



# **Adaptec Series 8 RAID Adapters**

**University Training Module**

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## Introduction

Adaptec Series 8 RAID adapters support both SATA and SAS devices, provide up to 150% of the bandwidth of the previous generation of RAID adapters, and offer unique features such as mini-SAS-HD connectors, auto configuration, maxCache 3.0 SSD read- and write- caching, and Zero Maintenance Cache Protection.

All Series 8 RAID adapters are ideal for bandwidth-intensive storage applications like NAS, online transaction processing servers (OLTP), web servers, digital surveillance and streaming applications.

Read on to learn about the features of the Series 8 RAID adapter families. At the completion of this module, you should be able to:

- Identify and explain the basics of the new RAID adapter features included in Adaptec Series 8.
- Identify which Adaptec Series 8 RAID adapter models support which RAID levels.
- Understand how many internal and external connectors each Adaptec Series 8 RAID adapter model has.
- Identify which Adaptec Series 8 RAID adapter models include maxCache 3.0 and which include Zero-maintenance Cache Protection.
- Understand the basic differences between Adaptec Series 7 and Series 8 RAID adapters.

## Adaptec RAID Adapters: A Quick Review

**Note:** You can find more information about many of these features in other Adaptec Training Modules on the Microsemi Web site at [www.microsemi.com](http://www.microsemi.com).

Adaptec Series 8 and Series 7 RAID adapters include these features:

- Adaptec maxCache read and write caching (available on 'Q' models only)
- Zero-maintenance Cache Protection, or ZMCP (not available on all models)
- Hybrid RAID
- Intelligent Power Management
- Automatic simple volume and HBA configuration (see *Adaptec Flexible Configuration on page 3*)
- Performance modes that optimize performance based on how a RAID adapter is being used:
  - Dynamic mode—(Default) The performance mode adjusts automatically based on usage, RAID level, and drive type.
  - OLTP mode—RAID adapter performance is optimized for transaction-oriented applications, such as data entry and retrieval.
  - Big Block Bypass mode—RAID adapter performance is optimized for Web page and file serving, and for data retrieval. In Big Block Bypass mode, the write cache is bypassed based on I/O write size.
- Storage management tools:
  - Adaptec maxView Storage Manager (MSM)
  - Adaptec RAID Controller Configuration (ARCCONF), a command line utility
  - Adaptec RAID Configuration utility, a BIOS-based utility with uEFI BIOS support on uEFI-capable motherboards; includes the Array Configuration Utility (ACU).

- Key software features:
  - Array migration support, so that you can migrate an array from one RAID level to another (some limitations apply)
  - Audible alarm
  - Automatic failover support, so arrays are automatically rebuilt when a failed drive is replaced (applies to redundant arrays in SES2- or SAF-TE-enabled disk drive enclosures only)
  - Background initialization, which lets you use an array while it's being initialized
  - Battery backup (not available on all RAID adapter models; additionally, some RAID adapter models feature ZMCP instead of a backup battery unit)
  - Bootable array support
  - Configurable stripe size
  - Copyback Hot Spare support
  - Disk drive hot-swapping
  - Dynamic sector repair, which allows the RAID adapter to recover from disk drive errors that would normally cause a degraded array
  - Enclosure support for disk drive enclosures with SES2 enclosure management hardware
  - Event logging and broadcasting including email and SNMP messages
  - Flash ROM for updates to adapter firmware, BIOS, and the Adaptec RAID Configuration utility
  - Hot spare (global and dedicated) support
  - I/O statistics logging
  - Native command queuing (NCQ), which lets disk drives arrange commands into the most efficient order for optimum performance
  - Online capacity expansion, so you can increase the capacity of a logical drive without recreating it (some limitations apply)
  - Optimized disk utilization, which ensures that the full capacity of all disk drives can be used, even if the disk drives vary in size
  - Quick initialization
  - S.M.A.R.T. support
  - Staggered drive spin-up

## What's New in Adaptec Series 8?

### maxCache 3.0 Read and Write SSD Caching

Introduced with Series 7 RAID adapters and further improved with Series 8, maxCache 3.0 Read and Write SSD caching uses SSDs to cache copies of frequently accessed data and writes to a redundant SSD cache pool (either RAID 1, 1E, or RAID 5) to improve performance in read- and/or write-intensive applications.

maxCache 3.0 also features Optimized Disk Utilization (ODU), which allows the SSD to be partitioned into both a cache pool (for read/write caching) and a logical device that can be used to install an operating system or store other data that requires fast, low-latency access.

**Note:** [Learn more about maxCache 3.0 in the Microsemi Adaptec University Training Module, \*Introduction to maxCache SSD Caching\*.](#)

### Improved Performance

Adaptec Series 8 RAID adapters provide improved performance over previous-generation RAID adapters, in terms of sequential read and write speeds on parity RAID 5:

- Up to 12 Gb/sec throughput
- Up to 6.6 Gb/sec sequential read speed
- Up to 5.2 Gb/sec sequential write speed

When paired with direct-connected 12-Gb/sec solid-state drives (SSDs), Series 8 RAID adapter can support up to 700,000 IOPS, which is 1.5 times the performance of Series 7 RAID adapters.

**Note:** Series 8 RAID adapters will perform at full speed (up to 12 Gb/sec) when they are paired with 12-Gb/sec devices. Adapter performance may be limited by device speed if the RAID adapter is paired with 6-Gb/sec devices.

## Embedded Flash Backup

Third-generation ZMCP is available for Adaptec Series 8 RAID adapters as an optional Adaptec Flash Module (AFM-700) and is pre-installed on the Series 8Q RAID adapter models.

Typically, ZMCP comprises a supercapacitor that's installed separately inside the server and connected to the RAID adapter, and a flash memory daughterboard that is mounted on the RAID adapter.

New with Series 8, the flash memory and control circuitry is embedded on the RAID adapter, instead of on a daughterboard, for more integrated cache protection. (Currently, embedded flash backup is available only on the Adaptec 81605ZQ.)

## Adaptec Flexible Configuration

Series 8 RAID adapters include Adaptec Flexible Configuration, originally introduced with Series 7 and updated for Series 8. Flexible Configuration includes two key features:

- **Support for drives in varying functional states**—In addition to supporting arrays and simple volumes, adapters with Flexible Configuration simultaneously support physical drives in three states: raw (same as factory-fresh), ready (initialized), and member (part of a RAID array or logical drive).
- **Four operational modes instead of one**—You can use the adapter in any of these four modes:
  - RAID Show Raw Mode—The adapter functions as a traditional RAID adapter and shows any raw drive to the operating system.
  - RAID Hide Raw Mode—The adapter functions as a traditional RAID adapter and hides any raw drive from the operating system.
  - Auto-Volume (AV) Mode—The adapter functions as a traditional RAID adapter; however, any brand-new or uninitialized drive that is connected to it is automatically converted into a simple volume. No user intervention is required.
  - Host Bus Adapter (HBA) Mode—The adapter operates as a standard host bus adapter (HBA).

When combined, these two features provide flexibility to system designers and automate many manual set-up and maintenance tasks.

You can use Adaptec RAID Controller Configuration utility (ARCCONF) to set the Flexible Configuration mode that best meets your needs.

**Note:** Learn more about the features and benefits of Flexible Configuration by reading the Adaptec University Training Module, *Adaptec Flexible Configuration*.

## High Port Count and Mini-SAS-HD Connectors

Introduced on Series 7 RAID adapters, mini-SAS-HD connectors give you greater flexibility and more configuration options by supporting a high number of SAS/SATA ports on one RAID adapter. Depending on which model you choose, you can directly connect up to 16 devices to a low-profile Series 8 RAID adapter without using an expander. (Series 8 RAID adapters come with either 8 or 16 SAS/SATA ports.)

The mini-SAS-HD connectors work with Adaptec SAS HD cables, which have either straight connectors or right angle connectors that make dense server configurations easier.

**Note:** Learn more about Series 8-compatible cables in the Adaptec University Training Module, *Adaptec SAS HD Cables*.

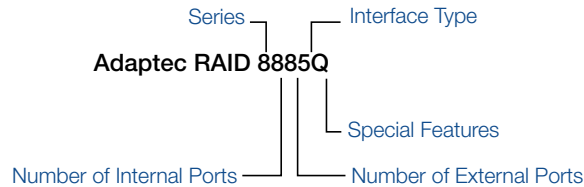
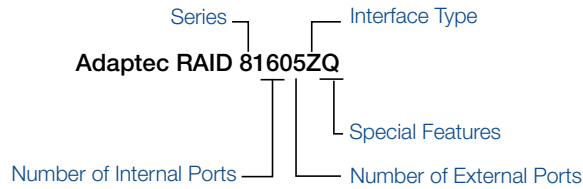
Series 8 RAID adapters support all types of devices including hard disk drives (HDDs) and SSDs, tape drives, autoloaders, and external storage systems (JBODs). You can connect both SAS and SATA devices to a Series 8 adapter; however, as noted on [page 3](#), adapter performance may be limited by device speed, and SATA devices cannot perform faster than 6 Gb/sec.

## The Series 8 RAID Adapter Family

Now let's take a look at each of the new RAID adapters.

### About RAID Adapter Model Numbers

Model numbers offer easy clues to each adapter's main features:



The interface type number denotes PCIe. All Series 8 RAID adapters are 8-lane PCIe Gen 3.

The special features available on the Series 8 RAID adapters have these letter codes:

- **No letter**—A mainstream Series 8 RAID adapter.

For example, Adaptec RAID 8805.

- **Z**—A Series 8 RAID adapter with embedded flash backup

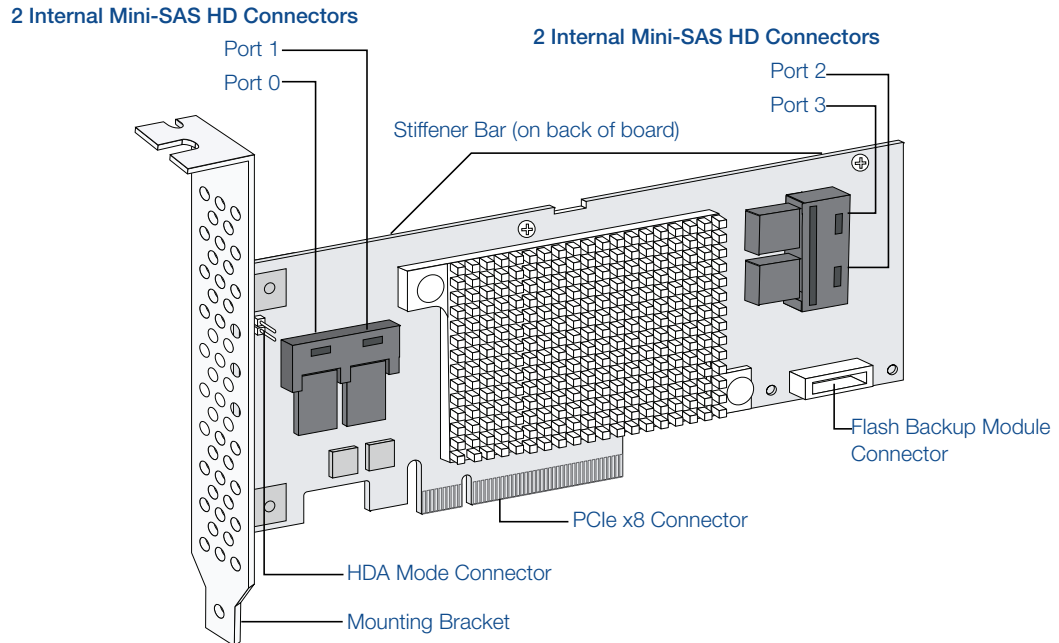
For example, Adaptec 81605ZQ

- **Q**—A RAID adapter with maxCache SSD caching.

For example, Adaptec RAID 8885Q.

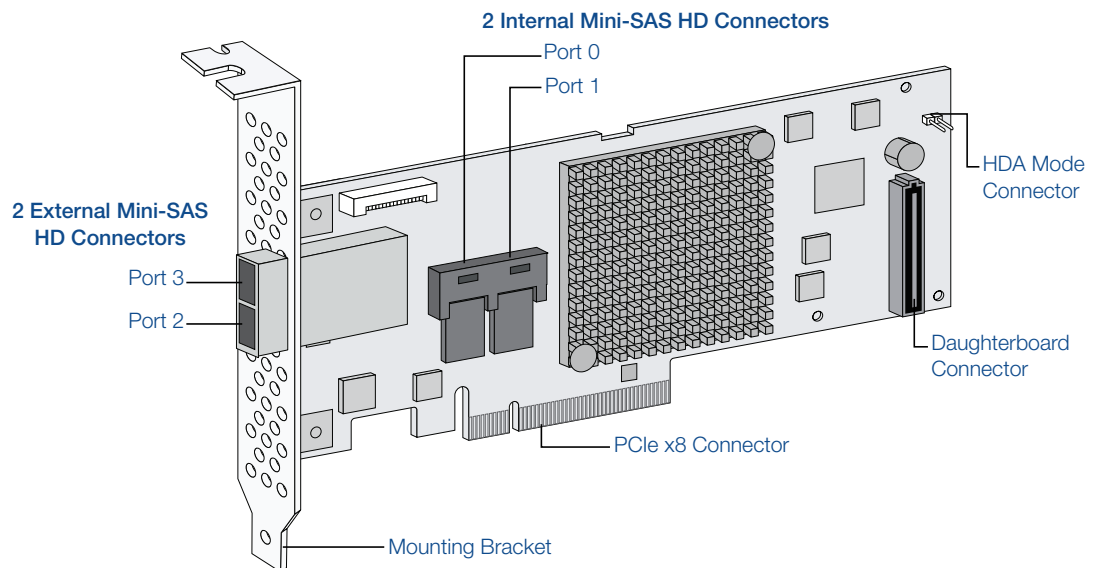
**Series 8Q RAID Adapters**

**Adaptec RAID 81605ZQ.**



**Note:** The low-profile bracket for the Adaptec RAID 81605ZQ differs slightly from the low-profile brackets for other Adaptec RAID adapters. To accommodate the stiffener bar on the back of the board, the low-profile bracket bolts onto the same side of the adapter as the high-profile bracket.

**Adaptec RAID 8885Q.**



**Why to Buy?** Series 8Q RAID adapters support both SAS and SATA devices and offer maxCache 3.0 SSD read- and write-caching for greater performance.

Ideal for:

- I/O-intensive storage applications
- Network Attached Storage
- Online transaction processing servers (OLTP)
- Web servers
- Cloud environments
- Solutions that reduce energy consumption and maintenance costs

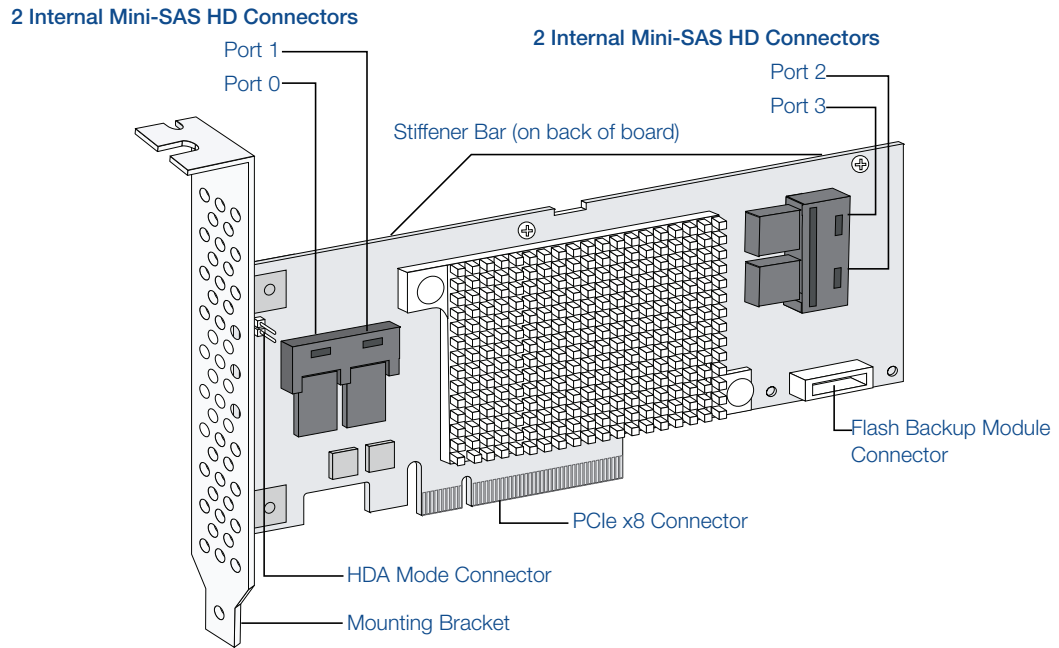
The Adaptec RAID81605ZQ adapter provides embedded flash backup instead of a flash backup daughterboard, which is ideal for servers with limited available space.

**Series 8Q Features.**

	<b>81605ZQ</b>	<b>8885Q</b>
<b>Ordering Part Number</b>	2281600-R (Single)	2277100-R (Single)
<b>Bandwidth</b>	12 Gb/second	
<b>Supported RAID Levels</b>	0, 1, 1E, 5, 6, 10, 50, 60, Simple Volume	
<b>Flexible Configuration</b>	Yes	
<b>Hybrid RAID 1 &amp; 10</b>	Yes	
<b>Form Factor</b>	MD2 (Low Profile)	
<b>Dimensions</b>	2.535"H x 6.6"L (64mm x 167mm)	
<b>Ports (Phys)</b>	16 Internal	8 Internal 8 External
<b>Maximum No. of Devices</b>	16 Direct-attached or 256 with Expanders	16 Direct-attached or 256 with Expanders
<b>Connectors</b>	4 Internal HD mini-SAS (SFF-8643)	2 Internal HD mini-SAS (SFF-8643) 2 External HD mini-SAS (SFF8644)
<b>Bus Interface</b>	8-lane PCIe Gen 3	
<b>Processor</b>	PMC PM8063	
<b>Cache</b>	1024 MB DDR3	
<b>maxCache 3.0 SSD Cache</b>	Yes	Yes
<b>Cache Protection</b>	ZMCP (included) Embedded Flash Backup	ZMCP (included) Flash Backup Daughterboard
<b>Intelligent Power Mgmt</b>	Yes	

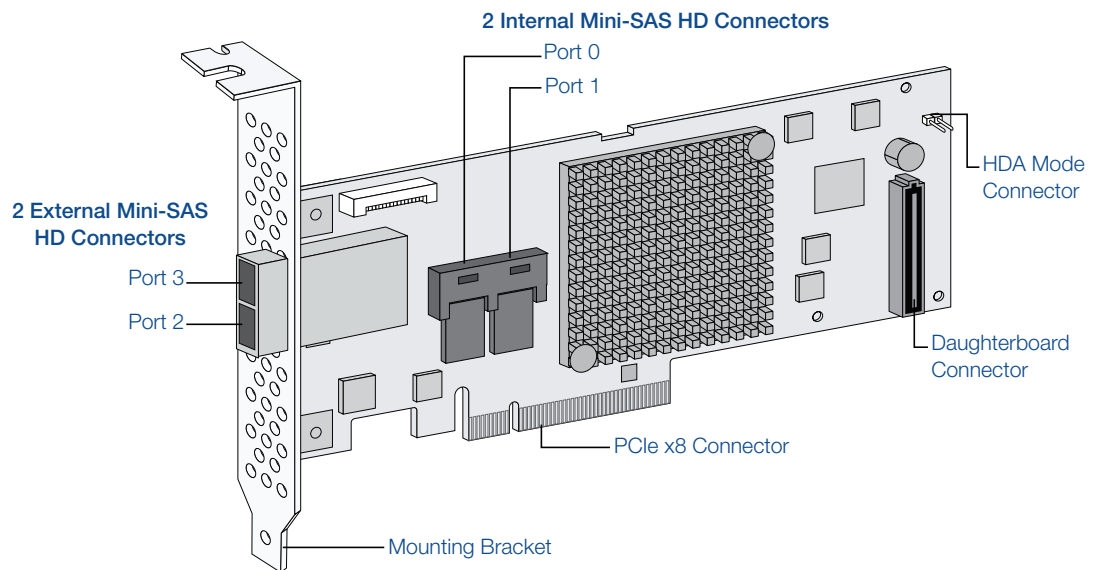
**Series 8 RAID Adapters**

**Adaptec RAID 81605Z.**



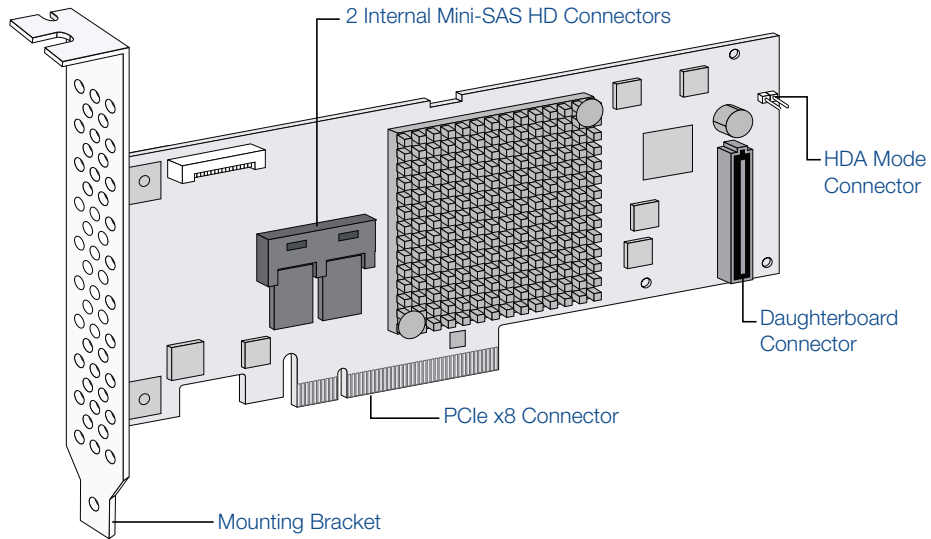
**Note:** The low-profile bracket for the Adaptec RAID 81605Z differs slightly from the low-profile brackets for other Adaptec RAID adapters. To accommodate the stiffener bar on the back of the board, the low-profile bracket bolts onto the same side of the adapter as the high-profile bracket.

**Adaptec RAID 8885.**

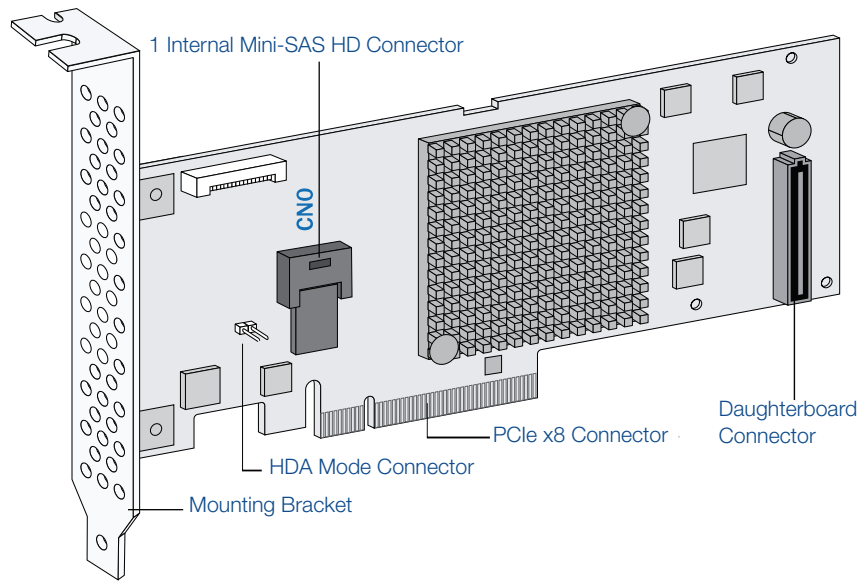




**Adaptec RAID 8805.**



**Adaptec RAID 8405.**



**Why to Buy?** Series 8 RAID adapters work well in entry-level servers to high-end server platforms and high-performance workstations without compromising performance or reliability.

Ideal for:

- I/O-intensive storage applications
- Network Attached Storage
- Online transaction processing servers (OLTP)
- Web servers
- Cloud environments
- Solutions that reduce energy consumption and maintenance costs

**Series 8 Features.**

	<b>81605Z</b>	<b>8885</b>	<b>8805</b>	<b>8405</b>
<b>Ordering Part Number</b>	2287101-R (Single)	2277000-R (Single)	2277500-R (Single)	2277600-R (Single)
<b>Bandwidth</b>	12 Gb/second			
<b>Supported RAID Levels</b>	0, 1, 1E, 5, 6, 10, 50, 60, Simple Volume			
<b>Flexible Configuration</b>	Yes			
<b>Hybrid RAID 1 &amp; 10</b>	Yes			
<b>Form Factor</b>	MD2 (Low Profile)			
<b>Dimensions</b>	2.535"H x 6.6"L (64mm x 167mm)			
<b>Ports (Phys)</b>	16 Internal	8 Internal 8 External	8 Internal	4 Internal
<b>Maximum No. of Devices</b>	16 Direct-attached or 256 with Expanders	16 Direct-attached or 256 with Expanders	8 Direct-attached or 256 with Expanders	4 Direct-attached or 256 with Expanders
<b>Connectors</b>	4 Internal HD mini-SAS (SFF-8643)	2 Internal HD mini-SAS (SFF-8643) 2 External HD mini-SAS (SFF8644)	2 Internal HD mini-SAS (SFF-8643)	1 Internal HD mini-SAS (SFF-8643)
<b>Bus Interface</b>	8-lane PCIe Gen 3			
<b>Processor</b>	PMC PM8063			
<b>Cache</b>	1024 MB DDR3			
<b>maxCache 3.0 SSD Cache</b>	No			
<b>Cache Protection</b>	ZMCP (included) Embedded Flash Backup	ZMCP (optional) Adaptec Flash Module AFM-700		
<b>Intelligent Power Management</b>	Yes			

## Series 8 vs. Series 7: Comparing Key Features

This table compares the key features of each series of Adaptec RAID adapters:

Adapter Series	Speed	Adaptec SAS RAID Adapter Features					Cache Features		Storage Mgmt Tools
		maxCache Support	ZMCP	Hybrid RAID	Intelligent Power Mgmt	Flexible Configuration	Cache Memory <sup>a</sup>	Cache Protection	MSM/ACU/ARCCONF/uEFI
Series 8Q	12 Gb/s	★ maxCache 3.0	★	★	★	★	1024 MB DDR3	★ (Included <sup>b</sup> )	★
Series 8Z	12 Gb/s		★	★	★	★	1024 MB DDR3	★ (Included <sup>b</sup> )	★
Series 8	12 Gb/s		★	★	★	★	1024 MB DDR3	★ (Optional <sup>c</sup> )	★
Series 7Q	6 Gb/s	★ maxCache 3.0	★	★	★	★	1024 MB DDR3	★ (Included <sup>c</sup> )	★
Series 7	6 Gb/s		★	★	★	★	1024 MB DDR3	★ (Optional <sup>c</sup> )	★
71605E	6 Gb/s			★	★	★	256 MB DDR3		★

a. On-board memory is not expandable.

Adaptec RAID adapters use a portion of installed memory for the on-board microprocessor. This means that the available I/O cache capacity is less than the actual amount of memory installed. Additional memory (approximately 12%) is allocated for RAID 6 operations (if RAID 6 is being used).

b. Adaptec Flash Module AFM-700. The Adaptec RAID 81605ZQ and 81605Z have flash backup embedded on the card; the Adaptec RAID 8885Q includes flash backup on a pre-installed daughterboard.

c. Adaptec Flash Module AFM-700.

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