Flash Storages
Embedded SD/SSD and M.2 2280 type SSD

- Embedded SD/SSD equipped with highly durable SLC/pSLC NAND flash
- Addition to the lineup of Type 2280-D5-B-M shape to M.2 SSD

May 8, 2018

TDK Corporation (TSE6762) announces the sequential launch of the embedded SD ESRD4 series, the embedded SSD ESS1B series and the M.2 SSD Type 2280-D5-B-M SNS1B series.

With the progress of IoT, the demand for micro storage for edge data is rapidly expanding. In particular, eMMC[*1], which can be mounted on a surface, was expected to be potent, but the trend is shifting from eMMC to UFS[*2], which is associated with the larger capacity of smartphones.

On the other hand, a reliable and appropriate storage capacity is required for I-IoT[*3] that usually uses a small capacity.

TDK's embedded SD ESRD4 series is a SD card, equipped with a highly durable SLC/pSLC NAND flash that can be implemented on boards. It covers a wide range of capacities from 1GB to 32GB, suitable for storing a lightweight system such as Linux and RTOS.

In contrast, TDK's embedded SSD ESS1B series is a SSD device, that support SATA 6Gbps. It is equipped with a pSLC NAND flash and housed in BGA packages that conform to JEDEC MO-276, allowing for a building storage capacity from 32GB to 64GB, suitable for storing a large capacity OS, such as Windows 10 IoT.

In addition, for applications that require larger capacity storage, TDK adds the 2280 type to the M.2 SSD SNS1B series. Customers can select a NAND flash from SLC/pSLC/MLC as well as the existing 2242 shape.

All three products are equipped with the TDK GBDriver series, NAND type flash memory controllers that are highly rated for industrial applications. It excels not only at data reliability and durability, but also data integrity upon power shutdown, securing the use for IoT devices that are often turned off due to the demand for energy saving.

The ESRD4/ESS1B/SNS1B series will be showcased at the TDK booth at the Embedded Systems Expo (ESEC) for Japan IT Week Spring, which will take place at Tokyo Big Sight on May 9-11, 2018.

Notes
*1 eMMC: embedded Multi Media Card
*2 UFS: Universal Flash Storage
*3 I-IoT: Industrial IoT

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Main applications

- Information technology (IT) equipment, cloud computing systems, edge computing systems and IoT devices, such as information terminals, thin client PCs and RAID SSDs
- Factory automation (FA) equipment such as semiconductor manufacturing equipment, NC machine tools, sequencers, programmable logic controllers (PLCs), panel computers and embedded CPU boards
- Equipment for station services 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
- Financial settlement terminals such as point-of-sales (POS) equipment, including cash registers, convenience store/kiosk terminals and ATM
- Automotive equipment, such as automotive navigation systems, digital tachographs, data loggers and rearview 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
- Advertisement display equipment such as digital signage, electronic billboards and electronic point-of-purchase (POP) displays
- Medical/healthcare equipment and data analysis devices such as diagnostic imaging systems, blood analysis equipment, medical PCs, electronic patient record systems, DNA microarray systems, automatic biochemistry analyzers, remote medical care systems and automated care devices
- Base station equipment for mobile phone systems 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, crime prevention and surveillance equipment such as biometric authentication systems, entry/exit control systems and surveillance cameras
- Disaster prevention related equipment such as earthquake early warning systems and household fire detectors and alarms

Main features and benefits

1. TDK GBDriver RD4/GS1, Proprietary Developed NAND Type Flash Memory Control IC
TDK's proprietary developed controllers, TDK GBDrivers, (ESRD4 series: GBDriver RD4; ESS1B series/SNS1B series: GBDriver GS1), enable the high reliability required for industrial and embedded applications. TDK can promptly propose an upward compatible product following generational changes and the termination of flash memory.

2. Versatile Packages and Shape Factors
The ESRD4 series adopts a JEDEC Standard eMMC package, the ESS1B series adopts a BGA package conforming to MO-276 in JEDEC Standards and the SNS1B series adopts M.2 Type 2280-D5-B-M. They boast versatile and easy-to-use shapes.

3. SLC/pSLC Flash Memory
Considering the use in industrial applications, TDK has a lineup of products equipped with highly durable SLC NAND flash and pSLC NAND flash, enabling the selection of products to meet requirements for capacity, cost and performance (regarding the SNS1B series, MLC NAND flash is also available).

4. 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 drive. The range for static wear leveling can be freely set. (In this case, dynamic wear leveling control is carried out for other areas of memory not set as static wear leveling areas.)

5. Enhanced Power Interruption Tolerance

Equipped with TDK GBDriver's anti-power interruption algorithm, the storage is resistant to sudden power-failure issues, by reducing the risk of collateral errors (such as the destruction of data other than those being written at the time of a power interruption) during the writing process. In addition, with embedded power backup circuits, the SNS1B series significantly reduces countermeasures against power interruption on the system side.

6. Error Correction Function

The auto refresh function reads all data on NAND flash including areas where reading is not done and performs automatic error correction as needed to prevent data losses caused by read disturb errors, data holding errors and other errors. The auto refresh function is performed both at startup and every 24 hours in the background and causes little delay in the response to commands, even during the correction process.

7. Security Functions

(a) Protection functions
The storage is equipped with SD/ATA standard security functionality, enabling independent setting and removal of passwords and protection of important data.

(b) TDK's original security function (optional)
The host and SSD use mutual authentication, which restricts third parties from access such as spoofing. (This function requires a separate non-disclosure agreement.)

8. SMART Command Support

With SMART commands (embedded SD also implements an equivalent function) it is possible to retrieve data on the number of overwrites (erases) in all memory blocks. This makes it easy to ascertain the state of flash memory and enables accurate lifespan management. In addition, our original software is available for free.

9. Solution Support

TDK has independently developed and marketed the GBDriver series of NAND type flash memory controllers since 2000. It has provided technical support to customers in Japan and overseas backed up by technologies, including dispatch of field application engineers (FAEs) and support for implementation of reliability monitoring functions, for which there is strong demand in the embedded flash storage market.

Production and Marketing Schedule

- Production location: Taiwan
- Scheduled production volume: 10,000 units per month by series
- Start of production: April 2018

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

passive components, such as ceramic, aluminum electrolytic and film capacitors, ferrites and inductors, high-frequency products, and piezo and protection components, as well as sensors and sensor systems and power supplies. These products are marketed under the product brands TDK, EPCOS, InvenSense, Micronas, Tronics and TDK-Lambda. TDK's further main product groups include magnetic application products, energy devices, and flash memory application devices. TDK focuses on demanding markets in the areas of information and communication technology and automotive, industrial and consumer 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 2017, TDK posted total sales of USD 10.5 billion and employed about 100,000 people worldwide.

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