
TDA-6050SP DC communication module

Overview

This document describes the specification of the TDA-6050SP DC communication module, the module is mainly used for measuring DC voltage, current, active power and energy consumption, the module is without display function, the data is read through the RS485 interface.

TDA-6050SP: Measuring Range 50A (Built-in Shunt)

Maker : TADA Automation Company Limited

1. Function description

1. Voltage

1. Measuring range:0.01-60V. (when the test voltage is $< 7V$, please use the independent power supply mode)
2. Resolution:0.01V.
3. Measurement accuracy:1%.

2. Current

1. Measuring range:0.01-50A
2. Resolution:0.01A
3. Measurement accuracy:1%

3. Over Voltage alarm

Voltage threshold can be set, divide into high voltage and low voltage threshold, when the measured voltage exceeds the threshold, it can alarm

The default high voltage threshold is 60V, the default low voltage threshold is 7V.

4. Communication interface

RS485 interface.

2. Communication protocol

1. Physical layer protocol

Physical layer use UART to RS485 communication interface.

Baud rate is 9600, 8 data bits, 1 stop bit, no parity.

2. Application layer protocol

The application layer use the Modbus-RTU protocol to communicate. At present, it only supports function codes such as 0x03 (Read Holding Register), 0x04 (Read Input Register), 0x06 (Write Single Register), 0x41 (Calibration), 0x42 (Reset energy).etc.

0x41 function code is only for internal use (address can be only 0xF8), used for factory calibration and return to factory maintenance occasions, after the function code to increase 16-bit password, the default password is 0x3721.

The address range of the slave is 0x01 ~ 0xF7. The address 0x00 is used as the broadcast address, the slave does not need to reply the master. The address 0xF8 is used as the general address, this address can be only used in single-slave environment and can be used for calibration etc.operation.

3. Read the measurement result

The command format of the master reads the measurement result is(total of 8 bytes):

Slave Address + 0x04 + Register Address High Byte + Register Address Low Byte + Number of Registers High Byte + Number of Registers Low Byte + CRC Check High Byte + CRC Check Low Byte.

The command format of the reply from the slave is divided into two kinds:

Correct Reply: Slave Address + 0x04 + Number of Bytes + Register 1 Data High Byte + Register 1 Data Low Byte + ... + CRC Check High Byte + CRC Check Low Byte

Error Reply: Slave address + 0x84 + Abnormal code + CRC check high byte + CRC check low byte

Abnormal code analyzed as following (the same below)

- 0x01,Illegal function;
- 0x02,Illegal address;
- 0x03,Illegal data;
- 0x04,Slave error.

The command format of the master to read the slave parameters and read the measurement results are same(described in details in Section 2.3), only need to change the function code from 0x04 to 0x03.

The command format of the master to modify the slave parameters is (total of 8 bytes):

Slave Address + 0x06 + Register Address High Byte + Register Address Low Byte + Register Value High Byte + Register Value Low Byte + CRC Check High Byte + CRC Check Low Byte.

The command format of the reply from the slave is divided into two kinds:

Correct Response: Slave Address + 0x06 + Number of Bytes + Register Address Low Byte + Register Value High Byte + Register Value Low Byte + CRC Check High Byte + CRC Check Low Byte.

Error Reply: Slave address + 0x86 + Abnormal code + CRC check high byte + CRC check low byte.

For example, the master sets the slave's high voltage alarm threshold:

0x01 + 0x06 + 0x00 + 0x00 + 0x4E + 0x20 + 0xHH + 0xLL

Indicates that the master needs to set the 0x0000 register (high voltage alarm threshold) to 0x4E20 (200.00V) .

Set up correctly, the slave return to the data which is sent from the master.

For example, the master sets the low voltage alarm threshold of the slave

0x01 + 0x06 + 0x00 + 0x01 + 0x03 + 0xE8 + 0xHH + 0xLL

Indicates that the master needs to set the 0x0001 register (low voltage alarm threshold) to 0x03E8(10.00V).

Set up correctly, the slave return to the data which is sent from the master.

For example, the master sets the address of the slave

0x01 + 0x06 + 0x00 + 0x02 + 0x00 + 0x05 + 0xHH + 0xLL

Indicates that the master needs to set the 0x0002 register (Modbus-RTU address) to 0x0005

Set up correctly, the slave return to the data which is sent from the master.

2.5 Reset energy

The command format of the master to reset the slave's energy is (total 4 bytes):

Slave address + 0x42 + CRC check high byte + CRC check low byte.

Correct reply: slave address + 0x42 + CRC check high byte + CRC check low byte.

Error Reply: Slave address + 0xC2 + Abnormal code + CRC check high byte + CRC check low byte

2.6 Calibration

The command format of the master to calibrate the slave is (total 6 bytes):

0xF8 + 0x41 + 0x37 + 0x21 + CRC check high byte + CRC check low byte.

Correct reply: 0xF8 + 0x41 + 0x37 + 0x21 + CRC check high byte + CRC check low byte.

Error Reply: 0xF8 + 0xC1 + Abnormal code + CRC check high byte + CRC check low byte.

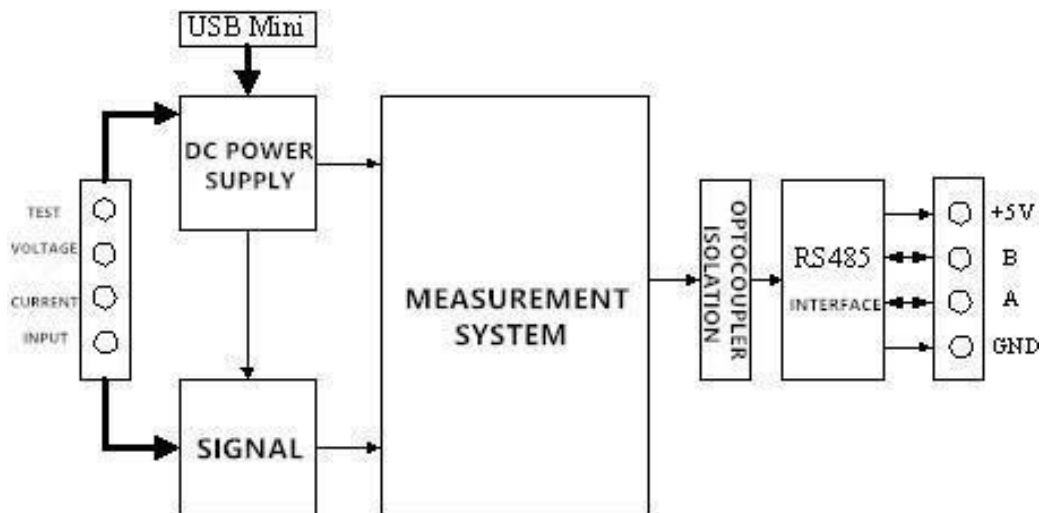
It should be noted that the calibration takes 3 to 4 seconds, after the master sends the command, if the calibration is successful, it will take 3 ~ 4 seconds to receive the response from the slave.

2.7 CRC check

CRC check use 16bits format, occupy two bytes, the generator polynomial is $X^{16} + X^{15} + X^2 + 1$, the polynomial value used for calculation is 0xA001.

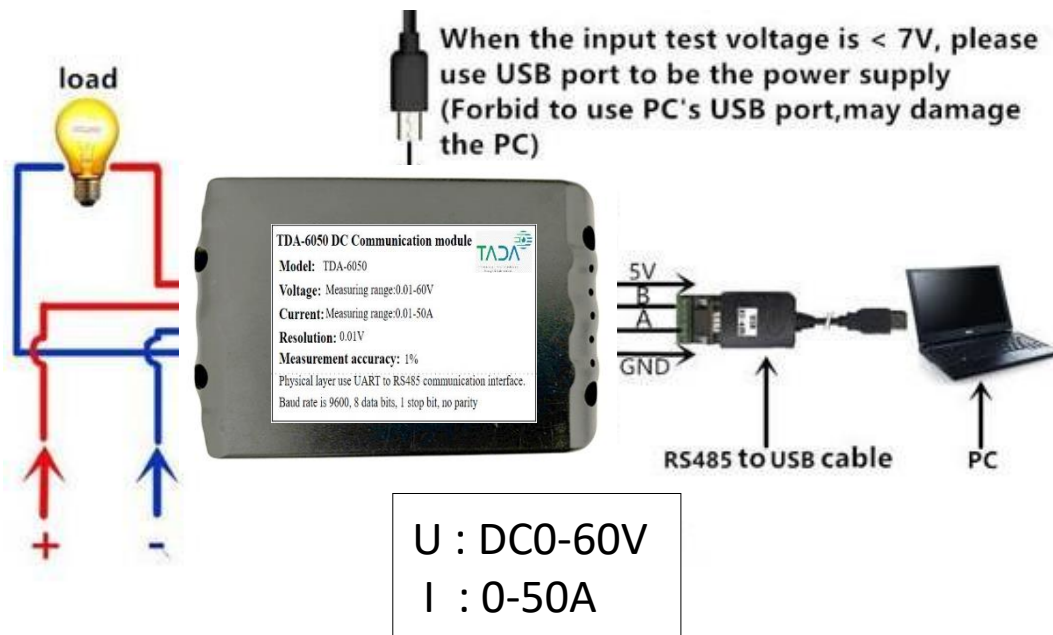
The value of the CRC check is all results of a frame data checking divide CRC

3. Functional block diagram



Picture 3 Functional block diagram

4. Wiring diagram



Picture 4.1 TDA-6050SP Wiring diagram

5. Other instructions

1. RS485 interface is passive output, need external connect 5V power supply and the the external power supply should > 100mA.
2. When the input test voltage is less than 7V, it must supply 5V independent work voltage through MICRO USB port ;

Note: Do not use the USB port bring by your PC to be the independent power supply, otherwise it may damage your PC !

5.1 Working temperature

-20°C ~ +60°C。