

SCK 2.1 Test Plan

Introduction

Four binary files are used for testing and flashing the Smartcitizen Kit:

1. SAM bootloader.
2. ESP firmware.
3. SAM testing firmware (customized with the Wifi credentials provided by you).
4. SAM production firmware.

The *SAM testing firmware* will be provided to you via mail and customized with the wifi credentials of your facilities, the rest of the files can be built from the code in our Github repository.

If you prefer we can send you any of this files in binary format directly to you.

Tools needed

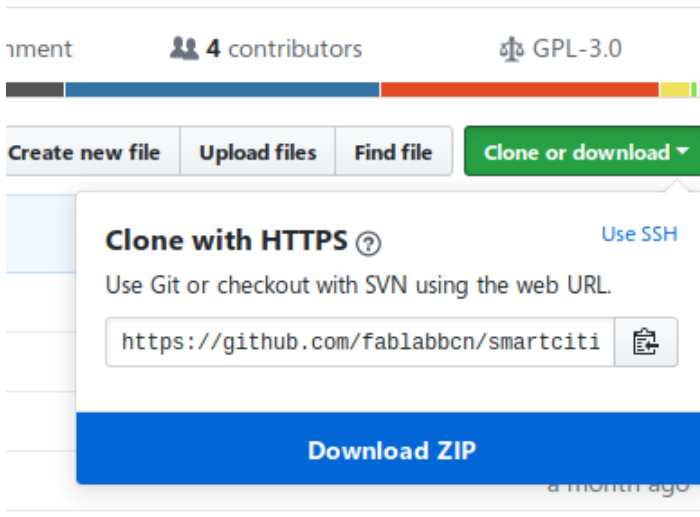
- Computer running Linux or Windows OS (not tested but should work with minor modifications)
 - Git client installed (optional)
 - Python 2.7 installed
 - PlatformIO (<https://platformio.org/platformio-ide>) (only needed if your are compiling firmware)
 - OpenOCD (included with platformIO) or Atmel-Studio
- Micro USB cable.
- ATMEL-ICE (<https://www.digikey.es/en/product-highlight/a/atmel/atmel-ice-programmer-debugger>) programmer.

Cloning the Firmware repository

All the tools needed to flash the Smartcitizen Kit firmware are in our github (<https://github.com/fablabbcn/smartcitizen-kit-20>) repository, you can **clone it**:

```
git clone --recursive https://github.com/fablabbcn/smartcitizen-kit-20
```

Or **download manually** going to this link (<https://github.com/fablabbcn/smartcitizen-kit-20>) and clicking the *Clone or download* green button on the top right and then the *Download ZIP* button:

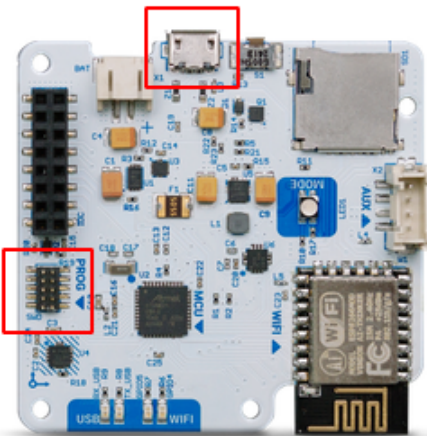


If you use this method you also need to download the bootloader repository (<https://github.com/fablabbcn/uf2-samdx1>), uncompress it in `smartcitizen-kit-20/bootloader/` folder and rename it to `uf2-samdx1`.

Bootloader

Bootloader flashing can be accomplished with OpenOCD (<http://openocd.org/>) or with Atmel Studio, depending on your preferences.

You need an ATMEL-ICE (<https://www.digikey.es/en/product-highlight/a/atmel/atmel-ice-programmer-debugger>) programmer connected to the SWD connector of the Smartcitizen Kit base board, and also provide power via USB.



If you are using Atmel-Studio to upload the bootloader you don't need this step, we can provide you the needed binary file

In the same folder where you clone the Smartcitizen kit repository just do:

```
cd smartcitizen-kit-20
./build.sh boot
```

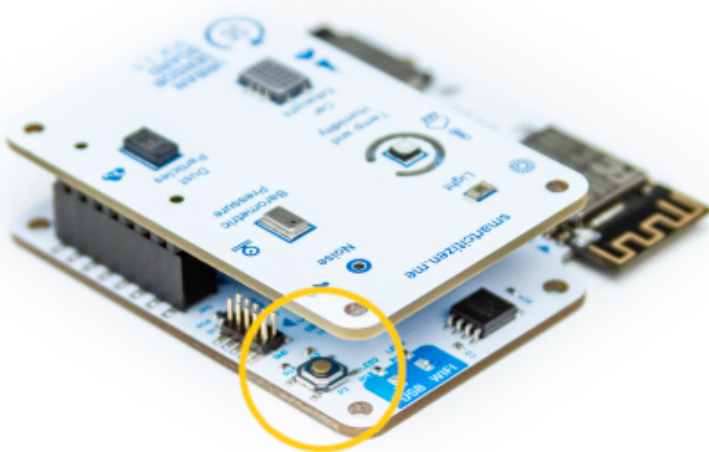
If no error pops up the led on the SCK should turn **green**. You are ready for the next step.

We don't provide specific instructions for flashing with **Atmel Studio** please follow your application instructions.

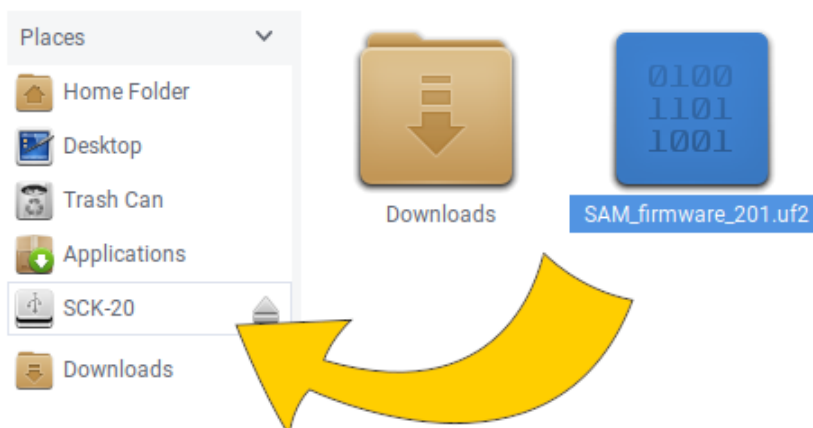
SAM testing firmware

For this step we will provide you the testing firmware with **harcoded WiFi credentials** (you must send us the SSID and password).

- **Connect your kit** with a micro USB cable to your computer.
- **Double click the reset button** of your SCK, the SCK led should turn green and a new drive called **SCK-20** should appear on your computer file browser.



- Simply **drag the firmware file over the SCK-20 drive**, your kit led will blink in green and after some seconds it will reset and start with the testing firmware.



Remember that before proceeding with the test process **you need to upload the ESP firmware**.

ESP firmware

For this script to run you need **python** 2.7 installed on your computer.

Go to the folder where you downloaded the Smartcitizen Kit firmware, if this is the first time you do this step you will need to build the ESP firmware (**you only need to do this step once**) with:

```
python build.py build esp
```

If you are not compiling the ESP firmware and using one provided by mail just copy the file to the repository folder: `smartcitizen-kit-20/bin/ESP_firmware.bin` and proceed with the upload explained on next step.

To **upload the ESP firmware** you just compiled, connect the SCK to the computer via USB and run:

```
python build.py flash esp
```

If everything went OK you are ready to start the test procedure on the SCK board.

Connecting the board for testing

For the test you will need:

1. **SCK urban board** connected to the base board.
2. **PM sensor** connected to the urban board.
3. **SHT31** grove module connected to the SCK base board grove auxiliary port.
4. Writable **SD card** inserted in the slot.
5. **Lipo battery NOT fully charged** connected to the base board.
6. **USB** cable connected to the kit (debugging info will be printed via the serial port).

Test procedure

1. Connect the **battery** and the **USB cable** (only needed if you want to debug errors) to the kit.
2. The led will change from green to white and finally **blue when the Kit is ready to start the test**.
3. **Click the button 3 times**: the led should cycle red-green-blue colors
4. The led will **blink in blue during the tests**.

5. When the test is finished the led is **green if everything is OK** or **red if there is a problem**.

In case of problems you can open a serial terminal while the kit is running the test to see what's failing:

```
*****
Starting SmartCitizenKit test...
SAM id: 860F3860504E4B4B372E314AFF031A29

Please click the button until the led is blue again..
Changing Led to red...
Changing Led to green..
Changing Led to blue..
Button and led test finished OK

Testing battery level
85.00 %
charging at: 366.00 mA
Charger status: Fast charging
Battery gauge test finished OK

Testing SDcard...
```

We have detected that **flash** memory test fails sometimes, repeating the test normally fix the issue.

Flashing SAM production firmware

If the test succeeded you need to upload the SAM production firmware, to do this go to the folder where you downloaded the Smartcitizen Kit firmware, if this is the first time you do this step you will need to build the SAM firmware (**you only need to do this step once**) with:

```
python build.py build sam
```

To **upload the SAM firmware** you just compiled, connect the SCK to the computer via USB and run:

```
python build.py flash sam
```

If everything went OK your kit should reboot and after few seconds the light will be red, your SCK is ready.

If you are not compiling the SAM firmware and instead using the one provided by mail just follow the procedure described previously to upload a binary file to the SAM chip:

1. **Double click the reset button** of your SCK, the SCK led should turn green and a new drive called *SCK-20* should appear on your computer file browser.
2. Simply **drag the firmware file over the SCK-20 drive**, your kit led will blink in green and after some seconds it will reset and start with the testing firmware.