

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY



PCB Design of H-Bridge Circuit

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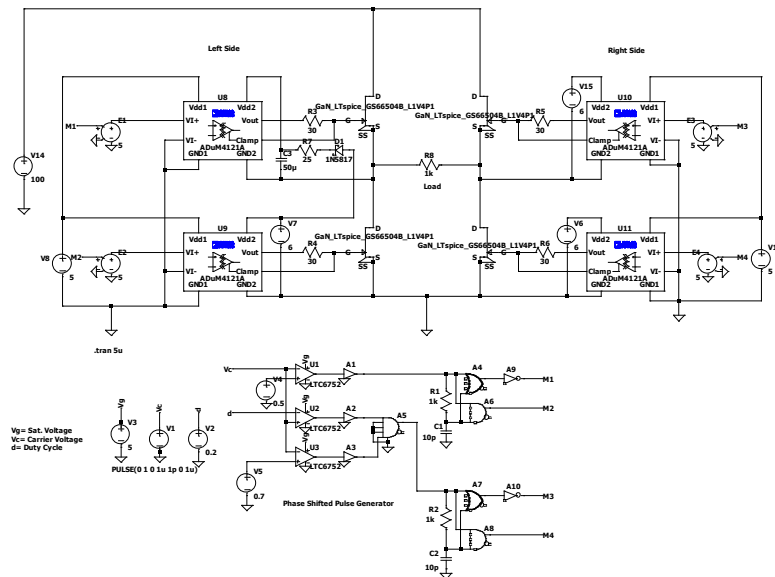
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Task

Operating the circuit at higher frequencies &
PCB schematic drawing and the PCB layout of H-Bridge circuit with
phase shifted PWM.

Signal Generator connected H-Bridge:



M1, M2, M3, M4 points are connected to the gate driver through VCVS with gain=5 that controls the gate to source voltage.

At $D=0.1$ at $f=1\text{MHz}$:

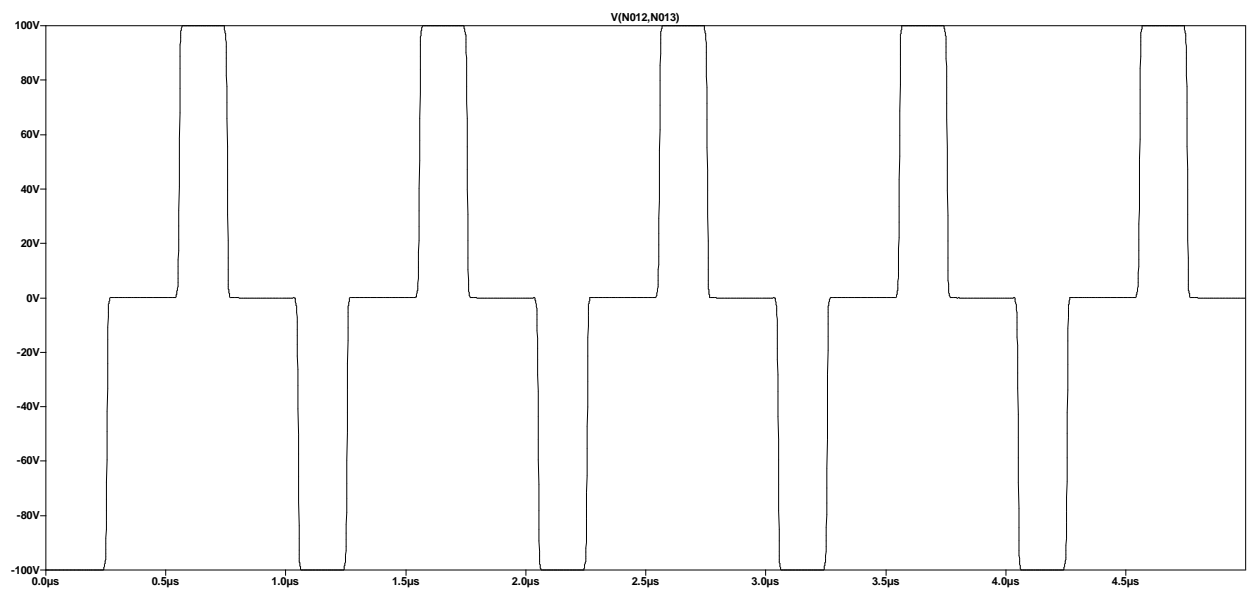
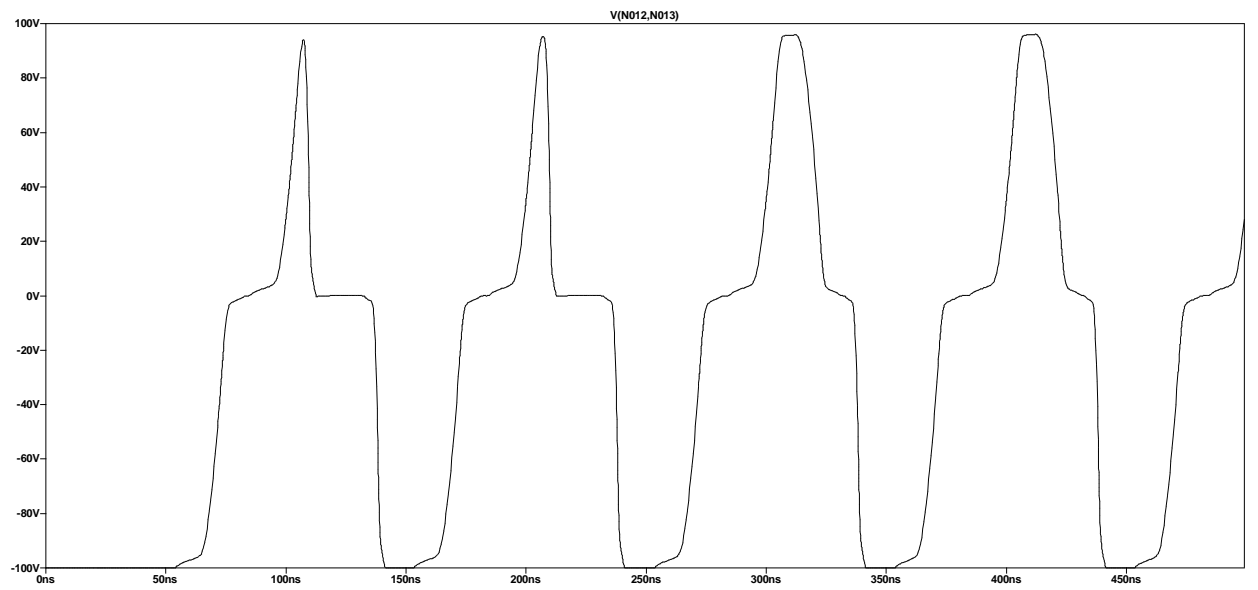


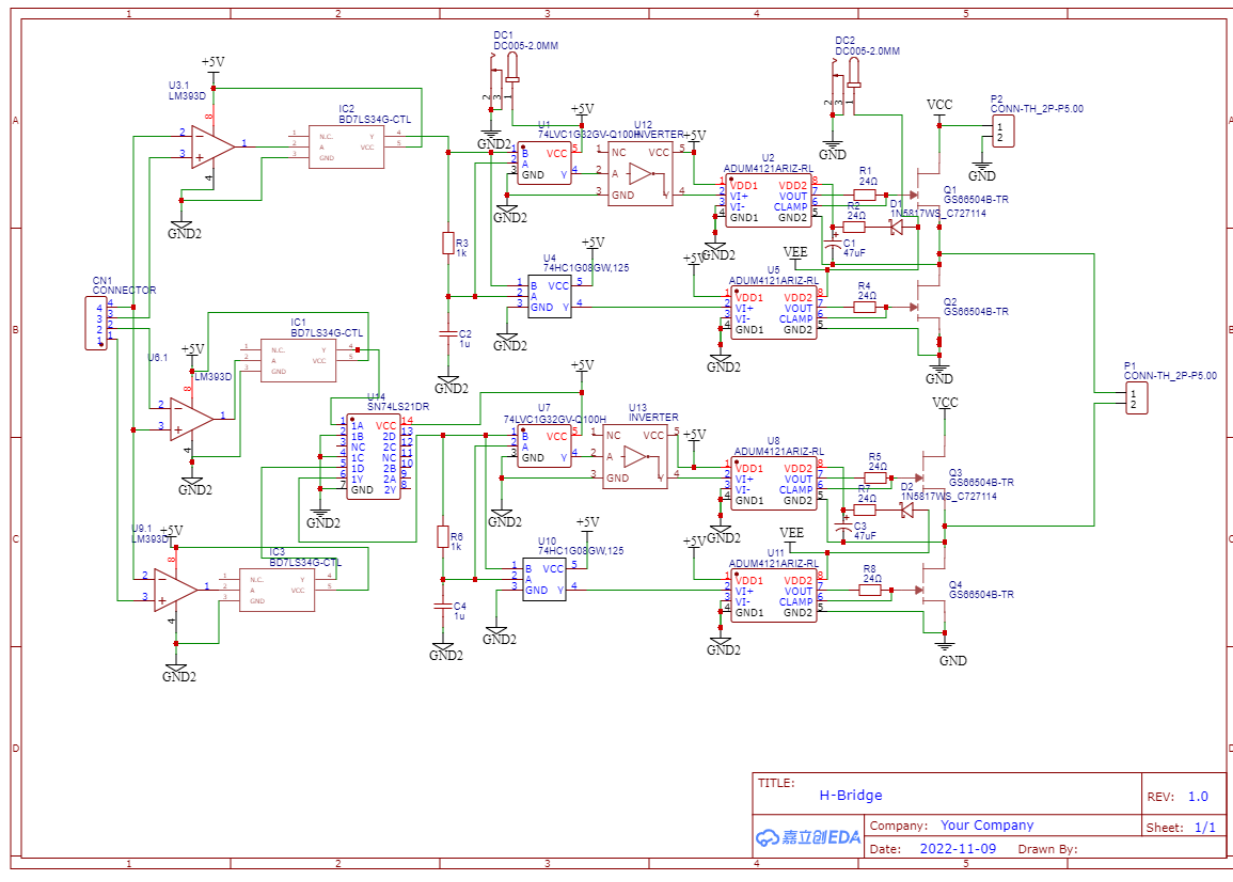
Figure showing voltage across the output resistor with duty cycle 0.1

At $D=0.1$ at $f=10\text{MHz}$:



According to simulation on LTspice, this circuit works up to 1MHz. If frequency is over 1MHz (eg. 10MHz applied here), the circuit is not working well.

PCB Schematic:

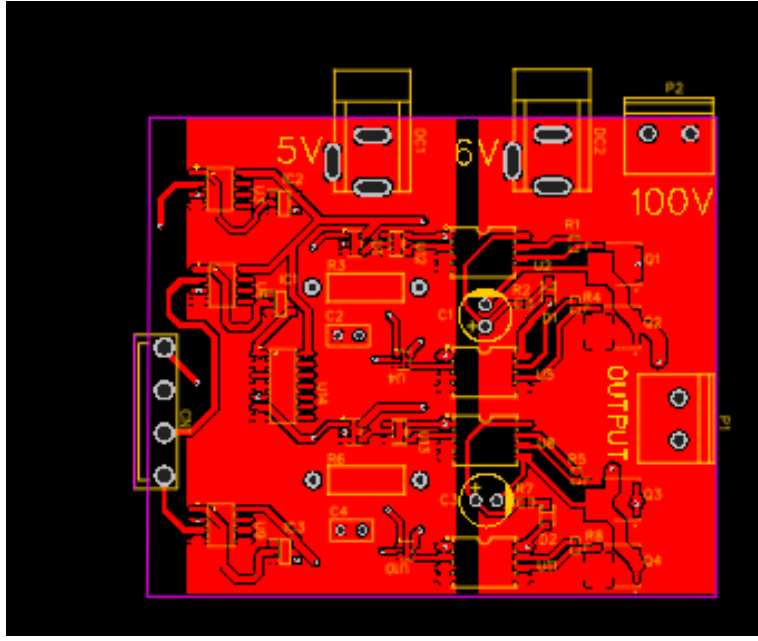


This PCB schematic diagram is made in **EasyEDA online free software** instead of **Kicad** because of unavailability of several footprints are missing in **Kicad** which are available in **EasyEDA** because of online software.

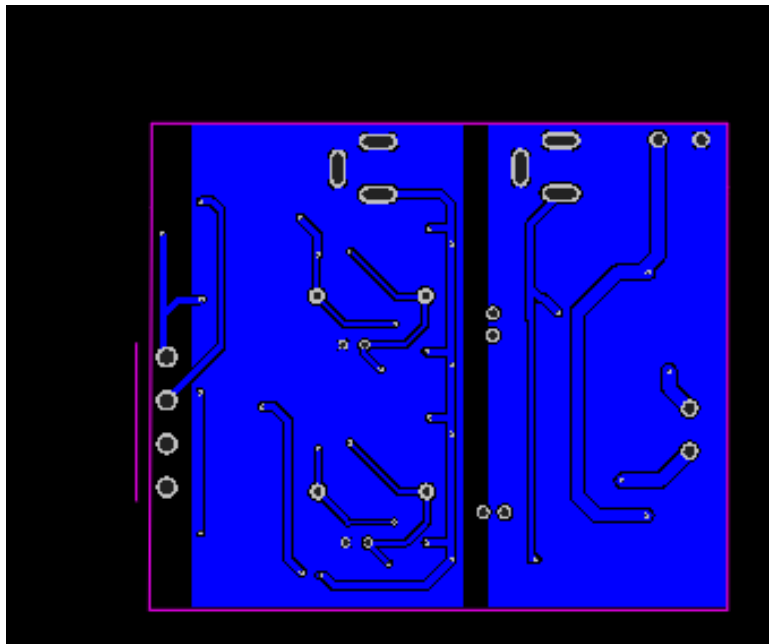
Though **working principle** of **Kicad** and **EasyEDA** exactly same.

PCB Design:

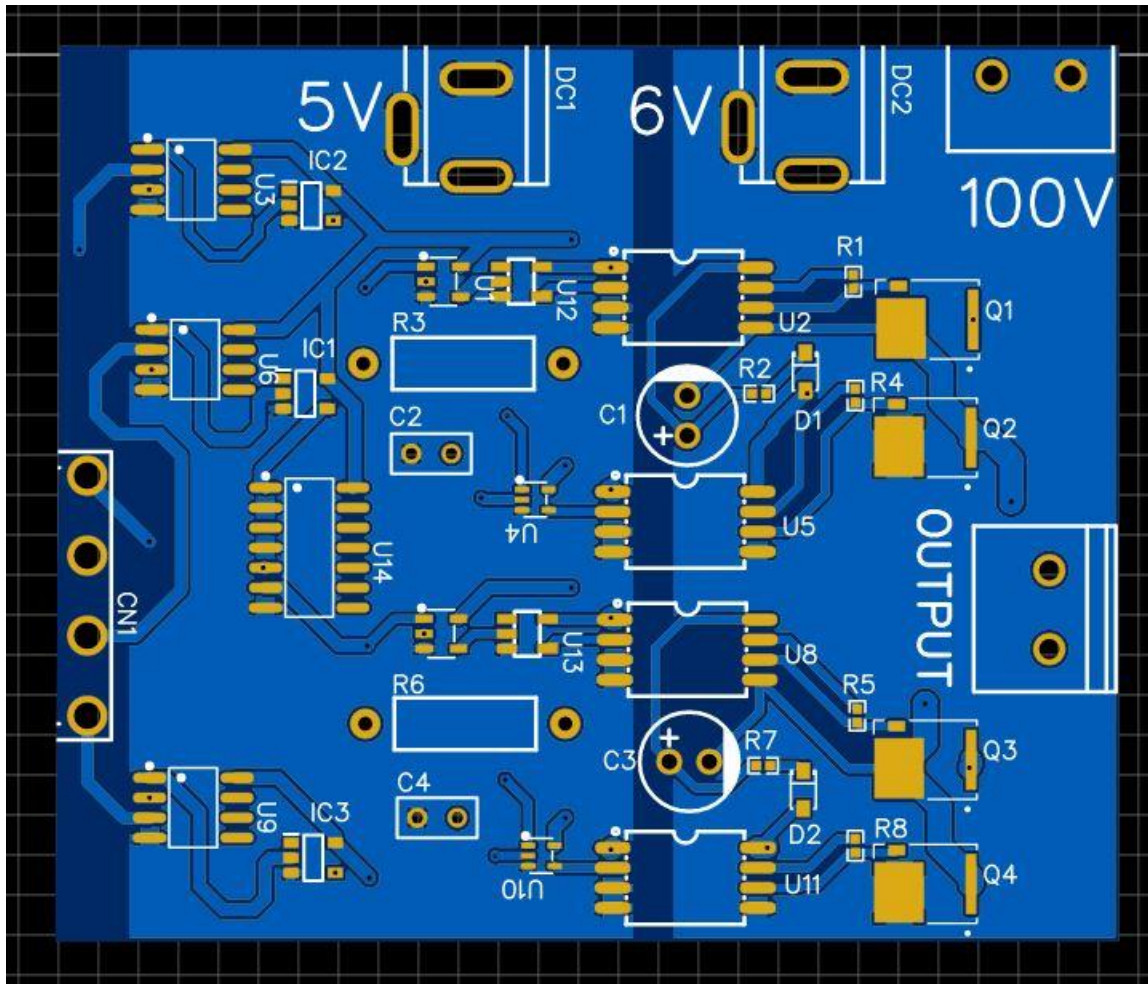
Top side:



Bottom side:



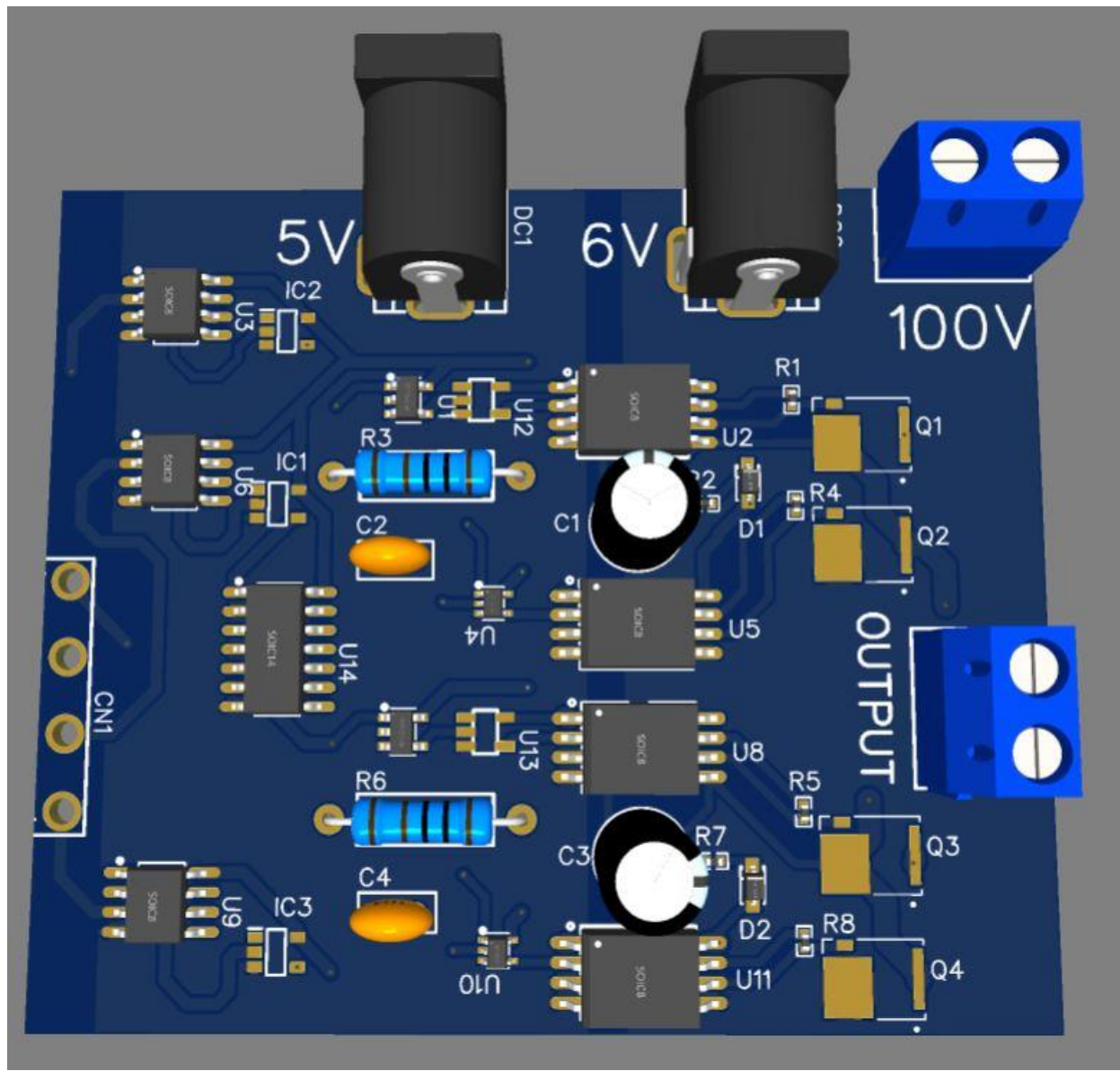
2D view:



Left side and right side is isolated(separate ground).

CN1 port for controlling voltage signal.

3D View:

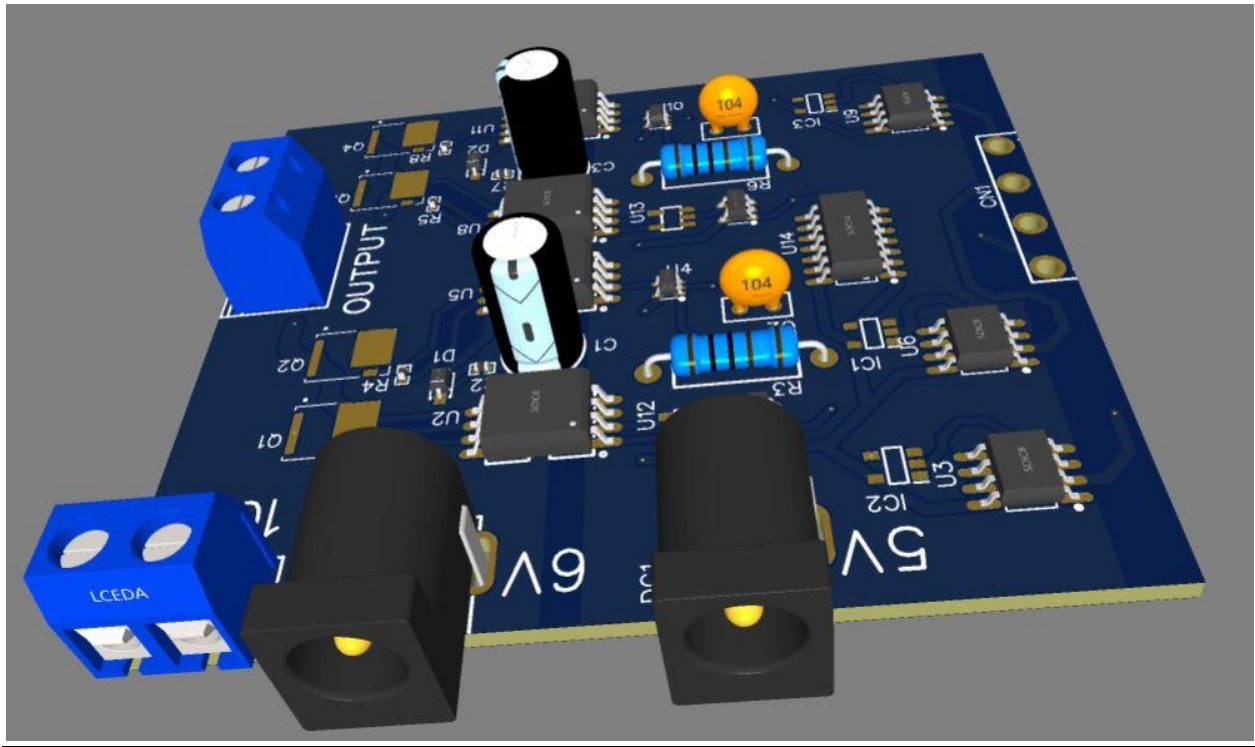


Here,

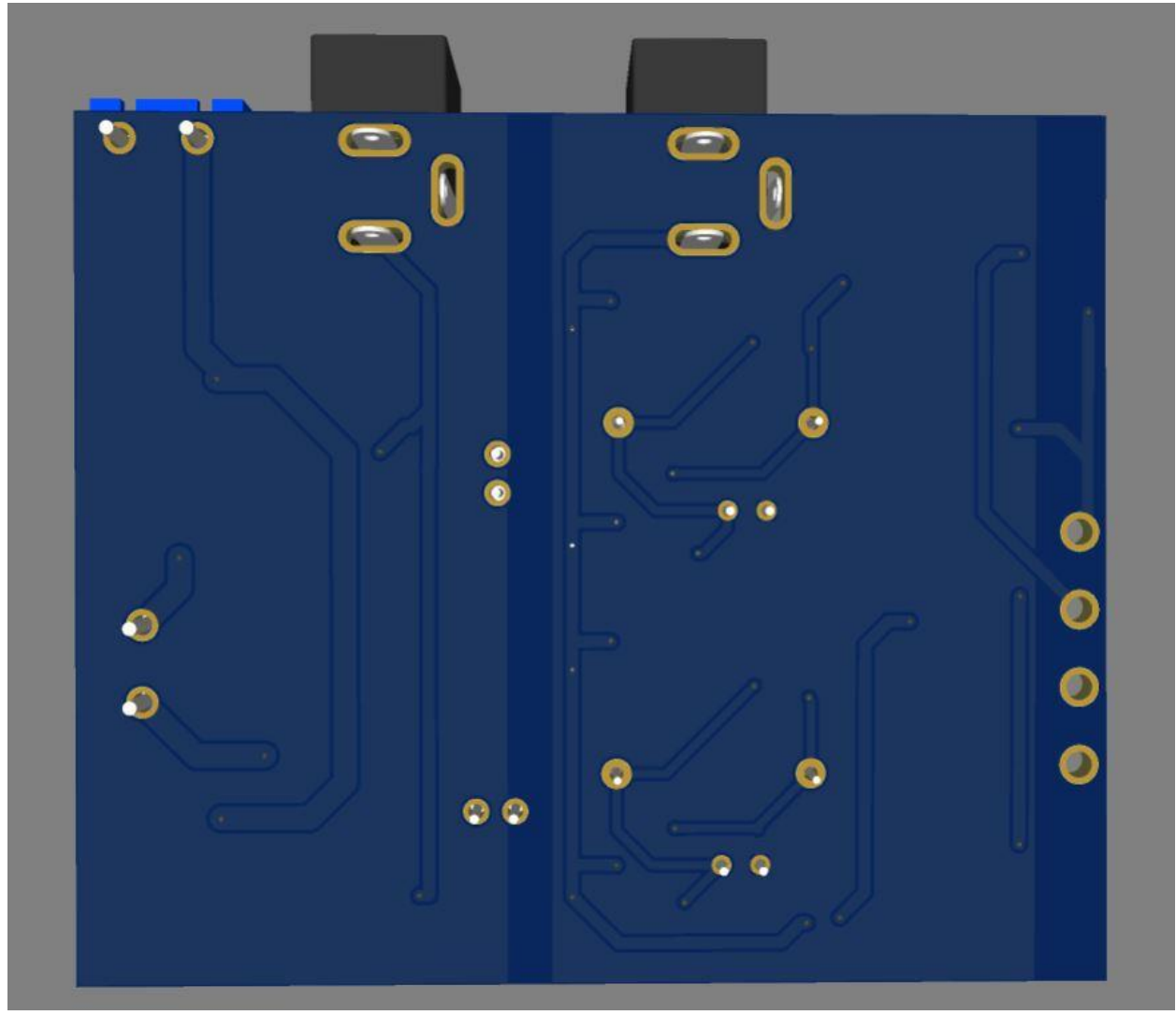
100Volt for Input of the GaN HEMT.

6Volt rail for supplying voltage to the gate drivers.

5Volt power rail for supplying voltage to the other IC's.



Bottom Side:



Summary:

- In Kicad PCB designing software some footprints are not available. For being new in PCB design I felt devastated earlier for not getting the expected model.
- It's also challenging to find suitable footprint for the expected PCB design.
- As ADuM4121 is a isolated gate driver and there are separate ground, previously mistakenly took single ground.
- Confused about how to power the IC's, then got an idea to put some ports for the input voltages.

Future Work:

- This circuit's PCB design is made on basis of simulation. In real circuit working some changes may be needed(eg. Values of resistor, capacitor etc).
- **ADuM4121(single driver \$7.24)** which is **costly**, comparatively using **Si8271(single driver \$3.93)** or **Si8273(double side driver \$5.54)** is cheaper.