

ALI²⁵

The Industry's first 5 MSa/s 24 bit Digitizer for Pyroshock Applications. 2 Channels supporting Bridge, ICP[®] and Voltage Inputs equipped with sophisticated anti-alias filtering. Includes buffered analog output channel and advanced options for synchronization and triggering.



ALI²⁵ MODULE

The ALI²⁵ is a high-bandwidth Module designed for triggered/ burst acquisition for Pyro-Shock / Mechanical Shock applications.

Every channel is equipped with precise anti-alias filtering on the Signal and Sense lines, along with dedicated bridge signal conditioning. In addition, each channel features a 24-bit, 5 MSa/s ADC and a 21 MSa data buffer. Systems can be configured with 2 to over 1000 channels.

Measurement Integrity and Sensor Status prior to an event is verified with continuous: pre-trigger monitoring, summarized signal information, and sensor fault detection. Built-in Signal Conditioning for bridge-type transducers and voltage signals. Constant voltage or current excitation is programmable for each channel.

Each input channel has a buffered low-noise output channel for monitoring or acquiring sensor data via a secondary system. Measurements are triggerable by signal level and persistence, external events, data flow, or software command. This advanced set of triggering options supports multi-system synchronization and ensures event detection.



12 Channel DECAQ

Where Used

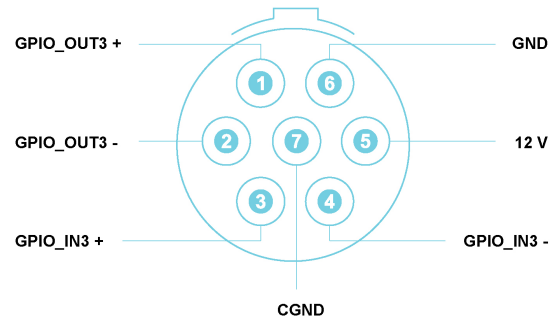
- Acquisition of Pyro-Shock / Mechanical Shock events related to impact / shock, ballistics, and explosives test.
- Bridge and Resistive Sensors that require 2-wire, 4-wire and 6-wire configurations.
- High Voltage SubModule for external high-voltage signal conditioning used in power measurements.
- Hopkinson Bar Testing

FRONT PANEL AND CONNECTORS

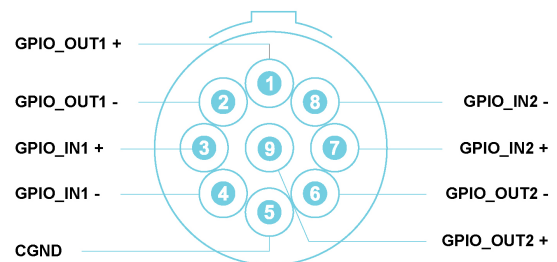
Note: All connectors are shown as if looking into the front panel's connector or at the rear of the cable's connector.



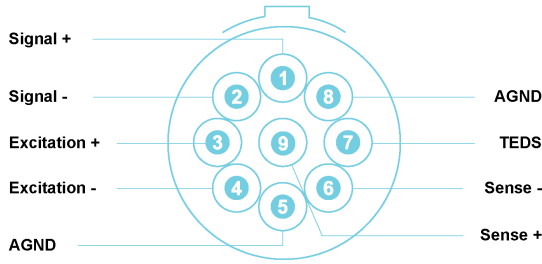
Front Panel



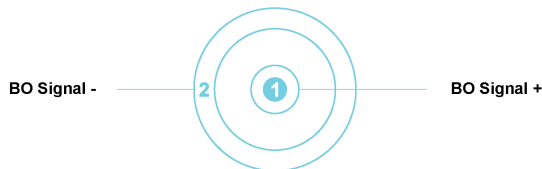
ISM: Intelligent subModule and Digital Interface connector with LEMO[®] 7-pin EHG.0B connector Module Pin Definition



TRG: Digital Interface connector with LEMO[®] 9-pin EHG.0B connector Module Pin Definition



Inx: Analog Input Channel connectors (1/2) with LEMO® 9-pin EHG.0B connectors Module Pin Definition



BOx: Buffered Analog Output connectors (1/2) with SMB connectors Module Pin Definition. Used to externally monitor the conditioned input signal

ANALOG INPUT CHANNELS	
OVERVIEW	
2 channels	
24-bit resolution, 5 MSa/s sampling rate per channel	
Bandwidth: <ul style="list-style-type: none"> DC – 1.0 MHz ± 0.1 dB at 5 MSa/s DC – 2.375 MHz -3 dB at 5 MSa/s 	
Modes of operation <ul style="list-style-type: none"> Voltage input mode ICP® mode 4 mA to 20 mA with 30 V compliance Bridge Input Mode: <ul style="list-style-type: none"> 2-wire plus Shield 4-wire plus Shield, targeting Pyro-Shock applications 6-wire plus Shield Constant Current Mode 	
Input Ranges <ul style="list-style-type: none"> $\pm(5, 2.5, 1.25)$ V, $\pm(680, 340, 160, 80, 40, 20, 10)$ mV 	
Accuracy <ul style="list-style-type: none"> $\pm 0.1\%$ of full scale ± 50 μV 	
Slew Rate <ul style="list-style-type: none"> > 50 V/μs 	
Memory <ul style="list-style-type: none"> 21 M Samples per channel, 24-bit 	
Differential Input <ul style="list-style-type: none"> Input impedance 2 MΩ Differential, 1 MΩ to GND 	

Coupling

- DC or AC coupled

CMRR

- DC – 100 Hz, > 85 dB

CM Voltage Range

- ± 9 V including signal

Crosstalk

- > 90 dB isolation (channel to channel)

Sense ADC

- Continuous fault detection of the excitation lines to detect open / short circuits.
- The ALI²⁵ can support other applications that require more than the 4-wire Pyro-Shock applications.

Connectors

- 9-pin LEMO® 0B.309 (one per input channel).
- Signal+, Signal-, Excitation+, Excitation-, Sense+, Sense-, TEDS (Class 1 & 2), AGND (REF GND), CGND.
 - Separate shield through the housing or pin of the breakout cable connector (9-pin LEMO® to D-Sub 15).

FUNCTIONS

Offset Control using DAC, ± 2.5 V 16-bit resolution

Offset Zero

- Software selectable Autozero routine sets ADC output to zero for a given input.
- Can use a combination of the offset null DAC and digital correction.

Bridge Balancing

- Current injection ± 1 mA
- Offset Nulling ± 2.5 V, 16-bit DAC
- Bridge balancing activation available through software command

Excitation Voltage and Current (16-bit DAC)

- Differential DC 0 to ± 10 V (20 V between Excitation+ & Excitation-), current monitored (limited to 90 mA per channel)
- Bipolar Constant Current Excitation**
 - 0 to ± 30 mA Constant Current
 - 4-wire & 2-wire mode

Bridge Voltage insertion

- 10 k Ω resistor may be connected to either signal arm of the bridge and is driven by a 16-bit programmable DAC. Simulated shunt resistors.

Health Check and Calibration Options

- Programmable Internal Reference, 16-bit DAC voltage ± 5 V
- Gain Calibration. Accomplished using internal multiple precision voltage references.
- Calibrated Reference Ladder matched to input range
- Full path can be calibrated System to System including buffered output channel path.
- External Calibration through **DCAT** ISO17025 certified system.

Sensing

- Local | Remote | None (Pyro-Shock 4-wire applications)

FILTERING

3 Stages of anti-aliasing (AA) filters:

- **Analog AA (AAA) Filtering:** Provides a -0.1 dB bandwidth of 2.5 MHz with minimal passband ripple and over 100 dB attenuation for high-frequencies
- **Delta-Sigma ADC:** Over-samples the signal 8 times and achieves a flat passband of up to 1.7 MHz, anti-alias filter ripple of less than ± 0.00002 dB, and stopband attenuation of 86 dB
- **FIR Filters:** Ensure exceptional signal integrity with a maximum passband ripple of 0.0005 dB and minimum stopband attenuation exceeding 125 dB

The ADC and FIR filters auto-track the ALI²⁵'s decimation factor, providing optimized performance across varying data rates.

Output data rates (ODR) of: (5, 2.5, 1.25) MSa/s, (500, 250, 125, 50, 25, 12.5, 5, 2.5, 1.25) kSa/s

ALI25 FILTER CHARACTERISTICS

Sample Rate (Sa/s)	Passband (Hz)	Rejection Band (Hz)	Atten. (dB)
5.0 M	2.4 M	2.9 M	>86
2.5 M	1.2 M	1.45 M	>86
1.25 M	600 k	725 k	>100
500 k	243 k	275 k	>100
250 k	121.5 k	137.5 k	>100
125 k	60.7 k	68.75 k	>100
50 k	24.3 k	27.5 k	>100
25 k	12.15 k	13.75 k	>100
12.5 k	6.075 k	6.875 k	>100
5 k	2.43 k	2.75 k	>100
2.5 k	1.215 k	1.375 k	>100
1.25 k	607	687	>100

DIGITAL INTERFACE

GPIO_IN1, GPIO_IN2, GPIO_IN3, GPIO_OUT0, GPIO_OUT1, GPIO_OUT2, 12 V, PWR_IN, GND (non-isolated PWR), 6 x GPIO (3 x IN, 3 x OUT)

- 5 V compliant, 3.3 V operation
- Communication interface to SubModules
- Can be configured as TRIG input / output (different combinations possible)
- Can be used for SYNC input / output
- Can output a CLK signal
- Can support communication over long cables with a SubModule

12 V, PWR_IN, GND (non-isolated)

- PWR signals that can be used by ISM / PSM for processor and relay control
- Can be used with SubModule to convert / adapt Digital interface for various requirements
- ISM / PSM can be locally powered if far away from the main system
- ISM / PSM detection; if present communication can read back the ID to identify the type

Trigger Options

- Software Trigger, triggered by a software command
- Data Flow Trigger, programmable data trigger
- External Trigger, triggered by external pulse
- Real Time Trigger, trigger when analog input signal reached and remains above programmable limit
- Backplane Trigger (4 lines)
- Synchronous snapshot monitoring of data blocks in parallel to RAM memory
- Synchronous monitoring across all channels while system is running

BUFFERED ANALOG OUTPUT CHANNELS

2 channels

Buffered Analog Output Channel for each Analog Input Channel. Provides a conditioned analog output signal for monitoring with a secondary acquisition system

± 1.25 V into 50 Ω for a full-scale input signal

RELATED CABLES, SUBMODULES AND ACCESSORIES

CABLES

CS-ALI-A-DB15 500 (056K 500)

- Breakout Signal Cable 500 mm (converts the 9-pin LEMO[®] connector to D-Sub 15)

CS-ALI-A-DB15 2000 (056K 2000)

- Breakout Signal Cable 2000 mm (converts the 9-pin LEMO[®] connector to D-Sub 15)

CS-ALI-T-DB15 500 (058K 500)

- Breakout Digital I/O Cable 500 mm (converts the 9-pin LEMO® connector to D-Sub 15)

CS-ALI-T-DB15 2000 (058K 2000)

- Breakout Digital I/O Cable 2000 mm (converts the 9-pin LEMO® connector to D-Sub 15)

CS-ALI-T-2J 500 (068K 500)

- Breakout Digital Trigger I/O Cable 500 mm (converts the 9-pin LEMO® connector to 2 BNC connectors)

CS-ALI-T-2J 1000 (068K 1000)

- Breakout Digital Trigger I/O Cable 1000 mm (converts the 9-pin LEMO® connector to 2 BNC connectors)

CS-ALI-TF-5J 200 (069K 200)

- Breakout Digital 5x Trigger I/O Cable 200 mm (converts the D-Sub 15 connector to 5 BNC connectors, Fanout cable for SM-ALI-TFCA-DB15)

CS-ALI-A-9L-BNCP 2000 (076K 2000)

- Breakout Signal Cable (Single-ended) 2000 mm (converts the 9-pin LEMO® connector to BNC connector)

CS-ALI-A-DB15M-BNCP-2000 (077K 2000)

- Breakout Signal Cable (Single-ended) 2000 mm (converts the D-Sub 15 connector of 056K to BNC connector)

CS-ALI-A-SMB-BNCP 1000 (038K 1000)

- Breakout Buffer Analog Output Cable 1000 mm (converts the SMB connector to BNC connector)

SUBMODULES

SM-ALI-TFCA-DB15 500

- Trigger Fanout SubModule 500 mm (converts the 9-pin LEMO® connector to D-Sub 15)

SM-ALI-SALI10 TYPE K, T

- Thermocouple to Voltage SubModule with 290 kHz bandwidth (converts the D-Sub 15 for Thermocouple Type K and T)

SM-ALI-SALI20 TYPE J

- Thermocouple to Voltage SubModule with 290 kHz bandwidth (converts the D-Sub 15 for Thermocouple Type J)

SM-ALI-SALI30-HS TYPE K,T

- Thermocouple to Voltage SubModule with 1 MHz bandwidth (converts the D-Sub 15 for Thermocouple Type K and T)

ACCESSORIES

RM-ALI-NALI10-20 (PIPS)

- 19 inch RackMount Kit to secure 20x D-Sub 15 connectors in one panel

RM-ALI-NALI10-16 (PIPS)

- 19 inch RackMount Kit to secure 16x D-Sub 15 connectors in one panel

DQ04 | 06 Grounding Kit



20 Channel DECAQ

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