

ADC18b TESTING PROCEDURE STEP BY STEP

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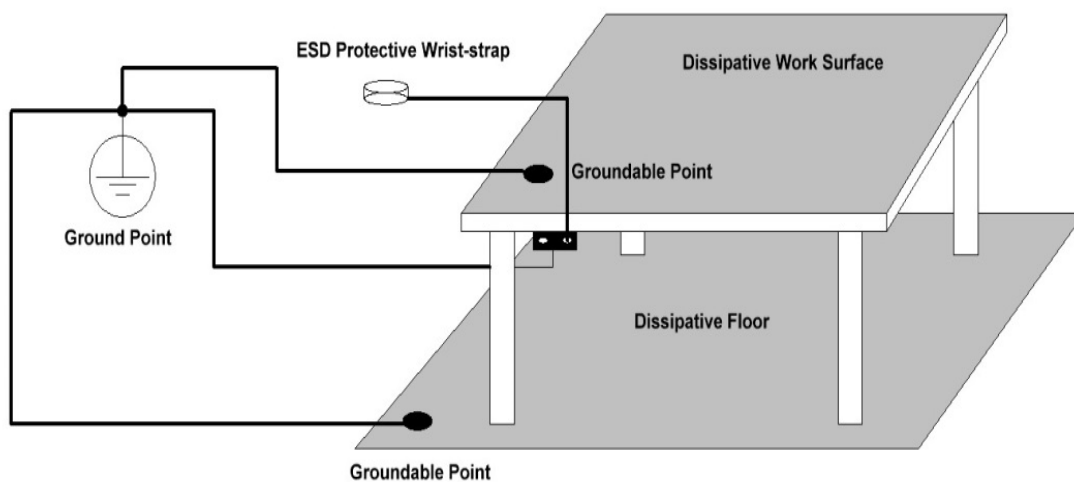
1 Introduction

This document describes step by step the testing procedure for the 18 bits Analog to Digital Converter (18BitADCII). The goal is to execute, in the proper way, each item reported in the testLog18bitADC_FG660_04x_xxxxxxx.pdf file table and this document gives the instruction to do it.

NOTE!!: Before starting the test, please pay attention to the Electrostatic Discharge Protection (ESD) equipment.

- Be sure that your Device Under Test (DUT) lays always over a dissipative work surface.
- Don't forget to connect yourself to ground through the Wrist Strap device.

Your testing area should look like the picture below.



2 Step description

The 18BitADCII card needs a dedicated test bench in order to be properly tested. On this test bench it is possible both to download the firmware into the FPGA and to execute the tests list. It is split in two parts: one for the FPGA configuration and the initial power supply test and a second part used for ADC chip calibration and the remaining tests.

2.1 Firmware Download

Configure the FPGA with the provided Firmware. For more info about the ADC programming procedure, please check out the *CommonModulesProgrammingProcedure.pdf* file.

2.2 Supply

Connect the 18BitADCII card in the power supply shelf like in the figure 2-2 below and check if it is connected to the power supply network.

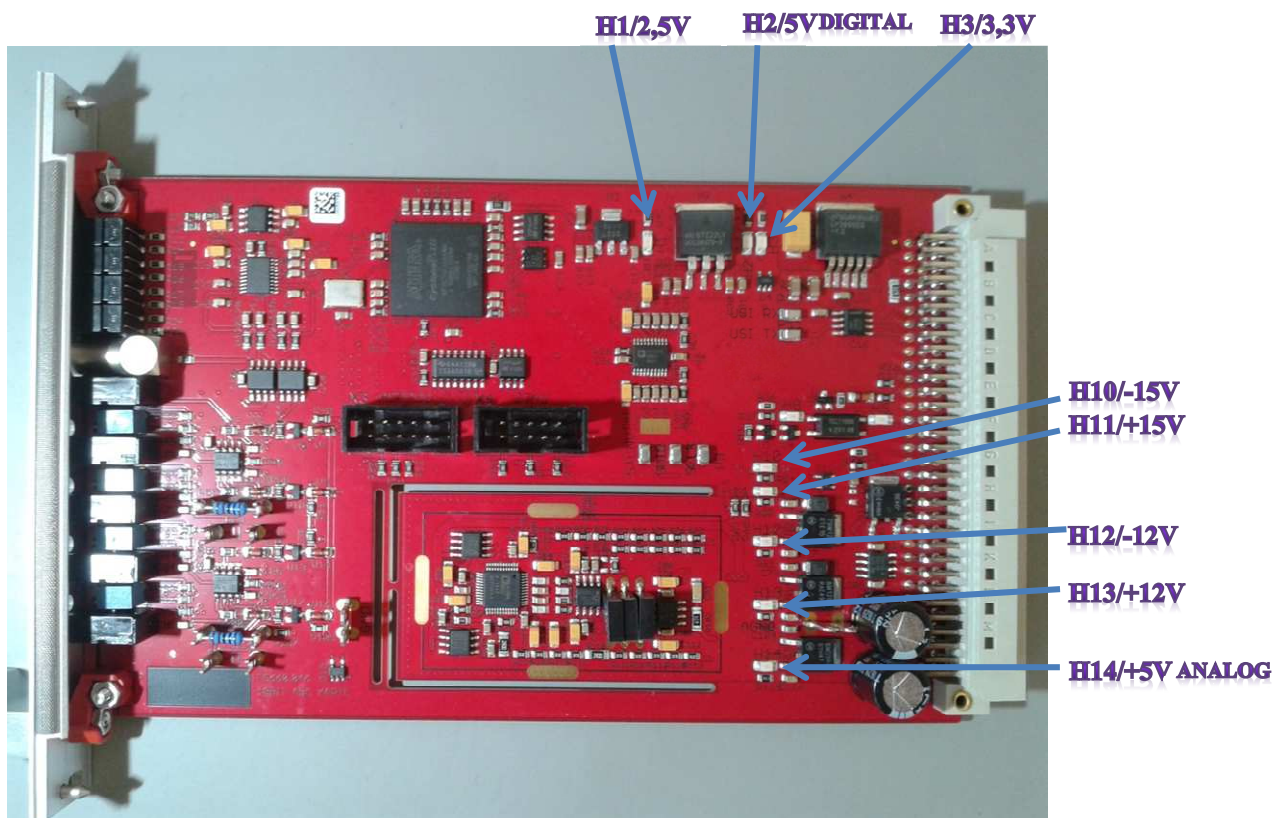


Figure 2-1 18BitADCII Card



Figure 2-2 Power Supply Shelf

Power up the module and execute a visual check of the supply voltages looking to the dedicated LEDs. They have to be all on; if one of them it is not lighting, please stop the test and report the fail with the dedicated fail description form.

LED Name	Value (V)
H10	-15
H11	15
H12	-12
H13	12
H14	5 Analog
H1	2,5
H2	5 Digital
H3	3,3

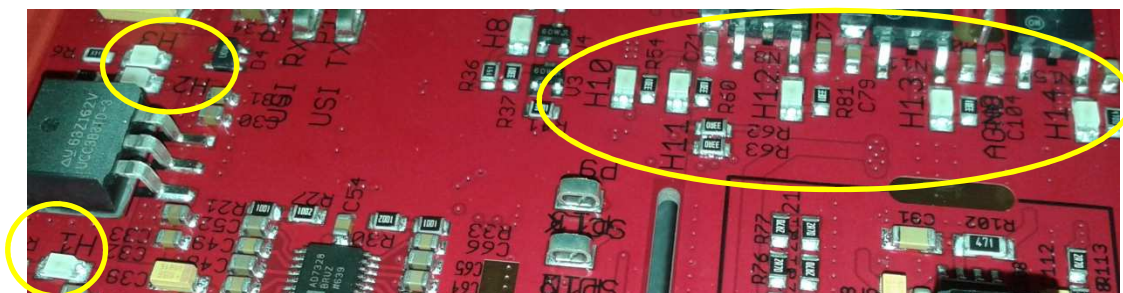


Figure 2-3 Power Supply LEDs Off

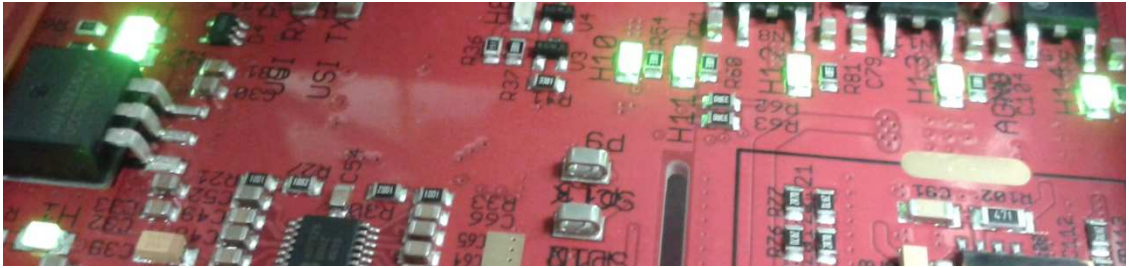


Figure 2-4 Power Supply LEDs On

With the test above it is not possible to be sure that the power supply voltages are correct (the LED can be on also with a different value from the expected). It is necessary for that reason to double check in Power Config Advance the power supply values.

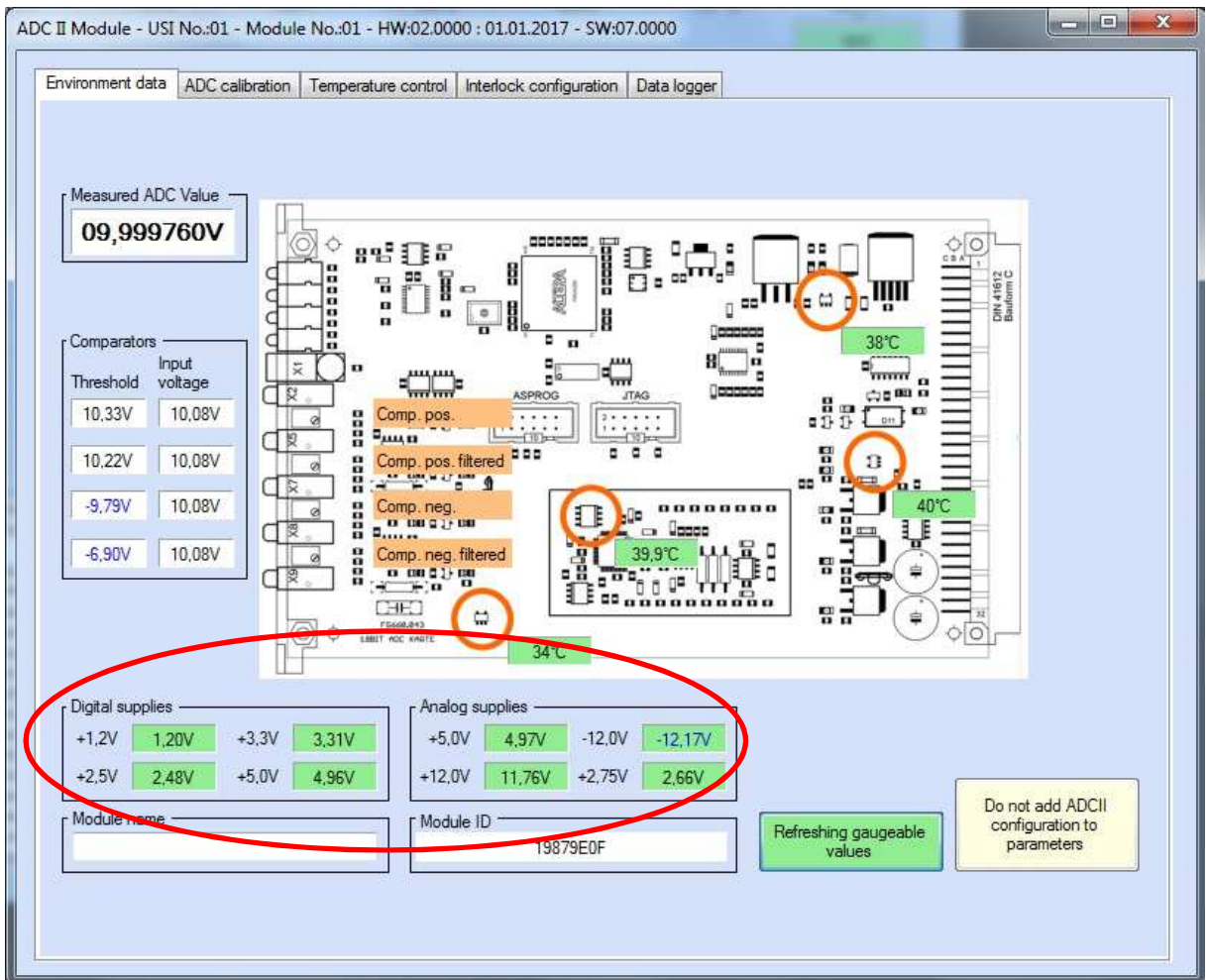


Figure 2-5 PCA Power Supply Check

2.3 Calibration

Turn off and disconnect the 18BitADCII card from the power supply test bench and plug it in the second shelf for the calibration. It has to be connected as usual to the USI number 1.

In order to perform the automatic calibration procedure, three additional frame settings are necessary:

1. Connect the DCCT emulator card on the DCCT electronic plug. Please double check if the switches are in the proper position as in the figure 2-6 below.

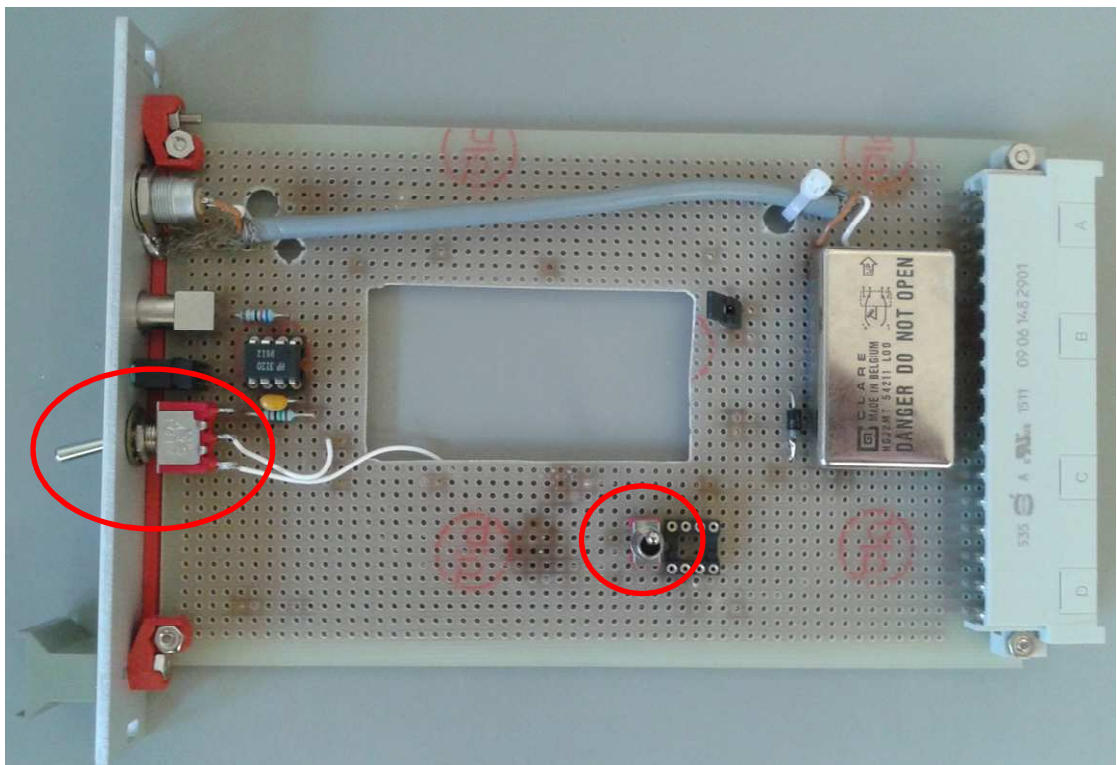


Figure 2-6 DCCT Emulator Card

2. Connect via LEMO cable the MFU X1 output to the DCCT emulator card.

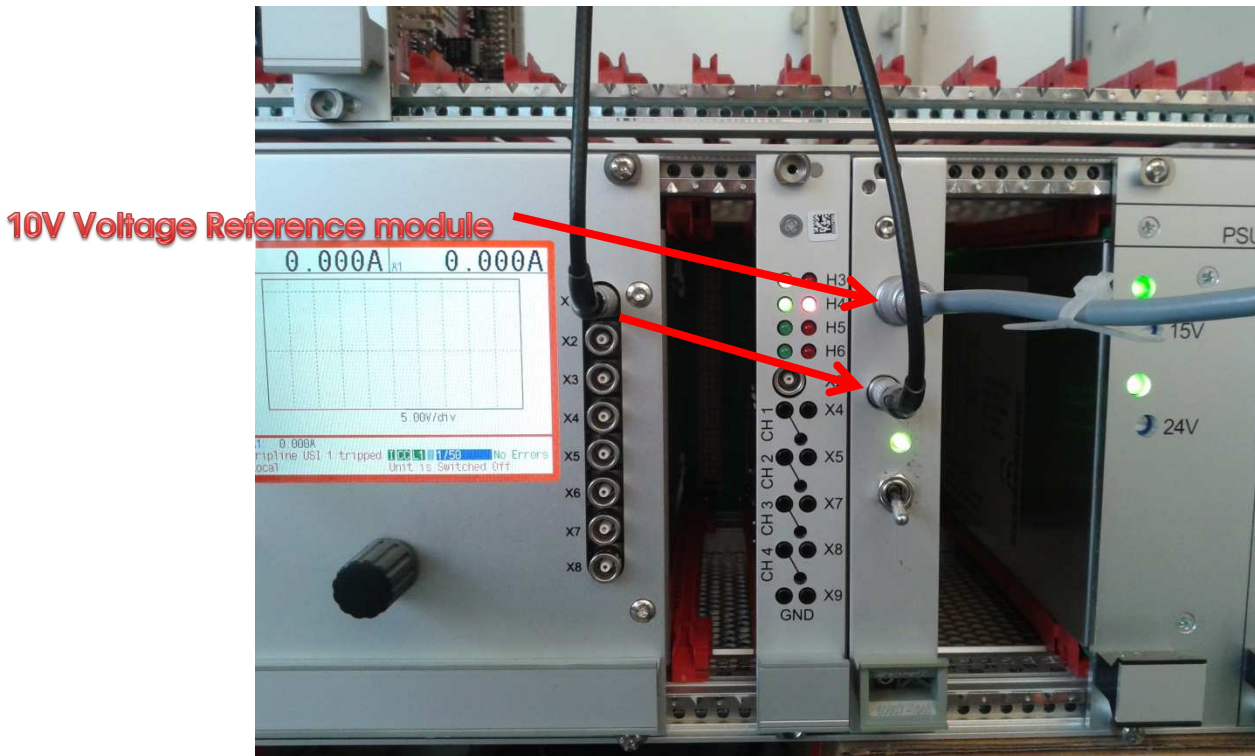


Figure 2-7 Calibration Connections

3. Connect the 10V voltage reference module to the DCCT emulator card.

The complete test bench has to look like in the picture below.

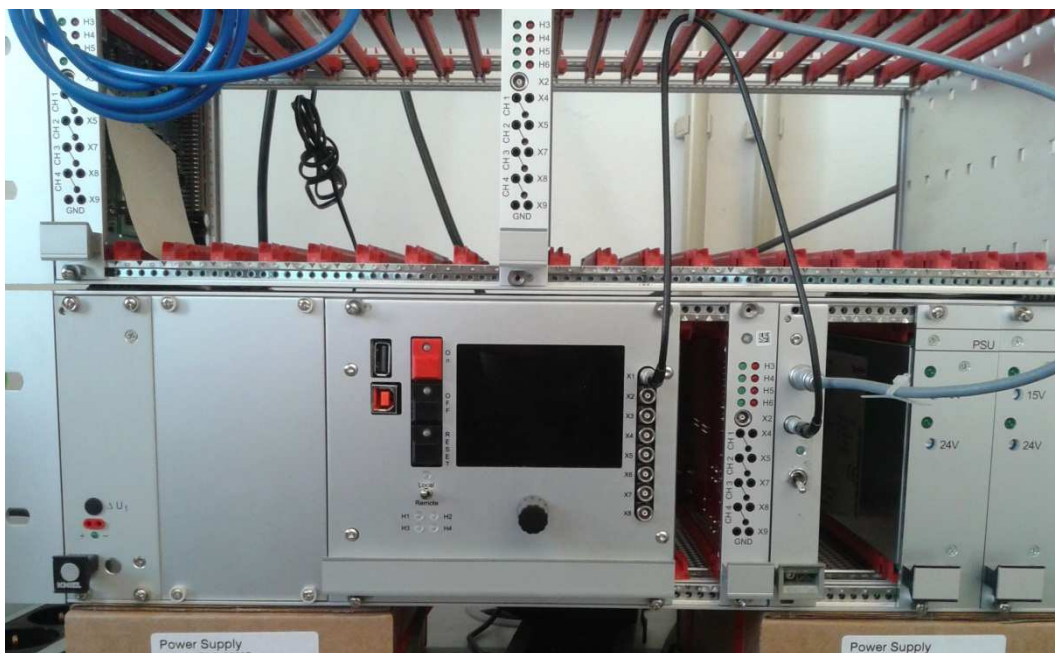


Figure 2-8 Calibration Test Bench

Open PCA and load the dedicated configuration file for the automatic calibration procedure (CalibrationTest.XPC7). If you haven't this file, you can generate it following the instructions below or you can ask to your supervisor for it. Otherwise, jump to the point number 6.

1. Turn on the DCCT emulator card.
2. Open PCA and check if the USB connection is established. Click *Tools* and *Open MFU SE form*. If a window message like the one in the figure 2.9 will show up, click yes. If not please contact your supervisor.

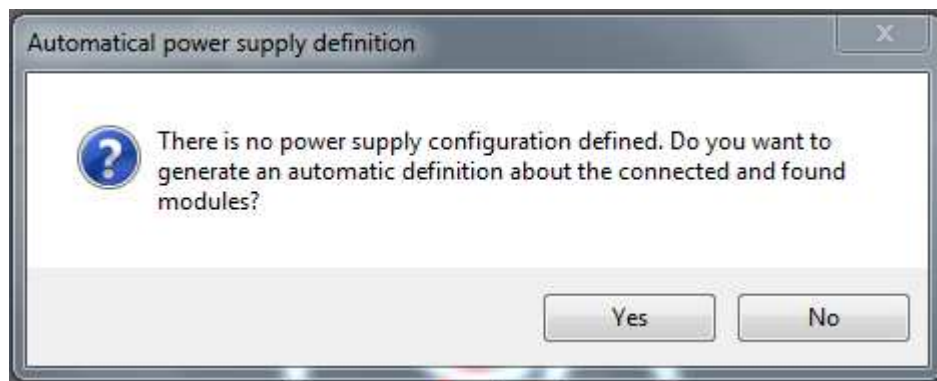


Figure 2-9 Automatic module detection

3. Check if the ADC18b module is detected.

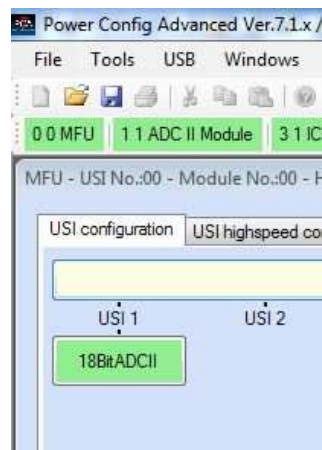


Figure 2-10 PCA ADC18b detection

- Select on the ADC18b form (ADC II) the *ADC Calibration* tab page and perform the same settings as displayed on the picture below.

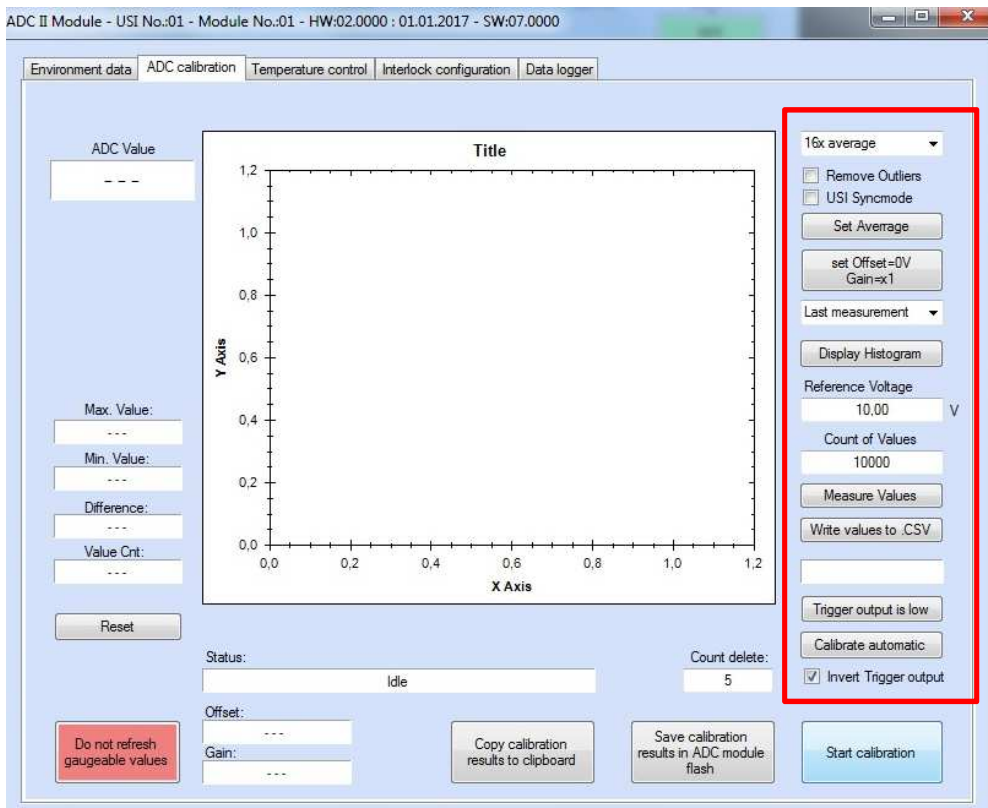


Figure 2-11 PCA Calibration Settings

- Write the configuration parameter to the FPGA.



Figure 2-12 Write parameter

- Press the *Start calibration* button and wait for the calibration ending.
- If the gain and offset values are inside a fixed and acceptable range, PCA will ask you to save the calibration results to the flash. The goodness of the calibration procedure can be double checked looking to the histogram (the values measured have to be centered on 10V).

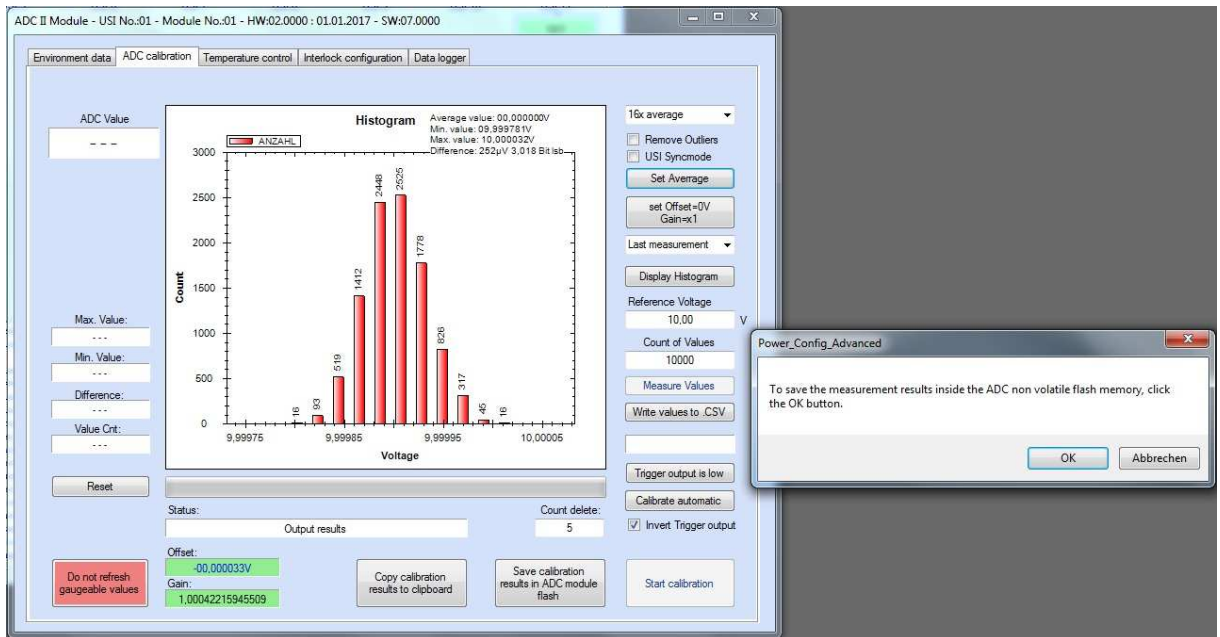


Figure 2-13 Calibration Successfully Complete

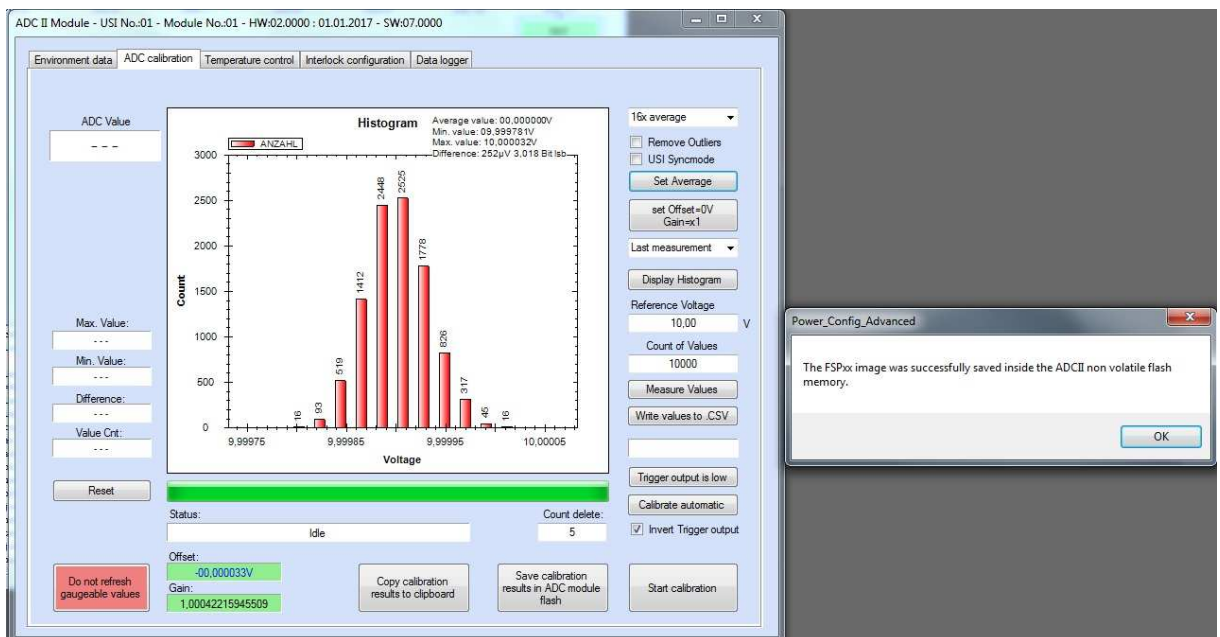


Figure 2-14 Calibration Results stored into the Flash

2.4 Potentiometers check (4x):

In the ADC18b card there are four comparators each of them with two inputs. One input is always connected to the analog current value RC filtered; the second input is connected to a threshold value via potentiometer configured.

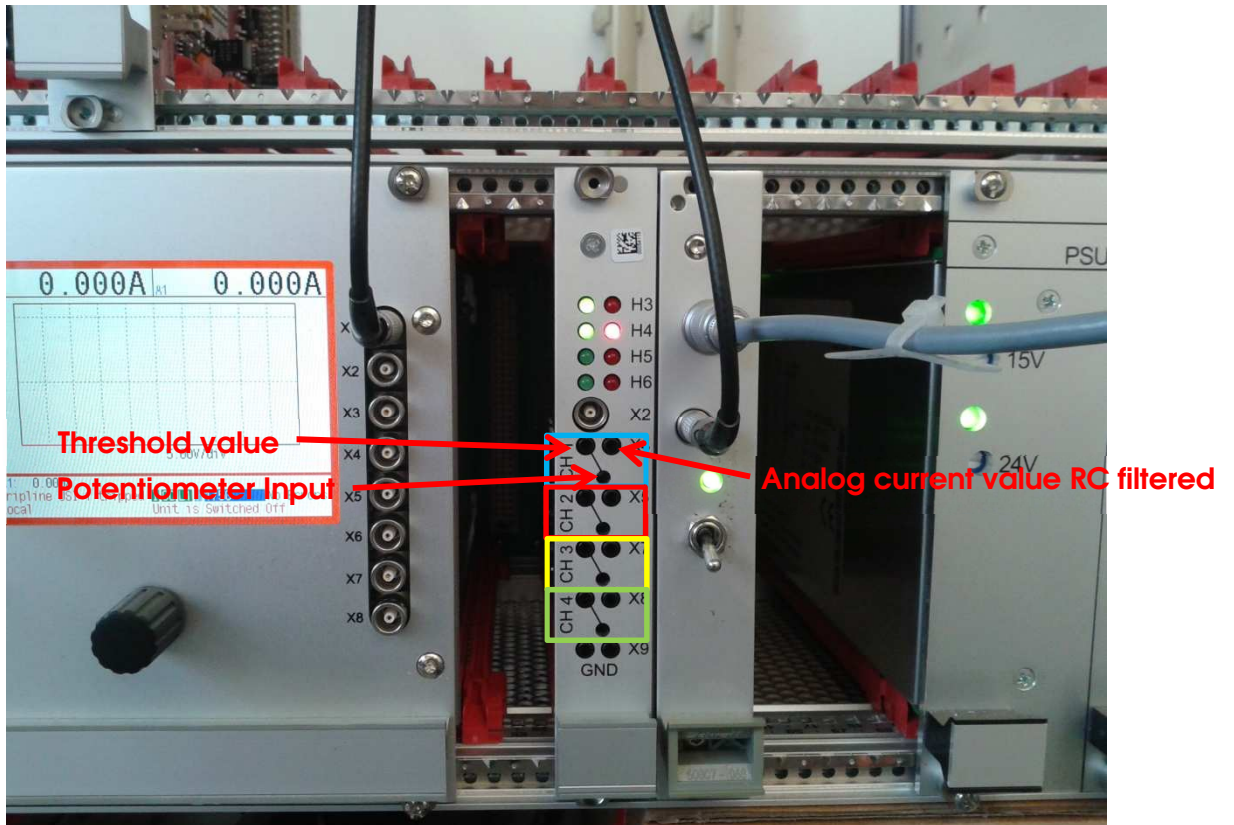


Figure 2-15 Comparators

For each comparator perform the following measurements:

1. Measure the analog current value RC filtered with a multimeter.



Figure 2-16 Analog Current RC filtered Value

2. Measure the threshold value with a multimeter before and after the potentiometer setting.



Figure 2-17 Threshold Value

3. Change the threshold value acting on the potentiometer with a screw driver and check in PCA the corresponding value changing.

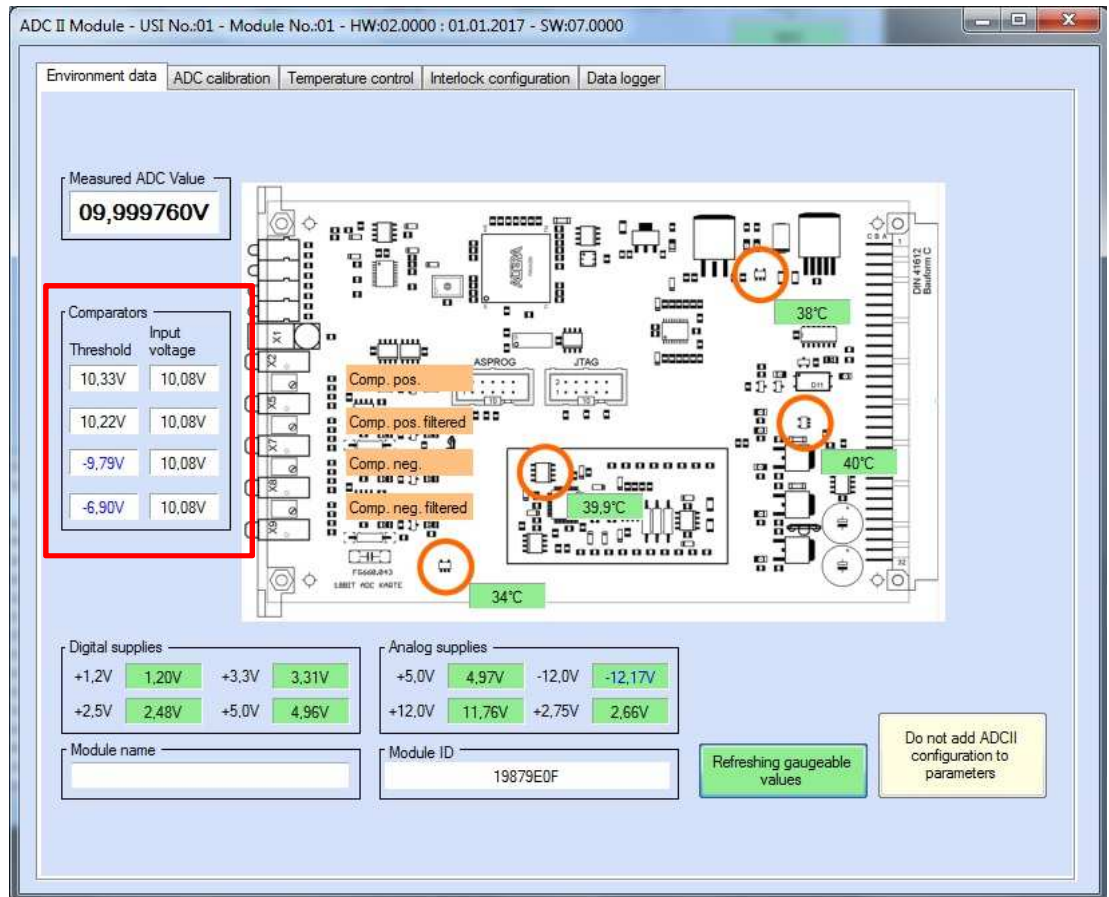


Figure 2-18 Poti Values Check

NOTE!: The *Comparators* values displayed in PCA (above in the red rectangle) are different from the ones measured with the multimeter (0,1V circa). The reason of this error is because the ADC reference voltage in the PCB card is not exactly the expected one (it is 2,66V instead of 2,75V).

4. Trigger an interlock setting the positive thresholds to +8V and connecting the reference 10V input signal. Repeat the same for negative values (-8 and -10V). Check the interlocks on the TFT display.

2.5 X2 Voltage check

Connect the multimeter to ADC18b X2 connector and check if almost the reference voltage value is measured (10V). Double check in PCA if also there more or less the same value as *Measured ADC Value* is reported

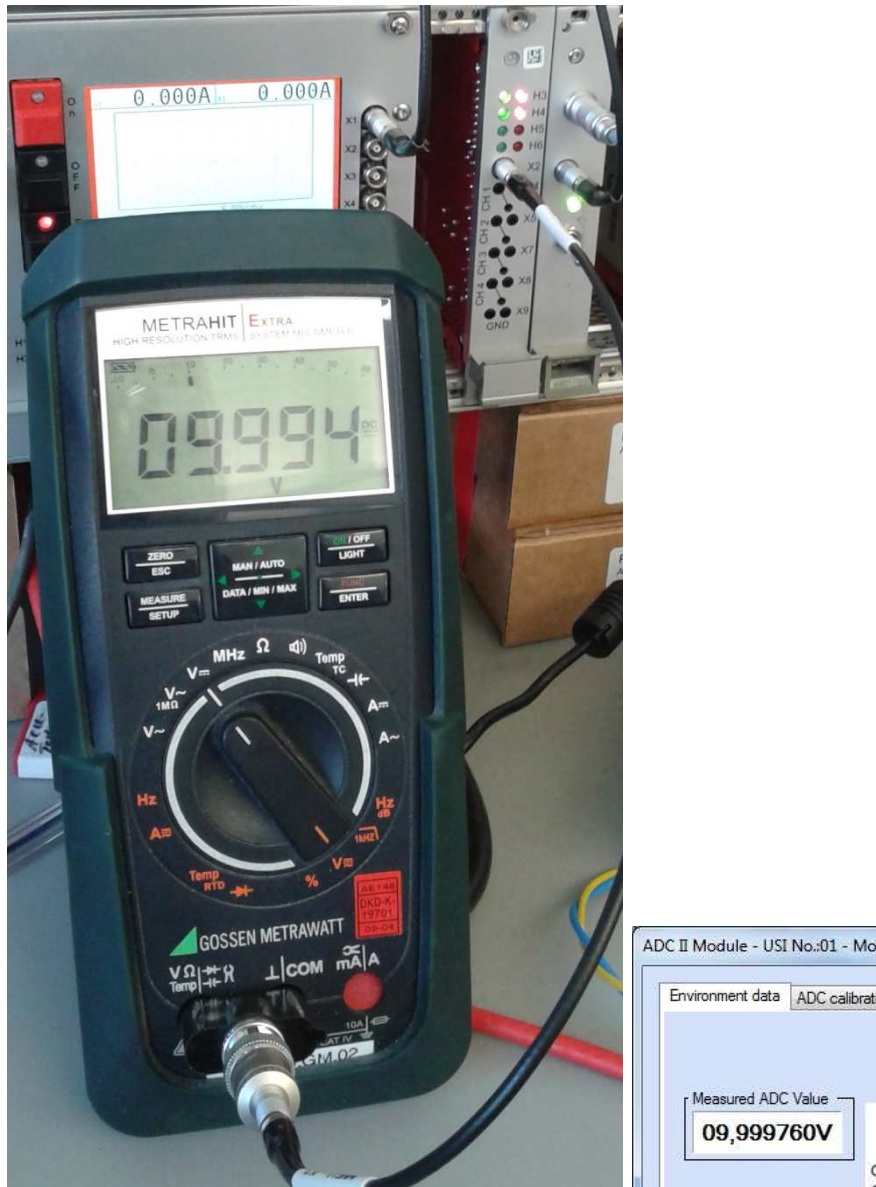


Figure 2-19 X2 Measured Value

2.6 Temperature Sensors

1. In the *Environment data* tab page check if the temperatures displayed are with a green background.
2. Reduce the temperature on the chip sensor using air pressure. It is enough just to see a reduction of few degrees.

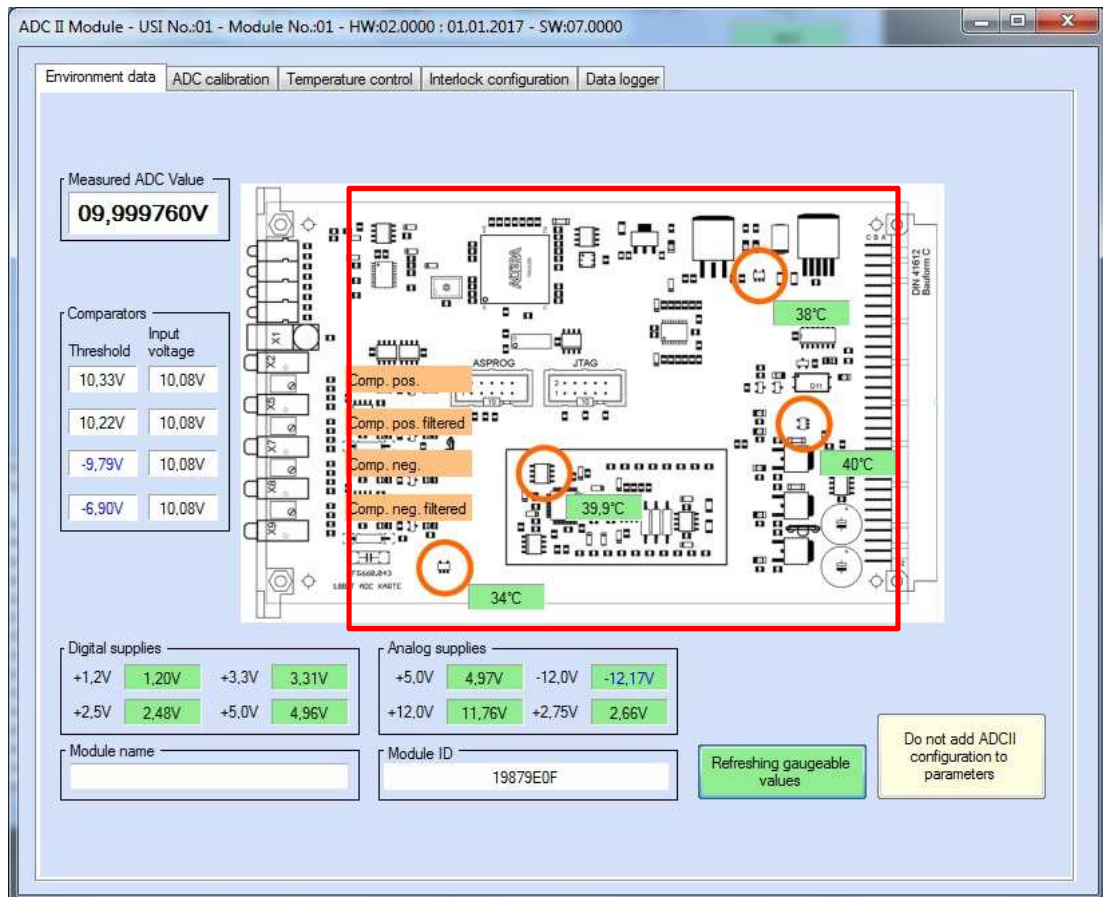
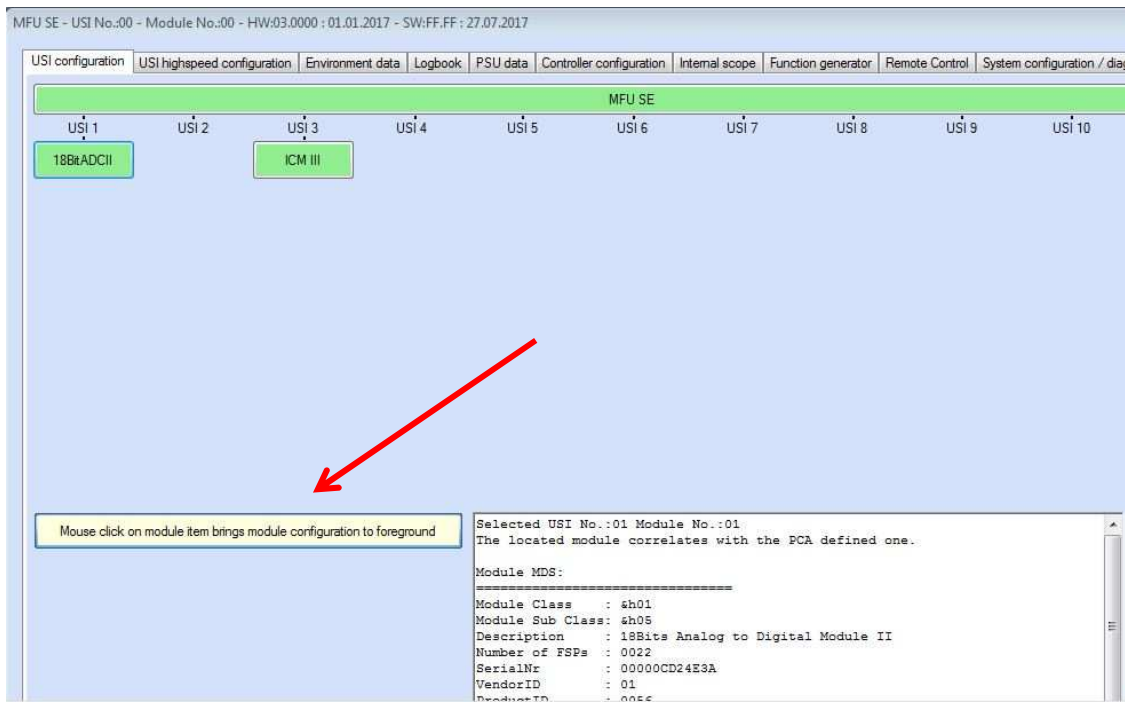


Figure 2-20 Temperature sensors

2.7 Check the ADC18b chip ID and print out labels:

- a. in PCA go in the *USI configuration* tab window and click on the Mouse mode button till you get the text label as shown below.



- b. Click on the 18BitADCII button and copy the SerialNr.

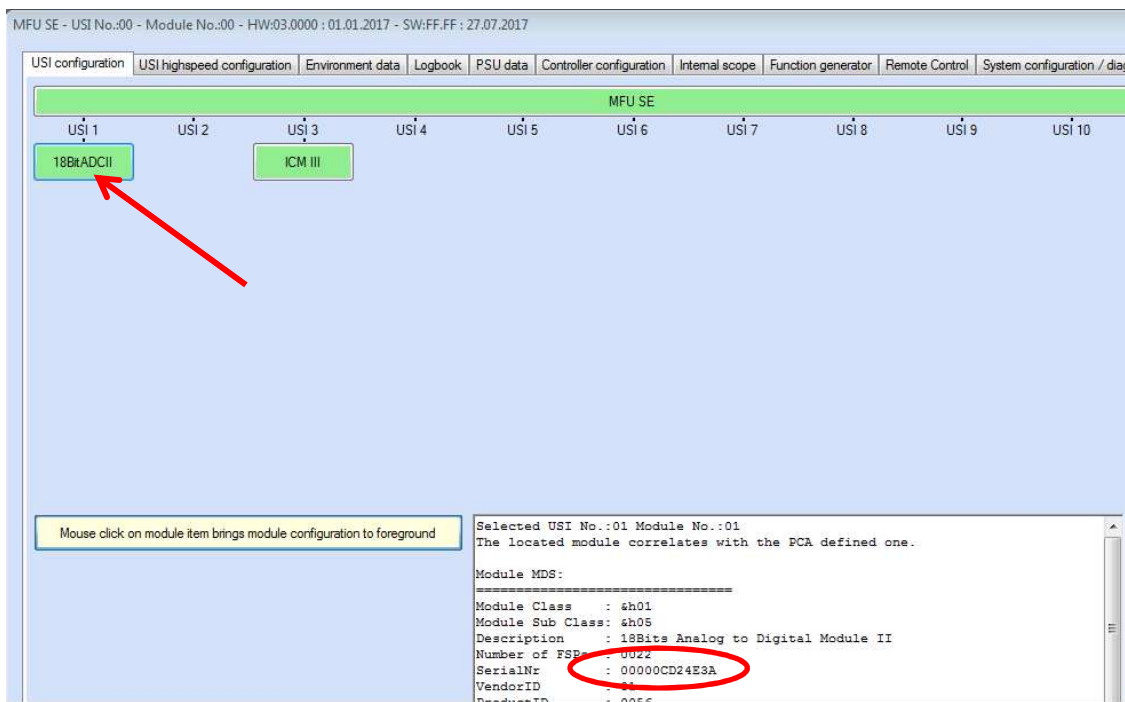


Figure 2-21 18BitADCII ChipID

- c. Launch P-Touch-Editor tool and open two label templates (one for the calibration and one with the serial number) from the eet-common folder (Arbeitsordner ACU\labels\ACU-Labels\Etiketten-ADC-kalibriert7_0-Zebra.lbx and Arbeitsordner ACU\labels\ACU-Labels\Etiketten-ADC-HP_SE-Verknüpft-Zebra.lbx)
- d. Change the serial number and if necessary the FG number as well.

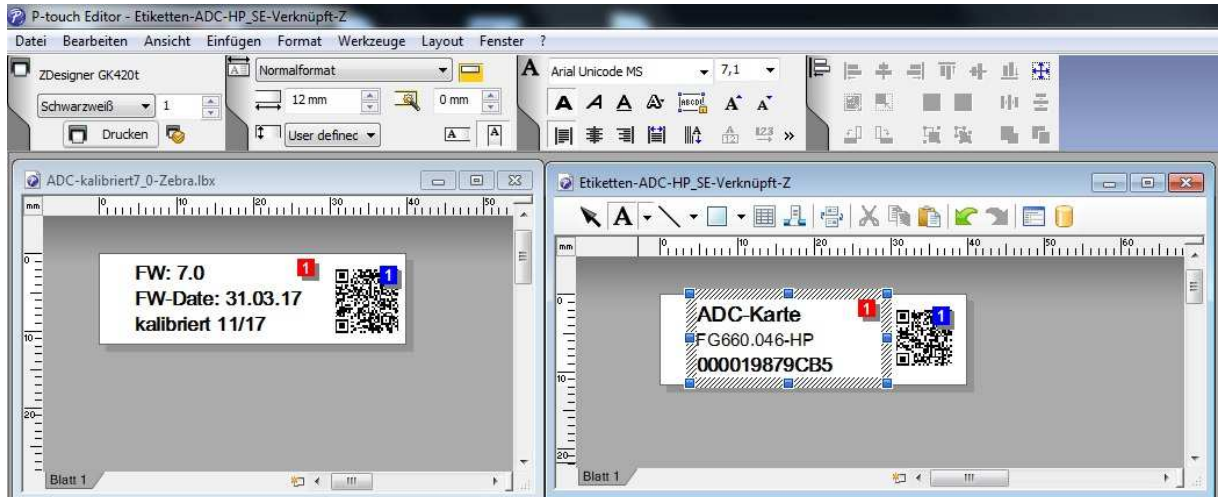


Figure 2-22 Labels

- e. Print out the two labels; both have to be stick on the board.



Figure 2-23 18BitADCII back card

- f. Double check with the scanner if the code in the QR-Code is matching with the expected one and save the chip-ID code in the following excel file:
eet-common\ Arbeitsordner ACU\Bestellungen & Angebote\ACU-IncomingComponentsList.xlsx

2.8 Test Log file generation

Generate the testLog18bitADC_FG660_04x_xxxxxxx.docx file and save it in pdf format in the dedicated eet-common folder (Arbeitsordner ACU\ACU - outgoing).

FOR ANY DOUBT, EVEN THE SMALLEST ONE, PLEASE CONTACT YOUR SUPERVISOR!