Soldering Guide
CHARM

Martin Michalski

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1 USB-C Port

1.1 Materials

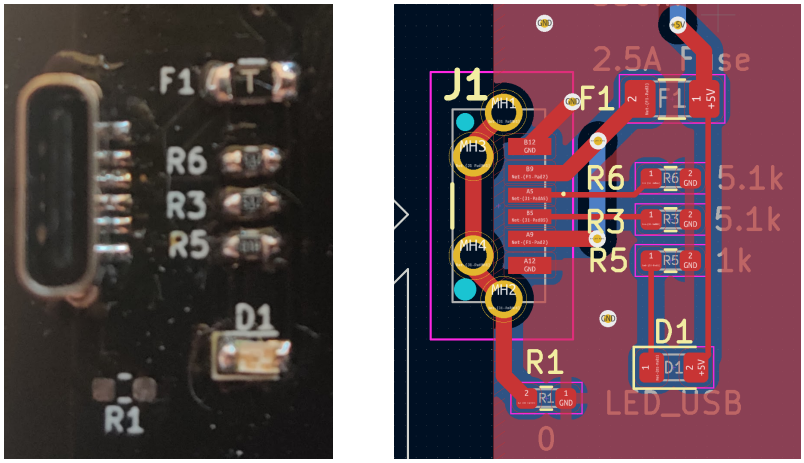
Begin by retrieving the components in Table 1.

Part No.	Description	Silkscreen No(s).	Quantity
USB4140-GF-0070-C	USB-C Port	J1	1
SF-1206F250-2	2.5A Fuse	F1	1
RT0603DRE075K1L	5.1kΩ Resistor	R3,R6	2
RT0603FRE131KL	1kΩ Resistor	R5	1
150080RS75000	USB LED	D1	1

Table 1: Required Components for USB-C Subsystem

1.2 Layout

Reference Figure 1 to properly place the components.



(a) Soldered Example (b) PCB Layout

Figure 1: USB-C Subsystem Layout Reference

Polarity Notes
Pay special attention to the orientation of the following components.

- D1: USB LED (Arrow towards H1/H3 side of board)

1.3 Soldering

Solder the components.

Recommended Order

1. F1: 2.5A Fuse
2. R6: 5.1kΩ Resistor
3. R3: 5.1kΩ Resistor
4. R5: 1kΩ Resistor
5. D1: USB LED
6. J1: USB-C Port

Do not solder R1.

1.4 Quality Assurance

2 Boost Converter

2.1 Materials

Begin by retrieving the components in Figure 2.

Part No.	Description	Silkscreen No(s).	Quantity
LM2585S-12/NOPB	Boost Converter IC	IC3	1
UUD1C221MCL1GS	220uF Capacitor	C7	1
16SVPF1000M	1mF Capacitor	C9	1
ECPU1C334MA5	330nF Capacitor	C2	1
MSS1210-683MED	68uH Inductor	L2	1
RC0603FR-072K94L	2.94kΩ Resistor	R7	1
SS24FL	Schottky Diode	D4	1

Figure 2: Required Components for Boost Converter Subsystem

2.2 Layout

Reference Figure 3 to properly place the components.

(a) Soldered Example

(b) PCB Layout

Figure 3: Boost Converter Subsystem Layout Reference

Polarity Notes
Pay special attention to the orientation of the following components.

- C9: 1mF Capacitor (Reference Figure 3.a)
- C7: 220uF Capacitor (Reference Figure 3.a)
- C2: TODO TREVOR
- D4: TODO TREVOR

2.3 Soldering

Solder the components.

Recommended Order

1. IC3: Boost Converter IC
2. C2: 330nF Capacitor
3. R7: 2.94kΩ Resistor
4. D4: Schottky Diode
5. L2: 68uH Inductor
6. C7: 1mF Capacitor
7. C9: 220uF Capacitor

2.4 Quality Assurance

3 Battery Charge Controller

3.1 Materials

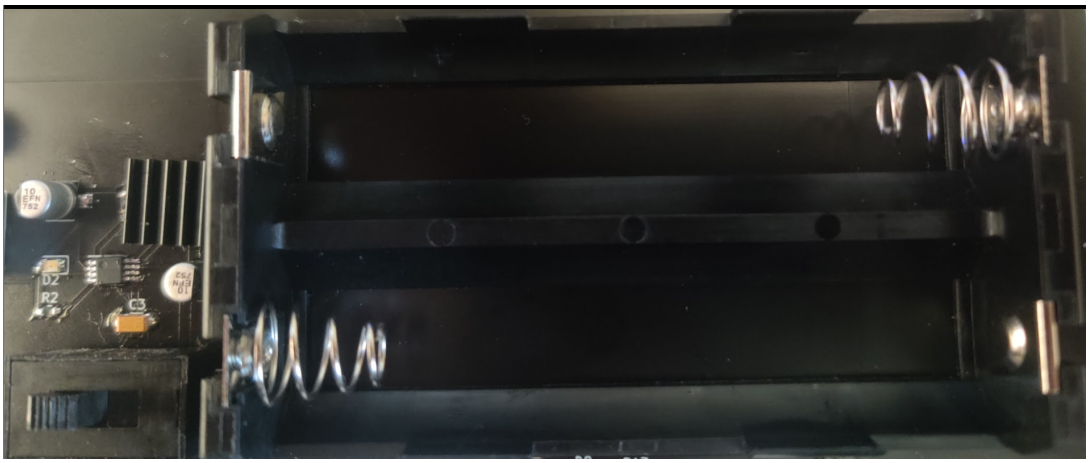
Begin by retrieving the components in Figure 4.

Part No.	Description	Silkscreen No(s).	Quantity
MCP73844-840I/MS	Battery Charge IC	IC1	1
EEE-FN1E100R	10uF Capacitor	C1, C6	2
T491A104K035AT	0.1uF Capacitor	C3	1
RT0603BRD0750KL	50kΩ Resistor	R2	1
ERJ-6RQFR22V	220mΩ Resistor	R4	1
150080RS75000	Red LED	D2	1
IRF7404TRPBF	MOSFET	Q1	1
MCP73844-840I/MS	Battery Holder	J2	1
L101011MS02Q	Switch	SW1	1

Figure 4: Required Components for the Battery Charge Controller Subsystem

3.2 Layout

Reference Figure 5 to properly place the components.



(a) Soldered Example

(b) PCB Layout

Figure 5: Battery Charge Controller Subsystem Layout Reference

Polarity Notes
Pay special attention to the orientation of the following components.

- C1: 10uF Capacitor (Reference Figure 5.a)
- C6: 10uF Capacitor (Reference Figure 5.a)
- C3: 0.1uF Capacitor (Banded, bevelled side towards H1/H3 board side)
- D2: Red LED (Arrow towards H2/H4 side of board)
- IC1: Battery Charge IC (Dot in top-left corner, towards H1 board corner)
- Q1: TODO TREVOR

3.3 Soldering

Solder the components.

Recommended Order

1. IC1: Battery Charge IC
2. Q1: MOSFET
3. R4: 220mΩ Resistor
4. D2: Red LED
5. R2: 50kΩ Resistor
6. C3: 0.1uF Capacitor
7. C1, C6: 10uF Capacitors
8. SW1: Switch
9. J2: Battery Holder

After soldering, attach heatsink to BobaFET square.

3.4 Quality Assurance

4 Buck Converter

4.1 Materials

Begin by retrieving the components in Figure 6.

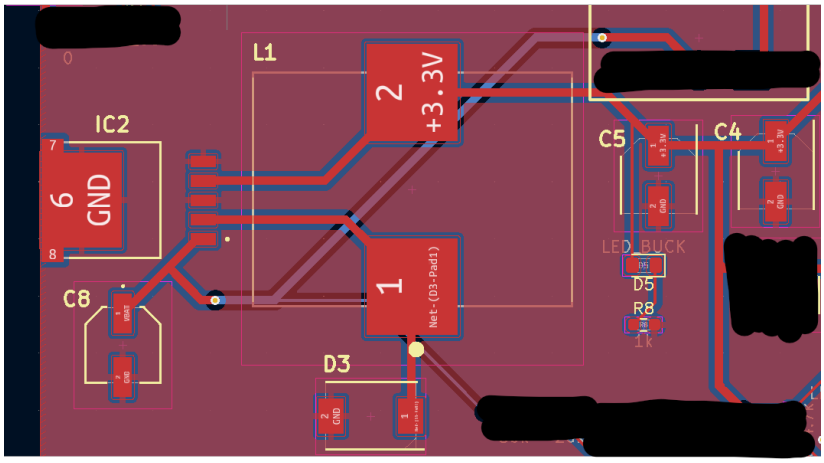
Part No.	Description	Silkscreen No(s).	Quantity
LM2576SX-3.3/NOPB	Buck Converter IC	IC2	1
RT0603FRE131KL	1kΩ Resistor	R8	1
16SVPC100M	100uF Capacitor	C8	1
UUD1C221MCL1GS	220uF Capacitor	C4, C5	2
B520C-13-F	Schottky Diode	D3	1
150080RS75000	Red LED	D5	1
74437429203101	100uH Inductor	L1	1

Figure 6: Required Components for Buck Converter Subsystem

4.2 Layout

Reference Figure 7 to properly place the components.

(a) Soldered Example



(b) PCB Layout

Figure 7: Buck Converter Subsystem Layout Reference

Polarity Notes
Pay special attention to the orientation of the following components.

- D3: Schottky Diode (Ensure band is on H2/H4 side of board)
- D5: Red LED (Arrow towards H2/H4 side of board)
- C4, C5: 220uF Capacitor (Reference Figure 7.a)
- C8: 100uF Capacitor (Reference Figure 7.a)

4.3 Soldering

Solder the components.

Recommended Order

1. R8: 1kΩ Resistor
2. D5: Red LED
3. D3: Schottky Diode

4. C4, C5: 220uF Capacitors
5. C8: 100uF Capacitor
6. IC2: Buck Converter IC
7. L1: 100uH Inductor

4.4 Quality Assurance

5 Omega 2S+

5.1 Materials

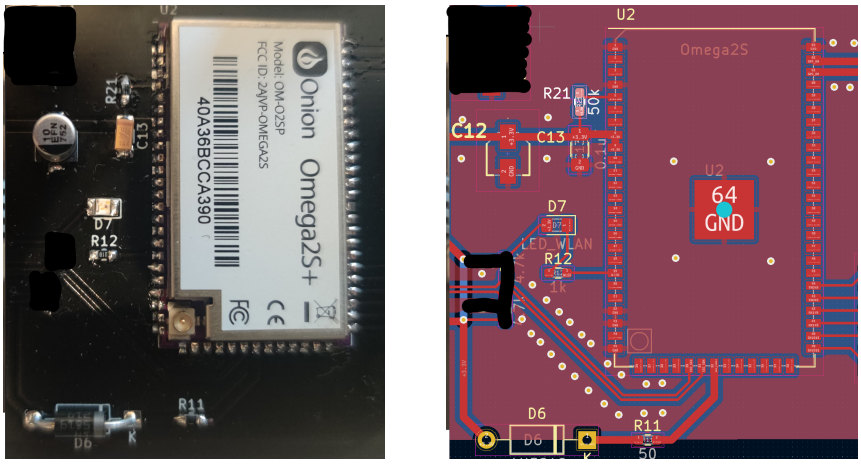
Begin by retrieving the components in Figure 8.

Part No.	Description	Silkscreen No(s).	Quantity
OM-O2SP	Omega2S+	U2	1
RT0603BRE0750RL	50Ω Resistor	R11	1
RT0603FRE131KL	1kΩ Resistor	R12	1
RT0603BRD0750KL	50kΩ Resistor	R21	1
150080VS75000	Green LED	D7	1
1N5819	Schottky Diode	D6	1
EEE-FN1E100R	10uF Capacitor	C12	1
T491A104K035AT	0.1uF Capacitor	C13	1

Figure 8: Required Components for Omega2S+ Subsystem

5.2 Layout

Reference Figure 9 to properly place the components.



(a) Soldered Example (b) PCB Layout

Figure 9: Omega2S+ Subsystem Layout Reference

Polarity Notes
Pay special attention to the orientation of the following components.

- C12: 10uF Capacitor (Reference Figure 9.a)

- C13: 0.1uF Capacitor (Bevel and band towards H1/H2 side of board)
- D6: Schottky Diode (Band towards H2/H4 side of board)
- D7: Green LED (Arrow towards H2/H4 side of board)

5.3 Soldering

Solder the components.

Recommended Order

1. R11: 50Ω Resistor
2. R12: 1kΩ Resistor
3. R21: 50kΩ Resistor
4. D7: Green LED
5. D6: Schottky Diode
6. C12: 10uF Capacitor
7. C13: 0.1uF Capacitor
8. U2: Omega2S+

After soldering, attach antenna to U2's U.FL connector.

5.4 Quality Assurance

6 Battery Monitor Subsystem

6.1 Materials

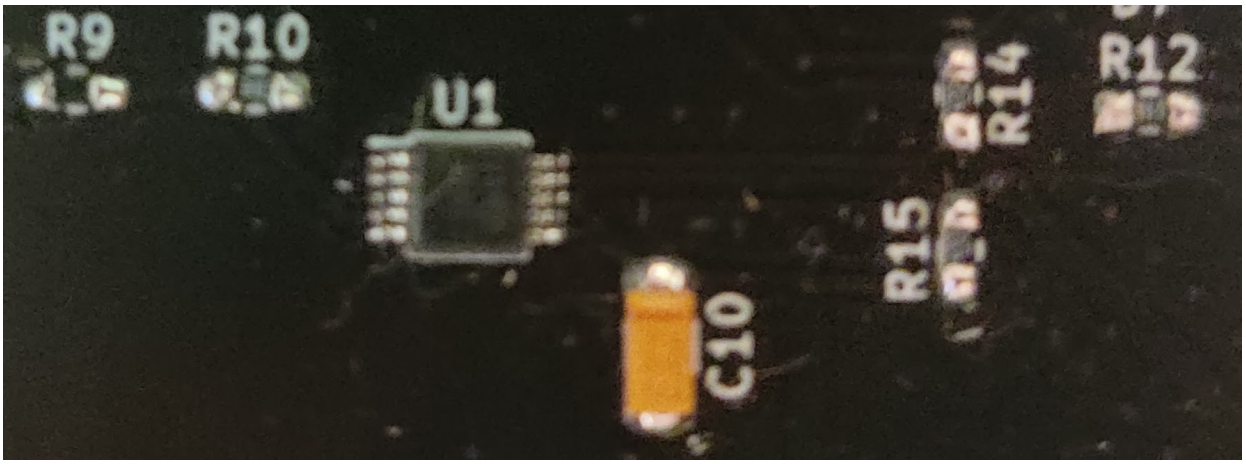
Begin by retrieving the components in Figure 10.

Part No.	Description	Silkscreen No(s).	Quantity
ADS1113IDGST	ADC	U1	1
RT0603BRD0750KL	50kΩ Resistor	R9	1
RT0603DRE0720KL	20kΩ Resistor	R10	1
RT0603DRE074K7L	4.7kΩ Resistor	R14, R15	2
T491A104K035AT	0.1uF Capacitor	C10	1

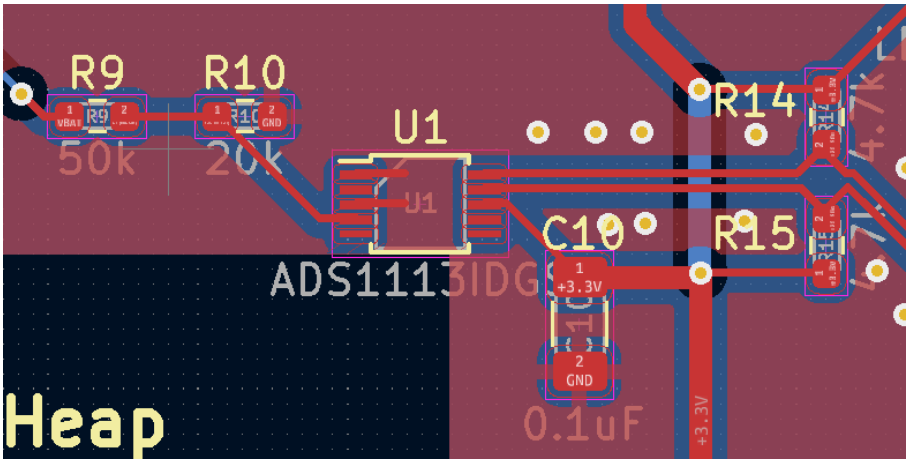
Figure 10: Required Components for Battery Monitor Subsystem

6.2 Layout

Reference Figure 11 to properly place the components.



(a) Soldered Example



(b) PCB Layout

Figure 11: Battery Monitor Subsystem Layout Reference

Polarity Notes
Pay special attention to the orientation of the following components

- C10: 0.1uF Capacitor (Bevelled, banded side towards H1/H2 side of the board)
- U1: ADC (Dot towards the H1 corner of the board)

6.3 Soldering

Solder the components.

Recommended Order

1. U1: ADC
2. R9: 50kΩ Resistor
3. R10: 20kΩ Resistor
4. R14, R15: 4.7kΩ Resistor
5. C10: 0.1uF Capacitor

6.4 Quality Assurance

7 GPS Sensor Subsystem

7.1 Materials

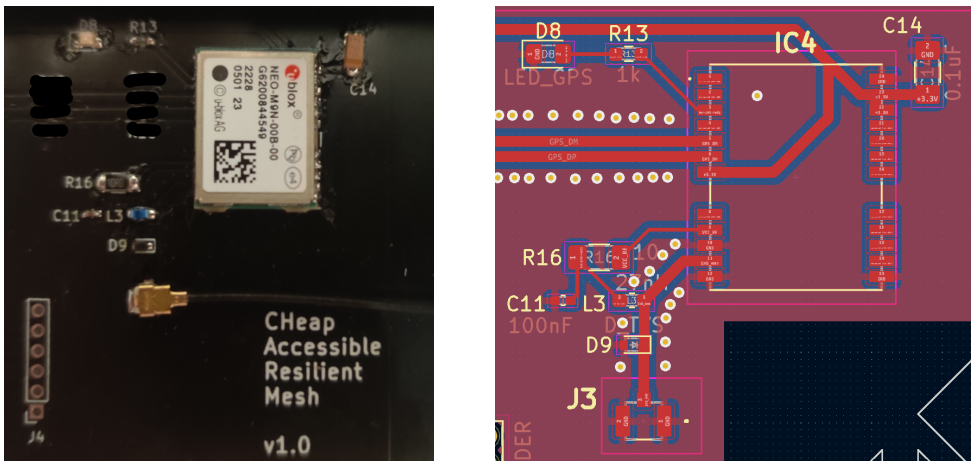
Begin by retrieving the components in Figure 12.

Part No.	Description	Silkscreen No(s).	Quantity
NEO-M9N-00B	GPS IC	IC4	1
C1005X7R1C104K050BC	100nF Capacitor	C11	1
T491A104K035AT	0.1uF Capacitor	C14	1
150080YS75000	Yellow LED	D8	1
AQ3522-01LTG	TVS Diode	D9	1
LQW18AN27NG00D	27nH Inductor	L3	1
U.FL-R-SMT(01)	U.FL Connector	J3	1
RT0603FRE131KL	1kΩ Resistor	R13	1
RT1206FRE1310RL	10Ω Resistor	R16	1

Figure 12: Required Components for GPS Sensor Subsystem

7.2 Layout

Reference Figure 13 to properly place the components.



(a) Soldered Example

(b) PCB Layout

Figure 13: GPS Sensor Subsystem Layout Reference

Polarity Notes

Pay special attention to the orientation of the following components

- IC4: GPS IC (Dot towards the H1 corner of the board)
- C11: TREVOR TODO
- C14: 0.1uF Capacitor (Bevelled, banded edge towards H3/H4 side of the board)
- D8: Yellow LED (Arrow towards H1/H3 side of the board)
- D9: TREVOR TODO

7.3 Soldering

Solder the components.

Recommended Order

1. IC4: GPS IC
2. C11: 100nF Capacitor
3. C14: 0.1uF Capacitor
4. D8: Yellow LED
5. D9: TVS Diode
6. L3: 27nH Inductor
7. J3: U.FL Connector
8. R13: 1kΩ Resistor
9. R16: 10Ω Resistor

After soldering, attach GPS antenna to J3.

7.4 Quality Assurance