

16 Channels Bus Switch Board

AL-2010 for SLSC

This document describes the AL-2010 board for National Instruments SLSC-12001 chassis.



Definitions

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.

Conditions

Specifications are valid under the following conditions unless otherwise noted.

The AL-3011 board 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.

Overview

The AL-2010 (Bus Switch Board) board provides fault insertion on all common interfaces used in a vehicle, it also provides enable or bypass for the bus signals to each DUT.

The AL-2010 board is made to fit National Instruments (NI) Switch Load Signal Conditioning (SLSC) system together with corresponding computer interface boards and is delivered with LabVIEW driver and custom device for VeriStand.

The main purpose if the board is to be used for test and validation of Devices Under Test (DUT), both software and hardware including hardware-In-the-Loop applications.

For easy configuration it's recommended to use together xMove Configurator (Option).

Contents

Definitions	1
Conditions.....	2
Overview.....	2
Description	4
Detailed description	5
Installation.....	7
Electromagnetic Compatibility	7
Unpacking the module	7
What You Need to Get Started.....	7
Installing the AL-2010.....	8
Front Connector Pinout.....	9
RTI Backplane	10
Software Installation, SLSC LabVIEW drivers.....	10
Software Installation, Aliaro custom devices	10
System Check.....	10
Maintenance	11
System check using LabVIEW	11
Calibration	11
Specification	12
Definition and conditions	12
Environmental Characteristics	12
Physical characteristics.....	12
Technical characteristics	13
Safety Guidelines.....	13
Product Certifications and Declarations.....	13
CE Compliance.....	13
Electromagnetic Compatibility Standards.....	14
Environmental Management	14
Waste Electrical and Electronic Equipment (WEEE).....	14

Description

The AL-2010 (Bus Switch Board) provides fault insertion on all common interfaces used in a vehicle, both serial interfaces such as Ethernet, RS-232, RS-485, Automotive Ethernet etc. and bus interfaces such as CAN (not CAN FD), LIN and Flexray.

Four connectors are available at the front (Connector 1-4) to be connected to the Device-Under-Test (DUT), the connectors may be used in other configurations pending the interfaces used in the test setup.

AL-2010 provides fault insertion for 8 serial (2-pair) communication channels (Channel S1-S8). The communication channels are also wired to a piggyback area for adapters (options) used for Automotive Ethernet or LIN sensor emulator.

The AL-2010 supports four bus channels (B1-B4), each distributed to four DUT outputs.

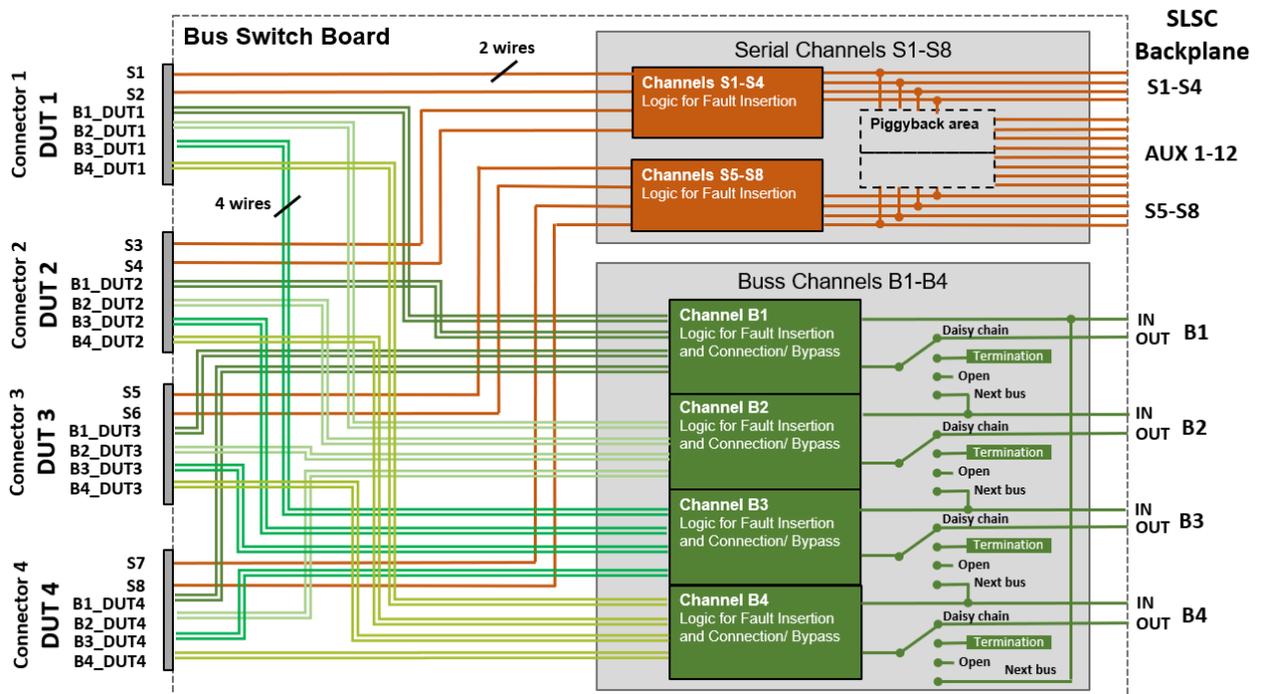


Figure 1, AL-2010 Block diagram

Detailed description

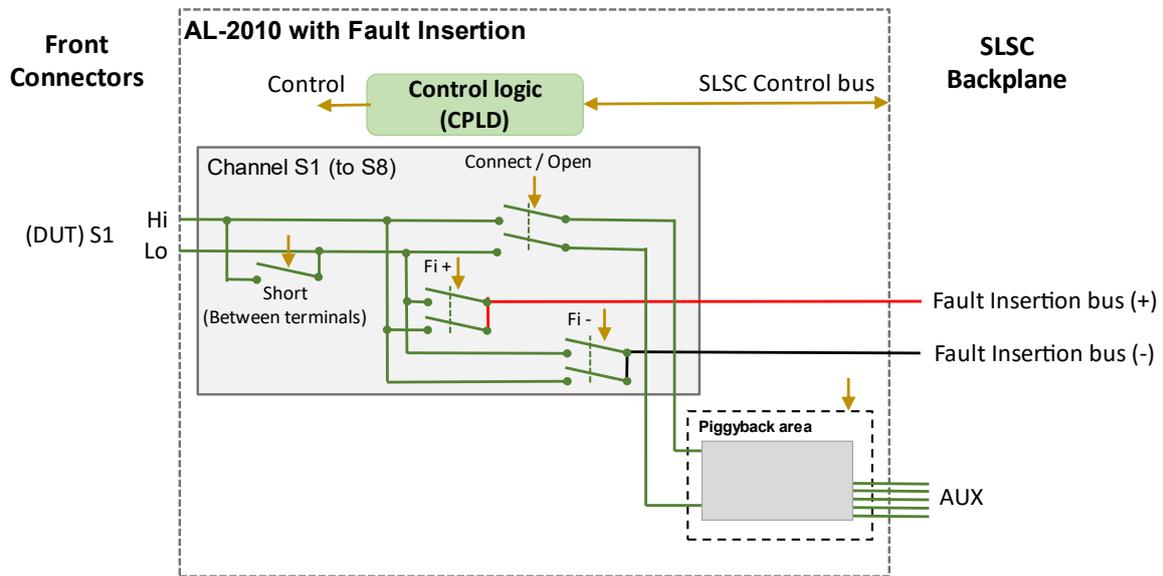


Figure 2, AL-2010 Block diagram, Serial interfaces

See fig 2, For the serial interfaces the AL-2010 provides fault insertion features such as:

- Connect / Disconnect
- Short (between lines) or Normal
- Fault insertion of HI or Lo signal to + or -
-

Additional features can be provided using the add on area, see examples

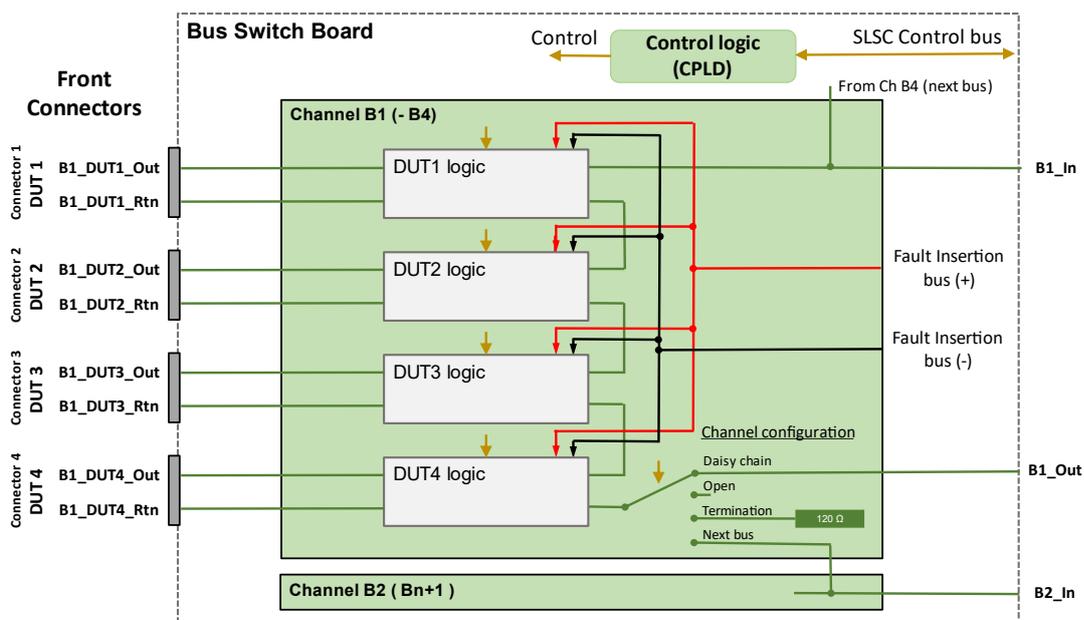


Figure 3, AL-2010 Block diagram, Bus interfaces for Bus B1

See fig 1 and 3, the AL-2010 provides four buses, each to be connected to four DUT interfaces, those buses can be linked by software control providing other configurations such as two busses to 8 DUT interfaces or 1 bus to 16 DUT interfaces. Each bus can be terminated (120 ohm) at the end by software.

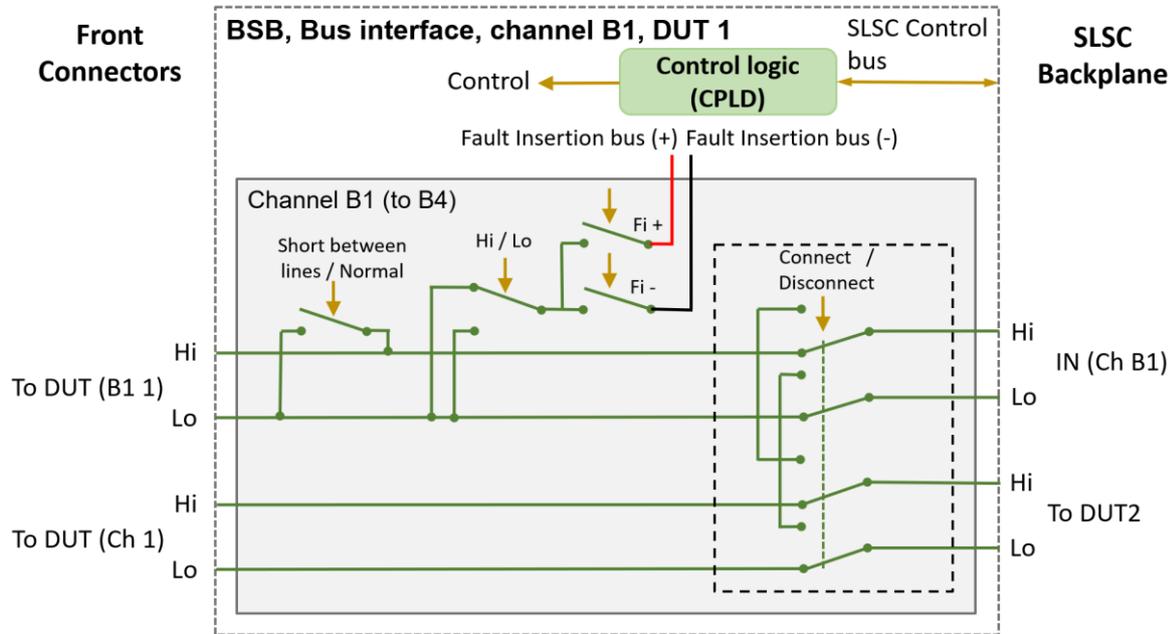


Figure 4, AL-2010 Block diagram, Bus interfaces for Bus B1

See fig 4, BUS interfaces the AL-2010 provides fault insertion features such as:

- Connect / Disconnect
- Short (between lines) or Normal
- Fault insertion of HI or Lo signal to + or –

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.

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.

What You Need to Get Started

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

Aliaro reserve the right to vary from the description given in this data sheet and shall not be liable for any errors.

Installing the AL-2010

1. Caution Do not touch the contacts or remove the I/O boards or cables while the system is energized.
2. Power off the main DC power source or disconnect the power source from the chassis before installing any modules or RTIs.
3. 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.



Notice The SLSC chassis and the AL-2010 do not support hot plug-in. The entire chassis must be powered off when a module is inserted or removed.

4. Loosen the screws on the upper rear panel of the chassis.
5. Position the RTI backplane at the desired slot and insert the securing screws, but do not fully tighten them.
6. Insert the AL-2010 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.
7. Repeat steps 4 and 5 for all required RTIs.
8. 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.
9. Fully tighten the two module mounting screws on each newly installed module.
10. Power on the SLSC chassis

Front Connector Pinout

Connector 1	
Pin	Signal name
1	B1 DUT Out Hi
2	B1 DUT1 Out Lo
3	B2 DUT1 Out Hi
4	B2 DUT1 Out Lo
5	S1 A Out
6	B3 DUT1 Out Hi
7	B3 DUT1 Out Lo
8	B4 DUT1 Out Hi
9	B4 DUT1 Out Lo
10	S2 A Out
11	B1 DUT1 Rtn Hi
12	B1 DUT1 Rtn Lo
13	B2 DUT1 Rtn Hi
14	B2 DUT1 Rtn Lo
15	S1 B Out
16	B3 DUT1 Rtn Hi
17	B3 DUT1 Rtn Lo
18	B4 DUT1 Rtn Hi
19	B4 DUT1 Rtn Lo
20	S2 B Out

Connector 2	
Pin	Signal name
1	B1 DUT2 Out Hi
2	B1 DUT2 Out Lo
3	B2 DUT2 Out Hi
4	B2 DUT2 Out Lo
5	S3 A Out
6	B3 DUT2 Out Hi
7	B3 DUT2 Out Lo
8	B4 DUT2 Out Hi
9	B4 DUT2 Out Lo
10	S4 A Out
11	B1 DUT2 Rtn Hi
12	B1 DUT2 Rtn Lo
13	B2 DUT2 Rtn Hi
14	B2 DUT2 Rtn Lo
15	S3 B Out
16	B3 DUT2 Rtn Hi
17	B3 DUT2 Rtn Lo
18	B4 DUT2 Rtn Hi
19	B4 DUT2 Rtn Lo
20	S4 B Out

20	10
19	9
18	8
17	7
16	6
15	5
14	4
13	3
12	2
11	1

Connector 1

20	10
19	9
18	8
17	7
16	6
15	5
14	4
13	3
12	2
11	1

Connector 2

20	10
19	9
18	8
17	7
16	6
15	5
14	4
13	3
12	2
11	1

Connector 3

20	10
19	9
18	8
17	7
16	6
15	5
14	4
13	3
12	2
11	1

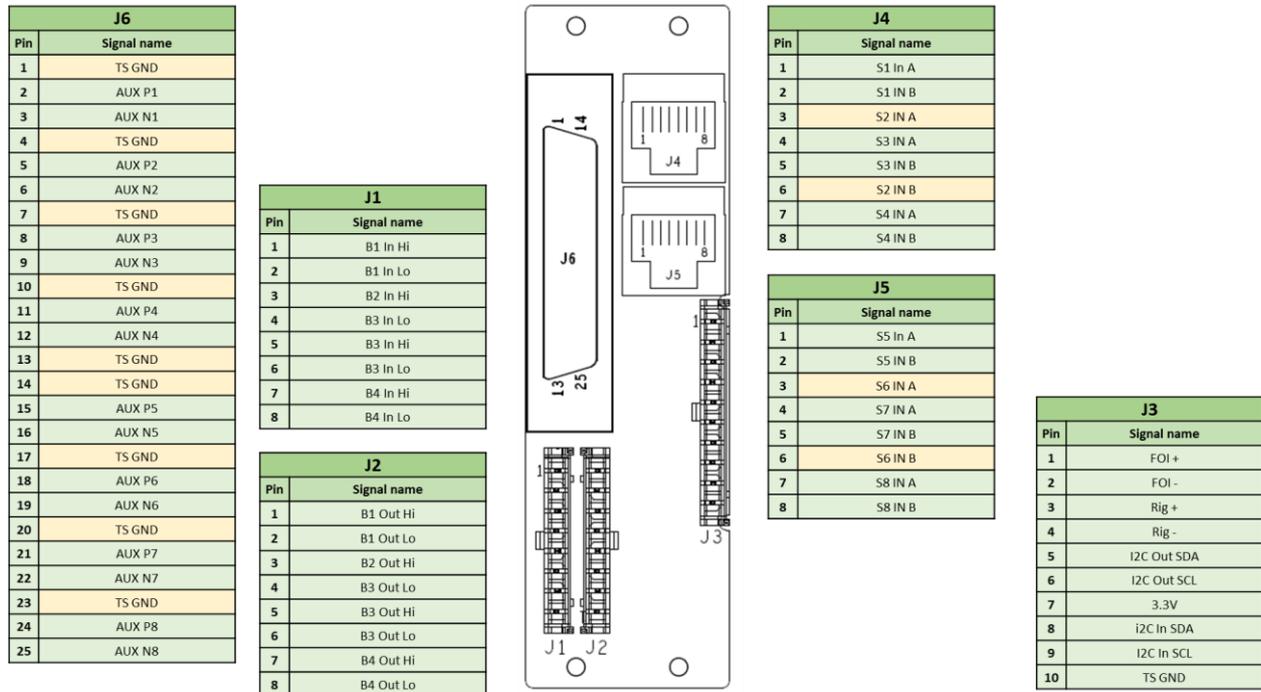
Connector 4

Connector 3	
Pin	Signal name
1	B1 DUT3 Out Hi
2	B1 DUT3 Out Lo
3	B2 DUT3 Out Hi
4	B2 DUT3 Out Lo
5	S5 A Out
6	B3 DUT3 Out Hi
7	B3 DUT3 Out Lo
8	B4 DUT3 Out Hi
9	B4 DUT3 Out Lo
10	S6 A Out
11	B1 DUT3 Rtn Hi
12	B1 DUT3 Rtn Lo
13	B2 DUT3 Rtn Hi
14	B2 DUT3 Rtn Lo
15	S5 B Out
16	B3 DUT3 Rtn Hi
17	B3 DUT3 Rtn Lo
18	B4 DUT3 Rtn Hi
19	B4 DUT3 Rtn Lo
20	S6 B Out

Connector 4	
Pin	Signal name
1	B1 DUT4 Out Hi
2	B1 DUT4 Out Lo
3	B2 DUT4 Out Hi
4	B2 DUT4 Out Lo
5	S7 A Out
6	B3 DUT4 Out Hi
7	B3 DUT4 Out Lo
8	B4 DUT4 Out Hi
9	B4 DUT4 Out Lo
10	S8 A Out
11	B1 DUT4 Rtn Hi
12	B1 DUT4 Rtn Lo
13	B2 DUT4 Rtn Hi
14	B2 DUT4 Rtn Lo
15	S7 B Out
16	B3 DUT4 Rtn Hi
17	B3 DUT4 Rtn Lo
18	B4 DUT4 Rtn Hi
19	B4 DUT4 Rtn Lo
20	S8 B Out

RTI Backplane

For communication between the AL-2010 and the bus communication board such as CAN, LIN, FlexRay or any other serial bus you need to connect a RTI backplane to the SLSC chassis. The AL-2010 works with the AL-2010 RTI backplane



The RTI backplane support RJ-45 for Ethernet and Molex connector for the serial bus connections.

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-2010 is used with VeriStand, Custom Devices needs to be installed, see the NI Custom Device installation instruction at ni.com

System Check

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

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	10 min
Calibration interval	Not required

Specification

Definition and conditions

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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

SLSC slots	1
Dimensions	144.32mm x 30.48mm x 281 mm (H x W x D)
Weight	More info shortly
Front I/O Connector	4 x Phoenix 1844808 20-pins
Rear I/O Connectors	More info shortly

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Technical characteristics

2-pair Impedance	Channel 1-4: 120Ohm Channel 5-12: 100 Ohm
Bandwidth	Channel 1-4: 50MHz Differential Channel 5-12: 400MHz Differential
Isolation	In open circuit Between channels
Voltage	100V
Short circuit current:	500mA (protected by current limiter circuit)
Path resistance	Channel 1-4: In to Out 2 Ω Channel 5-12: In to Out 1 Ω

Safety Guidelines



Caution Ensure that hazardous voltage wiring is performed only by qualified personnel adhering to local electrical standards.



Caution Do not mix hazardous voltage circuits and human-accessible circuits on the same module



Caution When device terminals are hazardous voltage LIVE, you must ensure that devices and circuits connected to the device are properly insulated from human contact.



Caution All wiring must be insulated for the highest voltage used.

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/

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 61326-1-2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements IEC 61326-1:2012

FCC Regulations Title 47 Chapter 1, Part 15, Subpart B, Class B.
§15.107: Conducted Emission, AC power line, §15.109: Radiated Emission

Environmental Management

Aliaro is committed to designing and manufacturing products in an environmentally responsible manner. Aliaro recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to Aliaro customers. For additional environmental information, refer to the Minimize Our Environmental Impact web page at aliaro.com/environment.

This page contains the environmental regulations and directives with which Aliaro complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of the product life cycle, all Aliaro products must be disposed of according to local laws and regulations.

For more information about how to recycle Aliaro products in your region, visit aliaro.com/environment/weee