

Features

- **Industry Standard 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
 - Native Command Queuing (NCQ) up to 32 commands
- **Performance**
 - Sequential data read: Up to 320 MByte/sec
 - Sequential data write: Up to 90 MByte/sec (measured using 128 KByte transfer size)
- **Power Management**
 - 3.3V power supply
- **Power Consumption**
 - Active mode:
 - 512GB: Up to 1400mW
 - 256GB: Up to 1400mW
 - 128GB: Up to 1400mW
 - 64GB: Up to 1200mW
 - Idle mode: < 450mW (typical)
 - DevSleep mode: < 95mW (typical)
- **Supports TRIM and SMART Commands**
- **Robust Built-in ECC**
- **Thermal Throttling**
- **Reliability**
 - Mean Time Between Failures (MTBF): More than 2 million hours
- **Hardware-based Power Loss Protection (PLP)**
- **Integrated Current Detector**
 - Protects from inrush current and generates reset during power-up and power-down to prevent inadvertent writes
- **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
- **Industrial 3D TLC NAND Flash**
- **Endurance**
 - Program/Erase (P/E) cycles: 5K
 - TeraBytes Written (TBW): up to 1,700
- **Operating Temperature Range**
 - Industrial: -40°C to 85°C
- **M.2 2280 Form Factor**
 - 22mm x 80mm x 2.38mm
 - Single-sided (SS), B+M key
- **All Devices are RoHS Compliant**

Product Description

The GLS87AR064G3 / 128G3 / 256G3 / 512G3 Industrial Temperature SATA M.2 2280 ArmourDrive™ PX Series modules (referred to as “M.2 ArmourDrive” in this factsheet) are high-reliability solid state drives. They include 64, 128, 256 or 512 GBytes of NAND flash on a printed circuit board (PCB).

M.2 ArmourDrive is ideal for applications that require removable form factor and more reliable data storage. Serial ATA (SATA) M.2 solid state storage technology is widely used in industrial computers, test and measurement instrumentation, multi-functional printers, medical equipment, security and surveillance systems, network servers and digital signage. These removable solid state drives (SSDs) surpass traditional hard disk drives (HDDs) in their small size, 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.

M.2 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.

M.2 ArmourDrive’s advanced NAND management technology improves endurance, enhances data security and prevents data loss during unexpected power loss 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.

1.0 GENERAL DESCRIPTION

Each M.2 ArmourDrive module contains a SATA SSD controller with NAND flash multi-chip packages. Refer to Figure 2-1 for the M.2 ArmourDrive block diagram.

1.1 Optimized M.2 ArmourDrive

The heart of M.2 ArmourDrive is the SATA SSD controller, which translates standard SATA signals into flash media data and control signals. The following components contribute to M.2 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)

M.2 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 M.2 ArmourDrive. The PMU dramatically reduces the power consumption of M.2 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 M.2 ArmourDrive firmware integrity. For regular power management, the host must send an IDLE_IMMEDIATE command and wait for command ready before powering down M.2 ArmourDrive.

1.1.4 Embedded Flash File System

The embedded flash file system is an integral part of M.2 ArmourDrive. It is integrated in the controller's firmware that performs the following tasks:

1. Manages and optimizes the data access of flash media
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 Loss Protection (PLP)

PLP is a mechanism to help prevent data corruption during unexpected power failure events. M.2 ArmourDrive uses dedicated power failure detection and backup power circuitry to prevent data integrity issues during abnormal power loss. The controller's advanced firmware offers additional power interrupt data protection. 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 Checking and Correction (ECC)

The ECC technology uses advanced 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 fast, sequential write performance by allowing concurrent Read, Program and Erase operations to multiple flash media.

1.2 Advanced NAND Management

M.2 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.

2.0 FUNCTIONAL BLOCKS

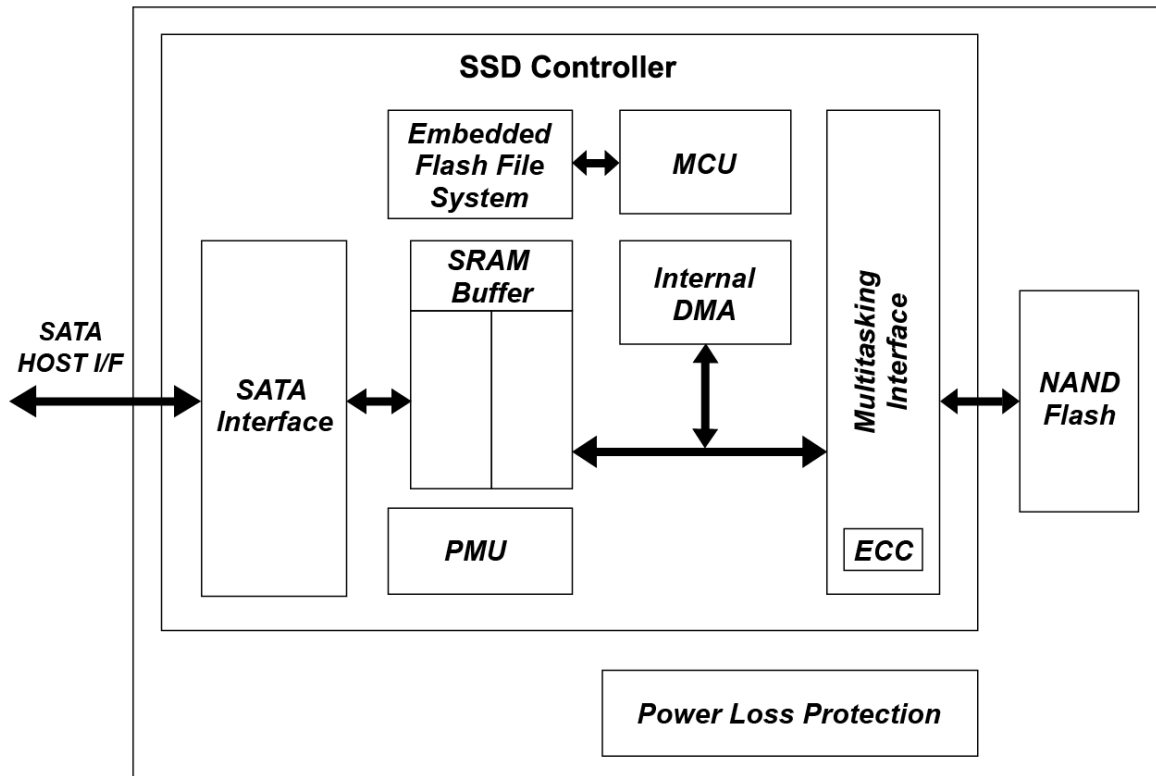
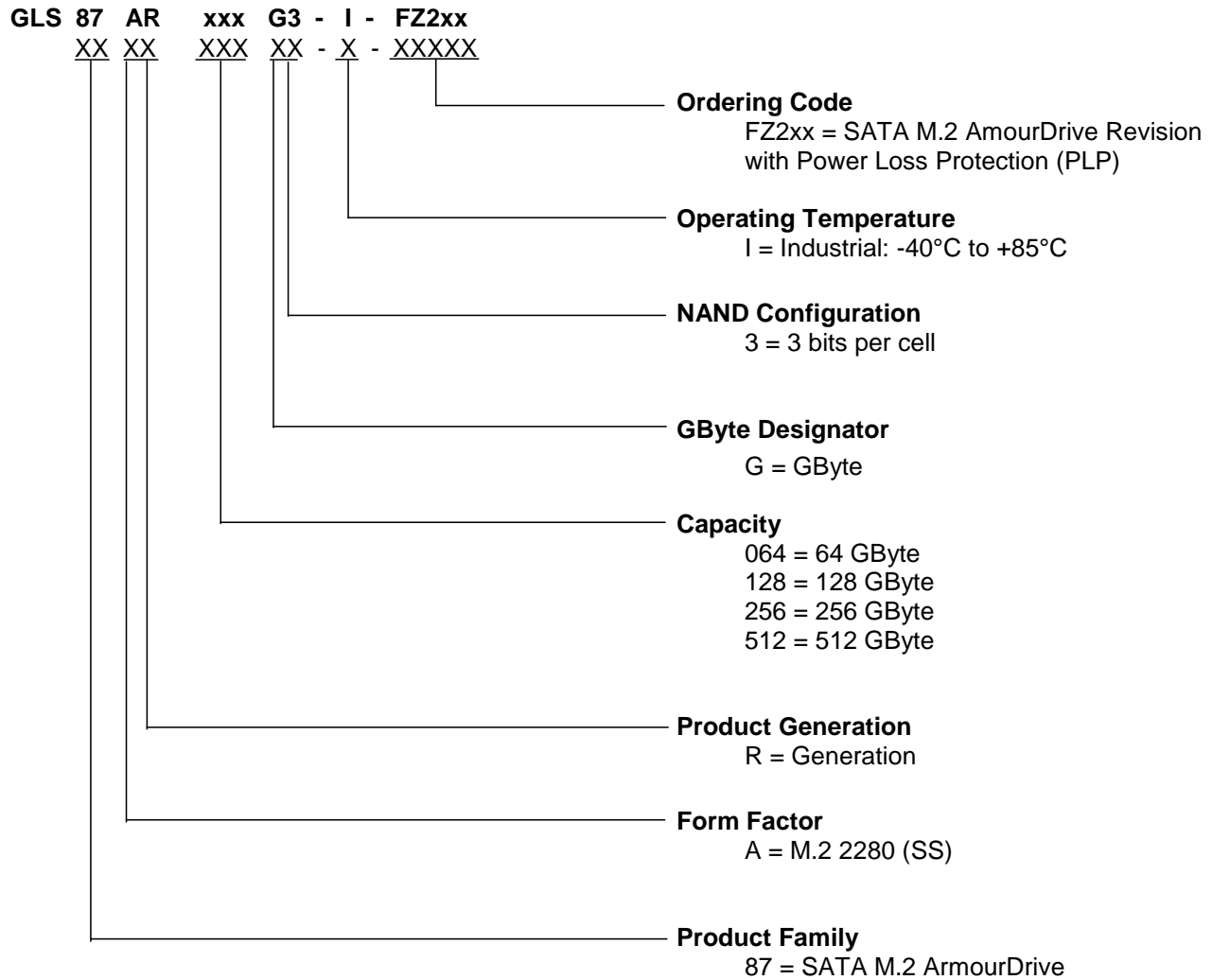


Figure 2-1: SATA M.2 ArmourDrive Block Diagram

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: M.2 ArmourDrive Product Valid Ordering Numbers

Capacity	Operating Temperature	Part Number	Form Factor
64GB	Industrial (-40°C to 85°C)	GLS87AR064G3-I-FZ212	2280 (SS), B+M key
128GB	Industrial (-40°C to 85°C)	GLS87AR128G3-I-FZ212	2280 (SS), B+M key
256GB	Industrial (-40°C to 85°C)	GLS87AR256G3-I-FZ212	2280 (SS), B+M key
512GB	Industrial (-40°C to 85°C)	GLS87AR512G3-I-FZ212	2280 (SS), B+M key

3.2 Board Diagrams

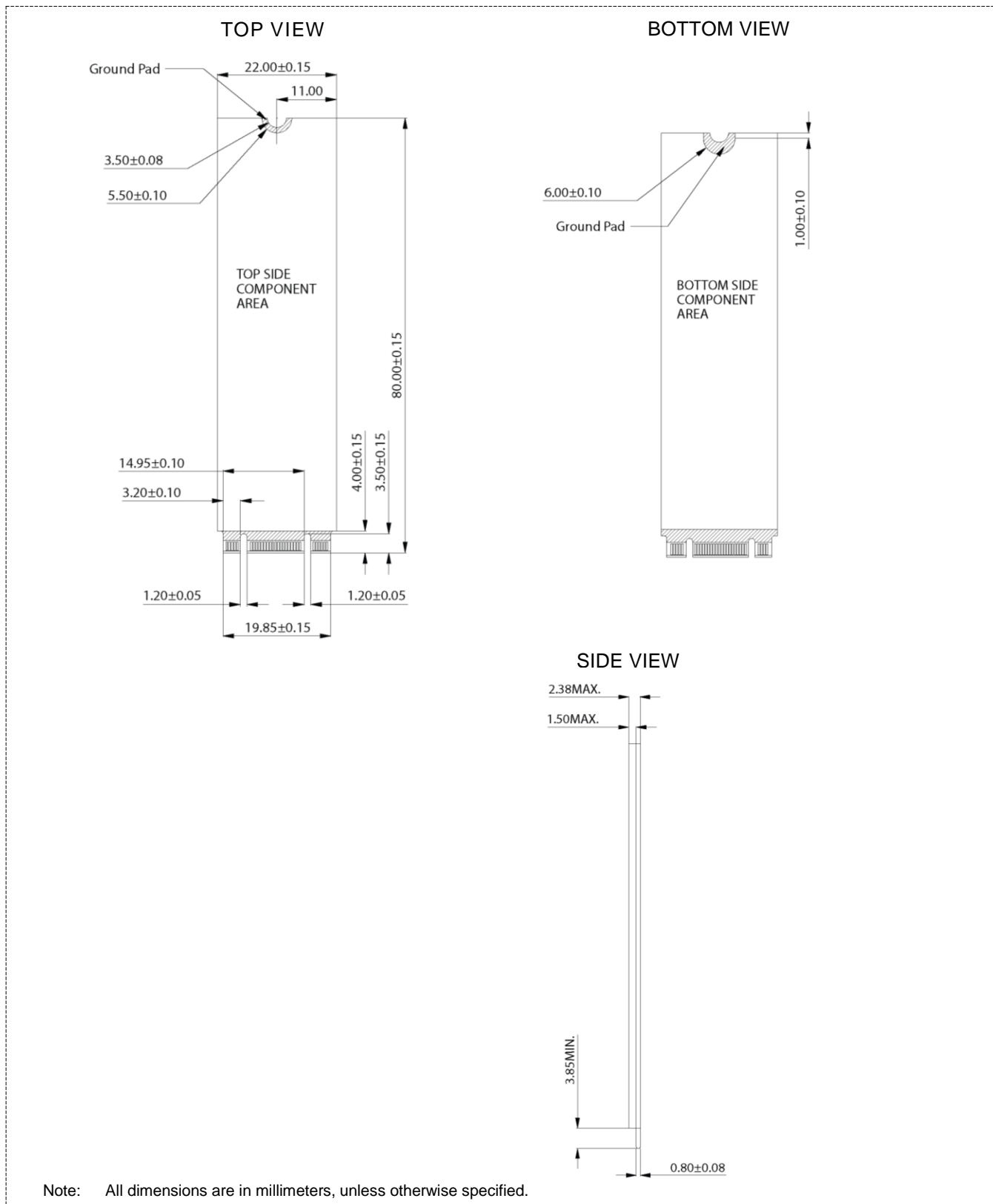


Figure 3-1: M.2 2280 ArmourDrive Dimensions

Revision History

Revision	Description	Date
01.000	Initial Release as Factsheet	December 20, 2022

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