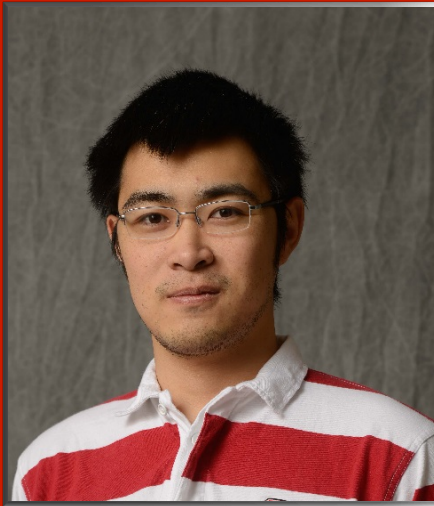


Medium Voltage Fast Charger

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Why Medium Voltage Fast Charger?

- Substantial Installation Cost Savings (simplified wiring, concrete slab)
- Substantial Efficiency Improvement; Weight and Volume Reduction

Prolec GE Transformer
 3- ϕ 75kVA 4160V-480V
 3,100L 1200kg

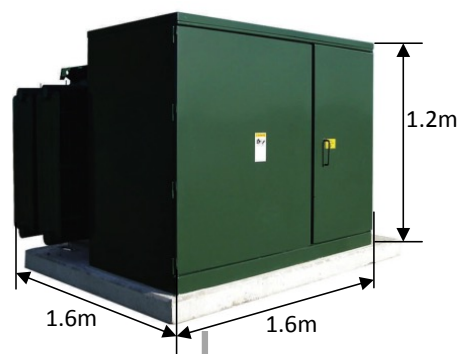
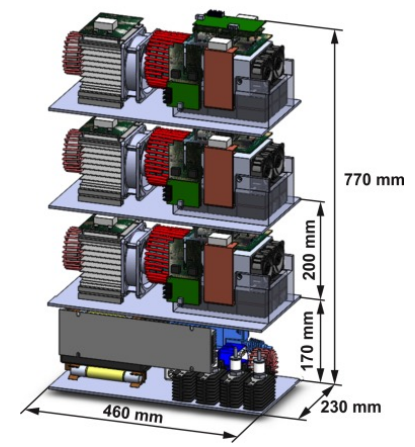


ABB Terra 51
 50kW Fast Charger
 1200L; 400kg



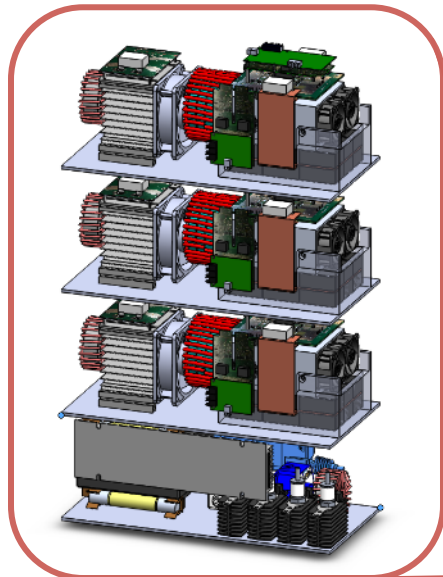
Power America
 50kW MV Fast Charger
 100L; 60kg*



*projected packaged weight and volume

System Specifications

- 50kW (25kw demo in BP1)
- 2400 Vac to 400 Vdc
- $\eta \geq 95\%$, $PF \geq 0.98$, $THD \leq 2\%$
- 10x size reduction
- 4x weight reduction
- Simple install w/o step-down transformer

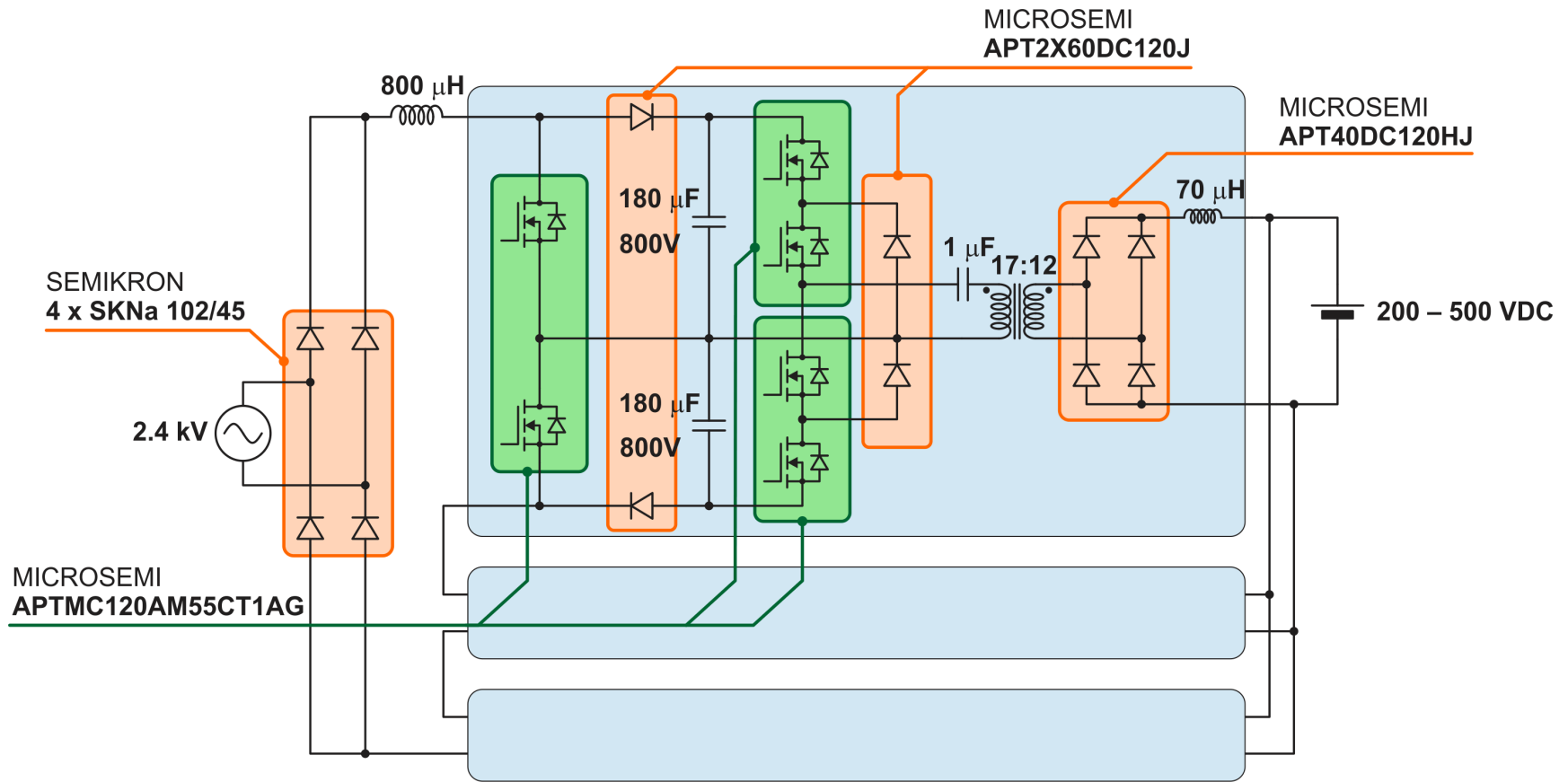


MV Fast Charger
 V = 81.5 L m = 60 kg



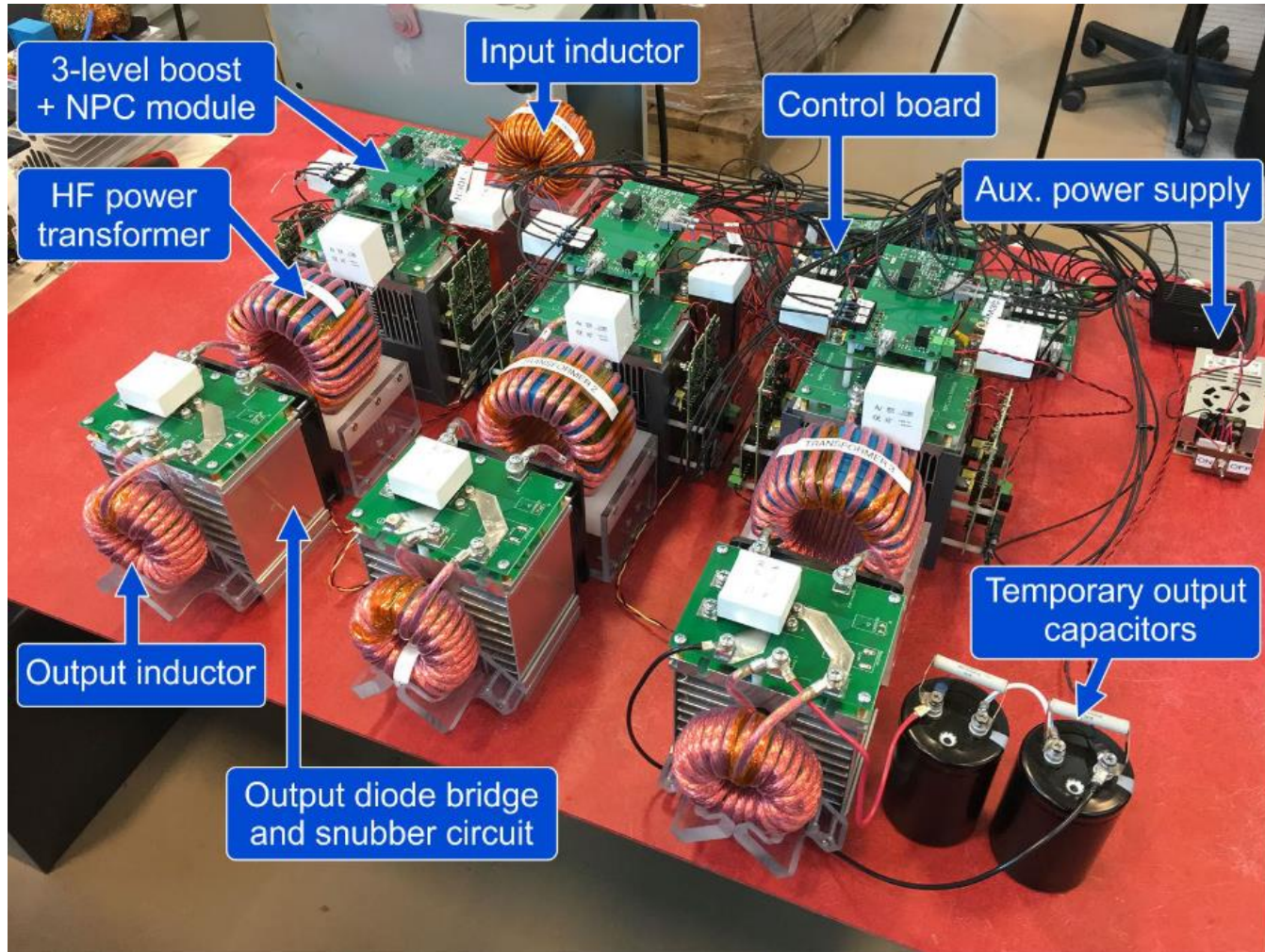
Commercial Fast Charger
 V = 1200 L m = 400 kg 40

Topology & Component Selection



Multi-cell Boost Topology

System Prototype



Predictive PFC Control

Proposed new predictive current control of the input PFC stage (NCSU Invention Disclosure # 17083, Filed 10/2016)

- The proposed control strategy can be applied to N-level topology
- Concept experimentally validated on the Fast Charger prototype.
- Improved controller enables the boost stage to operate with lower switching frequency

