Solid State Drive (SSD)

TDK Launches SNG4A Series of Solid State Drives With M.2 Form Factor Support

- Industry-leading power interruption tolerance in a M.2 form factor product
- Compact M.2 type SSD measures only 22 mm x 42 mm and offers support for both B and M key IDs

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TDK Corporation announced today the successful development of the SNG4A series of serial ATA II compatible industrial solid state drives. The new NAND flash memory modules enable storage capacities of up to 64 GB with SLC type NAND flash memory. Measuring only approx. 22 x 42 mm, the modules support use in M.2 slots and will be available from August 2014.

The new M.2 form factor is currently garnering a lot of attention and is expected to become the dominant standard for consumer applications. Furthermore, the adoption of M.2 for industrial applications will most likely also be promoted heavily. Motherboards for industrial use not only have to achieve good transfer speeds, but there is also a growing tendency to place more emphasis on reliability, since products often have to be operable for periods of ten years or more.

Taking advantage of the fact that TDK develops SSD controller chips in-house, and with a view towards the convenience of industrial customers who prefer being able to use the same form factor for a long time, TDK has taken an early lead and has realized an SSD lineup in the M.2 form factor, with both Key B and Key M support and the ability to process commands up to the Serial ATA Revision 2.6 Specification.

The SNG4A series employs the GBDriver RS4 developed by TDK. The GBDriver power interruption tolerance algorithm has won high acclaim especially among industrial users, making the new M.2 format SATA Flash Drives resistant against power supply problems, a highly desirable characteristic for demanding industrial applications.

Further advantages provided by the GBDriver RS4 include Enhanced ECC and other functions significantly bolstering data reliability, such as read retry, auto recovery, data randomizer, and auto refresh. Service life diagnosis software (TDK SMART) facilitates quantitative lifespan management of flash storage.

Data security has also been enhanced. In addition to the standard ATA security complement, AES*[1] 128-bit encryption and a TDK proprietary security function are also available. This makes it possible to store data in the NAND type flash memory in encrypted form, to guard against the risk of data leaks and tampering, resulting in highly robust storage security.

The TDK SNG4A series of industrial M.2 form factor SSDs are SATA flash memory drives ideally suited for use as replacements for hard disk drives or mSATA type SSDs in industrial equipment and embedded devices. They provide high-speed performance, data reliability, storage lifespan, and data security at the highest levels in the industry.

The products can be viewed at the TDK booth at the Embedded Systems Expo (ESEC) to be held from May 14 to 16.

Main applications

- Factory automation equipment such as semiconductor manufacturing equipment, NC machine tools, sequencers, programmable logic controllers, panel computers, and embedded CPU boards
- Railway and transport equipment such as automated ticket gates, automated ticket vending machines, commuter pass vending machines, train operation management systems, automated air ticket vending machines, and automated check-in systems
- Cashless registers and other point-of-sales (POS) equipment, convenience store and kiosk terminals, ATMs and other banking terminals
- Terminals and thin-client computers, SATA RAID SSD installations and other IT equipment for cloud computing systems
- Automotive equipment such as car navigation systems, digital tachographs, drive recorders, and rear-view monitors
- Office equipment such as multi-function printers (MFPs), commercial projectors, telephone conferencing systems, and electronic blackboards
- Amusement devices such as karaoke on demand, arcade games, and game consoles
- Advertising display equipment such as digital signage, electronic billboards, and electronic point-of-purchase (POP) displays
- Medical and measuring instruments and nursing-care equipment such as diagnostic imaging systems, blood analysis equipment, medical PCs, electronic patient records systems, DNA microarray systems, automatic biochemistry analyzers, remote medical care devices, and automated care devices
- 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 grid equipment such as smart electricity meters, power grid infrastructure equipment, automated power equipment control systems, energy management systems, and building air conditioning systems
- Security and surveillance equipment such as biometric authentication systems, entry/exit control systems, and security terminals for surveillance cameras
- Disaster prevention related equipment such as earthquake early warning systems and household fire detectors

Main features

1. Uses GBDriver RS4 NAND Flash Memory Controller Developed by TDK

The memory controller chip determines SSD performance and data reliability. The drives use the GBDriver RS4 series developed by TDK. By reflecting the latest NAND flash memory specifications and developments in the controller design, TDK enhances performance of solid state drives and ensures compatibility among flash memory generations. This means that the same product line can meet the flash storage needs of industrial and embedded applications, and the same configuration can be used to fit various flash storage needs and offer enhanced replacement products.

2. High-Speed Access

Compliant with Serial ATA Revision 2.6 Specification. Compatible with SATA Gen. 1 (1.5 Gbps), Gen. 2 (3.0 Gbps), and NCQ commands. Supports read access speeds up to 215 MByte/second and write access speeds up to 95 MByte/second*2 with no DRAM or other cache while maintaining high reliability.

3. Global Static Wear Leveling

TDK's proprietary global static wear leveling algorithm counts the number of times each memory block is programmed (erased) and replaces all blocks uniformly. Static blocks such as for the OS are also periodically leveled, which drastically improves the lifespan of the installed flash memory. The range for static wear leveling can be freely set. (In this case, dynamic wear leveling is used for other areas.)

4. Improved Power Interruption Tolerance

A proprietary algorithm in the SSD controller 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.

5. Enhanced ECC Function

Powerful 71-bit/1KByte ECC is a standard feature. For applications requiring even higher reliability, the SSD controller GBDriver RS4 provides an Enhanced ECC function which uses 71 bits per 512 Bytes (option).

6. Read Retry Function

As the cells of NAND flash memory get smaller, electric potential fluctuations at the floating gate can occur more easily, especially with MLC flash memory. When an ECC error has occurred in a read operation, the GBDriver RS4 changes the read potential and attempts to read the data again.

7. 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.

8. Error Recovery

The auto-recovery function automatically corrects bit errors (read disturbance errors) that can occur when data are read repeatedly. The auto-refresh function reads all data including little used areas and automatically performs error correction if required. This guards against data loss due to read disturbance errors and data hold errors. Auto refresh processing is performed in the background, so even when performing correction processing, there is virtually no delay in command response.

9. Security Functions

A) AES 128-bit encryption
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. (option)

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) TDK proprietary security function
Mutual authentication of host and SSD makes it possible to block access and response by unauthorized third parties through spoofing etc. (Contract for protection of confidential information required separately.)

10. ATA Trim Command

The ATA Trim command allows complete data erasure which is vital when replacing or discarding a drive. The command also enables improved write performance when erasing unneeded data.

11. Support for SMART Command

The number of times all memory blocks have been programmed (erased) can be obtained using the SMART command, which allows for easy determination of the flash memory status and facilitates appropriate lifespan management. Proprietary software from TDK can be used for this purpose free of charge.

12. Solution Support

TDK has independently developed and marketed the GBDriver series of NAND Flash memory controllers since 2000. We provide technical support to customers in Japan and overseas backed up by advanced proprietary technologies, including dispatch of field application engineers and support for implementation of reliability monitoring functions, for which there is strong demand in the industrial equipment embedded flash storage market.

Glossary

*1: Compliant with United States Department of Commerce Federal Information Processing Standard FIPS PUB197.

*2: With onboard SLC flash memory and 4-channel connection. May vary depending on system environment.

About TDK Corporation

TDK Corporation is a leading electronics company based in Tokyo, Japan. It was established in 1935 to commercialize ferrite, a key material in electronic and magnetic products. TDK's portfolio includes electronic components, modules and systems* which are marketed under the product brands TDK and EPCOS, power supplies, magnetic application products as well as energy devices, flash memory application devices, and others. TDK 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 2014, TDK posted total sales of USD 9.6 billion and employed about 83,000 people worldwide.

* The product portfolio includes ceramic, aluminum electrolytic and film capacitors, ferrites, inductors, high-frequency components such as surface acoustic wave (SAW) filter products and modules, piezo and protection components, and sensors.

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