SMART MODULAR TECHNOLOGIES

INDUSTRY EXPERIENCE
DESIGN EXPERTISE
GLOBAL MANUFACTURING

SMART Modular Technologies is a global leader in specialty memory solutions serving the electronics industry for over 25 years. SMART Modular delivers solutions to a broad customer base, including OEMs that compete in the computing, networking, communications, storage, mobile and industrial markets.

Focused on providing extensive customer-specific design capabilities, technical support and value-added testing services, SMART collaborates closely with their global OEM customers throughout their design process and across multiple projects to create memory solutions for demanding applications with differentiated requirements. Taking innovations from the design stage through manufacturing and supply, SMART Modular has developed a comprehensive product line comprised of DRAM and Flash memory technologies across various form factors.

GLOBAL FOOTPRINT

NEWARK, CA
Corporate HQ
Manufacturing and New Product Development

TEWKSBURY, MA
R&D Center

EAST KILBRIDE, SCOTLAND
European Planning Center and Sales

NEW TAIPEI CITY, TAIWAN
R&D Center and Sales

GYEONGGI, SOUTH KOREA
Advanced Package Engineering and R&D Center

HONG KONG, CHINA
Sales

PENANG, MALAYSIA
Manufacturing and Development

IRVINE, CA
R&D Center and Sales

ATIBAIA, BRAZIL
IC Packaging & Test, Module Manufacturing and R&D Center

PRAGUE, CZECH REPUBLIC
Outsourced Value-Added Distribution

SINGAPORE
Sales
SMART Modular Technologies designs and manufactures industrial-grade flash storage products with industry standard interfaces in a variety of form factors and capacities. Offering high performance, exceptional reliability, and endurance in a very small package, these products are ideal for OEMs designing, networking, telecommunications, mobile and embedded, automotive, GPS, and industrial computing appliances. SMART provides consistent quality and long product life cycles. Most products are available in Commercial and Industrial operating temperature ranges. Strong relationships with numerous suppliers of flash and controller ICs allow SMART to offer a wide range of cost-effective products to its customers.

## Embedded Storage Solutions

### Slim SATA

SMART’s Slim SATA, N200 and XL+ are JEDEC MO-297A standard embedded SSDs. Slim SATA is ideally suited for use in a wide variety of OEM storage applications that require multiple supply chains, design interoperability, rapid time to market, and long product life cycles. The X10 product is SMART’s latest product, which has enterprise class features, including NAND RAID protection.

<table>
<thead>
<tr>
<th>Slim SATA SSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slim SATA N200 TLC</td>
</tr>
<tr>
<td>Slim SATA XL+ SLC (I-temp)</td>
</tr>
</tbody>
</table>

* Part number noted is that of highest density available

### mSATA

SMART’s mSATA, N200, Q400, and XL+ are JEDEC MO-300A standard embedded SSDs. Providing high performance in a small form factor, mSATA is ideally suited for use in a wide variety of OEM storage applications that require multiple supply chains, design interoperability, rapid time to market, and long product life cycles.

<table>
<thead>
<tr>
<th>mSATA SSD</th>
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</thead>
<tbody>
<tr>
<td>mSATA Q400 TLC</td>
</tr>
<tr>
<td>mSATA N200 TLC</td>
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<tr>
<td>mSATA XL+ SLC</td>
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<tr>
<td>mSATA XL+ pSLC</td>
</tr>
</tbody>
</table>

* Part number noted is that of highest density available
SMART’s industrial-grade embedded USB (eUSB) flash drives feature sustained read speeds of up to 33 MB/s, write speeds up to 21 MB/s and seek time of typically 500 uS. eUSB Plus integrates SMART’s industrial grade eMMC product and a USB bridge chip to create a cost-effective eUSB solution.

SMART’s industrial-grade embedded USB (eUSB) flash drives feature sustained read speeds of up to 33 MB/s, write speeds up to 21 MB/s and seek time of typically 500 uS. eUSB Plus integrates SMART’s industrial grade eMMC product and a USB bridge chip to create a cost-effective eUSB solution.

**M.2 SATA MODULE**

- Networking
- Telecom
- Storage
- Servers

**M.2 2280 S1800**

- Networking
- Telecom
- Servers

**eUSB**

- Networking
- Medical
- Industrial

**DENSITIES FROM 1GB UP TO 32GB**

SMART’s industrial-grade embedded USB (eUSB) flash drives feature sustained read speeds of up to 33 MB/s, write speeds up to 21 MB/s and seek time of typically 500 uS. eUSB Plus integrates SMART’s industrial grade eMMC product and a USB bridge chip to create a cost-effective eUSB solution.

**eUSB**

<table>
<thead>
<tr>
<th>Connector Type</th>
<th>Density</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>4GB-32GB</td>
<td>SHEU52LO32GQDUx*</td>
</tr>
<tr>
<td>2mm</td>
<td>1GB-32GB</td>
<td>SHEU52MO32GQDUx*</td>
</tr>
</tbody>
</table>

*x = Commercial (x=C), Industrial (x=I)*

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**DENSITIES FROM 8GB UP TO 1960GB**

Utilizing an industry standard M.2 SATA interface and connector, XL+, N200,Q400/Q400-S, R800, and S1800 offer best-in-class sequential and random read/write performance in transaction intensive applications. M.2 SATA can be easily integrated into a host system without any special BIOS modifications or additional device drivers. SafeDATA™ Technology is a safeguard data against data corruption during power loss.

**M.2 SATA Modules**

<table>
<thead>
<tr>
<th>Model</th>
<th>Density Range</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.2 2280 R800 TLC</td>
<td>240GB-1760GB</td>
<td>SVM2S861920RT5I*</td>
</tr>
<tr>
<td>M.2 2280 Q400 TLC</td>
<td>120GB-960GB</td>
<td>SVM2S86D960GQTSI*</td>
</tr>
<tr>
<td>M.2 2280 Q400-S TLC</td>
<td>120GB-480GB</td>
<td>SVM2S86D960GQTSI*</td>
</tr>
<tr>
<td>M.2 2280 N200 TLC</td>
<td>32GB-960GB</td>
<td>SVM2S46S12GNTSI*</td>
</tr>
<tr>
<td>M.2 2242 N200 TLC</td>
<td>32GB-512GB</td>
<td>SVM2S46S12GNTSI*</td>
</tr>
<tr>
<td>M.2 2242 XL+ SLC</td>
<td>8GB-64GB</td>
<td>SH9M2S46D064GJS01*</td>
</tr>
</tbody>
</table>

* Part number noted is that of highest density available

**DENSITIES FROM 240GB TO 1920GB**

Utilizing a PCIe Base 3.1 interface, M.2 PCIe modules are easily integrated into a host system without any special BIOS modifications or additional device drivers. The SMART Modular M.2 PCIe module is specifically applicable for OEM markets, such as server, storage cache/accelerators, networking, and data communications which require reliable internal storage with a small footprint.

**M.2 SATA Module**

<table>
<thead>
<tr>
<th>Model</th>
<th>Density Range</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.2 2280 S1800</td>
<td>240GB-1920GB</td>
<td>SVM2P8B1920ST5I*</td>
</tr>
</tbody>
</table>

* Part number noted is that of highest density available
Removable Flash Solutions

**PCle U.2 SSD**

Utilizing PCle Base 3.1 interface, PCle U.2 modules are easily integrated into a host system without any special BIOS modifications or additional device drivers. The SMART Modular PCle U.2 module is specifically applicable for OEM markets, such as server, storage cache/accelerators, networking, and data communications which require reliable internal storage with a small footprint.

<table>
<thead>
<tr>
<th>PCle NVMe SSDs</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>NVMe, SI800</td>
<td>240GB to 3840GB</td>
<td>SVU2PB3840ST51*</td>
</tr>
</tbody>
</table>

* Part number noted is that of highest density available

**2.5” SATA SSD**

SMART's N200 2.5” SATA solid state drive provides an economic yet highly reliable mass storage in a 2.5” SATA form factor. Available in commercial and industrial temperature ranges.

<table>
<thead>
<tr>
<th>2.5” SATA SSDs</th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5” SATA R800 TLC</td>
<td>240GB to 7680GB</td>
<td>C-temp SVSAT67680RT51*</td>
</tr>
<tr>
<td>2.5” SATA N200 TLC</td>
<td>32GB to 1TB</td>
<td>C-temp SVSAT61024NT51*</td>
</tr>
</tbody>
</table>

* Part number noted is that of highest density available

**CF CARD**

SMART’s CF Cards are high-capacity, low-power memory cards that act like hard drives but are reliable, fast and portable. These cards also support self monitoring analysis and reporting technology (S.M.A.R.T.) attributes to help reduce unexpected field failures.

<table>
<thead>
<tr>
<th>Flash Card Products</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CF Card XL SLC</td>
<td>128MB to 8GB</td>
<td>SS9FD08GH3BAxS01*</td>
</tr>
<tr>
<td>CF Card XL+ SLC</td>
<td>512MB to 64GB</td>
<td>SG9CF64GHYDD*</td>
</tr>
</tbody>
</table>

* Part number noted is that of highest density available

**DENSITIES FROM 240GB UP TO 3840GB**

**DENSITIES FROM 32GB UP TO 7680GB**

**DENSITIES FROM 128MB UP TO 64GB**
SMART’s Enterprise USB Memory Key address the need for enhanced reliability and are designed with the industry’s best-in-class read and write speeds, providing reliable operation over the product life cycle.

**USB Key**

- **USB 3.0 Memory Key TLC**: 16GB to 256GB
  - Part number: SVJ33EGRS3C01*
- **USB Memory Key SLC**: 1GB to 16GB
  - Part number: SG9MK16GQDU*

* Part number noted is that of highest density available

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SMART’s industrial SD cards are robust and reliable solutions for solid state storage needs. Not to be confused with consumer grade cards, SMART’s SD cards are designed, built and tested to far higher standards of reliability and endurance.

**SD Card**

<table>
<thead>
<tr>
<th>SD Card</th>
<th>Densities</th>
<th>Part Number</th>
</tr>
</thead>
</table>
| SD XL+ TLC | 16GB to 256GB | C-temp SV95DEGPJETCS1*  
I-temp SV95DEGPJETE151* |
| SD XL+ SLC | 512MB to 2GB | SH95D032G5NIDC02* |
| SD XL+ MLC | 32GB to 128GB | SH95D128GSPNMC01* |
| SD XL MLC | 8GB to 64GB | SH95G064GPHEDMU21* |
| SD pSLC | 4GB to 32GB | SH95D032GPHEDUY21* |

* Part number noted is that of highest density available  
Commercial (y=C), Industrial (y=I), Extended (y=E)

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SMART’s industrial microSD cards are robust and reliable solutions for solid state storage needs. Not to be confused with consumer grade cards, SMART’s microSD cards are designed, built and tested to far higher standards of reliability and endurance.

**microSD Card**

<table>
<thead>
<tr>
<th>microSD Card</th>
<th>Densities</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>microSD TLC</td>
<td>16GB - 256GB</td>
<td>C-temp SV9UD0EGPHJETCS1*</td>
</tr>
<tr>
<td>microSD SLC</td>
<td>1GB to 4GB</td>
<td>S9UD004GPHB8Sy31*</td>
</tr>
<tr>
<td>microSD MLC</td>
<td>8GB to 64GB</td>
<td>S9UD064GPHECMy21*</td>
</tr>
<tr>
<td>microSD pSLC</td>
<td>4GB to 32GB</td>
<td>S9UD032GPHECUy21*</td>
</tr>
</tbody>
</table>

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**USB MEMORY KEY**

- Networking  
- Telecom  
- Embedded Designs
APPLICATIONS

**Auto**
Memory for auto electronics and connected cars include feature-rich infotainment systems and applications that require secured, data storage.

**Industrial**
Industrial applications need replacement storage solutions with extended life cycles and guarantees of a long-term supply. Key features include reliability, security, and performance.

**Computing**
Computing applications have unique, wide-ranging needs that span multiple architectures, configurations, densities, speeds, and packages required by big data processing.

**Networking**
Requiring small to standard form factors, networking applications have strict footprint and thermal specifications and require solutions with low latency as well as high performance and signal integrity.

**Communications**
Communications applications typically require small to standard form factors, reduced voltage, high performance, and reliability.

**Printers**
Printers require compatible, certified memory in a range of speeds, densities, form factors and technologies that offer high quality and performance.

**Defense**
Key defense needs for memory require rugged and durable designs with proven reliability in extreme conditions (shock, vibration, dust, humidity, and temperature), and low power operation.

**Servers**
Server applications need reliable, high-density memory modules with low power consumption at industrial-grade quality.

**Gaming**
Gaming applications typically require memory with small to standard form factors, reduced voltage demands, high performance, and high reliability.

**Storage**
Secure storage memory requires data protection and encryption capabilities that are available in a range of speeds, densities, form factors, and technologies.
CUSTOM PRODUCTS

SMART has a long history of partnering with customers to satisfy their specific design needs. With extensive industry and design expertise and global manufacturing capabilities, SMART offers a unique combination of advantages that can support customers’ unique designs from conception to manufacturing and test. This allows SMART to efficiently and reliably tailor products to meet particular customer needs. For more information, please email customers@smartm.com.

SERVICES

SMART built its reputation by providing proven technology and quality products to the most demanding OEMs around the world. SMART backs these products with outstanding services and expertise in design, manufacturing, test, and logistical support. OEMs can be confident that SMART products will perform to the highest degree of reliability and compatibility, as well as meet all system requirements and OEM specifications. More information on SMART can be obtained at www.smartm.com.

Key Competitive Advantages

- Inventory management of volatile commodity parts
- Established strategic alliances with major semiconductor manufacturers
- Broad custom design and packaging capabilities
- Value-added engineering
- Custom testing capabilities
- Comprehensive pre- and post-sale technical support
- Conformal coating, stacking and component underfill for enhanced ruggedization

SMART Modular Technologies excels in designing, manufacturing, testing, and rapidly delivering both standard and custom modular technologies to OEMs around the world.

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