

ThinkSystem RAID 5350-8i Adapter

Product Guide

The ThinkSystem RAID 5350-8i adapter is an entry-level 12 Gb SAS/SATA internal RAID adapter manufactured by Lenovo that offers a cost-effective RAID solution for small to medium business customers. This cacheless adapter supports RAID levels 0/1/10/5, and include support for Lenovo management tools.

The ThinkSystem RAID 5350-8i supports up to eight internal SAS and SATA drives and is shown in the following figure.

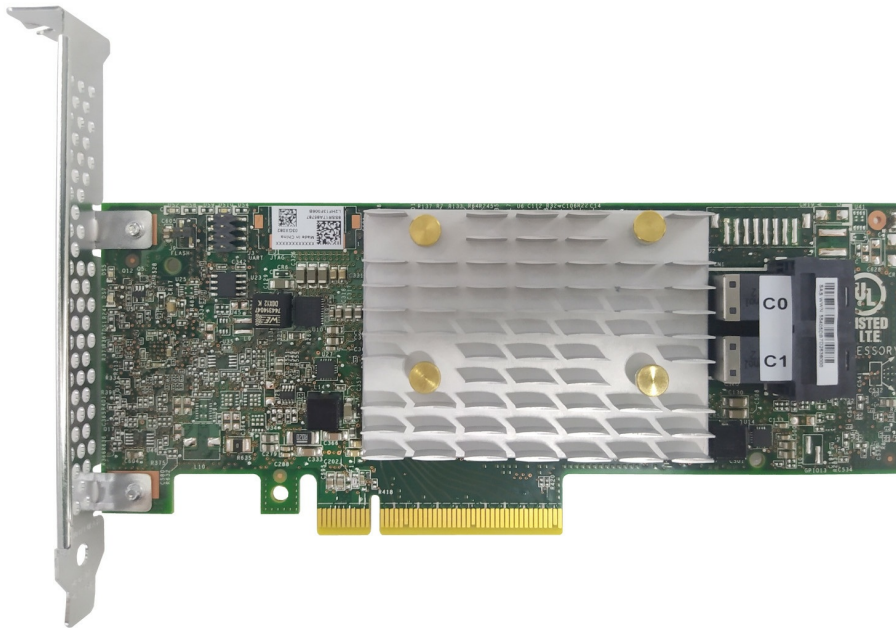


Figure 1. ThinkSystem RAID 5350-8i PCIe 12Gb Adapter

Did you know?

The ThinkSystem RAID 5350-8i combines uncompromised HBA functionality with basic RAID support in hardware using the PM8222 SmartIOC 2100 controller. The adapter provides high levels of storage performance and scalability. The 8-port adapter can achieve up to 1.5M IOPS (random read using 4KB blocks).

Rigorous testing of the ThinkSystem RAID adapters by Lenovo through the ServerProven program ensures a high degree of confidence in storage subsystem compatibility and reliability. Providing an additional peace of mind, the controller is covered under Lenovo warranty.

Part number information

The following table provides the ordering part numbers for the adapter.

Table 1. Ordering information

Part number	Feature code	Description
4Y37A72482	BJHK	ThinkSystem RAID 5350-8i PCIe 12Gb Adapter

The part number includes:

- RAID adapter with 3U full-height bracket attached
- 2U low-profile bracket

Technical specifications

The ThinkSystem RAID 5350 Series internal RAID adapters have the following specifications:

- PCIe 3.0 x8 host interface
- 12 Gbps SAS/SATA RAID controller, based on the Microsemi Adaptec SmartHBA 2100-8i
- Cacheless (not upgradeable)
- Connectivity for up to 8 internal SAS or SATA drives,
- Support for intermixing SAS and SATA HDDs and SSDs. Mixing SAS and SATA drives in the same array is not supported. Mixing of HDDs and SSDs in the same array is not supported.
- Support for intermixing of 12 Gbps and 6 Gbps drives.
- Support for RAID 0, 1, 10, and 5
- Support for JBOD (non-RAID, known as “raw” or “HBA mode” in Adaptec parlance) drive state
- Support for up to 8 virtual drives
- Support for logical drive sizes greater than 2 TB.
- Configurable stripe size from 16 KB up to 1 MB
- Supports 512e, 512n and 4K sector formatted drives
- S.M.A.R.T. support
- Performance of up to 1.7M random read IOPS with extremely low-latency 4 KB I/Os

The following table lists the specifications of the RAID 5350 adapter.

Table 2. Specifications

Feature	RAID 5350-8i
Form factor	PCIe low profile
Controller chip	Adaptec PM8222 SmartIOC 2100
Adaptec equivalent	Adaptec SmartHBA 2100-8i
Host interface	PCIe 3.0 x8
Port interface	12 Gb SAS
Number of ports	8
Port connectors	2x Mini-SAS HD x4 (SFF-8643)
Drive interface	SAS, SATA
Drive type	HDD, SSD
Hot-swap drives	Yes
Max devices	8
RAID levels	0, 1, 10, 5
JBOD mode (HBA mode / Raw)	Yes
Cache	None
SED support	No

To compare these adapters to others in the ThinkSystem portfolio, see the ThinkSystem RAID Adapter and HBA Reference:

<https://lenovopress.com/lp1288-thinksystem-raid-adapter-and-hba-reference>

Features

Smart Storage, Connectivity and Hardware RAID

Today's data centers and enterprises need storage solutions that can keep pace with rapid data expansion. The RAID 5350 Series is the newest product in the Smart Storage solutions family, forged through the convergence of SAS/SATA protocol controller expertise, more than 30 years of Microchip board innovation and the Smart Storage stack.

The RAID 5350 Series, combines the capabilities of a full-featured HBA like the 4350 SAS/SATA HBA series with those of a basic RAID adapter using hardware RAID. With an optimal mix of resiliency, efficiency, and ease of use, it adds the robustness of true host-offloading hardware RAID, offers open-source driver compatibility and comes with a full set of storage management tools. The RAID 5350 Series offers the flexibility of internal and external connectivity in a low-profile/MD2 form factor.

Resiliency, Efficiency and Data Availability

The RAID 5350-8i is an ideal solution for server-based storage systems that require maximum bandwidth and I/O connectivity, low-power consumption, high reliability, plus options for data availability. The Smart Software stack even allows a combination of RAID and raw devices. This is useful in SDS environments where hardware RAID significantly increases OS boot reliability, but full HBA features and performance are otherwise needed.

The RAID 5350-8i also provides enhanced enclosure management capabilities to both RAID and raw devices, and enables enclosure services by providing a virtual SEP to software stacks if needed. The RAID 5350-8i offers over 40 percent power savings compared to prior generations and significant power advantages versus competing solutions, giving it the lowest Total Cost of Ownership (TCO) for an HBA/basic RAID solution. It delivers a robust and scalable solution that can handle the toughest system workloads and configurations, from an array of high-performance SSDs to high-capacity HDDs.

Maximum Performance

The RAID 5350 Series provides the highest levels of storage performance and scalability for next-generation data centers. The RAID 5350 provides connectivity to large numbers of storage devices, including HDDs and, SSDs. These storage devices can aggregate the performance of devices to the limits of the PCIe Gen3 host bus at 6.6 Gbps, and achieve up to 1.7M IOPS and 60 percent higher IOPS performance with SATA devices without additional overhead or latency.

Entry-Level RAID Functionality

The RAID 5350 combines uncompromised HBA functionality with basic RAID support in hardware using the PM8222 SmartIOC 2100 silicon. Robust RAID support is the same for all platforms and operating systems, providing a consistent user experience. Metadata compatibility with RAID 9350 Series products allows customers to upgrade to a full-feature hardware RAID solution with caching for acceleration if needed. The RAID 5350-8i supports up to 8 HDDs or SSDs in RAID configurations using RAID levels 0, 1, 10, or even RAID 5, and can simultaneously use RAID arrays and raw devices in mixed mode (default).

Consistency Check

Consistency check automatically checks your logical drives for bad or inconsistent data, and then fixes any problems. Enabling consistency check ensures that you can recover data if a drive fails. The scanning process checks physical drives in fault-tolerant logical drives for bad sectors. It also verifies the consistency of parity data, if applicable.

Unified Storage Management Utilities

maxView provides both server and remote administration, including proactive failure notification, and supports all 4350, 5350 and 9350 Series products. This browser-based tool suite supports all standard browsers, and is also available as an offline USB boot image. maxView adapter management components include the maxView GUI, an ARCCONF command-line tool, and an event monitor for logging and email alerts.

Support for Lenovo system management tools is listed in the following table.

Table 3. Support for key management features

Function	Lenovo XClarity Controller	Lenovo XClarity Provisioning Manager	Lenovo XClarity Essentials OneCLI (out-of-band)	Lenovo XClarity Essentials OneCLI (in-band)	Lenovo XClarity Administrator	Bare Metal Update / Bootable Media Creator
Adapter FRU Inventory Details	Supported	Supported	Supported	Supported	Supported	No support
Disk Inventory Details	Supported	Supported	Supported	Supported	Supported	No support
RAID Configuration	Support planned for 4Q/2022	Supported	Support planned for 4Q/2022	Supported	Support planned for 1Q/2023	No support
Firmware Update	Supported	No support	Supported	Supported	Supported	Supported
Monitoring/ Events/ Log Capture	Supported*	Supported	Supported*	Supported	Supported*	No support

* No capture of controller firmware log

Server support

The following tables list the ThinkSystem servers that are compatible.

Table 4. Server support (Part 1 of 2)

Part Number	Description	Edge		1S Intel V2		2S Intel V2		AMD		Dense V2		4S V2	8S								
		SE350 (7Z46 / 7D1X)	SE450 (7D8T)	ST50 V2 (7D8K / 7D8J)	ST250 V2 (7D8G / 7D8F)	SR250 V2 (7D7R / 7D7Q)	ST650 V2 (7Z75 / 7Z74)	SR630 V2 (7Z70 / 7Z71)	SR650 V2 (7Z72 / 7Z73)	SR670 V2 (7Z22 / 7Z23)	SR635 (7Y98 / 7Y99)	SR655 (7Y00 / 7Z01)	SR645 (7D2Y / 7D2X)	SR665 (7D2W / 7D2V)	SD630 V2 (7D1K)	SD650 V2 (7D1M)	SD650-N V2 (7D1N)	SN550 V2 (7Z69)	SR850 V2 (7D31 / 7D32)	SR860 V2 (7Z59 / 7Z60)	SR950 (7X11 / 7X12)
4Y37A72482	ThinkSystem RAID 5350-8i PCIe 12Gb Adapter	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y ¹	Y ¹	N	N	N	N	Y	Y	N

1. Supported in the SR645 and SR665 only with an EPYC 7003 "Milan" processor. Not supported with an EPYC 7002 "Rome" processor.

Table 5. Server support (Part 2 of 2)

Part Number	Description	1S Intel V1			2S Intel V1						Dense V1			4S V1						
		ST50 (7Y48 / 7Y50)	ST250 (7Y45 / 7Y46)	SR150 (7Y54)	SR250 (7Y52 / 7Y51)	ST550 (7X09 / 7X10)	SR530 (7X07 / 7X08)	SR550 (7X03 / 7X04)	SR570 (7Y02 / 7Y03)	SR590 (7X98 / 7X99)	SR630 (7X01 / 7X02)	SR650 (7X05 / 7X06)	SR670 (7Y36 / 7Y37)	SD530 (7X21)	SD650 (7X56)	SN550 (7X16)	SN850 (7X15)	SR850 (7X18 / 7X19)	SR850P (7D2F / 2D2G)	SR860 (7X69 / 7X70)
4Y37A72482	ThinkSystem RAID 5350-8i PCIe 12Gb Adapter	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N

Note: The use of both an Intel E810 network adapter and an X350 HBA/RAID adapter (9350, 5350 and 4350) is currently not supported in ThinkSystem servers. Planned support for this combination of adapters is 4Q/2022 (22C).

Operating system support

The following table lists the supported operating systems for the adapter.

Table 6. Operating system support for ThinkSystem RAID 5350-8i PCIe 12Gb Adapter, 4Y37A72482 (Part 1 of 2)

Operating systems	SR250 V2	ST250 V2	ST50 V2	SR630 V2	SR650 V2	SR670 V2	SR850 V2	SR860 V2	ST650 V2	SR645	SR665	SR530 (Gen 2)	SR550 (Gen 2)	SR570 (Gen 2)	SR590 (Gen 2)	SR630 (Gen 2)	SR650 (Gen 2)	ST550 (Gen 2)
Microsoft Windows Server 2016	N	N	N	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2022	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.7	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.8	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.9	N	N	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.1	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.2	N	N	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.3	N	N	N	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.5	N	N	Y	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.6	N	N	N	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP3	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
SUSE Linux Enterprise Server 12 SP4	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP5	N	N	N	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP1	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP2	N	N	N	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
Ubuntu 18.04.5 LTS	N	N	N	Y	Y	Y	N	N	Y	N	N	N	N	N	N	N	N	N
Ubuntu 20.04 LTS	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N
Ubuntu 22.04 LTS	N	N	N	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	N	N	N	N	Y	Y	N
VMware vSphere Hypervisor (ESXi) 6.7 U2	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7 U3	N	N	N	Y	Y	Y	N	N	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U1	N	N	N	N	N	N	Y	Y	N	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U2	N	N	N	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U3	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 8.0	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y ¹	Y ¹	Y	Y	Y	Y	Y	Y	Y

¹ Not support with EPYC 7002 processors

Table 7. Operating system support for ThinkSystem RAID 5350-8i PCIe 12Gb Adapter, 4Y37A72482 (Part 2 of 2)

	SR530 (Gen 1)	SR550 (Gen 1)	SR570 (Gen 1)	SR590 (Gen 1)	SR630 (Gen 1)	SR650 (Gen 1)	ST550 (Gen 1)
Operating systems							
Microsoft Windows Server 2016	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2019	Y	Y	Y	Y	Y	Y	Y
Microsoft Windows Server 2022	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.7	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.8	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 7.9	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.1	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.2	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.3	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.4	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.5	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 8.6	Y	Y	Y	Y	Y	Y	Y
Red Hat Enterprise Linux 9.0	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP3	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP4	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 12 SP5	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP1	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP2	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP3	Y	Y	Y	Y	Y	Y	Y
SUSE Linux Enterprise Server 15 SP4	Y	Y	Y	Y	Y	Y	Y
Ubuntu 18.04.5 LTS	N	N	N	N	N	N	N
Ubuntu 20.04 LTS	N	N	N	N	N	N	N
Ubuntu 22.04 LTS	N	N	N	N	Y	Y	N
VMware vSphere Hypervisor (ESXi) 6.7 U2	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 6.7 U3	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U1	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U2	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 7.0 U3	Y	Y	Y	Y	Y	Y	Y
VMware vSphere Hypervisor (ESXi) 8.0	Y	Y	Y	Y	Y	Y	Y

Warranty

The adapters carry a 1-year limited warranty. When installed in a supported ThinkSystem server, the adapter assumes the server's base warranty and any warranty upgrades.

Physical specification

The adapters have the following dimensions:

- Height: 64 mm (2.5 inches)
- Length: 167 mm (6.6 inches)

Operating environment

The ThinkSystem RAID 5350-8i adapter is supported in the following environment:

- Operating:
 - Temperature: 0°C to 55°C (32°F to 131°F)
 - Relative humidity: 20% to 80% (non-condensing)
 - Altitude: Up to 3,000 meters

Agency approvals

The ThinkSystem RAID 5350 adapters have the following agency approvals:

- FCC Part 15 Class A
- Australia/New Zealand (AS/NZS 3548)
- Canada (ICES-003 Class B)
- Europe (EN55032/EN55024)
- Japan VCCI
- Korea KCC
- RoHS compliant
- EN/IEC/UL 60950
- USA (FCC 47 CFR part 15 Subpart B class B)

Related publications and links

For more information, see the following documents:

- Product publications:
 - [Adapter Hardware Installation Guide](#)
 - [Adapter Software User Guide](#)
- Lenovo ThinkSystem product publications:
<http://thinksystem.lenovofiles.com/help/index.jsp>
- ServerProven hardware compatibility:
<http://www.lenovo.com/us/en/serverproven>
- Lenovo RAID Management Tools and Resources:
<https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources>
- Lenovo RAID Introduction
<https://lenovopress.com/lp0578-lenovo-raid-introduction>
- Lenovo ThinkSystem RAID Adapter and HBA Reference
<https://lenovopress.com/lp1288-thinksystem-raid-adapter-and-hba-reference>

Related product families

Product families related to this document are the following:

- [RAID Adapters](#)

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