



Data Storage, Security & Performance

# XCubeSAN

| XS5200 Series



QSAN XS5200 Series is the high performance, simple, secure, scalable and affordable SAN storage systems for enterprise. It is an ideal solution to the applications of mission critical data center, high performance computing, virtualization integration, or media and entertainment environments.

## Product Highlights

- High Performance SAN storage system with Dual-Active (Active/Active) controller
- High availability design with no single point of failure
- 5th generation Intel® Xeon® 4-core processor, up to 128GB RAM per controller
- Latest 12Gb SAS 3.0 technology
- Built-in 10GbE iSCSI
- Up to 12,000MB/s sequential read and 8,000MB/s sequential write throughput, up to 1.5 million sequential IOPS
- Scale up solution supports over 4.3PB of raw storage capacity
- QSAN SANOS (SAN Operating System) 4.0
- Advanced Storage Management
  - Thin Provisioning
  - SSD Cache (read and write cache)
  - Auto Tiering
  - Snapshot
- Flexible I/O host cards for iSCSI SAN or Fibre Channel SAN
- Local clone and remote replication for disaster recovery
- Virtualization support for VMware VAAI, Microsoft Hyper-V ODX, and Citrix
- Cache-to-Flash memory protection technology



QThin

QCache

QTiering

QSnap

QClone

QReplica

## Next Generation Hybrid Storage

The XS5200 series integrates Intel® Xeon® processor that is optimized for enterprise SAN and cloud storage along with native 12Gb SAS 3.0 technology to build up the next generation storage platform to the highest standard. Innovative design includes dual host cards, dual on-board 10GBase-T ports, M.2 flash and super capacitor modules for memory protection, and Wake-on-SAS. Not only performance can be scaled by adding a second SAN controller or adding a second host card, but the storage capacity can be scaled with XCubeDAS expansion enclosures.

The core technology of XCubeSAN product family is SANOS 4.0 operating system, which delivers comprehensive storage functionalities. Especially it is optimized to support QCache (SSD Cache) and QTiering (Auto Tiering) to fully leverage the advantages of SSD drives and construct a high cost performance hybrid storage



## Wide Ranging Product Portfolio

The XS5200 series features a wide range of form factors including a 24-bay, 4U 3.5" LFF chassis (XS5224), 3U 16-bay (XS5216), 2U 12-bay (XS5212), and a 26-bay, 2U 2.5" SFF chassis (XS5226). This allows more deployment flexibility to meet users' budgets and rack density limitations. Through the modular I/O expansion slot, the XS5200 series models can be easily configured as iSCSI SAN storage or Fibre Channel SAN storage or even a hybrid of the two.



XS5224



XS5216



XS5212

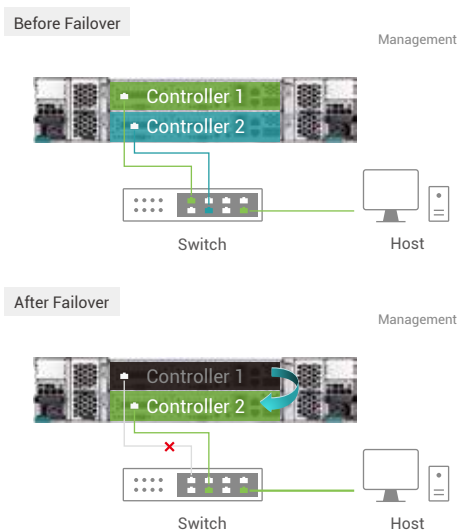


XS5226

QSAN XS5226 model (2.5" 2U 26-bay) is the industry's first high density all flash/low power SAN storage. It has two more storage bays (up to 8% more capacity) than the popular 2U 24-bay products available on the market. This can further lower the cost per TB, minimize IT rack space, and generate smaller and greener footprint.

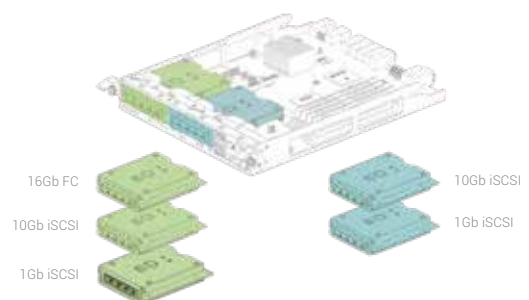
## Dual-Active (Active/Active) Controller SAN System

The XS5200 series features a Dual-Active controller architecture, both controllers concurrently provide storage services in real time. Active-Active architecture doubles the available host bandwidth and cache-hit ratio, this ensures maximum utilization of system resources and maximizes throughput.



## Modular Design for Versatility & Scaled Performance

The SAN controller has two host card slots for expanded connectivity and scaled performance. There are various types of optional host cards available to match your specific need, including 16Gb Fibre Channel, 10GbE iSCSI, and 1GbE iSCSI. You may have mixed Fibre Channel and iSCSI connectivity in the same system simultaneously. In dual controller mode, the system can support up to 20 ports of 10GbE iSCSI or 8 ports of 16Gb FC connectivity. You can connect multiple host servers directly to XS5200 series without using FC switch or Ethernet switch. It is more feasible for SMB businesses in terms of cost saving and flexibility.



## Accelerated Performance & Massive Capacity Expansion

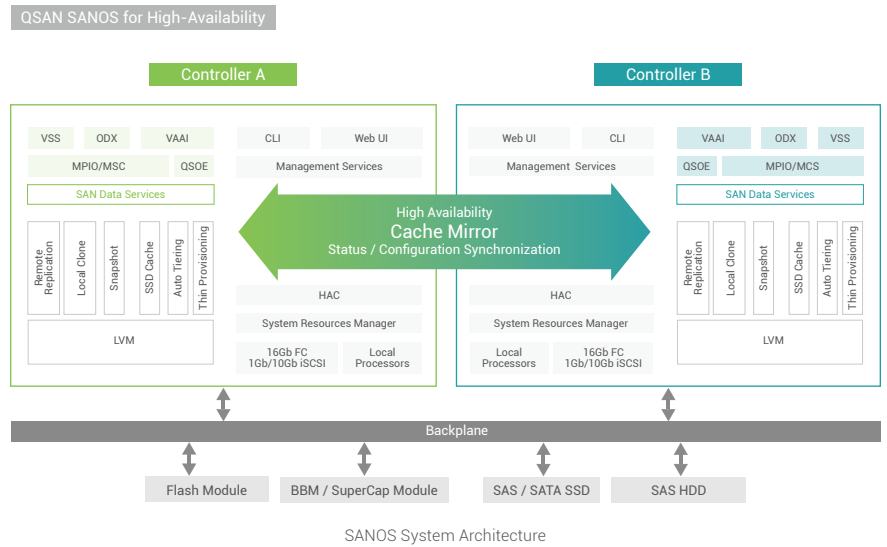
Extra storage capacity can be easily acquired through 2 x high speed 12Gb mini SAS HD ports (SFF-8644) per SAN controller to connect to XCubeDAS expansion enclosures. Up to 286 drives support, the XS5200 series can deliver up to 12,000MB/s read and 8,000MB/s write in throughput and up to 1.5 million IOPS performance. Enormous capacity expansion potential makes the XS5200 series a perfect candidate for backup/archive application, big data application, and 2K/4K digital image processing applications (media and entertainment, large-scale surveillance).

	Throughput (MB/s)
Read	12,000
Write	8,000

## SANOS 4.0 SAN Operating System

SANOS 4.0 is QSAN's proprietary SAN storage operating system. SANOS 4.0 is equipped with a refreshingly simple to use web GUI and easily deployable into any infrastructure.

Based on the Linux kernel, SANOS delivers comprehensive storage functionality including advanced storage management, complete RAID level protection, fast RAID rebuild, storage pool migration, thin provisioning, SSD cache, auto-tiering, snapshot, data backup & disaster recovery, virtualization support, performance monitoring, and scale-up support and more.



## Comprehensive Enterprise Storage Features

SANOS 4.0 brings you to a totally different experience of SAN operating system. SANOS 4.0 boots up your XCubeSAN with ultimate high performance by adopting ingenious SSD cache and auto tiering; smart and efficient storage space management by thin provisioning; and undefeatable data protection by snapshot, local volume clone, and remote replication.

### Thin Provisioning (QThin)

QThin operates by allocating disk storage space in a flexible manner among multiple users, based on the minimum space required by each user at any given time. As the storage pool fills, you can add extra disk groups to expand the storage pool capacity without downtime.

### SSD Cache (QCache)

QCache accelerates application performance by utilizing SSD drives as extended RAID controller cache for frequently-accessed hot data, while most of the cold data are stored in the hard drives. It can improve random read performance by up to 92 times and random write by up to 171 times. QCache 2.0 supports read cache and write cache which are up to four SSD cache pools per system. Each SSD cache pool can be used by one dedicated storage pool and its multiple volumes shared for effective usage of resources.

### Auto Tiering (QTiering)

With QTiering technology, the XS5200 series can help you put the right data at the right place in the right time for optimal use of all storage tiers and allow you to reduce storage costs and management overhead while increasing performance and capacity. Intelligent algorithm behind QTiering manages the data relocation and monitors the data hotness ratio using half-life coefficient and advanced ranking mathematics.

### Snapshot (QSnap)

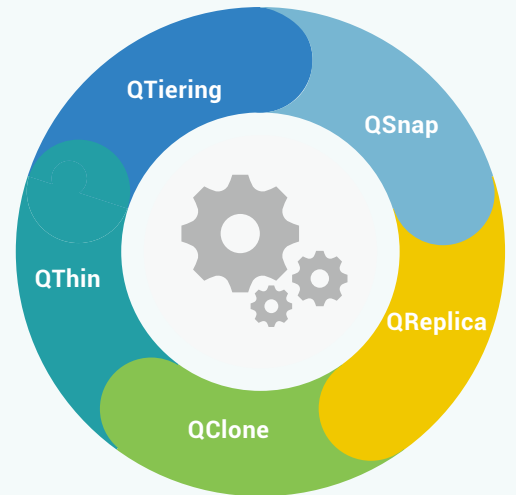
QSnap is the easiest and most effective measurement to protect against ransomware attacks, virus attacks, accidental file deletion, accidental file modification, or unstable system hardware caused by bad I/O cable connection, unstable power supply, etc. Writable snapshot support and compatible with Windows VSS (Volume Shadow Copy Service) are features included to provide additional data availability.

### Local Volume Clone (QClone)

QClone is used to make a duplicate copy of a volume in the same storage pool as well as in a separate storage pool within the same enclosure. Manual and scheduled tasks are available for management flexibility. In the event that the source volume fails, IT managers can quickly switch to the cloned volume and resume data services.

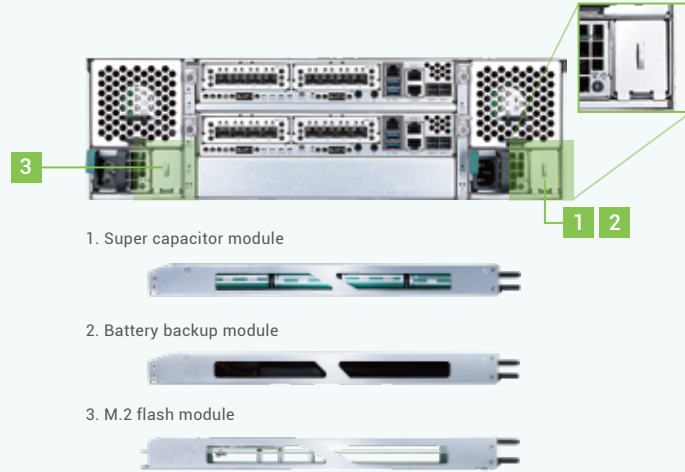
### Remote Replication (QReplica)

QSAN remote replication is a block-level, asynchronous, differential remote volume backup function through LAN or WAN. QReplica 2.0 has many powerful capabilities including unlimited bandwidth, traffic shaping, and multiple connections per replication task. It's the most cost-effective and efficient way to perform remote data backup.



## Efficient Memory Protection to Safeguard Data

In case of emergency and power outage, data in memory cache need to be protected for data consistency and integrity. The XS5200 series supports Cache-to-Flash technology with a M.2 flash module and power module. When outage strikes, cache data will be written to M.2 flash module drawing power from the power module. Power module has two options to choose from – traditional BBM module and super capacitor module. Super capacitors are environment-friendly and require no maintenance and are more resistant to temperature variation. Both modules can be hot swapped with zero downtime for extra availability and reliability.



## Future-Proof Storage Meets Enterprise Applications

With the next generation storage platform, the XS5200 series is positioned to provide excellent values for customers and can deliver ultra-high performance for both throughput and IOPS to enable all kinds of enterprise applications, such as

- Mission critical database applications : real-time transactional database (Exchange server, SQL server, RDBMS, DB2), OLTP (On-Line Transaction Processing)
- Consolidation a virtualization : virtualized data center, VMware, Hyper-V, Citrix
- Backup and disaster recovery : Symantec, Commvault, Veeam, Acronis
- Media and entertainment: 2K/4K/8K video editing, streaming, archiving
- Large-scale surveillance : mega structure (shopping mall/skyscraper), public transportation (airport/train station/highway), secure and smart city infrastructure
- Private cloud computing and big data analytics
- Science and HPC (High Performance Computing)
- Corporate analytic or decision-making applications : CRM (Customer relationship management), data warehousing, EAI (Enterprise Application Integration)



# Hardware Specifications



Model Name	XS5224D (Dual)	XS5216D (Dual)	XS5212D (Dual) XS5212S (Single)	XS5226D (Dual) XS5226S (Single)
Form Factor	4U 24-bay, LFF	3U 16-bay, LFF	2U 12-bay, LFF	2U 26-bay, SFF
RAID Controller	Dual-active or Single-upgradable controller			
Processor	Intel® Xeon® 4-core processor (8-core processor models are also available)			
Memory (Per Cntrler)	DDR4 ECC 8GB, up to 128GB (four DIMM slots, insert two DIMMs or more will boost performance)			
Host Connectivity (per Controller)	Host Card Slot 1 (optional): 4 x 16Gb FC (SFP+) ports 2 x 16Gb FC (SFP+) ports 4 x 10GbE iSCSI (SFP+) ports 2 x 10GbE iSCSI (RJ45) ports 4 x 1GbE iSCSI (RJ45) ports		Host Card Slot 2 (optional): 4 x 16Gb FC (SFP+) ports <sup>1</sup> 2 x 16Gb FC (SFP+) ports <sup>1</sup> 4 x 10GbE iSCSI (SFP+) ports <sup>1</sup> 2 x 10GbE iSCSI (RJ45) ports 4 x 1GbE iSCSI (RJ45) ports	
	Built-in 2 x 10GBASE-T iSCSI (RJ45) ports Built-in 1 x 1GbE management port			
Expansion Connectivity (per Controller)	Built-in 2 x 12Gb/s SAS wide ports (SFF-8644)			
Drive Type	Mix & match 3.5" & 2.5" SAS, NL-SAS, SED HDD 2.5" SAS, SATA <sup>2</sup> SSD			2.5" SAS, NL-SAS, SED HDD 2.5" SAS, SATA <sup>2</sup> SSD
Expansion Capabilities	Up to 10 expansion units using XD5300 series 12Gb SAS expansion enclosure XD5324 (LFF 24-bay), XD5316 (LFF 16-bay), XD5312 (LFF 12-bay), XD5326 (SFF 26-bay)			
Max. Drives Supported	624	616	612	626
Dimension (H x W x D)	19" Rackmount 170.3 x 438 x 515 mm	19" Rackmount 130.4 x 438 x 515 mm	19" Rackmount 88 x 438 x 515 mm	19" Rackmount 88 x 438 x 491 mm
Memory Protection	Cache-to-Flash module (optional) Battery backup module + Flash module (To protect all memory capacity) Super capacitor module + Flash module (To protect up to 16GB memory per controller)			
LCM	USB LCM (optional)			
Power Supply	80 PLUS Platinum, two redundant 770W (1+1) AC Input 100 - 127V 10A, 50-60Hz 200 - 240V 5A, 50-60Hz DC Output +12V 63.4A +5VSB 2.0A			
Fan Module	2 x hot pluggable/redundant fan modules			
Warranty	System : 3 years Battery backup module : 1 year ; Super capacitor module : 1 year			
Regulatory	CE, FCC, BSMI, VCCI, KCC			
Temperature	Operating temperature : 0 to 40°C Shipping temperature : -10°C to 50°C			
Relative Humidity	Operating relative humidity : 20% to 80% non-condensing Non-operating relative humidity : 10% to 90%			

<sup>1</sup> Slot 2 provides 20Gb bandwidth.

<sup>2</sup> 6Gb MUX board needed for 2.5" SATA drives in dual controller system.

# Software

## Operating System

- 64bit embedded Linux

## Storage Management

- RAID level 0, 1, 0+1, 3, 5, 6, 10, 30, 50, 60, and N-way mirror
- RAID EE level 5EE, 6EE, 50EE, and 60EE
- Flexible storage pool ownership
- Thin Provisioning (QThin) with space reclamation
- SSD Cache (QCache<sup>3</sup>)
- Auto Tiering (QTiering<sup>3</sup>)
- Global, local, and dedicated hot spares
- Write-through and write-back cache policy
- Online disk roaming
- Spreading RAID disk drives across enclosures
- Background I/O priority setting
- Instant RAID volume availability
- Fast RAID rebuild
- Online storage pool expansion
- Online volume extension
- Online volume migration<sup>4</sup>
- Auto volume rebuilding
- Instant volume restoration
- Online RAID level migration
- SED & ISE drive support
- Video editing mode for enhanced performance
- Disk drive health check and S.M.A.R.T. attributes
- Storage pool parity check and media scan for disk scrubbing
- SSD wear lifetime indicator
- Disk drive firmware batch update

## iSCSI Host Connectivity

- Proven QSOE 2.0 optimization engine
- CHAP & mutual CHAP authentication
- SCSI-3 PR (Persistent Reservation for I/O fencing) support
- iSNS support
- VLAN (Virtual LAN) support
- Jumbo frame (9,000 bytes) support
- Up to 256 iSCSI targets
- Up to 512 hosts per controller
- Up to 1,024 sessions per controller

## Fibre Channel Host Connectivity

- Proven QSOE 2.0 optimization engine
- FCP-2 & FCP-3 support
- Auto detect link speed and topology
- Topology supports point-to-point<sup>5</sup> and loop
- Up to 256 hosts per controller

## High Availability

- Dual-Active (Active/Active) SAN controllers
- Cache mirroring through NTB bus
- ALUA support
- Management port seamless failover
- Fault-tolerant and redundant modular components for SAN controller, PSU, FAN module, and dual port disk drive interface
- Dual-ported HDD tray connector
- Multipath I/O and load balancing support (MPIO, MC/S, Trunking, and LACP)
- Firmware update with zero system downtime

## Security

- Secured Web (HTTPS), SSH (Secure Shell)
- iSCSI Force Field to protect from mutant network attack
- iSCSI CHAP & mutual CHAP authentication
- SED & ISE drive support

## Storage Efficiency

- Thin Provisioning (QThin) with space reclamation
- Auto Tiering (QTiering<sup>3</sup>) with 3 levels of storage tiers

## Networking

- DHCP, Static IP, NTP, Trunking, LACP, VLAN, Jumbo frame (up to 9,000 bytes)

## Advanced Data Protection

- Snapshot (QSnap), block-level, differential backup
  - Writeable snapshot support
  - Manual or schedule tasks
  - Up to 64 snapshots per volume
  - Up to 64 volumes for snapshot
  - Up to 4,096 snapshots per system
- Remote Replication (QReplica)
- Asynchronous, block-level, differential backup based on snapshot technology
  - Traffic shaping for dynamic bandwidth controller
  - Manual or schedule tasks
  - Auto rollback to previous version if current replication fails
  - Up to 32 schedule tasks per controller
- Volume clone for local replication
- Configurable N-way mirroring
- Integration with Windows VSS (Volume Shadow Copy Service)
- Instant volume restoration
- Cache-to-Flash memory protection<sup>3</sup>
  - M.2 flash module
  - Power module: BBM (Battery Backup Module) or SCM (Super Capacitor Module)
- Support USB UPS and network UPS with SNMP management

## Virtualization Certification

- Server Virtualization & Clustering
- Latest VMware vSphere certification
- VMware VAAI for iSCSI & FC
- Windows Server 2016, 2012 R2 Hyper-V certification
- Microsoft ODX
- Latest Citrix XenServer certification

## Easy Management

- USB LCM<sup>3</sup>, serial console support, online firmware update
- Intuitive Web management UI, secured web (HTTPS), SSH (Secured Shell), LED indicators
- S.E.S. support, S.M.A.R.T. support, Wake-on-LAN, and Wake-on-SAS

## Green & Energy Efficiency

- 80 PLUS Platinum power supply
- Wake-on-LAN to turn on or wake up the system only when necessary
- Auto disk spin-down

## Host Operating Systems Support

- Windows Server 2008, 2008 R2, 2012, 2012 R2, 2016
- SLES 10, 11, 12
- RHEL 5, 6, 7
- CentOS 6, 7
- Solaris 10, 11
- FreeBSD 9, 10
- Mac OS X 10.11 or later

<sup>3</sup> The function is optional and is not included in the default package.

<sup>4</sup> The feature is based on RAID level migration of disk groups on the fly in thick provisioning pools.

<sup>5</sup> 16Gb Fibre Channel only supports Point-to-Point topology.



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