

# **Avago<sup>®</sup> SAS 9311 12Gb/s SAS** Host Bus Adapter Family



Product Brief

#### **Key Features**

- Eight/four ports of 12Gb/s SAS + SATA ports
- Eight lanes of PCI Express 3.0
- Low-profile form factor
- Mini-SAS HD connectors
- SAS 3008 12Gb/s SAS+SATA controller
- Supports SSDs, HDDs, and tape drives
- Offers Integrated RAID (0, 1, 1E and 10)

#### **Key Advantages**

- Provides connectivity in a low-profile form factor
- 8 lanes of PCI Express 3.0 provides fast signaling for high bandwidth applications
- High performance with 12Gb/s SAS data transfer rates

For applications demanding high levels of storage connectivity, performance, and Integrated RAID support. SAS 9311 HBAs connect servers and appliances to internal and external storage, achieving over 1 million IOPS.

### **Overview**

The SAS 9311 8 and 4-port, 12Gb/s SAS host bus adapter family provide increased connectivity and maximum performance for high-end servers and appliances within internal storage, or connecting to large scale storage enclosures.

The SAS 9311 HBA family is based on the SAS 3008 IO controller, integrating the latest enhancements in SAS and PCI Express' technology. Each host bus adapter also supports 8 or 4 SAS ports operating at 12Gb/s data transfer rates, and can reach over 1 million IOPs. The 9311 adapter family supports 8 PCI Express lanes that comply with the latest PCI Express 3.0 specifications. In addition, these adapters are backwards compatible with previous SAS and PCIe generations through automatic negotiation, and provide SAS data transfer rates of 12, 6, and 3 Gb/s per lane, and SATA data transfer rates of 6 and 3Gb/s per lane.

The SAS 9311 adapter family offers Integrated RAID (0, 1, 1E, and 10) support. Due to simplifying the configuration options and offering a IR firmware support for its 6Gb/s SAS host adapters, these integrated RAID solutions provide a low cost option for the server or workstation market which requires the extra performance, storage capacity, and/or redundancy of a RAID configuration.

Integrated RAID offers distinct performance and reliability advantages, including reduced CPU levels on your host computer, and also volumes that are OS agnostic.

The Integrated RAID solution includes the following RAID features:

- · The Integrated Mirroring solution, which provides features of RAID 1
- The Integrated Mirroring + Striping solution, which provides features of RAID 10
- The Integrated Mirroring Enhanced solution, which provides features of RAID 1
- The Integrated Striping solution, which provides features of RAID 0

## Avago Storage by LSI<sup>™</sup>

Avago Technologies products serve four primary target markets: wireless communications, wired infrastructure, enterprise storage, and industrial. Avago Storage by LSI<sup>™</sup> offers the industry's broadest portfolio of storage solutions, backed by decades of experience and trusted by the world's leading server and storage suppliers. Avago provides the building blocks for storage solutions that help customers understand, prioritize, store and protect critical data.

The Avago 12Gb/s SAS portfolio includes MegaRAID<sup>\*</sup> controller cards, host bus adapters (HBAs), advanced software options, Syncro<sup>\*</sup> shared DAS solutions and SAS storage ICs, including RAID-on-Chip (ROCs), I/O controllers and expanders.

# **Fusion-MPT<sup>™</sup> Architecture**

Fusion-MPT architecture marks the next generation of I/O architecture designed to deliver the highest performance available today while reducing time to market, integration, and certification time. Fusion-MPT

devices are high performance, cost-effective protocol controllers that represent the newest system- level integration technology in intelligent I/O processors from Avago.

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Strady Provide   Strady Stra	Port Count	8 port, internal	4 port ext/4 port int
Rate Loop SN 5.30 complant Loop SN 5.30 complant   SAS Bandwidth Haffbagler (34 wide bas) secon Moles Haffbagler (34 wide bas) secon Moles   Port Configurations Bex.X ports (individual drives) 2.0., 44 wide port 2.0., 44 wide port   Host Bus Selon Moles Selon Moles   PCI Data Burst Transfer Rates Bialfbagler Skiffbagler   Pixical Dimensions Low Profile Low Profile   Physical Dimensions Low Sciffbagler Skiffbagler   Cable Support Bialfbagler And Start Start Moles Restree Copper   Cable Support Restree Copper Restree Copper   Cable Support Haffbagler Adverse Stree Moles Restree Copper   Cable Support Restree Stree Stree Stree Stree Moles Restree Copper   Cable Support Haffbagler Adverse Stree Stree Moles Restree Copper   Cable Support Restree Stree	Connectors		SFF8644 One (x4),
initial set in the set in th	5 ,	12Gb/s SAS 3.0 Compliant	12Gb/s SAS 3.0 Compliant
initial distribution   initial distribution   initial distribution     Hots us   initial distribution   initial distribution     PCI distribution   initial distribution   initial distribution     Form Factor   initial distribution   initial distribution     Physical Dimensions   initial distribution   initial distribution     Problem   initial distribution   initial distribution     Grades distribution   initial distribution   initial distribution     Operation distribution   initial distribution   initial distribution     Initial distri	SAS Bandwidth		
PCI Data Burst Transfer Rates   Half Outplex xik PCI 3.0 8000 MB/s   Half Outplex xik PCI 3.0 8000 MB/s     Form Factor   Ive Molie   Low Porlie     Physical Dimensions   26% 6.0°   26% 6.0°     Brackets   Intellight and low profile vented   Intellight and low profile vented     Cable Support   Passic Opper Answer Capper   Passic Opper Answer Capper   Passic Opper Answer Capper     Operating Voltage   1.91 V - K% 3.3 V - / 9%   1.92 V - K% 3.3 V - / 9%   Passic Capper Answer Capper     PL Power (Normian)   Interver SF458 (SCPU) compliant   Refere CFF 4.485 (SCPU) compliant   Passic Capper Answer Capper Voltage     PL Power (Normian)   Interver SF458 (SCPU) compliant   Half prevalume RADD 1 Oper volume And D 1 Oper volume Answer Set Set Set Set Set	Port Configurations		•
NR PCR 3.0, 0000 MB/S   x8, PCR 3.0, 0000 MB/S     Form Factor   Low Porofile   Low Porofile     Physical Dimensions   2,6* x, 6.0°   2,6* x, 6.0°     Brackets   Full Height and low profile vented   Full Height and low profile vented     Cable Support   Raskie Copper   Passie Copper     Operating Voltage   +12V +/-8% 3.3V +/-9%   +12V +/-8% 3.3V +/-9%     LED Management   Reference SFF-8485 (SGPI0) compliant   Reference SFF-8485 (SGPI0) compliant     PCI Power (Nominal)   19V   +12V +/-8% 3.3V +/-9%     LED Management   RAID0 10 per volume   Reference SFF-8485 (SGPI0) compliant     RAID0 10 per volume   RAID0 10 per volume   RAID0 10 per volume     RAID0 10 per volume   RAID0 10 per volume   RAID0 10 per volume     RAID0 10 per volume   RAID0 10 per volume   RAID 10 10 per volume     RAID0 10 per volume   RAID0 10 per volume   RAID0 10 per volume     RAID0 10 per volume   RAID0 10 per volume   RAID0 10 per volume     RAID0 10 per volume   RAID0 10 per volume   RAID0 10 per volume     RAID0 10 per volume   RAID0 10 per volume   RAID0 10 per volume     RAID0 10 per volume   RAID0 10 per volume	Host Bus	x8 lane, PCle 3.0	x8 lane, PCle 3.0
Physical Dimensions2x 6.0°2.6°x 6.0°BracketsBulleijt and low profile ventedFull Bight and low profile ventedCable SupportRasive Copper Active Optical (Ext only)Operating Voltage+12V +/-9%3.3V +/-9%LED ManagementReference SFF- 8485 (SGPIO) compliantPC Power (Nominal)IW14.25WIntegrated RAID (I/R)14 spread across 2 volumes RAID 1 2 per volume Plas has spread across 2 volumes RAID 1 2 per volume	PCI Data Burst Transfer Rates		
Brackets   Full Height and low profile vented   Full Height and low profile vented     Cable Support   Passive Copper   Passive Copper   Active Optical (Ext only)     Operating Voltage   +12V +/.8%; 3.3V +/.9%   +12V +/.8%; 3.3V +/.9%     LED Management   Reference SFF-8485 (SGPI0) compliant   Reference SFF-8485 (SGPI0) compliant     PCI Power (Nominal)   13W   14.25W     Integrated RAID (IR)   14 spread across 2 volumes   RAID 0   10 per volume     RAID 0   10 per volume plus hot spare   RAID 1   2 per volume plus hot spare     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per v	Form Factor	Low Profile	Low Profile
Cable SupportPassive CopperPassive CopperActive Optical (Ext only)Operating Voltage+12V +/.8%; 3.3V +/.9%LED ManagementReference SFF-8485 (SGPI0) compliantPCI Power (Nominal)13WIntegrated RAID (IR)14 spread across 2 volumesRAID 0 10 per volumeRAID 0 10 per volumeRAID 1 2 per volume plus hot spareRAID 1 2 per volumeRAID 1 10 per volumeRAID 1 10 per volumeRAID 1 10 per volumeRAID 1 10 per volumeRAID 2 per volume plus hot spareRAID 1 10 per volumeRAID 2 per volume plus hot spareRAID 1 10 per volumeRAID 2 per volume plus hot spareSto 99% non-condensingAirflow: 200 LFMAirflow: 200 LFMMTBF>2800,000 hoursPSupportSto 90% non-condensingAirflow: 200 LFMKorea(KSE. Red Hat), Solaris, VMare, FreeSD; See www.lsi.com/support for details on versionsYmers RAID 2 per volume, RAID 10 and Cate's provides a built in driver; installation of an Arago driver is not required. For more information on the Oracle Solaris 10Microsoft Windows, Linux (SuSE, Red Hat), Solaris, VMare, FreeSD; See www.lsi.com/support for details on versionsYmers RAID 2 per volume and installation, sign in at the following Oracle link: tttps://support.cond.contact or	Physical Dimensions	2.6″ x 6.0″	2.6″ x 6.0″
Passive Copper   Active Optical (Ext only)     Operating Voltage   +12V +/-8%; 3.3V +/-9%     LED Management   Reference SFF-8485 (SGPI0) compliant     PCI Power (Nominal)   13W     Integrated RAID (IR)   14 spread across 2 volumes     RAID 0 10 per volume   RAID 0 10 per volume     RAID 1 2 per volume plus hot spare   RAID 1 2 per volume plus hot spare     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume   RAID 1 0 per volume     RAID 1 0 per volume	Brackets	Full Height and low profile vented	Full Height and low profile vented
LED Management   Reference SFF-8485 (SGPI0) compliant   Reference SFF-8485 (SGPI0) compliant     PCI Power (Nominal)   13W   14.25W     Integrated RAID (IR)   14 spread across 2 volumes   14 spread across 2 volumes     RAID 0   10 per volume plus hot spare   RAID 0   10 per volume     RAID 1   2 per volume plus hot spare   RAID 1   2 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   0 per volume plus hot spare   RAID 1   10 per volume     RAID 1   0 per volume   RAID 1   10 per volume     RAID 1   0 per volume   RAID 1   10 per volume     RAID 1   0 per volume   RAID 1   10 per volume     RAID 1   0 per volume   RAID 1   10 per volume     RAID 10   0 per volume   RAID 1   10 per volume     RAID 10   0 per volume   RAID 1   10 per volume     RAID 10   0 per volume   RAID 1   10 per volume     RAID 10   0 per volume   RAID 1   10 per volume     RAID 10   0 per volume   RAID 1   10 per volume     RAID 10	Cable Support	Passive Copper	
PCI Power (Nominal)   13W   14.25W     Integrated RAID (IR)   14 spread across 2 volumes   RAID 0   10 per volume     RAID 1   2 per volume plus hot spare   RAID 1   2 per volume plus hot spare     RAID 1   2 per volume plus hot spare   RAID 1   2 per volume     RAID 1   2 per volume plus hot spare   RAID 1   2 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 10   10 per volume   RAID 1   10 per volume     RAID 10   10 per volume   RAID 1   10 per volume     RAID 10   10 per volume   RAID 1   10 per volume     RAID 10   10 per volume   RAID 1   10 per volume     RAID 10   10 per volume   RAID 1   2 per volume plus hot spare     RAID	Operating Voltage	+12V +/-8%; 3.3V +/-9%	+12V +/-8%; 3.3V +/-9%
Integrated RAID (IR)   14 spread across 2 volumes   I a spread across 2 volumes     RAID 0   10 per volume   RAID 0   10 per volume     RAID 1   2 per volume plus hot spare   RAID 1   2 per volume plus hot spare     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   RAID 1   10 per volume     RAID 1   10 per volume   Normations   Storage= 45° C to 105° C     Storage 45° C to 105° C   Storage 45° C to 105° C   Storage 45° C to 105° C     Storage 45° C to 105° C   Storage 45° C to 105° C   Storage 45° C to 105° C <t< td=""><td>LED Management</td><td>Reference SFF-8485 (SGPIO) compliant</td><td>Reference SFF-8485 (SGPIO) compliant</td></t<>	LED Management	Reference SFF-8485 (SGPIO) compliant	Reference SFF-8485 (SGPIO) compliant
RAD 0   10 per volume   RAD 0   10 per volume     RAD 1   2 per volume plus hot spare   RAD 1   2 per volume plus hot spare     RAD 1   10 per volume   RAD 1   10 per volume     RAD 1   10 per volume   RAD 1   10 per volume     RAD 1   10 per volume   RAD 1   10 per volume     RAD 1   10 per volume   RAD 1   10 per volume     RAD 1   10 per volume   RAD 1   10 per volume     RAD 1   10 per volume   RAD 1   10 per volume     RAD 1   10 per volume   RAD 1   10 per volume     RAD 1   0 per volume   RAD 1   10 per volume     RAD 1   0 per volume   RAD 1   0 per volume     RAD 1   0 per volume   RAD 1   0 per volume     RAD 1   0 per volume   RAD 1   0 per volume     RAD 1   0 per volume   RAD 1   0 per volume     RAD 1   0 per volume   RAD 1   0 per volume     RAD 1   0 per volume   Store 2   Store 2     RAD 1   2 per volume volume   Store 2   Store 2 <td>PCI Power (Nominal)</td> <td>13W</td> <td>14.25W</td>	PCI Power (Nominal)	13W	14.25W
Arage: -45°C to 105°C   Storage: -45°C to 105°C     Storage: -45°C to 105°C   Storage: -45°C to 105°C     Sto 90% non-condensing   Sto 90% non-condensing     Airflow: 200 LFM   Airflow: 200 LFM     MTBF   >2,800,000 hours   >2,800,000 hours     Regulatory Certifications   EMC: Class B-US (CFR 47, P15B); Canada (ICES-003); Japan (V-3/02.04); Euros ENS5022/ENS5024); Australia/New Zealand (AS/NZS 3548); Korea (N-B 2-0001-404); Safety: EN60950; RoHS; WEEE     OS Support   Microsoft Windows, Linux (SuSE, Red Hat), Solaris, VMware, FreeBSD; See www.lsi.com/support for details on versions * The HBA supports Solaris 10 and Oracle* provides a built in driver; installation of an Avago driver is not required. For more information on the Oracle Solaris 10 and use and installation, sign and the oracle solaris 10 and use and installation sign and the oracle solaris 10 and installation sign and and the oracle solaris 10 and and and	Integrated RAID (IR)	RAID 010 per volumeRAID 12 per volume plus hot spareRAID 1E10 per volume	RAID 010 per volumeRAID 12 per volume plus hot spareRAID 1E10 per volume
Regulatory Certifications   EMC: Class B-US (CFR 47, P15B); Canada (ICES-003); Japan (V-3/02.04); Europe (EN55022/EN55024); Australia/New Zealand (AS/NZS 3548); Korea (N-B 2-0001-404); Safety: EN60950; RoHS; WEEE     OS Support   Microsoft Windows, Linux (SuSE, Red Hat), Solaris, VMware, FreeBSD; See www.lsi.com/support for details on versions * The HBA supports Solaris 10 and Oracle* provides a built in driver; installation of an Avago driver is not required. For more information on the Oracle Solaris 10 and installation, sign in at the following Oracle link: https://support.oracle.com/. Contact Oracle driver or software support.	Environmental	Storage: -45°C to 105°C 5 to 90% non-condensing	Storage: -45°C to 105°C 5 to 90% non-condensing
Korea (N-B 2-0001-404); Safety: EN60950; RoHS; WEEE     OS Support   Microsoft Windows, Linux (SuSE, Red Hat), Solaris, VMware, FreeBSD; See www.lsi.com/support for details on versions     **The HBA supports Solaris 10 and Oracle" provides a built in driver; installation of an Avago driver is not required. For more information on the Oracle Solaris 10 ard installation, sign in at the following Oracle link: https://support.oracle.com/. Contact Oracle support for Oracle driver or software support.	MTBF	>2,800,000 hours	>2,800,000 hours
* The HBA supports Solaris 10 and Oracle <sup>®</sup> provides a built in driver; installation of an Avago driver is not required. For more information on the Oracle Solaris 10 driver and installation, sign in at the following Oracle link: https://support.oracle.com/. Contact Oracle support for Oracle driver or software support.	Regulatory Certifications		
Warranty 3 years, free advanced technical support, advanced replacement option	OS Support	* The HBA supports Solaris 10 and Oracle <sup>®</sup> provides a built in driver; installation of an Avago driver is not required. For more information on the Oracle Solaris 10	
	Warranty	3 years, free advanced technical support, advanced replacement option	



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