

EEG-SMT development board QUICK START GUIDE

Revision H, January 2013
Designed by OLIMEX Ltd, 2011



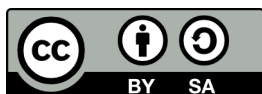
All boards produced by Olimex LTD are ROHS compliant

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The software is released under GPL.

It is possible that the pictures in this manual differ from the latest revision of the board.

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THERE IS NO WARRANTY FOR THE DESIGN MATERIALS AND THE COMPONENTS USED TO CREATE EEG-SMT. THEY ARE CONSIDERED SUITABLE ONLY FOR EEG-SMT.

General info:

The EEG-SMT module is an inexpensive unit for electroencephalography (EEG) - recording of electrical activity along the scalp. The project is based on the efforts of the OpenEEG community and our engineers here at Olimex. Project's webpage can be found here:

<http://openeeg.sourceforge.net/>

The OpenEEG project is about making plans and software for do-it-yourself EEG devices available for free (as in GPL). It is aimed toward amateurs who would like to experiment with EEG.

EEG-SMT is based on the ModularEEG project.

- Very low price compared to professional EEG devices
- Compact size
- Solid plastic case
- Powered by USB
- ICSP10 interface for reprogramming
- Fully open software and open hardware

What do you need to get your EEG recordings monitored?

- EEG-SMT board itself
- EEG-AE - Active Electrode – 0 or 4 AE
- EEG-PE - Passive Electrode – 1 or 5 PE
- USB-CABLE – USB A to USB B cable 1.5 meter for EEG-SMT to connect to a computer
- VCP FTDI drivers (you can download the latest version from the official FTDI web site <http://www.ftdichip.com/Drivers/VCP.htm>)
- Electric Guru v0.40 monitoring software or latest BrainBay

Note: You can either choose to use 5 passive electrodes or 4 active electrodes + 1 passive electrode (needed for electrical feedback).

IMPORTANT NOTE:

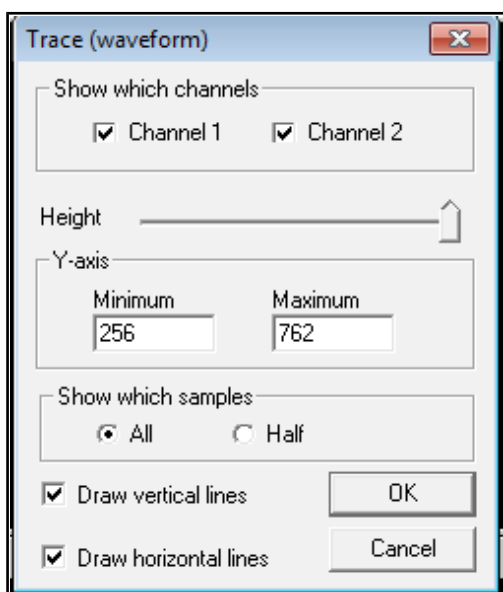
EEG-AEs, EEG-PEs, USB-CABLEs are sold separately and are NOT included in the box of EEG-SMT

We have tested EEG-SMT with three software tools. These are the tools recommended by Olimex and explained below: Electric Guru; Brain Bay and OpenVibe. However, the board should work

with any set of tools that supports OpenEEG/ModularEEG with firmware P2 (not P3).

- 1) Connect the EEG-SMT and a computer using the USB-CABLE
- 2) Go to device manager and locate the group “Other devices” and right click over the OLIMEX device. Chose update driver software. A dialog will appear and you click “Browse my computer for driver software” (the drivers can be downloaded from the FTDI web site under VCP link)
- 3) “Let me pick from a list of device drivers on my computer”->”Show all devices”-> Next
- 4) “Have disk”, and browse to the folder where you extracted CDM20814_WHQL_Certified.zip and locate “ftdibus.inf”
- 5) Click Next and then “Install software anyway”
- 6) If you wish to use BrainBay skip to step 11); if you wish to use OpenVibe skip to step step 17); for Electric Guru continue reading:
- 7) Get the program from here: [click to download](#)
- 8) Extract the contents of the archive named “ElecGuru[vN].zip” and run the executable

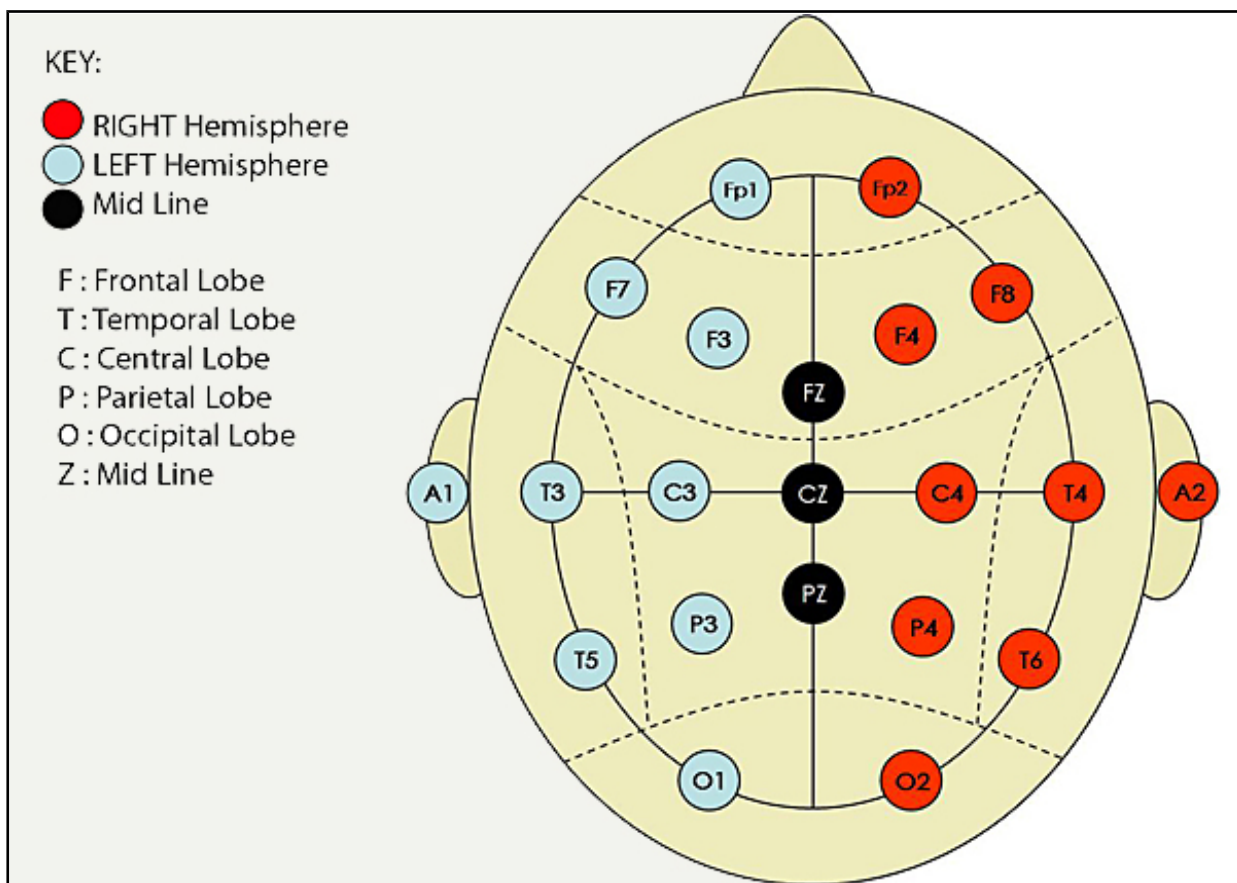
It is advisable to make the changes shown in the picture below in your ElecGuru program in preferences-> Trace (waveform); also make sure you have selected the proper COM port



- 9) Connect the 5 electrodes to the EEG-SMT (!!! The one connected to DLR must be passive electrode)

10) Place the DLR electrode (feedback) on your ear and the other 4 on your head depending what kind of brain activity you want to monitor – there is diagram on the next page showing the spots you might use.

For example if you want to monitor the Frontal Lobe (thought processing) you place the electrodes on Fp1, Fp2, F7, F8 spots (and DLR electrode to one of the ears A1, A2).



If you want to monitor visual perception you have to monitor the Occipital Lobe – Fp1, Fp2, O1 and O2.

For more information on the functions of the brain and the respective brain zones refer to the Wikipedia article: <http://en.wikipedia.org/wiki/Brain#Functions>

11) Download Brainbay software from their official web site: <http://www.shifz.org/brainbay/>

12) Install the program and run it

13) Click Load Design and import a sample project from folder Test_Elements (for example modeeg_test.con or 2chn_test.con, but feel free to check others also)

14) From Option -> Device manager change the COM port to the COM port EEG-SMT is assigned to and the baud rate to 57600 (you can check/change the COM in Windows Device Manager in Ports section, the device is recognized as USB Serial port (COM X))

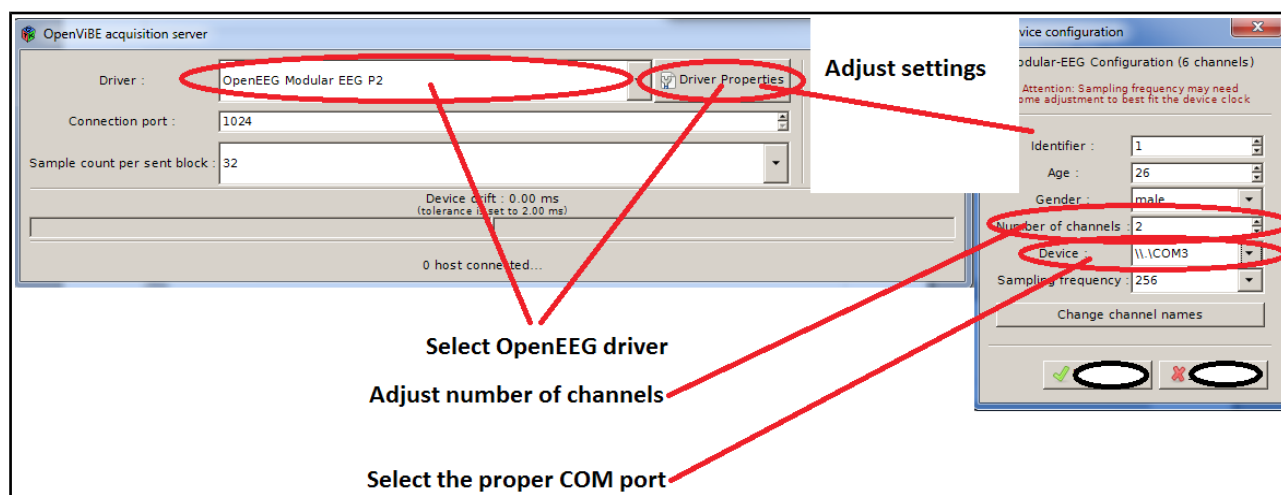
15) Do steps 9) and 10)

16) Click Play (F7)

17) Visit OpenVibe's web page: <http://openvibe.inria.fr/> and download the installation from the download button.

18) Install OpenVibe and from the start menu navigate to the start menu folder that the installer created. Run “openvibe acquisition server”.

19) Select “OpenEEG Modular EEG p2” from the drop-down menu and adjust it's properties. Especially change the COM port to the proper port the EEG-SMT got connected to (after the drivers were installed in point 6) and also remember to reduce the number of channels to 1 or 2!



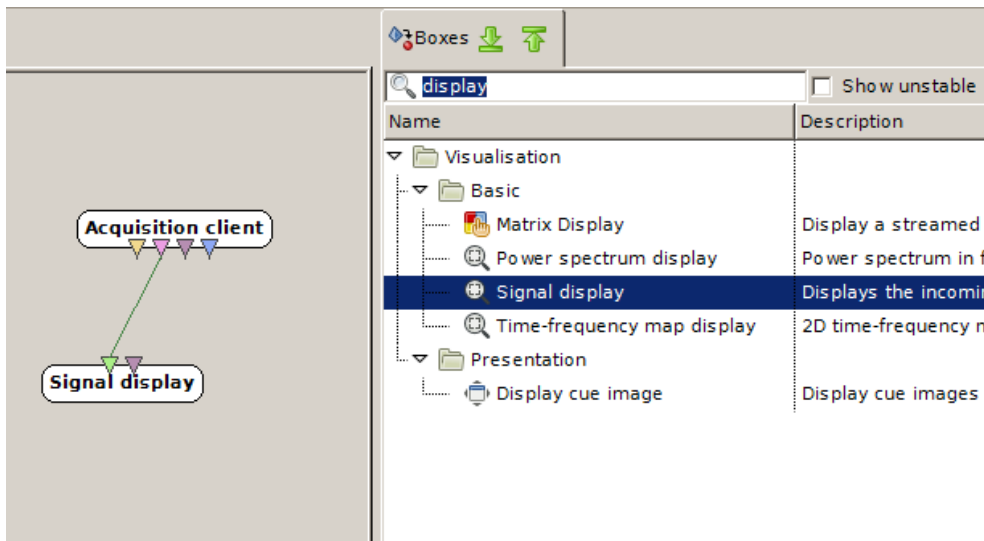
20) Click Connect and then click Run

21) Run the OpenVibe client designer from the start menu shortcut “openvibe designer”

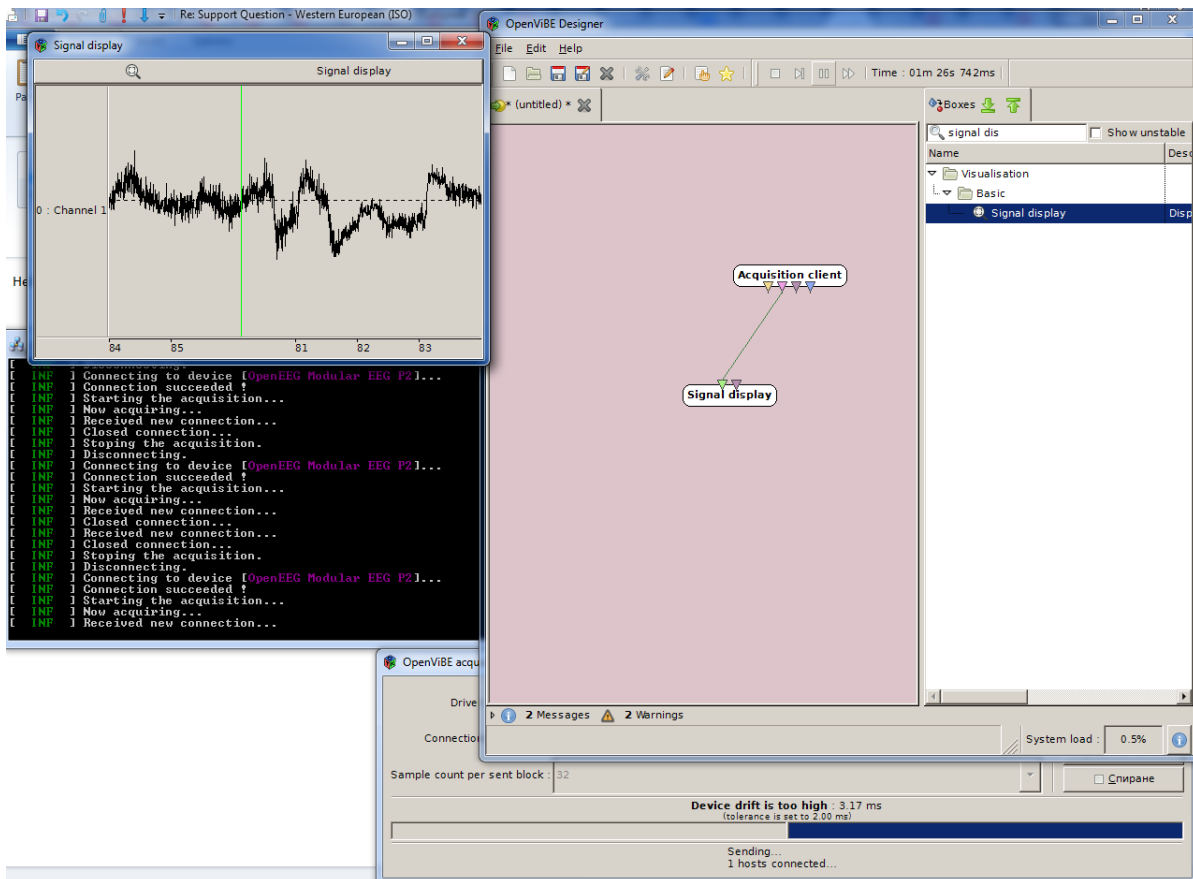
22) Create new design from File - > New

23) In the search box (to the right in the interface): type “acquisition” and drag-and-drop Acquisition client to the design workspace (to the left in the interface)

24) In the search box (to the right in the interface): type “display” and drag-and-drop the Signal Display box the design workspace (to the left in the interface)



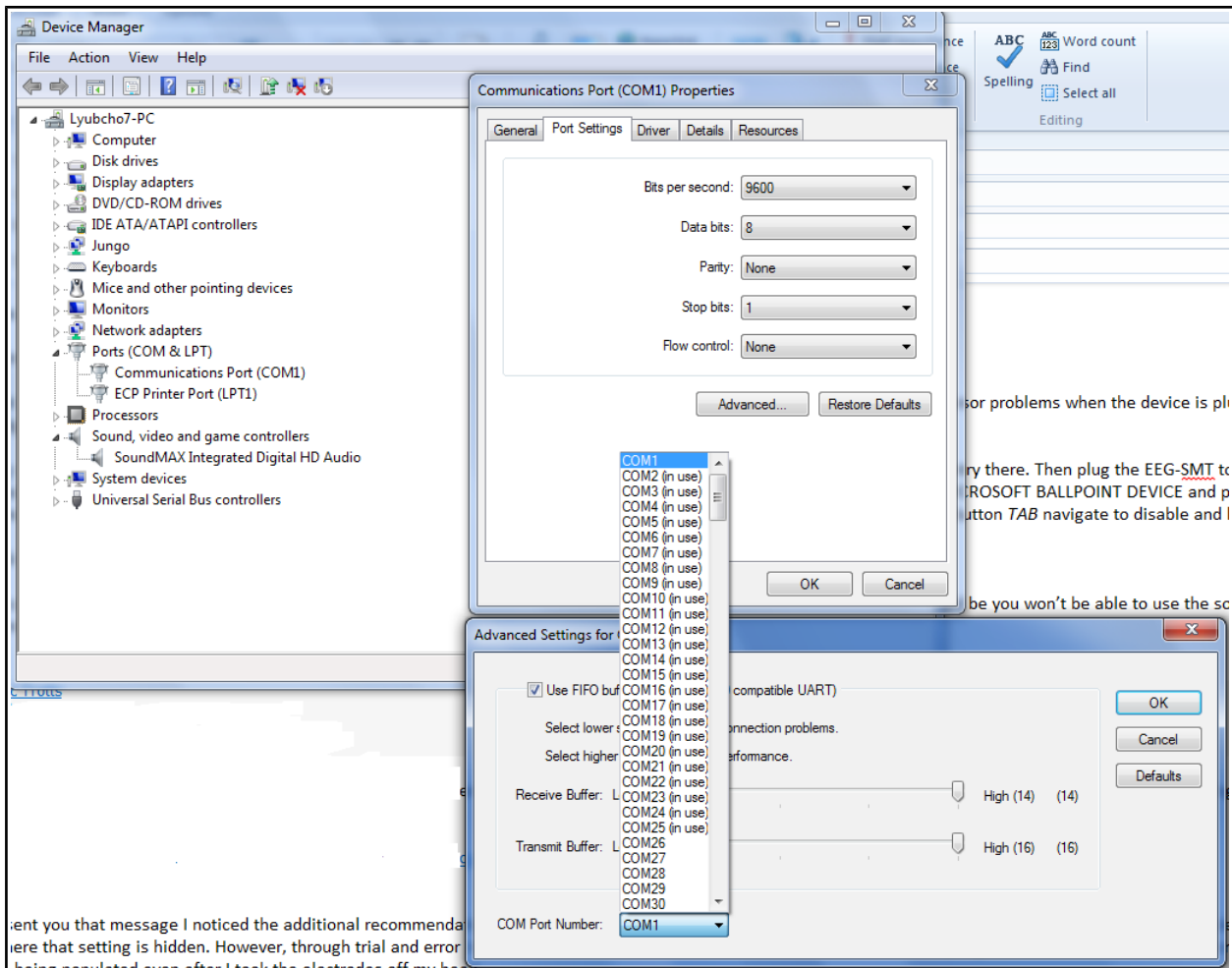
- 25) Connect the two elements as shown in the picture below:
 - 26) Do steps 9) and 10)
 - 27) Click “Play” from the tool bar at the top of the Designer interface
- Below is an example one-channel operation of OpenVibe:



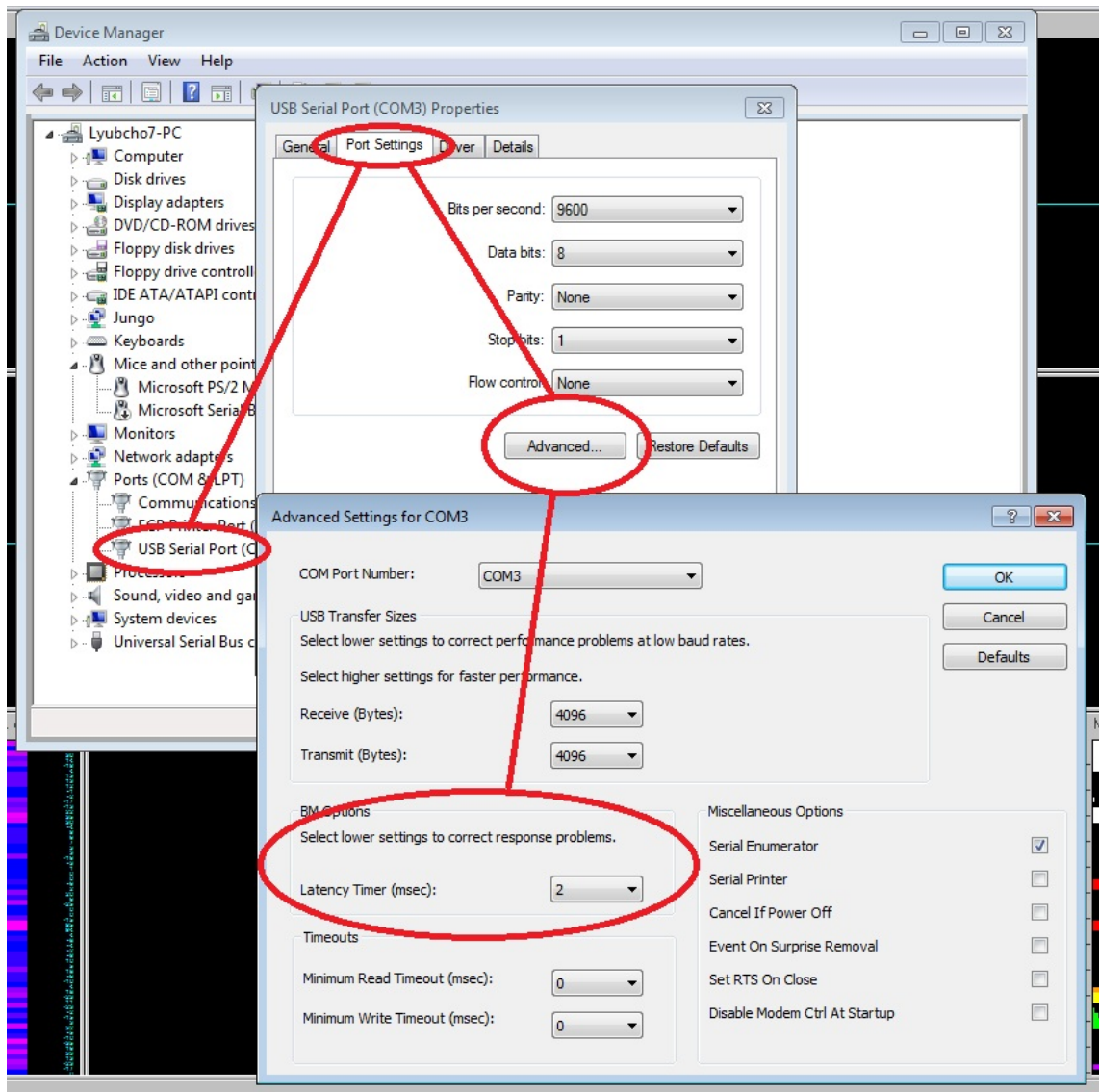
More information on the OpenVibe setup may be found at their web page. The basic setup design is described here: “<http://openvibe.inria.fr/tutorial-the-most-basic-openvibe-setup/>”.

IMPORTANT NOTES AND FAQ:

- The virtual com port must be numbered 1, 2, 3 or 4 in order to use ElecGuru, which you can do in Device Manager. Right-click over the COM port the device was installed onto and click “Properties”, then navigate to “Port Settings”, then to “Advanced” and finally change “COM number”. Check the screenshot below:



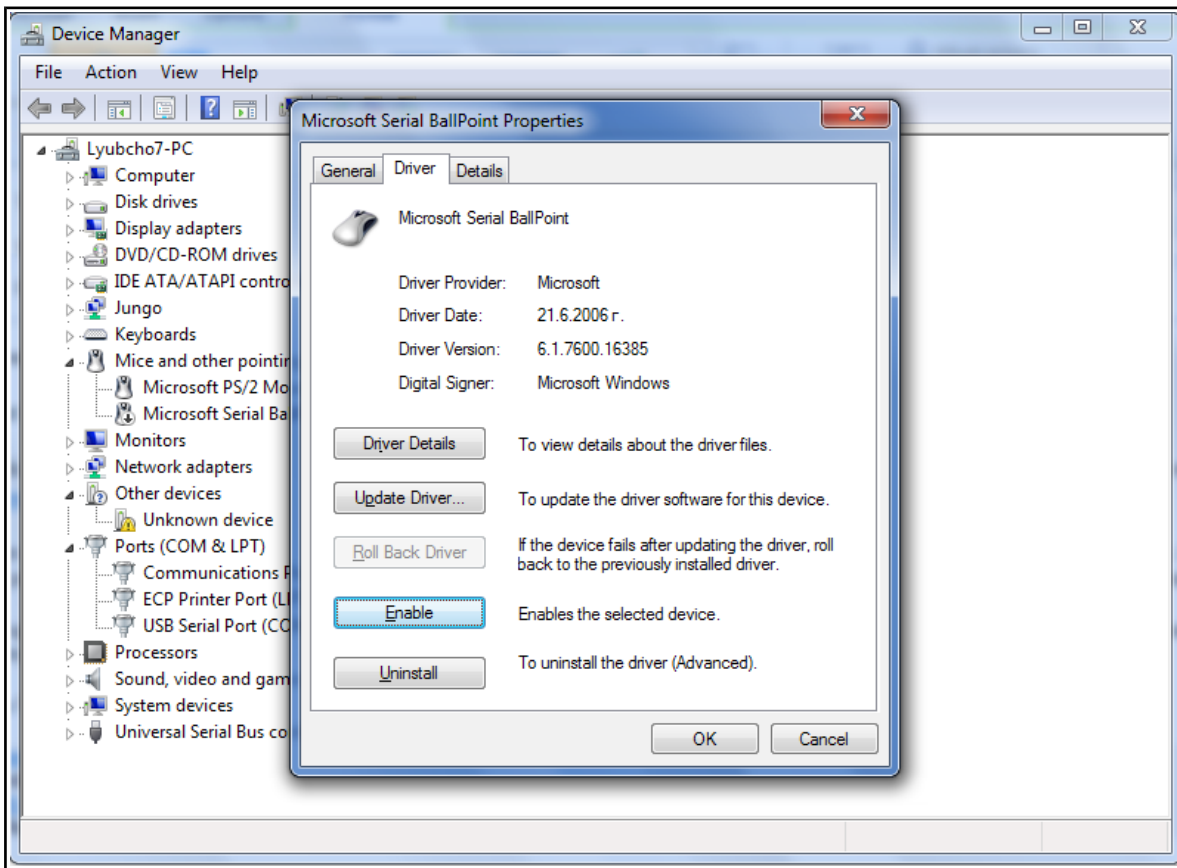
- The COM port which ElecGuru uses can be changed from preferences-> serial port.
- You have to install the drivers then start the ElecGuru program AND THEN connect the electrodes.
- If using only ONE channel it is recommended to short circuit the other channel, or connect it to the DLR for less noise
- Feel free to try other software that supports OpenEEG ModularEEG firmware 2 (P2) data packing.
- If you wish to change the update rate of the graph (e.g. make it update data on little intervals so the line seems fluid – more sensitive to changes) you have to change the Latency Timer of the virtual COM port. It is done from the same menu where you can change your COM number. Change it to 1ms or 2ms delay. Check the screenshot below:



There are reports that on certain operating systems it is possible that after installing the drivers and connecting the device the mouse pointer would become unresponsive and would act crazy.

It is a bug we have reported to Microsoft and FTDI. This bug persists in the COM communication since Windows 2000. There are two solutions available:

1)The first solution: Go to the device manager before plugging the device and mark an entry there. Then plug the EEG-SMT to the computer (and your mouse will go crazy!) leave the mouse and use *the keyboard arrows* and *TAB* to navigate in the device manager and reach the MICROSOFT SERIAL BALLPOINT DEVICE and press *Enter* on it. Then when General tab is marked (with dotted rectangle) press Right keyboard arrow which will lead you to Driver tab and using keyboard button *TAB* navigate to disable and hit enter. Check the following screenshot:

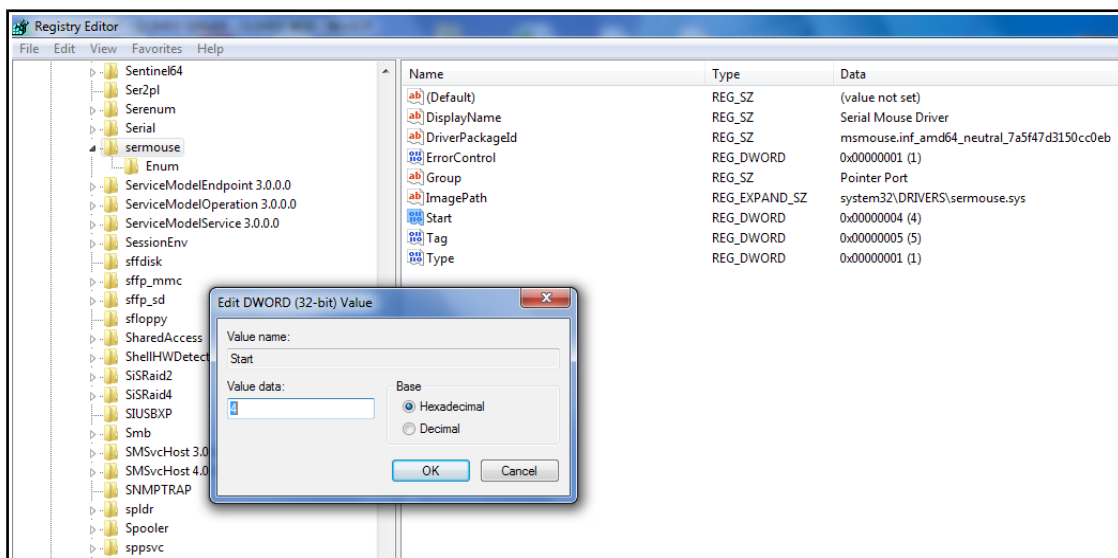


2)The second solution (Please follow carefully and at own risk): a solution that worked for me was to go into the registry (Start → Run/Search → “regedit” → Enter) and edit the following value:

Location: HKEY_LOCAL_MACHINE\System\CurrentControlSet\Services\sermouse

Key: Start

Default value: 3



Modify Value to 4, which is Disabled and it will stop this problem occurring. Check the picture below:

More info on the software which the board was tested with can be found here:

<http://www.shifz.org/brainbay/>

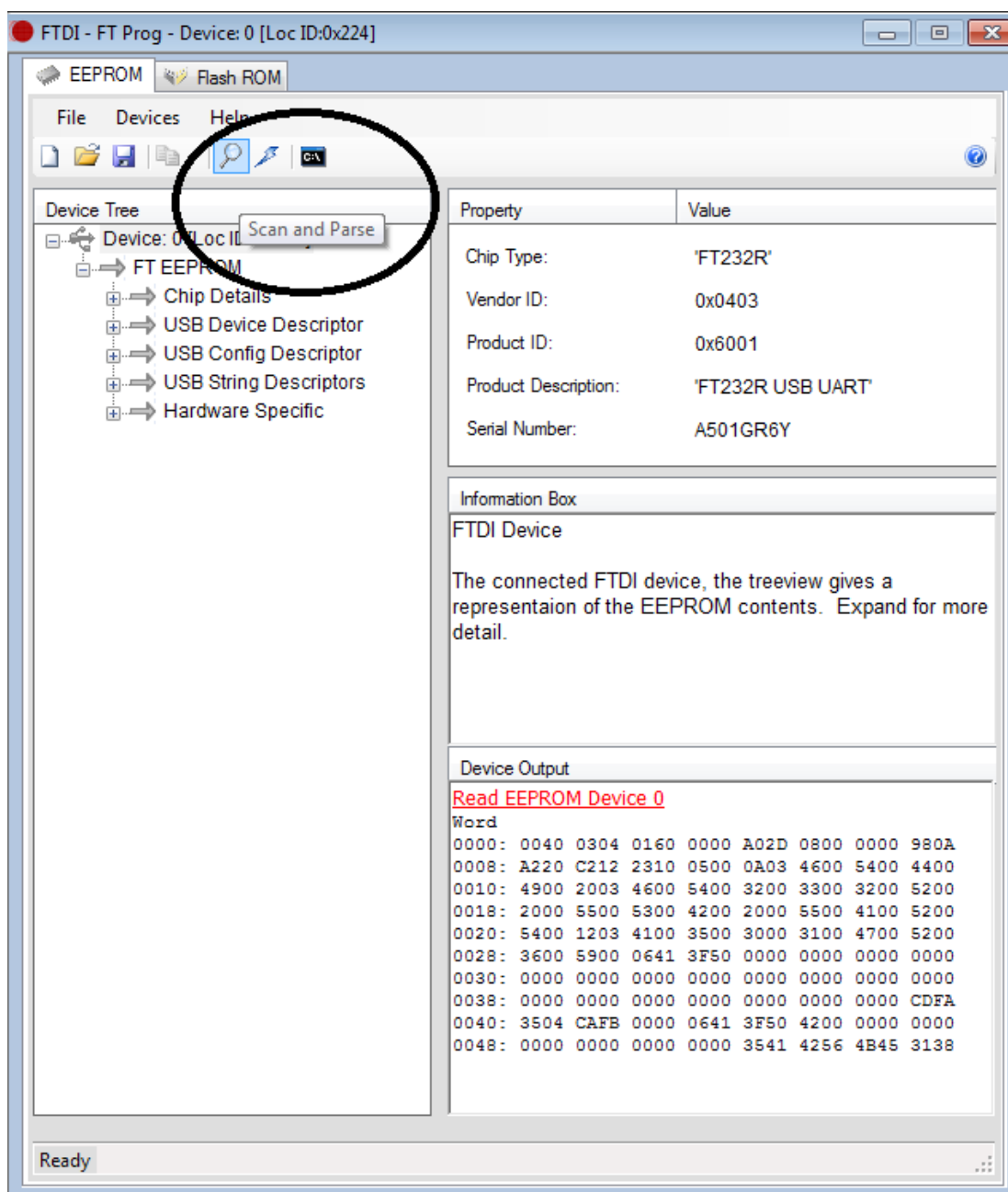
Here you get acquainted with the main parts of the board. Note the names used on the board might differ from the names used to describe them. For the actual names check the EEG-SMT board itself.

How to connect more than one EEG-SMT to a single PC

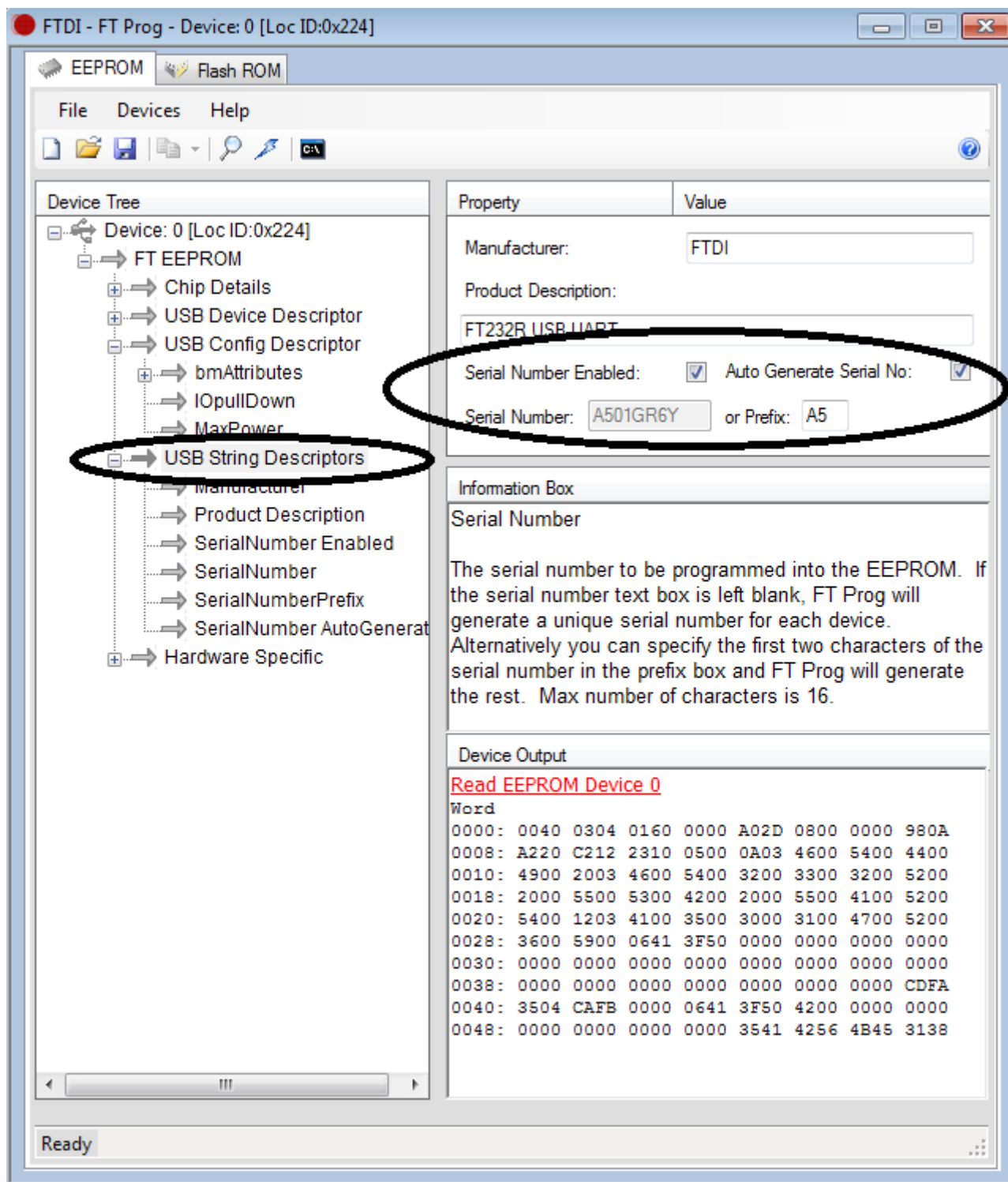
To continue with the good news to configure the devices in such a way you don't need additional hardware, nor you need to open them. It can be done via the USB. The steps to do so are listed below:

Important! Modifying other values than the ones suggested below might cause serious troubles and even render the EEG-SMT unrecoverable.

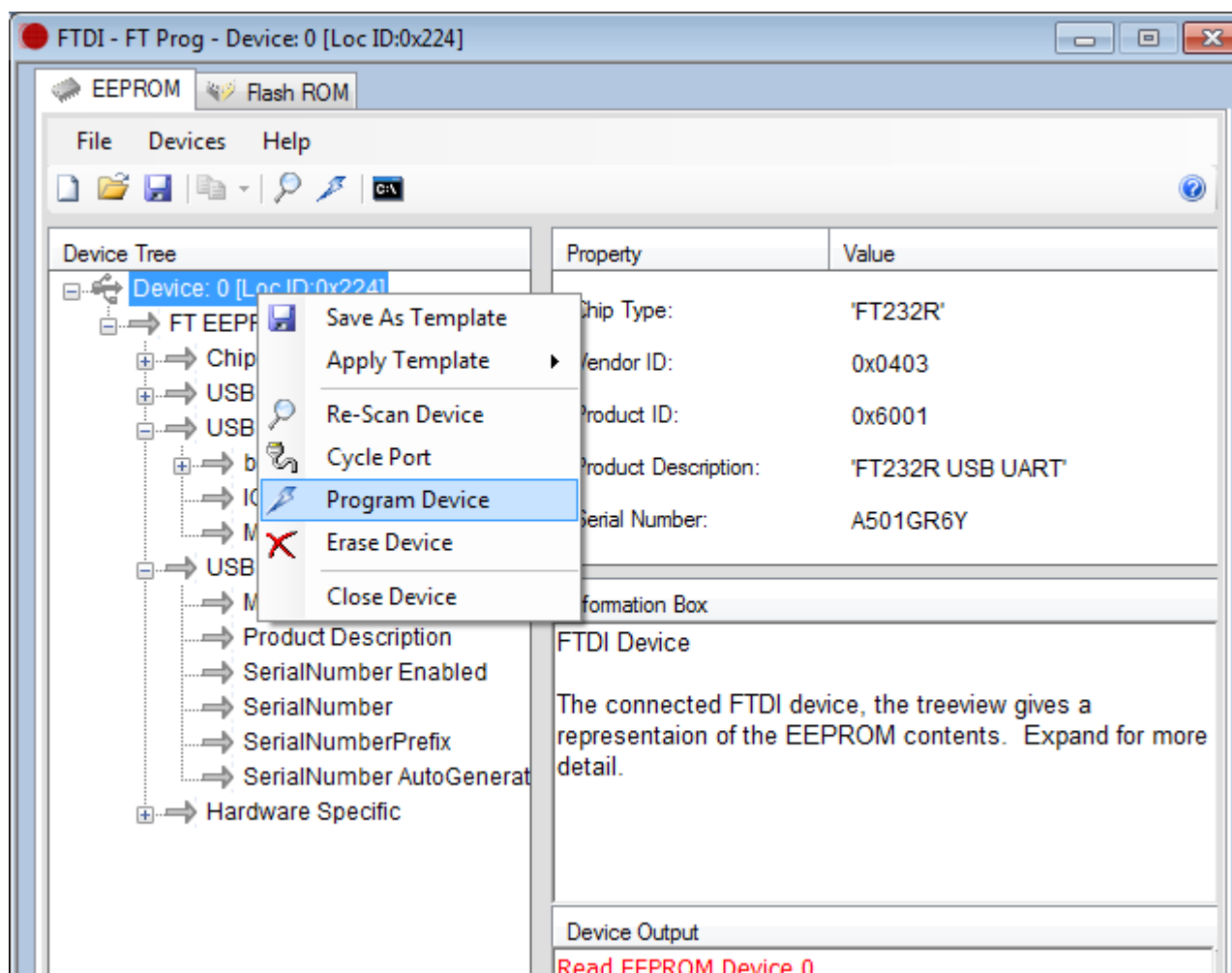
1. Connect EEG-SMT to a computer via the USB (and ensure no other FTDI devices are connected to the computer)
2. Make sure the drivers of the device are installed (if not install them from <http://www.ftdichip.com/Drivers/VCP.htm>)
3. Download and extract the FT_PROG utility from FTDI's web site: <http://www.ftdichip.com/Support/Utilities.htm>.
4. Run FT_prog.exe and select "Scan and Parse" from the menu (attached 1ftdi.png)



5. In the left panel navigate to “USB String Descriptors” and then in the right one make sure the “Serial Number” is enabled and the “Auto Generate Serial No” is enabled also. (2ftdi.png)



6. Right-click over Device 0 and choose to program device



7. Close FT_prog and power cycle the EEG-SMT, then connect the second EEG-SMT

8. Open “Windows Device Manager” and if both devices are enumerated with the same COM port # change one of them to another COM port # (from Properties → Port Settings → Advanced → COM port number)

9. Start two instances of a supported program (or two different supported programs). In their options set one to the COM port # of EEG-SMT#1 and the other to the COM port # of EEG-SMT#2
 Note: This way you can configure more than 2 EEG-SMT devices (4 channels) as long as your USB hub (computer motherboard, power supply, etc.) is able to power the number of EEG-SMT devices connected.

Ordering info

ORDER CODES:

EEG-SMT - assembled, programmed, tested, calibrated EEG device

EEG-AE - active electrode

EEG-PE - passive electrode

USB-CABLE - USB A to B cable 1.5 meter for EEG-SMT

How to order?

You can order from our web shop or from any of our distributors. List of distributors:

<https://www.olimex.com/Distributors>

Check our web site <https://www.olimex.com/> for more info.

Product support

For product support, hardware information and error reports mail to: support@olimex.com. Note that we are primarily a hardware company and our software support is limited.

Please consider reading the paragraph below about the warranty of Olimex products.

Warranty and returns:

Our boards have lifetime warranty against manufacturing defects and components.

During development work it is not unlikely that you can burn your programmer or development board. This is normal, we also do development work and we have damaged A LOT of programmers and boards during our daily job so we know how it works. If our board/programmer has worked fine then stopped, please check if you didn't apply over voltage by mistake, or shorted something in your target board where the programmer was connected etc. Sometimes boards might get damaged by ESD shock voltage or if you spill coffee on them during your work when they are powered.

Please note that warranty do not cover problems caused by improper use, shorts, over-voltages, ESD shock etc.

If the board has warranty label it should be not broken. Broken labels void the warranty, same applies for boards modified by the customer, for instance soldering additional components or removing components - such boards will be not be a subject of our warranty.

If you are positive that the problem is due to manufacturing defect or component you can return the board back to us for inspection.

When we receive the board we will check and if the problem is caused due to our fault and we will repair/replace the faulty hardware free of charge, otherwise we can quote price of the repair.

Note that all shippings back and forth have to be covered by the customer. Before you ship anything back you need to ask for RMA. When you ship back please attach to it your shipping address, phone, e-mail, RMA# and brief description of the problem. All boards should be sent back in antistatic package and well packed to prevent damages during the transport.