IBM System Storage EXP3500 Express

Low-cost, high-performance 6 Gbps SAS expansion units

Highlights

- Provide a highly available storage system by supporting attachment to the IBM DS3500 Express storage system

- Support high bandwidth and random I/O applications with 6 Gbps x4-wide SAS ports

- Support up to 36 TB of SAS disk storage in a single enclosure and up to 576 TB when fully expanded up to 192 drives

- Provide high-performance SAS, capacity-optimized SAS hard disk drives, self-encrypting drives (SEDs) and solid-state drives (SSDs) with intermixed support

- Help support continuous access to data for data availability 24×7 with redundant components

- Enhance data integrity with support of T10-PI protocol

The IBM® System Storage® EXP3500 Express consists of two models—EXP3512 and EXP3524 expansion units—designed to afford-ably meet the demanding data requirements of today and tomorrow by building on more than 30 years of design expertise. The IBM legacy in enterprise storage systems, with 6 Gbps SAS drive technology, enables the System Storage EXP3500 expansion units to deliver best-of-breed technology, reliability and performance. EXP3500 expansion units are 2U cabinet-mountable 6 Gbps drive enclosures that are designed to support either a total of twelve 3.5-inch SAS drives (EXP3512) or twenty-four 2.5-inch SAS drives (EXP3524) for optimal flexibility and efficiency. EXP3500 expansion units can be a key component of a high-performance storage solution. With each external SAS port on the environmental service module (ESM) supporting a 6 Gbps x4-wide connection, EXP3500 can achieve excellent throughput to the host.

With global commerce and 24×7 information available on demand, businesses require continuous access to information in order to be productive, competitive and able to ensure customer satisfaction. EXP3500 expansion units offer the assurance of high availability with redundant power supplies and ESMs, which help ensure that contact with the drives continues even in the rare instance of a component failure. With hot-swappable components, you can remove and replace ESMs, power supplies and drives with minimal or no downtime.

The struggle to manage escalating data volumes will not stop, even in a slow-growth economy. EXP3500 expansion units, with 6 Gbps SAS back-end technology, provide organizations with a seamless path to external storage—improving performance and scalability while lowering power consumption, all within a small footprint.

Gaining functionality comparable to Fibre Channel technology, 6 Gbps SAS builds on the solid foundation of 3 Gbps SAS while offering increased performance. It also offers reliability enhancements to support ever-increasing reliance on information while helping maintain the low price point to which organizations are accustomed. 2U cabinet-mountable 6 Gbps SAS EXP3500 expansion units are designed to support a range of SAS drives, from performance- to capacity-optimized drives, within a single expansion unit to meet a range of workload and application requirements.

Offered in two models, EXP3512 and EXP3524, these expansion units can be intermixed behind a single DS3500 with support for up to 192 total drives. Both of the expansion units offer their own unique value depending on your environment.

The EXP3512 expansion unit, with support for up to twelve 3.5-inch high-performance SAS, nearline SAS drives or SEDs, can offer the highest flexibility with support for a full range of requirements—high capacity (up to 36 TB) and low cost to high-performance critical applications. A single EXP3512 expansion unit can help ensure that workload demands are

assigned to the appropriate drive technology, allowing organizations to transparently tier storage without the high cost typically associated with this approach.

The EXP3524 expansion unit, which supports a total of twenty-four 2.5-inch high-performance SAS drives, nearline SAS drives, SEDs or SSDs, is ideal for input/output per second (IOPS) intensive applications and for energy efficiency requirements with the highest IOPS per watt and 134 percent improvement in IOPS per U compared to EXP3000 expansion units. EXP3524 can enable more drives per rack space and ultra-low power consumption. Utilizing 50 percent less power than larger drives, EXP3524 can accommodate twice as many drives in the same 2U of rack space.

Low power consumption, effective hardware utilization and cost were at the forefront when developing the EXP3500 expansion units. EXP3500 power supplies were designed to meet multiple power efficiency standards, such as the 80 PLUS certified power supply efficiency standard, enabling EXP3500 to reduce annual energy expenditures throughout the life of the enclosure.

Both of the EXP3500 expansion units can be a component of a high-performance storage solution with IBM System Storage DS3500. With each external SAS port on the ESM supporting a 6 Gbps x4-wide connection, these expansion units can achieve excellent throughput to the host. This can allow EXP3500 expansion units to effectively support data-intensive applications as part of an overall storage implementation.

EXP3500 expansion units provide the scalability support to help meet relentless data growth while providing the flexibility to meet a wide range of workload requirements. When data capacity demands call for it, EXP3512 and EXP3524 can cost-effectively support a "start small, grow big" strategy by connecting additional EXP3512 or EXP3524 expansion units—up to 192 drives when expanded behind the DS3500 storage system. This can provide investment protection with the assurance that DS3500 and EXP3500 expansion units can grow as your organization grows.

Data-on-demand is no longer an optional capability—it is what businesses require today. Constant access to data on EXP3500 expansion units is achieved with support of redundant power supplies and optional second ESMs to help ensure that contact with the drives continues even in the rare instance of an individual component failure. Four fans provide routine cooling, but only three are required to meet the operating specifications, providing an "N+1" strategy for dealing with a fan failure. With hot-swappable ESMs, drives and power supplies, components of EXP3512 and EXP3524 can be removed and replaced with minimal or no downtime.

Why IBM?

The struggle to manage escalating data capacities, performance and service level agreements is expected not only to continue, but to increase. EXP3512 and EXP3524 expansion units, with 6 Gbps SAS drive technology, can provide organizations with a seamless path to external storage—improving performance, storage efficiencies and total cost of ownership.

IBM System Storage EXP3500 Express at a glance

Part number	1746A2E – EXP3512 Express 1746A4E – EXP3524 Express
Drive interface	6 Gbps SAS
Supported drives	6 Gbps SAS 3.5-inch drives: • 300 GB, 450 GB and 600 GB 15k rpm • 2 TB and 3 TB 7.2k rpm nearline 6 Gbps SAS 2.5-inch drives: • 146 GB 15k rpm • 300 GB 10k rpm • 300 GB 15k rpm • 600 GB 10k rpm • 900 GB 10k rpm • 1 TB 7.2k rpm nearline • 300 GB 10k rpm SED Solid-state SAS 2.5-inch drives*: • 200 GB and 400 GB SSD
Maximum drives supported	EXP3512: twelve 3.5-inch drives; EXP3524: twenty-four 2.5-inch drives. Scalability up to 192 drives (optional mix of expansion enclosures)
Fans and power supplies	Dual
Rack support	Included standard
Warranty	Three-year limited warranty, CRU and onsite service, next business day 9×5, service upgrades available
Size	2U rack-optimized
Environment	Relative humidity – Operating range 20% – 80% Operating altitude – 30.5 m (100 ft) below sea level to 3,000 m (9,840 ft) above sea level
Heat output	EXP3512 – 945 BTU/hr.; EXP3524 – 821 BTU/hr.
Energy consumption efficiency*	80 PLUS efficiency standard

IBM System Storage EXP3500 Express features & benefits

Feature	Benefits
• **SAS expansion enclosures**	• Affordable entry point with midrange performance and reliability • 6 Gbps x4 wide SAS ports support high bandwidth and random I/O applications

• **Scalable up to 192 drives with a mix of EXP3512 and EXP3524 enclosures**	• Ability to start small and grow the configuration as storage demands change
	• A choice of EXP3512 and EXP3524 allows for flexibility to choose the optimal enclosure based on organizational requirement
	  – EXP3512 can offer the highest flexibility with support for a full range of requirements—high capacity and low cost to high-performance critical applications
	  – EXP3524 is ideal for IOPS-intensive applications and energy efficiency requirements with the highest IOPS/watt and 134 percent improvement in IOPS/U (compared to EXP3000 expansion unit)

• **Support for high-performance SAS, capacity-optimized SAS drives, SEDs and SSDs**	• Multiple drive support can increase efficiencies, which provides large consolidation and virtualization projects while keeping costs low • Support of SEDs enables relentless data protection • SSD support with EXP3524 can be used to improve application performance while simultaneously reducing power and cooling requirements
• **Redundant and hot-swappable ESMs, power supplies and drives**	• Key component of a highly available and reliable storage configuration • Support for constant access to data 24×7
• **Power supplies designed to meet multiple power efficiency standards**	• Power efficiencies meet green initiatives and reduce overall energy expenditures

IBM System Storage EXP3512 at a glance

Models	EXP3512 – 1746-E2A
Drive interface	6 Gbps SAS
Supported drives	6 Gbps SAS 3.5-inch drives: • 300 GB, 450 GB and 600 GB 15k rpm • 1 TB, 2 TB and 3 TB 7.2k nearline
Maximum drives supported	EXP3512: twelve 3.5-inch drives. Scalability up to 192 drives (mix of expansion enclosures)
Fans and power supplies	Dual
Rack support	Included standard
Warranty	Three-year parts and labor warranty, next business day 9×5, upgradable to 24×7 with four-hour response
Size	2U rack-optimized
Environment	Relative humidity – Operating range 20% – 80% Operating altitude – 30.5 m (100 ft) below sea level to 3,000 m (9,840 ft) above sea level
Heat output	EXP3512: 945 BTU/hr.
Energy consumption efficiency*	80 PLUS efficiency standard

IBM System Storage EXP3524 at a glance

Models	EXP3524 – 1746-E4A
Drive interface	6 Gbps SAS
Supported drives	6 Gbps SAS 2.5-inch drives: • 146 GB 15k rpm • 300 GB 10k rpm • 300 GB 15k rpm • 600 GB 10k rpm • 900 GB 10k rpm • 1 TB 7.2k rpm nearline • 300 GB 10k rpm SED Solid-state SAS 2.5-inch drives**: • 200 GB and 400 GB SSD
Maximum drives supported	EXP3524: twenty-four 2.5-inch drives. Scalability up to 192 drives (mix of expansion enclosures)
Fans and power supplies	Dual
Rack support	Included standard
Warranty	Three-year parts and labor warranty, next business day 9×5, upgradable to 24×7 with four-hour response
Size	2U rack-optimized
Environment	Relative humidity – Operating range 20% – 80% Operating altitude – 30.5 m (100 ft) below sea level to 3,000 m (9,840 ft) above sea level
Heat output	EXP3524 – 821 BTU/hr.
Energy consumption efficiency*	80 PLUS efficiency standard

For more information

To learn more about IBM System Storage EXP3500 expansion units, please contact your IBM representative or IBM Business Partner, or visit the following website: **ibm.com**/systems/storage/disk/exp3500

Additionally, IBM Global Financing can help you acquire the IT solutions that your business needs in the most cost-effective and strategic way possible. We'll partner with credit-qualified clients to customize an IT financing solution to suit your business goals, enable effective cash management, and improve your total cost of ownership. IBM Global Financing is your smartest choice to fund critical IT investments and propel your business forward. For more information, visit: **ibm.com**/financing