

Specifications Approval Sheet

CUSTOMER: _____

CUSTOMER P/N: _____

PART NAME: _____ DT-A Series - NTC Thermistor Chip

SPECIFICATION: _____ DT104F3950A-A-S-B

DATE: _____

For Customer Approval:

| |
|--|
| |
|--|

For Manufacturer Approval:

| Formulation | Audit | Approval |
|-------------|-------|----------|
| | | |

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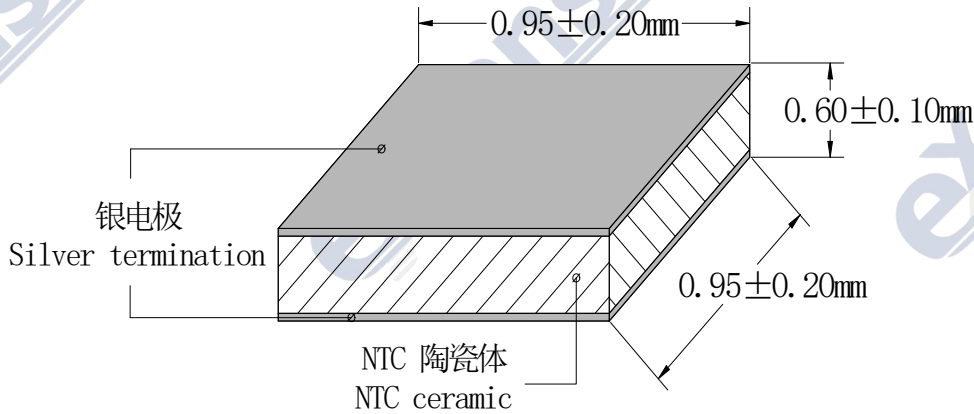
1. Range of Application

The specification approval sheet is applicable to DT-A 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

| DT | 104 | F | 3950 | A | A | S | B |
|----------------------------|----------------------|-----------------|-------|-----------------|--------------------|----------------|---------|
| ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |
| Product Series Code | Resistance @25°C | Tolerance @25°C | Beta | Test temp. of B | Electrode Material | Welding Method | Packing |
| DT-A Series NTC Thermistor | 10×10 ⁴ Ω | ±1% | 3950K | 25/50°C | Silver Electrode | Solder Welding | Bulk |

4. Electrical Performance

| No. | Item | Symbol | Test Condition | Scope | Unit |
|-----|--------------------------|--------------------|---|----------|-------|
| 1 | Resistance @25°C | R ₂₅ | T=25±0.01°C | 100±1% | KΩ |
| 2 | Beta | B _{25/50} | $B = \frac{\ln(R_{T1}) - \ln(R_{T2})}{(1/T1 - 1/T2)}$ | 3950±1% | K |
| 3 | Thermal time constant | τ | 50°C → 25°C, in oil | ≤2.0 | sec |
| 4 | Dissipation Factor | δ | Ta=25±0.5°C | ≈1.2 | mW/°C |
| 5 | Max. Rated Power | Pr | Ta=25±0.5°C | ≤60 | mW |
| 6 | Operating Temp. Range | / | / | -40~+125 | °C |

4.1 Resistance Value (R_{25°C})

Requirement: R₂₅ = 100KΩ ± 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_{25/50} = 3950K ± 1%

Test method: The resistance values of 25 ± 0.05°C and 50 ± 0.05°C are measured in high-precision thermostatic oil tank, then calculate according to the following formula:

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

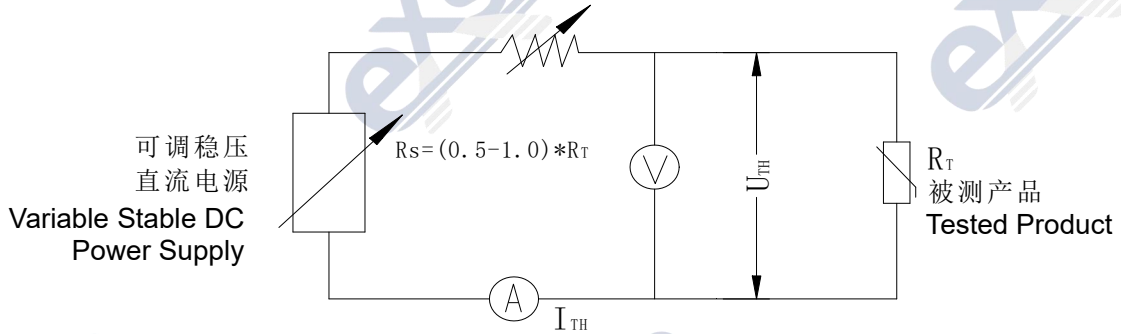
4.3 Thermal Time Constant (τ)

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

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 60mW.

4.6 Operating temp. Range

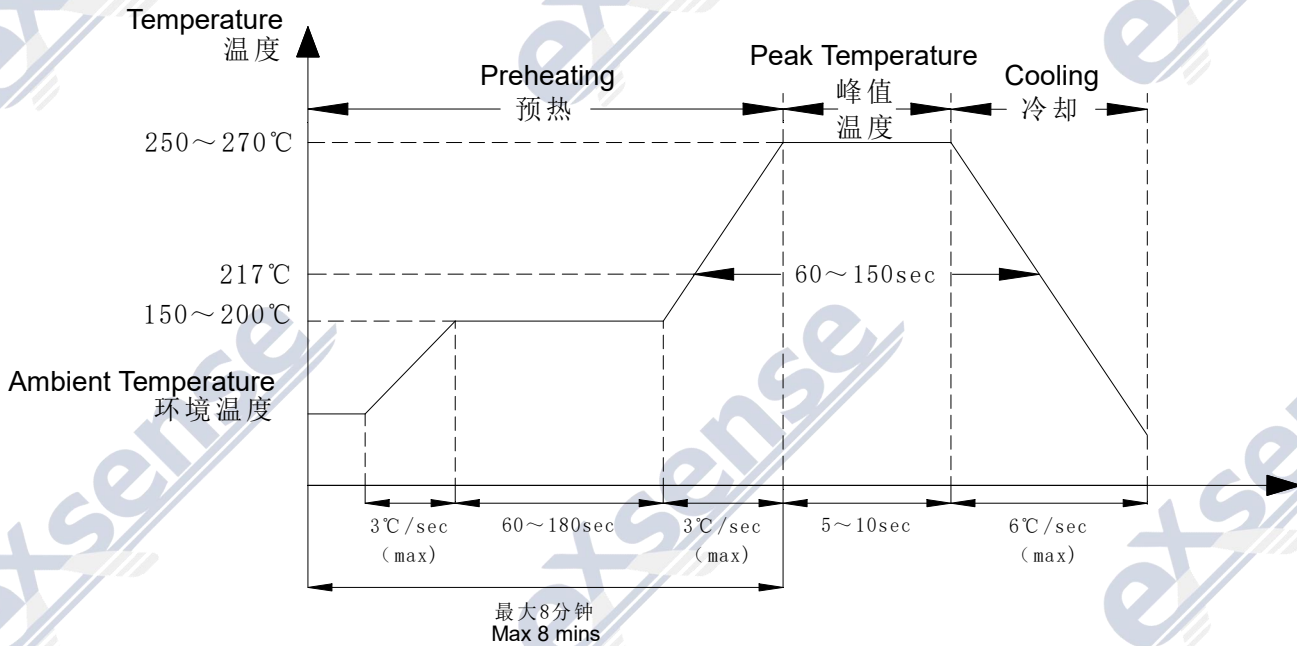
$-40^\circ\text{C} \sim +125^\circ\text{C}$. (All materials used to assemble must meet the highest operating temperature)

5. Reliability

| Item | Standard | Test Method |
|-------------------------------------|--|---|
| Solderability Test | △ At least 95% of the termination electrode surface is covered with solder | Preheating temperature: 100°C~150°C Preheating time: 1Min Product soldering temperature: 265±5°C Tin immersion time: 1±0.5s |
| Vibration Test | | Vibration frequency range:10~55Hz Total amplitude: 1.52mm Time: X, Y, Z direction each 2hrs. |
| Thermal Shock Test | | After the chip is welded to the lead, which is coated into a thermistor with epoxy resin and circulated 1000 times in the air according to the following temperature curve: -40°C×30min→100°C×30min |
| High Temperature Aging Test | △ Change rate of resistance value≤±1% | After the chip is welded to the lead, which is coated into a thermistor with epoxy resin, placed at 125±5°C air for 1000h±24hrs |
| Low Temperature Storage Test | △ Change rate of Beta≤±1% △ Appearance without damage | After the chip is welded to the lead, which is coated into a thermistor with epoxy resin, placed at -40±5°C air for 1000h±24hrs |
| High Temperature Load Test | | After the chip is welded to the lead, which is coated into a thermistor with epoxy resin, under the condition of 100±5°C, 1.0mA working current is transmitted, working 1000h±24hrs. |
| High Temperature High Humidity Test | | After the chip is welded to the lead, which is coated into a thermistor with epoxy resin, placed at 85±2°C, 85±5%RH air for 1000h±24hrs |

6. Recommended Welding Process Condition

6.1 Reflow soldering



6.2 Recommended working conditions for manual soldered iron soldering

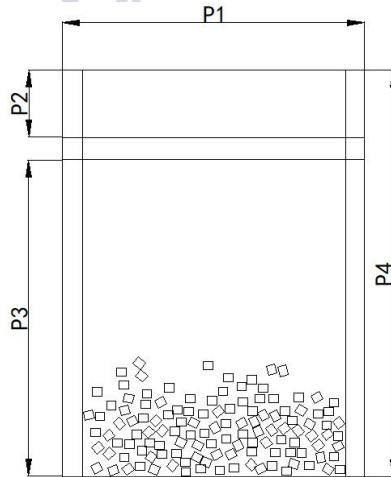
| Item | Condition |
|---|---|
| Soldering temperature | Soldering when the iron head temperature is 280°C (Max.) and the iron power is 30W (Max.) |
| Soldering time | ≤2sec |
| Note: Do not touch the chip with the soldering iron head. | |

6.3 Technological condition of soldering

| Item | Condition |
|--|-----------|
| Soldering temperature | 265±3°C |
| Soldering time | 1±0.5sec |
| Note: The use of soldering flux helps to obtain better soldering result. | |

7. Packing

Bulk, NTC thermistor chips are vacuumized and packed in anti-static bags, QTY: 5K pcs/bag.



| Unit | P1 | P2 | P3 | P4 |
|------|------|------|------|-------|
| mm | 90±3 | 20±3 | 85±3 | 120±3 |

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℃~+40℃.

8.5 Relative humidity: ≤75%RH.

9. Storage Life

9.1 Under the guarantee of the integrity of the sealed package and the above storage conditions, the bulk vacuum-sealed package can be stored for 1 year. (Recommended to store in inert gas.)

9.2 After the packing is opened, please use it within 24 hours under indoor conditions of normal 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 chip may be damaged or misused. Please strictly observe as following:

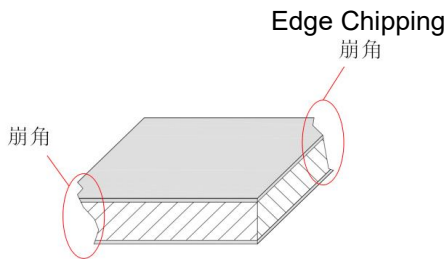
10.1 Thermistor is designed for the specified purpose. Do not use them for other purposes.

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

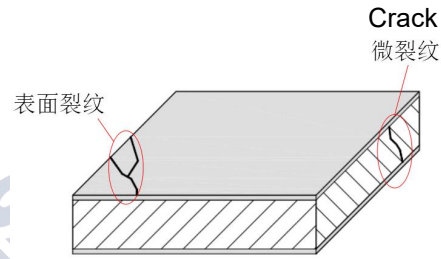
10.3 Please use the thermistor within the applicable temperature range. All materials used to assemble must meet the highest operating temperature.

10.4 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.)

10.5 Please avoid excessive welding pressure; Avoid the external mechanical force to the thermistor chip caused by crack, edge chipping and other damage. (The causes of thermistor chip damage are: ①using tweezers to pick up the chip; ②welding pressure is too large; ③strong impact) See Picture 1 and Picture 2 below:



Picture 1



Picture 2

10.6 Thermistor chip exposed to the air directly will lead to oxidation, yellowing; Do not touch thermistor chip with hands directly.

10.7 Do not use in the following environment:

- A. Corrosive air (C1₂, NH₃, 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. Period of Validity

After being used on the machine, under the conditions specified in the specification approval sheet, the used period can be guaranteed for 10 years.

12. R-T Table

| Part No.:DT104F3950A-A-S-B | | | | $R_{25}=100K\Omega\pm 1\%$ | | | | $B_{25/50}=3950K\pm 1\%$ | | | |
|----------------------------|-------------------------|-------------------------|-------------------------|----------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|-------------------------|-------------------------|
| 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 | 3094 | 3235 | 3383 | 2 | 288.0 | 294.1 | 300.3 | | | | |
| -39 | 2902 | 3033 | 3169 | 3 | 274.1 | 279.7 | 285.4 | | | | |
| -38 | 2723 | 2844 | 2970 | 4 | 260.9 | 266.2 | 271.5 | | | | |
| -37 | 2556 | 2668 | 2785 | 5 | 248.5 | 253.3 | 258.2 | | | | |
| -36 | 2401 | 2504 | 2612 | 6 | 236.7 | 241.2 | 245.7 | | | | |
| -35 | 2255 | 2351 | 2451 | 7 | 225.5 | 229.7 | 233.9 | | | | |
| -34 | 2120 | 2209 | 2301 | 8 | 214.9 | 218.8 | 222.7 | | | | |
| -33 | 1994 | 2076 | 2161 | 9 | 204.9 | 208.5 | 212.1 | | | | |
| -32 | 1875 | 1952 | 2030 | 10 | 195.4 | 198.7 | 202.1 | | | | |
| -31 | 1765 | 1835 | 1909 | 11 | 186.4 | 189.5 | 192.6 | | | | |
| -30 | 1662 | 1727 | 1795 | 12 | 177.8 | 180.7 | 183.6 | | | | |
| -29 | 1565 | 1626 | 1688 | 13 | 169.7 | 172.4 | 175.0 | | | | |
| -28 | 1475 | 1531 | 1589 | 14 | 162.0 | 164.5 | 167.0 | | | | |
| -27 | 1390 | 1442 | 1496 | 15 | 154.7 | 157.0 | 159.3 | | | | |
| -26 | 1311 | 1359 | 1409 | 16 | 147.8 | 149.9 | 152.0 | | | | |
| -25 | 1236 | 1281 | 1327 | 17 | 141.2 | 143.2 | 145.1 | | | | |
| -24 | 1167 | 1208 | 1251 | 18 | 135.0 | 136.8 | 138.6 | | | | |
| -23 | 1101 | 1140 | 1180 | 19 | 129.0 | 130.7 | 132.3 | | | | |
| -22 | 1040 | 1076 | 1113 | 20 | 123.4 | 124.9 | 126.4 | | | | |
| -21 | 982.5 | 1016 | 1050 | 21 | 118.0 | 119.4 | 120.8 | | | | |
| -20 | 928.4 | 959.3 | 991.0 | 22 | 112.9 | 114.2 | 115.5 | | | | |
| -19 | 877.1 | 905.7 | 935.1 | 23 | 108.0 | 109.2 | 110.4 | | | | |
| -18 | 828.9 | 855.4 | 882.7 | 24 | 103.4 | 104.5 | 105.6 | | | | |
| -17 | 783.7 | 808.3 | 833.6 | 25 | 99.00 | 100.0 | 101.0 | | | | |
| -16 | 741.2 | 764.0 | 787.5 | 26 | 94.72 | 95.72 | 96.72 | | | | |
| -15 | 701.2 | 722.4 | 744.2 | 27 | 90.66 | 91.65 | 92.65 | | | | |
| -14 | 663.7 | 683.4 | 703.6 | 28 | 86.78 | 87.77 | 88.77 | | | | |
| -13 | 628.4 | 646.7 | 665.4 | 29 | 83.10 | 84.08 | 85.07 | | | | |
| -12 | 595.1 | 612.1 | 629.6 | 30 | 79.58 | 80.56 | 81.54 | | | | |
| -11 | 563.9 | 579.7 | 595.8 | 31 | 76.24 | 77.21 | 78.18 | | | | |
| -10 | 534.4 | 549.1 | 564.1 | 32 | 73.05 | 74.01 | 74.98 | | | | |
| -9 | 506.7 | 520.3 | 534.3 | 33 | 70.01 | 70.96 | 71.92 | | | | |
| -8 | 480.6 | 493.2 | 506.2 | 34 | 67.12 | 68.06 | 69.00 | | | | |
| -7 | 455.9 | 467.7 | 479.7 | 35 | 64.35 | 65.28 | 66.22 | | | | |
| -6 | 432.7 | 443.6 | 454.8 | 36 | 61.72 | 62.64 | 63.56 | | | | |
| -5 | 410.8 | 421.0 | 431.3 | 37 | 59.21 | 60.11 | 61.02 | | | | |
| -4 | 390.1 | 399.6 | 409.2 | 38 | 56.81 | 57.70 | 58.60 | | | | |
| -3 | 370.6 | 379.4 | 388.3 | 39 | 54.52 | 55.40 | 56.28 | | | | |
| -2 | 352.2 | 360.3 | 368.6 | 40 | 52.33 | 53.20 | 54.07 | | | | |
| -1 | 334.8 | 342.4 | 350.1 | 41 | 50.25 | 51.10 | 51.95 | | | | |
| 0 | 318.3 | 325.4 | 332.5 | 42 | 48.25 | 49.09 | 49.93 | | | | |
| 1 | 302.8 | 309.3 | 315.9 | 43 | 46.35 | 47.17 | 48.00 | | | | |

