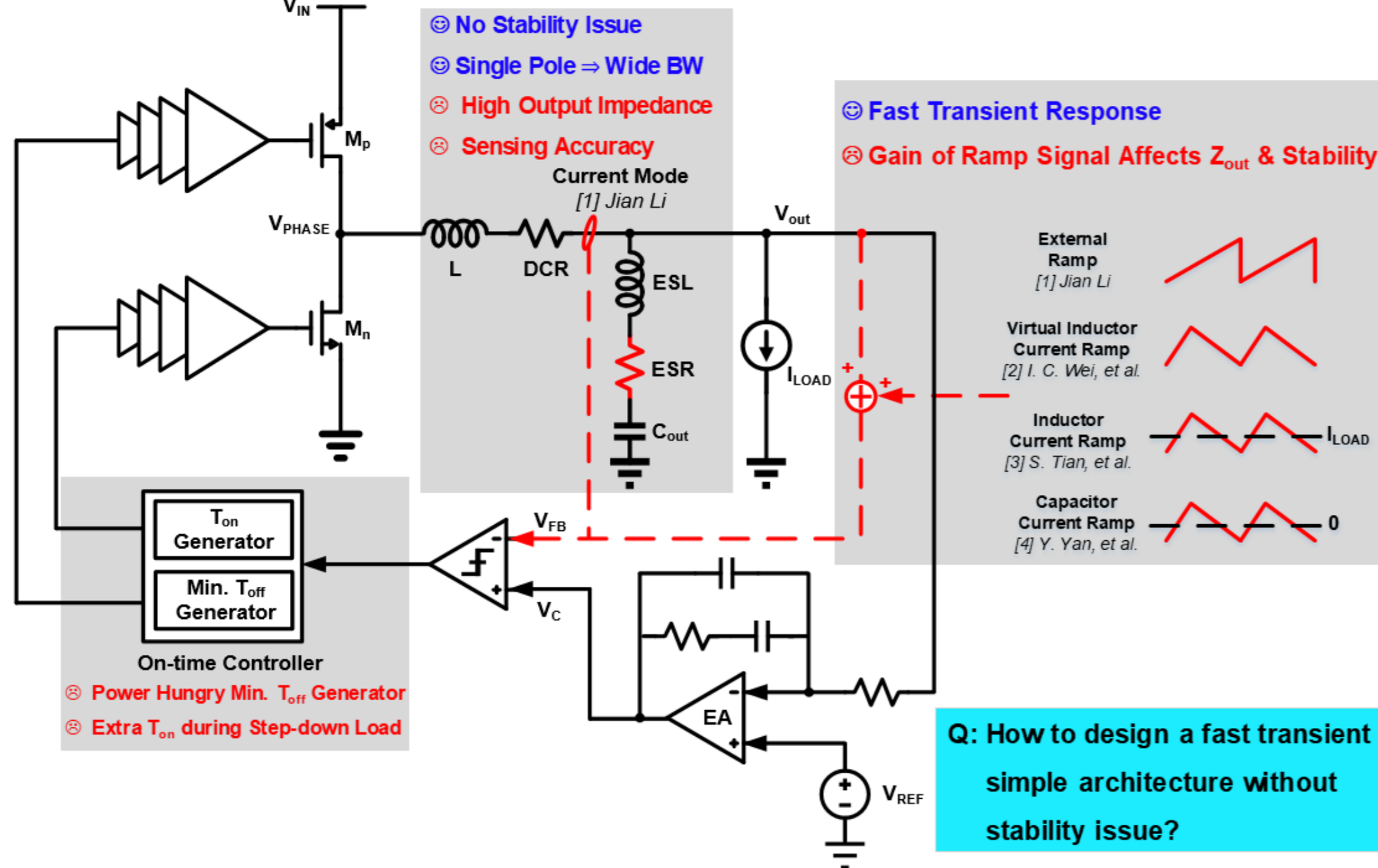


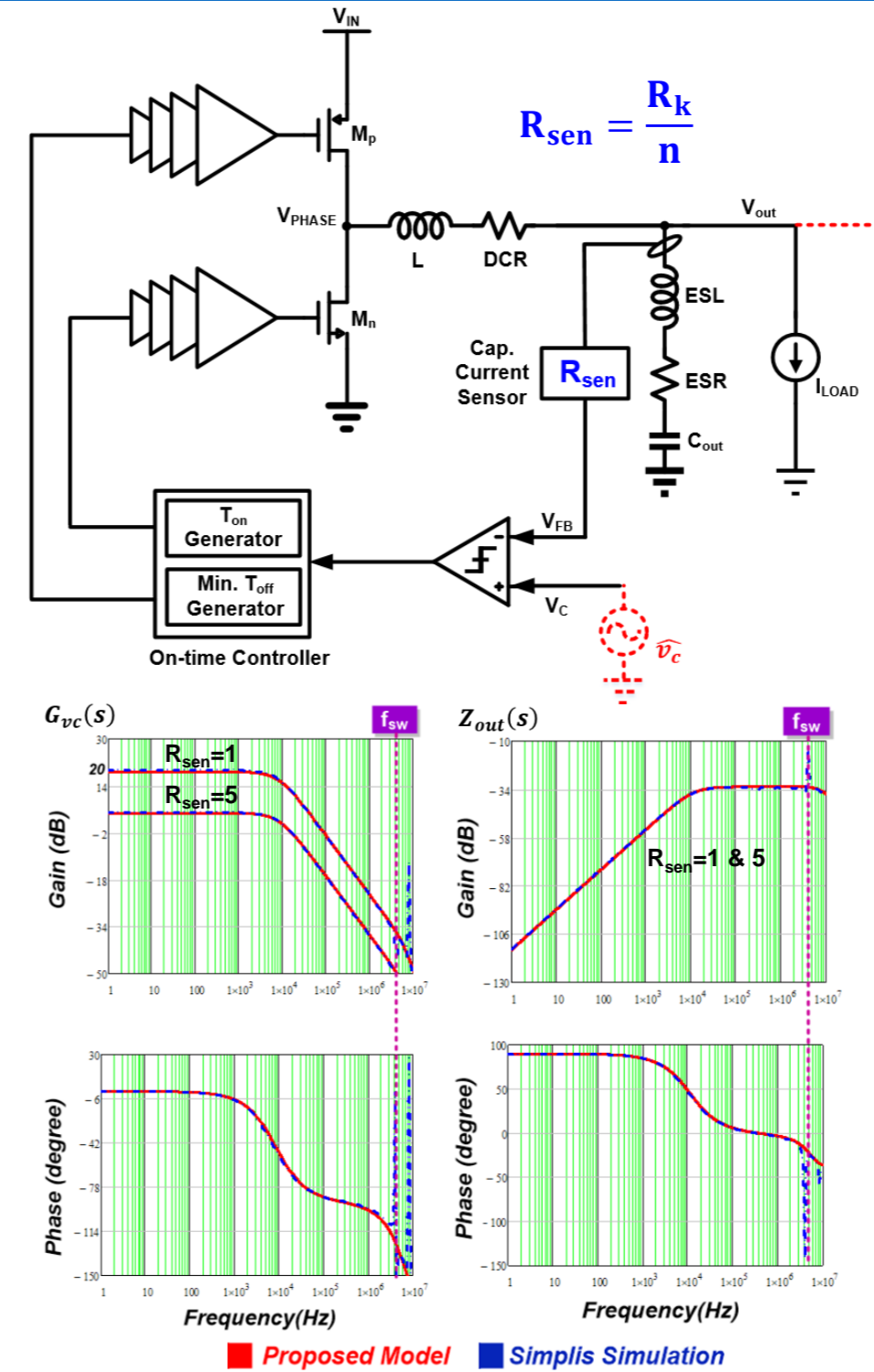
MOTIVATION

Traditional High-speed, High Bandwidth, Fast Transient

Constant On-time Controlled Buck Converter



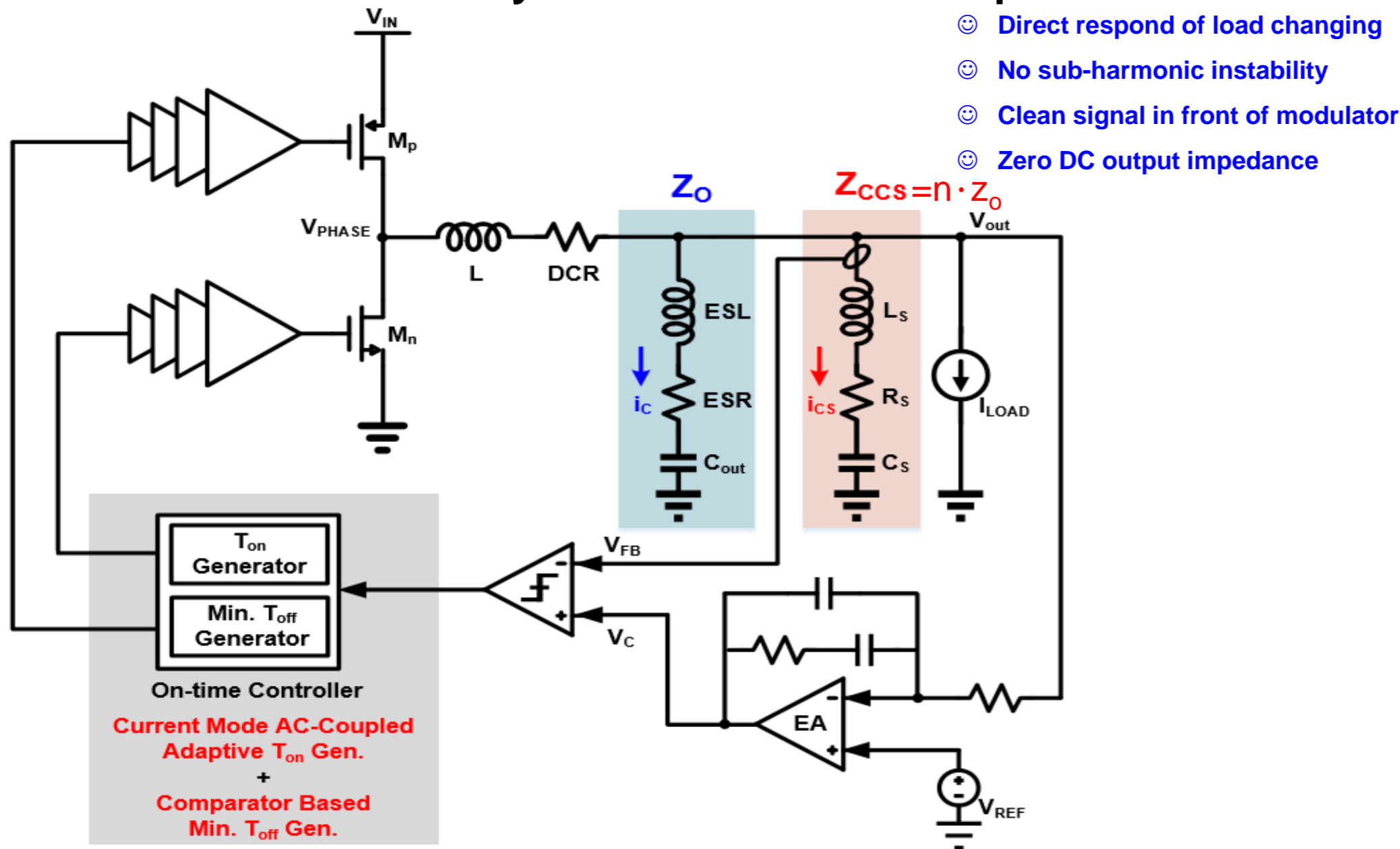
SMALL SIGNAL MODEL ANALYSIS



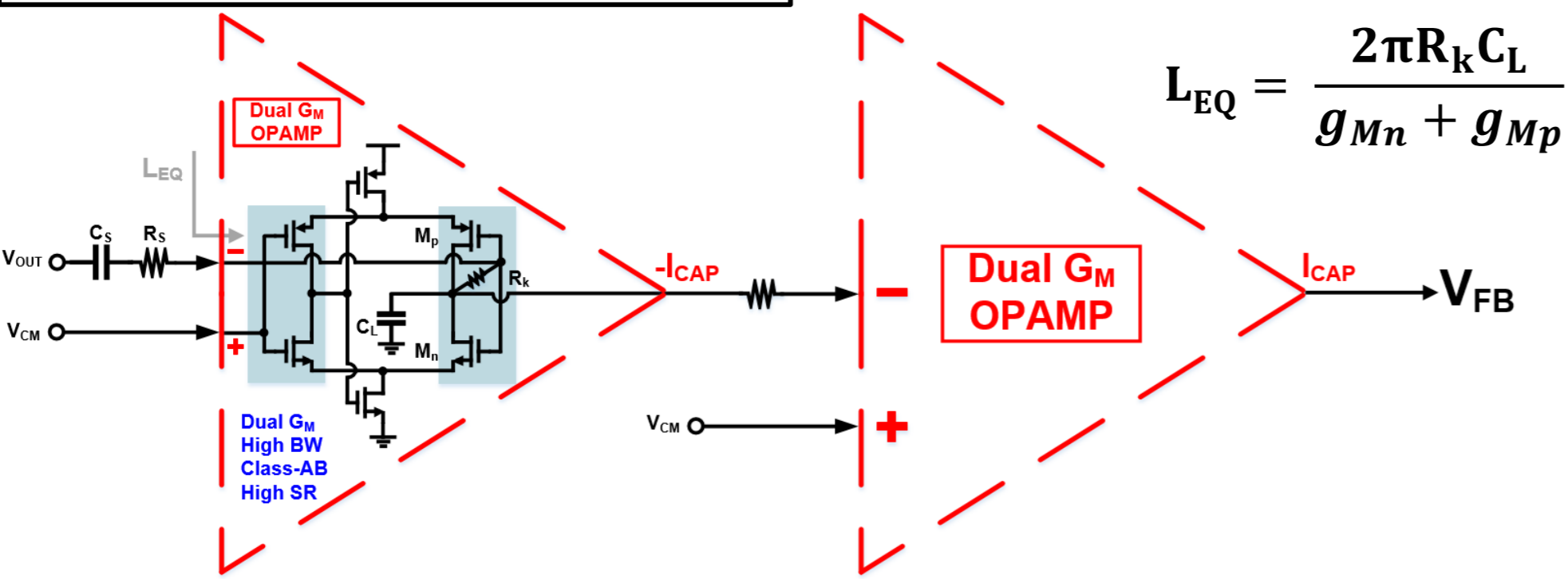
PROPOSED SOLUTION

Capacitor Current Constant On-Time (C²COT) Controlled Buck

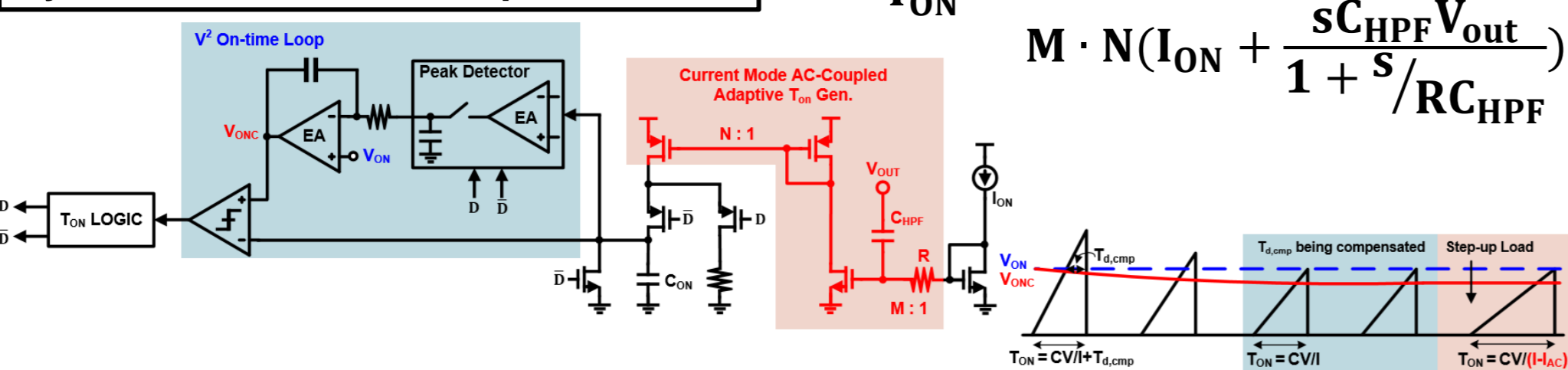
Converter with Dynamic On-Time V² Loop Generator



Dynamic Biased Cap. Current Sensor



Dynamic On-Time V² Loop Generator

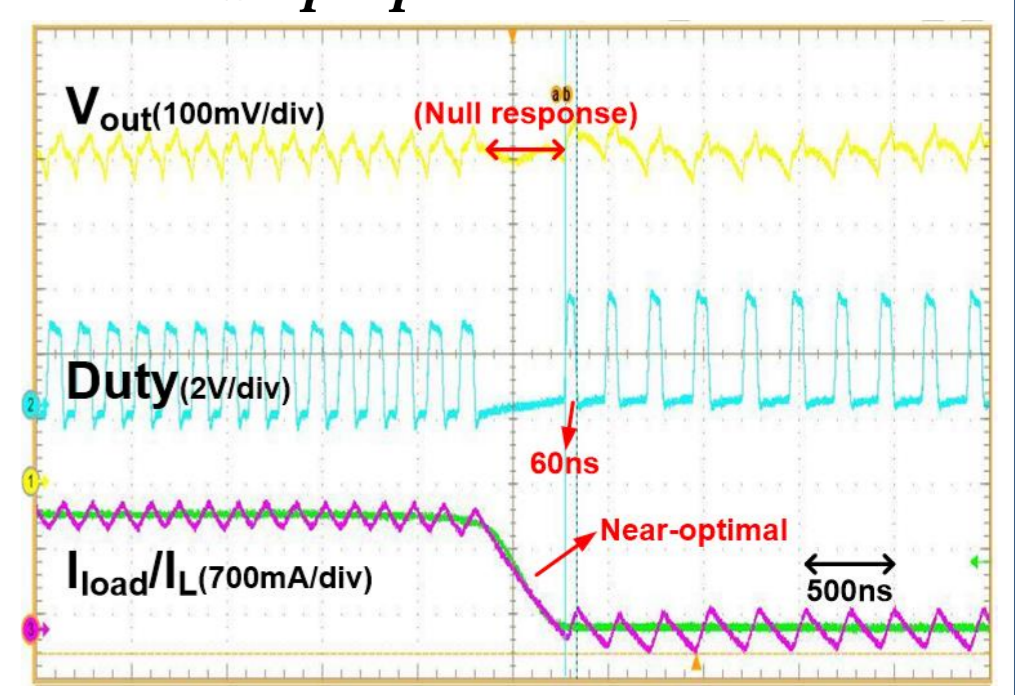
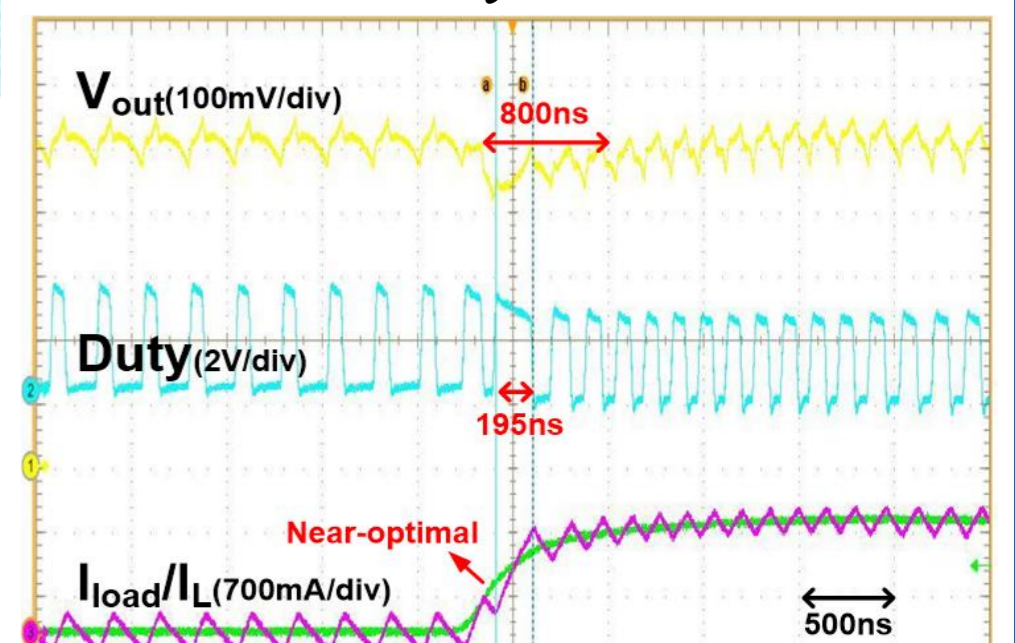
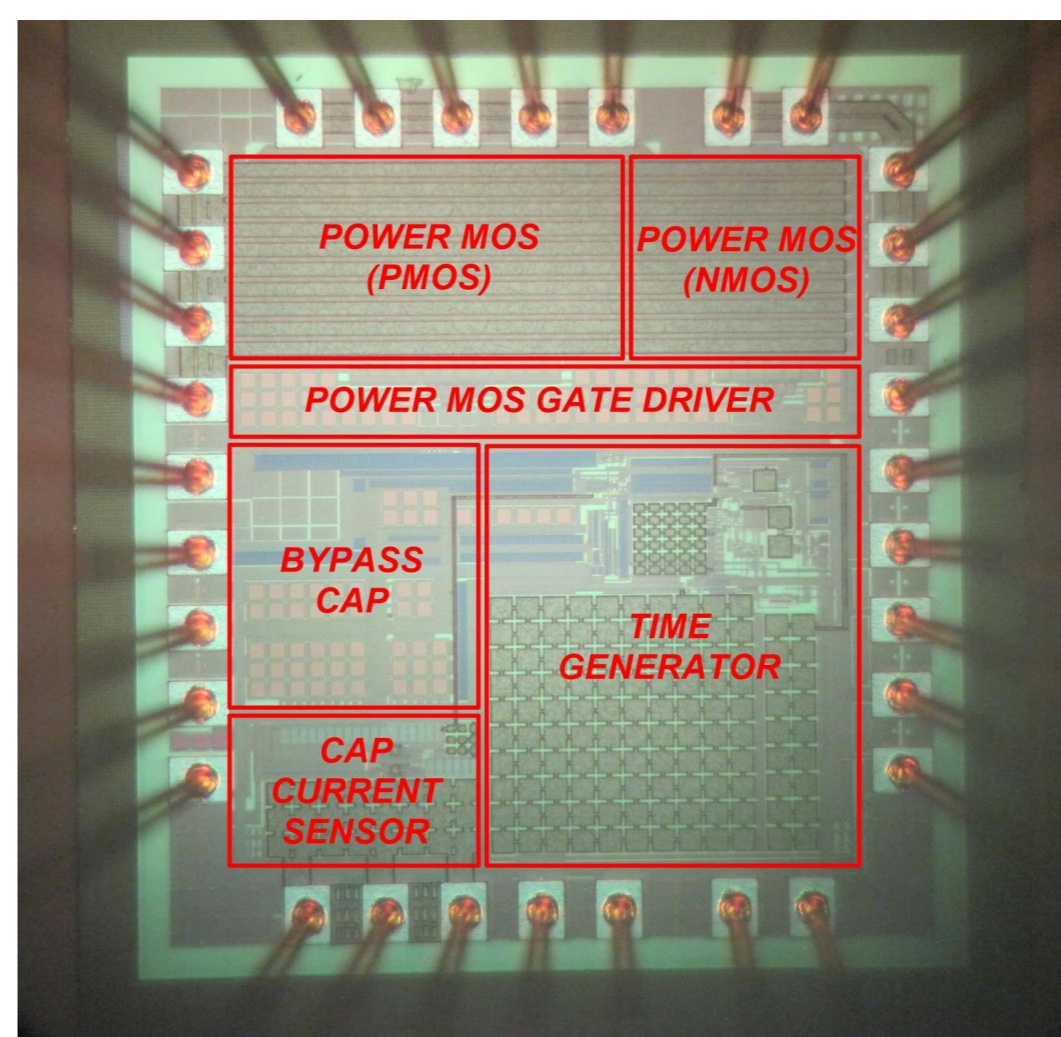
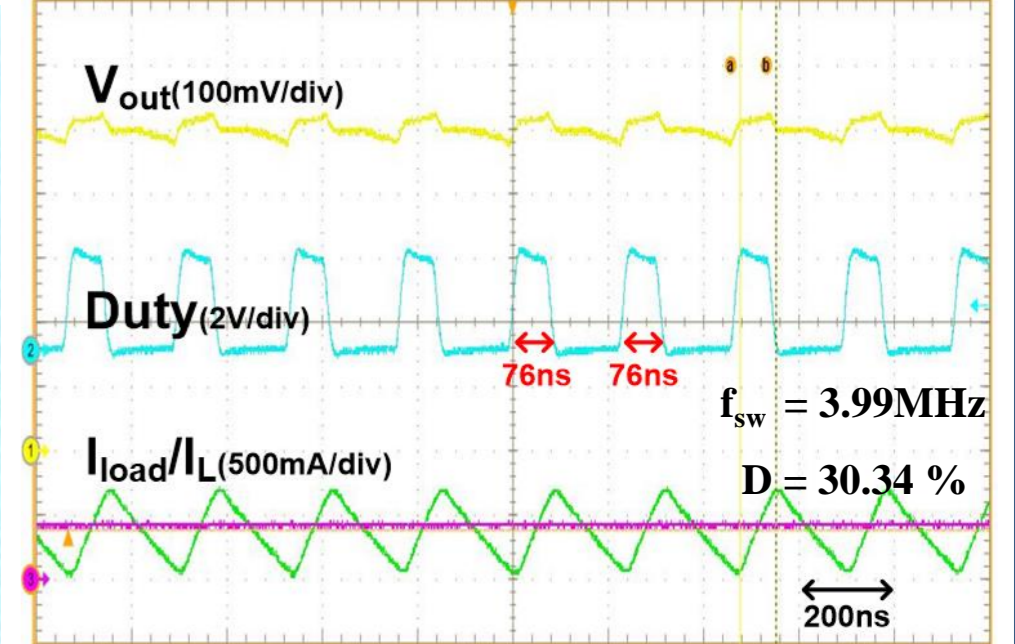
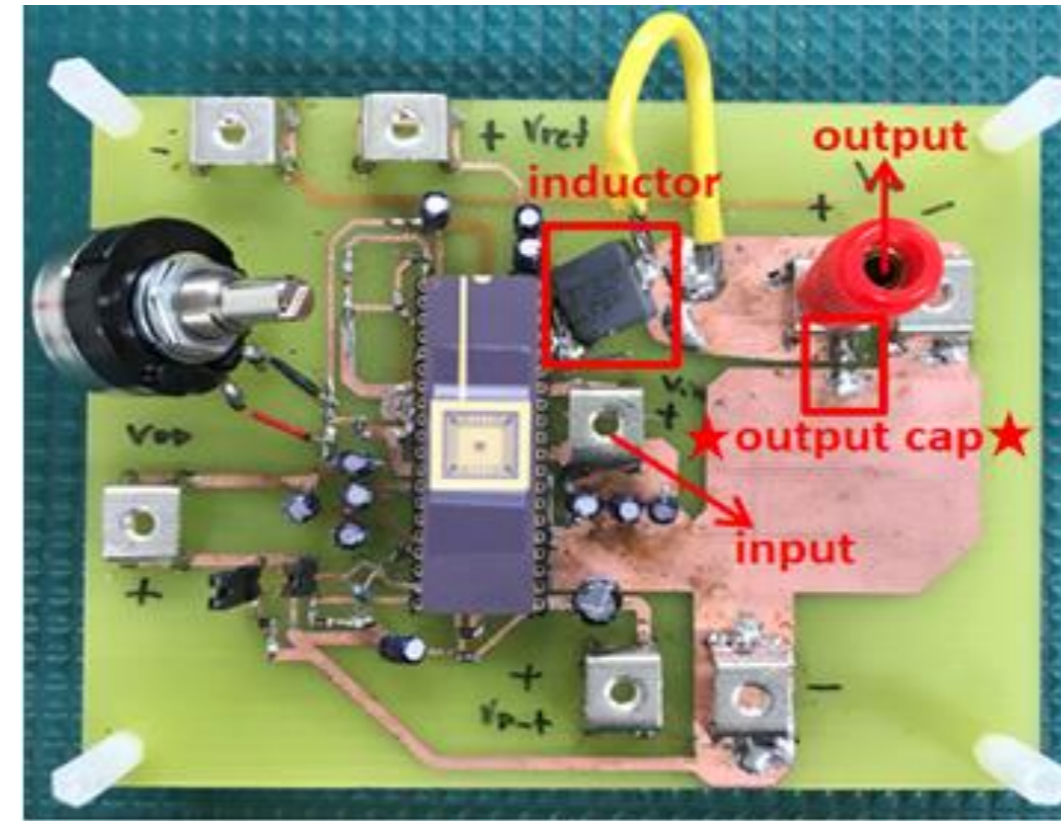


KEY CONTRIBUTIONS

This paper is going to design a high speed, wide bandwidth and low output impedance COT converter. The proposed architecture is sub-harmonic-free, inherent low output impedance and 1-pole only control behavior. Most important of all, the sensing gain does not affect the output impedance and stability, which means we do not need a auto-tuning or calibration loop for the proposed design compared to other previous works. Also, with the dynamic on-time V² loop generator, near optimal transient responses are achieved.

EXPERIMENTAL RESULTS

Hardware, Chip, and Experimental Waveforms



Summary:

- ✓ Without sub-harmonic instability by using ceramic cap.
- ✓ V²-DOT achieves constant 76ns on-time in steady state.
- ✓ Proposed C²COT controlled buck converter achieves near time-optimal responses during transient state.

ACKNOWLEDGMENTS

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