GLS91CP064G3 / 128G3 / 256G3

Industrial Temp **CFast ArmourDrive™** PX Series

Factsheet 01.001
June 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 550 MB/s*
  - Sequential data write: Up to 490 MB/s*
    * measured using 128 KByte transfer size
- **Power Management**
  - 3.3V power supply
  - Host SATA interface power management (HIPM Mode)
  - Immediate disabling of unused circuitry without host intervention (DIPM mode)
- **Power Specifications**
  - Active mode:
    256GB: 1440mW (typical)
    128GB: 1360mW (typical)
    64GB: 1350mW (typical)
  - Idle mode: < 325mW (typical)
  - Slumber mode: < 15mW (typical)
  - DevSleep mode (optional): < 5mW (typical)
- **Native Command Queuing (NCQ)**
  - Up to 32 commands
- **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
- **Supports SMART Commands**
- **Supports 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
- **CFast Card Form Factor**
  - 36.40mm x 42.80mm x 3.60mm
- **All Devices are RoHS Compliant**

Product Description

The GLS91CP064G3 / 128G3 / 256G3 Industrial Temperature CFast ArmourDrive™ PX Series (referred to as CFast ArmourDrive" in this factsheet) are high-performance, low-power storage cards. They combine 64, 128 or 256 GBytes of NAND flash memory with an advanced Serial ATA (SATA) NAND controller 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.

1.0 GENERAL DESCRIPTION

Each CFast ArmourDrive integrates a SATA NAND flash memory controller with up to two NAND flash devices 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 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

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.

2.0 FUNCTIONAL BLOCKS

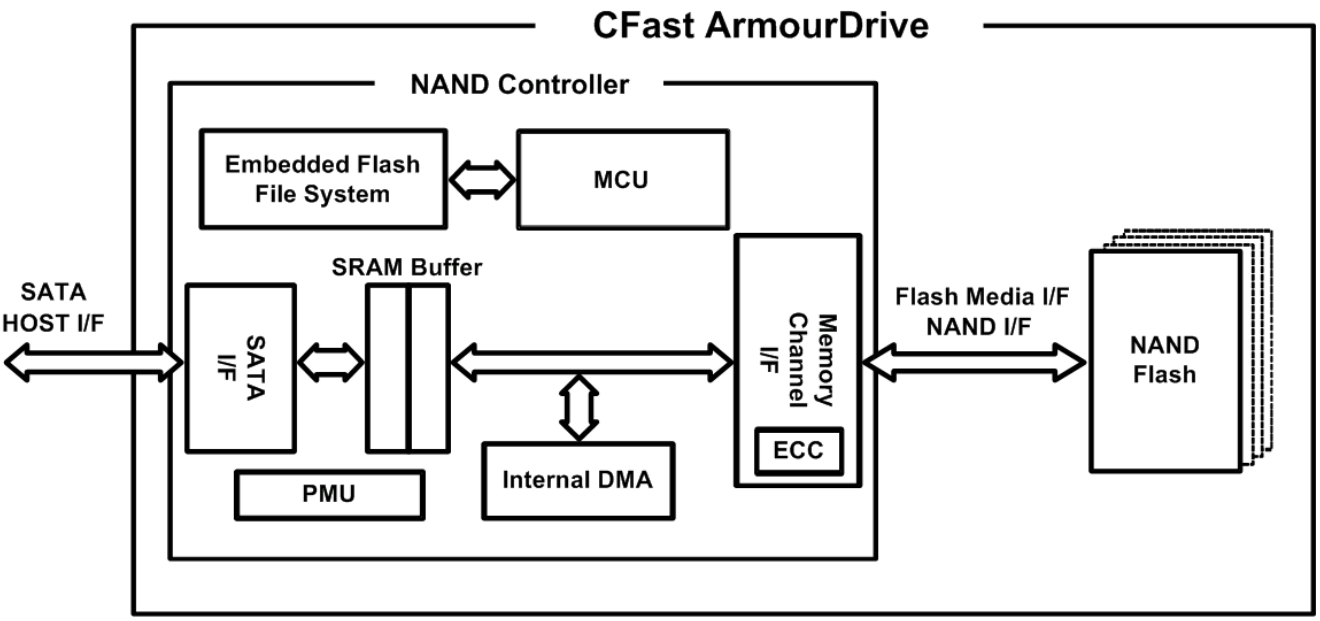
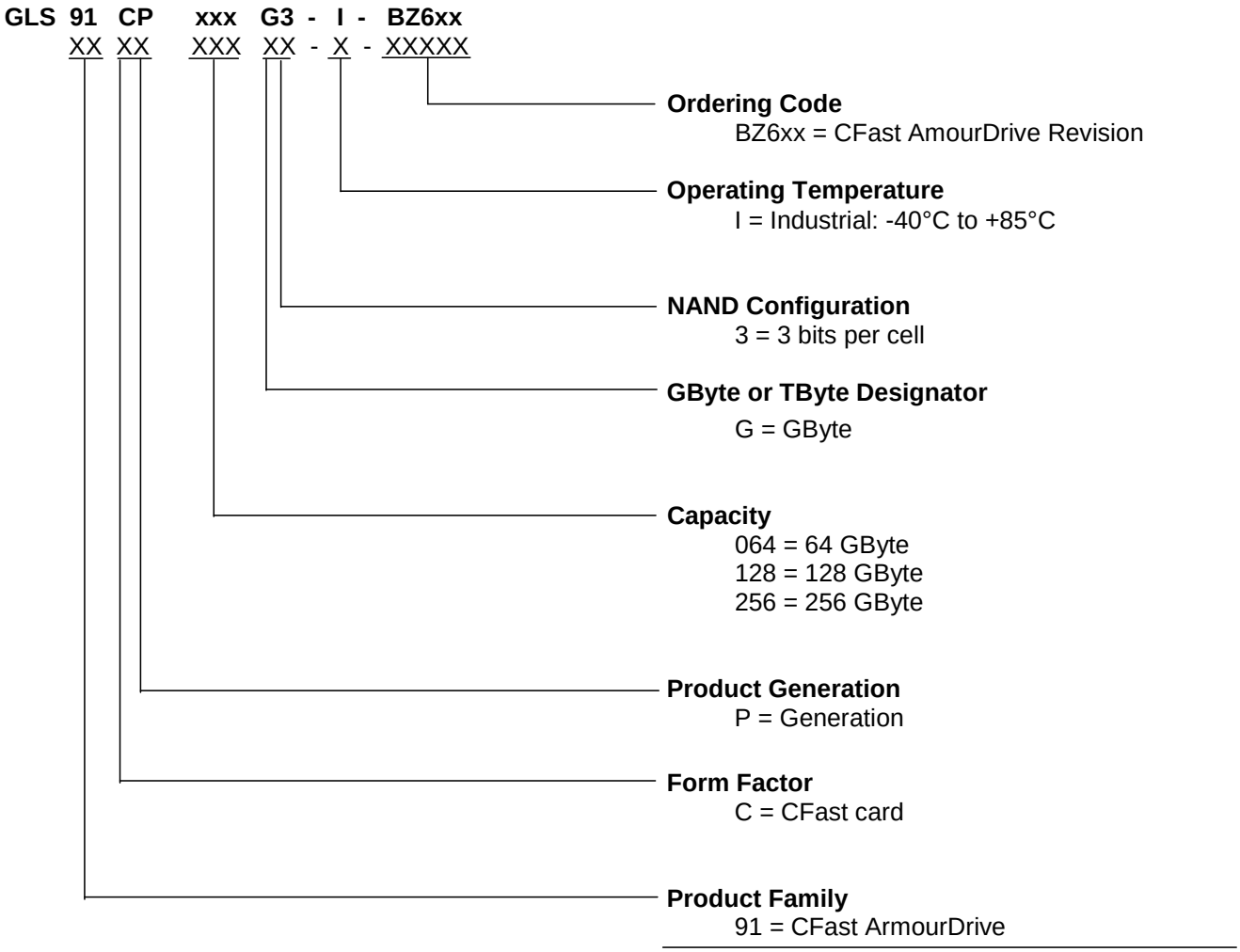


Figure 2-1: CFast ArmourDrive Block Diagram

3.0 APPENDIX

3.1 Product Ordering Information

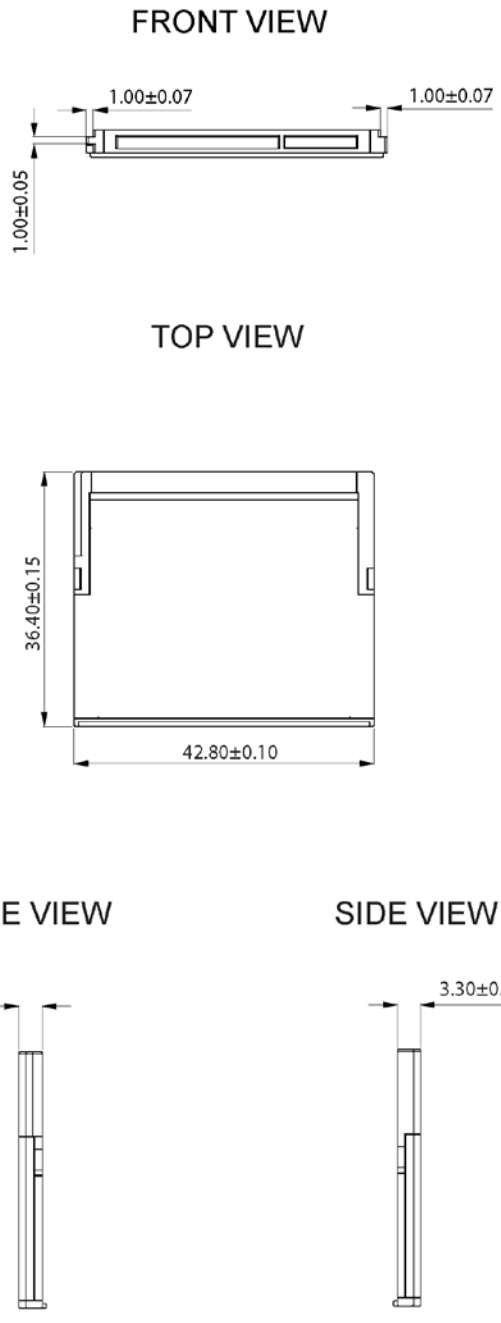


Valid Combinations
Valid product combinations are those that are in the mass production or will be in the mass production. Consult your Greenliant sales representative to confirm availability of the valid combinations and to determine availability of new product combinations.

Table 3-1: CFast ArmourDrive Product Valid Ordering Numbers

Capacity	Operating Temperature	Part Number	Form Factor
64GB	Industrial (-40°C to 85°C)	GLS91CP064G3-I-BZ600	CFast Card
128GB	Industrial (-40°C to 85°C)	GLS91CP128G3-I-BZ600	CFast Card
256GB	Industrial (-40°C to 85°C)	GLS91CP256G3-I-BZ600	CFast Card

3.2 Mechanical Diagrams



Note: All linear dimensions are in millimeters.

Figure 3-1: CFast ArmourDrive Dimensions

Revision History

Revision	Description	Date
01.000	Initial Release as Factsheet	January 25, 2019
01.001	Updated Features descriptions on page 1	June 26, 2019

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