GLS85LS1004A / 1008A / 1016A / 1032A
Commercial Temp **SATA NANDrive™**

Fact Sheet 01.200
August 2013

Features

- **Industry Standard Serial ATA (SATA) Host Interface**
  - SATA 1.5 Gb/s or SATA 3.0 Gb/s [1)]
  - ATA/ATAPI-8 compliant
  - Supports 48-bit address feature set
- **Performance**
  - Sustained sequential data read - Up to 70 MByte/sec*
  - Sustained sequential data write - Up to 30 MByte/sec*
    * measured using 128 KByte block size
- **Power Management**
  - 3.3V and 1.2Vpower supply
  - Host SATA interface power management
  - Immediate disabling of unused circuitry without host intervention
- **Power Specifications** [2)]
  - Active mode:
    945mW typical (GLS85LS1032A)
    650mW typical (GLS85LS1016A)
    490mW typical (GLS85LS1008A)
    400mW typical (GLS85LS1004A)
  - Idle mode: 210mW typical
  - Standby mode: 190mW typical
- **Integrated Voltage Detector**
  - Detects supply voltage fluctuations and generates reset during power-up and power-down to prevent inadvertent writes
- **Supports SMART Commands**
- **Expanded Data Protection**
  - Added data security through user-selectable protection zones
- **20-Byte Serial Number**
  - Factory pre-programmed 10-Byte unique ID
  - User-programmable 10-Byte ID
- **Robust Built-in ECC**
- **NAND Configuration**
  - Two bits per cell (MLC)
- **Commercial Temperature Range**
  - 0°C to 70°C
- **FBGA package**
  - 14.0 mm x 24.0 mm x 1.95 mm, 145-ball, 1.0 mm ball pitch, FZJE
- **All Devices are RoHS Compliant**

1) Current product revision will only support SATA Revision 1.x with host transfer rate of up to 1.5 Gb/s (i.e. SATA 1.5 Gb/s). SATA 3.0 Gb/s refers to SATA Revision 2.x and will be supported by our planned future product revisions.
2) For management of the Sleep Mode, refer to "SATA NANDrive Application Design Guide."

Product Description

The GLS85LS1004A / 1008A / 1016A / 1032A Commercial Temperature SATA NANDrive™ devices (referred to as "SATA NANDrive" in this datasheet) are high-performance, fully integrated solid state drives. They combine an advanced Greenliant SATA NAND controller and 4, 8, 16 or 32 GByte of NAND flash in a multi-chip package. These products are ideal for embedded and portable applications that require smaller form-factor and more reliable data storage.

SATA-interface solid state mass storage technology is widely used in portable and industrial computers, set-top boxes, multi-functional printers, point-of-sales terminals, video and audio recorders, medical instruments and car infotainment systems.

SATA NANDrive is a single device, solid state drive (SSD) that provides the functionality and compatibility of a complete SATA hard disk drive (HDD) in a 14 mm x 24 mm BGA package for easy, space saving mounting to a system motherboard. These products surpass traditional storage in their small size, security, reliability, ruggedness and low power consumption.

The integrated NAND flash controller with built-in advanced NAND management firmware communicates with the host through the standard SATA protocol. It does not require any additional or proprietary software such as the Flash File System (FFS) and Memory Technology Driver (MTD).

SATA NANDrive is pre-programmed with a 10-Byte unique serial ID and has the option of programming an additional 10-Byte serial ID for even greater system security.

SATA NANDrive's advanced NAND management technology enhances data reliability and security, improves endurance and accurately estimates the remaining lifespan of the NAND flash devices. This innovative technology combines robust NAND controller hardware error correction capabilities with advanced wear-leveling algorithms and bad block management to significantly extend the life of the product.

SATA NANDrive devices are offered in a 145-ball BGA, 1 mm ball pitch package.

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1.0 GENERAL DESCRIPTION

Each SATA NANDrive contains an integrated SATA NAND flash memory controller and up to eight discrete NAND flash die in a BGA package. Refer to Figure 2-1 for the SATA NANDrive block diagram.

1.1 Optimized SATA NANDrive

The heart of SATA NANDrive is the SATA NAND flash memory controller which translates standard SATA signals into flash media data and control signals. The following components contribute to SATA NANDrive's operation.

1.1.1 Microcontroller Unit (MCU)

The MCU translates SATA commands into data and control signals required for flash media operation.

1.1.2 Internal Direct Memory Access (DMA)

SATA NANDrive uses internal DMA allowing instant data transfer from/to buffer to/from flash media. This implementation eliminates microcontroller overhead associated with the traditional, firmware-based approach, thereby increasing the data transfer rate.

1.1.3 Power Management Unit (PMU)

The PMU controls the power consumption of SATA NANDrive. The PMU dramatically reduces the power consumption of SATA NANDrive by putting the part of the circuitry that is not in operation into sleep mode. 3)

The Flash File System handles inadvertent power interrupts and has auto-recovery capability to ensure SATA NANDrive firmware integrity. For regular power management, the host must send an IDLE_IMMEDIATE command and wait for command ready before powering down SATA NANDrive.

3) For management of the Sleep Mode, refer to "SATA NANDrive Application Design Guide."

1.1.4 Embedded Flash File System

The embedded flash file system is an integral part of SATA NANDrive. It contains MCU firmware that performs the following tasks:

1. Translates host side signals into flash media writes and reads
2. Provides flash media wear leveling to spread the flash writes across all memory address space to increase the longevity of flash media
3. Keeps track of data file structures
4. Manages system security for the selected protection zones

1.1.5 Error Correction Code (ECC)

High performance is achieved through optimized hardware error detection and correction.

1.1.6 Serial Communication Interface (SCI)

The Serial Communication Interface (SCI) is designed for error reporting. During the product development stage, it is recommended to provide the SCI port on the PCB to aid in design validation.

1.1.7 Multi-tasking Interface

The multi-tasking interface enables fast, sustained write performance by allowing concurrent Read, Program and Erase operations to multiple flash media.

1.2 SMT Reflow Consideration

The SATA NANDrive family utilizes standard NAND flash for data storage. Because the high temperature in a surface-mount soldering reflow process may alter the content on NAND flash, it is recommended to program SATA NANDrive after the reflow process.

1.3 Advanced NAND Management

SATA NANDrive's integrated controller uses advanced wear-leveling algorithms to substantially increase the longevity of NAND flash media. Wear caused by data writes is evenly distributed in all or select blocks in the device that prevents "hot spots" in locations that are programmed and erased extensively. This effective wear-leveling technique results in optimized device endurance, enhanced data retention and higher reliability required by long-life applications.

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2.0 FUNCTIONAL BLOCKS

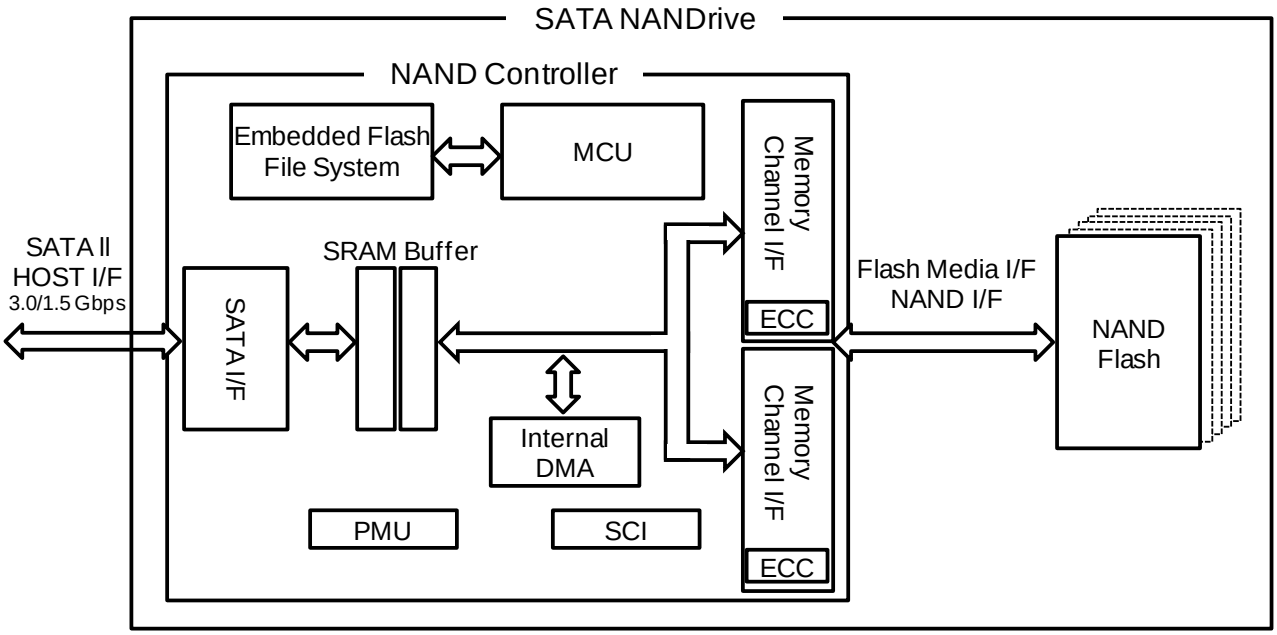
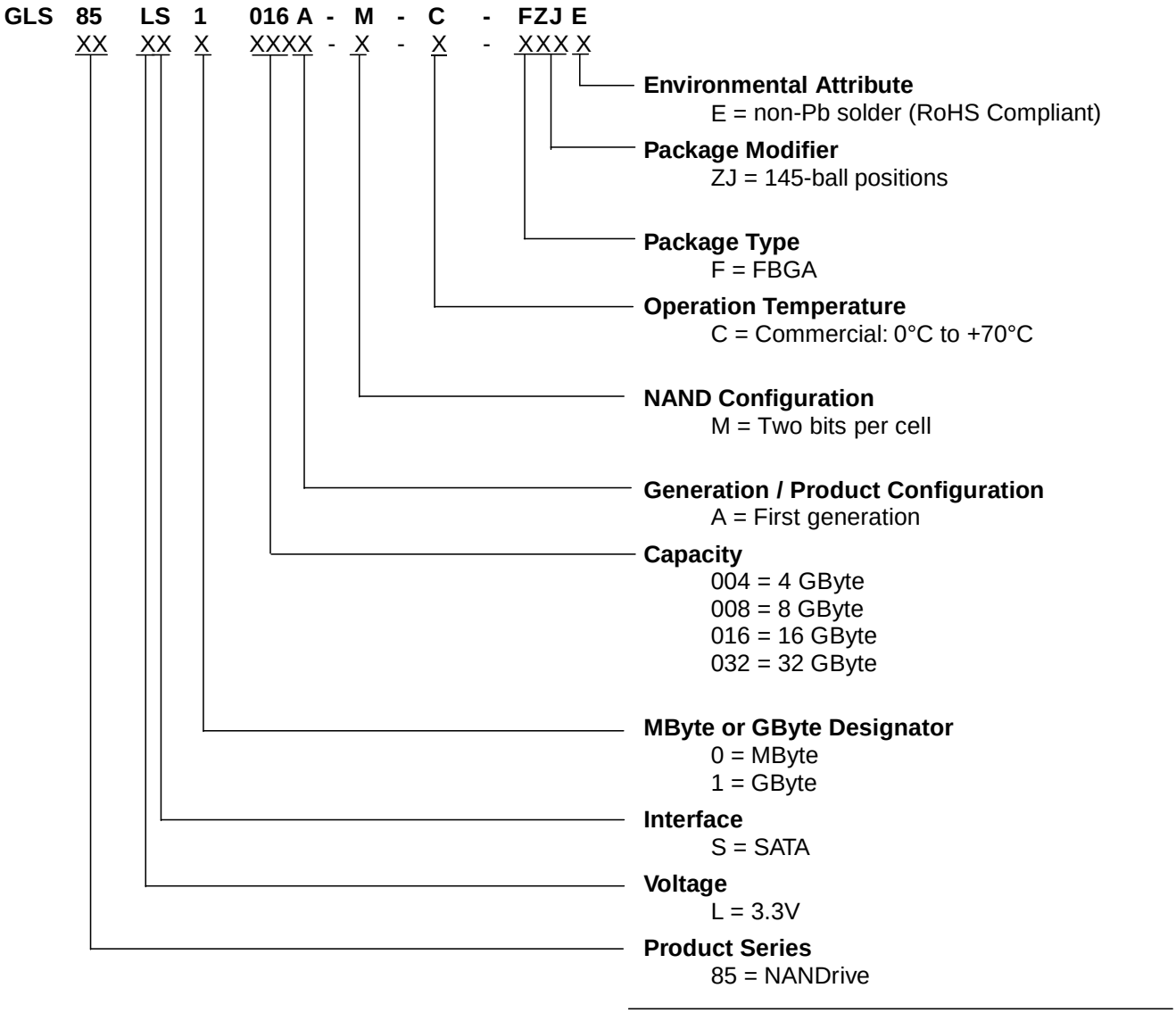


Figure 2-1: SATA NANDrive Block Diagram

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3.0 Product Ordering Information



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Valid Combinations

Valid product combinations are those that are in the mass production or will be in the mass production. Consult your Greenliant sales representative to confirm availability of the valid combinations and to determine availability of new product combinations.

Table 3-1: SATA NANDrive Product Valid Ordering Numbers

Capacity	Operating Temperature	Part Number	Package
4GB	Commercial (0°C to 70°C)	GLS85LS1004A-M-C-FZJE	FZJE, 14x24x1.95mm
8GB	Commercial (0°C to 70°C)	GLS85LS1008A-M-C-FZJE	FZJE, 14x24x1.95mm
16GB	Commercial (0°C to 70°C)	GLS85LS1016A-M-C-FZJE	FZJE, 14x24x1.95mm
32GB	Commercial (0°C to 70°C)	GLS85LS1032A-M-C-FZJE	FZJE, 14x24x1.95mm

Table 3-2: SATA NANDrive Evaluation Board Valid Ordering Numbers

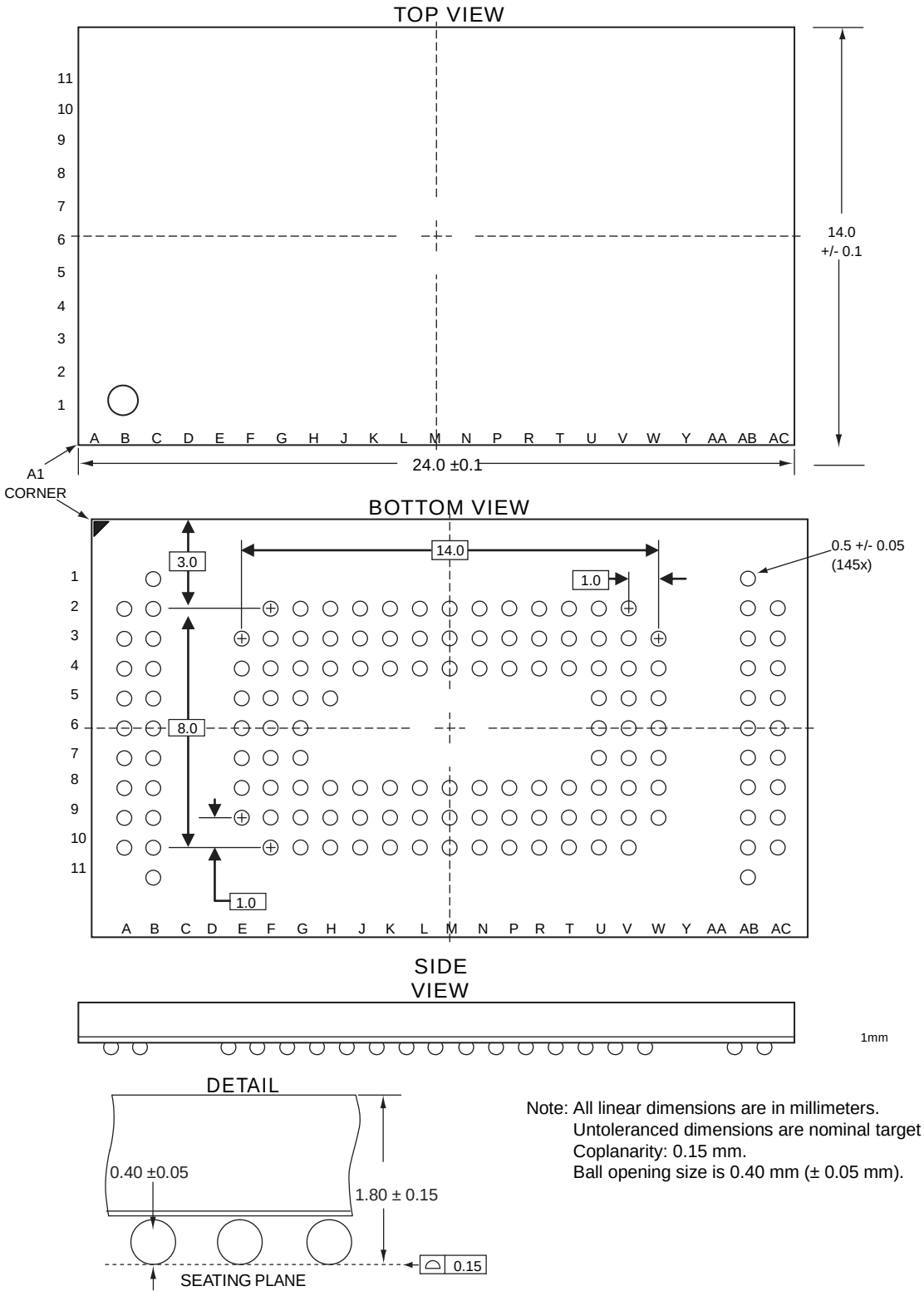
Capacity	Operating Temperature	Part Number	Form Factor
4GB	Commercial (0°C to 70°C)	GLS85LS1004A-M-C-1S-K	Module with SATA connector
8GB	Commercial (0°C to 70°C)	GLS85LS1008A-M-C-1S-K	Module with SATA connector
16GB	Commercial (0°C to 70°C)	GLS85LS1016A-M-C-1S-K	Module with SATA connector
32GB	Commercial (0°C to 70°C)	GLS85LS1032A-M-C-1S-K	Module with SATA connector

Table 3-3: SATA NANDrive miniSATA Evaluation Board Valid Ordering Numbers

Capacity	Operating Temperature	Part Number	Form Factor
4GB	Commercial (0°C to 70°C)	GLS85LS1004A-M-C-1mS-K	JEDEC MO-300
8GB	Commercial (0°C to 70°C)	GLS85LS1008A-M-C-1mS-K	JEDEC MO-300
16GB	Commercial (0°C to 70°C)	GLS85LS1016A-M-C-1mS-K	JEDEC MO-300
32GB	Commercial (0°C to 70°C)	GLS85LS1032A-M-C-1mS-K	JEDEC MO-300

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3.1 Package Diagram



Note: All linear dimensions are in millimeters.
Untoleranced dimensions are nominal target values.
Coplanarity: 0.15 mm.
Ball opening size is 0.40 mm (± 0.05 mm).

Figure 3-1: SATA NANDrive 145-Ball, Ball Grid Array (BGA) Greenliant Package Code: FZJ

Revision History

Revision	Description	Date
01.000	Initial release of Fact Sheet for GLS85LS1004A / 1008A / 1016A / 1032A	September 13, 2011
01.001	Updated Power Specifications and Table 3-1	December 22, 2011
01.002	Updated Power Specifications on page 1	January 24, 2012
01.003	Corrected typo on first page and in Table 3-1	March 12, 2012
01.004	Updated first page and figure 4-1	May 22, 2012
01.200	Changed Commercial Grade to Commercial Temp in document title; Removed Pin Assignments and Updated section numbering; Placed Valid Combinations into table format in Section 3.0	August 21, 2013

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Specifications are subject to change without notice. Memory sizes denote raw storage capacity; actual usable capacity may be less.

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