AlazarTech

AlazarStream® 8000
Ultra-Fast Disk Storage Systems

- 8 GB/s sustained disk throughput

- 32 Terabytes of total storage space

- Fully compatible with AlazarTech® PCI Express waveform digitizers

- Fully integrated system containing CPU, data acquisition and disk storage

- Includes disk streaming software

- No programming required

- Packaged in 4U rackmountable chassis

Bus	Operating System	Disk Throughput	Total Storage	Available PCIe Slots	Number of Disks	RAID Level
PCI Express	Windows® 10 Pro 64 bit	8 GB/s	32 TB (27.9 TB usable)	4 (Other options available)	32	0

Overview

AlazarStream® 8000 is a high performance disk storage system that provides up to 8 GB/s disk throughput. It is designed for use with AlazarTech's family of PCI Express waveform digitizers.

Today's computers are not designed with the needs of the test & measurement and data acquisition industry in mind. As such, not all computers are able to handle these very high data rates.

AlazarTech has tested and qualified all the components that go into AlazarStream in order to guarantee the specified throughput to disk.

AlazarStream 8000 is a complete system that consists of an advanced motherboard with a powerful CPU running the Windows 10 Pro operating system, a graphics card, and 4 available slots for plugging in a waveform digitizer or other cards.

The AlazarStream 8000 system uses hardware-based RAID technology to stripe data across 32 disk drives.

Built-in disk streaming software allows out-of-the-box operation without any need for custom programming.

The biggest advantage of using AlazarStream systems with AlazarTech's PCI Express waveform digitizers is that the disk throughput is guaranteed. No guesswork required.

Applications

RF signal recording (SIGINT)

Digital Video Broadcast (DVB)

Optical Coherence Tomography (OCT)

Terabyte Storage Oscilloscope

RAID 0 Across n Disk Drives

DISK 0	DISK 1	DISK 2	DISK n
1	2	3	n
n+1	n+2	n+3	2n
2n+1	2n+2	2n+3	3n
3n+1	3n+2	3n+3	4n

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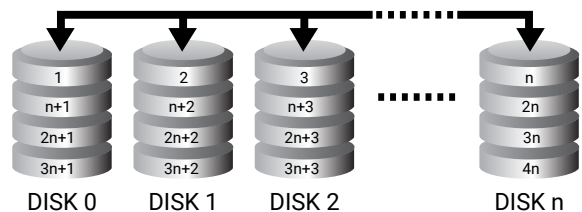
Disk Drives

Only the fastest and most reliable SATA III disk drives are used in AlazarStream systems.

According to benchmarks carried out at AlazarTech's laboratory, each individual disk drive provides close to 520 MB/s sustained writing capability.

It should be noted that AlazarTech reserves the right to change the type of disk drives used, if and when newer and better products become available.
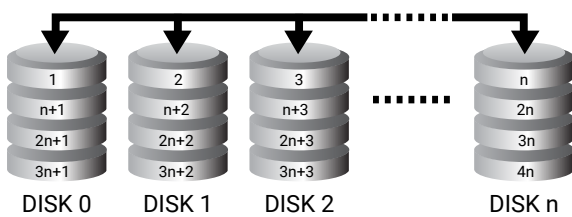
Power Supply

In order to power so many disk drives, AlazarTech has selected a high power, reliable power supply for AlazarStream 8000.

The power supply has 100 to 240 VAC universal inputs and 50 to 60 Hz frequency.

Hardware RAID

Using hardware RAID (Level 0) technology, data is striped across multiple disk drives.

RAID 0 Across *n* Disk Drives

DISK 0   DISK 1   DISK 2   DISK n

This parallel architecture increases data throughput in proportion to the number of disk drives being used.

Other RAID levels can be used for custom configurations. It should be noted, however, that RAID levels with redundancy will result is smaller total storage space and possibly slower sustained throughput.

Motherboard

AlazarStream 8000 systems are based on the latest Core i7 processor and X99 chipset, which provides a large number of PCI Express slots, very high data throughput to system memory and very fast multi-core processing.

One of the advantages of this architecture is that the X99 chipset communicates directly with PCI Express slots, thereby reducing system latencies and increasing sustained throughput.

The PCI Express Advantage

It is important to note that PCI Express lanes are point-to-point connections between an add-on board, such as an AlazarTech waveform digitizer, and system memory.

This means that overall bus throughput is not shared between multiple cards. For example, an AlazarTech ATS®9870 waveform digitizer can transfer data to PC memory at a rate of 1.4 GB/s.

It is possible to plug in two ATS9870 waveform digitizers in the same motherboard and have them transfer data to computer memory at 1.4 GB/s each, i.e. a total data transfer rate of 2.8 GB/s!

This is very different than the legacy PCI bus, which was a shared bus and using multiple cards resulted in bus bandwidth reduction for all the cards.

Compatible Waveform Digitizers

The architecture of AlazarTech's PCI Express waveform digitizers has been designed for data streaming applications. Unlike other digitizers on the market, there is no requirement for data acquisition to be stopped before the acquired data can be transferred to computer memory.

In other words, AlazarTech's PCI Express waveform digitizers feature dual-port memory buffer: ADC data is written into one port, while the bus reads this data out of another port.

The following waveform digitizers are compatible with AlazarStream 8000 systems:

Waveform Digitizer	Specifications	Transfer Rate
ATS9373	12 bit, 4 GS/s, 1 ch. or 12 bit, 2 GS/s, 2 ch.	6.8 GB/s
ATS9360	12 bit, 1.8 GS/s, 2 ch.	3.5 GB/s
ATS9371	12 bit, 1 GS/s, 2 ch.	6.8 GB/s
ATS9872	8 bit, 1 GS/s, 2 ch.	1.6 GB/s
ATS9870	8 bit, 1 GS/s, 2 ch.	1.6 GB/s
ATS9352	12 bit, 500 MS/s, 2 ch.	1.6 GB/s
ATS9353	12 bit, 500 MS/s, 2 ch.	1.6 GB/s
ATS9350	12 bit, 500 MS/s, 2 ch.	1.6 GB/s
ATS9351	12 bit, 500 MS/s, 2 ch.	1.6 GB/s
ATS9625	16 bit, 250 MS/s, 2 ch.	1.6 GB/s
ATS9626	16 bit, 250 MS/s, 2 ch.	1.6 GB/s
ATS9462	16 bit, 180 MS/s, 2 ch.	720 MB/s
ATS9440	14 bit, 125 MS/s, 4 ch.	1.6 GB/s
ATS9416	14 bit, 100 MS/s, 16 ch.	3.5 GB/s
ATS9146	14 bit, 125 MS/s, 2 ch.	200 MB/s
ATS9130	12 bit, 50 MS/s, 2 ch.	200 MB/s
ATS9120	12 bit, 20 MS/s, 2 ch.	200 MB/s

Bundle AlazarStream with a Digitizer

Customers can purchase an AlazarStream disk storage system bundled with one of AlazarTech's waveform digitizer cards.

Not only will this save a lot of installation hassles for users, it will also represent some savings. Contact AlazarTech or your local distributor for more details.

The standard, tested configuration for AlazarStream 8000 is to have one AlazarTech waveform digitizer card. Customers who wish to have a multi-board

configuration should contact AlazarTech Factory for custom configurations.

AlazarDSO® Stream To Disk Software

AlazarStream 8000 systems are supplied with AlazarDSO stream to disk software, which allows the user to setup the acquisition hardware and capture, display, process and archive the acquired signals.

For AlazarStream systems, the most important part of AlazarDSO software is its ability to allow the user to set up a very deep memory capture using an easy to use wizard.
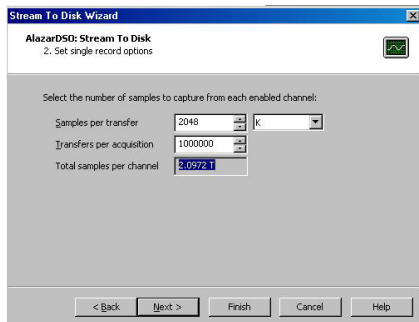
AlazarDSO also allows FFT, cursors, math functions, histograms, unattended archiving, signal file recall, on-line help, dual-port memory support and numerous other powerful features.

Viewing Captured Data

AlazarStream software allows users to view the recorded signal one *buffer* at a time. The size of the buffer can be specified by the user.

For example, if the amount of data captured is 100 Gigasamples and the buffer size is set to be 8 Megasamples, then the recorded data is divided into 12500 *buffers* and the user can view one of these *buffers* at one time, i.e. no more than 8 million samples can be displayed on the screen at one time.

A user interface is provided for the user to easily select a different *buffer* for viewing.

Extracting Data from AlazarStream

Once signals are digitized and stored in the disk drives of AlazarStream 8000 systems, the resulting files can be transferred to another computer or a network attached storage (NAS) device using the on-board Gigabit Ethernet or USB 3.1 ports.

Alternatively, customers can connect AlazarStream 8000 to their network using the dual Gigabit Ethernet ports and Windows operating system.

Converting Data to MATLAB® Format

AlazarStream 8000 stores the recorded data in a native binary format (ATB format). Users can set up the software to automatically convert the ATB file to MATLAB format immediately after the acquisition has finished resulting.

EC Conformity

AlazarStream conforms to the following standards:

Electromagnetic Emissions:
CISPR 32:2015/EN 55032:2015 (Class A): Electromagnetic compatibility of multimedia equipment – Emission requirements. Radio disturbance characteristics. Limits and method of measurement.

Electromagnetic Immunity:
CISPR 24:2010/EN 55024:2010 (+A1 +A2): Information Technology Equipment Immunity characteristics — Limits and methods of measurement.

Safety:
EN 62368-1:2014: Information technology equipment — Safety — Part 1: General requirements.

AlazarStream also follows the provisions of the following directives: 2014/35/EU (Low Voltage Equipment); 2014/30/EU (Electromagnetic Compatibility).

FCC & ICES-003 Compliance

AlazarStream 8000 has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15, subpart B of the FCC Rules, and the Canadian Interference-Causing Equipment Standard ICES-003:2016.

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Ultra-Fast Disk Storage Systems

Physical

Chassis size   (Rackmount rails not included)

Width	Height	Depth
16.93 in.	6.85 in.	20.98 in.
430 mm	174 mm	533 mm

Width incl. handles: 19" (483 mm)

Chassis height	4U
Rackmount rails	Optional

Environmental

Operating temperature	+10 to +50 degrees Celsius
Storage temperature	-20 to +60 degrees Celsius
Humidity	5% to 95% @ 45 degrees Celsius, non-condensing

Power Supply

Input Voltage	100 VAC ~ 240 VAC
Frequency	50 ~ 63 Hz
Safety approval	CB, CCC, CE, EAC, FCC Class A, KC, UL
Efficiency	Min. 91% at full load
Universal input	Yes (no manual switch)
Power Factor Correction	Active
Input Current:	12 A @ 120 VAC, 7.5 A @ 240 VAC

Output Current (Min. Load):

+5V	+3.3V	+12V	-12V
38 A	24 A	83 A	0.5 A

Total output wattage:	1200 Watts

Standard Motherboard

Motherboard	X99-E WS
Chipset	Intel X99
Processor	i7-6800K @3.4 GHz
On-board graphics	No
On-board Ethernet	Dual 1 GbE
On-board eSATA	SATA + sSATA (6 Gbps)
Memory technology	Quad channel DDR4
Memory size	64 GB
Number of available slots:	7 PCI Express x16 (x8 electrical)

Software Environment

Operating system	Windows 10 Pro, 64 bit
Signal recording software	AlazarDSO with Stream-to-disk
File format	ATB binary file format
MATLAB compatibility	User can set up the software to automatically convert the ATB file to MATLAB format immediately after the acquisition has finished

Compatible Waveform Digitizers

All AlazarTech PCI Express waveform digitizers:
ATS9373, ATS9360, ATS9371, ATS9872, ATS9870, ATS9352, ATS9353, ATS9350, ATS9351, ATS9625, ATS9626, ATS9462, ATS9440, ATS9416, ATS9146, ATS9130, ATS9120.

Disk System

Technology	SSD
Interface	SATA III (6 Gbps)
RAID Level	0 (striping) or 5 (distributed parity)
Hardware RAID	Yes
Sustained throughput:	8 GB/s
Total data storage:	32 Terabytes

Mouse and Keyboard

Keyboard	Standard 101-key keyboard
Mouse	Optical mouse

Optional Display Screen

Screen type	Desktop Flat-panel LCD
Screen size	24 inch
Resolution	1920 x 1080

Materials Supplied

AlazarStream chassis
Rackmount rails
Driver disks and manuals
Keyboard and mouse

Certification and Compliances

CE Mark Compliance (CE Marking — EC Conformity)
FCC Compliance
CSA approved power supplies

All specifications are subject to change without notice

Due to the changing nature of CPUs and motherboard technology, AlazarTech reserves the right to change the CPU and/or motherboard used in this system.

ORDERING INFORMATION

AlazarStream 8000	ATS-STR-8000
Optional Desktop Monitor	ATS-STR-101
Optional Graphics Card Upgrade	ATS-STR-201
System Integration and Testing	SysIntTest
Assembled Wooden Shipping Crate	ShippingCrate
Software Development Kit 1 Year Subscription (Supports C/C++, Python, MATLAB, and LabVIEW)	ATS-SDK

Manufactured By:
Alazar Technologies, Inc.

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DATASHEET REVISION HISTORY

Changes from version 1.0 (Jan 2020) to version 1.0A	Section, Page
Added ATS9872, ATS9353, and ATS9146 to table	Compatible Waveform Digitizers, pg. 2
Added ATS9872, ATS9353, and ATS9146 to list	Compatible Waveform Digitizers, pg. 4