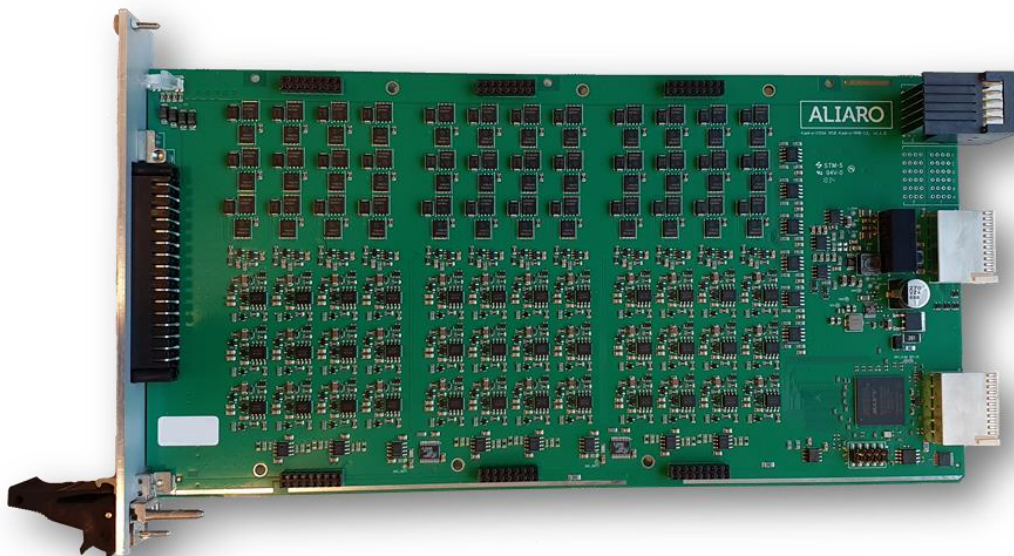


12 Channels Multi-Function Board

AL-1010 for SLSC

This document describes the SLSC AL-1010 for National Instruments SLSC-12001 chassis.



Overview

The AL-1010 is a 12-channel multi-purpose board to be connected between the Device Under Test (DUT) and the instrumentation part of the test system.

The board is recommended for systems requiring high flexibility on the pin configurations.


AL-1010 is made for National Instruments (NI) Switch Load Signal Conditioning (SLSC) system.

The board is made to interface with NI PXI and/or Compact-RIO instrumentation devices for the purposes of test and validation of Electronic Control Unit (ECU) software and hardware.

Custom device for VeriStand is included for Hardware-In-the-Loop applications.

For larger applications, Aliaro Configurator is recommended for channel configuration.

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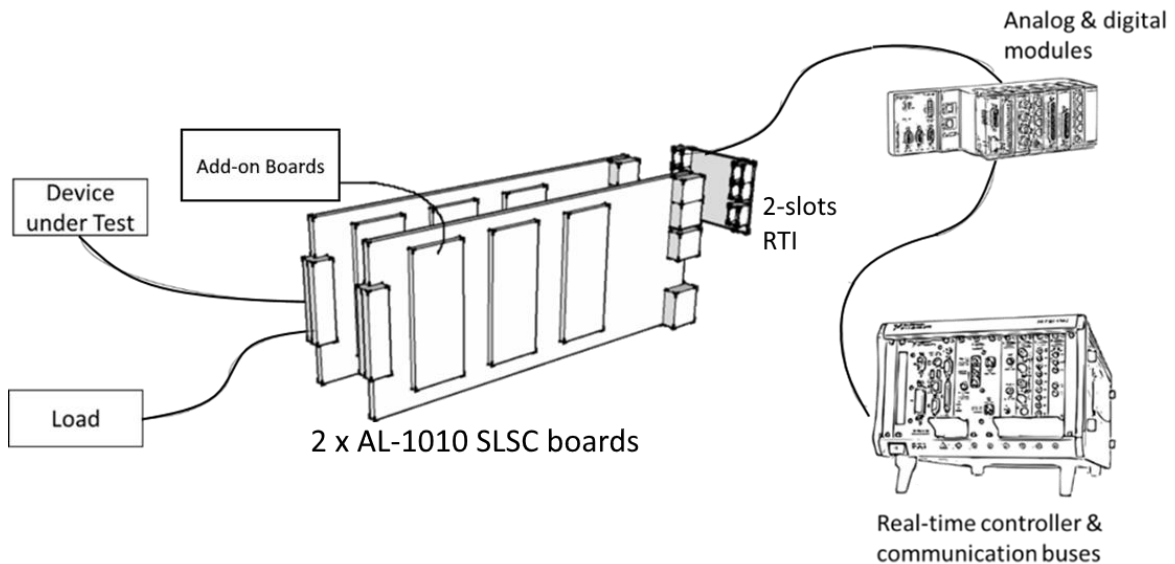
Description

The AL-1010 provide multiple functions for fault insertion, signal conditioning and digital I/O, including pulsed (PWM) signals.

The AL-1010 is fitted in pair through the RTI-backplane AL-1010-RTI.

This backplane PCB is needed to reach fully flexibility and enables easy connection to NI PXIe and/or Compact-RIO instrumentation devices.

Additional with add-on boards the functionality can be expanded further.



Features

- ✓ 60V, 10A per channel
- ✓ 12 independent and isolated channels in three banks
- ✓ 3 Expansion Slots for Add-on boards
- ✓ Two common buses per bank with switches to each channel
- ✓ Brake up switch for each channel
- ✓ Programmable level threshold on each channel
- ✓ Parallel connection possibility for high current signals
- ✓ LabVIEW driver included

Detailed description

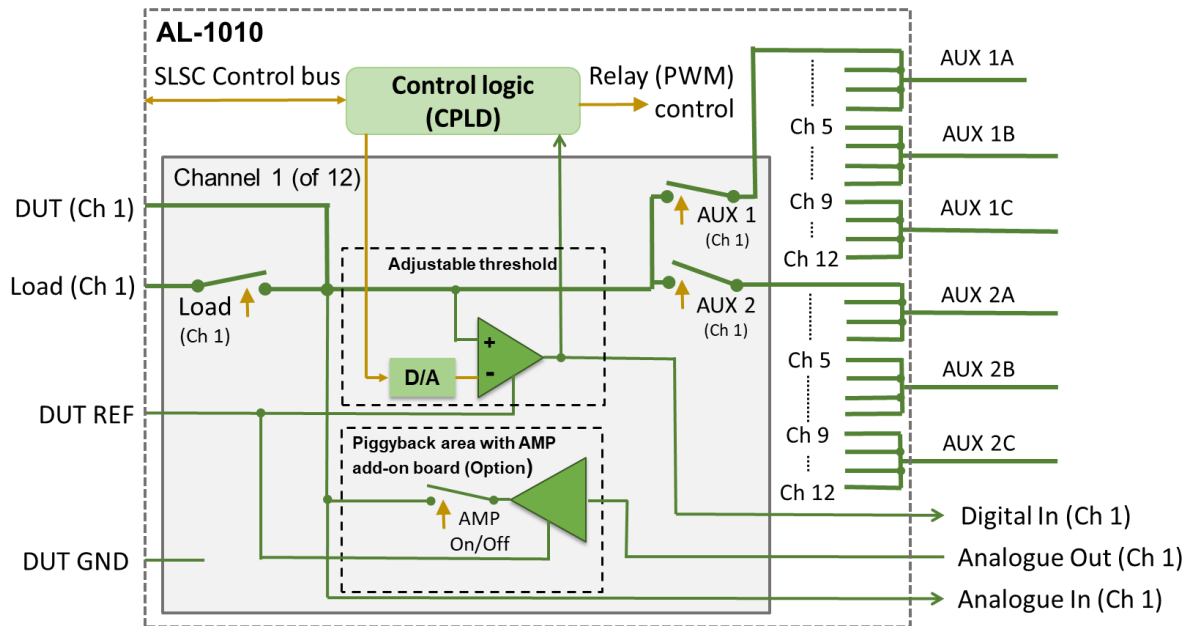


Figure 1, AL-1010 Block diagram

The AL-1010 board provides fault insertion, signal conditioning and digital I/O.

Fault insertion functions:

- Open circuit (DUT to Load)
- Short to + and - (DUT to AUX 1 or AUX2)

Signal conditioning functions:

- Digital input (from DUT) signal conditioning using adjustable threshold (0-50V)
- Analogue signal (to DUT) amplification (Piggyback option)
- Analogue signal (from DUT) attenuation (fitted on DAQ connection board)
- Adjustable resistive load (from DUT) (Piggyback option)

Digital I/O functions:

- Read digital status (from DUT) using adjustable threshold
- Read PWM signals (from DUT) using adjustable threshold (Frequency and duty cycle)
- Generate digital signals (to DUT) using AUX1 (+) and AUX2 (-)
- Generate PWM signals (To DUT) using AUX1 (+) and AUX2 (-)

Installation

Electromagnetic Compatibility

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential or commercial areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any modifications to the product not expressly approved by Aliaro could void your authority to operate it under your local regulatory rules.



Caution To ensure the specified EMC performance, operate this product only with Shielded cables and accessories.

Unpacking the module

- Carefully inspect the shipping container and the module for damage. Check for visible damage
- to the exterior and interior of the damage. If damage appears to have been caused during
- shipment file a claim with the carrier. Retain the packing material for possible inspection
- and/or reshipment. If the chassis is damaged, do not install it and contact Aliaro.

Hardware Installation

To set up and use the module you need the following items:

Hardware

- SLSC-12001 chassis
- SLSC module(s)
- Power cable
- Power input connector
- Grounding wire
- Grounding lug

Tools

- Screwdriver as needed for your application
- Wire stripper

Documentation

SLSC-12001 Chassis Getting Started Guide and Specifications

Caution:



Do not touch the contacts or remove the I/O boards or cables while the system is energized.

The SLSC chassis and the AL-1010 do not support hot plug-in. The entire chassis must be powered off when a module is inserted or removed.

Procedure:

1. Power off the main DC power source or disconnect the power source from the chassis before installing any modules or RTIs.
2. Ensure that the chassis is powered off. The POWER LED should be off. If the POWER LED is not off, do not proceed until it is off.
3. Loosen the screws on the upper rear panel of the chassis.
4. Position the RTI backplane at the desired slot and insert the securing screws, but do not fully tighten them.
5. Insert a AL-1010 module into the same slot as its corresponding RTI while firmly holding the RTI in place until the RTI is firmly connected to the module.
6. Repeat steps 4 and 5 for all required RTIs.
7. Fully tighten the screws for all RTIs and the upper rear panel of the chassis. Note Waiting until all RTIs and modules are installed to fully tighten the screws ensures proper alignment for future connections between modules and RTIs.
8. Fully tighten the two module mounting screws on each newly installed module.
9. Power on the SLSC chassis

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Software Installation, SLSC LabVIEW drivers

When the module is used with LabVIEW or TestStand, Aliaro drivers need to be installed, see Aliaro driver installation instruction.

Software Installation, Aliaro custom devices

When AL-1010 is used with VeriStand, Custom Devices needs to be installed, see the Custom Device installation instruction.

Software Installation, Aliaro Configurator (Option)



Note Description of the Aliaro Configuration can be found on www.aliaro.com

System Check

Finnish the installation by conducting a system check, see chapter:

Maintenance

Operation

Safety



Caution Observe all instructions and cautions in the user documentation. Using the model in a manner not specified can damage the model and compromise the built-in safety protection. Return damaged models to Aliaro for repair.

Using the AL-1010

All input characteristics are DC, ACrms, or a combination unless otherwise specified. Maximum switching voltage (any polarity) **100 Vpeak**. Every card provides a fully capable fault insertion with external control during simulations or testing. Relays can be configured with Aliaro Configurator, VeriStand and LabVIEW



Note Steady state voltages applied to the AL-1010 between any two I/O connector pins in excess of the maximum switching voltage specification may damage the module

Note Signal connections through the AL-1010 are intended to go through the DUTn pin connections. Signal paths that do not use the DUTn pin connections bypass the internal overcurrent limiting features and may exceed the module's thermal capabilities

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Maintenance

System check, using LabVIEW

This chapter requires LabVIEW development and installation of Aliaro LabVIEW drivers

To identify and control that the cards are inserted and work properly with the right firmware, LabVIEW provides basic VI scripts to check SLSC cards mounted in chassis

1. Open LabVIEW and select “**Help**” in the top menu bar and press “**Find Examples...**” (This opens a new window with pre-built VI (Virtual Instruments) for different applications).
1. Switch to the “**Search**” tab and enter keyword “**SLSC**” and double click.
2. In the new filtered table (to the right) find and select VI called “**Configuration.vi**”. This VI can located every card(s) that is online in SLSC chassi.
3. To find the newly inserted cards look for the SLSC chassi IP-address (in the table to the right).
4. Count the showing card(s) in the table and make up that there are as many mounted in the SLSC chassi as there are in the VI table for that specific IP address. (Can be 1 up to 11 cards per SLSC chassi)

Calibration

Recommended warm-up time	30 min
Calibration interval	Not required, recommended on system level

Specification

Definition and conditions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

The following characteristic specifications describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- Typical specifications describe the performance met by a majority of models.
- Nominal specifications describe an attribute that is based on design, conformance testing, or supplemental testing.

Specifications are *Typical* unless otherwise noted.

Specifications are valid under the following conditions unless otherwise noted.

The AL-1010 module is mounted in an SLSC chassis with the recommended cooling clearances and using a power supply that meets the specifications provided in the chassis user guide. For the entire temperature range of the chassis.



Note These specifications only apply to the product as provided by Aliaro. Modifications to the module may invalidate these. Be certain to verify the performance of modified modules.



Caution Observe all instructions and cautions in the user documentation. Using the model in a manner not specified can damage the model and compromise the built-in safety protection. Return damaged models to Aliaro for repair.

Environmental Characteristics

Temperature and Humidity

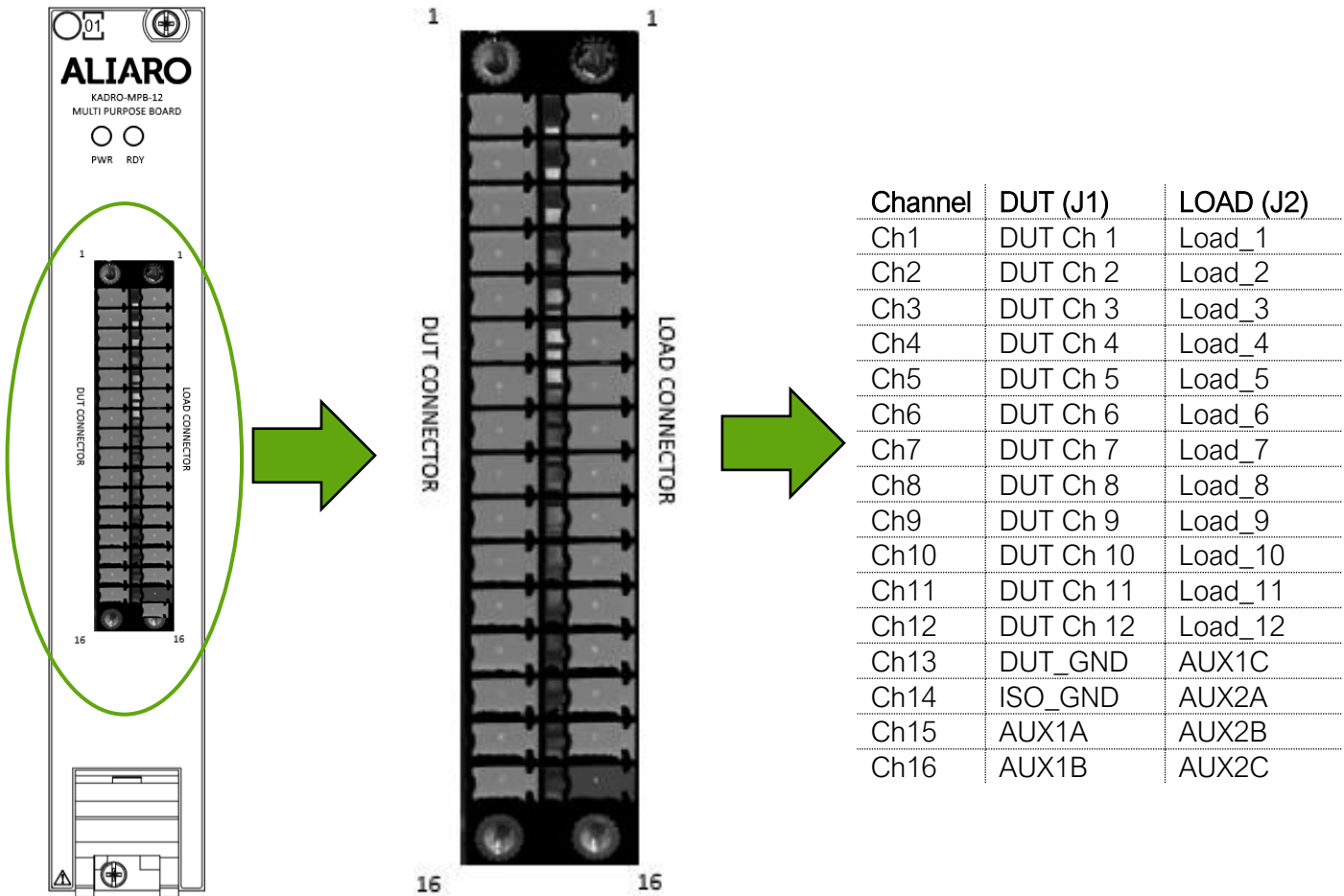
Operating temperature	0 °C to 40 °C
Storage temperature range	-40 °C to 85 °C
Operating relative humidity range	10% to 90%, noncondensing
Storage relative humidity range	5% to 95%, noncondensing

Physical characteristics

Category	Condition	Value
Module Dimensions	Excluding front handle	144.32mm x 30.48mm x 281 mm (H x W x D)
Front Panel Connector		1 x female Weidmuller 32 high density

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Front connectors (J1 & J2)



With 12 fully programmable pins (Analog In/Out, PWM In/Out, Digital In/Out and resistor emulation) on the DUT connector any of the given options can be generated from Ch1 to Ch12. The last 4 pins Ch13 to Ch16 are factory set and should not be changed. The Weidmüller connector are chose because of their rugged and simple design and provides time saving cable clips for the minimum use of tools, this makes them perfect for modular systems.



Caution The pins are not indestructible, ports and pins will tare if not treated with care

General specification

Category	Condition	Value
No of channels		12
No of banks		3
Power supply		24VDC, +/-5%
Channel to channel isolation	(50Ω/1MHz)	60dB
Max. Operating Voltage	Any pin	+ 60V
Min. Operating Voltage	Any pin	- 60V

Fault Insertion

Category	Condition	Specified value	Typical value
Max. continuously current	DUT to Load DUT to AUX 1 / 2 All other pins	10 A (40A using parallel channels) 10 A (40A using parallel channels) 100 mA	
Max peak current (<1 ms, 25 °C)	DUT to Load DUT to AUX 1/2	50A/1ms 50A/1ms	

**Notice Exceeding the maximum pulsed current can damage the module*

Signal conditioning

Category	Condition	Value
Threashold, range	Ch 1-12	5-50V
Threashold, resolution	Ch 1-12	?
Threashold, accuricy	Ch 1-12	5% of set value ??
Threashold, speed/bandwith ?		

Digital I/O

Category	Condition	Value
PWM frequency range		Will be added
PWM frequency resolution		Will be added
PWM frequency accuricy		Will be added
PWM duty cycle range		0 Will be added
PWM duty cycle resolution		Will be added
PWm duty cycle accuricy		Will be added

KADRO-AMP-4 Specification (Option)

Category	Condition	Value
No of channels / each board		4
Power supply	Need separate Isolated supply	24VDC, +/-5%
Current drive	Any pin	200mA per channel
KADRO-RES-2 Range	Any pin	1 Ohm to 110 kOhm

KADRO-RES-2 Specification (Option)

Category	Condition	Value
No of channels / each board		4
Power supply	From AL-1010	24VDC, +/-5%
Range	Any pin	1 Ohm to 110 kOhm

Configuration and Accessories

For most applications the AL-1010 needs to be configured with a backplane and a cross connector board. The AL-1010 provides 3 expansion slots for add-on boards such as amplifier or resistor boards, each supporting 4 channels

RTI Backplane

The AL-1010 card has three (3) expansion slots for add-on boards for adding additional functionality for enabling more flexibility in the system.

X-connector Board

Will be added

KADRO-AMP-4 Amplifier Board

The KADRO-AMP-4 add-on board amplifies voltage and current making it possible to use standard I/O instrumentation devices for operation. The board supplies four (4) independent channels (bank) with amplifier functionality (enables Analogue and Digital Out).

Visit aliaro.com for more information about AL-1010 accessories. You must install mating connectors according to local safety codes and standards and according to the specifications provided by the manufacturer.

You are responsible for verifying the safety compliance of third-party connectors and their usage according to the relevant standard(s).

Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information.

To obtain product certifications and the DoC for Aliaro products, visit aliaro.com/certification.

CE Compliance

This product meets the essential requirements of applicable European Directives, as follows:

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)
- 2011/65/EU; Restriction of Hazardous Substances (RoHS)

Electromagnetic Compatibility Standards

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 55011-2009 Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement CISPR 11:2009
- EN 55032:2012 Electromagnetic compatibility of multimedia equipment - Emission requirements CISPR 32:2012
- EN 61326-1-2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements IEC 61326-1:2012