ICM TESTING PROCEDURE STEP BY STEP

Contents

1 Revision

| Version	Date	Name	Comment
1.0		D. Rodomonti	
1.1	07.11.2018	D. Schupp	Spelling errors corrected.

1 Revision

2   Introduction

This document describes step by step the testing procedure for all the Interlock and Control Module (ICM). The goal is to execute, in the proper way, each item reported in the testLogILCM_FG660_xxx_xxxxxxxx.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.
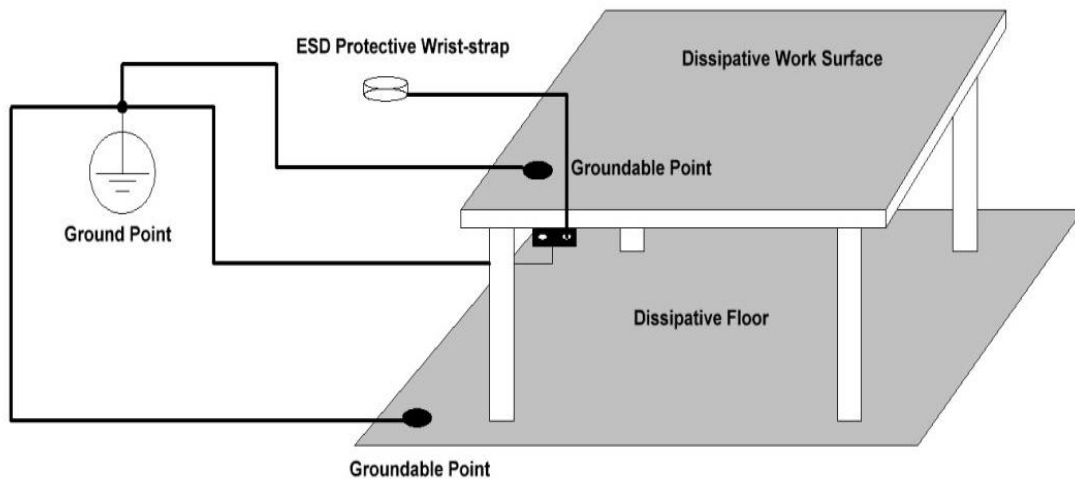
3   Step description

3.1 Supply

a. Connect 24V power supply to X1(in gold) and proceed with a board visual inspection in order to find out some missing components or damaged ones.

b. With a multimeter, check the voltages (+1,2; +3,3; +5; +12; -12; +2,5 and 2,75V) in the dedicated test points (in red). The ground points are in blue highlighted.
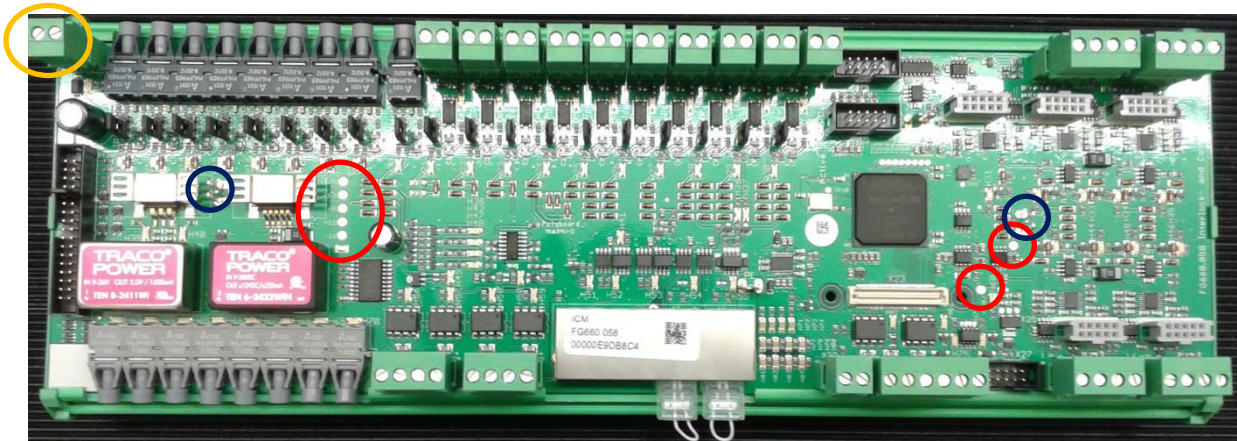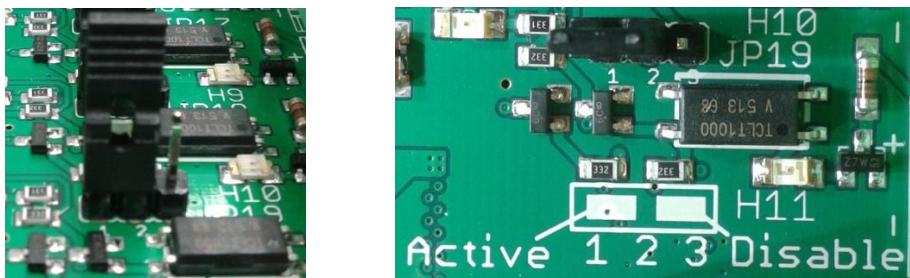

3.2 Firmware Download

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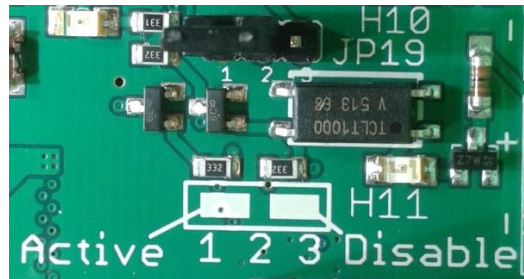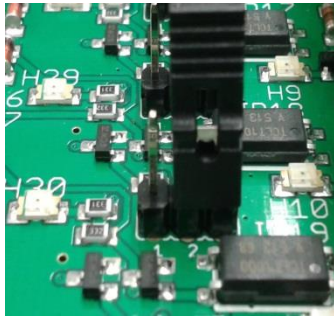
3.3 Interlocks

a. optical interlocks

i. Check the jumpers (JP1 to JP9) positions; they have to be as in the picture below (position 1-2).

It means that the corresponding interlock is enabled. Without any optical signal in input, the interlock has to be triggered and this is reported by a red LED on just below the jumper. At this point of the test, all the LEDs under the jumpers from JP1 to JP9 have to be on (red).

ii. Apply using a lamp some light on each optical input connector (D3 to D11) and the corresponding LED has to turn off.

iii. Change the jumper's position from enabled to disabled as shown below (position 2-3) and check that with and without light in input, the corresponding LED is always OFF.


b. Digital interlocks

i. Check if the interlocks are enabled looking at the jumpers (JP10 to JP19) positions as did for the optical interlocks. Also in this case without any electric signal in input (+24V), all the corresponding LEDs below the jumpers have to be ON (red).

ii. Apply using a DC power supply 24V on each electrical input connector (X4 to X13) and the corresponding LED has to turn off. At the same time the LED above the jumpers has to be on (green).

iii. Change the jumpers position from enabled to disabled and check that the LEDs above the jumpers are on with 24V input signal and off without. At the same time the LEDs below the jumpers have to be always off with or without the electric input.

3.4 X22 jumper:

A jumper has to be placed on the fifth couple of X22 pins start counting from the upper part as shown in the picture below.
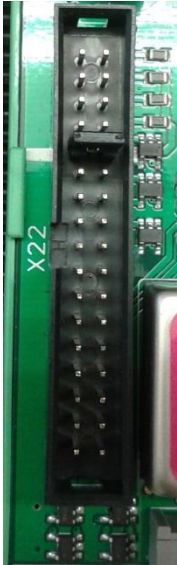
3.5 USI Module Detection

Connect the ICM module to the MFU via USI with an Ethernet cable (the plug on the ICM is the most left one) and perform a USI rescan in order to detect the ICM module on the MFU TFT display.

    a. USI Rescan procedure:

        i. Press the incremental encoder just below the TFT display.
        ii. Select the second item 2 (USI) rotating the incremental encoder and push it again.
        iii. Move to the item 23 (USI Rescan) and push the incremental encoder button.
        iv. Wait till the complete USI module connected list is displayed and in one of them the ICM module has to be reported as in the picture below.
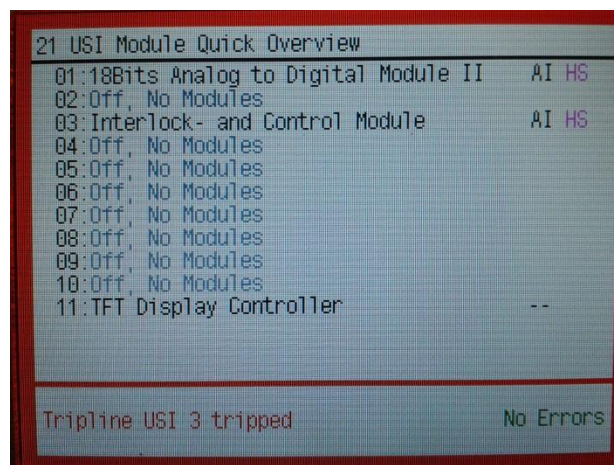

NOTE!: If the ICM module is not reported in the list, please turn the module off and on and try again a USI re-scan (step a above).
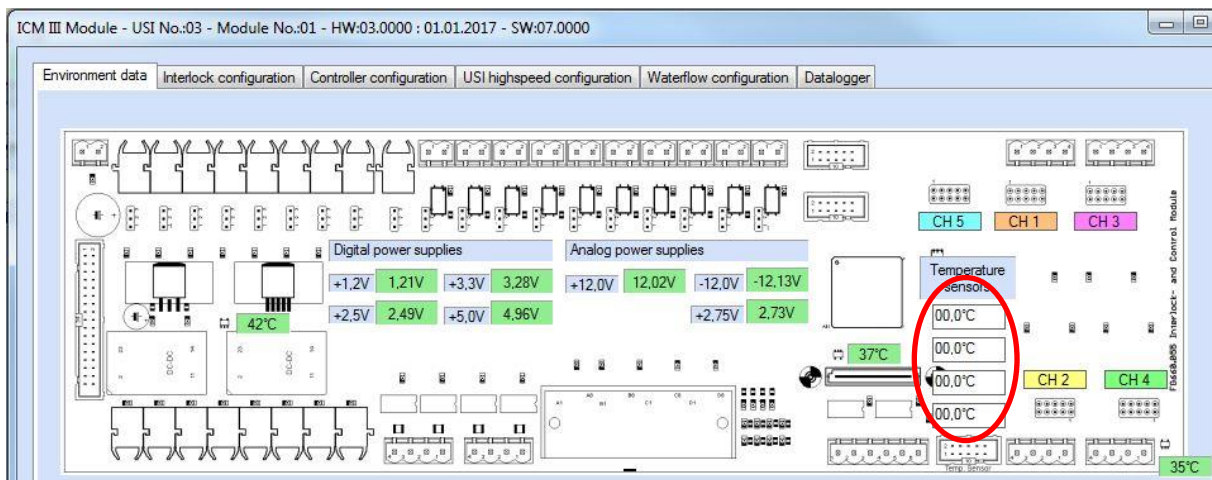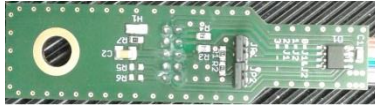
3.6 Temperature Sensors

a. Open Power Config Advanced (PCA), load the Test configuration file and if the ICM module is properly detected, click on it.
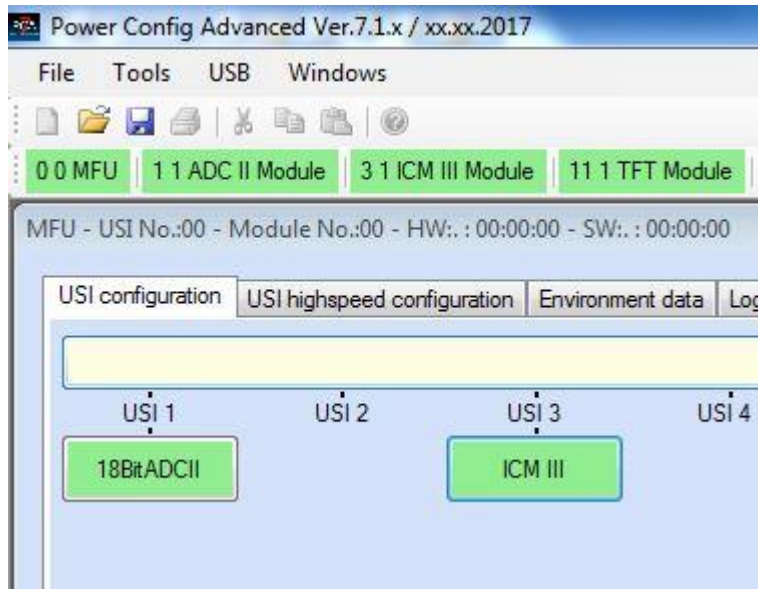
b. In the *Environment data* tab window check if the temperature reported by the three embedded temperature sensors are different from 255 (in red below).
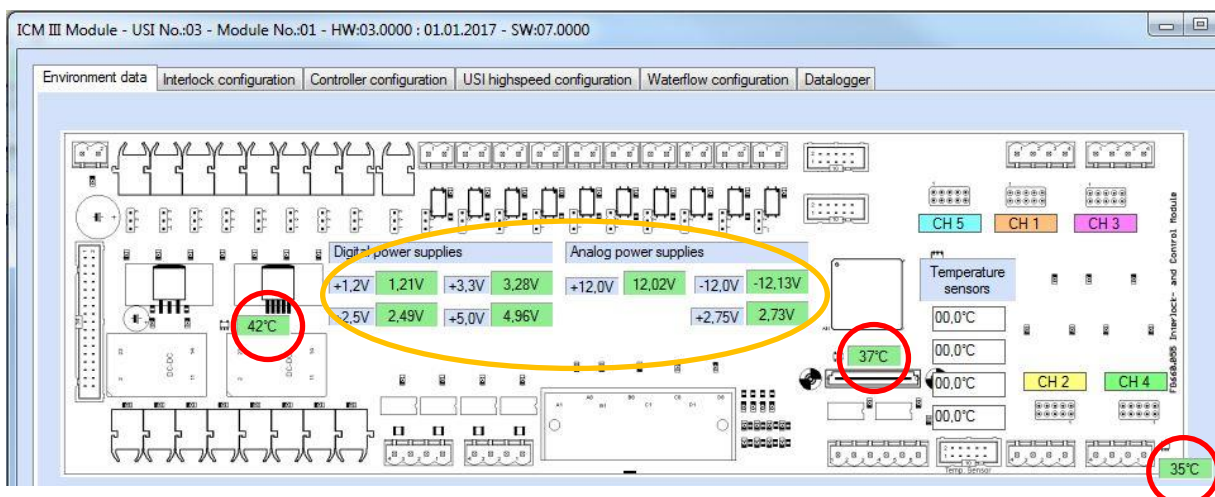
c. At the same time check also if the voltages displayed are in line with the expected ones (above in gold).

d. Spray some cooling liquid on each temperature sensor and check in PCA the value changing.

e. Connect the external temperature sensor (picture below) on X27 connector and check if a temperature value is reported in PCA.


f. Spray some cooling liquid on the external temperature sensor and play with the jumpers on it in order to see the external temperature value on each text box in PCA.

NOTE!: In the points d and f it is not strictly necessary to use the cooling liquid; the target is to see the temperature value changing. Air pressure works fine as well and it is safer from the chip side.

3.7 Analog Interlocks (5x)

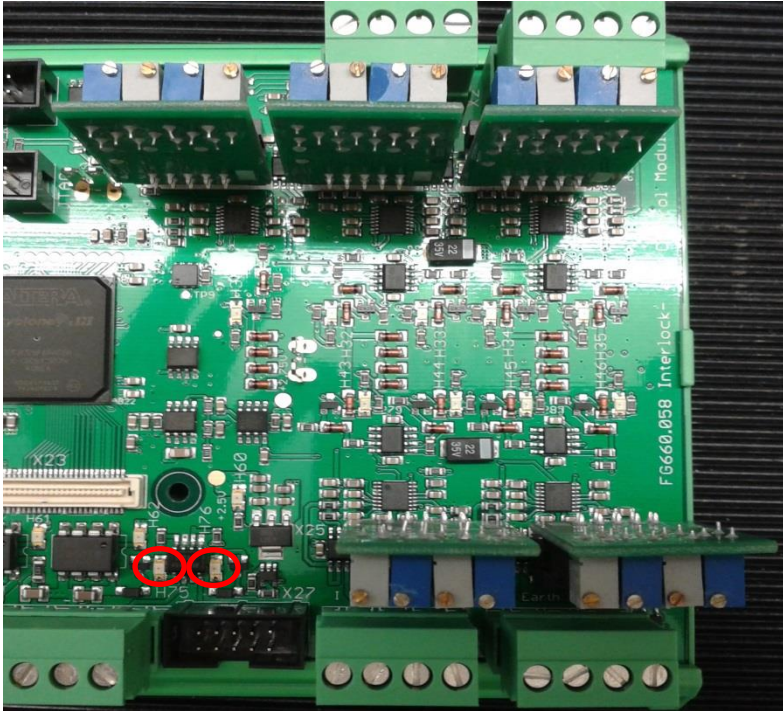a. Plug the Comparator Config Module devices on X15; X16; X17; X25 and X26 as in the picture below:
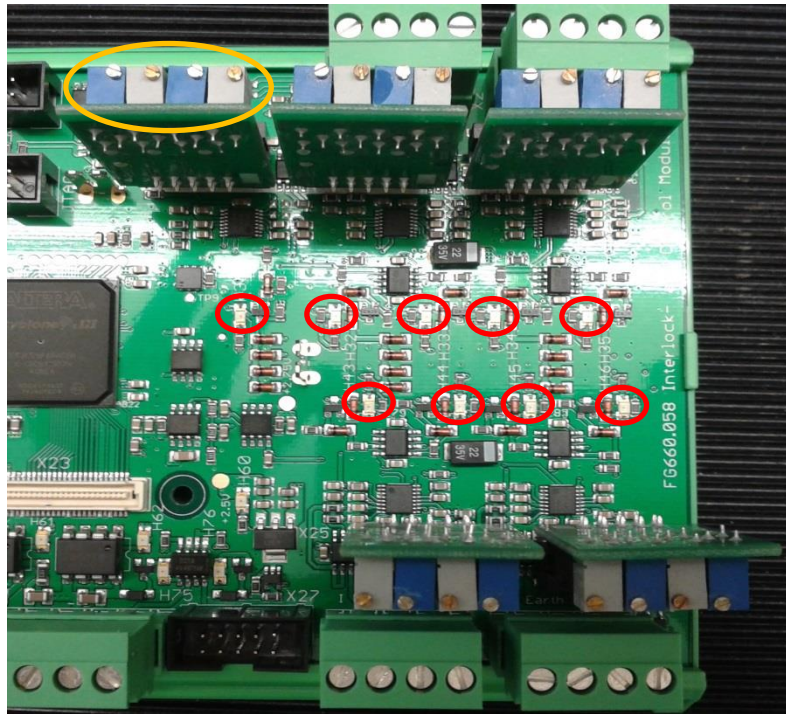
b. Please take care that every Comparator Config Modules has 4 potentiometers installed (above in orange). They are only for test used. the ones on the field look different.

c. Check that all the LEDs (above in red) are off (before plugging the Comparator Config Module devices at least one for each channel should be on (red)).

d. Change the positive threshold to zero for each Comparator Config Module device. This action is possible acting on the positive blue potentiometer with a screwdriver and checking the value in PCA. When the threshold is zero, the corresponding LED has to shine (red).

	Comp09	Comp09	Comp09	Comp09	Comp09
	CH 1	CH 2	CH 3	CH 4	CH 5
Meas. pos. threshold	10,28V	10,03V	10,57V	10,46V	2,16V
Adj. pos. threshold	0,00V	0,00V	0,00V	0,00V	0,00V
Meas. neg. threshold	-10,53V	-10,45V	-10,38V	-10,49V	
Adj. neg. threshold	0,00V	0,00V	0,00V	0,00V	

e. Repeat the test also for the negative threshold following the same steps performed in the point d above.

3.8 Water Pulse Measures:

Apply on X30 a square waveform of 1 Hz frequency and 0 to +15V amplitude and check that the LEDs H75 and H76 blink and that the interlocks 28 and 29 are reported on the TFT Display. To remove the interlocks it is necessary to set a square waveform of 250 Hz frequency.

3.9 Power Converter Switching check:

a. Connect the ICM to a Power Converter Test Bench

b. Turn the power converter on.

c. Listen the main and secondary switches to commutate.

d. Check if the LEDs (H63 to H68) over the optical outputs (D56 to D63) are on or blinking.

e. Trigger an interlock and check if the power converter switches automatically off.

f. Apply manually using the incremental encoder a set value and check if the actual value follows the set value (this has to be done for positive and negative values).

3.10 Check the ICM 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.
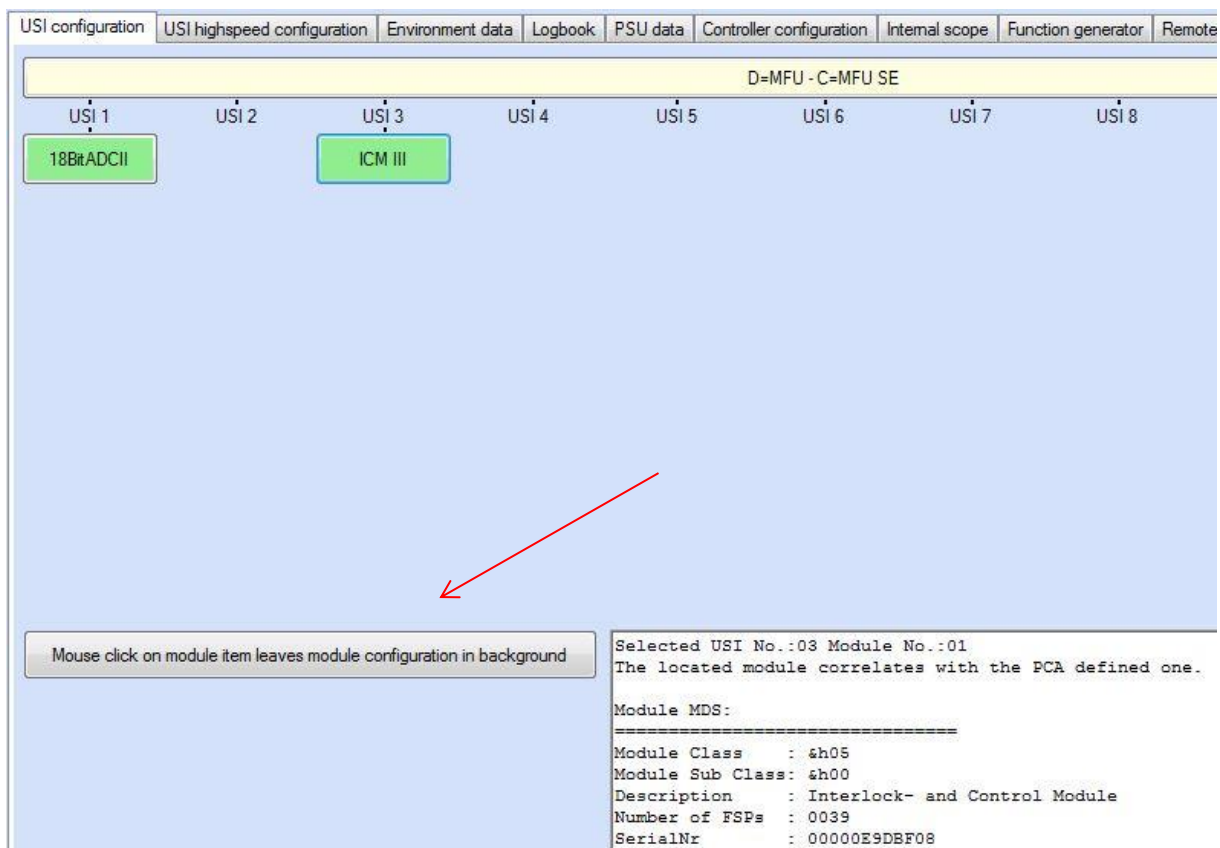
b. Click on the ICM button and copy the SerialNr.
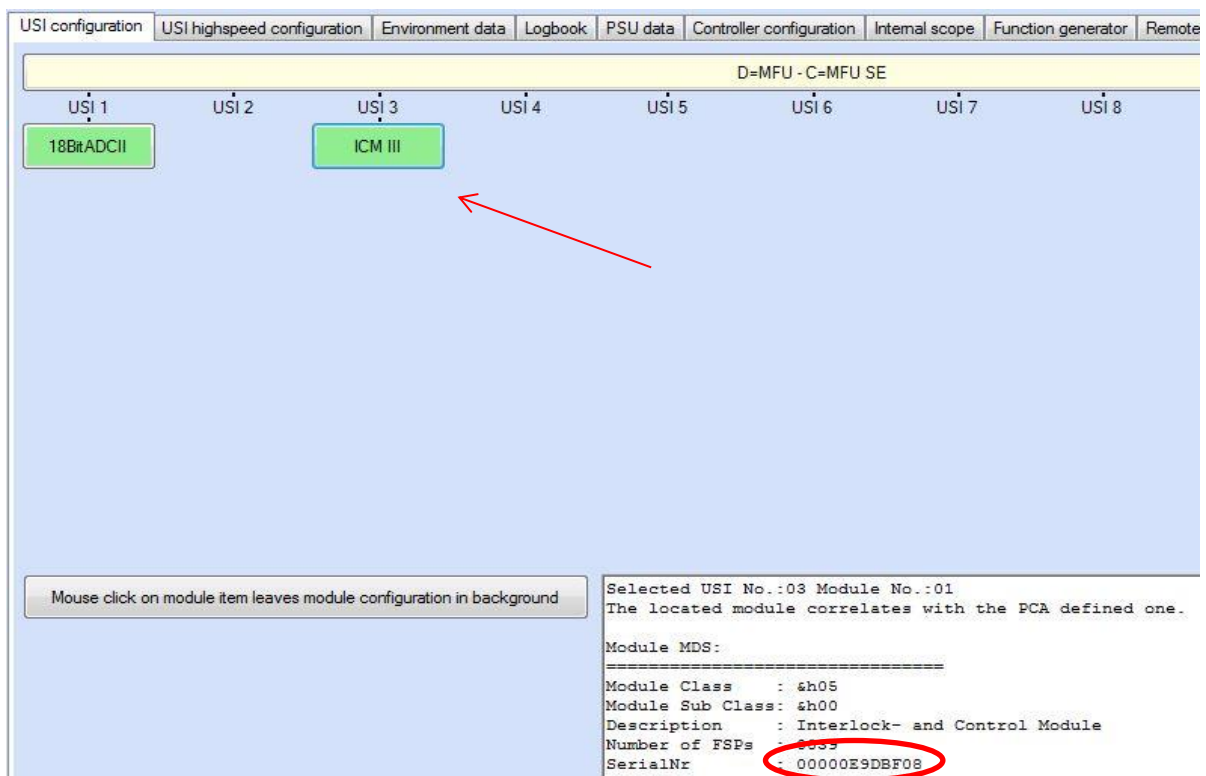
c. Launch P-Touch-Editor tool and open the label template from the eet-common folder (Arbeitsordner ACU\labels\ACU-Labels\Etiketten-ICM_59_SE-Verknüpft-Zebra.lbx)

d. Change the serial number and if necessary the FG number as well.
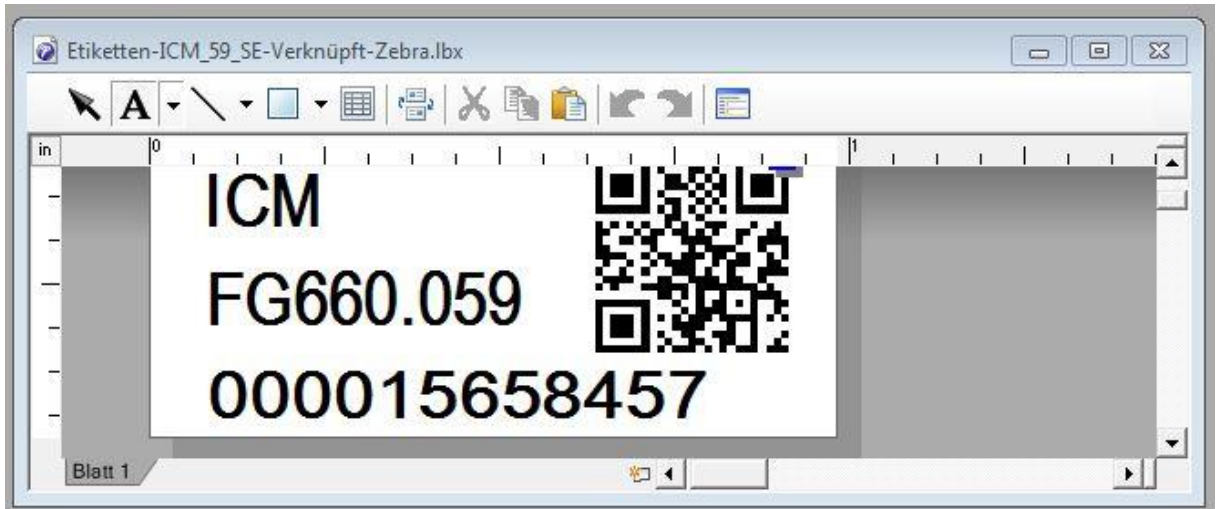
e. Print out two labels; one has to be stick on the board and the other on the box that will contain the ICM.

a. 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

3.11 Test Log file generation

Generate the testLogILCM_FG660_xxx_xxxxxxxx.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!