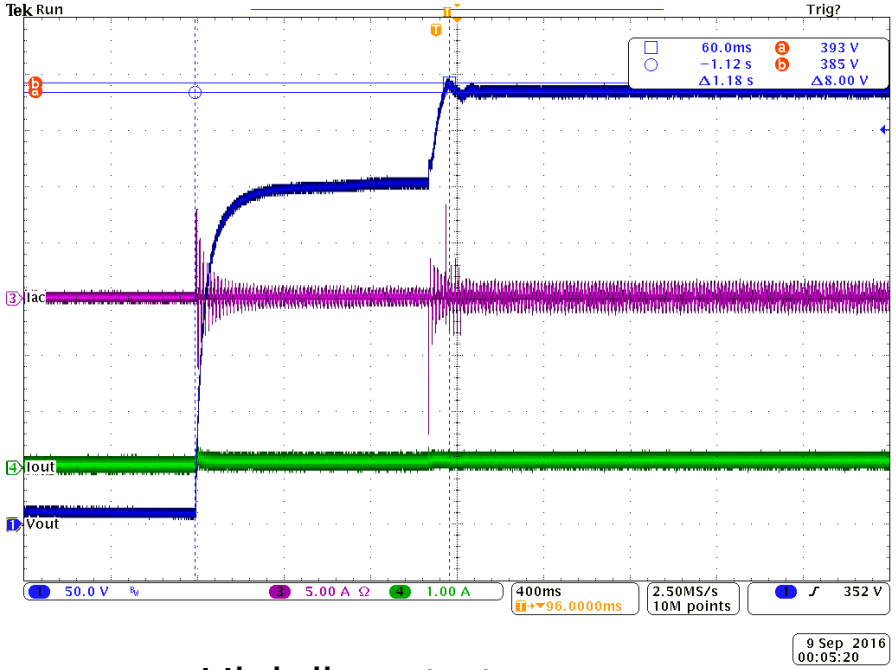
PMP20873 –
1kW Totem-Pole PFC EVM Test Report

GaN / Next

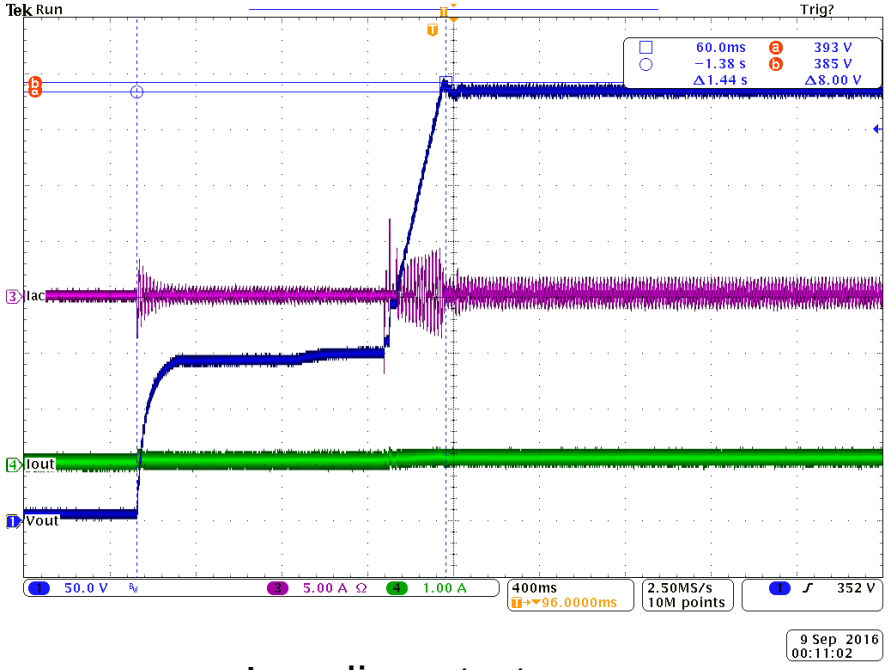
Zhong Ye

Oct. 2016

Start up



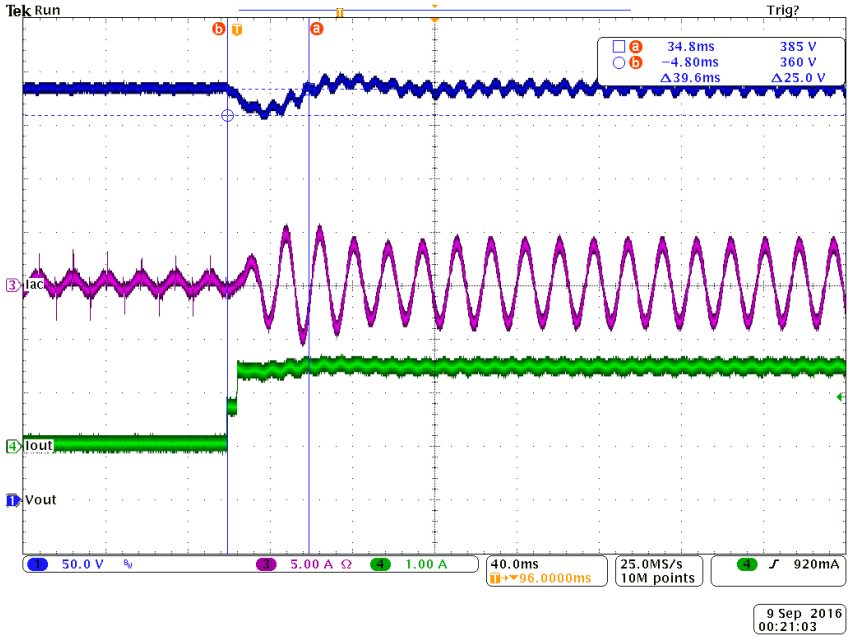
High line startup



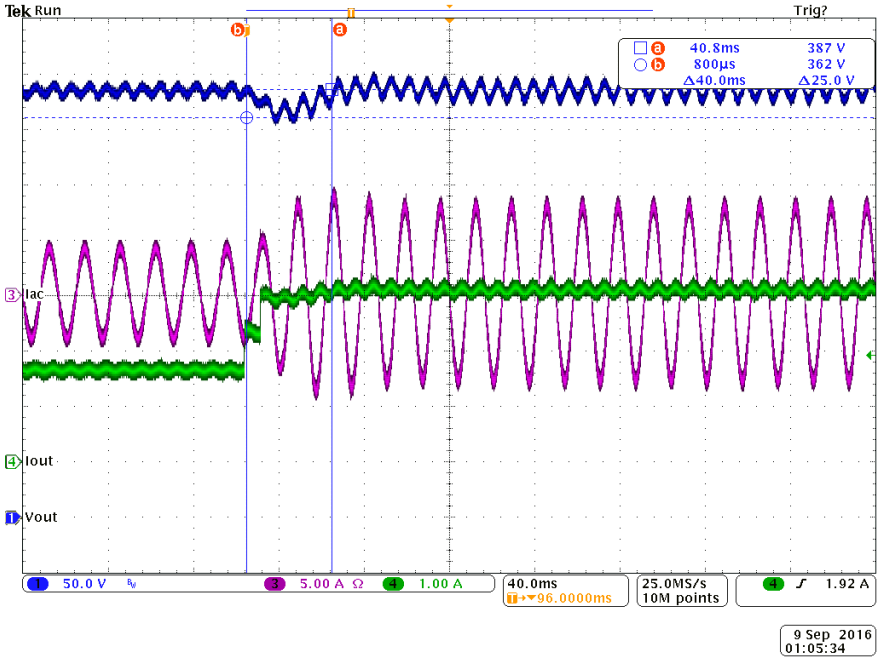
Low line startup

Note: extra 0.9 second was inserted due to DCP010512 bias long startup time.
The time can be eliminated when using bootstrap circuit.

Step Load Response – High Line (230Vac)

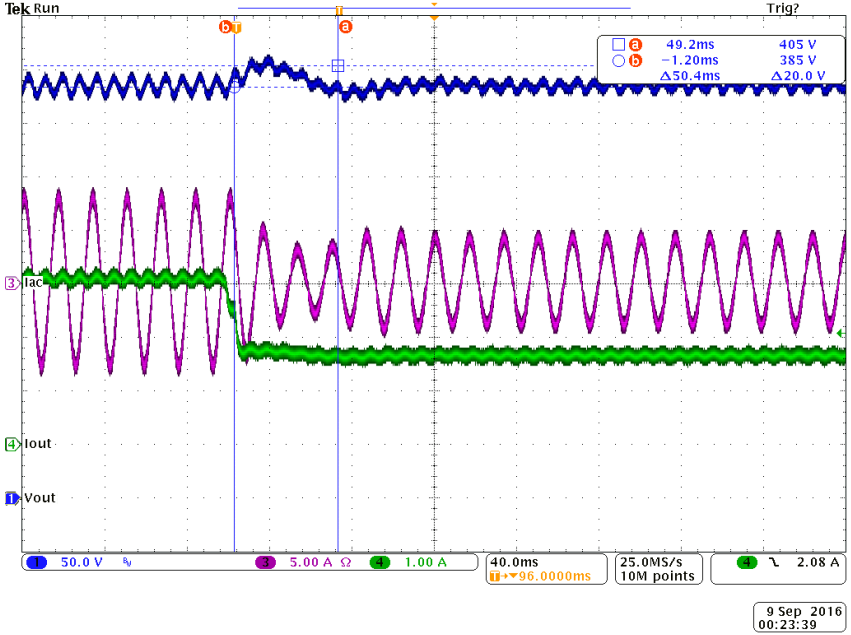


0 to 50% step load

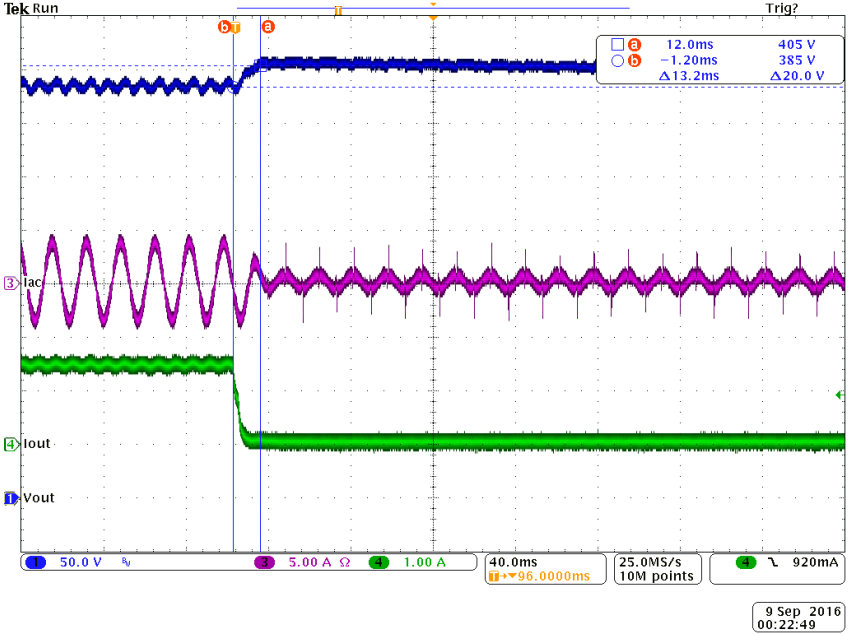


50 to 100% step load

Step Load Response – High Line (230Vac)

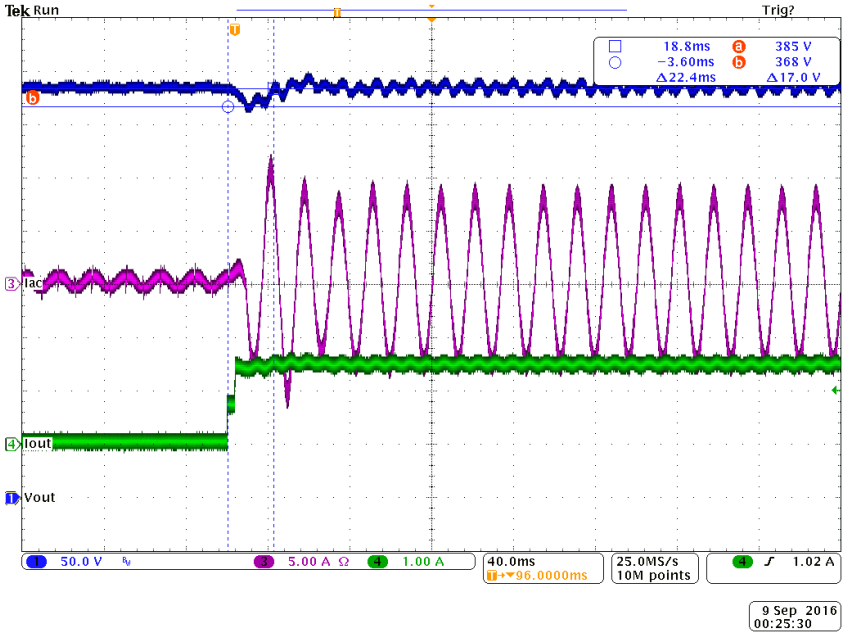


100% to 50% step load

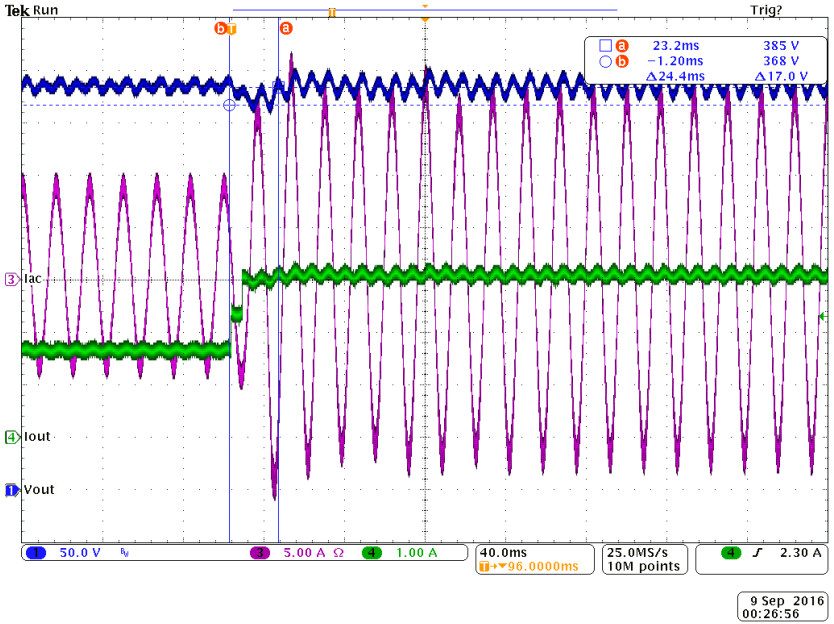


50 to 0% step load

Step Load Response – Low Line (115Vac)

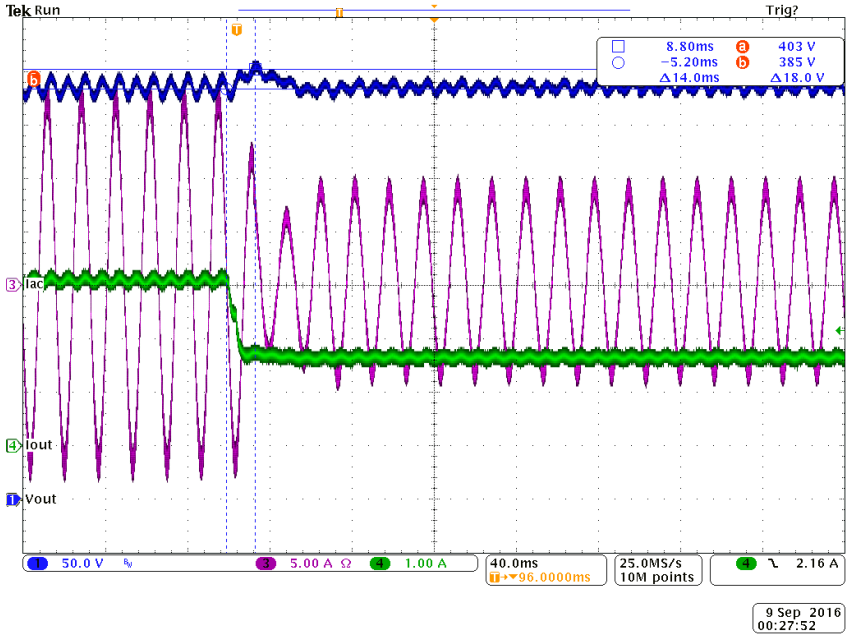


0 to 50% step load

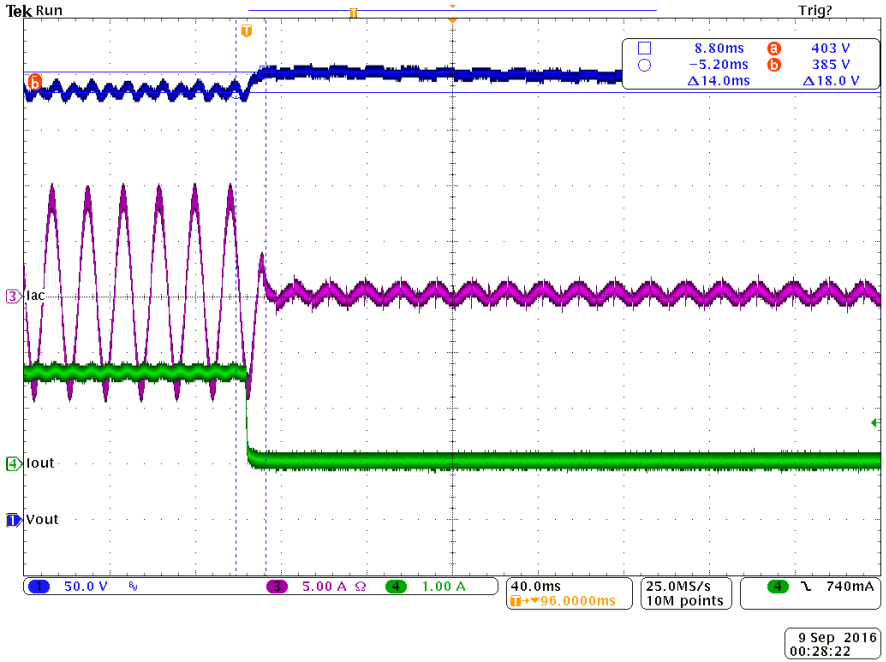


50 to 100% step load

Step Load Response – Low Line (115Vac)

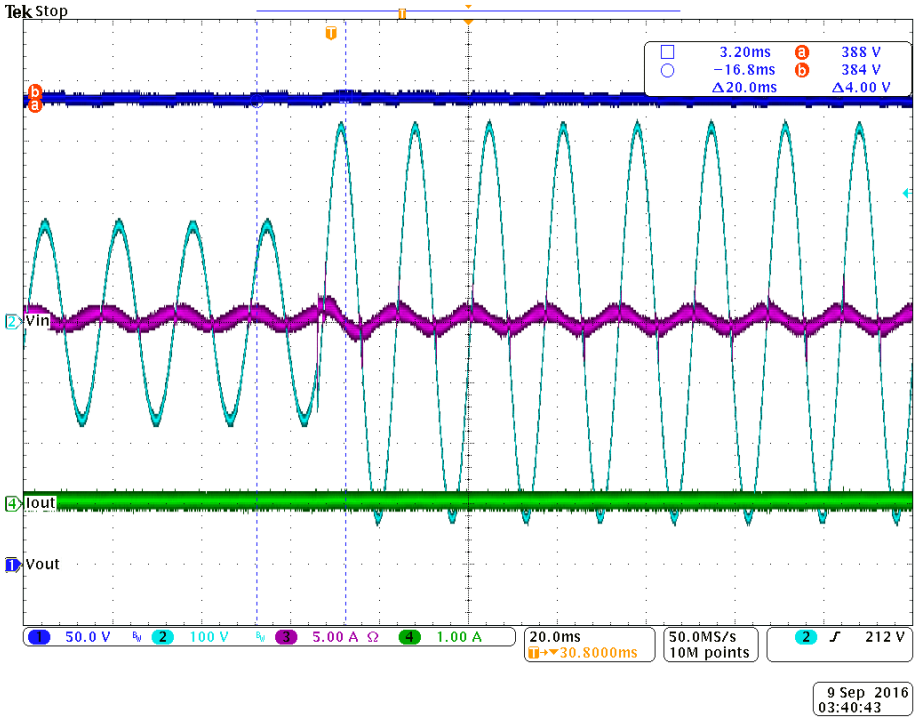


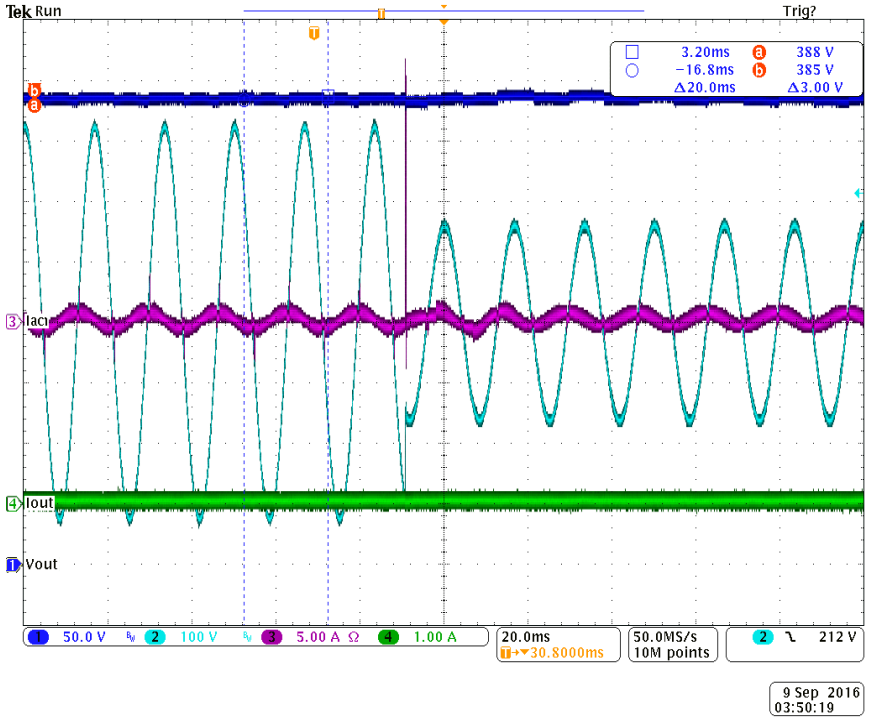
100% to 50% step load



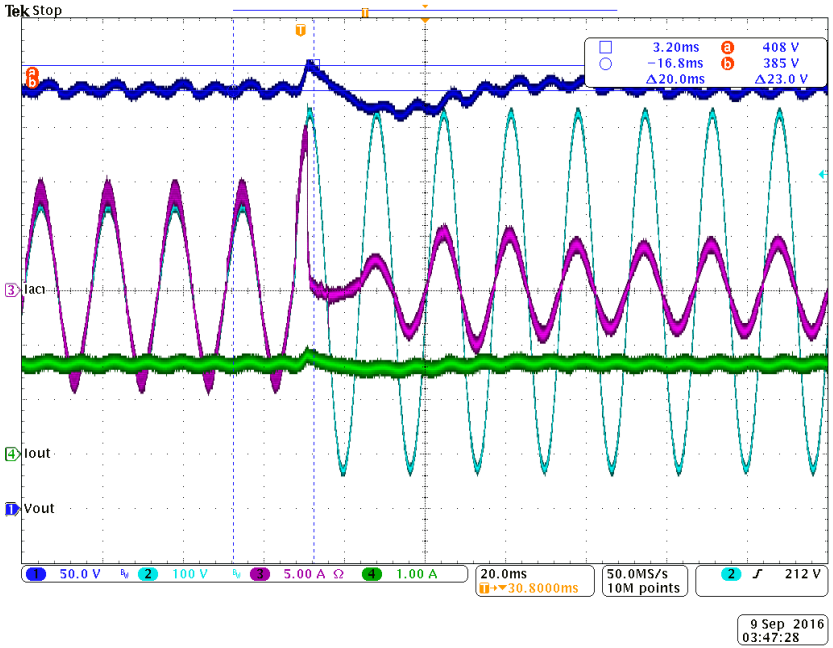
50 to 0% step load

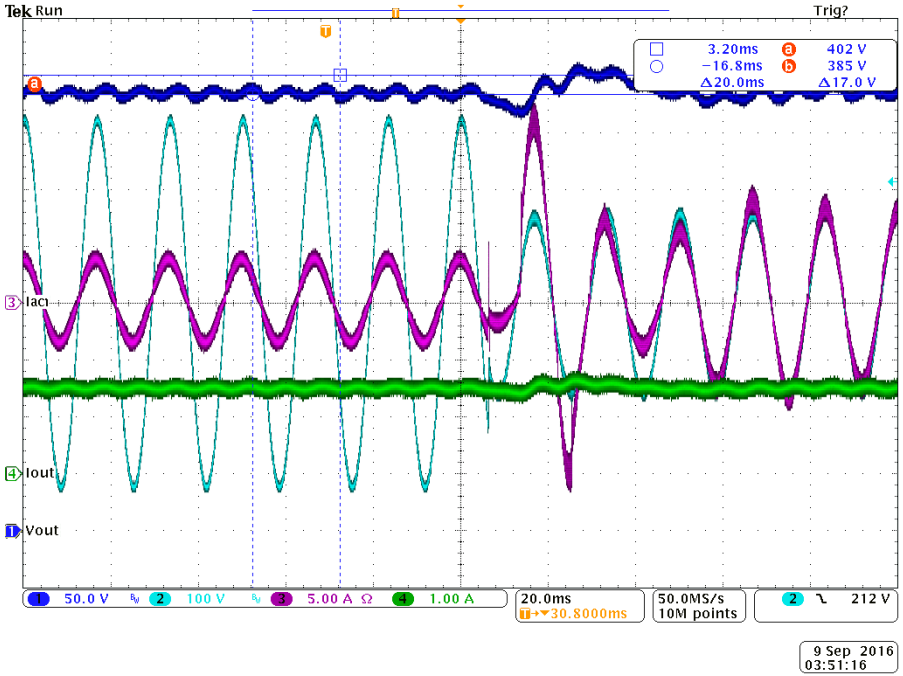
AC voltage transient Test 115V-230V at 0A load



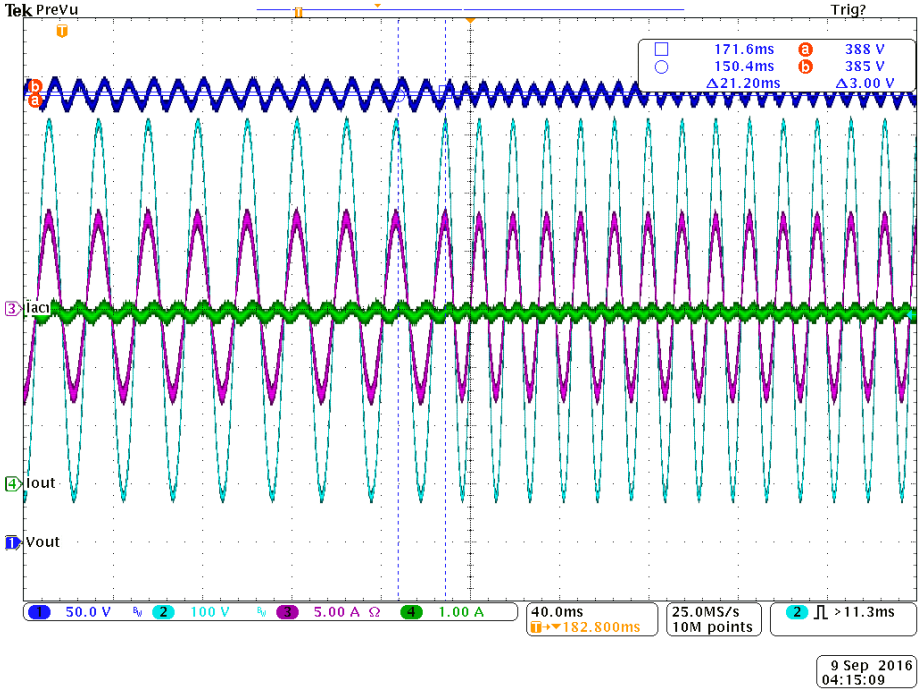


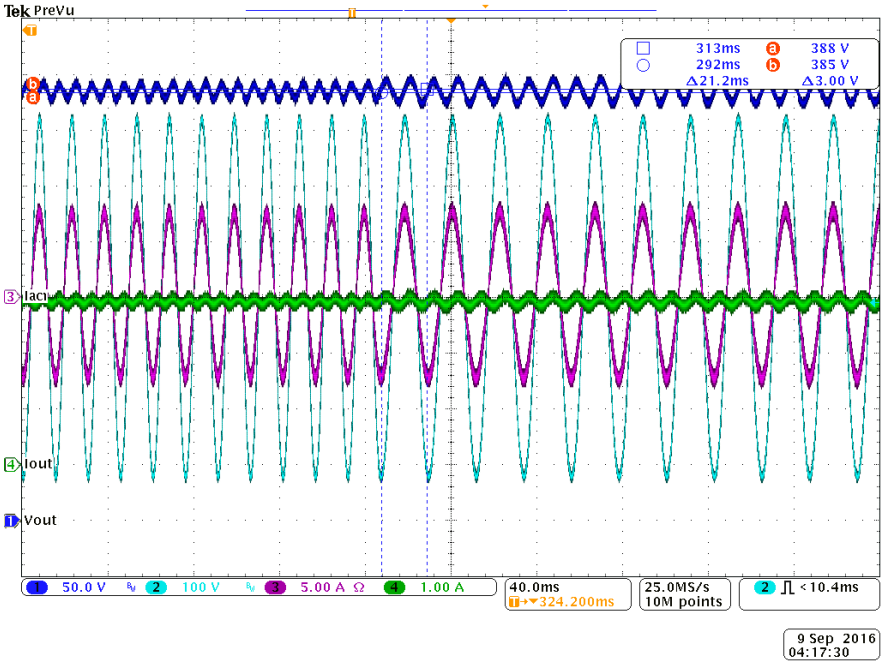
AC voltage transient Test 115V-230V at 1kW load



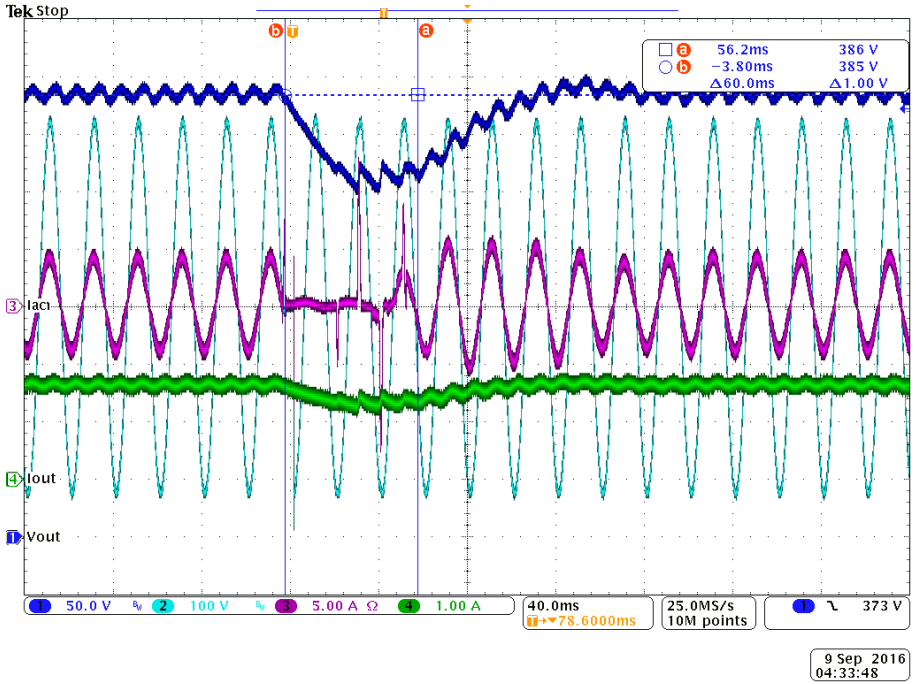


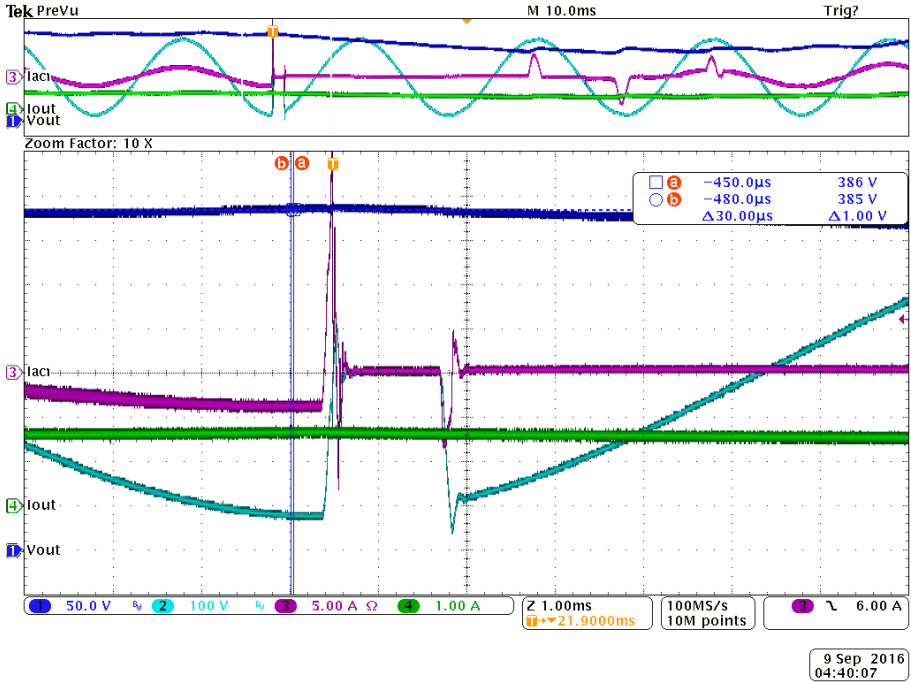
AC frequency transient Test (45 – 66Hz @ 230V 1kW)





AC drop and recovery test

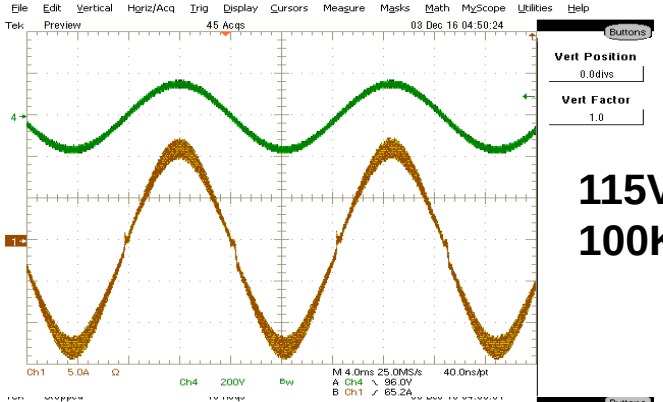




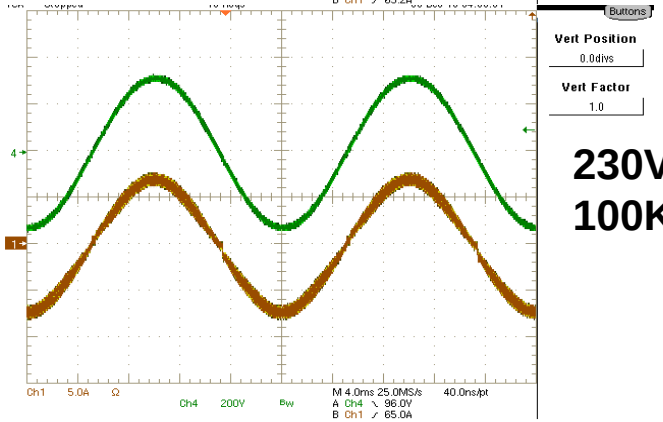
Pending issues: Current software disables PFC for three AC cycles when AC drop is detected.

A large reverse current occurs at AC dropping edges.

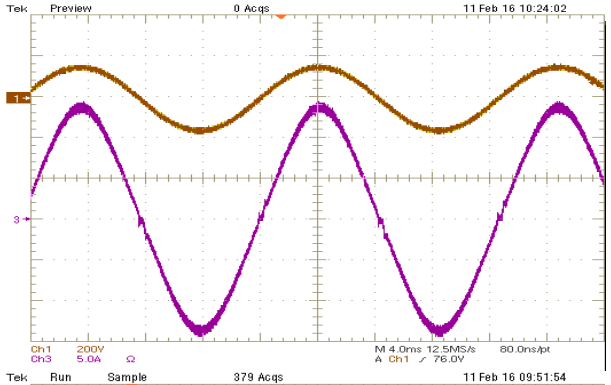
AC Current Waveforms at Full Load



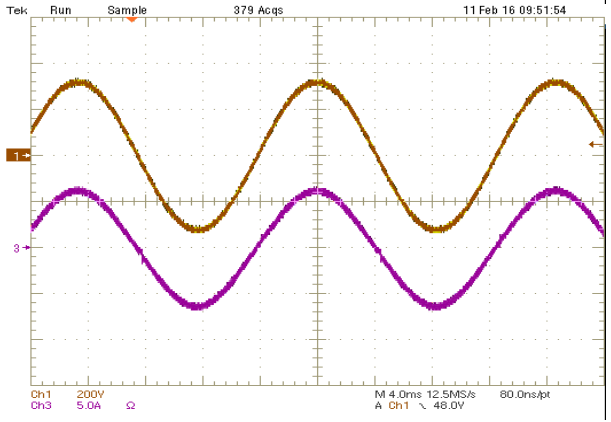
115Vac
100KHz



230Vac
100KHz

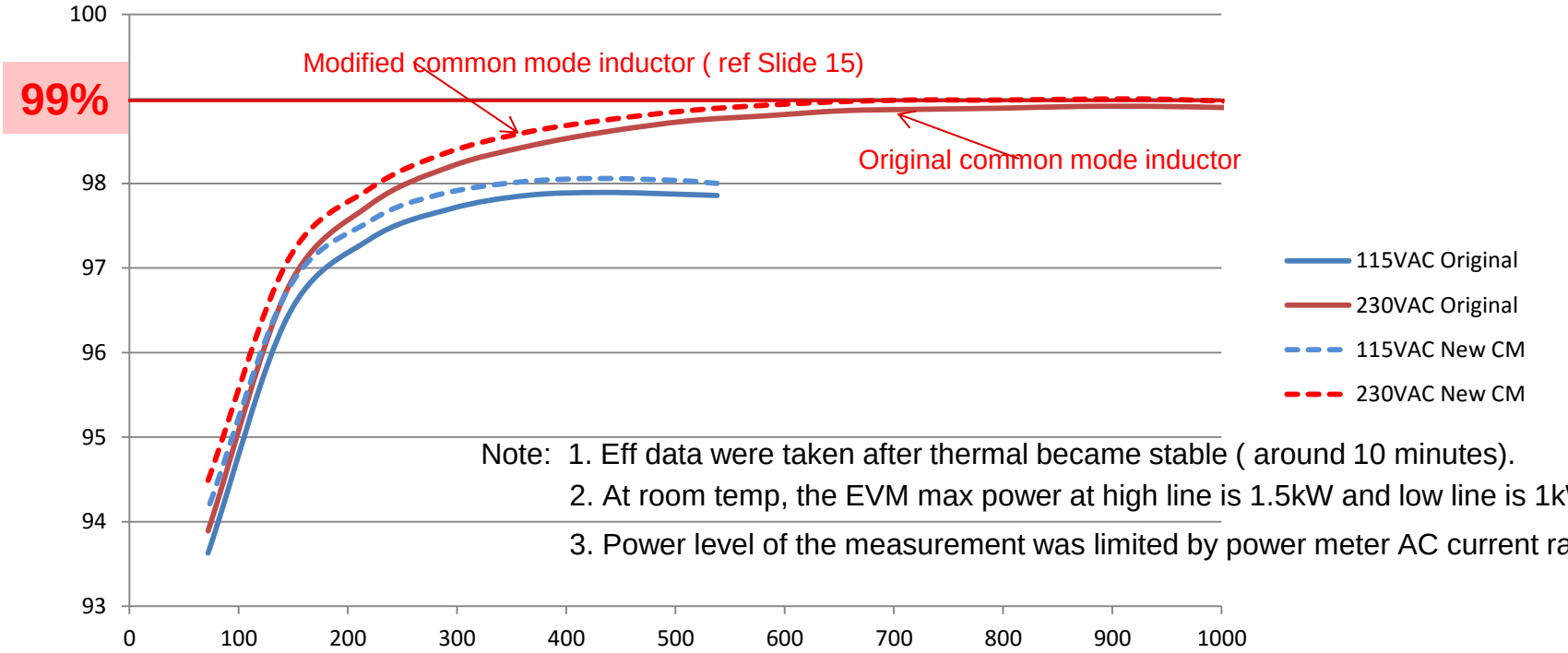


115Vac
140KHz



230Vac
140KHz

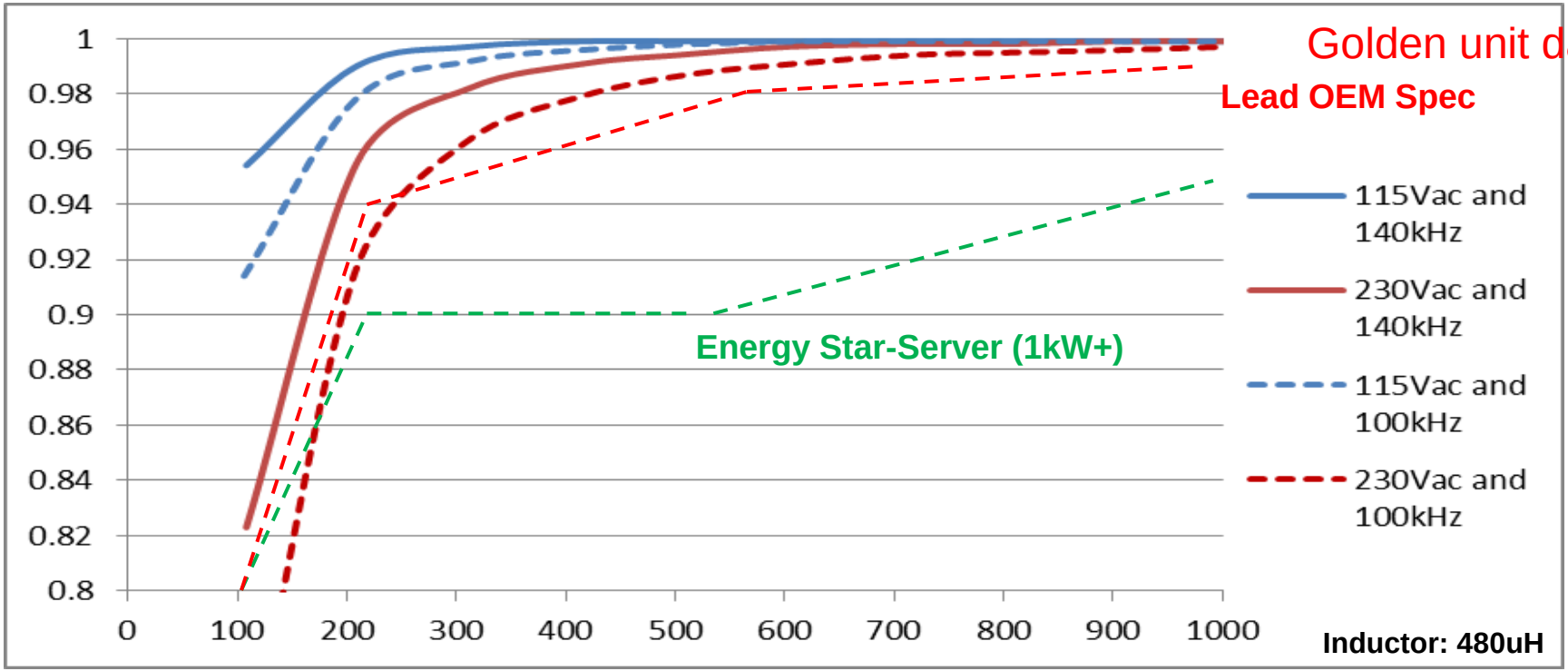
Efficiency



Note: 1. Eff data were taken after thermal became stable (around 10 minutes).
2. At room temp, the EVM max power at high line is 1.5kW and low line is 1kW.
3. Power level of the measurement was limited by power meter AC current range.

Note: Bias loss not included

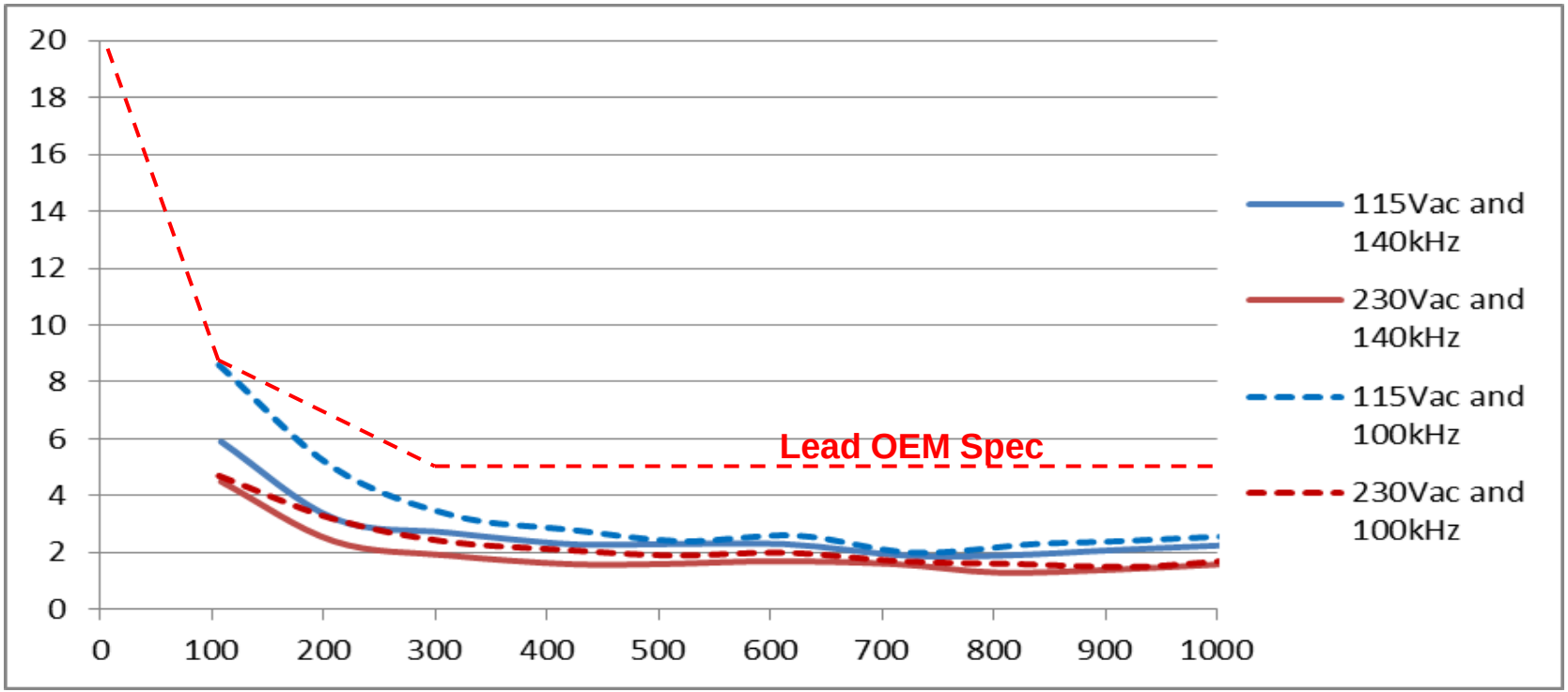
Improving Power Factor by Using Higher fs



Higher switching frequency increases current loop bandwidth and improves PF.

THD

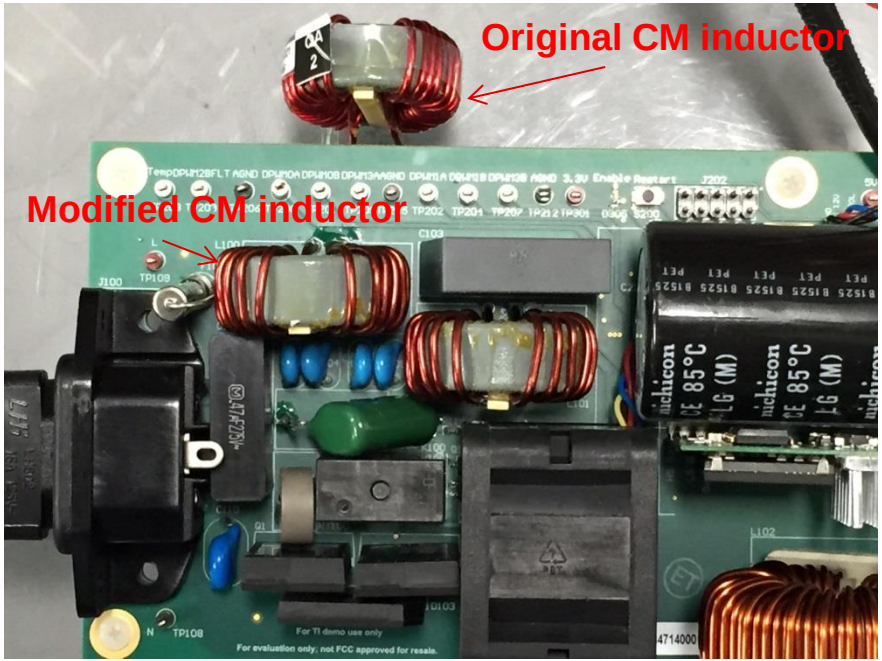
Golden unit data



Inductor: 480uH

Backup Slides

EMI design modification to improve efficiency



- Change CM inductor from 1.68mH to 1.2mH (DCR decreased from 30mΩ to 20mΩ by using 16 AWG 10 turn instead of 18 AWG wire)
- C103 changed from 1uF to 0.47uF
- C107 changed from 1uF to 2.2uF

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