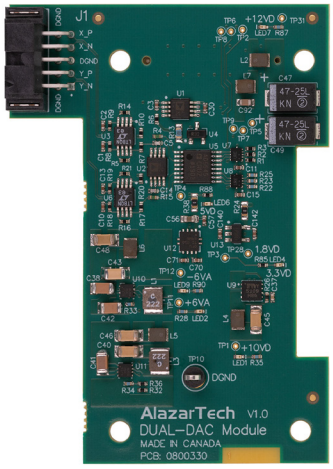
ATS Digitizer Accessory
Galvo Control Module 2

- Galvo driver board integrated into ATS9362, ATS9364, or ATST364-OEM
- Two analog outputs to control X-Y galvo
- 10 V_{P-P} differential outputs
- Output synchronized to A-Trigger
- Multiple patterns can be defined
- Patterns can be looped
- Patterns can be updated in real time
- Support for Windows® & Linux®



RoHS 3 COMPLIANT
2015/863/EU

CE

Accessory	Works with	Operating System	Max Output	Update Rate
ATS Galvo Control Module 2	ATS9362, ATS9364 ATST364-OEM	64-bit Windows & 64-bit Linux	10 V_{P-P}	300 kHz

Overview
The AlazarTech Galvo Control Module 2 (GCM2) is an accessory board that plugs into an on-board connector on ATS9362, ATS9364, and ATST364-OEM to provide two differential analog outputs that can be defined by user software to control an X-Y galvo in OCT applications. ATS GCM2 frees the user from having to use a separate DAQ board, reducing cost and saving a valuable PCIe slot.

Analog outputs are updated each time an A-Trigger is detected. This creates a very tight coupling between A-Trigger and galvo updates and avoids the software latencies inherent when a separate DAQ board is used for galvo control.

Users are allowed to define multiple custom patterns that can be repeated a specific number of times. Patterns can be linked in a custom order, allowing different image areas.

It is also possible to define one long (even infinite) pattern encompassing all available memory blocks.

To support AI-based intelligent diagnostic machines, this pattern memory can be updated during an acquisition, making it possible to focus imaging on a specific part of the target based on interpretation of results of previous imaging captures.

Coupled with the provided AlazarDSO® oscilloscope software for Windows or AlazarFrontPanel for Linux, this allows users to get started immediately without having to write any software.

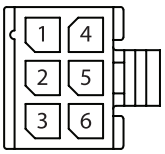
Users who need to integrate their digitizers and GCM in their own program can use the provided drivers, library, and code sample with the ATS-SDK software development kit for Windows or Linux.

Analog Output
The analog signal is generated by two on-board D/A converters (DACs). Update rates of these DACs has been verified up to 300 kHz for record lengths of 2048 points, although faster rates are possible. A differential output amplifier converts the DAC output into a 10 V_{P-P} bipolar differential output, which means each of the outputs swings between +5 V and -5 V full scale.

Output Connector
ATS GCM2 features a 10-pin connector (Samtec p/n: T2M-105-01-L-D-RA-WT) for connecting to galvo controllers.

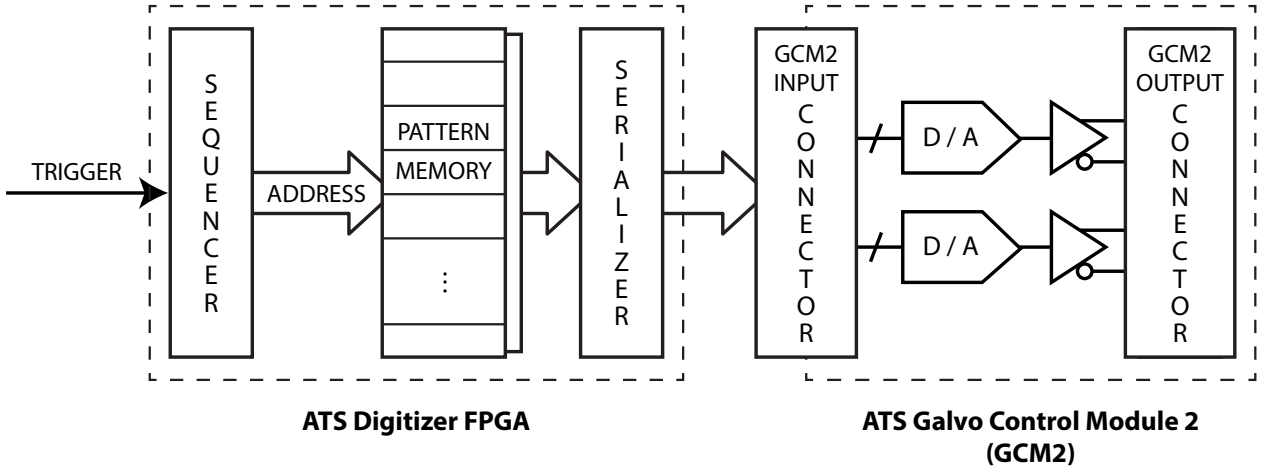
Galvo Control Module 2 Interface Cable
A cable terminating in a 6-pin (Molex 0430250600) connector compatible with the Mach DSP Servo Driver input (Molex 0430450613) is available as an accessory.

MOLEX CABLE PINOUT			
1	XIN-P	4	YIN-P
2	GND	5	GND
3	XIN-M	6	YIN-M



Customers who wish to design their own cables should use the Samtec ISD2-05-D-M connector to mate with the 10-pin T2M-105-01-L-D-RA-WT connector on the GCM.

ATS Galvo Control Module 2 (GCM2) Block Diagram



Pattern Memory

On-FPGA pattern memory consist of 32 blocks of 4K x 32-bit dual-port RAM.

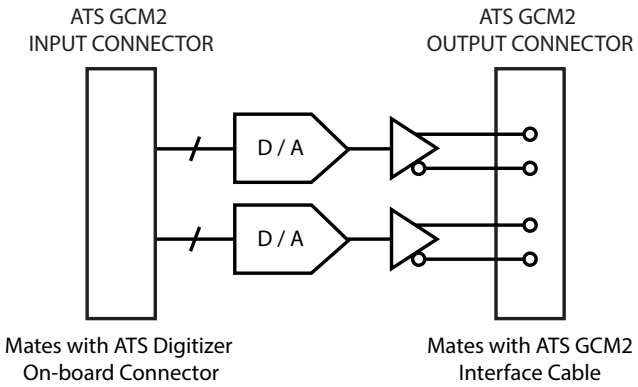
Output Patterns

Users can define very complex data patterns using on-board dual-port memory. This memory is divided up into 32 blocks. A pattern can exist in any part of a slot. To define a pattern, users must define a Slot number, a start address within that slot, and an End Address. By definition, the pattern length is equal to (End Address – Start Address).

Users can define the number of times a pattern is to be repeated. It is also possible to repeat a pattern an infinite number of times.

Users can also control at which point in the pattern a B-Trigger should be issued. Since the B-Trigger is issued from inside the FPGA, users can reduce cabling between an external DAQ and the AUX I/O input of the ATS9362, ATS9364, and ATST364-OEM.

How the Galvo Control Module Works



Compatible Waveform Digitizers

ATS GCM2 is compatible with ATS9362 and ATS9364 PCIe bus waveform digitizers, and ATST364-OEM Thunderbolt 3 digitizers (without enclosure).

ATST364 Thunderbolt 3 digitizers in enclosures are not supported.

Installation

When purchased with the digitizer, ATS GCM2 is shipped pre-installed on the ATS9362, ATS9364 or ATST364-OEM at the factory.

If the ATS GCM2 is purchased after the digitizer has shipped, it will be the responsibility of the user to install the mezzanine circuit board onto the AlazarTech digitizer.

Driver version 7.13.9 is required for ATS9362 and driver version 7.13.8 is required for ATS9364 or ATST364-OEM.

GCM GUI for Verification

GCM comes with a GUI that allows users to easily and rapidly test the Galvo Control Module. The application is design to resemble the user APIs that communicate with the CGM. Users have the ability to write predefined patterns to memory and define up to 32 sequences to be outputted by the sequencer. The ability to start and stop the output of patterns will give users confidence that the GCM is functioning accordingly.

Trigger Rate Measurement

ATS GCM2 allows software to read the frequency at which A-Trigger is being received. This can be useful in cases where users set their record length too long and start losing every other trigger.

Performance Verification

Every ATS GCM2 is tested at factory to ensure that it performs within specification.

RoHS Compliance

ATS GCM2 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.

Support for Windows

Windows support for ATS9362 ATS9364, or ATST364-OEM with the Galvo Control Module 2 (GCM2) 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.

Linux Support

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

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/ats9362/866/
www.alazartech.com/en/linux-drivers/ats9364/661/
www.alazartech.com/en/linux-drivers/atst364/682/.

Only 64-bit Linux operating systems are supported.

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

Software Development Kits

AlazarTech provides easy to use software development kits for customers who want to integrate the ATS GCM2 into their own software.

Version 25.1.0 of ATS-SDK is required for ATS GCM2.

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 AlazarTech digitizer 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).

Extended Warranty

The ATS GCM2 warranty is covered by the standard one (1) year ATS digitizer 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 AlazarTech digitizer warranty by ordering an Extended Warranty.

For full details, consult the AlazarTech digitizer datasheet available at www.alazartech.com.

EC Conformity

ATS GCM2 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 62368-1:2014 / EN 62368-1:2014+A11:2017:
Audio/video, information and communication technology equipment - Part 1: Safety requirements.

ATS GCM2 also follows the provisions of the following directives: 2014/35/EU (Low Voltage Equipment); 2014/30/EU (Electromagnetic Compatibility).

FCC & ICES-003 Compliance

ATS GCM2 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.

Power Requirements

+12 VDC	300 mA, typical (supplied by ATS Digitizer)
+3.3 VDC	1.8 mA, typical

Output Connector

Output connector type	10-pin connector (Samtec p/n: T2M-105-01-L-D-RA-WT)

Physical

Size	1.95 x 2.79 x 0.6 inches. Mounts on ATS9362, ATS9364 or ATST364-OEM; ATS9362 and ATS9364 remain a single-slot PCIe board. ATST364-OEM maximum profile is unchanged.
Weight	16.8 g

Environmental

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

Analog Outputs

Full Scale Output	10 V_{p-p} bipolar differential output, which means each of the outputs swings between +5 V and -5 V full scale
DC accuracy	±2% of full scale in all ranges
Output impedance	75 Ω ±1%
Output short protection	Yes. Current limited to 60 mA

Materials Supplied

ATS Galvo Control Module 2

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

All specifications are subject to change without notice

ORDERING INFORMATION

ATS9362: Galvo Control Module 2 (purchased with ATS digitizer and installed at factory)	ATS9362-030
ATS9362: Galvo Control Module 2 (purchased separately)	ATS9362-031
ATS9364: Galvo Control Module 2 (purchased with ATS digitizer and installed at factory)	ATS9364-030
ATS9364: Galvo Control Module 2 (purchased separately)	ATS9364-031
ATST364-OEM: Galvo Control Module 2 (purchased with ATS digitizer and installed at factory)	ATST364-030
ATST364-OEM: Galvo Control Module 2 (purchased separately)	ATST364-031
ATS GCM interface cable: 6-pin	GALVO-6P-CBL
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
5 Hours of technical support	SUPPORT-HR5

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Linux is a registered trademark of Linus Torvalds.
RHEL is a registered trademark of Red Hat, Inc. in the United States and other countries.
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