ATST872

1 GS/s 8-Bit Thunderbolt 3 Digitizer

- Thunderbolt™ 3 (USB type C) connectivity -- No embedded PC required!
- 2 channels sampled at 8-bit resolution
- 1 GS/s simultaneous real-time sampling rate on each input
- Continuous streaming mode
- ±100 mV to ± 4 V input range
- Asynchronous DMA device driver
- AlazarDSO® oscilloscope software
- Software Development Kit supports C/C++, C#, Python, MATLAB®, LabVIEW®
- Support for Windows® & Linux®

RoHS 3 COMPLIANT
2015/863/EU

Thunderbolt 4 Compatible

Product	Bus	Operating System	Channels	Max. Sample Rate	Bandwidth	Memory Per Channel	Resolution
ATST872	Thunderbolt 3	64-bit Windows & 64-bit Linux	2	1 GS/s on 2 channels	450 MHz	512 Megasamples	8 bits

Overview

AlazarTech ATS®T872 is a dual-channel, high-speed, 8-bit, 1 GS/s waveform digitizer card with Thunderbolt 3 connectivity, capable of acquiring data into its on-board memory or streaming to PC memory. Thunderbolt 3 connectivity allows data streaming at rates up to 1.6 GB/s.

From a software perspective, ATST872 looks exactly like the PCI Express based ATS9872. This means that any software developed for ATS9872 will work seamlessly with ATST872, giving customers an easy option to migrate to this Thunderbolt 3 based waveform digitizer.

There are two A/D converters on the ATST872 board, each running at 1 GS/s. Unlike other products on the market, ATST872 does not use interleaved sampling. Each input has its own 8-bit, 1 GSPS ADC chip.

Users can capture data from one trigger or a burst of triggers. Users can also stream very large datasets continuously to PC memory or hard disk.

ATST872 allows users to build real-time data acquisition systems even under the Windows or Linux operating systems, as users are allowed to read acquired data even while the next acquisition is in progress.

ATST872 is supplied with AlazarDSO software that lets the user start data acquisition immediately, without having to go through a software development process.

Users who need to integrate the ATST872 in their own program can purchase a software development kit, ATS-SDK, for C/C++, C#, Python, MATLAB, and LabVIEW for both Windows and Linux operating systems.

Applications

Ultrasonic & Eddy Current NDT/NDE

Radar/RF Signal Recording

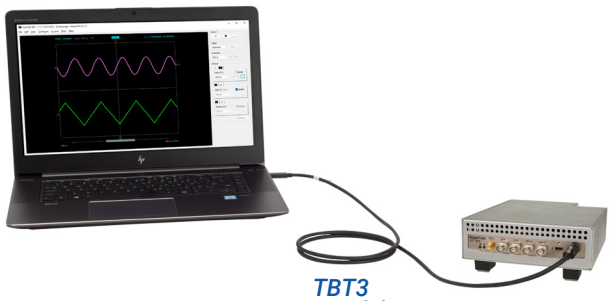
Terabyte Storage Oscilloscope

High-Resolution Oscilloscope

Lidar

Spectroscopy

Multi-Channel Transient Recording



TBT3 connectivity

Connect ATST872 directly to your computer using a Thunderbolt 3 cable

Thunderbolt 3 Interface

ATST872 interfaces to the host computer using the Thunderbolt 3 bus that runs at 40 Gbps.

ATST872 is also compatible with the Thunderbolt 4 bus. It is essential that customers use certified Thunderbolt 3 or Thunderbolt 4 cables for optimal performance.

ATST872 is a self-powered device and not bus powered, which means the customer must provide a separate 18~24V DC power to the ATST872 for it to operate.

The AlazarTech® **1.6 GB/s** benchmark was done on an HP® ZBook laptop. Similar results were obtained using the optional Thunderbolt 3 port on an HP Z4 workstation.

Software Portability

The biggest advantage of using Thunderbolt 3 over other serial connections is that any code developed for AlazarTech's PCIe boards can be ported over seamlessly to AlazarTech Thunderbolt 3 devices.

Analog Input

An ATST872 features two analog input channels with extensive functionality. Each channel has 450 MHz of full power analog input bandwidth.

With software-selectable attenuation, you can achieve an input voltage range of ±100 mV to ± 4V.

It must be noted that input impedance of both channels is fixed at 50 Ω.

Software-selectable AC or DC coupling further increases the signal measurement capability.

Acquisition System

ATST872 Thunderbolt 3 digitizers use state-of-the-art 1 GSPS, 8-bit ADCs to digitize the input signals. The real-time sampling rate ranges from 1 GS/s down to 1 MS/s.

The two channels are guaranteed to be simultaneous, as the two ADCs use a common clock.

An acquisition can consist of multiple records, with each record being captured as a result of one trigger event. A record can contain both pre-trigger and post-trigger data.

ATST872 can capture an infinite number of triggers when it is operating using dual-port memory.

In between the multiple triggers being captured, the acquisition system is re-armed by the hardware within 64 sampling clock cycles.

This mode of capture, sometimes referred to as Multiple Record, is very useful for capturing data in applications with a very rapid or unpredictable trigger rate. Examples of such applications include medical imaging, ultrasonic testing, OCT and NMR spectroscopy.

On-Board Acquisition Memory

ATST872 provides 512 Million samples per channel of on-board dual-port memory that can be used for signal storage.

There are two distinct advantages of having on-board memory:

First, a snapshot of the ADC data can be stored into this acquisition memory at full acquisition speed of 2 ch * 1 GS/s * 1 bytes per sample = 2 Gigabytes per second, which is higher than the maximum Thunderbolt 3 throughput of 1.6 GB/s.

Second, and more importantly, on-board memory is used as a very deep FIFO to temporarily store acquired ADC data before transferring it to motherboard memory using proprietary DMA engines. This on-board buffer allows loss-less data transfer even if the computer is temporarily interrupted by other tasks.

Maximum Sustained Bus Throughput

Data throughput across Thunderbolt 3 connection is highly dependent on the quality of the cable being used. Customers must use a certified Thunderbolt 3 cable to achieve the maximum sustained transfer rate of 1.6 GB/s.

ATST872 users can quickly determine the maximum sustained transfer rate for their motherboard by connecting their ATST872 to the Thunderbolt 3 or Thunderbolt 4 port of their laptop or desktop computer and running the bus benchmarking tool provided in AlazarDSO for Windows or AlazarFrontPanel for Linux.

Digitizer Transfer Speed

The digitizer transfer speed is limited by the lower of:

- Bus Throughput
- Cumulative ADC Data Rate

The Thunderbolt 3 bus throughput is 1.6 GB/s.

The Cumulative ADC Data Rate represents the maximum data the digitizer can generate and is calculated as:

Number of channels × Max. sampling rate × Bytes per sample

ATST872: 2 channels × 1 GS/s × 1 = 2 GB/s

The Cumulative ADC Data Rate for ATST872 is 2 GB/s and the bus throughput is 1.6 GB/s. Therefore, the digitizer transfer speed for ATST872 is 1.6 GB/s.

OEM model

An ATST872-OEM model is also available. It comes without the enclosure so that it can be designed into an OEM's system.

ATST872-OEM features two power connectors: a DC-jack that is used with an external AC-DC power supply; and a 2 pin locking Molex MiniFit 39-29-9029 connector that can be used in applications that require a more robust connection in OEM applications.

If OEMs wish to use the Molex MiniFit connector, the design of the power supply and related cabling is their responsibility. The power supply must comply with the requirements as specified in the Power Requirements section on page 9.

Recommended PCs

We recommend the use of certified Thunderbolt 3 or Thunderbolt 4 laptops or desktop computers with ATST872.

Recommended Thunderbolt 3 Cables

While Thunderbolt 3 uses the same USB C connector as USB 3.x, the unique electrical requirements of Thunderbolt 3 require the use of special cables that have been certified by an accredited laboratory.

According to Thunderbolt 3 specification, the maximum cable length for passive cables is 0.8 meters. Longer lengths require active cables.

AlazarTech supplies one 0.7 meter passive cable with the digitizer. We have also tested the Corning® 25 meter optical cable model# COR-AOC-CCU6JPN025M20.

Recommended AC-DC Power Supply

ATST872 is a self-powered Thunderbolt 3 device. Users must supply the necessary power to the digitizer for it to operate.

In order to obtain safety certification for the ATST872, AlazarTech cannot include a power supply with the digitizer. Though the recommended power supplies have all the necessary compliance marks, our Safety test lab insisted on reviewing the power supply schematics and bill of materials, which were not shared by the power supply manufacturer. The power supply must, therefore, be ordered separately.

A new power supply with interchangeable AC blades for international use is now available (order number ATST3PS-002). It includes AC blades for use in North America, Europe, U.K., Australia, and China. Customers may also opt to order the CUI Inc. SMI36-24-V-P5 power supply from their preferred vendor.

Limited quantities of the NEMA 5-15P power supply (for use in countries with type B outlets) are available at a reduced price (order number ATST3PS-001). Customers may opt to order this Phihong USA PSAC60M-240 power supply and AC30MNA power cord directly from their preferred vendor.

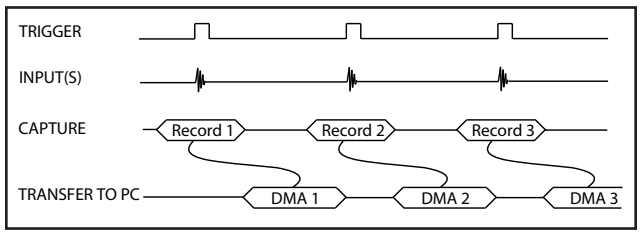
The following Phihong USA NEMA 5-15P power supplies have also been tested by AlazarTech: PPL65U-240 (65W) and PSAC30U-240L6 (30W).

The power supplies specified above have undergone testing at our factory and are the recommended power supplies for AlazarTech Thunderbolt 3 digitizers.

Traditional AutoDMA

In order to acquire both pre-trigger and post-trigger data in a dual-ported memory environment, users can use Traditional AutoDMA.

Data is returned to the user in buffers, where each buffer can contain from 1 to 8192 records (triggers). This number is called RecordsPerBuffer.



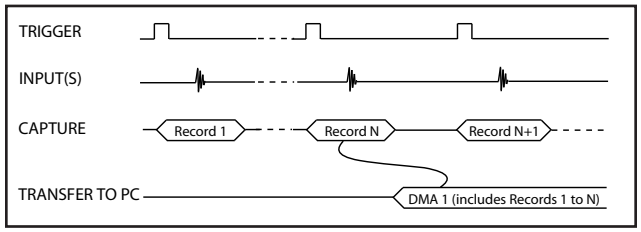
While Traditional AutoDMA can acquire data to PC host memory at the maximum sustained transfer rate of the motherboard, a BUFFER_OVERFLOW can occur if more than 512 triggers occur in very rapid succession, even if all the on-board memory has not been used up.

ATST872 features a high-performance memory management firmware that allows much faster data throughput in Traditional mode than previous generation digitizers.

No Pre-Trigger (NPT) AutoDMA

Many ultrasonic scanning and medical imaging applications do not need any pre-trigger data: only post-trigger data is sufficient.

NPT AutoDMA is designed specifically for these applications. By only storing post-trigger data, the memory bandwidth is optimized.



Note that a DMA is not started until RecordsPerBuffer number of records (triggers) have been acquired and written to the on-board memory.

NPT AutoDMA buffers do not include headers, so it is not possible to get trigger time-stamps.

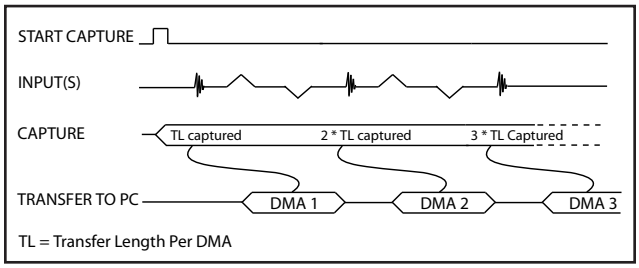
More importantly, a BUFFER_OVERFLOW flag is asserted if the on-board memory overflows, i.e. the amount of memory that has been written into but not not read out to PCIe bus exceeds the on-board memory size.

NPT AutoDMA can easily acquire data to PC host memory at the maximum sustained transfer rate of the motherboard without causing an overflow.

Continuous AutoDMA

Continuous AutoDMA is also known as the data streaming mode. In this mode, data starts streaming across the Thunderbolt 3 bus as soon as the ATST872 is armed for acquisition. It is important to note that triggering is disabled in this mode.

Continuous AutoDMA buffers do not include headers, so it is not possible to get trigger time-stamps. A BUFFER_OVERFLOW flag is asserted only if the entire on-board memory is used up.

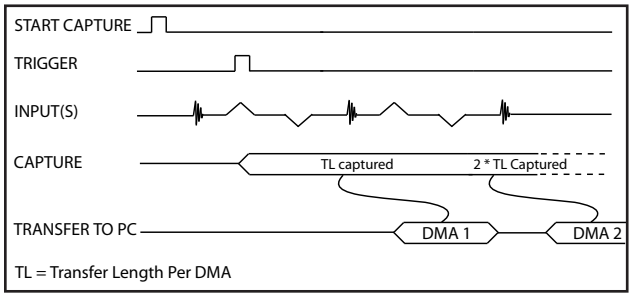


The amount of data to be captured is controlled by counting the number of buffers acquired. Acquisition is stopped by an AbortCapture command.

Continuous AutoDMA can easily acquire data to PC host memory at the maximum sustained transfer rate of the motherboard without causing an overflow. This is the recommended mode for very long signal recording.

Triggered Streaming AutoDMA

Triggered Streaming AutoDMA is virtually the same as Continuous mode, except the data transfer across the bus is held off until a trigger event has been detected. Triggered Streaming AutoDMA buffers do not include headers, so it is not possible to get trigger time-stamps.



A BUFFER_OVERFLOW flag is asserted only if the entire on-board memory is used up.

As in Continuous mode, the amount of data to be captured is controlled by counting the number of buffers acquired. Acquisition is stopped by an AbortCapture command.

Triggered Streaming AutoDMA can easily acquire data to PC host memory at the maximum sustained transfer rate of the motherboard without causing an overflow. This is the recommended mode for RF signal recording that has to be started at a specific time, e.g. based on a GPS pulse.

Multi-board Systems using ATS 4X1G

ATST872: Sync 4X1G is a device that allows simultaneous sampling across multiple independent ATST872 waveform digitizers. This is achieved by providing common clock and trigger signals to each digitizer.

Sync 4X1G supports Trigger Enable and Trigger Disable so that users can delay triggering until all digitizers are armed; this is a distinct advantage over passive signal splitters.

ATS Sync 4X1G comes with a software library that allows user software to control it.

Sync 4X1G interfaces to AlazarTech digitizer cards using a proprietary high-frequency cable. The provided cable terminates in a ganged micro-miniature RF connector, which is used to connect to the Sync 4X1G.

The other end of the cable terminates in male SMA and BNC connectors, which are used to connect to the digitizer External Clock and External Trigger respectively.

Sync 4X1G connects to the host computer using a provided USB cable. Please refer to the ATS Sync 4X1G datasheet for full specifications.

Asynchronous DMA Driver

The various AutoDMA schemes discussed above provide hardware support for optimal data transfer. However, a corresponding high-performance software mechanism is also required to make sure sustained data transfer can be achieved.

This proprietary software mechanism is called Async DMA (short for Asynchronous DMA).

A number of data buffers are posted by the application software. Once a data buffer is filled, i.e. a DMA has been completed, ATST872 hardware generates an interrupt, causing an event message to be sent to the application so it can start consuming data. Once the data has been consumed, the application can post the data buffer back on the queue. This can go on indefinitely.

One of the great advantages of Async DMA is that almost 95% of CPU cycles are available for data processing, as all DMA arming is done on an event-driven basis.

To the best of our knowledge, no other supplier of waveform digitizers provides asynchronous software drivers. Their synchronous drivers force the CPU to manage data acquisition, thereby slowing down the overall data acquisition process.

Output Data Format

By default, ATST872 data comes out as unsigned binary, where code 0 represents the negative full scale, code (2^n-1) represents the positive full scale with zero being 2^{n-1}.

It is possible to change the data format to signed binary using an API call. In signed binary format, zero is represented by code 0, positive full scale is represented by (2^{n-1}-1) and negative full scale is represented by (2^{n-1}).

Triggering

ATST872 is equipped with sophisticated digital triggering options, such as programmable trigger thresholds and slope on any of the input channels or the External Trigger input.

While most oscilloscopes offer only one trigger engine, ATST872 offers two trigger engines (called Engines J and K).

The user can specify the number of records to capture in an acquisition, the length of each record and the amount of pre-trigger data.

A programmable trigger delay can also be set by the user. This is very useful for capturing the signal of interest in a pulse-echo application, such as ultrasound, radar, lidar etc.

External Trigger Input

The external trigger input on the ATST872 is labeled TRIG IN on the face plate.

By default, the input impedance of this input is 50 Ω and the full scale input range is ±3 Volts. The trigger signal is treated as an analog signal in this situation and a high-speed comparator receives the signal.

It is also possible to trigger the ATST872 using a 3.3 V TTL signal. Input impedance is approximately 6.3 kΩ in this mode. This is very useful in imaging applications that use a trigger signal that cannot drive a 50 Ω load.

Timebase

ATST872 timebase can be controlled either by on-board low-jitter VCO or by external clock.

On-board low-jitter VCO uses a 10 MHz TCXO as a reference clock.

10 MHz Reference Clock

It is possible to generate the sampling clock based on an external 10 MHz reference input. This is useful for RF systems that use a common 10 MHz reference clock.

ATST872 uses an on-board low-jitter VCO to generate the 1 GHz high-frequency clock used by the ADC. This 1 GHz sampling clock can then be decimated by a factor of 1, 2, 4 or any other integer value that is divisible by 4.

AUX Connector

ATST872 provides an AUX (Auxiliary) BNC connector that is configured as a Trigger Output connector by default.

When configured as a Trigger Output, AUX BNC connector outputs a 5 Volt TTL signal synchronous to the ATST872 Trigger signal, allowing users to synchronize their test systems to the ATST872 Trigger. Note that the Trigger output is synchronized to a divide-by-4 clock (dual channel mode) or divide-by-8 clock (single channel mode).

When combined with the Trigger Delay feature of the ATST872, this option is ideal for ultrasonic and other pulse-echo imaging applications.

AUX connector can also be used as a Trigger Enable Input, or "Frame Start" input, which can be used to acquire complete frames, or B-scans, in imaging applications. In fact, this is the most popular use of the AUX connector in OCT applications.

Calibration

Every ATST872 digitizer is factory calibrated to NIST- or CNRC-traceable standards. To recalibrate an ATST872, the digitizer must be shipped back to the factory.

Test Reports

AlazarTech thoroughly tests every digitizer that leaves the factory; each board must pass hundreds of tests before it is shipped to a customer.

In addition to an 8-hour burn-in, each digitizer undergoes a full Performance Verification Test (PVT) where functionality such as external trigger, internal & external clock are tested, and characteristics such as frequency response and bandwidth are measured to ensure that they are within specification.

Customers can obtain test reports for their AlazarTech digitizer (for a fee) by adding the following order number to their digitizer order: *TestReport*. If ordered after board shipment, use order number: *TestReport-AO*.

On-Board Monitoring

Adding to the reliability offered by ATST872 are the on-board diagnostic circuits that constantly monitor over 20 different voltages, currents and temperatures. LED alarms are activated if any of the values surpass the limits.

AlazarDSO Software

ATST872 is supplied with the powerful AlazarDSO software that allows the user to setup the acquisition hardware and capture, display and archive the signals.

The Stream-To-Memory command in AlazarDSO allows users to stream a large dataset to motherboard memory.

AlazarDSO software also includes powerful tools for benchmarking the computer bus and disk drive.

Software Development Kits

AlazarTech provides easy to use software development kits for customers who want to integrate the ATST872 into their own software.

A Windows-compatible software development kit, called ATS-SDK, includes headers, libraries and source code sample programs written in C/C++, C#, Python, MATLAB, and LabVIEW.

A Linux-compatible software development kit, called ATS-devel, includes headers, libraries and source code sample programs written in C++ and Python.

These programs can fully control the ATST872 and acquire data in user buffers.

The purchase of an ATS-SDK license includes a subscription that allows users to download ATS-SDK updates from the AlazarTech website for period of 12 months from the date of purchase.

Customers who want to download new releases beyond this 12 month period should purchase extended maintenance (order number ATS-SDK-1YR).

ATS-GPU

ATS-GPU is a software library developed by AlazarTech to allow users to do real-time data transfer from ATST872 to a GPU card at rates up to 1.6 GB/s.

Interfacing waveform digitizers to GPUs involves creating a software mechanism to move data from one to the other and back to user buffers. The standard techniques used most often can get the job done, but feature very low data throughput due to software overheads.

AlazarTech designed ATS-GPU to eliminate this software bottleneck so that data can be moved from AlazarTech digitizers to GPUs and from GPUs to user buffers at full Thunderbolt 3 bus speeds. Once the data is available in GPU memory, many types of digital signal processing (DSP) can be done on this data at near-hardware speeds.

ATS-GPU-BASE is supplied with an example user application in source code. The application includes GPU kernels that use ATS-GPU to receive data, do very simple signal processing (data inversion), and copy the processed (inverted) data back to a user buffer. All this is done at the highest possible data transfer rate. Programmers can replace the data inversion code with application-specific signal processing kernels to develop custom applications.

Version 23.1.0 and higher of ATS-GPU-BASE includes a Boxcar Averaging example kernel that provides the ability to perform real-time boxcar averaging on signals acquired by AlazarTech waveform digitizers. It uses optimized GPU routines that allow raw data acquisition rates up to the full digitizer transfer speed (1.6 GB/s for ATST872). This signal processing module can lead to a major improvement of signal-to-noise ratio without using CPU resources and without doing FPGA programming.

ATS-GPU-OCT is the optional OCT Signal Processing library for ATS-GPU. It contains floating-point FFT routines that have also been optimized to provide the maximum number of FFTs per second. Kernel code running on the GPU can do zero-padding, apply a windowing function, do a floating-point FFT, calculate the amplitude and convert the result to a log scale. It is also possible to output phase information.

FFTs can be done on triggered data or on continuous gapless stream of data. It is also possible to do spectral averaging. Our benchmarks showed that it was possible to do 970,000 FFTs per second when capturing data in single-channel mode and using a NVIDIA® Quadro® P5000 GPU.

ATS-GPU-NUFFT is an extension of ATS-GPU-OCT that allows non-uniform FFTs to be performed on data acquired uniformly in time domain using a fixed sampling rate. For SS-OCTs where the wave-length does not vary linearly in time, a fixed sampling rate results in data that is non-uniformly dis-tributed in frequency domain. ATS-GPU-NUFFT allows linearized FFTs to be performed on such data.

ATS-GPU supports 64-bit Windows and 64-bit Linux for CUDA®-based development.

Support for Windows

Windows support for ATST872 includes Windows 11, Windows 10, Windows Server® 2019, and Windows Server 2016. As Windows Server 2019 and 2016 are seldom used by our customers, they are expected to work but are not regularly tested with each software release. If there are issues related to Windows Server 2016 or 2019, tech support may not be as rapid as for other operating systems.

Only 64-bit Windows operating systems are supported.

Microsoft mainstream support ended in 2018 for Windows 8.1 and Windows Server 2012 R2. As such, AlazarTech has ceased development on these operating systems. Current software and driver releases may work with these operating systems but they are not officially supported.

Due to lack of demand and due to the fact that Microsoft no longer supports these operating systems, AlazarTech no longer supports Windows 8, Windows 7, Windows XP, Windows Vista, Windows Server 2012, Windows Server 2008 R2, and Windows Server 2008.

Linux Support

AlazarTech offers Dynamic Kernel Module Support (DKMS) drivers for the following Linux distributions: Ubuntu, Debian, and RHEL®.

AlazarTech DKMS drivers may work for other Linux distributions but they have not been tested and technical support may be limited.

Users can download the DKMS driver and associated library for their specific distribution here: www.alazartech.com/en/linux-drivers/atst872/876/

Only 64-bit Linux operating systems are supported.

A GUI application called AlazarFrontPanel that allows simple data acquisition and display is also provided..

ATS-SDK includes source code example programs for Linux, which demonstrate how to acquire data programmatically using a C compiler. Note that example programs are only provided for Python and C++.

Accessories for Out-of-Warranty Products

Accessories, such as the DC power supply, purchased for use with in-warranty digitizer cards will be covered by a 1-year warranty.

Accessories purchased for use with out-of-warranty digitizers will not be warranted against defects in materials and workmanship. As AlazarTech cannot verify with certainty that the cause of any malfunction is not due to the non-warranted digitizer, accessories purchased for out-of-warranty digitizers will require a warranty waiver.

Technical Support

Effective immediately, AlazarTech will only provide free technical support on in-warranty hardware products.

As of November 1, 2025, AlazarTech digitizers come with a standard two (2) year parts and labor warranty. This warranty can be extended for a fee (more information can be found in the next section: *Extended Warranty*).

If your waveform digitizer is out of warranty, you will not be eligible for free technical support on AlazarTech hardware or software products and you will need to purchase technical support hours (order number SUPPORT-HR5) to obtain assistance.

In addition, any necessary repairs to your out-of-warranty hardware products will carry a minimum repair charge.

Extended Warranty

As of November 1, 2025, the purchase of an ATST872 includes a standard two (2) year parts and labor warranty. AlazarTech hardware parts and labor warranty should be maintained to ensure uninterrupted access to technical support and warranty repair services.

Customers may extend their warranty by ordering an Extended Warranty (order number ATST872-061). This must be purchased before expiration of the standard warranty (or before expiration of an Extended Warranty).

If the warranty lapses, renewal at a later date will be subject to a reinstatement fee, to cover the administrative costs of warranty reinstatement, and a 6-month waiting period for repair claims. Furthermore, warranty must be extended at least 6 months past the current date.

Get your warranty end date by registering your product at: www.alazartech.com/en/my-account/my-products/.

RoHS Compliance

ATST872 is fully RoHS compliant, as defined by Directive 2015/863/EU (RoHS 3) of the European Parliament and of the Council of 31 March 2015 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

All manufacturing is done using RoHS-compliant components and lead-free soldering.

REACH Compliance

AlazarTech verifies its supply chain against the latest REACH requirements. A compliance statement is usually available within 6 months of release of the European Chemicals Agency (ECHA) updated substance of very high concern (SVHC), Authorizations, and Restrictions lists.

Export Control Classification

According to the *Export Controls Division of the Government of Canada*, ATST872 is currently not controlled for export from Canada. Its export control classification is N8, which is equivalent to ECCN EAR99. ATST872 can be shipped freely outside of Canada, with the exception of countries listed on the *Area Control List* and *Sanctions List*. Furthermore, if the end-use of ATST872, in part or in its entirety, is related to the development or deployment of weapons of mass destruction, AlazarTech is obliged to apply for an export permit.

EC Conformity

ATST872 conforms to the following standards:

Electromagnetic Emissions:
CISPR 32:2015/AMD1:2019 /
EN 55032:2015/A11:2020 (Class A):
Multimedia Equipment (MME) Radio disturbance characteristics. Limits and method of measurement:
EN 61000-3-2:2014, EN 61000-3-3:2013.

Electromagnetic Immunity:
EN 55035:2017/A11:2020:
Multimedia Equipment (MME) Immunity characteristics. Limits and methods of measurement:
EN 61000-4-2:2009, EN 61000-4-4:2012, EN 61000-4-5:2006, EN 61000-4-6:2009, EN 61000-4-11:2004.

Safety:
IEC 62368-1:2018 / EN 62368-1:2020+A11:2020:
Audio/video, information and communication technology equipment - Part 1: Safety requirements.

ATST872 also follows the provisions of the following directives: 2014/35/EU (Low Voltage Equipment); 2014/30/EU (Electromagnetic Compatibility).

FCC & ICES-003 Compliance

ATST872 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 issue 7 October 2020.

ORDERING INFORMATION

ATST872 (with enclosure)	ATST872-001
ATST872-OEM (without enclosure)	ATST872-101
ATST872: One Year Extended Warranty	ATST872-061
ATSTXXX: Type B Power Supply (N.America)	ATST3PS-001
ATSTXXX: Power Supply with changeable international AC blades	ATST3PS-002
Test reports ordered with board	TestReport
Test reports ordered after board shipment	TestReport-AO
ATST872: Sync 4X1G	ATST872-025
ATS Sync xX1G: AC Wall Adapter	SYNC-X1G-PWR
ATS Sync 4X1G: GRF1-SMA/BNC cable	SYNC-4X1-CBL
SYNC-4X1G: One Year Extended Warranty	SYNC-4X1-061
ATS-SDK purchased with a digitizer board or ATS-GPU: License + 1 Year Subscription (Supports C/C++, Python, MATLAB, and LabVIEW)	ATS-SDK
ATS-SDK purchased separately: License + 1 Year Subscription + 5 hours of technical support (Supports C/C++, Python, MATLAB, and LabVIEW)	ATS-SDK-WOD
ATS-GPU-BASE: GPU Streaming Library License + 1 Year Subscription	ATSGPU-001
ATS-GPU-OCT: Signal Processing Library License + 1 Year Subscription (requires ATSGPU-001)	ATSGPU-101
ATS-GPU-NUFFT: ATS-GPU-OCT Extension for fixed-frequency sampled data License + 1 Year Subscription (requires ATSGPU-001 & ATSGPU-101)	ATSGPU-201
5 Hours of technical support	SUPPORT-HR5

System Requirements

Personal computer with at least one free Thunderbolt 3 or Thunderbolt 4 port, (must be a certified Thunderbolt 3 or Thunderbolt 4 port to achieve full data throughput), 16 GB RAM; if using AlazarDSO, 16 GB of free hard disk space is also required.

Power Requirements

Input voltage:	+20 V to +24 V
Voltage ripple:	240 mV_{P-P}, max
Current consumption:	1.2 A at 24 Vdc input

Power Connectors

Connector types:	
DC (Barrel Plug)	2.1mm I.D. x 5.5mm O.D. x 9.5mm
Molex (for OEM use)	MiniFit 39-29-9029

Physical

Size
(excluding the connectors protruding from the front panel)

In enclosure:	6.5 inches x 8.16 x 2.7 inches
OEM version:	6.57 inches x 5.5 inches

Weight

In enclosure:	655 g
OEM version:	220 g

I/O Connectors

CH A, CH B, TRIG IN, AUX I/O	BNC female connectors
ECLK	SMA female connector

Environmental

Operating temperature	0 to 55 degrees Celsius, ambient
Storage temperature	-20 to 70 degrees Celsius
Relative humidity	5 to 95%, non-condensing

Acquisition System

Resolution	8 bits
Bandwidth (-3 dB)	
DC-coupled, 50 Ω	DC - 450 MHz
AC-coupled, 50 Ω	100 kHz - 450 MHz
Number of channels	2, simultaneously sampled
Maximum sample rate	1 GS/s
Minimum sample rate	1 MS/s (internal clock)
Full scale input ranges	
50 Ω input impedance:	±100 mV, ±200 mV, ±400 mV, ±1 V, ±2 V, and ±4 V, software-selectable
DC accuracy	±2% of full scale in all ranges
Input coupling	AC or DC, software-selectable
Input impedance	50 Ω ±1%
Absolute maximum input 50 Ω	±4 V (DC + peak AC for CH A and CH B only without external attenuation)

Acquisition Memory System

Acquisition Memory/ch	512 Million samples per channel
Record length	Software-selectable with 64-point resolution. Record length must be a minimum of 256 points. There is no upper limit on the maximum record length.
Number of records	Software-selectable from a minimum of 1 to a maximum of infinite number of records
Pre-trigger depth	
Traditional mode:	Up to (Record length - 256)
NPT AutoDMA mode:	From 0 to 4080 for single channel From 0 to 2040 for dual channel
Post-trigger depth	Record Length – Pre-Trigger Depth

Timebase System

Timebase options	Internal Clock or External 10 MHz Reference
Internal sample rates	1 GS/s, 500 MS/s, 250 MS/s, 100 MS/s, 50 MS/s, 20 MS/s, 10 MS/s, 5 MS/s, 2 MS/s, 1 MS/s,
Internal clock accuracy	±2 ppm

Dynamic Parameters

Typical values measured on CHA of a randomly selected ATST872. Input signal was provided by a Rohde & Schwarz (SMB 100A), followed by a 9-pole, 20 MHz band-pass filter (TTE Q36T-20M-2M-50-720BMF). Input frequency was set at 20 MHz and output amplitude was 796 mVpp, which was approximately 99% of the full scale input. Input range was set to 400mV. Input was not averaged and bandwidth limiting filter was disabled.

SNR	46.34 dB
SINAD	44.44 dB
THD	-48.95 dBc
SFDR	51.44 dBc

Note that these dynamic parameters may vary from one unit to another, with input frequency and with the full scale input range selected.

10 MHz Reference PLL Input

Signal level	500 mV_{P-P}
Input impedance	50 Ω
Input coupling	AC
Input Frequency	10 MHz ± 0.1 MHz
Maximum frequency	10.1 MHz
Minimum frequency	9.9 MHz
Sampling clock freq.	1 GHz

Triggering System

Mode	Edge triggering with hysteresis
Comparator type	Digital comparators for internal (CH A, CH B) triggering and analog comparators for TRIG IN (External) triggering
Number of trigger engines	2
Trigger engine combination	Engine J, engine K, J OR K, software-selectable

Trigger engine source	CH A, CH B, TRIG IN, Software or None, independently software-selectable for each of the two Trigger Engines
Hysteresis	±5% of full scale input, typical
Trigger sensitivity	±10% of full scale input range. This implies that the trigger system may not trigger reliably if the input has an amplitude less than ±10% of full scale input range selected
Trigger level accuracy	±5%, typical, of full scale input range of the selected trigger source
Bandwidth	450 MHz
Trigger delay	Software-selectable from 0 to 9,999,999 sampling clock cycles
Trigger timeout	Software-selectable with a 10 µs resolution. Maximum settable value is 3,600 seconds. Can also be disabled to wait indefinitely for a trigger event

TRIG IN (External Trigger) Input

Input type	Analog or 3.3 V TTL, software-selectable
Input coupling	DC only
Analog input impedance	50 Ω
Analog bandwidth (-3 dB)	DC - 250 MHz
Analog input range	±3 V
Analog DC accuracy	±10% of full scale input
Analog absolute max. input	±8 V (DC + peak AC without external attenuation)
TTL input impedance	6.3 kΩ ±10%
TTL min. pulse width	32 ADC sampling clocks
TTL min. pulse amplitude	2 Volts
TTL absolute max. input	-0.7 V to +5.5 V

Auxiliary I/O (AUX I/O)

Signal direction	Input or Output, software-selectable. Trigger Output by default
Output types:	Trigger Output, Pacer (programmable clock) Output, Software-controlled Digital Output
Input types:	Trigger Enable Software readable Digital Input
Output	
Amplitude:	5 Volt TTL
Synchronization:	Synchronized to a clock derived from the ADC sampling clock. Divide-by-8 clock (dual channel mode) or divide-by-16 clock (single channel mode)
Input	
Amplitude:	3.3 Volt TTL
Input coupling:	DC

Certification and Compliances

RoHS 3 (Directive 2015/863/EU) Compliance

REACH Compliance

CE Marking — EC Conformity

FCC Part 15 Class A / ICES-003 Class A Compliance

Materials Supplied

ATST872 Thunderbolt 3 Digitizer
- with enclosure if ordering ATST872-001
- without enclosure if ordering ATST872-101

ATSTxxx 0.7m Thunderbolt 3 passive 1x screw lock cable

ATST872 Software Installer (downloadable from product page)

All specifications are subject to change without notice

Manufactured By:

Alazar Technologies, Inc.

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DATASHEET REVISION HISTORY

Changes from version 1.0 (Oct 2025) to version 1.0A	Section, Page
Changed section name. Previously *Maximum Sustained Transfer Rate*	Maximum Sustained Bus Throughput, pg. 2
Added section	Digitizer Transfer Speed, pg. 2
Replaced *full bus speed* with *digitizer transfer speed*	ATS-GPU, pg. 6
Updated standard warranty period from one year to two years	Technical Support, pg. 7
Updated standard warranty period from one year to two years Removed limit on the number of purchasable extended warranties	Extended Warranty, pg. 7