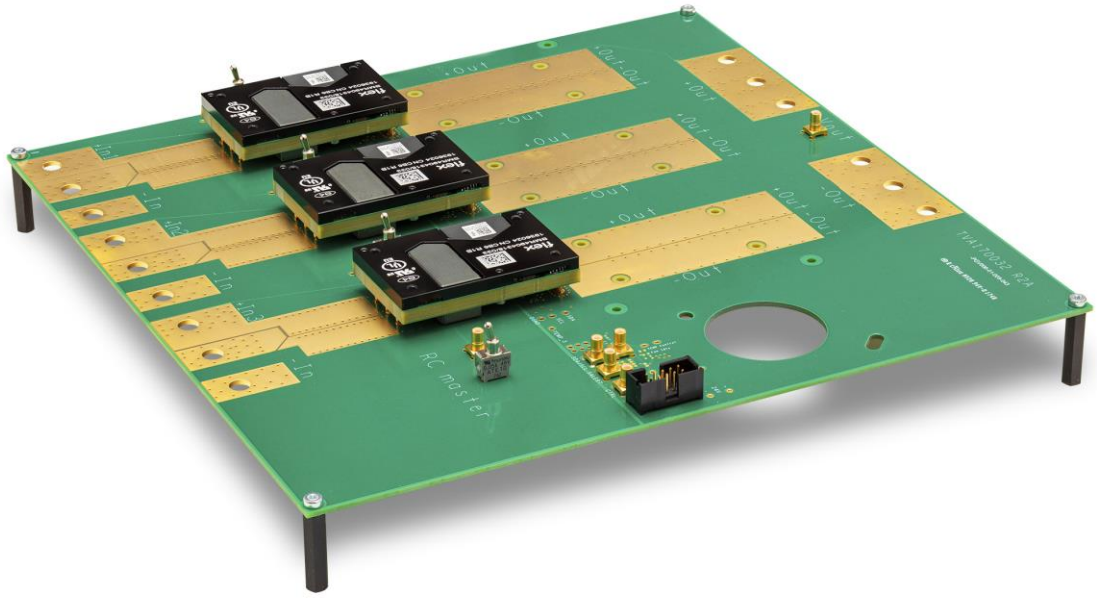
# Test Board BMR 480, BMR490, BMR491

## ROA 170 032

User Guide



# Contents

# 1 Introduction

This User Guide provides a brief introduction and instruction on how to use the Test Board ROA 170032. This board is designed for the following product series: BMR480, BMR490 and BMR491 (in the following named as BMR4xx). It provides the possibility to evaluate the BMR4xx modules in parallel and stand alone.

## 1.1 How to contact Flex Power Modules

For general questions or interest in our products, please contact your local sales representative. Contact details are available from our website:

www.flexpowermodules.com

## 1.2 Prerequisites

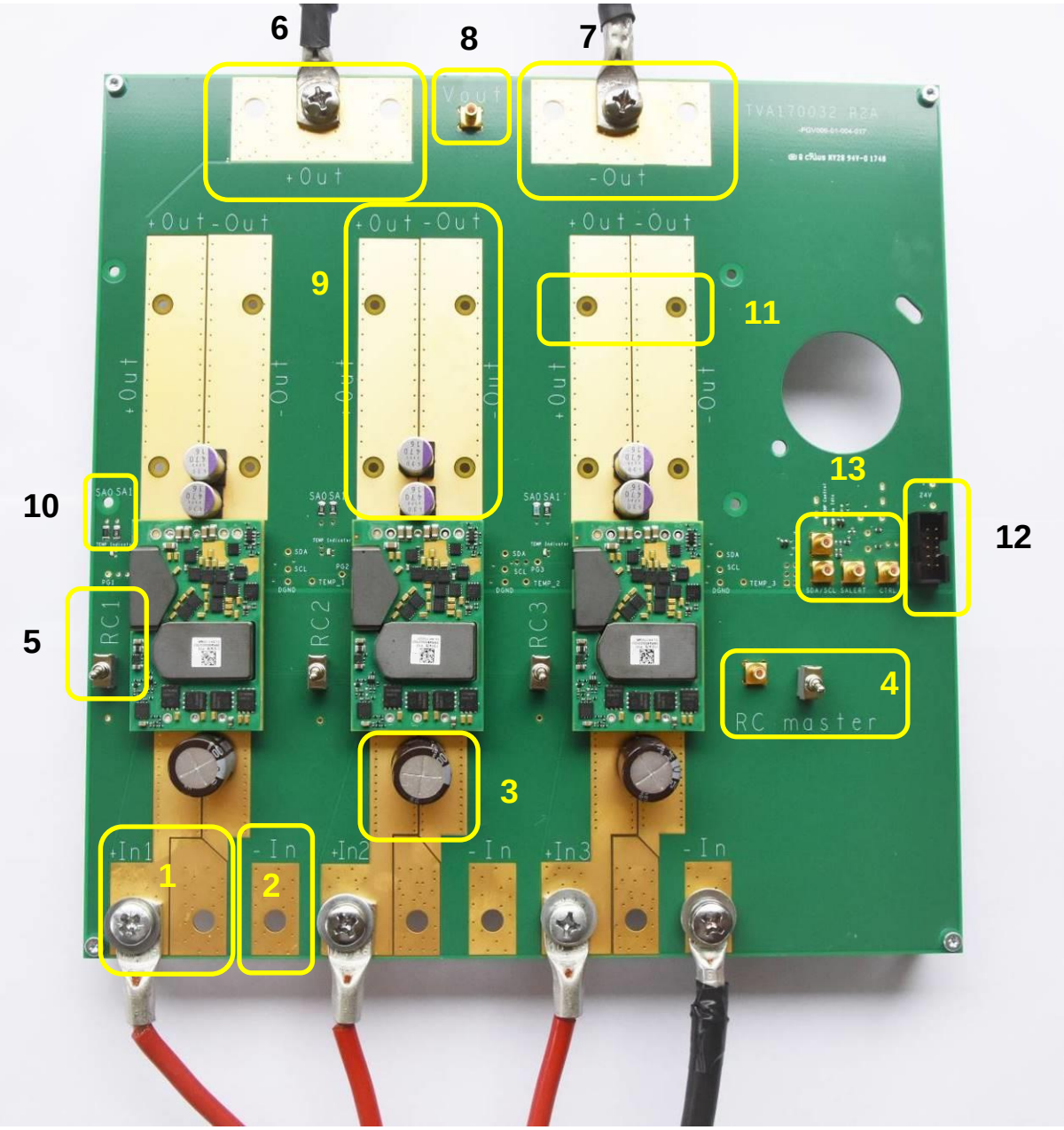
In order to operate the Test Board BMR4xx the following is needed:

- Power supply 40-60 V
- Electronic load
- One or more BMR4xx modules, the modules are intended to be soldered onto the board. Up to 3 modules can be operated in parallel and one module can also be operated in stand-alone mode.
- PMBus-to-USB adapter KEP 910 17.
- The "Flex Power Designer" software package and a compatible Windows PC. Users must be familiar with the Windows® operating system.

## 1.3 References

- 1911-ROA 170 032
- n/1301-BMR480

# 2 Test Board BMR4xx




*Picture 2. ROA 170 032 (top side).*

**Position Description**

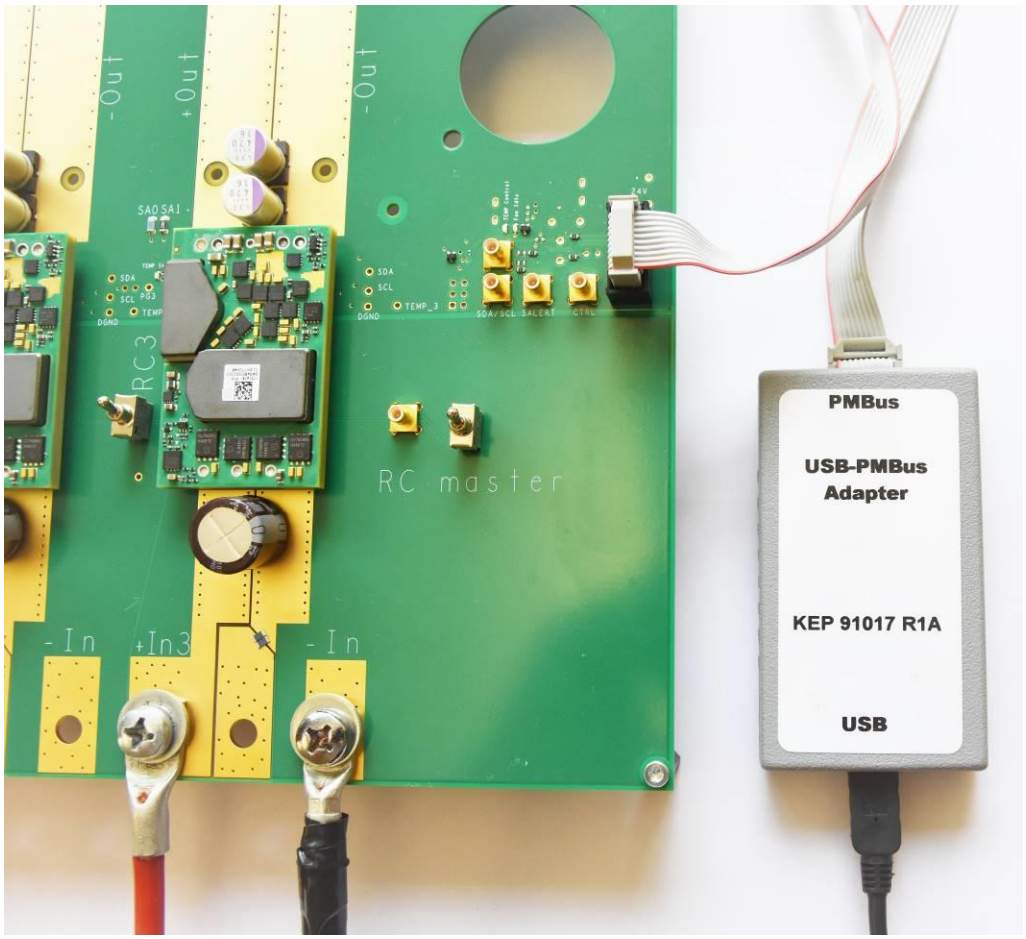
| Number | Description |
|---|---|
| 1 | Positive input voltage connectors |
| 2 | Negative input voltage connectors |
| 3 | Pads for input capacitors |
| 4 | Master RC switch and SMB Oscilloscope connector |
| 5 | RC switches |
| 6 | Positive output voltage connectors |
| 7 | Negative output voltage connectors |
| 8 | SMB Oscilloscope connector for output voltage monitoring |
| 9 | Pads for output capacitors |
| 10 | Address resistors |
| 11 | Holes for attachment of heat sinks |
| 12 | PMBus connector |
| 13 | SMB Oscilloscope connectors for PMBus related signals |

# 3 USB to PMBus adapter

In order to communicate with the modules on the board the USB to PMBus adapter KEP 910 17 shall be connected to the board and the PC.

## 3.1 Connection of KEP 910 17 USB to PMBus adapter

Connect the KEP 910 17 USB to PMBus adapter as shown in the picture.




*Picture 3. Connection of the KEP 910 17 USB to PMBus adapter.*

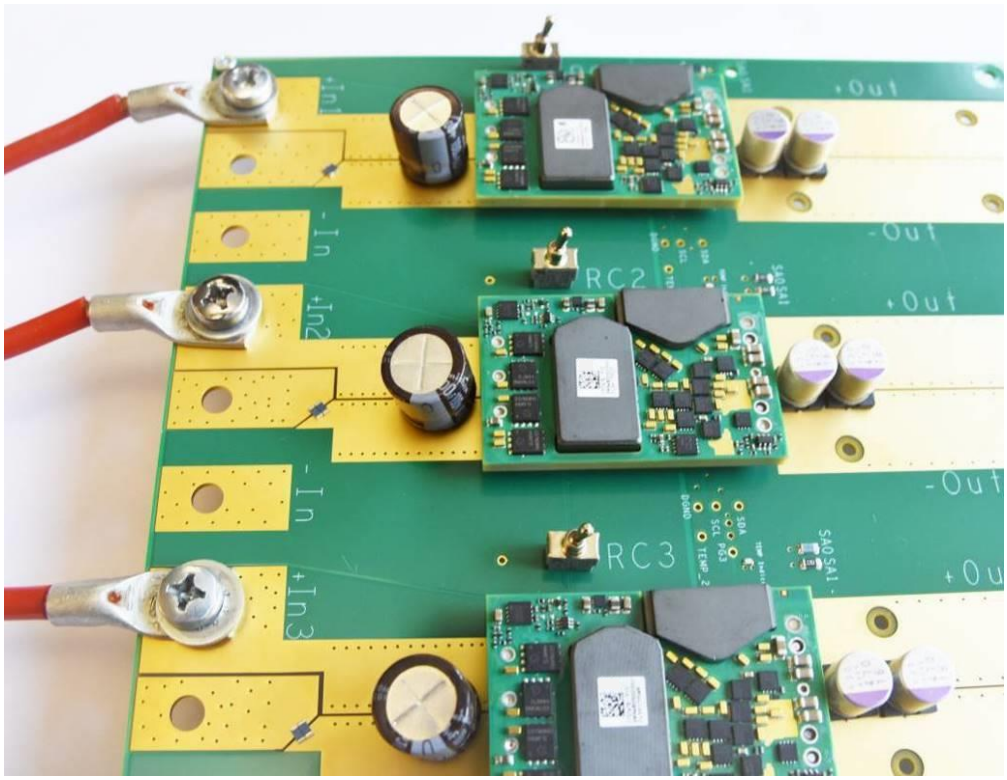
# 4 Input

Populate the board with the desired number of modules. Two or three modules can be operated in parallel mode and a single module can be operated in stand-alone mode. The modules must be soldered on to the board.

Each module position has pads which makes it possible to solder capacitors to the inputs. There are also pads on the bottom side of the board.

## 4.1 RC Control

Each module can be turned on and off by the RC switches, see picture. If one desires to start up all modules simultaneously the RC master switch can be used. This switch must be in "On" position in order for the RC switches to be activated. See pictures.

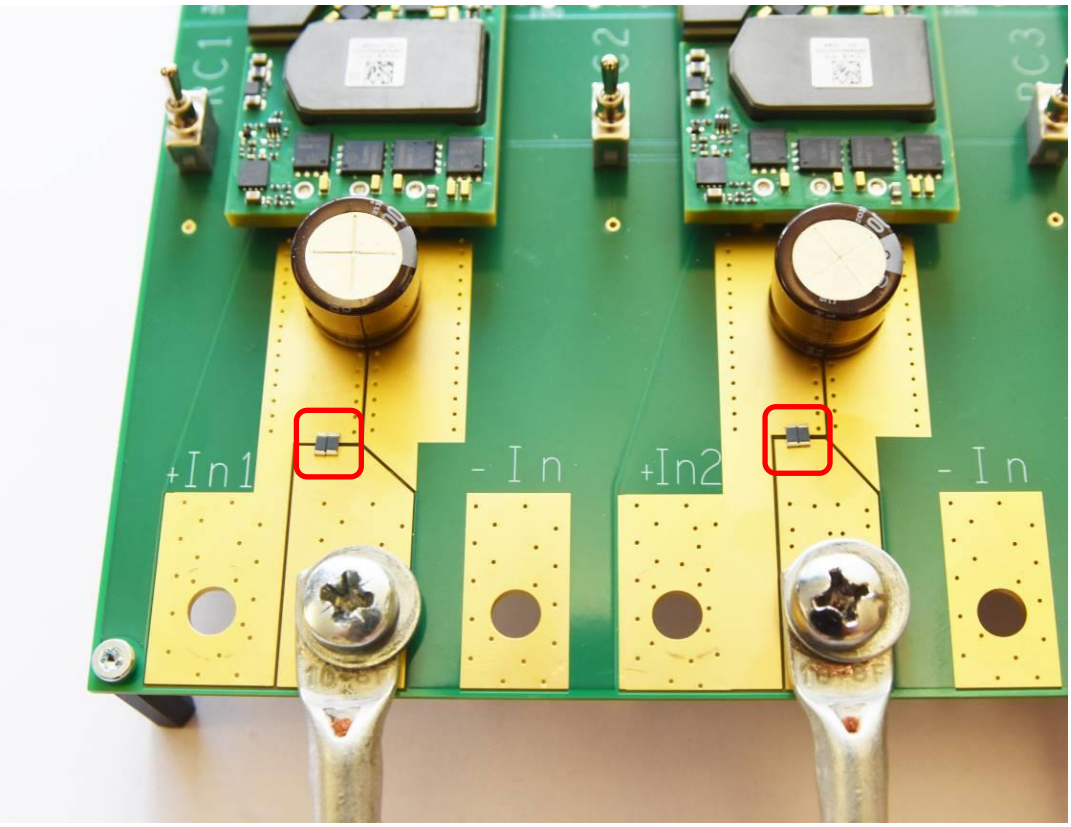


*Picture 4.1 RC switches in "On" position.*


*Figure 4.2 Master RC switch in "On" position.*

## 4.2 Input current measurement

The positive inputs to the modules are electrically separated from each other while the negative inputs are common. The input current to each module can be measured either by using current probes or by measuring the voltage drop over sense resistors mounted on the pads to the right, see picture. In that case the cable lugs shall be attached to those pads.




*Picture 4.3 Current sense resistors mounted.*

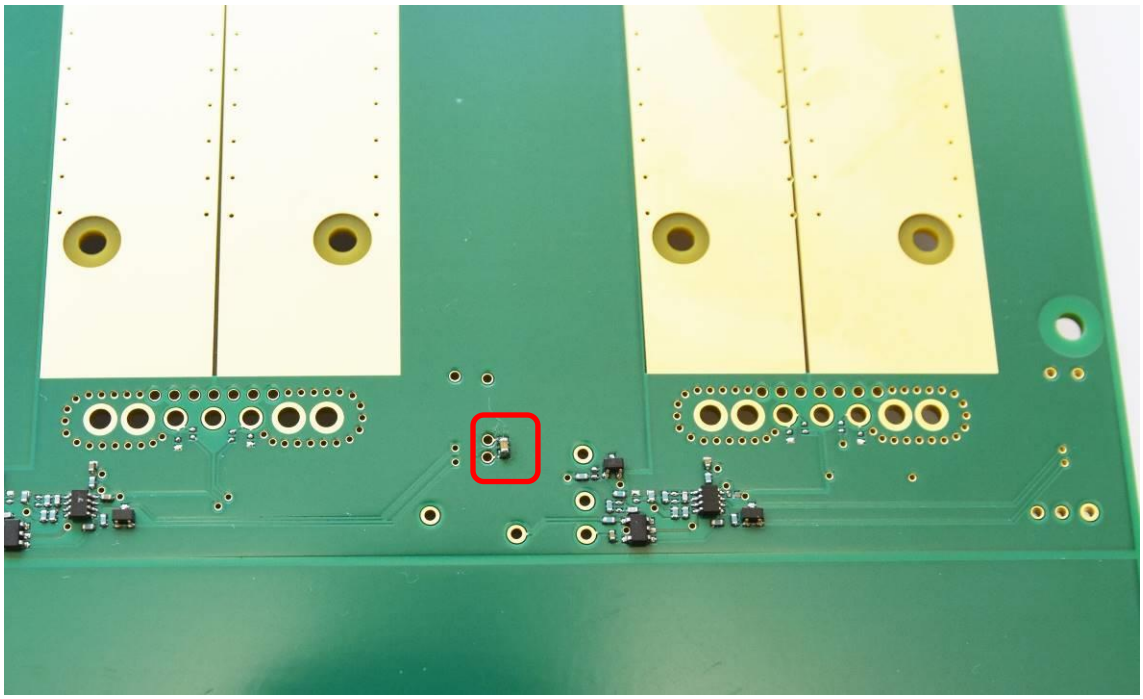
# 5 Output

The positive as well as the negative outputs are common for all module positions. Each module position has pads both on top and bottom side which makes it possible to solder capacitors to the outputs.

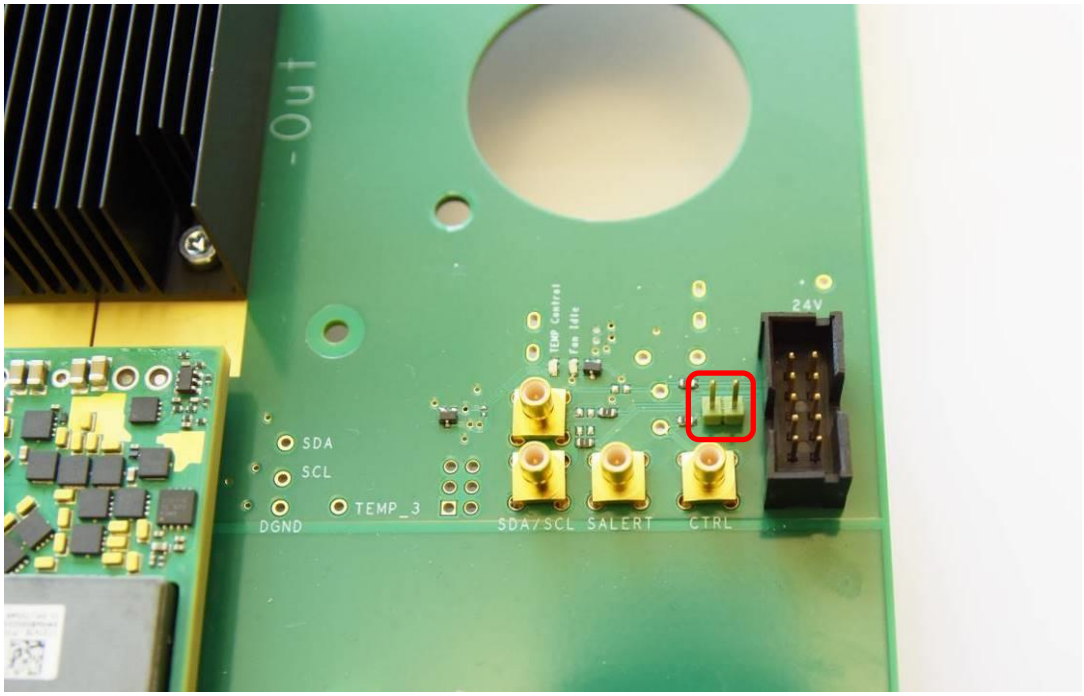
The output has a SMB Oscilloscope connector which makes it possible to monitor the output voltage with an oscilloscope.

## 5.1 Active current share

If the modules shall be operated in active current share (ACS) mode, a capacitor shall be mounted in position C2, see picture. This position is found on the bottom side of the board. Also jumper J17 must be left open, see picture.



*Picture 5.1 Capacitor C2.*




*Picture 5.2 Jumper J17 left open.*

## 5.2 Address resistors

To change the addresses for each module, change the resistor values as shown in fig. 5.1. Change resistors SA0 and SA1 to achieve the desired PMBus addresses. See technical specification of the modules.

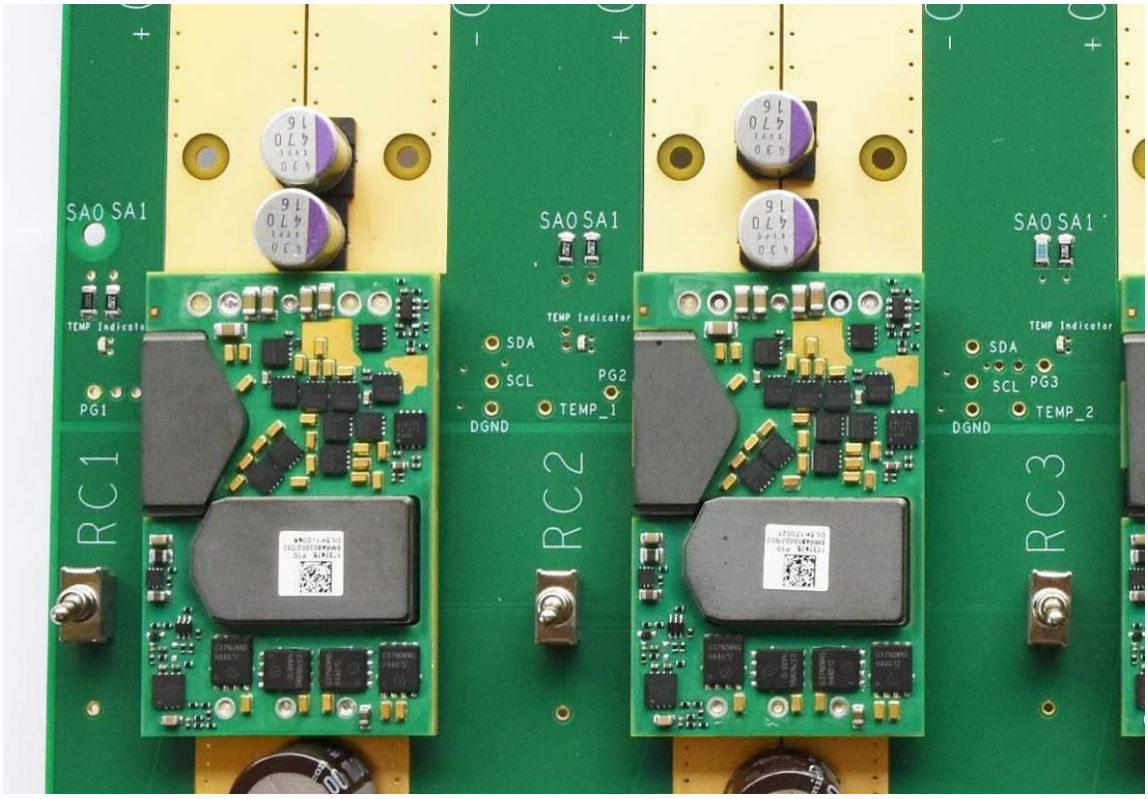
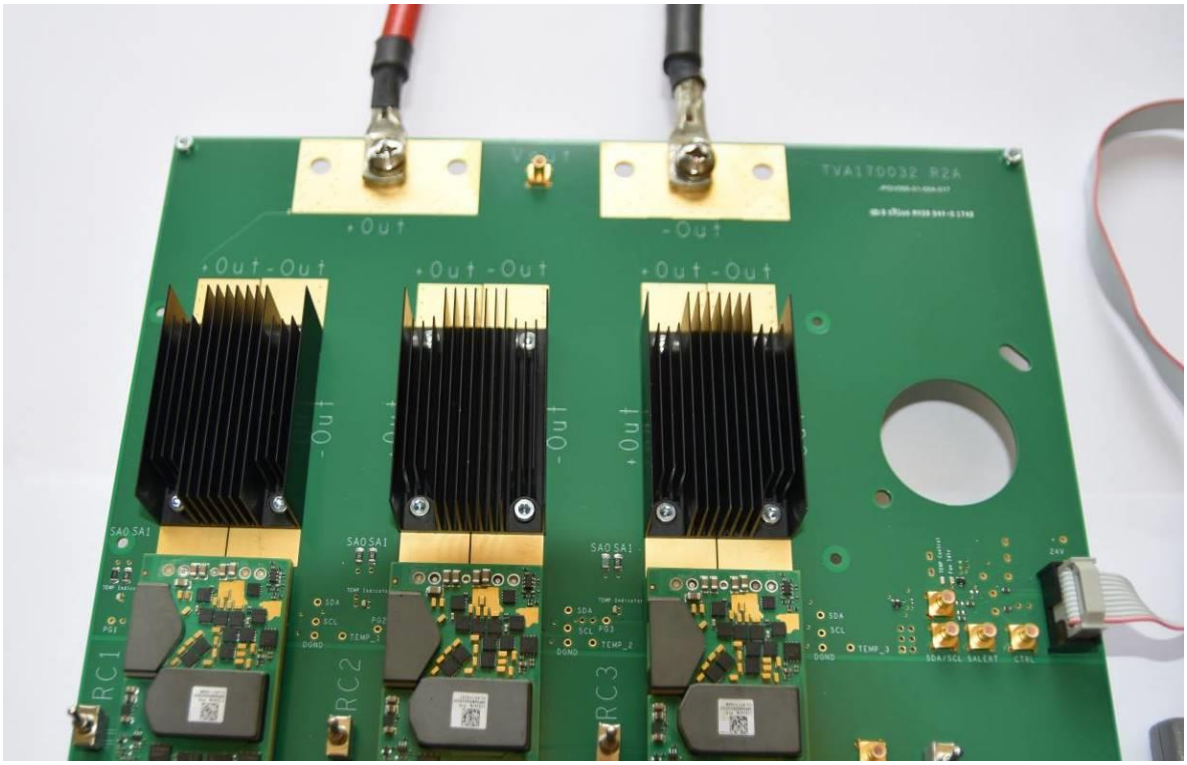



*Figure 5.3 Address resistors.*

## 5.3 Heat sinks

In order to increase thermal performance, it is possible to attach heat sinks on the output pads. The heat sinks shall be attached with screws, see picture below. The hole pattern fits ¼ brick DC/DC converters. They can be placed on either side of the board. If one desires to place heat sinks on the top side, output capacitors shall be placed on the bottom side pads.




*Picture 5.4 Heat sinks, in this case Aavid Thermalloy 241409B91200G, attached on the output pads.*

# 6 Layout

## 6.1 PCB stackup summary

The PCB consists of 8 layers of 0.105 mm / 3 Oz. copper thickness. The dielectric thickness is 0.127 mm and the total board thickness without mask is 1.729 ± 0.2 mm.

Board dimension is 250 x 254.4 mm.

## 6.2 PCB Resistances

PCB resistances are measured between pin positions for each module position and branch.

**Input branches:**

| Module positions on the board | Branch | Pin position | Resistance (mΩ) |
|---|---|---|---|
| 1 - 2 | -IN - -IN | 3 - 3 | 0.15 |
| 1 - 3 | -IN - -IN | 3 - 3 | 0.20 |
| 2 - 3 | -IN - -IN | 3 - 3 | 0.15 |

Explanation: E.g. 1 - 3, measurement is performed between pin position 3 on module position 1 and pin position 3 on module position 3.

**Output branches:**

| Module positions on the board | Branch | Pins | Resistance (mΩ) |
|---|---|---|---|
| 1 - 2 | +OUT - +OUT | 7 - 7 | 0.15 |
| 1 - 3 | +OUT - +OUT | 7 - 7 | 0.19 |
| 2 - 3 | +OUT - +OUT | 7 - 7 | 0.15 |

| Module positions on the board | Branch | Pins | Resistance (mΩ) |
|---|---|---|---|
| 1 - 2 | -OUT - -OUT | 5 - 5 | 0.15 |
| 1 - 3 | -OUT - -OUT | 5 - 5 | 0.19 |
| 2 - 3 | -OUT - -OUT | 5 - 5 | 0.15 |

# 7 Revision record

| Rev | Description | Date |
|---|---|---|
| A | New Document | 2018-05-28 |
| B | updated with BMR490 & BMR491 | 2021-01-19 |