



## Test and Measurement Procedures

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

- Ambient Temperature: 20±15°C
- Relative Humidity: 65±20%
- Air Pressure: 86 kPa to 106 kPa

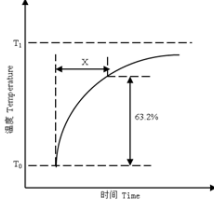
If any doubt on the results, measurements/tests should be made within the following limits

- Ambient Temperature: 20±2°C
- Relative Humidity: 65±5%
- Air Pressure: 86 kPa to 106 kPa

Inspection Equipment

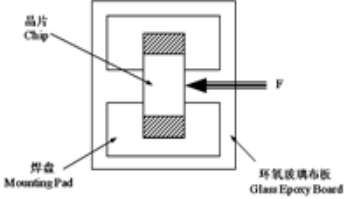
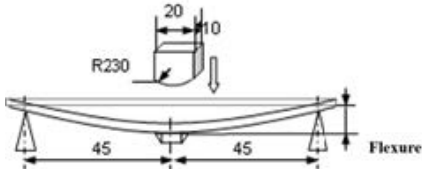
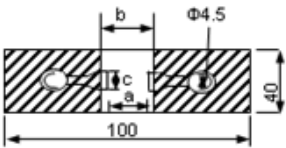
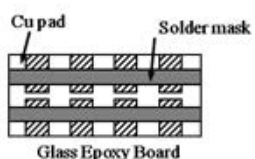
- Visual Examination: 20x magnifier
- Resistance value test: Thermistor resistance tester

## Electrical Test

Item	Test Methods and Remarks
Nominal Zero-Power Resistance at 25 °C (R25)	Ambient temperature: 25 ± 0.05°C Measuring electric power: ≤0.1 mW
Nominal B Constant	25 ± 0.05°C, 50 ± 0.05°C, 85 ± 0.05°C Measure the resistance at the ambient temperature of 25 ± 0.05°C, 50 ± 0.05°C or 85 ± 0.05°C $B(25-50^{\circ}\text{C}) = \frac{\ln R_{25} - \ln R_{50}}{1/T_{25} - 1/T_{50}} \quad B(25-85^{\circ}\text{C}) = \frac{\ln R_{25} - \ln R_{85}}{1/T_{25} - 1/T_{85}}$ T: (K) Absolute temperature (K)
Thermal Time Constant	The total time for the temperature of the thermistor to change by 63.2% of the difference from ambient temperature T <sub>0</sub> (°C) to T <sub>1</sub> (°C) by the drastic change of the power applied to thermistor from non-zero Power to Zero-Power state, normally expressed in second (S) 

Item	Test Methods and Remarks
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 $\delta = WT - T_0$
Rated Power	The necessary electric power makes thermistor's temperature rise 100°C by self-heating at ambient temperature 25°C
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

Item	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>0402, 0603</td> <td>5N</td> <td rowspan="2">10 ± 1 s</td> </tr> <tr> <td>0805</td> <td>10N</td> </tr> </tbody> </table>	Size	F	Duration	0402, 0603	5N	10 ± 1 s	0805	10N	<p>No removal or split of the termination or other defects shall occur</p> 																		
Size	F	Duration																											
0402, 0603	5N	10 ± 1 s																											
0805	10N																												
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>0402, 0603</td> <td>1 mm</td> <td rowspan="2">&lt;0.5 mm/s</td> <td rowspan="2">10 ± 1 s</td> </tr> <tr> <td>0805</td> <td>2 mm</td> </tr> </tbody> </table>	Size	Flexure	Pressurizing Speed	Duration	0402, 0603	1 mm	<0.5 mm/s	10 ± 1 s	0805	2 mm	<p>1. No visible damage 2.   <math>\Delta R_{25}/R_{25}</math>   ≤5%</p> <table border="1"> <thead> <tr> <th>Size</th> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>0402</td> <td>0.4 mm</td> <td>1.5 mm</td> <td>0.5 mm</td> </tr> <tr> <td>0603</td> <td>1 mm</td> <td>3 mm</td> <td>1.2 mm</td> </tr> <tr> <td>0805</td> <td>1.2 mm</td> <td>4 mm</td> <td>1.65 mm</td> </tr> </tbody> </table> 	Size	a	b	c	0402	0.4 mm	1.5 mm	0.5 mm	0603	1 mm	3 mm	1.2 mm	0805	1.2 mm	4 mm	1.65 mm
Size	Flexure	Pressurizing Speed	Duration																										
0402, 0603	1 mm	<0.5 mm/s	10 ± 1 s																										
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Size	a	b	c																										
0402	0.4 mm	1.5 mm	0.5 mm																										
0603	1 mm	3 mm	1.2 mm																										
0805	1.2 mm	4 mm	1.65 mm																										
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 1.5 mm, 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 3 mutually 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																										

# Chip NTC Thermistor

Item	Standard	Test Methods and Remarks	Requirements															
Solderability	IEC 60068-2-58	<ul style="list-style-type: none"> <li>Solder temperature: <math>245 \pm 5^{\circ}\text{C}</math></li> <li>Duration: <math>10 \pm 1\text{s}</math></li> <li>Solder: Sn/3.0Ag/0.5Cu</li> <li>Flux: 25% resin and 75% ethanol in weight</li> </ul>	1. No visible damage  2. Wetting shall exceed 95% coverage															
Resistance to Soldering Heat	IEC 60068-2-58	<ul style="list-style-type: none"> <li>Solder temperature: <math>245 \pm 5^{\circ}\text{C}</math></li> <li>Duration: <math>10 \pm 1\text{s}</math></li> <li>Solder: Sn/3.0Ag/0.5Cu</li> <li>Flux: 25% resin and 75% ethanol in weight</li> <li>The chip shall be stabilized at normal condition for 1~2 hours before measuring</li> </ul>	1. No visible damage  2. $ \Delta R_{25}/R_{25}  \leq 5\%$  3. $ \Delta B/B  \leq 2\%$															
Temperature Cycling	IEC 60068-2-14	5 cycles of following sequence without loading <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><math>-40 \pm 5^{\circ}\text{C}</math></td> <td><math>30 \pm 3\text{min}</math></td> </tr> <tr> <td>2</td> <td><math>25 \pm 2^{\circ}\text{C}</math></td> <td><math>5 \pm 3\text{min}</math></td> </tr> <tr> <td>3</td> <td><math>125 \pm 2^{\circ}\text{C}</math></td> <td><math>30 \pm 3\text{min}</math></td> </tr> <tr> <td>4</td> <td><math>25 \pm 2^{\circ}\text{C}</math></td> <td><math>5 \pm 3\text{min}</math></td> </tr> </tbody> </table>	Step	Temperature	Time	1	$-40 \pm 5^{\circ}\text{C}$	$30 \pm 3\text{min}$	2	$25 \pm 2^{\circ}\text{C}$	$5 \pm 3\text{min}$	3	$125 \pm 2^{\circ}\text{C}$	$30 \pm 3\text{min}$	4	$25 \pm 2^{\circ}\text{C}$	$5 \pm 3\text{min}$	1. No visible damage  2. $ \Delta R_{25}/R_{25}  \leq 3\%$  3. $\Delta B/B \leq 2\%$
Step	Temperature	Time																
1	$-40 \pm 5^{\circ}\text{C}$	$30 \pm 3\text{min}$																
2	$25 \pm 2^{\circ}\text{C}$	$5 \pm 3\text{min}$																
3	$125 \pm 2^{\circ}\text{C}$	$30 \pm 3\text{min}$																
4	$25 \pm 2^{\circ}\text{C}$	$5 \pm 3\text{min}$																
Resistance to Dry Heat	IEC 60068-2-2	1. $125 \pm 5^{\circ}\text{C}$ in air, for $1000 \pm 24$ hours without loading  2. The chip shall be stabilized at normal condition for 1~2 hours before measuring	1. No visible damage  2. $ \Delta R_{25}/R_{25}  \leq 5\%$  3. $ \Delta B/B  \leq 2\%$															
Resistance to Cold	IEC 60068-2-1	1. $-40 \pm 3^{\circ}\text{C}$ in air, for $1000 \pm 24$ hours without loading  2. The chip shall be stabilized at normal condition for 1~2 hours before measuring	1. No visible damage  2. $ \Delta R_{25}/R_{25}  \leq 5\%$  3. $ \Delta B/B  \leq 2\%$															
Resistance to Damp Heat	IEC 60068-2-78	1. $40 \pm 2^{\circ}\text{C}$ , 90~95%RH in air, for $1000 \pm 24$ hours without loading  2. The chip shall be stabilized at normal condition for 1~2 hours before measuring	1. No visible damage  2. $ \Delta R_{25}/R_{25}  \leq 3\%$  3. $ \Delta B/B  \leq 2\%$															
Resistance to high temperature load	IEC 60539-1 5.25.4	1. $85 \pm 2^{\circ}\text{C}$ in air with permissive operating current for $1000 \pm 48$ hours  2. The chip shall be stabilized at normal condition for 1~2 hours before measuring	1. No visible damage  2. $ \Delta R_{25}/R_{25}  \leq 5\%$  3. $ \Delta B/B  \leq 2\%$															

## 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 after delivery

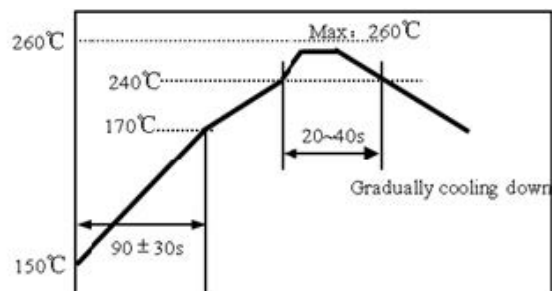
## Notes & Warnings

The RND 155QN series thermistors shall not be operated and stored under the following environmental conditions:

- Corrosive or deoxidized atmospheres (such as chlorine, sulfurated hydrogen, ammonia, sulfuric acid, nitric oxide and so on)
- Volatile or inflammable atmospheres
- Dusty condition
- Excessively high or low pressure condition
- Humid site
- Places with brine, oil, chemical liquid or organic solvent
- Intense vibration
- Places with analogously deleterious conditions
- The ceramic body of the RND 155QN series thermistors is fragile, no excessive pressure or impact shall be exerted on it
- The RND 155QN series thermistors shall not be operated beyond the specified "Operating Temperature Range" in the catalog

## Re-Flowing Profile

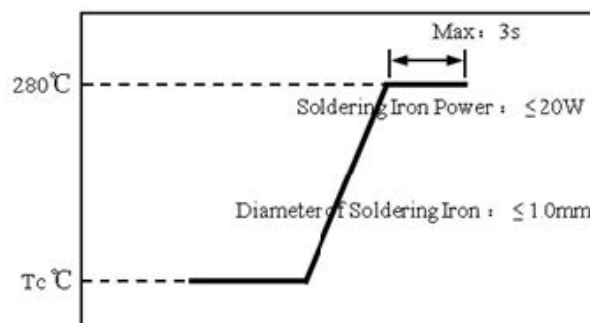
- 1~2°C/sec. Ramp
- Pre-heating: 150~170°C/90±30 sec.
- Time above 240°C: 20~40 sec.
- Peak temperature: 260°C Max./10 sec.
- Solder paste: Sn/3.0Ag/0.5Cu
- Max.2 times for re-flowing



## 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: Sn/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



# Chip NTC Thermistor



R-T Table

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
-40	339.083	353.504	368.501	4.24%	0.68
-39	319.626	333.021	346.942	4.18%	0.68
-38	301.417	313.862	326.788	4.12%	0.67
-37	284.366	295.934	307.940	4.06%	0.67
-36	268.394	279.149	290.305	4.00%	0.66
-35	253.425	263.427	273.796	3.94%	0.66
-34	239.350	248.653	258.292	3.88%	0.65
-33	226.151	234.806	243.768	3.82%	0.65
-32	213.767	221.822	230.158	3.76%	0.64
-31	202.143	209.642	217.397	3.70%	0.64
-30	191.228	198.210	205.427	3.64%	0.63
-29	180.973	187.477	194.195	3.58%	0.63
-28	171.335	177.394	183.649	3.53%	0.62
-27	162.273	167.919	173.745	3.47%	0.62
-26	153.749	159.012	164.439	3.41%	0.61
-25	145.726	150.634	155.690	3.36%	0.61
-24	138.174	142.750	147.463	3.30%	0.60
-23	131.062	135.330	139.723	3.25%	0.59
-22	124.361	128.342	132.439	3.19%	0.59
-21	118.044	121.760	125.579	3.14%	0.58
-20	112.088	115.556	119.119	3.08%	0.58
-19	106.470	109.706	113.030	3.03%	0.57
-18	101.168	104.190	107.291	2.98%	0.57
-17	96.163	98.985	101.879	2.92%	0.56
-16	91.437	94.072	96.773	2.87%	0.55
-15	86.971	89.432	91.954	2.82%	0.55
-14	82.743	85.042	87.396	2.77%	0.54
-13	78.747	80.894	83.092	2.72%	0.53
-12	74.968	76.974	79.026	2.67%	0.53
-11	71.394	73.268	75.184	2.61%	0.52
-10	68.012	69.763	71.552	2.56%	0.52
-9	64.811	66.447	68.118	2.51%	0.51
-8	61.779	63.308	64.869	2.46%	0.50
-7	58.908	60.337	61.794	2.42%	0.50
-6	56.187	57.523	58.884	2.37%	0.49
-5	53.609	54.857	56.129	2.32%	0.48
-4	51.164	52.330	53.518	2.27%	0.48
-3	48.844	49.935	51.044	2.22%	0.47
-2	46.644	47.663	48.699	2.17%	0.46
-1	44.556	45.508	46.476	2.13%	0.45
0	42.573	43.463	44.368	2.08%	0.45
1	40.688	41.520	42.364	2.03%	0.44

# Chip NTC Thermistor

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
2	38.898	39.675	40.463	1.99%	0.43
3	37.196	37.922	38.658	1.94%	0.43
4	35.579	36.257	36.944	1.90%	0.42
5	34.042	34.675	35.317	1.85%	0.41
6	32.582	33.173	33.772	1.80%	0.40
7	31.192	31.744	32.303	1.76%	0.40
8	29.870	30.385	30.906	1.72%	0.39
9	28.611	29.092	29.578	1.67%	0.38
10	27.412	27.861	28.314	1.63%	0.37
11	26.269	26.688	27.111	1.58%	0.37
12	25.181	25.571	25.965	1.54%	0.36
13	24.143	24.507	24.874	1.50%	0.35
14	23.154	23.493	23.835	1.45%	0.34
15	22.211	22.527	22.845	1.41%	0.34
16	21.312	21.606	21.902	1.37%	0.33
17	20.454	20.728	21.003	1.33%	0.32
18	19.636	19.890	20.146	1.29%	0.31
19	18.854	19.091	19.328	1.24%	0.30
20	18.108	18.328	18.549	1.20%	0.30
21	17.396	17.600	17.804	1.16%	0.29
22	16.715	16.904	17.094	1.12%	0.28
23	16.065	16.240	16.416	1.08%	0.27
24	15.444	15.606	15.769	1.04%	0.26
25	14.850	15.000	15.150	1.00%	0.25
26	14.271	14.421	14.571	1.04%	0.26
27	13.717	13.867	14.017	1.08%	0.28
28	13.188	13.337	13.486	1.12%	0.29
29	12.682	12.831	12.979	1.16%	0.30
30	12.199	12.346	12.494	1.20%	0.31
31	11.736	11.882	12.029	1.24%	0.32
32	11.294	11.439	11.584	1.27%	0.34
33	10.870	11.014	11.158	1.31%	0.35
34	10.464	10.607	10.750	1.35%	0.36
35	10.076	10.217	10.359	1.39%	0.37
36	9.705	9.844	9.984	1.43%	0.39
37	9.349	9.487	9.625	1.46%	0.40
38	9.008	9.144	9.281	1.50%	0.41
39	8.681	8.815	8.951	1.54%	0.42
40	8.368	8.501	8.634	1.58%	0.44
41	8.067	8.198	8.330	1.61%	0.45
42	7.779	7.908	8.039	1.65%	0.46
43	7.503	7.630	7.759	1.69%	0.48
44	7.238	7.363	7.490	1.72%	0.49
45	6.983	7.107	7.232	1.76%	0.50
46	6.739	6.861	6.984	1.79%	0.52

# Chip NTC Thermistor

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
47	6.505	6.625	6.746	1.83%	0.53
48	6.280	6.398	6.517	1.86%	0.54
49	6.064	6.180	6.298	1.90%	0.56
50	5.857	5.971	6.086	1.93%	0.57
51	5.658	5.770	5.883	1.97%	0.58
52	5.466	5.576	5.688	2.00%	0.60
53	5.282	5.390	5.500	2.04%	0.61
54	5.105	5.212	5.320	2.07%	0.62
55	4.935	5.040	5.146	2.11%	0.64
56	4.772	4.874	4.979	2.14%	0.65
57	4.614	4.715	4.818	2.18%	0.67
58	4.463	4.562	4.663	2.21%	0.68
59	4.317	4.415	4.514	2.24%	0.69
60	4.177	4.272	4.370	2.28%	0.71
61	4.042	4.136	4.231	2.31%	0.72
62	3.912	4.004	4.098	2.34%	0.74
63	3.787	3.877	3.969	2.38%	0.75
64	3.666	3.755	3.845	2.41%	0.77
65	3.550	3.637	3.726	2.44%	0.78
66	3.439	3.524	3.611	2.47%	0.80
67	3.331	3.415	3.501	2.51%	0.81
68	3.227	3.310	3.394	2.54%	0.83
69	3.127	3.208	3.290	2.57%	0.84
70	3.031	3.110	3.191	2.60%	0.86
71	2.938	3.016	3.095	2.63%	0.87
72	2.849	2.925	3.003	2.66%	0.89
73	2.762	2.837	2.913	2.70%	0.90
74	2.679	2.752	2.827	2.73%	0.92
75	2.598	2.670	2.744	2.76%	0.93
76	2.521	2.591	2.663	2.79%	0.95
77	2.445	2.515	2.586	2.82%	0.96
78	2.373	2.441	2.510	2.85%	0.98
79	2.303	2.370	2.438	2.88%	1.00
80	2.236	2.301	2.368	2.91%	1.01
81	2.170	2.234	2.300	2.94%	1.03
82	2.107	2.170	2.235	2.97%	1.04
83	2.046	2.108	2.171	3.00%	1.06
84	1.987	2.048	2.110	3.03%	1.08
85	1.930	1.990	2.051	3.06%	1.09
86	1.876	1.934	1.993	3.09%	1.11
87	1.823	1.880	1.938	3.12%	1.12
88	1.771	1.827	1.885	3.15%	1.14
89	1.722	1.777	1.833	3.18%	1.16
90	1.674	1.728	1.783	3.21%	1.17
91	1.627	1.680	1.735	3.24%	1.19



# Chip NTC Thermistor



Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
92	1.583	1.634	1.688	3.26%	1.21
93	1.539	1.590	1.642	3.29%	1.23
94	1.497	1.547	1.598	3.32%	1.24
95	1.456	1.505	1.556	3.35%	1.26
96	1.417	1.465	1.514	3.38%	1.28
97	1.379	1.426	1.474	3.41%	1.29
98	1.342	1.388	1.435	3.43%	1.31
99	1.306	1.351	1.398	3.46%	1.33
100	1.271	1.315	1.361	3.49%	1.35
101	1.238	1.281	1.326	3.52%	1.36
102	1.205	1.248	1.292	3.54%	1.38
103	1.174	1.216	1.259	3.57%	1.40
104	1.143	1.184	1.227	3.60%	1.42
105	1.114	1.154	1.196	3.62%	1.43
106	1.085	1.125	1.166	3.65%	1.45
107	1.057	1.096	1.136	3.68%	1.47
108	1.030	1.068	1.108	3.70%	1.49
109	1.004	1.041	1.080	3.73%	1.51
110	0.978	1.015	1.053	3.76%	1.52
111	0.954	0.990	1.027	3.78%	1.54
112	0.930	0.965	1.002	3.81%	1.56
113	0.907	0.942	0.978	3.84%	1.58
114	0.884	0.918	0.954	3.86%	1.60
115	0.862	0.896	0.931	3.89%	1.62
116	0.841	0.874	0.908	3.91%	1.63
117	0.821	0.853	0.887	3.94%	1.65
118	0.801	0.833	0.866	3.96%	1.67
119	0.781	0.812	0.845	3.99%	1.69
120	0.762	0.793	0.825	4.01%	1.71
121	0.744	0.775	0.806	4.04%	1.73
122	0.727	0.756	0.787	4.06%	1.75
123	0.709	0.739	0.769	4.09%	1.77
124	0.693	0.721	0.751	4.11%	1.79
125	0.677	0.705	0.734	4.14%	1.81