

HENAN FOSEN ELECTRONICS TECHNOLOGY CO., LTD.

SPECIFICATION FOR APPROVAL

FORMALDEHYDE MODULE

MODEL : FS00501



<b>Customer</b>	XXXXXXXX
<b>Product Name</b>	Formaldehyde module
<b>Model</b>	FS00501
<b>Specification Version</b>	2015-10-08
<b>Specification Status</b>	<input type="checkbox"/> Sample <input type="checkbox"/> Mass Production
<b>Sample specification</b>	Apply to short run production
<b>The specification for mass production</b>	Apply to mass production

Customer Approval		Supplier		
Approval	Date	Check	Prepare	Data

Note: No prior notice will be given for any change on targeted improvement as if it does not affect the performance of product .Any objection shall be submitted to us once available.

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## 1. Product description

FS00501 Electrochemical formaldehyde module using high stability gas sensor, high-performance microprocessors, providing digital output, easy to use. The module uses precise automated calibration, testing equipment, reducing the interference of human factors, mass production mean time to ensure the accuracy of the data, good consistency.

## 2. Module characteristics

- High sensitivity, high stability, high resolution
- Good anti-interference ability, with temperature compensation
- Good linear output
- Low power consumption, long service life
- Provide UART, DAC output mode

## 3. Main application

- Air Quality monitors, portable instrument, air cleaner
- Fresh air ventilator, air conditioning, equipment for smart home
- Hospital, hotel and school and locus public

#### 4. Technique index

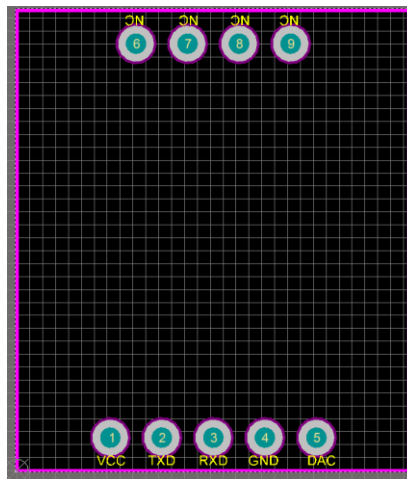
##### Formaldehyde module(FS00501)Technical index

Detection of gas	Formaldehyde
Interference gas	Ethanol, methanol, phenol and other gases
Output mode	UART output (3.3V) DAC(0.4~2V Standard voltage signal)( Reserve)
Operating voltage	3.7V~6V
Operating current	<10mA
Warm up time	≤3min
Response time	≤60s
Recovery time	≤60s
Range	0~3ppm
Resolution ratio	0.01 ppm
Operating temperature	-10℃~50℃
Operating humidity	15%RH-90%RH (No condensation)
Storage temperature	-20℃~60℃
Service life	2years (in the air)

Table1 Technique index

\*NB: Sensor performance tested under standard conditions of 293K, 1atm., 35%RH. Sensors are best stored at 20℃ in sealed plastic bags for maximum storage life.

### 5. Pin name



Note: the needle is 2.0mm pitch (from the side with sensor)

Table2 Digital pin interface definition

Pin name	Pin description
PIN1	Vin (voltage input 3.7V~6V)
PIN2	UART (TXD) 0~3.3V data output
PIN3	UART (RXD) 0~3.3V data input
PIN4	GND
PIN5	DAC(0.4~2V,Corresponds to 0-full scale)
PIN6	Suspended
PIN7	Suspended
PIN8	Suspended
PIN9	Suspended

## 6. Communication protocol

### 1.General settings

Table3

<b>Baud rate</b>	9600
<b>Data bit</b>	8 bits
<b>Stop bit</b>	1 bit
<b>Check bit</b>	No

### 2.Communication command

Communication is divided into active upload and question-and-answer mode. The factory defaults to active upload and sends concentration values every 1S interval. The command line format is as follows:

Table 4

0	1	2	3	4	5	6	7	8
Start bit	Device type	Unit	Decimals No	Gas concentration High bit (ppb)	Gas concentration Low bit (ppb)	Full range High bit(ppb)	Full range Low bit(ppb)	Check value
0xff	0x17	0x04	0x00	0x00	0xD3	0x07	0xD0	0x3B

Gas concentration value = (Gas concentration high bit \* 256 + Gas concentration low bit) / 1000 Unit:ppm

Switch to question-and-answer format. The command line format is as follows:

Table 5

0	1	2	3	4	5	6	7	8
Start bit	Function code	Switch command	Q&A	Reserved	Reserved	Reserved	Reserved	Check value
0xff	0x01	0x78	0x41	0x00	0x00	0x00	0x00	0x46

Switch to active upload. The command line format is as follows:

Table 6

0	1	2	3	4	5	6	7	8
Start bit	Function code	Switch command	Active upload	Reserved	Reserved	Reserved	Reserved	Check value
0xff	0x01	0x78	0x40	0x00	0x00	0x00	0x00	0x47

The format of reading gas concentration values is as follows:

Table 7

0	1	2	3	4	5	6	7	8
Start bit	Function code	Command	Reserved	Reserved	Reserved	Reserved	Reserved	Check value

0xff      0x01      0x86      0x00      0x00      0x00      0x00      0x00      0x79

The sensor return value format is as follows:

Table 8

0	1	2	3	4	5	6	7	8
Start bit	Reserved	Gas concentration High bit (ppb)	Gas concentration Low bit (ppb)	Reserved	Reserved	Gas concentration High bit (ppb)	Gas concentration Low bit (ppb)	Check value
0xff	0x86	0x00	0x2A	0x00	0x00	0x00	0x2A	0x30

Gas concentration value = (Gas concentration high bit \* 256 + Gas concentration low bit) / 1000    Unit:ppm

### Attached: Check algorithm

/\*\*\*\*\*\*

\* Function name: unsigned char FucCheckSum(unsigned char \*i,unsigned char l)

\* Functional Description: Sum check (take the sum of 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 of the send or receive protocol )

\* Function Description: the array of elements 1 - the penultimate element and take the sum (the number of elements must be greater than 2 )

\*\*\*\*\*/

unsigned char FucCheckSum(unsigned char \*i,unsigned char l)

```
{
    unsigned char j,tempq=0;
    i+=1;
    for(j=0;j<(l-2);j++)
    {
        tempq+=*i;
        i++;
    }
    tempq=(~tempq)+1;
    return(tempq);
}
```

### 7. Cross Interference Gas Characteristics List

Substance	Cross Sensitivity (%)
CO	1
H2S	No data
H2	0.1
SO2	12
NO2	No data
NO	No data
Cl2	-3
C2H4	No data
NH3	0.0
CO2	0.0
Ethanol, methanol	50
Phenol	7
Water vapour	0.0

Table 9

\*NB: Within specified range. Step changes in %RH produce short term transient response

### 8. Data output characteristics of sensor

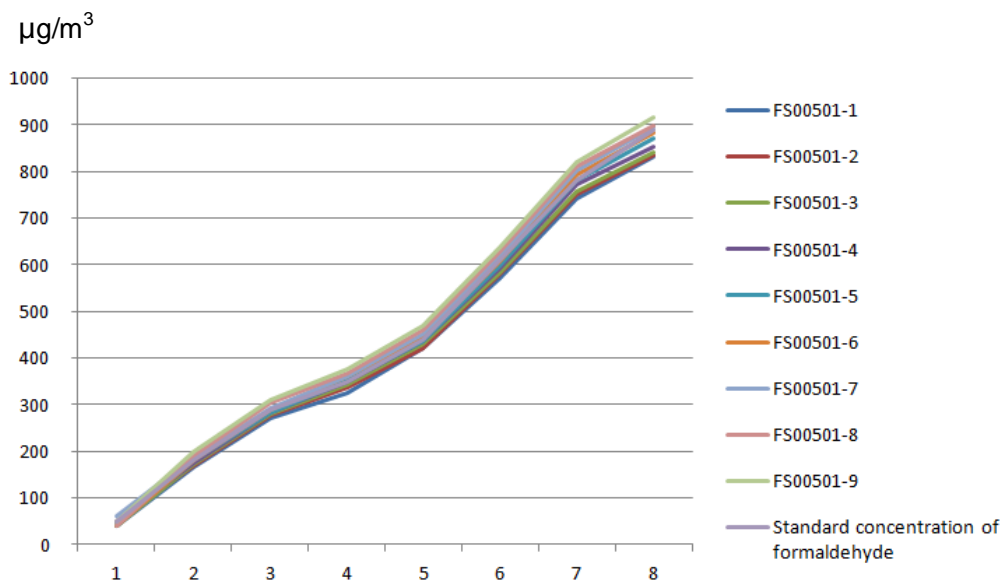


Figure1 Consistency of sensors under normal temperature and atmospheric pressure





increased, or fans should be considered in design, and odorless materials should be used.

✧ The module avoids contact with organic solvents (including silica gel and other adhesives), coatings, reagents, oils and high concentration gases. Do not place modules near silica compounds, and do not clean sensor surfaces with organic solvents.

✧ Do not place the module in a high concentration of organic gas for a long time. Long term placement will cause the sensor zero to drift. As far as possible in the normal temperature and humidity of clean air environment custody.

✧ The module can not withstand excessive impact or vibration.

✧ The module for the first time to use the need to preheat more than 5 minutes.

✧ Do not apply the module to systems involving personal safety.

✧ Do not install the module in a strong air convection environment.

**HENAN FOSEN ELECTRONICS TECHNOLOGY CO., LTD.**

**Tel: +86-371-53308389**

**Email : [service@hnfosen.com](mailto:service@hnfosen.com)**

**Consultion: 9:00AM to 18:00P (From Monday to Friday)**

**Web: [www.hnfosen.com](http://www.hnfosen.com)**

**Add: NO. 11 Changchun Road,High-tech District,  
Zhengzhou .China**