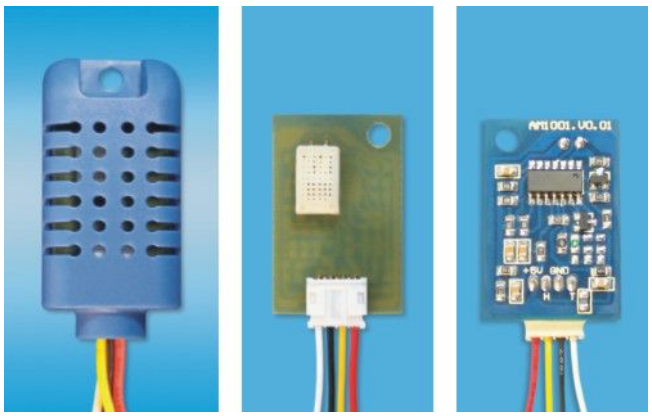
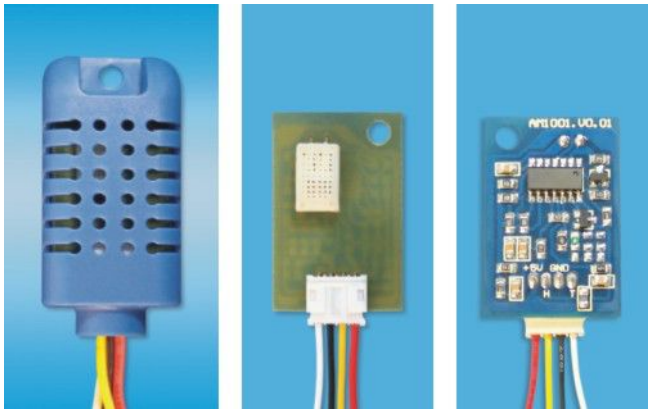
Temperature and Humidity Module

AM1001 / AMT1001 Product Manual



1. Product Overview

AM1001 / AMT1001 is humidity resistance type temperature and humidity sensors, which AM1001 is a single wet, AMT1001 is integrated temperature and humidity sensor; sensor signals using analog voltage output; This module has high accuracy, high reliability, consistency, and has been with temperature compensation to ensure long-term stability, ease of use and low price and other characteristics, especially suitable for the quality, cost requirements more demanding businesses.



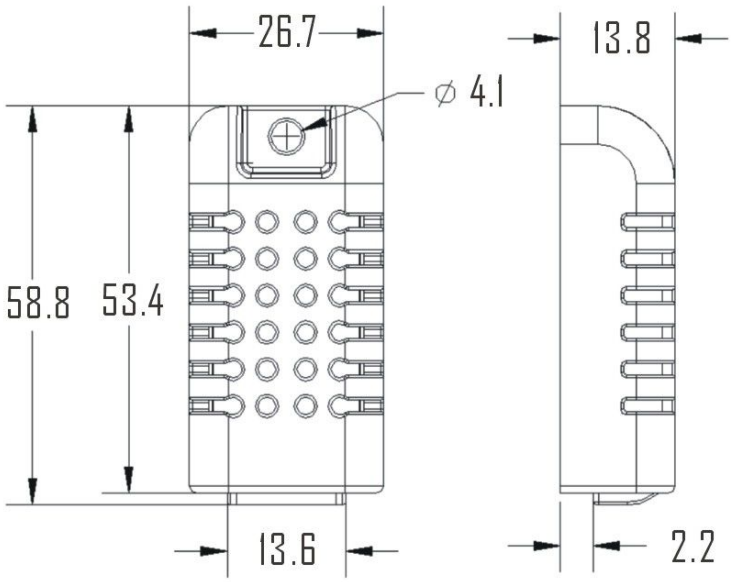
2. Applications

HVAC air conditioners, humidifiers, dehumidifiers, communication, atmospheric environmental monitoring, industrial process control, agriculture, measuring instruments and other applications.

3. Product Highlights

Low power consumption, small size, with temperature compensation, calibration microcontroller linear output, ease of use, low cost, completely interchangeable, long distance signal transmission, precise calibration.

4. Dimensions（unit: mm）



5. Product Selection

Product Model	Product Type	DC voltage	Output	Specifications
AM1001	Resistive	4.75~5.25V DC	0~3V	Single wet
AMT1001	Resistive	4.75~5.25V DC	0~3V	Integrated temperature and humidity

Product Description: AM1001 single wet, AMT1001 for temperature and humidity of a body, a common specification, except single wet and humid merely a body temperature increases, other features like, then not be repeated.

6. Interface Definition

6.1 Pin Assignment

Table 1： Pin Assignment

Pin	color	name	Description
1	Red	VDD	Power supply （4.75V-5.25V DC)
2	Yellow	Hout	Humidity output （0-3V DC）
3	Black	GND	Ground
4	White	Tout	NTC10K Thermistor

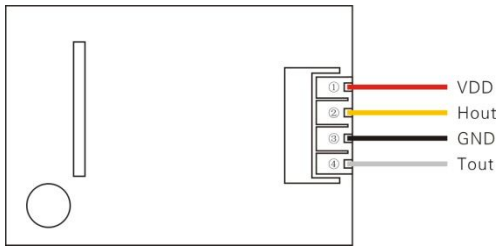


Figure1: Pin Assignment Figure

6.2 Power supply pins（VDD GND）

The module's supply voltage range is 4.75V - 5.25V, recommended supply voltage is 5.0V.

6.3 Voltage output signal line（Hout）

Humidity signal from the signal line in the form of voltage output, voltage output range of 0-3V, specific humidity and voltage reference voltage and humidity relations Please characteristics (Table 5).

6.4 Temperature output signal line（Tout）

Temperature interface for 10K thermistor, connection mode as shown below.

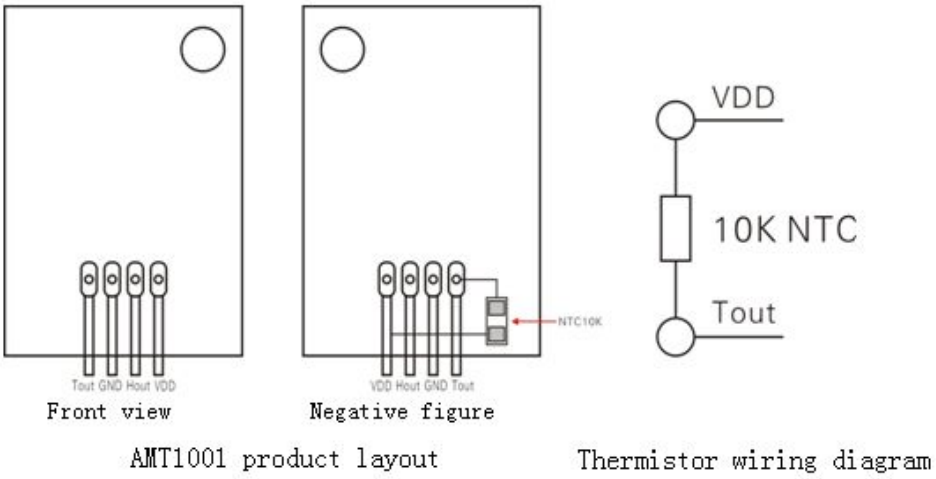


Figure 2: Temperature wiring schematic

7. Sensor Performance

7.1 Relative humidity

Table 2: Relative Humidity Performance Table

Parameters	Conditions	min	typ	max	unit
Range		20		90	%RH
	25℃		±5		%RH
Repeatability			±1		%RH
Interchangeability		Completely interchangeable			
Response time [2]	1/e(63%)		<5		S
Hysteresis			±0.3		%RH
Drift [3]	Typical values		<0.5		%RH/yr

[1] The accuracy of the factory inspection, precision index sensor at 25 ℃ and 5V, the conditions tested, it does not include hysteresis and non-linearity, and is only suitable for non-condensing environment.

[2] At 25 ℃ and 1m / s airflow conditions, to achieve a first-order response time of 63% required.

[3] In the volatile organic compounds in the value may be higher. See manual application store information.

7.2 Temperature

NTC10K temperature sensor is a thermistor. Temperature sensor parameters shown in Table 3.

Table 3: 10K NTC B.3435 technical parameters

Specification	Rated zero power resistance (R25)	B （K）	Dissipation factor（mw/℃）	Thermal time constant（S）	Rated Power （mw）	Operating Temperature Range（℃）
SNE103B13435AS150EF	10KΩ	3435	≥2.5	≤18	150	-40~125

8. Electrical Characteristics

Electrical characteristics such as energy consumption, input and output voltage, etc., depending on the power supply. Table 4 details the electrical characteristics of the sensor, if not stated otherwise supply voltage is 5V. To get the best results with the sensor, in strict accordance with the design

conditions shown in Table 4, please design.

Table 4: AM1001 / AMT1001 sensor DC characteristics.

Parameters	Conditions	min	typ	max	unit
Supply voltage		4.75	5.0	5.25	V
Humidity voltage output range		0		3	V
Power Consumption	Measurement		2.0		mA
Humidity sampling period			3		S
Humidity measurement range		20		90	%RH
Temperature range		0		60	℃
Temperature measurement range	NTC10K	0		60	℃

8.1 Standard humidity output voltage（Free Debugging）（Conditions:at25℃,Vin=5.0V）

Unit：V

Table 5: AM1001 / AMT1001 standard humidity output voltage corresponding to the table

Relative humidity（%RH）	0	10	20	30	40	50	60	70	80	90	100
The output voltage（V）	0	0.3	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0

Full range temperature compensation, full-scale calibration microcontroller output, output impedance: 5kΩ following.

8.2 Humidity and output voltage relationship

Humidity conversion formula: Humidity = Voltage（Output Voltage）÷0.03 (%RH)

8.3 Linear voltage output curve and humidity

Humidity sensor measurement range 0-100% RH, the voltage output is a linear relationship between the voltage and the humidity 0.0-3.0V shown in Figure 3

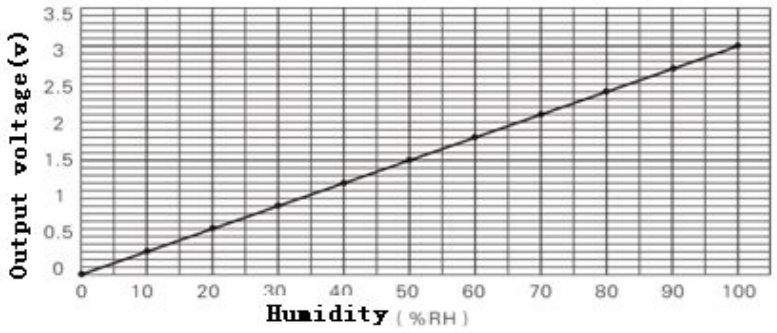


Figure3 Linear voltage output curve and humidity

8.4 NTC10K thermistor temperature corresponding to the resistance table

Standard temperature output resistance（Free Debugging）:

Table 6: 10K NTC B.3435 temperature and resistance correspondence table

Temperature（℃）	0	10	20	30	40	50	60	70	80

Resistance（kΩ）	27.90	18.22	12.12	8.31	5.80	4.12	3.00	2.21	1.66

10kΩNTC Detailed in Schedule: Resistance - Temperature Characteristics Table

9. Standard testing conditions

The atmosphere, the temperature 25 ℃, 5.0V DC supply voltage as a reference.

Characteristics measured before the first measurement of temperature and humidity module into 25 ℃ / 0% RH dry air in place five minutes, humidity generating means generating the humidity 60% RH, temperature and humidity module 5 minutes into the measured voltage value.

10. Stability Test

number	Item	Test methods	Specified Value
1	Impact resistance	Hard texture board 1m height repeated three times natural fall.	No damage, sealing off the electrical characteristics of the normal components.
2	Vibration resistance	Frequency Number 10 ~ 55Hz, amplitude 1.5mm (10 ~ 55Hz ~ 10Hz) The X-Y-Z directions for two hours vibration test.	No damage, sealing off the electrical characteristics of the normal components.
3	Heat resistance	Temperature 80 ℃, humidity of the air below 30% RH for 1000 hours.	± 5% RH or less
4	Cold	Temperature 10 ℃, humidity below 70% RH for 1000 hours in the air.	± 5% RH or less
5	Moisture resistance	Temperature 40 ℃, humidity 90% RH for 1000 hours in the air.	± 5% RH or less
6	Temperatu re cycling	To stand at 0 ℃ 30 minutes and then transferred for 30 minutes at 50 ℃, Then put 0 ℃ under 30 minutes, 5 cycles.	± 5% RH or less
7	Resistant to organic solvents	An organic solvent such as ethanol at room temperature the gas (30 minutes), acetone gas (30 minutes)	± 5% RH or less

Note 1) specification values amount to 60% RH humidity changes as a benchmark.

Note 2) after the completion of each test, the humidity module to normal room temperature and humidity in air for 4 hours, the measured amount of change in its moisture.

Schedule NTC10K resistance - temperature characteristics table

T(℃)	RMin(KΩ)	RNor(KΩ)	RMax(KΩ)	T(℃)	RMin(KΩ)	RNor(KΩ)	RMax(KΩ)
-40	218.9971	228.2376	237.8441	-1	28.9630	29.5745	30.1959
-39	206.2948	214.8696	223.7783	0	27.6951	28.2671	28.8480
-38	194.4226	202.3826	210.6475	1	26.4908	27.0257	27.5687
-37	183.3204	190.7126	198.3831	2	25.3463	25.8466	26.3542
-36	172.9331	179.8005	186.9219	3	24.2585	24.7264	25.2008

-35	163.2098	169.5919	176.2059	4	23.2242	23.6617	24.1051
-34	154.1034	160.0366	166.1815	5	22.2404	22.6495	23.0638
-33	145.5707	151.0884	156.7995	6	21.3044	21.6869	22.0739
-32	137.5716	142.7046	148.0144	7	20.4136	20.7711	21.1327
-31	130.0693	134.8459	139.7840	8	19.5655	19.8996	20.2373
-30	123.0294	127.4759	132.0698	9	18.7578	19.0700	19.3854
-29	116.4204	120.5608	124.8359	10	17.9884	18.2801	18.5746
-28	110.2132	114.0696	118.0492	11	17.2553	17.5276	17.8025
-27	104.3805	107.9735	111.6791	12	16.5564	16.8108	17.0673
-26	98.8973	102.2459	105.6972	13	15.8901	16.1275	16.3668
-25	93.7405	96.8620	100.0775	14	15.2547	15.4762	15.6994
-24	88.8883	91.7990	94.7955	15	14.6484	14.8550	15.0631
-23	84.3209	87.0357	89.8288	16	14.0699	14.2625	14.4564
-22	80.0197	82.5523	85.1565	17	13.5176	13.6972	13.8778
-21	75.9675	78.3306	80.7593	18	12.9903	13.1576	13.3257
-20	72.1481	74.3538	76.6191	19	12.4867	12.6425	12.7989
-19	68.5468	70.6058	72.7194	20	12.0056	12.1505	12.2960
-18	65.1498	67.0723	69.0446	21	11.5459	11.6806	11.8158
-17	61.9440	63.7394	65.5803	22	11.1064	11.2316	11.3571
-16	58.9176	60.5946	62.3132	23	10.6862	10.8025	10.9190
-15	56.0594	57.6261	59.2307	24	10.2844	10.3923	10.5002
-14	53.3589	54.8228	56.3212	25	9.9000	10.0000	10.1000
-13	50.8065	52.1745	53.5741	26	9.5249	9.6248	9.7248
-12	48.3931	49.6717	50.9791	27	9.1662	9.2658	9.3656
-11	46.1103	47.3056	48.5269	28	8.8230	8.9223	9.0218
-10	43.9502	45.0676	46.2088	29	8.4946	8.5934	8.6925
-9	41.9055	42.9503	44.0166	30	8.1803	8.2786	8.3772
-8	39.9693	40.9462	41.9428	31	7.8794	7.9770	8.0750
-7	38.1351	39.0487	39.9801	32	7.5913	7.6882	7.7855
-6	36.3970	37.2514	38.1219	33	7.3153	7.4114	7.5080
-5	34.7494	35.5484	36.3621	34	7.0509	7.1461	7.2419
-4	33.1869	33.9342	34.6949	35	6.7976	6.8919	6.9867
-3	31.7047	32.4037	33.1148	36	6.5547	6.6480	6.7420
-2	30.2982	30.9520	31.6167	37	6.3219	6.4142	6.5072

T(℃)	RMin(KΩ)	RNor(KΩ)	RMax(KΩ)	T(℃)	RMin(KΩ)	RNor(KΩ)	RMax(KΩ)
38	6.0986	6.1899	6.2818	82	1.5032	1.5469	1.5918
39	5.8845	5.9746	6.0655	83	1.4613	1.5043	1.5484
40	5.6790	5.7680	5.8578	84	1.4208	1.4630	1.5063
41	5.4818	5.5697	5.6584	85	1.3816	1.4231	1.4656
42	5.2926	5.3793	5.4669	86	1.3437	1.3844	1.4262

43	5.1109	5.1964	5.2829	87	1.3070	1.3470	1.3880
44	4.9364	5.0208	5.1060	88	1.2715	1.3107	1.3510
45	4.7688	4.8520	4.9361	89	1.2371	1.2756	1.3152
46	4.6079	4.6898	4.7727	90	1.2038	1.2416	1.2805
47	4.4532	4.5339	4.6156	91	1.1716	1.2087	1.2469
48	4.3045	4.3840	4.4645	92	1.1404	1.1768	1.2143
49	4.1616	4.2398	4.3191	93	1.1101	1.1459	1.1827
50	4.0242	4.1012	4.1793	94	1.0808	1.1159	1.1520
51	3.8920	3.9678	4.0447	95	1.0524	1.0868	1.1223
52	3.7649	3.8395	3.9152	96	1.0248	1.0587	1.0936
53	3.6426	3.7160	3.7905	97	0.9981	1.0314	1.0656
54	3.5249	3.5971	3.6704	98	0.9723	1.0049	1.0385
55	3.4116	3.4826	3.5547	99	0.9472	0.9792	1.0123
56	3.3025	3.3724	3.4433	100	0.9228	0.9543	0.9868
57	3.1975	3.2662	3.3360	101	0.8992	0.9302	0.9620
58	3.0964	3.1639	3.2325	102	0.8764	0.9067	0.9380
59	2.9990	3.0654	3.1328	103	0.8542	0.8840	0.9147
60	2.9052	2.9704	3.0367	104	0.8326	0.8619	0.8921
61	2.8148	2.8788	2.9440	105	0.8117	0.8405	0.8702
62	2.7276	2.7905	2.8547	106	0.7914	0.8197	0.8488
63	2.6436	2.7054	2.7684	107	0.7717	0.7995	0.8281
64	2.5626	2.6233	2.6853	108	0.7526	0.7799	0.8080
65	2.4845	2.5442	2.6050	109	0.7341	0.7608	0.7885
66	2.4091	2.4678	2.5276	110	0.7161	0.7423	0.7695
67	2.3365	2.3940	2.4528	111	0.6986	0.7244	0.7511
68	2.2663	2.3229	2.3806	112	0.6816	0.7069	0.7332
69	2.1987	2.2542	2.3109	113	0.6650	0.6900	0.7158
70	2.1334	2.1879	2.2436	114	0.6490	0.6735	0.6988
71	2.0703	2.1239	2.1786	115	0.6334	0.6575	0.6824
72	2.0094	2.0620	2.1158	116	0.6183	0.6419	0.6664
73	1.9506	2.0023	2.0551	117	0.6036	0.6268	0.6508
74	1.8938	1.9446	1.9964	118	0.5893	0.6121	0.6357
75	1.8390	1.8888	1.9397	119	0.5754	0.5978	0.6210
76	1.7860	1.8349	1.8849	120	0.5618	0.5839	0.6067

T(℃)	RMin(KΩ)	RNor(KΩ)	RMax(KΩ)	T(℃)	RMin(KΩ)	RNor(KΩ)	RMax(KΩ)
77	1.7348	1.7828	1.8319	121	0.5487	0.5703	0.5928
78	1.6853	1.7324	1.7807	122	0.5359	0.5572	0.5793
79	1.6374	1.6837	1.7311	123	0.5235	0.5444	0.5661
80	1.5912	1.6366	1.6831	124	0.5114	0.5319	0.5533
81	1.5464	1.5910	1.6367	125	0.4996	0.5198	0.5408

11. Application Information

1. Work and storage conditions

The proposed scope of work beyond the sensor could lead to up to 3% RH temporary drift signal. Return to normal operating conditions, sensor calibration status will slowly recover. To speed up the recovery process can be found in "recovery process." Prolonged use under abnormal operating conditions, it will accelerate aging.

Avoid placing components on a long-term condensation and dry conditions and the following environments.

A. Smoke

B. An acid or an oxidizing gas, such as sulfur dioxide, hydrochloric acid

Recommended Storage Environment

Temperature: 10~40℃ Humidity: 60%RH or less

2. The influence of exposure to chemicals

Resistive humidity sensor sensing layer would be disturbed chemical vapor diffusion in the sensing layer of chemicals may cause drift and measurement sensitivity. In a clean environment, will slowly release contaminants out. Restore processing described below to achieve this will accelerate the process. High concentrations of chemical pollutants (such as ethanol) can cause damage to the sensor sensing layer completely.

3. Temperature Effect

The relative humidity of the gas, is heavily dependent on temperature. Therefore, when measuring the humidity, the humidity should be possible to ensure the sensors at the same temperature. If you share a printed circuit board and electronic components heat released in the sensor should be installed as far as possible away from the electronic components, and installed under the heat, while maintaining a well-ventilated enclosure. To reduce heat conduction to other parts of the sensor and the copper plating of printed circuit boards to be the smallest possible, and leaving a gap between.

4. Lighting effects

Prolonged exposure to sunlight or strong ultraviolet radiation, would reduce the performance.

5. Recovery process

Placed under extreme operating conditions or chemical vapor sensors, through the following processing program, you can make it back to the state of calibration. <2 hours (drying) under a humidity of 10% RH; followed by 20-30 ℃ and> 45 ℃ and at a humidity of 70% RH 5 hours or more.

6. Wiring Precautions

Signal wire quality will affect the voltage output quality, it is recommended to use high quality shielded cable.

7. Welding Information

Manual soldering at a temperature up to 300 ℃ contact time must be less than 3 seconds.

8. Product upgrades

For details, please consult Aosong electronic technology sector.

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14. Quality Assurance

The company provides a period of 12 months (one year) quality assurance (calculated from the date of shipment from) their direct purchasers of the product. Data sheet published by the company for the product's technical specifications shall prevail. If within the warranty period, the product was confirmed quality is really flawed, the company will provide free repair or replacement. Users must satisfy the following conditions:

① The product is found defective within 14 days written notice to the Company;

② The product should be mailed back to the company to pay the purchaser;

③ The shelf life of the product should be.

The company only to those used in compliance with the technical condition and defects of products is responsible for. Company for its products used in those special applications without any warranty, guarantee or written statement. At the same time, the products applied to the products or reliability in circuit is also not to make any commitment.