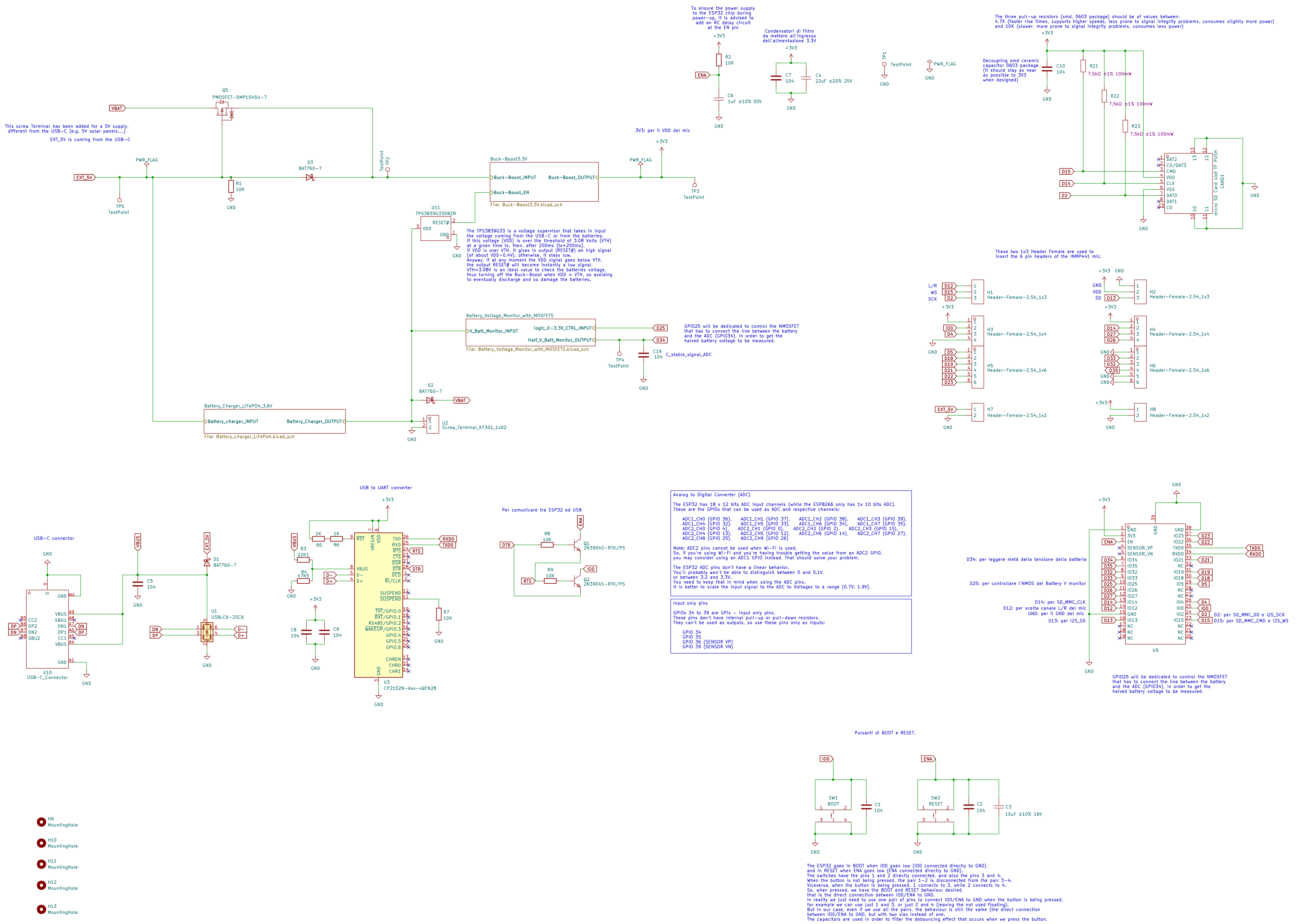
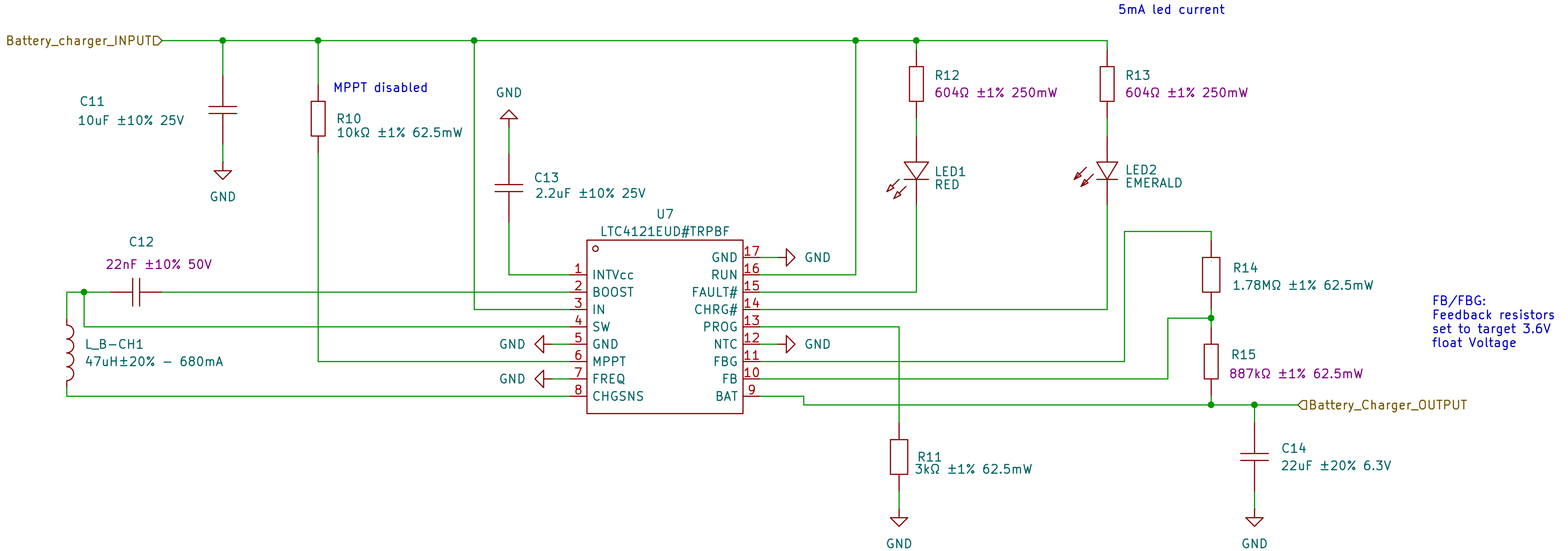
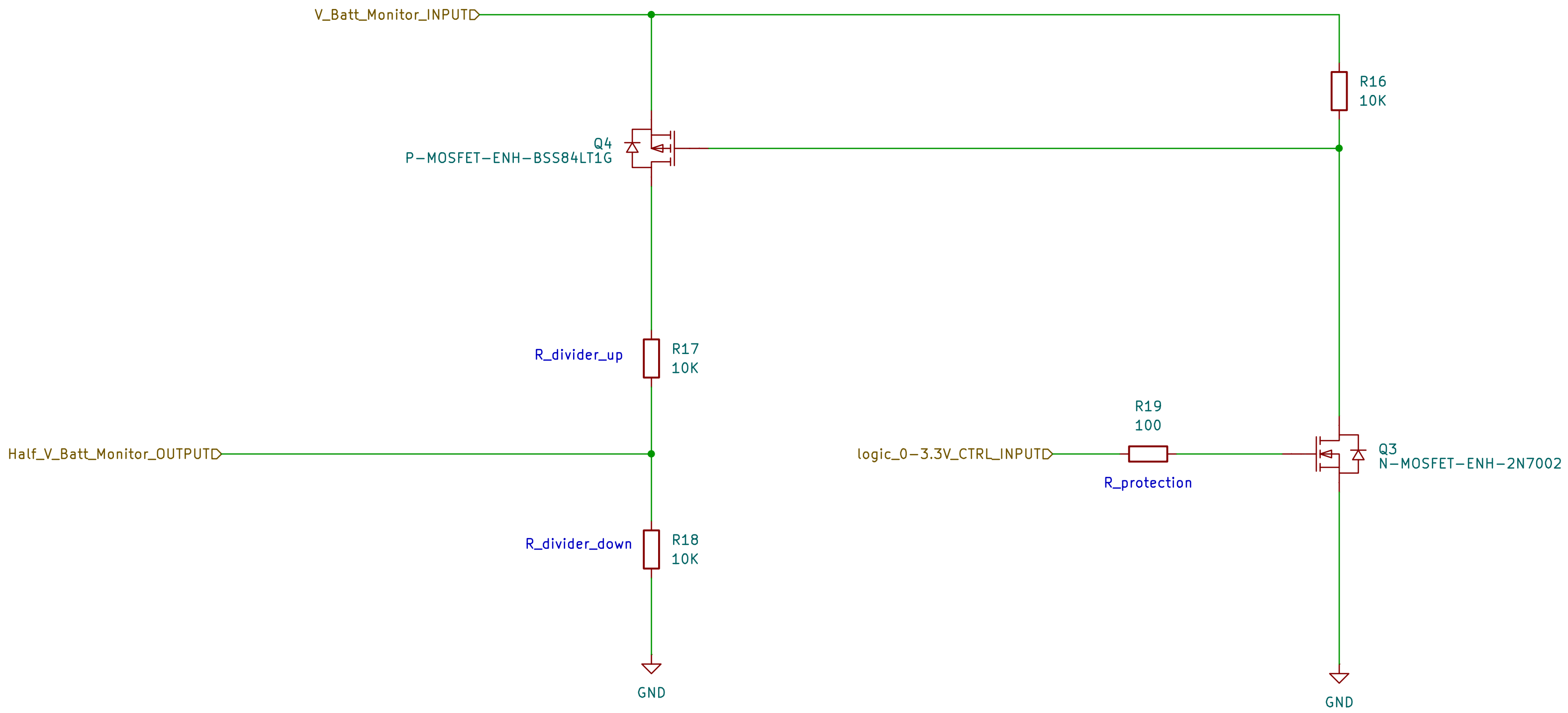


To ensure the power supply to the ESP32 chip during power-up, it is advised to add an RC delay circuit at the EN pin
Condensatori di filtro da mettere all'ingresso dell'alimentazione 3.3V
The three pull-up resistors (smd, 0603 package) should be of values between:
4.7K (faster rise times, supports higher speeds, less prone to signal integrity problems, consumes slightly more power)
and 10K (slower, more prone to signal integrity problems, consumes less power)
Decoupling smd ceramic capacitor 0603 package (it should stay as near as possible to 3V3 when designed)
This screw Terminal has been added for a 5V supply, different from the USB-C (e.g. 5V solar panels....)
EXT_5V is coming from the USB-C
3V3: per il VDD del mic
Q5 PMOSFET-DMP1045U-7
D3 BAT760-7
Buck-Boost3.3V
Buck-Boost_INPUT
Buck-Boost_OUTPUT
Buck-Boost_EN
File: Buck-Boost3.3V.kicad_sch
U11 TPS3839G33DBZR
The TPS3839G33 is a voltage supervisor that takes in input the voltage coming from the USB-C or from the batteries.
If this voltage (VDD) is over the threshold of 3.08 Volts (VTH) at a given time tx, then, after 200ms (tx+200ms),
if VDD is over VTH, it gives in output (RESET#) an high signal (of about VDD-0.4V), otherwise, it stays low.
Anyway, if at any moment the VDD signal goes below VTH, the output RESET# will become instantly a low signal.
VTH=3.08V is an ideal value to check the batteries voltage, thus turning off the Buck-Boost when VDD < VTH, so avoiding to eventually discharge and so damage the batteries.
Battery_Voltage_Monitor_with_MOSFETS
V_Batt_Monitor_INPUT
logic_0-3.3V_CTRL_INPUT
Half_V_Batt_Monitor_OUTPUT
File: Battery_Voltage_Monitor_with_MOSFETS.kicad_sch
C19 104 C_stable_signal_ADC
GPIO25 will be dedicated to control the NMOSFET that has to connect the line between the battery and the ADC (GPIO34), in order to get the halved battery voltage to be measured.
Battery_Charger_LiFePO4_3.6V
Battery_charger_INPUT
Battery_Charger_OUTPUT
File: Battery_charger_LiFePo4.kicad_sch
D2 BAT760-7
U2 Screw_Terminal_KF301_1x02
These two 1x3 Header Female are used to insert the 6 pin headers of the INMP441 mic.
H1 Header-Female-2.54_1x3
H2 Header-Female-2.54_1x3
H3 Header-Female-2.54_1x4
H4 Header-Female-2.54_1x4
H5 Header-Female-2.54_1x6
H6 Header-Female-2.54_1x6
H7 Header-Female-2.54_1x2
H8 Header-Female-2.54_1x2
micro SD Card slot TF PUSH
CARD1
USB-C connector
U10 USB-C_Connector
U1 USBLC6-2SC6
D1 BAT760-7
USB to UART converter
U3 CP2102N-Axx-xQFN28
Per comunicare tra ESP32 ed USB
Q1 2N3904S-RTK/PS
Q2 2N3904S-RTK/PS
Analog to Digital Converter (ADC)
The ESP32 has 18 x 12 bits ADC input channels (while the ESP8266 only has 1x 10 bits ADC).
These are the GPIOs that can be used as ADC and respective channels:
ADC1_CH0 (GPIO 36), ADC1_CH1 (GPIO 37), ADC1_CH2 (GPIO 38), ADC1_CH3 (GPIO 39),
ADC1_CH4 (GPIO 32), ADC1_CH5 (GPIO 33), ADC1_CH6 (GPIO 34), ADC1_CH7 (GPIO 35),
ADC2_CH0 (GPIO 4), ADC2_CH1 (GPIO 0), ADC2_CH2 (GPIO 2), ADC2_CH3 (GPIO 15),
ADC2_CH4 (GPIO 13), ADC2_CH5 (GPIO 12), ADC2_CH6 (GPIO 14), ADC2_CH7 (GPIO 27),
ADC2_CH8 (GPIO 25), ADC2_CH9 (GPIO 26)
Note: ADC2 pins cannot be used when Wi-Fi is used.
So, if you're using Wi-Fi and you're having trouble getting the value from an ADC2 GPIO, you may consider using an ADC1 GPIO instead. That should solve your problem.
The ESP32 ADC pins don't have a linear behavior.
You'll probably won't be able to distinguish between 0 and 0.1V, or between 3.2 and 3.3V.
You need to keep that in mind when using the ADC pins.
It is better to scale the input signal to the ADC to Voltages to a range [0.7V; 1.9V].
Input only pins
GPIOs 34 to 39 are GPIs - input only pins.
These pins don't have internal pull-up or pull-down resistors.
They can't be used as outputs, so use these pins only as inputs:
GPIO 34
GPIO 35
GPIO 36 (SENSOR VP)
GPIO 39 (SENSOR VN)
D34: per leggere metà della tensione della batteria
D25: per controllare l'NMOS del Battery V monitor
D14: per SD_MMC_CLK
D12: per scelta canale L/R del mic
GND: per il GND del mic
D13: per I2S_SD
D2: per SD_MMC_D0 e I2S_SCK
D15: per SD_MMC_CMD e I2S_WS
U9
GPIO25 will be dedicated to control the NMOSFET that has to connect the line between the battery and the ADC (GPIO34), in order to get the halved battery voltage to be measured.
Pulsanti di BOOT e RESET.
SW1 BOOT
SW2 RESET
C3 10uF ±10% 16V
The ESP32 goes in BOOT when IO0 goes low (IO0 connected directly to GND),
and in RESET when ENA goes low (ENA connected directly to GND).
The switches have the pins 1 and 2 directly connected, and also the pins 3 and 4.
When the button is not being pressed, the pair 1-2 is disconnected from the pair 3-4.
Viceversa, when the button is being pressed, 1 connects to 3, while 2 connects to 4.
So, when pressed, we have the BOOT and RESET behaviour desired,
that is the direct connection between IO0/ENA to GND.
In reality we just need to use one pair of pins to connect IO0/ENA to GND when the button is being pressed,
for example we can use just 1 and 3, or just 2 and 4 (leaving the not used floating).
But in our case, even if we use all the pairs, the behaviour is still the same (the direct connection
between IO0/ENA to GND, but with two vias instead of one.
The capacitors are used in order to filter the debouncing effect that occurs when we press the button.
H9 MountingHole
H10 MountingHole
H11 MountingHole
H12 MountingHole
H13 MountingHole

For this schematic, see LTC4121EUD datasheet,
at pag.26, Figure 10. Design Example 3, SLA Charging with LTC4121



PROG: 400mA charge current.
NTC: safety disabled.
FREQ: 750KHz switching freq.


V_Batt_Monitor_INPUT
R16
10K
Q4
P-MOSFET-ENH-BSS84LT1G
R_divider_up
R17
10K
Half_V_Batt_Monitor_OUTPUT
R19
100
logic_0-3.3V_CTRL_INPUT
R_protection
Q3
N-MOSFET-ENH-2N7002
R_divider_down
R18
10K
GND
GND

This Buck–Boost (TPS63001DRCR) is an efficient converter (up to 96%),
and can convert either the 5V coming from the USB,
or eventually the 3–3.6V coming from the batteries,
to fixed 3.3V necessary for the esp32.