RAM-SAN™

The World's Fastest Storage®

RamSan-300

- **1.5 Gigabytes per Second**
- **200,000 IOPS**
- **16 to 32 GB Storage**
- **2-4 FC Links (4-Gb)**
- **1-2 IB Links (4x)**
- **Hot-swap Modules**

RamSan-300

Solid State Disk Storage

The RamSan-300 from Texas Memory Systems is the reference standard in entry-level solid state disks. Its data storage is based on fast DDR RAM media instead of mechanical, rotating drives. Fully-loaded, this system can sustain over 200,000 random I/Os per second and 1.5 GB/sec of bandwidth. Its low latency has two advantages: it provides users (or servers) with 50x faster response times and allows 50x more users or servers to access the same volume. The RamSan-300 provides an incredible performance improvement over the best disks.

Typical Storage Hierarchy

As computer performance increases faster than rotational disk performance, the traditional two-level storage hierarchy scheme needs a new performance level. The high-performance RamSan-300 fills this need by allowing users to implement a three tiered storage hierarchy. Even under heavy load conditions, the RamSan-300's I/O power allows many computers to have immediate access to highly active data files simultaneously. The RamSan-300 is perfect for small databases, metadata storage, and transaction logs for larger databases.

Installation and Management

The RamSan-300 is as easy to install as a disk drive. In its simplest configuration, it provides a direct link to one server through a host bus adapter (HBA) or host channel adapter (HCA). In its expanded configuration, it can be linked through Fibre Channel or InfiniBand switches to hundreds of servers or workstations via SANs. Basic management operations, including manual shutdown and any alerts, are available from the front panel

screen. Full monitoring and configuration capabilities are available over any browser via a Java applet.

Highly Reliable Storage

With any storage device, reliability is a primary concern. The RamSan-300 is designed to offer superior reliability to other solid state disks and RAID devices. Its standard features include: Chipkill-protected RAM, hot-swap power supplies, redundant internal batteries, and redundant, hot-swappable backup disks.

Non-Volatile Backup Methods

The RAM used to give the RamSan-300 record-breaking performance would generally lose its data if power was lost. To ensure non-volatility, the RamSan-300 includes batteries and copies SSD data at 60 MB/sec to the redundant, internal hard disks when external power is lost or the unit is shut down.

Specifications

I/Os per second	200,000
Capacity	16-32 GB
Bandwidth	1.5 GB/sec
Fibre Channels: 4-Gb, 2-Gb	2 to 4 Ports
InfiniBand: 4x	1 to 2 Ports
Latency	<15 microseconds
Disk Drives	Redundant Hot-Swap
Power Supplies	Redundant Hot-Swap
Batteries	2 Redundant
Size	5.25" (3U) x 16"
Power Consumption (peak)	250 Watts
Weight (maximum)	70 lbs

Fibre Channel Connection
- 4-Gbit Fibre Channel (2-Gbit capable) controllers available
- 2 ports standard; up to 4 ports available
- Supports point-to-point, arbitrated loop, and switched fabric topologies
- Interoperable with Fibre Channel host bus adapters, switches, and operating systems

InfiniBand Connection
- 4x InfiniBand (10-Gbit)
- 1 port standard; up to 4 ports available
- Supports SRP Upper Layer Protocol
- Interoperable with InfiniBand Host Channel Adapters, switches, and operating systems

Management
- Browser-enabled system monitoring, management, and configuration
- Telnet management capability
- Front panel displays system status and provides basic management functionality

LUN Support
- 1 to 1024 LUNS with variable capacity per LUN
- Flexible assignment of LUNs to ports
- Hardware LUN masking

Data Retention
- Non-volatile solid state disk
- Redundant internal batteries power the system after power loss
- Automatically backs up data to disk if power is lost or manual shutdown

Reliability and Availability
- High availability architecture
- Chipkill™ technology protects data against memory errors up to and including loss of an entire memory chip
- Internal redundancies
  -Power supplies and fans
  -Backup battery power
  -Backup hard disk drives (mirrored)
- Hot swappable components
  -Backup hard disk drives (front access)
  -Power supplies)
- Supports most multipathing drivers

Backup Procedures
Supports two backup modes that are configurable per system or per LUN:
- Data Sync mode - synchronizes data to redundant internal disk drives before shutdown or with power loss.
- Active Backup™ mode (optional) - backs up data constantly to internal redundant disks without impacting system performance.
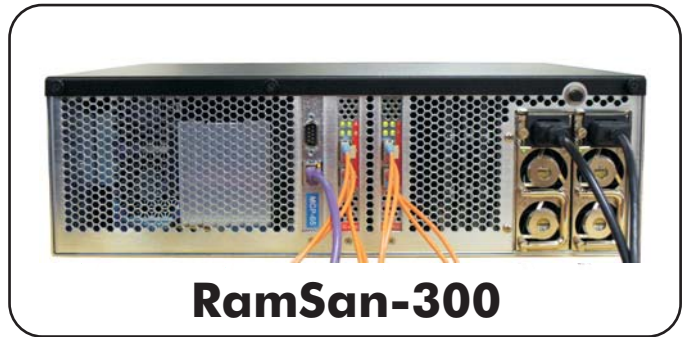
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Introducing Soft Error Scrubbing
The RamSan-300 is the first solid state disk to include soft error scrubbing. All solid state disks will correct a single bit error before sending data to the server as a part of their ECC protection. The RamSan-300, however, goes a step further by scrubbing; re-writing the corrected data to memory and then verifying the re-write to determine if a memory chip has a failure (a hard error) or if radiation transients caused the single bit error (a soft error). Systems that do not scrub single bit memory errors will either a) report errors to a system log that will eventually encourage replacement of a memory board or b) hide these errors thus leaving a potentially unsafe memory board in the system. Research on this topic suggests that 90% of single bit errors are soft errors. In these cases, the RamSan-300 will correct the error through the scrubbing process and prevent unnecessary downtime to replace the memory board.

About Texas Memory Systems
Since 1978, Texas Memory Systems (TMS) has specialized in high bandwidth, low latency, I/O-intensive storage systems. While the primary feature of our products has always been high performance, we achieve this performance without resorting to overly complex circuitry or unwieldy protocols. This emphasis on simplicity allows TMS to deliver outstanding performance using mature technologies and readily available off-the-shelf components.

TMS systems were originally designed to meet the needs of the U.S. defense industry. This market has always demanded the ultimate in performance and TMS has always delivered it. The RamSan-300 delivers a level of performance previously unavailable in a commercial storage product.

Call or Email Nathalie: nathalie.gonzalez@texmemsys.com

Texas Memory Systems, Inc.
10777 Westheimer Suite 600, Houston, Texas 77042

(713) 266-3200   **www.superSSD.com**