Temperature and Humidity Module

（Model No.ZS0301）

Manual

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Zhengzhou Winsen Electronics Technology Co.,Ltd

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, 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

ZS0301 Product Instructions

1 Product Overview

ZS0301 is a digital temperature and humidity module. The temperature and humidity collection uses NTC temperature measuring elements and polymer resistance type humidity sensing elements. The module is also equipped with a high-performance single-chip microcomputer to output the temperature and humidity information through a standard single bus signal.

Excellent, with the advantages of ultra-fast response, strong anti-interference ability and high cost performance.

Features

- High sensitivity
- Wide supply voltage range, from 3.3V to 5.5V
- Digital output, standard single bus serial interface
- Quick response and strong anti-interference ability
- Excellent long-term stability
- Low power consumption, high precision

Application Scenario

Home appliance field: home appliances, humidity control, HVAC, dehumidifier, smart thermostat , room monitor; Industrial field: automobile, testing and inspection equipment, automatic control; Other fields: data logger, weather station and other related temperature and humidity detection and control system.

2 Sensor Performance

2.1 Relative humidity

Table 1 Humidity characteristics table

parameter	condition	minimum	typical	maximum	unit
Accuracy error [1]	typical	-	±3	-	%RH
Repeatability	-	-	±0.3	-	%RH
Hysteresis	-	-	±1	-	%RH

Response Time [2]	τ63 %	-	20	-	s
Working scope	-	20	-	95	%RH
Long-term drift	normal	-	2	-	%RH/yr

2.2 temperature

Table 2 Temperature characteristics table

parameter	condition	Minimum	typical	maximum	unit
Accuracy error [3]	typical	-	±1	-	℃
Repeatability	-	-	±0.1	-	℃
Hysteresis	-	-	±0.1	-	℃
Response time	τ63%	5	-	30	s
Working scope	-	0	-	60	℃
Long-term drift	-	-	<0.04	-	℃/yr

2.3 Electrical Characteristics

Table 3 Electrical Characteristics Table

parameter	condition	Minimum	typical	maximum	unit
Supply voltage	typical	3.3	-	5.5	V
Supply current , IDD [4]	measurement	-	-	2.5	mA
Low level input voltage	decline	0	-	30%	VDD
High level input voltage	rise	60%	-	100%	VDD
Sampling period	1				s
Communication Format	Single bus				

1 This accuracy is the test accuracy of the sensor at 25℃ and 3.3V supply voltage during factory inspection. This value does not include hysteresis and non-linearity and is only applicable to non-condensing conditions.

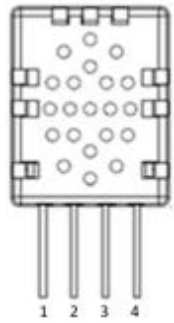
2 The time required to reach 63% of the first-order response under 25℃ and 1m/s airflow conditions.

3 This accuracy is the test accuracy of the sensor at 25℃ and 3.3V supply voltage during factory inspection. This value does not include hysteresis and non-linearity and is only applicable to non-condensing conditions.

4 The minimum and maximum values of the supply current are based on the conditions of VDD = 3.3V and T<60℃.

3 Interface Definition

Table 4 ZS0301 interface definition

name	pinout	Interpretation	
VCC	1	Power supply 3.3-5.5V	
DATA	2	Serial data, bidirectional	
NC	3	Empty foot (need to be suspended)	
GND	4	Ground, negative pole of power supply	

4 Sensor Communication

ZS0301 module uses a standard single bus communication protocol, which is suitable for a variety of devices . The protocol uses a single communication line : serial data line (DATA), the serial data line needs to be connected to a pull-up resistor to VCC , and the pull-up resistor is generally 4~10 kΩ .

4.1 Communication Timing

The idle state of the bus is high level. The host pulls the bus low and waits for the response of ZS0301. The host must pull the bus low for more than 18ms to ensure that ZS0301 can detect the start signal. After receiving the start signal from the host, ZS0301 waits for the end of the host start signal, and then sends an 80μs low-level response signal. After the host sends the start signal, it waits for 20-40μs and reads the response signal of ZS0301 . After the host sends the start signal, it can switch to input mode or output high level. The bus is pulled high by the pull-up resistor.

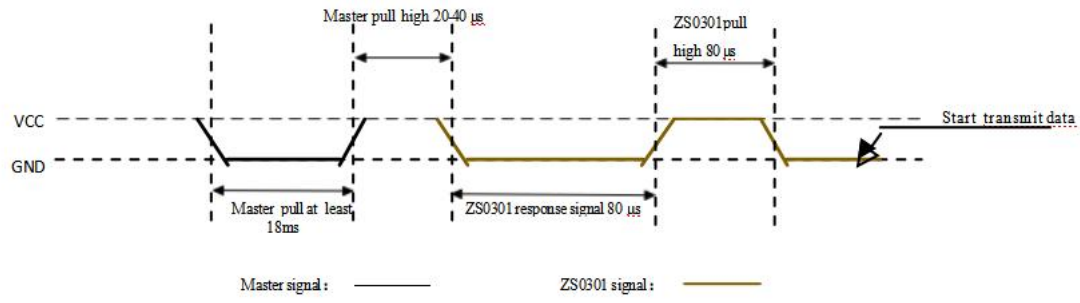


Figure 1 Single bus communication timing

The bus is low level, indicating that the sensor sends a response signal. After ZS0301 sends the response signal, it pulls the bus high for 80μs to prepare for sending . When sending data, each bit of data starts with a 50μs low-level time slot, and the length of the high-level time determines whether the data bit is 0 or 1 .

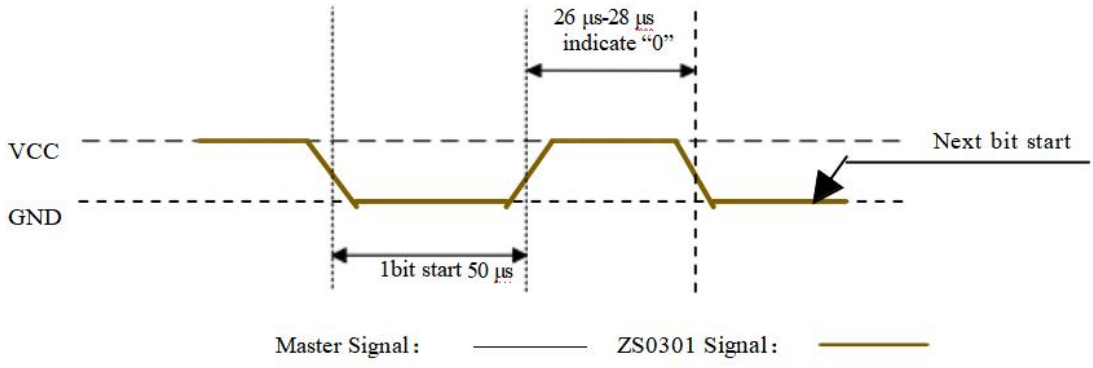


Figure 2 How to represent the number 0

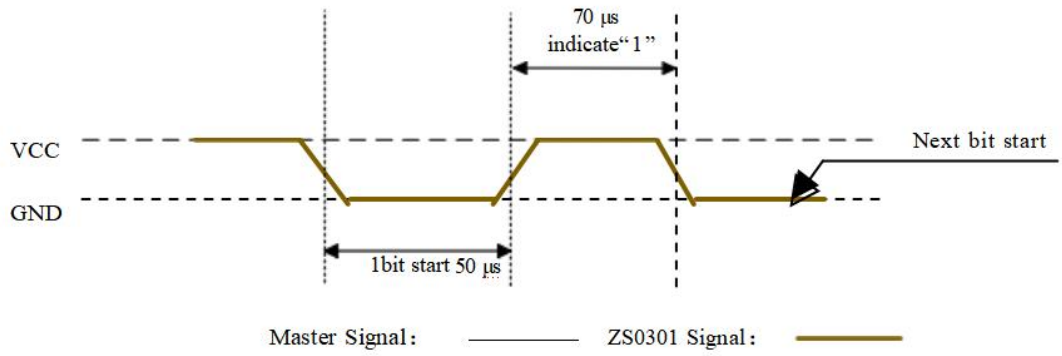


Figure 3 How to represent the number 1

If the response signal is high, it means the sensor has no response. Please check whether the line is connected properly. After the data is transmitted, the sensor pulls the bus low for 50μs , and then the bus is pulled high by the pull-up resistor and enters the idle state.

4.2 Communication Data Format

DATA is used for communication between the host and ZS0301 . It adopts single bus data format. The communication time is about 4 ms . The data is divided into an integer part and a decimal part. A complete data transmission is 5 bytes (40 bits), with the high bit out first.

- Communication data (information frame) format

Read data:

Data Format	Humidity integer	Humidity decimal	Temperature integer	Temperature decimal	Checksum
Data Length	1 Bytes	1 Bytes	1 Bytes	1 Bytes	1 Bytes

Temperature and humidity output format:

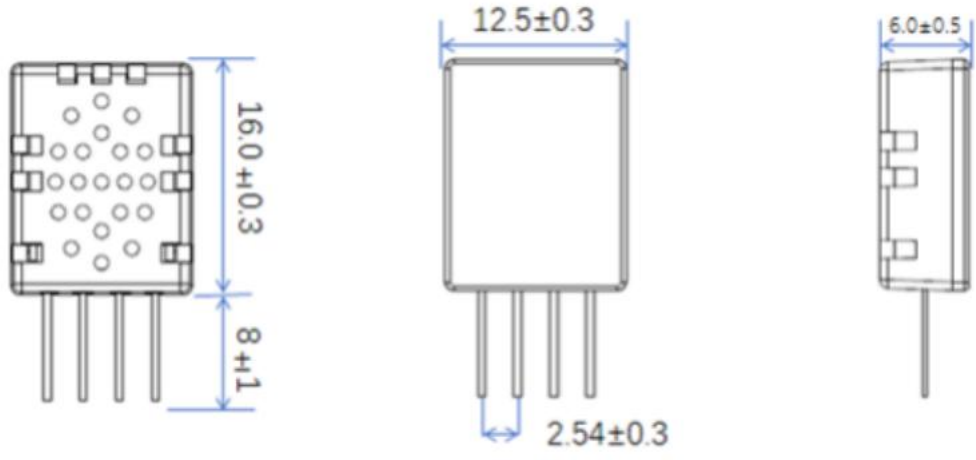
Humidity integer + humidity decimal + temperature integer + temperature decimal + checksum

When the temperature is positive, the most significant bit of the temperature decimal byte is 0 ; when the temperature is negative, the most significant bit of the temperature decimal byte is 1 .

- Inspection and calculation:

When a complete packet of correct data is received, the checksum data read is equal to the humidity integer byte + humidity decimal byte + temperature Integer byte + fractional temperature byte.

5 Product size



Front **Back** **Side**

Figure 4 Product dimensions (unit: mm)

ZS0301 User Guide

1 Performance Supplement

ZS0301 at different temperatures varies. Figure 5 shows the typical humidity error at different temperature ranges.

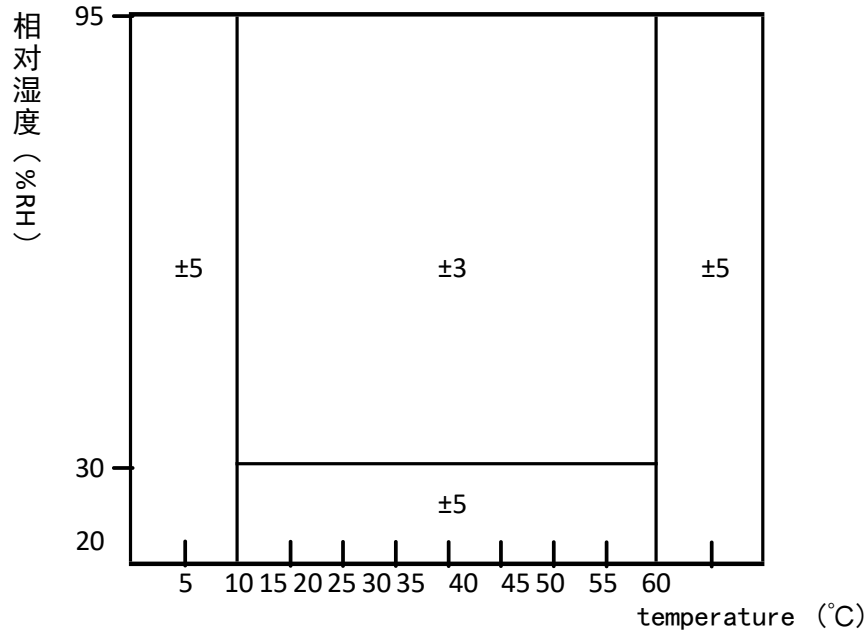


Figure 5 Typical humidity error in the range of 0~60℃ , unit : (%RH)

Please note : The above errors are typical errors (excluding hysteresis) when tested with a high-precision dew point meter as a reference instrument .

2 Application Guide

2.1 Storage conditions and operating instructions

The moisture sensitivity level (MSL) is 1 , according to IPC/JEDECJ-STD-020 standard. Therefore, it is recommended to For internal use.

The temperature and humidity sensor is not an ordinary electronic component and needs careful protection. Users must pay attention to this. Long-term exposure to high concentrations of chemical vapor will cause the sensor readings to drift. Therefore, it is recommended to store the sensor in its original packaging including the seal. sealed ESD bag and meet the following conditions: temperature range 10 ℃-40 ℃ ; humidity 20-60% RH (sensors without ESD package). For sensors that have been removed from their original packaging, we recommend storing them in a metal

In the anti-static bag made of PET/AL/CPE material, please do not touch the moisture-sensitive components inside the product.

During production and transportation, the sensor should avoid contact with high concentrations of chemical solvents and long-term exposure. It should avoid contact with volatile glue, tape, stickers or volatile packaging materials such as bubble foil, foam materials , etc. Production area There should be good ventilation.

2.2 Temperature Effect

The relative humidity of the gas depends largely on the temperature. Therefore, when measuring humidity , all sensors measuring the same humidity should be operated at the same temperature as much as possible . If the product shares a PCB with electronic components that release heat , the product should be installed as far away from the electronic components as possible and installed below the heat source, while ensuring good ventilation of the housing.

When welding the module, the shell temperature must not exceed 150℃ , the sensor temperature must not exceed 120℃ , and the maximum temperature of the manual welding is 260℃. The contact time under temperature conditions must be less than 10s .

2.3 Materials used for sealing and encapsulation

Many materials absorb moisture and will act as a buffer, increasing response time and hysteresis. The material should be selected carefully. Recommended materials are: metal materials , LCP , POM(Delrin) , PTFE (Teflon) , PE ,PEEK , PP , PB , PPS , PSU , PVDF , PVF .

3 Precautions

3.1 Warning , Personal Injury

Do not use this product in safety protection devices or emergency stop devices , or in any other application where failure of the product could result in personal injury . Refer to the product data sheet and application guide before installing, handling, using or maintaining this product . Failure to follow this advice may result in serious risk of personal injury or death.

If the buyer is going to purchase or use Weisheng's products without obtaining any application license and authorization, the buyer will bear all compensation for personal injury and death caused thereby , and exempt Weisheng's managers and employees and affiliated subsidiaries, agents and Any claims that may be made by dealers, distributors, etc., including: various costs, compensation costs, attorney fees, etc.

3.2 ESD Protection

The design of product components inevitably makes them sensitive to static electricity. To prevent the influence of static electricity on product performance, it is recommended to When using this product, take necessary anti-static measures.

3.3 Quality Assurance

a 12 -month (1 -year) quality warranty to direct purchasers of its products (calculated from the date of shipment), based on the technical specifications in the data sheet of the product published by Weisheng. If the product is proven to be defective during the warranty period , The company will provide free repair or replacement. Users must meet the following conditions:

1. The company shall be notified in writing within 14 days of discovering any defects in the product ;
2. The product should be within the shelf life.

The company is only responsible for products that are defective when used in situations that meet the technical requirements of the product . The Company makes no warranty, guarantee or written representation regarding the application of its products in those specific applications.No warranty is made regarding the reliability of any product or circuit.

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