Winsen
炜盛科技

Temperature and Humidity Module

（Model No.ZS05）

Manual

Version：1.1

Valid from：2019-01-10

Zhengzhou Winsen Electronics Technology Co.,Ltd

Statement

This manual copyright belongs to Zhengzhou Winsen Electronics Technology Co., LTD. Without the written permission, any part of this manual shall not be copied, translated, stored in database or retrieval system, also can't spread through electronic, copying, record ways.

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, 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.

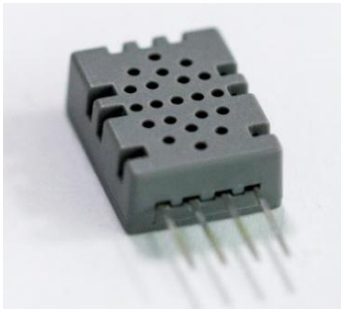
We are devoting ourselves to products development and technical innovation, so we reserve the right to improve the products without notice. Please confirm it is the valid version before using this manual. At the same time, users' comments on optimized using way are welcome.

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

Zhengzhou Winsen Electronics Technology CO., LTD

ZS05 Temperature and Humidity Module

ZS05 temperature and humidity module is a digital signal output temperature and humidity sensor module, which is an upgraded product of ZS03. It uses dedicated digital module acquisition technology to ensure high reliability and stability. The ZS05 has a single bus and standard IIC communication modes, and the single bus communication method is fully compatible with the ZS03. Users can choose any communication method, which is convenient to use and the package format is consistent with ZS03.



Features

Low cost
Low power consumption,Small sizes
High sensitivity
Standard single bus interface
Standard IIC digital interface

Application

Storage, industrial production, process controlling, environment monitoring, household appliances, meteorological field

Parameters

Stable 1.

Part No.	ZS05
Detection Object	Relative humidity, temperature
Operation Voltage	2.7～5.5V DC
Detection Range	20～90%RH
Accuracy for humidity detection	±5%RH (at25℃，60%RH，Vin=2.7V)
Accuracy for temperature detection	±1℃
Operation temperature	-20℃～60℃
Package	Single row straight 4-pins(SIP4)

Temperature and humidity performance

Humidity performance					
Paramete	Conditio	MIN	TYP	MAX	UNIT
Resolution			0.1		%RH
Measuring		20		90	%RH
Accuracy			±5		%RH

Detection			5		S
Voltage		2.7		5.5	V
Working current		2.8		6.6	mA
Quiescent Current		15	20		uA
Interchange ability	Completely interchangeable				
Storage conditions	＜90%RH				

Structure

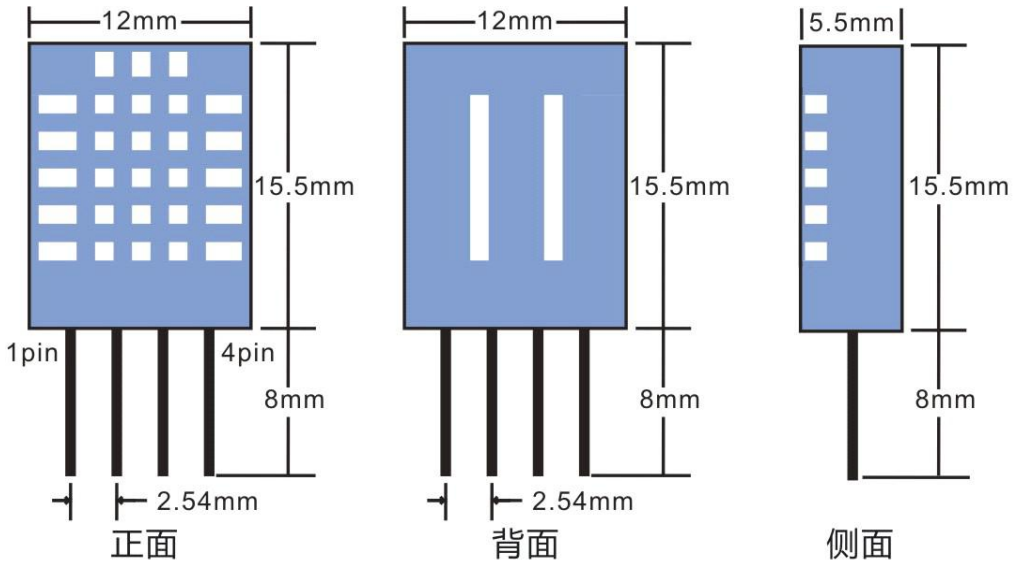
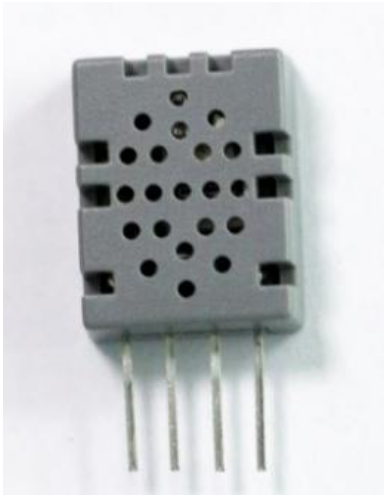


Fig1： Structure

Pins definition

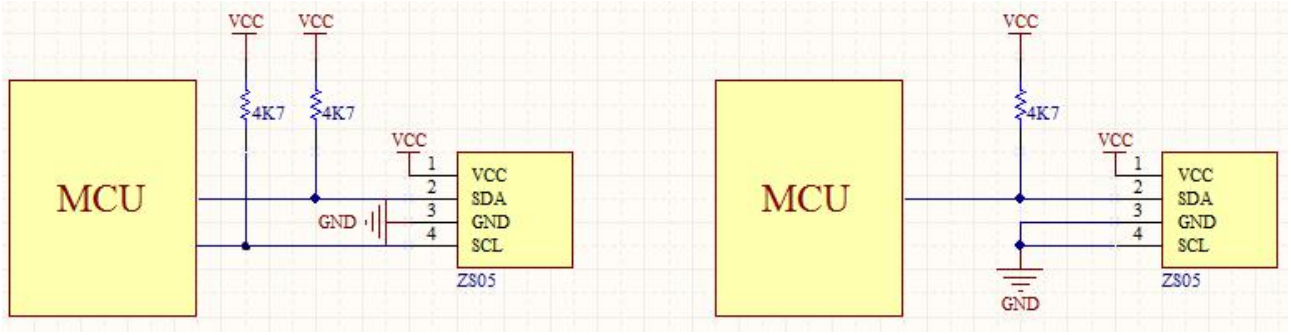
1. VCC Power supply 2.7～5.5V DC
2. SDA Data foot
3. GND Power ground
4. SLC Clock pin (short-circuit clock pin to power ground in single bus mode)



VCC SDA GND SCL

Pin definition map

Typical circuit



IIC typical application circuit

Single bus typical application circuit

Electrical performance

Parameter	Condition	Min	Typ	Max	UNIT
Power supply		2.7	5	5.5	V
Low level output voltage		0		300	mV
High level output voltage		90%		100%	VDD
Low level input voltage		0%		30%	VDD
High level input voltage		70%		100%	VDD
Output current	open		8		mA
	Tristate (off)	10	20		uA
The sampling period		2			S

Data interface

Power Supply Pin: (VCC GND) The ZS05 has a supply voltage range of 2.7V - 5.5V.

Serial Clock Input: (SCL) The SCL pin is used to select the sensor communication method and the clock line for IIC communication. When SCL is kept low after power-on, it means that the user selects single-bus

communication, otherwise it is IIC communication; after selecting communication mode, the sensor communication mode remains unchanged during power-on; if you want to change the communication mode, please re-apply Electricity, and select the communication method according to the operation requirements.

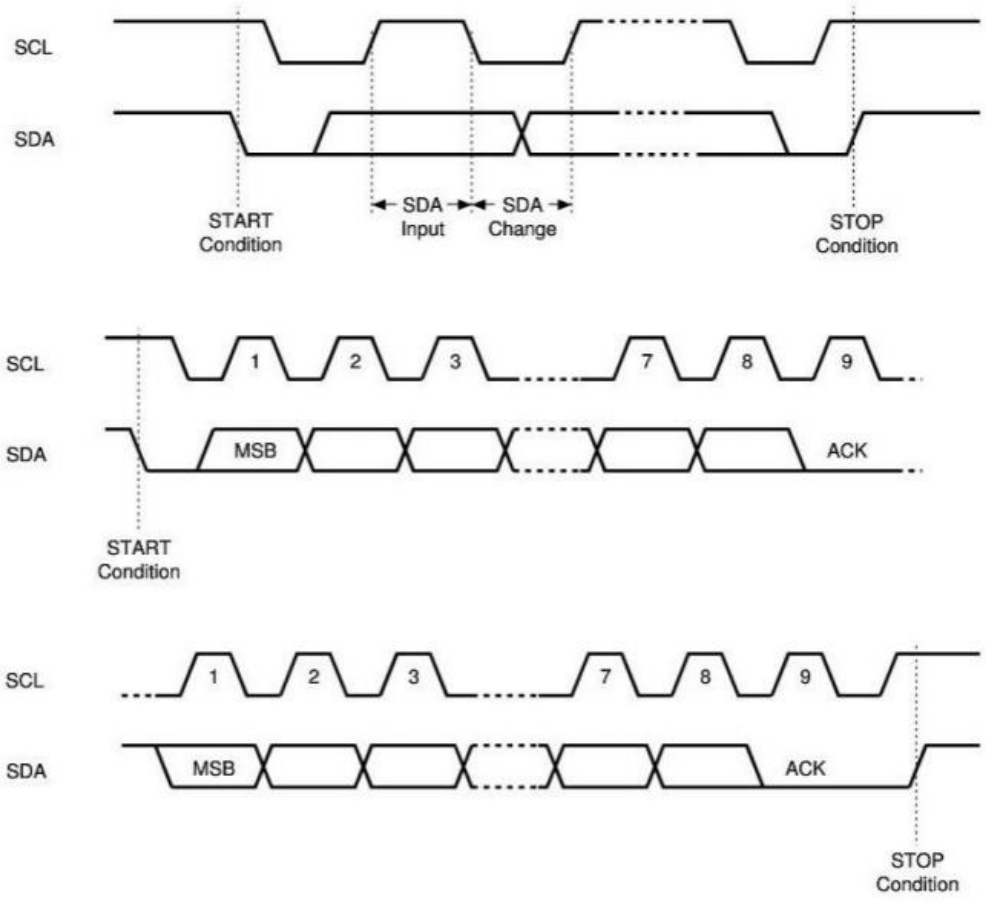
Serial Data (SDA): The SDA pin is a three-state structure for reading and writing sensor data.

IIC communication protocol

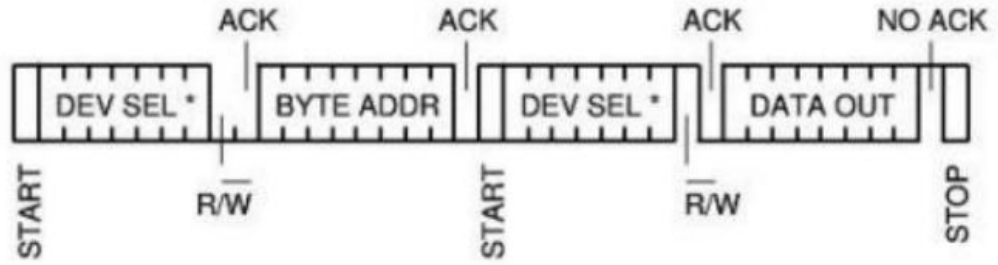
The ZS05 supports the IIC mode for communication. It is compiled according to the IIC standard protocol and can be directly hung on the IIC bus. The sensor SDA pin is connected to the IIC data bus, and the SCL is connected to the IIC clock bus. When using it, the two pins must be connected to a 1KΩ. ~10KΩ pull-up resistor, I2C address is 0xB8 (DEV SEL); IIC communication rate can't be higher than 400KHZ.

BYTE ADDR	R/W	Desc	Note
0x00	R	Humidity integer	Relative humidity value
0x01	R	Humidity decimal place	
0x02	R	Temperature integer	Relative temperature value
0x03	R	Temperature decimal place	
0x04	R		Checksum

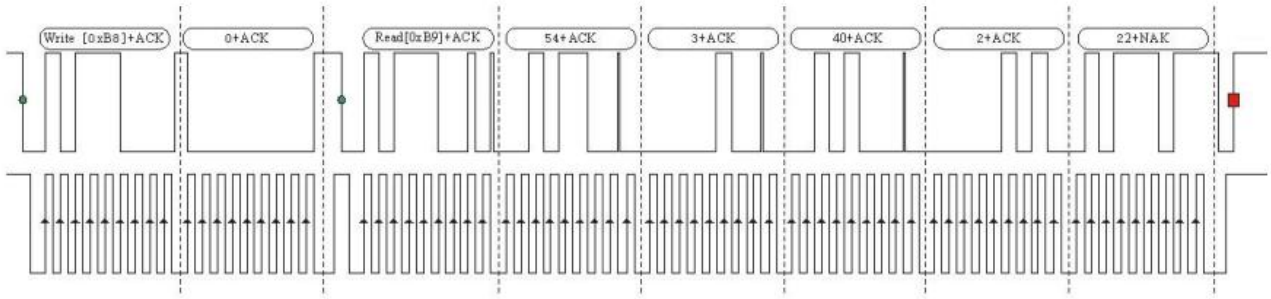
IIC interface characteristics: The following communication specifications must be strictly observed, otherwise the sensor will not work properly.



IIC communication protocol



IIC read timing diagram



Reference timing diagram

Data Processing Reference Single Bus Data Processing Example.

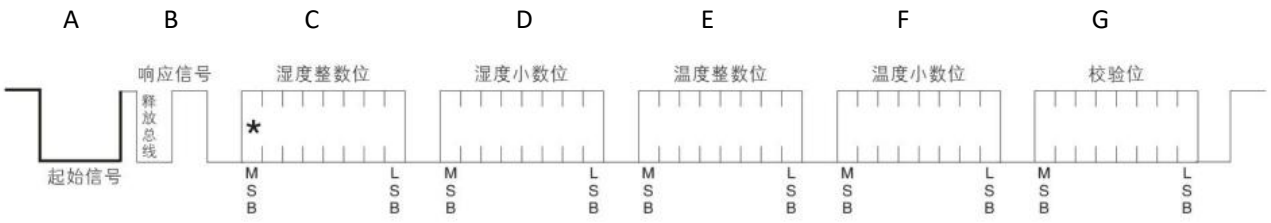
Single bus communication protocol

When the ZS05 uses single bus communication. The data exchange and control in the system are all completed by single bus communication. The host is connected to the data line through an open-drain or tri-state port to allow the device to release the bus when it is not transmitting data, and to allow other devices to use the bus; a single bus typically requires an external pull-up resistor of approximately 4.7K Ω . The default state is high when the bus is idle. Because they are master-slave, the sensor responds only when the host calls the sensor. Therefore, the single bus timing must be strictly followed during host access. If there is timing disorder, the temperature and humidity data will not be read correctly.

Single bus transfer data definition:

The SDA pin is used for communication and synchronization between the client host and the ZS05. It uses a single bus data format to transfer 40 bits of data at a time.

First out. The specific communication timing is shown in the figure below, and the communication format description is shown in the table below.



Single bus communication protocol

A:Start signal B:Corresponding signal C: Humidity integer D:Humidity decimal place

E:Temperature integer F:Temperature decimal place G:Check Digit

Single bus data processing example:

Name	Single bus format definition
Start signal	The host pulls the data bus (SDA) low for a period of time (18ms), notifying the sensor to prepare the data
Response signal	The sensor pulls the data bus (SDA) down for 80 μs and then pulls it up 80 μs to start the corresponding host signal.
Data Format	After receiving the host start signal, the sensor serializes 40 bits of data from the data bus (SDA) at a time, high first out
Humidity	Humidity high is humidity integer data, humidity status is humidity decimal data
Temperature	The high temperature is the humidity integer data, the temperature status is the humidity decimal data, and the low temperature bit 8 is the negative temperature, otherwise it is the positive temperature.
Check Digit	Check digit = humidity high + humidity low + temperature high + low temperature

Data example:

Example 1: The received 40-bit data is:

00110111 00000000 00010010 00000000 01001001

High humidity 8 bits Low humidity 8 bits High temperature 8 bits Low temperature 8 bits Check digit

Calculation:

00110111 + 00000000 + 00010010 + 00000000 = 01001001

Receive the data correctly:

Humidity: 00110111 = 37H = 55% RH

Temperature: 00010010 = 12H = 18° C

Example 2: The received 40-bit data is:

00101001 00000000 00000110 00000000 01000100

High humidity 8 bits Low humidity 8 bits High temperature 8 bits Low temperature 8 bits Check digit

Calculation:

00101001 + 00000000 + 00000110 + 00000000 = 00101111

00101111 not equal to 01000100

The data received this time is incorrect, give up, and receive data again.

Caution

- The temperature will affect the relative humidity of the gas. When measuring the humidity, the humidity sensor should be operated at the same temperature as much as possible.
- If you share a printed circuit board with the heat-releasing electronic components, keep the sensor away from the electronic components as much as possible and install it under the heat source while keeping the casing well ventilated.
- Do not use the module for a long time in an environment with high dust density.
- Do not touch the internal humidity sensor.
- It is strictly forbidden to place the product in a corrosive atmosphere for a long time.
- Recommended storage conditions: temperature 10 ° C ~ 40 ° C, humidity 60% RH or less.
- Avoid condensation.