ATST371-OEM

1 GS/s 12-Bit Thunderbolt 3 Digitizer

- Thunderbolt™ 3 (USB type C) connectivity -- No embedded PC required!
- 2 channels sampled at 12-bit resolution
- 1 GS/s real-time sampling rate
- FPGA-based FFT processing
- Variable frequency external clocking
- OCT Ignore Bad Clock technology
- Continuous streaming mode
- ±400 mV fixed input range
- AlazarDSO® oscilloscope software
- Software Development Kit supports C/C++, C#, Python, MATLAB®, LabVIEW®
- Support for Windows®, Linux® & macOS®

RoHS 3 COMPLIANT
2015/863/EU

Thunderbolt 3 Connectivity

Product	Bus	Operating System	Channels	Max. Sample Rate	Bandwidth	Memory Per Channel	Resolution
ATST371	Thunderbolt 3	32/64-bit Windows 64-bit Linux & macOS	2	1 GS/s on 2 channels	1.0 GHz	2 Gigasamples on 2 channels	12 bits

Overview

AlazarTech ATS®T371 is a dual-channel, high-speed, 12-bit, 1 GS/s waveform digitizer card with Thunderbolt 3 connectivity, capable of acquiring data into its on-board 8 GB memory or streaming to PC memory. Thunderbolt 3 connectivity allows data streaming at rates up to 2.6 GB/s.

From a software perspective, ATST371 looks exactly like the PCI Express based ATS9371. This means that any software developed for ATS9371 will work seemlessly with ATST371, giving customers an easy option to migrate to this Thunderbolt 3 based waveform digitizer.

ATST371 is also possible to do FPGA-based 4096 point FFT on acquired data. This is useful for Optical Coherence Tomography (OCT) applications.

There are two A/D converters on the ATST371 board, each running at 1 GS/s. Unlike other products on the market, ATST371 does not use interleaved sampling. Each input has its own 12-bit, 1 GSPS ADC chip.

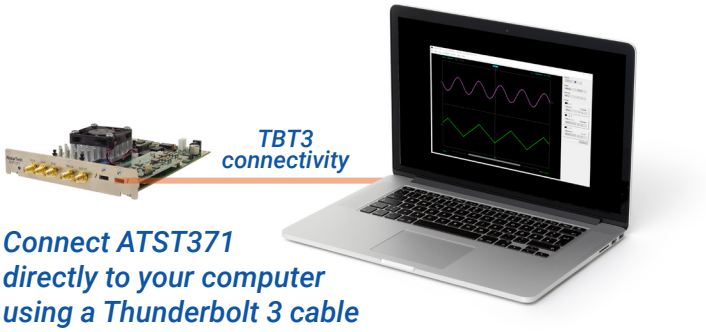
Optional variable frequency external clock allows operation from 1 GHz down to 300 MHz (or 100 MHz for screened ATST371 cards), making ATST371 an ideal waveform digitizer for many applications.

ATST371 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 ATST371 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

Optical Coherence Tomography (OCT)
Ultrasonic & Eddy Current NDT/NDE
RF Signal Recording & Analysis
Terabyte Storage Oscilloscope
High-Resolution Oscilloscope
Spectroscopy
Multi-Channel Transient Recording



Connect ATST371 directly to your computer using a Thunderbolt 3 cable

Thunderbolt 3 Interface

ATST371 interfaces to the host computer using the Thunderbolt 3 bus that runs at 40 Gbps. It is essential that customers use certified Thunderbolt 3 cables for optimal performance.

ATST371 is a self-powered device and not bus powered, which means the customer must provide a separate 18~24V DC power to the ATST371 for it to operate.

The AlazarTech® **2.6 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 ATST371 features two analog input channels. Each channel has up to 1.0 GHz of full power analog input bandwidth. Input voltage range is fixed at ±400 mV.

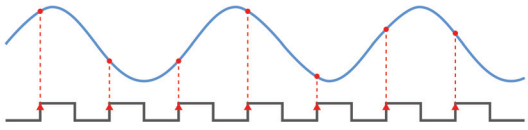
It must be noted that input impedance of both channels is fixed at 50 Ω. Input coupling is fixed to DC.

Acquisition System

ATST371 PCI Express digitizers use state-of-the-art dual 1 GS/s, 12-bit ADCs to digitize the input signals.

The two channels are guaranteed to be simultaneous, as the two ADCs use a common clock. Note that it is not possible to perform dual edge sampling (DES) on ATST371.

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. Up to 8064 pre-trigger points can be captured in single channel mode and 3968 in dual-channel mode. ATST371 can capture an infinite number of triggers. In between the multiple triggers being captured, the acquisition system is re-armed by the hardware within 256 sampling clock cycles.



ATST371 Sampling

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

ATST371 features two DDR3 SODIMM sockets that can each be populated with a 4 GB SODIMM, for a total on-board memory of 8 GB (4 Gigasamples).

This 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 Transfer Rate

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 2.6 GB/s.

ATST371 users can quickly determine the maximum sustained transfer rate for their motherboard by connecting their ATST371 to the Thunderbolt 3 port of their laptop or desktop computer and running the bus benchmarking tool provided in AlazarDSO for Windows or AlazarFrontPanel for Linux.

Recommended PCs

We recommend the use of certified Thunderbolt 3 laptops or desktop computers with ATST371.

Recommended Thunderbolt 3 Cables

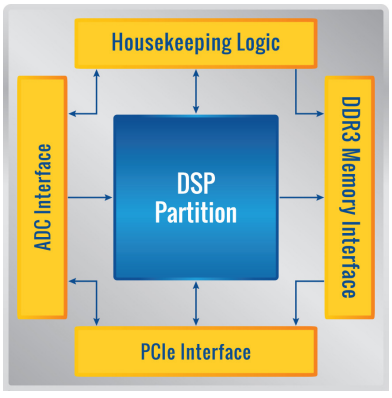
While Thunderbolt 3 uses the same USB C connector as USB 3.x, the unique electrical requirements of Thunderbolt 3 require the use of special cables that have been certified by an accredited laboratory.

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

AlazarTech supplies one 0.8 meter passive cable with the digitizer. Other options for the cable include a 2 meter long active cable or a 25 meter long optical cable.

FPGA-Based Digital Signal Processing

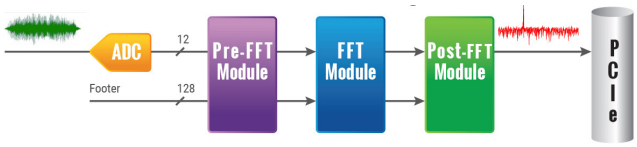
In addition to providing the bus interface and managing the acquisition engine, ATST371's on-board FPGA is also used for digital signal processing, such as Fast Fourier Transforms. ATST371 features a large Stratix V FPGA 5SGXMA3K3F40C3N.



ATST371 FPGA

FPGA-Based FFT Processing

It is possible to do real-time FFT signal processing using the on-board FPGA. Note that only one input can be processed.



Up to 4096-point FFT length is supported. A user programmable complex windowing function can be applied to the acquired data before FFT calculation.

The complex FFT output is converted to magnitude in single-precision floating-point format. A logarithmic output is also available.

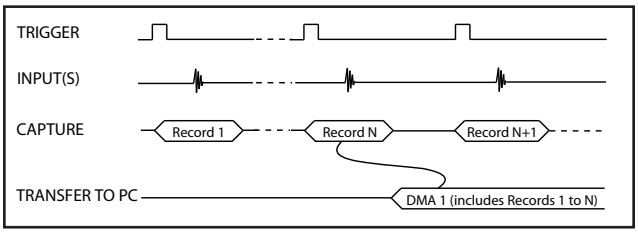
It is also possible to DMA both frequency and time domain data. This allows users to verify FPGA-based FFT operation during algorithm development.

ATST371 can perform 250,000 4096-point FFTs per second. FPGA-based FFT is ideal for customers in the Optical Coherence Tomography (OCT) field.

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 and the entire on-board memory acts like a very deep FIFO.



Note that a DMA is not started until (RecordsPerBuffer +1) number of records (triggers) have been acquired and written to the on-board memory.

NPT AutoDMA buffers do not include headers. However, users can specify that each record should come with its own footer that contains a 40-bit trigger timestamp. The footer is called NPT Footer.

More importantly, a BUFFER_OVERFLOW flag is asserted only if the entire on-board memory is used up. This provides a very substantial improvement over Traditional AutoDMA.

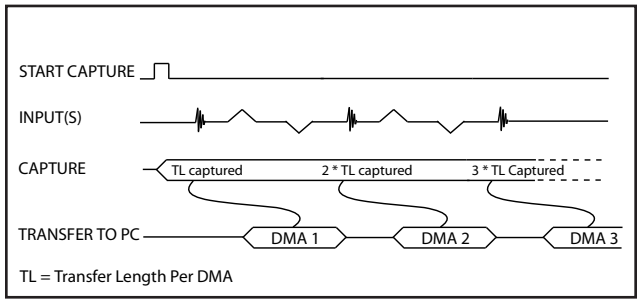
NPT AutoDMA can easily acquire data to PC host memory at the maximum sustained transfer rate of the motherboard without causing an overflow.

This is the recommended mode of operation for most ultrasonic scanning, OCT and medical imaging applications.

It should be noted that even though this mode is called "No Pre Trigger", it is now possible to do limited pre-trigger data captures, i.e. up to 8192 points in single channel mode and 4096 points in dual channel mode.

Continuous AutoDMA

Continuous AutoDMA is also known as the data streaming mode. In this mode, data starts streaming across the PCIe bus as soon as the ATST371 is armed for acquisition. It is important to note that triggering is disabled in this mode.



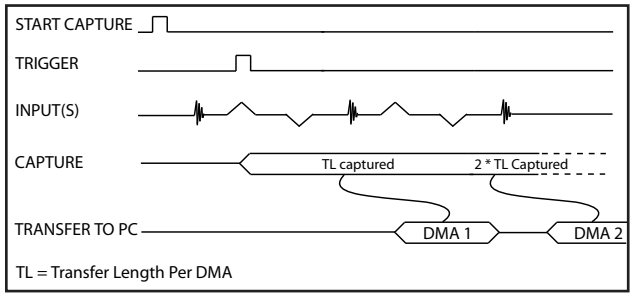
Continuous AutoDMA buffers do not include headers, so it is not possible to get trigger time-stamps. A BUFFER_OVERFLOW flag is asserted only if the entire on-board memory is used up.

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.

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, ATST371 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.

Data Packing Mode

By default, ATST371 stores 12-bit data acquired by its on-board A/D converters as a 16-bit integer. Users can also choose to pack the data as 12-bit integers or even 8-bit integers. Being able to reduce the total amount of data being transferred can be very useful in data recording applications.

Note that it is the user application's responsibility to unpack the data. Also note that NPT Footers are not available in Data Packing Mode.

Triggering

ATST371 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, ATST371 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

ATST371 external trigger input (TRIG IN) can be set as an analog input with ±2.5 V full scale input range and 50 Ω input impedance, or a 3.3 V TTL input.

When TTL input is selected, the input impedance increases to approximately 6.6 kΩ, making it easier to drive the TRIG IN input from high-output impedance sources.

Note: If full 12-bit resolution is required, users should select CH A or CH B as the trigger source. When the External Trigger Input is used as the trigger source, the least significant bit (LSB) of each 12-bit sample is replaced by the state of the external trigger signal source.

Timebase

ATST371 timebase can be controlled either by on-board low-jitter VCO or by optional External Clock.

On-board low-jitter VCO uses a 10 MHz TCXO as a reference clock. Clock buffers used feature less than 76 fs_{RMS} additive jitter.

Optional External Clock

While the ATST371 features low jitter VCO and a 10 MHz TCXO as the source of the timebase system, there may be occasions when digitizing has to be synchronized to an external clock source.

ATST371 External Clock option provides an SMA input for an external clock signal, which should have a high slew rate. Signal levels, specified in detail on page 8, must be respected.

Input impedance for the External Clock input is fixed at 50 Ω. External clock input is always AC-coupled.

There are two types of External Clock supported by ATST371. These are described below.

Fast External Clock

A new sample is taken by the on-board ADCs for each rising edge of this External Clock signal.

In order to satisfy the clocking requirements of the ADC chips being used, Fast External Clock frequency must always be higher than 300 MHz and lower than 1 GHz.

For customers whose external clocks may go lower than 300 MHz during the acquisition, it is possible to have AlazarTech screen the ATST371 boards for external clock operation down to 100 MHz (Order number ATST371-006)

This is the ideal clocking scheme for OCT applications.

10 MHz Reference Clock

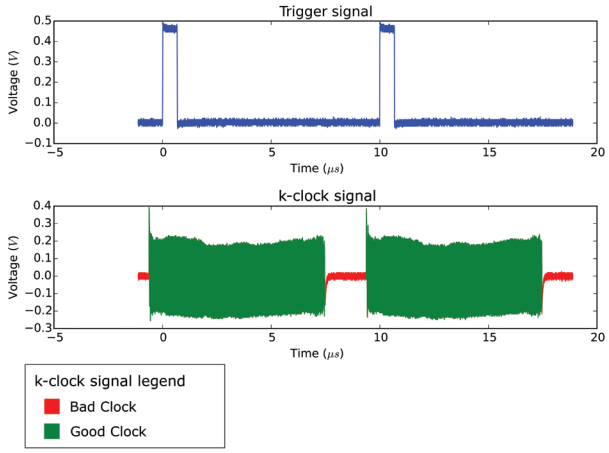
With the optional external clock upgrade, it is possible to generate the sampling clock based on an external 10 MHz reference input. This is useful for RF systems that use a common 10 MHz reference clock.

ATST371 uses an on-board low-jitter PLL to generate a user-specified high-frequency clock used by the ADC. This sampling clock can be any multiple of 1 MHz between 300 MHz and 1 GHz.

OCT Ignore Bad Clock

The ADCs used on the ATST371 require the external clock frequency to be above 300 MHz and lower than 1 GHz. In OCT applications, these limits cannot always be respected due to the nature of the optical source.

AlazarTech's *OCT Ignore Bad Clock* technology allows safe operation with these out-of-specification clocks without requiring the use of a dummy clock in the source.



See www.alazartech.com/en/technology/oct-ignore-bad-clock/ for more information on this technology.

AUX Connector

ATST371 provides an AUX (Auxiliary) SMA connector that is configured as a Trigger Output connector by default.

When configured as a Trigger Output, AUX SMA connector outputs a 5 Volt TTL signal synchronous to the ATST371 Trigger signal, allowing users to synchronize their test systems to the ATST371 Trigger.

When combined with the Trigger Delay feature of the ATST371, this option is ideal for ultrasonic and other pulse-echo imaging applications.

AUX connector can also be used as a Trigger Enable Input for Frame Capture (B-scan) applications. In fact, this is the most popular use of AUX connector in OCT applications.

Calibration

Every ATST371 digitizer is factory calibrated to NIST- or CNRC-traceable standards. To recalibrate an ATST371, the digitizer must be shipped back to the factory.

On-Board Monitoring

Adding to the reliability offered by ATST371 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

ATST371 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 ATST371 into their own software.

A Windows and Linux compatible software development kit, called ATS-SDK, includes headers, libraries and source code sample programs written in C/C++, C#, Python, MATLAB, and LabVIEW. These programs can fully control the ATST371 and acquire data in user buffers.

The purchase of an ATS-SDK license includes a subscription that provides the following benefits for a period of 12 months from the date of purchase:

- Download ATS-SDK updates from the AlazarTech website;
- Receive technical support on ATS-SDK.

Customers who want to receive technical support and download new releases beyond this 12 month period should purchase extended support and 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 ATST371 to a GPU card at rates up to 2.6 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 PCIe 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.

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 1,900,000 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 ATST371 includes Windows 10, Windows 8.x, and Windows Server 2012.

Microsoft support for Windows 7 and Windows Server 2008 R2 ended on January 14, 2020. As such, AlazarTech ceased development on Windows 7 and Windows Server 2008 R2 as of this date. We will continue to support customers using Windows 7 and Windows Server 2008 R2 until December 31, 2020. After this date, no support will be provided.

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

Linux Support

AlazarTech offers ATST371 Dynamic Kernel Module Support (DKMS) drivers for the following Linux distributions: CentOS, Debian, and Ubuntu.

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 for their specific distribution by choosing from the available drivers here:

ftp://release@ftp.alazartech.com/outgoing/linux

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.

ATS-SDK includes source code example programs for Linux, which demonstrate how to acquire data programmatically using a C compiler.

Based on a minimum annual business commitment, the Linux driver source code license (order number ATST371-LINUX) may be granted to qualified OEM customers for a fee. For release of driver source code, a Non-Disclosure Agreement must be executed between the customer's organization and AlazarTech.

All such source code disclosures are made on an as-is basis with limited support from the factory.

MacOS Support

As per Thunderbolt 3 licensing agreement, we do provide drivers for MacOS. A console application can be made available to users interested in use of ATST371 under MacOS.

Extended Warranty

The purchase of an ATST371 includes a standard one (1) year parts and labor warranty. Customers may extend their warranty by ordering an Extended Warranty (order number ATST371-061).

This must be purchased before expiration of the standard warranty (or before expiration of an Extended Warranty). Extended Warranties can only be purchased while there is a valid warranty in place.

AlazarTech reserves the right to limit the number of warranty extensions for any product.

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

Export Control Classification

According to the *Export Controls Division of the Government of Canada*, ATST371 is currently not controlled for export from Canada. Its export control classification is N8, which is equivalent to ECCN EAR99. ATST371 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 ATST371, 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.

RoHS Compliance

ATST371 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.

System Requirements

Personal computer with at least one free Thunderbolt 3 port, (must be a certified Thunderbolt 3 port to achieve full data throughput), 128 GB RAM, 100 MB of free hard disk space, SVGA display adaptor and monitor with at least a 1024 x 768 resolution.

Power Requirements

+12 V	1.5 A, typical
+3.3 V	3.0 A, typical

Physical

Size	6.57 inches x 5.5 inches excluding the connectors protruding from the front panel
Weight	500 g

I/O Connectors

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

Environmental

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

Acquisition System

Resolution	12 bits
Bandwidth (-3 dB) DC-coupled, 50 Ω	Standard DC - 1.0 GHz
Number of channels	2, simultaneously sampled
Maximum Sample Rate	1 GS/s single shot
Minimum Sample Rate	1 KS/s single shot for internal clocking
Full Scale Input ranges 50 Ω input impedance:	±400 mV
DC accuracy	±2% of full scale in all ranges
Input coupling	DC
Input impedance	50 Ω ±1%
Input protection 50 Ω	±4 V (DC + peak AC for CH A, CH B and TRIG IN only without external attenuation)

Acquisition Memory System

Memory Size	8 GB (4 Gigasamples in one channel mode)
Record Length	Software-selectable with 128-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	From 0 to 8176 for single channel From 0 to 4088 for dual channel
Post-trigger depth	Record Length – Pre-Trigger Depth

Timebase System

Timebase options	Internal Clock or External Clock (Optional)
Internal Clock accuracy	±2 ppm
Internal Sample Rates	1 GS/s, 800 MS/s, 500 MS/s, 200 MS/s, 100 MS/s, 50 MS/s, 20 MS/s, 10 MS/s, 5 MS/s, 2 MS/s, 1 MS/s, 500 KS/s, 200 KS/s, 100 KS/s, 50 KS/s, 20 KS/s, 10 KS/s, 5 KS/s, 2 KS/s, 1 KS/s

Dynamic Parameters

Typical values measured on the 400 mV range of CH A of a randomly selected ATST371. Input signal was provided by an SRS SG384 signal generator, followed by a 9-pole, 100 MHz band-pass filter (TTE Q36T-100M-10M-50-720BMF). Input frequency was set at 99.9 MHz and output amplitude was set to approximately 95% of the full scale input.

SNR	57.1 dB
SINAD	56.6 dB

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

Optional ECLK (External Clock) Input

Signal Level	400 mV_{P-P} to 2 V_{P-P}
Input impedance	50 Ω
Input coupling	AC
Maximum frequency for Fast External Clock	1 GHz
Minimum frequency for Fast External Clock	300 MHz 100 MHz for Screened ECLK boards
Sampling Edge	Rising only

Optional 10 MHz Reference PLL Input

Signal Level	400 mV_{P-P} to 2 V_{P-P}
Input impedance	50 Ω
Input Coupling	AC coupled
Input Frequency	10 MHz ± 0.1 MHz
Maximum frequency	10.1 MHz
Minimum frequency	9.9 MHz
Sampling Clock Freq.	Any multiple of 1 MHz between: 300 MHz and 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, EXT, 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	250 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	±2.5 V
Analog DC accuracy	±10% of full scale input
Analog input protection	±8 V (DC + peak AC without external attenuation)
TTL input impedance	6.6 kΩ ±10%
TTL min. pulse width	32 ADC sampling clocks
TTL min. pulse amplitude	2 Volts
TTL input protection	-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-4 clock (dual channel mode) or divide-by-8 clock (single channel mode)
Input	
Amplitude:	3.3 Volt TTL (5 Volt-compliant)
Input coupling	DC only

Materials Supplied

ATST371-OEM Thunderbolt 3 Digitizer Card

ATST371-OEM Thunderbolt 3 Cable

ATST371-OEM Power Supply and Power Supply Cable

ATST371-OEM Install Disk on USB flash drive

All specifications are subject to change without notice

ORDERING INFORMATION

ATST371-OEM	ATST371-001
ATST371-OEM: External Clock Upgrade	ATST371-005
ATST371-OEM: Screened External Clock Upg.	ATST371-006
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