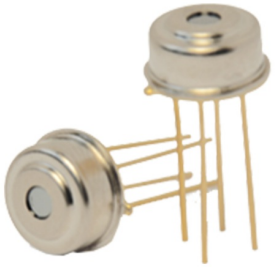


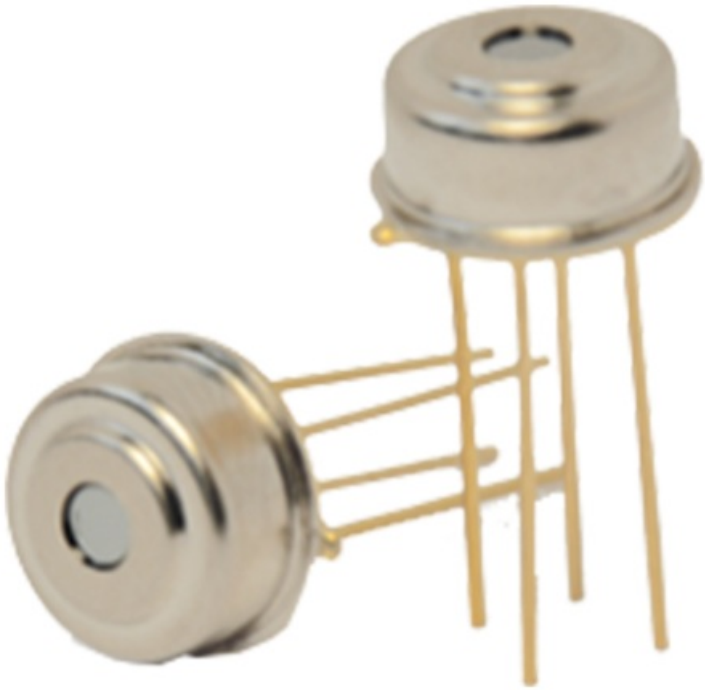
Winsen MRT313 Thermopile Temperature Sensor User Manual

MRT313 Thermopile Temperature Sensor
User Manual

Contents

1 MRT313 Thermopile Temperature Sensor
2 Statement
3 Product Description
4 Features
5 Technical parameters
6 Documents / Resources
6.1 References

MRT313 Thermopile Temperature Sensor



Thermopile Temperature Sensor
(Model: MRT313)
Version: 3.0
Valid from: 2022-11

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.
MRT313 Thermopile Temperature Sensor

Product Description

MRT-313 is an infrared thermopile temperature sensor, direct contact is not required when measuring object temperature. The core component thermopile chip is formed by connecting hundreds of thermocouples in series based on MEMS technology. The thermopile absorbs the infrared energy emitted from the measured object, and uses the Setback theory, the sensor outputs the corresponding voltage to detect the temperature of the target.

Features

- TO-39 metal package
- Specific perspective
- Quick response
- Good stability
- High precision NTC

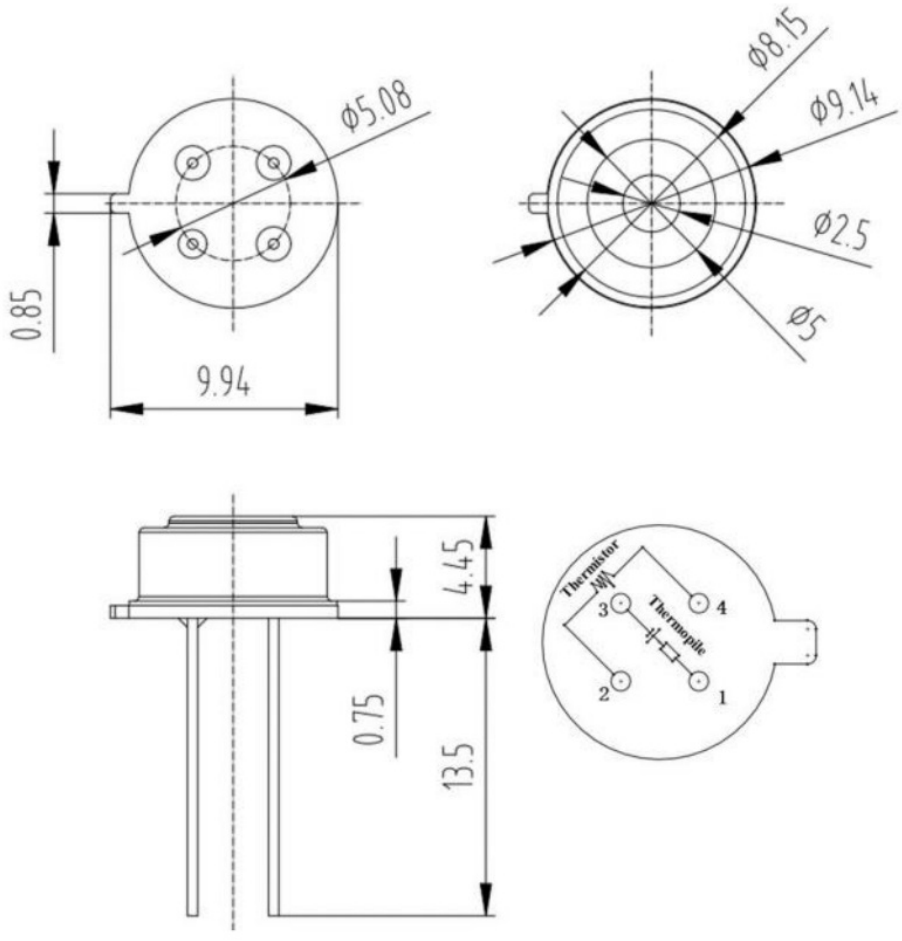
Applications

- Household appliances (Microwave oven, hair dryers, range hood etc), temperature measuring and controlling
- Non-contact temperature measuring
- Continuous temperature control of production process
- Human presence detection
- Power industry temperature monitoring;

Technical parameters

Parameter	Value	Unit	Remarks
Sensitive area	1×1	mm	/
Field of view	60	Degree	Above 50%
Thermopile resistor	75±15	KO	25°C
Noise voltage	38	nV/Hz112	25°C
Noise equivalent power	0.23	nW/Hz1/2	500K, 1Hz, 25°C
Response rate	110±30	V/W	500K, 1Hz, 25°C
Temperature coefficient of resi stance	0.06	%/°C	25°C 75°C
Time constant	≤ 20	ms	
Detection rate	1.2 x108	cmHz1/2/W	500K, 1Hz, 25°C
NTC resistance	100 ± 1%	KO	25°C
B-value constant	3950 ± 1%	/	25°C/50°C
Working temperature	-30 ~ 100	°C	/
Storage temperature	40 — 110	°C	

Sensor diagram(unit:mm)

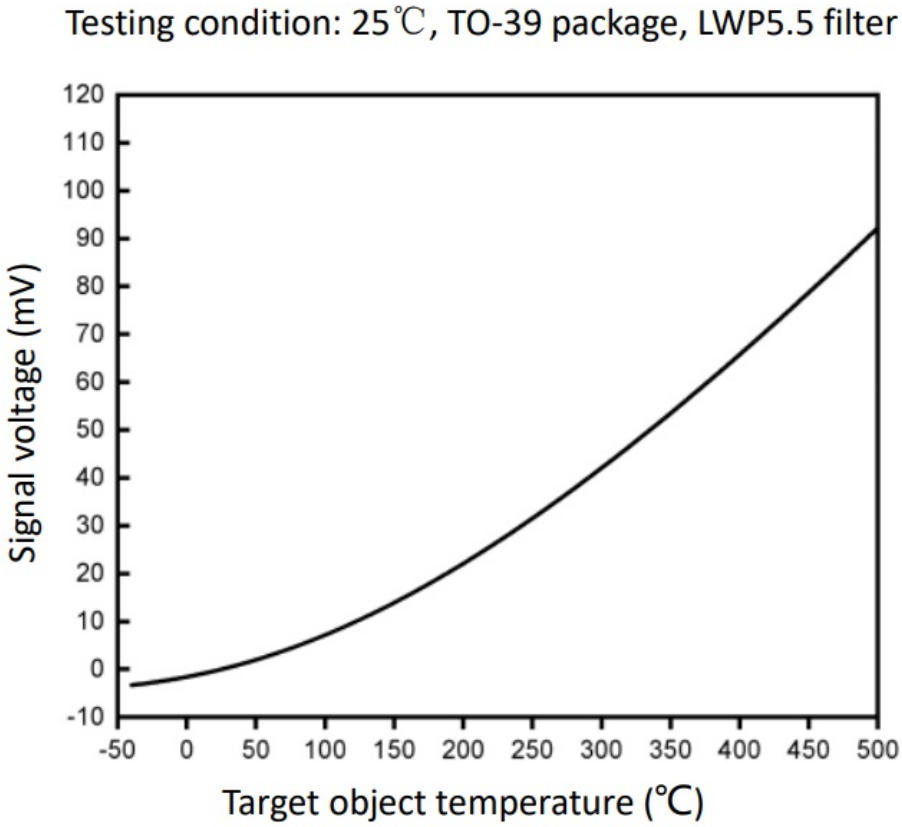


Electrode connection:

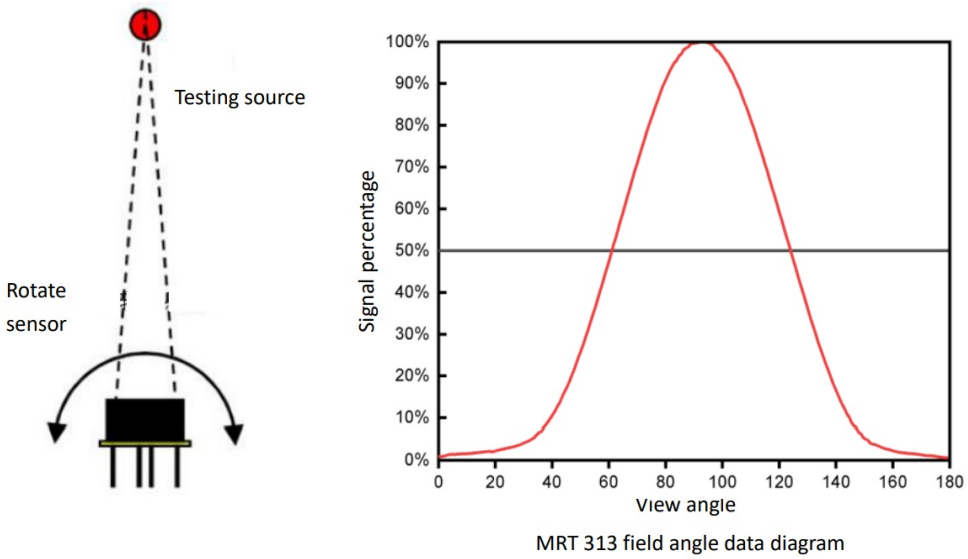
Pin	1	2	3	4
Definite	Thermopile positive	NTC	Thermopile negative	GND

Sensor Character:

1. Typical thermopile performance (V-T) curve:



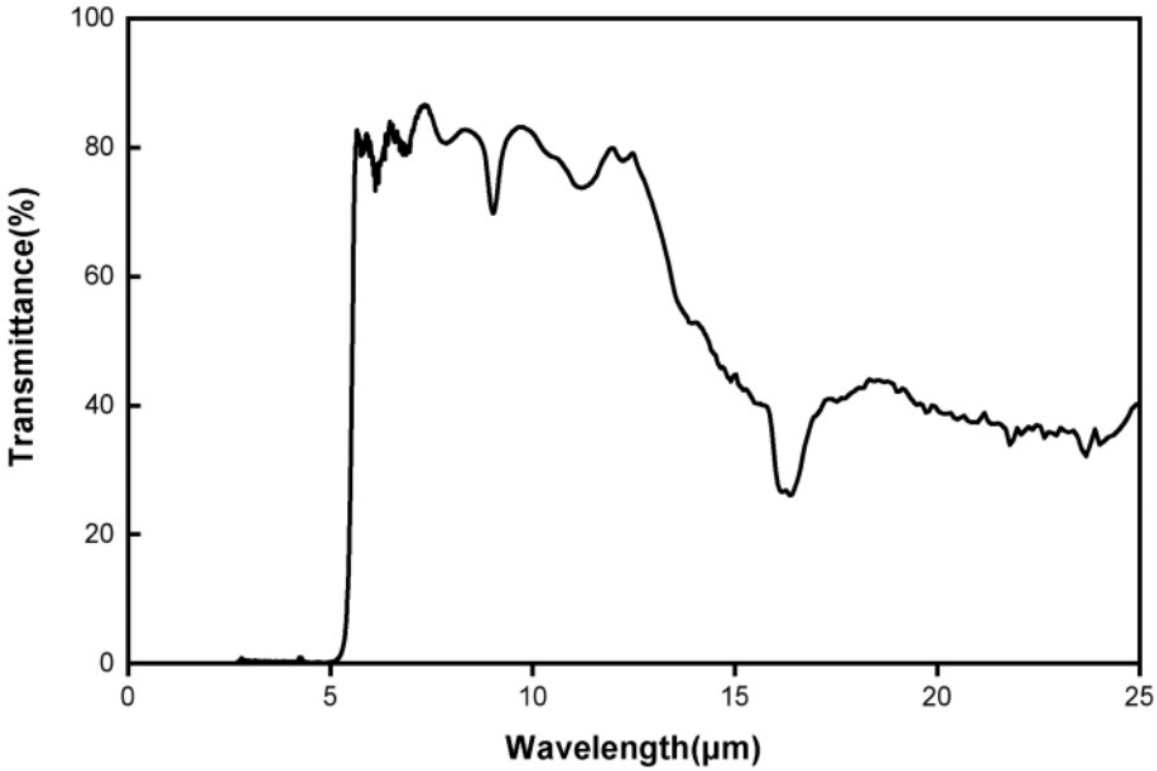
2. **Sensor view angle** The light hole of the sensor is facing the heat source, rotate the window of the sensor around the same axis. The sensor signal response is the range covered when the maximum signal response of the sensor at 50%;



MRT 313 field angle data diagram

3. Filter Performance Curve

Parameter	Value	Unit	Remarks
Wavelength range	5.5~14	um	
Transmittance 1	≥75	%	Average, 5.5~14um
Transmittance 2	<1	%	<5μm



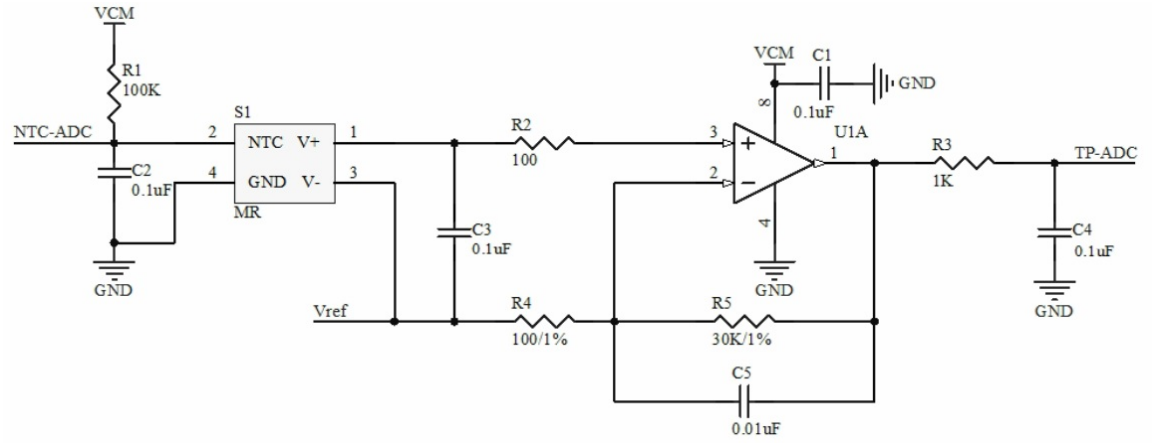
Spectral transmittance of infrared cut-off filter

4. Thermistor (NTC) R-T Table

T(°C)	**R(Cl1)**	**T(°C)**	**It(IClI)**	**T(°C)**	**R(ICL1)**	**T(°C)**	**R(K12)**
-30	1788.	3	281.	36	63.	69	18.
-29	1680.	4	267.	37	60.	70	17.
-28	1579.	5	254.	38	57.6610	71	17.
-27	1484.	6	242.	39	55.	72	16.1930
-26	1396.	7	230.3940	40	53.	73	16.
-25	1314.	8	219.	41	51.	74	15.
-24	1237.	9	209.	42	49.	75	15.
-23	1165.	10	199.	43	47.	76	14.
-22	1098.	11	190.	44	45.3130	77	14.

-21	1035.	12	181.	45	43.5o21	78	13.
-20	976.	13	173.	46	42.	79	13.
-19	921.	14	164.7540	47	40.	80	12.
-18	869.	15	157.2290	48	39.	81	12.
-17	820.	16	150.	49	37.	82	12.
-16	774.8710	17	143.	50	36.	83	11.2270
-15	732.	18	137.	51	35.	84	11.
-14	692.	19	131.	52	33.	85	11.
-13	654.	20	125.	53	32.	86	10.
-12	6191540	21	119.	54	31.	87	10.
-II	586.	22	114.	55	30.	88	10.
-10	555.	23	109.	56	29.	89	9.
_9	525.	24	105.	57	27.5860	911	9.
-8	498.	25	100.0000	58	27.	91	9.
-7	472.	26	96.	59	26.	92	8.
-6	447.	27	92.	60	25.	93	8.
-5	424.	28	88.	61	24.	94	8.
-4	402.	29	84.	62	23.	95	8.
-3	382.	30	81.	63	22.	96	7.
-2	362.	31	77.	64	21.	97	7.2360
-I	344.	32	74.	65	21.	98	7.
0	327.	33	71.	66	20.	99	7.
I	310.7640	34	68.	67	19.	100	7.
2	295.	35	65.	68	18.5920	101	6.

4. Recommended circuit:



Basic principle and use method

(1) Combined with the reference circuit, read the resistance value Ra between pin 2 and 4;

(2) According to the resistance value of Ra, the B value constant of NTC and the R-T table in the specification, to get the corresponding ambient temperature Tamb (this temperature is not the ambient temperature of the outside atmosphere, but the internal ambient temperature of the sensor);

(3) Reading the voltage Vibe between pin 1 and 3;

(4) The corrected signal voltage Vobj,cal is obtained by introducing the correction coefficient of the sensor;

(5) Find the voltage value equal to or close to the Vobj,cal value in the Tamb column of the V-T table, and The corresponding Tobj line is the temperature of the measured object Tobj.

Note:

- Due to the existence of individual differences and the influence of blackbody temperature, distance, environment and other factors, each sensor must be calibrated before use;
- The test output voltage of the sensor is easily affected by the NTC resistance value. It is necessary to increase the thermal resistance and thermal capacity to increase the temperature stability. Generally, metal (copper, aluminum) kits are used;
- The view angle of the sensor is large, so it usually need to adjust according to the size of the test target object and the test distance in actual use;
- In order to reduce the thermal interference between the sensor pins, the sensor pins should be thermally isolated when making a PCB;
- Frequent, excessive vibration, strong impact or collision will cause resonance inside the sensor to break.

Zhengzhou Wines Electronics Technology Co., Ltd
Add: No.299, Jinhua Road, National Hi-Tech Zone,
Zhengzhou 450001 China
Tel: +86-371-67169097/67169670
Fax: +86-371-60932988
E-mail: sales@winsensor.com
Website: www.winsen-sensor.com
Tel: 86-371-67169097/67169670 Fax: 86-371-60932988
Email: sales@winsensor.com

Documents / Resources

	Winsen MRT313 Thermopile Temperature Sensor [pdf] User Manual MRT313 Thermopile Temperature Sensor, MRT313, Thermopile Temperature Sensor, Temperature Sensor, Sensor

References

- Winsen Gas Sensor_CO2 Sensor_Air Quality Sensor_Dust Sensor_CO Sensor-Winsen Electronics
- Winsen Gas Sensor_CO2 Sensor_Air Quality Sensor_Dust Sensor_CO Sensor-Winsen Electronics
- User Manual