Winsen MH-Z19C Infrared CO2 Sensor Module User Manual

**MH-Z19C Infrared CO2 Sensor Module
User Manual**

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www.winsen-sensor.com

Contents

Statement

Thanks for purchasing our product. In order to let customers use it better and reduce the faults caused by misuse, please read the manual carefully and operate it correctly in accordance with the instructions. If users disobey the terms or remove, disassemble, or change the components inside of the sensor, we shall not be responsible for the loss.

The specific such as color, appearance, sizes &, etc., please in kind prevail.

We are devoting ourselves to product development and technical innovation, so we reserve the right to improve the products without notice. Please confirm it is the valid version before using this manual. At the same time, users' comments on the optimized using way are welcome.

Please keep the manual properly, in order to get help if you have questions during the usage in the future.

MH-Z19C NDIR CO2 Module

Profile

MH-Z19C NDIR infrared gas module is a common type, small size sensor, pins type or terminal type, using non-dispersive infrared (NDIR) principle to detect the existence of CO_2 in the air, with good selectivity, non-oxygen dependent and long life. Built-in temperature compensation; and it has UART output and PWM output. It is developed by the tight integration of mature infrared absorbing gas detection technology, precision optical circuit design, and superior circuit design.
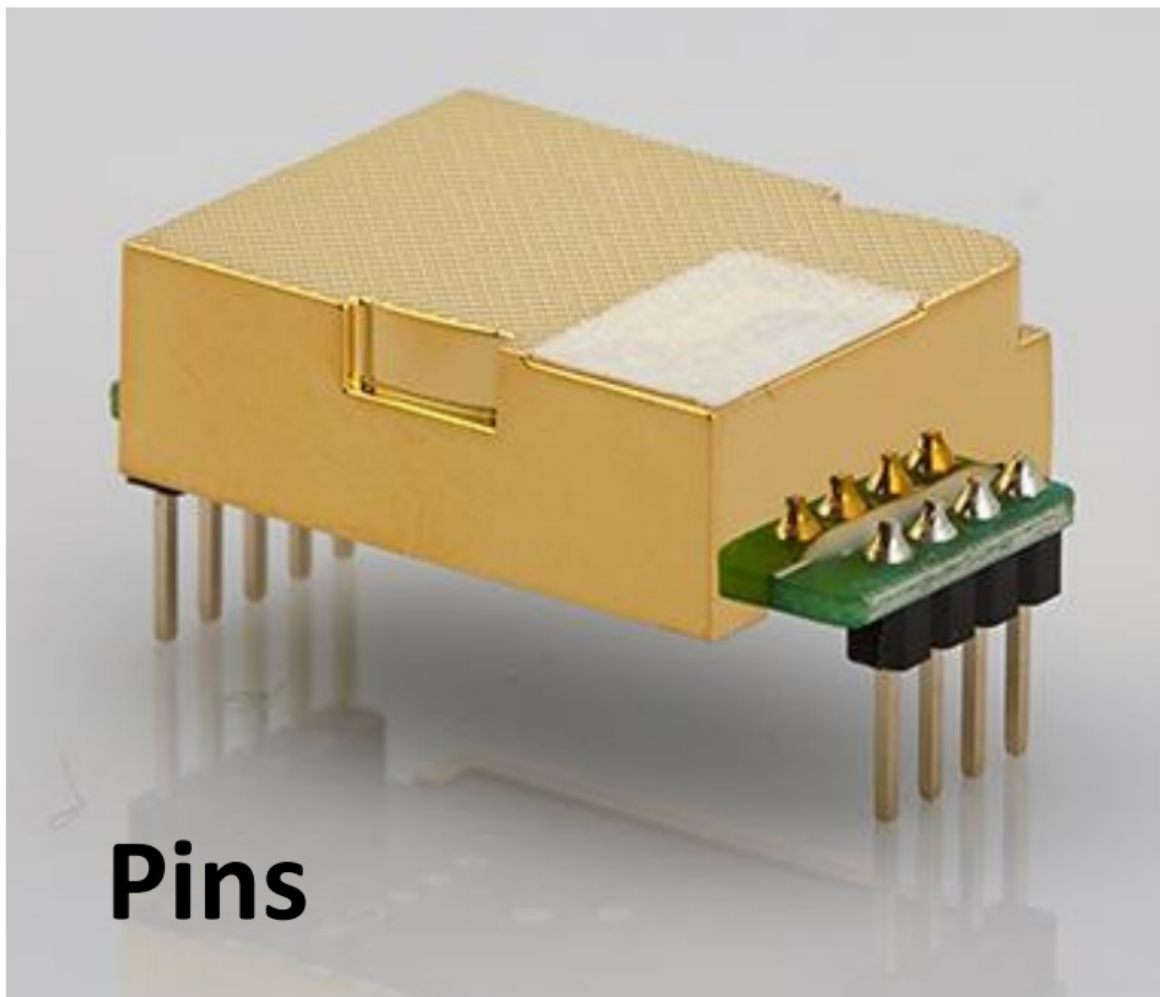
Applications

*HVAC refrigeration
*Air cleaner device
*Indoor air quality monitoring
*Smart home
*Ventilation system
*School
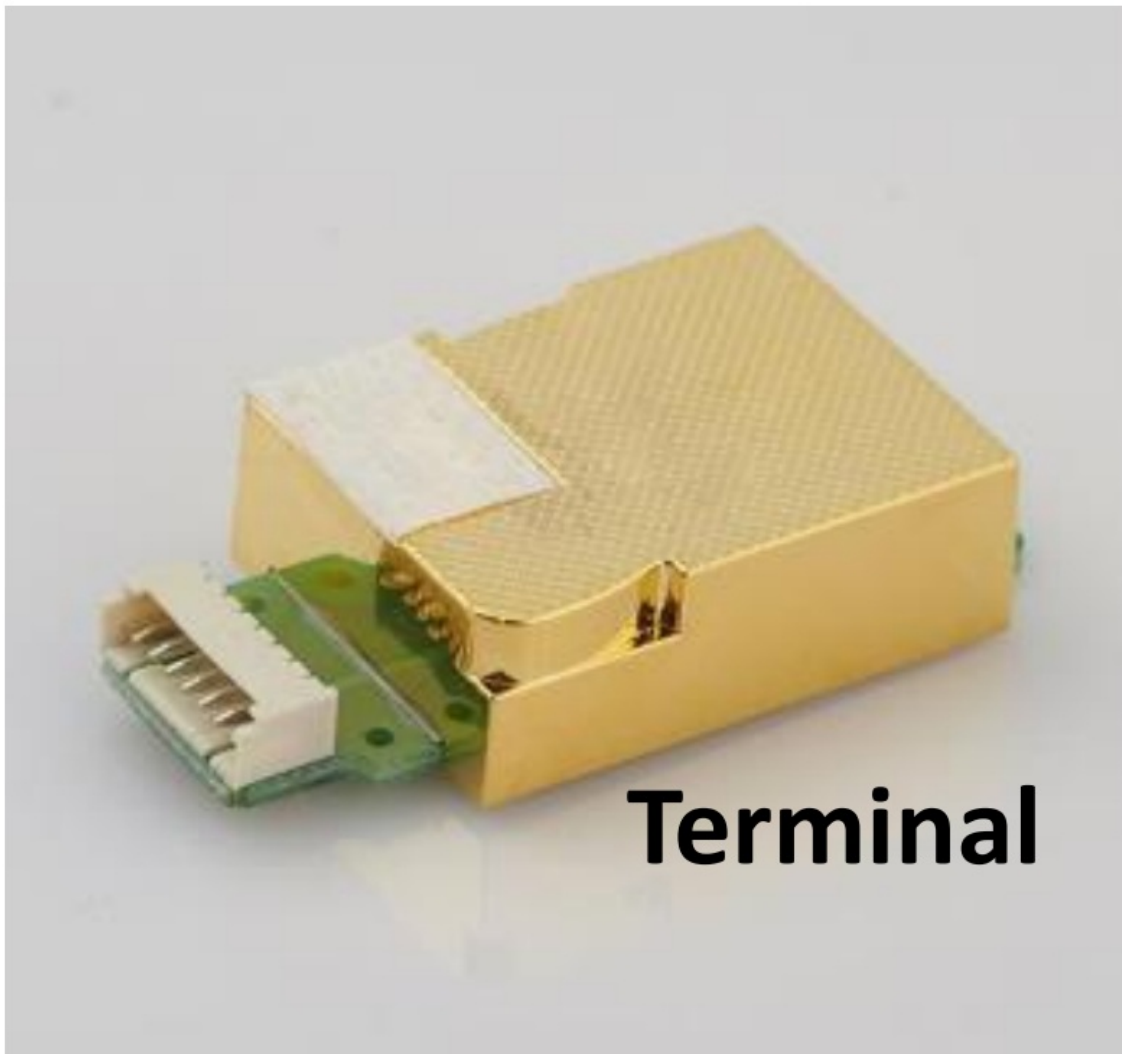
Terminal

Main Features

*Chamber is gold plated
*High sensitivity, low power consumption
*Good stability
*Temperature compensation, excellent linear output
*Multiple output modes: UART, PWM
*Long lifespan
*Anti-water vapor interference, anti-poisoning

## Main parameters

Model No.	MH-Z19C
Detection Gas	CO2
Working voltage	5.0±0.1V DC
Average current	< 40mA (@5V power supply)
Peak current	125mA (@5V power supply)
Interface level	3.3 V (Compatible with 5V)
Detection Range	400-10000ppm(optional)
Output signal	Serial Port (UART) (TTL level 3.3V)
	PWM
Preheat time	1 min
Response Time	T90 < 120 s
Working temperature	-10 — 50 °C
Working humidity	0 — 95% RH (No condensation)
Storage temperature	-2060 °C
Weight	5 g
Lifespan	> 10 years

Detection range and accuracy

Detection Gas	Formula	Detection Range	Resolution	Accuracy
Carbon Dioxide	CO2	400-2000ppm	1PPrn	± (50ppm+5% reading value)
		400-5000ppm		
		400-10000ppm		

Dimensions(Pins type)
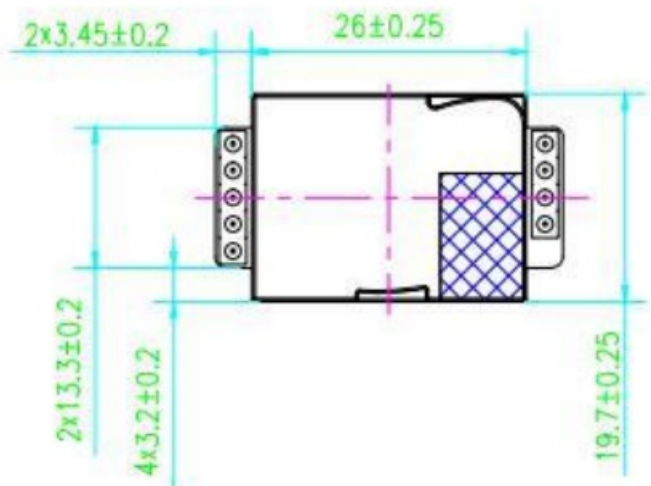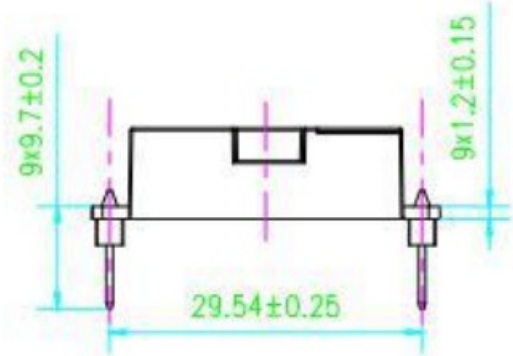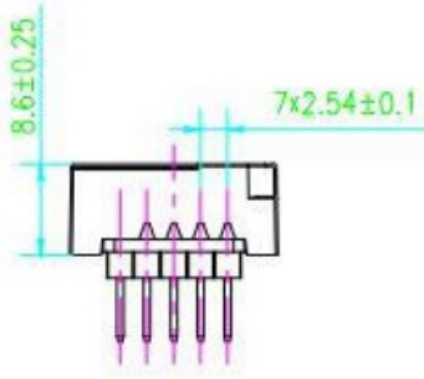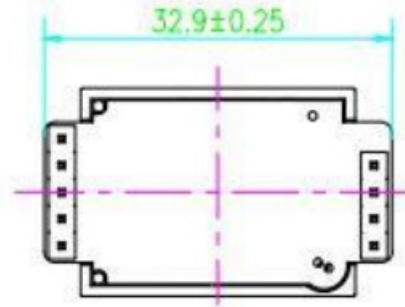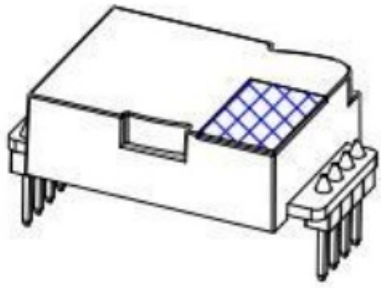
Pins connection type:

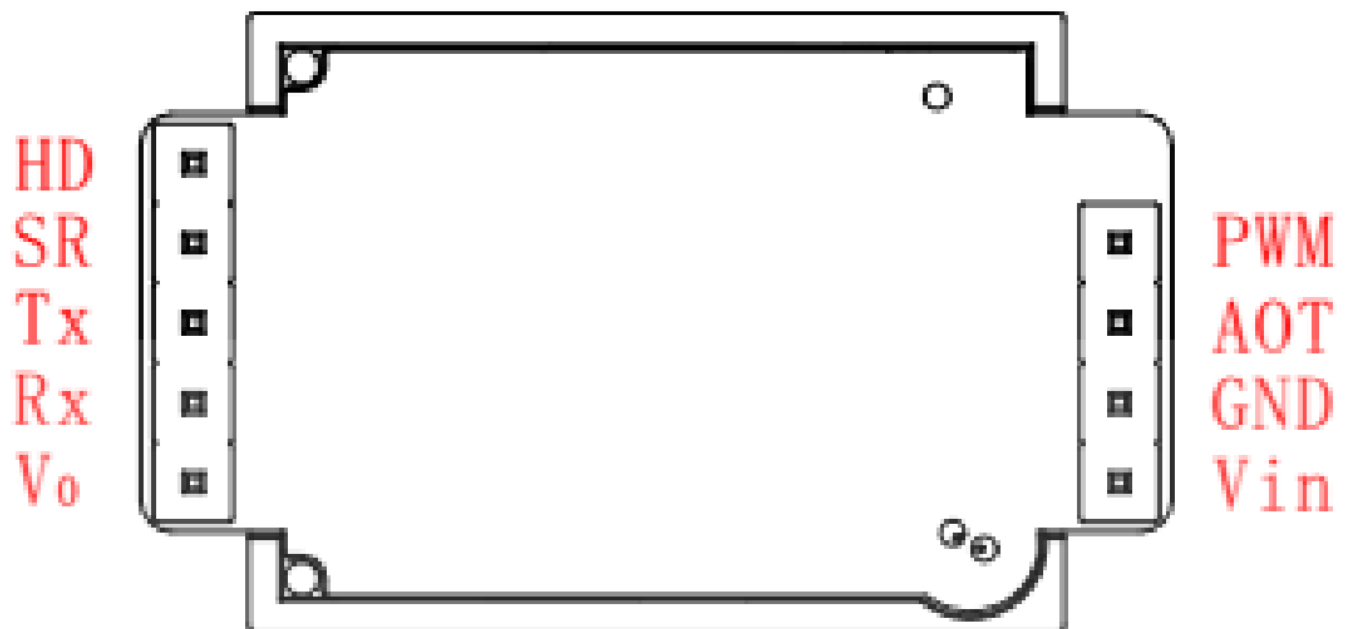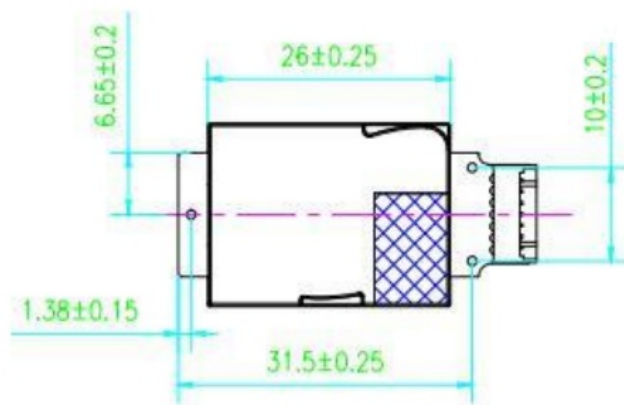| Pin	Pin Definition
Vin	The positive pole of power (Vin)
GND	The negative pole of power (GND)
PWM	PWM
Hd	HD(zero point calibration, low level lasting for over 7s is effective)
Rx	UART(RDX)TTL Level data input
Tx	UART(TXD)TTL Level data output

HD
SR
Tx
Rx
Vo

PWM
AOT
GND
Vin

Fig3.from bottom

Dimensions(Terminal type)

2x13.3±0.2

38.8±0.3

19.7±0.25

1.25±0.1

8.6±0.25

4.4±0.2

6.65±0.2

26±0.25

10±0.2

1.38±0.15

31.5±0.25
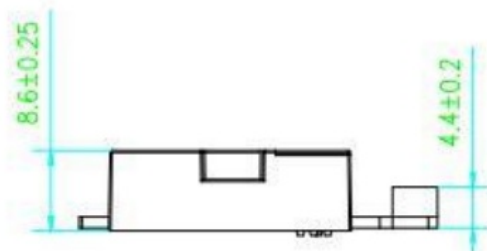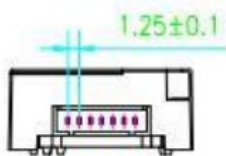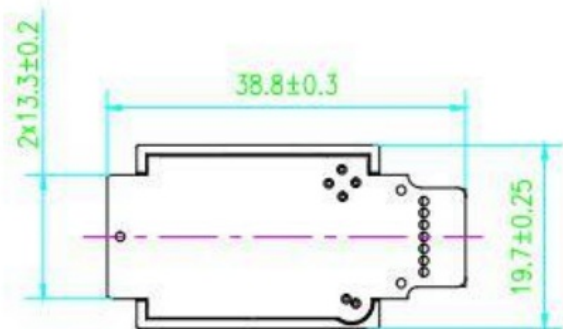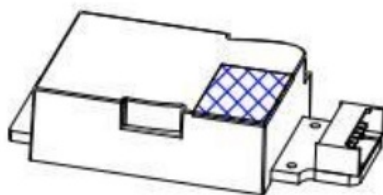
Terminal connection type

Pin	Terminal pin Definition
Pin 4	Vin power in
Pin 3	GND
Pin 2	Reserved
Pin 7	PWM
Pin 1	HD(zero point calibration, low level lasting for over 7s is effective)
Pin 5	UART(RDX)TTL Level data input
Pin 6	UART(TXD)TTL Level data output
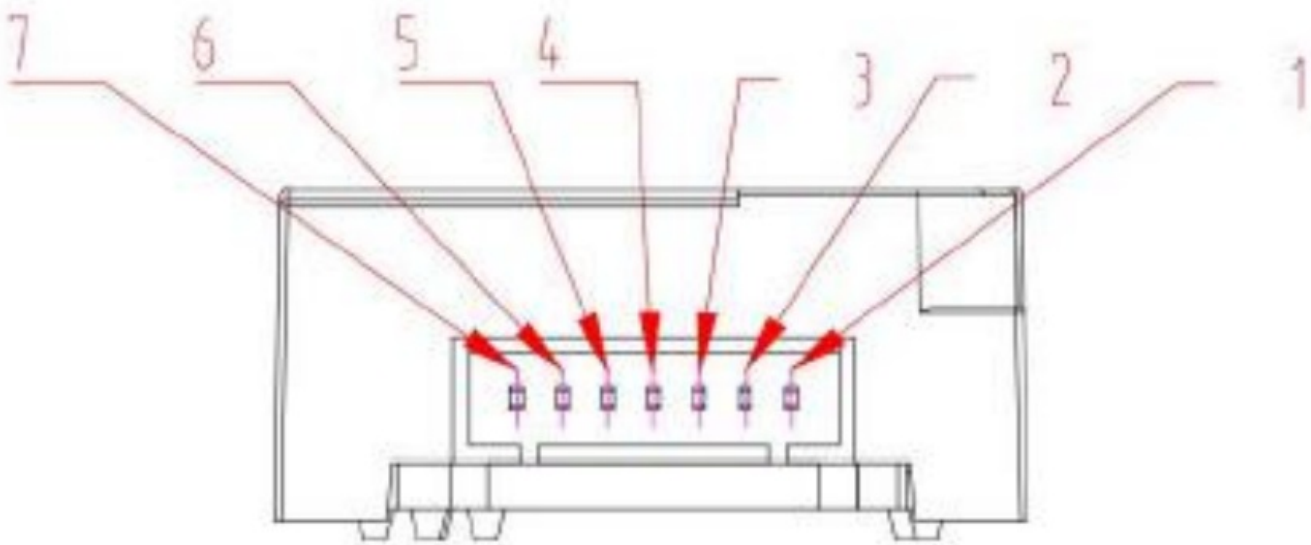
Fig4.Terminal connection version

Output

PWM output	
Take 400″2000ppm for example	
CO2 output range	400-2000ppm
Cycle	1004ms±5%
Cycle start high-level output	2ms (theoretical value)
The middle cycle	1000ms±5%

cycle end low-level output	
CO2 concentration: Cppm=2000×(TH-2ms)/(T-4ms)	
CPPM: CO2 concentration could be calculated by PWM outp TH high-level output time during the cycle T output time during the cycle(1004ms±5%)	
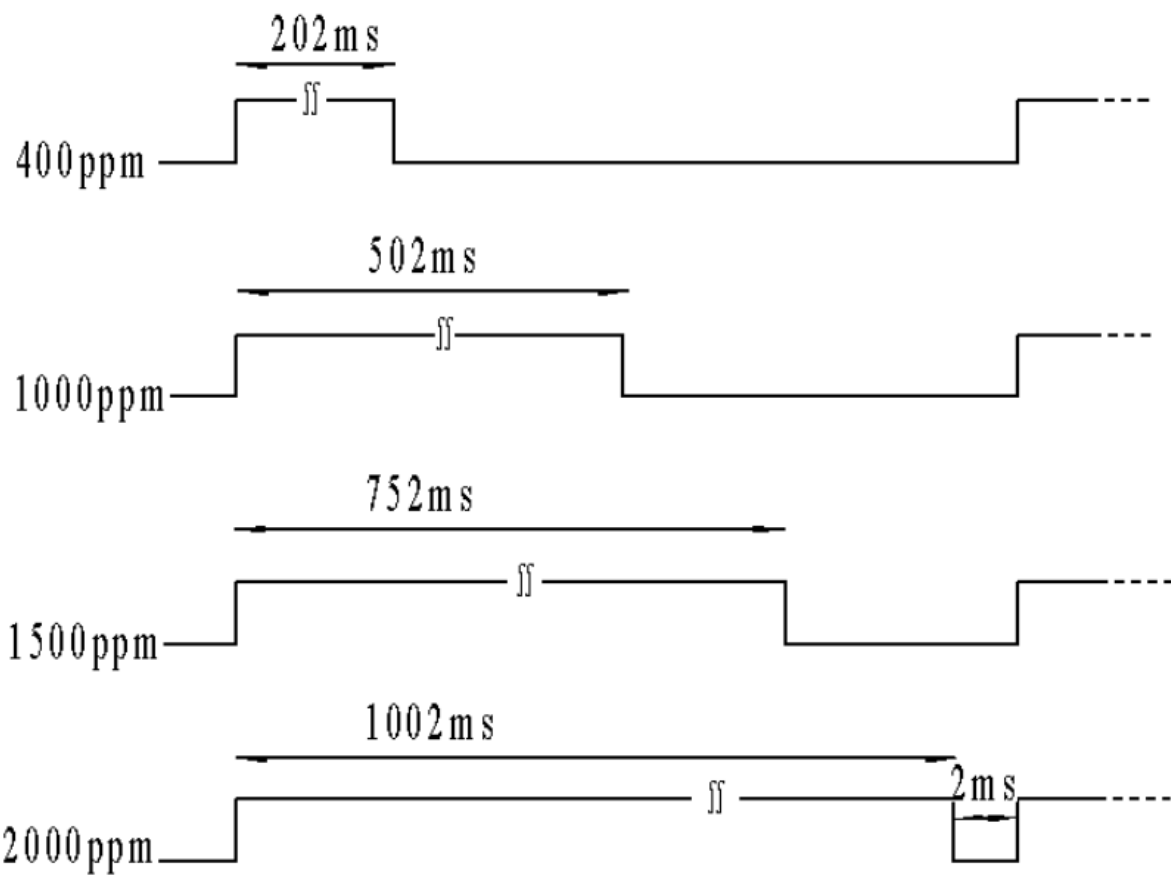
Serial port output (UART)

Hardware connection
Connect module's Vin-GND-RDX-TXD to users' 5V-GND-TXD-RDX.
(Users must use TTL level. If RS232 level, it must be converted.)
Software setting
Set serial port baud rate be 9600, data bit 8 bytes, stop bit 1byte, parity bit null.

Commands	
0x86	Read CO2 concentration
0x79	Turn on/off the self-calibration function

0x86- Read CO2 concentration								
Sending command								
ByteO	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Reserved	Command	–	–	–	–	–	Check m
OxFF	Ox01	0x86	Ox00	Ox00	Ox00	Ox00	Ox00	0x79
Return value								
ByteO	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Command	Concentration (High 8 Byte)	Concentration (Low 8 Byte)	–	–	–	–	Checksum

0xFF	0x86	HIGH	LOW	–	–

For example: CO2 concentration = HIGH * 256 + LOW
How to calculate concentration: convert hexadecimal 01 into decimal 1, hexadecimal F4 into decimal 244, then 1*25

0x79- On/Off Self-calibration for Zero Point								
Send command-No return value								
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
Start Byte	Reserved	Command	–	–	–	–	–	Checksum
0xFF	0x01	0x79	0xA0/0x00	0x00	0x00	0x00	0x00	Checksum

No return value
NOTE: when byte3 is 0xA0, the auto-calibration function is on; when byte3 is 0x00, the auto-calibration function is turned off. The sensor factory by default is on the self-calibration function.

Checksum calculation method

Checksum = (Negative (Byte1+Byte2+Byte3+Byte4+Byte5+Byte6+Byte7))+1

For example:

Byte0	Byte1	Byte2	Byte3	Byte4	Byte
Start Byte	Reserved	Command	–	–	–
0xFF	0x01	0x86	0x00	0x00	0x0(

Calculating Checksum
1 Add Byte 1 to Byte 7: 0x01 + 0x86 + 0x00 + 0x00 + 0x00 + 0x00 + 0x00 = 0x87
2 Negative: 0xFF – 0x87 = 0x78
3 Then+1 0x78 + 0x01 = 0x79

C language

```
char getCheckSum(char *packet)
{char i, checksum; for( i = 1; i < 8; i++) { checksum += packet[i]; }
checksum = 0xff – checksum;
```

Zero Point Calibration
This module has two methods for zero point calibration: the hand-operated method and self-calibration. All the zero point is at 400ppm CO2.

Hand-operated method:

Connect module's HD pin to a low level(0V), lasting for 7 seconds at least. Before calibrating the zero point,

please ensure that the sensor is stable for more than 20 minutes in a 400ppm ambient environment.

Self-calibration:

After the module works for some time, it can judge the zero point intelligently and do the zero calibration automatically. The calibration cycle is every 24 hours since the module is powered on. The zero point is 400ppm.
This method is suitable for office and home environments, not suitable for agricultural greenhouses, farms, refrigerators, etc.. If the module is used in the latter environment, please turn off this function.

Notes

- Please avoid the pressure of its gilded plastic chamber from any direction, during welding, installation, and use.
- When placed in a small space, the space should be well ventilated, especially for the diffusion windows.
- To ensure the normal work, the power supply must be among 4.5V~5.5V DC rang, the power current must be no
  r. (The concentration output is low, or the sensor cannot work normally.)
- The module should be away from heat and avoid direct sunlight or other heat radiation.
- The module should be calibrated termly, the suggested period is no longer than 6 months
- Do not use the sensor in a high dusty environment for a long time
- During the zero-point calibration procedure by manual or sending command, the sensor must work in a stable ga
- Forbid using wave soldering for the sensor.
- When soldering with a soldering iron, set the temperature to be (350 ± 5) °C, and the soldering time must be with

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Leading gas sensing solutions supplier in China!
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Documents / Resources

Winsen MH-Z19C Infrared CO2 Sensor Module [pdf] User Manual
MH-Z19C Infrared CO2 Sensor Module, MH-Z19C, Infrared CO2 Sensor Module

References

- ◎ **Winsen Gas Sensor_CO2 Sensor_Air Quality Sensor_Dust Sensor_CO Sensor-Winsen Electronics**
- ◎ **Winsen Gas Sensor_CO2 Sensor_Air Quality Sensor_Dust Sensor_CO Sensor-Winsen Electronics**