



# HPE MSA 2052 Storage Data Sheet



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## Content

Overview .....	2
Standard Features .....	3
Technical Specifications .....	9
Configuration and Order Information.....	11
Where to Buy .....	15
Source.....	15

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## Overview

The hybrid flash HPE MSA 2052 Storage system with the new Gen10 ProLiant Branding is designed for affordable application acceleration that is ideal for small and remote office deployments. But do not let the low cost fool you. The HPE MSA 2052 Storage system gives you the combination of simplicity, flexibility to grow now and into the future, and advanced features you may not expect to find in an entry-priced array. Start with 1.6 TB of flash capacity included and scale as needed with any combination of solid state disks (SSD), high-performance enterprise, or lower-cost midline SAS-based drives.

HPE MSA Storage has been the industry-leading entry storage Fibre Channel platform for the past eight years, with nearly 500,000 storage systems sold worldwide. Delivering performance in excess of 200,000 IOPS, the hybrid flash MSA 2052 Storage system can save you up to 40% with an all-inclusive software suite and 1.6 TB of flash capacity included. It's seriously simple and affordable flash storage to help you get the most performance for the lowest cost.

- HPE MSA 2052 performs in excess of 200,000 IOPS for affordable application acceleration
- Delivers 2x IOPS performance than the previous generation MSA 2042
- Save 40% on the hybrid flash MSA 2052 with all-inclusive software and 1.6 TB of SSD capacity included
  - Advanced data services with no experience required
- Easy to install, easy to use, easy to maintain—no storage expertise necessary
- Automated tiering dynamically responds to workload changes, so you don't have to
  - Keep your business running with expanded data protection features
- New virtualized snapshot technology makes data protection and instant recovery a snap
- Remote replication with FC and iSCSI supports affordable disaster recovery
  - Grow flexibly now and into the future
- Data-in-place upgrades protect drive investments and eliminate data migrations
- Start small and scale as needed with any combination of SSD, Enterprise or Midline SAS drives

**Figure 1 shows the MSA 2052 enclosure.**



## What's New in the MSA 2052 array family

- New I/O Workload tools in the User Interface to help users benefit from tiering on the MSA.
- New LDAP Support
- Introducing new HPE Storage File Controllers for file services.
- Introducing new support for Zerto Virtual Replication for hypervisor-based BC/DR solution

## Standard Features

<b>HPE MSA 2052 Storage</b>	
<b>Array</b>	
Access Type	Block
Form Factor	2U, SFF or LFF
Number of controllers per array	2
Number of host ports per array	8
FC host connectivity	8/16Gb
iSCSI host connectivity	1Gb or 10Gb
SAS host connectivity	6/12Gb
<b>Cache, per array</b>	
Max Read cache per array	8TB
Data (read/write) cache + system memory per array	16GB
Pool Capacity (with Large Pool Support)	562 TB (512 TiB)
RAID Levels supported: Virtual mode	RAID 1, 5, 6, 10
<b>Enclosures</b>	
Expansion Drive Enclosures	0-7 enclosures
LFF/SFF array/enclosure mixing	Supported
Maximum number of drives per array enclosure	24 SFF/12 LFF
Maximum number of drives per drive enclosure	24 SFF/12 LFF
Drive enclosure interface type	6Gb SAS
<b>Drives</b>	
Maximum total HDDs per array	192 SFF / 96 LFF
Maximum total SSDs per array	192 SFF / 96 LFF
Max raw capacity per array enclosure	76.8 TB SFF / 144TB LFF
Max raw capacity per drive enclosure	76.8 TB SFF / 144TB LFF
Max raw capacity per array	614.4TB SFF / 1152TB LFF
Integrated SSDs	2x800GB Mixed Use SSDs
<b>Drive Capacities</b>	
SFF SSDs (Mixed Use)	400GB, 800GB, 1.6TB, 3.2TB

LFF SSDs (Mixed Use)	400GB, 800GB
SFF HDDs	15K: 300GB, 600GB, 900GB 10K: 300GB, 600GB, 1.2TB, 1.8TB, 2.4TB 7.2K: 1.0TB, 2.0TB
LFF HDDs	7.2K: 2TB, 4TB, 6TB, 8TB, 10TB, 12TB
SEDs	Encryption not supported
<b>Software Features</b>	
Thin Technologies	Thin Provisioning, Space Reclamation, Thin Rebuild
Tiering	Performance Tier, Standard Tier, Archive Tier
Replication	Snapshots (512), Volume Copy, Remote Snaps
Quality of Service	Virtual Tier Affinity
Bundled/Integrated Licenses	Advanced Data Services LTU standard
<b>Additional Features</b>	
Maximum number of volumes	512
Maximum number of snapshots	512
Maximum number of hosts	512
Maximum number of initiators	1024
Customer self-installable	Yes
Customer self-repairable	Yes
Customer self-upgradeable	Yes
File Services	Yes HPE Storage File Controller

### MSA 2052 Storage Models

Descriptions	Part Number
HPE MSA 2052 SAN Dual Controller LFF Storage	<a href="#">Q1J02A</a>
NOTE: The MSA 2052 is a pre-configured bundle that includes an MSA 2050-branded LFF array chassis, two AC power supplies, two MSA 2050 SAN controllers, two 800GB Mixed Use SSDs, one Advanced Data Services LTU, two .7m PDU cords (IEC C14), and one rack-mount kit. The two 800GB SSDs are shipped integrated in the MSA 2050 array. The Advanced Data Services LTU is shipped with the MSA 2050 array and requires license activation. NOTE: SFPs not included.	
HPE MSA 2052 SAN Dual Controller SFF Storage	<a href="#">Q1J03A</a>
NOTE: The MSA 2052 is a pre-configured bundle that includes an MSA 2050-branded SFF array chassis, two AC power supplies, two MSA 2050 SAN controllers, two 800GB Mixed Use SSDs, one Advanced Data Services LTU, two .7m PDU cords (IEC C14), and one rack-mount kit. The two 800GB SSDs are shipped integrated in the MSA 2050 array. The Advanced Data Services LTU is shipped with the MSA 2050 array and requires license activation. NOTE: SFPs not included.	
HPE MSA 2052 SAS Dual Controller LFF Storage	<a href="#">Q1J30A</a>
NOTE: The MSA 2052 is a pre-configured bundle that includes an MSA 2050-branded LFF array chassis, two AC power supplies, two MSA 2050 SAS controllers, two 800GB Mixed Use SSDs, one Advanced Data Services LTU, two .7m PDU cords (IEC C14), and one	

rack-mount kit. The two 800GB SSDs are shipped integrated in the MSA 2050 array. The Advanced Data Services LTU is shipped with the MSA 2050 array and requires license activation.

NOTE: SFPs are not required for SAS Storage systems.

**HPE MSA 2052 SAS Dual Controller SFF Storage**

[Q1J31A](#)

NOTE: The MSA 2052 is a pre-configured bundle that includes an MSA 2050-branded SFF array chassis, two AC power supplies, two MSA 2050 SAS controllers, two 800GB Mixed Use SSDs, one Advanced Data Services LTU, two .7m PDU cords (IEC C14), and one rack-mount kit. The two 800GB SSDs are shipped integrated in the MSA 2050 array. The Advanced Data Services LTU is shipped with the MSA 2050 array and requires license activation.

NOTE: SFPs are not required for SAS Storage systems.

**All MSA 2052 models offer a common set of valuable features:**

- MSA 2052 storage system architecture maximizes performance
- Includes MSA 2050-branded SFF or LFF array chassis, depending on model
- Two MSA 2050 SAN or SAS controllers
- Four host ports per controller
- Each SAN controller supports 8 GB FC, 16 GB FC, 1GbE iSCSI or 10GbE iSCSI. Host connectivity
- Each SAS controller supports 6Gb and/or 12Gb SAS host connectivity
- 8 GB cache per controller.
- Battery-free cache backup with super capacitors and compact flash
- Two .7m PDU cords (IEC C14)
- One rack-mount kit
- Two 800GB Mixed Use SSDs
- One Advanced Data Services Software Suite LTU

**MSA 2050 SAN Controller allows customers to create their own Combo Controller by mixing FC and iSCSI SFPs.**

**Below are the valid configurations for mixing SFPs:**

**Configuration Table for mixing SFPs**

Configuration	Controller	Host Port 1 SFP <sup>1</sup>	Host Port 2 SFP <sup>1</sup>	Host Port 3 SFP <sup>2</sup>	Host Port 4 SFP <sup>2</sup>
<b>Dual SAN Controller</b>	Controller A	16Gb FC	16Gb FC	None	None
				16Gb FC	16Gb FC
				8Gb FC	8Gb FC
				10GbE iSCSI	10GbE iSCSI
				1GbE iSCSI	1GbE iSCSI
		8Gb FC	8Gb FC	None	None
				16Gb FC	16Gb FC
				8Gb FC	8Gb FC
				10GbE iSCSI	10GbE iSCSI
				1GbE iSCSI	1GbE iSCSI
		10GbE iSCSI	10GbE iSCSI	None	None
				10GbE iSCSI	10GbE iSCSI
				1GbE iSCSI	1GbE iSCSI

		1GbE iSCSI	1GbE iSCSI	None	None
				10GbE iSCSI	10GbE iSCSI
				1GbE iSCSI	1GbE iSCSI
	Controller B	Match Controller A	Match Controller A	Match Controller A	Match Controller A
<b>NOTES:</b>					
<sup>1</sup> SFP in Host Port 1 must match SFP in Host Port 2					
<sup>2</sup> SFP in Host Port 3 must match SFP in Host Port 4					

**All MSA 2052 models offer a common set of valuable features (cont):**

- MSA 2052 comes standard with two 800GB flash drives which allow IT managers to accelerate application performance
- The two 800GB SSDs can be optionally deployed either as read cache, or as an SSD virtual disk group for tiered storage.
  - Deploy the two embedded SSDs as Read Cache to improve random read performance. A maximum of 2 SSD's are supported per pool providing a maximum of 4TB of read cache per controller, max 8TB of read cache per array.
  - Deploy the two embedded SSDs as tiered storage. The MSA 2052 can manage up to three tiers of storage: Performance tier, Standard tier and Archive tier.
  - The Performance Auto Tiering License necessary to create an SSD virtual disk group for both read and write capabilities comes standard with all MSA 2052 models. No additional software license purchase is necessary.
- The two 800GB SSDs are shipped integrated (pre-installed) in the array chassis.
- All MSA 2052 models come standard with the Advanced Data Services (ADS) Software Suite LTU, which includes automatic tiering, 512 snapshots, and remote snaps for remote replication. The Advanced Data Services LTU requires license activation.
- Storage Management Utility V3 (SMU). This new MSA management GUI brings a new modern look and feel to array management.
- Thin Provisioning allows storage allocation of physical storage resources only once they are consumed by an application. Thin Provisioning also allows over-provisioning of physical storage pool resources allowing ease of growth for volumes without predicting storage capacity upfront.
- All models feature a wide variety of drives: High-performance SSD drives, enterprise-class SAS, and SAS Midline drives.
- The MSA 2052 will support a maximum of 7 disk enclosures (either LFF and/or SFF). Add-on enclosures can either be HPE MSA 2050 LFF Disk Enclosure or HPE MSA 2050 SFF Disk Enclosure.
- The MSA 2050 can grow incrementally to a maximum of 96 LFF, 192 SFF drives, or a combination of SFF and LFF enclosures up to the maximum of 8 total enclosures.
- Virtual Storage Disks Groups can be spanned across multiple enclosures.
- Virtual Storage RAID levels supported; 1, 5, 6, 10.
- Maximum hard drive counts vary by RAID levels: 2 drive max for RAID level 1; max of 16 drives for RAID levels 5, 6, and 10.
- Multiple Disk Groups can be aggregated into a single Storage Pool.
- The maximum LUN size is 140TB (128TiB)

- Storage Pools allow data on a given LUN to span across all drives in a pool. When capacity is added to a system, the user is also getting a performance benefit of the additional spindles.
- Snapshot enhancements for virtual storage, including performance improvements, hierarchical snapshots, and simplified resource management. Administrators can monitor and optionally control snapshot space usage.
- Prioritize data by assigning appropriate affinity level (Performance, No Affinity or Archive)
- Customers can configure 512 TiB capacity per virtual pool by enabling large pool support.
- Non-disruptive on-line controller code upgrade. Requires Multi-pathing software.
- Upgradable by design. Owners of an MSA 2040, MSA 2042 and MSA 1040 array are able to do data-in-place upgrades to the new MSA 2052 array. This unique ability protects the earlier investments in drives, and JBODs.
- Certain limitations are applicable. Please review the Upgrading to the HPE MSA 2050/2052 Technical Whitepaper before upgrading your MSA 2040, MSA 2042 or MSA 1040 systems
- StoreEasy 3850 Gateway support for block and file storage.

### Performance

MSA 2052 End-to-End Performance Results:

<b>MSA 2050 Array Performance <sup>1</sup></b>	<b>HPE MSA 2052 Converged SAN Controllers with HDDs</b>	<b>HPE MSA 2052 Converged SAN Controllers with Mixed Use SSDs</b>
Protocol (host connect)	16 Gb Fibre Channel	16 Gb Fibre Channel
<b>MSA 2050 RAID 1 SSD Performance Results <sup>2</sup></b>		
Random Reads (IOPs)		220,600
Random Writes (IOPs)		102,800
<b>MSA 2050 RAID 5 Performance Results <sup>3,4</sup></b>		
Segmented Sequential Reads (MB/s)	5,280	
Segmented Sequential Writes (MB/s)	4,650	

#### End-to-End performance notes

- 1 Performance results were generated using internal HPE test tools. Number and type of applications, drive type and number of drives, operating system used, and the number of hosts will affect overall performance. This table is provided strictly as a test-lab comparison.
- 2 Dual Controller configuration, (8) 400GB Mixed Use SSDs, RAID: 1, two drives per Disk Group; two Disk Groups per Pool, 2 volumes per Pool, block size: 8k, average latency under 5ms, Windows Server 2012 host, 16Gb FC direct connect to array.
- 3 Dual Controller configuration, (72) 15k HDD, RAID: 5, nine drives per Disk Group, 4 Disk Groups per Pool, 32 volumes per Pool, block size: 256k, average latency under 30ms, Windows Server 2012 host, 16Gb FC direct connect to array.
- 4 Sequential performance numbers were generated using segmented sequential workloads. For segmented sequential workloads with a queue depth greater than 1, each sequential stream is targeted to operate on a separate LBA range. Other types of sequential workloads that target specific LBA ranges may achieve higher results.



## End-to-End Performance Figures using Virtual Storage

HPE MSA 2050 End-to-End Performance Figures <sup>1</sup>								
Controller Model	HPE MSA 2050 SAN						HPE MSA 2050 SAS	
Host Protocol <sup>2</sup>	16 Gb FC		10 GbE iSCSI		1 GbE iSCSI		12 Gb SAS	
Drive Technology	HDD	SSD	HDD	SSD	HDD	SSD	HDD	SSD
<b>MSA 2050 RAID 10 Performance Results</b> <sup>3,4,5,11</sup> ** NOTE: RAID 1 was used for SSD testing.								
Random Reads IOPS	63,600	220,800	63,500	208,400	63,200	103,700	50,800	219,100
Random Writes IOPS	37,300	103,000	37,300	94,300	37,200	93,300	37,100	97,500
Random Mix 60/40 IOPS	47,600	142,100	46,600	133,000	46,800	130,500	44,500	138,800
Sequential Reads MB/s	5,350		5,350		880		5,350	
Sequential Writes MB/s	3,110		3,110		880		3,120	
<b>MSA 2050 RAID 5 Performance Results</b> <sup>6,7,12</sup>								
Random Reads IOPS	56,300	219,200	55,800	201,400	56,000	103,400	47,300	209,600
Random Writes IOPS	18,100	43,400	18,000	41,400	18,300	40,600	18,000	43,100
Random Mix 60/40 IOPS	29,100	80,000	29,200	75,400	28,700	73,900	28,000	78,700
Sequential Reads MB/s	5,290		5,280		880		5,290	
Sequential Writes MB/s	4,650		3,870		880		4,710	
<b>MSA 2050 RAID 6 Performance Results</b> <sup>8,9,10,13</sup>								
Random Reads IOPS	56,100	219,000	55,700	201,300	55,700	105,000	47,400	209,800
Random Writes IOPS	13,000	36,000	13,000	35,600	13,200	35,300	13,000	36,700
Random Mix 60/40 IOPS	21,400	72,200	21,200	68,500	21,300	67,300	21,300	71,500
Sequential Reads MB/s	5,550		5,530		880		5,560	
Sequential Writes MB/s	4,440		3,680		880		4,600	

NOTE: Number and type of applications, drive type and number of drives, operating system used, and the number of hosts will affect overall performance. This table is provided strictly as a test-lab comparison. These numbers reflect a full array configuration with the maximum number of front-end ports and controllers. The test results shown for the HPE MSA 2050 are designed to give a conservative reference point for comparisons.

1. Sequential tests (MB/s) are based on 256K block sizes and random tests (IOPS) are based on 8K block sizes run against the storage. For sequential workloads with a queue depth greater than 1, each sequential stream is targeted to operate on a separate LBA range. Other types of sequential workloads that target specific LBA ranges may achieve higher results. Results cannot be expected with a single host.

2. Fibre Channel results were measured using 16 Gb FC Host Bus Adapters. SAS results were measured using 12 Gb SAS Host Bus Adapters. 10 GbE iSCSI results were measured using 10GbE iSCSI Host Bus Adapters. 1 GbE iSCSI results were measured using 1GbE network interface controllers (NICs). Hosts were directly attached to the HPE MSA 2050 array.

3. MSA 2050 RAID 10 Hard Disk Drive (HDD) random results: Dual Controller configuration, (192) 15K HDD, 12 drives per disk group, 8 disk groups per pool, 8 volumes per pool.

4. MSA 2040 RAID 10 Hard Disk Drive (HDD) sequential read results: Dual Controller configuration, (96) 15K SAS HDDs, 12 drives per disk group, 4 disk groups per pool, 4 volumes per pool.
5. MSA 2040 RAID 10 Hard Disk Drive (HDD) sequential write results: Dual Controller configuration, (48) 15K SAS HDDs, 12 drives per disk group, 2 disk groups per pool, 4 volumes per pool.
6. MSA 2050 RAID 5 Hard Disk Drive (HDD) random results: Dual Controller configuration, (180) 15K HDD, 9 drives per disk group, 10 disk groups per pool, 10 volumes per pool.
7. MSA 2050 RAID 5 Hard Disk Drive (HDD) sequential results: Dual Controller configuration, (72) 15K HDD, 9 drives per disk group, 4 disk groups per pool, 4 volumes per pool.
8. MSA 2050 RAID 6 Hard Disk Drive (HDD) random results: Dual Controller configuration, (180) 15K HDD, 10 drives per disk group, 9 disk groups per pool, 9 volumes per pool.
9. MSA 2050 RAID 6 Hard Disk Drive (HDD) sequential read results: Dual Controller configuration, (80) 15K HDD, 10 drives per disk group, 4 disk groups per pool, 4 volumes per pool.
10. MSA 2050 RAID 6 Hard Disk Drive (HDD) sequential write results: Dual Controller configuration, (40) 15K HDD, 10 drives per disk group, 2 disk groups per pool, 4 volumes per pool.
11. MSA 2050 RAID 1 Solid State Drives (SSD) results: Dual Controller configuration, (8) SSDs, 2 SSDs per disk group, 2 disk groups per pool, 4 volumes per pool.
12. MSA 2050 RAID 5 Solid State Drives (SSD) results: Dual Controller configuration, (6) SSDs, 3 SSDs per disk group, 1 disk group per pool, 4 volumes per pool.
13. MSA 2050 RAID 6 Solid State Drives (SSD) results: Dual Controller configuration, (8) SSDs, 4 SSDs per disk group, 1 disk group per pool, 4 volumes per pool.

## Technical Specifications

<b>MSA 2052</b>	<b>Power requirements</b>	
	Input Power Requirements (typical-running I/O) SFF/LFF arrays	110VAC 3.32A, 344-390 W; 220VAC 1.61A, 374-432W
	Max Input Power	100-240 VAC, 50/60 Hz., 4.5-1.9A; 48-60 VDC 10.4A/8.3A
	Heat Dissipation	1622 BTU/hr
	<b>Temperature and humidity ranges</b>	
	Operating Temperature	41°F to 104°F (5°C to 40°C)
	Shipping Temperature	-40°F to 158°F (-40°C to 70°C)
	Operating Humidity	10% to 90% RH @ 104°F (40°C) non-condensing
	Non-Operating Humidity	Up to 93% RH @ 104°F (40°C)
	<b>Declared acoustic noise levels</b>	
	Sound Power	A weighted sound power LWAd=6,75 B

	Sound Pressure	A weighted sound pressure LpAm - 55dB
	<b>SHOCK AND VIBRATION</b>	
	Shock, Operational	3G's for 11 milliseconds
	Shock, Non-Operational	15G 11ms half sine
	Vibration, Operational	5-500Hz, 0.14 Grms shaped
	Vibration, Non-Operational	3-365-3Hz, 1.22 Grms,z-axis,0.85 Grms, X&Y axis shaped spectrum
	<b>Physical</b>	
	Height	3.5 in/ 8.9 cm
	Depth (excluding cables) (back of ear to back of controller handle)	SFF 24-bay array: 19.5 in / 49.5 cm LFF 12-bay array: 22.5in. / 57.2 cm
	Width (body only)	17.6 in / 44.7 cm (w/ ears 19 in / 48.26 cm)
	Weight (Includes chassis and 2 controllers. No drives)	LFF chassis: 40.6 lbs. SFF chassis: 38.7 lbs
<b>MSA 2052 Regulatory Info</b>	Safety	UL 60950-1 (USA)
		CAN/CSA-C22.2 No.60950-1-03 (Canada)
		EN 60950-1 (European Union)
		GS mark (Germany)
		IEC 60950-1 (International)
		CCC Mark (power supply only, China PRC)
	Electromagnetic Compatibility	VCCI:2008-04 Class A (Japan)
		FCC 15:109(g) Class A (USA)
		ICES-003:2004 Class A (Canada)
		EN55022: (European Union Class A); CISPR 22 (International Class A)
		EN61000-3- : (Harmonics) (European Union)
		EN61000-3-3: (Flicker) (European Union)
		EN 55024 (European Union, Immunity, Class A); CISPR 24 (International Immunity, Class A)
		AS/NZS CISPR 22, Class A (Australia, New Zealand)
		CNS 13438 Taiwan, Class A (Taiwan)
	KN22 Class A (Emissions Class A); KN24 (Immunity) (S Korea)	
	RoHS and WEEE	RoHS-6/6 Compliance, China RoHS, WEEE
	Country Approvals	United States, Australia/New Zealand, Canada, China (PRC), European Union, Germany (GS Mark), Japan, South Korea, Taiwan

## Configuration and Order Information

### Step 1 - MSA 2052 - Base Configurations

HPE MSA 2052 SAN Dual Controller LFF Storage	<a href="#">Q1J02A</a>
<p>NOTE: The MSA 2052 is a pre-configured bundle that includes an MSA 2050-branded LFF array chassis, two AC power supplies, two MSA 2050 SAN controllers, two 800GB Mixed Use SSDs, one Advanced Data Services LTU, two .7m PDU cords (IEC C14), and one rack-mount kit. The two 800GB SSDs are shipped integrated in the MSA 2050 array. The Advanced Data Services LTU is shipped with the MSA 2050 array and requires license activation.</p> <p>NOTE: SFPs not included.</p>	
HPE MSA 2052 SAN Dual Controller SFF Storage	<a href="#">Q1J03A</a>
<p>NOTE: The MSA 2052 is a pre-configured bundle that includes an MSA 2050-branded SFF array chassis, two AC power supplies, two MSA 2050 SAN controllers, two 800GB Mixed Use SSDs, one Advanced Data Services LTU, two .7m PDU cords (IEC C14), and one rack-mount kit. The two 800GB SSDs are shipped integrated in the MSA 2050 array. The Advanced Data Services LTU is shipped with the MSA 2050 array and requires license activation.</p> <p>NOTE: SFPs not included.</p>	
HPE MSA 2052 SAS Dual Controller LFF Storage	<a href="#">Q1J30A</a>
<p>NOTE: The MSA 2052 is a pre-configured bundle that includes an MSA 2050-branded LFF array chassis, two AC power supplies, two MSA 2050 SAS controllers, two 800GB Mixed Use SSDs, one Advanced Data Services LTU, two .7m PDU cords (IEC C14), and one rack-mount kit. The two 800GB SSDs are shipped integrated in the MSA 2050 array. The Advanced Data Services LTU is shipped with the MSA 2050 array and requires license activation.</p> <p>NOTE: SFPs are not required for SAS Storage systems.</p>	
HPE MSA 2052 SAS Dual Controller SFF Storage	<a href="#">Q1J31A</a>
<p>NOTE: The MSA 2052 is a pre-configured bundle that includes an MSA 2050-branded SFF array chassis, two AC power supplies, two MSA 2050 SAS controllers, two 800GB Mixed Use SSDs, one Advanced Data Services LTU, two .7m PDU cords (IEC C14), and one rack-mount kit. The two 800GB SSDs are shipped integrated in the MSA 2050 array. The Advanced Data Services LTU is shipped with the MSA 2050 array and requires license activation.</p> <p>NOTE: SFPs are not required for SAS Storage systems.</p>	

### Step 2 – Choose Your SFP+ Module

<b>SFP+ Modules</b>	HPE MSA 8Gb Short Wave Fibre Channel SFP+ 4-pack Transceiver (Includes four x 8Gb SW FC SFPs)	<a href="#">C8R23B</a>
	HPE MSA 16Gb Short Wave Fibre Channel SFP+ 4-pack Transceiver (Includes four x 16Gb SW FC SFPs)	<a href="#">C8R24B</a>
	HPE MSA 10Gb Short Range iSCSI SFP+ 4-pack Transceiver (Includes four x 10Gb SW iSCSI SFPs)	<a href="#">C8R25B</a>
	HPE MSA 1Gb RJ-45 iSCSI SFP+ 4-pack Transceiver (Includes four x 1Gb RJ-45 iSCSI SFPs)	<a href="#">C8S75B</a>

### Step 3 – Select Your Drives

MSA HDDs and SSDs drives are for use with MSA Storage Systems only.

Customers can mix SSD, SAS, and SAS MDL drives in the same array enclosure and disk enclosure

<b>SFF SSDs</b>	
<b>12G SFF SAS SSDs (Mixed Use)</b>	
HPE MSA 400GB 12G SAS Mixed Use SFF (2.5in) 3yr Warranty Solid State Drive	<a href="#">N9X95A</a>
HPE MSA 800GB 12G SAS Mixed Use SFF (2.5in) 3yr Warranty Solid State Drive	<a href="#">N9X96A</a>
HPE MSA 1.6TB 12G SAS Mixed Use SFF (2.5in) 3yr Warranty Solid State Drive	<a href="#">N9X91A</a>
HPE MSA 3.2TB 12G SAS Mixed Use SFF (2.5in) 3yr Warranty Solid State Drive	<a href="#">N9X92A</a>
<b>SFF HDDs</b>	
<b>12G SFF 15K SAS HDDs</b>	
HP MSA 300GB 12G SAS 15K SFF (2.5in) Enterprise 3yr Warranty Hard Drive	<a href="#">J9F40A</a>
HP MSA 600GB 12G SAS 15K SFF (2.5in) Enterprise 3yr Warranty Hard Drive	<a href="#">J9F42A</a>
HPE MSA 900GB 12G SAS 15K SFF (2.5in) Enterprise 3yr Warranty Hard Drive	<a href="#">Q1H47A</a>
<b>12G SFF 10K SAS HDDs</b>	
HP MSA 300GB 12G SAS 10K SFF(2.5in) Dual Port Enterprise 3yr Warranty Hard Drive	<a href="#">J9F44A</a>
HP MSA 600GB 12G SAS 10K SFF(2.5in) Dual Port Enterprise 3yr Warranty Hard Drive	<a href="#">J9F46A</a>
HP MSA 1.2TB 12G SAS 10K SFF(2.5in) Dual Port Enterprise 3yr Warranty Hard Drive	<a href="#">J9F48A</a>
HP MSA 1.8TB 12G SAS 10K SFF (2.5in) 512e Enterprise 3yr Warranty Hard Drive	<a href="#">J9F49A</a>
NOTE: 512e drives require MSA 1040/2040 firmware version GL200P002 or newer	
<b>12G SFF 7.2K SAS MDL HDDs</b>	
HP MSA 1TB 12G SAS 7.2K SFF (2.5in) 512e Midline 1yr Warranty Hard Drive	<a href="#">J9F50A</a>
HP MSA 2TB 12G SAS 7.2K SFF (2.5in) 512e Midline 1yr Warranty Hard Drive	<a href="#">J9F51A</a>
NOTE: 512e drives require MSA 1040/2040 firmware version GL200P002 or newer	
<b>LFF SSDs</b>	
<b>12G LFF SAS SSDs (Mixed Use)</b>	
HPE MSA 400GB 12G SAS Mixed Use LFF (3.5in) Converter Carrier 3yr Wty Solid State Drive	<a href="#">P9M79A</a>
HPE MSA 800GB 12G SAS Mixed Use LFF (3.5in) Converter Carrier 3yr Wty Solid State Drive	<a href="#">P9M80A</a>
<b>LFF HDDs</b>	
<b>12G LFF 7.2K SAS Midline Drives</b>	
HPE MSA 2TB 12G SAS 7.2K LFF (3.5in) 512n Midline 1 yr Warranty Hard Drive	<a href="#">N9X93A</a>
HPE MSA 4TB 12G SAS 7.2K LFF (3.5in) 512e Midline 1yr Warranty Hard Drive	<a href="#">K2Q82A</a>
HPE MSA 6TB 12G SAS 7.2K LFF (3.5in) 512e Midline 1yr Warranty Hard Drive	<a href="#">J9F43A</a>
HPE MSA 8TB 12G SAS 7.2K LFF (3.5in) 512e Midline 1yr Warranty Hard Drive	<a href="#">M0S90A</a>
HPE MSA 10TB 12G SAS 7.2K LFF (3.5in) Midline 512e 1 yr Wty Hard Drive	<a href="#">P9M82A</a>
HPE MSA 12TB 12G SAS 7.2K LFF (3.5in) Midline 512e 1yr Warranty Hard Drive	<a href="#">Q2R42A</a>
<b>SFF SEDs</b>	

<b>MSA Small Form Factor (SFF) SAS DP Self-Encrypted Drives</b>		
HPE MSA 1.2TB 12G SAS 10K SFF (2.5in) Enterprise Self Encrypted 3yr Wty Hard Drive		<a href="#">P9M81A</a>
<b>LFF SED</b>		
<b>MSA Large Form Factor (LFF) SAS DP Self-Encrypted Drives</b>		
HPE MSA 4TB 12G SAS 7.2K LFF (3.5in) Enterprise Self Encrypted 3 yr Wty Hard		<a href="#">Q1H48A</a>

#### Step 4 – Options

<b>Drive Enclosures</b>	HPE MSA 2050 LFF Disk Enclosure	<a href="#">Q1J06A</a>
	HPE MSA 2050 SFF Disk Enclosure <b>Note:</b> <ul style="list-style-type: none"> <li>· Each drive enclosure includes two 0.5m MiniSAS to MiniSAS cables</li> <li>· Add up to 7 additional drive enclosures</li> <li>· MSA 2050 LFF Disk Enclosure can be connected to either the MSA 2050 SFF or LFF dual controller systems.</li> <li>· HPE MSA 2050 SFF Disk Enclosure can be connected to either the MSA 2050 SFF or LFF dual controller systems.</li> </ul>	<a href="#">Q1J07A</a>
<b>SAS Cable</b>	HP External Mini SAS 1m Cable ALL	407337-B21
	HP External Mini SAS 2m Cable	407339-B21
<b>Power Cords</b>	HPE C13 - C14 WW 250V 10Amp 2.0m Jumper Cord	<a href="#">A0K02A</a>
	HPE C13 - C14 WW 250V 10Amp Flint Gray 2.0m Jumper Cord	AF573A
	HPE C13 - AS3112-3 AU 250V 10Amp 2.5m Power Cord	AF569A
	HPE C13 - BS-1363A UK/HK/SG 250V 10Amp 1.83m Power Cord	<a href="#">AF570A</a>
	HPE C13 - C14 WW 250V 10A Gray 0.7m Jumper Cord	A0K03A
	HPE C13 - C14 WW 250V 10A Gray 1.37m Jumper Cord	A0K04A
	HPE C13 - CEE-VII EU 250V 10Amp 1.83m Power Cord	AF568A
	HPE C13 - CEI-23-50 IT/CL 250V 10Amp 1.83m Power Cord	<a href="#">AF571A</a>
	HPE C13 - CNS-690 TW 110V 13Amp 1.83m Power Cord	AF561A
	HPE C13 - DK-2.5A DK 250V 10Amp 1.83m Power Cord	AF566A
	HPE C13 - GB-1002 CN 250V 10Amp 1.83m Power Cord	<a href="#">AF557A</a>
	HPE C13 - IRAM -2073 AR 250V 10A 2.5m Power Cord	AF558A
	HPE C13 - IS-1293 IN 240V 6Amp LV 2.0m Power Cord	AF562A
	HPE C13 - JIS C8303 JP 100V 12Amp 2.0m Power Cord	AF572A
	HPE C13 - KSC- 8305 KR 250V 10Amp 1.83m Power Cord	AF560A
	HPE C13 - NBR-14136 BR 250V 10Amp 1.83m Power Cord	AF591A
	HPE C13 - Nema 5-15P US/CA 110V 10Amp 1.83m Power Cord	<a href="#">AF556A</a>
	HPE C13 - SABS-164 ZA 250V 10Amp 2.5m Power Cord	AF567A
	HPE C13 - SEV 1011 CH 250V 10Amp 1.83m Power Cord	AF565A
	HPE C13 - SI-32 IL 250V 10Amp 1.83m Power Cord	AF564A
HPE C13-NEMA 6-15P 10A/250V 3.6m Black Power Cord	<a href="#">A0N33A</a>	
HPE OEM C13 - C14 WW 250V 10A Gray 3m Jumper Cord	A0K06A	

	<p>NOTE:</p> <ul style="list-style-type: none"> <li>Two PDU cables: one 142263-008 (Black) and one 1422633-013 (Grey), ship standard with all AC-powered enclosures.</li> </ul>
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**Step 5a - Choose Supported Options for Fibre Channel Infrastructure**

<b>PremierFlexOM4 cables</b>	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 5m Cable	<a href="#">QK734A</a>
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 15m Cable	QK735A
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 30m Cable	QK736A
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 50m Cable	<a href="#">QK737A</a>
	HP LC to LC Multi-mode OM3 2-Fiber 0.5m 1-Pack Fiber Optic Cable	AJ833A
	HP LC to LC Multi-mode OM3 2-Fiber 1.0m 1-Pack Fiber Optic Cable	AJ834A
	HPE LC to LC Multi-mode OM3 2-Fiber 2.0m 1-Pack Fiber Optic Cable	AJ835A
<b>OM3 FC LC-LC cables</b>	HP LC to LC Multi-mode OM3 2-Fiber 5.0m 1-Pack Fiber Optic Cable	<a href="#">AJ836A</a>
	HP LC to LC Multi-mode OM3 2-Fiber 15.0m 1-Pack Fiber Optic Cable	AJ837A
	HP LC to LC Multi-mode OM3 2-Fiber 30.0m 1-Pack Fiber Optic Cable	AJ838A
	HP LC to LC Multi-mode OM3 2-Fiber 50.0m 1-Pack Fiber Optic Cable	AJ839A

**Step 5b - Choose Supported Options For 10GbE Infrastructure**

<b>Mini SAS Cables</b>	
HPE 1.0m External Mini SAS High Density to Mini SAS Cable	716189-B21
HPE 2.0m External Mini SAS High Density to Mini SAS Cable	716191-B21
NOTE: These cables are used to connect 6Gb SAS initiator to MSA 2050 SAS controller. These are not used for connecting to a disk enclosure.	
HPE External 1.0m (3ft) Mini-SAS HD 4x to Mini-SAS HD 4x Cable	716195-B21
HPE External 2.0m (6ft) Mini-SAS HD 4x to Mini-SAS HD 4x Cable	<a href="#">716197-B21</a>
NOTE: These cables are used to connect 12Gb SAS initiator to MSA 2050 SAS controller. These are not used for connecting to a disk enclosure.	
HPE 4.0m External Mini SAS High Density to Mini SAS Cable	<a href="#">716193-B21</a>
NOTE: This cable is used to connect 6Gb SAS initiator to MSA 2050 SAS controller. This is not used for connecting to a disk enclosure.	
HPE External 4.0m (13ft) Mini-SAS HD 4x to Mini-SAS HD 4x Cable	716199-B21
NOTE: These cables are used to connect 12Gb SAS initiator to MSA 2050 SAS controller. These are not used for connecting to a disk enclosure	
<b>SAS Controllers/HBAs</b>	
HPE Smart Array E208e-p SR Gen10 (8 External Lanes/No Cache) 12G SAS PCIe Plug-in Controller	<a href="#">804398-B21</a>
HPE Smart Array P408e-p SR Gen10 (8 External Lanes/4GB Cache) 12G SAS PCIe Plug-in Controller	<a href="#">804405-B21</a>
HPE Smart Array P408e-m SR Gen10 (8 External Lanes/2GB Cache) 12G SAS Mezzanine Controller	<a href="#">804381-B21</a>
HPE H241 12Gb 2-ports Ext Smart Host Bus Adapter	<a href="#">726911-B21</a>
HPE Smart Array P441/4GB FBWC 12Gb 2-ports Ext SAS Controller	<a href="#">726825-B21</a>

SAS Switches	
HPE 6Gb SAS Switch Single Pack for HPE BladeSystem c-Class	<a href="#">BK763A</a>
HPE 6Gb SAS Switch Dual Pack for HPE BladeSystem c-Class	<a href="#">BK764A</a>

### Step 6 – Software

The MSA Advanced Data Services Software Suite comes standard on the MSA 2052. No optional software titles are available on the MSA 2052.

### Step 7 – Add File Services

HPE Storage File Controller	Q9D43A
NOTE: HPE Storage File Controllers have 4 x 1GbE ports and are pre-configured with Windows Storage Server 2016, which includes a software iSCSI initiator. Other connections require adding an HBA or adapter. Cluster up to eight file controllers for high availability and with transparent failover, enabling continuity of data access in the event of a failure.	

## Where to Buy

### Want to buy this series of products? please contact:

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