



SMX100 series smart sensors
(Model: SMX100 Series)

Manual

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Zhengzhou Winsen Electronics Technology CO., LTD.

SMX100 series smart sensors

◆ Product Description:

SMX100 series smart sensors are high-performance, general-purpose smart sensors that use three-electrode electrochemical sensors, catalytic sensors, and high-performance microprocessors to test the concentration of corresponding gases with different types of sensors. It has a small size and digital output function, which is convenient for users to use and debug, and greatly shortens the user's design and development cycle. It perfectly integrates electrochemical sensors and circuits to meet the needs of users for different gas detection occasions.



Fig 1

◆ Product features:

The intelligent sensor has the characteristics of high sensitivity, fast response speed, small size, wide power supply range, data traceability, temperature compensation, fault reminder, and strong anti-interference ability.

◆ Main applications:

It is suitable for portable and stationary gas detectors.

◆ Technical Parameters:

Product model	SME100-CO、SME100-H2S、 SME100-O2、SMC100-CH4	
Detect gases	CO、H2S、O2、CH4	
Detection range	See Table 3	
Output method	UART output	
Operating voltage	3.0V ~ 5.0V DC	
Operating current	<10mA (CH4, <110mA)	
Life expectancy	5 years (in normal air)	
Operating temperature	Continuous work	-20℃ ~ +40℃
	Intermittent work	-40℃ ~ +60℃
Operating humidity	15%RH-90%RH (non-condensing)	
Storage temperature	10℃ ~ 30℃	
Storage humidity	15%RH-90%RH (non-condensing)	
weight	<15g	

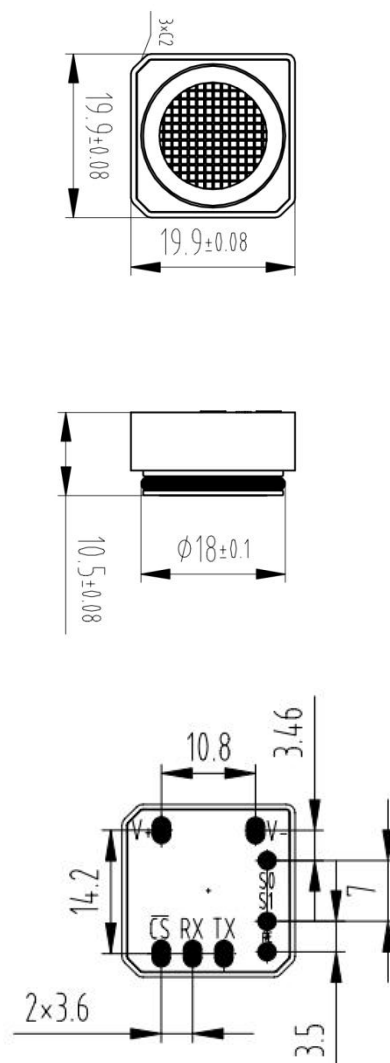


Fig 2 Smart sensor structure diagram

Pin definition

Table 2

PIN1	V+	Power supply cathode
PIN2	V-	Power supply negative
PIN3	RX	UART input
PIN4	TX	UART output
PIN5	CS	Chip Selector Pin (High Level Active)

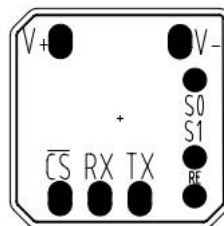


Figure 3: Smart sensor pin diagram

Detection range

Table 3

Serial number	Gas code	Gas type	Detection range	resolution	Response Time (T90)
1	0x04	CO	(0-1000)ppm	1ppm	≤30S
2	0x03	H2S	(0-200)ppm	0.1ppm	≤30S
3	0x05	O2	(0-25)%VOL	0.1%VOL	≤15S
4	0x01	CH4	(0-100)%LEL	1%LEL	≤15S

Communication protocol

1 Communication settings

Table 4

Porter rate	9600
Data bits	8 bits
Stop bit	1 bit
Check bit	None

2 Communication instructions

The smart sensor is configured as an active upload communication mode by default when it leaves the factory, and the smart sensor will send the current concentration value (concentration is hexadecimal) every second. If you need to change to Q&A, you can change the communication mode to 0x41 (Q&A) by sending 0x78 command, and then the smart sensor will send the current concentration value after receiving the 0x86 command (reading the concentration of the smart sensor), and the recommended communication period is 1 second.

3 Communication commands

1. The frame format received in active upload mode is as follows:

Table 5

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start bit	Command	High concentration	Low concentration	Gas code	Decimal places	Reserved	Reserved	Check sum
0xFF	0x86	0x00	0xD1	0x05	0x01	0x00	0x00	0xA3

Remarks:

Gas concentration value = (gas concentration high * 256 + gas concentration low) * resolution.

Gas concentration value = (0 * 256 + 0xD1) * 0.1 = 20.9, that is, the concentration value is 20.9% VOL (take O2 oxygen sensor as an example).

The decimal place is 0x00, indicating that the resolution is 1; The decimal place is 0x01, indicating a resolution of 0.1, and the decimal place is 0x02, indicating a resolution of 0.01.

2. Modify the communication mode, the command format is as follows:

Table 6

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start bit	Address	Command	Communication mode	Reserved	Reserved	Reserved	Reserved	Check sum
0xFF	0x01	0x78	0x41	0x00	0x00	0x00	0x00	0x46

Remarks:

Communication mode: 0x40 Active upload ; 0x41 Q&A

To switch to active mode, send FF 01 78 40 00 00 00 00 47 (hexadecimal).

The answer data frame format is as follows:

Table 7

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start bit	Command	Modify result	Reserved	Reserved	Reserved	Reserved	Reserved	Check sum
0xFF	0x78	0x01	0x00	0x00	0x00	0x00	0x00	0x87

Remarks:

Modification Result: 0x01 Modification Successful 0x00 Modification Failure

3. Read the concentration, the command format is as follows:

Table 8

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
starting position	Address	Command word	Reserved	Reserved	Reserved	Reserved	Reserved	Checksum
0xFF	0x01	0x86	0x00	0x00	0x00	0x00	0x00	0x79

The answer data frame format is as follows:

Table 9

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
starting position	order	High concentration	The concentration is low	Gas code	Decimal places	Reserved	Reserved	Checksum
0xFF	0x86	0x00	0xD1	0x05	0x01	0x00	0x00	0xA3

Remarks:

Gas concentration value = (gas concentration high * 256 + gas concentration low) * resolution.

Gas concentration value = (0 * 256 + 0xD1) * 0.1 = 20.9, that is, the concentration value is 20.9% VOL (take O2 oxygen sensor as an example).

The decimal place is 0x00, indicating that the resolution is 1; The decimal place is 0x01, indicating a resolution of 0.1, and the decimal place is 0x02, indicating a resolution of 0.01.

4 Checkpoint calculation

/*****

* Function name: ucharFucCheckSum(uchar *i,ucharIn)

* Function description: sum check (take the sum of 1\2\3\4\5\6\7 of the transmit and receive protocols and take the inverse +1)

* Function description: Add element 1 - the penultimate element of the array and inverse +1 (the number of elements must be greater than 2)

*****/

unsigned char FucCheckSum(unsigned char *i,unsigned char In)

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

Notes

- 1、 It is forbidden to separate the sensor from the board.
- 2、 It is forbidden to directly weld the pins of the smart sensor, and it is recommended to use shrapnel and other structural parts for connection.
- 3、 Smart sensors avoid contact with organic solvents (including silicone and other adhesives), coatings, chemicals, oils, and high-concentration gases. If you need to fix the smart sensor during use, it is recommended to use silicone-free epoxy resin glue to fix it.
- 4、 Smart sensors are not subject to excessive impact or vibration.
- 5、 The smart sensor needs to be warmed up for more than 5 minutes for the first time on power, and it is recommended to warm up for more than 24 hours if it has not been used for a long time.
- 6、 Do not use this smart sensor in systems that involve personal safety.
- 7、 Do not install the smart sensor in a strong air convection environment.
- 8、 Do not leave the smart sensor in high concentrations of organic gases for long periods of time.
- 9、 The data returned by the serial port of the smart sensor is the real-time concentration value in the current environment, in the absence of standard gas, please do not try the calibration command, this command will cause the calibrated data to be cleared, and the data returned by the serial port is inaccurate.
- 10、 To judge whether the intelligent sensor communication is normal, it is recommended to use the USB to TTL tool, debug the assistant software through the serial port, and observe and judge according to the communication protocol.

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