Technical note:

PROGRAMMING OF THE CYPD3120 USB TYPE-C CONTROLLER CHIP

This document has been modified to remove the specific details that refer to the

instrument and printed circuit board that I am developing.

Revision 1

Date: 6/13/2018

Summary

The instrument's USB/Power Board has several functions. One of them is to provide the battery charging power to the device. This is accomplished via a Type C USB connector. The external power source can be any USB power supply.

However, we would prefer to have a smart USB Type C power supply that can deliver 5V/3A, 9V/3A or 15V/3A power.

Our USB/Power Board has a special chip CYPD3120, which should, when the smart power supply is connected to the instrument, communicate with the smart power supply, and request 15V/3A power.

By default, the CYPD3120 chip will request only 5V/900 mA power.
So, in order to fully utilize the features of the smart power supply, we have to reconfigure the default configuration of the CYPD3120 chip.

The CYPD3120 chip on each new USB/Power board has to be, using the Cypress EZ-PD Configuration Utility, reconfigured to request 15V/3A power from the smart power supply.

This Technical Note contains the description of the procedure required to reconfigure a new CYPD3120 chip that is on the USB/Power Board.

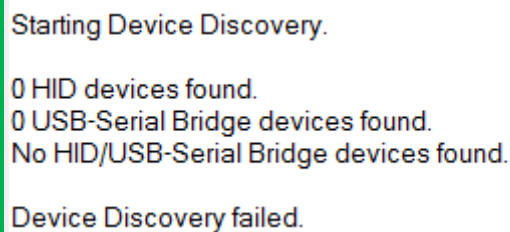# Programming of the CYPD3120, step-by-step

1) Launch the EZ-PD Configuration Utility

This is the program/application that is used to program the CYPD3120 chip. If you do not have it on your computer, you can download it from:
http://www.cypress.com/documentation/software-and-drivers/ez-pd-configuration-utility?source=search&cat=software_tools
Download both setup files and follow the instructions.

So, if you start the EZ_PD Configuration Utility application, you will get to a "Start Page". On the bottom of it under "Message", you will see the following text:
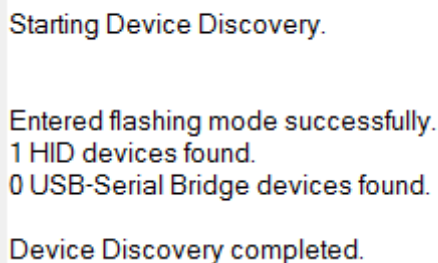
```
Starting Device Discovery.

0 HID devices found.
0 USB-Serial Bridge devices found.
No HID/USB-Serial Bridge devices found.

Device Discovery failed.
```

If you get another message, try to reinstall the utility. If you get the message that is displayed under Step#2, that is fine also.

2) Connect the PCB

Now, use a USB cable with Type A connector on one side, and Type C connector on the other side to connect the USB/Power Board to the computer. After a few seconds, the computer might display a message that it could not find a driver for the USB device. That is fine. However, under the previous message, in the EZ-PD Configuration Utility Start Page, you should see a new message:

```
Starting Device Discovery.


Entered flashing mode successfully.
1 HID devices found.
0 USB-Serial Bridge devices found.

Device Discovery completed.
```

If you have this or a similar message, you can proceed. If not, check the cable, or try to test the system with a PCB that has been proven to be functioning.
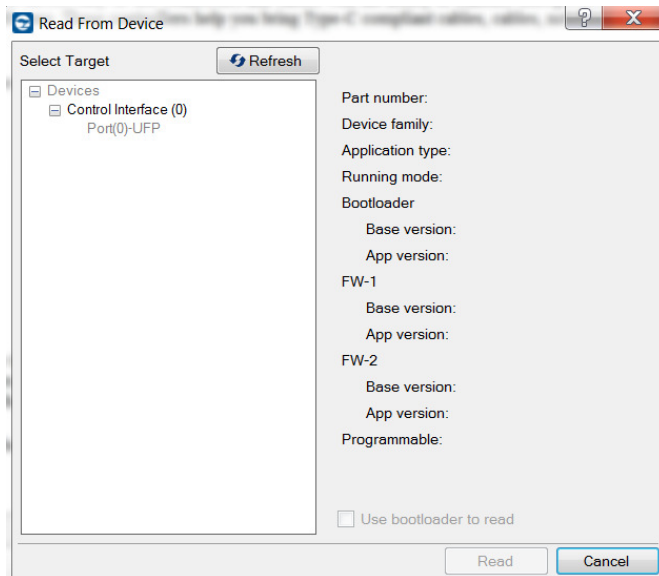
3) Read the CYPD3120 configuration file

In order to read in the current default configuration, you have to click on the "Read from Device" icon
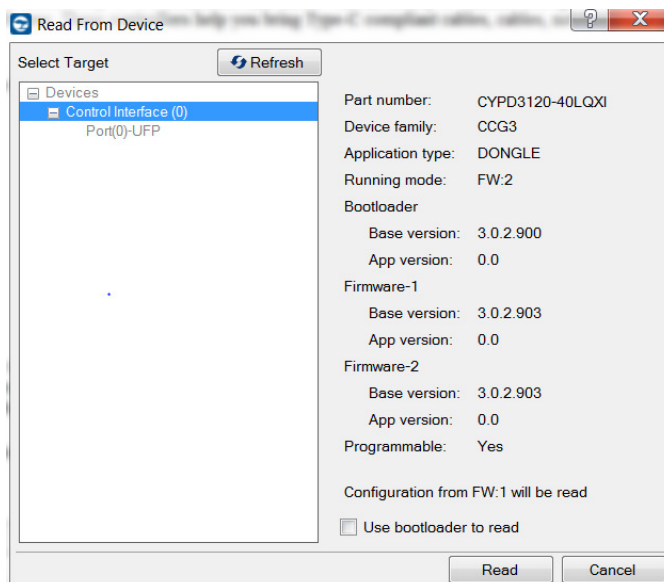
 (or click on "FILE", and "Read from Device")

Once you do it, you will get the following response:

Now, click on the "Control Interface (0). You should get the following response:

This contains the basic information about the chip: CYPD3120-40LQXI. Also, it is important to see the two Firmware versions that are programmed in the chip. Both of these are identical default configurations that we will have to modify. Note that the "Configuration from FW! Will be read". To really read the full configuration in, we have to click on the "Read" button. We will get the following response:

For this operation, we are concerned only with PDOs – these are configuration Power Data Objects that define the power sourcing or sinking of our device.

If we click on "Sink PDO 0" line, then at the right we will have the default power sinking configuration of the CYPD3120 chip. First, we see that there is only one possible configuration PDO 0. Next, we see that the chip will request 5000 mV = 5V, with a current limit of 900 mA. While this is fine to start the things moving, this is not sufficient for the Scion – we have to modify this configuration.

4) Modify Sink PDO 0 of the configuration file
We have to modify the PDO 0 be requesting 3000 mA. In addition, we have to add PDO 1 for 9V/3A (9000 mV/3000mA), and PDO 2 for 15V/3A.

First in "Sink PDO 0" we click on 900 in the "Operational current (mA)" window and type in 3000. Then we click on 900 in the "Min/Max operating current (mA)" window and type in 3000:

5) Add Sink PDO 1 to the configuration file

Next, we have to add the option for the CYPD3120 to request 9V/3A of power from the power supply.

➕ Add
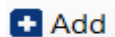
We click on "Sink PDO", and click on

A new item "Sink PDO 1" will appear under "Sink PDO":

Now we click on "Sink PDO 1", change the "Voltage (mV)" to 9000, "Operational current (mA)" to 3000 and "Min/Max operating current (mA)" to 3000:

6) Add Sink PDO 2 to the configuration file

Next, we have to add the option for the CYPD3120 to request 15V/3A of power from the power supply.

Repeat step#5. The only difference is that you have to change "Voltage (mV)" to 15000. So, you get:

7) Configure the CY3120 with the new firmware

You have the new configuration. However, the application will not let you continue before you save it. So, click on the disk icon or click on "FILE", "Save as". When prompted give it a file name, e.g. CYPD3120_Conf_file. The file extension should be "XML". Save the file.
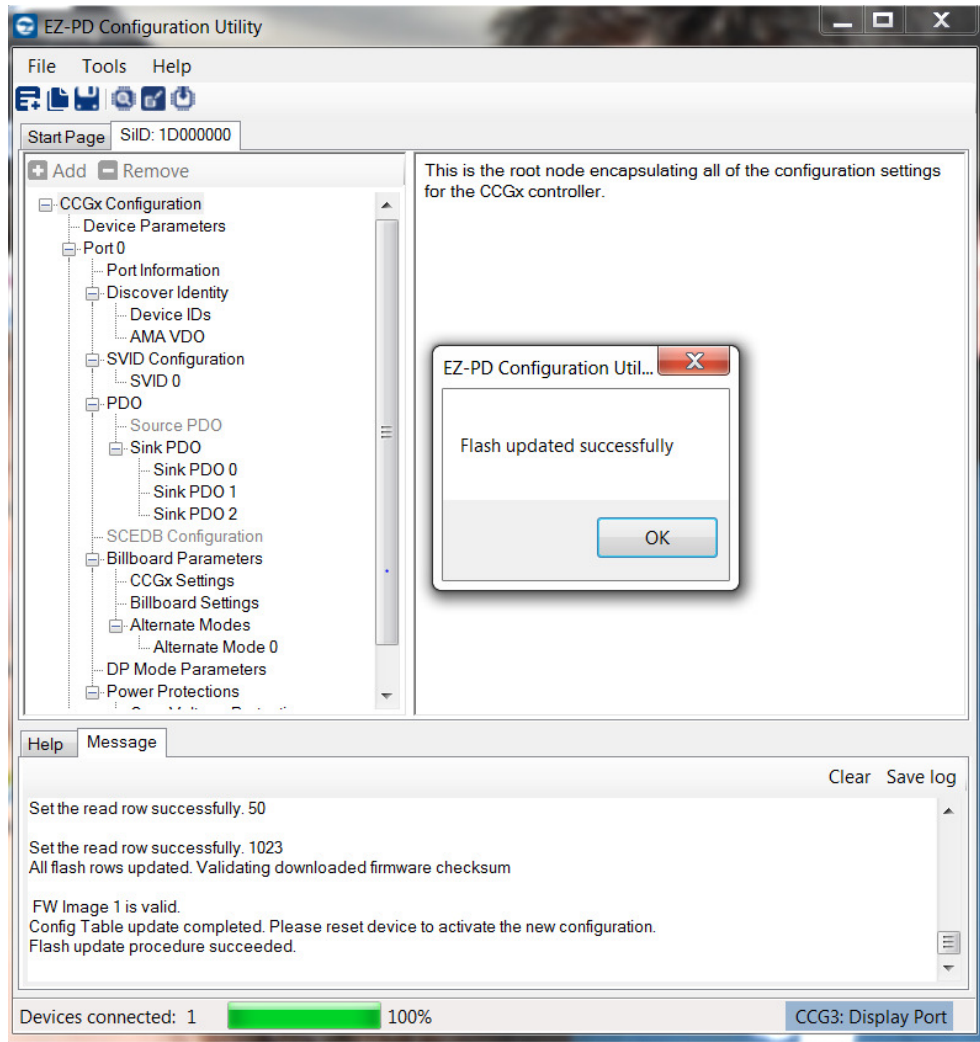
Now click on the "Configure device" icon or "Tools", "Configure device". You will get:
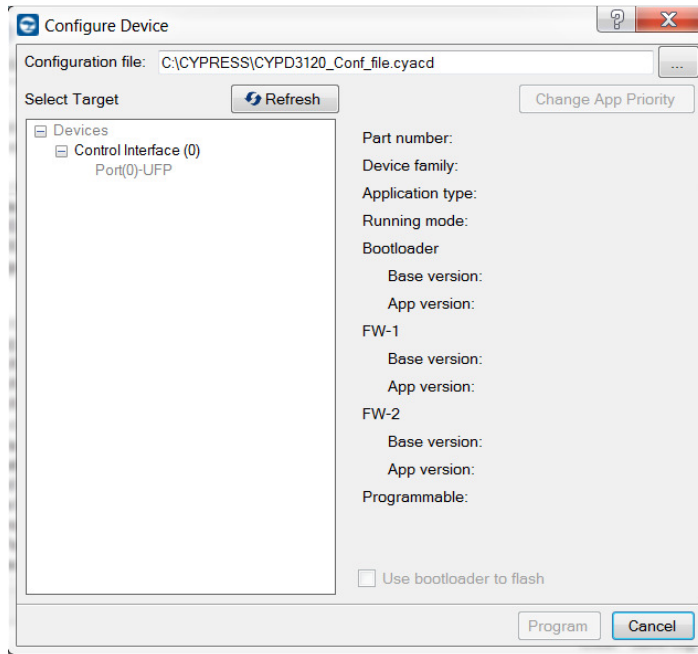
Click on "Control Interface (0)" line, and get:
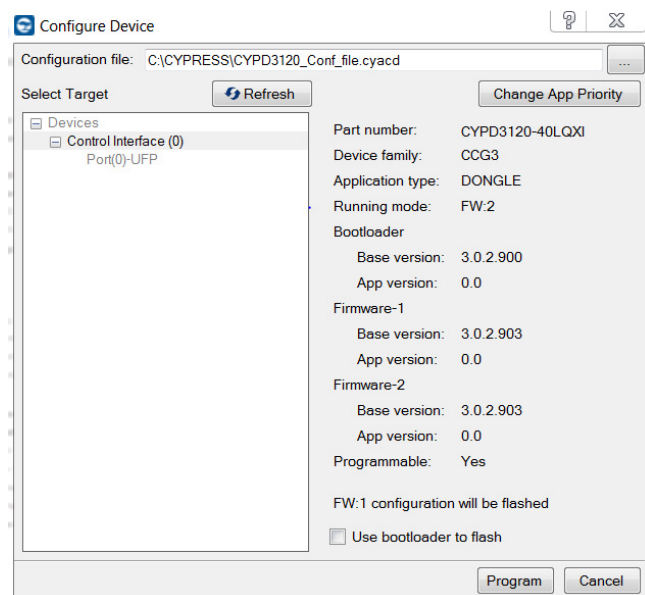
Click on "Program" button, and you should get the following:

Click on "OK".

That's it.

8) Test the success of the configuration update

Disconnect the USB/Power Board from the computer.

Connect a smart USB Type C charger to the USB/Power Board USB port.

With a voltmeter measure the voltage VBUS & GND. It should be 15 ±0.3 V.

9) Repeat the process to configure more boards

Plug the USB cable from the computer into a new USB/Power Board.

Perform Step#7. Perform Step#8.