

1. 一般事项 General

1.1 适用范围 Scope

本规格承认书适用于精密金属膜固定电阻器。

This specification is available for Metal Film Leded Precision Resistor manufactured

1.2 质量 Quality

本电阻制造经质量管理程序，具有高信赖质量保证，且符合环境相关物质SGS测试。

The resistor is manufactured by quality-controlled process and guaranteed high reliability , it accords with SGS test of Environment related substance requirement.

1.3.1 标准规格(Standard Electrical Specifications)

MF之精密金属膜固定电阻器标准规格如表-1

The Specifications of resistor (MF series) shall be as follows:

表-1.规格说明(Table-1.Specification)

项目 Type 型号	额定功率 (W) Power Rating	工作温度 Operating temperature range	最大工作电压 Max. Operating Voltage	最大负载电压 Max. Overload Voltage	精度/电阻值范围 Resistance range					温度系数 (PPM/°C)
					±0.05%	±0.1%	±0.25%	±0.5%	±1%	
MFR1/8W	1/8W	-55 ~ +155°C	200V	400V		10Ω-1MΩ		10Ω-4.99MΩ		±15
						10Ω-1MΩ		10Ω-10MΩ		±25、±50
MFR1/4W	1/4W		250V	500V	10Ω-1M5Ω					±5、±10
					10Ω-1M5Ω		10Ω-10MΩ			±15、±25
MFR1/2W	1/2W		350V	700V	10Ω-1MΩ					±5、±10
					10Ω-1MΩ		10Ω-10MΩ			±15、±25
MFR1W	1W		450V	1,000V	-	10Ω-1MΩ				±5、±10
						10Ω-1MΩ		10Ω-4.99MΩ		±15
						10Ω-1MΩ		10Ω-10MΩ		±25、±50
MFR2W	2W		500V	1,000V	-	10Ω-1MΩ		10Ω-4.99MΩ		±15
						10Ω-1MΩ		10Ω-10MΩ		±25、±50

1.3.2 高功率标准规格(High Power Rating Electrical Specifications)

项目 型号	额定功率 (W) Power Rating	工作温度 Operating temperature range	最大工作电压 Max. Operating Voltage	最大负载电压 Max. Overload Voltage	精度/电阻值范围 Resistance range					温度系数 (PPM/°C)
					±0.05%	±0.1%	±0.25%	±0.5%	±1%	
MFR1/4WS	1/4WS	-55 ~ +155°C	200V	400V	-	10Ω – 1MΩ		10Ω – 4.99MΩ		±15
						10Ω – 1MΩ		10Ω – 10MΩ		±25、±50
MFR1/2WS	1/2WS	-55 ~ +155°C	300V	600V	10Ω – 1M5Ω					±5、±10
					10Ω – 1M5Ω			10Ω – 10MΩ		±15、±25

项目 型号	额定功率(W) Power Rating	工作温度 Operating temperature range	最大工作电压 Max. Operating Voltage	最大负载电压 Max. Overload Voltage	精度/电阻值范围 Resistance range					温度系数 (PPM/°C)
					±0.05%	±0.1%	±0.25%	±0.5%	±1%	
MFR1WS	1WS	-55 ~ +155°C	400V	800V	10Ω – 1MΩ					± 5、±10
					10Ω – 1MΩ		10Ω – 10MΩ			±15、±25
MFR2WS	2WS	-55 ~ +155°C	500V	1000V	-	10Ω – 1MΩ				± 5、±10
						10Ω – 1MΩ		10Ω – 4.99MΩ		±15
						10Ω – 1MΩ		10Ω – 10MΩ		±25、±50
MFR3WS	3WS	-55 ~ +155°C	500V	1000V	-	10Ω – 1MΩ		10Ω – 4.99MΩ		±15
						10Ω – 1MΩ		10Ω – 10MΩ		±25、±50

1.4 编号定义 (例) Part Numbering (Example)

依规格、精度、包装类型、温度系数、功率、阻值而区别，其构造如下：

The type designation shall be in the following form and as specified.

MFR	1WS		B		A		C		R		0200	
产品类型 Type	规格(L*D) Dimensions		精度 Resistance tolerance		包装类型 Packing Code		温度系数 TCR(PPM/°C)		功率 Power Rating		阻值 Resistance value	
	1/8W	3.3*1.8	A	±0.05%	A	Taping& Ammo	S	±5ppm/°C	F	1/8W	0010	1Ω
	1/4WS								FS	1/8WS		
	1/4W	6.3*2.3	B	±0.1%	B	Bulk	B	±10ppm/°C	S	2W	1000	100Ω
	1/2WS								SS	2WS		
	1/2W	9.0*3.2	C	±0.25%	T	Taping& Reel	N	±15ppm/°C	T	1W	2201	2K2Ω
	1WS								TS	1WS		
	1W	11.5*4.5	D	±0.5%			C	±25ppm/°C	U	1/2W	1001	1KΩ
	2WS								US	1/2WS		
	2W	15.5*5.0	F	±1%			D	±50ppm/°C	V	1/4W	1002	10KΩ
	3WS								VS	1/4WS		
							E	±100ppm/°C			1003	100KΩ
											1004	1MΩ

1.5 降功率曲线(Derating Curve)

额定功率(Rated Power)在周围温度70℃可连续负载最大电力；但周围温度如超过70℃时之额定功率则依图-1的降功率曲线实施。

Rated power is maximum power which can be continuously loaded at specified ambient temperature 70℃, however when the ambient temperature exceeds 70℃, rated power should be determined from the derating curve of Fig.1.

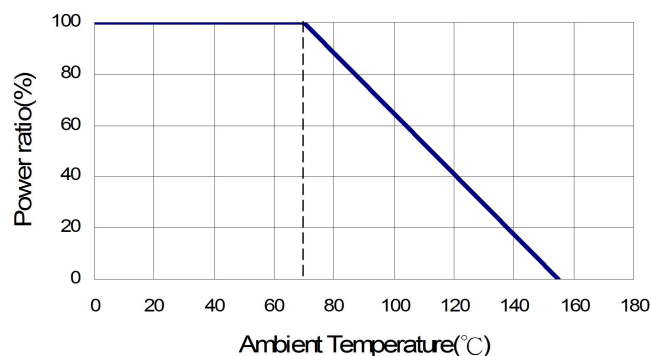


图-1(Fig.1)

1.6 额定电压 (Rated Voltage)

额定电压系指对应于额定功率的直流或交流产生的电压，由下式求得。

The rated voltage shall be the D.C. or A.C. (R.M.S. at power frequency) voltage which corresponds the rated power and the value of which is calculated from the formula below.

$$E = \sqrt{P \cdot R}$$

Where E: 额定电压 Rated voltage (V)

P: 额定功率 Rated power (W)

R: 阻值 Resistance (Ω)

2. 构造 Construction

2.1 外形尺寸 External Dimensions

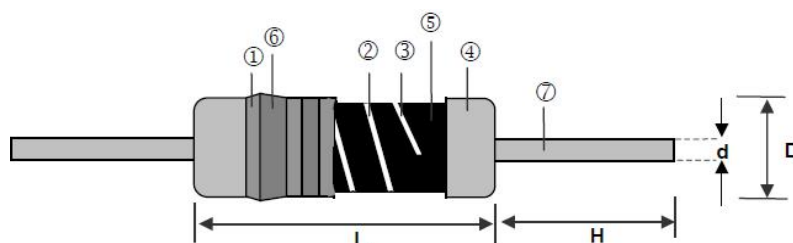
参照本规格承认书的「5. 外形尺寸」。

The dimensions shall be satisfied with 「5. External dimensions」.

2.2 构造图 Structure Diagram

MF系列之精密金属膜固定电阻器系按下表的材料而构成：

The construction of resistor (MF series) shall be as follows:



号码 No.	构造名称 Item	内 容 aterial
1	金属底漆 (环氧树脂) Insulation Coating (Epoxy resin)	本厂所生产之金属膜固定电阻器皆为环氧树脂涂料涂装。 All of our metal film Resistors are Epoxy resin coating.
2	切割线 Trimming Line	雷射切割 Laser cutting
3	金属膜(镍铬合金) Ceramic Core(Alumina ceramic)	电阻体的成份系使用具耐热性之镍铬合金薄膜。 The resistor element consists of heat resistant film of nickel alloy.
4	镀锡铁帽 Electrode Cap	镀锡铁帽。 Tinned iron cap.
5	磁棒(氧化铝陶瓷) Resistor Layer (Nickel alloy)	使用高含铝量的瓷器棒。(氧化铝陶瓷) High alumina ceramic is used.
6	标示(环氧树脂) Indication (Epoxy)	色码。 Color code.
7	镀铜线 Lead Wire (Tinned annealed copper wire)	焊锡或镀锡的软铜线。 Soldered or tinned annealed copper wire.

2.3 镀锡铁帽 Terminal Caps

镀锡铁帽须确实地连接于电阻体上。

The caps shall be securely connected with the resistor.

2.4 涂装 Painting

本体必须依照规格承认书之规定以绝缘涂料绝缘之。

Coating in accordance with specification insulates the body.

2.5 外装色泽 Resistor Body Color

蓝色 Blue

2.6 标示 Indication

参照本规格书的「4. 标示」。

The indication shall be satisfied with 「4. Indication」.

3. 特性 Characteristics

3.1 检验项目与方法 Environmental Characteristics

表-3.特性表 (Table-3.Characteristics)

项目 Item	基本要求 Requirement	试验方法 Test methods
温度系数 Temperature coefficient	±25PPM/°C ±15PPM/°C ±10PPM/°C ±5 PPM/°C	$\frac{R_1 - R_0}{R_0(T_1 - T_0)} \times 10^6 \text{ (PPM/°C)}$ $R_0(T_1 - T_0)$ R_0 : 室温(T_0)所测量之电阻值。 R_1 : 室温+100°C(T_1)后所测量之电阻值。 R_0 : Resistance value at room temp. (T_0). R_1 : Resistance value at room temp. plus 100°C (T_1).
短时间过负荷 Short time Overload	±0.25%	2.5倍额定电压5秒钟 RCWV*2.5 Max. overload voltage for 5 seconds
绝缘抵抗 Insulation Resistance	>1,000MΩ	施加100V _{DC} 维持1分钟 Apply 100V _{DC} for 1 minute.
长效性测试 Endurance	±0.2%	70±2°C 在工作电压下维持1,000 个小时 (1.5小时 “ON” 0.5小时“OFF”) 70±2°C, Max. working voltage for 1,000 hrs with 1.5 hrs “ON” and 0.5 hrs “OFF”
耐湿性测试 Damp Heat with Load	±0.3%	40±2°C 湿度 90~95% R.H. 在工作电压下维持1,000 个小时 (1.5小时 “ON” 0.5小时“OFF”) 40±2°C, 90~95% R.H. Max. working voltage for 1000 hrs with 1.5 hrs “ON” and 0.5 hrs “OFF”
焊接附着性 Solderability	至少95%以上覆盖新锡 95% min. Coverage	245±5°C 下持续3±0.5秒 245±5°C for 3±0.5 seconds.
抗电压 Dielectric Withstanding Voltage	By Type	施加个别规定之交流电压 60 秒 Apply Max. Overload Voltage for 1 minute
脉冲电压 Pulse Overload	±0.75%	4 倍额定电压脉冲循环 10000 次(1 秒“ON”25 秒钟“OFF”) 4 times RCWV for 10000 cycles with 1sec “ON” and 25 sec “OFF”
耐溶剂性 Resistance To Solvent	Coatings保持完整 No deterioration of coatings and markings	放入清洗溶剂之超音波机内, 保持1分钟 Trichroethane for 1 min. with ultrasonic
引线强度 Terminal Strength	拉力Tensile: ≥2.5kg	拉力强度: 25N(2.5Kgf),保持10秒 Direct Load for 10 sec. In the direction off the terminal leads
稳定度测试 Shelf life	ΔR=±0.1%	最高 25±3°C, 80%RH 室温下维持 12 个月 . 12 months at room temperature 25±3°C, 80%RH Max.

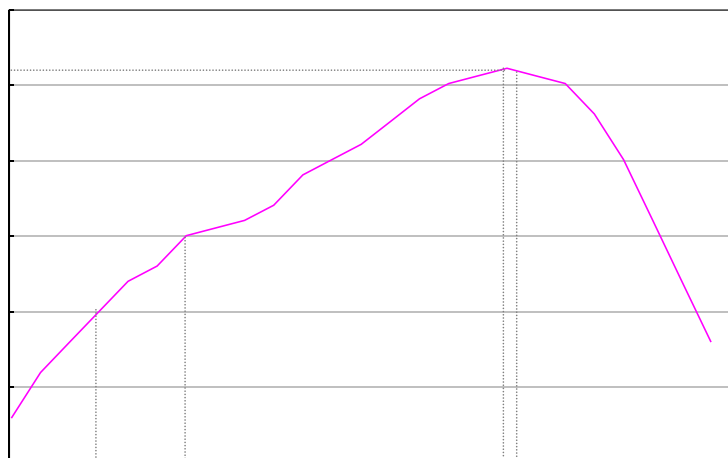
※检验标准 Reference Standards: MIL-STD-202, JIS-C 5201-1

※室温控制 Storage Temperature: 25±3°C; 湿度 < 80%RH

3.2 耐焊锡温度曲线(Lead-Free)

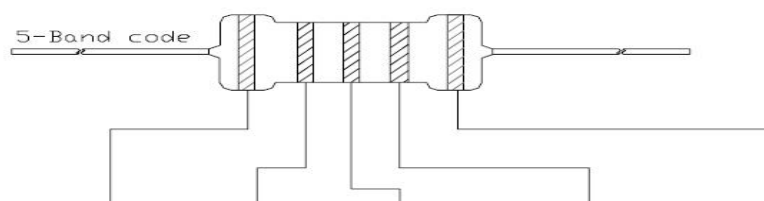
1.耐焊锡温度：260℃ / 5sec.

2.焊接附着性测试：245±5℃ 下/ 5sec. 95%



4. 标示 Indication

色码 Color Code



颜色 Color	第1个数字 1st Figure	第2个数字 2nd Figure	第3个数字 3rd Figure	倍率 Multiplier	误差率 Tolerance
黑 Black	0	0	0	10^0	
棕 Brown	1	1	1	10^1	±1%
红 Red	2	2	2	10^2	±2%
橙 Orange	3	3	3	10^3	
黄 Yellow	4	4	4	10^4	
绿 Green	5	5	5	10^5	±0.5%
蓝 Blue	6	6	6	10^6	±0.25%
紫 Violet	7	7	7	10^7	±0.1%
灰 Gray	8	8	8	10^8	±0.05%
白 White	9	9	9	10^9	
金 Gold				10^{-1}	
银 Silver				10^{-2}	
无 Plain					

5. 外形尺寸 External Dimensions

5.1 尺寸

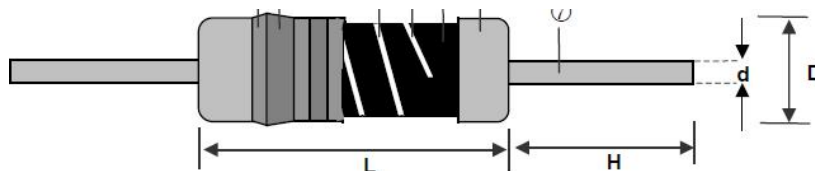


表-5.尺寸说明(Table-5. Dimensions)

种类 Type	尺寸 Dimensions (单位: mm)			
	L	D	H	d
MFR 1/8W 1/4WS	3.3±0.5	1.8±0.3	29±2.0	0.45±0.03
MFR 1/4W 1/2WS	6.3±0.5	2.3±0.3	28±2.0	0.55±0.03
MFR 1/2WS 1WS	9.0±0.5	3.2±0.5	26±2.0	0.60±0.03
MFR1W 2WS	11.5±1.0	4.5±0.5	35±2.0	0.78±0.03
MFR2W 3WS	15.5±1.0	5.0±0.5	32±2.0	0.78±0.03

5.2 贴带/包装规格 Taping/Packing Specification

标准型Standard Type

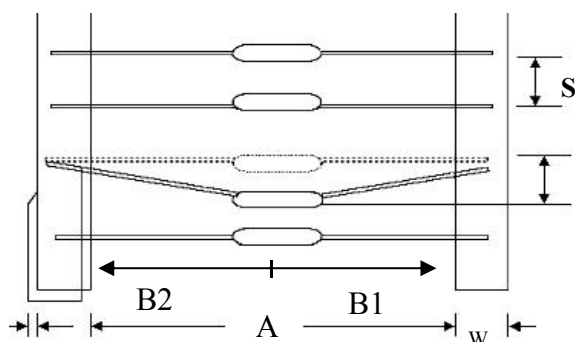


表-6.盒装包装说明 (Table-6. Reel/Ammo packing Dimensions)

单位(Unit):mm

型号 Codes	包装 Packing	标准尺寸 Dimensions				Ammo 包装
		A	B1-B2 Max	S±0.5	W±0.5	MF Qty
MFR 1/8W 1/4WS		52±1	1.2	5	6	5,000
MFR 1/4W 1/2WS		52±1	1.2	5	6	5,000
MFR 1/2WS 1WS		52±1	1.2	5	6	1,000
MFR1W 2WS		73±1	1.5	5	6	1,000
MFR2W 3WS		73±1	1.5	10	6	1,000