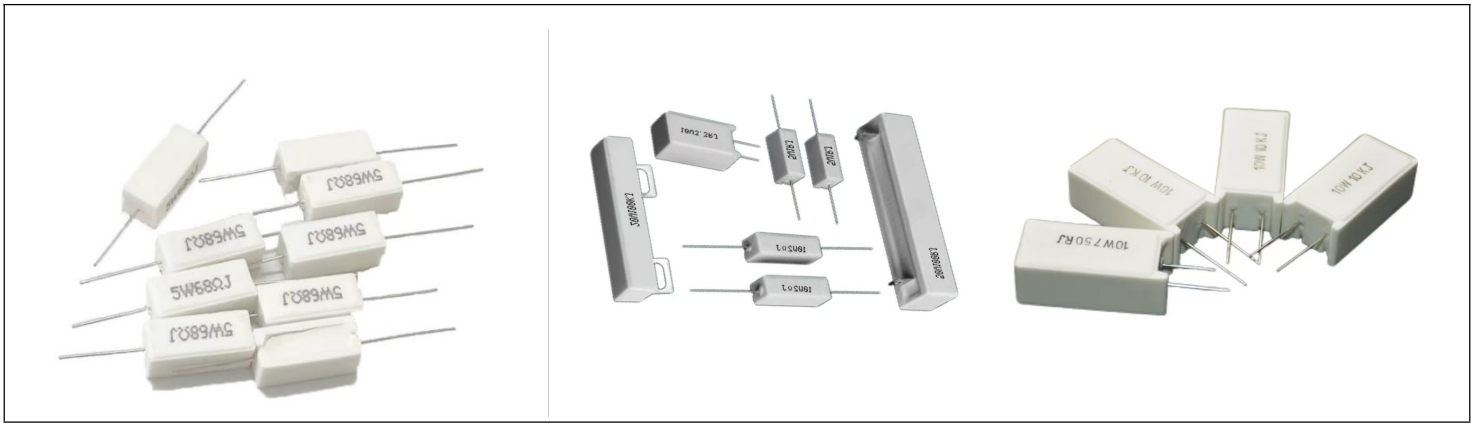
水泥电阻

Cement resistance



产品特点 Product Features

- 耐震、耐湿、耐热及良好的散热

Shock resistance, moisture resistance, heat resistance, and good heat dissipation

- 完全绝缘，适用于印刷电路板

Completely insulated, suitable for printed circuit boards

- 瓷棒上绕线然后接头电焊，制出精确电阻值及延长寿命

Wrap the wire around the porcelain rod and then weld the joint to produce precise resistance values and extend its lifespan

- 高电阻值采用金属氧化膜体代替绕线方式制成

High resistance value is made by using metal oxide film instead of winding method

- 耐热性优，电阻温度系数小，呈直线变化

Excellent heat resistance, small temperature coefficient of resistance, and linear variation

- 耐短时间超负载，低杂音，阻值经年无变化

Resistant to short-term overload, low noise, and resistance unchanged for years

- 防爆性能好，起保护作用

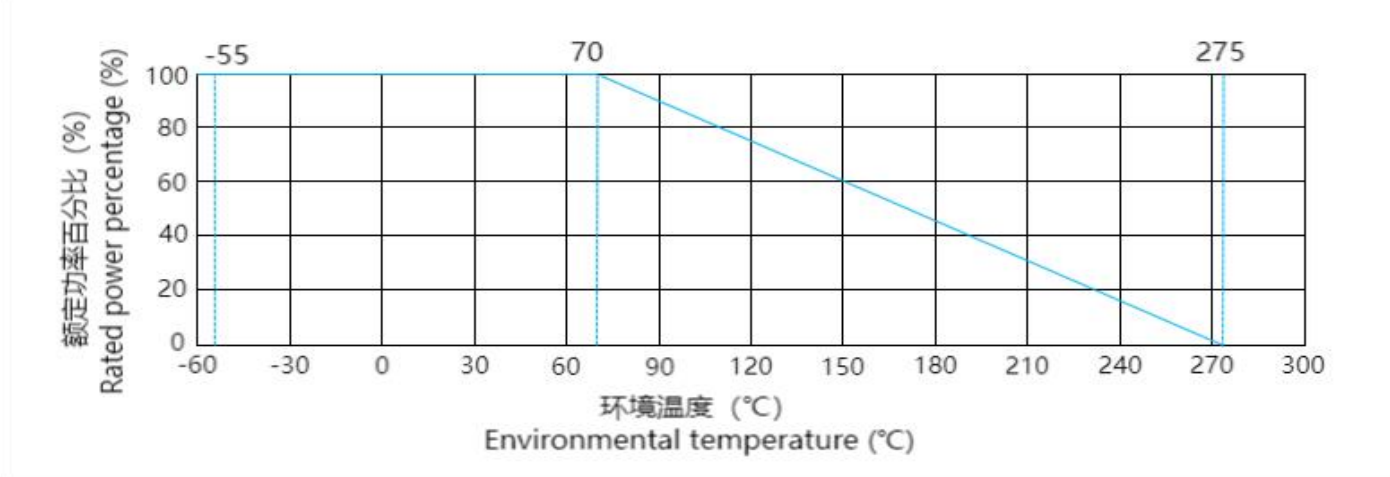
Good explosion-proof performance, providing protection

应用范围 Application scope

广泛应用于电源适配器、音响设备、音响分频器、仪器仪表、电视机、汽车等设备中

Widely used in power adapters, audio equipment, audio dividers, instruments, televisions, cars, and other devices

额定功率或电压/温度变化相关曲线
Rated power or voltage/temperature variation related curve



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性能参数 performance parameter

测试项目 Test project	测试条件 Test conditions	性能 Performance
温度系数 Temperature coefficient	分别测试常温及常温+100℃时的电阻值并计算每度的阻值变化率 Test the resistance values at room temperature and at room temperature+100 ℃ separately, and calculate the resistance change rate per degree	±300ppm℃
短时间过负荷 Short term overload	施加 5 倍的额定电压或最高负荷电压（取较小者）5 秒 Apply 5 times the rated voltage or maximum load voltage (whichever is smaller) for 5 seconds	Δ R≤±(2%R+0.05Ω)
耐焊接热 Resistance to Soldering Heat	在 350℃±10℃的锡炉中浸入 2～3 秒 Immerse in a tin furnace at 350 ℃± 10 ℃ for 2-3 seconds	Δ R≤±(1%R+0.05Ω)
可焊性 Solderability	在 265℃±5℃锡炉中 2～3 秒 2-3 seconds in a 265 ℃± 5 ℃ tin furnace	焊锡面积覆盖率 95%以上 Solder area coverage rate of over 95%
温度循环 Temperature cycling	在-55℃时放置 30 分钟,然后再+25℃时放置 10~15 分钟， 然后在+125℃时放置 30 分钟，然后再+25℃时放置 10~15 分钟，共循环 5 次。 Let it stand at -55 ℃ for 30 minutes, then at+25 ℃ for 10-15 minutes, then at+125 ℃ for 30 minutes, and then at+25 ℃ for 10-15 minutes, in a total of 5 cycles.	Δ R≤±(1%R+0.05Ω)
耐湿负荷寿命 Moisture resistant load life	在 70±2℃恒温箱中施加额定电压或最大工作电压(取最小者)1000 小时(通 1.5 小时，断 0.5 小时) Apply rated voltage or maximum operating voltage (whichever is lower) in a 70 ± 2 ℃ constant temperature chamber for 1000 hours (1.5 hours on, 0.5 hours off)	Δ R≤±(5%R+0.05Ω)
难燃性 Flame retardancy	分别用 5、10、15 倍额定电压交流负荷 5 分钟 Use AC loads of 5, 10, and 15 times the rated voltage for 5 minutes respectively	不可有明显火焰 There must be no obvious flames

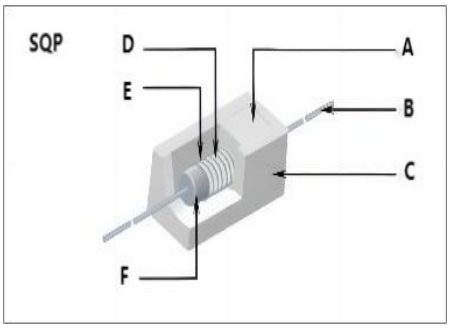
水泥电阻

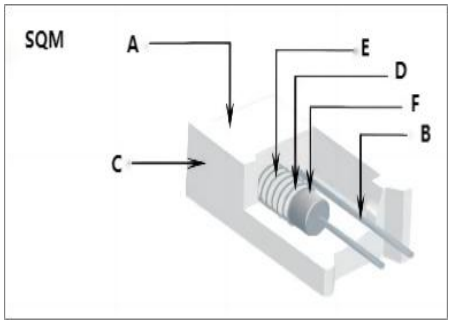
Cement resistance

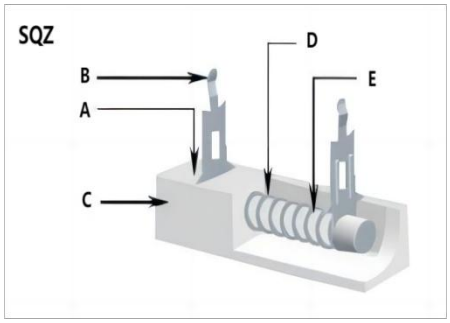
耐压性能 pressure resistant performance

功率 Power	最高工作电压 Maximum working voltage	最高负荷电压 Maximum load voltage	最高绝缘电压 Maximum insulation voltage
3W	350V	600V	1000V
5W	350V	600V	1000V
7W	500V	700V	1000V
10W	750V	850V	1000V
15W	1000V	1000V	1000V
20W	1000V	1000V	1500V
25W	1000V	1000V	1500V
50W	1000V	1000V	1500V
100W	1000V	1000V	1500V

产品结构 Product Structure:







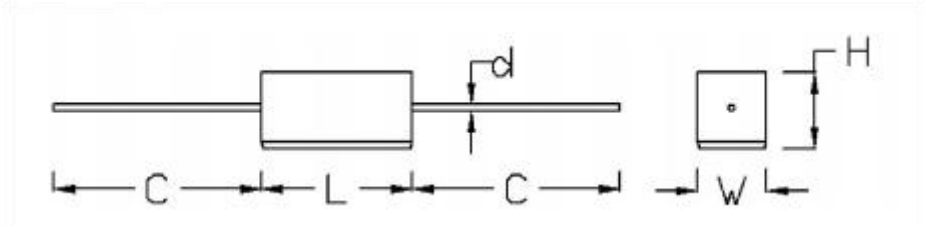
A	B	C	D	E	F
填充料 Filling material	端子 / 镀锡铜线 Terminal / Tin plated copper wire	瓷壳 Ceramic shell	玻璃纤维或陶瓷基体或电阻膜层 Glass fiber or ceramic matrix or resistive film layer	电阻丝或陶瓷基体 Resistance wire or ceramic substrate	铁帽 gossan

水泥电阻

Cement resistance

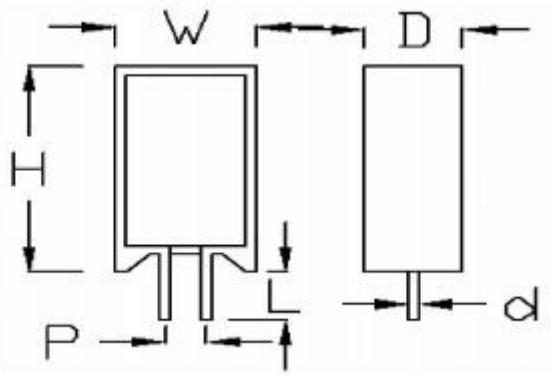
规格参数 Specification parameters

SQP



型号 Type	功率 power	阻值范围 Resistance range	尺寸 dimensions (mm)				
			L±1.5	W±1	H±1	C±3	d±0.05
SQP	3W	0.1R～820K	22	8	8	35	0.75
	5W		22	10	9	35	0.75
	7W		35	10	9	35	0.75
	10W		48	10	9	33	0.78
	15W		48	12.5	11.5	33	0.78
	20W		60	14	14	33	0.78
	25W		64	14	14	33	0.78
	50W		90	19	19	33	0.78
	100W		135	24	24	33	0.78

SQM

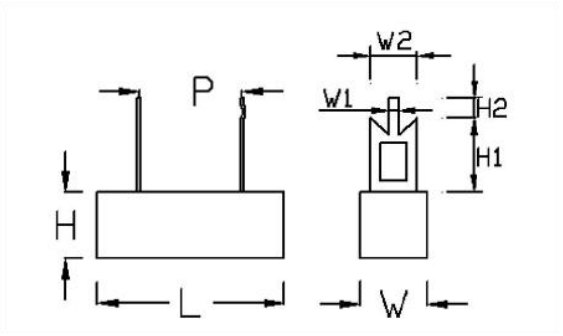


型号 Type	功率 power	阻值范围 Resistance range	尺寸 dimensions (mm)					
			H±1.5	W±1	D±1	P±1	L±0.5	d±0.05
SQM	3W	0.1R～820K	25	12	8	4	3.5	0.75
	5W		25	13	9	4	3.5	0.75
	7W		39	13	9	4	3.5	0.75
	10W		51	13	9	4	3.5	0.78
	15W		51	13	9	4	3.5	0.78
	20W		35	16	12	8	3.5	0.78

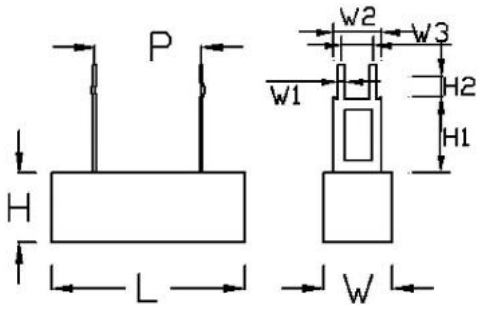
水泥电阻

Cement resistance

SQZ

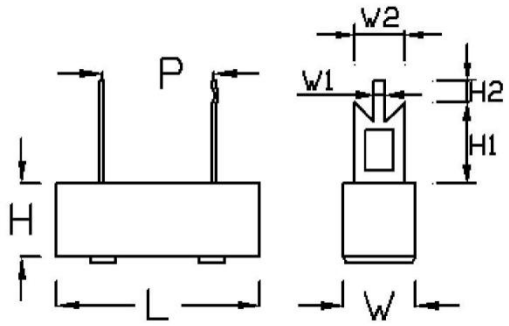


SQZA

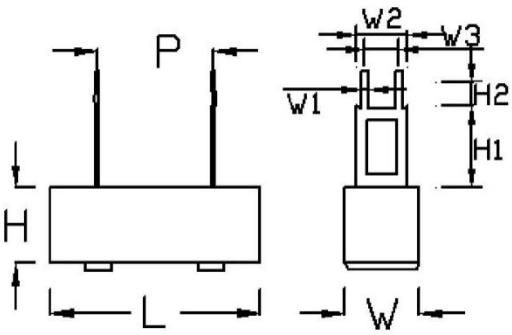


型号 Type	功率 power	阻值范围 Resistance range	尺寸 dimensions (mm)								
			L±1.5	W±1	H±1	P±3	H1±1	H2±0.5	W1±0.5	W2±0.5	W3±0.5
SQZ	5W	0.1R～820K	28	10	9	15	10	4.5	1.5	7	5
	7W		36	10	9	20	10	4.5	1.5	7	5
	10W		48	10	9	30	10	4.5	1.5	7	5
	15W		48	12.5	12	30	30	4.5	3.0	10	8
	20W		63	15	13	42	30	4.5	3.0	10	8
	25W		63	15	13	42	30	4.5	3.0	10	8
	50W		88	19	19	72	30	4.5	3.0	10	8

SQH



SQHA

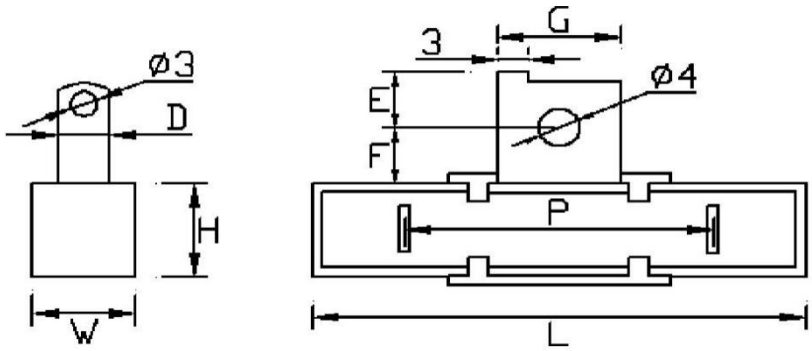


型号 Type	功率 power	阻值范围 Resistance range	尺寸 dimensions (mm)								
			L±1.5	W±1	H±1	P±3	H1±1	H2±0.5	W1±0.5	W2±0.5	W3±0.5
SQH	5W	0.1R～820K	28	10	9	15	10	4.5	1.5	7	5
	7W		36	10	9	20	10	4.5	1.5	7	5
	10W		48	10	9	30	10	4.5	1.5	7	5
	15W		48	12.5	12	30	30	4.5	3.0	10	8
	20W		63	15	13	42	30	4.5	3.0	10	8
	25W		63	15	13	42	30	4.5	3.0	10	8
	50W		88	19	19	72	30	4.5	3.0	10	8

水泥电阻

Cement resistance

SHG



型号 Type	功率 power	阻值范围 Resistance range	尺寸 dimensions (mm)							
			L±1.5	W±1	H±1	P±3	D±0.5	E±0.5	F±0.5	G±0.5
SHG	10W	0.1R～820K	48	10	10	30	5	5	7	12
	15W		48	12.5	12	30	6	5	9	12
	20W		60	14.5	14	42	6	5	9	12
	25W		60	14.5	14	42	6	5	9	12
	30W		75	19	19	55	7.5	7	9	18
	40W		88	19	19	72	7.5	7	9	18

订购信息 Ordering information

选型示例：SQP-10W2RJ

Selection example: SQP-10W2RJ

SQP	10W	2R	J
型号 Type SQP SQM SQZ / SQZA SQH / SQHA SHG	功率 Power	阻值 Resistance 2R=2Ω 1K=1KΩ	精度 Accuracy F=±1% J=±5% K=±10%

电阻使用建议 Suggestions for using resistors

- 电阻在使用电路中最好留 1.5 倍的功率余量，如电路中电压 100V，电流 0.01A，计算功率 P=100*0.01=1W，这时候电阻不能使用 1W 的，计算 1*1.5=1.5W，没有 1.5W 的电阻，故需用到 2W 的电阻。

It is best to leave 1.5 times the power margin for resistors in circuits. For example, if the voltage in the circuit is 100V and the current is 0.01A, the calculated power is P=100 * 0.01=1W. At this time, a resistor of 1W cannot be used, and 1 * 1.5=1.5W is calculated. There is no 1.5W resistor, so a 2W resistor is needed

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- 电阻在使用过程中不能超过电阻的最高使用电压，例如：电阻 1/4W 10K 的最高使用电压为 V=$\sqrt[2]{0.25*10000}$ =50V，不是 4.0 中的 250V。或者 1/4W 1M，计算 V=$\sqrt[2]{0.25*1000000}$ = 500V 此时的最高使用电压为 4.0 中的 250V，而不是计算得到的 500V，取两者中的较小值。

Resistors should not exceed their maximum operating voltage during use. For example, the maximum operating voltage for resistor 1/4W 10K is V= $\sqrt[2]{0.25*10000}$ =50V, not 250V as specified in 4.0. Or 1/4W 1M, calculate V=$\sqrt[2]{0.25*1000000}$ = 500V the highest operating voltage at this time is 250V in 4.0, instead of the calculated 500V, take the smaller of the two.

实验项目 Pilot projects

- **焊锡性测试 Soldering test**

将受测电阻之导线一端倾斜约 45℃方式浸入 265℃+5℃锡炉中 3 秒钟后取出,检视其附着性(视情形使用助焊剂)。焊锡面积覆盖率 95%以上。

Tilt one end of the wire of the tested resistor at approximately 45 ℃ and immerse it in a 265 ℃+5 ℃ tin furnace for 3 seconds, then remove it and inspect its adhesion (using soldering flux as appropriate). The coverage rate of soldering area is over 95%.

- **铜线拉力测试 Copper wire tensile test**

将电阻放入拉力测试仪器中，固定好电阻两端引线，摇动手把使压力表转至 20N，并维持 30 秒 ，引线不可被拉断为合格。

Place the resistor into the tensile testing instrument, fix the leads at both ends of the resistor, shake the handle to turn the pressure gauge to 20N, and maintain it for 30 seconds

The lead wire cannot be pulled off to be qualified.

- **绝缘耐电压试验 Insulation withstand voltage test**

将受测电阻的导线一端固定于仪器夹上，再将本体以锡箔纸包围至铁帽上沿，此时即可将测 试仪器的另一测试棒靠在本体上，将电压调至最高绝缘电压，并持续 60 秒，未击穿为合格。

Fix one end of the wire of the tested resistor onto the instrument clamp, and then wrap the body with tin foil around the top edge of the iron cap. At this point, place the other test rod of the testing instrument against the body, adjust the voltage to the highest insulation voltage, and continue for 60 seconds. If there is no breakdown, it is considered qualified.

- **短时间过负荷之测试及计算方法 Short term overload testing and calculation methods**

先将测试的电阻器按其电阻值及瓦特数计算出 2.5 倍的额定电压(若求得之 2.5 倍电压超出该瓦数电阻的最高负荷电压时,以该瓦数电阻的最高负荷为额定电压。例：碳膜 1/4W 的最高负荷电压为 500V,以 240KΩ的电阻计算其 2.5 倍额定电压（V=$\sqrt[2]{P*R*2.5}$）为 612.3V,此时其最高负荷电压,仍以 500V 计算,而不得以 612.3V 计算)。再以无波交流电或直流电按期计算的最高负荷电压，加电压 5 秒，其结果必须在无负荷的情况下放置约 30 分钟，且电阻不得有异状产生。其电阻的测试前及测试后的变化率则不得超出特性参数所定的各类电阻标准。

变化率 = （R2-R1）/R1*100%

R1：表示实验前阻值 R2 表示试验后阻值

First, calculate 2.5 times the rated voltage of the tested resistor based on its resistance value and wattage (if the calculated 2.5 times voltage exceeds the maximum load voltage of the wattage resistor, the maximum load voltage of the wattage resistor is used as the rated voltage. For example, the maximum load voltage of a carbon film 1/4W is 500V, and the rated voltage （V=$\sqrt[2]{P*R*2.5}$）is 612.3V calculated based on a 240K Ω resistor. At this time, the maximum load voltage is still calculated as 500V, not 612.3V). The maximum load voltage calculated on a regular basis using non wave alternating current or direct current, with a voltage applied for 5 seconds, must be left unloaded for about 30 minutes without any abnormal resistance. The rate of change of its resistance before and after testing shall not exceed the

various resistance standards determined by the characteristic parameters.

Change rate=(R2-R1)/R1 * 100%

R1: represents the resistance before the experiment, R2 represents the resistance after the experiment

● 长时间寿命试验 Long life test

先将测试电阻固定于测量夹内,并相互排列,使其不影响相互间的温度或通风过度。在上述条 件完成后，加入该受测电阻测电阻的额定电压，其加电压的过程以加电压 90 分钟，再停止 30 分 钟为一循环，持续做 1000 小时，完成后再置于恒温状态测量其阻值。计算变化率不得超出特性 参数所定的各类电阻标准。

First, fix the test resistors in the measuring clip and arrange them in a way that does not affect the temperature or excessive ventilation between them. After completing the above conditions, add the rated voltage of the measured resistor. The process of applying voltage is to apply voltage for 90 minutes, then stop for 30 minutes as a cycle, and continue for 1000 hours. After completion, place it in a constant temperature state to measure its resistance value. The calculated rate of change shall not exceed the various resistance standards determined by the characteristic parameters.

● 温度系数测试 Temperature coefficient test

先将测试电阻测出在室温下 t1=25℃的电阻值 R1,在置入温度 t2=125℃的树脂槽中约 5 分钟 ,并同时量测其阻值 R2,并由下列公式求出该电阻的温度系数(T.C.R)是否在其所需的范围内。

First, measure the resistance value R1 of the test resistor at t1=25 ℃ at room temperature. Place it in a resin tank at t2=125 ℃ for about 5 minutes, and simultaneously measure its resistance value R2. Use the following formula to determine whether the temperature coefficient (T.C.R) of the resistor is within its required range.

温度系数 temperature coefficient $TCR = \frac{R2 - R1}{R1} * \frac{1}{t2 - t1} * 10^6$

● 温度循环实验 Temperature cycling experiment

在-55℃时放置 30 分钟，然后在+25℃时放置 15 分钟，然后在+125℃时放置 30 分钟。然后在+25℃时放置 5 分钟，共循环 5 次。如下表所示：

Leave at -55 ℃ for 30 minutes, then at+25 ℃ for 15 minutes, and finally at+125 ℃ for 30 minutes. Then let it stand at+25 ℃ for 5 minutes and cycle 5 times in total. As shown in the table below:

循环循序 Cycle in sequence	温度 Temperature	放置时间 Standing Time
1	-55℃	30 分钟
2	+25℃	15 分钟
3	+125℃	30 分钟
4	+25℃	15 分钟

● 耐温负荷实验 Temperature resistance load test

电阻在 70±2℃恒温箱中施加额定电压或最大工作电压（取最小者）1000 小时，以施压 1.5 小时断电 0.5 为一个循环。完成后再置于恒温状态测量其阻值。计算变化率不得超出特性参数所定的各类电阻标准。

Apply the rated voltage or maximum operating voltage (whichever is the minimum) to the resistor in a constant temperature box at 70 ± 2 ℃ for 1000 hours, and cut off power for 0.5 hours after applying pressure for 1.5 hours as one cycle. After completion, measure its resistance by placing it in a constant temperature state. The calculated rate of change shall not exceed the various resistance standards determined by the characteristic parameters.