GLS91CAxxxG1 / GLS91CAxxxG8
Industrial Grade **CFast ArmourDrive™** EX Series

Factsheet 01.000
August 2019

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
- **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**
  - 3.3V 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
    8GB: Up to 1200mW
  - Idle 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**
  - GLS91CAxxxG1: 50K P/E cycles
  - GLS91CAxxxG8: 100K P/E cycles
- **Operating Temperature Range**
  - Industrial: -40°C to 85°C
- **CFast Card Form Factor**
  - 36.40mm x 42.80mm x 3.60mm
- **All Devices are RoHS Compliant**

Product Description

The GLS91CA008G1 / 016G1 / 032G1 / 064G1 / 128G1/ 008G8 / 016G8 / 032G8 / 064G8 / 128G8 Industrial Temperature CFast ArmourDrive™ EX Series (referred to as "CFast ArmourDrive" in this factsheet) are high-endurance, high-reliability storage cards. They include an 8, 16, 32, 64 or 128 GByte SATA NANDrive™ in the standard CFast card form factor.

CFast ArmourDrive is ideal for applications that require hot-swappable, small form factor data storage with high shock-resistance. CFast cards are widely used in transportation systems, industrial automation, vending and gaming machines, medical computing, professional video and photo cameras, set-top boxes and point-of-sales (POS) equipment. These removable storage products surpass traditional hard disk drives (HDD) 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.

CFast 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 CFast ArmourDrive contains a NANDrive multi-chip package, which integrates a SATA NAND flash memory controller with discrete NAND flash die, in a standard CFast card form factor housing. Refer to Figure 2-1 for the CFast ArmourDrive block diagram.

1.1 Optimized CFast ArmourDrive

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

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

1.1.4 Embedded Flash File System

The embedded flash file system is an integral part of CFast 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

CFast 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

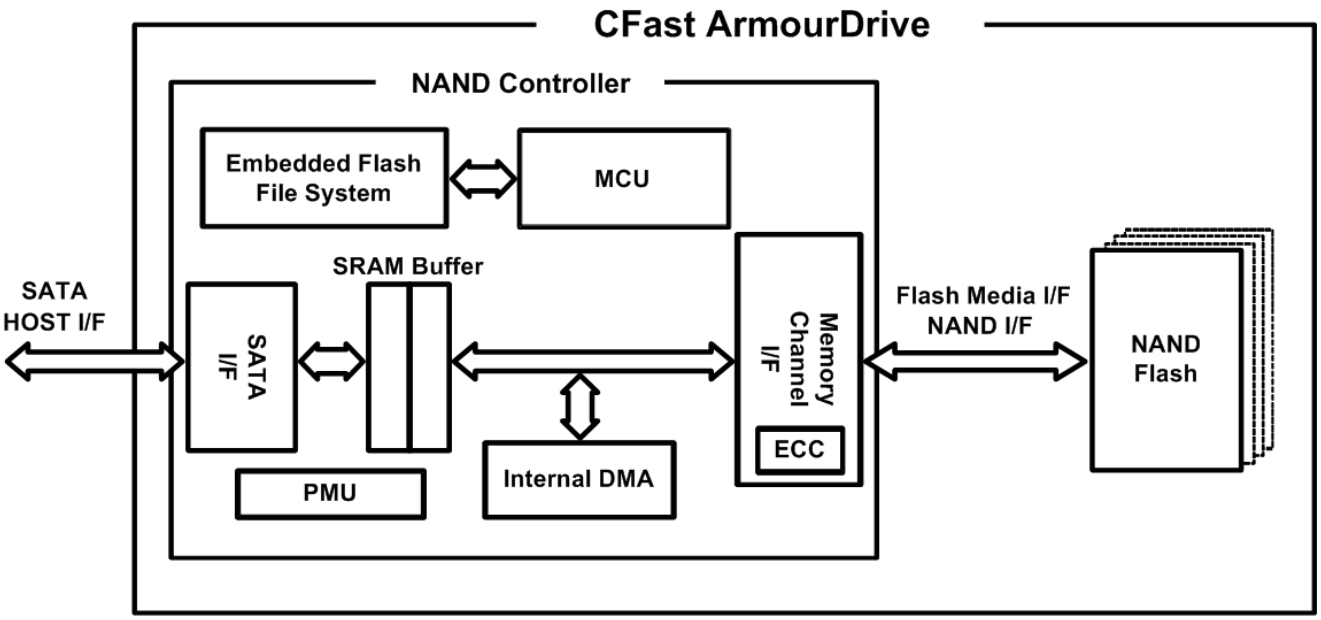
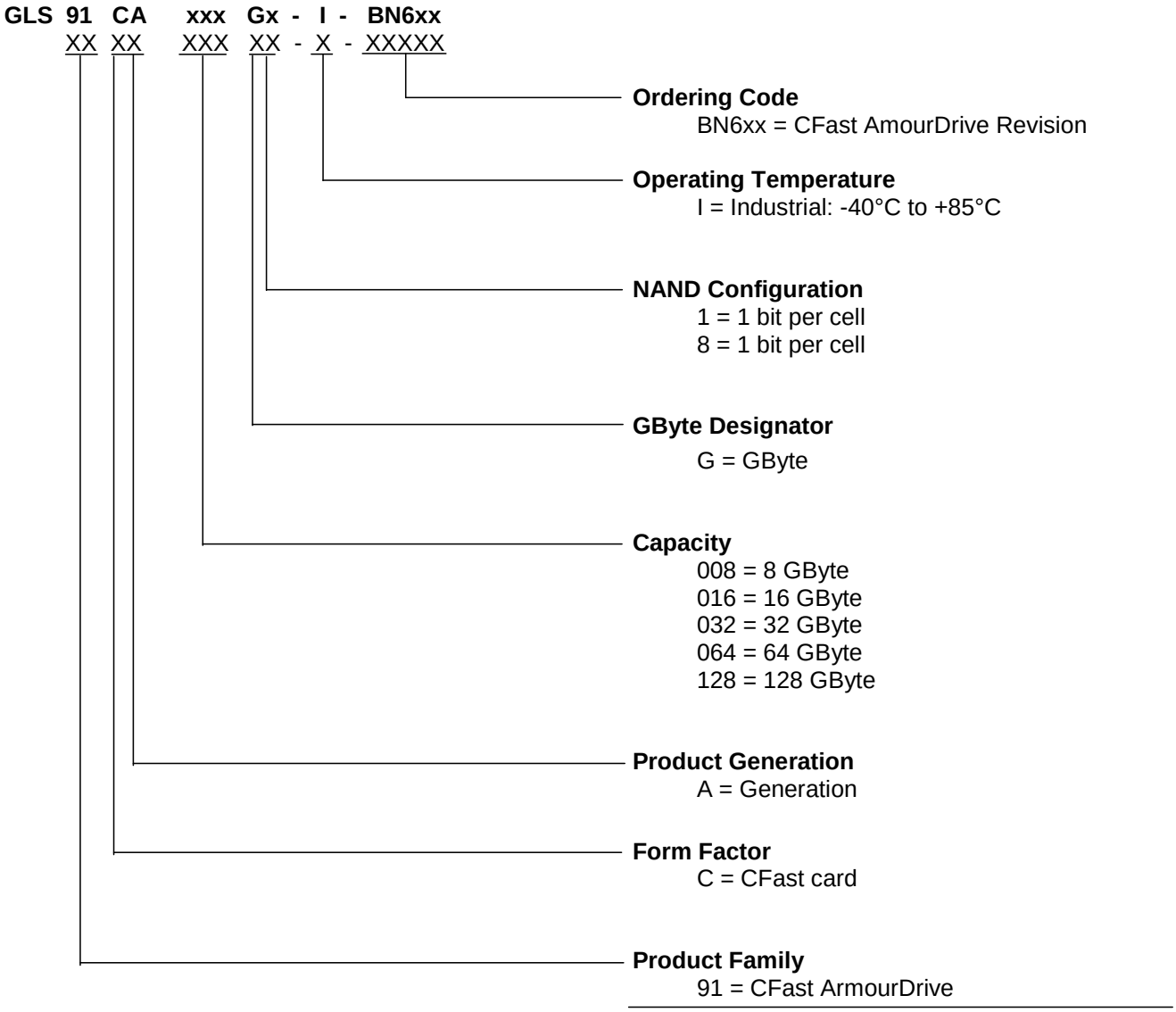


Figure 2-1: CFast ArmourDrive Block Diagram

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: CFast ArmourDrive Product Valid Ordering Numbers

Capacity	Operating Temperature	Part Number	Form Factor
8GB	Industrial (-40°C to 85°C)	GLS91CA008G1-I-BN600	CFast Card
		GLS91CA008G8-I-BN601	
16GB	Industrial (-40°C to 85°C)	GLS91CA016G1-I-BN600	CFast Card
		GLS91CA016G8-I-BN601	
32GB	Industrial (-40°C to 85°C)	GLS91CA032G1-I-BN600	CFast Card
		GLS91CA032G8-I-BN601	
64GB	Industrial (-40°C to 85°C)	GLS91CA064G1-I-BN600	CFast Card
		GLS91CA064G8-I-BN601	
128GB	Industrial (-40°C to 85°C)	GLS91CA128G1-I-BN600	CFast Card
		GLS91CA128G8-I-BN601	

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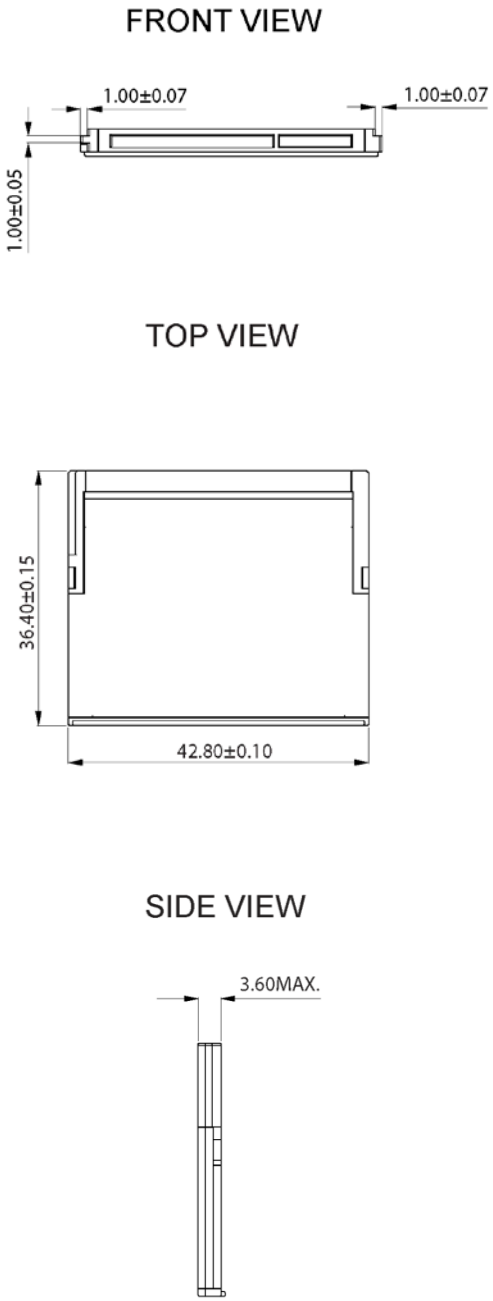
3.2 Mechanical Diagrams



Note: All linear dimensions are in millimeters.

Figure 3-1: CFast ArmourDrive Dimensions

Revision History

Revision History

Revision	Description	Date
01.000	Initial Release as Factsheet	August 22, 2019

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