Testing a New PCBA

Before starting the test of the newly received from manufacturer PCBA, the test station has to be prepared: ESD protective mat has to be placed on the table and be connected to earth ground. Laboratory Power Supply for 0 – 15V and up to 1A current must be present.

Digital multimeter, digital microscope, oscilloscope, soldering station, craft knife with narrow and sharp tip – are necessary tools for testing.

The first step in testing a fresh new PCBA is to visually analyze it: look for any abnormalities: missing components, bad soldering (unintended solder bridges or not soldered pins). A digital microscope will be a good help at this time. Verify that all Solder Bridges (and other jumpers) are correct, all “Do Not Staff” components are not installed. Verify that all placed components placed correctly: pin 1 matches a location of a white dot indicating pin 1 location.

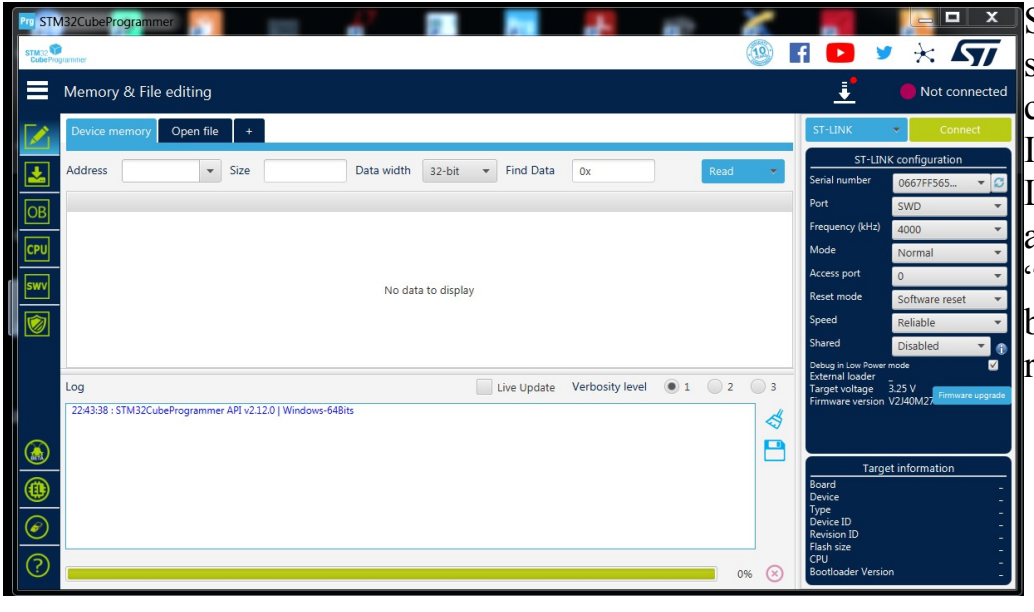
Next Steps in Testing

The next step is testing the PCBA with an Ohmmeter to make sure the power buses are not shorted to ground or between each other. Check that AGND and DGND are connected. If there are some isolated power supplies, check that they are not connected by grounds or by power buses.

If the first two steps provided good results, The PCBA may be powered from a laboratory power supply with regulated voltage and regulated current limiting capability. The current limit should be set to a value, estimated as a sum of average currents of all components. If there is no smoke, test all power voltages relative to their grounds. The voltages should have less than +/-5% tolerances. If more – verify temperature of the pertinent voltage regulator or switching transistor. Use all your senses: olfaction (nose), audition (ears), somatosensation (fingers), vision (eyes), gustation (tongue – can be used to test up to 9V batteries).

Preparation to Functional Testing

Download and install on your computer en.stm32cubeprg-win64-v2-12-0.zip or other version, if you use Linux or iOS. It is a programmer for 32-bit uCs.

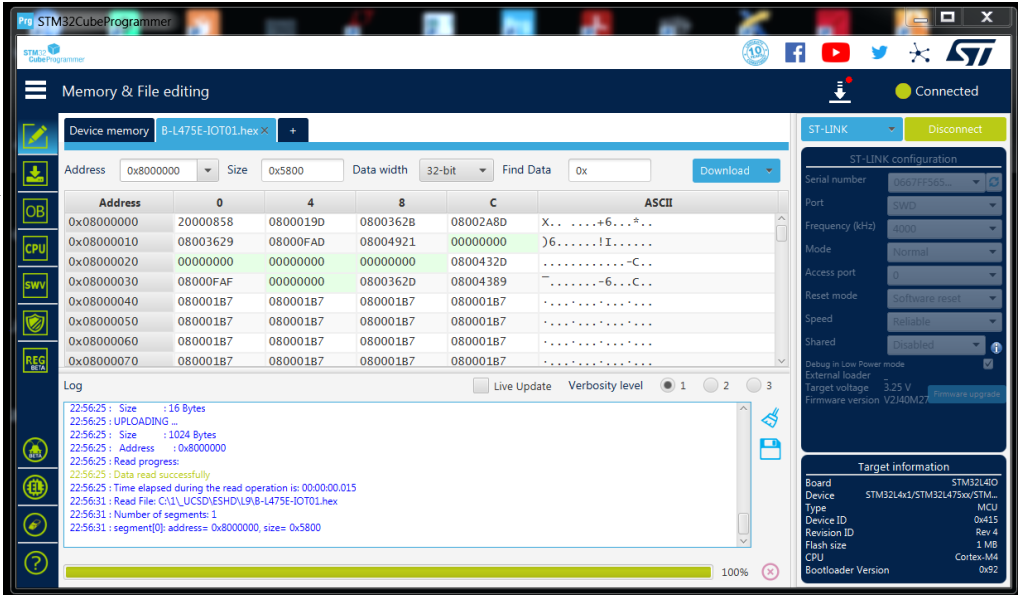


Start the software, connect your IoT board to ST-Link connector and press "Connect" button on the right side.

Loading the Test FirmWare in the MicroController

When you see successful connection message in the Log section (bottom left side), click on dark blue tab Open File. Select the B-L475E-IOT01.hex file, and observe some data in the main window and a success message in the Log section.

Now click on Download button, observe “File downlaod complete” in a pop-up window.



Testing Embedded System

Do not forget to click on Disconnect in Programmer window.

Now, after successful programming it is time to test the system. In order to do it, we have to use some communication software, for example, TeraTerm. Install it in your computer and open the SW.

For those of you who uses iOS, you can try PuTTY, Minicom, or something else.

Click on menu Setup and select Serial Port (if you cannot select, check you drivers; you may have to unplug your board for a few seconds).

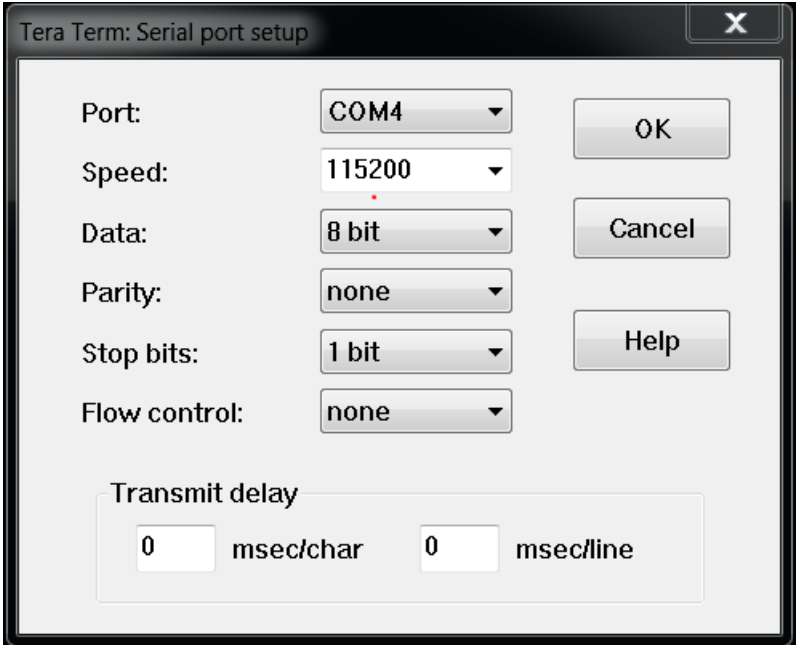
The UART configuration in IoT board is:

BaudRate = 115200; UART_WORDLENGTH_8B;
UART_STOPBITS_1; UART_PARITY_NONE;
UART_HWCONTROL_NONE;

So we have to configure computer's COMx port to have the same settings.

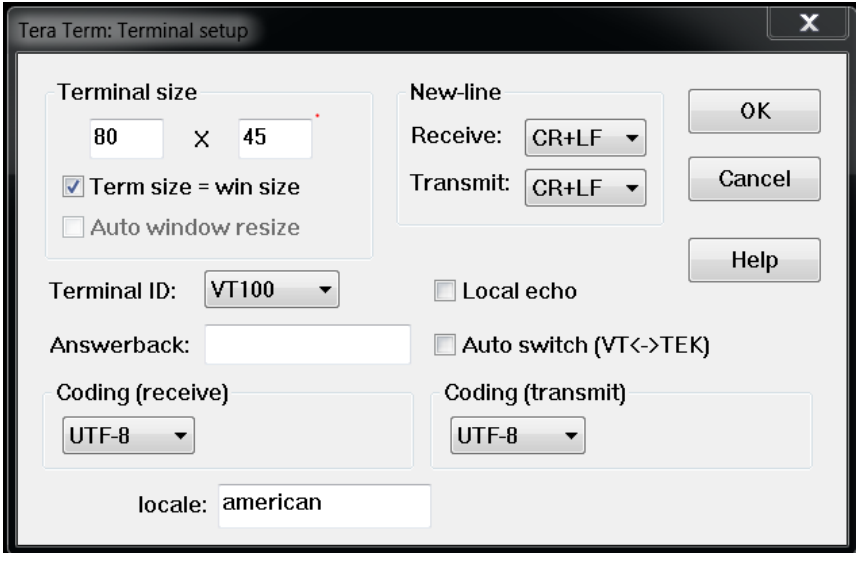
Cofiguring TeraTerm COM Port

Go to menu: Setup → Serial Port. Select Baud Rate 115200, Data: 8 bit, Parity: none, Stop bits: 1 bit, Flow control: none. Click OK.



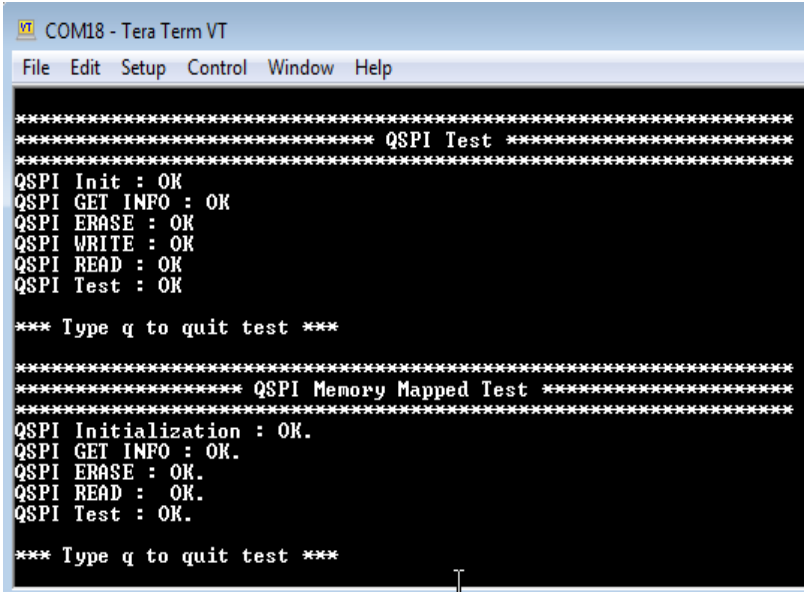
TeraTerm Terminal Setup

From Menu → Setup → Terminal. Select Receive = CR+LF, Transmit=CR+LF. Check other settings to match the picture. Click OK.



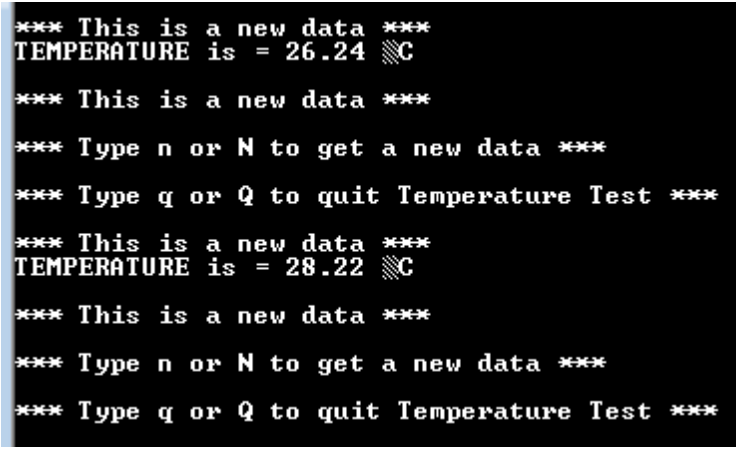
Testing QSPI Memory

Tap on Reset button (black) on STM board, and you should see the first message: “Press User button to put LED2 ON”. After pressing the User button observe a new message about successful testing QSPI Flash memory.
Press q or Q, and see another set of messages about QSPI Flash Memory Mapped Test.

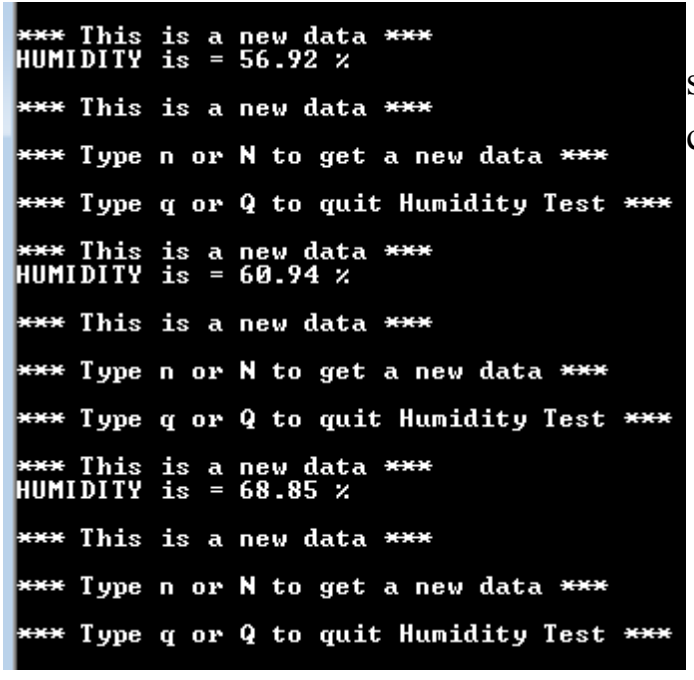


Temperature Measurements

After pressing q or Q again, the new test starts: Temperature measurements. Press n for new value. Heat the temperature sensor U6 (next to the last pin of PMOD connector) with your finger and observe new values of rising temperature.



Humidity Measurements



Now you can breathe on the sensor (the same U6) and see the change of humidity readings.

Atmospheric Pressure Measurements

You got the idea of how to continue with the tests. For this test you can put your board as high as the USB cable allows, and make a few measurements. Then put the board down as much as you can, and make another few measurements. Notice a slight difference.

In my tests I got the following data Hi level: 1021.90, Lo level 1022.11 as a result of averaging 3 measurements for each Hi & Lo.

Go through all other tests and present all your results (not only testing but the whole process of designing an embedded system) in a good looking Project Report.

Final Words

Please read one more time the Requirements to Project Report.pdf.
Read also the Announcements related to Final Project and Lesson 9.

I wish you all Good luck in your professional careers and in your personal lives. Hope you can use some knowlege acquired in this couse for your work or, maybe, hobby.

Please submit all your works before March 12.