

Serial ATA 3Gbps Compatible NAND-Type Flash Memory Controller IC GBDriver RS4 Series

Conformity to RoHS Directive

Latest 16KB/Page Flash Compatible Incorporates the Enhanced ECC function
High-Speed SATA Controller IC

For Embedded System / SATA Flash Modules

TDK GBDriver RS4 is a series of high-speed flash memory controller ICs supporting the Serial ATA Generation 2 transfer rate of 3.0Gbps, realizing high-speed access at an effective speed of 180MByte/sec without using the DRAM cache.

The controller supports SLC (Single Level Cell NAND) and MLC (Multi Level Cell NAND) with 4KByte, 8KByte, and 16KByte/page structures, enabling high-speed SATA storage with a single chip giving 512MByte to 1TByte capacity.

Incorporates functions required for the latest Flash control, including a data randomizer function, an auto-refresh function, and a read-retry function, along with a powerful error correction function that can be expanded up to 71bits/1KByte ECC. Coupled with an auto-recovery function (read-disturbance error auto-recovery function) and a collateral error prevention function for power failures, both of which are commonly included in the TDK GBDriver series, the GBDriver RS4 series provides complete data reliability.

When a balance between cost and reliability is desired, it is possible for the user to control the NAND flash memory using a combination of the Enhanced ECC function and eMLC to ensure a data reliability that is higher than that of conventional MLC NAND flash memory chips, while maintaining their cost benefit.

In addition, the rewritable life span of a NAND-type flash memory is maximized by the advanced static wear leveling algorithm designed to average out the number of programming (erasing) times of all memory areas (blocks) in a NAND-type flash memory. To enable quantitative life span management of the flash storage system SMART (Self-Monitoring & Analysis Reporting Technology) information can be acquired for the number of times all memory blocks are erased.

Furthermore, the installed AES 128bit auto-encryption function enables the prevention of data leakage, alteration and unauthorized copying ensuring high-grade storage security.

FEATURES

- Conforms to Serial ATA Revision 2.6 Specification.
Supports SATA Gen.1 (1.5Gbps), Gen. 2 (3.0Gbps).
Read: 180MByte/sec, Write: 130MByte/sec*1
- Supports NAND-type flash memory structure with 4KByte/page, 8KByte/page, 16KByte/page.
512MByte to 512GByte for SLC, and 2GByte to 1TByte for MLC are compatible.
3Xnm to 1Xnm process generation flash memory provided by major flash memory vendors are supported.*2
- The controller incorporates the TDK-unique static wear leveling function that counts the number of times all memory areas (blocks) are programmed (erased) and evenly replaces blocks; this function dramatically improves the storage life span. The static wear leveling control range can be set manually.*3
- Incorporates a data randomizer function which randomizes written data during the writing process in order to eliminate data pattern bias and enable greater MLC flash data reliability.
- Incorporates a auto-refresh function. Flash memory data is regularly read out and screened for bit errors, and error correction is implemented where necessary, preventing loss of data caused by read-disturb and data retention errors. The readrefresh function runs in the background, causing virtually no delay to command response even during correction processing.
- 30bit, 44bit, 71bit/sector (1024byte) ECC capability is incorporated (Bit-correction is automatically selected depending on the detected flash memory to be used).
- Incorporates the Enhanced ECC function.
Capable of expanding ECC to 71bit/512byte.
- Incorporates a read-retry function. When an ECC error occurs in a read operation, the GBDriver RS4 changes the read potential and attempts to read the data again.
- TDK-unique flash memory control system enhances tolerance for system power failure, allowing no collateral errors.
- To enable quantitative life span management SMART information can be acquired for the number of times all memory blocks are programmed 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.*4
Data is encoded and recorded, enabling high-grade data security that prevents alteration and leakage of personal and confidential information.
- Supports a protect function conforming to ATA standards. In addition to the TDK-unique Write Protect/Read Protect functions, the user can set or disable the password.
- 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 SLC, depends on the flash memory used.

*2 Please contact us to confirm flash memory compatibility.

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

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

• 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.

APPLICATION EXAMPLES

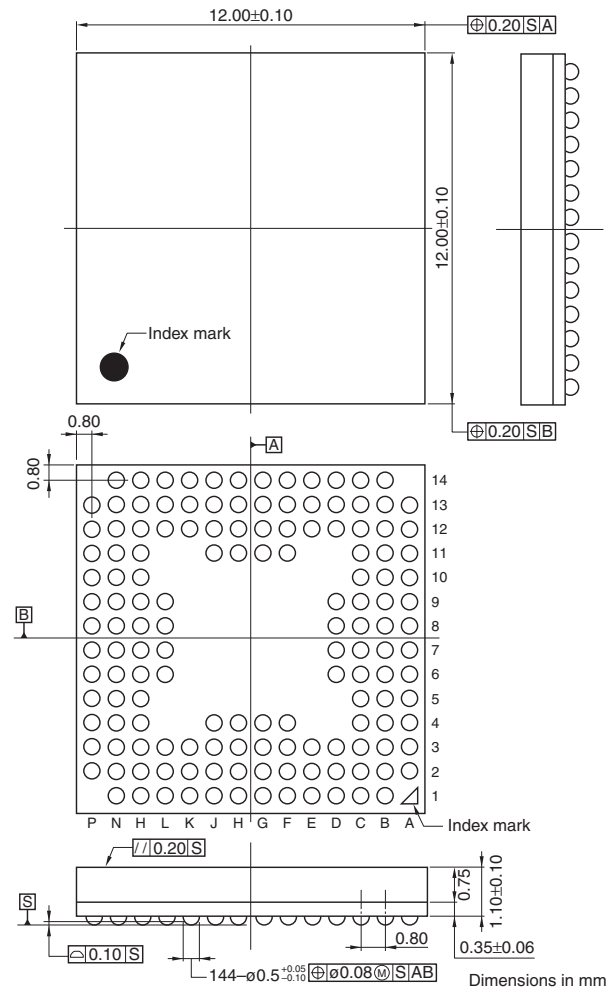
- AV equipment: e.g. digital cameras, camcorders, smart TV (digital TV), LCD TV, Blu-ray Disc (BD) TV, BD players and recorders, set top box (STB), CS broadcasting tuners
- Smartphones and Androids; Netbook PCs: e.g. thin client PCs, slate PCs and mobile internet devices (MID), ultra mobile PCs (UMPC), and tablet PCs
- Onboard equipment: e.g. car navigation systems, portable navigation devices (PND)
- OA equipment: e.g. multifunction printers (MFP), label printers, barcode printers, industrial-use projectors, phone conference systems
- Amusement and game equipment: e.g. online karaoke, arcade games
- General FA equipment: NC machine tools, sequencers, PLCs, panel computers, touch panel systems, embedded CPU boards, etc.
- Station and airport service equipment: e.g. Suica terminals and automatic ticket gates, ticket machines, commuter pass vending machines, auto air-ticketing machines, auto check-in machines
- Banking terminals: e.g. POS, convenience store/kiosk terminals, ATMs
- Medical equipment and measurement equipment: e.g. diagnostic imaging apparatus, electrocardiographs, blood analysis devices, medical PCs, electronic medical recording systems
- Communications and broadcasting equipment and information system equipment for LTE base stations: e.g. 3G mobile phone data communication systems
- Security terminals and surveillance equipment: e.g. digital signage, entry control systems, security cameras
- Disaster damage prevention equipment: e.g. rapid response earthquake report systems, residential fire alarms

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 booting devices using OS HORM (Hibernate Once/Resume Many) functions for embedded equipment such as 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.

SHAPES AND DIMENSIONS

VFBGA144pin Single Chip 12mmx12mm, ball-pitch 0.80mm



SPECIFICATIONS

Host I/F	Serial ATA Standard Rev.2.6	
	Gen.1: 1.5Gbps, Gen.2: 3.0Gbps	
Power specifications	I/O	3.3V (3.0 to 3.6V)
	Core	1.8V (1.7 to 1.95V)
System clock	30MHz	
Temperature ranges	Operating	-40 to +85°C
	Storage	-65 to +150°C

