Factsheet 01.000
August 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 470 MByte/sec*
  - Sequential data write: Up to 340 MByte/sec*
    * 128 KByte transfer size tested in VDBench on Linux
- **Power Management**
  - 5V power supply
  - Host initialized power management (HIPM)
  - Device initialized power management (DIPM)
- **Power Specifications**
  - Active mode:
    128GB: Up to 2180mW
    64GB: Up to 1800mW
    32GB: Up to 1980mW
    16GB: Up to 1540mW
  - Idle / Standby mode: < 355mW (typical)
  - DevSleep mode: < 70mW (typical)
- **Reliability**
  - Mean Time Between Failures (MTBF):
    More than 2 million hours**
    ** preliminary estimate
- **Expanded Data Protection**
  - Added data security through user-selectable protection zones
  - Secure Erase (data sanitization)
- **20-Byte Serial Number**
  - Factory pre-programmed unique ID
  - User-programmable 10-Byte ID
- **Supports TRIM and SMART Commands**
- **Robust Built-in ECC**
- **Thermal Throttling**
- **Native Command Queuing (NCQ)**
  - Up to 32 commands
- **NAND Configuration**
  - 1 bit per cell (SLC)
  - Designed with Greenliant's advanced EnduroSLC™ Technology
- **High Endurance**
  - GLS89SAxxxG1: 50K P/E cycles
  - GLS89SAxxxG8: 100K P/E cycles
- **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 GLS89SA016G1 / 032G1 / 064G1 / 128G1 / 016G8 / 032G8 / 064G8 / 128G8 Industrial Temperature SATA 2.5" ArmourDrive™ EX Series (referred to as "2.5" ArmourDrive" in this factsheet) are high-endurance, high-reliability solid state drives. They include a 16, 32, 64 or 128 GByte SATA NANDrive™ 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 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). The firmware effectively optimizes the use of NAND flash memory's program/erase (P/E) cycles and minimizes write amplification.

2.5" ArmourDrive 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.

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 contains a NANDrive multi-chip package, which integrates a SATA NAND flash memory controller with discrete NAND flash die, 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 NAND flash 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 Error Correction Code (ECC)

The ECC technology uses advanced algorithms to detect and correct errors, ensuring data integrity and extending the SSD lifespan.

1.1.6 Multi-tasking Interface

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

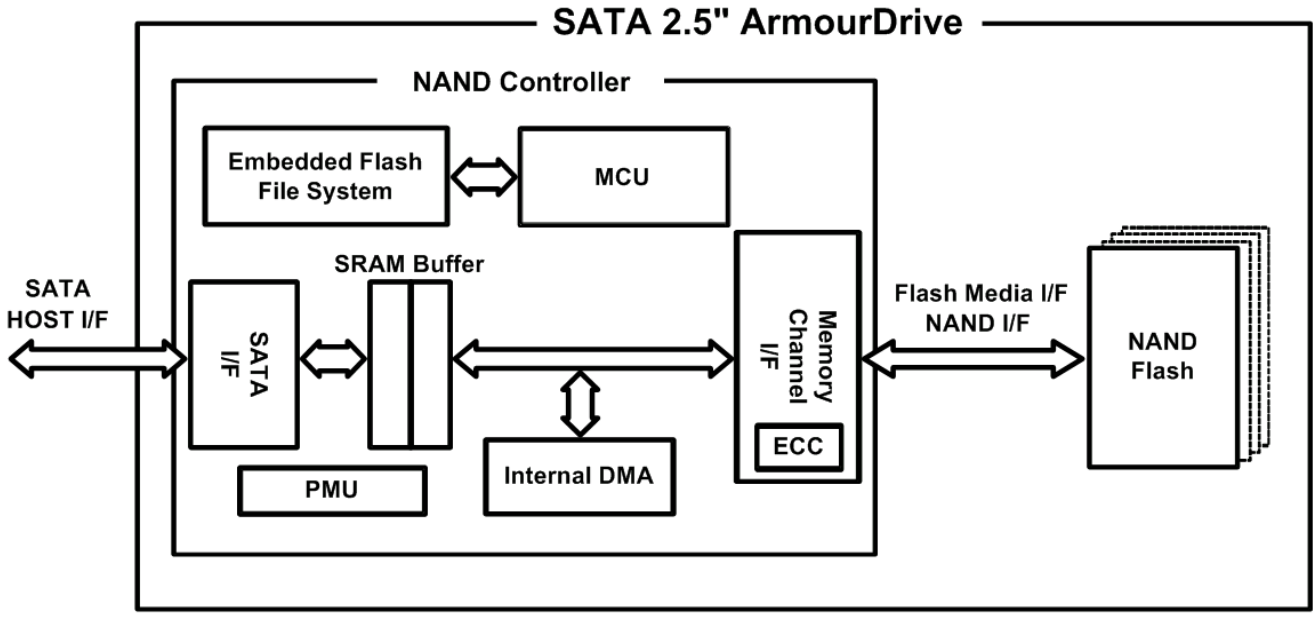
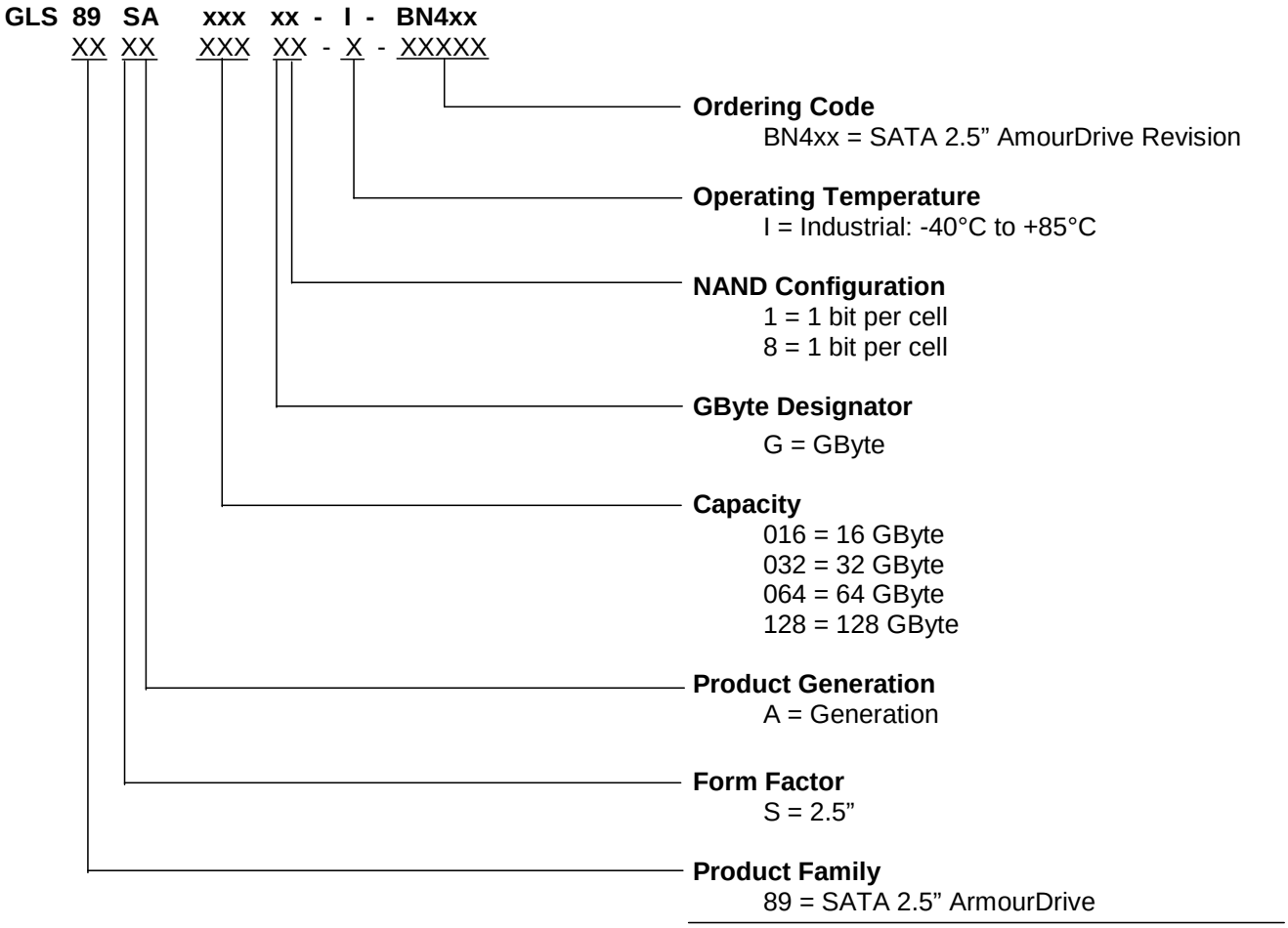


Figure 2-1: SATA 2.5" ArmourDrive Block Diagram

3.0 APPENDIX

3.1 Product Ordering Information



Valid Combinations

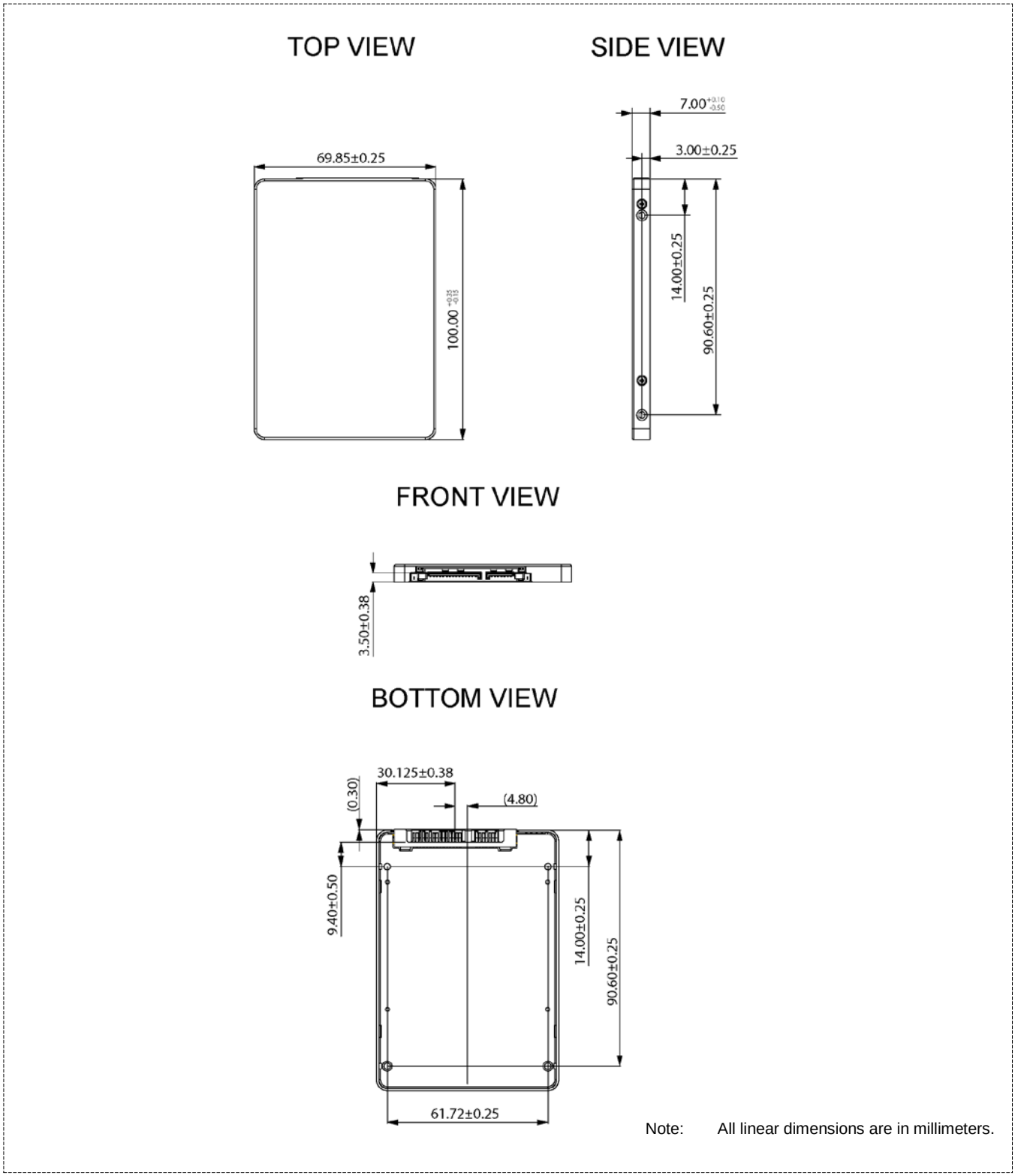
Valid product combinations are those that are in the mass production or will be in the mass production. Consult your Greenliant sales representative to confirm availability of the valid combinations and to determine availability of new product combinations.

Table 3-1: SATA 2.5" ArmourDrive Product Valid Ordering Numbers

Capacity	Operating Temperature	Part Number	Form Factor
16GB	Industrial (-40°C to 85°C)	GLS89SA016G1-I-BN400	2.5-inch
		GLS89SA016G8-I-BN401	
32GB	Industrial (-40°C to 85°C)	GLS89SA032G1-I-BN400	2.5-inch
		GLS89SA032G8-I-BN401	
64GB	Industrial (-40°C to 85°C)	GLS89SA064G1-I-BN400	2.5-inch
		GLS89SA064G8-I-BN401	
128GB	Industrial (-40°C to 85°C)	GLS89SA128G1-I-BN400	2.5-inch
		GLS89SA128G8-I-BN401	

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3.2 Mechanical Diagrams



Note: All linear dimensions are in millimeters.

Figure 3-1: SATA 2.5" ArmourDrive Dimensions

Revision History

Revision History

Revision	Description	Date
01.000	Initial Release as Factsheet	August 20, 2019

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