1，Basic principle

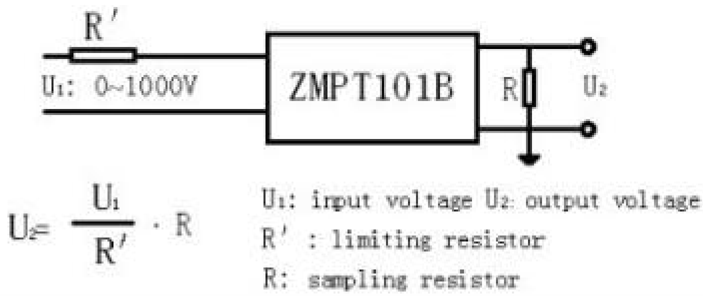
When the measured AC voltage is connected to the voltage transformer ZMPT101B, the transformer will output a weak sinusoidal voltage whose amplitude is reduced by a certain ratio (transformation ratio), and then sample through the sampling resistor R11, which will generate a sinusoidal voltage signal at R11 , And then amplified by the LM358 circuit, an amplified sinusoidal voltage signal will be obtained at the OUT end. By observing the output signal, the measured voltage value can be roughly calculated according to the amplification factor.

2，Gain

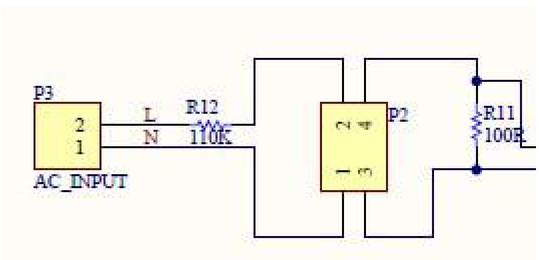
Consists of the following 2 parts(A&B)：

1, Sensor voltage ratio(Part A)

According to the data sheet of the sensor



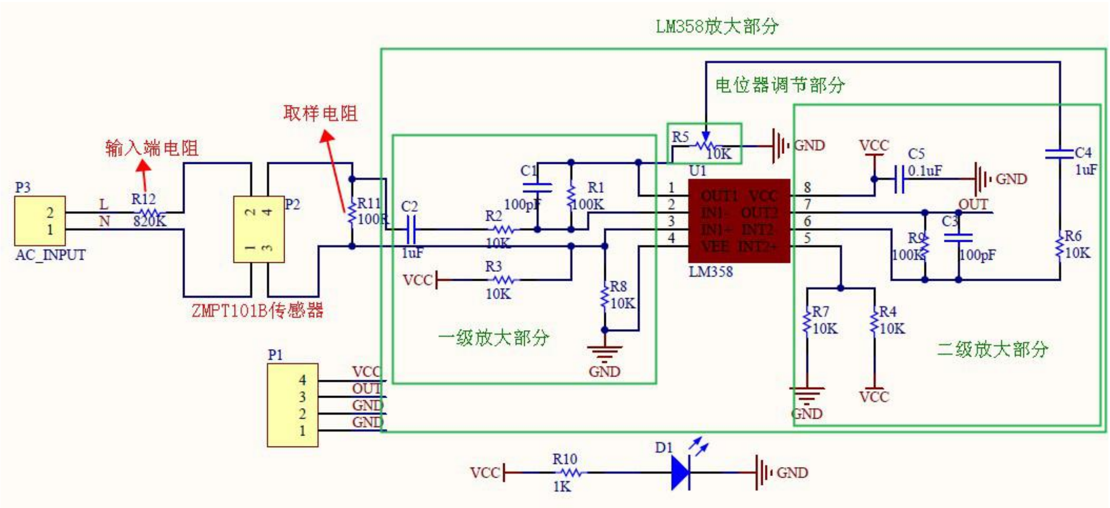
R’ and R here are respectively equivalent to R12 and R11 in the schematic diagram of our transformer module, as shown in the following figure:



So the Sensor voltage ratio **A**=U2/U1=R/R’ =R11/R12=100R/820000R=1/8200 (that is, the measured voltage is reduced to 1/8200 and then sent to the LM358 circuit for amplification)

2, The gain of LM358(Part B)

B= First magnification X Potentiometer divider ratio X Second magnification， First magnification and Second magnification are both about 9.5，For easier calculation, we adjust the potentiometer R5 to the maximum value， so the Potentiometer divider ratio=10K/10K=1， then **B**=9.5*1*9.5=90.25, as below:

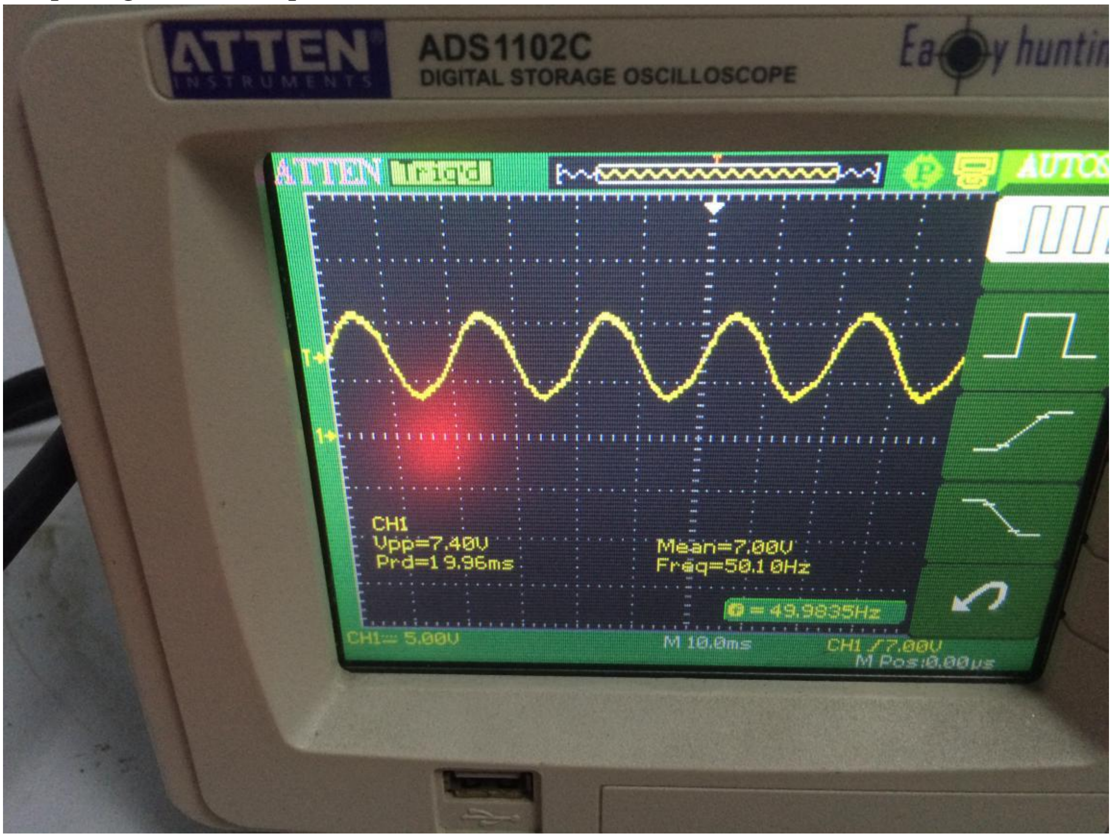


3， Voltage actual value

It can be seen from the power monitor that the actual input voltage(L and N ends of the modules) is **217.6V**

4，Voltage calculation value

Output signal at OUT pin of the module



It can be seen from the above figure that the peak-to-peak value Vpp=7.40V, then the peak-to-peak value Vp=Vpp/2=3.7V

So the effective value of voltage: Ve=Vp/ √2=3.7/1.414=2.62V

So the voltage calculation value: Vin=Ve/(B*A)=2.62/（90.25*（1/8200））=**238V**

It can be seen that there will be a certain deviation between the actual value and the calculation value. This is generally caused by component errors, grid fluctuations and other factors. The user can use related methods (such as adjusting the program code appropriately during AD sampling) To achieve the purpose of correcting errors.