1. Brown in/out Circuit For N386X Series

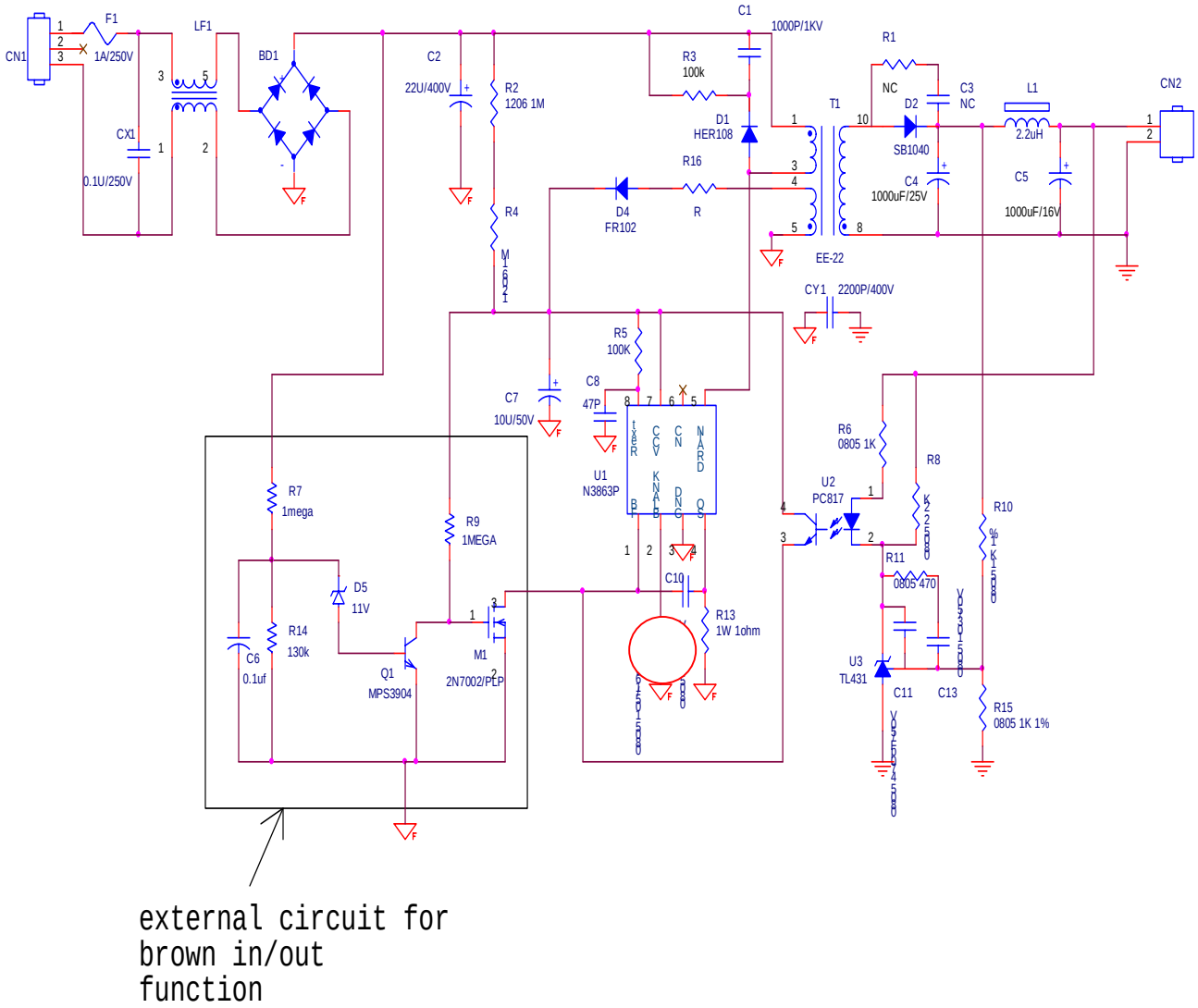
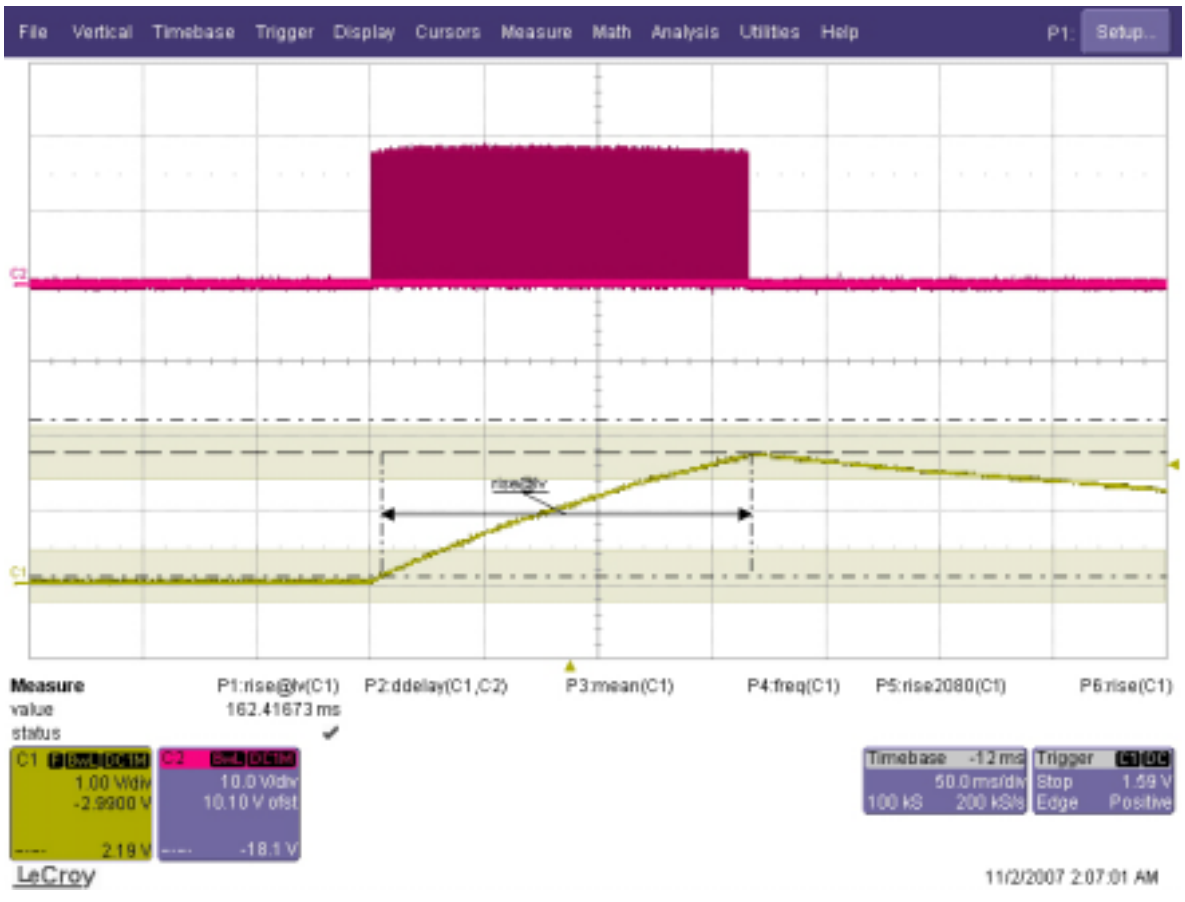


Figure1. Circuit diagram

The circuit in the black frame is the brown in/out circuit for N386X series. The idea is to control the FB pin and force the FB voltage to be lowered when the input voltage doesn't reach the brown in/out level. The circuit is built with a few external components to achieve the brown in/out function. The brown in/out threshold level are through the resistor divider"R7, R14" to set-up the trigger point. The resistor divider can be also replaced by the PFC voltage detector divider resister in order to save the power consumption.

2 Turn on Delay Time for Capacitance load

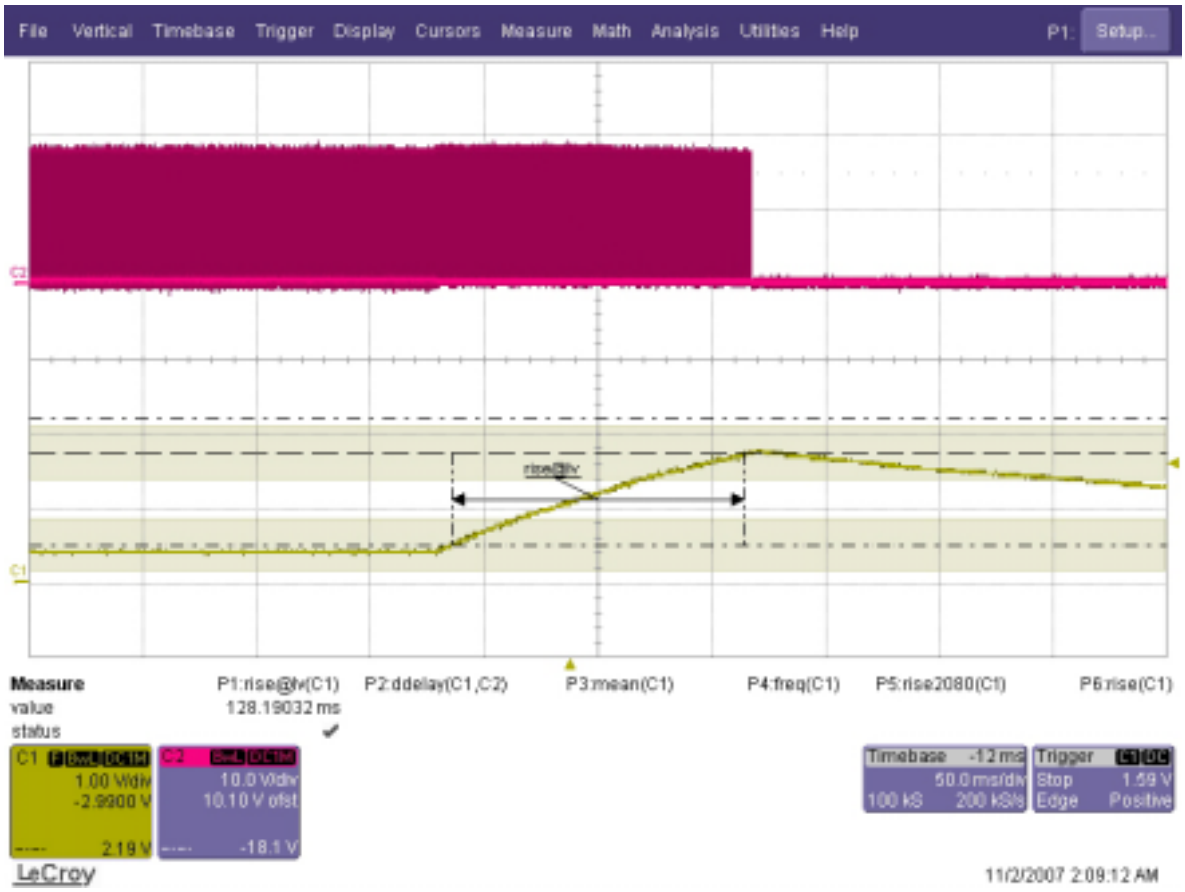
During the startup phase, the peak current is pushed to the maximum until the output voltage reaches its target level and it takes a short time after a few switch cycles. Thus situations like the presence of a short circuit on output which will activate the OLP protection and a capacitance load may make this effect worsen. The active time of the OLP protection can be slightly adjusted by the external capacitor of C12 from 1uf to 4.7uf, to avoid initial–startup fault conditions as shown in Figure2. This modification does not change the OLP function when it operates in normal conditions. Figure3 shows the OLP delay time is shorter than the initial turn-on delay time. This may help the OLP to have a short response time to protect the circuit.



Ch1: Blank Voltage.(OLP protection delay time)

Ch2: N386X Driver out

Figure2. The OLP protect time is extend from 50ms to 162ms by changing the C12 capacitor value.



Ch1: Blank Voltage.(OLP protection delay time)

Ch2: N386X Driver out

Figure3. When OLP is activated during the normal operation, the OLP protection delay time is shorter than initial star-up delay time (Compared with Figur2).

3. Frequency Jitter Modulation

The oscillation frequency of the N386X series is variable when the operation frequency can be changed by the external signal. Frequency jittering can be used to reduce EMI without having to increase system costs by adding extra components such as EMI shielding and a complicated line filter. The N386X series can easily achieve the frequency jittering function by using a coupling capacitor. Figure 4 shows the circuit diagram. The oscillation frequency is jittered by an AC ripple signal through the C4 capacitor. The min. frequencies are at the bottom of the AC ripple voltage and the max frequencies are at the top of the AC ripple voltage as shown in Figure 5.

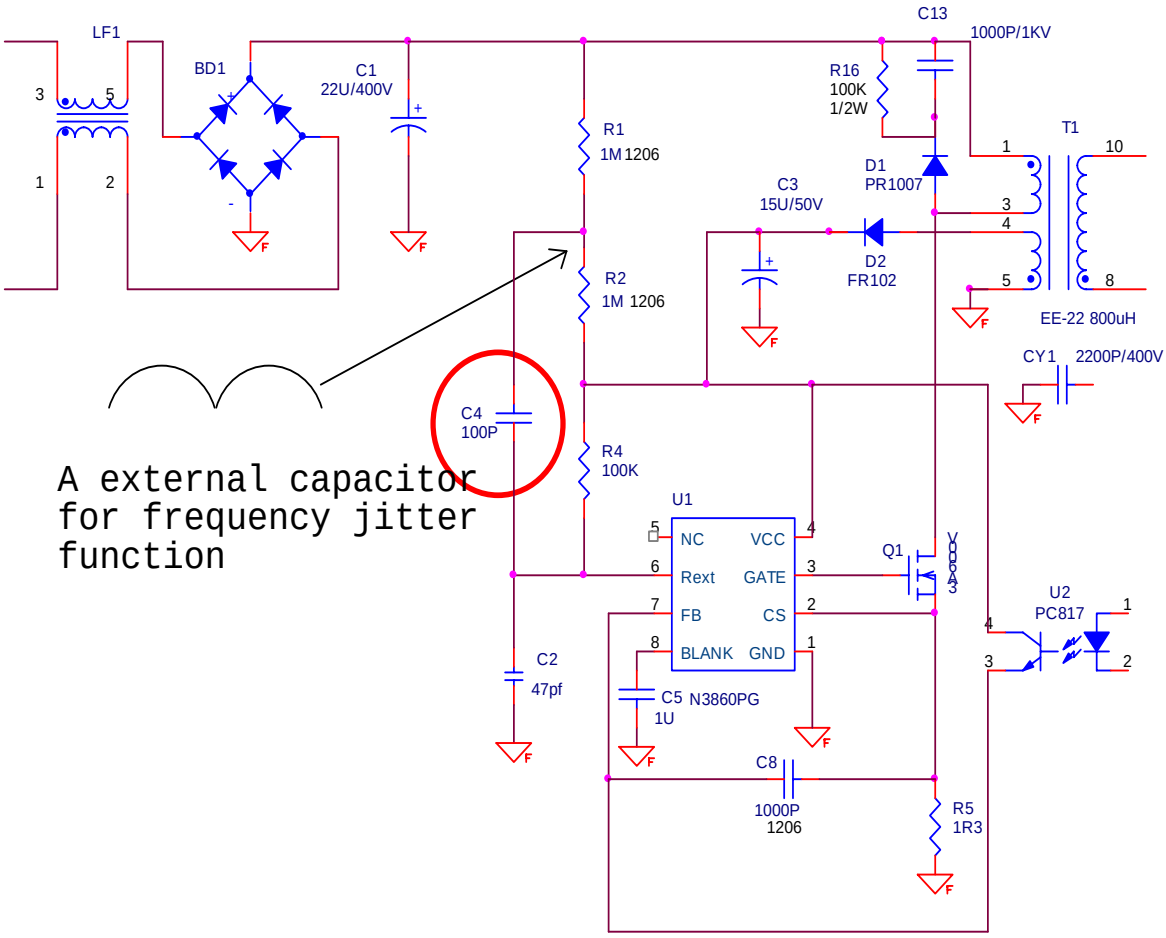


Figure 4.Circuit Diagram

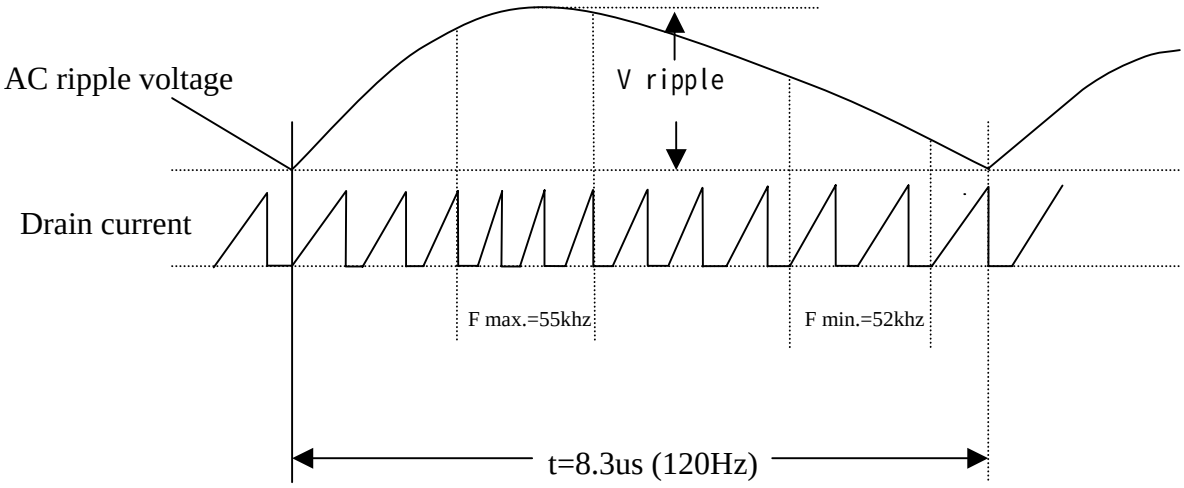


Figure5. Switch frequency jitter modulation

The range of the frequency jitter may not effectively reduce the EMI at the high line input voltage (264VAC), because of the small AC ripple voltage. There is another circuit option as shown in Figure 6. This circuit costs an extra resistor R3 compared with the Figure 4 circuit. The modulation signal directly comes from the AC line which can have a larger amplitude signal to modulate the jittering range. The range of frequency jitter can be slight adjusted by the capacitor C4 to improve EMI. But it should have a range limit in order to prevent core saturation when it operates below the original design frequency.

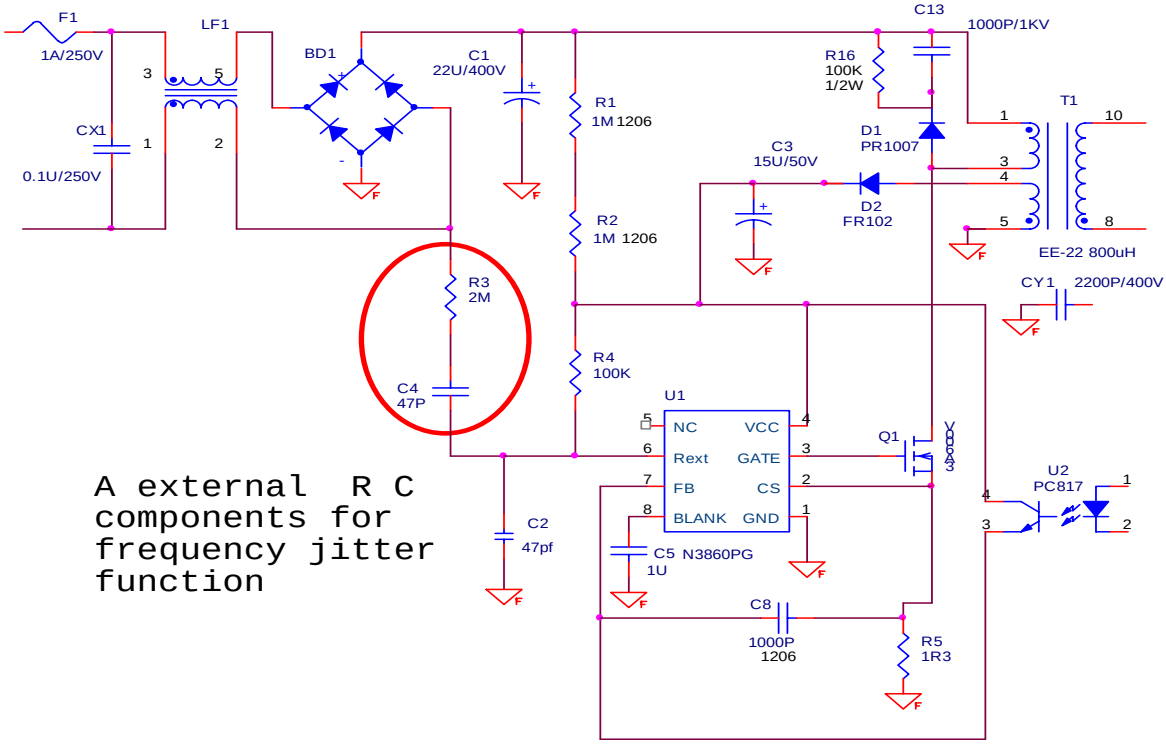


Figure6. The circuit diagram