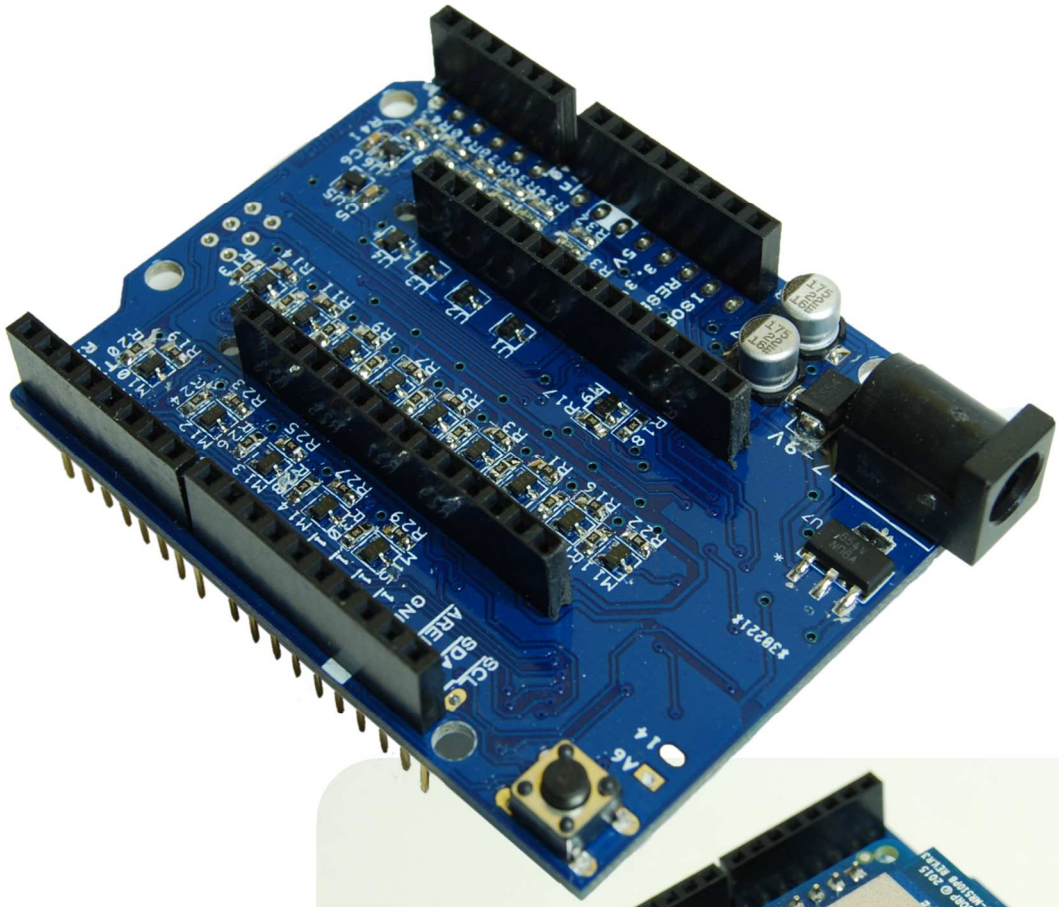
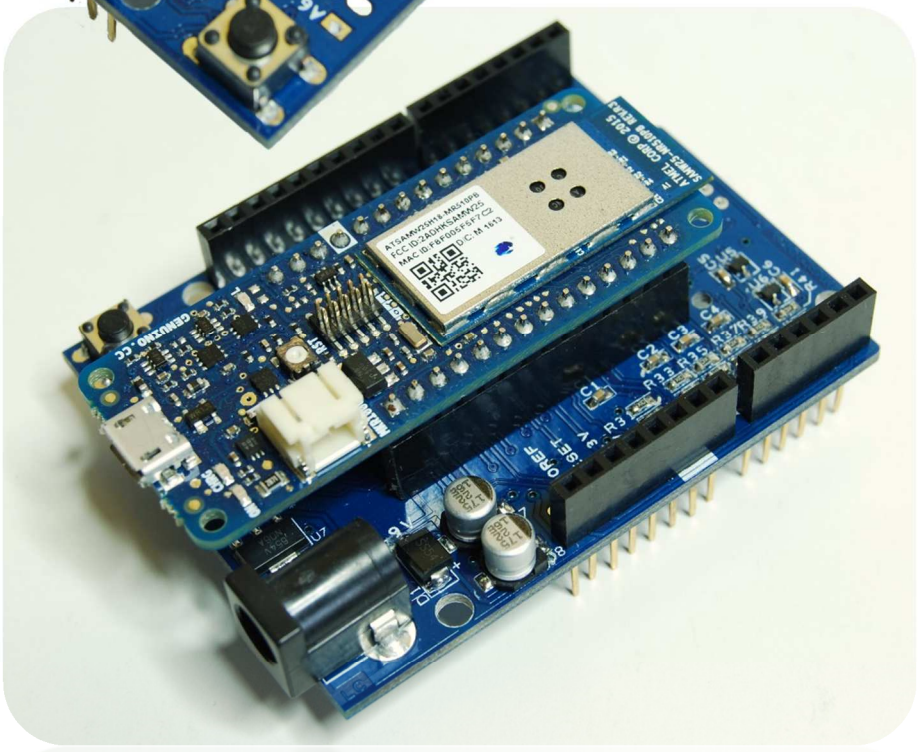
MKR2UNO PLUS
(Ver. 1.0)
User Manual





INDEX

NOTE:

Some pictures contained in this manual, may be different from the board revision in your hands (at time of writing the current version is rev. 1.0), this does not affect the functionality of the board described in this manual.

1. Technical Specifications

- Arduino UNO board form factor
- It works with:
  - ARDUINO MKR 1000 WIFI
  - ARDUINO MKR GSM 1400
  - ARDUINO MKR FOX 1200
  - ARDUINO MKR WiFi 1010
  - ARDUINO MKR Vidor 4000
- On-board bidirectional level shifting (5V <-> 3.3V) on each digital pin
- On-board clipping voltage at 3.3V on each analog input pin
- External 7-9VDC power supply
- RST button, for resetting program
- Compatible with standard 2.54mm pitch breadboard (see pag. 22)

2. Getting the MKR2UNO Plus board out of the box

The MKR2UNO Plus comes in your hands as shown in the picture below.

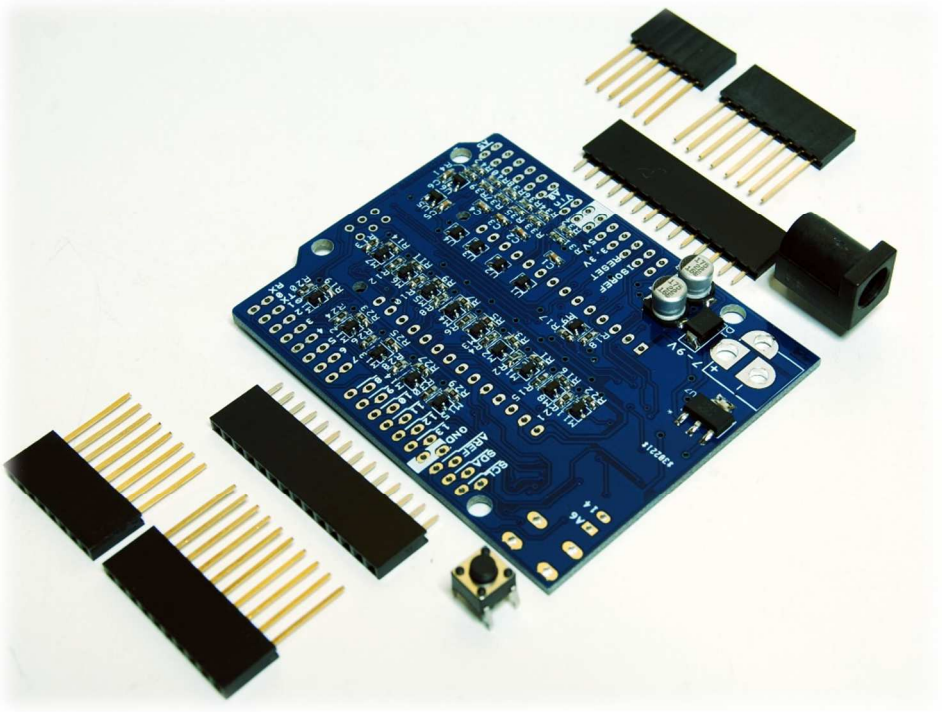


Figure 1 – The MKR2UNO Plus right out of the box

The MKR2UNO Plus consists of:

- 1x MKR2UNO Plus PCB with all SMD components
- 2x 14 way, 2.54mm pitch, headers
- 2x 8 way, stackable, 2.54mm pitch, headers
- 1x 6 way, stackable, 2.54mm pitch, header
- 1x 10 way, stackable, 2.54mm pitch, header
- 1x pushbutton
- 1x 2.5mm DC connector

2.1. Assembling the 14 way headers

First you have to solder the two 14 way headers as shown in the picture below.

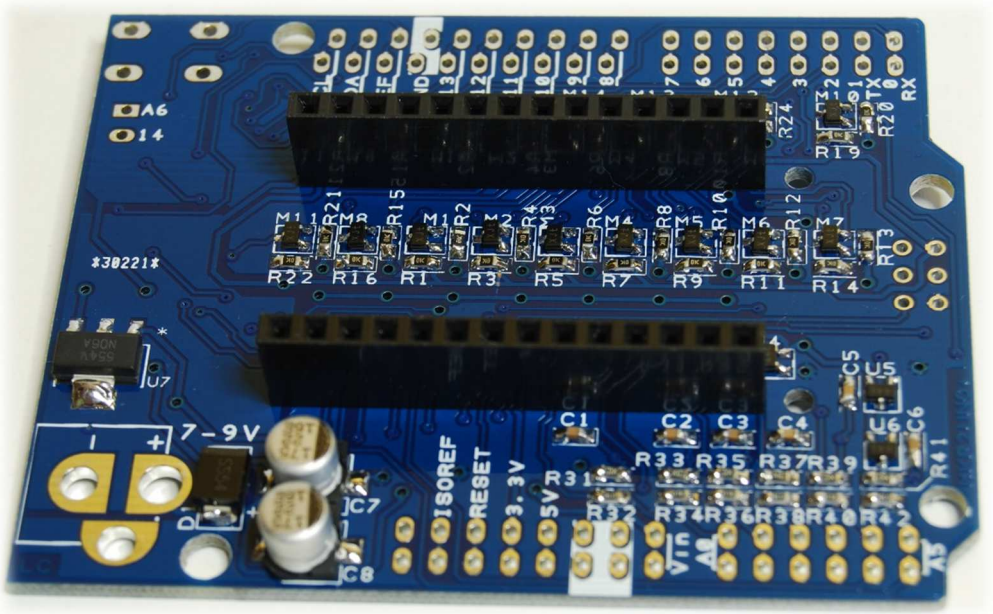


Figure 2 – Assembling the two 14 way headers

2.2. Assembling the reset pushbutton and the 2.5mm DC connector

Even if it is not mandatory, since the board works properly without these two items, you may choose to solder the reset pushbutton and the 2.5mm DC connector.

Or you can decide to add them later.

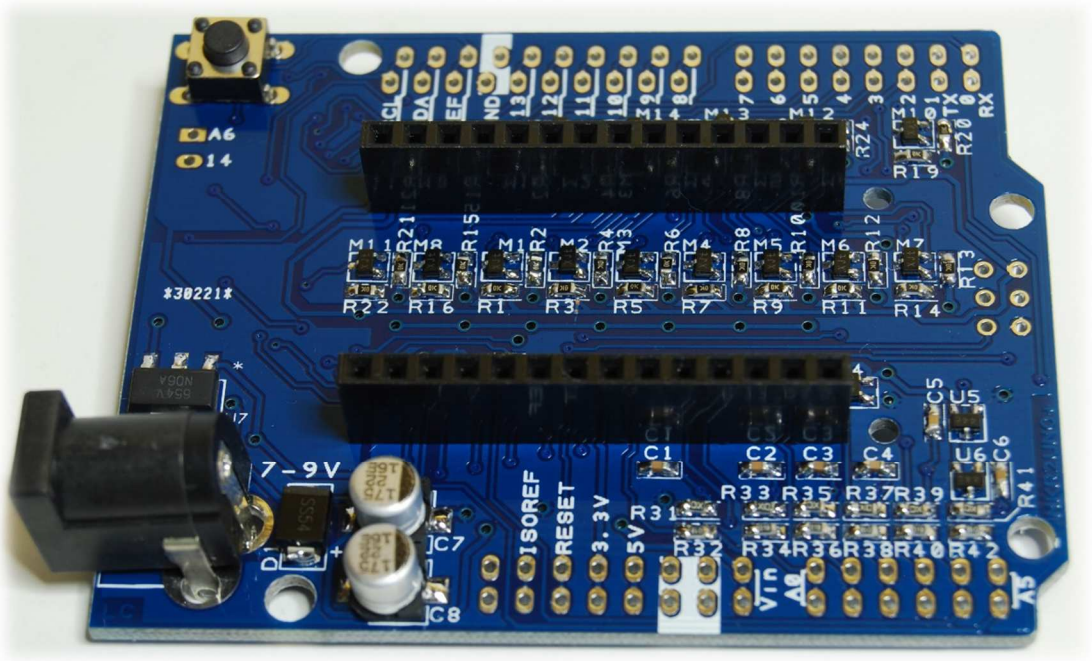


Figure 3 – Assembling the reset pushbutton and the 2.5mm DC connector

2.3. Assembling the stackable headers

Stackable headers can be soldered in two differt way: the “standard” way or the “long headers” way.

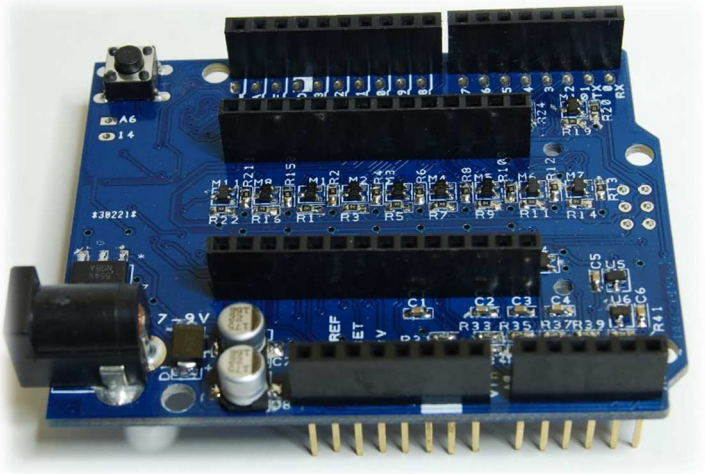


Figure 4 – Assembling the stackable headers in the “standard” way

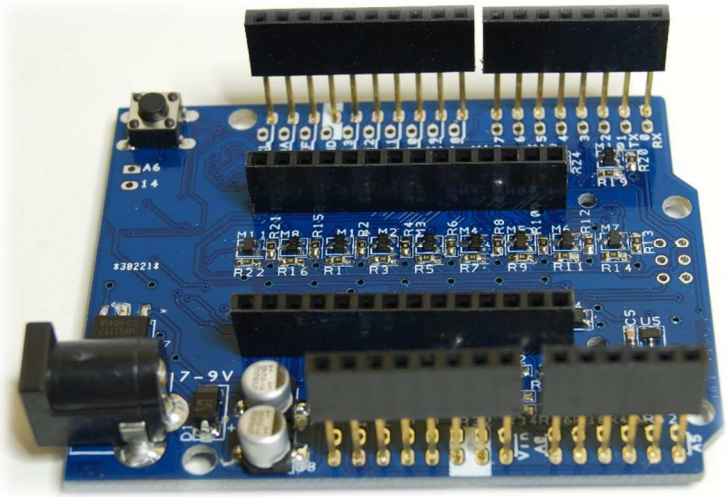


Figure 5 – Assembling the stackable headers in the “long headers” way

To better understand why you should choose one way or the other, you have to consider the Arduino MKR board and the environment you are going to use in your project.

Arduino MKR boards come with pin stripes or stackable headers.

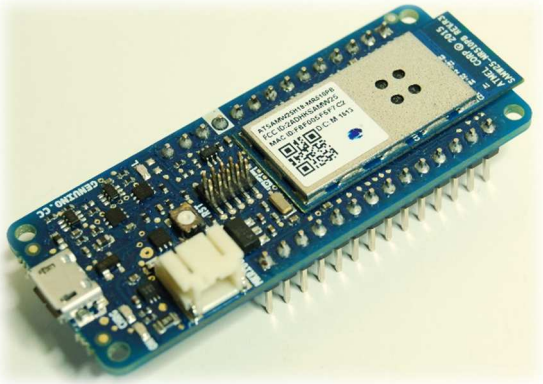


Figure 6 – Arduino MKR1000 *with pin stripes*

Figure 7 – Arduino MKR GSM 1400 and MKR Vidor 4000, both with stackable headers

The "standard" way allows the MKR2UNO Plus to fit both stackable headers and pin stripes boards.

The "long headers" way allows the MKR2UNO Plus to fit only pin stripes boards.

Unless you are going to use an Arduino MKR board with pin stripes AND your project needs a "long headers" layout, we suggest you to solder them in the "standard way" which allows the MKR2UNO Plus to fit any Arduino MKR board.

3. Using the MKR2UNO Plus with an Arduino MKR board

Plug the Arduino MKR board into the MKR2UNO Plus (pay attention to pin alignment and orientation).

Connect it to your PC and start using it.

Each digital pin of the MKR2UNO Plus now provides 5V instead of 3.3V if configured as digital Out and it accepts 5V if configured as Input.

Each Analog pin now clips the input voltage to 3.3V in order not to damage the Arduino MKR analog inputs.

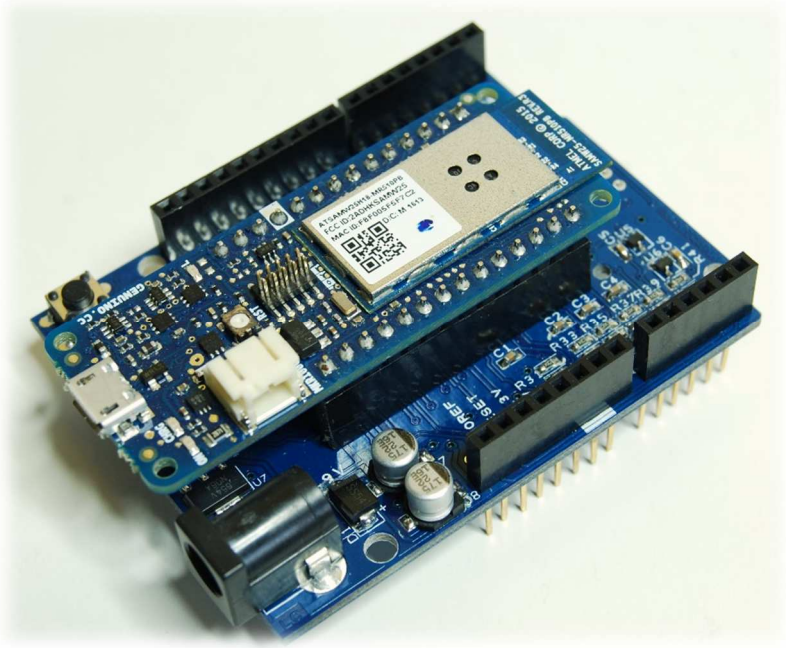
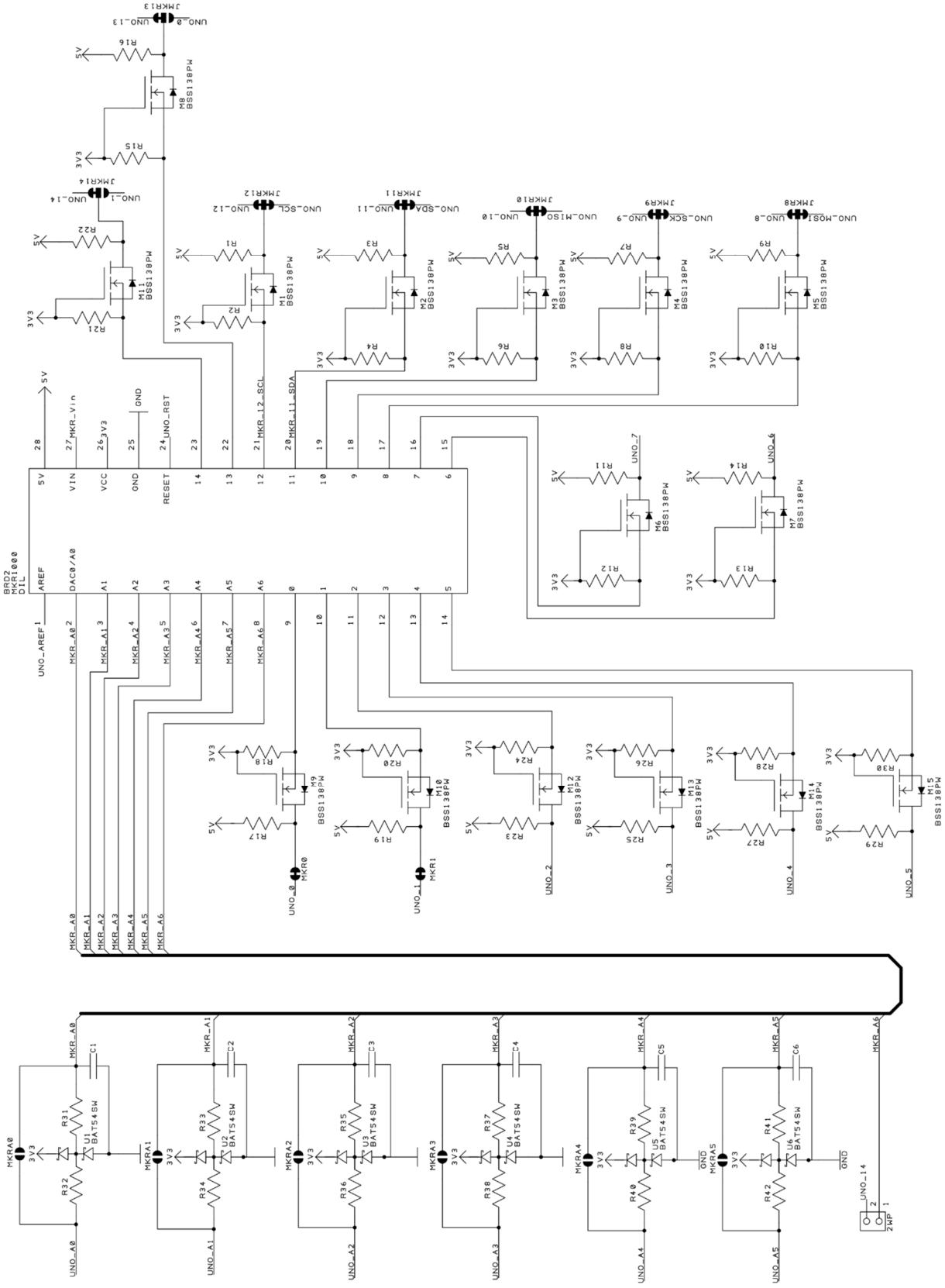
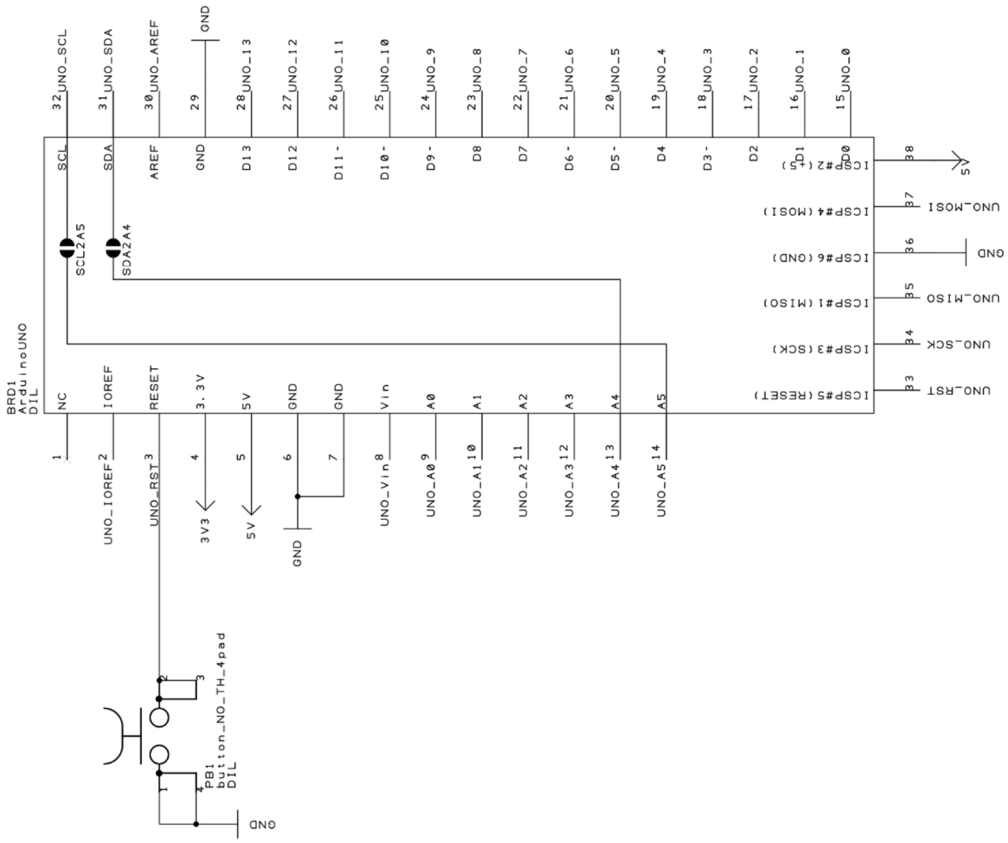
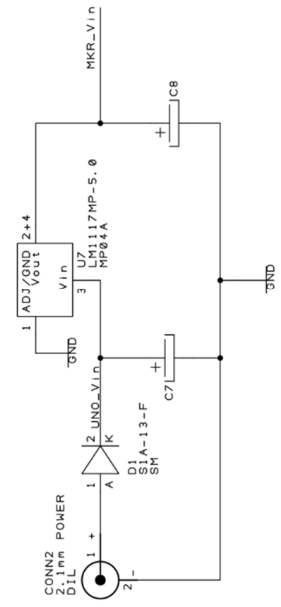


Figure 8 – The MKR2UNO Plus with an Arduino MKR 1000 WiFi plugged in

4. The MKR2UNO Plus schematic design




BRD1
ArduinoUNO
DIL
NC
IOREF
RESET
3.3V
5V
GND
GND
Vin
A0
A1
A2
A3
A4
A5
SCL
SDA
AREF
GND
D13
D12
D11
D10
D9
D8
D7
D6
D5
D4
D3
D2
D1
D0
SCL2A5
SDA2A4
ICSP#2
ICSP#4(MOSI)
ICSP#6(GND)
ICSP#1(MISO)
ICSP#3(SCK)
ICSP#5(RESET)
UNO_MOSI
UNO_MISO
UNO_SCK
UNO_RST
5V
GND
UNO_IOREF
UNO_RST
3V3
5V
GND
UNO_Vin
UNO_A0
UNO_A1
UNO_A2
UNO_A3
UNO_A4
UNO_A5
PB1
button_NO_TH_4pad
DIL
GND


MKR_Vin
C8
U7
LM1117MP-5.0
MP04A
ADJ/GND
Vout
Vin
GND
GND
C7
UNO_Vin
D1
SIA-13-F
SM
CONN2
2mm
DIL
POWER

5. Using I2C pins (SCL and SDA)

Arduino MKR boards have SCL and SDA pins on D12 and D11 (we are going to call them MKR12 and MKR11 to distinguish them from D12 and D11 on the MKR2UNO Plus).
MKR12 connects by default to SCL and D12 pins on the MKR2UNO Plus board by means of JMKR12.
MKR11 connects by default to SDA and D11 pins on the MKR2UNO Plus board by means of JMKR11.
You can disconnect MKR12 from SCL or D12 cutting JMKR12 (see Figure 9, Figure 10 and Figure 11).
You can disconnect MKR11 from SDA or D11 cutting JMKR11 (see Figure 9, Figure 10 and Figure 11).
Configure the MKR2UNO Plus according to your project needs.

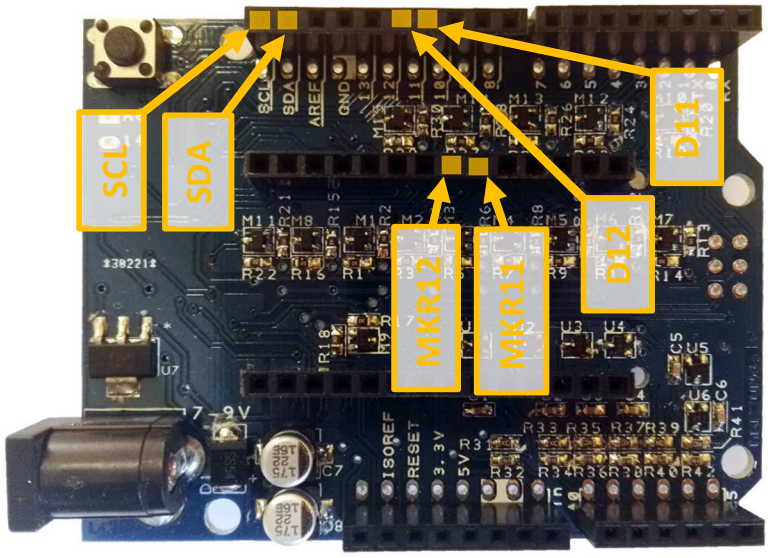


Figure 9 – The MKR2UNO Plus SCL, SDA, MKR12, MKR11, D12 and D11 pins

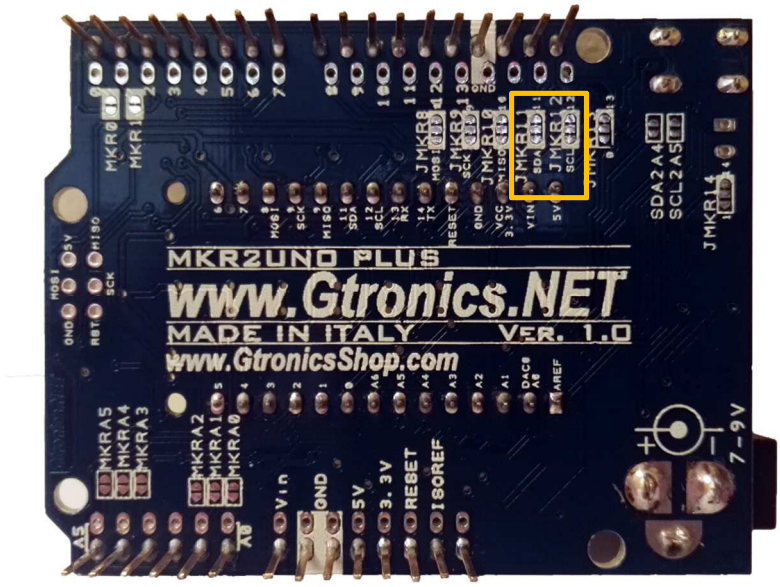


Figure 10 – The MKR2UNO Plus JMKR12 and JMKR11

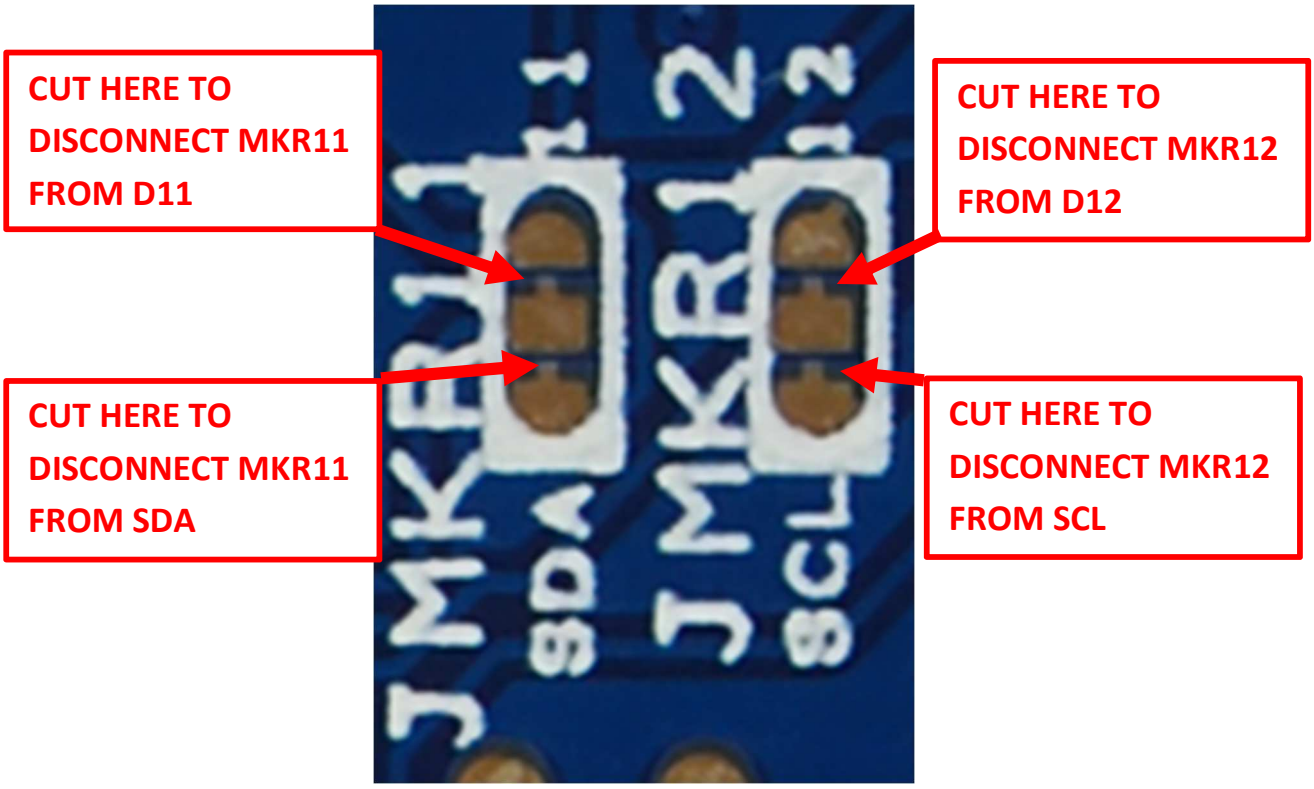


Figure 11 – Routing MKR12 and MKR11

Once cut, you can reconnect MKR11 to D11 and / or SDA soldering a little drop of tin.

Once cut, you can reconnect MKR12 to D12 and / or SCL soldering a little drop of tin.

6. Using SPI pins (MOSI, MISO and SCK)

Arduino MKR boards have MOSI,MISO and SCK pins on D8,D10 and D9 (we are going to call them MKR8, MKR10 and MKR9 to distinguish them from D8,D10 and D9 on the MKR2UNO Plus).
MKR8 connects by default to MOSI and D8 pins on the MKR2UNO Plus board by means of JMKR8.
MKR10 connects by default to MISO and D10 pins on the MKR2UNO Plus board by means of JMKR10.
MKR9 connects by default to SCK and D9 pins on the MKR2UNO Plus board by means of JMKR9.
You can disconnect MKR10 from MOSI or D10 cutting JMKR10 (see Figure 12, Figure 13 and Figure 14).
You can disconnect MKR8 from MISO or D8 cutting JMKR8 (see Figure 12, Figure 13 and Figure 14).
You can disconnect MKR9 from SCK or D9 cutting (see Figure 12, Figure 13 and Figure 14).
Configure the MKR2UNO Plus according to your project needs.

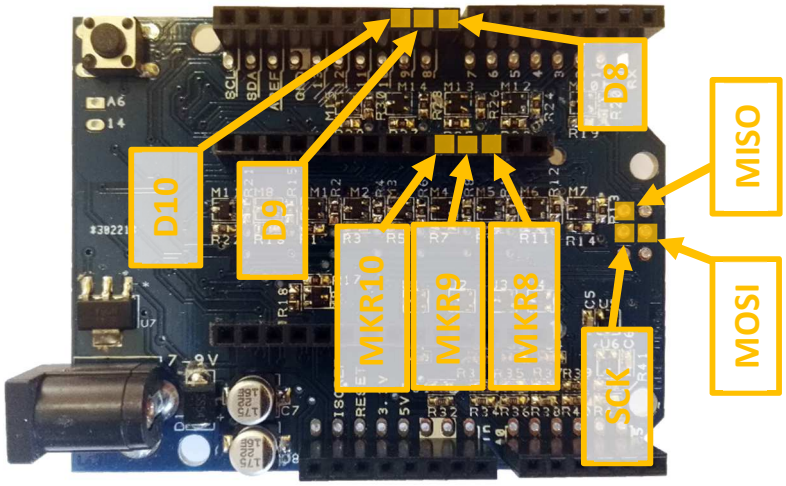


Figure 12 – The MKR2UNO Plus MOSI, MISO, SCK, D8, D10, D9, MKR8, MKR10 and MKR9 pins

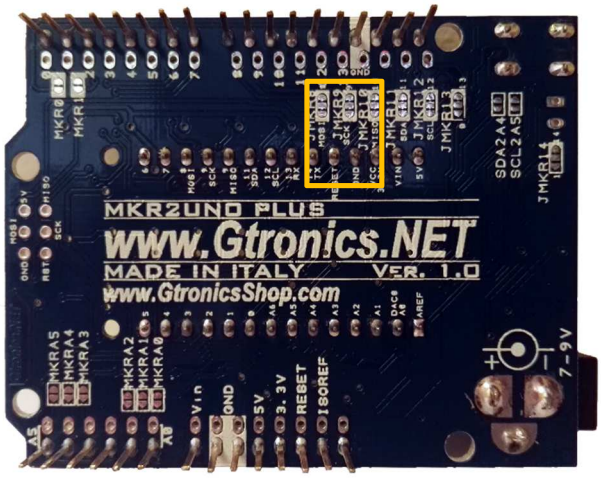


Figure 13 – The MKR2UNO Plus JMKR8, JMKR10 and JMKR9

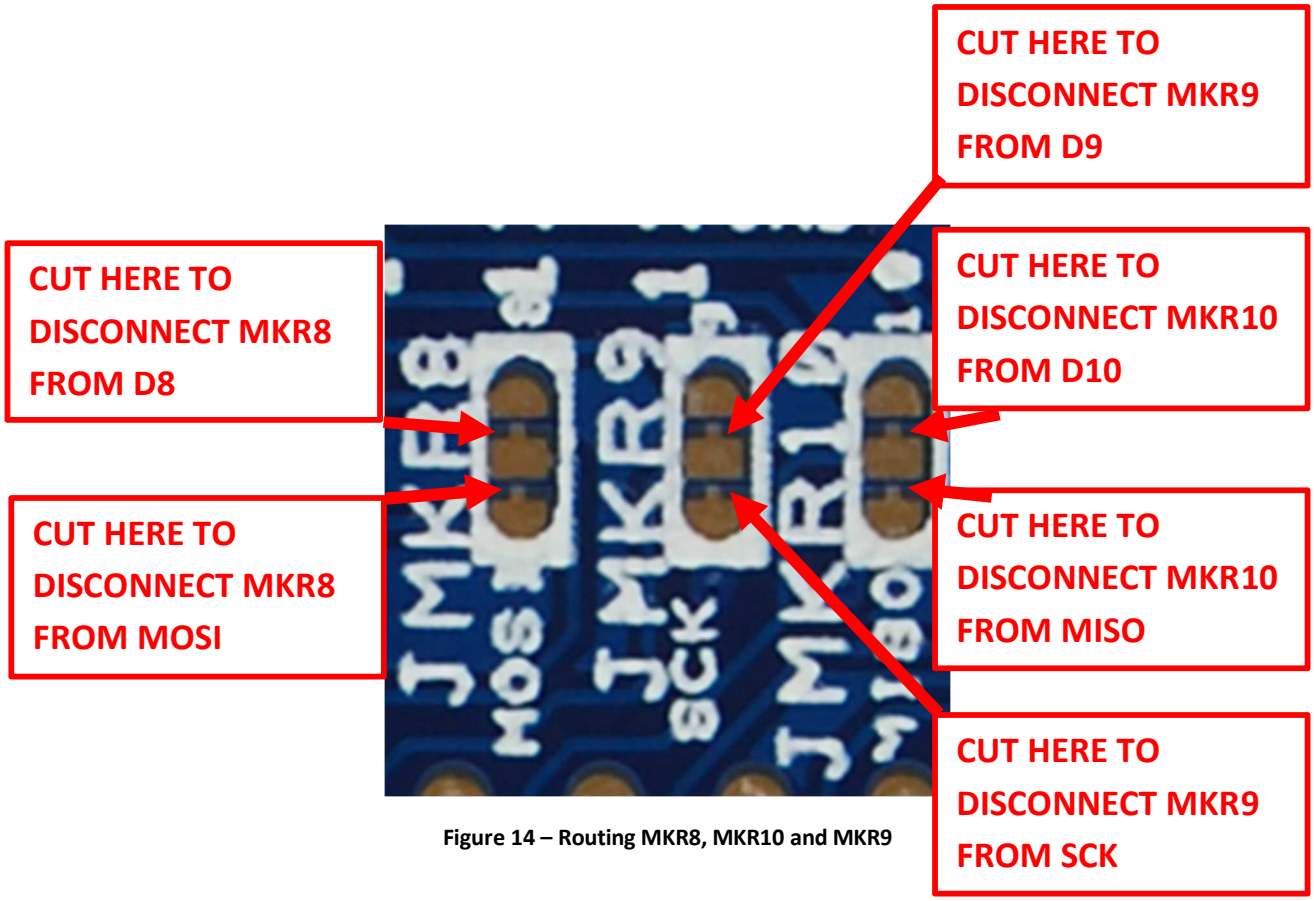


Figure 14 – Routing MKR8, MKR10 and MKR9

Once cut, you can reconnect MKR8 to D8 and / or MOSI soldering a little drop of tin.

Once cut, you can reconnect MKR9 to D9 and / or SCK soldering a little drop of tin.

Once cut, you can reconnect MKR10 to D10 and / or MISO soldering a little drop of tin.

7. Using RX and TX pins

Arduino MKR boards have RX and TX pins on D13 and D14 (we are going to call them MKR13 and MKR14 to distinguish them from D13 and D14 on the MKR2UNO Plus).
MKR13 connects by default to D13 pin on the MKR2UNO Plus board by means of JMKR13.
MKR14 connects by default to D14 pin on the MKR2UNO Plus board by means of JMKR14.
You can route MKR13 by means of JMKR13 and JMKR0 (see Figure 15, Figure 16, Figure 17 and Figure 18).
You can route MKR14 by means of JMKR14 and JMKR1 (see Figure 15, Figure 16, Figure 17 and Figure 18).
Configure the MKR2UNO Plus according to your project needs.

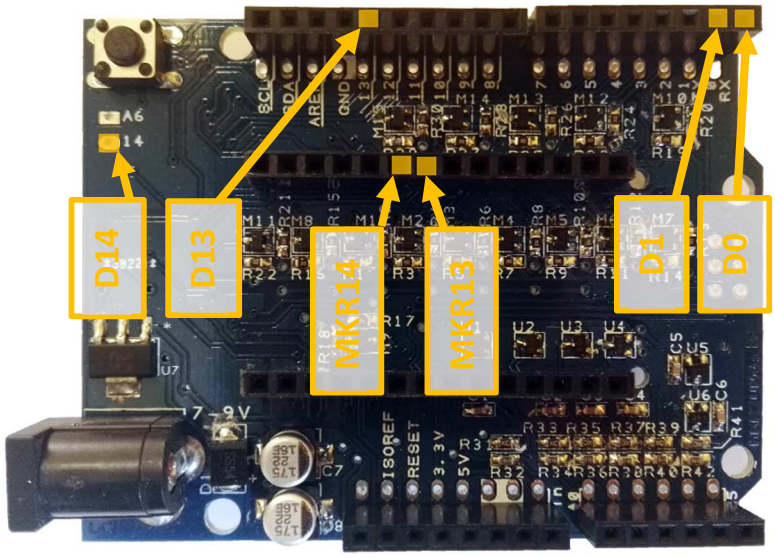


Figure 15 – The MKR2UNO Plus MKR13, MKR14, D13, D14, D0 and D1 pins

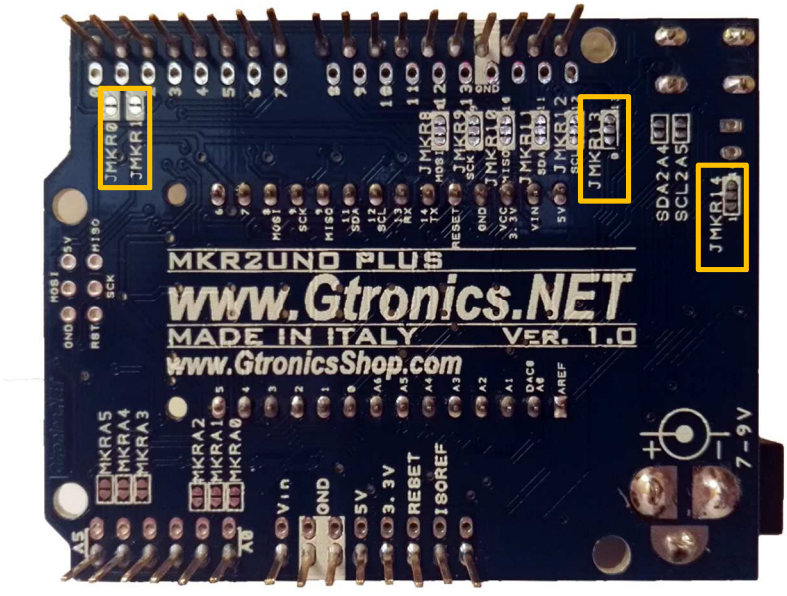


Figure 16 – The MKR2UNO Plus JMKR13, JMKR11, JMKR0 and JMKR1

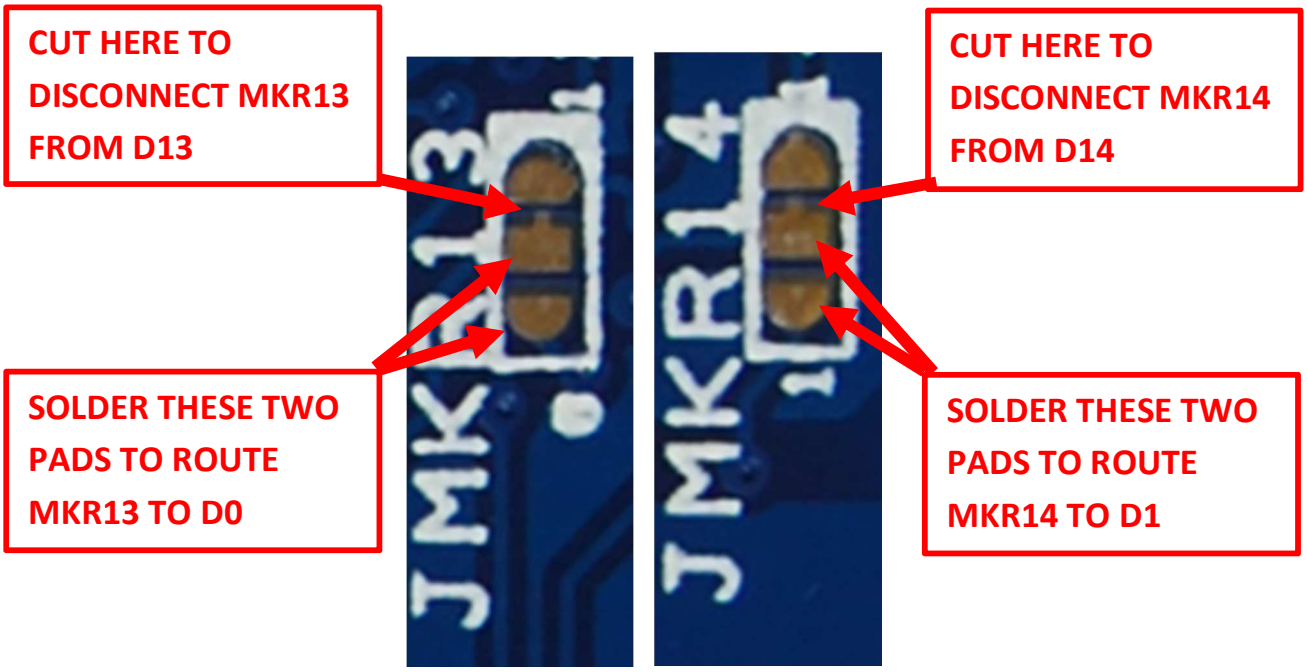


Figure 17 – The MKR2UNO Plus JMKR12 and JMKR11

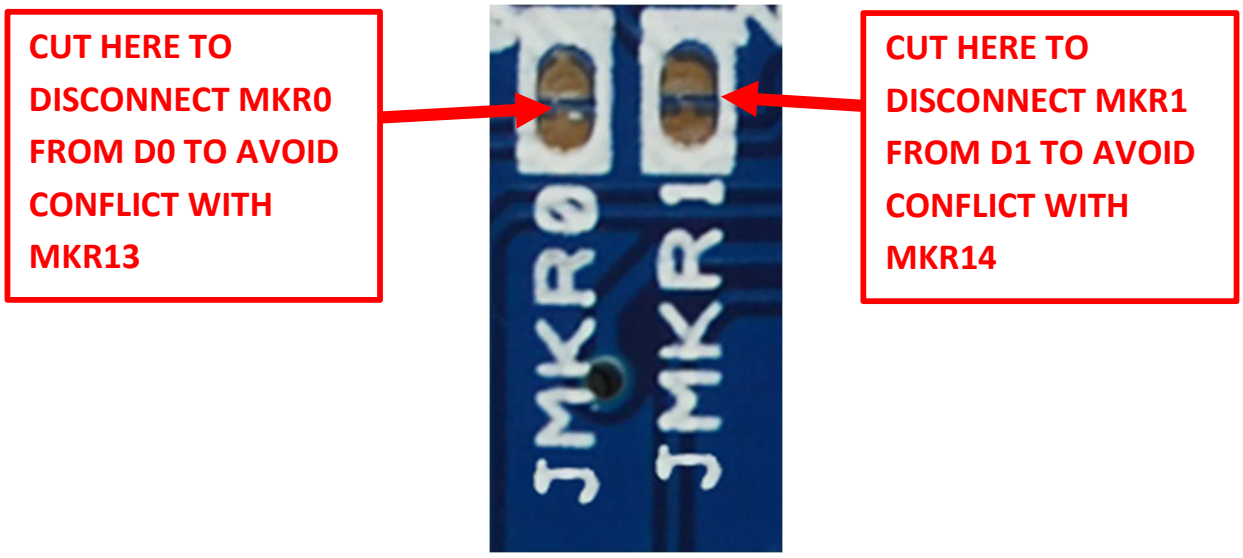


Figure 18 – The MKR2UNO Plus JMKR0 and JMKR1

Manage routing of MKR13 cutting, soldering and desoldering JMKR13 and JMKR0.

Manage routing of MKR14 cutting, soldering and desoldering JMKR14 and JMKR0.

8. Using A6 pin

A6 is an additional analog input pin and it is not present in the standard UNO board.
See Figure 19 to access this pin on the MKR2UNO Plus.

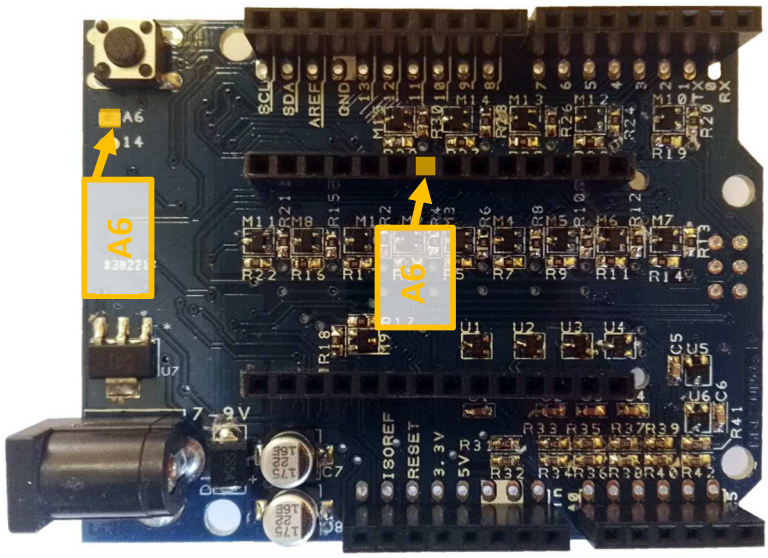


Figure 19 – The MKR2UNO Plus A6 pin

9. Using D14 pin

Refer to paragraph 7, Figure 15 and Figure 16 to see how to access D14 pin on the MKR2UNO Plus

10. Using DAC0 on A0 pin

Arduino MKR family boards lets you to use A0 pin as a “standard” analog input pin or as analog output with 10 bits DAC.

Depending on your application, you may need to bypass the clipping diodes and resistors on A0 (see schematics) .

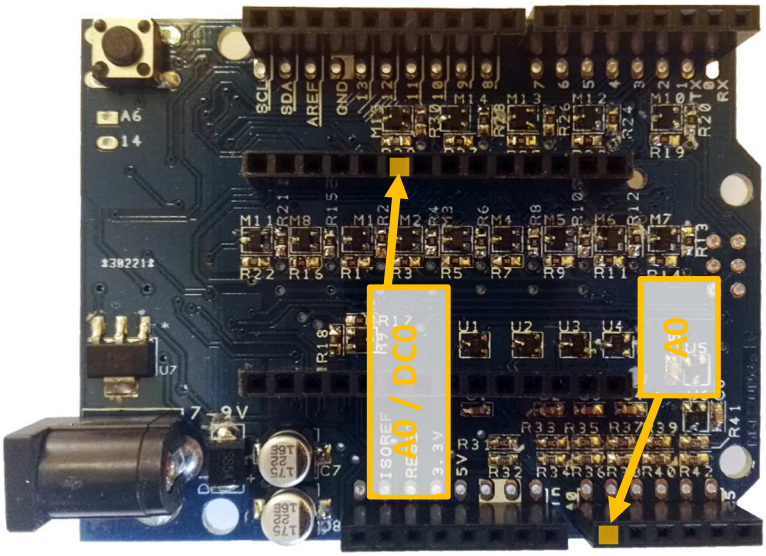


Figure 20 – The MKR2UNO Plus A0 pin

Figure 21 – The MKR2UNO Plus MKRA0 jumper

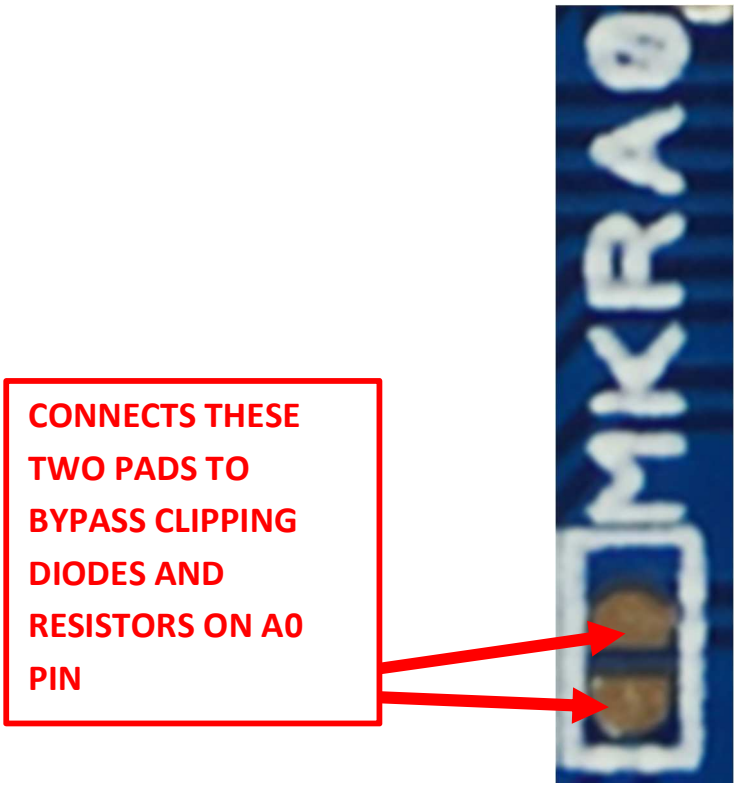


Figure 22 – The MKR2UNO Plus JMKR12 and JMKR11

11. EXTERNAL POWER SUPPLY

An external 7 to 9 VDC power supply can be provided by means of the 2.5mm power jack (see Figure 23). The external power supply does not directly connects to the MKR Vin pin (which accept max 5V) but it reduces the input voltage (7 to 9V) to 5V and then feed it to the MKR Vin pin (see Figure 24).

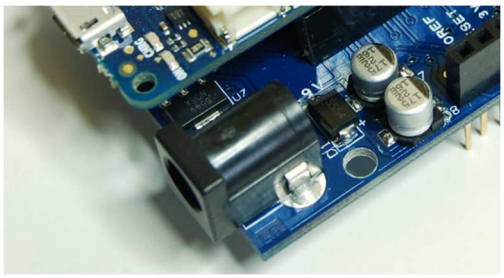


Figure 23 – 2.5mm power jack

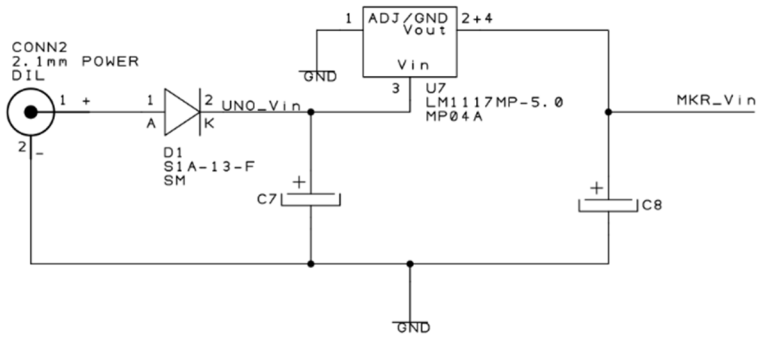


Figure 24 – Schematic of the external power supply

12. Using the MKR2UNO Plus with 2.54mm pitch breadboard

It is well known that one of the four I/O connector (highlighted in red in Figure 25) of the UNO board is not in standard 2.54mm pin pitch.

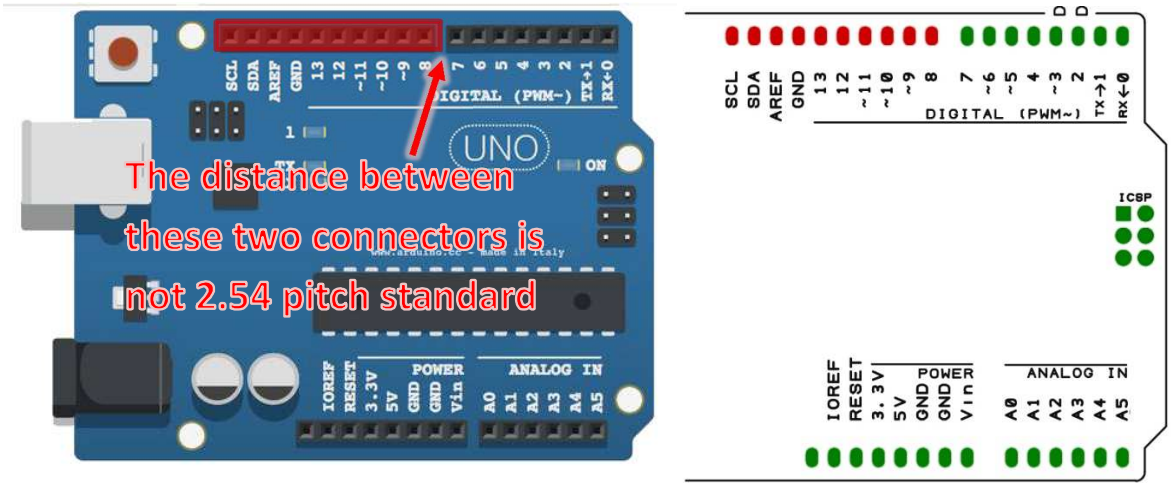


Figure 25 – Highlighted in RED the not-standard 2.54mm pin pitch connector of the UNO board (in GREEN all the other standard 2.54 pitch pins)

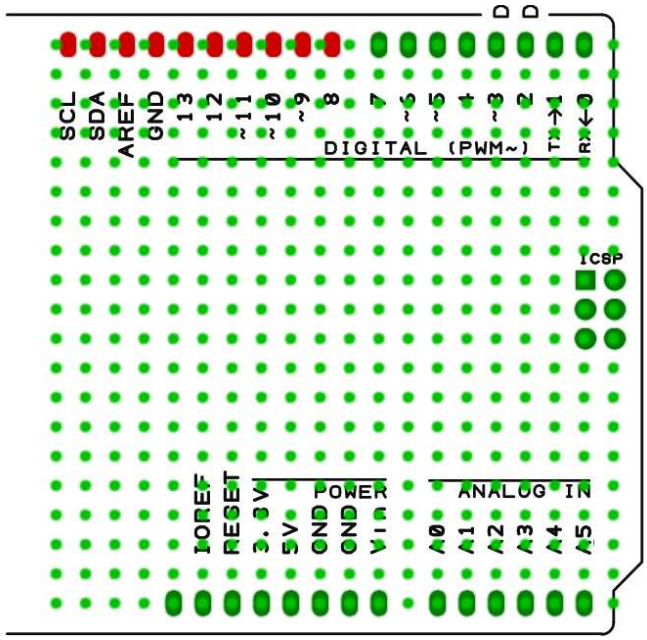


Figure 26 – In LIGHT GREEN, a standard 2.54mm pin pitch breadboard (in RED the resulting misaligned connector)

Thus if you want to use the MKR2UNO Plus, using a standard 2.54mm pitch breadboard, you can use the additional holes (see Figure 27) to let it fits the a 2.54mm pitch breadboard (see Figure 28).
It is up the user to mount a male or female connector depending on its own needs.

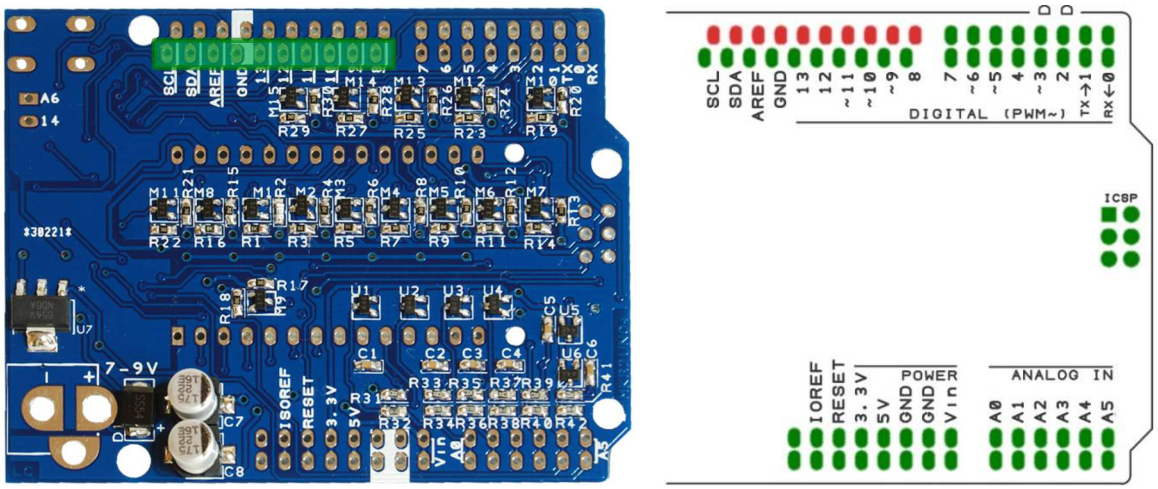


Figure 27 – Highlighted in GREEN the additional 2.54mm pin pitch connector of the MKR2UNO Plus

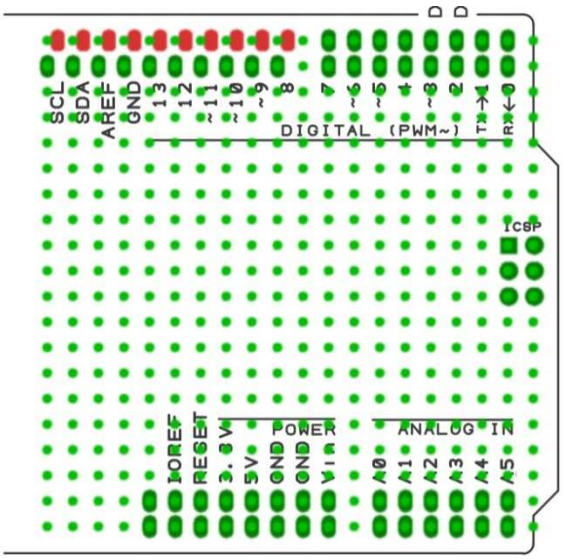


Figure 28 – In LIGHT GREEN, a standard 2.54mm pin pitch breadboard (the additional connector fits it)

13. Using the MKR2UNO Plus with the PROTOSHIELD Plus

If you want to use the MKR2UNO Plus on the PROTOSHIELD Plus, you have to consider:

- On the PROTOSHIELD Plus D11 connects by default to RED LED and it will conflict with MKR11 pin which acts as SDA pin to establish I2C communication with PCF8254 LCD driver
- On the PROTOSHIELD Plus D12 connects by default to GRN LED and it will conflict with MKR12 pin which acts as SCL pin to establish I2C communication with PCF8254 LCD driver
- To let the pushbuttons resistive network work properly you need to set Vbrd of the PROTOSHIELD Plus to 3,3V

13.1. Disconnecting RED and GRN leds from D11 and D12

On the PROTOSHIELD Plus GRN LED connects by default to digital pin 12 (by means of SJD12).
On the PROTOSHIELD Plus RED LED connects by default to digital pin 11 (by means of SJD11).

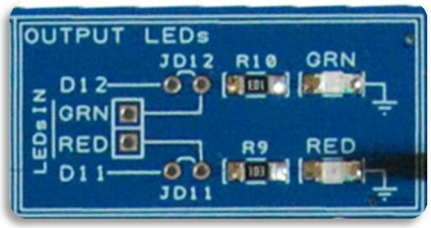


Figure 29 – OUTPUT LEDs on the PROTOSHIELD Plus

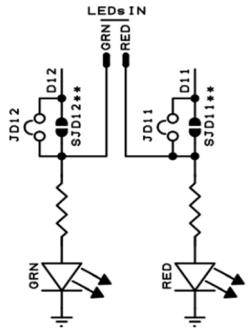


Figure 30 – OUTPUT LEDs connection on the PROTOSHIELD Plus

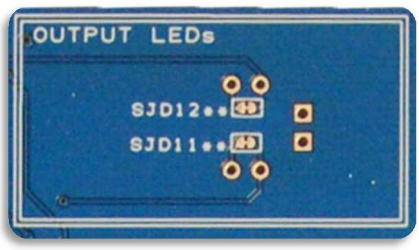


Figure 31 – SJD12 and SJD11 on the PROTOSHIELD Plus

Cut SJD12 and SJD11 (see Figure 31) in the middle to disconnect D11 and D12 pins from the OUTPUT LEDs.

13.2. Setting Vbrd of the PROTOSHIELD Plus to 3,3V

Locate SJBRD on the bottom of the (see Figure 32).

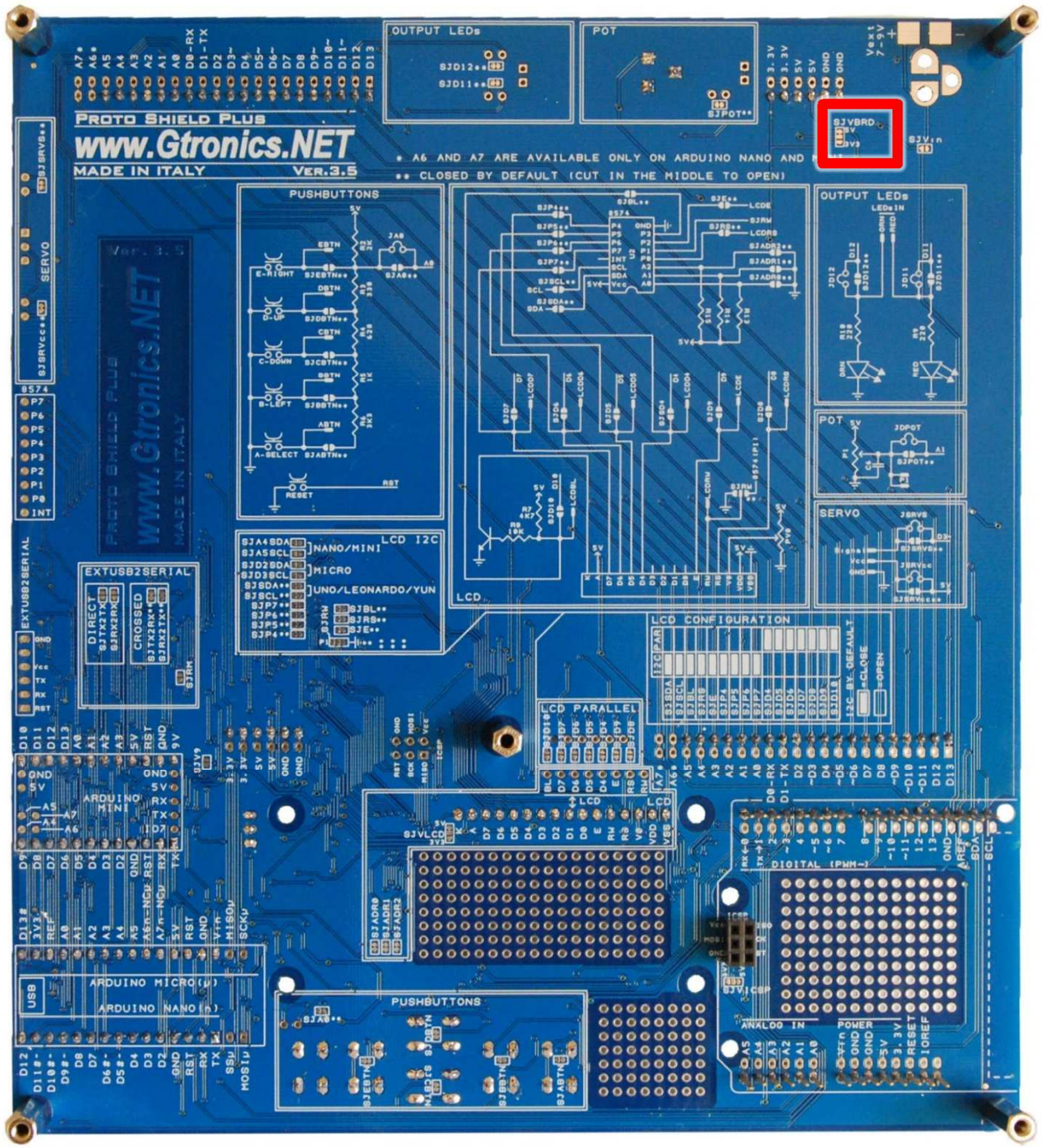


Figure 32 – Bottom view of the PROTOSHIELD Plus

As you can see in Figure 33, SJVBRD connects by default to 5V

Figure 33 – SJVBRD on the bottom side of the PROTOSHIELD Plus

To set Vbrd to 3,3V, you have to cut the default connection to 5V and connect it to 3V3 with a little drop of tin (see Figure 34).

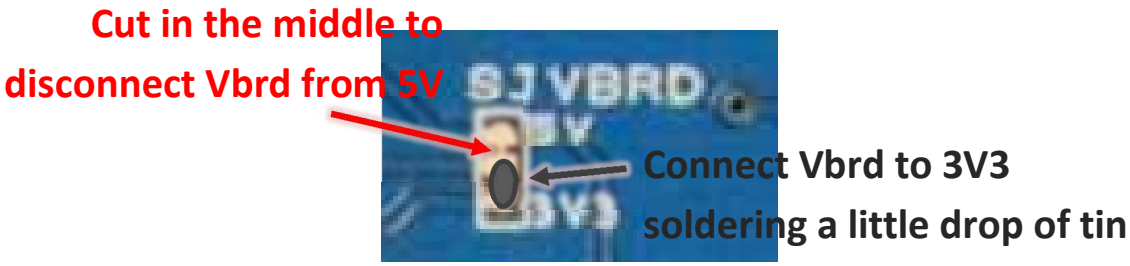


Figure 34 – Configuring SJVBRD to set 3,3V Vbrd on the PROTOSHIELD Plus

13.3. Testing the APSP_demo_MKR1000 sketch

Download the APSP_demo_MKR1000 sketch from www.GtronicsShop.com website.
This sketch works with any of the Arduino MKR board family (MKR1000, MKR 1400 GSM, MKR FOX 1200, etc.)
This sketch makes use of D2 and D3 to drive GRN end RED LEDs, so if you want to see them light up, you have to follow the instructions on the PROTOSHIELD Plus User Manual chapter 10.1.