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TDK Launches SHG2A Series of Serial ATA II Half Slim Type SSDs

- High-Speed, High-Reliability, Long-life Half Slim Type SATA II Solid State Drives with First Public Release of Life Monitoring Software and First Use of SLC Flash in Japan* and Internal Power Supply Protection circuit Provide Power Interruption Resistance at the Industry's Highest Level -

TOKYO JAPAN, March 30, 2010 — TDK Corporation announced today the launch in April 2010 of the SHG2A series of half slim type solid state drive (SSD) modules. The new modules, which have a maximum capacity of 32 GB, are about one half the size of a 1.8-inch hard disk drive (HDD).

The new drives are half slim Flash drives equipped with GBDriver RS2 series SATA controller ICs developed by TDK. They support high-speed access with an effective read speed of 95 MB/s and an effective write speed of 55 MB/s. They also feature powerful error correction capabilities scalable to 15-bit/sector error correction code (ECC), providing high levels of data reliability. In addition, the use of an internal power supply protection circuit prevents errors in the event of power interruption. These SATA Flash drives are also equipped with an auto-recovery function that automatically recovers data when read disturbance errors occur from repeated reading of data, making them ideal for automotive applications such as car navigation systems.

TDK has achieved substantial increases in the life spans of semiconductor memory storage devices. A static wear leveling function developed by TDK equalizes data writing among all of the Flash memory blocks, maximizing the life span of the memory. SMART (self-monitoring and analysis reporting technology) data makes it possible to grasp the number of times each memory block is rewritten (erased) and diagnose drive status in real-time, facilitating quantitative assessment of the life spans of silicon disks used in systems. In addition, a life span assessment tool is being made publicly available for the first time in the world and can be downloaded from TDK's website, enabling customers to monitor the life span of half slim SSDs in their systems.

The drives also feature an advanced encryption function using the 128-bit AES encryption that has been registered as United States Department of Commerce Federal Information Processing Standards FIPS PUB197. Data is automatically encrypted before writing to the Flash memory, preventing data leaks and tampering. A high level of storage security is provided to prevent unauthorized copying and other data risks by using both ATA standard security functions and an original TDK password lock function.

TDK's SHG2A series of industrial half slim SSDs are suitable as replacements for HDDs and provide high-speed performance, data reliability, storage life span, and data security at the highest levels in the industry. TDK also provides technical support through a specialized field application engineer (FAE) program to ensure customer confidence in these new products.

* Japan's first public release of life span assessment software for a half slim SSD product; as of March 2010, according to TDK investigations. Also, TDK is the first in Japan to launch a half slim SSD with a single-level cell (SLC) NAND Flash memory.

Basic Specifications

Series	TDK RS2 series of serial ATA II interface half slim solid state drives		
Models	SHG2A series		
Capacity	1 GB, 2 GB, 4 GB, 8 GB, 16 GB	32 GB	
Configuration	Half Slim Type		
Onboard memory	SLC (single-level cell) NAND Flash memory	MLC (multi-level cell) NAND Flash memory	
Onboard controller	TDK GBDriver RS2		
Interface	Serial ATA Revision 2.6		
Data transfer modes	SATA Gen1: 1.5 Gbps, Gen2: 3.0 Gbps		
Data transfer speeds*1	Read (Max)	95 MB/s	95 MB/s
	Write (Max)	55 MB/s	28 MB/s
Error correction function	8 bit/sector (512 byte) correction (15 bit/sector correction)		
Rewritable life span*2	100,000 times × Number of valid blocks regardless of the presence of fixed blocks (e.g., in the case of a 16 GB SSD, 6.3 billion times) SMART data provides information on drive status in real time (the number of times each memory block has been rewritten can be grasped)		3,000 times × Number of valid blocks regardless of the presence of fixed blocks (e.g., in the case of a 32 GB SSD, 900 million times) SMART data provides information on drive status in real time (the number of times each memory block has been rewritten can be grasped)
	The life span assessment tool can be downloaded from the TDK website: http://www.tdk.co.jp/memorycontroller/mem01000.htm (Japanese only)		
Vibration resistance	15 G (when operating)		
Shock resistance	1500 G (when not operating)		
MTBF	900,000 hours		
Operating Temp. range	0°C to 70°C (-40°C to 85°C industrial option)	0°C to 70°C	
Storage temp. range	-25°C to 85°C		
Storage/Operating humidity range	0% to 90% RH (without condensation)		
Power supply voltage	5 V ± 10%		
Certifications	CE/FCC/VCCI		
Environmental specifications	RoHS compliant		
Production site	Taiwan		

Main Applications

- Thin client PCs, tablet PCs, smart phones, electronic book readers, etc.
- Automotive equipment such as car navigation systems and portable navigation devices (PNDs)
- Office equipment such as multi-function printers (MFPs), commercial projectors, and electronic blackboards
- Advertising display devices such as digital signage and digital photo frames
- Amusement devices such as karaoke on demand and arcade games
- Factory automation equipment such as NC machine tools, sequencers, PLCs, panel computers, touch panel systems, and embedded CPU boards
- Smart grid systems such as smart meters, power network communications infrastructure, electric power equipment automatic control systems, and energy management systems
- Railway and transport equipment: automated ticket gates & vending machines, commuter pass vending machines, automated airline vending machines, and check-in systems
- Banking terminals: POS devices, convenience store & kiosk terminals, Felica & Suica terminals and ATMs
- Medical and measuring instruments such as diagnostic imaging systems, blood analysis equipment, medical PCs, and electronic records systems
- Communications equipment for base stations such as LTE (Super 3G, third-generation mobile phone data communications) servers and routers, broadcasting equipment such as IP simulcast radio terminals, and information system equipment
- Security terminals & devices: digital signage, entry control systems, monitoring cameras
- Disaster prevention related equipment such as earthquake early warning systems, household fire detectors, and security recorders

Main Features

1. First Half Slim SSD Product with Single-Level Cell (SLC) Flash Memory in Japan

This is the first time that a Japanese maker has adopted SLC in a NAND Flash memory for use in the half slim SSDs (solid state drives) that are currently being standardized by JEDEC and the SATA International Organization. By combining its GBDriver RS2 SATA NAND controller static wear leveling algorithm with an advanced dispersed write function, TDK has created a half slim SSD product with a life span at the industry's highest levels.

2. World's First Public Release of Life Span Assessment Tool for Half Slim SSD

This is the first time ever that a half slim SSD life span assessment tool has been released publicly. A SMART command can be used to grasp the number of times that each block has been rewritten (erased), making it easy for customers to understand the memory life spans of their systems and to manage them accurately. By using the TDK SMART data, customers can, for example, raise the precision of reliability, availability and serviceability (RAS) functions.

3. Uses GBDriver RS2 NAND Flash Memory Controller ICs Developed by TDK

The memory controller IC determines SSD performance and data reliability, and these drives use the GBDriver RS2 NAND Flash memory controller ICs developed by TDK. By reflecting the latest NAND Flash memory specifications and developments in the controller design, TDK enhanced performance as NAND Flash drives and ensured compatibility among Flash memory generations. This means that the same product line can meet the Flash storage needs of industrial and embedded applications and make suitable proposals for enhanced replacement products.

4. High-Speed Access

Compliant with Serial ATA Revision 2.6 Specification. Compatible with Gen.1 (1.5 Gbps), and Gen.2 (3.0 Gbps). Supports read access speeds up to 95 MByte/second and write access speeds up to 55 MByte/second.*³

5. Error Correction and Recovery

A Flash identification function enables selection of 8 bit/sector ECC or 15 bit/sector ECC to provide error correction capabilities with room to accommodate future NAND developments. An auto-recovery function is also included to correct bit errors automatically when reading data repeatedly (read-disturbance errors).

6. Advanced Dispersed Write Format (Static Wear Leveling Function for All Blocks)

A new static wear leveling algorithm developed by TDK counts the number of times each memory block is rewritten (erased) and replaces blocks uniformly. Fixed blocks such as OS/FAT are also periodically equalized across all blocks regardless of a Flash memory chip or management zone, making it possible to maximize the lifespan of installed Flash memory and substantially lengthening the life span of Flash memory storage.

Half Slim SSD capacity	Number of times Half Slim SSD can be rewritten	Number of permissible Half Slim accesses in the case of device operation 24 hours a day, 365 days a year (accesses per second)		
		1 Year	5 Years	10 Years
1GB	389,120,000 Times	12.34 Times	2.47 Times	1.23 Times
2GB	778,240,000 Times	24.68 Times	4.94 Times	2.47 Times
4GB	1,556,480,000 Times	49.36 Times	9.87 Times	4.94 Times
8GB	3,112,960,000 Times	98.71 Times	19.74 Times	9.87 Times
16GB	6,225,920,000 Times	197.42 Times	39.48 Times	19.74 Times

7. Improved Power Interruption Tolerance

A power interruption tolerance algorithm for the onboard controller completely prevents collateral data errors such as corruption of data other than the data being written if power is interrupted when writing data. In addition, an internal power supply protection circuit prevents power interruption errors.

8. Automated Encryption (CBC Mode) Using 128-bit AES (Advanced Encryption Standard)

A 128-bit AES encryption function automatically encrypts data and writes it to the Flash memory, preventing leaks of and tampering with personal data and confidential information.

9. Other Functions (Optional)

(a) Total Sector Number-Setting Function (includes clipping function)

The number of logical blocks allocated to a data area can be adjusted up or down in individual sector units. For example, the half slim SSD rewritable life span 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 half slim SSD memory capacity can be maximized by increasing the number of logical blocks in the data area. CHS settings can be freely adjusted, making it possible to create highly compatible SATA RAID systems and facilitating installation with systems in use.

(b) Protection (Password) Function

An ATA-standard protection function has been incorporated to allow customers to set and remove a password to protect important data.

10. Solution Support

TDK has independently developed and marketed the GBDriver series of NAND Flash memory controller ICs since 2000, and cumulative shipments exceed 30 million units. TDK has marketed numerous compact flash cards (CF cards) and solid-state drives (SSDs) that use the GBDriver series of controllers and has 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.

Production and Sales Plans

- Production location: Taiwan
- Production capacity: 20,000 units/month at launch (planned)
- Start of production: April 2010

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***Notes**

1. During four-channel interleave connection. May vary depending on the system environment.
2. When 4 Kbyte/page structure NAND Flash memory is used.
3. Onboard SLC Flash memory. During four-channel interleave connection.
May vary depending on the system environment.

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