DWCS3300

AC / DC Sensing Current Sensor with Digital Data output

Feature:

- Small package with digital current output
- Continuous、AT Command、Modbus - RTU
- Operating voltage DC5.0V
- Temperature compensation
- Diameter 9.0mm conductor through hole
- Sensing current range:
  AC: 0~50A (50Hz, 60Hz)
  DC: 0~±75A
- High accuracy:
  AC: (0~24A) ± 0.24A
  (24~50A) ± 1%
- DC: ±(0~24A) ± 0.24A
  ±(24~75A) ± 1%
- Resolution: 100mA
- UART digital data output，Baud Rate: 9600 bps
- Isolation voltage 4KV
- Application Note: http://www.winson.com.tw/Product/83

General Description:

DWCS3300 is a AC/DC current sensor with calibrated digital signal output. It applies exclusive digital signal collecting technique and allows for easy implementation without breaking original system. Typical applications include load detection and management, over-current fault detection and any intelligent power management system etc…

DWCS3300 is composed of a precise, low-temperature drift, differential output linear hall sensor IC with temperature compensation circuit, temperature sensor, digital signal processor and through-hole mechanism with a diameter of 9.0mm etc. through differential output, DWCS3300 improves its sensitivity twice as much as the original.

All the sensors on DWCS3300 are temperature compensated and calibrated with accurate calibration instrument. The UART interface directly transmits digital current signals, making system integration simple and fast. Small size, low consumption and the terminals of the conductive path are electrically isolated from the sensor leads enable DWCS3300 to be suited in all kinds of harsh application occasions.

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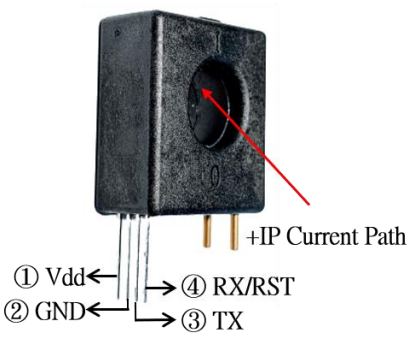
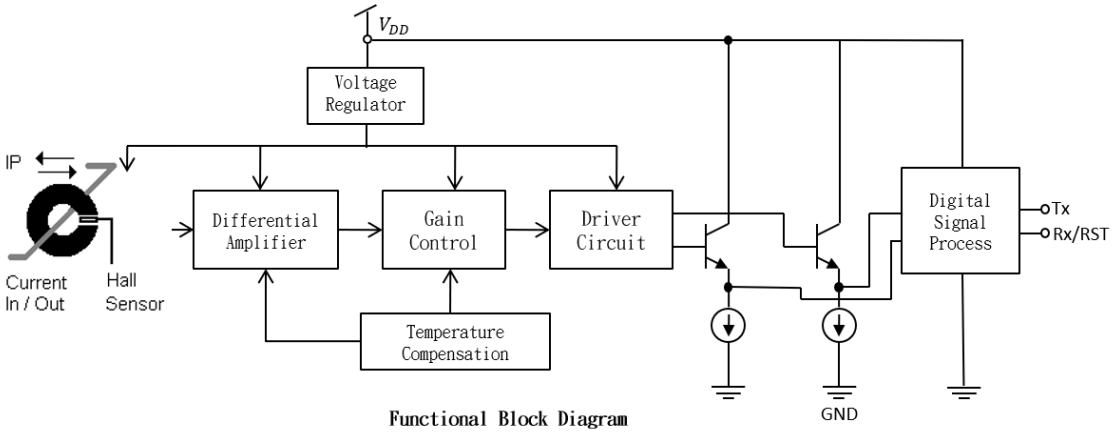


Absolute Maximum Range

Supply Voltage, Vdd ---------- **6V**
Pass Through Wire Diameter ---------- **9.0mm**
Basic Isolation Voltage ---------- **4000V**
Operating Temperature Range, Ta ----------
---------- **-20ºC to +70ºC**
Storage Temperature Range, Ts ----------
---------- **-60ºC to +125ºC**

Note: Stresses above those listed may cause permanent damage to the devices



Functional Block Diagram

Selection Guide:

Model	Maximum Current		Operating Voltage	Frequency	Version
	AC	DC			
DWCS3300-AC50C	50A	-	5.0V	50Hz/60Hz	Continuous
DWCS3300-DC50C	-	75A	5.0V	DC	Continuous
DWCS3300-50C	50A	75A	5.0V	50Hz/60Hz,DC	AT Command
DWCS3300-50M	50A	75A	5.0V	50Hz/60Hz,DC	Modbus-RTU

Note:

Continuous Mode: UART Interface, continuous transmission, external reset method (RST pull low to GND).

Professional & Modbus Mode: UART interface, command transmission, internal reset method (UART Command).

Pad Description:

Pad No	Pad Name	I/O	Description
1	VDD	-	The positive power input pin
2	GND	-	The system ground

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3	TX	O	The current data output, UART interface, baud rate 9600 bits/sec
4	RX/RST	I	RST(Continuous): External Reset, RX(AT Command & Modbus-RTU): Internal UART Reset

Electrical Characteristics:

Common Operating Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
VDD	Operation Voltage	-	4.9	5	5.1	V
IDD	Operation Current	V_{DD} = 5.000V	-	6.5	10	mA
-	Conductor Through Hole	-	-	9	-	mm
TOP	Operating Temperature	-	-20	-	70	˚C
Acc	Internal Temperature Accuracy	V_{DD} = 5.000V	-	-	5	˚C

-AC50C **V_{DD} = 5.000V**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_{OP}	Current Range	-	0	-	50	A
E_{TOT}	Current Output Error	I_{OP}= 0~24A, T_{op} = 25˚C	-	±0.24	-	A
		I_{OP}= 24~50A, T_{op} = 25˚C	-	±1	-	%
		I_{OP}= 0~50A, -20˚C< T_{op}<70˚C	-	±4	-	%

-DC50C **V_{DD} = 5.000V**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_{OP}	Current Range	-	0	-	75	A
E_{TOT}	Current Output Error	I_{OP}=0~24A, T_{op} = 25˚C	-	±0.24	-	A
		I_{OP}=24~75A, T_{op} = 25˚C	-	±1	-	%
		I_{OP}=0~75A, -20˚C< T_{op}<70˚C	-	±4	-	%

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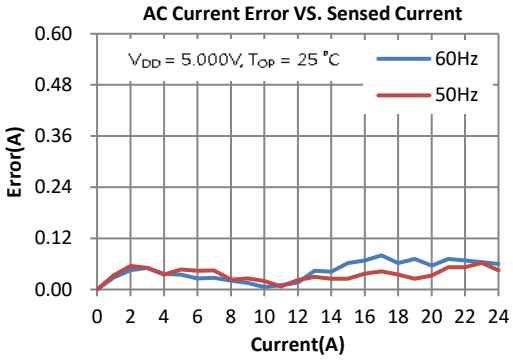

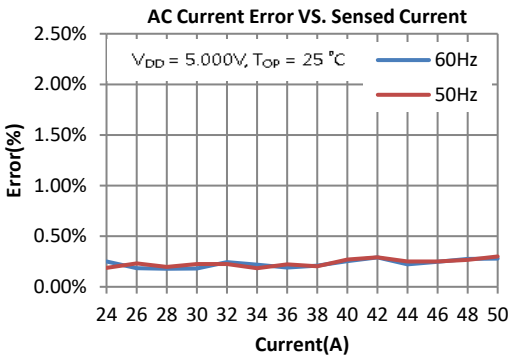

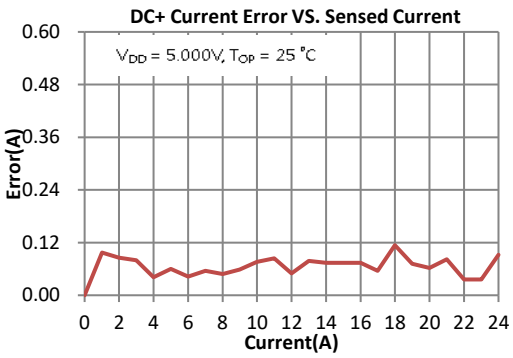

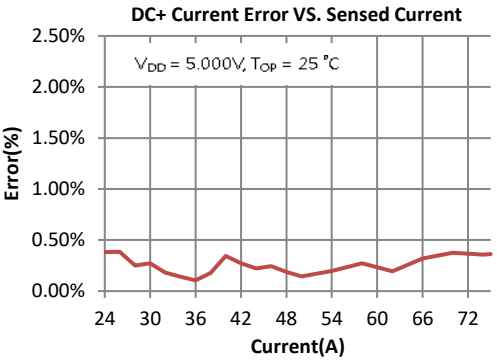

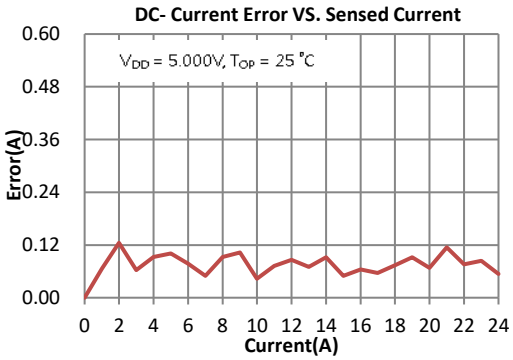

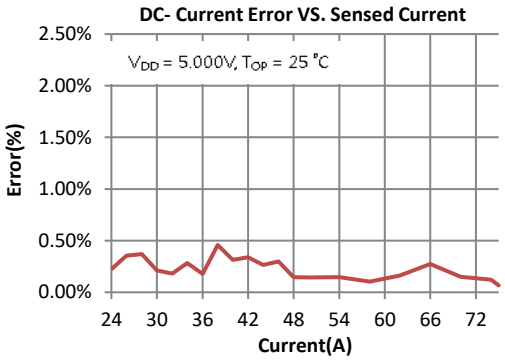

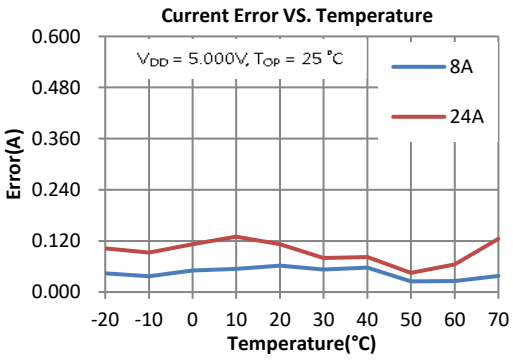

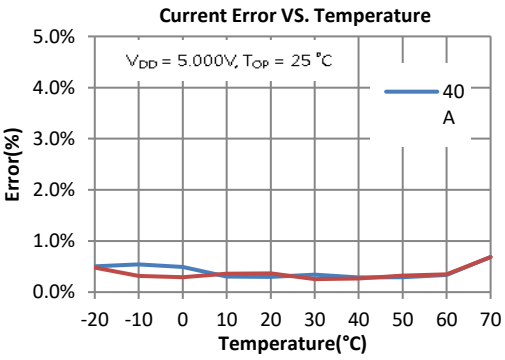

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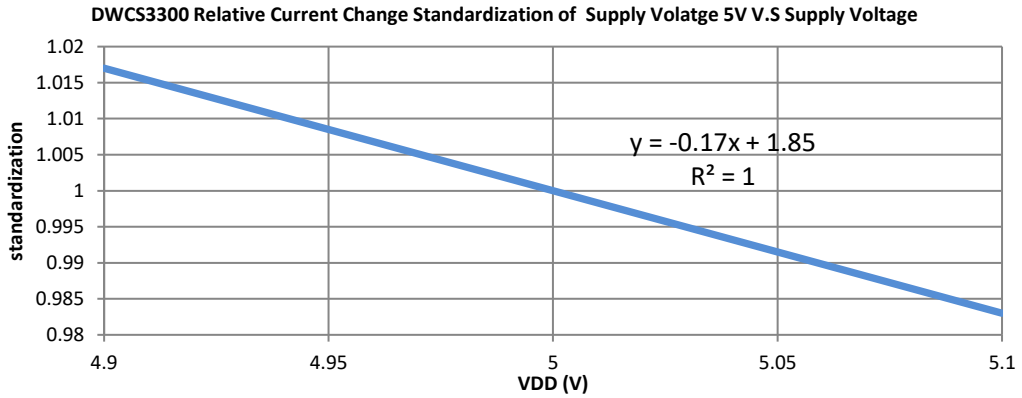
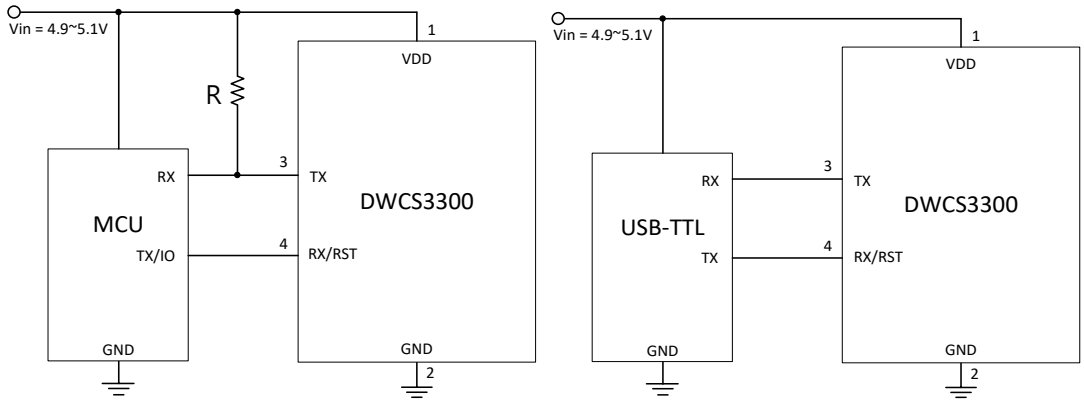


Application Notes:

(1) Application Diagram:



App. 1 Connect to MCU App. 2. Connect to USB-TTL

(DWCS3300 TX needs open drain with external pull-up resistors)

(2) Measured Current Data Output (Continuous & AT Command):

The measured current can be transmitted by UART format.

(2.1) If the measured data is AC “1.23” A, then the output data is ‘~’, ‘1’, ‘.’, ‘2’, ‘3’, ‘0’, ‘\r’, ‘\n’, total of 8 bytes; the output data is ASCII code. If the measured data is “10.45” A, then the output data is ‘~’, ‘1’, ‘0’, ‘.’, ‘4, ‘5, ‘\r’, ‘\n’, total of 8 bytes.

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

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

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(3) 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.

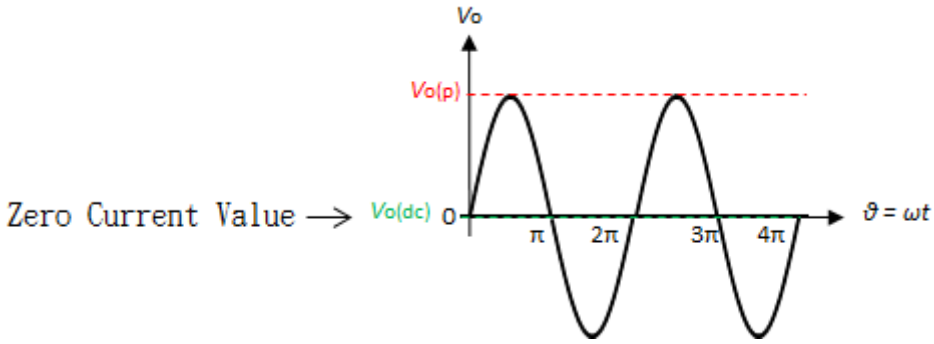

Figure 1 The zero current value of sine waveform

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.

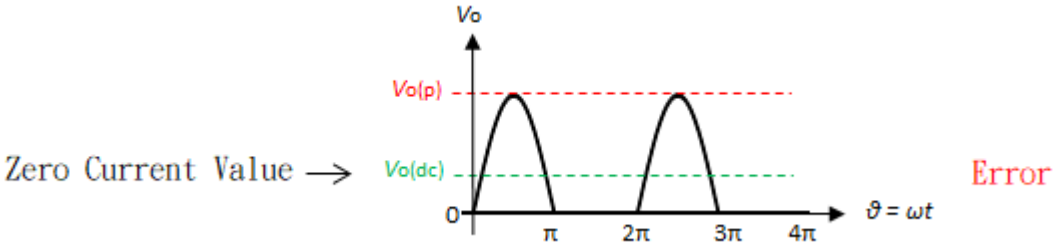

Figure 2 The zero current value of the asymmetric waveform (Error)

The DWCS3300 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.

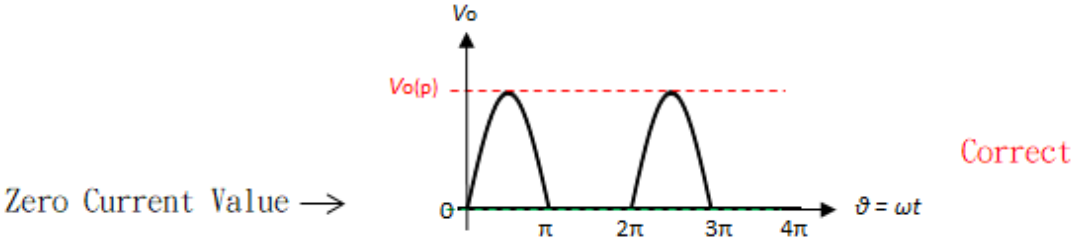

Figure 3 The zero current value of the asymmetric waveform (Correct)

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(4) AT Command:

Setting Command	Command	Example	Return Parameter
Reset Current	AT+RST\r\n	"AT+RST\r\n"	"OK\r\n"(1)
0: DC 1: AC	AT+CURR\r\n	"AT+CURR,0\r\n" "AT+CURR,1\r\n"	"OK\r\n"(1)
Measure Current	AT+MEAS\r\n	"AT+MEAS\r\n"	<Current>
Measure Temperature	AT+TEMP\r\n	"AT+TEMP\r\n"	<Temperature>

1. Command is error: return "Err\r\n" ◦

(5).Modbus-RTU Commands:

Modbus Parameter List

Item	Address	Byte	R/W	Description
Reset	0x0000	2	Write	Input 256 to Reset
Current	0x0002	4	Read	Hexadecimal signed (HEX), Unit:0.001A Current= HEX / 1000 (A)
Temperature	0x0004	4	Read	Hexadecimal signed (HEX), Unit:0.1°C Temperature= HEX / 10 (°C)
Slave Address (1)	0x0010	2	Write	Default address: 1 Input address1~247
DC/AC	0x0020	2	Write	0: DC 1: AC

1. Address will be memorized.

For more detail on Modbus-RTU description, please refer to the “DWCS 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)

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Function Code

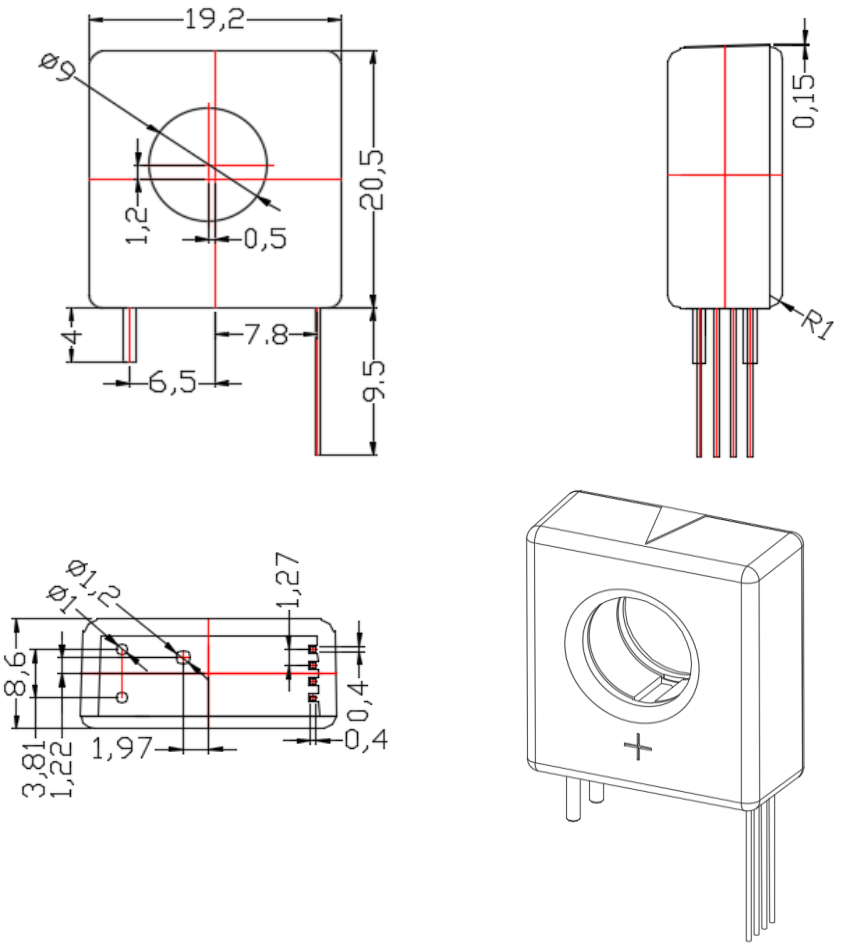
Function Code	Description
03H	Read up to 125 continuous memory words
06H	Write one memory word

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.

Package: (Units: mm)



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