



深圳市精萃电子有限公司

SHENZHEN ZEITGEIST ELECTRONICS CO., LTD

编 号:JC-MF11-302

页 数:1 /13

产 品 规 格 书

(第 1 次送样)

客 户:

名 称: 温补型 NTC 热敏电阻器

型 号: MF11 302K4000

拟制	邓骅翊	审查	黄艳萍	批准	徐然
日期	2013-12-31	日期	2013-12-31	日期	2013-12-31

____公司____确认收到此规格书
(收到该规格书后请在上一行相应处签字回传 0755-83655503, 多谢!)

客 户 承 认 书

兹同意此规格书作为我公司 MF11 302K4000 型号系列的验收标准。

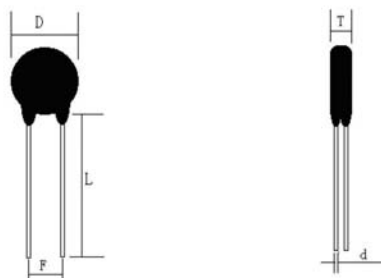
工程 _____ 品质 _____ 采购 _____

公司地址: 福田区深南中路 3027 号嘉汇新城汇商中心 2918 室
邮 编: 518000
网 址: <http://www.china-zeitgeist.com>
电子信箱: szzeit@china-zeitgeist.com



1 、一般参数 (Common Parameters) :

(1) 尺寸 (mm) (Size)



DMax	LMin	F	TMax	d
6.0	25.0	2.5 ± 1.0	5.0	0.45 ± 0.06

(2) 材料 (Materials)

- ①封装材料 (Wrapper) : 环氧树脂 (Silicone)
②引线 (Down-lead) : 镀锡电子线 (Tinned Electron Wire)
③颜色 (Coating color) : 黑色 (Black)

2、主要技术参数 (Parameters of Technology) :

- ①25℃时零功率电阻值 (Ω) (Zero Power Resistance at 25℃) : $3000 \pm 10\%$
②B 值 25/50℃ (K) (B Value) : $4000 \pm 7\%$
③热时间常数(S) (Thermal Time Constant) : ≤ 30
④热耗散系数 (mW/℃) (Thermal Dissipation Constant) : ≥ 6
⑤工作温度 (℃) (Operating Temperature) : $-40 - +125$
⑥绝缘电阻(M Ω) (Insulating Resistance) : ≥ 100



3. 电气性能及要求 (electrical properties and requirements)

项目	测试方法	性能要求
零功率电阻值 Zero Power Resistance	在 25℃ 下, 当由于电阻体内部发热引起的电阻值变化相对于总测量误差可以忽略不计时所测得的电阻值。 At 25℃, the measured resistance value can be neglected compared to the general tolerance when the change of the resistance is made through its self-heat of the resistor.	见电特性参数 See Electrical Parameters
B 值 B-value	B 值可以用 25℃ 和 50℃ 时的零功率电阻值计算出来。其计算公式是: $B = \frac{T_1 \cdot T_2}{T_2 - T_1} \cdot \ln \left(\frac{R_1}{R_2} \right)$ The B value can be calculated using the zero power resistance value at 25℃ and 50℃. The equation is as above.	见电特性参数 See Electrical Parameters
热耗散系数 Thermal Dissipation Constant	在规定的温度下, 热敏电阻中耗散的功率变化与热敏电阻相应温度变化之比。其单位: mw/℃ The ratio of the change of the dissipation power to the corresponding change of the temperature at specified temperature. The unit is: mw/℃	见电特性参数 See Electrical Parameters
热时间常数 ThermalTimeConstant	在零功率条件下, 当温度发生变化时, 热敏电阻的温度变化为其初始的和最终的温度差的 63.2% 所需的时间。 Under zero power condition, thermal time constant is the time required by a thermistor that its body temperature reach 63.2% of the difference between its initial and final temperature.	见电特性参数 See Electrical Parameters
工作温度 Operating Temperature	热敏电阻器长期连续工作所允许的温度范围。 Allowable temperature range while the thermistor work continuously for long time	-40--+125℃



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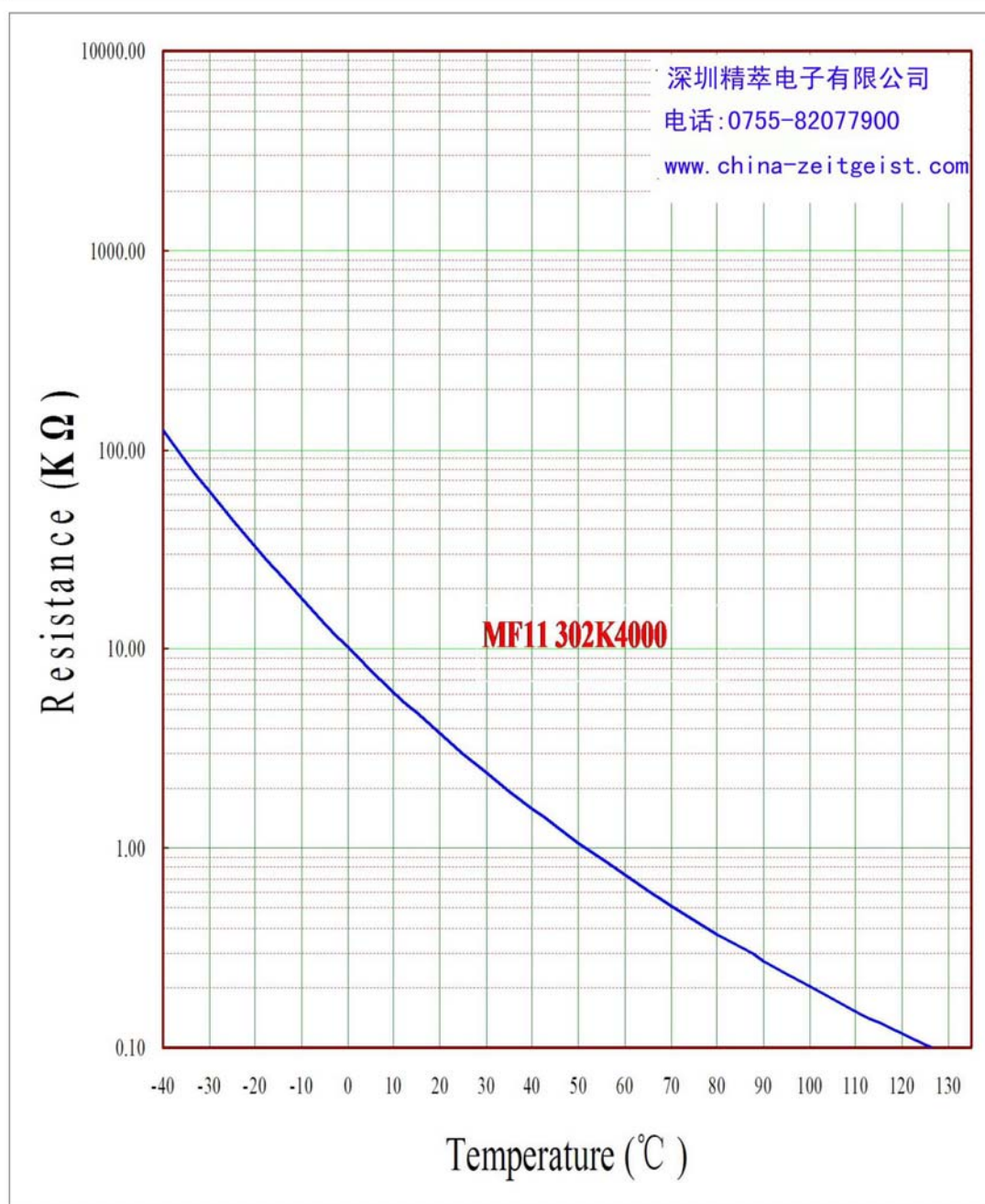
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稳态湿热 Damp Heat	温度 $40\pm2^{\circ}\text{C}$, 相对湿度 $93\pm3\%$, 存放 1000 ± 2 小时后, 在正常状态下 1 小时。 The sample should be subjected to $40\pm2^{\circ}\text{C}$, relative humidity $93\pm3\%$ for 1000 ± 2 hours, then stored at room temperature and humidity for 1 hour.	无可见损伤、标志清晰、无击穿或飞弧, 绝缘电阻大于 $100\text{M}\Omega$ 。电阻值的最大变化率在 $\pm 15\%$ 以内。 No visible damage, the mark is clear, no breakdown or arcing. Insulating resistance is $>100\text{M}\Omega$. The change ratio of the resistance is within $\pm 15\%$.
耐电压 Withstand Voltage	施加 700ACV 电压, 时间 60S, 电压加在电阻器引线及绝缘层之间 Applied AC voltage of 700V between the lead of the resistor and the insulating coating for 60S	无击穿或飞弧 No breakdown or arcing
耐焊接热 Resistance to Soldering Heat	将热敏电阻器引线在 $260\pm10^{\circ}\text{C}$ 的焊锡液里, 液面距电阻体 6mm 时间 10S。在室温下恢复到原来的状态。 Immerse the lead of the resistor into tin liquor of $260\pm10^{\circ}\text{C}$ for 10S, the distance from the liquor surface to the resistor is 6mm. Then resume to the original state.	无可见损伤、电阻值的最大变化率在 $\pm 15\%$ 以内 No visible damage. The max change ratio of the resistance is within $\pm 15\%$
可焊性 Solderability	引线浸在 $260\pm10^{\circ}\text{C}$ 的锡液里, 时间 3 秒。 浸锡温度: $260\pm5^{\circ}\text{C}$ 手锡温度: $260\pm5^{\circ}\text{C}$ (5s) Immerse the lead into tin liquor of $260\pm10^{\circ}\text{C}$ for 3 sec. The temperature of immerse welding: $260\pm5^{\circ}\text{C}$, The temperature of hand welding: $260\pm5^{\circ}\text{C}$ (5s)	焊锡涂布面积在 90% 以上 The covered surface area should be above 90%
引出端变曲强度 Bending Strength of Terminals	固定电阻体, 在一根引出端悬挂 0.5kg 重力变曲 90 度; 然后再回复, 再把方向弯曲 90 度 Fix the resistor, hanging a force of 0.5kg to one terminal to bend it by 90 degree, then resume to the original state, bend it by 90 degree again.	无可见损伤 NO visible damage



振 动 Vibration	频率: 10-50HZ; 振幅: 1.55mm 方向和时间: X、Y 及 Z 轴各 2 个小时 Frequency: 10-50HZ, Wave Amplitude:1.55mm. Direction and Time: 2 hours respectively f o r X , Y a n d Z a x i s .	无机械损伤 No mechanical damage
绝缘电阻 Insulation resistance	施加 500DCV 电压, 时间 60s, 电压加在电 阻器引线及绝缘层之间 Applied DC voltage of 500v between the lead of the resistor and the insulating coating for 60s	绝缘电阻 $\geq 100M\Omega$ 无击穿或飞弧 Insulation resistance $\geq 100M\Omega$ No breakdown or arcing
温度快速变化 Temperature Rapid Change	$-40^{\circ}C/30 \longrightarrow 25^{\circ}C/5 \longrightarrow$ $+160^{\circ}C/30 \longrightarrow 25^{\circ}C/5$	电阻变化率 $\pm 20\%$ The change ratio of the resistance is $\pm$ 20%
储存条件 Storage conditions	$-10^{\circ}C \sim 40^{\circ}C$ RH $\leq 75\%$	





深圳精萃电子有限公司

电话: 0755-82077900

传真: 0755-83655503

型号: MF11 302K4000

R: 3000 ohms $\pm$ 10%

B: 4000 $^{\circ}$ K $\pm$ 7%

网址: www.china-zeitgeist.com

温度	阻值 (Ω)			温度系数	阻值精度偏差 (%)		测温精度偏差 ($^{\circ}$ C)	
($^{\circ}$ C)	上限值	中心值	下限值	(%/ $^{\circ}$ C)	最小	最大	最小	最大
0.0	8461.9406	10246.3406	12282.9533	-5.36	-17.41	19.88	-3.71	3.25
0.5	8253.8646	9975.6753	11936.1004	-5.34	-17.26	19.65	-3.68	3.23
1.0	8051.6384	9713.1110	11600.2575	-5.32	-17.11	19.43	-3.65	3.21
1.5	7855.0783	9458.3785	11275.0390	-5.31	-16.95	19.21	-3.62	3.20
2.0	7664.0070	9211.2186	10960.0739	-5.29	-16.80	18.99	-3.59	3.18
2.5	7478.2532	8971.3814	10655.0053	-5.27	-16.64	18.77	-3.56	3.16
3.0	7297.6517	8738.6260	10359.4899	-5.25	-16.49	18.55	-3.53	3.14
3.5	7122.0428	8512.7203	10073.1975	-5.23	-16.34	18.33	-3.51	3.12
4.0	6951.2721	8293.4403	9795.8100	-5.21	-16.18	18.12	-3.48	3.11
4.5	6785.1908	8080.5702	9527.0215	-5.19	-16.03	17.90	-3.45	3.09
5.0	6623.6549	7873.9019	9266.5377	-5.17	-15.88	17.69	-3.42	3.07
5.5	6466.5252	7673.2345	9014.0749	-5.15	-15.73	17.47	-3.39	3.05
6.0	6313.6674	7478.3744	8769.3602	-5.14	-15.57	17.26	-3.36	3.03
6.5	6164.9515	7289.1349	8532.1308	-5.12	-15.42	17.05	-3.33	3.01
7.0	6020.2521	7105.3357	8302.1337	-5.10	-15.27	16.84	-3.30	3.00
7.5	5879.4477	6926.8029	8079.1250	-5.08	-15.12	16.64	-3.27	2.98
8.0	5742.4210	6753.3688	7862.8700	-5.06	-14.97	16.43	-3.25	2.96
8.5	5609.0586	6584.8713	7653.1425	-5.04	-14.82	16.22	-3.22	2.94
9.0	5479.2508	6421.1542	7449.7245	-5.03	-14.67	16.02	-3.19	2.92
9.5	5352.8915	6262.0666	7252.4062	-5.01	-14.52	15.81	-3.16	2.90
10.0	5229.8782	6107.4629	7060.9850	-4.99	-14.37	15.61	-3.13	2.88
10.5	5110.1116	5957.2023	6875.2661	-4.97	-14.22	15.41	-3.10	2.86
11.0	4993.4957	5811.1491	6695.0613	-4.96	-14.07	15.21	-3.07	2.84
11.5	4879.9376	5669.1722	6520.1896	-4.94	-13.92	15.01	-3.04	2.82
12.0	4769.3476	5531.1449	6350.4761	-4.92	-13.77	14.81	-3.01	2.80
12.5	4661.6387	5396.9448	6185.7523	-4.90	-13.62	14.62	-2.98	2.78
13.0	4556.7268	5266.4537	6025.8560	-4.89	-13.48	14.42	-2.95	2.76
13.5	4454.5304	5139.5575	5870.6302	-4.87	-13.33	14.22	-2.92	2.74



14.0	4354.9707	5016.1458	5719.9240	-4.85	-13.18	14.03	-2.89	2.72
14.5	4257.9715	4896.1121	5573.5916	-4.84	-13.03	13.84	-2.86	2.70
15.0	4163.4589	4779.3532	5431.4922	-4.82	-12.89	13.64	-2.83	2.67
15.5	4071.3614	4665.7696	5293.4902	-4.80	-12.74	13.45	-2.80	2.65
16.0	3981.6098	4555.2651	5159.4547	-4.79	-12.59	13.26	-2.77	2.63
16.5	3894.1369	4447.7465	5029.2592	-4.77	-12.45	13.07	-2.74	2.61
17.0	3808.8780	4343.1239	4902.7818	-4.75	-12.30	12.89	-2.71	2.59
17.5	3725.7700	4241.3103	4779.9048	-4.74	-12.16	12.70	-2.68	2.57
18.0	3644.7521	4142.2216	4660.5144	-4.72	-12.01	12.51	-2.65	2.54
18.5	3565.7652	4045.7764	4544.5010	-4.70	-11.86	12.33	-2.62	2.52
19.0	3488.7522	3951.8961	4431.7586	-4.69	-11.72	12.14	-2.59	2.50
19.5	3413.6577	3860.5044	4322.1849	-4.67	-11.57	11.96	-2.56	2.48
20.0	3340.4279	3771.5279	4215.6809	-4.66	-11.43	11.78	-2.53	2.46
20.5	3269.0109	3684.8952	4112.1514	-4.64	-11.29	11.59	-2.50	2.43
21.0	3199.3563	3600.5374	4011.5040	-4.62	-11.14	11.41	-2.47	2.41
21.5	3131.4151	3518.3877	3913.6497	-4.61	-11.00	11.23	-2.44	2.39
22.0	3065.1399	3438.3818	3818.5025	-4.59	-10.86	11.06	-2.41	2.36
22.5	3000.4850	3360.4570	3725.9792	-4.58	-10.71	10.88	-2.38	2.34
23.0	2937.4056	3284.5529	3635.9993	-4.56	-10.57	10.70	-2.35	2.32
23.5	2875.8587	3210.6109	3548.4853	-4.55	-10.43	10.52	-2.31	2.29
24.0	2815.8023	3138.5744	3463.3621	-4.53	-10.28	10.35	-2.28	2.27
24.5	2757.1959	3068.3885	3380.5570	-4.52	-10.14	10.17	-2.25	2.25
25.0	2700.0000	3000.0000	3300.0000	-4.50	-10.00	10.00	-2.22	2.22
25.5	2635.8735	2933.3575	3231.7713	-4.49	-10.14	10.17	-2.27	2.26
26.0	2573.4772	2868.4111	3165.1746	-4.47	-10.28	10.35	-2.31	2.30
26.5	2512.7590	2805.1126	3100.1660	-4.46	-10.42	10.52	-2.36	2.34
27.0	2453.6689	2743.4152	3036.7029	-4.44	-10.56	10.69	-2.41	2.38
27.5	2396.1584	2683.2735	2974.7439	-4.43	-10.70	10.86	-2.45	2.42
28.0	2340.1803	2624.6438	2914.2488	-4.41	-10.84	11.03	-2.50	2.46
28.5	2285.6894	2567.4834	2855.1787	-4.40	-10.98	11.21	-2.55	2.50
29.0	2232.6416	2511.7512	2797.4957	-4.38	-11.11	11.38	-2.60	2.54
29.5	2180.9944	2457.4072	2741.1633	-4.37	-11.25	11.55	-2.64	2.58
30.0	2130.7067	2404.4127	2686.1456	-4.35	-11.38	11.72	-2.69	2.62
30.5	2081.7386	2352.7302	2632.4083	-4.34	-11.52	11.89	-2.74	2.65
31.0	2034.0516	2302.3233	2579.9176	-4.32	-11.65	12.06	-2.79	2.69
31.5	1987.6083	2253.1567	2528.6410	-4.31	-11.79	12.23	-2.84	2.73
32.0	1942.3727	2205.1963	2478.5467	-4.30	-11.92	12.40	-2.89	2.77
32.5	1898.3098	2158.4088	2429.6042	-4.28	-12.05	12.56	-2.93	2.81
33.0	1855.3857	2112.7623	2381.7834	-4.27	-12.18	12.73	-2.98	2.85



33.5	1827.1080	2068.2254	2317.7507	-4.25	-11.66	12.06	-2.84	2.74
34.0	1786.8186	2024.7680	2271.4608	-4.24	-11.75	12.18	-2.87	2.77
34.5	1747.5445	1982.3607	2226.2416	-4.23	-11.85	12.30	-2.91	2.80
35.0	1709.2571	1940.9750	2182.0651	-4.21	-11.94	12.42	-2.95	2.83
35.5	1671.9286	1900.5835	2138.9043	-4.20	-12.03	12.54	-2.99	2.87
36.0	1635.5324	1861.1592	2096.7328	-4.19	-12.12	12.66	-3.02	2.90
36.5	1600.0422	1822.6762	2055.5251	-4.17	-12.21	12.78	-3.06	2.93
37.0	1565.4331	1785.1093	2015.2565	-4.16	-12.31	12.89	-3.10	2.96
37.5	1531.6804	1748.4340	1975.9026	-4.15	-12.40	13.01	-3.14	2.99
38.0	1498.7607	1712.6267	1937.4402	-4.13	-12.49	13.13	-3.18	3.02
38.5	1466.6508	1677.6641	1899.8465	-4.12	-12.58	13.24	-3.22	3.05
39.0	1435.3285	1643.5240	1863.0993	-4.11	-12.67	13.36	-3.25	3.09
39.5	1404.7722	1610.1846	1827.1771	-4.09	-12.76	13.48	-3.29	3.12
40.0	1374.9610	1577.6249	1792.0590	-4.08	-12.85	13.59	-3.33	3.15
40.5	1345.8746	1545.8243	1757.7248	-4.07	-12.93	13.71	-3.37	3.18
41.0	1317.4932	1514.7631	1724.1547	-4.05	-13.02	13.82	-3.41	3.21
41.5	1289.7978	1484.4218	1691.3294	-4.04	-13.11	13.94	-3.45	3.25
42.0	1262.7698	1454.7817	1659.2304	-4.03	-13.20	14.05	-3.49	3.28
42.5	1236.3911	1425.8247	1627.8395	-4.01	-13.29	14.17	-3.53	3.31
43.0	1210.6445	1397.5330	1597.1390	-4.00	-13.37	14.28	-3.57	3.34
43.5	1185.5128	1369.8894	1567.1118	-3.99	-13.46	14.40	-3.61	3.37
44.0	1160.9797	1342.8774	1537.7413	-3.98	-13.55	14.51	-3.65	3.41
44.5	1137.0292	1316.4805	1509.0112	-3.96	-13.63	14.62	-3.69	3.44
45.0	1113.6458	1290.6831	1480.9057	-3.95	-13.72	14.74	-3.73	3.47
45.5	1090.8144	1265.4700	1453.4095	-3.94	-13.80	14.85	-3.77	3.50
46.0	1068.5206	1240.8261	1426.5077	-3.93	-13.89	14.96	-3.81	3.54
46.5	1046.7501	1216.7370	1400.1856	-3.91	-13.97	15.08	-3.85	3.57
47.0	1025.4891	1193.1887	1374.4294	-3.90	-14.05	15.19	-3.89	3.60
47.5	1004.7243	1170.1675	1349.2250	-3.89	-14.14	15.30	-3.93	3.63
48.0	984.4427	1147.6602	1324.5593	-3.88	-14.22	15.41	-3.97	3.67
48.5	964.6317	1125.6538	1300.4191	-3.87	-14.30	15.53	-4.02	3.70
49.0	945.2791	1104.1357	1276.7918	-3.85	-14.39	15.64	-4.06	3.73
49.5	926.3729	1083.0939	1253.6651	-3.84	-14.47	15.75	-4.10	3.77
50.0	907.9017	1062.5163	1231.0270	-3.83	-14.55	15.86	-4.14	3.80
50.5	889.8542	1042.3915	1208.8658	-3.82	-14.63	15.97	-4.18	3.83
51.0	872.2195	1022.7083	1187.1700	-3.81	-14.71	16.08	-4.22	3.87
51.5	854.9871	1003.4557	1165.9288	-3.80	-14.80	16.19	-4.27	3.90
52.0	838.1465	984.6231	1145.1312	-3.78	-14.88	16.30	-4.31	3.93
52.5	821.6879	966.2001	1124.7668	-3.77	-14.96	16.41	-4.35	3.97



53.0	805.6015	948.1769	1104.8254	-3.76	-15.04	16.52	-4.39	4.00
53.5	789.8779	930.5435	1085.2970	-3.75	-15.12	16.63	-4.44	4.03
54.0	774.5078	913.2905	1066.1719	-3.74	-15.20	16.74	-4.48	4.07
54.5	759.4824	896.4085	1047.4407	-3.73	-15.27	16.85	-4.52	4.10
55.0	744.7930	879.8887	1029.0942	-3.71	-15.35	16.96	-4.57	4.13
55.5	730.4311	863.7223	1011.1234	-3.70	-15.43	17.07	-4.61	4.17
56.0	716.3886	847.9006	993.5196	-3.69	-15.51	17.17	-4.65	4.20
56.5	702.6574	832.4155	976.2744	-3.68	-15.59	17.28	-4.70	4.24
57.0	689.2298	817.2588	959.3794	-3.67	-15.67	17.39	-4.74	4.27
57.5	676.0983	802.4228	942.8266	-3.66	-15.74	17.50	-4.78	4.30
58.0	663.2555	787.8996	926.6081	-3.65	-15.82	17.60	-4.83	4.34
58.5	650.6943	773.6819	910.7162	-3.64	-15.90	17.71	-4.87	4.37
59.0	638.4078	759.7625	895.1436	-3.63	-15.97	17.82	-4.91	4.41
59.5	626.3892	746.1342	879.8828	-3.61	-16.05	17.93	-4.96	4.44
60.0	614.6319	732.7902	864.9269	-3.60	-16.12	18.03	-5.00	4.47
60.5	603.1295	719.7238	850.2689	-3.59	-16.20	18.14	-5.05	4.51
61.0	591.8759	706.9285	835.9021	-3.58	-16.27	18.24	-5.09	4.54
61.5	580.8650	694.3978	821.8199	-3.57	-16.35	18.35	-5.14	4.58
62.0	570.0909	682.1257	808.0160	-3.56	-16.42	18.46	-5.18	4.61
62.5	559.5478	670.1061	794.4839	-3.55	-16.50	18.56	-5.23	4.65
63.0	549.2302	658.3331	781.2178	-3.54	-16.57	18.67	-5.27	4.68
63.5	539.1327	646.8010	768.2116	-3.53	-16.65	18.77	-5.32	4.72
64.0	529.2499	635.5042	755.4596	-3.52	-16.72	18.88	-5.36	4.75
64.5	519.5768	624.4373	742.9561	-3.51	-16.79	18.98	-5.41	4.79
65.0	510.1083	613.5951	730.6956	-3.50	-16.87	19.08	-5.46	4.82
65.5	500.8396	602.9722	718.6728	-3.49	-16.94	19.19	-5.50	4.86
66.0	491.7658	592.5638	706.8823	-3.48	-17.01	19.29	-5.55	4.89
66.5	482.8825	582.3650	695.3192	-3.47	-17.08	19.40	-5.59	4.93
67.0	474.1850	572.3709	683.9784	-3.46	-17.15	19.50	-5.64	4.96
67.5	465.6691	562.5768	672.8550	-3.45	-17.23	19.60	-5.69	5.00
68.0	457.3304	552.9784	661.9444	-3.44	-17.30	19.71	-5.73	5.03
68.5	449.1647	543.5711	651.2418	-3.43	-17.37	19.81	-5.78	5.07
69.0	441.1681	534.3507	640.7429	-3.42	-17.44	19.91	-5.83	5.10
69.5	433.3366	525.3128	630.4430	-3.41	-17.51	20.01	-5.87	5.14
70.0	425.6663	516.4535	620.3381	-3.40	-17.58	20.11	-5.92	5.18
70.5	418.1535	507.7688	610.4238	-3.39	-17.65	20.22	-5.97	5.21
71.0	410.7946	499.2547	600.6961	-3.38	-17.72	20.32	-6.02	5.25
71.5	403.5860	490.9075	591.1509	-3.37	-17.79	20.42	-6.06	5.28
72.0	396.5242	482.7233	581.7845	-3.36	-17.86	20.52	-6.11	5.32



72.5	389.6058	474.6988	572.5929	-3.35	-17.93	20.62	-6.16	5.35
73.0	382.8277	466.8302	563.5724	-3.34	-17.99	20.72	-6.21	5.39
73.5	376.1865	459.1142	554.7195	-3.33	-18.06	20.82	-6.26	5.43
74.0	369.6791	451.5474	546.0305	-3.32	-18.13	20.92	-6.30	5.46
74.5	363.3026	444.1265	537.5021	-3.31	-18.20	21.02	-6.35	5.50
75.0	357.0539	436.8484	529.1307	-3.30	-18.27	21.12	-6.40	5.54
75.5	350.9301	429.7100	520.9132	-3.29	-18.33	21.22	-6.45	5.57
76.0	344.9285	422.7081	512.8463	-3.28	-18.40	21.32	-6.50	5.61
76.5	339.0462	415.8398	504.9269	-3.27	-18.47	21.42	-6.55	5.64
77.0	333.2806	409.1023	497.1519	-3.26	-18.53	21.52	-6.60	5.68
77.5	327.6290	402.4927	489.5182	-3.25	-18.60	21.62	-6.65	5.72
78.0	322.0890	396.0082	482.0230	-3.24	-18.67	21.72	-6.70	5.75
78.5	316.6580	389.6463	474.6634	-3.23	-18.73	21.82	-6.75	5.79
79.0	311.3336	383.4041	467.4366	-3.23	-18.80	21.92	-6.80	5.83
79.5	306.1135	377.2792	460.3398	-3.22	-18.86	22.02	-6.85	5.86
80.0	300.9953	371.2691	453.3704	-3.21	-18.93	22.11	-6.90	5.90
80.5	295.9768	365.3714	446.5258	-3.20	-18.99	22.21	-6.95	5.94
81.0	291.0558	359.5835	439.8034	-3.19	-19.06	22.31	-7.00	5.98
81.5	286.2301	353.9033	433.2007	-3.18	-19.12	22.41	-7.05	6.01
82.0	281.4977	348.3284	426.7153	-3.17	-19.19	22.50	-7.10	6.05
82.5	276.8565	342.8567	420.3448	-3.16	-19.25	22.60	-7.15	6.09
83.0	272.3045	337.4859	414.0870	-3.15	-19.31	22.70	-7.20	6.12
83.5	267.8398	332.2139	407.9394	-3.14	-19.38	22.79	-7.25	6.16
84.0	263.4605	327.0387	401.9000	-3.14	-19.44	22.89	-7.30	6.20
84.5	259.1648	321.9583	395.9664	-3.13	-19.50	22.99	-7.35	6.24
85.0	254.9508	316.9706	390.1367	-3.12	-19.57	23.08	-7.40	6.27
85.5	250.8168	312.0738	384.4087	-3.11	-19.63	23.18	-7.45	6.31
86.0	246.7610	307.2659	378.7803	-3.10	-19.69	23.27	-7.51	6.35
86.5	242.7819	302.5452	373.2497	-3.09	-19.75	23.37	-7.56	6.39
87.0	238.8776	297.9098	367.8149	-3.08	-19.82	23.47	-7.61	6.43
87.5	235.0468	293.3580	362.4739	-3.08	-19.88	23.56	-7.66	6.46
88.0	231.2877	288.8880	357.2250	-3.07	-19.94	23.66	-7.71	6.50
88.5	227.5988	284.4982	352.0662	-3.06	-20.00	23.75	-7.77	6.54
89.0	223.9788	280.1870	346.9959	-3.05	-20.06	23.84	-7.82	6.58
89.5	220.4260	275.9527	342.0123	-3.04	-20.12	23.94	-7.87	6.62
90.0	216.9392	271.7938	337.1137	-3.03	-20.18	24.03	-7.92	6.65
90.5	213.5169	267.7088	332.2984	-3.02	-20.24	24.13	-7.98	6.69
91.0	210.1577	263.6961	327.5648	-3.02	-20.30	24.22	-8.03	6.73
91.5	206.8604	259.7543	322.9114	-3.01	-20.36	24.31	-8.08	6.77



92.0	203.6236	255.8820	318.3365	-3.00	-20.42	24.41	-8.14	6.81
92.5	200.4461	252.0778	313.8387	-2.99	-20.48	24.50	-8.19	6.85
93.0	197.3267	248.3402	309.4165	-2.98	-20.54	24.59	-8.24	6.89
93.5	194.2641	244.6681	305.0684	-2.98	-20.60	24.69	-8.30	6.92
94.0	191.2572	241.0600	300.7930	-2.97	-20.66	24.78	-8.35	6.96
94.5	188.3049	237.5147	296.5888	-2.96	-20.72	24.87	-8.40	7.00
95.0	185.4059	234.0310	292.4546	-2.95	-20.78	24.96	-8.46	7.04
95.5	182.5592	230.6076	288.3891	-2.94	-20.84	25.06	-8.51	7.08
96.0	179.7638	227.2434	284.3908	-2.94	-20.89	25.15	-8.57	7.12
96.5	177.0186	223.9372	280.4585	-2.93	-20.95	25.24	-8.62	7.16
97.0	174.3225	220.6877	276.5910	-2.92	-21.01	25.33	-8.68	7.20
97.5	171.6747	217.4940	272.7870	-2.91	-21.07	25.42	-8.73	7.24
98.0	169.0739	214.3550	269.0454	-2.90	-21.12	25.51	-8.79	7.27
98.5	166.5195	211.2695	265.3650	-2.90	-21.18	25.60	-8.84	7.31
99.0	164.0103	208.2365	261.7446	-2.89	-21.24	25.70	-8.90	7.35
99.5	161.5455	205.2550	258.1831	-2.88	-21.30	25.79	-8.95	7.39
100.0	159.1242	202.3240	254.6794	-2.87	-21.35	25.88	-9.01	7.43
100.5	156.7456	199.4426	251.2325	-2.86	-21.41	25.97	-9.06	7.47
101.0	154.4087	196.6097	247.8412	-2.86	-21.46	26.06	-9.12	7.51
101.5	152.1127	193.8245	244.5046	-2.85	-21.52	26.15	-9.18	7.55
102.0	149.8569	191.0860	241.2215	-2.84	-21.58	26.24	-9.23	7.59
102.5	147.6404	188.3933	237.9912	-2.83	-21.63	26.33	-9.29	7.63
103.0	145.4624	185.7455	234.8125	-2.83	-21.69	26.42	-9.34	7.67
103.5	143.3222	183.1418	231.6845	-2.82	-21.74	26.51	-9.40	7.71
104.0	141.2190	180.5814	228.6063	-2.81	-21.80	26.59	-9.46	7.75
104.5	139.1522	178.0635	225.5770	-2.80	-21.85	26.68	-9.51	7.79
105.0	137.1209	175.5871	222.5957	-2.80	-21.91	26.77	-9.57	7.83
105.5	135.1246	173.1516	219.6615	-2.79	-21.96	26.86	-9.63	7.87
106.0	133.1624	170.7561	216.7735	-2.78	-22.02	26.95	-9.69	7.91
106.5	131.2338	168.4000	213.9310	-2.78	-22.07	27.04	-9.74	7.95
107.0	129.3381	166.0825	211.1331	-2.77	-22.12	27.13	-9.80	7.99
107.5	127.4746	163.8028	208.3790	-2.76	-22.18	27.21	-9.86	8.03
108.0	125.6428	161.5602	205.6679	-2.75	-22.23	27.30	-9.92	8.07
108.5	123.8420	159.3541	202.9990	-2.75	-22.29	27.39	-9.97	8.11
109.0	122.0716	157.1838	200.3716	-2.74	-22.34	27.48	-10.03	8.16
109.5	120.3310	155.0486	197.7849	-2.73	-22.39	27.56	-10.09	8.20
110.0	118.6197	152.9478	195.2382	-2.72	-22.44	27.65	-10.15	8.24



110.5	116.9371	150.8809	192.7309	-2.72	-22.50	27.74	-10.21	8.28
111.0	115.2827	148.8472	190.2621	-2.71	-22.55	27.82	-10.26	8.32
111.5	113.6558	146.8460	187.8312	-2.70	-22.60	27.91	-10.32	8.36
112.0	112.0561	144.8769	185.4376	-2.70	-22.65	28.00	-10.38	8.40
112.5	110.4829	142.9391	183.0806	-2.69	-22.71	28.08	-10.44	8.44
113.0	108.9358	141.0322	180.7595	-2.68	-22.76	28.17	-10.50	8.48
113.5	107.4143	139.1556	178.4737	-2.68	-22.81	28.25	-10.56	8.52
114.0	105.9179	137.3086	176.2227	-2.67	-22.86	28.34	-10.62	8.57
114.5	104.4461	135.4909	174.0057	-2.66	-22.91	28.43	-10.68	8.61
115.0	102.9984	133.7018	171.8222	-2.66	-22.96	28.51	-10.74	8.65
115.5	101.5745	131.9408	169.6716	-2.65	-23.02	28.60	-10.80	8.69
116.0	100.1738	130.2075	167.5533	-2.64	-23.07	28.68	-10.86	8.73
116.5	98.7960	128.5013	165.4668	-2.63	-23.12	28.77	-10.92	8.77
117.0	97.4406	126.8217	163.4116	-2.63	-23.17	28.85	-10.98	8.82
117.5	96.1071	125.1683	161.3870	-2.62	-23.22	28.94	-11.04	8.86
118.0	94.7953	123.5406	159.3926	-2.61	-23.27	29.02	-11.10	8.90
118.5	93.5046	121.9382	157.4278	-2.61	-23.32	29.10	-11.16	8.94
119.0	92.2348	120.3605	155.4922	-2.60	-23.37	29.19	-11.22	8.98
119.5	90.9853	118.8072	153.5852	-2.59	-23.42	29.27	-11.28	9.03
120.0	89.7559	117.2778	151.7063	-2.59	-23.47	29.36	-11.34	9.07
120.5	88.5461	115.7719	149.8551	-2.58	-23.52	29.44	-11.40	9.11
121.0	87.3557	114.2890	148.0311	-2.57	-23.57	29.52	-11.47	9.15
121.5	86.1842	112.8289	146.2339	-2.57	-23.62	29.61	-11.53	9.19
122.0	85.0313	111.3910	144.4629	-2.56	-23.66	29.69	-11.59	9.24
122.5	83.8967	109.9750	142.7178	-2.56	-23.71	29.77	-11.65	9.28
123.0	82.7801	108.5805	140.9980	-2.55	-23.76	29.86	-11.71	9.32
123.5	81.6811	107.2071	139.3033	-2.54	-23.81	29.94	-11.77	9.36
124.0	80.5993	105.8545	137.6331	-2.54	-23.86	30.02	-11.84	9.41
124.5	79.5346	104.5223	135.9870	-2.53	-23.91	30.10	-11.90	9.45
125.0	78.4865	103.2102	134.3647	-2.52	-23.95	30.19	-11.96	9.49