



南京时恒电子科技有限公司

Nanjing Shiheng Electronics Co.,Ltd.

规格承认书

APPROVAL SHEET

客户名称 CUSTOMER :

MF51 玻封测温型 NTC 热敏电阻器

产品名称 PART NAME :

MF51 Glass shell NTC Thermistor

产品规格 PART NUMBER :

MF51-103F3435 (B)

产品编号 PRODUCTCODE:

版次 REV.NO:

B0

日期 DATE:

2024-2-23

确认

CONFIRM

| 客户 CLIENT | | 供货商/制造商 MANUFACTOR | |
|-------------------------|--|---------------------------|-----|
| 品保部 Quality Dep. | | 规格书制作 Design | 刘星月 |
| 制造部 Production Dep. | | 业务部审核 Checked by sales | |
| 工程部 Engineering Dep. | | 技术部审核 Checked by R&D | 张居见 |
| | | 品质部审核 Checked by QA | 李少媛 |

南京时恒电子科技有限公司

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1、产品型号说明 Product model specification

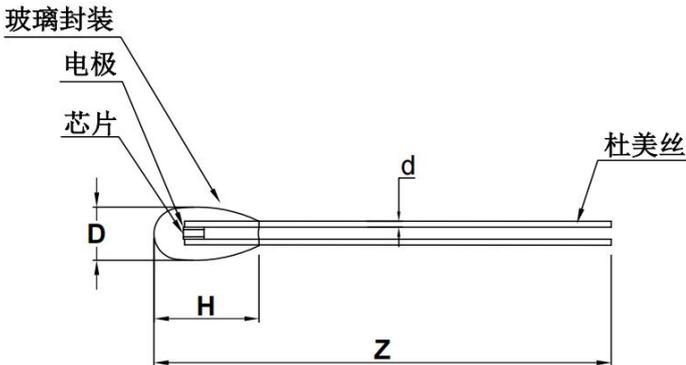
MF51- 103 F 3435 B
 ① ② ③ ④ ⑤

- ① MF51: 玻封测温型 NTC 热敏电阻器 (Series Glass Seal shell NTC Thermistor)
- ② 103: 25℃ 的零功率电阻值 10KΩ (Zero Power Resistance at 25℃ is 10KΩ)
- ③ F: 阻值精度代码 F-±1% G-±2% H-±3% J-±5% (Resistance precision code F-±1% G-±2% H-±3% J-±5%)
- ④ 3435: B25/85 值 3435K (B25/85:3435K)
- ⑤ B: 外形尺寸代码 (Shape and size code)

2、电气性能 Electrical Characteristics

| No. | 项目 Item | 符号 Symbol | 测试条件 Test conditions | 单位 Unit | 性能要求 Requirements |
|------|--|--------------------|--|------------|---|
| 2.1 | 25℃ 的零功率电阻值 Zero Power Resistance at 25℃ | R _{25℃} | T _a =25±0.01℃ Test Power≤0.1mW | KΩ | 10KΩ±1% |
| 2.2 | B 值 B-value | B _{25/85} | $B=[(T_a \times T_b)/(T_b - T_a)] \times \ln(R_a/R_b)$ T _a =25±0.01℃ T _b =85℃±0.01℃ | K | 3435±1% |
| 2.3 | 耗散系数 Thermal dissipation Coefficient | δ | 静止空气中 In still air | mW/ ℃ | 约 0.9 |
| 2.4 | 时间常数 Thermal time constant | τ | 静止空气中 In still air | sec | 约 9 |
| 2.5 | 耐电压 withstand voltage | / | 500V/AC 1min | / | 无击穿或飞弧 No breakthrough and flash over |
| 2.6 | 绝缘电阻 Insulation resistance | / | 50V/DC 1min | MΩ | ≥10 |
| 2.7 | 工作温度范围 Operating temperature range | / | / | ℃ | -55℃ ~ 250℃ |
| 2.8 | 最大额定功率 Maximum rated power | P _{max} | / | mW | 35 |
| 2.9 | 阻温特性 R&T-table | / | / | / | 见附表 I See attached table I |
| 2.10 | 阻值误差&B 值误差 Resistance tolerance& B-value tolerance | / | / | / | 见附表 II See attached table II |

3、产品图纸 Product drawing

| | | | | | |
|--|-------------------|--|----------------|------------------|-----------------|
|  产品图纸 Product drawing | | 客户确认 Customer confirm | 客户名称 Customer: | | |
| 产品型号 MODEL NO. | MF51-103F3435 (B) | | 确认 Confirm | 日期 DATE | |
| | | 审核 Approve: | 日期 DATE | | (Unit: mm) |
| 尺寸 Dimensions: | |  | | | |
| 型号 | D | H | Z | d | |
| MF51-B | 1.7±0.25 | 3.2±0.5 | 65±5 | 0.25±0.05 | |
| 技术要求 Technical requirements: | | | | | |
| 1) 零功率阻值: R25: 10KΩ±1% (Zero Power Resistance: R25: 10KΩ±1%); 2) B25/85 数值: 3435K±1% (B-value: B25/85: 3435K±1%); 3) 引线: Φ0.25 杜美丝线 (Φ0.25 Magnesium wire); 4) 封装: 玻壳封装 (Glass shell package); 5) 符合 RoHS 环保要求 (Meet environmental protection requirements: RoHS)。 | | | | | |
| 更新履历 Revised record sheet | | | | | |
| 版本 REV. NO | 更新时间 REV. DATE | 更新内容 Change content | | 申请人 Applicant | 批准人 Approved |
| A0 | 2015. 4. 10 | 版本制定。 Version formulation | | 吴迎丽 | 李少媛 |
| B0 | 2022. 4. 1 | 更新规格书版本格式, 增加版次管控 Update for version form of datasheet, add to management and control for number of edition | | 吴迎丽 | 李少媛 |
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4、可靠性

| 试验项目 | 测试标准 | 试验条件/方法 | 性能要求 | | | | | | | | | | | | | | | |
|--|------------------------|---|---------------------------------------|------------------------|-------------------|---|------|------|---|------------------------|-----|---|------|------|---|------------------------|-----|---------------------------------------|
| 高温存储试验 High temperature storage | IEC60068-2-2 | Tu±5℃, 1000±24 小时 | 无可见损伤 No obvious damage R/R≤±5% | | | | | | | | | | | | | | | |
| 稳态湿热试验 Steady humidity and heat | IEC60068-2-78 | 40±2℃,92~95%RH, 1000±24 小时 | 无可见损伤 No obvious damage R/R≤±3% | | | | | | | | | | | | | | | |
| 温度急变试验 Rapid changes in temperature | IEC60068-2-14 | 温度急变按下表条件循环五个周期 The rapid change of temperature cycles five cycles according to the following table conditions <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>步骤 Step</th> <th>温度 (°C) Temperature</th> <th>周期 (分钟) Period</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>TL±5</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>室温 Room Temperature</td> <td>5±3</td> </tr> <tr> <td>3</td> <td>Tu±5</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>室温 Room Temperature</td> <td>5±3</td> </tr> </tbody> </table> | 步骤 Step | 温度 (°C) Temperature | 周期 (分钟) Period | 1 | TL±5 | 30±3 | 2 | 室温 Room Temperature | 5±3 | 3 | Tu±5 | 30±3 | 4 | 室温 Room Temperature | 5±3 | 无可见损伤 No obvious damage R/R≤±3% |
| 步骤 Step | 温度 (°C) Temperature | 周期 (分钟) Period | | | | | | | | | | | | | | | | |
| 1 | TL±5 | 30±3 | | | | | | | | | | | | | | | | |
| 2 | 室温 Room Temperature | 5±3 | | | | | | | | | | | | | | | | |
| 3 | Tu±5 | 30±3 | | | | | | | | | | | | | | | | |
| 4 | 室温 Room Temperature | 5±3 | | | | | | | | | | | | | | | | |
| 最大功耗 Maximum power consumption | IEC60539-1-4.26.3 | 25±5℃, Pmax,1000±24 小时 | 无可见损伤 No obvious damage R/R≤±5% | | | | | | | | | | | | | | | |

▲注： 1) 稳态湿热及温度快速变化试验结束后，样品需在常温环境下静置 2 小时后再做性能测试；

▲Note: 1) After the test of steady-state humid heat and rapid temperature change, the sample should be kept for 2 hours at room temperature before performance test ;

2) 高温存储及低温存储结束后，需随测试环境自然恢复至常温，再取出做性能测试。

2) After the test of high - and low-temperature storage is complete, and then take it out for performance test when the test environment naturally regain to normal temperature.

5、产品包装 Product packaging

5.1 包装方式 Packing Type

散装方式 Bulk Type 编带方式 Reel Type

5.2 包装规格 Packing specification

| No. | 包装规格 Packing specification | 包装材料、尺寸 Packing material, size | 产品数量 Quantity |
|-----|-------------------------------|-----------------------------------|------------------|
| 1 | 包装袋 Packing bag | 自封口袋(self sealing bag) | |
| 2 | 编带带包装盒 Reel Packing box | 265mm*80mm*75mm | |

6、安装&使用注意事项 Installation & Use precautions

6.1 本产品的用途：温度测量与控制；application:test and control for temperature

6.2 避免过大的电流引起元件自身发热而产生测量误差；

To avoid of testing tolerance caused by huge current upon the self-heat of component.

6.3 烙铁焊接时，焊接处距包封头部距离至少 2mm，焊接温度应低于 360℃，焊接时间<3ses；

When welded by soldering iron,weld spot should be 2mm at least from head,weld temperature should be under 360℃,time<3ses

6.4 若引线弯曲时，弯曲点应距玻壳端 2mm 以上，以免造成玻壳损伤；

In case of lead bending,the dot of bending should be above 2mm from glass shell to avoid of damaging for glass shell.

6.5 储存温度：-10℃ ~ 40℃；储存湿度：≤75% RH；

storage temp:-10℃ ~ 40℃；storage humidity:≤75% RH

6.6 避免存放在具有腐蚀性气体及光照的环境下；To avoid of leaving with such environment as corrosive gases and illumination

6.6 包装打开后需重新密封保存，贮存期 1 年，超过贮存期，可按本标准规定的项目重新检验，如符合要求仍可使用；

The packing need to be resealed since opened,storage period 1 year.once valid,it should be retest according to regulated of criterion and can be still used if meet the requirement.

6.7 如在加工过程中需使用热缩管，热缩管热缩时不可使用电吹风进行吹制，建议热缩工艺，将套好热缩管后的产品放入恒温烘箱中，按 110℃/10-12min 进行热缩；

In case of using heat-shrink tube,hair drier is prohibited.we suggest that put the product with heat shrink into constant-temperature box and heat shrink under 110℃/10-12min

7、产品认证 Product certification

| No. | 项目 Projects | 产品认证 Product certification |
|-----|--|---|
| 7.1 | 质量管理体系认证 Quality Management System Certification | ISO9001:2015 |
| | | IATF16949: 2016 |
| 7.2 | 环境管理体系认证 Environmental Management System Certification | ISO14001:2015 |
| 7.3 | 环保检测报告 Environmental test report | RoHS 2.0 |
| 7.4 | CQC 认证 (CQC07001019009) CQC certificate (CQC07001019009) |  |
| 7.5 | UL 认证 (E240991) UL certificate (E240991) |  |
| 7.6 | TUV 认证 (R50245892) UL certificate (R50245892) |  |
| 7.7 | 江苏省高新技术产品认证 High-tech product certificate in Jiangsu Province |  |
| 7.8 | AEC-Q200 认证 AEC-Q200certificate | 20172052556G |

附表 I (Attachment I)

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R25=10K Ω 精度: $\pm 1\%$ B25/85=3435K 精度: $\pm 1\%$ (P174-9A)

| 温度($^{\circ}\text{C}$) | 电阻(K Ω) | | | 电阻精度(%) | | 温度精度($^{\circ}\text{C}$) | |
|--------------------------|-----------------|---------|---------|------------|-------------|----------------------------|-------------|
| | 最小值 | 中心值 | 最大值 | ΔR | $-\Delta R$ | ΔT | $-\Delta T$ |
| -55 | 475.553 | 500.13 | 524.706 | 4.914 | -4.914 | 0.735 | -0.735 |
| -54 | 499.871 | 525.983 | 552.096 | 4.964 | -4.964 | 0.727 | -0.727 |
| -53 | 499.875 | 525.987 | 552.1 | 4.964 | -4.964 | 0.721 | -0.721 |
| -52 | 482.92 | 507.96 | 533.001 | 4.929 | -4.929 | 0.716 | -0.716 |
| -51 | 455.932 | 479.28 | 502.628 | 4.871 | -4.871 | 0.712 | -0.712 |
| -50 | 424.263 | 445.648 | 467.033 | 4.798 | -4.798 | 0.709 | -0.709 |
| -49 | 391.531 | 410.916 | 430.3 | 4.717 | -4.717 | 0.706 | -0.706 |
| -48 | 359.918 | 377.4 | 394.882 | 4.632 | -4.632 | 0.703 | -0.703 |
| -47 | 330.571 | 346.315 | 362.059 | 4.546 | -4.546 | 0.7 | -0.7 |
| -46 | 303.961 | 318.155 | 332.349 | 4.461 | -4.461 | 0.697 | -0.697 |
| -45 | 280.158 | 292.988 | 305.817 | 4.378 | -4.378 | 0.694 | -0.694 |
| -44 | 259.011 | 270.648 | 282.284 | 4.299 | -4.299 | 0.691 | -0.691 |
| -43 | 240.265 | 250.86 | 261.455 | 4.223 | -4.223 | 0.687 | -0.687 |
| -42 | 223.631 | 233.316 | 243 | 4.15 | -4.15 | 0.684 | -0.684 |
| -41 | 208.82 | 217.706 | 226.591 | 4.081 | -4.081 | 0.68 | -0.68 |
| -40 | 195.568 | 203.75 | 211.931 | 4.015 | -4.015 | 0.677 | -0.677 |
| -39 | 183.642 | 191.197 | 198.753 | 3.951 | -3.951 | 0.673 | -0.673 |
| -38 | 172.839 | 179.836 | 186.832 | 3.89 | -3.89 | 0.668 | -0.668 |
| -37 | 162.991 | 169.484 | 175.977 | 3.83 | -3.83 | 0.664 | -0.664 |
| -36 | 153.957 | 159.994 | 166.031 | 3.773 | -3.773 | 0.66 | -0.66 |
| -35 | 145.62 | 151.241 | 156.863 | 3.716 | -3.716 | 0.655 | -0.655 |
| -34 | 137.886 | 143.127 | 148.368 | 3.661 | -3.661 | 0.651 | -0.651 |
| -33 | 130.678 | 135.569 | 140.46 | 3.607 | -3.607 | 0.646 | -0.646 |
| -32 | 123.935 | 128.502 | 133.069 | 3.553 | -3.553 | 0.641 | -0.641 |
| -31 | 117.606 | 121.873 | 126.139 | 3.5 | -3.5 | 0.636 | -0.636 |
| -30 | 111.651 | 115.638 | 119.626 | 3.448 | -3.448 | 0.631 | -0.631 |
| -29 | 106.035 | 109.763 | 113.491 | 3.396 | -3.396 | 0.626 | -0.626 |
| -28 | 100.734 | 104.219 | 107.705 | 3.344 | -3.344 | 0.621 | -0.621 |
| -27 | 95.723 | 98.982 | 102.242 | 3.292 | -3.292 | 0.616 | -0.616 |
| -26 | 90.984 | 94.032 | 97.08 | 3.241 | -3.241 | 0.611 | -0.611 |
| -25 | 86.499 | 89.35 | 92.2 | 3.19 | -3.19 | 0.606 | -0.606 |
| -24 | 82.255 | 84.921 | 87.587 | 3.139 | -3.139 | 0.6 | -0.6 |
| -23 | 78.238 | 80.731 | 83.225 | 3.088 | -3.088 | 0.595 | -0.595 |
| -22 | 74.435 | 76.768 | 79.1 | 3.038 | -3.038 | 0.59 | -0.59 |
| -21 | 70.836 | 73.018 | 75.201 | 2.988 | -2.988 | 0.584 | -0.584 |
| -20 | 67.43 | 69.472 | 71.514 | 2.938 | -2.938 | 0.579 | -0.579 |

| | | | | | | | |
|-----|--------|--------|--------|-------|--------|-------|--------|
| -19 | 64.207 | 66.118 | 68.028 | 2.889 | -2.889 | 0.573 | -0.573 |
| -18 | 61.157 | 62.945 | 64.732 | 2.839 | -2.839 | 0.568 | -0.568 |
| -17 | 58.271 | 59.944 | 61.617 | 2.791 | -2.791 | 0.562 | -0.562 |
| -16 | 55.539 | 57.105 | 58.671 | 2.742 | -2.742 | 0.556 | -0.556 |
| -15 | 52.954 | 54.42 | 55.886 | 2.694 | -2.694 | 0.55 | -0.55 |
| -14 | 50.506 | 51.879 | 53.252 | 2.646 | -2.646 | 0.544 | -0.544 |
| -13 | 48.188 | 49.474 | 50.76 | 2.599 | -2.599 | 0.538 | -0.538 |
| -12 | 45.993 | 47.198 | 48.402 | 2.551 | -2.551 | 0.532 | -0.532 |
| -11 | 43.914 | 45.042 | 46.17 | 2.505 | -2.505 | 0.526 | -0.526 |
| -10 | 41.942 | 43 | 44.057 | 2.458 | -2.458 | 0.52 | -0.52 |
| -9 | 40.073 | 41.064 | 42.055 | 2.412 | -2.412 | 0.514 | -0.514 |
| -8 | 38.3 | 39.229 | 40.157 | 2.366 | -2.366 | 0.508 | -0.508 |
| -7 | 36.617 | 37.488 | 38.358 | 2.321 | -2.321 | 0.501 | -0.501 |
| -6 | 35.02 | 35.835 | 36.651 | 2.276 | -2.276 | 0.495 | -0.495 |
| -5 | 33.502 | 34.267 | 35.031 | 2.231 | -2.231 | 0.488 | -0.488 |
| -4 | 32.059 | 32.776 | 33.493 | 2.187 | -2.187 | 0.482 | -0.482 |
| -3 | 30.688 | 31.36 | 32.032 | 2.143 | -2.143 | 0.475 | -0.475 |
| -2 | 29.383 | 30.013 | 30.643 | 2.099 | -2.099 | 0.468 | -0.468 |
| -1 | 28.141 | 28.732 | 29.322 | 2.055 | -2.055 | 0.462 | -0.462 |
| 0 | 26.959 | 27.513 | 28.066 | 2.012 | -2.012 | 0.455 | -0.455 |
| 1 | 25.833 | 26.352 | 26.87 | 1.969 | -1.969 | 0.448 | -0.448 |
| 2 | 24.759 | 25.246 | 25.732 | 1.926 | -1.926 | 0.441 | -0.441 |
| 3 | 23.736 | 24.192 | 24.648 | 1.883 | -1.883 | 0.434 | -0.434 |
| 4 | 22.761 | 23.188 | 23.614 | 1.841 | -1.841 | 0.427 | -0.427 |
| 5 | 21.83 | 22.23 | 22.63 | 1.798 | -1.798 | 0.42 | -0.42 |
| 6 | 20.942 | 21.316 | 21.691 | 1.756 | -1.756 | 0.412 | -0.412 |
| 7 | 20.094 | 20.445 | 20.795 | 1.715 | -1.715 | 0.405 | -0.405 |
| 8 | 19.285 | 19.613 | 19.941 | 1.673 | -1.673 | 0.398 | -0.398 |
| 9 | 18.512 | 18.819 | 19.126 | 1.632 | -1.632 | 0.39 | -0.39 |
| 10 | 17.729 | 18.016 | 18.302 | 1.588 | -1.588 | 0.384 | -0.384 |
| 11 | 17.068 | 17.337 | 17.606 | 1.55 | -1.55 | 0.375 | -0.375 |
| 12 | 16.394 | 16.646 | 16.897 | 1.509 | -1.509 | 0.368 | -0.368 |
| 13 | 15.75 | 15.985 | 16.22 | 1.469 | -1.469 | 0.36 | -0.36 |
| 14 | 15.135 | 15.354 | 15.574 | 1.428 | -1.428 | 0.352 | -0.352 |
| 15 | 14.546 | 14.751 | 14.956 | 1.388 | -1.388 | 0.345 | -0.345 |
| 16 | 13.983 | 14.175 | 14.366 | 1.348 | -1.348 | 0.337 | -0.337 |
| 17 | 13.445 | 13.624 | 13.802 | 1.309 | -1.309 | 0.329 | -0.329 |
| 18 | 12.931 | 13.097 | 13.263 | 1.269 | -1.269 | 0.321 | -0.321 |
| 19 | 12.438 | 12.593 | 12.748 | 1.23 | -1.23 | 0.313 | -0.313 |
| 20 | 11.967 | 12.112 | 12.256 | 1.191 | -1.191 | 0.305 | -0.305 |
| 21 | 11.517 | 11.651 | 11.785 | 1.152 | -1.152 | 0.297 | -0.297 |
| 22 | 11.085 | 11.21 | 11.335 | 1.114 | -1.114 | 0.289 | -0.289 |

| | | | | | | | |
|----|--------|--------|--------|-------|--------|-------|--------|
| 23 | 10.673 | 10.789 | 10.905 | 1.075 | -1.075 | 0.281 | -0.281 |
| 24 | 10.278 | 10.386 | 10.493 | 1.037 | -1.037 | 0.273 | -0.273 |
| 25 | 9.9 | 10 | 10.1 | 1 | -1 | 0.264 | -0.264 |
| 26 | 9.53 | 9.63 | 9.73 | 1.037 | -1.037 | 0.276 | -0.276 |
| 27 | 9.177 | 9.276 | 9.376 | 1.075 | -1.075 | 0.288 | -0.288 |
| 28 | 8.838 | 8.938 | 9.037 | 1.112 | -1.112 | 0.3 | -0.3 |
| 29 | 8.514 | 8.613 | 8.712 | 1.149 | -1.149 | 0.312 | -0.312 |
| 30 | 8.204 | 8.303 | 8.401 | 1.185 | -1.185 | 0.324 | -0.324 |
| 31 | 7.907 | 8.005 | 8.103 | 1.222 | -1.222 | 0.336 | -0.336 |
| 32 | 7.623 | 7.72 | 7.817 | 1.258 | -1.258 | 0.348 | -0.348 |
| 33 | 7.35 | 7.447 | 7.543 | 1.294 | -1.294 | 0.36 | -0.36 |
| 34 | 7.089 | 7.185 | 7.28 | 1.33 | -1.33 | 0.373 | -0.373 |
| 35 | 6.839 | 6.934 | 7.028 | 1.366 | -1.366 | 0.385 | -0.385 |
| 36 | 6.599 | 6.693 | 6.786 | 1.401 | -1.401 | 0.398 | -0.398 |
| 37 | 6.368 | 6.461 | 6.554 | 1.436 | -1.436 | 0.41 | -0.41 |
| 38 | 6.148 | 6.239 | 6.331 | 1.471 | -1.471 | 0.423 | -0.423 |
| 39 | 5.936 | 6.027 | 6.117 | 1.506 | -1.506 | 0.436 | -0.436 |
| 40 | 5.732 | 5.822 | 5.912 | 1.54 | -1.54 | 0.448 | -0.448 |
| 41 | 5.537 | 5.626 | 5.714 | 1.575 | -1.575 | 0.461 | -0.461 |
| 42 | 5.35 | 5.437 | 5.525 | 1.609 | -1.609 | 0.474 | -0.474 |
| 43 | 5.169 | 5.256 | 5.342 | 1.643 | -1.643 | 0.487 | -0.487 |
| 44 | 4.996 | 5.082 | 5.167 | 1.676 | -1.676 | 0.5 | -0.5 |
| 45 | 4.83 | 4.914 | 4.998 | 1.71 | -1.71 | 0.513 | -0.513 |
| 46 | 4.67 | 4.753 | 4.836 | 1.743 | -1.743 | 0.527 | -0.527 |
| 47 | 4.516 | 4.598 | 4.68 | 1.776 | -1.776 | 0.54 | -0.54 |
| 48 | 4.369 | 4.449 | 4.53 | 1.809 | -1.809 | 0.553 | -0.553 |
| 49 | 4.226 | 4.306 | 4.385 | 1.842 | -1.842 | 0.567 | -0.567 |
| 50 | 4.089 | 4.168 | 4.246 | 1.875 | -1.875 | 0.58 | -0.58 |
| 51 | 3.958 | 4.035 | 4.111 | 1.907 | -1.907 | 0.594 | -0.594 |
| 52 | 3.831 | 3.906 | 3.982 | 1.939 | -1.939 | 0.607 | -0.607 |
| 53 | 3.708 | 3.783 | 3.858 | 1.971 | -1.971 | 0.621 | -0.621 |
| 54 | 3.591 | 3.664 | 3.738 | 2.003 | -2.003 | 0.635 | -0.635 |
| 55 | 3.477 | 3.549 | 3.622 | 2.035 | -2.035 | 0.649 | -0.649 |
| 56 | 3.368 | 3.439 | 3.51 | 2.067 | -2.067 | 0.662 | -0.662 |
| 57 | 3.262 | 3.332 | 3.402 | 2.098 | -2.098 | 0.676 | -0.676 |
| 58 | 3.161 | 3.23 | 3.298 | 2.13 | -2.13 | 0.69 | -0.69 |
| 59 | 3.063 | 3.13 | 3.198 | 2.161 | -2.161 | 0.704 | -0.704 |
| 60 | 2.968 | 3.035 | 3.101 | 2.192 | -2.192 | 0.719 | -0.719 |
| 61 | 2.877 | 2.942 | 3.008 | 2.223 | -2.223 | 0.733 | -0.733 |
| 62 | 2.789 | 2.853 | 2.918 | 2.254 | -2.254 | 0.747 | -0.747 |
| 63 | 2.704 | 2.767 | 2.831 | 2.284 | -2.284 | 0.762 | -0.762 |
| 64 | 2.622 | 2.684 | 2.746 | 2.315 | -2.315 | 0.776 | -0.776 |

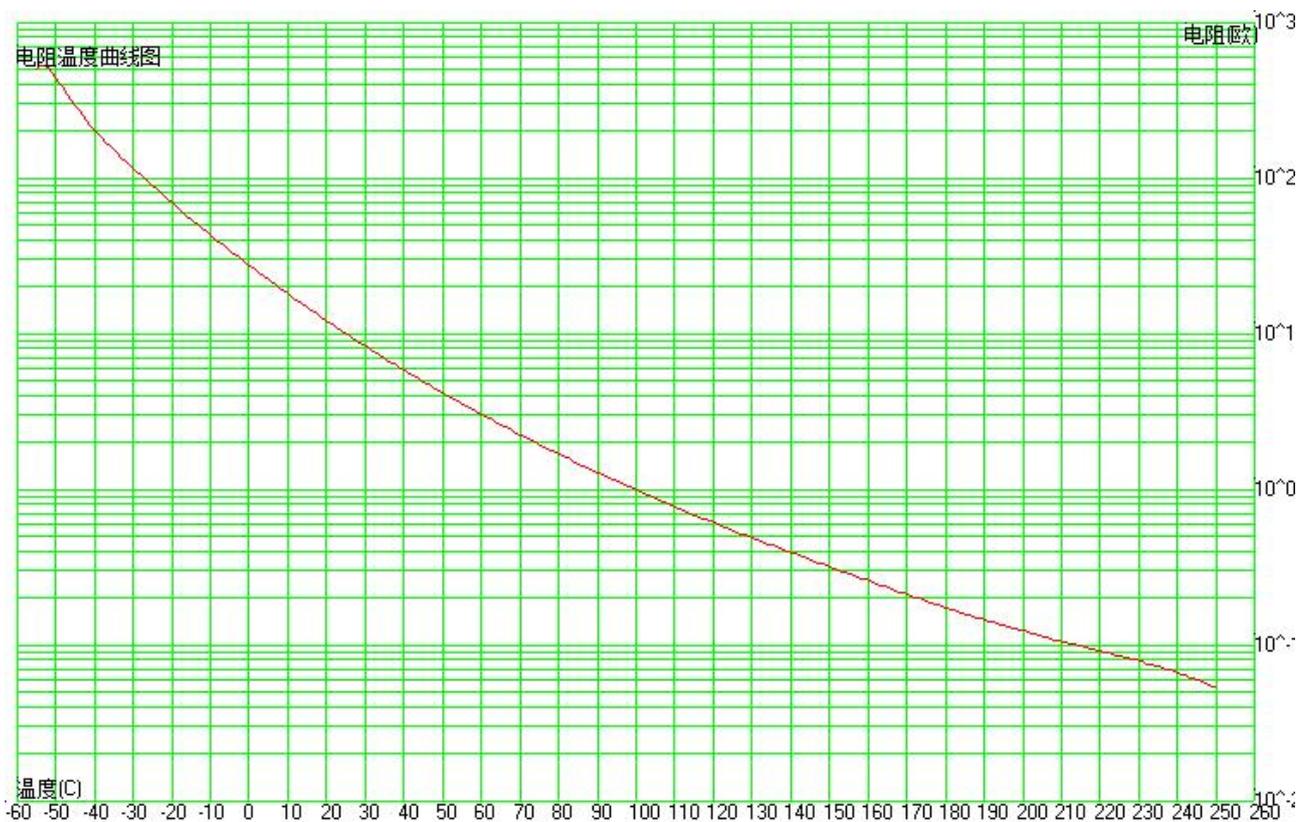
| | | | | | | | |
|-----|-------|-------|-------|-------|--------|-------|--------|
| 65 | 2.543 | 2.604 | 2.665 | 2.345 | -2.345 | 0.79 | -0.79 |
| 66 | 2.467 | 2.527 | 2.587 | 2.375 | -2.375 | 0.805 | -0.805 |
| 67 | 2.393 | 2.452 | 2.511 | 2.405 | -2.405 | 0.82 | -0.82 |
| 68 | 2.322 | 2.379 | 2.437 | 2.435 | -2.435 | 0.834 | -0.834 |
| 69 | 2.253 | 2.31 | 2.367 | 2.465 | -2.465 | 0.849 | -0.849 |
| 70 | 2.186 | 2.242 | 2.298 | 2.495 | -2.495 | 0.864 | -0.864 |
| 71 | 2.122 | 2.177 | 2.232 | 2.524 | -2.524 | 0.879 | -0.879 |
| 72 | 2.06 | 2.114 | 2.168 | 2.554 | -2.554 | 0.894 | -0.894 |
| 73 | 2 | 2.053 | 2.106 | 2.583 | -2.583 | 0.909 | -0.909 |
| 74 | 1.942 | 1.994 | 2.046 | 2.612 | -2.612 | 0.924 | -0.924 |
| 75 | 1.886 | 1.937 | 1.988 | 2.641 | -2.641 | 0.939 | -0.939 |
| 76 | 1.832 | 1.882 | 1.932 | 2.67 | -2.67 | 0.954 | -0.954 |
| 77 | 1.779 | 1.829 | 1.878 | 2.699 | -2.699 | 0.97 | -0.97 |
| 78 | 1.729 | 1.777 | 1.826 | 2.727 | -2.727 | 0.985 | -0.985 |
| 79 | 1.68 | 1.727 | 1.775 | 2.756 | -2.756 | 1.001 | -1.001 |
| 80 | 1.632 | 1.679 | 1.726 | 2.784 | -2.784 | 1.016 | -1.016 |
| 81 | 1.586 | 1.632 | 1.678 | 2.812 | -2.812 | 1.032 | -1.032 |
| 82 | 1.542 | 1.587 | 1.632 | 2.84 | -2.84 | 1.048 | -1.048 |
| 83 | 1.499 | 1.544 | 1.588 | 2.868 | -2.868 | 1.063 | -1.063 |
| 84 | 1.458 | 1.501 | 1.545 | 2.896 | -2.896 | 1.079 | -1.079 |
| 85 | 1.418 | 1.461 | 1.503 | 2.923 | -2.923 | 1.095 | -1.095 |
| 86 | 1.379 | 1.421 | 1.463 | 2.951 | -2.951 | 1.111 | -1.111 |
| 87 | 1.341 | 1.383 | 1.424 | 2.978 | -2.978 | 1.127 | -1.127 |
| 88 | 1.305 | 1.346 | 1.386 | 3.005 | -3.005 | 1.143 | -1.143 |
| 89 | 1.27 | 1.31 | 1.349 | 3.032 | -3.032 | 1.16 | -1.16 |
| 90 | 1.236 | 1.275 | 1.314 | 3.059 | -3.059 | 1.176 | -1.176 |
| 91 | 1.203 | 1.241 | 1.28 | 3.086 | -3.086 | 1.192 | -1.192 |
| 92 | 1.171 | 1.209 | 1.246 | 3.112 | -3.112 | 1.209 | -1.209 |
| 93 | 1.14 | 1.177 | 1.214 | 3.139 | -3.139 | 1.225 | -1.225 |
| 94 | 1.11 | 1.147 | 1.183 | 3.165 | -3.165 | 1.242 | -1.242 |
| 95 | 1.082 | 1.117 | 1.153 | 3.191 | -3.191 | 1.258 | -1.258 |
| 96 | 1.053 | 1.089 | 1.124 | 3.217 | -3.217 | 1.275 | -1.275 |
| 97 | 1.026 | 1.061 | 1.095 | 3.243 | -3.243 | 1.292 | -1.292 |
| 98 | 1 | 1.034 | 1.068 | 3.269 | -3.269 | 1.309 | -1.309 |
| 99 | 0.975 | 1.008 | 1.041 | 3.294 | -3.294 | 1.326 | -1.326 |
| 100 | 0.95 | 0.983 | 1.015 | 3.32 | -3.32 | 1.343 | -1.343 |
| 101 | 0.926 | 0.958 | 0.99 | 3.345 | -3.345 | 1.36 | -1.36 |
| 102 | 0.903 | 0.934 | 0.966 | 3.37 | -3.37 | 1.377 | -1.377 |
| 103 | 0.88 | 0.911 | 0.942 | 3.395 | -3.395 | 1.395 | -1.395 |
| 104 | 0.858 | 0.889 | 0.919 | 3.42 | -3.42 | 1.412 | -1.412 |
| 105 | 0.837 | 0.867 | 0.897 | 3.445 | -3.445 | 1.429 | -1.429 |
| 106 | 0.817 | 0.846 | 0.876 | 3.469 | -3.469 | 1.447 | -1.447 |

| | | | | | | | |
|-----|-------|-------|-------|-------|--------|-------|--------|
| 107 | 0.797 | 0.826 | 0.855 | 3.493 | -3.493 | 1.465 | -1.465 |
| 108 | 0.778 | 0.806 | 0.834 | 3.518 | -3.518 | 1.482 | -1.482 |
| 109 | 0.759 | 0.787 | 0.815 | 3.542 | -3.542 | 1.5 | -1.5 |
| 110 | 0.741 | 0.768 | 0.796 | 3.566 | -3.566 | 1.518 | -1.518 |
| 111 | 0.723 | 0.75 | 0.777 | 3.59 | -3.59 | 1.536 | -1.536 |
| 112 | 0.706 | 0.732 | 0.759 | 3.613 | -3.613 | 1.554 | -1.554 |
| 113 | 0.689 | 0.715 | 0.741 | 3.637 | -3.637 | 1.572 | -1.572 |
| 114 | 0.673 | 0.699 | 0.724 | 3.661 | -3.661 | 1.59 | -1.59 |
| 115 | 0.657 | 0.683 | 0.708 | 3.684 | -3.684 | 1.608 | -1.608 |
| 116 | 0.642 | 0.667 | 0.692 | 3.707 | -3.707 | 1.626 | -1.626 |
| 117 | 0.627 | 0.652 | 0.676 | 3.73 | -3.73 | 1.645 | -1.645 |
| 118 | 0.613 | 0.637 | 0.661 | 3.753 | -3.753 | 1.663 | -1.663 |
| 119 | 0.599 | 0.622 | 0.646 | 3.776 | -3.776 | 1.682 | -1.682 |
| 120 | 0.585 | 0.608 | 0.631 | 3.799 | -3.799 | 1.7 | -1.7 |
| 121 | 0.572 | 0.595 | 0.617 | 3.822 | -3.822 | 1.719 | -1.719 |
| 122 | 0.559 | 0.581 | 0.604 | 3.844 | -3.844 | 1.737 | -1.737 |
| 123 | 0.546 | 0.568 | 0.59 | 3.867 | -3.867 | 1.756 | -1.756 |
| 124 | 0.534 | 0.556 | 0.577 | 3.889 | -3.889 | 1.775 | -1.775 |
| 125 | 0.522 | 0.544 | 0.565 | 3.912 | -3.912 | 1.794 | -1.794 |
| 126 | 0.511 | 0.532 | 0.552 | 3.934 | -3.934 | 1.813 | -1.813 |
| 127 | 0.499 | 0.52 | 0.54 | 3.956 | -3.956 | 1.832 | -1.832 |
| 128 | 0.488 | 0.509 | 0.529 | 3.978 | -3.978 | 1.851 | -1.851 |
| 129 | 0.478 | 0.497 | 0.517 | 4 | -4 | 1.87 | -1.87 |
| 130 | 0.467 | 0.487 | 0.506 | 4.022 | -4.022 | 1.89 | -1.89 |
| 131 | 0.457 | 0.476 | 0.495 | 4.044 | -4.044 | 1.909 | -1.909 |
| 132 | 0.447 | 0.466 | 0.485 | 4.066 | -4.066 | 1.928 | -1.928 |
| 133 | 0.437 | 0.456 | 0.475 | 4.088 | -4.088 | 1.948 | -1.948 |
| 134 | 0.428 | 0.446 | 0.464 | 4.109 | -4.109 | 1.967 | -1.967 |
| 135 | 0.418 | 0.437 | 0.455 | 4.131 | -4.131 | 1.987 | -1.987 |
| 136 | 0.409 | 0.427 | 0.445 | 4.152 | -4.152 | 2.007 | -2.007 |
| 137 | 0.401 | 0.418 | 0.436 | 4.174 | -4.174 | 2.026 | -2.026 |
| 138 | 0.392 | 0.409 | 0.426 | 4.195 | -4.195 | 2.046 | -2.046 |
| 139 | 0.384 | 0.401 | 0.418 | 4.217 | -4.217 | 2.066 | -2.066 |
| 140 | 0.375 | 0.392 | 0.409 | 4.238 | -4.238 | 2.086 | -2.086 |
| 141 | 0.367 | 0.384 | 0.4 | 4.259 | -4.259 | 2.106 | -2.106 |
| 142 | 0.36 | 0.376 | 0.392 | 4.281 | -4.281 | 2.126 | -2.126 |
| 143 | 0.352 | 0.368 | 0.384 | 4.302 | -4.302 | 2.146 | -2.146 |
| 144 | 0.345 | 0.36 | 0.376 | 4.323 | -4.323 | 2.166 | -2.166 |
| 145 | 0.337 | 0.353 | 0.368 | 4.344 | -4.344 | 2.186 | -2.186 |
| 146 | 0.33 | 0.345 | 0.36 | 4.365 | -4.365 | 2.207 | -2.207 |
| 147 | 0.323 | 0.338 | 0.353 | 4.386 | -4.386 | 2.227 | -2.227 |
| 148 | 0.316 | 0.331 | 0.346 | 4.407 | -4.407 | 2.248 | -2.248 |

| | | | | | | | |
|-----|-------|-------|-------|-------|--------|-------|--------|
| 149 | 0.31 | 0.324 | 0.339 | 4.428 | -4.428 | 2.268 | -2.268 |
| 150 | 0.303 | 0.318 | 0.332 | 4.449 | -4.449 | 2.289 | -2.289 |
| 151 | 0.297 | 0.311 | 0.325 | 4.47 | -4.47 | 2.309 | -2.309 |
| 152 | 0.291 | 0.305 | 0.318 | 4.491 | -4.491 | 2.33 | -2.33 |
| 153 | 0.285 | 0.298 | 0.312 | 4.512 | -4.512 | 2.351 | -2.351 |
| 154 | 0.279 | 0.292 | 0.305 | 4.532 | -4.532 | 2.372 | -2.372 |
| 155 | 0.273 | 0.286 | 0.299 | 4.553 | -4.553 | 2.393 | -2.393 |
| 156 | 0.267 | 0.28 | 0.293 | 4.574 | -4.574 | 2.414 | -2.414 |
| 157 | 0.262 | 0.275 | 0.287 | 4.594 | -4.594 | 2.435 | -2.435 |
| 158 | 0.256 | 0.269 | 0.281 | 4.615 | -4.615 | 2.456 | -2.456 |
| 159 | 0.251 | 0.263 | 0.276 | 4.636 | -4.636 | 2.477 | -2.477 |
| 160 | 0.246 | 0.258 | 0.27 | 4.656 | -4.656 | 2.498 | -2.498 |
| 161 | 0.241 | 0.253 | 0.265 | 4.676 | -4.676 | 2.519 | -2.519 |
| 162 | 0.236 | 0.248 | 0.259 | 4.697 | -4.697 | 2.541 | -2.541 |
| 163 | 0.231 | 0.243 | 0.254 | 4.717 | -4.717 | 2.562 | -2.562 |
| 164 | 0.227 | 0.238 | 0.249 | 4.737 | -4.737 | 2.584 | -2.584 |
| 165 | 0.222 | 0.233 | 0.244 | 4.758 | -4.758 | 2.605 | -2.605 |
| 166 | 0.218 | 0.228 | 0.239 | 4.778 | -4.778 | 2.627 | -2.627 |
| 167 | 0.213 | 0.224 | 0.235 | 4.798 | -4.798 | 2.649 | -2.649 |
| 168 | 0.209 | 0.219 | 0.23 | 4.818 | -4.818 | 2.671 | -2.671 |
| 169 | 0.205 | 0.215 | 0.226 | 4.838 | -4.838 | 2.693 | -2.693 |
| 170 | 0.201 | 0.211 | 0.221 | 4.858 | -4.858 | 2.714 | -2.714 |
| 171 | 0.197 | 0.207 | 0.217 | 4.878 | -4.878 | 2.736 | -2.736 |
| 172 | 0.193 | 0.203 | 0.213 | 4.897 | -4.897 | 2.759 | -2.759 |
| 173 | 0.189 | 0.199 | 0.209 | 4.917 | -4.917 | 2.781 | -2.781 |
| 174 | 0.185 | 0.195 | 0.205 | 4.936 | -4.936 | 2.803 | -2.803 |
| 175 | 0.182 | 0.191 | 0.201 | 4.956 | -4.956 | 2.825 | -2.825 |
| 176 | 0.178 | 0.188 | 0.197 | 4.975 | -4.975 | 2.848 | -2.848 |
| 177 | 0.175 | 0.184 | 0.193 | 4.994 | -4.994 | 2.87 | -2.87 |
| 178 | 0.171 | 0.18 | 0.19 | 5.013 | -5.013 | 2.893 | -2.893 |
| 179 | 0.168 | 0.177 | 0.186 | 5.032 | -5.032 | 2.915 | -2.915 |
| 180 | 0.165 | 0.174 | 0.183 | 5.051 | -5.051 | 2.938 | -2.938 |
| 181 | 0.162 | 0.17 | 0.179 | 5.07 | -5.07 | 2.961 | -2.961 |
| 182 | 0.159 | 0.167 | 0.176 | 5.089 | -5.089 | 2.984 | -2.984 |
| 183 | 0.156 | 0.164 | 0.173 | 5.107 | -5.107 | 3.007 | -3.007 |
| 184 | 0.153 | 0.161 | 0.17 | 5.126 | -5.126 | 3.03 | -3.03 |
| 185 | 0.15 | 0.158 | 0.167 | 5.144 | -5.144 | 3.053 | -3.053 |
| 186 | 0.147 | 0.155 | 0.164 | 5.162 | -5.162 | 3.076 | -3.076 |
| 187 | 0.145 | 0.153 | 0.161 | 5.18 | -5.18 | 3.099 | -3.099 |
| 188 | 0.142 | 0.15 | 0.158 | 5.198 | -5.198 | 3.123 | -3.123 |
| 189 | 0.14 | 0.147 | 0.155 | 5.216 | -5.216 | 3.146 | -3.146 |
| 190 | 0.137 | 0.145 | 0.152 | 5.233 | -5.233 | 3.17 | -3.17 |

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|-----|-------|-------|-------|-------|--------|-------|--------|
| 191 | 0.135 | 0.142 | 0.15 | 5.251 | -5.251 | 3.193 | -3.193 |
| 192 | 0.132 | 0.14 | 0.147 | 5.268 | -5.268 | 3.217 | -3.217 |
| 193 | 0.13 | 0.137 | 0.145 | 5.285 | -5.285 | 3.241 | -3.241 |
| 194 | 0.128 | 0.135 | 0.142 | 5.302 | -5.302 | 3.265 | -3.265 |
| 195 | 0.126 | 0.133 | 0.14 | 5.319 | -5.319 | 3.289 | -3.289 |
| 196 | 0.124 | 0.131 | 0.138 | 5.335 | -5.335 | 3.313 | -3.313 |
| 197 | 0.122 | 0.129 | 0.136 | 5.352 | -5.352 | 3.337 | -3.337 |
| 198 | 0.12 | 0.127 | 0.133 | 5.368 | -5.368 | 3.361 | -3.361 |
| 199 | 0.118 | 0.124 | 0.131 | 5.384 | -5.384 | 3.385 | -3.385 |
| 200 | 0.116 | 0.123 | 0.129 | 5.4 | -5.4 | 3.41 | -3.41 |
| 201 | 0.114 | 0.121 | 0.127 | 5.416 | -5.416 | 3.434 | -3.434 |
| 202 | 0.112 | 0.119 | 0.125 | 5.432 | -5.432 | 3.459 | -3.459 |
| 203 | 0.11 | 0.117 | 0.123 | 5.447 | -5.447 | 3.483 | -3.483 |
| 204 | 0.109 | 0.115 | 0.121 | 5.462 | -5.462 | 3.508 | -3.508 |
| 205 | 0.107 | 0.113 | 0.12 | 5.478 | -5.478 | 3.533 | -3.533 |
| 206 | 0.105 | 0.112 | 0.118 | 5.493 | -5.493 | 3.558 | -3.558 |
| 207 | 0.104 | 0.11 | 0.116 | 5.508 | -5.508 | 3.583 | -3.583 |
| 208 | 0.102 | 0.108 | 0.114 | 5.523 | -5.523 | 3.608 | -3.608 |
| 209 | 0.101 | 0.107 | 0.113 | 5.537 | -5.537 | 3.633 | -3.633 |
| 210 | 0.099 | 0.105 | 0.111 | 5.552 | -5.552 | 3.658 | -3.658 |
| 211 | 0.098 | 0.104 | 0.109 | 5.566 | -5.566 | 3.683 | -3.683 |
| 212 | 0.096 | 0.102 | 0.108 | 5.581 | -5.581 | 3.709 | -3.709 |
| 213 | 0.095 | 0.101 | 0.106 | 5.595 | -5.595 | 3.734 | -3.734 |
| 214 | 0.094 | 0.099 | 0.105 | 5.609 | -5.609 | 3.76 | -3.76 |
| 215 | 0.092 | 0.098 | 0.103 | 5.623 | -5.623 | 3.785 | -3.785 |
| 216 | 0.091 | 0.097 | 0.102 | 5.637 | -5.637 | 3.811 | -3.811 |
| 217 | 0.09 | 0.095 | 0.101 | 5.651 | -5.651 | 3.837 | -3.837 |
| 218 | 0.089 | 0.094 | 0.099 | 5.666 | -5.666 | 3.863 | -3.863 |
| 219 | 0.087 | 0.093 | 0.098 | 5.68 | -5.68 | 3.888 | -3.888 |
| 220 | 0.086 | 0.091 | 0.096 | 5.694 | -5.694 | 3.914 | -3.914 |
| 221 | 0.085 | 0.09 | 0.095 | 5.708 | -5.708 | 3.94 | -3.94 |
| 222 | 0.084 | 0.089 | 0.094 | 5.722 | -5.722 | 3.966 | -3.966 |
| 223 | 0.082 | 0.087 | 0.093 | 5.736 | -5.736 | 3.993 | -3.993 |
| 224 | 0.081 | 0.086 | 0.091 | 5.75 | -5.75 | 4.019 | -4.019 |
| 225 | 0.08 | 0.085 | 0.09 | 5.764 | -5.764 | 4.045 | -4.045 |
| 226 | 0.079 | 0.084 | 0.089 | 5.779 | -5.779 | 4.071 | -4.071 |
| 227 | 0.078 | 0.083 | 0.087 | 5.793 | -5.793 | 4.097 | -4.097 |
| 228 | 0.077 | 0.081 | 0.086 | 5.808 | -5.808 | 4.124 | -4.124 |
| 229 | 0.075 | 0.08 | 0.085 | 5.823 | -5.823 | 4.15 | -4.15 |
| 230 | 0.074 | 0.079 | 0.084 | 5.838 | -5.838 | 4.177 | -4.177 |
| 231 | 0.073 | 0.078 | 0.082 | 5.854 | -5.854 | 4.203 | -4.203 |
| 232 | 0.072 | 0.076 | 0.081 | 5.869 | -5.869 | 4.23 | -4.23 |

| | | | | | | | |
|-----|-------|-------|-------|-------|--------|-------|--------|
| 233 | 0.071 | 0.075 | 0.08 | 5.885 | -5.885 | 4.256 | -4.256 |
| 234 | 0.07 | 0.074 | 0.078 | 5.902 | -5.902 | 4.283 | -4.283 |
| 235 | 0.068 | 0.073 | 0.077 | 5.918 | -5.918 | 4.309 | -4.309 |
| 236 | 0.067 | 0.072 | 0.076 | 5.936 | -5.936 | 4.336 | -4.336 |
| 237 | 0.066 | 0.07 | 0.075 | 5.953 | -5.953 | 4.362 | -4.362 |
| 238 | 0.065 | 0.069 | 0.073 | 5.971 | -5.971 | 4.389 | -4.389 |
| 239 | 0.064 | 0.068 | 0.072 | 5.99 | -5.99 | 4.415 | -4.415 |
| 240 | 0.062 | 0.066 | 0.07 | 6.009 | -6.009 | 4.442 | -4.442 |
| 241 | 0.061 | 0.065 | 0.069 | 6.029 | -6.029 | 4.468 | -4.468 |
| 242 | 0.06 | 0.064 | 0.068 | 6.049 | -6.049 | 4.494 | -4.494 |
| 243 | 0.059 | 0.062 | 0.066 | 6.071 | -6.071 | 4.521 | -4.521 |
| 244 | 0.057 | 0.061 | 0.065 | 6.093 | -6.093 | 4.547 | -4.547 |
| 245 | 0.056 | 0.06 | 0.063 | 6.115 | -6.115 | 4.573 | -4.573 |
| 246 | 0.055 | 0.058 | 0.062 | 6.139 | -6.139 | 4.6 | -4.6 |
| 247 | 0.053 | 0.057 | 0.06 | 6.164 | -6.164 | 4.626 | -4.626 |
| 248 | 0.052 | 0.055 | 0.059 | 6.189 | -6.189 | 4.652 | -4.652 |
| 249 | 0.051 | 0.054 | 0.057 | 6.216 | -6.216 | 4.678 | -4.678 |
| 250 | 0.049 | 0.053 | 0.056 | 6.243 | -6.243 | 4.704 | -4.704 |



附表 II (Attachment II)

南京时恒电阻误差曲线图
Nanjing The curve of resistance tolerance

