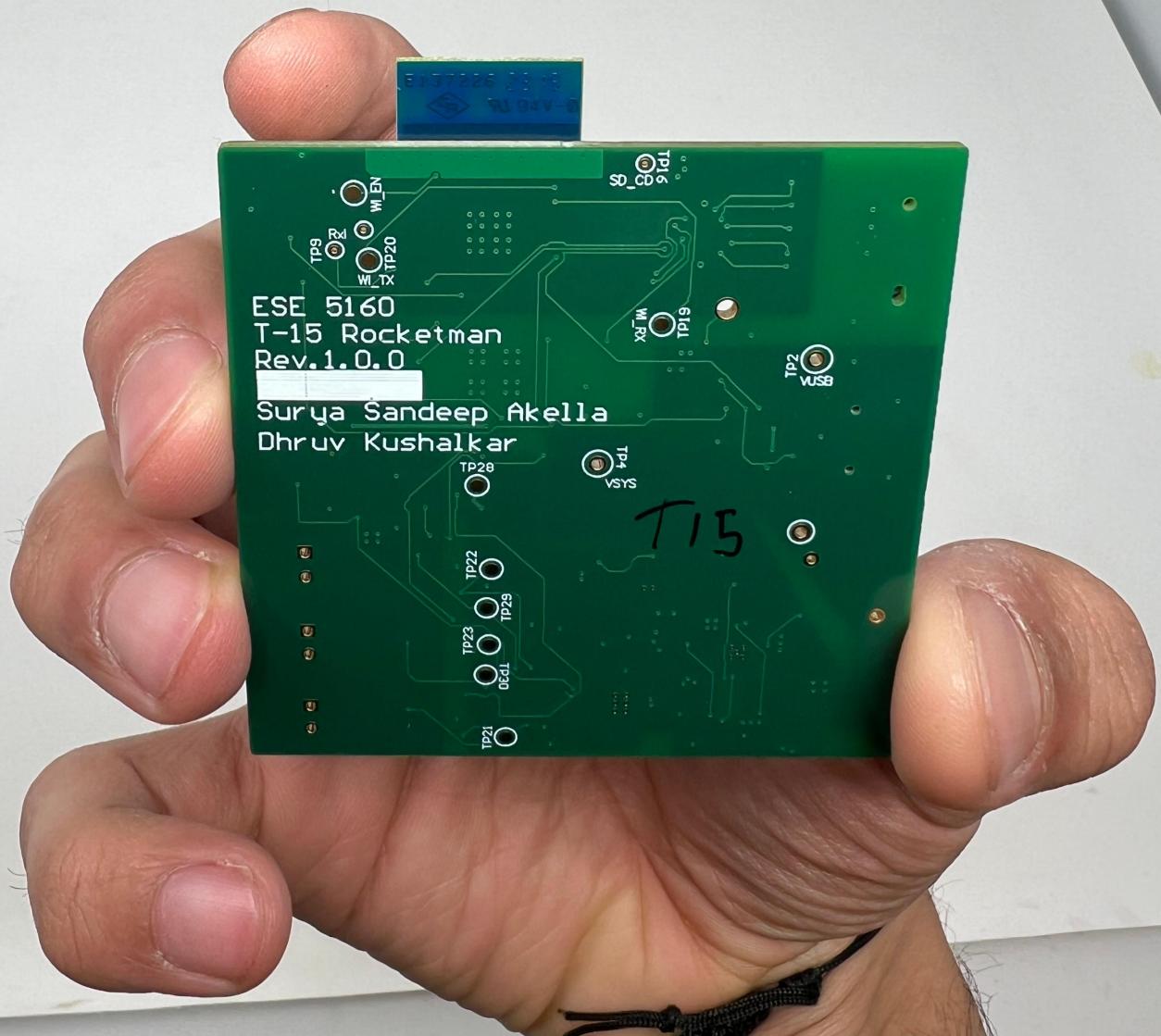
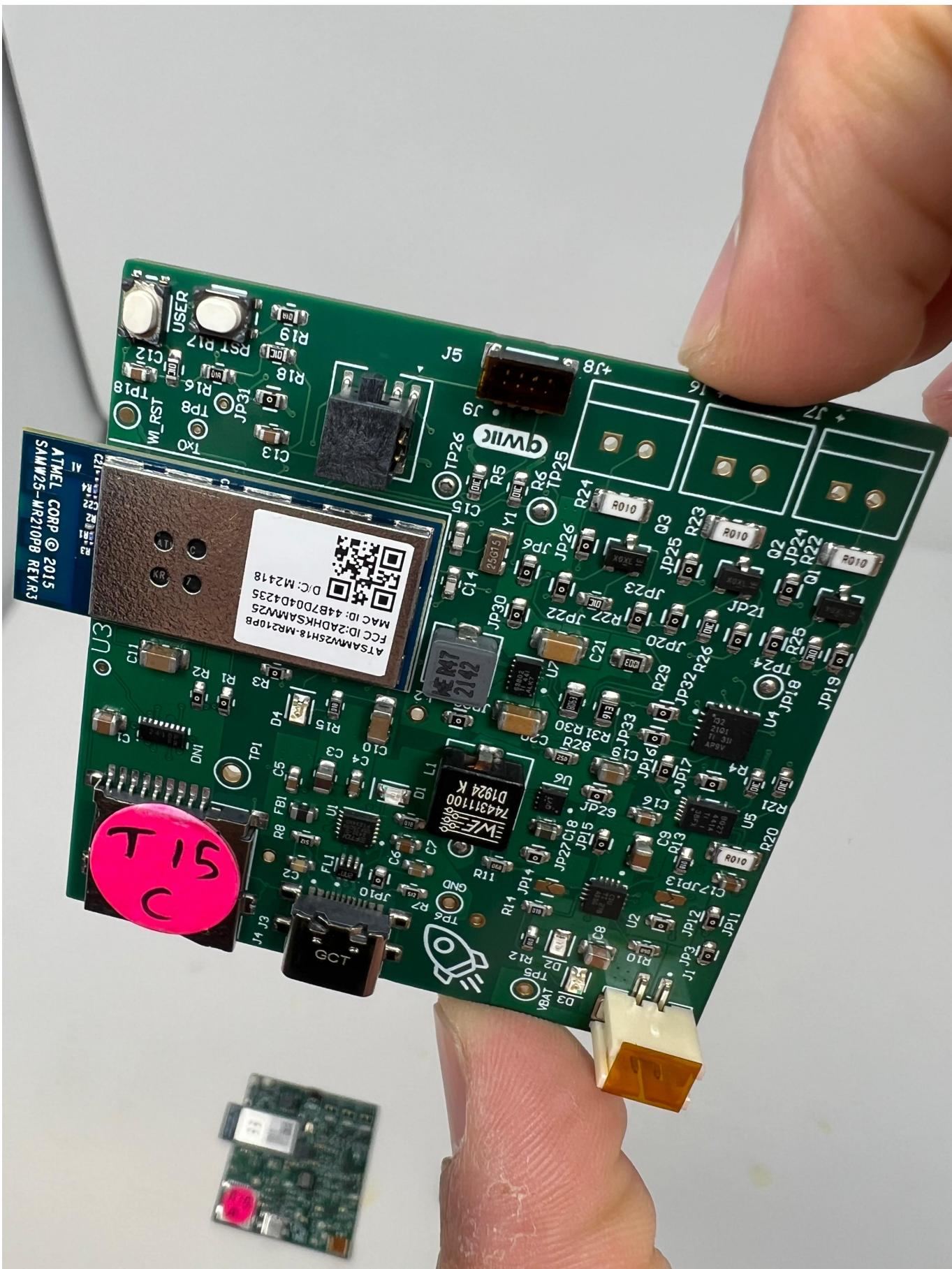


1. Visual Board Inspection & Photograph

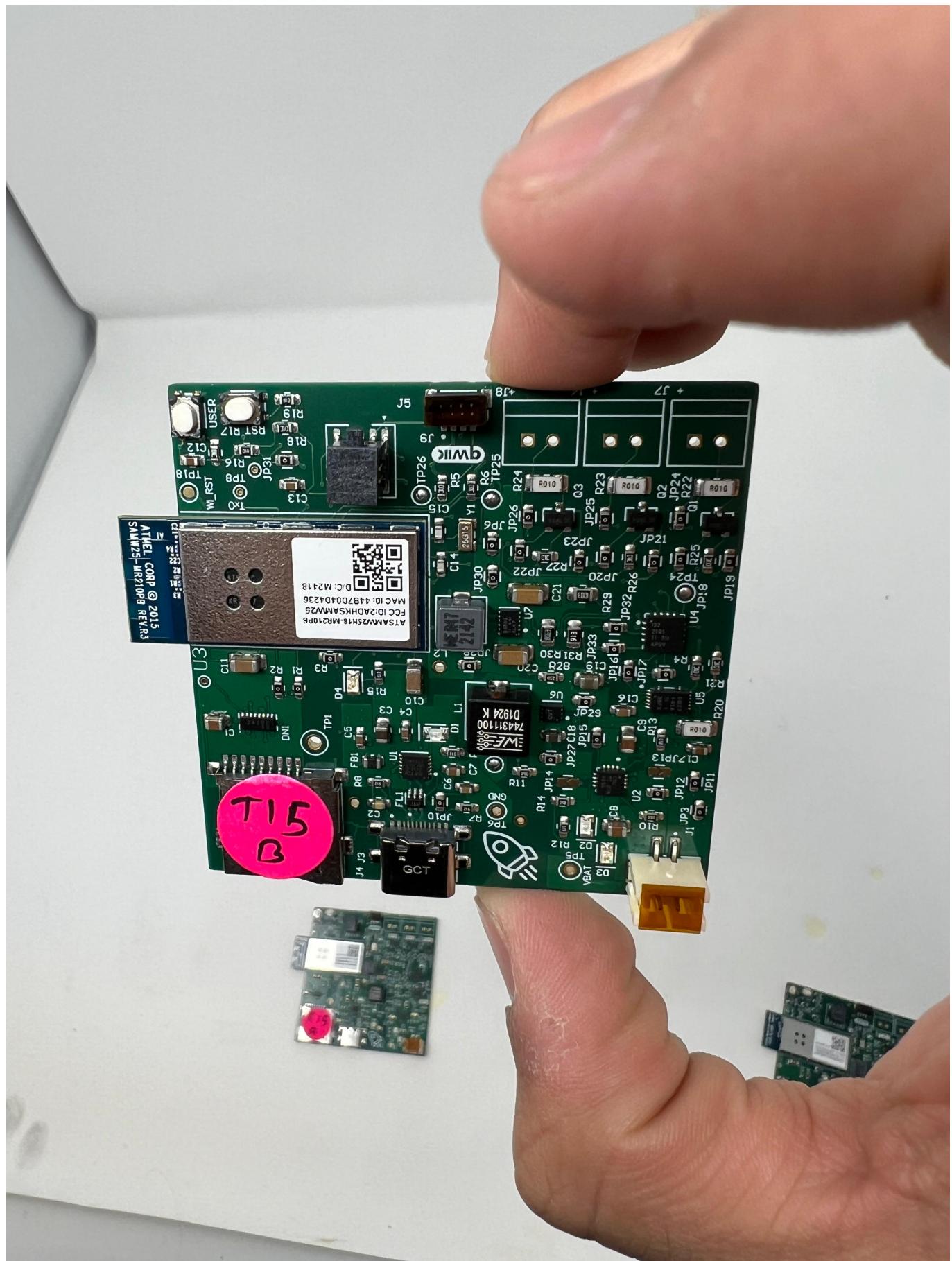




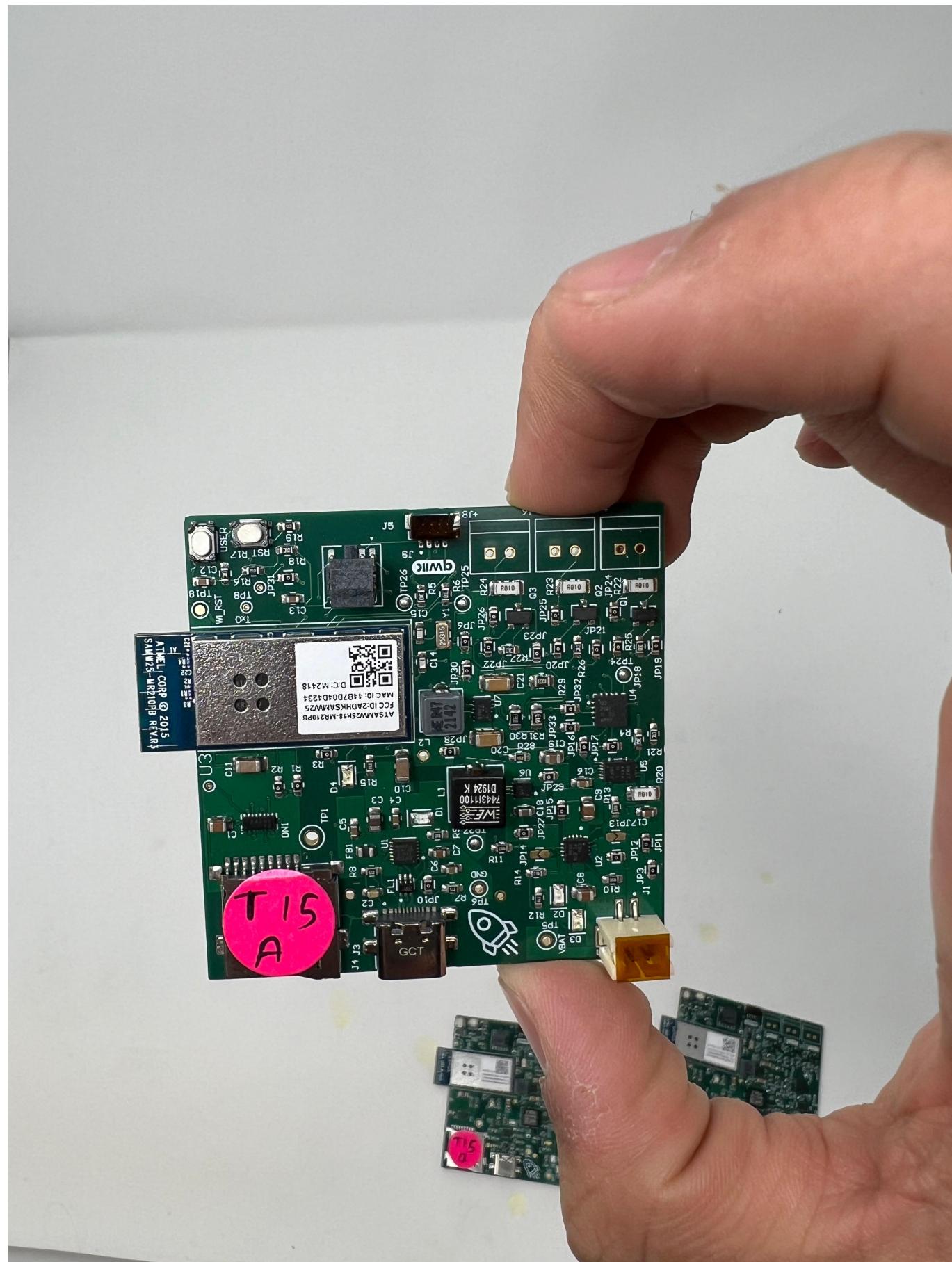




Noticed here that jumpers JP14 and JP13 are missing







2. Power System Evaluation

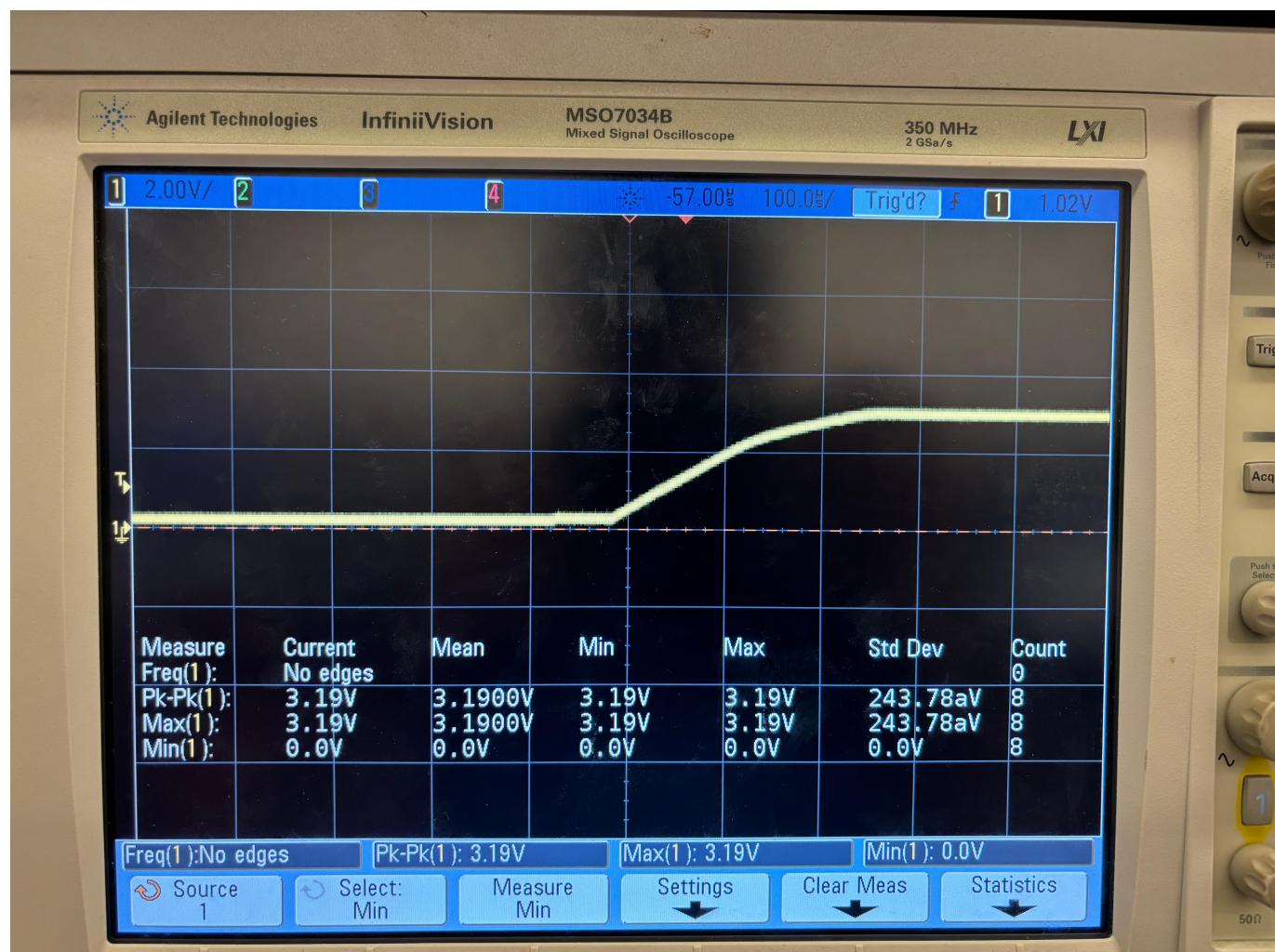
2.1 Distinct Power Modes

1. Unregulated battery only is connected and ranges from 3.7V to 4.2V
2. Regulated USB only is connected and ranges from 4.4V to 5.25V
3. Both battery and USB are connected, so the USB voltage will be selected by the battery charger (BQ24075) (4.4-5.25V)

Outputs (not power modes):
4. Regulated output from Battery charger ranging from 3.4V to 5.25V.
5. Regulated output from buck converter of 3.3V.
6. Regulated output from buck boost converter of 5V

2.2 Power Regulation Evaluation

1. 3.3V :

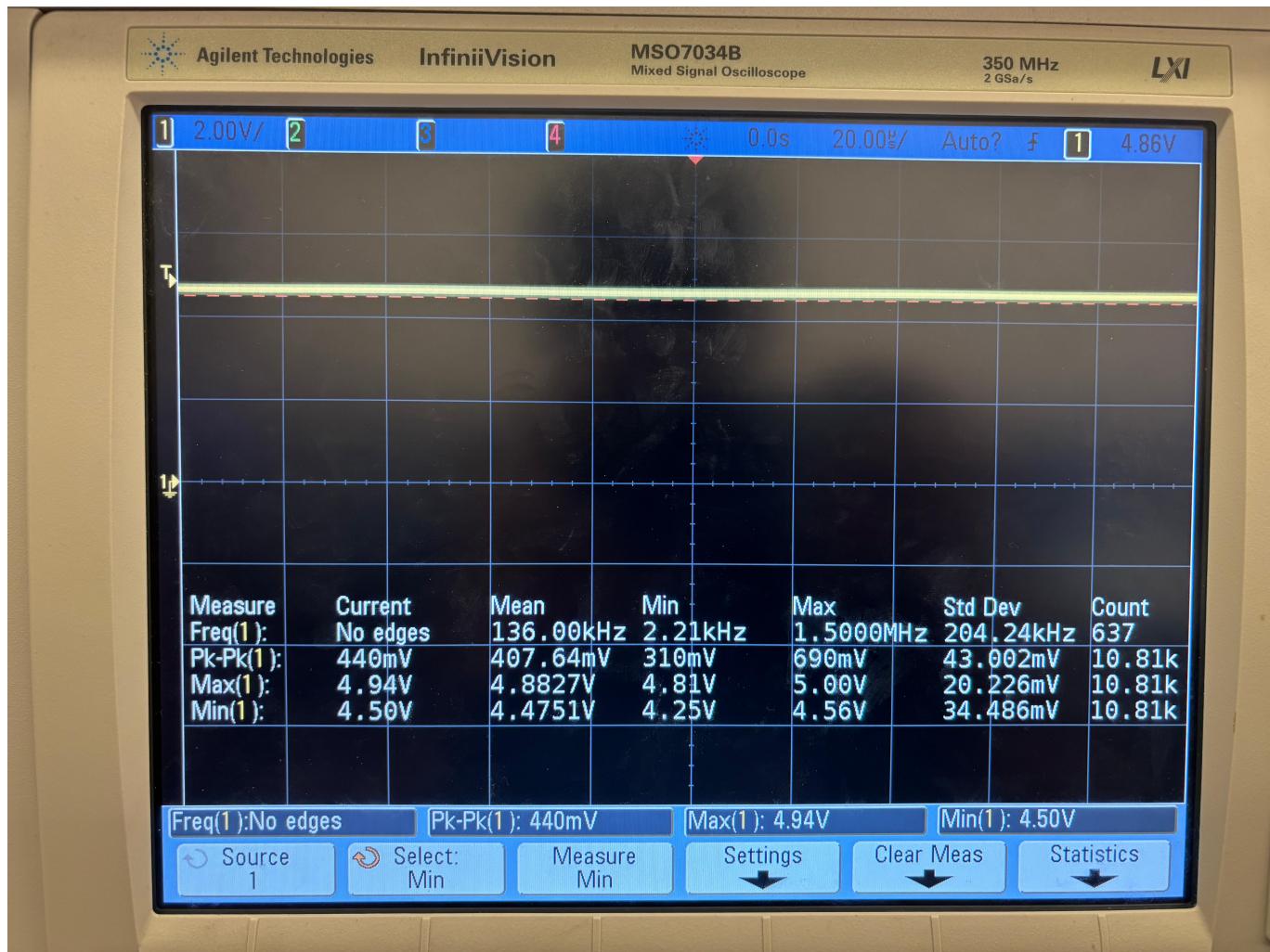




- Average Voltage: 3.002 • Error: 0.3V • minimum Voltage: 2.81V • Maximum Voltage: 3.19V • DC offset: ~0.298 V → 9.0 % • Peak-to-peak ripple: 0.380 V → 11.5 % of 3.3 V (≈12.7 % of the measured average)

2. 5V:

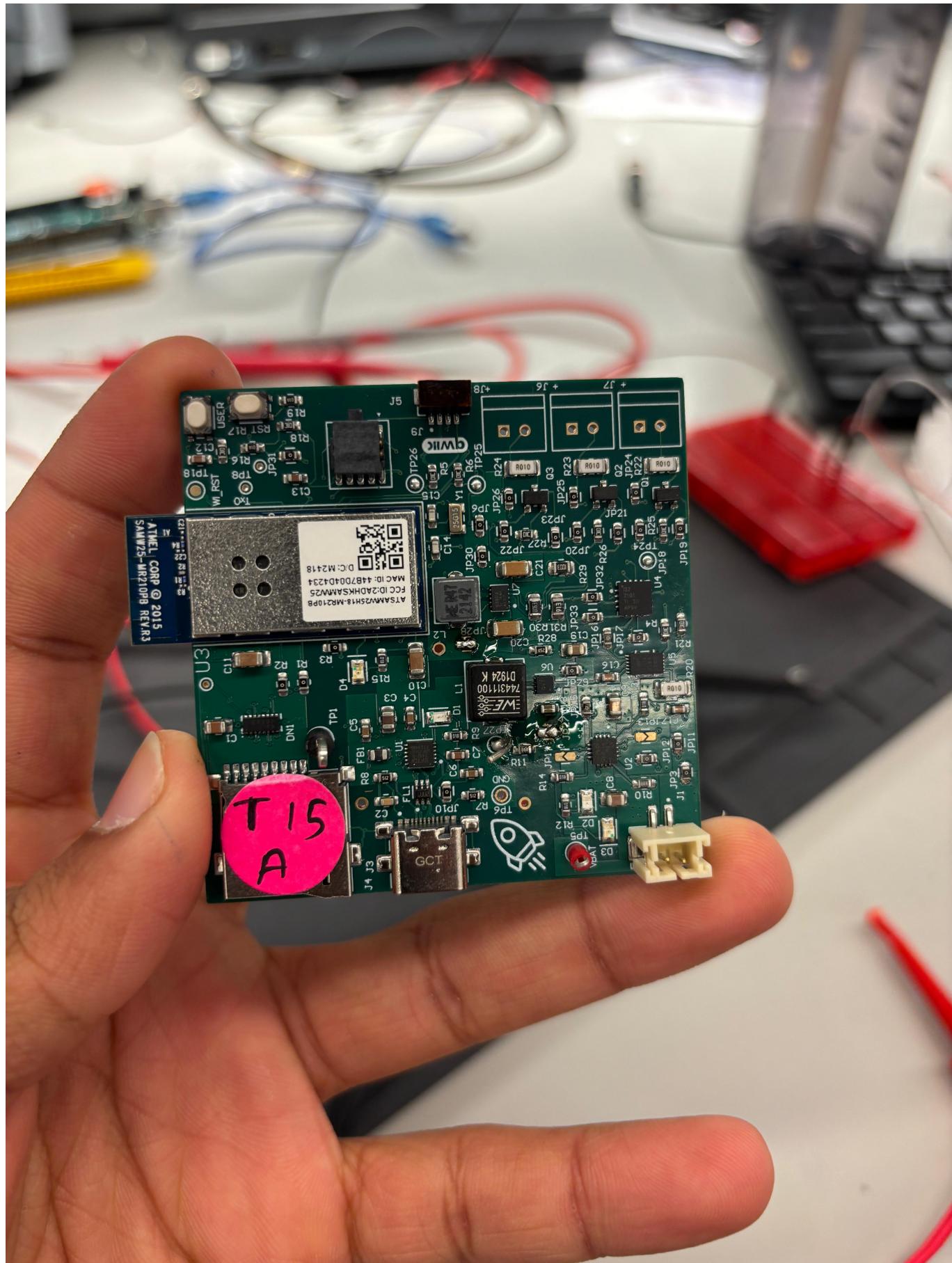




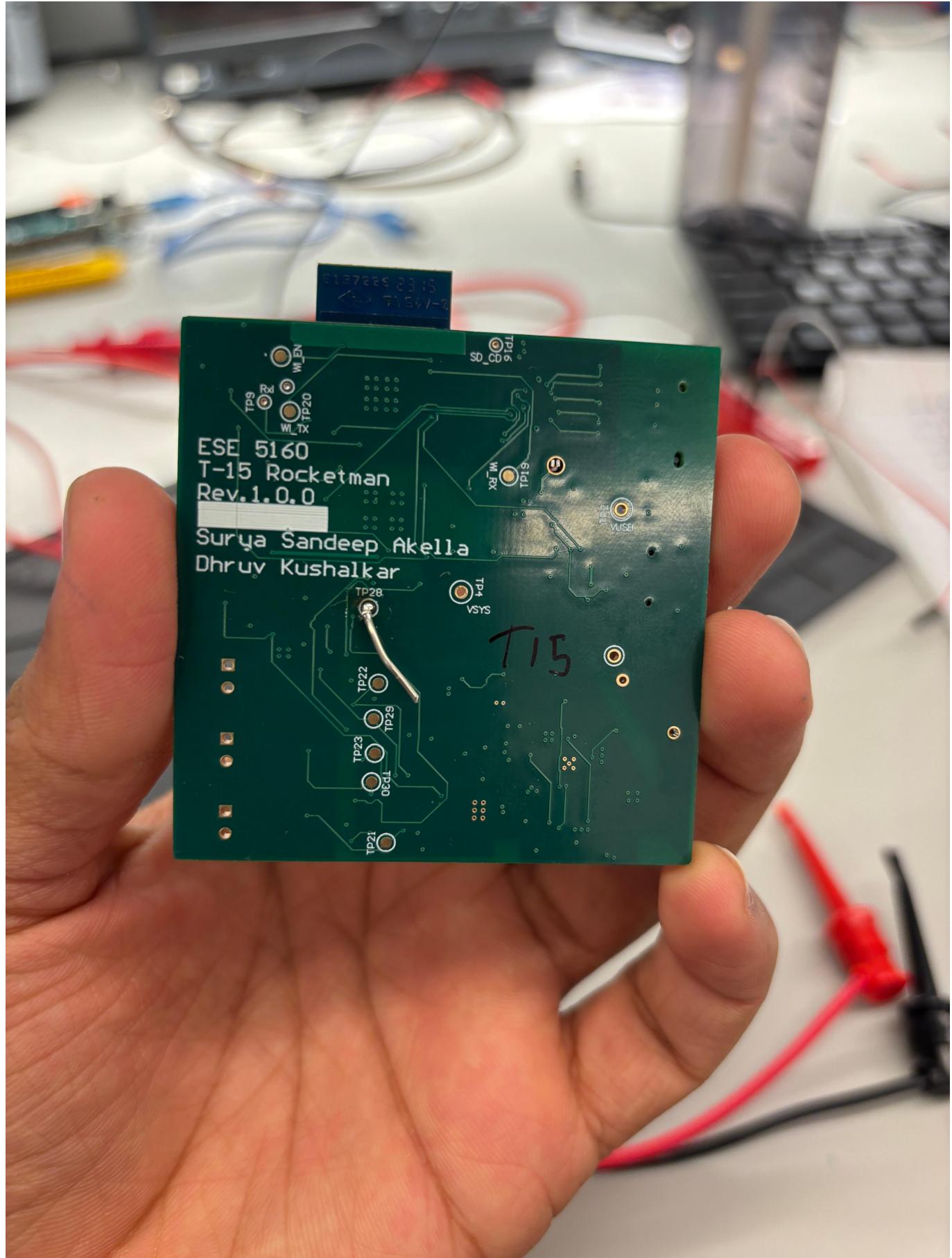
- Average: 4.72V • Error: 0.28V • minimum Voltage: 4.50V • Maximum Voltage: 4.94V • DC offset: 0.280 V
→ 5.6 % of 5 V • Peak-to-peak ripple: 0.440 V → 8.8 % of 5 V (\approx 9.3 % of the average)

- 3.3V Rail: Within spec on average, but ripple may need optimization.
- 5V Rail: Functional, but transient spikes may pose a risk to sensitive components.

2.3 Load Testing



3V3 Test (Wire hooklike structure below the inductor)



5V test

Expected Load	Voltage
10% (0.1A)	4.91V
30% (0.3A)	4.86V
50% (0.6A)	4.77V
100% (1.1A)	4.66V
120% (1.3A)	4.61V

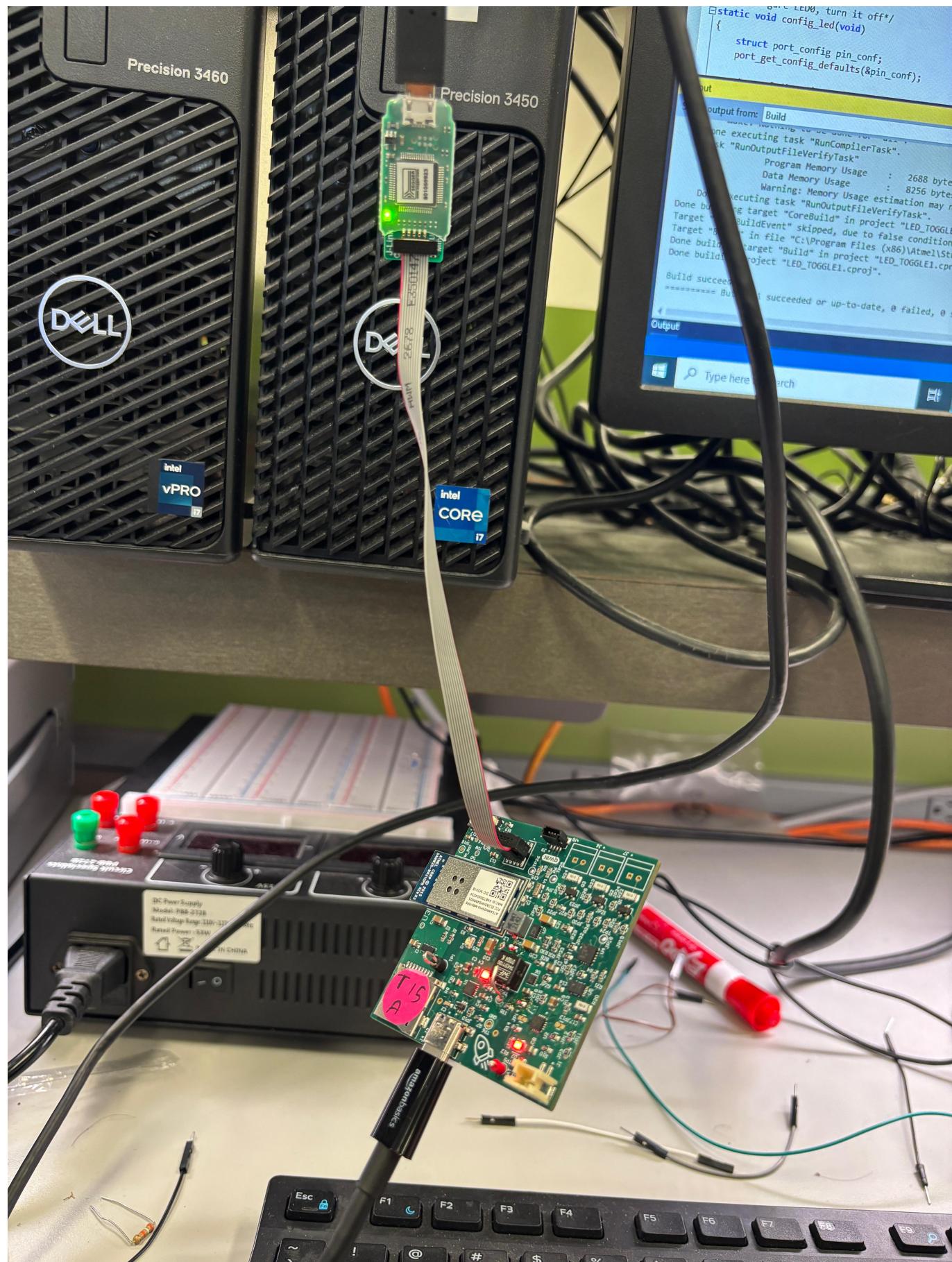
- The 5V rail demonstrates a gradual voltage drop as load increases, which is expected due to internal resistance and regulation limits.
- Voltage remained above 4.6V, even at 120% load, indicating that the power supply has reasonable headroom and doesn't collapse under excess load.
- The total drop from no load to 120% load is around 300 mV, which is acceptable

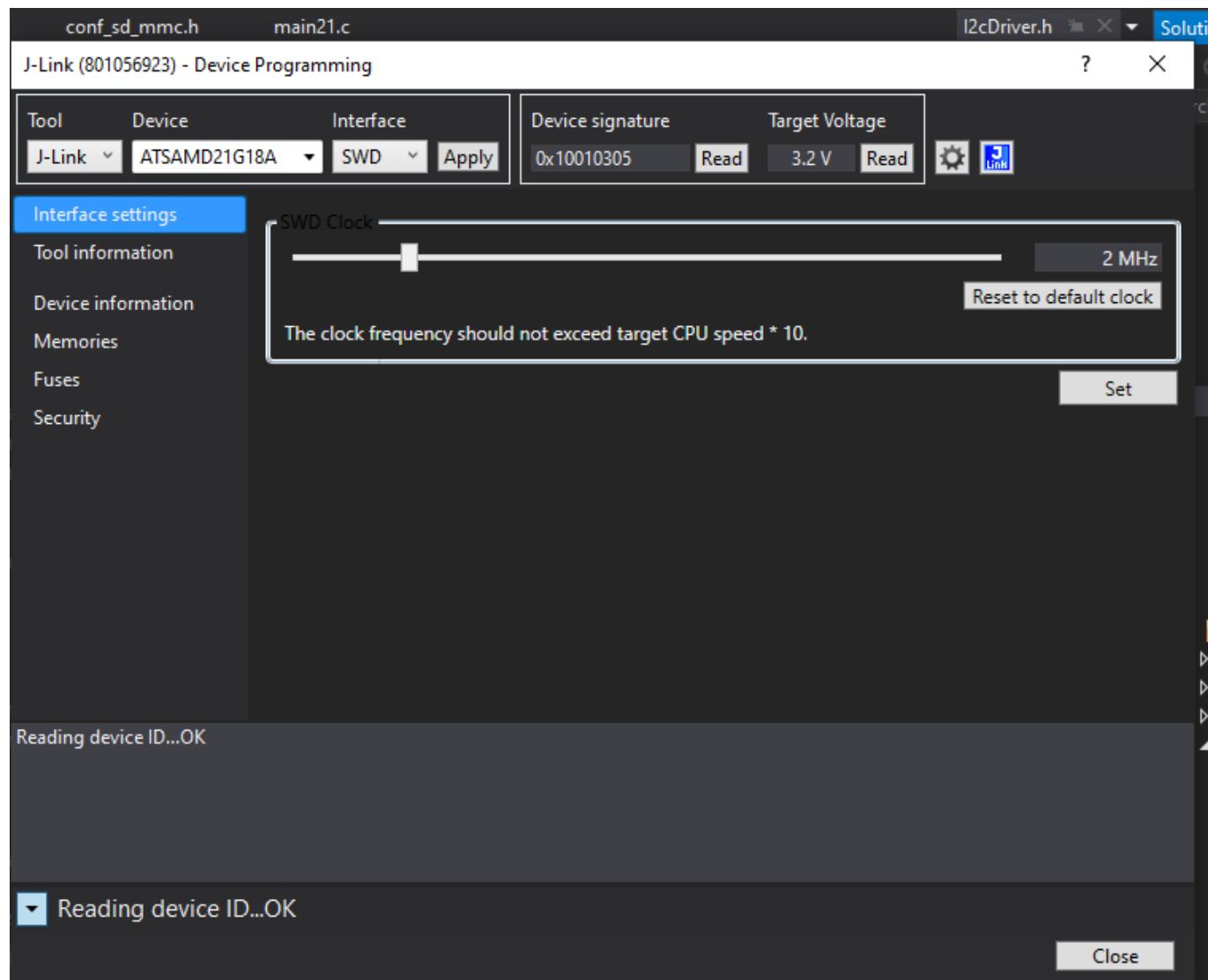
2.4 Thermal Image



The PCBA was running under 55% capacity, 0.6A

3. Programming





4. Peripheral Evaluation

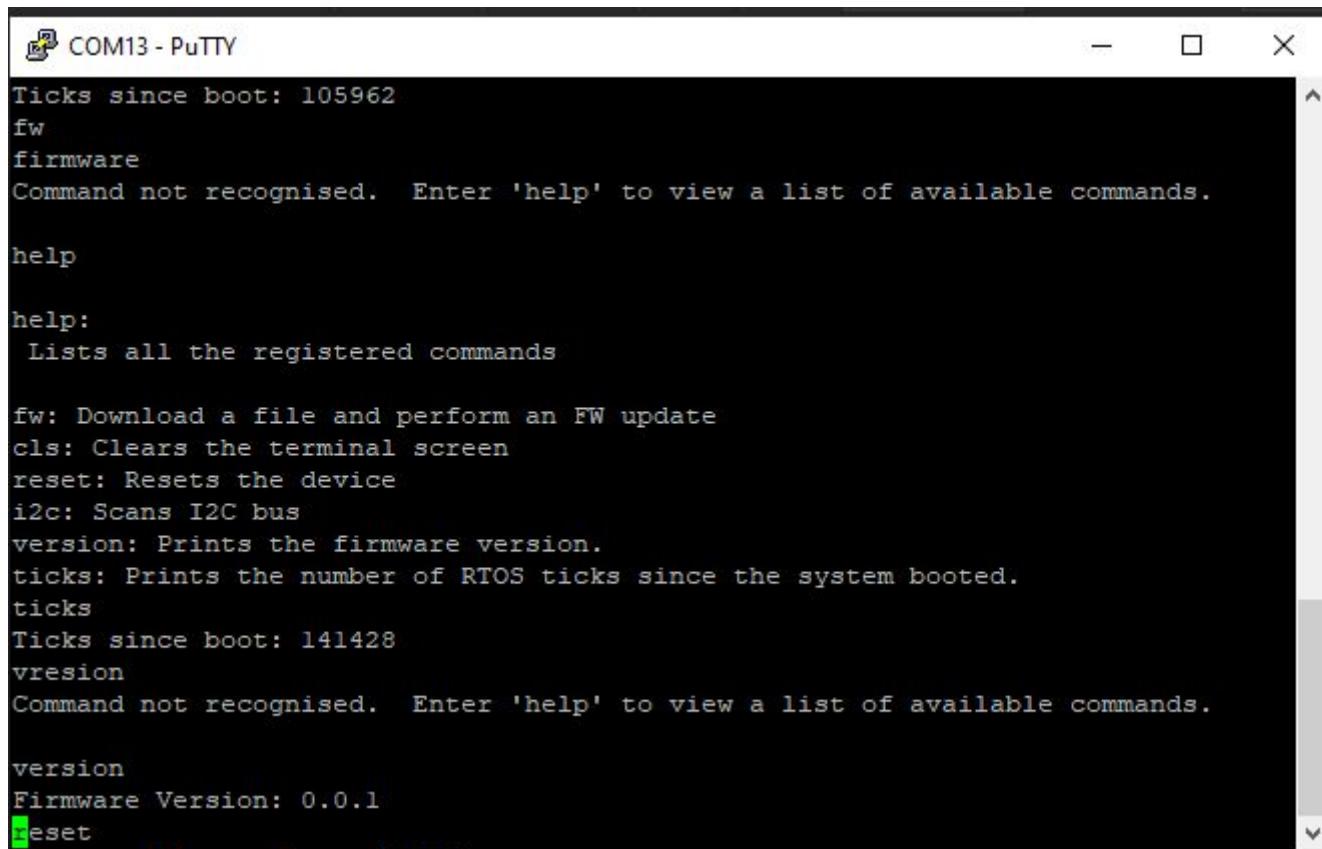
4.1 Debug LED

https://drive.google.com/file/d/19V2K6_OfFLM3kvusqBtiGh3jovviLZS9/view?usp=sharing

4.2 Debug Button

Issue Faced: Registers Swapped

4.3 UART Communication



```
Ticks since boot: 105962
fw
firmware
Command not recognised. Enter 'help' to view a list of available commands.

help
Lists all the registered commands

fw: Download a file and perform an FW update
cls: Clears the terminal screen
reset: Resets the device
i2c: Scans I2C bus
version: Prints the firmware version.
ticks: Prints the number of RTOS ticks since the system booted.
ticks
Ticks since boot: 141428
vresion
Command not recognised. Enter 'help' to view a list of available commands.

version
Firmware Version: 0.0.1
reset
```

4.4 Non-volatile Memory (SD Card)

Not secure 48.217.67.9:1880/ui/#!/0?socketid=ZJEZc1gw1ADo7ekbAAAD

Default

COM6 - PuTTY

```
FreeRTOS CLI.  
Type Help to view a list of registered commands.  
Heap before starting tasks: 9696  
Heap after starting CLI: 7784  
Heap after starting WIFI: 3696  
ESE516 - Wifi Init Code  
init_storage: please plug an SD/MMC card in slot...  
init_storage: mounting SD card...  
init_storage: SD card mount OK.  
(APP) (INFO)Chip ID 1503a0  
(APP) (INFO)DriverVerInfo: 0x13301354  
(APP) (INFO)Firmware ver : 7.39249.536882144 Svnrev 55611  
(APP) (INFO)Firmware Build 03:59:06 Time ====  
(APP) (INFO)Firmware Min driver ver : 3.39249.536882144  
(APP) (INFO)Driver ver: 5.39249.536882144  
(APP) (INFO)Driver built at 00:42:52 =====  
main: connecting to WiFi AP AirPennNet-Device...  
wifi_cb: M2M_WIFI_CONNECTED  
wifi_cb: IP address is 10.103.207.162  
(APP) (INFO)Socket 1 session ID = 39249  
  
Connecting to Broker...MQTT Connected  
MQTT Connected to broker
```

```

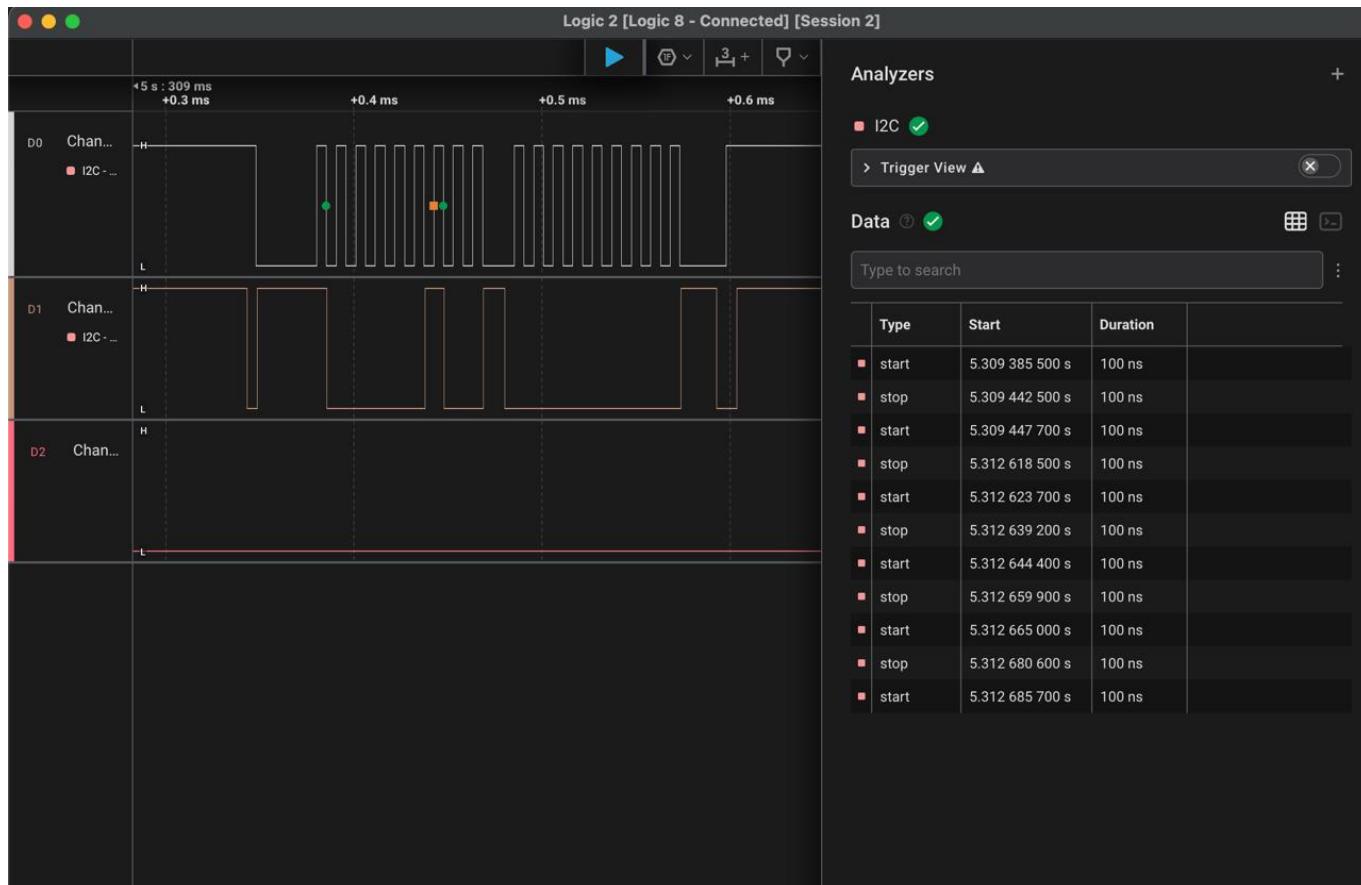
fw: Download a file and perform an FW update
cls: Clears the terminal screen
reset: Resets the device
i2c: Scans I2C bus
version: Prints the firmware version.
ticks: Prints the number of RTOS ticks since the system booted.
i2c
0 1 2 3 4 5 6 7 8 9 a b c d e f
00: 00: X X X X X X X X X X X X X X X X
10: X X X X X X X X X X X X X X X X X X
20: X X X X X X X X X X X X X X X X X X
30: X X X X X X X X X X X X X X X X X X
40: 80: X X X X X X X X X X X X X X X X X X
50: X X X X X X X X X X X X X X X X X X
60: X X X X X X X X X X X X X X X X X X
70: X X X X X X X X X X X X X X X X X X

```

```

Initialize HW...
Initialized I2C Driver!
FreeRTOS CLI.
Type Help to view a list of registered commands.
Heap before starting tasks: 9696
Heap after starting CLI: 7784
I2C Test Task started...
INA3221 Config: 0xA5A5
BQ27441 Device Type: 0x9600

```



- Start condition: SDA goes low while SCL is high – initiates a data transfer.

- Stop condition: SDA goes high while SCL is high – ends the data transfer.
- These events repeat several times, indicating multiple transmissions

Conclusion

All our peripherals are working and good to go.