FOSAN TECHNOLOGY 富捷科技

Product Datasheet
产品规格说明书

FCM Series
Bare Chip High Power Alloy Resistors
裸片高功率合金电阻

安徽省富捷电子科技有限公司
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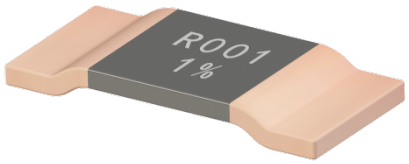


■ 特点 (Features)

- 电子束焊接工艺 - Electron beam welding process
- 低热电动势 - Low thermal electromotive force
- 用于电流检测的低电流，高精度电阻 - Low Resistance and High Accuracy Resistor for Current Detection
- 低电感 - Low inductance
- 低温度系数 - Low temperature coefficient
- 无铅，符合 RoHS、Reach 要求 - Pb-free to Meet RoHS、Reach Requirements
- 符合 AEC-Q200 可靠性测试 - Complies with AEC-Q200 reliability test
- 特殊规格可定制 - Special specifications can be customized

■ 应用 (Application)

- DC-DC 转换器，电池组，充电，适配器 - DC-DC Converter , Battery Pack, Charge, Adaptor
- 工业仪器设备 - Industrial instruments and equipment
- 自动化控制电源 - Automation Control Power Supply
- 变频驱动与伺服驱动系统 - Variable frequency drives and servo drive systems
- 电流检测 - Current sensing
- 电源管理系统 - Power Management Applications
- 汽车电子控制系统 - Automotive electronic control system

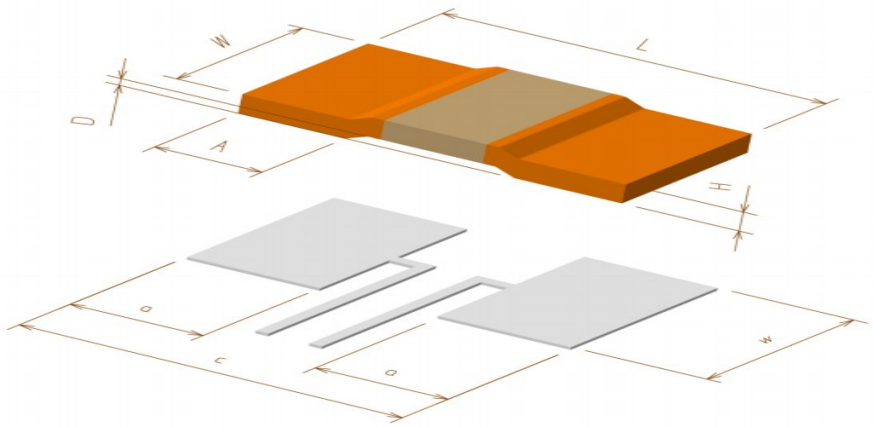
■ 产品料号 (Parts Number Explanation)

示例：FCM39207WFR001RM

FCM 系列	3920 型别	7W 功率	F 公差	R001 字码	R 包装别	M 材质	特殊型
FOSAN Type	2512 3920 5930	3W:3W 7W:7W 15W:15W	D:±0.5% F:±1% G:±2% J:±5%	R001=1mΩ 0M50=0.5mΩ	T: 7 inch reel R:13 inch reel B:Bulk	M: Metal	Blank: none
Type code	Size	Power	Tolerance	Resistance	Packaging	Termination	Special Case

▪ 尺寸 (Dimension)

产品尺寸与焊盘尺寸 Product Dimension & Pad Dimension



单位 (unit) : mm

型别 Type	阻值 Resistance (mΩ)	材质 Element Material	焊盘尺寸 Pad Dimension			产品尺寸 Product Dimension				
			c	w	a	L	W	A	D	H (±0.1)
2512	0.2	CuMnSn	7	3.4	1.8	6.3±0.2	3.1±0.3	1.2±0.2	0.5±0.1	1.40
	0.3	CuMnSn								0.90
	0.3	CuMn								1.50
	0.5	CuMn								0.93
	1.0	CuMn								0.45
	1.5	Karma/FeCrAl								0.86
	2.0	Karma/FeCrAl								0.65
	2.5	Karma/FeCrAl								0.50
	3.0	Karma/FeCrAl								0.43
	4.0	Karma/FeCrAl								0.31
	5.0	Karma/FeCrAl								0.28
3920	0.2	CuMn	11	6.2	2.7	10±0.2	5.1±0.4	2.2±0.2	0.5±0.1	1.64
	0.3	CuMn								1.37
	0.4	CuMn								0.97
	0.5	CuMn								0.83
	0.7	CuMn								0.55
	1	CuMn								0.40
	1	Karma/FeCrAl								1.16
	1.5	Karma/FeCrAl								0.75
	2.0	Karma/FeCrAl								0.56
	2.5	Karma/FeCrAl								0.47
	3.0	Karma/FeCrAl								0.37

	4.0	Karma/FeCrAl								0.28
	5.0	Karma/FeCrAl								0.28
5930	0.1	CuMnSn	16	8.8	5.2	15±0.3	7.6±0.4	4.2±0.3	0.5±0.1	2.00
	0.2	CuMn								1.50
	0.3	CuMn								0.80
	0.5	CuMn								0.60
	1.0	Karma/FeCrAl								0.86
	1.5	Karma/FeCrAl								0.61
	2.0	Karma/FeCrAl								0.40
	2.5	Karma/FeCrAl								0.34
	3.0	Karma/FeCrAl								0.29

▪ 电气特性 (Electrical characteristics)

型别 Type	阻值 Resistance (mΩ)	材质 Element Material	T.C.R. (PPM/℃)	额定功率 Power Rating at P70 (W)	精度 Tolerance (%)	使用温度范围 Operating Temperature (°C)
2512	0.2	CuMnSn	±175	6	±0.5%、±1%、±2%、±5%	-55~170
	0.3	CuMnSn	±175	6		
	0.3	CuMn	±175	6		
	0.5	CuMn	±120	6		
	1.0	CuMn	±100	5		
	1.5	Karma/FeCrAl	±50	6		
	2.0	Karma/FeCrAl	±50	5		
	2.5	Karma/FeCrAl	±50	4		
	3.0	Karma/FeCrAl	±50	4		
	4.0	Karma/FeCrAl	±50	3		
	5.0	Karma/FeCrAl	±50	3		
3920	0.2	CuMn	±200	12		
	0.3	CuMn	±150	10		
	0.4	CuMn	±100	9		
	0.5	CuMn	±70	9		
	0.7	CuMn	±70	8		
	1	CuMn	±70	7		
	1	Karma/FeCrAl	±50	8		
	1.5	Karma/FeCrAl	±50	6		
	2.0	Karma/FeCrAl	±50	6		

	2.5	Karma/FeCrAl	±50	5		
	3.0	Karma/FeCrAl	±50	5		
	4.0	Karma/FeCrAl	±50	5		
	5.0	Karma/FeCrAl	±50	4		
5930	0.1	CuMnSn	±200	15	±0.5%、±1%、±2%、±5%	-55~170
	0.2	CuMn	±100	15		
	0.3	CuMn	±75	10		
	0.5	CuMn	±75	10		
	1.0	Karma/FeCrAl	±50	9		
	1.5	Karma/FeCrAl	±50	8		
	2.0	Karma/FeCrAl	±50	7		
	2.5	Karma/FeCrAl	±50	7		
	3.0	Karma/FeCrAl	±50	7		

如有非标准品的需求,请联系我们的业务部门 For non-standard parts, please contact our sales dept.

▪ 印字标识（Marking）

The resistance value of the product is expressed in two ways:

a. The decimal point of Ω is indicated by the character "R".

b. Using "m" to indicate the decimal point of mΩ.

E.g.,

R001 1%=1mΩ 1%;

0m50 1%=0.5mΩ 1%; 2m50 1%=2.5mΩ 1%

产品阻值使用两种方式表示:

a. 以“R”字指示 Ω 的小数点的位置

b. 以“m”字指示 mΩ 的小数点的位置

例:

R001 1%=1mΩ 1%;

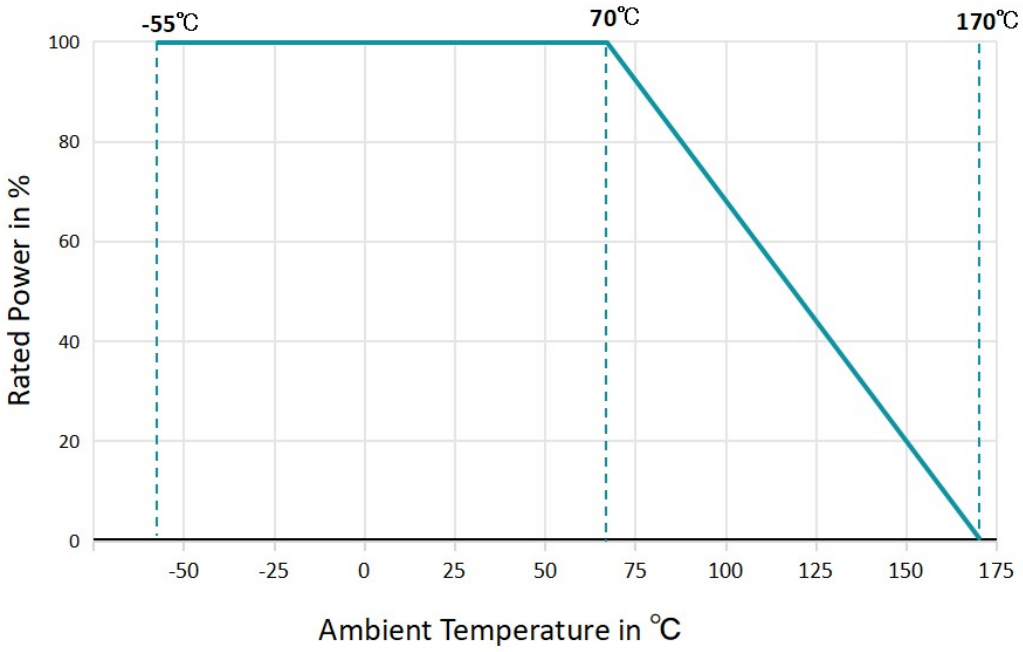
0m50 1%=0.5mΩ 1%; 2m50 1%=2.5mΩ 1%

▪ 性能（Performance）

Test Items 测试项目	Reference 依据标准	Conditions of Test 测试条件	Test Limits 测试结果
Temperature Coefficient of Resistance 温度系数	AEC-Q200 TEST 19 IEC 60115-1 4.8	Measuring points 25°C and +125°C, reference point +25°C 测量点 25℃和+125°C，参考点+25°C	见图表
High Temperature Exposure (Storage) 高温存储	AEC-Q200-REV D-Test 3 MIL-STD202 Method 108	T=170℃,1000hrs, Measurement at 24hrs after test conclusion. 170℃，1000 小时，测试结束后 24 小时测量。	▵R≤±1%
Low Temperature Exposure (Storage) 低温存储	IEC60115-1 4.25	T=-55°C, 1000 hours，Measurement at 24hrs after test conclusion. -55°C，1000 小时，测试结束后 24 小时测量。	▵R≤±0.5%
Temperature Cycling	AEC-Q200-REV	1000 Cycle (-55°C to 125°C) Measurement at 24hrs	▵R≤±0.5%

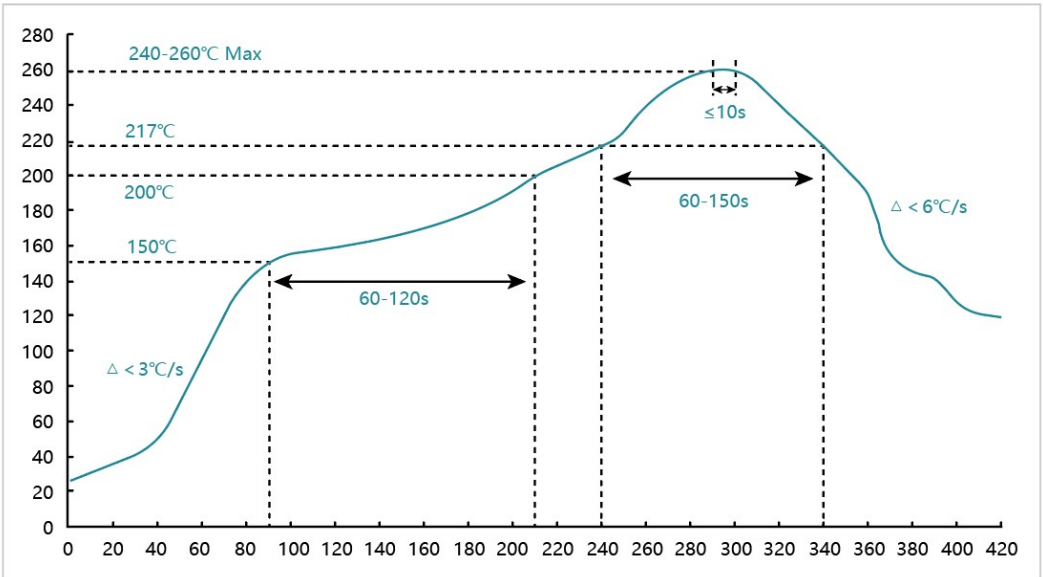
温度循环	D-Test 4 JESD22 Method JA-104	after test conclusion. 1000 次循环（-55℃至 125℃）测试结束后 24 小时进行测量。	
Short time overload 短时过载	IEC60115-1 4.13	5 X rated power for 5s 5 倍额定功率,5 秒	▵R≤±0.5%
Moisture Resistance 耐湿性	AEC-Q200-REV D-Test 6 MIL-STD-202 Method 106	T=24 hours / Cycle ,10 Cycles. Notes: Steps 7a& 7b not required. 施加 T=24 小时/周期,零功率,方法中 7a 和 7b 不做要求	▵R≤±1%
Biased Humidity 高温高湿	AEC-Q200-REV D-Test 7 MIL-STD-202 Method 103	10% Rated power at 85℃, RH:85%, 1000Hrs,Measurement at 24hrs after test conclusion. 10%额定功率，85℃，相对湿度：85%，1000 小时，测试结束后 24 小时测量。	▵R≤±0.5%
Load Life 负载寿命	AEC-Q200-REV D-Test 8 MIL-STD-202 Method 108	1000 h at +70 °C, 1.5 h “ON”, 0.5 h “OFF”, Measurement at 24hrs after test conclusion. 1000 小时，+70 °C，1.5 小时"开启"，0.5 小时"关闭"，测试结束后 24 小时测量。	▵R≤±1%
Resistance to Solvents 耐溶剂性	AEC-Q200-REV D-Test 12 MIL-STD-202 Method 215	Dip in solvent for 3 minutes and wipe 10 times, three cycles of three solvents, rinse and dry at room temperature. 浸入溶剂三分钟后擦十次，三种溶剂三个循环，清洗后室温干燥	Markings are clear, no visible damage 标志清晰，无可见损伤
Resistance to Soldering Heat 耐焊接热	AEC-Q200-REV D-Test 15 MIL-STD-202 Method 210	T=260±5℃ solder,10±1 sec dwell 260±5℃焊接，停留 10±1 秒。	▵R≤±0.5%
Mechanical Shock 机械冲击	AEC-Q200-REV D-Test 13 MIL-STD-202 Method 213	100g's, Normal duration is 6ms, half sine shock pulse 正半弦波,峰值加速度 100g's,脉冲持续 6ms,三轴六向各 3 次。	▵R≤±0.5%
Resistance to vibration 抗震性	AEC-Q200-REV D-Test 14 MIL-STD-202 Method 204	5g's for 20min.12cycles, 10-2000Hz 10-2000Hz,5g's，20 分钟一个循环,X.Y.Z 三个方向各 12 个循环	▵R≤±0.5%
Board Flex 板弯曲试验	AEC-Q200-REV D-Test 21 AEC-Q200-005	Min 2mm deflection ,60sec. 2mm,保持时间 60s	▵R≤±0.5%
Thermal Shock 冷热冲击	AEC-Q200-REV D-Test 16 MIL-STD-202 Method 107	-55°C/+155°C. Note: Number of cycles required-1000, Maximum transfer time-20 seconds, Dwell time-15 minutes. -55℃,15 分钟~常温<20 秒~+155℃,15 分钟,1000 个循环	▵R≤±1%
Solderability 可焊性	AEC-Q200-REV D-Test 18 J-STD-002	Dip the terminal in a flux and then dip into a soldering bath at 245±5℃ for3±0.5sec 沾助焊剂后浸入锡炉，锡炉温度 245±5℃，时间 3±0.5 秒。	> 95% area covered >95%面积上锡

■ 功率衰减曲线 (Derating Curve)

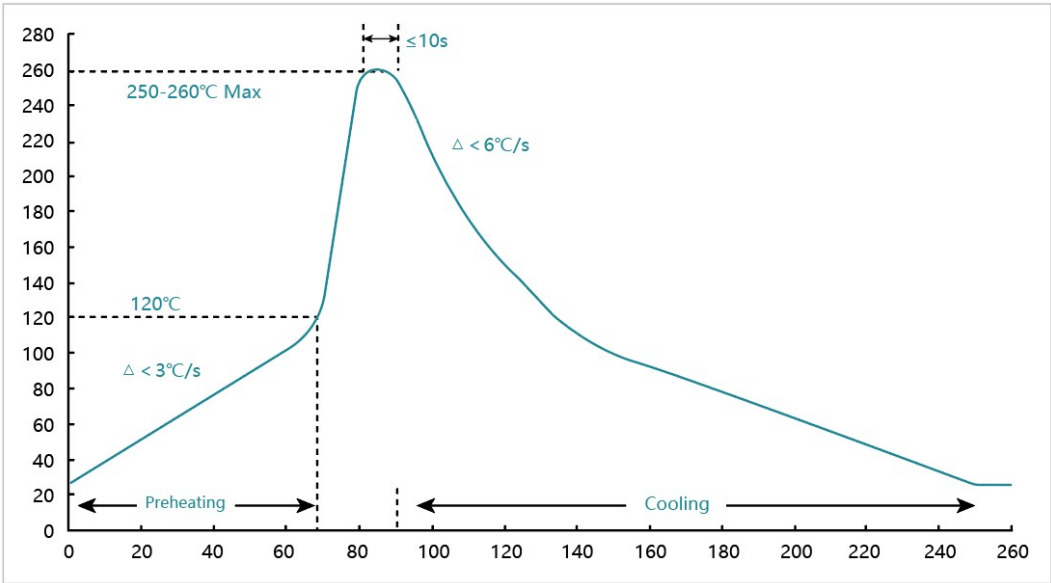


■ 焊接 (soldering)

- 建议回流焊曲线（Recommend reflow soldering profile）



- 建议波峰焊曲线（Recommend wave soldering profile)

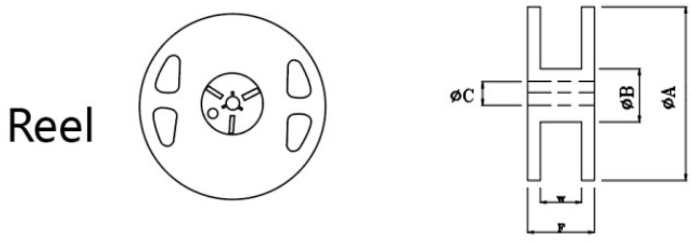


- 手工焊温度（hand soldering temperature)

烙铁温度 350±10℃ 3 秒之内，避免烙铁接触电阻本体

The iron temperature is 350±10℃, hand soldering time less than 3S. Avoid solder iron tip direct touch the components body

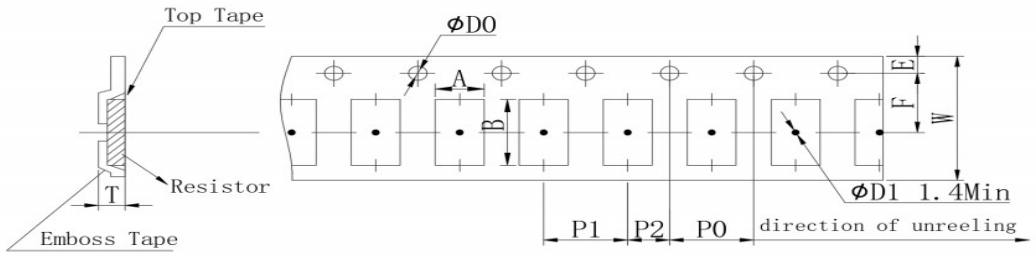
■ 包装规格 (Tapping Specification)



-卷盘尺寸（Reel dimension)

Type	Size		Unit	φA	φB	φC	F	W
2512	7”	4K/Reel	mm	178±2.0	60.0±1.0	13.5±1.0	15.4±2.0	12.5±0.2
3920	13”	2K/Reel	mm	330±2.0	100±1.0	13.5±1.0	29±2.0	24.5±0.2
5930	13”	2K/Reel	mm	330±2.0	100±1.0	13.5±1.0	29±2.0	24.5±0.2

-包装尺寸（packing dimension）



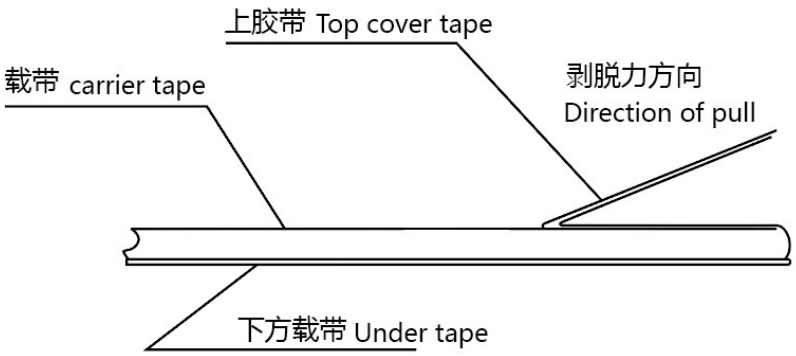
Unit: mm

Size	A±0.2	B±0.2	W±0.2	E±0.1	F±0.1	P0±0.1	P1±0.1	P2±01	φD0	T
2512	3.5	6.8	16	1.75	7.5	4.0	8.0	2.0	1.5	1.8
3920	5.8	10.5	24	1.75	11.5	4.0	12	2.0	1.5	2.5
5930	8.6	16.1	24	1.75	11.5	4.0	12	4.0	1.5	2.5

▪ 上胶带剥离力测试（Peel force of top cover tape）

上胶带以 200mm/分钟的速度，沿 165∽180 度角的方向进行剥离，如下图所示。纸带的剥离力范为 10g∽70g;
载带的剥离力范围 30∽100g。

The top cover tape is pulled at a speed of 200 mm/min with the angle between the tape during peel and the direction of unreeling maintained at 165 to 180 degree as following picture. The peel force of paper carrier tape shall be 0.1N to 0.7N(10 to 70 g), the peel force of plastic carrier tape shall be 0.3N to 1N (30 to 100 g)



▪ 合金电阻器使用说明（Alloy Resistor Instructions for use）

本产品在以下特殊环境下应用，性能可能会受到影响：
（Application of the products in a special environment can deteriorate product performance）：

1. 高温；
   High temperature
2. 有海风或腐蚀性气体，包括氯气，硫化氢，氨气，二氧化硫，二氧化氮等；
   Near the sea ,or corrosive gas, such as Cl_2,H_2S,NH_3,SO_2,and NO_2,etc;
3. 各种类型的液体，包括水，油，化学品，有机溶剂的使用；
   Unverified liquids, such as water,oil,chenical or organic solvent;
4. 在用树脂或其他涂层材料密封产品的情况下使用；
   Unverified resin or paint to cover products;
5. 焊接后使用不洁焊剂或使用水或水溶性清洁剂清洗产品
   Products should be washed with soluble cheaner even if non cleaning flux.

- **储存 / 搬运条件**（Storage / Carry conditions）

1. 储存温度 25±5℃　　Temperature：25±5℃
2. 湿度 30~70%RH　　Humidity：30~70%RH
3. 储存期限：先进先出，2 年　　Storage life：2years FIFO
4. 存放和搬运时，请保持盒子的正确方向。严禁跌落在箱体上，否则可能损坏产品电极或本体
   Please hold box correct orientation when storing and carrying.It is strictly prohibited to fall on the box. otherwise the product electrode or body may be damaged.

修订履历（Revision History）

版本 Version	修订日期 Revision Date	修订内容 Revision Description	版本确认 Version Checked
FJ-JS-3001-V1.0	2024.12.01	原版 The original version	罗国涛 Guotao Luo