TDK

Serial ATA 3Gbps Compatible NAND-Type Flash Memory Controller IC GBDriver RS3 Series

Conformity to RoHS Directive

Latest 8KB/Page Flash Compatible High-Speed SATA Controller IC with Data Randomizer and Read-Refresh

For Smart Phones (Android) / Smart TV / Blue-ray Disc Devices / SATA Flash Modules

The TDK GBDriver RS3 is a high-speed SSD controller IC supporting the serial ATA Gen2: 3.0Gbps and enabling high-speed access with an effective speed of 170MByte/sec. The controller supports SLC (Single Level Cell NAND) and MLC (Multi Level Cell NAND) with 2KByte and 4KByte/page, as well as the latest 8KByte/page structures, enabling high-speed storage with a single chip giving 128MByte to 128GByte capacity. Along with the latest data randomizer required for Flash control and an auto-refresh function, the GBDriver RS3 provides complete data reliability by incorporating a powerful error correction capability that can be expanded up to 44bit ECC, coupled with an auto-recovery function (read-disturbance error auto-recovery function) and a collateral error prevention function for power failure, both of which are commonly included in the TDK GBDriver series.
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 rewriting (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: 170MByte/sec, Write: 70MByte/sec*1
- Supports NAND-type flash memory structure with 2Kbyte/page, 4KByte/page, latest 8KByte/page.
  128MByte to 64GByte for SLC, and 256MByte to 128GByte for MLC are compatible.*2
  60nm to 20nm process generation flash memory provided by major flash memory vendors are supported.*3
- The controller incorporates the TDK-unique static wear leveling function that counts the number of times all memory areas (blocks) are rewritten (erased) and evenly replaces blocks; this function dramatically improves the storage life span. The static wear leveling control range can be set manually.*4
- 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 read-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 read-refresh function runs in the background, causing virtually no delay to command response even during correction processing.
- 8bit, 15bit/sector (512Byte) and 30bit, 44bit (1024Byte) ECC capability is incorporated (Bit-correction is automatically selected depending on the detected flash memory to be used).
- TDK-unique flash memory control system improves tolerance for system power failures, allowing no collateral data errors.
- To enable quantitative life span management SMART information can be acquired for the number of times all memory blocks are 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.*5
  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 The number of connection channels and feasible capacity vary depending on packages. In the case of MLC NAND, for TQFP120, 8CE connection with 2 channels/interleave connection is possible with a maximum capacity of 64GByte; for VFBGA144, 16CE connection with 4 channels/interleave connection is possible with a maximum capacity of 128GByte.
*3 Please contact us to confirm flash memory compatibility.
*4 Dynamic wear leveling control is applied to all areas except those set for static wear leveling control.
*5 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.

APPLICATION EXAMPLES

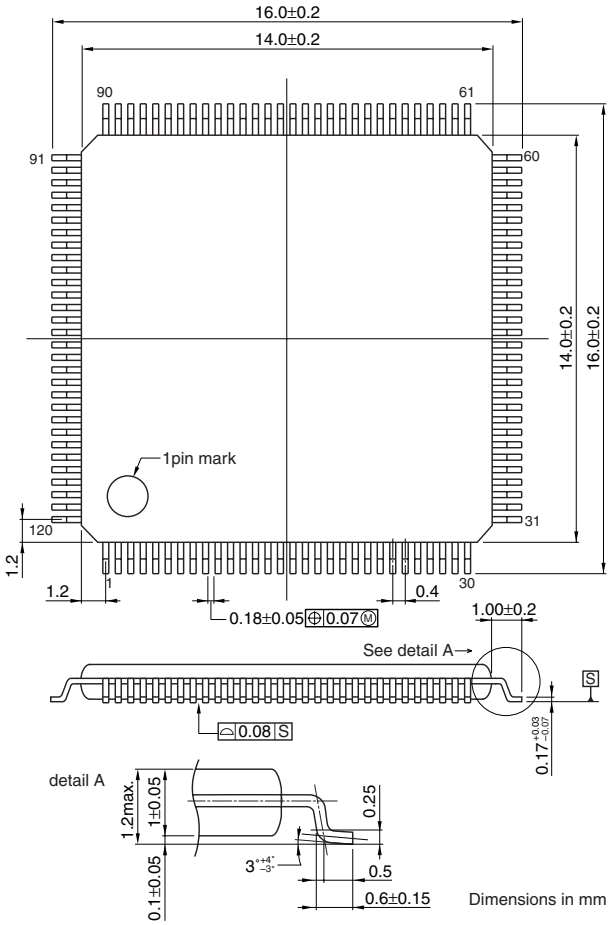
- AV equipment
  Digital cameras, camcorders, smart TV (digital TV), Blu-ray Disc (BD) TV, BD players and recorders, set top box (STB), CS broadcasting tuners
- PDAs
  Smart Phones and Androids; Netbook PCs: e.g. thin client PCs, mobile Internet devices (MID), ultra mobile PCs (UMPC), and tablet PCs
- Onboard equipment
  Car navigation systems, portable navigation devices (PND)
- OA equipment
  Multifunction printers (MFP), label printers, barcode printers, industrial-use projectors, telephone conference systems
- Amusement and game equipment
  Online karaoke, arcade games
- FA equipment
  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
  3G mobile phone data communication systems
- Security terminals and surveillance equipment
  Digital signage, entry control systems, security cameras
- Disaster damage prevention equipment
  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 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

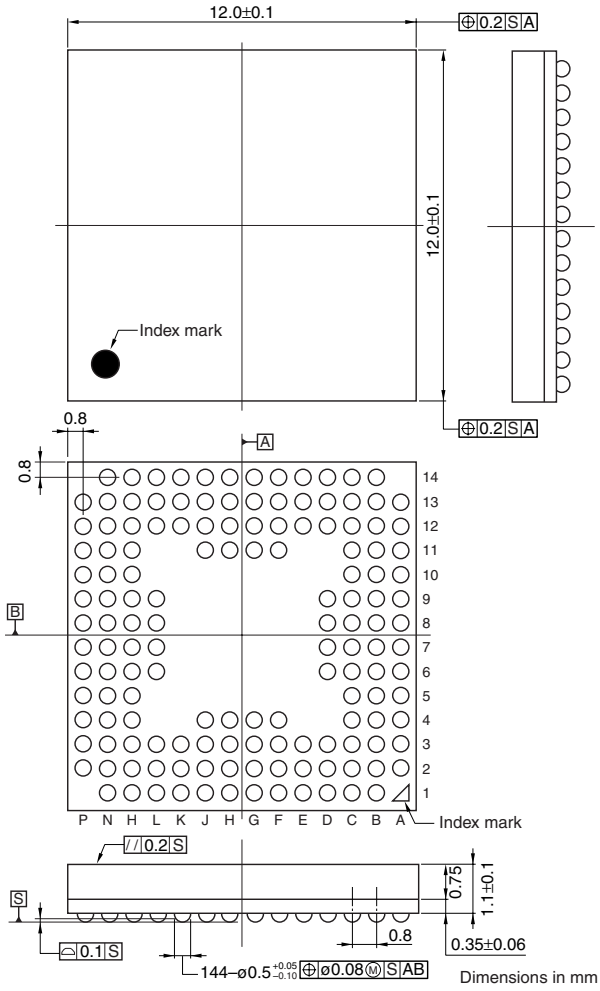
SHAPES AND DIMENSIONS

TQFP 120pin Single Chip 14mmx14mm, pin-pitch 0.40mm(for 2ch-Flash I/F)



Each lead centerline is located within 0.07mm of its true position at maximum material condition.

VFBGA144pin Single Chip12mmx12mm, ball-pitch 0.80mm(for 4ch-Flash I/F)



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	1.0V (0.9 to 1.1V)
System clock	30MHz	
Temperature ranges	Operating	–40 to +85°C
	Storage	–65 to +150°C