

MNTC0603X103J3380HTB

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 $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$.
- 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.

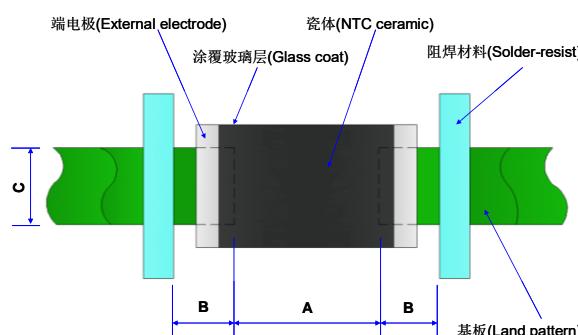
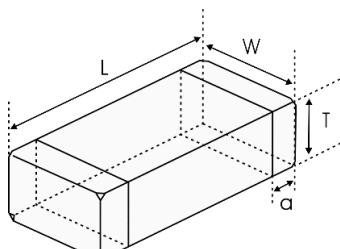
PRODUCT IDENTIFICATION

MNTC 0603 X 103 J 3380 H T B

1 2 3 4 5 6 7 8 9

- 1:Product Series: Chip Temp. Sensing NTC Thermistor
- 2:Dimensions:0603[1608] : $1.60\times0.8\times0.8$
- 3:Delimiter:X
- 4:Nominal Zero-Power Resistance at 25°C : 103: $10\text{k}\Omega$
- 5:Tolerance of Resistance:F $\pm 1\%$,G $\pm 2\%$,H $\pm 3\%$,J $\pm 5\%$
- 6:B Constant:3380:3380K
- 7:Tolerance of B Constant:F $\pm 1\%$, H $\pm 3\%$
- 8: Packing:Tape Carrier Package
- 9:B constant calculation method:A $25^{\circ}\text{C} \& 85^{\circ}\text{C}$;B:25 $^{\circ}\text{C} \& 50^{\circ}\text{C}$

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°C) (kΩ)	B Constant (25/50°C) (K)	B Constant (25/85°C) (K)	Permissible Operating Current (25°C) (mA)	Dissipation Factor (mW/°C)	Thermal Time Constant (s)	Rated Electric Power(25°C) (mW)	Operating ambient temperature (°C)
MNTC0603X103J3380HTB	10±5%	3380±3%	3435 ref.	0.31	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: $20 \pm 15^\circ\text{C}$
- b. Relative Humidity: $65 \pm 20\%$
- c. Air Pressure: 86kPa to 106kPa

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

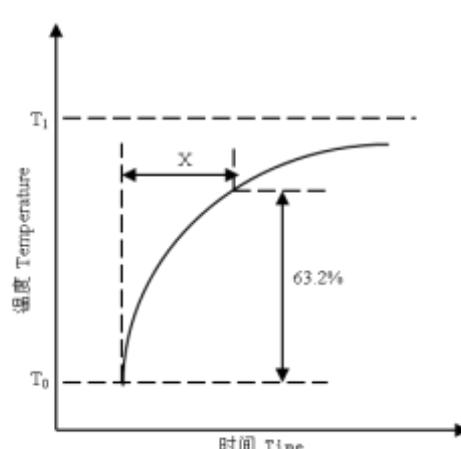
- a. Ambient Temperature: $25 \pm 2^\circ\text{C}$
- b. Relative Humidity: $65 \pm 5\%$
- c. Air Pressure: 86kPa to 106kPa

· Inspection Equipment

Visual Examination: 20×magnifier

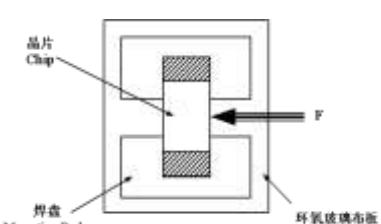
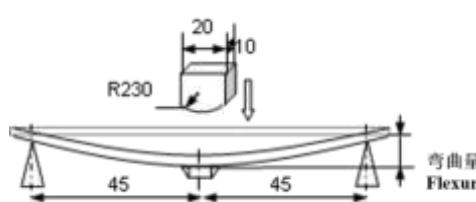
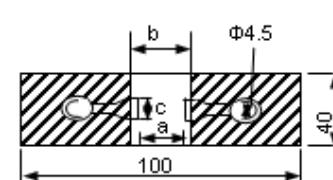
Resistance value test: Thermistor resistance tester

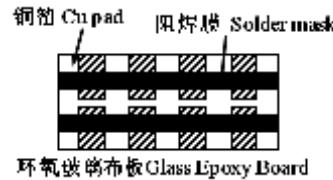
Electrical Test

No.	Items	Test Methods and Remarks
1	Nominal Zero-Power Resistance at 25°C (R25)	Ambient temperature: $25 \pm 0.05^\circ\text{C}$ Measuring electric power: $\leq 0.1\text{mW}$
2	Nominal B Constant	Measure the resistance at the ambient temperature of $25 \pm 0.05^\circ\text{C}$, $50 \pm 0.05^\circ\text{C}$ or $85 \pm 0.05^\circ\text{C}$. $B(25-50^\circ\text{C}) = \frac{\ln R_{25} - \ln R_{50}}{1/T_{25} - 1/T_{50}}$ $B(25-85^\circ\text{C}) = \frac{\ln R_{25} - \ln R_{85}}{1/T_{25} - 1/T_{85}}$ 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 ($^\circ\text{C}$) to T_1 ($^\circ\text{C}$) 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°C through self-heated, normally expressed in milliwatts per degree Celsius (mW/°C). 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°C by self-heating at ambient temperature 25°C.
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

Items	Standard	Test Methods and Remarks	Requirements																														
Terminal Strength	IEC 60068-2-21	<p>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.</p> <table border="1"> <thead> <tr> <th>Size</th><th>F</th><th>Duration</th></tr> </thead> <tbody> <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> </tbody> </table>	Size	F	Duration	0201	2N	10±1s	0402, 0603	5N	0805	10N	<p>No removal or split of the termination or other defects shall occur.</p> 																				
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Resistance to Flexure	IEC 60068-2-21	<p>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;</p>  <table border="1"> <thead> <tr> <th>Size</th><th>Flexure</th><th>Pressurizing Speed</th><th>Duration</th></tr> </thead> <tbody> <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> </tbody> </table> 	Size	Flexure	Pressurizing Speed	Duration	0201,	1mm	<0.5mm/s	10±1s	0402, 0603, 0805	2mm	<p>① No visible damage.</p> <p>② $\Delta R_{25}/R_{25} \leq 2\%$</p> <p>unit: mm</p> <table border="1"> <thead> <tr> <th>Type</th><th>a</th><th>b</th><th>c</th></tr> </thead> <tbody> <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> </tbody> </table>	Type	a	b	c	0201	0.25	0.3	0.3	0402	0.4	1.5	0.5	0603	1.0	3.0	1.2	0805	1.2	4.0	1.65
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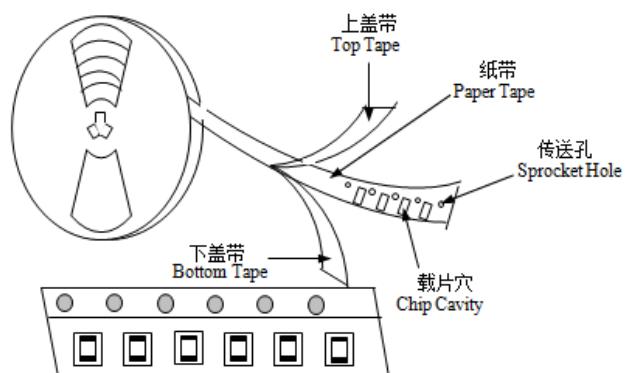
Vibration	IEC 60068-2-80	<p>① Solder the chip to the testing jig (glass epoxy board shown in the left) using eutectic solder.</p> <p>② The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz.</p> <p>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).</p>	<p>No visible damage.</p> 															
Dropping	IEC 60068-2-32	Drop a chip 10 times on a concrete floor from a height of 1 meter.	No visible damage.															
Solderability	IEC 60068-2-58	<p>① Solder temperature: 245 ± 5 °C.</p> <p>② Duration: 3 ± 0.3s.</p> <p>③ Solder: 96.5Sn/3.0Ag/0.5Cu.</p> <p>④ Flux: (重量比) 25%松香 and 75%酒精25% Resin and 75% ethanol in weight.</p>	<p>① No visible damage.</p> <p>② Wetting shall exceed 95% coverage</p>															
Resistance to Soldering Heat	IEC 60068-2-58	<p>① Solder temperature: 260 ± 5 °C .</p> <p>② Duration: 10 ± 1s.</p> <p>③ Solder: 96.5Sn/3.0Ag/0.5Cu.</p> <p>④ Flux: (重量比) 25%松香 and 75%酒精25% Resin and 75% ethanol in weight.</p> <p>⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring.</p>	<p>① No visible damage.</p> <p>② $\Delta R_{25}/R_{25} \leq 2\%$</p> <p>③ $\Delta B/B \leq 1\%$</p>															
Temperature cycling	IEC 60068-2-14	<p>① 5 cycles of following sequence without loading.</p> <table border="1" data-bbox="492 1527 1032 1706"> <thead> <tr> <th>Step</th><th>Temperature</th><th>Time</th></tr> </thead> <tbody> <tr> <td>1</td><td>-40 ± 5 °C</td><td>30 ± 3min</td></tr> <tr> <td>2</td><td>25 ± 2 °C</td><td>5 ± 3min</td></tr> <tr> <td>3</td><td>125 ± 2 °C</td><td>30 ± 3min</td></tr> <tr> <td>4</td><td>25 ± 2 °C</td><td>5 ± 3min</td></tr> </tbody> </table> <p>② The chip shall be stabilized at normal condition for 1~2 hours before measuring.</p>	Step	Temperature	Time	1	-40 ± 5 °C	30 ± 3 min	2	25 ± 2 °C	5 ± 3 min	3	125 ± 2 °C	30 ± 3 min	4	25 ± 2 °C	5 ± 3 min	<p>① No visible damage.</p> <p>② $\Delta R_{25}/R_{25} \leq 2\%$</p> <p>③ $\Delta B/B \leq 1\%$</p>
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4	25 ± 2 °C	5 ± 3 min																
Resistance to dry heat	IEC 60068-2-2	<p>① 125 ± 5 °C in air, for 1000 ± 24 hours without loading.</p> <p>② The chip shall be stabilized at normal condition for 1~2 hours before measuring.</p>	<p>① No visible damage.</p> <p>② $\Delta R_{25}/R_{25} \leq 2\%$</p> <p>③ $\Delta B/B \leq 1\%$</p>															

Resistance to cold	IEC 60068-2-1	<p>① $-40 \pm 3^\circ\text{C}$ in air, for 1000 ± 24 hours without loading.</p> <p>② The chip shall be stabilized at normal condition for 1~2 hours before measuring.</p>	<p>① No visible damage.</p> <p>② $\Delta R_{25}/R_{25} \leq 2\%$</p> <p>③ $\Delta B/B \leq 1\%$</p>
Resistance to damp heat	IEC 60068-2-78	<p>① $40 \pm 2^\circ\text{C}$, $90 \sim 95\%$RH in air, for 1000 ± 24 hours without loading.</p> <p>② The chip shall be stabilized at normal condition for 1~2 hours before measuring.</p>	<p>① No visible damage.</p> <p>② $\Delta R_{25}/R_{25} \leq 2\%$</p> <p>③ $\Delta B/B \leq 1\%$</p>
Resistance to high temperature load	IEC 60539-1 5.25.4	<p>① $85 \pm 2^\circ\text{C}$ in air with permissive operating current for 1000 ± 48 hours</p> <p>② The chip shall be stabilized at normal condition for 1~2 hours before measuring.</p>	<p>① No visible damage.</p> <p>② $\Delta R_{25}/R_{25} \leq 2\%$</p> <p>③ $\Delta B/B \leq 1\%$</p>

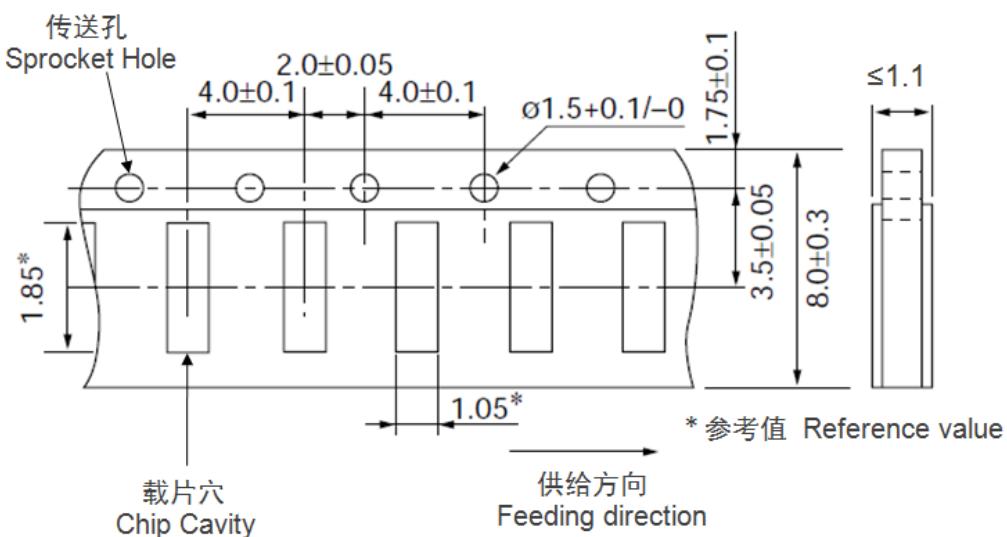
Taping

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

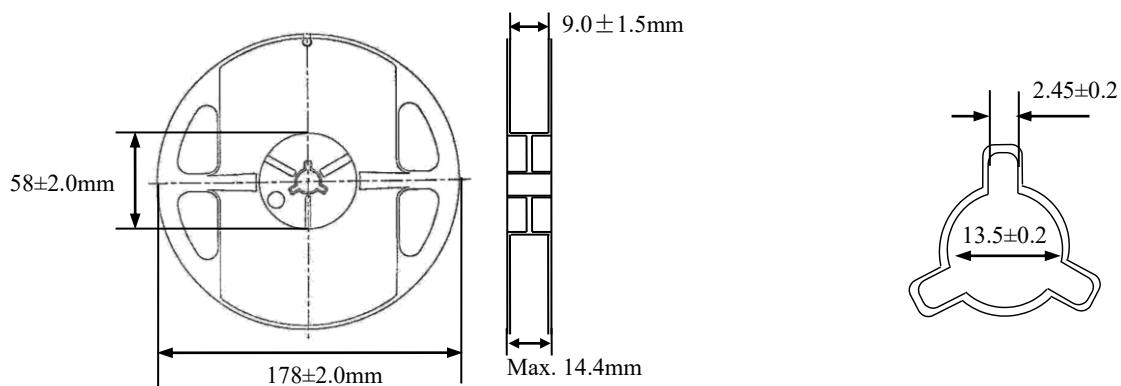
Taping Drawings



Paper Tape Dimensions



Reel Dimensions Unit: mm)



Storage

- **Storage Conditions**
 - Storage Temperature: $-10^{\circ}\text{C} \sim 40^{\circ}\text{C}$
 - Relative Humidity: $\leq 75\%\text{RH}$
 - Keep away from corrosive atmosphere and sunlight.
- **Period of Storage: 6 Months**

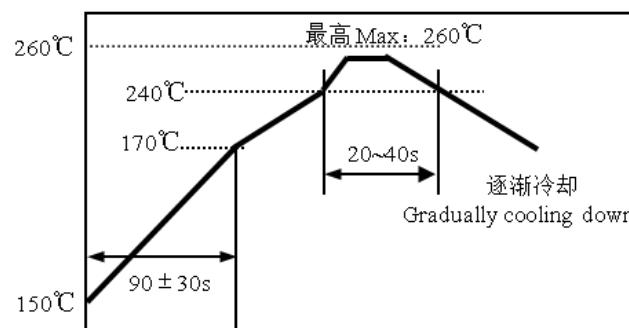
Notes & Warnings

- 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 °C/sec. Ramp
- Pre-heating: 150~170 °C/90±30 sec.
- Time above 240 °C: 20~40 sec.
- Peak temperature: 260 °C 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 °C/60sec.
- Soldering Tip temperature: 280 °C 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.]

