

LOW-COST LORA GATEWAY: BUILDING OUTDOOR VERSION



PROF. CONG DUC PHAM
[HTTP://WWW.UNIV-PAU.FR/~CPHAM](http://www.univ-pau.fr/~cpham)
UNIVERSITÉ DE PAU, FRANCE



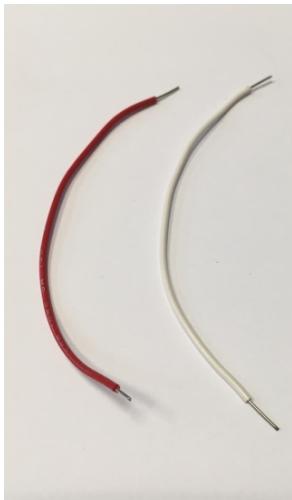
OVERVIEW OF THE PARTS



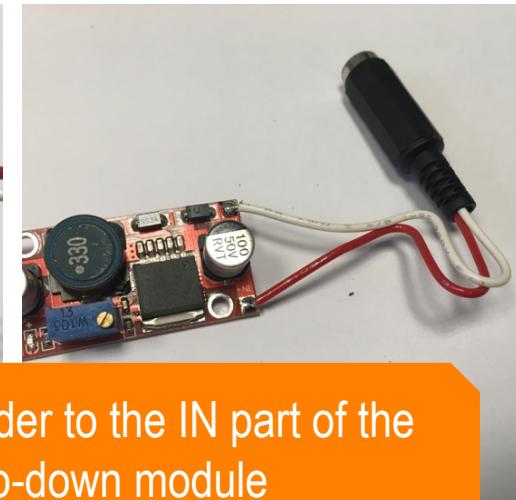
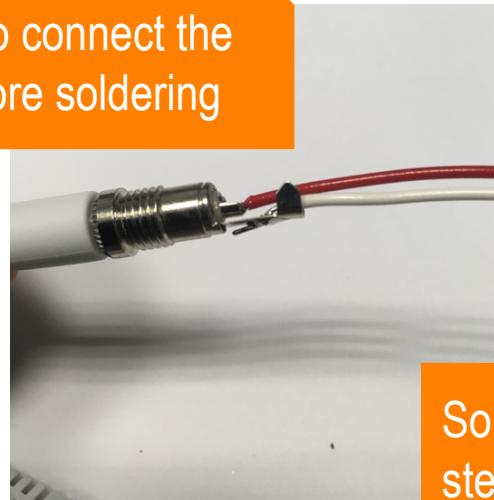
FIXING THE RASPBERRY TO THE CASE



PREPARE THE DC STEP-DOWN (LM2596)



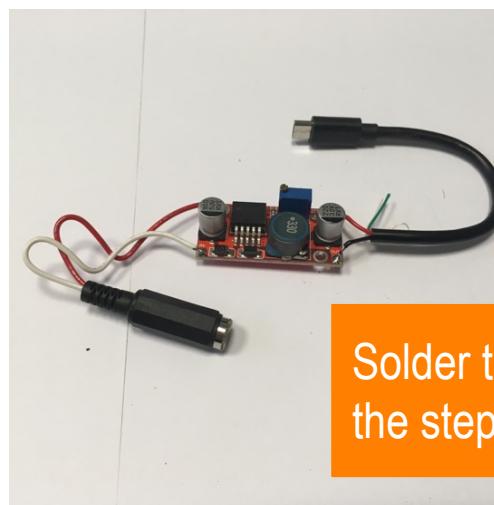
It is advised to connect the DC plugs before soldering



Solder to the IN part of the step-down module

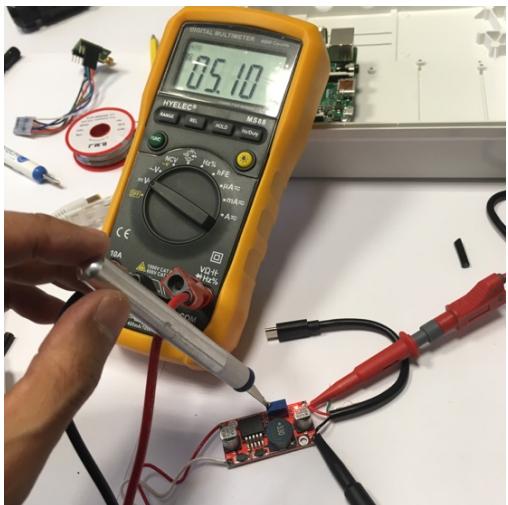
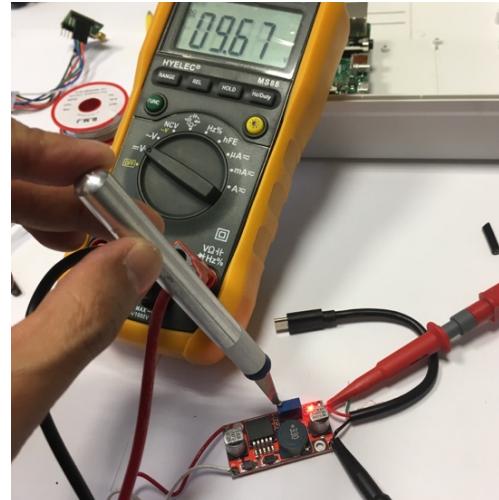


Cut a USB cable, keeping the micro-USB side



Solder to the OUT part of the step-down module

SETTING THE STEP-DOWN MODULE

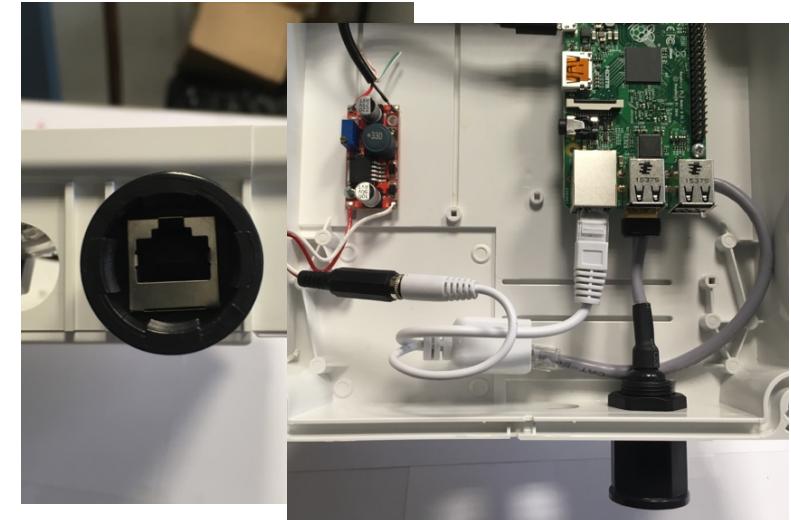


Use for instance a 9v, 12v or 18V AC-DC adaptor, connect to the IN plug, then check the output voltage with a voltmeter and turn the regulation screw until output is about 5.1v.



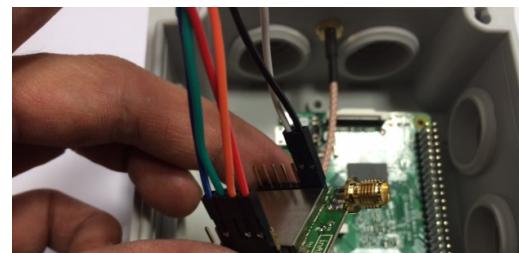
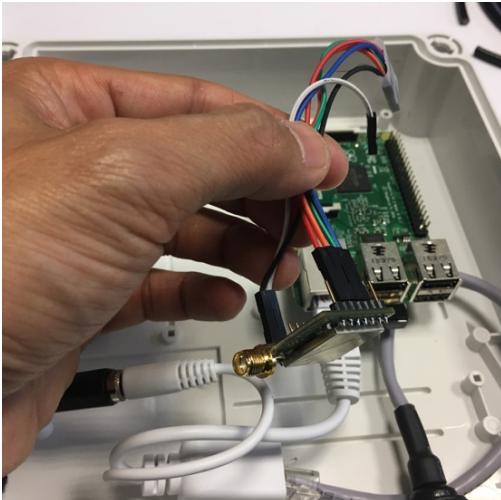
Then fix the module to the case

INSTALLING THE POE INJECTOR AND WATER-RESISTANT ETHERNET PLUG



THE RADIO MODULE

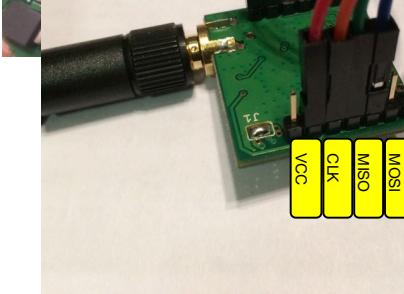
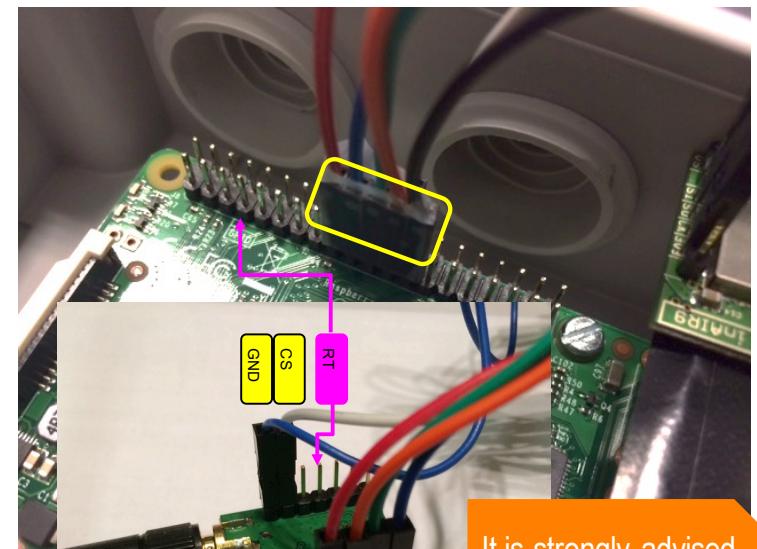
STANDALONE MODULE



GPIO#	2nd func.	Pin#	Pin#	2nd func.	GPIO#
+3.3 V		1	2	+5 V	
2	SDA1 (I2C)	3	4	+5 V	
3	SCL1 (I2C)	5	6	GND	
4	GCLK	7	8	TXD0 (UART)	14
	GND	9	10	RXD0 (UART)	15
17	GEN0	11	12	GEN1	18
27	GEN2	13	14	GND	
22	GEN3	15	16	GEN4	23
+3.3 V		17	18	GEN5	24
10	MOSI (SPI)	19	20	GND	
9	MISO (SPI)	21	22	GEN6	25
11	SCLK (SPI)	23	24	CE0_N (SPI)	8
	GND	25	26	CE1_N (SPI)	7

(RPI 1 Models A and B stop here)

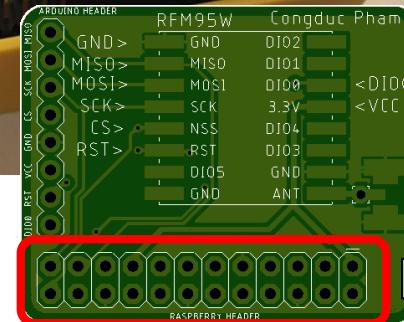
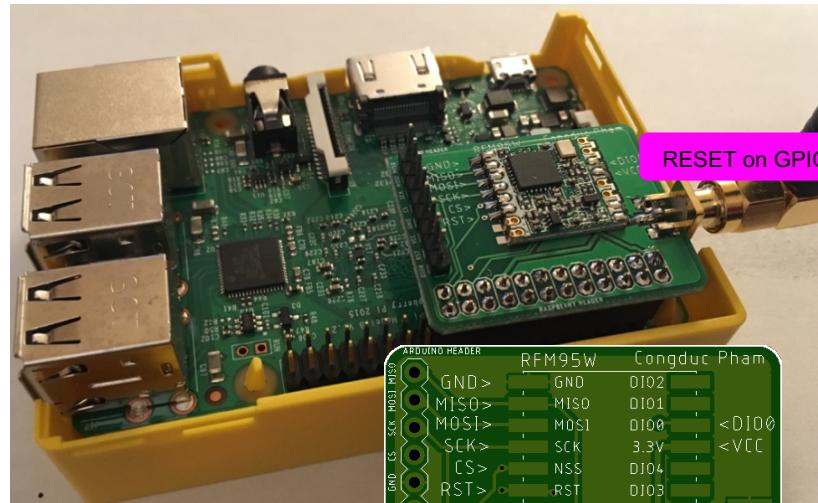
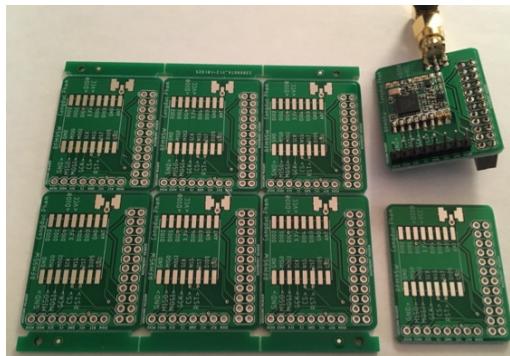
EEPROM	ID_SD	27	28	ID_SC	EEPROM
5	N/A	29	30	GND	
6	N/A	31	32		12
13	N/A	33	34	GND	
19	N/A	35	36	N/A	16
26	N/A	37	38	Digital IN	20
	GND	39	40	Digital OUT	21



It is strongly advised to also connect the RESET pin (RT) to the RPI's #7 pin (GPIO4)

THE RADIO MODULE RFM95W BREAKOUT

- We also propose a very simple RFM95W breakout that can be used for gateway and end-device

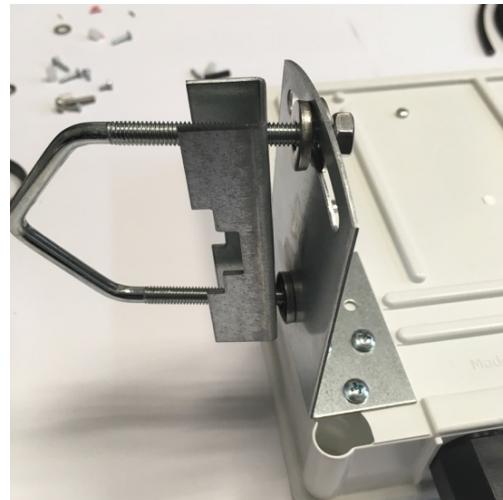


Raspberry Pi2 GPIO Header			
Pin#	NAME	NAME	Pin#
01	3.3v DC Power	DC Power	5v 02
03	GPIO02 (SDA1 , I ^C)	DC Power	5v 04
05	GPIO03 (SCL1 , I ^C)	Ground	06
07	GPIO04 (GPIO_GCLK)	(TXD0) GPIO14	08
09	Ground	(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)	(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)	Ground	14
15	GPIO22 (GPIO_GEN3)	(GPIO_GEN4) GPIO23	16
17	3.3v DC Power	(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)	Ground	20
21	GPIO09 (SPI_MISO)	(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)	(SPI_CE0_N) GPIO24	24
25	Ground	(SPI_CE1_N) GPIO07	26
27	ID_SD (I ^C ID EEPROM)	(PC ID EEPROM) ID_SC	28
29	GPIO05	Ground	30
31	GPIO06	GPIO12	32
33	GPIO13	Ground	34
35	GPIO19	GPIO16	36
37	GPIO26	GPIO20	38
39	Ground	GPIO21	40

Rev 1
26/01/2014
<http://www.element14.com>

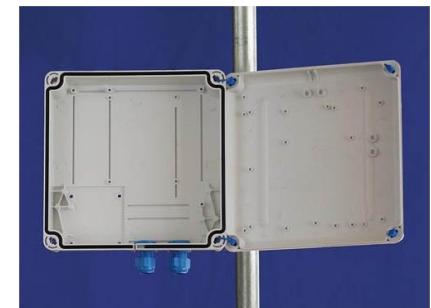
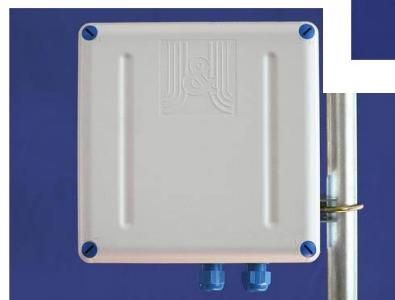
- The zipped Gerber archive can be freely downloaded from
<https://github.com/CongducPham/LowCostLoRaGw>

INSTALL FIXING PARTS OF THE CASE



These parts of course depends on the case that you have.

Here we use the GentleBOX JE-200 case from MHzShop.



ADDING EXTERNAL ANTENNA CONNECTOR



Use a female N-connector in mount version. Some already have an SMA or uFl connector (pigtail) at the other end



If you only have the simple version, take a short SMA cable where one end has a connector that fits your radio module. Usually it should be SMA or RP-SMA male. Cut the other end. Then solder to the N-Connector



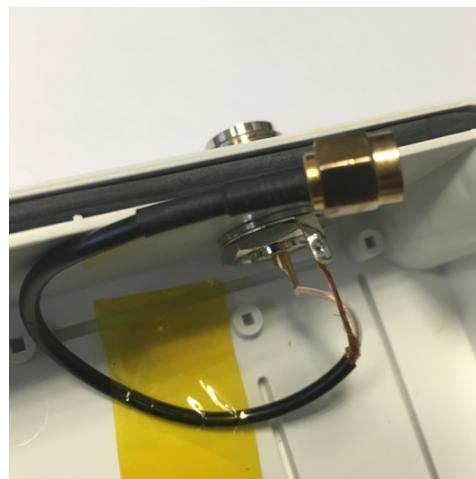
SMA Male



RP-SMA Male



Drill a hole in the case and do not forget to put a rubber joint if your connector does not have one.



FINAL RESULT

