Carlson SuperProbe Assembled PCB Kit

MK1ASM: 26 part kit (pre-assembly)
MK2ASM: 35 part kit (pre-assembly)

First, thanks for purchasing this kit. This is the assembled version of our 2 kits. There are many implementations of this non-contact probe on the web, but most seem to have stuck to Carlson's design rather closely. Since this is a kit of just the 2 PCBs and some of the remaining required parts, there is more needed to arrive at a final working probe. You can't go wrong reviewing and following the implementations presented on the Instructables website. In particular, this kit is based on the PCB designs from Yannick99. Certainly you should watch Carlson's original YouTube video on the probe. I can't do better in describing its adjustment and use.

Assembly & Testing
The PCB parts are almost exclusively SMD 0805/1206 size components. The 2 pads on top-side next to the probe tip input are connected to the backplane ground. Use these for reinforcing the tip support and as mounting holes if disired. At the output end the ground-plane is connected to the top-side pad with the mounting hole.

R16 (10K) in the output EF (T6) of the probe PCB is not normally installed. But if you choose to test or use the probe PCB as a stand-alone circuit you will need this to bias the emitter follower. Then you can drive any audio amplifier through its line-in filtering network. *The amplifier speaker is NOT grounded*, so take care that you never let a speaker lead touch the common or it may permanently damage the LM4871 amplifier chip.

We have fully tested the 2 PCBs *but the noise LED is not fitted*. Once you have decided on a probe body, you can arrange the LED mounting as needed by insulating the legs with some #22 wire insulation. The probe PCB draws only hundreds of micro amps, while the LM4871 amp PCB uses noticeably more with the speaker attached. If you have problems with the SuperAmp motor-boating, check your power supply connections and contacts. This LM4871 requires 100-200 mA to power up, where it then idles at 10-20mA. The SuperAmp schematic shows the expected DC node voltages with VCC=4.5V.

Case & Housing Options
Almost anything can be used to house the amplifier, though I recommend using some form of 3-contact (stereo) jack for interfacing the probe to the amplifier. (included in the MK2 kit) The amplifier can be powered using 3.5-5.5VDC from a variety of sources, but 4-AA batteries are the limit for the amplifier IC. We have only built units using 4 ohm 2 watt speakers. While 8ohm may work fine, output power is likely reduced.

The probe case ***must*** be all metal and connected to the common of the probe PCB (bottom) and shield of the wire probe tip. This can be a hazard around high-voltage circuits. Use insulation and safety techniques any time the voltage is greater than 48VDC. And even then, remember that a 10A 48V supply can do some real damage if a ring on the finger is used to test continuity!

You can use just about anything for the actual probe tip wire. I had some 1/8" rigid copper coax. Others have used 1/8" flex coax. Just insure that only about 1/16" of the tip of the wire has the shield removed.

Compromises
Carlson designed this probe to be as simple as possible yet have flexibility. Because the probe operates from a variable power supply, both amplifier controls affect the probe sensitivity. But because the probe consumes so little power, the voltage regulator pot was set at 2K. There is a risk in testing or use that the probe power lead may be shorted to

common accidently. This WILL destroy the pot. To protect against this, the design includes a 6V-40mA lamp that should be placed in series with the voltage regulator pot wiper lead. The lamp resistance is normally just a few ohms, but if the power lead is shorted the lamp will glow to protect the pot wiper. Fit it anywhere that makes sense. *(There remains the possibility, with a stereo type jack, of shorting the power momentarily if the probe is plugged or unplugged with the power switch on. The lamp will protect against damage in this case also.)*

I do not find the LED pop indicator very sensitive at low settings of the supply POT. The LED is biased through 1K ohm to the probe supply. Since this supply has a rather high output resistance (the pot), the LED can't be made really bright. Yes it can be made to flicker, but you have to be looking at it. So physical positioning of the LED should be considered early in the probe case design.

Part List

The following list indicates all of the parts included in the kit. While I stuck to the parts specified by Yannick99 where I could, some were not available or were unreasonably expensive. The GREEN backgrounds are the kit part numbers. I have also indicated both the required component count and the included kit component count.

bag line #	*desc*	*part #*	*alt part #*	*qty-req*	*qty-kit*	*val*	*size*	*pol*
1	C	CL21B103KBANNNC		3	5	0.01uF	0805	none
2	C	TAJA226K010TNJ		5	6	22uF	1206	+band
3	C	CL21B104KBCNNNC		3	5	0.1uF	0805	none
4	C	CL21A475KOFNNNE		4	5	4.7uF	0805	none
5	C	80-C0805C361J5G		1	2	360pF	0805	none
6	C	CL21B105KAFNNNE		1	2	1uF	0805	none
7	D	1N5711WS	1PS76SB70,115	1	2	1N5711	SMD	K band
8	Q	MMBT3904		7	9	2N3904	SMD	
9	R	ERJ-6GEYJ335V		5	7	3.3M	0805	
10	R		CRGCQ0805F15K	3	5	15K	0805	
11	R		CRGCQ0805F2K7	1	2	2.7K	0805	
12	R		CRGCQ0805F1K0	5	7	1K	0805	
13	R		CRGCQ0805F330K	1	2	330K	0805	
14	R		CRGCQ0805F10K	1	2	10K	0805	
15	R		CRGCQ0805F22K	3	5	22K	0805	
16	R	ERJ-6ENF6802V	CRGCQ0805F68K	1	2	68K	0805	
17	R		CRGCQ0805F100R	1	2	100	0805	
18	VR	CT-6EX104		1	1	100K	TH	
19	VR	eBay	P160KNP-0EC15B2K	1	1	2K	PNL	LIN
20	VR	987-1736	P160KNPD-4QA15A5K	1	1	4.7K	PNL	AUD
21	SW1	EG2350	OS102011MA1QN1	1	1	SPDT	TH-RA	
22	U	LM4871MX/NOPB		1	1	LM4871	SMD	
23	PCB			1	1	SupAmp		
24	PCB			1	1	SupProbe		
25	LED	TLLK4401	SSL-LX3054SRD	1	1	320mcd	T1-red	noise
26	LMP	560-1730	CM683	1	1	6V-40mA		

SuperAmp Part List

	MC Supe rAmplifier 1/13/25			
Kit	***Bag #***	*Quantity Needed*	***Reference***	*Part*
MK1	❑ *2*	2	C2,C6	22uF
MK1	❑ *3*	1	C3	0.1uF
MK1	❑ *4*	2	C4,C5	4.7uF
MK1	❑ *6*	1	C1	1uF
MK1	❑ *8*	1	T1	2N3904
MK1	❑ *12*	1	R3	1K
MK1	❑ *15*	3	R1,R2,R5	22K
MK1	❑ *16*	1	R4	68K
MK1	❑ *17*	1	R6	100
MK1	❑ *19*	1	R7 POT	2K
MK1	❑ *20*	1	R8 POT	4.7K
MK1	❑ *22*	1	U2	LM4871
MK1	❑ *26*	1	DS1	6V-40mA
MK2	❑ *27*	2	KB	6mm Knurl Nobs
MK2	❑ *28*	1	J1	3.5mm jack
MK2	❑ *30*	1	SW1	Pwr SW
MK2	❑ *32*	24”	#22	Hook up wire
MK2	❑ *33*	1	R9	430-470
MK2	❑ *34*	12”	1/8”	Shrink tube
MK2	❑ *35*	1	D1	Org LED

SuperProbe Part List

	MC Super Probe Revised:1/13/25			
Kit	***Bag #***	*Quantity Needed*	***Reference***	*Part*
MK1	❑ *1*	3	C1,C3,C10	0.01uF
MK1	❑ *2*	3	C2,C5,C7	22uF
MK1	❑ *3*	2	C4,C6	0.1uF
MK1	❑ *4*	2	C8,C11	4.7uF
MK1	❑ *5*	1	C9	360pF
MK1	❑ *7*	1	D2	1N5711
MK1	❑ *8*	6	T1,T2,T3,T4,T5,T6	2N3904
MK1	❑ *9*	5	R1,R4,R7,R9,R15	3.3MEG
MK1	❑ *10*	3	R3,R6,R11	15K
MK1	❑ *11*	1	R8	2.7K
MK1	❑ *12*	4	R2,R5,R10,R14	1K
MK1	❑ *13*	1	R12	330K
MK1	❑ *14*	1	R16	10K
MK1	❑ *18*	1	R13 (Trim POT)	100K
MK1	❑ *21*	1	SW1	SPDT
MK1	❑ *25*	1	D1	POP-LED
MK2	❑ *29*	1	JP1	3.5mm plug
MK2	❑ *31*	36”	3w+sh cable	cable

Feedback

It takes quite a bit of effort to put kits like this together, and it is easy to make a mistake or omission. If you find errors, omissions, or if you have suggestions on the instructions, kit, packaging or anything else, I would be happy to receive feedback.

I would encourage you to add your implementation to the Instructables “I Made This” section!

The easiest way to provide feedback would be by email to:

Kevin
hcsales@hwcz.com or ppsales@hwcz.com

References

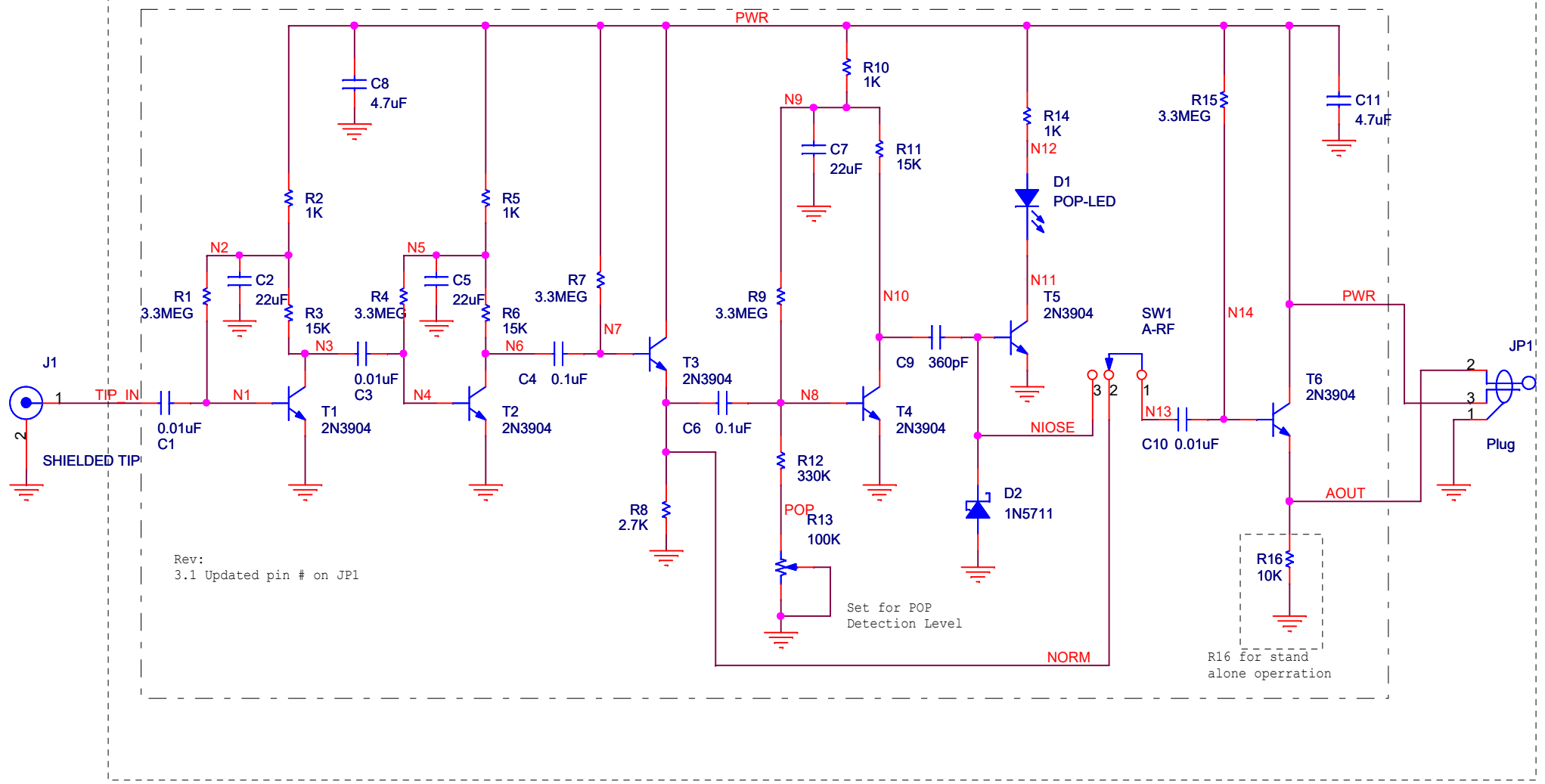
https://www.youtube.com/watch?v=uVkJqqZroN0&t=2583s

https://www.instructables.com/Carlsons-Super-Probe/

https://www.hollywoodcontrols.com/phpSP/MCSP_ SelectionGuide.php

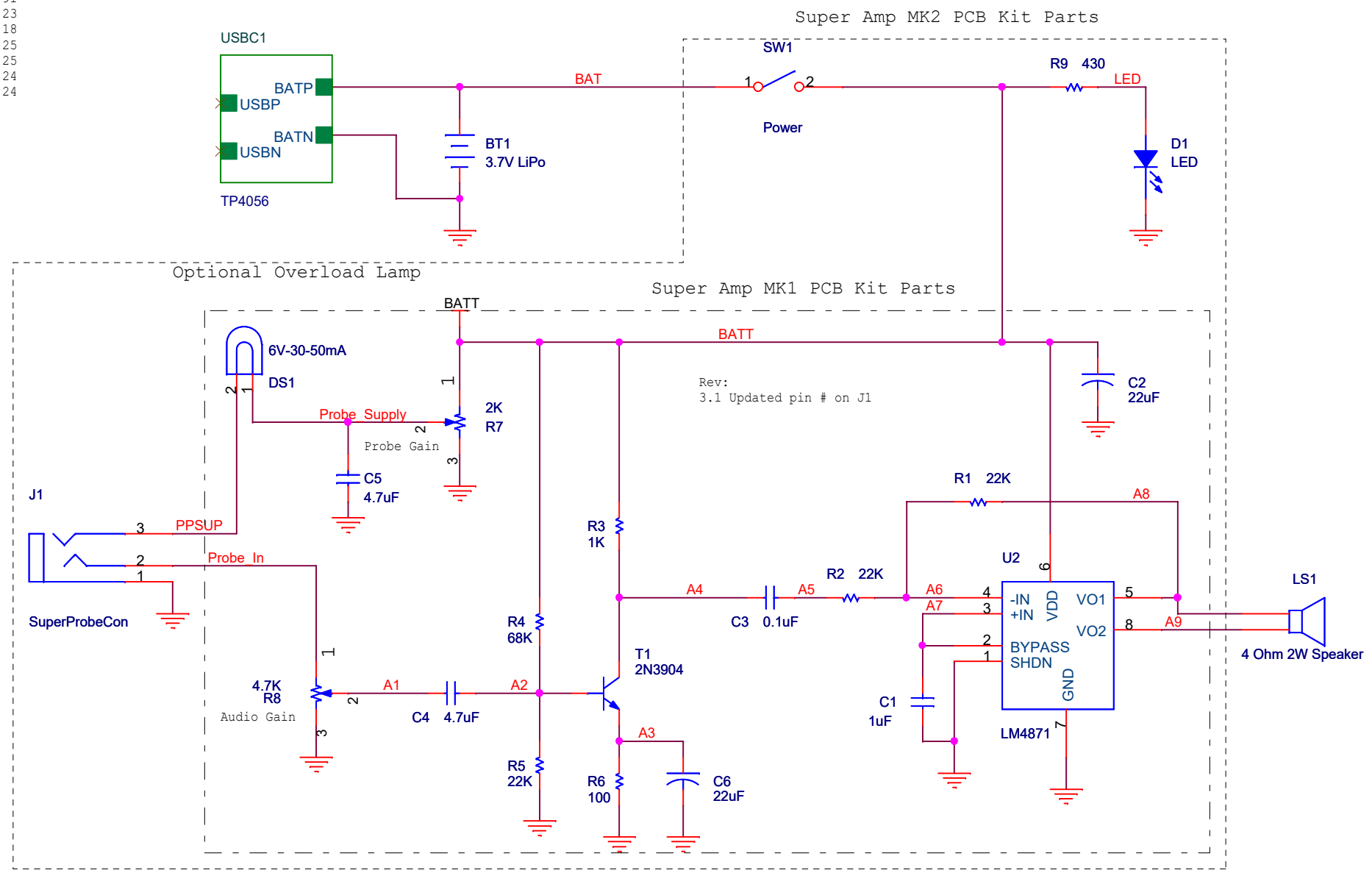
Super Probe MK2 PCB Kit Parts

Super Probe MK1 PCB Kit Parts



Title: Mr Carlson's Super Probe		
Size: A	Document Number: <Doc>	Rev: v3.1
Date: Wednesday, February 12, 2025	Sheet 1 of 1	

Node Voltages Vbatt = 4.5
BATT 4.5
A2 0.91
A3 0.23
A4 2.18
A6 2.25
A7 2.25
A8 2.24
A9 2.24



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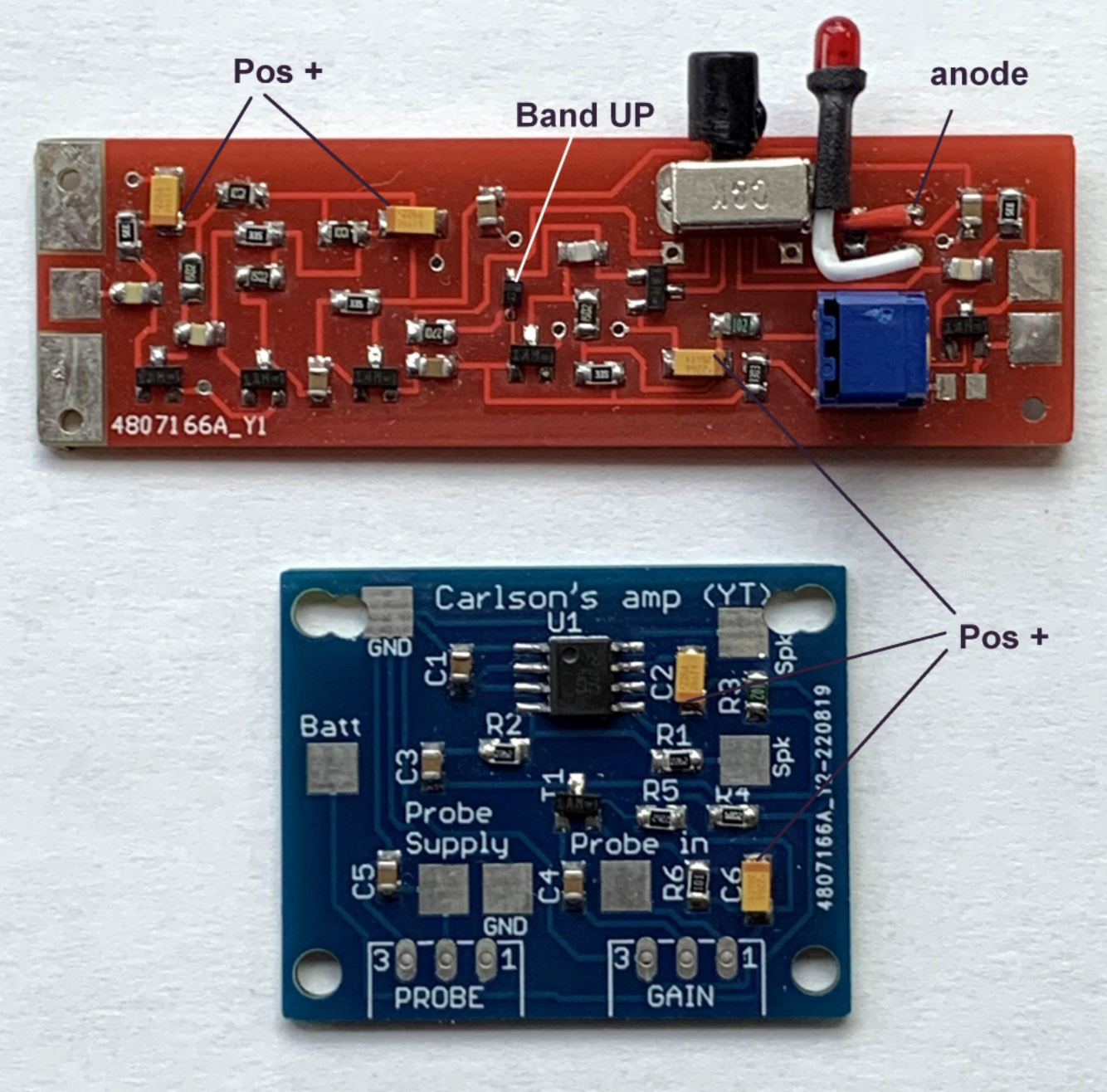
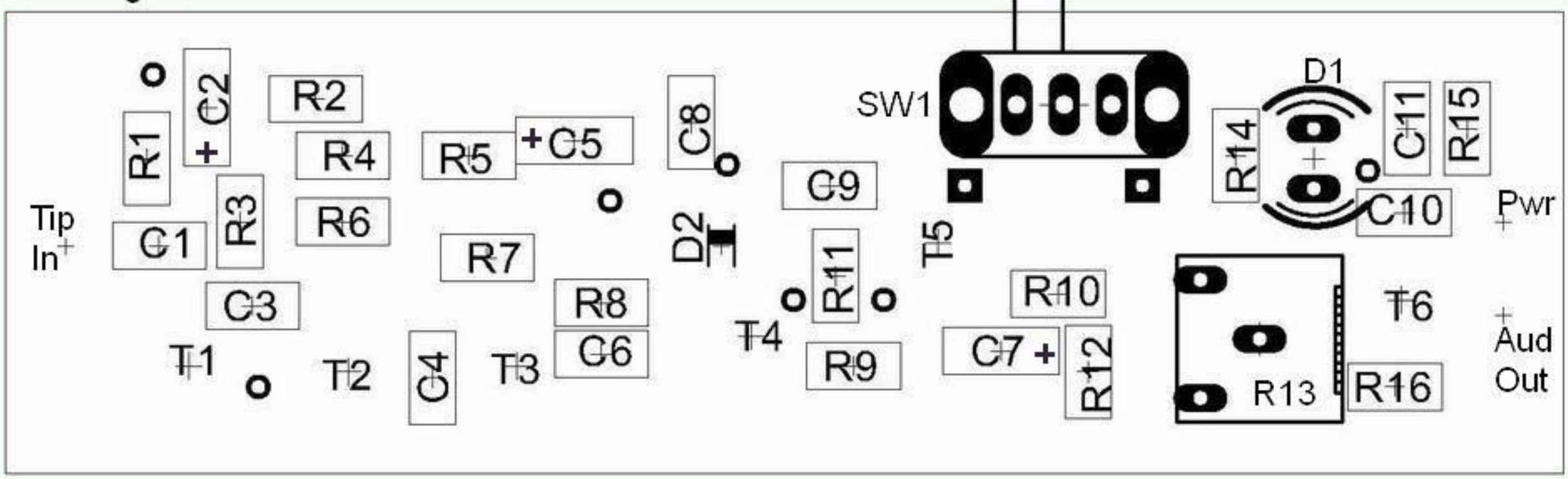
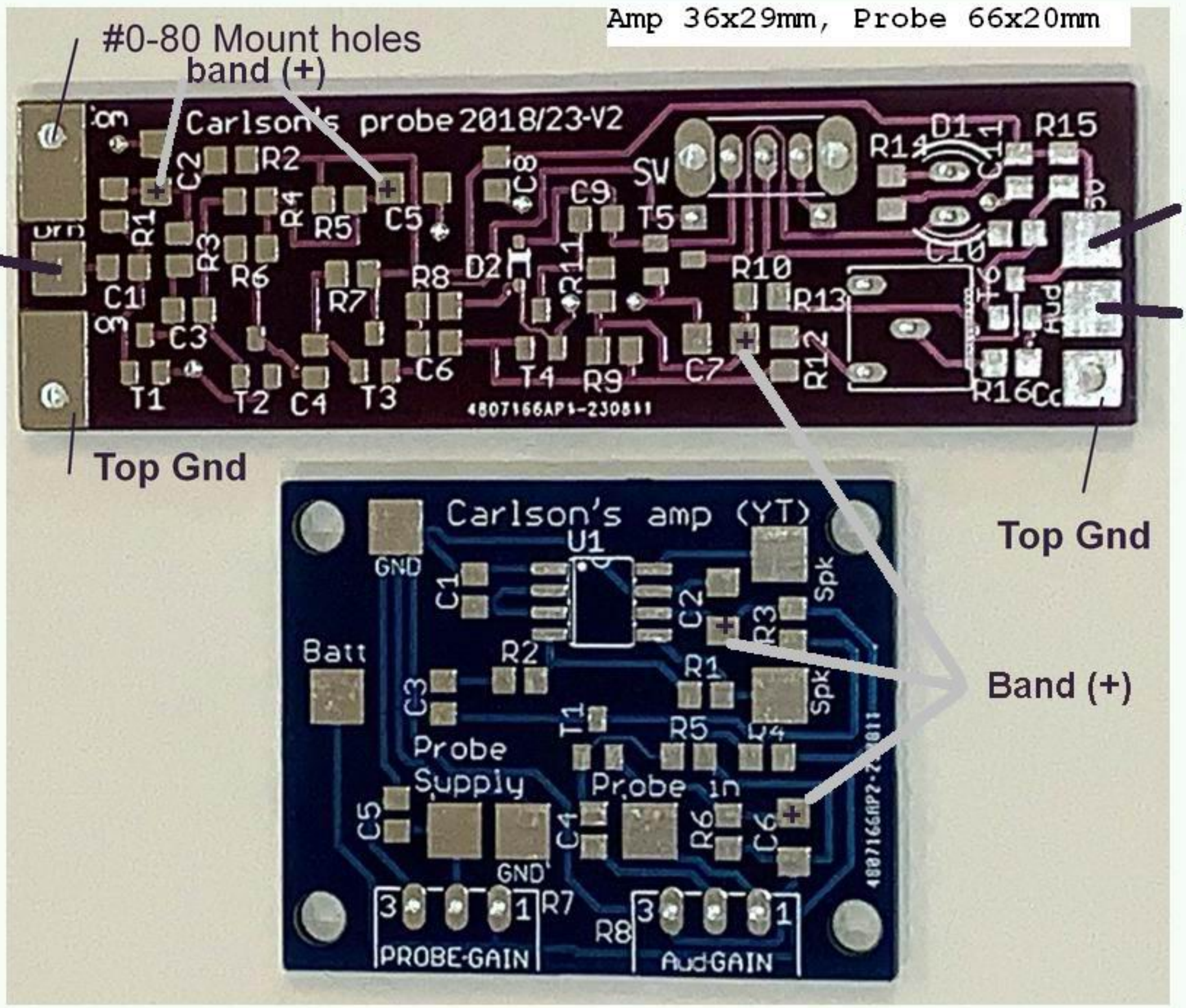
Size A	Document Number <Doc>	Rev 3.1
Date: Wednesday, February 12, 2025	Sheet 1 of 1	

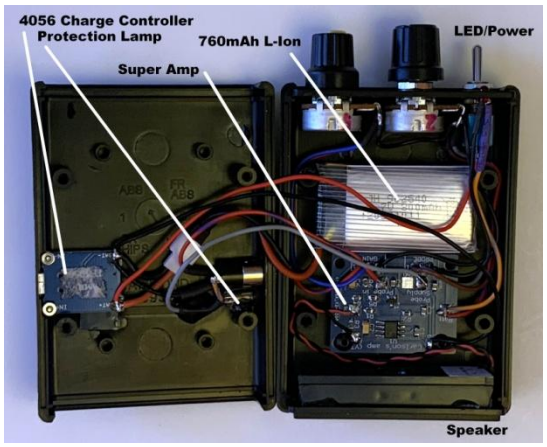

Pos +
Band UP
anode
4807166A_Y1
Carlson's amp (YT)
U1
GND
C1
C2
R3
Spk
Batt
R2
R1
C3
T1
R5
R4
Spk
Probe
Supply
Probe in
C5
C4
R6
C6
GND
3
1
PROBE
3
1
GAIN
4807166A_Y2-220819
Pos +

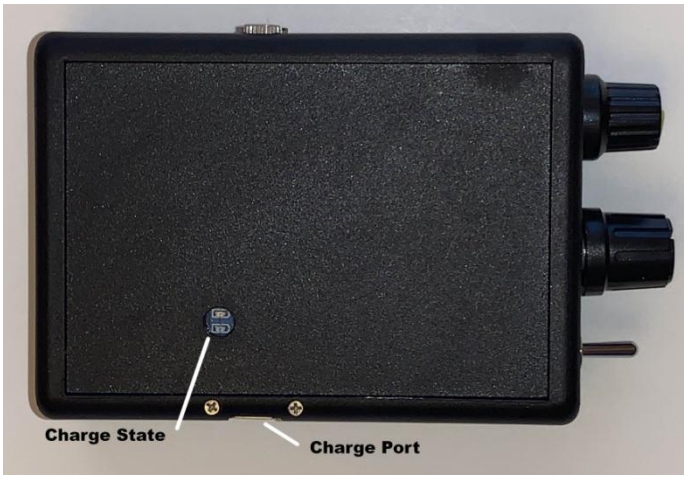
Drawing V2

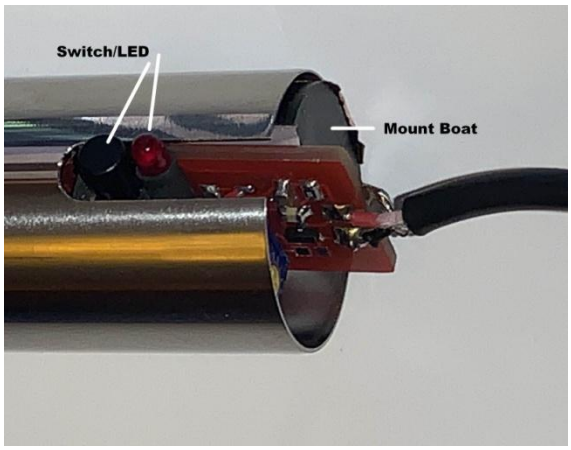


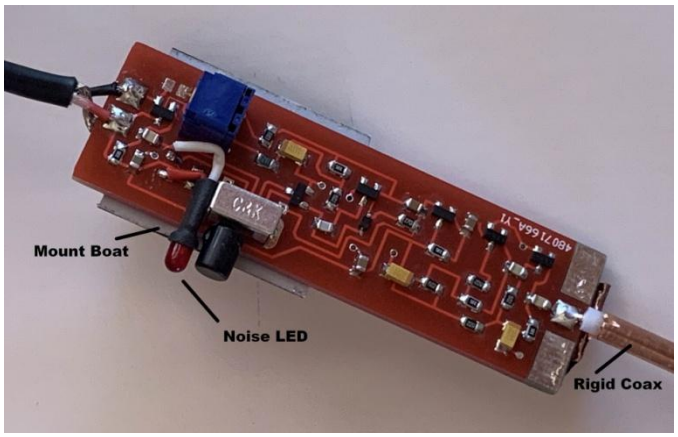
Amp 36x29mm, Probe 66x20mm

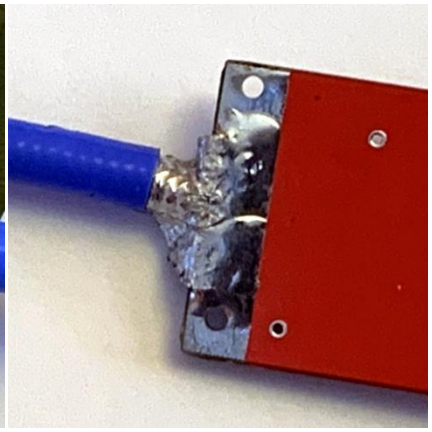


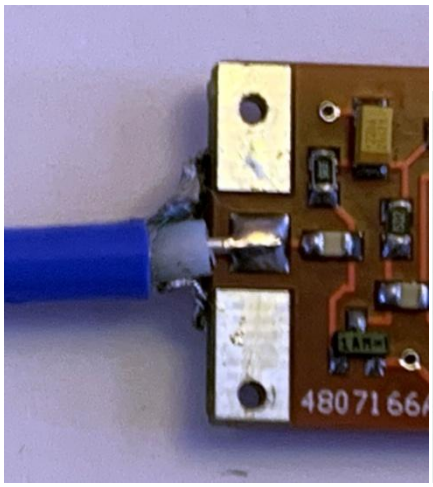

4056 Charge Controller
Protection Lamp
760mAh L-Ion
LED/Power
Super Amp
Speaker

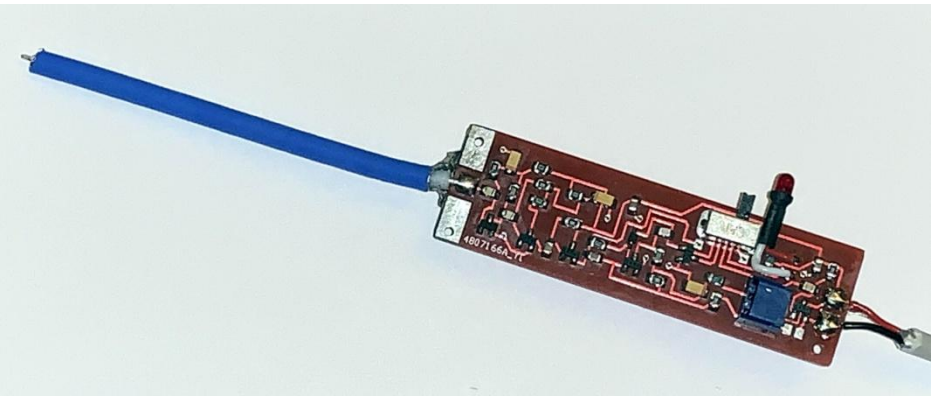

Charge State
Charge Port


Switch/LED
Mount Boat


Mount Boat
Noise LED
Rigid Coax







Basic Wiring Diagram