Thread Tracking Toolkit

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Thread Status: Closed

Region: OK9

Responsible Organization
 --[HVPS] HVPS-HPCS

Thread ID: 515206

Account: TI SCINTL (ELIM)

Assign

Email addresses entered above will receive a one-time email notifying them of assignment to this thread **and** will be automatically email subscribed to all subsequent replies.

Company: Texas Instruments

Priority: Normal

Notify

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Notes:

Submit

UCC28180 input current spike

✔ Answered

Kotaro Yamashita

Team,

My customer is evaluating UCC28180-EVM573 now. Then they can see spike on the input current under following condition.

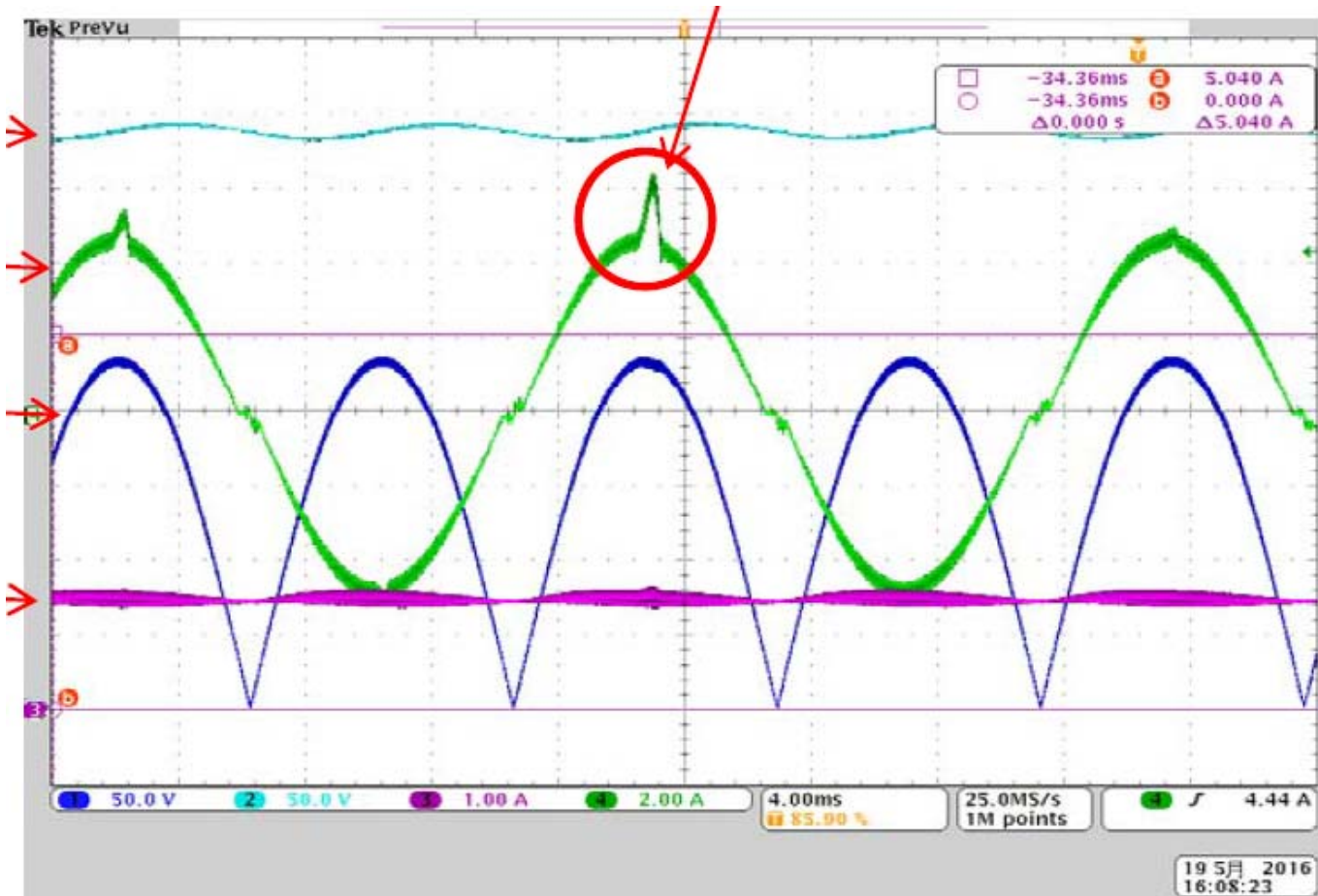Could you advise me the root cause of this behavior?
input: AC170V
output: 390V (Spike occured over 530W output)
*R6: 22.6k -> 12k
*C14: 0.47uF -> 1uF

 *calculated by DESIGN TOOL

CH1: voltage of diode bridge output

CH2: output voltage

CH3: output current

CH4: input current

Regards,

Kotaro Yamashita

Kotaro Yamashita

John Griffin1

Hi,
The UCC28180-EVM573 is a 360W design.
How did your customer manage to get 530W output?
What components besides R6 and C14 were changed?

Regards,
John

Kotaro Yamashita

In reply to John Griffin1:

Hi John-san,

In my customer understanding, Max360W power depend on current limit. if input voltage is 2 times from min. voltage on this EVM, EMV can support more power. Does customer wrong?

Regards,
Kotaro Yamashita

Bosheng Sun

In reply to Kotaro Yamashita:

Hi Kotaro,

This looks like ICOMP reaches its upper limit and be clamped there, then PWM duty becomes fixed at AC peak, therefore you see a AC current spike. Please reduce the current shunt resistor R4, the current spike should go away.
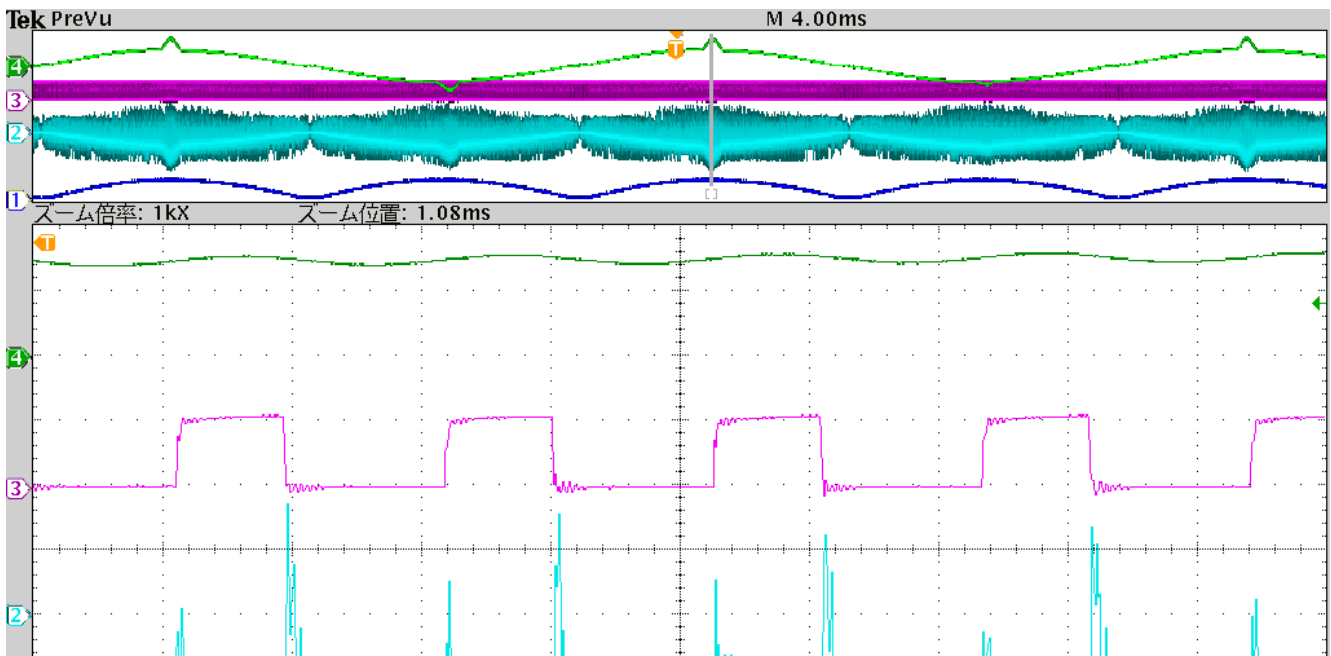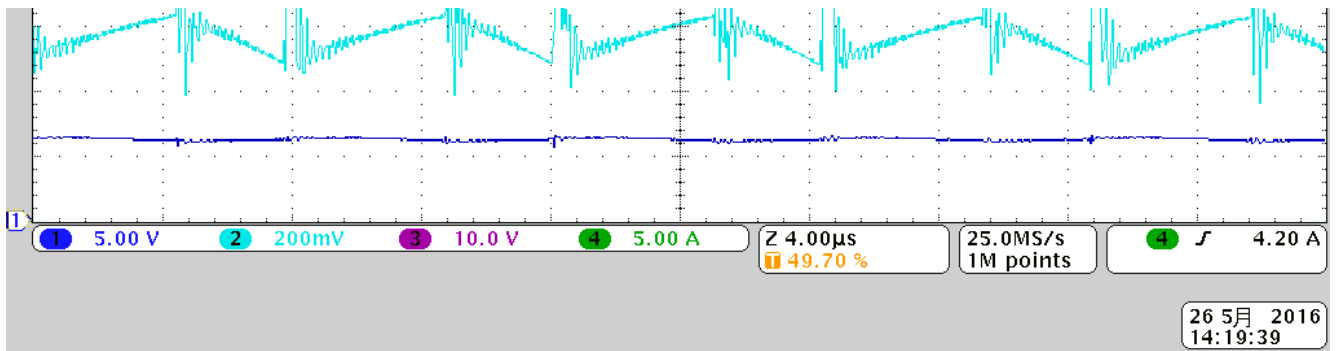
Regards,
Bosheng Sun

Kotaro Yamashita

In reply to Bosheng Sun:

Hi Bosheng,

Thank you for your reply.

I just get more detail, however ICOMP voltage isn't clamped. Could you have any advice?

CH1: ICOMP

CH2: ISENSE

CH3: GATE

CH4: input current

Regerds,

Kotaro Yamashita

Bosheng Sun

In reply to Kotaro Yamashita:

Hi Kotaro,

The upper limit of ICOMP is about 6V, from your waveform ICOMP already hit the limit. Please reduce the value of current shunt resistor R4.

Regards,
Bosheng Sun

Kotaro Yamashita

In reply to <u>Bosheng Sun</u>:

Hi Bosheng,

Customer would like to understand below. Could you support?

1. Based on Design Calculator, <u>UCC28180</u> EVM can drive 720W output at min.AC170V input. Calculator is wrong?
2. Current Amp's gain(gmi) was non-linearity changed by Vcomp voltage, right? Was Vcomp voltage decided by output voltage? or line voltage? or both?

Regards,
Kotaro Yamashita

<u>Bosheng Sun</u>

In reply to <u>Kotaro Yamashita</u>:

Ki Kotaro,

1. <u>UCC28180</u> is designed for universal input from 85VAC to 264VAC, both voltage loop and current loop gains are non-linear, the current sensing resistor should be calculated with 85VAC otherwise ICOMP may reach the internal upper clamp limit. The calculator is assuming the input range is from 85VAC to 264VAC.
2. Yes, current Amp's gain(gmi) is non-linearity changed by Vcomp voltage, and Vcomp voltage is changed by both output voltage, input voltage and load.

Regards,
Bosheng Sun

<u>Kotaro Yamashita</u>

In reply to <u>Bosheng Sun</u>:

Hi Bosheng,

Thank you for your reply.
>1.
Their application will release to only 220V-240Vac area. If PFC need more current capability, there is cost impact for them. Is there the way that UCC28180 has low current capability for only 220V-240Vac area?

3. Does UCC28019A have same control?

Regards,
Kotaro

Bosheng Sun

In reply to Kotaro Yamashita:

Hi Kotaro,

1, can you explain more about your question? UCC28180 can support from 100W to a few KW load range.
3, UCC28109A has the same control algorithm.

Regards,
Bosheng

Kotaro Yamashita

In reply to Bosheng Sun:

Hi Bosheng,

1. For example, They are considering 720W PFC at AC170V input. Then, input current is 4.55Arms, right? if they need to consider 720W PFC at AC85V input too, external component need to have 9.1Arms current capability. (it is rough calculation)

Regards,
Kotaro