

Specifications Approval Sheet

CUSTOMER: _____

CUSTOMER P/N: _____

PART NAME: _____ AT Series - NTC Thermistor

SPECIFICATION: _____ AT103F3435B-L17

DATE: _____

For Customer Approval:

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For Manufacturer Approval:

Formulation	Audit	Approval

EXSENSE Electronics Technology Co., Ltd.

Address: No. 201, Shunjing Road, Dinghu District, Zhaoqing City, Guangdong Province, China

TEL: 0086-758-2661333

FAX: 0086-758-2698912

Web: <http://www.exsense.com>

Email: mkb@exsense.com.cn

exsense 廣東愛晟電子科技有限公司	Spec. No. :
EXSENSE ELECTRONICS TECHNOLOGY CO., LTD.	Version: A/0
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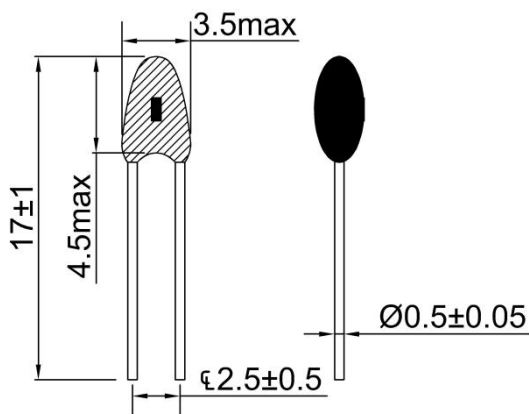
1. Range of Application

The specification approval sheet is applicable to AT series NTC thermistor produced by EXSENSE Electronics Technology Co., Ltd.

This product is complied with the EU RoHS Directive.

2. Product Structure and Size

Unit: mm



3. Part Number

AT	103	F	3435	B	L17
①	②	③	④	⑤	⑥
Product Series Code	Resistance @25℃	Tolerance @25℃	Beta	Test temp. of B	Total Length
AT Series NTC Thermistor	10×10³Ω	±1%	3435K	25℃/85℃	17mm

4. Electrical Performance

No.	Item	Symbol	Test Condition	Scope	Unit
1	Resistance @25℃	R_{25}	$T=25\pm0.05^{\circ}\text{C}$	$10\pm1\%$	KΩ
2	Beta	$B_{25/85}$	$B = \frac{\ln(R_{T1}) - \ln(R_{T2})}{(1/T1 - 1/T2)}$	$3435\pm1\%$	K
3	Thermal time constant	τ	$50^{\circ}\text{C} \rightarrow 25^{\circ}\text{C}$, in oil	≤ 10	sec
4	Dissipation Factor	δ	$T_a=25\pm0.5^{\circ}\text{C}$	≈ 1.3	mW/℃
5	Max. Rated Power	P_r	$T_a=25\pm0.5^{\circ}\text{C}$	≤ 90	mW
6	Operating Temp. Range	/	/	$-40\sim+125$	℃

4.1 Resistance Value ($R_{25^{\circ}\text{C}}$)

Requirement: $R_{25}=10\text{K}\Omega\pm1\%$

Test method: Measuring in high-precision thermostatic oil tank of $25^{\circ}\text{C}\pm0.05^{\circ}\text{C}$, high precision resistance measuring instrument is used, and the measuring power of the measuring instrument should be zero power. (That is, the self-heat generated by the current flowing through the product can be negligible.)

4.2 Beta

Requirement: $B_{25/85}=3435\text{K}\pm1\%$

Test method: The resistance values of $25\pm0.05^{\circ}\text{C}$ and $85\pm0.05^{\circ}\text{C}$ are measured in high-precision thermostatic oil tank, then calculate according to the following formula:

$$B_{T1/T2}=\ln(R_{T1}/R_{T2})/(1/(T1+273.15)-1/(T2+273.15))$$

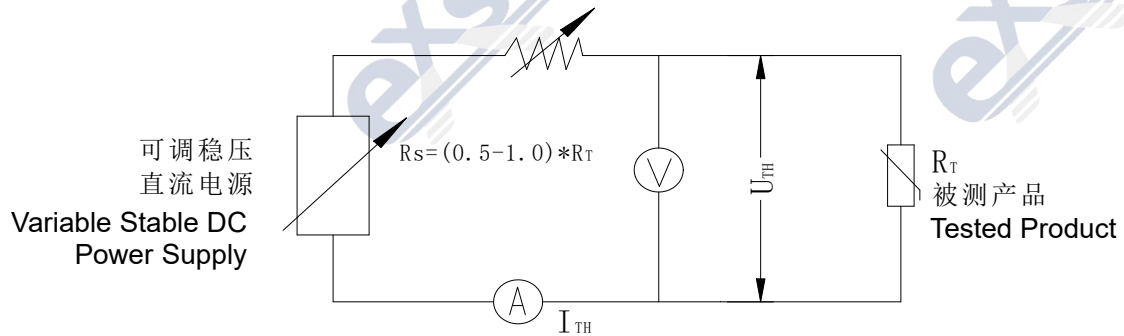
4.3 Thermal Time Constant (τ)

Thermal time constant: $T1=50-(50-25)*63.2\%=34.2^{\circ}\text{C}$, max 10 seconds (in oil)

Test method: the time required for the product to quickly convert from the 50°C oil tank to the 25°C oil tank to reach the resistance value corresponding to 34.2°C .

4.4 Dissipation Factor (δ)

Test method: the product under test is connected to the following circuit in the still air of $25 \pm 0.5^\circ\text{C}$.



Adjust I_{TH} for $\frac{U_{TH}}{I_{TH}} = R_{85}$, then calculate by the following formula:

$$\delta = \frac{U_{TH} \cdot I_{TH}}{85 - 25^\circ\text{C}} \quad (\text{mw}/^\circ\text{C})$$

4.5 Max. Rated Power (P_r)

Requirement: $T_a = 25 \pm 0.5^\circ\text{C}$, max 90mW.

4.6 Operating temp. Range

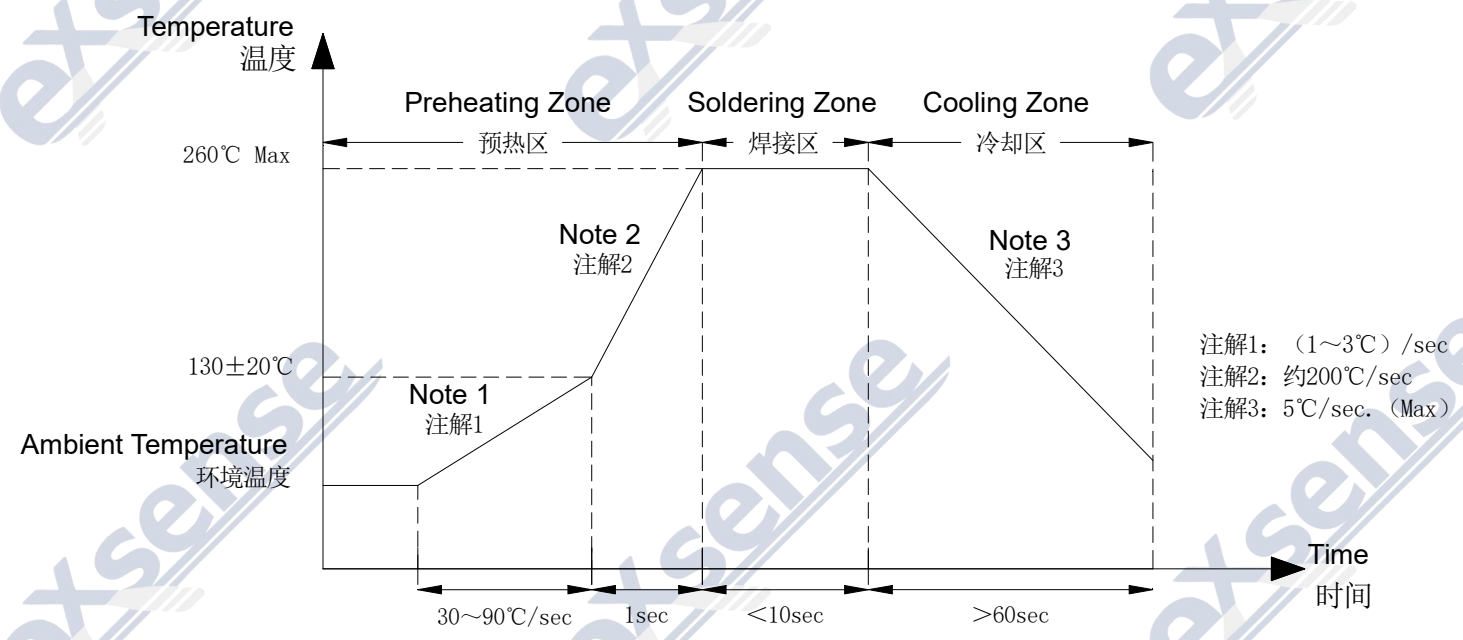
$-40^\circ\text{C} \sim +125^\circ\text{C}$. (All materials used to assemble must meet the highest operating temperature)

5. Reliability

Item	Standard	Test Method
Soldering Test	△ Soldering coverage rate≥90%	Soldering temperature: 265±3℃, Tin immersion time: 1±0.5 seconds
Soldering Resistance Test	△ Change rate of resistance value≤±1% △ Change rate of Beta≤±1% △ Appearance without damage	Soldering temperature: 265±3℃, Immersion Tin time: 10±1sec; Immerse it 3mm far from the resistor body.
Drop Test		Free drop 3 times from a height of 1 meter to the concrete floor.
Lead Strength Test		Fix the head of the product and apply a force of 5N along the lead for 30 seconds.
Vibration Test		Vibration frequency range:10~55Hz Total amplitude: 1.52mm Time: X, Y, Z direction each 2hrs.
Temperature Cycling Test		-40℃×30min→room temperature×5min→100℃×30min→room temperature×5min, 10 cycle times.
Thermal Shock Test		0℃×3min→room temperature×3min→100℃×3min→room temperature×3min, 100 cycle times.
High Temperature Against Test		Thermistor placed at 125±5℃ air for 1000h±24hrs
Low Temperature Storage Test		Thermistor placed at -40±5℃ air for 1000h±24hrs
Load Test		Thermistor operates at room temperature with DC 0.2mA working current for 1000h±24hrs.
Moisture Resistance Test		Thermistor placed at 40±2℃, 90-95%RH air for 1000h±24hrs

6. Recommended Soldering Process Condition

6.1 Reflow soldering



5.2 Soldering conditions of handcrafted soldering iron

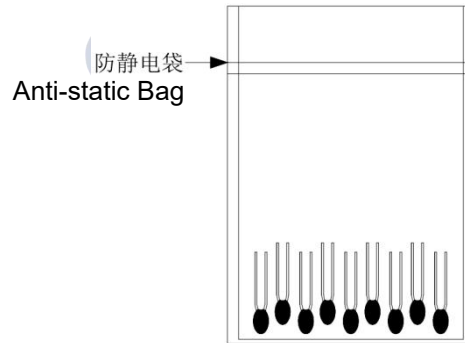
Item	Condition
Temperature of soldering iron head	360°C (max)
Soldering time	1 sec (max)
Distance between soldering position and encapsulation layer	7mm (min)
Note: the soldering iron head should not touch the thermistor head	

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7. Packing

Bulk

The thermistor is vacuumized and packed in an . The packing quantity is 1K pcs/ bag.



8. Transportation and Storage

8.1 The height of each stack shall not exceed 4 boxes during storage and transportation, products must be vacuumized and stored in anti-oxidation packaging.

8.2 Select packing cases according to the quantity of shipment, any method of transportation is allowed; But need to avoid the directly or indirectly drenched hit of dirt, rain, snow and mechanical damage in transport process

8.3 The storage environment of product must be free from acidic and alkaline substances, corrosive gases or radiation sources, avoid storing in environment with light.

8.4 Storage temperature: $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$.

8.5 Relative humidity: $\leq 75\% \text{RH}$.

9. Storage Life

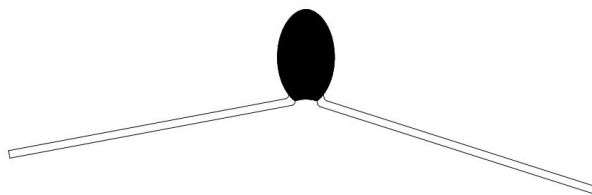
9.1 Under the guarantee of the integrity of the sealed package and the above storage conditions, the vacuum-sealed package of bulk can be stored for 2 years.

9.2 After opening the package, please use it within 7 days under indoor conditions of room temperature and humidity. If not, please immediately vacuum again and keep according to storage method to avoid the oxidation of product leads.

10. Attention

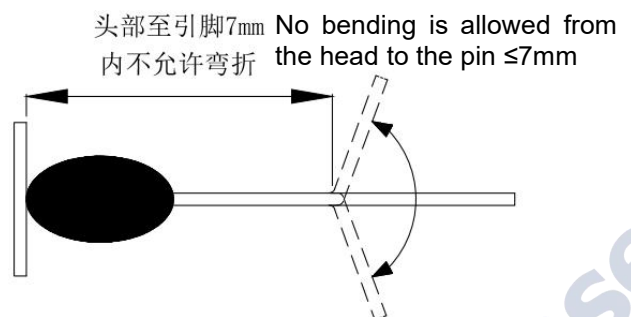
Thermistor may be damaged or misused. Please strictly observe as following:

- 10.1 Thermistor is designed for the specified purpose. Do not use them for other purposes.
- 10.2 After designed to be sensor, the reliability evaluation test should be carried out to confirm that there is no abnormality before use.
- 10.3 Do not use the thermistor exceed the maximum rated power of it.
- 10.4 Please use the thermistor within the applicable temperature range.
- 10.5 Measuring power of the measuring instrument should be zero power. (That is, the self-heat generated by the current flowing through the product can be negligible.)
- 10.6 Soldering iron head should not touch the product head.
- 10.7 Please avoid damage to the thermistor head caused by external mechanical force; In the process of inspection or use, it is forbidden to expand the leads outward and bending from head to the leads $\leq 7\text{mm}$. (See Picture 1 and Picture 2 below)



Do not expand the pin outward
嚴禁將引腳向外擴張

Picture 1



头部至引腳7mm No bending is allowed from the head to the pin $\leq 7\text{mm}$
內不允許彎折

Picture 2

- 10.8 Do not touch the thermistor leads directly with hands to avoid leads oxidation, thus affect the solderability.
- 10.9 Do not use in the following environment:
 - A. Corrosive air (Cl_2 , NH_3 , SO_x , NO_x , etc.)
 - B. Acid, alkali, organic solvent
 - C. Medium with high electrical conductivity (electrolyte, water, salt water)
 - D. Places with lots of dust

11. R-T Table

Part No:AT103F3435B				R25=10K Ω ±1%				B25/85=3435K±1%			
Temperature (°C)	R _{min} (K Ω)	R _{nor} (K Ω)	R _{max} (K Ω)	Temperature (°C)	R _{min} (K Ω)	R _{nor} (K Ω)	R _{max} (K Ω)	Temperature (°C)	R _{min} (K Ω)	R _{nor} (K Ω)	R _{max} (K Ω)
-40	198.7	206.9	215.4	3	23.78	24.23	24.69				
-39	187.8	195.5	203.4	4	22.79	23.22	23.65				
-38	177.6	184.7	192.1	5	21.85	22.25	22.65				
-37	168.0	174.7	181.5	6	20.95	21.32	21.70				
-36	159.0	165.2	171.6	7	20.10	20.45	20.80				
-35	150.6	156.3	162.3	8	19.28	19.61	19.94				
-34	142.6	148.0	153.5	9	18.50	18.81	19.12				
-33	135.1	140.1	145.3	10	17.76	18.05	18.34				
-32	128.1	132.7	137.6	11	17.06	17.32	17.59				
-31	121.4	125.8	130.3	12	16.38	16.63	16.88				
-30	115.2	119.3	123.5	13	15.74	15.97	16.21				
-29	109.3	113.1	117.0	14	15.12	15.34	15.56				
-28	103.7	107.3	111.0	15	14.53	14.74	14.94				
-27	98.50	101.8	105.3	16	13.97	14.16	14.35				
-26	93.56	96.67	99.88	17	13.43	13.61	13.79				
-25	88.90	91.81	94.80	18	12.92	13.09	13.25				
-24	84.50	87.22	90.02	19	12.43	12.58	12.74				
-23	80.34	82.89	85.51	20	11.96	12.10	12.25				
-22	76.42	78.80	81.25	21	11.51	11.65	11.78				
-21	72.71	74.93	77.22	22	11.08	11.21	11.33				
-20	69.20	71.28	73.42	23	10.67	10.79	10.90				
-19	65.80	67.75	69.75	24	10.28	10.38	10.49				
-18	62.60	64.42	66.29	25	9.900	10.00	10.10				
-17	59.57	61.28	63.02	26	9.532	9.632	9.732				
-16	56.71	58.31	59.94	27	9.179	9.279	9.379				
-15	54.01	55.50	57.02	28	8.841	8.941	9.040				
-14	51.46	52.85	54.27	29	8.518	8.617	8.716				
-13	49.04	50.34	51.68	30	8.208	8.306	8.405				
-12	46.75	47.97	49.22	31	7.911	8.009	8.107				
-11	44.59	45.73	46.89	32	7.627	7.723	7.821				
-10	42.54	43.61	44.70	33	7.354	7.450	7.547				
-9	40.60	41.60	42.62	34	7.092	7.187	7.283				
-8	38.76	39.69	40.65	35	6.841	6.935	7.030				
-7	37.01	37.89	38.78	36	6.600	6.694	6.788				
-6	35.36	36.18	37.01	37	6.369	6.462	6.555				
-5	33.79	34.56	35.34	38	6.147	6.239	6.331				
-4	32.30	33.02	33.75	39	5.935	6.025	6.116				
-3	30.89	31.56	32.24	40	5.730	5.819	5.910				
-2	29.54	30.17	30.81	41	5.534	5.622	5.711				
-1	28.27	28.86	29.46	42	5.345	5.432	5.520				
0	27.05	27.61	28.17	43	5.164	5.250	5.337				
1	25.91	26.43	26.95	44	4.990	5.075	5.160				
2	24.82	25.30	25.79	45	4.822	4.906	4.990				

Temperature (°C)	R _{min} (KΩ)	R _{nor} (KΩ)	R _{max} (KΩ)	Temperature (°C)	R _{min} (KΩ)	R _{nor} (KΩ)	R _{max} (KΩ)
46	4.662	4.744	4.827	86	1.370	1.411	1.454
47	4.507	4.588	4.670	87	1.332	1.373	1.414
48	4.358	4.438	4.519	88	1.296	1.335	1.376
49	4.215	4.293	4.373	89	1.260	1.299	1.339
50	4.077	4.155	4.233	90	1.226	1.264	1.303
51	3.945	4.021	4.098	91	1.193	1.230	1.269
52	3.817	3.892	3.969	92	1.160	1.197	1.235
53	3.695	3.769	3.844	93	1.129	1.165	1.202
54	3.577	3.649	3.723	94	1.099	1.134	1.171
55	3.463	3.534	3.607	95	1.069	1.104	1.140
56	3.353	3.424	3.495	96	1.041	1.075	1.110
57	3.248	3.317	3.387	97	1.013	1.0468	1.081
58	3.146	3.214	3.283	98	0.9865	1.0194	1.053
59	3.048	3.115	3.183	99	0.9605	0.9929	1.026
60	2.954	3.019	3.086	100	0.9353	0.9671	1.000
61	2.863	2.927	2.993	101	0.9109	0.9421	0.9743
62	2.775	2.838	2.903	102	0.8872	0.9178	0.9494
63	2.690	2.753	2.816	103	0.8642	0.8943	0.9253
64	2.608	2.670	2.732	104	0.8419	0.8714	0.9019
65	2.530	2.590	2.651	105	0.8203	0.8492	0.8791
66	2.454	2.513	2.573	106	0.7993	0.8277	0.8571
67	2.380	2.438	2.498	107	0.7789	0.8068	0.8356
68	2.309	2.366	2.425	108	0.7591	0.7865	0.8148
69	2.241	2.297	2.354	109	0.7399	0.7668	0.7946
70	2.175	2.230	2.286	110	0.7212	0.7476	0.7749
71	2.111	2.165	2.221	111	0.7031	0.7290	0.7558
72	2.049	2.103	2.157	112	0.6855	0.7110	0.7373
73	1.990	2.042	2.096	113	0.6684	0.6934	0.7193
74	1.932	1.984	2.036	114	0.6518	0.6763	0.7017
75	1.877	1.927	1.979	115	0.6356	0.6598	0.6847
76	1.823	1.872	1.923	116	0.6200	0.6436	0.6682
77	1.771	1.820	1.869	117	0.6047	0.6280	0.6521
78	1.721	1.769	1.817	118	0.5899	0.6128	0.6364
79	1.672	1.719	1.767	119	0.5755	0.5980	0.6212
80	1.625	1.671	1.718	120	0.5615	0.5836	0.6064
81	1.579	1.624	1.671	121	0.5479	0.5696	0.5920
82	1.535	1.579	1.624	122	0.5347	0.5560	0.5780
83	1.491	1.535	1.580	123	0.5219	0.5427	0.5644
84	1.450	1.493	1.536	124	0.5094	0.5299	0.5511
85	1.409	1.451	1.494	125	0.4972	0.5173	0.5382