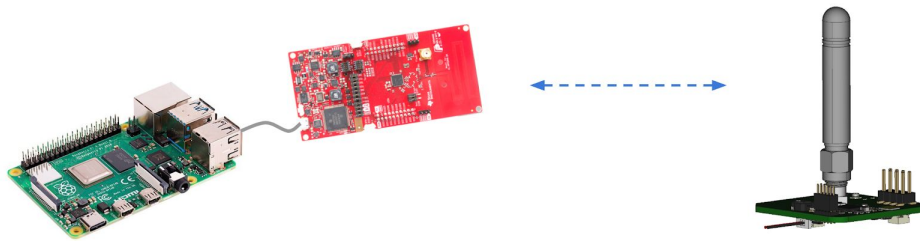# Testing procedure - Yardbird-0.4.0

Hardware needed:

- GeoPhone
- Ground Sensor 0.4.0 Board (Amanda)
- SMA-Male 915 MHz External Antenna (Amanda)
- 3.3V Power Supply (Min. 100mA) (Amanda)
- Cables for connecting the power supply and geophone to the board (Ask Amanda to get it from Sam)
    i. JST Connector Header SMD R/A 2POS 1mm
    ii. Female-female jumper wire
- Texas Instrument Launchpad CC1352R and ISP Programming Cable (Amanda)
- Computer to flash the Ground Sensor
- Computer to run test scripts

Tools/Software required:

1) Uniflash Download link
2) Latest firmware Download link

Ground Sensor Testing Environment

1) Flashing Process

Testing procedure:

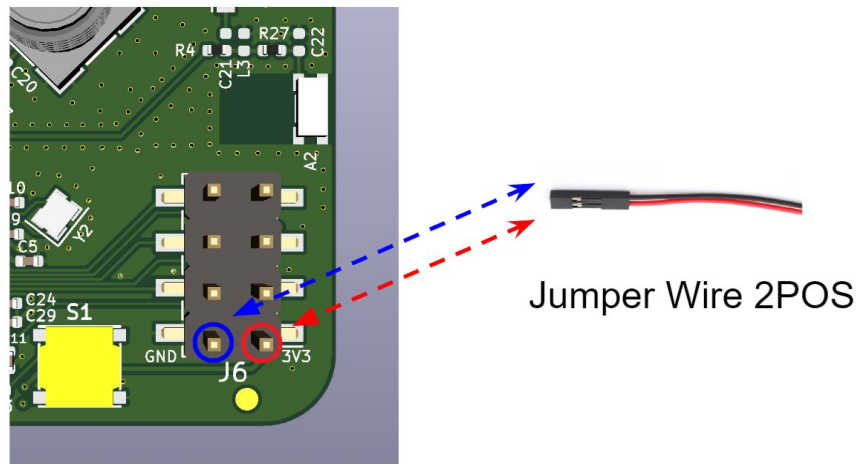You need to have **Uniflash** or **Code Composer Studio** installed. Uniflash download link: https://www.ti.com/tool/download/UNIFLASH

1.a) Power-up the board by connecting 3V3 (red) and GND (black) wires. Use **one** of the options below

- Option A

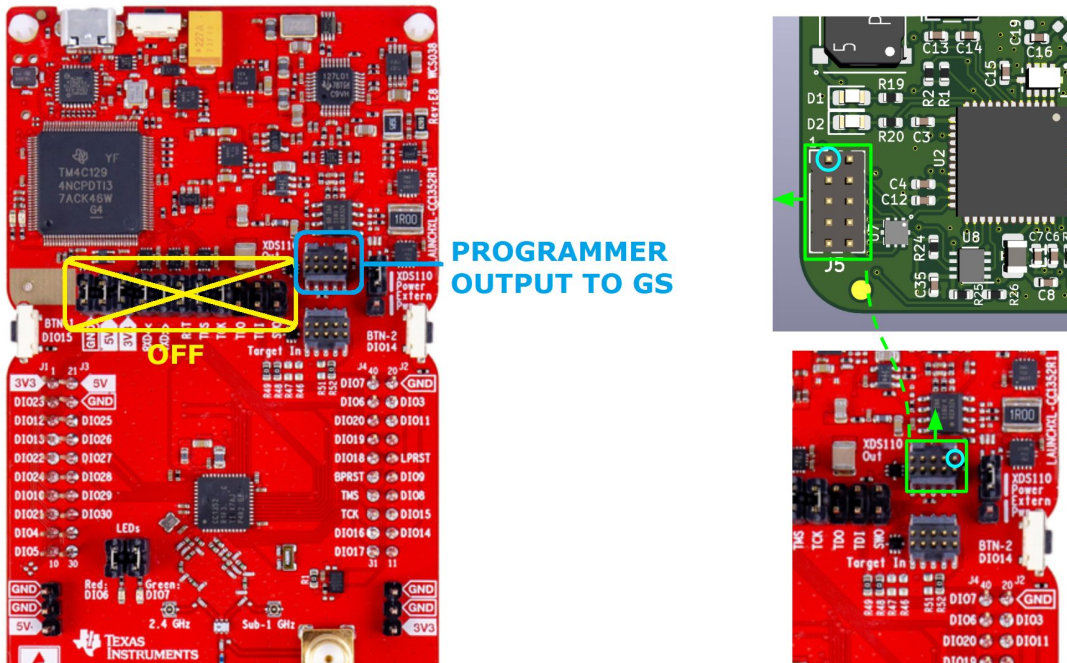JST SH Connector
Terminal 1.0mm 2POS

- Option B

Jumper Wire 2POS
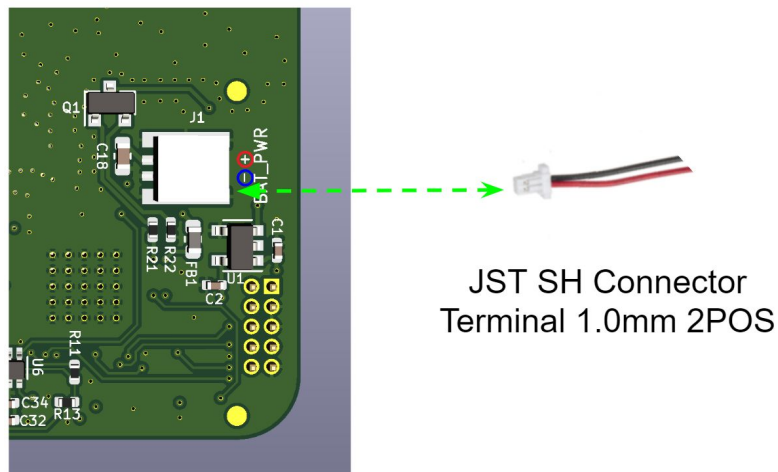
1.b) Program the Yardbird PCB using the TI LAUNCHXL-CC1352R programmer:

The jumpers connecting the upper part (debugger) to the lower part (microcontroller) must be removed, and the ISP programming cable is connected to the programmer output connector (in blue).

1.c) Open **Uniflash** Software and connect the programmer device to one of the computer USB Ports.

- If the software succeeds in automatically recognizing the programmer device, its name and serial number will be shown in the _Detected Devices_ tab - just click _Start_ to open a _Session_.
- If autodetection doesn't succeed, select the microcontroller CC1352R (the MCU used on the Ground Sensor PCB) in the _New Configuration_ tab. Then, click _Start_ to open a _Session._

1.d) In the new _Session_, go to Program -> Select and Load Images, browse for the Application file and open it. Then, click on _Add Another Image,_ browse for the Bootloader file and open it.
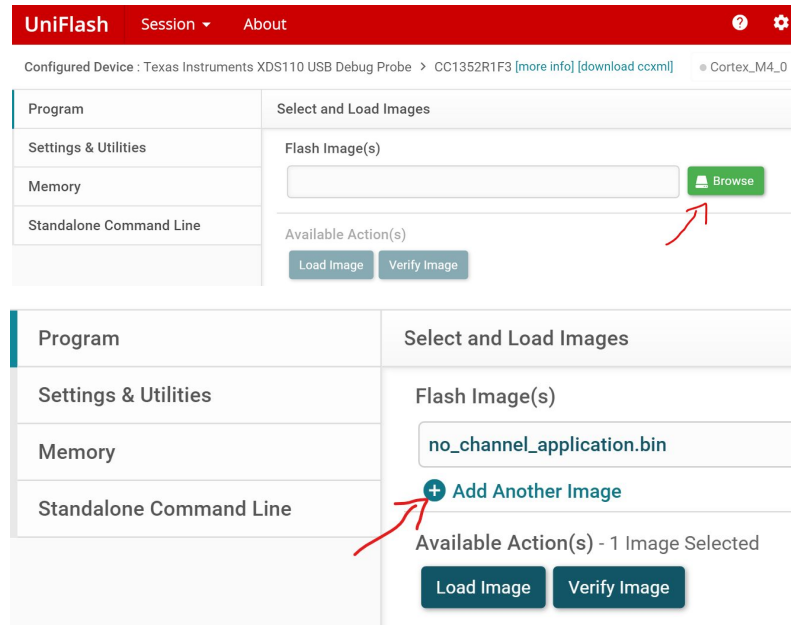
1.e) First, flash the *low_power_app* binary by clicking on *Load This Image*. Then flash the bootloader file the same way (the files below are being used as examples).

Test evaluation:

If no error shows up when loading the Application and Bootloader images, the Flashing Process was done successfully.

2) Reset + buzzer

Press the reset button. If you can easily hear the buzzer's *beep*, then the test is successful.

3) Low power mode current

Testing procedure:

The Ground Sensor needs to be running the *low_power_app* firmware.

Test evaluation:

Current values between 70~200uA (direct current) indicate that the Low Power Mode is working correctly.

Based on past experiences, current values higher than 1mA usually indicate that the Ground Sensor is not entering in Low Power Mode.

4) RF Communication

One of the possible approaches below:

- Run a simple test in computer (Linux/Windows?) using HAL and Coprocessor
- Packet Sniffer (if LaunchPad Rev is superior than B)
- Software Defined Radio (SDR) - verify the central frequency of Ground Sensor signal
  - e.g. YB-03 on the bottom is roughly centered at 902.2MHz; the green ones are not
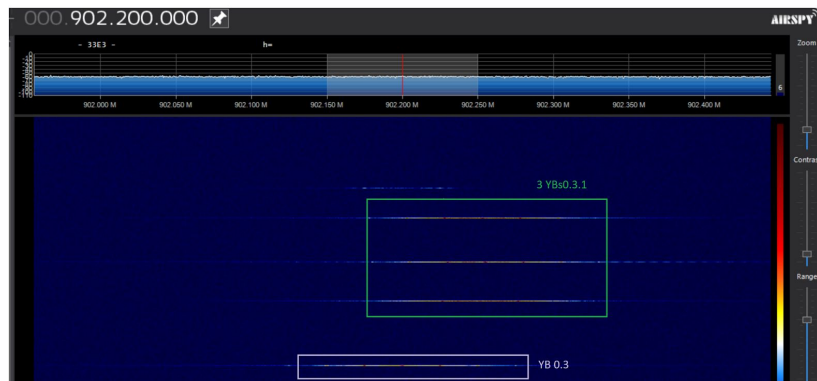
- Sensor <-> Collector applications, receive collector data in terminal