Factsheet 01.002
July 2019

Features

- **Industry Standard 2.5" SATA Host Interface**
  - SATA 1.5Gb/s, 3Gb/s and 6Gb/s
  - SATA Revision 3.2
  - ATA/ATAPI-8 compliant
  - Supports 48-bit address feature set
- **Performance**
  - Sequential data read: Up to 550 MB/s*
  - Sequential data write: Up to 500 MB/s*
    * measured using 128 KByte transfer size
- **Power Management**
  - 5V power supply
  - Host initialized power management (HIPM)
  - Device initialized power management (DIPM)
- **Power Specifications**
  - Active mode:
    1TB: 1680mW (typical)
    512GB: 1670mW (typical)
    256GB: 1450mW (typical)
    128GB: 1350mW (typical)
    64GB: 1230mW (typical)
    32GB: 1100mW (typical)
  - Idle mode: < 325mW (typical)
  - Slumber mode: < 16mW (typical)
  - DevSleep mode (optional): < 5mW (typical)
- **Reliability**
  - Mean Time Between Failures (MTBF): More than 2 million hours
- **Data Protection**
  - Secure Erase (data sanitization)
- **Integrated Current Detector**
  - Protects from inrush current and generates reset during power-up and power-down to prevent inadvertent writes
- **Native Command Queuing (NCQ)**
  - Up to 32 commands
- **Supports SMART and TRIM Commands**
- **20-Byte Serial Number**
  - Factory pre-programmed unique ID
- **Built-in ECC**
  - Uses advanced LDPC bit error detection and correction optimized for 3D NAND
- **NAND Configuration**
  - 3 bits per cell (3D TLC)
- **Endurance**
  - 3K P/E cycles (typical)
- **Operating Temperature Range**
  - Industrial: -40°C to 85°C
- **2.5-inch Form Factor**
  - 100mm x 69.85mm x 7.00mm
- **All Devices are RoHS Compliant**

Product Description

The GLS89SP032G3 / 064G3 / 128G3 / 256G3 / 512G3 / 001T3 Industrial Temperature SATA 2.5" ArmourDrive™ PX Series (referred to as 2.5" ArmourDrive" in this factsheet) are high-performance, high-reliability solid state drives. They combine 32, 64, 128, 256 or 512 GBytes, or 1 TByte of NAND flash memory with an advanced Serial ATA (SATA) controller in a standard 2.5-inch form factor housing.

2.5" ArmourDrive is ideal for applications that require hot-swappable and reliable data storage. 2.5" SATA solid state storage technology is widely used in servers, laptops, network-attached storage, industrial computers, navigation systems, test and measurement instrumentation, multi-function printers, security and surveillance equipment, digital signage and networking systems. These removable solid state drives (SSDs) surpass traditional hard disk drives (HDDs) in their security, reliability, ruggedness and low power consumption.

The SATA SSD 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). The firmware effectively optimizes the use of NAND flash memory's program/erase (P/E) cycles and minimizes write amplification.

2.5" ArmourDrive's advanced NAND management technology improves endurance, enhances data security and helps prevent data loss during unexpected power failure events. This innovative technology combines robust NAND controller hardware error correction capabilities with advanced wear-leveling algorithms and bad block management to improve data reliability and significantly extend the life of the product.

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1.0 GENERAL DESCRIPTION

Each 2.5" ArmourDrive integrates a SATA SSD controller with up to four NAND flash multi-chip packages in a standard 2.5-inch form factor housing. Refer to Figure 2-1 for the 2.5" ArmourDrive block diagram.

1.1 Optimized 2.5" ArmourDrive

The heart of 2.5" ArmourDrive is the SATA SSD controller, which translates standard SATA signals into flash media data and control signals. The following components contribute to 2.5" ArmourDrive'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)

2.5" ArmourDrive 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 2.5" ArmourDrive. The PMU dramatically reduces the power consumption of 2.5" ArmourDrive by putting the part of the circuitry that is not in operation into sleep mode.

The Flash File System handles inadvertent power interrupts and has auto-recovery capability to ensure 2.5" ArmourDrive firmware integrity. For regular power management, the host must send an IDLE_IMMEDIATE command and wait for command ready before powering down 2.5" ArmourDrive.

1.1.4 Embedded Flash File System

The embedded flash file system is an integral part of 2.5" ArmourDrive. 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

1.1.5 Power Interrupt Data Protection

Power Interrupt Data Protection is a mechanism to help prevent data loss during unexpected power failure events. Enhanced data integrity is supported by the controller's advanced firmware during abnormal power loss. The controller proactively optimizes the amount and stay time of the "in-flight" data residing in the cache. To ensure there is no data loss risk caused by power cycling, the controller sends an acknowledgement to the host only when the incoming data is fully committed to the NAND flash.

1.1.6 Error Correction Code (ECC)

The ECC technology uses advanced Low Density Parity Check (LDPC) algorithms to detect and correct errors, ensuring data integrity and extending the SSD lifespan.

1.1.7 Multi-tasking Interface

The multi-tasking interface enables concurrent Read, Program and Erase operations to multiple NAND flash media.

1.2 Advanced NAND Management

2.5" ArmourDrive's 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

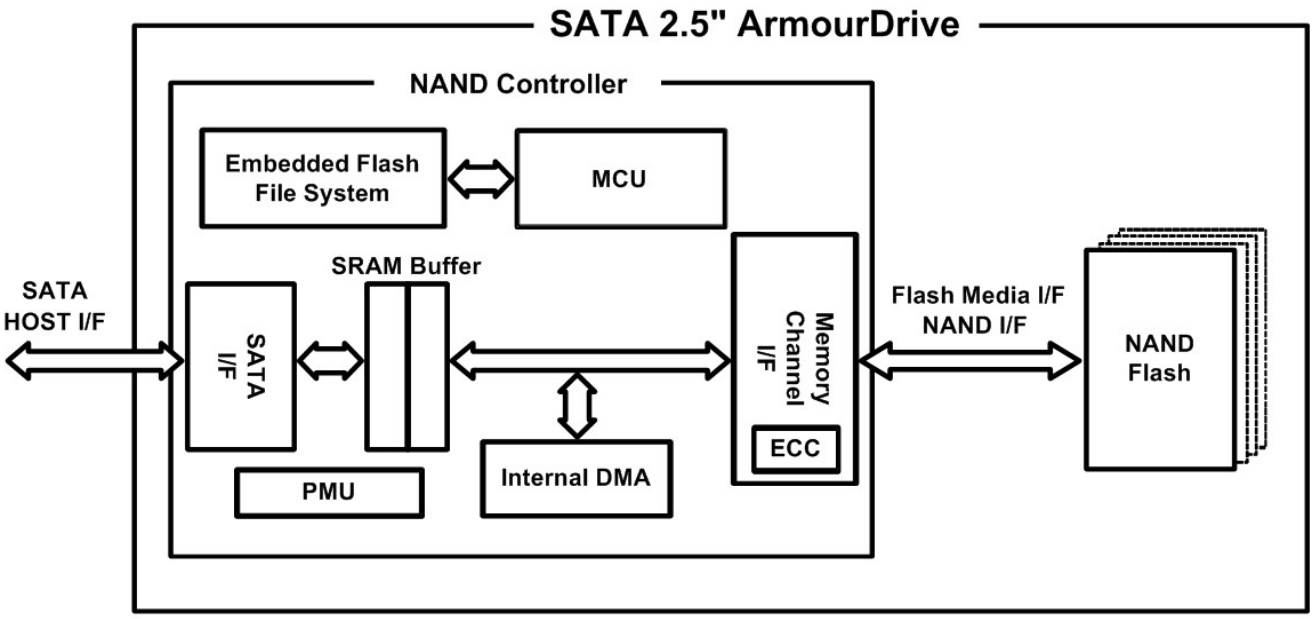
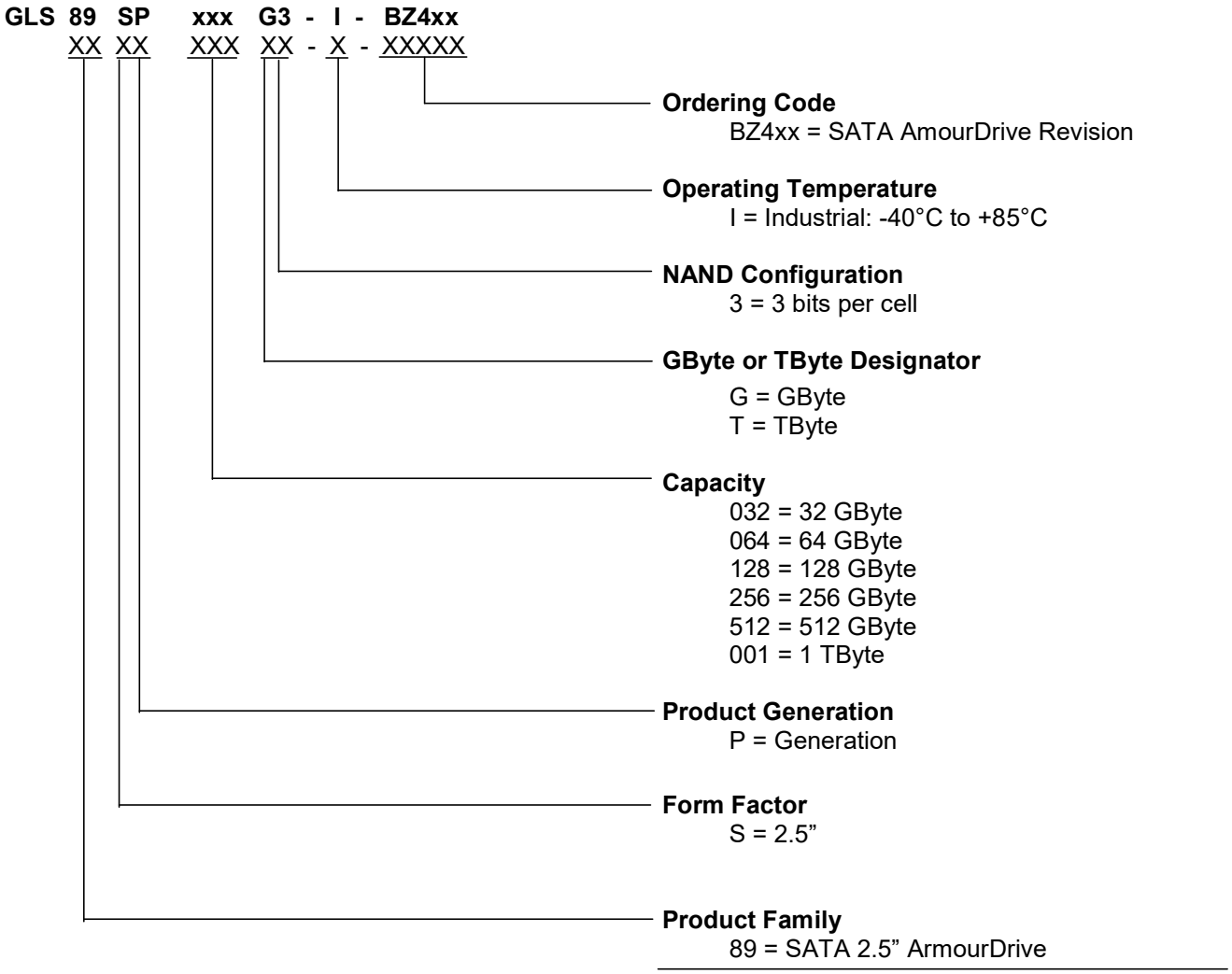


Figure 2-1: SATA 2.5" ArmourDrive Block Diagram

3.0 APPENDIX

3.1 Product Ordering Information



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 2.5" ArmourDrive Product Valid Ordering Numbers

Capacity	Operating Temperature	Part Number	Form Factor
32GB	Industrial (-40°C to 85°C)	GLS89SP032G3-I-BZ400	2.5-inch
64GB	Industrial (-40°C to 85°C)	GLS89SP064G3-I-BZ400	2.5-inch
128GB	Industrial (-40°C to 85°C)	GLS89SP128G3-I-BZ400	2.5-inch
256GB	Industrial (-40°C to 85°C)	GLS89SP256G3-I-BZ400	2.5-inch
512GB	Industrial (-40°C to 85°C)	GLS89SP512G3-I-BZ400	2.5-inch
1TB	Industrial (-40°C to 85°C)	GLS89SP001T3-I-BZ400	2.5-inch

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3.2 Mechanical Diagrams

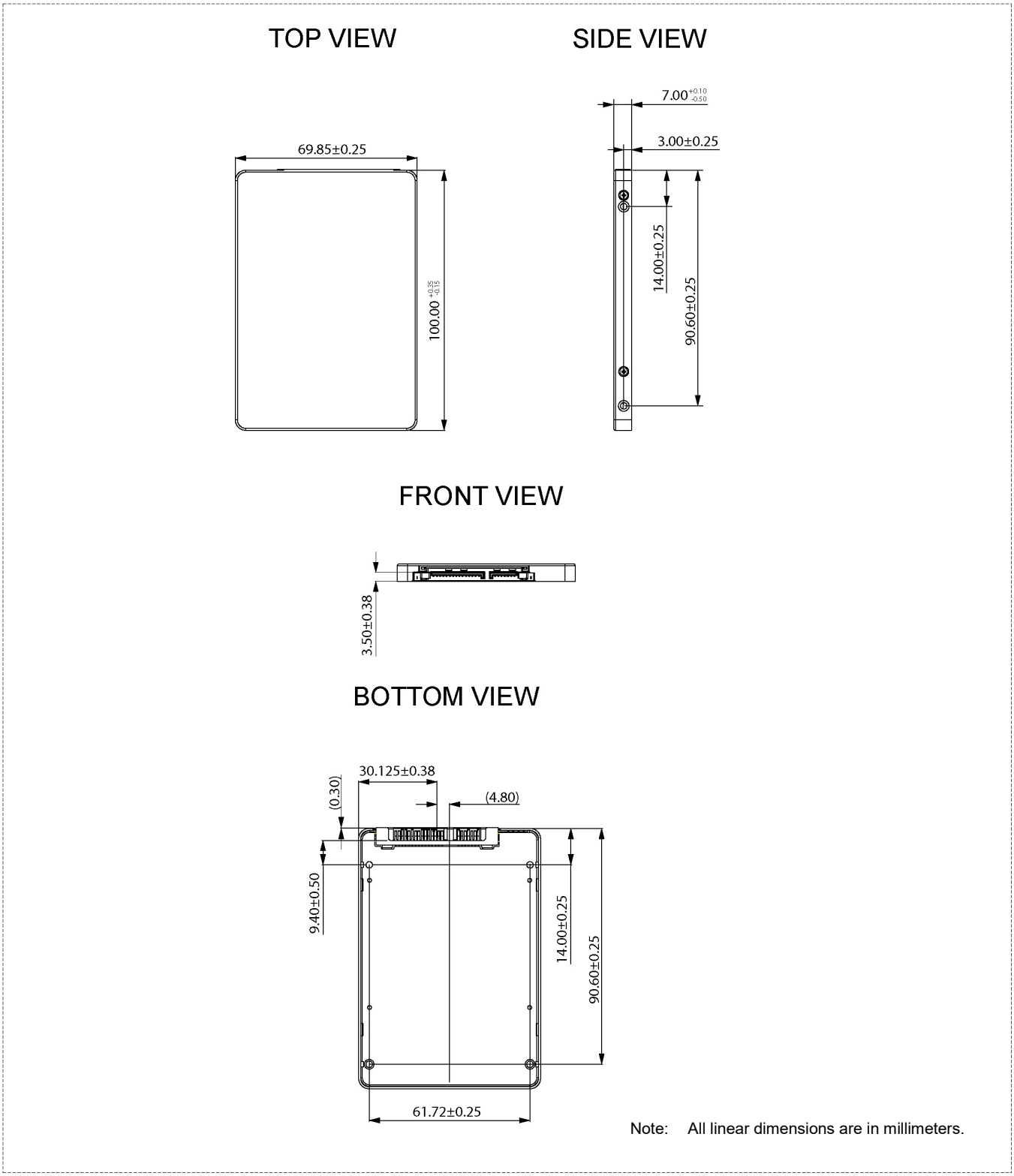


Figure 3-1: SATA 2.5" ArmourDrive Dimensions

Revision History

Revision	Description	Date
01.000	Initial Release as Factsheet	January 31, 2019
01.001	Updated Features descriptions on page 1	June 5, 2019
01.002	Updated Features descriptions on page 1	July 8, 2019

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