



The eGaN<sup>®</sup> FET  
Journey Continues

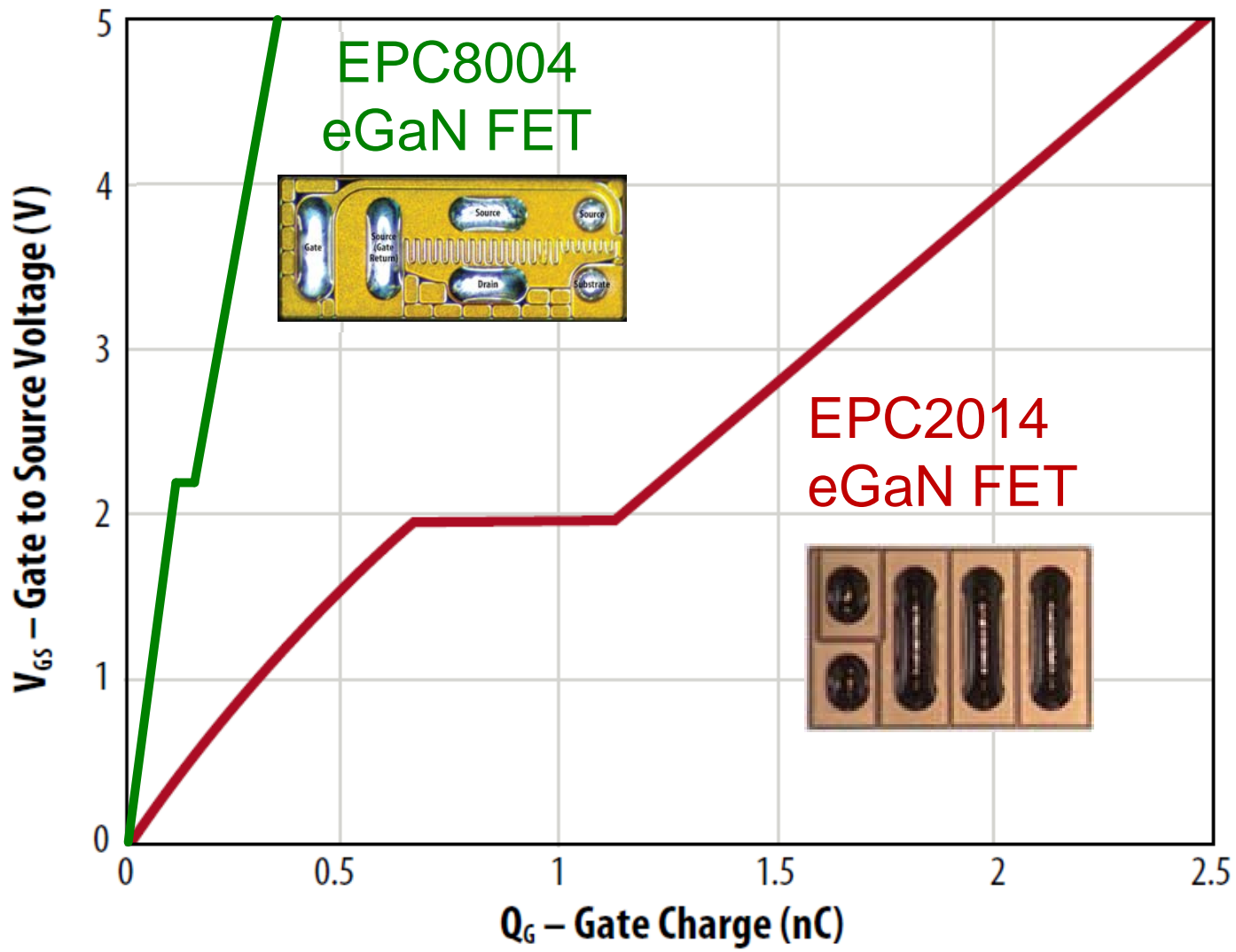
**Design and Evaluation of a 10 MHz Gallium Nitride Based  
42 V DC-DC Converter**

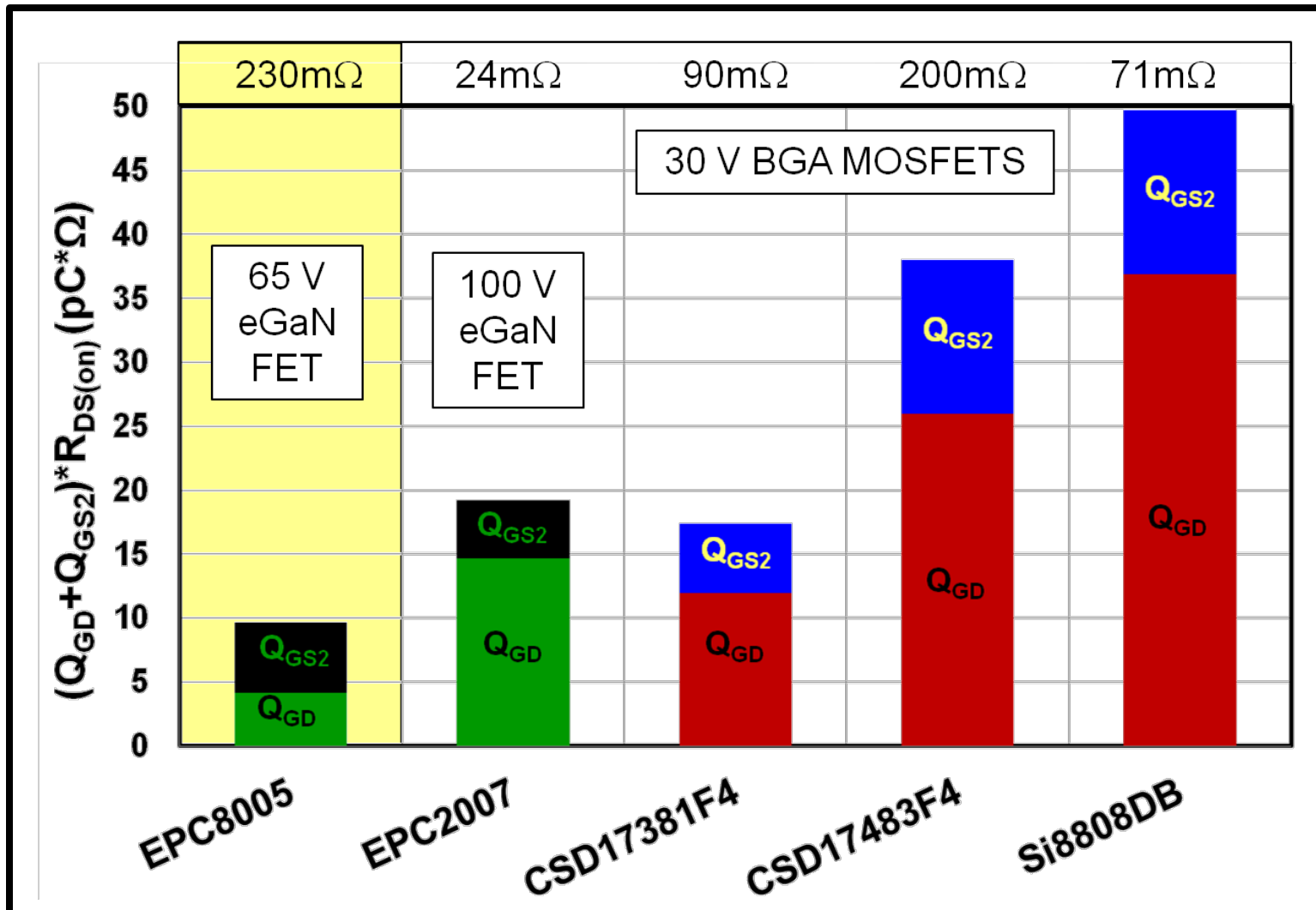
Johan Strydom and David Reusch

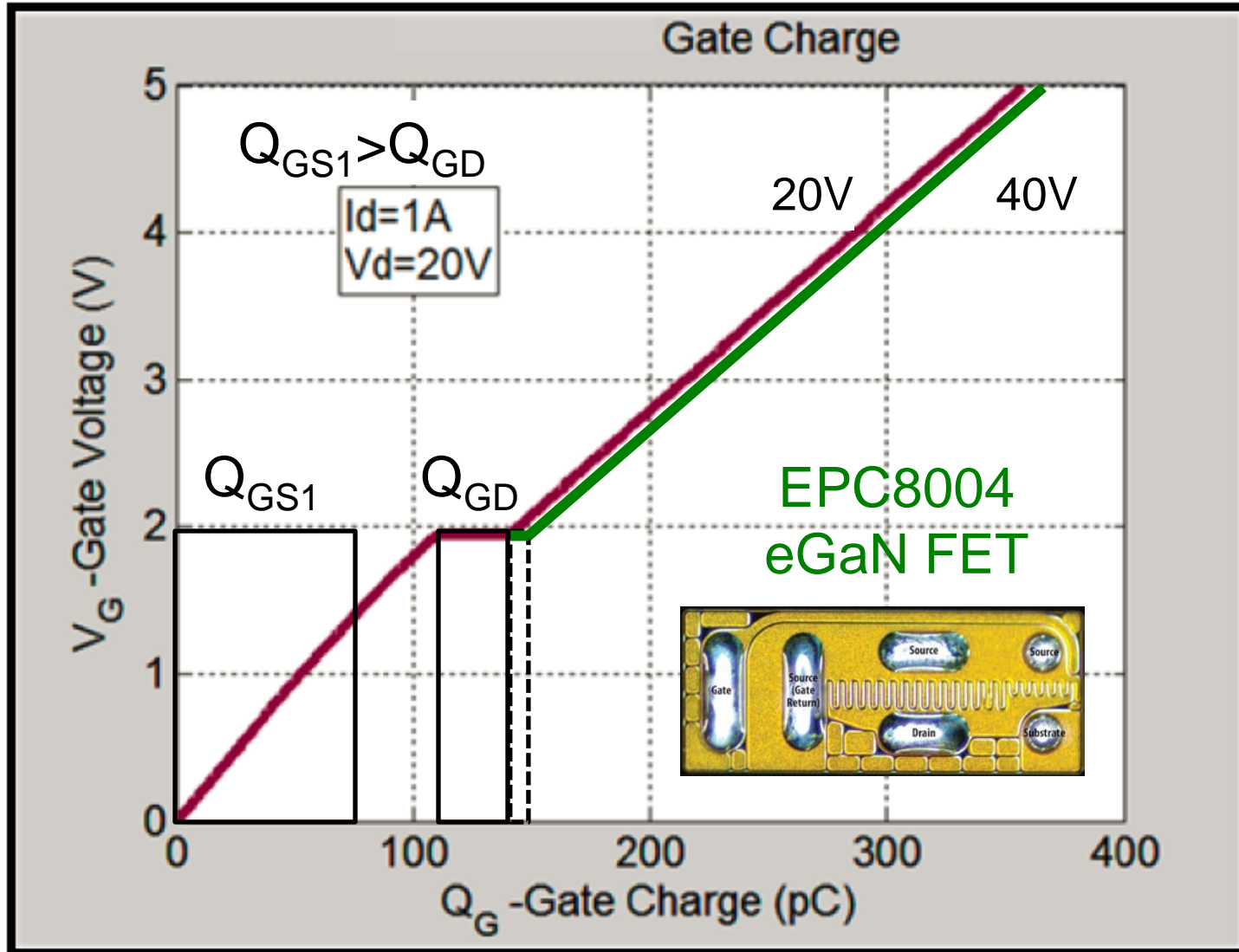
*Efficient Power Conversion Corporation*

- **Requirements for HF hard switching**
- **EPC8000 Series Parts**
- **Experimental Results**
- **Limiting Factors**
- **Summary**

- **Reduce active area for lower power operation**
- **Minimize Hard Switching Figure of Merit**
- **Complete  $dv/dt$  immunity**
- **Separate gate and power loops**
- **Minimize power loop inductance**
- **Minimize gate loop inductance**

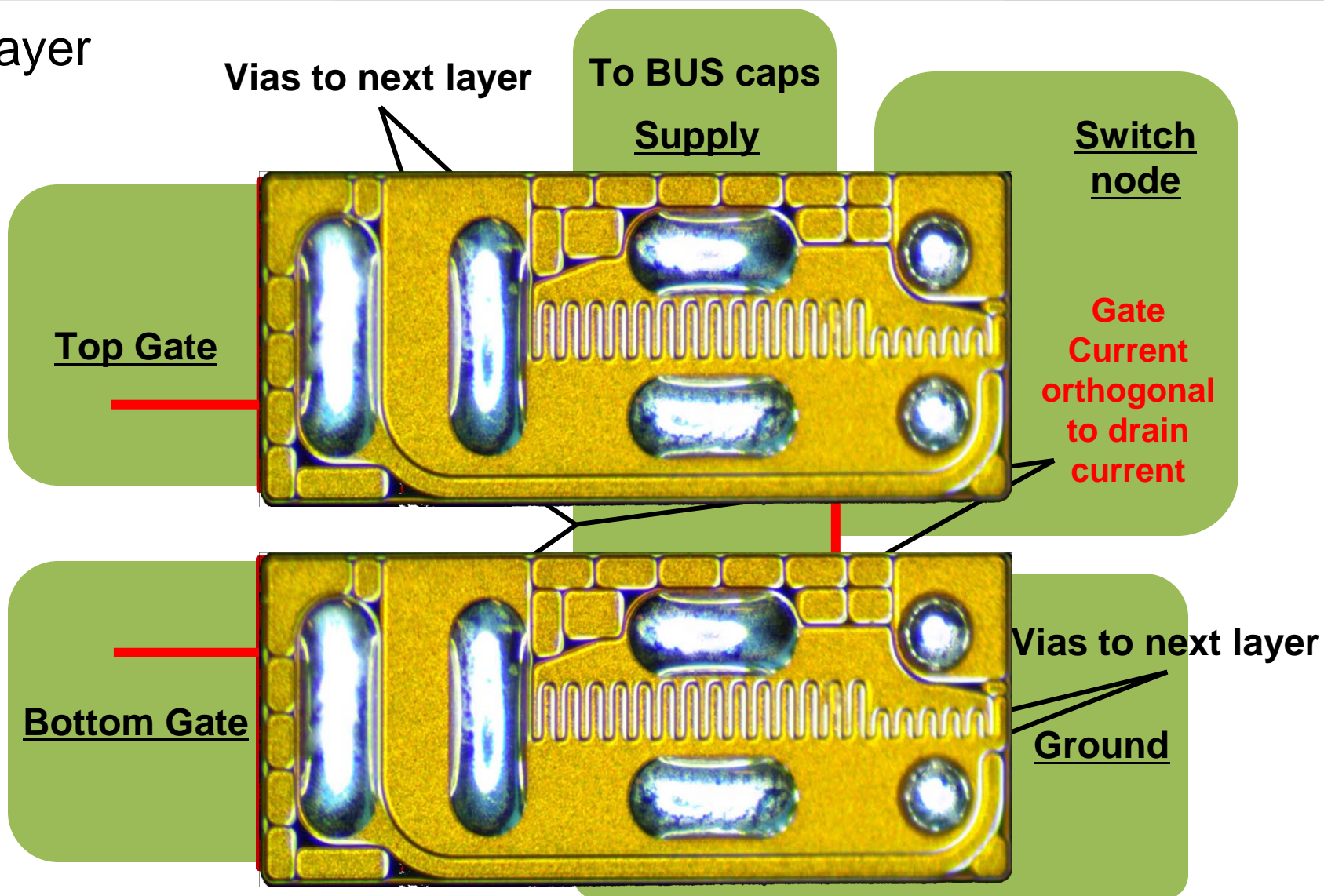




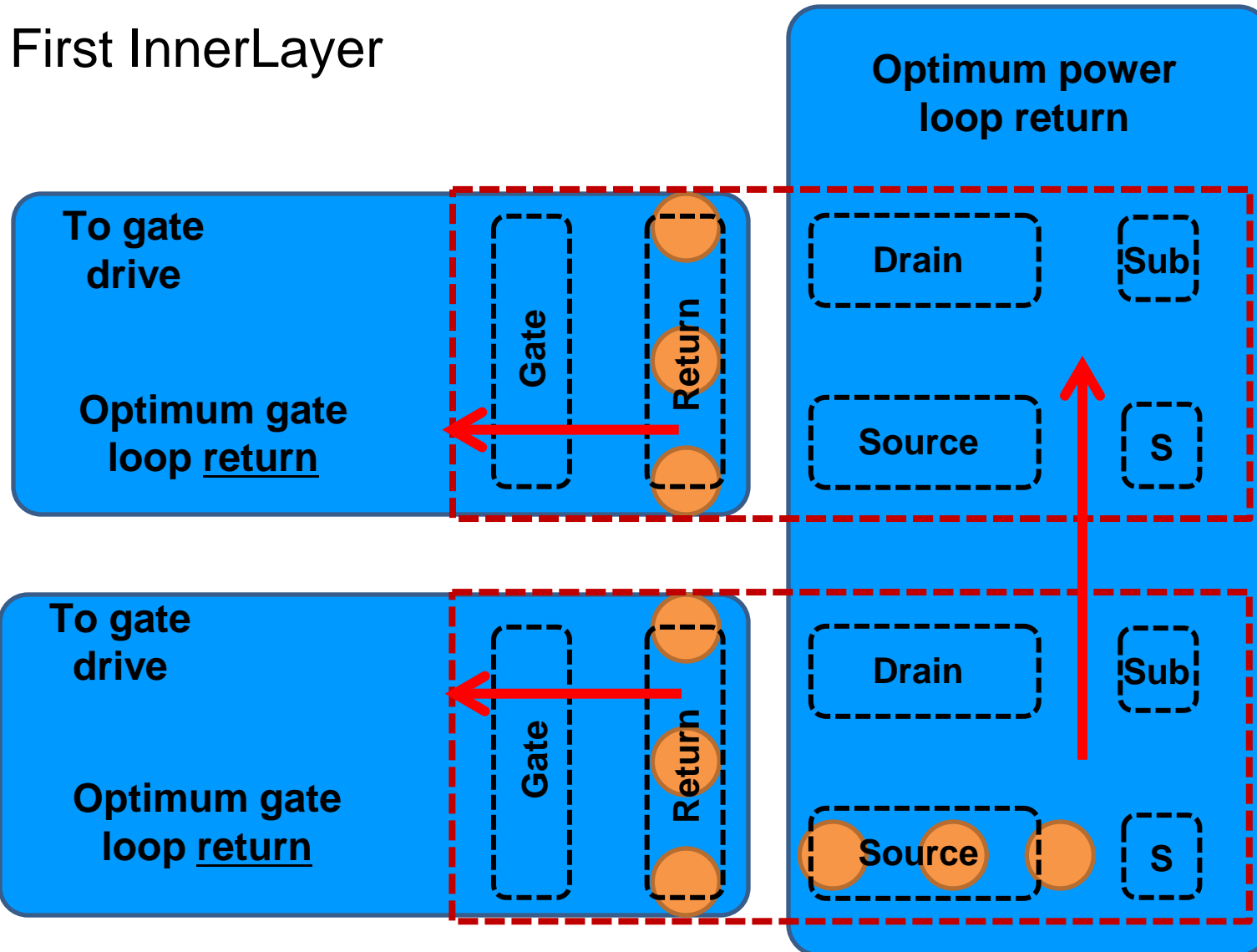




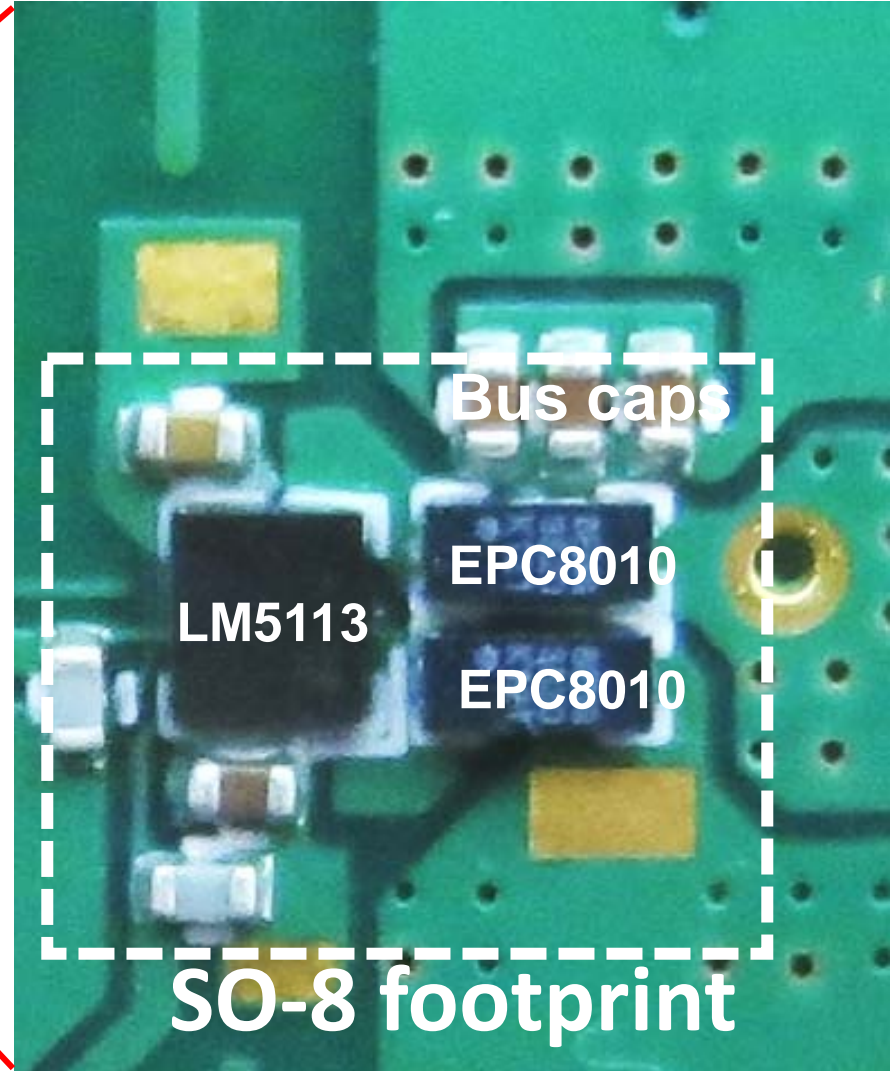
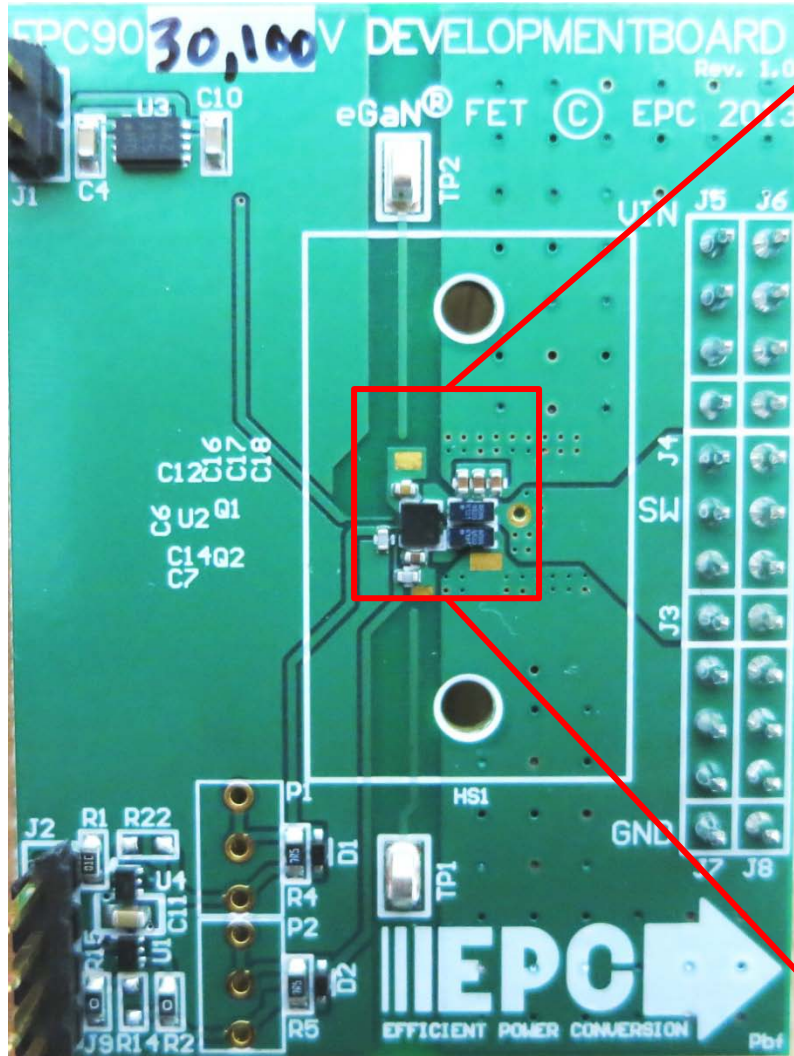
Top Layer

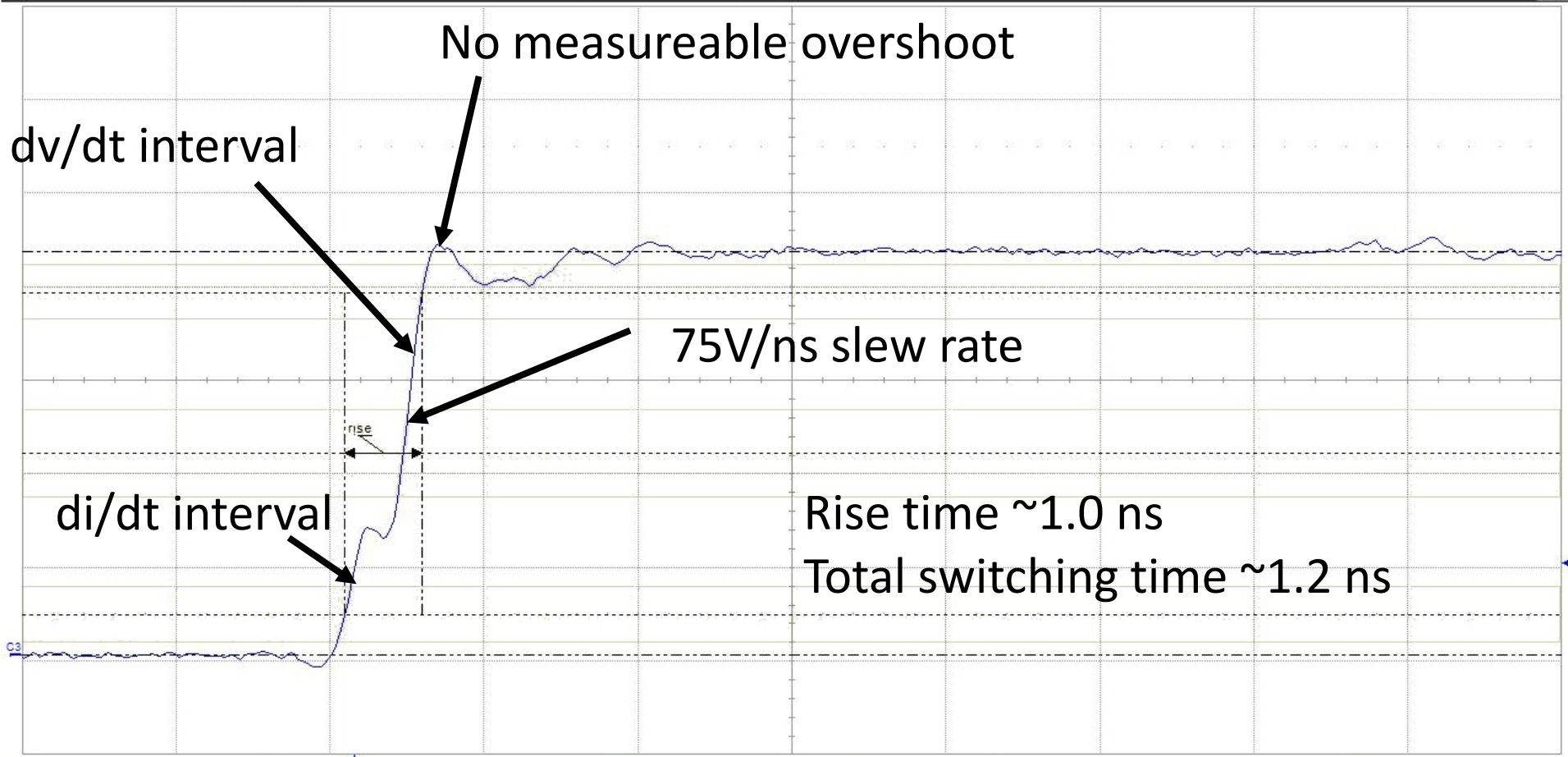


## First InnerLayer







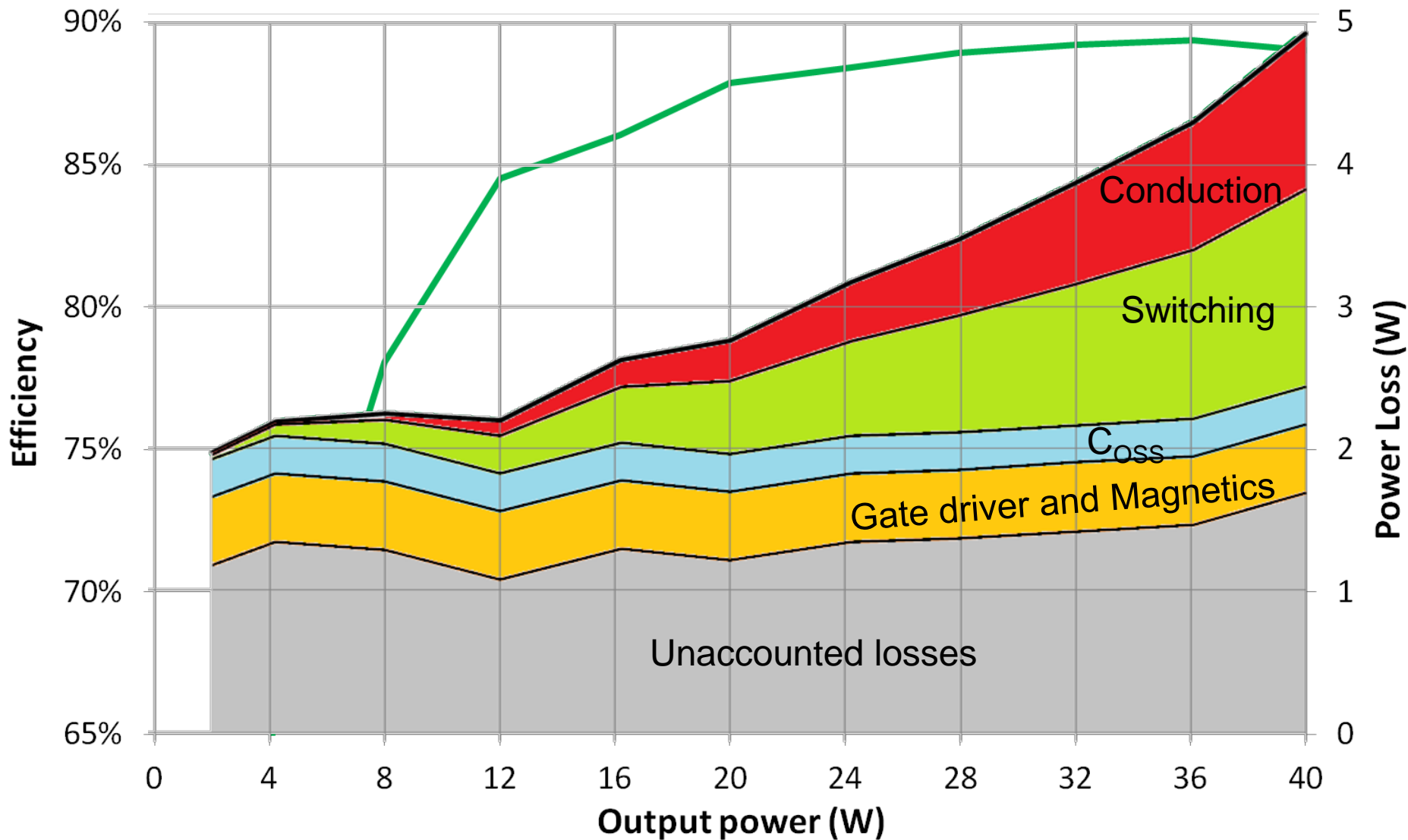


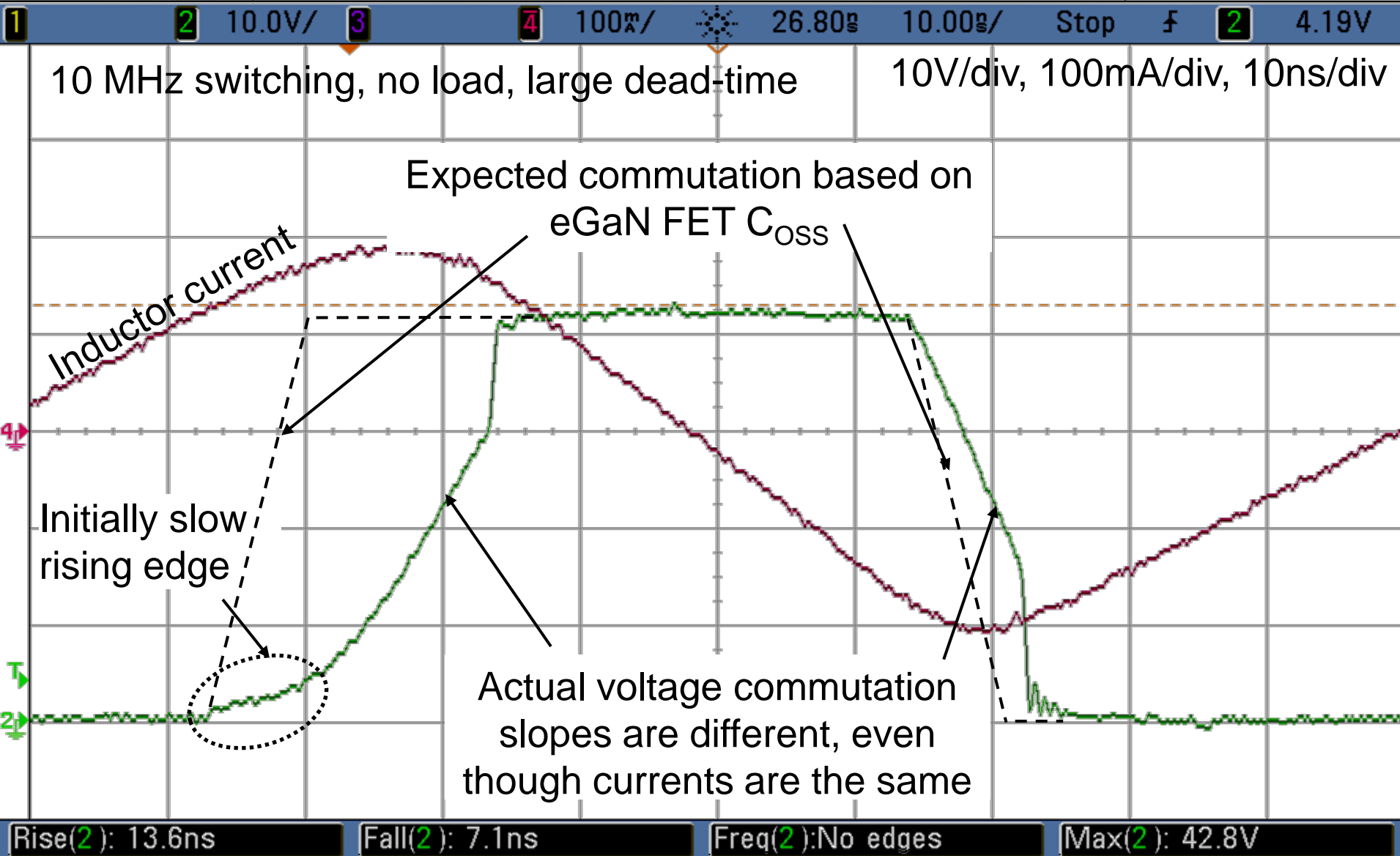
Measure	P1:duty(C2)	P2:freq(C3)	P3:rise(C3)	P4:fall(C3)	P5:---	P6:---	P7:---	P8:---
value			1.005 ns					
status			✓					

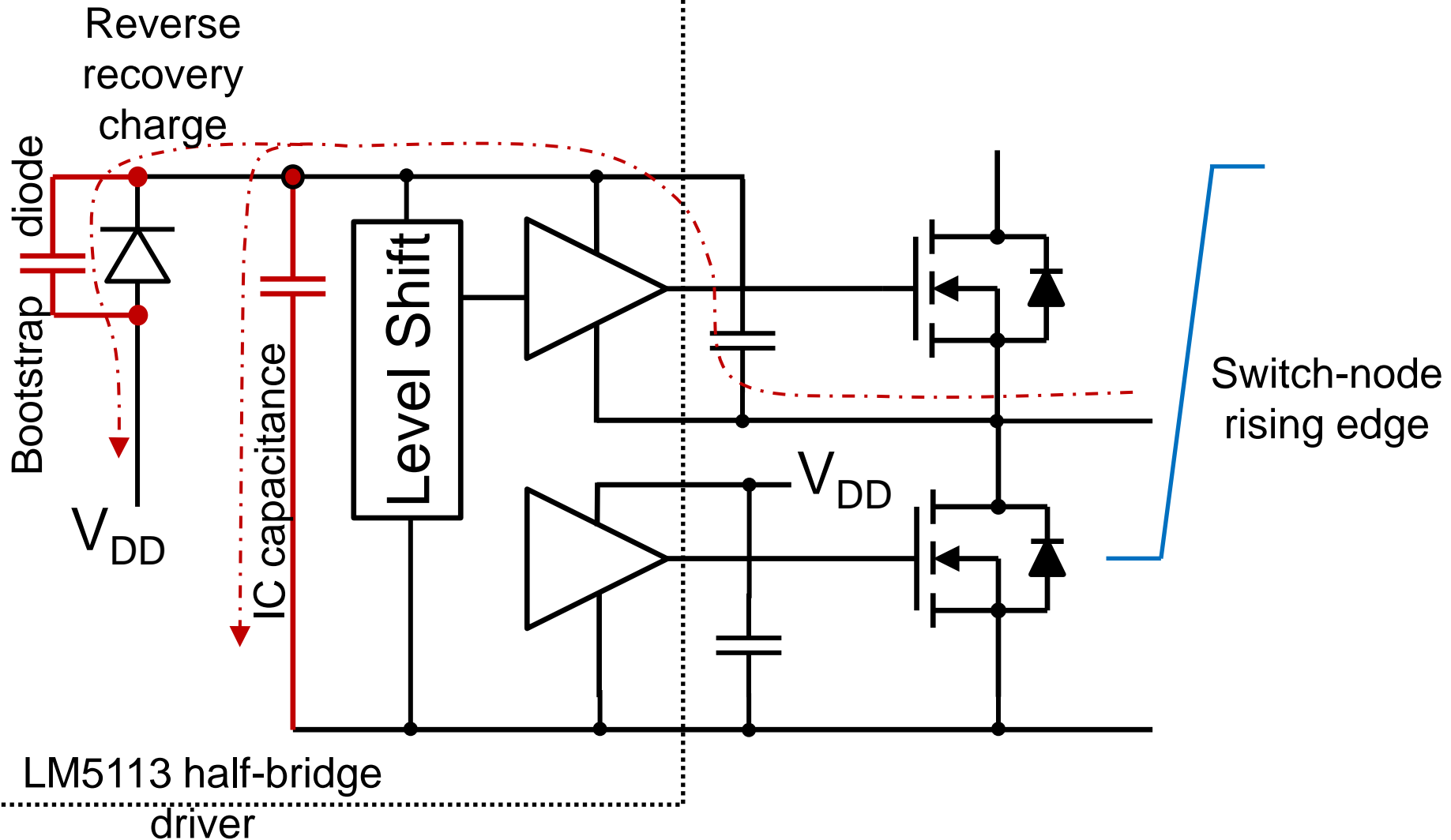
10.0 V/div  
-29.30 V  
LeCroy

2 ns/div and 10 V/div, 1 GHz 100:1 1pF TM probe

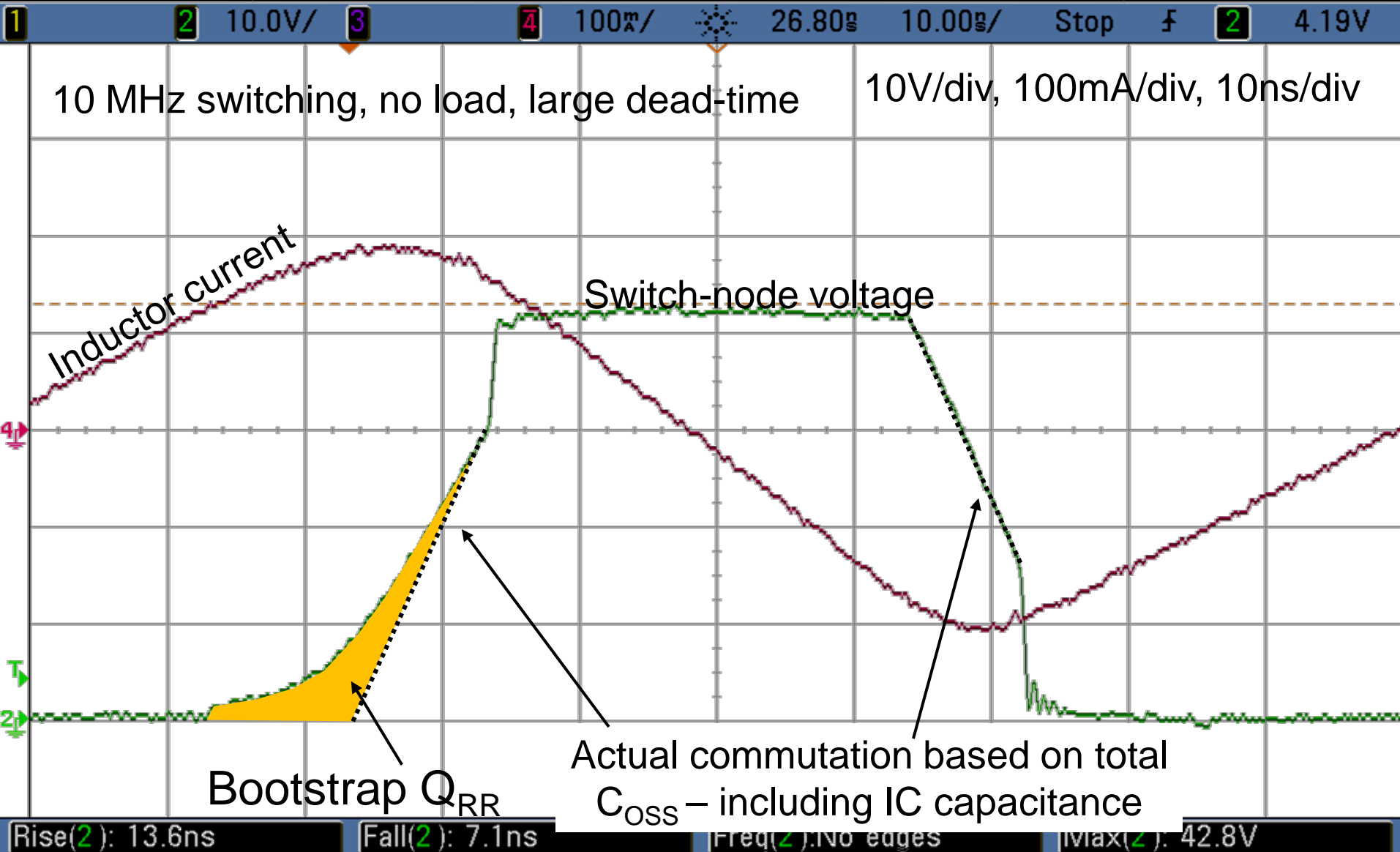
Tbase	-5.68 ns	Trigger	C3 DC
	2.00 ns/div	Stop	9.8 V
400 S	20 GS/s	Edge	Positive
7/2/2013 3:15:51 PM			



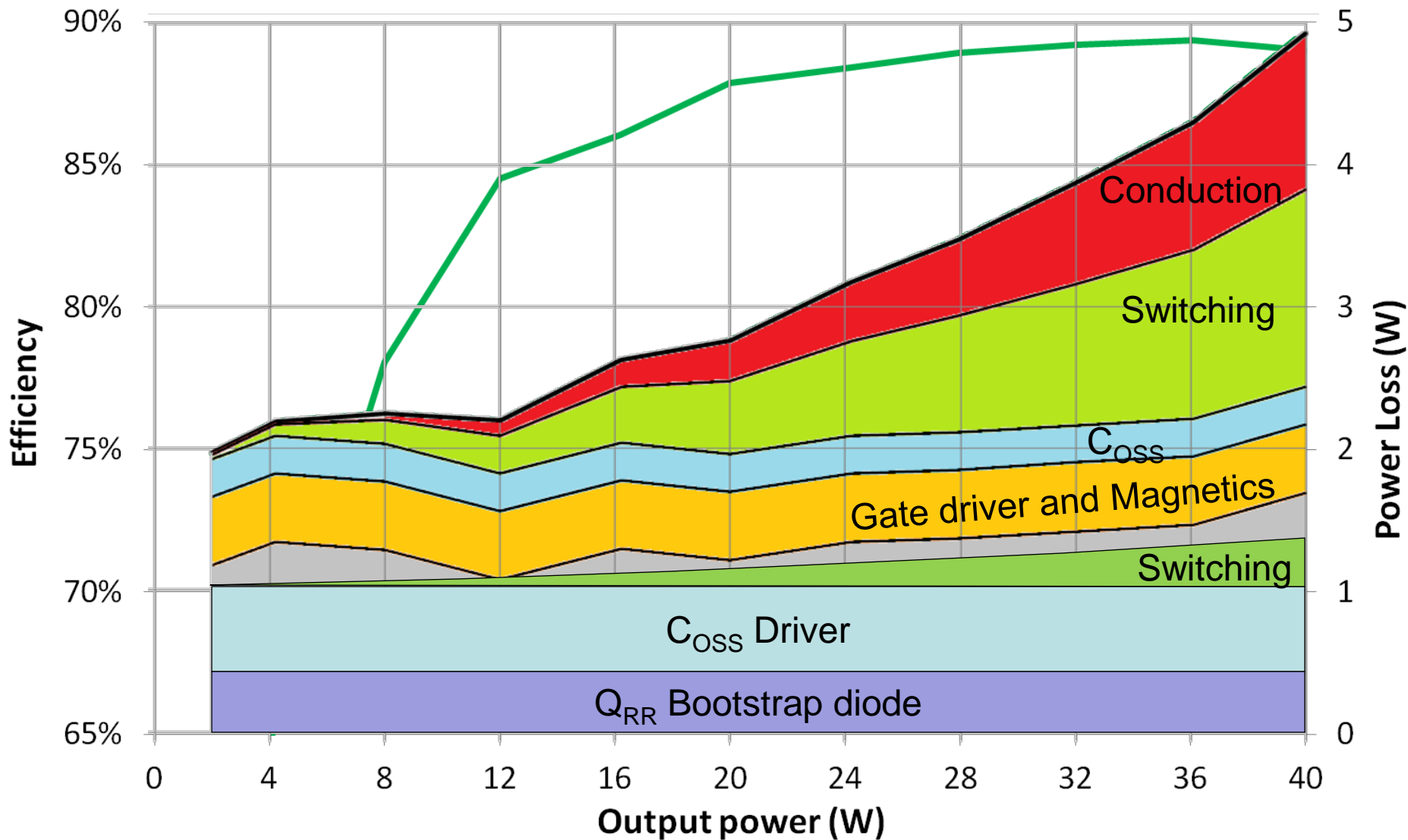


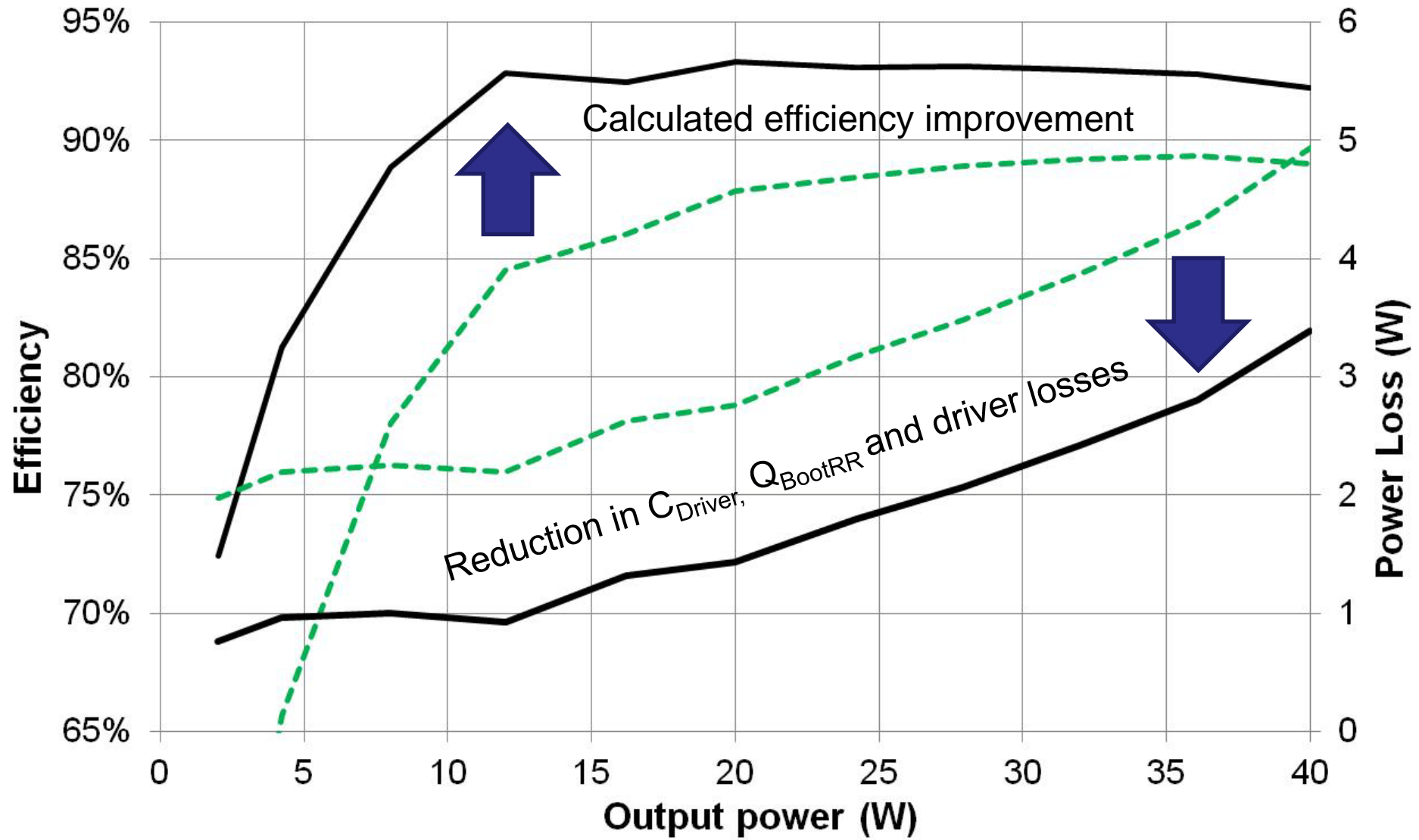












- **New devices enable higher switching frequencies**
- **Switching 42V, 40W at 10MHz at 89% possible**
- **Driver parasitics limit performance**
  - Doubles light load losses
- **Further improvements in efficiency possible**



*The end of the road  
for silicon.....*

*is the beginning of  
the eGaN FET  
journey!*