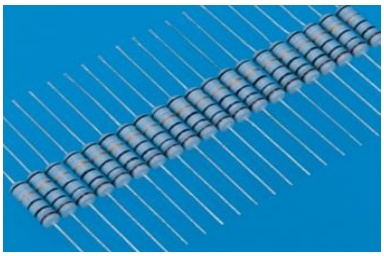
# ■金属氧化膜电阻器
# Metal Oxide Film Resistor



## ◆ 特征
## Features

＊ 阻值范围宽，温度系数小、散热性能好、使用环境温度高、阻燃特性好、过负荷特性好

Complete power specifications, wide resistance range, small temperature coefficient, good heat dissipation performance, high ambient temperature, good flame retardant characteristicsCeramic potting, Greater safety.

＊ 环保无铅产品

RoHS compliant / lead-free available.

## ◆ 应用
## Application

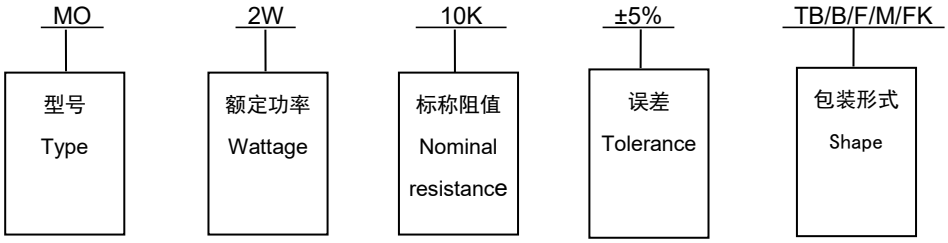
＊ 适用于各种交、直流电子电路中

It is suitable for various AC and DC circuits, has a certain impact resistance.

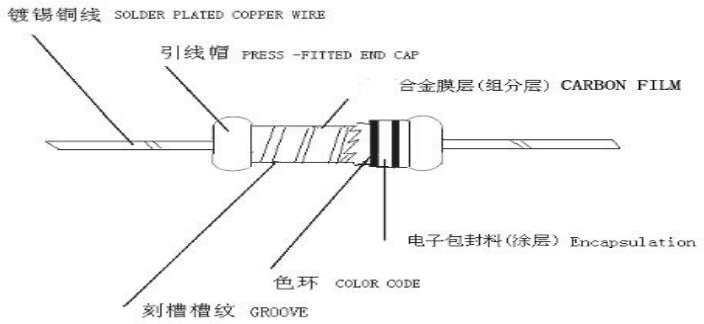
## ◆ 型号表示法
## Part Number

＊ 依据其种类，分别标明型号、额定功耗、标称阻值、精度、和形状。

According to the types of power rated, resistor value, tolerance and shapes.




## ◆ 金属氧化膜电阻器结构尺寸图
## Metal Oxide Film Construction




备注 REMARK:　底漆颜色 COATING COLOR: 灰 GREY

皮膜材质 SKIN FILM MATERIAL：碳膜皮膜 CARBON FILM

## ◆ 特点
## Features

* 具有大负荷下的优良耐久性
  Good durability under heavy load.
* 不燃性绝缘涂装
  Flame retardant coating with non-flammble paint.
* 标准误差:±5%(1%,±2%客户要求)
  Standard tolerance:±5% (1% ,±2% is available on request)
* 环保无铅产品
  RoHS compliant/lead-free available.

## ◆ 主要技术指标
## Main Specification

表一

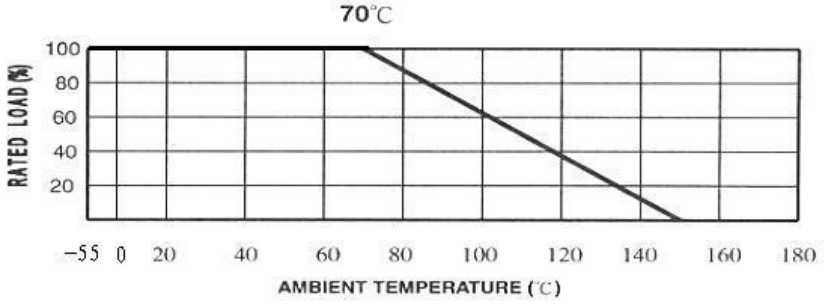
| 型号 Type | 最大工作电压 MAX WORKING | 最大负荷电压 MAX OVERLOAD | 额定功率 RatedPowerat70℃ | 电阻范围 RESISTANCE VALUE RANGE | 绝缘耐压 Dielectric withstanding |
|---|---|---|---|---|---|
| MO 1/4W | 250V | 500V | 1/4W | 0.1Ω－1MΩ | 300V |
| MO 1/2W / 1/2WS | 350V | 700V | 1/2W | 0.1Ω－10MΩ | 350V |
| MO 1W / 1WS | 500V | 1000V | 1W | 0.1Ω－10MΩ | 350V |
| MO 2W / 2WS | 600V | 1000V | 2W | 0.1Ω－10MΩ | 500V |
| MO 3W / 3WS | 700V | 1000V | 3W | 0.1Ω－10MΩ | 500V |
| MO 5W | 800V | 1000V | 5W | 0.1Ω－10MΩ | 500V |

* 额定功率 Power Rating

额定功率的定义为在环境温度 70℃最大输出功率。当环境温度超过 70℃，额定功率按下图曲线递减。

Power rating is defined as maximum power rating continuously applied under ambient temperature at 70℃.when the ambient temperature exceeds 70℃，The rated power decreases according to the curve below。

FIG.1 DERATING CURVE




* 额定电压 Rated Voltage

额定电压为交流或直流电压（频率为 50Hz 或 60Hz）额定电压计算方式为：

Rated voltage is defined as the DC or AC (effective Value at commercial frequency example 50 C/S,60 C/S)，Voltage when rated power is applied and can be calculated

By the following：

$$V = \sqrt{P \times R}$$

**V** = Rated voltage

**P** = Rated power(Watts)

**R** =Nominal resistance Value(Ohm)

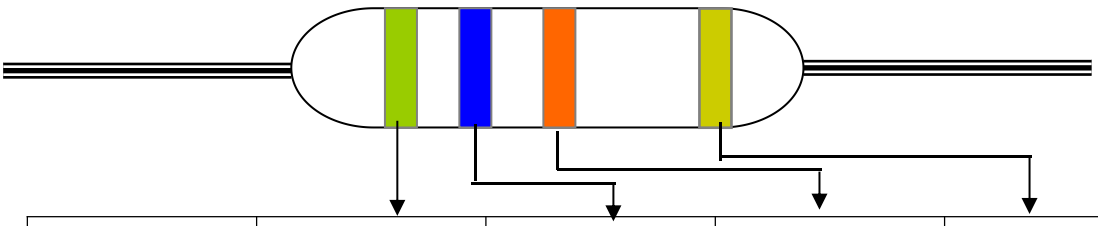
When the calculated rated voltage exceeds the Maximum usable voltage flue shown in CHART, the Maximum usable voltage is defined as the voltage According to the power-decreasing curve shown in CHART.

✱ 产品性能 Performance

| 项目<br>ITEM | 性能及验收标准<br>PERFORMANCE AND QUALIITY ACCEPTANCE | 测试方法(JIS C 5202)<br>TEST METHOD(JIS C 5202) |
|---|---|---|
| 温度系数<br>Resistance to temperature coefficient | 1. Rx ＜ 100KΩ<br>PPM/℃ ＜ ±500 PPM/℃<br>2. 100KΩ＞ Rx ＜1MΩ<br>PPM/℃ ＜ ±700PPM/℃<br>Rx ＞1MΩ<br>PPM/℃ ＜ ±1500PPM/℃ | $PPM/℃ = \frac{R - R_O}{R_O} * \frac{10^6}{T - T_0}$<br>R = Measured resistance（Ω）at T<br>T ℃ 电阻实测值（Ω）<br>Ro = Measured resistance （Ω）at To<br>To ℃ 电阻实测值（Ω）<br>T = Measured test temperature(℃)<br>测试温度的实测值<br>To = Measured base temperature( ℃)<br>基准温度的实测值 |
| 短时负荷<br>Short time overload | ≤ ±(1%R + 0. 5ohm)<br>无破损（外观正常）<br>Shall be no mechanical breakage | 2.5 倍额定电压（交流或直流），5 秒。<br>AC or DC voltage 2.5times the rated Voltage for 5 seconds . |
| 耐电压<br>Voltage endurance | 无击穿或飞弧<br>No breakdown or flashover | 将电阻放于“V”形槽内，参照表一电压，保持一分钟.<br>Place the resistor in the "V" slot and hold for one minute, as shown in Table 1. |
| 端子强度<br>Terminal strength | 内外部无损伤<br>Shall be no mechanical breakage | 施加 3.5KG 30S 的拉力<br>Pull test apply 3.5KG force to the lead in the direction of lead axis for 30±5 seconds. |
| 耐焊性<br>Heat resistively against soldering | ≤ ± (1%R + 0.5ohm)<br>无破损（外观正常）<br>Shall be no mechanical breakage | 将电阻引出端浸入 350℃ ± 10℃的锡中，深度离电阻体 3±0.05mm，时间 3.5±0.5 秒。放置一小时再测试。<br>Dip the lead in to a solder bath having a temperature of 350℃ ± 10℃ up to 3±0.05mm from the body of the resistor and hold it for 3.5±0.5seconds leave the resistor ,at room temperature 1 hours after ,then Measure. |
| 寿命试验<br>Load life test | ≤ ±(5%R + 0.1ohm)<br>无破损（外观正常）<br>Shall be no mechanical breakage | 在 70℃的环境中施加额定电压，1.5 小时通，0.5 小时断 1000 小时。<br>In the constant temperature chamber 70℃ ,apply rated voltage for 1.5 hour and shut voltage for 0.5 hour and repeat this cycle for 1000 hours, |

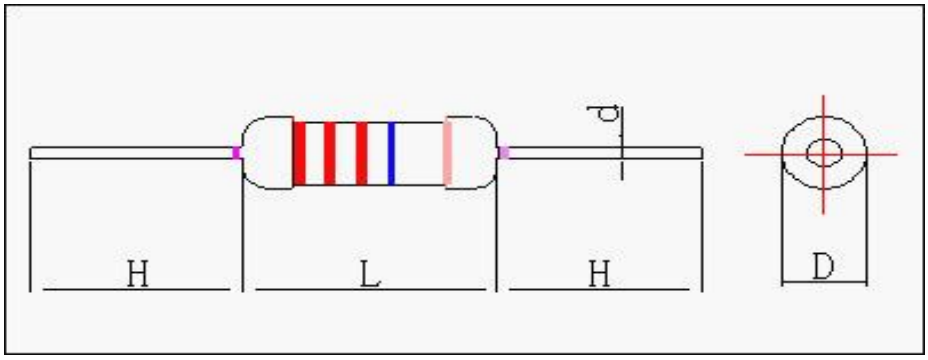
| | | |
|---|---|---|
| 上锡效果<br>Solder ability | ≥95% | 浸入 260℃±5℃的锡槽中，<br>时间 5± 0.5 秒。<br><br>Dip the lead in to a solder bath having a temperature of 260℃±5℃.<br>Time:5± 0.5seconds。 |
| 湿度负荷试验<br>Humidity load test | ≤± (5% R+ 0.1ohm)<br>无破损（外观正常）<br>Shall be no mechanical breakage | 温度在 40℃± 2℃，相对湿度 90 - 95%室内，用额定电压 1.5 小时开和关闭电压 0.5 小时，重复这个周期 1000 小时，离开 1 小时后在室温下测试。<br><br>In temperature chamber 40℃±2℃，relative humidity 90 – 95%,Apply rated voltage 1.5hour and shut voltage 0.5 hour repeat this cycle for 1000 hours, leave in room temperature for 1 hour after test, |
| 耐熔性<br>Resistance to solvent | 外观无异常，标示能清楚辩认<br>No visible damages to protective coating and marking. | 三氯乙烷浸泡 3 分钟，用刷子刷 10 次。<br>The resistor shall be completely immersed for 3 min in IPA and rubbed 10 times with the whisk. |
| 上限类别温度耐久性<br>Endurance at upper-limit temperature | ≤±(5%R+0.1Ω) | 在 125℃温度下，持续时间 1000H<br>At 125 ℃ temperature, duration of 1000h |
| 不燃性<br>Flammability | 不燃烧现象<br>No evidence of flaming | 本体用试验火焰烧 15 秒，离开 15 秒，5 次.<br>The test flame shall be applied and removed for 15 secretary respectively,and repeated cycle for 5times. |

* 标示 Marking



| Color | 1 st Band | 2 nd Band | 3 th Band | Tolerance |
|---|---|---|---|---|
| Black 黑 | 0 | 0 | $10^0$ | |
| Brown 棕 | 1 | 1 | $10^1$ | ±1%(F) |
| Red 红 | 2 | 2 | $10^2$ | ±2%(G) |
| Orange 橙 | 3 | 3 | $10^3$ | |
| Yellow 黄 | 4 | 4 | $10^4$ | |
| Green 绿 | 5 | 5 | $10^5$ | ±0.5%(D) |
| Blue 蓝 | 6 | 6 | $10^6$ | ±0.25%(C) |
| Violet 紫 | 7 | 7 | $10^7$ | ±0.1%(B) |
| Grey 灰 | 8 | 8 | $10^8$ | ±0.05%(A) |
| White 白 | 9 | 9 | $10^9$ | |
| Gold 金 | | | $10^{-1}$ | ±5%(J) |
| Silver 银 | | | $10^{-2}$ | ±10%(K) |

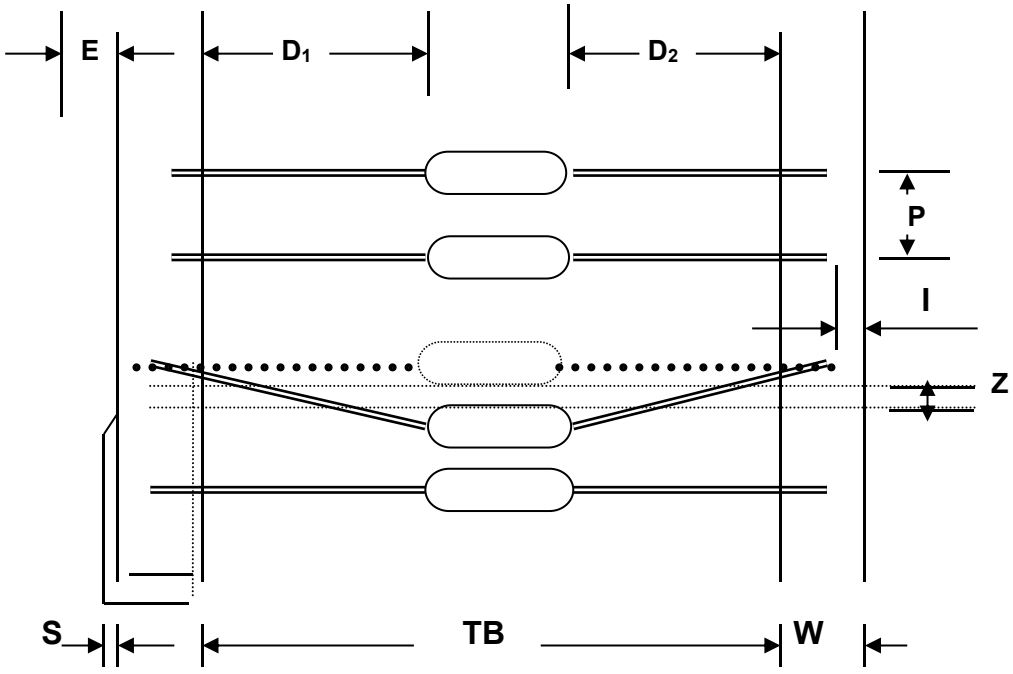
＊ B 型尺寸 Dimension（B）




**Unit:** m/m

| TYPE | | L | D | H | d | PULLING(Kg) |
|---|---|---|---|---|---|---|
| 1/4W / 1/2WS | | 6.0±0.5 | 2.3±0.3 | 27±2.0 | 0.45±0.05 | 2.5Kg-30S |
| 1/2W / 1WS | | 9.0±1.0 | 3.5±0.5 | 26±2.0 | 0.56±0.05 | 2.5Kg-30S |
| 1W / 2WS | T52 | 11.0±1.0 | 4.5±0.5 | 25±2.0 | 0.65±0.05 | 3Kg-30S |
| | T63 | 11.0±1.0 | 4.5±0.5 | 31±2.0 | 0.65±0.05 | 3Kg-30S |
| | T73 | 11.0±1.0 | 4.5±0.5 | 34±2.0 | 0.65±0.05 | 3Kg-30S |
| 2W / 3WS | T63 | 15.0±1.0 | 5.0±0.5 | 29±2.0 | 0.70±0.05 | 5Kg-30S |
| | T73 | 15.0±1.0 | 5.0±0.5 | 33±2.0 | 0.70±0.05 | 5Kg-30S |
| 3W /5WS | T63 | 17.0±1.0 | 6.0±0.5 | 27±2.0 | 0.70±0.05 | 5Kg-30S |
| | T73 | 17.0±1.0 | 6.0±0.5 | 32±2.0 | 0.70±0.05 | 5Kg-30S |
| 5W | | 24.0±1.0 | 8.0±1.0 | 28±2.0 | 0.75±0.05 | 5Kg-30S |

＊ 编带尺寸 Taping Dimension（TB）



**Unit:** m/m

| WATTS | Type | TB | P±0.5 | W±0.5 | (D1－D2) MAX | E MAX | Z MAX | S MAX | (I) MAX |
|---|---|---|---|---|---|---|---|---|---|
| 1/6W/ 1/8W 1/4WS | T 52 | 52±1.5 | 5 | 6 | 0.8 | 0 | 1.2 | 0.8 | 3.2 |
| 1/4W / 1/2WS | T 52 | 52±1.5 | 5 | 6 | 0.8 | 0 | 1.2 | 0.8 | 3.2 |
| 1/2W / 1WS | T 52 | 52±1.5 | 5 | 6 | 0.8 | 0 | 1.2 | 0.8 | 3.2 |
| 1W / 2WS | T52 | 52±1.5 | 5 | 6 | 0.8 | 0 | 1.4 | 0.8 | 3.2 |
| | T 63 | 63±1.5 | 5 | 6 | 0.8 | 0 | 1.4 | 0.8 | 3.2 |
| | T 73 | 73±1.5 | 5 | 6 | 0.8 | 0 | 1.4 | 0.8 | 3.2 |
| 2W / 3WS | T63 | 63±1.5 | 5 | 6 | 0.8 | 0 | 1.4 | 0.8 | 3.2 |
| | T 73 | 73±1.5 | 5 | 6 | 0.8 | 0 | 1.4 | 0.8 | 3.2 |
| 3W / 5WS | T 73 | 73±1.5 | 10 | 6 | 0.8 | 0 | 1.4 | 0.8 | 3.2 |
| | T63 | 63±1.5 | 5 | 6 | 0.8 | 0 | 1.4 | 0.8 | 3.2 |
| 5W | T 73 | 73±1.5 | 10 | 6 | 0.8 | 0 | 1.4 | 0.8 | 3.2 |

＊ 包装 Packing

• 标签规格 LABEL SPECIFICATION

a. TYPE、WATTS 型号、功率

b. RESISTOR VALUE AND TOLERANCE 阻值、误差

c. QUANTITY 数量

d. LOT NO. 生产批号

• 包装数量 Packing quantity

**Unit:** BOX / Kpcs

| TYPE / QTY | 1/8W | 1/4W | 1/2W | 1W | 2W | 3W | 5W |
|---|---|---|---|---|---|---|---|
| T52 | 5 | 5 | 2.5 | 1 | NA | NA | NA |
| T63 | NA | NA | NA | 1 | 1 | 0.5 | 0.25 |
| T73 | NA | NA | NA | 1 | 1 | 0.5 | 0.25 |
| B | 20 | 10 | 5 | 4 | 3 | 2 | 1 |
| F | 20 | 10 | 5 | 4 | 3 | 2 | 1 |
| M | 20 | 10 | 5 | 4 | 3 | 2 | 1 |
| MB | NA | NA | NA | 4 | 3 | 2 | 1 |
| MK | NA | NA | NA | 4 | 3 | 2 | 1 |

## ◆附加说明：
## Additional Instructions:

* 产品存放条件

Product storage conditions

a 电阻器应存放在干燥、通风的环境条件下，产品不得受阳光直接照射；

Resistor should be stored in dry and ventilated environment conditions, the product shall not be affected by direct sunlight;

b 电阻器存放环境应无酸、碱、硫化等具有腐蚀气氛的环境中；

Resistor to deposit environment should be no acid, alkali corrosion, sulfide, etc have atmosphere environment;

c 产品存储时间不得超过两年。

Product storage time may not exceed two years .

* 产品使用补充说明

Products use added

a 产品功率负荷，遵循额定功率降功耗曲线负荷；

Product power load, follow the rated power drop curve of load power consumption;

b 工作电压按额定电压计算公式计算：

Working voltage according to the rated voltage calculation formula:

$V = \sqrt{P \times R}$

式中：

V =额定电压（伏特） rated voltage （volt）

P =额定功率(瓦特) rated power (watts)

R =标称电阻值(欧姆) nominal resistance (ohms)