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A Folded GaN VRM with High Electrical and Thermal Performance

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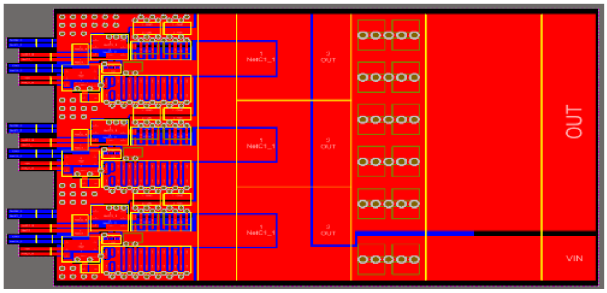
Proposed Design

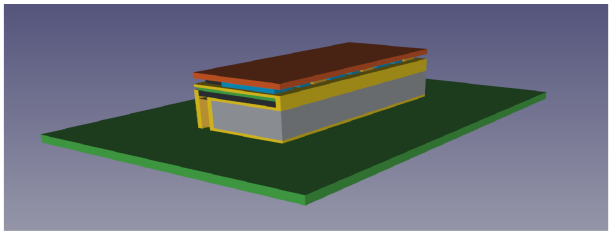
- Modern processors need high current, low voltage and fast VRM response time

Parameter	Value	Challenge
Power	1.2V 100W	Heat dissipation in limited space.
Footprint	10mm*25mm	Limited space for passives.
Height	10mm	Limited space for passives.
DVFS speed	100mV/us	Requires fast control loop speed.
Challenge	Solution	
Heat density	Reduce thermal resistance from devices to heat sink.	
	Increase conversion efficiency.	
Limited space	Increase switching frequency to use smaller passives.	
	Increase layout density.	
Fast control loop	Use higher switching frequency.	

- Flexible PCB has very thin core, hence inductance cancellation is superb

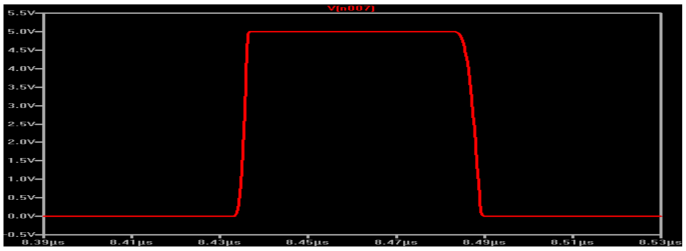


- Folding offers not only high power density, but also better thermal performance

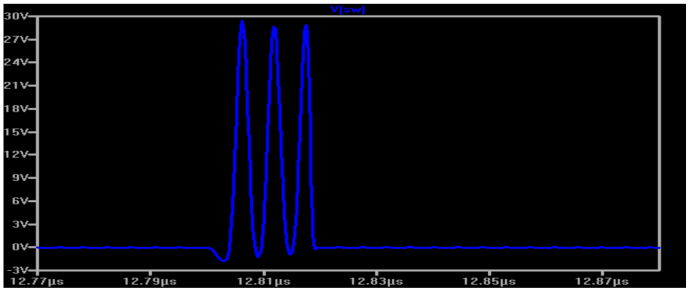


Simulation Result

- Gate driver's output shows clean and sharp driving waveform at 4nF load, 5V p-p



- Switching node oscillation caused by decoupling path inductance



- Thermal plot of proposed design running at 10MHz (12V→1.8V 90A, 88.22% efficiency)