PhotoSound®
Imaging and Data Acquisition Solutions

Build the best data acquisition platform powered by PhotoSound®

LEGION™ ADC

256-Channel Analog-to-Digital Converter

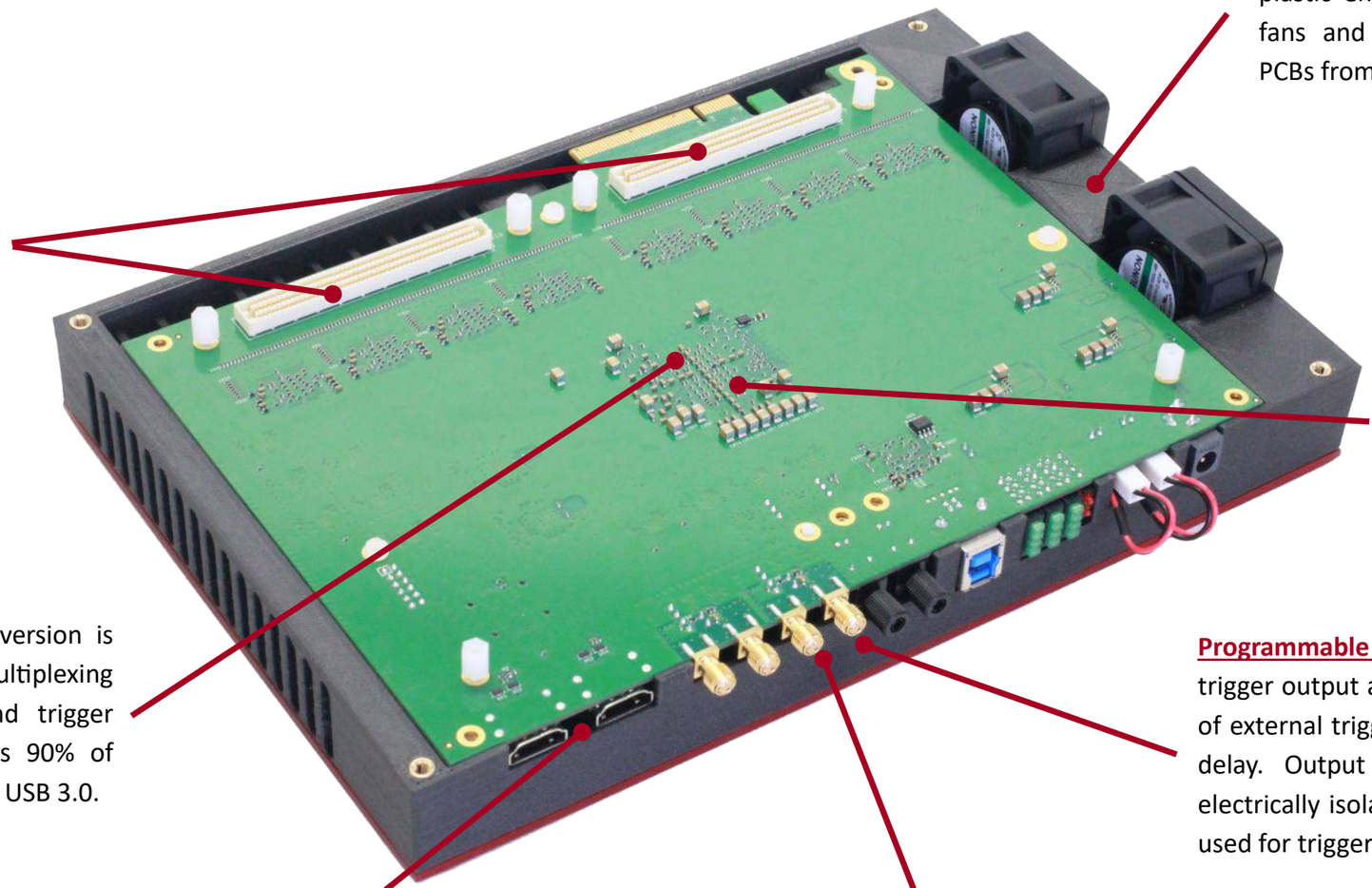
Applications

Photoacoustics (Optoacoustics)
X-ray Induced Acoustics
Thermoacoustics
Acoustoelectrics
3D Tomography
Photoacoustic Microscopy (PAM)
2D Imaging
Multi-Sensor Monitoring
Non-Destructive Testing
Transducer Manufacturing
Low Voltage Ultrasonics

The LEGION™ ADC unit offers fully parallel operation for simultaneous data acquisition from all channels without multiplexing in an ultra-compact external USB enclosure. Each unit supports 128- and 256-element detectors. Up to four ADC units can be operated in parallel to enable an unprecedented 1024 data acquisition channels. Incoming analog signals can be amplified on each channel by a fixed 40 dB using optional, integrated preamplifiers.

FEATURES

Each LEGION™ ADC undergoes a rigorous quality control process to ensure that all channels and features are operating at the highest level of performance. Thoroughly designed and meticulously planned, the LEGION™ ADC supports a wide range of applications.



Input connectors The unit comes with two SAMTEC series press-fit ports on each 128-channel bank. Each port can be fitted with preamplifiers and medical grade connectors that support third-party 128- and 256-element probes.

Protective Housings Durable and light plastic enclosures with integrated cooling fans and aluminum panels that protect PCBs from unintended exposure.

Programmable gain Each analog channel has integrated amplifier with digitally controlled gain. Amplifiers integrated inside ADC chips are controlled using bundled software or a free-of-charge software development kit (SDK).

Streaming ADCs Analog-to-digital conversion is continuous with no buffering or multiplexing allowing faster data transmission and trigger rates. The practical data rate exceeds 90% of 400MBps theoretical data bandwidth of USB 3.0.

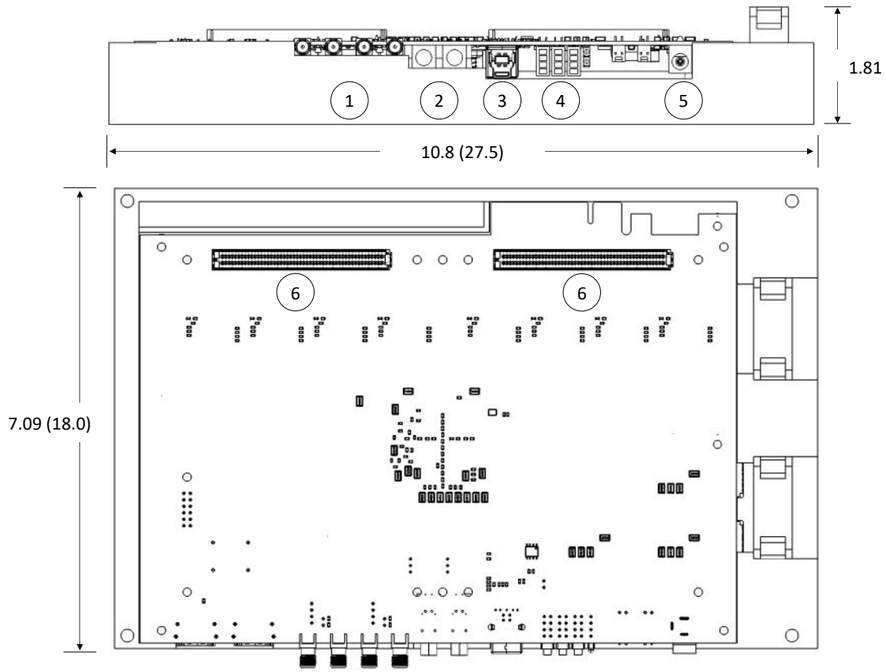
Programmable trigger outputs Generate trigger output at defined rate or repetition of external trigger input with programmed delay. Output trigger supplied through electrically isolated SMA connector can be used for triggering of external devices.

1024 Parallel Channels Connect up to four units in parallel and acquire more data at fast data acquisition rates.

Optical and electrical trigger inputs Sync external hardware (e.g. a laser) with data acquisition using electronic or optical IN and OUT ports located on the unit housing.

SPECIFICATIONS

128 / 256	*channels*[1]
6 to 51 dB	*programmable gain*[2]
(46 to 91 dB)	*(w/ optional preamplifiers)*
12.5 kHz to 25 MHz	*analog bandwidth*[3]
(40 kHz to 25 MHz)	*(w/ optional preamplifiers)*
12-bit	*resolution*
40 MSPS	*sampling rate*
50 Ω	*input impedance*
(2.2 MΩ)	*(w/ optional preamplifiers)*
up to 200 Hz / fps	*trigger / frame rate*[4]
4096	*points / frame / channel*[5]



All dimensions approximate in inches (cm). Weight 2.5 lbs (1.1 g).

1. Two sets of programmable electrical trigger input and output (isolated SMA connectors)
2. Two optical trigger inputs for connecting patch fibers allow precise triggering from external light sources
3. USB 3.0 port for high data transmission
4. Status and diagnostic LEDs
5. 12VDC 5A power connector (power supply included)
6. Samtec SEAFP series input connector per 128-channels

(1) Single unit supports 128- and 256-channel configurations. Multiple units support 512- and 1024-channel configurations.

(2) Depends on mode selection. Measured using signal generator and oscilloscope with 50 Ω input.

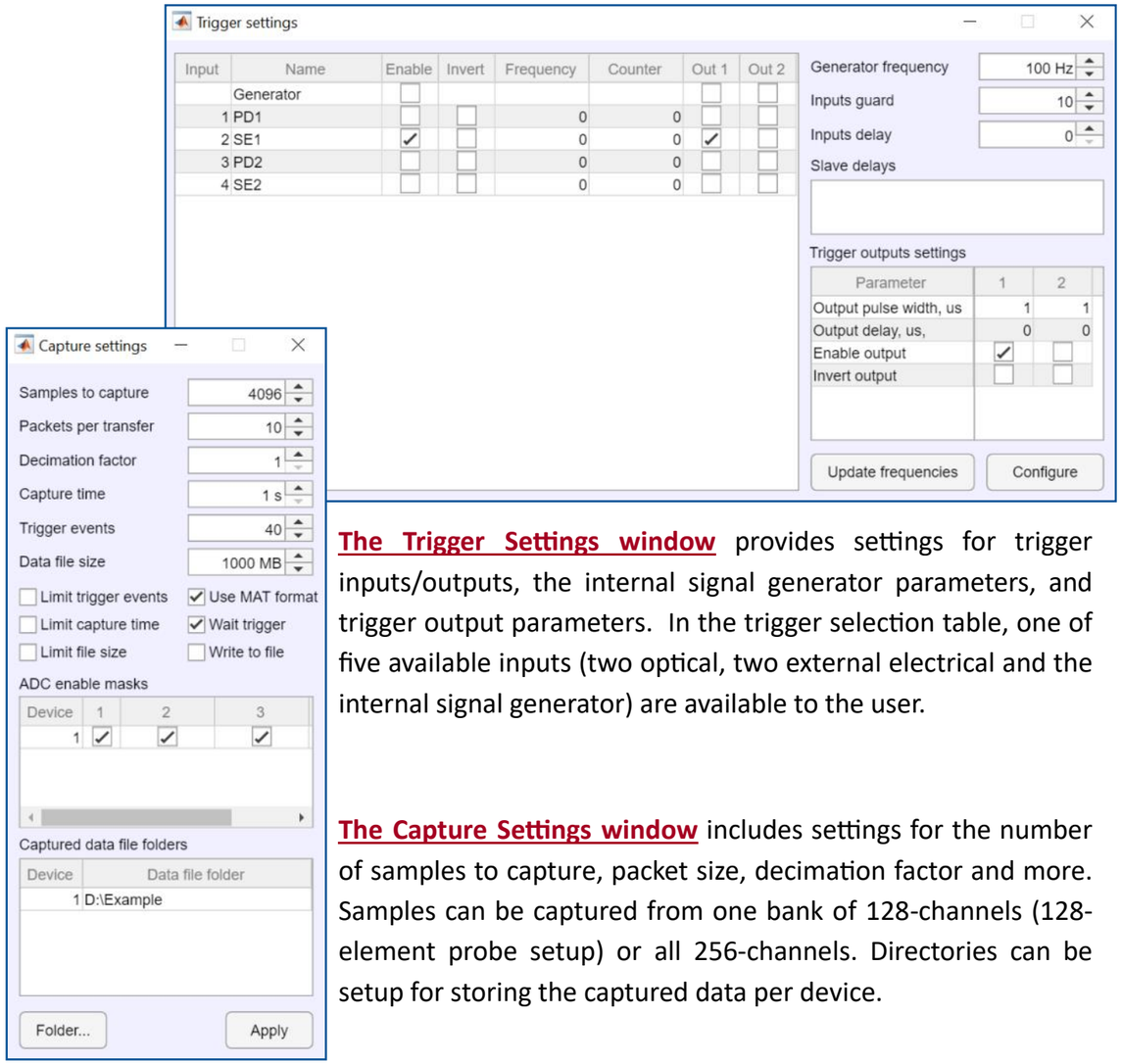
(3) @ -6 dB. Depends on probe, mode and parameter selection (low pass programmable filters available).

(4) Rates up to 400 Hz supported when using 128-channels only. Depends on PC specifications.

Minimum PC Requirements: 6th generation Genuine Intel® quad-core processor, 8 GB DDR4 RAM. USB3 port on Intel® host controller, 500 GB PCIe 3.0 x4 SSD w/ heatsink, Microsoft Windows 10 64-bit Home. Recommended PC Requirements: 9th generation Genuine Intel® hexa-core processor or better, 16 GB DDR4 RAM, USB3 port on Intel® host controller, 1 TB PCIe 3.0 x4 SSD w/ heatsink (e.g. Samsung 970 Pro), Microsoft Windows 10 64-bit Pro

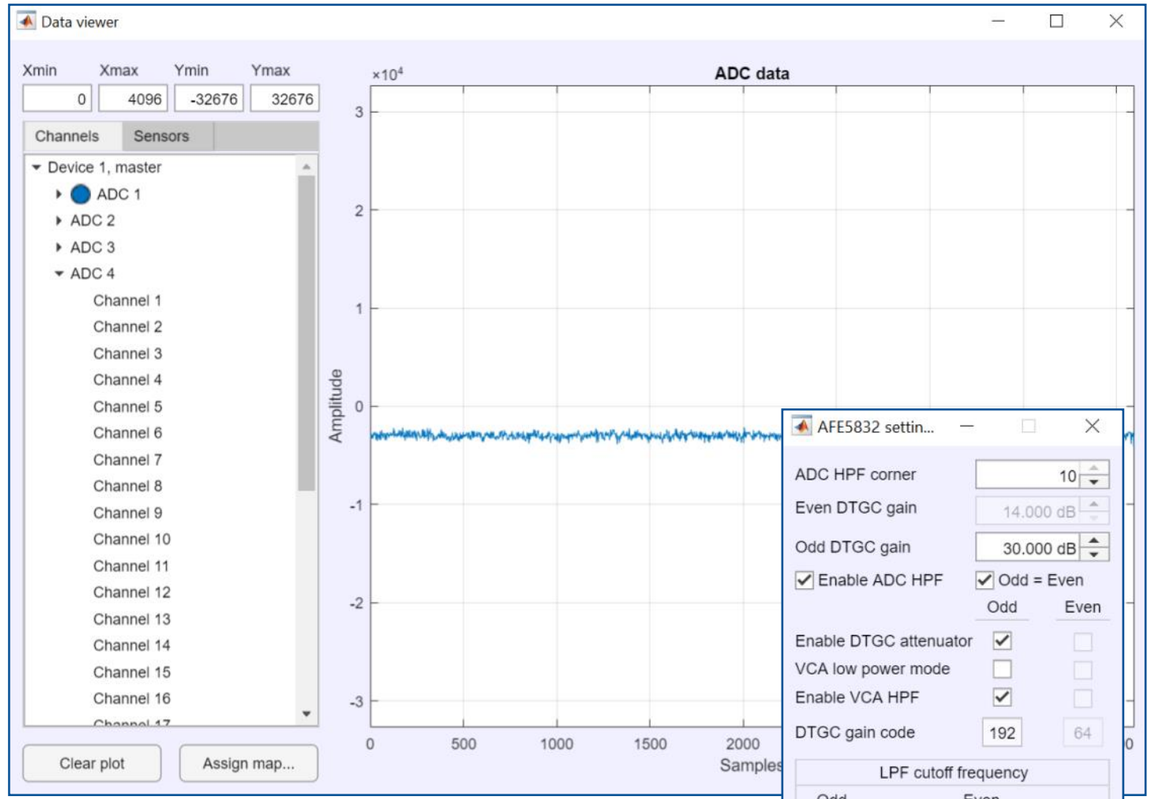
SOFTWARE

The LEGION™ ADC Standalone Software Package included with every unit is based on the MATLAB® computing environment and provides complete control over all unit functions. A free-of-charge backend SDK written in C++ is compatible with many frontend languages such as LabView, MATLAB®, Python™, etc.



The Trigger Settings window provides settings for trigger inputs/outputs, the internal signal generator parameters, and trigger output parameters. In the trigger selection table, one of five available inputs (two optical, two external electrical and the internal signal generator) are available to the user.

The Capture Settings window includes settings for the number of samples to capture, packet size, decimation factor and more. Samples can be captured from one bank of 128-channels (128-element probe setup) or all 256-channels. Directories can be setup for storing the captured data per device.

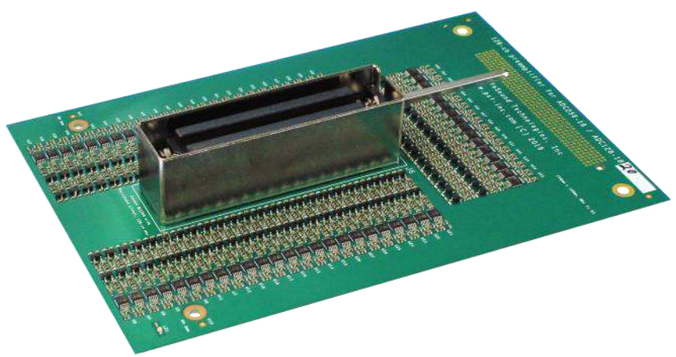


The Data Viewer window displays the list of channels to show/hide on each device and the virtual oscilloscope. The default channel mapping can be reassigned to match the variety of ways in which third-party probes are connected.

The ADC Settings window allows for entering the various gain, attenuation, and filter settings. These settings include low and high pass frequency cutoff, corner filter, gain compensation and more. Each 128-channel bank can be configured across all connected devices.

OPTIONAL PREAMPS

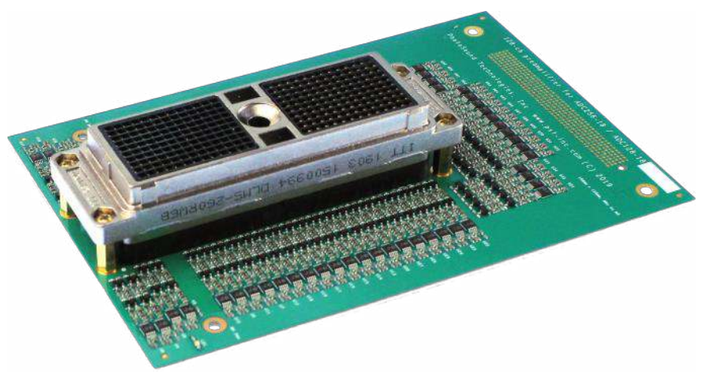
Optional preamplification boards add an additional 40 dB of fixed gain and change the input from low (50 Ω) to high (50 kΩ) impedance. Preamplifiers on each channel measure only 2 x 25 mm resulting in an overall compact design. The entire assembly (ADC+AMP) is integrated into a single, protective housing.



Medical Grade Cannon QLC260

Compact, 260-pin connector for newer probes and ring-arrays. Each channel is connected to a signal and ground pin to minimize crosstalk. Cannon QLC260 connectors have superior shielding which reduces noise. Recommended for high element count ring arrays.

Example of ADC unit with 2x Cannon QLC260 AMPs



Medical Grade Cannon DLM260

Popular 260-pin connector used in many third-party ADCs and ultrasound products. Typical configuration consists of connecting one board to half the number of channels for 128-element probes.

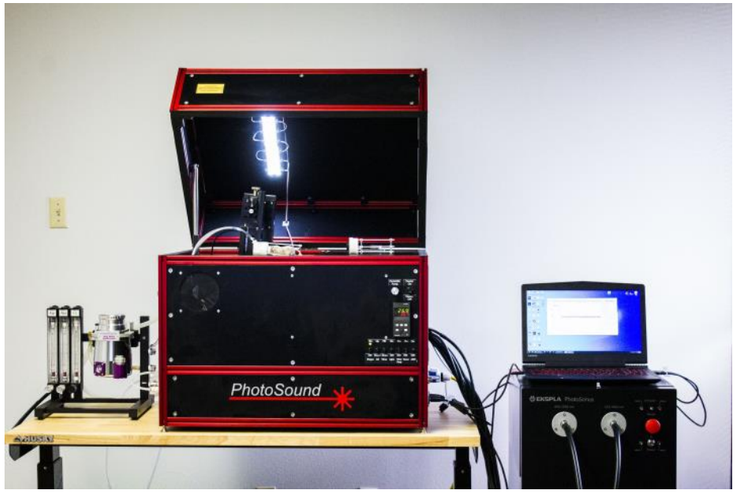
Example of ADC unit with 1x Cannon DLM260 AMP

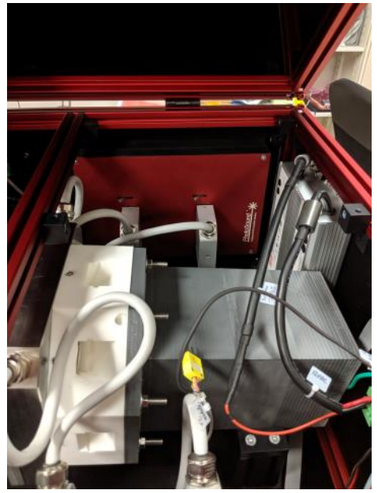
DESIGN. BUILD. ACQUIRE.

The LEGION™ ADC is the perfect data acquisition solution for the most challenging application and system integration requirements. PhotoSound engineers excel in designing advanced technology with high channel counts, low signal acquisition in high noise environments, photonic light source synchronization and RF shielded components.

High Channel Count Platforms

Connect up to two or four LEGION™ ADC units in parallel with 512- and 1024- transducer ring arrays and up to 200 Hz high repetition rate, high power tunable laser systems. Push the limits of imaging and data acquisition technology!





Custom Real-time PhotoAcoustic Tomography Platform designed by PhotoSound®

Multi-Modal 3D Tomography

Reinvent optical imaging through multi-modal platforms that combine high resolution photoacoustic technology, powered by the LEGION™ ADC, with conventional fluorescence and bioluminescence tomography.

PhotoSound® **TRITOM**™, discover the power of light and sound

PhotoSound® Molecul**US**™, ultrasonic imaging with molecular analysis

UltraSound PhotoAcoustic (USPA) Imaging

Combine the photoacoustic optimized LEGION™ ADC (preamps, laser triggering, receive only, etc.) with transmit/receive ultrasound optimized electronics. Co-register familiar ultrasound features with molecular analysis data provided by high resolution photoacoustic imaging.

About PhotoSound®

PhotoSound Technologies, Inc. was founded in September 2015 in Houston, Texas USA to develop and manufacture new imaging products and technologies. Deriving it's name from Alexander Graham Bell's discovery of the production of sound by light, PhotoSound excels in research, development and manufacturing of specialized equipment for biomedical applications based on photoacoustics.

The company developed and patented the first commercially available imaging instrument based on Photoacoustic Fluorescent Tomography (PAFT) and manufactures unique data acquisition systems with up to 256 channels on a single board with the ability to run up to four boards in parallel.

Engineers and application scientists at PhotoSound possess some of the best expertise in the market with skills in tunable laser development, transducer implementation and complex ADC/AMP board designs. All employees at PhotoSound are committed to provide every customer with the highest quality products and services with short delivery times and competitive pricing.

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