

Specifications Approval Sheet

CUSTOMER: _____

CUSTOMER P/N: _____

PART NAME: _____ VT Series - NTC Thermistor _____

SPECIFICATION: _____ VT10K00FO25C3435B-L12.5E5.5D3 _____

DATE: _____

For Customer Approval:

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For Manufacturer Approval:

Formulation	Audit	Approval

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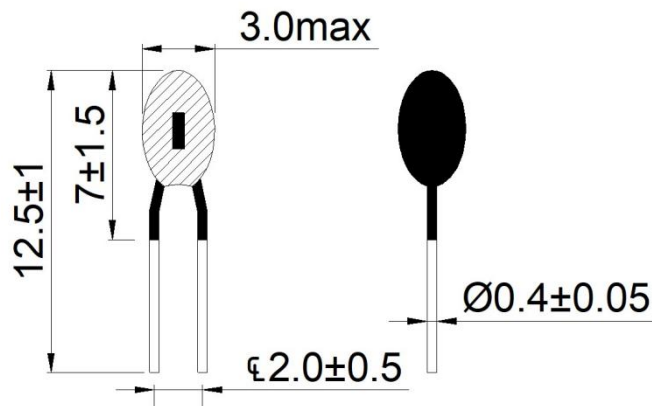
1. Range of Application

The specification approval sheet is applicable to VT 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

VT	10K00	F	O	25C	3435	B	L12.5	E5.5	D3
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩
Product Series Code	Resistance @25°C	Tolerance @25°C	Correction Gradient of Resistance Value	Measure Temp.	Beta	Test temp. of B	Total Length	Bare Leads Length	Head Diameter
LT Series NTC Thermistor	10KΩ	±1%	0%	25°C	3435K	25/85°C	12.5mm	5.5mm	3mm

4. Electrical Performance

No.	Item	Symbol	Test Condition	Scope	Unit
1	Resistance @25°C	R ₂₅	T=25±0.01°C	10±1%	KΩ
2	Beta	B _{25/85}	$B = \frac{\ln(R_{T1}) - \ln(R_{T2})}{(1/T1 - 1/T2)}$	3435±1%	K
3	Thermal time constant	τ	50°C→25°C, in the oil	≤10	sec
4	Dissipation Factor	δ	Ta=25±0.5°C	≈1.3	mW/°C
5	Max. Rated Power	Pr	Ta=25±0.5°C	≤90	mW
6	Operating Temp. Range	/	/	-40~+150	°C

4.1 Resistance Value (R_{25c})

Requirement: R₂₅=10KΩ±1%

Test method: Measuring in high-precision thermostatic oil tank of 25°C±0.05°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}=3435K±1%

Test method: The resistance values of 25±0.05°C and 85±0.05°C are measured in high-precision thermostatic oil tank, then calculate according to the following formula:

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

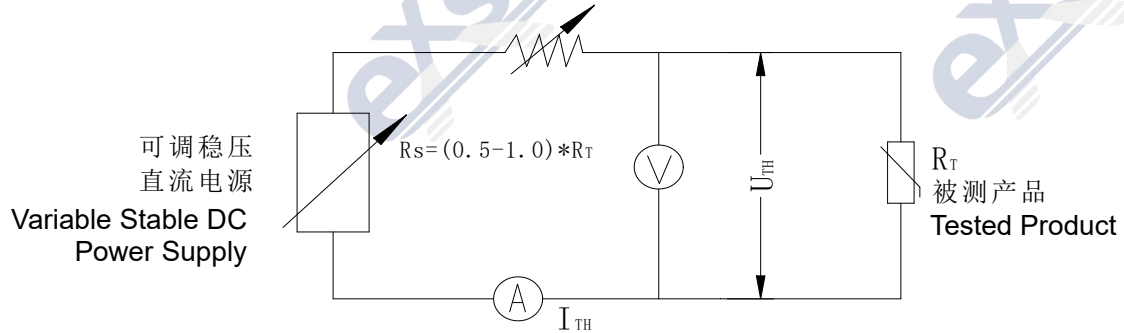
4.3 Thermal Time Constant (τ)

Thermal time constant: T1=50-(50-25)*63.2%=34.2°C, max 10 seconds (in oil tank)

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

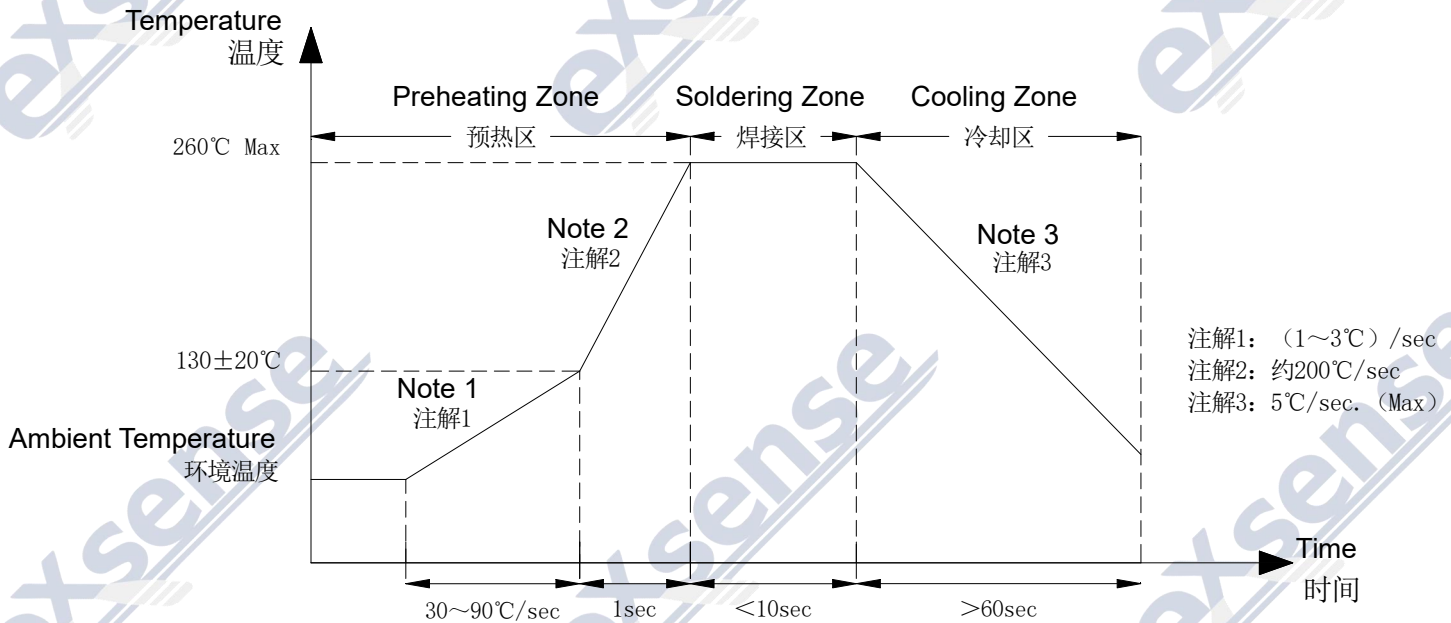
$-40^\circ\text{C} \sim +150^\circ\text{C}$.

5. Reliability

Item	Standard	Test Method
Soldering Test	△ Soldering coverage rate \geq 90%	Soldering temperature: $265\pm 3^{\circ}\text{C}$, Tin immersion time: 1 ± 0.5 seconds
Soldering Resistance Test		Soldering temperature: $265\pm 3^{\circ}\text{C}$, Immersion Tin time: 10 ± 1 sec; 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: $10\sim 55\text{Hz}$ Total amplitude: 1.52mm Time: X, Y, Z direction each 2hrs.
Temperature Cycling Test	△ Change rate of resistance value $\leq\pm 1\%$ △ Change rate of Beta $\leq\pm 1\%$	$-40^{\circ}\text{C}\times 30\text{min}\rightarrow$ room temperature $\times 5\text{min}\rightarrow 100^{\circ}\text{C}\times 30\text{min}\rightarrow$ room temperature $\times 5\text{min}$, 10 cycle times.
Thermal Shock Test	△ Appearance without damage	$0^{\circ}\text{C}\times 3\text{min}\rightarrow$ room temperature $\times 3\text{min}\rightarrow 100^{\circ}\text{C}\times 3\text{min}\rightarrow$ room temperature $\times 3\text{min}$, 100 cycle times.
Low Temperature Storage Test		Thermistor placed at $-40\pm 5^{\circ}\text{C}$ air for $1000\text{h}\pm 24\text{hrs}$
Load Test		Thermistor operates at room temperature with DC 0.2mA working current for $1000\text{h}\pm 24\text{hrs}$.
Moisture Resistance Test		Thermistor placed at $40\pm 2^{\circ}\text{C}$, 90-95%RH air for $1000\text{h}\pm 24\text{hrs}$
High Temperature Against Test	△ Change rate of resistance value $\leq\pm 3\%$ △ Change rate of Beta $\leq\pm 1\%$ △ Appearance without damage	Thermistor placed at $150\pm 5^{\circ}\text{C}$ air for $1000\text{h}\pm 24\text{hrs}$

6. Recommended Soldering Process Condition

6.1 Reflow soldering



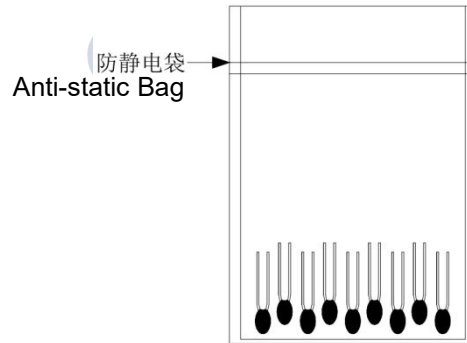
5.2 Soldering conditions of handcrafted soldering iron

Item	Condition
Temperature of soldering iron head	360°C (max)
Soldering time	3Sec (max)
Distance between soldering position and encapsulation layer	7mm (min)
Note: the soldering iron head should not touch the thermistor head	

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 vacuumed 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.

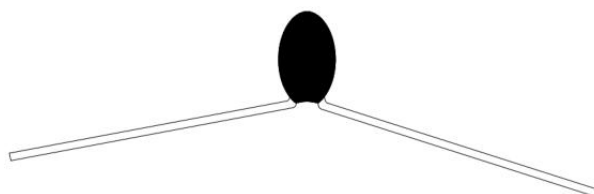
10.3 Do not use the thermistor exceed the maximum rated power of it.

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.)

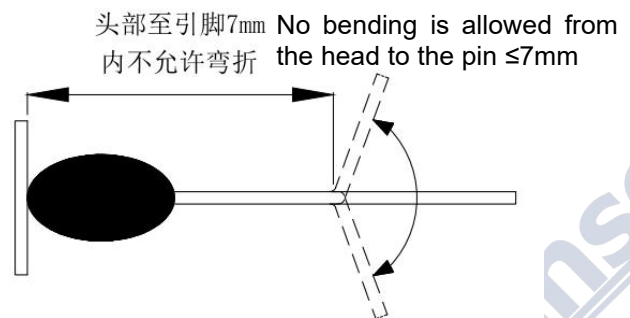
10.6 Soldering iron head should not touch the product head.

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
 严禁将引脚向外扩张

Picture 1



头部至引脚7mm No bending is allowed from
 内不允许弯折 the head to the pin $\leq 7\text{mm}$

Picture 2

10.7 Do not touch the thermistor leads directly with hands to avoid leads oxidation, thus affect the solderability.

10.8 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: VT10K00FO25C3435B				R25=10KΩ±1%				B25/85=3435K±1%			
Temperature (°C)	R _{min} (KΩ)	R _{nor} (KΩ)	R _{max} (KΩ)	Temperature (°C)	R _{min} (KΩ)	R _{nor} (KΩ)	R _{max} (KΩ)	Temperature (°C)	R _{min} (KΩ)	R _{nor} (KΩ)	R _{max} (KΩ)
-40	197.7	205.8	214.2	3	23.82	24.27	24.73	3	23.82	24.27	24.73
-39	186.7	194.3	202.1	4	22.83	23.25	23.68	4	22.83	23.25	23.68
-38	176.5	183.5	190.8	5	21.88	22.28	22.68	5	21.88	22.28	22.68
-37	166.9	173.4	180.2	6	20.98	21.35	21.73	6	20.98	21.35	21.73
-36	157.8	163.9	170.3	7	20.12	20.47	20.82	7	20.12	20.47	20.82
-35	149.4	155.1	161.0	8	19.30	19.63	19.96	8	19.30	19.63	19.96
-34	141.4	146.7	152.2	9	18.52	18.83	19.14	9	18.52	18.83	19.14
-33	133.9	138.9	144.0	10	17.78	18.07	18.35	10	17.78	18.07	18.35
-32	126.9	131.5	136.3	11	17.07	17.34	17.61	11	17.07	17.34	17.61
-31	120.2	124.6	129.0	12	16.39	16.64	16.90	12	16.39	16.64	16.90
-30	114.0	118.0	122.2	13	15.75	15.98	16.22	13	15.75	15.98	16.22
-29	108.1	111.9	115.8	14	15.13	15.35	15.57	14	15.13	15.35	15.57
-28	102.6	106.1	109.8	15	14.54	14.74	14.95	15	14.54	14.74	14.95
-27	97.41	100.7	104.1	16	13.98	14.17	14.36	16	13.98	14.17	14.36
-26	92.50	95.56	98.72	17	13.44	13.62	13.80	17	13.44	13.62	13.80
-25	87.87	90.73	93.69	18	12.93	13.09	13.26	18	12.93	13.09	13.26
-24	83.50	86.18	88.94	19	12.43	12.59	12.74	19	12.43	12.59	12.74
-23	79.38	81.88	84.46	20	11.96	12.11	12.25	20	11.96	12.11	12.25
-22	75.48	77.83	80.24	21	11.51	11.65	11.78	21	11.51	11.65	11.78
-21	71.81	74.00	76.25	22	11.08	11.21	11.33	22	11.08	11.21	11.33
-20	68.33	70.38	72.49	23	10.67	10.79	10.90	23	10.67	10.79	10.90
-19	65.06	66.97	68.94	24	10.28	10.39	10.49	24	10.28	10.39	10.49
-18	61.95	63.75	65.59	25	9.900	10.00	10.10	25	9.900	10.00	10.10
-17	59.02	60.70	62.42	26	9.531	9.631	9.731	26	9.531	9.631	9.731
-16	56.24	57.82	59.43	27	9.178	9.278	9.378	27	9.178	9.278	9.378
-15	53.62	55.09	56.60	28	8.841	8.940	9.039	28	8.841	8.940	9.039
-14	51.13	52.51	53.92	29	8.517	8.616	8.715	29	8.517	8.616	8.715
-13	48.77	50.06	51.38	30	8.207	8.305	8.404	30	8.207	8.305	8.404
-12	46.53	47.74	48.98	31	7.910	8.008	8.106	31	7.910	8.008	8.106
-11	44.41	45.55	46.70	32	7.625	7.722	7.820	32	7.625	7.722	7.820
-10	42.40	43.46	44.55	33	7.352	7.449	7.545	33	7.352	7.449	7.545
-9	40.49	41.49	42.50	34	7.091	7.186	7.282	34	7.091	7.186	7.282
-8	38.68	39.62	40.57	35	6.840	6.934	7.029	35	6.840	6.934	7.029
-7	36.97	37.84	38.73	36	6.599	6.692	6.787	36	6.599	6.692	6.787
-6	35.33	36.15	36.99	37	6.368	6.460	6.554	37	6.368	6.460	6.554
-5	33.78	34.55	35.33	38	6.146	6.238	6.330	38	6.146	6.238	6.330
-4	32.31	33.03	33.76	39	5.933	6.024	6.115	39	5.933	6.024	6.115
-3	30.91	31.58	32.27	40	5.729	5.818	5.909	40	5.729	5.818	5.909
-2	29.58	30.21	30.85	41	5.533	5.621	5.710	41	5.533	5.621	5.710
-1	28.31	28.90	29.50	42	5.344	5.431	5.519	42	5.344	5.431	5.519
0	27.11	27.66	28.22	43	5.163	5.249	5.336	43	5.163	5.249	5.336
1	25.96	26.48	27.00	44	4.989	5.074	5.160	44	4.989	5.074	5.160
2	24.86	25.35	25.84	45	4.822	4.906	4.990	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	4.661	4.744	4.827	92	1.160	1.197	1.235
47	4.507	4.588	4.670	93	1.129	1.165	1.202
48	4.358	4.438	4.519	94	1.098	1.134	1.170
49	4.215	4.294	4.373	95	1.069	1.104	1.140
50	4.077	4.155	4.233	96	1.040	1.075	1.110
51	3.945	4.021	4.099	97	1.013	1.046	1.081
52	3.818	3.893	3.969	98	0.9859	1.019	1.053
53	3.695	3.769	3.844	99	0.9599	0.9922	1.026
54	3.577	3.650	3.723	100	0.9346	0.9664	0.9991
55	3.463	3.535	3.607	101	0.9098	0.9410	0.9731
56	3.354	3.424	3.496	102	0.8857	0.9163	0.9478
57	3.248	3.317	3.388	103	0.8623	0.8923	0.9233
58	3.146	3.215	3.284	104	0.8396	0.8691	0.8995
59	3.049	3.115	3.183	105	0.8176	0.8465	0.8764
60	2.954	3.020	3.087	106	0.7962	0.8246	0.8539
61	2.863	2.928	2.993	107	0.7755	0.8033	0.8321
62	2.775	2.839	2.903	108	0.7554	0.7827	0.8109
63	2.690	2.753	2.817	109	0.7358	0.7627	0.7904
64	2.609	2.670	2.733	110	0.7169	0.7432	0.7704
65	2.530	2.590	2.652	111	0.6985	0.7243	0.7510
66	2.454	2.513	2.574	112	0.6806	0.7059	0.7321
67	2.380	2.439	2.498	113	0.6632	0.6881	0.7138
68	2.310	2.367	2.425	114	0.6463	0.6707	0.6960
69	2.241	2.297	2.355	115	0.6299	0.6539	0.6787
70	2.175	2.230	2.287	116	0.6140	0.6375	0.6619
71	2.111	2.166	2.221	117	0.5985	0.6216	0.6455
72	2.050	2.103	2.157	118	0.5835	0.6062	0.6296
73	1.990	2.042	2.096	119	0.5689	0.5911	0.6142
74	1.933	1.984	2.036	120	0.5547	0.5765	0.5992
75	1.877	1.927	1.979	121	0.5412	0.5626	0.5848
76	1.823	1.873	1.923	122	0.5280	0.5491	0.5709
77	1.771	1.820	1.870	123	0.5153	0.5359	0.5573
78	1.721	1.769	1.818	124	0.5028	0.5231	0.5442
79	1.672	1.719	1.767	125	0.4907	0.5107	0.5313
80	1.625	1.672	1.719	126	0.4790	0.4985	0.5189
81	1.579	1.625	1.671	127	0.4675	0.4868	0.5067
82	1.535	1.579	1.625	128	0.4564	0.4753	0.4949
83	1.492	1.535	1.580	129	0.4456	0.4641	0.4834
84	1.450	1.493	1.536	130	0.4351	0.4533	0.4722
85	1.409	1.451	1.494	131	0.4248	0.4427	0.4613
86	1.370	1.411	1.454	132	0.4149	0.4324	0.4507
87	1.332	1.373	1.414	133	0.4052	0.4224	0.4403
88	1.296	1.335	1.376	134	0.3957	0.4127	0.4303
89	1.260	1.299	1.339	135	0.3865	0.4032	0.4205
90	1.226	1.264	1.303	136	0.3776	0.3939	0.4109
91	1.192	1.230	1.268	137	0.3689	0.3849	0.4016

Temp(°C)	Rmin(KΩ)	Rnor(KΩ)	Rmax(KΩ)	Temp(°C)	Rmin(KΩ)	Rnor(KΩ)	Rmax(KΩ)
138	0.3604	0.3762	0.3926	145	0.3069	0.3208	0.3354
139	0.3521	0.3676	0.3838	146	0.3000	0.3137	0.3280
140	0.3441	0.3593	0.3752	147	0.2933	0.3068	0.3208
141	0.3362	0.3512	0.3668	148	0.2868	0.3000	0.3138
142	0.3286	0.3433	0.3586	149	0.2804	0.2934	0.3070
143	0.3212	0.3356	0.3507	150	0.2742	0.2870	0.3004
144	0.3139	0.3281	0.3429				