Chip NTC Thermistor

RND components

Features

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Applications

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- ¢ŜƴƖƜŜƝǀ·ǘdzƝŜ ǎŜƴǎƛƴƎƩ ƖƜƨǘŜǑǘƛƨƴ ǀ·ƴŘ ǑƨƴƖƜŜƴǎǀ·ǘƛƨƴ ƛƴƴƛƴŘdzǎǘƝƛǀ·ƭƩ ǘŜƭŜǑƨƴ ǀ·ƴŘ ǑƨƴǎdzƴŜƝ ǀ·ƖƖƭƛǑǀ·ǘƛƨƴǎ
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PART NUMBER

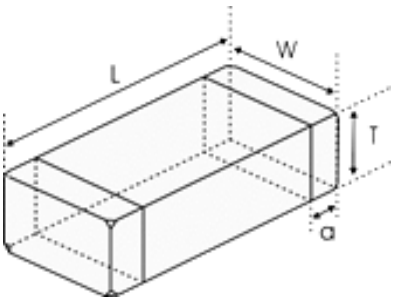
Example: RND 155QN0402X472H3600FB

RND 155QN0402	X	472	H	3600	F	B
Type	Delimeter	Nominal Resistance	Tolerance	B Constant	Tolerance of B Constant	B Constant Calculation Method
RND 155QN0402: 0402 RND 155QN0603: 0603 RND 155QN0805: 0805		472 = 4.7 kΩ 333 = 33 kΩ 334 = 330 kΩ	F = ± 1% G = ± 2% H = ± 3% J = ±5 %	3600 = 3600 K 3950 = 3950 K 4050 = 4050 K 4500 = 4500 K	F = ± 1% H = ± 3%	A = 25℃ & 85℃ B = 25℃ & 50℃

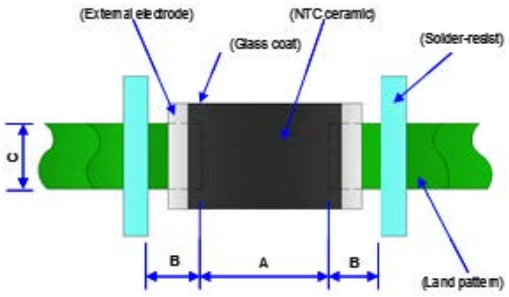
Electrical Characteristics

Type	Resistance @ 25 °C	B Constant @ 25 / 50 °C	B Constant @ 25 / 85 °C	Permissible Operating Current @ 25 °C	Dissipation Factor	Thermal Time Constant	Rated Electric Power @ 25 °C	Operating Ambient Temperature
RND 155QN0402X472H3600FB	4.7 kΩ ±3%	3600 K ±1%	3650 K	0.46 mA	1 mW / °C	<3 s	100 mW	-40 ... 125 °C

Shape and Dimensions



Dimensions



Recommended PCB pattern for reflow soldering

Type	L	W	T	a	A	B	/
0402	1 mm	0.5 mm	0.5 mm	0.25 mm	0.45 ... 0.55 mm	0.4 ... 0.5 mm	лΦпр ΦΦΦ лΦрр ƴƴ
0603	1.6 mm	0.8 mm	0.8 mm	0.3 mm	0.6 ... 0.8 mm	0.6 ... 0.7 mm	лΦс ΦΦΦ лΦу ƴƴ
0805	2 mm	1.25 mm	0.85 mm	0.5 mm	1 ... 1.1 mm	0.6 ... 0.7 mm	м ... мΦн mm

RND is a trademark of Distrelec

Test and Measurement Procedures

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

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

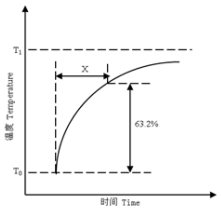
If any doubt on the results, measurements/tests should be made within the following limits

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

Inspection Equipment

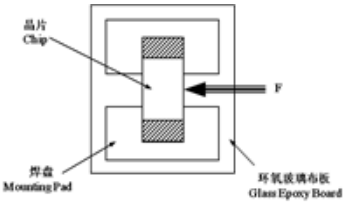
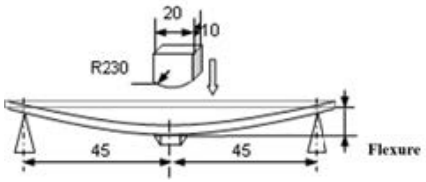
- Visual Examination: 20x magnifier
- Resistance value test: Thermistor resistance tester

Electrical Test

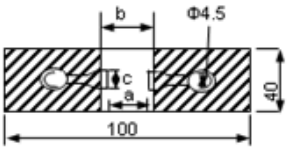
Item	Test Methods and Remarks
Nominal Zero-Power Resistance at 25 ℃(R25)	Ambient temperature: 25 ± 0.05℃ Measuring electric power: ≤0.1 mW
Nominal B Constant	25 ± 0.05℃, 50 ± 0.05℃, 85 ± 0.05℃ Measure the resistance at the ambient temperature of 25 ± 0.05℃, 50 ± 0.05℃ or 85 ± 0.05℃ B(25-50℃) = $\frac{\ln R_{25}-\ln R_{50}}{1/T_{25}-1/T_{50}}$ B(25-85℃) = $\frac{\ln R_{25}-\ln R_{85}}{1/T_{25}-1/T_{85}}$ 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 T0 (℃) to T1 (℃) 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℃ through self-heated, normally expressed in milliwatts per degree Celsius (mW/℃). It can be calculated by the following formula $\delta = WT-T0$
Rated Power	The necessary electric power makes thermistor's temperature rise 100℃ by self-heating at ambient temperature 25℃
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

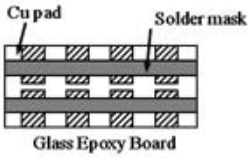
Reliability Test

<table>
<tr><th>Item</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>0402, 0603</td><td>5N</td><td rowspan="2">10 ± 1 s</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>0402, 0603</td><td>1 mm</td><td rowspan="2"><0.5 mm/s</td><td rowspan="2">10 ± 1 s</td></tr>
<tr><td>0805</td><td>2 mm</td></tr>
</table></td><td>1. No visible damage

2. ΔR25/R25 ≤5%
<table>
<tr><th>Size</th><th>a</th><th>b</th><th>c</th></tr>
<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>
</table>

</td></tr>
<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 1.5 mm, 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 3 mutually 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>
</table>

Item	Standard	Test Methods and Remarks	Requirements
Solderability	IEC 60068-2-58	• Solder temperature: 245 ± 5℃ • Duration: 10 ± 1s • Solder: Sn/3.0Ag/0.5Cu • Flux: 25% resin and 75% ethanol in weight	1. No visible damage 2. Wetting shall exceed 95% coverage
Resistance to Soldering Heat	IEC 60068-2-58	• Solder temperature: 245 ± 5℃ • Duration: 10±1s • Solder: Sn/3.0Ag/0.5Cu • Flux: 25% resin and 75% ethanol in weight • The chip shall be stabilized at normal condition for 1~2 hours before measuring	1. No visible damage 2. |ΔR25/R25| ≤5% 3. |ΔB/B| ≤2%
Temperature Cycling	IEC 60068-2-14	5 cycles of following sequence without loading Step / Temperature / Time 1 / -40 ± 5℃ / 30 ± 3min 2 / 25 ± 2 ℃ / 5 ± 3min 3 / 125 ± 2 ℃ / 30 ± 3min 4 / 25±2℃ / 5 ± 3min	1. No visible damage 2. |ΔR25/R25| ≤3% 3. |ΔB/B| ≤2%
Resistance to Dry Heat	IEC 60068-2-2	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	1. No visible damage 2. |ΔR25/R25| ≤5% 3. |ΔB/B| ≤2%
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| ≤5% 3. |ΔB/B| ≤2%
Resistance to Damp Heat	IEC 60068-2-78	1. 40 ± 2℃, 90~95%RH in air, for 1000 ±2 4 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| ≤3% 3. |ΔB/B| ≤2%
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| ≤5% 3. |ΔB/B| ≤2%

Storage

Storage Conditions

- Storage Temperature: -10℃～40℃
- Relative Humidity: ≦ 75%RH
- Keep away from corrosive atmosphere and sunlight
- Period of Storage: 6 Months after delivery

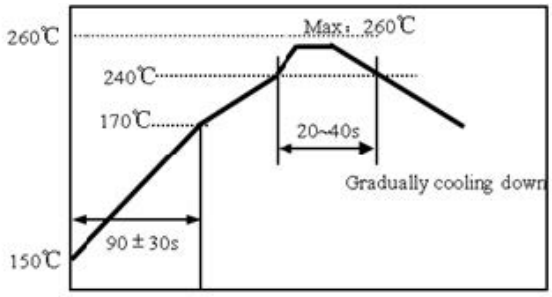
Notes & Warnings

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

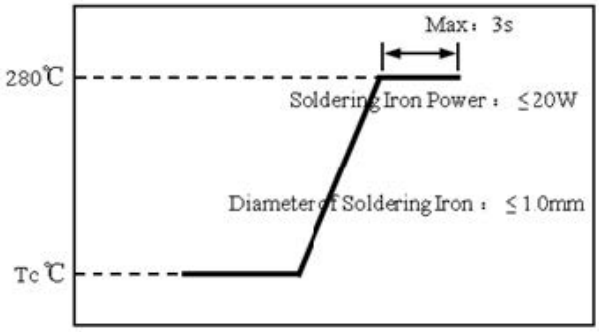
- 1~2℃/sec. Ramp
- Pre-heating: 150~170℃/90±30 sec.
- Time above 240℃: 20~40 sec.
- Peak temperature: 260℃Max./10 sec.
- Solder paste: Sn/3.0Ag/0.5Cu
- Max.2 times for re-flowing



Iron Soldering Profile

- Iron soldering power: Max.20W
- Pre-heating: 150℃/60sec.
- Soldering Tip temperature: 280℃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

RND components

R-T Table

Temp. (°C)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(°C)
-40	103.210	109.809	116.724	6.30%	1.02
-39	97.268	103.425	109.872	6.23%	1.01
-38	91.709	97.456	103.469	6.17%	1.01
-37	86.581	91.953	97.571	6.11%	1.01
-36	81.703	86.722	91.966	6.05%	1.01
-35	77.134	81.824	86.721	5.99%	1.00
-34	72.910	77.299	81.879	5.92%	1.00
-33	68.889	72.994	77.275	5.86%	1.00
-32	65.168	69.013	73.019	5.80%	1.00
-31	61.624	65.223	68.970	5.75%	0.99
-30	58.340	61.713	65.222	5.69%	0.99
-29	55.210	58.370	61.655	5.63%	0.99
-28	52.307	55.271	58.349	5.57%	0.98
-27	49.540	52.318	55.201	5.51%	0.98
-26	46.969	49.576	52.280	5.46%	0.98
-25	44.517	46.963	49.498	5.40%	0.98
-24	42.237	44.533	46.913	5.34%	0.97
-23	40.062	42.217	44.449	5.29%	0.97
-22	38.036	40.062	42.157	5.23%	0.97
-21	36.125	38.029	39.997	5.18%	0.96
-20	34.301	36.090	37.938	5.12%	0.96
-19	32.599	34.282	36.019	5.07%	0.96
-18	30.974	32.556	34.188	5.01%	0.95
-17	29.457	30.946	32.480	4.96%	0.95
-16	28.022	29.424	30.868	4.91%	0.95
-15	26.652	27.971	29.329	4.85%	0.94
-14	25.371	26.613	27.890	4.80%	0.94
-13	24.146	25.315	26.518	4.75%	0.94
-12	22.999	24.101	25.233	4.70%	0.93
-11	21.913	22.952	24.018	4.65%	0.93
-10	20.875	21.854	22.858	4.60%	0.92
-9	19.901	20.824	21.770	4.54%	0.92
-8	18.978	19.848	20.741	4.49%	0.92
-7	18.095	18.916	19.757	4.44%	0.91
-6	17.266	18.041	18.834	4.39%	0.91
-5	16.473	17.204	17.952	4.35%	0.90
-4	15.726	16.417	17.122	4.30%	0.90
-3	15.018	15.670	16.336	4.25%	0.89
-2	14.341	14.956	15.584	4.20%	0.89
-1	13.702	14.284	14.877	4.15%	0.89
0	13.095	13.645	14.205	4.10%	0.88
1	12.515	13.035	13.563	4.06%	0.88

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Temp. (℃)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(℃)
2	11.967	12.458	12.958	4.01%	0.87
3	11.443	11.907	12.379	3.96%	0.87
4	10.948	11.387	11.833	3.92%	0.86
5	10.477	10.892	11.313	3.87%	0.86
6	10.026	10.419	10.817	3.82%	0.85
7	9.599	9.971	10.347	3.78%	0.85
8	9.191	9.542	9.899	3.73%	0.84
9	8.804	9.137	9.474	3.69%	0.84
10	8.434	8.749	9.067	3.64%	0.83
11	8.082	8.381	8.682	3.60%	0.83
12	7.746	8.029	8.314	3.55%	0.82
13	7.427	7.695	7.965	3.51%	0.82
14	7.122	7.375	7.631	3.47%	0.81
15	6.832	7.072	7.314	3.42%	0.81
16	6.554	6.782	7.011	3.38%	0.80
17	6.290	6.505	6.722	3.34%	0.80
18	6.037	6.241	6.447	3.29%	0.79
19	5.796	5.990	6.184	3.25%	0.79
20	5.565	5.749	5.934	3.21%	0.78
21	5.346	5.520	5.695	3.17%	0.78
22	5.135	5.301	5.466	3.12%	0.77
23	4.935	5.091	5.248	3.08%	0.77
24	4.743	4.891	5.040	3.04%	0.76
25	4.559	4.700	4.841	3.00%	0.75
26	4.380	4.517	4.655	3.04%	0.77
27	4.209	4.343	4.476	3.08%	0.78
28	4.046	4.176	4.306	3.12%	0.80
29	3.889	4.016	4.143	3.16%	0.81
30	3.740	3.863	3.987	3.20%	0.83
31	3.597	3.717	3.837	3.24%	0.85
32	3.460	3.576	3.694	3.28%	0.86
33	3.329	3.442	3.557	3.32%	0.88
34	3.203	3.314	3.425	3.36%	0.89
35	3.084	3.191	3.300	3.40%	0.91
36	2.968	3.073	3.179	3.44%	0.92
37	2.858	2.960	3.063	3.48%	0.94
38	2.753	2.852	2.953	3.52%	0.96
39	2.652	2.749	2.846	3.55%	0.97
40	2.555	2.649	2.745	3.59%	0.99
41	2.462	2.554	2.646	3.63%	1.00
42	2.373	2.462	2.553	3.67%	1.02
43	2.288	2.375	2.463	3.71%	1.04
44	2.206	2.291	2.376	3.74%	1.05
45	2.127	2.210	2.293	3.78%	1.07
46	2.052	2.132	2.214	3.82%	1.09

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47	1.980	2.058	2.137	3.85%	1.10
48	1.910	1.987	2.064	3.89%	1.12
49	1.844	1.918	1.993	3.93%	1.14
50	1.780	1.852	1.925	3.96%	1.15
51	1.718	1.789	1.860	4.00%	1.17
52	1.659	1.728	1.798	4.04%	1.19
53	1.603	1.669	1.737	4.07%	1.20
54	1.548	1.613	1.679	4.11%	1.22
55	1.496	1.559	1.624	4.14%	1.24
56	1.445	1.507	1.570	4.18%	1.26
57	1.397	1.457	1.518	4.21%	1.27
58	1.350	1.409	1.469	4.25%	1.29
59	1.305	1.362	1.421	4.28%	1.31
60	1.262	1.318	1.375	4.32%	1.33
61	1.220	1.275	1.330	4.35%	1.35
62	1.181	1.234	1.288	4.39%	1.36
63	1.142	1.194	1.247	4.42%	1.38
64	1.105	1.156	1.207	4.46%	1.40
65	1.070	1.119	1.169	4.49%	1.42
66	1.035	1.083	1.132	4.52%	1.44
67	1.003	1.049	1.097	4.56%	1.46
68	0.971	1.016	1.063	4.59%	1.47
69	0.940	0.984	1.030	4.62%	1.49
70	0.911	0.954	0.998	4.66%	1.51
71	0.882	0.924	0.967	4.69%	1.53
72	0.854	0.896	0.938	4.72%	1.55
73	0.828	0.868	0.910	4.75%	1.57
74	0.803	0.842	0.882	4.79%	1.59
75	0.778	0.816	0.855	4.82%	1.61
76	0.754	0.792	0.830	4.85%	1.63
77	0.731	0.768	0.805	4.88%	1.65
78	0.709	0.745	0.781	4.92%	1.67
79	0.688	0.722	0.758	4.95%	1.68
80	0.667	0.701	0.736	4.98%	1.70
81	0.647	0.680	0.715	5.01%	1.72
82	0.628	0.660	0.694	5.04%	1.74
83	0.610	0.641	0.674	5.07%	1.76
84	0.592	0.622	0.654	5.10%	1.78
85	0.574	0.605	0.636	5.13%	1.80
86	0.558	0.587	0.618	5.16%	1.82
87	0.542	0.570	0.600	5.20%	1.84
88	0.526	0.554	0.583	5.23%	1.87
89	0.511	0.538	0.567	5.26%	1.89
90	0.496	0.523	0.551	5.29%	1.91
91	0.482	0.509	0.536	5.32%	1.93

Chip NTC Thermistor

RND components

Temp. (℃)	R_Min (Kohm)	R_Cent (Kohm)	R_Max (Kohm)	Res TOL.	Temp. TOL.(℃)
92	0.469	0.494	0.521	5.35%	1.95
93	0.456	0.481	0.506	5.38%	1.97
94	0.443	0.467	0.493	5.41%	1.99
95	0.430	0.454	0.479	5.44%	2.01
96	0.419	0.442	0.466	5.46%	2.03
97	0.407	0.430	0.454	5.49%	2.05
98	0.396	0.418	0.441	5.52%	2.07
99	0.385	0.407	0.429	5.55%	2.10
100	0.375	0.396	0.418	5.58%	2.12
101	0.365	0.385	0.407	5.61%	2.14
102	0.355	0.375	0.396	5.64%	2.16
103	0.345	0.365	0.386	5.67%	2.18
104	0.336	0.355	0.376	5.69%	2.20
105	0.327	0.346	0.366	5.72%	2.23
106	0.319	0.337	0.357	5.75%	2.25
107	0.310	0.328	0.347	5.78%	2.27
108	0.302	0.320	0.339	5.81%	2.29
109	0.294	0.312	0.330	5.83%	2.31
110	0.287	0.304	0.322	5.86%	2.34
111	0.279	0.296	0.314	5.89%	2.36
112	0.272	0.288	0.305	5.92%	2.38
113	0.265	0.281	0.298	5.94%	2.40
114	0.258	0.274	0.290	5.97%	2.43
115	0.252	0.267	0.283	6.00%	2.45
116	0.246	0.261	0.276	6.02%	2.47
117	0.239	0.254	0.269	6.05%	2.50
118	0.234	0.248	0.263	6.08%	2.52
119	0.228	0.242	0.257	6.10%	2.54
120	0.222	0.236	0.250	6.13%	2.57
121	0.217	0.230	0.244	6.15%	2.59
122	0.211	0.225	0.239	6.18%	2.61
123	0.206	0.219	0.233	6.21%	2.64
124	0.201	0.214	0.227	6.23%	2.66
125	0.196	0.209	0.222	6.26%	2.68

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