## 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



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:

- Technical Support: www.microchip.com/support
- Evaluation samples of any Microchip device: www.microchip.com/sample
- Knowledge base and peer help: www.microchip.com/forums
- Sales and Global Distribution: www.microchip.com/sales

### 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
- MASTERs Conferences: www.microchip.com/masters
- Developer Help Website: www.microchip.com/developerhelp
- Technical Training Centers: www.microchip.com/seminars

## Adaptec® Product Guide
Trusted Storage Solutions

## 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
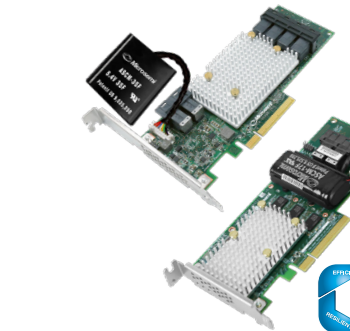- maxCrypto controller-based encryption on the 3162-8i/e adapter

### 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





Microchip Technology Inc. | 2355 W. Chandler Blvd. | Chandler AZ, 85224-6199    **www.microchip.com**

## 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 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 | 2294800-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 | Embedded Flash backup Tethered ASCM-35F supercap |
| SmartRAID 3151-4i | 2294900-R | | 4 internal | 1 (x4) SFF-8643 | 1 GB DDR4/2100 MHz | NA | 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.

## 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 2100-24i | 2301600-R | 2.535" H × 6.6" L (64 mm × 167 mm) | 24 internal | 6 (x4) SFF-8643 | Hardware RAID 0, 1, 10, 5 | NA |
| SmartHBA 2100-16i | 2302100-R | 2.535" H × 6.6" L (64 mm × 167 mm) | 16 internal | 4 (x4) SFF-8643 | | |
| SmartHBA 2100-8i8e | 2301900-R | 2.535" H × 6.6" L (64 mm × 167 mm) | 8 internal/8 external | 2 (x4) SFF-8643/2 (x4) SFF-8644 | | |
| SmartHBA 2100-8i | 2290400-R | 2.535" H × 6.6" L (64 mm × 167 mm) | 8 internal | 2 (x4) SFF-8643 | | |
| SmartHBA 2100-4i4e | 2292200-R | 2.535" H × 5.2" L (64 mm × 132.08 mm) | 4 internal/4 external | 1 (x4) SFF-8643/1 (x4) SFF-8644 | | |

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

### HBA 1100 Host Bus Adapters

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

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

## 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 Hybrid RAID 1, 10 | 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 | | 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 | | 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 | Hardware RAID 0, 1, 10 Hybrid RAID 1, 10 | 8 internal | 2 internal SFF-8643 | 512 MB | NA | NA |
| RAID 8405E | 2296901-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 × SFF-8643, 2 × SFF-8644 | MD2-low profile | 2.535" H × 6.6" L (64 mm × 167 mm) | Through PCIe ×4 interface | Yes |

## Internal Cables

**Supported Products**
SmartRAID 3162-8i
SmartRAID 3162-8i/e
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
SmartRAID 3101-4i
SmartRAID 3102E-8i
SmartRAID 3101E-4i
SmartHBA 2100-24i
SmartHBA 2100-16i
SmartHBA 2100-8i8e
SmartHBA 2100-8i
SmartHBA 2100-4i4e
HBA 1100-24i
HBA 1100-16i
HBA 1100-8i
HBA 1100-4i
ASR-81605Z
ASR-81605ZQ
ASR-8405
ASR-8805E
ASR-8885Q
ASR-8885
ASR-8805

**12 Gbps Internal** — Connector to End Device: SFF-8643, SFF-8087, SFF-8482, SATA, SATA right angle
**6 Gbps Internal**
Connector to Adapter: SFF-8643 right angle, ACK-I-HDmSAS-HDmSAS, ACK-I-HDmSAS6-mSAS SAS, ACK-I-HDmSAS-4SAS-SB, ACK-I-HDmSAS-4SATA-SB, ACK-I-HDmSAS-4x6SATA-SB

Part # 1 meter: 2282800-R Part # .8 meter: 2280200-R
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
ACK-I-HDmSAS-HDmSAS, ACK-I-mSAS-mSAS, ACK-I-HDmSAS-6SAS-SB, ACK-I-HDmSAS-4SATA-SB

Part # 1 meter: 2282100-R Part # 1 meter: 2279700-R
Part # .8 meter: 2282200-R Part # .5 meter: 2281200-R Part # .8 meter: 2280700-R Part # .8 meter: 2279700-R

## External Cables

**Supported Products**
HBA 1100-16e
HBA 1100-8i8e
HBA 1100-8e
ASR-8885Q
ASR-8885
ASR-78165
ASR-71685

**12 Gbps Internal**
Connector to End Device: SFF-8644 External
**6 Gbps Internal**: SFF-8088 External
Connector to Adapter: ACK-E-HDmSAS-HDmSAS, 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 8/8Q/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.