Solid State Drive (SSD)

TDK Launches Embedded mSATA Solid-State Drive with 3 Gbps Serial ATA Support suitable for Industrial Applications

- Features life diagnosis software, small size 30 mm x 50 mm, and max. 64 GB capacity
- Fast mSATA type SSD module realizes 170 MB/sec read and 70 MB/sec write speeds

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TDK Corporation has developed the mSATA type SSD (Solid-State Drive) SMG3B series with support for 3 Gbps serial ATA. The products will be available from July 2012.

The SMG3B series drives with mSATA interface measure only about 30 mm x 50 mm and offer storage capacities up to 64 GB. High-speed mSATA implementation achieves actual read access speed of 170 MB per second. The mSATA standard, established by the Serial ATA International Organization (SATA IO), was initially adopted mainly for digital consumer products such as tablet computers and netbooks. Because of its space-saving advantages, the standard is now gaining increased acceptance also for social infrastructure equipment and smart grid applications. Products designed for such uses must fulfill high requirements not only with regard to data reliability but also in terms of endurance, data security, reliability monitoring, and similar aspects.

The SMG3B series uses the TDK original SSD controller GBDriver RS3, featuring powerful error correction expandable to 44-bit ECC. Data reliability has been signifi-cantly enhanced thanks to a sophisticated power interruption data preservation algorithm and the auto refresh function. Another special feature is the data random-izer that varies data patterns during writing to reduce the risk of bit errors.

Thanks to the use of high-reliability Single Level Cell (SLC) NAND type flash memory and the global static wear leveling capability of the GBDriver RS3 that allows high-speed distributed writing, the drives achieve a storage life that meets the requirements of industrial equipment characterized by high usage frequency and long service periods.

Data security also has been enhanced. The ATA standard security functions of the SMG3B series allow the user to set a password to counter the risk of data leaks, tampering, or unauthorized copying. AES* 128-bit encryption. used when writing data to the flash memory, makes it impossible to analyze data by reverse engineering. The ATA Trim command allows complete data erasure which is vital when replacing or discarding a drive.

Glossary

- AES: Advanced Encryption Standard. A block encryption method registered as United States Department of Commerce Federal Information Processing Standards FIPS PUB197

Main applications

- Thin-client computers, tablet computers, SATA RAID SSD installations and other IT equipment for cloud computing systems
- Fish finders, GPS plotters, satellite compass systems, NAVTEX, 3D navigation radar, VTS (Vessel Traffic Services) equipment, land-based AIS (Automatic Identification System) equipment, Inmarsat, weather fax, weather satellite image receivers, ECDIS (Electronic Chart Display and Information System) equipment and other maritime navigation equipment
- Multi-function printers (MFPs), commercial-use projectors, telephone conferencing systems, electronic blackboards and other office automation equipment
- Karaoke on demand systems, arcade games and other amusement equipment
- Digital signage, electronic billboards, electronic point-of-purchase (POP) displays and other advertising display equipment
- Semiconductor manufacturing equipment, NC machine tools, sequencers, programmable logic controllers, panel computers, embedded CPU boards and other factory automation equipment
- Automated ticket gates, automated ticket vending machines, commuter pass vending machines, train movement management systems, automated air ticket vending machines, automated check-in systems and other railway and transportation services equipment
- Cashless registers and other point-of-sales (POS) equipment, convenience store and kiosk terminals, ATMs and other banking terminals
- Diagnostic imaging systems, blood analysis equipment, medical PCs, electronic patient records systems, DNA microarray systems, automatic biochemistry analyzers, remote medical care devices, automated care devices and other medical equipment and data analysis equipment
- Base station equipment for 4th generation (4G) mobile data communication systems such as LTE-Advanced/WiMAX2 and other communications and broadcasting equipment and information system devices
- Smart electricity meters, power grid infrastructure equipment, automated power equipment control systems, energy management systems, building air conditioning systems and other smart grid equipment
- Biometric authentication systems, entry/exit control systems, security terminals for surveillance cameras and other security equipment
- Earthquake emergency information systems, household fire detectors and other disaster prevention related equipment

Main features and benefits

1. Host Interface
Compliant with Serial ATA Standard Revision 2.6. Compatible with Gen1:1.5 Gbps, and Gen2:3.0 Gbps.
Realizes high-speed access: 170 MB/sec read access, 70 MB/sec. write access.
(64 GB type, measured with Crystal Disk Mark 3.1. Actual speeds depend on the system environment.)

2. Single Level Cell (SLC) NAND Type Flash Memory

3. TDK SSD Controller GBDriver RS3
The product uses the NAND type flash memory controller GBDriver RS3 developed by TDK, offering the following technology features for enhanced reliability.

3.1 Global static wear leveling
TDK's global static wear leveling algorithm counts the number of times each memory block is erased (programmed) and replaces blocks uniformly. Static blocks such as OS/FAT are also periodically leveled, which drastically improves the lifespan of the installed flash memory. The 64 GB type for example supports approximately 6.3 billion erase cycles. Even at a rate of 10 erases per second, this equates to an expected service life of 20 years.

3.2 Power interruption tolerance algorithm
A proprietary algorithm reduces the risk of collateral data errors such as corruption of data other than the data being written if power is interrupted when writing data.

3.3 Error correction and recovery
8-bit, 15-bit/512 byte, 30-bit, 44-bit/1KB ECC capability together with an auto recovery function correct bit errors automatically when reading data repeatedly (read disturbance errors).

3.4 Data randomizer function
Data patterns are automatically randomized during the write process, to minimize the risk of bit errors due to writing the same data repeatedly.

3.5 Auto-refresh function
While there is no access by the host, internal data are automatically refreshed. This function is paused during access, so there is no delay in response.

3.6 Automated encryption using 128-bit AES
The integrated 128-bit AES encryption function automatically encrypts data when writing to the NAND flash memory, to prevent leaking of and tampering with personal data and confidential information.

3.7 ATA Trim command
The ATA Trim command improves write performance when erasing unneeded data. The command enables complete and secure data erasure which is vital when replacing or discarding a drive.

3.8 Other functions
 (a) Total sector number setting function (clipping function)
    The number of logical blocks allocated to a data area can be adjusted up or down in individual block units. For example, the number of times data can be written to the flash memory can be increased by reducing the number of logical blocks in the data area. Conversely, in the case of applications that do not require an extended life span, the memory capacity can be maximized by increasing the number of logical blocks in the data area.
 (b) Protection function
    Incorporation of an ATA standard protection function allows customers to set and remove a password to implement independent authentication and protect important data.
 (c) SMART command support
    The number of times all memory blocks are erased (programmed) can be obtained using the SMART command, which allows for easy determination of the flash memory status and facilitates appropriate lifespan management.

4. Solution Support
TDK has independently developed and marketed the GBDriver series of NAND Flash memory controllers since 2000 and provides technical support to customers in Japan and overseas backed up by its advanced proprietary technologies. This includes dispatch of field application engineers which is a vital service especially in the embedded systems market, and support for implementation of reliability monitoring functions.

About TDK Corporation

TDK Corporation is a leading electronics company based in Tokyo, Japan. It was established in 1935 to commercialize ferrites, a key material in electronic and magnetic products. TDK's current product line includes passive components, magnetic application products as well as energy devices, flash memory application devices, and others. TDK today focuses on demanding markets in the areas of information and communication technology and consumer, automotive and industrial electronics. The company has a network of design and manufacturing locations and sales offices in Asia, Europe, and in North and South America. In fiscal 2012, TDK posted total sales of USD 9.9 billion and employed about 79,000 people worldwide.

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