Solid State Drive (SSD)
TDK Launches SHG4A Series of Serial ATA 3 Gbps Compliant Half Slim Type SSDs

- Support for high storage capacities up to 128 GB with SLC flash memory realized in compact package (half the size of 1.8-inch HDD)
- Internal power supply protection circuit provides power interruption resistance at the industry's highest level while saving space

November 5, 2013

TDK Corporation announced today the launch in November 2013 of the SHG4A series of half slim type solid state drive (SSD) modules for industrial applications. The new NAND flash memory modules support the serial ATA II standard and enable storage capacities of up to 128 GB also with SLC type NAND flash memory. Measuring only approx. 54 x 40 mm, the modules are about one half the size of a 1.8-inch hard disk drive (HDD).

The SHG4A series of half slim type industrial SSDs employs the standard SATA connector also used for 2.5 inch type SSDs, which eliminates the need for a special connector at the customer's host side. The GBDriver power interruption tolerance algorithm which has won high acclaim especially among industrial users, and an integrated power supply protection circuit are standard features, making this compact SATA flash drive resistant against power supply problems, a highly desirable characteristic for demanding industrial applications.

The addition of the Enhanced ECC function and a read retry function for enhancing data reliability are major advantages of the new products, augmented by features of the existing GBDriver series such as auto recovery, data randomizer, and auto refresh. Integrated control of these functions enables the product to easily accommodate coming trends in flash memory.

The sophisticated static wear leveling algorithm averages the write and erase process over all blocks of the memory area, thereby drastically improving the lifespan of installed flash memory. SMART (Self-Monitoring & Analysis Reporting Technology) provides information about the number of times that memory blocks have been programmed (erased), which facilitates quantitative lifespan management of flash storage.

Data security has been further enhanced by the addition of AES[*1] 128-bit encryption and a TDK proprietary security function to the standard ATA security complement. 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 SHG4A series of half slim type industrial SSDs are SATA flash memory drives ideally suited for use as replacements for hard disk drives in industrial equipment and embedded devices. They provide excellent performance in all vital aspects, including high-speed performance, data reliability, long storage lifespan, and data security.

Glossary

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

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 and benefits

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 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 power interruption tolerance algorithm on the SSD onboard controller and an internal power supply protection circuit reliably prevent collateral data errors such as corruption of data other than the data being written if power is interrupted when writing data. This provides robust reliability against sudden power supply problems.

5. Enhanced ECC Function

30-bit ECC, 44-bit ECC or 71-bit/1KByte ECC can be selected, based on automatic flash evaluation. For applications requiring even higher reliability, the 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 retention 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 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.
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 by 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 have a complete specialized field application engineer support network to provide technical support and reliability monitoring function installation support, demand for which is particularly high in the embedded system market, in Japan and overseas.

*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 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 2013, TDK posted total sales of USD 9.1 billion and employed about 80,000 people worldwide.

You can download this text and associated images from
www.global.tdk.com/news_center/press/20131105695.htm

Contact for media

Contact		Phone	Mail
Ms. Mari KONISHI	TDK Corporation	+81 3 6852-7102	pr@jp.tdk.com

Contact for customers

Contact		Phone	Mail
Mr. Shunichi HANAFUSA	TDK Corporation	+81 47 378-9130	shanafus@jp.tdk.com