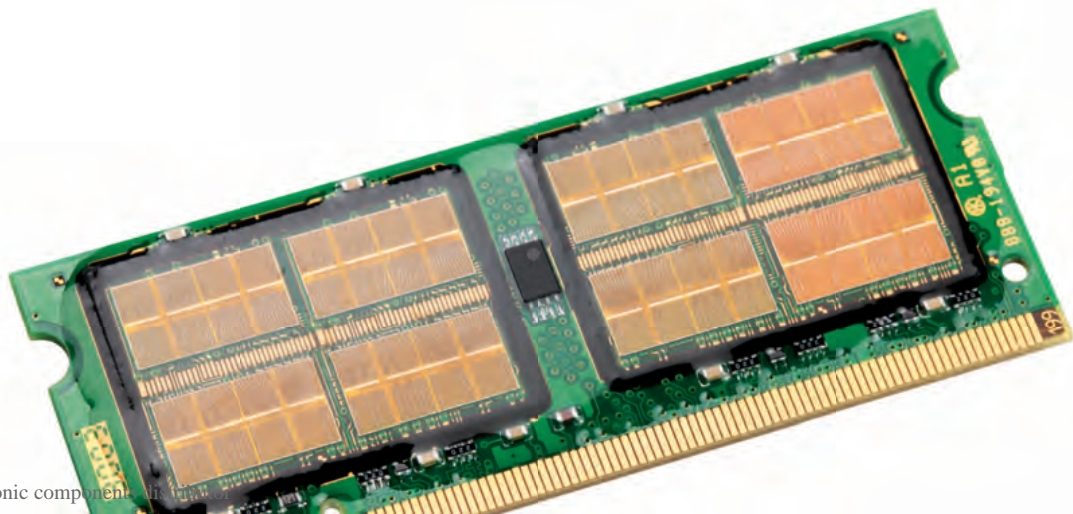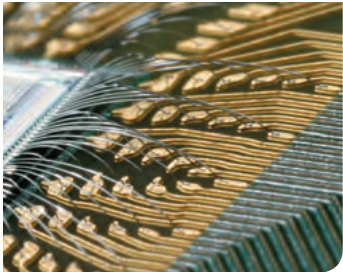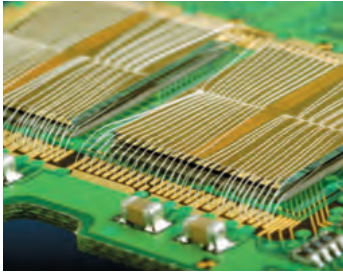
FEATURES

A COB memory module as offered by Swissbit provides customers with the following advantages:
– Typically Swissbit SODIMMS are 1.00" (25.4 mm) high, low profile format. Typical SMT modules are 1.25" or 1.18". This enables Swissbit modules to be used in more applications and allows better airflow.
– COB modules are 3.0mm thin; typical SMT modules are max. 3.8 mm thick. A thinner design allows for better airflow around the installed module in most applications resulting in cooler operation. (see diagram)
– The thermal properties of Swissbit modules are superior to typical SMT modules. COB modules dissipate heat more efficiently and will run lower die junction temperatures in demanding convective cooling conditions. A cooler operating module runs faster and lasts longer.
– Our COB module has less lead frame connections then the typical SMT modules, which results in better signal integrity and higher reliability.
– Swissbit COB modules are available in commercial temperature grade (0°C to +70°C) and three extended temperature grades up to industrial grade (–40°C to +85°C).
– COB modules accept conformal coating better than the typical SMT modules do to their low profile and Glob Top encapsulation.
– Swissbit COB modules are inherently ruggedized for shock and vibration due to the COB technology and the Glob Top encapsulation process; typical SMT modules are not ruggedized.
– Swissbit COB modules are burned in and 100 % tested at the module level as finished product, not at the IC level before assembly.
– All Swissbit COB modules are RoHS compliant.

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FLASH PART NUMBER DECODER

S	F	CF	2048	H	4	B	K	2	SA	- I	- Q	T	- *	- *
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Swissbit Memory (1)

Memory Type (2)

F: Flash Products

Product Type (3)

U2: USB 2.0 Drive
CA: CFast™
CF: CompactFlash™
UI: UFD internal / Module
SD: SecureDigital
MM: Multimedia Card
PA: PATA/IDE
SA: SATA

Density (4)

0016: 16 MByte	2048: 2 GByte
0032: 32 MByte	4096: 4 GByte
0064: 64 MByte	8192: 8 GByte
0128: 128 MByte	016G: 16 GByte
0256: 256 MByte	032G: 32 GByte
0512: 512 MByte	064G: 64 GByte
1024: 1 GByte	128G: 128 GByte

Product Dimension (5)

Product Generation (6)

Memory Organization (7)

Technology (8)

Design Option (15)

Configuration (14)

PIN Mode (13)

0: Normal nCE & R/nB
1: Dual nCE & R/nB
2: Quad nCE & R/nB
A: LGA 1 nCE & R/nB
B: LGA 2 nCE & R/nB
C: LGA 4 nCE & R/nB
M: TSOP 1 nCE & R/nB
S: TSOP 2 nCE & R/nB
T: TSOP 4 nCE & R/nB

DIE Classification (12)

M: SLC MONO (single die package)
D: SLC DDP (dual die package)
Q: SLC QDP (quad die package)
N: SLC ODP (octal die package)
G: MLC MONO (single die package)
L: MLC DDP (dual die package)
H: MLC QDP (quad die package)
O: MLC ODP (octal die package)

TEMPERATURE RATING (11)

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

Flash Supplier (10)

SA: Samsung
MT: Micron Technologies
HY: Hynix
IT: Intel
TO: Toshiba
NX: Numonyx

Channels / Chips (9)

DRAM PART NUMBER DECODER

S	G	N	02G	64	E1	B	F	2	SA - BB	*	R	T
1	2	3	4	5	6	7	8	9	10 11	12	13	14

Swissbit Memory (1)

Product Group (2)

S: SDRAM SDR
D: SDRAM DDR
E: SDRAM DDR2
G: SDRAM DDR3

Module Type (3)

SDR   U: 168 Pin UDIMM 3.3 V
      R: 168 Pin RDIMM 3.3 V
      N: 144 Pin SODIMM 3.3 V

DDR   U: 184 Pin UDIMM 2.5 V
      R: 184 Pin RDIMM 2.5 V
      N: 200 Pin SODIMM 2.5 V
      M: 172 Pin Micro-DIMM 2.5 V

DDR2   U: 240 Pin UDIMM 1.8 V
      R: 240 Pin RDIMM 1.8 V, w/o Parity
      P: 240 Pin RDIMM 1.8 V, w/ Parity
      F: 240 Pin FBDIMM
      N: 200 Pin SODIMM 1.8 V
      G: 200 Pin SO-RDIMM 1.8 V
      H: 244 Pin Mini RDIMM 1.8 V, w/ Parity
      M: 214 Pin MicroDIMM 1.8 V

DDR3   U: 240 Pin UDIMM 1.5 V
      P: 240 Pin RDIMM 1.5 V
      N: 204 Pin SODIMM/SOUDIMM 1.5 V
      M: 214 Pin MicroDIMM 1.5 V

Data Depth (4)

008: 64 MB   256: 2 GB
016: 128 MB   512: 4 GB
032: 256 MB   01G: 1 GB
064: 512 MB   02G: 2 GB
128: 1 GB   04G: 4 GB

Data Width (5)

32: w/o Parity
36: w/ Parity
64: w/o ECC
72: w/ ECC

Printed Circuit Board with Revision (6)

Thermal Sensor / Heat Spreader (14)

RoHs/ Lead Free (13)

Temperature Rating (12)

C: (or blank) (0°C to +70°C)
E: Ext. Temp.(0°C to +85°C)
I: Ext. Temp.(-25°C to +85°C)
W: Ind. Temp.(-40°C to +85°C)

Speed (11)

DDR3   AA: DDR3-800 CL5   AB: DDR3-800 CL6
     BA: DDR3-1066 CL6   BB: DDR3-1066 CL7
     CA: DDR3-1333 CL7   CB: DDR3-1333 CL8
     CC: DDR3-1333 CL9
     DA: DDR3-1600 CL9   DB: DDR3-1600 CL10
     DC: DDR3-1600 CL11

DDR2   50: DDR2-400 CL3   37: DDR2-533 CL4
     30: DDR2-667 CL5   3A: DDR2-667 CL4
     25: DDR2-800 CL6   2A: DDR2-800 CL5
     BB: DDR2-1066 CL7

DDR   08: DDR-200 CL2   5:   DDR-266B CL2.5
     70: DDR-266A CL2   7A: DDR-266A CL2
     60: DDR-333B CL2.5   6A: DDR-333A CL2
     50: DDR-400B CL3   5A: DDR-400A CL2.5

SDR   10: PC-100 CL3   08: PC-100 CL2
     75: PC-133 CL3   70: PC-133 CL2

DRAM Manufacturer (10)

MT: Micron Technology
EP: Elpida
QI: Qimonda
SA: Samsung
HY: Hynix
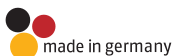WI: Winbond

Module Ranks (9)

1: 1 Rank Module
2: 2 Rank Module

DRAM Revision (8)

DRAM Organization (7)

A: x4   E: x8 TSOP Stack
D: x4 TSOP Stack   C: x16
B: x8   G: x4 BGA Stack

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