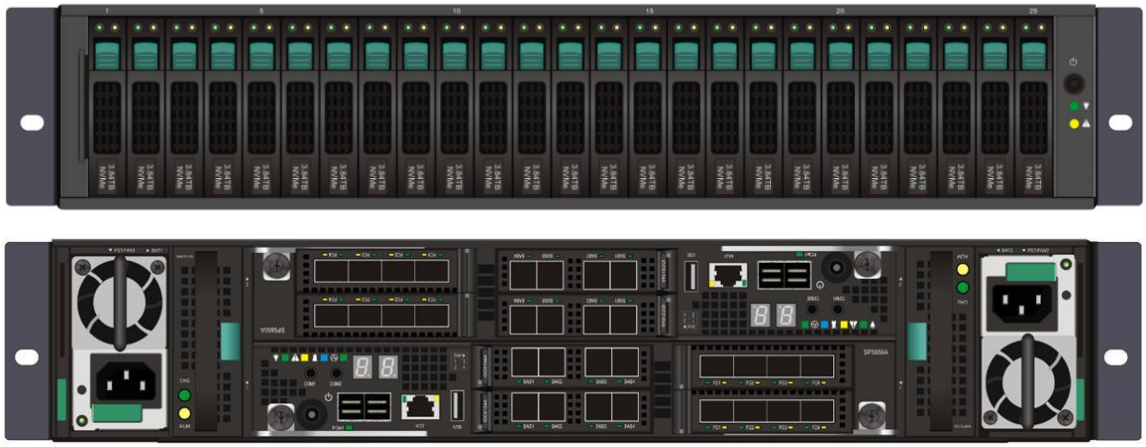
# Maipu MPS5520G3 Storage Datasheet

## Overview

The MPS5520G3 is a new generation of mid-to-high-end hybrid flash storage of Maipu. It adopts the industry-leading high-performance hardware architecture design and high-reliability design. Aimed at the core business systems of medium and large data centers, it provides stable, reliable, excellent in performance, and flexible in application storage products, fully meeting the ever-increasing performance and capacity requirements in scenarios such as databases, server virtualization, and virtual desktops.



MPS5520G3

# Key Features

## Safe and Reliable

- **Fully Redundant Architecture**: The MPS5520G3 adopts a modular and fully redundant architecture design. In the event of a failure of any component, it can achieve rapid fault isolation and online replacement of components, ensuring business continuity.
- **Dual-Controller Active-Active Architecture Design**: The controllers adopt an Active-Active redundant dual-controller architecture. The data cache, I/O paths, and hard disk resources are accessed in a shared manner, realizing load balancing of storage services and enhancing the access performance of the storage system.
- **Controller Self-Healing Technology**: When various controllers of the storage engine experience abnormalities simultaneously (such as crashes or software and hardware failures), the system can quickly and automatically repair itself, resume normal operation status, and ensure that the cached data is not lost, significantly reducing the business interruption time.
- **Cache Power-Off Protection**: The cache drop technology is adopted. When the storage experiences an unexpected power outage, the cached data is flushed down to the flash memory for permanent preservation by the built-in battery of the storage, ensuring that the data in the cache is not lost.
- **Cache Freezing Technology**: When problems such as momentary disconnections or failures occur on the data disks, causing data to be unable to be written, the data in the cache can be frozen. After the data disk failures are repaired, the frozen cached data is flushed down to the data disks, ensuring that the data is not lost.
- **CRAID Technology**: The unique IDDC + CRAID technology enables rapid reconstruction at the minute level for partial hard disk damages. A single RAID group can tolerate the failure of any three whole hard disks without data loss. Based on the global load technology, I/O is distributed across all hard disks, significantly enhancing the I/O concurrency capability and realizing rapid reconstruction. The reconstruction time for 1TB of data can be shortened to within 20 minutes. Moreover, it allows multiple disks in a RAID group to experience media failures simultaneously without data loss. Meanwhile, combined with the slow power-on technology of the hard disks in the storage system, it avoids the risks such as current overload and tripping caused by a large number of hard disks being powered on simultaneously, further ensuring the high reliability of the system.
- **Data Consistency Protection**: It supports data consistency protection based on T10 PI. During the data reading and writing process, it ensures the integrity of the data along the entire path from the host port to the hard disk, preventing silent data errors and safeguarding the security of user data.

## Comprehensive Data Protection

The MPS5520G3 provides rich data protection functions, including data snapshots, data replication, data mirroring, and symmetric dual-active features. Through these features, data management and protection from online to near-line and from local to remote are realized, easily providing users with multi-level and cross-regional storage solutions.

- **Data Snapshots**: The continuous data snapshot function of Maipu Technology can create up to 2,048 incremental-based historical time-point copies for a single data volume, providing continuous data protection. When a "soft" data failure occurs, such as data corruption caused by software programs, virus attacks, or accidental deletion, the data can be quickly recovered by "rolling back" to the appropriate time-point mark. Cascade snapshots are supported, further protecting the safety of snapshot data.
- **Data Replication**: It supports both synchronous and asynchronous replication and can be converted online according to business needs, taking into account both business performance and data protection. It supports local replication within the device and remote replication across devices. The replication link supports 10/25/100GE Ethernet and 16/32G FC, providing users with flexible configuration options.

Asynchronous replication supports customizing the time interval of data transmission and can provide configuration modes such as continuous hopping, one-to-many, and many-to-one. In the event of an unexpected disaster, the business can be quickly recovered based on the data copy, ensuring the business continuity of the users. Synchronous replication is based on I/O-level synchronization, maintaining a completely synchronized real-time mirror of the primary data. When the primary data fails, the mirror data can provide storage services with PRO = 0.

- **Cloning**: The cloning function can online provide a highly available and highly flexible data copy that is exactly the same as the production volume at a certain moment. After creating the clone, the clone volume can be immediately provided to the front-end business for use without waiting for the data synchronization to be completed. It is suitable for application scenarios where data analysis or testing is frequently performed on the generated data. It also supports forward and reverse synchronization. The system quickly synchronizes based on the differential data without the need to reclone the entire amount of data, realizing continuous protection and flexible use of the data.
- **Symmetric Storage Dual-Active**: Without the need to introduce any third-party software or hardware, the dual-active operation of two storage arrays can be directly realized by two MPS5520G3 series storage arrays, which are mutually redundant. When one of the storage arrays fails, the other storage array can take over the business in real time, achieving zero RPO and RTO. The dual-active link between the devices supports 10/25/100GE Ethernet and 16/32G FC. The dual-active function can cooperate with the replication function to realize a multi-site, cross-regional ring 3DC disaster recovery plan, providing a high-reliability guarantee at the plan level.

## Excellent Performance

- **High-Performance Hardware Platform**: The MPS5520G3 storage controller is based on Intel's new generation of Xeon Scalable Processors, with built-in hardware acceleration. The internal communication of the engine adopts a high-speed 100GE RDMA channel, providing excellent I/O processing capabilities. The controller can insert 25 NVMe SSDs. Each dual-port NVMe SSD directly exchanges data with two controllers. Additionally, the MPS5520G3 backend can flexibly expand NVMe hard disk enclosures and SAS hard disk enclosures, simultaneously meeting the extreme performance and capacity expansion requirements in all scenarios.
- **End-to-End NVMe Architecture**: The MPS5520G3 supports the construction of an end-to-end NVMe storage architecture with extreme performance. The front-end network supports the industry-leading NVMe over Fabric technology. The hard disk channel design adopts a matrix-type full-switching architecture, effectively reducing the I/O processing latency, fully releasing the performance of the flash memory, and providing extreme IOPS and ultra-low latency. Meanwhile, the MPS5520G3 supports the iNOF technology, realizing rapid fault switching and storage plug-and-play in the NVMe over Fabric scenario.
- **Efficient Horizontal Expansion**: The MPS5520G3 adopts the Maipu CloudSAN horizontal SAN expansion architecture, supporting the online horizontal expansion of the 10/25/100GE Ethernet and 16/32G FC network dual protocols. It can be expanded to a maximum of 32 storage controllers, with a 16TB first-level cache and a maximum disk-carrying capacity of 32,000 blocks, constructing a large-scale parallel storage system to meet the growing data processing needs. At the same time, it can tolerate business continuity and data non-loss when at least half of the controllers fail, enhancing the reliability of the storage system.
- **Intelligent Cache Scheduling**: The MPS5520G3 adopts the asymmetric cache scheduling technology in the cache strategy, dynamically adjusting the sizes of the read and write caches according to the actual situation to meet the real-time changing performance requirements of the LUN.
- **Dynamic Load Balancing**: The MPS5520G3 supports dynamic load balancing between controllers, adjusting the workload between controllers without interruption, eliminating performance bottlenecks, and achieving strict service level objectives.
- **Quality of Service Control (QoS)**: With the continuous enhancement of storage performance and expansion capabilities, more and more business systems are accommodated in a single set of storage.

Users need to specify different service priorities for different business types. The QoS function provided by the MPS5520G3 integrates and pools storage resources such as CPU, memory, and ports, ensuring that service requests with higher priorities can obtain higher IOPS/throughput bandwidth and lower response latency.

## Intelligent Storage Platform for Flash Memory

The high performance of flash memory hard disks has been unanimously recognized by the industry. With the help of the MPSP storage operating system, the MS series storage integrates this leading hard disk technology into its high-performance architecture, providing an extreme flash memory fusion solution.

- **Intelligent Medium Recognition for Extreme Performance**: The MPSP storage operating system can intelligently recognize the back-end storage medium. For flash memory hard disks, it automatically executes flash memory optimization algorithms, reducing the frequency of hard disk operations, shortening the I/O path, and providing extreme performance.
- **Global Wear Leveling to Enhance Flash Memory Life**: On the basis of CRAID3.0, integrating the characteristics of flash memory to form the CRAID3.0 flash memory optimization technology, each flash memory hard disk can be cut into several small pieces to form a global resource pool. Then, through the discrete algorithm, the I/O is intelligently and evenly distributed to all small pieces, thereby realizing global wear leveling and significantly enhancing the service life of the flash memory.

## Intelligent Data Management

The MPS5520G3 virtualizes the resource space to form a Cell resource pool. Based on the dynamic allocation and free flow of Cells, Maipu Technology has constructed an intelligent management method, namely ICMT (Intelligent Cell Management Technology, Intelligent Resource Management Technology Based on Cells).

- **Automatic Layering**: After adopting the ICMT technology, there is no binding relationship between LUNs and RAID, and hard disks. Through data copying and migration based on Cells, the data can freely flow on different hard disk media according to the access frequency of the data, thereby realizing automatic layered storage.
- **Automatic Thin Provisioning**: Based on the automatic thin provisioning technology of ICMT, the system automatically recognizes the front-end business I/O, coordinates and dynamically allocates storage resources, which can significantly reduce the difficulty of capacity planning for system administrators.
- **Adaptive Deduplication**: Based on the MPSP storage software platform, global data block-level, online and post-line adaptive lossless deduplication is realized, reducing the amount of data and improving the utilization rate of storage space. The system automatically switches between online deduplication and post-line deduplication according to the business load situation, reducing the impact of deduplication processing on business performance. A second comparison is made before deleting duplicate data to avoid data loss. It supports flexibly opening and closing the deduplication function online in units of data volumes, and also supports enabling it simultaneously with the online compression function to improve the data reduction ratio.
- **Online Compression**: Through the built-in data compression function module of the storage system, the data is compressed online at the moment of data writing. Lossless data compression is adopted to avoid data loss caused by data compression. At the same time, through powerful hardware resources and optimized compression algorithms, the impact of data compression on the front-end business system is minimized, ensuring the smooth access of the business to the maximum extent. It supports configuring hardware acceleration cards to improve the compression ratio and reduce the occupation of storage controller resources. It supports flexibly opening and closing the compression function online in units of data volumes, and also supports enabling it simultaneously with the adaptive deduplication function to improve the data reduction ratio.

## Efficient Business Deployment

- **SAN/NAS Integration**: In the same set of hardware equipment, both SAN and NAS data storage services are provided simultaneously, without the need to configure additional NAS gateway devices, reducing equipment investment, shortening the data access path, and effectively reducing the deployment and operation and maintenance complexity. NAS supports functions such as file system snapshots, replication, and dual-active, and can construct a high-reliability SAN/NAS integrated dual-active scheme.
- **Support for Cloud and Container Loads**: The MPS5520G3 provides the ability to interface with OpenStack-like cloud platforms and K8S container orchestration platforms, providing high-performance and high-reliable storage resources for cloud and container environments, simplifying management and improving the efficiency of business deployment.

## Open Platform, Interconnection and Interoperability

- **Heterogeneous Virtualization**: The built-in virtualization data management engine can incorporate storage array devices of different brands and different architectures such as IP SAN and FC SAN into the unified storage resource pool of Maipu Technology for unified management, thereby effectively reducing the management difficulty and maintenance cost and improving the utilization rate of resources. In addition, the heterogeneous virtualization function can be combined with software such as replication, snapshots, and dual-active to realize local or cross-site data protection, supporting the storage products of mainstream virtualization storage manufacturers and effectively protecting the existing investments of users.
- **Non-Interrupting Data Migration (NDM)**: The NDM technology of Maipu Technology can realize online data migration within a single device and across devices. The front end is unaware during the migration process and the business is not interrupted. All series of hybrid array and all-flash array products of Maipu Technology support the NDM technology. The hybrid array can realize non-Interrupting data migration between the hybrid array and the all-flash array through the NDM technology. In addition, for third-party storage arrays, Maipu Technology can also realize data migration to third-party storage arrays through the NDM technology combined with the heterogeneous virtualization function, realizing resource integration.
- **Full Support for IPv6**: It supports both IPv4 and IPv6 dual protocol stacks. The IP SAN storage network can be constructed between the host and the storage through the IPv4/v6 protocol. The out-of-band management network can be constructed between the management terminal and the storage through the IPv4/v6 protocol. The data replication network can be constructed between the storage and the storage through the IPv4/v6 protocol to meet the IP deployment, application, and management needs in different application scenarios.

# Technical Specifications

| Product Model | MPS5520G3 |
|---|---|
| **General Specification** | |
| Max. Controllers | 32 |
| Max. Cache (Per Dual Control) | 1TB |
| Max. Host Interfaces (Per Dual Control) | 34 |
| IO Module Type | 1/10/25/40/100Gb/s Ethernet module, PCIE module, 8/16/32Gb/s FC module, 10Gb/s FCoE module, 24/48Gb/s SAS module and so on |
| Expand Hard Disk Cabinet Type | 4U hard disk cabinet: 24 Bays, supporting 2.5/3.5-inch hard disk drive<br>2U hard disk cabinet: 25 Bays, supporting 2.5-inch hard disk drive<br>2U hard disk cabinet: 25 Bays, supporting 2.5-inch NVMe SSD |
| Hard Disk Type | NVMe, SSD, SAS, NL-SAS, SATA and so on<br>(support mixed insertion of different types of hard disks) |
| Max. Hard Disks | 32000 (dual-control 3200) |
| Max. LUNs | 65536 |
| Hard Disk Detection and Diagnosis | Support periodic hard disk detection and intelligent dynamic adjustment of hard disk detection speed |
| RAID Class and Hot Backup Feature | RAID/CRAID(CRAID3.0) 0, 1, 3, 4, 5, 6, 10, 50, 60, X0 and so on, support dedicated hot backup, global hot backup, and hot backup of idle hard disk |
| CRAID Feature | CRAID group allows media errors in multiple hard disks, tolerates physical failures in any three disks, and supports normal reconstruction, local reconstruction, and fast reconstruction |
| LUN Synchronization Feature | Support asynchronization, check synchronization, and fast synchronization |
| OS Supporting | AIX, HP-UX, Solaris, Windows, Linux and so on |
| Virtualization Platform Supporting | VMware, Citrix, Hyper-V, OpenStack, KVM, XEN and so on |
| Basic Management Software | Management Suite, including basic storage management, CRAID, system monitoring, log and alarm functions |
| Management Mode | Support graphical, CLI interface, provide WebService access interface, provide SMI-S, Cinder management interface |
| Advanced Features | Thin provisioning, intelligent tiered storage, non-interrupt data migration (NDM), performance monitoring, data snapshots, data replication, data mirroring, local cloning, local mirroring, symmetric dual-active, quality of service control (QoS), online global deduplication, online compression, etc. |
| NAS Features | Support CIFS, NFS, HTTP, FTP, and other protocols |
| **Hardware Specification** | |
| Number of SPs | 2 |
| Number of Fan Modules | 10 |
| Number of Battery Modules | 2 |
| Number of Power Supply | 2 |

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|---|---|
| Modules | |
| Number of Onboard Front-End Ports/SP | 1* Console ETH port |
| Number of Front-End IO Card Slots/SP | 4 (Optional) |
| Number of Disk Module Slots | 25 |
| Dimension (H×W×L) | 88.1mm(2U)×482.6mm×780mm |
| Bare Weight | ⩽36kg |
| Full Weight | ⩽45kg |
| Average Power Consumption with Full Configuration | 1320W |
| Peak Power Consumption with Full Configuration | 1459W |
| Power Input | 100V-240V±20% AC; 60Hz±2%/50Hz±2%; 240V HVDC |
| Power Module | Equipped with redundant platinum AC power supply |
| Temperature | Work temperature: 5°C -35°C; recommended 10°C -35°C |
| | Non-work temperature: -20°C -60°C (Without Battery)<br>Non-work temperature: -15°C -40°C (With Battery) |
| Humidity | Working humidity: 10%-90%, no-condensing; 20% - 80% recommended, no condensing |
| | Non-work humidity: 10%-90%, non-condensing |

Maipu values and appreciates comments you may have concerning our products or this document. Please address comments to:

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