MetalLions

MNTC0603X503F4150FTB

Chip Temp. Sensing NTC Thermistor

FEATURES

- SMD type suitable for high density mounting
- Series of B constant for various applications
- Excellent solder ability
- Operate temperature range .... －40℃～＋125℃.
- RoHS compliant

APPLICATIONS

- Telecommunication equipments such as cellular phone, automobile phone, etc.
- Office automation such as printer, facsimile, word processor, etc.
- Battery, CPU temperature protection.

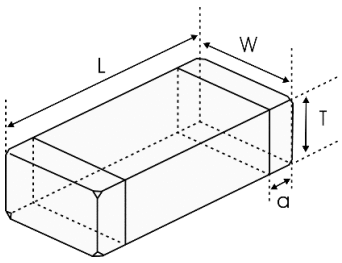
PRODUCT IDENTIFICATION

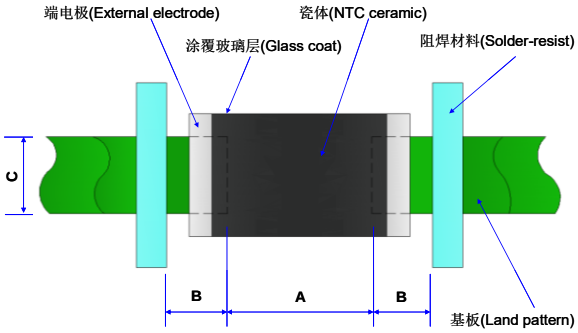
MNTC 0603 X 503 F 4150 F T B

1 2 3 4 5 6 7 8 9

- 1:Product Series: Chip Temp. Sensing NTC Thermistor
- 2:Dimensions:0603[1608] :1.60×0.8×0.8
- 3:Delimiter:X
- 4:Nominal Zero-Power Resistance at 25℃: 503:50kΩ
- 5:Tolerance of Resistance:F±1%,G±2%,H±3%,J±5%
- 6:B Constant:4150:4150K
- 7:Tolerance of B Constant:F±1%, H±3%
- 8: Packing:Tape Carrier Package
- 9:B constant calculation method:A25℃&85℃;B:25℃&50℃

Dimensions: [mm]





Recommended PCB pattern for reflow soldering

unit: inch[mm]

Type	L	W	T	a	A	B	C
0603 [1608]	0.063±0.006 [1.6±0.15]	0.031±0.006 [0.8±0.15]	0.031±0.006 [0.8±0.15]	0.012±0.008 [0.3±0.2]	[0.6-0.8]	[0.6-0.7]	[0.6-0.8]

Electrical Characteristics List

Part No	Resistance (25℃) (kΩ)	B Constant (25/50℃) （K）	B Constant (25/85℃) （K）	Permissible Operating Current （25℃） （mA）	Dissipation Factor (mW/℃)	Thermal Time Constant (s)	Rated Electric Power(25℃) (mW)	Operating ambient temperature （℃）
MNTC0603X503F4150FTB	50±1%	4150±1%	4209 ref.	0.13	1.0	＜5	100	-40～+125

When measured at 25°C in still air, as a single unit without mounting.

Test and Measurement Procedures

· Test Conditions

Unless otherwise specified, the standard atmospheric conditions for measurement/test as:

a. Ambient Temperature: 20±15℃
b. Relative Humidity: 65±20%
c. Air Pressure: 86kPa to 106kPa

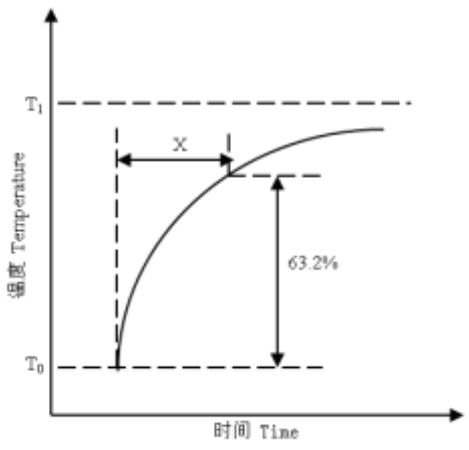
If any doubt on the results, measurements/tests should be made within the following limits:

a. Ambient Temperature: 25±2℃
b. Relative Humidity: 65±5%
c. Air Pressure: 86kPa to 106kPa

· Inspection Equipment

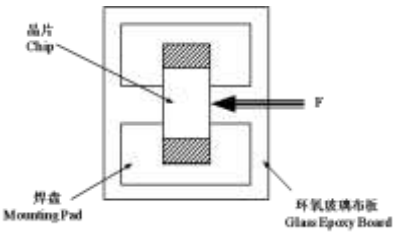
Visual Examination: 20×magnifier
Resistance value test: Thermistor resistance tester

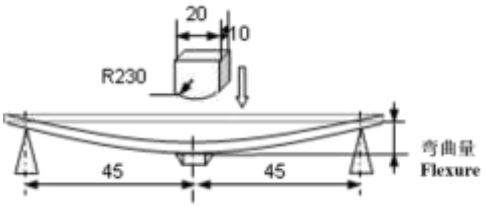
Electrical Test

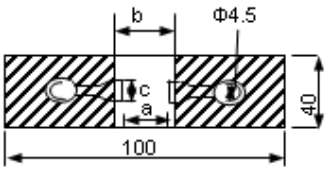
No.	Items	Test Methods and Remarks
1	Nominal Zero-Power Resistance at 25℃(R25)	Ambient temperature：25±0.0 5℃ Measuring electric power：≤0.1mW
2	Nominal B Constant	Measure the resistance at the ambient temperature of 25±0.05℃, 50±0.0 5℃ or 85 ±0.0 5℃. $B(25\text{-}50℃)=\frac{\ln R_{25}-\ln R_{50}}{1/T_{25}-1/T_{50}}$ $B(25\text{-}85℃)=\frac{\ln R_{25}-\ln R_{85}}{1/T_{25}-1/T_{85}}$ T：（K）Absolute temperature (K)
3	Thermal Time Constant	The total time for the temperature of the thermistor to change by 63.2% of the difference from ambient temperature T_0(℃) to T_1 (℃) by the drastic change of the power applied to thermistor from Non-zero Power to Zero-Power state, normally expressed in second(S). 

4	Dissipation Factor	The required power which makes the NTC thermistor body temperature raise 1℃ through self-heated, normally expressed in milliwatts per degree Celsius (mW/℃). It can be calculated by the following formula: $\delta = \frac{W}{T-T_0}$
5	Rated Power	The necessary electric power makes thermistor's temperature rise 100℃ by self-heating at ambient temperature 25℃.
6	Permissible operating current	The current that keep body temperature of chip NTC on the PC board in still air rising 1°C by self-heating.

Reliability Test

<table>
<tr><th>Items</th><th>Standard</th><th>Test Methods and Remarks</th><th>Requirements</th></tr>
<tr>
<td>Terminal Strength</td>
<td>IEC 60068-2-21</td>
<td>Solder the chip to the testing jig (glass epoxy board shown in the right) using eutectic solder. Then apply a force in the direction of the arrow.
<table>
<tr><th>Size</th><th>F</th><th>Duration</th></tr>
<tr><td>0201</td><td>2N</td><td rowspan="3">10±1s</td></tr>
<tr><td>0402, 0603</td><td>5N</td></tr>
<tr><td>0805</td><td>10N</td></tr>
</table>
</td>
<td>No removal or split of the termination or other defects shall occur.


</td>
</tr>
<tr>
<td>Resistance to Flexure</td>
<td>IEC 60068-2-21</td>
<td>Solder the chip to the test jig (glass epoxy board shown in the right) using a eutectic solder. Then apply a force in the direction shown as follow;


<table>
<tr><th>Size</th><th>Flexure</th><th>Pressurizing Speed</th><th>Duration</th></tr>
<tr><td>0201,</td><td>1mm</td><td rowspan="2">＜0.5mm/s</td><td rowspan="2">10±1s</td></tr>
<tr><td>0402, 0603, 0805</td><td>2mm</td></tr>
</table>
</td>
<td>① No visible damage.
② ｜ΔR25/R25｜≤2%
unit：mm
<table>
<tr><th>Type</th><th>a</th><th>b</th><th>c</th></tr>
<tr><td>0201</td><td>0.25</td><td>0.3</td><td>0.3</td></tr>
<tr><td>0402</td><td>0.4</td><td>1.5</td><td>0.5</td></tr>
<tr><td>0603</td><td>1.0</td><td>3.0</td><td>1.2</td></tr>
<tr><td>0805</td><td>1.2</td><td>4.0</td><td>1.65</td></tr>
</table>


</td>
</tr>
</table>

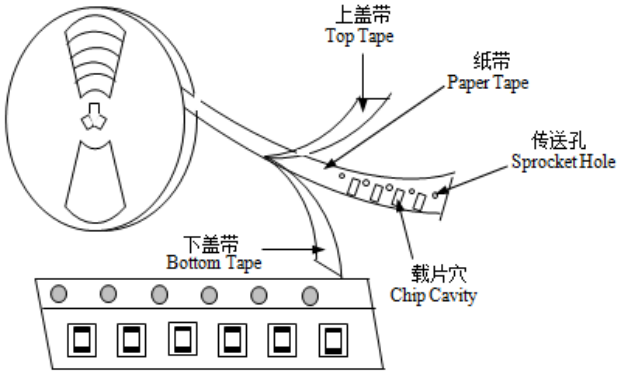
<table>
<tr>
<td>Vibration</td>
<td>IEC 60068-2-80</td>
<td>① Solder the chip to the testing jig (glass epoxy board shown in the left) using eutectic solder.
② The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz.
③ The frequency ranges from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3mutually perpendicular directions (total of 6 hours).</td>
<td>No visible damage.
 
</td>
</tr>
<tr>
<td>Dropping</td>
<td>IEC 60068-2-32</td>
<td>Drop a chip 10 times on a concrete floor from a height of 1 meter.</td>
<td>No visible damage.</td>
</tr>
<tr>
<td>Solderability</td>
<td>IEC 60068-2-58</td>
<td>① Solder temperature: 245±5 ℃.
② Duration: 3±0.3s.
③ Solder: 96.5Sn/3.0Ag/0.5Cu.
④ Flux: （重量比）25%松香和 75%酒精25%
Resin and 75% ethanol in weight.</td>
<td>① No visible damage.
② Wetting shall exceed 95% coverage</td>
</tr>
<tr>
<td>Resistance to Soldering Heat</td>
<td>IEC 60068-2-58</td>
<td>① Solder temperature: 260±5 ℃.
② Duration: 10±1s.
③ Solder: 96.5Sn/3.0Ag/0.5Cu.
④ Flux: （重量比）25%松香和 75%酒精25%
Resin and 75% ethanol in weight.
⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.</td>
<td>① No visible damage.
② $|\Delta R25/R25| \leq 2\%$
③ $|\Delta B/B| \leq 1\%$</td>
</tr>
<tr>
<td>Temperature cycling</td>
<td>IEC 60068-2-14</td>
<td>① 5 cycles of following sequence without loading.
<table>
<tr><th>Step</th><th>Temperature</th><th>Time</th></tr>
<tr><td>1</td><td>-40±5℃</td><td>30±3min</td></tr>
<tr><td>2</td><td>25±2℃</td><td>5±3min</td></tr>
<tr><td>3</td><td>125±2℃</td><td>30±3min</td></tr>
<tr><td>4</td><td>25±2℃</td><td>5±3min</td></tr>
</table>
② The chip shall be stabilized at normal condition for 1~2 hours before measuring.</td>
<td>① No visible damage.
② $|\Delta R25/R25| \leq 2\%$
③ $|\Delta B/B| \leq 1\%$</td>
</tr>
<tr>
<td>Resistance to dry heat</td>
<td>IEC 60068-2-2</td>
<td>① 125±5℃ in air, for 1000±24 hours without loading.
② The chip shall be stabilized at normal condition for 1~2 hours before measuring.</td>
<td>① No visible damage.
② $|\Delta R25/R25| \leq 2\%$
③ $|\Delta B/B| \leq 1\%$</td>
</tr>
</table>

Resistance to cold	IEC 60068-2-1	① -40±3℃ in air, for 1000±24 hours without loading. ② The chip shall be stabilized at normal condition for 1~2 hours before measuring.	① No visible damage. ② |ΔR25/R25| ≤2% ③ |ΔB/B| ≤1%
Resistance to damp heat	IEC 60068-2-78	① 40±2℃, 90~95%RH in air, for 1000±24 hours without loading. ② The chip shall be stabilized at normal condition for 1~2 hours before measuring.	① No visible damage. ② |ΔR25/R25| ≤2% ③ |ΔB/B| ≤1%
Resistance to high temperature load	IEC 60539-1 5.25.4	① 85± 2℃in air with permissive operating current for 1000±48 hours ② The chip shall be stabilized at normal condition for 1~2 hours before measuring.	① No visible damage. ② |ΔR25/R25| ≤2% ③ |ΔB/B| ≤1%

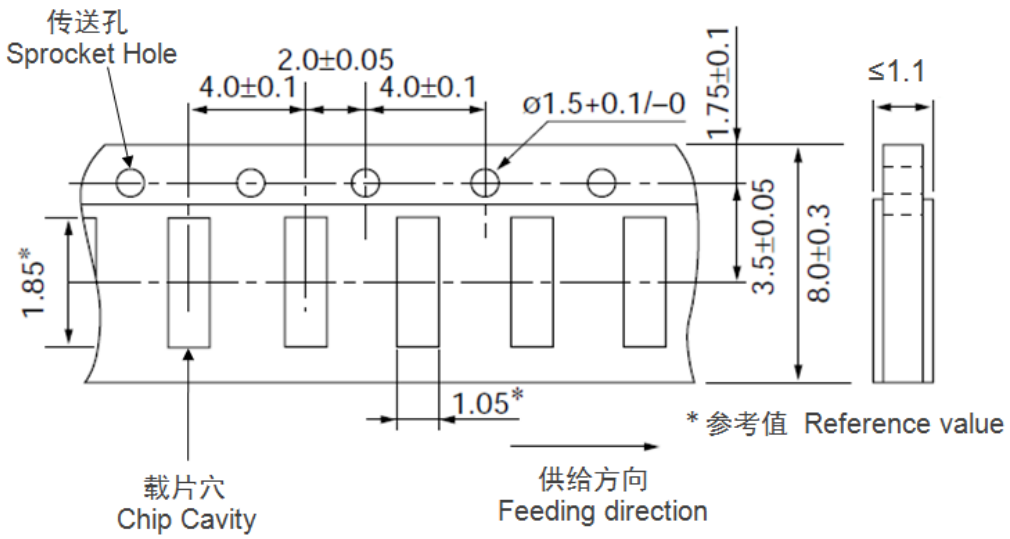
Taping

Type	0603
Tape thickness(mm)	0.8± 0.15
Tape material	Paper Tape
Quantity per Reel	4K

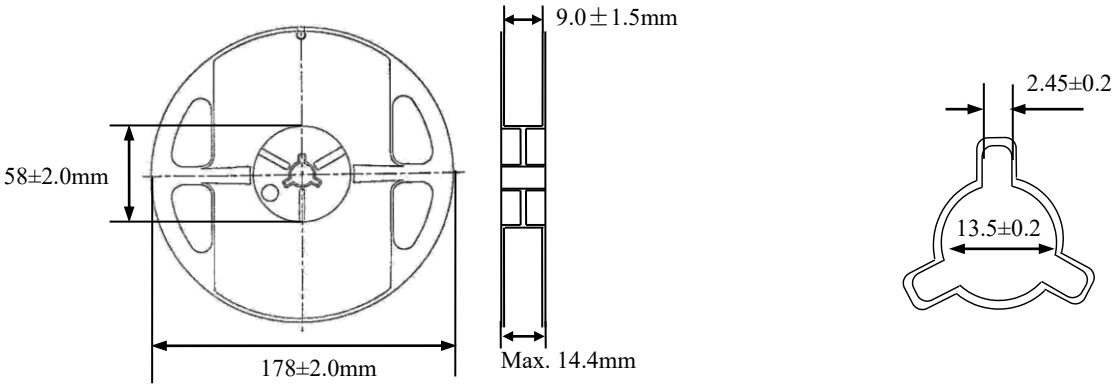
Taping Drawings



Paper Tape Dimensions



Reel Dimensions Unit：mm)



Storage

- **Storage Conditions**

  a. Storage Temperature: -10℃～40℃

  b. Relative Humidity: ≦75%RH

  c. Keep away from corrosive atmosphere and sunlight.

- **Period of Storage**: **6 Months**

Notes＆Warnings

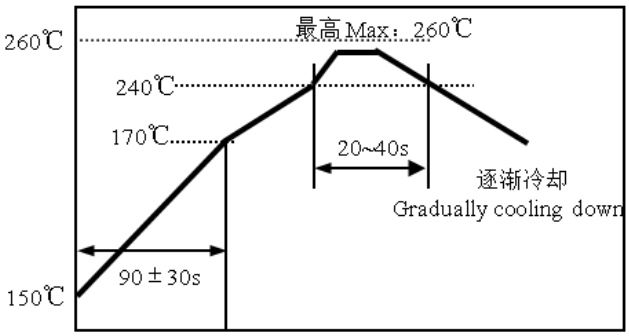
- The MNTC series thermistors shall not be operated and stored under the following environmental condition:

(1) Corrosive or deoxidized atmospheres
(such as chlorine, sulfurated hydrogen, ammonia, sulfuric acid, nitric oxide and so on)
(2) Volatile or inflammable atmospheres
(3) Dusty condition
(4) Excessively high or low pressure condition
(5) Humid site
(6) Places with brine, oil, chemical liquid or organic solvent
(7) Intense vibration
(8) Places with analogously deleterious conditions

- The ceramic body of the MNTC series thermistors is fragile, no excessive pressure or impact shall be exerted on it.
- The MNTC series thermistors shall not be operated beyond the specified “Operating Temperature Range” in the catalog.

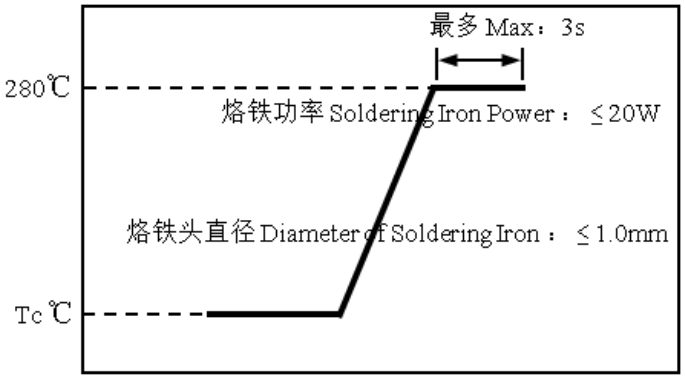
Recommended Soldering Technologies

- **Re-flowing Profile**
  - 1~2℃/sec. Ramp
  - Pre-heating: 150~170℃/90±30 sec.
  - Time above 240℃: 20~40 sec.
  - Peak temperature: 260℃Max./10 sec.
  - Solder paste: 96.5Sn/3.0Ag/0.5Cu
  - Max.2 times for re-flowing



Iron Soldering Profile

- Iron soldering power: Max.20W
- Pre-heating: 150℃/60sec.
- Soldering Tip temperature: 280℃Max.
- Soldering time: 3 sec Max.
- Solder paste: 96.5Sn/3.0Ag/0.5Cu
- Max.1 times for iron soldering



[Note: Take care not to apply the tip of the soldering iron to the terminal electrodes.]