

Power PROFET™ + 24/48V Shield for Arduino

User guide

About this document

Scope and purpose

This document describes how to use the high-side switch Shield for Arduino with the Power PROFET™ + 24/48V.

Intended audience

Engineers, hobbyists and students who want to use powerful protected high-side switches for Arduino projects.

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1 Getting started

The BTH500xx-1LUA Shield for Arduino from Infineon Technologies is a flexible evaluation board dedicated to drive loads. This board is compatible with Infineon's XMC1100 Boot Kit, the Arduino UNO, the Arduino DUE and all the other boards which comply with the Arduino form factor.

The shield can be controlled either with the general logic IO-Ports of a microcontroller or with a PWM signal generated by a waveform generator.

The board is designed with the typical circuit to control one BTH50015-1LUA and one BTH50030-1LUA. This shield offers a quick evaluation of features like the analog current feedback and all the different protection functions.

1.1 Shield overview

The **Figure 1** shows and describes the board. With this board, users are able to drive loads by adding power connectors on BAT, OUT1 and OUT2. All the pins of the two devices are accessible by test points. If a user does not want to use a microcontroller, it is possible to connect the inputs of the two devices to a low frequency generator and do the measurements with an oscilloscope. The demoboard can also be easily connected to any Arduino UNO board or Infineon board which has the Arduino UNO form factor through headers.

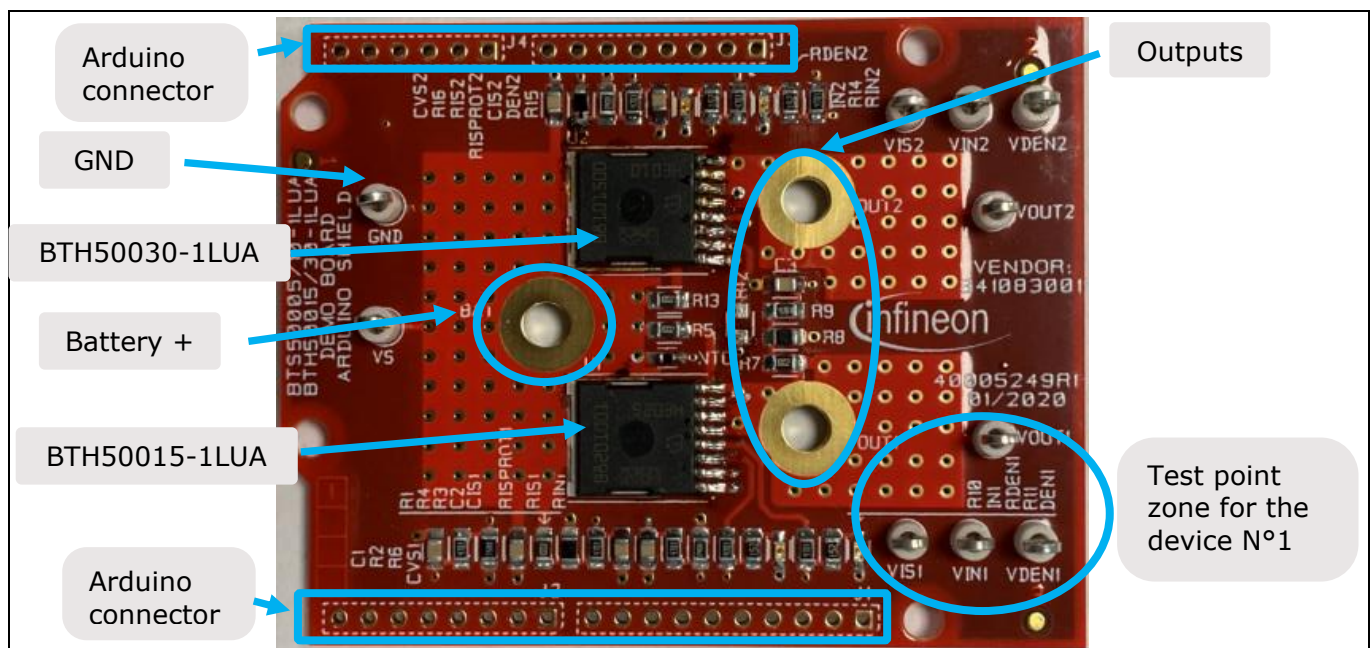


Figure 1 Arduino compatible evaluation board for the Power PROFET™ + 24/48V

This shield offers a quick evaluation of the product:

- the latch functionality
- the current sensing functionality
- and all protections, e.g. “over temperature shut down” and “over current shut down”

WARNING: Refer to the datasheet for details on functionalities and parameters values. This user guide does not replace the datasheet and the user must be aware of limitations before turning on any supply.

1.2 Typical connection

In **Figure 2**, the evaluation board is connected to an Arduino UNO board, this pinout connection works with all microcontrollers using an Arduino pinout.

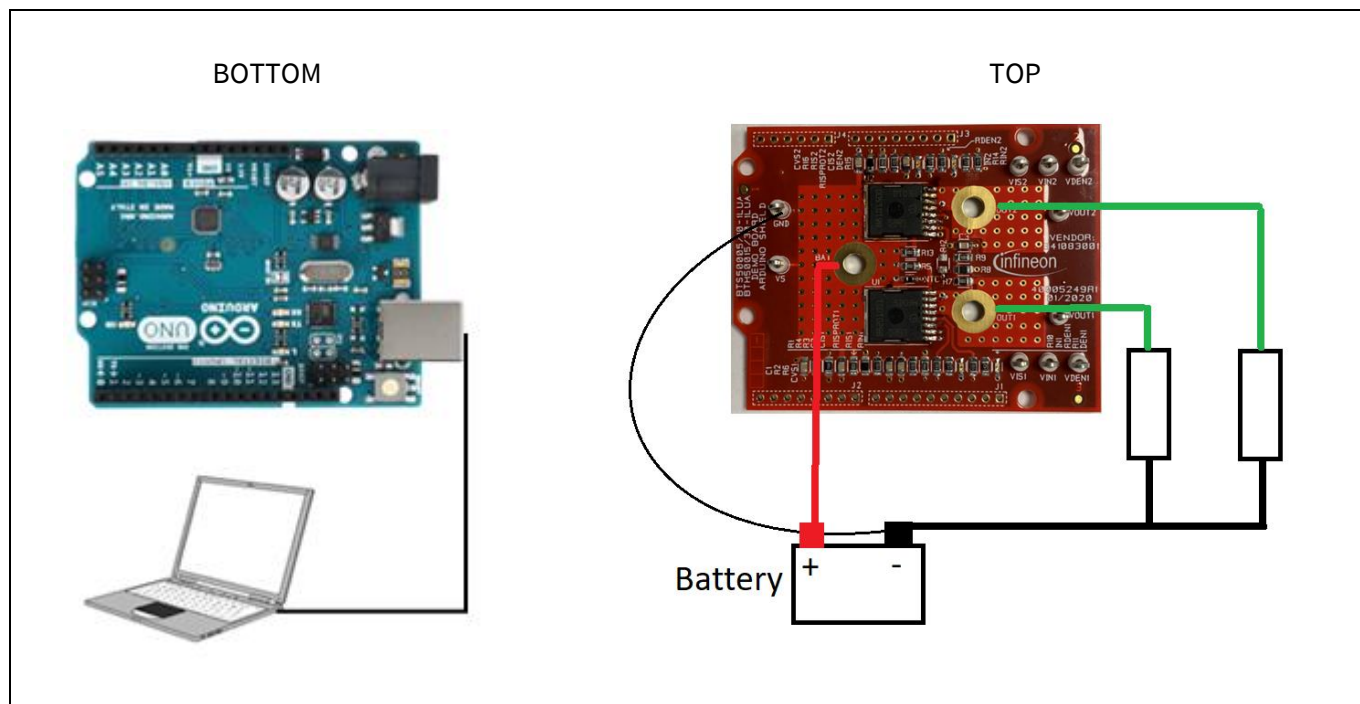


Figure 2 Evaluation board connected to the Arduino UNO board

In **Figure 3**, the evaluation board is connected to a waveform generator, driving the IN and DEN pin.

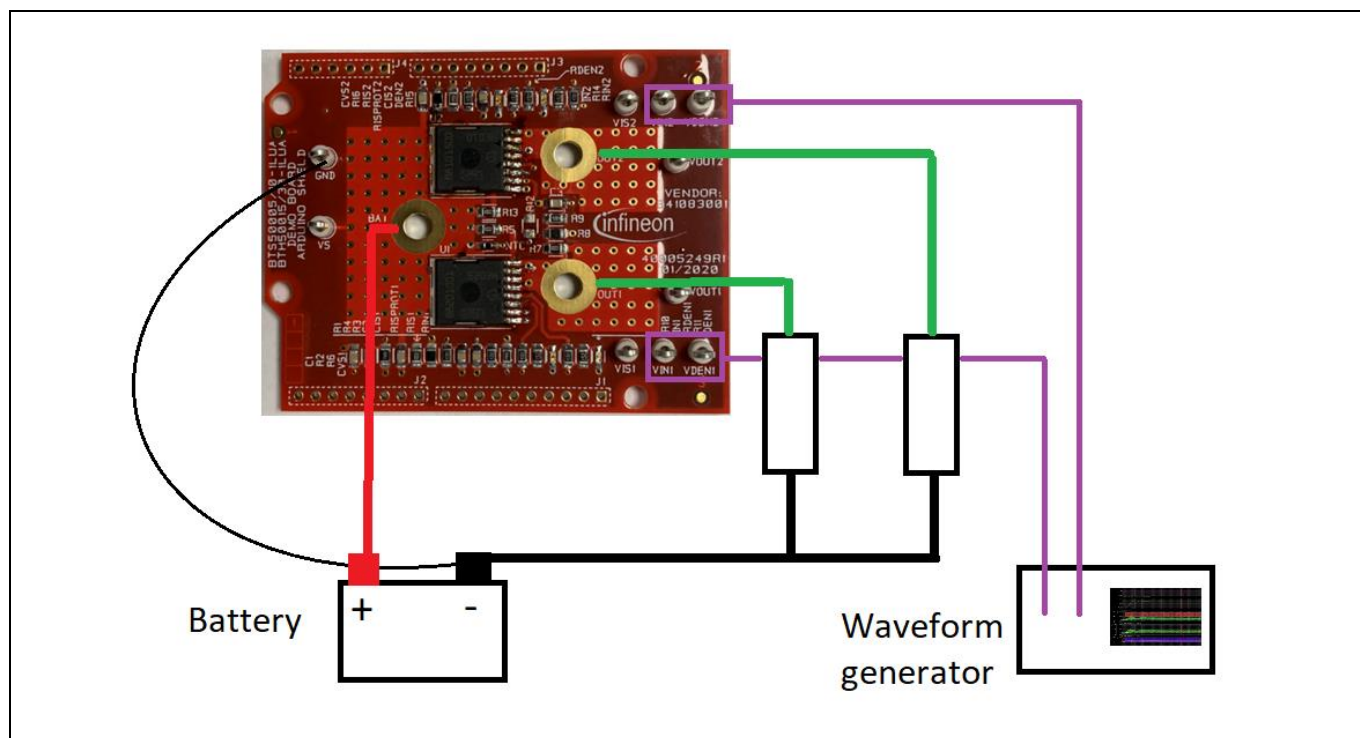


Figure 3 Evaluation board connected to a waveform generator

1.3 Key features

- The demoboard is able to provide continuous load current (48V-35A) between V_OUT and BAT.
- A green LED will turn on when the logic supply voltage is connected and turned on.
- A red LED will turn on when the logic supply voltage is connected and only if the referred device is latched.
- Output voltage, battery voltage, input and DEN logic, output current sense IS voltage can be measured externally with test points.
- Output voltage, battery voltage, input and DEN logic, output current sense IS can be monitored with the Shield for Arduino and also through the GitHub library.

2 How to drive the evaluation board

2.1 Without any Arduino board connected

Users can connect a waveform generator in order to drive the evaluation board manually. The IN pin has to be driven to turn the device on. The DEN pin has to be driven to enable the diagnosis ability.

2.2 Using a microcontroller

Users are able to connect any microcontroller which is compliant with the Arduino UNO form factor. Source code for microcontroller can be written and implemented according to the schematic and the pinout of the evaluation board provided in chapter 3.

2.3 With the GitHub library

Users have the possibility to use the Power PROFET™ + 24/48V Shield for Arduino GitHub library. The procedure is described step by step below.

- 1- Open the Arduino IDE.
- 2- Select “Manage library”, search for “High-Side-Switch” and install it.
- 3- Choose an example inside the “High-Side-Switch” library. For the Power PROFET™ + 24/48V, there are three examples. The first one is about switching one single channel, the second is about switching the two channels and the third is about switching the two channels separately and measuring the available parameters like the battery voltage and the current sense voltage of the two channels.

Many functions are available with the GitHub library. All functions are described below.

The source file can be found following this link: <https://github.com/Infineon/high-side-switch>

3 Board connectors description

3.1 Power connectors

| Name | Type | Description |
|------|--------------|---------------------------|
| BAT | Power supply | Positive power supply 48V |
| GND | Ground power | Ground |
| OUT1 | Power output | Output 1 |
| OUT2 | Power output | Output 2 |

3.2 Arduino connector

Connector J1

| Name | Pin | Type | Description / Arduino pin name |
|-------|-----|----------------|------------------------------------|
| - | 1 | No connected | - |
| - | 2 | No connected | - |
| - | 3 | No connected | - |
| Gnd | 4 | Digital Ground | Ground |
| - | 5 | No connected | - |
| IN1 | 6 | Digital Input | IN activation for U1 / Digital 12 |
| DEN1 | 7 | Digital Input | DEN activation for U1 / Digital 11 |
| IN2 | 8 | Digital Input | IN activation for U2 / Digital 10 |
| DEN23 | 9 | Digital Input | DEN activation for U2 / Digital 9 |
| - | 10 | No connected | - |

Connector J2

| Name | Pin | Type | Description |
|------|-----|--------------|-------------|
| - | 1 | No connected | - |
| - | 2 | No connected | - |
| - | 3 | No connected | - |
| - | 4 | No connected | - |
| - | 5 | No connected | - |
| - | 6 | No connected | - |
| - | 7 | No connected | - |
| - | 8 | No connected | - |

Connector J3

| Name | Pin | Type | Description |
|------|-----|----------------|-------------|
| - | 1 | No connected | - |
| - | 2 | No connected | - |
| - | 3 | No connected | - |
| - | 4 | No connected | - |
| - | 5 | No connected | - |
| Gnd | 6 | Digital Ground | Ground |
| Gnd | 7 | Digital Ground | Ground |
| - | 8 | No connected | - |

Connector J4

| Name | Pin | Type | Description/ Arduino pin name |
|----------|-----|--------------|---|
| IS_adc1 | 1 | Analog input | Analog measurement for the current sense U1 / A0 |
| VS_adc | 2 | Analog input | Analog measurement for the Vs voltage 2 / A1 |
| Temp_adc | 3 | Analog input | Analog measurement for the temperature / A2 |
| VOU_adc | 4 | Analog input | Analog measurement for the output voltage U2 / A3 |
| IS_adc2 | 5 | Analog input | Analog measurement for the current sense U2 / A4 |
| - | 6 | No connected | - |

Test points

| Name | Type | Description |
|-------|---------------------|---|
| VIN1 | Digital Input | IN activation for U1 |
| VIN2 | Digital Input | IN activation for U2 |
| VDEN1 | Digital Input | DEN activation for U1 |
| VDEN2 | Digital Input | DEN activation for U2 |
| VIS1 | Analog output | Analog measurement for the current sense U1 |
| VIS2 | Analog output | Analog measurement for the current sense U2 |
| VS | Analog output | Analog measurement for the VS voltage |
| Out1 | Analog power output | Analog power output from U1 |
| Out2 | Analog power output | Analog power output from U2 |

4 Schematic

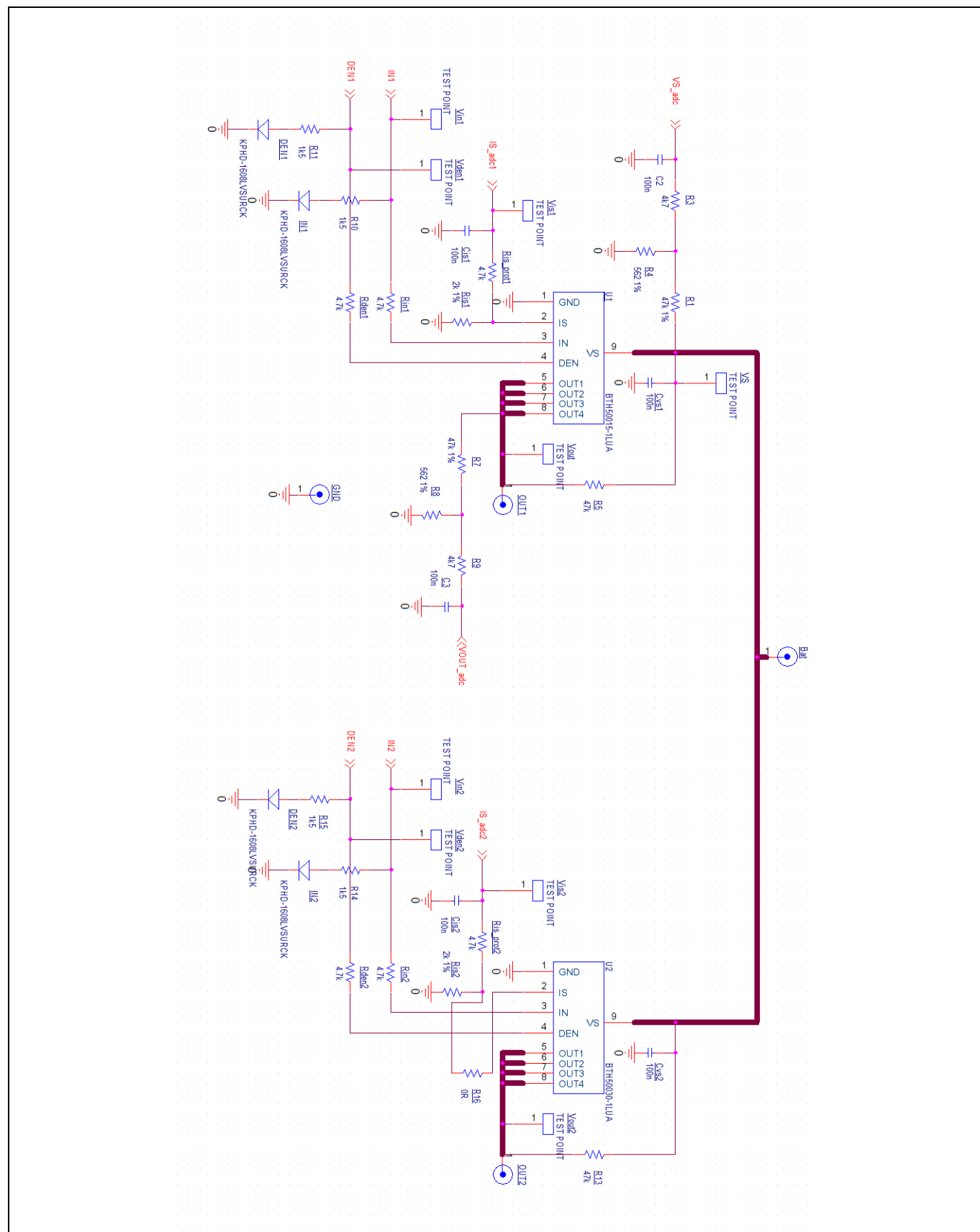


Figure 4 Schematic

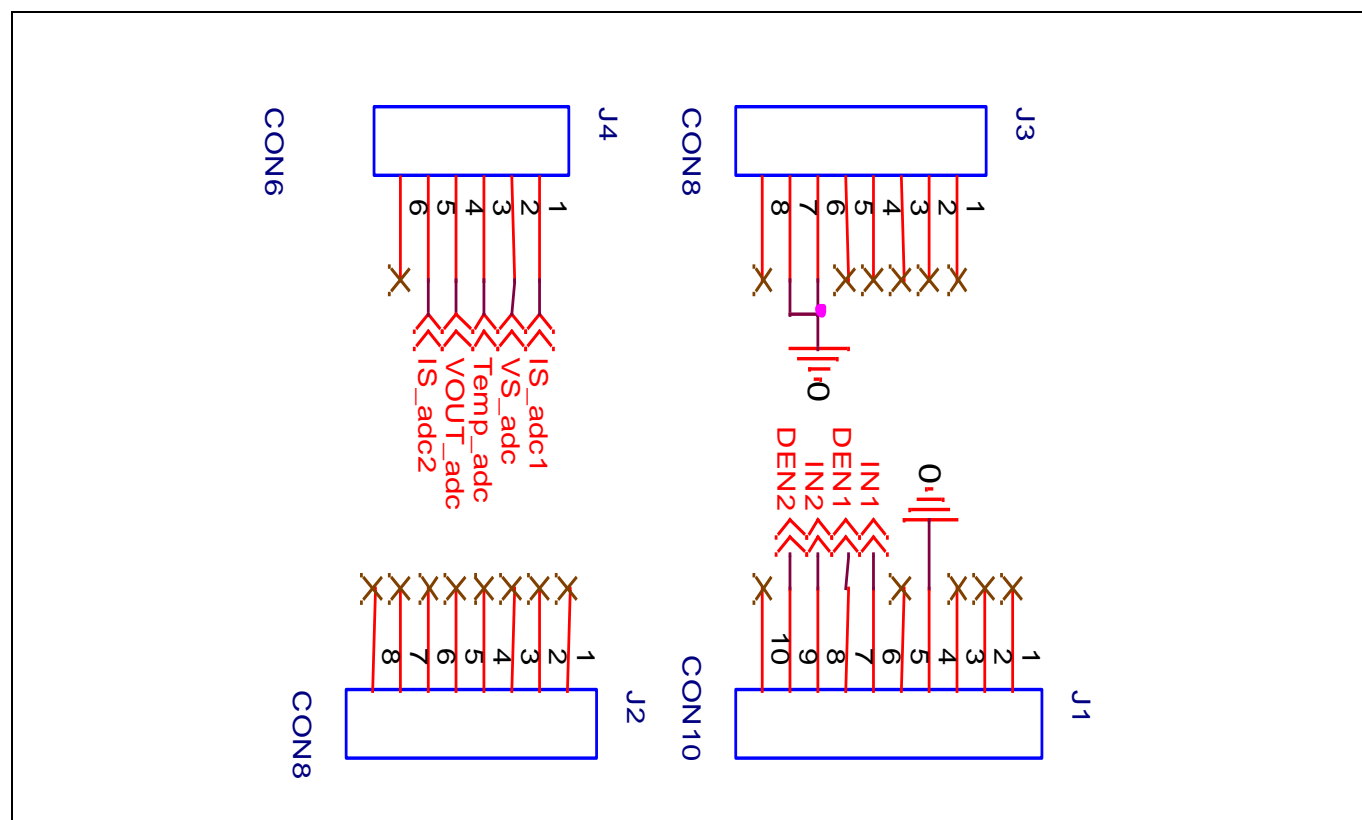


Figure 5 ARDUINO pin compatibility

Revision history

| Document revision | Date | Description of changes |
|-------------------|------------|--------------------------|
| 1.00 | 2023-09-15 | Initial version released |
| | | |
| | | |

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Edition 2023-09-15

Published by

Infineon Technologies AG

81726 Munich, Germany

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Email: erratum@infineon.com

Document reference

Z8F80493431

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