

Serial ATA 3Gbps Compatible One Package Solid State Drive eSSD Series 1GB to 4GB

Conformity to RoHS Directive

TDK's SSD Controller IC GBDriver RS3 and SLC NAND-type flash memory have been integrated into one package through multi-chip packaging (MCP) technology, providing serial ATA 3Gbps SSDs with a maximum capacity of 4GB while being the size of a stamp.

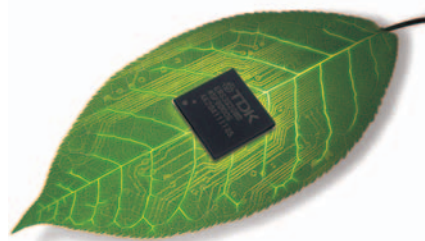
The TDK SATA 3Gbps eSSD series is an SSD device IC that combines an SSD controller IC and NAND type flash memory into a single package through MCP technology. The series realizes ATA 3Gbps SSDs with a maximum storage capacity of 4GB in a 17mm x 17mm 208-ball BGA package and enables a reduction in mounting board size and mounting costs.

A single level cell (SLC) flash memory unit has been adopted as the NAND-type flash memory, which enables high-speed access with a maximum speed of 55MByte/sec. The SATA controller IC GBDriver RS3, developed in-house by TDK, has been adopted as the internal SSD controller. In addition to a powerful error correction function, the series is equipped with a data randomizer function that reduces the risk the occurrence of data errors and an auto-refresh function that is effective as a data retention measure. The eSSD series is a storage IC that is best suited for industrial equipment or embedded systems.

In addition, the SSD lifespan has been dramatically improved through a global static wear leveling technique called "TDK Smart Swap", which evenly disperses write areas throughout the entire memory. The series also features easy SSD lifespan monitoring where write counts can be obtained in real time as SMART information, which makes it easier to know when maintenacnce or replacement is needed. Moreover, the series also incorporates an AES 128-bit encryption function, which prevents data leakage, alterations and illegal copying. The series also supports the ATA Trim command, allowing for complete erasure of electronic data, ensuring security during replacement and disposal.

TDK'S HIGHLY RELIABLE SSD eSSD SERIES FUNCTIONAL FEATURES

| High-speed performance: SATA 3Gbps-Compatible | | |
|--|---|--|
| High reliability | Long lifespan | Security |
| High durability Single Level Cell (SLC) flash memory | | AES128bit encryption function |
| Strong ECC function | Global static wear leveling function TDK Smart Swap | ATA security: password lock, secure erase |
| Data randomizer: lesser ECC booting | | TDK original password function (Read/Write Protect) |
| Auto refresh function | Small writes accumulation | ATA Trim command |
| Auto recovery function | Lifespan management by SSD life monitor software TDK SMART | |
| Algorithm against powerdisconnection | | |



• Conformity to RoHS Directive: This means that, in conformity with EU Directive 2002/95/EC, lead, cadmium, mercury, hexavalent chromium, and specific bromine-based flame retardants, PBB and PBDE, have not been used, except for exempted applications.

• All specifications are subject to change without notice.

FEATURES

- Realizes serial ATA 3Gbps SSD with a storage capacity ranging from 1GB to 4GB in a 17mm x 17mm 208-ball BGA package. Conforms to Serial ATA Revision 2.6 Specification. Supports SATA Gen.1 (1.5Gbps), Gen. 2(3.0Gbps). Read: 55MByte/sec, Write: 30MByte/sec*¹
- Incorporates the SSD controller IC GBDriver RS3, developed in-house by TDK.
- Adopts high-reliability SLC NAND-type flash memory.
- Equipped with 15bit/sector (512byte) ECC capability.
- TDK's proprietary power interruption tolerance algorithm reduces the risk of collateral data errors such as corruption of data other than the data being written.
- Incorporates a data randomizer function, which reduces bit errors by randomizing written data during the writing process in order to eliminate data pattern bias
- Incorporates an auto refresh function. Flash memory data is regularly read out and screened for bit errors, and automatically recovered where necessary. The auto refresh function runs in the background, causing no delays in command response, even during correction processing.
- Incorporates TDK's global static wear leveling function, "TDK Smart Swap", which counts the number of times all memory areas (blocks) are rewritten (erased) and evenly replaces blocks; this function dramatically improves the SSD's life span. The static wear leveling execution range can be arbitrarily set. *²
- To enable real-time quantitative life span management, SMART information can be acquired for the number of times all memory blocks have been rewritten or erased.
- A function for setting the number of sectors for all data areas is incorporated. The number of physical blocks to be assigned to a data area can be increased or decreased in one sector units. CHS parameters can also be set as desired, allowing easy system installation.
- Incorporates an AES 128bit encryption function.*³ Data is encoded and recorded, enabling the prevention of alterations to and leakage of personal information and secret information.
- Supports ATA-standard Trim command allowing complete deletion of all drive data and easy replacement or safe disposal.
- Supports a protect function conforming to ATA standards. In addition to ATA standard security, TDK's unique password lock function allows the range for Write Protect/Read Protect to be specified.
- Supports NCQ (Native Command Queuing).
- Conformity to RoHS Directive: No harmful materials as banned by the EU Directive have been used for structural members or lead terminals etc.

*¹ Speed for a 4GB type. Depends on the system environment.

*² Dynamic wear leveling control is applied to all areas except those set for static wear leveling control.

*³ AES 128bit: Advanced Encryption Standard standardized by U.S. Federal Information Processing Standard (FIPS) PUB197.

MAIN APPLICATIONS

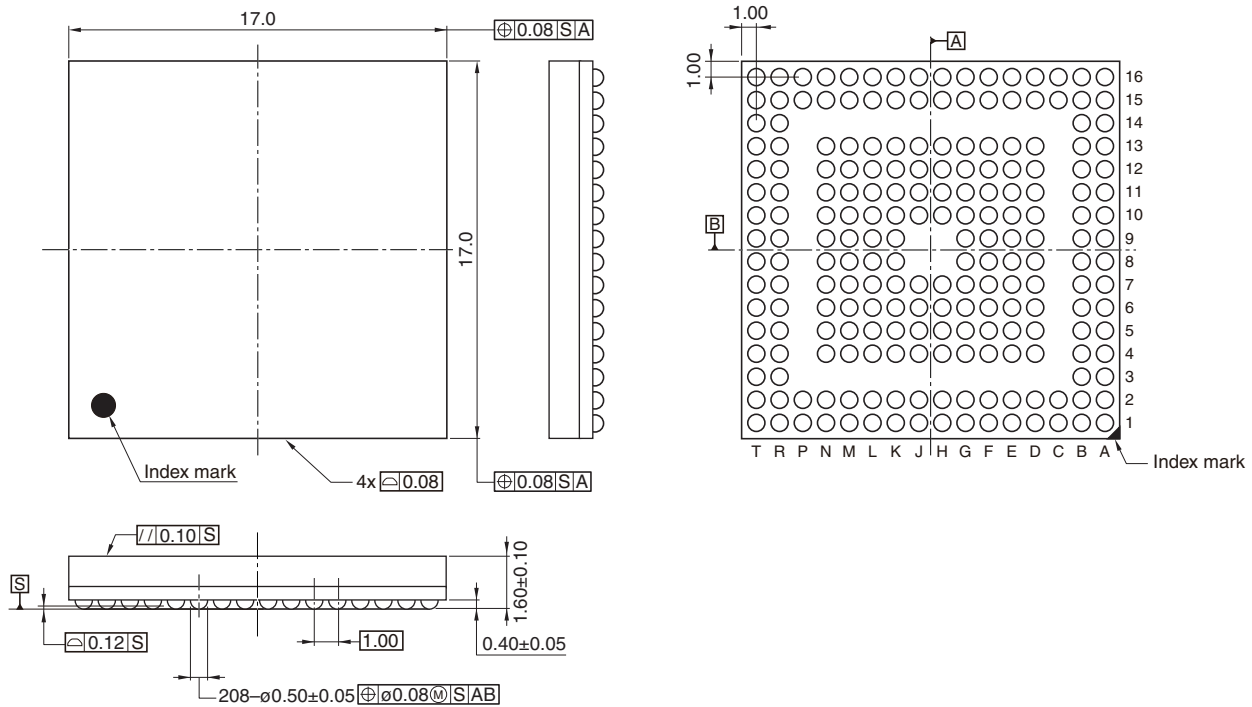
- For replacing NOR-type flash memory or HDD (Hard Disk Drive) with SSD (Solid State Drive)
- For WIN or Android OS, system or user data storage for home information appliances: e.g. netbooks, BD devices, digital TV, STB
- High-speed boot devices employing the HORM (Hibernate Once/Resume Many) function of embedded operating systems, e.g. Windows XP Embedded
- For storage devices in which data is rewritten frequently: e.g. POS systems or station service equipment
- For applications that require resistance to vibration, electric power saving and downsizing: e.g. medical equipment, physical distribution systems, machine tools
- For applications that require high-grade data security: e.g. banking terminals, digital signage systems, etc. requiring high data reliability and security

APPLICATION EXAMPLES

- AV equipment
Digital cameras, camcorders, smart TV (digital TV), LCD-TV, Blu-ray Disc (BD) TV, BD players and recorders, set top box (STB), CS broadcasting tuners
- PDAs
Smart Phones and Androids; Netbook PCs: e.g. thin client PCs, mobile Internet devices (MID), ultra mobile PCs (UMPC), and tablet PCs
- Onboard equipment
Car navigation systems, portable navigation devices (PND), ETC terminals
- OA equipment
Multifunction printers (MFP), label printers, barcode printers, industrial-use projectors, telephone conference systems
- Amusement and game equipment
Online karaoke, arcade games
- Advertising display equipment such as digital signage and digital posters.
- FA equipment
industrial robots, NC machine tools, sequencers, PLCs, panel computers, touch panel systems, embedded CPU boards
- Station and airport service equipment
Suica terminals and automatic ticket gates, ticket machines, commuter pass vending machines, auto air-ticketing machines, auto check-in machines
- Banking terminals
POS, convenience store/kiosk terminals, ATMs
- Medical equipment and measurement equipment
Diagnostic imaging apparatus, electrocardiographs, blood analysis devices, medical PCs, electronic medical recording systems
- Communications and broadcasting equipment and information system equipment for base stations
4G mobile phone data communication systems
- Security terminals and surveillance equipment
Entry control systems, security cameras
- Disaster damage prevention equipment
Rapid response earthquake report systems, residential fire alarms

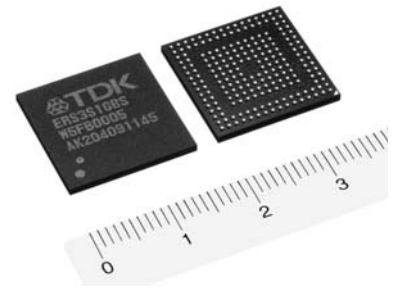
SHAPES AND DIMENSIONS

BGA 208-ball 17mm×17mm, ball-pitch 1.0mm



SPECIFICATIONS

| | |
|----------------------|--------------------------------|
| Host I/F | Serial ATA standard Rev.2.6 |
| | Gen.1 : 1.5Gbps, Gen.2 3.0Gbps |
| Power specifications | Controller I/O 3.0 to 3.6V |
| | Controller CORE 0.90 to 1.10V |
| | Flash memory 3.0 to 3.6V |
| Temperature ranges | Operating 0 to +70°C |
| | Storage -25 to +85°C |
| System clock | 30MHz |



eSSD EVALUATION KIT

The following items are provided as an evaluation kit for the TDK One Package Solid State Drive eSSD:

- 1) eSSD mSATA (eSSD mounted on an mSATA board), and
- 2) mSATA-SATA converter board



1) eSSD mSATA



2) mSATA-SATA converter board



http://www.tdk.co.jp/techjournal_e/vol15_essd/