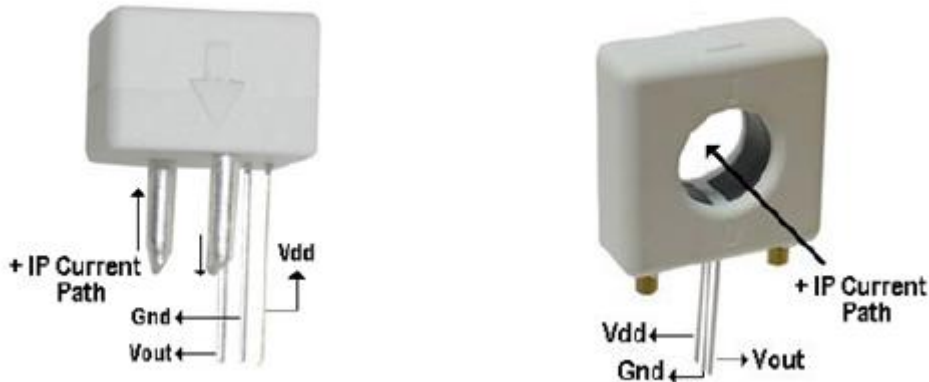
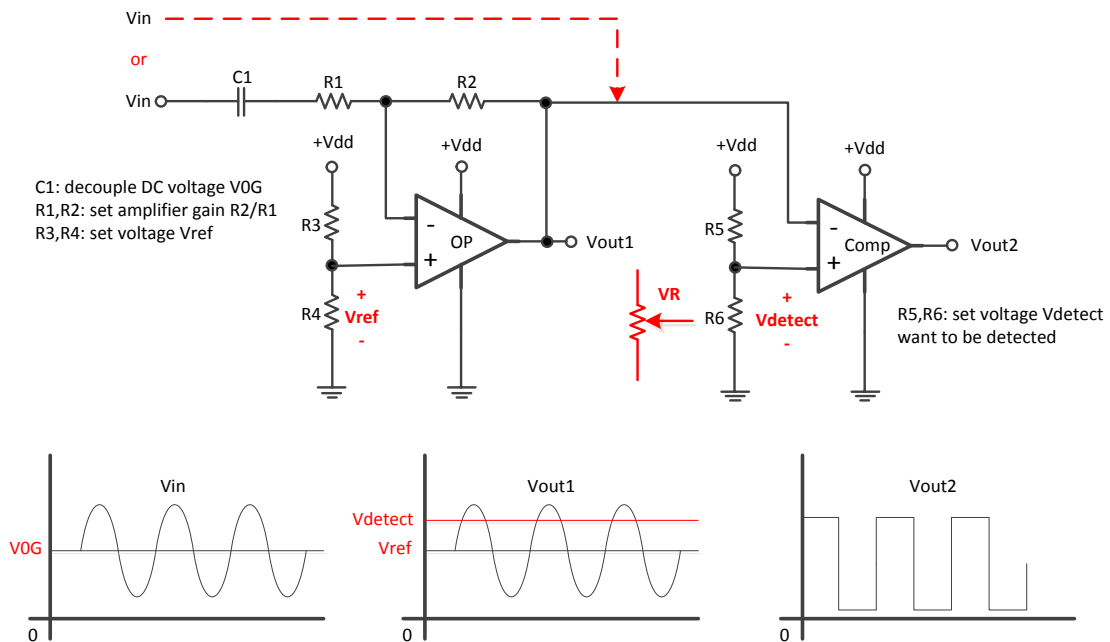


## WCS Current Sensor Application Note



To precisely measure the current by using WCS series products is easy and straight forward. First connect the conductor in series with the current path you plan to measure (or pass conductor through the conductor hole) and apply 5V ~12V between Vdd and GND (Fig. above). Then you already finish the hardware setup of WCS series current sensor.

### Over current detection:



The above circuit can detect current and protect your system from over current or short circuit.

Winson reserves the right to make changes to improve reliability or manufacturability.

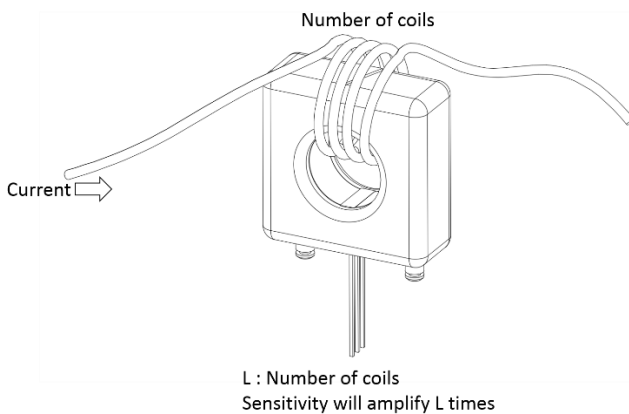
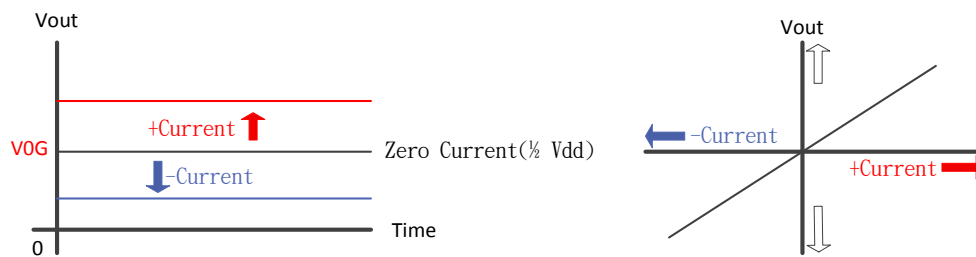
### DC Current measurement:

1. **Supply Voltage** : apply voltage  $V_{dd}$  (5V).
2. **Quiescent Output Voltage** : measure the output's voltage  $V_{0G}$  when no current pass through.
3. **Quiescent Output Voltage Drift with Temperature ( considering temperature)**: take the interval time to measure the output's voltage  $V_{0G}$  when no current pass through.
4. **Calibration** :
  - 4.1 Single-Point Calibration : pass an already known current (for example: 10A) through the current sensor and measure the output voltage  $V_{10A}$ .

The sensitivity of this current sensor is  $\text{Sensitivity} = \frac{V_{10A} - V_{0G}}{10}$  Unit : V/A

  - 4.2 Multi-Point Calibration : calibrate at different current range to improve the accuracy of measuring current
5. **Sensitivity Shift with Temperature ( considering temperature)**: in WCS datasheet - figure Sensitivity Standardization of 30°C V.S temperature, it can compensate DC voltage at different temperature, to solve sensitivity offset with temperature.
6. **Start Measurement** : you can measure any current by the following

equation.  $\text{Current} = \frac{V_{out} - V_{0G}}{\text{Sensitivity}}$  Unit : A

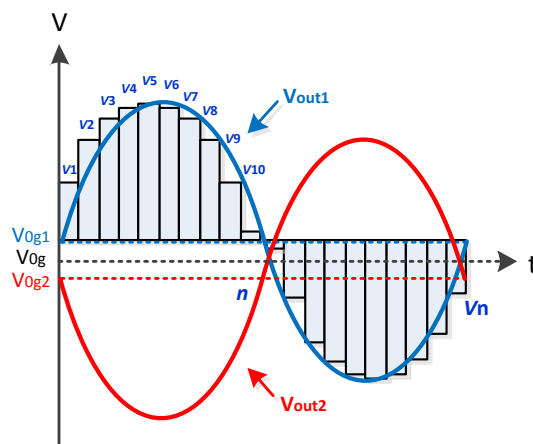


Winson reserves the right to make changes to improve reliability or manufacturability.

### AC Effective Current measurement:

1. **Supply Voltage** : apply voltage  $V_{dd}$  (5V).
2. **Quiescent Output Voltage** : measure the output's voltage  $V_{OG}$  when no current pass through.
3. **Quiescent Output Voltage Drift with Temperature ( considering temperature )** : get the average value of the symmetrical signal to be a stable  $V_{OG1}$  或  $V_{OG2}$  at any time.

$$V_{OG1} = \frac{\sum V_n}{n} , \quad V_{OG2} = \frac{\sum V_n}{n}$$



### 4. Software Solution :

- 4.1 Pass an already known AC current (for example: 10A) through the current sensor
- 4.2 Connect sensor's output signal  $V_{out10A}$  directly into analog input of micro-controller
- 4.3 Write a program to calculate the root mean square of several periods of AC signal, the higher sampling rate per period the more precision you get.
- 4.4 "root mean square of the sampling times n" and get the RMS value of AC signal

$$V_{rms10A} = \sqrt{\frac{\sum (V_n - V_{OG})^2}{n}} \quad \text{Unit : V}$$

### 4.5. Calibration :

- 4.5.1 Single-Point Calibration : calibrate the sensitivity of current

sensor by  $\text{Sensitivity} = \frac{V_{rms10A}}{10} \quad \text{Unit : V/A}$

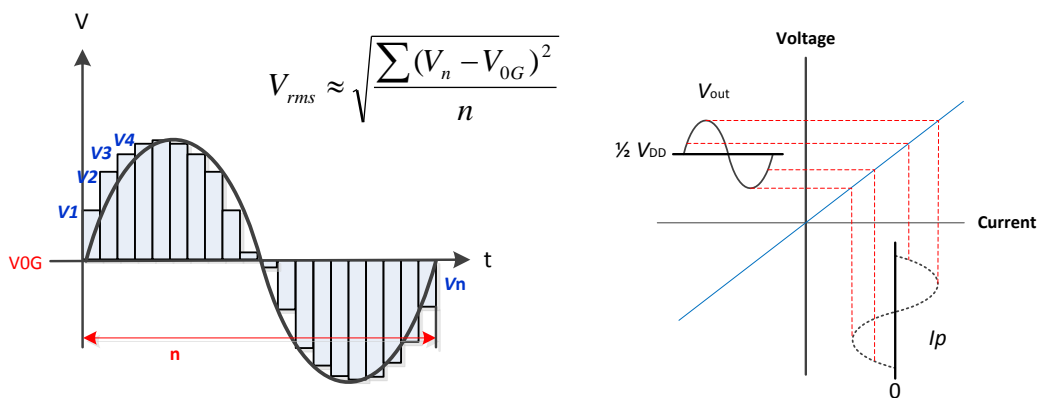
Winson reserves the right to make changes to improve reliability or manufacturability.

4.5.2 Multi-Point Calibration : calibrate at different current range to improve the accuracy of measuring current

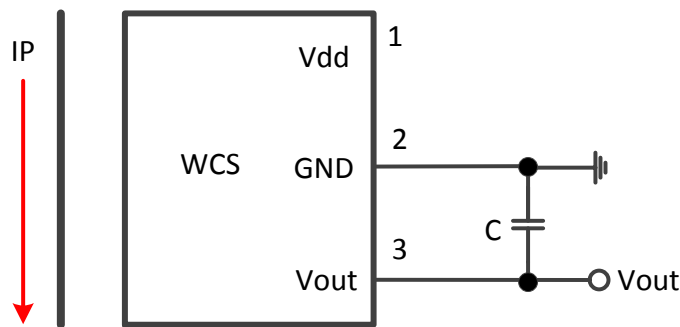
4.6 Sensitivity Shift with Temperature ( **considering temperature**): in WCS datasheet - figure Sensitivity Standardization of 30°C V.S temperature, it can compensate DC voltage at different temperature, to solve sensitivity offset with temperature.

4.7 Start Measurement: use the same program to measure any current by

equation  $\text{Current} = \frac{V_{rms}}{\text{Sensitivity}}$  Unit : A



**Hardware Circuit:** solve output voltage( Vout) influence with noise



C is for optimal noise management, with values that depend on the application, that recommended value is 0.01uF~0.1uF.