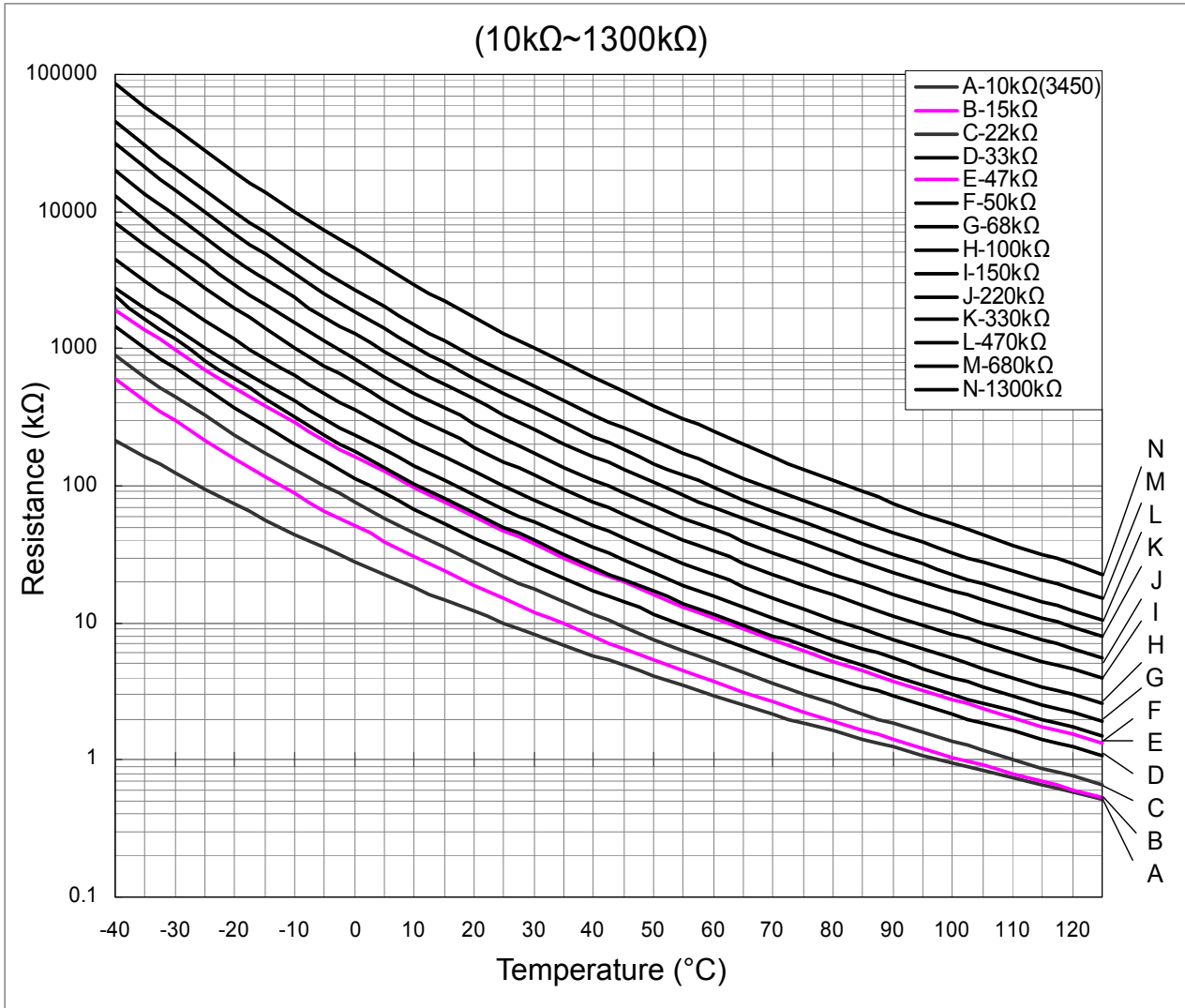


Specifications for Chip NTC Thermistor

Electrical Characteristics

Resistance at 25°C R25 (kΩ)	B constant (25-50°C) (K)	Max. Permissible Operating Current (25°C) (mA)	Thermal Time Constant	Dissipation Factor (mW/°C)	Rated Electric Power (mW)
10	3435	0.31	<5sec	1.0	100

TYPICAL ELECTRICAL CHARACTERISTICS



- 1) Operating and storage temperature range (individual chip without packing): -55°C ~ +125°C
- 2) Storage temperature range (packing conditions): -10°C~+40°C and RH 75% (Max.)

Specifications for Chip NTC Thermistor

Shape and Dimensions

- 1) Dimensions: See Fig.4-1 and Table 4-1.
- 2) Recommended PCB pattern for reflow soldering: See Fig.4-2 and Table 4-1.

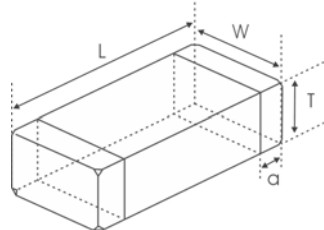


Fig. 4-1

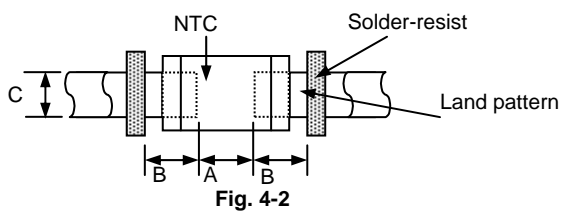


Fig. 4-2

[Table 4-1]

Unit: mm [inch]

Type	L	W	T	a	A	B	C
1608 [0603]	1.6±0.15 [0.063±0.006]	0.8±0.15 [0.031±0.006]	0.8±0.15 [0.031±0.006]	0.3±0.2 [0.012±0.008]	0.60~0.80	0.60~0.80	0.60~0.80

Specifications for Chip NTC Thermistor

Test and Measurement Procedures

Test Conditions

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

- Ambient Temperature: $20 \pm 15^\circ\text{C}$
- Relative Humidity : $65 \pm 20\%$
- Air Pressure: 86kPa to 106kPa

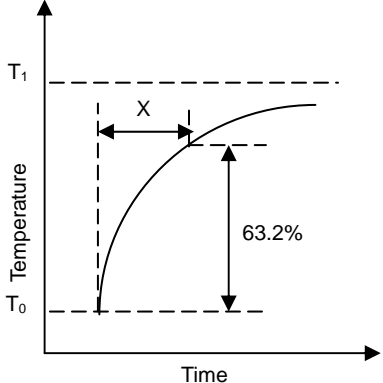
If any doubt on the results, measurements/tests should be made within the following limits:

- Ambient Temperature: $20 \pm 2^\circ\text{C}$
- Relative Humidity: $65 \pm 5\%$
- Air Pressure: 86kPa to 106kPa

Visual Examination

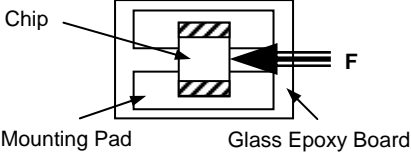
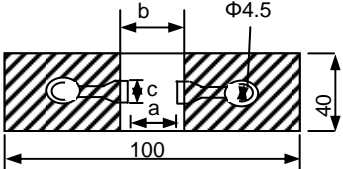
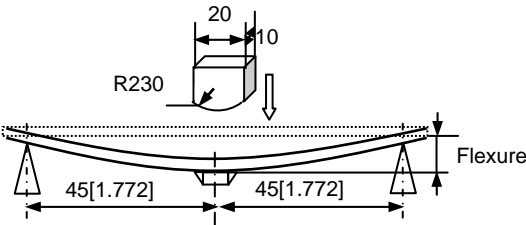
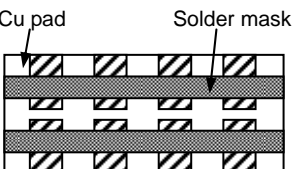
- Inspection Equipment: $20\times$ magnifier

Electrical Test

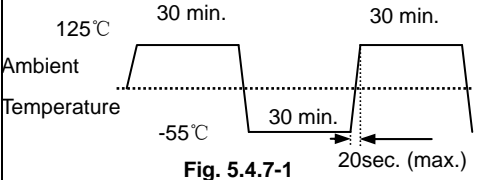
Items	Requirements	Test Methods and Remarks
Nominal Zero-Power Resistance (R25)	Refer to Item 3	Ambient temperature: $25 \pm 0.2^\circ\text{C}$. Measuring electric power: 0.1mW Max.
Nominal B Constant	Refer to Item 3	Measure the resistance at the ambient temperature of $25 \pm 0.2^\circ\text{C}$ and $50 \pm 0.2^\circ\text{C}$ $B = \frac{\ln R_{25} - \ln R_{50}}{1/T_{25} - 1/T_{50}}$ T: absolute temperature (K)
Thermal Time Constant (single unit)	Refer to Item 3 	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.
Dissipation Constant (single unit)	Refer to Item 3	The total electric power required to raise the temperature of the element by 1°C through self-heating under thermal equilibrium. It calculates by next formula. $C = \frac{W}{T - T_0}$
Rated Power	Refer to Item 3	The necessary electric power makes thermistor's temperature rise 100°C by self-heating at ambient temperature 25°C .
Permissive operating current	Refer to Item 3	The current that keeps body temperature of chip NTC on the PC board in still air rising 1°C by self-heating.

Specifications for Chip NTC Thermistor

Reliability Test

Items	Requirements	Test Methods and Remarks								
Terminal Strength	<p>No removal or split of the termination or other defects shall occur.</p>  <p>Fig.5.4.1-1</p>	<ol style="list-style-type: none"> ① Solder the chip to the testing jig (glass epoxy board shown in the following Fig. 5.4.1-1) using eutectic solder. Then apply a force in the direction of the arrow. ② 5N force for 1608 series. ③ Keep time: 10±1s. 								
Resistance to Flexure	<p>No visible mechanical damage.</p> <p>Unit: mm [inch]</p> <table border="1" data-bbox="308 651 767 741"> <thead> <tr> <th>Type</th> <th>a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td>1608[0603]</td> <td>1.0</td> <td>3.0</td> <td>1.2</td> </tr> </tbody> </table>  <p>Fig. 5.4.2-1</p>	Type	a	b	c	1608[0603]	1.0	3.0	1.2	<ol style="list-style-type: none"> ① Solder the chip to the test jig (glass epoxy board shown in Fig. 5.4.2-1) using a eutectic solder. Then apply a force in the direction shown in Fig. 5.4.2-2. ② Flexure: 2mm. ③ Pressurizing Speed: 0.5mm/sec. ④ Keep time: 30 sec.  <p>Fig. 5.4.2-2</p>
Type	a	b	c							
1608[0603]	1.0	3.0	1.2							
Vibration	<p>No visible mechanical damage.</p>  <p>Fig. 5.4.3-1</p>	<ol style="list-style-type: none"> ① Solder the chip to the testing jig (glass epoxy board shown in Fig. 5.4.3-1) 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 ranging from 10 to 55 Hz and returning 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). 								
Dropping	<ol style="list-style-type: none"> ① No visible mechanical damage. 	<p>Drop chip inductor 10 times on a concrete floor from a height of 100 cm.</p>								
Solderability	<ol style="list-style-type: none"> ① No visible mechanical damage. ② Wetting shall exceed 80% coverage. 	<ol style="list-style-type: none"> ① Solder temperature: 240±2°C. ② Duration: 3 sec. ③ Solder: Sn/3.0Ag/0.5Cu. ④ Flux: 25% Resin and 75% ethanol in weight. 								
Resistance to Soldering Heat	<ol style="list-style-type: none"> ① No visible mechanical damage. ② R25 change: within ±5%. ③ B Constant change: within ±3%. 	<ol style="list-style-type: none"> ① Solder temperature: 260±3°C ② Duration: 5 sec. ③ Solder: Sn/3.0Ag/0.5Cu. ④ Flux: 25% Resin and 75% ethanol in weight. ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring. 								

Specifications for Chip NTC Thermistor

<p>Thermal Shock</p>	<p>① No visible mechanical damage. ② R25 change: within $\pm 5\%$. ③ B Constant change: within $\pm 3\%$.</p>  <p style="text-align: center;">Fig. 5.4.7-1</p>	<p>① Temperature, Time: -55°C for 30 ± 3 min \rightarrow 125°C for 30 ± 3 min. ② Transforming interval: 20sec. Max. ③ Tested cycle: 100 cycles. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.</p>
<p>Resistance to Low Temperature</p>	<p>① No visible mechanical damage. ② R25 change: within $\pm 5\%$. ③ B Constant change: within $\pm 3\%$.</p>	<p>① Temperature: $-55\pm 2^{\circ}\text{C}$ ② Duration: 1000^{+24} hours. ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.</p>
<p>Resistance to High Temperature</p>	<p>① No visible mechanical damage. ② R25 change: within $\pm 5\%$. ③ B Constant change: within $\pm 3\%$.</p>	<p>① Temperature: $125\pm 2^{\circ}\text{C}$ ② Duration: 1000^{+24} hours. ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.</p>
<p>Damp Heat (Steady States)</p>	<p>① No visible mechanical damage. ② R25 change: within $\pm 5\%$. ③ B Constant change: within $\pm 3\%$.</p>	<p>① Temperature: $60\pm 2^{\circ}\text{C}$ ② Humidity: 90% to 95% RH. ③ Duration: 1000^{+24} hours. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.</p>
<p>Loading at High Temperature (Life Test)</p>	<p>① No visible mechanical damage. ② R25 change: Within $\pm 5\%$. ③ B constant change: Within $\pm 3\%$.</p>	<p>① Temperature: $85\pm 2^{\circ}\text{C}$ ② Duration: 1000^{+24} hours. ③ Applied current: Max. Permissible Operating Current. ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring.</p>

Packaging, Storage and Transportation

Packaging

Tape Carrier Packaging:

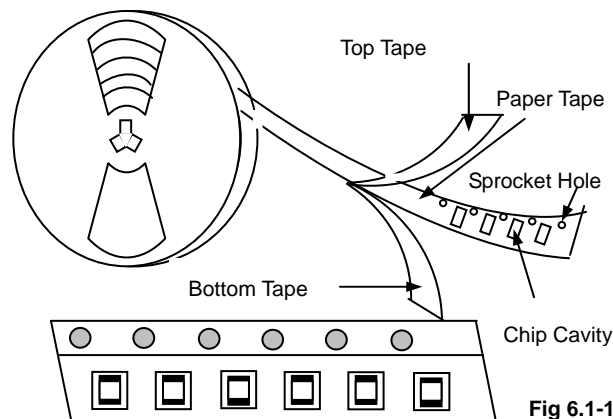
Packaging code: T

a. Tape carrier packaging are specified in attached figure **Fig.6.1-1~3**

b. Tape carrier packaging quantity please see the following table:

Type	1608[0603]
T(mm)	0.8 ± 0.15
Tape	Paper Tape
Quantity	4K

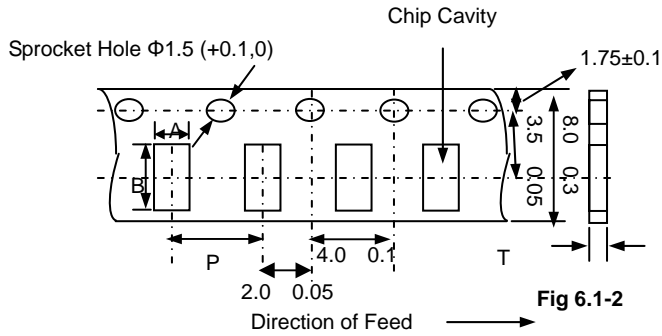
(1). Taping Drawings (Unit: mm)



Remark: The sprocket holes are to the right as the tape is pulled toward the user.

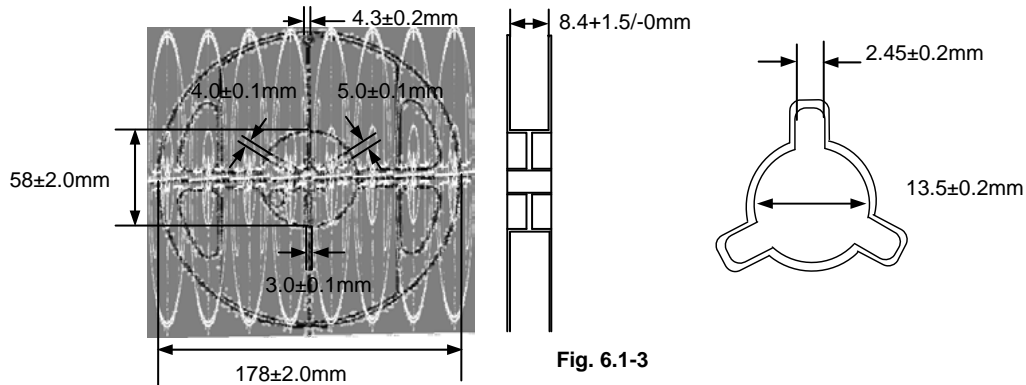
Specifications for Chip NTC Thermistor

(2) Taping Dimensions (Unit: mm)



Type	A	B	P	Tmax
1608[0603]	1.0±0.2	1.8±0.2	4.0±0.1	1.1

(3) Reel Dimensions (Unit: mm)



Storage

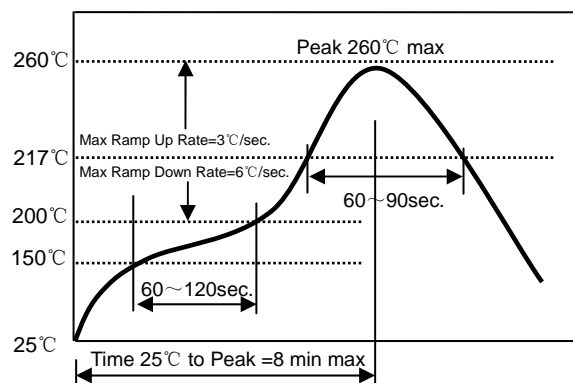
- The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to high humidity. Package must be stored at 40°C or less and 70% RH or less.
- The solderability of the external electrode may be deteriorated if packages are stored where they are exposed to dust of harmful gas (e.g. HCl, sulfurous gas of H₂S)
- Packaging material may be deformed if package are stored where they are exposed to heat of direct sunlight.
- Solderability specified in **Clause 5.4.6** shall be guaranteed for 3 months from the date of delivery on condition that they are stored at the environment specified in **Clause 3**. For those parts, which passed more than 3 months shall be checked solder-ability before use.

Recommended Soldering Technologies

Re-flowing Profile:

- △ Preheat condition: 150 ~200°C/60~120sec.
- △ Allowed time above 217°C: 60~90sec.
- △ Max temp: 260°C
- △ Max time at max temp: 10sec.
- △ Solder paste: Sn/3.0Ag/0.5Cu
- △ Allowed Reflow time: 2x max

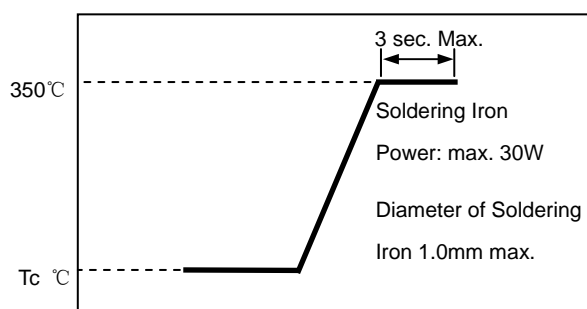
[Note: The reflow profile in the above table is only for qualification and is not meant to specify board assembly profiles. Actual board assembly profiles must be based on the customer's specific board design, solder paste and process, and should not exceed the parameters as the Reflow profile shows.]



Iron Soldering Profile.

- △ Iron soldering power: Max.30W
- △ Pre-heating: 150 °C / 60 sec.
- △ Soldering Tip temperature: 350°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.]



(°C)	25°C (K Ω)	B	(K Ω)	(°C)	25°C (K Ω)	B	(K Ω)	(°C)	25°C (K Ω)	B	(K Ω)	(°C)	25°C (K Ω)	B	(K Ω)
-30	10	3435	119.52	8	10	3435	19.70	46	10	3435	4.72	84	10	3435	1.48
-29	10	3435	113.30	9	10	3435	18.90	47	10	3435	4.57	85	10	3435	1.44
-28	10	3435	107.45	10	10	3435	18.13	48	10	3435	4.42	86	10	3435	1.40
-27	10	3435	101.93	11	10	3435	17.39	49	10	3435	4.27	87	10	3435	1.37
-26	10	3435	96.73	12	10	3435	16.69	50	10	3435	4.13	88	10	3435	1.33
-25	10	3435	91.83	13	10	3435	16.02	51	10	3435	4.00	89	10	3435	1.29
-24	10	3435	87.21	14	10	3435	15.39	52	10	3435	3.87	90	10	3435	1.26
-23	10	3435	82.85	15	10	3435	14.78	53	10	3435	3.75	91	10	3435	1.23
-22	10	3435	78.73	16	10	3435	14.20	54	10	3435	3.63	92	10	3435	1.19
-21	10	3435	74.85	17	10	3435	13.64	55	10	3435	3.51	93	10	3435	1.16
-20	10	3435	71.18	18	10	3435	13.11	56	10	3435	3.40	94	10	3435	1.13
-19	10	3435	67.71	19	10	3435	12.61	57	10	3435	3.30	95	10	3435	1.10
-18	10	3435	64.43	20	10	3435	12.12	58	10	3435	3.19	96	10	3435	1.07
-17	10	3435	61.33	21	10	3435	11.66	59	10	3435	3.09	97	10	3435	1.05
-16	10	3435	58.40	22	10	3435	11.22	60	10	3435	3.00	98	10	3435	1.02
-15	10	3435	55.62	23	10	3435	10.79	61	10	3435	2.91	99	10	3435	0.99
-14	10	3435	53.00	24	10	3435	10.39	62	10	3435	2.82	100	10	3435	0.97
-13	10	3435	50.51	25	10	3435	10.00	63	10	3435	2.73	101	10	3435	0.95
-12	10	3435	48.16	26	10	3435	9.63	64	10	3435	2.65	102	10	3435	0.92
-11	10	3435	45.93	27	10	3435	9.27	65	10	3435	2.57	103	10	3435	0.90
-10	10	3435	43.81	28	10	3435	8.93	66	10	3435	2.49	104	10	3435	0.88
-9	10	3435	41.81	29	10	3435	8.61	67	10	3435	2.42	105	10	3435	0.85
-8	10	3435	39.91	30	10	3435	8.30	68	10	3435	2.35	106	10	3435	0.83
-7	10	3435	38.11	31	10	3435	8.00	69	10	3435	2.28	107	10	3435	0.81
-6	10	3435	36.40	32	10	3435	7.71	70	10	3435	2.21	108	10	3435	0.79
-5	10	3435	34.77	33	10	3435	7.43	71	10	3435	2.15	109	10	3435	0.77
-4	10	3435	33.23	34	10	3435	7.17	72	10	3435	2.09	110	10	3435	0.76
-3	10	3435	31.77	35	10	3435	6.92	73	10	3435	2.03	111	10	3435	0.74
-2	10	3435	30.38	36	10	3435	6.67	74	10	3435	1.97	112	10	3435	0.72
-1	10	3435	29.05	37	10	3435	6.44	75	10	3435	1.91	113	10	3435	0.70
0	10	3435	27.80	38	10	3435	6.22	76	10	3435	1.86	114	10	3435	0.69
1	10	3435	26.60	39	10	3435	6.00	77	10	3435	1.80	115	10	3435	0.67
2	10	3435	25.46	40	10	3435	5.80	78	10	3435	1.75	116	10	3435	0.65
3	10	3435	24.38	41	10	3435	5.60	79	10	3435	1.70	117	10	3435	0.64
4	10	3435	23.35	42	10	3435	5.41	80	10	3435	1.66	118	10	3435	0.62
5	10	3435	22.37	43	10	3435	5.23	81	10	3435	1.61	119	10	3435	0.61
6	10	3435	21.44	44	10	3435	5.05	82	10	3435	1.57	120	10	3435	0.60
7	10	3435	20.55	45	10	3435	4.88	83	10	3435	1.52	125	10	3435	0.53

