AgOpenGPS - ALL in One PCB

1. Standard or Micro

The first choice that we will have to make is which model of GPS receiver we are going to use:

Standard

https://www.ardusimple.com/product/simplertk2b/

Micro

https://www.ardusimple.com/product/simplertk2b-micro/

Options :

RF connector --------> SMA

Form Factor----------> Through hole

2. Antenna

https://www.ardusimple.com/product/ann-mb-00-ip67/

3. Single or dual

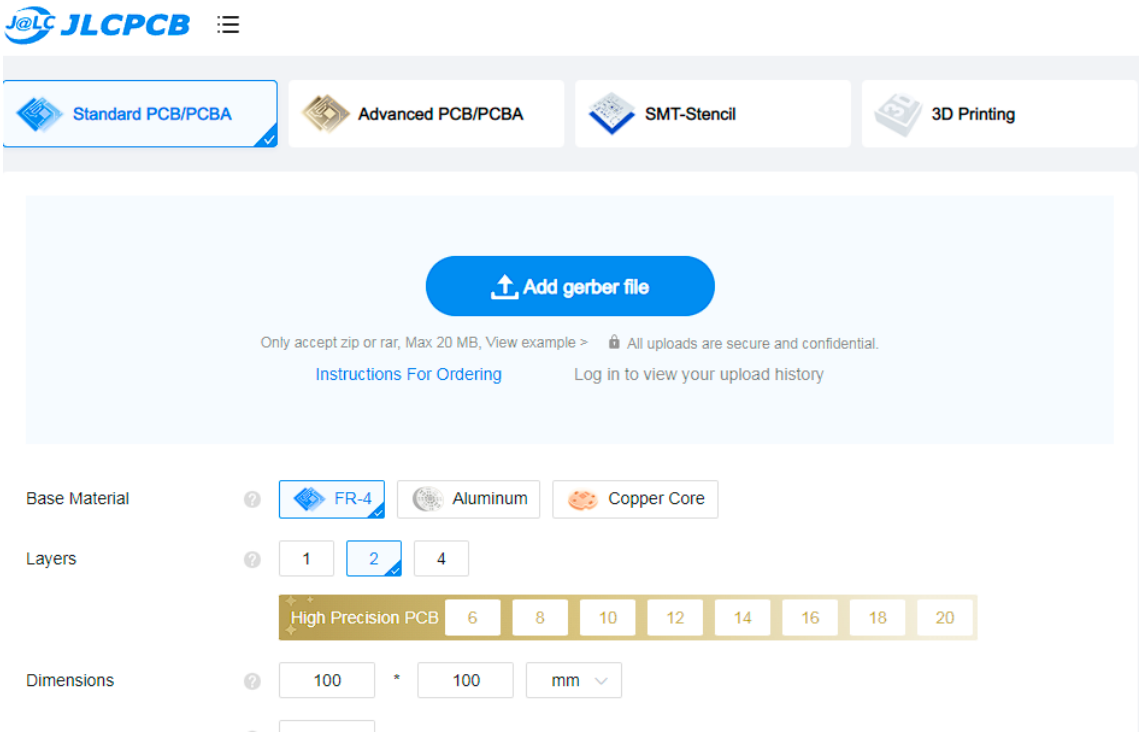
This choice is not important for the PCB model that you are going to make, it is only important to buy the receivers and antennas.

4. How order/build PCB

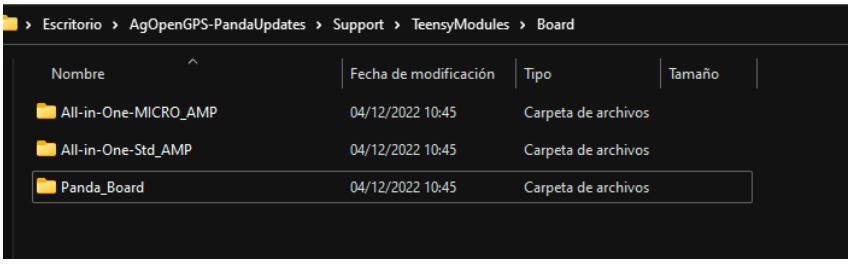
We use the JCLPCB service to manufacture our PCBs, but you can use another supplier if you prefer.

https://jlcpcb.com/

1.- Click on **Order Now** to access the page to place the order

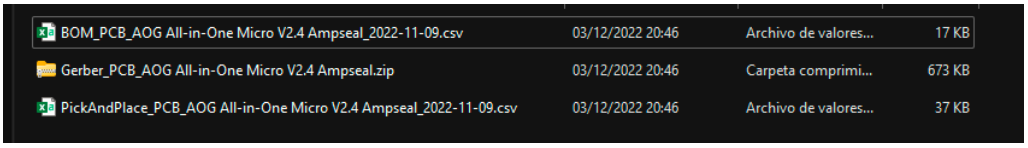


2.- Add gerber file, this files contents all info about PCB desing, these files are located in **AgOpenGPS/Support/TeensyModules/Board**

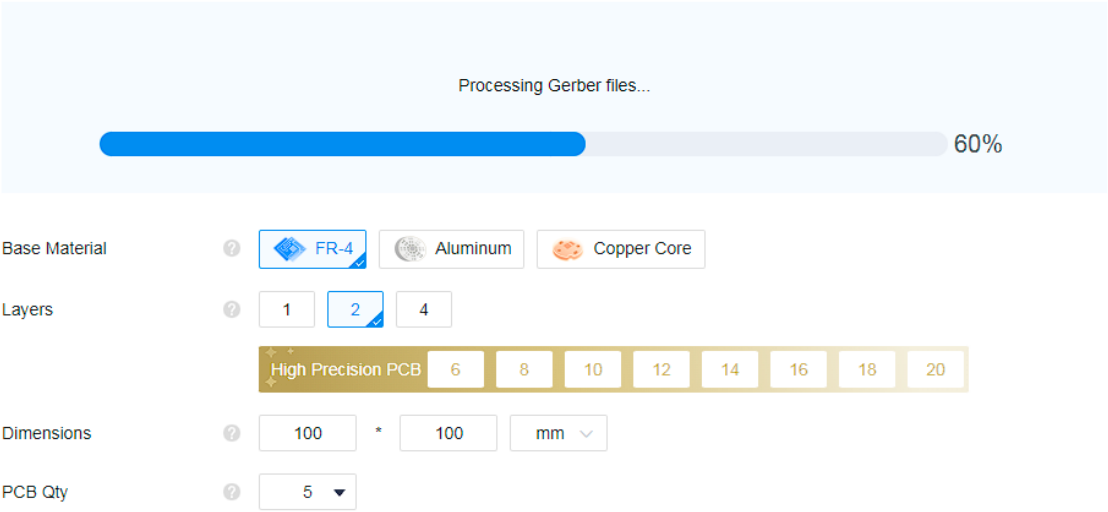


3.- We will use the Micro or Standard folder depending on our choice of receiver

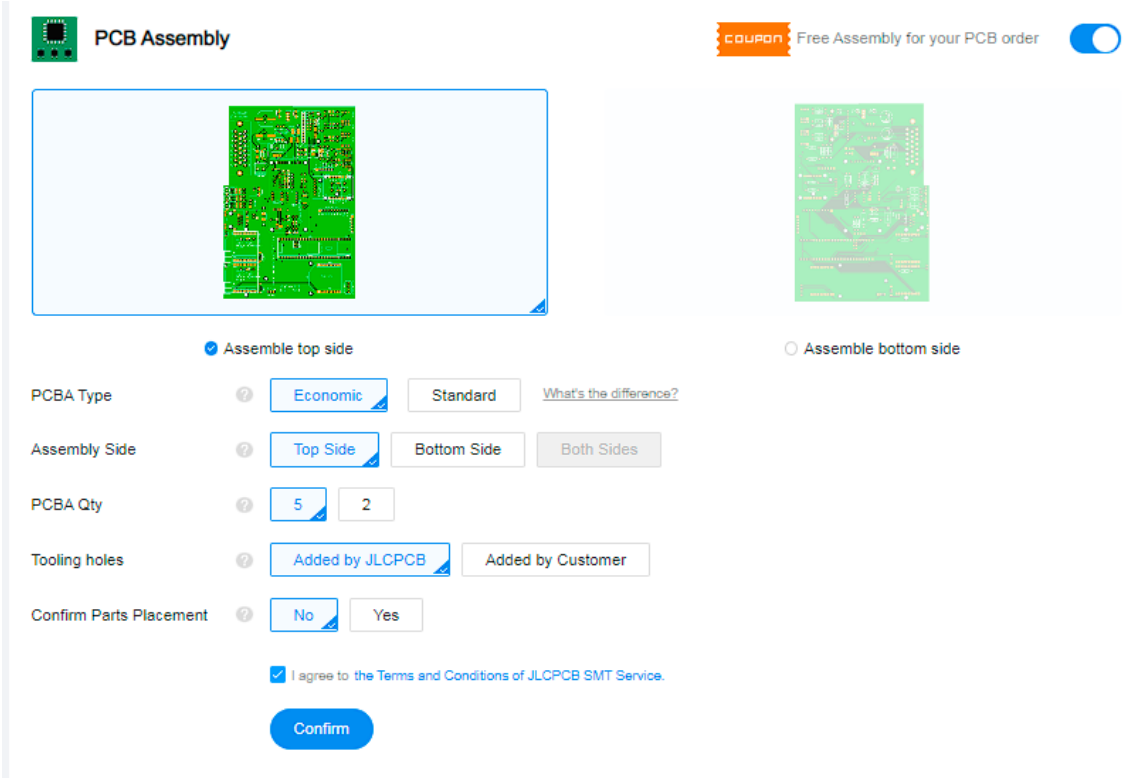
4.- Inside each folder we will find three files that we are going to use



5.- Upload Gerber.zip file in JCLPCB

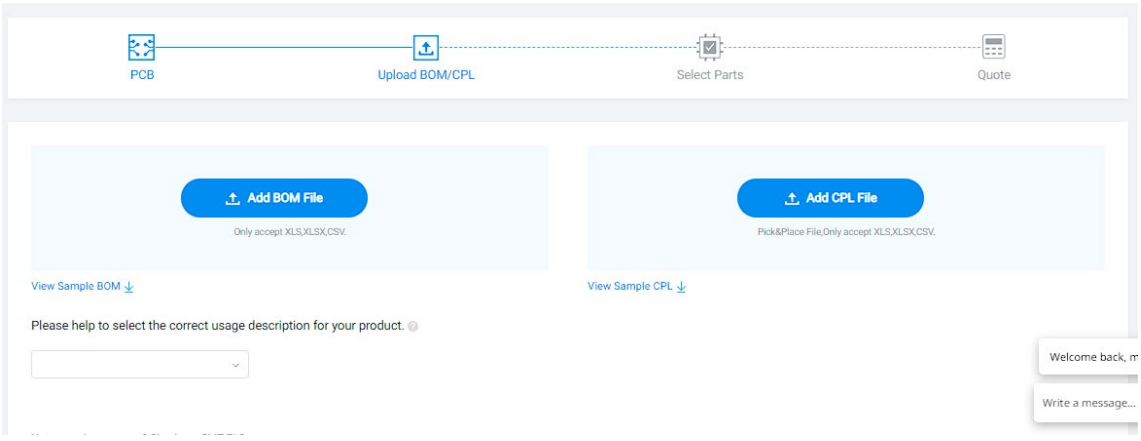


6.- Activate PCB Assembly

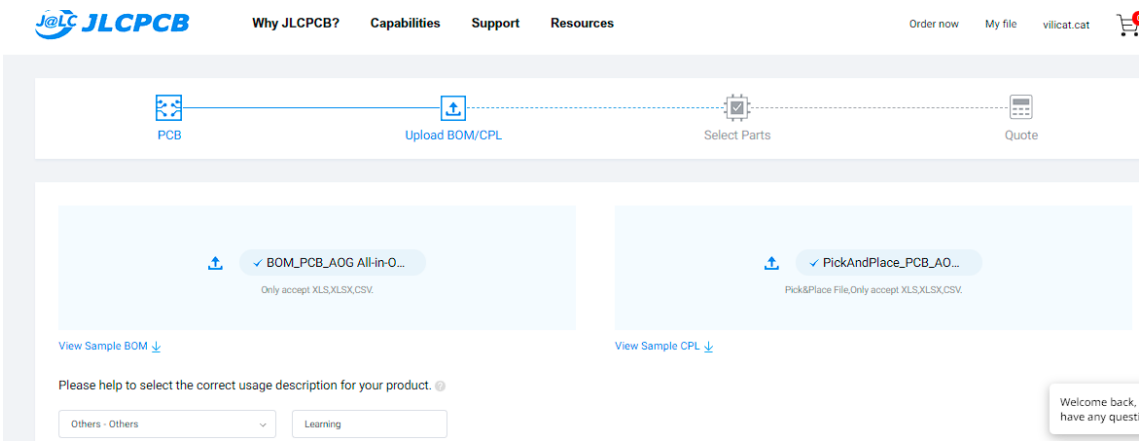


Here you need select assemble top side, and other important things are PCBA quantity, you can choose 5 full PCB (with SMD components soldered) or only 2 full PCB and 3 empty. If you choose Confirm Parts placement an JCLPCB engineer will correct your part placement and polarity (this action need your confirmation)

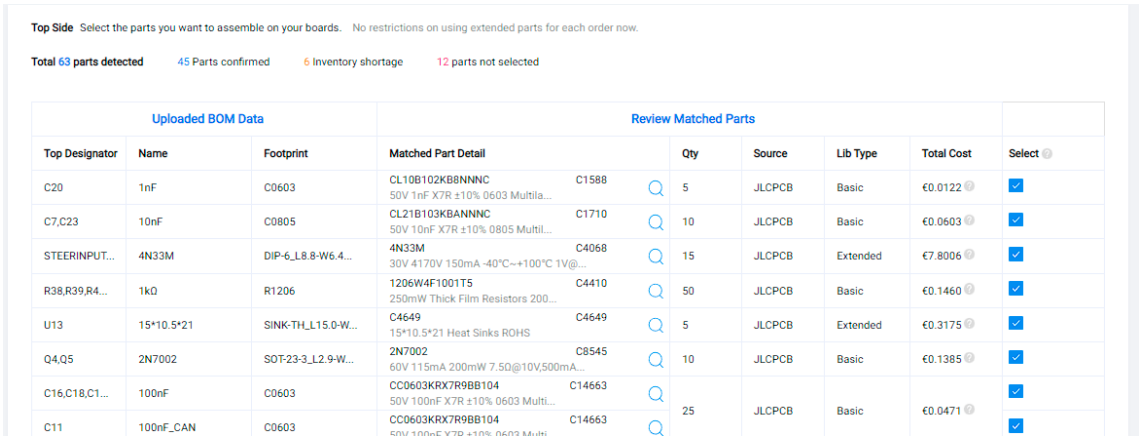
7.- Bom and CPL files



Here upload the other two files, the BOM and the CPL, BOM is components list, and CPL is the place



8.- Select Parts



Top Side Select the parts you want to assemble on your boards. No restrictions on using extended parts for each order now.

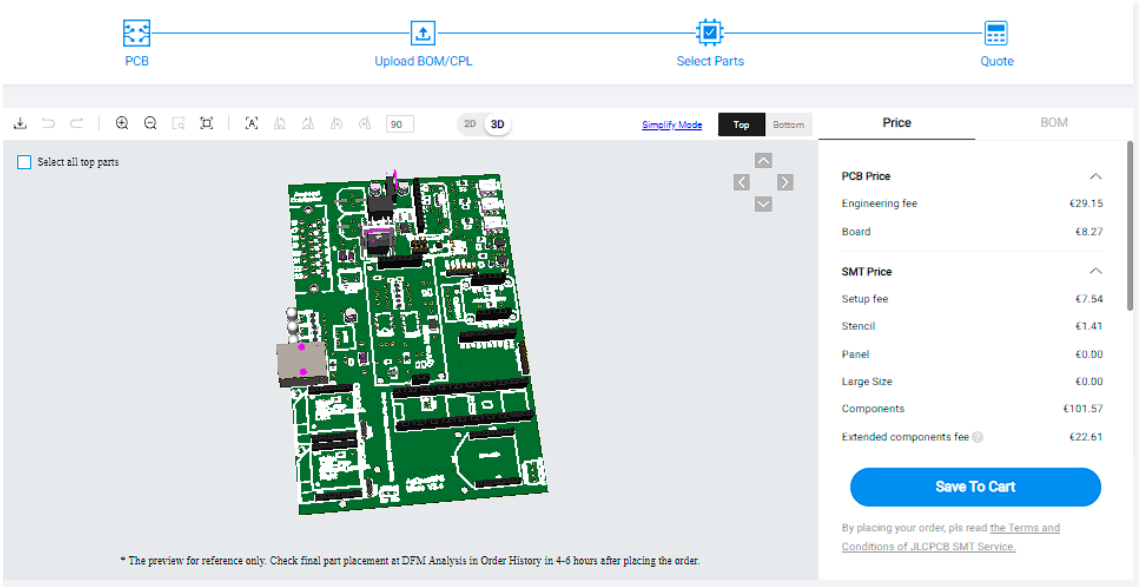
Total 63 parts detected 45 Parts confirmed 6 Inventory shortage 12 parts not selected

Uploaded BOM Data			Review Matched Parts					
Top Designator	Name	Footprint	Matched Part Detail	Qty	Source	Lib Type	Total Cost	Select
C20	1nF	C0603	CL10B102KB8NNNC C1588 50V 1nF X7R ±10% 0603 Multila...	5	JLCPCB	Basic	€0.0122	☑
C7,C23	10nF	C0805	CL21B103KBANNNC C1710 50V 10nF X7R ±10% 0805 Multil...	10	JLCPCB	Basic	€0.0603	☑
STEERINPUT...	4N33M	DIP-6_L8.8-W6.4...	4N33M C4068 30V 4170V 150mA -40°C~+100°C 1V@...	15	JLCPCB	Extended	€7.8006	☑
R38,R39,R4...	1kΩ	R1206	1206W4F1001T5 C4410 250mW Thick Film Resistors 200...	50	JLCPCB	Basic	€0.1460	☑
U13	15*10.5*21	SINK-TH_L15.0-W...	C4649 C4649 15*10.5*21 Heat Sinks ROHS	5	JLCPCB	Extended	€0.3175	☑
Q4,Q5	2N7002	SOT-23-3_L2.9-W...	2N7002 C8545 60V 115mA 200mW 7.5Ω@10V,500mA...	10	JLCPCB	Basic	€0.1385	☑
C16,C18,C1...	100nF	C0603	CC0603KRX7R9BB104 C14663 50V 100nF X7R ±10% 0603 Multi...	25	JLCPCB	Basic	€0.0471	☑
C11	100nF_CAN	C0603	CC0603KRX7R9BB104 C14663 50V 100nF X7R ±10% 0603 Multi...					☑

A list of all the components opens, with all the details of each one, the name, the quantity, the price...

We will have **Confirmed parts, Non-selected parts** (in red), which are the components that we will have to buy elsewhere (for example, the GPS receiver or the BNO085) and parts in **Inventory Storage** (restocking) due to supply problems. In these parts you can try to find a substitute in JLCPCB or in another provider (with this last option you will have to solder it yourself).

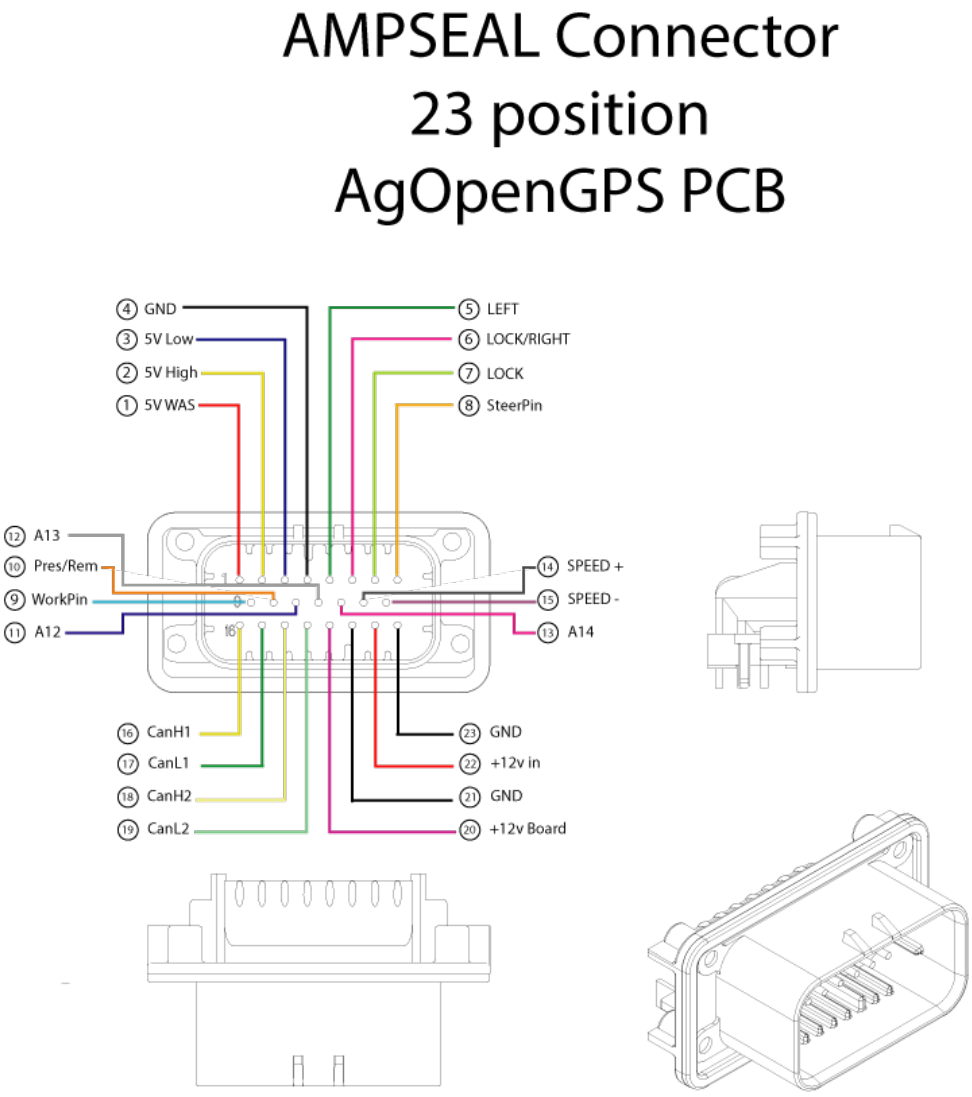
9.- Quote



We are done, we just need to pay and wait for the postman :)

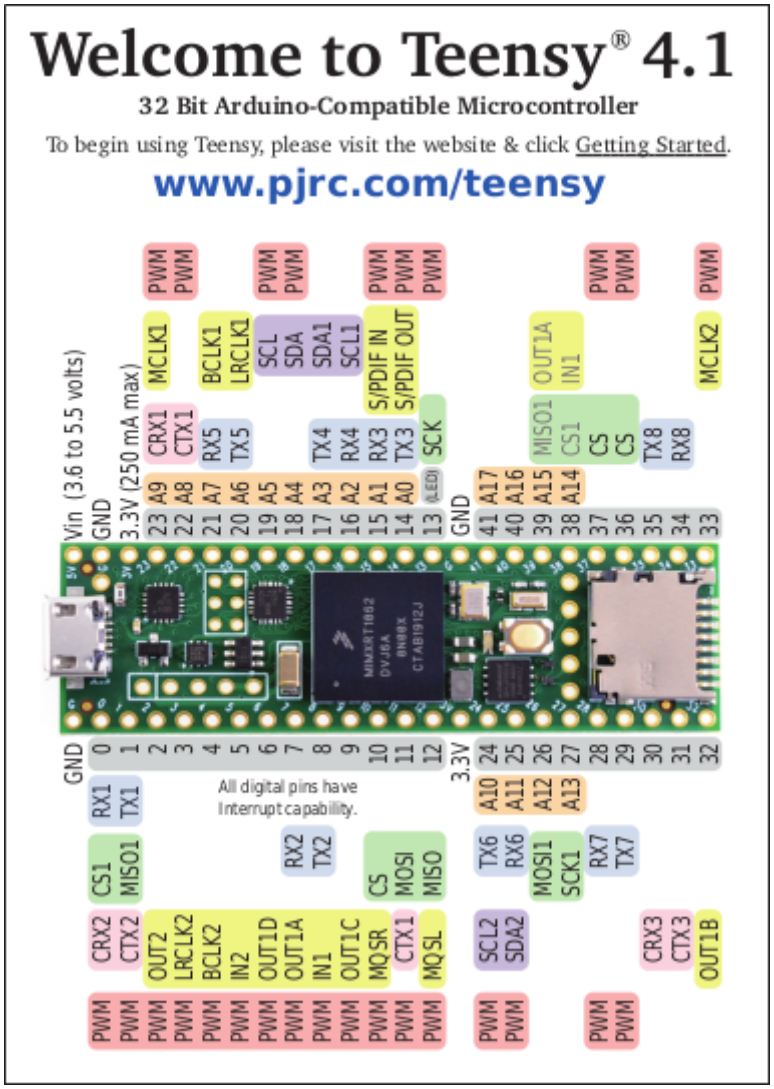
5. COMPO1NENTS

1.- AMPSEAL Connector Automotive Header 776087-1



2.- Housing for Female Terminals, Wire-to-Board, 23 Position, .157 in [4 mm] Centerline, Sealable, Black, Power & Signal, AMPSEAL 770680-1

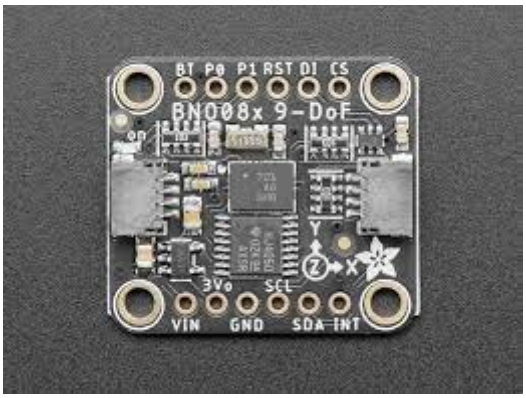
3.- Teensy 4.1 Development Board



4.- Cytron MD13S - Cytron 13Amp Motor Driver

5.- WAS (Wheel Angle Sensor)

6.- Optional in Dual receiver, mandatory for single. BNO085X



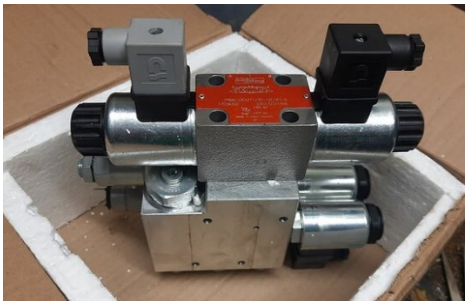
7.- Jumpers

8.- Power ON switch, optional

9.- Ethernet Cable (CAT6 recommended)

10.- Tablet Windows (800 nits recommended)

11.- Motor or Valves

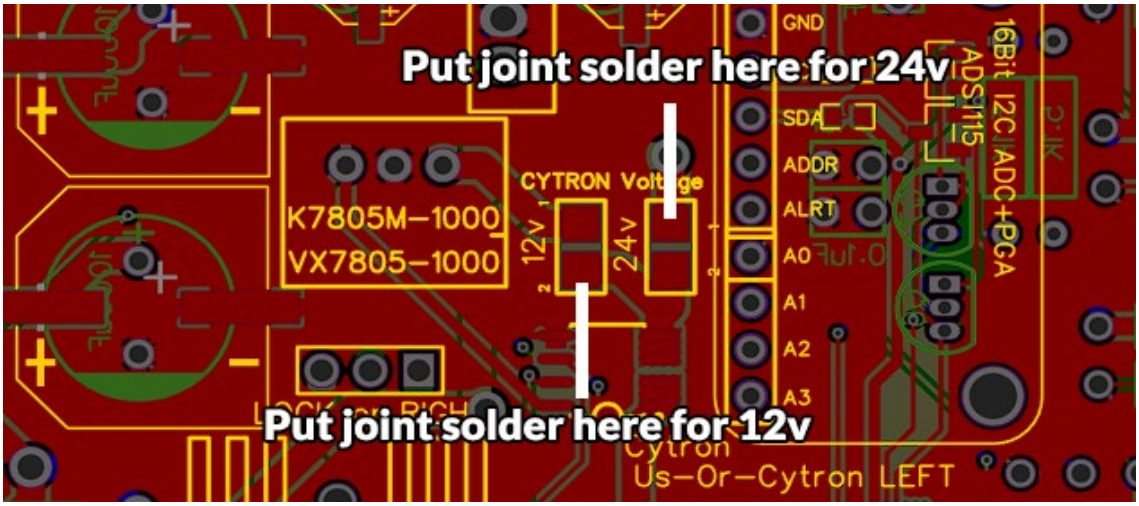


6. WIRINGS AND CONNECTIONS

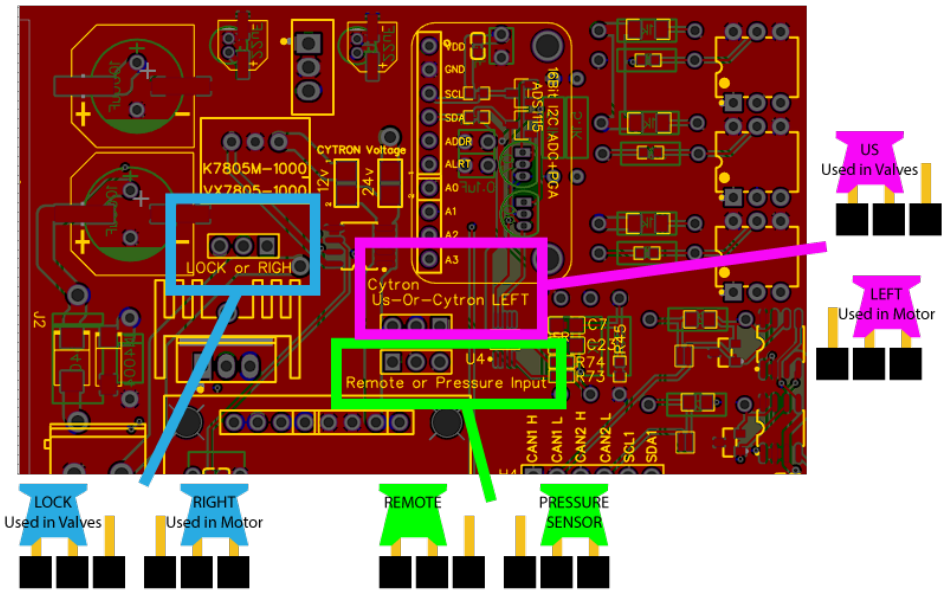
Component	PIN	Optional PIN	Description
Battery +	22		+12v in
Battery -	23	21/4	GND
WAS 5V	1		Power WAS 5v
WAS GND	4	21/23	GND WAS
WAS Low	3		WAS signal
WAS High	2		Used for differential WAS (Factory installed WAS)
Steerswitch	8		ON/OFF Autosteering
Steerswitch GND	23	21/4	
Workswitch	9		ON/OFF sections
Workswitch GND	23	21/4	
Remote/Pressure	10		Used for pressure sensor in valves or encoder in motor
Remote/Pressure GND	23	21/4	
Left	5		Power output for motor/valves
Lock/Right	6		Power output for motor/valves
Lock	7		Used in valves
CanH1	16		Can High Output channel 1
CanL1	17		Can Low Output channel 1
CanH2	18		Can High Output channel 2
CanL2	19		Can Low Output channel 2
Speed +	14		Output speed pulse +
Speed -	15		Output speed pulse -
A12	11		!Use at your own risk! Unprotected connection to pin A12
A13	12		!Use at your own risk! Unprotected connection to pin A13
A14	14		!Use at your own risk! Unprotected connection to pin A14
+12v Board	20		+12v Output

7. PCB CONFIGURATION

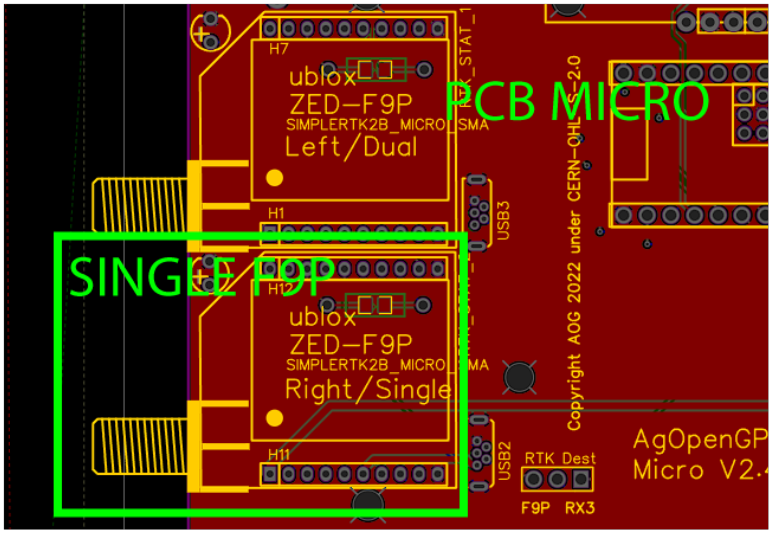
1.- 12v or 24v Motor

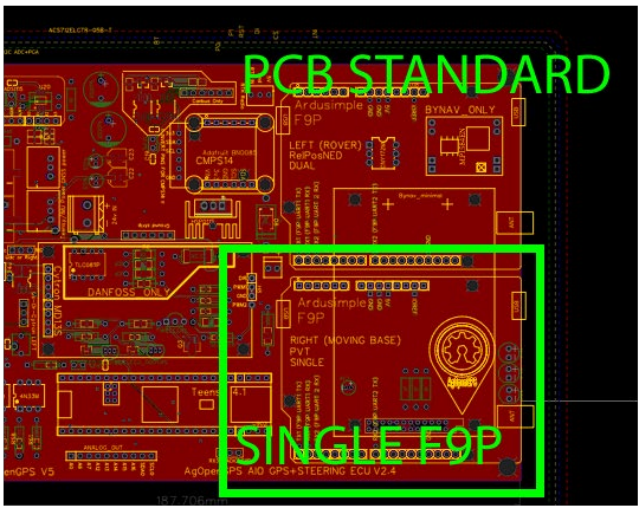


2.- Motor or Valves (Jumper configuration)

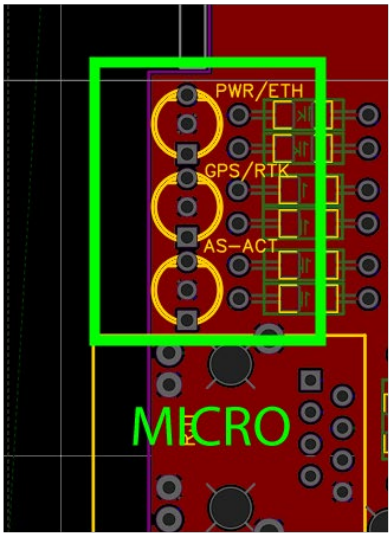


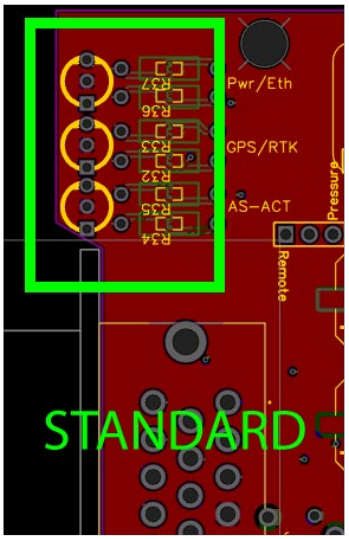
3.- F9P slot in single mode





8. READING LEDS





LED	COLOR	
PWR/ETH	RED	Power on
PWR/ETH	GREEN	Ethernet active
GPS/RTK	RED	GPS ON, NO RTK
GPS/RTK	GREEN	GPS ON, RTK ON
AS-ACT	RED	Steer Module connected and enabled; steer switch off
AS-ACT	GREEN	Autosteer connected and enabled

9.- FIRMWARE UPLOAD

Teensy uses a special firmware located in :

AgOpenGPS/Support/TeensyModules/Firmware/Autosteer_gps_teensy_vx_x/

vx_x are a version number e.: v5_5

To upload the firmware we use the Arduino IDE 1.8.xx together with the TeensyArduino plugin, or this plugin is already included in version 2.0.xx of the program.

More info in :

https://www.pjrc.com/teensy/teensyduino.html

10.- F9P CONFIGURATION AND FIRMWARE UPLOAD

Config files are located in :

AgOpenGPS/Support/Ublox F9P Configurations/

Config Upload and firmware update :

https://discourse.agopengps.com/t/f9p-firmware-update-and-config-files/8830