

Chroma Systems Solutions, Inc.

# **61500 series AC source simulates Off-line UPS quasi square wave output voltage**

**61500 AC Power Sources, Soft Panel Software**

Keywords: Custom waveform, AC Source, 61500, Soft Panel Software

Title:

## 61500 series AC source simulates Off-line UPS quasi square wave output voltage

Product Family: **61500 AC Power Sources, Soft Panel Software**

### Abstract :

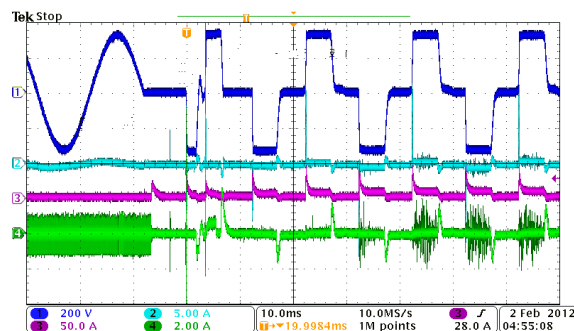
Uninterruptible Power Sources (UPS) are used in a variety of applications where utility power or grid power interruption may cause a variety of issues from loss of Data and Phone operations to Medical facility shutdown. Some of the UPS systems have a true sine wave output but there are many that use a Square Wave output commonly referred to as a Quasi-Square wave. The Quasi Square wave is a simpler topology and is less expensive to produce versus a sine wave. To verify equipment will operate with this modified Square wave rather than a true sine wave, requires testing. Chroma's 61500 Family of AC sources have the ability to create the Quasi-square wave and generate the timing normally seen when a UPS switches from Utility/Grid power to Back up power.

### Objective :

To define the use of the Chroma 61500 series AC source to simulate Off-line UPS output, quasi square wave voltage.

### Illustration :

- Below figure 1 shows the sequence that occurs during a grid power blackout for several milliseconds. The UPS switches from the Grid Sine wave to a Quasi-Square wave AC power after a delay of several milliseconds.



**Figure 1 Ch1 Output Voltage from UPS**

In figure1 there are 8 milliseconds black out time that simulates the time required for the UPS to detect the Grid power drop out and relay switching time.

Most power supplies have a hold up time of 1 Cycle or approximately 20mSec for 50Hz. This allows the equipment to continue to operate until the UPS output is re-established.

- Figure 2, is an actual waveform from Chroma 61500 AC source output. The output waveform simulates that UPS quasi square wave after a grid sine wave black out.

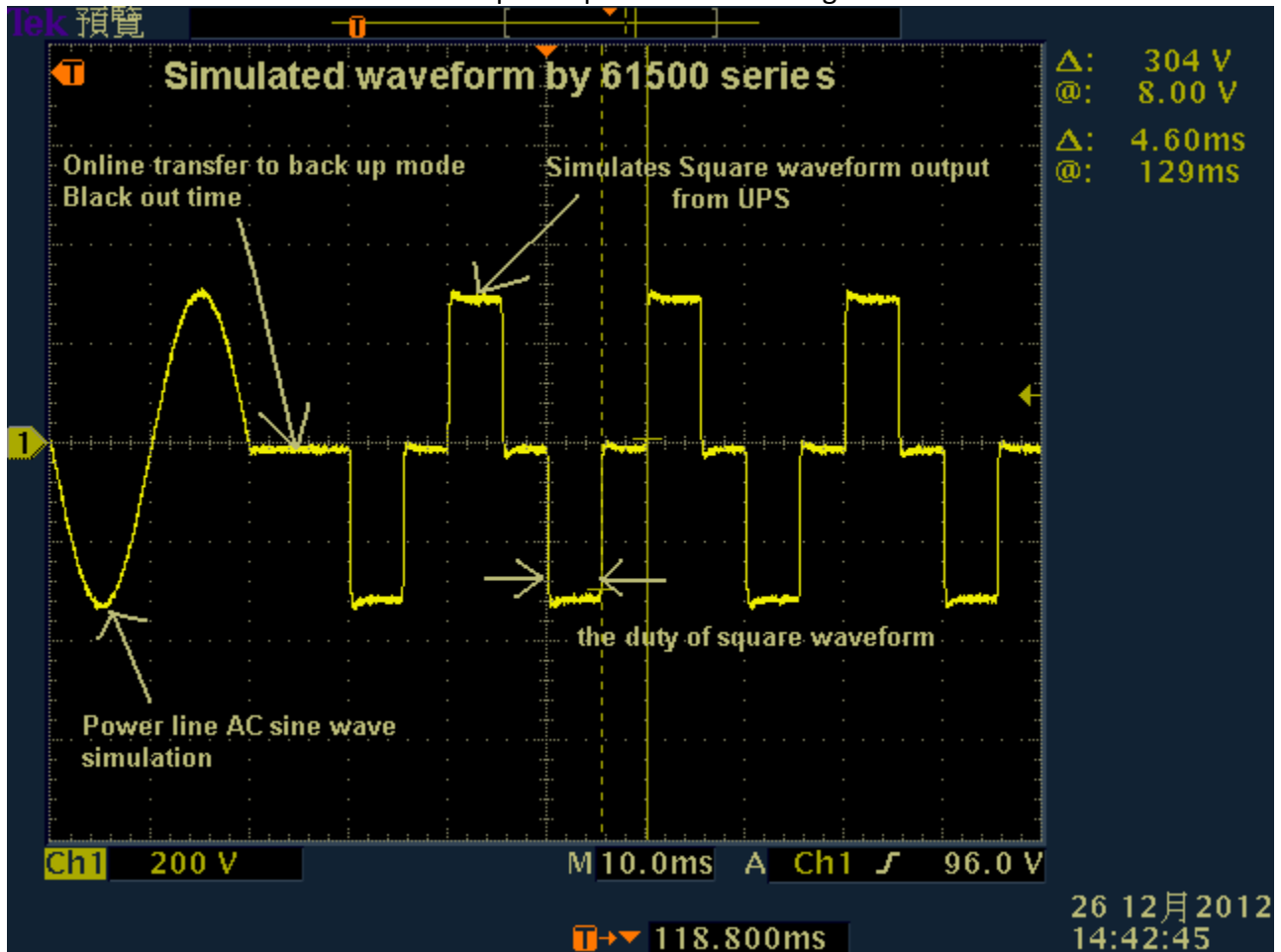


Figure 2

- The following describes how to use 61500 series AC source to program square wave voltage as Off-line UPS output:

Start 615\_616Xx Soft Panel → Set Model Select as 1 Phase Output Mode → Select Communication interface → Click Set OK enter AC source operation window. Please refer to Figure 3 for the setting.

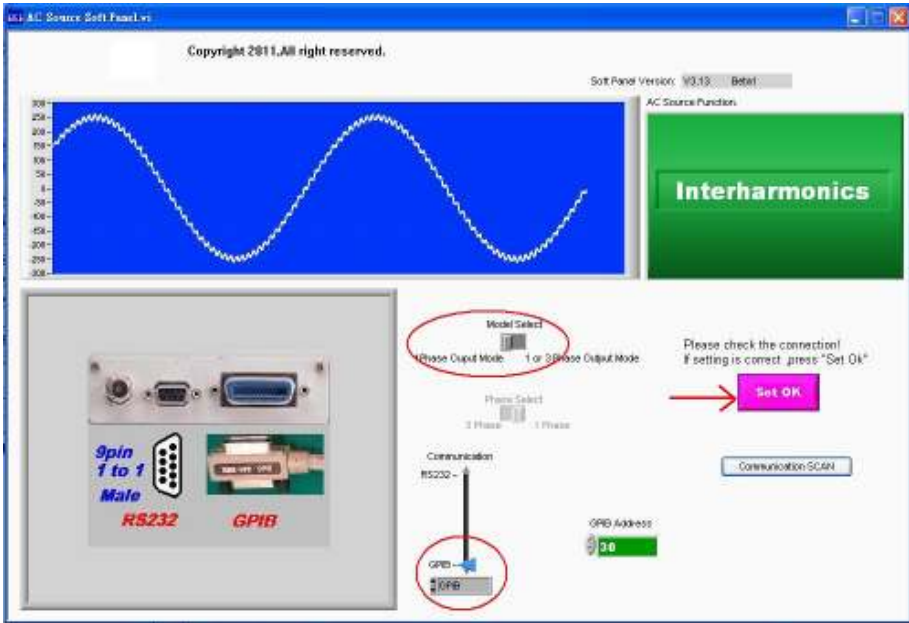


Figure 3

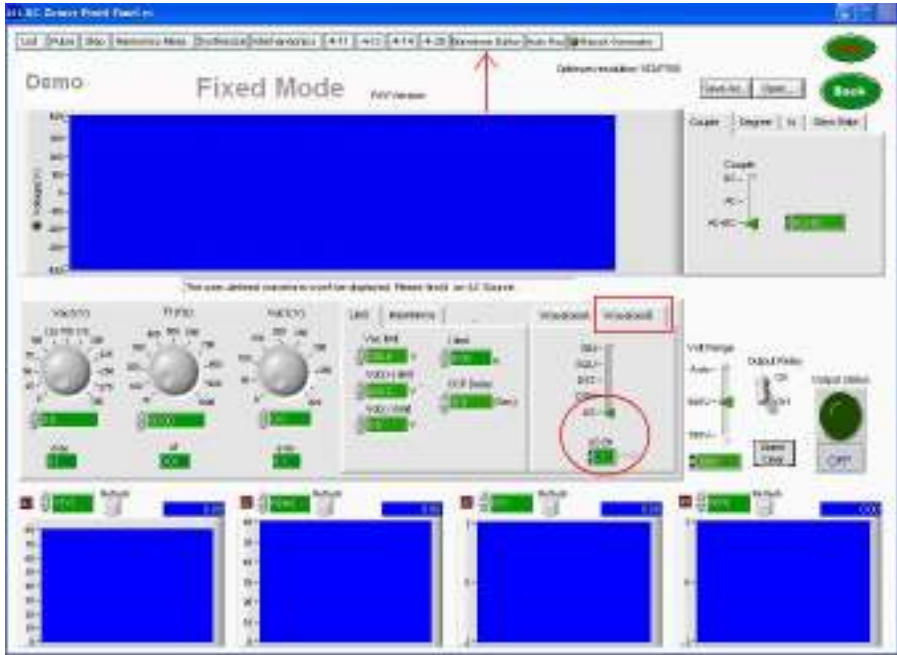


Figure 4

4. AC source softpanel as Figure 4, click **WaveformB** and select US waveform **US B1 1**, then go into **Waveform Editor** for user waveform edit function.



5. Please save PluseGen01.xle file, this is a quasi square wave editor by Microsoft Office Excel. The user can define output frequency and duty cycle of the square waveform in this excel file, please refer to figure 5-1.

|    | A | B                            | C    |
|----|---|------------------------------|------|
| 1  | 1 | Frequency(Hz)=               | 50   |
| 2  | 1 | Square Wave Pulse Width(ms)= | 5.7  |
| 3  | 1 | Ratio=                       | 0.57 |
| 4  | 1 |                              |      |
| 5  | 1 |                              |      |
| 6  | 1 |                              |      |
| 7  | 1 |                              |      |
| 8  | 1 |                              |      |
| 9  | 1 |                              |      |
| 10 | 1 |                              |      |
| 11 | 1 |                              |      |

Figure 5-1

Figure 5-2 shows User Waveform Editor, to choose US1 as waveform save position which same with Waveform B at figure 4. Then click choose the path of PluseGen01.xls file

and set number 1 in Column Select because the data begin from A1 in PluseGen01.xls file. After the file path and setting were confirmed then start to impose data by

click .

To push button and wait for 5~6 seconds for data translation then finish square waveform editing.

Back to last screen as figure 4 then choose Waveform B US1 and Vac output voltage 100V/110V/220V, be careful of frequency setting that must be same as PluseGen01.xls setting.

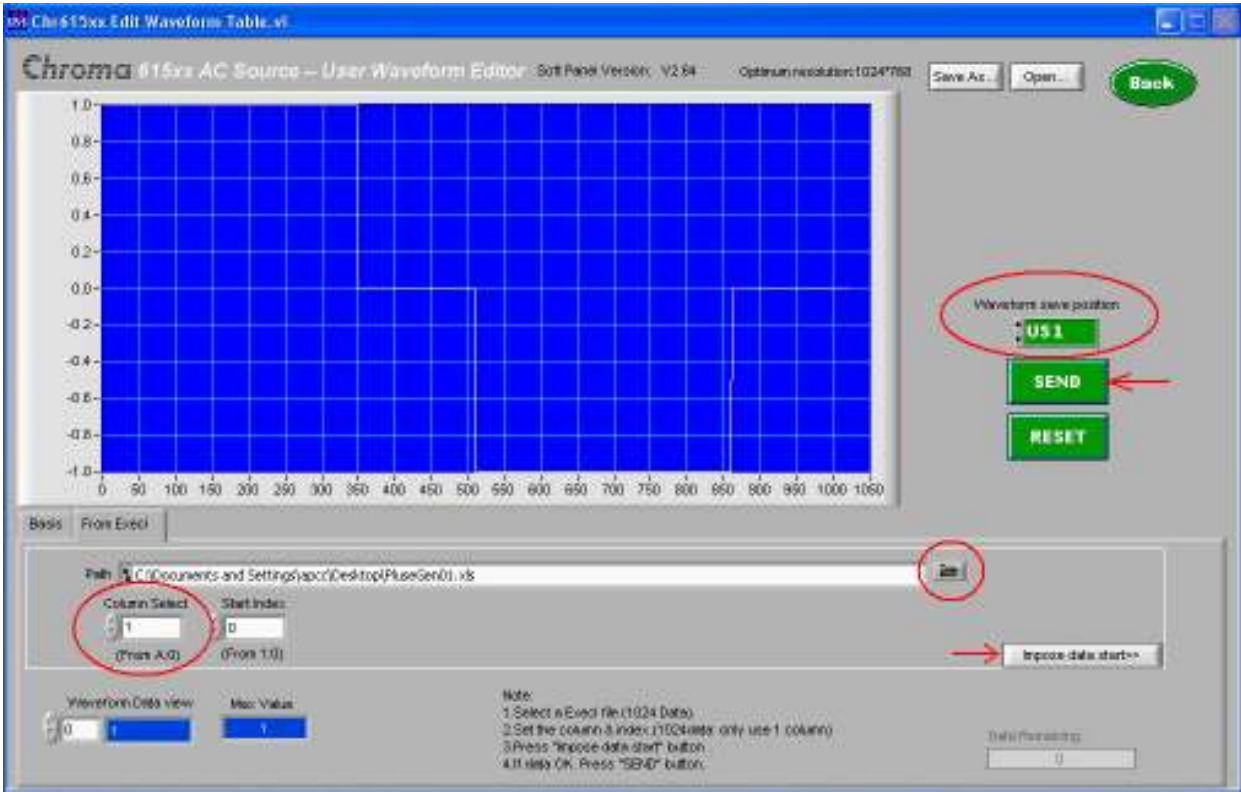



Figure 5-2

6. To change quasi square waveform duty cycle width, you must go back to the User Waveform Editor PluseGen01.xls file and set the square waveform pulse width or frequency then save the file. Repeat the procedure to impose data by click  and send  again.

7. The previous sections 3-6 defined hoe to create the quasi square waveform. The following will introduce how to use 61500 AC source to simulate UPS output voltage waveform from normal mains sine wave power off after a few ms time, then continue to supply power as quasi square wave from UPS inverter.

To press  button and go into List mode function. The first sine wave sequence

programming to choose waveform A  as sine wave in Sequence Index 0 and set the amplitude and frequency of the sine output voltage  $V_{ac\_start1}=V_{ac\_end1}$  ·  $F_{start1}=F_{end1}$

then decide the output cycle or time . The time selection is recommended, because the length of time can determine the sine wave blackout phase angle.

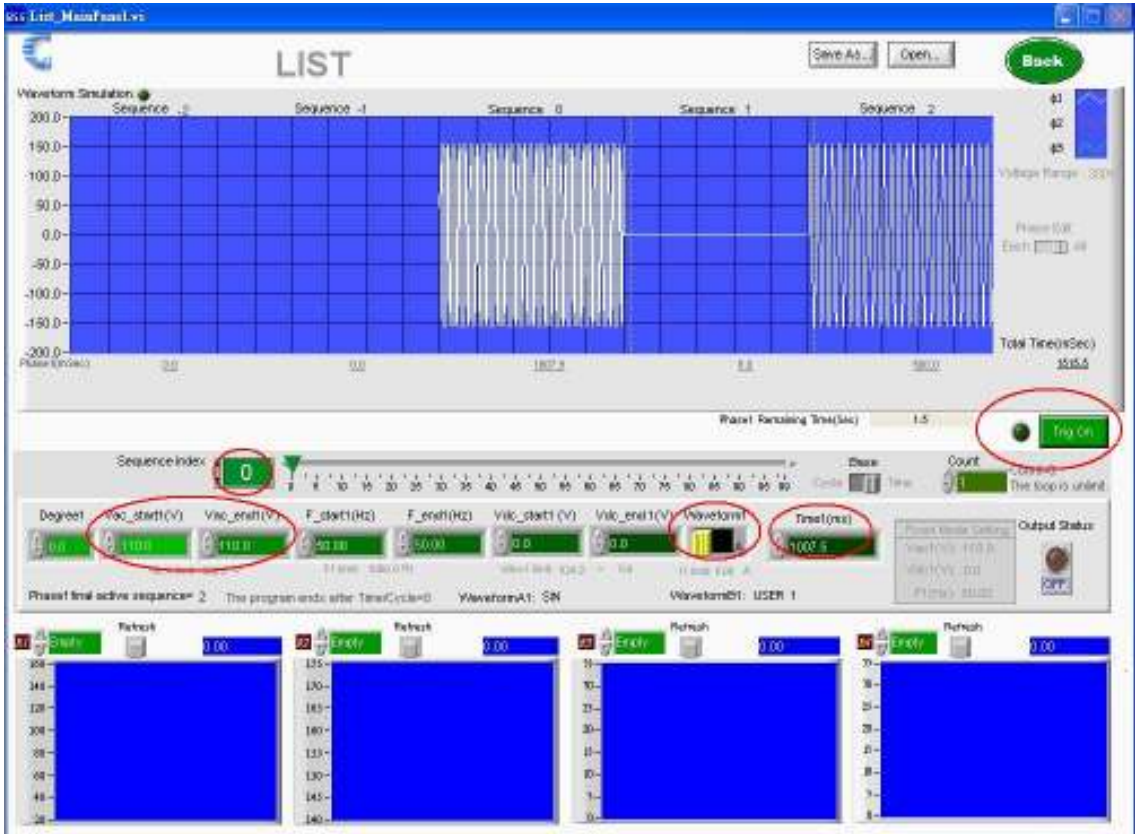
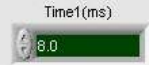


Figure 6 : Sequence Index 0 setting

Next, programming the Sequence Index 1 waveform, this sequence determine the length of the power-off time, therefore Vac\_start1,Vac\_end1 must be set to 0 and then

decided  the time of the power-off. Please refer to figure 7.

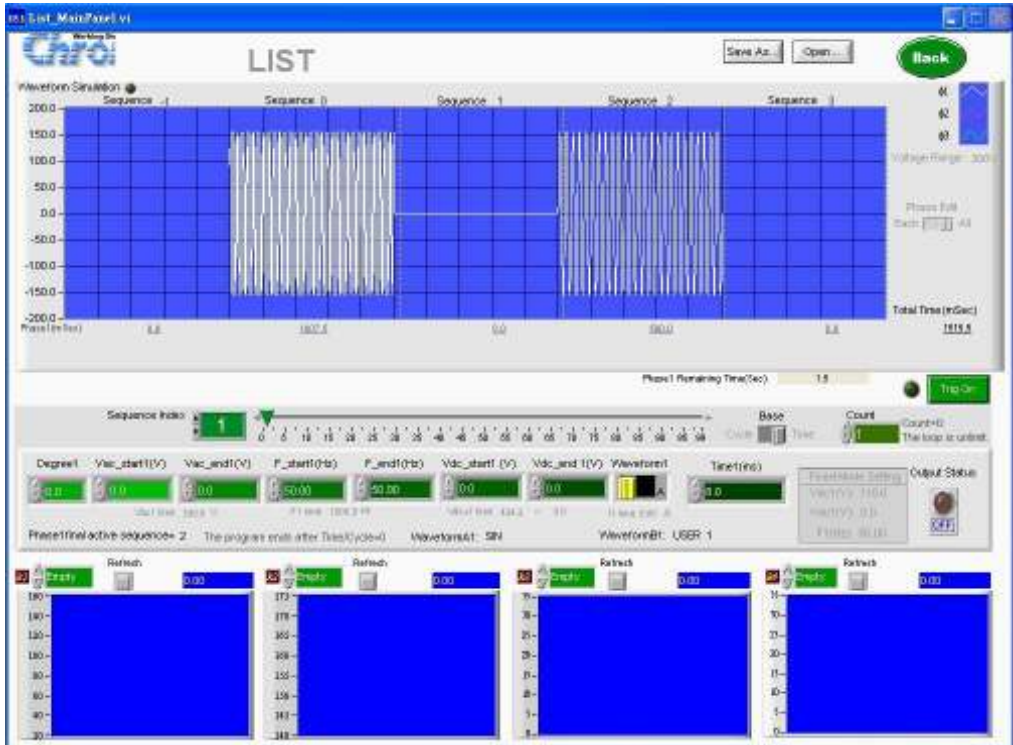



Figure 7 : Sequence Index 1 setting

Finally, to set square wave output in Sequence Index 2 and also set the amplitude and frequency of the square output voltage ( $V_{ac\_start1}=V_{ac\_end1}$ 、 $F_{start1}=F_{end1}$ ), then

select waveform B  and decide the output cycle or time.

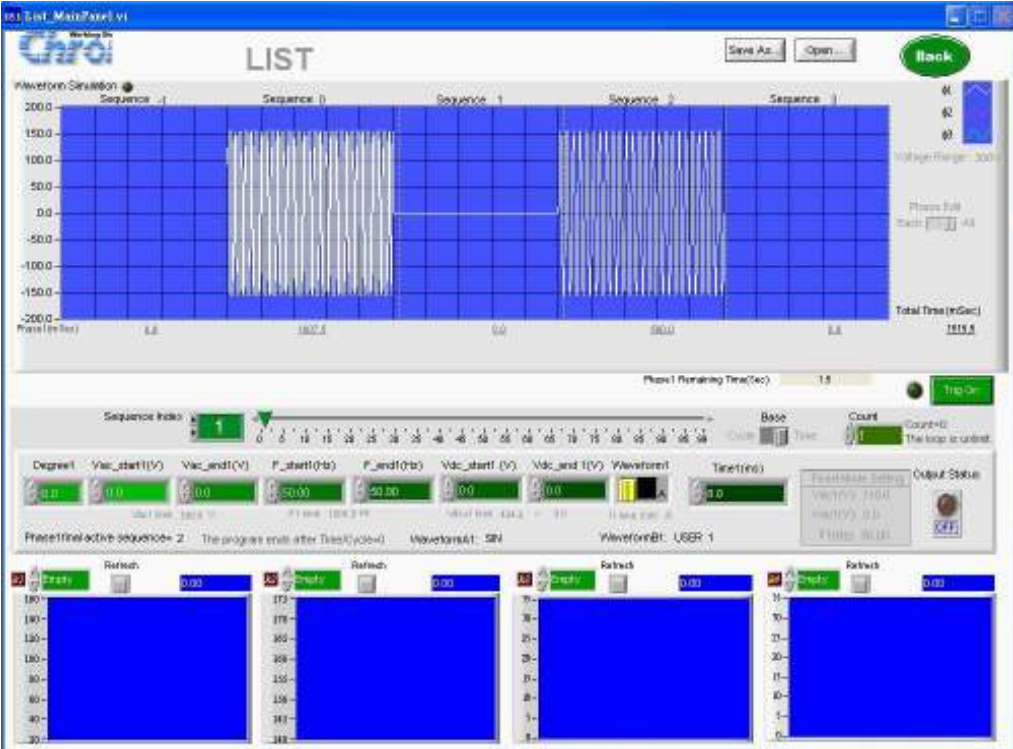




Figure 8 : Sequence Index 2 setting

After set "Sequence Index" 0~2, and push Trig On , then AC source will output as figure2 and figure 9 waveform.

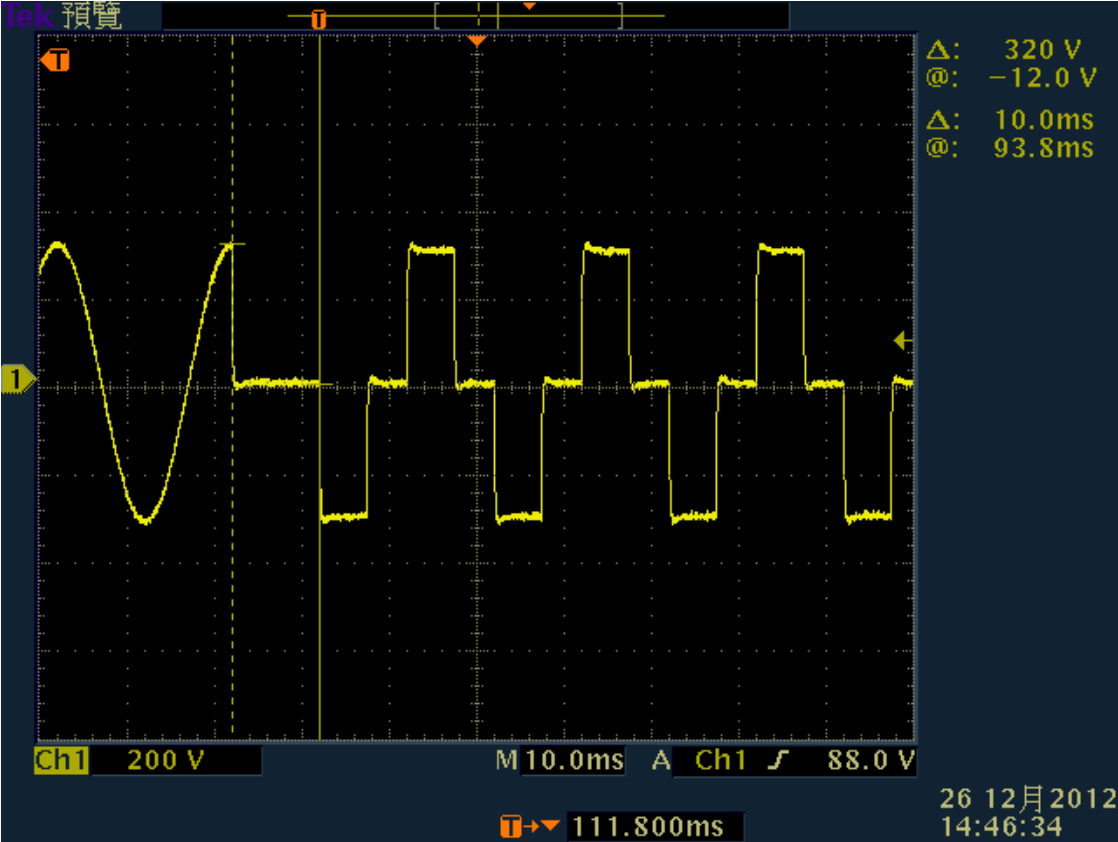


Figure 9 : 90° phase angle black out