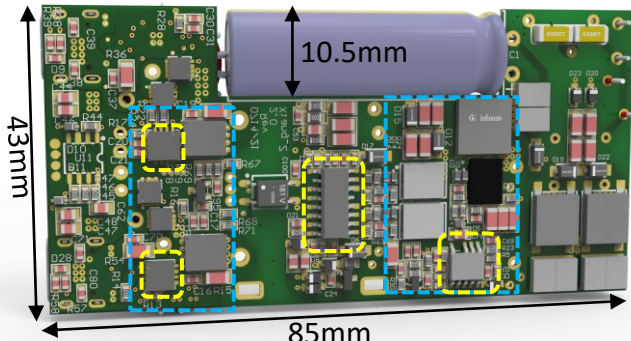


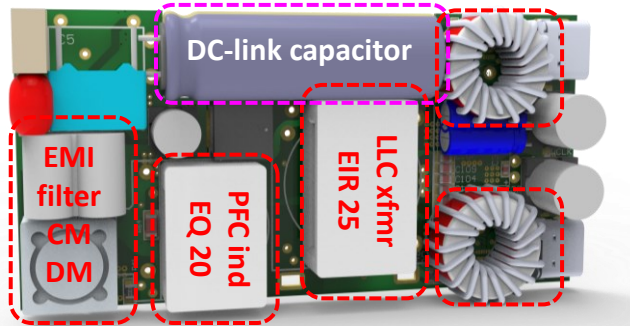
Experience #2: High Density 200W PD3.0 laptop charger (2020)



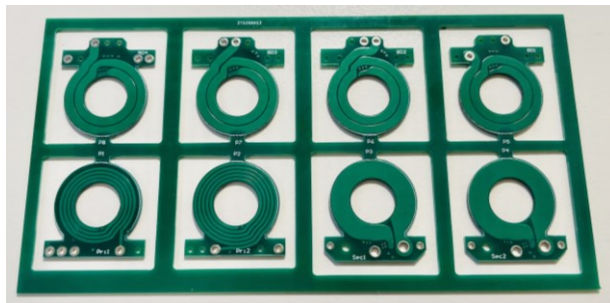
武汉大学
WUHAN UNIVERSITY



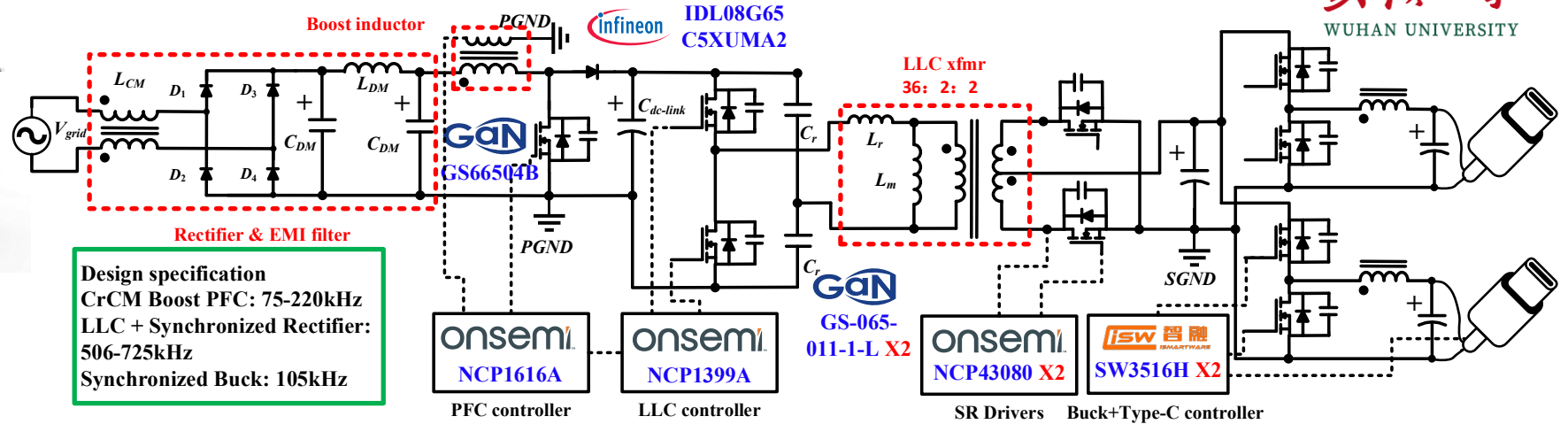
2nd-gen prototype (back)



2nd-gen prototype (front)



PCB windings



- The project use the Onsemi solution pack of PFC+LLC+SR controller, all devices are soldered on a single 4-layer PCB. To minimize the size of magnetic devices, PCB winding with planar ferrite core are selected for high frequency power transformer and inductor. The maximum power density can be 5211W/litre.
- For dual usb-C (or 2C+1A) full load operation, two PD-protocol controller should be used.

Air Gap [mm]	0.6	0.4	0.15
Llk_p [uH]	6.998673	7.004927	7.015796
Lm [uH]	132.0325	172.7437	349.6153
Llk_s [uH]	1.280994	1.68992	3.467082

Design challenges of LLC transformer:

- The leakage inductance is incorporated as resonant components to reduce the system volume;
- The air gap length has nearly no impact on leakage.



NCP 1616 PFC start-up process
requires pull-up signal



NCP1399A will easily enter burst
mode when the loop design is poor