



Thermopile Gas Sensor (Model: RTGA71)

User's Manual

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Zhengzhou Winsen Electronics Technology Co., Ltd

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Zhengzhou Winsen Electronics Technology CO., LTD.

RTGA71 Thermopile Gas Sensor

Production Description

RTGA71 sensor is a single-channel thermopile gas sensor, which contains a thermopile chip based on MEMS technology and connects hundreds of pairs of thermocouples in series, to convert the absorbed infrared radiation into a voltage signal. There is a narrow-band filter in the front of the sensor, and the sensor can be used for the detection of carbon dioxide concentration. The sensor NTC itself has temperature compensation, to improve the measurement accuracy.

Features

- TO-46 metal package
- High sensitivity
- Quick response, Good stability
- High transmittance of narrowband filter
- High precision NTC



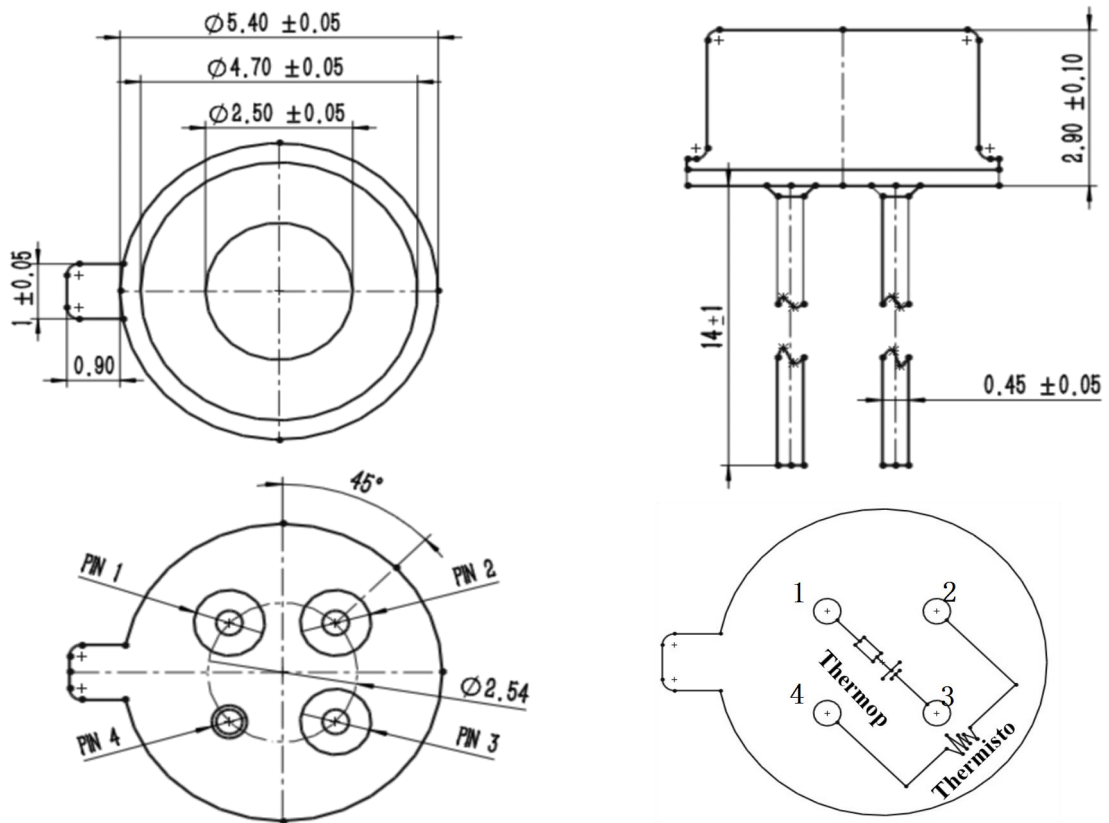
Applications

- NDIR (CO2) Gas Detection equipment
- Indoor air quality detection and HVAC system control
- CO2 gas control in industrial workshop
- CO2 emission control of combustion furnace
- Human breath detection
- Interior air quality monitoring of automotive

Table 2 RTGA71 thermopile parameters

Parameter	Value	Unit	Remarks
Chip size	1.35×1.35	mm	/
Field of view	95	Degree	Above 50%
Filter center wavelength	4.26	um	
Thermopile resistor	76±10	KΩ	25°C, 1V
Noise voltage	38	nV/Hz ^{1/2}	25°C
Noise equivalent power	0.23	nW/Hz ^{1/2}	500K, 1Hz, 25°C
Response rate	160±40	V/W	500K, 1Hz, 25°C
Temperature coefficient of resistance	0.06	%/°C	25°C~75°C
Time constant	≤13	ms	
Chip Detection rate	1.5 ×10 ⁸	cmHz ^{1/2} /W	500K, 1Hz, 25°C
NTC resistance	100 ± 1%	KΩ	25°C
NTC(β)	3950 ± 1%	/	25°C/50°C
Working temperature	-30 ~ 125°C		

Sensor diagram(unit:mm)

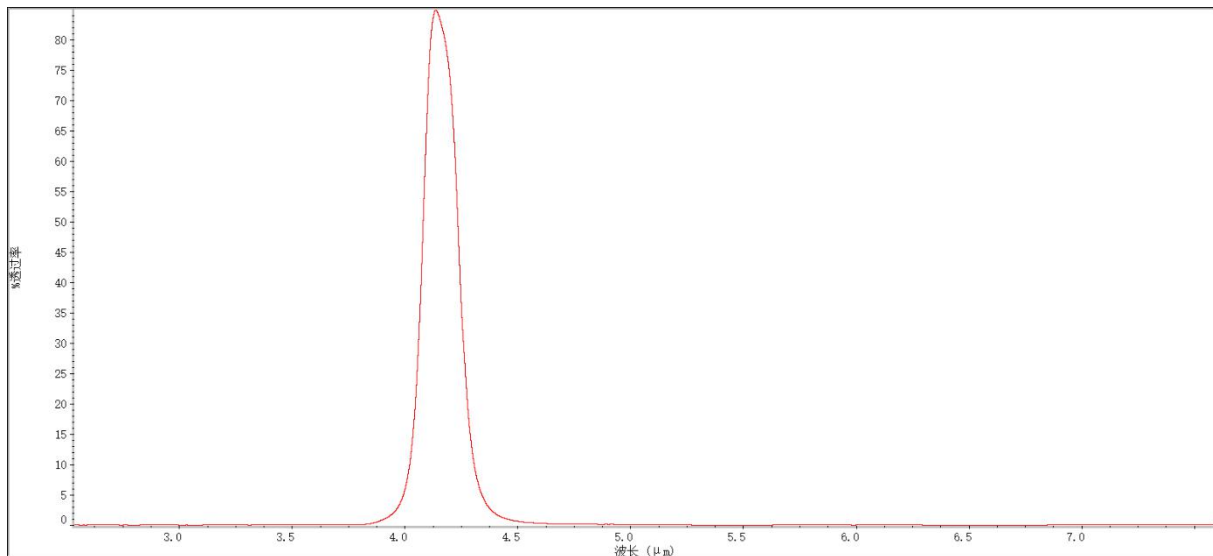


Pin	1	2	3	4
Definition	Thermopile positive	NTC	Thermopile negative	GND

Filter Performance Curve

1. Filter performance curve:

center wavelength $4.26\mu\text{m}$; peak wavelength transmittance is greater than 80%, and half-width is 180nm



2. Thermistor (NTC) R-T Table

T(°C)	R(KΩ)	T(°C)	R(KΩ)	T(°C)	R(KΩ)	T(°C)	R(KΩ)	T(°C)	R(KΩ)
-40	3179.00	-6	439.56	28	87.80	62	22.66	96	6.97
-39	2980.73	-5	417.22	29	84.11	63	21.83	97	6.75
-38	2796.06	-4	396.14	30	80.59	64	21.05	98	6.53
-37	2623.95	-3	376.25	31	77.24	65	20.29	99	6.33
-36	2463.46	-2	357.47	32	74.04	66	19.56	100	6.13
-35	2313.73	-1	339.73	33	70.99	67	18.86	101	5.94
-34	2173.97	0	322.98	34	68.07	68	18.19	102	5.75
-33	2043.44	1	307.14	35	65.29	69	17.54	103	5.58
-32	1921.48	2	292.17	36	62.64	70	16.92	104	5.40
-31	1807.49	3	278.02	37	60.11	71	16.33	105	5.24
-30	1700.89	4	264.63	38	57.68	72	15.76	106	5.08
-29	1601.17	5	251.96	39	55.37	73	15.21	107	4.92
-28	1507.85	6	239.96	40	53.16	74	14.68	108	4.77
-27	1420.48	7	228.61	41	51.05	75	14.17	109	4.63
-26	1338.66	8	217.85	42	49.03	76	13.68	110	4.49
-25	1262.00	9	207.66	43	47.10	77	13.21	111	4.36
-24	1190.15	10	198.00	44	45.25	78	12.76	112	4.23
-23	1122.79	11	188.84	45	43.49	79	12.32	113	4.10
-22	1059.61	12	180.16	46	41.79	80	11.90	114	3.98
-21	1000.34	13	171.92	47	40.18	81	11.50	115	3.86
-20	944.72	14	164.10	48	38.63	82	11.11	116	3.75
-19	892.50	15	156.68	49	37.15	83	10.74	117	3.64
-18	843.46	16	149.63	50	35.88	84	10.38	118	3.54
-17	797.38	17	142.94	51	34.37	85	10.03	119	3.43
-16	754.09	18	136.58	52	33.06	86	9.70	120	3.34
-15	713.38	19	130.54	53	31.81	87	9.38	121	3.24
-14	675.11	20	124.79	54	30.62	88	9.07	122	3.15
-13	639.10	21	119.33	55	29.47	89	8.77	123	3.06
-12	605.22	22	114.13	56	28.37	90	8.48	124	2.97
-11	573.33	23	109.19	57	27.32	91	8.21	125	2.89
-10	543.30	24	104.48	58	26.31	92	7.94		
-9	515.01	25	100.00	59	25.34	93	7.69		
-8	488.36	26	95.73	60	24.41	94	7.44		
-7	463.24	27	91.67	61	23.51	95	7.20		

Note:

1. The sensor must first calibrate the resistance of the thermistor NTC;
2. The sensor test is affected by factors such as black body temperature, distance, and environment. The V-T table is for reference only. The V-T meter needs to be calibrated before use.
3. The output voltage of the sensor is easily affected by the NTC resistance value. It is necessary to increase the thermal resistance and heat capacity to increase the temperature stability. Generally, metal (copper, aluminum) kits are used;
4. In order to reduce the thermal interference between the sensor pins, the sensor pins should be thermally isolated when making a PCB;
5. Hand soldering temperature should be $330\pm 20^{\circ}\text{C}$, and single pin soldering time should not exceed 3s;
6. Frequent, excessive vibration, strong impact or collision will cause resonance inside the sensor to break.

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