

Temperature and Relative Humidity Sensor Module User's Guide

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NOTES:

Product Version : Ver 1.0

Document Version : Ver 1.0

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Chapter1.Welcome

Thanks for using the relative humidity and temperature sensor module by Sure Electronics. This product employs PIC16F690 as the processing chip and measures relative humidity with HS1101. This module is able to measure a wide range of relative humidity (1%RH-99%RH) and temperature and can output via many interfaces.

Features:

- DC 5V or 3.3V
- Fast response time
- Wide-range relative humidity & temperature measuring
- Analog & digital output
  - Analog: relative humidity & temperature voltage signal linear output
  - Digital: UART half duplex, SPI slave mode
- DIP-like packaging, which facilitates system integration

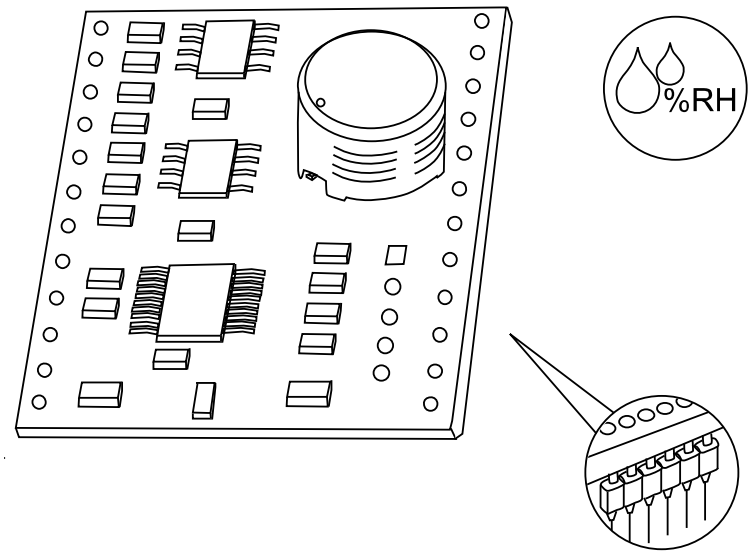
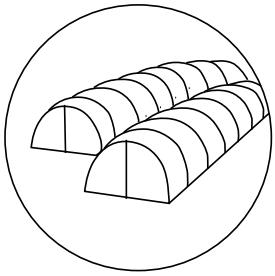
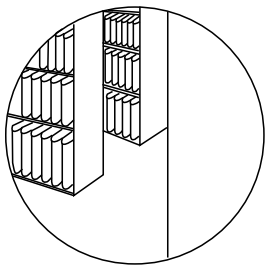
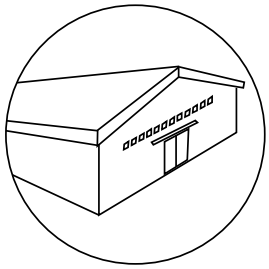


Fig1. Overview

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Applications:

	
Green houses	Books and archives storage
	
Medicine storage	Warehouse environment surveillance

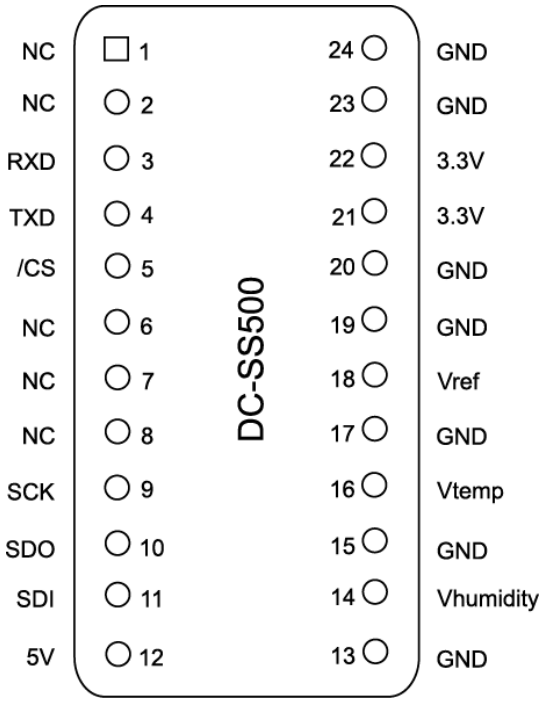


Fig2. Connection Diagram (Top View)

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Pin Descriptions:

Label	Pin #	Function	Label	Pin#	Function
NC	1	No Connection	GND	13	Ground
NC	2	No Connection	Vhumidity	14	Humidity voltage output
RXD	3	UART Received Data	GND	15	Ground
TXD	4	UART Transmitted Data	Vtemp	16	Temperature voltage output
/CS	5	SPI enable.	GND	17	Ground
NC	6	No Connection	Vref	18	Reference voltage output
NC	7	No Connection	GND	19	Ground
NC	8	No Connection	GND	20	Ground
SCK	9	SPI clock	3.3V	21	DC 3.3V input
SDO	10	SPI data output	3.3V	22	DC 3.3V input
SDI	11	SPI data input	GND	23	Ground
5V	12	DC 5V input	GND	24	Ground

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Chapter2.Characteristics

2.1 Absolute Maximum Ratings

Storage temperature:-20 to 85 °C
Storage humidity range: 0 to 100 % RH
Supply voltage: DC 5.5 V

2.2 Operating Ratings

Temperature operating range:-15 to 60 °C
Humidity operating range: 1 to 99 % RH
Supply voltage: DC 3.3V or 5V

2.3 Humidity Characteristics

	Min.	Typ.	Max.	Unit.
Humidity measuring range	1		99	%RH
Humidity accuracy (10 to 95 % RH)		±5	±10	%RH
Temperature coefficient (0 to 60 °C)		-0.2		%RH/℃
Humidity hysterics		±2		% RH
Long term stability		±1		% RH/yr
Response time (33 to 76 % RH, still air @ 63%)		6		s
Deviation to typical response curve (10% to 90% RH)		±2		%RH
Recovery time after 150 hours of condensation		10		s

2.4 Temperature Characteristics

	Min.	Typ.	Max.	Unit.
Temperature measuring range	-15		60	℃
Temperature accuracy		±2	±5	℃
Response time		10		s

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2.5 Interface Characteristics:

2-5-1. Digital Interface Characteristics:

D-1.Digital Interface I/O Electrical Characteristics :Vin=3.3V or 5.0V）

	Min.	Typ.	Max.	Units
Input low voltage	——	——	0.2Vin	V
Input high voltage	0.8Vin	——	——	V
Output low voltage	——	——	0.6	V
Output high voltage	Vin – 0.9	——	——	V

D-2. UART Interface:

DC-SS500 has an UART interface and is able to communicate with any host that has an UART interface.

UART Properties:

Baud rate: 9600bps
Start bit: 1bit
Data bit: 8bits
Parity bit: 0bit
Stop bit: 1bit

UART Command:

Command	Function
Temp	Return current temperature in ℃&℉
Temp -c	Return current temperature in ℃
Temp -f	Return current temperature in ℉
Humidity	Return current humidity in %RH
Status	Return system status and" Ready…"will be returned when system is in idle.

Note:1. All UART commands shall start with"$sure" and followed by a space (0x20) and end with enter (0x0d, 0x0a).

2. All UART commands shall be expressed in ASCII.

3. All UART commands are not case-sensitive.

Examples:

1. Access current humidity

```
$sure humidity
056%RH
```

Current relative humidity is 56%RH

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2. Access current temperature

```
$sure temp -c
023Centigrade
```

Current temperature is 23℃

```
$sure temp -f
073Fahrenheit
```

Current temperature is 73℉

```
$sure temp
023Centigrade, 073Fahrenheit
```

Current temperature is 23℃, 73℉

3. Access current system status

```
$sure status
Ready...
```

The current system is in accessible status

4. Prompt of bad commands

```
sure
Bad command!
```

Unrecognized guide word, returns “Bad command!”

```
$sure su
Unknown command!
```

Unknown command!

Incorrect command, returns “Unknown command!”

D-3.SPI Interface:

DC-SS500 has a SPI interface (Slave Mode), which can be used conveniently for the communication with any host that has SPI interface.

SPI Command:

Command	**Function**
0xa0	Return current humidity reading (8 bit signed number) in %RH
0xb0	Return current temperature reading (8 bit signed number) in ℃
0xb1	Return current temperature reading (8 bit signed number) in ℉
0xc0	Return system status, returns 0xAF when system is in idle

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Examples:

Received command	Return value	Descriptions
0xb0	0xEE	The current temperature reading has gone beyond the measuring range
0xb0	0xF5	The current temperature is -11℃
0xb0	0x10	The current temperature is 16℃
0xb1	0x3D	The current temperature is 61℉
0xa0	0x32	The current humidity is 50%RH
0xc0	0xAF	system is in idle

SPI Timing:

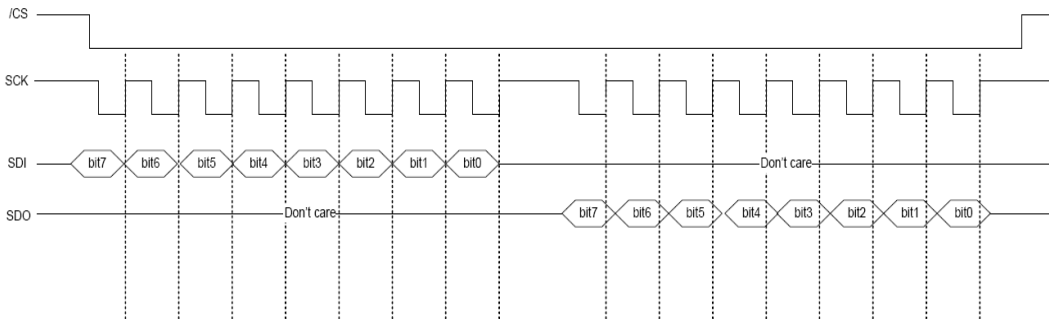


Fig 3. SPI timing

Note:

1. The SCK frequency of SPI interface shall be in a range from 3 kHz to 2MHz.
2. /CS is in low level only when SPI interface communication is in progress and shall be in high level in any other situations.
3. The interval of two successive commands shall be greater than 0.2s.

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2-5-2.Analog Interface Characteristics

A-1.Vhumidity typical characteristics

Humidity (%RH)	Vhumidity (Vref=3.07V) (V)	Vhumidity (Vref=4.95V) (V)
10	0.33	0.52
20	0.64	1.04
30	0.92	1.48
40	1.24	1.95
50	1.54	2.44
60	1.84	2.92
70	2.1	3.4
80	2.44	3.91
90	2.78	4.4

Table1. Humidity Look-up Tables

A-2.Vtemp typical characteristics

Temperature (℃)	Vtemp(Vref=3.07V) (V)	Vtemp(Vref=4.95V) (V)
-15	0.54	0.89
-10	0.64	1.06
-5	0.75	1.24
0	0.88	1.45
5	1.02	1.67
10	1.17	1.91
15	1.32	2.15
20	1.47	2.40
25	1.62	2.64
30	1.76	2.87
35	1.90	3.10
40	2.03	3.30
45	2.15	3.50
50	2.26	3.67
55	2.36	3.83
60	2.45	3.98

Table2.Temperature Look-up Tables

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Chapter3.Typical Application

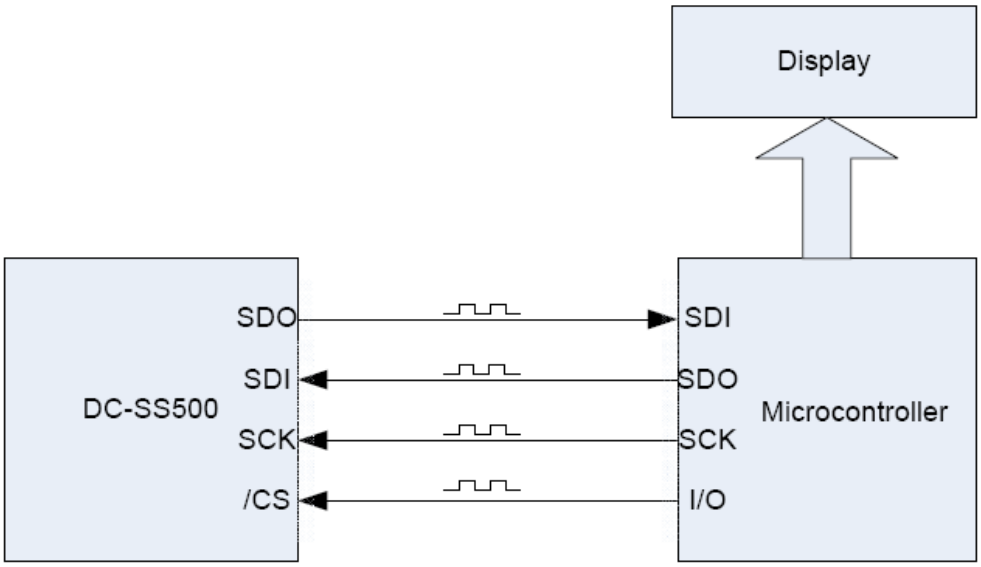


Fig 4. Diagram of temperature & relative humidity indicator

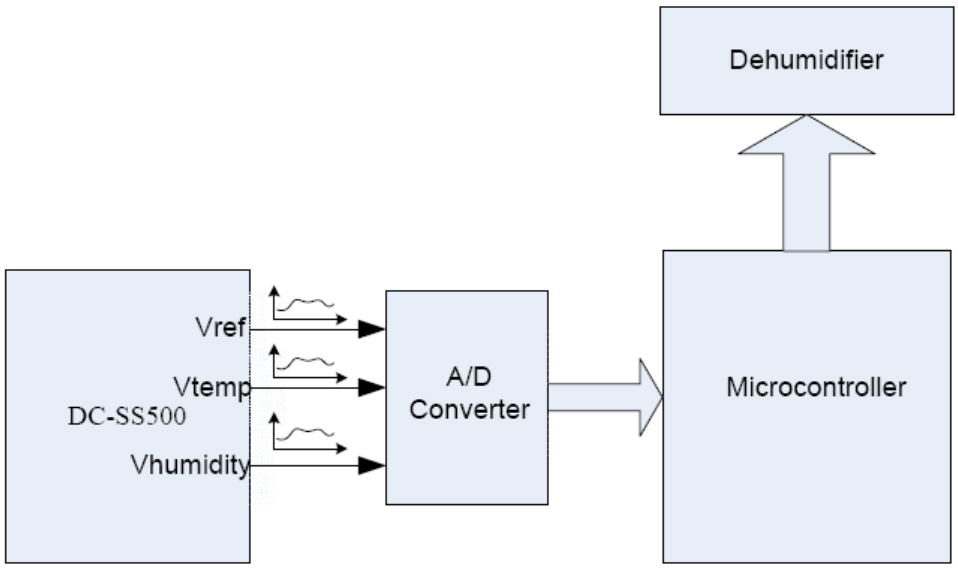


Fig 5. Dehumidifier Controller

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Typical Application

NOTE:

1. To extend its service life, you may take some measures to clean the module.
2. The module cannot be immersed in liquid.
3. 5V and 3.3V pins of this module cannot be used simultaneously. You can use only one power pin to power the module at the same time.

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Chapter4.Mechanical Drawing

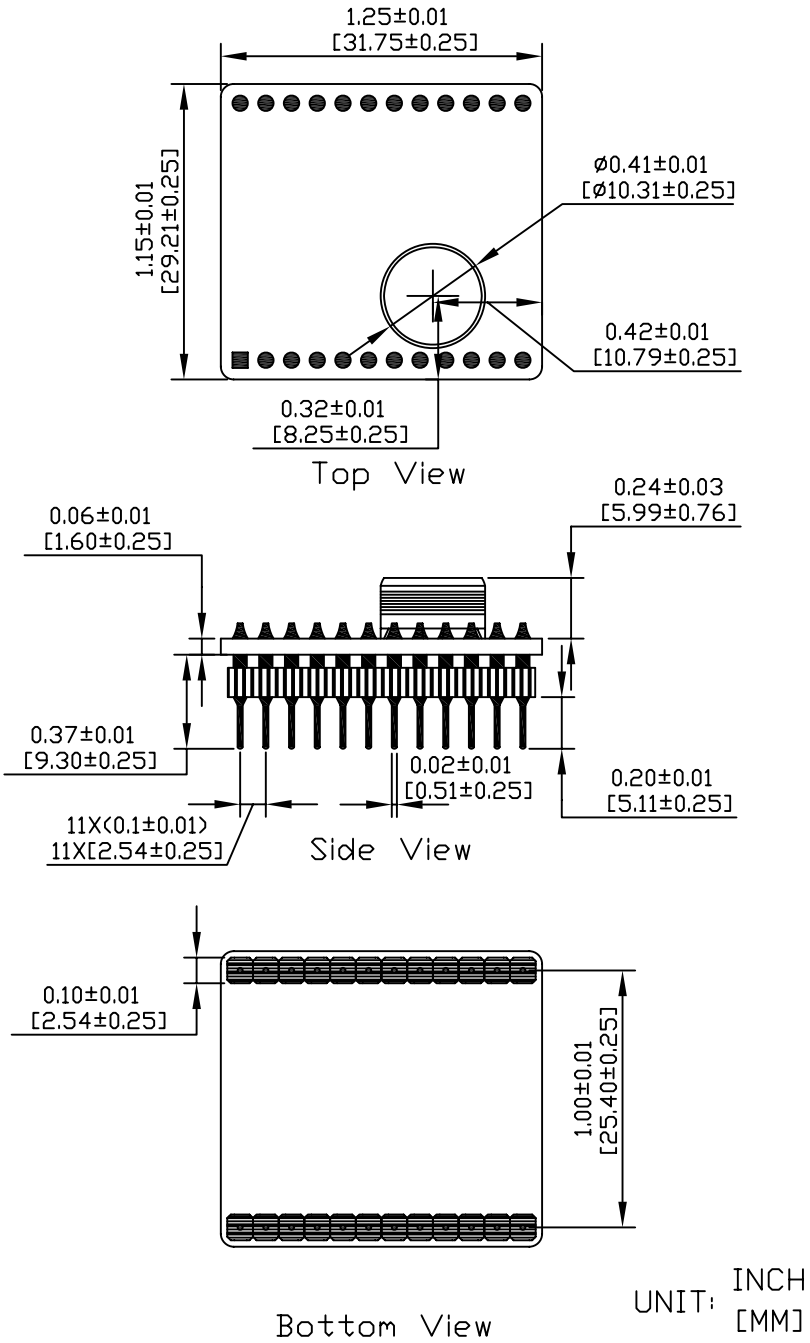


Fig6. Mechanical drawing

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Chapter5.Contact Us

Sure Electronics Co., Ltd.
5F, Zone A,
Qinhuai Technology Innovation Center
105-2 DaMing Rd (ZIP:210022)
Nanjing
P.R.China
Tel: +86-25-66606340 (English service, from GMT1-10AM)
+86-13601408832 (For technical questions & Reseller qualifications)
Fax: +86-25- 66606340
Website: www.sure-electronics.com
www.sure-electronics.net

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