Prylada Core (IoT Sensor Hub ADH-02)

User Manual

Version 1.0

17/05/2021

Revision History

Version	Date	Notes	Contributors	Approver
1.0	17 May 2021	Initial version	Yury Tsybulka	

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1. Overview

ADH-02 is a data acquisition module with IoT gateway functionality. It can be used as a standalone data harvester as well as a proxy, linking a cloud with IoT mesh. ADH-2 has onboard a range of industrial interfaces that can be extended thanks to modular device architecture. It can be powered via dual-source prioritized power supply input that enables battery back-up functionality. The board requires external LTE and GNSS antennas connected with u.FI connectors.

1.1. Cautions & Warnings

TYMIQ provides all the documentation, design resources, web application and other resources “AS IS” and with all faults, and disclaims all warranties, express and implied, including without limitation any implied warranties of merchantability, fitness for a particular purpose or noninfringement of third party intellectual property rights.
These resources are intended for skilled developers/users building their solutions with TYMIQ products. You are solely responsible for selecting the appropriate TYMIQ products for your application, designing, validating and testing your application, and ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice.
TYMIQ disclaims responsibility for, and you willfully indemnify TYMIQ and its representatives against, any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

1.2. Electrostatic Discharge Caution

This integrated circuit can be damaged by ESD. TYMIQ recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

2. Key Features

2.1. Wireless connectivity

2.1.1. LTE

- nRF9160 based
- Assisted GPS
- Certified LTE bands: B1, B2, B3, B4, B5, B8, B12, B13, B14, B17, B18, B19, B20, B25, B26, B28 and B66
- External antennas for LTE and GPS are required connected via u.FI connectors

2.2. Interfaces

2.2.1. 4-channel isolated software programmable

- Analog inputs 4-20 mA, 0-10V
- Analog outputs 4-20 mA, 0-10V
- Digital input (dry contact)
- RTD measurement
- 16-bit Σ-Δ ADC and 13-bit DAC
- HART – compatible

2.2.2. 3 Digital inputs

- 20V compatible

2.2.3. Digital outputs

- 1 high-side 5-34V switch
- 1 low-side switch

2.2.4. 1 bistable relay

- Voltage rating 220V
- Current rating 2A

2.2.9. 3V 300mA power output

2.3. Power supply

- 2 inputs, prioritized 4.5-28V

2.4. Dimensions

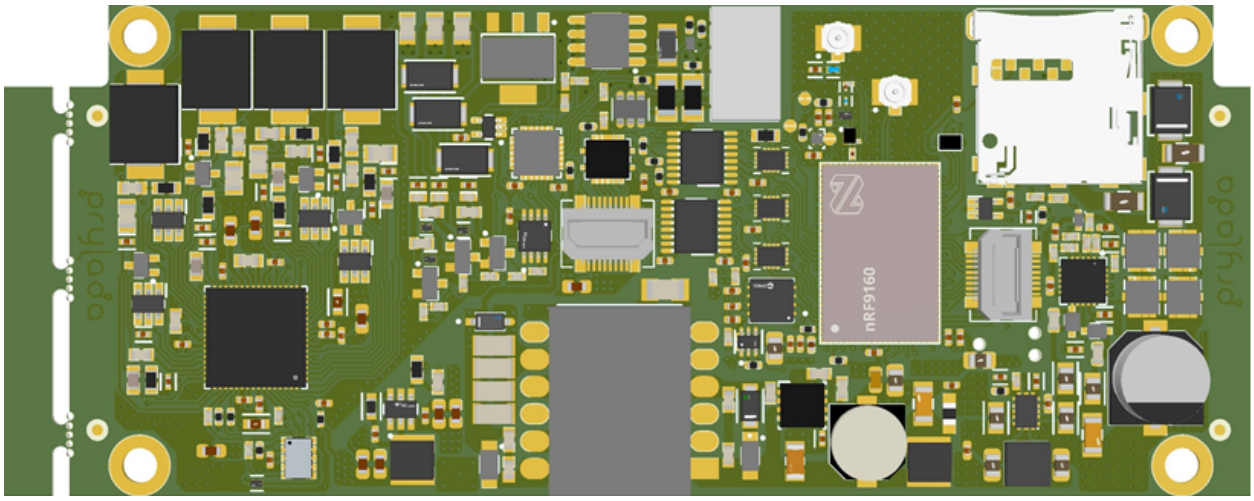
- 171x121x55mm

2.5. Applications

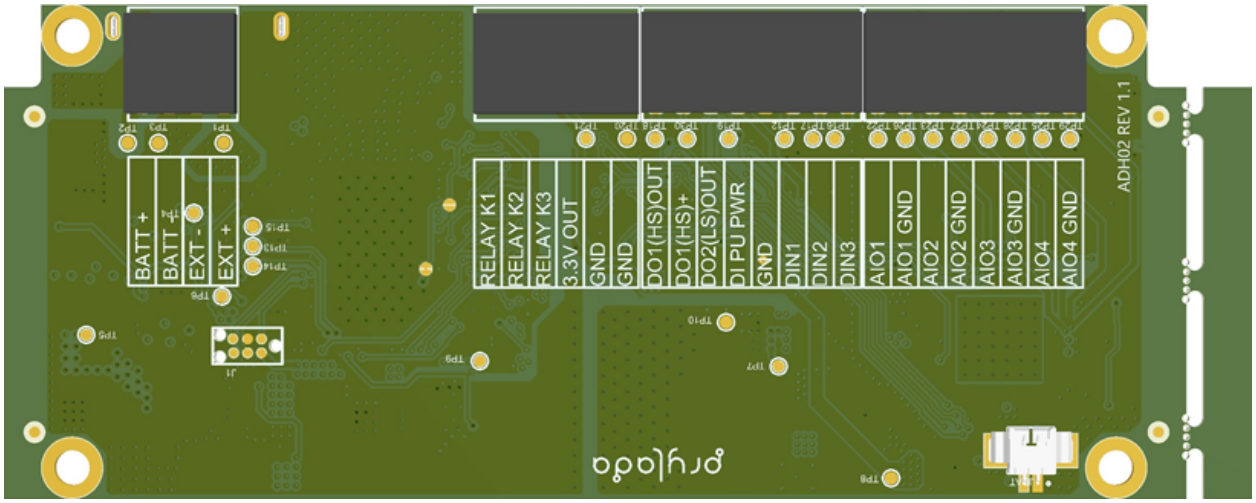
- Logistics and asset tracking
- Sensors networks
- Smart energy
- Smart building automation
- Smart agriculture
- Predictive maintenance
- Factory automation
- Retail and monitor devices
- Medical devices
- Wearables

3. Connectors description

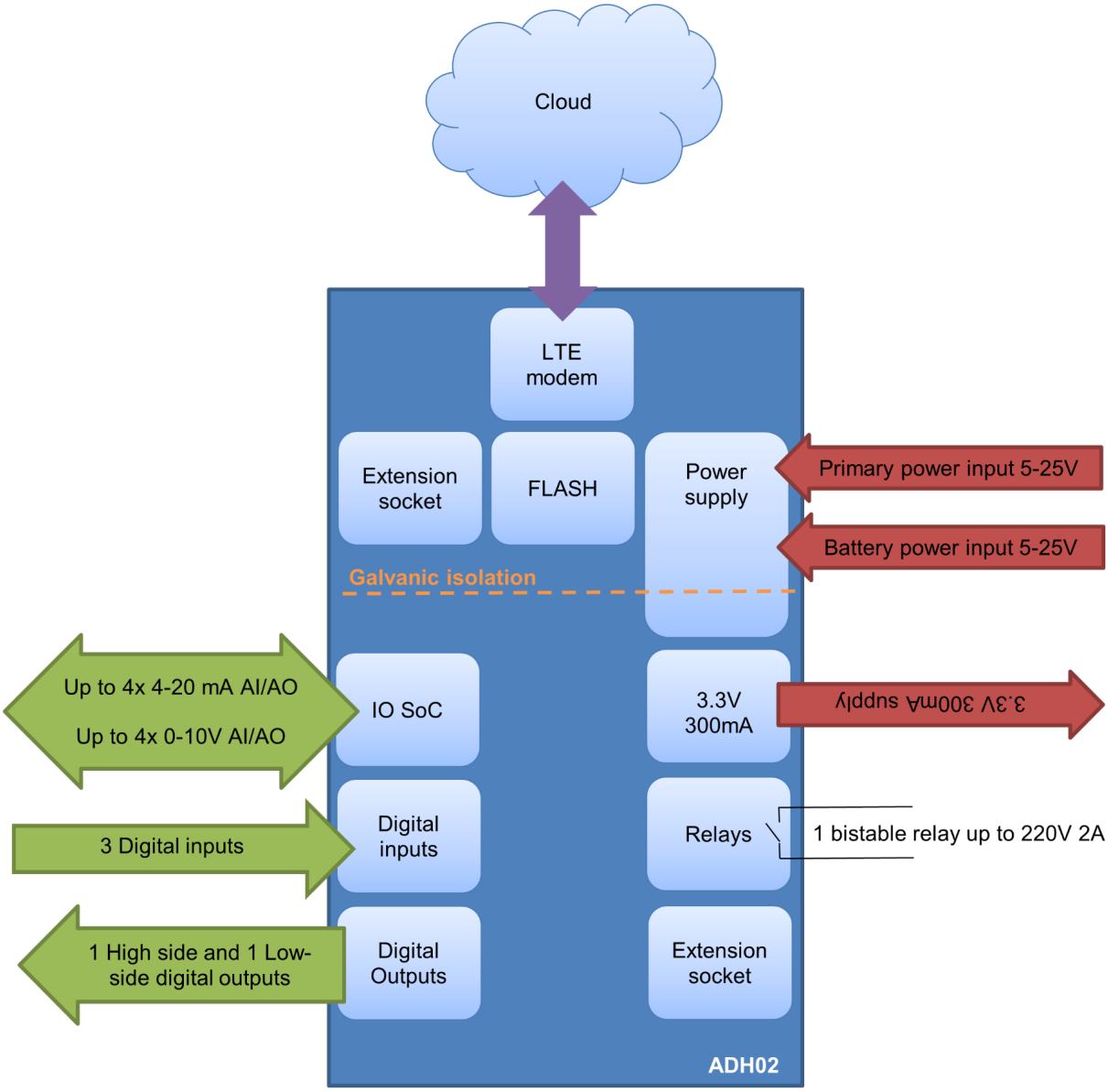
3.1. Top view



3.2. Bottom view

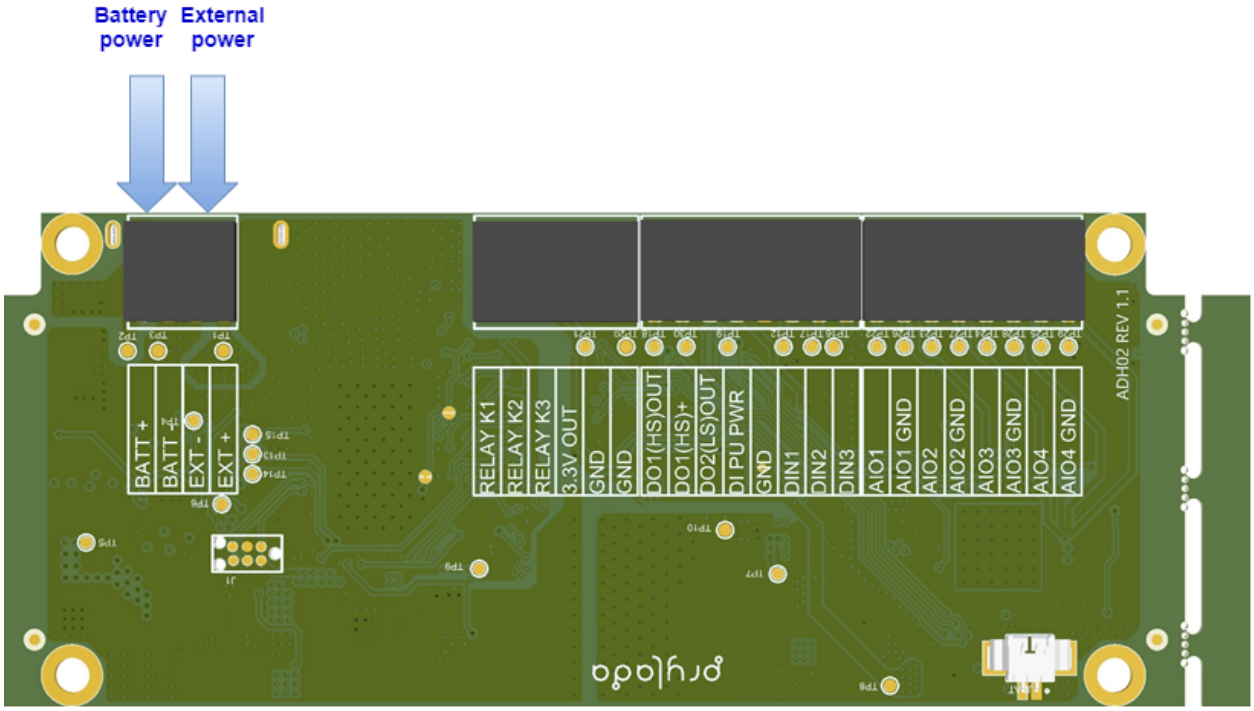


4. Architecture overview



5. Getting starting

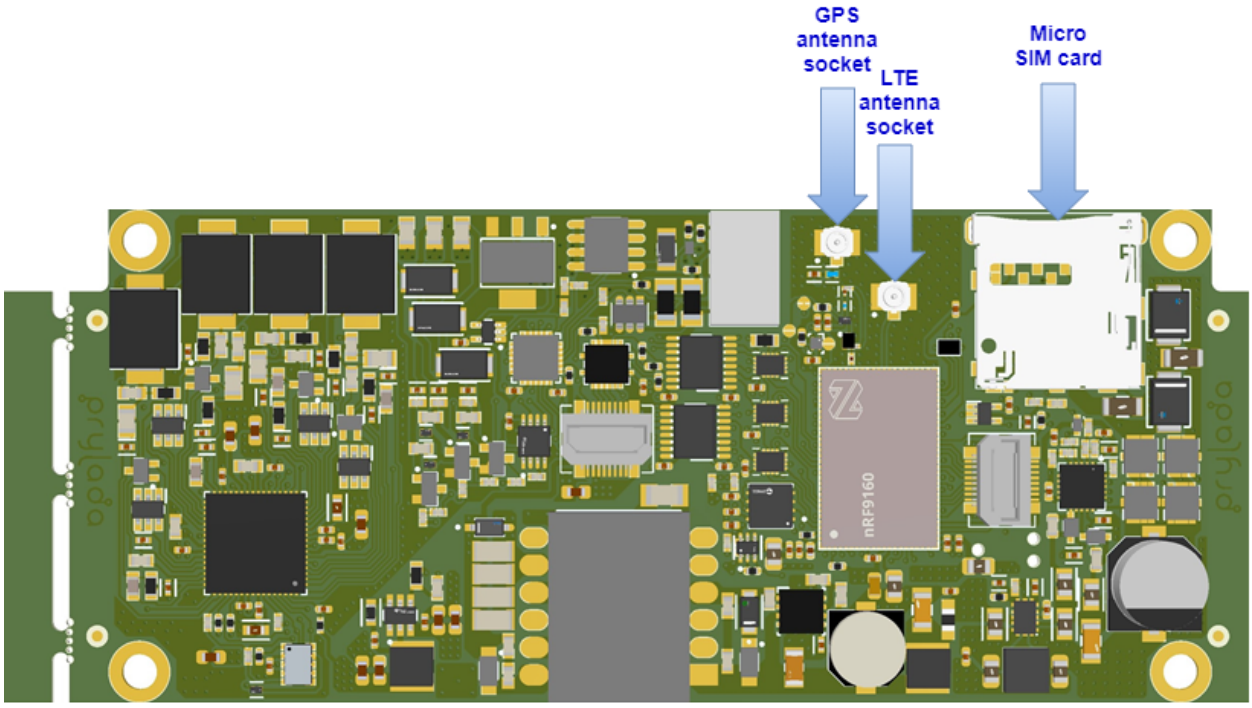
5.1. Powering-up ADH-02



ADH-02 can be powered by connecting power source(s) to one of two or to both “EXT POWER” and “BATT POWER” connectors. Both power inputs are +-40V tolerant and have under- and overvoltage protection enabling device operation in 5-25V range. Both inputs have reverse polarity protection.
The difference between “EXT POWER” and “BATT POWER” is in priority only - “EXT POWER” is of higher priority comparing to “BATT POWER”, and therefore even if battery, being connected to “BATT POWER”, provides higher voltage than power source connected to “EXT POWER”, the last one will supply ADH-02 except the cases when its voltage is out of 5-25V range.
As soon as the power source, connected to “EXT POWER” is not available/interrupted, ADH-02 power controller will seamlessly switch to “BATT POWER” source if it is available and its voltage is in 5-25V range. It is switching back to “EXT POWER” when it is on and in range.
ADH-02, internally, is divided on two power domains – AON (always on) and isolated power domains. Isolated power domain can be switched off for power saving needs.

5.2. Antennas connection

ADH-02 is designed to work with external LTE and GPS antennas.



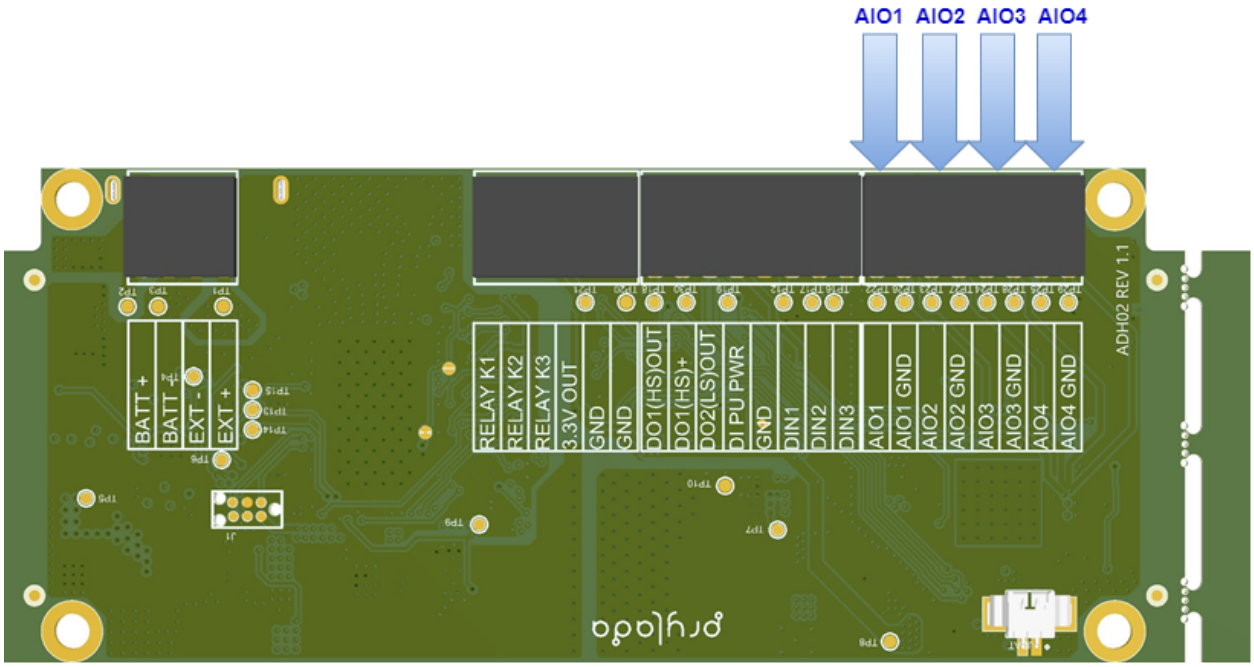
External antennas can be connected directly to u.Fl connector or via u.Fl to SMA adapter.
While connecting antennas, users should follow antenna connection rules described in a datasheet provided by antenna manufacture in order not to lower device RF performance.

5.3. SIM card installation

ADH-02 supports micro-SIM cards which are to be inserted as shown in the picture above. SIM card socket is of Push-Push Eject type.

5.4. Analog IOs

ADH-02 contains a powerful on-the-fly reprogrammable 4-inputs-outputs subsystem.

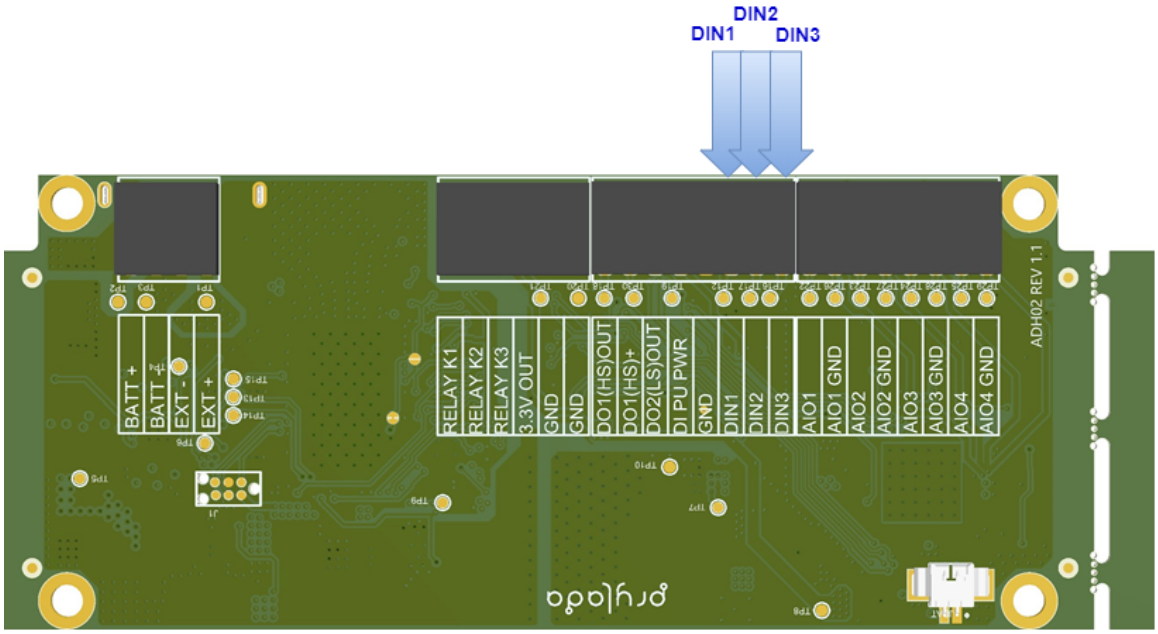


Each channel can be individually programmed to act as:

- 4-20 mA digital input
- 4-20 mA digital output
- 0-10V analog input
- 0-10V analog output
- Digital input
- RTD measurement

5.5. Digital Inputs

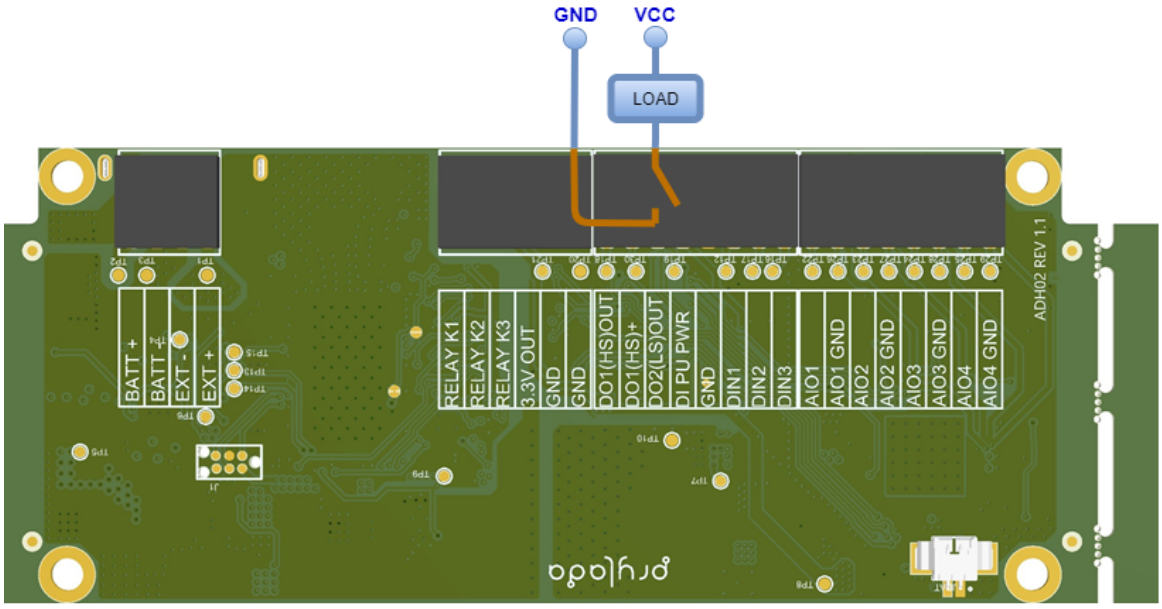
ADH-02 is equipped with three 20V digital inputs sharing one ground pin.



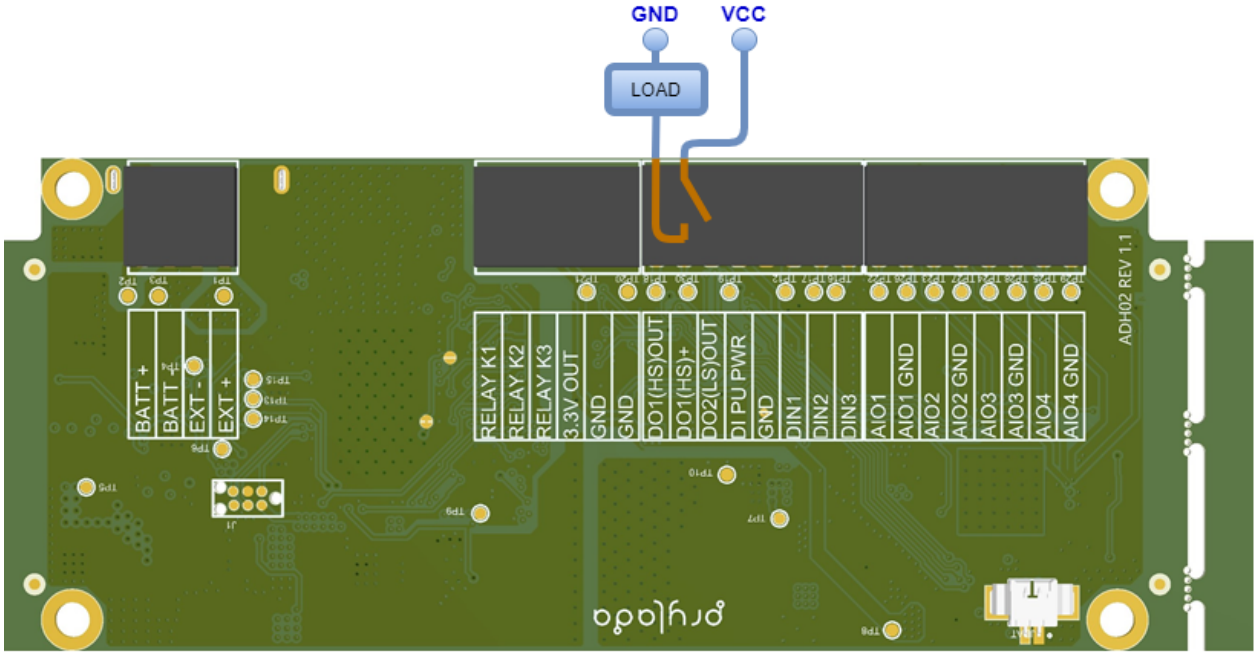
5.6. Digital Outputs

ADH-02 contains 1 high-side and 1 low-side low-side switches.
Pictures below depicts:

- low-side switch connection - the switch commutates LOAD connection to ground.

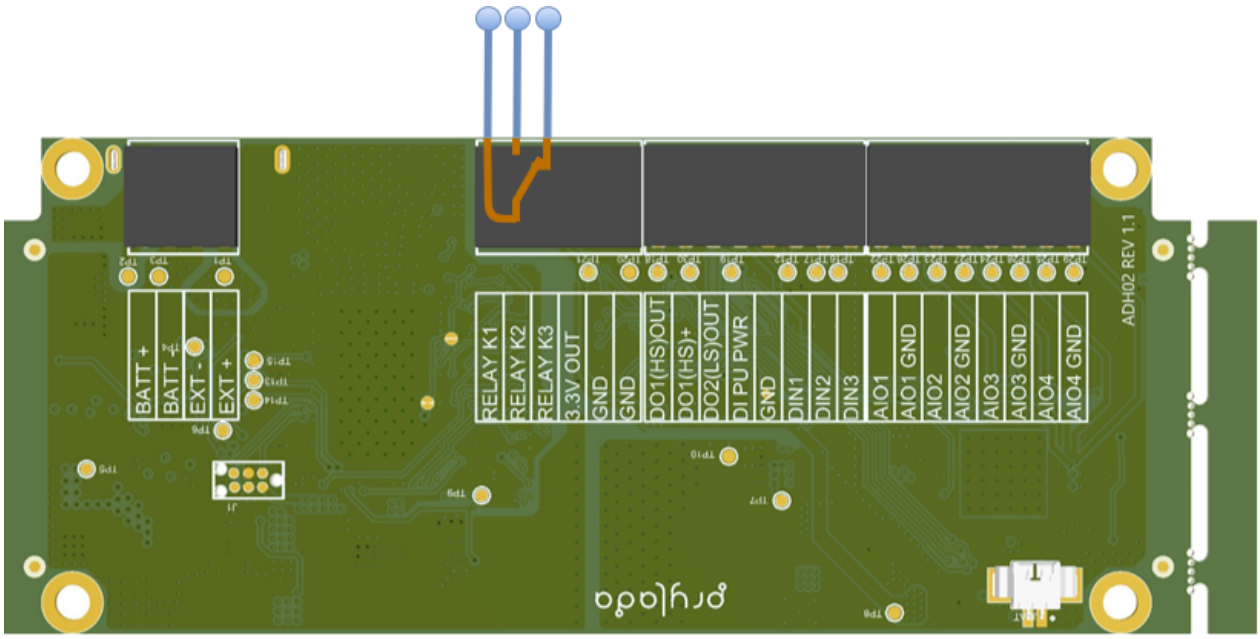


- High-side switch connection – the switch commutates LOAD to power source



5.8. Relay

ADH-02 is equipped with bistable relay letting user to leave some device being powered even if ADH-02 is off



5.9. External sensors power supply

In case sensors, connected to ADH-02, require to be powered from ADH-02 there is 3.3V output with 300mA current limit. It gets active as soon as the isolated power domain is on.

6. Using the System

6.1 Connectors

ADH-02 is equipped with miniature 2.5 pitch AVX connectors of 9276 series compliant with wires up to 1 mm diameter. Like any connector of this type, it imposes certain requirements on how the wires should be prepared, and how they should be removed.

- Wire strip length must be 4-5 mm
- Wire can be removed with use of special tool only provided by manufacturer or its equivalent provided by TYMIQ

6.2. Running ADH-02

The following steps are to be performed to make ADH-02 running:

1. Mount ADH-02 in housing if necessary
2. Attach power supply according to the needed use scheme and consider information given in 5.1.
3. Attach antennas in accordance with antennas manufacturers guidelines and considering the information given in 5.2.
4. Insert SIM card (see section 5.3)
5. Attach all the sensors and networks according to sensors specifications and considering the information given in 5.4-5.9
6. Power ADH-02 up
7. Check whether ADH-02 appears in TYMIQ cloud or custom cloud service.
8. Configure ADH-02 via cloud configuration services.
9. Configure all the ADH-02 interfaces via cloud services.
10. Check all the connected devices availability.

7. Troubleshooting & Support

7.1. Support

Table 1 - Support Points of Contact

Contact	Organization	Phone	Email	Role	Responsibility
	TYMIQ GmbH		support@prylada.com	Duty support manager	First line support