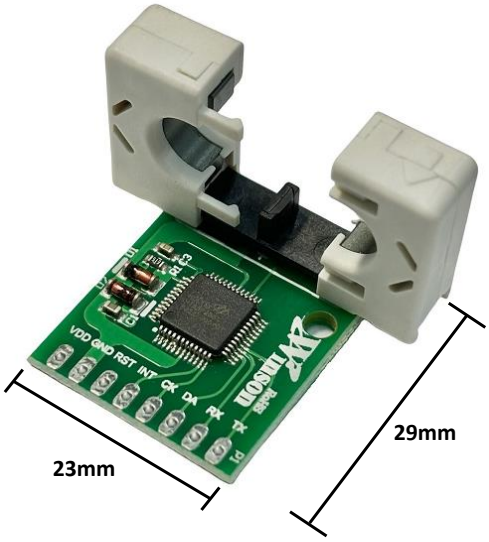
AC / DC Sensing Current Module with Digital Data output

Feature:

- New spring structure with high measurement stability (increased by more than 2 times)
- 10.4 x 8 mm^2 split through hole design
- Continuous output and Modbus-RTU
- Operating voltage DC5.0V
- Sensing current range :
  AC : 0~50A (50Hz, 60Hz)
  DC : 0~±75A
- High accuracy :
  AC : (0~15A) ± 0.45A
  (15~50A) ± 3%
- DC : ±(0~15A) ± 0.45A
  ±(15~75A) ± 3%



- High resolution : AC / DC : 54mA
- UART, Baud Rate : 9600 bps, Parity bit : None，Data bit : 8，Stop bit : 1
- Temperature calibration
- Isolation Voltage 4KV
- Application note: http://www.winson.com.tw/Product/83

General Description:

The WCM7600 consists of a current sensor, temperature sensor, a very high accuracy A/D converter and digital signal output of current.

The unique spring structure of WCM7600 can improve the tightness on both sides of the iron core, making measurement more stable and reducing the influence of structural opening and closing tolerances. Users can just use system's own electric wire by pass it through this hole to measure passing current without breaking original system, user's MCU can get the real data from DATA pin.

The WCM7600 provides temperature calibration of the internal current sensor and accurately measures the current of AC 50 / 60Hz and DC at temperature from -20˚C~70˚C. The WCM7600 also offers solutions for true RMS current measurement of various loads.

1.VDD 2.GND 3.RST 4.INT 5.CK 6.DA 7.RX 8.TX

ABSOLUTE MAXIMUM RATING

Supply Voltage, Vdd ---------- **6V**

Pass Through Wire Diameter ----------**10.4x8mm**

Basic Isolation Voltage ---------- **4000V**

Operating Temperature Range, Ta ----------

---------- **-20ºC to +70ºC**

Storage Temperature Range, Ts ----------

---------- **-50ºC to +125ºC**

Selection Guide:

Model	Maximum Current		Operating Voltage	mode
	AC	DC		
WCM7600-AC50C	50A	-	5.0V	Continuous
WCM7600-DC50C		±75A	5.0V	Continuous
WCM7600-50C	50A	±75A	5.0V	Continuous
WCM7600-50M	50A	±75A	5.0V	Modbus-RTU

Pad Description:

Pad No	Pad Name	I/O	Description
1	VDD	-	The positive power input pin
2	GND	-	The system ground
3	RST	I	The system reset
4	INT	I	Sampling control
5	CK	I/O	System programming, reserve
6	DA	I/O	
7	RX	I	The data of measured current output. Its output is UART
8	TX	O	communication. The baud rate is 9.6K bits/sec.

Electrical Characteristics:

Common Operating Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
VDD	Operation Voltage	-	4.900	5.000	5.100	V
IDD	Operation Current	-	-	8	10	mA
-	Conductor Through Hole	-	-	10.4x8	-	mm
TOP	Operating Temperature	-	-20	-	70	˚C

-AC50C

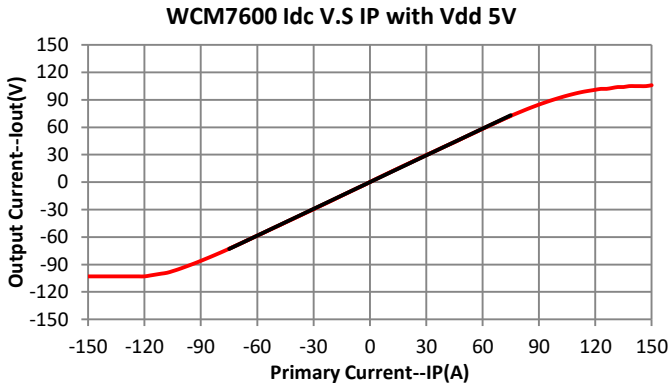
T_{OP} = 25 ˚C, V_{DD} = 5.000V

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
IOP	AC Current Range	-	0	-	50	A
ETOT	AC Current Total Output Error	IOP=0~15A，TOP=25˚C	-	±0.45	-	A
		IOP=15~50A，TOP=25˚C	-	±3	-	%
		IOP=0~50A，TOP=-20˚C to 70˚C	-	±6	-	%

-DC50C

T_{OP} = 25 ˚C, V_{DD} = 5.000V

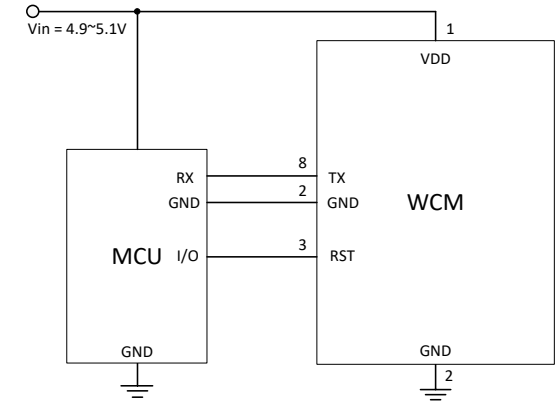
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
IOP	DC Current Range	-	0	-	±75	A
ETOT	DC Current Total Output Error	IOP=±(0~15A)，TOP=25˚C	-	±0.45	-	A
		IOP=±(15~75A)，TOP=25˚C	-	±3	-	%
		IOP=0~±75A，TOP=-20˚C to 70˚C	-	±6	-	%



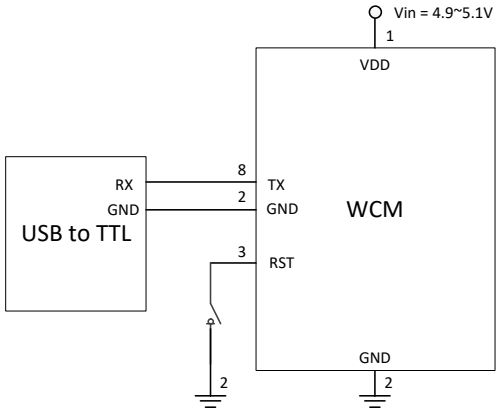
Winson reserves the right to make changes to improve reliability or manufacturability.

Application Note:

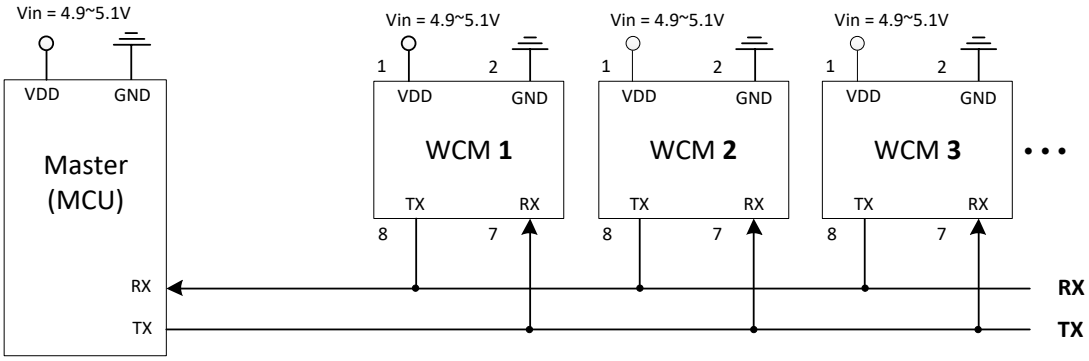
Application Diagram:



APP. 1. Output UART signal with MCU



APP. 2. Output UART signal with USB to TTL



App. 3 Modbus Connection

Measured Current Data Output (Continuous Mode):

The measured current can be **continuously transmitted** by UART format.

(1) If the measured data is AC “1.23”A, then the output data is ‘~’, ‘0’, ‘1’, ‘2’, ‘3’, ‘0’, ‘\r’,‘\n’, total of 8 bytes; the output data is ASCII code. If the measured data is “10.76” A, then the output data is ‘~’, ‘1’, ‘0’, ‘7’, ‘6’, ‘0’, ‘\r’,‘\n’, total of 8 bytes.

(2) If the measured data is +DC “1.23”A, then the output data is ‘+’, ‘0’, ‘1’, ‘2’, ‘3’, ‘0’, ‘\r’,‘\n’, total of 8 bytes; the output data is ASCII code. If the measured data is “10.76” A, then the output data is ‘+’, ‘1’, ‘0’, ‘7’, ‘6’, ‘0’, ‘\r’,‘\n’, total of 8 bytes.

(3) If the measured data is -DC “1.23”A, then the output data is ‘-’, ‘0’, ‘1’, ‘2’, ‘3’, ‘0’, ‘\r’,‘\n’, total of 8 bytes; the output data is ASCII code. If the measured data is “10.76” A, then the output data is ‘-’, ‘1’, ‘0’, ‘7’, ‘6’, ‘0’, ‘\r’,‘\n’, total of 8 bytes.

Measured Current Data Output (Modbus-RTU Mode):

Modbus Parameter List

For example description, please refer to the “Current Module Application Note:

Modbus-RTU Data Format

Slave Address	Function Code	Data	Check Code (CRC16)
1 Byte	1 Byte	N x Byte	2 Byte (Low byte first)

Function Code

Function Code	Description
03H	Read up to 125 continuous memory words
06H	Write one memory word

Exception Code

Exception Code	Description
01H	Illegal function code
02H	Illegal data address
03H	Illegal data count

When responding to an exception, the MSB (Most Significant Bit) of the function code is automatically set to 1.

True RMS Current Measurement:

In order to calculate true RMS of AC current, you need to know "zero" value of AC current first. The "zero" value of symmetric AC current is the average value *Vo*(dc) of the current shown in Figure 1.

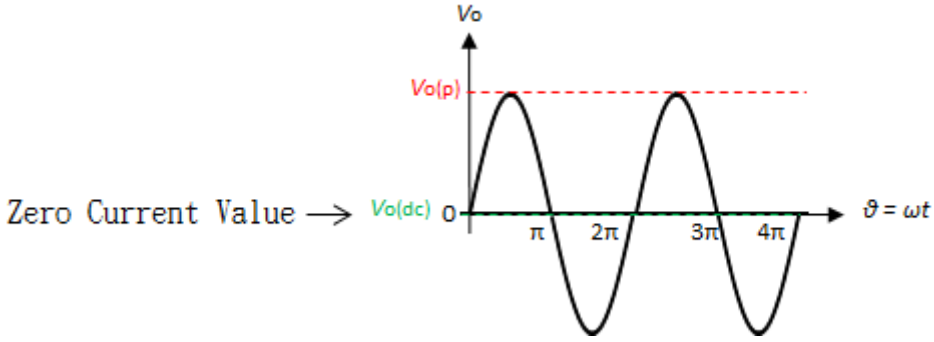


Figure 1 The zero current value of sine waveform

But in asymmetrical AC current, the "zero" value is not the average value *Vo*(dc) of the current. Based on this "zero" value and do RMS calculation. You will get wrong answer.

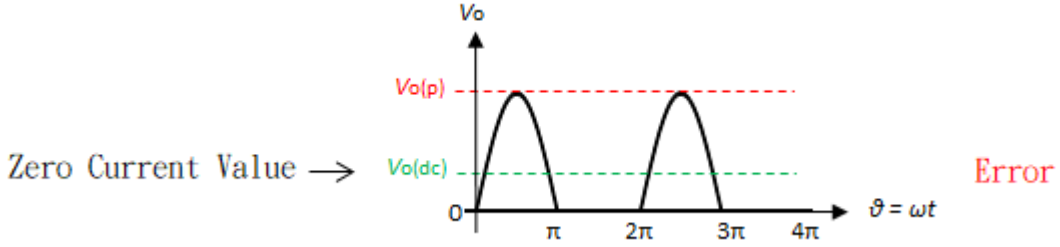


Figure 2 The zero current value of the asymmetric waveform (Error)

The WCM series offers a true RMS solution for both symmetric and asymmetric AC current. It can correctly detect "zero" current value, shown in Figure 3. and do perfect RMS calculation.

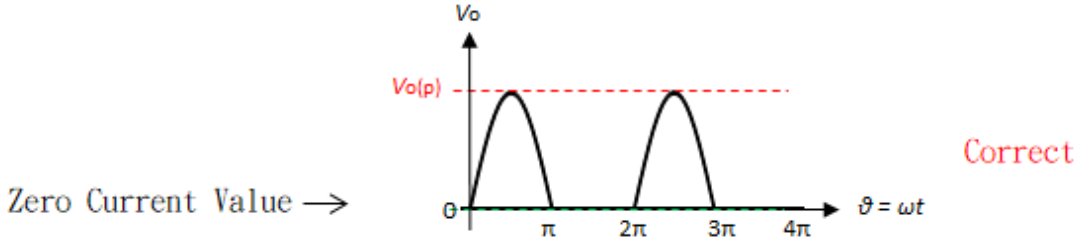


Figure 3 The zero current value of the asymmetric waveform (Correct)

Package:

(Unit: mm)