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Product : NTC THERMISTOR

Redfish Part No. : RGLR-103F–3480

Specifications : R_{25} 10K Ω ± 1 %

$B_{25\text{-}85}$ 3480°K ± 1 %

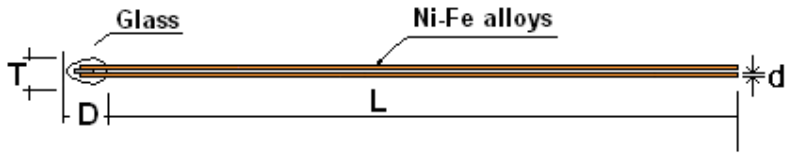
1. D E S C R I P T I O N

This document is the mechanical, electrical specification and the test method for RGLR TYPE THERMISTOR.

2. PART NO. : RGLR-103F-3480

3. S P E C I F I C A T I O N

3 – 1. APPEARANCE (Unit: ㎜)



	D	T	L	d
Size (mm)	1.4	0.8	55.0	0.15
Tol (mm)	± 0.4	± 0.1	± 3.00	± 0.05

3 – 2. THE OTHER SPECIFICATION ON THE APPEARANCE

- There is neither crack nor bare element, lead appearance on coated surface.
- There is neither two failure factors – scratch, burr, etc – nor more factors.
- There is neither bending point exceed 10 ° on the lead wire nor over two bending point.

3 – 3. ELECTRICAL SPECIFICATION

	Item	Particulars		Specification
3-3-1	Resistance	Resistance at 25℃	R_{25}	10 ±1%
3-3-2	“B” Constant	R_{25} to R_{85}℃	$B_{25/85}$	3480°K ±1%
3-3-3	Operating Temp. Range			-50 to 300℃
3-3-4	Dissipation Constant	at 25℃, in still Air		0.5 mW/℃
3-3-5	Insulation Resistance	at DC 500V		Min. 100
3-3-6	Rated Power	at 25℃, in still Air		0.5mW
3-3-7	Thermal Time Constant	at 25℃, in still Air		2~3 sec max.

4. INSPECTION CONDITION

4-1. SAMPLING METHOD: Apply to MIL-STD-105D

4-2. LEVEL: Level 1, AQL 1.0%

4-3. CHECK POINT AND METHOD

Check point	Test method	Grade
Appearance and Dimension	Refer to 5-2.	Important
Electrical Characteristics	Refer to 5-3.	Very Important
Mechanical Characteristics	Refer to 5-4.	Very Important
Environment Test	Refer to 5-5.	Very Important

※ Follow the special specification if another check point require.

5. TEST SPECIFICATION

5-1. TEST CONDITION

5-1-1. NORMAL CONDITION
Temperature : 15~35℃
Relative humidity : 25 ~85%
Atmosphere : 860 ~ 1016 mbar

5-1-2. STANDARD CONDITION
Temperature : 25℃
Relative humidity : 50%
Atmosphere : 1013 mbar

5-2. APPEARANCE AND DIMENSION

5-2-1. APPEARANCE: Visual test on normally but it can be use microscope or another equipment if necessary

5-2-2. DIMENSION: Apply to following tool normally
Vernier calipers : It can be check within 0.05㎜

5-3. ELECTRICAL CHARACTERISTICS

5-3-1. ZERO POWER RESISTANCE (R_0@T℃)

The resistance value of a Thermistor at a specified temperature with zero electrical power dissipation. The temperature controlled liquid bath for précis measurements must be 0.05℃ on temperature tolerance and the liquid volume of the bath should be at least 1000 times that of any object placed in it.

5-3-2. β VALUE (β (T/T))

The β value is the ratio of the zero power resistance of a Thermistor measured at two specified reference temperature. It may be determined as following equation.

$$\beta(T/T) = \frac{\ln \frac{R@T}{R@T}}{\frac{1}{T} - \frac{1}{T}} \quad (T < T)$$

R@T= Resistance at Kelvin temperature T
R@T= Resistance at Kelvin temperature T
T, T= Kelvin temperature (K=℃+273.15)

5-3-3. DISSIPATION CONSTANT (δ)

Unless otherwise specified, the dissipation constant is given for the Thermistor when supported by its leads in stirred oil at an ambient temperature of 25℃ within Thermistor under chamber have a volume greater than 1,000 times the volume of the Thermistor under test. Usually, the power dissipated is taken as the power required to raise the body temperature of the Thermistor by 50℃.

5-3-4. THERMAL TIME CONSTANT (τ)

The time constant is the time required for a Thermistor to change 63.2% of the difference between its initial and final body temperature in stirred oil.

5-3-5. INSULATING RESISTANCE

There shall be satisfied insulation resistance at specified DC voltage between coating area and terminal. 100MΩMin. at DC 500V unless otherwise specified.

6-4. MECHANICAL CHRACTERISTICS

6-4-1. REQUIREMENT: Requirements shall be as specified herein after each test.

- Zero power resistance: Max. ±2% change from initial at specified temperature
- β value: Max. ±1% change from initial value
- Insulation resistance: Min. 100MΩat DC 500V
- No mechanical damage – leakage, removal, breakage, etc – in appearance.

6-4-2. TERMINAL STRENGTH

- Pull test: Apply to the one terminal 1kg, 30sec. In terminal axes direction.

6-4-3. RANDOM VIBRATION

Apply frequency 50 ~200Hz, acceleration 37.8G, direction X, Y, Z, for 90sec.

6-4-4. DROP TEST

Drop on rigid plate (concrete) from 75 ㎝ high by 3 times.

6-4-5. SOLDERABILITY

Dip two terminals in 235℃±5℃ molten solder for 2 sec.

Test the soldering area is over 95% in dip-area.

6-4-6. RESISTANCE TO SOLDERING HEAT

Dip two terminals to point located 2.0~2.5 ㎜ form element in 260℃±5℃ molten solder for 10 sec.

7-5. ENVIRONMENT TEST

7-5-1. REQUIREMENT: Refer to 4-4-1.

7-5-2. LOW TEMPERATURE STORAGE

Store in cold still air at -20℃±5℃ for 1000 hours.

7-5-3. HOT TEMPERATURE STORAGE

Store in hot still air at 200℃±5℃ for 1000 hours.

7-5-4. TEMPERATURE CYCLE

Test 10 times as following conditioned air.

-20℃ x 1HR. ←ROOM TEMP. 0.5HR. → 200℃ x 1HR.

7-5-5. THERMAL SHOCK

Test 50 times as following conditioned air.

-20℃ x 0.5HR. ←5MIN. → 200℃ x 0.5HR.

7-5-6. IMMERSION

Test 2 times by dipping 0.9% salt solution as following condition.

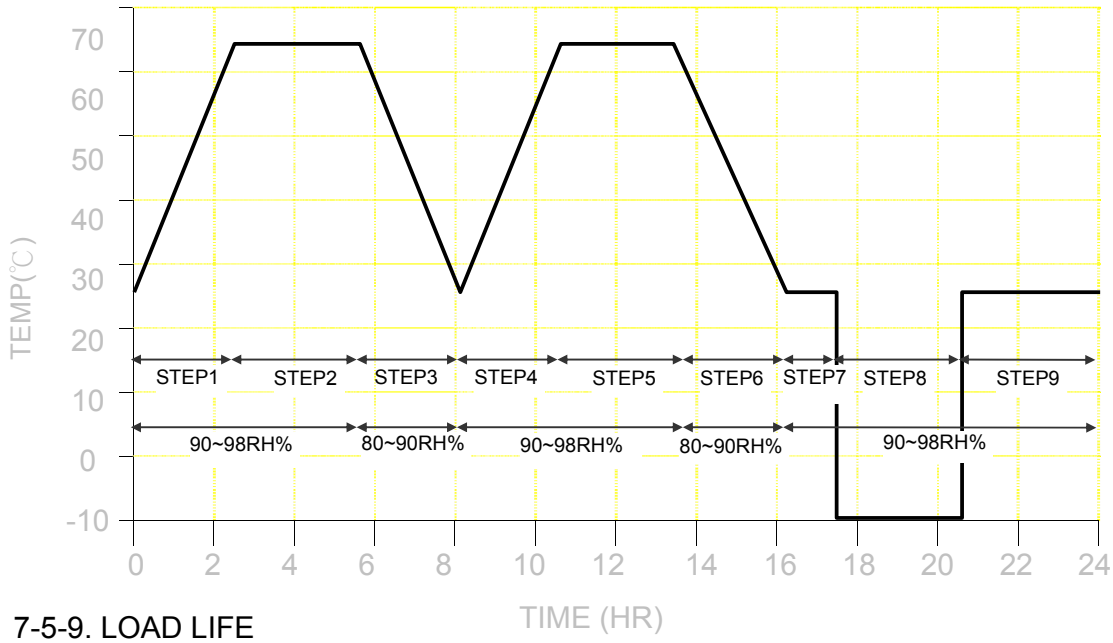
65℃ x 15MIN. 25℃ x 15MIN.

7-5-7. HUMIDITY

Test in condition 80℃, 95%RH for 1000 hours.

7-5-8. MOISTURE RESISTANCE

Test 10 times as following condition in 1.5hours after standing off form drying oven. But, apply the 50% of maximum power rating as initial 2hours of STEP 2 and STEP 5.



7-5-9. LOAD LIFE

Apply the maximum power rating ON for 1.5 hours and OFF 0.5 hours for 1000 hours in room temperature

8. RT-CHARACTERISTICS

PART NO.: **RGLR-103F-3480**

R 25: 10,000 ohms ± 1%
B25/85 : 3480 °K ± 1%

Temperature (℃)	Resistance (Ω)			Temperature Coef.	Resist. Tolerance (%)		Temp. Tolerance (℃)	
	MIN.	CENTER	MAX.	(%/℃)	MIN.	MAX.	MIN.	MAX.
-40.0	238024	248277	258944	-6.32	-4.13	4.30	-0.68	0.65
-39.0	223650	233136	243000	-6.27	-4.07	4.23	-0.68	0.65
-38.0	210255	219036	228161	-6.21	-4.01	4.17	-0.67	0.65
-37.0	197765	205897	214343	-6.16	-3.95	4.10	-0.67	0.64
-36.0	186114	193648	201467	-6.11	-3.89	4.04	-0.66	0.64
-35.0	175238	182221	189464	-6.06	-3.83	3.97	-0.66	0.63
-34.0	165081	171556	178267	-6.01	-3.77	3.91	-0.65	0.63
-33.0	155590	161596	167817	-5.96	-3.72	3.85	-0.65	0.62
-32.0	146717	152290	158059	-5.91	-3.66	3.79	-0.64	0.62
-31.0	138416	143590	148942	-5.86	-3.60	3.73	-0.64	0.62
-30.0	130648	135452	140419	-5.81	-3.55	3.67	-0.63	0.61
-29.0	123375	127837	132448	-5.76	-3.49	3.61	-0.63	0.61
-28.0	116560	120707	124989	-5.72	-3.44	3.55	-0.62	0.60
-27.0	110173	114028	118006	-5.67	-3.38	3.49	-0.62	0.60
-26.0	104184	107768	111464	-5.62	-3.33	3.43	-0.61	0.59
-25.0	98564	101898	105334	-5.58	-3.27	3.37	-0.60	0.59
-24.0	93289	96391	99586	-5.53	-3.22	3.31	-0.60	0.58
-23.0	88336	91222	94194	-5.49	-3.16	3.26	-0.59	0.58
-22.0	83681	86369	89133	-5.45	-3.11	3.20	-0.59	0.57
-21.0	79306	81809	84382	-5.40	-3.06	3.15	-0.58	0.57
-20.0	75192	77523	79918	-5.36	-3.01	3.09	-0.58	0.56
-19.0	71320	73492	75722	-5.32	-2.96	3.03	-0.57	0.56
-18.0	67677	69701	71778	-5.28	-2.90	2.98	-0.56	0.55
-17.0	64245	66132	68067	-5.24	-2.85	2.93	-0.56	0.54
-16.0	61013	62771	64575	-5.19	-2.80	2.87	-0.55	0.54
-15.0	57966	59606	61286	-5.15	-2.75	2.82	-0.55	0.53
-14.0	55093	56623	58189	-5.11	-2.70	2.77	-0.54	0.53
-13.0	52383	53810	55270	-5.08	-2.65	2.71	-0.53	0.52
-12.0	49825	51157	52519	-5.04	-2.60	2.66	-0.53	0.52
-11.0	47411	48654	49924	-5.00	-2.55	2.61	-0.52	0.51
-10.0	45130	46290	47475	-4.96	-2.51	2.56	-0.52	0.51
-9.0	42976	44058	45164	-4.92	-2.46	2.51	-0.51	0.50
-8.0	40939	41950	42981	-4.89	-2.41	2.46	-0.50	0.49
-7.0	39013	39957	40919	-4.85	-2.36	2.41	-0.50	0.49
-6.0	37191	38072	38970	-4.81	-2.31	2.36	-0.49	0.48
-5.0	35467	36290	37128	-4.78	-2.27	2.31	-0.48	0.47
-4.0	33834	34603	35386	-4.74	-2.22	2.26	-0.48	0.47
-3.0	32288	33006	33737	-4.71	-2.18	2.21	-0.47	0.46
-2.0	30824	31494	32176	-4.67	-2.13	2.17	-0.46	0.46
-1.0	29435	30062	30698	-4.64	-2.08	2.12	-0.46	0.45

0.0	28119	28704	29299	-4.60	-2.04	2.07	-0.45	0.44
1.0	26871	27417	27972	-4.57	-1.99	2.02	-0.44	0.44
2.0	25686	26197	26715	-4.54	-1.95	1.98	-0.44	0.43
3.0	24562	25039	25522	-4.50	-1.90	1.93	-0.43	0.42
4.0	23495	23940	24391	-4.47	-1.86	1.89	-0.42	0.42
5.0	22481	22897	23318	-4.44	-1.82	1.84	-0.41	0.41
6.0	21517	21906	22299	-4.41	-1.77	1.80	-0.41	0.40
7.0	20602	20964	21331	-4.38	-1.73	1.75	-0.40	0.40
8.0	19731	20070	20412	-4.35	-1.69	1.71	-0.39	0.39
9.0	18903	19219	19539	-4.31	-1.64	1.66	-0.39	0.38
10.0	18115	18410	18708	-4.28	-1.60	1.62	-0.38	0.37
11.0	17366	17641	17919	-4.25	-1.56	1.57	-0.37	0.37
12.0	16652	16909	17168	-4.22	-1.52	1.53	-0.36	0.36
13.0	15972	16212	16453	-4.20	-1.48	1.49	-0.35	0.35
14.0	15325	15548	15773	-4.17	-1.44	1.45	-0.35	0.34
15.0	14708	14916	15125	-4.14	-1.40	1.40	-0.34	0.34
16.0	14119	14313	14508	-4.11	-1.35	1.36	-0.33	0.33
17.0	13559	13739	13921	-4.08	-1.31	1.32	-0.32	0.32
18.0	13024	13192	13360	-4.05	-1.27	1.28	-0.32	0.31
19.0	12513	12669	12827	-4.02	-1.23	1.24	-0.31	0.31
20.0	12026	12171	12317	-4.00	-1.19	1.20	-0.30	0.30
21.0	11561	11696	11832	-3.97	-1.15	1.16	-0.29	0.29
22.0	11117	11242	11368	-3.94	-1.12	1.12	-0.28	0.28
23.0	10693	10809	10926	-3.92	-1.08	1.08	-0.28	0.27
24.0	10287	10395	10503	-3.89	-1.04	1.04	-0.27	0.27
25.0	9900	10000	10100	-3.86	-1.00	1.00	-0.26	0.26
26.0	9522	9622	9722	-3.84	-1.04	1.04	-0.27	0.27
27.0	9161	9261	9361	-3.81	-1.08	1.08	-0.28	0.28
28.0	8816	8916	9015	-3.79	-1.11	1.12	-0.29	0.29
29.0	8487	8585	8684	-3.76	-1.15	1.15	-0.31	0.31
30.0	8171	8269	8368	-3.74	-1.19	1.19	-0.32	0.32
31.0	7869	7967	8065	-3.71	-1.22	1.23	-0.33	0.33
32.0	7581	7678	7775	-3.69	-1.26	1.27	-0.34	0.34
33.0	7304	7400	7497	-3.66	-1.30	1.30	-0.36	0.35
34.0	7040	7135	7231	-3.64	-1.33	1.34	-0.37	0.37
35.0	6786	6881	6975	-3.62	-1.37	1.38	-0.38	0.38
36.0	6544	6637	6731	-3.59	-1.41	1.41	-0.39	0.39
37.0	6311	6403	6496	-3.57	-1.44	1.45	-0.41	0.40
38.0	6088	6179	6271	-3.55	-1.48	1.49	-0.42	0.42
39.0	5875	5965	6056	-3.53	-1.51	1.52	-0.43	0.43
40.0	5670	5759	5849	-3.50	-1.54	1.56	-0.45	0.44
41.0	5473	5561	5650	-3.48	-1.58	1.59	-0.46	0.45
42.0	5285	5372	5459	-3.46	-1.61	1.63	-0.47	0.47
43.0	5104	5189	5276	-3.44	-1.65	1.66	-0.48	0.48
44.0	4930	5015	5100	-3.42	-1.68	1.70	-0.50	0.49
45.0	4764	4847	4931	-3.39	-1.71	1.73	-0.51	0.51
46.0	4604	4686	4769	-3.37	-1.75	1.77	-0.52	0.52

47.0	4450	4531	4612	-3.35	-1.78	1.80	-0.54	0.53
48.0	4302	4382	4462	-3.33	-1.81	1.84	-0.55	0.54
49.0	4161	4239	4318	-3.31	-1.85	1.87	-0.57	0.56
50.0	4024	4101	4179	-3.29	-1.88	1.90	-0.58	0.57
51.0	3893	3969	4046	-3.27	-1.91	1.94	-0.59	0.58
52.0	3767	3842	3917	-3.25	-1.94	1.97	-0.61	0.60
53.0	3646	3719	3794	-3.23	-1.97	2.00	-0.62	0.61
54.0	3529	3601	3675	-3.21	-2.01	2.04	-0.63	0.63
55.0	3417	3488	3560	-3.19	-2.04	2.07	-0.65	0.64
56.0	3309	3379	3450	-3.17	-2.07	2.10	-0.66	0.65
57.0	3205	3274	3343	-3.15	-2.10	2.13	-0.68	0.67
58.0	3105	3172	3241	-3.13	-2.13	2.17	-0.69	0.68
59.0	3008	3075	3142	-3.11	-2.16	2.20	-0.71	0.69
60.0	2916	2981	3047	-3.09	-2.19	2.23	-0.72	0.71
61.0	2826	2890	2956	-3.08	-2.22	2.26	-0.74	0.72
62.0	2740	2803	2867	-3.06	-2.25	2.29	-0.75	0.74
63.0	2657	2719	2782	-3.04	-2.28	2.32	-0.76	0.75
64.0	2577	2638	2700	-3.02	-2.31	2.36	-0.78	0.76
65.0	2499	2559	2620	-3.00	-2.34	2.39	-0.79	0.78
66.0	2425	2484	2544	-2.99	-2.37	2.42	-0.81	0.79
67.0	2353	2411	2470	-2.97	-2.40	2.45	-0.82	0.81
68.0	2284	2341	2399	-2.95	-2.43	2.48	-0.84	0.82
69.0	2217	2273	2330	-2.93	-2.46	2.51	-0.85	0.84
70.0	2152	2207	2263	-2.92	-2.48	2.54	-0.87	0.85
71.0	2090	2144	2199	-2.90	-2.51	2.57	-0.89	0.87
72.0	2030	2083	2137	-2.88	-2.54	2.60	-0.90	0.88
73.0	1972	2024	2077	-2.87	-2.57	2.63	-0.92	0.90
74.0	1916	1967	2019	-2.85	-2.60	2.66	-0.93	0.91
75.0	1861	1912	1963	-2.83	-2.62	2.69	-0.95	0.93
76.0	1809	1858	1909	-2.82	-2.65	2.71	-0.96	0.94
77.0	1758	1807	1856	-2.80	-2.68	2.74	-0.98	0.96
78.0	1710	1757	1806	-2.79	-2.71	2.77	-0.99	0.97
79.0	1662	1709	1757	-2.77	-2.73	2.80	-1.01	0.99
80.0	1617	1662	1709	-2.75	-2.76	2.83	-1.03	1.00
81.0	1572	1617	1664	-2.74	-2.79	2.86	-1.04	1.02
82.0	1530	1574	1619	-2.72	-2.81	2.88	-1.06	1.03
83.0	1488	1532	1576	-2.71	-2.84	2.91	-1.08	1.05
84.0	1448	1491	1535	-2.69	-2.87	2.94	-1.09	1.06
85.0	1409	1451	1494	-2.68	-2.89	2.97	-1.11	1.08
86.0	1372	1413	1455	-2.66	-2.92	3.00	-1.12	1.10
87.0	1336	1376	1418	-2.65	-2.94	3.02	-1.14	1.11
88.0	1300	1340	1381	-2.63	-2.97	3.05	-1.16	1.13
89.0	1266	1305	1346	-2.62	-3.00	3.08	-1.18	1.14
90.0	1233	1272	1311	-2.60	-3.02	3.10	-1.19	1.16
91.0	1201	1239	1278	-2.59	-3.05	3.13	-1.21	1.18
92.0	1171	1208	1246	-2.58	-3.07	3.16	-1.23	1.19
93.0	1141	1177	1214	-2.56	-3.10	3.18	-1.24	1.21

94.0	1111	1147	1184	-2.55	-3.12	3.21	-1.26	1.22
95.0	1083	1118	1155	-2.53	-3.15	3.24	-1.28	1.24
96.0	1056	1091	1126	-2.52	-3.17	3.26	-1.29	1.26
97.0	1030	1063	1098	-2.51	-3.19	3.29	-1.31	1.27
98.0	1004	1037	1072	-2.49	-3.22	3.31	-1.33	1.29
99.0	979	1012	1046	-2.48	-3.24	3.34	-1.35	1.31
100.0	955	987	1020	-2.47	-3.27	3.37	-1.36	1.32
101.0	931	963	996	-2.45	-3.29	3.39	-1.38	1.34
102.0	909	940	972	-2.44	-3.31	3.42	-1.40	1.36
103.0	887	917	949	-2.43	-3.34	3.44	-1.42	1.37
104.0	865	895	926	-2.41	-3.36	3.47	-1.44	1.39
105.0	844	874	904	-2.40	-3.38	3.49	-1.45	1.41
106.0	824	853	883	-2.39	-3.41	3.52	-1.47	1.43
107.0	805	833	863	-2.38	-3.43	3.54	-1.49	1.44
108.0	786	814	843	-2.36	-3.45	3.57	-1.51	1.46
109.0	767	795	823	-2.35	-3.48	3.59	-1.53	1.48
110.0	749	776	804	-2.34	-3.50	3.61	-1.54	1.50
111.0	732	758	786	-2.33	-3.52	3.64	-1.56	1.51
112.0	715	741	768	-2.32	-3.54	3.66	-1.58	1.53
113.0	698	724	751	-2.30	-3.57	3.69	-1.60	1.55
114.0	682	708	734	-2.29	-3.59	3.71	-1.62	1.57
115.0	667	692	717	-2.28	-3.61	3.73	-1.64	1.58
116.0	651	676	701	-2.27	-3.63	3.76	-1.66	1.60
117.0	637	661	686	-2.26	-3.65	3.78	-1.68	1.62
118.0	622	646	671	-2.25	-3.68	3.80	-1.69	1.64
119.0	609	632	656	-2.23	-3.70	3.83	-1.71	1.65
120.0	595	618	642	-2.22	-3.72	3.85	-1.73	1.67
121.0	582	604	628	-2.21	-3.74	3.87	-1.75	1.69
122.0	569	591	614	-2.20	-3.76	3.90	-1.77	1.71
123.0	557	578	601	-2.19	-3.78	3.92	-1.79	1.73
124.0	544	566	588	-2.18	-3.80	3.94	-1.81	1.75
125.0	533	554	576	-2.17	-3.82	3.97	-1.83	1.76
126.0	521	542	564	-2.16	-3.84	3.99	-1.85	1.78
127.0	510	530	552	-2.15	-3.87	4.01	-1.87	1.80
128.0	499	519	540	-2.13	-3.89	4.03	-1.89	1.82
129.0	488	508	529	-2.12	-3.91	4.05	-1.91	1.84
130.0	478	498	518	-2.11	-3.93	4.08	-1.93	1.86
131.0	468	487	507	-2.10	-3.95	4.10	-1.95	1.88
132.0	458	477	497	-2.09	-3.97	4.12	-1.97	1.90
133.0	449	467	487	-2.08	-3.99	4.14	-1.99	1.91
134.0	439	458	477	-2.07	-4.01	4.16	-2.01	1.93
135.0	430	448	467	-2.06	-4.03	4.19	-2.03	1.95
136.0	421	439	458	-2.05	-4.05	4.21	-2.05	1.97
137.0	413	430	448	-2.04	-4.07	4.23	-2.07	1.99
138.0	404	422	439	-2.03	-4.09	4.25	-2.09	2.01
139.0	396	413	431	-2.02	-4.11	4.27	-2.11	2.03
140.0	388	405	422	-2.01	-4.12	4.29	-2.13	2.05

141.0	380	397	414	-2.00	-4.14	4.31	-2.15	2.07
142.0	373	389	406	-1.99	-4.16	4.33	-2.17	2.09
143.0	365	381	398	-1.98	-4.18	4.35	-2.20	2.11
144.0	358	374	390	-1.97	-4.20	4.37	-2.22	2.13
145.0	351	367	383	-1.96	-4.22	4.40	-2.24	2.15
146.0	344	359	375	-1.96	-4.24	4.42	-2.26	2.17
147.0	337	352	368	-1.95	-4.26	4.44	-2.28	2.19
148.0	331	346	361	-1.94	-4.28	4.46	-2.30	2.21
149.0	325	339	354	-1.93	-4.29	4.48	-2.32	2.23
150.0	318	333	348	-1.92	-4.31	4.50	-2.34	2.25
151.0	312	326	341	-1.91	-4.33	4.52	-2.37	2.27
152.0	306	320	335	-1.90	-4.35	4.54	-2.39	2.29
153.0	300	314	328	-1.89	-4.37	4.56	-2.41	2.31
154.0	295	308	322	-1.88	-4.39	4.58	-2.43	2.33
155.0	289	303	316	-1.87	-4.40	4.60	-2.45	2.35
156.0	284	297	311	-1.87	-4.42	4.62	-2.47	2.37
157.0	279	291	305	-1.86	-4.44	4.63	-2.50	2.39
158.0	273	286	299	-1.85	-4.46	4.65	-2.52	2.41
159.0	268	281	294	-1.84	-4.47	4.67	-2.54	2.43
160.0	263	276	289	-1.83	-4.49	4.69	-2.56	2.45
161.0	259	271	284	-1.82	-4.51	4.71	-2.59	2.47
162.0	254	266	278	-1.81	-4.53	4.73	-2.61	2.50
163.0	249	261	274	-1.81	-4.54	4.75	-2.63	2.52
164.0	245	256	269	-1.80	-4.56	4.77	-2.65	2.54
165.0	240	252	264	-1.79	-4.58	4.79	-2.68	2.56
166.0	236	247	259	-1.78	-4.60	4.81	-2.70	2.58
167.0	232	243	255	-1.77	-4.61	4.82	-2.72	2.60
168.0	228	239	250	-1.77	-4.63	4.84	-2.74	2.62
169.0	224	235	246	-1.76	-4.65	4.86	-2.77	2.64
170.0	220	231	242	-1.75	-4.66	4.88	-2.79	2.67
171.0	216	227	238	-1.74	-4.68	4.90	-2.81	2.69
172.0	212	223	234	-1.73	-4.70	4.92	-2.84	2.71
173.0	209	219	230	-1.73	-4.71	4.93	-2.86	2.73
174.0	205	215	226	-1.72	-4.73	4.95	-2.88	2.75
175.0	201	211	222	-1.71	-4.74	4.97	-2.91	2.77
176.0	198	208	218	-1.70	-4.76	4.99	-2.93	2.80
177.0	195	204	215	-1.70	-4.78	5.01	-2.95	2.82
178.0	191	201	211	-1.69	-4.79	5.02	-2.98	2.84
179.0	188	198	208	-1.68	-4.81	5.04	-3.00	2.86
180.0	185	194	204	-1.67	-4.83	5.06	-3.02	2.88
181.0	182	191	201	-1.67	-4.84	5.08	-3.05	2.91
182.0	179	188	198	-1.66	-4.86	5.09	-3.07	2.93
183.0	176	185	194	-1.65	-4.87	5.11	-3.10	2.95
184.0	173	182	191	-1.64	-4.89	5.13	-3.12	2.97
185.0	170	179	188	-1.64	-4.90	5.15	-3.14	3.00

186.0	167	176	185	-1.63	-4.92	5.16	-3.17	3.02
187.0	165	173	182	-1.62	-4.94	5.18	-3.19	3.04
188.0	162	170	179	-1.62	-4.95	5.20	-3.22	3.06
189.0	159	168	176	-1.61	-4.97	5.21	-3.24	3.09
190.0	157	165	174	-1.60	-4.98	5.23	-3.27	3.11
191.0	154	162	171	-1.59	-5.00	5.25	-3.29	3.13
192.0	152	160	168	-1.59	-5.01	5.27	-3.32	3.16
193.0	149	157	166	-1.58	-5.03	5.28	-3.34	3.18
194.0	147	155	163	-1.57	-5.04	5.30	-3.37	3.20
195.0	145	152	161	-1.57	-5.06	5.32	-3.39	3.23
196.0	142	150	158	-1.56	-5.07	5.33	-3.42	3.25
197.0	140	148	156	-1.55	-5.09	5.35	-3.44	3.27
198.0	138	145	153	-1.55	-5.10	5.36	-3.47	3.30
199.0	136	143	151	-1.54	-5.12	5.38	-3.49	3.32
200.0	134	141	149	-1.53	-5.13	5.40	-3.52	3.34
201.0	132	139	146	-1.53	-5.14	5.41	-3.54	3.37
202.0	130	137	144	-1.52	-5.16	5.43	-3.57	3.39
203.0	128	135	142	-1.52	-5.17	5.45	-3.59	3.41
204.0	126	133	140	-1.51	-5.19	5.46	-3.62	3.44
205.0	124	131	138	-1.50	-5.20	5.48	-3.65	3.46
206.0	122	129	136	-1.50	-5.22	5.49	-3.67	3.49
207.0	120	127	134	-1.49	-5.23	5.51	-3.70	3.51
208.0	118	125	132	-1.48	-5.24	5.52	-3.72	3.53
209.0	117	123	130	-1.48	-5.26	5.54	-3.75	3.56
210.0	115	121	128	-1.47	-5.27	5.56	-3.78	3.58
211.0	113	120	126	-1.47	-5.29	5.57	-3.80	3.61
212.0	112	118	124	-1.46	-5.30	5.59	-3.83	3.63
213.0	110	116	123	-1.45	-5.31	5.60	-3.85	3.66
214.0	108	114	121	-1.45	-5.33	5.62	-3.88	3.68
215.0	107	113	119	-1.44	-5.34	5.63	-3.91	3.71
216.0	105	111	118	-1.44	-5.35	5.65	-3.93	3.73
217.0	104	110	116	-1.43	-5.37	5.66	-3.96	3.75
218.0	102	108	114	-1.42	-5.38	5.68	-3.99	3.78
219.0	101	107	113	-1.42	-5.40	5.69	-4.01	3.80
220.0	99	105	111	-1.41	-5.41	5.71	-4.04	3.83
221.0	98	104	110	-1.41	-5.42	5.72	-4.07	3.85
222.0	97	102	108	-1.40	-5.44	5.74	-4.10	3.88
223.0	95	101	107	-1.40	-5.45	5.75	-4.12	3.90
224.0	94	99	105	-1.39	-5.46	5.77	-4.15	3.93
225.0	93	98	104	-1.38	-5.47	5.78	-4.18	3.96
226.0	91	97	102	-1.38	-5.49	5.80	-4.20	3.98
227.0	90	95	101	-1.37	-5.50	5.81	-4.23	4.01
228.0	89	94	99	-1.37	-5.51	5.83	-4.26	4.03
229.0	88	93	98	-1.36	-5.53	5.84	-4.29	4.06
230.0	86	91	97	-1.36	-5.54	5.85	-4.31	4.08

231.0	85	90	96	-1.35	-5.55	5.87	-4.34	4.11
232.0	84	89	94	-1.35	-5.57	5.88	-4.37	4.13
233.0	83	88	93	-1.34	-5.58	5.90	-4.40	4.16
234.0	82	87	92	-1.34	-5.59	5.91	-4.43	4.19
235.0	81	86	91	-1.33	-5.60	5.93	-4.45	4.21
236.0	80	84	89	-1.33	-5.62	5.94	-4.48	4.24
237.0	79	83	88	-1.32	-5.63	5.95	-4.51	4.26
238.0	78	82	87	-1.31	-5.64	5.97	-4.54	4.29
239.0	77	81	86	-1.31	-5.65	5.98	-4.57	4.32
240.0	76	80	85	-1.30	-5.67	5.99	-4.60	4.34
241.0	75	79	84	-1.30	-5.68	6.01	-4.62	4.37
242.0	74	78	83	-1.29	-5.69	6.02	-4.65	4.40
243.0	73	77	82	-1.29	-5.70	6.04	-4.68	4.42
244.0	72	76	81	-1.28	-5.71	6.05	-4.71	4.45
245.0	71	75	80	-1.28	-5.73	6.06	-4.74	4.48
246.0	70	74	79	-1.27	-5.74	6.08	-4.77	4.50
247.0	69	73	78	-1.27	-5.75	6.09	-4.80	4.53
248.0	68	72	77	-1.26	-5.76	6.10	-4.83	4.56
249.0	67	71	76	-1.26	-5.77	6.12	-4.86	4.58
250.0	66	70	75	-1.26	-5.79	6.13	-4.88	4.61
251.0	66	70	74	-1.25	-5.80	6.14	-4.91	4.64
252.0	65	69	73	-1.25	-5.81	6.16	-4.94	4.66
253.0	64	68	72	-1.24	-5.82	6.17	-4.97	4.69
254.0	63	67	71	-1.24	-5.83	6.18	-5.00	4.72
255.0	62	66	70	-1.23	-5.84	6.20	-5.03	4.75
256.0	62	65	69	-1.23	-5.86	6.21	-5.06	4.77
257.0	61	65	69	-1.22	-5.87	6.22	-5.09	4.80
258.0	60	64	68	-1.22	-5.88	6.24	-5.12	4.83
259.0	59	63	67	-1.21	-5.89	6.25	-5.15	4.86
260.0	59	62	66	-1.21	-5.90	6.26	-5.18	4.88
261.0	58	62	65	-1.20	-5.91	6.27	-5.21	4.91
262.0	57	61	65	-1.20	-5.92	6.29	-5.24	4.94
263.0	57	60	64	-1.19	-5.94	6.30	-5.27	4.97
264.0	56	59	63	-1.19	-5.95	6.31	-5.30	5.00
265.0	55	59	62	-1.19	-5.96	6.33	-5.33	5.02
266.0	55	58	62	-1.18	-5.97	6.34	-5.36	5.05
267.0	54	57	61	-1.18	-5.98	6.35	-5.39	5.08
268.0	53	57	60	-1.17	-5.99	6.36	-5.42	5.11
269.0	53	56	60	-1.17	-6.00	6.38	-5.46	5.14
270.0	52	55	59	-1.16	-6.01	6.39	-5.49	5.16
271.0	51	55	58	-1.16	-6.02	6.40	-5.52	5.19
272.0	51	54	58	-1.16	-6.04	6.41	-5.55	5.22
273.0	50	53	57	-1.15	-6.05	6.42	-5.58	5.25
274.0	50	53	56	-1.15	-6.06	6.44	-5.61	5.28
275.0	49	52	56	-1.14	-6.07	6.45	-5.64	5.31

276.0	49	52	55	-1.14	-6.08	6.46	-5.67	5.34
277.0	48	51	54	-1.13	-6.09	6.47	-5.70	5.37
278.0	47	50	54	-1.13	-6.10	6.49	-5.74	5.39
279.0	47	50	53	-1.13	-6.11	6.50	-5.77	5.42
280.0	46	49	53	-1.12	-6.12	6.51	-5.80	5.45
281.0	46	49	52	-1.12	-6.13	6.52	-5.83	5.48
282.0	45	48	51	-1.11	-6.14	6.53	-5.86	5.51
283.0	45	48	51	-1.11	-6.15	6.54	-5.89	5.54
284.0	44	47	50	-1.11	-6.16	6.56	-5.93	5.57
285.0	44	47	50	-1.10	-6.17	6.57	-5.96	5.60
286.0	43	46	49	-1.10	-6.18	6.58	-5.99	5.63
287.0	43	46	49	-1.09	-6.19	6.59	-6.02	5.66
288.0	42	45	48	-1.09	-6.20	6.60	-6.05	5.69
289.0	42	45	48	-1.09	-6.21	6.62	-6.09	5.72
290.0	41	44	47	-1.08	-6.22	6.63	-6.12	5.75
291.0	41	44	47	-1.08	-6.23	6.64	-6.15	5.78
292.0	41	43	46	-1.08	-6.24	6.65	-6.18	5.81
293.0	40	43	46	-1.07	-6.25	6.66	-6.22	5.84
294.0	40	42	45	-1.07	-6.26	6.67	-6.25	5.87
295.0	39	42	45	-1.06	-6.27	6.68	-6.28	5.90
296.0	39	41	44	-1.06	-6.28	6.70	-6.31	5.93
297.0	38	41	44	-1.06	-6.29	6.71	-6.35	5.96
298.0	38	41	43	-1.05	-6.30	6.72	-6.38	5.99
299.0	38	40	43	-1.05	-6.31	6.73	-6.41	6.02
300.0	37	40	42	-1.05	-6.32	6.74	-6.45	6.05