Regarding re-adjustment of CR connection of UCC256403_Isns pin 2025.06.27

was recently advised to adjust the capacitance of the capacitor connected to the Isns pin, and I replied that I had done so before and that it had no effect, but later I became a bit concerned and tried to add it again. As a result, the overshoot caused by a sudden change in the 5V output load was improved. I think the reason why the same capacitor was not improved before was that the current detection resistor (R42) was mounted far from the Isns pin of the IC, so the noise reduction effect was not achieved. By moving the current detection resistor closer to the Isns pin, the effect of increasing the bypass capacitance was achieved, and the occurrence of a single burst operation was eliminated, making continuous mode operation possible. So I have a question.

[Question 1]

I have found that adding this capacitor is an effective countermeasure, so please let me know how large a capacitance of the capacitor that can be connected to the Isns pin without impairing the function of this pin.Currently, the connection capacitance is 570pF in total, with 470pF added to the existing capacitance of 100pF, and overshoot is being suppressed.

[Question 2]

In this sudden load change from 100% to 0%, the LLC control frequency was narrowed down to a maximum of about 200KHz, but it could not be narrowed down to a maximum of 300kHz.

Even though the feedback from the output pulls the FB terminal to almost 0V instantly, why is it that the control frequency cannot be raised this much?Also, how can control up to nearly 300kHz be achieved?

The observed data on overshoot improvement due to this measure is shown below.

<Waveform measurement conditions>

1) Input voltage: DC380V (PFC output)

2) Output settings

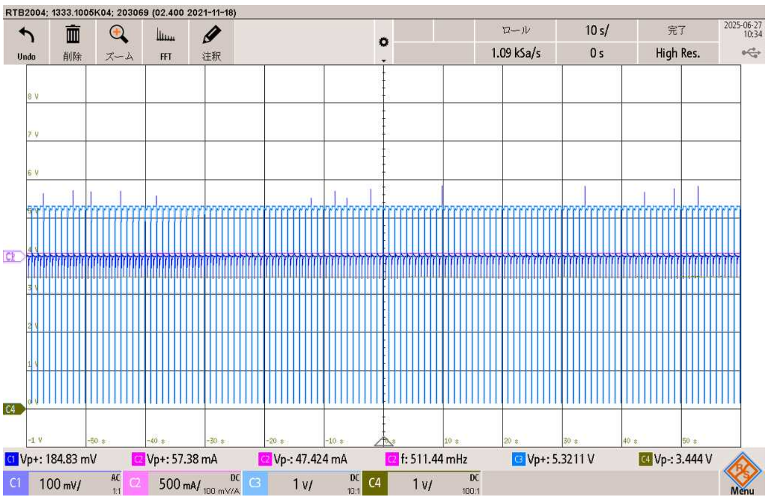
①_5V output voltage setting: Vo=4.70V_Io=(100%⇒0%) sudden change, ②_24V: no load

The output is not the normal voltage setting, but is evaluated at 4.7V

due to the specification requirement of a rated voltage -5% setting.

1．Before overshoot improvement

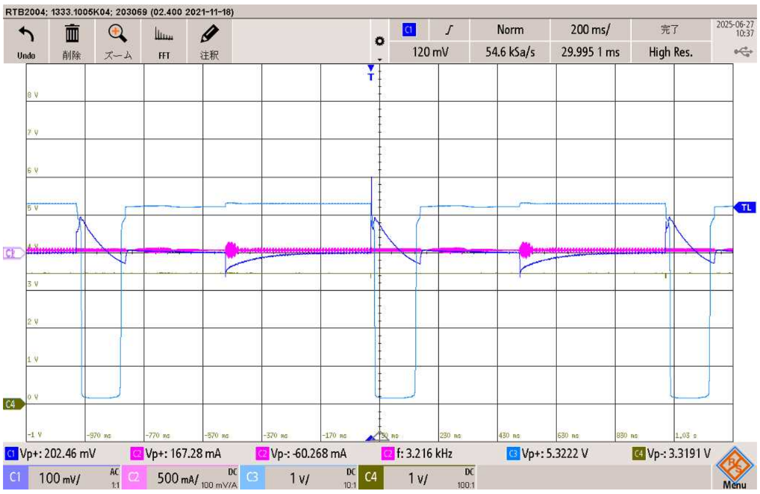
1-1. The frequency of overshoot occurrence is observed with slow sweep.



C1: 5Vout [100mV/div], C2: T1 primary current [500mA/div], C3: FB pin voltage [1V/div],

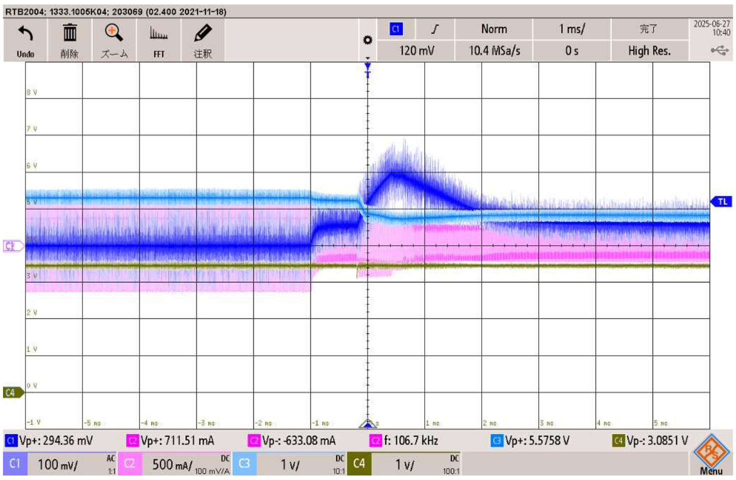
C4: LL/SS pin voltage [1V/div]

1-2. When the load of the 5V output suddenly changes from 100% to 0%, an overshoot of about 200mV occurs (H: 200msec/div).



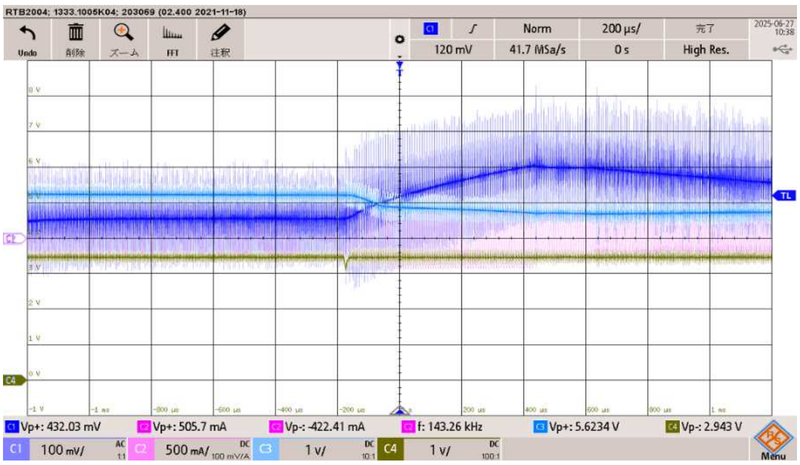
C1: 5Vout [100mV/div], C2: T1 primary current [500mA/div], C3: FB pin voltage [1V/div], C4: LL/SS pin voltage [1V/div]

1-3. Enlarged waveform of overshoot in item 1-2 (H: 1 msec/div)



C1: 5Vout [100mV/div], C2: T1 primary current [500mA/div], C3: FB pin voltage [1V/div], C4: LL/SS pin voltage [1V/div]

1-4. Enlarged waveform of overshoot in item 1-2 (H: 200 μ sec/div)

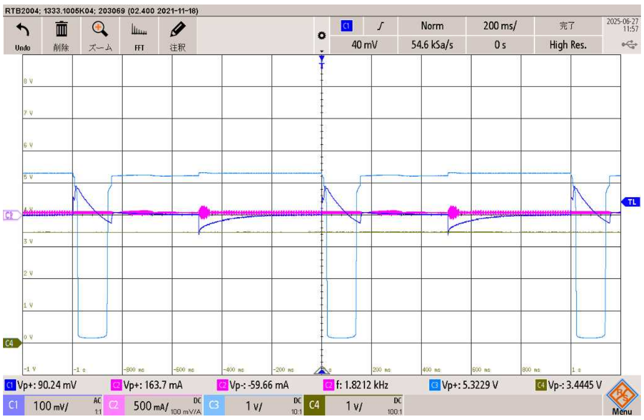


When the 5V output suddenly changed load, a momentary dip that was thought to be due to noise was observed in the LL/SS pin waveform.

C1: 5Vout [100mV/div], C2: T1 primary current [500mA/div], C3: FB pin voltage [1V/div], C4: LL/SS pin voltage [1V/div]

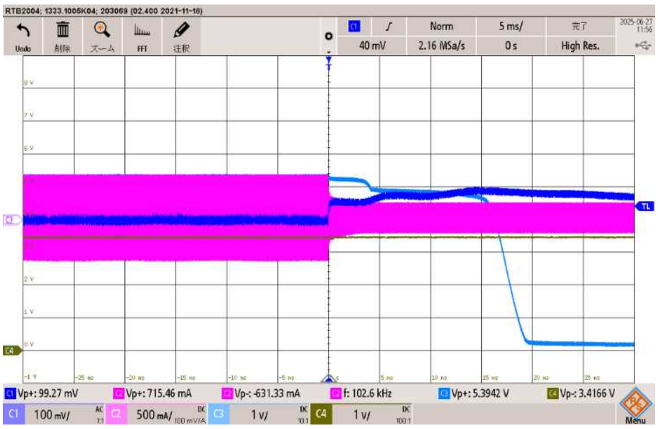
2． 5V overshoot improvement waveform after measures were taken

2-1. Improved waveforms for each overshoot when the load of the 5V output changes suddenly from 100% to 0% (H: 200msec/div)



C1: 5Vout [100mV/div], C2: T1 primary current [500mA/div], C3: FB pin voltage [1V/div], C4: LL/SS pin voltage [1V/div]

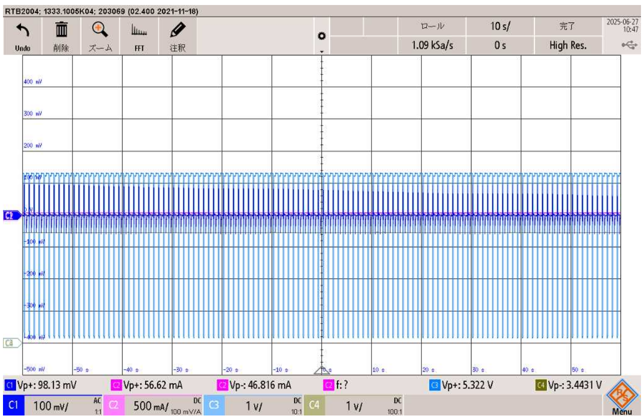
2-2. Enlarged waveform of item 2-1（H：5msec／div)



The momentary dip change seen before the improvement is no longer observed in the LL/SS pin waveform.

C1: 5Vout [100mV/div], C2: T1 primary current [500mA/div], C3: FB pin voltage [1V/div], C4: LL/SS pin voltage [1V/div]

2-3. Suppression of repeated overshoots observed with slow sweeps.（H：10sec／div)



C1: 5Vout [100mV/div], C2: T1 primary current [500mA/div], C3: FB pin voltage [1V/div], C4: LL/SS pin voltage [1V/div]

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