



## Smart Storage Solutions Overview

### Smart Storage Performance, Power, Security and Reliability

With the massive growth of data centers, performance, power and reliability are more important considerations than ever.

Performance requirements are driven by both the increased adoption of Flash-based SSDs and the increasing sizes of HDD arrays. Data centers are looking to take advantage of the performance that these Flash-based drives promise and require storage solutions that can deliver manageability and data availability without compromising performance.

Power is a significant component of a data center's operating expenses. Optimizing power for cold storage tiers in the data center, for example, delivers substantial benefits to the bottom line.

Data security has become one of the highest priorities for data centers and cloud computing environments as enterprises seek to safeguard customer information, classified company documentation and communications, financial records, employee payroll records and other confidential data.

As more mission-critical data finds its way to data centers, end customers insist on reduced downtime, improved response times to issues and a more positive end-user experience overall.

The Adaptec® SmartRAID 3100, SmartHBA 2100 and HBA 1100 product families are based on the company's latest 28 nm SmartROC 3100 and SmartIOC 2100 storage controller Integrated Circuits (ICs). The SmartRAID 3162-8i/e adapter includes maxCrypto™, the industry's only data-at-rest controller-based encryption solution, that provides a superior solution over self-encrypting drives.

Microchip's unified Smart Storage stack powers the entire family of products, leveraging core IP that has shipped in over 30 million servers, delivering one of the industry's most reliable and highest-performing storage controller software platforms.

### Technology Leadership With Data Encryption

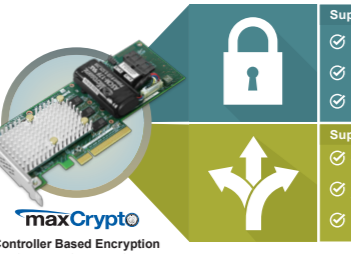
Solutions for data-at-rest encryption are now a security requirement in many market segments such as health care, finance, e-commerce, federal government branches and insurance—a significant overall percentage of the deployed storage.

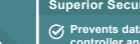
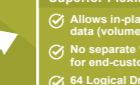
Data center managers face the challenge of safeguarding data while still meeting continually-increasing performance demands for large-scale applications, such as web serving, file serving, databases, Online Transaction Processing (OLTP), machine learning and High-Performance Computing (HPC).

Now available, the SmartRAID 3162-8i/e with maxCrypto, delivers data protection with little to no impact on latency or I/O performance. The 3162-8i/e offers superior advantages over Self-Encrypting Drives (SEDs) and integrates seamlessly into existing storage infrastructures, allowing data centers to deploy a uniform, scalable encryption strategy across the enterprise.

### Controller-Based Encryption

#### Value Proposition Versus Self-Encrypting Drives



	<b>Superior Security vs. SED</b> <ul style="list-style-type: none"> <li>Prevents data snooping between controller and drives</li> <li>Re-key support for wrapping keys or data volume keys</li> <li>Encrypted controller cache</li> </ul>
	<b>Superior Flexibility vs. SED</b> <ul style="list-style-type: none"> <li>Allows in-place encryption of existing data (volume remains available)</li> <li>No separate "special" (SED) drives for end-customers to manage</li> <li>64 Logical Drive support for flexible mapping to OS Users and Applications</li> </ul>

Controller Based Encryption  
Delivers Superior Security & Flexibility

### Support

Microchip is committed to supporting its customers in developing products faster and more efficiently. We maintain a worldwide network of field applications engineers and technical support ready to provide product and system assistance. For more information, please visit [www.microchip.com](http://www.microchip.com):

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### Training

If additional training interests you, Microchip offers several resources including in-depth technical training and reference material, self-paced tutorials and significant online resources.

- Overview of Technical Training Resources: [www.microchip.com/training](http://www.microchip.com/training)
- MASTERS Conferences: [www.microchip.com/masters](http://www.microchip.com/masters)
- Developer Help Website: [www.microchip.com/developerhelp](http://www.microchip.com/developerhelp)
- Technical Training Centers: [www.microchip.com/seminars](http://www.microchip.com/seminars)



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## Data Center Solutions



# MICROCHIP

## Adaptec® Product Guide

### Trusted Storage Solutions

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## Smart Storage Solutions Overview

### Each New Product Family Has Unique, Differentiating Features

#### SmartRAID 3100

The SmartRAID 3100 is optimized for Enterprise storage applications that require the highest level of data availability and data center applications that benefit from caching.

- Adapters with up to 24 ports using 28 nm SAS/SATA-optimized silicon, offering the industry's lowest power
- Zero Maintenance Cache Protection (ZMCP) with a cache size up to 4 GB with integrated cache backup circuitry for optimal cost, thermal performance and operating efficiency
- Board options without cache backup
- Mixed mode enables drives to be independently configured as raw drives or as part of a logical volume
- maxCache 4.0 included on 315x and 316x adapters
- maxCrypto controller-based encryption on the 3162-8i/e adapter

#### SmartHBA 2100

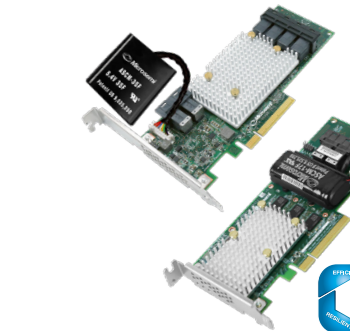
The SmartHBA 2100 is optimized for Software-Defined Storage (SDS) applications that require hardware RAID for OS boot drives as well as entry-level RAID for SMBs.

- The only basic hardware RAID solution offering a fully featured, high-performance Host Bus Adapter (HBA) for drives configured as raw drives, required for multi-path IO and SDS applications
- RAID levels 0, 1, 10, 5
- Industry's only basic hardware RAID solution with more than 8 ports
- Mixed mode enables drives to be independently configured as raw drives or as part of a logical volume

#### HBA 1100

The HBA 1100 is optimized for SDS, cold storage, and raw high-performance connectivity.

- Adapters with up to 24 ports using 28 nm SAS/SATA-optimized silicon, offering the industry's lowest power
- Support for host-managed and host-aware Shingled Magnetic Recording (SMR) drives
- Broad OS driver support, including inbox driver support
- Performance of up to 1.7M IOPS





## SmartRAID

### SmartRAID 3100 RAID Adapters

Adaptec 12 Gbps SmartRAID 3100 adapters have an 8-lane PCIe® Gen 3 host bus interface, a SmartROC 3100 processor, an MD2 low-profile form factor, and can be scaled to a maximum of 256 SAS/SATA devices\*. The newest addition, the SmartRAID 3162-8i/e, provides the industry's only data-at-rest controller-based encryption solution, maxCrypto. Supporting operating systems include include Microsoft Windows®, Red Hat, SUSE, Fedora, Debian, Ubuntu, Sun Solaris, FreeBSD, VMware ESXi, open-source Linux® drivers and inbox drivers.

Product	Part Number	RAID Levels	SAS/SATA Ports	Connectors	Cache	SSD Cache	Cache Protection
SmartRAID 3162-8i	2299800-R	Hardware RAID 0, 1, 5, 6, 10, 50, 60, 1 ADM and 10 ADM	8 internal	2 (x4) SFF-8643	2 GB DDR4/2100 MHz	maxCache 4.0	Embedded Flash backup On board ASCM-17F supercap
SmartRAID 3162-8i /e	2299600-R		8 internal	2 (x4) SFF-8643	2 GB DDR4/2100 MHz	maxCache 4.0	Embedded Flash backup On board ASCM-17F supercap
SmartRAID 3154-24i	2294700-R		24 internal	6 (x4) SFF-8643	4 GB DDR4/2100 MHz	maxCache 4.0	Embedded Flash backup Tethered ASCM-35F supercap
SmartRAID 3154-8i16e	2294600-R		8 internal/ 16 external	2 (x4) SFF-8643 4 (x4) SFF-8644	4 GB DDR4/2100 MHz	maxCache 4.0	Embedded Flash backup Tethered ASCM-35F supercap
SmartRAID 3154-16i	2295000-R		16 internal	4 (x4) SFF-8643	4 GB DDR4/2100 MHz	maxCache 4.0	Embedded Flash backup Tethered ASCM-35F supercap
SmartRAID 3154-8i8e	2295100-R		8 internal/ 8 external	2 (x4) SFF-8643 2 (x4) SFF-8644	4 GB DDR4/2100 MHz	maxCache 4.0	Embedded Flash backup Tethered ASCM-35F supercap
SmartRAID 3154-8e	2290800-R		8 external	2 (x4) SFF-8644	4 GB DDR4/2100 MHz	maxCache 4.0	Embedded Flash backup Tethered ASCM-35F supercap
SmartRAID 3154-8i	2291000-R		8 internal	2 (x4) SFF-8643	4 GB DDR4/2100 MHz	maxCache 4.0	Embedded Flash backup Tethered ASCM-35F supercap
SmartRAID 3152-8i	2290200-R		8 internal	2 (x4) SFF-8643	2 GB DDR4/2100 MHz	maxCache 4.0	Embedded Flash backup Tethered ASCM-35F supercap
SmartRAID 3102-8i	2294800-R		8 internal	2 (x4) SFF-8643	2 GB DDR4/2100 MHz	NA	NA
SmartRAID 3151-4i	2294900-R	4 internal	1 (x4) SFF-8643	1 GB DDR4/2100 MHz	maxCache 4.0	Embedded Flash backup Tethered ASCM-35F supercap	
SmartRAID 3101-4i	2291700-R	4 internal	1 (x4) SFF-8643	1 GB DDR4/2100 MHz	NA	NA	
SmartRAID 3102E-8i	2304200-R	0, 1, 1 ADM, 10, 10 ADM	8 internal	2 (x4) SFF-8643	2 GB DDR4/2100 MHz	NA	NA
SmartRAID 3101E-4i	2304400-R	0, 1, 1 ADM, 10, 10 ADM	4 internal	1 (x4) SFF-8643	1 GB DDR4/2100 MHz	NA	NA

\*238 SSD/HDD maximum. Remaining device count is reserved for expanders and enclosure management.

## SmartRAID

### SmartHBA and Host Bus Adapters (HBA)

Adaptec 12 Gbps HBAs have an 8-lane PCIe Gen 3 host bus interface, a SmartIOc 2100 processor, an MD2 low-profile form factor, and can be scaled to a maximum of 256 SAS/SATA devices\*. In addition, the SmartHBA 2100 series uniquely combines the capabilities of a full-featured HBA, with those of a basic hardware RAID adapter. Supporting operating systems include Microsoft Windows, Red Hat, SuSE, CentOS, Ubuntu, VMware ESXi, FreeBSD, Solaris and Citrix Xen Server.

### SmartHBA 2100 Host Bus Adaptor Specifications

Product	Part Number	Dimensions	SAS/SATA Ports	Connectors	RAID Levels	Caching
SmartHBA 2100-24it	2301600-R	2.535" H x 6.6" L (64 mm x 167 mm)	24 internal	6 (x4) SFF-8643	Hardware RAID 0, 1, 10, 5	NA
SmartHBA 2100-16i	2302100-R	2.535" H x 6.6" L (64 mm x 167 mm)	16 internal	4 (x4) SFF-8643		
SmartHBA 2100-8i8e	2301900-R	2.535" H x 6.6" L (64 mm x 167 mm)	8 internal/8 external	2 (x4) SFF-8643/2 (x4) SFF-8644		
SmartHBA 2100-8i	2290400-R	2.535" H x 6.6" L (64 mm x 167 mm)	8 internal	2 (x4) SFF-8643		
SmartHBA 2100 4i4e	2292200-R	2.535" H x 5.2" L (64 mm x 132.08 mm)	4 internal/4 external	1 (x4) SFF-8643/1 (x4) SFF-8644		
<b>*238 SSD/HDD maximum. Remaining device count is reserved for expanders and enclosure management.</b>						

### HBA 1100 Host Bus Adapters

Product	Part Number	Dimensions	SAS/SATA Ports	Connectors
HBA 1100-24i	2293800-R	2.535" H x 6.6" L (64 mm x 167 mm)	24 internal	6 (x4) SFF-8643
HBA 1100-16i	2293500-R	2.535" H x 6.6" L (64 mm x 167 mm)	16 internal	4 (x4) SFF-8643
HBA 1100-16e	2293600-R	2.535" H x 6.6" L (64 mm x 167 mm)	16 external	4 (x4) SFF-8644
HBA 1100- 8i8e	2293700-R	2.535" H x 6.6" L (64 mm x 167 mm)	8 internal/8 external	2 (x4) SFF-8643/2 (x4) SFF-8644
HBA 1100-8i	2293200-R	2.535" H x 6.6" L (64 mm x 167 mm)	8 internal	2 (x4) SFF-8643
HBA 1100-8e	2293300-R	2.535" H x 6.6" L (64 mm x 167 mm)	8 external	2 (x4) SFF-8644
HBA 1100-4i	2293400-R	2.535" H x 5.2" L (64 mm x 132.08 mm)	4 internal	1 (x4) SFF-8643

\*238 SSD/HDD maximum. Remaining device count is reserved for expanders and enclosure management.

## SmartHBA

### Series 8 RAID Adapters

Adaptec 12 Gbps RAID Adapters have an 8-lane PCIe Gen3 host bus interface, a 12 Gbps RoC processor, a MD2 low-profile form factor, and can be scaled to a maximum of 256 SAS/SATA devices\*. Supporting operating systems include Microsoft Windows, Red Hat Linux, SUSE Linux, Fedora, Debian Linux, Ubuntu Linux, Sun Solaris, FreeBSD and VMware ESXi.

Product	Part Number	RAID Levels	SAS/SATA Ports	Connectors	Cache	SSD Cache	Cache Protection
RAID 81605ZQ	2281600-R	Hardware RAID 0, 1, 1E, 5, 6, 10, 50, 60	16 internal	4 internal SFF-8643	1024 MB	maxCache 3.0	Flash backup embedded AFM-700 Supercap (included)
RAID 8885Q	2277100-R		8 internal 8 external	2 internal SFF-8643/ 2 external SFF-8644	1024 MB	maxCache 3.0	AFM-700 (included)
RAID 81605Z	2287101-R	Hybrid RAID 1, 10	16 internal	4 internal SFF-8643	1024 MB	NA	Flash backup embedded AFM-700 Supercap (included)
RAID 8885	2277000-R		8 internal 8 external	2 internal SFF-8643/ 2 external SFF-8644	1024 MB	NA	AFM-700 (optional) 2275400-R
RAID 8805	2277500-R	Hybrid RAID 0, 1, 10	8 internal	2 internal SFF-8643	1024 MB	NA	AFM-700 (optional) 2275400-R
RAID 8405	2277600-R		4 internal	1 internal SFF-8643	1024 MB	NA	AFM-700 (optional) 2275400-R
RAID 8805E	2294001-R		8 internal	2 internal SFF-8643	512 MB	NA	NA
RAID 8405E	2293901-R	4 internal	1 internal SFF-8643	512 MB	NA	NA	

\*238 SSD/HDD maximum. Remaining device count is reserved for expanders and enclosure management.

### SAS Expander Card

Product	Part Number	Ports	Connector	Form Factor	Dimensions	PCIe® Slot Power	Auxiliary Power Connector
82885T	Single: 2283400-R	28 internal/ 8 external	7 x SFF-8643, 2 x SFF-8644	MD2-low profile	2.535" H x 6.6" L (64 mm x 167 mm)	Through PCIe x4 interface	Yes

## Cables

### Internal Cables

Supported Products	12 Gbps Internal		6 Gbps Internal		
	Connector to End Device				
Internal SmartRAID 3162 -8i SmartRAID 3162-8i SmartRAID 3162-8ie SmartRAID 3154-8i16e SmartRAID 3154-8i8e SmartRAID 3154-24i SmartRAID 3154-16i SmartRAID 3154-8i SmartRAID 3152-8i SmartRAID 3102-8i SmartRAID 3151-4i SmartHBA 2100-8i8e SmartHBA 2100-4i4e SmartHBA 2100-24i SmartHBA 2100-16i SmartHBA 2100-8i	SFF-8643	SFF-8087	SFF-8482	SATA	SATA right angle
	SFF-8643 right angle	ACK-I-rA-HDmSAS-HDmSAS	ACK-I-rA-HDmSAS-mSAS	ACK-I-rA-HDmSAS-4SAS-SB	ACK-I-rA-HDmSAS-4SATA-SB
	SFF-8643	ACK-I-HDmSAS-HDmSAS	ACK-I-HDmSAS-m	ACK-I-HDmSAS-4SAS-SB	ACK-I-HDmSAS-4SATA-SB
Part # .5 meter: 2282500-R Part # .5 meter: 2281300-R Part # .8 meter: 2279600-R Part # .8 meter: 2280000-R Part # .8 meter: 2279900-R					
Part # 1 meter: 2282800-R Part # .8 meter: 2280200-R					
Part # 1 meter: 2282100-R Part # 1 meter: 2279700-R					
Part # .5 meter: 2282200-R Part # .5 meter: 2281200-R Part # .8 meter: 2280100-R Part # .8 meter: 2279800-R					

### External Cables

Supported Products	12 Gbps Internal		6 Gbps Internal
	Connector to End Device		
External HBA 1100-16e HBA 1100-8i8e HBA 1100-8e ASR-8885Q ASR-8885 ASR-78165 ASR-71685	SFF-8644 External		SFF-8088 External
	SFF-8644		ACK-E-HDmSAS-mSAS

### Make the Right Connection With Adaptec 12 Gbps and 6 Gbps SAS HD Cables

Adaptec SmartRAID 3100, SmartHBA 2100, HBA 1100 and Series 8/8C/8E RAID adapters are configured with mini-SAS HD connectors to allow for maximum performance and connectivity in a MD2 low-profile form factor. Pick the right cable for your internal or external storage solution.