



Five in One Sensor Module

(Model: ZPHS01)

Manual

Version: 1.1

Valid From: 2017.02.14

Zhengzhou Winsen Electronics Technology Co., Ltd

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Zhengzhou Winsen Electronics Technology CO., LTD

Five in One Sensor Module

Profile

This module integrates Electrochemical methanol, VOC sensor, Laser particle sensor, NDIR CO2 sensor and temperature& humidity sensor.

Communication Interface: TTL serial, Baud rate:9600, data bits:8, stop bit:1, check bit: no.

Application

- Gas detector
- Air conditioner
- Air quality monitoring EQP
- Air purifier
- HVAC
- Smart home

Specification

Model	ZPHS01
Detection classification	CO ₂ 、PM2.5、CH ₂ O、TVOC、Temperature、Humidity
Interference gas	Alcohol、co,etc
Working voltage	5V (DC)
Average Current	< 200 mA
Interface level	3 V(compatible with 3.3V)
Output signal	UART、IIC
Preheat time	≤ 5min
CO ₂ range	0~5000ppm
PM2.5 range	0~1000ug/m ³
CH ₂ O range	0~2000 μg/m ³
TVOC range	4 等级
Temp.range	-10~50℃
Tem.precision	±0.5℃
H range	0~100% RH
H precision	±3%
Size	72mmx61mm

Figure 1: performance parameter

Module Appearance



Fig 1: CH2O version

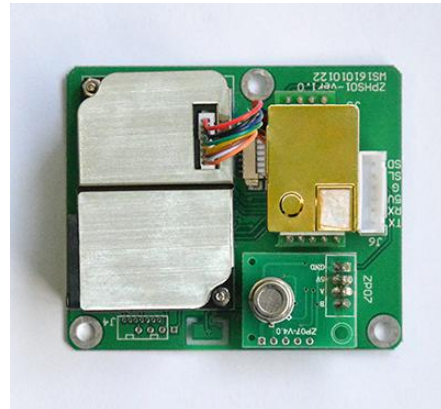


Fig 2: VOC version

Module size

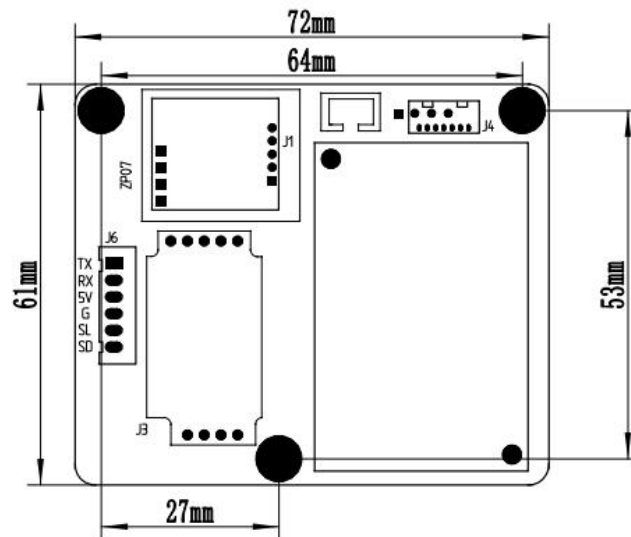


Fig 3: Mounting dimension

Pin Definition

PIN1	TX	serial port (circuit board serial port transmitter) 3V TTL level
PIN2	RX	serial port (circuit board serial port transmitter) 3V TTL level
PIN3	+5V	Power input (+5V)
PIN4	GND	Power input (Ground terminal)
PIN5	SL	I2C Clock end
PIN6	SD	I2C Data side

Serial communication protocol format

The host computer sends the format

Start character	length	Command number	Data 1	Data n	checksum
HEAD	LEN	CMD	Data 1	Data n	CS
11H	XXH	XXH	XXH	XXH	XXH

Detailed protocol format

Protocol format	Detailed explanation
Start character	Upper PC send [11H], Module responses [16H]
Length	Frame byte length = data length+1 (includes CMD+DATA)
Command No	Command number
Data	Data read or written, with variable length
Checksum	Sum of data accumulation

Serial protocol command number table

NO.	Function	Command number	Functional description
1	the measurement results	0x01	
2	CO2 calibration	0x03	
3	Start/stop dust measure	0x0C	

Detailed description of protocol

Send: 11 02 01 00 EC

Response: 16 0B 01 13 88 00 47 01 B7 02 EC 00 03 B6
 CO2 VOC/CH2O Humidity Temperature PM2.5 CS

Identifying	Decimal valid range	Corresponding value	multiple
CO2	0~5000	0~5000ppm	1
VOC	0~4	0~4 level	1
CH2O	0~2000	0~2000 μ g/m3	1
PM2.5	0~1000	0~1000ug/m3	1
Temperature	400~1000	-10~50℃	10
Humidity	0~1000	0~100%	10

- The temperature value increases 500 from the actual measurement results, that is, -20.0 °C corresponding to the number of 300.
 Temperature value = (DF7*256+DF8-500)/10
- The measured value is represented by two bytes, the higher byte in front while the lower byte in the back.

CO2 zero point calibration

send: 11 03 03 01 90 58

respond: 16 01 03 E6

function: CO2 zero point calibration

Instruction: zero point means 400ppm, please ensure that the sensor has already been working for 20 mins under 400ppm concentration before sending zero point calibration command.

Start & Stop dust measurement

Send: 11 03 0C DF1 1E C2

Respond: 16 02 0C DF1 CS

Function: Start/Stop dust measurement

Instruction:

- 1、 Among send command, DF1=2 means starting measurement, DF1=1 means stopping measurement;
- 2、 Among respond command, DF1=2 means starting measurement, DF1=1 means stopping measurement;
- 3、 When the sensor receives the measurement command, it enters the state of continuous measurement by default. If

Send: 11 03 0C 02 1E C0 //start dust measurement

Respond: 16 02 0C 02 DA //the module is in "on-state dust measurement"

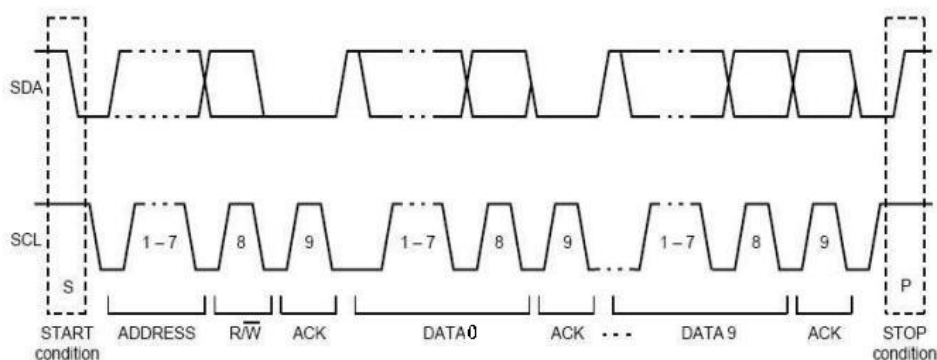
Send: 11 03 0C 01 1E C1 //stop dust measurement

Respond: 16 02 0C 01 DB //the module is in "off-state dust measurement"

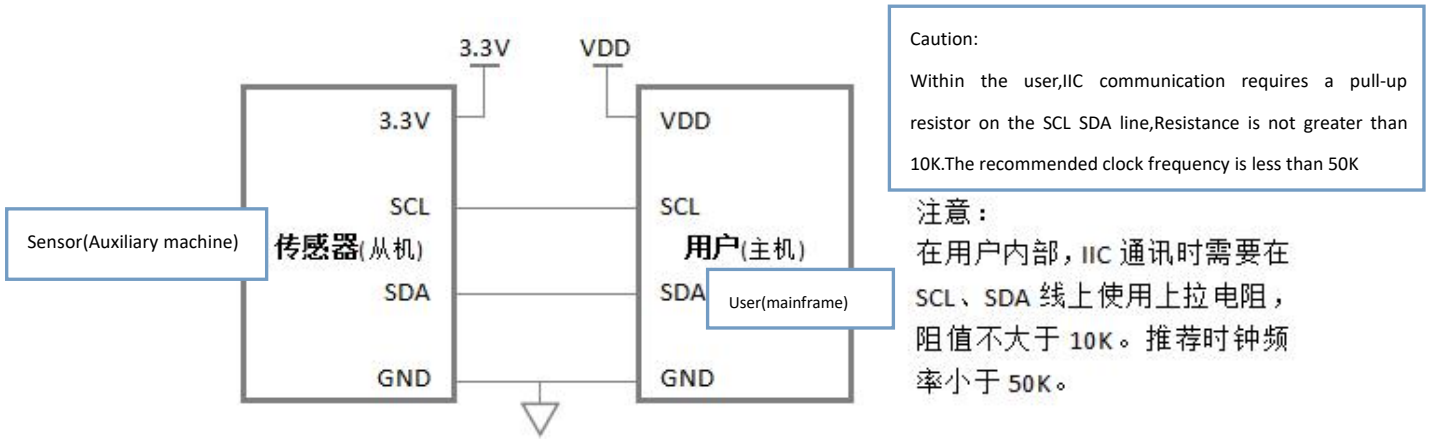
IIC communication protocol

General description:

The IIC interface protocol is a special bus signaling protocol. Consists of Start (S) (start signal), Stop (P) (end signal), binary data, as shown below. At the beginning, SCL high, SDA falling edge. After that, send the slave address. In the 7-bit address bit, is the control and write bits, select the read and write operations. When the slave recognizes the corresponding address information, it will send an acknowledge signal to the master and pull down the SDA in the 9th clock cycle. When stops, SCL remains high, SDA rising edge.



Hardware connection:



Device address:

Address format: high 7 bits for the sensor module address (0x55), the lowest bit for the read / write operation bit, 1 for reading, 0 for writing.

A7	A6	A5	A4	A3	A2	A1	R/W
1	0	1	0	1	0	1	1

Data frame format:

The slave machine returns each frame of data containing 14 bytes of data, the contents of which are as follows.

Answer: 16 0B 01 13 88 00 47 01 B7 02 EC 00 03 B6
 CO2 VOC/CH2O Hum TEMP PM2.5 CS

Identifying	Decimal valid range	Corresponding value	multiple
CO2	0~5000	0~5000ppm	1
VOC	0~10	0~10 level	1
CH2O	0~2000	0~2000 μg/m3	1
PM2.5	0~1000	0~1000ug/m3	1
Temperature	400~1000	-10~50℃	10
Humidity	0~1000	0~100%	10

1.The temperature is in the actual measurement results increased by 500, that is, -20.0 °C corresponding to the number of 300

$$\text{temperature} = (DF7 * 256 + DF8 - 500) / 10$$

2.The measured value is represented by two bytes, the upper and the lower bits are in the back

Precautions

The module should avoid contact with organic solvents (including silicone and other adhesives), coatings, pharmaceuticals, oils and high concentrations of gas

Module for the first time to use the need to preheat more than 3 minutes

If the sensor is to be placed in a small space, this space should be well ventilated

The sensor should be away from heat and avoid direct sunlight or other heat radiation

The module can not withstand excessive impact or vibration

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