DATA SHEET

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 DECA**Q***

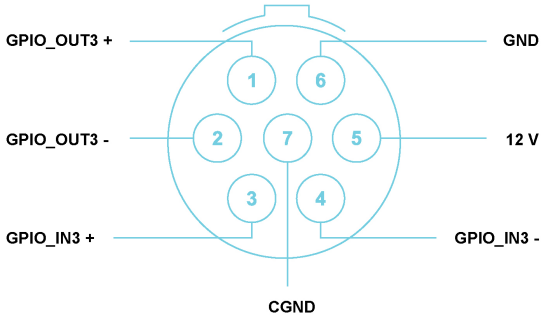
Where Used

- 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

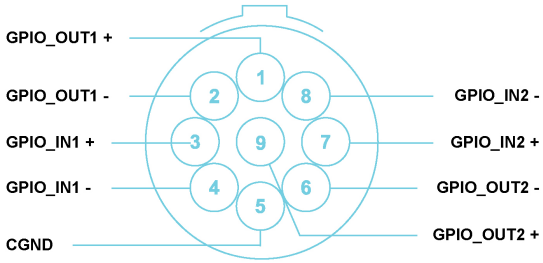
FRONT PANEL AND CONNECTORS

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

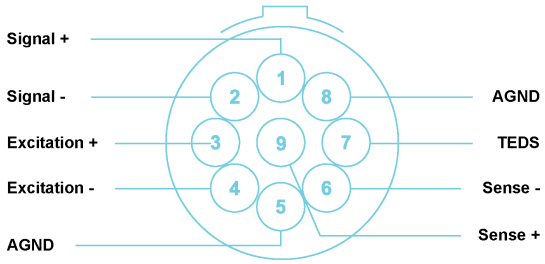
Front Panel



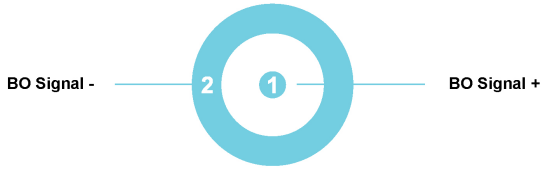
ISM: Intelligent subModule and Digital Interface connector with LEMO® 7-pin EHG.0B connector Module Pin Definition



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:
- DC – 1.0 MHz ±0.1 dB at 5 MSa/s
- DC – 2.375 MHz -3 dB at 5 MSa/s

Modes of operation
- Voltage input mode
- ICP® mode 4 mA to 20 mA with 30 V compliance
- Bridge Input Mode:
  - 2-wire plus Shield
  - 4-wire plus Shield, targeting Pyro-Shock applications
  - 6-wire plus Shield
- Constant Current Mode

Input Ranges
- ±(5, 2.5, 1.25) V, ±(680, 340, 160, 80, 40, 20, 10) mV

Accuracy
- ±0.1% of full scale ±50 µV

Slew Rate
- >50 V/µs

Memory
- 21 M Samples per channel, 24-bit

Differential Input
- 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 ALI^{25} 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 kΩ 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 D**CAT** 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 ALI^{25}'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 DECA**Q***

MECALC

MECALC.com