

MOSFET : BS C082N10LS

DIODE :- PMEG4010BEAL SHOTTKY

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Given :-

$$V_{in} = 24V$$

$$V_{out} = 5V$$

$$\text{Input Current} = 1A$$

$$S = 100kHz$$

$$\eta \approx 98 \text{ \& } 99\%$$

Output Current ($I_{out \max}$)

$$P_{in} = V_{in} \times I_{in}$$

$$P_{out} = V_{out} \times I_{out}$$

new efficiency

$$P_{out} = P_{in} \times \eta = 24V \times 1V \times 0.99$$

$$= 23.76W$$

(Output power)

$$I_{out \max} = \frac{P_{out}}{V_o} = \frac{23.76}{5}$$

$$= \boxed{4.752A}$$

$$\text{Duty}(D) = 0.20\% = 0.208$$

$$\text{Inductor}(L) = \frac{(V_{in} - V_{out}) \times D}{\Delta I_{L \text{ ripple}}}$$

$$= 30.5\mu H$$

We have increased the value to $37\mu H$ to meet ~~the~~ a more legitimate graph.

$$C = \frac{\Delta I_L}{8 \times f}$$

capacitor value :-

Buck converter :

$$C_{out} = \frac{1.296 A}{8 \times 100000 Hz \times 0.05}$$

$$= 32.4 \mu F$$

$$R_{Load} :- \frac{V_{out}}{I_{out}} \approx 1.16 \Omega$$

$$\Delta I_L = 0.3 \times I_{out} = 0.3 \times 4.32 A$$

$$= 1.296 A$$

Here, ripple current is 30% of the output current

$$I_{ds} \approx 6 A \text{ [Approx]}$$

$$I_{diode} = I_{out max} + \frac{\Delta I_L}{2}$$

$$= 4.98 + \left(\frac{1.296}{2} \right)$$

$$= 5.628 A$$

$$\approx 5.5 A \text{ Schottky}$$

Pulse generation,

$$T = \frac{1}{f} = \frac{1}{10000} = 10 \mu s$$

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$$T_{on} = 0.244 e^{-5}$$

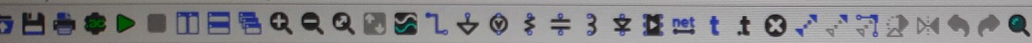
Efficiency power

$$\eta = \frac{23.76}{24} = \boxed{0.99} = 99\%$$

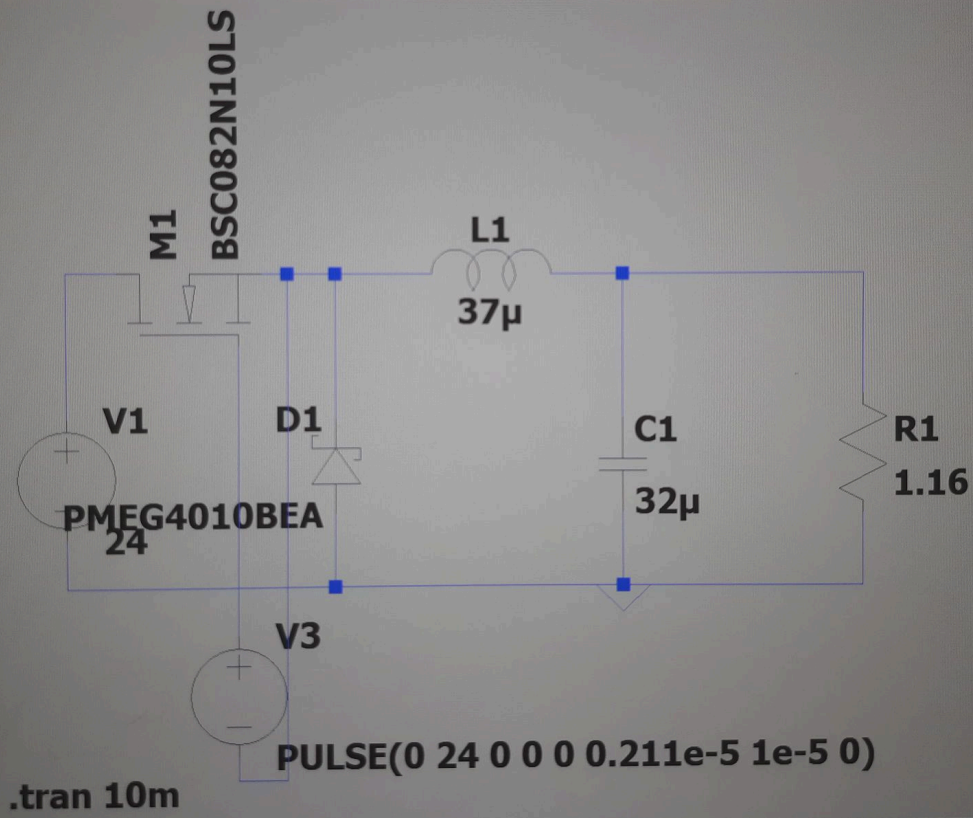
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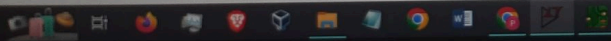
Hierarchy View Simulate Tools Window Help



erLT-1.asc BuckConverterLT-1.raw

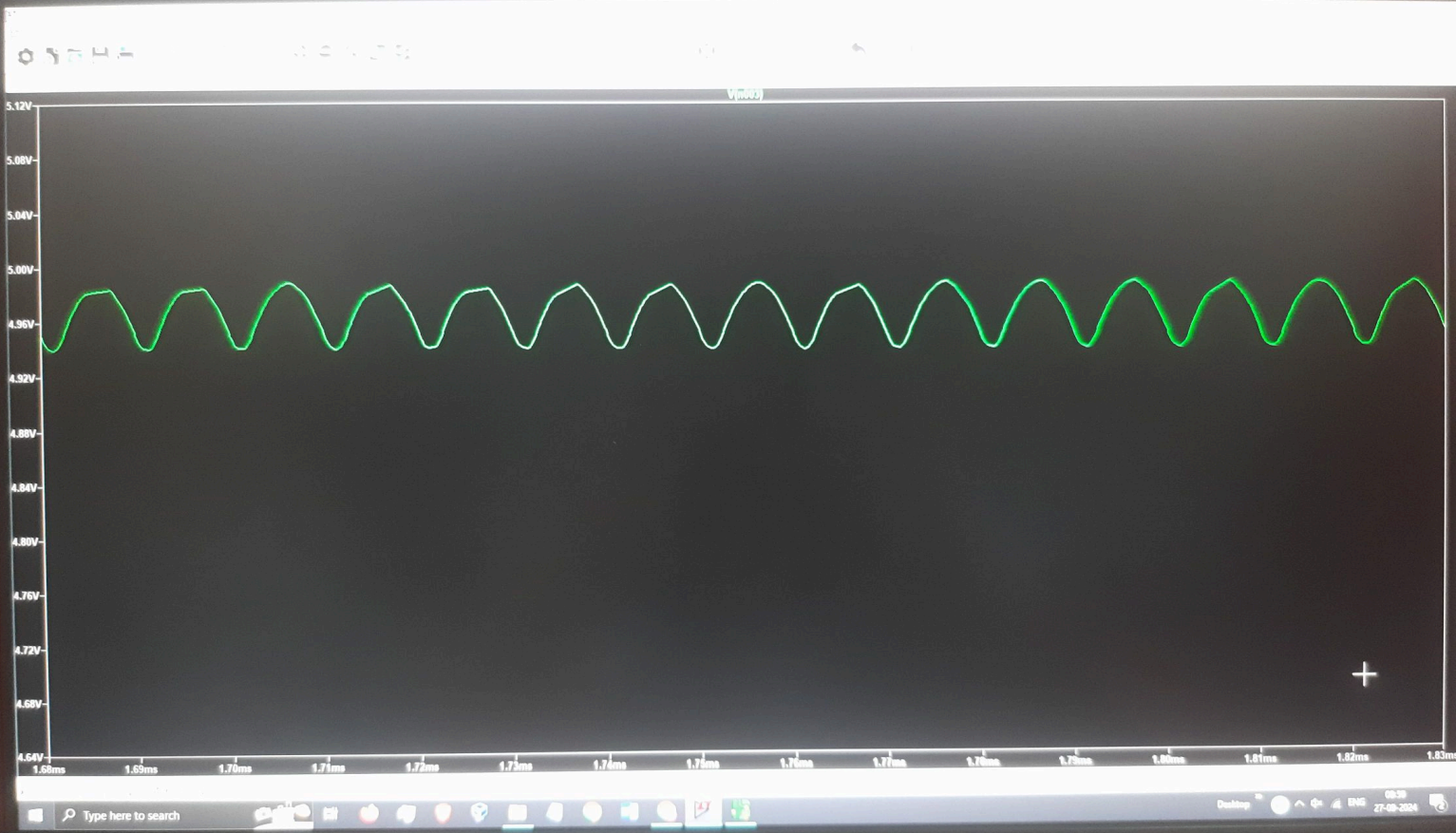


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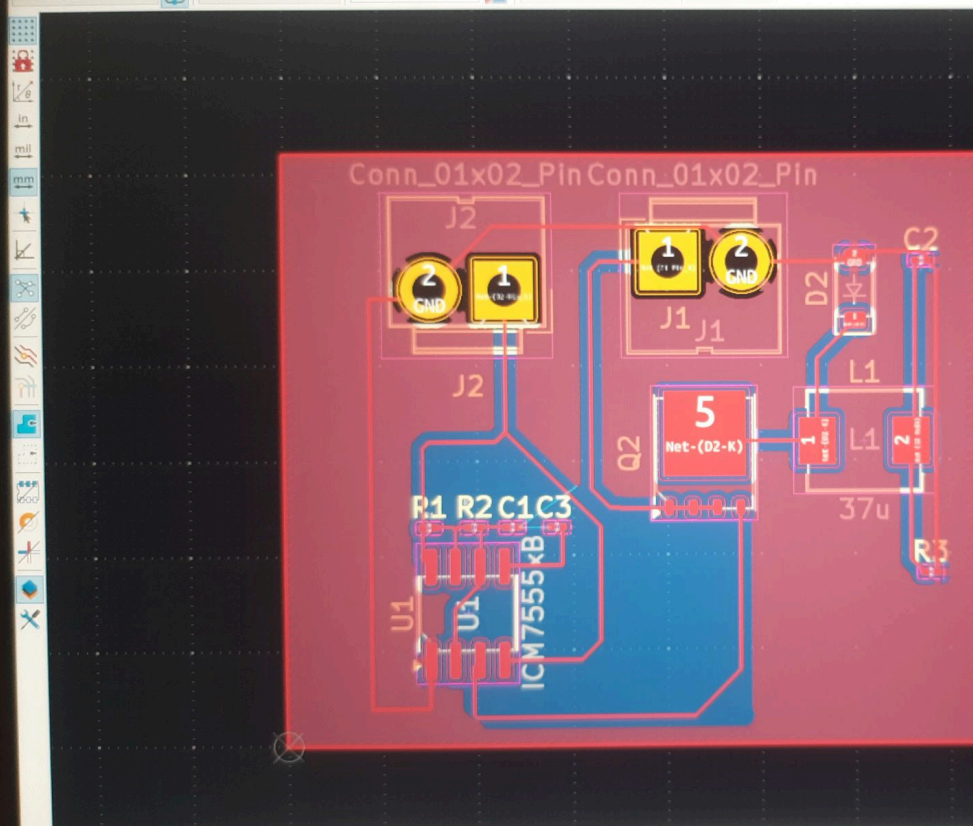


BUCK-minster draft - PCB Editor

File Edit View Place Route Inspect Tools Preferences Help



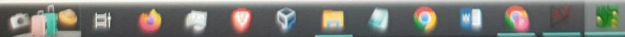
Track: use netclass width Via: use netclass sizes F.Cu (PgtUp) 0.5000 mm (19.69 mils) Zoom 5.00



Pads: 54
Vias: 0
Track Segments: 69
Nets: 9
Unrouted: 2

Z: 5.63 X: 341.0000 Y: 80.5000 dx: 341.0000 dy: 80.5000 dist: 254.0891 grid: 0.5000 mm

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